

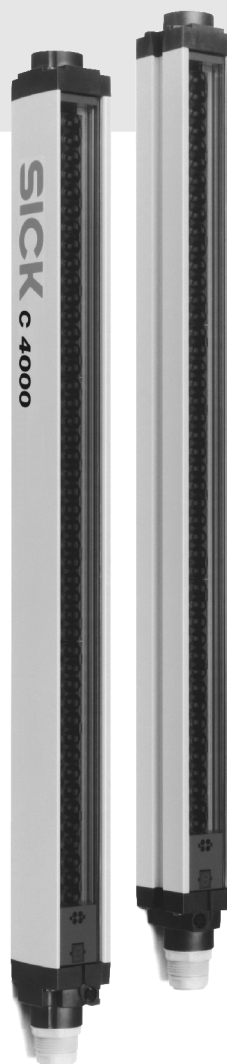
## OPERATING INSTRUCTIONS

### C4000 Standard and C4000 Advanced



#### Safety Light Curtain

GB



**SICK**  
Sensor Intelligence.

This document is protected by the law of copyright, whereby all rights established therein remain with the company SICK AG. Reproduction of this document or parts of this document is only permissible within the limits of the legal determination of Copyright Law. Alteration or abridgement of the document is not permitted without the explicit written approval of the company SICK AG.



# List of contents

## List of contents

|          |                                                       |           |
|----------|-------------------------------------------------------|-----------|
| <b>1</b> | <b>About this document.....</b>                       | <b>7</b>  |
| 1.1      | Function of this document.....                        | 7         |
| 1.2      | Target group .....                                    | 7         |
| 1.3      | Scope .....                                           | 7         |
| 1.4      | Depth of information.....                             | 7         |
| 1.5      | Abbreviations.....                                    | 8         |
| 1.6      | Symbols used .....                                    | 8         |
| <b>2</b> | <b>On safety.....</b>                                 | <b>10</b> |
| 2.1      | Qualified safety personnel.....                       | 10        |
| 2.2      | Applications of the device.....                       | 11        |
| 2.3      | Correct use .....                                     | 11        |
| 2.4      | General protective notes and protective measures..... | 12        |
| 2.5      | Protection of the environment.....                    | 12        |
| <b>3</b> | <b>Product description .....</b>                      | <b>13</b> |
| 3.1      | Special features .....                                | 13        |
| 3.2      | Operating principle of the device .....               | 14        |
| 3.2.1    | Components of the device.....                         | 14        |
| 3.2.2    | The light curtain principle .....                     | 14        |
| 3.2.3    | Cascading.....                                        | 15        |
| 3.2.4    | Device variants.....                                  | 15        |
| 3.3      | Examples of range of use .....                        | 17        |
| 3.4      | Status indicators .....                               | 18        |
| 3.4.1    | Status indicators of the sender .....                 | 18        |
| 3.4.2    | Status indicators of the receiver .....               | 19        |
| <b>4</b> | <b>Configurable functions .....</b>                   | <b>20</b> |
| 4.1      | Restart interlock.....                                | 20        |
| 4.2      | External device monitoring (EDM).....                 | 22        |
| 4.3      | Emergency stop.....                                   | 23        |
| 4.4      | Bypass .....                                          | 24        |
| 4.5      | Signal output (ADO).....                              | 25        |
| 4.6      | Beam coding.....                                      | 25        |
| 4.7      | Scanning range .....                                  | 26        |
| 4.8      | Blanking.....                                         | 27        |
| 4.8.1    | Fixed blanking .....                                  | 29        |
| 4.8.2    | Floating blanking.....                                | 31        |
| 4.8.3    | Effective resolution for blanking .....               | 33        |
| 4.8.4    | Teach-in of blanked areas .....                       | 35        |
| 4.9      | Reduced resolution.....                               | 36        |
| 4.10     | Sender test .....                                     | 38        |
| 4.11     | Functions that cannot be combined .....               | 39        |

|          |                                                                                    |           |
|----------|------------------------------------------------------------------------------------|-----------|
| <b>5</b> | <b>Installation and mounting.....</b>                                              | <b>40</b> |
| 5.1      | Determining the minimum distance.....                                              | 40        |
| 5.1.1    | Minimum distance from the hazardous point.....                                     | 40        |
| 5.1.2    | Minimum distance to reflective surfaces.....                                       | 43        |
| 5.2      | Steps for mounting the device.....                                                 | 44        |
| 5.2.1    | Mounting with swivel mount bracket.....                                            | 45        |
| 5.2.2    | Mounting with side bracket.....                                                    | 47        |
| 5.2.3    | Mounting the C4000 Guest with side bracket.....                                    | 49        |
| 5.2.4    | Mounting the C4000 Guest with swivel mount bracket Guest.....                      | 50        |
| <b>6</b> | <b>Electrical installation .....</b>                                               | <b>51</b> |
| 6.1      | System connection M26 × 11 + FE.....                                               | 52        |
| 6.2      | Configuration connection M8 × 4 (serial interface).....                            | 53        |
| 6.3      | Extension connection M26 × 11 + FE.....                                            | 54        |
| 6.4      | Extension connection M12 × 7 + FE .....                                            | 55        |
| 6.5      | System connection C4000 Guest (M12 × 7 + FE) .....                                 | 56        |
| 6.6      | External device monitoring (EDM) .....                                             | 57        |
| 6.7      | Reset button .....                                                                 | 58        |
| 6.8      | Teach-in key-operated switch .....                                                 | 59        |
| 6.9      | Emergency stop .....                                                               | 60        |
| 6.10     | Key-operated pushbutton for bypass .....                                           | 61        |
| 6.11     | Signal output (ADO) .....                                                          | 61        |
| 6.12     | Test input (sender test) .....                                                     | 62        |
| 6.13     | sens:Control applications.....                                                     | 62        |
| <b>7</b> | <b>Commissioning.....</b>                                                          | <b>63</b> |
| 7.1      | Display sequence during power-up.....                                              | 63        |
| 7.2      | Aligning sender and receiver.....                                                  | 63        |
| 7.3      | Test notes.....                                                                    | 64        |
| 7.3.1    | Tests before the first commissioning .....                                         | 64        |
| 7.3.2    | Regular inspection of the protective device by qualified<br>safety personnel ..... | 64        |
| 7.3.3    | Daily functional checks of the protective device .....                             | 65        |
| <b>8</b> | <b>Configuration.....</b>                                                          | <b>66</b> |
| 8.1      | Default delivery status .....                                                      | 66        |
| 8.2      | Preparing the configuration .....                                                  | 66        |
| <b>9</b> | <b>Care and maintenance .....</b>                                                  | <b>67</b> |

# List of contents

|           |                                                                                        |           |
|-----------|----------------------------------------------------------------------------------------|-----------|
| <b>10</b> | <b>Fault diagnosis .....</b>                                                           | <b>68</b> |
| 10.1      | What to do in case of faults.....                                                      | 68        |
| 10.2      | SICK Support .....                                                                     | 68        |
| 10.3      | Error displays of the diagnostics LEDs.....                                            | 68        |
| 10.4      | Error displays of the 7-segment display.....                                           | 69        |
| 10.5      | Status indicators on the C4000 .....                                                   | 71        |
| 10.6      | Extended diagnosis.....                                                                | 72        |
| <b>11</b> | <b>Technical specifications .....</b>                                                  | <b>73</b> |
| 11.1      | Data sheet .....                                                                       | 73        |
| 11.2      | Data sheet C4000 Guest.....                                                            | 77        |
| 11.3      | Response time .....                                                                    | 79        |
| 11.3.1    | Different response times .....                                                         | 81        |
| 11.4      | Table of weights .....                                                                 | 82        |
| 11.4.1    | C4000 Standard/Advanced .....                                                          | 82        |
| 11.4.2    | C4000 Standard/Advanced Guest .....                                                    | 82        |
| 11.4.3    | Deflector mirrors PNS75 and PNS125 .....                                               | 83        |
| 11.5      | Dimensional drawings .....                                                             | 84        |
| 11.5.1    | C4000 Standard/Advanced without extension connection .....                             | 84        |
| 11.5.2    | C4000 Standard with angled system connection and without<br>extension connection ..... | 85        |
| 11.5.3    | C4000 Standard/Advanced with M26 extension connection .....                            | 86        |
| 11.5.4    | C4000 Standard/Advanced with M12 extension connection .....                            | 87        |
| 11.5.5    | C4000 Standard/Advanced Guest .....                                                    | 88        |
| 11.5.6    | Swivel mount bracket .....                                                             | 89        |
| 11.5.7    | Side bracket .....                                                                     | 89        |
| 11.5.8    | Swivel mount bracket for C4000 Guest .....                                             | 90        |
| 11.5.9    | Deflector mirror PNS75 .....                                                           | 91        |
| 11.5.10   | Deflector mirror PNS125 .....                                                          | 92        |

|           |                                                                                     |            |
|-----------|-------------------------------------------------------------------------------------|------------|
| <b>12</b> | <b>Ordering information .....</b>                                                   | <b>93</b>  |
| 12.1      | Delivery.....                                                                       | 93         |
| 12.2      | System without extension connection.....                                            | 94         |
| 12.2.1    | C4000 Standard without extension connection .....                                   | 94         |
| 12.2.2    | C4000 Standard with angled system connection and without extension connection ..... | 95         |
| 12.2.3    | C4000 Advanced without extension connection .....                                   | 96         |
| 12.2.4    | C4000 Standard without extension connection with pre-configuration C .....          | 97         |
| 12.2.5    | C4000 Standard without extension connection with pre-configuration D .....          | 98         |
| 12.2.6    | C4000 Standard without extension connection with pre-configuration E .....          | 99         |
| 12.2.7    | C4000 Standard without extension connection with pre-configuration F.....           | 100        |
| 12.2.8    | C4000 Standard without extension connection with pre-configuration R .....          | 101        |
| 12.3      | System with extension connection .....                                              | 102        |
| 12.3.1    | C4000 Standard with M26 extension connection.....                                   | 102        |
| 12.3.2    | C4000 Advanced with M26 extension connection.....                                   | 103        |
| 12.3.3    | C4000 Standard with M12 extension connection.....                                   | 104        |
| 12.3.4    | C4000 Advanced with M12 extension connection.....                                   | 105        |
| 12.4      | C4000 Guest .....                                                                   | 106        |
| 12.4.1    | C4000 Standard Guest with straight system connection .....                          | 106        |
| 12.4.2    | C4000 Standard Guest with angled system connection.....                             | 107        |
| 12.4.3    | C4000 Advanced Guest with straight system connection .....                          | 108        |
| 12.4.4    | C4000 Advanced Guest with angled system connection.....                             | 109        |
| 12.5      | Additional front screen (weld spark guard).....                                     | 110        |
| 12.6      | Deflector mirror.....                                                               | 110        |
| 12.6.1    | Deflector mirror PNS75 for protective field width 0 ... 12 m (total).....           | 110        |
| 12.6.2    | Deflector mirror PNS125 for protective field width 4 ... 18.5 m (total).....        | 111        |
| 12.7      | Accessories .....                                                                   | 111        |
| <b>13</b> | <b>Annex.....</b>                                                                   | <b>114</b> |
| 13.1      | EC declaration of conformity.....                                                   | 114        |
| 13.2      | Checklist for the manufacturer.....                                                 | 116        |
| 13.3      | List of tables .....                                                                | 117        |
| 13.4      | List of illustrations .....                                                         | 119        |

# 1 About this document

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

## 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 safety light curtain C4000.

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 safety light curtains C4000. It also addresses persons who integrate the C4000 into a machine, initialise its use, or who are in charge of servicing and maintaining the unit.

## 1.3 Scope

These operating instructions are original operating instructions.

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

- 8009855
- 8009855/NA63
- 8009855/OE59
- 8009855/QB65
- 8009855/TI72
- 8009855/U014
- 8009855/WA65

This document is part of SICK part number 8009855 (operating instructions “C4000 Standard and C4000 Advanced” 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 safety light curtain C4000.

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

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

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

- Note** We also refer you to the SICK homepage on the Internet at: [www.sick.com](http://www.sick.com)
- Here you will find information on:
- sample applications
  - a list of frequently asked questions about the C4000
  - these operating instructions in different languages for viewing and printing
  - certificates on the prototype test, the EC declaration of conformity and other documents

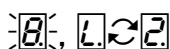
## 1.5 Abbreviations

|             |                                                                                                                      |
|-------------|----------------------------------------------------------------------------------------------------------------------|
| <b>ADO</b>  | Application diagnostic output = configurable signal output that indicates a specific status of the protective device |
| <b>CDS</b>  | SICK Configuration & Diagnostic Software                                                                             |
| <b>EDM</b>  | External device monitoring                                                                                           |
| <b>EFI</b>  | Enhanced function interface = safe SICK device communication                                                         |
| <b>ESPE</b> | Electro-sensitive protective equipment (e.g. C4000)                                                                  |
| <b>OSSD</b> | Output signal switching device                                                                                       |

## 1.6 Symbols used

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

**Note** Refer to notes for special features of the device.



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



Constant indication of characters, e.g. U



Flashing indication of characters, e.g. 8



Alternating indication of characters, e.g. L and 2

The depiction of numbers on the 7-segment display can be rotated by 180° with the aid of the CDS. In this document the depiction of the numbers on the 7-segment display is however always in the normal, non-rotated position.

● Red, ● Yellow,  
○ Green

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

● **Red** The red LED is illuminated constantly.

● **Yellow** The yellow LED is flashing.

○ **Green** The green LED is off.

➤ Take action ...

Instructions for taking action are shown by an arrow. 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!



Software notes show the location in the CDS (Configuration & Diagnostic Software) where you can make the appropriate settings and adjustments. Go to the menu **View, Dialog box** of the CDS and activate the item **File cards** to view the named dialog fields as required. Alternatively, the Software Assistant will guide you through the appropriate setting.

If you use the SICK switching amplifier UE402, you will find the functions under the same names, however to some extent in different places in the CDS Configuration dialog box. This is dependent on the scope of the related function. The operating instructions for the UE402 contain detailed information.



### **Sender and receiver**

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

### **The term “dangerous state”**

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

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

## 2 On safety

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

- Please read this chapter carefully before working with the C4000 or with the machine protected by the C4000.

### 2.1 Qualified safety personnel

The C4000 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 EC member states) that they can assess the work safety aspects of the power-driven equipment

**and**

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

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

## 2.2 Applications of the device

The safety light curtain C4000 is an item of electro-sensitive protective equipment (ESPE). The physical resolution is 14, 20, 30 or 40 mm with a maximum protective field width of 19 metres (resolution 20 mm and higher). The realisable protective field height is between 300 and 1,800 mm.

The device is a *Type 4 ESPE* as defined by EN 61496-1 and IEC 61496-2 and is therefore allowed for use with controls in category 4 according to EN ISO 13849-1. The emergency stop monitoring in the device corresponds to stop category 0 in accordance with EN ISO 13850. The device is suitable for:

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

Access to the hazardous point must be allowed only through the protective field. The plant/system is not allowed to start as long as personnel are within the hazardous area. Refer to chapter 3.3 “Examples of range of use” on page 17 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 safety light curtain C4000 operates as a standalone system, comprising a sender and receiver, or in combination with other cascable C4000 systems. This means that the protective field can be adapted to suit individual safety requirements.

## 2.3 Correct use

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

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

## 2.4 General protective notes and protective measures



WARNING

### Safety notes

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

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

Manufacturers and operators of the machine 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 64) 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 check the effectiveness of the protective device.

The person who makes the change is also responsible for the correct protective function of the device. When making configuration changes, please always use the password hierarchy provided by SICK to ensure that only authorised persons make changes to the configuration. The SICK service team is available to provide assistance if required.

- The tests must be carried out by qualified safety personnel or specially qualified and authorised personnel and must be recorded and documented to ensure that the tests can be reconstructed and retraced at any time.
- The operating instructions must be made available to the operator of the machine where the safety light curtain C4000 is fitted. The machine operator is to be instructed in the use of the device by qualified safety personnel and must be instructed to read the operating instructions.
- The external voltage supply of the device 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 (Siemens type series 6 EP 1).

## 2.5 Protection of the environment

The safety light curtain C4000 has been designed to minimise environmental impact. It uses only a minimum of power and natural resources.

At work, always act in an environmentally responsible manner. For this reason please note the following information on disposal.

### Disposal

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

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

## 3 Product description

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

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

### 3.1 Special features

#### **C4000 Standard**

- protection with either internal or external (realised on the machine) restart interlock
- connection for the reset button either in the control cabinet or directly to the device
- connection option on the device for an emergency-stop button or a key-operated push-button for bypass
- external device monitoring (EDM)
- 2 beam codings possible in addition to non-coded operation
- configurable signal output (ADO) for improved availability
- status display with 7-segment display
- range of functions can be expanded using switching amplifiers in the SICK sens:Control product family
- EFI connection. Function expansion on the C4000 with the type label entry in the field *Software Version: 3.0.0* and later and switching amplifiers in the SICK sens:Control product family
- cascading of up to three C4000

#### **C4000 Advanced**

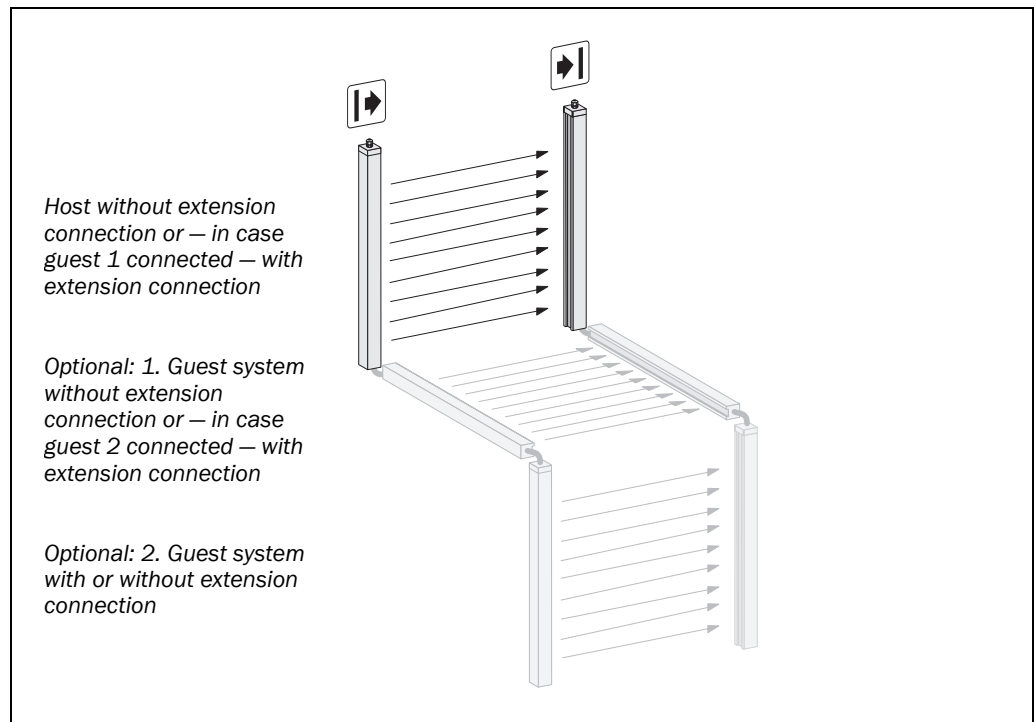
In addition to the features of the C4000 Standard, the Advanced version offers:

- blanking of several areas
- blanking with tolerance of up to 2 beams
- floating blanking
- reduced resolution
- object monitoring for areas with floating blanking

## 3.2 Operating principle of the device

### 3.2.1 Components of the device

Fig. 1: Components of the C4000



Please refer to chapter 11 “Technical specifications” on page 73 for the data sheet.  
Please refer to pages 84ff. for the dimensional drawings.

### 3.2.2 The light curtain principle

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

The construction height determines the *height of the protective field* of the appropriate system. For the exact protective field height, please see Tab. 36ff. in chapter 11.5 “Dimensional drawings” on page 84.

The *width of the protective field* is derived from the dimension of the light path between sender and receiver and must not exceed the maximum rated width of the protective field (see “Technical specifications” on page 73).

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

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

### 3.2.3 Cascading

To provide effective point-of-operation guarding, a maximum of three C4000 can be connected in series as a “cascade”. The device connected to the control cabinet is the main sensor, called *host*. The subsequent sensors are called *guest* (cf. Fig. 1 on page 14).

Devices in the default delivery status and devices that have not yet been used in a cascaded system can be connected together and immediately form a basically functional cascade. Note the following:

- Guest systems adopt any beam coding configured on the host system.
- Any blanking configured on the guest systems is deleted.

**Note** If safety light curtains are used in a cascaded system, the system position (host, guest 1 or guest 2) is stored permanently in the device memory of the C4000. The device can no longer be used as a standalone device or in a different system position. There is then no chance of mistakes when setting up the system again after dismantling.

Reset the system position saved in the C4000 using the CDS or using the Host-Guest Plug available as an accessory (see 12.7 “Accessories” on page 111).

#### Benefits of cascading

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

#### Limits of cascading

- The maximum protective field width must be guaranteed for each individual system!
- The maximum 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 cascaded systems must not exceed 3 metres.

### 3.2.4 Device variants

Different variants of the C4000 Standard/Advanced are available for various applications:

- without extension connection,  
can be used as a standalone system or as the last guest in a cascaded system
- with M26 extension connection,  
can be used as a standalone system, as a host, as the first or second guest in a cascaded system
- with M12 extension connection,  
can be used as a standalone system, as a host, as the first or second guest in a cascaded system

**Recommendation** Use this type if you want to use the C4000 Guest.

- Guest with M12 system connection,  
C4000-Device variant for limited access,  
can only be used as the last guest in a cascaded system

Tab. 1: Functions of the C4000 device variants compared

|                                                      | C4000 Standard                                                                                                                                                                                                         |                               |                               |                                  | C4000 Advanced               |                               |                               |                                  |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------|----------------------------------|------------------------------|-------------------------------|-------------------------------|----------------------------------|
|                                                      | Without extension connection                                                                                                                                                                                           | With M26 extension connection | With M12 extension connection | Guest with M12 system connection | Without extension connection | With M26 extension connection | With M12 extension connection | Guest with M12 system connection |
| Emergency stop can be connected to the device        |                                                                                                                                                                                                                        | ■                             |                               |                                  |                              | ■                             |                               |                                  |
| Reset button can be connected directly to the device | □                                                                                                                                                                                                                      | ■                             | □                             | □                                | □                            | ■                             | □                             | □                                |
| Output for "Reset required" on the device            | □                                                                                                                                                                                                                      | ■                             | □                             | □                                | □                            | ■                             | □                             | □                                |
| Application diagnostic output (ADO)                  | ■                                                                                                                                                                                                                      | ■                             | ■                             | ■                                | ■                            | ■                             | ■                             | ■                                |
| External device monitoring (EDM)                     | ■                                                                                                                                                                                                                      | ■                             | ■                             | ■                                | ■                            | ■                             | ■                             | ■                                |
| Reduced resolution                                   |                                                                                                                                                                                                                        |                               |                               |                                  | ■                            | ■                             | ■                             | ■                                |
| Blanking                                             |                                                                                                                                                                                                                        |                               |                               |                                  | ■                            | ■                             | ■                             | ■                                |
| Teaching in blanked areas                            |                                                                                                                                                                                                                        |                               |                               |                                  | ○                            | ○                             | ○                             | ○                                |
| PSDI mode                                            | ○                                                                                                                                                                                                                      | ○                             | ○                             | ○                                | ○                            | ○                             | ○                             | ○                                |
| Bypass                                               | ○                                                                                                                                                                                                                      | ■                             | ○                             | ○                                | ○                            | ■                             | ○                             | ○                                |
| Operating mode switching                             | ○                                                                                                                                                                                                                      | ○                             | ○                             | ○                                | ○                            | ○                             | ○                             | ○                                |
|                                                      | □ = Device functions can be accessed via the terminal strip in the control cabinet from the C4000 system connection!<br>○ = Only in conjunction with an external switching amplifier or bus node, e.g. UE402 or UE4155 |                               |                               |                                  |                              |                               |                               |                                  |

**C4000 Standard/Advanced****3.3 Examples of range of use**

Fig. 2: Hazardous point protection using a safety light curtain C4000 (left)

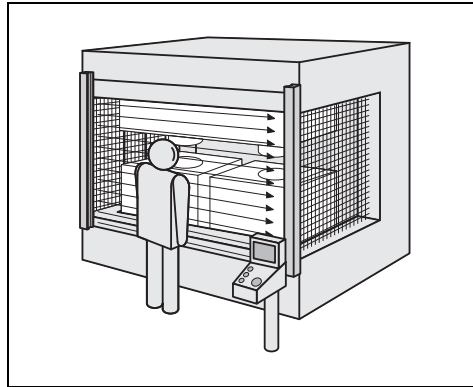


Fig. 3: Hazardous area protection using a safety light curtain C4000 (right)

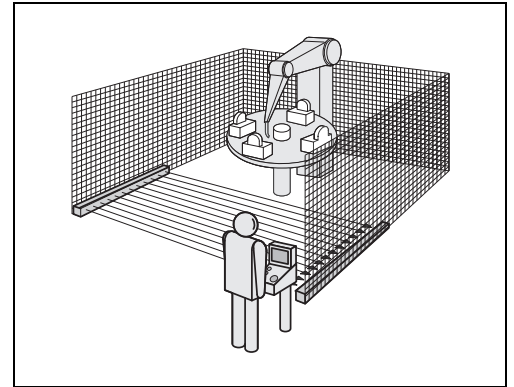


Fig. 4: Access protection using a safety light curtain C4000

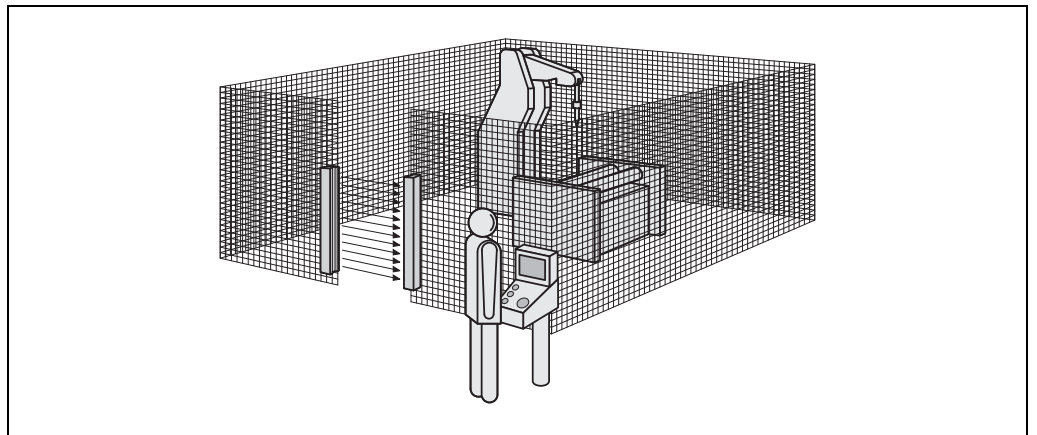


Fig. 5: C4000 Guest used for point-of-operation guarding (left)

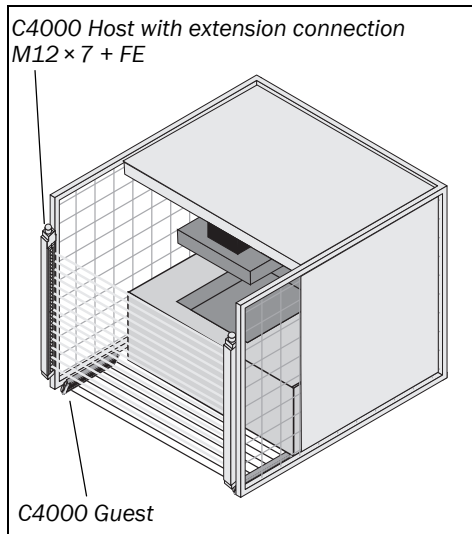
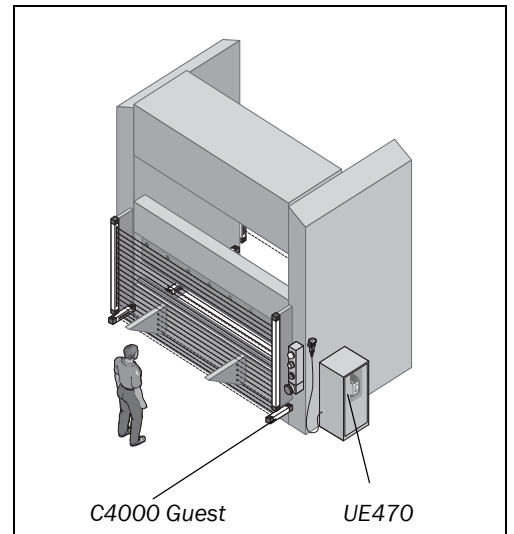


Fig. 6: C4000 Host/Guest direct on UE470 in PSDI mode (right)



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

- The control of the machine must be electrical.
- The dangerous state of the machine must be transferable at any time into a safe state.
- Sender and receiver unit must be so mounted that objects penetrating the hazardous area are safely identified by the C4000.
- The restart button must be fitted outside the hazardous area such that it cannot be operated by a person working inside the hazardous area. When operating the reset button, the operator must have full visual command of the hazardous area.
- The statutory and local rules and regulations must be observed when installing and using the device.

### 3.4 Status indicators

The LEDs and the 7-segment displays of the sender and the receiver signal the operational status of the C4000.

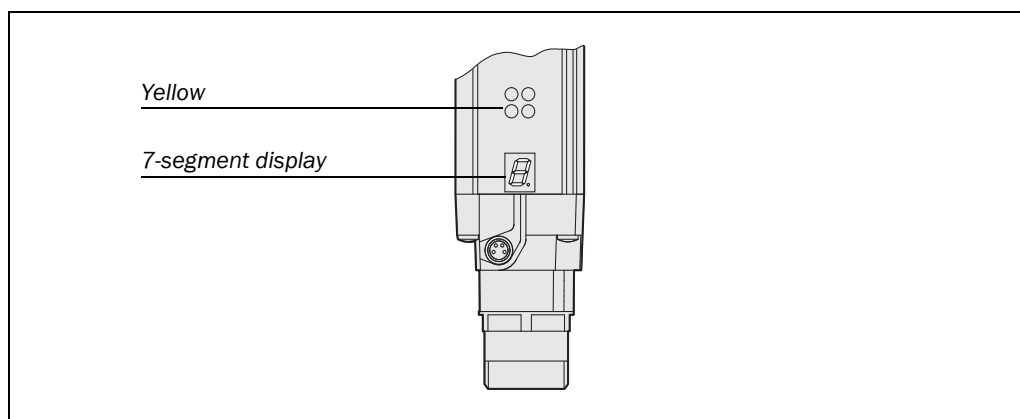
**Note** The depiction of numbers on the 7-segment display can be rotated by 180° with the aid of the CDS (Configuration & Diagnostic Software). In this case the point on the 7-segment display goes out:

- Point visible: The bottom edge of the numbers on the 7-segment display is pointing towards the configuration connection.
- Point not visible: The bottom edge of the numbers on the 7-segment display is pointing towards the LED display.



Device symbol **C4000 Host (receiver)** or **C4000 Host (sender)**, context menu **Configuration draft, Edit**, option **7-segment display** of the related device.

Fig. 7: Status indicators of the sender

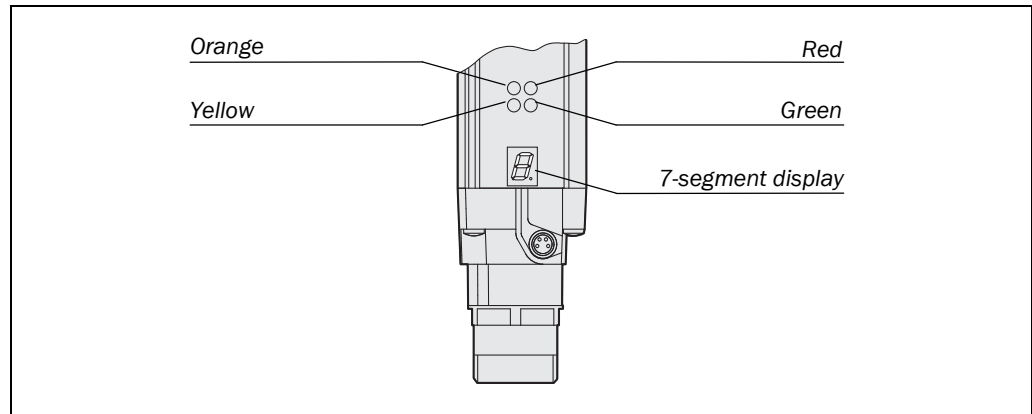


Tab. 2: Status indicators of the sender

| Display        | Meaning                                                                                                                     |
|----------------|-----------------------------------------------------------------------------------------------------------------------------|
| ● Yellow       | Supply voltage OK                                                                                                           |
|                | System error. Disconnect the supply voltage to the C4000 for at least 3 seconds. If the problem persists, replace the unit. |
|                | The device is in the test mode.                                                                                             |
|                | Non-coded operation (only after switching on)                                                                               |
|                | Operation with code 1 (only after switching on)                                                                             |
|                | Operation with code 2 (only after switching on)                                                                             |
| Other displays | All other displays are error messages. Please refer to chapter "Fault diagnosis" on page 68.                                |

## 3.4.2 Status indicators of the receiver

Fig. 8: Status indicators of the receiver



Tab. 3: Status indicators of the receiver

| Display         | Meaning                                                                                                                     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------|
| ● <b>Orange</b> | Cleaning or realignment required                                                                                            |
| ☼ <b>Yellow</b> | Reset required (on C4000 Guest has no function)                                                                             |
| ● <b>Red</b>    | System providing signals for shutting down the machine (switching output off)                                               |
| ● <b>Green</b>  | System enabled (switching output on)                                                                                        |
|                 | Bypass active                                                                                                               |
|                 | System error. Disconnect the supply voltage to the C4000 for at least 3 seconds. If the problem persists, replace the unit. |
|                 | Poor alignment to sender.                                                                                                   |
|                 | Please refer to chapter 7.2 "Aligning sender and receiver" on page 63.                                                      |
|                 |                                                                                                                             |
|                 |                                                                                                                             |
|                 | Operation with large protective field width (only after switching on)                                                       |
|                 | Operation with reduced resolution and/or blanking                                                                           |
|                 | Non-coded operation (only after switching on)                                                                               |
|                 | Operation with code 1 (only after switching on)                                                                             |
|                 | Operation with code 2 (only after switching on)                                                                             |
|                 | Emergency stop active                                                                                                       |
| Other displays  | All other displays are error messages. Please refer to chapter "Fault diagnosis" on page 68.                                |

## 4 Configurable functions

This chapter describes the functions of the safety light curtain which are selectable via software C4000. Some of the functions can be combined. An overview of the possible combinations and possible limitation is given in chapter 4.11 “Functions that cannot be combined” on page 39.

**Note** The Clone Plug configuration tool is available for transferring already saved and tested configurations from one C4000 to identical C4000 safety light curtains (see 12.7 “Accessories” on page 111). In a Clone Plug, you can successively save the configuration of the sender and of the receiver. You can use the saved configuration either as a backup or for cloning.



WARNING

### Test the protective device after any changes!

Changes to the configuration of the devices can degrade the protective function. After every change to the configuration you must therefore check the effectiveness of the protective device (see section 7.3 on page 64).

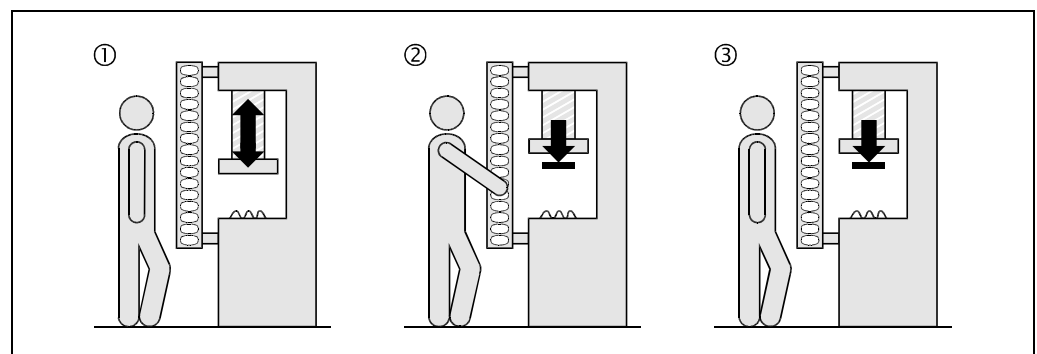
The person who makes the change is also responsible for the correct protective function of the device. When making configuration changes, please always use the password hierarchy provided by SICK to ensure that only authorised persons make changes to the configuration. The SICK service team is available to provide assistance if required.



When starting to configure the device, you may save an application name with a maximum of 22 characters. Use this function as a “memory jog”, e.g. to describe the application of the current device configuration. Device symbol **C4000 Host (receiver)** or **C4000 Host (sender)**, context menu **Configuration draft, Edit**, file card **General**, option **Application name**.

### 4.1 Restart interlock

Fig. 9: Schematic layout of the protective operation



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

**Note** Do not confuse the restart interlock with the starting interlock on the machine. The start interlock prevents the machine starting at switch on. The restart interlock prevents the machine starting again after an error or an interruption in the light path.

The restart interlock can be implemented in two different ways:

- With the internal restart interlock of the C4000:  
The C4000 controls the restart.
- With the restart interlock of the machine (external):  
The C4000 has no control over the restart.

**C4000 Standard/Advanced**

Tab. 4: Permissible configuration of the restart interlock

The possible combinations are shown in the following table:

| Restart interlock of the C4000 | Restart interlock of the machine | Permissible application                                                                         |
|--------------------------------|----------------------------------|-------------------------------------------------------------------------------------------------|
| Deactivated                    | Deactivated                      | Only if one cannot stand between the safety light curtain and the machine. Observe EN 60 204-1! |
| Deactivated                    | Activated                        | All                                                                                             |
| Activated                      | Deactivated                      | Only if one cannot stand between the safety light curtain and the machine. Observe EN 60 204-1! |
| Activated                      | Activated                        | All. Restart interlock of the C4000 handles the reset function (see "Reset" below).             |

**WARNING**

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

The C4000 is unable to verify if the restart interlock of the machine is operable. If in applications in which it is possible to stand behind the safety light curtain you deactivate both the internal and the external restart interlock, you will place the machine operator in acute danger.

**Recommendation**

The electrical connection of the reset button is described in chapter "Reset button" on page 58.

Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **General**, option **Restart interlock**.

You can indicate the status "Reset required" using a signal lamp. The C4000 has a dedicated output for this purpose. The electrical connection of the signal lamp is described in chapter "Connection of a signal lamp to the output *Reset required*" on page 58.

**Note**

You can define whether the operator must *press* the reset button, or *press and release* it to start the function. If you configure *Press*, then the reset is performed before the operator releases the reset button again. This can be useful if you want, for example, to use a two-hand control unit also as the reset button for the safety light curtain.

**WARNING**

**Never configure *Reset after press* if it is possible to stand behind the safety light curtain!**

Reason: If pressing the reset button (without releasing it) is sufficient as the reset signal, then the safety light curtain cannot differentiate the operation of the reset button from a short-circuit to 24 V. In case of a short-circuit, the safety light curtain would be inadvertently reset. In this case the operator would be in serious danger.



Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **General**, option **Reset button active**.

### Reset

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

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

- the C4000 activates the switching outputs.
- the safety light curtain changes to green.

Only the external restart interlock prevents the machine from restarting. After pressing the reset button for the C4000, the operator must also press the restart button for the machine. If the reset button and the restart button are not pressed in this specified sequence, the dangerous state remains unchanged.

### Recommendation

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

## 4.2 External device monitoring (EDM)

The EDM checks if the contactors actually de-energise when the protective device responds. If you activate external device monitoring, then the C4000 checks the contactors after each interruption to the light path and prior to the machine restart. The EDM can so identify if one of the contacts has welded, for instance. In this case the external device monitoring places the system in the safe operational state. The OSSDs are not re-activated in this case.

### Note

The indicators and the operational status after the external device monitoring has triggered are dependent on the type of error present and the configuration of the internal restart interlock in the C4000 (see Tab. 5).

Tab. 5: Device status after the external device monitoring has triggered

| Internal restart interlock of the C4000 | Signal on the EDM input | Device status after the external device monitoring has triggered                    |                    |                                                          |
|-----------------------------------------|-------------------------|-------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------|
|                                         |                         | Display of the 7-segment display                                                    | Display of the LED | Operational status                                       |
| Activated                               | Permanently 0 V         |  | ● Red              | Output signal switching devices off                      |
|                                         | Permanently 24 V        |  | ● Red<br>● Yellow  | Output signal switching devices off and "Reset required" |
| Deactivated                             | Permanently 0 V         |  | ● Red              | Output signal switching devices off                      |
|                                         | Permanently 24 V        |  | ● Red              | Lock-out                                                 |

The electrical connection for the external device monitoring is described in chapter "External device monitoring (EDM)" on page 57.



Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **General**, option **EDM**.

### 4.3 Emergency stop

The C4000 has an input for a two-channel emergency stop button. The emergency stop monitoring in the device corresponds to stop category 0 in accordance with EN ISO 13850. You can connect e.g. a door contact or an emergency stop button to the emergency stop input. The operation of the emergency stop button has the following effect:

- The safety light curtain deactivates the OSSDs.
- The host switches to red.
- The 7-segment display on the host indicates

**Notes** The emergency stop function deactivates the OSSDs even if the bypass function is activated.

Take into account the response time of the emergency stop function! The response time of the safety light curtain on interruption via the emergency stop input is up to 200 ms.



WARNING

#### Pay attention to the way in which the emergency stop function works!

The emergency stop button connected to the extension connection on the C4000 affects *only* the switching outputs (OSSDs) on the C4000.

- Notes**
- The C4000 checks after switch on whether an emergency stop has been configured and whether a door switch or similar switch is connected. If the configuration and the electrical connection do not match, the system locks completely (lock-out). The 7-segment display will then show the error message
  - The safety light curtain has a signal output (ADO) at which the status of the *emergency stop* input can be signalled. For details refer to the next section.



WARNING

#### Regularly check the connected emergency stop button or door contact!

- By means of organisational measures ensure that the emergency stop button or door contact is operated once at a specified interval.

This is necessary so that the C4000 can detect any fault that has occurred on the emergency stop button or door switch. The interval is to be defined to suit the specific case dependant on the application.

- Always check whether the switching outputs on the light curtain are deactivated on the operation of the emergency stop button or door switch.

The electrical connection of the emergency stop is described in chapter 6.9 “Emergency stop” on page 60.

**Note** The C4000 Guest does not have an extension connection. For this reason the emergency stop function cannot be configured for a cascaded system with a C4000 Guest.

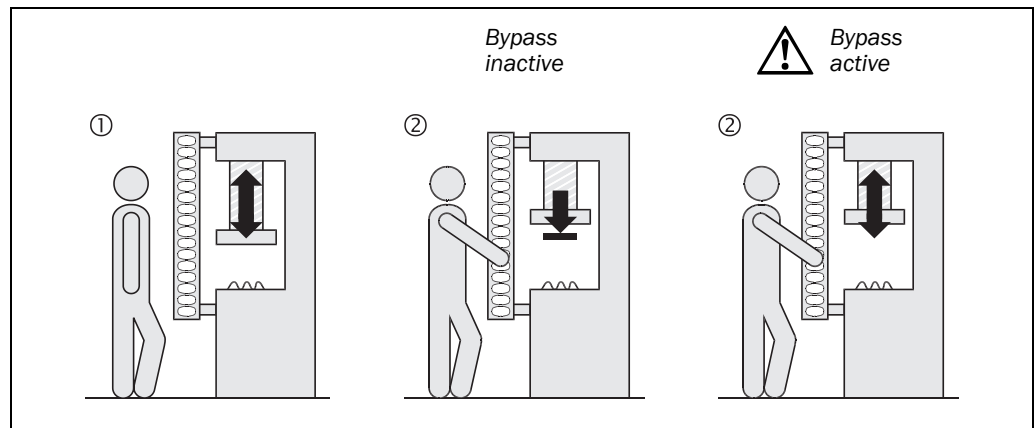


Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **General**, option **Emergency stop active**.

## 4.4 Bypass

**Note** The bypass function is only supported by C4000 systems with software version 3.0.1 or later. You will find this information on the type label in the *Software Version* field.

Fig. 10: Schematic layout of the bypass function



In some applications it is at times necessary to mute the protective field evaluation of the safety light curtain. This could be, e.g. in a safe machine setup mode, in which the machine can be operated only in jog mode. When the bypass is active, the safety light curtain displays ● **Green** and the 7-segment display of the receiver displays **b**.



**WARNING**

### Switch on the machine safely, when using the bypass function!

As long as the bypass function is active, the safety light curtain does **not** detect any movements in the protective field. You must ensure that other protective measures are forcibly activated during the bypass, e.g. the safe machine setup mode, so that the machine cannot endanger persons or parts of the machine during the bypass function.

The bypass function may only be activated by a key-operated pushbutton with an automatic reset and two levels or by two input signals that are independent of each other, e.g. two position switches.

- Notes**
- It must be possible to view the entire hazardous point when pressing the key-operated pushbutton.
  - It is not possible to combine the bypass and PSDI mode functions.
  - 200 ms after switching off the bypass, the system is again in a safe status (latency time).
  - The Bypass function can not be activated in connection with C4000 Guest devices with M12 system connection (type code C46).



Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, selection of the **Operating mode**, file card **General**, option **Bypass**.

The connection of the key-operated pushbutton for bypass is described in chapter 6.10 "Key-operated pushbutton for bypass" on page 61.

## 4.5 Signal output (ADO)

The C4000 has a signal output (ADO) that can be configured. With the aid of the signal output, the safety light curtain can signal specific states. You can use this output for a relay or a PLC.



WARNING

**You must not use the signal output for safety-relevant functions!**

You are only allowed to use the signal output for signalling. You must never use the signal output for controlling the application or with safety-relevant functions.

Tab. 6: Possible configuration for the signal output

| Assignment                    | Possible uses                                                                                                                                                                                                                                              |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Contamination                 | Eases diagnostics in case of soiled front screen                                                                                                                                                                                                           |
| OSSD status with delay of [s] | Signals the status of the switching outputs. If the safety light curtain switches to red, then it signals the status immediately. If it switches to green, then it signals the status only after an adjustable delay in the range from 0.1 to 3.0 seconds. |
| Status of the emergency stop  | Signal is present if the button connected to the emergency stop input on the C4000 has been pressed.                                                                                                                                                       |
| Protective field free         | Signal is present if no invalid interruption has occurred. I.e. the protective field must be clear in protective operation.                                                                                                                                |



Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **General**, option **Assignment of the signal output**.

The electrical connection of a PLC/controller to the signal output is described in chapter 6.11 "Signal output (ADO)" on page 61.

## 4.6 Beam coding

If several safety light curtains operate in close proximity to each other, the sender beams of one system may interfere with the receiver of another system. 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.

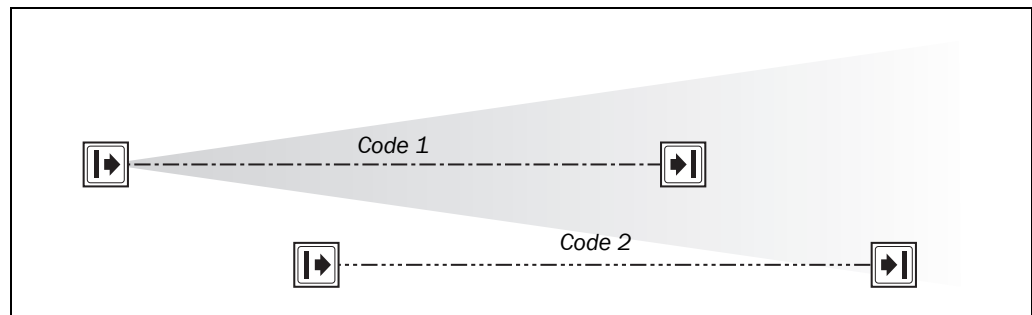


WARNING

**Use different beam codings if the systems are mounted in close proximity!**

Systems 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 system may be impaired in its protective function by the beams from the neighbouring system and so change to the unsafe state. This would mean that the operator is at risk.

Fig. 11: 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 or similar.
  - In a cascaded system the host and guest always have the same beam coding. There is no mutual interference.
  - Beam coding will increase the response time of the system. This will also change the required minimum distance. Instructions can be found in chapter 5.1 "Determining the minimum distance" on page 40.
  - After activating the system, sender and receiver will briefly display the coding.
  - Beam coding is only possible on systems with a maximum total of 405 beams.



Device symbol **C4000 Host (receiver)** or **C4000 Host (sender)**, context menu **Configuration draft, Edit**, file card **General**, option **Beam coding**.

## 4.7 Scanning range



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 too great, the safety light curtain may malfunction. This would mean that the operator is at risk.

The available settings depend on the physical resolution of the system:

| Physical resolution | Selectable scanning ranges | Scanning range with 1 additional front screen | Scanning range with 2 additional front screens |
|---------------------|----------------------------|-----------------------------------------------|------------------------------------------------|
| 14 mm               | 0-2.5 m<br>2-8 m           | 0-2.3 m<br>1.8-7.3 m                          | 0-2.1 m<br>1.7-6.8 m                           |
| 20, 30, 40 mm       | 0-6 m<br>5-19 m            | 0-5.5 m<br>4.6-17.4 m                         | 0-5 m<br>4.2-16 m                              |

Tab. 7: Guaranteed scanning ranges



Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **Host** or **Guest**, option **Scanning range [m]**.

- Notes**
- If the scanning range is set too low, the safety light curtain may not switch to green.
  - Tab. 7 shows the guaranteed scanning ranges for the system. You can also use the C4000 in applications that require a larger scanning range if the orange LED is not illuminated at the required scanning range.
  - If you are using the additional front screen (see page 110) available as an accessory, the overall scanning range will be reduced by 8% for each additional front screen.
  - The deflector mirrors available as accessories (see page 110f.) reduce the overall scanning range as a function of the number of deflector mirrors in the light path (see Tab. 8). When using deflector mirrors, you **must** configure the safety light curtain for a long 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 behaviour. The protective function of the system will be affected and the system will thus become unsafe. This would mean that the operator is at risk.

## C4000 Standard/Advanced

Tab. 8: Scanning range when using 1 or 2 deflector mirrors

| Deflector mirror | 14 mm   |         | 20, 30 or 40 mm |         |
|------------------|---------|---------|-----------------|---------|
|                  | 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 contact at SICK.

## 4.8 Blanking

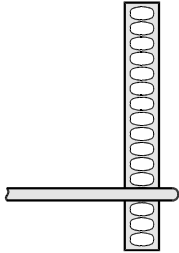
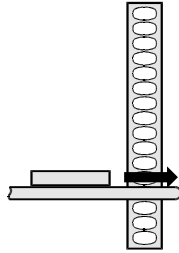
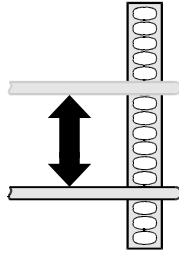
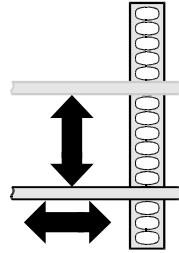
**Note** The blanking function is only available on the C4000 Advanced.

The C4000 Advanced offers various ways of blanking the protective field. In this way in many applications a higher level of safety and availability can be assured than would be possible without the usage of the blanking function. This requires the careful analysis of the usage of blanking as part of a risk analysis for these applications. Only if the analysis produces advantages in reliability and thus advantages in safety when the blanking function is used the usage of the function is recommended.

The person responsible for the machine has the responsibility to decide whether or not to use the blanking function and to undertake the installation, mounting and configuration of the light curtain such that

- the necessary safety is achieved on the machine
- and
- access to the hazardous area through the safety light curtain in conjunction with the blanking function is prevented by other guards.

Tab. 9: Overview of the blanking function

| Fixed blanking                                                                             |                                                                                                                            | Floating blanking                                                                                                            |                                                                                                                               |
|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Fixed blanking                                                                             | Fixed blanking with increased size tolerance                                                                               | Floating blanking with complete object monitoring                                                                            | Floating blanking with partial object monitoring                                                                              |
| An object of <i>fixed</i> size <i>must</i> be at a specific point in the protective field. | On one side of the fixed blanking an object of <i>limited</i> size <i>is allowed</i> to move through the protective field. | An object of <i>fixed</i> size <i>must</i> be within a specific area of the protective field. The object is allowed to move. | An object of <i>limited</i> size <i>is allowed</i> in a specific area of the protective field. The object is allowed to move. |
|         |                                         |                                         |                                          |
| See page 29.                                                                               | See page 29.                                                                                                               | See page 31.                                                                                                                 | See page 32.                                                                                                                  |

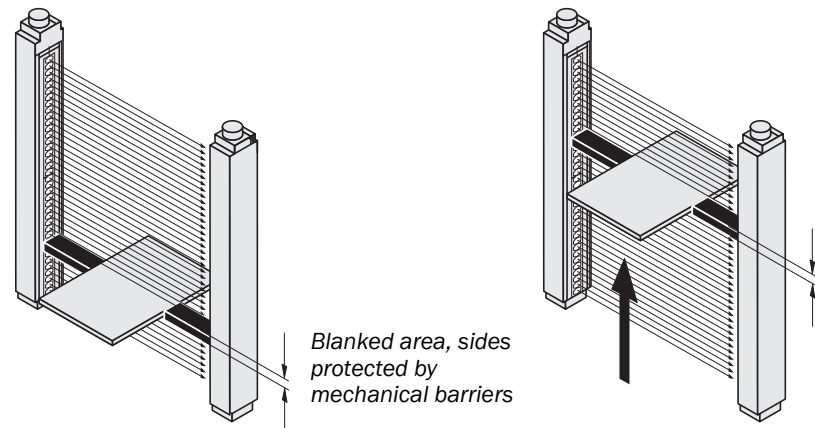


WARNING

### Blanked areas require a separate risk analysis!

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 minimum distance and mount the safety light curtain appropriately.

Fig. 12: Example of mechanical protection of fixed or floating blanking



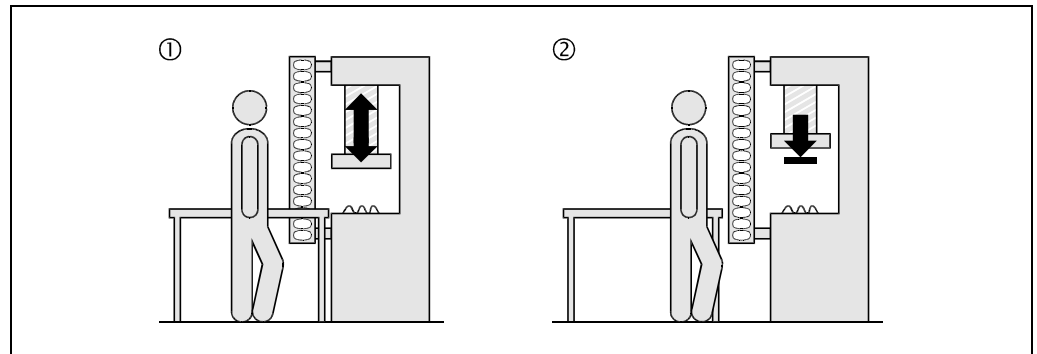
- After modifying the blanking, check the protective field with the test rod. Instructions can be found in chapter 7.3.3 on page 65.
- Also pay attention to the warnings in the related chapter.

### Properties of blanked areas

- The C4000 Advanced is capable of blanking a total of four areas simultaneously.
- Fixed and floating blanking can be mixed.
- A minimum of one beam spacing must exist between two blanked areas. The CDS (Configuration & Diagnostic Software) automatically ensures that this is the case during the configuration. **Exception:** It is not necessary to maintain any distance between an area of floating blanking with *partial* object monitoring and an area of fixed blanking *without* a positional tolerance. In this case the effective resolution for the overlapping is equal to the sum of the effective resolutions in the two areas (see Tab. 11 and Tab. 12).
- The first beam of the light curtain (close to the 7-segment display) cannot be blanked. It is needed for the synchronisation between sender and receiver.
- With fixed blanking, the 7-segment display indicates  as soon as sender and receiver are aligned.

Fig. 13: Schematic layout of the fixed blanking

#### 4.8.1 Fixed blanking



The C4000 Advanced safety light curtain is capable of fixed-blanking one or several adjacent beams, e.g. to allow continued operation in spite of an obstruction such as a table placed permanently in the light path.

The blanked area will no longer be part of the protective field. Objects to be blanked out must therefore be permanently located inside the blanked area (①). As soon as the object is removed from the beam path, the safety light curtain will send a signal to stop the dangerous movement (②). Protection is otherwise no longer guaranteed.

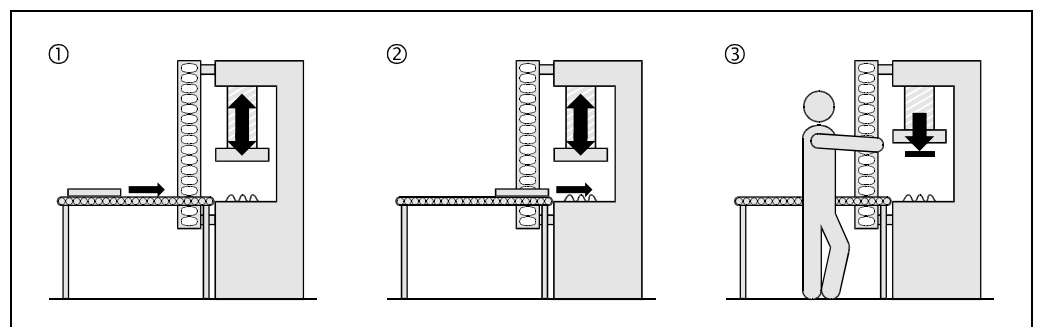
- Notes**
- On devices with a physical resolution of 14 or 20 millimetres, you can set an area positional tolerance for the fixed blanking of maximum  $\pm 2$  beams. This is e.g. helpful when blanking vibrating objects. The effective resolution of the light curtain does not change due to the positional tolerance.
  - In addition you can define a size tolerance of  $-1$  beam, i.e. the blanked object is allowed to be a maximum of 1 beam smaller.
  - Depending on the size tolerance configured, the effective resolution reduces at the edges of the blanked area as per Tab. 11. For this reason the moving area must always be greater than the effective resolution at the edges of the area.
  - If you configure a blanked area *without* positional and *without* size tolerance, the movement of the object within the area is very limited before the safety light curtain may change to red.
  - The maximum selectable tolerance values depend on the size of the blanked area: The actual tolerance expansion in millimetres differs. It depends on the physical resolution of the device.



Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **Blanking** of the appropriate system, option **Type of blanking** = fixed. Here you can also set the positional tolerance and size tolerance directly in millimetres.

#### Increased size tolerance

Fig. 14: Schematic layout of the fixed blanking with increased size tolerance



You can configure an increased size tolerance of the fixed blanking. In this way objects can pass through the protective field on one side of the fixed blanking, e.g. for material feed on

a conveyor belt (① and ②). Configure fixed blanking for the conveyor, for the material input an increased size tolerance above the fixed blanking.

Unlike the normal size tolerance for blanking, the increased size tolerance allows the blanked object on a *specific side* of the area to be *larger* than the blanked area.

In the area of the increased size tolerance, the object can penetrate the protective field if it does not exceed the increased size tolerance defined.

#### Notes

- The increased size tolerance must not cover the last beam.
- On fixed blanking with increased size tolerance, you cannot configure a positional tolerance or a normal size tolerance in addition.

You can expand the increased size tolerance to the next blanked area as a maximum, or to the second or second last beam of the light curtain.

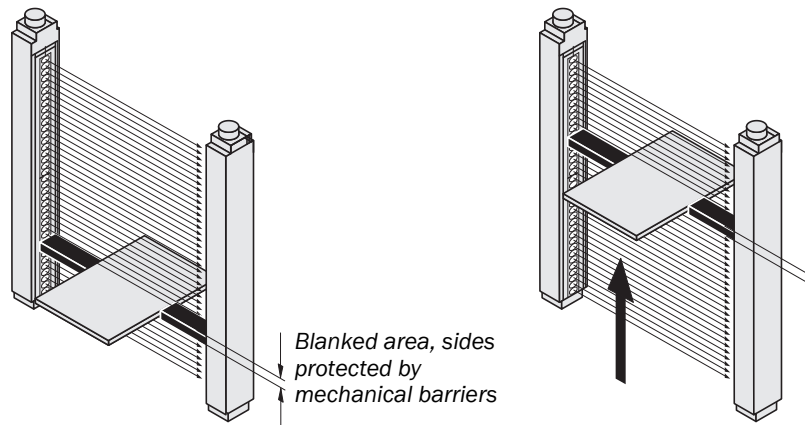


WARNING

#### Blanked areas require a separate risk analysis!

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 minimum distance and mount the safety light curtain appropriately.

Fig. 15: Example of mechanical protection of fixed or floating blanking



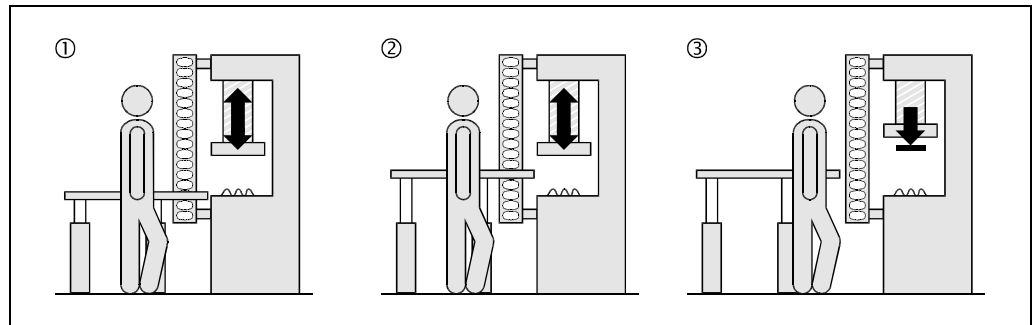
- After modifying the blanking, check the protective field with the test rod. Instructions can be found in chapter 7.3.3 on page 65.
- Also pay attention to the warnings in the related chapter.



Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **Blanking** of the related system, option **Type of blanking** = fixed + increased size tolerance. Here you can adjust the position of the increased size tolerance and the size of this area in millimetres directly.

## 4.8.2 Floating blanking

Fig. 16: Schematic layout of the floating blanking



The C4000 Advanced safety light curtain is capable of blanking an area of two or more adjacent beams (①). In contrast to fixed blanking, the blanked area is allowed to move (②) without the safety light curtain changing to red. The safety light curtain detects whether the object is in the blanked area or not (③, so-called Object monitoring, see below in chapter).

**Notes**

- You cannot combine the function *Floating blanking with partial object monitoring* with the function *Reduced resolution* (see page 36).
- For each floating area with complete object monitoring you must choose a size tolerance of –1 or –2 beams, i.e. the blanked object is allowed to be a maximum total of 1 beam or 2 beams smaller.
- Depending on the size tolerance configured, the effective resolution reduces at the edges of the blanked area as per Tab. 11. For this reason the moving area must always be greater than the effective resolution at the edges of the area.
- The size of the blanked area for floating blanking with complete object monitoring must be at least equal to the effective resolution.
- The size tolerance of –2 beams can be used only in devices with a physical resolution of 14 mm and 20 mm.



Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **Blanking** of the related system, option **Type of blanking** = floating (full) or floating (partial). With the help of the selection fields, the size of the area can be selected directly (in millimetres).

**Object monitoring**

Despite the floating blanking of the area, the safety light curtain monitors whether there are objects in the area with floating blanking. For areas with floating blanking you must configure which type of object monitoring is to apply to the areas:

Tab. 10: Types of object monitoring for floating blanking

| Object monitoring | Description                                                                                                                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Complete          | The blanked area must be completely covered by the object within the size tolerance. If this is not the case, then the safety light curtain switches to red.                                                                                  |
| Partial           | The blanked area does not need to be covered by an object. However within the size tolerance it can be partially or completely covered. If you have configured several areas with floating blanking, then only one area can use this setting. |

**Notes**

- Directly adjacent to the area with floating blanking with partial object monitoring you can only configure areas with fixed blanking.
- During operation an area with floating blanking with *partial* object monitoring is allowed to overlap with an area of fixed blanking *without* positional tolerance.

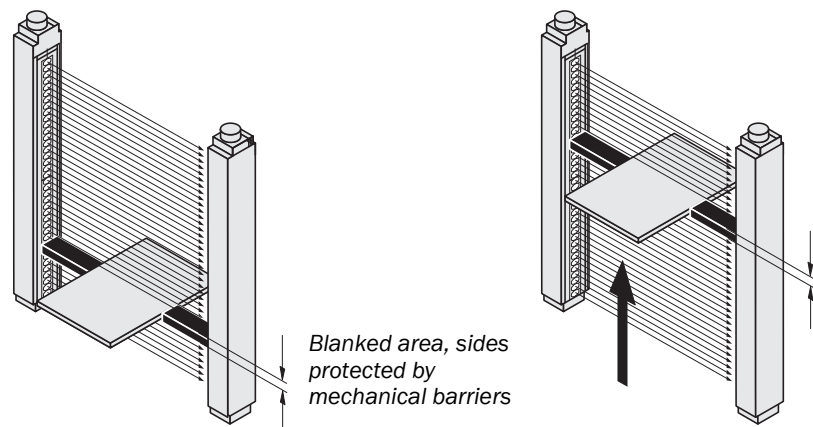


WARNING

**Blanked areas require a separate risk analysis!**

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 minimum distance and mount the safety light curtain appropriately.

Fig. 17: Example of mechanical protection of fixed or floating blanking



- After modifying the blanking, check the protective field with the test rod. Instructions can be found in chapter 7.3.3 on page 65.
- Also pay attention to the warnings in the related chapter.

### 4.8.3 Effective resolution for blanking

The effective resolution of an optical system depends on both its optical components and on its configuration. The effective resolution cannot be higher than the highest possible physical resolution of the system. However, it can be reduced by the configuration, e.g. by blanking beams.

In conjunction with size tolerance, the effective resolution is reduced at the edges of the blanked areas. For blanking with size tolerance, the effective resolution depends on the physical resolution and the size tolerance chosen.



WARNING

#### Check the minimum distance!

When using floating blanking with increased size tolerance, the required minimum distance will depend on the *effective resolution* (see Tab. 11).

➤ If required, recalculate the minimum distance and readjust it on the machine.

Example:

- physical resolution 14 mm
- size tolerance –2 beams
- effective resolution 22 mm

Calculate the minimum distance with a resolution of 22 mm (see page 40).

➤ Mark the effective resolution on the information label “Operation with blanking combined with size tolerance ...” on the related sender and receiver.

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

|                                                                                                                                                               |                      |       |       |              |              |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------|-------|--------------|--------------|--|
| Warning: During operation with “Blanking” combined with “Size tolerance”, the minimum distance that corresponds to the modified resolution is to be observed. |                      |       |       |              |              |  |
| Resolution modified to:<br>(please mark)                                                                                                                      | Physical resolution  |       |       |              |              |  |
|                                                                                                                                                               | 14 mm                | 20 mm | 30 mm | 40 mm        |              |  |
| Size tolerance                                                                                                                                                | Effective resolution |       |       |              |              |  |
| 1 beam                                                                                                                                                        | 14 mm                | ✓     | 20 mm | 40 mm        | 60 mm        |  |
| 2 beams                                                                                                                                                       | 22 mm                |       | 30 mm | Not possible | Not possible |  |
| 4034160                                                                                                                                                       |                      |       |       |              |              |  |

Tab. 11: Effective resolution for blanking with size tolerance

| Physical resolution | Size tolerance | Effective resolution at the edges of the blanked area | Permissible types of blanking |
|---------------------|----------------|-------------------------------------------------------|-------------------------------|
| 14 mm               | Without        | 14 mm                                                 | Fixed                         |
|                     | –1 beam        | 14 mm                                                 | Fixed and floating            |
|                     | –2 beams       | <b>22 mm</b>                                          | Floating                      |
| 20 mm               | Without        | 20 mm                                                 | Fixed                         |
|                     | –1 beam        | 20 mm                                                 | Fixed and floating            |
|                     | –2 beams       | <b>30 mm</b>                                          | Floating                      |
| 30 mm               | Without        | 30 mm                                                 | Fixed                         |
|                     | –1 beam        | <b>40 mm</b> (no PSDI mode)                           | Fixed and floating            |
|                     | –2 beams       | Not permitted                                         | Not permitted                 |
| 40 mm               | Without        | 40 mm                                                 | Fixed                         |
|                     | –1 beam        | <b>60 mm</b>                                          | Fixed and floating            |
|                     | –2 beams       | Not permitted                                         | Not permitted                 |

For floating blanking with partial object monitoring and for fixed blanking with increased size tolerance, a **hole is produced in the protective field** for technical reasons. With the aid of Tab. 12 you can determine the effective resolution of the safety light curtain at this point and the minimum size of an object to ensure that the safety light curtain reliably switches to red.

Tab. 12: Effective resolution for floating blanking with partial object monitoring and for fixed blanking with increased size tolerance

| 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>                                               |
|                     | 22.5 mm                   | 3 beams                     | <b>37 mm</b>                                               |
|                     | $n \times 7.5 \text{ mm}$ | $n$ beams                   | <b><math>(n + 2) \times 7.5 \text{ mm}</math></b>          |
| <b>20 mm</b>        | 10 mm                     | 1 beam                      | <b>30 mm</b>                                               |
|                     | 20 mm                     | 2 beams                     | <b>40 mm</b>                                               |
|                     | 30 mm                     | 3 beams                     | <b>50 mm</b>                                               |
|                     | $n \times 10 \text{ mm}$  | $n$ beams                   | <b><math>(n + 2) \times 10 \text{ mm}</math></b>           |
| <b>30 mm</b>        | 20 mm                     | 1 beam                      | <b>50 mm</b>                                               |
|                     | 40 mm                     | 2 beams                     | <b>70 mm</b>                                               |
|                     | 60 mm                     | 3 beams                     | <b>90 mm</b>                                               |
|                     | $n \times 20 \text{ mm}$  | $n$ beams                   | <b><math>n \times 20 \text{ mm} + 30 \text{ mm}</math></b> |
| <b>40 mm</b>        | 30 mm                     | 1 beam                      | <b>70 mm</b>                                               |
|                     | 60 mm                     | 2 beams                     | <b>100 mm</b>                                              |
|                     | 90 mm                     | 3 beams                     | <b>130 mm</b>                                              |
|                     | $n \times 30 \text{ mm}$  | $n$ beams                   | <b><math>n \times 30 \text{ mm} + 40 \text{ mm}</math></b> |

- Mark the effective resolution on the information label “Operation with reduced resolution or blanking ...” on the related sender and receiver.

Fig. 19: Marking the effective resolution on the device label

Warning: During operation with “Reduced resolution” or “Blanking” the minimum distance that corresponds to the modified resolution is to be observed.

|                                          |                                                 |         |       |        |
|------------------------------------------|-------------------------------------------------|---------|-------|--------|
| Resolution modified to:<br>(please mark) | <b>Physical resolution</b>                      |         |       |        |
|                                          | 14 mm                                           | 20 mm   | 30 mm | 40 mm  |
| <b>Reduction</b>                         | <b>Effective resolution/minimum object size</b> |         |       |        |
| 1 beam                                   | 22 mm                                           | ✓ 30 mm | 50 mm | 70 mm  |
| 2 beams                                  | 30 mm                                           | 40 mm   | 70 mm | 100 mm |
| 3 beams                                  | 37 mm                                           | 50 mm   | 90 mm | 130 mm |
| $n$ beams                                | mm                                              | mm      | mm    | mm     |

4034160

#### 4.8.4 Teach-in of blanked areas

Teach-in enables the operator to re-define the size of blanked areas in a simple manner by introducing an object of appropriate size into the protective field at the required position. This is, e.g., useful during a tool change.

##### Requirements

To be able to use the teach-in function, the application must meet the following requirements:

- A reset button is connected to the C4000 Advanced and is correctly configured (see chapter 6.7 “Reset button” on page 58).
- A teach-in key-operated switch or a comparable tamper-proof device, e.g. an MMI with password protection is connected to the C4000 Advanced (see section 6.8 “Teach-in key-operated switch” on page 59).
- As an option you can connect a switch for deactivating blanking to the C4000 Advanced (see section 6.8 “Teach-in key-operated switch” on page 59).
- You have already configured the number and type of blanked areas as well as the tolerances with the aid of the CDS.
- You have activated the option **Teach-in key-operated switch active** in the CDS:



Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **General**, option **Teach-in key-operated switch active**.

##### Limits for teach-in operation

- You can only activate the teach-in function for the entire system. It is not possible to limit the teach-in to specific sub-systems (host, guest), specific areas, or specific operating modes.
- Teach-in is not available in connection with C4000 Guest devices with M12 system connection (type code C46).



WARNING

##### Prevent teach-in in areas or operating modes where it is not intended to be used!

A successfully completed teach-in process changes the size and, for fixed blanking, also the position of the blanked areas. Areas of unsuitable size or in an unsuitable position can reduce the availability of the system. For this reason:

- Ensure by means of organisational measures that the operator only teaches in those areas and only in those operating modes that are also suitable in relation to the application.
- Ensure that only authorised persons have access to the teach-in key.

- You cannot add or delete any blanked areas using teach-in. Use the CDS to define the number of blanked areas.
- If you use a SICK switching amplifier (e.g. UE402) in conjunction with an operating mode selector switch, then the change in the operating mode is effective when the teach-in key-operated switch has been set to the “Operation” position again. The taught-in areas always apply for the operating mode that was set when the teach-in key-operated switch was switched on.
- The mounting position can change slightly on a device change. For this reason it is recommended in this case to teach-in the areas again.

**This is how you teach-in a blanked area:**

- Set the teach-in key-operated switch to the “Teach-in” position.  
The safety light curtain changes to red.
- Guide the object or objects into the protective field.  
You must guide an object of suitable size into the protective field for all blanked areas.  
There must be no other objects in the protective field.
- Press the reset button for at least 0.2 seconds.  
After the button is released, the C4000 Advanced saves the interrupted part of the protective field as a blanked area. The 7-segment display on the receiver indicates  if the objects represent valid areas to be blanked.

**Note**

If the number or arrangement of the objects does not match the configured areas for the individual system, or the necessary minimum distance is not met, then the old areas for the system remain valid. In this case the 7-segment display on the receiver indicates . You can correct the arrangement and repeat the step.

- Set the teach-in key-operated switch back to the “Operation” position, and remove the key. The safety light curtain performs a switch on cycle (see page 63) and is ready for use.

**WARNING****Test the protective device after teach-in!**

- Test the entire protective device for effectiveness (see 7.3 on page 64).
- Check whether the safety light curtain behaves as expected when you introduce the object into the protective field, remove it again, or operate the system without the object.
- If required, recalculate the minimum distance and readjust it on the machine.



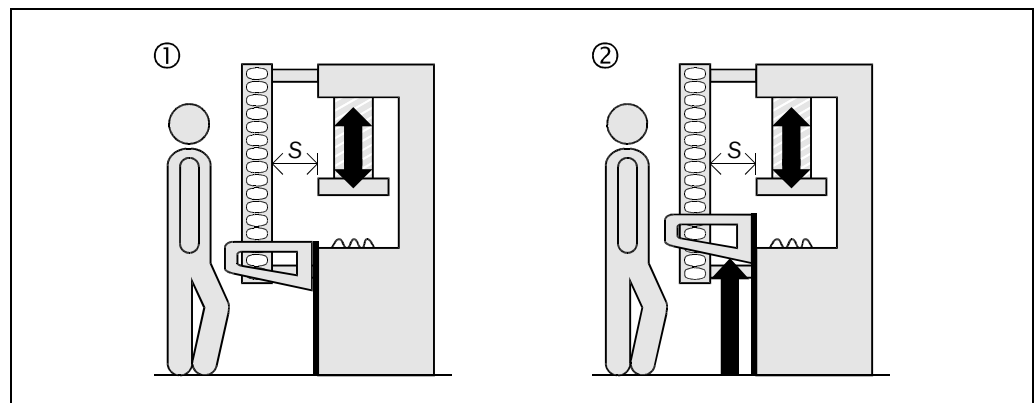
With the aid of the CDS diagnostics function, you can check whether defined areas have been changed using teach-in. Menu **Project, Connect**. Then device symbol for the related system, context menu **Diagnostics, Show**.

**4.9 Reduced resolution****Note**

The reduced resolution function is only available on the C4000 Advanced.

Under reduced resolution, the safety light curtain ignores the interruption of 1, 2 or 3 adjacent beams. Objects which are not larger than specified in Tab. 13 may be moved through the safety light curtain without the light curtain changing to red (Fig. 20, ① and ②).

Fig. 20: Schematic layout of the operation with reduced resolution.  
(Example: reduction by one beam)



**C4000 Standard/Advanced**

Tab. 13: Effective resolution and maximum size of moving objects under reduced resolution

| Physical resolution | Reduction | Effective resolution | Maximum size of movable objects |
|---------------------|-----------|----------------------|---------------------------------|
| 14 mm               | 1 beam    | 22 mm                | 10 mm                           |
|                     | 2 beams   | 30 mm                | 18 mm                           |
|                     | 3 beams   | 37 mm                | 25 mm                           |
| 20 mm               | 1 beam    | 30 mm                | 14 mm                           |
|                     | 2 beams   | 40 mm                | 24 mm                           |
|                     | 3 beams   | Not possible         | –                               |

**Notes**

- The reduced resolution function can only be used with the C4000 Advanced with a physical resolution of 14 mm and 20 mm.
- The first beam of the light curtain (close to the 7-segment display) must not be interrupted. Otherwise, the safety light curtain will change to red.
- The system response time does not change under reduced resolution.
- You cannot combine the function *Reduced resolution* with the function *Floating blanking with partial object monitoring* (see page 32).
- With reduced resolution, the 7-segment display indicates  as soon as sender and receiver are aligned.

**WARNING****Check the minimum distance!**

The minimum distance required under reduced resolution depends on the *effective* resolution.

- If required, recalculate the minimum distance and readjust it on the machine.

Example: – physical resolution 14 mm  
 – resolution reduced by 1 beam  
 – effective resolution 22 mm

Calculate the minimum distance with a resolution of 22 mm. (See page 40.)

- Mark the effective resolution on the information label “Operation with reduced resolution or blanking ...” on the related sender and receiver.

Fig. 21: Marking the effective resolution on the device label



Warning: During operation with “Reduced resolution” or “Blanking” the minimum distance that corresponds to the modified resolution is to be observed.

|                                          |                                          |    |       |    |       |    |        |    |
|------------------------------------------|------------------------------------------|----|-------|----|-------|----|--------|----|
| Resolution modified to:<br>(please mark) | Physical resolution                      |    |       |    |       |    |        |    |
|                                          | 14 mm                                    |    | 20 mm |    | 30 mm |    | 40 mm  |    |
| Reduction                                | Effective resolution/Minimum object size |    |       |    |       |    |        |    |
| 1 beam                                   | 22 mm                                    | ✓  | 30 mm |    | 50 mm |    | 70 mm  |    |
| 2 beams                                  | 30 mm                                    |    | 40 mm |    | 70 mm |    | 100 mm |    |
| 3 beams                                  | 37 mm                                    |    | 50 mm |    | 90 mm |    | 130 mm |    |
| n beams                                  |                                          | mm |       | mm |       | mm |        | mm |

4034160



Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **Host** or **Guest** for the related system, option **Reduced resolution**. Here you can adjust the effective resolution in millimetres directly.

## 4.10 Sender test

The C4000 sender has a test input on pin 3 for checking the sender and the related receiver. During the test, the sender no longer emits light beams. Thus, it simulates — for the receiver — an interruption of the protective field.

- During the test the sender indicates .
- The test is successful, if the C4000 receiver switches to red, i.e. the output signal switching devices (OSSDs) are deactivated. In a cascade this only applies for the host.

**Note** C4000-Sender and receiver are self-testing and do not require any external sender test. You can deactivate the sender test with the aid of the CDS, if the test is not required for the current application.

To be able to perform a sender test ...

- the option **Enable sender test** must be active. This is the condition as supplied.
- a means of controlling the test input must be available.



Device symbol **C4000 Host (sender)**, context menu **Configuration draft, Edit**, option **Enable sender test**.

**Note** If you do not connect the test input, then you must deactivate the **Sender test** function with the aid of the CDS. Otherwise the safety light curtain will be permanently switched to red.

The electrical connection at the test input is described in chapter 6.12 “Test input (sender test)” on page 62.

### 4.11 Functions that cannot be combined

Tab. 14: Functions that cannot be combined

| Function that can be configured                              | Limitation                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Teach-in key-operated switch on the M26 extension connection | <ul style="list-style-type: none"> <li>Emergency stop function or Bypass can only be used in conjunction with a SICK switching amplifier (teach-in on the switching amplifier, emergency stop/bypass on the C4000)</li> </ul>                                                                                                                    |
| Emergency stop on the M26 extension connection               | <ul style="list-style-type: none"> <li>Teach-in or Bypass only possible in conjunction with SICK switching amplifier. It is possible to connect either an emergency stop signal, a key-operated pushbutton for bypass or a teach-in key-operated switch</li> </ul>                                                                               |
| Bypass on the M26 extension connection                       | <ul style="list-style-type: none"> <li>The Emergency stop or the Teach-in function can only be used in conjunction with a SICK switching amplifier (teach-in on the switching amplifier, emergency stop on the C4000)</li> </ul>                                                                                                                 |
| Reduced resolution                                           | <ul style="list-style-type: none"> <li>Not with <i>floating blanking with partial object monitoring</i></li> <li>Not with <i>fixed blanking and increased size tolerance</i></li> </ul>                                                                                                                                                          |
| Floating blanking with partial object monitoring             | <ul style="list-style-type: none"> <li>Not with <i>floating blanking with partial object monitoring</i></li> <li>Cannot be used if a neighbouring area uses <i>floating blanking with complete object monitoring</i></li> <li>Not with <i>fixed blanking and increased size tolerance</i></li> <li>Not with <i>reduced resolution</i></li> </ul> |
| Floating blanking with complete object monitoring            | <ul style="list-style-type: none"> <li>Cannot be used if a neighbouring area uses <i>floating blanking with partial object monitoring</i></li> <li>Not with <i>fixed blanking with increased size tolerance</i></li> </ul>                                                                                                                       |
| Fixed blanking with increased size tolerance                 | <ul style="list-style-type: none"> <li>Not with <i>floating blanking with partial object monitoring</i></li> <li>Not with <i>floating blanking with complete object monitoring</i></li> <li>Not with <i>reduced resolution</i></li> </ul>                                                                                                        |

## 5 Installation and mounting

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

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

The following steps are necessary after mounting and installation:

- making the electrical connections (chapter 6)
- aligning sender and receiver unit (chapter 7.2)
- checking the installation (chapter 7.3)

### 5.1 Determining the minimum distance

The safety light curtain must be mounted with the correct minimum distance

- from the hazardous point
- from reflective surfaces



WARNING

---

#### No protection without correct minimum distance!

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

---

#### 5.1.1 Minimum distance from the hazardous point

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

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

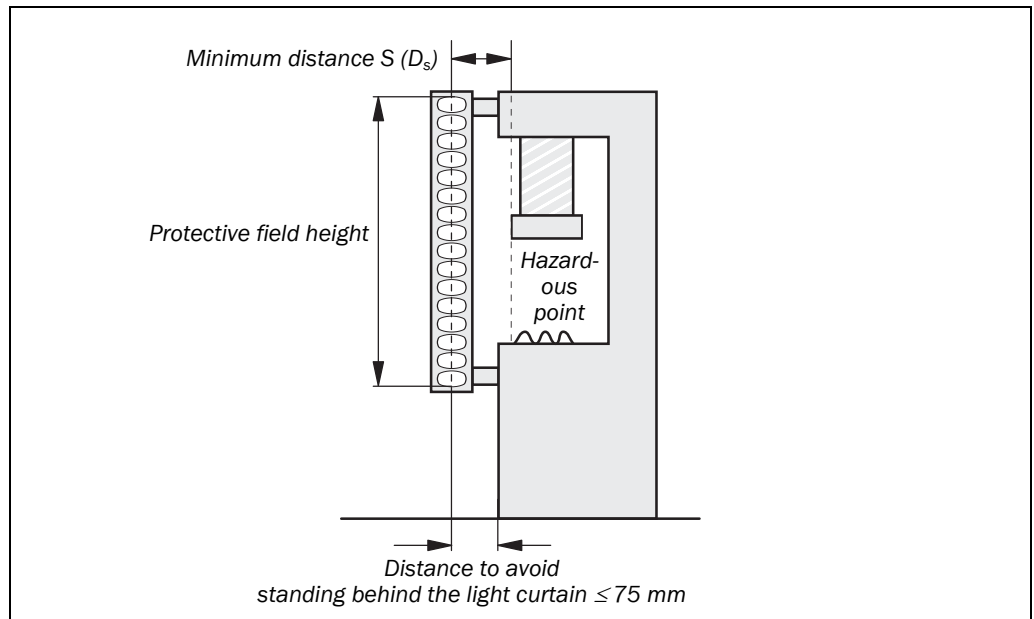
- stopping/run-down time of the machine or system  
(The stopping/run-down time is shown in the machine documentation or must be determined by taking a measurement.)
- response time of the entire protective device, e.g. C4000 consisting of host and guest (response times, see chapter "Response time" on page 79)
- reach or approach speed
- resolution of the light curtain and/or beam separation
- other parameters that are stipulated by the standard depending on the application

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

- stopping/run-down time of the machine or system  
(The stopping/run-down time is shown in the machine documentation or must be determined by taking a measurement.)
- response time of the entire protective device, e.g. C4000 consisting of host and guest (response times, see chapter "Response time" on page 79)
- reach or approach speed
- other parameters that are stipulated by the standard depending on the application

**C4000 Standard/Advanced**

Fig. 22: Minimum distance from the hazardous point



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

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

➤ First, calculate S using the following formula:

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

Where ...

T = Stopping/run-down time of the machine

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

d = Resolution of the light curtain [mm]

S = Minimum distance [mm]

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

➤ If the result S is  $\leq 500$  mm, then use the determined value as the minimum distance.

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

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

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

➤ If the new value S is  $\leq 500$  mm, then use 500 mm as the minimum distance.

**Example:**

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

Response time after light path interruption = 30 ms

Resolution of the light curtain = 14 mm

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

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

$S > 500$  mm, therefore:

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

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

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

➤ Calculate  $D_s$  using the following formula:

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

Where ...

$D_s$  = The minimum distance in inches (or millimetres) from the hazardous point to the detection point, plan or zone

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

$T_s$  = Stopping time of the machine tool measured at the final control element

$T_c$  = Response time of the control system

$T_r$  = Response time of the presence-sensing device and its interface

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

**Note** Any additional time delays must be accounted for in this calculation.

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

**Example:**

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

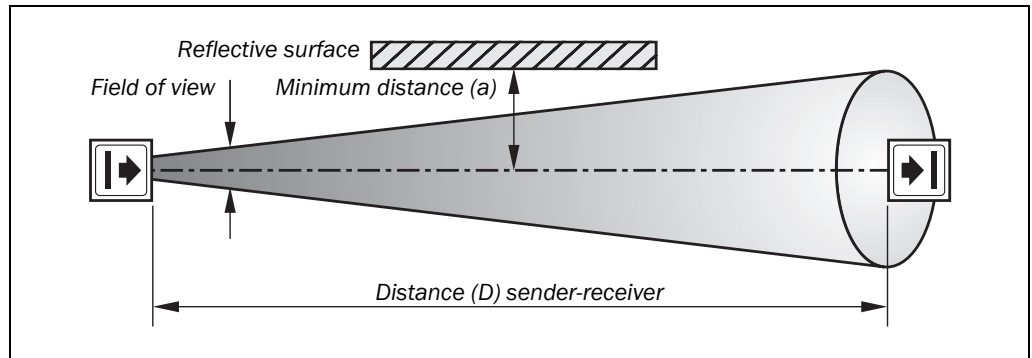
$$D_{pf} \text{ (inches)} = 3.4 \times (\text{object sensitivity} - 0.276), \text{ but not less than } 0.$$

### 5.1.2 Minimum distance to reflective surfaces

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

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

Fig. 23: Minimum distance from reflective surfaces

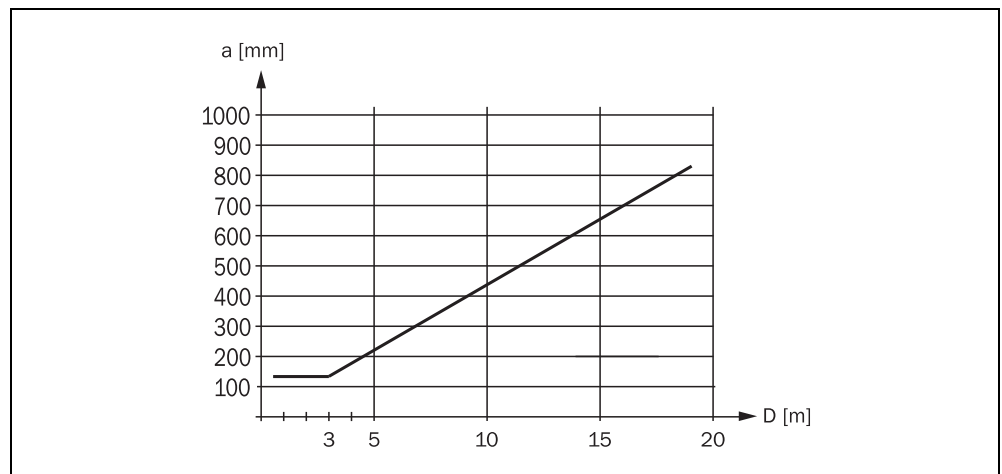


**Note** The field of view of the sender and receiver optics is identical.

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

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

Fig. 24: Graph, minimum distance from reflective surfaces



**Note** If under any circumstances the minimum distance to reflective surfaces in the application can not be achieved, there are measures to minimize the amount of deflection and the resulting reduction of the resolution of the safety light curtain.

To verify whether these measures are sufficient to minimize the residual risk caused by the reduction of the resolution of the safety light curtain, an overall risk assessment of the application needs to be done by the manufacturer of the machine.

For further information or support please contact SICK.

## 5.2 Steps for mounting the device

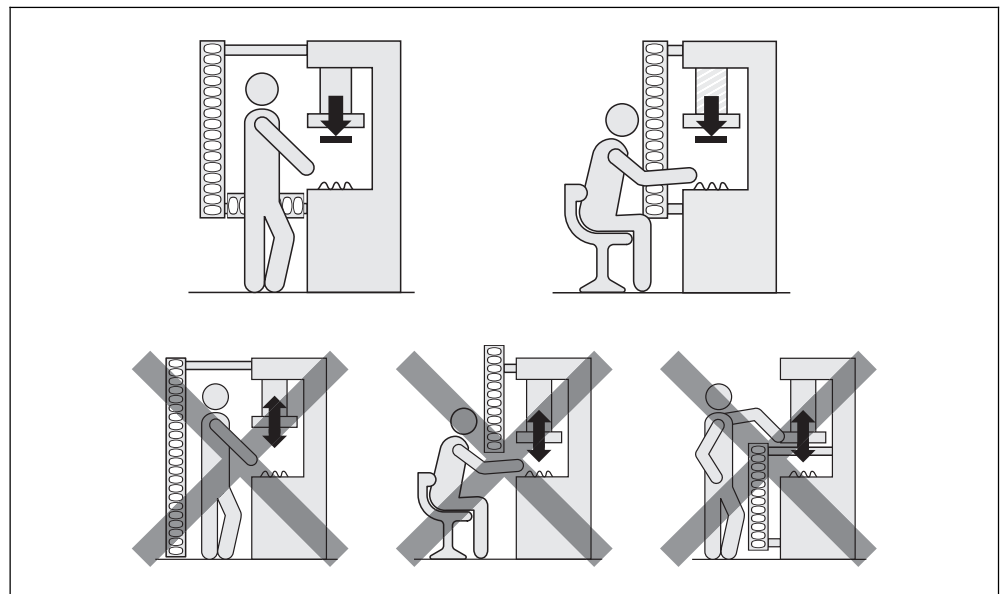


WARNING

### Special features to note during mounting:

- Always mount the sender and receiver parallel to one another.
- During mounting, make sure that sender and receiver are aligned correctly. The optical lens systems of sender and receiver must be located in exact opposition to each other; the display elements must be mounted at the same height. The system plugs of both devices must point in the same direction.
- Take suitable measures to attenuate vibration if the shock requirements are above the values given in chapter 11.1 “Data sheet” on page 77.
- Observe the minimum distance of the system during mounting. On this topic read the chapter “Determining the minimum distance” on page 40.
- Connect a maximum of three systems into a cascaded system.
- Always connect sender-sender and receiver-receiver within a system configuration.
- Mount the safety light curtain such that the hazardous point cannot be reached from below, above or behind the safety light curtain and that the light curtain cannot be repositioned.

Fig. 25: The correct installation (above) must eliminate the errors (below) standing behind, reaching below and reaching above



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

Sender and receiver can be mounted in two different ways:

- mounting with swivel mount bracket
- mounting with side bracket

### 5.2.1 Mounting with swivel mount bracket

The swivel mount bracket is made of black polyamide PA6. The bracket is designed such that sender and receiver can still be accurately aligned even after the bracket has been mounted.

The swivel mount bracket is also suitable for mounting the deflector mirrors PNS75 and PNS125 (see chapter 11.5.9f. on page 91f.).

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

Fig. 26: Composition of the swivel mount bracket

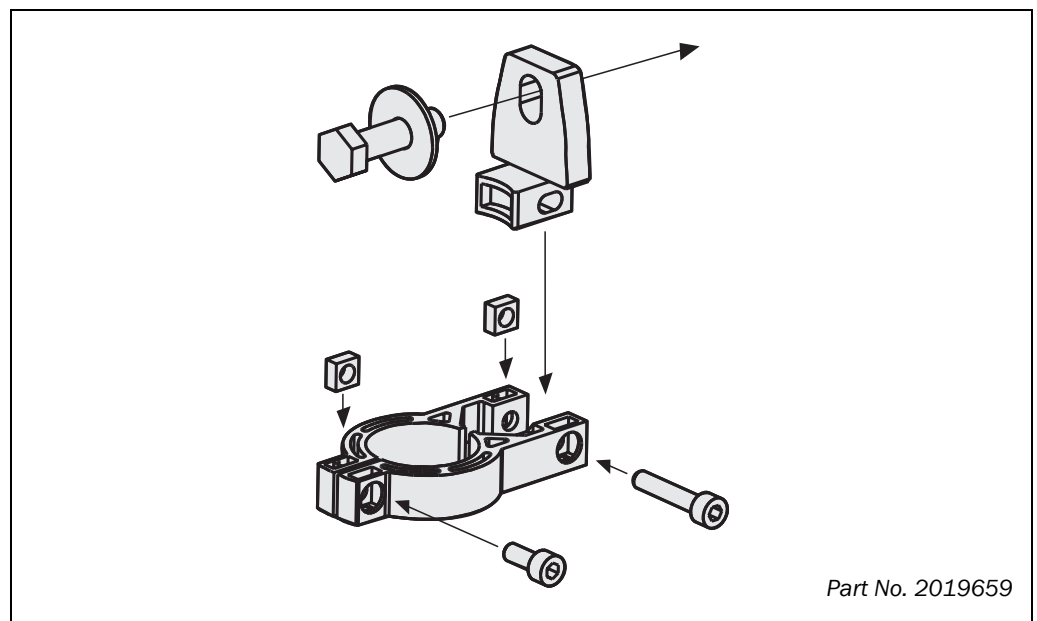
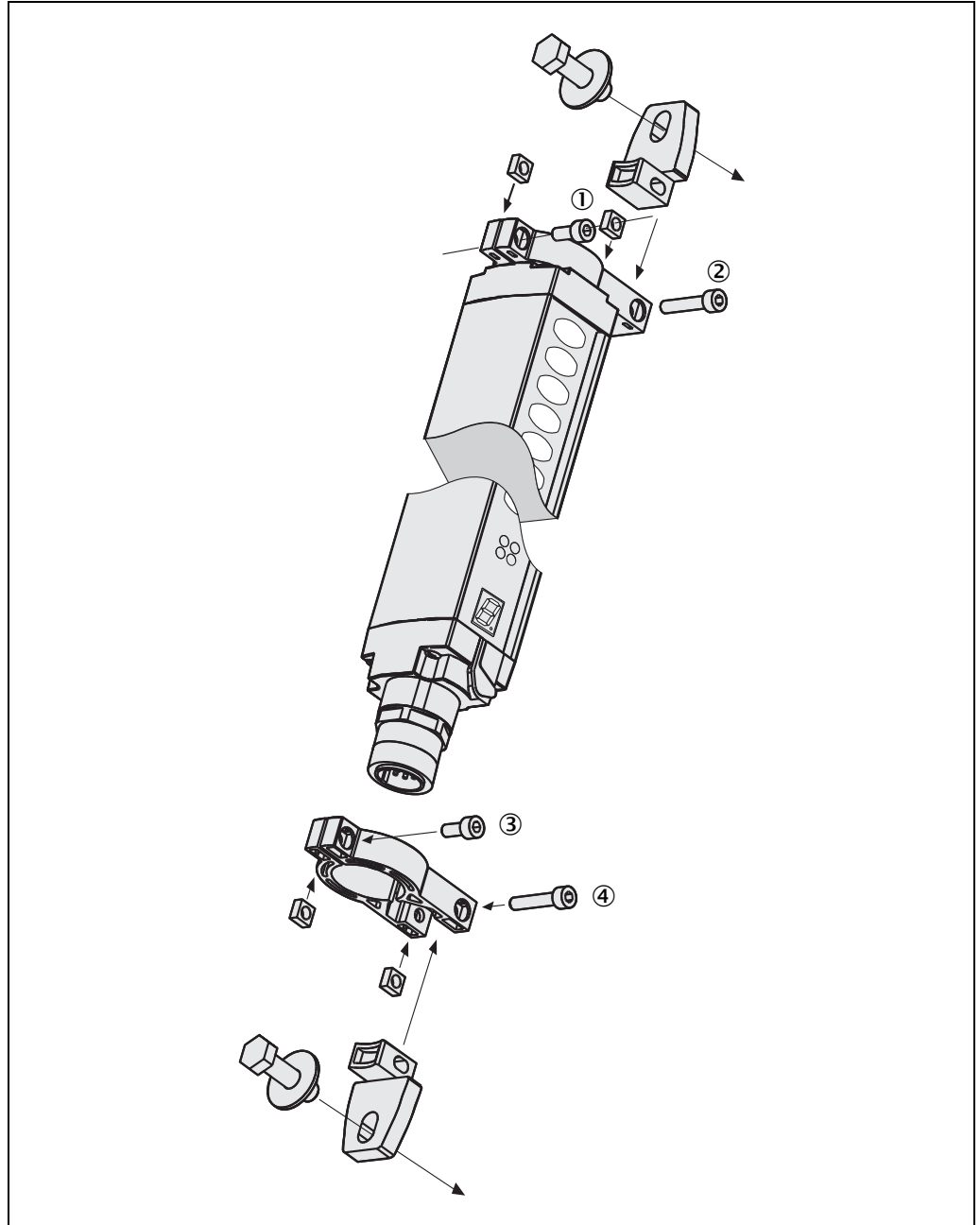


Fig. 27: Mounting sender and receiver using swivel mount brackets

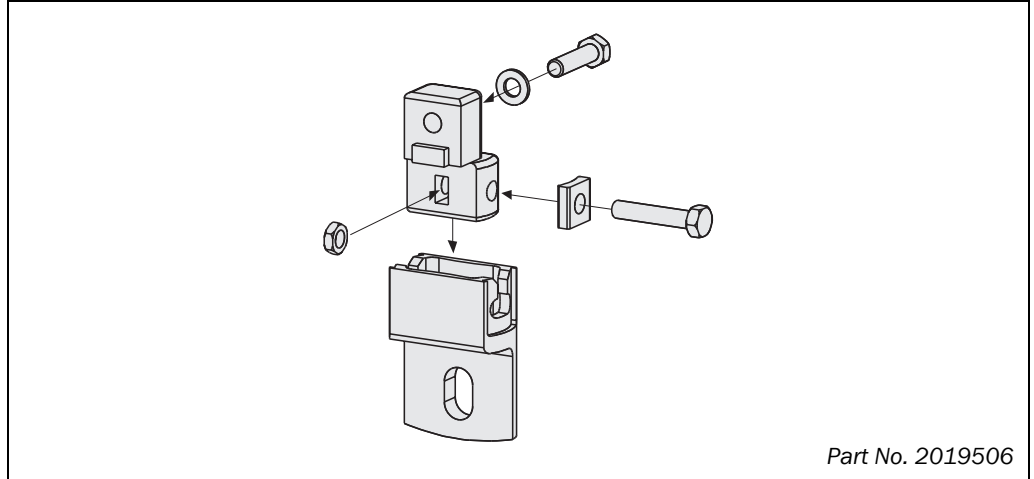


- Notes**
- Mount the bolts marked with ① to ④ on the operator side of the system to ensure that they remain accessible after mounting and to allow you to readjust the safety light curtain later, if necessary.
  - If you wish to use the additional front screen (see “Additional front screen (weld spark guard)” on page 110), make sure that the curved side of the device remains accessible after mounting.

**5.2.2 Mounting with side bracket**

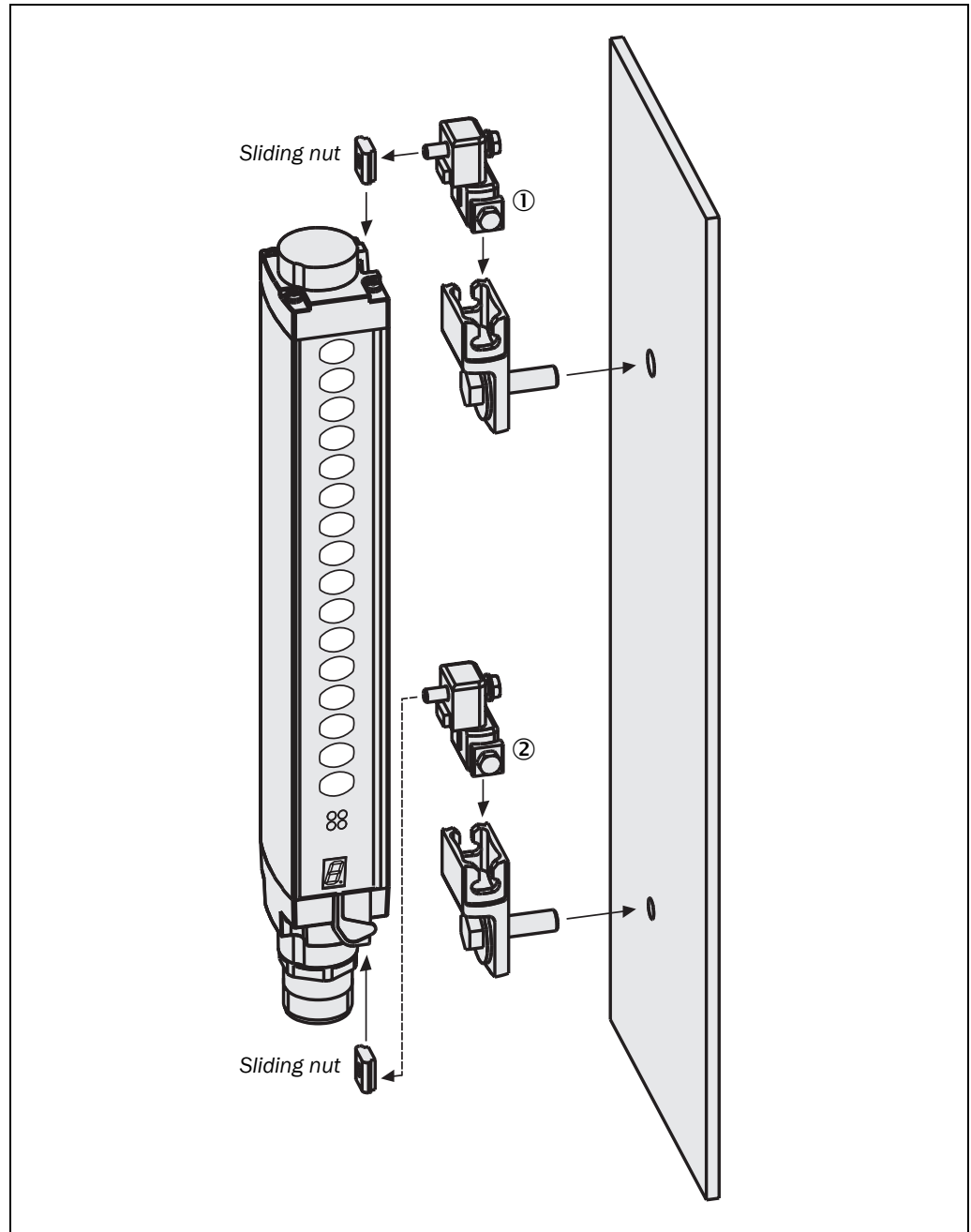
The side bracket is made of die cast zinc ZP 0400. It is enamelled in black. The side bracket will be covered by the device after mounting. But it is only suitable for mounting surfaces lying parallel to the desired protective field because the alignment of sender and receiver can only be adjusted by a maximum of  $\pm 2.5^\circ$  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.
  - When mounting the bracket, note the distance and the position of the sliding nuts as described in chapter 11.5 “Dimensional drawings” on page 84f.

Fig. 29: Mounting the C4000 with side bracket

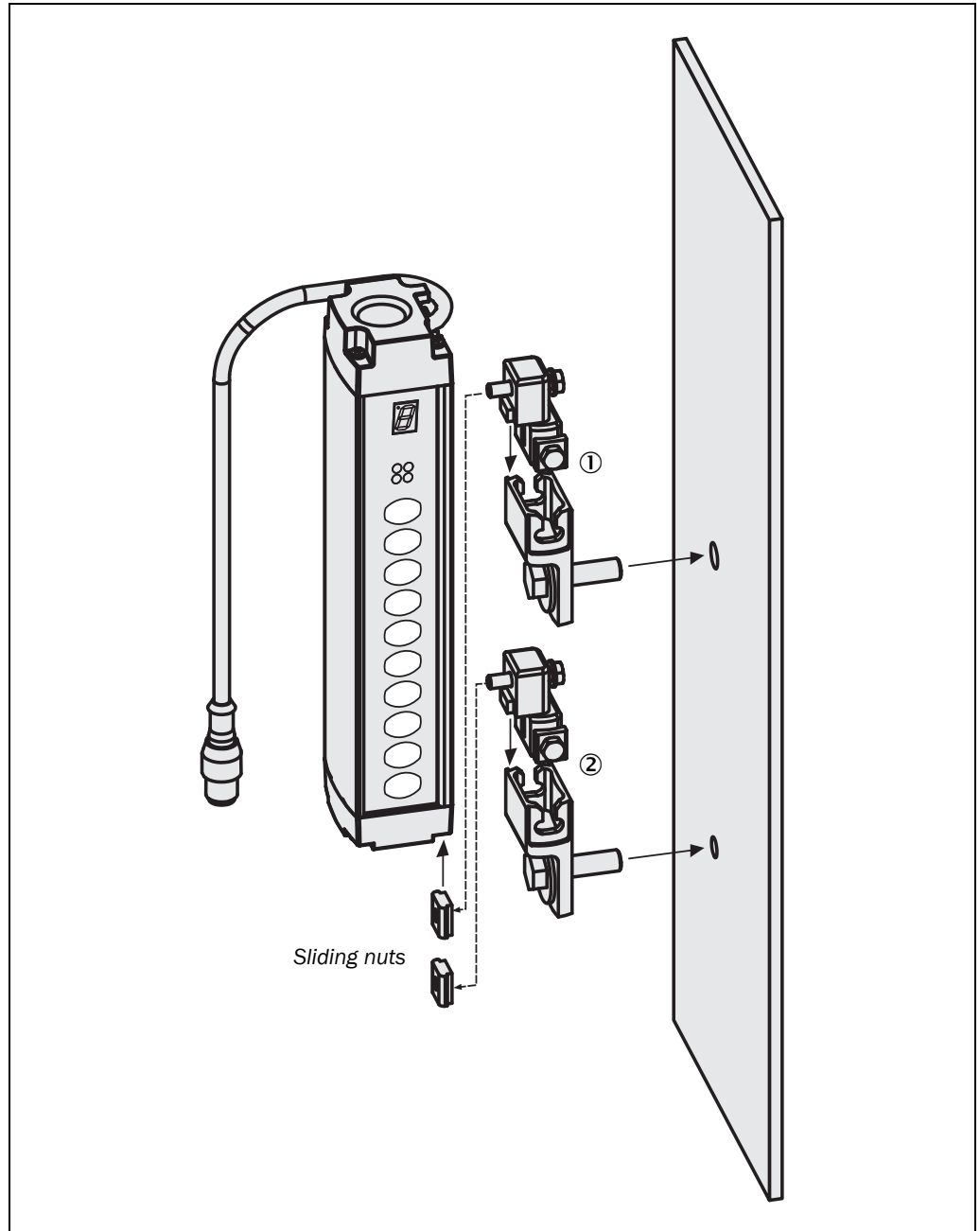


- Notes**
- When mounting the side bracket make sure that the bolts marked ① and ② remain accessible, allowing you later to adjust and lock the safety light curtain in position.
  - If you wish to use the additional front screen (see “Additional front screen (weld spark guard)” on page 110), make sure that the curved side of the device remains accessible after mounting.

**5.2.3 Mounting the C4000 Guest with 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.
  - When mounting the bracket, note the distance and the position of the sliding nuts as described in chapter 11.5.5 “C4000 Standard/Advanced Guest” on page 88.

Fig. 30: Mounting the C4000 with side bracket



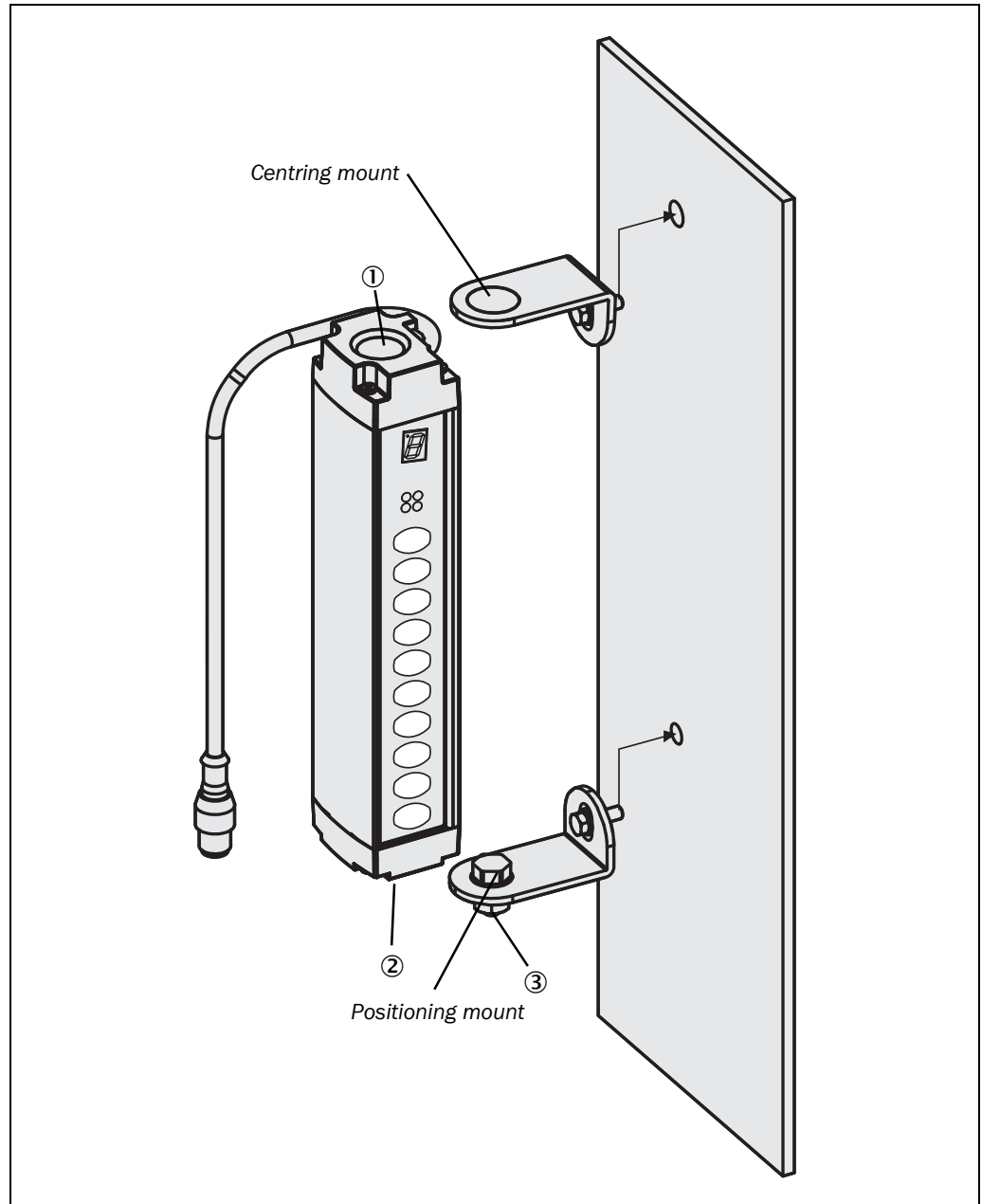
- Notes**
- When mounting the side bracket ensure that the bolts marked ① and ② remain accessible, allowing you later to adjust and lock the light curtain in position.

#### 5.2.4 Mounting the C4000 Guest with swivel mount bracket Guest

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

The advantages of this bracket are quick and easy assembly. If the C4000 Guest needs to be replaced, then by undoing the top bracket in the drawing ("centring mount"), the need to re-align the replacement device can be avoided. The lock nut defines the alignment (positioning mount).

Fig. 31: Mounting sender and receiver using swivel mount brackets



The curvature on the centring mount fits exactly in the recess on the C4000 Guest ①. The head on the hexagon screw on the positioning mount fits exactly in the hex socket on the C4000 Guest ②.

- Align sender and receiver.
- Then lock the hexagon screw on the positioning mount using the nut ③.

## 6 Electrical installation



WARNING

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

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

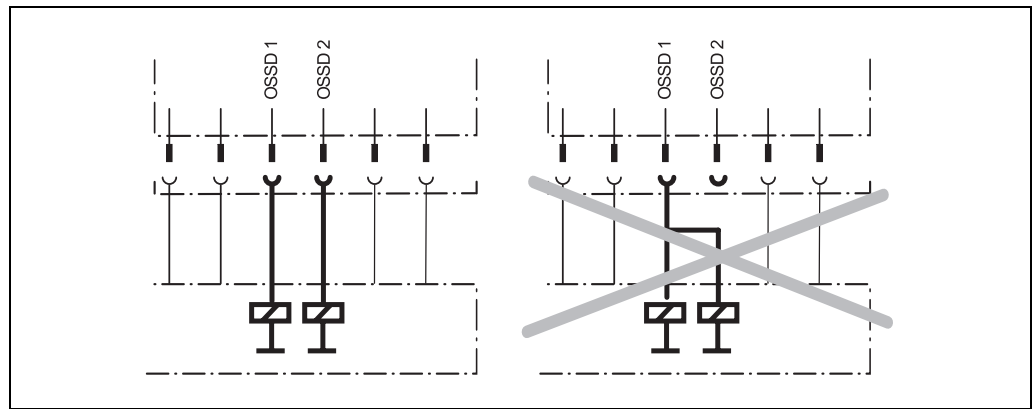
- Ensure that the entire machine/system is disconnected during the electrical installation.

### Connect OSSD1 and OSSD2 separately!

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

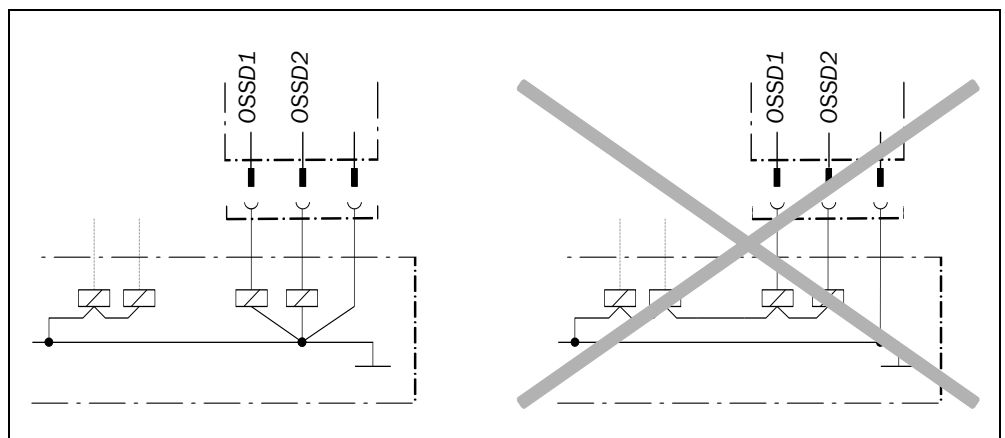
- Ensure that the machine controller processes the two signals separately.

Contactors connected in series must be positively guided and monitored (see section 6.6 “External device monitoring (EDM)” on page 57).



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

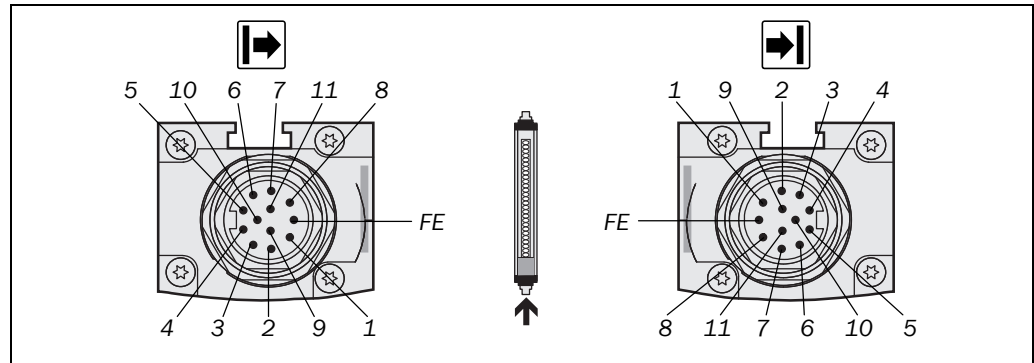
- If you connect loads that are not reverse-polarity protected to the OSSDs or the safety outputs, you must connect the 0 V connections of these loads and those of the corresponding protective device individually and directly to the same 0 V terminal strip. This is the only way to ensure that, in the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



- Notes**
- The two outputs are protected against short-circuits to 24 V DC and 0 V. When the light path is clear, the signal level on the outputs is HIGH DC (at potential), when the light beams are interrupted or there is a device fault the outputs are LOW DC.
  - The safety light curtain C4000 meets the interference suppression requirements (EMC) for industrial use (interference suppression class A). When used in residential areas it can cause interference.
  - To ensure full electromagnetic compatibility (EMC), functional earthing (FE) must be connected.
  - The external voltage supply of the 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 12.7 “Accessories” on page 111).
  - System connections and extension connections in a cascaded system must be connected only if the system is off line. The configuration connection however, may be connected/disconnected with the system on line.

## 6.1 System connection M26 × 11 + FE

Fig. 32: Pin assignment  
system connection  
M26 × 11 + FE



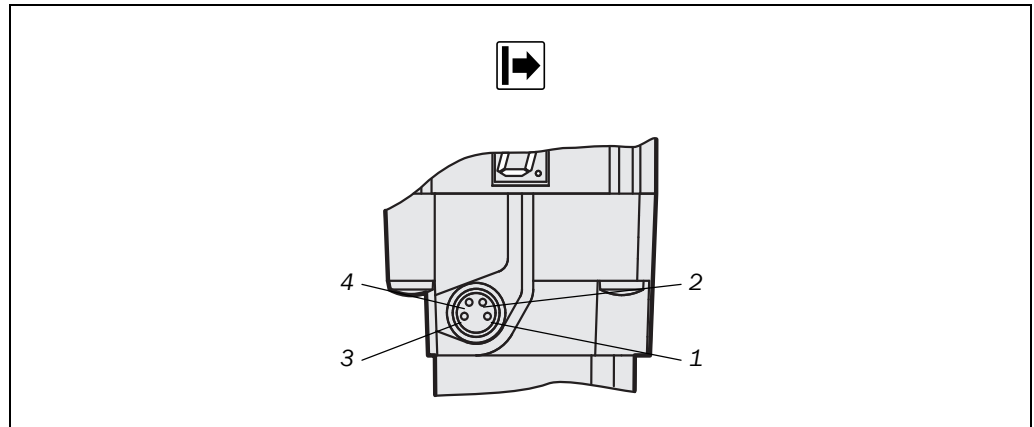
Tab. 15: Pin assignment  
system connection  
M26 × 11 + FE

| Pin | Wire colour | Sender                                                                   | Receiver                                 |
|-----|-------------|--------------------------------------------------------------------------|------------------------------------------|
| 1   | Brown       | 24 V DC input (voltage supply)                                           | 24 V DC input (voltage supply)           |
| 2   | Blue        | 0 V DC (voltage supply)                                                  | 0 V DC (voltage supply)                  |
| 3   | Grey        | Test input:<br>0 V: external test active<br>24 V: external test inactive | OSSD1 (output signal switching device 1) |
| 4   | Pink        | Reserved                                                                 | OSSD2 (output signal switching device 2) |
| 5   | Red         | Reserved                                                                 | Reset/restart                            |
| 6   | Yellow      | Reserved                                                                 | External device monitoring (EDM)         |
| 7   | White       | Reserved                                                                 | Signal output (ADO)                      |
| 8   | Red/blue    | Reserved                                                                 | Output <i>Reset required</i>             |
| 9   | Black       | Device communication (EFL <sub>A</sub> )                                 | Device communication (EFL <sub>A</sub> ) |
| 10  | Purple      | Device communication (EFL <sub>B</sub> )                                 | Device communication (EFL <sub>B</sub> ) |
| 11  | Grey/pink   | Input host/guest SEL                                                     | Input host/guest SEL                     |
| FE  | Green       | Functional earthing                                                      | Functional earthing                      |

- Notes**
- For the connection of pin 9 and 10 only use cable with twisted cores, e.g. the SICK connection cables available as accessories (see chapter 12.7 “Accessories” on page 111).
  - If you do not use EFI device communication, to improve the EMC behaviour we recommend, especially on cascaded systems, the termination of the pin 9 and 10 connections (EFI device communication) on the system connection in the control cabinet using a resistor of 182  $\Omega$  (see section 12.7 “Accessories” on page 111).

## 6.2 Configuration connection M8 × 4 (serial interface)

Fig. 33: Pin assignment  
configuration connection  
M8 × 4



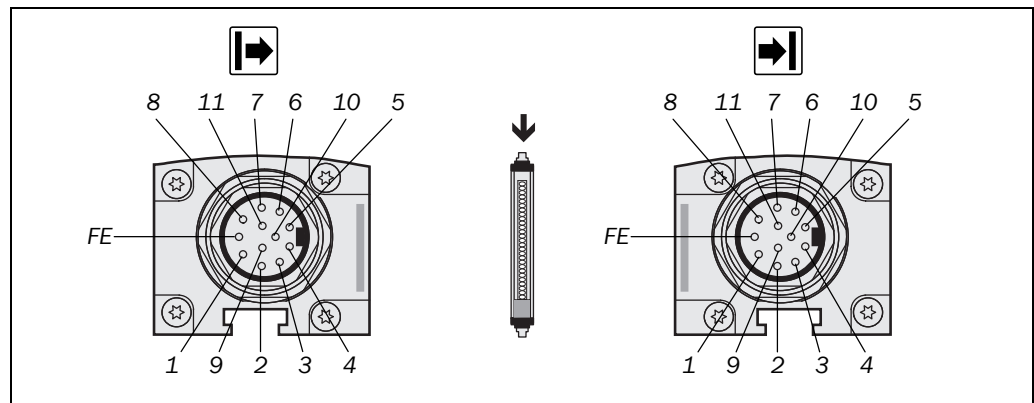
Tab. 16: Pin assignment  
configuration connection  
M8 × 4

| Pin | Sender/Receiver         | PC-side RS-232-D-Sub |
|-----|-------------------------|----------------------|
| 1   | Not assigned            |                      |
| 2   | RxD                     | Pin 3                |
| 3   | 0 V DC (voltage supply) | Pin 5                |
| 4   | TxD                     | Pin 2                |

- Notes**
- The pin assignment of sender and receiver is identical.
- After configuration always remove the connecting cable from the configuration connection!
  - After the configuration of the device has been completed, locate the attached protection cap to cover the configuration connection.

### 6.3 Extension connection M26 × 11 + FE

Fig. 34: Pin assignment  
extension connection  
M26 × 11 + FE



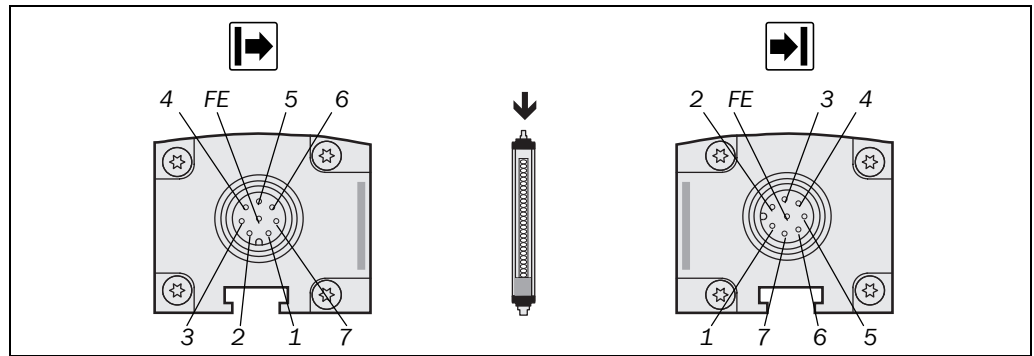
Tab. 17: Pin assignment  
extension connection  
M26 × 11 + FE

| Pin | Wire colour | ☛ Sender                                 | ☛ Receiver                                                             |
|-----|-------------|------------------------------------------|------------------------------------------------------------------------|
| 1   | Brown       | 24 V DC output (voltage supply)          | 24 V DC output (voltage supply)                                        |
| 2   | Blue        | 0 V DC (voltage supply)                  | 0 V DC (voltage supply)                                                |
| 3   | Grey        | Reserved                                 | Input emergency stop/bypass/switch for deactivating the blanking       |
| 4   | Pink        | Reserved                                 | Input emergency stop/bypass/teach-in                                   |
| 5   | Red         | Reserved                                 | Reset/restart                                                          |
| 6   | Yellow      | Reserved                                 | Test output emergency stop/bypass/teach-in                             |
| 7   | White       | Reserved                                 | Test output emergency stop/bypass/switch for deactivating the blanking |
| 8   | Red/blue    | Reserved                                 | Output <i>Reset required</i>                                           |
| 9   | Black       | Device communication (EFl <sub>A</sub> ) | Device communication (EFl <sub>A</sub> )                               |
| 10  | Purple      | Device communication (EFl <sub>B</sub> ) | Device communication (EFl <sub>B</sub> )                               |
| 11  | Grey/pink   | Output host/guest SEL                    | Output host/guest SEL                                                  |
| FE  | Green       | Functional earthing                      | Functional earthing                                                    |

- Notes**
- The plug alignment (direction of turn) in the housing may vary from device to device. You can identify the correct pin assignment by the position of the pins in relation to each other as shown in the drawings.
  - If you do not connect any further safety light curtain to an extension connection, then you must also not connect any cable to pins 9 and 10.
  - If the extension connection is no longer required, always screw the attached protective cap over the extension connection.

## 6.4 Extension connection M12 × 7 + FE

Fig. 35: Pin assignment  
extension connection  
M12 × 7 + FE



Tab. 18: Pin assignment  
extension connection  
M12 × 7 + FE

| Pin | Wire colour | Sender                                   | Receiver                                 |
|-----|-------------|------------------------------------------|------------------------------------------|
| 1   | White       | Output host/guest SEL                    | Output host/guest SEL                    |
| 2   | Brown       | 24 V DC output (voltage supply)          | 24 V DC output (voltage supply)          |
| 3   | Green       | Device communication (EFL <sub>A</sub> ) | Device communication (EFL <sub>A</sub> ) |
| 4   | Yellow      | Device communication (EFL <sub>B</sub> ) | Device communication (EFL <sub>B</sub> ) |
| 5   | Grey        | Reserved                                 | Reserved                                 |
| 6   | Pink        | Reserved                                 | Reserved                                 |
| 7   | Blue        | 0 V DC (voltage supply)                  | 0 V DC (voltage supply)                  |
| FE  | Screen      | Functional earthing                      | Functional earthing                      |

**Note** As there are fewer pins, the following connection options are not available on an extension connection M12 × 7 + FE for the C4000:

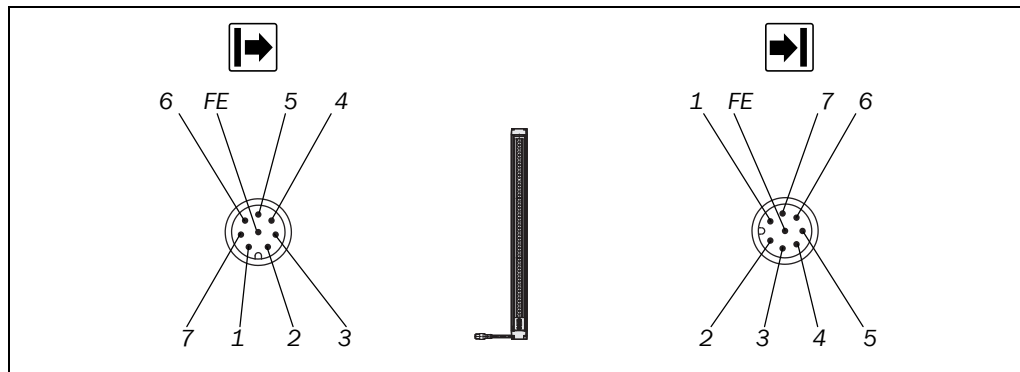
- reset button (can only be connected in the control cabinet)
- teach-in key-operated switch (can only be connected in combination with a SICK switching amplifier; further information can be found in the operating instructions for the switching amplifier)
- key-operated pushbutton for bypass
- emergency stop

## 6.5 System connection C4000 Guest (M12 × 7 + FE)

On the C4000 Guest safety light curtain, a cable with a cable plug M12 × 7 + FE is used for the system connection.

**Note** The C4000 Guest is only allowed to be connected to a C4000 safety light curtain with extension connection M12 × 7 + FE.

Fig. 36: Pin assignment system connection C4000 Guest (M12 × 7 + FE)



Tab. 19: Pin assignment system connection C4000 Guest (M12 × 7 + FE)

| Pin | Wire colour | Sender                                   | Receiver                                 |
|-----|-------------|------------------------------------------|------------------------------------------|
| 1   | White       | Input host/guest SEL                     | Input host/guest SEL                     |
| 2   | Brown       | 24 V DC input (voltage supply)           | 24 V DC input (voltage supply)           |
| 3   | Green       | Device communication (EFI <sub>A</sub> ) | Device communication (EFI <sub>A</sub> ) |
| 4   | Yellow      | Device communication (EFI <sub>B</sub> ) | Device communication (EFI <sub>B</sub> ) |
| 5   | Grey        | Reserved                                 | Reserved                                 |
| 6   | Pink        | Reserved                                 | Reserved                                 |
| 7   | Blue        | 0 V DC (voltage supply)                  | 0 V DC (voltage supply)                  |
| FE  | Screen      | Functional earthing                      | Functional earthing                      |

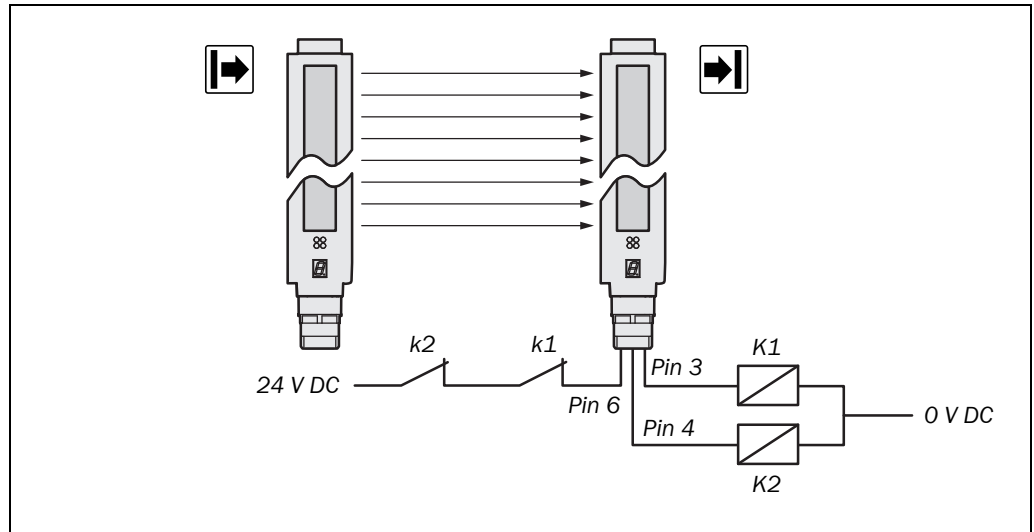
**Note** As the C4000 Guest does not have an extension connection, there are the following limitations on the facilities for connecting a cascaded system to a C4000 Guest:

- A reset button can only be connected in the control cabinet
- A connection to the “Reset required” output can only be made in the control cabinet
- A teach-in key-operated switch can only be connected to a SICK switching amplifier
- A key-operated pushbutton for bypass can only be connected to a SICK switching amplifier
- It is **not** possible to connect an emergency stop

## 6.6 External device monitoring (EDM)

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

Fig. 37: Connecting the contact elements to the EDM



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

### Notes



- If you connect the contact elements to be monitored to the EDM input, then you must activate the option **EDM** in the CDS (Configuration & Diagnostic Software). If not, the device will show the error .
- If you later deselect the **EDM** option, pin 6 of the system plug must not remain connected to 24 V.

## 6.7 Reset button

In the protective operation mode with internal restart interlock (see page 20) the operator must first press the reset button before restarting.



WARNING

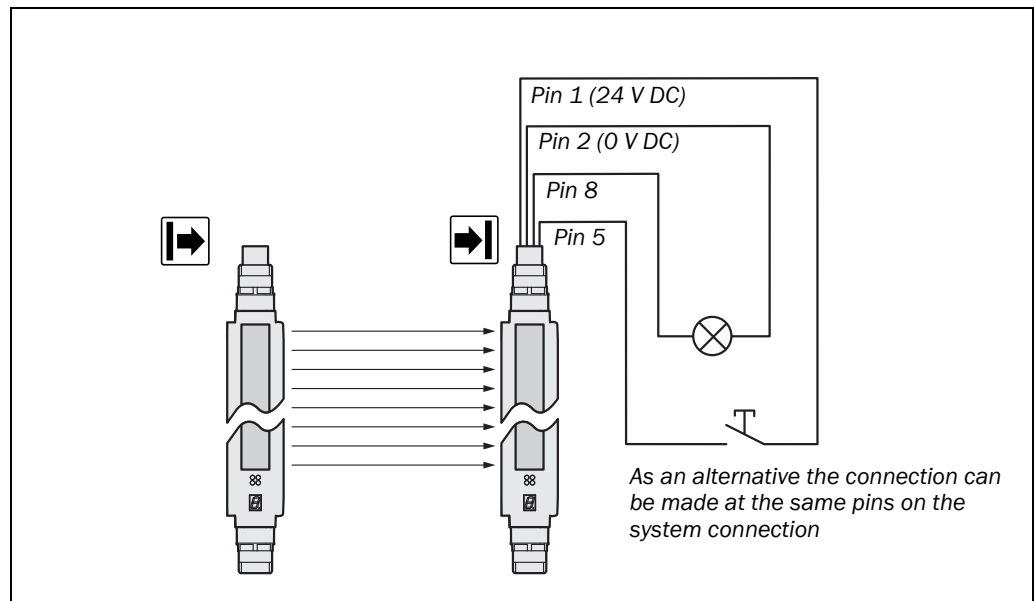
### Select the correct installation site for the reset button!

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

### Recommendation

You can reduce the wiring effort by connecting the reset button directly to the spare extension connection on the receiver. In a cascaded system this is the extension connection on the last receiver.

Fig. 38: Connection of the reset button and the signal lamp "Reset required" to the extension connection



WARNING

### Device configuration after replacement!

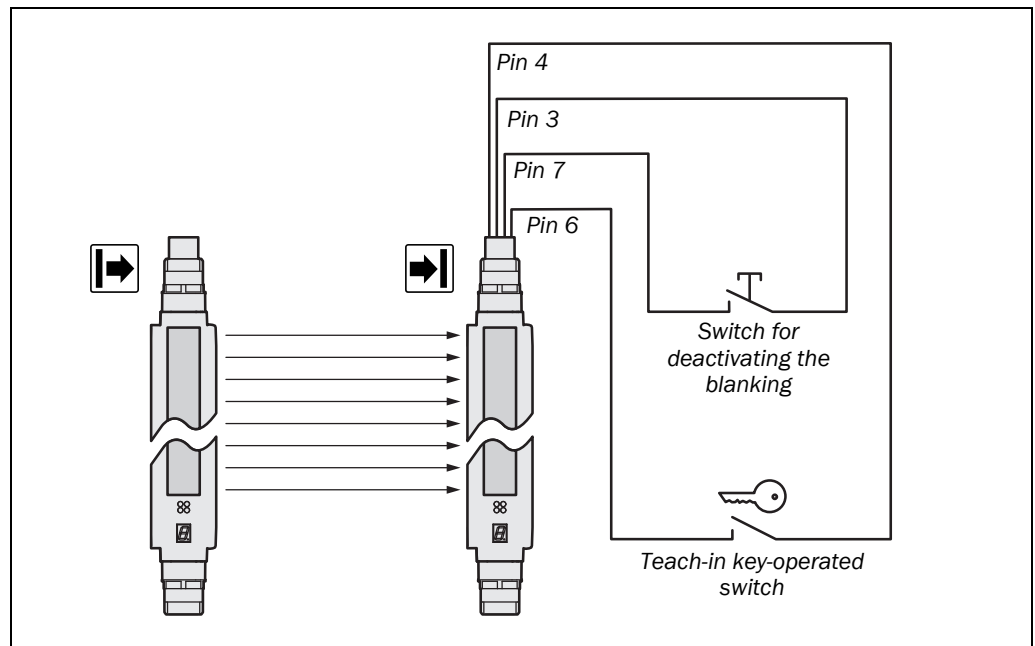
If you replace a safety light curtain with active reset function with a replacement unit, the reset function must again be activated via the software. It is not sufficient to make the electrical connections, because new devices are supplied ex factory with deactivated reset function.

### Connection of a signal lamp to the output *Reset required*

Pin 8 of the extension connection is the output "Reset required" (24 V). You can connect a signal lamp here to indicate this status. The output has a frequency of 1 Hz.

## 6.8 Teach-in key-operated switch

Fig. 39: Connection of an external teach-in key-operated switch



- Notes**
- Instead of the teach-in key-operated switch a comparable tamper-proof device, e.g. an MMI (Man-Machine-Interface) with password protection can be connected.
  - For teach-in a reset button must be connected to the C4000 (see chapter 6.7 “Reset button” on page 58).
  - If you connect a teach-in key-operated switch to the C4000, then you can no longer use the emergency stop function or the bypass function in the C4000.
  - If you use a SICK switching amplifier, then you can also connect the teach-in key-operated switch to the switching amplifier. There is more information in the operating instructions for the switching amplifier.
  - On a cascaded system with a C4000 Guest or a C4000 without extension connection as the last guest, you can only connect the teach-in key-operated switch to a switching amplifier.
- Ensure that only authorised persons have access to the teach-in key.



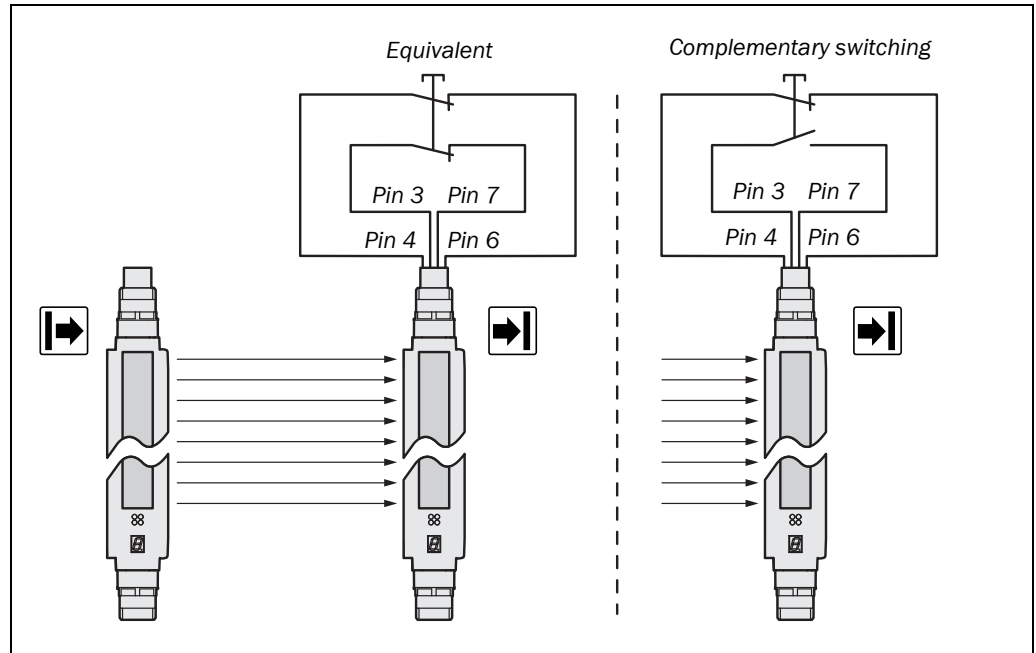
Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **General**, option **Teach-in key-operated switch active**.

## 6.9 Emergency stop

The emergency stop input has two channels. The emergency stop monitoring in the device corresponds to stop category 0 in accordance with EN ISO 13850. Switch off at the emergency stop input (see page 23) has the same effect as reaching into the protective field. You can connect the emergency stop input e.g. to a door switch.

The emergency stop signal can be connected to the same connections as the key-operated pushbutton for bypass instead of the key-operated pushbutton for bypass.

Fig. 40: Possible methods of connection of a door switch or similar to the emergency stop input



You can design the two-channel button as equivalent (N/C, N/C) or complementary (N/O, N/C). You must configure the C4000 as appropriate with the aid of the CDS. If the configuration and the electrical connection do not match, the system locks completely (lock-out). The 7-segment display will then show the error message .

**Note** If you connect an emergency stop signal to the C4000, then it is no longer possible to connect a key-operated pushbutton for bypass, as the pushbutton uses the same connections.



Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, file card **General**, option **Emergency stop active**.



**WARNING**

### Device configuration after replacement!

If you replace a safety light curtain with the emergency stop function active, then you must transfer the configuration to the device again. It is not sufficient to make the electrical connections, because new devices are supplied ex factory with deactivated Emergency stop function.

## 6.10 Key-operated pushbutton for bypass

The bypass function may only be activated by a key-operated pushbutton with an automatic reset and two levels or by two input signals that are independent of each other, e.g. two position switches.

The key-operated pushbutton for bypass is connected to the same connections as the emergency stop signal instead of the emergency stop signal. You can design it also as equivalent (N/C / N/C) or complementary (N/O / N/C). See section 6.9 “Emergency stop” on page 60.

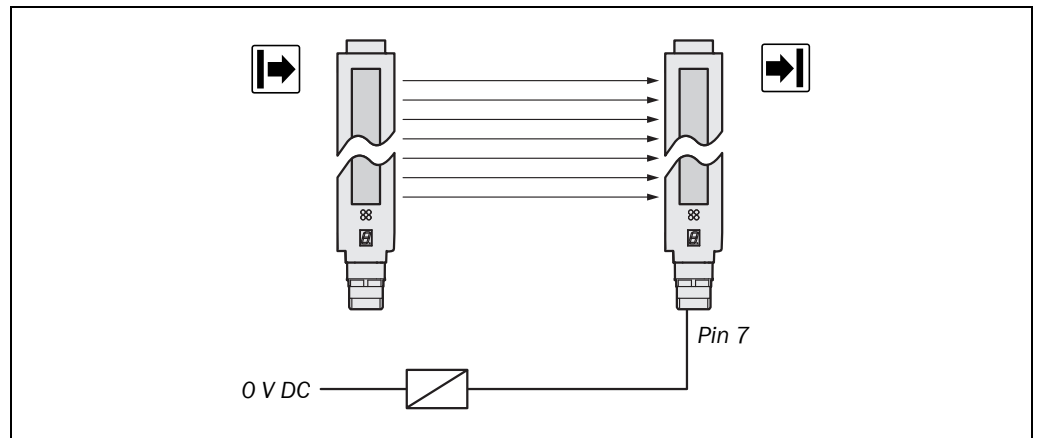
- Notes**
- Mount the key-operated pushbutton for bypass in such a way that the hazardous point is completely visible when the key-operated pushbutton is used.
  - The key-operated pushbutton for bypass must have volt-free contacts.
  - When you connect the key-operated pushbutton for bypass to the C4000, you can connect a teach-in key-operated switch only to the UE402. An emergency stop signal can therefore no longer be connected, as it uses the same connections.
  - On a cascaded system with a C4000 Guest or a C4000 without extension connection as the last guest, you can only connect the key-operated pushbutton for bypass to a switching amplifier.
  - You must configure the switching mode of the key-operated pushbutton for bypass to comply with the selected switch type (N/C / N/O or N/O / N/O) with the aid of the CDS:  
Device symbol **C4000 Host (receiver)**, context menu **Configuration draft, Edit**, selection **System**, file card **General**, option **Key-operated pushbutton for bypass**.



## 6.11 Signal output (ADO)

Pin 7 on the system connector is a signal output (ADO). You can use this output for a relay or a PLC.

Fig. 41: Connection to the signal output



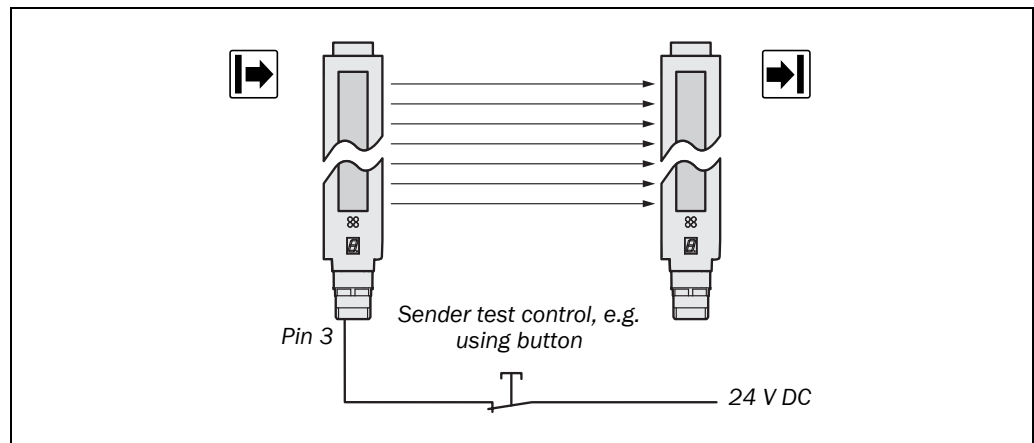
If you connect the signal output, then you must configure it with the aid of the CDS prior to commissioning. Details can be found in chapter 4.5 “Signal output (ADO)” on page 25.

**Note**     **Device configuration after replacement!**

If you replace a safety light curtain on which the signal output (ADO) is connected, then you must transfer the configuration to the device again. It is not sufficient to make the electrical connections, because new devices are supplied ex factory with the signal output deactivated.

## 6.12 Test input (sender test)

Fig. 42: Connection of the sender test button



The sender test is performed when 0 V is present at the test input (pin 3).



To be able to use the sender test button, you must also configure the **Sender test** function with the aid of the CDS: Device symbol **C4000 Host (sender)**, context menu **Configuration draft, Edit**, option **Enable sender test**.

**Note** If you do not connect the test input, then you must deactivate the **Sender test** function with the aid of the CDS. Otherwise, the safety light curtain remains permanently red.

## 6.13 sens:Control applications

Using sens:Control, the intelligent interface technology for safety systems, SICK provides you with an entire range of interface products that were specially developed for interfacing safety products and machines.

For complex applications the C4000 can be integrated into UE100 sens:Control family safety systems. In this way the functions of the safety light curtain can be enhanced and corresponding applications realised.

All C4000 Standard/Advanced variants are equipped with an EFI (safe SICK device communication). All safety-relevant signals are transmitted using this interface. A bus interface to a safe fieldbus is possible using the series UE1000 Intelliface device family.

**Note** You will find example circuits in the operating instructions for the series UE100 and UE1000.

# 7 Commissioning



WARNING

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

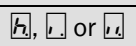
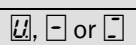
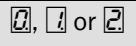
Before you operate a system protected by the C4000 safety light curtain for the first time, make sure that the system is first checked and released by qualified safety personnel. Please read the notes in chapter "On safety" on page 10.

## 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:

Tab. 20: Displays shown during the power-up cycle

| Display                                                                                              | Meaning                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | Testing the 7-segment display. All segments are activated sequentially.                                                                                                                                                                                                                                                                                 |
|                     | Ca. 0.5 s. Is displayed only at the receiver and only in operation with large scanning range.                                                                                                                                                                                                                                                           |
|                     | Only on cascaded systems: Ca. 0.5 s. System operates as host (  ) or as guest 1 (  ) or guest 2 (  . |
|                   | Ca. 0.5 s. Non-coded operation or operation with code 1 or 2.                                                                                                                                                                                                                                                                                           |
| No display<br>or  | The device is operational. Display  appears if the device is operated with reduced resolution and/or with blanking.                                                                                                                                                  |
|                   | Receivers only: Receiver-sender alignment incorrect (see "Aligning sender and receiver").                                                                                                                                                                                                                                                               |
| Other display                                                                                        | Device error. See "Fault diagnosis" on page 68.                                                                                                                                                                                                                                                                                                         |

## 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.

**Note** If you wish to align a cascaded system, always align the individual systems in the following sequence: host, guest 1, guest 2.

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



WARNING

### Secure the plant/system. No dangerous movement possible!

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

- Loosen the clamping bolts which hold the light curtain in place.
- Switch on the power supply to the light curtain.
- Watch the alignment information on the 7-segment display of the receiver (see Tab. 21). Correct the alignment of the sender and receiver, until the 7-segment display goes off.
- Using the clamping bolts, fix the light curtain in place.

- Switch the power supply off and then back on again and check via the 7-segment display whether the alignment is correct after tightening the clamping bolts (Tab. 21).

The display values have the following meaning:

Tab. 21: Display values during the alignment of sender and receiver

| Display                                                                                            | Meaning                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   | The receiver cannot synchronise with the sender; the alignment is very poor.                                                                                                                                                                         |
|                   | Some light beams do not hit the receiver.                                                                                                                                                                                                            |
|                   | All the light beams hit the receiver, but the alignment is still slightly off.                                                                                                                                                                       |
| No display<br>or  | The alignment is now true; the devices must be locked in this position.<br>Display  appears if the device is operated with reduced resolution and/or with blanking. |

- Notes**
- If the optimum alignment (= no display) persists for longer than 2 minutes, the system automatically deactivates the alignment mode.
  - If you wish to readjust the alignment later, switch the power supply of the C4000 off and back on again.
  - The host in a cascaded system remains on red until all guests have been correctly aligned.

## 7.3 Test notes

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

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

These tests must therefore always be performed.

### 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 116).
- Ensure that the operating personnel of the machine protected by the safety light curtain are correctly instructed by qualified safety personnel before being allowed to operate the machine. Instructing the operating personnel is the responsibility of the machine owner.
- Annex 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 authorised personnel, using the correct test rod.

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

#### How to check the effectiveness and proper 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 blanking or reduced resolution. 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 14 mm
- operation with resolution reduced by 1 beam
- effective resolution 22 mm

Use the test rod for a resolution of 22 mm.



WARNING

#### Do not operate the machine if the green or yellow LED is lit during the test!

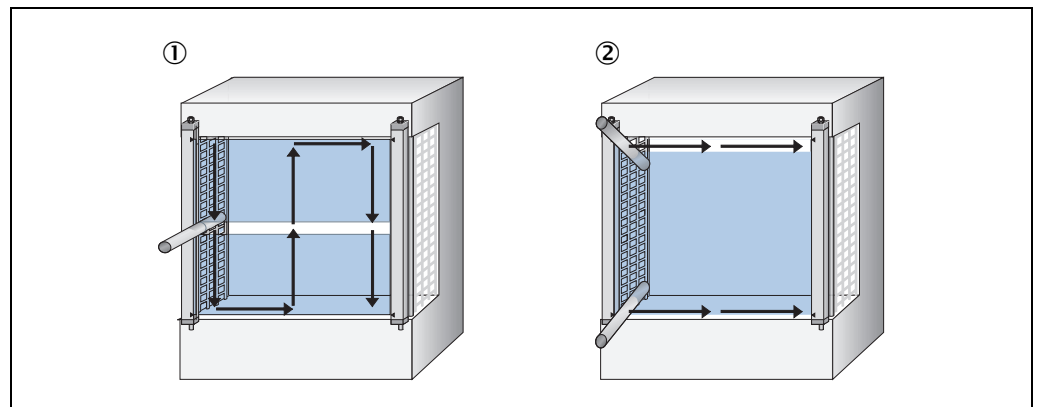
If the green or yellow LED lights up *during the test* even for a short period, work must stop at the machine. In this case the mounting and the configuration of the safety light curtain must be checked by qualified safety personnel (see chapter 5).

- *Before* inserting the test rod, check that the green LED is lit if the internal restart interlock is deactivated or, if the internal restart interlock is activated, that the yellow LED flashes (“Reset required”). If this is not the case, make sure that this condition is reached. The test is otherwise meaningless.

- Move the test rod slowly through the protective field to be tested, as shown in ① in Fig. 43.
- Then move the test rod along the edges of the protective field, as shown in ② in Fig. 43. This procedure allows you to test if the point-of-operation/reaching behind protection is functioning properly (see 5.2 “Steps for mounting the device” on page 44).
- 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 the blanking function (see section 4.8 “Blanking” on page 27), then the protective field is divided into several sections. In this case check **all sections** of the protective field.

**Note** During all tests, only the red LED is allowed to illuminate on the C4000 receiver.

Fig. 43: Daily checks of the protective device



## 8 Configuration

### 8.1 Default delivery status

As delivered the C4000 is configured ready for protective operation. The C4000 Standard without extension connection is also available as an option with the pre-configurations C, D, E, F and R. You can change the pre-configuration at any time with the aid of the CDS.

Tab. 22: Default delivery status of the C4000

| Function that can be configured  | C4000 Standard | C4000 Advanced | C4000 Standard with pre-configuration ... |   |          |   |             |
|----------------------------------|----------------|----------------|-------------------------------------------|---|----------|---|-------------|
|                                  |                |                | C                                         | D | E        | F | R           |
| Restart interlock                | External       | External       | External                                  |   | Internal |   | External    |
| External device monitoring (EDM) | Deactivated    | Deactivated    | Activated                                 |   |          |   | Deactivated |
| Beam coding                      | Non-coded      | Non-coded      | Non-coded                                 |   |          |   |             |
| Blanking                         | None           | None           | None                                      |   |          |   |             |
| Guaranteed scanning range        |                |                |                                           |   |          |   |             |
| 0-2.5 m or 0-6 m                 | ■              | ■              | ■                                         |   | ■        |   |             |
| 2-8 m or 5-19 m                  |                |                |                                           | ■ |          | ■ | ■           |

Tab. 23: Default delivery status of the C4000 Guest

| Function that can be configured | C4000 Standard Guest | C4000 Advanced Guest |
|---------------------------------|----------------------|----------------------|
| Beam coding                     | Non-coded            | Non-coded            |
| Blanking                        | None                 | None                 |
| Guaranteed scanning range       | 0-2.5 m              | 0-6 m                |
| 0-2.5 m or 0-6 m                | ■                    | ■                    |
| 2-8 m or 5-19 m                 |                      |                      |

### 8.2 Preparing the configuration

#### How to prepare the configuration:

- Make sure that the safety light curtain has been correctly mounted and that the electrical connections are correct and in place.
- Plan all required settings (operating mode, beam coding, resolution, cascading etc.)

To configure the safety light curtain, you need:

- CDS (Configuration & Diagnostic Software) on CD-ROM
- user manual for CDS on CD-ROM
- PC/Notebook with Windows NT/2000/XP/Vista and a serial interface (RS-232).  
PC/Notebook not included
- connecting cable for connecting PC and C4000 (SICK part number 6021195)
- To configure the device, please read the user manual for the CDS (Configuration & Diagnostic Software) and use the online help function of the programme.

## 9 Care and maintenance

The safety light curtain C4000 is maintenance-free. The front screen of the safety light curtain C4000 and any additional front screen(s) (see “Additional front screen (weld spark guard)” on page 110) should be cleaned at regular intervals and when dirty.

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

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

**How to clean the front screen and/or the additional front screen (optional extra):**

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

**Note** ➤ After cleaning, check the position of sender and receiver to make sure that the protective device cannot be bypassed (reaching above, below or behind).

➤ Verify the effectiveness of the protective device as described in chapter 7.3 “Test notes” on page 64.

# 10 Fault diagnosis

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

## Recommendation

You can speed up the fault diagnostics of some frequent faults by querying a signal on the signal output on the safety light curtain on the occurrence of the fault. Details can be found in chapter 4.5 "Signal output (ADO)" on page 25.

## 10.1 What to do in case of faults

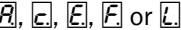


WARNING

### 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 and if you cannot safely remedy the malfunction.

### The system state lock-out

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

- Rectify the cause of the fault as per Tab. 25.
- Switch the power supply for the C4000 off and on again (e.g. by unplugging the system plug 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 agency.

## 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 the chapter 3.4 "Status indicators" on page 18.

Tab. 24: Error displays of the LEDs

| Display                                                                              | Possible cause                           | Remedying the error                                                                                                                                               |
|--------------------------------------------------------------------------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ● <b>Orange</b> LED of receiver lights up                                            | Weak signal                              | <ul style="list-style-type: none"> <li>➤ Check the alignment of sender and receiver.</li> <li>➤ Check the front screen (dirt) and clean, if necessary.</li> </ul> |
| ● <b>Yellow</b> LED of receiver flashes                                              | Reset required                           | <ul style="list-style-type: none"> <li>➤ Press the reset button.</li> </ul>                                                                                       |
| ○ <b>Yellow</b> LED of sender fails to light up                                      | No operating voltage, or voltage too low | <ul style="list-style-type: none"> <li>➤ Check the voltage supply and activate, if necessary.</li> </ul>                                                          |
| ○ <b>Red</b> and ○ <b>Green</b> Neither the red nor the green receiver LED lights up |                                          |                                                                                                                                                                   |

## 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 to the messages. Please refer to chapter 3.4 "Status indicators" on page 18 for a description of the 7-segment display.

Tab. 25: Error displays of the 7-segment display

| Display                                                                                                                                                                | Possible cause                                                                 | Remedying the error                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  or  | Inadequate alignment                                                           | ➤ Re-align sender and receiver (see page 63).<br>The display goes off after 2 minutes.                                                                                                                                                                                                                                                                                      |
|                                                                                       | Configuration incomplete                                                       | ➤ The display goes off automatically once the configuration has been successfully transferred.<br>If display  does not go off:<br>➤ Check the configuration of the system using the CDS (Configuration & Diagnostic Software).<br>➤ Re-transfer the corrected configuration to the system. |
|  or  | EDM error                                                                      | ➤ Check the contactors and their wiring, eliminate any wiring errors, if necessary.<br>➤ If  is displayed, switch the device off and back on again.                                                                                                                                        |
|                                                                                       | Reset button fault                                                             | ➤ Check the reset button for correct function. The button may be defective or stuck.<br>➤ Check the wiring of the reset button/for any short-circuit to 24 V.                                                                                                                                                                                                               |
|                                                                                     | Configuration of the switching amplifier connected (e.g. UE402) is incorrect   | ➤ Configure the switching amplifier connected with the aid of the CDS.<br>➤ Check the connection from the C4000 to the switching amplifier.                                                                                                                                                                                                                                 |
|                                                                                     | Several operating modes configured, but none selected                          | ➤ Check the connection and the function of the operating mode selector switch.<br>➤ Check the connection for the operating mode selector switch on the switching amplifier.                                                                                                                                                                                                 |
|                                                                                     | Several operating modes selected simultaneously                                | ➤ Check the connection and the function of the operating mode selector switch.<br>➤ Check the connection for the operating mode selector switch on the switching amplifier for a short-circuit.                                                                                                                                                                             |
|                                                                                     | Unconfigured operating mode selected                                           | ➤ Configure the operating mode set on the operating mode selector switch, or ensure that this operating mode cannot be selected.                                                                                                                                                                                                                                            |
|                                                                                     | Key-operated push-button for bypass is malfunctioning or invalid configuration | ➤ Check whether the configuration of the key-operated pushbutton for bypass in the CDS matches the electrical connection.<br>➤ Check the function of the key-operated push-button for bypass and replace it if necessary.<br>➤ Ensure that both contacts on the key-operated pushbutton for bypass are pressed within 2 seconds.                                            |

| Display | Possible cause                                                                                                 | Remedying the error                                                                                                                                                                                                                                                                                                                                                                |
|---------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | Short-circuit at the operating mode selector switch                                                            | ➤ Check the operating mode inputs on the switching amplifier connected for short-circuit to 24 V.                                                                                                                                                                                                                                                                                  |
|         | System error                                                                                                   | <ul style="list-style-type: none"> <li>➤ Disconnect the supply voltage to the C4000 for at least 3 seconds.</li> <li>➤ If the problem persists, then have the unit (sender or receiver) replaced.</li> </ul>                                                                                                                                                                       |
|         | Switching amplifier connected (e.g. UE402) is faulty                                                           | <ul style="list-style-type: none"> <li>➤ Interrupt the supply of power to the C4000 and to the switching amplifier for at least 3 seconds.</li> <li>➤ If the problem persists, replace the switching amplifier.</li> </ul>                                                                                                                                                         |
|         | Overcurrent at switching output 1                                                                              | <ul style="list-style-type: none"> <li>➤ Check the contactor. Replace, if necessary.</li> <li>➤ Check the wiring for short-circuit to 0 V.</li> </ul>                                                                                                                                                                                                                              |
|         | Short-circuit at switching output 1                                                                            | ➤ Check the wiring for short-circuit to 24 V.                                                                                                                                                                                                                                                                                                                                      |
|         | Short-circuit at switching output 1                                                                            | ➤ Check the wiring for short-circuit to 0 V.                                                                                                                                                                                                                                                                                                                                       |
|         | Overcurrent at switching output 2                                                                              | <ul style="list-style-type: none"> <li>➤ Check the contactor. Replace, if necessary.</li> <li>➤ Check the wiring for short-circuit to 0 V.</li> </ul>                                                                                                                                                                                                                              |
|         | Short-circuit at switching output 2                                                                            | ➤ Check the wiring for short-circuit to 24 V.                                                                                                                                                                                                                                                                                                                                      |
|         | Short-circuit at switching output 2                                                                            | ➤ Check the wiring for short-circuit to 0 V.                                                                                                                                                                                                                                                                                                                                       |
|         | Short-circuit between switching output 1 and 2                                                                 | ➤ Check the wiring and rectify the error.                                                                                                                                                                                                                                                                                                                                          |
|         | Error on the teach-in key-operated switch, the emergency stop button or the key-operated pushbutton for bypass | <ul style="list-style-type: none"> <li>➤ Check whether the configuration of the teach-in key-operated switch, the emergency stop button or the key-operated pushbutton for bypass in the CDS matches the electrical connection.</li> <li>➤ Check the function of the teach-in key operated switch, the emergency stop button or the key-operated pushbutton for bypass.</li> </ul> |
|         | Invalid configuration of the EDM                                                                               | ➤ Verify that the machine-side EDM is connected correctly.                                                                                                                                                                                                                                                                                                                         |
|         | External sender detected                                                                                       | <ul style="list-style-type: none"> <li>➤ Check the distance from reflective surfaces (page 43) or from other light curtains.</li> <li>➤ If necessary, re-configure the device with another beam coding (page 25) or install non-reflective partitions.</li> </ul>                                                                                                                  |
|         | Connection problem between host and guest                                                                      | ➤ Check the connection between the cascaded devices. If necessary, replace defective cables.                                                                                                                                                                                                                                                                                       |

| Display                                                                           | Possible cause                          | Remedying the error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Communication in cascaded system failed | <ul style="list-style-type: none"> <li>➤ Verify the configuration of the system using the CDS (Configuration &amp; Diagnostic Software). Retransfer the corrected configuration to the system.</li> <li>➤ Check the connection between the cascaded devices. If necessary, replace defective cables.</li> </ul>                                                                                                                                                                                                                                                                  |
|  | Supply voltage too low                  | <ul style="list-style-type: none"> <li>➤ Check the supply voltage and the power supply. If necessary, replace defective components.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|  | Fault in PSDI mode                      | <ul style="list-style-type: none"> <li>➤ Verify the configuration of the system using the CDS (Configuration &amp; Diagnostic Software). Retransfer the corrected configuration to the system.</li> <li>➤ Check the switch for the machine cycle contacts. Ensure that these are correctly connected and configured. Replace this if necessary.</li> </ul>                                                                                                                                                                                                                       |
|  | Fault of a device connected via EFI     | <ul style="list-style-type: none"> <li>➤ Wait a few seconds. Invalid input signals could still be present on the external switching amplifier or bus node.</li> </ul> <p>If the error continues to occur:</p> <ul style="list-style-type: none"> <li>➤ Check the sensors/signals connected to the external device.</li> <li>➤ Check whether the sensor test is configured correctly.</li> <li>➤ Check the connections to the external devices. If necessary, replace defective cables.</li> <li>➤ Carry out a fault diagnosis of the device connected with the C4000.</li> </ul> |

## 10.5 Status indicators on the C4000

Tab. 26: Status indicators of the sender

| Display                                                                             | Meaning                                                                                                                     |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| ● <b>Yellow</b>                                                                     | Supply voltage o.k.                                                                                                         |
|  | System error. Disconnect the supply voltage to the C4000 for at least 3 seconds. If the problem persists, replace the unit. |
|  | The device is in the test mode.                                                                                             |
|  | Non-coded operation (only after switching on)                                                                               |
|  | Operation with code 1 (only after switching on)                                                                             |
|  | Operation with code 2 (only after switching on)                                                                             |
| Other displays                                                                      | All other displays are error messages.                                                                                      |

<sup>1)</sup> This error display only occurs in conjunction with an external switching amplifier or bus node.

Tab. 27: Status indicators of the receiver

| Display                                                                            | Meaning                                                                                                                     |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| ● <b>Orange</b>                                                                    | Cleaning or realignment required                                                                                            |
| ☀ <b>Yellow</b>                                                                    | Reset required (on C4000 Guest has no function)                                                                             |
| ● <b>Red</b>                                                                       | System providing signals for shutting down the machine (output signal switching devices off)                                |
| ● <b>Green</b>                                                                     | System enabled (output signal switching devices on)                                                                         |
|   | Bypass active                                                                                                               |
|   | System error. Disconnect the supply voltage to the C4000 for at least 3 seconds. If the problem persists, replace the unit. |
|   | Poor alignment to sender.                                                                                                   |
|   | Please refer to chapter 7.2 "Aligning sender and receiver" on page 63.                                                      |
|   |                                                                                                                             |
|   |                                                                                                                             |
|   | Operation with large protective field width (only after switching on)                                                       |
|   | Operation with reduced resolution and/or blanking                                                                           |
|   | Non-coded operation (only after switching on)                                                                               |
|   | Operation with code 1 (only after switching on)                                                                             |
|   | Operation with code 2 (only after switching on)                                                                             |
|  | Emergency stop active                                                                                                       |
| Other displays                                                                     | All other displays are error messages.                                                                                      |

## 10.6 Extended diagnosis

The CDS software supplied with the device (Configuration & Diagnostic Software) includes extended diagnostic options. It allows you to narrow down the problem if the error is non-specific or if you experience usage downtime problems. Detailed information to be found ...

- in the online help for the CDS.
- in the user manual for the CDS.

# 11 Technical specifications

## 11.1 Data sheet

Tab. 28: Data sheet C4000

|                                                         | Minimum                                   | Typical              | Maximum |
|---------------------------------------------------------|-------------------------------------------|----------------------|---------|
| <b>General system data</b>                              |                                           |                      |         |
| Type                                                    | Type 4 (EN 61496-1)                       |                      |         |
| Safety integrity level <sup>2)</sup>                    | SIL3 (IEC 61508)                          |                      |         |
| SIL claim limit <sup>2)</sup>                           | SILCL3 (EN 62061)                         |                      |         |
| Category                                                | Category 4 (EN ISO 13849-1)               |                      |         |
| Performance Level <sup>2)</sup>                         | PL e (EN ISO 13849-1)                     |                      |         |
| PFHd (mean probability of a dangerous failure per hour) |                                           |                      |         |
| Standalone system <sup>3)</sup>                         | $15 \times 10^{-9}$                       |                      |         |
| Cascaded system (host/guest)                            | $43 \times 10^{-9}$                       |                      |         |
| Cascaded system (host/guest/guest)                      | $63 \times 10^{-9}$                       |                      |         |
| T <sub>M</sub> (mission time)                           | 20 years (EN ISO 13849)                   |                      |         |
| Protection class                                        | III (EN 50178) <sup>4)</sup>              |                      |         |
| Enclosure rating                                        | IP 65 (EN 60529) <sup>5)</sup>            |                      |         |
| Protective field height, depending on type              | 300 mm to 1800 mm                         |                      |         |
| Resolution, depending on type                           | 14 mm to 40 mm                            |                      |         |
| Protective field width                                  |                                           |                      |         |
| Resolution 14 mm                                        | 0-8 m                                     | 0-10 m <sup>6)</sup> |         |
| Resolution 20, 30 or 40 mm                              | 0-19 m                                    | 0-21 m <sup>6)</sup> |         |
| Supply voltage U <sub>V</sub> at device <sup>7)</sup>   | 19.2 V                                    | 24 V                 | 28.8 V  |
| Residual ripple <sup>8)</sup>                           |                                           |                      | ± 10 %  |
| Synchronisation                                         | Optical, without separate synchronisation |                      |         |
| Power-up delay of sender and receiver before ready      |                                           |                      | 12 s    |

<sup>2)</sup> For detailed information on the safety design of your machine/system, please contact your SICK subsidiary.

<sup>3)</sup> These values apply to systems with a resolution of 14 mm. As a rule systems with other resolutions will achieve better results.

<sup>4)</sup> Safety extra-low voltage SELV/PELV.

<sup>5)</sup> Valid if all plug connections are closed.

<sup>6)</sup> On the utilisation of this protective field width, it must be expected the orange LED will illuminate (cleaning or realignment required). The system then only has a reserve of 30%.

<sup>7)</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>8)</sup> Within the limits of U<sub>V</sub>.

| Minimum | Typical | Maximum |
|---------|---------|---------|
|---------|---------|---------|

 **Sender unit**

|                                           |                                                    |        |                        |
|-------------------------------------------|----------------------------------------------------|--------|------------------------|
| Test input                                |                                                    |        |                        |
| Input voltage <sup>9)</sup> HIGH (active) | 11 V                                               | 24 V   | 30 V                   |
| Input current HIGH                        | 7 mA                                               | 10 mA  | 20 mA                  |
| Switching voltage LOW (inactive)          | -30 V                                              | 0 V    | 5 V                    |
| Input current LOW <sup>9)</sup>           | -3.5 mA                                            | 0 mA   | 0.5 mA                 |
| Response time to test                     | Depending on the number of beams, maximum 150 ms   |        |                        |
| Wavelength of sender                      |                                                    | 950 nm |                        |
| Power consumption                         |                                                    |        | 2 A (host/guest/guest) |
| Weight                                    | Depending on protective field height (see page 82) |        |                        |

<sup>9)</sup> As per IEC 61131-2.

| Minimum | Typical | Maximum |
|---------|---------|---------|
|---------|---------|---------|

### Receiver unit

|                                                                    |                                                                                       |        |                               |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------|-------------------------------|
| Switching outputs (OSSDs)                                          | 2 PNP semiconductor, short-circuit protected <sup>10)</sup> , cross-circuit monitored |        |                               |
| Response time                                                      | See chapter 11.3 on page 79                                                           |        |                               |
| Switch off time                                                    | 100 ms                                                                                |        |                               |
| Switch on time                                                     | 2.5 × response time (single system)                                                   |        | 4.5 × response time (cascade) |
| Switching voltage <sup>11) 12)</sup> HIGH (active, $U_{eff}$ )     | $U_V - 2.25\text{ V}$                                                                 | 24 V   | $U_V$                         |
| Switching voltage <sup>11)</sup> LOW (inactive)                    | 0 V                                                                                   | 0 V    | 3.5 V                         |
| Switching current                                                  | 0 mA                                                                                  |        | 500 mA                        |
| Leakage current <sup>13)</sup>                                     |                                                                                       |        | 0.25 mA                       |
| Load capacity                                                      |                                                                                       |        | 2.2 μF                        |
| Switching sequence                                                 | Depending on load inductance                                                          |        |                               |
| Load inductance <sup>14)</sup>                                     |                                                                                       |        | 2.2 H                         |
| Test pulse data <sup>15)</sup>                                     |                                                                                       |        |                               |
| Test pulse width                                                   | 120 μs                                                                                | 150 μs | 300 μs                        |
| Test pulse rate                                                    | 3 1/s                                                                                 | 5 1/s  | 10 1/s                        |
| Permissible line resistance between device and load <sup>16)</sup> |                                                                                       |        | 2.5 Ω                         |
| Supply lead                                                        |                                                                                       |        | 1 Ω                           |
| Power consumption                                                  |                                                                                       |        | 3 A (host/guest/guest)        |

<sup>10)</sup> Applies to the voltage range between -30 V and +30 V.

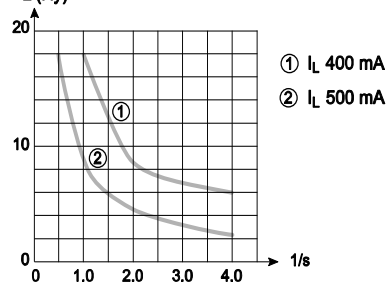
<sup>11)</sup> As per IEC 61131-2.

<sup>12)</sup> On the device plug.

<sup>13)</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>14)</sup> The maximum rated load inductance is higher with lower switching sequence.

L (Hy)



<sup>15)</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>16)</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.)

|                                                                          | Minimum                                                    | Typical         | Maximum     |
|--------------------------------------------------------------------------|------------------------------------------------------------|-----------------|-------------|
| External device monitoring (EDM) input                                   |                                                            |                 |             |
| Input voltage <sup>17)</sup> HIGH (inactive)                             | 11 V                                                       | 24 V            | 30 V        |
| Input current HIGH                                                       | 6 mA                                                       | 10 mA           | 20 mA       |
| Input voltage <sup>17)</sup> LOW (active)                                | -30 V                                                      | 0 V             | 5 V         |
| Input current LOW                                                        | -2.5 mA                                                    | 0 mA            | 0.5 mA      |
| Contactors                                                               |                                                            |                 |             |
| Permissible dropout time                                                 |                                                            |                 | 300 ms      |
| Permissible pick-up time                                                 |                                                            |                 | 300 ms      |
| Control input (reset button)                                             |                                                            |                 |             |
| Input voltage <sup>17)</sup> HIGH (active)                               | 11 V                                                       | 24 V            | 30 V        |
| Input current HIGH                                                       | 6 mA                                                       | 10 mA           | 20 mA       |
| Input voltage <sup>17)</sup> LOW (inactive)                              | -30 V                                                      | 0 V             | 5 V         |
| Input current LOW                                                        | -2.5 mA                                                    | 0 mA            | 0.5 mA      |
| Operation time control switch input                                      | 50 ms                                                      |                 |             |
| Devices with firmware $\geq$ V3.36                                       |                                                            |                 |             |
| Operation time control switch input                                      | 200 ms                                                     |                 |             |
| Devices with firmware $<$ V3.36                                          |                                                            |                 |             |
| Output <i>Reset required</i>                                             | PNP semiconductors, short-circuit protected <sup>18)</sup> |                 |             |
| 24 V lamp output                                                         |                                                            |                 | 4 W/0.2 A   |
| Switching voltage HIGH (active)                                          | 15 V                                                       | 24 V            | 28.8 V      |
| Switching voltage LOW (inactive)                                         |                                                            | High resistance |             |
| Signal output (ADO)                                                      | PNP semiconductors, short-circuit protected <sup>18)</sup> |                 |             |
| Switching voltage HIGH (active)                                          | $U_V - 4.2$ V                                              | 24 V            | $U_V$       |
| Switching voltage LOW (inactive)                                         |                                                            | High resistance |             |
| Switching current                                                        | 0 mA                                                       |                 | 100 mA      |
| Emergency stop/bypass                                                    |                                                            |                 |             |
| Changeover time                                                          |                                                            |                 | 2 s         |
| Latency time                                                             |                                                            |                 | 200 ms      |
| Cable resistance                                                         |                                                            |                 | 30 $\Omega$ |
| Cable capacitance                                                        |                                                            |                 | 10 nF       |
| Teach-in key-operated switch/<br>switch for deactivating the<br>blanking |                                                            |                 |             |
| Cable resistance                                                         |                                                            |                 | 30 $\Omega$ |
| Cable capacitance                                                        |                                                            |                 | 10 nF       |
| Operation time (reset button)                                            | 240 ms                                                     |                 |             |
| Weight                                                                   | Depending on protective field height (see page 82)         |                 |             |

<sup>17)</sup> As per IEC 61131-2.<sup>18)</sup> Applies to the voltage range between -30 V and +30 V.

| Minimum | Typical | Maximum |
|---------|---------|---------|
|---------|---------|---------|

**Operating data**

|                                            |                               |                      |        |
|--------------------------------------------|-------------------------------|----------------------|--------|
| System connection and extension connection | Hirschmann plug M26 × 11 + FE |                      |        |
| Alternative extension connection           | Plug M12 × 8 + FE             |                      |        |
| Cable length <sup>19)</sup>                |                               |                      | 50 m   |
| Wire cross-section                         |                               | 0.75 mm <sup>2</sup> |        |
| Bend radius                                |                               |                      | 150 mm |
| Ambient operating temperature              | 0 °C                          |                      | +55 °C |
| Air humidity (non-dewing)                  | 15 %                          |                      | 95 %   |
| Storage temperature                        | -25 °C                        |                      | +70 °C |
| Housing cross-section                      | 40 mm × 48 mm                 |                      |        |
| Rigidity                                   | 5 g, 10-55 Hz (EN 60 068-2-6) |                      |        |
| Shock resistance                           | 10 g, 16 ms (EN 60 068-2-27)  |                      |        |

**11.2 Data sheet C4000 Guest**

At variance with 11.1 "Data sheet" for the C4000 Guest the following data apply.

Tab. 29: Data sheet C4000 Guest

| Minimum | Typical | Maximum |
|---------|---------|---------|
|---------|---------|---------|

**General system data**

|                                            |                   |                       |  |
|--------------------------------------------|-------------------|-----------------------|--|
| Protective field height, depending on type | 150 mm to 1800 mm |                       |  |
| Resolution, depending on type              | 14 mm and 30 mm   |                       |  |
| Protective field width                     |                   |                       |  |
| Resolution 14 mm                           | 0-8 m             | 0-10 m <sup>20)</sup> |  |
| Resolution 30 mm                           | 0-19 m            | 0-21 m <sup>20)</sup> |  |

**☐ Sender unit**

|        |                                                        |
|--------|--------------------------------------------------------|
| Weight | Depending on the protective field height (see page 82) |
|--------|--------------------------------------------------------|

<sup>19)</sup> Depending on load, power supply and wire cross-section. The technical specifications must be observed.

<sup>20)</sup> On the utilisation of this protective field width, it must be expected the orange LED will illuminate (cleaning or realignment required). The system then only has a reserve of 30 %.

| Minimum | Typical | Maximum |
|---------|---------|---------|
|---------|---------|---------|

#### Receiver unit

|                                                                   |                                                        |
|-------------------------------------------------------------------|--------------------------------------------------------|
| Output signal switching devices (OSSDs)                           | Not present                                            |
| External device monitoring (EDM) input                            | Not present                                            |
| Control switch input (reset button)                               | Not present                                            |
| Output <i>Reset required</i>                                      | Not present                                            |
| Application diagnostic output (ADO)                               | Not present                                            |
| Emergency stop/bypass                                             | Not present                                            |
| Teach-in key-operated switch/switch for deactivating the blanking | Not present                                            |
| Weight                                                            | Depending on the protective field height (see page 82) |

#### Operating data

|                                     |                                                                 |                      |       |
|-------------------------------------|-----------------------------------------------------------------|----------------------|-------|
| Connection                          | Cable plug M12 × 7 + FE, 320 mm cable, maximum extension to 3 m |                      |       |
| Wire cross-section                  |                                                                 | 0.25 mm <sup>2</sup> |       |
| Bend radius, rigid wiring           |                                                                 |                      | 18 mm |
| Bend radius, flexible wiring        |                                                                 |                      | 60 mm |
| Strain relief on the cable, static  |                                                                 |                      | 90 N  |
| Strain relief on the cable, dynamic |                                                                 |                      | 35 N  |

### 11.3 Response time

The response time depends on the following parameters:

- number of beams
- beam coding
- configuration of floating blanking
- number of cascaded systems
- the output signal switching device used (see section 11.3.1 “Different response times” on page 81)

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

- Read the response times of the individual systems (shown on type label). Note whether the system is operated with or without beam coding.

#### Note

If you are planning the application without actually having any devices available, you may also determine the response time using Tab. 31 and Tab. 32. When determining the number of beams in Tab. 31, the physical resolution is important. The physical resolution of the light curtain does not change even if fixed or floating blanking has been selected.

- Fill out the following table to determine the total response time.

Tab. 30: Determining the response time of a C4000 system

| Line | Required detail                                                                                                           |                                                          | Response time |
|------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|---------------|
| 1    | Host                                                                                                                      |                                                          | ms            |
| 2    | Guest 1                                                                                                                   |                                                          | + ms          |
| 3    | Guest 2                                                                                                                   |                                                          | + ms          |
| 4    | Only if floating blanking is used:                                                                                        | Greatest response time from lines 1 to 3: $\times 0.5 =$ | + ms          |
|      |                                                                                                                           | Deduct 4 ms here.                                        | - ms          |
| 5    | If single guest is used, then add 8 ms here. (If no guest is used or two guests are used, do not add anything here.)      |                                                          | + ms          |
| 6    | <b>Total response time to be taken into account</b><br><b>(The total response time must be <math>\leq 108</math> ms!)</b> |                                                          | = ms          |

- Verify that the total response time determined is  $\leq 108$  ms. EN 61496-1 does not permit response times exceeding 108 ms. If necessary, adjust the configuration.

**Example**

Calculating the response time for a cascaded system without beam coding in which fields are configured with floating blanking:

| Line | Required detail                                                                                                      |                                                                        | Response time |              |
|------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|---------------|--------------|
| 1    | Host: 750 mm protective field height, resolution 14 mm                                                               |                                                                        | 16 ms         |              |
| 2    | Guest 1: 300 mm protective field height, resolution 40 mm                                                            |                                                                        | +             | 9 ms         |
| 3    | Guest 2: –                                                                                                           |                                                                        | +             | 0 ms         |
| 4    | Only if floating blanking is used:                                                                                   | Greatest response time from lines 1 to 3: $16 \text{ ms} \times 0.5 =$ | +             | 8 ms         |
|      |                                                                                                                      | Deduct 4 ms here.                                                      | –             | 4 ms         |
| 5    | If single guest is used, then add 8 ms here. (If no guest is used or two guests are used, do not add anything here.) |                                                                        | +             | 8 ms         |
| 6    | <b>Total response time to be taken into account</b>                                                                  |                                                                        | =             | <b>37 ms</b> |

Tab. 31: Number of beams depending on the protective field height and the physical resolution

| Protective field height<br>[mm] | Number of beams for physical resolution |       |       |       |
|---------------------------------|-----------------------------------------|-------|-------|-------|
|                                 | 14 mm                                   | 20 mm | 30 mm | 40 mm |
| <b>150</b>                      | 20                                      | –     | 8     | –     |
| <b>300</b>                      | 40                                      | 30    | 15    | 10    |
| <b>450</b>                      | 60                                      | 45    | 23    | 15    |
| <b>600</b>                      | 80                                      | 60    | 30    | 20    |
| <b>750</b>                      | 100                                     | 75    | 38    | 25    |
| <b>900</b>                      | 120                                     | 90    | 45    | 30    |
| <b>1050</b>                     | 140                                     | 105   | 53    | 35    |
| <b>1200</b>                     | 160                                     | 120   | 60    | 40    |
| <b>1350</b>                     | 180                                     | 135   | 68    | 45    |
| <b>1500</b>                     | 200                                     | 150   | 75    | 50    |
| <b>1650</b>                     | 220                                     | 165   | 83    | 55    |
| <b>1800</b>                     | 240                                     | 180   | 90    | 60    |

**C4000 Standard/Advanced**

Tab. 32: Response time as factor of the number of beams

| Number of beams | Without beam coding | With beam coding |
|-----------------|---------------------|------------------|
| 8               | 9 ms                | 11 ms            |
| 10              | 9 ms                | 11 ms            |
| 15              | 10 ms               | 12 ms            |
| 20              | 10 ms               | 13 ms            |
| 23              | 10 ms               | 14 ms            |
| 25              | 10 ms               | 14 ms            |
| 30              | 11 ms               | 15 ms            |
| 35              | 11 ms               | 16 ms            |
| 38              | 11 ms               | 17 ms            |
| 40              | 11 ms               | 17 ms            |
| 45              | 12 ms               | 18 ms            |
| 50              | 12 ms               | 19 ms            |
| 53              | 12 ms               | 20 ms            |
| 55              | 12 ms               | 20 ms            |
| 60              | 13 ms               | 21 ms            |
| 68              | 13 ms               | 22 ms            |
| 75              | 14 ms               | 24 ms            |
| 80              | 14 ms               | 25 ms            |
| 83              | 14 ms               | 25 ms            |
| 90              | 15 ms               | 27 ms            |
| 100             | 16 ms               | 29 ms            |
| 105             | 16 ms               | 30 ms            |
| 120             | 17 ms               | 33 ms            |
| 135             | 18 ms               | 36 ms            |
| 140             | 19 ms               | 37 ms            |
| 150             | 19 ms               | 39 ms            |
| 160             | 20 ms               | 40 ms            |
| 165             | 20 ms               | 41 ms            |
| 180             | 22 ms               | 44 ms            |
| 200             | 23 ms               | 48 ms            |
| 220             | 24 ms               | 52 ms            |
| 240             | 26 ms               | 56 ms            |

**11.3.1 Different response times**

In the following cases the total response time of a cascaded system is **reduced by 14 ms**:

- If interruption of the dangerous movement through the protective field of the guest can be excluded, i.e. if interruption is only possible by the host (e.g. if the guest is used for point-of-operation guarding; see Fig. 5 on page 17).

or

- If the interruption **through the protective field of the guest** can be assumed to be at a low approach speed (e.g. if the guest prevents reaching under the host).

**Response time if external OSSDs are switched**

If you use the OSSDs on another device via the EFI as external switching outputs (for example those on a sens:Control device), the response time will **increase by 4 ms**.

## 11.4 Table of weights

### 11.4.1 C4000 Standard/Advanced

Tab. 33: Weight of sender and receiver C4000 Standard/Advanced

| Protective field height<br>[mm] | Weight [g] |            |
|---------------------------------|------------|------------|
|                                 | ☑ Sender   | ☑ Receiver |
| 300                             | 820        | 850        |
| 450                             | 1100       | 1130       |
| 600                             | 1390       | 1420       |
| 750                             | 1670       | 1700       |
| 900                             | 1960       | 1990       |
| 1050                            | 2250       | 2280       |
| 1200                            | 2530       | 2560       |
| 1350                            | 2820       | 2850       |
| 1500                            | 3110       | 3140       |
| 1650                            | 3390       | 3420       |
| 1800                            | 3680       | 3710       |

### 11.4.2 C4000 Standard/Advanced Guest

Tab. 34: Weight of sender and receiver C4000 Standard/Advanced Guest

| Protective field height<br>[mm] | Weight [g] |            |
|---------------------------------|------------|------------|
|                                 | ☑ Sender   | ☑ Receiver |
| 150                             | 540        | 570        |
| 300                             | 820        | 850        |
| 450                             | 1100       | 1130       |
| 600                             | 1390       | 1420       |
| 750                             | 1670       | 1700       |
| 900                             | 1960       | 1990       |
| 1050                            | 2250       | 2280       |
| 1200                            | 2530       | 2560       |
| 1350                            | 2820       | 2850       |
| 1500                            | 3110       | 3140       |
| 1650                            | 3390       | 3420       |
| 1800                            | 3680       | 3710       |

**C4000 Standard/Advanced**

Tab. 35: Weight of the deflector mirrors PNS75 and PNS125

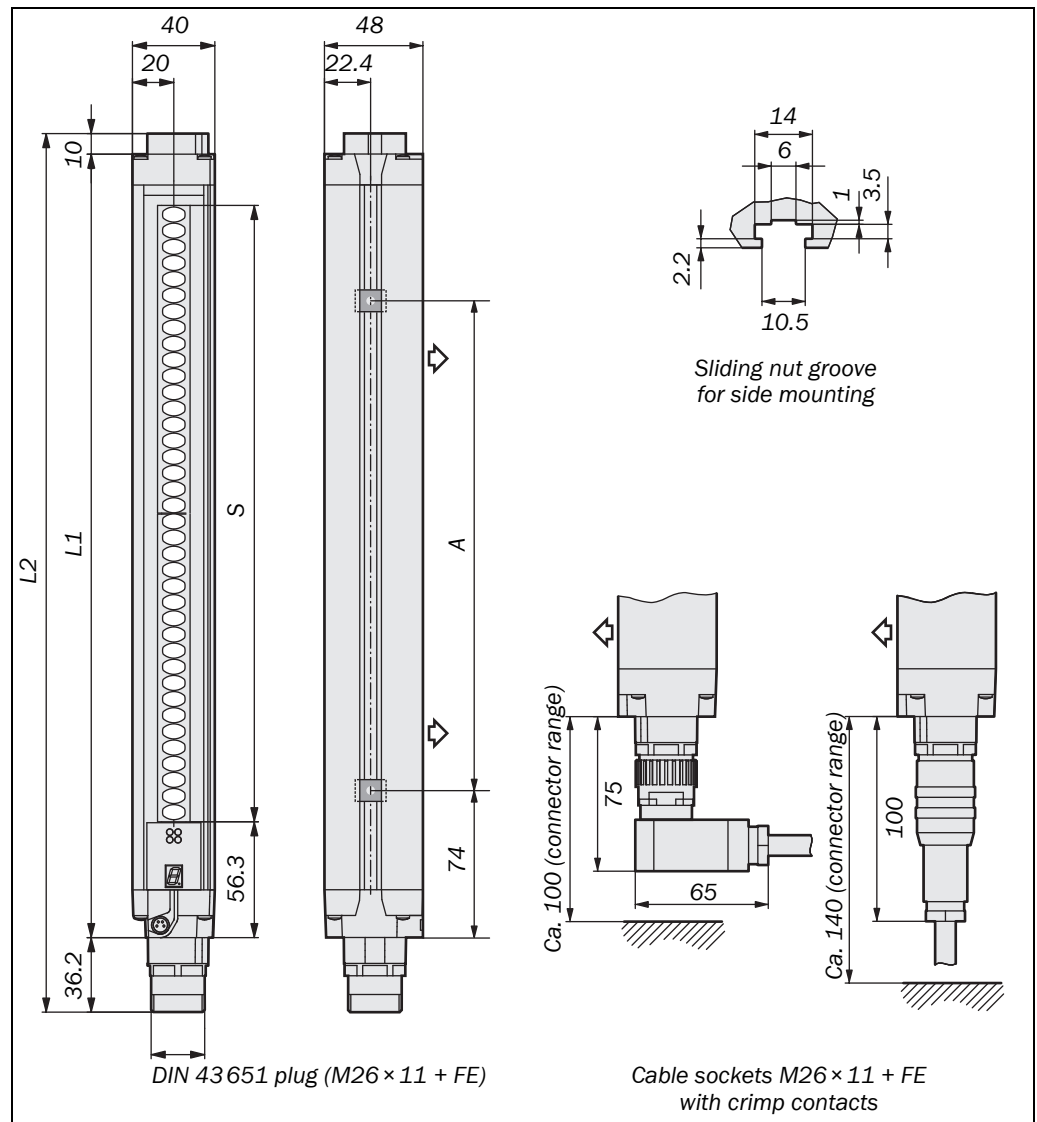
**11.4.3 Deflector mirrors PNS75 and PNS125**

| Mirror height<br>[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   |

## 11.5 Dimensional drawings

### 11.5.1 C4000 Standard/Advanced without extension connection

Fig. 44: Dimensional drawing C4000 Standard/Advanced without extension connection, sender. Receiver, mirror image



Tab. 36: Dimensions dependent on the protective field height, C4000 Standard/Advanced without extension connection

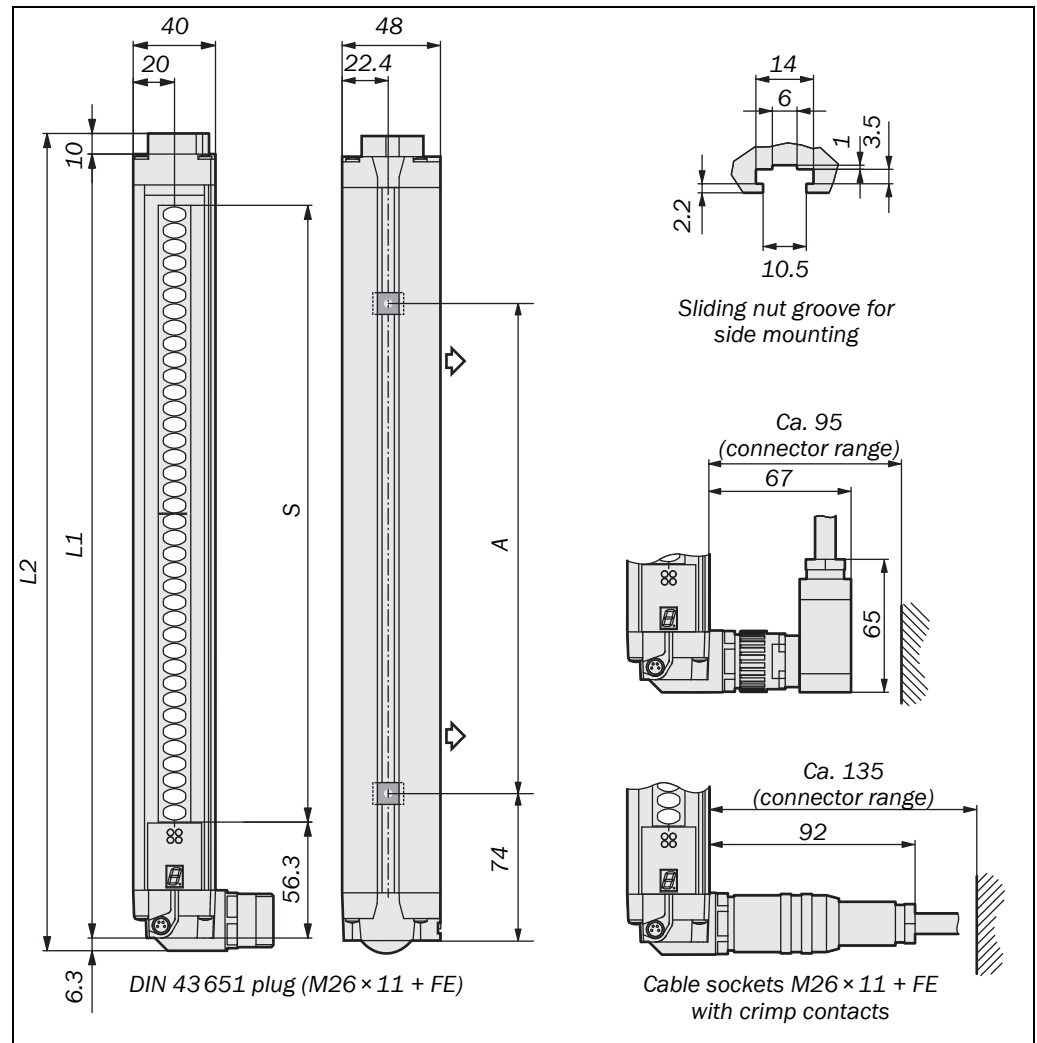
| Protective field height S [mm] | Dimension L1 [mm] | Dimension L2 [mm] | Dimension A [mm] |
|--------------------------------|-------------------|-------------------|------------------|
| 300                            | 381               | 427               | 224              |
| 450                            | 532               | 578               | 374              |
| 600                            | 682               | 728               | 524              |
| 750                            | 833               | 879               | 674              |
| 900                            | 984               | 1030              | 824              |
| 1050                           | 1134              | 1180              | 974              |
| 1200                           | 1283              | 1329              | 1124             |
| 1350                           | 1435              | 1481              | 1274             |
| 1500                           | 1586              | 1632              | 1424             |
| 1650                           | 1736              | 1782              | 1574             |
| 1800                           | 1887              | 1933              | 1724             |

## C4000 Standard/Advanced

## 11.5.2 C4000 Standard with angled system connection and without extension connection

Fig. 45: Dimensional drawing C4000 Standard, sender with angled system connection and without extension connection.

Receiver, mirror image



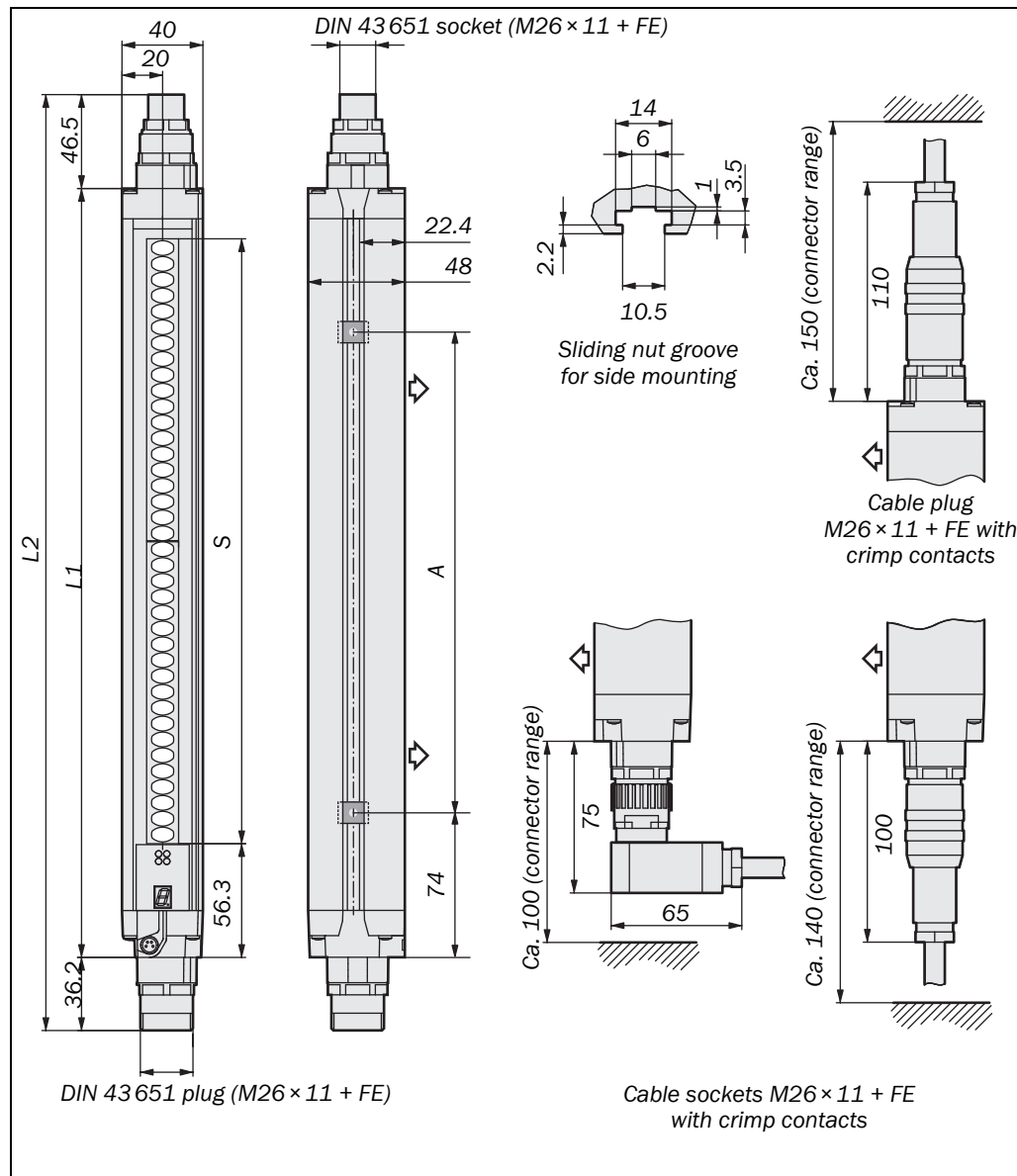
Tab. 37: Dimensions dependent on the protective field height, C4000 Standard with angled system connection and without extension connection

| Protective field height S [mm] | Dimension L1 [mm] | Dimension L2 [mm] | Dimension A [mm] |
|--------------------------------|-------------------|-------------------|------------------|
| 300                            | 381               | 397               | 224              |
| 450                            | 532               | 548               | 374              |
| 600                            | 682               | 698               | 524              |
| 900                            | 984               | 1000              | 824              |
| 1050                           | 1134              | 1150              | 974              |

Other systems on request.

## 11.5.3 C4000 Standard/Advanced with M26 extension connection

Fig. 46: Dimensional drawing C4000 Standard/Advanced with M26 extension connection, sender. Receiver, mirror image



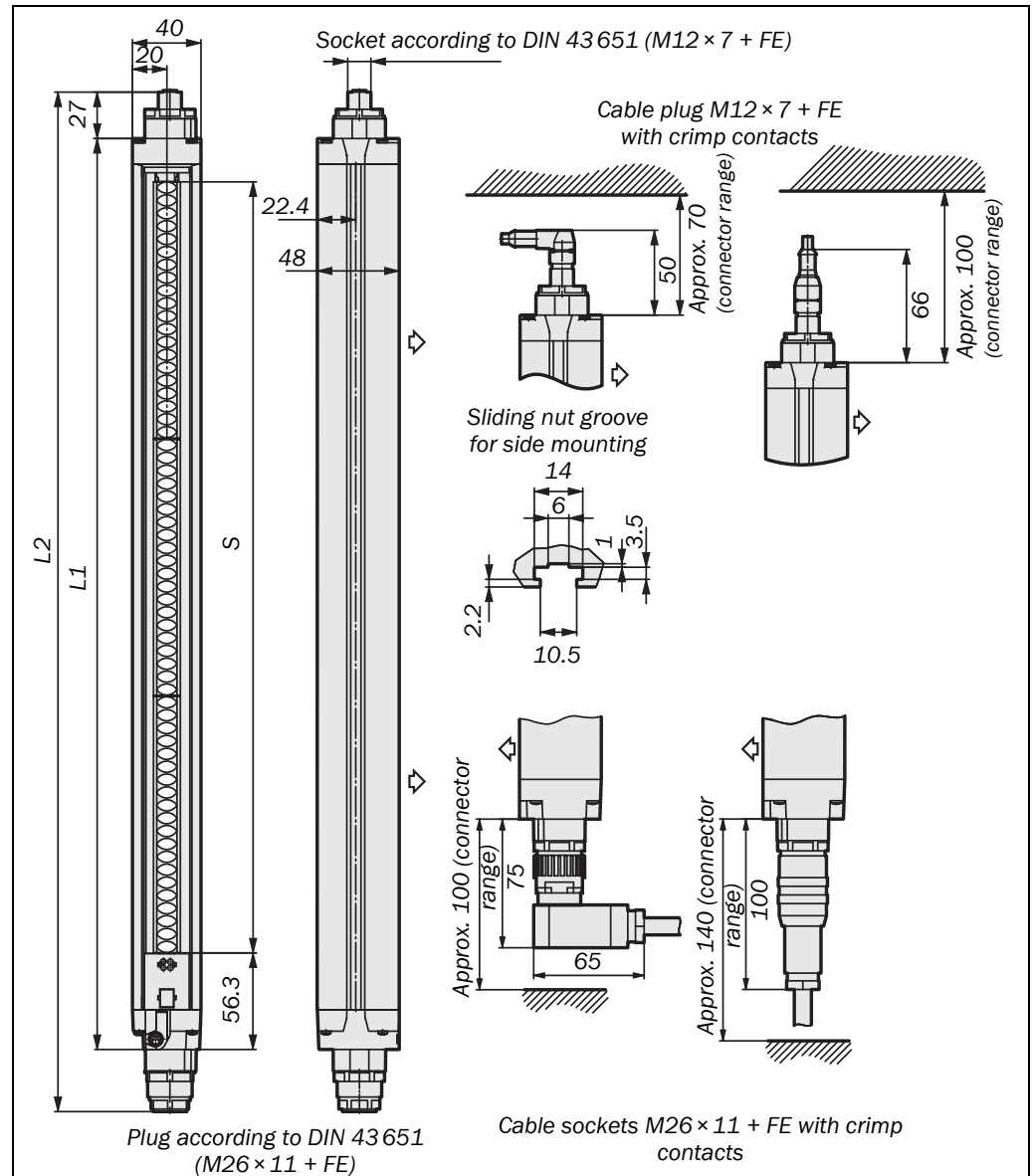
Tab. 38: Dimensions depending on the protective field height, C4000 Standard/Advanced with M26 extension connection

| Protective field height S [mm] | Dimension L1 [mm] | Dimension L2 [mm] | Dimension A [mm] |
|--------------------------------|-------------------|-------------------|------------------|
| 300                            | 381               | 464               | 224              |
| 450                            | 532               | 614               | 374              |
| 600                            | 682               | 765               | 524              |
| 750                            | 833               | 915               | 674              |
| 900                            | 984               | 1066              | 824              |
| 1050                           | 1134              | 1216              | 974              |
| 1200                           | 1283              | 1366              | 1124             |
| 1350                           | 1435              | 1517              | 1274             |
| 1500                           | 1586              | 1669              | 1424             |
| 1650                           | 1736              | 1818              | 1574             |
| 1800                           | 1887              | 1969              | 1724             |

## C4000 Standard/Advanced

## 11.5.4 C4000 Standard/Advanced with M12 extension connection

Fig. 47: Dimensional drawing  
C4000 Standard/Advanced  
with M12 extension  
connection, sender.  
Receiver, mirror image

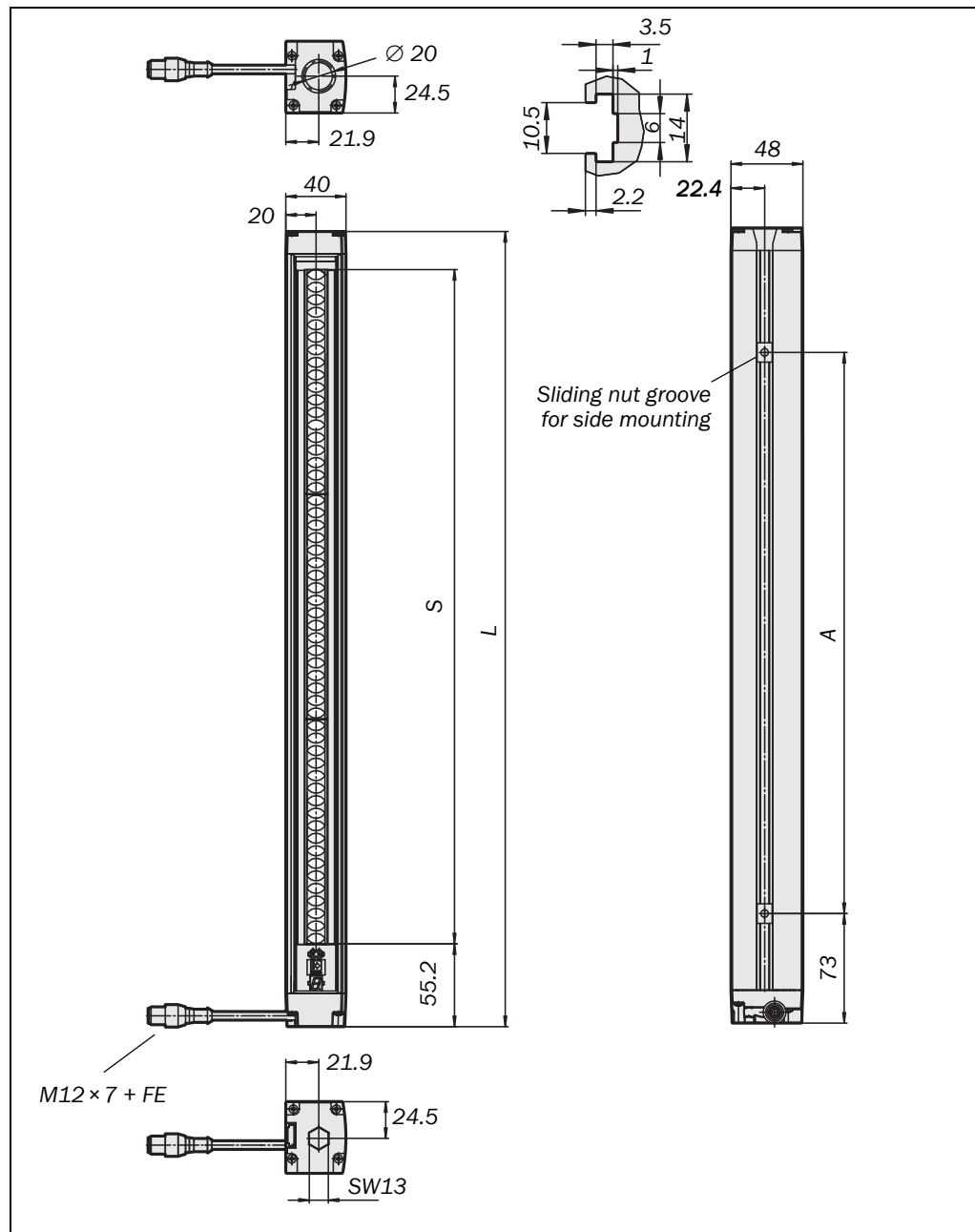


Tab. 39: Dimensions  
depending on the protective  
field height, C4000  
Standard/Advanced with  
M12 extension connection

| Protective field height S [mm] | Dimension L1 [mm] | Dimension L2 [mm] |
|--------------------------------|-------------------|-------------------|
| 300                            | 381               | 444               |
| 450                            | 532               | 594               |
| 600                            | 682               | 744               |
| 750                            | 833               | 895               |
| 900                            | 984               | 1046              |
| 1050                           | 1134              | 1196              |
| 1200                           | 1283              | 1346              |
| 1350                           | 1435              | 1497              |
| 1500                           | 1586              | 1649              |
| 1650                           | 1736              | 1798              |
| 1800                           | 1887              | 1949              |

## 11.5.5 C4000 Standard/Advanced Guest

Fig. 48: Dimensional drawing  
C4000 Standard/Advanced  
Guest, sender. Receiver  
Mirror image



Tab. 40: Dimensions  
depending on the protective  
field height, C4000  
Standard/Advanced Guest

| Protective field height S [mm] | Dimension L [mm] | Dimension A [mm] |
|--------------------------------|------------------|------------------|
| 150                            | 220              | 76               |
| 300                            | 380              | 224              |
| 450                            | 530              | 374              |
| 600                            | 680              | 524              |
| 750                            | 830              | 674              |
| 900                            | 981              | 825              |
| 1050                           | 1131             | 975              |
| 1200                           | 1281             | 1125             |
| 1350                           | 1432             | 1276             |
| 1500                           | 1583             | 1427             |
| 1650                           | 1733             | 1504             |
| 1800                           | 1884             | 1728             |

**C4000 Standard/Advanced****11.5.6 Swivel mount bracket**

Fig. 49: Dimensional drawing, swivel mount bracket (mm)

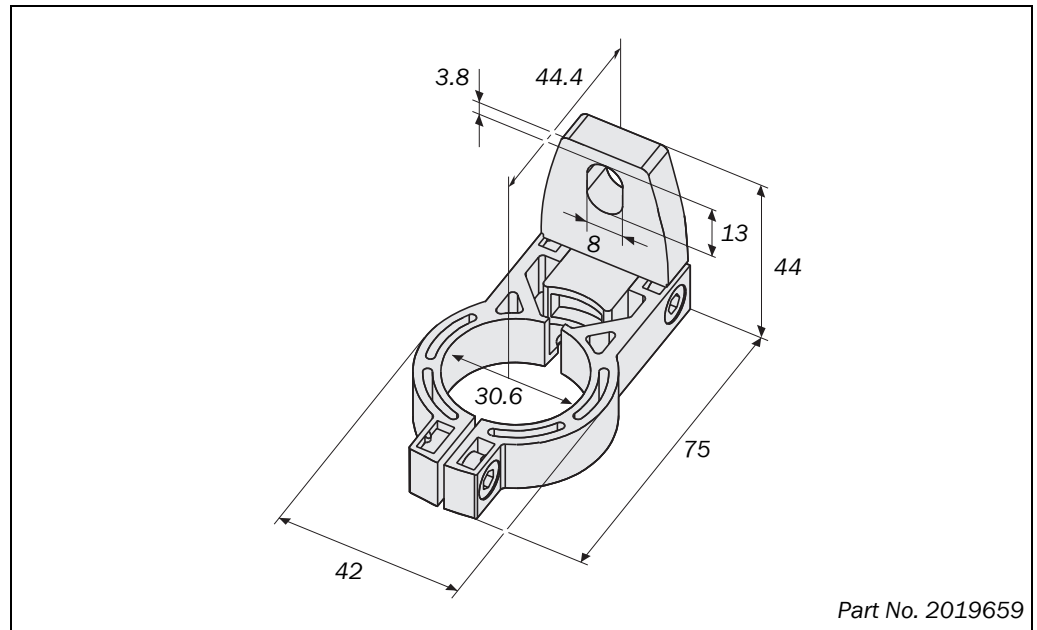
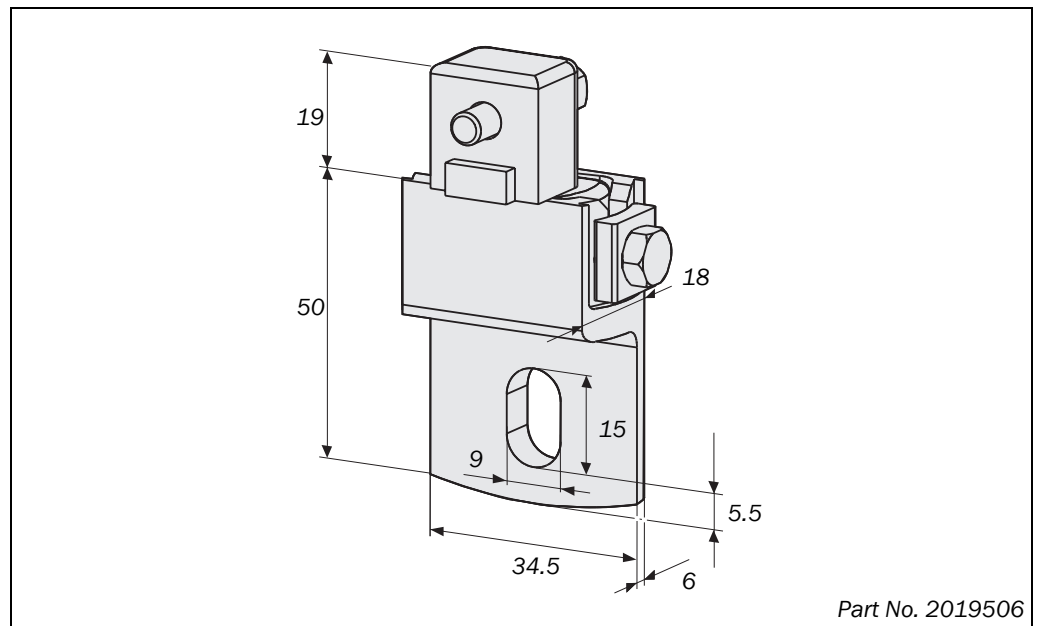
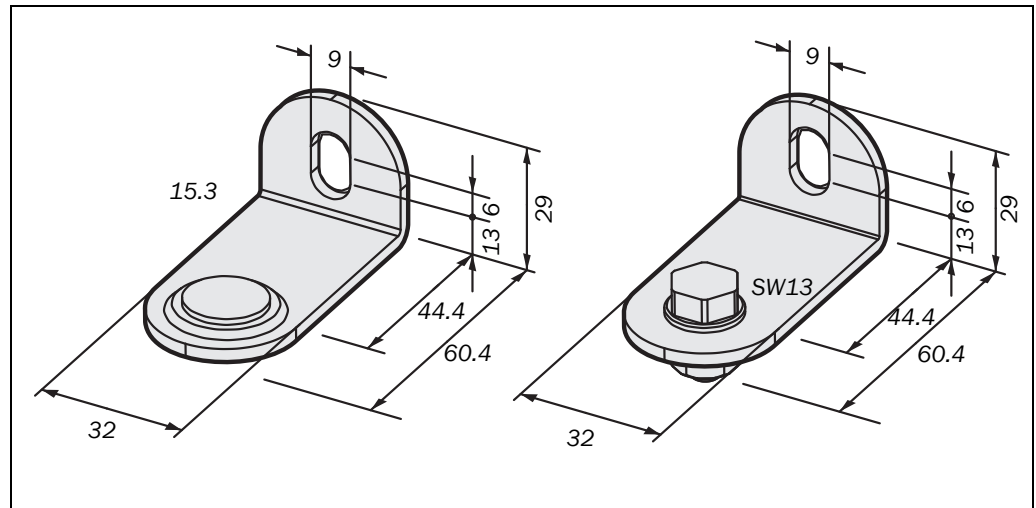
**11.5.7 Side bracket**

Fig. 50: Dimensional drawing, side bracket (mm)



**11.5.8 Swivel mount bracket for C4000 Guest**

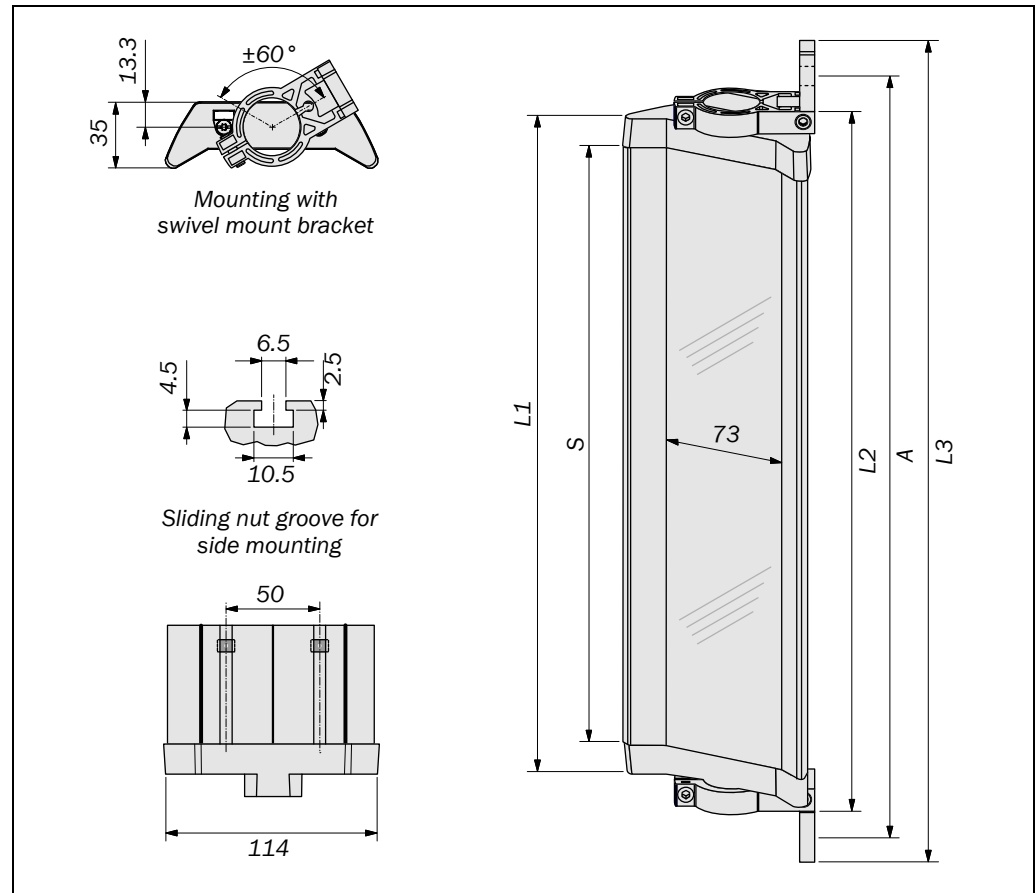
Fig. 51: Swivel mount bracket for C4000 Guest



## C4000 Standard/Advanced

## 11.5.9 Deflector mirror PNS75

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



Tab. 41: Dimensions for the deflector mirror PNS75 dependent on the mirror height

| Mirror height<br>S [mm] | Dimension<br>L1 [mm] | Dimension<br>L2 [mm] | Dimension<br>L3 [mm] | Dimension<br>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 overall scanning range is reduced (see Tab. 8 on page 27).



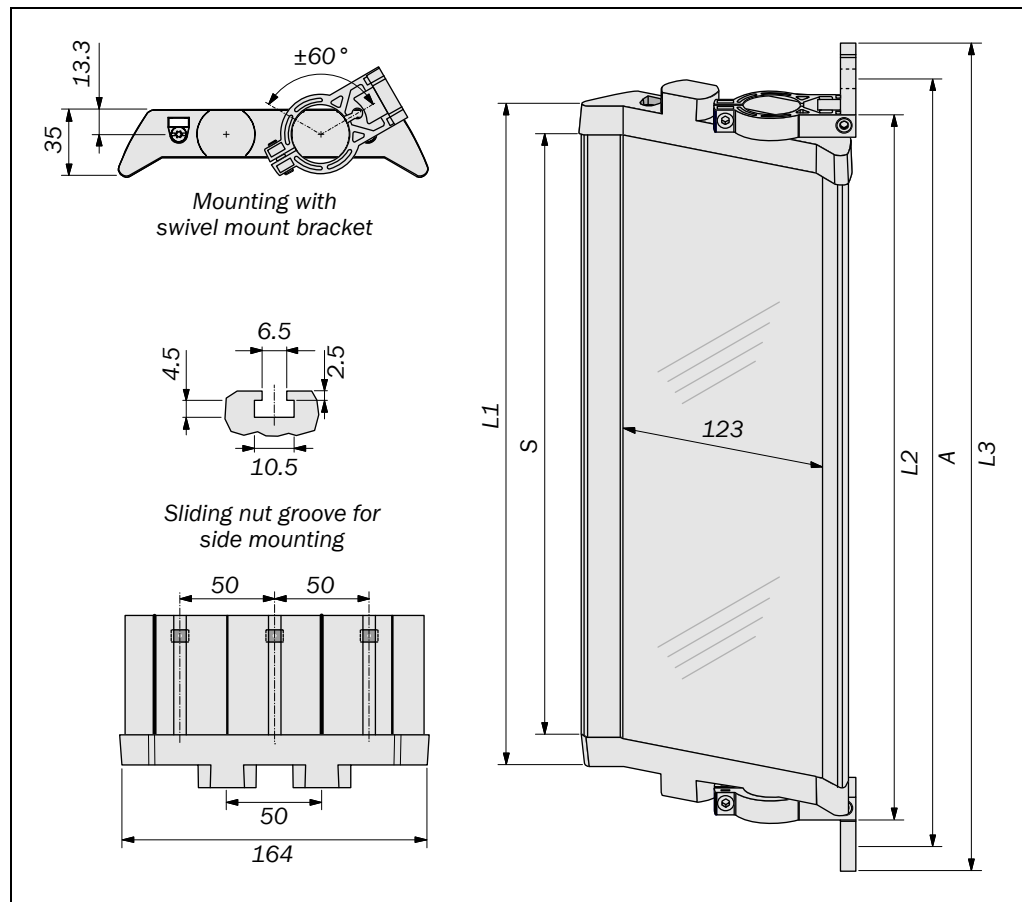
WARNING

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

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

## 11.5.10 Deflector mirror PNS125

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



Tab. 42: Dimensions for the deflector mirror PNS125 dependent on the mirror height

| Mirror height<br>S [mm] | Dimension<br>L1 [mm] | Dimension<br>L2 [mm] | Dimension<br>L3 [mm] | Dimension<br>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 overall scanning range is reduced (see Tab. 8 on page 27).



**WARNING**

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

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

# 12 Ordering information

## 12.1 Delivery

### C4000 Standard

Delivery, sender

- sender unit
- 4 sliding nuts for side bracket

Delivery, receiver

- 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”
- operating instructions on CD-ROM
- CDS (Configuration & Diagnostic Software) on CD-ROM
- information label “Operator’s notes”

### C4000 Advanced

The C4000 Advanced also includes:

- additional test rods for testing the effective resolution:
  - for 14 mm systems: diameters 22, 30 and 37 mm
  - for 20 mm systems: diameters 30 and 40 mm
  - for 30 mm systems: diameter 40 mm
- information labels for the resolution of the device

### Pre-configured systems

The C4000 Standard without extension connection is also available as an option with the pre-configurations C, D, E, F and R (see chapter 8.1 “Default delivery status” on page 66).

### Deflector mirror

- deflector mirror
- 2 swivel mount brackets

## 12.2 System without extension connection

For use as single system or as last guest of a cascable system.

### 12.2.1 C4000 Standard without extension connection

Tab. 43: Part numbers  
C4000 Standard without  
extension connection

| Protective field<br>height [mm] | Part numbers for resolution |                             |                             |                             |
|---------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|                                 | 14 mm                       | 20 mm                       | 30 mm                       | 40 mm                       |
| <b>300</b>                      | 1018591<br>(C40S-0301CA010) | 1018613<br>(C40S-0302CA010) | 1018635<br>(C40S-0303CA010) | 1018657<br>(C40S-0304CA010) |
|                                 | 1018592<br>(C40E-0301CA010) | 1018614<br>(C40E-0302CA010) | 1018636<br>(C40E-0303CA010) | 1018658<br>(C40E-0304CA010) |
| <b>450</b>                      | 1018347<br>(C40S-0401CA010) | 1018615<br>(C40S-0402CA010) | 1018637<br>(C40S-0403CA010) | 1018659<br>(C40S-0404CA010) |
|                                 | 1018348<br>(C40E-0401CA010) | 1018616<br>(C40E-0402CA010) | 1018638<br>(C40E-0403CA010) | 1018660<br>(C40E-0404CA010) |
| <b>600</b>                      | 1018593<br>(C40S-0601CA010) | 1018617<br>(C40S-0602CA010) | 1018639<br>(C40S-0603CA010) | 1018661<br>(C40S-0604CA010) |
|                                 | 1018594<br>(C40E-0601CA010) | 1018618<br>(C40E-0602CA010) | 1018640<br>(C40E-0603CA010) | 1018662<br>(C40E-0604CA010) |
| <b>750</b>                      | 1018595<br>(C40S-0701CA010) | 1018619<br>(C40S-0702CA010) | 1018641<br>(C40S-0703CA010) | 1018663<br>(C40S-0704CA010) |
|                                 | 1018596<br>(C40E-0701CA010) | 1018620<br>(C40E-0702CA010) | 1018642<br>(C40E-0703CA010) | 1018664<br>(C40E-0704CA010) |
| <b>900</b>                      | 1018597<br>(C40S-0901CA010) | 1018621<br>(C40S-0902CA010) | 1018643<br>(C40S-0903CA010) | 1018665<br>(C40S-0904CA010) |
|                                 | 1018598<br>(C40E-0901CA010) | 1018622<br>(C40E-0902CA010) | 1018644<br>(C40E-0903CA010) | 1018666<br>(C40E-0904CA010) |
| <b>1050</b>                     | 1018599<br>(C40S-1001CA010) | 1018623<br>(C40S-1002CA010) | 1018645<br>(C40S-1003CA010) | 1018667<br>(C40S-1004CA010) |
|                                 | 1018600<br>(C40E-1001CA010) | 1018624<br>(C40E-1002CA010) | 1018646<br>(C40E-1003CA010) | 1018668<br>(C40E-1004CA010) |
| <b>1200</b>                     | 1018601<br>(C40S-1201CA010) | 1018625<br>(C40S-1202CA010) | 1018647<br>(C40S-1203CA010) | 1018669<br>(C40S-1204CA010) |
|                                 | 1018602<br>(C40E-1201CA010) | 1018626<br>(C40E-1202CA010) | 1018648<br>(C40E-1203CA010) | 1018670<br>(C40E-1204CA010) |
| <b>1350</b>                     | 1018603<br>(C40S-1301CA010) | 1018627<br>(C40S-1302CA010) | 1018649<br>(C40S-1303CA010) | 1018671<br>(C40S-1304CA010) |
|                                 | 1018604<br>(C40E-1301CA010) | 1018628<br>(C40E-1302CA010) | 1018650<br>(C40E-1303CA010) | 1018672<br>(C40E-1304CA010) |
| <b>1500</b>                     | 1018605<br>(C40S-1501CA010) | 1018629<br>(C40S-1502CA010) | 1018651<br>(C40S-1503CA010) | 1018673<br>(C40S-1504CA010) |
|                                 | 1018606<br>(C40E-1501CA010) | 1018630<br>(C40E-1502CA010) | 1018652<br>(C40E-1503CA010) | 1018674<br>(C40E-1504CA010) |
| <b>1650</b>                     | 1018607<br>(C40S-1601CA010) | 1018631<br>(C40S-1602CA010) | 1018653<br>(C40S-1603CA010) | 1018675<br>(C40S-1604CA010) |
|                                 | 1018608<br>(C40E-1601CA010) | 1018632<br>(C40E-1602CA010) | 1018654<br>(C40E-1603CA010) | 1018676<br>(C40E-1604CA010) |
| <b>1800</b>                     | 1018609<br>(C40S-1801CA010) | 1018633<br>(C40S-1802CA010) | 1018655<br>(C40S-1803CA010) | 1018677<br>(C40S-1804CA010) |
|                                 | 1018610<br>(C40E-1801CA010) | 1018634<br>(C40E-1802CA010) | 1018656<br>(C40E-1803CA010) | 1018678<br>(C40E-1804CA010) |

**C4000 Standard/Advanced****12.2.2 C4000 Standard with angled system connection and without extension connection**

Tab. 44: Part numbers  
C4000 Standard with angled  
system connection and  
without extension connection

| Protective field<br>height [mm] | Part numbers for resolution                                                                                   |                                                                                                                 |                                                                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|                                 | 14 mm                                                                                                         | 30 mm                                                                                                           | 40 mm                                                                                                           |
| <b>300</b>                      |  1022267<br>(C40S-0301CA020) |  1026733<br>(C40S-0303CA020) | -                                                                                                               |
|                                 |  1022268<br>(C40E-0301CA010) |  1026734<br>(C40E-0303CA020) |                                                                                                                 |
| <b>450</b>                      |  1026737<br>(C40S-0401CA020) |  1026735<br>(C40S-0403CA020) | -                                                                                                               |
|                                 |  1026738<br>(C40E-0401CA020) |  1026736<br>(C40E-0403CA020) |                                                                                                                 |
| <b>600</b>                      | -                                                                                                             |  1029577<br>(C40S-0603CA020) | -                                                                                                               |
|                                 |                                                                                                               |  1029578<br>(C40E-0603CA020) |                                                                                                                 |
| <b>900</b>                      | -                                                                                                             | -                                                                                                               |  1026568<br>(C40S-0904CA020) |
|                                 |                                                                                                               |                                                                                                                 |  1026847<br>(C40E-0904CA020) |
| <b>1050</b>                     | -                                                                                                             | -                                                                                                               |  1029579<br>(C40S-1004CA020) |
|                                 |                                                                                                               |                                                                                                                 |  1029580<br>(C40E-1004CA020) |

Other systems on request.

## 12.2.3 C4000 Advanced without extension connection

Tab. 45: Part numbers  
C4000 Advanced without  
extension connection

| Protective field<br>height [mm] | Part numbers for resolution   |                               |                               |                               |
|---------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|                                 | 14 mm                         | 20 mm                         | 30 mm                         | 40 mm                         |
| <b>300</b>                      | ➡ 1018591<br>(C40S-0301CA010) | ➡ 1018613<br>(C40S-0302CA010) | ➡ 1018635<br>(C40S-0303CA010) | ➡ 1018657<br>(C40S-0304CA010) |
|                                 | ➡ 1018781<br>(C40E-0301CB010) | ➡ 1018792<br>(C40E-0302CB010) | ➡ 1018803<br>(C40E-0303CB010) | ➡ 1018815<br>(C40E-0304CB010) |
| <b>450</b>                      | ➡ 1018347<br>(C40S-0401CA010) | ➡ 1018615<br>(C40S-0402CA010) | ➡ 1018637<br>(C40S-0403CA010) | ➡ 1018659<br>(C40S-0404CA010) |
|                                 | ➡ 1018782<br>(C40E-0401CB010) | ➡ 1018793<br>(C40E-0402CB010) | ➡ 1018804<br>(C40E-0403CB010) | ➡ 1018816<br>(C40E-0404CB010) |
| <b>600</b>                      | ➡ 1018593<br>(C40S-0601CA010) | ➡ 1018617<br>(C40S-0602CA010) | ➡ 1018639<br>(C40S-0603CA010) | ➡ 1018661<br>(C40S-0604CA010) |
|                                 | ➡ 1018783<br>(C40E-0601CB010) | ➡ 1018794<br>(C40E-0602CB010) | ➡ 1018805<br>(C40E-0603CB010) | ➡ 1018817<br>(C40E-0604CB010) |
| <b>750</b>                      | ➡ 1018595<br>(C40S-0701CA010) | ➡ 1018619<br>(C40S-0702CA010) | ➡ 1018641<br>(C40S-0703CA010) | ➡ 1018663<br>(C40S-0704CA010) |
|                                 | ➡ 1018784<br>(C40E-0701CB010) | ➡ 1018795<br>(C40E-0702CB010) | ➡ 1018806<br>(C40E-0703CB010) | ➡ 1018818<br>(C40E-0704CB010) |
| <b>900</b>                      | ➡ 1018597<br>(C40S-0901CA010) | ➡ 1018621<br>(C40S-0902CA010) | ➡ 1018643<br>(C40S-0903CA010) | ➡ 1018665<br>(C40S-0904CA010) |
|                                 | ➡ 1018785<br>(C40E-0901CB010) | ➡ 1018796<br>(C40E-0902CB010) | ➡ 1018807<br>(C40E-0903CB010) | ➡ 1018819<br>(C40E-0904CB010) |
| <b>1050</b>                     | ➡ 1018599<br>(C40S-1001CA010) | ➡ 1018623<br>(C40S-1002CA010) | ➡ 1018645<br>(C40S-1003CA010) | ➡ 1018667<br>(C40S-1004CA010) |
|                                 | ➡ 1018786<br>(C40E-1001CB010) | ➡ 1018797<br>(C40E-1002CB010) | ➡ 1018809<br>(C40E-1003CB010) | ➡ 1018820<br>(C40E-1004CB010) |
| <b>1200</b>                     | ➡ 1018601<br>(C40S-1201CA010) | ➡ 1018625<br>(C40S-1202CA010) | ➡ 1018647<br>(C40S-1203CA010) | ➡ 1018669<br>(C40S-1204CA010) |
|                                 | ➡ 1018787<br>(C40E-1201CB010) | ➡ 1018798<br>(C40E-1202CB010) | ➡ 1018810<br>(C40E-1203CB010) | ➡ 1018821<br>(C40E-1204CB010) |
| <b>1350</b>                     | ➡ 1018603<br>(C40S-1301CA010) | ➡ 1018627<br>(C40S-1302CA010) | ➡ 1018649<br>(C40S-1303CA010) | ➡ 1018671<br>(C40S-1304CA010) |
|                                 | ➡ 1018788<br>(C40E-1301CB010) | ➡ 1018799<br>(C40E-1302CB010) | ➡ 1018811<br>(C40E-1303CB010) | ➡ 1018822<br>(C40E-1304CB010) |
| <b>1500</b>                     | ➡ 1018605<br>(C40S-1501CA010) | ➡ 1018629<br>(C40S-1502CA010) | ➡ 1018651<br>(C40S-1503CA010) | ➡ 1018673<br>(C40S-1504CA010) |
|                                 | ➡ 1018789<br>(C40E-1501CB010) | ➡ 1018800<br>(C40E-1502CB010) | ➡ 1018812<br>(C40E-1503CB010) | ➡ 1018823<br>(C40E-1504CB010) |
| <b>1650</b>                     | ➡ 1018607<br>(C40S-1601CA010) | ➡ 1018631<br>(C40S-1602CA010) | ➡ 1018653<br>(C40S-1603CA010) | ➡ 1018675<br>(C40S-1604CA010) |
|                                 | ➡ 1018790<br>(C40E-1601CB010) | ➡ 1018801<br>(C40E-1602CB010) | ➡ 1018813<br>(C40E-1603CB010) | ➡ 1018824<br>(C40E-1604CB010) |
| <b>1800</b>                     | ➡ 1018609<br>(C40S-1801CA010) | ➡ 1018633<br>(C40S-1802CA010) | ➡ 1018655<br>(C40S-1803CA010) | ➡ 1018677<br>(C40S-1804CA010) |
|                                 | ➡ 1018791<br>(C40E-1801CB010) | ➡ 1018802<br>(C40E-1802CB010) | ➡ 1018814<br>(C40E-1803CB010) | ➡ 1018825<br>(C40E-1804CB010) |

**12.2.4 C4000 Standard without extension connection with pre-configuration C**

The pre-configuration is a specific system delivery state (see chapter 8.1 “Default delivery status” on page 66). You can change this configuration using the software supplied.

Tab. 46: Part numbers  
C4000 Standard without  
extension connection with  
pre-configuration C

| Protective field<br>height [mm] | Part numbers for resolution   |                               |                               |                               |
|---------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|                                 | 14 mm                         | 20 mm                         | 30 mm                         | 40 mm                         |
| <b>300</b>                      | ➡ 1018591<br>(C40S-0301CA010) | ➡ 1018613<br>(C40S-0302CA010) | ➡ 1018635<br>(C40S-0303CA010) | ➡ 1018657<br>(C40S-0304CA010) |
|                                 | ➡ 1022358<br>(C40E-0301CC010) | ➡ 1022369<br>(C40E-0302CC010) | ➡ 1022380<br>(C40E-0303CC010) | ➡ 1022391<br>(C40E-0304CC010) |
| <b>450</b>                      | ➡ 1018347<br>(C40S-0401CA010) | ➡ 1018615<br>(C40S-0402CA010) | ➡ 1018637<br>(C40S-0403CA010) | ➡ 1018659<br>(C40S-0404CA010) |
|                                 | ➡ 1022359<br>(C40E-0401CC010) | ➡ 1022370<br>(C40E-0402CC010) | ➡ 1022381<br>(C40E-0403CC010) | ➡ 1022392<br>(C40E-0404CC010) |
| <b>600</b>                      | ➡ 1018593<br>(C40S-0601CA010) | ➡ 1018617<br>(C40S-0602CA010) | ➡ 1018639<br>(C40S-0603CA010) | ➡ 1018661<br>(C40S-0604CA010) |
|                                 | ➡ 1022360<br>(C40E-0601CC010) | ➡ 1022371<br>(C40E-0602CC010) | ➡ 1022382<br>(C40E-0603CC010) | ➡ 1022393<br>(C40E-0604CC010) |
| <b>750</b>                      | ➡ 1018595<br>(C40S-0701CA010) | ➡ 1018619<br>(C40S-0702CA010) | ➡ 1018641<br>(C40S-0703CA010) | ➡ 1018663<br>(C40S-0704CA010) |
|                                 | ➡ 1022361<br>(C40E-0701CC010) | ➡ 1022372<br>(C40E-0702CC010) | ➡ 1022383<br>(C40E-0703CC010) | ➡ 1022394<br>(C40E-0704CC010) |
| <b>900</b>                      | ➡ 1018597<br>(C40S-0901CA010) | ➡ 1018621<br>(C40S-0902CA010) | ➡ 1018643<br>(C40S-0903CA010) | ➡ 1018665<br>(C40S-0904CA010) |
|                                 | ➡ 1022362<br>(C40E-0901CC010) | ➡ 1022373<br>(C40E-0902CC010) | ➡ 1022384<br>(C40E-0903CC010) | ➡ 1022395<br>(C40E-0904CC010) |
| <b>1050</b>                     | ➡ 1018599<br>(C40S-1001CA010) | ➡ 1018623<br>(C40S-1002CA010) | ➡ 1018645<br>(C40S-1003CA010) | ➡ 1018667<br>(C40S-1004CA010) |
|                                 | ➡ 1022363<br>(C40E-1001CC010) | ➡ 1022374<br>(C40E-1002CC010) | ➡ 1022385<br>(C40E-1003CC010) | ➡ 1022396<br>(C40E-1004CC010) |
| <b>1200</b>                     | ➡ 1018601<br>(C40S-1201CA010) | ➡ 1018625<br>(C40S-1202CA010) | ➡ 1018647<br>(C40S-1203CA010) | ➡ 1018669<br>(C40S-1204CA010) |
|                                 | ➡ 1022364<br>(C40E-1201CC010) | ➡ 1022375<br>(C40E-1202CC010) | ➡ 1022386<br>(C40E-1203CC010) | ➡ 1022397<br>(C40E-1204CC010) |
| <b>1350</b>                     | ➡ 1018603<br>(C40S-1301CA010) | ➡ 1018627<br>(C40S-1302CA010) | ➡ 1018649<br>(C40S-1303CA010) | ➡ 1018671<br>(C40S-1304CA010) |
|                                 | ➡ 1022365<br>(C40E-1301CC010) | ➡ 1022376<br>(C40E-1302CC010) | ➡ 1022387<br>(C40E-1303CC010) | ➡ 1022398<br>(C40E-1304CC010) |
| <b>1500</b>                     | ➡ 1018605<br>(C40S-1501CA010) | ➡ 1018629<br>(C40S-1502CA010) | ➡ 1018651<br>(C40S-1503CA010) | ➡ 1018673<br>(C40S-1504CA010) |
|                                 | ➡ 1022366<br>(C40E-1501CC010) | ➡ 1022377<br>(C40E-1502CC010) | ➡ 1022388<br>(C40E-1503CC010) | ➡ 1022399<br>(C40E-1504CC010) |
| <b>1650</b>                     | ➡ 1018607<br>(C40S-1601CA010) | ➡ 1018631<br>(C40S-1602CA010) | ➡ 1018653<br>(C40S-1603CA010) | ➡ 1018675<br>(C40S-1604CA010) |
|                                 | ➡ 1022367<br>(C40E-1601CC010) | ➡ 1022378<br>(C40E-1602CC010) | ➡ 1022389<br>(C40E-1603CC010) | ➡ 1022400<br>(C40E-1604CC010) |
| <b>1800</b>                     | ➡ 1018609<br>(C40S-1801CA010) | ➡ 1018633<br>(C40S-1802CA010) | ➡ 1018655<br>(C40S-1803CA010) | ➡ 1018677<br>(C40S-1804CA010) |
|                                 | ➡ 1022368<br>(C40E-1801CC010) | ➡ 1022379<br>(C40E-1802CC010) | ➡ 1022390<br>(C40E-1803CC010) | ➡ 1022401<br>(C40E-1804CC010) |

**12.2.5 C4000 Standard without extension connection with pre-configuration D**

The pre-configuration is a specific system delivery state (see chapter 8.1 “Default delivery status” on page 66). You can change this configuration using the software supplied.

Tab. 47: Part numbers  
C4000 Standard without  
extension connection with  
pre-configuration D

| Protective field<br>height [mm] | Part numbers for resolution |                             |                             |                             |
|---------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|                                 | 14 mm                       | 20 mm                       | 30 mm                       | 40 mm                       |
| <b>300</b>                      | 1018591<br>(C40S-0301CA010) | 1018613<br>(C40S-0302CA010) | 1018635<br>(C40S-0303CA010) | 1018657<br>(C40S-0304CA010) |
|                                 | 1022402<br>(C40E-0301CD010) | 1022413<br>(C40E-0302CD010) | 1022424<br>(C40E-0303CD010) | 1022435<br>(C40E-0304CD010) |
| <b>450</b>                      | 1018347<br>(C40S-0401CA010) | 1018615<br>(C40S-0402CA010) | 1018637<br>(C40S-0403CA010) | 1018659<br>(C40S-0404CA010) |
|                                 | 1022403<br>(C40E-0401CD010) | 1022414<br>(C40E-0402CD010) | 1022425<br>(C40E-0403CD010) | 1022436<br>(C40E-0404CD010) |
| <b>600</b>                      | 1018593<br>(C40S-0601CA010) | 1018617<br>(C40S-0602CA010) | 1018639<br>(C40S-0603CA010) | 1018661<br>(C40S-0604CA010) |
|                                 | 1022404<br>(C40E-0601CD010) | 1022415<br>(C40E-0602CD010) | 1022426<br>(C40E-0603CD010) | 1022437<br>(C40E-0604CD010) |
| <b>750</b>                      | 1018595<br>(C40S-0701CA010) | 1018619<br>(C40S-0702CA010) | 1018641<br>(C40S-0703CA010) | 1018663<br>(C40S-0704CA010) |
|                                 | 1022405<br>(C40E-0701CD010) | 1022416<br>(C40E-0702CD010) | 1022427<br>(C40E-0703CD010) | 1022438<br>(C40E-0704CD010) |
| <b>900</b>                      | 1018597<br>(C40S-0901CA010) | 1018621<br>(C40S-0902CA010) | 1018643<br>(C40S-0903CA010) | 1018665<br>(C40S-0904CA010) |
|                                 | 1022406<br>(C40E-0901CD010) | 1022417<br>(C40E-0902CD010) | 1022428<br>(C40E-0903CD010) | 1022439<br>(C40E-0904CD010) |
| <b>1050</b>                     | 1018599<br>(C40S-1001CA010) | 1018623<br>(C40S-1002CA010) | 1018645<br>(C40S-1003CA010) | 1018667<br>(C40S-1004CA010) |
|                                 | 1022407<br>(C40E-1001CD010) | 1022418<br>(C40E-1002CD010) | 1022429<br>(C40E-1003CD010) | 1022440<br>(C40E-1004CD010) |
| <b>1200</b>                     | 1018601<br>(C40S-1201CA010) | 1018625<br>(C40S-1202CA010) | 1018647<br>(C40S-1203CA010) | 1018669<br>(C40S-1204CA010) |
|                                 | 1022408<br>(C40E-1201CD010) | 1022419<br>(C40E-1202CD010) | 1022430<br>(C40E-1203CD010) | 1022441<br>(C40E-1204CD010) |
| <b>1350</b>                     | 1018603<br>(C40S-1301CA010) | 1018627<br>(C40S-1302CA010) | 1018649<br>(C40S-1303CA010) | 1018671<br>(C40S-1304CA010) |
|                                 | 1022409<br>(C40E-1301CD010) | 1022420<br>(C40E-1302CD010) | 1022431<br>(C40E-1303CD010) | 1022442<br>(C40E-1304CD010) |
| <b>1500</b>                     | 1018605<br>(C40S-1501CA010) | 1018629<br>(C40S-1502CA010) | 1018651<br>(C40S-1503CA010) | 1018673<br>(C40S-1504CA010) |
|                                 | 1022410<br>(C40E-1501CD010) | 1022421<br>(C40E-1502CD010) | 1022432<br>(C40E-1503CD010) | 1022443<br>(C40E-1504CD010) |
| <b>1650</b>                     | 1018607<br>(C40S-1601CA010) | 1018631<br>(C40S-1602CA010) | 1018653<br>(C40S-1603CA010) | 1018675<br>(C40S-1604CA010) |
|                                 | 1022411<br>(C40E-1601CD010) | 1022422<br>(C40E-1602CD010) | 1022433<br>(C40E-1603CD010) | 1022444<br>(C40E-1604CD010) |
| <b>1800</b>                     | 1018609<br>(C40S-1801CA010) | 1018633<br>(C40S-1802CA010) | 1018655<br>(C40S-1803CA010) | 1018677<br>(C40S-1804CA010) |
|                                 | 1022412<br>(C40E-1801CD010) | 1022423<br>(C40E-1802CD010) | 1022434<br>(C40E-1803CD010) | 1022445<br>(C40E-1804CD010) |

**12.2.6 C4000 Standard without extension connection with pre-configuration E**

The pre-configuration is a specific system delivery state (see chapter 8.1 “Default delivery status” on page 66). You can change this configuration using the software supplied.

Tab. 48: Part numbers  
C4000 Standard without  
extension connection with  
pre-configuration E

| Protective field<br>height [mm] | Part numbers for resolution |                             |                             |                             |
|---------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|                                 | 14 mm                       | 20 mm                       | 30 mm                       | 40 mm                       |
| <b>300</b>                      | 1018591<br>(C40S-0301CA010) | 1018613<br>(C40S-0302CA010) | 1018635<br>(C40S-0303CA010) | 1018657<br>(C40S-0304CA010) |
|                                 | 1022446<br>(C40E-0301CE010) | 1022457<br>(C40E-0302CE010) | 1022468<br>(C40E-0303CE010) | 1022479<br>(C40E-0304CE010) |
| <b>450</b>                      | 1018347<br>(C40S-0401CA010) | 1018615<br>(C40S-0402CA010) | 1018637<br>(C40S-0403CA010) | 1018659<br>(C40S-0404CA010) |
|                                 | 1022447<br>(C40E-0401CE010) | 1022458<br>(C40E-0402CE010) | 1022469<br>(C40E-0403CE010) | 1022480<br>(C40E-0404CE010) |
| <b>600</b>                      | 1018593<br>(C40S-0601CA010) | 1018617<br>(C40S-0602CA010) | 1018639<br>(C40S-0603CA010) | 1018661<br>(C40S-0604CA010) |
|                                 | 1022448<br>(C40E-0601CE010) | 1022459<br>(C40E-0602CE010) | 1022470<br>(C40E-0603CE010) | 1022481<br>(C40E-0604CE010) |
| <b>750</b>                      | 1018595<br>(C40S-0701CA010) | 1018619<br>(C40S-0702CA010) | 1018641<br>(C40S-0703CA010) | 1018663<br>(C40S-0704CA010) |
|                                 | 1022449<br>(C40E-0701CE010) | 1022460<br>(C40E-0702CE010) | 1022471<br>(C40E-0703CE010) | 1022482<br>(C40E-0704CE010) |
| <b>900</b>                      | 1018597<br>(C40S-0901CA010) | 1018621<br>(C40S-0902CA010) | 1018643<br>(C40S-0903CA010) | 1018665<br>(C40S-0904CA010) |
|                                 | 1022450<br>(C40E-0901CE010) | 1022461<br>(C40E-0902CE010) | 1022472<br>(C40E-0903CE010) | 1022483<br>(C40E-0904CE010) |
| <b>1050</b>                     | 1018599<br>(C40S-1001CA010) | 1018623<br>(C40S-1002CA010) | 1018645<br>(C40S-1003CA010) | 1018667<br>(C40S-1004CA010) |
|                                 | 1022451<br>(C40E-1001CE010) | 1022462<br>(C40E-1002CE010) | 1022473<br>(C40E-1003CE010) | 1022484<br>(C40E-1004CE010) |
| <b>1200</b>                     | 1018601<br>(C40S-1201CA010) | 1018625<br>(C40S-1202CA010) | 1018647<br>(C40S-1203CA010) | 1018669<br>(C40S-1204CA010) |
|                                 | 1022452<br>(C40E-1201CE010) | 1022463<br>(C40E-1202CE010) | 1022474<br>(C40E-1203CE010) | 1022485<br>(C40E-1204CE010) |
| <b>1350</b>                     | 1018603<br>(C40S-1301CA010) | 1018627<br>(C40S-1302CA010) | 1018649<br>(C40S-1303CA010) | 1018671<br>(C40S-1304CA010) |
|                                 | 1022453<br>(C40E-1301CE010) | 1022464<br>(C40E-1302CE010) | 1022475<br>(C40E-1303CE010) | 1022486<br>(C40E-1304CE010) |
| <b>1500</b>                     | 1018605<br>(C40S-1501CA010) | 1018629<br>(C40S-1502CA010) | 1018651<br>(C40S-1503CA010) | 1018673<br>(C40S-1504CA010) |
|                                 | 1022454<br>(C40E-1501CE010) | 1022465<br>(C40E-1502CE010) | 1022476<br>(C40E-1503CE010) | 1022487<br>(C40E-1504CE010) |
| <b>1650</b>                     | 1018607<br>(C40S-1601CA010) | 1018631<br>(C40S-1602CA010) | 1018653<br>(C40S-1603CA010) | 1018675<br>(C40S-1604CA010) |
|                                 | 1022455<br>(C40E-1601CE010) | 1022466<br>(C40E-1602CE010) | 1022477<br>(C40E-1603CE010) | 1022488<br>(C40E-1604CE010) |
| <b>1800</b>                     | 1018609<br>(C40S-1801CA010) | 1018633<br>(C40S-1802CA010) | 1018655<br>(C40S-1803CA010) | 1018677<br>(C40S-1804CA010) |
|                                 | 1022456<br>(C40E-1801CE010) | 1022467<br>(C40E-1802CE010) | 1022478<br>(C40E-1803CE010) | 1022489<br>(C40E-1804CE010) |

**12.2.7 C4000 Standard without extension connection with pre-configuration F**

The pre-configuration is a specific system delivery state (see chapter 8.1 “Default delivery status” on page 66). You can change this configuration using the software supplied.

Tab. 49: Part numbers  
C4000 Standard without  
extension connection with  
pre-configuration F

| Protective field<br>height [mm] | Part numbers for resolution   |                               |                               |                               |
|---------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|                                 | 14 mm                         | 20 mm                         | 30 mm                         | 40 mm                         |
| <b>300</b>                      | ➡ 1018591<br>(C40S-0301CA010) | ➡ 1018613<br>(C40S-0302CA010) | ➡ 1018635<br>(C40S-0303CA010) | ➡ 1018657<br>(C40S-0304CA010) |
|                                 | ➡ 1022490<br>(C40E-0301CF010) | ➡ 1022501<br>(C40E-0302CF010) | ➡ 1022512<br>(C40E-0303CF010) | ➡ 1022523<br>(C40E-0304CF010) |
| <b>450</b>                      | ➡ 1018347<br>(C40S-0401CA010) | ➡ 1018615<br>(C40S-0402CA010) | ➡ 1018637<br>(C40S-0403CA010) | ➡ 1018659<br>(C40S-0404CA010) |
|                                 | ➡ 1022491<br>(C40E-0401CF010) | ➡ 1022502<br>(C40E-0402CF010) | ➡ 1022513<br>(C40E-0403CF010) | ➡ 1022524<br>(C40E-0404CF010) |
| <b>600</b>                      | ➡ 1018593<br>(C40S-0601CA010) | ➡ 1018617<br>(C40S-0602CA010) | ➡ 1018639<br>(C40S-0603CA010) | ➡ 1018661<br>(C40S-0604CA010) |
|                                 | ➡ 1022492<br>(C40E-0601CF010) | ➡ 1022503<br>(C40E-0602CF010) | ➡ 1022514<br>(C40E-0603CF010) | ➡ 1022525<br>(C40E-0604CF010) |
| <b>750</b>                      | ➡ 1018595<br>(C40S-0701CA010) | ➡ 1018619<br>(C40S-0702CA010) | ➡ 1018641<br>(C40S-0703CA010) | ➡ 1018663<br>(C40S-0704CA010) |
|                                 | ➡ 1022493<br>(C40E-0701CF010) | ➡ 1022504<br>(C40E-0702CF010) | ➡ 1022515<br>(C40E-0703CF010) | ➡ 1022526<br>(C40E-0704CF010) |
| <b>900</b>                      | ➡ 1018597<br>(C40S-0901CA010) | ➡ 1018621<br>(C40S-0902CA010) | ➡ 1018643<br>(C40S-0903CA010) | ➡ 1018665<br>(C40S-0904CA010) |
|                                 | ➡ 1022494<br>(C40E-0901CF010) | ➡ 1022505<br>(C40E-0902CF010) | ➡ 1022516<br>(C40E-0903CF010) | ➡ 1022527<br>(C40E-0904CF010) |
| <b>1050</b>                     | ➡ 1018599<br>(C40S-1001CA010) | ➡ 1018623<br>(C40S-1002CA010) | ➡ 1018645<br>(C40S-1003CA010) | ➡ 1018667<br>(C40S-1004CA010) |
|                                 | ➡ 1022495<br>(C40E-1001CF010) | ➡ 1022506<br>(C40E-1002CF010) | ➡ 1022517<br>(C40E-1003CF010) | ➡ 1022528<br>(C40E-1004CF010) |
| <b>1200</b>                     | ➡ 1018601<br>(C40S-1201CA010) | ➡ 1018625<br>(C40S-1202CA010) | ➡ 1018647<br>(C40S-1203CA010) | ➡ 1018669<br>(C40S-1204CA010) |
|                                 | ➡ 1022496<br>(C40E-1201CF010) | ➡ 1022507<br>(C40E-1202CF010) | ➡ 1022518<br>(C40E-1203CF010) | ➡ 1022529<br>(C40E-1204CF010) |
| <b>1350</b>                     | ➡ 1018603<br>(C40S-1301CA010) | ➡ 1018627<br>(C40S-1302CA010) | ➡ 1018649<br>(C40S-1303CA010) | ➡ 1018671<br>(C40S-1304CA010) |
|                                 | ➡ 1022497<br>(C40E-1301CF010) | ➡ 1022508<br>(C40E-1302CF010) | ➡ 1022519<br>(C40E-1303CF010) | ➡ 1022530<br>(C40E-1304CF010) |
| <b>1500</b>                     | ➡ 1018605<br>(C40S-1501CA010) | ➡ 1018629<br>(C40S-1502CA010) | ➡ 1018651<br>(C40S-1503CA010) | ➡ 1018673<br>(C40S-1504CA010) |
|                                 | ➡ 1022498<br>(C40E-1501CF010) | ➡ 1022509<br>(C40E-1502CF010) | ➡ 1022520<br>(C40E-1503CF010) | ➡ 1022531<br>(C40E-1504CF010) |
| <b>1650</b>                     | ➡ 1018607<br>(C40S-1601CA010) | ➡ 1018631<br>(C40S-1602CA010) | ➡ 1018653<br>(C40S-1603CA010) | ➡ 1018675<br>(C40S-1604CA010) |
|                                 | ➡ 1022499<br>(C40E-1601CF010) | ➡ 1022510<br>(C40E-1602CF010) | ➡ 1022521<br>(C40E-1603CF010) | ➡ 1022532<br>(C40E-1604CF010) |
| <b>1800</b>                     | ➡ 1018609<br>(C40S-1801CA010) | ➡ 1018633<br>(C40S-1802CA010) | ➡ 1018655<br>(C40S-1803CA010) | ➡ 1018677<br>(C40S-1804CA010) |
|                                 | ➡ 1022500<br>(C40E-1801CF010) | ➡ 1022511<br>(C40E-1802CF010) | ➡ 1022522<br>(C40E-1803CF010) | ➡ 1022533<br>(C40E-1804CF010) |

**12.2.8 C4000 Standard without extension connection with pre-configuration R**

The pre-configuration is a specific system delivery state (see chapter 8.1 “Default delivery status” on page 66). You can change this configuration using the software supplied.

Tab. 50: Part numbers  
C4000 Standard without  
extension connection with  
pre-configuration R

| Protective field<br>height [mm] | Part numbers for resolution                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------|
|                                 | 30 mm                                                                                                             |
| <b>300</b>                      |  1018635<br>(C40S-0303CA010)   |
|                                 |  1041119<br>(C40E-0303CR010)   |
| <b>600</b>                      |  1018639<br>(C40S-0603CA010)   |
|                                 |  1041120<br>(C40E-0603CR010)   |
| <b>750</b>                      |  1018641<br>(C40S-0703CA010)   |
|                                 |  1040258<br>(C40E-0703CR010)   |
| <b>900</b>                      |  1018643<br>(C40S-0903CA010)   |
|                                 |  1041121<br>(C40E-0903CR010)   |
| <b>1050</b>                     |  1018645<br>(C40S-1003CA010)   |
|                                 |  1040259<br>(C40E-1003CR010) |
| <b>1350</b>                     |  1018649<br>(C40S-1303CA010) |
|                                 |  1040260<br>(C40E-1303CR010) |
| <b>1500</b>                     |  1018651<br>(C40S-1503CA010) |
|                                 |  1040261<br>(C40E-1503CR010) |
| <b>1800</b>                     |  1018655<br>(C40S-1803CA010) |
|                                 |  1041569<br>(C40E-1803CR010) |

Other systems on request.

## 12.3 System with extension connection

For use as single system, as host or as first or second guest of a cascaded system.

### 12.3.1 C4000 Standard with M26 extension connection

Tab. 51: Part numbers  
C4000 Standard with M26  
extension connection

| Protective field<br>height [mm] | Part numbers for resolution |                             |                             |                             |
|---------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|                                 | 14 mm                       | 20 mm                       | 30 mm                       | 40 mm                       |
| <b>300</b>                      | 1018690<br>(C40S-0301DA010) | 1018710<br>(C40S-0302DA010) | 1018733<br>(C40S-0303DA010) | 1018755<br>(C40S-0304DA010) |
|                                 | 1018691<br>(C40E-0301DA010) | 1018711<br>(C40E-0302DA010) | 1018734<br>(C40E-0303DA010) | 1018756<br>(C40E-0304DA010) |
| <b>450</b>                      | 1018349<br>(C40S-0401DA010) | 1018712<br>(C40S-0402DA010) | 1018735<br>(C40S-0403DA010) | 1018757<br>(C40S-0404DA010) |
|                                 | 1018350<br>(C40E-0401DA010) | 1018713<br>(C40E-0402DA010) | 1018736<br>(C40E-0403DA010) | 1018758<br>(C40E-0404DA010) |
| <b>600</b>                      | 1018692<br>(C40S-0601DA010) | 1018714<br>(C40S-0602DA010) | 1018737<br>(C40S-0603DA010) | 1018759<br>(C40S-0604DA010) |
|                                 | 1018693<br>(C40E-0601DA010) | 1018715<br>(C40E-0602DA010) | 1018738<br>(C40E-0603DA010) | 1018760<br>(C40E-0604DA010) |
| <b>750</b>                      | 1018694<br>(C40S-0701DA010) | 1018716<br>(C40S-0702DA010) | 1018739<br>(C40S-0703DA010) | 1018762<br>(C40S-0704DA010) |
|                                 | 1018695<br>(C40E-0701DA010) | 1018717<br>(C40E-0702DA010) | 1018740<br>(C40E-0703DA010) | 1018763<br>(C40E-0704DA010) |
| <b>900</b>                      | 1018696<br>(C40S-0801DA010) | 1018718<br>(C40S-0802DA010) | 1018741<br>(C40S-0803DA010) | 1018765<br>(C40S-0804DA010) |
|                                 | 1018697<br>(C40E-0801DA010) | 1018719<br>(C40E-0802DA010) | 1018742<br>(C40E-0803DA010) | 1018766<br>(C40E-0804DA010) |
| <b>1050</b>                     | 1018698<br>(C40S-1001DA010) | 1018720<br>(C40S-1002DA010) | 1018743<br>(C40S-1003DA010) | 1018767<br>(C40S-1004DA010) |
|                                 | 1018699<br>(C40E-1001DA010) | 1018721<br>(C40E-1002DA010) | 1018744<br>(C40E-1003DA010) | 1018768<br>(C40E-1004DA010) |
| <b>1200</b>                     | 1018700<br>(C40S-1201DA010) | 1018722<br>(C40S-1202DA010) | 1018745<br>(C40S-1203DA010) | 1018769<br>(C40S-1204DA010) |
|                                 | 1018701<br>(C40E-1201DA010) | 1018723<br>(C40E-1202DA010) | 1018746<br>(C40E-1203DA010) | 1018770<br>(C40E-1204DA010) |
| <b>1350</b>                     | 1018702<br>(C40S-1301DA010) | 1018724<br>(C40S-1302DA010) | 1018747<br>(C40S-1303DA010) | 1018771<br>(C40S-1304DA010) |
|                                 | 1018703<br>(C40E-1301DA010) | 1018725<br>(C40E-1302DA010) | 1018748<br>(C40E-1303DA010) | 1018772<br>(C40E-1304DA010) |
| <b>1500</b>                     | 1018704<br>(C40S-1501DA010) | 1018726<br>(C40S-1502DA010) | 1018749<br>(C40S-1503DA010) | 1018773<br>(C40S-1504DA010) |
|                                 | 1018705<br>(C40E-1501DA010) | 1018727<br>(C40E-1502DA010) | 1018750<br>(C40E-1503DA010) | 1018774<br>(C40E-1504DA010) |
| <b>1650</b>                     | 1018706<br>(C40S-1601DA010) | 1018728<br>(C40S-1602DA010) | 1018751<br>(C40S-1603DA010) | 1018775<br>(C40S-1604DA010) |
|                                 | 1018707<br>(C40E-1601DA010) | 1018729<br>(C40E-1602DA010) | 1018752<br>(C40E-1603DA010) | 1018776<br>(C40E-1604DA010) |
| <b>1800</b>                     | 1018708<br>(C40S-1801DA010) | 1018730<br>(C40S-1802DA010) | 1018753<br>(C40S-1803DA010) | 1018777<br>(C40S-1804DA010) |
|                                 | 1018709<br>(C40E-1801DA010) | 1018731<br>(C40E-1802DA010) | 1018754<br>(C40E-1803DA010) | 1018778<br>(C40E-1804DA010) |

## C4000 Standard/Advanced

Tab. 52: Part numbers  
C4000 Advanced with M26  
extension connection

## 12.3.2 C4000 Advanced with M26 extension connection

| Protective field<br>height [mm] | Part numbers for resolution   |                               |                               |                               |
|---------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|                                 | 14 mm                         | 20 mm                         | 30 mm                         | 40 mm                         |
| <b>300</b>                      | ➡ 1018690<br>(C40S-0301DA010) | ➡ 1018710<br>(C40S-0302DA010) | ➡ 1018733<br>(C40S-0303DA010) | ➡ 1018755<br>(C40S-0304DA010) |
|                                 | ➡ 1018827<br>(C40E-0301DB010) | ➡ 1018838<br>(C40E-0302DB010) | ➡ 1018849<br>(C40E-0303DB010) | ➡ 1018860<br>(C40E-0304DB010) |
| <b>450</b>                      | ➡ 1018349<br>(C40S-0401DA010) | ➡ 1018712<br>(C40S-0402DA010) | ➡ 1018735<br>(C40S-0403DA010) | ➡ 1018757<br>(C40S-0404DA010) |
|                                 | ➡ 1018828<br>(C40E-0401DB010) | ➡ 1018839<br>(C40E-0402DB010) | ➡ 1018850<br>(C40E-0403DB010) | ➡ 1018861<br>(C40E-0404DB010) |
| <b>600</b>                      | ➡ 1018692<br>(C40S-0601DA010) | ➡ 1018714<br>(C40S-0602DA010) | ➡ 1018737<br>(C40S-0603DA010) | ➡ 1018759<br>(C40S-0604DA010) |
|                                 | ➡ 1018829<br>(C40E-0601DB010) | ➡ 1018840<br>(C40E-0602DB010) | ➡ 1018851<br>(C40E-0603DB010) | ➡ 1018862<br>(C40E-0604DB010) |
| <b>750</b>                      | ➡ 1018694<br>(C40S-0701DA010) | ➡ 1018716<br>(C40S-0702DA010) | ➡ 1018739<br>(C40S-0703DA010) | ➡ 1018762<br>(C40S-0704DA010) |
|                                 | ➡ 1018830<br>(C40E-0701DB010) | ➡ 1018841<br>(C40E-0702DB010) | ➡ 1018852<br>(C40E-0703DB010) | ➡ 1018863<br>(C40E-0704DB010) |
| <b>900</b>                      | ➡ 1018696<br>(C40S-0901DA010) | ➡ 1018718<br>(C40S-0902DA010) | ➡ 1018741<br>(C40S-0903DA010) | ➡ 1018765<br>(C40S-0904DA010) |
|                                 | ➡ 1018831<br>(C40E-0901DB010) | ➡ 1018842<br>(C40E-0902DB010) | ➡ 1018853<br>(C40E-0903DB010) | ➡ 1018864<br>(C40E-0904DB010) |
| <b>1050</b>                     | ➡ 1018698<br>(C40S-1001DA010) | ➡ 1018720<br>(C40S-1002DA010) | ➡ 1018743<br>(C40S-1003DA010) | ➡ 1018767<br>(C40S-1004DA010) |
|                                 | ➡ 1018832<br>(C40E-1001DB010) | ➡ 1018843<br>(C40E-1002DB010) | ➡ 1018854<br>(C40E-1003DB010) | ➡ 1018865<br>(C40E-1004DB010) |
| <b>1200</b>                     | ➡ 1018700<br>(C40S-1201DA010) | ➡ 1018722<br>(C40S-1202DA010) | ➡ 1018745<br>(C40S-1203DA010) | ➡ 1018769<br>(C40S-1204DA010) |
|                                 | ➡ 1018833<br>(C40E-1201DB010) | ➡ 1018844<br>(C40E-1202DB010) | ➡ 1018855<br>(C40E-1203DB010) | ➡ 1018866<br>(C40E-1204DB010) |
| <b>1350</b>                     | ➡ 1018702<br>(C40S-1301DA010) | ➡ 1018724<br>(C40S-1302DA010) | ➡ 1018747<br>(C40S-1303DA010) | ➡ 1018771<br>(C40S-1304DA010) |
|                                 | ➡ 1018834<br>(C40E-1301DB010) | ➡ 1018845<br>(C40E-1302DB010) | ➡ 1018856<br>(C40E-1303DB010) | ➡ 1018867<br>(C40E-1304DB010) |
| <b>1500</b>                     | ➡ 1018704<br>(C40S-1501DA010) | ➡ 1018726<br>(C40S-1502DA010) | ➡ 1018749<br>(C40S-1503DA010) | ➡ 1018773<br>(C40S-1504DA010) |
|                                 | ➡ 1018835<br>(C40E-1501DB010) | ➡ 1018846<br>(C40E-1502DB010) | ➡ 1018857<br>(C40E-1503DB010) | ➡ 1018868<br>(C40E-1504DB010) |
| <b>1650</b>                     | ➡ 1018706<br>(C40S-1601DA010) | ➡ 1018728<br>(C40S-1602DA010) | ➡ 1018751<br>(C40S-1603DA010) | ➡ 1018775<br>(C40S-1604DA010) |
|                                 | ➡ 1018836<br>(C40E-1601DB010) | ➡ 1018847<br>(C40E-1602DB010) | ➡ 1018858<br>(C40E-1603DB010) | ➡ 1018869<br>(C40E-1604DB010) |
| <b>1800</b>                     | ➡ 1018708<br>(C40S-1801DA010) | ➡ 1018730<br>(C40S-1802DA010) | ➡ 1018753<br>(C40S-1803DA010) | ➡ 1018777<br>(C40S-1804DA010) |
|                                 | ➡ 1018837<br>(C40E-1801DB010) | ➡ 1018848<br>(C40E-1802DB010) | ➡ 1018859<br>(C40E-1803DB010) | ➡ 1018870<br>(C40E-1804DB010) |

## 12.3.3 C4000 Standard with M12 extension connection

Tab. 53: Part numbers  
C4000 Standard with M12  
extension connection

| Protective field<br>height [mm] | Part numbers for resolution |                             |
|---------------------------------|-----------------------------|-----------------------------|
|                                 | 14 mm                       | 30 mm                       |
| 300                             | 1028969<br>(C40S-0301DA040) | 1029001<br>(C40S-0303DA040) |
|                                 | 1028970<br>(C40E-0301DA040) | 1029002<br>(C40E-0303DA040) |
| 450                             | 1028967<br>(C40S-0401DA040) | 1029003<br>(C40S-0403DA040) |
|                                 | 1028968<br>(C40E-0401DA040) | 1029004<br>(C40E-0403DA040) |
| 600                             | 1028971<br>(C40S-0601DA040) | 1029005<br>(C40S-0603DA040) |
|                                 | 1028972<br>(C40E-0601DA040) | 1029006<br>(C40E-0603DA040) |
| 750                             | 1028973<br>(C40S-0701DA040) | 1029007<br>(C40S-0703DA040) |
|                                 | 1028974<br>(C40E-0701DA040) | 1029008<br>(C40E-0703DA040) |
| 900                             | 1028975<br>(C40S-0801DA040) | 1029009<br>(C40S-0903DA040) |
|                                 | 1028976<br>(C40E-0801DA040) | 1029010<br>(C40E-0903DA040) |
| 1050                            | 1028977<br>(C40S-1001DA040) | 1029011<br>(C40S-1003DA040) |
|                                 | 1028978<br>(C40E-1001DA040) | 1029012<br>(C40E-1003DA040) |
| 1200                            | 1028979<br>(C40S-1201DA040) | 1029013<br>(C40S-1203DA040) |
|                                 | 1028980<br>(C40E-1201DA040) | 1029014<br>(C40E-1203DA040) |
| 1350                            | 1028981<br>(C40S-1301DA040) | 1029015<br>(C40S-1303DA040) |
|                                 | 1028982<br>(C40E-1301DA040) | 1029016<br>(C40E-1303DA040) |
| 1500                            | 1028983<br>(C40S-1501DA040) | 1029017<br>(C40S-1503DA040) |
|                                 | 1028984<br>(C40E-1501DA040) | 1029018<br>(C40E-1503DA040) |
| 1650                            | 1028985<br>(C40S-1601DA040) | 1029019<br>(C40S-1603DA040) |
|                                 | 1028986<br>(C40E-1601DA040) | 1029020<br>(C40E-1603DA040) |
| 1800                            | 1028987<br>(C40S-1801DA040) | 1029021<br>(C40S-1803DA040) |
|                                 | 1028988<br>(C40E-1801DA040) | 1029022<br>(C40E-1803DA040) |

## C4000 Standard/Advanced

Tab. 54: Part numbers  
C4000 Advanced with M12  
extension connection

## 12.3.4 C4000 Advanced with M12 extension connection

| Protective field<br>height [mm] | Part numbers for resolution                                                                                     |                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
|                                 | 14 mm                                                                                                           | 30 mm                                                                                                             |
| <b>300</b>                      |  1028969<br>(C40S-0301DA040)   |  1029001<br>(C40S-0303DA040)   |
|                                 |  1028989<br>(C40E-0301DB040)   |  1029023<br>(C40E-0303DB040)   |
| <b>450</b>                      |  1028967<br>(C40S-0401DA040)   |  1029003<br>(C40S-0403DA040)   |
|                                 |  1028990<br>(C40E-0401DB040)   |  1029024<br>(C40E-0403DB040)   |
| <b>600</b>                      |  1028971<br>(C40S-0601DA040)   |  1029005<br>(C40S-0603DA040)   |
|                                 |  1028991<br>(C40E-0601DB040)   |  1029025<br>(C40E-0603DB040)   |
| <b>750</b>                      |  1028973<br>(C40S-0701DA040)   |  1029007<br>(C40S-0703DA040)   |
|                                 |  1028992<br>(C40E-0701DB040)   |  1029026<br>(C40E-0703DB040)   |
| <b>900</b>                      |  1028975<br>(C40S-0901DA040)   |  1029009<br>(C40S-0903DA040)   |
|                                 |  1028993<br>(C40E-0901DB040)   |  1029027<br>(C40E-0903DB040)   |
| <b>1050</b>                     |  1028977<br>(C40S-1001DA040)   |  1029011<br>(C40S-1003DA040)   |
|                                 |  1028994<br>(C40E-1001DB040) |  1029028<br>(C40E-1003DB040) |
| <b>1200</b>                     |  1028979<br>(C40S-1201DA040) |  1029013<br>(C40S-1203DA040) |
|                                 |  1028995<br>(C40E-1201DB040) |  1029029<br>(C40E-1203DB040) |
| <b>1350</b>                     |  1028981<br>(C40S-1301DA040) |  1029015<br>(C40S-1303DA040) |
|                                 |  1028996<br>(C40E-1301DB040) |  1029030<br>(C40E-1303DB040) |
| <b>1500</b>                     |  1028983<br>(C40S-1501DA040) |  1029017<br>(C40S-1503DA040) |
|                                 |  1028997<br>(C40E-1501DB040) |  1029031<br>(C40E-1503DB040) |
| <b>1650</b>                     |  1028985<br>(C40S-1601DA040) |  1029019<br>(C40S-1603DA040) |
|                                 |  1028998<br>(C40E-1601DB040) |  1029032<br>(C40E-1603DB040) |
| <b>1800</b>                     |  1028987<br>(C40S-1801DA040) |  1029021<br>(C40S-1803DA040) |
|                                 |  1028999<br>(C40E-1801DB040) |  1029033<br>(C40E-1803DB040) |

## 12.4 C4000 Guest

### 12.4.1 C4000 Standard Guest with straight system connection

Tab. 55: Part numbers  
C4000 Standard Guest with  
straight system connection

| Protective field<br>height [mm] | Part numbers for resolution   |                               |
|---------------------------------|-------------------------------|-------------------------------|
|                                 | 14 mm                         | 30 mm                         |
| 150                             | ➡ 1028796<br>(C46S-0101CT400) | ➡ 1028879<br>(C46S-0103CT400) |
|                                 | ➡ 1028797<br>(C46E-0101CT400) | ➡ 1028880<br>(C46E-0103CT400) |
| 300                             | ➡ 1028802<br>(C46S-0301CT400) | ➡ 1028881<br>(C46S-0303CT400) |
|                                 | ➡ 1028803<br>(C46E-0301CT400) | ➡ 1028882<br>(C46E-0303CT400) |
| 450                             | ➡ 1028804<br>(C46S-0401CT400) | ➡ 1028883<br>(C46S-0403CT400) |
|                                 | ➡ 1028805<br>(C46E-0401CT400) | ➡ 1028884<br>(C46E-0403CT400) |
| 600                             | ➡ 1028806<br>(C46S-0601CT400) | ➡ 1028885<br>(C46S-0603CT400) |
|                                 | ➡ 1028807<br>(C46E-0601CT400) | ➡ 1028886<br>(C46E-0603CT400) |
| 750                             | ➡ 1028808<br>(C46S-0701CT400) | ➡ 1028887<br>(C46S-0703CT400) |
|                                 | ➡ 1028809<br>(C46E-0701CT400) | ➡ 1028888<br>(C46E-0703CT400) |
| 900                             | ➡ 1040173<br>(C46S-0901CT400) | ➡ 1040193<br>(C46S-0903CT400) |
|                                 | ➡ 1040174<br>(C46E-0901CT400) | ➡ 1040194<br>(C46E-0903CT400) |
| 1050                            | ➡ 1040175<br>(C46S-1001CT400) | ➡ 1040195<br>(C46S-1003CT400) |
|                                 | ➡ 1040176<br>(C46E-1001CT400) | ➡ 1040196<br>(C46E-1003CT400) |
| 1200                            | ➡ 1040177<br>(C46S-1201CT400) | ➡ 1040197<br>(C46S-1203CT400) |
|                                 | ➡ 1040178<br>(C46E-1201CT400) | ➡ 1040198<br>(C46E-1203CT400) |
| 1350                            | ➡ 1040179<br>(C46S-1301CT400) | ➡ 1040199<br>(C46S-1303CT400) |
|                                 | ➡ 1040180<br>(C46E-1301CT400) | ➡ 1040200<br>(C46E-1303CT400) |
| 1500                            | ➡ 1040181<br>(C46S-1501CT400) | ➡ 1040201<br>(C46S-1503CT400) |
|                                 | ➡ 1040214<br>(C46E-1501CT400) | ➡ 1040202<br>(C46E-1503CT400) |
| 1650                            | ➡ 1040182<br>(C46S-1601CT400) | ➡ 1040203<br>(C46S-1603CT400) |
|                                 | ➡ 1040183<br>(C46E-1601CT400) | ➡ 1040204<br>(C46E-1603CT400) |
| 1800                            | ➡ 1040184<br>(C46S-1801CT400) | ➡ 1040205<br>(C46S-1803CT400) |
|                                 | ➡ 1040185<br>(C46E-1801CT400) | ➡ 1040206<br>(C46E-1803CT400) |

**C4000 Standard/Advanced**

Tab. 56: Part numbers  
C4000 Standard Guest with  
angled system connection

**12.4.2 C4000 Standard Guest with angled system connection**

| Protective field<br>height [mm] | Part numbers for resolution                                                                                   |                                                                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|                                 | 14 mm                                                                                                         | 30 mm                                                                                                           |
| 150                             |  1028810<br>(C46S-0101CT500) |  1028901<br>(C46S-0103CT500) |
|                                 |  1028811<br>(C46E-0101CT500) |  1028902<br>(C46E-0103CT500) |

## 12.4.3 C4000 Advanced Guest with straight system connection

Tab. 57: Part numbers  
C4000 Advanced Guest with  
straight system connection

| Protective field<br>height [mm] | Part numbers for resolution |                             |
|---------------------------------|-----------------------------|-----------------------------|
|                                 | 14 mm                       | 30 mm                       |
| 150                             | 1028796<br>(C46S-0101CT400) | 1028879<br>(C46S-0103CT400) |
|                                 | 1028820<br>(C46E-0101CU400) | 1028889<br>(C46E-0103CU400) |
| 300                             | 1028802<br>(C46S-0301CT400) | 1028881<br>(C46S-0303CT400) |
|                                 | 1028821<br>(C46E-0301CU400) | 1028890<br>(C46E-0303CU400) |
| 450                             | 1028804<br>(C46S-0401CT400) | 1028883<br>(C46S-0403CT400) |
|                                 | 1028822<br>(C46E-0401CU400) | 1028891<br>(C46E-0403CU400) |
| 600                             | 1028806<br>(C46S-0601CT400) | 1028885<br>(C46S-0603CT400) |
|                                 | 1028823<br>(C46E-0601CU400) | 1028892<br>(C46E-0603CU400) |
| 750                             | 1028808<br>(C46S-0701CT400) | 1028887<br>(C46S-0703CT400) |
|                                 | 1028824<br>(C46E-0701CU400) | 1028893<br>(C46E-0703CU400) |
| 900                             | 1040173<br>(C46S-0901CT400) | 1040193<br>(C46S-0903CT400) |
|                                 | 1040186<br>(C46E-0901CU400) | 1040207<br>(C46E-0903CU400) |
| 1050                            | 1040175<br>(C46S-1001CT400) | 1040195<br>(C46S-1003CT400) |
|                                 | 1040187<br>(C46E-1001CU400) | 1040208<br>(C46E-1003CU400) |
| 1200                            | 1040177<br>(C46S-1201CT400) | 1040197<br>(C46S-1203CT400) |
|                                 | 1040188<br>(C46E-1201CU400) | 1040209<br>(C46E-1203CU400) |
| 1350                            | 1040179<br>(C46S-1301CT400) | 1040199<br>(C46S-1303CT400) |
|                                 | 1040189<br>(C46E-1301CU400) | 1040210<br>(C46E-1303CU400) |
| 1500                            | 1040181<br>(C46S-1501CT400) | 1040201<br>(C46S-1503CT400) |
|                                 | 1040190<br>(C46E-1501CU400) | 1040211<br>(C46E-1503CU400) |
| 1650                            | 1040182<br>(C46S-1601CT400) | 1040203<br>(C46S-1603CT400) |
|                                 | 1040191<br>(C46E-1601CU400) | 1040212<br>(C46E-1603CU400) |
| 1800                            | 1040184<br>(C46S-1801CT400) | 1040205<br>(C46S-1803CT400) |
|                                 | 1040192<br>(C46E-1801CU400) | 1040213<br>(C46E-1803CU400) |

**C4000 Standard/Advanced**

Tab. 58: Part numbers  
C4000 Advanced Guest with  
angled system connection

**12.4.4 C4000 Advanced Guest with angled system connection**

| Protective field<br>height [mm] | Part numbers for resolution                                                                                   |                                                                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|                                 | 14 mm                                                                                                         | 30 mm                                                                                                           |
| 150                             |  1028810<br>(C46S-0101CT500) |  1028901<br>(C46S-0103CT500) |
|                                 |  1028825<br>(C46E-0101CU500) |  1028894<br>(C46E-0103CU500) |

## 12.5 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. 59: Part numbers additional front screen (weld spark guard)

| Protective field height [mm] | Part number | Protective field height [mm] | Part number |
|------------------------------|-------------|------------------------------|-------------|
| 300                          | 2022412     | 1200                         | 2022418     |
| 450                          | 2022413     | 1350                         | 2022419     |
| 600                          | 2022414     | 1500                         | 2022420     |
| 750                          | 2022415     | 1650                         | 2022421     |
| 900                          | 2022416     | 1800                         | 2022422     |
| 1050                         | 2022417     |                              |             |

## 12.6 Deflector mirror

### 12.6.1 Deflector mirror PNS75 for protective field width 0 ... 12 m (total)

Tab. 60: Part numbers deflector mirror PNS75

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

Dimensional drawing see Fig. 52 on page 91. Effect on the scanning range see Tab. 8 on page 27.

Tab. 61: Part numbers  
deflector mirror PNS125**12.6.2 Deflector mirror PNS125 for protective field width 4 ... 18.5 m (total)**

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

Dimensional drawing see Fig. 53 on page 92. Effect on the scanning range see Tab. 8 on page 27.

**12.7 Accessories**Tab. 62: Part numbers  
accessories

| Part                                                                                   | Part number |
|----------------------------------------------------------------------------------------|-------------|
| <b>C4000-system connection</b>                                                         |             |
| Hirschmann cable socket M26 × 11 + FE, crimp contacts, straight                        | 6020757     |
| Hirschmann cable socket M26 × 11 + FE, crimp contacts, angled                          | 6020758     |
| Terminal with 182 Ω resistance for pin 9 and 10 on the system connection (cf. page 53) | 2027227     |
| Connection cable <sup>21)</sup>                                                        |             |
| Socket straight/stripped, 2.5 m                                                        | 2022544     |
| Socket straight/stripped, 5 m                                                          | 2022545     |
| Socket straight/stripped, 7.5 m                                                        | 2022546     |
| Socket straight/stripped, 10 m                                                         | 2022547     |
| Socket straight/stripped, 15 m                                                         | 2022548     |
| Socket straight/stripped, 20 m                                                         | 2022549     |
| Socket straight/stripped, 30 m                                                         | 2022550     |

<sup>21)</sup> The cable sheath is made of PVC (UL listed).

| Part                                                                                                                                    | Part number |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>C4000-extension connection M26</b>                                                                                                   |             |
| Hirschmann cable socket M26 × 11 + FE, crimp contacts, straight                                                                         | 6021191     |
| Connecting cable for the connection of guest 1 or guest 2 <sup>22)</sup>                                                                |             |
| Plug straight/socket straight, 0.25 m                                                                                                   | 2022278     |
| Plug straight/socket angled, 0.25 m                                                                                                     | 2022284     |
| Plug straight/socket straight, 0.5 m                                                                                                    | 2021838     |
| Plug straight/socket angled, 0.5 m                                                                                                      | 2022285     |
| Plug straight/socket straight, 1 m                                                                                                      | 2022279     |
| Plug straight/socket angled, 1 m                                                                                                        | 2022286     |
| Plug straight/socket straight, 1.5 m                                                                                                    | 2022280     |
| Plug straight/socket angled, 1.5 m                                                                                                      | 2022287     |
| Plug straight/socket straight, 2 m                                                                                                      | 2022281     |
| Plug straight/socket angled, 2 m                                                                                                        | 2022288     |
| Plug straight/socket straight, 2.5 m                                                                                                    | 2022282     |
| Plug straight/socket angled, 2.5 m                                                                                                      | 2022289     |
| Plug straight/socket straight, 3 m                                                                                                      | 2022283     |
| Plug straight/socket angled, 3 m                                                                                                        | 2022290     |
| <b>C4000 Guest with M12 system connection or C4000 with M12 extension connection</b>                                                    |             |
| Extension cable M12 × 8, 1 m long, straight plug, straight socket, for extending the cable on the C4000 Guest                           | 6021002     |
| Extension cable M12 × 8, 1 m long, angled plug, straight socket, for extending the cable on the C4000 Guest                             | 6030974     |
| <b>Other accessories</b>                                                                                                                |             |
| Mounting kit 2: pivoting (swivel mount), 4 pieces for all protective field heights                                                      | 2019659     |
| Mounting kit 3: pivoting, with anti-vibration mount, 4 pieces for all protective field heights. For higher vibration and shock exposure | 2017752     |
| Mounting kit 6: pivoting (side bracket), 4 pieces for all protective field heights                                                      | 2019506     |
| Mounting kit Swivel mount bracket Guest, 2 pairs for all protective field heights                                                       | 2034959     |
| UE402 switching amplifier: expands the C4000 with the functions PSDI mode, bypass, operating mode switching                             | 1023577     |
| AR60, external laser alignment aid                                                                                                      | 1015741     |
| Adapter for AR60 for attaching to the C4000-housing                                                                                     | 4032461     |
| Power supply 24 V, 100/240 V AC, 50 W                                                                                                   | 7028789     |
| Power supply 24 V, 120/240 V AC, 95 W                                                                                                   | 7028790     |

<sup>22)</sup> The cable sheath is made of PVC (UL listed).

| Part                                                                                                                                     | Part number |
|------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Connection cable M8 × 4/D-Sub 9 pin; for connecting the configuration connection to the serial interface on the PC                       |             |
| 2 m                                                                                                                                      | 6021195     |
| 10 m                                                                                                                                     | 2027649     |
| UC232-A, USB/RS-232 converter                                                                                                            | 6035396     |
| Host-Guest Plug, for resetting a system position saved in a C4000 (host, guest 1, guest 2).                                              | 1029717     |
| Clone Plug – configuration tool for quickly programming safety light curtains                                                            | 1029665     |
| Terminator 182 Ω for EFI connections                                                                                                     | 2027227     |
| <b>Accessories included in a standard delivery</b>                                                                                       |             |
| Sliding nuts for side bracket, 4 pcs.                                                                                                    | 2017550     |
| CDS (Configuration & Diagnostic Software) on CD-ROM including online documentation and operating instructions in all available languages | 2026875     |

# 13 Annex

## 13.1 EC declaration of conformity

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

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SICK</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                           |
| <b>TYPE: C4000 Standard / Advanced</b><br><b>C4000 Standard Guest / Advanced Guest</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Ident-No.: 9140810</b> |
| <p><b>EC declaration of conformity</b> <span style="float: right;">en</span><br/>         The undersigned, representing the following manufacturer herewith declares that the product is in conformity with the provisions of the following EC directive(s) (including all applicable amendments), and that the respective standards and/or technical specifications have been applied.</p> <p><b>EG-Konformitätserklärung</b> <span style="float: right;">de</span><br/>         Der Unterzeichner, der den nachstehenden Hersteller vertritt, erklärt hiermit, dass das Produkt in Übereinstimmung mit den Bestimmungen der nachstehenden EG-Richtlinie(n) (einschließlich aller zutreffenden Änderungen) ist, und dass die entsprechenden Normen und/oder technischen Spezifikationen zur Anwendung gelangt sind.</p> <p><b>ЕС декларация за съответствие</b> <span style="float: right;">bg</span><br/>         Подписалият, който представя долупоспоменатия производител, обявява, че продуктът съответва на разпоредбите на долуизброените директиви на ЕС (включително на всички действащи изменения) и че отговаря на съответните норми и/или технически спецификации за приложение.</p> <p><b>ES prohlášení o shodě</b> <span style="float: right;">cs</span><br/>         Níže podepsaný, zastupující následujícího výrobce, tímto prohlašuje, že výrobek je v souladu s ustanoveními následující(ch) směrnice (směrnic) ES (včetně všech platných změn) a že byly použity odpovídající normy a/nebo technické specifikace.</p> <p><b>EF-overensstemmelseserklæring</b> <span style="float: right;">da</span><br/>         Undertegnede, der repræsenterer følgende producent erklærer hermed at produktet er i overens-stemmelse med bestemmelserne i følgende EF-direktiv(er) (inklusive alle gældende ændringer) og at alle tilsvarende standarder og/eller tekniske specifikationer er blevet anvendt.</p> <p><b>ΕΕ-Δήλωση συμμόρφωσης</b> <span style="float: right;">el</span><br/>         Ο Υπογράφων, εκπροσωπών τον ακόλουθο κατασκευαστή δηλώνει με το παρόν έγγραφο ότι το προϊόν συμμορφώνεται με τους όρους της (των) ακόλουθης (-ων) Οδηγίας (-ών) της ΕΕ (συμπεριλαμβανομένων όλων των εφαρμοζόμενων τροποποιήσεων) και ότι έχουν εφαρμοστεί τα αντίστοιχα πρότυπα και/ή οι τεχνικές προδιαγραφές.</p> <p><b>Declaración de conformidad CE</b> <span style="float: right;">es</span><br/>         El abajo firmante, en representación del fabricante indicado a continuación, declara que el producto es conforme con las disposiciones de la (s) siguiente(s) directiva(s) de la CE (incluyendo todas las modificaciones aplicables) y que las respectivas normas y/o especificaciones técnicas han sido aplicadas.</p> <p><b>EÜ vastavusdeklaratsioon</b> <span style="float: right;">et</span><br/>         Allakirjutanu, kes esindab järgmist tootjat, kinnitab käesolevaga, et antud toode vastab järgneva(te) EÜ direktiivi(de) sätetele (kaasa arvatud kõikidele asjakohastele muudatustele) ja et on kohaldatud vastavaid nõudeid ja/või tehnilisi kirjeldusi.</p> <p><b>EY-vaatimustenmukaisuusvakuutus</b> <span style="float: right;">fi</span><br/>         Allekirjoittanut, joka edustaa alla mainittua valmistajaa, vakuuttaa täten, että tuote on seuraavan (-ien) EU-direktiivin (-ien) vaatimusten mukainen (mukaan lukien kaikki sovellettavat muutokset) ja että vastaavia standardeja ja teknisiä erittelyjä on sovellettu.</p> <p><b>Déclaration CE de conformité</b> <span style="float: right;">fr</span><br/>         Le soussigné, représentant le constructeur ci-après, déclare par la présente que le produit est conforme aux exigences de la (des) directive(s) CE suivantes (y compris tous les amendements applicables) et que les normes et/ou spécifications techniques correspondantes ont été appliquées.</p> <p><b>EK megfeleléségi nyilatkozat</b> <span style="float: right;">hu</span><br/>         Alulírott, az alábbi gyártó képviselőjeként ezennel kijelenti, hogy a termék megfelel az alábbi EK-irányelv(ek) követelményeinek (beleértve azok minden vonatkozó módosítását) és kijelenti hogy a megfelelő szabványokat és/vagy műszaki előírásokat alkalmazta.</p> <p><b>EB-samræmisýfirlýsing</b> <span style="float: right;">is</span><br/>         Undirritaður, fyrir hönd framleiðandans sem nefndur er hér að neðan, lýsir því hér með yfir að varan er í samræmi við ákvæði eftirtalinna EB-tilskipana (að meðtöldum öllum breytingum sem við eiga) og að varan er í samræmi við viðeigandi staðla og/eða tækniforskriftir.</p> <p><b>Dichiarazione CE di conformità</b> <span style="float: right;">it</span><br/>         Il sottoscritto, rappresentante il seguente costruttore dichiara qui di seguito che il prodotto risulta in conformità a quanto previsto dalla(e) seguente(i) direttiva(e) comunitaria(e) (comprese tutte le modifiche applicabili) e che sono state applicate tutte le relative norme e/o specifiche tecniche.</p> |                           |

## C4000 Standard/Advanced

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

| <b>SICK</b>                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TYPE: C4000 Standard / Advanced</b><br><b>C4000 Standard Guest / Advanced Guest</b>                                                                                                                                                                                                                                                        | Ident-No.: 9140810                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>EB atitikties deklaracija</b><br>Pasirašiusysis, atstovaujantis šiam gamintojui deklaruoja, kad gaminyje atitinka šios (-ių) EB direktyvos (-ų) reikalavimus (įskaitant visus taikytinus keitinius) ir kad buvo taikomi antrajame puslapyje nurodyti standartai ir (arba) techninės specifikacijos.                                        | lt                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>EK atbilstības deklarācija</b><br>Apakšā parakstījusies persona, kas pārstāv zemāk minēto ražotāju ar šo deklarē, ka izstrādājums atbilst zemāk minētajai (-ām) EK direktīvai (-ām) (ieskaitot visus atbilstošos grozījumus) un ka izstrādājumam ir piemēroti attiecīgie standarti un/vai tehniskās specifikācijas.                        | lv                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>EG-verklaring van overeenstemming</b><br>Ondergetekende, vertegenwoordiger van de volgende fabrikant, verklaart hiermee dat het product voldoet aan de bepalingen van de volgende EG-richtlijn(en) (inclusief alle van toepassing zijnde wijzigingen) en dat de overeenkomstige normen en/of technische specificaties zijn toegepast.      | nl                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>EF-samsvarserklæring</b><br>Undertegnede, som repræsenterer nedennevnte producent, erklærer herved at produktet er i samsvar med bestemmelsene i følgende EU-direktiv(er) (inkludert alle relevante endringer) og at relevante normer og/eller tekniske spesifikasjoner er blitt anvendt.                                                  | no                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Deklaracja zgodności WE</b><br>Niżej podpisany, reprezentujący następującego producenta niniejszym oświadcza, że wyrób jest zgodny z postanowieniami następujących dyrektyw WE (wraz z odpowiednimi poprawkami) oraz, że zastosowano odpowiednie normy i/lub specyfikacje techniczne.                                                      | pl                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Declaração CE de conformidade</b><br>O abaixo assinado, que representa o seguinte fabricante, declara deste modo que o produto está em conformidade com as disposições da(s) seguinte(s) directiva(s) CE (incluindo todas as alterações aplicáveis) e que foram aplicadas as respectivas normas e/ou especificações técnicas.              | pt                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Declaratie de conformitate CE</b><br>Semnatarul, în calitate de reprezentant al producătorului numit mai jos, declară prin prezenta că produsul este în conformitate cu prevederile directivelor CE enumerate mai jos (inclusiv cu toate modificările aferente) și că s-au intrunit normele și/sau specificațiile tehnice corespunzătoare. | ro                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>ES vyhlášení o zhode</b><br>Dolu podpísaný zástupca výrobce tímto vyhlasuje, že výrobek je v súlade s ustanoveniami nasledujúcej (nasledujúcich) smernice (smerníc) ES (vrátane všetkých platných zmien) a že sa použili príslušné normy a/alebo technické špecifikácie.                                                                   | sk                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Izjava ES o skladnosti</b><br>Podpisani predstavnik spodaj navedenega proizvajalca izjavljam, da je proizvod v skladu z določbami spodaj navedenih direktiv ES (vključno z vsemi ustreznimi spremembami) in da so bili uporabljeni ustrezni standardi in/ali tehnične specifikacije.                                                       | sl                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>EG-försäkran om överensstämmelse</b><br>Undertecknad, som representerar nedanstående tillverkare, försäkras härmed att produkten överensstämmer med bestämmelserna i följande EU-direktiv (inklusive samtliga tillämpliga tillägg till dessa) och att relevanta standarder och/eller tekniska specifikationer har tillämpats.              | sv                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>AB-Uygunluk Beyanı</b><br>Aşağıdaki üreticiyi temsil eden imza sahibi böylelikle, ürünün aşağıdaki AB-Yönergesinin(lerin) direktifleri ile (tüm ilgili değişiklikleri kapsayacak şekilde) uyumlu olduğunu ve ilgili normların ve/veya teknik spesifikasyonların uygulandığını beyan eder.                                                  | tr                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Directives used: MAS-DIRECTIVE 2006/42/EC<br>EMC-DIRECTIVE 2004/108/EC                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| You can obtain the EC declaration of conformity with the standards used at: <a href="http://www.sick.com">www.sick.com</a>                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>SICK AG</b><br>Erwin-Sick-Straße 1<br>D-79183 Waldkirch<br>Germany                                                                                                                                                                                                                                                                         | <div style="display: flex; justify-content: space-between;"> <div> <p>2009-11-12</p> <p>Date</p> </div> <div> <p><i>ppa. Dr. Georg Plasberg</i></p> <p>ppa. Dr. Georg Plasberg<br/>Management Board<br/>(Industrial Safety Systems)<br/>authorized for technical documentation</p> </div> <div> <p><i>ppa. Birgit Knobloch</i></p> <p>ppa. Birgit Knobloch<br/>Division Manager Production<br/>(Industrial Safety Systems)</p> </div> </div> |

## 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 fulfil the required PL/SILCL and PFHd according to EN ISO 13 849-1/EN 62 061 and the type according to EN 61 496-1?                                                                                               | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 4. Is the access to the hazardous area/hazardous point only possible through the protective field of the ESPE?                                                                                                                                  | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 5. Have appropriate measures been taken to prevent (mechanical point-of-operation guarding) or monitor unprotected presence in the hazardous area when protecting a hazardous area/hazardous point and have these been secured against removal? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 6. Are additional mechanical protective measures fitted and secured against manipulation which prevent reaching below, above 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 properly 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 (OSSDs, AS-Interface Safety at Work) integrated in compliance with the required PL/SILCL according to EN ISO 13 849/EN 62 061 and does the integration comply with the circuit diagrams?                        | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 13. Has the protective function been checked in compliance with the test notes of this documentation?                                                                                                                                           | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 14. Are the given protective functions effective at every setting of the operating mode selector switch?                                                                                                                                        | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 15. Are the switching elements activated by the ESPE, e.g. contactors, valves, monitored?                                                                                                                                                       | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 16. Is the ESPE effective over the entire period of the dangerous state?                                                                                                                                                                        | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 17. Once initiated, will a dangerous state be stopped when switching the ESPE on or off and when changing the operating mode, or when switching to another protective device?                                                                   | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 18. Has 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.**

**13.3 List of tables**

|          |                                                                                                                                             |    |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------|----|
| Tab. 1:  | Functions of the C4000 device variants compared .....                                                                                       | 16 |
| Tab. 2:  | Status indicators of the sender .....                                                                                                       | 18 |
| Tab. 3:  | Status indicators of the receiver.....                                                                                                      | 19 |
| Tab. 4:  | Permissible configuration of the restart interlock .....                                                                                    | 21 |
| Tab. 5:  | Device status after the external device monitoring has triggered.....                                                                       | 22 |
| Tab. 6:  | Possible configuration for the signal output .....                                                                                          | 25 |
| Tab. 7:  | Guaranteed scanning ranges.....                                                                                                             | 26 |
| Tab. 8:  | Scanning range when using 1 or 2 deflector mirrors .....                                                                                    | 27 |
| Tab. 9:  | Overview of the blanking function .....                                                                                                     | 27 |
| Tab. 10: | Types of object monitoring for floating blanking.....                                                                                       | 32 |
| Tab. 11: | Effective resolution for blanking with size tolerance.....                                                                                  | 33 |
| Tab. 12: | Effective resolution for floating blanking with partial object monitoring and<br>for fixed blanking with increased size tolerance.....      | 34 |
| Tab. 13: | Effective resolution and maximum size of moving objects under reduced<br>resolution .....                                                   | 37 |
| Tab. 14: | Functions that cannot be combined.....                                                                                                      | 39 |
| Tab. 15: | Pin assignment system connection M26 × 11 + FE.....                                                                                         | 52 |
| Tab. 16: | Pin assignment configuration connection M8 × 4.....                                                                                         | 53 |
| Tab. 17: | Pin assignment extension connection M26 × 11 + FE .....                                                                                     | 54 |
| Tab. 18: | Pin assignment extension connection M12 × 7 + FE.....                                                                                       | 55 |
| Tab. 19: | Pin assignment system connection C4000 Guest (M12 × 7 + FE) .....                                                                           | 56 |
| Tab. 20: | Displays shown during the power-up cycle .....                                                                                              | 63 |
| Tab. 21: | Display values during the alignment of sender and receiver .....                                                                            | 64 |
| Tab. 22: | Default delivery status of the C4000 .....                                                                                                  | 66 |
| Tab. 23: | Default delivery status of the C4000 Guest .....                                                                                            | 66 |
| Tab. 24: | Error displays of the LEDs .....                                                                                                            | 68 |
| Tab. 25: | Error displays of the 7-segment display .....                                                                                               | 69 |
| Tab. 26: | Status indicators of the sender .....                                                                                                       | 71 |
| Tab. 27: | Status indicators of the receiver.....                                                                                                      | 72 |
| Tab. 28: | Data sheet C4000 .....                                                                                                                      | 73 |
| Tab. 29: | Data sheet C4000 Guest .....                                                                                                                | 77 |
| Tab. 30: | Determining the response time of a C4000 system .....                                                                                       | 79 |
| Tab. 31: | Number of beams depending on the protective field height and the<br>physical resolution.....                                                | 80 |
| Tab. 32: | Response time as factor of the number of beams.....                                                                                         | 81 |
| Tab. 33: | Weight of sender and receiver C4000 Standard/Advanced.....                                                                                  | 82 |
| Tab. 34: | Weight of sender and receiver C4000 Standard/Advanced Guest.....                                                                            | 82 |
| Tab. 35: | Weight of the deflector mirrors PNS75 and PNS125.....                                                                                       | 83 |
| Tab. 36: | Dimensions dependent on the protective field height,<br>C4000 Standard/Advanced without extension connection.....                           | 84 |
| Tab. 37: | Dimensions dependent on the protective field height, C4000 Standard<br>with angled system connection and without extension connection ..... | 85 |

|                                                                                                                              |     |
|------------------------------------------------------------------------------------------------------------------------------|-----|
| Tab. 38: Dimensions depending on the protective field height,<br>C4000 Standard/Advanced with M26 extension connection ..... | 86  |
| Tab. 39: Dimensions depending on the protective field height,<br>C4000 Standard/Advanced with M12 extension connection ..... | 87  |
| Tab. 40: Dimensions depending on the protective field height,<br>C4000 Standard/Advanced Guest .....                         | 88  |
| Tab. 41: Dimensions for the deflector mirror PNS75 dependent on the mirror<br>height .....                                   | 91  |
| Tab. 42: Dimensions for the deflector mirror PNS125 dependent on the mirror<br>height .....                                  | 92  |
| Tab. 43: Part numbers C4000 Standard without extension connection .....                                                      | 94  |
| Tab. 44: Part numbers C4000 Standard with angled system connection and<br>without extension connection .....                 | 95  |
| Tab. 45: Part numbers C4000 Advanced without extension connection .....                                                      | 96  |
| Tab. 46: Part numbers C4000 Standard without extension connection with<br>pre-configuration C .....                          | 97  |
| Tab. 47: Part numbers C4000 Standard without extension connection with<br>pre-configuration D .....                          | 98  |
| Tab. 48: Part numbers C4000 Standard without extension connection with<br>pre-configuration E .....                          | 99  |
| Tab. 49: Part numbers C4000 Standard without extension connection with<br>pre-configuration F .....                          | 100 |
| Tab. 50: Part numbers C4000 Standard without extension connection with<br>pre-configuration R .....                          | 101 |
| Tab. 51: Part numbers C4000 Standard with M26 extension connection .....                                                     | 102 |
| Tab. 52: Part numbers C4000 Advanced with M26 extension connection .....                                                     | 103 |
| Tab. 53: Part numbers C4000 Standard with M12 extension connection .....                                                     | 104 |
| Tab. 54: Part numbers C4000 Advanced with M12 extension connection .....                                                     | 105 |
| Tab. 55: Part numbers C4000 Standard Guest with straight system connection .....                                             | 106 |
| Tab. 56: Part numbers C4000 Standard Guest with angled system connection .....                                               | 107 |
| Tab. 57: Part numbers C4000 Advanced Guest with straight system connection .....                                             | 108 |
| Tab. 58: Part numbers C4000 Advanced Guest with angled system connection .....                                               | 109 |
| Tab. 59: Part numbers additional front screen (weld spark guard) .....                                                       | 110 |
| Tab. 60: Part numbers deflector mirror PNS75 .....                                                                           | 110 |
| Tab. 61: Part numbers deflector mirror PNS125 .....                                                                          | 111 |
| Tab. 62: Part numbers accessories .....                                                                                      | 111 |

**13.4 List of illustrations**

|          |                                                                                                                             |    |
|----------|-----------------------------------------------------------------------------------------------------------------------------|----|
| Fig. 1:  | Components of the C4000 .....                                                                                               | 14 |
| Fig. 2:  | Hazardous point protection using a safety light curtain C4000 .....                                                         | 17 |
| Fig. 3:  | Hazardous area protection using a safety light curtain C4000 .....                                                          | 17 |
| Fig. 4:  | Access protection using a safety light curtain C4000 .....                                                                  | 17 |
| Fig. 5:  | C4000 Guest used for point-of-operation guarding .....                                                                      | 17 |
| Fig. 6:  | C4000 Host/Guest direct on UE470 in PSDI mode .....                                                                         | 17 |
| Fig. 7:  | Status indicators of the sender .....                                                                                       | 18 |
| Fig. 8:  | Status indicators of the receiver .....                                                                                     | 19 |
| Fig. 9:  | Schematic layout of the protective operation .....                                                                          | 20 |
| Fig. 10: | Schematic layout of the bypass function .....                                                                               | 24 |
| Fig. 11: | Schematic layout of the beam coding .....                                                                                   | 25 |
| Fig. 12: | Example of mechanical protection of fixed or floating blanking .....                                                        | 28 |
| Fig. 13: | Schematic layout of the fixed blanking .....                                                                                | 29 |
| Fig. 14: | Schematic layout of the fixed blanking with increased size tolerance .....                                                  | 29 |
| Fig. 15: | Example of mechanical protection of fixed or floating blanking .....                                                        | 30 |
| Fig. 16: | Schematic layout of the floating blanking .....                                                                             | 31 |
| Fig. 17: | Example of mechanical protection of fixed or floating blanking .....                                                        | 32 |
| Fig. 18: | Marking the effective resolution on the device label .....                                                                  | 33 |
| Fig. 19: | Marking the effective resolution on the device label .....                                                                  | 34 |
| Fig. 20: | Schematic layout of the operation with reduced resolution. ....                                                             | 36 |
| Fig. 21: | Marking the effective resolution on the device label .....                                                                  | 37 |
| Fig. 22: | Minimum distance from the hazardous point .....                                                                             | 41 |
| Fig. 23: | Minimum distance from reflective surfaces .....                                                                             | 43 |
| Fig. 24: | Graph, minimum distance from reflective surfaces .....                                                                      | 43 |
| Fig. 25: | The correct installation (above) must eliminate the errors (below) standing behind, reaching below and reaching above ..... | 44 |
| Fig. 26: | Composition of the swivel mount bracket .....                                                                               | 45 |
| Fig. 27: | Mounting sender and receiver using swivel mount brackets .....                                                              | 46 |
| Fig. 28: | Composition of the side bracket .....                                                                                       | 47 |
| Fig. 29: | Mounting the C4000 with side bracket .....                                                                                  | 48 |
| Fig. 30: | Mounting the C4000 with side bracket .....                                                                                  | 49 |
| Fig. 31: | Mounting sender and receiver using swivel mount brackets .....                                                              | 50 |
| Fig. 32: | Pin assignment system connection M26 × 11 + FE .....                                                                        | 52 |
| Fig. 33: | Pin assignment configuration connection M8 × 4 .....                                                                        | 53 |
| Fig. 34: | Pin assignment extension connection M26 × 11 + FE .....                                                                     | 54 |
| Fig. 35: | Pin assignment extension connection M12 × 7 + FE .....                                                                      | 55 |
| Fig. 36: | Pin assignment system connection C4000 Guest (M12 × 7 + FE) .....                                                           | 56 |
| Fig. 37: | Connecting the contact elements to the EDM .....                                                                            | 57 |
| Fig. 38: | Connection of the reset button and the signal lamp "Reset required" to the extension connection .....                       | 58 |
| Fig. 39: | Connection of an external teach-in key-operated switch .....                                                                | 59 |

|          |                                                                                                                |     |
|----------|----------------------------------------------------------------------------------------------------------------|-----|
| Fig. 40: | Possible methods of connection of a door switch or similar to the emergency stop input .....                   | 60  |
| Fig. 41: | Connection to the signal output .....                                                                          | 61  |
| Fig. 42: | Connection of the sender test button .....                                                                     | 62  |
| Fig. 43: | Daily checks of the protective device .....                                                                    | 65  |
| Fig. 44: | Dimensional drawing C4000 Standard/Advanced without extension connection, sender. ....                         | 84  |
| Fig. 45: | Dimensional drawing C4000 Standard, sender with angled system connection and without extension connection..... | 85  |
| Fig. 46: | Dimensional drawing C4000 Standard/Advanced with M26 extension connection, sender. ....                        | 86  |
| Fig. 47: | Dimensional drawing C4000 Standard/Advanced with M12 extension connection, sender. ....                        | 87  |
| Fig. 48: | Dimensional drawing C4000 Standard/Advanced Guest, sender. Receiver .....                                      | 88  |
| Fig. 49: | Dimensional drawing, swivel mount bracket (mm) .....                                                           | 89  |
| Fig. 50: | Dimensional drawing, side bracket (mm) .....                                                                   | 89  |
| Fig. 51: | Swivel mount bracket for C4000 Guest .....                                                                     | 90  |
| Fig. 52: | Dimensional drawing deflector mirror PNS75 (mm).....                                                           | 91  |
| Fig. 53: | Dimensional drawing deflector mirror PNS125 (mm).....                                                          | 92  |
| Fig. 54: | EC declaration of conformity (page 1) .....                                                                    | 114 |
| Fig. 55: | EC declaration of conformity (page 2) .....                                                                    | 115 |







#### **Australia**

Phone +61 3 9497 4100  
1800 334 802 – tollfree  
E-Mail sales@sick.com.au

#### **Belgium/Luxembourg**

Phone +32 (0)2 466 55 66  
E-Mail info@sick.be

#### **Brasil**

Phone +55 11 3215-4900  
E-Mail sac@sick.com.br

#### **Canada**

Phone +1(952) 941-6780  
1 800-325-7425 – tollfree  
E-Mail info@sickusa.com

#### **Ceská Republika**

Phone +420 2 57 91 18 50  
E-Mail sick@sick.cz

#### **China**

Phone +852-2763 6966  
E-Mail ghk@sick.com.hk

#### **Danmark**

Phone +45 45 82 64 00  
E-Mail sick@sick.dk

#### **Deutschland**

Phone +49 211 5301-301  
E-Mail kundenservice@sick.de

#### **España**

Phone +34 93 480 31 00  
E-Mail info@sick.es

#### **France**

Phone +33 1 64 62 35 00  
E-Mail info@sick.fr

#### **Great Britain**

Phone +44 (0)1727 831121  
E-Mail info@sick.co.uk

#### **India**

Phone +91-22-4033 8333  
E-Mail info@sick-india.com

#### **Israel**

Phone +972-4-999-0590  
E-Mail info@sick-sensors.com

#### **Italia**

Phone +39 02 27 43 41  
E-Mail info@sick.it

#### **Japan**

Phone +81 (0)3 3358 1341  
E-Mail support@sick.jp

#### **Magyarország**

Phone +36 1 371 2680  
E-Mail office@sick.hu

#### **Nederlands**

Phone +31 (0)30 229 25 44  
E-Mail info@sick.nl

#### **Norge**

Phone +47 67 81 50 00  
E-Mail austefjord@sick.no

#### **Österreich**

Phone +43 (0)22 36 62 28 8-0  
E-Mail office@sick.at

#### **Polska**

Phone +48 22 837 40 50  
E-Mail info@sick.pl

#### **România**

Phone +40 356 171 120  
E-Mail office@sick.ro

#### **Russia**

Phone +7 495 775 05 30  
E-Mail info@sick.ru

#### **Schweiz**

Phone +41 41 619 29 39  
E-Mail contact@sick.ch

#### **Singapore**

Phone +65 6744 3732  
E-Mail admin@sicksgp.com.sg

#### **South Africa**

Phone +27 11 472 3733  
E-Mail info@sickautomation.co.za

#### **South Korea**

Phone +82-2 786 6321/4  
E-Mail info@sickkorea.net

#### **Slovenija**

Phone +386 (0)1-47 69 990  
E-Mail office@sick.si

#### **Suomi**

Phone +358-9-25 15 800  
E-Mail sick@sick.fi

#### **Sverige**

Phone +46 10 110 10 00  
E-Mail info@sick.se

#### **Taiwan**

Phone +886 2 2375-6288  
E-Mail sales@sick.com.tw

#### **Türkiye**

Phone +90 216 528 50 00  
E-Mail info@sick.com.tr

#### **United Arab Emirates**

Phone +971 4 8865 878  
E-Mail info@sick.ae

#### **USA/México**

Phone +1(952) 941-6780  
1 800-325-7425 – tollfree  
E-Mail info@sickusa.com

More representatives and agencies  
at [www.sick.com](http://www.sick.com)