



**C 4000 Palletizer  
Standard/Advanced  
Safety Light Curtain**



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DIN EN ISO 9001 Reg. No. 462-03

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# 1 About this document

Please read this chapter carefully before working with the documentation and the C 4000 Palletizer, also referred to in the following as C 4000 for short.

## 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 C 4000.

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

## 1.2 Target group

These operating instructions are addressed to *planning engineers, developers* and *operators* of plants and systems which are to be protected by one or several C 4000 safety light curtains. It also addresses people who integrate the C 4000 into a machine, initialise its use, or who are in charge of servicing and maintaining the device.

## 1.3 Scope

**Note** These operating instructions apply to the safety light curtain C 4000 Palletizer with the following entry on the type label in the field *Operating Instructions*: 8 010 835. This document is part of SICK part number 8 010 835 (operating instructions “C 4000 Palletizer Safety Light Curtain” in all available languages).

For the configuration and diagnostics of these devices you require CDS (Configuration & Diagnostic Software) version 2.30 or higher. To check the version of the software, on the ? menu select **Info....**

## 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 C 4000.

Planning and using protective devices such as the C 4000 also require specific technical skills which are not detailed in this documentation.

When operating the C 4000, the national, local and statutory rules and regulations must be observed.

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

**Note** We also refer you to the SICK homepage on the Internet at  
www.sick.com

Here you will find information on:

- sample applications
- a list of frequently asked questions regarding the C 4000
- 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>ESPE</b>	Electro-sensitive protective equipment (e.g. C 4000)
<b>CDS</b>	SICK Configuration & Diagnostic Software
<b>EDM</b>	External device monitoring
<b>EFI</b>	Enhanced function interface = safe SICK device communication
<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:

● <b>Red</b>	The red LED is illuminated constantly.
● <b>Yellow</b>	The yellow LED is flashing.
○ <b>Green</b>	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 warning notices!

**C 4000 Palletizer**

Software notes show the location in the CDS (Configuration & Diagnostic Software) where you can make the appropriate settings and adjustments. In the CDS open the menu **View, Dialog box** and select the item **File cards** to go straight to the above dialog fields. Alternatively, the software wizard will guide you through the appropriate setting.

If you use the SICK switching amplifier UE 402, 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 UE 402 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 a movement of a machine part. In practical operation, there may be a number of different dangerous states:

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

## 2 On safety

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

- Please read this chapter carefully before working with the C 4000 or with the machine protected by the C 4000.

### 2.1 Specialist personnel

The safety light curtain C 4000 must be installed, commissioned and serviced only by specialist personnel. Specialist personnel are defined as persons who

- have undergone the appropriate technical training
- and
- who have been instructed by the responsible machine operator in the operation of the machine and the current valid safety guidelines
- and
- who have access to these operating instructions.

### 2.2 Applications of the device

The safety light curtain C 4000 is an electro-sensitive protective equipment (ESPE).

The physical resolution is 30 or 40 mm with a maximum protective field width of 19 metres. The realisable protective field length is between 750 and 1,800 mm.

The device is a *Type 4 ESPE* as defined by IEC 61496-1 and -2 and is therefore allowed for use with controls in control category 4 in compliance with EN 954-1. The device is suitable for

- 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 “Application examples” on page 13 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 protective devices may be required in addition to the safety light curtain.

**Note** The safety light curtain C 4000 Palletizer cannot be cascaded.



## 2.3 Correct use

The safety light curtain C 4000 must be used only as defined in chapter 2.2 “Applications of the device”. It must be used only by qualified personnel and only on the machine where it has been installed and initialised by qualified personnel in accordance with these operating instructions.

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

## 2.4 General safety notes and protective measures

**WARNING**

### Safety notes

Please observe the following procedures in order to ensure the correct and safe use of the safety light curtain C 4000.

- The national/international rules and regulations apply to the installation, commissioning, use and periodic technical inspections of the safety light curtain, in particular:
  - Machine Directive 98/37/EEC
  - Work Equipment Directive 89/655/EEC
  - the work safety regulations/safety rules
  - other relevant health and safety regulations

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

- The notices, in particular the test regulations (see “Test notes” on page 44) of these operating instructions (e.g. on use, mounting, installation or integration into the existing machine controller) must be observed.
- The operator of the machine on which the safety light curtain is used, must prevent bypassing of the protective field with appropriate additional measures (see "**Additional measures against bypassing the protection**" on page 25).
- 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 specialist 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 C 4000 is fitted. The machine operator is to be instructed in the use of the device by specialist 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 Environmental protection

The safety light curtain C 4000 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 on 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 C 4000 Palletizer. 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.

**Note** The descriptions of functions in this chapter only apply to the safety light curtain C 4000 Palletizer with the following entry on the type label in the *Operating Instructions* field: 8 010 835.

### 3.1 Special features

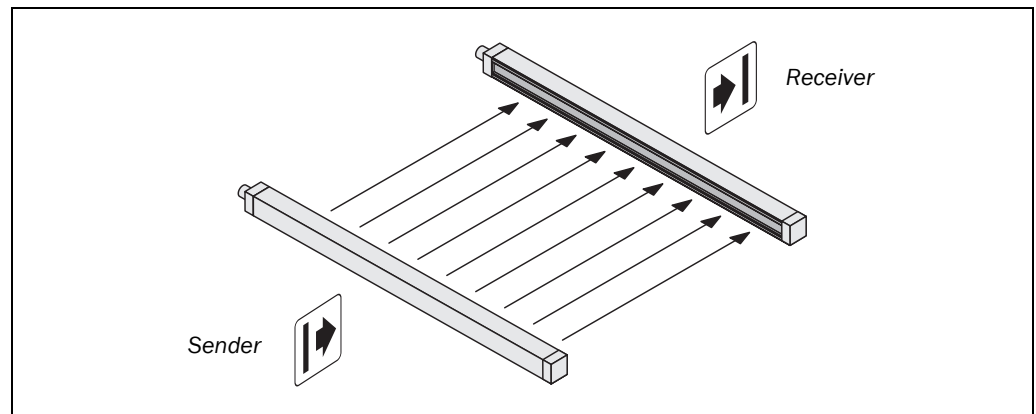
The safety light curtain C 4000 Palletizer has the following characteristics:

- protective operation 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
- external device monitoring (EDM)
- bypass for safe operational statuses
- 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 Intelliface product family
- connection option on device for an emergency stop button or a key-operated pushbutton for bypass
- self-teach dynamic blanking and direction detection of moving objects in the protective field
- operating mode switching (only in conjunction with SICK switching amplifier, e.g. UE 402)
- link to conveyor-belt signal

## 3.2 Operating principle of the device

### 3.2.1 Device components

Fig. 1: Components of the C 4000 Palletizer



Please refer to chapter 11 “Technical specifications” on page 52 for the data sheet.  
Please refer to pages 57ff. for the dimensional drawings.

### 3.2.2 The light curtain principle

The safety light curtain C 4000 consists of a sender and a receiver (Fig. 1). Between these two units is the protective field, defined as the protective field length and the protective field width.

The construction height determines the *protective field length* of the appropriate system. For the exact protective field length, please see Tab. 18ff. in chapter 11.4 “Dimensional drawings” on page 57.

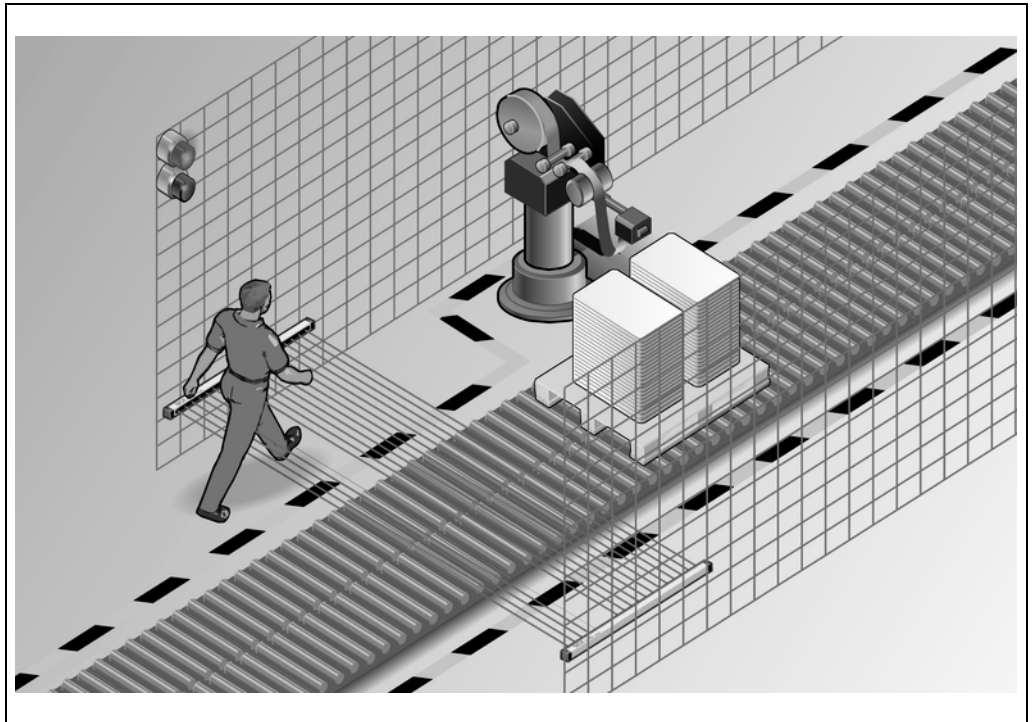
The *protective field width* is derived from the dimension of the light path between sender and receiver and must not exceed the maximum rated protective field width (see “Technical specifications” on page 52).

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

The C 4000 is modular in structure. All optical and electronic components and assemblies are housed in a slim and torsionally rigid housing.

### 3.3 Application examples

Fig. 2: Access protection with self-teach dynamic blanking



The safety light curtain C 4000 operates correctly as a protective device only if the following conditions are met:

- The control of the machine must be electrical.
- It must be possible to achieve a safe state on the machine at any time.
- Sender and receiver unit must be so mounted that objects penetrating the hazardous area are safely identified by the C 4000.
- 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 operating status of the C 4000.

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

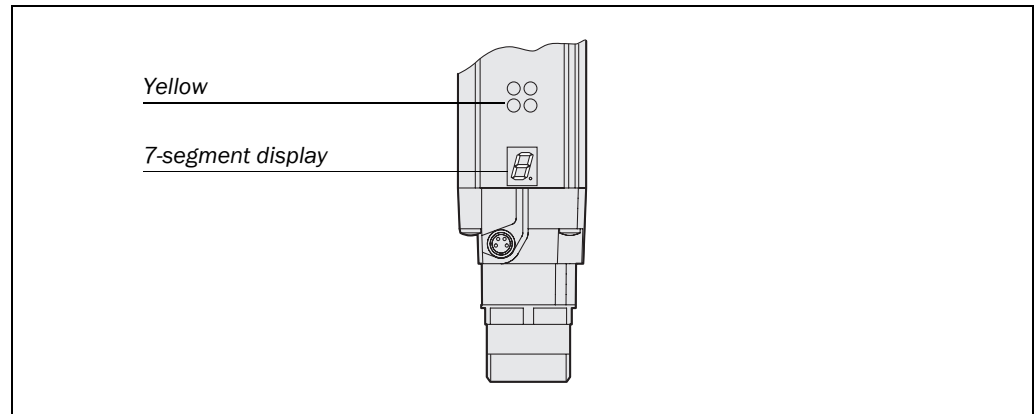
- Point visible: The bottom edge of the numbers on the 7-segment display is pointing towards the configuration connection.
- Point not visible: The bottom edge of the numbers on the 7-segment display is pointing towards the LED display.



Device symbol **C 4000 Palletizer (receiver)** or **C 4000 Palletizer (sender)**, context menu **Configuration draft, Edit**, option **7-segment display** of the related device.

## 3.4.1 Status indicators of the sender

Fig. 3: Status indicators of the sender



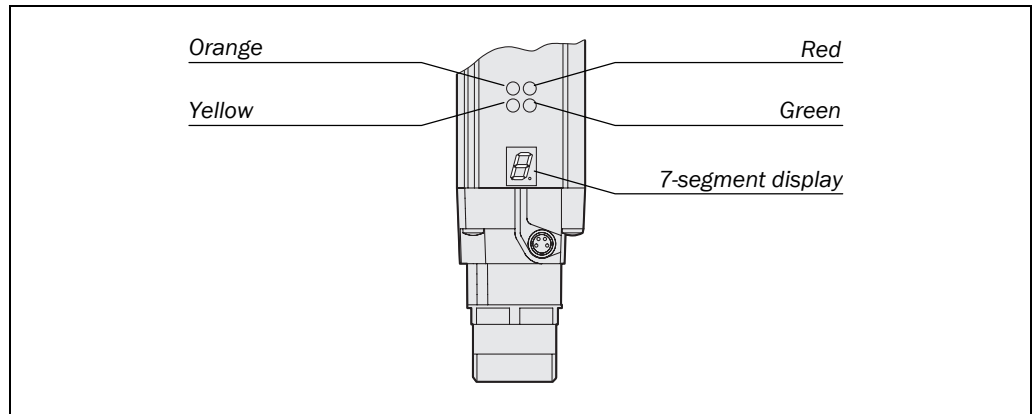
Tab. 1: Status indicators of the sender

Display	Meaning
● Yellow	Power supply OK
E	System error. The device is defective. Replace the sender.
□	The device is in the test mode.
U	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 48.

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### 3.4.2 Status indicators of the receiver

Fig. 4: Status indicators of the receiver



Tab. 2: Status indicators of the receiver

Display	Meaning
● Orange	Cleaning or realignment required
● Yellow	Reset required
● Red	System providing signals for shutting down the machine (output signal switching devices off)
● Green	System enabled (output signal switching devices on)
	Bypass active
	System error. The device is defective. Replace the receiver.
	Poor alignment to sender.
	Please refer to chapter 7.2 "Aligning sender and receiver" on page 43.
	Operation with large protective field width (only after switching on)
	Self-teach dynamic blanking active
	Object in the protective field with activated self-teach dynamic 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 48.

## 4 Configurable functions

This chapter describes the functions of the safety light curtain C 4000 Palletizer which are selectable via software.



WARNING

### Test the protective device after any changes!

The entire protective device must be tested for correct operation after each change of the configuration (see chapter 7.3 “Test notes” on page 44).



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 **C 4000 Palletizer (receiver)** or **C 4000 Palletizer (sender)**, context menu **Configuration draft, Edit**, file card **General**, option **Application name**.

### 4.1 Restart interlock



WARNING

#### Always configure the application with restart interlock!

Ensure that there is always a restart interlock. The C 4000 is unable to verify if the restart interlock of the machine is operable. If you deactivate both the internal and the machine’s restart interlock, the operators of the machine will be at an acute risk of injury.

The dangerous state of the machine is interrupted if the light path is broken, and is not re-enabled 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 after switching on. The restart interlock prevents the machine starting again after an error or an interruption in the light path.

The possible combinations are shown in the following table:

Restart interlock of the C 4000	Restart interlock of the machine	Permissible application
Deactivated	Activated	All
Activated	Activated	All. Restart interlock of the C 4000 handles the reset function (see “Reset” below).
Activated	Deactivated	Not permitted
Deactivated	Deactivated	Not permitted

The electrical connection of the reset button is described in chapter “Reset button” on page 39.



Device symbol **C 4000 Palletizer (receiver)**, context menu **Configuration draft, Edit**, file card **General**, option **Restart interlock**.

#### Recommendation

You can indicate the status *Reset required* using a signal lamp. The C 4000 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 39.

Tab. 3: Permissible configuration of the restart interlock



**Reset**

If you want to activate the restart interlock on the C 4000 (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 C 4000 activates the output signal switching devices.
- the safety light curtain changes from red to green.



Only the external restart interlock prevents the machine from restarting. After pressing the reset button for the C 4000, the operator must also press the restart button for the machine. If the reset button and the restart button are not pressed in the specified sequence, the dangerous state remains disrupted.

**Recommendation**


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

**4.2 External device monitoring (EDM)**

The external device monitoring (EDM) checks if the contactors actually de-energise when the protective device responds. If you activate external device monitoring, then the C 4000 checks the contactors after each interruption to the light path and prior to machine restart. The EDM can so identify if one of the contacts has fused, for instance. In this case ...

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

**Note**

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


The electrical connection for the external device monitoring is described in chapter 6.4 "External device monitoring (EDM)" on page 38.



Device symbol **C 4000 Palletizer (receiver)**, context menu **Configuration draft, Edit**, file card **General**, option **EDM**.

**4.3 Emergency stop**

The C 4000 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 418. 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 C 4000 Palletizer switches to red.
- The 7-segment display on the C 4000 Palletizer 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 C 4000 affects *only* the output signal switching devices (OSSDs) on the C 4000.

#### Notes

- The C 4000 checks after switch on whether an emergency stop function 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 C 4000 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 output signal switching devices on the light curtain are deactivated on the operation of the emergency stop button or door switch.

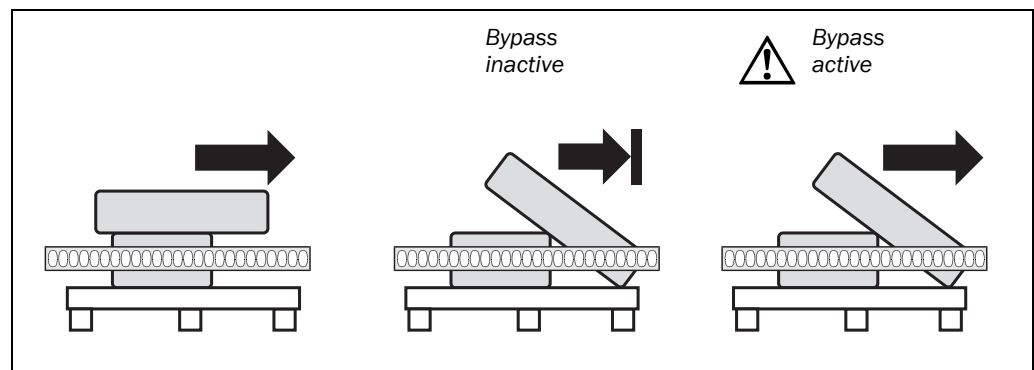
The electrical connection of the emergency stop is described in chapter 6.7 “Emergency stop” on page 40.



Device symbol **C 4000 Palletizer (receiver)**, context menu **Configuration draft, Edit**, file card **General**, option **Emergency stop active**.

## 4.4 Bypass

Fig. 5: Schematic layout of the bypass function



In some applications it is, at times, necessary to mute the protective evaluation field of the safety light curtain. For example, for continued transport of a pallet with shifted cargo.

When the bypass is active, the safety light curtain displays ● **Green** and the 7-segment display of the receiver displays .



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 activated during the bypass, e.g. the safe set-up mode of the machine in order that there is no danger to persons or parts of the machine during the bypass.

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The bypass function may only be activated as follows:

- by a key-operated pushbutton with an automatic reset and two levels
- by two input signals that are independent of each other, e.g. two position pushbuttons or two secure PLC signals

**Notes**

- It must be possible to view the entire hazardous point when operating the key-operated switch.
- 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).



Device symbol **C 4000 Host (receiver)**, context menu **Configuration draft, Edit**, selection of the **operating mode, General** tab, option **Bypass**.

The connection of the key-operated switch for bypass is described in Section 6.8 "Key-operated switch for bypass" on Page 41.

### 4.5 Signal output (ADO)

The C 4000 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 FPLC.



**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.

The connection can signal one of the following states:

Tab. 4: Possible configuration for the signal output

Assignment	Possible uses
Contamination	Eases diagnostics in case of contaminated front screen.
OSSD status with delay of [s]	Signals the status of the output signal switching devices. 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 3.1 seconds.
Status of the emergency stop	Signal is present if the button connected to the emergency stop input on the C 4000 has been pressed.
Object in the protective field	Signal is present if a valid object is in the protective field while the function "Multi Mode", "Single Mode" or "Self-Teach Dynamic Blanking" is selected.



Device symbol **C 4000 Palletizer (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 6.9 "Signal output (ADO)" on page 41.

## 4.6 Conveyor-belt signal

The self-teach dynamic blanking can be coupled to a conveyor-belt signal. By coupling to a conveyor-belt signal, blanking is only active if a signal is present from a transport conveyor belt. If the conveyor belt is not moving, the entire protective field is active.



Device symbol **C 4000 Palletizer (receiver)**, context menu **Configuration draft, Edit**, file card **Self-teach dynamic blanking**, option **Conveyor-belt signal**.

The electrical connection to a conveyor-belt signal is described in section 6.6 "Conveyor-belt signal" on page 40.

## 4.7 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.

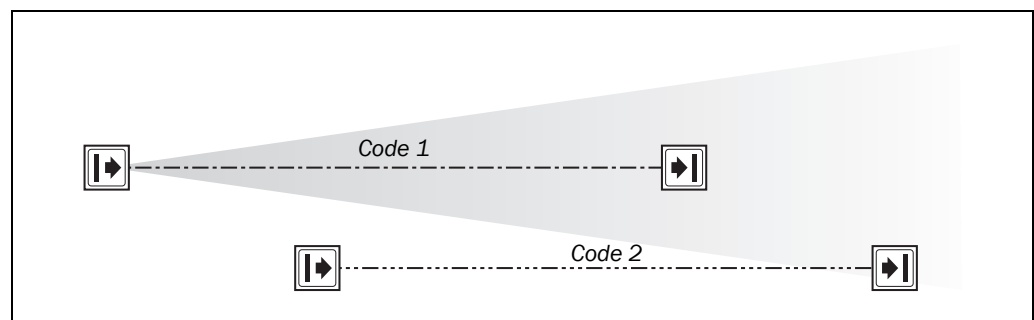


WARNING

### 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. 6: 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.
- Beam coding will increase the response time of the system. This may also change the required safety distance. Instructions can be found in chapter 5.2 "Determining the safety distance" on page 25.
- After activating the system, sender and receiver will briefly display the coding.



Device symbol **C 4000 Palletizer (receiver)** or **C 4000 Palletizer (sender)**, context menu **Configuration draft, Edit**, file card **General**, option **Beam coding**.

## 4.8 Scanning range



WARNING

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

The scanning range of the system must be adapted to the protective field width.

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

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

Tab. 5: Physical resolution and scanning range

Physical resolution	Selectable scanning ranges	Scanning range with 1 additional front screen	Scanning range with 2 additional front screens
30 mm	0.5–6 m	0.5–5.5 m	0.5–5 m
40 mm	5–19 m	4.6–17.4 m	4.2–16 m



Device symbol **C 4000 Palletizer (receiver)**, context menu **Configuration draft, Edit**, file card **Standalone**, option **Scanning range [m]**.

**Note**

- If you are using the additional front screen (see page 61) available as an accessory, the overall scanning range will be reduced by 8% for each additional front screen.

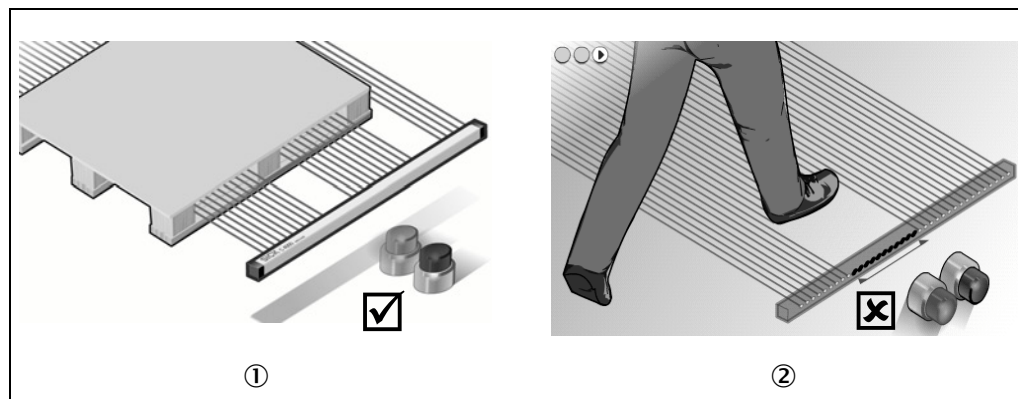
## 4.9 Self-teach dynamic blanking

### 4.9.1 Function

On the C 4000 Palletizer you configure self-teach dynamic blanking.

The self-teaching dynamic blanking provides access protection in which precisely defined objects (e.g. pallets) have access to a system or machine (see Fig. 7, ①). However, if other objects, particularly people, enter the protective field, the C 4000 shuts down the output signal switching devices (see Fig. 7, ②).

Fig. 7: Schematic diagram of the self-teach dynamic blanking



The direction of movement may not change during entry. During this process, the C 4000 dynamically teaches itself the distance between objects. The C 4000 monitors this distance until the objects leave the beam path.

The direction of entry into the beam path can be configured:

1. coming from the display
2. going towards the display
3. coming from both sides

**Notes** Devices with a protective field of 750mm can only be used in combination with the direction of object entry monitoring activated.

While the objects pass through the protective field, the C 4000 monitors the speed at which objects move. This must not exceed 2 m/s.

#### **Differences between C 4000 Palletizer Standard and Advanced:**

The Standard model (resolution 40 mm) can only blank single objects (e.g.: packages). The Advanced model (resolution 30 mm) can also blank compound objects, which move up to three objects in the beam path (e.g. three supports of a pallet).

- Notes**
- Compound-object blanking is only available with the C 4000 Palletizer Advanced.
  - In this way, in many applications a higher level of safety and availability can be assured than would be possible without compound-object blanking. This requires the careful analysis of the usage of compound-object blanking as part of a risk analysis for these applications. The usage of this function is only recommended if the analysis produces advantages in reliability and thus advantages in safety.
  - The person responsible for the machine has the responsibility to decide whether or not to use this function and, if compound-object blanking is used, to undertake the installation, mounting and configuration of the light curtain such that
    - the necessary safety is achieved at the machine**and**
    - access to the hazardous area through the light curtain in conjunction with compound-object blanking is prevented by other safeguards.
  - Safety can be improved further by connection of a conveyor-belt signal. Thus, if the conveyor belt is not moving, the entire protective field is active without blanking (see section 4.6 "Conveyor-belt signal" on page 20).

#### **4.9.2 Object size**

You configure the maximum permissible object size for the number of moving objects. This can be up to 240 mm for compound objects (Multi Mode) (only possible with a resolution of 30 mm).

For single objects (Single Mode), the maximum object size is calculated by the protective field length minus 100 mm. For example, protective field 1500 mm – 100 mm = a maximum object size of 1400 mm.

The minimum object size for single objects (Single Mode) is 500 mm.

The Light curtain switches to red after recognizing a new object size (object is completely in the protective field and both synchronization beams are free). The new object will be taught in via the connected reset button with implicated Teach-in functionality. At the same time the restart interlock will be reset at the C4000.

- Note**
- Objects up to this size are not detected. Safe shut down requires larger objects (see Tab. 6 on page 23).



WARNING

### Prevent objects that are too small entering the protective field!

The safety light curtain does not switch to red when the object is smaller than the configured maximum permissible object size.

The safety light curtain only safely switches to red when the object is sufficiently larger than the configured maximum permissible object size. Exactly how large an object must be to cause a safe shut down depends on two factors:

- the physical resolution of the safety light curtain
- on whether the object is moving through the protective field or is stationary in the protective field (e. g. when the machine is being restarted)

➤ Based on Tab. 6 on page 23.

If you allow a maximum permissible object size bigger than 70 mm, then you must take organisational measures to ensure that people (or other objects that are not allowed) are detected, e. g. appropriate safety clothing or industrial clothing. A person is only detected when he/she is larger than the object size necessary for safe shut down or when the distance between his/her legs changes when walking.

➤ During the object entry (while single mode is activated) the conveyor with its load is blocking access to the hazardous area.

Tab. 6: Object size from which the C 4000 safely shuts down the OSSDs in Multi Mode (compound objects).  
 Example (\*): At a physical resolution of 30 mm and a maximum permissible object size of 40 mm, a moving object with a size of 50 mm or larger results in safe shut down.

### Object size for safe shut down in Multi Mode

Configured maximum permissible object size [mm]	Necessary object size [mm] from which the C 4000 safely shuts down the OSSDs			
	Physical resolution			
	30 mm		40 mm	
	Floating	Stationary	Floating	Stationary
40	50*	70	-	-
60	70	90	70	100
80	90	110	-	-
90	-	-	100	130
100	110	130	-	-
120	130	150	130	160
140	150	170	-	-
150	-	-	160	190
160	170	190	-	-
180	190	210	190	220
200	210	230	-	-
210	-	-	220	250
220	230	250	-	-
240	250	270	250	280

### Object size for safe shut down in Single Mode

The object size, from which the C 4000 safely shuts down the OSSDs in Single Mode (single objects), can be calculated using the following formulas:

For **moving objects**: configured maximum permissible object size + configured tolerance + 10 mm

Example: configured maximum permissible object size (120 mm) + configured tolerance (60 mm) + 10 mm = required object size of 190 mm

For **stationary objects**: configured maximum permissible object size + configured tolerance + 10 mm + resolution

Example: configured maximum permissible object size (120 mm) + configured tolerance (60 mm) + 10 mm + resolution (30 mm) = required object size of 220 mm



Device symbol **C 4000 Palletizer (receiver)**, context menu **Configuration draft, Edit**, file card **Self-teach dynamic blanking**, option **Compound object**.


### 4.9.3 Deactivating the output switching signal devices

The C 4000 Palletizer deactivates its OSSDs for at least 1 second ...

- if there are more objects in the protective field than configured.
- when the size of an object exceeds the object size necessary for safe shut down.
- if the distance between two objects in the protective field changes.
- if an object enters the protective field other than at the start.
- if an object enters the protective field other than at the end.
- if the speed of an object exceeds 2.5 m/s.
- if the object number has been configured for multiple objects but only one object passed through the light grid.

## 4.10 Sender test

The C 4000 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 C 4000 receiver switches to red, i.e. the output signal switching devices (OSSDs) are deactivated.

**Note** C 4000-sender and receiver are self-testing. You only need to configure the function of the sender test if this is necessary for an older existing application.

To be able to perform a sender test ...

- the option **Enable sender test** must be active. (Deactivated in its default delivery status).
- a means of controlling the test input must be available.



Device symbol **C 4000 Palletizer (sender)**, context menu **Configuration draft, Edit**, option **Enable sender test**.

The electrical connection at the test input is described in chapter 6.10 “Test input (sender test)” on page 42.



## 5 Installation and mounting

This chapter describes the preparation and completion of the installation of the safety light curtain C 4000. The installation and mounting requires two steps:

- determining the necessary safety distance
- installation with swivel mount or side brackets
- additional measures against bypassing the protection

The following steps are necessary after mounting and installation:

- completing the electrical connections (chapter 6)
- aligning sender and receiver (chapter 7.2)
- testing the installation (chapter 7.3)

### 5.1 Additional measures against bypassing the protection

In order for the protective field not to be bypassed (intentionally/unintentionally), the following additional measures may become necessary:

Bypass attempts	Measures
<ul style="list-style-type: none"> <li>• Jumping across the protective field</li> </ul>	<ul style="list-style-type: none"> <li>• Select a sufficient light-curtain length</li> <li>• Mount the light curtain higher</li> <li>• Mount fixed barriers</li> </ul>
<ul style="list-style-type: none"> <li>• Crawling underneath the protective field</li> </ul>	<p>Observe a maximum mounting height of 400 mm or choose additional barriers</p>
<ul style="list-style-type: none"> <li>• Balancing across the protective field</li> <li>• Walking in the shadow of an object</li> <li>• Teach-in of persons with a solid object (cardboard box, briefcase)</li> </ul>	<ul style="list-style-type: none"> <li>• Mount additional light curtains</li> <li>• Mount fixed barriers</li> <li>• Minimize the distance between C4000 and pallet to prevent a foot being placed in between</li> </ul>

### 5.2 Determining the safety distance

The light curtain must be mounted with the correct safety distance

- from the hazardous point
- from reflective surfaces



WARNING

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

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

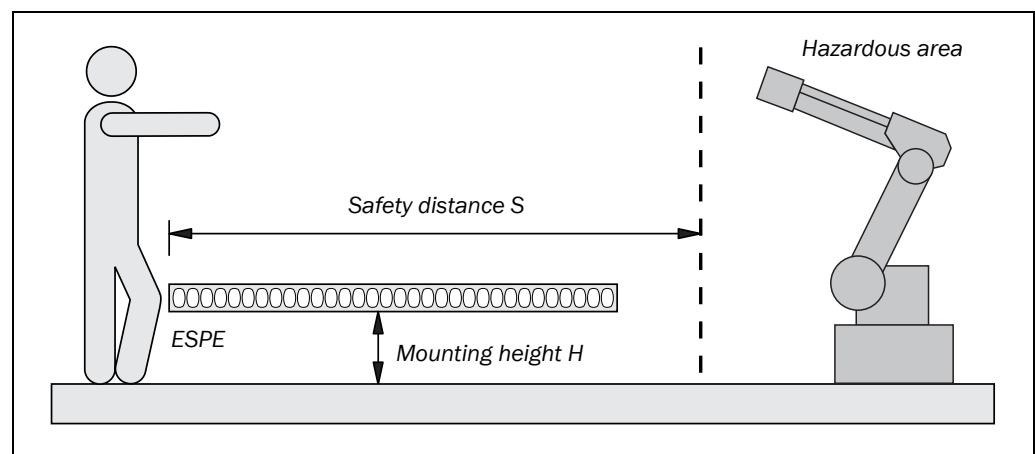
### 5.2.1 Safety distance from the hazardous point

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

#### The safety distance as defined in EN 999 and EN 294 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 protective device (response times see chapter 11.2 “Response time” on page 55)
- approach speed
- resolution of the light curtain and/or beam separation
- other parameters that are stipulated by the standard depending on the application

Fig. 8: Safety distance from the hazardous point



#### How to calculate the safety distance S according to EN 999 and EN 294:

**Note** The safety distance is in respect to the first beam in the direction of the approach to the hazardous point (cf. Fig. 8).

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

#### Safety distance for single objects (Single Mode):

➤ Calculate the safety distance for single objects (Single Mode) using the following formula:

$$S = k \times T + 850 + \text{penetration depth [mm]}$$

Where ...

S = Safety distance [mm]

k = Approach speed [1600 mm/s]

T = Stopping/run-down time of the machine  
+ response time of the protective device after light path interruption [s]

850 = Arm length according to EN 999 [mm]

The penetration depth is calculated by object size + tolerance. In the worst case, it corresponds to the length of the protective field – 100 mm.

**C 4000 Palletizer****Example:**

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

Response time after light path interruption = 30 ms

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

Object size = 700 mm

Tolerance = 90 mm

Penetration depth = 790 mm

$S = 1600 \times 0.32 + 850 + 790 = \underline{2152 \text{ mm}}$

**Safety distance for compound objects (Multi Mode):**

Calculate the safety distance for compound objects (Multi Mode) using the following formula:

$$S = SW + \frac{1}{2} \times SW + A + EB - (0,4 \times H) + k \times T$$

➤ Where ...

S = Safety distance [mm]

SW = Step length according to EN 999 [700 mm]

A = Arm length according to EN 999 [850 mm]

EB = Entry area of the ESPE [60 mm]

k = Approach speed [1600 mm/s]

T = Stopping/run-down time of the machine  
+ response time of the protective device after light path interruption [s]

H = Mounting height for the light curtain [mm]

**Example:**

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

Response time after light path interruption = 30 ms

Mounting height for the light curtain = 300 mm

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

H = 300 mm

$S = 700 \text{ mm} + 350 \text{ mm} + 850 \text{ mm} + 60 \text{ mm} -$   
 $(300 \text{ mm} \times 0,4) + (0,32 \text{ s} \times 1600 \text{ mm/s}) = \underline{2352 \text{ mm}}$

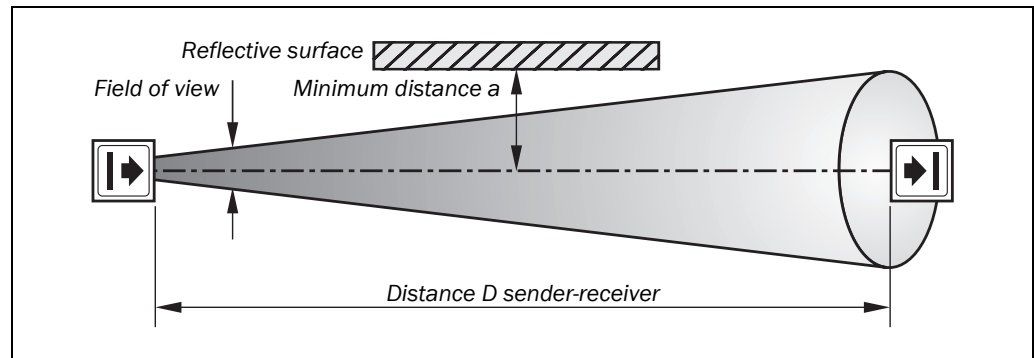
While having objects < 70mm reduced safety distances can be applied other than stated in the above mentioned formula.

### 5.2.2 Minimum distance to reflective surfaces

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

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

Fig. 9: Minimum distance to reflective surfaces

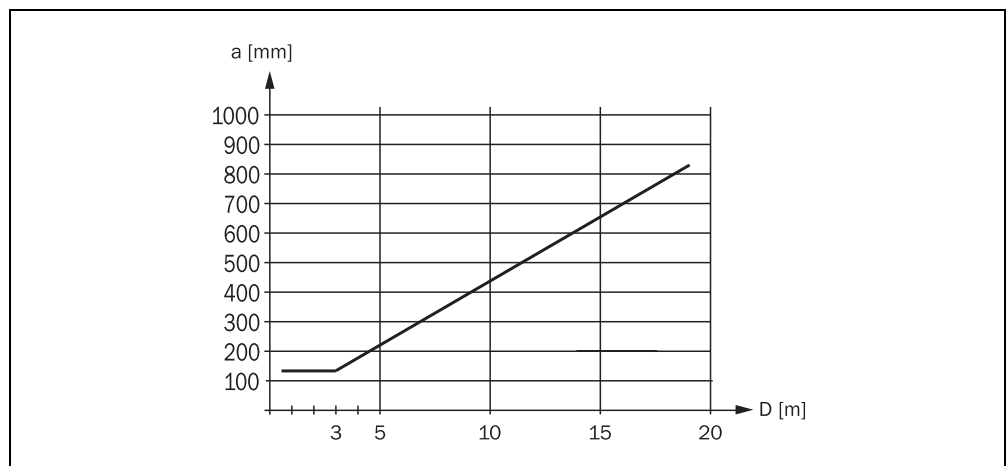


**Note** The field of view of the sender and receiver optics is identical.

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

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

Fig. 10: Graph, minimum distance from reflective surfaces



## 5.3 Mounting the device



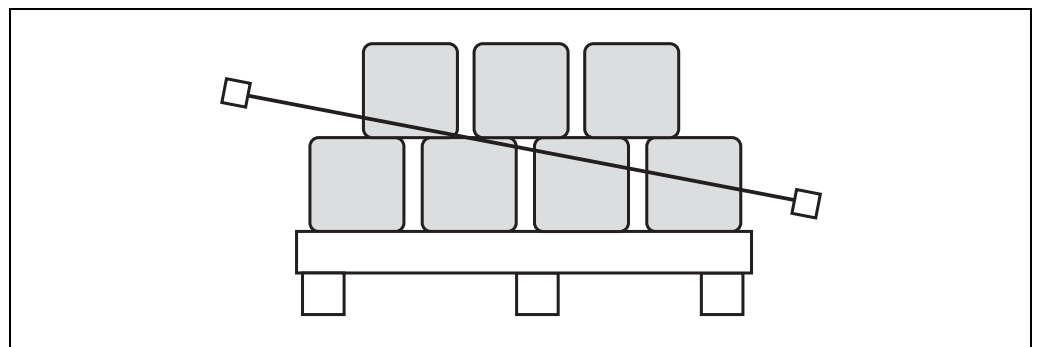
WARNING

### Special features to note during mounting:

- Always mount the sender and receiver parallel to one another.
- Only mount the sender and receiver horizontally.
- During mounting, ensure 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 system plugs of both devices must point in the same direction.
- The minimum distance between sender and receiver is 500 mm.
- Take suitable measures to attenuate vibration if the shock requirements are above the values given in chapter 11.1 “Data sheet” on page 55.
- Observe the safety distance of the system during mounting. On this subject read the chapter “Determining the safety distance ” on page 25.
- Mount the safety light curtain such that it is not possible to climb over, crawl underneath or stand behind the safety light curtain and such that the light curtain cannot be repositioned. A mounting height of 400 mm is considered to be a non-critical value with regards to crawling.
- Access to the hazardous area is only to be via the protective field.
- Once the system is mounted, one or several of the enclosed self-adhesive safety information labels must be affixed.
  - Use only information labels in the language which the operators of the machine understand.
  - Affix the information labels such that they are easily visible by the operators during operation. After attaching additional objects and equipment, the information labels must not be concealed from view.
  - Affix the information label “Important Notices” to the system in close proximity to sender and receiver.

The sender and receiver can also be mounted diagonally to one another to make packages, which are stacked cardboard boxes, appear as a single, solid object for the light curtain. This arrangement must be especially protected against crawling.

Fig. 11: Diagonal mounting



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

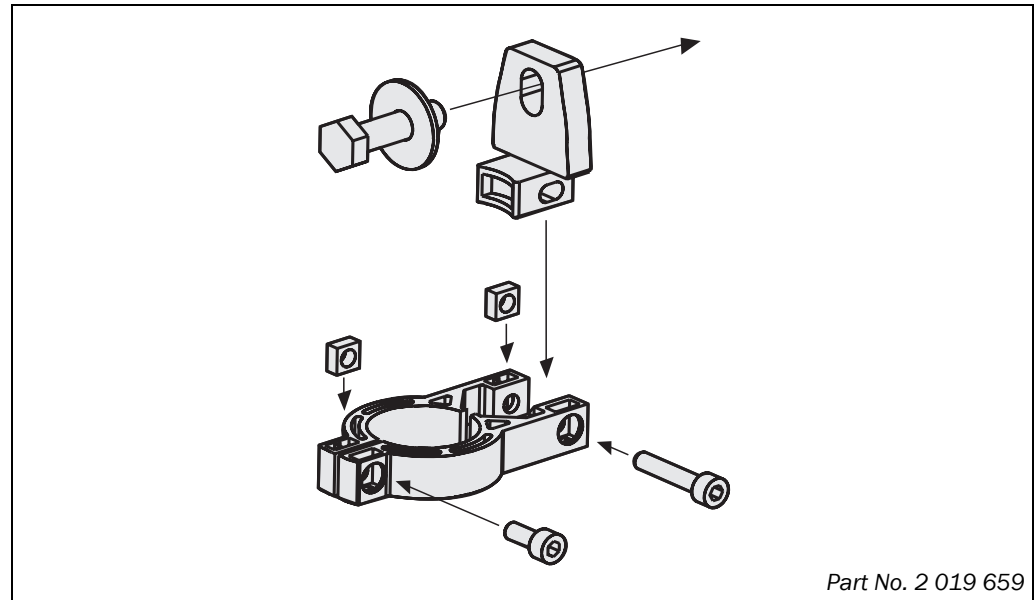
- mounting with swivel mount bracket
- mounting with side bracket

### 5.3.1 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.

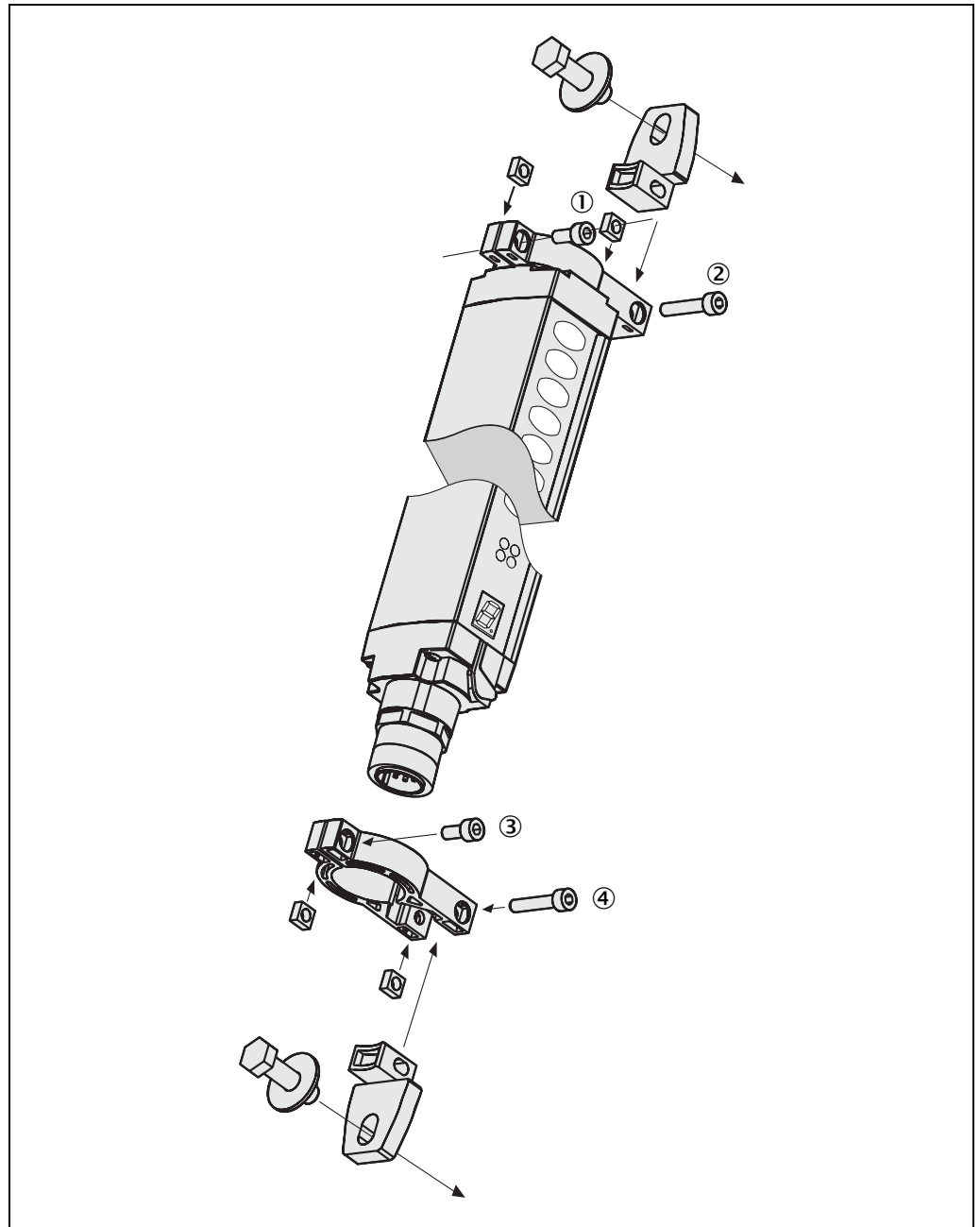
- Note** ➤ Attach the bolts of the swivel mount bracket with a torque of between 2.5 and 3 nm. Higher torques can damage the bracket; lower torques provide inadequate protection against vibration.

Fig. 12: Composition of the swivel mount bracket



**C 4000 Palletizer**

Fig. 13: Mounting sender and receiver using swivel mount brackets

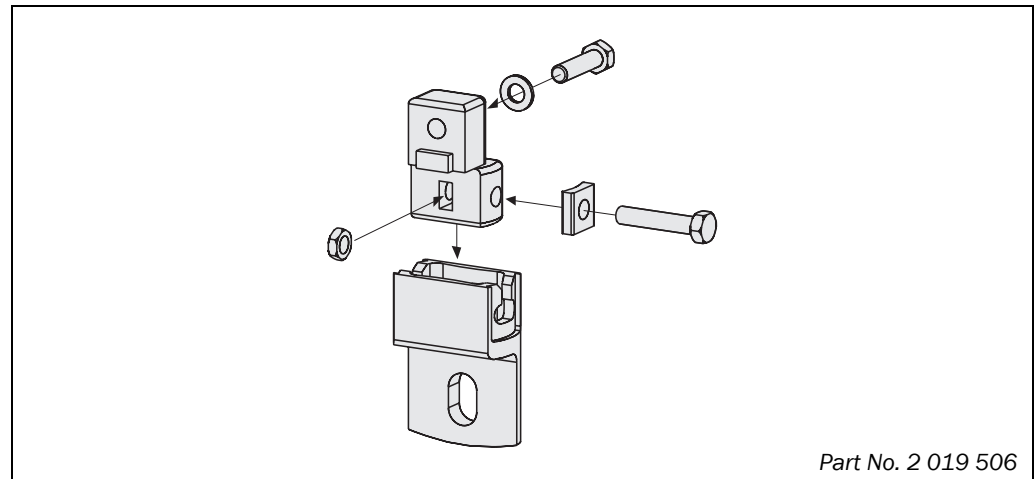


- Notes**
- Mount the bolts marked with ① to ④ on the operator side of the system to ensure that they remain accessible after mounting and to allow you to readjust the light curtain later, if necessary.
  - If you wish to use the additional front screen (see “Additional front screen (weld spark guard)”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

### 5.3.2 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. 14: Composition of the side bracket

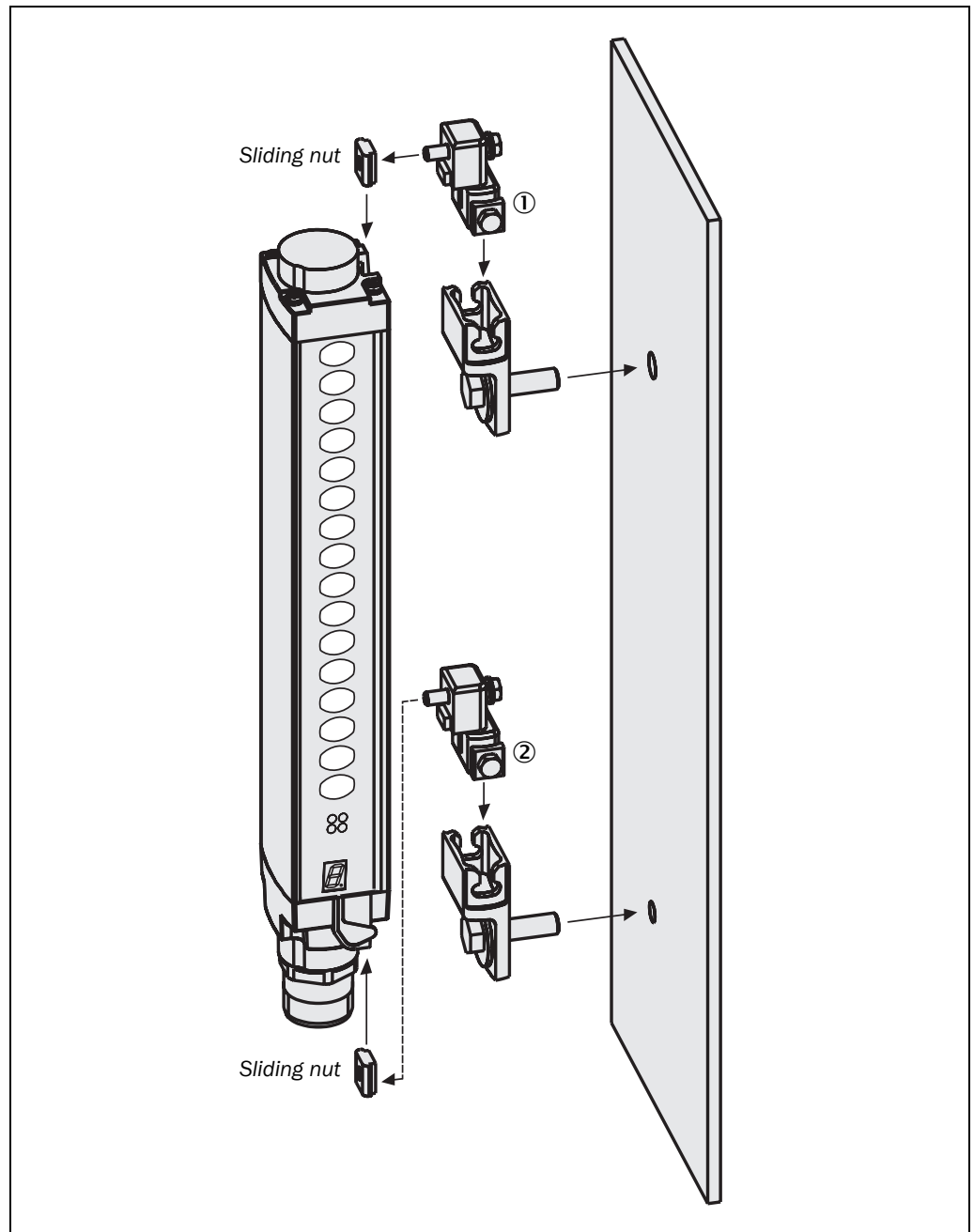


- Notes**
- Attach the bolts of the side bracket with a torque of between 5 and 6 nm. Higher torques can damage the bracket; lower torques provide inadequate protection against vibration.
  - When mounting the bracket, note the distance and the position of the sliding nuts as described in chapter 11.4 “Dimensional drawings” on page 57f.



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Fig. 15: Mounting the C 4000 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.
  - If you wish to use the additional front screen (see “Additional front screen (weld spark guard)” on page 61), make sure that the curved side of the device remains accessible after mounting.

## 6 Electrical installation



WARNING

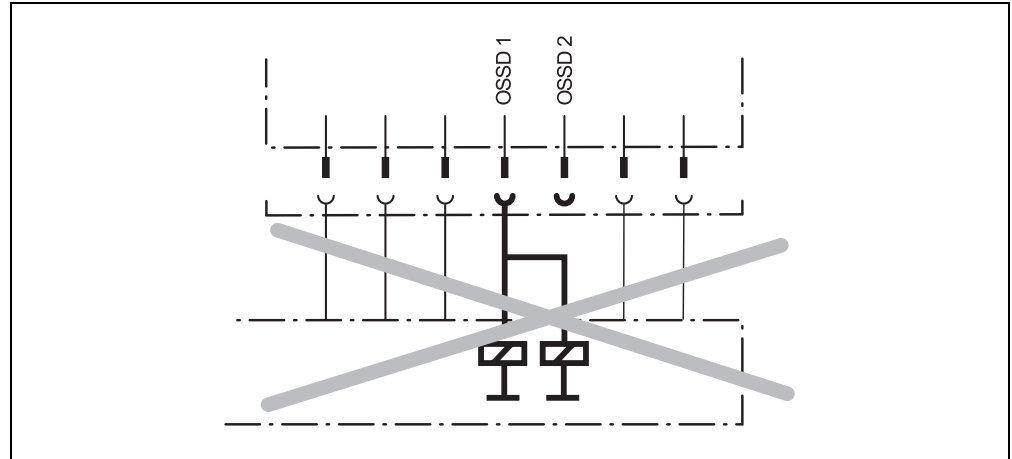
### Switch the entire machine/system off line!

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!

- To ensure that the signals are safe, OSSD1 and OSSD2 are to be connected separately to the machine controller and the machine controller must process the two signals separately. OSSD1 and OSSD2 must not be connected together.

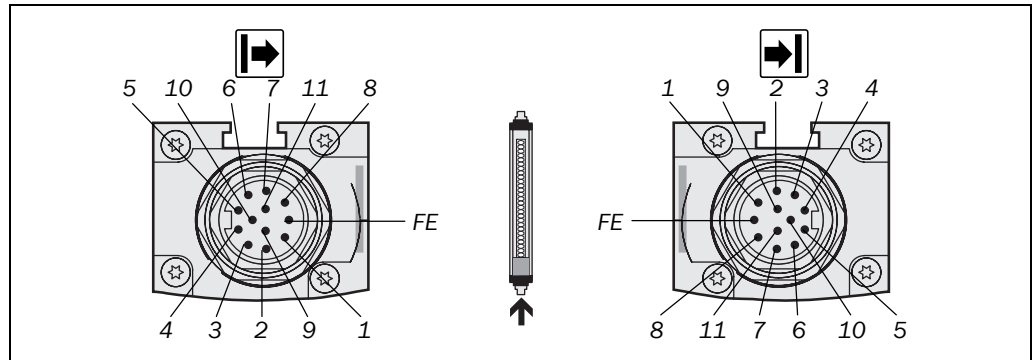


- Notes**
- The safety light curtain C 4000 meets the interference suppression requirements (EMC) for industrial use (interference suppression class A). When used in residential areas it can cause interference.
  - To ensure full electromagnetic compatibility (EMC), functional earthing (FE) must be connected.
  - The external voltage supply of the device must be capable of buffering brief mains voltage failures of 20 ms as specified in EN 60 204-1. Suitable power supplies are available as accessories from SICK (Siemens type series 6 EP 1).

## C 4000 Palletizer

### 6.1 System connection M26×11 + FE

Fig. 16: Pin assignment system connection M26×11 + FE



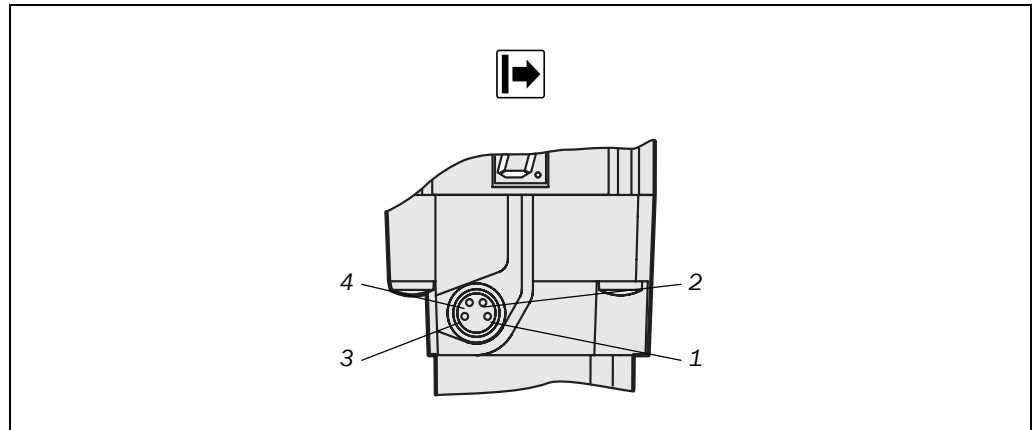
Tab. 7: Pin assignment system connection M26×11 + FE

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: 0 V: external test active 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 Interlock Teach in of single objects
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 (EFI <sub>A</sub> )	Device communication (EFI <sub>A</sub> )
10	Purple	Device communication (EFI <sub>B</sub> )	Device communication (EFI <sub>B</sub> )
11	Grey/pink	Do not use	Conveyor-belt signal
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 12.4 “Accessories” on page 61).
  - If you do not use either a SICK switching amplifier or a SICK bus node, to improve the EMC behaviour we recommend the termination of the connections pin 9 and 10 (device communication EFI) on the system connection in the control cabinet using a resistor of 182 Ω (SICK part number 2 027 227).

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

Fig. 17: Pin assignment configuration connection M8×4



Tab. 8: 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

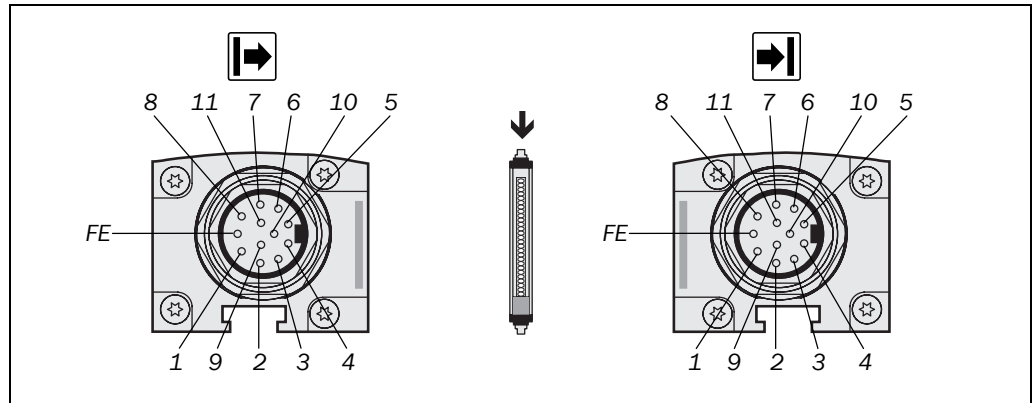
**Notes** The pin assignment of sender and receiver is identical.

- 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.

**C 4000 Palletizer**

## 6.3 Extension connection M26×11 + FE

Fig. 18: Pin assignment extension connection M26×11 + FE



Tab. 9: Pin assignment extension connection M26×11 + FE

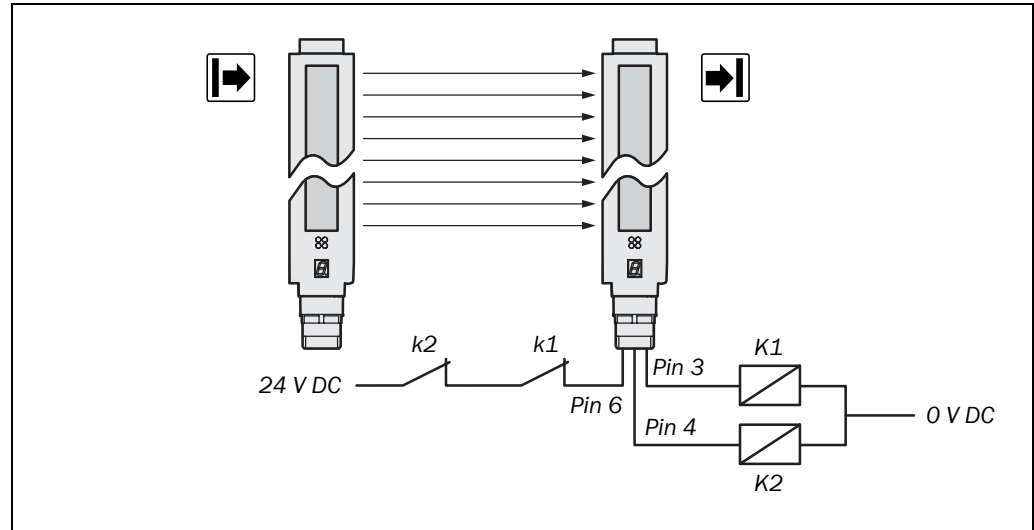
Pin	Wire colour	Sender	Receiver
1	Brown	24 V DC output (voltage supply)	24 V DC output (voltage supply)
2	Blue	0 V DC (voltage supply)	0 V DC (voltage supply)
3	Grey	Reserved	Input emergency stop 1/bypass
4	Pink	Reserved	Input emergency stop 2/bypass
5	Red	Reserved	Reset/restart
6	Yellow	Reserved	Test output emergency stop 2/ bypass
7	White	Reserved	Test output emergency stop 1/ bypass
8	Red/blue	Reserved	Output <i>Reset required</i>
9	Black	Device communication (EFI <sub>A</sub> )	Device communication (EFI <sub>A</sub> )
10	Purple	Device communication (EFI <sub>B</sub> )	Device communication (EFI <sub>B</sub> )
11	Grey/pink	Do not use	Do not use
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 External device monitoring (EDM)

The external device monitoring (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 output signal switching devices again.


Fig. 19: 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.

## 6.5 Reset button

In the protective operation mode with internal restart interlock (see page 16) 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.

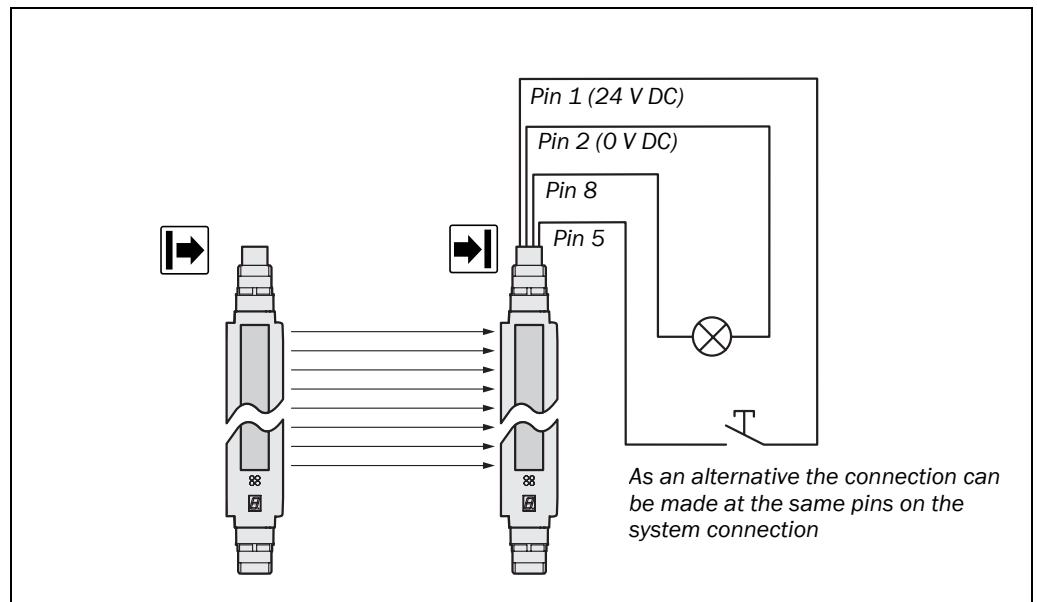


WARNING

### Function of the reset button

The reset button is simultaneously used to teach in new objects while in Self Teach dynamic Blanking "Single Mode" (see chapter 4.9, Self-teach dynamic blanking on page 21).

Fig. 20: 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 deactivated reset function with a replacement unit, the reset function must again be deactivated via the software. It is not sufficient to make the electrical connections, because new devices are supplied ex factory always with activated reset function.

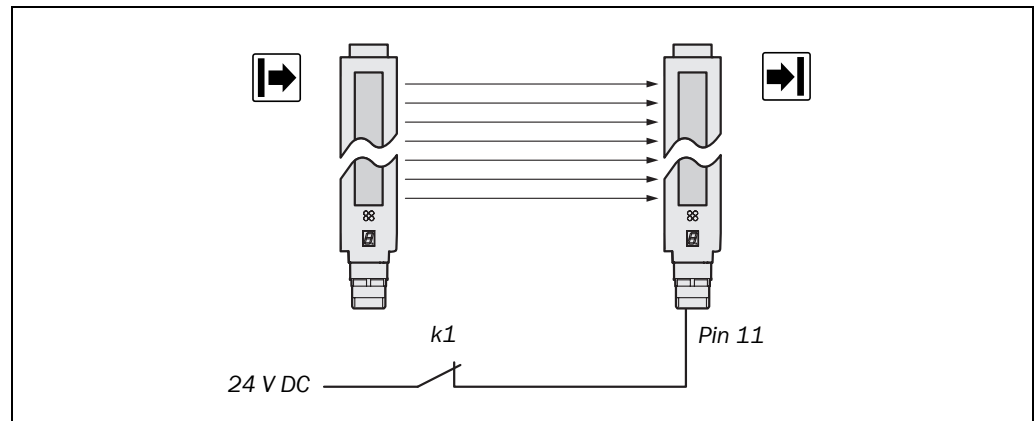
### Connection of a signal lamp to the output *Reset required*

Pin 8 of the system plug 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.

## 6.6 Conveyor-belt signal

The conveyor-belt signal is connected via the system connection of the receiver, pin 11.

Fig. 21: Connection to the conveyor-belt signal

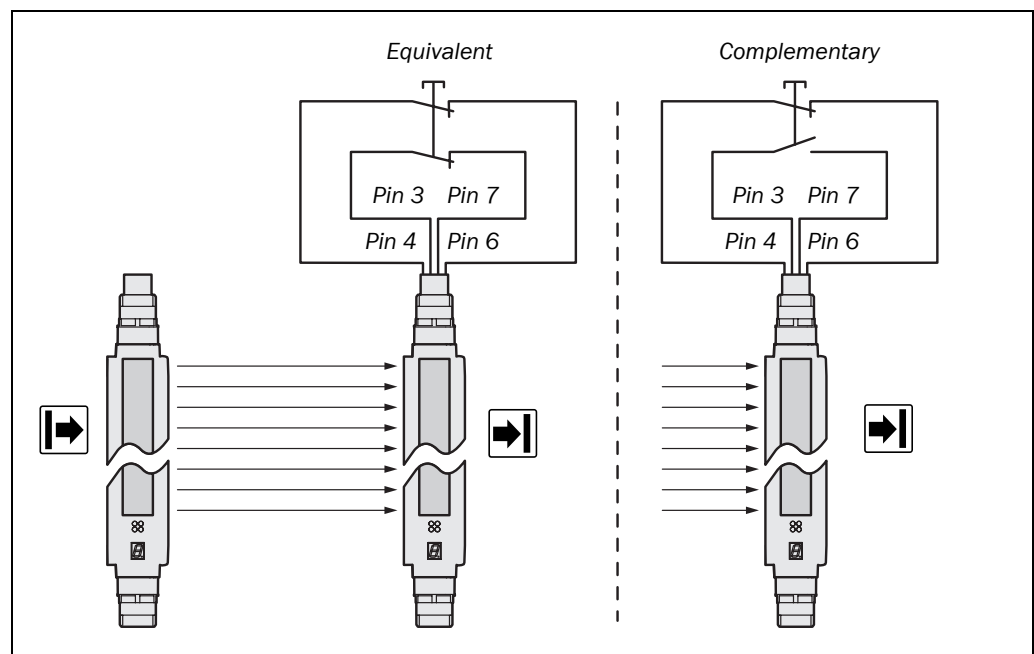



## 6.7 Emergency stop

The emergency stop input has two channels. The emergency stop monitoring in the device corresponds to stop category 0 in accordance with EN 418. Switch off at the emergency stop input (see page 17) 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 can be connected instead of the key-operated switch for bypass, to the same connections as the key-operated switch for bypass.

Fig. 22: 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/O). You must configure the C 4000 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 to the C 4000, a bypass can no longer be connected, as it requires the same connections.



Device symbol **C 4000 Palletizer (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.

## 6.8 Key-operated switch for bypass

The bypass function may only be activated as follows:

- by a key-operated pushbutton with an automatic reset and two levels.
- by two input signals that are independent of each other, e.g. two position pushbuttons or two secure PLC signals

The key-operated switch for bypass is connected to the same connections as the emergency stop, instead of the emergency stop. You can also design it as equivalent (N/C, N/C) or complementary (N/O, N/C). See Section 6.7 "Emergency stop" on Page 40.

### Notes

➤ Mount the key-operated switch for bypass in such a way that the hazardous point is completely visible when the key-operated switch is used.

- The key-operated switch for bypass must have volt-free contacts.
- If you connect the key-operated pushbutton for bypass to C 4000, an emergency stop cannot be connected anymore since it needs the same connections.
- You must configure the switching mode of the key-operated switch for bypass to comply with the selected switch type (N/C, N/O or N/O, N/O) with the aid of the CDS:

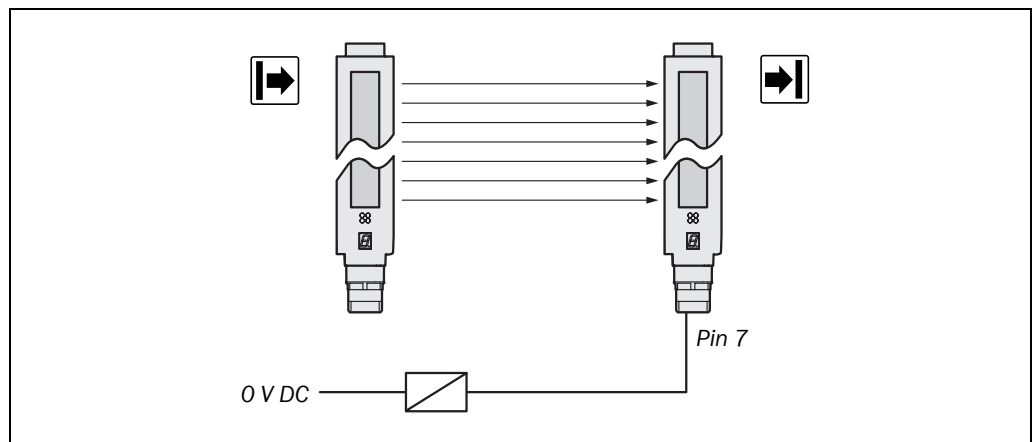


Device symbol **C 4000 Host (receiver)**, context menu **Configuration draft, Edit**, selection **System, General** tab, option **Key-operated switch for bypass**.

## 6.9 Signal output (ADO)

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

Fig. 23: 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 19.



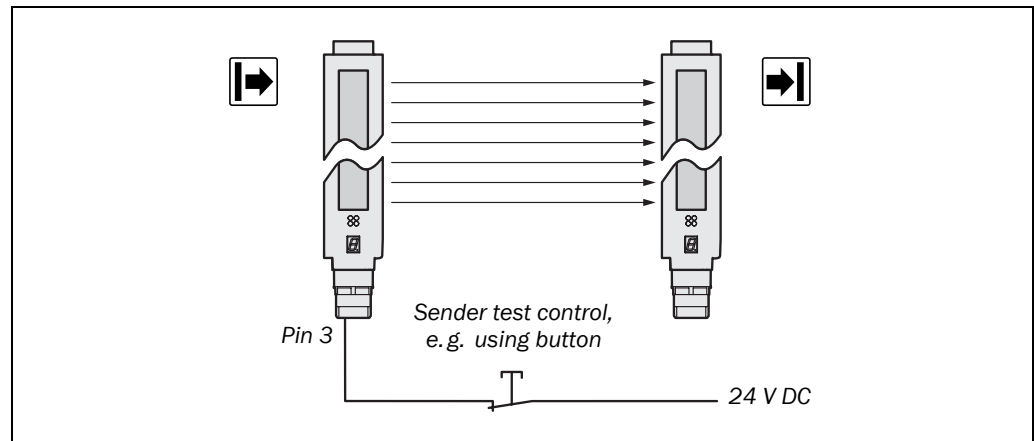
WARNING

### 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.

## 6.10 Test input (sender test)

Fig. 24: 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 **C 4000 Palletizer (sender)**, context menu **Configuration draft, Edit**, option **Enable sender test**.

# 7 Commissioning



WARNING

## Commissioning requires a thorough check by qualified personnel!

Before you operate a system protected by the safety light curtain C 4000 for the first time, make sure that the system is first checked and released by qualified personnel. Please read the notes in chapter “On safety” on page 8.

## 7.1 Display sequence during start-up

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

The display values have the following meaning:

Tab. 10: Displays shown during the power-up cycle

Display	Meaning
	Testing the 7-segment display. All segments are activated sequentially.
	Approx. 0.5 s. Is displayed only at the receiver and only in operation with large scanning range.
	Approx. 0.5 s. Non-coded operation or operation with code 1 or 2.
	The device is operational. The indication  appears if the device has detected an object in the protective field on switch on.
	Receivers only: Receiver-sender alignment is not optimal (see “Aligning sender and receiver” below).
Other display	Device error. See “Fault diagnosis” on page 48.

## 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.

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



WARNING








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

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

- Loosen the clamping bolts which hold the light curtain in place.
- Switch on the power supply to the light curtain.
- Important for problem-free availability is the alignment of all axes:  
Place the AR 60 at the start and end of the device in succession. The laser point is incident on the "Receiver/Sender" text on the device opposite or in the hole on the second mounting bracket that is also to be fitted to the device.
- Watch the alignment information on the 7-segment display of the receiver (see Tab. 11).  
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. 11).

The display values have the following meaning:

Tab. 11: 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.
 or 	The alignment is now true; the devices must be locked in this position. The indication  appears when the device has detected an object in the protective field, otherwise  is indicated.

- Notes**
- If the optimum alignment (= no display) persists for longer than 2 minutes without the protective field being interrupted, the system automatically deactivates the alignment mode.
  - If you wish to readjust the alignment later, switch the power supply of the C 4000 off and back on again.

**Recommendation** For aligning the sender and receiver use the laser alignment aid AR 60.

## 7.3 Test notes

The purpose of the tests described below is to confirm the safety requirements specified in the national and international rules and regulations, especially in the Machinery Directive and the Use of Work Equipment Directive (EC Conformity).

These tests are also intended as a way of detecting whether protection is being affected by sources of extraneous light or by other unusual environmental influences. It is therefore essential that these tests be carried out.

### 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 64).
- Ensure that the operating personnel of the machine protected by the light curtain are correctly instructed by specialist 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 personnel**

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

**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 correct function of the safety light curtain:**

- The output signal switching devices on the light curtain must shut off once every 24 hours, i.e. the LEDs must illuminate Red. For this purpose interrupt the protective field from the top, in the middle, not in the entry or exit area. In this case the brief illumination of the red LEDs indicates the shut down of the OSSDs.
- It is not necessary to test individual beams.
- If you use one or more deflector mirrors (PNS), then also guide the test rod into the protective field directly in front of the mirrors as described above.

**WARNING****Do not operate the machine if the red LED does not light up during the test!**

If the red LED does not light up *during the test*, work must stop at the machine. In this case the installation of the safety light curtain must be checked by specialised personnel (see chapter 5).

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

# 8 Configuration

## 8.1 Default delivery status

As delivered the C 4000 is configured ready for protective operation. You can change the configuration at any time with the aid of the CDS. Default delivery status:

- restart interlock: external
- external device monitoring (EDM): deactivated
- beam coding: non-coded
- dynamic blanking:
  - Standard: active, 1 object, teach-in object size, without conveyor-belt signal
  - Advanced: active, 3 objects 170 mm each (typical for Euro pallets), without conveyor-belt signal
- scanning range: 0.5–6 m

## 8.2 Preparing the configuration

### How to prepare the configuration:

- Ensure 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, 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 9x/NT 4/2000 Professional/XP and a serial interface (RS-232). PC/Notebook not included
- connecting cable between PC and C 4000 (SICK part no. 6 021 195)
- 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 C 4000 is maintenance-free. The front screen of the safety light curtain C 4000 and any additional front screen(s) (see “Additional front screen (weld spark guard)” on page 61) should be cleaned at regular intervals and when dirty.

- Do not use aggressive detergents.
- 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 No. 5 600 006) and the SICK lens cloth (Part No. 4 003 353).

### **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.
- Now wipe the front screen with a clean and damp cloth.

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

➤ Verify the effectiveness of the protective device as described in chapter 7.3 “Test notes” on page 44.

# 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 diagnosis 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 19.

## 10.1 In the event of faults or errors



WARNING

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

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

### The system state lock-out

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

- Rectify the cause of the fault as per Tab. 13.
- Switch the power supply for the C 4000 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 representative.

## 10.3 Error displays of the diagnostics LEDs

This chapter explains the meaning of the error displays of the LEDs and how to respond. Please refer to the description in the chapter 3.4 “Status indicators” on page 13.

Tab. 12: 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 ○ <b>Red and Green</b> Neither the red nor the green receiver LED lights 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>
















## 10.4 Error displays of the 7-segment display




This section explains the meaning of the additional error displays of the 7-segment display and how to respond to the messages. For a description of the 7-segment display please refer to chapter 3.4 “Status indicators” on page 13.

Tab. 13: Error displays of the 7-segment display

Display	Possible cause	Remedying the error
 or 	Inadequate alignment	<ul style="list-style-type: none"> <li>➤ Re-align sender and receiver (see page 43).</li> </ul> The display goes off after 2 minutes.
	Configuration incomplete	<ul style="list-style-type: none"> <li>➤ The display goes off automatically once the configuration has been successfully transferred.</li> </ul> If display  does not go off: <ul style="list-style-type: none"> <li>➤ Check the configuration of the system using the CDS (Configuration &amp; Diagnostic Software).</li> <li>➤ Re-transfer the corrected configuration to the system.</li> </ul>
 or 	EDM error	<ul style="list-style-type: none"> <li>➤ Check the contactors and their wiring, eliminate any wiring errors, if necessary.</li> <li>➤ If  is displayed, switch the device off and back on again.</li> </ul>
	Reset button fault	<ul style="list-style-type: none"> <li>➤ Check the reset button for correct function. The button may be defective or stuck.</li> <li>➤ Check the wiring of the reset button for any short-circuit to 24 V.</li> </ul>
	Configuration of the switching amplifier connected (e.g. UE 402) is incorrect	<ul style="list-style-type: none"> <li>➤ Configure the switching amplifier connected with the aid of the CDS.</li> <li>➤ Check the connection from the C 4000 to the switching amplifier.</li> </ul>
	Several operating modes configured, but none selected	<ul style="list-style-type: none"> <li>➤ Check the connection and the function of the operating mode selector switch.</li> <li>➤ Check the connection for the operating mode selector switch on the switching amplifier.</li> </ul>
	Several operating modes selected simultaneously	<ul style="list-style-type: none"> <li>➤ Check the connection and the function of the operating mode selector switch.</li> <li>➤ Check the connection for the operating mode selector switch on the switching amplifier for a short-circuit.</li> </ul>
	Un-configured operating mode selected	<ul style="list-style-type: none"> <li>➤ Configure the operating mode set on the operating mode selector switch, or ensure that this operating mode cannot be selected.</li> </ul>

Display	Possible cause	Remedying the error
	Key-operated pushbutton for bypass malfunctioning or invalid configuration	<ul style="list-style-type: none"> <li>➤ Check whether the configuration of the key-operated pushbutton for bypass in the CDS matches the electrical connection.</li> <li>➤ Check the function of the key-operated pushbutton for bypass and replace it if necessary.</li> <li>➤ Ensure that both contacts on the key-operated pushbutton for bypass are pressed within 2 seconds.</li> </ul>
	Short-circuit at the operating mode selector switch	<ul style="list-style-type: none"> <li>➤ Check the operating mode inputs on the switching amplifier connected for short-circuit to 24 V.</li> </ul>
	System error	<ul style="list-style-type: none"> <li>➤ Replace the unit (receiver or sender).</li> </ul>
	Switching amplifier connected (e.g. UE 402) is faulty	<ul style="list-style-type: none"> <li>➤ Interrupt the supply of power to the C 4000 and to the switching amplifier for at least 3 seconds.</li> <li>➤ If the problem is still present, then replace the switching amplifier.</li> </ul>
	Overcurrent at output signal switching device 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 output signal switching device 1	<ul style="list-style-type: none"> <li>➤ Check the wiring for short-circuit to 24 V.</li> </ul>
	Short-circuit at output signal switching device 1	<ul style="list-style-type: none"> <li>➤ Check the wiring for short-circuit to 0 V.</li> </ul>
	Overcurrent at output signal switching device 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 output signal switching device 2	<ul style="list-style-type: none"> <li>➤ Check the wiring for short-circuit to 24 V.</li> </ul>
	Short-circuit at output signal switching device 2	<ul style="list-style-type: none"> <li>➤ Check the wiring for short-circuit to 0 V.</li> </ul>
	Short-circuit between output signal switching device 1 and 2	<ul style="list-style-type: none"> <li>➤ Check the wiring and rectify the error.</li> </ul>
	Error of the emergency stop button or of the key-operated pushbutton for bypass	<ul style="list-style-type: none"> <li>➤ Check whether the configuration of the emergency stop button or key-operated pushbutton for bypass in the CDS matches the electrical connection.</li> <li>➤ Check whether the emergency stop button or the key-operated pushbutton works.</li> </ul>
	Invalid configuration of the EDM	<ul style="list-style-type: none"> <li>➤ Verify that the machine-side EDM is connected correctly.</li> </ul>

**C 4000 Palletizer**

Display	Possible cause	Remedying the error
	External sender detected	<ul style="list-style-type: none"> <li>➤ Check the distance from reflective surfaces (page 28) or from other light curtains.</li> <li>➤ If necessary, re-configure the device with another beam coding (page 20) or install non-reflective partitions.</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>
	Malfunction of a device connected via EFI	<ul style="list-style-type: none"> <li>➤ Perform a fault diagnosis of the device connected to the C 4000.</li> </ul>

**10.5 Extended diagnostics**

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. 14: Technical specifications C 4000

	Minimum	Typical	Maximum
<b>General system data</b>			
Protective field length, depending on type	750 mm to 1800 mm		
Resolution, depending on type	14 mm to 40 mm		
Protective field width	0.5 m		19 m
Protection class (IEC 61140:1997)	III		
Enclosure rating (IEC 60529)	IP 65		
Supply voltage $U_V$ at device <sup>1)</sup>	19.2 V	24 V	28.8 V
Residual ripple <sup>2)</sup>			±10%
Synchronisation	Optical, without separate synchronisation		
Type according to IEC 61496	4		
Power-up delay of sender and receiver before ready			8 s

### Sender unit

Test input			
Input voltage <sup>3)</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>3)</sup>	-3.5 mA	0 mA	0.5 mA
Reaction time to test	Depending on the number of beams, maximum 150 ms		
Wavelength of sender		950 nm	
Power consumption			1 A
Weight	Depending on the protective field length (see page 56)		

<sup>1)</sup> The external voltage supply must be capable of buffering brief mains failures of 20 ms as specified in EN 60204-1. Suitable power supplies are available as accessories from SICK (Siemens type series 6 EP 1).

<sup>2)</sup> Within the limits of  $U_V$ .

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

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

Receiver unit

Output signal switching devices (OSSDs)	2 PNP semiconductors, short-circuit protected <sup>4)</sup> , cross-circuit monitored		
Response time	See chapter 11.2 on page 55		
Switch off time	1000 ms	1.5 × response time	
Power-up delay			
Switching voltage <sup>5) 6)</sup> HIGH (active, $U_{eff}$ )	$U_V - 2.25 V$	24 V	$U_V$
Switching voltage <sup>5)</sup> LOW (inactive)	0 V	0 V	3.5 V
Switching current	0 mA		500 mA
Leakage current <sup>7)</sup>			0.25 mA
Load capacity			2.2 $\mu F$
Switching sequence	Depending on load inductance		
Load inductance <sup>8)</sup>			2.2 H
Test pulse data <sup>9)</sup>			
Test pulse width	120 $\mu S$	150 $\mu S$	300 $\mu S$
Test pulse rate	3 $1/s$	5 $1/s$	10 $1/s$
Permissible cable resistance between device and load <sup>10)</sup>			2.5 $\Omega$
Supply lead			1 $\Omega$
Power consumption			1.8 A
Contactors			
Permissible dropout time			300 ms
Permissible pick-up time			300 ms

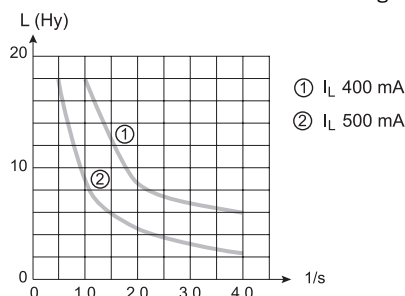
<sup>4)</sup> Applies to the voltage range between -30 V and +30 V.

<sup>5)</sup> As per IEC 61131-2.

<sup>6)</sup> On the device plug.

<sup>7)</sup> In the case of a fault (0-V cable open circuit) maximally the 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>8)</sup> The maximum rated load inductance is higher with lower switching sequence.



<sup>9)</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>10)</sup> Make sure to limit the individual cable resistance to the downstream controller to this value to ensure that a cross-circuit between the outputs is safely detected (also note EN 60204 Electrical Machine Equipment, Part 1: General Requirements.).

	Minimum	Typical	Maximum
Control switch input (reset button)			
Input voltage <sup>11)</sup> HIGH (active)	11 V	24 V	30 V
Input current HIGH	6 mA	10 mA	20 mA
Input voltage <sup>11)</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	100 ms		
Output <i>Reset required</i> (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)			
Switching voltage HIGH (active)	15 V	24 V	28.8 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 Ω
Cable capacitance			10 nF
External device monitoring (EDM) input			
Input voltage <sup>11)</sup> HIGH (inactive)	11 V	24 V	30 V
Input current HIGH	6 mA	10 mA	20 mA
Input voltage <sup>11)</sup> LOW (active)	-30 V	0 V	5 V
Input current LOW	-2,5 mA	0 mA	0,5 mA
Conveyor-belt signal input			
Input voltage HIGH (active) = self-tech dynamic blanking	13,5 V	24 V	30 V
Input current HIGH	1,5 mA	2 mA	2,5 mA
Input voltage LOW (inactive) = no self-tech dynamic blanking	-0,5 V	0 V	5 V
Input current LOW	0 mA	0 mA	0,4 mA
Weight	Depending on protective field length (see page 56)		

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

## C 4000 Palletizer

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

### Operating data

Connection	Hirschmann plug M26×11 + FE		
Cable length <sup>12)</sup>			50 m
Wire cross-section		0.75 mm <sup>2</sup>	
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 acc. to IEC 60068-2-6		
Shock resistance	10 g, 16 ms acc. to IEC 60068-2-29		

## 11.2 Response time

The response time depends on the following parameters:

- number of beams
- beam coding
- configuration of multiple sampling of the scan

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

➤ Read the response times of the C 4000 (shown on the 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. 15 and Tab. 16. When determining the number of beams in Tab. 15, the physical resolution is important. The physical resolution of the light curtain does not change even if self-teach dynamic blanking has been selected.



**WARNING**

### The response time must be ≤ 94 ms!

Verify that the total response time determined is ≤ 94 ms. EN 61496 does not permit response times exceeding 94 ms. If necessary, adjust the configuration.

Tab. 15: Number of beams depending on the protective field length and the physical resolution

Protective field length [mm]	Number of beams for physical resolution	
	30 mm	40 mm
<b>750</b>	38	25
<b>900</b>	45	30
<b>1050</b>	53	35
<b>1200</b>	60	40
<b>1350</b>	68	45
<b>1500</b>	75	50
<b>1650</b>	83	55
<b>1800</b>	90	60

<sup>12)</sup> Depending on load, power supply and wire cross-section. The technical specifications must be observed.

Tab. 16: Response time depending on the number of beams and the multiple sampling selected

Number of beams	Without beam coding	With beam coding
25	15 ms	20 ms
30	15 ms	22 ms
35	16 ms	23 ms
38	16 ms	24 ms
40	16 ms	24 ms
45	17 ms	26 ms
50	17 ms	27 ms
53	18 ms	28 ms
55	18 ms	29 ms
60	18 ms	30 ms
68	19 ms	33 ms
75	20 ms	35 ms
83	21 ms	37 ms
90	22 ms	39 ms

## 11.3 Table of weights

### 11.3.1 C 4000 Palletizer

Tab. 17: Weight of sender and receiver

Protective field length [mm]	Weight [g]	
	☐ Sender	☐ Receiver
900	1960	1990
1050	2250	2280
1200	2530	2560
1350	2820	2850
1500	3110	3140

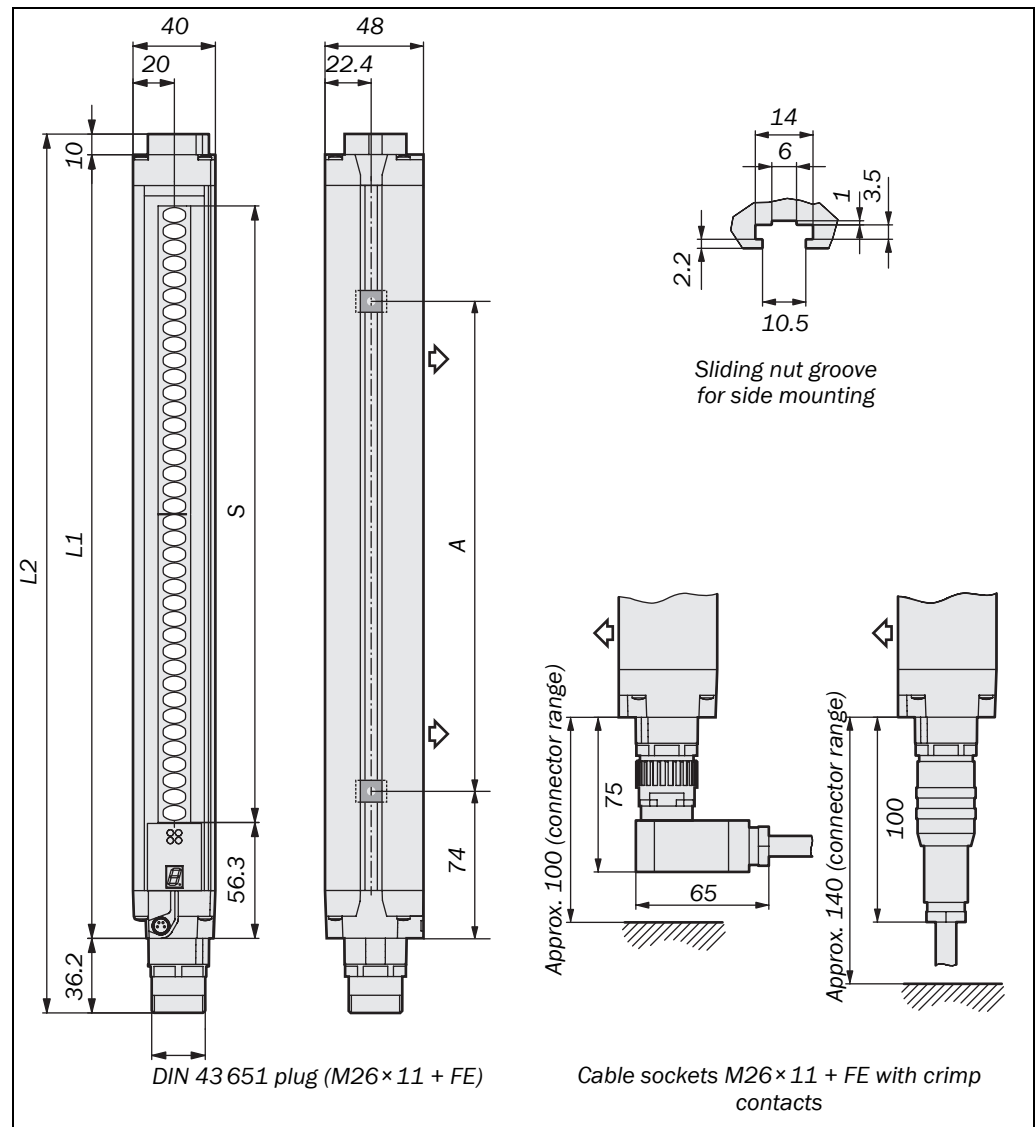


## C 4000 Palletizer

### 11.4 Dimensional drawings

#### 11.4.1 C 4000 Palletizer without extension connection

Fig. 25: Dimensional drawing C 4000 Palletizer without extension connection, sender. Receiver, mirror image

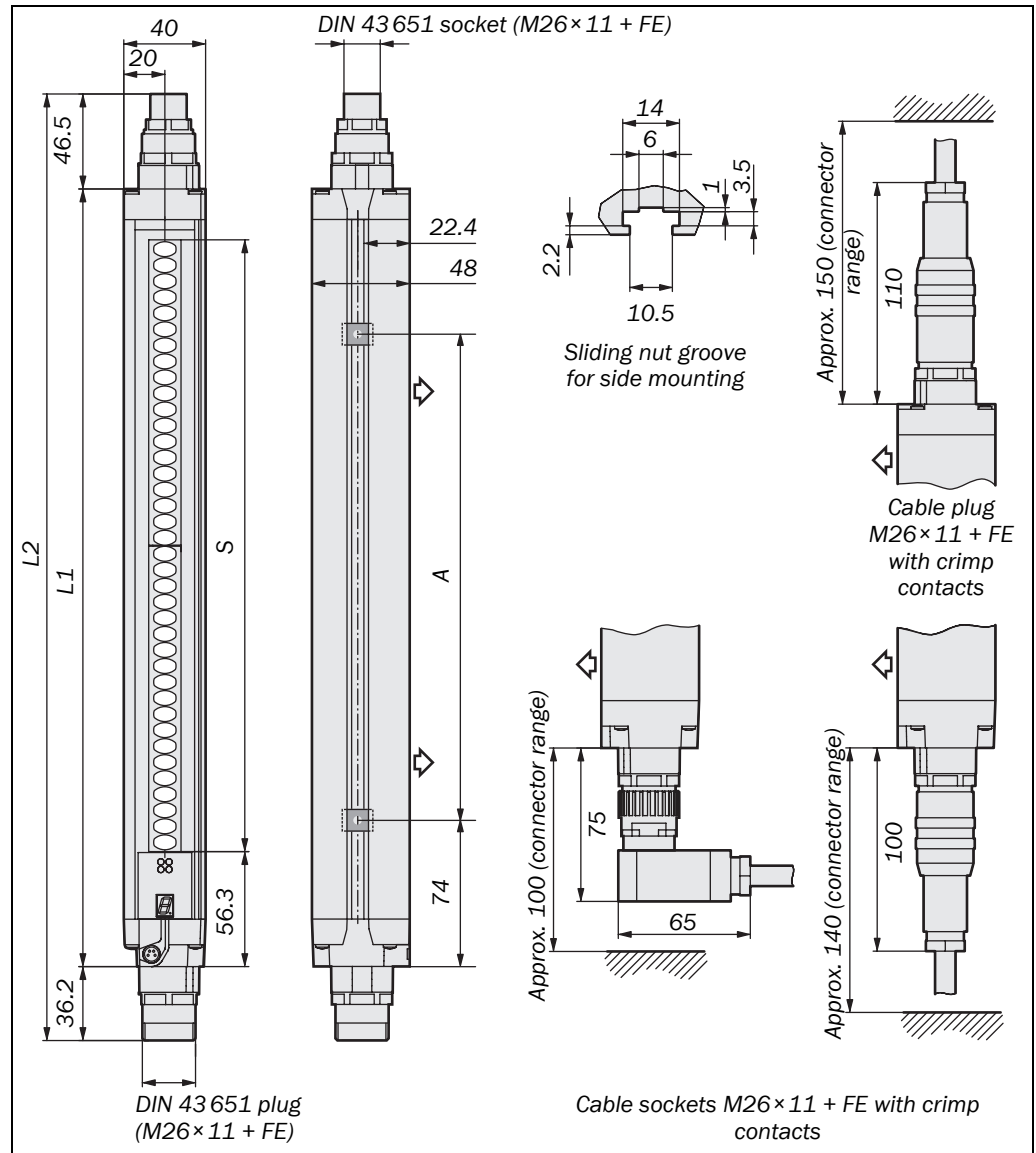


Tab. 18: Dimensions depending on the protective field length, C 4000 Palletizer without extension connection

Protective field length S [mm]	Dimension L1 [mm]	Dimension L2 [mm]	Dimension A [mm]
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

## 11.4.2 C 4000 Palletizer with extension connection

Fig. 26: Dimensional drawing C 4000 Palletizer with extension connection, sender. Receiver, mirror image



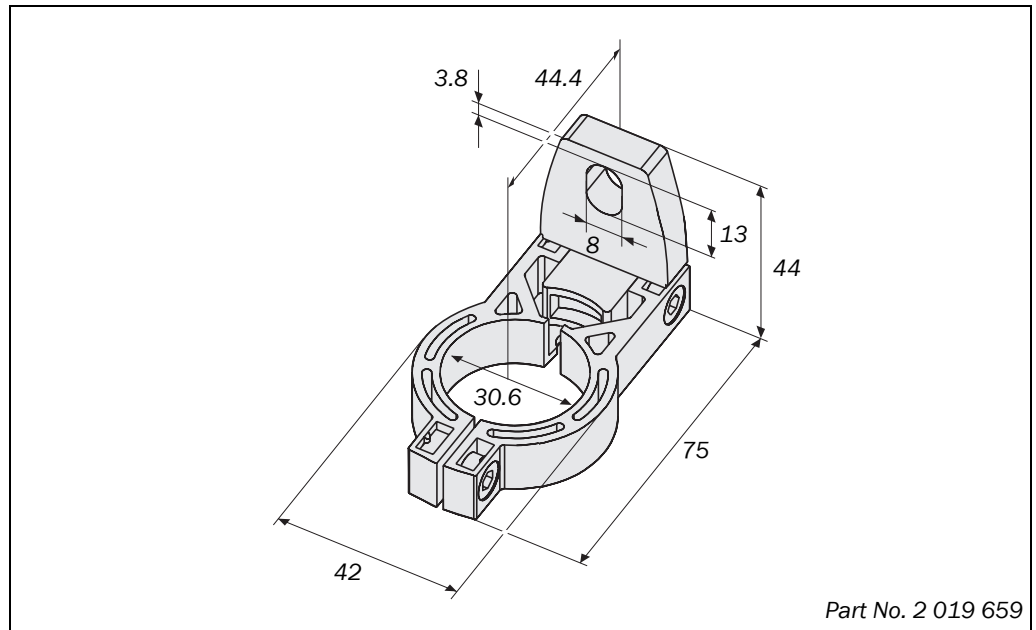
Tab. 19: Dimensions depending on the protective field length, C 4000 Palletizer with system connection

Protective field length S [mm]	Dimension L1 [mm]	Dimension L2 [mm]	Dimension A [mm]
750	833	879	674
900	984	1030	824
1050	1134	1216	974
1200	1283	1366	1124
1350	1435	1517	1274
1500	1586	1669	1424
1650	1736	1782	1574
1800	1887	1933	1724

## C 4000 Palletizer

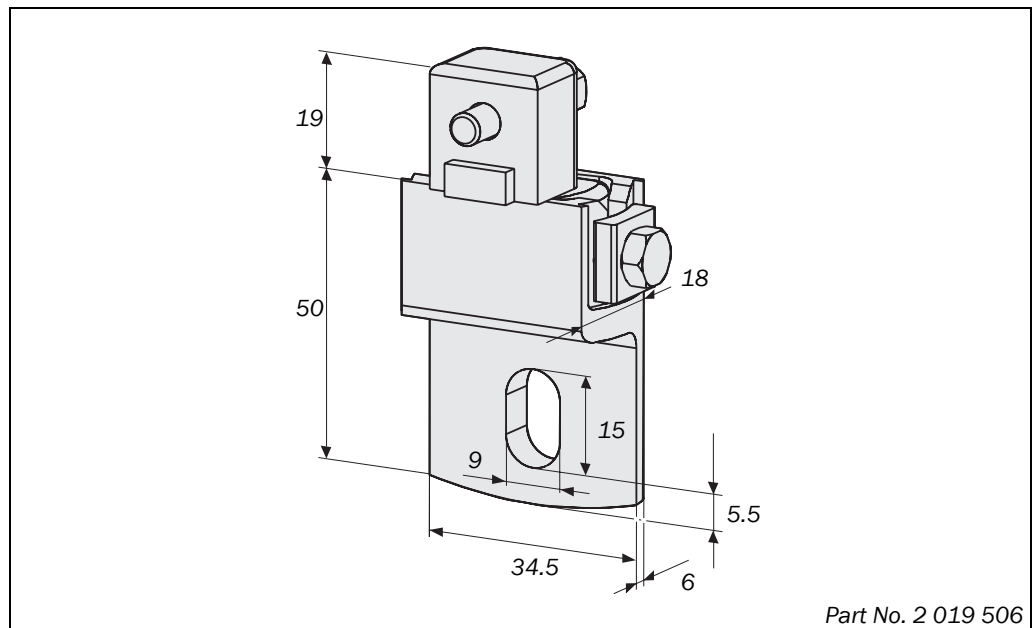
### 11.4.3 Swivel mount bracket

Fig. 27: Dimensional drawing swivel mount bracket (mm)



### 11.4.4 Side bracket

Fig. 28: Dimensional drawing, side bracket (mm)



# 12 Ordering information

## 12.1 Delivery

### C 4000 Palletizer

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 light curtain
- label "Important Information"
- operating instructions
- CDS (Configuration & Diagnostic Software) on CD-ROM

### Deflector mirror

- deflector mirror
- 2 swivel mount brackets

## 12.2 C 4000 Palletizer

Can only be used as a single system, not in combination with other C 4000.

Tab. 20: Part numbers  
C 4000 Palletizer

Protective field length [mm]	Part numbers for resolution	
	30 mm (Advanced)	40 mm (Standard)
750	▶ 1 027 100 (C40S-0703CP010)	▶ 1 027 124 (C40S-0704CP010)
	▶ 1 027 101 (C40E-0703CK010)	▶ 1 027 125 (C40E-0704CP010)
900	▶ 1 027 102 (C40S-0903CP010)	▶ 1 027 126 (C40S-0904CP010)
	▶ 1 027 103 (C40E-0903CK010)	▶ 1 027 127 (C40E-0904CP010)
1050	▶ 1 027 104 (C40S-1003CP010)	▶ 1 027 128 (C40S-1004CP010)
	▶ 1 027 105 (C40E-1003CK010)	▶ 1 027 129 (C40E-1004CP010)
1200	▶ 1 024 106 (C40S-1203CP010)	▶ 1 027 130 (C40S-1204CP010)
	▶ 1 027 107 (C40E-1203CK010)	▶ 1 027 131 (C40E-1204CP010)
1350	▶ 1 027 108 (C40S-1303CP010)	▶ 1 027 132 (C40S-1304CP010)
	▶ 1 027 109 (C40E-1303CK010)	▶ 1 027 133 (C40E-1304CP010)
1500	▶ 1 027 110 (C40S-1503CP010)	▶ 1 027 134 (C40S-1504CP010)
	▶ 1 027 111 (C40E-1503CK010)	▶ 1 024 135 (C40E-1504CP010)
1650	▶ 1 027 112 (C40S-1603CP010)	▶ 1 027 136 (C40S-1604CP010)
	▶ 1 027 113 (C40E-1603CK010)	▶ 1 027 137 (C40E-1604CP010)
1800	▶ 1 027 114 (C40S-1803CP010)	▶ 1 027 138 (C40S-1804CP010)
	▶ 1 027 115 (C40E-1803CK010)	▶ 1 027 139 (C40E-1804CP010)

Other systems on request.

### 12.3 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. 21: Part numbers, additional front screen (weld spark guard)

Protective field length [mm]	Part number
750	2 022 415
900	2 022 416
1050	2 022 417
1200	2 022 418
1350	2 022 419
1500	2 022 420
1650	2 022 421
1800	2 022 422

### 12.4 Accessories

Tab. 22: Part numbers, accessories

Part	Part number
<b>C 4000-system connection</b>	
Hirschmann cable socket M26×11 + FE, crimp contacts, straight	6 020 757
Hirschmann cable socket M26×11 + FE, crimp contacts, angled	6 020 758
Terminal with 182 Ω resistance for pin 9 and 10 on the system connection (cf. page 35)	2 027 227
Connection cable	
Socket straight/stripped, 2.5 m	2 022 544
Socket straight/stripped, 5 m	2 022 545
Socket straight/stripped, 7.5 m	2 022 546
Socket straight/stripped, 10 m	2 022 547
Socket straight/stripped, 15 m	2 022 548
Socket straight/stripped, 20 m	2 022 549
Socket straight/stripped, 30 m	2 022 550

Part	Part number
<b>Other accessories</b>	
Mounting kit 2: Swivel mount, 4 pcs. for any protective field length	2 019 659
Mounting kit 6: Swivel function (side bracket), 4 pcs. for any protective field length. For higher vibration and shock exposure	2 019 506
Reinforced stainless steel bracket, swivel mount, 4 pieces for all protective field lengths (vibration load 5 g/10–55 Hz, impact load 10 g/16 ms)	2 026 850
AR 60 – laser alignment aid (does not require connection to electricity power supply)	1 015 741
AR 60 adapter for C 4000 (2 pieces recommended for the alignment of all axes)	4 032 461
Switching amplifier UE 402: expands the C 4000 with the functions Bypass and Operating mode switching	1 023 577
Connection cable between the serial interface of the PC and the configuration interface	6 021 195
<b>Accessories included in a standard delivery</b>	
Sliding nuts for side bracket, 4 pcs.	2 017 550
CDS (Configuration & Diagnostic Software) on CD-ROM including online documentation and operating instructions in all available languages	2 026 875

# 13 Annex

## 13.1 Declaration of conformity

# SICK

### EC Declaration of conformity

en

Ident-No. : 9096616/0

The undersigned, representing the following manufacturer

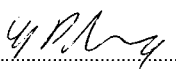
**SICK AG**  
Industrial Safety Systems  
Sebastian-Kneipp-Straße 1  
79183 Waldkirch  
Deutschland

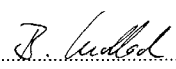
herewith declares that the product

<b>C40 palletizer</b>
-----------------------

is in conformity with the provisions of the following EC directive(s) (including all applicable amendments), and that the standards and/or technical specifications referenced overleaf have been applied.

Waldkirch, 15.08.2005

  
.....  
ppa. Dr. Plasberg  
(Manager Research and Development  
Industrial Safety Systems)

  
.....  
i.V. Knobloch  
(Manager Production  
Industrial Safety Systems)

## 13.2 Manufacturer's checklist

# SICK

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

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

- |   |                              |                             |
|---|------------------------------|-----------------------------|
| 4. 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"/> |
| 5. Are the applied directives and standards listed in the declaration of conformity?  | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 6. Does the protective device comply with the required control category?  | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 7. 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"/> |
| 8. 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"/> |
| 9. Are additional mechanical protective measures fitted and secured against manipulation which prevent climbing over or crawling underneath the ESPE?   | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 10. Has the maximum stopping and/or run-down time of the machine been measured, specified and documented (at the machine and/or in the machine documentation)?  | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 11. Has the ESPE been mounted such that the required safety distance from the nearest hazardous point has been achieved?  | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 12. Are the ESPE devices correctly mounted and secured against manipulation after adjustment?   | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 13. Are the required protective measures against electric shock in effect (protection class)?   | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 14. Is the control switch for resetting the protective device (ESPE) or restarting the machine present and correctly installed?   | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 15. Are the outputs of the ESPE (OSSDs) integrated in compliance with the required control category and does the integration comply with the circuit diagrams?  | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 16. Has the protective function been checked in compliance with the test notes of this documentation?   | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 17. Are the given protective functions effective at every setting of the operating mode selector switch?  | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 18. Are the switching elements activated by the ESPE, e.g. contactors, valves, monitored?   | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 19. Is the ESPE effective over the entire period of the dangerous state?  | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 20. 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"/> |
| 21. Has the information label "Important Information" for the daily check been attached so that it is easily visible for the operator?  | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

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



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