Described product
C4000 Advanced Ex

Manufacturer
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Germany

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Original document
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## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1   About this document</td>
<td>4</td>
</tr>
<tr>
<td>2   Safety information</td>
<td>5</td>
</tr>
<tr>
<td>2.1  Correct use</td>
<td>5</td>
</tr>
<tr>
<td>2.2  General safety notes</td>
<td>6</td>
</tr>
<tr>
<td>3   Mounting</td>
<td>8</td>
</tr>
<tr>
<td>3.1  Safety</td>
<td>8</td>
</tr>
<tr>
<td>3.2  Unpacking</td>
<td>9</td>
</tr>
<tr>
<td>3.3  Installation</td>
<td>9</td>
</tr>
<tr>
<td>3.3.1 Mounting the safety light curtain in the explosion-proof enclosure (only if the safety light curtain is used in North America)</td>
<td>10</td>
</tr>
<tr>
<td>3.3.2 Mounting the optional cable gland</td>
<td>12</td>
</tr>
<tr>
<td>3.3.3 Mounting the handles onto the cover of the explosion-proof enclosure</td>
<td>12</td>
</tr>
<tr>
<td>3.3.4 Mounting the safety light curtain</td>
<td>13</td>
</tr>
<tr>
<td>4   Electrical installation</td>
<td>20</td>
</tr>
<tr>
<td>4.1  Safety</td>
<td>20</td>
</tr>
<tr>
<td>5   Aligning the sender and receiver</td>
<td>22</td>
</tr>
<tr>
<td>6   Maintenance</td>
<td>24</td>
</tr>
<tr>
<td>6.1  Regular cleaning</td>
<td>24</td>
</tr>
<tr>
<td>7   Technical data</td>
<td>26</td>
</tr>
<tr>
<td>7.1  Data sheet</td>
<td>26</td>
</tr>
<tr>
<td>7.2  Table of weights</td>
<td>26</td>
</tr>
<tr>
<td>7.3  Dimensional drawings</td>
<td>27</td>
</tr>
<tr>
<td>8   Ordering information</td>
<td>30</td>
</tr>
<tr>
<td>8.1  Scope of delivery</td>
<td>30</td>
</tr>
<tr>
<td>8.2  Ordering information C4000 Advanced Ex</td>
<td>30</td>
</tr>
<tr>
<td>9   Accessories</td>
<td>31</td>
</tr>
<tr>
<td>9.1  Brackets</td>
<td>31</td>
</tr>
<tr>
<td>9.2  Connectivity</td>
<td>32</td>
</tr>
<tr>
<td>9.3  Alignment aid</td>
<td>32</td>
</tr>
<tr>
<td>10  Annex</td>
<td>34</td>
</tr>
<tr>
<td>10.1 Compliance with EU directives</td>
<td>34</td>
</tr>
<tr>
<td>11  List of figures</td>
<td>35</td>
</tr>
<tr>
<td>12  List of tables</td>
<td>36</td>
</tr>
</tbody>
</table>
About this document

These operating instructions are available to all those who work with the C4000 Advanced Ex safety light curtain.

Please read these operating instructions carefully and make sure that you understand the content fully before working with the C4000 Advanced Ex safety light curtain.

Scope

These operating instructions only apply to the C4000 Advanced Ex safety light curtain with one of the following type label entries in the Operating Instructions field:

- 8017105
- 8017105/YIZ2
- 8017105/YSV5

These operating instructions are only valid in conjunction with the underlying operating instructions "C4000 Standard/Advanced Safety Light Curtain" (SICK part number 8009855, change index WA65 or newer).

Unless otherwise specified in this document, the information in the underlying operating instructions will apply with reference to the C4000 Advanced safety light curtain without an extension connection and with the respective protective field height and resolution.

This document is included with the following SICK part numbers (this document in all available language versions):

8017105/YSV5
2 Safety information

In addition to the information in the underlying operating instructions for the C4000 Advanced safety light curtain, please observe the following points when using the C4000 Advanced Ex safety light curtain.

2.1 Correct use

The C4000 Advanced Ex safety light curtain is an electro-sensitive protective device (ESPE) and is suitable for the following applications:

- Hazardous point protection
- Access protection
- Hazardous area protection

The C4000 Advanced Ex safety light curtain is suitable for use in enclosed spaces only. It has UL/cUL certification for the following hazardous areas defined in the National Electrical Code® and Canadian Electrical Code®:

- Class I, Groups C, D
- Class II, Groups E, F, G
- Class III

The C4000 Advanced Ex safety light curtain also complies with these standards:


- II 2 G Ex db IIB T6
- II 2 D Ex tb IIIC T56 °C Db IP6X
- Ex db IIB T6
- Ex tb IIIC T56 °C Db IP6X

DEMKO 14 ATEX 1315X
IECEx UL 14.0034X

The C4000 Advanced Ex safety light curtain does not emit any paint wetting impairment substances or volatile silicones and does not expel any fixed parts or materials into the surrounding area.

Foreseeable misuse

The C4000 Advanced Ex safety light curtain is not suitable for the following applications:

- Outdoors
- Under water
- In areas where there may be flying sparks
2.2 General safety notes

DANGER
Hazard due to lack of effectiveness of the protective device
In the case of non-compliance, it is possible that the dangerous state of the machine may not be stopped or not stopped in a timely manner.

- Read this document carefully and ensure that you have fully understood the contents before you work with the device.
- Pay particular attention to all safety notes in this document.
WARNING

Risk of ineffectiveness of the protective device

Please observe the following information to ensure that you are using the C4000 Advanced Ex safety light curtain safely and correctly.

- National and international regulations and guidelines must be observed when mounting, using, and commissioning electrical devices as well as when carrying out regular technical inspections in explosion-hazardous areas. Article 500 of the National Electrical Code and ATEX Directive 2014/34/EU shall apply in particular. Manufacturers and operators of machines using safety light curtains are responsible for ensuring that all applicable safety regulations and guidelines are complied with.

- These operating instructions must be made available to the operator of the machine on which the safety light curtain is used. Qualified safety personnel must instruct the operator in how to use the device. The operator must also be directed to read and follow the operating instructions.

NOTE

For more information about the following explosion-proof joints, contact SICK:

- Joint between glass and cover
- Joint between cover and explosion-proof enclosure
3 MOUNTING

3 Mounting

This chapter contains instructions on how to mount the safety light curtain.

An optional alignment bracket is also available with extended adjustment possibilities, see "Accessories", page 31.

NOTE
Mount the safety light curtain in the following order.

3.1 Safety

In addition to the information in the underlying operating instructions, please observe the following points when mounting the safety light curtain.

DANGER
Risk of ignition or explosion
▶ Disconnect the power supply before starting to mount the explosion-proof enclosure to avoid igniting hazardous atmospheres.
▶ Do not reconnect the power supply until you have completed the mounting process.

DANGER
Risk of ignition
Failure to observe this information could result in a risk of ignition.

▶ If the safety light curtain is used in an environment classified as tb IIIC, tc IIIB or tc IIIC the cover must not be removed, not even temporarily (e.g. for maintenance purposes).

DANGER
Risk of ignition or explosion
▶ If you have to remove the cover when working on the safety light curtain, make sure that the joints and o-ring are clean and undamaged before refitting the cover.

DANGER
Risk of ignition or explosion
▶ The safety light curtain must be mounted so that there is a gap of more than 30 mm between all other objects and the flange joints between the housing and the cover.

DANGER
Dangerous state of the machine
▶ Make sure that the dangerous state of the machine is (and remains) switched off during mounting, electrical installation, and commissioning.
▶ Make sure that the outputs of the safety light curtain have no effect on the machine during mounting, electrical installation, and commissioning.
3.2 Unpacking

- Check the components for completeness and the integrity of all parts, see "Scope of delivery", page 30.
- Please contact your respective SICK subsidiary should you have any complaints.

3.3 Installation

- **DANGER**
  Risk of ignition or explosion
  - Disconnect the power supply before starting to mount the explosion-proof enclosure to avoid igniting hazardous atmospheres.
  - Do not reconnect the power supply until you have completed the mounting process.

- **DANGER**
  Risk of ignition
  Failure to observe this information could result in a risk of ignition.
  - If the safety light curtain is used in an environment classified as tb IIIC, tc IIIB or tc IIC the cover must not be removed, not even temporarily (e.g. for maintenance purposes).

- **DANGER**
  Risk of ignition or explosion
  - If you have to remove the cover when working on the safety light curtain, make sure that the joints and o-ring are clean and undamaged before refitting the cover.

The mounting process is comprised of either three or four stages:

1. If you have purchased the safety light curtain in pre-mounted condition, please skip this step.
First mount the C4000 Advanced safety light curtain in the explosion-proof enclosure using the two swivel mount brackets supplied and the mounting bracket supplied. Recommended tool: curved box wrench.

2. Install the cable glands if necessary.
3. Secure the handles supplied onto the enclosure cover.
4. Mount the safety light curtain in the explosion-proof enclosure onto the machine. The explosion-proof enclosure can either be attached directly or using the alignment bracket (available as an accessory, see "Accessories", page 31).

**NOTE**
- Read this section completely before mounting the safety light curtain.
- Read the section "Aligning the sender and receiver", page 22.

### 3.3.1 Mount the safety light curtain in the explosion-proof enclosure (only if the safety light curtain is used in North America)

**NOTE**
Skip this chapter if you have received the safety light curtain in pre-mounted condition.

**DANGER**
Risk of ignition or explosion
- Use fixing screws with a yield point of at least 640 MPa to attach the cover to the explosion-proof enclosure.

**NOTE**
Only safety light curtains with a resolution of 30 mm are suitable for mounting in the explosion-proof enclosure.

1. Unscrew the fixing screws on the cover and remove the cover from the explosion-proof enclosure.
2. Attach the swivel mount brackets to the upper and lower end caps on the safety light curtain.
3. Mount the mounting bracket onto the riser using the fixing screws supplied. Align the mounting bracket with the two locating pins. Tighten the fixing screws with a torque of 5 to 5.5 Nm.
4. Secure the mounting bracket about halfway along the safety light curtain using the two sliding nuts so that the riser is behind the safety light curtain. Insert and hand-tighten the screws on the sliding nuts.
5. Position the safety light curtain in the explosion-proof enclosure so that the connecting cable is at the same end of the explosion-proof enclosure as the 3/4" NPT opening.
6. Using the fixing screws supplied, attach the swivel mount brackets and riser to the mounting holes provided in the explosion-proof enclosure.
7. Tighten the fixing screws on the swivel mount brackets with a torque of 2.5 to 3 Nm. Too high a torque could damage the swivel mount brackets while too low a torque does not provide sufficient protection against vibration.
Figure 1: Mounting the safety light curtain in the explosion-proof enclosure

Figure 2: Aligning the safety light curtain in the explosion-proof enclosure

1. Measure the distance from the end of the cover to the first rib.
2. Detailed view
8. Align the safety light curtain in the explosion-proof enclosure so that it meets the following criteria:
   - Each rib in the window on the cover must cover no more than one optical lens.
   - Depending on the protective field height, the first rib on the side of the connection must cover the following optical lenses:

<table>
<thead>
<tr>
<th>Protective field height</th>
<th>Optical lenses covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 mm</td>
<td>Sixth optical lens</td>
</tr>
<tr>
<td>900 mm</td>
<td>Second optical lens</td>
</tr>
<tr>
<td>1,200 mm</td>
<td>Second optical lens</td>
</tr>
</tbody>
</table>

9. Tighten the screws used to secure the mounting bracket to the explosion-proof enclosure with a torque of 12 to 13 Nm.
10. Tighten the screws used to secure the mounting bracket to the safety light curtain with a torque of 5 to 5.5 Nm.
11. Tighten the screws used to secure the safety light curtain in the swivel mount brackets with a torque of 2.5 to 3 Nm.
12. Guide the connecting cable through the 3/4" NPT opening. Make sure that the thread for the 3/4" NPT opening is not damaged.
13. If a cable gland is required, follow the instructions to mount the gland, see "Mounting the optional cable gland", page 12.
14. Fit the cover to the explosion-proof enclosure using the supplied fixing screws and washers. Tighten the fixing screws with a torque of 11.5 to 14.5 Nm.

**NOTE**
The washers must be used to obtain enclosure rating IP 66.

### 3.3.2 Mounting the optional cable gland

Depending on national regulations and requirements, a cable gland may have to be installed. The cable gland is available as an accessory.

1. Guide the cable through the cable gland.
2. Screw the cable gland into the 3/4" NPT opening on the explosion-proof enclosure.
3. Pull the collar on the cable gland so that the cable is securely attached.

**DANGER**
Risk of ignition or explosion

- Check the 3/4" NPT opening for damage to the thread.
- Do not use the device if the thread of the 3/4" NPT opening is damaged.

### 3.3.3 Mounting the handles onto the cover of the explosion-proof enclosure

1. Use the supplied M6 screws to secure the two handles onto the cover of the explosion-proof enclosure.
2. Tighten the screws with a torque of 4.5 to 5 Nm.
3.3.4 Mounting the safety light curtain

General notes

- Find a place to mount the safety light curtain that is stable enough to hold its weight.
- Mount the sender and receiver on a level surface.
- Mount the sender and receiver at the same height.
- The end with the connecting cable must point in the same direction for both devices.
Sender and receiver must not be installed at 180° rotated relative to each other.
Make sure that the sender and receiver are aligned correctly. The optical lens systems of the sender and the receiver must be located opposite one another.
If necessary, use a water level to check that the components are parallel.
The alignment bracket makes it possible to rotate the sender and receiver around the axis of the device and to align them accurately, see "Aligning the sender and receiver", page 22.

Mounting the safety light curtain without the alignment bracket

Use wrench size 13 mm.

1. Using 6 to 8 revolutions, screw in the two M8 screws for mounting the lower end of the explosion-proof enclosure. Make sure you leave enough space between the screws and the mounting surface for the lower end of the explosion-proof enclosure.
2. Position the explosion-proof enclosure on the two screws so that the mounting holes are directly over the partly-tightened screws.

3. Fix the upper end of the explosion-proof enclosure to the mounting surface using two M8 screws.
4. Tighten the two lower M8 screws.
Mounting the safety light curtain using the alignment brackets

Figure 9: Mounting the safety light curtain using the alignment brackets

Figure 10: Assembling the alignment brackets

Scope of delivery

- 4 x
- 4 x

Part no. 2072525

- 2 x
- 4 x

Required tools

WS 13 mm
1. Mount the lower alignment bracket so that the threaded hole faces up and the head of the lock screw faces down.

2. Rotate the alignment bracket as far to one side as possible. Secure the alignment bracket on the open side by screwing the first M8 screw into the through hole.

3. Rotate the lower alignment bracket to the other side. Secure the alignment bracket using the second M8 screw.

4. Mount the upper alignment bracket so that the threaded hole faces down and the head of the lock screw faces up.

5. Rotate the upper alignment bracket as far to one side as possible. Secure the alignment bracket on the open side by screwing the first M8 screw into the through hole.

6. Rotate the upper alignment bracket to the other side. Secure the alignment bracket using the second M8 screw.

7. Using 6 to 8 revolutions, screw the two M8 screws for mounting the lower end of the explosion-proof enclosure into the lower alignment bracket. Make sure you leave enough space between the screws and the alignment bracket for the lower end of the explosion-proof enclosure.

8. Position the explosion-proof enclosure on the two screws so that the mounting holes are directly over the partly-tightened screws.
9. Fix the upper end of the explosion-proof enclosure to the upper alignment bracket using two M8 screws.

10. Tighten the two lower screws.

11. Turn the safety light curtains so that they face one another and so that the receiver receives the strongest signal possible.
12. Tighten the locking screws on all alignment brackets with a torque of 28 to 28.5 Nm in order to secure the safety light curtain in this position.
4 Electrical installation

4.1 Safety

In addition to the information in the underlying operating instructions, please observe the following points when installing the electrics for the safety light curtain.

**DANGER**

Ignition Hazard

Failure to observe this information could result in a risk of ignition

- Always switch the power supply off before disconnecting a connecting cable from the device.
- Ensure that all electrical connections to the device or the connections are protected.
- The IP enclosure rating for the connections and therefore for the device is only guaranteed if the connections are protected. Otherwise foreign objects can get into the terminal compartment. This can cause an explosion the next time the device is switched on.
- It is absolutely essential that you take technical measures to guarantee the IP enclosure rating for the connecting cables.

**DANGER**

Risk of ignition

Failure to observe this information could result in a risk of ignition.

- If the safety light curtain is used in an environment classified as tb IIIC, tc IIIB or tc IIIC the cover must not be removed, not even temporarily (e.g. for maintenance purposes).

**DANGER**

Risk of ignition or explosion

- If you have to remove the cover when working on the safety light curtain, make sure that the joints and o-ring are clean and undamaged before refitting the cover.

**DANGER**

Risk of ignition or explosion

- Disconnect the power supply before opening the explosion-proof enclosure to avoid igniting hazardous atmospheres.
- Do not reconnect the power supply until you have completed the electrical installation.
DANGER
Risk of ignition or explosion

- Each connection to the protection earth (PE) on the explosion-proof enclosure must use at least one wire with a cross-section meeting the requirements of the table below.

<table>
<thead>
<tr>
<th>Wire cross-section of outer cable S</th>
<th>Minimum wire cross-section of the corresponding protection earth wire $S_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S \leq 16 \text{ mm}^2$</td>
<td>$S$</td>
</tr>
<tr>
<td>$16 \text{ mm}^2 &lt; S \leq 35 \text{ mm}^2$</td>
<td>$16 \text{ mm}^2$</td>
</tr>
<tr>
<td>$S &gt; 35 \text{ mm}^2$</td>
<td>$0.5 \ S$</td>
</tr>
</tbody>
</table>

*Table 1: Minimum wire cross-section for protection earth (PE)*
Aligning the sender and receiver

After mounting and electrical installation, the sender and receiver must be aligned with each other.

![DANGER]

Dangerous state of the machine

- Make sure that the outputs of the safety light curtain have no effect on the machine during the alignment process.

![NOTE]

Use the optional alignment bracket if the alignment cannot be adjusted when mounting the safety light curtain directly.

Aligning using the alignment bracket

The alignment bracket can be used to adjust the safety light curtain as follows:

- Rotate (± 45°)

![Figure 16: Rotating with the alignment bracket](image)

Aligning the sender and receiver with one another

How to align the sender and receiver using the alignment bracket:

- Pay attention to the mounting heights of the sender and receiver. Both devices must be mounted at the same height.
- Provide a rectangular protective field. The sender and receiver must be mounted parallel to one another.
- Switch on the power supply to the safety light curtain.
- Rotate the sender to align the sender to the receiver.
- Rotate the receiver to align the receiver to the sender.
Follow the alignment instructions in the underlying operating instructions.

Once the sender and receiver are aligned correctly, secure the components in the alignment brackets with a torque of 28 to 28.5 Nm.

Switch the power supply off and then on again.

Check the alignment quality display as described in the underlying operating instructions to make sure that components are still correctly aligned with one another.
6 Maintenance

DANGER
Risk of ignition or explosion
► Disconnect the power supply before carrying out any maintenance work to avoid igniting hazardous atmospheres.
► Do not reconnect the power supply until you have completed the maintenance work.

DANGER
Risk of ignition
Failure to observe this information could result in a risk of ignition.
► If the safety light curtain is used in an environment classified as tb IIIc, tc IIIb or tc IIIc the cover must not be removed, not even temporarily (e.g. for maintenance purposes).

DANGER
Risk of ignition or explosion
► If you have to remove the cover when working on the safety light curtain, make sure that the joints and o-ring are clean and undamaged before refitting the cover.

DANGER
Risk of ignition or explosion
► Use fixing screws with a yield point of at least 640 MPa to attach the cover to the explosion-proof enclosure.

The safety light curtain is maintenance-free. Depending on the ambient conditions, regular cleaning is required.

6.1 Regular cleaning

DANGER
Risk of ignition or explosion
Static discharge could cause explosions in hazardous atmospheres.
► Always use anti-static cleaning agents to prevent static charge.
► Do not clean the device using a dry cloth.

NOTICE
► Do not use aggressive cleaning agents.
► Do not use abrasive cleaning agents.
► Do not use any oil-based cleaning agents.
► We recommend anti-static cleaning agents.

Clean the front screen.
1. Use a clean, soft brush to remove dust from the front screen.
2. Then wipe the front screen with a clean, damp cloth.
3. Check the position of the sender and receiver after cleaning.
4. Check the effectiveness of the protective device. You will find information on how to check the effectiveness in the underlying operating instructions.
7 Technical data

7.1 Data sheet

NOTE
The following table only contains details on the safety light curtain that are not included in the underlying operating instructions.

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective field height, depending on type</td>
<td>600, 900, and 1,200 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution (detection capability)</td>
<td>30 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protective field range</td>
<td>0 m ... 16 m 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enclosure rating (EN 60529)</td>
<td>IP 66 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment group/category II</td>
<td>II 2 G Ex d IIB T6 Gb</td>
<td>II 2 D Ex tb IIIC T56 °C Db</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Depending on the protective field height see “Table of weights”, page 26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: General system data

1) If you are using the full protective field range, check to see if the orange LED lights up (cleaning or alignment necessary). The system still has a reserve of 30 %.
2) In order to achieve enclosure rating IP 66, washers must be used for the fixing screws on the enclosure cover.

7.2 Table of weights

<table>
<thead>
<tr>
<th>Protective field height [mm]</th>
<th>Weight [kg] 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sender</td>
</tr>
<tr>
<td>600</td>
<td>28.51</td>
</tr>
<tr>
<td>900</td>
<td>36.54</td>
</tr>
<tr>
<td>1200</td>
<td>44.55</td>
</tr>
</tbody>
</table>

Table 3: Weight of sender and receiver

1) Tolerance: ± 50 g.
### 7.3 Dimensional drawings

![Dimensional drawing, sender and receiver, protective field height 600 mm](image)

*Figure 17: Dimensional drawing, sender and receiver, protective field height 600 mm*
Figure 18: Dimensional drawing, sender and receiver, protective field height 900 mm
Figure 19: Dimensional drawing, sender and receiver, protective field height 1,200 mm
8 Ordering information

8.1 Scope of delivery

Items supplied, sender
- C4000 Advanced sender without extension connection
- Explosion-proof enclosure
- 2 swivel mount brackets
- 2 handles
- 30 m system connection cables, open end

Items supplied, receiver
- C4000 Advanced receiver without extension connection
- Explosion-proof enclosure
- 2 swivel mount brackets
- 2 handles
- 30 m system connection cables, open end
- Test rod with diameter corresponding to the physical resolution of the safety light curtain
- Label "Notes for ATEX II 2G/2D"
- Label "Important Information"
- Information label "Notes for the machine operator"
- Operating instructions on CD-ROM
- CDS (Configuration & Diagnostic Software) on CD-ROM

8.2 Ordering information C4000 Advanced Ex

<table>
<thead>
<tr>
<th>Protective field height [mm]</th>
<th>Sender</th>
<th>Receiver</th>
<th>Sender and receiver</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Part number</td>
<td>Type code</td>
<td>Part number</td>
</tr>
<tr>
<td>600</td>
<td>1068398</td>
<td>EXS-06C6203B020</td>
<td>1068397</td>
</tr>
<tr>
<td>900</td>
<td>1068401</td>
<td>EXS-09C6403B020</td>
<td>1068400</td>
</tr>
<tr>
<td>1200</td>
<td>1068404</td>
<td>EXS-12C6603B020</td>
<td>1068403</td>
</tr>
</tbody>
</table>

Table 4: Ordering information C4000 Advanced Ex
9 Accessories

9.1 Brackets

<table>
<thead>
<tr>
<th>Part</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 swivel mount brackets, 2 risers, 1 mounting bracket with riser (included with delivery)</td>
<td>2074626</td>
</tr>
<tr>
<td>2 alignment brackets for the explosion-proof enclosure</td>
<td>2072525</td>
</tr>
</tbody>
</table>

Swivel mount bracket with mounting bracket and risers

![Swivel mount bracket with mounting bracket and risers](image)

Figure 20: Dimensional drawing, swivel mount bracket with riser (2074626)

![Swivel mount bracket with mounting bracket and risers](image)

Figure 21: Dimensional drawing, mounting bracket with riser (2074626)
### 9.2 Connectivity

#### Part | Part number
---|---
Connecting cable\(^1\) M26, 12-pin (0.75 mm\(^2\)) |  
DOL-0612G2M5075KM0, female connector, straight with 2.5 m cable, open end | 2022544  
DOL-0612G05M075KM0, female connector, straight with 5 m cable, open end | 2022545  
DOL-0612G7M5075KM0, female connector, straight with 7.5 m cable, open end | 2022546  
DOL-0612G10M075KM0, female connector, straight with 10 m cable, open end | 2022547  
DOL-0612G15M075KM0, female connector, straight with 15 m cable, open end | 2022548  
DOL-0612G20M075KM0, female connector, straight with 20 m cable, open end | 2022549  
DOL-0612G30M075KM0, female connector, straight with 30 m cable, open end | 2022550  
DOL-0612G50MD75KM0, female connector, straight with 50 m cable, open end | 2033548  
Cable (ready to assemble) |  
Per meter, max. 100 m, 12-wire (0.75 mm\(^2\)) | 6021437  
Cable gland |  
Cable gland for the European market | 5329002  
Power supplies |  
Output 24 V DC, 50 W (2.1 A), power supply NEC Class 2, SELV, PELV, input 120–240 V AC (PS50WE24V) | 7028789  
Output 24 V DC, 95 W (3.9 A), power supply NEC Class 2, SELV, PELV, input 100–120/220–240 V AC (PS95WE24V) | 7028790

\(^1\) Ambient operating temperature: Down to -30°C with fixed installation.

### 9.3 Alignment aid

#### Part | Part number
---|---
Laser alignment aid AR60 | 1015741
<table>
<thead>
<tr>
<th>Part</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapter</td>
<td>2074849</td>
</tr>
</tbody>
</table>
10 Annex

10.1 Compliance with EU directives

EU declaration of conformity (excerpt)

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

Complete EU declaration of conformity for download

You can call up the EU declaration of conformity and the current operating instructions for the protective device by entering the part number in the search field at www.sick.com (part number: see the type label entry in the “Ident. no.” field).
11 List of figures

1. Mounting the safety light curtain in the explosion-proof enclosure........................11
2. Aligning the safety light curtain in the explosion-proof enclosure........................11
3. Mounting the two handles......................................................................................... 13
4. The sender and receiver are mounted incorrectly....................................................13
5. Mounting the safety light curtain without the alignment bracket........................... 14
6. Mounting the safety light curtain without the alignment bracket: Step 1.............. 14
7. Mounting the safety light curtain without the alignment bracket: Step 2.............. 15
8. Mounting the safety light curtain without the alignment bracket: Steps 3 and 4..15
9. Mounting the safety light curtain using the alignment brackets.............................16
10. Assembling the alignment brackets.......................................................................... 16
11. Mounting the safety light curtain using the alignment brackets: Steps 1 to 6..... 17
12. Mounting the safety light curtain using the alignment brackets: Step 7.............. 17
13. Mounting the safety light curtain using the alignment brackets: Step 8.............. 18
14. Mounting the safety light curtain using the alignment brackets: Steps 9 and 10.18
15. Mounting the safety light curtain using the alignment brackets: Steps 11 and 12
    ......................................................................................................................... 19
16. Rotating with the alignment bracket.........................................................................22
17. Dimensional drawing, sender and receiver, protective field height 600 mm...........27
18. Dimensional drawing, sender and receiver, protective field height 900 mm............28
19. Dimensional drawing, sender and receiver, protective field height 1,200 mm......29
20. Dimensional drawing, swivel mount bracket with riser (2074626).......................31
21. Dimensional drawing, mounting bracket with riser (2074626)...............................31
22. Dimensional drawing, alignment bracket (2072525).............................................32
## List of tables

1. Minimum wire cross-section for protection earth (PE) ............................................. 21  
2. General system data .................................................................................................. 26  
3. Weight of sender and receiver .................................................................................. 26  
4. Ordering information C4000 Advanced Ex ............................................................... 30