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**Described product**

Lector61x

**Manufacturer**

SICK AG  
Erwin-Sick-Str. 1  
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Germany

**Legal information**

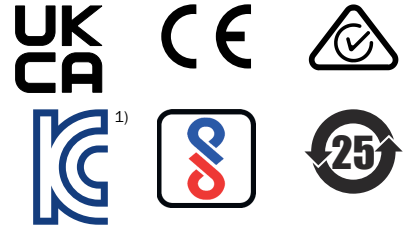
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**Original document**

This document is an original document of SICK AG.



<sup>1)</sup> The KC certification is type-dependent.

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# 1 About this document

## 1.1 Information on the operating instructions

These operating instructions provide important information on how to use devices from SICK AG.

Prerequisites for safe work are:

- Compliance with all safety notes and handling instructions supplied.
- Compliance with local work safety regulations and general safety regulations for device applications

The operating instructions are intended to be used by qualified personnel and electrical specialists.



### NOTE

Read these operating instructions carefully to familiarize yourself with the device and its functions before commencing any work.

The operating instructions are an integral part of the product. Store the instructions in the immediate vicinity of the device so they remain accessible to staff at all times. Should the device be passed on to a third party, these operating instructions should be handed over with it.

These operating instructions do not provide information on the handling and safe operation of the machine or system in which the device is integrated. Information on this can be found in the operating instructions for the machine or system.

## 1.2 Explanation of symbols

Warnings and important information in this document are labeled with symbols. Signal words introduce the instructions and indicate the extent of the hazard. To avoid accidents, damage, and personal injury, always comply with the instructions and act carefully.



### DANGER

... indicates a situation of imminent danger, which will lead to a fatality or serious injuries if not prevented.



### WARNING

... indicates a potentially dangerous situation, which may lead to a fatality or serious injuries if not prevented.



### CAUTION

... indicates a potentially dangerous situation, which may lead to minor/slight injuries if not prevented.



### NOTICE

... indicates a potentially harmful situation, which may lead to material damage if not prevented.



### NOTE

... highlights useful tips and recommendations as well as information for efficient and trouble-free operation.

### 1.3 Further information

More information can be found on the product page.

The product page can be accessed via the **SICK Product ID: [pid.sick.com/{P/N}/{S/N}](https://pid.sick.com/{P/N}/{S/N})**

**{P/N}** corresponds to the part number of the product, see type label.

**{S/N}** corresponds to the serial number of the product, see type label (if indicated).

**The following information is available depending on the product:**

- Data sheets
- This document in all available language versions
- CAD files and dimensional drawings
- Certificates (e.g., declaration of conformity)
- Other publications
- Software
- Accessories

## 2 Safety information

### 2.1 Intended use

The Lector61x image-based code reader is suited for automatic, stationary identification and decoding of codes on moving or stationary objects. The product reads 1D codes and 2D codes. In read mode, the product transmits the read results via a host interface to a higher-level computer (e.g. PLC) for further centralized processing.

The product is suitable for industrial and logistics applications that require stable and fast reading of codes. The product meets the applicable requirements for industrial robustness, interfaces and data processing.

SICK AG assumes no liability for losses or damage arising from the use of the product, either directly or indirectly. This applies in particular to use of the product that does not conform to its intended purpose and is not described in this documentation.

### 2.2 Improper use

Any use outside of the stated areas, in particular use outside of the technical specifications and the requirements for intended use, will be deemed to be incorrect use.

- The device does not constitute a safety component in accordance with the respective applicable safety standards for machines.
- The device must not be used in explosion-hazardous areas, in corrosive environments or under extreme environmental conditions.
- The device must not be operated in the temperature range below 0 °C.
- Any use of accessories not specifically approved by SICK AG is at your own risk.



#### **WARNING**

#### **Danger due to improper use!**

Any improper use can result in dangerous situations.

Therefore, observe the following information:

- Product should be used only in accordance with its intended use.
- All information in the documentation must be strictly observed.
- Shut down the product immediately in case of damage.

### 2.3 Cybersecurity

#### **Overview**

To protect against cybersecurity threats, the operator must have a comprehensive cybersecurity concept, which must be continuously monitored and maintained. A suitable concept consists of organizational, technical, procedural, electronic, and physical levels of defense and considers suitable measures for different types of risks. The measures implemented in this product can only support protection against cybersecurity threats if the product is used as part of such a concept.

You will find further information at [www.sick.com/psirt](http://www.sick.com/psirt), e.g.:

- General information on cybersecurity
- Contact option for reporting vulnerabilities
- Information on known vulnerabilities (security advisories)

### 2.4 Limitation of liability

Relevant standards and regulations, the latest technological developments, and our many years of knowledge and experience have all been taken into account when compiling the data and information contained in these operating instructions. The manufacturer accepts no liability for damage caused by:

- Non-adherence to the product documentation (e.g., operating instructions)
- Incorrect use
- Use of untrained staff
- Unauthorized conversions or repair
- Technical modifications
- Use of unauthorized spare parts, consumables, and accessories

### 2.5 Modifications and conversions



#### NOTICE

Modifications and conversions to the device may result in unforeseeable dangers.

Interrupting or modifying the device or SICK software will invalidate any warranty claims against SICK AG. This applies in particular to opening the housing, even as part of mounting and electrical installation.

### 2.6 Requirements for skilled persons and operating personnel



#### WARNING

**Risk of injury due to insufficient training.**

Improper handling of the device may result in considerable personal injury and material damage.

- All work must only ever be carried out by the stipulated persons.

The following qualifications are required for various activities:

*Table 1: Activities and technical requirements*

Activities	Qualification
Mounting, maintenance	<ul style="list-style-type: none"> <li>■ Basic practical technical training</li> <li>■ Knowledge of the current safety regulations in the workplace</li> </ul>
Electrical installation, device replacement	<ul style="list-style-type: none"> <li>■ Practical electrical training</li> <li>■ Knowledge of current electrical safety regulations</li> <li>■ Knowledge of the operation and control of the devices in their particular application</li> </ul>
Commissioning, configuration	<ul style="list-style-type: none"> <li>■ Basic knowledge of the computer operating system used</li> <li>■ Basic knowledge of the design and setup of the described connections and interfaces</li> <li>■ Basic knowledge of data transmission</li> <li>■ Basic knowledge of 1D technology (bar code) or 2D technology (matrix code)</li> </ul>
Operation of the device for the particular application	<ul style="list-style-type: none"> <li>■ Knowledge of the operation and control of the devices in their particular application</li> <li>■ Knowledge of the software and hardware environment for the particular application</li> </ul>



## 2.7 Operational safety and specific hazards

Please observe the safety notes and the warnings listed here and in other sections of this product documentation to reduce the possibility of risks to health and avoid dangerous situations.

Danger due to visible radiation is product-specific. See the technical data for more information.

The product is fitted with LEDs in risk group 0. The accessible radiation from these LEDs does not pose a danger to the eyes or skin.



### CAUTION

#### Optical radiation: LED risk group 1, visible radiation, 400 nm to 780 nm

The LEDs may pose a danger to the eyes in the event of incorrect use.

- Do not look into the light source intentionally.
- Do not open the housing. Opening the housing will not switch off the light source. Opening the housing may increase the level of risk.
- Comply with the current national regulations on photobiological security of lamps and lamp systems.

If the product is operated in conjunction with external illumination units, the risks described here may be exceeded. This must be taken into consideration by users on a case-by-case basis.



### CAUTION

#### Optical radiation: Class 1 Laser Product

The accessible radiation does not pose a danger when viewed directly for up to 100 seconds. It may pose a danger to the eyes and skin in the event of incorrect use.

- Do not open the housing. Opening the housing may increase the level of risk.
- Current national regulations regarding laser protection must be observed.

Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

#### For both radiation types:

It is not possible to entirely rule out temporary disorienting optical effects, particularly in conditions of dim lighting. Disorienting optical effects may come in the form of dazzle, flash blindness, afterimages, photosensitive epilepsy, or impairment of color vision, for example.



### CAUTION

#### Risk of injury due to hot device surface!

The surface of the product can become hot.

- Before performing work on the product (e.g. mounting, cleaning, disassembly), switch off the product and allow it to cool down.
- Ensure good dissipation of excess heat from the product to the surroundings.



### **WARNING**

#### **Electrical voltage!**

Electrical voltage can cause severe injury or death.

- Work on electrical systems must only be performed by qualified electricians.
  - The power supply must be disconnected when attaching and detaching electrical connections.
  - The product must only be connected to a voltage supply as set out in the requirements in the operating instructions.
  - National and regional regulations must be complied with.
  - Safety requirements relating to work on electrical systems must be complied with.
- 



### **WARNING**

#### **Risk of injury and damage caused by potential equalization currents!**

Improper grounding can lead to dangerous equipotential bonding currents, which may in turn lead to dangerous voltages on metallic surfaces, such as the housing. Electrical voltage can cause severe injury or death.

- Work on electrical systems must only be performed by qualified electricians.
  - Follow the notes in the operating instructions.
  - Install the grounding for the product and the system in accordance with national and regional regulations.
-

### 3 Product description

#### 3.1 Scope of delivery

##### Scope of delivery

No. of units	Component	Note
1	Product in the type ordered	The Ethernet connection is sealed with a tightly-fastened protective cap. Without bracket
1	Protective cap	To seal off the Ethernet connection if the interface is not being used. The device complies with protection class IP54 when the protective cap is screwed in.
1	Focus adjustment tool	Only available for the V2D61xx-xMxxxx product type For manual focus adjustment
1	Printed safety notes, multilingual	Brief information and general safety notes

The actual scope of delivery may differ for special designs, additional orders or due to the latest technical changes.

#### 3.2 Product ID

##### 3.2.1 Type label

The type label contains information for identifying the product.

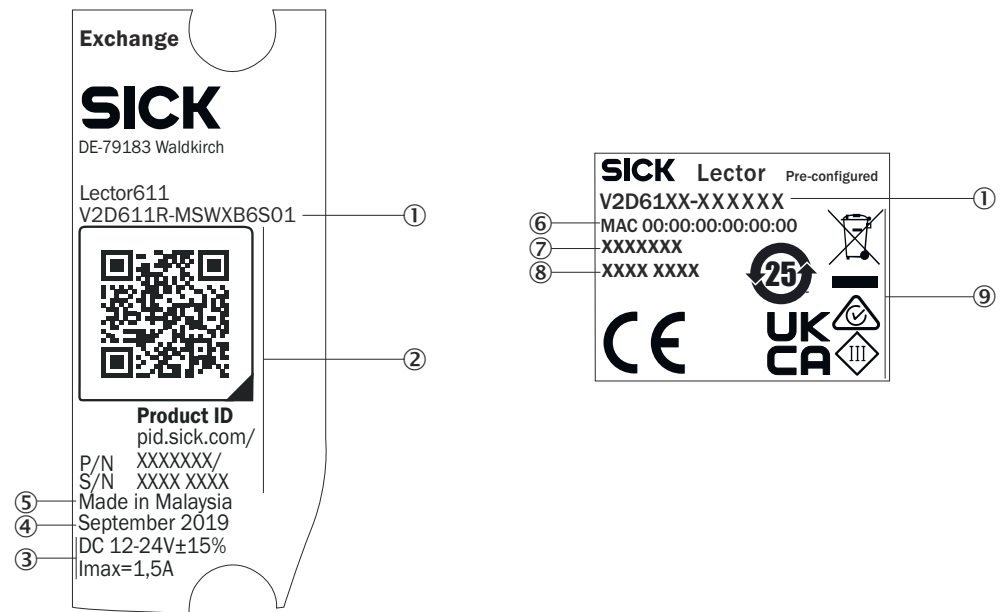


Figure 1: Lector61x type label (example)

- ① Type designation according to type code
- ② Product ID
- ③ Supply voltage and maximum power consumption
- ④ Date of manufacture
- ⑤ Production location
- ⑥ MAC address (placeholder)
- ⑦ Part number (placeholder)
- ⑧ Serial number (placeholder)
- ⑨ Conformity mark and certification mark

#### 3.2.2 Type code

##### Type code structure

V2D a b c d – e f g h i k

Placeholder	Description	Characteristic
a	Product family	6: V2D6xx
b	Platform, housing	1: Standard line
c	Resolution of the image sensor	0: 0.3 Mpx (640 px x 480 px) 1: 1.2 Mpx
d	Function	R: Read D: Reading with DPM
e	Generation	"empty": 1. Generation
f	Image sensor type, color	M: Monochrome (black-and-white)
g	Optical focus method	M: Manual focus L: Liquid lens
h	Integrated illumination unit, LED alignment aid	S: Integrated illumination unit (visible amber light, visible blue light), LED alignment aid (visible red light), ToF (Time of Flight, invisible infra-red light)
i	Focal length, aperture	B: 6 mm C: 12 mm

Placeholder	Description	Characteristic
j	Data interface	E: Ethernet with 0.25 m cable (female connector, M12, 4-pin, D-coded), RS232C and CAN with 0.35 m cable (male connector, M12, 17-pin, A-coded)
k	IP protection class	4: IP54 5: IP65

### 3.3 Product overview

#### Product overview

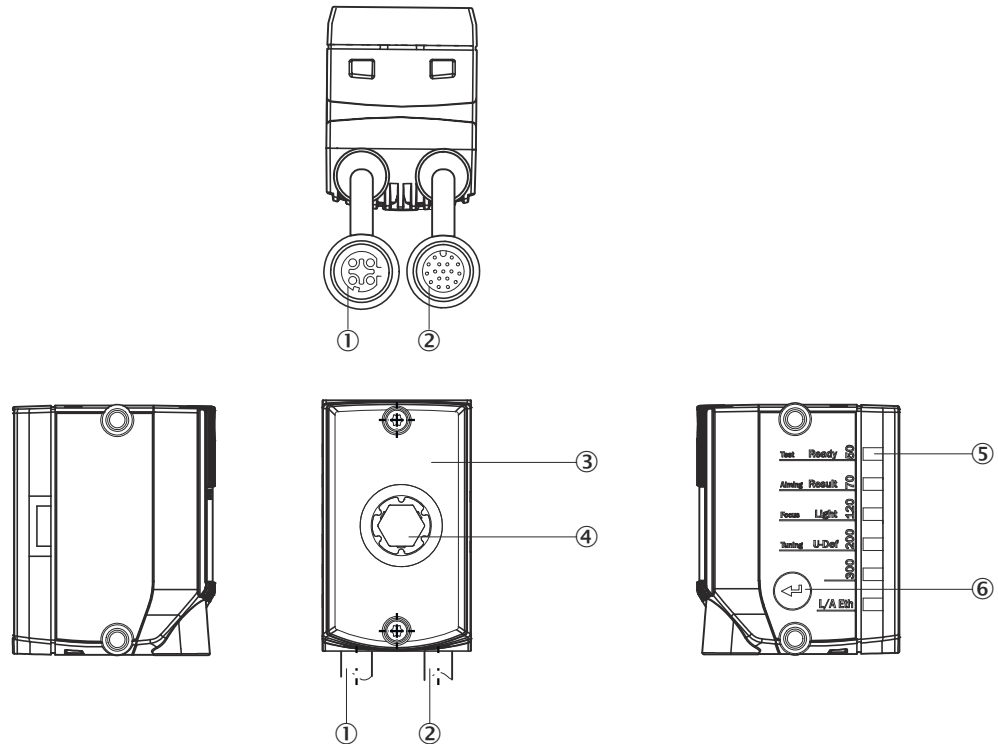


Figure 2: Product overview, product type V2D61xx-xMxxxx (example)

- ① Connecting cable with “Ethernet” connection (female connector, M12, 4-pin, D-coded), length of cable: 0.25 m
- ② Connecting cable with “Power/Serial Data/CAN/I/O” connection (male connector, M12, 17-pin, A-coded), length of cable: 0.35 m
- ③ Viewing window with 8 integrated illumination LEDs, 2 LED alignment aids, 1 feedback LED, 1 time-of-flight sensor
- ④ Optics, manual focus adjustment using a focus adjustment tool (V2D61xx-xMxxxx only)
- ⑤ 6 status LEDs to display the focus position and working distance, product status, and product function (3 display levels)
- ⑥ Function button

#### Further topics

- [Dimensional drawing](#)
- [Integrated illumination](#)

#### 3.4 Integrated illumination

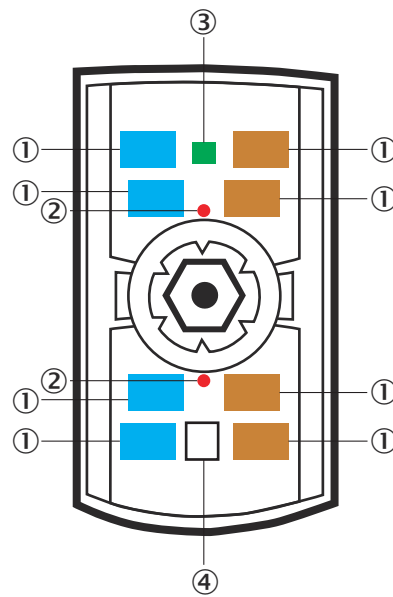


Figure 3: Illumination unit (integrated illumination), example product type V2D61xx-xMxxxx

- ① 8 integrated illumination LEDs (color: 4 visible amber light, 4 visible blue light)
- ② 2 LED alignment aids, can be deactivated (color: visible red light)
- ③ Feedback LED (color: visible green light, visible red light; green for example for Good Read, red for example for No Read)
- ④ Time-of-flight sensor for measuring the working distance in configuration mode (color: invisible infrared light)



#### NOTE

To avoid being dazzled by the integrated illumination unit, do not look into the viewing window of the device.

### 3.5 Display and operating elements

#### Overview

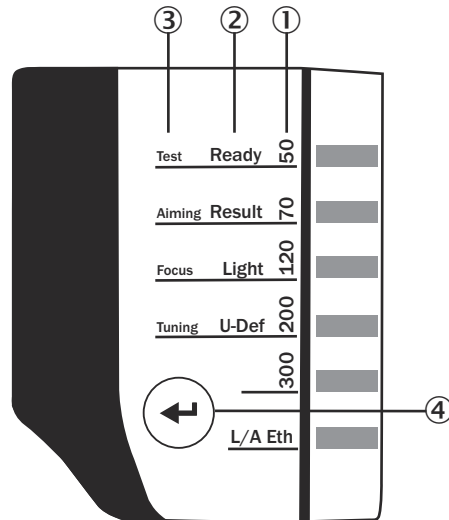


Figure 4: Status LEDs (3 display levels) and function button on the side of the housing

- ① Distance display (focus position and working distance) in configuration mode
- ② Product status in read mode
- ③ Product function
- ④ Function button

#### Distance displays

- Product type V2D61xx-xMxxxx: The distance display supports adjustment of the focus position with the focus adjustment tool. The LEDs indicate the working distance and the set focus position.
- Product type V2D61xx-xLxxxx: Working distance and set focus position are displayed.

#### Product status









Display	LED (green)	LED (red)	LED (yellow)	Status
Ready	●	○	-	The product is ready for operation.
	○	●	-	The product is not ready for use (hardware or software error).
Result	●	○	-	The read is successful.
	○	●	-	The read is not successful.
Light	●	-	-	Read mode: illumination on, internal reading interval open
U-Def	-	-	●	Data output via the host interface
L/A Eth	☀	-	-	Data traffic via the Ethernet interface

● = lights up; ☀ = flashes; ○ = does not light up

#### PROFINET operation (single port)

The Ready status LED signals the product status in the PROFINET network.

Table 2: LEDs in PROFINET operation (single port)

Ready LED		Product status	Remarks
Green components	Red components		
		The product is ready for operation.	
	 Flashes every 7 seconds.	Network detection in the product is active.	The duration of network detection can be configured in SOPAS ET (default: 3 minutes).
	 Flashes every 0.5 seconds.	PROFINET is activated in the product. The product is not connected to the PROFINET IO controller (PLC) or the product is not configured.	To not use PROFINET, deactivate PROFINET. In the default configuration of the product, automatic PROFINET network detection is activated. This detects during startup whether the product is in a PROFINET environment and activates PROFINET automatically. To prevent this, deactivate PROFINET network detection or set the product name or IP address different from the default. To apply the changed settings, permanently save the changes and restart the product.
		The <b>flashing</b> function is activated via the configuration software.	The red and green components of the LED flash alternately. Prerequisite: PROFINET is activated in the product.

● = lights up; ☀ = flashes; ○ = does not light up

#### Product functions

Function	Description
<b>Test</b>	Checking stability of code reading: The product records a series of images and uses the current reading performance settings to decode them. To assess the code reading stability, check the feedback LED.
<b>Aiming</b>	Switching LED alignment aid on and off: The LEDs can be switched off so that the LED alignment aids do not influence the code reading. To switch the LED alignment aid back on again, run the <b>Aiming</b> function again.
<b>Focus</b>	Adjust focus position with the focus adjustment tool.
<b>Tuning</b>	The product automatically adjusts to suit the lighting conditions and the quality of the code presented. Product type V2D61xx-xLxxx also automatically adjusts the focus position. The product permanently stores the acquired values. The <b>Tuning</b> function is not supported for pharmacodes.

#### Function button and product functions in configuration mode

The function button is used to call up product functions manually without using a computer. On the third display level, the LEDs indicate the selectable product functions and the execution of a product function.



#### Further topics

- [Adjusting focus with the focus adjustment tool](#)
- [Configuration with operating buttons](#)

### 3.6 Working distance and field of view size

#### Working distance and field of view size

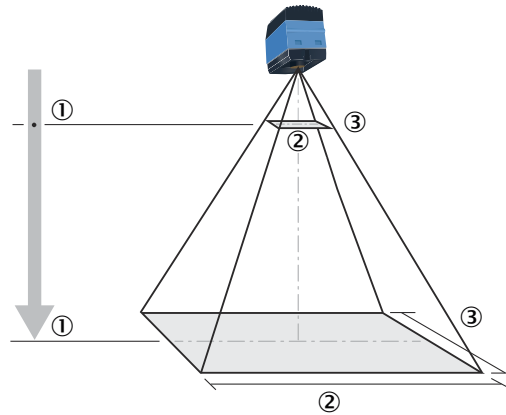


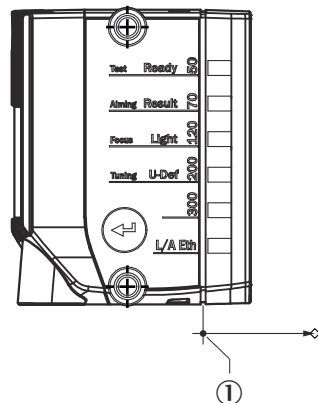
Figure 5: Working distance and field of view size

- ① Working distance in mm
- ② Perceived field of view area: horizontal (mm)
- ③ Perceived field of view area: vertical (mm)

The field of view size is determined by the focus position, the focal length of the lens, and the working distance. The necessary working distance can be determined from the field of view diagram.

#### Reference edge for the working distance

The working distance is measured from the edge of the blue part of the housing.



- ① Reference edge for the working distance from the product to the object

#### Further topics

- [Field of view](#)

### 3.7 Focus setting

#### Focus setting

- Product type V2D61xx-xMxxxx: The focus position can be adjusted manually to the working distance with the focus adjustment tool.
- Product type V2D61xx-xLxxxx: The product can automatically adjust the focus position. To do so, use the function button to start the **Tuning** product function or the **Auto Setup** function in SOPAS ET. If necessary, the focus position can be manually adjusted in SOPAS ET.

The focus position is valid for one working distance. The product does not perform automatic tracking (auto focus) if, for example, the working distance changes significantly.

#### Further topics

- [Adjusting focus with the focus adjustment tool](#)
- [Adjusting focus using the function buttons \(tuning\)](#)
- [Adjusting focus in SOPAS ET](#)

## 4 Transport and storage

### 4.1 Transport



#### NOTICE

##### Damage due to improper transport!

- The product must be packaged with protection against shock and damp.
- Recommendation: Use the original packaging.
- Note the symbols on the packaging.
- Do not remove packaging until immediately before you start mounting.

### 4.2 Unpacking

- To protect the device against condensation, allow it to equilibrate with the ambient temperature before unpacking if necessary.
- Handle the device with care and protect it from mechanical damage.
- To avoid ingress of dust and water, only remove the protective elements, e.g. protective caps of the electrical connections just before attaching the connecting cable.

### 4.3 Transport inspection

Immediately upon receipt in Goods-in, check the delivery for completeness and for any damage that may have occurred in transit. In the case of transit damage that is visible externally, proceed as follows:

- Do not accept the delivery or only do so conditionally.
- Note the scope of damage on the transport documents or on the transport company's delivery note.
- File a complaint.



#### NOTE

Complaints regarding defects should be filed as soon as these are detected. Damage claims are only valid before the applicable complaint deadlines.

### 4.4 Storage

- Electrical connections are provided with a protective cap.
- Do not store outdoors.
- Store in a place protected from moisture and dust.
- Recommendation: Use the original packaging.
- To allow any residual dampness to evaporate, do not package in airtight containers.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: [see "Technical data", page 52](#).
- Relative humidity: [see "Technical data", page 52](#).
- For storage periods of longer than 3 months, check the general condition of all components and packaging on a regular basis.

## 5 Mounting

### 5.1 Mounting instructions

- Observe the technical data.
- Protect the sensor from direct and indirect sunlight.
- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- The mounting site has to be designed for the weight of the device.
- Mount the product in a shock and vibration insulated manner.
- Ensure a good dissipation of excess heat from the device to the surroundings, in particular at higher ambient temperatures. Good heat transfer from the device can be achieved, for example, by using a bracket on the mounting base or by ensuring that the back of the device is located at a sufficient distance from the wall of an enclosure.
- For ambient operating temperatures  $\geq 40\text{ °C}$ , mount the device using an aluminum mounting bracket (e.g., part number 2113160, 2112790).
- Make sure the device has a clear view of the codes.

### 5.2 Mounting location

#### 5.2.1 Determining alignment

##### Vertical mounting

Orientation for maximum field of view width:

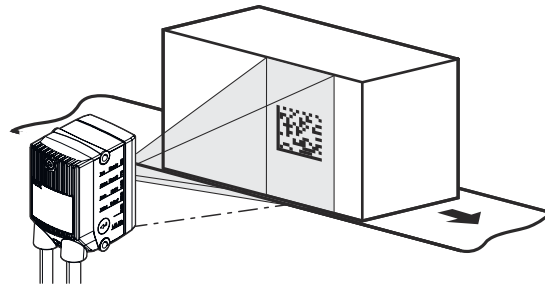


Figure 6: Vertical mounting

##### Horizontal mounting

Orientation for highest conveying speeds:

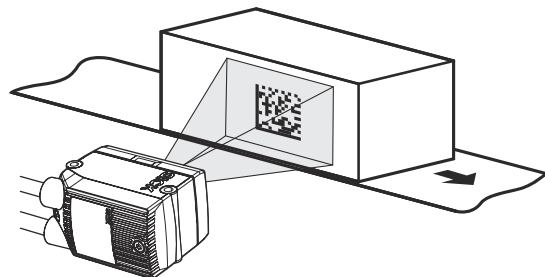


Figure 7: Horizontal mounting

#### 5.2.2 Mounting angle and reflection prevention

In order to avoid reflections from the surfaces to be scanned, mount the product so that it is tilted from the perpendicular to the surface.

The mounting angle to use depends on the lens:

- $f = 6 \text{ mm}$ : The typical value is  $20^\circ$ .
- $f = 12 \text{ mm}$ : The typical value is  $10^\circ$ .

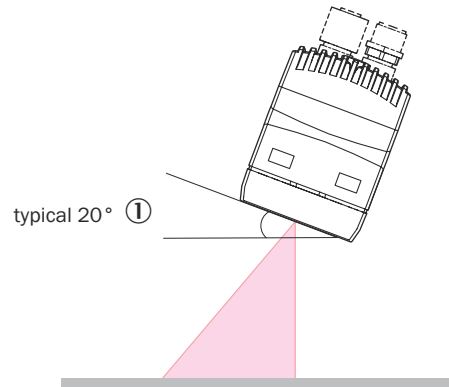


Figure 8: Mounting angle to use,  $f = 6 \text{ mm}$ , depending on the application

① Typical angle  $20^\circ$

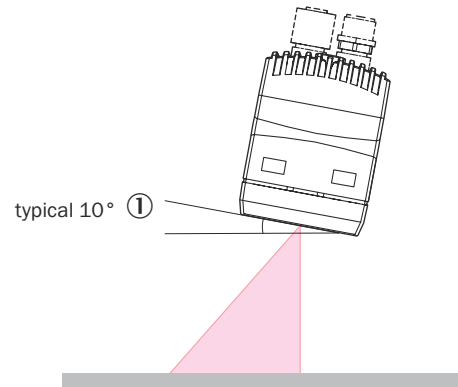


Figure 9: Mounting angle to use,  $f = 12 \text{ mm}$ , depending on the application

① Typical angle  $10^\circ$

Depending on the application, an angle of  $0^\circ$  (brightfield illumination) or up to  $45^\circ$  (darkfield illumination) is appropriate.

## 5.3 Adjusting the focus position

### 5.3.1 Adjusting focus with the focus adjustment tool

#### Overview

The user adjusts the focus position to suit the required working distance with the help of the focus adjustment tool. The focus position is valid for one working distance. The product does not perform automatic tracking (auto focus) if, for example, the working distance changes significantly. The focus adjustment tool is included with delivery.

#### Important information



#### NOTE

Only relevant for product type V2D61xx-xMxxxx.



#### NOTICE

##### Risk of product damage

If the focus adjustment tool is turned with too much force, the product will be damaged.

- Observe maximum tightening torque.

### Approach

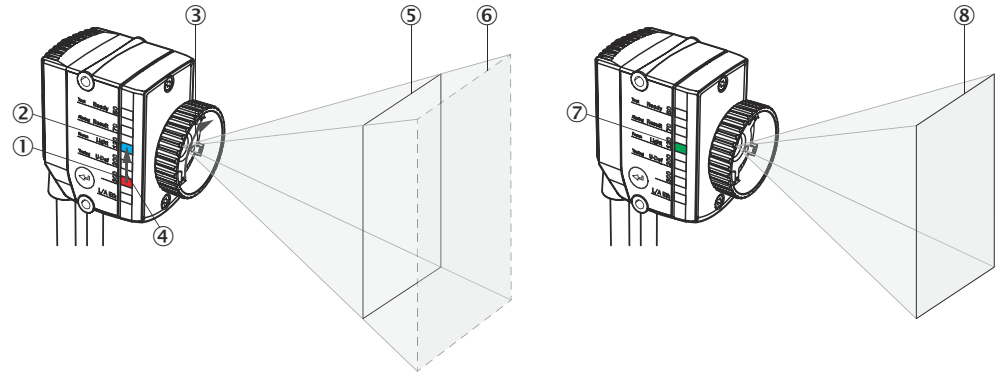
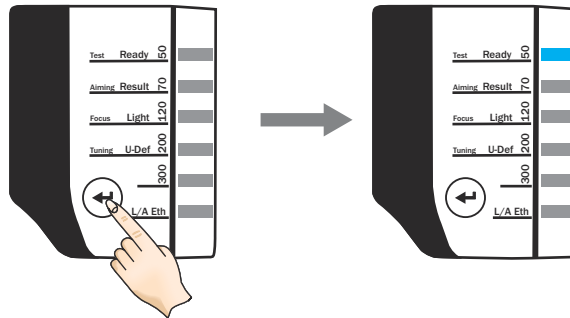


Figure 10: Manually adjusting the focus position with the help of the focus adjustment tool

- ① Red LED = the focus position set
- ② Blue LED = current working distance
- ③ Rotate the focus adjustment tool
- ④ The red LED (current focus position) is made to approach the blue LED (current working distance) by turning the focus adjustment tool.
- ⑤ Target focus position setting
- ⑥ Actual focus position setting
- ⑦ Green LED = focus position has been adjusted to suit the working distance (actual status = target status)
- ⑧ Focus position coincides with the working distance (actual status = target status)

1. Mount and align the product at the required working distance.
2. Activating the **Focus** product function:
  - Press the function button (↩) for 3 seconds.

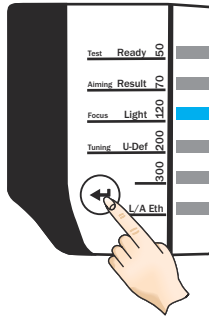
Press function key 3 seconds ①



- ① Press the function button (↩) for 3 seconds.

- Once the **Focus** LED lights up, briefly press the function button (↵) one time.

Press function key 1 x shortly ①



① Briefly press the function button (↵) once

- ✓ The **Focus** mode is activated.
- ✓ The LED that lights up red indicates the currently set focus position on the product.
- ✓ The LED that lights up blue indicates the working distance at which the product is mounted.
- 3. Attach the focus adjustment tool to the optics.
- 4. To align the focus position to the adjusted working distance, rotate the focus adjustment tool with a maximum tightening torque of 60 Ncm.
  - To align the focus position with a larger working distance, rotate the focus adjustment tool in the clockwise direction.
  - To align the focus position with a smaller working distance, rotate the focus adjustment tool in the counterclockwise direction.
- ✓ As the tool is rotated, the red LED continuously indicates the current focus position.
- ✓ When the LED of the set working distance lights up green, the focus position is aligned with the working distance.
- 5. Check the focus position again when commissioning the device using the SOPAS ET configuration software. If necessary, adjust the focus setting manually using the focus adjustment tool.



#### NOTE

The working distance that the product measures using the time-of-flight sensor is displayed in SOPAS ET in the **ToF distance (mm)** parameter. The currently set focus position is displayed in SOPAS ET in the **Focus position (mm)** parameter.

### 5.3.2 Adjusting focus using the function buttons (tuning)

#### Overview

Using the function button on the product, the focus position can be automatically adjusted with the **Tuning** product function. The focus position is valid for one working distance. The product does not perform automatic tracking (auto focus) if, for example, the working distance changes significantly.

#### Important information



#### NOTE

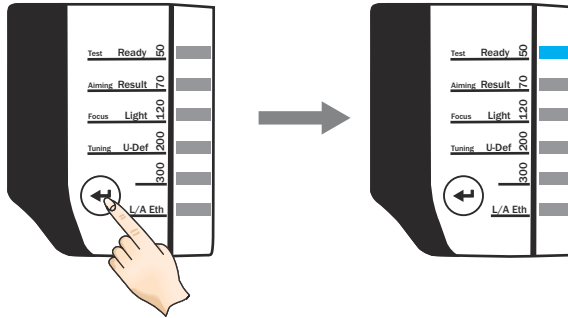
Only relevant for product type V2D61xx-xLxxx.

#### Approach

- Mount and align the product at the required working distance.
- Start the **Tuning** product function:

- Press the function button (↩) for 3 seconds.

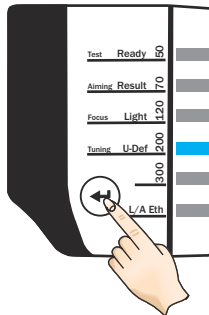
Press function key 3 seconds ①



- ① Press the function button (↩) for 3 seconds.

- Once the **Tuning** LED lights up, briefly press the function button (↩) one time.

Press function key 1 x shortly ①



- ① Briefly press the function button (↩) once

- ✓ The **Tuning** product function starts.
- ✓ The focus position is set automatically.
- 3. Check the focus position again when commissioning the device using the SOPAS ET configuration software. Adjust if necessary.

### 5.3.3 Adjusting focus in SOPAS ET

#### Overview

Using SOPAS ET, the focus position can be automatically adjusted with the **Auto Setup** function. If necessary, the focus position can be adjusted manually in SOPAS ET. The focus position is valid for one working distance. The product does not perform automatic tracking (auto focus) if, for example, the working distance changes significantly.

#### Important information



#### NOTE

Only relevant for product type V2D61xx-xLxxxx.

#### Approach

1. Mount and align the product at the required working distance.
  2. In SOPAS ET, start the **Auto Setup** function: In the **Wizards** window, click on the **Code Reading** button.
- ✓ The **Auto Setup** product function starts.
  - ✓ The focus position is set automatically.



## 5.4 Mounting the product

### Important information



#### NOTICE

##### Product damage due to incorrect mounting

Screw M3 screws through the through hole. Screws with a larger thread diameter damage the product.

- Do not screw the M4 screws right through to the other side of the product.
- To mount the product, carefully screw only M3 screws (length: min 35 mm) into the through holes on opposite sides of the product.

### Procedure

1. Mount the product in a suitably prepared mounting system using the threaded mounting holes provided.
  - Mount the product on a mounting system using M4 screws. Screw the screws no more than 5 mm into the threaded mounting holes or sliding nuts. Use the threaded mounting holes in pairs on the left and right side of the product.
  - For alternative mounting, carefully screw the 2 M3 screws (length: min 35 mm) into the through holes on opposite sides of the product. Use the threaded mounting holes in pairs on the left and right side of the product.
  - Optional: attach the separately ordered SICK mounting system to the product. Mounting equipment is available as an accessory.
2. Align the product taking into consideration the field of view and the application circumstances.
3. Connect the product to interfaces and supply voltage when disconnected from voltage.
- ✓ The **Ready** status LED lights up green.
4. Perform fine adjustment.

### Further topics

- [see "Field of view", page 57](#)
- [see "Mounting instructions", page 20](#)
- [see "Connecting", page 36](#)

## 5.5 Mounting the read cycle sensor (optional)

### Prerequisites

- The product is triggered via an external trigger sensor.

## Approach

- Mount the trigger sensor near the product. The mounting location of the product depends on distance  $a$  of the codes from the front object edge. Depending on the application, mount the product so that codes on objects of different sizes can be read completely during the reading interval.

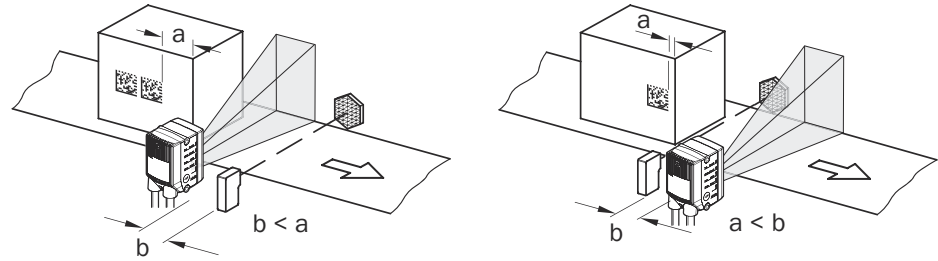


Figure 11: Positioning an external trigger sensor for the read cycle (mounting example)

## 6 Electrical installation

### 6.1 Wiring instructions



#### NOTE

Pre-assembled cables can be found on the product page.

The product page can be accessed via the **SICK Product ID: [pid.sick.com/{P/N}/{S/N}](https://pid.sick.com/{P/N}/{S/N})**

**{P/N}** corresponds to the part number of the product, see type label.

**{S/N}** corresponds to the serial number of the product, see type label (if indicated).



#### NOTICE

##### **Faults during operation and defects in the device or the system**

Incorrect wiring may result in operational faults and defects.

- Follow the wiring notes precisely.



#### NOTE

Pre-assembled cables with open cable end at one end:

Information about pin, signal and wire color assignments can be found in the appendix, see "[Signal assignment of cables with open cable end at one end](#)", page 64.

The enclosure rating stated in the technical data is achieved only with screwed plug connectors or protective caps.

Configure the circuits connected to the device as ES1 circuits or as SELV circuits (SELV = Safety Extra Low Voltage). The voltage source must meet the requirements of ES1 and PS2 (EN 62368-1) or SELV and LPS (EN 60950-1).

Protect the device with an external slow-blow fuse at the beginning of the supply cable.

Connect the connecting cables in a de-energized state. Do not switch on the supply voltage until installation is complete and all connecting cables are connected to the device and control.

Perform all connection work only at ambient temperatures above 0 °C.

The supply voltage must be as specified in the technical data, see "[Technical data](#)", page 52.

Wire cross-sections in the supply cable from the customer's power system must be implemented in accordance with the applicable standards.

In the case of open end cables, make sure that bare wire ends do not touch. Wires must be appropriately insulated from each other.

Wire cross-sections of the data and switching signal cables have to also be designed in accordance with the applicable national standards.

### 6.1.1 Data cables

#### Important information

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#### NOTE

##### Layout of data cables

- Use screened data cables with twisted-pair wires.
  - Implement the screening design correctly and completely.
  - To avoid interference, always use EMC-compliant cables and layouts. This applies, for example, to cables for switched-mode power supplies, motors, clocked drives, and contactors.
  - Do not lay cables over long distances in parallel with power supply cables and motor cables in cable channels.
- 

#### Length of cable and data transmission rate

The maximum length of cable between device and, for example, host computer depends on the interface type and the data transmission rate.

#### Further topics

- For information on data transmission rates and lengths of cable: [Wiring the data interface](#)

## 6.2 Prerequisites for safe operation of the device

---



#### WARNING

##### Risk of injury and damage caused by electrical current!

As a result of equipotential bonding currents between the device and other grounded devices in the system, faulty grounding of the device can give rise to the following dangers and faults:

- Dangerous voltages are applied to the metal housings.
- Devices will behave incorrectly or be destroyed.
- Cable shielding will be damaged by overheating and cause cable fires.

#### Remedial measures

- Only skilled electricians should be permitted to carry out work on the electrical system.
  - If the cable insulation is damaged, disconnect the voltage supply immediately and have the damage repaired.
  - Ensure that the ground potential is the same at all grounding points.
  - Where local conditions do not meet the requirements for a safe earthing method, take appropriate measures. For example, ensure low-impedance and current-carrying equipotential bonding.
- 

The device is connected to the peripheral devices (any local trigger sensor(s), system controller) via shielded cables. The cable shield – for the data cable, for example – rests against the metal housing of the device.

The device can be grounded through the cable shield or through a blind tapped hole in the housing, for example.

If the peripheral devices have metal housings and the cable shields are also in contact with their housings, it is assumed that all devices involved in the installation have the **same ground potential**.

This is achieved by complying with the following conditions:

- Mounting the devices on conductive metal surfaces
- Correctly grounding the devices and metal surfaces in the system
- If necessary: low-impedance and current-carrying equipotential bonding between areas with different ground potentials

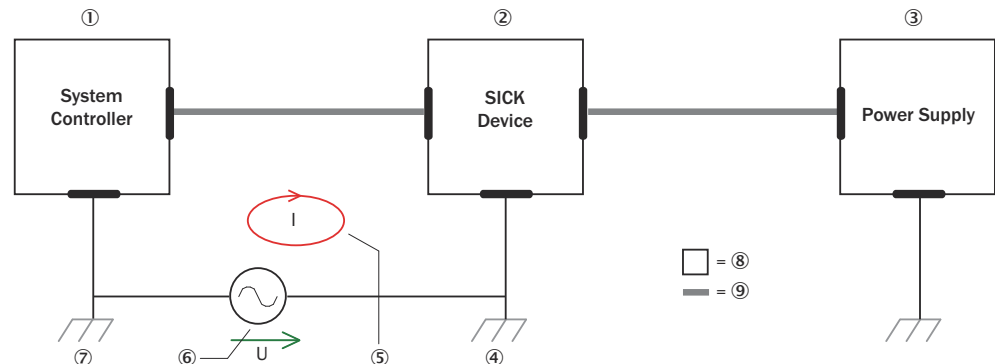


Figure 12: Example: Occurrence of equipotential bonding currents in the system configuration

- ① System controller
- ② Device
- ③ Voltage supply
- ④ Grounding point 2
- ⑤ Closed current loop with equalizing currents via cable shield
- ⑥ Ground potential difference
- ⑦ Grounding point 1
- ⑧ Metal housing
- ⑨ Shielded electrical cable

If these conditions are not fulfilled, equipotential bonding currents can flow along the cable shielding between the devices due to differing ground potentials and cause the hazards specified. This is, for example, possible in cases where there are devices within a widely distributed system covering several buildings.

#### Remedial measures

The most common solution to prevent equipotential bonding currents on cable shields is to ensure low-impedance and current-carrying equipotential bonding. If this equipotential bonding is not possible, the following solution approaches serve as a suggestion.



#### NOTICE

We expressly advise against opening up the cable shields. This would mean that the EMC limit values can no longer be complied with and that the safe operation of the device data interfaces can no longer be guaranteed.

#### Measures for widely distributed system installations

On widely distributed system installations with correspondingly large potential differences, the setting up of local islands and connecting them using commercially available **electro-optical signal isolators** is recommended. This measure achieves a high degree of resistance to electromagnetic interference.

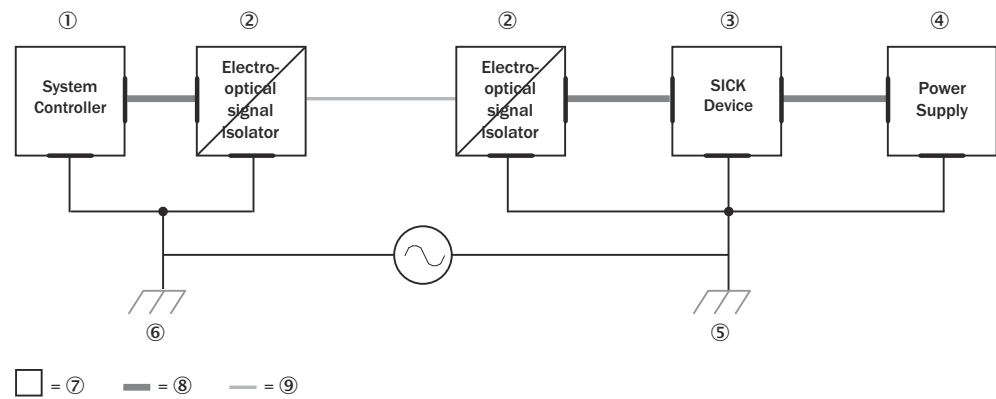


Figure 13: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

- ① System controller
- ② Electro-optical signal isolator
- ③ Device
- ④ Voltage supply
- ⑤ Grounding point 2
- ⑥ Grounding point 1
- ⑦ Metal housing
- ⑧ Shielded electrical cable
- ⑨ Fibers

The use of electro-optical signal isolators between the islands isolates the ground loop. Within the islands, a stable equipotential bonding prevents equalizing currents on the cable shields.

### Measures for small system installations

For smaller installations with only slight potential differences, insulated mounting of the device and peripheral devices may be an adequate solution.

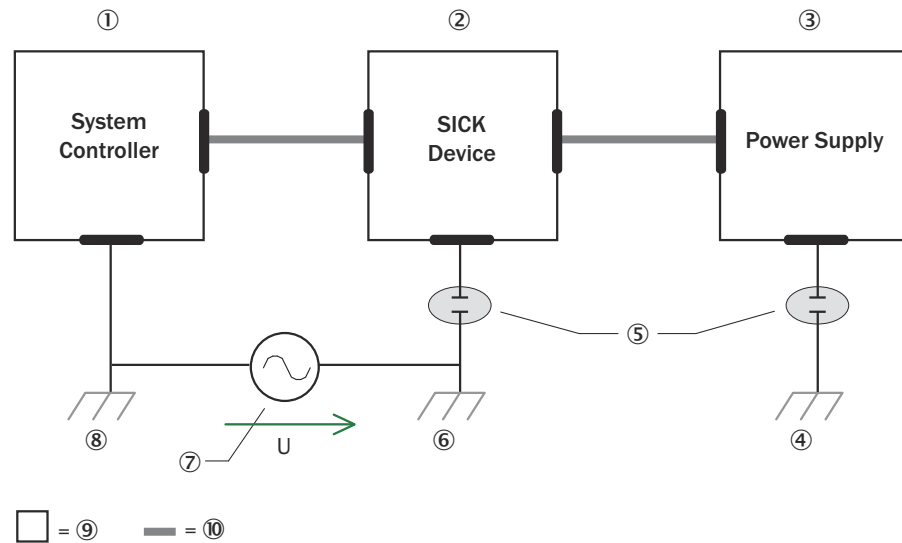


Figure 14: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

- ① System controller
- ② Device
- ③ Voltage supply
- ④ Grounding point 3
- ⑤ Insulated mounting
- ⑥ Grounding point 2
- ⑦ Ground potential difference
- ⑧ Grounding point 1
- ⑨ Metal housing
- ⑩ Shielded electrical cable

Even in the event of large differences in the ground potential, ground loops are effectively prevented. As a result, equalizing currents can no longer flow via the cable shields and metal housing.



#### NOTICE

The voltage supply for the device and the connected peripheral devices must also guarantee the required level of insulation.

Under certain circumstances, a tangible potential can develop between the insulated metal housings and the local ground potential.

## 6.3 Connection diagrams

### 6.3.1 Service mode connection schematic

This operating mode is recommended for initial commissioning of the product.

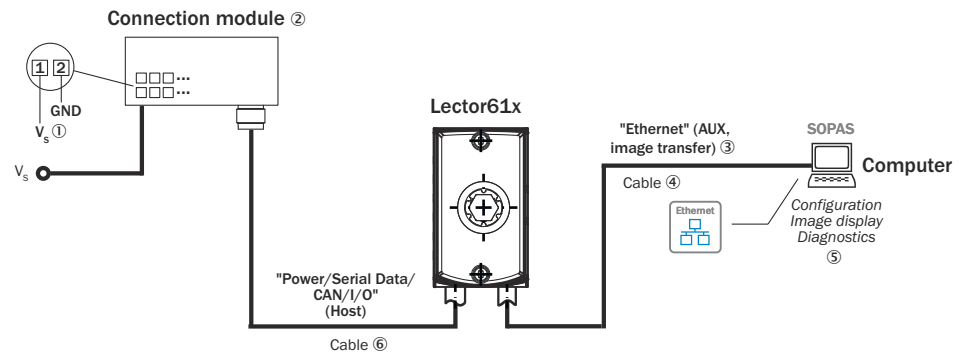


Figure 15: Connection block diagram for commissioning

- ① Supply voltage  $V_s$
- ② Connection module CDB650-204 or CDM420-0006
- ③ Ethernet, AUX interface (image transmission)
- ④ Adapter cable (male connector, M12, 4-pin, D-coded/male connector, RJ-45, 8-pin)
- ⑤ Configuration with SOPAS ET, image display or reading diagnostics
- ⑥ For CDB650-204: Connection cable 1:1 (female connector, M12, 17-pin, A-coded/male connector, M12, 17-pin, A-coded)  
For CDM420-0006: Adapter cable (female connector, M12, 17-pin, A-coded/male connector, DSub-HD, 15-pin)



### 6.3.2 Connection principle for read mode

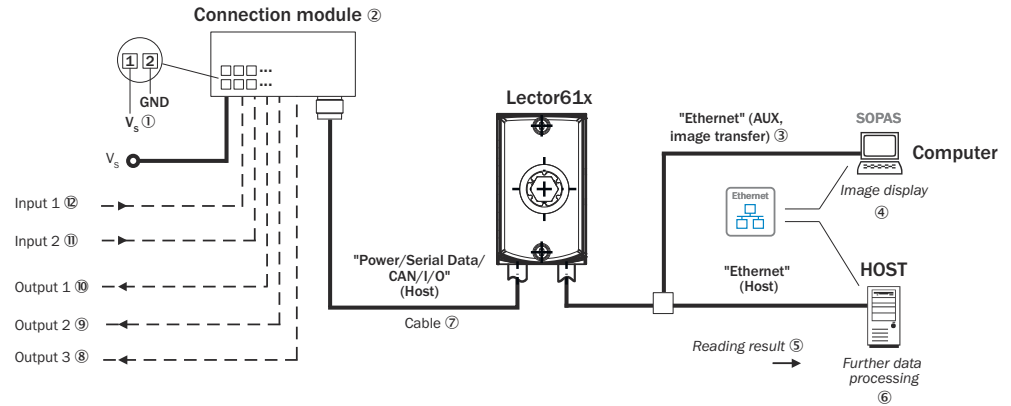


Figure 16: Connection block diagram for read mode

- ① Supply voltage  $V_s$
- ② Connection module CDB650-204 or CDM420-0006
- ③ Ethernet, AUX interface (image transmission)
- ④ Image display
- ⑤ Read result
- ⑥ Data further processing
- ⑦ For CDB650-204: Connection cable 1:1 (female connector, M12, 17-pin, A-coded/male connector, M12, 17-pin, A-coded)  
For CDM420-0006: Adapter cable (female connector, M12, 17-pin, A-coded/male connector, DSub-HD, 15-pin)
- ⑧ Digital output 3, e.g. for connecting an LED
- ⑨ Digital output 2, e.g. for connecting an LED
- ⑩ Digital output 1, e.g. for connecting an LED
- ⑪ Digital input 2, e.g. for connecting an incremental encoder
- ⑫ Digital input 1, e.g. for connecting a read cycle trigger sensor

## 6.3.3 Example applications

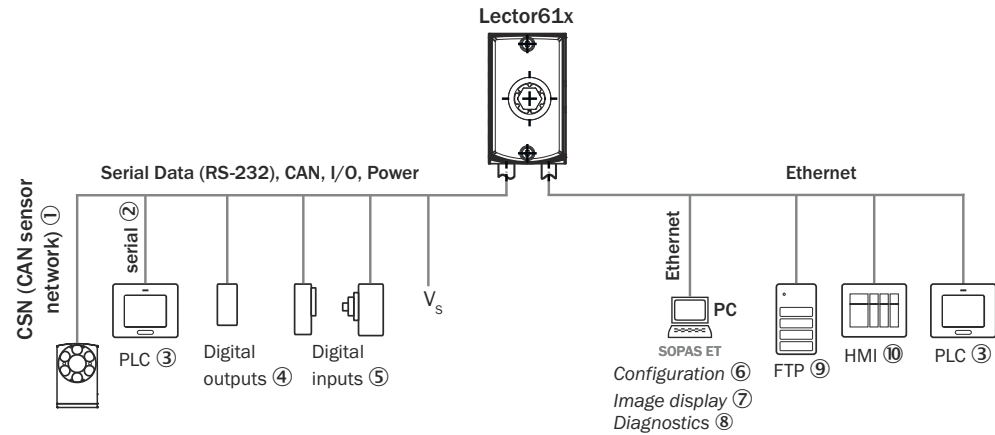


Figure 17: Facilities for connecting

- ① CSN (CAN sensor network)
- ② Serial
- ③ PLC (programmable logic controller)
- ④ Digital outputs, e.g. for signal lamps
- ⑤ Digital inputs e.g. for encoders, photoelectric sensors (trigger sensor)
- ⑥ Configuration
- ⑦ Image display
- ⑧ Diagnostics
- ⑨ FTP server (image storage)
- ⑩ HMI interface

## 6.4 Pin assignment

### Important information



#### NOTE

##### Limitations in the options for backing up the parameter set

The device does not come with an AUX serial interface.

A current and application-specific parameter set created in SOPAS ET can therefore only be **manually** saved and archived as a project file on the computer.



#### NOTE

##### Using an additional extension cable

- If the serial interface (RS-232) is not being used, the maximum total length of cable is 30 m.
- If the serial interface (RS-232) is being used, the maximum total length of cable is 15 m.
- Wire diameter: at least AWG26 (0.14 mm<sup>2</sup>).

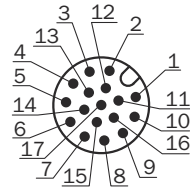
**Power/Serial Data/CAN/I/O**

Figure 18: Male connector, M12, 17-pin, A-coded

Table 3: Pin assignment for Power/Serial Data/CAN/I/O

Contact	Signal	Function
1	GND	Ground
2	V <sub>s</sub>	Supply voltage
3	CAN L	CAN bus (IN/OUT)
4	CAN H	CAN bus (IN/OUT)
5	-	-
6	TxD (RS-232), host	Serial data interface (sender)
7	-	-
8	-	-
9	SensGND	Digital input ground
10	Sensor 1	Digital input 1
11	-	-
12	RxD (RS-232), host	Serial data interface (receiver)
13	Result 1	Digital output 1
14	Result 2	Digital output 2
15	Sensor 2	Digital input 2
16	Result 3	Digital output 3
17	-	-
-	-	Shield

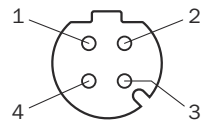
**Ethernet**

Figure 19: M12 female connector, 4-pin, D-coded

Table 4: Ethernet pin assignment

Female connector	Signal	Function
1	TD+	Sender+
2	RD+	Receiver+
3	TD-	Sender-
4	RD-	Receiver-

## 6.5 Connecting

### 6.5.1 Using CDB and CDM connection modules

Connection on the device	Connection modules	Connection cable
Connecting cable with male connector, M12, 17-pin, A-coded	CDB650-204	Connecting cable
	CDM420-0006 <sup>1)</sup>	Adapter cable <sup>2)</sup>

<sup>1)</sup> CDM420-0007: for connecting 2 devices.

<sup>2)</sup> Adapter cable (female connector, M12, 17-pin, A-coded / male connector, D-Sub-HD, 15-pin).

#### Connecting device with connection module

Connection modules	Reference
CDB650-204	see "Connection of the device to CDB650-204", page 65
CDM420-0006	see "Connection of the device to CDM420-0006", page 74



#### NOTE

The operating instructions of the connection modules contains detailed information on mounting and electrical installation. The operating instructions are available as a download on the product page of the connection module.

#### Connection module product page

- [www.sick.com/CDB](http://www.sick.com/CDB)
- [www.sick.com/CDM](http://www.sick.com/CDM)

### 6.5.2 Connecting the supply voltage

The voltage source meets the requirements of ES1 and PS2 (EN 62368-1) or SELV and LPS (EN 60950-1).

Table 5: Required supply voltage  $V_S$  and power output

Supply voltage $V_S$	Power source: required power output <sup>1)</sup>
DC 12 V ... 24 V $\pm$ 15%	Maximum 16 W

<sup>1)</sup> Valid for device with 3 loaded digital outputs (each 50 mA).

Table 6: Typical current consumption depending on supply voltage

Designation		Supply voltage ( $V_S$ ) in [DC V]			
		10.2 (12 V -15%)	12	24	27.6 (24 V +15%)
Current consumption, digital outputs unloaded	$I_{B\text{ RMS}}$ [A]	0.290	0.244	0.128	0.110
Power loss, digital outputs unloaded	$P_{\text{RMS}}$ [W]	2.96	2.93	3.07	3.04
Maximum current consumption, digital outputs unloaded	$I_{B\text{ Peak}}^{\text{1)}$ [A]	1.06	0.848	0.387	0.331
Typical, all 3 digital outputs loaded (0.05 A per output)	$I_{B\text{ RMS }30\text{ut}}$ [A]	0.44	0.394	0.278	0.26
Power loss, all 3 digital outputs loaded (0.05 A per output)	$P_{\text{Peak }30\text{ut}}$ [W]	14.6	15.09	15.61	15.831

<sup>1)</sup> Valid for the power supply unit rating, supply cable and fuse protection at the start of the cable.

### Protecting the supply cables

To ensure protection against short-circuits/overload in the customer's supply cables, appropriately choose and protect the wire cross-sections used.

Observe applicable standards (Germany):

- DIN VDE 0100 (part 430)
- DIN VDE 0298 (part 4) and DIN VDE 0891 (part 1)

### Connecting device without connection module

For a supply voltage of DC 12 V to 24 V  $\pm$  15%, protect the device with a separate 2 A fuse.

- Install the fuse in the supply circuit at the start of the supply cable.

### Connecting device with connection module

The supply voltage for the device is protected as follows in the connection modules in the circuit after switch S1:

Table 7: Protection of the supply voltage in the connection module

Connection modules	Supply voltage fuse protection	Reference
CDB650-204	2 A (slow-blow)	see "Connecting supply voltage for the device in CDB650-204", page 67
CDM420-0006	2 A (slow-blow)	see "Connecting supply voltage for the device in CDM420-0006", page 77

## 6.5.3 Wiring the data interface

### Wiring the Internet interface

1. Connect the device to the Ethernet connection of the computer via the adapter cable.
2. Set up communication via the SOPAS ET configuration software.



#### NOTE

The Ethernet interface of the device has an Auto-MDIX function. This automatically adjusts the transmission speed as well as any necessary crossover connections.

### Wiring the serial data interface



#### NOTE

The serial data interface is available only as a host interface for this device.

The maximum data transmission rate for the serial interface depends on the length of cable and on the type of interface.

Table 8: Data transmission rates and recommended maximum lengths of cable

Interface	Data transmission rate	Distance to the target computer (host)
RS-232	Up to 19.2 kBd	Max. 15 m
	38.4 kBd ... 57.6 kBd	Max. 5 m
	115.2 kBd ... 500 kBd	< 2 m

**NOTICE****Risk of damage to the internal interface modules!**

If the serial data interfaces are wired incorrectly, then electronic components in the device could get damaged.

- Observe the information on wiring.
- Carefully check the wiring prior to switching on the device.

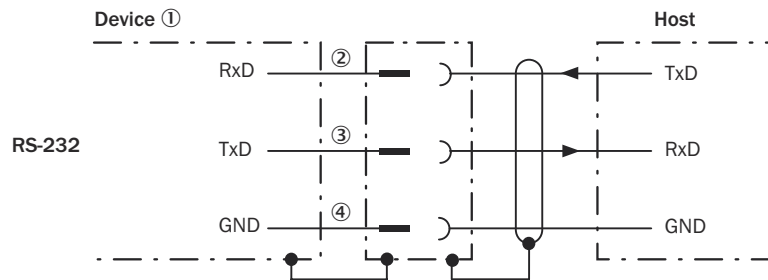


Figure 20: Wiring of the RS-232 serial data interface

① Device

②...④ Pin assignment: see RS-232 pin assignment for the respective device

**NOTE**

Activate the serial data interface type in the device using a configuration software, e.g., the SOPAS ET configuration software.

**Wiring data interfaces via a connection module**

Connection modules	Data interface	Reference
CDB650-204	RS-232	see "Wiring serial host interface RS-232 of the device in CDB650-204", page 68
CDM420-0006	RS-232	see "Wiring serial host interface RS-232 of the device in the CDM420-0006", page 77

#### 6.5.4 Wiring the CAN interface

**NOTE**

Activate the CAN data interface in the device using a configuration software, e.g., SOPAS ET.

Configure further settings in the device according to the function of the device in the system configuration.

**Wiring CAN interfaces via a connection module**

Connection modules	Interface	Reference
CDB650-204	CAN	see "Wiring the CAN interface of the device in the CDB650-204", page 69
CDM420-0006	CAN	see "Wiring the CAN interface of the device in the CDM420-0006", page 78

### 6.5.5 Wiring the digital inputs

The device has two switching digital inputs (Sensor1, Sensor 2).

#### Functions (examples)

- Start and end external reading cycle.
- Feed in incremental signal.

#### Position of digital inputs

- Male connector of the device cable (M12, 17-pin, A-coded)
- Adapter cable (female connector, M12, 17-pin, A-coded/male connector, D-Sub-HD, 15-pin)
- Open end of the adapter cable (female connector, M12, 17-pin, A-coded/open end)

All digital inputs are available at the individual positions.

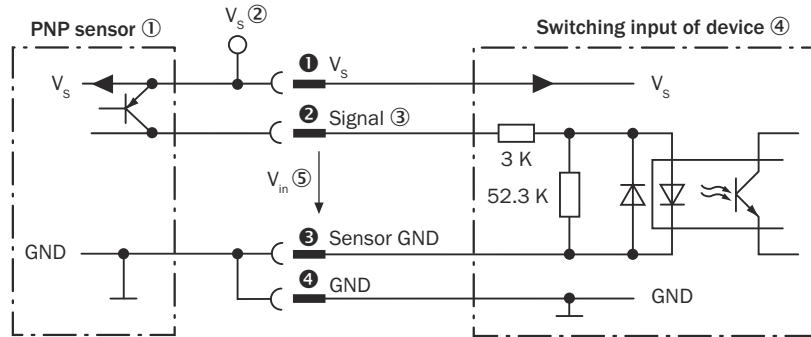


Figure 21: Wiring a digital input

- ① Trigger sensor (PNP sensor)
- ② Supply voltage  $V_s$
- ③ Input signal
- ④ Digital input of the device (Sensor 1, Sensor 2)
- ⑤ Input voltage  $V_{in}$
- ① ... Pin assignment (see respective device)
- ④

Table 9: Characteristic data of the digital inputs (Sensor 1, Sensor 2)

<b>Switching behavior</b>	Signal on the input starts the assigned function, e.g. start of the internal reading interval of the device. Default: active high Debouncing: 10 ms (standard)
<b>Properties</b>	<ul style="list-style-type: none"> <li>• Opto-decoupled, reverse polarity protected</li> <li>• Can be wired to PNP output of a trigger sensor</li> </ul>
<b>Electrical values</b>	The electrical values are identical for all digital inputs of the device. Low: $V_{in}^{1)} \leq 2 \text{ V}$ ; $I_{in}^{2)} \leq 0.3 \text{ mA}$ High: $6 \text{ V} \leq V_{in} \leq 27.6 \text{ V}$ ; $0.7 \text{ mA} \leq I_{in} \leq 5 \text{ mA}$

1) Input voltage  $V_{in}$ .

2) Input current  $I_{in}$ .

#### Function assignment



#### NOTE

Allocate the functions for the digital inputs in the device using a configuration software, e.g., SOPAS ET.

### Wiring digital inputs via connection module

Connection modules	Digital inputs	Reference
CDB650-204	SENS/IN 1 SENS/IN 2	see "Wiring digital inputs of the device in the CDB650-204", page 71
CDM420-0006	Sensor 1 Sensor 2	see "Wiring digital inputs of the device in the CDM420-0006", page 80

### 6.5.6 Wiring the digital outputs

The digital outputs Result 1 to Result 3 are used to signal events in the read operation. Different functions can be assigned to the digital outputs independently of each other for this purpose. If the assigned event occurs, then the corresponding digital output becomes live after the end of the read cycle for the selected pulse duration, for example (default).

#### Positions of digital outputs:

- Male connector of the device cable (M12, 17-pin, A-coded)
- Open end of the adapter cable (female connector, M12, 17-pin, A-coded/open end)
- CDB650-204 connection module

All digital outputs are each available at the individual positions.

The three digital outputs are available in the CDM420-0006 connection module but reduced to two outputs ("Result1" "Result2"). Connect the device to the CDM420-0006 connection module using an adapter cable (female connector, M12, 17-pin, A-coded / male connector, D-Sub-HD, 15-pin).

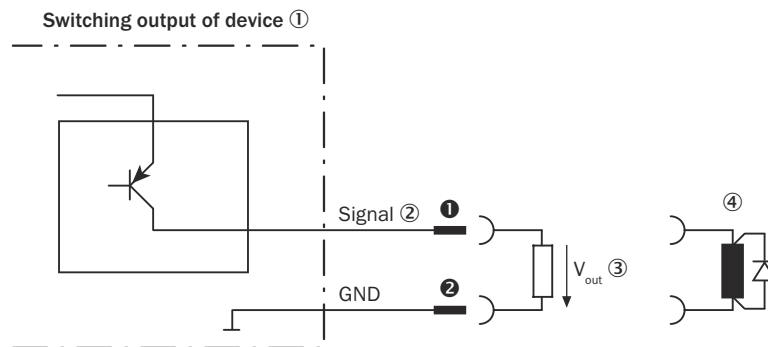


Figure 22: Wiring a digital output

- ① Digital output of the device (Result 1 to Result 3)
- ② Output signal
- ③ Output voltage  $V_{out}$
- ④ With inductive load: see note
- ①... ② For pin assignment, see respective device

Table 10: Characteristic data of the digital outputs

Switching behavior	PNP switching to supply voltage $V_S$ Default: No function Logic: not inverted (active high)
Properties	<ul style="list-style-type: none"> <li>• Short-circuit protected</li> <li>• Not electrically isolated from <math>V_S</math> <sup>1)</sup></li> </ul>



<b>Electrical values</b>	$0\text{ V} \leq V_{\text{out}}^{2)} \leq V_{\text{S}}$ $(V_{\text{S}} - 1.5\text{ V}) \leq V_{\text{out}} \leq V_{\text{S}}$ at $I_{\text{out}}^{3)} \leq 50\text{ mA}$
--------------------------	---

- 1) Supply voltage.  
 2) Output voltage.  
 3) Output current.

**NOTE**

Provide an arc-suppression switch at the digital output if inductive load is present.

- Attach a freewheeling diode directly to the load for this purpose.

**NOTE**

Capacitive loads on the digital outputs have an effect on the switch-on and switch-off behavior. A maximum capacitance of 100 nF is the limit value.

**Function assignment****NOTE**

Allocate the functions for the digital outputs in the device using a configuration software, e.g., SOPAS ET.

**Wiring digital outputs via connection module**

Connection modules	Digital outputs	Reference
CDB650-204	RES/OUT 1 RES/OUT 2 RES/OUT 3	see "Wiring digital outputs of the device in the CDB650-204", page 73
CDM420-0006	Result 1 Result 2	see "Wiring digital outputs of the device in the CDM420-0006", page 82

## 7 Commissioning

### 7.1 Start SOPAS ET

#### Overview

SOPAS ET is used for parameterization and servicing purposes (e.g., diagnostics, data logger, firmware update). If the product has been parameterized with the operating buttons, use SOPAS ET to continue parameterization. The product outputs the recorded images to SOPAS ET for display.

#### Prerequisites

- Computer with the SOPAS ET software installed  
Use SOPAS ET version 3.0 or above.  
The most up-to-date version of the SOPAS ET software can be downloaded from [www.sick.com/SOPAS\\_ET](http://www.sick.com/SOPAS_ET). The respective system requirements for installing SOPAS ET are also specified there.
- Ethernet connection
- SDD file (device description file)  
You can install the SDD file using the device catalog in SOPAS ET. Use the wizard in SOPAS ET to do this. The SDD file can be installed from the product or the SICK website. To install it from the SICK website, you need an Internet connection.

#### Approach

1. Install the latest version of the SOPAS ET software and the current device description file (SDD file) for the product variant. In this case, select the “Complete” option as suggested by the installation wizard. Administrator rights may be required on the computer to install the software.
2. Start “SOPAS ET” after completing the installation.
3. Establish a connection between SOPAS ET and the product.
- ✓ The connection wizard starts automatically.  
The following IP addresses are configured by default on the product:
  - IP address P1: 192.168.0.1
  - Subnet mask: 255.255.255.0
4. Double-click on the desired product to add it to the project.
5. To open the product window, double-click the product in the **New Project** window.
6. Select display of the user interface.
- ✓ SOPAS ET establishes communication with the product and loads the associated device description file for the product.
7. In the **Wizard** window, click on the **Code Reading** button.
- ✓ The **Initial Setup** window appears.
8. Position the code within the displayed region. Follow the instructions.
- ✓ The effects of any parameter changes are directly visible.
- ✓ The product will continuously record images and automatically attempt to find the appropriate settings for the image and the decoder. If the read is successful, these settings can be saved directly.


### 7.2 Configuration with SOPAS ET

#### 7.2.1 Activate password protection

##### Overview

Reading and adjusting the parameter settings is possible ex works without a password. Password protection should be activated to protect the product against unauthorized changes to the settings.

**Procedure**

1. Establish a connection between SOPAS ET and the device.
  2. Open the device page by double-clicking on the tile of the connected device.
  - ✓ Automatic login with the user level **Authorized Client**.
  3. Open the **Parameters** folder in the structure tree.
  4. In the **General** window, tick the box for password protection.
  5. Click  to permanently save the settings on the device.
  - ✓ Password protection has now been activated.
  - ✓ When you call up the device page again, the **Operator** user level is now used.
- Adjusting the settings is only possible from the **Authorized Client** user level.

**7.2.2 Change password****Overview**

Change the passwords during initial commissioning to protect your device.

A higher user level can change the password of a lower user level.

User level	Default password
Operator	-
Maintenance	main
Authorized Client (Integrator)	client
Service	servicelevel

Table 11: User level and authorization

<b>Operator</b>	<p>An <b>Operator</b> level user can view the basic device parameters.</p> <ul style="list-style-type: none"> <li>• No password required</li> <li>• Read only permissions</li> <li>• Not all parameters are visible</li> </ul>
<b>Maintenance</b>	<p><b>Maintenance</b> can view the application-related device parameters.</p> <ul style="list-style-type: none"> <li>• Read only permissions</li> <li>• Not all parameters are visible</li> <li>• Can change the password for this user level</li> </ul>
<b>Authorized Client (Integrator)</b>	<p>Device parameters can be set as an <b>Authorized Client</b>.</p> <ul style="list-style-type: none"> <li>• Access to most parameters</li> <li>• Can change the password for this user level and the password for the <b>Maintenance</b> user level.</li> <li>• Can create a diagnostic report</li> </ul>
<b>Service</b>	<p>A <b>Service</b> level user can configure all device parameters.</p> <ul style="list-style-type: none"> <li>• Access to all parameters</li> <li>• Can change the password for this user level as well as the password for the user levels <b>Maintenance</b> and <b>Authorized Client</b></li> <li>• Can create a diagnostic report</li> <li>• Can perform firmware updates</li> </ul>

**Prerequisites**

- Password protection must be activated.
- To change the password, the **Maintenance** user level is required as the minimum.

**Procedure**

1. Establish a connection between SOPAS ET and the product.
2. Click on **Lector6xx** in the menu bar.

3. Under **Password** > select **Change password**.
4. Change desired password.

### 7.2.3 Configuring the product manually

1. In the **Online Image** window, click the **Live** button.
- ✓ In the **Live** mode, the product starts recording images consecutively. The product uses the current settings to decode them. The effects of any parameter changes are thus directly visible.



#### NOTE

Deactivated in Live mode



- Digital inputs and outputs
- Data output via the host interface

2. Align the product in the desired depth of field range with a medium-height object with a test code.
3. Click the **Camera & Illumination** configuration bar. Use the **Shutter timer** and **Brightness** sliders to adjust the image brightness so that the code is easy to see.
4. Only available in **Extended** mode: activate the sharpness diagnostic bar. To do this, go to the **Camera & Illumination** area and click the **Display sharpness** checkbox.

### 7.2.4 Continuing the configuration

1. Make additional settings (e.g. codes, triggers, data processing, data interface).
2. In the **Online Image** window, click the **Operation** button.
3. Test the settings during operational use.

### 7.2.5 Complete the configuration

1. To permanently save the parameter set in the product: Click the  button.
2. To permanently save the parameter set on the PC: Click the  button.


## 7.3 Configuration with operating buttons

The function buttons and the LEDs with their third display level can be used to manually configure the product.

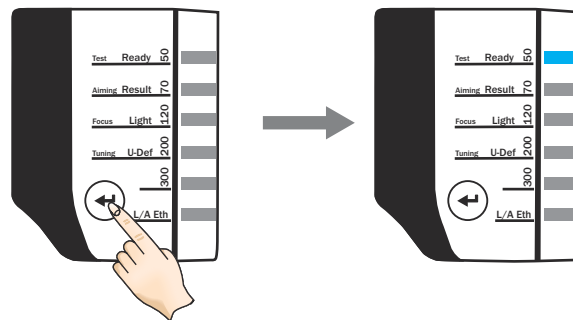



#### NOTE

The **Tuning** product function is not supported for pharmacodes.

1. To start **Live** mode, press the function button () for 3 seconds.

Press function key 3 seconds ①



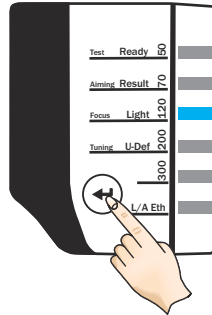
- ① Press the function button () for 3 seconds.

- ✓ The product exits the current read mode and switches into button operation mode.

The product now ignores all further external read cycles. The product no longer outputs any read results via the data interface.

- ✓ The product runs through all possible functions without executing them and then starts again from the beginning. The LEDs light up one after the other for 1.5 seconds for each function in the third display level (functions: **Test**, **Aiming**, **Focus**, **Tuning**). The product cyclically repeats the process.
- 2. To execute a function while the corresponding indication LED is lit, briefly press the function button (↩) once.  
Example: To switch to the **Focus** mode while the **Focus** indication LED is lit, briefly press the function button (↩) once.

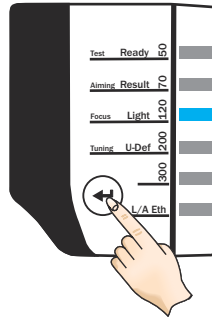
Press function key 1 x shortly ①



- ① Briefly press the function button (↩) once

- ✓ The product executes the respective function. Without having to press the push-button, the product automatically switches to read mode after 60 seconds.
- 3. To manually end (cancel) a function, press the function button (↩) again and hold for 3 seconds.

Press function key 3 seconds ①



- ① Press the function button (↩) for 3 seconds

- ✓ The product is ready for reading and is waiting for a read cycle.



#### NOTE

If the user does not press the function button (↩) for 3 seconds, after 20 seconds of cyclically lighting the LEDs, the product automatically exits the third display level and returns to operational use.



## 7.4 Saving the parameter set

### Overview

The parameter values in the working memory of the product can be modified in SOPAS ET. Current parameter values can then be permanently stored and therefore transferred to the permanent parameter memory of the product.

To be able to restore the parameter set to a replacement product, for example in the event of a product failure, you should also save the parameter set externally.

### Approach

1. To save the parameters permanently in SOPAS ET: Parameter > Save parameters  
.
- ✓ The product stores the parameter set internally in the permanent parameter memory.
2. In SOPAS ET, manually save the parameter set as a project file on the computer:  
.
- ✓ The parameter set is also saved externally. The parameter set in the project file can be transferred to a replacement product via download.

### Further topics

- [External data back-up](#)

## 7.5 External data back-up

The current parameter set can be manually saved and archived on the computer as a project file (\*.sopas-file with configuration data). This is the generally recommended procedure.

### External data back-up

1. Save the current parameter set in the permanent parameter memory of the product with the **Permanent** option.
2. Also save the parameter set manually as a project file (\*.sopas) on the computer.

The saved configuration data can be transferred via download to the replacement product and saved there permanently. This enables a product to be quickly exchanged with a replacement product of the same type.

## 8 Maintenance

### 8.1 Maintenance plan

During operation, the device works maintenance-free.



#### NOTE

No maintenance is required to ensure compliance with the laser class.



#### NOTE

No maintenance is required to ensure compliance with the LED risk group.

Depending on the assignment location, the following preventive maintenance tasks may be required for the device at regular intervals:

Table 12: Maintenance plan

Maintenance work	Interval	To be carried out by
Check device and connecting cables for damage at regular intervals.	Depends on ambient conditions and climate.	Specialist
Clean housing and viewing window.	Depends on ambient conditions and climate.	Specialist
Check the screw connections and plug connectors.	Depends on the place of use, ambient conditions or operating requirements. Recommended: At least every 6 months.	Specialist
Check that all unused connections are sealed with protective caps.	Depends on ambient conditions and climate. Recommended: At least every 6 months.	Specialist

### 8.2 Cleaning

Cleaning includes the viewing window and the housing of the device.



#### NOTICE

##### Damage to the inspection window.

Reduced read performance due to scratches or streaks on the window!

- Clean the window only when wet.
- Use a mild cleaning agent that does not contain powder additives. Do not use aggressive cleaning agents, such as acetone, etc.
- Avoid any movements that could cause scratches or abrasions on the window.
- Only use cleaning agents suitable for the screen material.



#### NOTICE

##### Equipment damage due to improper cleaning.

Improper cleaning may result in equipment damage.

- Only use recommended cleaning agents and tools.
- Never use sharp objects for cleaning.

#### Cleaning the viewing window

Check the viewing window of the device for accumulated dirt at regular intervals. This is especially important in harsh operating environments (dust, abrasion, damp, fingerprints, etc.).

The viewing window lens must be kept clean and dry during operation.



### NOTE

Static charging may cause dust particles to stick to the viewing window. This effect can be avoided by using an anti-static cleaning agent in combination with the SICK lens cloth.

The viewing window is made of plastic, see ["Technical data", page 52](#).

### Cleaning procedure:

- ▶ Switch off the device for the duration of the cleaning operation. If this is not possible, use suitable laser protection goggles. These must absorb radiation of the device's wavelength effectively.
- ▶ Clean the viewing window only with a clean, damp, lint-free cloth, and a mild anti-static lens cleaning fluid.



### NOTICE

If the inspection window is scratched or damaged (cracked or broken), the lens must be replaced. Contact SICK Support to arrange this.

- If the inspection window is cracked or broken, take the device out of operation immediately for safety reasons and have it repaired by SICK.

### Cleaning the housing

In order to ensure that heat is adequately dissipated from the device, the housing surface must be kept clean.

- ▶ Clear the build up of dust on the housing with a soft brush.



## 9 Troubleshooting

### 9.1 General faults, warnings, and errors

Possible faults and corrective actions are described in the table below for troubleshooting. In the case of faults that cannot be rectified using the information below, please contact SICK Service. To find your agency, see the final page of this document.



#### NOTE

To help us to resolve the matter quickly, please note down the details on the type label.

Situation	Error or fault
Mounting	<ul style="list-style-type: none"> <li>■ Product poorly aligned to objects with codes (e.g. glare)</li> <li>■ Incremental encoder (optional) incorrectly positioned</li> </ul>
Electrical installation	<ul style="list-style-type: none"> <li>■ Interfaces of the product incorrectly wired</li> </ul>
Configuration	<ul style="list-style-type: none"> <li>■ Functions not adapted to local conditions, e.g., parameters for the data interface not set correctly</li> <li>■ Technical limits not observed, e.g., working range, aperture angle</li> <li>■ Trigger source for read cycle not selected correctly</li> </ul>
Operation	<ul style="list-style-type: none"> <li>■ Product faults (hardware, software)</li> </ul>

### 9.2 Displaying the status log

#### Overview

The product saves only the last five entries for each error type. The status log is retained even after switching the product off and on again.

#### Error types

- Information
- Warning
- Error
- Critical fault

#### Approach

1. Connect the SOPAS ET configuration software to the product.
2. Opening the product in the project tree: **SERVICE > SYSTEM STATUS > SYSTEM INFORMATION** tab.

### 9.3 Repairs

Repair work on the device may only be performed by qualified and authorized personnel from SICK AG. Interruptions or modifications to the device by the customer will invalidate any warranty claims against SICK AG.

### 9.4 Returns

- ▶ Only send in devices after consulting with SICK Service.
- ▶ The device must be sent in the original packaging or an equivalent padded packaging.



### NOTE

To enable efficient processing and allow us to determine the cause quickly, please include the following when making a return:

- Details of the contact person
  - Description of the application
  - Description of the fault that occurred
- 

## 9.5 Replacing the product

### Important information

---



### CAUTION

**Risk of injury due to hot device surface.**

The surface of the product can become hot.

- Before performing work on the product (e.g. mounting, cleaning, disassembly), switch off the product and allow it to cool down.
  - Ensure good dissipation of excess heat from the product to the surroundings.
- 

### Transferring configuration data

The current configuration data can be transferred to a replacement product via download from the computer. The configuration data of the product is combined as a parameter set. The replacement product saves the parameter set to the permanent parameter memory.

#### Prerequisites:

- Product type identical
- Project file (\*.sopas) with current configuration data
- Connecting a computer to SOPAS ET

### Removing the product to be replaced:

1. Switch off the supply voltage to the product that is to be replaced.
2. Mark the position and alignment of the product on the bracket or surroundings.
3. Disconnect and remove all connecting cables from the product.
4. Remove the product from the bracket.

### Putting the replacement product into operation

1. Mount and align the replacement product. When doing so, note the previously applied markings on the bracket or surroundings.
2. Reconnect the connecting cables to the replacement product.
3. Switch on the supply voltage for the replacement product.
- ✓ The product starts with its last permanently saved parameter set. In the case of products that have not been used before, this corresponds to the factory default setting.
4. Establish a connection with the replacement product using the SOPAS ET configuration software.
5. Transfer the configuration data of the product to be replaced by downloading to the replacement product and permanently store this data in the device.

### Further topics

- [see "Saving the parameter set", page 45](#)
- ["External data back-up", page 46](#)

## 10 Decommissioning

### 10.1 Disposal

**CAUTION****Risk of injury due to hot device surface!**

The surface of the product can become hot.

- Before performing work on the product (e.g. mounting, cleaning, disassembly), switch off the product and allow it to cool down.
- Ensure good dissipation of excess heat from the product to the surroundings.

If a device can no longer be used, dispose of it in an environmentally friendly manner in accordance with the applicable country-specific waste disposal regulations. Do not dispose of the product along with household waste.

**NOTICE****Danger to the environment due to improper disposal of the device.**

Disposing of devices improperly may cause damage to the environment.

Therefore, observe the following information:

- Always observe the national regulations on environmental protection.
- Separate the recyclable materials by type and place them in recycling containers.

## 11 Technical data



### NOTE

The relevant online product page for your product, including technical data, dimensional drawing, and connection diagrams, can be downloaded, saved, and printed from the Internet.

The product page can be accessed via the **SICK Product ID: [pid.sick.com/{P/N}/{S/N}](https://pid.sick.com/{P/N}/{S/N})**.  
**{P/N}** corresponds to the part number of the product, see type label.

**{S/N}** corresponds to the serial number of the product, see type label (if indicated).

Please note: This documentation may contain further technical data.

### 11.1 Features

Type	Lector610	Lector611
Focus	V2D61xx-xxMxxxx: Manually adjustable focus with focus adjustment tool V2D61xx-xxLxxxx: Liquid lens, automatic focus adjustment	
Sensor resolution	0.3 Mpx (640 px x 480 px)	1.2 Mpx
Integrated illumination unit	<b>8 LEDs:</b> <ul style="list-style-type: none"> <li>4 LEDs with visible amber light (<math>\lambda = 617 \text{ nm} \pm 50 \text{ nm}</math>)</li> <li>4 LEDs with visible blue light (<math>\lambda = 470 \text{ nm} \pm 15 \text{ nm}</math>)</li> </ul>	
Feedback LED (spot in field of view)	<b>1 LED:</b> <ul style="list-style-type: none"> <li>Visible green light (<math>\lambda = 525 \text{ nm} \pm 15 \text{ nm}</math>)</li> <li>Visible red light (<math>\lambda = 635 \text{ nm} \pm 15 \text{ nm}</math>)</li> </ul>	
LED alignment aid (2 points in the field of view)	2 LEDs, can be deactivated: Visible red light ( $\lambda = 630 \text{ nm} \pm 15 \text{ nm}$ )	
LED risk group	<b>Integrated illumination unit:</b> Risk group 1 (low risk) according to IEC 62471-1: 2006-07 / EN 62471-1: 2008-09 including EU Directive 2006/25 / EC (DIN EN 62471:2009-03 is identical to EN 62471:2008-09).  <b>Radiance</b> <ul style="list-style-type: none"> <li><math>L_B^{1)}</math>: <math>&lt; 10 \times 10^3 \text{ W}/(\text{m}^2\text{sr})</math> within 100 seconds; at distance <math>\geq 200 \text{ mm}</math></li> <li><math>L_R^{2)}</math>: <math>&lt; 2.2 \times 10^6 \text{ W}/(\text{m}^2\text{sr})</math> within 10 seconds; at distance <math>\geq 200 \text{ mm}</math></li> </ul> <b>Distance-dependent hazard value</b> <ul style="list-style-type: none"> <li>Risk group 0 (no risk) based on <math>L_B^{1)}</math>: <math>&lt; 100 \text{ W}/(\text{m}^2\text{sr})</math> within 10,000 seconds; at a distance of <math>&gt; 2.0 \text{ m}</math>.</li> </ul> <b>Feedback LED, LED alignment aid and status LEDs:</b> Risk group 0 (no risk) according to IEC 62471-1: 2006-07 / EN 62471-1: 2008-09 including EU Directive 2006/25 / EC (DIN EN 62471:2009-03 is identical to EN 62471:2008-09).	
MTBF of LEDs	<b>Integrated illumination unit, feedback LED and LED alignment aid:</b> 75,000 h, at 25 °C ambient operating temperature	
Time-of-flight sensor	1 laser (distance measurement in configuration mode): Invisible infrared light (wavelength 940 nm, maximum output power $\leq 17.5 \text{ mW}$ , pulse length $\leq 3.7 \text{ ns}$ )	

Type	Lector610	Lector611
Laser class	<b>Time-of-flight sensor:</b> Class 1 Laser Product according to EN 60825-1:2014+A11:2021; IEC 60825-1:2014. Complies with 21 CFR 1040.10 except for conformance with IEC 60825-1 Ed. 3.0 as described in "Laser Notice 56" dated May 8, 2019.	
Scanning frequency	1.2 Mpx: maximum 40 Hz at full resolution	
Code resolution	<b>f = 12 mm:</b> <ul style="list-style-type: none"> <li>≥ 0.04 mm (1D code)</li> <li>≥ 0.08 mm (2D code)</li> </ul> <b>f = 6 mm:</b> <ul style="list-style-type: none"> <li>≥ 0.1 mm (1D code)</li> <li>≥ 0.2 mm (2D code)</li> </ul>	<b>f = 12 mm:</b> <ul style="list-style-type: none"> <li>≥ 0.02 mm (1D code)</li> <li>≥ 0.04 mm (2D code)</li> </ul> <b>f = 6 mm:</b> <ul style="list-style-type: none"> <li>≥ 0.05 mm (1D code)</li> <li>≥ 0.1 mm (2D code)</li> </ul>
	The code resolution depends on the lens and the working distance. The specifications are valid for 1D codes and 2D codes with good print quality.	
Working distance	50 mm ... 300 mm <sup>3)</sup>	
Lens	<b>Focal length</b> <ul style="list-style-type: none"> <li>V2D61xx-xxxxBxx: 6 mm</li> <li>V2D61xx-xxxxCxx: 12 mm</li> </ul>	

1) L<sub>B</sub>= Hazard from blue light.

2) L<sub>R</sub>= Hazard to the retina of the eye due to heating.

3) With internal illumination, can be extended to greater distances when using external lighting.  
 Valid for Data Matrix, PDF417, and 1D codes with good print quality.  
 For details: [Field of view](#).

## 11.2 Mechanics/electronics

	Lector610	Lector611
Electrical connection	1 cable (length: 0.35 m) with male connector, M12, 17-pin, A-coded <ul style="list-style-type: none"> <li>Maximum length: 30 m</li> <li>Maximum length when used as a serial interface: 15 m</li> </ul> 1 cable (length: 0.25 m) with female connector, M12, 4-pin, D-coded	
Supply voltage V <sub>S</sub>	DC 12 V ... 24 V, ± 15 % Voltage source in accordance with ES1 and PS2 (EN 62368-1) and according to SELV and LPS (EN 60950-1).	
Power consumption	Operation: 3.5 W typical <sup>1)</sup> Maximum 16 W (peak) with typical loading of the 3 digital outputs with 50 mA each and 27.6 V DC supply voltage	
Current consumption	Max. 1.5 A (peak) at 10.2 V DC	
Housing material	Die cast aluminum, plastic	
Housing color	Light blue (RAL 5012), black	
Viewing window material	Plastic (PMMA), 2 mm thick	
Enclosure rating	V2D61xx-xxxxx4: IP 54 (EN 60529, EN 60529 / A2) <sup>2)</sup> V2D61xx-xxxxx5: IP 65 (EN 60529, EN 60529 / A2) <sup>2)</sup>	
Protection class	III	
Electrical safety	EN 62368-1	
Weight	165 g, including connecting cables	

	Lector610	Lector611
<b>Dimensions (L x W x H)</b>	50 mm x 40.3 mm x 29.6 mm <sup>3)</sup>	

- 1) For digital outputs without load.
- 2) Prerequisites:
  - The electrical connections must be tightly screwed to the contacted female connector or male connector.
  - The Ethernet port, if not used, must be sealed with a tightly-fastened protective cap (as in the delivery condition).
- 3) see "Dimensional drawing", page 54.

## 11.3 Dimensional drawing

V2D61xx-xMxxxx

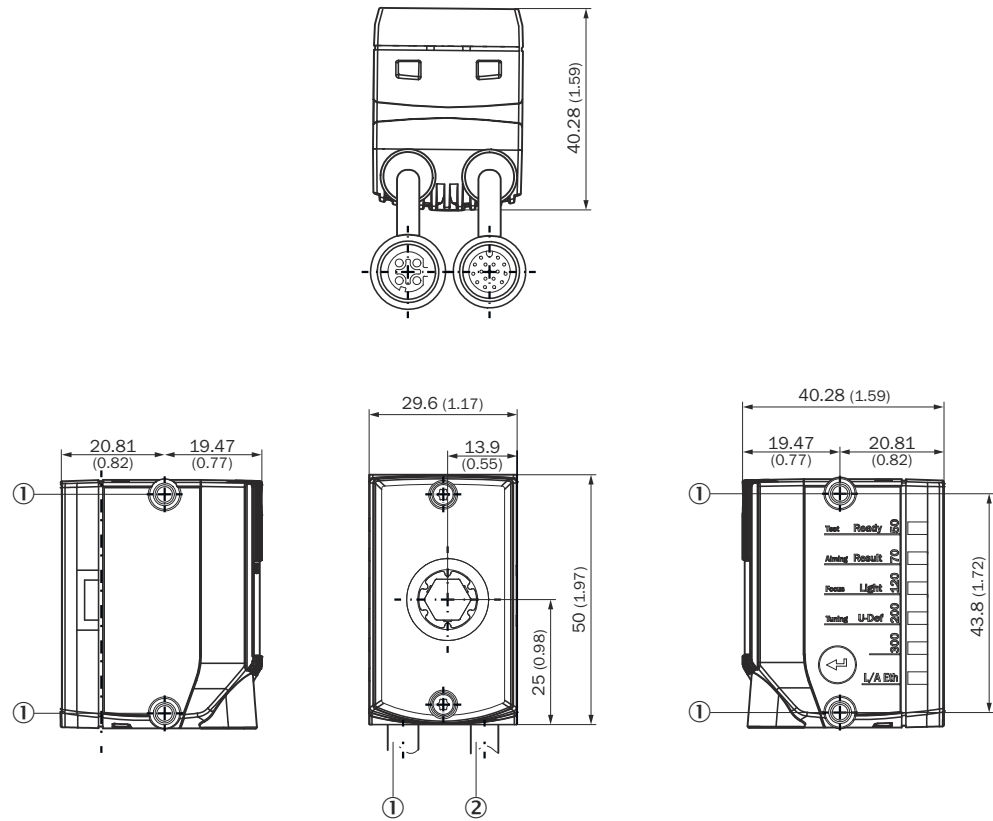


Figure 23: Structure and device dimensions, unit: mm (inch), decimal separator: period, product type V2D61xx-xMxxxx

- ① 4 threaded mounting holes (M4 through hole) 6.4 mm deep; maximum depth of thread 5 mm

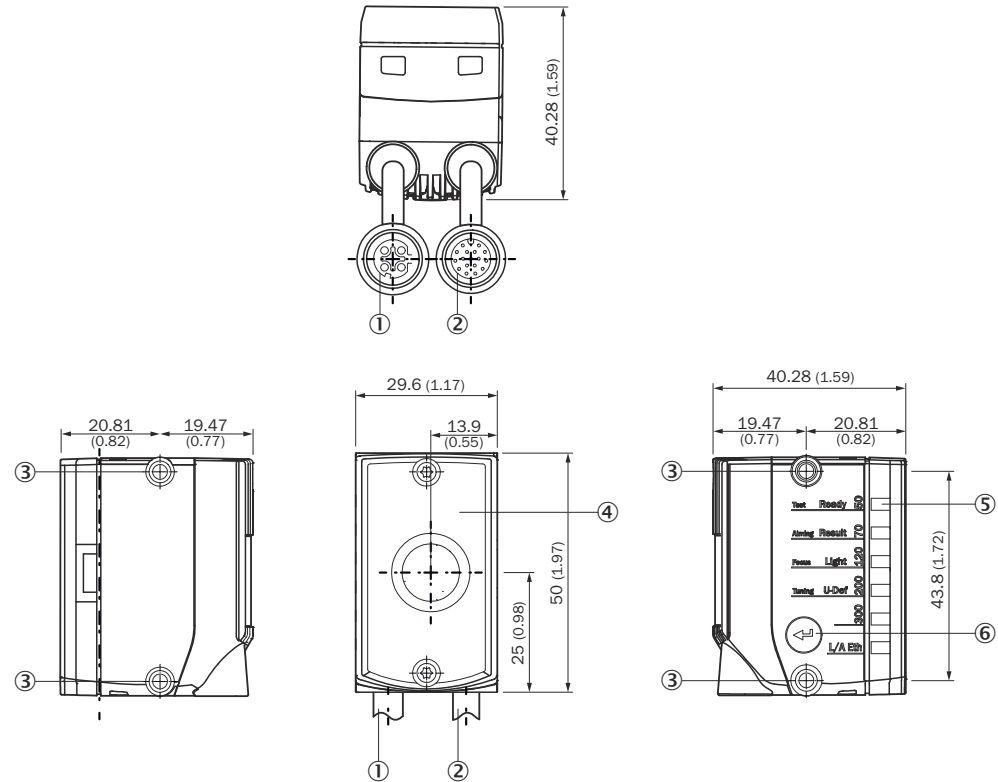
**V2D61xx-xLxxx**


Figure 24: Structure and device dimensions, unit: mm (inch), decimal separator: period, product type V2D61xx-xLxxx

- ① 4 threaded mounting holes (M4 through hole) 6.4 mm deep; maximum depth of thread 5 mm

## 11.4 Performance

Type	Lector610	Lector611
<b>Readable code structures</b>	1D, 2D, stacked codes, DPM	
<b>1D code types (bar code)</b>	GS1-128 / EAN 128, UPC / GTIN / EAN, 2/5 interleaved, Pharma-code, GS1 DataBar, Code 39, Code 128, Codabar, Code 32, Code 93, Plessey Code, MSI/Plessey, Telepen, postal codes	
<b>2D code types</b>	Data Matrix ECC200, GS1 Data Matrix, PDF417, PDF417 Truncated, QR code, MaxiCode	
<b>Code qualification</b>	On the basis of ISO/IEC 16022, ISO/IEC 15415, ISO/IEC 15416, ISO/IEC 18004	
<b>No. of codes per reading interval</b>	1 ... 50 (auto-discriminating)	
<b>No. of characters per reading interval</b>	Max. 500 (for multiplexer function in CAN network operation)	
<b>Evaluation time</b>	< 200 µs	> 60 µs
<b>Shutter time</b>	60 µs ... 6,000 µs	
<b>Automatic parameter switching</b>	Integrated	

## 11.5 Interfaces

	Lector610	Lector611
<b>Ethernet</b>	Protocol: <ul style="list-style-type: none"> <li>• TCP/IP</li> <li>• EtherNet/IP</li> <li>• Modbus® TCP</li> </ul> Function: host (data output of the read result) Function: AUX (service) <sup>1)</sup> Data transmission rate: 10/100 Mbit/s Services: DHCP, NTP, HTTP, mDNS, DNS-SD, DNS, HTTPS. MAC address (device-specific), see type label	
<b>Serial RS-232</b>	Function: host (data output of the read result) Data transmission rate: 0.3 kBd ... 115.2 kBd	
<b>CAN</b>	Protocol: <ul style="list-style-type: none"> <li>• A connection in a CANopen-based environment is possible. For additional support, please contact SICK customer service.</li> <li>• SICK CAN sensor network CSN (master/slave, multiplexer/server)</li> </ul> Function: host (data output of the read result) Data transmission rate: 20 kBit/s ... 1 MBit/s Bus length: maximum 30 m	
<b>PROFINET (line topology)</b>	Function: host (data output of read result), PROFINET Single Port Data transmission rate: 10/100 Mbit/s Function blocks for various PLC manufacturers are available online on the product page.	
<b>Digital inputs</b>	Type: 2 x physical, switching ("Sensor 1", "Sensor 2") $V_{in}^{2)} = \text{maximum } 27.6 \text{ V}$ , $I_{in}^{3)} = \text{max. } 5 \text{ mA}$ Opto-decoupled, not reverse polarity protected regarding supply voltage Debounce time: adjustable <sup>4)</sup> Encoder frequency: max. 300 Hz	
<b>Digital outputs</b>	Type: 3 x physical, switching ("Result 1" ... "Result 3") $V_{out}^{5)} = V_S^{6)} - 1.5 \text{ V}$ , $I_{out}^{7)} \leq 50 \text{ mA}$ (typical) Short-circuit protected, not electrically isolated from the supply voltage $V_S$	
<b>Reading pulse</b>	Digital inputs, free, serial interface, Ethernet, CAN, auto pulse or presentation mode	
<b>Optical indicators</b>	6 status LEDs on the side of the product 2 LED alignment aids on the front side of the product 1 feedback LED (green and red) as a light spot on the code	
<b>Operating elements</b>	1 function button (select function, start and end)	
<b>Operator interfaces</b>	Web server	
<b>Configuration software (parameterization)</b>	SOPAS ET configuration software, web server, CoLa commands (telegrams), fieldbus controller (PLC) with additional support by SICK function blocks, function button	
<b>Data storage and retrieval</b>	Image and data storage via internal memory and external FTP	
<b>Maximum encoder frequency</b>	300 Hz	

1) Service: Image display, configuration and diagnostics.

2) Input voltage.

3) Input current.

4) For example using the SOPAS ET configuration software.



- 5) Output voltage.
- 6) Supply voltage.
- 7) Output current.

## 11.6 Ambient data

Table 13: Technical data: Ambient data

	Lector610	Lector611
<b>Electromagnetic compatibility (EMC)</b>	Radiated emission: EN 61000-6-3:2007 + A1:2011 Electromagnetic immunity: EN 61000-6-2:2005-08	
<b>Vibration resistance</b>	EN 60068-2-6:2008-02	
<b>Shock resistance</b>	EN 60068-2-27:2009-05	
<b>Ambient operating temperature</b>	0 °C ... +40 °C <sup>1)</sup>	
<b>Storage temperature</b>	-20 °C ... +70 °C	
<b>Permissible relative humidity</b>	0% ... 90%, non-condensing	

<sup>1)</sup> To use the product at the maximum ambient operating temperature, mount it with an aluminum mounting bracket (e.g., part number 2113160, 2112790).

## 11.7 Field of view

### Overview

The field of view data are typical values and do not take into account lens or product tolerances. The values apply to a vertical object.

**Focal length: 6 mm**

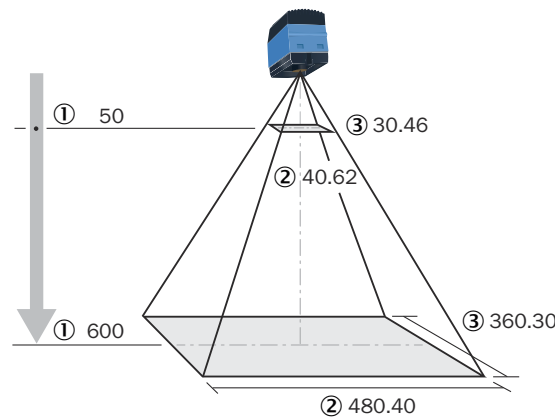


Figure 25: Field of view, focal length: 6 mm

- ① Working distance in mm
- ② Perceived field of view area: horizontal (mm)
- ③ Perceived field of view area: vertical (mm)

Table 14: Perceived field of view area

Working distance (mm)	Horizontal (mm)	Vertical (mm)
50	40.62	30.46

Working distance (mm)	Horizontal (mm)	Vertical (mm)
60	48.70	36.52
70	56.75	42.56
80	64.79	48.59
90	72.82	54.61
100	80.83	60.63
150	120.86	90.65
200	160.84	120.63
250	200.80	150.60
300	240.76	180.57
400	320.65	240.49
500	400.53	300.40
600	480.40	360.30

Table 15: Minimum resolution for Lector610

Working distance (mm)	1D code (mm)	2D code (mm)
50	0.1	0.16
150	0.3	0.5
300	0.5	1.0
600	1.0	2.0

Table 16: Minimum resolution for Lector611

Working distance (mm)	1D code (mm)	2D code (mm)
50	0.05	0.08
150	0.15	0.25
300	0.25	0.5
600	0.5	1.0

Focal length: 12 mm

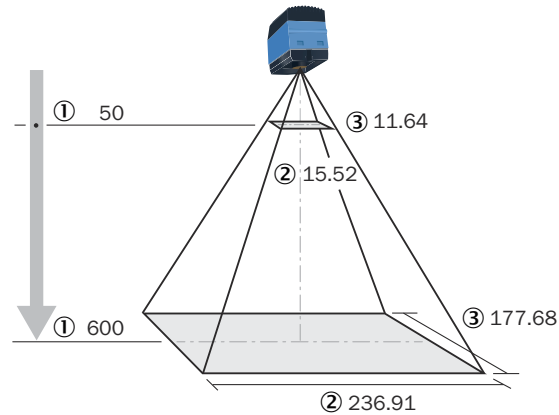


Figure 26: Field of view, focal length: 12 mm

- ① Working distance in mm
- ② Perceived field of view area: horizontal (mm)
- ③ Perceived field of view area: vertical (mm)

Table 17: Perceived field of view area

Working distance (mm)	Horizontal (mm)	Vertical (mm)
50	15.52	11.64
60	19.85	14.89
70	24.05	18.04
80	28.19	21.14
90	32.29	24.22
100	36.37	27.28
150	56.60	42.45
200	76.71	57.53
250	96.77	72.58
300	116.81	87.61
400	156.86	117.65
500	196.89	147.67
600	236.91	177.68

Table 18: Minimum resolution for Lector610

Working distance (mm)	1D code (mm)	2D code (mm)
50	0.04	0.08
150	0.16	0.25
300	0.25	0.5
600	0.5	1.0

Table 19: Minimum resolution for Lector611

Working distance (mm)	1D code (mm)	2D code (mm)
50	0.02	0.04

Working distance (mm)	1D code (mm)	2D code (mm)
150	0.08	0.125
300	0.125	0.25
600	0.25	0.5

## 11.8 Field of view diagrams

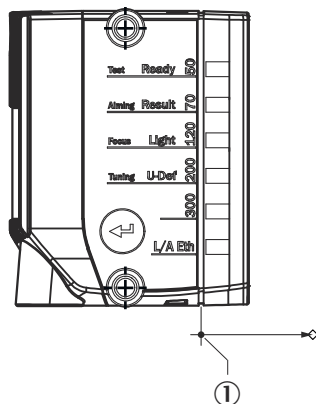
### Application design

Consider the following aspects:

- Field of view geometry of the device
- Position of the field of view in the space in front of the device.
- Possible reading angles at which the codes can occur with respect to the device.
- For the planned working distance: resultant field of view length and width and minimum possible resolution.

### Reference edge for the working distance

The working distance is measured from the edge of the blue part of the housing.



- ① Reference edge for the working distance from the device to the object

## Field of view diagram

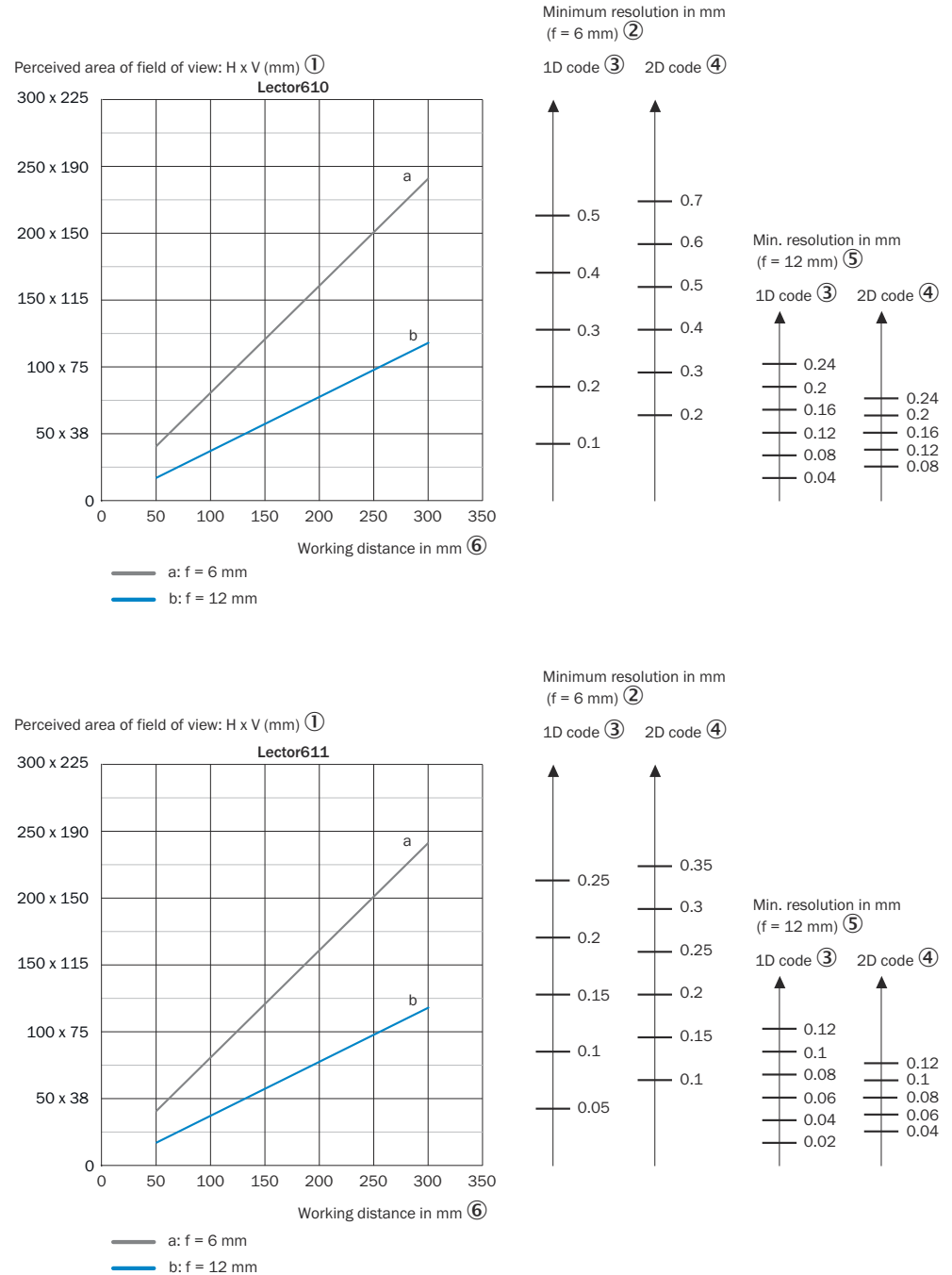


Figure 27: Field of view diagram for Lector610 and Lector611

- ① Perceived field of view area: horizontal x vertical (mm)
- ② Minimum resolution in mm (f = 6 mm)
- ③ 1D code
- ④ 2D code
- ⑤ Minimum resolution in mm (f = 12 mm)
- ⑥ Working distance in mm (reference edge: Blue edge of the housing facing the front screen)

### Interpretation aid for the field of view diagram

Using the diagram, you can determine the following data for each device type:

- The maximum working distance for a selected code resolution.
- The dimensions of the field of view that is available for this distance.

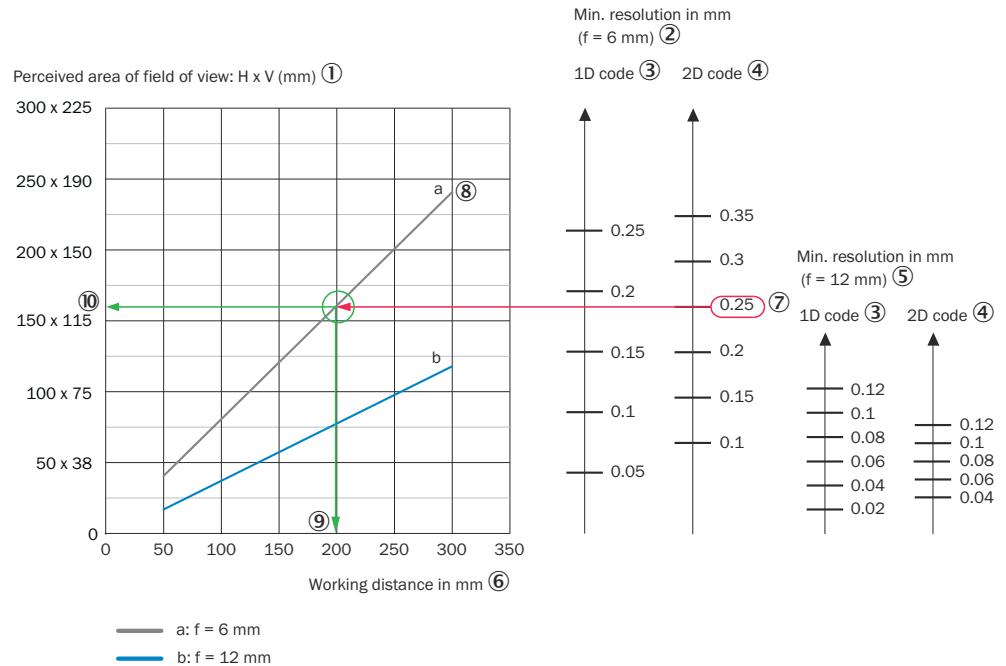


Figure 28: Interpretation aid for the field of view diagram (example, Lector611)

- ① Perceived field of view area: horizontal x vertical (mm)
- ② Minimum resolution in mm (f = 6 mm)
- ③ 1D code
- ④ 2D code
- ⑤ Minimum resolution in mm (f = 12 mm)
- ⑥ Working distance in mm
- ⑦ Selected code resolution
- ⑧ Focal length of lens, here example for f = 6 mm
- ⑨ Reading off: resultant maximum working distance
- ⑩ Reading off: Resulting perceived area of the field of view (mm x mm)

Given (in red):

- Code resolution for 2D code ⑦: 0.25 mm
- Focal length of lens ⑧: 6 mm

Read off (in green):

- Maximum working distance ⑨: approx. 190 mm
- Field of view ⑩: approx. 120 mm x approx. 160 mm

Both axes of the field of view diagrams must be interpreted linearly.

## 12 Accessories

**NOTE**

On the product page you will find accessories and, if applicable, related installation information for your product.

The product page can be accessed via the **SICK Product ID: [pid.sick.com/{P/N}/{S/N}](https://pid.sick.com/{P/N}/{S/N})**

**{P/N}** corresponds to the part number of the product, see type label.  
**{S/N}** corresponds to the serial number of the product, see type label (if indicated).

## 13 Annex

### 13.1 Declarations of conformity and certificates

You can download declarations of conformity and certificates via the product page.

The product page can be accessed via the **SICK Product ID: [pid.sick.com/{P/N}/{S/N}](https://pid.sick.com/{P/N}/{S/N})**

{P/N} corresponds to the part number of the product, see type label.

{S/N} corresponds to the serial number of the product, see type label (if indicated).

### 13.2 Signal assignment of cables with open cable end at one end

#### 13.2.1 “Power/SerialData/CAN/I/O” connection to customer-specific connection equipment or control cabinet

##### Adapter cable, straight female connector, open end

Part no. 2114287 (2 m), part no. 2114296 (5 m), part no. 2114297 (10 m), shielded, suitable for drag chain, deep-freeze compatible, PUR, halogen-free

Ambient temperature range:

For mobile installation:  $-20\text{ °C}$  to  $+80\text{ °C}$ , for fixed installation:  $-40\text{ °C}$  to  $+80\text{ °C}$

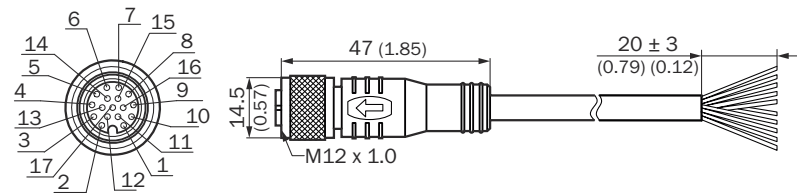


Figure 29: Adapter cable, e.g., part no. 2070425 (3 m)

Table 20: Signal assignment of adapter cable with open end

PIN	Signal	Function	Wire color
1	GND	Ground	Brown
2	V <sub>s</sub>	Supply voltage	Blue
3	CAN L	CAN bus (IN/OUT)	White
4	CAN H	CAN bus (IN/OUT)	Green
5	–	–	Pink
6	TxD (RS-232), host	Host interface (sender)	Yellow
7	–	–	Black
8	–	–	Gray
9	SensGND	Digital input ground	Red
10	Sensor 1	Digital input 1	Violet
11	–	–	Gray-pink
12	RxD (RS-232), host	Host interface (receiver)	Red-blue
13	Result 1	Digital output 1	White-green
14	Result 2	Digital output 2	Brown-green
15	Sensor 2	Digital input 2	White-yellow
16	Result 3	Digital input 3	Yellow-brown
17	N. c.	–	White-gray



### 13.2.2 “Power/SerialData/CAN/I/O” connection to customer-specific connection equipment or control cabinet

#### Adapter cable, straight female connector, open

Part no. 2075220 (5 m), shielded, suitable for 2 A, suitable for drag chain, deep-freeze compatible

Permitted currents for ambient temperature +40 °C:

- Contact 1 (blue) and contact 2 (brown): 2 A
- All other contacts: 1.5 A

Ambient temperature range:

For mobile installation: –25 °C to +40 °C, for fixed installation: –35 °C to +40 °C

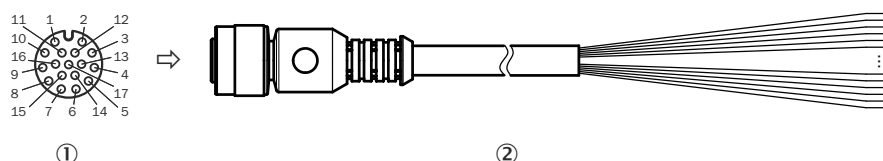


Figure 30: Adapter cable, part no. 2075220

- ① Female connector, M12, 17-pin, A-coded (front view)  
 ② Figure may differ.

Table 21: Signal assignment of adapter cable with open end

PIN	Signal	Function	Wire color
1	GND ssss	Ground	Blue
2	V <sub>S</sub>	Supply voltage	Brown
3	CAN L	CAN bus (IN/OUT)	Green
4	CAN H	CAN bus (IN/OUT)	White
5	N.c.	Not connected	Pink
6	TxD (RS-232), host	Host interface (sender)	Yellow
7	N.c.	Not connected	Black
8	N.c.	Not connected	Gray
9	SensGND	Ground for digital inputs	Gray-brown
10	Sensor 1	Digital input 1	Violet
11	N.c.	Not connected	Gray-pink
12	RxD (RS-232), host	Host interface (receiver)	Red-blue
13	Result 1	Digital output 1	White-green
14	Result 2	Digital output 2	Brown-green
15	Sensor 2	Digital input 2	White-yellow
16	Result 3	Digital input 3	Yellow-brown
17	N. c.	Not connected	White-gray

## 13.3 Connection diagrams of connection module CDB650-204

### 13.3.1 Connection of the device to CDB650-204

Device = Lector61x = V2D61xx- xxxxxEx

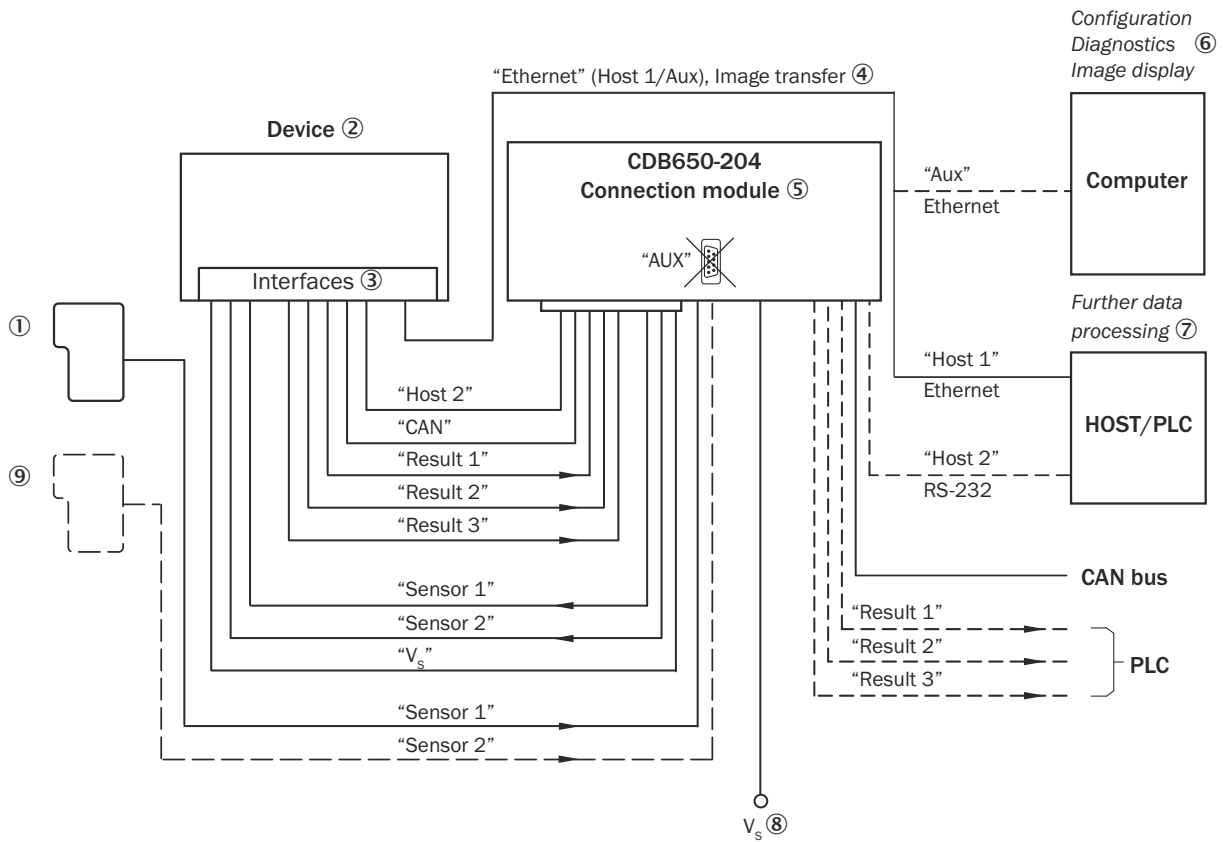


Figure 31: Connection of the device to peripherals via CDB650-204 (overview)

- ① External trigger sensor
- ② Device
- ③ Interfaces
- ④ Image transmission
- ⑤ Connection modules
- ⑥ Configuration, diagnostics or image display
- ⑦ Data further processing
- ⑧ Supply voltage  $V_s$
- ⑨ Can also be used as an alternative stop trigger (e.g., photoelectric sensor) or travel increment (incremental encoder), depending on the application

### 13.3.2 Wiring overview of the CDB650-204

Device = Lector61x = V2D61xx-xxxxEx, 1 digital input used

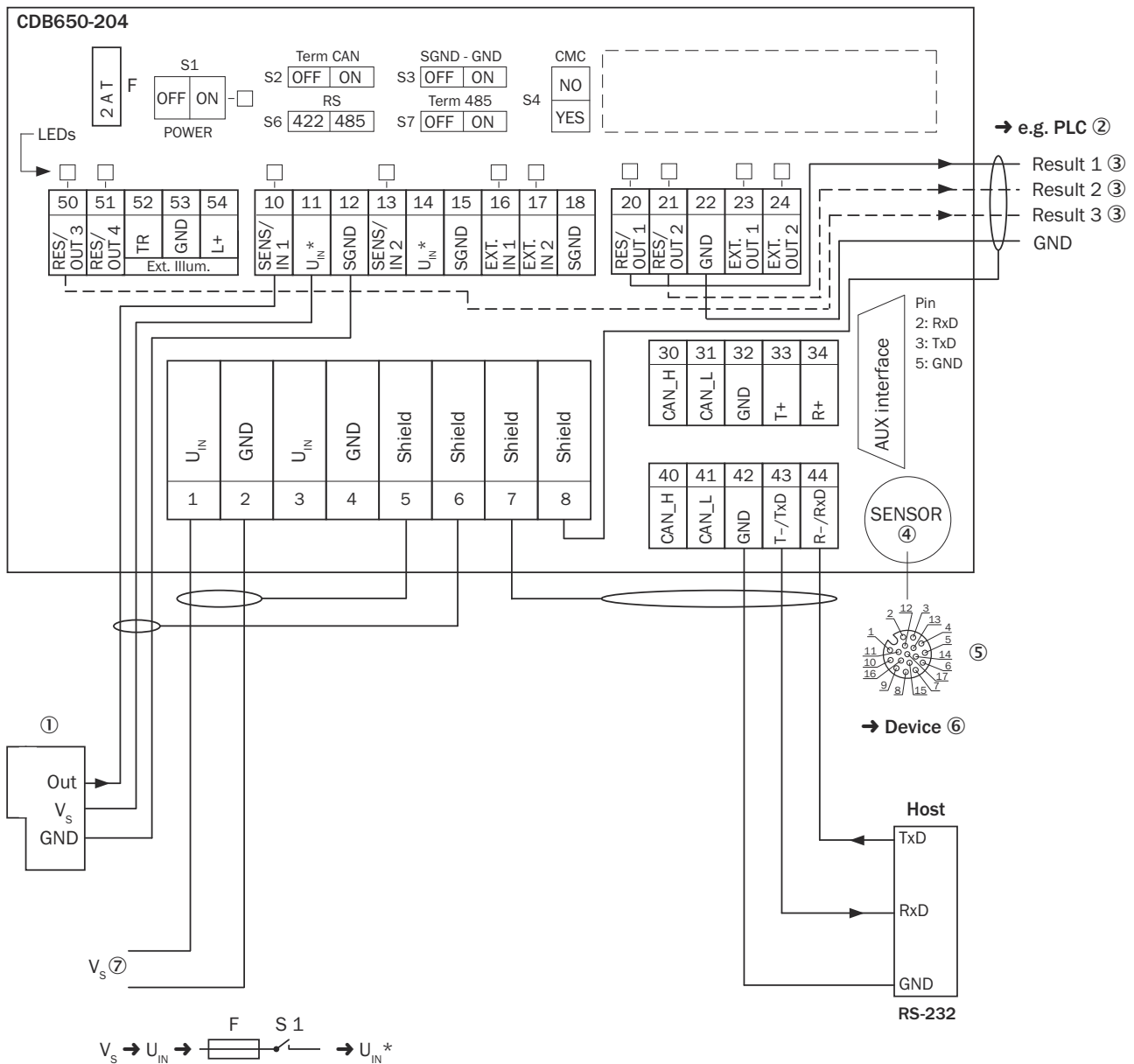


Figure 32: Connection of device and peripherals to the CDB650-204 connection module (overview).

- ① External trigger sensor
- ② E.g., PLC (programmable logic controller)
- ③ Name of the digital output
- ④ SENSOR = Device
- ⑤ Female connector, M12, 17-pin, A-coded
- ⑥ Device to be connected
- ⑦ Supply voltage  $V_s$

### 13.3.3 Connecting supply voltage for the device in CDB650-204

Device = Lector61x = V2D61xx- xxxxxEx

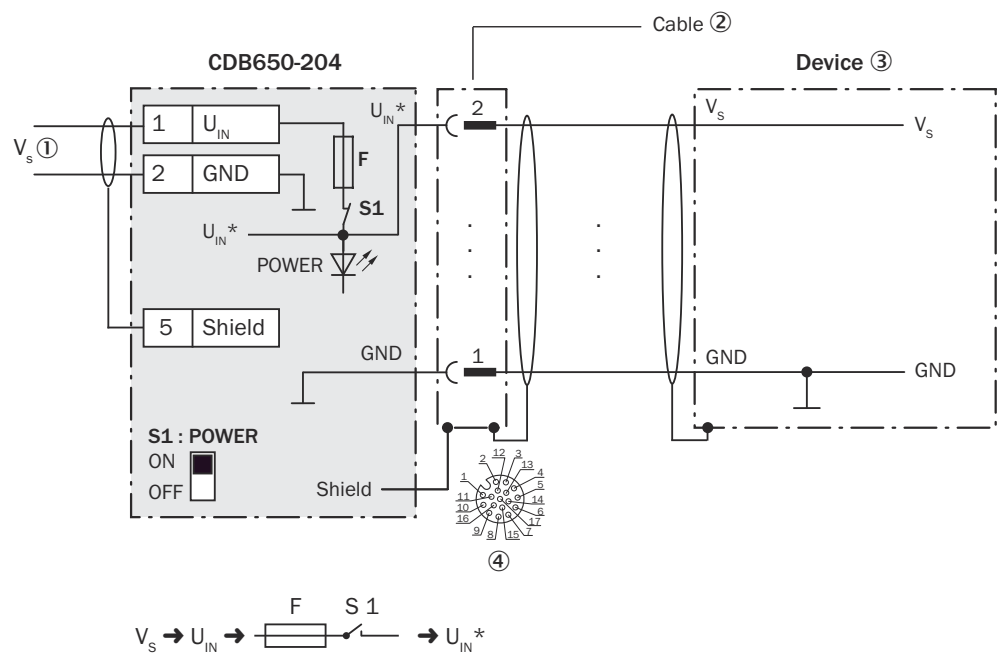


Figure 33: Connecting supply voltage for the device in CDB650-204 connection module.

- ① Supply voltage  $V_s$
- ② Connecting cable permanently connected with the device (male connector, M12, 17-pin, A-coded)
- ③ Device
- ④ Connection module: female connector, M12, 17-pin, A-coded

**Function of switch S1**

Table 22: Switch S1: Power

Switch setting	Function
ON	Supply voltage $U_{IN}$ connected to CDB650-204 and device via fuse and switch S1 as a supply voltage $U_{IN}^*$ Supply voltage $U_{IN}^*$ can be additionally tapped at terminals 11 and 14.
OFF	CDB650-204 and device disconnected from supply voltage Recommended setting for all connection work

**13.3.4 Wiring serial host interface RS-232 of the device in CDB650-204**

Device = Lector61x = V2D61xx- xxxxxEx

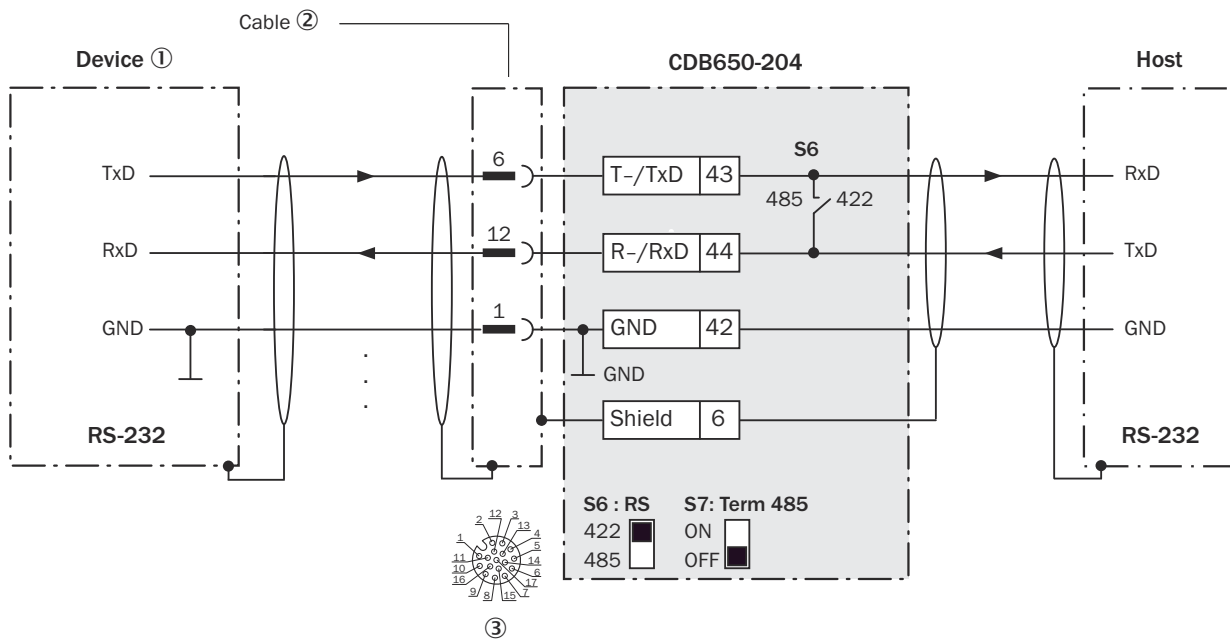


Figure 34: Wiring data interface RS-232 of the device in connection module CDB650-204.

- ① Device
- ② Connecting cable permanently connected with the device (male connector, M12, 17-pin, A-coded)
- ③ Connection module: female connector, M12, 17-pin, A-coded



#### NOTE

Activate the RS-232 data interface in the device using a configuration software, e.g., SOPAS ET.

### 13.3.5 Wiring the CAN interface of the device in the CDB650-204

Device = Lector61x = V2D61xx-xxxxEx

Not considered: connection and looping through of the supply voltage, connection of a trigger sensor for read cycle generation (e.g. at the CAN controller)

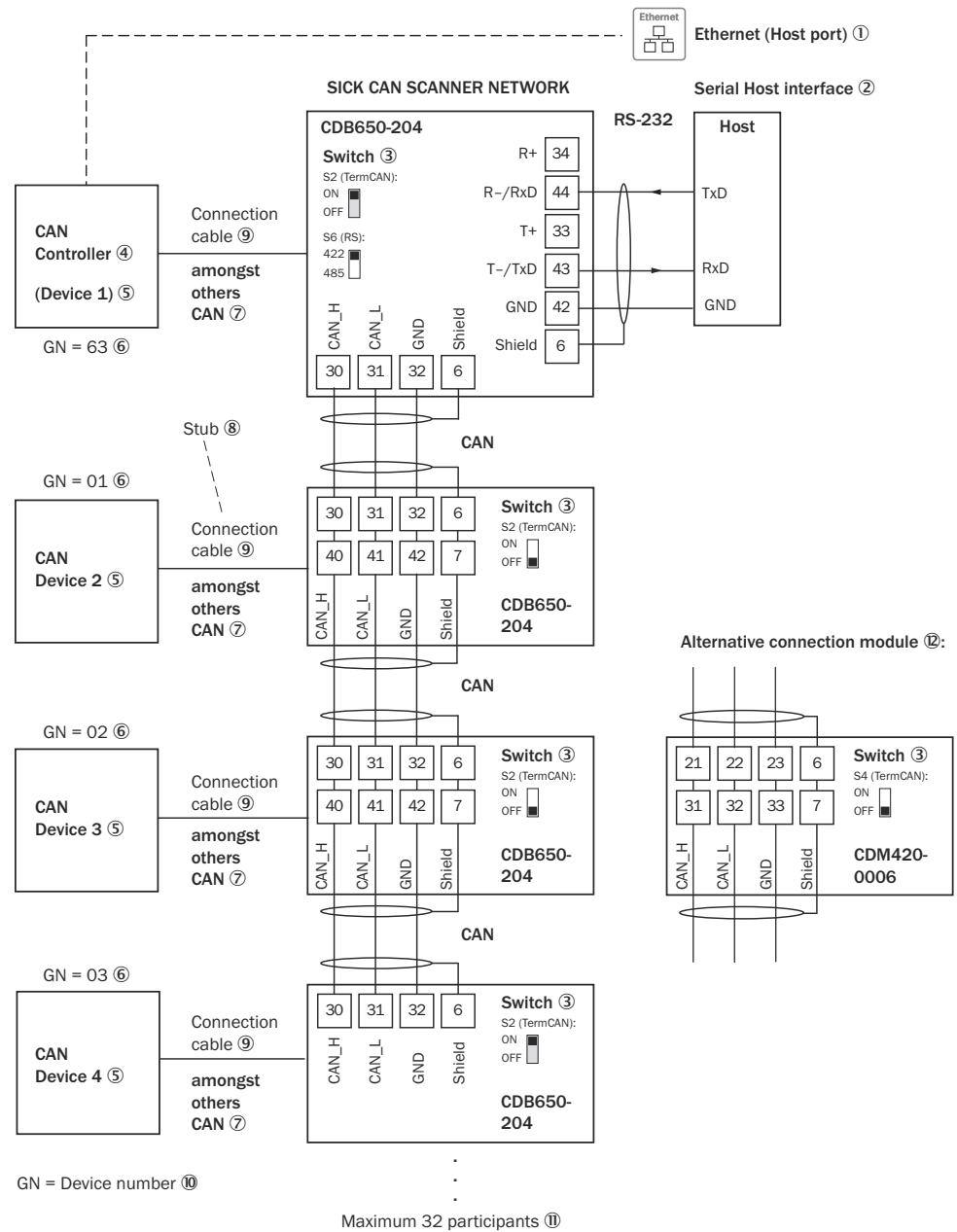


Figure 35: Wire the CAN interface of the device in the CDB650-204 connection module.

- ① Ethernet (host port)
- ② Serial host interface
- ③ Switch
- ④ CAN controller
- ⑤ CAN device
- ⑥ Device number
- ⑦ CAN etc.
- ⑧ Branch line
- ⑨ Connecting cable permanently connected with the device (male connector, M12, 17-pin, A-coded)
- ⑩ Device number (GN)
- ⑪ Maximum 32 users
- ⑫ Example of alternative connection module CDM420-0006

An adapter cable with female connector, M12, 17-pin, A-coded and male connector, D-Sub-HD, 15-pin is required to connect the device.



#### NOTE

Activate the CAN data interface in the device using a configuration software, e.g., SOPAS ET.

Configure further settings in the device according to the function of the device in the system configuration.

### 13.3.6 Wiring digital inputs of the device in the CDB650-204

Device = Lector61x = V2D61xx- xxxxxEx

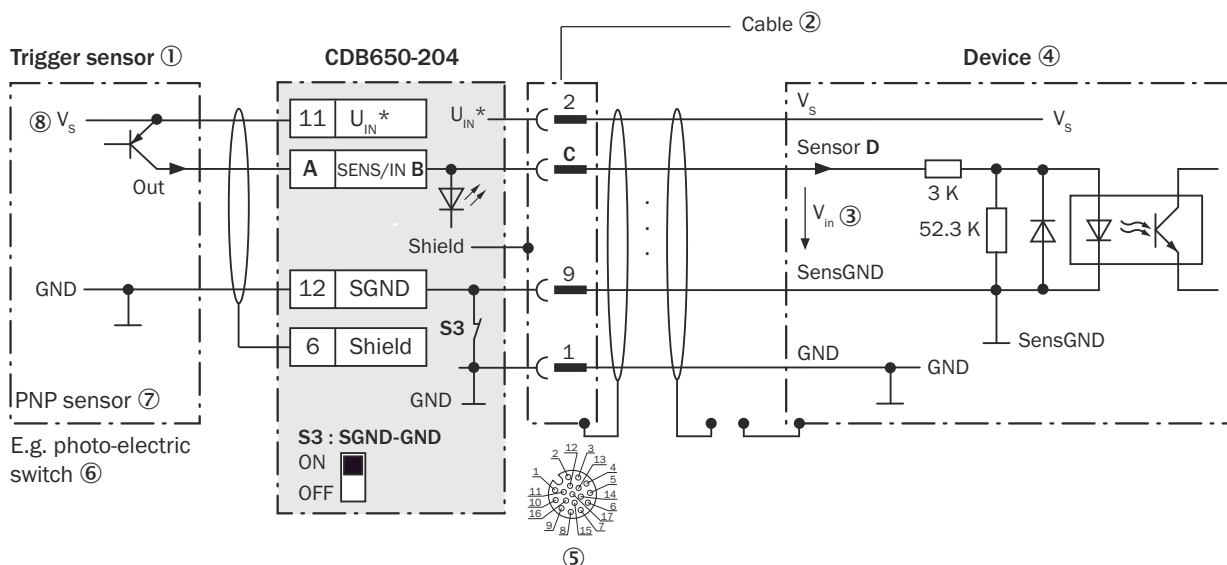


Figure 36: Trigger sensor supplied with power by connection module CDB650-204.

- ① Trigger sensor
- ② Connecting cable permanently connected with the device (male connector, M12, 17-pin, A-coded)
- ③ Input voltage  $V_{in}$
- ④ Device
- ⑤ Connection module: female connector, M12, 17-pin, A-coded
- ⑥ E.g. photoelectric sensor
- ⑦ PNP sensor
- ⑧ Supply voltage  $V_s$

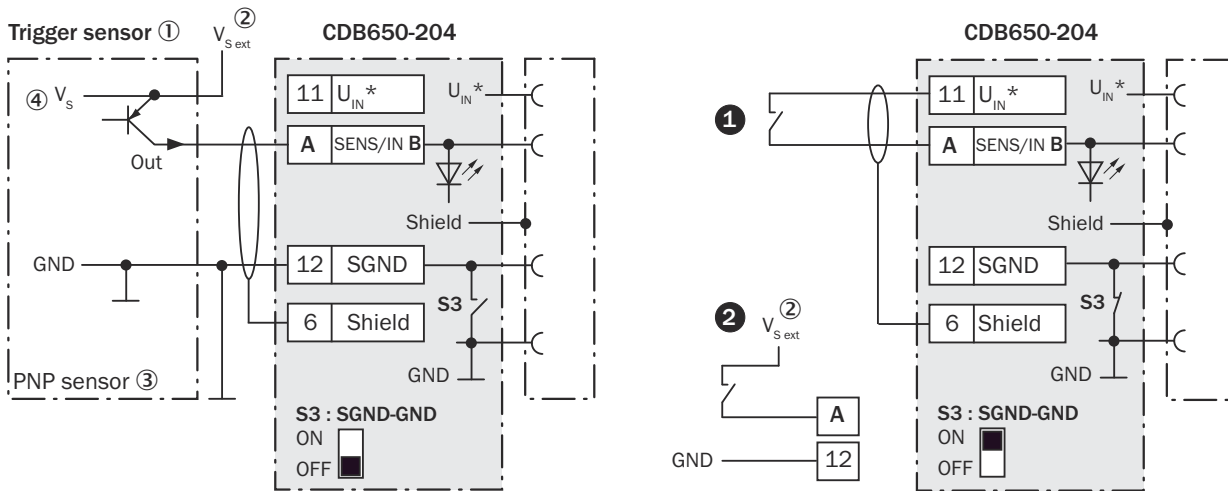


Figure 37: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ① supplied with power by connection module CDB650-204 or ② connected potential-free and supplied with power externally. Now select switch setting S3 as shown in the left figure.

- ① Trigger sensor, e.g., for read cycle generation
- ② External supply voltage  $V_{s\ ext}$
- ③ PNP sensor
- ④ Supply voltage  $V_s$

Table 23: Assignment of placeholders to the digital inputs

CDB650-204			Device
Terminal A	Signal B	Pin C	Sensor D
10	SENS/IN 1	10	1
13	SENS/IN 2	15	2

### Function of switch S3

Table 24: Switch S3: SGND-GND

Switch setting	Function
ON	GND of the trigger sensor is connected with GND of CDB650-204 and GND of the device
OFF	Trigger sensor is connected volt-free at CDB650-204 and the device. Common, isolated reference potential of all digital inputs is SGND.

### Characteristic data of the digital inputs

Table 25: Characteristic data of the digital inputs "Sensor 1" and "Sensor 2"

Type	Switching
------	-----------



<b>Switching behavior</b>	Power to the input starts the assigned function, e.g. start read cycle. Default setting in the device: logic not inverted (active high), debounce time 10 ms
<b>Properties</b>	<ul style="list-style-type: none"> <li>• Opto-decoupled, reverse polarity protected</li> <li>• Can be wired with PNP output of a trigger sensor</li> </ul>
<b>Electrical values</b>	Low: $V_{in}^{1)} \leq 2 \text{ V}$ ; $I_{in}^{2)} \leq 0.3 \text{ mA}$ High: $6 \text{ V} \leq V_{in} \leq 27.6 \text{ V}$ ; $0.7 \text{ mA} \leq I_{in} \leq 5 \text{ mA}$

- 1) Input voltage.  
2) Input current.

**NOTE**

Assign the functions for the digital inputs in the device using a configuration software, e.g., SOPAS ET.

### 13.3.7 Wiring digital outputs of the device in the CDB650-204

Device = Lector61x = V2D61xx-xxxxxEx

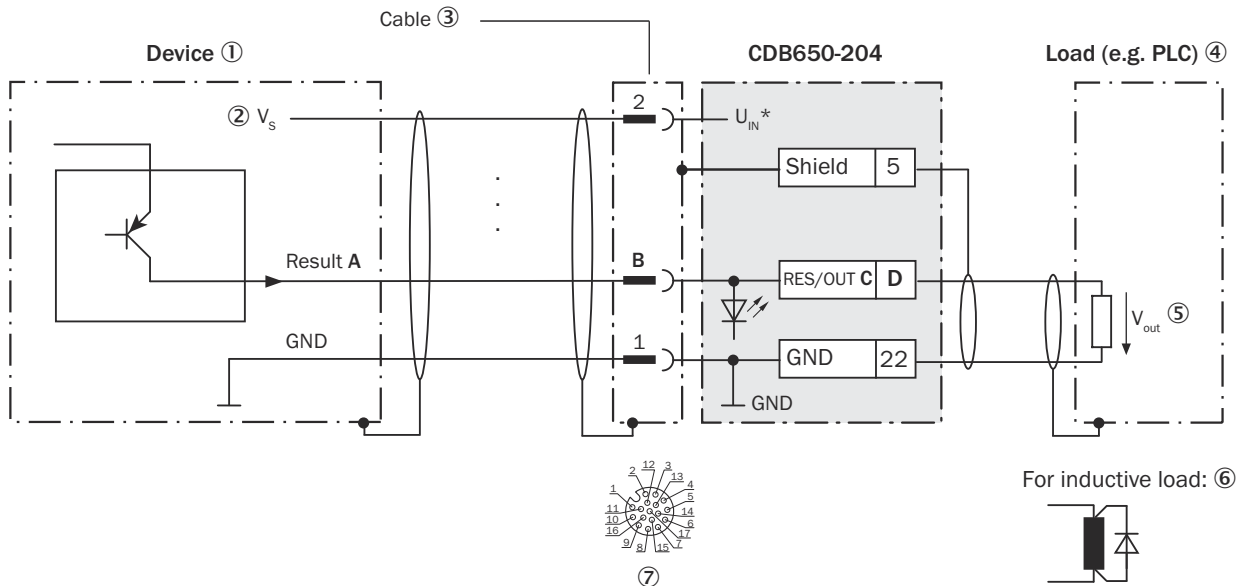


Figure 38: Wire the digital output in the CDB650-204 connection module.

- ① Device
- ② Supply voltage  $V_s$
- ③ Connecting cable permanently connected with the device (male connector, M12, 17-pin, A-coded)
- ④ Load (e.g. PLC)
- ⑤ Output voltage  $V_{out}$
- ⑥ With inductive load: see note
- ⑦ Connection module: female connector, M12, 17-pin, A-coded

#### Inductive load

**NOTE**

Provide an arc-suppression switch at the digital output if inductive load is present.

- Attach a freewheeling diode directly to the load for this purpose.

Table 26: Assignment of placeholders to the digital outputs

Device		CDB650-204	
Output A	Pin B	Signal C	Terminal D
Result 1	13	RES/OUT 1	20
Result 2	14	RES/OUT 2	21
Result 3	16	RES/OUT 3	50

**Characteristic data of the digital outputs**

Table 27: Characteristic data of the digital switching outputs

Type	Switching
Switching behavior	PNP switching to supply voltage $V_S$ Default settings in the device: no function, logic: not inverted (active high)
Properties	<ul style="list-style-type: none"> <li>Short-circuit protected and temperature protected</li> <li>Not electrically isolated from <math>V_S</math></li> </ul>
Electrical values	$0 \text{ V} \leq V_{\text{out}}^{1)} \leq V_S$ $(V_S - 1.5 \text{ V}) \leq V_{\text{out}} \leq V_S$ at $I_{\text{out}}^{2)} \leq 50 \text{ mA}$

1) Output voltage.

2) Output current.

**NOTE**

Allocate the functions for the digital outputs in the device using a configuration software, e.g., SOPAS ET.

**13.4 Connection diagrams of connection module CDM420-0006****13.4.1 Connection of the device to CDM420-0006**

Device = Lector61x = V2D61xx-xxxxxEx

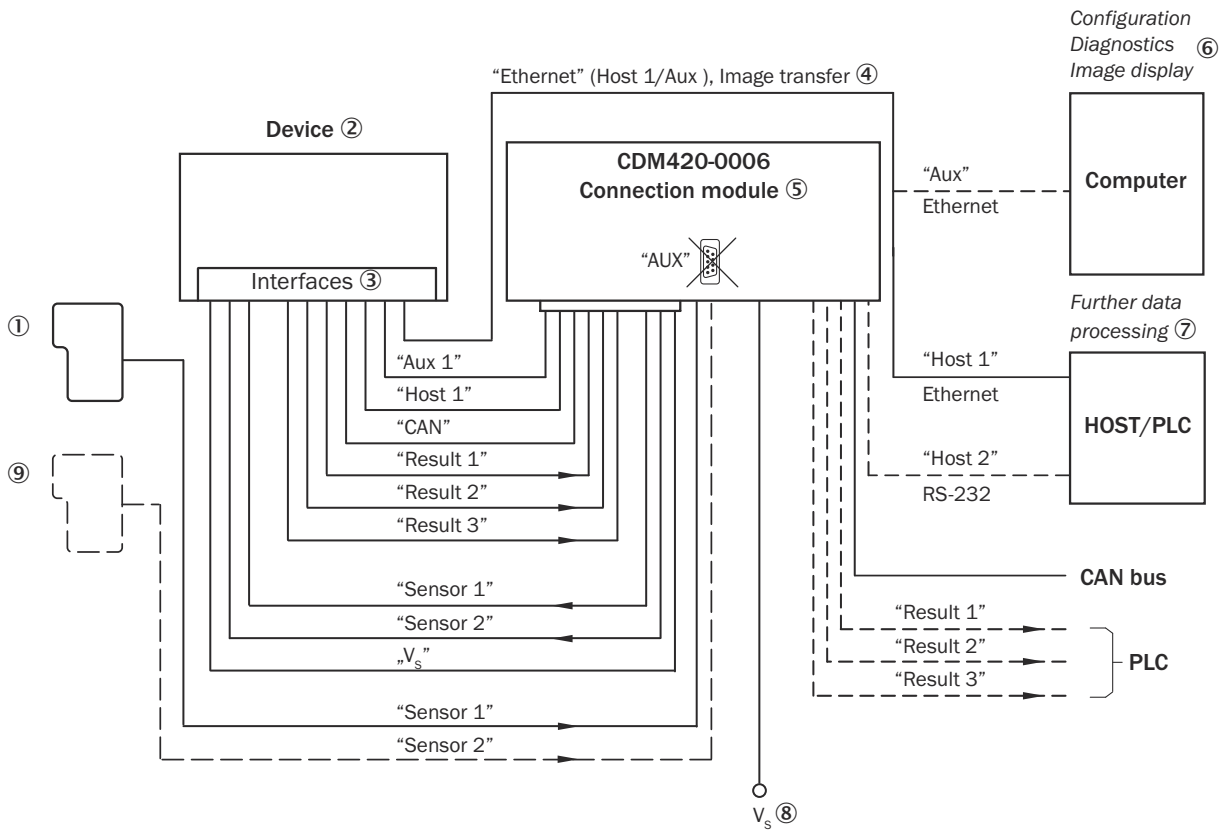


Figure 39: Connection of the device to peripherals via CDM420-0006 (overview)

- ① External trigger sensor
- ② Device
- ③ Interfaces
- ④ Image transmission
- ⑤ Connection modules
- ⑥ Configuration, diagnostics or image display
- ⑦ Data further processing
- ⑧ Supply voltage  $V_s$
- ⑨ Application-dependent alternative stop trigger (e.g., photoelectric sensor) or travel increment (incremental encoder)

### 13.4.2 Wiring overview of the CDM420-0006

Device = Lector61x = V2D61xx-xxxxEx

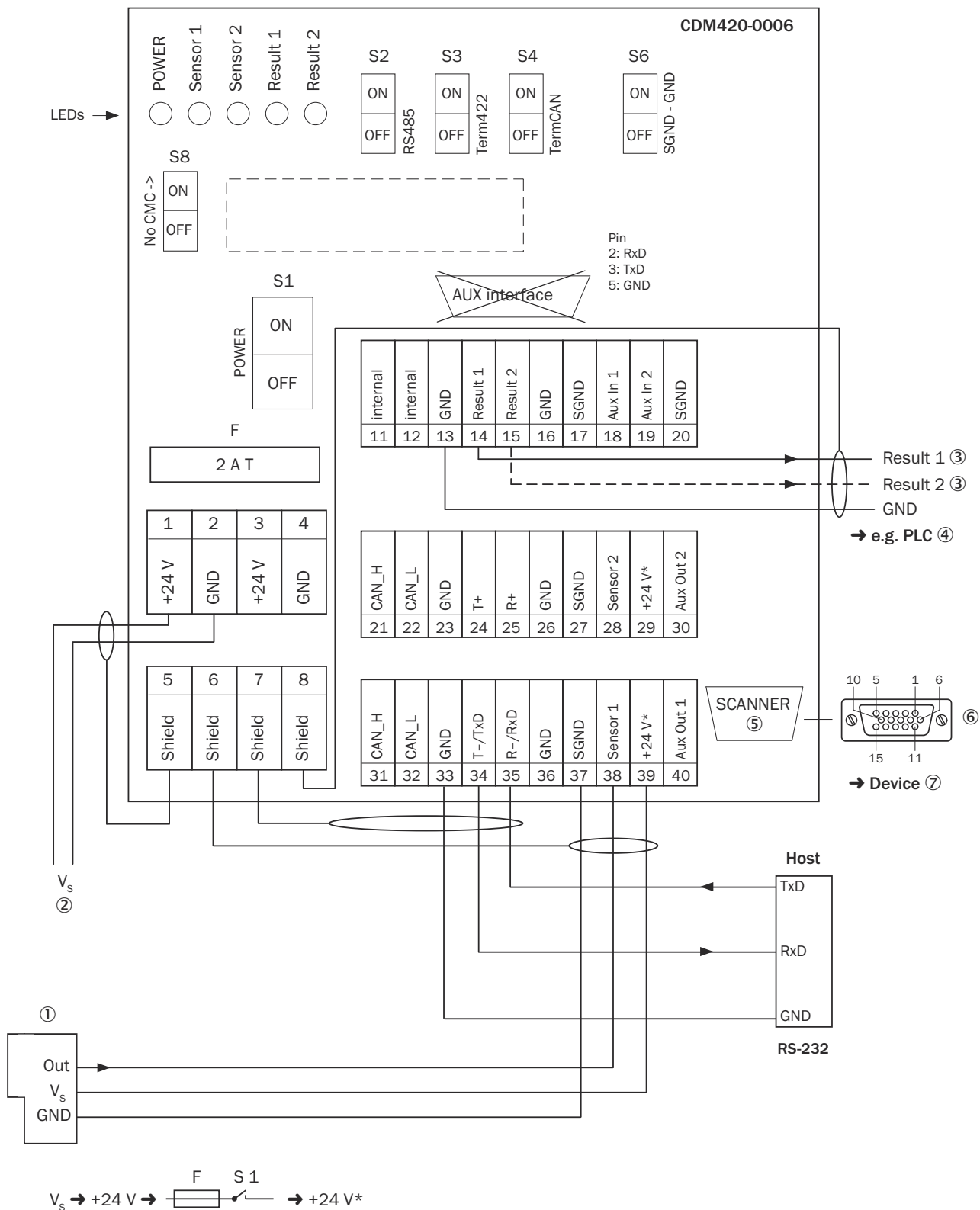


Figure 40: Connection of device and peripherals to the CDM420-0006 connection module (overview).

- ① External trigger sensor
- ② Supply voltage  $V_s$
- ③ Name of the digital output
- ④ E.g., PLC (programmable logic controller)
- ⑤ SCANNER = Device
- ⑥ Female connector, D-Sub-HD, 15-pin
- ⑦ Device to be connected

### 13.4.3 Connecting supply voltage for the device in CDM420-0006

Device = Lector61x = V2D61xx-xxxxxEx

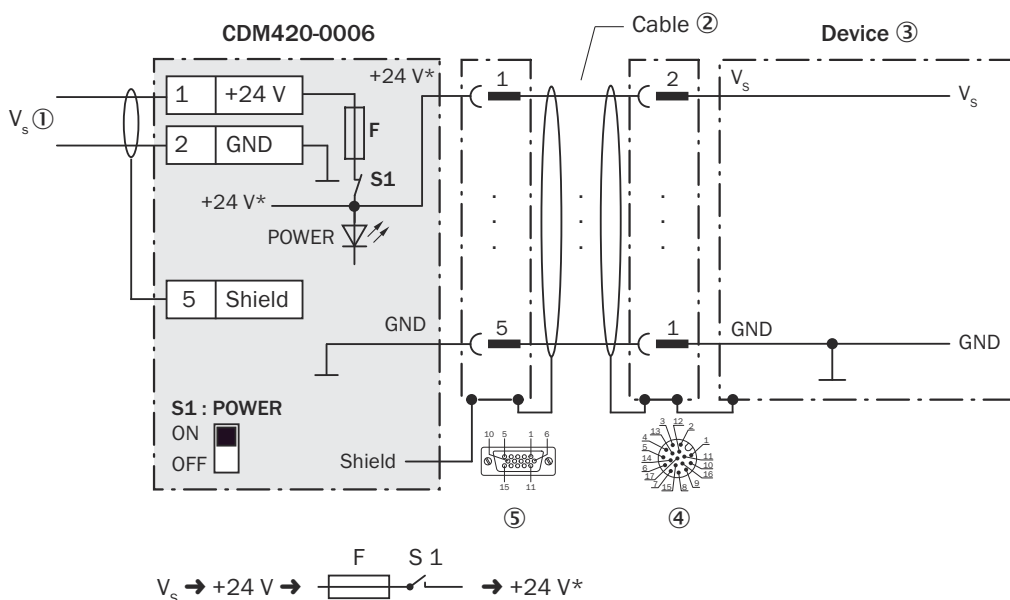


Figure 41: Connecting supply voltage for the device in CDM420-0006 connection module.

- ① Supply voltage  $V_s$
- ② Adapter cable with male connector, D-Sub-HD, 15-pin and female connector, M12, 17-pin, A-coded
- ③ Device
- ④ Connecting cable with male connector, M12, 17-pin, A-coded permanently connected with the device
- ⑤ Connection module: female connector, D-Sub-HD, 15-pin

#### Function of switch S1

Table 28: Switch S1: Power

Switch setting	Function
ON	Supply voltage +24 V connected to CDM420-0006 and device via fuse as +24 V* supply voltage Supply voltage +24 V* can be additionally tapped at terminals 29 and 39
OFF	CDM420-0006 and device disconnected from supply voltage Recommended setting for all connection work

### 13.4.4 Wiring serial host interface RS-232 of the device in the CDM420-0006

Device = Lector61x = V2D61xx-xxxxxEx

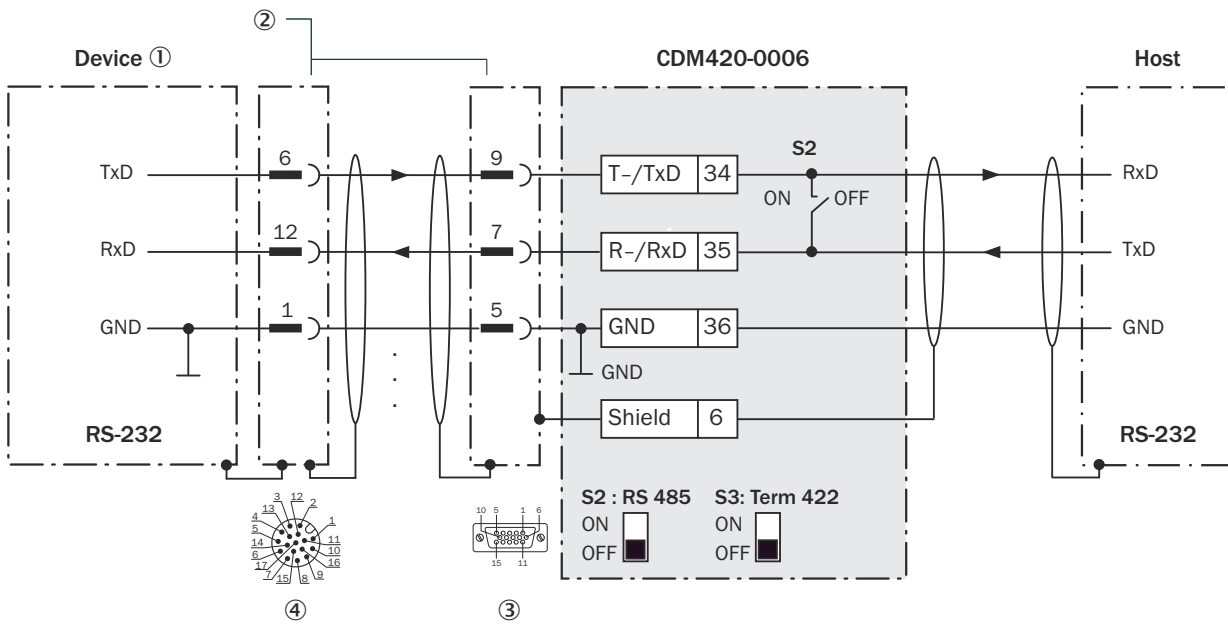


Figure 42: Wiring data interface RS-232 of the device in connection module CDM420-0006.

- ① Device
- ② Adapter cable with male connector, D-Sub-HD, 15-pin and female connector, M12, 17-pin, A-coded
- ③ Connection module: female connector, D-Sub-HD, 15-pin
- ④ Connecting cable permanently connected with the device (male connector, M12, 17-pin, A-coded)



#### NOTE

Activate the RS-232 data interface in the device using a configuration software, e.g., SOPAS ET.

### 13.4.5 Wiring the CAN interface of the device in the CDM420-0006

Device = Lector61x = V2D61xx-xxxxEx

Not considered: connection and looping through of the supply voltage, connection of a trigger sensor for read cycle generation (e.g. at the CAN controller)

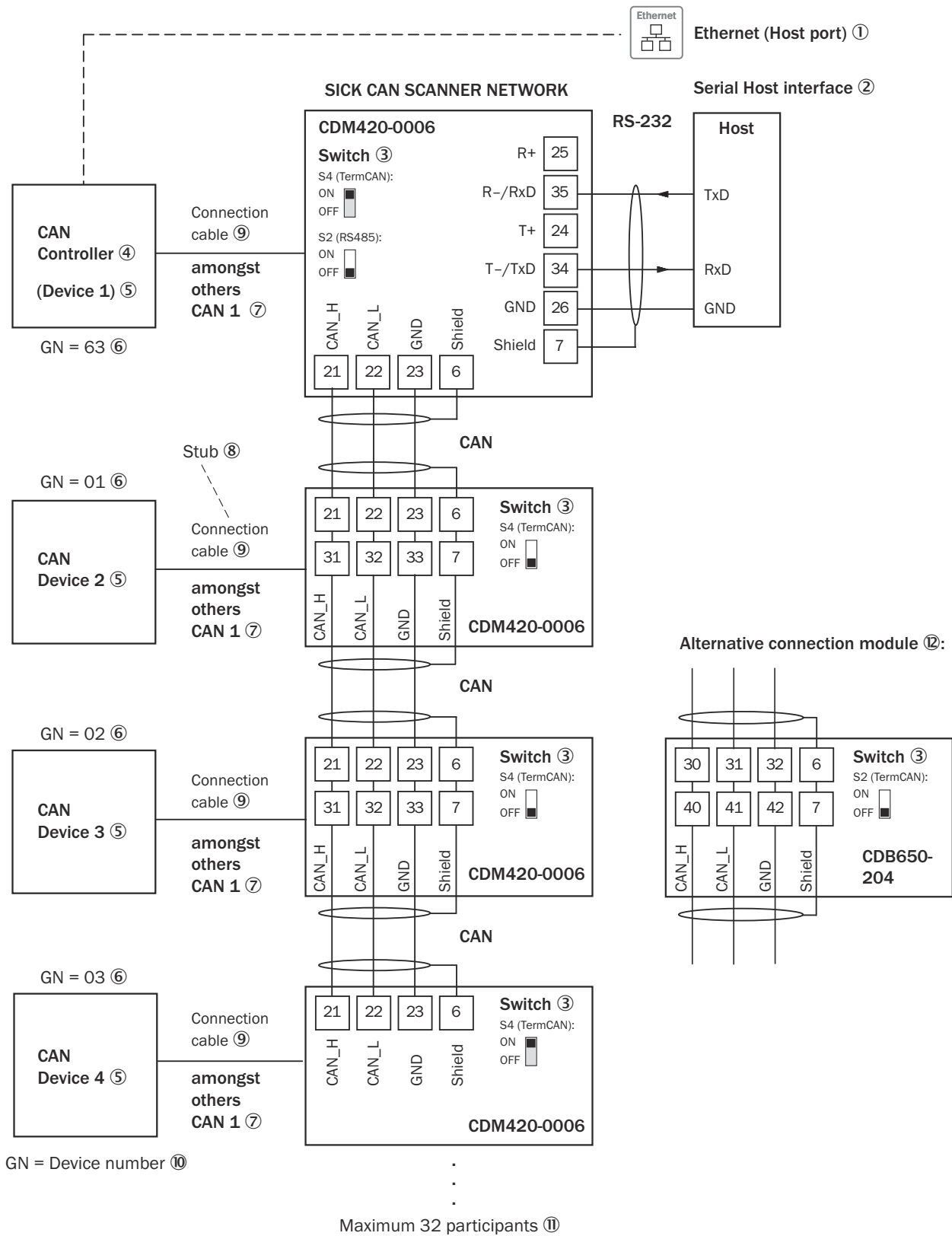


Figure 43: Wire the CAN interface of the device in the CDM420-0006 connection module.

- ① Ethernet (host port)
- ② Serial host interface
- ③ Switch
- ④ CAN controller
- ⑤ CAN device
- ⑥ Device number
- ⑦ CAN etc.
- ⑧ Branch line
- ⑨ Adapter cable with female connector, M12, 17-pin, A-coded and male connector, D-Sub-HD, 15-pin
- ⑩ Device number (GN)
- ⑪ Maximum 32 users
- ⑫ Example of alternative connection module:  
CDB650-204

**NOTE**

Activate the CAN data interface in the device using a configuration software, e.g., SOPAS ET.

Configure further settings in the device according to the function of the device in the system configuration.

### 13.4.6 Wiring digital inputs of the device in the CDM420-0006

Device = Lector61x = V2D61xx-xxxxEx

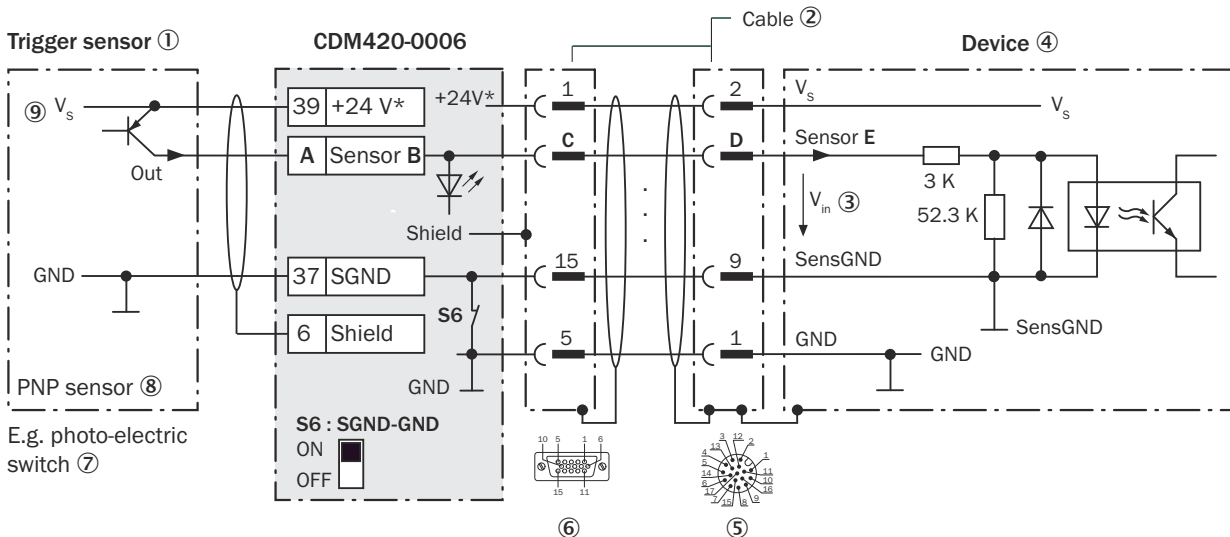


Figure 44: Trigger sensor supplied with power by connection module CDM420-0006

- ① Trigger sensor
- ② Adapter cable with male connector, D-Sub-HD, 15-pin and female connector, M12, 17-pin, A-coded
- ③ Input voltage  $V_{in}$
- ④ Device
- ⑤ Connecting cable permanently connected with the device (male connector, M12, 17-pin, A-coded)
- ⑥ Connection module: female connector, D-Sub-HD, 15-pin
- ⑦ E.g. photoelectric sensor
- ⑧ PNP sensor
- ⑨ Supply voltage  $V_s$



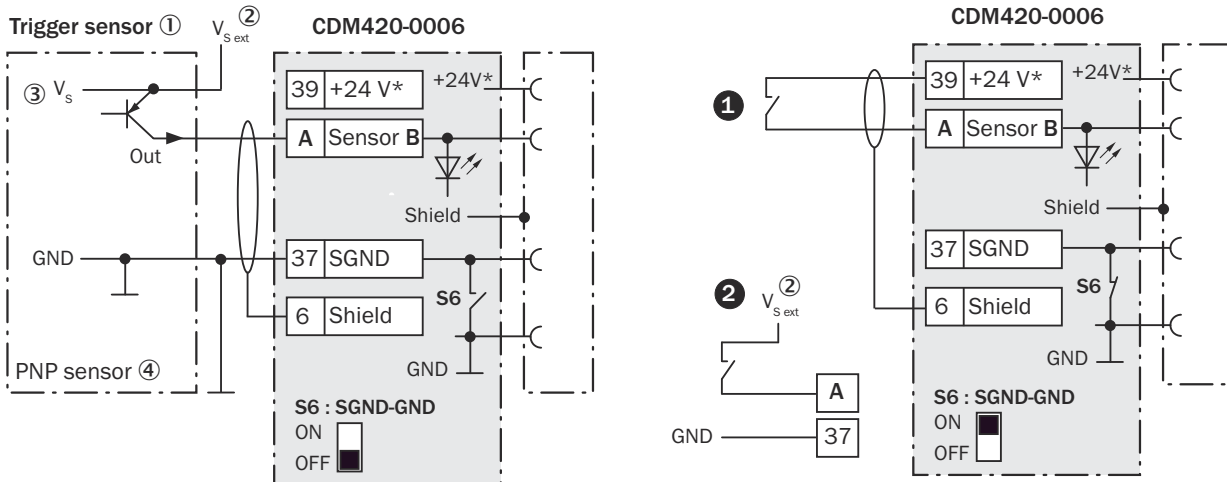


Figure 45: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ① supplied with power by connection module CDM420-0006 or ② connected potential-free and supplied with power externally. Now select switch setting S6 as shown in the left figure.

- ① Trigger sensor, e.g. for read cycle generation
- ② External supply voltage  $V_{S\ ext}$
- ③ Supply voltage  $V_S$
- ④ PNP sensor

Table 29: Assignment of placeholders to the digital inputs

CDM420-0006			Device	
Terminal A	Signal B	Pin C	Pin D	Sensor E
38	Sensor 1	14	10	1
28	Sensor 2	4	15	2

### Function of switch S6

Table 30: Switch S6: SGND - GND

Switch setting	Function
ON	GND of the trigger sensor is connected with GND of CDM420-0006 and GND of the device
OFF	Trigger sensor is connected volt-free at CDM420-0006 and the device. Common, isolated reference potential of all digital inputs is SGND.

### Characteristic data of the digital inputs

Table 31: Characteristic data of the digital inputs "Sensor 1" and "Sensor 2"

Type	Switching
Switching behavior	Power to the input starts the assigned function, e.g. start read cycle. Default setting in the device: logic not inverted (active high), debounce time 10 ms
Properties	<ul style="list-style-type: none"> <li>• Opto-decoupled, reverse polarity protected</li> <li>• Can be wired with PNP output of a trigger sensor</li> </ul>
Electrical values	Low: $V_{in}^{1)} \leq 2\text{ V}$ ; $I_{in}^{2)} \leq 0.3\text{ mA}$ High: $6\text{ V} \leq V_{in} \leq 27.6\text{ V}$ ; $0.7\text{ mA} \leq I_{in} \leq 5\text{ mA}$

1) Input Voltage

2) Input current

**NOTE**

Allocate the functions for the digital inputs in the device using a configuration software, e.g., SOPAS ET.

### 13.4.7 Wiring digital outputs of the device in the CDM420-0006

Device = Lector61x = V2D61xx-xxxxEx

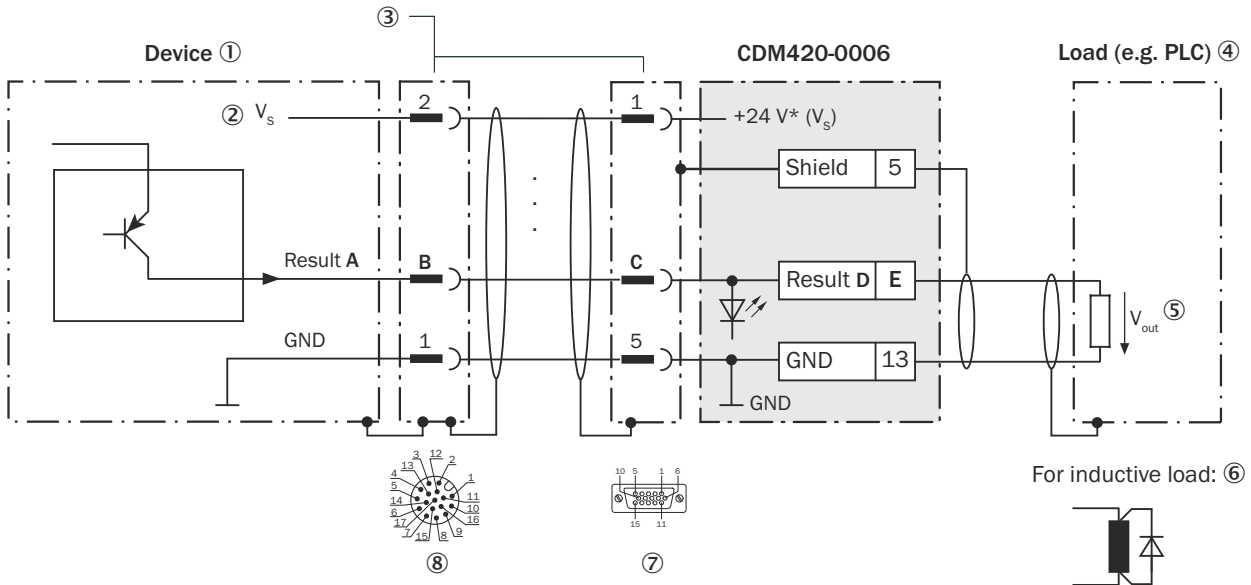


Figure 46: Wire the digital output in the CDM420-0006 connection module.

- ① Device
- ② Supply voltage  $V_s$
- ③ Adapter cable with female connector, M12, 17-pin, A-coded and male connector, D-Sub-HD, 15-pin
- ④ Load (e.g. PLC)
- ⑤ Output voltage  $V_{out}$
- ⑥ With inductive load: see note
- ⑦ Connection module: female connector, D-Sub-HD, 15-pin
- ⑧ Connecting cable permanently connected with the device (male connector, M12, 17-pin, A-coded)

**NOTE**

Digital outputs are omitted due to the 15-pin adapter cable.

Not available in CDM420-0006:

- Result 3

#### Inductive load

**NOTE**

Provide an arc-suppression switch at the digital output if inductive load is present.

- Attach a freewheeling diode directly to the load for this purpose.

Table 32: Assignment of placeholders to the digital outputs

Device		CDM420-0006		
Output A	Pin B	Pin C	Signal D	Terminal E
Result 1	13	12	Result 1	14
Result 2	14	13	Result 2	15

### Characteristic data of the digital outputs

Table 33: Characteristic data of the and digital outputs

Type	Switching
Switching behavior	PNP switching to supply voltage $V_S$ Default settings in the device: no function, logic: not inverted (active high)
Properties	<ul style="list-style-type: none"> <li>Short-circuit protected and temperature protected</li> <li>Not electrically isolated from the supply voltage <math>V_S</math></li> </ul>
Electrical values	$0\text{ V} \leq V_{\text{out}}^{1)} \leq V_S$ $(V_S - 1.5\text{ V}) \leq V_{\text{out}} \leq V_S$ at $I_{\text{out}}^{2)} \leq 50\text{ mA}$

1) Output voltage.

2) Output current.



#### NOTE

Allocate the functions for the digital outputs in the device using a configuration software, e.g., SOPAS ET.

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