

Lector61x

Image-based code reader

SICK
Sensor Intelligence.



Described product

Lector61x

Manufacturer

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Legal information

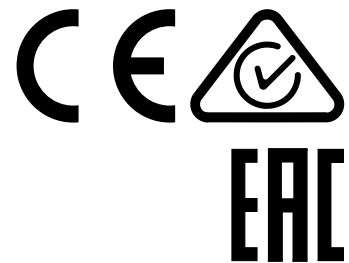
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Original document

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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 operating the machine or system in which the device is integrated. For information about this, refer to the operating instructions of the specific machine.

1.2 Scope

These operating instructions serve to incorporate the device into a customer system. Instructions are given by stages for all actions required.

These operating instructions apply to all available device types of the product. To obtain more detailed information on identifying your device type, see "Type code", page 12.

Available device types are listed on the online product page:

- www.sick.com/Lector61x

Commissioning is described using one particular device type as an example and based on the default parameter settings for the relevant device.

1.3 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.

1.4 Further information



NOTE

Further documentation for the device can be found on the online product page at:

- www.sick.com/Lector61x

There, additional information has been provided depending on the product, such as:

- Model-specific online data sheets for device types, containing technical data, dimensional drawing, and specification diagrams
 - EU declarations of conformity for the product family
 - Dimensional drawings and 3D CAD dimension models of the device types in various electronic formats
 - This documentation, available in English and German, and in other languages if necessary
 - Other publications related to the devices described here
 - Publications dealing with accessories
-

Documents on request

Overview of command strings for the device.

2 Safety information

2.1 Intended use

The Lector61x image-based code reader is an intelligent ID sensor.

The device is used for automatic, stationary identification and decoding of codes on moving or stationary objects. The device reads all commonly used 1D codes (bar codes/stacked codes) and 2D codes (matrix codes). The device uses its host interface to send the read data to a higher-level computer (e.g. PLC) for coordinating further processing.

The device is suitable for industrial and logistics applications that require stable and fast reading of codes. The device 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.

2.1.1 Conditions for specified enclosure rating

To ensure compliance with the specified IP54 enclosure rating of the device during operation, the following requirements must be met: If these requirements are not met, the device does not fulfill any specified enclosure rating.

- The two electrical M12 connections must be tightly screwed to the contacted female connector or male connector.
- The Ethernet connection, if not used, must be sealed with a tightly-fastened protective plug (as in the delivery condition).

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 these operating instructions must be strictly observed.
 - Shut down the product immediately in case of damage.
-

2.3 Internet protocol (IP) technology

**NOTE**

SICK uses standard IP technology in its products. The emphasis is placed on availability of products and services.

SICK always assumes the following prerequisites:

- The customer ensures the integrity and confidentiality of the data and rights affected by its own use of the aforementioned products.
 - In all cases, the customer implements the appropriate security measures, such as network separation, firewalls, virus protection, and patch management.
-

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

With special variants, where optional extras have been ordered, or owing to the latest technical changes, the actual scope of delivery may vary from the features and illustrations shown here.

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.
-

This product documentation refers to the following qualification requirements for the various activities associated with the device:

- **Instructed personnel** have been briefed by the operator about the tasks assigned to them and about potential dangers arising from improper action.
- **Skilled personnel** have the specialist training, skills, and experience, as well as knowledge of the relevant regulations, to be able to perform tasks delegated to them and to detect and avoid any potential dangers independently.
- **Electricians** have the specialist training, skills, and experience, as well as knowledge of the relevant standards and provisions, to be able to carry out work on electrical systems and to detect and avoid any potential dangers independently. The electrician must comply with the provisions of the locally applicable work safety regulation.

The following qualifications are required for various activities:

Table 1: Activities and technical requirements

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

2.7 Operational safety and particular hazards

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

LEDs on the product

The feedback LED, the LED alignment aid, and the status LEDs of the product are classified as risk group 0.

The accessible radiation from LEDs of risk group 0 does not pose a risk to eyes or skin.

The product is fitted with LEDs in risk group 1 for object illumination.



CAUTION

Warning! Optical radiation: LED risk group 1

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

- Protect the eyes and skin against radiation.
 - Use suitable eye protection.
 - Use protective measures such as a screen to shield the radiation.
 - 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.
-

Time-of-flight sensor (invisible infrared light, distance measurement in configuration mode)



CAUTION

Optical radiation: Laser class 1

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 dizziness, flash blindness, afterimages, photosensitive epilepsy, or impairment of color vision, for example.



DANGER

Risk of injury due to hot device surface.

The surface of the device can become hot during operation.

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

3.1.1 Type label

The type label gives information for identification of the device.

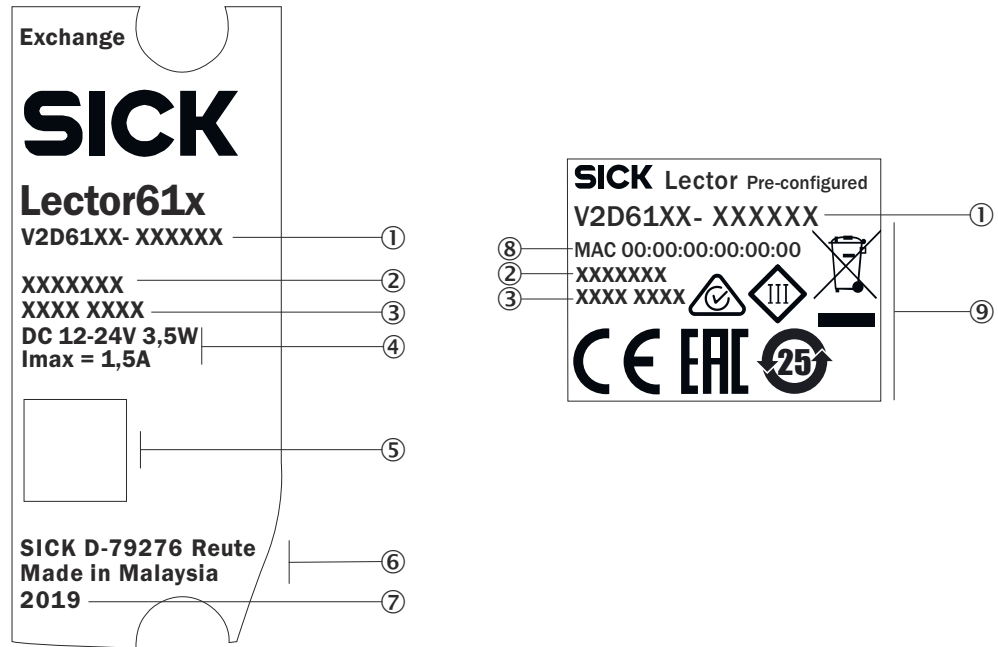


Figure 1: Structure of the type labels on the device

- ① Type designation according to type code
- ② Part number
- ③ Serial number
- ④ Supply voltage, power consumption and maximum current consumption
- ⑤ DataMatrix code with product data (part number, serial number, MAC address)
- ⑥ Manufacturer and production location
- ⑦ Date of manufacture
- ⑧ MAC address (placeholder)
- ⑨ Conformity mark and certification mark

3.1.2 Type code

The devices of the Lector61x product family are arranged according to the following type code:

V2D61yz- abcdefg

V2D	6	1	y	z	-	a	b	c	d	e	f	g
1	2	3	4	5	6	7	8	9	10	11	12	13

Position	Description	Characteristic
1	Device name type	V2D: Vision 2D matrix
2	Product family	6: 6xx
3	Platform / housing	1: Standard line
4	Resolution of the image sensor	0: 0.3 Mpx (640 px x 480 px) 1: 1.2 Mpx

Position	Description	Characteristic
5	Function	D: Reading with DPM and OCR
6	Separator	"_"
7	generation	"empty": 1. generation
8	Imager type / color	M: Monochrome (black-and-white)
9	Optical	M: Manual focus
10	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 infrared light)
11	Focal length / aperture	B: 6 mm C: 12 mm
12	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)
13	IP protection class	4: IP54



NOTE

Not all combinations are possible according to the type code. The available device types can be found online at:

- www.sick.com/Lector61x

3.2 Scope of delivery

The delivery of the device includes the following components:

Table 2: Scope of delivery

No. of units	Component	Comment
1	Device in the version ordered	M12 female connector for Ethernet sealed with tightly-fastened protective plug . Without bracket.
1	Printed safety notes, multilingual	Brief information on the safe use of the product.
1	Protective plug	To seal off the M12 female connector of the Ethernet connection if the interface is not being used. The screwed in protective plug maintains, in this case, the IP54 enclosure rating of the device.
1	Focus adjustment tool	For manual focus adjustment.

Associated components not contained in the delivery:

Table 3: Other components

Component	Comment
SOPAS ET configuration software	Available online at: • www.sick.com/SOPAS_ET
This documentation, available in English and German, and in other languages if necessary	Available online at: • www.sick.com/Lector61x

Accessories

Accessories such as brackets and additional connecting cables are only delivered if the accessories have been ordered separately, see "Accessories", page 57.

3.3 Product characteristics

3.3.1 Device view

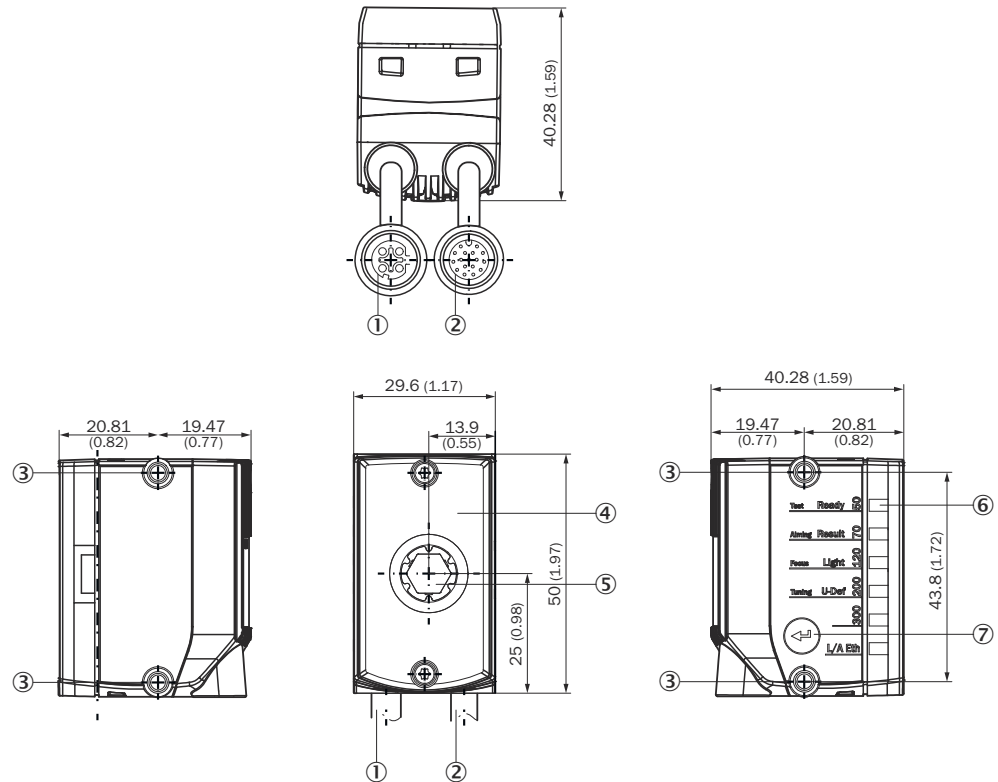


Figure 2: structure and device dimensions, unit: mm (inch), decimal separator: period

- 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 4 tapped blind holes, M4, 6.4 mm deep for mounting the device
- ④ Viewing window with 8 integrated illumination LEDs, 2 LED alignment aids, 1 feedback LED, 1 time-of-flight sensor
- ⑤ Optics, manual focus adjustment with the help of a focus adjustment tool
- ⑥ 6 status LEDs to display the focus position and working distance, device status, and device function (3 display levels)
- ⑦ Function button

3.3.1.1 Illumination unit

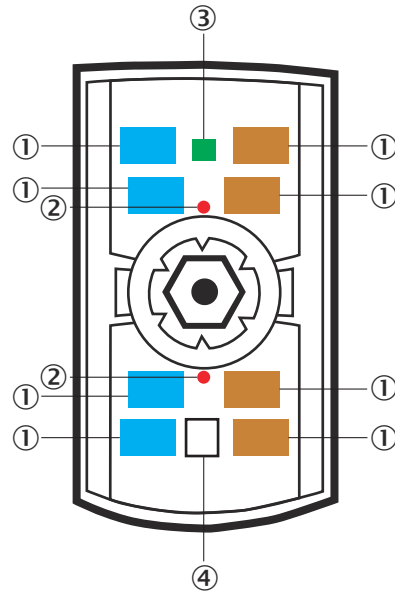


Figure 3: Illumination unit (integrated illumination)

- 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 e.g. for Good Read, red e.g. 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.

3.3.2 Display and operating elements

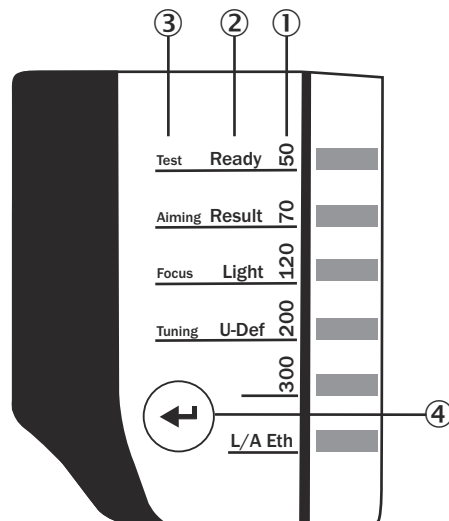


Figure 4: Status LEDs (3 display levels) and function button on the side of the housing

- ① First display level: distance displays (focus position and working distance) in configuration mode
- ② Second display level: device status in read mode

- ③ Third display level: selected device function
- ④ Function button

Distance displays

The distance displays (first display level) are provided for the purpose of adjusting the focus position, see ["Adjusting the focus position", page 23](#). The LEDs, when the first display level is active, indicate the working distance and the focus position that has been set.

Device status

Table 4: Device status (second display level)

Display	LED (green)	LED (red)	LED (yellow)	Status
Ready	●	○	-	The device is ready for use.
	○	●	-	The device is not ready for use: hardware fault or software error.
Result	●	○	-	The read was successful.
	○	●	-	The read was unsuccessful.
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

Device functions

Table 5: Device functions (third display level)

Function	Description
Test	Check the code reading stability: The device 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.
Aiming	Switch the LED alignment aid on and off: By switching off the LED alignment aid, the user can ensure that the LED alignment aid does not affect the code reading. To switch the LED alignment aid back on again, run the Aiming function again.
Focus	Adjust the focus position: The focus position can be adjusted with the help of the focus adjustment tool, see "Adjusting the focus position", page 23 .
Tuning	The device adjusts itself automatically to suit the lighting conditions and the quality of the code presented. The device stores these determined values permanently. The Tuning function is not supported for OCR detection or pharmacodes.

Function button and device functions in configuration mode

The function button is used to call up device functions manually without using a computer. On the third display level, the LEDs indicate the selectable device functions and the execution of a device function. For more information on the configuration steps, see ["Configuring the device via the button without configuration software \(SOPAS ET\)", page 43](#).

PROFINET operation (single port)

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

Table 6: Device status in the PROFINET network (first display level, Ready status LED)

Ready LED		Device status	Remarks
Green components	Red components		
●	○	Device is ready for use.	
●	⦿ Red components flash cyclically	The device status in the PROFINET network depends on the flashing frequency of the red LED components.	
	Flashes every 7 seconds	Network detection in the device is active.	After switching on, the device detects a PROFINET network and activates the PROFINET protocol. The duration of network detection can be configured in SOPAS ET (default: 3 minutes). Network detection can be deactivated in SOPAS ET.
	Flashes every 0.5 seconds	PROFINET is activated in the device.	PROFINET is activated in the device. The device is not connected to the PLC or the device is not configured.
●	⦿	PROFINET is activated in the device.	Prerequisite: the "Flashing" function was activated for the device in the configuration software of the PLC (device identification).

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

3.3.3 Product features and functions

The Lector61x image-based code reader with integrated LED illumination is used to reliably detect and decode 1D codes (bar codes/stacked codes) and 2D codes (matrix code). The device sends the read data to a higher-level computer (e.g. PLC) via the host interface for further centralized processing.

Thanks to its compact housing, the device can also be used where space is limited. The flexible lighting concept allows consistent code identification, regardless of the surface or code color. The device can read the codes reliably even for small codes, short reading distances, weak contrasts, contamination or low code quality. Visible LED alignment aids simplify the process of aligning the device to the code to be scanned. A time-of-flight sensor measures the working distance of the device using invisible infrared light. The focus position can be manually adjusted on the device with the help of a focus adjustment tool.

The device does not come with an Aux serial interface. An application-specific parameter set created in SOPAS ET can therefore only be manually saved and archived as a project file on the computer.

4 Transport and storage

4.1 Transport

For your own safety, please read and observe the following notes:



NOTICE

Damage to the product due to improper transport.

- The device must be packaged for transport with protection against shock and damp.
 - Recommendation: Use the original packaging as it provides the best protection.
 - Transport should be performed by trained specialist staff only.
 - The utmost care and attention is required at all times during unloading and transportation on company premises.
 - 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 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

Store the device under the following conditions:

- Recommendation: Use the original packaging.
- Electrical connections are provided with a protective cap (as in the delivery condition).
- Do not store outdoors.
- Store in a dry area that is protected from dust.
- So that any residual damp can 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 53.

- Relative humidity: [see "Technical data", page 53.](#)
- 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.

5.2 Preparation for mounting

5.2.1 Installation requirements



DANGER

Risk of injury due to hot device surface.

The surface of the device can become hot during operation.

- Before performing work on the device (e.g. mounting, cleaning, disassembly), switch off the device and allow it to cool down.
- Ensure good lost heat transfer from the device.

-
- Typical space requirement: see ["Field of view diagrams", page 24](#) and type-specific dimensional drawing.
 - Comply with the technical data, such as the permitted ambient conditions for operation of the device, see ["Technical data", page 53](#).
 - Ensure good dissipation of excess heat from the device to the surroundings, in particular at higher ambient temperatures. Ensure that there is good heat transfer from the device, for example via the bracket to the mounting base, or ensure that the back of the device is a sufficient distance from the wall of a housing.
 - The device must be mounted using the tapped blind holes provided for this purpose.
 - Mount the device in a shock and vibration insulated manner.
 - Make sure the device has a clear view of the codes.

Auxiliary equipment required

- Mounting bracket with sufficient load-bearing capacity and suitable dimensions.
- Four or two M4 screws for mounting the device on a bracket supplied by the customer. The screw length depends on the mounting base (wall thickness of the bracket). Two M3 screws can optionally be used to mount the device on a bracket supplied by the customer (screw length: at least 35 mm). When using an optional SICK mounting bracket, the screws for mounting are included with delivery.
- Tool and tape measure.

5.2.2 Mounting systems

Mount the device on the mounting bracket by means of a minimum of two tapped blind holes (M4).

The tapped blind holes are located on the right and left side of the device.

SICK offers prefabricated mounting brackets that are optimally suited for mounting the device, see ["Accessories", page 57](#).

Customer-supplied mounting brackets

A customer-supplied mounting bracket must meet the following requirements:

- The device can be aligned in the X- and Y-axes.
- The mounting bracket must be able to bear the weight of the device and connecting cables without shock.
- Device mounting options using the tapped blind holes must be provided.

5.3 Mounting location

5.3.1 Determining alignment

Vertical mounting

Orientation for maximum field of view width:

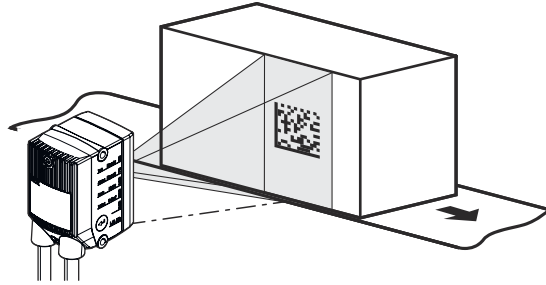


Figure 5: Vertical mounting

Horizontal mounting

Orientation for highest conveying speeds:

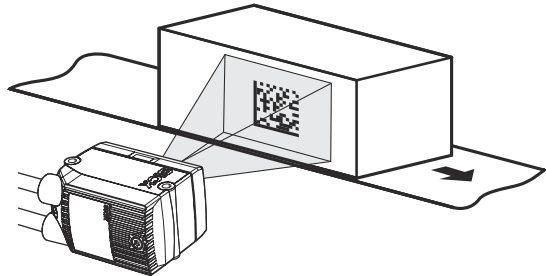


Figure 6: Horizontal mounting

5.3.2 Working range

The available working range for reading is 50 mm to 300 mm.

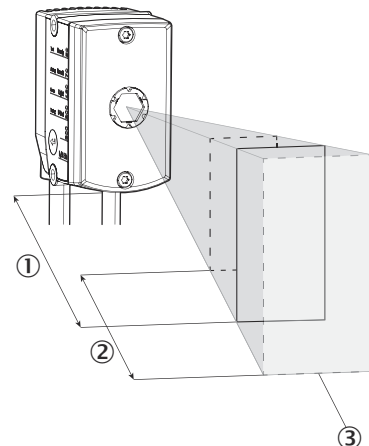


Figure 7: Field of view geometry

- ① Working distance

- ② Depth of field
- ③ Field of view

The user manually adjusts the focus position to suit the working distance with the help of the focus adjustment tool, see "Adjusting the focus position", page 23.

5.3.3 Mounting bracket and reflection prevention

In order to avoid reflections from the surfaces to be scanned, mount the device 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° .
- $f = 12 \text{ mm}$: The typical value is 10° .

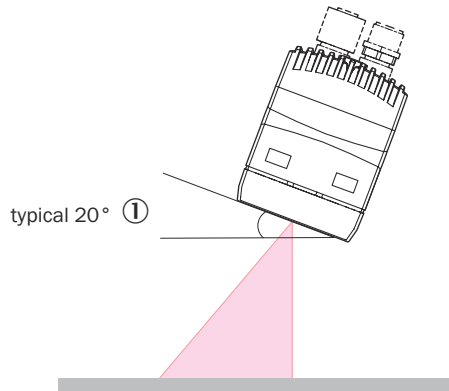


Figure 8: Mounting angle to use, $f = 6 \text{ mm}$, depending on the application

① Typical angle 20°

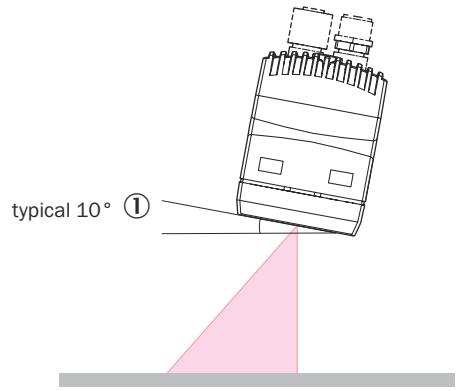


Figure 9: Mounting angle to use, $f = 12 \text{ mm}$, depending on the application

① Typical angle 10°

Depending on the application, an angle of between 0° (bright field light) and 45° (dark field light) may be advisable.

5.3.4 Reading angle in space

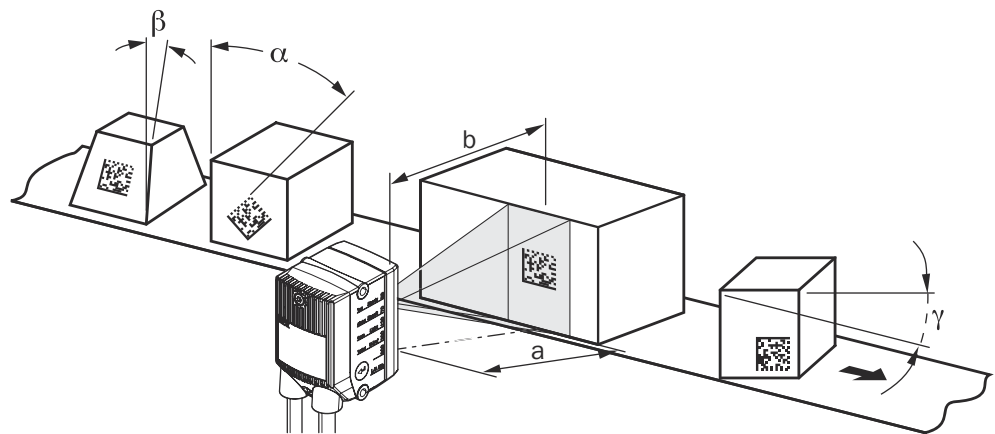


Figure 10: Possible reading angles at which the codes can occur with respect to the field of view.

Table 7: Permissible values

Reading angle	Permissible value (limit value)
α tilt angle	0 to 360°
β pitch angle	max. $\pm 45^\circ$ (depending on cell size and symbol size)
γ skew angle	max. $\pm 45^\circ$ (depending on cell size and symbol size)

Reading angle	Permissible value (limit value)
Distances	
a Working distance	see "Field of view diagrams", page 24
b Working range	see "Field of view diagrams", page 24

5.3.5 Adjusting the focus position

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 device does not perform automated tracking (auto focus) if, for example, the working distance changes significantly. The focus adjustment tool is included with delivery.

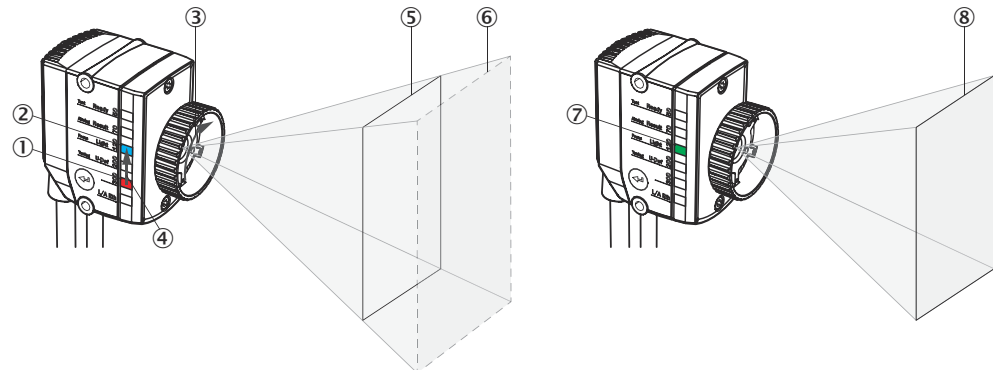
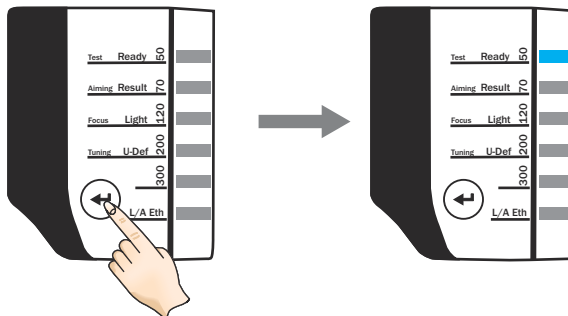


Figure 11: Manually adjusting the focus position with the help of the focus adjustment tool

- 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 setting = target setting)
- ⑧ Focus position coincides with the working distance (actual position = target position)

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

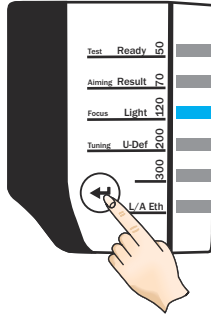
Press function key 3 seconds ①



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

- Once the **Focus** indication LED lights up in the third display level, briefly press the function button (↩) once.

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 device.
 - ✓ The LED that lights up blue indicates the working distance at which the device is mounted.
3. Attach the focus adjustment tool to the optics.
 4. Rotate the focus adjustment tool to align the focus position with the working distance that has been set:
 - 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.



NOTICE
Risk of damage to the product!

Rotating the focus adjustment tool with too much force may damage the product.

- Apply a maximum of 60 Ncm of torque when rotating the focus adjustment tool.

- ✓ 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 and, if necessary manually align the focus setting with the help of the focus adjustment tool.



NOTE
The working distance that the device 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.

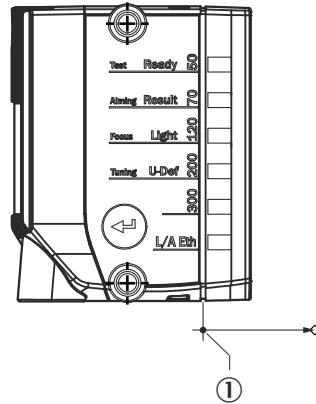
5.3.6 Field of view diagrams

Take into account the following aspects in application design:

- Field of view geometry of the device and 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

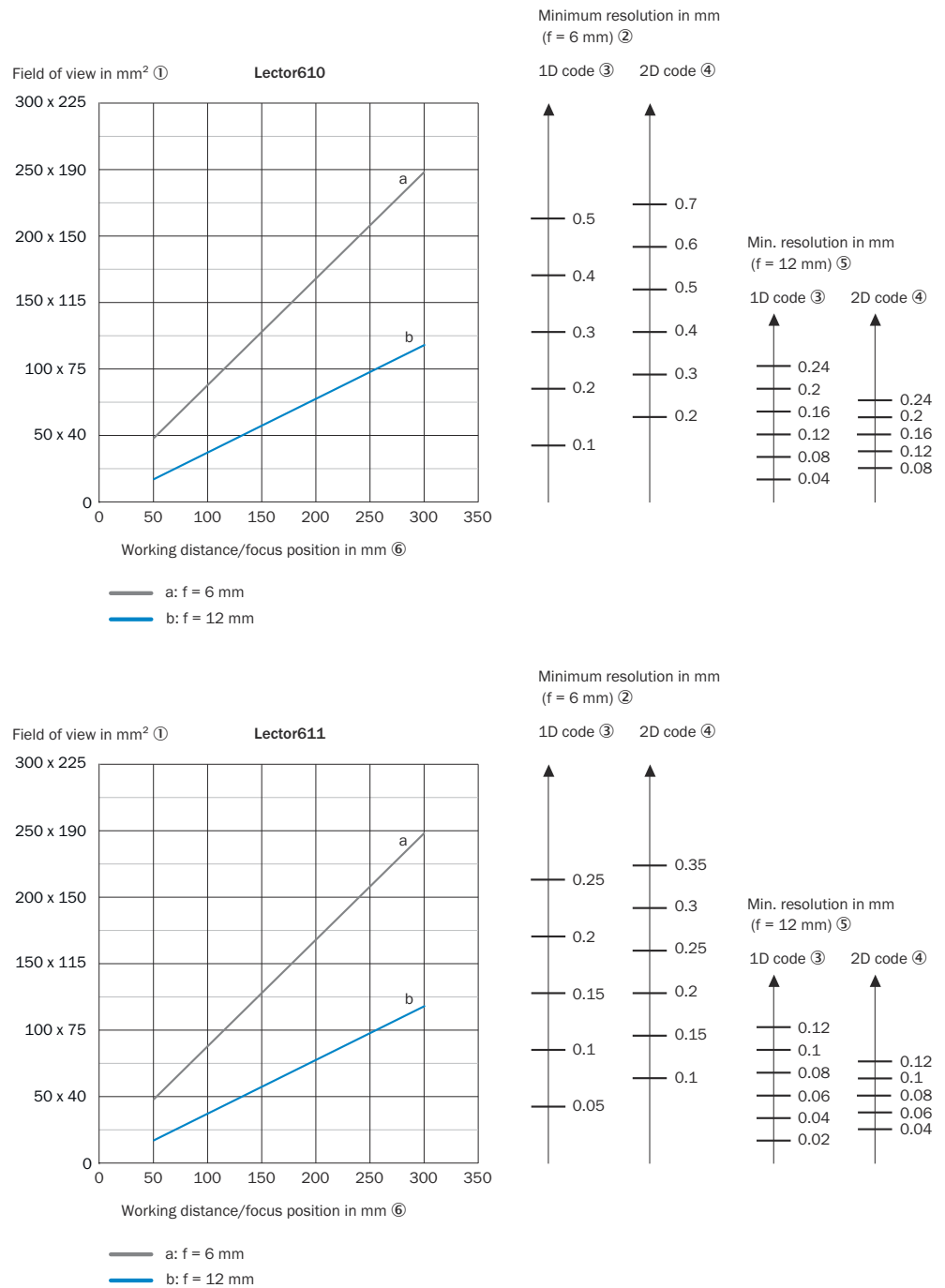


Figure 12: Field of view diagram for Lector610 and Lector611

- ① Field of view in mm²
- 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/focus position 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.

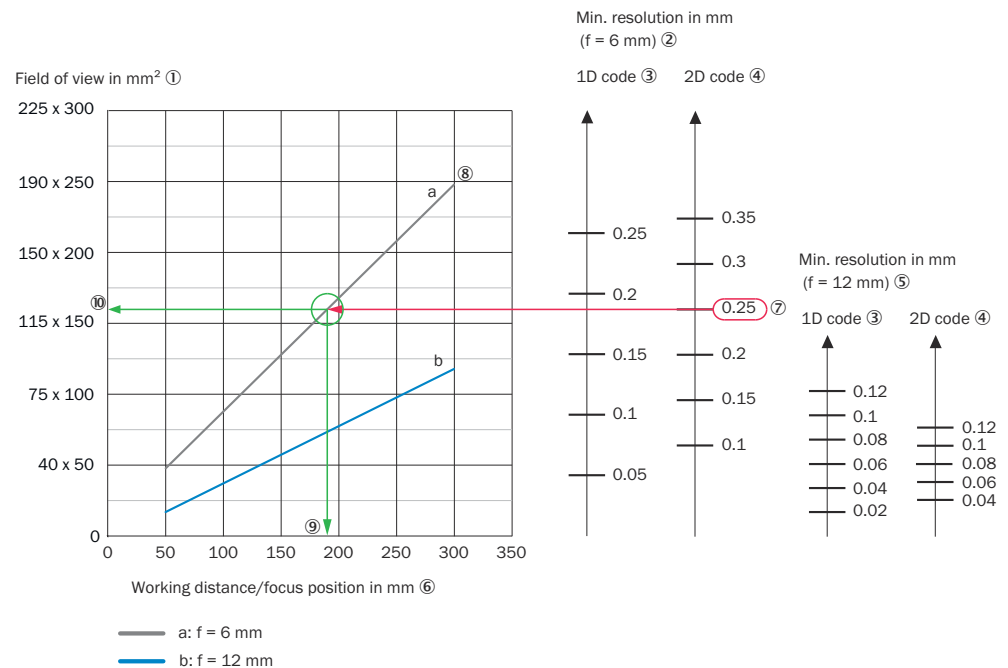


Figure 13: Interpretation aid for the field of view diagram (example, Lector611)

- ① Field of view in mm²
- 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/Focus position 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: resultant 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.

5.4 Mounting the device

Aligning the device with viewing window to object

The device must be aligned in consideration of the field of view (see "Field of view diagrams", page 24) and the application circumstances (see "Installation requirements", page 20).

Mounting the device

Perform one of the following steps:

Variant 1

- Mount the device on a customer-supplied mounting bracket using at least two M4 screws of a suitable length. Screw the screws no more than 5 mm into the tapped blind holes of the device when doing so. Use the tapped blind holes on the left and right side of the device in pairs.

**NOTICE**

Do not screw the M4 screws right through to the other side of the device!

Variant 2

- Mount the device on a customer-supplied mounting bracket using two M3 screws (length: at least 35 mm). Carefully screw the screws into the tapped blind holes on opposite sides of the device when doing so. Use the tapped blind holes on the left and right side of the device in pairs.

Variant 3

- Attach the separately ordered, optional SICK mounting bracket to the device.

5.5 Mounting the read cycle sensor (optional)

If the device is triggered by means of an external trigger sensor, the trigger sensor must be mounted close to the device.

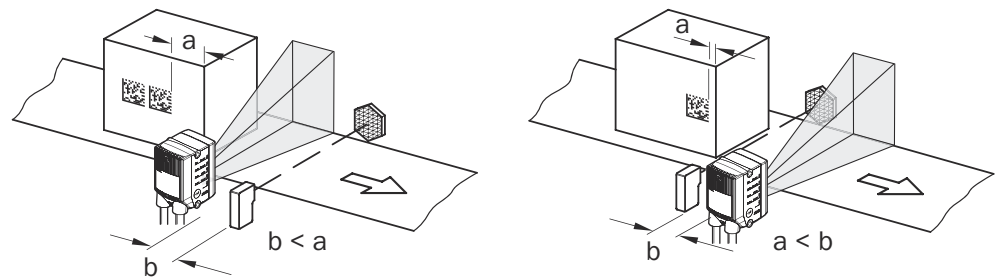


Figure 14: Positioning an external trigger sensor for the read cycle (mounting example)

The mounting location of the device depends on the distance a of the codes from the front object edge. Depending on the application, mount the device so that codes on objects of different sizes can be read completely during the evaluation time window (reading interval).

6 Electrical installation

6.1 Safety

6.1.1 Conditions for specified enclosure rating

To ensure compliance with the specified IP54 enclosure rating of the device during operation, the following requirements must be met: If these requirements are not met, the device does not fulfill any specified enclosure rating.

- The two electrical M12 connections must be tightly screwed to the contacted female connector or male connector.
- The Ethernet connection, if not used, must be sealed with a tightly-fastened protective plug (as in the delivery condition).

6.1.2 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 (e.g., ensuring low-impedance and current-carrying equipotential bonding).

The device is connected to the peripheral devices (voltage supply, 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

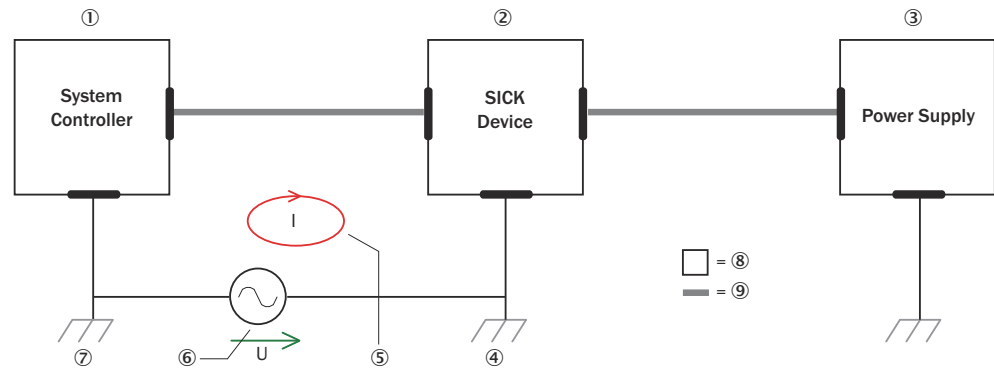


Figure 15: Example: Occurrence of equipotential bonding currents in the system configuration

- 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.

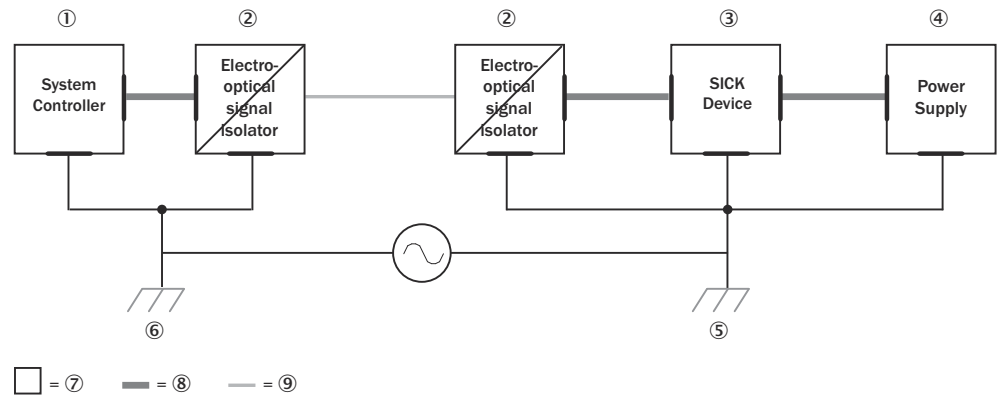


Figure 16: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

- 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 Optical fiber

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.

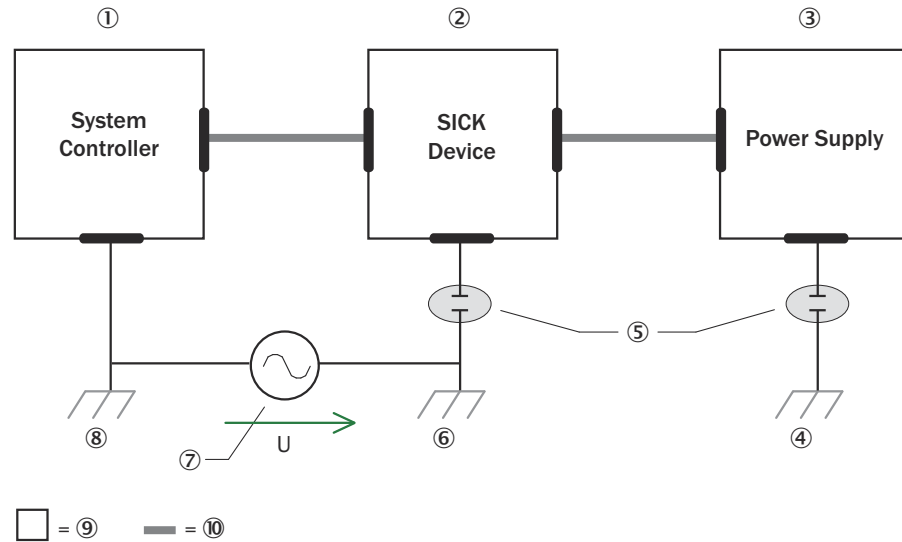


Figure 17: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

- 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.

6.2 Wiring instructions



NOTE

Pre-assembled cables can be found online at:

- www.sick.com/Lector61x
-



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 58.



NOTICE

Faults during operation and device or system defects!

Incorrect wiring may result in operational faults and defects.

- Follow the wiring notes precisely.
-

The protection class stated in the technical data is achieved only with a screwed plug connector or a protective cap in the Ethernet connection, if not used.

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. The required fuse rating is 2 A slow-blow.

Connect the connecting cables in a de-energized state. Do not switch on the supply voltage until installation is complete and all connection work on the device and controller has been finished.

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

Connect the device only to the permissible supply voltage, see "[Connecting the supply voltage](#)", page 36.

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.

6.2.1 Data cables



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.

Serial data transmission (RS-232)

- The possible length of cable between the device and host computer depends on the following factors:
 - The physical version of the host interface selected
 - The data transmission rate set in the device

For further information, see "Wiring data interfaces", page 37.

6.3 Connection diagrams

6.3.1 Service mode connection schematic

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

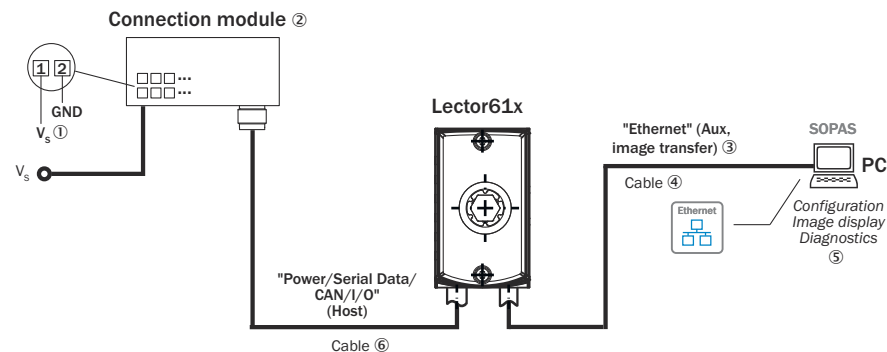


Figure 18: Connection block diagram for commissioning

- 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

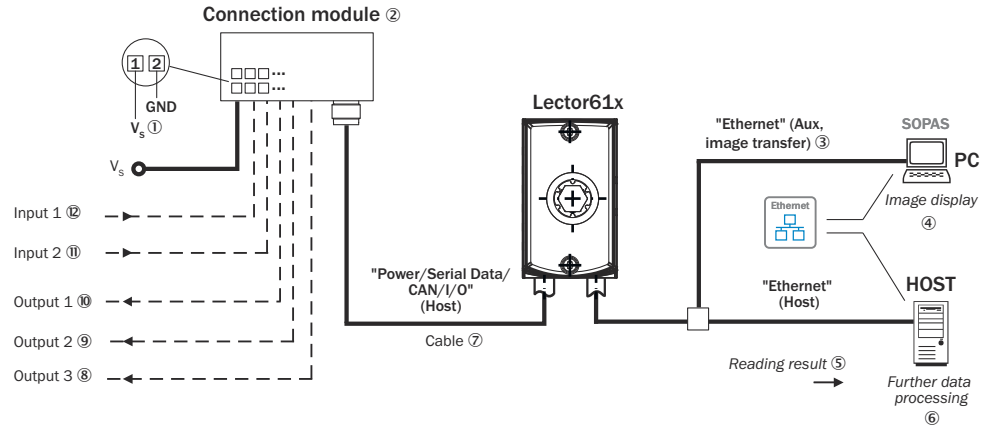


Figure 19: Connection block diagram for read mode

- 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

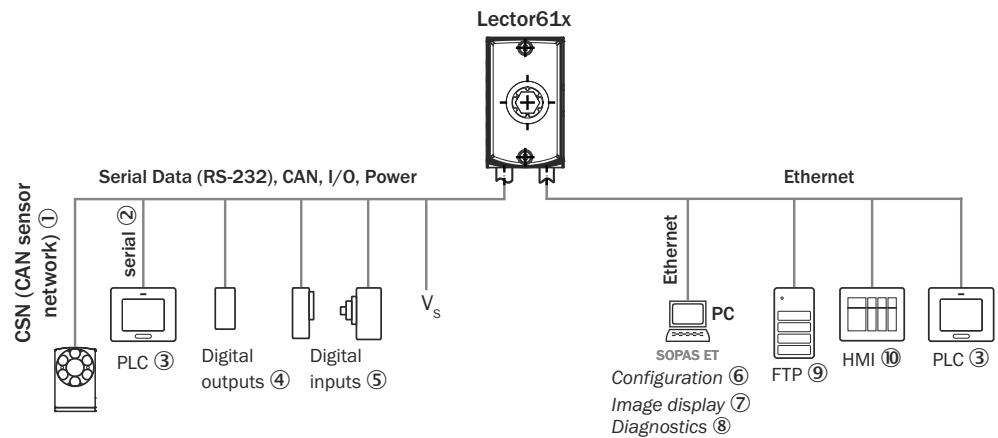


Figure 20: Facilities for connecting

- 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 assignments of electrical connections

“Power/Serial data/CAN/I/O” connection

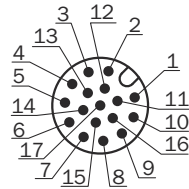


Figure 21: Male connector, M12, 17-pin, A-coded

Table 8: Pin assignment of the “Power/Serial data/CAN/I/O” connection

Pin	Signal	Function
1	GND	Ground
2	V _s	Supply voltage
3	CAN L	CAN bus (IN/OUT)
4	CAN H	CAN bus (IN/OUT)
5	-	-
6	TxD (RS-232), host	Host interface (sender)
7	-	-
8	-	-
9	SensGND	Digital input ground
10	Sensor 1	Digital input 1
11	-	-
12	RxD (RS-232), host	Host 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	-	-
-	-	Screen



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 mm²).

“Ethernet” connection

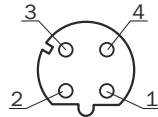


Figure 22: M12 female connector, 4-pin, D-coded

Table 9: Pin assignment of the “Ethernet” connection

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

6.5 Connecting the device

6.5.1 Using the optional connection modules CDB and CDM

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

1) CDM420-0007: for connecting 2 devices.

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



NOTE

Connection module

For detailed information about mounting and electrical installation, please refer to the operating instructions for the connection module in question. These are available online at.

- www.sick.com/CDB
- www.sick.com/CDM

6.5.2 Connecting the supply voltage

Voltage source in accordance with ES1 and PS2 (EN 62368-1) or SELV and LPS (EN 60950-1).

The power source for the device must be able to provide the following power outputs:

Table 10: Required supply voltage V_S

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

1) For device with 3 loaded digital outputs (each 50 mA).

Table 11: 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_{RMS} [W]	2.96	2.93	3.07	3.04
Maximum current consumption, digital outputs unloaded	$I_{B\text{ Peak}}^{1)}$ [A]	1.06	0.848	0.387	0.331
Typical, all 3 digital outputs loaded (0.05 A per output)	$I_{B\text{ RMS }30\text{out}}$ [A]	0.44	0.394	0.278	0.26
Power loss, all 3 digital outputs loaded (0.05 A per output)	$P_{\text{Peak }30\text{out}}$ [W]	14.6	15.09	15.61	15.831

¹⁾ For design of the power supply unit, supply cable and fuse protection at the start of the line.

Protecting the supply cables

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

The following standards must be observed in Germany:

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

Connection without connection module

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

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

Connection with connection module

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

Table 12: 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 61
CDM420-0006	2 A (slow-blow)	see "Connecting supply voltage for the device in CDM420-0006", page 71

6.5.3 Wiring data interfaces

Wiring Ethernet 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 (host)



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. Observe the following recommendations:

Table 13: Data transmission rates and recommended max. cable lengths

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.

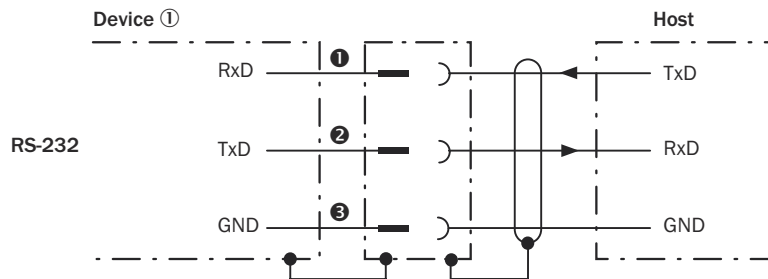


Figure 23: Wiring of the serial data interface RS-232 (host)

① Device

①...③ Pin assignment: see RS-232 pin assignment for the respective device



NOTE

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

Wiring the data interfaces of the device via a connection module:

Connection module	Data interface	Reference
CDB650-204	RS-232	see "Wiring serial host interface RS-232 of the device in CDB650-204", page 62
CDM420-0006	RS-232	see "Connecting serial host interface RS-232 of the device in CDM420-0006", page 71

6.5.4 Wiring the CAN interface



NOTE

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

Make further settings in the device corresponding to the function of the device in the system configuration.

Wiring the CAN interface of the device via a connection module:

Connection modules	Interface	Reference
CDB650-204	CAN	see "Wiring the CAN interface in the CDB650-204", page 63
CDM420-0006	CAN	see "Wiring the CAN interface in the CDM420-0006", page 72

6.5.5 Wiring the digital inputs

digital inputs on the device

The two digital inputs "Sensor 1" and "Sensor 2" can be used, for example, for starting and/or ending the external read cycle or for feeding an incremental signal.

The full complement of digital inputs is available at each of the following locations:

- 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)

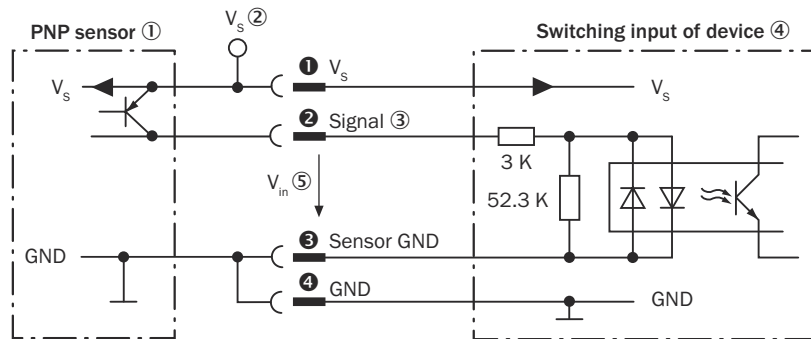


Figure 24: Wiring a digital input

- ① Trigger sensor (PNP sensor)
- ② Supply voltage V_s
- ③ Input signal
- ④ Digital input of the device ("Sensor 1" or "Sensor 2")
- ⑤ Input voltage V_{in}

①... ④ For pin assignment, see respective device

Table 14: Characteristic data of the digital inputs "Sensor 1" and "Sensor 2"

Switching behavior	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)
Properties	<ul style="list-style-type: none"> • Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor

Electrical values	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
- 2) Input current

Function assignment



NOTE

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

Wiring the digital inputs of the device via a connection module:

Connection modules	Digital switching inputs	Reference
CDB650-204	“SENS/IN 1” “SENS/IN 2”	see "Wiring the digital inputs “Sensor 1” and “Sensor 2” of the device in the CDB650-204", page 65
CDM420-0006	“Sensor 1” “Sensor 2”	see "Wiring the digital inputs “Sensor 1” and “Sensor 2” of the device in the CDM420-0006", page 74

6.5.6 Wiring the digital outputs

digital outputs on the device

The “Result 1” to “Result 3” digital outputs are used to signal events in the read operation. Different functions can be assigned to them 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).

The full complement of digital outputs is available at each of the following locations:

- 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

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).

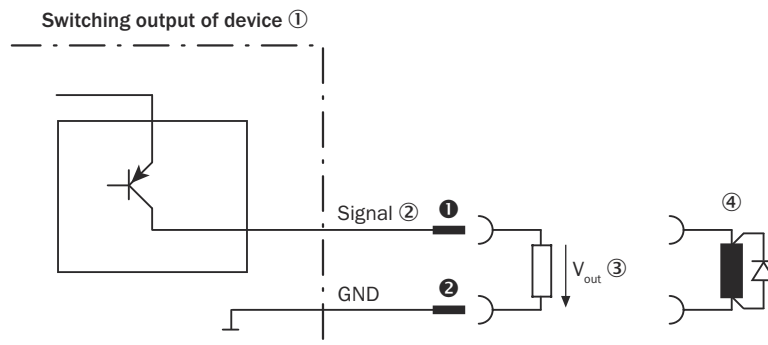


Figure 25: Wiring a digital output

- 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 15: 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"> • Short-circuit protected • Not electrically isolated from V_S ¹⁾
Electrical values	$0\text{ V} \leq V_{out} \text{ } ^{2)} \leq V_S$ $(V_S - 1.5\text{ V}) \leq V_{out} \leq V_S$ at $I_{out} \text{ } ^{3)} \leq 50\text{ mA}$

- 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**

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

Wiring the digital outputs of the device via a connection module:

Connection modules	Digital outputs	Reference
CDB650-204	"RES/OUT 1" "RES/OUT 2" "RES/OUT 3"	see "Wiring the digital outputs "Result 1" to "Result 3" of the device in the CDB650-204", page 67
CDM420-0006	"Result 1" "Result 2"	see "Wiring the digital outputs "Result 1" and "Result 2" of the device in the CDM420-0006", page 76

7 Commissioning

7.1 Configuring the device with SOPAS ET

Adaptation of the device parameters to the application as well as diagnostics in the event of malfunctions take place as default with the SOPAS ET configuration software. The device supports this process by displaying the images it has recorded in SOPAS ET (requirement SOPAS ET: at least version 3.0).



NOTE

Image output takes place only via the Ethernet interface.

If the scan characteristics of the device have been adjusted using the function button rather than a computer, SOPAS ET is used to continue the configuration process (reading clock, result formats, output data interface, etc.).

Installing and starting the configuration software

1. Download and install the latest version of the SOPAS ET configuration software and the current device description files (*.sdd) from the online product page for the software by following the instructions provided there: www.sick.com/SOPAS_ET. 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 program. Path: **Start > Programs > SICK > SOPAS EngineeringTool > SOPAS EngineeringTool**.
3. Establish a connection between the software and the device via Ethernet.
✓ The connection wizard starts automatically.
4. The following IP addresses are configured by default on the device:
 - IP address P1: 192.168.0.1
 - Subnet mask: 255.255.255.0
5. Select the desired device from the available devices and add to the project by double-clicking.
✓ The device appears on the left side of the window.
6. To open the device window, double-click on the device on the left side of the window.
7. Select view of the user interface (available modes: **Standard**, **Extended**).
✓ SOPAS ET establishes communication with the device and loads the associated device description file for the device.
8. In the **Wizard** window, click on the **Code Reading** button.
✓ The **Initial Setup** window appears.
9. Position the code within the displayed region and following the instructions.
✓ The effects of any parameter changes are directly visible.
✓ The device will now 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.

Configuring the device manually

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



NOTE

The following functions are deactivated in **Live** mode:

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

2. Align the device 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.

Continuing configuration

1. Make settings for additional functions during planned operation such as codes, trigger, data processing, data interface, etc.
2. In the **Online Images** window, click the **Operation** button and test the settings in operational use.

Completing the configuration

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

7.2 Configuring the device via the button without configuration software (SOPAS ET)

The function key and the LEDs in their third display level are used to manually configure the device.

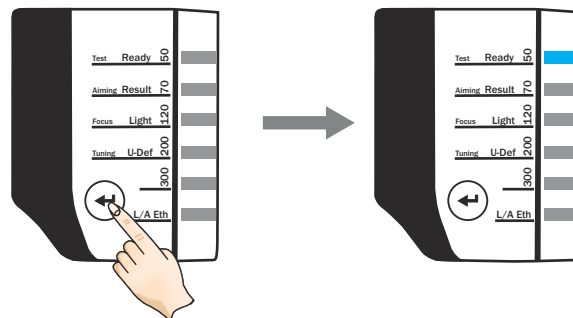


NOTICE

The **Tuning** function is not supported for OCR detection or pharmacodes.

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

Press function key 3 seconds ①

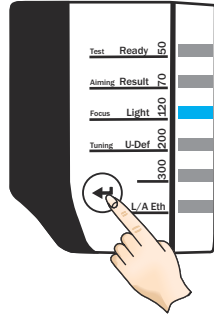


- ① Press the function button (↩) for 3 seconds.

- ✓ The device exits the current read mode and switches into button operation mode. The device now ignores all further external read cycles. The device no longer outputs any read results via the data interface.
 - ✓ The device 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 device 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.

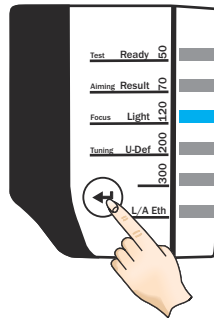
Press function key 1 x shortly ①



① Briefly press the function button (◀) once

- ✓ The device executes the relevant function and automatically returns to read mode after 60 seconds without pressing any button.
- 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 device 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 device automatically exits the third display level and returns to operational use.

7.3 Initial commissioning

The device is configured for the particular application situation on site using the SOPAS ET configuration software on a computer. The default factory settings of the device are the starting point for this. The default parameter values (configuration data) in the working memory of the device can be modified for optimization purposes. To do so, the user creates an application-specific parameter set using the SOPAS ET configuration software, or edits the parameter set later as required. The user then loads the current parameter set into the permanent parameter memory of the device.

Memory organization for parameter set

The following diagram shows the memory organization scheme for the internal and external components involved:

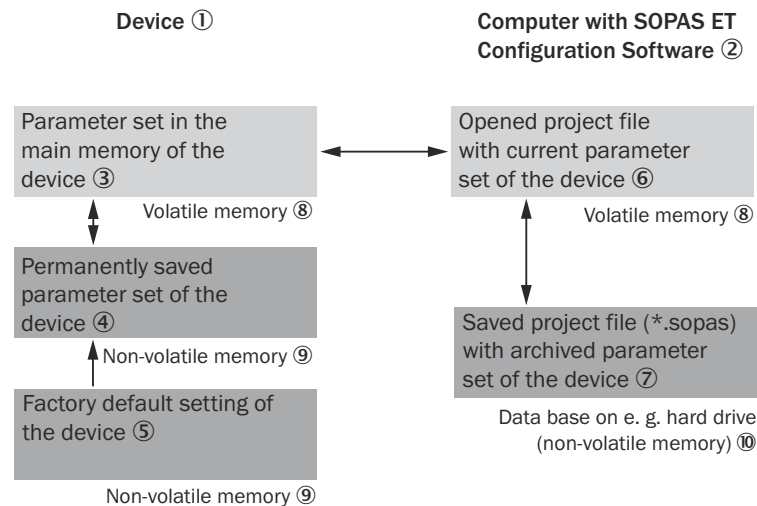


Figure 26: Configuration with SOPAS ET and saving the parameter set

- ① Device
- ② Computer with SOPAS ET configuration software
- ③ Permanently saved device parameter set
- ④ Parameter set in the working memory of the device
- ⑤ Factory-set defaults for the device
- ⑥ Opened project file with current device parameter set
- ⑦ Saved project file with archived device parameter set
- ⑧ Volatile memory
- ⑨ Nonvolatile memory
- ⑩ Database on the hard drive, for example (nonvolatile memory)



NOTE

As part of a data backup plan, always save the current parameter set outside the device memory. This makes it easier, if necessary (device failure, etc.), to restore, to a replacement device of the same type, the current parameter set used to date.

External data backup:

To back up the data outside the device memory, the current parameter set can be **manually** saved and archived to the computer as a project file (*.sopas file with configuration data). This is the generally recommended procedure.

Functionality

The user saves the current parameter set to the permanent parameter memory of the device using the **Permanent** option. In addition, the user manually saves the parameter set as a project file (sopas file with configuration data) on the computer.

The configuration data of the device to be replaced that have been stored on the computer can, e.g. in the event of a device failure, be downloaded to the replacement device and permanently stored there. This enables a device to be quickly exchanged with a replacement device 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 16: 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.



DANGER

Risk of injury due to hot device surface.

The surface of the device can become hot during operation.

- Before performing work on the device (e.g. mounting, cleaning, disassembly), switch off the device and allow it to cool down.
- Ensure good lost heat transfer from the device.



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 inspection window

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

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

**NOTE**

Static charging may cause dust particles to stick to the inspection window. This effect can be reduced by using an anti-static cleaning agent in combination with the SICK lens cloth (part no. 4003353) (can be obtained from www.sick.com).

The viewing window is made of plastic, see "Technical data", page 53.

**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.

Cleaning procedure:**CAUTION****Warning! Optical radiation: LED risk group 1**

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

- Protect the eyes and skin against radiation.
- Use suitable eye protection.
- Use protective measures such as a screen to shield the radiation.
- 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 systems, the risks described here may be exceeded. This must be taken into consideration by users on a case-by-case basis.

**CAUTION****Optical radiation: Laser class 1**

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 daz-zle, flash blindness, afterimages, photosensitive epilepsy, depending on parameteriza-tion), or impairment of color vision, for example.

- ▶ 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. For faults that cannot be resolved using the information below, please contact SICK Service. To find your agency, see the final page of this document.

Table 17: Other possible error sources

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

9.2 Displaying the status log

To display the status log, connect the SOPAS ET configuration software with the device online.

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

9.3 SICK service

If the fault cannot be rectified, the device may be defective.

The device may not be repaired by the user. Interference with or modification of the device will invalidate any warranty claims against SICK AG.

Rapid replacement of a device by the user is, however, possible.

- ▶ Where a fault cannot be rectified, make contact with the SICK Service department. To find your agency, see the final page of this document.



NOTE

Before calling, make a note of all type label data such as type designation and serial number to ensure faster telephone processing.

9.4 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.

9.5 Returns

- ▶ Do not dispatch devices to the SICK Service department without consultation.
- ▶ 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
-

9.6 Replacing the device

Replacing a device with transfer of the current configuration data

The current configuration data of the device to be replaced can be downloaded from a computer to a replacement device. The configuration data of the device is combined as a parameter set. The replacement device saves the parameter set to the permanent parameter memory.

Prerequisites:

- The replacement device is a device of the same type.
 - The configuration data of the device have been saved on the computer and are available. This took place on completion of configuration of the device that is now to be replaced with the SOPAS ET configuration software after confirmation by the user.
 - The computer is connected to the replacement device when transferring the configuration data.
-

**NOTE**

For further information see ["Initial commissioning", page 44](#).

Removing the device to be replaced:

**DANGER**

Risk of injury due to hot device surface.

The surface of the device can become hot during operation.

- Before performing work on the device (e.g. mounting, cleaning, disassembly), switch off the device and allow it to cool down.
 - Ensure good lost heat transfer from the device.
-

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

Putting the replacement device into operation:

1. Mount and align the replacement device (see ["Mounting", page 20](#)). When doing so, note the previously applied markings on the bracket or surroundings.
2. Reconnect the connecting cables to the replacement device (see ["Electrical installation", page 29](#)).
3. Switch on the supply voltage for the replacement device.
- ✓ The device starts with its last permanently saved parameter set. In the case of devices that have not been used before, this corresponds to the factory default setting.

4. Establish a connection with the replacement device using the SOPAS ET configuration software.
5. Download the configuration data of the device to be replaced, which have been stored on the computer, to the replacement device and permanently store them there.

10 Decommissioning

10.1 Disposal

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

11 Technical data



NOTE

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

- www.sick.com/Lector61x

Please note: This documentation may contain further technical data.

11.1 Features

Type	Lector610	Lector611
Focus	Adjustable focus, manual focus adjustment tool in combination with the LEDs on the device (first display level)	
Sensor resolution	Identifier see "Type code", page 12.	
Integrated illumination unit	8 LEDs: <ul style="list-style-type: none"> • 4 LEDs with visible amber light ($\lambda = 617 \text{ nm} \pm 50 \text{ nm}$) • 4 LEDs with visible blue light ($\lambda = 470 \text{ nm} \pm 15 \text{ nm}$) 	
Feedback LED (spot in field of view)	1 LED: <ul style="list-style-type: none"> • Visible green light ($\lambda = 525 \text{ nm} \pm 15 \text{ nm}$) • Visible red light ($\lambda = 635 \text{ nm} \pm 15 \text{ nm}$) 	
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	<p>Integrated illumination unit: 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).</p> <p>Radiance</p> <ul style="list-style-type: none"> • $L_B^{1): < 10 \times 10^3 \text{ W}/(\text{m}^2\text{sr})$ within 100 s; at a distance of $\geq 200 \text{ mm}$ • $L_R^{2): < 2.2 \times 10^6 \text{ W}/(\text{m}^2\text{sr})$ within 10 s; at a distance of $\geq 200 \text{ mm}$ <p>Distance-dependent hazard value</p> <ul style="list-style-type: none"> • Risk group 0 (no risk) based on $L_B^{1): < 100 \text{ W}/(\text{m}^2\text{sr})$ within 10,000 s; at a distance of $> 2.0 \text{ m}$. <p>Feedback LED, LED alignment aid and status LEDs: 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).</p> 	
MTBF of LEDs	Integrated illumination unit, feedback LED and LED alignment aid: 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, max. output power $\leq 17.5 \text{ mW}$, pulse length $\leq 3.7 \text{ ns}$)	
Laser class	Time-of-flight sensor: Laser class 1 according to EN/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	

Type	Lector610	Lector611
Code resolution	f = 12 mm: <ul style="list-style-type: none"> • ≥ 0.04 mm (1D code) • ≥ 0.08 mm (2D code) f = 6 mm: <ul style="list-style-type: none"> • ≥ 0.1 mm (1D code) • ≥ 0.2 mm (2D code) 	f = 12 mm: <ul style="list-style-type: none"> • ≥ 0.02 mm (1D code) • ≥ 0.04 mm (2D code) f = 6 mm: <ul style="list-style-type: none"> • ≥ 0.05 mm (1D code) • ≥ 0.1 mm (2D code)
	The code resolution depends on the lens and the working distance. Valid for 1D codes and 2D codes with good print quality.	
Working distance	Depends on type, see "Field of view diagrams", page 24.	
Lens	Identifier, see "Type code", page 12.	

1) L_B = Hazard from blue light.

2) L_R = Hazard to the retina of the eye due to heating.

11.2 Mechanics/electronics

Table 18: Technical data: 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"> • Maximum length: 30 m • Maximum length when used as a serial interface: 15 m 	1 cable (length: 0.25 m) with female connector, M12, 4-pin, D-coded
Supply voltage V_S	DC 12 V ... 24 V, ± 15% Voltage source in accordance with ES1 and PS2 (EN 62368-1) or SELV and LPS (EN 60950-1).	
Power consumption	Operation: 3.5 W typical ¹⁾ 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	IP 54 (EN 60529, EN 60529 / A2) ²⁾	
Protection class	III	
Electrical safety	EN 62368-1	
Weight	165 g, including connecting cables	
Dimensions (L x W x H)	50 mm x 40.3 mm x 29.6 mm ³⁾	

1) For digital outputs without load.

2) Prerequisite: The male connectors and female connectors of both connecting cables are connected and screwed together at the device being connected.

3) see "Device view", page 14.

11.3 Performance

Table 19: Technical data: Performance

Type	Lector610	Lector611
Readable code structures	1D, 2D, stacked codes, DPM, OCR/OCV	

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

11.4 Interfaces

Table 20: Technical data: Interfaces

	Lector610	Lector611
Ethernet	Protocol: <ul style="list-style-type: none"> • TCP/IP • EtherNet/IP • Modbus® TCP Function: host (data output of the read result) Function: Aux (service) ¹⁾ Data transmission rate: 10/100 Mbit/s Services: DHCP, NTP, HTTP, mDNS, DNS-SD, DNS, HTTPS. MAC address (device-specific), see type label	
Serial RS-232	Function: host (data output of the read result) Data transmission rate: 0.3 kBd ... 115.2 kBd	
CAN	Protocol: <ul style="list-style-type: none"> • A connection in a CANopen-based environment is possible. For additional support, please contact SICK customer service. • SICK CAN sensor network CSN (master/slave, multiplexer/server) Function: host (data output of the read result) Data transmission rate: 20 kBit/s ... 1 MBit/s Bus length: maximum 30 m	
PROFINET (line topology)	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 at: www.sick.com/Lector61x	
Digital inputs	Type: 2 x physical, switching ("Sensor 1", "Sensor 2") $V_{in}^{2)} = \max. 27.6 \text{ V}$, $I_{in}^{3)} = \max. 5 \text{ mA}$ Opto-decoupled, not reverse polarity protected regarding supply voltage Debounce time: adjustable ⁴⁾ Encoder frequency: max. 300 Hz	

	Lector610	Lector611
Digital outputs	Type: 3 x physical, switching (“Result 1” ... “Result 3”) $V_{out}^{5)} = V_S^{6)} - 1.5 V$, $I_{out}^{7)} \leq 50 mA$ (typical) Short-circuit protected, not electrically isolated from the supply voltage V_S	
Reading pulse	Digital inputs, free, serial interface, Ethernet, CAN, auto pulse or presentation mode	
Optical indicators	6 status LEDs on the side of the device 2 LED alignment aids on the front side of the device 1 feedback LED (green and red) as a light spot on the code	
Operating elements	1 function button (select function, start and end)	
Operator interfaces	Web server	
Configuration software (parameterization)	SOPAS ET configuration software, web server, CoLa commands (telegrams), fieldbus controller (PLC) with additional support by SICK function blocks, function button	
Data storage and retrieval	Image and data storage via internal memory and external FTP	
Maximum encoder frequency	300 Hz	

- 1) Service: Image display, configuration and diagnostics.
- 2) Input voltage.
- 3) Input current.
- 4) e.g. with SOPAS ET configuration software.
- 5) Output voltage.
- 6) Supply voltage.
- 7) Output current.

11.5 Ambient data

Table 21: Technical data: Ambient data

	Lector610	Lector611
Electromagnetic compatibility (EMC)	Radiated emission: EN 61000-6-3:2007+A1:2011 / IEC 61000-6-3:2006+AMD 1:2010 Immunity: EN 61000-6-2: 2005-08	
Vibration resistance	EN 60068-2-6:2008-02	
Shock resistance	EN 60068-2-27:2009-05	
Ambient operating temperature	0 °C ... +40 °C	
Storage temperature	-20 °C ... +70 °C	
Permissible relative humidity	0% ... 90%, non-condensing	

12 Accessories



NOTE

Accessories and where applicable mounting information can be found online at:

- www.sick.com/Lector61x
-

13 Annex

13.1 EU declaration of conformity / Certificates

The EU declaration of conformity and other certificates can be downloaded from the Internet at:

- www.sick.com/Lector61x

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 suitable for drag chain

Part no. 2070425 (3 m), part no. 2070426 (5 m), part no. 2070427 (10 m), shielded, suitable for drag chain, suitable for 2 A

Ambient temperature range:

For mobile installation: -25 °C to +80 °C, for fixed installation: -40 °C to +80 °C

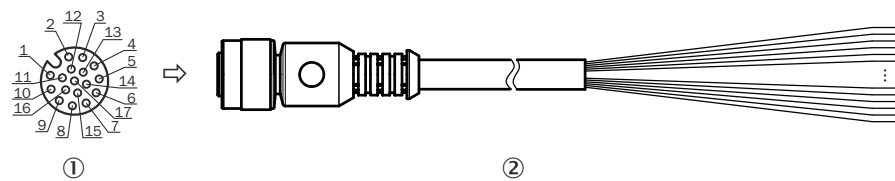


Figure 27: Adapter cable, e.g. part no. 2070425 (3 m)

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

Table 22: Signal assignment of adapter cable with open end

Pin	Signal	Function	Wire color
1	GND	Ground	Blue
2	V _s	Supply voltage	Brown
3	CAN L	CAN bus (IN/OUT)	Green
4	CAN H	CAN bus (IN/OUT)	White
5	-	-	Pink
6	TxD (RS-232), host	Host interface (sender)	Yellow
7	-	-	Black
8	-	-	Gray
9	SensGND	Digital input ground	White-black
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 output 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 suitable for drag chain, deep-freeze compatible

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

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 +80 °C, for fixed installation: -40 °C to +85 °C

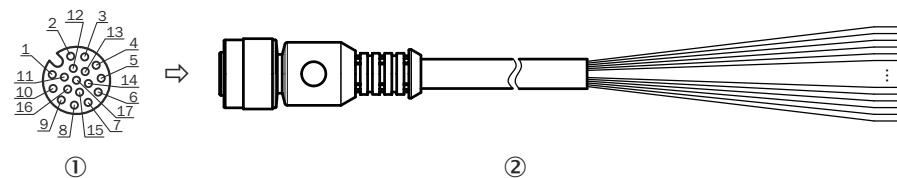


Figure 28: Adapter cable, part no. 2075220 (5 m)

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

Table 23: Signal assignment of adapter cable with open end

Pin	Signal	Function	Wire color
1	GND	Ground	Blue
2	V _s	Supply voltage	Brown
3	CAN L	CAN bus (IN/OUT)	Green
4	CAN H	CAN bus (IN/OUT)	White
5	-	-	Pink
6	TxD (RS-232), host	Host interface (sender)	Yellow
7	-	-	Black
8	-	-	Gray
9	SensGND	Digital input ground	Gray-brown
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 output 3	Yellow-brown
17	N. c.	-	White-gray

13.3 Connection diagrams of connection module CDB650-204

13.3.1 Connection of the device to CDB650-204

Device = Lector61x = V2D61xx- xxxxEx

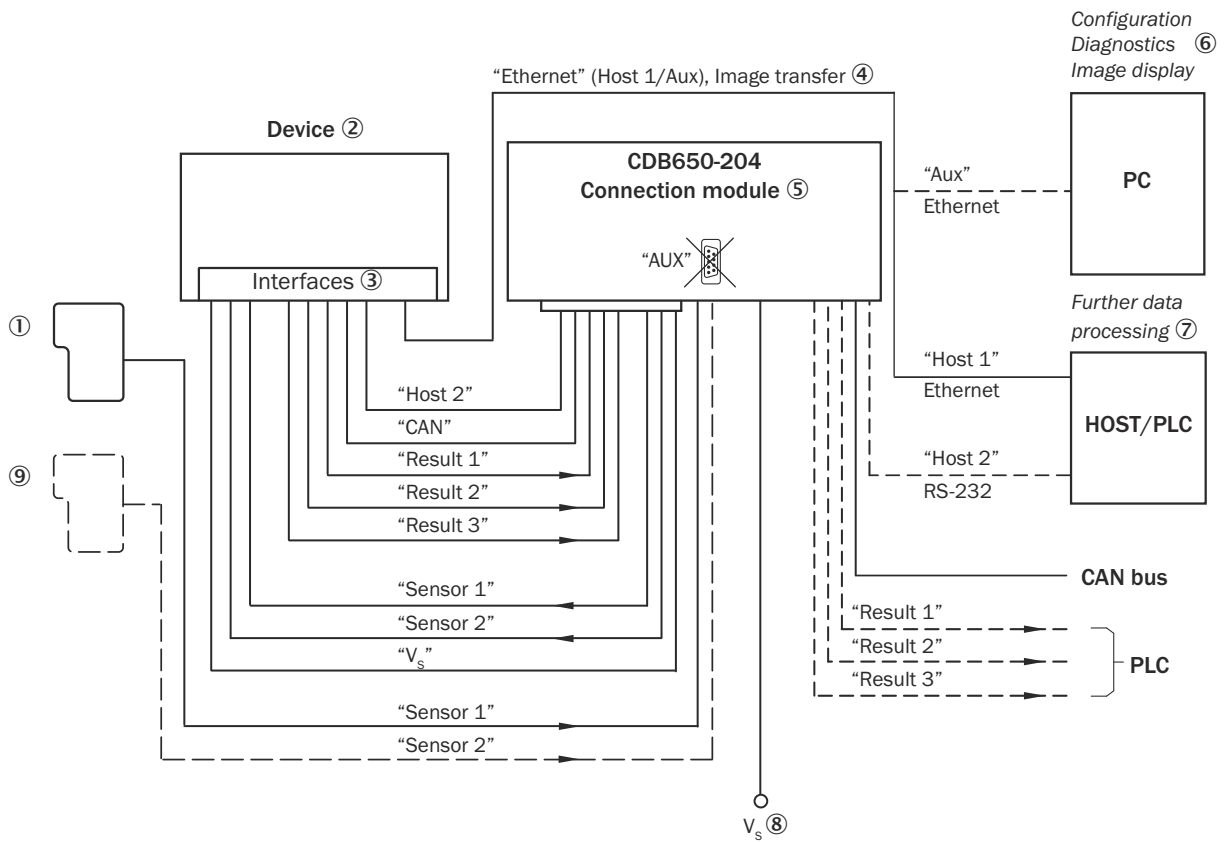


Figure 29: Connection of the device to peripherals via CDB650-204 (overview)

- ① External trigger sensor, e.g. for read cycle generation
- 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)

13.3.2 Wiring overview of the CDB650-204

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

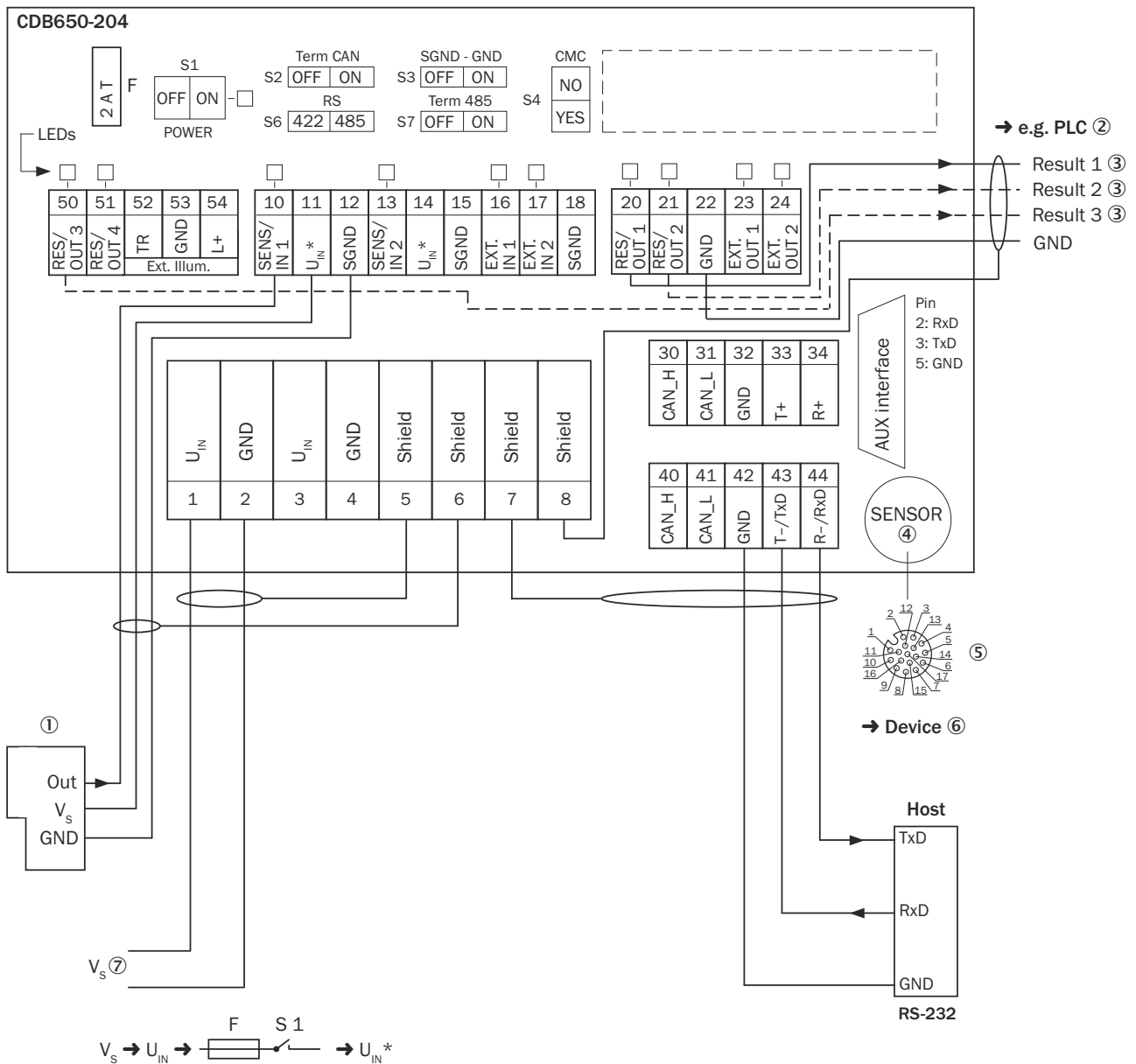


Figure 30: Overview: connection of device and peripherals to the CDB650-204 connection module

- ① External trigger sensor, e.g. for read cycle generation
- 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- xxxxEx

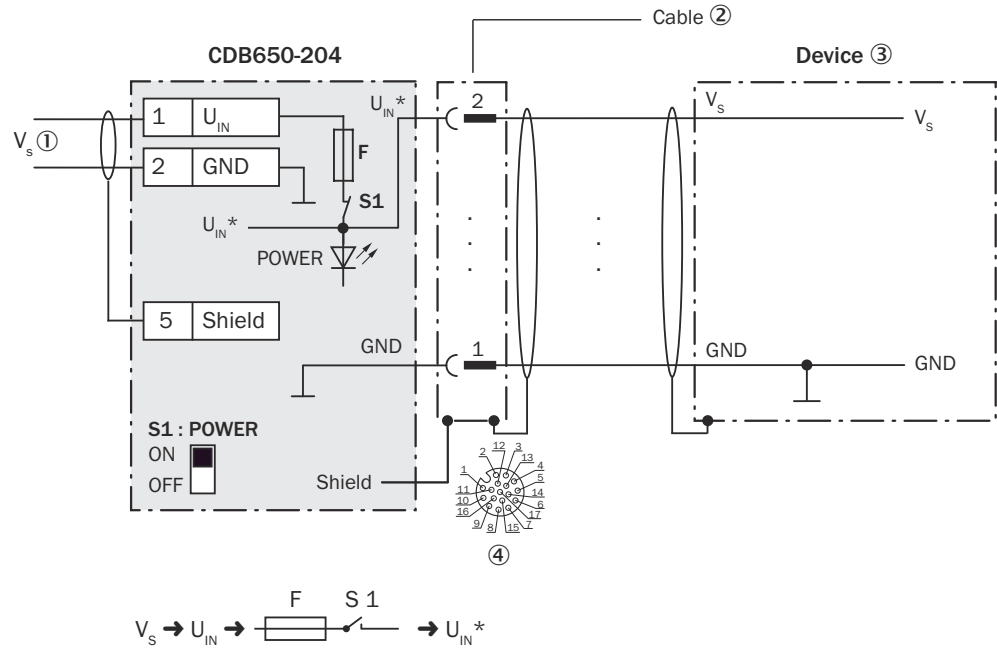


Figure 31: Connecting supply voltage for the device in CDB650-204 connection module

- 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 24: 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- xxxxEEx

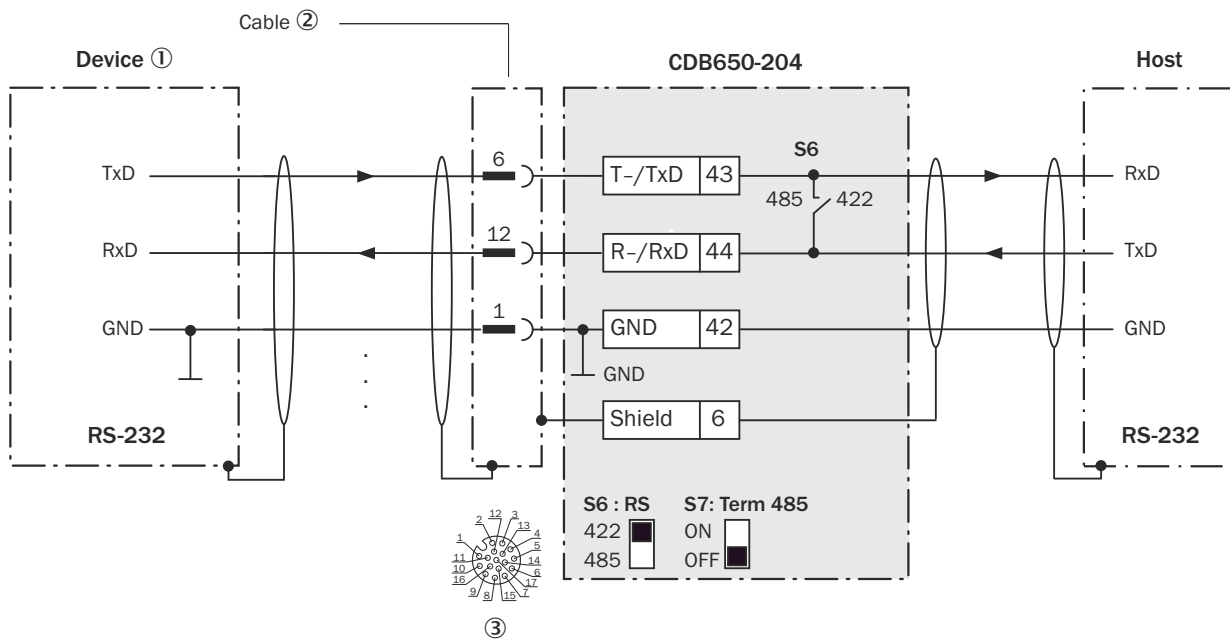


Figure 32: Wiring data interface RS-232 of the device in the connection module CDB650-204

- 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

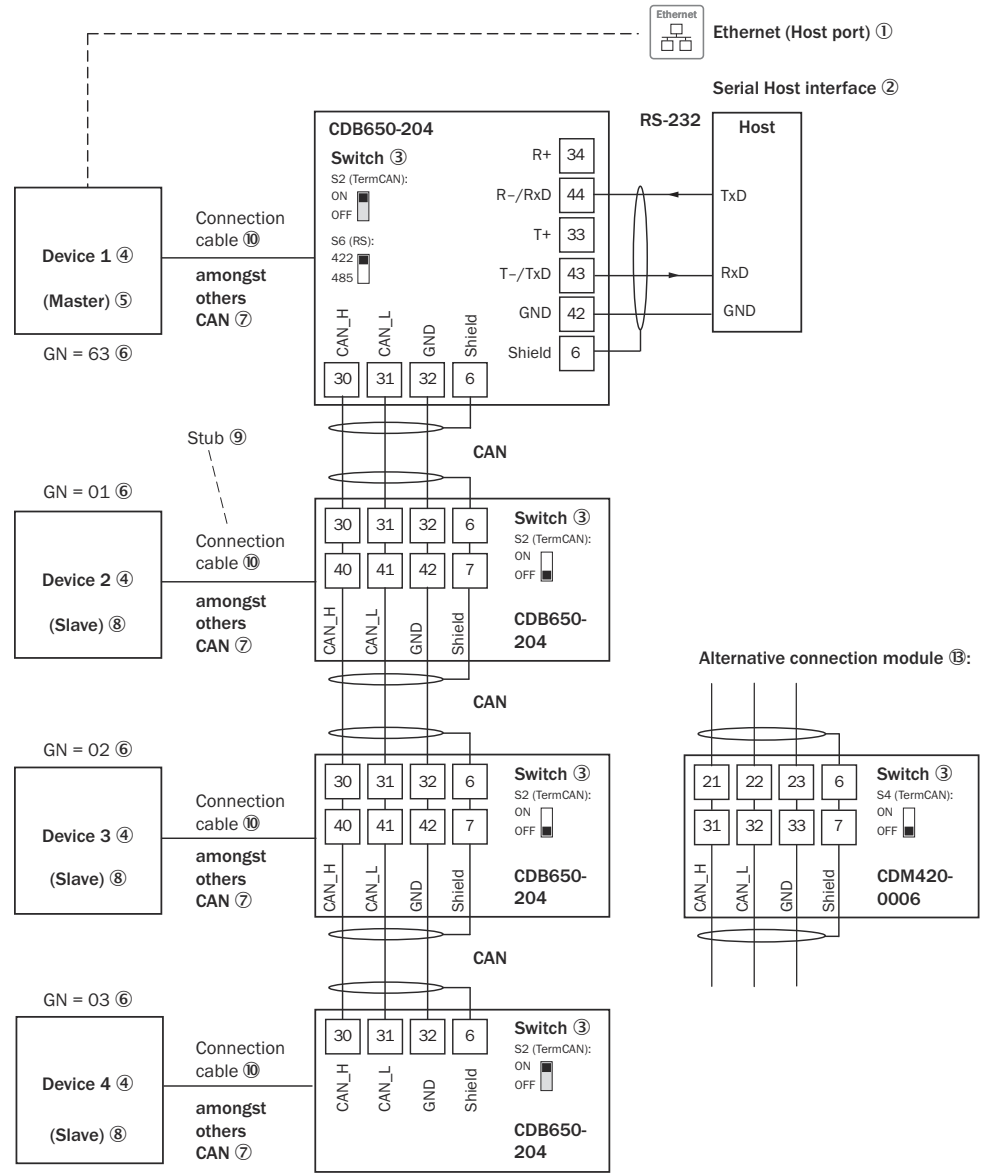


NOTE

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

13.3.5 Wiring the CAN interface in the CDB650-204

Device = Lector61x = V2D61xx-xxxxxEx



GN = Device number ⑪
 (max. 32 participants) ⑫

Figure 33: Wire the CAN interface of the device in the CDB650-204 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the master, for example, are disregarded here!

- ① Lector61x = V2D61xx-xxxxEx: Ethernet (host port)
- ② Serial host interface
- ③ Switch
- ④ Device
- ⑤ Master
- ⑥ Device number
- ⑦ CAN etc.
- ⑧ Slave
- ⑨ Branch line
- ⑩ Connecting cable permanently connected with the device (male connector, M12, 17-pin, A-coded)
- ⑪ Device number (GN)
- ⑫ Maximum 32 users

- ③ Example of alternative connection module.

Alternative connection module for Lector61x = V2D61xx-xxxxEx: CDM420-0006.

CDM420-0006: an adapter cable (female connector, M12, 17-pin, A-coded/male connector, D-Sub-HD, 15-pin) is required to connect the Lector61x = V2D61xx-xxxxEx



NOTE

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

Make further settings in the device corresponding to the function of the device in the system configuration.

13.3.6 Wiring the digital inputs “Sensor 1” and “Sensor 2” of the device in the CDB650-204

Device = Lector61x = V2D61xx-xxxxEx

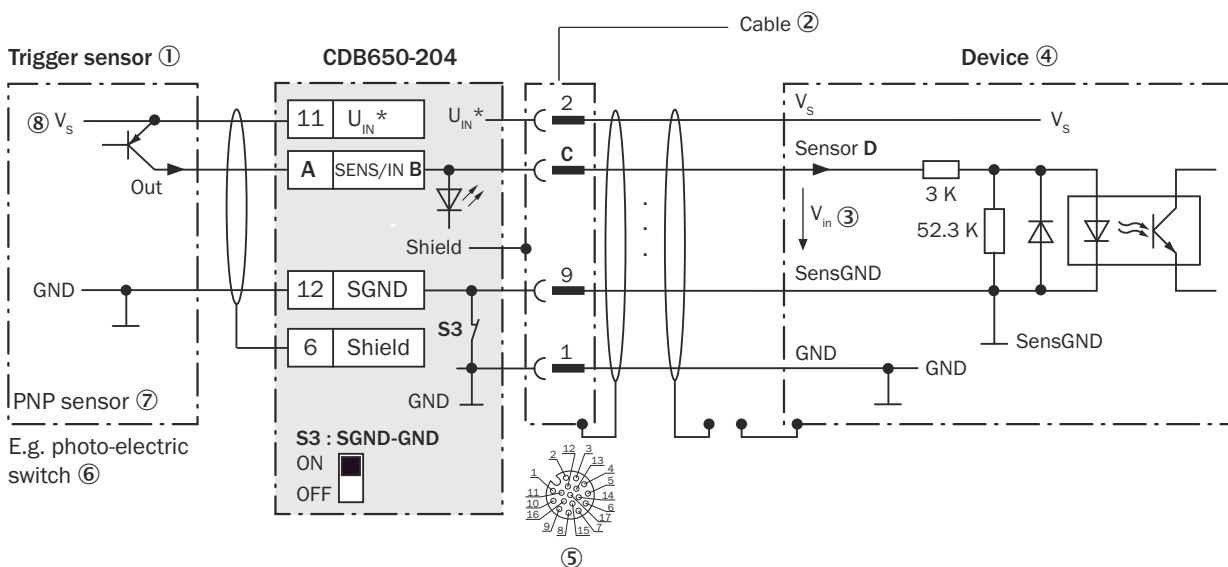


Figure 34: Trigger sensor supplied with power by connection module CDB650-204

- ① Trigger sensor, e.g. for read cycle generation
- 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

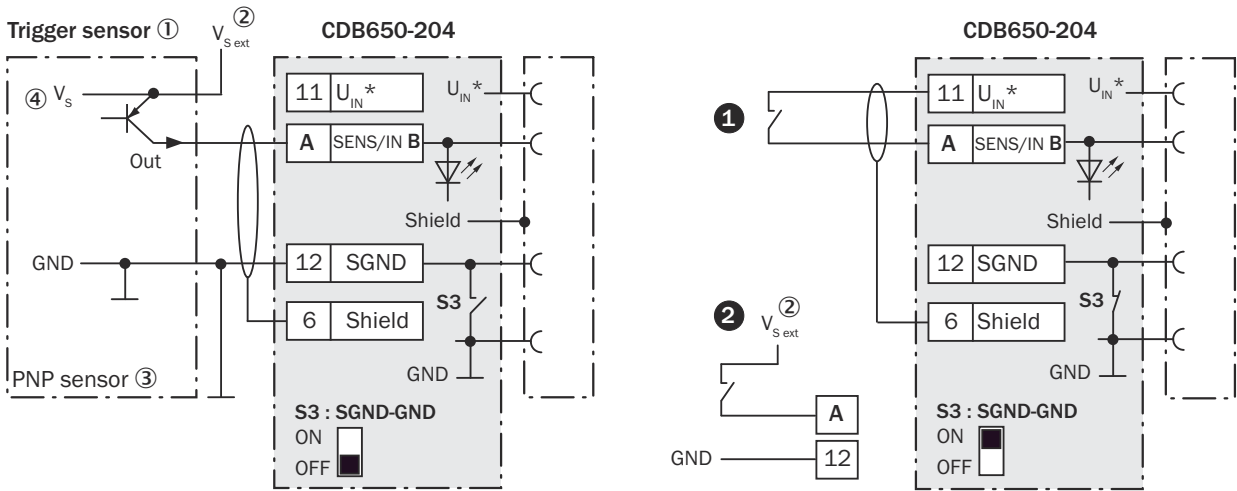


Figure 35: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDB650-204 or ❷ connected potential-free and supplied with power externally. Switch setting S3 then as in left figure.

- ❶ Trigger sensor, e.g. for read cycle generation
- ❷ External supply voltage $V_{S\ ext}$
- ❸ PNP sensor
- ❹ Supply voltage V_s

Table 25: 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 26: Switch S3: SGND - GND

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

Characteristic data of the digital inputs

Table 27: 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"> • Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor
Electrical values	Low: $V_{in}^{1)} \leq 2\ V$; $I_{in}^{2)} \leq 0.3\ mA$ High: $6\ V \leq V_{in} \leq 27.6\ V$; $0.7\ mA \leq I_{in} \leq 5\ mA$

1) Input voltage.
2) Input current.

**NOTE**

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

13.3.7 Wiring the digital outputs “Result 1” to “Result 3” of the device in the CDB650-204

Device = Lector61x = V2D61xx- xxxxEx

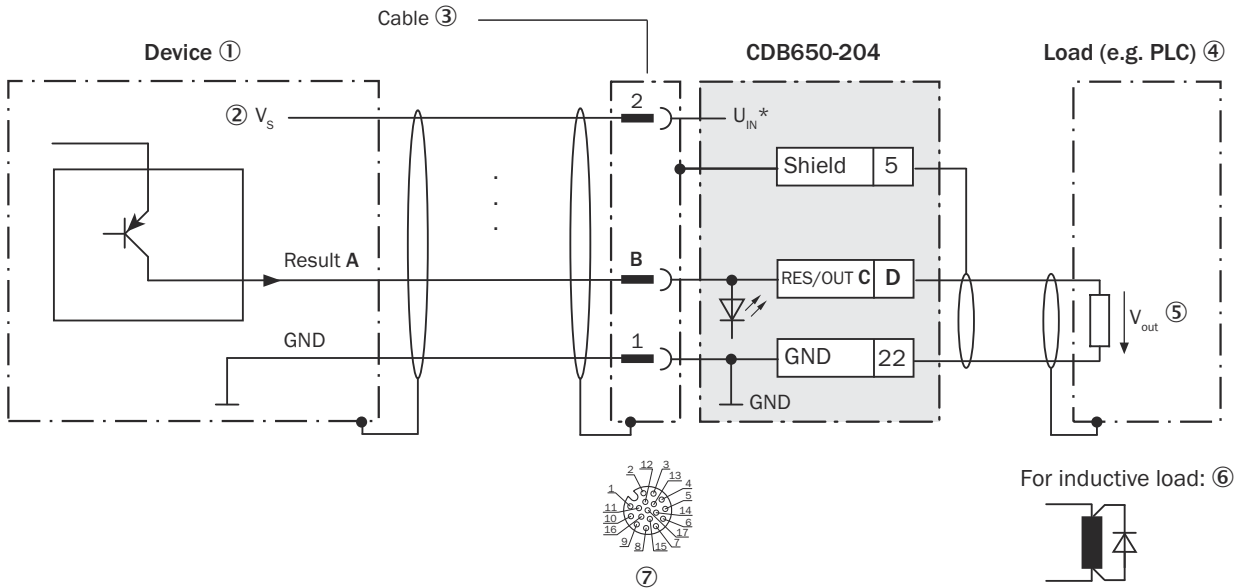


Figure 36: Wiring the digital outputs “Result 1” to “Result 3” of the device in the connection module CDB650-204

- 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 28: 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 29: Characteristic data of the digital outputs "Result 1" to "Result 3"

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"> • Short-circuit protected + temperature protected • Not electrically isolated from V_S
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

Assign the functions for the digital outputs in the device using a configuration tool, e.g. the configuration software 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

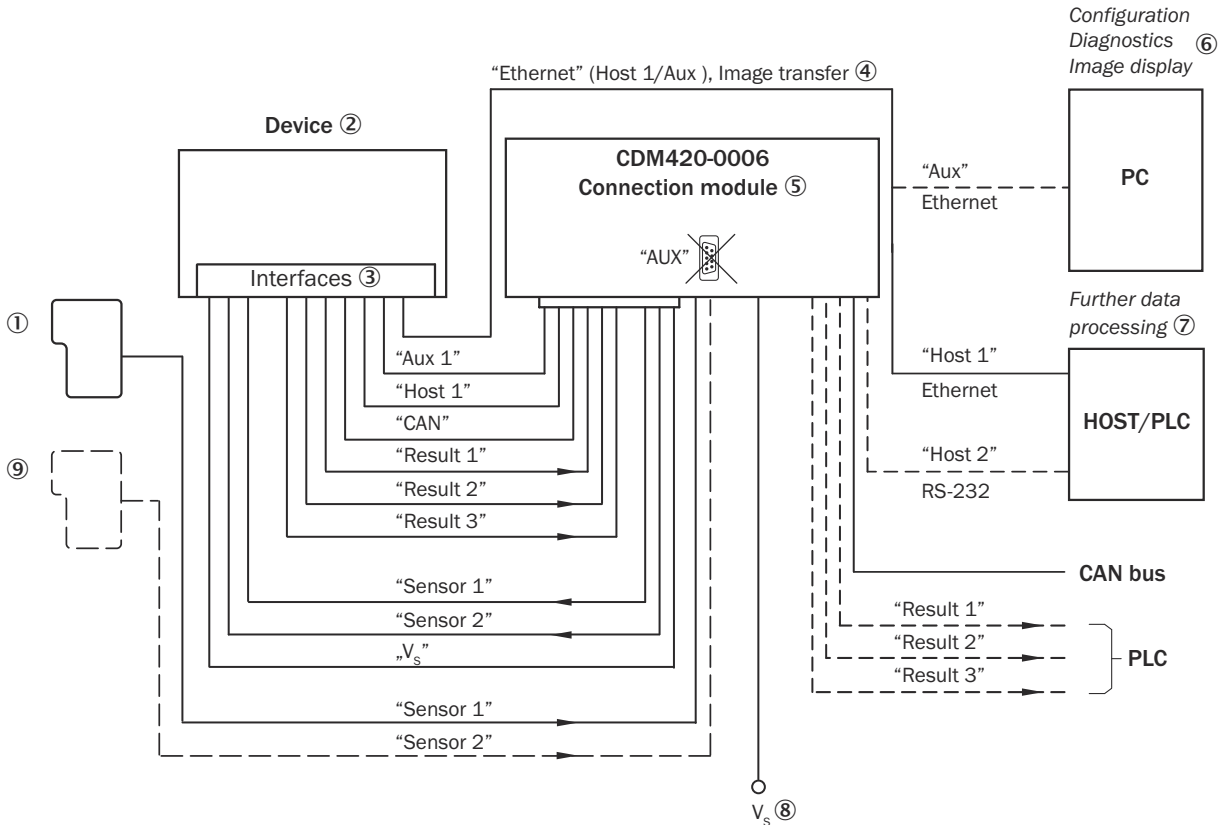


Figure 37: Connection of the device to peripherals via CDM420-0006 (overview)

- ① External trigger sensor, e.g. for read cycle generation
- 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- xxxxxEx

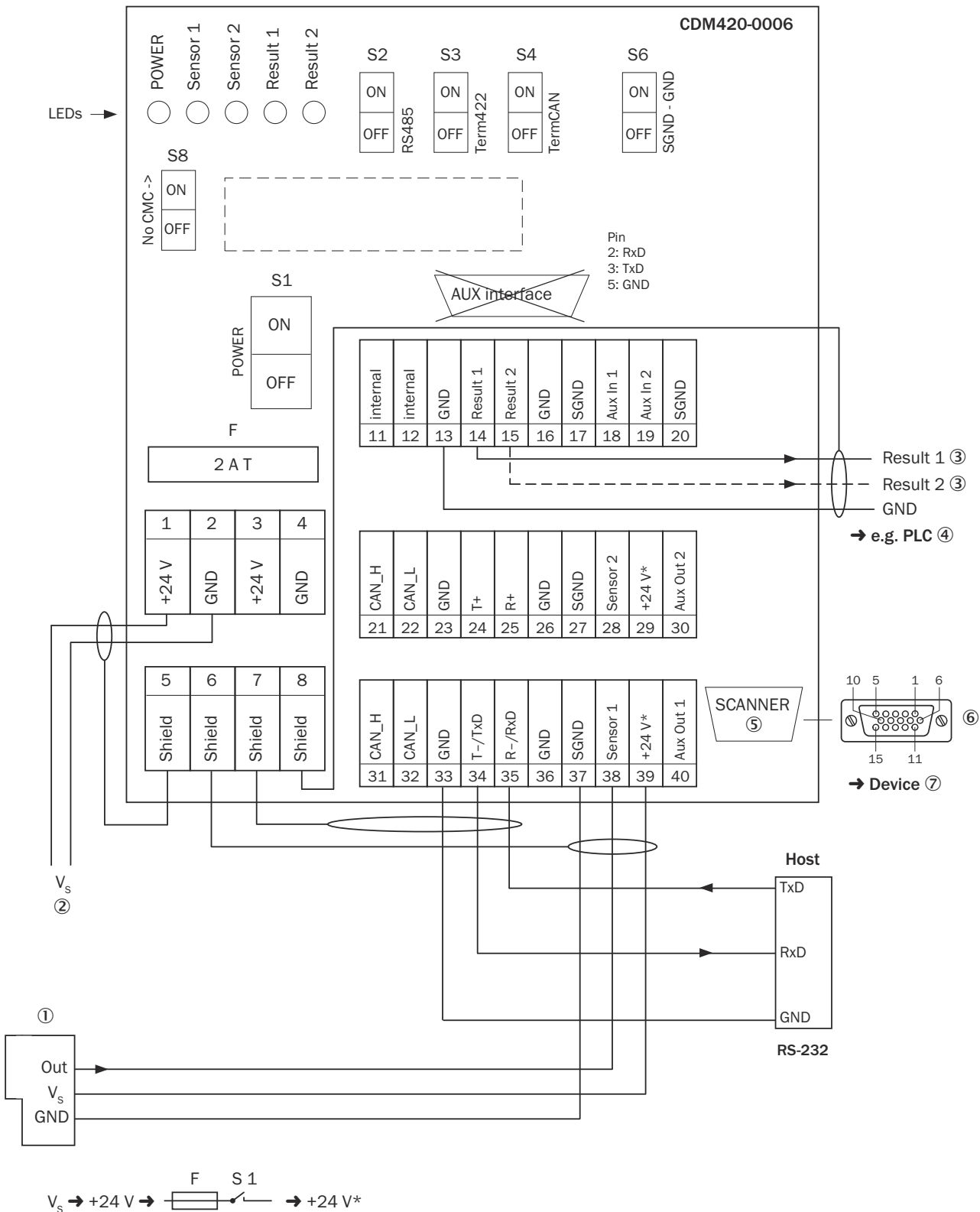


Figure 38: Overview: connection of device and peripherals to the CDM420-0006 connection module

- ① External trigger sensor, e.g. for read cycle generation
- 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

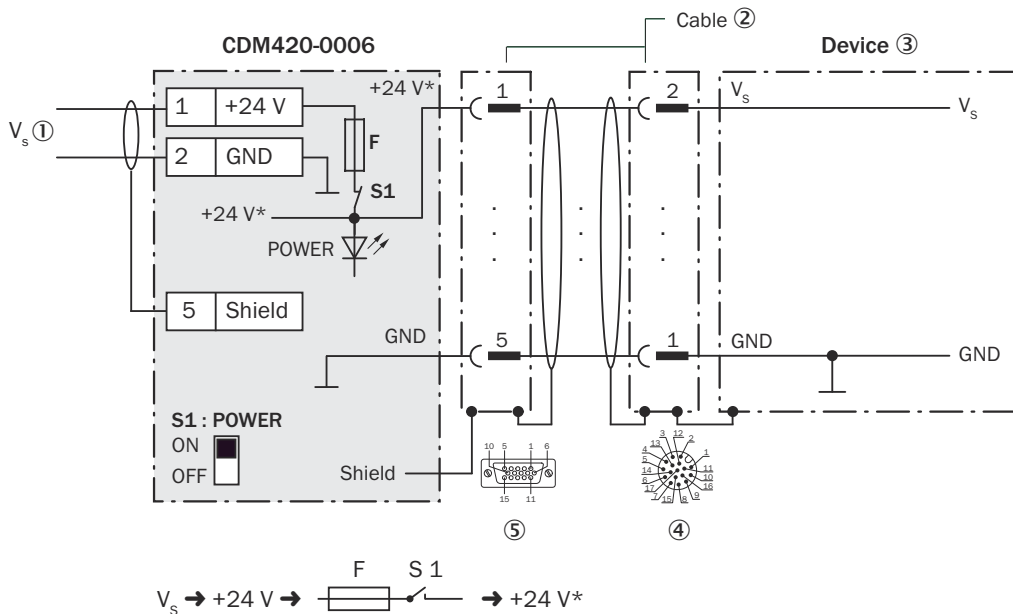


Figure 39: Connecting supply voltage for the device in CDM420-0006 connection module

- ① Supply voltage V_s
- ② Adapter cable (male connector, D-Sub-HD, 15-pin / 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 30: 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 Connecting serial host interface RS-232 of the device in CDM420-0006

Device = Lector61x = V2D61xx- xxxxxEx

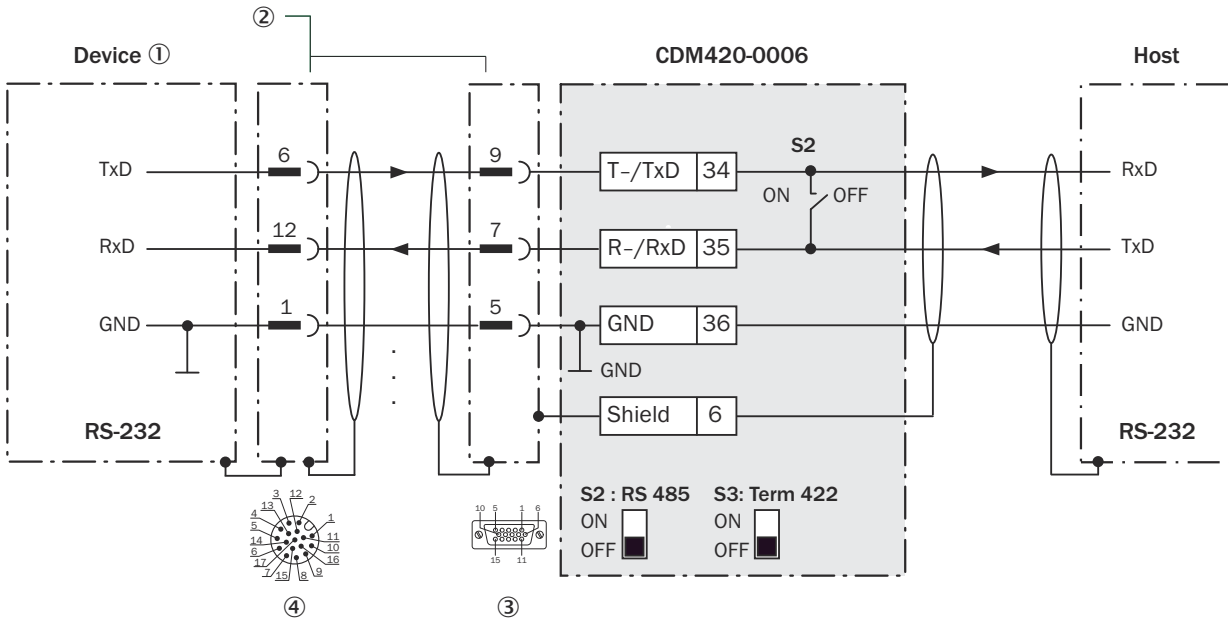


Figure 40: Connecting data interface RS-232 of the device in the connection module CDM420-0006

- ① Device
- ② Adapter cable (male connector, D-Sub-HD, 15-pin / 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)

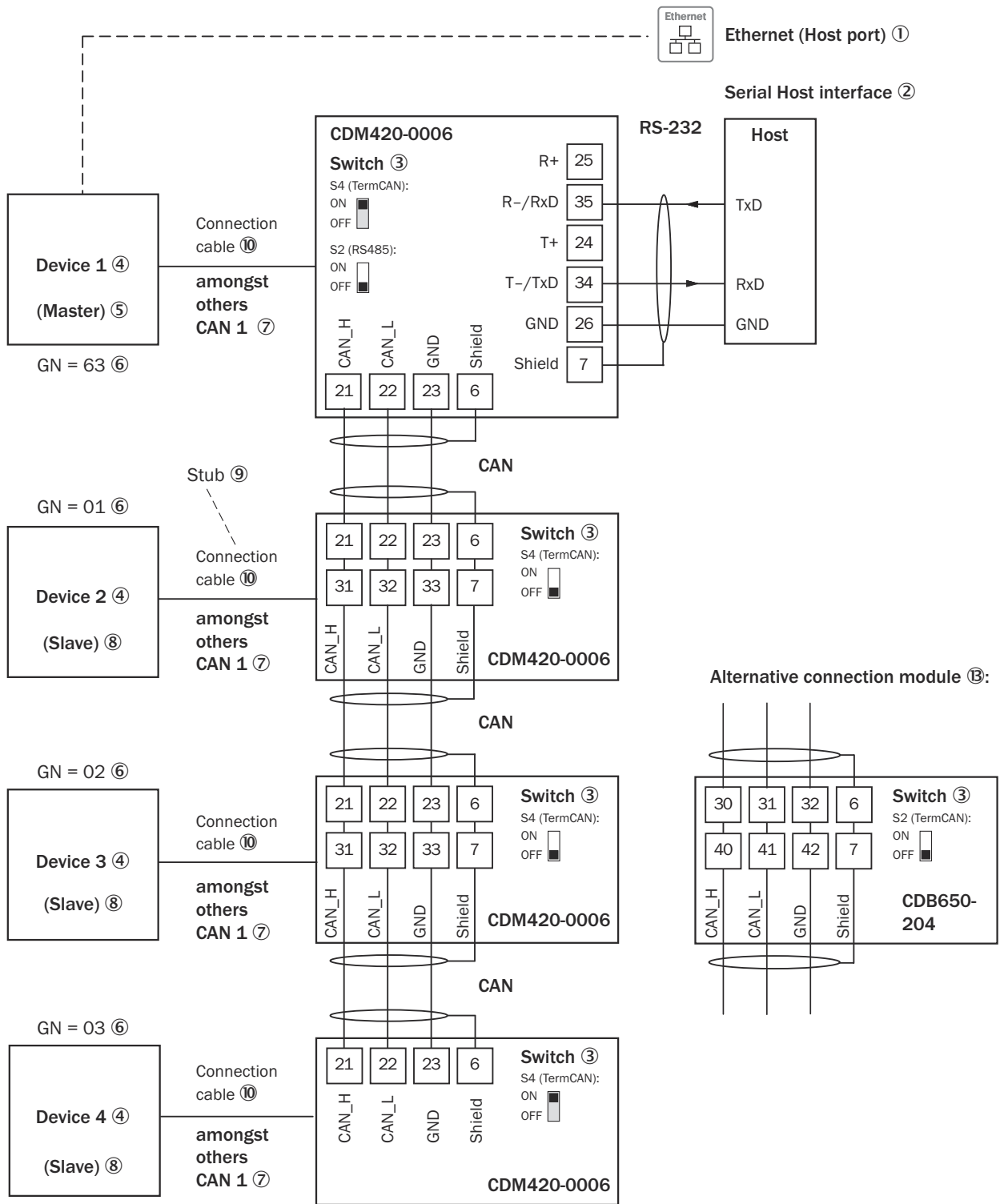


NOTE

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

13.4.5 Wiring the CAN interface in the CDM420-0006

Device = Lector61x = V2D61xx- xxxxxEx



GN = Device number ⑪
(max. 32 participants) ⑫

Figure 41: Wire the CAN interface of the device in the CDM420-0006 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the master, for example, are disregarded here!

- ① Ethernet (host port)
- ② Serial host interface
- ③ Switch

- ④ Device
- ⑤ Master
- ⑥ Device number
- ⑦ CAN etc.
- ⑧ Slave
- ⑨ Branch line
- ⑩ An adapter cable (female connector, M12, 17-pin, A-coded / male connector, D-Sub-HD, 15-pin) is required to connect the device
- ⑪ Device number (GN)
- ⑫ Maximum 32 users
- ⑬ Alternative connection module CDB650-204.



NOTE

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

Make further settings in the device corresponding to the function of the device in the system configuration.

13.4.6 Wiring the digital inputs “Sensor 1” and “Sensor 2” of the device in the CDM420-0006

Device = Lector61x = V2D61xx- xxxxE_x

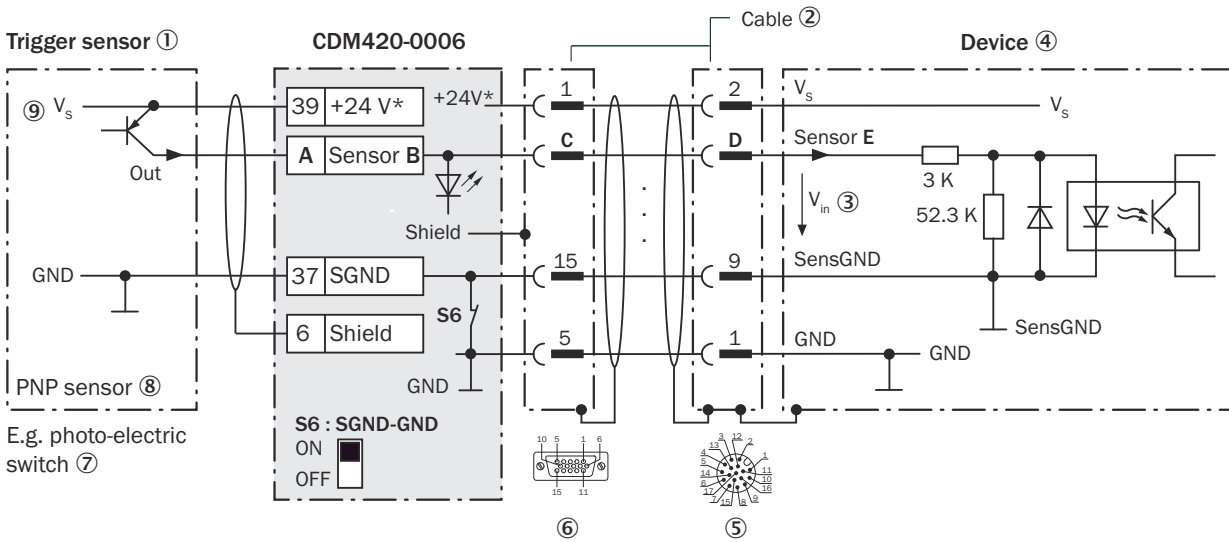


Figure 42: Trigger sensor supplied with power by connection module CDM420-0006

- ① Trigger sensor, e.g. for read cycle generation
- ② Adapter cable (male connector, D-Sub-HD, 15-pin / 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

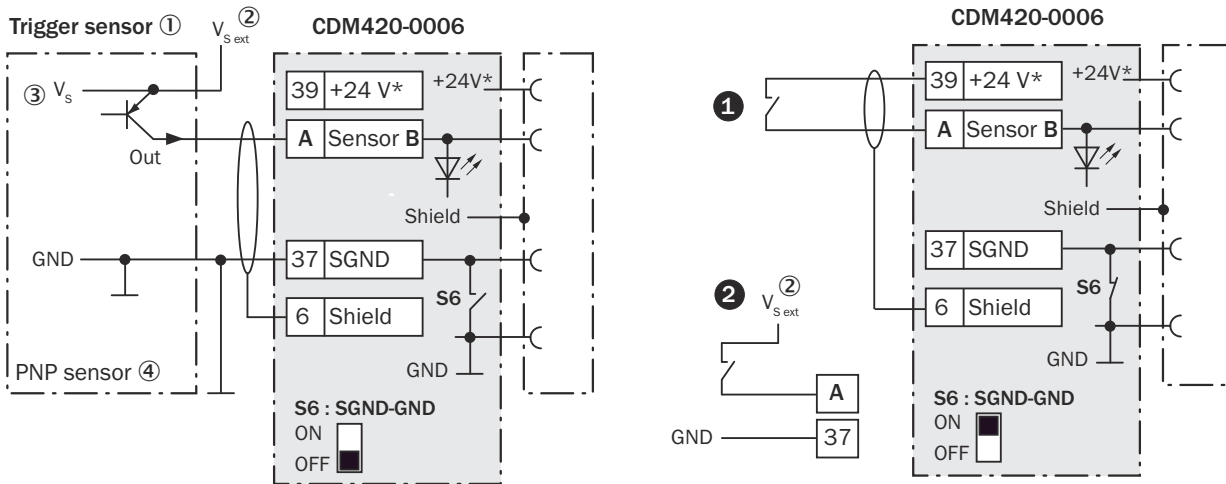


Figure 43: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ① supplied with power by connection module CDM420-0006 or ② connected potential-free and supplied with power externally. Switch setting S6 then as in left figure.

- 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 31: 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 32: Switch S6: SGND - GND

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

Characteristic data of the digital inputs

Table 33: 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"> • Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor
Electrical values	Low: $V_{in}^{1)} \leq 2\ V$; $I_{in}^{2)} \leq 0.3\ mA$ High: $6\ V \leq V_{in} \leq 27.6\ V$; $0.7\ mA \leq I_{in} \leq 5\ mA$

- 1) Input Voltage
- 2) Input current

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

13.4.7 Wiring the digital outputs “Result 1” and “Result 2” of the device in the CDM420-0006

Device = Lector61x = V2D61xx- xxxxE_x

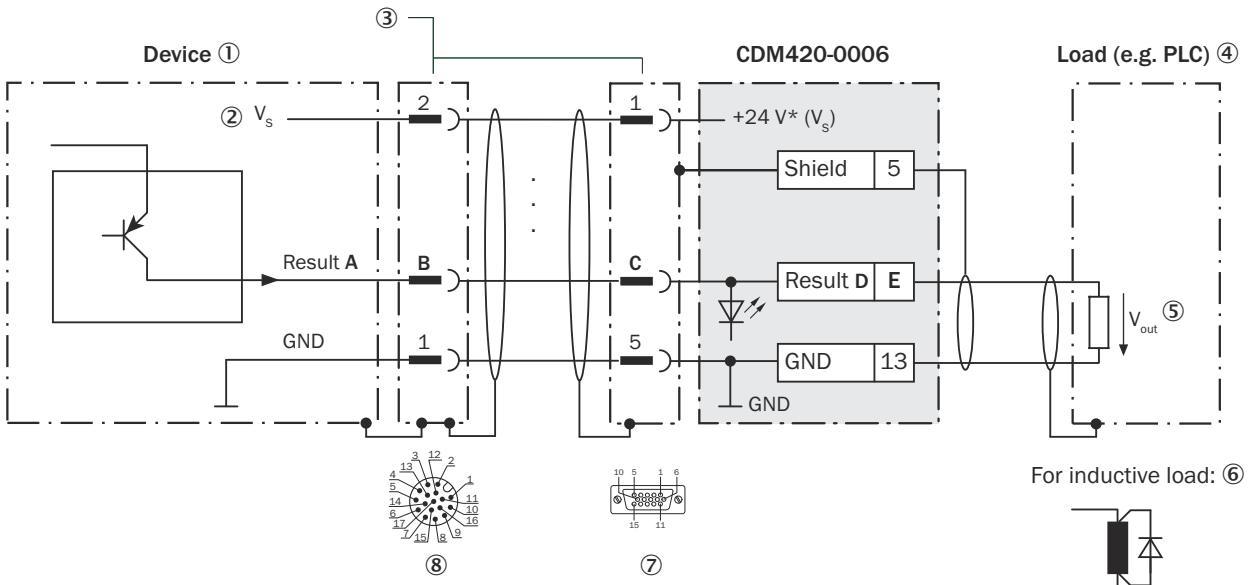


Figure 44: Wiring the digital outputs “Result 1” and “Result 2” of the device in the connection module CDM420-0006

NOTE
The digital output “Result 3” of the device is not available in the CDM420-0006.

- ① Device
- ② Supply voltage V_s
- ③ Adapter cable (female connector, M12, 17-pin, A-coded/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)

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 34: 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 35: Characteristic data of the digital outputs "Result 1" and "Result 2"

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"> • Short-circuit protected + temperature protected • Not electrically isolated from the supply voltage V_S
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

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

13.5 Copyright notices

Open source programs

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13.6 General cybersecurity notice

Protection against cybersecurity threats requires a comprehensive and holistic cybersecurity concept that must be continuously monitored and maintained. Such a concept consists of organizational, technical, process-related, electronic and physical defense levels and sets up appropriate measures for the different types of risk. SICK's products and solutions must be regarded as an integral part of this concept.

Information on Cybersecurity can be found at: www.sick.com/psirt .

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