OPERATING INSTRUCTIONS

InspectorP61x

2D machine vision

SICK
Sensor Intelligence.

Described product

InspectorP61x

Manufacturer

SICK AG
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Germany

Legal information

Original document

This document is an original document of SICK AG.

Contents

1 About this document

1.1 Information on the operating instructions

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

Prerequisites for safe work are:

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

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

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

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

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

1.2 Scope

The operating instructions are valid for all available product types. To obtain more detailed information on identifying your product type, see "Type code", page 12.

Available product types are listed on the online product page:

- www.sick.com/InspectorP61x

A number of product types are used as examples for commissioning 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

More information can be found on the product page.

The page can be accessed via the **SICK Product ID: pid.sick.com/{P/N}/{S/N}**

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

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

The following information is available depending on the product:

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

2 Safety information

2.1 Intended use

The InspectorP6xx is a programmable vision sensor for industrial use for tasks which require high-resolution images at long distances.

The device is programmed on a PC by using the development environment software SICK AppSpace. Depending on the application, a browser-based, graphical user interface (GUI) can be created, which provides opportunities defined by the application developer to influence an application at operator level. The device offers various interfaces for controlling, programming, and operating purposes, which can be activated as necessary via development environments, control systems (programmable logic controllers), or applications. However, configuration, programming, and control requires various technical skills, depending on how the device is connected and used.

The devices are primarily designed for use in industrial and logistics areas, and they meet the requirements for industrial ruggedness, interfaces and data processing. They are not safety components as per the Machinery Directive 2006/42/EC. They are not intended and not permitted to be used in areas with explosive atmospheres, in corrosive environments, or in extreme ambient conditions.

2.1.1 Conditions for specified enclosure rating

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

- The electrical 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 cap (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 the documentation must be strictly observed.
- Shut down the product immediately in case of damage.

2.3 Limitation of liability

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

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

2.3.1 Programmable product

For programmable products, the respective programmer is responsible for his/her programming performance and the resulting working principle of the product.

The liability and warranty of SICK AG is limited to the product specification (functionality and any programming interfaces) according to the agreed conditions.

Therefore, SICK AG is not liable, among other things, for damages that are caused by programming of the customer or third parties.

2.4 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.

2.5 Cybersecurity

Overview

To protect against cybersecurity threats, it is necessary to continuously monitor and maintain a comprehensive cybersecurity concept. A suitable concept consists of organizational, technical, procedural, electronic, and physical levels of defense and considers suitable measures for different types of risks. The measures implemented in this product can only support protection against cybersecurity threats if the product is used as part of such a concept.

You will find further information at www.sick.com/psirt, e.g.:

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

2.6 Requirements for skilled persons and operating personnel

WARNING
Risk of injury due to insufficient training.
Improper handling of the device may result in considerable personal injury and material damage.

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

The following qualifications are required for various activities:

Table 1: Activities and technical requirements

Activities	Qualification
Mounting, maintenance	■ Basic practical technical training ■ Knowledge of the current safety regulations in the workplace
Electrical installation, device replacement	■ Practical electrical training ■ Knowledge of current electrical safety regulations ■ Knowledge of the operation and control of the devices in their particular application
Commissioning, configuration	■ Basic knowledge of the computer operating system used ■ Basic knowledge of the design and setup of the described connections and interfaces ■ Basic knowledge of data transmission Knowledge of the configuration of image processing systems and network components
Operation of the device for the particular application	■ 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 specific hazards

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

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

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

CAUTION

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

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

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

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

CAUTION

Optical radiation: Class 1 Laser Product

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

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

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

For both radiation types:

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

CAUTION
Risk of injury due to hot device surface.

The surface of the device can become hot.

- 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 Scope of delivery

Scope of delivery

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

3.2 Product ID

3.2.1 Type label

The type label gives information for identification of the device.

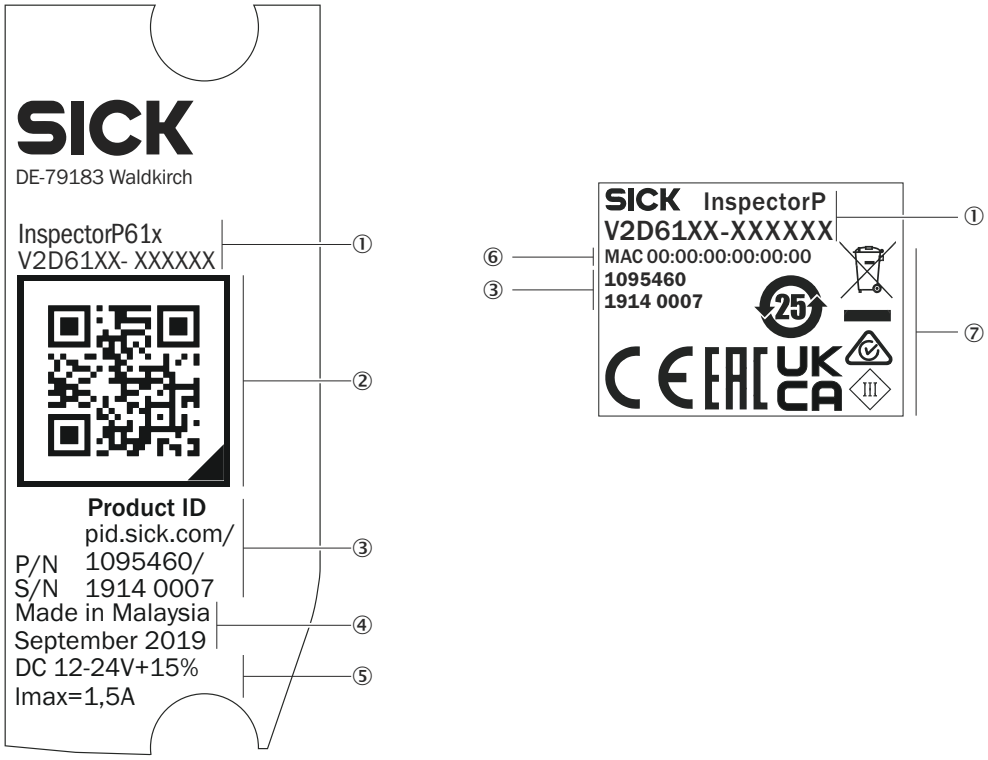


Figure 1: InspectorP61x type label (example)

① Product and type designation
② QR code with a link to the product and more information
③ Product ID
④ Place and date of production
⑤ Supply voltage and maximum power consumption
⑥ MAC address (placeholder)
⑦ Conformity mark and certification mark

3.2.2 Type code

The devices of the InspectorP61x product family are arranged according to the following type code:

V2D61yz- abcdefg

V	2	D	6	1	y	z	-	a	b	c	d	e	f	g
1	2	3	4	5	6	7		8	9	10	11	12	13	14

Position	Description
1 .. 5	Product family V2D61 InspectorP61x
6	Image sensor resolution 1: 1.2 Mpx (1280 x 960)
7	Function P: Machine Vision, programmable with SICK AppSpace
8	Generation
9	Image sensor type M: Monochrome

Position	Description
10	Optical focus method M: Manual focus L: Liquid lens
11	Integrated illumination unit / LED alignment aid S: Integrated illumination unit (visible amber light, visible blue light), LED alignment aid (visible red light), ToF (Time of Flight, invisible infra-red light) I: IR, aimer
12	Focal length / aperture B: 6 mm C: 12 mm
13	Data interface E: Ethernet with 0.35 m cable (female connector, M12, 4-pin, D-coded), RS232C (male connector, M12, 17- pin, A-coded), 2 digital input + 3 digital input/output (configurable) I: Ethernet with 0.35 m cable (female connector, M12, 4-pin, D-coded), RS232C (male connector, M12, 17- pin, A-coded), 2 digital input + 3 digital input/output (configurable) + 1 digital output with 0.3 m cable
14	IP protection class 4: IP54 5: IP65

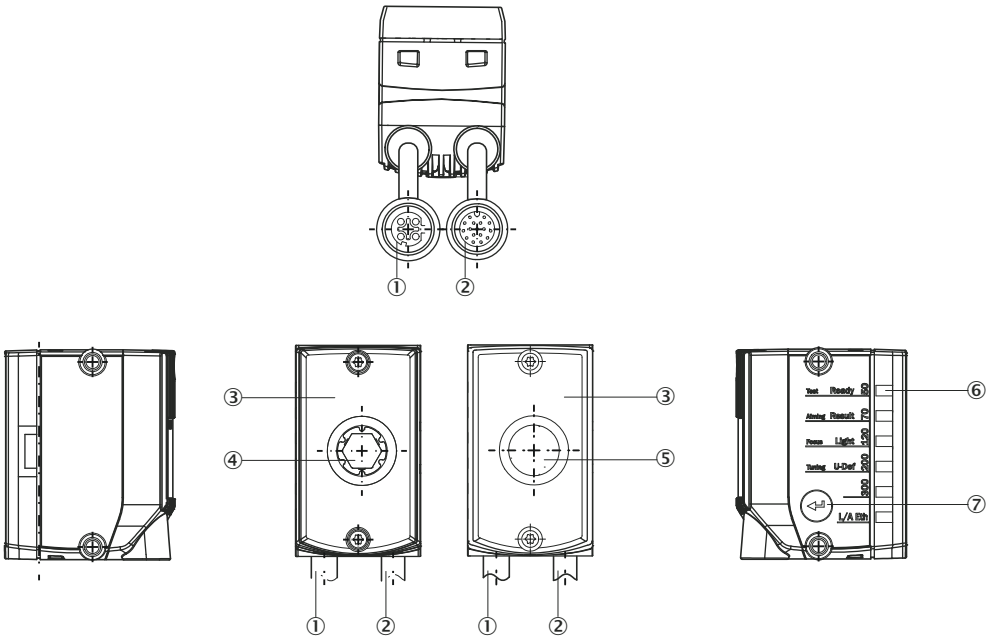
NOTE

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

- www.sick.com/InspectorP61x

3.3 Product characteristics

3.3.1 Device view



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/I/O connection (male connector, M12, 17-pin, A-coded), length of cable: 0.35 m

③ Viewing window with 8 integrated illumination LEDs, 2 LED alignment aids, 1 feedback LED, 1 time-of-flight sensor

④ Optics, manual focus adjustment with the help of a focus adjustment tool

⑤ Optics, liquid lens, the product can adjust the focus position automatically

⑥ 6 status LEDs to display the focus position and working distance, device status, and device function (3 display levels)

⑦ Function button

Further topics

- Dimensional drawings

3.3.2 Illumination unit

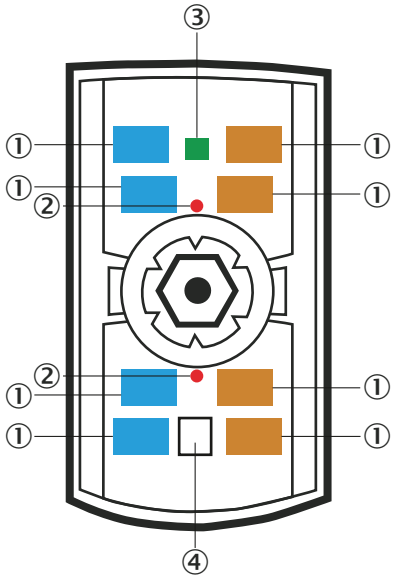


Figure 2: Illumination unit (integrated illumination)

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.

3.3.3 Display and operating elements

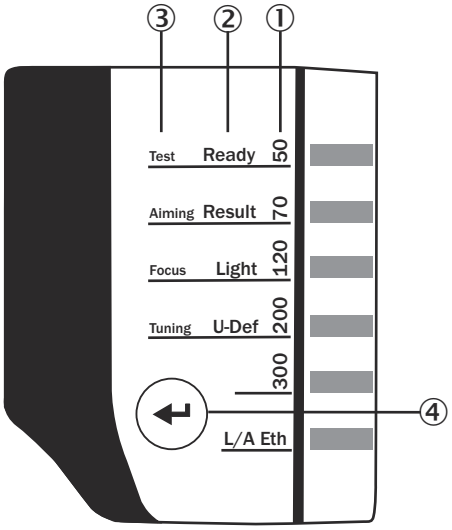


Figure 3: LED status displays, bar graph display and function keys on the top of the device

① First display level
② Second display level
③ Third display level
④ Function button

Status displays

Display	LED	API name[1)]	Color	Status
Ready	Steady	-	● (green)	Device is ready
	Steady	-	● (red)	Hardware or software error
	Steady	-	● (yellow)	Firmware or SensorApps are being installed on the device. Do not disconnect the power to the device.
	Flashing (about 1 Hz)	-	● ● (green/yellow)	Profinet is configured, but no successful connection to a PLC is established. If there are additional errors related to the SensorApp, the LED flashes with red color.
Result	Programmable	`RESULT_LED`	red, green, blue, fuchsia, yellow, aqua, white	Function defined by user
Light	Programmable	`LIGHT_LED`	red, green, blue, fuchsia, yellow, aqua, white	Function defined by user
U-Def	Programmable	`FUNCTION_LED`	red, green, blue, fuchsia, yellow, aqua, white	Function defined by user

Display	LED	API name[1)]	Color	Status
L/A Eth	Steady		● (green)	The device is connected to a network
	Flashing		✳ (green)	Data traffic via the Ethernet interface

○ = off; ● = illuminated; ✳ = flashing

1) For programmable LEDs only

3.3.4 Product features and functionality

The InspectorP6xx is a vision sensor which is well-suited for a wide variety of industrial tasks thanks to its programmable interface.

Convenient functions such as function buttons, auto-setup, aiming laser, and a green feedback LED reduce the amount of work required for training and installation.

For manual product types, the focus position can be adjusted manually with the focus adjustment tool. For product types with liquid lens, the product can adjust the focus position automatically.

The near infrared[1)] product type provides a variant which does not disturb the surroundings with blinking lights. This variant can provide a more suitable contrast for some applications.

3.4 SICK AppSpace

The InspectorP6xx product family is part of the SICK AppSpace ecosystem, which consists of software tools and programmable sensors or devices. See figure 4 for an overview of SICK AppSpace.

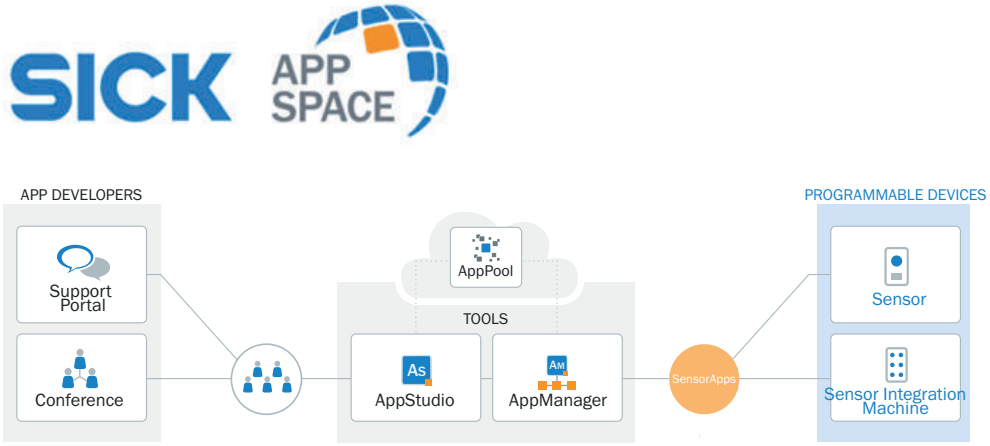


Figure 4: SICK AppSpace

SICK AppSpace includes the following components and resources:

- SICK AppManager: A software tool used for the installation and management of SensorApps and device firmware updates.
- SICK AppPool: A cloud-based repository for storing and sharing SensorApps. SICK AppPool can be accessed directly from SICK AppManager, SICK AppStudio, and from the web.
- SICK AppStudio: A Software Development Kit (SDK) for developing SensorApps on programmable SICK devices. Its user interface for machine operators can be created individually as a web GUI.
- The SICK Support Portal (supportportal.sick.com) contains tutorials and instructions for programming the InspectorP6xx in SICK AppStudio.

1) NIR

For more information about downloading SensorApps and programming the device, see "Commissioning", page 45.

For more information about SICK AppSpace, see **www.sick.com/SICK_AppSpace**.

4 Transport and storage

4.1 Transport

NOTICE
Damage due to improper transport!

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

4.2 Unpacking

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

4.3 Transport inspection

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

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

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

4.4 Storage

- Electrical connections are provided with a protective cap.
- Do not store outdoors.
- Store in a place protected from moisture and dust.
- Recommendation: Use the original packaging.
- To allow any residual dampness to evaporate, do not package in airtight containers.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see "Technical data", page 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.
- 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.
- For ambient operating temperatures ≥ 40 °C, mount the device using an aluminum mounting bracket (e.g., part number 2113160, 2112790).

5.2 Preparation for mounting

5.2.1 Installation requirements

Mounting requirements

- Typical space requirement: see "Field of view diagrams", page 23 and type-specific dimensional drawing
- Comply with the technical data, such as the permitted ambient conditions for operation, see "Technical data", page 53.
- Only mount the device using the threaded mounting holes provided.
- Mount the device in a shock and vibration insulated manner.
- Make sure the device has a clear view of the objects to be scanned.

Auxiliary equipment required

- Mounting system with sufficient load-bearing capacity and suitable dimensions
- 4 or 2 M4 screws for mounting the device on a mounting system supplied by the customer
- Alternatively: 2 M3 screws to mount the device on a bracket supplied by the customer (screw length: at least 35 mm)

The screw length depends on the mounting base (wall thickness of the bracket). When using an optional SICK mounting system, the screws for mounting the device are included with delivery.

5.2.2 Mounting systems

Mount the device to the mounting systems using at least 2 threaded mounting holes (M4).

The threaded mounting holes are located on the right and left side of the device.

SICK offers prefabricated mounting systems that are optimally suited for mounting the device, see "Accessories", page 58.

Customer-supplied mounting system

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

- The device can be aligned in the X- and Y-axes.
- The mounting system must be able to bear the weight of the device and connecting cables without shock.
- Mounting options for the device using the threaded mounting holes must be available.

5.3 Mounting location

5.3.1 Determining alignment

Vertical mounting

Orientation for maximum field of view height:

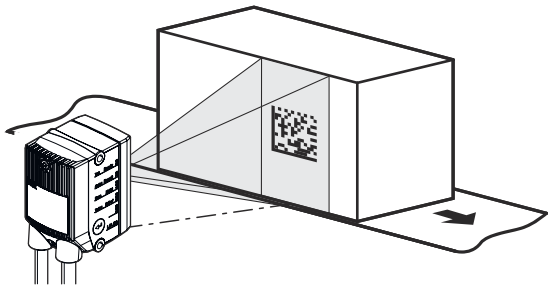


Figure 5: Vertical mounting

Horizontal mounting

Orientation for maximum field of view width:

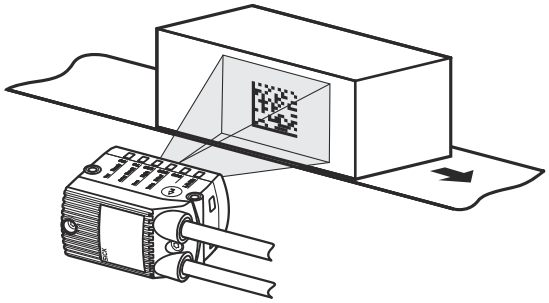


Figure 6: Horizontal mounting

5.3.2 Working range

If integrated illumination is used, the working range is 50 mm to 300 mm. To reach greater distances, use external illumination or other device variants.

Working distance and field of view size

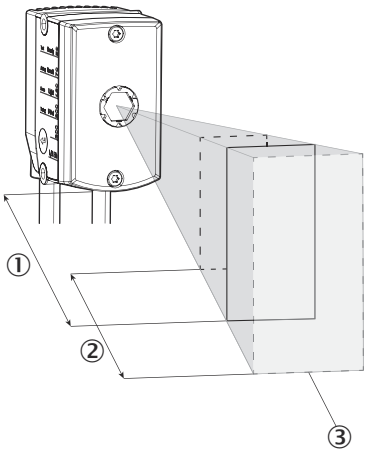


Figure 7: Field of view, example

① Working distance

② Depth of field

③ Field of view size: horizontal x vertical (mm) in working distance ①

The field of view size is determined by the focus position, the focal length of the lens, and the working distance. The necessary working distance can be determined from the field of view diagram, see "Field of view diagrams", page 23.

Focus setting

The focus position can be adjusted manually to suit the working distance using the focus adjustment tool.

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

Further topics

- Adjusting the focus position

5.3.3 Mounting angle and reflection prevention

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

The mounting angle to use depends on the lens:

- f = 6 mm: The typical value is 20°.
- f = 12 mm: The typical value is 10°.

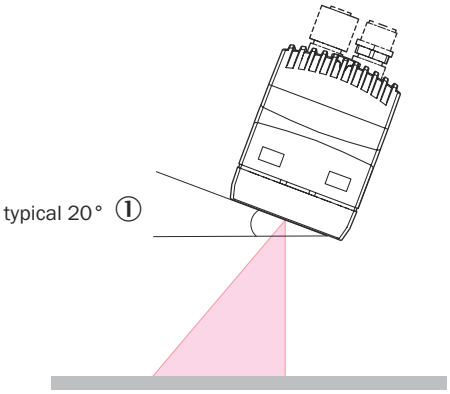


Figure 8: Mounting angle to use, f = 6 mm, depending on the application

① Typical angle 20°

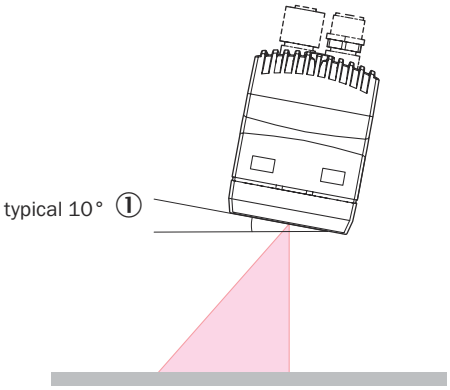


Figure 9: Mounting angle to use, f = 12 mm, depending on the application

① Typical angle 10°

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

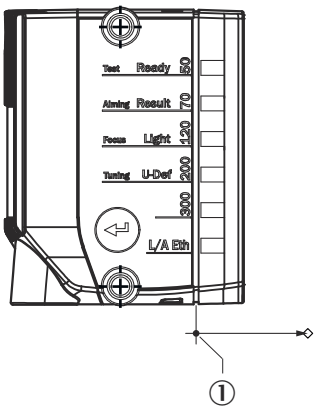
5.3.4 Field of view diagrams

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 angles at which the objects can occur with respect to the device
- For the planned working distance: resultant field of view length and width and approximate 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

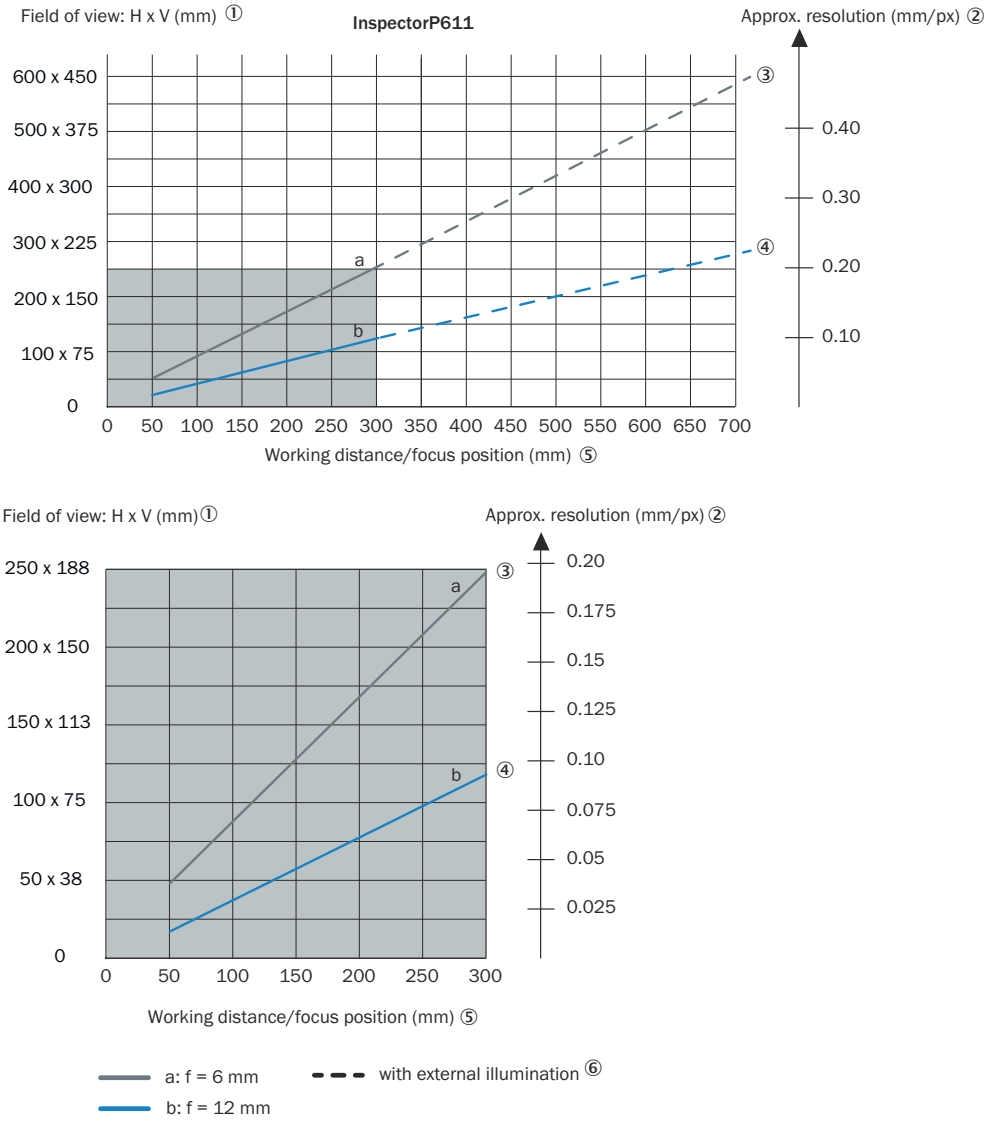


Figure 10: Field of view diagram for InspectorP611

① Field of view: horizontal x vertical in mm

② Approximate resolution in mm/px

③ f = 6 mm. Solid line with internal illumination, and dashed line with suitable external illumination accessories.

④ f = 12 mm. Solid line with internal illumination, and dashed line with suitable external illumination accessories.

⑤ Working distance/focus position in mm

⑥ With external illumination

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 resolution
- The dimensions of the field of view that is available for this distance

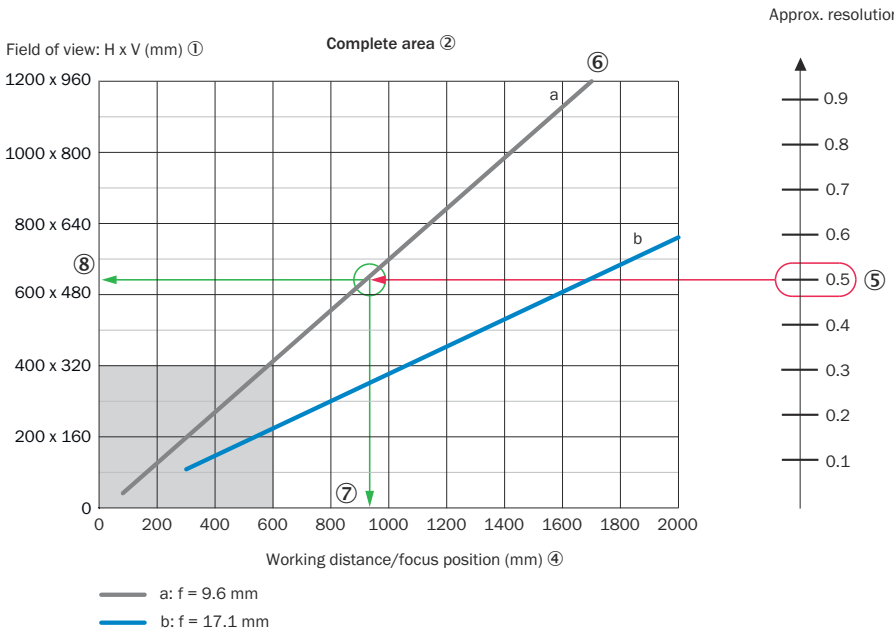


Figure 11: Example of field of view diagram

① Field of view: horizontal x vertical in mm
② Complete area
③ Approximate resolution in mm/px
④ Working distance/Focus position in mm
⑤ Selected resolution
⑥ Focal length of lens, here example for f = 9.6 mm
⑦ Reading off: resultant maximum working distance
⑧ Reading off: resultant field of view (mm x mm)

Given (in red):

- Resolution ⑤: approx. 0.5 mm/px
- Focal length of lens ⑥: 9.6 mm

Read off (in green):

- Maximum working distance ⑦: approx. 930 mm
- Field of view ⑧: approx. 640 mm x approx. 510 mm

Both axes of the diagrams must be interpreted linearly.

5.4 Adjusting the focus position

5.4.1 Adjusting focus with the focus adjustment tool

Overview

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

NOTE
Only relevant for manual product types, see "Type code", page 12.

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.

Approach

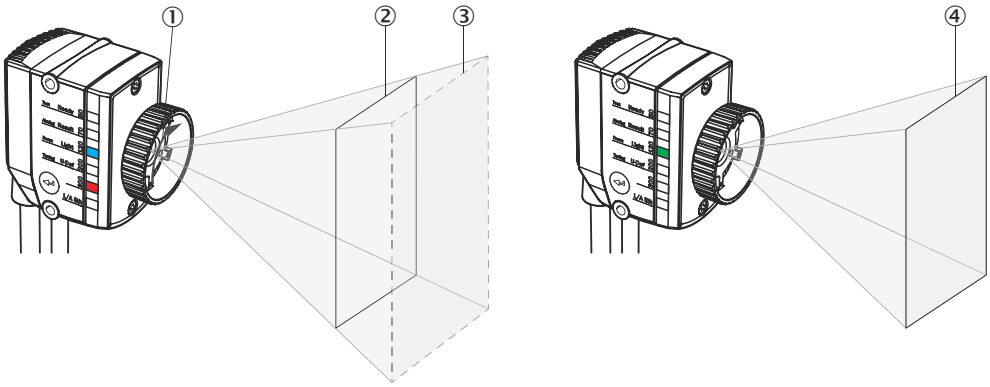


Figure 12: Manually adjusting the focus position with the help of the focus adjustment tool

① Rotate the focus adjustment tool
② Target focus position setting
③ Actual focus position setting
④ Focus position coincides with the working distance (actual position = target position)

1. Mount and align the device at the required working distance.
2. Attach the focus adjustment tool to the optics.
3. 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.
4. Check the focus position again when commissioning the device using the web user interface (requires an installed suitable SensorApp or similar) and, if necessary manually align the focus setting with the help of the focus adjustment tool.

5.4.2 Adjusting focus using the SensorApp

Overview

Using the **Quality inspection** or **Intelligent Inspection** SensorApp, the focus position can be automatically adjusted with the **Auto setup** function. The focusing engine allows an app to control the image focus distance in an auto-focus manner. The focusing engine should only be used for teach-style or batch change auto focus, and not as part of a frequent measurement cycle.

NOTE
Only relevant for product type with liquid lens, see "Type code", page 12.

Approach

NOTE
Only applicable if using the pre-installed **Quality Inspection** SensorApp or the **Intelligent Inspection** SensorApp.

1. Mount and align the device at the required working distance.
2. Start the **Auto setup** function in the SensorApp.
3. Make sure the parameter **Auto focus** is enabled.
✓ The focus position is set automatically.
4. Verify that the focus position is correct prior to use.

5.5 Mounting the device

NOTICE
Damage to device due to improper mounting
Screw M3 screws through the through hole. Screws with a larger thread diameter damage the device.

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

1. Mount the device in a suitably prepared mounting system using the threaded mounting holes provided.
   - Mount the device on a mounting system using M4 screws. Screw the screws no more than 5 mm into the threaded mounting holes or sliding nuts. Use the threaded mounting holes in pairs on the left and right side of the device.
   - For alternative mounting, carefully screw the 2 M3 screws (length: min 35 mm) into the through holes on opposite sides of the device. Use the threaded mounting holes in pairs on the left and right side of the device.
   - Optional: attach the separately ordered SICK mounting system to the device. Mounting systems are available as accessories, see "Accessories", page 58.
2. Align the device taking into consideration the field of view (see "Field of view diagrams", page 23) and the application circumstances (see "Installation requirements", page 20).
3. Connect the device to interfaces and supply voltage when disconnected from voltage, see "Connecting", page 38.
✓ The **Ready** status LED lights up green.
4. Perform fine adjustment.

5.6 Mounting an external trigger sensor (optional)

If the device is triggered by an external trigger sensor, it is recommended to place the trigger sensor beyond the device (see left image).

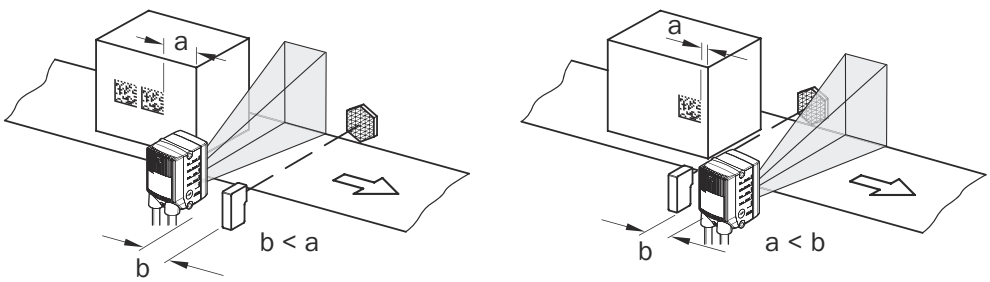


Figure 13: Positioning an external trigger sensor for the read cycle (mounting example)

Place the trigger sensor so that the distance b between the trigger sensor and the device is smaller than the distance a between the device and the part of the object to be inspected Adjust the mounting location of the external trigger sensor so that the correct part of the object is inspected when the object activates the trigger sensor (see left image).

The API contains functionality for delaying the external trigger signal. For SensorApps where this functionality is implemented, the sensor can delay the external trigger signal so that the mounting of the external trigger is more flexible (see right image).

6 Electrical installation

6.1 Wiring instructions

NOTE

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

The page can be accessed via the **SICK Product ID: pid.sick.com/{P/N}/{S/N}**

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

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

NOTICE

Faults during operation and defects in the device or the system

Incorrect wiring may result in operational faults and defects.

- Follow the wiring notes precisely.

NOTE

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

Information about pin, signal and wire color assignments can be found in the appendix, see "Signal assignment of cables with open cable end at one end", page 59.

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

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

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

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

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

The supply voltage must be as specified in the technical data, see "Technical data", page 53.

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

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

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

6.1.1 Data cables

Important information

NOTE
Layout of data cables

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

Length of cable and data transmission rate

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

Further topics

- For information on data transmission rates and lengths of cable: Wiring the data interface

6.2 Prerequisites for safe operation of the device

WARNING
Risk of injury and damage caused by electrical current!

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

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

Remedial measures

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

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

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

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

This is achieved by complying with the following conditions:

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

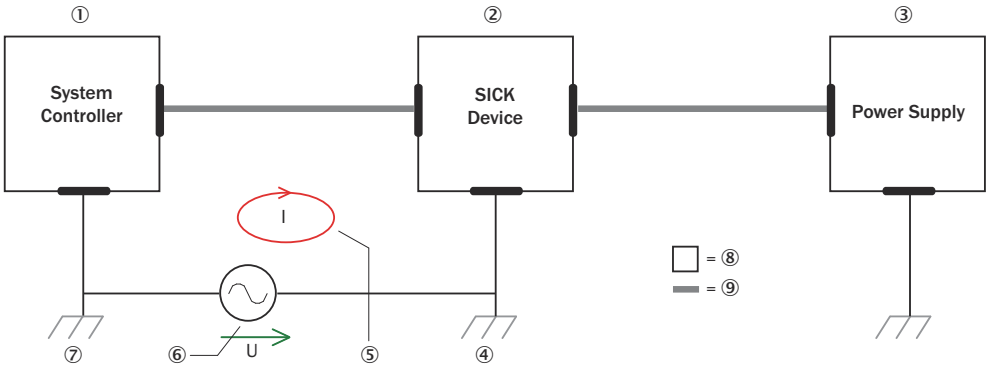


Figure 14: Example: Occurrence of equipotential bonding currents in the system configuration

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.

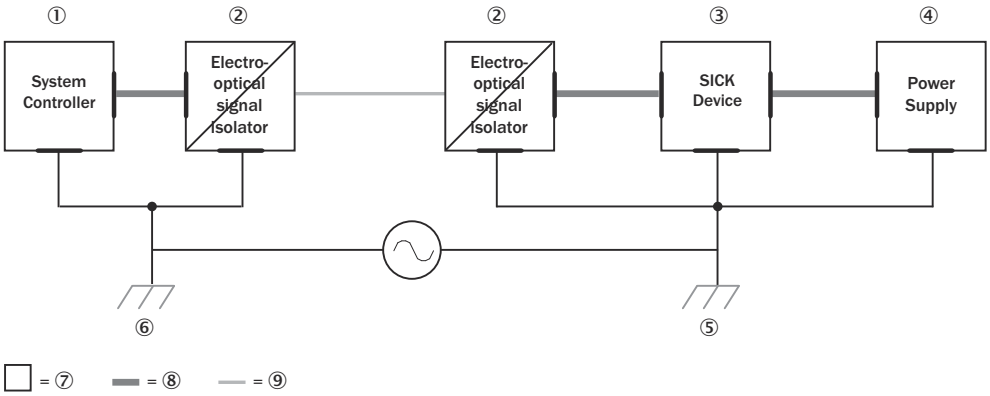


Figure 15: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

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.

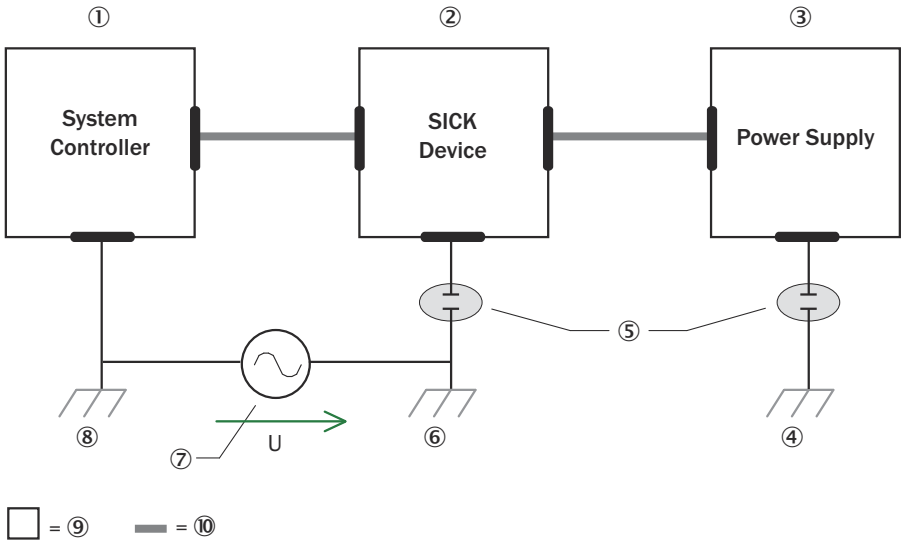


Figure 16: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

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

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

NOTICE

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

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

6.3 Connection diagrams

6.3.1 Service mode connection schematic

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

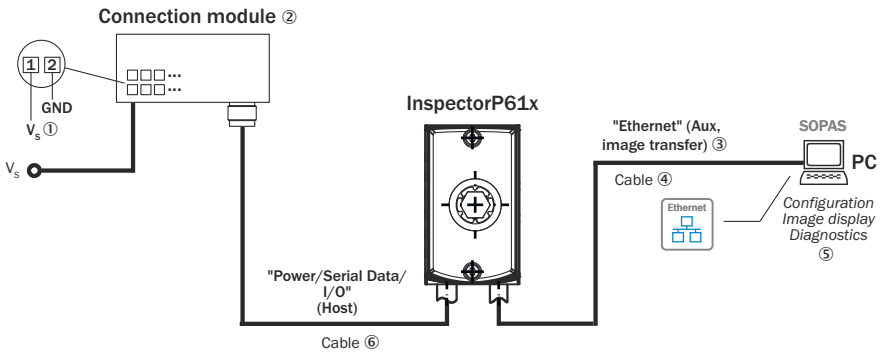


Figure 17: Connection block diagram for commissioning

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 Web user interface or AppSpace tools for configuration, image display, diagnostics, or programming

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 operation mode

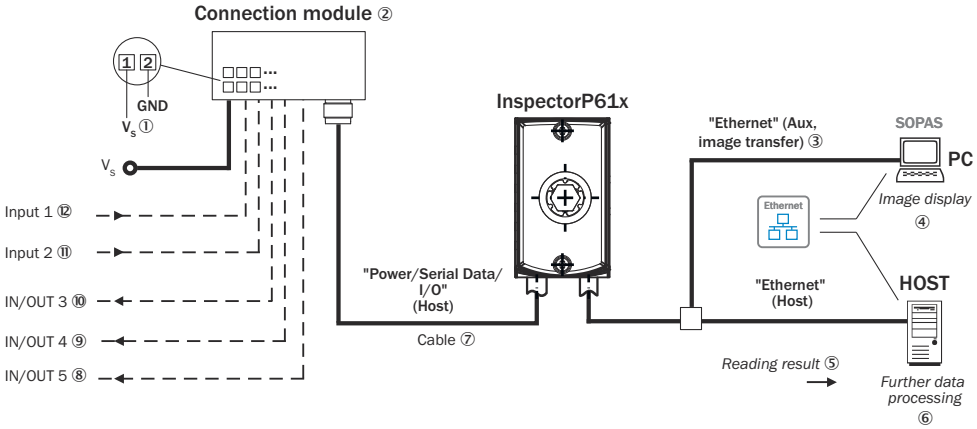


Figure 18: Connection block diagram for operation mode

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 Configurable digital input/output 5 (e.g. for external control, external light or result communication)

⑨ Configurable digital input/output 4

⑩ Configurable digital input/output 3

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

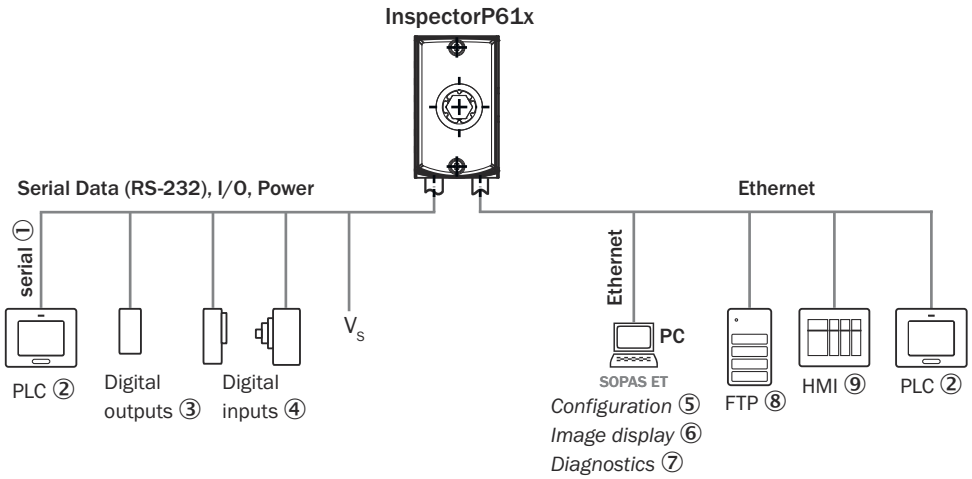


Figure 19: InspectorP61x: connection options

① Serial
② PLC (Programmable Logic Controller)
③ Digital outputs, e.g. for signal lamps
④ Digital inputs e.g. for encoders, photoelectric sensors (trigger sensor)
⑤ Configuration
⑥ Image display
⑦ Diagnostics
⑧ FTP server (image storage)
⑨ HMI interface

6.4 Connections and pin assignment

Power/Serial data/IO

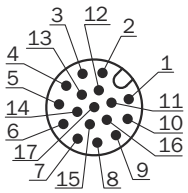


Figure 20: Male connector, M12, 17-pin, A-coded

Pin	Signal	Function
1	GND	Ground
2	V_S	Supply voltage
3	–	–
4	–	–
5	–	–
6	TxD (RS-232), host	Host interface (sender)
7	–	–
8	–	–
9	SensGND	Digital input ground
10	Sensor 1	Digital input 1
11	–	–

Pin	Signal	Function
12	RxD (RS-232), host	Host interface (receiver)
13	IN/OUT 3	Digital input/output 3 (configurable)
14	IN/OUT 4	Digital input/output 4 (configurable)
15	Sensor 2	Digital input 2
16	IN/OUT 5	Digital input/output 5 (configurable)
17	OUT 6	Digital output 6[1]
–	–	Screen

1 Depends on type, see "Type code", page 12.

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

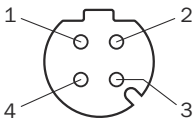


Figure 21: M12 female connector, 4-pin, D-coded

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

Complementary information

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

The call is made via the **SICK Product ID: pid.sick.com/{P/N}/{S/N}**

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

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

Further topics

- Information on interfaces: Technical data

6.5 Connecting

6.5.1 Using CDB and CDM connection modules

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

Connecting device with connection module

Connection modules	Reference
CDB650-204	see "Connection of the device to CDB650-204", page 61
CDM420-0006	see "Connection of the device to CDM420-0006", page 67

NOTE

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

Connection module product page

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

6.5.2 Connecting the supply voltage

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

Table 2: Required supply voltage V_S and power output

Supply voltage V_S	Power source: required power output [1]
DC 12 V ... 24 V ± 15%	Maximum 18 W

1) Valid for device with 4 loaded digital outputs (each 50 mA).

Table 3: 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	$I_{B\ RMS}$ [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	$I_{B\ Peak}$ [1] [A]	1.06	0.848	0.387	0.331
Typical, all 4 digital outputs loaded (0.05 A per output)	$I_{B\ RMS\ 4Out}$ [A]	0.49	0.444	0.328	0.31
Power loss, all 4 digital outputs loaded (0.05 A per output)	$P_{Peak\ 4Out}$ [W]	15.3	15.8	17.05	17.49

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

Protecting the supply cables

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

Observe applicable standards (Germany):

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

Connecting device without connection module

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

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

Connecting device with connection module

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

Table 4: 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 62
CDM420-0006	2 A (slow-blow)	see "Connecting supply voltage for the device in CDM420-0006", page 70

6.5.3 Wiring the data interface

Wiring the Internet interface

1. Connect the device to the Ethernet connection of the computer via the adapter cable.
2. Set up communication via the SICK AppManager software.

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

Wiring the serial data interface

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

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

Table 5: Data transmission rates and recommended maximum lengths of cable

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

NOTICE

Risk of damage to the internal interface modules!

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

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

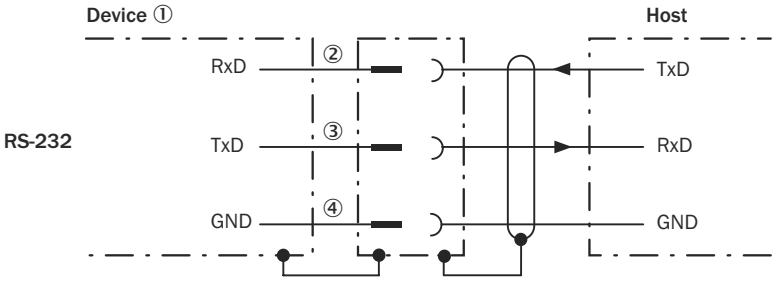


Figure 22: Wiring of the RS-232 serial data interface

① Device

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

NOTE

Control the serial data interface in the device with the API functions. In order to activate the serial data interface, use an installed SensorApp which contains this function.

Wiring data interfaces via a connection module

Connection modules	Data interface	Reference
CDB650-204	RS-232	see "Wiring serial host interface RS-232 of the device in CDB650-204", page 63
CDM420-0006	RS-232	see "Wiring serial host interface RS-232 of the device in the CDM420-0006", page 70

6.5.4 Wiring the digital inputs

Sensor 1 and Sensor 2 can be used as digital inputs. It is also possible to use any configurable IN/OUT signal of the device as a digital input if this function has been activated in the software. The functionality of the digital inputs is configured via the software.

Functions (examples)

- Trigger camera recording.
- Track movement with an incremental signal.
- Select tasks.

Position of digital inputs

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

All digital inputs are available at the individual positions.

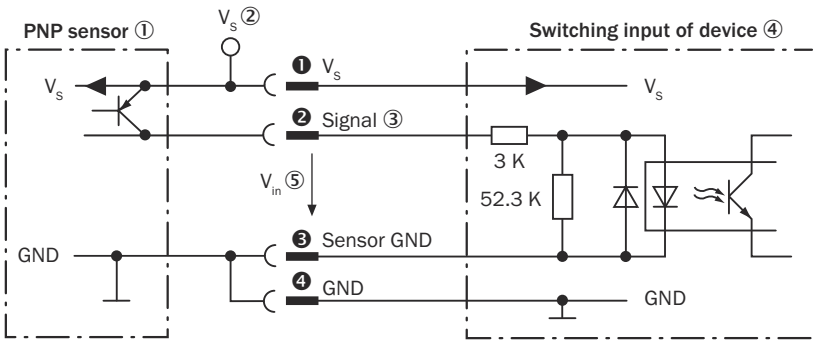


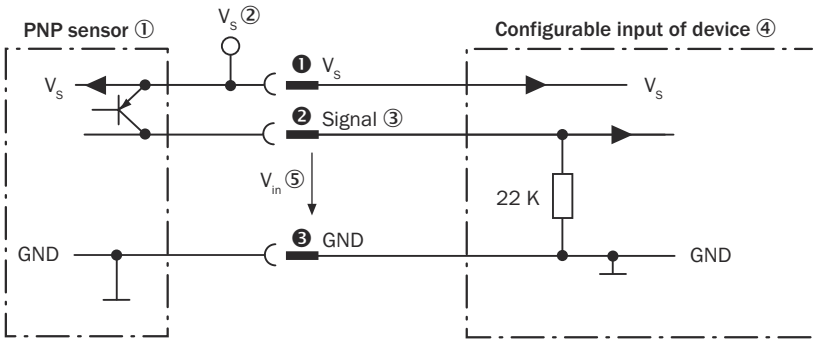
Figure 23: Wiring a digital input

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

Table 6: Characteristic data of the digital inputs (Sensor 1, 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	• Opto-decoupled, reverse polarity protected • Can be wired to PNP output of a trigger sensor
Electrical values	The electrical values are identical for all digital inputs of the device. Low: V_{in} [1] ≤ 2 V; I_{in} [2] ≤ 0.3 mA High: 6 V ≤ V_{in} ≤ 27.6 V; 0.7 mA ≤ I_{in} ≤ 5 mA

1) Input voltage V_{in}.
2) Input current I_{in}.



① Trigger sensor (PNP sensor)
② Supply voltage V_S
③ Input signal
④ Digital input of the device (configurable digital input, IN3, IN4, IN5)
⑤ Input voltage V_{in}
❶ ... ❹ Pin assignment (see respective device)

Table 7: Characteristic data of the digital inputs (configurable digital input, IN3, IN4, IN5)

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)
Features	• Opto-decoupled, reverse polarity protected • PNP output of a trigger sensor can be wired
Electrical values	V_S [1] > 18 V • Low: V_{in} [2] < 9 V • High: 12.5 V < V_{in} < V_S $V_S \leq 18$ V • Low: V_{in} < 45% of V_S • High: 72% of V_S < V_{in} < V_S

1) Supply voltage V_S.
2) Input voltage V_{in}.

Function assignment

NOTE
Control the digital inputs in the device with the API functions. In order to assign the digital inputs functions, use an installed SensorApp which contains this function.

Wiring digital inputs via connection module

Connection modules	Digital inputs	Reference
CDB650-204	SENS/IN 1 SENS/IN 2 RES/OUT 1 [1] RES/OUT 2 [1] RES/OUT 3 [1]	see "Wiring digital inputs of the device in the CDB650-204", page 64
CDM420-0006	Sensor 1 Sensor 2 Result 1 [1] Result 2 [1]	see "Wiring digital inputs of the device in the CDM420-0006", page 71

1) If configured in input mode.

6.5.5 Wiring the digital outputs

The digital outputs can be used, for example, to signal events or to control an external illumination unit. The functionality of the digital outputs is configured via the software. Every configurable IN/OUT signal of the device can be used as a digital output if this function has been activated in the software. The digital outputs are only valid for any port if the digital outputs have been configured in output mode.

Positions of digital outputs:

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

All digital outputs are each available at the individual positions.

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

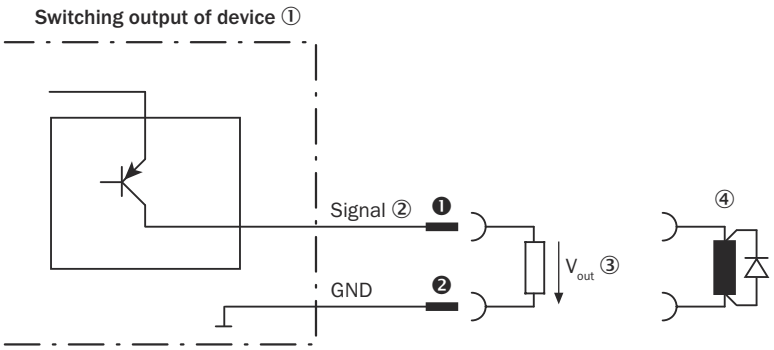


Figure 24: Wiring a digital output

① Digital output of the device via a configurable digital input and output
② Output signal
③ Output voltage V_{out}
④ With inductive load: see note
❶... ❷ For pin assignment, see respective device

Table 8: Characteristic data of the digital outputs

Switching behavior	PNP switching to supply voltage V_S Default: No function Logic: not inverted (active high)
Properties	• Short-circuit protected • Not electrically isolated from V_S [1]
Electrical values	$0\ V \leq V_{out}$ [2] $\leq V_S$ $(V_S - 1.5\ V) \leq V_{out} \leq V_S$ at I_{out} [3] ≤ 50 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
Control the digital outputs in the device with the API functions. In order to assign the digital output functions, use an installed SensorApp which contains this function.

Wiring digital outputs via connection module

Connection modules	Digital outputs	Reference
CDB650-204	RES/OUT 1 RES/OUT 2 RES/OUT 3	see "Wiring digital outputs of the device in the CDB650-204", page 66

Connection modules	Digital outputs	Reference
CDM420-0006	Result 1 Result 2	see "Wiring digital outputs of the device in the CDM420-0006", page 73

7 Commissioning

NOTE
Update the device firmware version before you start using the device. Always use the latest version, unless there is a specific need to use an older version. Download the latest version of the firmware from the SICK Support Portal (**supportportal.sick.com**) and install it using SICK AppManager.

InspectorP6xx is a programmable device. To use it, the following options are available:

- Using the default SensorApp Nova 2D with a pre-activated Quality Inspection license (see "Default SensorApp: Nova 2D", page 46).
- Using other SensorApps that are available for the device (see "Installing SensorApps", page 46).
- Programming SensorApps for the device (see "Programming the device", page 47).

7.1 Computer software

SICK AppManager

The SICK AppManager software can be used for the following actions:

- Installing a SensorApp on a device.
- Reading and changing the device's IP address.
- Starting, stopping or deleting an installed SensorApp.
- Installing firmware updates.

Download SICK AppManager from **www.sick.com/SICK_AppManager**. To install SICK AppManager on the computer, open the installation (.exe) file and follow the instructions on the screen.

SICK AppStudio

The SICK AppStudio development environment is used to program the device and to perform diagnostics in case of faults.

The use of SICK AppStudio requires a valid license. A one-year license (art no 1610199) is available from **www.sick.com/SICK_AppStudio**. After purchasing the license, download the SICK AppStudio software from the SICK Support Portal, **supportportal.sick.com**.

After downloading SICK AppStudio, follow the on-screen instructions to complete the installation.

7.2 Network communication settings

To connect to the device from a computer, make sure that the network communication settings are correctly set up:

- The device must be connected to the computer via Ethernet.
- The computer must be on the same network as the device.
- The computer must not use the same IP address as the device. The device's default IP is 192.168.0.1.

Editing the device's IP address

To change the device's IP address using SICK AppManager:

1. Open SICK AppManager.

✓ All connected devices on the network are listed on the **Device search** tab.

2. Select the correct device in the list.
3. Click **Edit IP address**.
4. Enter the new IP address for the device.

7.3 Default SensorApp: Nova 2D

The Nova 2D SensorApp with a pre-activated Quality Inspection license is pre-installed on the device and is also available for download from SICK AppPool. The Nova 2D SensorApp uses vision-based quality inspection to ensure that produced items have the exact qualities required regarding presence and measurements of details.

Opening the user interface

Nova 2D is configured through a web-based graphical user interface. To open the user interface from a web browser:

1. Open a web browser window.
2. Type the IP address of the device. The default IP address is 192.168.0.1.

Using tools

The Quality Inspection toolset contains a selection of software tools for image analysis, result output, and communication. A help text for each tool is accessible directly from the GUI. The tools are also listed and described in the Nova 2D Operating Instructions, art no 8025687.

The Quality Inspection toolset is based on SICK Nova, which allows the user to create and import additional tools. For a description of how to import a tool through SICK AppManager, see the Nova 2D Operating Instructions. Information on SICK Nova tool development is available from the SICK Support Portal, supportportal.sick.com.

7.4 Installing SensorApps

7.4.1 Available SensorApps

The available SensorApps for the device can be downloaded from SICK AppPool (http://apppool.cloud.sick.com/). The use of SICK AppPool requires a SICK ID, which can be obtained at the login page at the link above.

The **Apps** tab on each device page on www.sick.com contains a list of available SensorApps for the device.

7.4.2 Installing or updating a SensorApp on the device

A SensorApp must be downloaded to the computer before installing it on the device. There are two different options for downloading a SensorApp:

- Online option: If the computer has Internet access when connected to the device, the SensorApp can be downloaded and installed directly from SICK AppPool as part of the installation procedure described below.
- Offline option: If the computer does not have Internet access when connected to the device, the SensorApp must be downloaded from the SICK AppPool to the computer via a web browser prior to the installation.

To install or update a SensorApp using SICK AppManager:

1. Connect the device to the computer via Ethernet.
2. On the computer, open SICK AppManager.
3. Under the **Device Search** tab in SICK AppManager, click **Scan** to search for available devices on the network.
4. In the list of available devices, select the device where you want to install the SensorApp.

5. If the device tab (lower left pane) contains any active applications, right-click the applications and delete them.
6. Online option: To download and install the SensorApp directly from the AppPool:
   a) Click **Login to SICK ID** (below the **Utils** menu in SICK AppManager) to log in to SICK AppPool.
   b) Click the **AppPool** tab.
   c) Select a SensorApp in the list of available SensorApps.
   d) Click **Download and install** to download the selected SensorApp to the computer and install it on the device.

   Or:

   Offline option: To install a downloaded SensorApp from the computer to the device:
   a) Click the **Local Packages** tab in SICK AppManager.
   b) Drag and drop the **SensorApp** into the file list.
   c) Click **Install** to install the SensorApp on the device.

✓ The SensorApp is now installed and running on the device.

7.4.3 Opening the web user interface

To access the user interface for an installed SensorApp:

1. Open a Google Chrome web browser window.
2. Type the IP address of the device. The default IP address is 192.168.0.1.

7.5 Programming the device

7.5.1 Starting SICK AppStudio

Before starting SICK AppStudio:

- Make sure that the network communication settings are correct (see "Network communication settings", page 45).
- When starting SICK AppStudio for the first time, a license dialog opens. To be able to use the software, make sure to have a valid license available (see "Computer software", page 45).

7.5.2 Lua scripting

The embeddable scripting language Lua is used to create scripts in SICK AppStudio. See www.lua.org for more information about Lua.

7.5.3 Programming API

SICK AppSpace has a large application programming interface (API) which includes algorithms and functionality for hardware configuration, result processing, and result communication. The API consists of functional groups called crowns, where each crown contains functions and events related to a specific topic.

The complete API documentation for each InspectorP6xx firmware release is available in the SICK Support Portal, supportportal.sick.com.

NOTE
The API is directly accessible from SICK AppStudio. To access it, click a free place in a lua file and press Ctrl+Space to display a list of all accessible functions and commands for the device.

7.5.4 Tutorials and code samples

Tutorials and code samples for general and device-specific topics are available to help the user get started with the programming of the device:

- Tutorials are available from the SICK Support Portal: supportportal.sick.com/pages/appspace/documentation-and-more.
- Code samples are available from Gitlab: gitlab.com/sick-appspace/samples.

The above pages can be accessed directly from the **Help** menu in SICK AppStudio.

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 9: Maintenance plan

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

8.2 Cleaning

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

NOTICE
Damage to the inspection window.
Reduced analysis performance due to scratches or streaks on the window!

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

NOTICE
Equipment damage due to improper cleaning.
Improper cleaning may result in equipment damage.

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

Cleaning the viewing window

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

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

NOTE
Static charging may cause dust particles to stick to the viewing window. This effect can be reduced by using an anti-static cleaning agent in combination with the SICK lens cloth (part number 4003353).

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

Cleaning procedure:

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

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

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

Cleaning the housing

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

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

9 Troubleshooting

9.1 Overview of possible errors and faults

Table 10: Errors and faults

Situation	Error/fault
Mounting	■ Device poorly aligned to the object (e.g. dazzle).
Electrical installation	■ Data interfaces of the device incorrectly wired.
Programming	■ See SICK AppSpace interface documentation (troubleshooting of individual objects and functions).
Operation	■ Trigger control incorrect and/or not suitable for the object. ■ Device faults (hardware/software).

9.2 Detailed fault analysis

9.2.1 LEDs on the device

The LED display indicates the status of the device and its connections. When troubleshooting, see the information given for the different LEDs.

Further topics

- Display and operating elements

9.3 SICK service

If you require any technical information, our SICK Service will be happy to help. To find your agency, see the final page of this document.

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

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

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

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

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

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

11 Technical data

NOTE

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

The page can be accessed via the **SICK Product ID: pid.sick.com/{P/N}/{S/N}**

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

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

Please note: This documentation may contain further technical data.

11.1 Features

	InspectorP611
Task	Quality Inspection Position determination Measuring 2D Code reading
Technology	2D snapshot, image analysis, Deep Learning
Product category	Programmable, configurable
Pre-installed SensorApp	Nova InspectorP
License included	Quality Inspection License included Optional upgrade with the Intelligent Inspection Upgrade License, which enables productive use of the complete toolset.
Toolkit	SICK algorithm API HALCON Depends on type, see "Type code", page 12.
Sensor	CMOS matrix sensor, grayscale values
Shutter technology	Global shutter
Focus	Adjustable focus, auto-focus[1)], manual focus adjustment tool in combination with the LEDs on the device (first display level)
Sensor resolution	Depends on type, see "Type code", page 12.
Integrated illumination unit	Depends on type, see "Type code", page 12. **8 LEDs:** • 4 LEDs with visible amber light (λ = 617 nm ± 50 nm) • 4 LEDs with visible blue light (λ = 470 nm ± 15 nm) **8 LEDs:** • 8 LEDs invisible, infrared (λ = 850 nm ± 15 nm)
Feedback LED (spot in field of view)	**1 LED:** • Visible green light (λ = 525 nm ± 15 nm) • Visible red light (λ = 635 nm ± 15 nm)
Aiming light (2 points in the field of view)	**2 LEDs (can be deactivated:** • Visible red light (λ = 630 nm ± 15 nm)

	InspectorP611
LED risk group	**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). **Radiance** • L_B [2]: < 10 x 10^3 W/(m^2sr) within 100 s; at a distance of ≥ 200 mm • L_R [3]: < 2.2 x 10^6 W/(m^2sr) within 10 s; at a distance of ≥ 200 mm **Distance-dependent hazard value** • Risk group 0 (no risk) based on L_B [2]: < 100 W/(m^2sr) within 10,000 s; at a distance of > 2.0 m. **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).
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 ≤ 17.5 mW, pulse length ≤ 3.7 ns)
Laser class	**Time-of-flight sensor:** Class 1 Laser Product according to EN 60825-1:2014+A11:2021, IEC 60825-1:2014. Complies with 21CFR1040.10/11 except for conformance with IEC 60825-1 Ed.3., as described in Laser Notice No.56, dated May 8, 2019.
Working distance	50 mm ... 300 mm with internal illumination. Can be extended to longer distances when using external illumination.[4]
Spectal range	Approx. 400 nm ... 900 nm
Lens	Depends on type, see "Type code", page 12.

1) Depends on type, see "Type code", page 12. The focusing engine allows an app to control the image focus distance in an auto-focus manner. The focusing engine should only be used for teach-style or batch change auto focus, and not as part of a frequent measurement cycle.
2) L_B= Hazard from blue light.
3) L_R= Hazard to the retina of the eye due to heating.
4) For details, see "Field of view diagrams", page 23.

11.2 Mechanics/electronics

Table 11: Technical data: Mechanics/electronics

	InspectorP611
Electrical connection	**1 cable (length: 0.35 m) with male connector, M12, 17-pin, A-coded** • 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).

	InspectorP611
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	Zinc diecast
Housing color	Light blue (RAL 5012), black
Viewing window material	Plastic (PMMA), 2 mm thick
Enclosure rating	IP54, IP65 (EN 60529, EN 60529 / A2) [2] Depends on type, see "Type code", page 12.
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 electrical connections are firmly screwed to the contacted junction box or connector plug.
   - The Ethernet connection that may not be used is sealed with a screwed-on protective cap (as in the as-delivered state).
3) See "Dimensional drawings", page 57.

11.3 Performance

Table 12: Technical data: Performance

	InspectorP611
Image sensor resolution	1.2 Mpx
Scan/frame rate	40 Hz[1]
Shutter time	60 µs ... 20,000 µs (40,000 µs when using external illumination)

1) Imager speed, does not include processing time. Lower at long shutter times.

11.4 Interfaces

Table 13: Technical data: Interfaces

	InspectorP611
Serial[1]	RS-232 Data transmission rate: 300 Baud ... 115.2 kBaud
Ethernet	TCP/IP Function: FTP Data transmission rate: 10/100 MBit/s
Ethernet/IP™	Data transmission rate: 10/100 MBit/s
PROFINET	Function: PROFINET Single port Data transmission rate: 10/100 MBit/s
Operator interfaces	Web server
Configuration software	Web GUI (SensorApp configuration), SICK AppManager (IP determination and configuration, SensorApp installation), SICK AppStudio (programming)
Data storage and retrieval	Image and data logging via external FTP
Digital switching inputs and outputs	2 x input, physical, switching 3 x configurable input/output, physical, switching

	InspectorP611
Digital inputs	Type: 2 x physical, switching (“Sensor 1”, “Sensor 2”) V_{in} [3] = max. 27.6 V, I_{in} [4] = max. 5 mA Opto-decoupled[5], not reverse polarity protected regarding supply voltage Debounce time: adjustable [1] Encoder frequency: max. 300 Hz
	3 x physical (configurable IN 3 ... 5) V_{in} = Max V_S (Supply Voltage) Reverse polarity protected regarding supply voltage Debounce time: adjustable [1] Encoder frequency: max. 300 Hz
Digital outputs[5]	Type: 3 x physical, switching (configurable OUT 3 ... 5) V_{out} [6] = V_S [7] – 1.5 V, I_{out} [8] ≤ 50 mA (typical) Short-circuit protected, not electrically isolated from the supply voltage V_S
	Type: 1 x physical, switching (OUT6) V_{out} [6] = V_S [7] – 1.5 V, I_{out} [8] ≤ 50 mA (typical) Short-circuit protected, not electrically isolated from the supply voltage V_S
Reading pulse	Digital inputs, free, serial interface, Ethernet, 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 button[1]

1) Not yet available in pre-installed Quality Inspection SensorApp.
2) Service: Image display, configuration and diagnostics.
3) Input voltage.
4) Input current.
5) Depends on type, see "Type code", page 12.
6) Output voltage.
7) Supply voltage.
8) Output current.

11.5 Ambient data

Table 14: Technical data: Ambient data

	InspectorP611
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[1]
Storage temperature	–20 °C ... +70 °C
Permissible relative humidity	0% ... 90%, non-condensing[2]

1) For ambient operating temperatures ≥ 40 °C, mount the device using an aluminum mounting bracket (e.g., part number 2113160, 2112790).
2) Permissible relative humidity: 0% ... 90%, non-condensing

11.6 Dimensional drawings

V2D61xx-xMxxxx

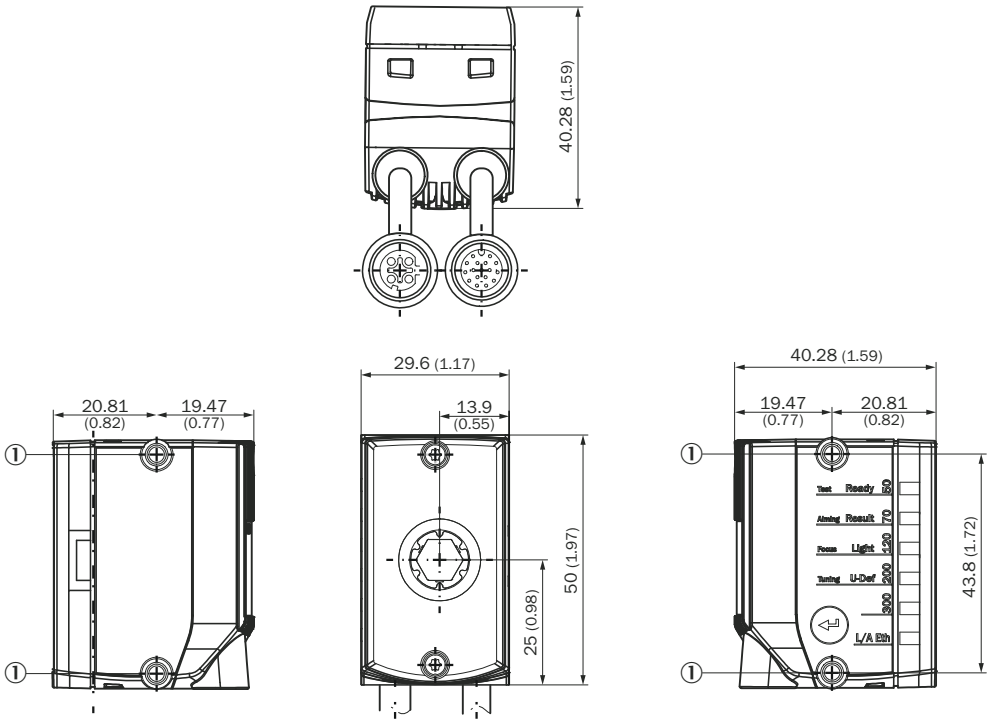


Figure 25: Structure and device dimensions, unit: mm (inch), decimal separator: period

① 4 tapped blind holes, M4, 6.4 mm deep for mounting the device

V2D61xx-xLxxxx

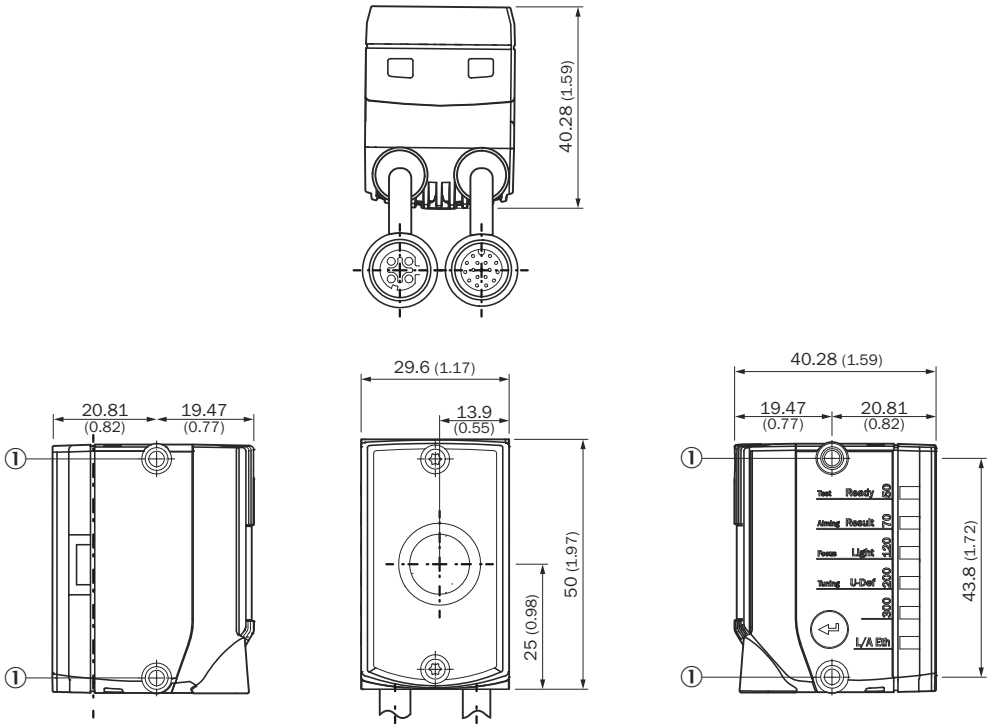


Figure 26: Structure and device dimensions, unit: mm (inch), decimal separator: period

① 4 tapped blind holes, M4, 6.4 mm deep for mounting the device

12 Accessories

NOTE

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

The page can be accessed via the **SICK Product ID: pid.sick.com/{P/N}/{S/N}**

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

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

13 Annex

13.1 Declarations of conformity and certificates

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

The page can be accessed via the **SICK Product ID: pid.sick.com/{P/N}/{S/N}**

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

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

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

13.2.1 "Power/SerialData/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

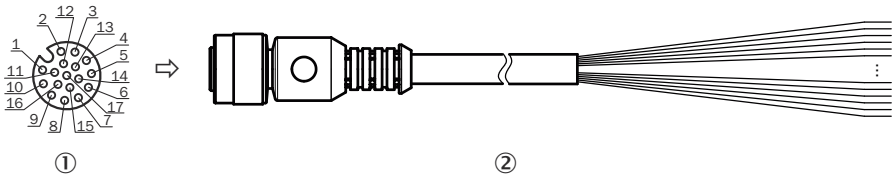


Figure 27: Adapter cable, e.g. part no. 2070425 (3 m)

① Female connector, M12, 17-pin, A-coded (view from front)

② Illustration may differ

② Illustration may differ

Table 15: Signal assignment of adapter cable with open end

Pin	Signal	Function	Wire color
1	GND	Ground	Blue
2	V_S	Supply voltage	Brown
3	–	–	Green
4	–	–	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	Input/output 3	Digital input/output 3 (configurable)	White-green
14	Input/output 4	Digital input/output 4 (configurable)	Brown-green
15	Sensor 2	Digital input 2	White-yellow

Pin	Signal	Function	Wire color
16	Input/output 5	Digital input/output 5 (configurable)	Yellow-brown
17	Output 6	Digital output 6	White-gray

13.2.2 “Power/SerialData/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

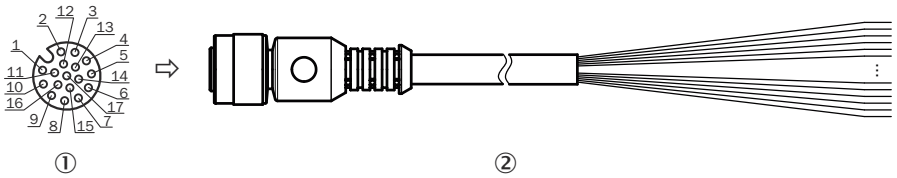


Figure 28: Adapter cable, part no. 2075220 (5 m)

① Female connector, M12, 17-pin, A-coded (view from front)

② Illustration may differ

Table 16: Signal assignment of adapter cable with open end

Pin	Signal	Function	Wire color
1	GND	Ground	Blue
2	V_S	Supply voltage	Brown
3	–	–	Green
4	–	–	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	Input/output 3	Digital input/output 3 (configurable)	White-green
14	Input/output 4	Digital input/output 4 (configurable)	Brown-green
15	Sensor 2	Digital input 2	White-yellow
16	Input/output 5	Digital input/output 5 (configurable)	Yellow-brown
17	Output 6	Digital output 6	White-gray

13.3 Connection diagrams of connection module CDB650-204

13.3.1 Connection of the device to CDB650-204

Device = InspectorP61x = V2D61xP- xxxxxEx

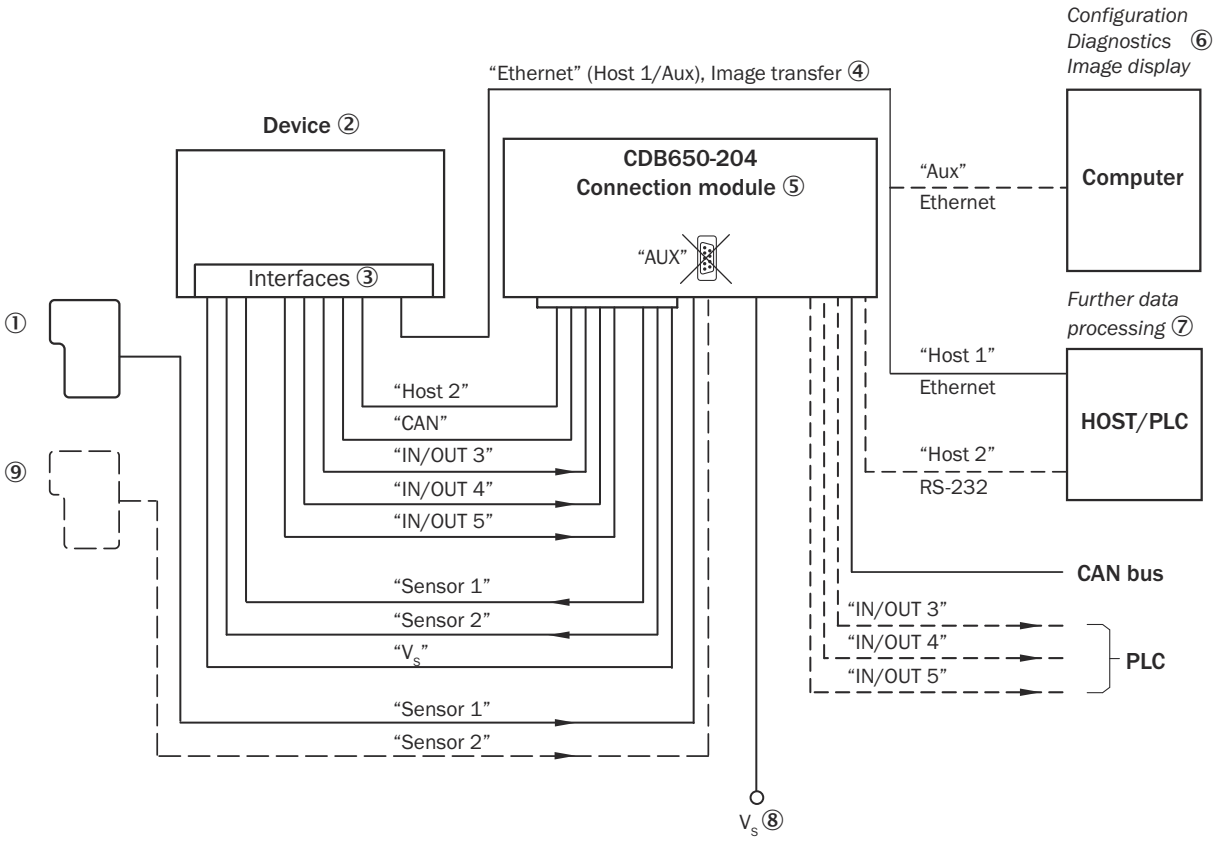


Figure 29: Connection of the device to peripherals via CDB650-204 (overview)

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

13.3.2 Wiring overview of the CDB650-204

Device = InspectorP61x = V2D61xP-xxxxxEx, 1 digital input used

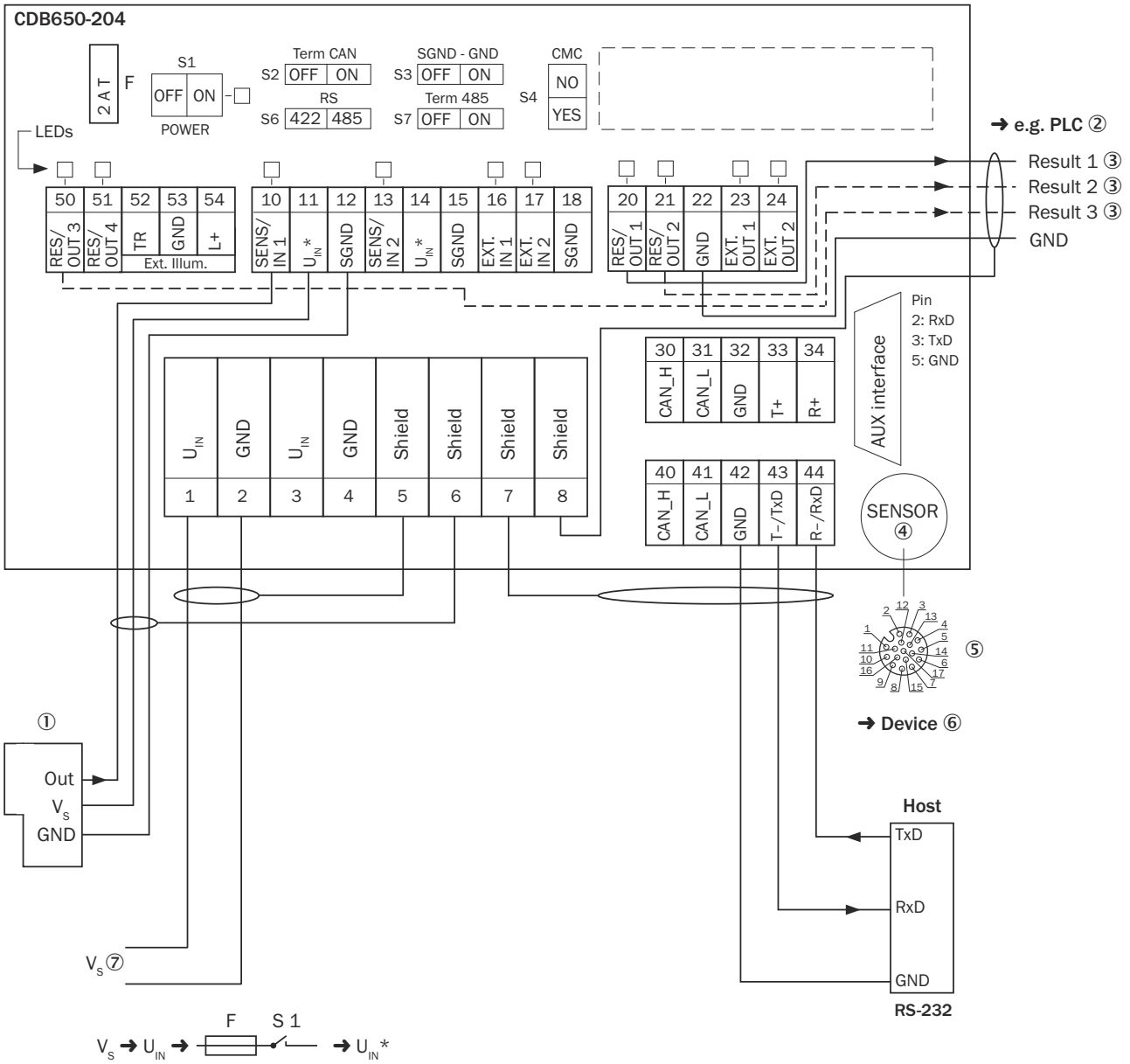


Figure 30: Connection of device and peripherals to the CDB650-204 connection module (overview).

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

13.3.3 Connecting supply voltage for the device in CDB650-204

Device = InspectorP61x = V2D61xP- xxxxxEx

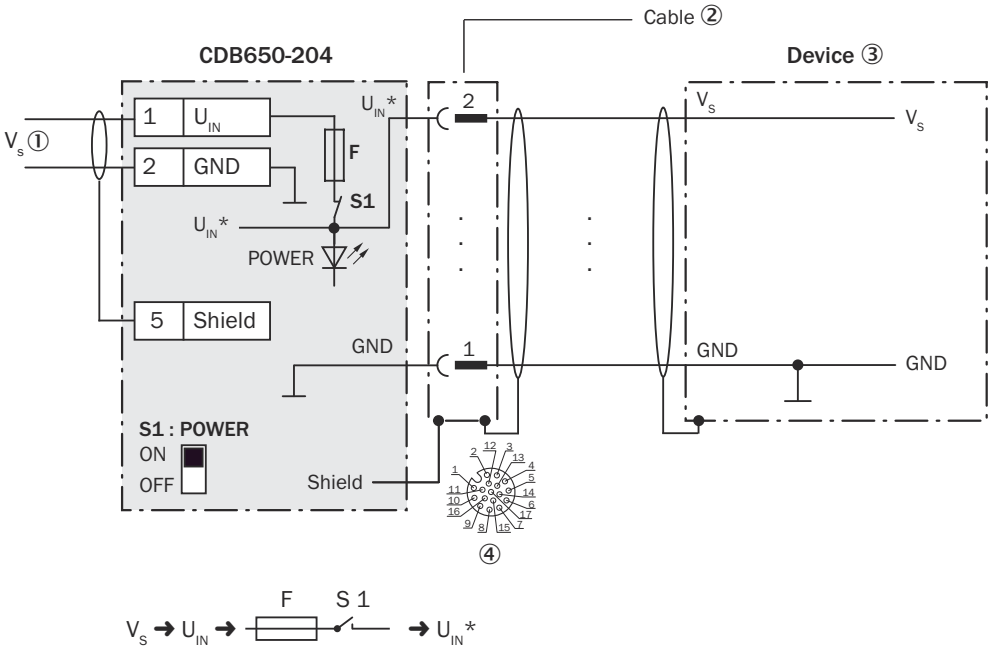


Figure 31: Connecting supply voltage for the device in CDB650-204 connection module.

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 17: 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 = InspectorP61x = V2D61xP- xxxxxEx

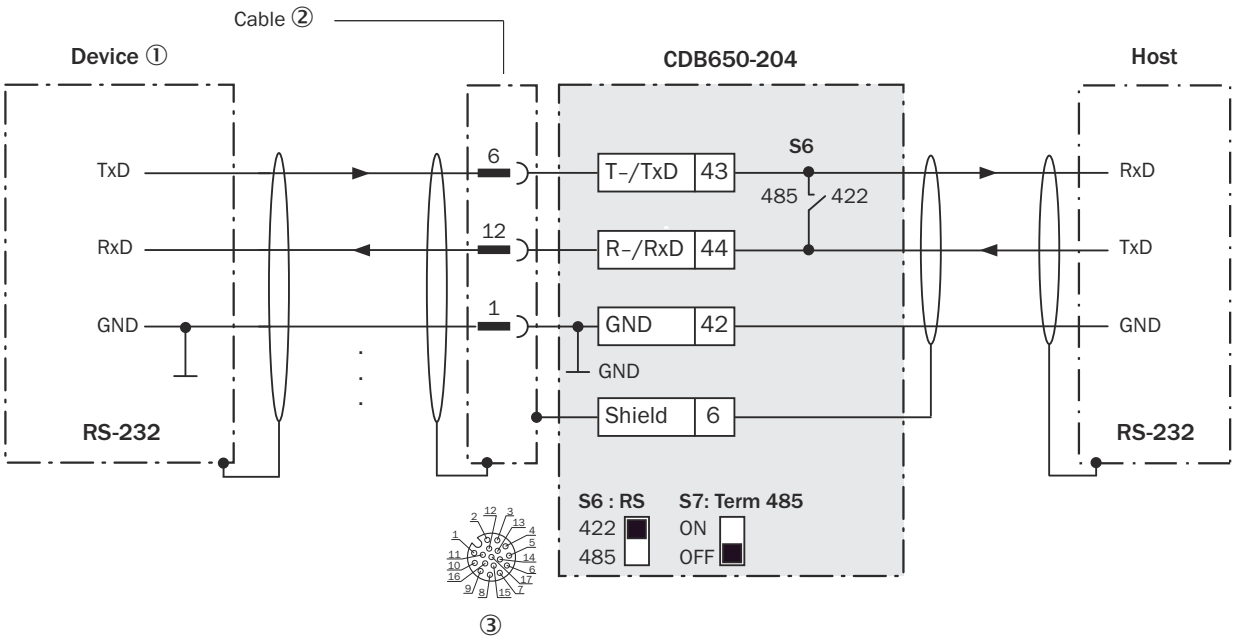


Figure 32: Wiring data interface RS-232 of the device in connection module CDB650-204.

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

NOTE
Control the RS-232 data interface in the device with the API functions. In order to activate the RS-232 data interface, use an installed SensorApp which contains this function.

13.3.5 Wiring digital inputs of the device in the CDB650-204

Device = InspectorP61x = V2D61xP- xxxxxEx

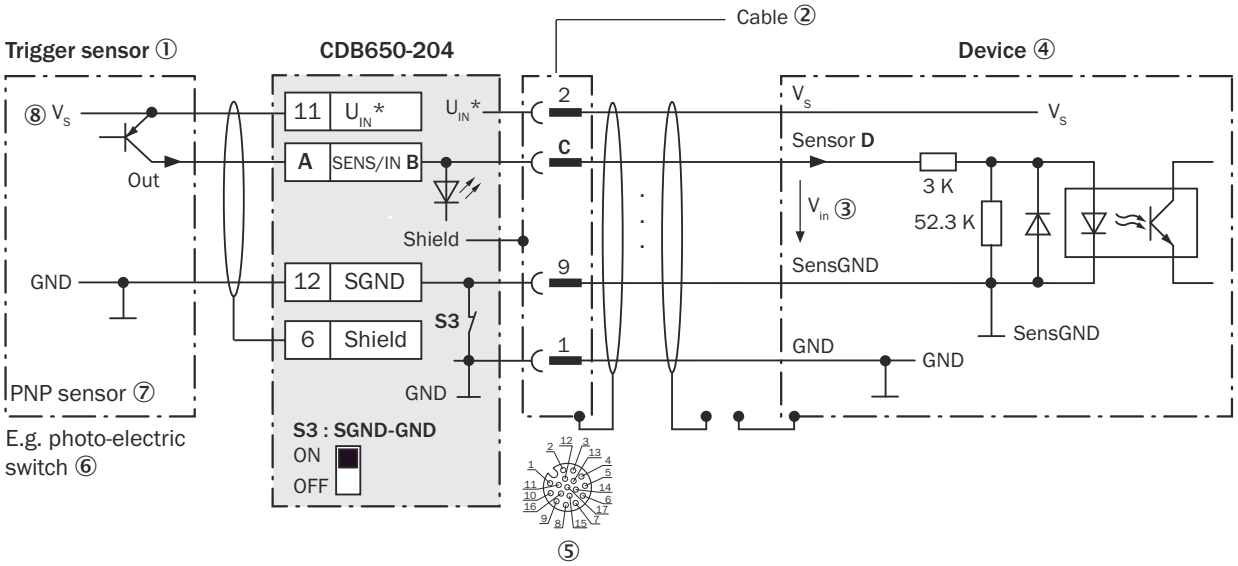


Figure 33: Trigger sensor supplied with power by connection module CDB650-204.

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

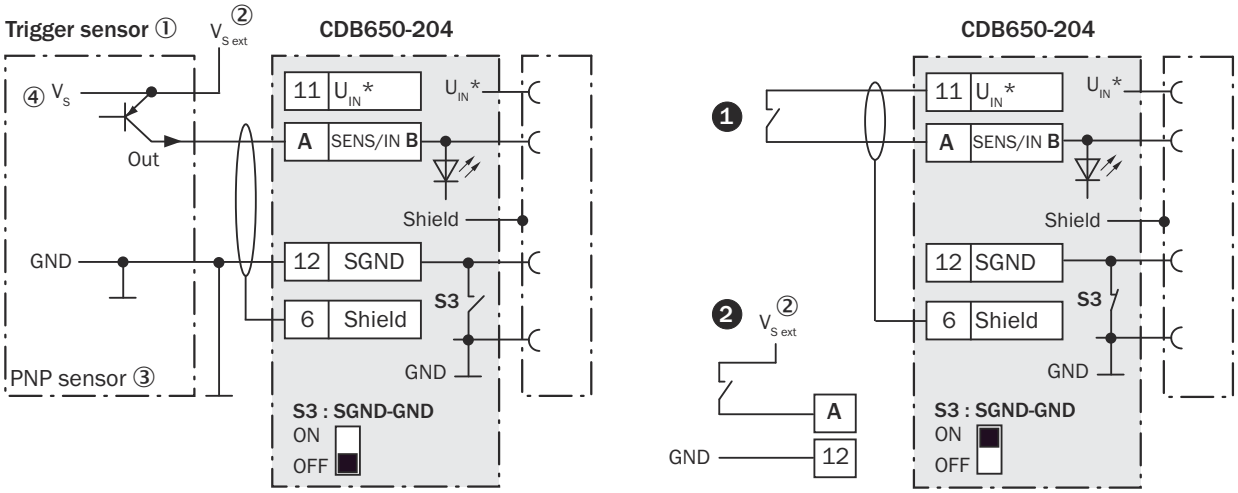


Figure 34: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDB650-204 or ❷ connected potential-free and supplied with power externally. Now select switch setting S3 as shown in the left figure.

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

Table 18: 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 19: Switch S3: SGND-GND

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

Characteristic data of the digital inputs

Table 20: 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 analysis. Default setting in the device: logic not inverted (active high), debounce time 10 ms
Properties	• Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor
Electrical values	Low: V_{in} [1] ≤ 2 V; I_{in} [2] ≤ 0.3 mA High: 6 V ≤ V_{in} ≤ 27.6 V; 0.7 mA ≤ I_{in} ≤ 5 mA

1) Input voltage.
2) Input current.

NOTE
Assign the functions for the digital inputs in the device using SICK AppStudio.

13.3.6 Wiring digital outputs of the device in the CDB650-204

Device = InspectorP61x = V2D61xP- xxxxxEx

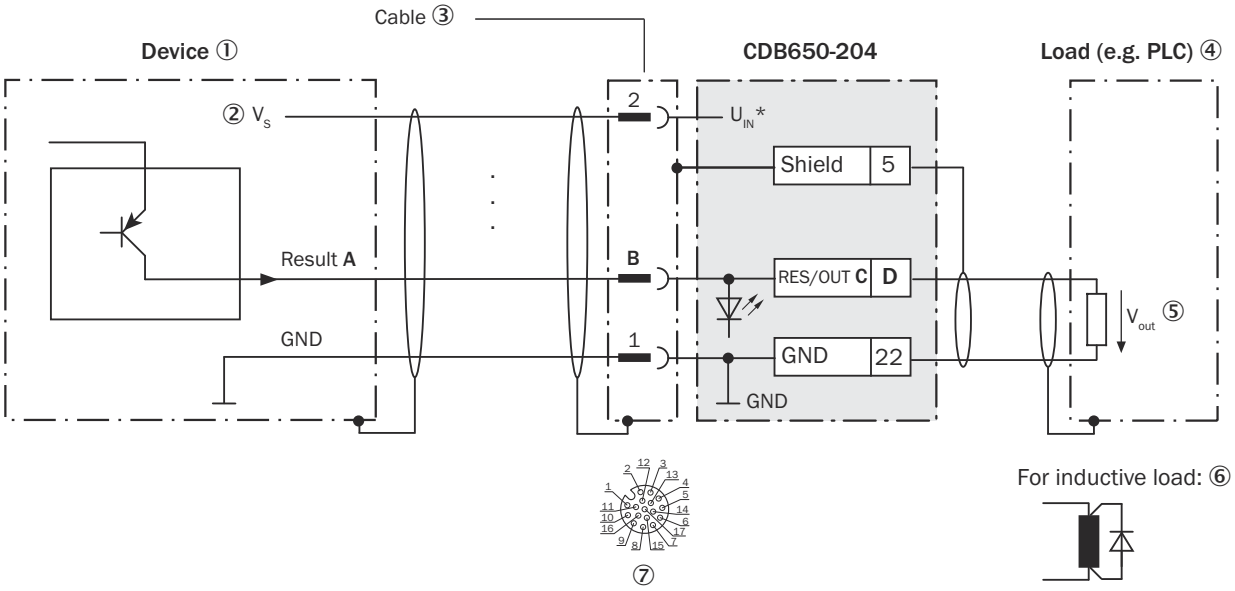


Figure 35: Wire the digital output in the CDB650-204 connection module.

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

Inductive load

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

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

Table 21: Assignment of placeholders to the digital outputs

Device		CDB650-204	
Output A	**Pin B**	**Signal C**	**Terminal D**
IN/OUT 3	13	RES/OUT 1	20
IN/OUT 4	14	RES/OUT 2	21
IN/OUT 5	16	RES/OUT 3	50

Characteristic data of the digital outputs

Table 22: Characteristic data of the digital switching outputs

Type	Switching
Switching behavior	PNP switching to supply voltage V_S Default settings in the device: no function, logic: not inverted (active high)
Properties	• Short-circuit protected and temperature protected • Not electrically isolated from V_S
Electrical values	0 V ≤ V_{out} [1] ≤ V_S (V_S −1.5 V) ≤ V_{out} ≤ V_S at I_{out}[2] ≤ 50 mA

1) Output voltage.
2) Output current.

13.4 Connection diagrams of connection module CDM420-0006

13.4.1 Connection of the device to CDM420-0006

Device = InspectorP61x = V2D61xP-xxxxxEx

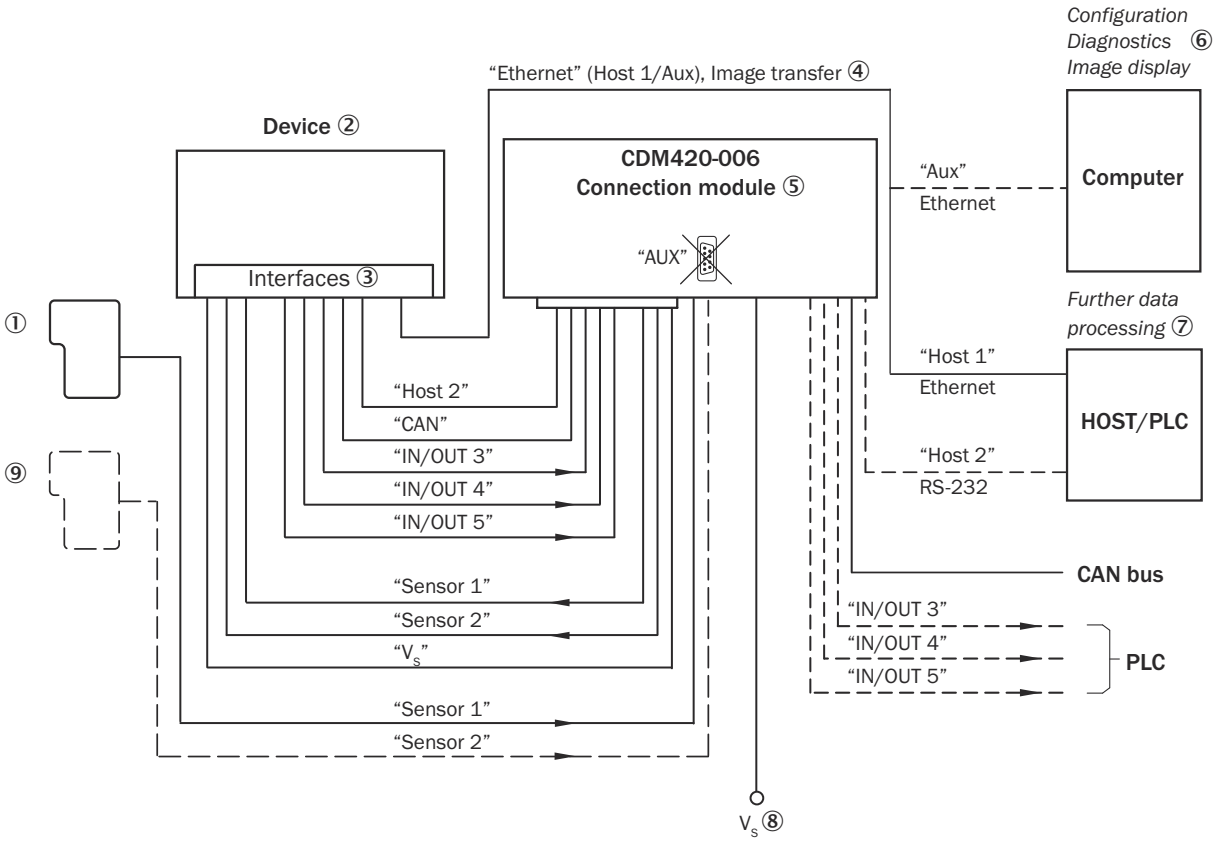


Figure 36: Connection of the device to peripherals via CDM420-0006 (overview)

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

13.4.2 Wiring overview of the CDM420-0006

Device = InspectorP61x = V2D61xP-xxxxxEx

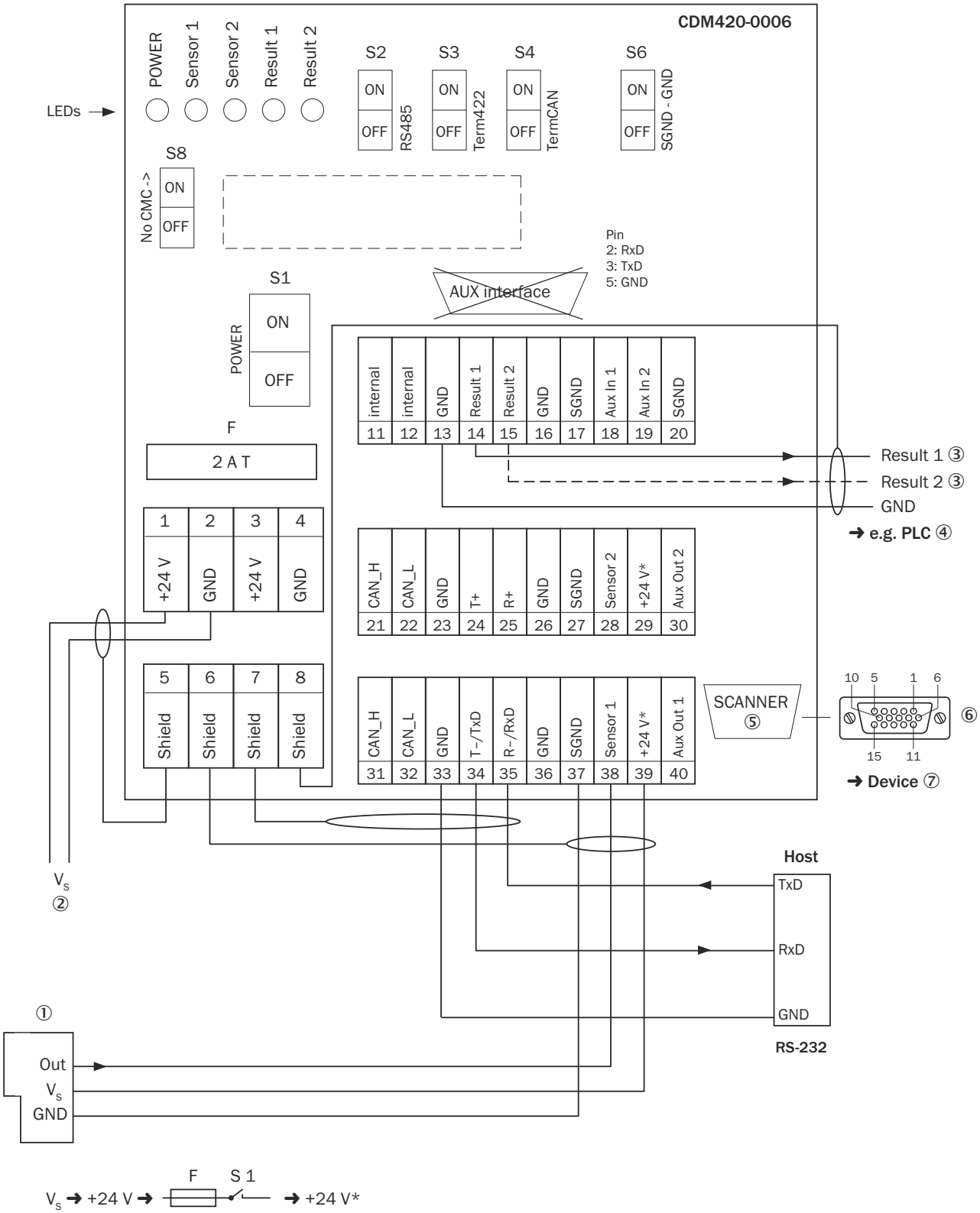


Figure 37: Connection of device and peripherals to the CDM420-0006 connection module (overview).

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

13.4.3 Connecting supply voltage for the device in CDM420-0006

Device = InspectorP61x = V2D61xP-xxxxxEx

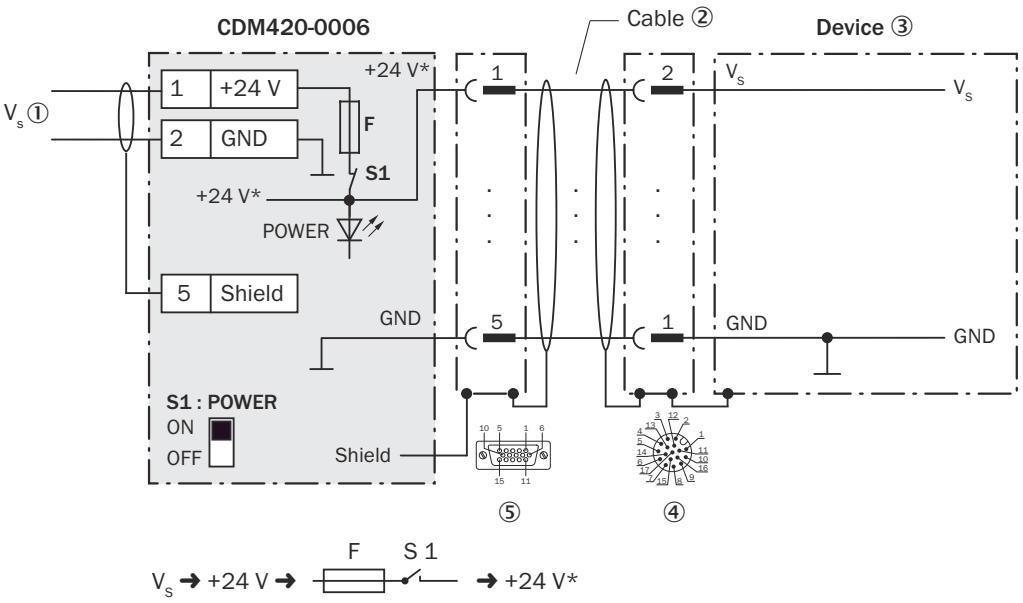


Figure 38: Connecting supply voltage for the device in CDM420-0006 connection module.

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

Function of switch S1

Table 23: Switch S1: Power

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

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

Device = InspectorP61x = V2D61xP-xxxxxEx

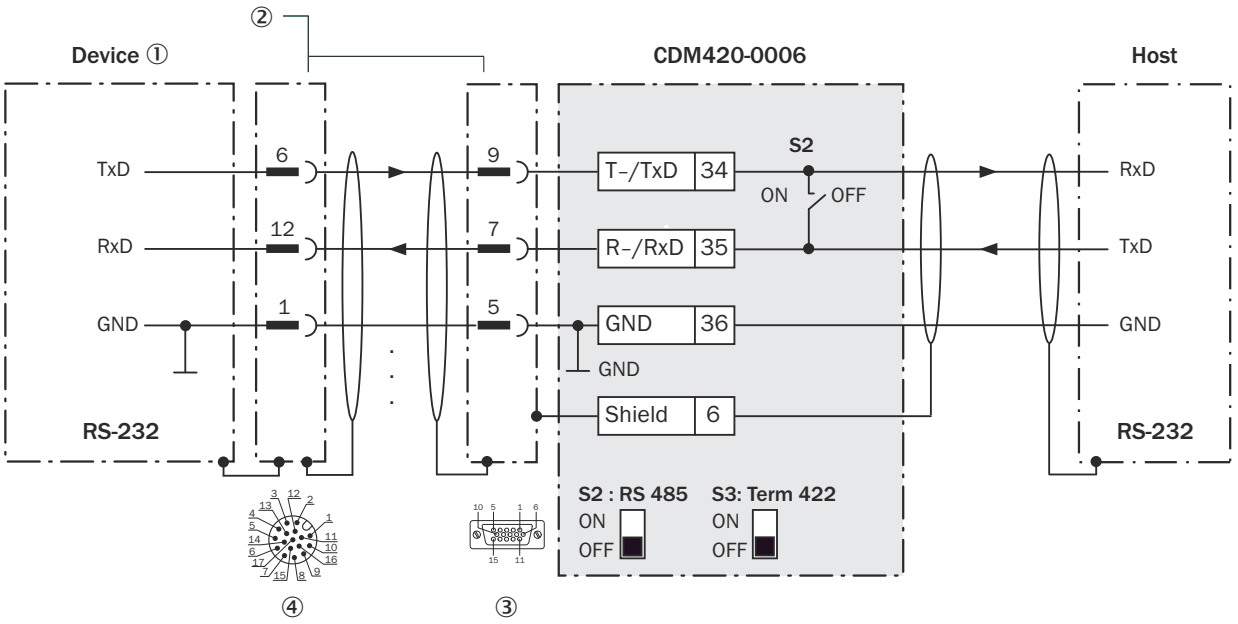


Figure 39: Wiring data interface RS-232 of the device in connection module CDM420-0006.

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

NOTE
Control the RS-232 data interface in the device with the API functions. In order to activate the RS-232 data interface, use an installed SensorApp which contains this function.

13.4.5 Wiring digital inputs of the device in the CDM420-0006

Device = InspectorP61x = V2D61xP-sxxxxxEx

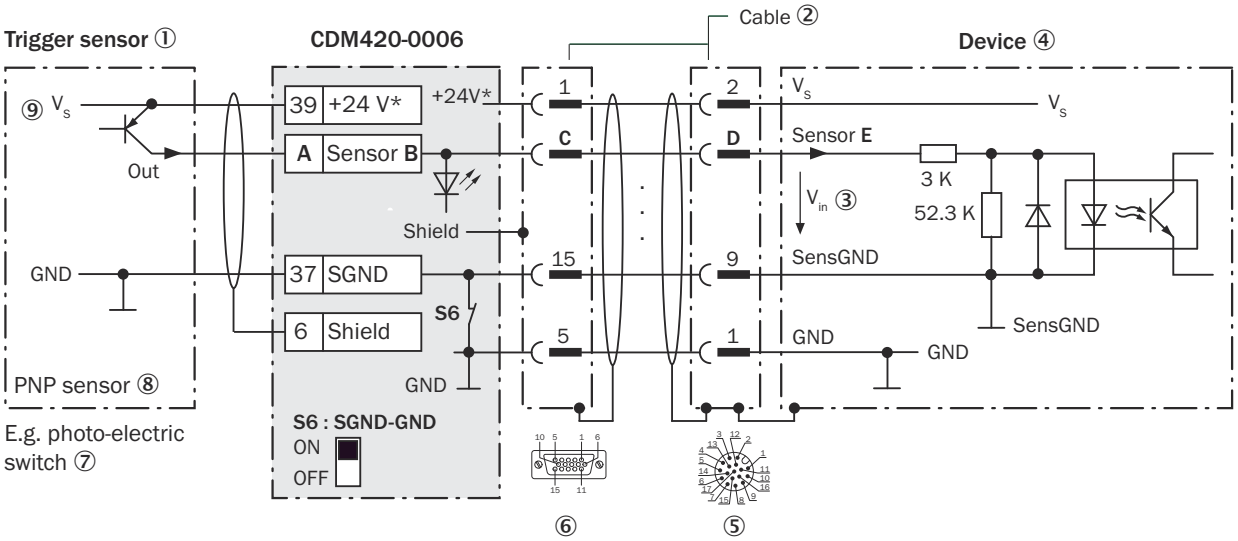


Figure 40: Trigger sensor supplied with power by connection module CDM420-0006

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

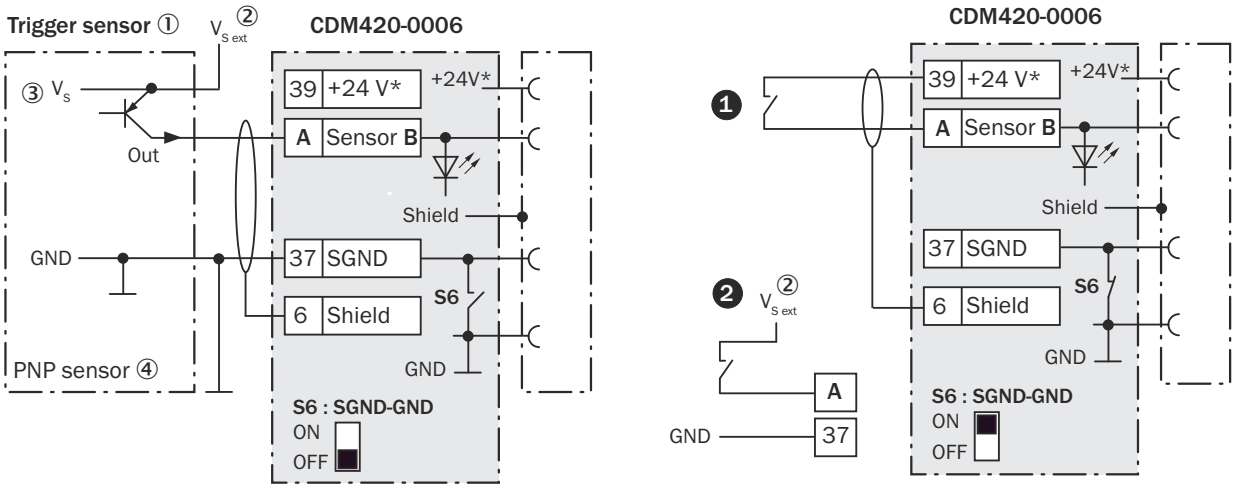


Figure 41: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDM420-0006 or ❷ connected potential-free and supplied with power externally. Now select switch setting S6 as shown in the left figure.

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

Table 24: 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 25: Switch S6: SGND - GND

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

Characteristic data of the digital inputs

Table 26: 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 analysis. Default setting in the device: logic not inverted (active high), debounce time 10 ms
Properties	• Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor
Electrical values	Low: V_{in}[1] ≤ 2 V; I_{in}[2] ≤ 0.3 mA High: 6 V ≤ V_{in} ≤ 27.6 V; 0.7 mA ≤ I_{in} ≤ 5 mA

1) Input Voltage
2) Input current

NOTE
Control the digital inputs in the device with the API functions. In order to assign the digital inputs functions, use an installed SensorApp which contains this function.

13.4.6 Wiring digital outputs of the device in the CDM420-0006

Device = InspectorP61x = V2D61xP-xxxxxEx

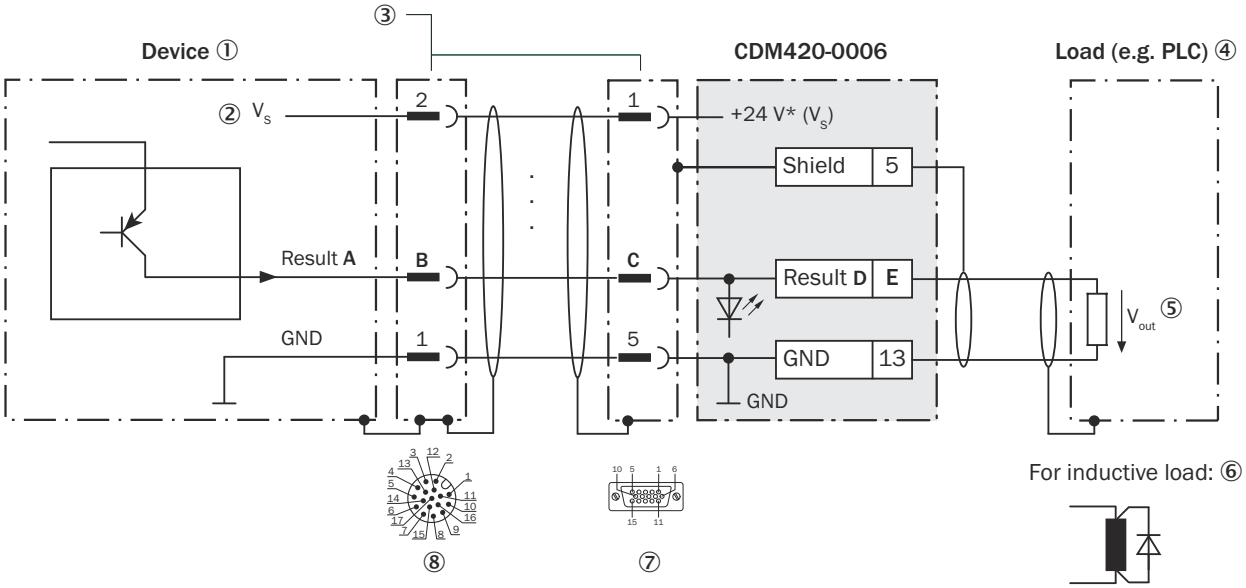


Figure 42: Wire the digital output in the CDM420-0006 connection module.

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

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

Not available in CDM420-0006:
- IN/OUT 5

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 27: Assignment of placeholders to the digital outputs

Device		CDM420-0006		
Output A	**Pin B**	**Pin C**	**Signal D**	**Terminal E**
IN/OUT 3	13	12	Result 1	14
IN/OUT 4	14	13	Result 2	15

Characteristic data of the digital outputs

Table 28: Characteristic data of the and digital outputs

Type	Switching
Switching behavior	PNP switching to supply voltage V_S Default settings in the device: no function, logic: not inverted (active high)
Properties	• Short-circuit protected and temperature protected • Not electrically isolated from the supply voltage V_S
Electrical values	$0\ V \leq V_{out}$ [1] $\leq V_S$ $(V_S - 1.5\ V) \leq V_{out} \leq V_S$ at I_{out} [2] $\leq 50\ mA$

1) Output voltage.
2) Output current.

NOTE

Control the digital outputs in the device with the API functions. In order to assign the digital output functions, use an installed SensorApp which contains this function.

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