

InspectorP64x/65x

2D machine vision

SICK
Sensor Intelligence.



Described product

InspectorP64x Flex

InspectorP65x Flex

InspectorP65x DynamicFocus

Manufacturer

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Original document

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1 About this document

1.1 Information on the operating instructions

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

Prerequisites for safe work are:

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

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



NOTE

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

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

These operating instructions do not provide information on 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 13.

Available product types are listed on the online product page:

- www.sick.com/InspectorP64x
- www.sick.com/InspectorP65x

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 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).

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

1.5 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

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

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 Operating restrictions



NOTE

Radio interference may occur when the device is used in residential areas!

- Only use the device in industrial environments (EN 61000-6-4).

2.1.2 Conditions for specified enclosure rating

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

- The cables plugged into the electrical connections must be screwed tight.
- Any electrical connections that are not being used must be sealed with a tightly-fastened protective cap (as in the delivery condition).
- The foldable cover must be flush with the device and screwed tight.
- The optics protection hood must be screwed tightly onto the device.

2.1.3 Cover on the device



NOTICE

Risk of product damage if cover is open!

In open state, the device does not conform to a specified enclosure rating.

If necessary, only operate the device for a short time with an open cover for the activities listed in the following: During this time, protect the device against moisture and dust.

Briefly open the cover for the following activities:

- Inserting or removing the optional memory card

For further warranty provisions, see the General Terms and Conditions of SICK AG, e.g., on the delivery note of the device.

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.
- 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 device

The InspectorP6xx is a programmable device.

Therefore the respective programmer is responsible for his/her programming performance and the resulting working principle of the device.

The liability and warranty of SICK AG is limited to the device specification (hardware 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	<ul style="list-style-type: none"> ■ Basic practical technical training ■ Knowledge of the current safety regulations in the workplace
Electrical installation, device replacement	<ul style="list-style-type: none"> ■ Practical electrical training ■ Knowledge of current electrical safety regulations ■ Knowledge of the operation and control of the devices in their particular application
Commissioning, configuration	<ul style="list-style-type: none"> ■ Basic knowledge of the 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 programming of image-processing systems and network components
Operation of the device for the particular application	<ul style="list-style-type: none"> ■ Knowledge of the operation and control of the devices in their particular application ■ Knowledge of the software and hardware environment for the particular application

2.7 Operational safety and 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.

LED radiation of the integrated illumination unit



NOTICE

Only the VI83I illumination units from SICK intended for integration in this application can be used as an integrated illumination unit.

Risk group 1

- Color of the illumination: visible blue light (aperture angle: wide, medium), visible red light or visible white light
- Color of the feedback LED: visible green light



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.

Risk group 2

- Color of the illumination: visible blue light (aperture angle: narrow)



CAUTION

Warning! Optical radiation: LED risk group 2, visible radiation, 400 nm to 780 nm

Potentially dangerous optical radiation. Can be damaging to the eyes.

- Do not look into the light source for extended periods of time.
- Never point the light source at people.
- Avoid any reflections on people from reflective surfaces. Be particularly careful during mounting and alignment work.
- Do not open the housing. Opening the housing will not switch off the light source. Opening the housing may increase the level of risk.
- Comply with the current national regulations on photobiological security of lamps and lamp systems.

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



CAUTION

Optical radiation: 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.

**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.

2.8 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.

3 Product description

3.1 Scope of delivery

Depending on the chosen device version, the scope of delivery of a device will include the following components:

Table 2: Scope of delivery

No. of units	Component	Remarks
1	Type of device ordered (complete device or basic device)	Complete device: <ul style="list-style-type: none"> Components are assembled at the factory (camera housing and optics accessories). Optics protection hood is provided with a device seal. Basic device: <ul style="list-style-type: none"> Mount camera housing with C-mount threaded connection and individual components on your own. Order individual components separately as accessories. Light inlet is sealed with a protective cap. All devices: <ul style="list-style-type: none"> Electrical connections are sealed with protective caps. Without holders and connecting cables
2	Sliding nut, 5.5 mm deep, with M5 threaded fixing hole	<ul style="list-style-type: none"> Alternative mounting option for the device instead of the threaded mounting hole Use in pairs.
1	Hexagon key WAF 2	<ul style="list-style-type: none"> Basic device: mount integratable VI83I illumination. Open and close foldable cover (access to the microSD card slot).
1 or 2	LED warning label RG 2 (self-adhesive)	<ul style="list-style-type: none"> Complete device: 1 LED warning label (French) for integrated ring illumination RG 2 in the scope of delivery of the device. Basic device: 2 LED warning labels in English and French included in the scope of delivery of the separately-ordered integratable ring illumination unit RG 2.
1	Laser warning label (self-adhesive)	Basic device: laser warning label (French) for the laser output aperture in the camera housing
1	SICK lens cloth	Basic device: clean optical surfaces (e.g. front screen in the optics protection hood).
1	Printed safety notes, multilingual	Brief information and general safety notes
	Quality Inspection SensorApp	Pre-installed on the device

¹⁾ Depending on order, e.g. optional optics kit (lens, integratable VI88I illumination unit, spacers, optics protection hood).

Associated components not contained in the delivery:

Table 3: Other components

Component	Remarks
SOPAS ET configuration software	Available online at: <ul style="list-style-type: none"> www.sick.com/SOPAS_ET

Component	Remarks
SICK AppStudio software	Available online at: <ul style="list-style-type: none"> www.sick.com/SICK_AppStudio
SICK AppManager software	Available online at: <ul style="list-style-type: none"> www.sick.com/SICK_AppManager
This documentation, available in English, German and French, and in other languages if necessary	Available online at: <ul style="list-style-type: none"> www.sick.com/InspectorP64x www.sick.com/InspectorP65x

An overview of available complete devices and a selection guide for the matching device components for the basic devices is provided on the online product page.

Accessories

Accessories are only supplied if you order them separately, see "Accessories", page 46.

3.2 Product ID

3.2.1 Type label

The type label gives information for identification of the device.

The UL certification is dependent on the type. Any existing UL certification can be found on the type label. The corresponding UL logo is then printed on the label.

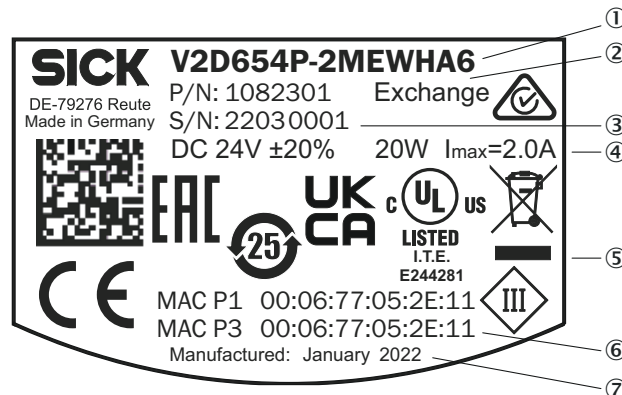


Figure 1: Structure of the type label

- ① Type designation according to type code
- ② Part number
- ③ Serial number
- ④ Supply voltage, power consumption and maximum current consumption
- ⑤ Certificates and symbols
- ⑥ MAC address (placeholder)
- ⑦ Production date

3.2.2 Type code

V	2	D	6	x	x	P	-	x	M	x	x	x	x	x
1	2	3	4	5	6	7		8	9	10	11	12	13	14

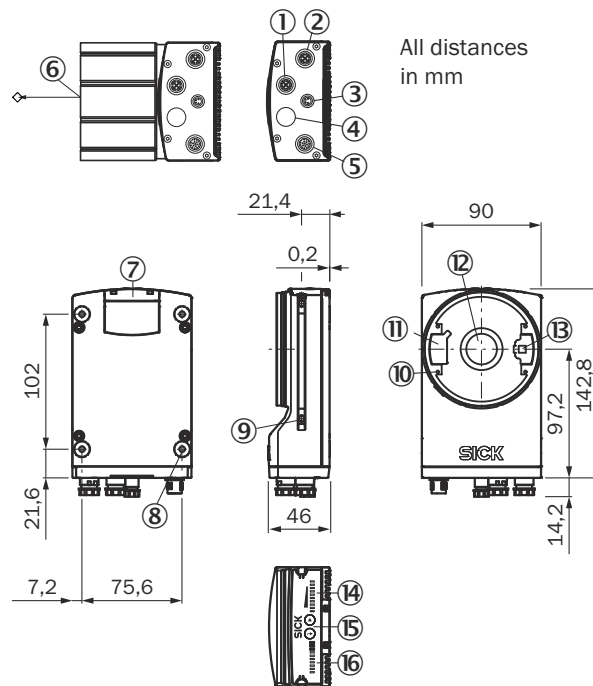
Position	Description
1 ... 5	Product family V2D6xx InspectorP6xx
6	Image sensor resolution 2: For InspectorP642: 1.7 megapixels (1600 px x 1088 px) 2: For InspectorP652: 2.1 megapixels (2048 px x 1088 px) 4: 4.2 megapixels (2048 px x 2048 px)
7	Function P: Programmable
8	Generation
9	Image sensor type M: Monochrome
10	Lens unit type E: Electrical focus (dynamic, auto, teach-auto) C: C-mount thread
11	Illumination R: Red/Amber W: White B: Blue X: No illumination unit installed
12	Focal distance (lens unit) H: 54 mm K: 40 mm X: No lens installed
13	Connection variants¹⁾ A: Connection variant 1 F: Connection variant 2 H: Connection variant 3
14	IP protection class and front screen 5: IP 65: Plastic front screen 6: IP 65: Glass front screen

¹⁾ see "Connections and pin assignment", page 31

3.3 Product characteristics

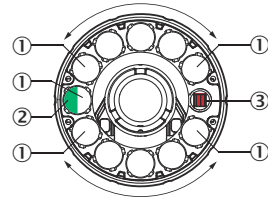
3.3.1 Device view

InspectorP64x/65x Flex dimensional drawing



- ① Connection P1, function and design dependent on type
- ② Gigabit Ethernet port
- ③ Connection X2, function and design dependent on type
- ④ Connection P2, function and design dependent on type
- ⑤ Connection X1, function and design dependent on type
- ⑥ Reference point for working distance (center of front screen) from InspectorP64x/65x Flex to object
- ⑦ Black cover for the micro SD memory card slot
- ⑧ M5 blind tapped holes, 5 mm deep (4 x), for mounting the InspectorP64x/65x Flex
- ⑨ Optics protective hood for lens unit and integrated illumination
- ⑩ Sliding nut M5, 5.5 mm deep (2 x), pivoting, for an alternative method of mounting the InspectorP64x/65x Flex
- ⑪ Feedback LED, green
- ⑫ Lens unit
- ⑬ Outlet opening for light beam from aiming laser
- ⑭ Bar graph display (10 x LEDs)
- ⑮ Function button (2 x)
- ⑯ Status display (10 x LEDs)

Integrable illumination unit (option)



- ① Illumination via 11 LEDs
- ② Feedback LED, green (pass), briefly generates a light spot on the object within the field of view after a successful analysis (default)
- ③ Opening in the illumination for the aiming laser for alignment, the red laser LEDs can be switched off and generates a red cross on the object within the field of view

3.3.2 Status indicators and functions



- ① Enter pushbutton
- ② Skip pushbutton

See [table 4](#) for LED descriptions. The functions for the programmable LEDs are defined by the user in the SICK AppStudio software.

Table 4: LED status descriptions

Display	LED	Color	Status
Ready		green	Sensor ready
		yellow	Firmware or SensorApps are being installed on the device. Do not disconnect the power to the device.
		red	Hardware or software error
Result	Programmable	red, green, blue, fuchsia, yellow, aqua, white	Function defined by user
Light	Programmable	red, green, blue, fuchsia, yellow, aqua, white	Function defined by user
Function	Programmable	red, green, blue, fuchsia, yellow, aqua, white	Function defined by user
L/A P3 GbE		green	The device is connected to a network
L/A P1 GbE			Not in use
L/A P2 FB			Not in use
L/A P1 FB			Not in use
BF ERR MS			Not in use
SF RUN NS			Not in use
LED bar graph (0 - 9)	Programmable	green	Function for each LED defined by user

= illuminated, = flashing

3.3.3 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, an acoustic feedback signal, and a green feedback LED reduce the amount of work required for training and installation.

The microSD memory card can be used to store images or backup copies of parameters. Thanks to SICK's 4Dpro feature, the InspectorP6xx can be integrated into numerous industrial networks.

The near infrared¹⁾ 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.

3.3.4 Memory card



NOTICE

Risk of damage to the memory card!

- To avoid damaging the microSD memory card, make sure the device is **de-energized** when you insert or remove the card. For this purpose, disconnect the device from the supply voltage.



NOTICE

Loss of configuration data

Do not remove the memory card or switch off the supply voltage while the parameter set is being saved. Otherwise all parameters not yet saved permanently will be lost.

The device has a card slot for a microSD memory card integrated in the housing.

The microSD memory card is optional and not included in the scope of delivery of the device. To ensure that the memory card functions reliably, only use card types (industrial standard) approved by SICK. These can be found as accessories on the product page in the Internet, [see "Accessories", page 46](#). The memory card has no write protection that can be activated.

Inserting the memory card in the device

The card slot for the memory card is located under the hinged cover on the rear side of the device.

1. Switch off the supply voltage to the device.
2. Undo screws (size 2 hex key) on the hinged cover and open the cover.
3. Opening cover:
 - Carefully pull the upper edge of the cover away from the housing a little at the level of the hinges on the side. Use both of the recesses on the inside of the cover to do this.
 - Fold the cover upwards starting from the bottom edge.
4. Making sure it is in the correct position, insert the memory card into the slot until it locks into place. When doing this, position the contacts so that they are facing to the rear and upwards, see the card symbol on the device.
5. Close the cover again. Make sure that the cover is completely flush with the housing.
6. Re-tighten the screws on the cover.
7. Switch on the supply voltage for the device.

1) NIR

Removing the memory card from the device:

1. Switch off the supply voltage to the device.
2. Undo the screws on the cover.
3. Making sure it is in the correct position, push the memory card into the slot until it is released. When doing this, position the contacts so that they are facing to the rear and upwards, see the card symbol on the device.
4. Remove the memory card.
5. Close the cover again. Make sure that the cover is completely flush with the housing.
6. Tighten the screws on the cover.
7. Switch on the supply voltage for the device.

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 2](#) for an overview of SICK AppSpace.

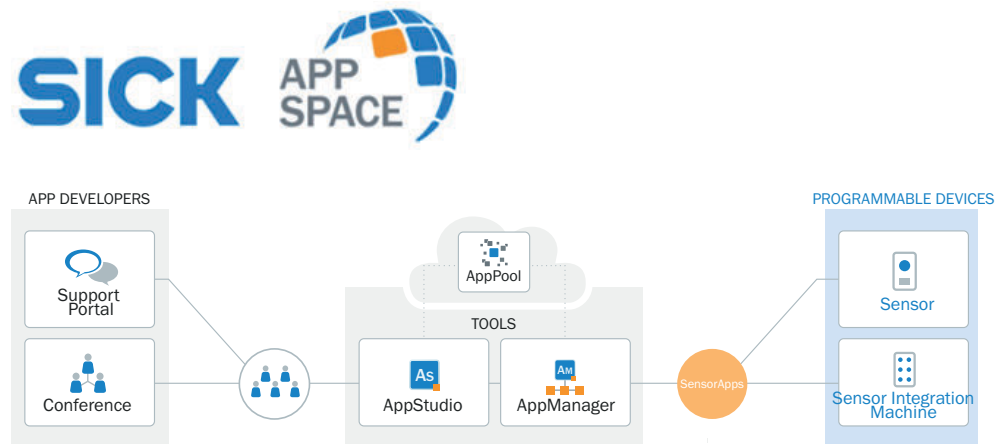


Figure 2: SICK AppSpace

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.

For more information about downloading SensorApps and programming the device, see "[Commissioning](#)", page 36.

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 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.

4.3 Storage

- Do not store outdoors.
- Store in a place protected from moisture and dust.
- Recommendation: Use the original packaging.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see "Technical data", page 42.
- Relative humidity: see "Technical data", page 42.
- 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 Overview of mounting procedure

The mounting of the device is divided into the following steps:

- Mount the device.
- Align the device with the object.
- Connect the device to interfaces and supply voltage.
- Adjust the device.

5.2 Optic kit scope of delivery



Figure 3: Optic kit

The optics kit is an accessory which can be optionally ordered for the basic device (InspectorP64x Flex, InspectorP65x Flex) and is mounted on the C-Mount threaded connection of the camera housing.



NOTE

The IP protection class IP65 can only be guaranteed with the optic protective hood (can also be ordered individually).

The following components are included in the scope of delivery of the optic kit:

- Application-specific lens unit
- Application-specific integratable illumination unit (VI83I ring illumination unit), luminous field appropriate for focal distance of lens
- Two spacers, one with a plated-through connection for the electrical connection
- Screws: 4 x M2, 5 x 6 mm, 4 x M2, 5 x 12 mm, all screws have a hexagon cylinder head, SW 2
- IP65 optics protective hood with screw thread and viewing window

5.3 Preparation for mounting

5.3.1 Installation requirements

Mounting requirements

- Typical space requirement: see ["Field of view diagrams", page 24](#) and type-specific dimensional drawing
- Comply with the technical data, such as the permitted ambient conditions for operation, see ["Technical data", page 42](#).
- Only mount the device using the threaded mounting holes provided or the movable sliding nuts.
- 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 M5 screws for mounting the device on a mounting system supplied by the customer

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.

5.3.2 Mounting systems

Mount the device to the mounting systems using at least 2 threaded mounting holes (M5) or sliding nuts.

The threaded mounting holes are located on the rear side of the device.

The sliding nuts can each be inserted into a slot on the side of the housing.

SICK offers prefabricated mounting systems that are optimally suited for mounting the device, [see "Accessories", page 46](#).

Customer-supplied mounting system

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

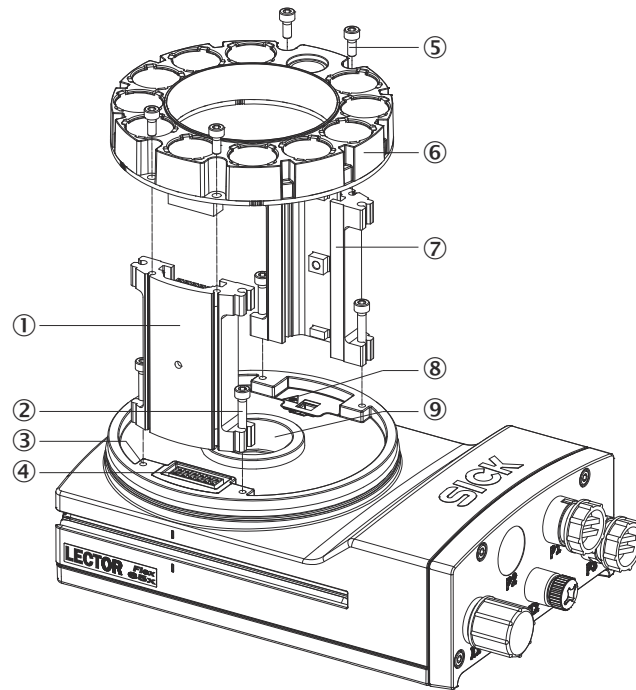
- The device can be aligned in the X- and Y-axes.
- The mounting system must be able to bear the weight of the device and connecting cables without shock.
- In mounting situations with strong vibrations, it may be necessary to provide shock mounts.
- Mounting options for the device using the threaded mounting holes or sliding nuts must be available.

5.4 Mount the optics**NOTE**

This mounting step is only required if the optional optics accessory has been included in the order for a programmable vision sensor of the InspectorP6xx Flex product family. This does not apply for the Dynamic Focus type.

5.4.1 Mounting the lens and illumination**NOTE**

When mounting the optics accessories on the camera housing, always ensure that there is no power to the system.



- ① Spacer, left with electrical connection
- ② 4 tapped blind holes, M2.5, 5.5 mm deep, for mounting the spacer
- ③ 4 x screws, long
- ④ Electrical connection for integratable ring illumination unit
- ⑤ 4 screws, short
- ⑥ Integratable ring illumination unit
- ⑦ Spacer, right
- ⑧ Laser warning shield of the laser output aperture
- ⑨ Light inlet with threaded connection for lens

1. Switch off the supply voltage to the device.
2. Peel off the white protective sticker on the camera housing that covers the electrical connection for the ring illumination unit.
3. Place the camera housing on a nonslip base.
4. If required for the country in question, stick the French laser warning label supplied over the English laser warning label in the camera housing. Make sure to stick the label exactly over the other one. For safety reasons, the English laser warning label must not be removed.
5. Remove the protective cap from the round light inlet.
6. Carefully insert the optional filter and spacer disk into the light inlet.
7. Screw the lens unit into the C-mount thread until it engages. This will also lock the optional filter in place at the same time.
8. Take two pairs of long screws and screw them into the tapped blind holes to mount each spacer to the correct side of the camera housing.
9. Use the 4 short screws to mount the ring illumination unit to the two spacers.
10. Manually preset the sharpness and mask of the lens unit.
11. Check the setting of the SOPAS ET configuration software.



NOTE

If the required adjustments to the lens are not carried out immediately, mount the optics protective hood for the lens.

12. With illumination unit variants with LEDs in risk group RG 2: Attach the country-specific warning label to the optics protective hood near the light emission, [see "Warning label", page 23](#).

5.4.2 Warning label

Devices and illumination units with LEDs in risk group RG 2 are provided with the following warning label.

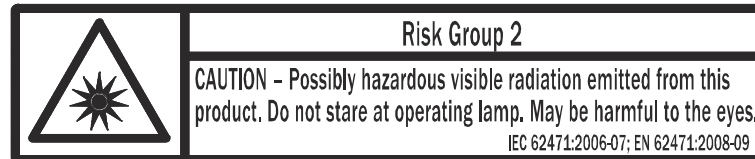


Figure 4: Risk Group 2: CAUTION - Possibly hazardous optical radiation emitted from this product. Do not look into the lamp during operation. This could damage your eyes. IEC 62471:2006-07; EN62471:2008-09

The warning label is located on the exterior of the housing of the devices. For the illumination units, the warning label is located on the outer ring.

The mounted optics protective hood covers the warning label on the illumination unit. The integrable illumination unit types in risk group RG 2 therefore contain an additional warning label for risk group RG 2.

Attach the additional warning label in a well visible location on the outside of the optics protective hood of the device.

1. Affix the illumination unit to the device housing.
2. Manually adjust the focus and aperture of the lens and check these using the live image in SICK AppStudio.
3. Attach the protective optics cover and screw it tight.
4. Attach the warning label to the optics protection hood in a well visible location near the light outlet.
5. If the device itself is, for example, integrated into a machine in such a way that the attached warning label is obscured, attach further clearly visible labels to the machine close to where the light is emitted.

For commissioning using SICK AppStudio [see "Installing SensorApps and programming the device", page 36](#).

5.5 Mounting location

5.5.1 Work area

Depending on the device type, the working range is between 50 mm and 2,200 mm.

- Dynamic Focus device variant: the device automatically adjusts its focus position to the working distance with **Auto-Setup**.
- Flex device variant: the focus position is manually set on the lens.

The field of view 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 24](#).

5.5.2 Mounting bracket and reflection prevention

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

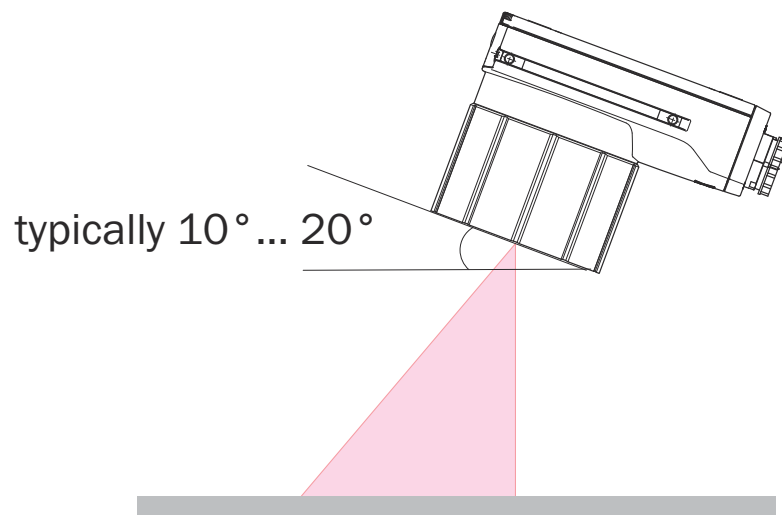


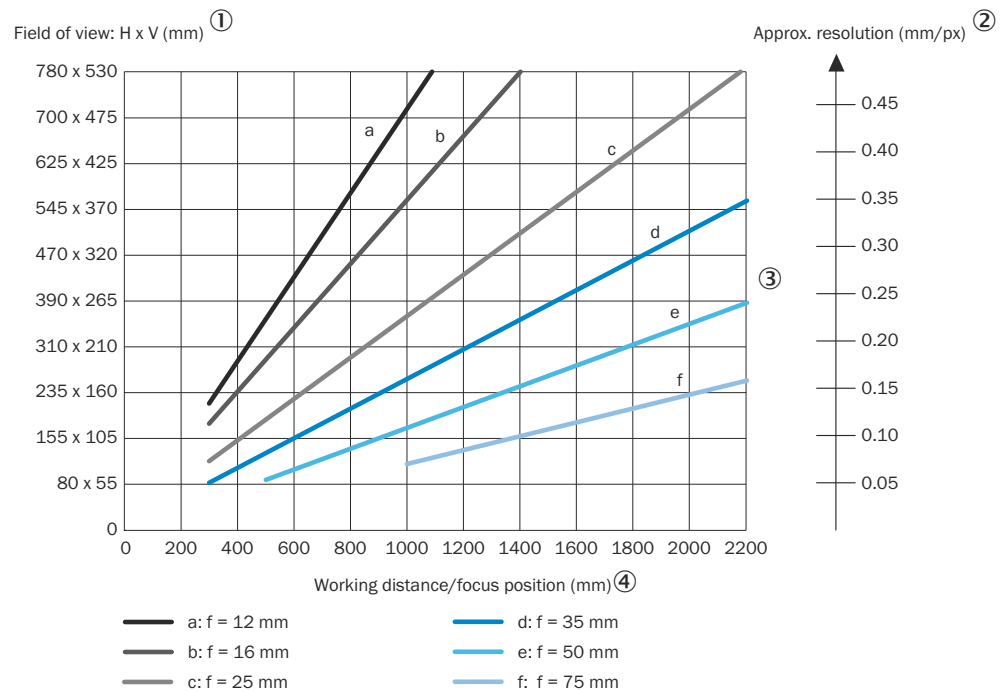
Figure 5: Mounting angle to use, depending on the application

① Typical angle 10° ... 20°

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

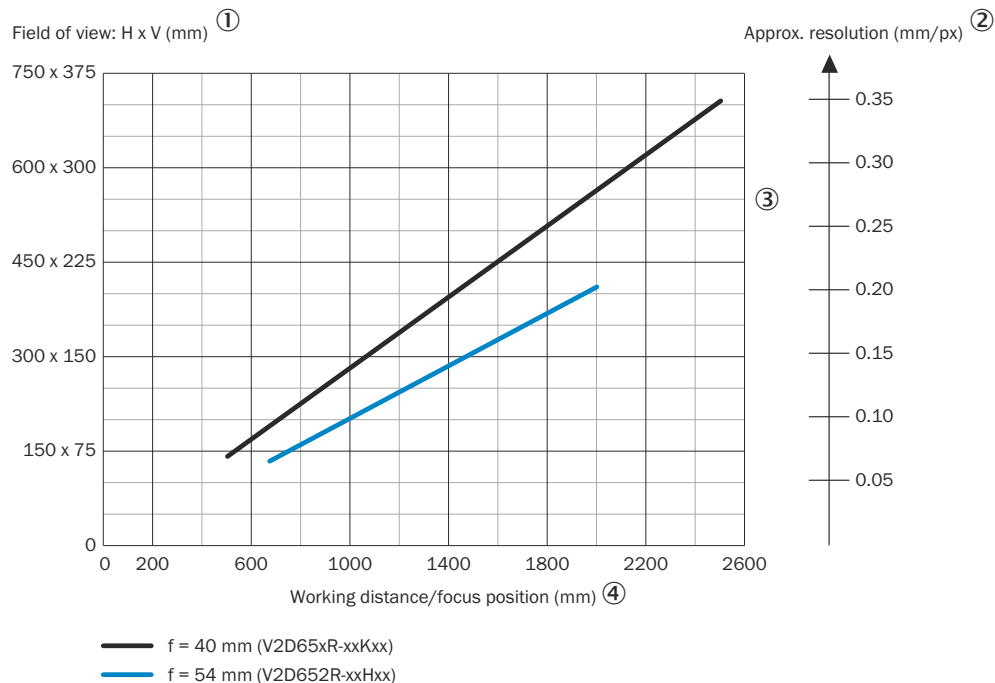
5.5.3 Field of view diagrams

InspectorP64x Flex



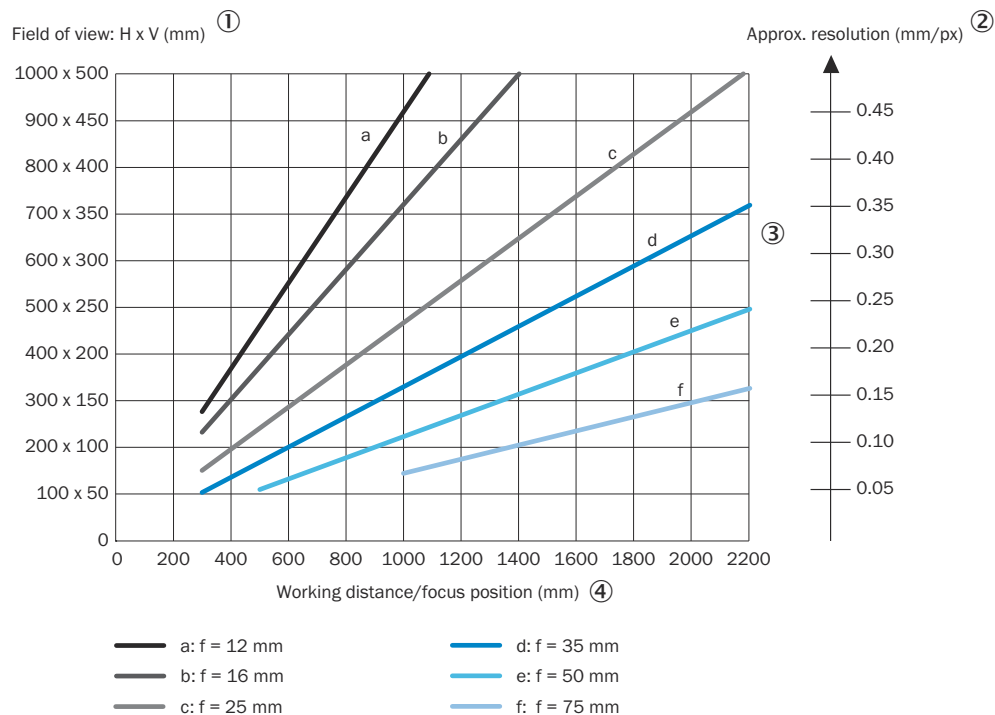
- ① Field of view: horizontal x vertical in mm
- ② Approximate resolution in mm/px
- ③ Lens focal length
- ④ Working distance/focus position in mm

InspectorP652 Dynamic Focus



- ① Field of view: horizontal x vertical in mm
 ② Approximate resolution in mm/px
 ③ Lens focal length
 ④ Working distance/focus position in mm

InspectorP652 Flex

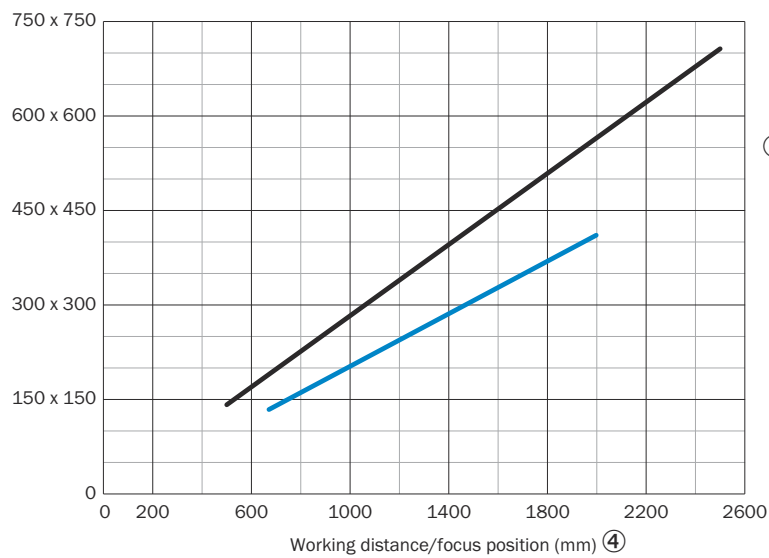


- ① Field of view: horizontal x vertical in mm
 ② Approximate resolution in mm/px
 ③ Lens focal length

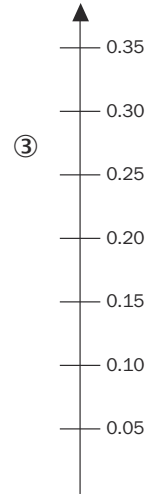
④ Working distance/focus position in mm

InspectorP654 Dynamic Focus

Field of view: H x V (mm) ①



Approx. resolution (mm/px) ②

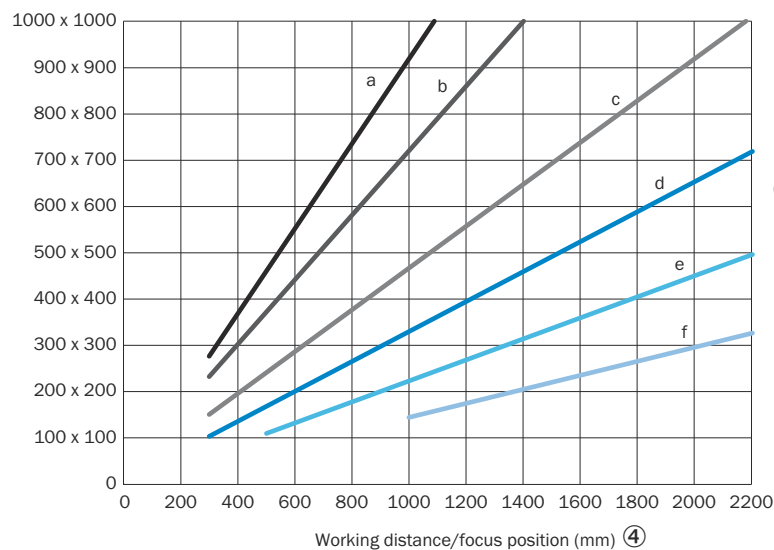


— f = 40 mm (V2D65xR-xxKxx)
— f = 54 mm (V2D654R-xxHxx)

- ① Field of view: horizontal x vertical in mm
- ② Approximate resolution in mm/px
- ③ Lens focal length
- ④ Working distance/focus position in mm

InspectorP654 Flex

Field of view: H x V (mm) ①



Approx. resolution (mm/px) ②



— a: f = 12 mm — d: f = 35 mm
— b: f = 16 mm — e: f = 50 mm
— c: f = 25 mm — f: f = 75 mm

- ① Field of view: horizontal x vertical in mm
- ② Approximate resolution in mm/px

- ③ Lens focal length
- ④ Working distance/focus position in mm

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

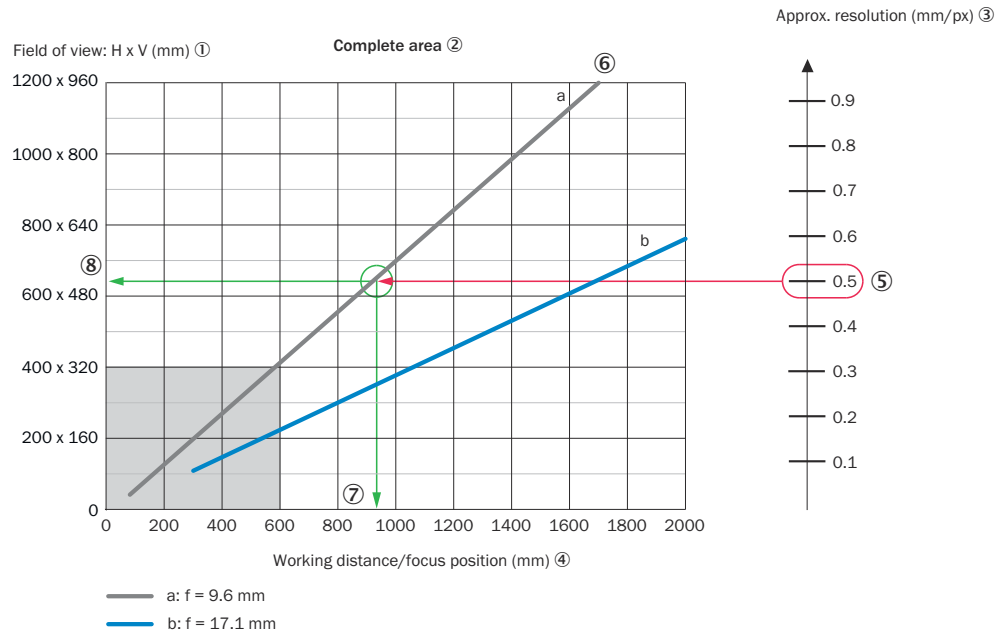


Figure 6: Example of field of view diagram

- 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.

5.6 Mounting the device

1. If required for the country in question, stick the French warning label supplied over the English warning label for LED risk group RG 2.
2. Mount the device in a suitably prepared mounting system with M5 screws using the threaded mounting holes or sliding nuts provided.

- Screw the screws no more than 5 mm into the threaded mounting holes or sliding nuts.
 - To do so, either use all 4 threaded mounting holes on the rear of the device or the two sliding nuts on the side of the device.
 - Attach the separately-ordered, optional SICK mounting system using the sliding nuts on the device. Mounting systems are available as accessories, [see "Accessories", page 46](#).
3. Align the device taking into consideration the field of view ([see "Field of view diagrams", page 24](#)) and the application circumstances ([see "Installation requirements", page 20](#)).

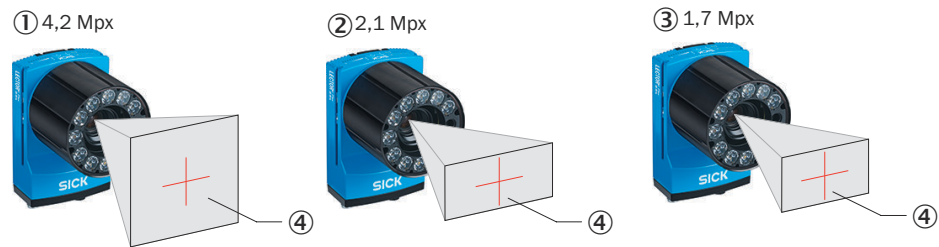


Figure 7: Resolution-dependent field of view geometries

- ① InspectorP654 with 4.2 mpx image sensor
 - ② InspectorP652 with 2.1 mpx image sensor
 - ③ InspectorP642 with 1.7 mpx image sensor
 - ④ Field of view
4. Connect the device to interfaces and supply voltage when disconnected from voltage, [see "Connecting the device", page 32](#).
- ✓ The **Ready** status LED lights up green.
5. Perform fine adjustment.

6 Electrical installation

6.1 Wiring instructions



NOTE

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).



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.

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.

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.

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 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

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.

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.

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.

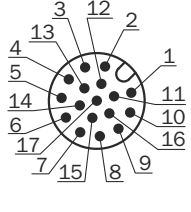
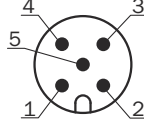
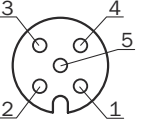
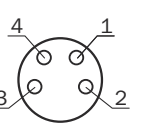
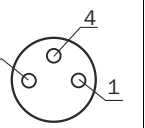
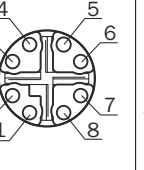
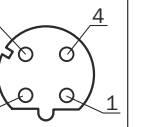


NOTICE

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 Connections and pin assignment

Pin	Power/Serial-Data/CAN/IO	CAN IN	CAN OUT	USB	Triggering of external illumination	GB Ethernet	Ethernet
	 17-pin M12 male connector, A-coded	 5-pin M12 male connector, A-coded	 5-pin M12 female connector, A-coded	 4-pin M8 female connector	 3-pin M8 female connector	 8-pin M12 female connector, X-coded	 4-pin M12 female connector, D-coded
1	GND	Shielding	Shielding	+5 V	Sensor 1	TRD0_P	TX+
2	DC 24 V ± 20%	DC 24 V ± 20%	DC 24 V ± 20%	Data-	-	TRD0_N	RX+
3	CAN L	GND	GND	Data+	Result 4	TRD1_P	TX-
4	CAN H	CAN H	CAN H	GND	SensGND	TRD1_N	RX-
5	TD+ (RS-422), Host	CAN L	CAN L	-	-	TRD3_P	-
6	TD- (RS-422), Host TxD (RS-232), Host	-	-	-	-	TRD3_N	-
7	TxD (RS-232), Aux	-	-	-	-	TRD2_P	-
8	RxD (RS-232), Aux	-	-	-	-	TRD2_N	-
9	SensGND	-	-	-	-	-	-
10	Sensor 1, digital input	-	-	-	-	-	-
11	RD+ (RS-422), host	-	-	-	-	-	-
12	RD- (RS-422), host RxD (RS-232), host	-	-	-	-	-	-
13	Result 1, digital output	-	-	-	-	-	-
14	Result 2, digital output	-	-	-	-	-	-
15	Sensor 2, digital input	-	-	-	-	-	-
16	Result 3, digital output	-	-	-	-	-	-
17	Result 4, digital output	-	-	-	-	-	-

6.4 Connection diagrams

Connection principle

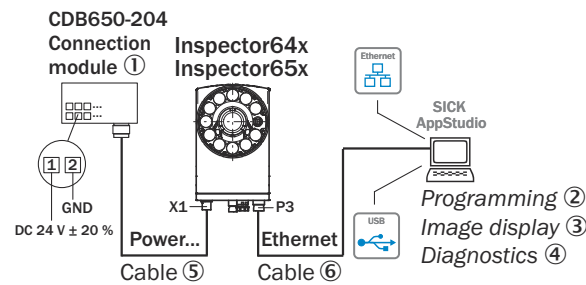


Figure 8: General connection principle

- ① CDB650-204 connection module
- ② Programming
- ③ Image display
- ④ Diagnostics
- ⑤ Cable, e.g. part no. 6051194 (3 m)
- ⑥ Cable, e.g. part no. 6049728 (2 m)

Wiring without SICK connection module

When using customer-specific connection units, the wiring principle for the signals can be found in the connection diagrams for the connection module CDM420-0006, [see "Connection of the device to CDM420-0006", page 57](#).

6.5 Connecting the device

6.5.1 Using CDB and CDM connection modules

Table 5: Possible combinations of device and connection modules

Connection on the device	Connection modules	Connection cable
Male connector, M12, 17-pin, A-coded	CDB650-204	Cable 1:1 ¹⁾
	CDM420-0006 ²⁾	Adapter cable ³⁾

¹⁾ Connection cable 1:1 (female connector, M12, 17-pin, A-coded / male connector, M12, 17-pin, A-coded).

²⁾ CDM420-0007: for connecting 2 devices.

³⁾ 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 47
CDM420-0006	see "Connection of the device to CDM420-0006", page 57



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 6: Required supply voltage V_S and power output

Supply voltage V_S	Power source: required power output ¹⁾
DC 24 V \pm 20%	At least 30 W

¹⁾ Valid for device with 4 loaded digital outputs (each 100 mA).

When connecting via the optional CDB or CDM connection module: if the CMC600 cloning module is used, an additional output power of 0.5 W is required.

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 24 V DC \pm 20%, protect the device using a separate fuse rated at 2 A.

- 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 in the connection modules in the circuit after switch S1.

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

Connection modules	Supply voltage fuse protection	Reference
CDB650-204	2 A (slow-blow)	see "Connecting supply voltage for the device in CDB650-204", page 50
CDM420-0006	2 A (slow-blow)	see "Connecting supply voltage for the device in CDM420-0006", page 60

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

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

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

Interface	Data transmission rate	Distance to the target computer (host)
-----------	------------------------	--

**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.

**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
--------------------	----------------	-----------

6.5.4 Wiring the CAN interface**NOTE**

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

Wiring CAN interfaces via a connection module

Connection modules	Interface	Reference
CDB650-204	CAN	see "Wiring the CAN interface of the device in the CDB650-204", page 52
CDM420-0006	CAN	see "Wiring the CAN interface of the device in the CDM420-0006", page 62

6.5.5 Wiring the digital inputs

The device has 2 switching digital inputs (Sensor1, Sensor 2). IN/OUT 3 ... 6 can also be used as digital inputs.

Functions (examples)

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

Position of digital inputs

- Male connector of the device (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.

Wiring digital inputs via connection module

Connection modules	Digital inputs	Reference
CDB650-204	SENS/IN 1 SENS/IN 2	see "Wiring digital inputs of the device in the CDB650-204", page 54
	Parameterizable digital inputs IN 3 ... IN 6	page 57
CDM420-0006	Sensor 1 Sensor 2	see "Wiring digital inputs of the device in the CDM420-0006", page 64
	Parameterizable digital inputs IN 3 and IN 4	page 57

6.5.6 Wiring the digital outputs

The four IN/OUT 3 ... 6 switching digital outputs can be assigned independently of each other with various functions for the output of the result status. If the allocated event occurs in the analysis process, then the corresponding digital output is live after the end of the trigger for the selected pulse duration.

Position of digital outputs

- Male connector of the device (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.

**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	IN/OUT 3 ... 6 (RES/OUT 1 ... 4)	see "Wiring digital outputs of the device in the CDB650-204", page 56
CDM420-0006	N/OUT 3 ... 4	see "Wiring digital outputs of the device in the CDM420-0006", page 66

7 Commissioning

7.1 Installing SensorApps and programming the device



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.

Installing SensorApps on the device

Use the SICK AppManager software to manage and install SensorApp packages (*.sapk files) on the device. The latest version of SICK AppManager is available from www.sick.com/SICK_AppManager.

Many SensorApps have a web user interface which is accessed by following the steps below:

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.

Installing and starting the development environment

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

1. Download and install the latest version of SICK AppStudio from www.sick.com/SICK_AppStudio. Administrator rights may be required on the PC to install the software.
2. Enter your personal license key to complete the installation.
3. Start the program. Path: **Start > All programs > SICK > SICK AppStudio**
4. Establish a connection between the software and the device via Ethernet.
- ✓ The connection wizard starts automatically.
5. The following IP address is configured by default on the device:
 - IP address P1: 192.168.0.1

First steps with the device

The device is supplied with a pre-installed SensorApp called ImageSetup.

1. In SICK AppStudio, double-click the paths in the AppExplorer to display all content.
2. Double-click the primary script file to open it in the script editor and display the source code.

Receiving images

1. Click on the corresponding button to start all apps.
2. The device page (in online mode) will now display an image on the right-hand side, enabling basic configuration to adjust parameters such as illumination, gain, contrast, and trigger methods.



NOTE

If the device page displays Error 404, port 80 is already occupied by another piece of software. To find out which process you need to quit, go to Task Manager > Performance tab > Resource monitor > Network tab.

Search for port 80 among the listed ports.

C-mount lens: adjusting the brightness and sharpness

1. Remove the protective optics cover.
2. Loosen the lock nut fitting on the aperture ring and sharpness ring.
3. Adjust the mask using the aperture ring (top ring) on the lens to a low value such as “2”.
4. Reduce the **shutter time** and **brightness** until the object is clearly visible on the image.
5. Increase the image sharpness using the sharpness ring (bottom ring) on the lens. The object must be clearly displayed in sharp focus so that all edges are easy to identify.
6. Use the lock nut fitting to fix the sharpness ring setting in place.
7. Apply the correct mask setting for the depth of field. In order to do this, check the settings with the test object. Adjust the mask to a higher value. If a greater depth of field is required, select a higher value. Bear in mind that using a greater mask value reduces image brightness, meaning that brightness must be increased using the software. This reduces image quality.
8. Fix the aperture ring using the lock nut fitting.
9. Mount the protective optics cover.

Continuing programming

- ▶ Adjust the settings for additional functions during planned operation such as triggers, result formats, data interface, etc.

Quitting programming

1. Save the program in the non-volatile memory of the device.
2. Save the parameter set on the PC.

8 Maintenance

8.1 Maintenance plan

8.2 Cleaning

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



NOTICE

Equipment damage due to improper cleaning.

Improper cleaning may result in equipment damage.

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

- The device must be cleaned regularly from the outside to guarantee heat dissipation and therefore operation. Use a dry cloth or an industrial vacuum cleaner for cleaning. Do not use cleaning agents.

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 type of material used for the viewing window can be found on the type label ([see "Type code", page 13](#)).

Cleaning procedure:



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.



CAUTION

Warning! Optical radiation: LED risk group 2, visible radiation, 400 nm to 780 nm

Potentially dangerous optical radiation. Can be damaging to the eyes.

- Do not look into the light source for extended periods of time.
- Never point the light source at people.
- Avoid any reflections on people from reflective surfaces. Be particularly careful during mounting and alignment work.
- Do not open the housing. Opening the housing will not switch off the light source. Opening the housing may increase the level of risk.
- Comply with the current national regulations on photobiological security of lamps and lamp systems.

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



CAUTION

Optical radiation: 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.

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.

- ▶ Switch off the device for the duration of the cleaning operation. If this is not possible, wear suitable laser safety goggles. These must absorb radiation of the device's wavelength effectively.
- ▶ Glass window: remove dust from the viewing window using a soft, clean brush. If necessary, also clean the viewing window with a clean, damp, lint-free cloth, and a mild anti-static lens cleaning fluid.
- ▶ Plastic window: 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.

8.3 Repairs

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

9 Troubleshooting

9.1 Overview of possible errors and faults

Table 9: 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 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

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

9.3 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 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).

Please note: This documentation may contain further technical data.

11.1 Optics and Illumination

Type	InspectorP64x Flex (V2D64xP-MCxxxx) InspectorP65x Flex (V2D65xP-MCxxxx)	InspectorP65x DynamicFocus (V2D65xP-MExxxx)
Focus	Manual adjustment of the sharpness and aperture on the optional lens unit	Dynamic and externally triggered electrical focus adjustment for working distance
Shutter technology	Global shutter	Global shutter
Illumination for field of view	Optional e.g., variants of the VI83I integrable illumination unit: 11 x LED, visible light. White ($\lambda = 6,000 \pm 500$ K) Blue ($\lambda = 455 \pm 20$ nm) Red ($\lambda = 620 \pm 30$ nm)	11 x LED, visible light. White ($\lambda = 6,000 \pm 500$ K) Blue ($\lambda = 455 \pm 20$ nm)
Feedback LED (spot in field of view)	Optional e.g., variants of the VI83I integrable illumination unit: 1 x LED, visible light. Green ($\lambda = 525 \pm 15$ nm)	1 x LED, visible light. Green ($\lambda = 525 \pm 15$ nm)

Type	InspectorP64x Flex (V2D64xP-MCxxx) InspectorP65x Flex (V2D65xP-MCxxx)	InspectorP65x DynamicFocus (V2D65xP-MExxx)
LED risk group of illumination unit	"White + Feedback LED" option "Blue – Medium + Feedback LED" option "Blue – Wide + Feedback LED" option <ul style="list-style-type: none"> Risk group 1 (low risk) according to IEC 62471-1: 2006-07/EN 62471-1: 2008-09. "Red + Feedback LED" option Radiance: $L_B < 10 \times 10^3 \text{ W/(m}^2\text{sr)}$ within 100 s; at a distance of $\geq 200 \text{ mm}$ $L_R < 7 \times 10^5 \text{ W/(m}^2\text{sr)}$ within 10 s; at a distance of $\geq 200 \text{ mm}$	"White + Feedback LED" option <ul style="list-style-type: none"> Risk group 1 (low risk) according to IEC 62471-1: 2006-07/EN 62471-1: 2008-09. Radiance: $L_B < 10 \times 10^3 \text{ W/(m}^2\text{sr)}$ within 100 s; at a distance of $\geq 200 \text{ mm}$ $L_R < 7 \times 10^5 \text{ W/(m}^2\text{sr)}$ within 10 s; at a distance of $\geq 200 \text{ mm}$
	"Blue – Narrow + Feedback LED" option <ul style="list-style-type: none"> Risk group 2 (moderate risk) according to IEC 62471-1: 2006-07/EN 62471-1: 2008-09 due to exposure to blue light. Radiance: $L_B < 10 \times 10^3 \text{ W/(m}^2\text{sr)}$ within 50 s (RG 2); at a distance of $\geq 200 \text{ mm}$ $L_R < 7 \times 10^5 \text{ W/(m}^2\text{sr)}$ within 10 s (RG 1); at a distance of $\geq 200 \text{ mm}$ Risk RG 1 (low risk) corresponding to $L_B < 10 \times 10^3 \text{ W/(m}^2\text{sr)}$ within 100 s for distances $> 1 \text{ m}$.	"Blue + Feedback LED" option <ul style="list-style-type: none"> Risk group 2 (moderate risk) according to IEC 62471-1: 2006-07/EN 62471-1: 2008-09 due to exposure to blue light. Radiance: $L_B < 10 \times 10^3 \text{ W/(m}^2\text{sr)}$ within 50 s (RG 2); at a distance of $\geq 200 \text{ mm}$ $L_R < 7 \times 10^5 \text{ W/(m}^2\text{sr)}$ within 10 s (RG 1); at a distance of $\geq 200 \text{ mm}$ Risk RG 1 (low risk) corresponding to $L_B < 10 \times 10^3 \text{ W/(m}^2\text{sr)}$ within 100 s for distances $> 1 \text{ m}$.
Aiming laser (field of view)	Visible light. Red ($\lambda = 630 \text{ nm} \dots 680 \text{ nm}$), can be disengaged	
Laser class	Class 1M Laser Product according to IEC 60825-1: 2007 or Class 1 Laser Product according to 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. $P < 1.40 \text{ mW}$	

11.2 Performance

Type	InspectorP64x Flex (V2D64xP-MCxxx) InspectorP65x Flex (V2D65xP-MCxxx)	InspectorP65x DynamicFocus (V2D65xP-MExxx)
Working distance	see "InspectorP64x Flex", page 24 see "InspectorP652 Dynamic Focus", page 25	see "InspectorP652 Flex", page 25
Lens unit	Application-specific www.sick.com/InspectorP64x www.sick.com/InspectorP65x	see "", page 13
Image sensor resolution	see "", page 13	
Image sensor type	see "", page 13	

Type	InspectorP64x Flex (V2D64xP-MCxxx) InspectorP65x Flex (V2D65xP-MCxxx)	InspectorP65x DynamicFocus (V2D65xP-MExxx)
Image recording rate	InspectorP64x Flex At 1.7 Mpx: 40 Hz InspectorP65x Flex At 2 Mpx: 70 Hz At 4 Mpx: 40 Hz	At 2 Mpx: 70 Hz At 4 Mpx: 40 Hz
Ambient light tolerance	2000 lx on surface	
Image memory	Internally 512 MB, externally on optional microSD memory card (max. 16 GB)	

11.3 Interfaces

Type	InspectorP64x Flex (V2D64xP-MCxxx) InspectorP65x Flex (V2D65xP-MCxxx)	InspectorP65x DynamicFocus (V2D65xP-MExxx)
Serial RS-232/ 422	Host (300 Bd ... 115.2 kBd), for data output	
Serial RS-232	Aux (57.6 kBd)	
USB	Not supported	
Ethernet	Image transmission (FTP). 10/100/1,000 Mbit/s, TCP/IP, PROFINET IO, EtherNet/IP. MAC address(es), see type label.	
CAN	20 kbit/s ... 1 Mbit/s Protocol: SICK CAN sensor network	
PROFIBUS ¹⁾	Optional via external fieldbus module CDF600-21xx	
PROFINET IO	Built-in, additionally available (optional) via external fieldbus module CDF600-2200	
Digital switching inputs and outputs	2 x Sensor 1 and 2 4 x physical (freely configurable inputs and outputs) 2 x additional external via optional CMC600 ¹⁾ module in connection module CDB650-204 or CDM420-0006 (external input/output 1 and 2)	
Digital switching inputs	2 x Sensor 1 and 2 4 x physical (configurable IN 3 ... 6) U _e = max. 32 V, I _e = max. 5 mA, opto-decoupled, reverse polarity protected, adjustable debounce time	
Digital switching outputs	4 x physical (configurable OUT 3 ... 6) U _a = U _V - 1.5 V, I _a ≤ 100 mA. Short-circuit protected, temperature protected. Not galvanically isolated from the supply voltage.	

¹⁾ Function planned

11.4 Mechanics and electronics

Type	InspectorP64x Flex (V2D64xP-MCxxx) InspectorP65x Flex (V2D65xP-MCxxx)	InspectorP65x DynamicFocus (V2D65xP-MExxx)
Optical indicators	10 x RGB LEDs: status indicators 1 x LED: feedback LED, green 10 x RGB LEDs: bar graph, blue	

Type	InspectorP64x Flex (V2D64xP-MCxxx) InspectorP65x Flex (V2D65xP-MCxxx)	InspectorP65x DynamicFocus (V2D65xP-MExxx)
Acoustic indicators	1 x beeper for signaling events, can be deactivated	
External backup of configuration data	Optional on plug-in micro SD memory card or via optional CMC600 module in connection module CDB650-204 or CDM420-0006.	
Supply voltage	DC 24 V ± 20% SELV (EN 60950-1: 2014-08) and LPS (EN 60950-1: 2014-08) or Class 2 (UL 1310) required	
Current consumption	Max. 2.0 A (with switching outputs)	
Power consumption	Typically 20 W (with switching outputs without load)	
Weight	Max. 635 g, without optic kit	Max. 950 g, model-dependent
Material Housing	Aluminum die cast	
Material Viewing window	Glass or plastic (PMMA), 2 mm thick, with scratch-proof coating: see "" , page 13	
Electrical protection class	III, in accordance with DIN EN 60950-1: 2014-08	
Enclosure rating	According to EN 60529: 2000-09: see "" , page 13	

11.5 Ambient data

Type	InspectorP64x Flex (V2D64xP-MCxxx) InspectorP65x Flex (V2D65xP-MCxxx)	InspectorP65x DynamicFocus (V2D65xP-MExxx)
Vibration resistance Shock resistance	According to EN 60068-2-6: 2008-02 In accordance with EN 60068-2-27: 2009-05	
Ambient temperature	Operation ¹⁾ : 0 °C ... +50 °C Storage -20 °C ... +70 °C	
Permissible relative humidity	0% ... 90%, non-condensing	

¹⁾ Notes regarding adequate dissipation of lost heat: [see "Installation requirements", page 20](#)

12 Accessories



NOTE

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

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).

13 Annex

13.1 Declarations of conformity and certificates

You can download declarations of conformity and certificates via 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).

13.2 Licenses

SICK uses open source software which is published by the rights holders under a free license. Among others, the following license types are used: GNU General Public License (GPL version 2, GPL version 3), GNU Lesser General Public License (LGPL), MIT license, zlib license and licenses derived from the BSD license.

This program is provided for general use without warranty of any kind. This warranty disclaimer also extends to the implicit assurance of marketability or suitability of the program for a particular purpose.

More details can be found in the GNU General Public License.

For license texts see www.sick.com/licenses/texts.

Printed copies of the license texts are also available on request.

13.3 Connection diagrams of connection module CDB650-204

13.3.1 Connection of the device to CDB650-204

Device = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

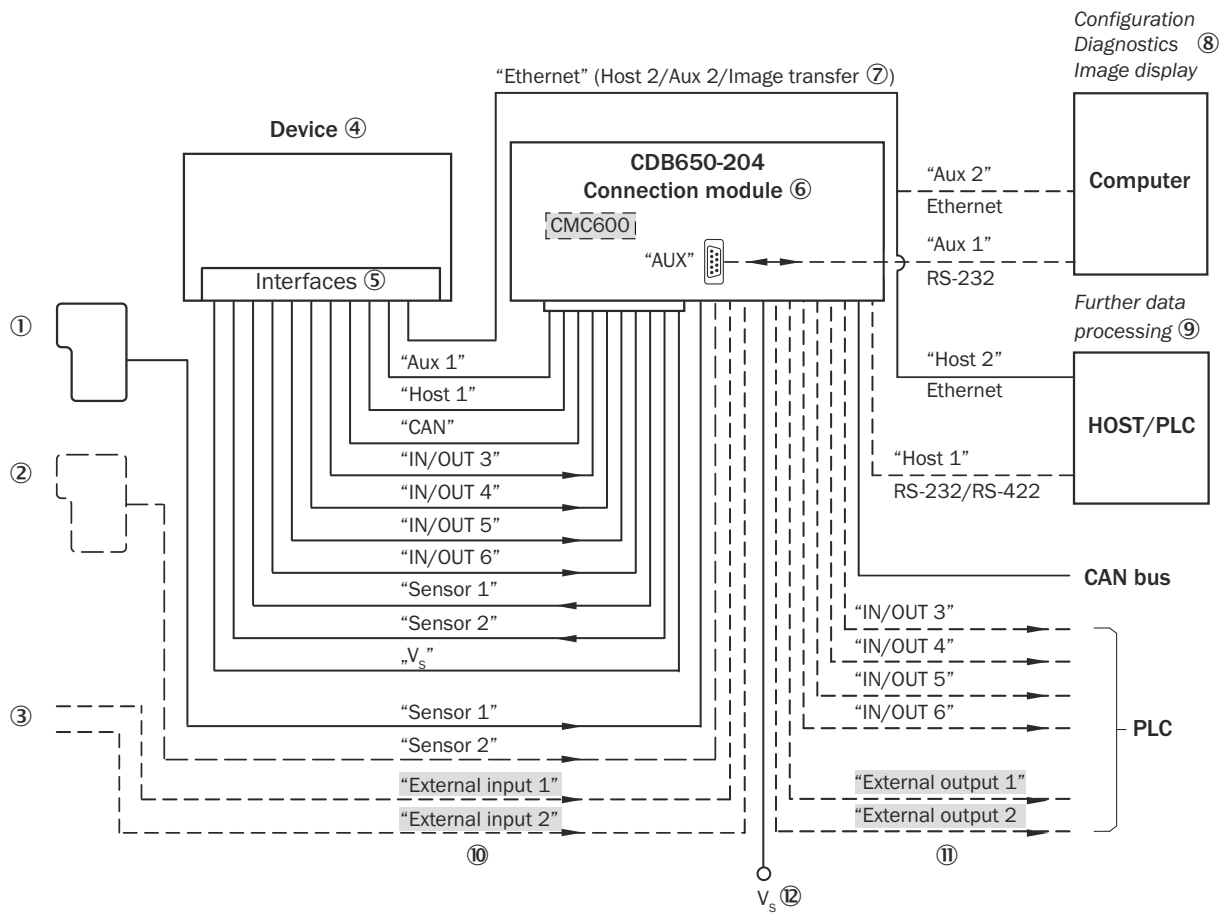


Figure 9: Connection of the device to peripherals via CDB650-204 (overview)

- ① Start/Stop trigger (e.g. photoelectric sensor)
- ② Application-dependent alternative stop trigger (e.g. photoelectric sensor) or travel increment (incremental encoder)
- ③ Other functions
- ④ Device
- ⑤ Interfaces
- ⑥ Connection module
- ⑦ Image transmission
- ⑧ Configuration, diagnostics and image display
- ⑨ Further data processing
- ⑩ External switching inputs (not supported)
- ⑪ External switching outputs (not supported)
- ⑫ Supply voltage V_s

13.3.2 Wiring overview of the CDB650-204

Device = InspectorP64x = V2D64xP-xxxxAx, 1 digital input used

Device = InspectorP65x = V2D65xP-xxxxAx, 1 digital input used

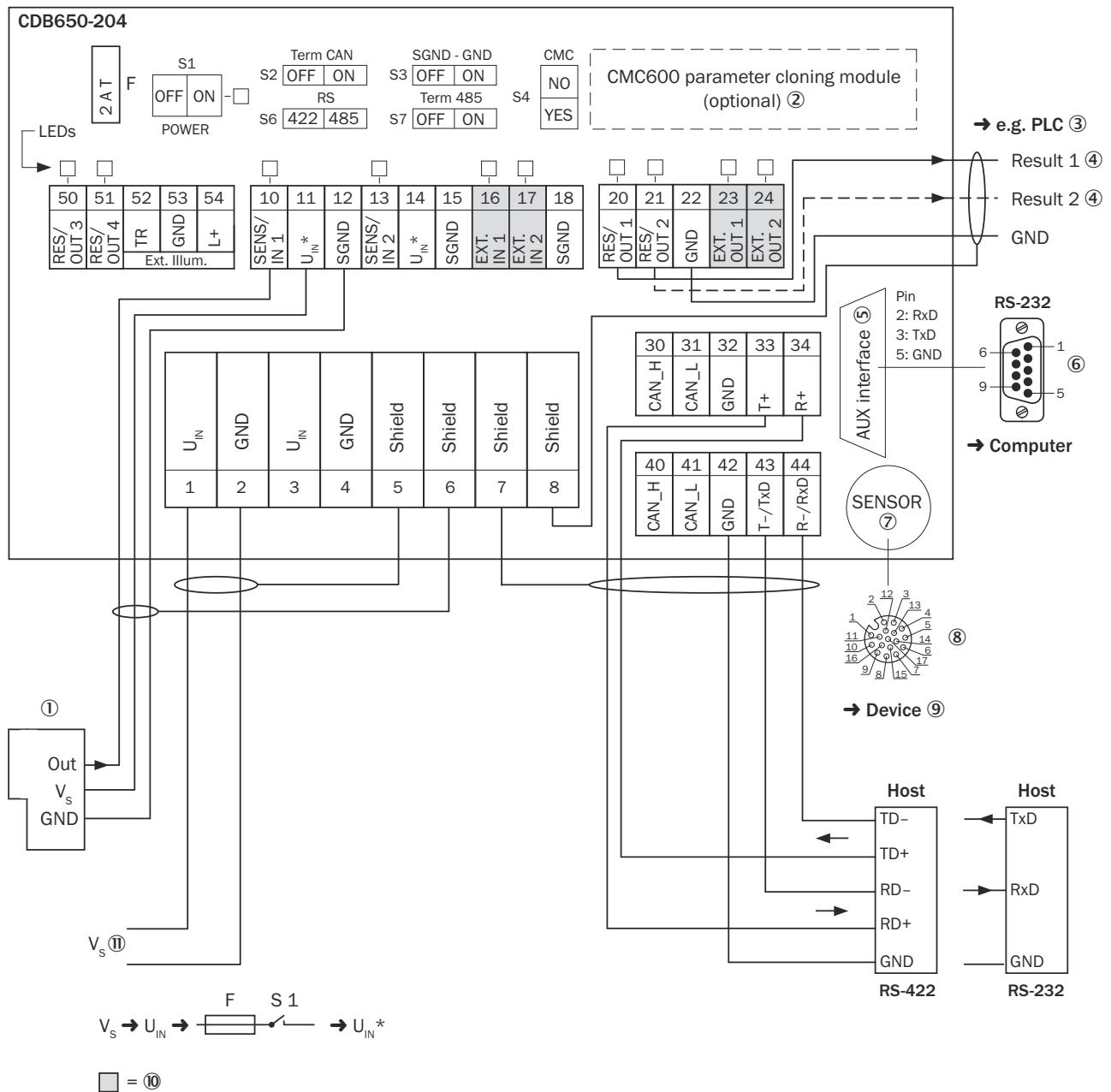


Figure 10: Connection of device and peripherals to the CDB650-204 connection module (overview).

- ① External trigger sensor
- ② Parameter cloning module CMC600 (optional), not supported
- ③ E.g., PLC (programmable logic controller)
- ④ Name of the digital output
- ⑤ Auxiliary interface "AUX"
- ⑥ Male connector, D-Sub, 9-pin
- ⑦ SENSOR = Device
- ⑧ Female connector, M12, 17-pin, A-coded
- ⑨ Device to be connected
- ⑩ External digital inputs and digital outputs of the device, not supported
- ⑪ Supply voltage V_S

13.3.3 Connecting supply voltage for the device in CDB650-204

Device = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

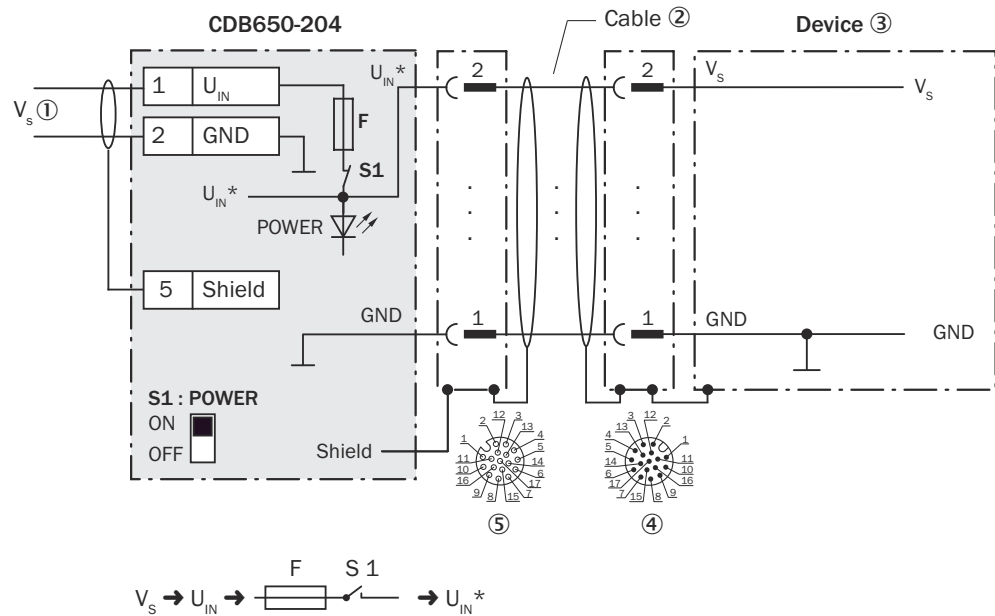


Figure 11: Connecting supply voltage for the device in CDB650-204 connection module.

- ① Supply voltage V_s
- ② Connection cable 1:1 (male connector, M12, 17-pin, A-coded / female connector, M12, 17-pin, A-coded)
- ③ Device
- ④ Device: male connector, M12, 17-pin, A-coded
- ⑤ Connection module: female connector, M12, 17-pin, A-coded

Function of switch S1

Table 10: 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 = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

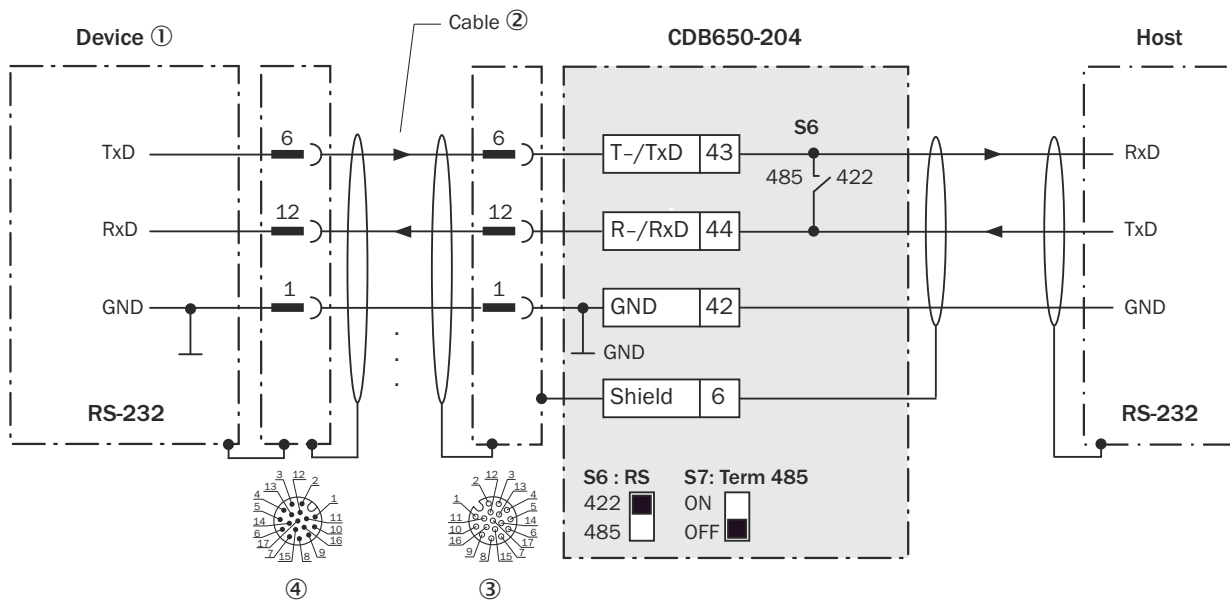


Figure 12: Wiring data interface RS-232 of the device in connection module CDB650-204.

- ① Device
- ② Connection cable 1:1 (female connector, M12, 17-pin, A-coded/male connector, M12, 17-pin, A-coded)
- ③ Connection module: female connector, M12, 17-pin, A-coded
- ④ Device: male connector, M12, 17-pin, A-coded



NOTE

Activate the RS-232 data interface in the device with the SICK AppStudio development environment.

13.3.5 Wiring serial host interface RS-422 of the device in CDB650-204

Device = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

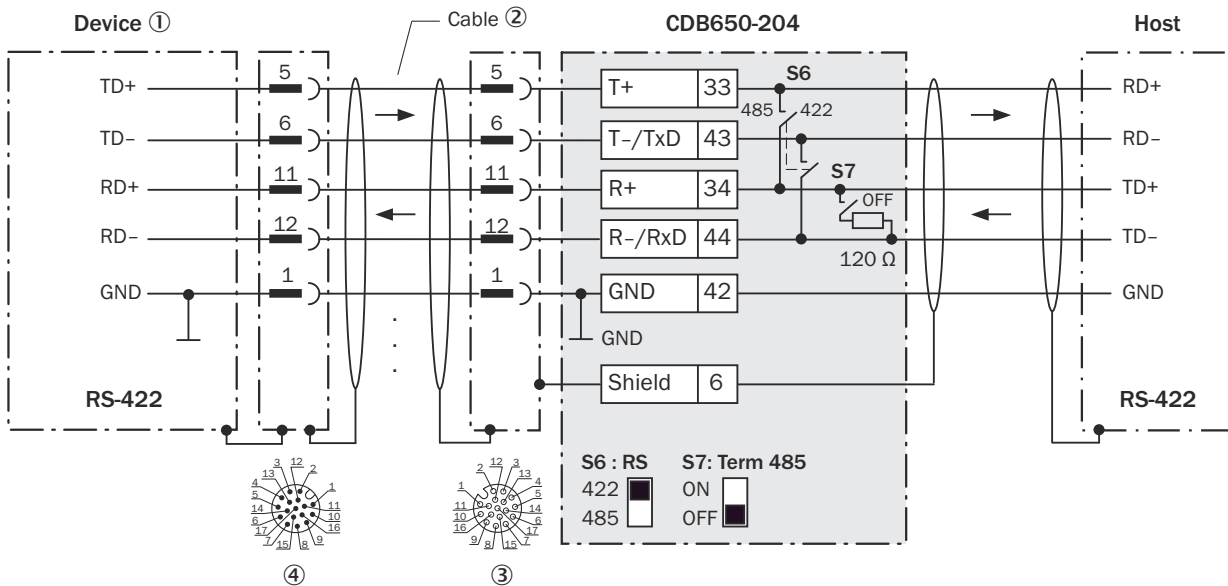


Figure 13: Wiring data interface RS-422 of the device in connection module CDB650-204.

- ① Device
- ② Connection cable 1:1 (female connector, M12, 17-pin, A-coded / male connector, M12, 17-pin, A-coded)
- ③ Connection module: female connector, M12, 17-pin, A-coded
- ④ Device: male connector, M12, 17-pin, A-coded

Function of switch S7

Table 11: Switch S7: Term 485

Switch setting	Function
ON	Terminates the RS-422 receiver in the device to improve the noise ratio on the line
OFF	No termination



NOTE

User of the RS-422 data interface:

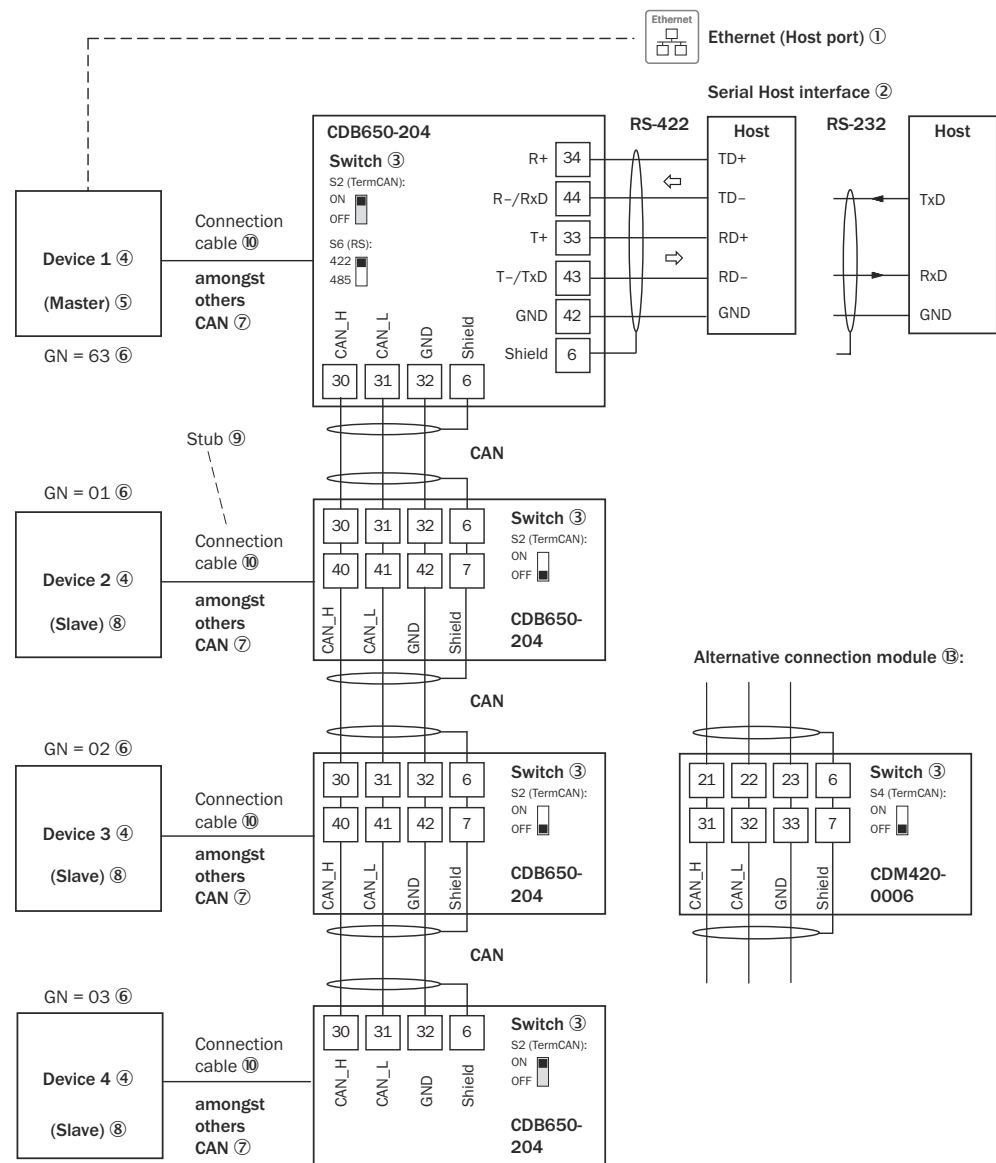
- The relevant interface drivers for the device comply with the standard in accordance with RS-422.
- The connection shown above is configured for operation of the host with permanently activated drivers (often described as “RS-422 operation”).
- Activate the RS-422 data interface (“Point-to-Point” option) in the device with SICK AppStudio.

13.3.6 Wiring the CAN interface of the device in the CDB650-204

Device = InspectorP64x = V2D64xP-xxxxYx

Device = InspectorP65x = V2D65xP-xxxxx

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



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

Figure 14: Wire the CAN interface of the device in the CDB650-204 connection module.

- ① Ethernet (host port)
- ② Serial host interface
- ③ Switch
- ④ Device
- ⑤ Master
- ⑥ Device number
- ⑦ CAN etc.
- ⑧ Slave
- ⑨ Branch line
- ⑩ Connection cable 1:1 (female connector, M12, 17-pin, A-coded/male connector, M12, 17-pin, A-coded)
- ⑪ Device number (GN)
- ⑫ Maximum 32 users
- ⑬ Example of alternative connection module CDM420-0006

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

**NOTE**

Activate the CAN data interface in the device with the SICK AppStudio development environment.

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

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

Device = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

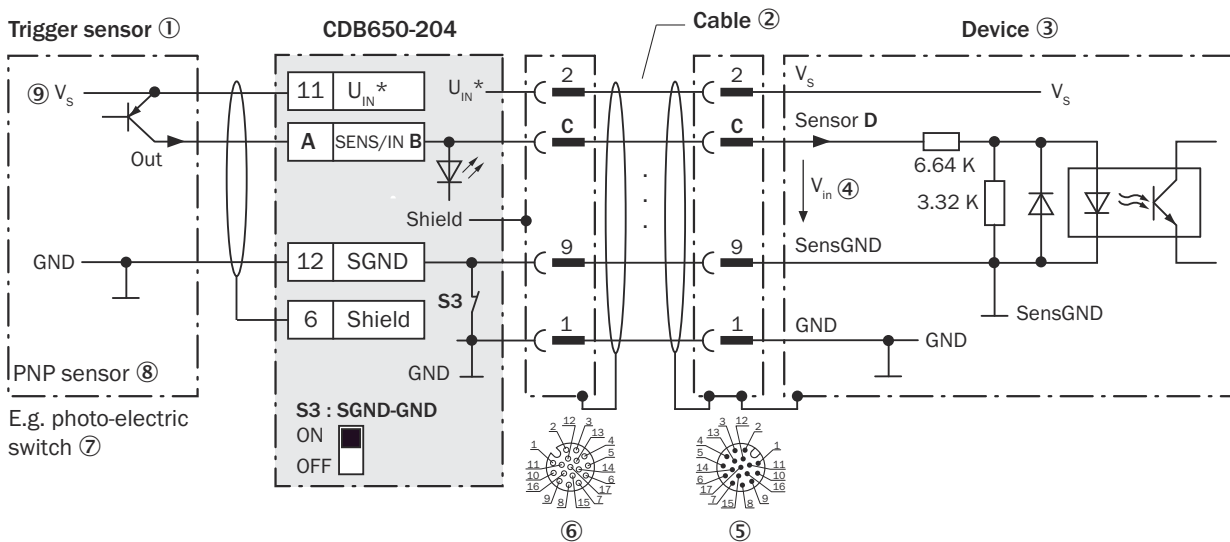


Figure 15: Trigger sensor supplied with power by connection module CDB650-204.

- ① Trigger sensor
- ② Connection cable 1:1 (female connector, M12, 17-pin, A-coded/male connector, M12, 17-pin, A-coded)
- ③ Device
- ④ Input voltage V_{in}
- ⑤ Device: male connector, M12, 17-pin, A-coded
- ⑥ Connection module: female connector, M12, 17-pin, A-coded
- ⑦ E.g. photoelectric sensor
- ⑧ PNP sensor
- ⑨ Supply voltage V_s

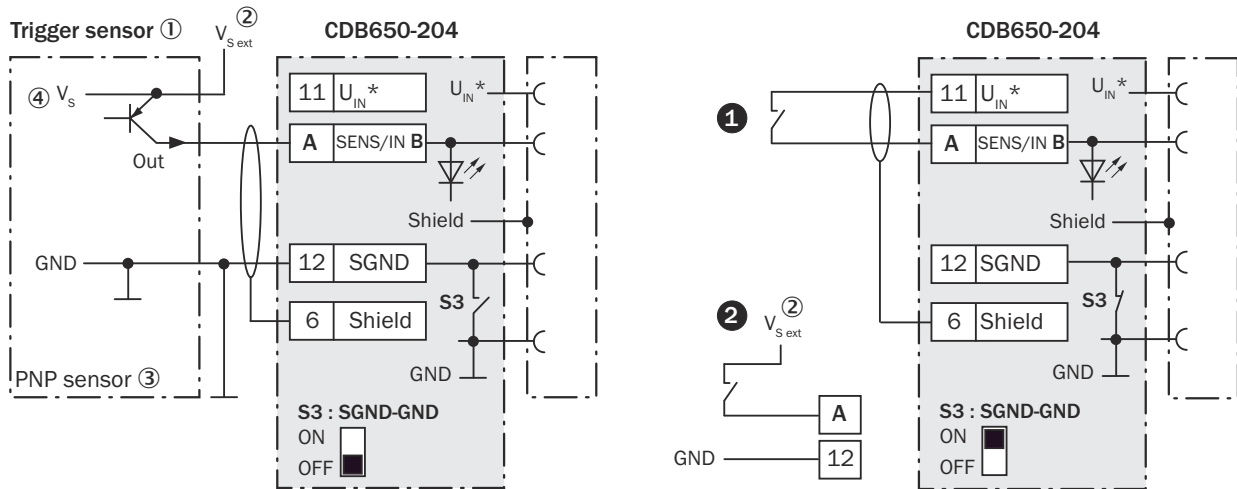


Figure 16: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ① supplied with power by connection module CDB650-204 or ② connected potential-free and supplied with power externally. Now select switch setting S3 as shown in the left figure.

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

Table 12: 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 13: 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 14: 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	<ul style="list-style-type: none"> • Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor
Electrical values	Low: $V_{in}^{1)} \leq 2\text{ V}$; $I_{in}^{2)} \leq 0.3\text{ mA}$ High: $6\text{ V} \leq V_{in} \leq 30\text{ V}$; $0.7\text{ mA} \leq I_{in} \leq 5\text{ mA}$

1) Input voltage.

2) Input current.



NOTE

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

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

Device = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

These digital outputs can be parameterized independently as IN and OUT. Default: IN

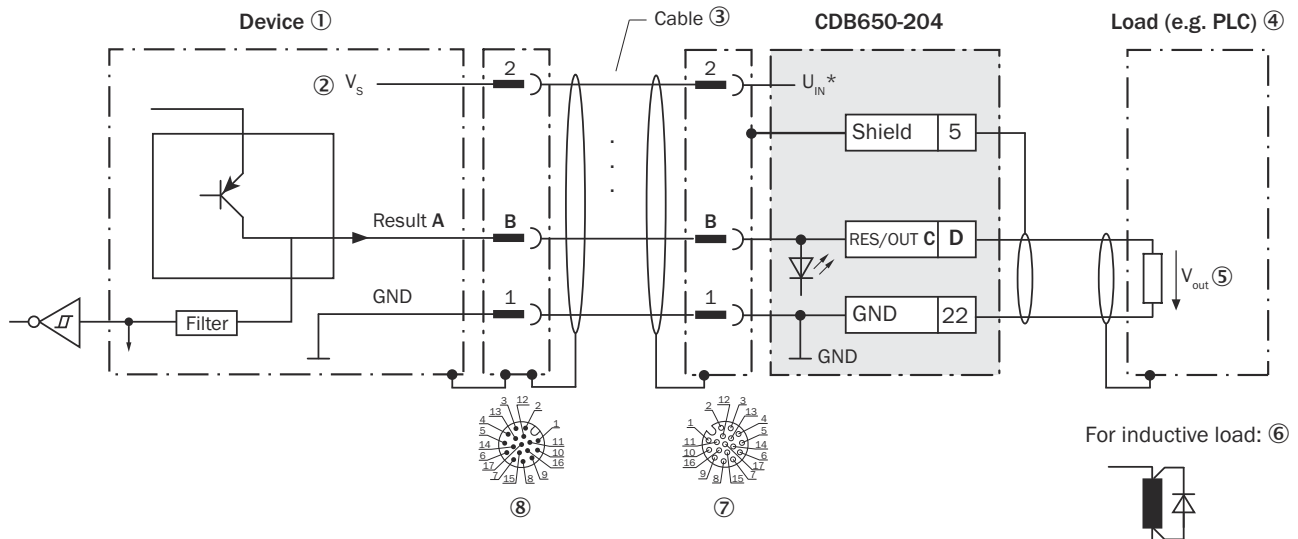


Figure 17: Wire the digital output in the CDB650-204 connection module.

- ① Device
- ② Supply voltage V_S
- ③ Connection cable 1:1 (female connector, M12, 17-pin, A-coded/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
- ⑧ Device: male connector, M12, 17-pin, A-coded

Inductive load



NOTE

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

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

Table 15: 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
IN/OUT 6	17	RES/OUT 4	51

Characteristic data of the digital outputs

Table 16: Characteristic data of the digital switching outputs

Type	Switching
Switching behavior	PNP switching to supply voltage V_S Default settings in the device: no function, logic: not inverted (active high)
Properties	<ul style="list-style-type: none"> • Short-circuit protected and temperature protected • Not electrically isolated from V_S
Electrical values	$0 \text{ V} \leq V_{\text{out}}^{1)} \leq V_S$ $(V_S - 1.5 \text{ V}) \leq V_{\text{out}} \leq V_S$ at $I_{\text{out}}^{2)} \leq 100 \text{ mA}$

1) Output voltage.

2) Output current.



NOTE

Assign the functions for the digital outputs in the device using SICK AppStudio.

13.3.9 Wiring a digital switching input in configurable switching inputs

Characteristic data for digital IN/OUT used as a switching input (IN)

V2D65x

- Low: $U_e \leq 5 \text{ V}$; $I_e \leq 0.3 \text{ mA}$
- High: $12 \text{ V} \leq U_e \leq U_V$; $I_e \leq 1 \text{ mA}$

For the purpose of electromagnetic compatibility, inputs must be set to a defined low-impedance level!

13.4 Connection diagrams of connection module CDM420-0006

13.4.1 Connection of the device to CDM420-0006

Device = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

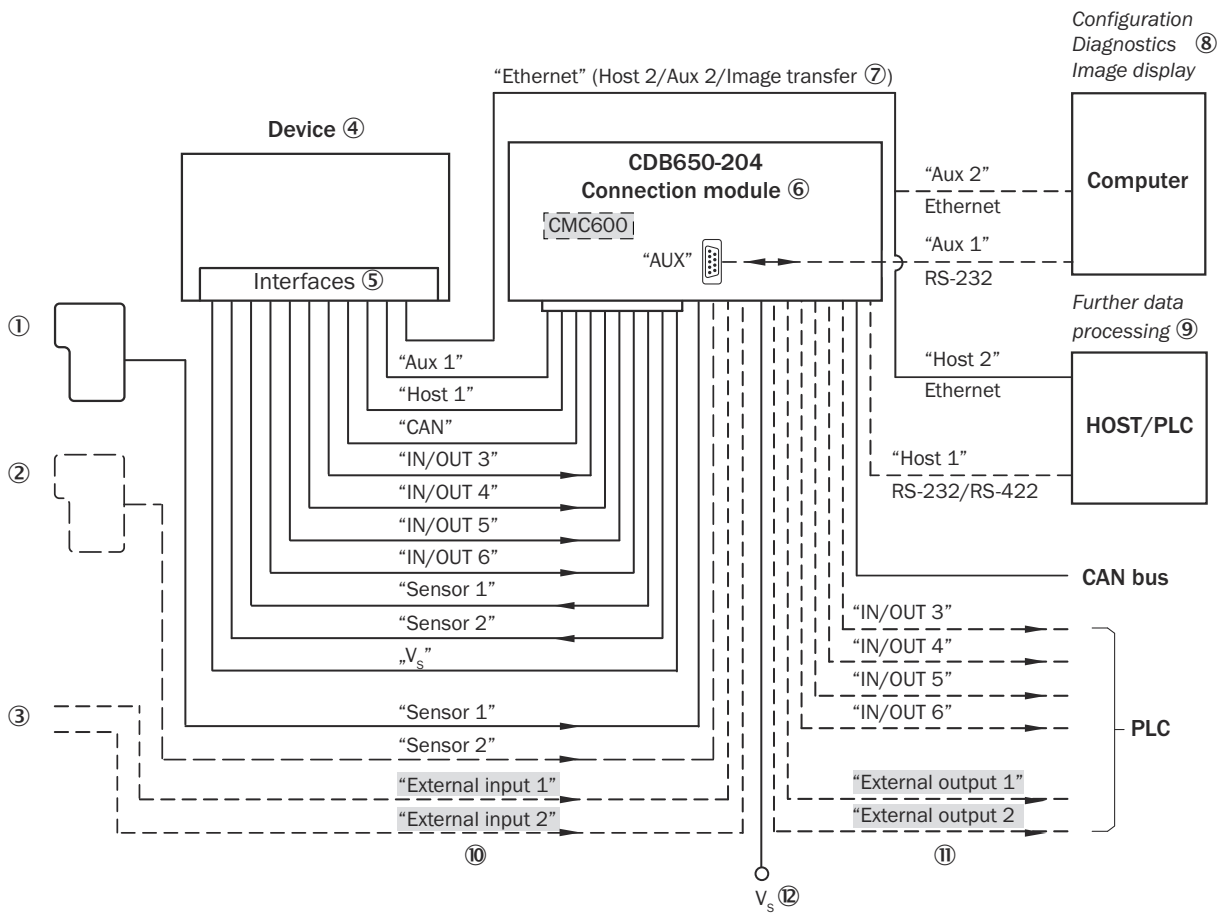


Figure 18: Connection of the device to peripherals via CDM420-0006 (overview)

- ① Start/Stop trigger (e.g. photoelectric sensor)
- ② Application-dependent alternative stop trigger (e.g. photoelectric sensor) or travel increment (incremental encoder)
- ③ Other functions
- ④ Device
- ⑤ Interfaces
- ⑥ Connection module
- ⑦ Image transmission
- ⑧ Configuration, diagnostics and image display
- ⑨ Further data processing
- ⑩ External switching inputs (not supported)
- ⑪ External switching outputs (not supported)
- ⑫ Supply voltage V_s

13.4.2 Wiring overview of the CDM420-0006

Device = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

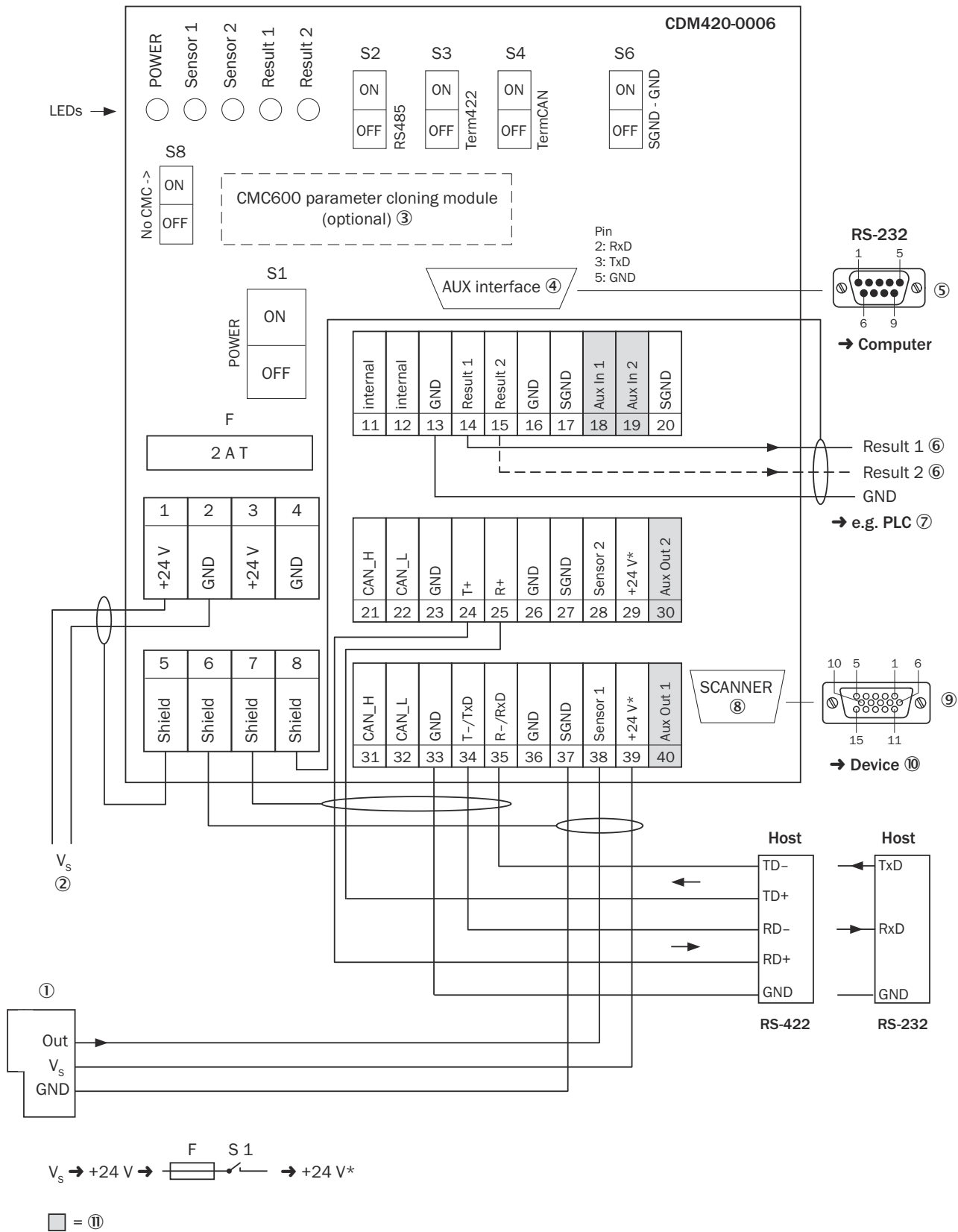


Figure 19: Connection of device and peripherals to the CDM420-0006 connection module (overview).

- ① External trigger sensor
- ② Supply voltage V_s

- ③ Parameter cloning module CMC600 (optional), not supported
- ④ Auxiliary interface "AUX"
- ⑤ Male connector, D-Sub, 9-pin
- ⑥ Name of the digital output or digital input of the device (function selectable in the device)
- ⑦ E.g., PLC (programmable logic controller)
- ⑧ SCANNER = Device
- ⑨ Female connector, D-Sub-HD, 15-pin
- ⑩ Device to be connected
- ⑪ External digital inputs and digital outputs (not supported)

13.4.3 Connecting supply voltage for the device in CDM420-0006

Device = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

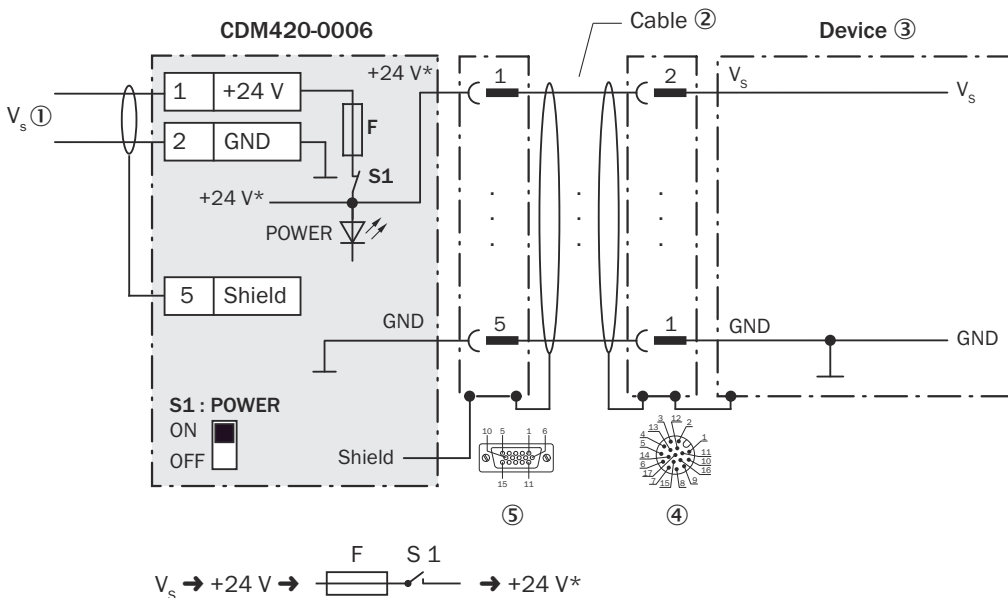


Figure 20: Connecting supply voltage for the device in CDM420-0006 connection module.

- ① Supply voltage V_s
- ② Adapter cable (male connector, D-Sub-HD, 15-pin / female connector, M12, 17-pin, A-coded)
- ③ Device
- ④ Device: male connector, M12, 17-pin, A-coded
- ⑤ Connection module: female connector, D-Sub-HD, 15-pin

Function of switch S1

Table 17: 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 = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

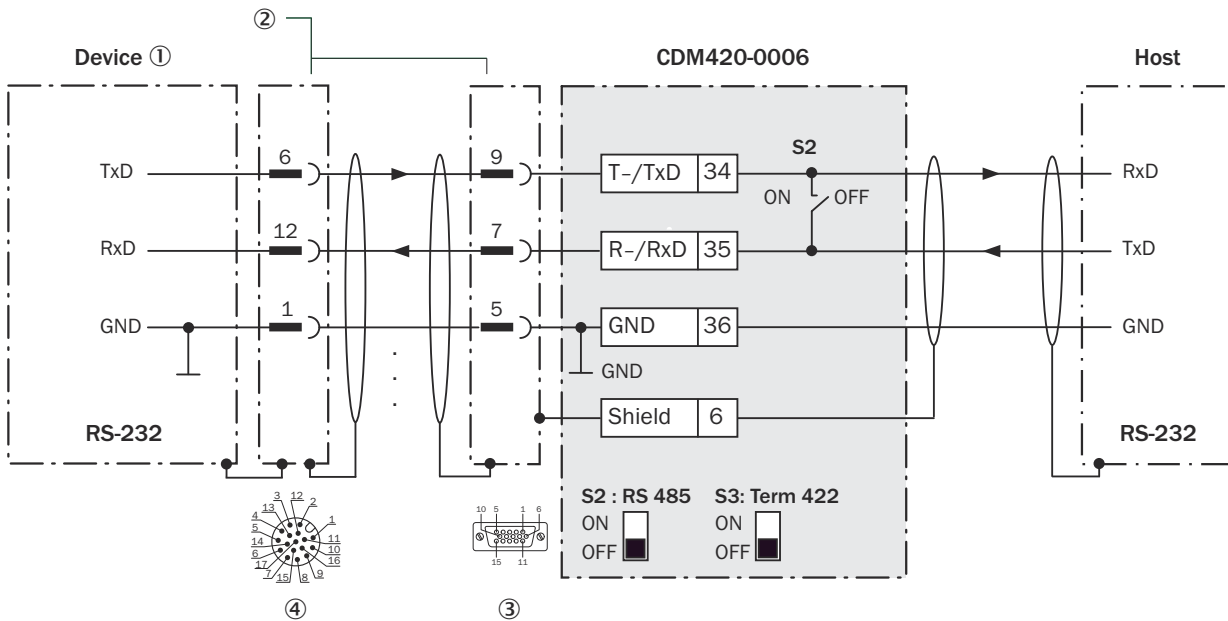


Figure 21: Wiring data interface RS-232 of the device in connection module CDM420-0006.

- ① Device
- ② Adapter cable (male connector, D-Sub-HD, 15-pin / female connector, M12, 17-pin, A-coded)
- ③ Connection module: female connector, D-Sub-HD, 15-pin
- ④ Device: male connector, M12, 17-pin, A-coded



NOTE

Activate the RS-232 data interface in the device with the SICK AppStudio development environment.

13.4.5 Wiring serial host interface RS-422 of the device in the CDM420-0006

Device = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

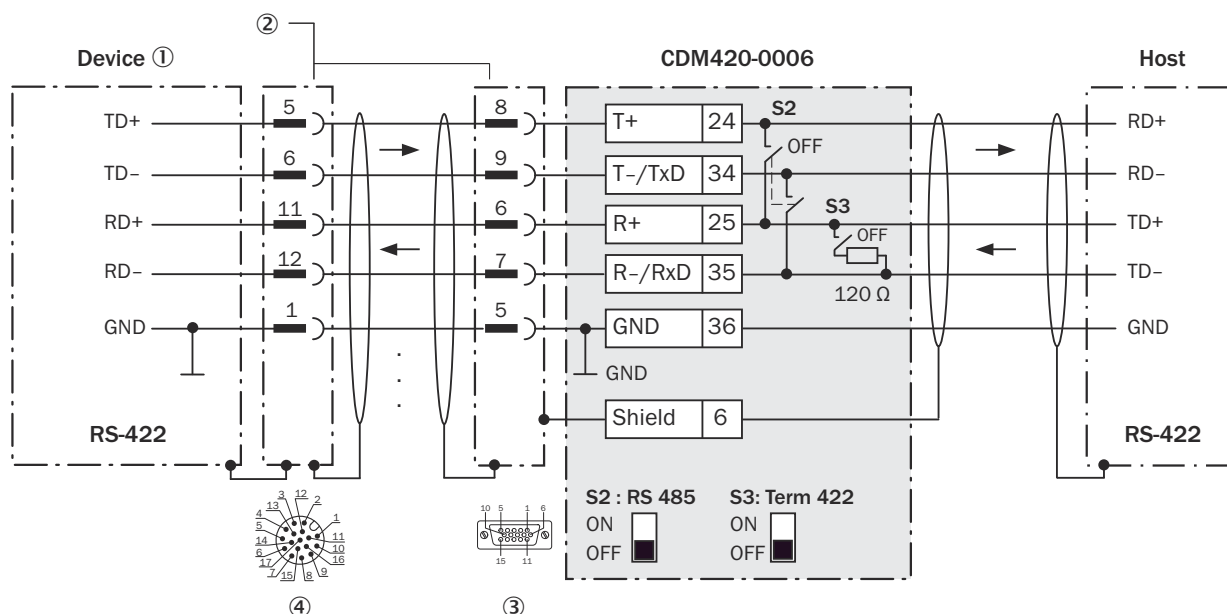


Figure 22: Wiring data interface RS-422 of the device in connection module CDM420-0006.

- ① Device
- ② Adapter cable (male connector, D-Sub-HD, 15-pin / female connector, M12, 17-pin, A-coded)
- ③ Connection module: female connector, D-Sub-HD, 15-pin
- ④ Device: male connector, M12, 17-pin, A-coded

Function of switch S3

Table 18: Switch S3: Term 422

Switch setting	Function
ON	Terminates the RS-422 receiver in the device to improve the noise ratio on the line
OFF	No termination



NOTE

Activate the RS-422 data interface ("Point-to-Point" option) in the device with the SICK AppStudio development environment.

The requirements and restrictions apply when using the RS-422 data interface:

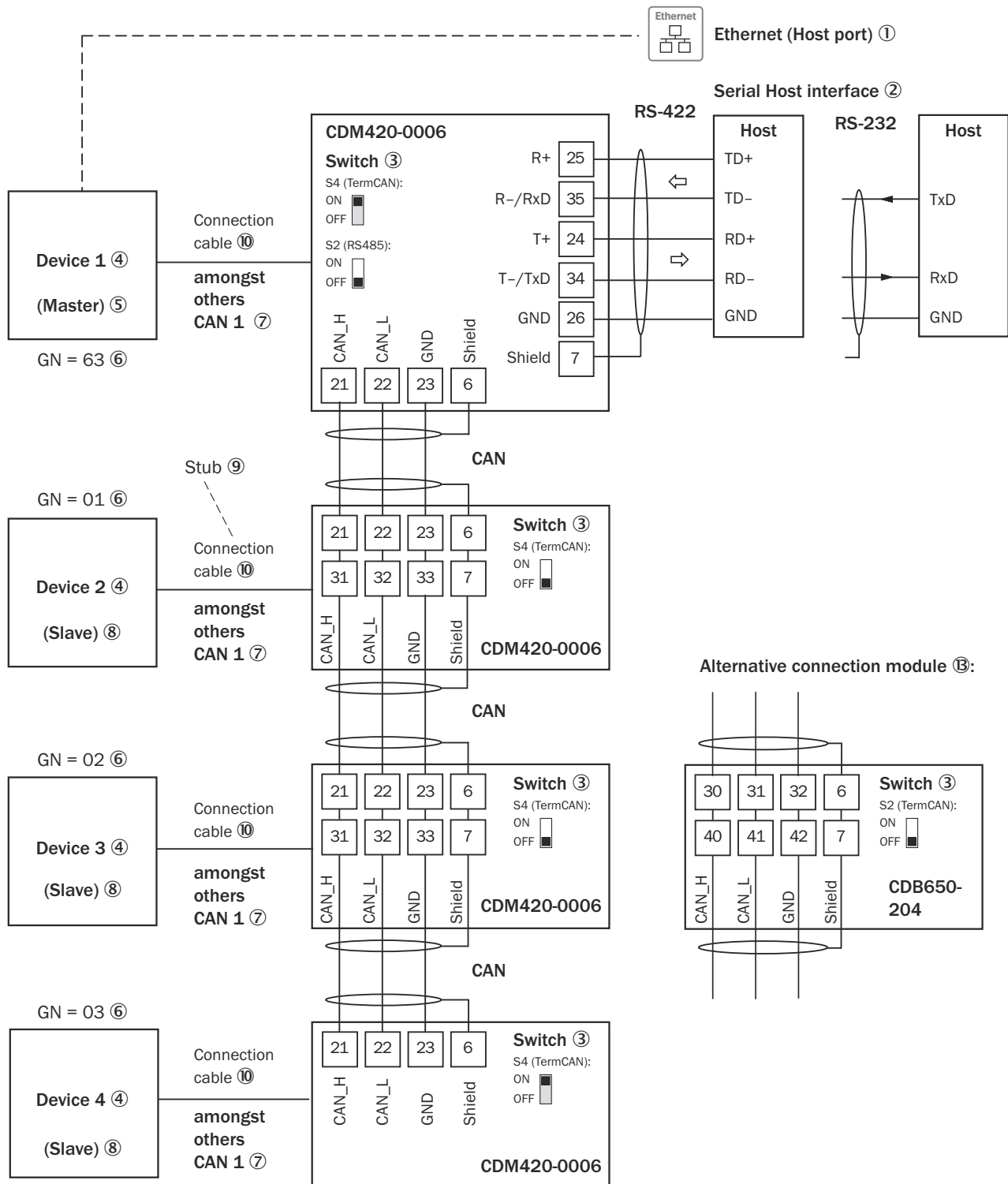
- The relevant interface drivers for the device comply with the standard in accordance with RS-422.
- The connection shown above is configured for operation of the host with permanently activated drivers (often described as "RS-422 operation").

13.4.6 Wiring the CAN interface of the device in the CDM420-0006

Device = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

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



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

Figure 23: Wire the CAN interface of the device in the CDM420-0006 connection module.

- ① Ethernet (host port)
- ② Serial host interface
- ③ Switch
- ④ Device
- ⑤ Master

- ⑥ Device number
- ⑦ CAN etc.
- ⑧ Slave
- ⑨ Branch line
- ⑩ Adapter cable (female connector, M12, 17-pin, A-coded/male connector, D-Sub-HD, 15-pin)
- ⑪ Device number (GN)
- ⑫ Maximum 32 users
- ⑬ Example of alternative connection module:

CDB650-204

A connection cable 1:1 (female connector, M12, 17-pin, A-coded / male connector, M12, 17-pin, A-coded) is required to connect the device.



NOTE

Activate the CAN data interface in the device with the SICK AppStudio development environment.

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

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

Device = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

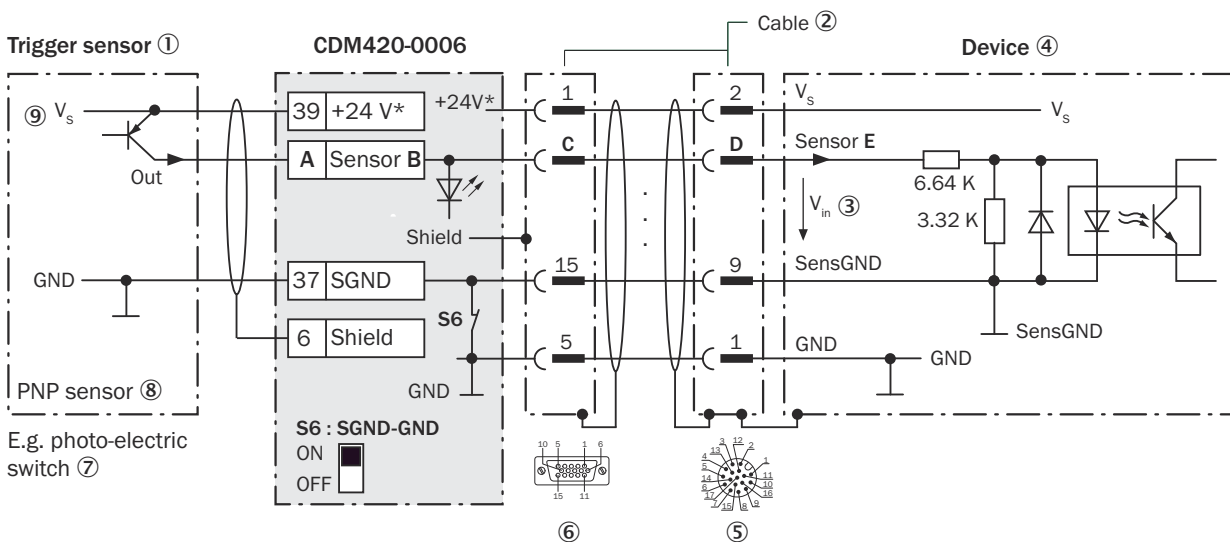


Figure 24: Trigger sensor supplied with power by connection module CDM420-0006.

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

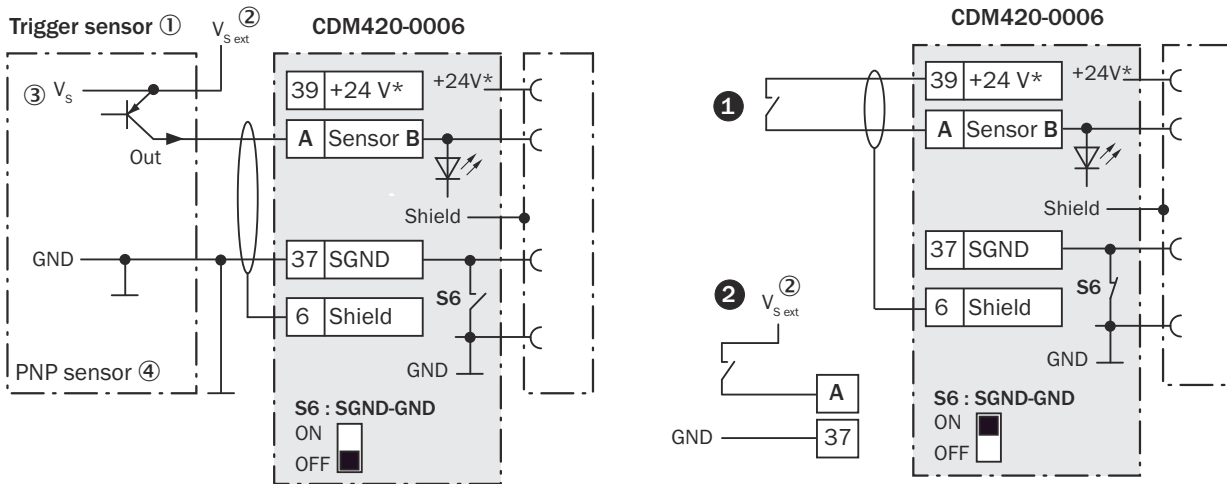


Figure 25: Left: Trigger sensor connected potential-free and supplied with power externally. Right: alternative switch, ① supplied with power by connection module CDM420-0006 or ② connected volt-free and supplied with power externally. Now select switch setting S6 as shown in the left figure.

- 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 19: 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 20: 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 21: 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	<ul style="list-style-type: none"> • Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor
Electrical values	Low: $V_{in}^{1)} \leq 2\text{ V}$; $I_{in}^{2)} \leq 0.3\text{ mA}$ High: $6\text{ V} \leq V_{in} \leq 30\text{ V}$; $0.7\text{ mA} \leq I_{in} \leq 5\text{ mA}$

1) Input Voltage

2) Input current

**NOTE**

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

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

Device = InspectorP64x = V2D64xP-xxxxAx

Device = InspectorP65x = V2D65xP-xxxxAx

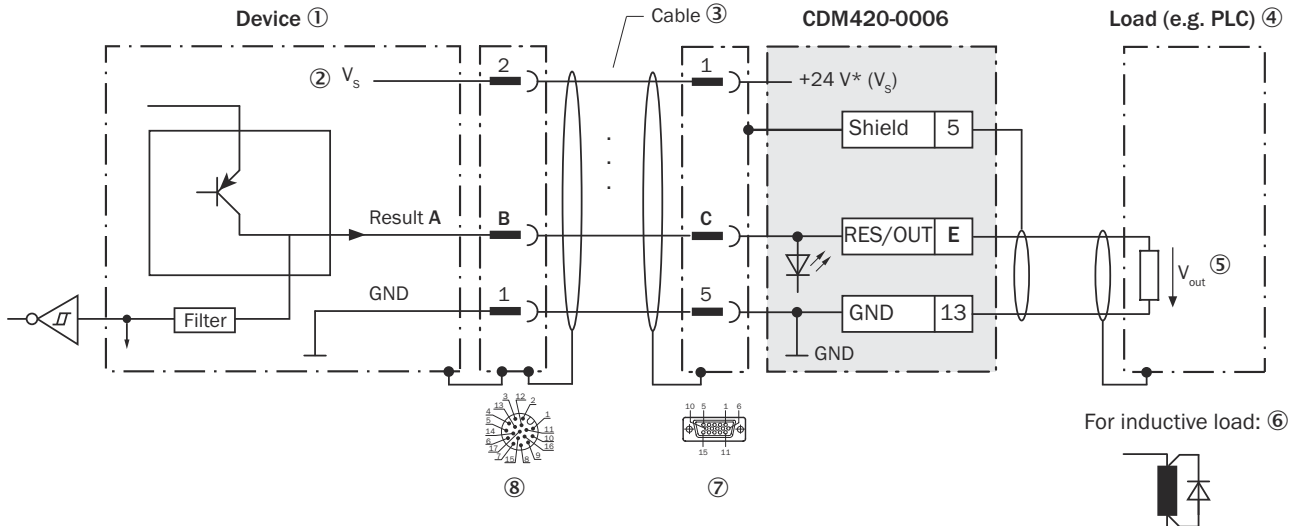


Figure 26: Wire the digital output in the CDM420-0006 connection module.

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

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 22: 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 23: Characteristic data of the and digital outputs

Type	Switching
Switching behavior	PNP switching to supply voltage V_S Default settings in the device: no function, logic: not inverted (active high)
Properties	<ul style="list-style-type: none"> Short-circuit protected and temperature protected Not electrically isolated from the supply voltage V_S
Electrical values	$0\text{ V} \leq V_{\text{out}}^{1)} \leq V_S$ $(V_S - 1.5\text{ V}) \leq V_{\text{out}} \leq V_S$ at $I_{\text{out}}^{2)} \leq 100\text{ mA}$

1) Output voltage.

2) Output current.

**NOTE**

Assign the functions for the digital outputs in the device using SICK AppStudio.

13.4.9 Wiring a digital switching input in configurable switching inputs**Characteristic data for digital IN/OUT used as a switching input (IN)**

V2D65x

- Low: $U_e \leq 5\text{ V}$; $I_e \leq 0.3\text{ mA}$
- High: $12\text{ V} \leq U_e \leq U_V$; $I_e \leq 1\text{ mA}$

For the purpose of electromagnetic compatibility, inputs must be set to a defined low-impedance level!

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