Lector64x/65x Flex, Lector65x Dynamic Focus

Image-based code readers

SICK
Sensor Intelligence.

Described product

Lector64x Flex

Lector65x Flex

Lector65x Dynamic Focus

Manufacturer

SICK AG
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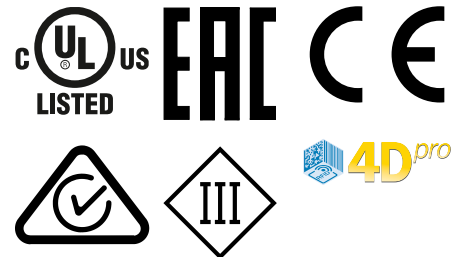Germany

Legal information

Original document

This document is an original document of SICK AG.

Contents

CONTENTS

1 About this document

1.1 Information on the operating instructions

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

Prerequisites for safe work are:

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

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

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

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

These operating instructions do not provide information on operating the machine or system in which the device is integrated. For more information, refer to the operating instructions of the specific machine or system.

1.2 Scope

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

These operating instructions apply to all available device types of the product. To obtain more detailed information on identifying your device type, see "Type code", page 13.

Available device types are listed on the online product page:

- www.sick.com/Lector64x
- www.sick.com/Lector65x

A number of device 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

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

- www.sick.com/Lector64x
- www.sick.com/Lector65x

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

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

NOTE
Important information about the integratable VI83I illumination unit can be found in the "VI83I ring illumination unit" technical information (part number: 8017270, www.sick.com/8017270).

Documents on request

Overview of command strings for the device.

Supplementary documents

Information about configuration of the device can be found in the online help function of the SOPAS ET configuration software.

2 Safety information

2.1 Intended use

The Lector64x and Lector65x image-based code readers are intelligent SICK-4Dpro sensors.

The devices are used for automated, stationary identification and decoding of codes on moving or stationary objects. The devices read all commonly used 1D codes (bar codes, stacked codes) and 2D codes (matrix codes). In read mode, the devices transmit the read results via a host interface to a higher-level computer (e.g. PLC) for further centralized processing.

The devices are designed for use in industrial and logistics areas, and they meet the requirements for industrial ruggedness, interfaces and data processing.

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

2.1.1 Operating restrictions

For devices with the type code V2D6xxx-xxxxxHx, the EN61000-6-4 standard applies. Note the following for these devices:

> **!** **NOTICE**
> **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 IP65 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 M12 connections and M8 connections must be screwed tight.
- Any electrical M12 connections and M8 connections that are not being used must be sealed with a tightly-fastened protective cap (as in the delivery condition).
- The black cover at the top of the device at the rear must be flush with the device and screwed tight.
- The optics protective hood must be screwed tightly onto the device.

> **!** **NOTICE**
> **Operate the device with open black cover only for a short time for the following tasks as required:**
> - Inserting or removing the optional memory card
>
> During this time, protect the device against moisture and dust.

2.1.3 Using the USB interface

> **i** **NOTE**
> The USB interface of the device is used in industrial environments only as a service interface for temporary use (e.g. for configuration, troubleshooting). Permanent use in operational use of the system as a host interface is not intended.

2.2 Improper use

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

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

⚠️ **WARNING**
Danger due to improper use!

Any improper use can result in dangerous situations.

Therefore, observe the following information:

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

2.3 Internet protocol (IP) technology

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

SICK always assumes the following prerequisites:

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

2.4 Limitation of liability

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

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

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

2.5 Modifications and conversions

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

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

2.5.1 Exception: temporarily opening the cover on the device

! **NOTICE**
The user may open the housing only in order to obtain temporary access to the slot for the optional memory card. For this purpose, the corresponding black cover at the top of the device at the rear can be opened temporarily.

In open state, the device does not conform to a specified enclosure rating. The device should therefore be protected against moisture and dust during this time.

▸ Operate the device only for a short time without closed cover.

i **NOTE**
The USB interface of the device is used in industrial environments only as a service interface for temporary use (e.g. for configuration, troubleshooting). Permanent use in operational use of the system as a host interface is not intended.

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

2.6 Requirements for skilled persons and operating personnel

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

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

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

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

The following qualifications are required for various activities:

Table 1: Activities and technical requirements

Activities	Qualification
Mounting, maintenance	■ Basic practical technical training ■ Knowledge of the current safety regulations in the workplace
Electrical installation, device replacement	■ Practical electrical training ■ Knowledge of current electrical safety regulations ■ Knowledge of the operation and control of the devices in their particular application

Activities	Qualification
Commissioning, configuration	■ Basic knowledge of the Windows™ operating system in use ■ Basic knowledge of the design and setup of the described connections and interfaces ■ Basic knowledge of data transmission ■ Basic knowledge of 1D technology (bar code) or 2D technology (matrix code)
Operation of the device for the particular application	■ Knowledge of the operation and control of the devices in their particular application ■ Knowledge of the software and hardware environment for the particular application

2.7 Operational safety and particular hazards

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

LED radiation of the integratable illumination unit

! **NOTICE**
Only the VI83I illumination units from SICK intended for integration in this application can be used as integratable illumination units.

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.

Laser alignment aid

⚠️ **CAUTION**

Optical radiation: Laser class 1

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

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

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

For both radiation types:

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

⚠️ **DANGER**

Risk of injury due to hot device surface.

The surface of the device can become hot during operation.

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

⚠️ **WARNING**

Electrical voltage!

Electrical voltage can cause severe injury or death.

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

⚠️ **WARNING**

Risk of injury and damage caused by potential equalization currents!

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

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

2.8 UL conformity

The UL certification is dependent on the type. Any existing UL certification can be found on the type label.

NFPA79 applications only. Adapters including field wiring cables are available.

For more information visit:

▶ www.sick.com/Lector64x
▶ www.sick.com/Lector65x

⚠ **CAUTION**
Hazardous radiation!

Using control elements or settings or executing procedures other than those specified in this document may result in dangerous exposure to radiation.

3 Product description

3.1 Product ID

3.1.1 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.
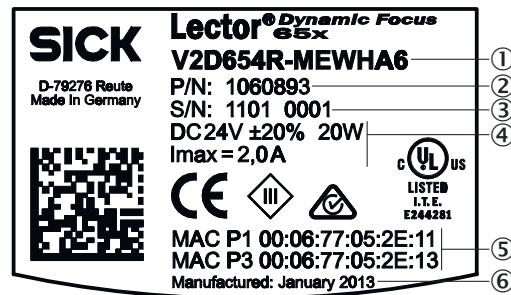
Figure 1: Structure of the type label on the device

① Type designation according to type code
② Part number
③ Serial number
④ Supply voltage, power consumption, current consumption
⑤ MAC addresses
⑥ Date of manufacture

3.1.2 Type code

The devices of the Lector64x and Lector65x product families are arranged according to the following type code:

V2D6xyz-abcdefg

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

Position	Description	Characteristic
1	Device name	V2D: Vision 2D matrix
2	Product family	6: 6xx
3	Platform / housing	4: Advanced Line small 5: Advanced Line
4	Resolution of the image sensor	2: 2 megapixels (2048 px x 1088 px) • For Lector642: 1.7 megapixels (1,600 px x 1,088 px) • For Lector652: 2.1 megapixels (2,048 px x 1,088 px) 4: 4.2 megapixels (2,048 px x 2,048 px)
5	Function	R: Read, standard decoder (1D, 2D) D: Read, standard decoder (1D, 2D), DPM decoder, OCR decoder
6	Separator	"-"
7	generation	"empty": 1. generation

Position	Description	Characteristic
8	Imager type/color	M: Monochrome (black-and-white)
9	Optics/Focusing system	C: C-mount thread E: Electrical focus (dynamic, auto, teach-auto)
10	Color of the integratable illumination unit, aperture angle narrow, wide, medium possible	X: without illumination unit R: Red/Amber W: White B: Blue
11	Focal distance (lens unit)	X: No lens installed H: 54 mm K: 40 mm
12	Connection variant [1]	A: USB; CAN, serial, IO; Enet 1; Enet 2 (connection variant 1, stand-alone solution) F: CAN IN, IO; CAN OUT, IO; Enet 1; Enet 2; illumination unit (connection variant 2, for system) H: USB; CAN, serial, IO; Enet 1; Enet 2:Fieldbus IN - Profinet; Enet 3:Fieldbus OUT - Profinet (connection variant 3, with Dual Port Profinet)
13	IP protection class and viewing window	5: IP65, plastic viewing window 6: IP65, glass viewing window

3.2   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 (Lector65x Dynamic Focus):** All required components have already been assembled at the factory (camera housing and optics accessories). The optics protection hood is provided with a device seal. **Basic device (Lector64x Flex, Lector65x Flex) :** Camera housing with C-mount threaded connection and individual components for independent assembly. The light inlet is fitted with a round protective cap in the basic version. **All devices:** The M12 and M8 electrical connections are sealed with a tightly-fastened protective cap. Without holders and connecting cables.
2	Sliding nut, 5.5 mm deep, with M5 threaded fixing hole	Alternative mounting option for the device instead of tapped blind hole. Use in pairs.
1	Hexagon key WAF 2	• Basic device: For mounting the integratable VI83I illumination unit from the optional optics kit. • All devices: For opening and closing the cover at the rear of the device (access to the microSD card slot).

No. of units	Component	Remarks
1 or 2	LED warning label RG 2 (self-adhesive)	• Complete device: 1 LED warning label in French for the integrated ring illumination unit of LED risk group RG 2. • Basic device: 2 LED warning labels in English and French included in the scope of delivery of the separately-ordered integratable ring illumination unit of LED risk group RG 2.
1	Laser warning label (self-adhesive)	Basic device: laser warning label in French for the laser output aperture in the camera housing.
1	SICK lens cloth	For the basic device only. Is used for cleaning optical surfaces, e.g. the viewing window in the optics protection hood.
1	Printed safety notes, multilingual	Brief information and general safety notes.

[1)] Order individual components separately as accessories. 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: • www.sick.com/SOPAS_ET
This documentation, available in English, German and French, and in other languages if necessary	Available online at: • www.sick.com/Lector64x • www.sick.com/Lector65x

> **NOTE**
>
> An overview of available complete devices and a selection guide for the matching device components for the basic devices is available on the online product page:
> • www.sick.com/Lector64x
> • www.sick.com/Lector65x

Accessories

Accessories such as brackets and connecting cables is only delivered if the accessories have been ordered separately, see "Accessories", page 66.

3.2.1 Optic kit scope of delivery

Figure 2: Optic kit

The optics kit is an accessory which can be optionally ordered for the basic device (Lector64x Flex, Lector65x 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

3.3 Product characteristics

3.3.1 Device view
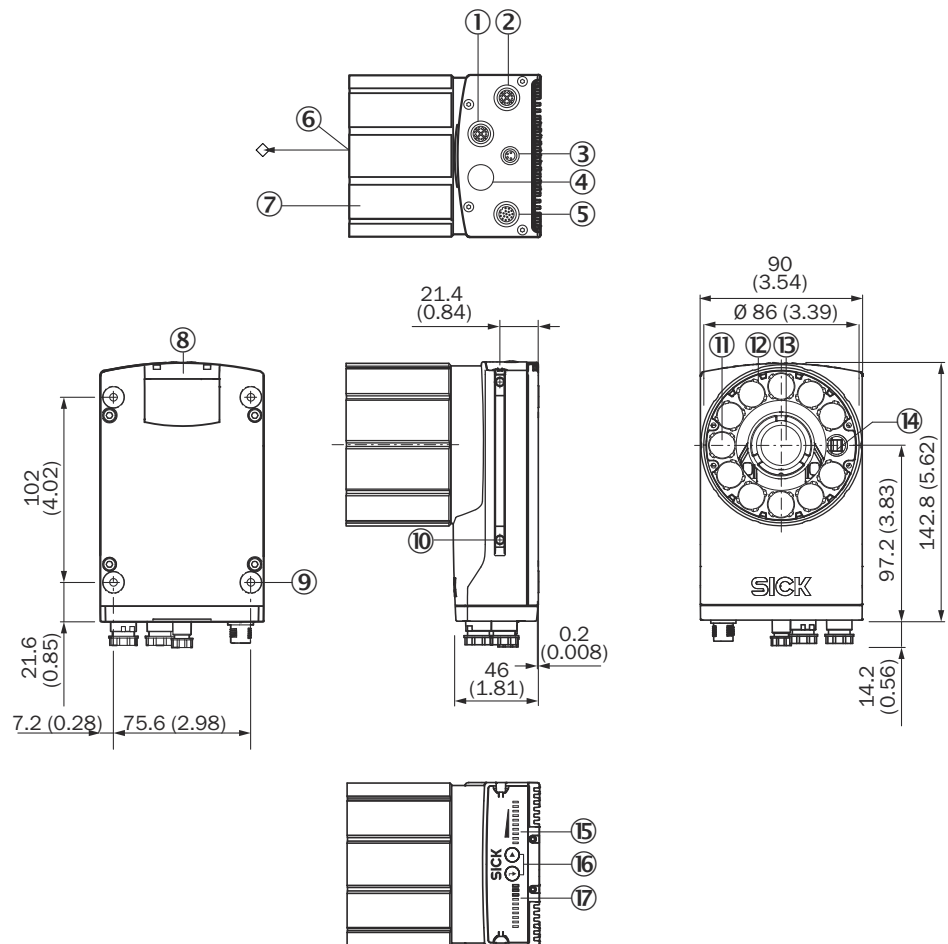
Figure 3: structure and device dimensions, unit: mm (inch), decimal separator: period

①   Connection P1, function and design dependent on type
②   Connection P3, function and design dependent on type
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 (viewing window center) from device to object

⑦   Protective hood for optical chamber

⑧   Foldable black cover at the rear of the device, access to the microSD memory card

⑨   4 tapped blind holes, M5, 5.5 mm deep for mounting the device

⑩   2 sliding nuts, M5, 5.5 mm deep, pivoting, as an alternative method of mounting the device

⑪   Feedback LED: visible green light

⑫   VI83I ring illumination unit (11 LEDs)

⑬   Lens

⑭   Outlet opening for light beam from laser alignment aid

⑮   10 bar graph LEDs

⑯   2 function keys

⑰   10 status LEDs (2 levels)

3.3.1.1   Integrable illumination unit (optional)

For the Dynamic Focus device variant, the integrable illumination unit is already mounted. For the Flex device variant, the user needs to order the optional optics kit with the integrable illumination unit (VI83I ring illumination unit) separately if required, and install it himself.
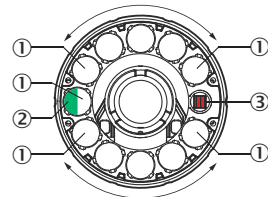
Figure 4: VI83I ring illumination unit (integrable illumination unit)

①   Illumination unit = 11 LEDs

②   1 feedback-LED of the VI83I ring illumination unit (color: visible green light, e.g. for Good Read)

③   1 opening for the laser alignment aids for aligning the device, can be deactivated (color: visible red light) Generates a red cross in the field of view on the object

> **NOTE**
> Set the display function of the feedback LED using the SOPAS ET configuration software. With the default device settings, the feedback LED briefly generates a green light spot within the field of view of the device after a successful read.

3.3.2   Display and control elements

Figure 5: Status LEDs, bar graph display and function keys on the top of the device

①   Status LEDs

②   Return pushbutton

③   Arrow pushbutton

④   Bar graph display

Status indicators

Table 4: First display level

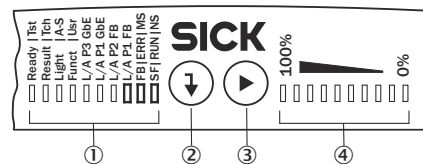| Display	LED	Color	Status
Ready	🟢	Green	Device ready
	🔴	Red	Hardware or software error
Result	🟢	Green	Read operation successful
	🔴	Red	Read operation unsuccessful
Light	🟢	Green	Operation: Illumination on, internal trigger active
Funct	🟢	Green	Function can be defined by user
	🟡	Yellow	Function can be defined by user
	🔵	Blue	Function can be defined by user
	🔴	Red	Function can be defined by user

● = illuminated; 🔅 = flashing

PROFINET operation (single port)

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

*Table 5: Device status in the PROFINET network (first display level, **Ready** status LED)*

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

● = lights up; 🔅 = flashes; ⭕ = does not light up

Table 6: Second display level

Display	LED	Color	Status
Tst (Test)	🔵	Blue	Test (reading diagnostics) selected
	🔅	Blue	Test started

Display	LED	Color	Status
Tch **(Teach-in)**	●	Blue	Teach-in selected (default: Match code)
	☀	Blue	Teach-in started
	●	Green	Teach-in successful
	●	Red	Teach-in unsuccessful (match code default setting: Unable to teach in any code)
A-S **(Auto-** **Setup)**	●	Blue	Set-up selected
	☀	Blue	Set-up started
	●	Green	Set-up successfully quit
	●	Yellow	Set-up partially successful (in at least one of the 3 parameter modules)
	●	Red	Setup unsuccessful
Usr **(User)**	●	Green	Function can be defined by user
	●	Yellow	Function can be defined by user
	●	Blue	Function can be defined by user
	●	Red	Function can be defined by user

● = illuminated; ☀ = flashing

Functions

Table 7: Function overview

Function	Description
Test (read diagnostics)	Percentage analysis: The device records a series of images and uses the current reading performance settings to decode them. With the 0 ... 100% bar graph, the device shows the read rate of the last 10% (90% to 100%). The bar graph display is activated in standard read mode.
Teach	When you teach in a match code, the device reads the code that is presented and saves the code permanently as a target code for future code comparisons during read mode. For Pharmacodes, the **Code type & code length** function must first be defined in SOPAS ET.
Auto-Setup	The device adjusts itself automatically to suit the lighting conditions, working distance [1], and quality of the code presented. The device permanently stores the acquired values as per the default setting.

[1]   Only applies for Dynamic Focus.

3.3.3   Memory card

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

ⓘ **NOTE**
The microSD memory card is optional and not included in the scope of delivery of the device. The device supports memory cards up to max. 16 GB.

Only use types (industrial standard) approved by SICK to ensure reliable function of the memory card. You can find these as accessories online at:

- www.sick.com/Lector64x
- www.sick.com/Lector65x

The memory card has no write protection that can be activated.

Functions

An inserted memory card serves as a local external storage medium for the device outside the internal device memory, see "Initial commissioning", page 50.

The device can execute the following functions using the memory card:

- **Cloning function: storage of the currently valid parameter set**
  Automated additional storage of the parameter set with the configuration data of the device on an external storage medium that is quickly accessible to the user. This takes place as part of the recommended backup concept for the parameter sets of the 4Dpro devices. The externally stored parameter set is also updated automatically each time the currently valid configuration data is permanently saved. For devices without a card slot, the optional CMC600 cloning module, installed in the CDB/CDM connection module, also offers the same external storage option in addition to other functions. The otherwise necessary connection of a computer to the device in order to manually save the parameter set is not required with this data backup method. The cloning function provides the means, for example in the event of a device fault, for a manual transfer of the currently valid parameter set to an exchange unit of the same type.
  Automated saving to the external storage medium is triggered by saving the parameter set in the device with the **Permanent** option, e.g., via the SOPAS ET configuration software.
- **Firmware download (update)**
  For information on prerequisites, and the procedure for downloading and updating the firmware, see the SICK Support Portal.
- Optional: Image is saved for a failed read (read result: No Read).
- For information on other available functions, see "Overview of SOPAS Parameters" in the online help of the device (part number: 8020322, www.sick.com/8020322).
- Other functions available on request.

When saving a parameter set for the first time, use an empty MicroSD memory card.

▶ Check and, if necessary, delete the contents of the current memory card on the computer.

Device access to the memory card

ℹ **NOTE**
The device does not directly signal access (read, write) to the memory card.

When saving the parameter set using the **Permanent** option, the **Ready** LED indicates when the save process has completed:

- When the device starts saving, the **Ready** LED goes out.
- When the device has finished saving, the **Ready** LED lights up green again.

⚠ **NOTICE**
Possible data loss!

If the memory card is removed or the supply voltage switched off when saving the parameter set in SOPAS ET, data may be lost.

▶ Do not remove the memory card or switch off the supply voltage while the parameter set is being permanently changed by saving it with the **Permanent** option in SOPAS ET.

▶ To safely remove the memory card during operation, select the **Remove SD card** option under **Analysis/SD card** in SOPAS ET. Then wait for the feedback from SOPAS ET.

Inserting the memory card in the device:

! 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.

Access to the card slot

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 the screws (SW2 hexagon key) on the hinged cover and open the cover as follows:
    o   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.
    o   Fold the cover upwards starting from the bottom edge.
3. 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.
4. Close the hinged cover. Make sure that the cover is completely flush with the housing.
5. Tighten the screws on the hinged cover again.
6. Switch on the supply voltage for the device.

Interpretation of the stored parameter set

Once it is switched on, the device automatically detects the presence of a memory card and, depending on the memory card's content, behaves as follows:

■   If the memory card is empty or contains a parameter set that cannot be interpreted by the device, the device saves its currently valid internal parameter set to the memory card (provided there is sufficient storage space). The device then starts with its internal parameter set.
■   If the memory card contains a parameter set that can be interpreted by the device, the device permanently overwrites the currently valid internal parameter set with this external parameter set. The device then starts with its new valid parameter set.
■   The goal is for the internal parameter set and the parameter set saved externally to always be identical.

The highest-ranking parameter set is used by the device when operated in the PROFINET with the following sequence hierarchy:

1   After starting, the device loads the last permanently stored internal parameter set to its working memory.
2   The device then searches for a valid parameter set in the optional external memory card slot. If there is a positive search result, the device overwrites the existing parameter set in its working memory with this external parameter set.
3   If the PROFINET controller sends a parameter set via the PROFINET with central configuration of the bus users, the device again overwrites corresponding parameter values in its working memory. These changes are lost again when the device is switched off. The PROFINET controller must then again send the most recently valid parameter values each time the device is restarted (supply voltage is switched on).

Removing the memory card from the device:

> ⚠ **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.

1. Switch off the supply voltage to the device.
2. Undo the screws on the hinged 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 hinged cover. Make sure that the cover is completely flush with the housing.
6. Tighten the screws on the hinged cover.
7. Switch on the supply voltage for the device.

3.3.4 Product features and functionality

The Lector64x and Lector65x image-based code readers are available in the following device variants:

- Lector64x Flex, Lector65x Flex (basic device)
- Lector65x Dynamic Focus (complete device)

The basic device (Flex device variant) is equipped with a C-mount thread. The user compiles the basic device depending on the application case. We recommend only using products from SICK as components. Optionally, the user can order an application-specific optics kit (lens, integratable VI88I illumination unit, spacer, optics protective hood) separately as an accessory. The complete device (Dynamic Focus device variant) is already equipped with a pre-assembled lens and a pre-assembled integrated illumination unit.

The intuitive device equipment – featuring function buttons, auto-setup, laser alignment aid, an acoustic feedback signal, and a green feedback LED – reduces the amount of work required for training and installation.

4 Transport and storage

4.1 Transport

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

> ⚠ **NOTICE**
> **Damage to the product due to improper transport.**
>
> - The device must be packaged for transport with protection against shock and damp.
> - Recommendation: Use the original packaging as it provides the best protection.
> - Transport should be performed by trained specialist staff only.
> - The utmost care and attention is required at all times during unloading and transportation on company premises.
> - Note the symbols on the packaging.
> - Do not remove packaging until immediately before you start mounting.

4.2 Unpacking

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

4.3 Transport inspection

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

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

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

4.4 Storage

Store the device under the following conditions:

- Recommendation: Use the original packaging.
- Electrical connections are provided with a protective cap (as in the delivery condition).
- Do not store outdoors.
- Store in a dry area that is protected from dust.
- To allow any residual dampness to evaporate, do not package in airtight containers.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see "Technical data", page 60.

- Relative humidity: see "Technical data", page 60.
- For storage periods of longer than 3 months, check the general condition of all components and packaging on a regular basis.

5 Mounting

5.1 Mounting instructions

- Observe the technical data.
- Protect the sensor from direct and indirect sunlight.
- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- The mounting site has to be designed for the weight of the device.

5.2 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.

5.3 Preparation for mounting

5.3.1 Installation requirements

For devices with the type code V2D6xxx-xxxxx**H**x, the EN61000-6-4 standard applies. Note the following for these devices:

! NOTICE

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

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

- Typical space requirement: see "Field of view diagrams", page 29 and type-specific dimensional drawing.
- Comply with the technical data, such as the permitted ambient conditions for operation of the device, see "Technical data", page 60.
- Ensure good dissipation of excess heat from the device to the surroundings, in particular at higher ambient temperatures. Ensure that there is good heat transfer from the device, for example via the bracket to the mounting base, or ensure that the back of the device is a sufficient distance from the wall of a housing.
- The device must be mounted using the tapped blind holes provided for this purpose, or using the sliding nuts.
- Mount the device in a shock and vibration insulated manner.
- Make sure the device has a clear view of the codes.

Auxiliary equipment required

- Mounting system with sufficient load-bearing capacity and suitable dimensions.
- Four or two 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.
- Tool and tape measure.

5.3.2 Mounting systems

Mount the device on the mounting system by means of two tapped blind holes (M5) or sliding nuts.

The threaded mounting holes are located on the rear 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 66.

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.
- Device mounting options using the four tapped blind holes or two sliding nuts must be provided.

5.4 Mounting the optics

> **NOTE**
> This mounting step is only required if the optics accessory or the Lector6xx Flex (basic device) device variant has been ordered.

> **!** **NOTICE**
> **Risk of damage due to electrostatic discharge!**
>
> Electrostatic discharge from the human body may damage parts of the illumination unit or the camera housing.
>
> The illumination variants for lenses with a focal length of 12 mm or 16 mm do not feature any plastic lenses in front of the LEDs in the round recesses.
>
> - Take the necessary ESD precautions when assembling the device.
> - Do not insert your fingers into the recesses.
> - Do not touch the open contacts of the electrical connection for the illumination unit on the camera housing.

> **NOTE**
> **Possible impairment of image quality!**
>
> Dust and fingerprints on optical boundary surfaces can decrease the image quality and decoding performance of the device.
>
> ▶ Ensure a dust-free and dry environment when mounting components.
> ▶ Do not touch the image sensor (CMOS) in the light inlet opening of the device or the glass lenses at either end of the lens unit.

Auxiliary equipment required

- SW 2 hexagon key (included with delivery)
- SW 5 socket wrench, Recommendation: as a torque wrench for 65 Ncm

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.
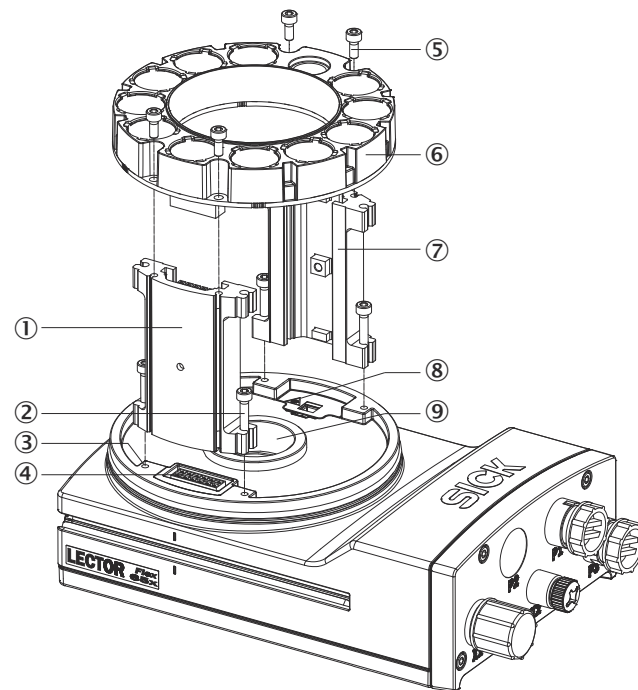
①	Spacer, left with electrical connection
②	4 tapped blind holes, M2.5, 5.5 mm deep, for mounting the spacer
③	4 x screws, long
④	Electrical connection for integratable ring illumination unit
⑤	4 screws, short
⑥	Integratable ring illumination unit
⑦	Spacer, right
⑧	Laser warning shield of the laser output 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 "Attaching the warning label", page 28.

5.4.2 Attaching the warning label

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

Risk Group 2

CAUTION – Possibly hazardous visible radiation emitted from this product. Do not stare at operating lamp. May be harmful to the eyes.
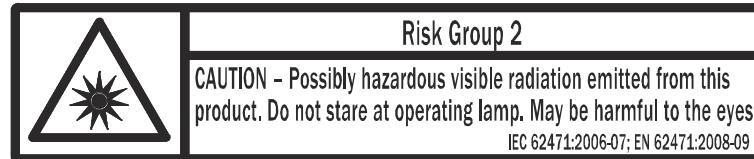IEC 62471:2006-07; EN 62471:2008-09

Figure 6: 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. ICE 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 that are mounted by the user are therefore accompanied by an additional black and yellow warning label for optical radiation of risk group RG 2.

The warning sign in available in English and French. Attach the country-specific warning label in a highly 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 SOPAS ET configuration software.
3. Attach the protective optics cover and screw it tight.
4. Attach the warning label to the protective optics cover near the light outlet so that it is clearly visible.
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.

5.5 Mounting location

5.5.1 Working range

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

- Lector64/65x Dynamic Focus: the device automatically adjusts its focus position to the working distance with the Auto-Setup function.
- Lector64/65x Flex: the user manually sets the focus position 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 29.

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.
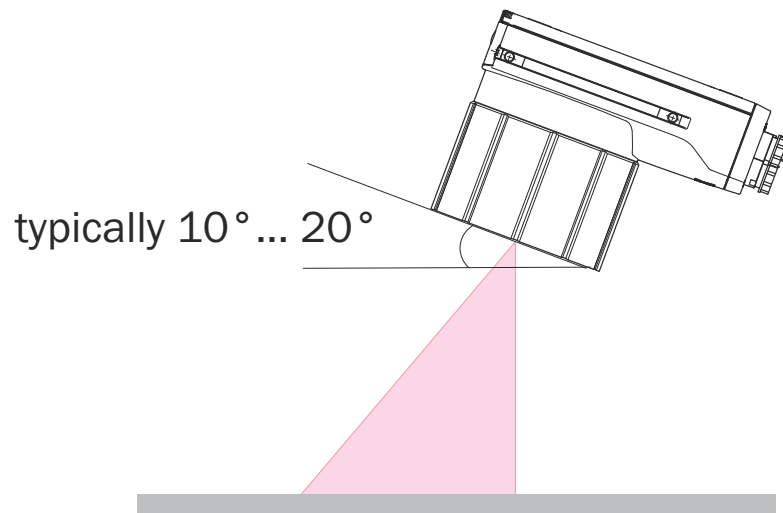
Figure 7: Mounting angle to use, depending on the application

①   Typical angle 10° ... 20°

The typical value is between 10° and 20°.

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

5.5.3   Field of view diagrams

Lector64x Flex
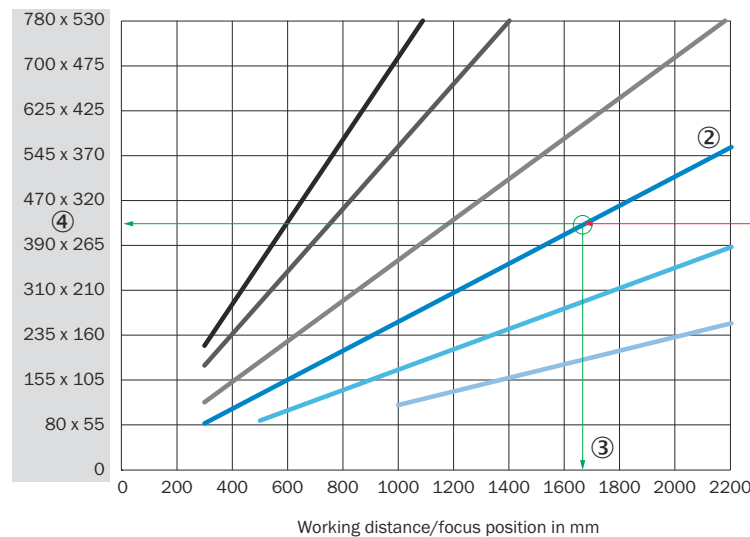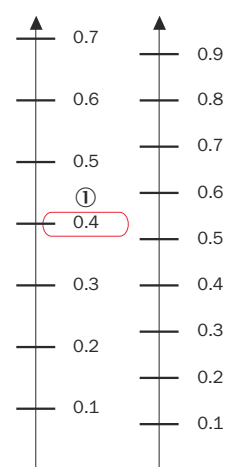
①   Field of view in mm²

②   Minimum resolution in mm

③   1D code

        working distance (max.)

④   2D code

        field of view (mm x mm)

⑤   Working distance/Focus position in mm

⑥   Selected code resolution

⑦   Focal length of lens, here for example for f = 35.0 mm

⑧   Reading off: resultant maximum working distance

⑨   Reading off: resultant field of view (mm x mm)

Lector65x Flex
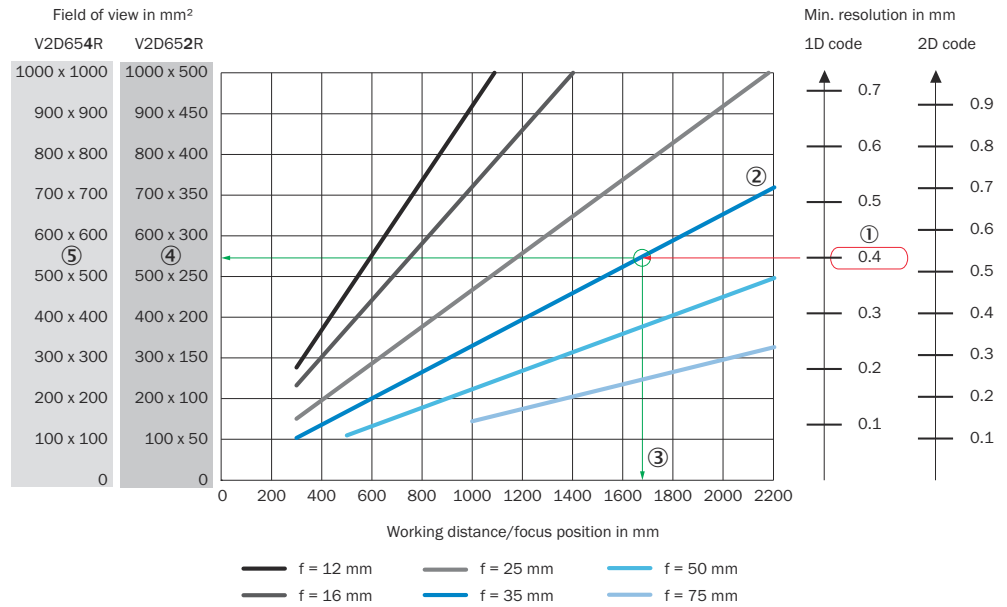
①   Field of view in mm²

②   Minimum resolution in mm

③   1D code

④   2D code

⑤   Working distance/Focus position in mm

⑥   Selected code resolution

⑦   Focal length of lens, here for example for f = 35.0 mm

⑧   Reading off: resultant maximum working distance

⑨   Reading off: resultant field of view **V2D652R** (mm x mm)

①⓪   Reading off: resultant field of view **V2D654R** (mm x mm)

Lector65x Dynamic Focus
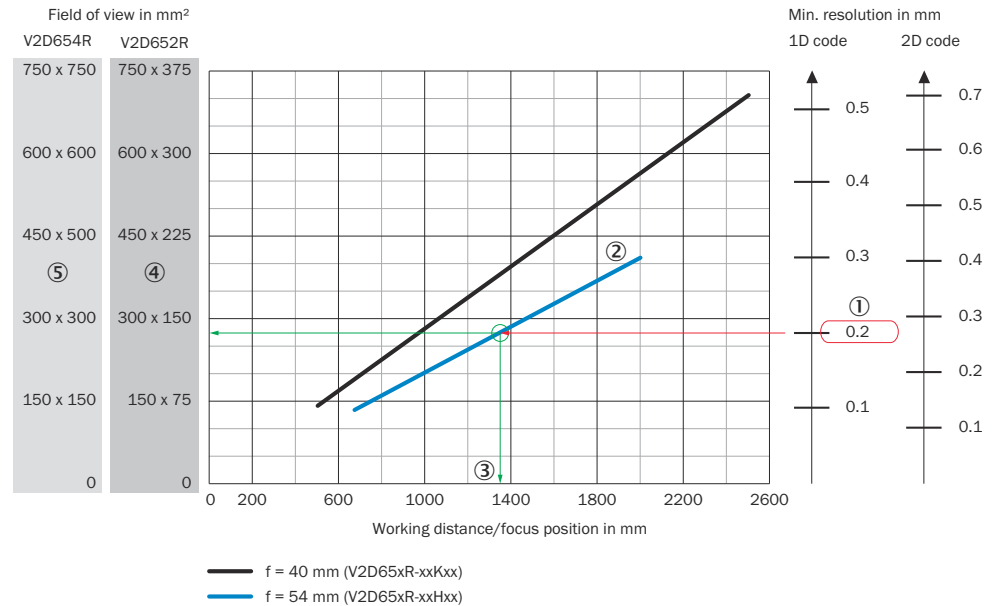
① Field of view in mm²
② Minimum resolution in mm
③ 1D code
④ 2D code
⑤ Working distance/Focus position in mm
⑥ Selected code resolution
⑦ Focal length of lens, here for example for f = 54.0 mm
⑧ Reading off: resultant maximum working distance
⑨ Reading off: resultant field of view V2D652R (mm x mm)
①⓪ Reading off: resultant field of view V2D654R (mm x mm)

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 using the tapped blind holes or sliding nuts provided (see "Device view", page 16) with at least 2 screws. Screw the screws no more than 5 mm into the tapped blind holes or sliding nuts. To do so, either use the 4 tapped blind 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 66.
3. Align the device taking into consideration the field of view (see "Field of view diagrams", page 29) and the application circumstances (see "Installation requirements", page 25).

4.2 Mpx image sensor ①   2.1 Mpx image sensor ②   1.7 Mpx image sensor ③

FOV ④   FOV ④   FOV ④
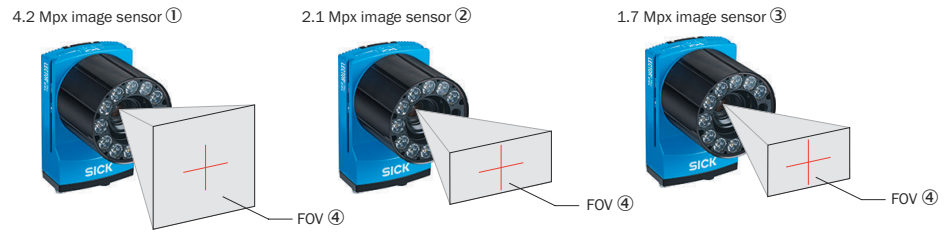
Figure 8: Resolution-dependent field of view geometries

①	Lector654 with image sensor 4.2 Mpx
②	Lector652 with image sensor 2.1 Mpx
③	Lector642 with image sensor 1.7 Mpx
④	Field of view

4. Connect the device to interfaces and supply voltage when disconnected from voltage, see "Connecting the device", page 38.
✓ The **Ready** status LED lights up green.
5. Perform fine adjustment.

6 Electrical installation

6.1 Safety

6.1.1 Conditions for specified enclosure rating

To ensure compliance with the specified IP65 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 M12 connections and M8 connections must be screwed tight.
- Any electrical M12 connections and M8 connections that are not being used must be sealed with a tightly-fastened protective cap (as in the delivery condition).
- The black cover at the top of the device at the rear must be flush with the device and screwed tight.
- The optics protective hood must be screwed tightly onto the device.

! **NOTICE**

Operate the device with open black cover only for a short time for the following tasks as required:

- Inserting or removing the optional memory card

During this time, protect the device against moisture and dust.

6.1.2 Prerequisites for safe operation of the device

⚠️ **WARNING**
Risk of injury and damage caused by electrical current!

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

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

Remedial measures

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

The device is connected to the peripheral devices (voltage supply, any local trigger sensor(s), system controller) via shielded cables. The cable shield – for the data cable, for example – rests against the metal housing of the device. The device can be grounded through the cable shield or through a blind tapped hole in the housing, for example.

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

This is achieved by complying with the following conditions:

- Mounting the devices on conductive metal surfaces
- Correctly grounding the devices and metal surfaces in the system
- If necessary: low-impedance and current-carrying equipotential bonding between areas with different ground potentials
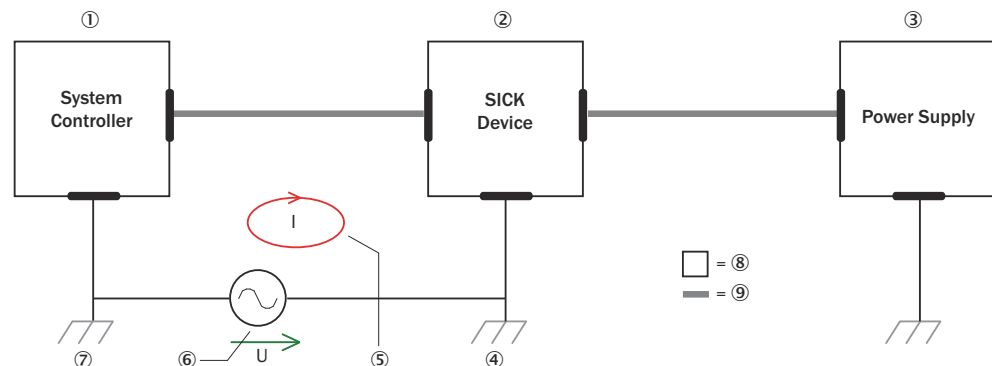
Figure 9: Example: Occurrence of equipotential bonding currents in the system configuration

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

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

Remedial measures

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

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

Measures for widely distributed system installations

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

① ② ② ③ ④

| System Controller | Electro-optical signal isolator | Electro-optical signal isolator | SICK Device | Power Supply |

⑥ ⑤

☐ = ⑦ ▬ = ⑧ ── = ⑨
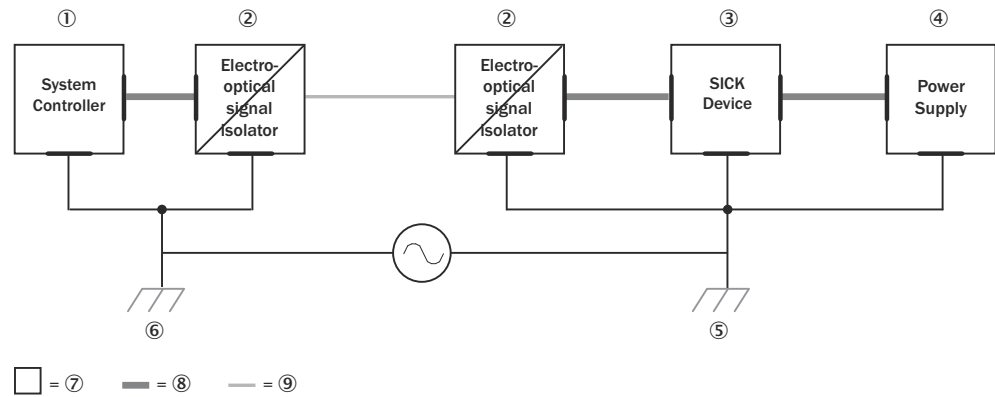
Figure 10: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

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

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

Measures for small system installations

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

① ② ③

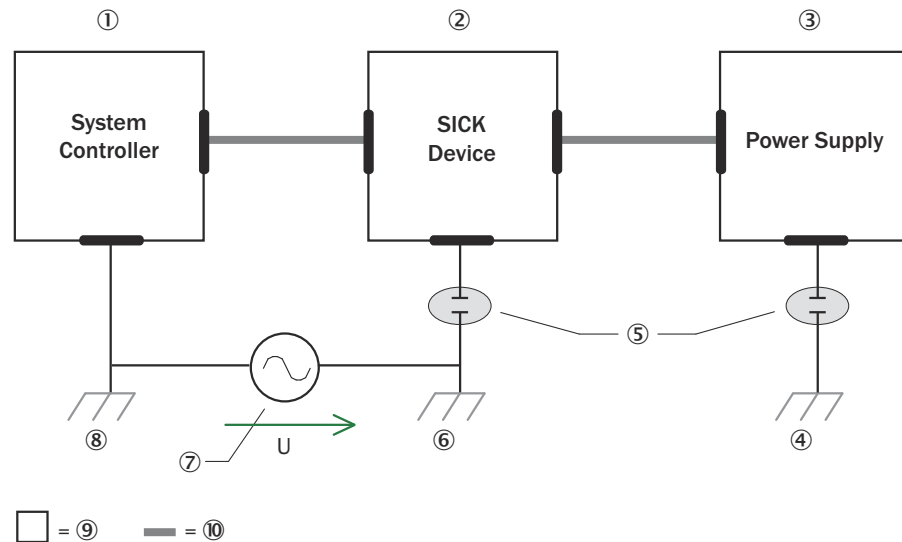| System Controller | SICK Device | Power Supply |

⑤

⑧ ⑦ U ⑥ ④

☐ = ⑨ ▬ = ⑩

Figure 11: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

①	System controller
②	Device
③	Voltage supply

④   Grounding point 3

⑤   Insulated mounting

⑥   Grounding point 2

⑦   Ground potential difference

⑧   Grounding point 1

⑨   Metal housing

⑩   Shielded electrical cable

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

> **NOTICE**
>
> The voltage supply for the device and the connected peripheral devices must also guarantee the required level of insulation.
>
> Under certain circumstances, a tangible potential can develop between the insulated metal housings and the local ground potential.

6.2 Wiring instructions

> **NOTE**
>
> Pre-assembled cables can be found online at:
>
> - www.sick.com/Lector64x
> - www.sick.com/Lector65x

> **NOTICE**
>
> **Faults during operation and device or system defects!**
>
> Incorrect wiring may result in operational faults and defects.
>
> ■ Follow the wiring notes precisely.

All electrical connections of the device are configured as round connectors.

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

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

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.

6.2.1   Data cables

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

Serial data transmission (RS-232, RS422)
- The possible length of cable between the device and host computer depends on the following factors:
  - The physical version of the host interface selected
  - The data transmission rate set in the device

  For further information, see "Wiring data interfaces", page 40.

6.3   Connection principle

Connection with CDB650-204 connection module
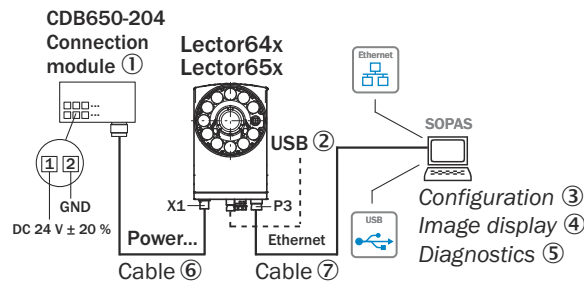
Figure 12: Only valid for connection variant 1. Connection variants for Systems and DualPort are not entirely taken into account in this view.

①	CDB650-204 connection module
②	Alternative USB cable: male connector, M8, 4-pin/male connector, USB-A, 4-pin
③	Configuration
④	Image display
⑤	Diagnostics
⑥	Cable: male connector, M12, 17-pin, A-coded/female connector, M12, 17-pin, A-coded
⑦	Cable: male connector, M12, 8-pin, X-coded/male connector, RJ45, 8-pin

Wiring without SICK connection module
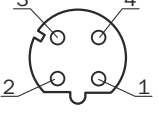
When using customer-specific connection units, the wiring principle for the signals can be found in the connection diagrams for the CDM420-0006 connection module, see "Connection of the device to CDM420-0006", page 80.

6.4   Overview of the electrical connections
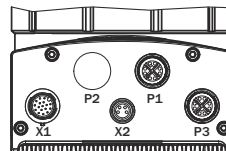
Connection	V2D6xxR-MCxxAx connection variant 1 (stand-alone solution)	V2D6xxR-MCxxFx connection variant 2 (for Systems)	V2D6xxR-MCxxHx connection variant 3 (with Dual-Port PROFINET)
X1	Power/SerialData/CAN/IO	CAN IN	Power/SerialData/CAN/IO
X2	USB	Triggering of external illumination	USB
P1	GB Ethernet	GB Ethernet	Ethernet (100 Mbit/s)
P2	–	CAN OUT	Ethernet (100 Mbit/s)
P3	GB Ethernet	GB Ethernet	GB Ethernet

6.5 Connections and pin assignment

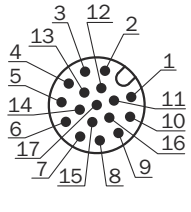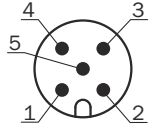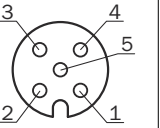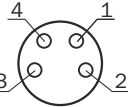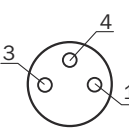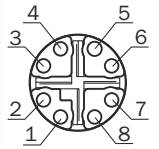| Pin	Power/Serial-Data/CAN/IO	CAN IN	CAN OUT	USB	Triggering of external illumination	GB Ethernet	Ethernet
	17-pin M12 male connector, A-coded	5-pin M12 male connector, A-coded	5-pin M12 female connector, A-coded	4-pin M8 female connector	3-pin M8 female connector	8-pin M12 female connector, X-coded	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	–	–	–	–	–	–

6.6 Connecting the device

6.6.1 Using the optional connection modules CDB and CDM

Table 8: 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 via the CDB and CDM connection modules:

Connection modules	Reference
CDB650-204	see "Connection of the device to CDB650-204", page 67
CDM420-0006	see "Connection of the device to CDM420-0006", page 80

> **NOTE**
> **Connection module**
>
> For detailed information about mounting and electrical installation, please refer to the operating instructions for the connection module in question. These are available online at.
>
> - www.sick.com/CDB
> - www.sick.com/CDM

6.6.2 Connecting the supply voltage

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

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

Table 9: Required supply voltage V_S

Supply voltage V_S	Power source: required power output [1]
DC 24 V ± 20%	At least 30 W

[1] For device with 4 loaded digital outputs (each 100 mA).

In the case of connection via the optional connection module CDB/CDM: additionally required output power 0.5 W when using the optional parameter cloning module CMC600 in the connection module.

Protecting the supply cables

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

The following standards must be observed in Germany:

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

Connection without connection module

For a supply voltage of 24 V DC ± 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.

Connection with connection module

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

Table 10: 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 69

Connection modules	Supply voltage fuse protection	Reference
CDM420-0006	2 A (slow-blow)	see "Connecting supply voltage for the device in CDM420-0006", page 83

6.6.3 Wiring data interfaces

Wiring Ethernet interface

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

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

Wiring the serial data interface

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

Table 11: Data transmission rates and recommended max. cable lengths

Interface	Data transmission rate	Distance to the target computer (host)
RS-232	Up to 19.2 kBd	Max. 15 m
	38.4 kBd ... 57.6 kBd	Max. 5 m
	115.2 kBd ... 500 kBd	< 2 m
RS-422 [1]	Up to 38.4 kBd	Max. 1,200 m
	38.4 kBd ... 57.6 kBd	Max. 500 m
	57.6 kBd ... 500 kBd	Max. 10 m

[1] For RS-422-compatible cable and corresponding cable termination as per specification

> **NOTICE**
> **Risk of damage to the internal interface modules!**
>
> If the serial data interfaces are wired incorrectly, then electronic components in the device could get damaged.
>
> - Observe the information on wiring.
> - Carefully check the wiring prior to switching on the device.
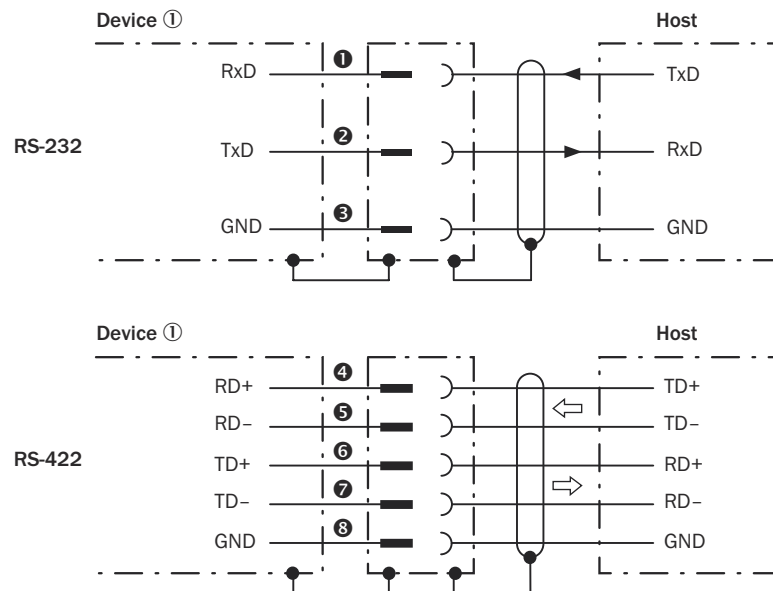
Figure 13: Wiring of the serial data interfaces RS-232 and RS-422

①   Device

❶...❸   Pin assignment: see RS-232 pin assignment for the respective device

❹...❽   Pin assignment: see RS-422 pin assignment for the respective device

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

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

Connection module	Data interface	Reference
CDB650-204	RS-232	see "Wiring serial host interface RS-232 of the device in CDB650-204", page 70
	RS-422	see "Wiring serial host interface RS-422 of the device in CDB650-204", page 70
CDM420-0006	RS-232	see "Connecting serial host interface RS-232 of the device in CDM420-0006", page 84
	RS-422	see "Connecting serial host interface RS-422 of the device in CDM420-0006", page 84

Termination of the RS-422 data interface

Termination can be implemented in the connection module via switches.

Additional information on this can be found in the operating instructions for the relevant connection module.

6.6.4 Wiring the CAN interface

> **ℹ NOTE**
> Activate the CAN data interface in the device with a configuration tool, e.g. the configuration software SOPAS ET.
>
> Make further settings in the device corresponding to the function of the device in the system configuration.

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

Connection modules	Interface	Reference
CDB650-204	CAN	see "Wiring the CAN interface in the CDB650-204", page 71
CDM420-0006	CAN	see "Wiring the CAN interface in the CDM420-0006", page 85

Connection type 2 (for Systems)

For this connection type, the devices can be directly switched in series without a connection module (line typology). The devices communicate with each other and are supplied with voltage via the CAN In/CAN Out connections.

A maximum of 3 devices can be supplied with voltage via the CAN cable. If a device network/CAN network with more than 3 participants is needed, a separate voltage supply must be used for every 3 devices. Communication between all devices in the network is done via CAN.

Other information on using system devices combined with a system controller can be found in the operation instructions of the controller (e.g. MSC800 modular system controller, part number 8011539).

6.6.5 Wiring the digital inputs

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

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

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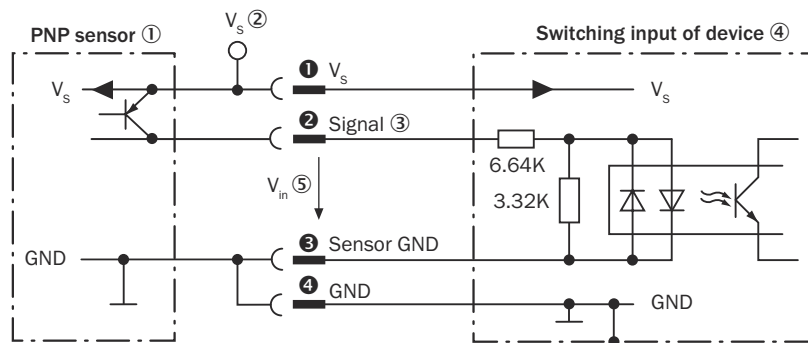

Figure 14: Wiring a digital input

①   Trigger sensor (PNP sensor)
②   Supply voltage V_S
③   Input signal

④   Digital input of the device ("Sensor 1" or "Sensor 2")

⑤   Input voltage V_{in}

❶... ❹ For pin assignment, see respective device

Table 12: Characteristic data of the digital inputs "Sensor 1" and "Sensor 2"

Switching behavior	Power to the input starts the assigned function, e.g. start of the internal reading interval of the device. Default: active high Debouncing: 10 ms (standard)
Features	• Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor
Electrical values	The electrical values are identical for all digital inputs of the device. Low: V_{in} [1] ≤ 2 V; I_{in} [2] ≤ 0.3 mA High: 6 V ≤ V_{in} ≤ 30 V; 0.7 mA ≤ I_{in} ≤ 5 mA

[1]   Input voltage.
[2]   Input current.

Function assignment

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

Extension: additional logical digital inputs in the device for physical external digital inputs on the optional connection module

Thanks to the optional CMC600 parameter cloning module in combination with the CDB or CDM connection module, the two digital inputs "External input 1" and "External input 2" are additionally available at the relevant terminals of the connection module.

> **NOTE**
> The external digital inputs are software-controlled and therefore do not offer the same timing precision as physical digital inputs. The external digital inputs may not be suitable for time-critical applications.

For the electrical characteristic data of the two external digital inputs, see the respective connection diagrams for the connection modules in these operating instructions.

Wiring the digital inputs of the device via a 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 73
	External input 1 ("EXT. IN 1") External input 2 ("EXT. IN 2"	see "Wiring the external digital inputs of the device in the CDB650-204", page 75
CDM420-0006	"Sensor 1" "Sensor 2"	see "Wiring digital inputs of the device in the CDM420-0006", page 87
	External input 1 ("Aux In 1") External input 2 ("Aux In 2")	see "Wiring the external digital inputs of the device in the CDM420-0006", page 89

6.6.6 Wiring the digital outputs

The physical digital outputs "Result 1" to "Result 4" or "Result 1" and "Result 2" are used to signal events in the read operation. Different functions can be assigned to them independently of each other for this purpose. If the assigned event occurs, then the corresponding digital output becomes live after the end of the read cycle for the selected pulse duration, for example (default).

The full complement of digital outputs is available at each of the following locations:
- Male connector of the device (M12, 17-pin, A-coded)
- Open end of the adapter cable (female connector, M12, 17-pin, A-coded/open end)
- CDB650-204 connection module

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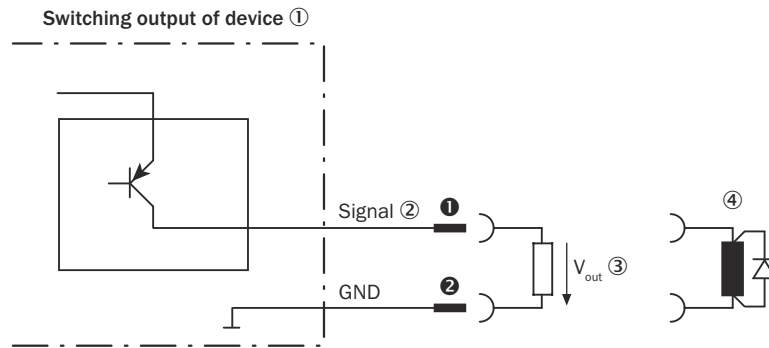
Figure 15: Wiring a digital output

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

Table 13: Characteristic data of the digital outputs

Switching behavior	PNP switching to supply voltage V_S Default: No function Logic: not inverted (active high)
Properties	• Short-circuit protected • Not electrically isolated from V_S [1]
Electrical values	$0\ V \leq V_{out}$ [2] $\leq V_S$ $(V_S - 1.5\ V) \leq V_{out} \leq V_S$ at I_{out} [3] $\leq 100\ mA$

[1] Supply voltage.
[2] Output voltage.
[3] Output current.

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

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

NOTE

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

Function assignment

NOTE

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

Extension: additional logical digital outputs in the device for physical external digital outputs on the optional connection module

Thanks to the optional CMC600 parameter cloning module in combination with the CDB or CDM connection module, the two digital outputs "External output 1" and "External output 2" are additionally available at the relevant terminals of the connection module.

NOTE

The external digital outputs are software-controlled and therefore do not offer the same timing precision as physical digital outputs. The external digital outputs may not be suitable for time-critical applications.

For the electrical characteristic data of the two external digital outputs, see the respective connection diagrams for the connection modules in these operating instructions.

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

Connection modules	Digital outputs	Reference
CDB650-204	"RES/OUT 1" "RES/OUT 2" "RES/OUT 3" "RES/OUT 4"	see "Wiring digital outputs of the device in the CDB650-204", page 77
	External output 1 ("EXT. OUT 1") External output 2 ("EXT. OUT 2")	see "Wiring the external digital outputs of the device in the CDB650-204", page 78
CDM420-0006	"Result 1" "Result 2"	see "Wiring digital outputs of the device in the CDM420-0006", page 91
	External output 1 ("AUX Out 1") External output 2 ("AUX Out 2")	see "Wiring the external digital outputs of the device in the CDM420-0006", page 92

7 Commissioning

7.1 Configuring the device with SOPAS ET

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

> **NOTE**
> Image output takes place only via the Ethernet interface and the USB interface.

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

Installing and starting the configuration software

1. Download and install the latest version of the SOPAS ET configuration software and the current device description files (*.sdd) from the online product page for the software by following the instructions provided there: **www.sick.com/SOPAS_ET**. In this case, select the **complete** option as suggested by the installation wizard. Administrator rights may be required on the computer to install the software.
2. Start program. Path: **Start** > **Programs** > **SICK** > **SOPAS EngineeringTool** > **SOPAS EngineeringTool**.
3. Establish a connection between the software and the device via Ethernet or USB (depending on type).
✓ The connection wizard starts automatically.
4. The following IP addresses are configured by default on the device:
   o IP address P1: 192.168.0.1
   o Subnet mask: 255.255.255.0
5. Select the desired device from the available devices and add to the project by double-clicking.
✓ The device appears in the **New Project** window.
6. To open the device window, double-click the device in the **New Project** window.
✓ The **User interface selection** window appears.
7. Select view of the user interface (available modes: **Standard**, **Extended**).
✓ SOPAS ET establishes communication with the device and loads the associated device description file for the device.
8. In the **Auto Setup** window, click on the **Code Reading** button.
✓ The **Initial Setup** window appears.
9. Position the code within the displayed region and following the instructions.
✓ The effects of any parameter changes are directly visible.
✓ The device will now continuously record images and automatically attempt to find the appropriate settings for the image and the decoder. If the read is successful, these settings can be saved directly.

Configuring the Lector64/65x Flex manually

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

> **i** **NOTE**
>
> The following functions are deactivated in **Live** mode:
>
> - Digital inputs and outputs
> - Data output via the host interface

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

Configuring the Lector64/65x Dynamic Focus manually

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

> **i** **NOTE**
>
> In **Edit** mode or when using the **Auto-Setup** wizard, the following functions are deactivated:
>
> - Digital inputs and outputs
> - Data output via the host interface

2. Align the device in the desired depth of field range with a medium-height object with a test code.
3. In the **Auto Setup** window, click on the **Code Reading** button.
✓ The **Initial Setup** window appears.
4. Position the code within the displayed region and following the instructions.
✓ The effects of any parameter changes are directly visible.
✓ The device uses the Auto-Setup function to adjust itself automatically to suit the working distance, lighting conditions, and quality of the code presented (not applicable to Pharmacode). If the read is successful, these settings can be saved directly.
5. If refocusing is required during operation due to lens changes: to specify to the device the focus height per object, connect a profile measuring sensor (e.g. MLG or VMS) upstream to the device.
6. For custom optimization of the image and code settings of the device, click the **Camera & Illumination** and **Codes** configuration bars on the right and adjust the parameter values.
7. Only available in **Extended** mode: activate the sharpness diagnostic bar. To do this, go to the **Camera & Illumination** area and click the **Display sharpness** checkbox.
8. To make the changes directly visible, go to the **Online Images** window and click the **Edit** button.

Variants with compact C-mount lens: Adjusting the brightness and sharpness

1. Remove the optics protective hood.
2. Loosen the lock nut fitting on the lens or on the mask ring and sharpness ring.
3. Set the aperture ring (upper ring) on the lens unit to a value of 8, which is an appropriate starting value. To increase the depth of field (value > 8) or the image quality (value < 8), this value may need to be adjusted in conjunction with the online image display.
4. Adjust the focus to the approximate actual working distance of the device from the test code using the focus ring (lower ring) on the top side of the lens so that the online image shows a sharp, clear image of the test code with no distortion.

> **NOTE**
> The reference point for the working distance is the center of the viewing window on the screwed-on optics protective hood. If the optics protective hood has been removed, the leading edge of the illumination unit can be used instead.

✓ The test code in the image comes into focus and the edges are clearly discernible.

5. If necessary, use the **Shutter time**, **Brightness** and **Contrast** sliders to optimize the brightness and contrast.

6. Available in **Extended** mode: if necessary activate the sharpness diagnostic bar. To do this, go to the **Camera & Illumination** area and click the **Display sharpness** checkbox.

✓ The sharpness diagnostic bar is now at its maximum position. The test code in the image comes into focus and the edges are clearly discernible.

7. Keep adjusting the sharpness setting on the lens until the test code in the image comes into focus and the edges of the test code are clearly discernible. If the sharpness diagnostic bar is activated: until the sharpness diagnosis bar reaches its maximum position and the color of the bar graph changes to green.

8. Once the online image adjustment process has been successfully completed, use the locking screws to lock both adjusting rings of the lens unit in place.

9. Define a suitable aperture setting for the depth of field. In order to do this, check the settings with the test code. Adjust the mask to a higher value.

> **NOTE**
> The higher the aperture number the lower the image brightness. The image brightness can be increased in SOPAS ET using the **Brightness** slider. Increasing the image brightness will, however, reduce the image quality.

10. Attach the optics protective hood again and screw it tight.

Continuing configuration

1. Make settings for additional functions during planned operation such as codes, trigger, data processing, data interface, etc.

2. In the **Online Images** window, click the **Operation** button and test the settings in operational use.

Completing the configuration

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

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

7.2 Configuring the device via buttons without configuration software (SOPAS ET)
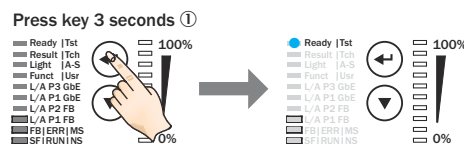
The two function buttons, the second display level of the status LEDs and the bar graph display are used to manually adjust the reading characteristics of the device with **Auto-Setup (A-S)**.

> **NOTICE**
> Auto-Setup (A-S) is not supported for a Pharmacode.

1. Start **Setup** mode.

Press key 3 seconds ①

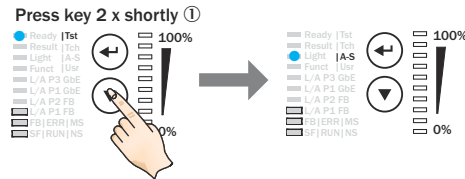① Press the ◀ function button for 3 seconds

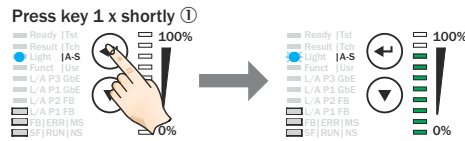2. Align the device with the code.

Figure 16: Test code

3. Select **Auto-Setup (A-S)**.

① Press the ▼ function button twice briefly.

✓ The **Auto-Setup (A-S)** LED lights up blue.

4. Start **Auto-Setup (A-S)**.

① Press the ◄┘ function button once briefly.

✓ The **Auto-Setup (A-S)** LED flashes blue.
The device adjusts itself automatically to suit the lighting conditions, working distance [1] and quality of the code presented. According to the default setting, the device permanently stores the values determined for the two parameter modules (image, decoder) during this process, thereby overwriting the existing configuration.

> **ⓘ NOTE**
> If the **Auto-Setup (A-S)** LED lights up yellow or red, the read result is inadequate. If this is the case, check the alignment and distance of the device in relation to the code and repeat the procedure.

5. Wait until **Auto-Setup (A-S)** has finished. The bar graph display shows the percentage progress of the **Auto-Setup (A-S)** function. 100% means **Auto-Setup (A-S)** has finished.

✓ The **Auto-Setup (A-S)** LED indicates the result, see "Display and control elements", page 17.

6. Exit **Setup** mode and save the parameters.
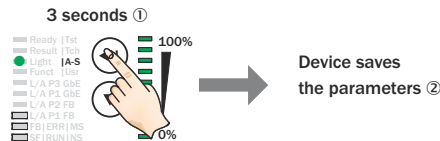
① Press the ◄┘ function button for 3 seconds

② Device permanently saves the parameters

✓ The existing configuration in the device is overwritten.

---

[1] Only applies for complete device (Dynamic Focus).

Alternatively, the device saves the parameters automatically if 5 minutes elapse without a pushbutton being pressed, and it returns to read mode.

7.3 Initial commissioning

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

Memory organization for parameter set

The following diagram shows the memory organization scheme for the internal and external components involved:
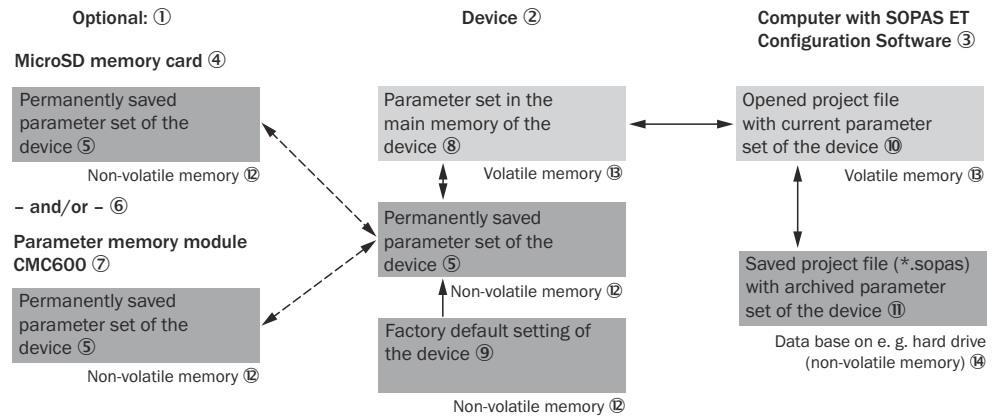
Figure 17: Configuration with SOPAS ET and saving the parameter set

① Optional
② Device
③ Computer with the SOPAS ET configuration software
④ MicroSD memory card
⑤ Permanently saved device parameter set
⑥ and/or
⑦ CMC600 parameter cloning module
⑧ Parameter set in the working memory of the device
⑨ Factory-set defaults for the device
⑩ Opened project file with current device parameter set
⑪ Saved project file with archived device parameter set
⑫ Nonvolatile memory
⑬ Volatile memory
⑭ Database on the hard drive, for example (nonvolatile memory)

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

External data backup: option 1

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

External data backup: option 2

The prerequisite for **automatically** backing up the current parameter set data outside the device memory is to have an additional external storage medium. The device can optionally be permanently connected to an external parameter memory for this purpose.

Possible external storage media:
a) By inserting a microSD memory card with sufficient storage capacity into the device.
b) By connecting a CDB or CDM connection module to the device. The connection module is equipped with a CMC600 parameter cloning module.
c) By connecting the device to a CDF600 fieldbus module and operating it in proxy mode.
d) If necessary, by using a combination of a) plus b) or c)

> **NOTE**
> To ensure that the MicroSD memory card functions reliably, only use types approved by SICK.
>
> You can find these as accessories online at:
> - www.sick.com/Lector64x
> - www.sick.com/Lector65x

Functionality

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

The device then **automatically** also saves the parameter set to an external, permanent parameter memory.

Depending on the selected backup plan, the parameter set is saved either to a MicroSD memory card, in the CMC600, in the CDF600 or, when using one of the supported combinations, in both storage media (see above).

At each restart after being switched on, the device automatically loads the compatible parameter set from the external storage medium into its working memory and into its internal, permanent parameter memory. This enables a device, e.g. in the event of a device failure, to be quickly exchanged with a replacement device of the same type. The device replacement is achieved without any loss of configuration data, and without having to connect the computer to the SOPAS ET configuration software.

8 Maintenance

8.1 Maintenance plan

During operation, the device works maintenance-free.

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

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

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

Table 14: Maintenance plan

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

8.2 Cleaning

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

> **!** **NOTICE**
> **Equipment damage due to improper cleaning.**
> Improper cleaning may result in equipment damage.
> - Only use recommended cleaning agents and tools.
> - Never use sharp objects for cleaning.

Cleaning the inspection window

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

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

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

The type of material used for the inspection window can be found on the type label ().

! **NOTICE**
Damage to the inspection window.

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

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

Cleaning procedure:

⚠ **CAUTION**
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: Laser class 1

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

- Do not open the housing. Opening the housing may increase the level of risk.

- Current national regulations regarding laser protection must be observed.

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

For both radiation types:

It is not possible to entirely rule out temporary disorienting optical effects, particularly in conditions of dim lighting. Disorienting optical effects may come in the form of 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, use suitable laser protection 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.

Cleaning the housing

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

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

9 Troubleshooting

9.1 General faults, warnings, and errors

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

Table 15: Other possible error sources

Situation	Error/fault
Mounting	■ Device poorly aligned to objects with codes (e.g. glare) ■ Trigger sensor for reading cycle incorrectly positioned (e.g. internal reading interval is opened too late or closed too early) ■ Incremental encoder (optional) incorrectly positioned
Electrical installation	■ Interfaces of the device incorrectly wired
Configuration	■ Functions not adapted to local conditions, e.g. parameters for the data interface not set correctly ■ Device limits not observed, e.g. reading distance, aperture angle ■ Trigger source for reading pulse not selected correctly
Operation	■ Start/stop operation: external read cycle missing, more than one object is in the reading field. ■ Device faults (hardware, software)

9.2 Detailed fault analysis

9.2.1 LEDs on the device

The conditions that can be read from the LED on the device housing (see "Display and control elements", page 17) include:

- Operational readiness (Ready)
- Status of the analysis result (pass or fail)
- Hardware fault
- Firmware download status
- Connection status of the device

The LED display can indicate any errors or faults with this. Further information for this can be found in the system information.

9.2.2 System information

The device outputs faults in different ways. Fault output is staggered and therefore allows for an increasingly detailed level of analysis:

- Communication errors can occur when transmitting data to the device. The device then returns a fault code.
- For faults that occur during reading, the device writes fault codes in the status log (see "Status log", page 55).

9.3 Status log

ℹ NOTE
The status log is retained even after switching the device off and on again.

The device distinguishes between four types of faults:

- Information
- Warning
- error
- Critical fault

The device saves only the last five entries for each fault type.

9.3.1 Displaying the status log

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

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

9.4 SICK service

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

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

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

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

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

9.5 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.

9.6 Returns

▶ Do not dispatch devices to the SICK Service department without consultation.
▶ The device must be sent in the original packaging or an equivalent padded packaging.

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

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

9.7 Replacing the device

Replacing a device with transfer of the current configuration data

The current configuration data of the device to be replaced can be transferred to a replacement device in several ways. The configuration data of the device is combined as a parameter set. The replacement device saves the parameter set to the permanent parameter memory.

Prerequisites:
- The replacement device is a device of the same type.
- The current configuration data of the device to be replaced is accessible in a storage medium outside the device.

The available options depend on the backup concept chosen by the user at the time of installation and configuration of the device to be replaced.

The first three methods are performed automatically by the device. The fourth method is operated manually by the user.

Available options for transferring the configuration data:

1   **Transfer of the current configuration data using the optional microSD memory card removed from the device to be replaced.**
    Prerequisite:
    If there is sufficient memory capacity on the microSD memory card, the configuration data from the last save operation in the device with the **Permanent** option was automatically saved on the memory card.
    It is not necessary to connect a computer with the SOPAS ET configuration software for transfer to the replacement device.

2   **Transfer of the current configuration data using the optional CMC600 parameter cloning module in the optional CDB or CDM connection module.**
    Prerequisite:
    The device to be replaced was continuously operated connected to the connection module. If the optional microSD memory card and CMC600 parameter cloning module are present, the configuration data in the parameter cloning module has higher priority.
    It is not necessary to connect a computer with the SOPAS ET configuration software for transfer to the replacement device.

3   **Transfer of the current configuration data using the parameter memory in the optional CDF600 bus connection module.**
    Prerequisite:
    The device to be replaced was continuously operated in proxy mode connected to the bus connection module. If the optional microSD memory card and bus connection module are present, the configuration data in the bus connection module has higher priority.
    It is not necessary to connect a computer with the SOPAS ET configuration software for transfer to the replacement device.

4   **Transfer of the current configuration data by means of a download from the computer.**
    Prerequisite:
    The configuration data of the device was saved on the computer. This took place on completion of configuration of the device that is now to be replaced with the SOPAS ET configuration software after confirmation by the user.

ⓘ **NOTE**
For further information .

Removing the device to be replaced:

> ⚠️ **CAUTION**
> **Risk of injury due to hot device surface.**
>
> The surface of the device can become hot during operation.
>
> ▪ Before commencing disassembly, switch off the device and allow it to cool down as necessary.

> ❗ **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.

1. Switch off the supply voltage to the device that is to be replaced.
2. Mark the position and alignment of the device on the bracket or surroundings.
3. Disconnect and remove all connecting cables of the device.
4. Detach the device and remove from the bracket.
5. Backed-up configuration data: if an optional memory card was installed in the device, remove the microSD memory card with the backed-up parameter set. The memory card is located behind the cover on the rear side of the device.

Putting the replacement device into operation:

1. Backed-up configuration data: install the optional microSD memory card from the device that is to be replaced in the replacement device of the same type.
2. Mount and align the replacement device (see "Mounting", page 25). When doing so, note the previously applied markings on the bracket or surroundings.
3. Reconnect the connecting cables of the replacement device (see "Electrical installation", page 33).
4. Switch on the supply voltage for the replacement device.
✓ The replacement device starts with the default setting and searches for external storage medium with a valid parameter set. Depending on the success of the search, the replacement device proceeds as follows:
   o If the replacement device detects a memory card or the CM600 parameter cloning module, the replacement device transfers the valid parameter set from this storage medium to its permanent memory and operates in accordance with its configuration data.
   o If the replacement device does not detect any external storage media, the replacement device will start with its last permanently stored parameter set. In the case of devices that have not been used before, this corresponds to the factory default setting.
5. Establish a connection with the replacement device using the SOPAS ET configuration software.
6. Download the configuration data of the device to be replaced, which have been stored on the computer as part of a data backup plan, to the replacement device and permanently store them there.

10 Decommissioning

10.1 Disposal

> ⚠️ **CAUTION**
> **Risk of injury due to hot device surface.**
>
> The surface of the device can become hot during operation.
>
> - Before commencing disassembly, switch off the device and allow it to cool down as necessary.

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 data sheet for your product, including technical data, dimensional drawing, and connection diagrams can be downloaded, saved, and printed from the Internet:
>
> - www.sick.com/Lector64x
> - www.sick.com/Lector65x
>
> Please note: This documentation may contain further technical data.

11.1 Features

Type	Lector64x Flex (V2D64xR-MCxxxx) Lector65x Flex (V2D65xR-MCxxxx)	Lector65x Dynamic Focus (V2D65xR-MExxxx)
Focus	Manual sharpness and aperture setting on optional lens	Dynamic and externally triggered electrical focus adjustment depending on working distance
Sensor	For identifier, see see "Type code", page 13	
Sensor resolution	For identifier, see see "Type code", page 13	
Integrated illumination unit	Optional, e.g. with variants of the integrable VI83I ring illumination unit 11 LEDs, type-dependent combination of light colors: • Visible white light (T = 6,000 K ± 500 K) • Visible blue light (λ = 455 nm ± 20 nm) • Visible red light (λ = 620 nm ± 30 nm)	11 LEDs Light color combination, type-dependent, identifier see see "Type code", page 13: • Visible white light (T = 6,000 K ± 500 K) • Visible blue light (λ = 455 nm ± 20 nm)
Feedback LED (spot in field of view)	Optional, e.g. with variants of the integrable VI83I ring illumination unit 1 LED: Visible green light (λ = 525 nm ± 15 nm), RG 1	1 LED: Visible green light (λ = 525 nm ± 15 nm), RG 1

Type	Lector64x Flex (V2D64xR-MCxxxx) Lector65x Flex (V2D65xR-MCxxxx)	Lector65x Dynamic Focus (V2D65xR-MExxxx)
LED risk group of illumination unit	**Variants of the integratable VI83I ring illumination unit (risk group RG 1)** • Type "visible white light + feedback LED" (part number: 2069006, 2074001, 2069099) • Type "visible red light + feedback LED" (part number: 2074003, 2074005, 2066563) • Type "visible blue light - medium + feedback LED" (number: 2074012) • Type "visible blue light - wide + feedback LED" (number: 2074009) Risk group RG 1 (low risk) according to IEC 62471-1: 2006-07/ EN 62471-1: 2008-09. Radiance: • L_B [1]: $< 10 \times 10^3$ W/(m²sr) within 100 s; at distance ≥ 200 mm • L_R[2]: $< 7 \times 10^5$ W/(m²sr) within 10 s; at a distance of ≥ 200 mm	**Variants of the integratable VI83I ring illumination unit (risk group RG 1)** • Type "visible white light + feedback LED" (part number: 2069006, 2074001, 2069099) Risk group RG 1 (low risk) according to IEC 62471-1: 2006-07/ EN 62471-1: 2008-09. Radiance: • L_B [1]: $< 10 \times 10^3$ W/(m²sr) within 100 s; at distance ≥ 200 mm • L_R[2]: $< 7 \times 10^5$ W/(m²sr) within 10 s; at a distance of ≥ 200 mm
	Variants of the integratable VI83I ring illumination unit (risk group RG 2) • Type "visible blue light - narrow + feedback LED" (part number: 2074007) 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 [1]: $< 10 \times 10^3$ W/(m²sr) within 50 s (RG 2); at a distance of ≥ 200 mm • L_R [2]: $< 7 \times 10^5$ W/(m²sr) within 10 s (RG 1); at a distance of ≥ 200 mm Risk RG 1 (low risk) corresponding to $L_B < 10 \times 10^3$ W/(m²sr) within 100 s for distances > 1 m.	**Variants of the integratable VI83I ring illumination unit (risk group RG 2)** • Type "visible blue light - narrow + feedback LED" (part number: 2074007) 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 [1]: $< 10 \times 10^3$ W/(m²sr) within 50 s (RG 2); at a distance of ≥ 200 mm • L_R [2]: $< 7 \times 10^5$ W/(m²sr) within 10 s (RG 1); at a distance of ≥ 200 mm Risk RG 1 (low risk) corresponding to $L_B < 10 \times 10^3$ W/(m²sr) within 100 s for distances > 1 m.
Laser alignment aid	1 LED, can be switched off Visible red light (λ = 630 nm ... 680 nm)	
Laser class	**Laser alignment aid:** Class 1 according to EN/IEC 60825-1: 2014. Corresponds to 21 CFR 1040.10 except for tolerances according to Laser Notice 50 from June 24, 2007 and subsequent versions. P < 1.40 mW	
Scanning frequency	**Lector64x Flex** 1.7 Mpx: 40 Hz **Lector65x Flex** 2.1 Mpx: 70 Hz 4.2 Mpx: 40 Hz	2.1 Mpx: 70 Hz 4.2 Mpx: 40 Hz

Type	Lector64x Flex (V2D64xR-MCxxxx) Lector65x Flex (V2D65xR-MCxxxx)	Lector65x Dynamic Focus (V2D65xR-MExxxx)
Code resolution	≥ 0.1 mm, depending on lens	≥ 0.12 mm, depending on working distance
Working range	Depending on type, see "Field of view diagrams", page 29	
Lens	Application-specific, optionally available as accessories, see "Accessories", page 66.	Integrated For identifier, see see "Type code", page 13

[1] L_B = Hazard from blue light.

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

11.2 Mechanics and Electronics

Type	Lector64x Flex (V2D64xR-MCxxxx) Lector65x Flex (V2D65xR-MCxxxx)	Lector65x Dynamic Focus (V2D65xR-MExxxx)
Connection type	Connection variant 1 (V2D6xxR-MxxxAx) • 1 male connector, M12, 17-pin, A-coded (serial, CAN, I/O, voltage supply) • 2 female connectors, M12, 8-pin, X-coded (Ethernet, 1 GBit/s, P1 without function) • 1 female connector, M8, 4-pin (USB) Connection variant 2 (V2D6xxR-MxxxFx), for systems • 1 male connector, M12, 5-pin, A-coded (CAN IN) • 1 female connector, M12, 5-pin, A-coded (CAN OUT) • 1 female connector, M8, 3-pin (control of external illumination unit) • 2 female connectors, M12, 8-pin, X-coded (Ethernet, 1 GBit/s, P1 without function) Connection variant 3 (V2D6xxR-MxxxHx), with DualPort PROFINET • 1 male connector, M12, 17-pin, A-coded (serial, CAN, I/O, voltage supply) • 1 female connector, M12, 8-pin, X-coded (Ethernet, 1 GBit/s) • 1 female connector, M8, 4-pin (USB) • 2 female connectors, M12, 4-pin, D-coded (Ethernet, 100 mBit/s)	
Supply voltage V_S	DC 24 V ± 20% Voltage source in accordance with ES1 and PS2 (EN62368-1) or SELV and LPS (EN 60950-1) or class 2 (UL 1310) required.	DC 24 V ± 20% Voltage source in accordance with ES1 and PS2 (EN 62368-1) or SELV and LPS (EN 60950-1).
Power consumption	Operation: 20 W ± 20% typical [1]	
Current consumption	Max. 2.0 A for a typical load of 100 mA on each of the 4 digital outputs	
Housing material	Aluminum die cast	
Housing color	Light blue (RAL 5012)	
Viewing window material	Glass or plastic (PMMA), 2 mm thick, with scratch-proof coating: see "Type code", page 13	
Hinged cover (rear of device)	Material: Plastic Function: for temporary access to microSD memory card slot Hinged [2], screws (SW2 hexagon key), captive	
Enclosure rating	IP 65 (EN 60529, EN 60529/A2)	
Protection class	III	
Electrical safety	EN 62368-1 (2014-08)	
Weight	Max. 635 g, without lens and connecting cables	Max. 950 g, model-dependent

Type	Lector64x Flex (V2D64xR-MCxxxx) Lector65x Flex (V2D65xR-MCxxxx)	Lector65x Dynamic Focus (V2D65xR-MExxxx)
Dimensions (L x W x H)	142 mm x 89 mm x 46 mm [3]	142.8 mm x 90 mm x 106.1 mm

[1] For digital outputs without load.
[2] When the cover is open, the device no longer conforms with the specified enclosure rating.
[3] Housing only, without lens and protective hood.

11.3 Performance

Type	Lector64x Flex (V2D64xR-MCxxxx) Lector65x Flex (V2D65xR-MCxxxx)	Lector65x Dynamic Focus (V2D65xRMExxxx)
Readable code structures	1D codes, Stacked, 2D codes	
1D code types (bar code)	GS1-128 / EAN 128, UPC/GTIN/EAN, 2/5 Interleaved, Pharmacode, GS1 DataBar, Code 39, Code 128, Codabar, Code 32, Code 93	
Postal codes	USPS (Postnet, Planet, USPS4SCB), Australian Post, Dutch KIX Post, Royal Mail, Swedish Post	
2D code types	Data Matrix ECC200, GS1 Data Matrix, MaxiCode, QR-Code	
Stacked code types	PDF417	
Code qualification	Based on ISO/IEC 16022, ISO/IEC 15415, ISO/IEC 18004	
Internal image memory	512 MB External image memory on optional microSD memory card (max. 16 GB)	

11.4 Interfaces

Type	Lector64x Flex (V2D64xR-MCxxxx) Lector65x Flex (V2D65xR-MCxxxx)	Lector65x Dynamic Focus (V2D65xR-MExxxx)
Ethernet	Protocol: • TCP/IP • EtherNet/IP Functions: • Host (data output of the read result) • AUX (Service) [2] • FTP (image transfer) Data transmission rate: 10/100/1,000 MBit/s MAC address (device-specific), see type label	
Serial [1] RS-232/422	Function: host (data output of the read result) Data transmission rate: 0.3 kBd … 115.2 kBd	
Serial RS-232 [1]	Function: AUX, for Service [2] Data transmission rate: 57.6 kBd	
CAN	Protocol: SICK CAN Sensor Network CSN (Master/Slave, Multiplexer/Server) Function: host (data output of the read result) Data transmission rate: 20 kBit/s … 1 MBit/s	
PROFIBUS [1]	Function: host (RS-232, data output of the read result) Type of fieldbus integration: optionally over external CDF600-21xx fieldbus module Function blocks for various PLC manufacturers are available online at: • **www.sick.com/Lector64x** • **www.sick.com/Lector65x**	

Type	Lector64x Flex (V2D64xR-MCxxxx) Lector65x Flex (V2D65xR-MCxxxx)	Lector65x Dynamic Focus (V2D65xR-MExxxx)
USB 2.0	Function: AUX (service) [3]	
PROFINET [1]	Function: host (RS-232, data output of read result), PROFINET Single Port, PROFINET Dual Port Type of fieldbus integration: PROFINET Single Port, PROFINET Dual Port optionally over external CDF600-2200 fieldbus module Function blocks for various PLC manufacturers are available online at: • www.sick.com/Lector64x • www.sick.com/Lector65x	
Digital inputs [1]	Type: 2 physical digital inputs, switching ("Sensor 1", "Sensor 2") Optional 2 additional external digital inputs (software-controlled) via the CMC600 parameter cloning module in the CDB650-204 or CDM420-0006 connection module V_{in}= max. 32 V, I_{in}= max. 5 mA Opto-decoupled, reverse polarity protected, adjustable debounce time	
Configurable digital inputs	Encode input, external trigger	
Digital outputs [1]	Type: 4 physical digital outputs, switching ("Result1", "Result2", "Result3", "Result4") When using the CDB420: 2 physical digital outputs, switching ("Result1", "Result2") Optional 2 additional external logical digital outputs (software-controlled) via optional CMC600 module in the CDB650-204 or CDM420-0006 connection module $V_{out} = V_S - 1.5$ V, $I_{out} \leq 100$ mA Short-circuit protected, not electrically isolated from the supply voltage	
Configurable digital outputs	Read confirmation, external illumination control, freely configurable output condition, "Device Ready"	
Reading pulse	Digital inputs, free, serial interface, Ethernet, CAN, auto pulse, presentation mode	
Optical indicators	10 status LEDs 10 bar graph LEDs 1 feedback LED for the integratable VI83I ring illumination unit (green), as a light spot on the code	
Acoustic indicator	1 beeper (can be switched off, with functions for indicating a result)	
Operating elements	2 buttons (select, start, stop functions)	
Operator interfaces	Web server	
Configuration tools (parameterization)	SOPAS ET	
MicroSD memory card	microSD memory card (flash card) max. 16 GB, optional	
Data storage and retrieval	image and data storage via microSD memory card and external FTP	
Maximum encoder frequency	1 kHz	
External illumination control	Via digital output (max. 24 V trigger) or external illumination connection	

[1] Does not apply to system variants of type V2D64xR-MCxxFx, type V2D65xR-MCxxFx and V2D65xR-MExxFx for systems (connection variant 2).

[2] For example: Configuration, diagnosis, transponder access or display of the read result.
[3] Data interface only for temporary use (service).

11.5 Ambient data

Type	Lector64x Flex (V2D64xR-MCxxxx) Lector65x Flex (V2D65xR-MCxxxx)	Lector65x Dynamic Focus (V2D65xRMExxxx)
Electromagnetic compatibility (EMC)	Immunity: EN 61000-6-2: 2005-08 Radiated emission: EN 61000-6-3 (2007-01)	
Vibration resistance	EN 60068-2-6:2008-02	
Shock resistance	EN 60068-2-27: 2009-05	
Ambient operating temperature	0 °C … +50 °C	
Storage temperature	–20 °C … +70 °C	
Permissible relative humidity	0% … 90%, non-condensing	
Ambient light immunity	2,000 lx on code	

12 Accessories

> **NOTE**
> Accessories and where applicable mounting information can be found online at:
> - **www.sick.com/Lector64x**
> - **www.sick.com/Lector65x**

13 Annex

13.1 EU declaration of conformity/Certificates

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

- www.sick.com/Lector64x
- www.sick.com/Lector65x

13.2 Connection diagrams of connection module CDB650-204

13.2.1 Connection of the device to CDB650-204

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)

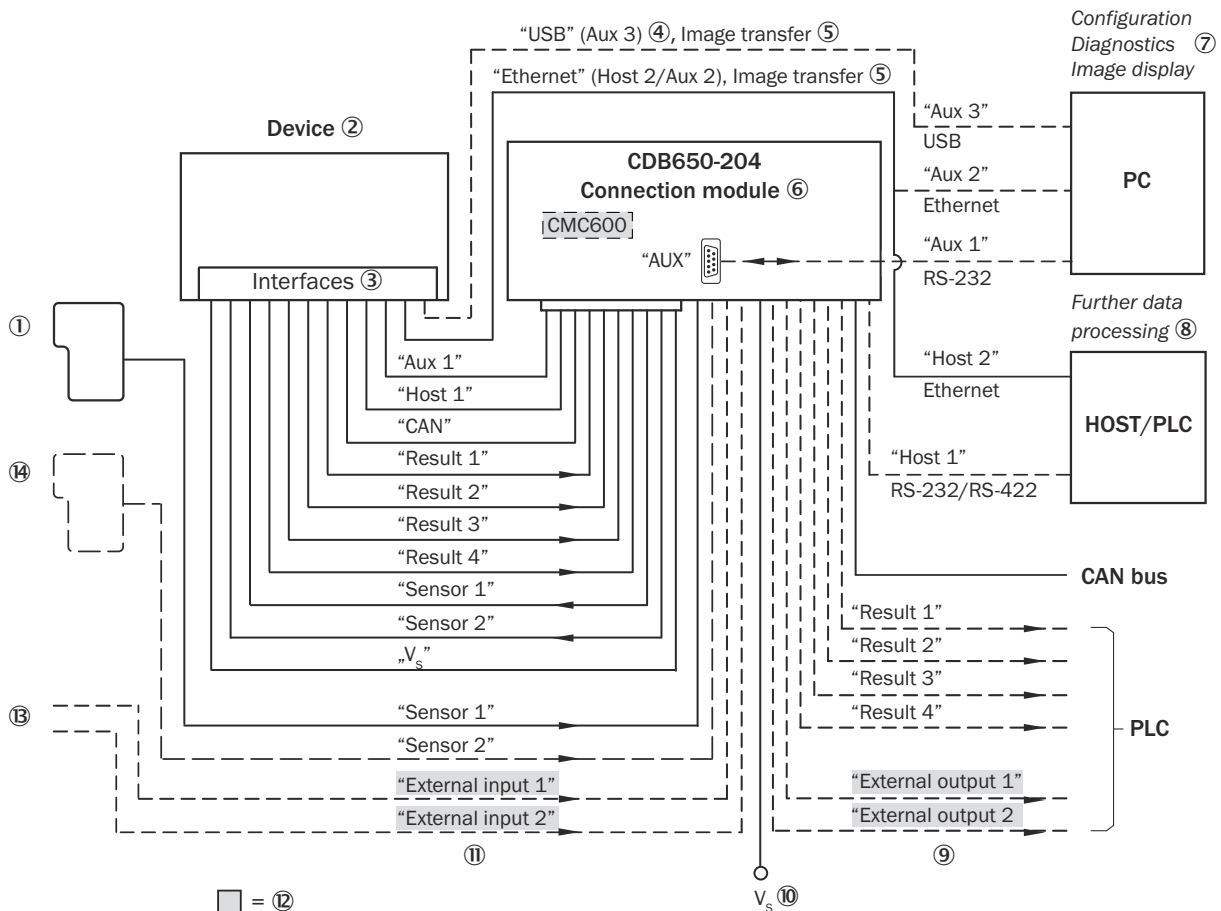*Figure 18: Connection of the device to peripherals via CDB650-204 (overview)*

① External trigger sensor, e.g. for read cycle generation
② Device
③ Interfaces
④ USB interface only for temporary use (service)
⑤ Image transmission
⑥ Connection modules
⑦ Configuration, diagnostics or image display
⑧ Data further processing

⑨   External digital outputs

⑩   Supply voltage V_S

⑪   External digital inputs

⑫   The optional CMC600 parameter cloning module is required in the connection module in order to be able to use the additional external digital inputs and outputs of the device (highlighted in gray).

⑬   Other functions

⑭   Application-dependent alternative stop trigger (e.g. photoelectric sensor) or travel increment (incremental encoder)

13.2.2   Wiring overview of the CDB650-204

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S), 1 digital input used

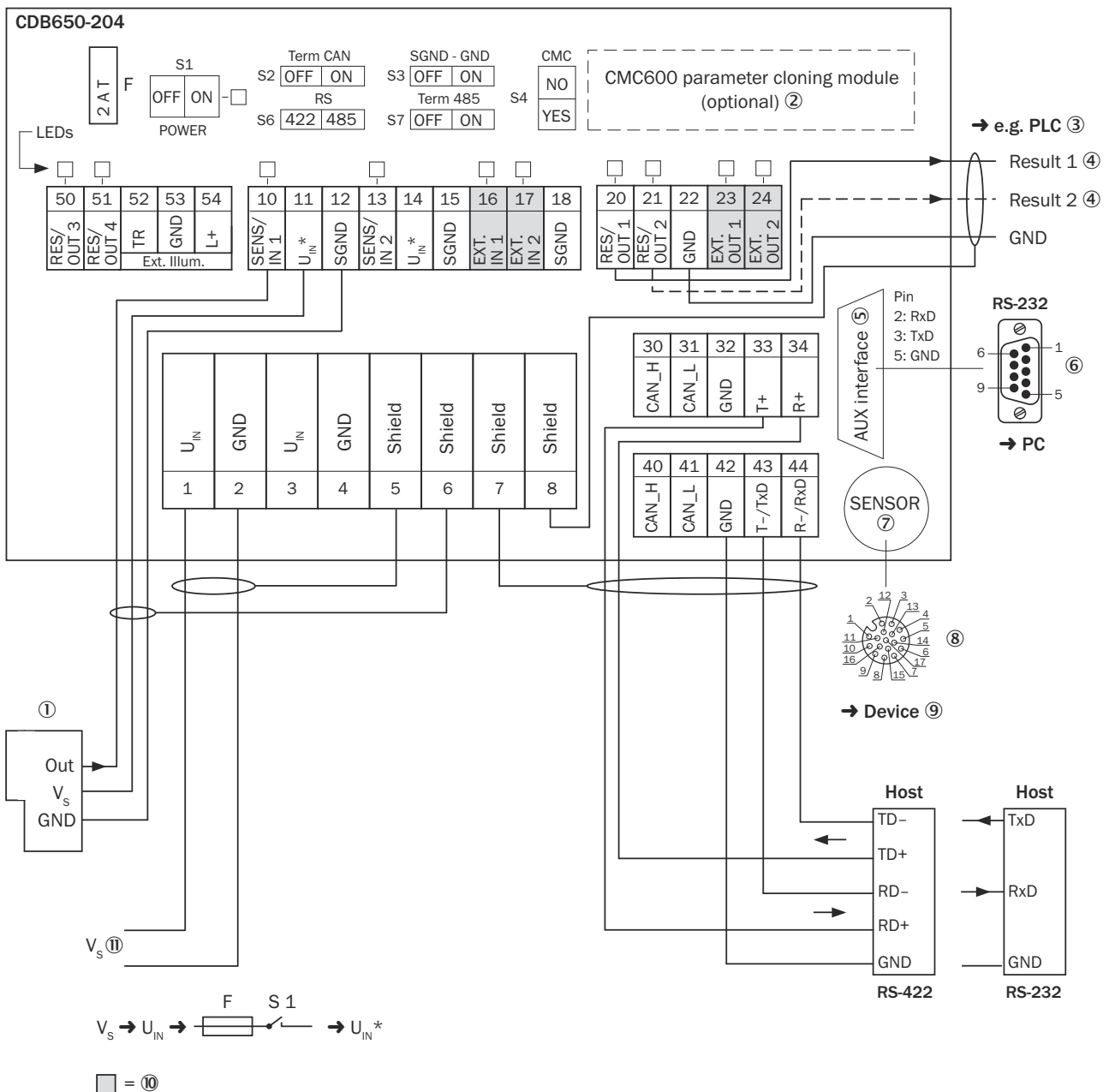**Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S), 1 digital input used**

Figure 19: Connection of device and peripherals to the CDB650-204 connection module (overview)

①	External trigger sensor, e.g. for read cycle generation
②	CMC600 parameter cloning module (optional)
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	The optional CMC600 parameter cloning module is required in the connection module in order to be able to use the additional external digital inputs and outputs of the device (highlighted in gray).
⑪	Supply voltage V_S

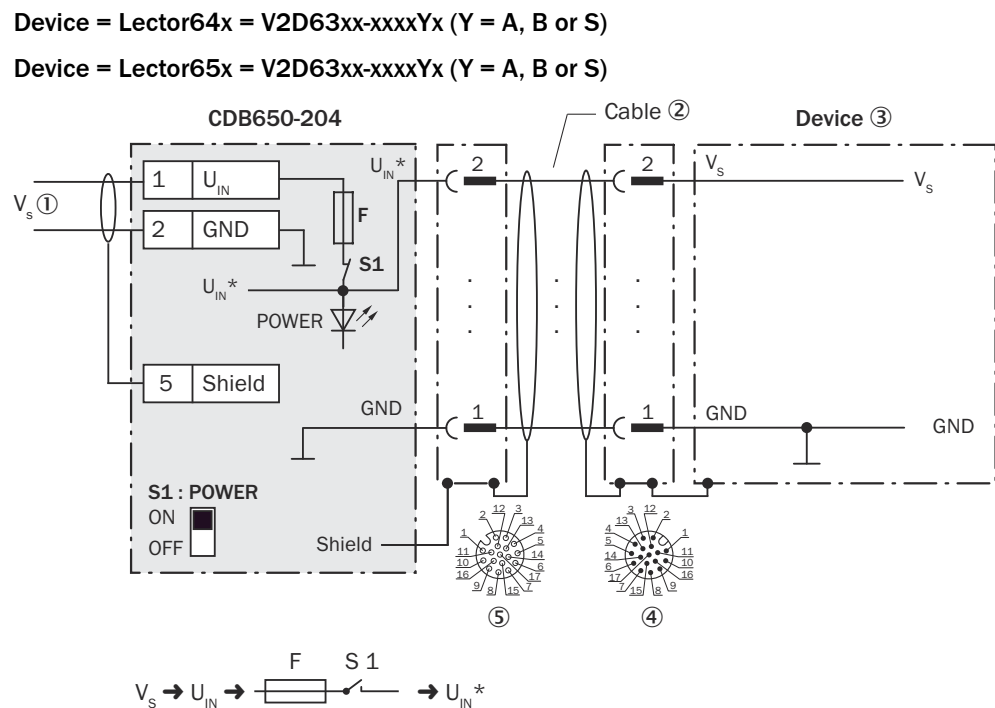### 13.2.3 Connecting supply voltage for the device in CDB650-204

Device = Lector64x = V2D63xx-xxxxYx (Y = A, B or S)

Device = Lector65x = V2D63xx-xxxxYx (Y = A, B or S)

Figure 20: 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 16: 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.

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

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)
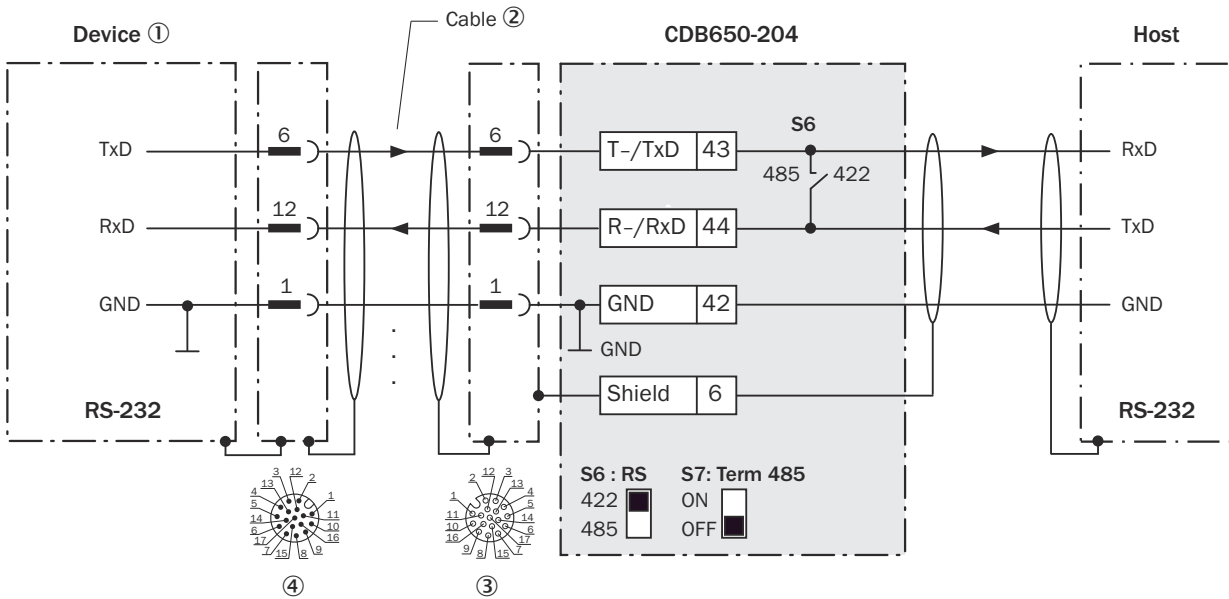
Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)

Figure 21: Wiring data interface RS-232 of the device in the 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 a configuration tool, e.g. the configuration software SOPAS ET.

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

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

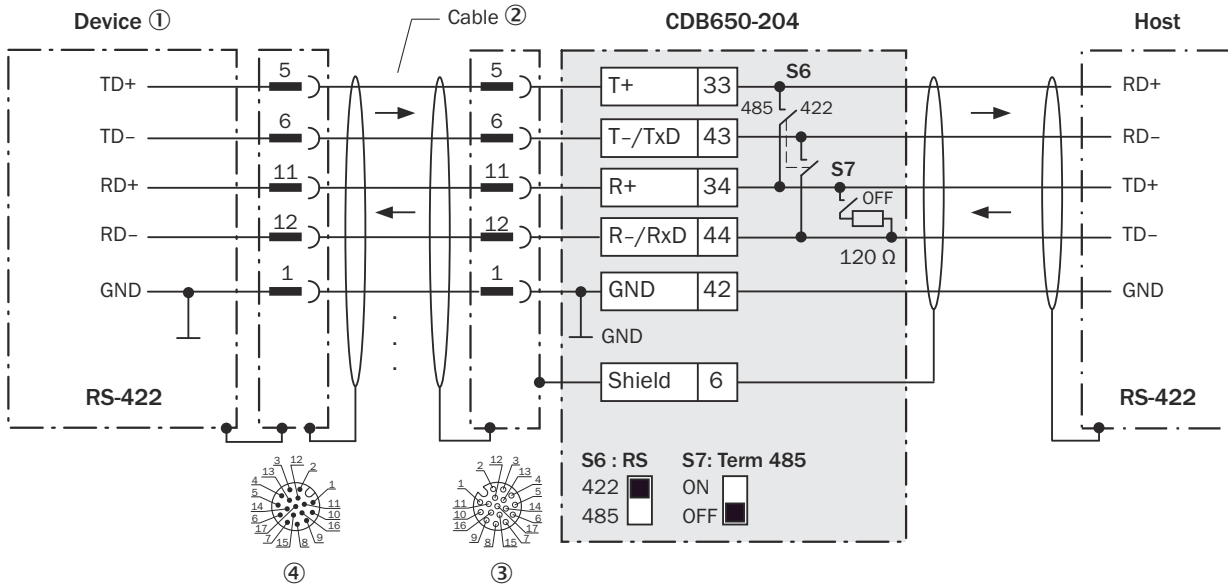**Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)**

Figure 22: Wiring data interface RS-422 of the device in the 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 17: 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 a configuration tool, e.g. the configuration software SOPAS ET.

13.2.6 Wiring the CAN interface in the CDB650-204

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)
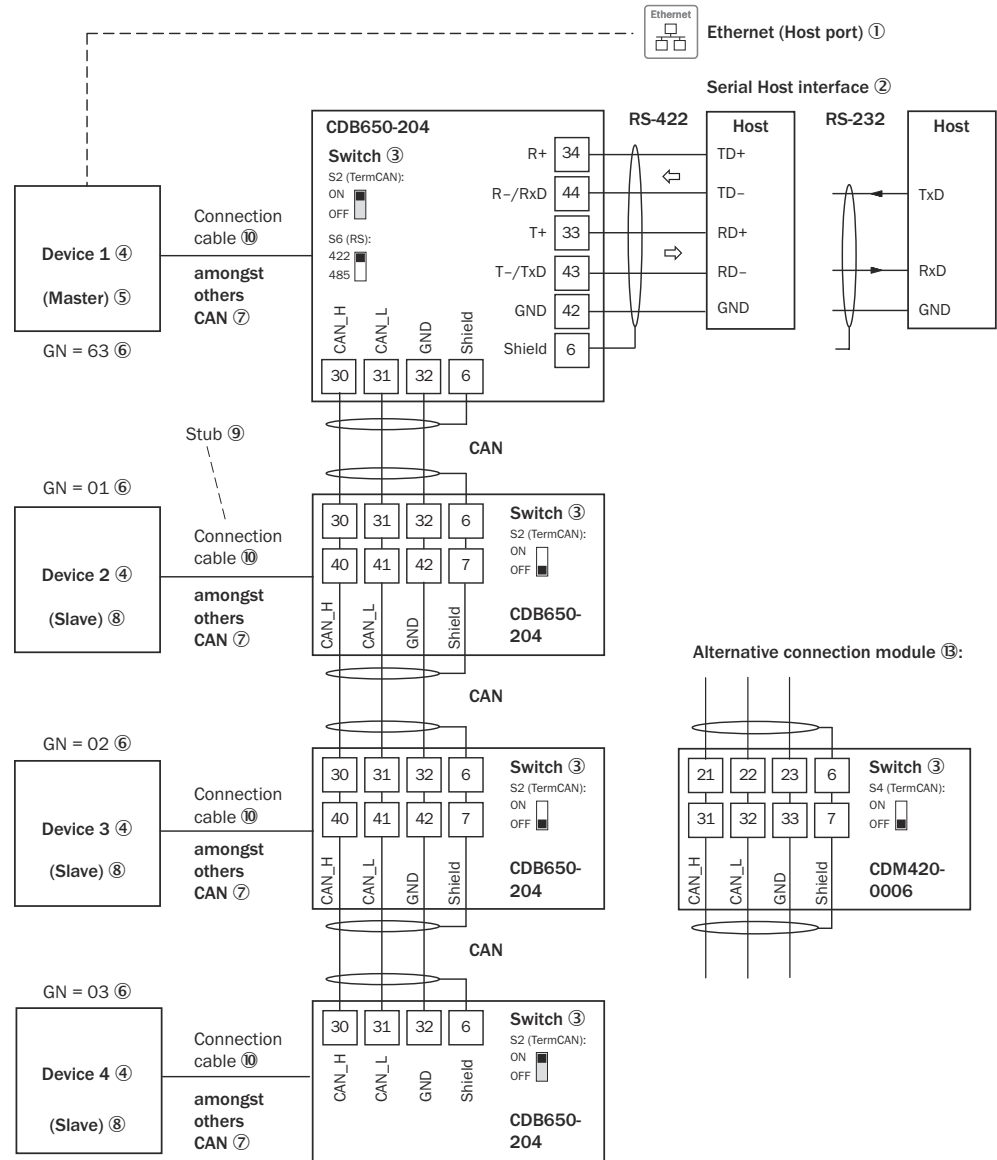
Figure 23: Wire the CAN interface of the device in the CDB650-204 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the master, for example, are disregarded here!

① Lector64x = V2D64xx-xxxxYx (Y = A, B or S): Ethernet (host port)

Lector65x = V2D65xx-xxxxYx (Y = A, B or S): 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 Lector64x = V2D64xx-xxxxYx (Y = A, B or S): connection cable 1:1 (female connector, M12, 17-pin, A-coded/male connector, M12, 17-pin, A-coded)

Lector65x = V2D65xx-xxxxYx (Y = A, B or S): 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

Alternative connection module for Lector64x = V2D64xx-xxxxYx (Y = A, B or S): CDM420-0006

Alternative connection module for Lector65x = V2D65xx-xxxxYx (Y = A, B or S): CDM420-0006

CDM420-0006: an adapter cable (female connector, M12, 17-pin, A-coded / male connector, D-Sub-HD, 15-pin) is required to connect the Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

CDM420-0006: an adapter cable (female connector, M12, 17-pin, A-coded / male connector, D-Sub-HD, 15-pin) is required to connect the Lector65x = V2D65xx-xxxxYx (Y = A, B or S)

> **NOTE**
> Activate the CAN data interface in the device with a configuration tool, e.g. the configuration software SOPAS ET.
>
> Make further settings in the device corresponding to the function of the device in the system configuration.

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

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

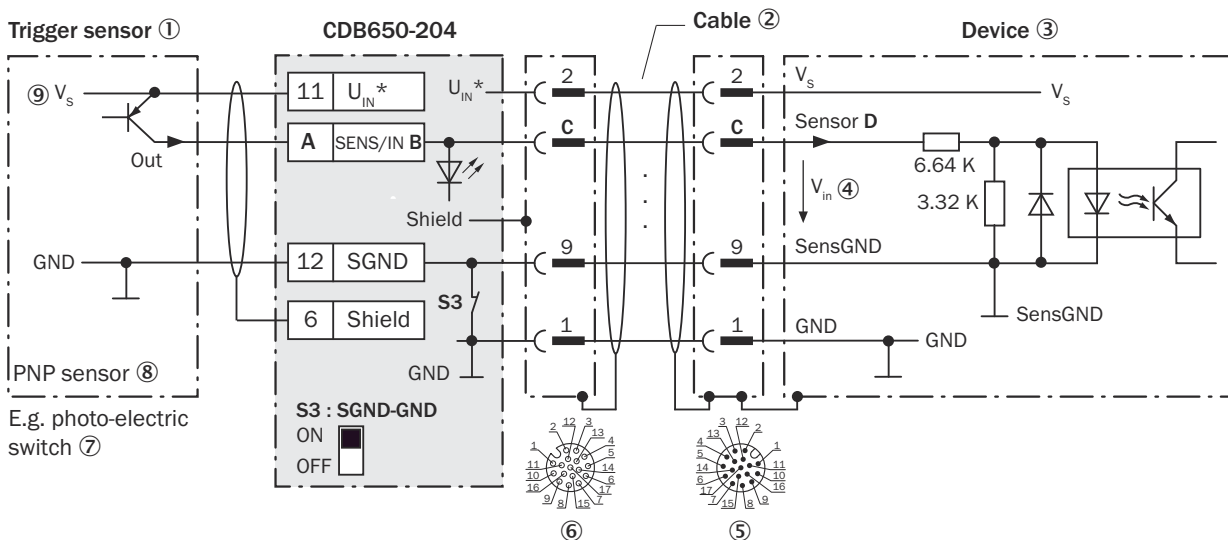**Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)**

Figure 24: Trigger sensor supplied with power by connection module CDB650-204

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

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
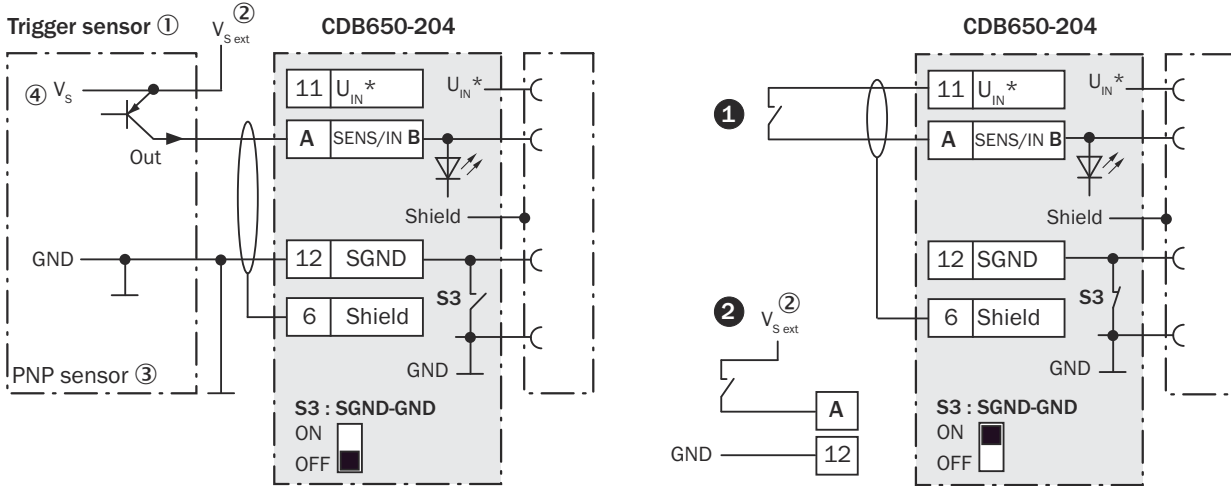⑧   PNP sensor
⑨   Supply voltage V_S

Figure 25: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDB650-204 or ❷ connected potential-free and supplied with power externally. Switch setting S3 then as in left figure.

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

Table 18: Assignment of placeholders to the digital inputs

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

Function of switch S3

Table 19: Switch S3: SGND - GND

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

Characteristic data of the digital inputs

Table 20: Characteristic data of the digital inputs "Sensor 1" and "Sensor 2"

Type	Switching
Switching behavior	Power to the input starts the assigned function, e.g. start read cycle. Default setting in the device: logic not inverted (active high), debounce time 10 ms
Properties	• Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor

Electrical values	Low: V_{in} [1] ≤ 2 V; I_{in} [2] ≤ 0.3 mA
	High: 6 V ≤ V_{in} ≤ 30 V; 0.7 mA ≤ I_{in} ≤ 5 mA

[1]   Input voltage.
[2]   Input current.

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

13.2.8   Wiring the external digital inputs of the device in the CDB650-204

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)

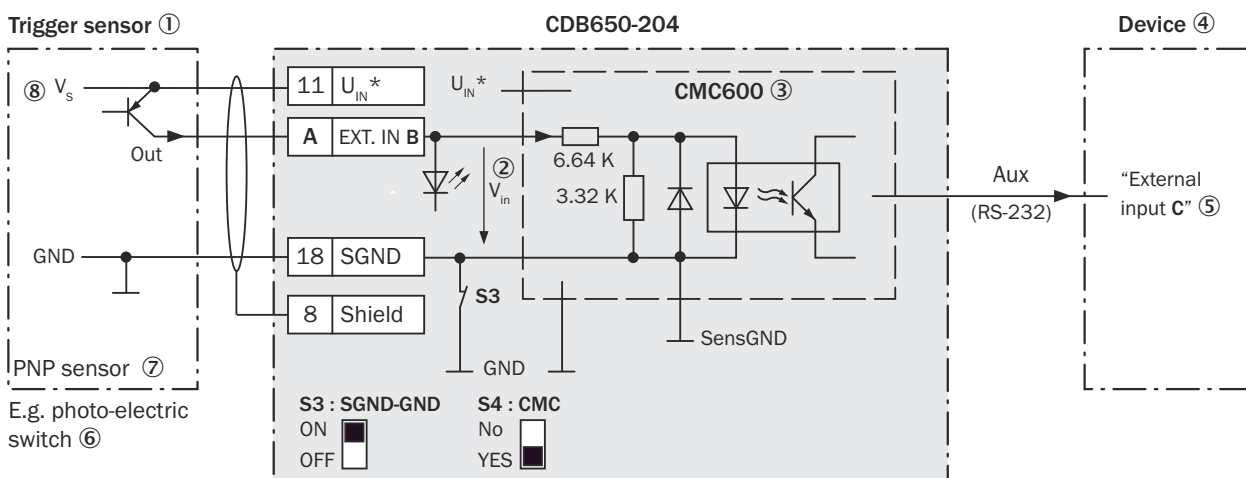*Figure 26: Trigger sensor supplied with power by connection module CDB650-204*

①   Trigger sensor, e.g. for read cycle generation
②   Input voltage V_{in}
③   The optional CMC600 parameter cloning module is required in the connection module in order to be able to use the additional external digital inputs and outputs of the device
④   Device
⑤   Logical "External input" in the device
⑥   e.g. photoelectric sensor
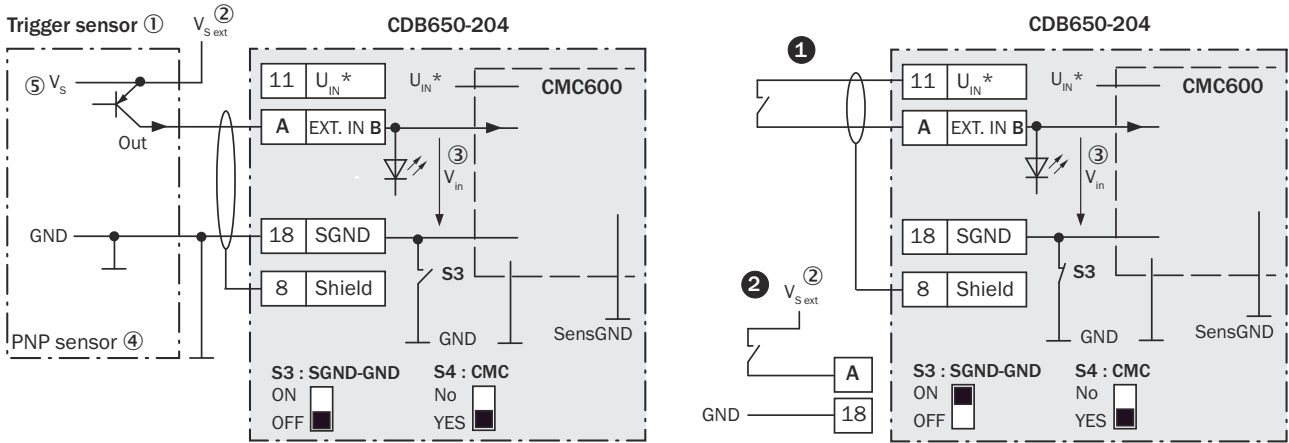⑦   PNP sensor
⑧   Supply voltage V_S

Figure 27: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDB650-204 or ❷ connected potential-free and supplied with power externally. Switch setting S3 then as in left figure.

①   Trigger sensor, e.g. for read cycle generation
②   External supply voltage $V_{S\,ext}$
③   Input voltage V_{in}
④   PNP sensor
⑤   Supply voltage V_S

Table 21: Assignment of placeholders to the external digital inputs

CDB650-204 (physical inputs)		Device (logical inputs)
Terminal A	Signal B	External input C
16	EXT. IN 1	1
17	EXT. IN 2	2

Function of switch S3

Table 22: Switch S3: SGND - GND

Switch setting	Function
ON	GND of the trigger sensor connected with GND of CDB650-204 and CMC600.
OFF	Trigger sensor connected potential-free at CDB650-204 and CMC600. Common, isolated reference potential of all digital inputs is SGND.

Functional principle of the external digital inputs

The optional CMC600 parameter cloning module in combination with the CDB or CDM connection module offers two additional physical digital inputs for the device. The inputs are available at the respective terminals of the connection module. To distinguish them from the physical digital inputs directly on the device, these addition inputs via the CMC600 are designated as "external inputs".

ⓘ NOTE

The CMC600 transmits the switching signals of the external digital inputs as statuses to the local inputs of the device via its serial data interface.

The digital inputs are not suitable for time-critical applications.

Characteristic data of the digital inputs

Table 23: Characteristic data of the digital inputs "External input 1" and "External input 2"

Type	Switching
Switching behavior	Power to the input starts the assigned function, e.g. start read cycle. Default setting in the device: logic not inverted (active high), debounce time 10 ms
Properties	• Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor
Electrical values	Low: V_{in} [1] ≤ 2 V; I_{in} [2] ≤ 0.3 mA High: 6 V ≤ V_{in} ≤ 30 V; 0.7 mA ≤ I_{in} ≤ 5 mA

[1] Input voltage.
[2] Input current.

NOTE

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

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

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

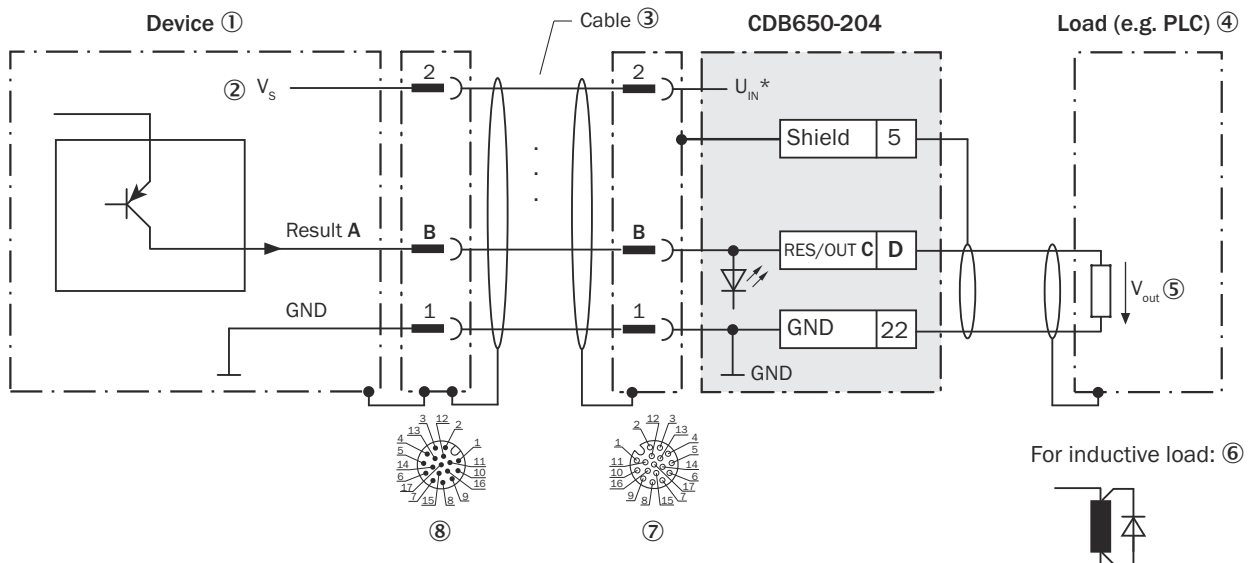**Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)**

Figure 28: Wiring the digital outputs "Result 1" to "Result 4" of the device in the connection module CDB650-204

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 24: Assignment of placeholders to the digital outputs

Device		CDB650-204	
Output A	**Pin B**	**Signal C**	**Terminal D**
Result 1	13	RES/OUT 1	20
Result 2	14	RES/OUT 2	21
Result 3	16	RES/OUT 3	50
Result 4	17	RES/OUT 4	51

Characteristic data of the digital outputs

Table 25: Characteristic data of the digital outputs "Result 1" to "Result 4"

Type	Switching
Switching behavior	PNP switching to supply voltage V_S Default settings in the device: no function, logic: not inverted (active high)
Properties	• Short-circuit protected + temperature protected • Not electrically isolated from V_S
Electrical values	$0\,V \leq V_{out}$ [1] $\leq V_S$ $(V_S - 1.5\,V) \leq V_{out} \leq V_S$ at I_{out} [2] $\leq 100\,mA$

[1] Output voltage.
[2] Output current.

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

13.2.10 Wiring the external digital outputs of the device in the CDB650-204

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)
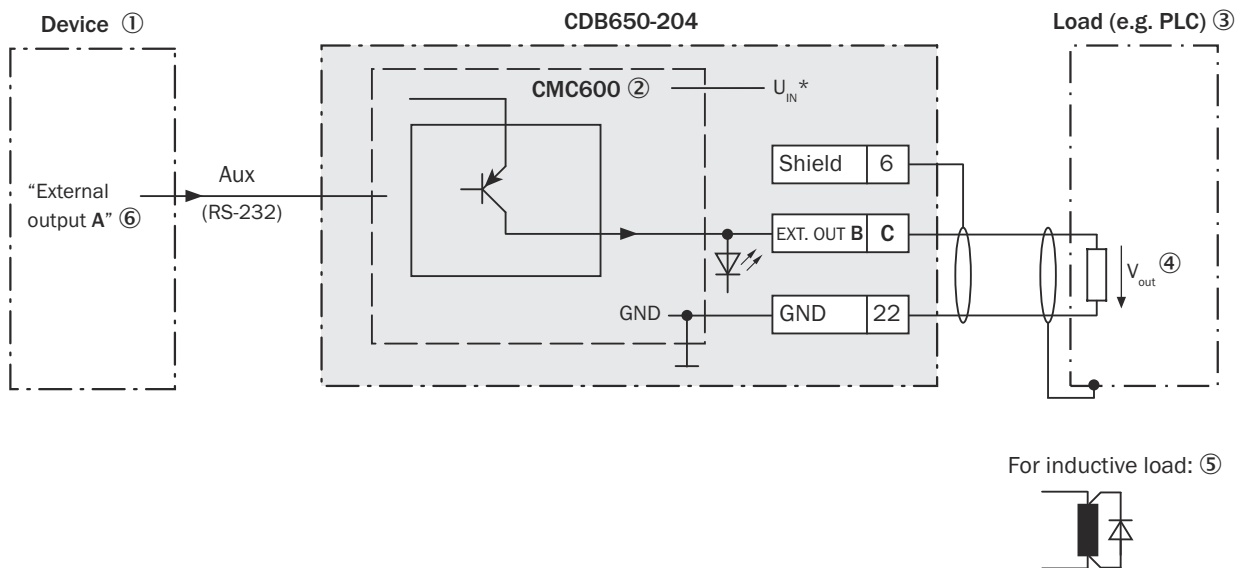
Device = Lector65x = V2D653xx-xxxxYx (Y = A, B or S)

Figure 29: Wiring external digital outputs "External output 1" and "External output 2" of the device in the CDB650-204 connection module

①   Device
②   The optional CMC600 parameter cloning module is required in the connection module in order to be able to use the additional external digital inputs and outputs of the device
③   Load (e.g. PLC)
④   Output voltage V_{out}
⑤   With inductive load: see note
⑥   Logical "External output" in the device

Inductive load

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

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

Table 26: Assignment of placeholders to the digital outputs

Device (logical output)	CDB650-204 (physical output)	
External output A	**Signal B**	**Terminal C**
1	EXT. OUT 1	23
2	EXT. OUT 2	24

Functional principle of the external digital outputs

The optional CMC600 parameter cloning module in combination with the CDB or CDM connection module offers two additional digital outputs for the device. The outputs are available at the respective terminals of the connection module. To distinguish them from the physical digital outputs directly on the device, these addition outputs via the CMC600 are designated as "external outputs".

> **NOTE**
>
> The device transmits the statuses of its logical outputs to the CMC600 via its serial data interface. The CMC600 converts the statuses into switching signals on its physical digital outputs.
>
> The digital outputs are not suitable for time-critical applications.

Characteristic data of the digital outputs

Table 27: Characteristic data of the digital outputs "External output 1" and "External output 2"

Type	Switching
Switching behavior	PNP switching to supply voltage V_S Default settings in the device: no function, logic: not inverted (active high)
Properties	• Short-circuit protected + temperature protected • Not electrically isolated from the supply voltage V_S
Electrical values	$0\ V \leq V_{out}$ [1] $\leq V_S$ $(V_S - 1.5\ V) \leq V_{out} \leq V_S$ at I_{out}[2] ≤ 100 mA

[1] Output voltage.
[2] Output current.

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

13.3 Connection diagrams of connection module CDM420-0006

13.3.1 Connection of the device to CDM420-0006

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)
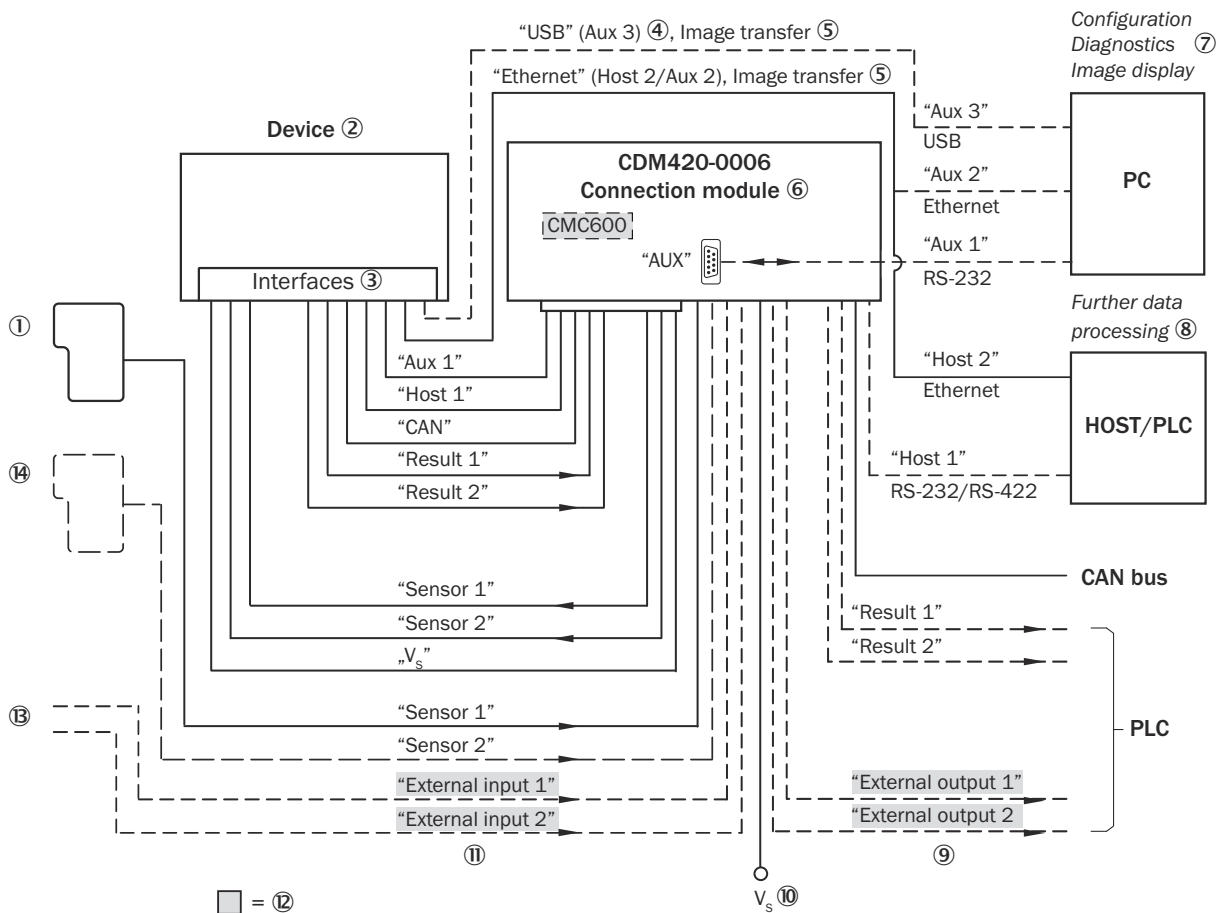
Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)

Figure 30: Connection of the device (Ethernet variant) to peripherals via CDM420-0006 (overview)

① External trigger sensor, e.g. for read cycle generation
② Device
③ Interfaces
④ USB interface only for temporary use (service)
⑤ Image transmission
⑥ Connection module
⑦ Configuration, diagnostics or image display
⑧ Data further processing
⑨ External digital outputs (switching)
⑩ Supply voltage V_S
⑪ External digital inputs (switching)
⑫ The optional CMC600 parameter cloning module is required in the connection module in order to be able to use the additional external digital inputs and outputs of the device (highlighted in gray)
⑬ Other functions
⑭ Application-dependent alternative stop trigger (e.g. photoelectric sensor) or travel increment (incremental encoder)

13.3.2 Wiring overview of the CDM420-0006

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)

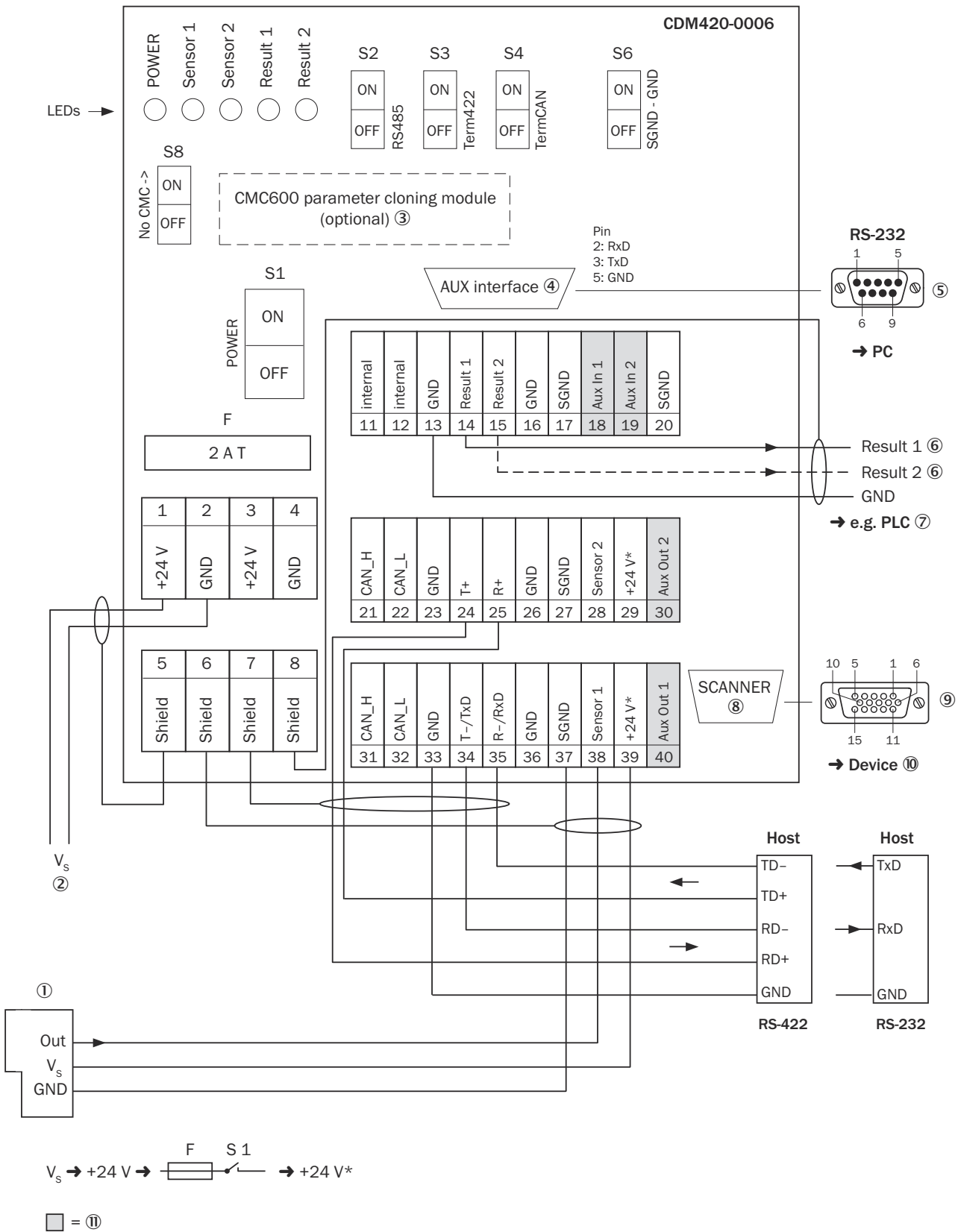*Figure 31: Overview: connection of device and peripherals to the CDM420-0006 connection module*

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

②   Supply voltage V_S

③ CMC600 parameter cloning module (optional)

④ Auxiliary interface "Aux"

⑤ Male connector, D-Sub, 9-pin

⑥ Name of the digital output

⑦ e.g. PLC (programmable logic controller)

⑧ SCANNER = Device

⑨ Female connector, D-Sub-HD, 15-pin

⑩ Device to be connected

⑪ The optional CMC600 parameter cloning module is required in the connection module in order to be able to use the additional external digital inputs and outputs of the device (highlighted in gray).

13.3.3 Connecting supply voltage for the device in CDM420-0006

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)

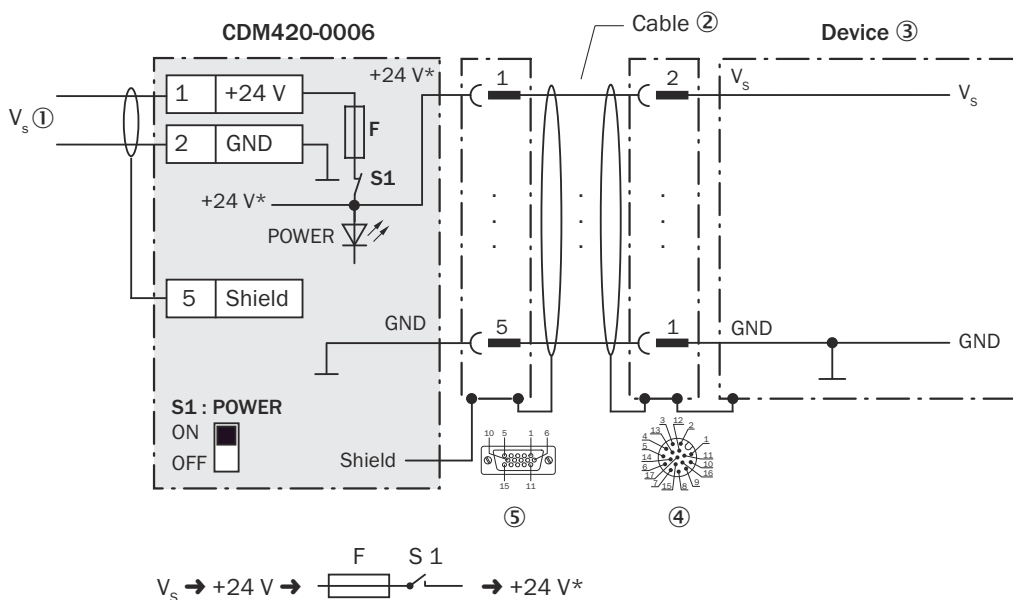*Figure 32: Connecting supply voltage for the device in CDM420-0006 connection module*

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 28: Switch S1: Power

Switch setting	Function
ON	Supply voltage +24 V connected to CDM420-0006 and device via fuse as +24 V* supply voltage. Supply voltage +24 V* can be additionally tapped at terminals 29 and 39.

Switch setting	Function
OFF	CDM420-0006 and device disconnected from supply voltage. Recommended setting for all connection work.

13.3.4 Connecting serial host interface RS-232 of the device in CDM420-0006

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)

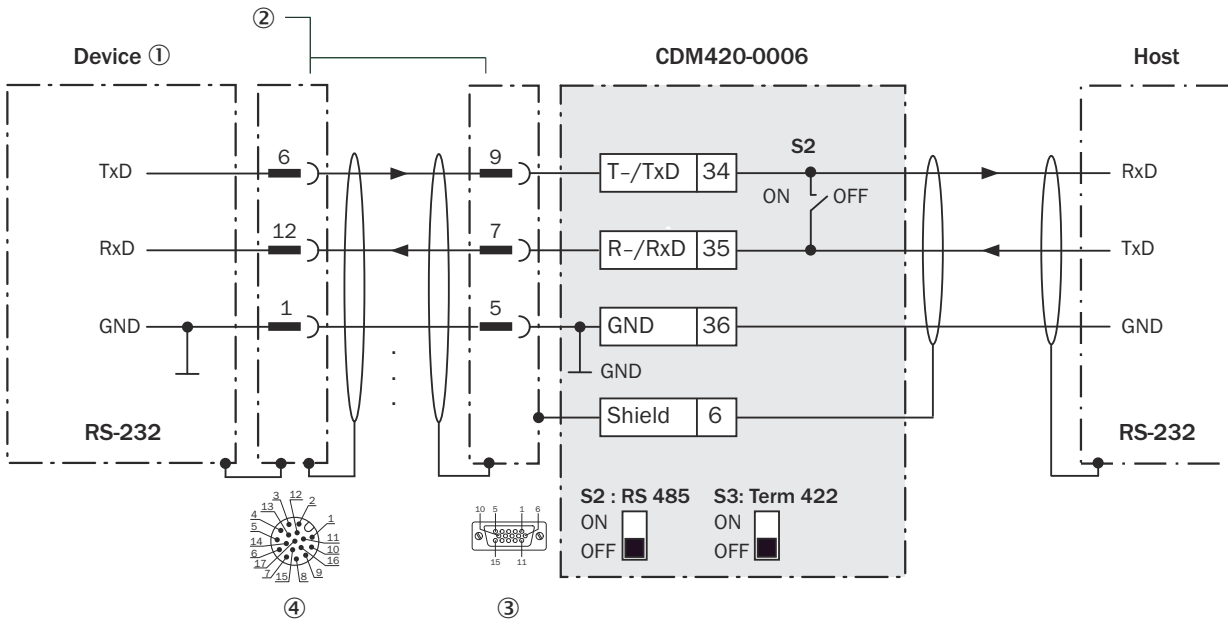*Figure 33: Connecting data interface RS-232 of the device in the connection module CDM420-0006*

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

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

13.3.5 Connecting serial host interface RS-422 of the device in CDM420-0006

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)
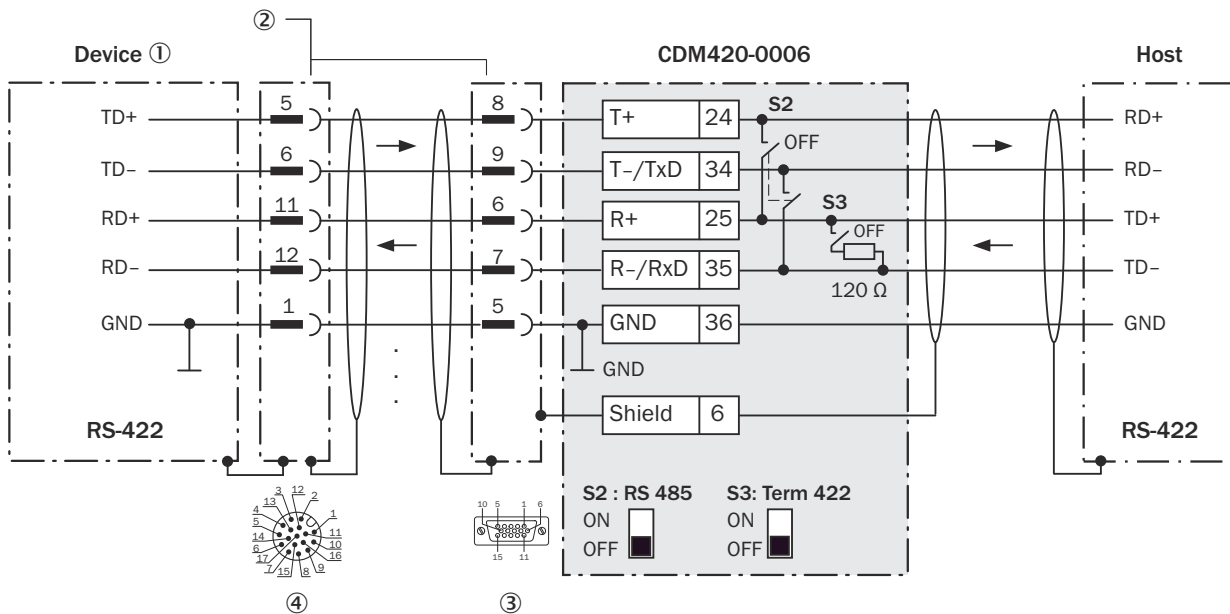
Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)

Figure 34: Connecting data interface RS-422 of the device in the connection module CDM420-0006

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

Function of switch S3

Table 29: 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

User of the RS-422 data interface:

- The relevant interface driver for the device complies 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 a configuration tool, e.g. the configuration software SOPAS ET.

13.3.6   Wiring the CAN interface in the CDM420-0006

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)
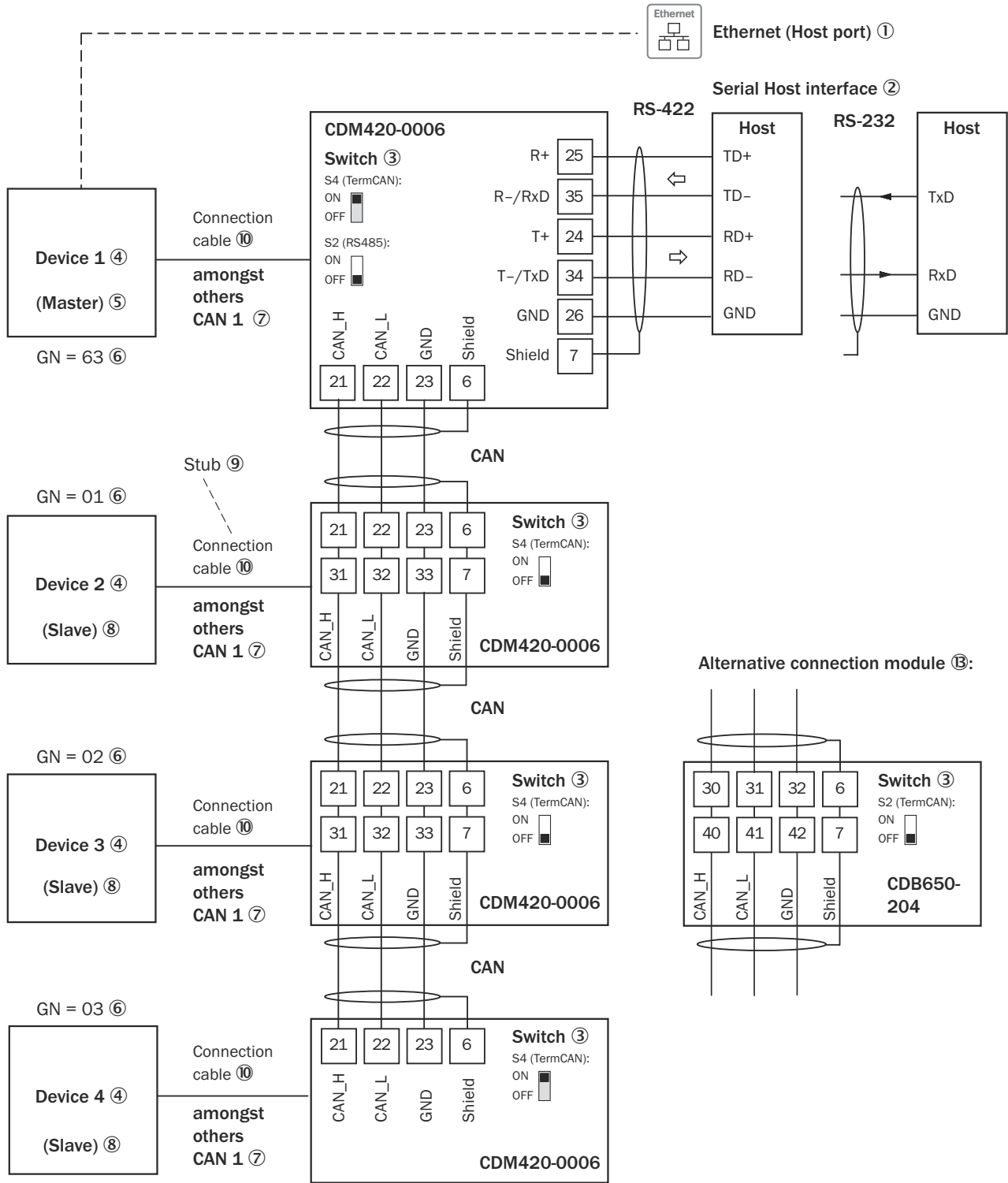
Figure 35: Wire the CAN interface of the device in the CDM420-0006 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the master, for example, are disregarded here!

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

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

        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 a configuration tool, e.g. the configuration software SOPAS ET.
>
> Make further settings in the device corresponding to the function of the device in the system configuration.

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

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

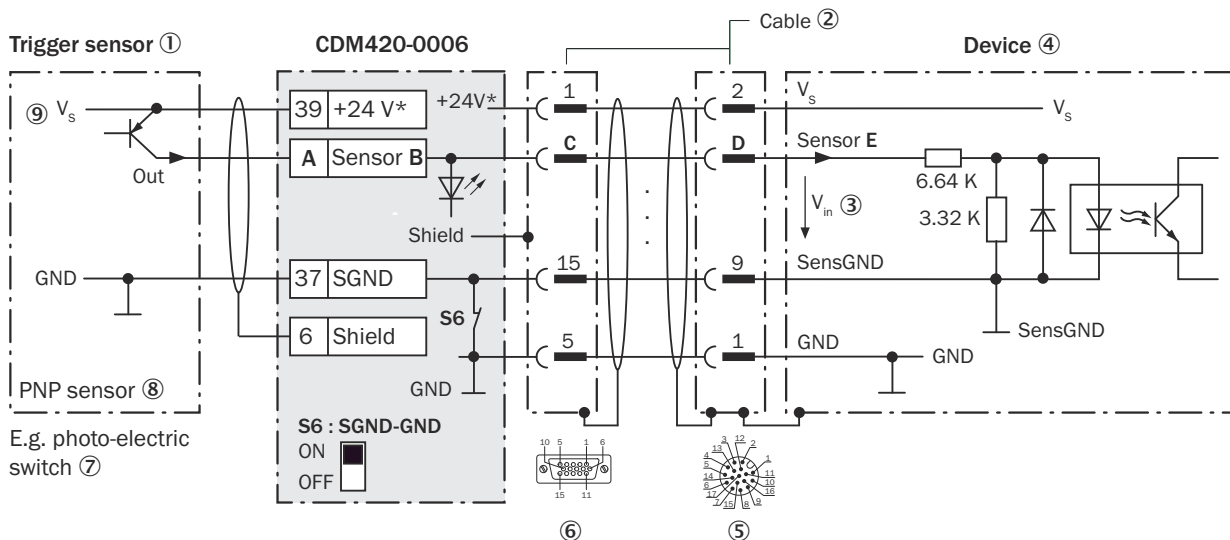**Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)**

Figure 36: Trigger sensor supplied with power by connection module CDM420-0006

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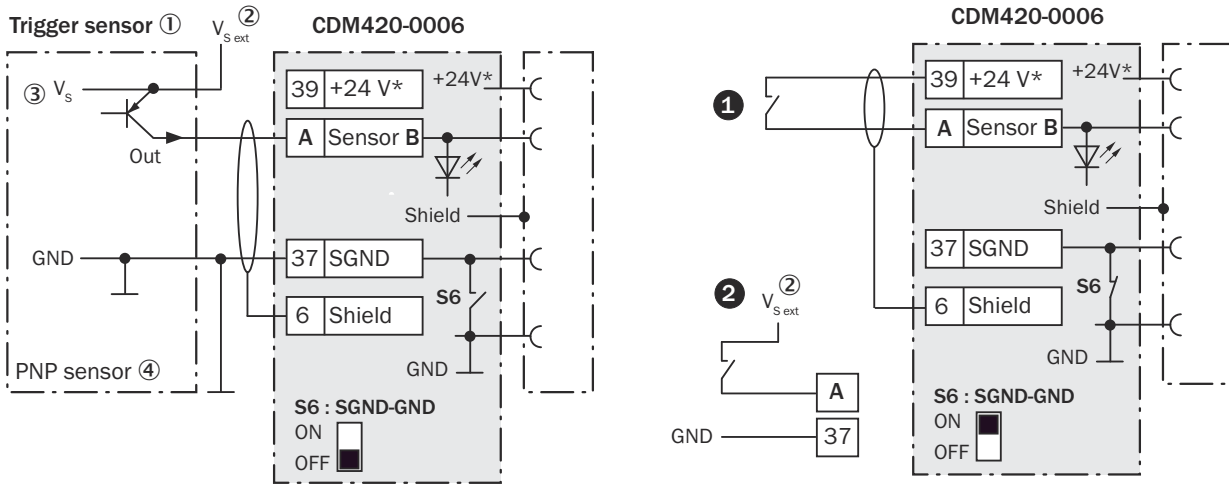
⑧   PNP sensor

⑨   Supply voltage V_S

Figure 37: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDM420-0006 or ❷ connected potential-free and supplied with power externally. Switch setting S6 then as in left figure.

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

②   External supply voltage $V_{S\,ext}$

③   PNP sensor

④   Supply voltage V_S

Table 30: 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 31: Switch S6: SGND - GND

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

Characteristic data of the digital inputs

Table 32: Characteristic data of the digital inputs "Sensor 1" and "Sensor 2"

Type	Switching
Switching behavior	Power to the input starts the assigned function, e.g. start read cycle. Default setting in the device: logic not inverted (active high), debounce time 10 ms
Properties	• Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor

Electrical values	Low: $V_{in}^{1)} \leq 2$ V; $I_{in}^{2)} \leq 0.3$ mA
	High: 6 V $\leq V_{in} \leq 30$ V; 0.7 mA $\leq I_{in} \leq 5$ mA

1)   Input Voltage
2)   Input current

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

13.3.8   Wiring the external digital inputs of the device in the CDM420-0006

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)

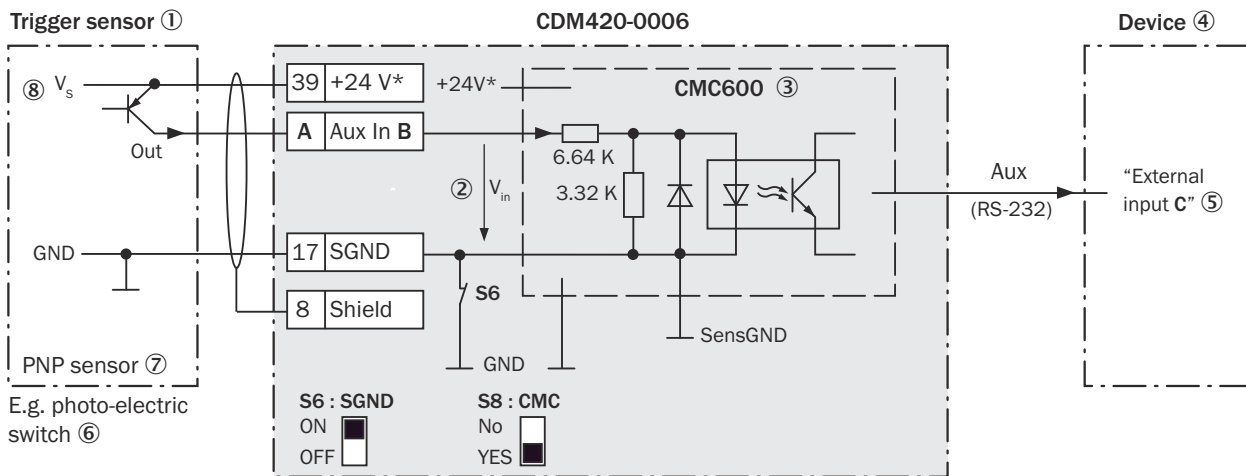**Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)**

Figure 38: Trigger sensor supplied with power by connection module CDM420-0006

①   Trigger sensor, e.g. for read cycle generation
②   Input voltage V_{in}
③   The optional CMC600 parameter cloning module is required in the connection module in order to be able to use the additional external digital inputs and outputs of the device
④   Device
⑤   Logical "External input" in the device
⑥   e.g. photoelectric sensor
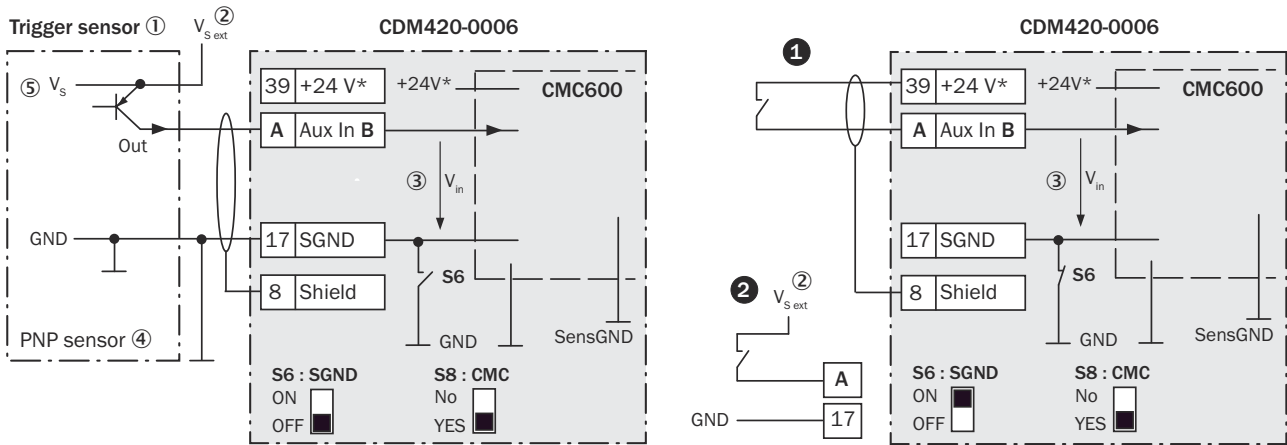⑦   PNP sensor
⑧   Supply voltage V_S

Figure 39: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDM420-0006 or ❷ connected potential-free and supplied with power externally. Switch setting S3 then as in left figure.

①   Trigger sensor, e.g. for read cycle generation
②   External supply voltage $V_{S\,ext}$
③   Input voltage V_{in}
④   PNP sensor
⑤   Supply voltage V_S

Table 33: Assignment of placeholders to the digital inputs

CDM420-0006		Device
Terminal A	Signal B	External input C
18	Aux In 1	1
19	Aux In 2	2

Function of switch S6

Table 34: Switch S6: SGND - GND

Switch setting	Function
ON	GND of the trigger sensor connected with GND of CDM420-0006 and CMC600
OFF	Trigger sensor connected potential-free at CDM420-0006 and CMC600. Common, isolated reference potential of all digital inputs is SGND.

Functional principle of the external digital inputs

The optional CMC600 parameter cloning module in combination with the CDB or CDM connection module offers two additional physical digital inputs for the device. The inputs are available at the respective terminals of the connection module. To distinguish them from the physical digital inputs directly on the device, these addition inputs via the CMC600 are designated as "external inputs".

ℹ️ **NOTE**
The CMC600 transmits the switching signals of the external digital inputs as statuses to the local inputs of the device via its serial data interface.
The digital inputs are not suitable for time-critical applications.

Characteristic data of the digital inputs

Table 35: Characteristic data of the digital inputs "External input 1" and "External input 2"

Type	Switching
Switching behavior	Power to the input starts the assigned function, e.g. start read cycle. Default setting in the device: logic not inverted (active high), debounce time 10 ms
Properties	• Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor
Electrical values	Low: V_{in}[1] ≤ 2 V; I_{in}[2] ≤ 0.3 mA High: 6 V ≤ V_{in} ≤ 30 V; 0.7 mA ≤ I_{in} ≤ 5 mA

[1] Input Voltage
[2] Input current

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

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

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)
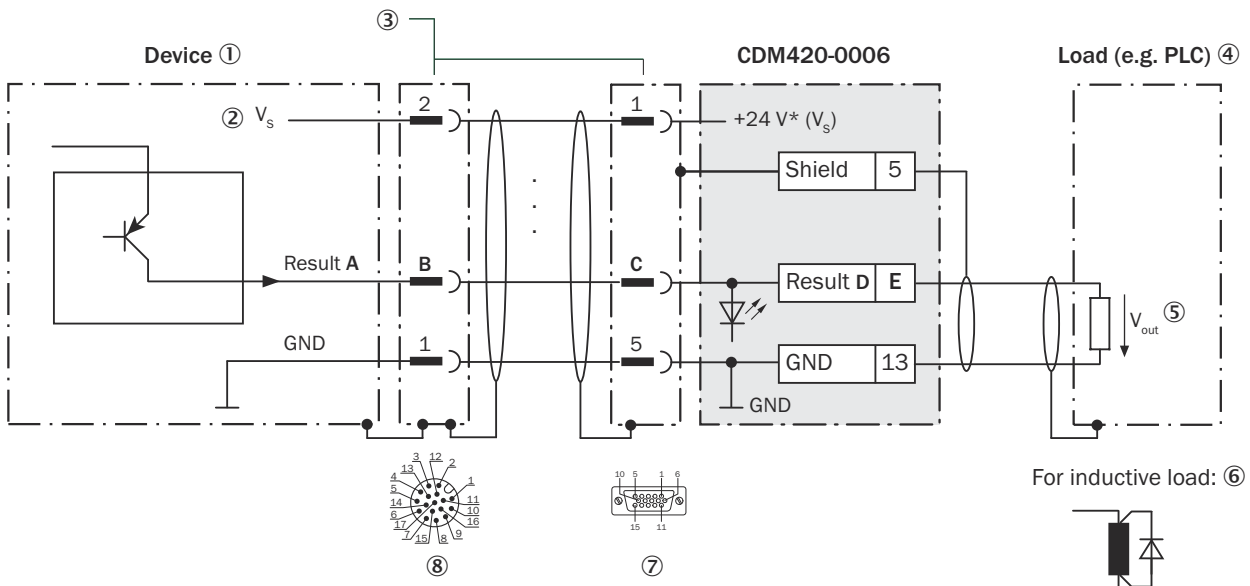
Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)

Figure 40: Wiring the digital outputs "Result 1" and "Result 2" of the device in the connection module CDM420-0006

> **NOTE**
> The two digital outputs "Result 3" and "Result 4" are not available in the CDM420-0006.

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

⑧   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 36: Assignment of placeholders to the digital outputs

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

Characteristic data of the digital outputs

Table 37: Characteristic data of "Result 1" and "Result 2" digital outputs

Type	Switching
Switching behavior	PNP switching to supply voltage V_S Default settings in the device: no function, logic: not inverted (active high)
Properties	• Short-circuit protected + temperature protected • Not electrically isolated from the supply voltage V_S
Electrical values	$0\ V \leq V_{out}^{1)} \leq V_S$ $(V_S - 1.5\ V) \leq V_{out} \leq V_S$ at $I_{out}^{2)} \leq 100\ mA$

[1]   Output voltage.
[2]   Output current.

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

13.3.10   Wiring the external digital outputs of the device in the CDM420-0006

Device = Lector64x = V2D64xx-xxxxYx (Y = A, B or S)
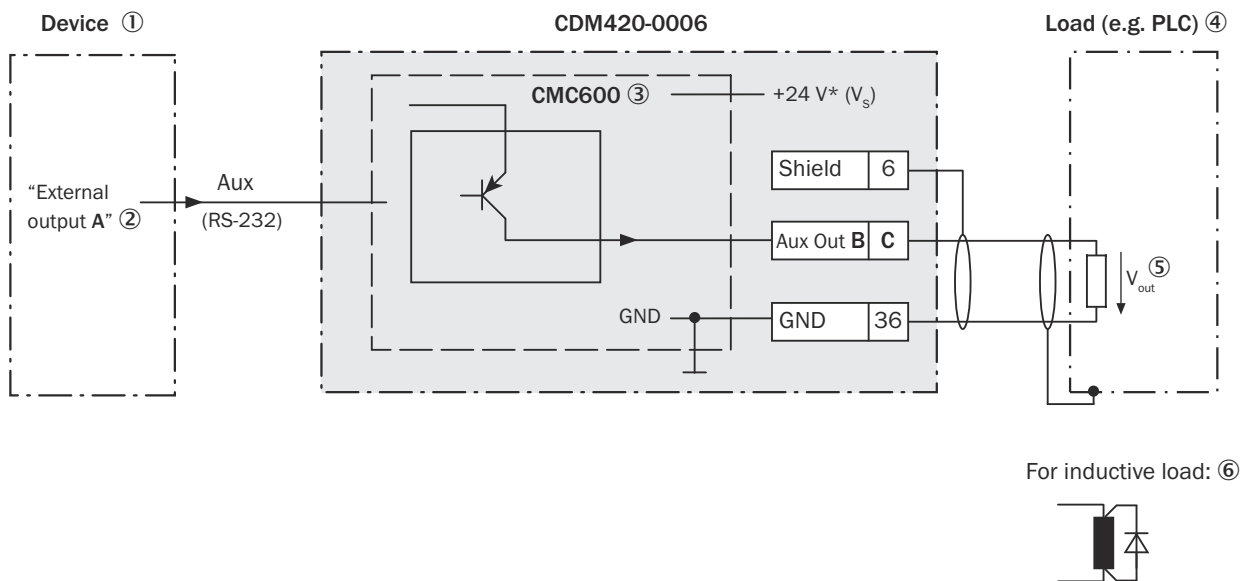
Device = Lector65x = V2D65xx-xxxxYx (Y = A, B or S)

Figure 41: Wiring external digital outputs "Aux Out 1" and "Aux Out 2" of the device in the connection module CDM420-0006

①   Device
②   Logical "External output" in the device
③   The optional CMC600 parameter cloning module is required in the connection module in order to be able to use the additional external digital inputs and outputs of the device
④   Load (e.g. PLC)
⑤   Output voltage V_{out}
⑥   With inductive load: see note

Inductive load

ℹ **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 38: Assignment of placeholders to the digital outputs

Device	CDM420-0006	
External output A	Signal B	Terminal C
1	Aux Out 1	40
2	Aux Out 2	30

Functional principle of the external digital outputs

The optional CMC600 parameter cloning module in combination with the CDB or CDM connection module offers two additional digital outputs for the device. The outputs are available at the respective terminals of the connection module. To distinguish them from the physical digital outputs directly on the device, these addition outputs via the CMC600 are designated as "external outputs".

ℹ **NOTE**
The device transmits the statuses of its logical outputs to the CMC600 via its serial data interface. The CMC600 converts the statuses into switching signals on its physical digital outputs.

The digital outputs are not suitable for time-critical applications.

Characteristic data of the digital outputs

Table 39: Characteristic data of the digital outputs "External output 1" and "External output 2"

Type	Switching
Switching behavior	PNP switching to supply voltage V_S Default settings in the device: no function, logic: not inverted (active high)
Properties	• Short-circuit protected + temperature protected • Not electrically isolated from V_S
Electrical values	$0\ V \leq V_{out}{}^{1)} \leq V_S$ $(V_S - 1.5\ V) \leq V_{out} \leq V_S$ at $I_{out}{}^{2)} \leq 100$ mA

[1]   Output voltage
[2]   Output current

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

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