OPERATING INSTRUCTIONS

# CLV61x

## Fixed mount bar code scanner

SICK
Sensor Intelligence.



### Described product

CLV61x CAN

CLV61x FIELDBUS (fieldbus access via CDF600 bus connection module)

### Manufacturer

SICK AG
Erwin-Sick-Str. 1
79183 Waldkirch
Germany

### Legal information

This work is protected by copyright. Any rights derived from the copyright shall be reserved for SICK AG. Reproduction of this document or parts of this document is only permissible within the limits of the legal determination of Copyright Law. Any modification, abridgment or translation of this document is prohibited without the express written permission of SICK AG.

The trademarks stated in this document are the property of their respective owner.

© SICK AG. All rights reserved.

### Original document

This document is an original document of SICK AG.

KC certification type-dependent, for this device see:
www.sick.com/CLV61x

# Contents


1 About this document ..... 5
1.1 Information on the operating instructions ..... 5
1.2 Scope ..... 5
1.3 Explanation of symbols ..... 6
1.4 Further information ..... 7

2 Safety information ..... 8
2.1 Intended use ..... 8
2.2 Improper use ..... 8
2.3 Cybersecurity ..... 9
2.4 Limitation of liability ..... 9
2.5 Modifications and conversions ..... 9
2.6 Requirements for skilled persons and operating personnel ..... 9
2.7 Operational safety and particular hazards ..... 10
2.8 Switching off the device ..... 13
2.9 Protection of the environment ..... 13

3 Product description ..... 14
3.1 Product ID ..... 14
3.2 Product characteristics ..... 17

4 Transport and storage ..... 24
4.1 Transport ..... 24
4.2 Unpacking ..... 24
4.3 Transport inspection ..... 24
4.4 Storage ..... 24

5 Mounting ..... 26
5.1 Overview of mounting procedure ..... 26
5.2 Preparing for mounting ..... 26
5.3 Mounting location ..... 28
5.4 Mounting device ..... 31
5.5 Mounting external components ..... 32

6 Electrical installation ..... 33
6.1 Safety ..... 33
6.2 Wiring instructions ..... 36
6.3 Pin assignments for electrical connections ..... 39
6.4 Connection diagrams ..... 40
6.5 Wiring interfaces ..... 40

7 Commissioning ..... 47
7.1 Overview of the commissioning steps ..... 47
7.2 SOPAS ET configuration software ..... 47
7.3 Initial commissioning ..... 48

7.4 Adjusting the device for operational use ... 49
7.5 Fine adjustment and further configuration ... 50

**8 Operation ... 52**
8.1 Operating and status indicators ... 52
8.2 Operating options ... 53

**9 Maintenance ... 54**
9.1 Maintenance plan ... 54
9.2 Cleaning ... 54

**10 Troubleshooting ... 57**
10.1 Overview of possible errors and faults ... 57
10.2 Detailed fault analysis ... 57
10.3 Repairs ... 58
10.4 Disassembly ... 58
10.5 Returns ... 58
10.6 Device exchange with transmission of the current configuration data. 59

**11 Decommissioning ... 60**
11.1 Disposal ... 60

**12 Technical data ... 61**
12.1 Features ... 61
12.2 Performance ... 61
12.3 Interfaces ... 62
12.4 Mechanics/Electronics ... 63
12.5 Ambient data ... 64
12.6 Dimensional drawings ... 64
12.7 Reading field diagrams (working ranges) ... 64

**13 Accessories ... 72**
13.1 Dimensional drawings of brackets ... 72

**14 Annex ... 74**
14.1 Declarations of conformity and certificates ... 74
14.2 UL conformity ... 74
14.3 Dimensional drawings electronic formats ... 74
14.4 Signal assignment of cables with open cable end at one end ... 74
14.5 Connection diagrams of connection module CDB620-001 ... 76
14.6 Connection diagrams of connection module CDM420-0001 ... 87
14.7 Connection diagrams of connection module CDM420-0006 ... 99
14.8 Abbreviations used ... 111

# 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. Information on this can be found in the operating instructions for the machine or system.

## 1.2 Scope

**NOTE**
These instructions are not valid for the CLV61x Dual Port fixed mount bar code scanner.

The “CLV61x Dual Port Fixed Mount Bar Code Scanner” operating instructions can be found, depending on the type (CLV61x-Dxxxx), under “Documentation” on the product page on the Internet:

- www.sick.com/CLV61x_Dual_Port

**The documentation concept for the device includes the following publications:**

- Safety Notes
- Operating instructions

**Functions of publications:**

The Safety Notes provide information about:

- Safe handling of the device
- Online access to the operating instructions and other documentation

The Safety Notes are printed and enclosed with the device at the time of delivery.

Operating instructions

- These operating instructions serve to incorporate the device into a customer system.
- The operating instructions provide step-by-step instructions for all necessary activities.

You can download the operating instructions as a PDF from the product page on the Internet:

- www.sick.com/CLV61x

The operating instructions are valid for all available CAN and FIELDBUS variants of the device. More detailed information on the identification of the present device type, see "Type code", page 15.

Available device variants are listed on the online product page.

For commissioning, an example is given with a device variant, based on the basic parameter setting of the 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/CLV61x

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
- Declarations of conformity and certificates of 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
- Funktionsbausteine für gängige Steuerungen (SPS)
- GSD-Gerätebeschreibungsdateien für Feldbusgateways
- EPLAN-Makros

### 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 device is an intelligent, opto-electronic ID sensor and is used for automatic, fixed identification and decoding of bar codes on moving or stationary objects.

The device transmits the data content of the decoded bar codes to a higher-level control (PLC) for coordinating further processing.

The device is primarily designed for use in industrial and logistics areas. The device meets the applicable requirements for industrial robustness, interfaces and data processing.

**NOTE**
The bar codes being read must conform to at least quality level C in accordance with ISO/IEC 15416.

SICK AG assumes no liability for losses or damage arising from the use of the product, either directly or indirectly. This applies 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

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

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

### 2.1.2 Conditions for specified enclosure rating

To ensure compliance with the IP65 enclosure rating of the device and connecting cable during operation, the following requirements must be met: If these requirements are not met, the device does not fulfill any specified enclosure rating.

- The head of the connecting cable (D-Sub male connector) is firmly screwed to the contacted female connector.
- If an extension cable is used, a corresponding rubber seal (SICK accessory) must be fitted between the two D-Sub plug connectors. The plug connectors must be screwed together tightly. You can find a suitable IP65 rubber seal online at: www.sick.com/CLV61x.

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

## 2.2 Improper use

Any use that goes beyond the areas specified below is considered improper use. This applies to use outside the technical specifications and the specifications for intended 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 or corrosive areas or under extreme ambient conditions.
- The device must not be operated in the ambient temperature range below 0 °C.
- The use of accessories not 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 Cybersecurity

To protect against cybersecurity threats, it is necessary to continuously monitor and maintain a comprehensive and holistic cybersecurity concept. A suitable concept comprises organizational, technical, procedural, electronic, and physical levels of defense and provides suitable measures for different types of risks. SICK's products and solutions must be viewed as a component of this concept.

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

## 2.4 Limitation of liability

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

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

## 2.5 Modifications and conversions

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

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

## 2.6 Requirements for skilled persons and operating personnel

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

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

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

The following qualifications are required for various activities:

*Table 1: Activities and technical requirements*

| Activities | Qualification |
|---|---|
| Mounting, maintenance | ■ Basic practical technical training<br>■ Knowledge of the current safety regulations in the workplace |
| Electrical installation, device replacement | ■ Practical electrical training<br>■ Knowledge of current electrical safety regulations<br>■ Knowledge of the operation and control of the devices in their particular application |
| Commissioning, configuration | ■ Basic knowledge of the computer operating system used<br>■ Basic knowledge of the design and setup of the described connections and interfaces<br>■ Basic knowledge of data transmission<br>■ Basic knowledge of bar code technology |
| Operation of the device for the particular application | ■ Knowledge of the operation and control of the devices in their particular application<br>■ 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 sections of this production documentation to reduce the possibility of risks to health and avoid dangerous situations.



**CAUTION**
**Optical radiation: Class 2 Laser Product**

The human eye is not at risk when briefly exposed to the radiation for up to 0.25 seconds. Exposure to the laser beam for longer periods of time may cause damage to the retina. The laser radiation is harmless to human skin.

- Do not look into the laser beam intentionally.
- Never point the laser beam at people's eyes.
- If it is not possible to avoid looking directly into the laser beam, e.g., during commissioning and maintenance work, suitable eye protection must be worn.
- Avoid laser beam reflections caused by reflective surfaces. Be particularly careful during mounting and alignment work.
- 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.

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

**WARNING**
**Electrical voltage!**

Electrical voltage can cause severe injury or death.

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

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

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

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

### 2.7.1 Laser radiation

**Laser class**

The device corresponds to laser class 2.

**NOTE**
No maintenance is required to ensure compliance with Laser Class 2.

**Wavelength**

The device works with a red light laser diode in the wavelength 655 nm.

**Laser activity display**

**NOTE**
The device has no optical indicator for laser diode activity.

**Laser output aperture**

The entire viewing window is a laser output aperture.

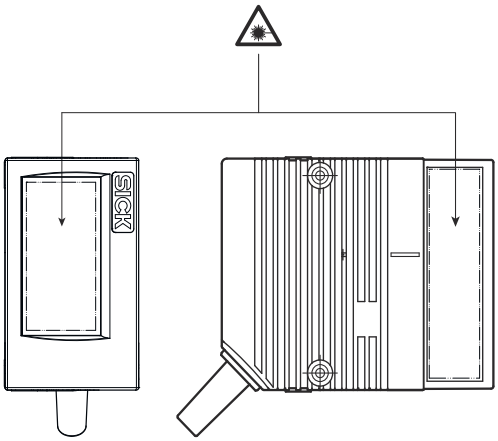


*Figure 1: Laser output aperture for the two designs of the device*

### Warning symbol on the device

The colored laser warning label is affixed to the rear of the device combined with the type label.

### Laser output data

In addition to other information, the type label of the device in use also contains the laser output data.

**The laser power data consists of:**

- Laser output power (maximum and average)
- Wavelength or wavelength range
- Pulse duration

The laser power data is located in the lower part of the type label, as an example see "Type label", page 14.

If the device is installed inaccessibly, see "Features", page 61 in the technical data.

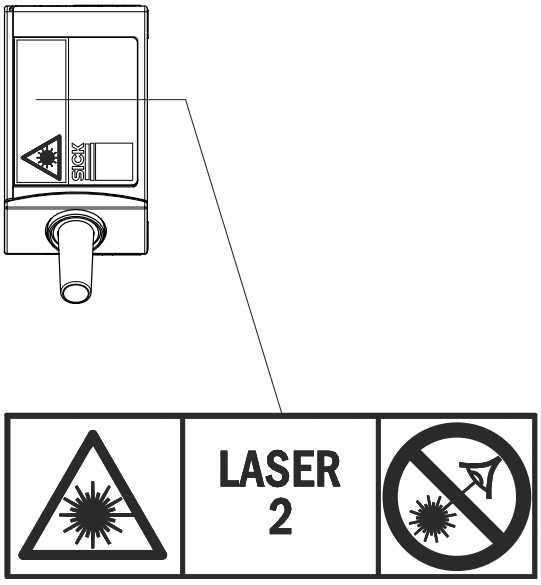



*Figure 2: Position and contents of the laser warning label on the device*

Meaning of the laser warning label: Laser radiation. Do not look into the light beam. Laser class 2.

**NOTE**
**Additional laser warning label**

If the laser warning label applied to the device is concealed when installed into a machine or paneling, the laser beam output aperture must be suitably labeled. For this purpose, an additional warning label of the same type must be applied next to the output aperture.

**Controlling the laser diode**

During operational use, the device only switches the laser diode on if there is an object in the reading area, or if a reading is required (cyclic reading operation).

A laser timeout can automatically switch off the laser diode in this type of object trigger control if **the pulse has been active for too long**, e.g. when the conveyor system is at a standstill. In this case, the current internal reading interval of the device remains open.

Depending on the selected parameterization type, the laser timeout can be set as follows:

- Using the SOPAS ET configuration software, on the **Illumination Control** device page

In the default setting, the laser timeout is deactivated.

The laser diode is permanently or repeatedly switched on in the following device statuses:

- In reading operation in the PSDI types “Auto pulse” (adjustable duty cycle) or “Free”
- In the operating modes “Percentage evaluation” and “Auto setup”. Use these operating modes only temporarily for configuration or diagnostics.

If the timeout is activated, it will have no effect in this case.

## 2.8 Switching off the device

When the device is switched off, a maximum of the following data is lost in the device:

- A modified, application-specific parameter set that is only temporarily located in the working memory of the device and is not yet permanently stored in the device as a new valid configuration data set.
- Last reading result
- State of the daily operating hours counter

## 2.9 Protection of the environment

During construction of the device, attention was paid to achieving the smallest environmental impact possible. Apart from the housing, the device contains no materials using silicon.

# 3 Product description

## 3.1 Product ID

### 3.1.1 Type label

The type label is combined with the laser warning label on the device. The type label contains information for identifying the device as well as conformity marks and test marks. If necessary, information is moved to an additional label for space reasons.

If the device has been UL certified, this can be found on the type label.

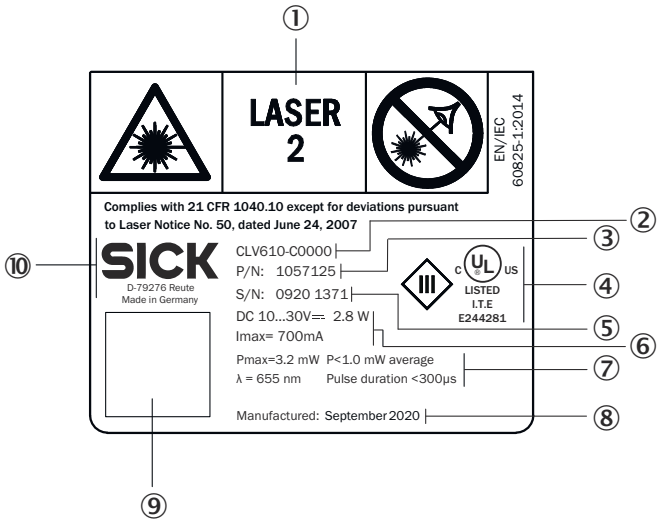



*Figure 3: CLV61x: Example of type label of CLV610-C0000. Electrical values shown here for devices with connecting cable 0.9 m to max. 3 m. Figure may differ.*

① Laser warning label
② Type designation according to type code
③ Part number
④ Conformity mark and certification mark
⑤ Serial number
⑥ Supply voltage, power consumption, maximum current consumption
⑦ Laser power data: Maximum power, average power, wavelength, pulse duration
⑧ Production date
⑨ Data Matrix code with product data: Part number, production date and serial number
⑩ Manufacturer and production site

The combination type label with laser warning label is located on the rear of the device.

#### Additional label

In addition to the type label, the additional label also displays other conformity marks and test marks.



The additional label is attached to the right side of the device (device viewed from the rear).

### 3.1.2 Type code

The devices of the CLV61x product family are arranged according to the following type code:

**CLVxyz-abcdef**

| CLV | x | y | z | – | a | b | c | d | e | f |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | | 5 | 6 | 7 | 8 | 9 | 10 |

*Table 2: Type code*

| Position | Description | Characteristic |
|---|---|---|
| 1 | Code reader, V principle | – |
| 2 – 3 | Product family | 61: CLV61x |
| 4 | Working range | 0: Mid range<br>2: Short range<br>5: Long Range<br>8: Long range |
| 5 | Performance | C: CAN<br>D: Dual Port PROFINET<br>F: Fieldbus (Dual Port) over external fieldbus module CDF600-2<br>I: IO-Link |
| 6 | Reading method, orientation of viewing window [1] | 0: Line scanner, viewing window on front side<br>1: Raster scanner, viewing window on front side<br>2: Line scanner, viewing window on the side<br>3: Raster scanner, viewing window on the side |
| 7 | Electrical connections (design) | 0: Cable 0.9 m with male connector, D-Sub-HD, 15-pin<br>1 = Swivel connector with 1 male connector, M12, 5-pin, A-coded and 1 female connector, M12, 5-pin, A-coded<br>4: 1 swivel connector with 2 female connectors, M12, 4-pin, D-coded. 1 cable 0.9 m with male connector, M12, 4-pin, A-coded<br>5: 1 swivel connector with 2 female connectors, M12, 4-pin, D-coded. 1 cable 0.9 m with male connector, M12, 5-pin, A-coded |
| 8 | Interfaces, storage media | 0: Host (RS-232), AUX (RS-232), 2 digital inputs, 2 digital outputs<br>1: Host (Ethernet), AUX (Ethernet, USB [2])<br>2: Host (Ethernet), AUX (Ethernet, USB [2]), 1 digital input<br>3: Host (Ethernet), AUX (Ethernet), 1 external parameter memory (microSD memory card) [3]<br>4: Host (Ethernet), AUX (Ethernet), 1 external parameter memory (microSD memory card [3]), 1 digital input<br>5: IO-Link, 1 digital input (hardware) |
| 9 | Window material of the viewing window | 0: Glass<br>1: Plastic |
| 10 | Ambient operating temperature | Without marking: Standard (0 °C ... +40 °C)<br>F0: Extended (-35 °C ... +40 °C, with integrated heating) |
| Enclosure rating: IP65 | | |

1) Refers to the longitudinal axis of the device.
2) The USB interface is only for temporary use by the user as a service interface.
3) For service functions such as parameter cloning.

**NOTE**
Not all combinations based on type code are possible.

**The available device variants can be found online at:**
- www.sick.com/CLV61x

### 3.1.3 Scope of delivery

The delivery of the device includes the following components:

*Table 3: CLV61x: scope of delivery*

| Item | Component | Comments |
|---|---|---|
| 1 | Device in the version ordered | **Delivery state:**<br>• Device with permanently connected connecting cable<br>• Without bracket<br>• Without fixing screws |
| 1 | Printed Safety Notes (safety information), multilingual | **The document contains:**<br>• Information on safe handling of the device<br>• Note for online access to the operating instructions and other documentation |

The following associated components are not included with delivery of the device. The components are available on the Internet.

*Table 4: CLV61x: Scope of delivery, other associated components*

| Component | Notes |
|---|---|
| SOPAS ET configuration software and device description file (*.sdd-file for SOPAS ET) of the CLV61x | Available online at:<br>• www.sick.com/SOPAS_ET |
| CLV61x operating instructions as PDF in the following language versions: English, German and French. Other languages may be available. | The document informs about mounting, electrical installation and technical data of the device.<br>Available online at:<br>• www.sick.com/CLV61x |

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.

## 3.2 Product characteristics

### 3.2.1 Device view

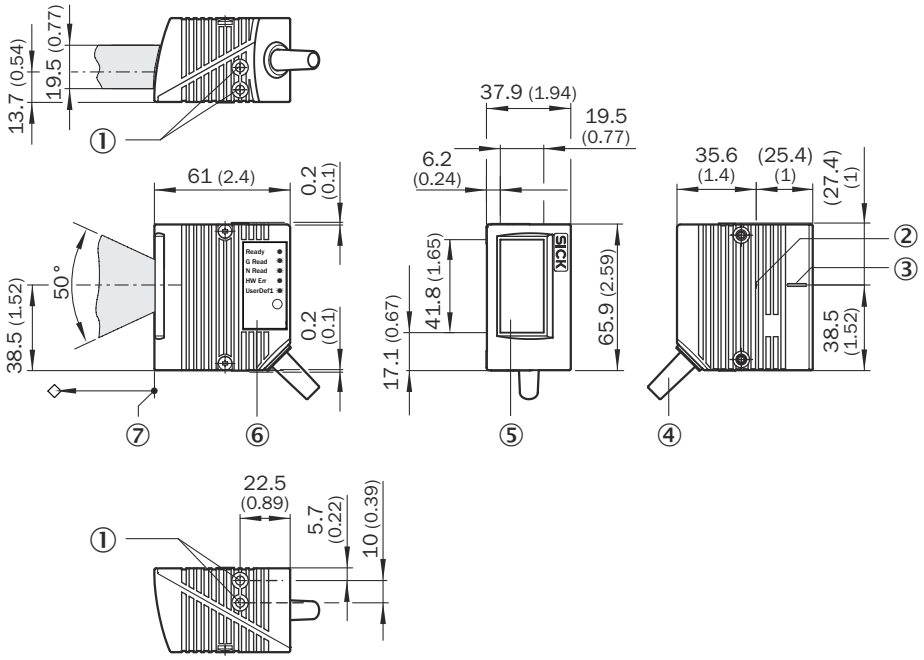



*Figure 4: CLV61x with front viewing window: Structure and device dimensions, unit of measurement: mm (inch), decimal separator: Period*

① Tapped blind hole M5, 5 mm deep (2 x), for mounting the device
② Internal impact point: Rotation point of the variable direction laser beam
③ Central position of the deflected laser beam in the V-shaped aperture angle
④ Cable outlet, standard cable 0.9 m (+10 %) with male connector, D-Sub-HD, 15-pin
⑤ Viewing window, front orientation
⑥ RGB LED (1 x), status display with signal color allocation for events
⑦ Reference point of the reading distance (from housing edge to object)

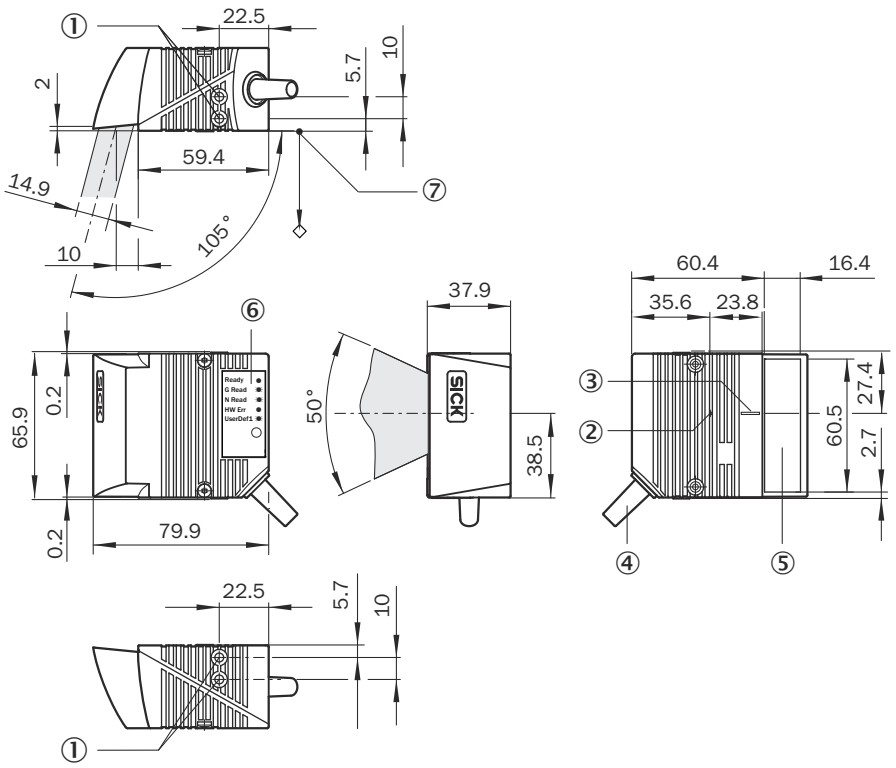



*Figure 5: CLV61x with side viewing window: Structure and device dimensions, unit of measurement: mm (inch), decimal separator: Period*

① Tapped blind hole M5, 5 mm deep (2 x), for mounting the device
② Internal impact point: Rotation point of the variable direction laser beam
③ Central position of the deflected laser beam in the V-shaped aperture angle
④ Cable outlet, standard cable 0.9 m (+10 %) with male connector, D-Sub-HD, 15-pin
⑤ Viewing window, side orientation
⑥ RGB LED (1 x), status display with signal color assignment for events
⑦ Reference point of the reading distance (from housing edge to object)

### 3.2.2 Device variants

The CLV61x product family offers four possible interface applications:

- CLV61x CAN
- CLV61x FIELDBUS (in combination with the CDF600 fieldbus module)
- CLV61x Dual Port
- CLV61x IO-Link (see CLV61x IO-Link operating instructions)

The interface applications differ, amongst other things, in regard to the following features:

*Table 5: Differences between the interface applications*

| Feature | CLV61x CAN | CLV61x FIELDBUS | CLV61x Dual Port (PROFINET) |
|---|---|---|---|
| Connection type | Data output to host via RS-232 | Connection to fieldbus via optional CDF600-2 fieldbus module (dual port switch) | Direct integration in line or ring topology |
| Scanning methods | Line scanning or raster scanning, depending on type | | |
| Sensor type | Line scanner or raster scanner, depending on type | | |
| Reading ranges (working range) | • Short Range (CLV612)<br>• Mid Range (CLV610)<br>• Long Range (CLV615) | | • Long Range (CLV615 and CLV618) |

| Feature | CLV61x CAN | CLV61x FIELDBUS | CLV61x Dual Port (PROFINET) |
|---|---|---|---|
| Orientation of the viewing window | • CLV610, CLV612: front or side<br>• CLV615, CLV618: side | | |
| Electrical Interfaces | • Power<br>• RS-232 (Host, AUX)<br>• CAN<br>• 2 digital inputs<br>• 2 digital outputs | | • Power<br>• Ethernet (Host, AUX)<br>• USB or MicroSD memory card[1) 2) 3)]<br>• 1 digital input [1)] |
| Type of electrical connections | 1 cable with male connector, D-Sub-HD, 15-pin | | • 2 female connectors, M12, 4-pin, D-coded in swivel connector<br>• Cable with 1 male connector, 4- or 5-pin, A-coded [1)]<br>• 1 female connector, 5-pin, type USB Micro-B or MicroSD memory card [1)] |
| Supply voltage | 10 V DC ... 30 V DC | | • 10 V DC ... 30 V DC<br>• 18 V DC ... 30 V DC [4)] |
| Power consumption | | | • Typically 5 W [5)]<br>• Typically 15 W [4) 5)] |
| Memory card | – | | Optional [1) 2)] |
| Heating | – | | Optional [1)] |
| Ambient operating temperature | 0 °C ... +40 °C | | 0 °C ... +40 °C<br>–35 °C ... +40 °C [4)] |
| Storage temperature | –20 °C ... +70 °C | | –20 °C ... +70 °C<br>–35 °C ... +70 °C [4)] |
| Dimensions for device with front viewing window | 61 mm x 66 mm x 38 mm | | 61 mm x 96 mm x 38 mm |
| Dimensions for device with side viewing window | 80 mm x 66 mm x 38 mm | | 80 mm x 96 mm x 38 mm |

1) Depending on type.
2) USB interface or memory card shaft.
3) USB interface is for temporary use as a service interface only.
4) For device variants with integrated heating.
5) For digital outputs without load.

### 3.2.3 Product features and functions (overview)

*Table 6: Overview of product features and functions of the device*

| Product feature/function | Characteristic |
|---|---|
| Safety and ease of use | • Rugged, compact IP65 metal housing, CE marking (Europe)<br>• Laser Class 2, laser switches off if the output power is exceeded<br>• Automatic self-test on system start<br>• Diagnostic tools for system setup and (remote) system monitoring<br>• Configurable output of reading diagnostic data in two reading results formats<br>• Operating data polling, in case of error, issue of error code if required<br>• Activatable test string function (heartbeat) to signal that the device is ready for operation<br>• Password-protected configuration mode via SOPAS ET<br>• Future-proof due to firmware update via data interface<br>• Future-oriented SOPAS ET configuration software<br>• Low power consumption<br>• Additional supply voltage range<br>• Optional parameter cloning using an external CMC600 parameter cloning module in the CDB/CDM connection module |
| Convenient operation and configuration | • Configuration via SOPAS ET configuration software (online/offline) or commands<br>• Type-dependent configuration via GSD parameterization and via CDF600-2xx for CLV61x-Fxxxx<br>• LED status indicator<br>• Deactivatable acoustic signaling device for confirming device functioning |
| Reading Operation Mode | • Start/stop operation (one bar-code bearing object per reading interval) |
| Read cycle | • Pulse sources for start: Digital inputs, data interface (command), auto pulse, free-running, CAN<br>• Pulse sources for stop: Read cycle source, digital inputs, data interface (command), timer, condition |
| Bar code evaluation | • All current 1D bar code types<br>• Max. number of bar codes: 50 per reading interval<br>• Separation of identical codes of the same code type using the read angle |
| Data processing | • Output of read data configurable through event-dependent evaluation conditions<br>• Influencing the output string by filtering and output sorting |
| Data communication | • Host interface: Two data output formats can be configured for the reading result, can be switched to various physical interfaces, parallel operation possible<br>• AUX interface: Fixed data output format that can be switched for various physical interfaces |

### 3.2.4 Operating principle

The device consists of a laser scanner (laser diode and optics), an electronics unit with integrated decoder and various data interfaces (type-dependent) to industrial bus systems. The use of various focusing settings, resolutions, scan processes, bus systems, mounting options and optics enables use in most industrial applications. Interfaces to external timers, such as photoelectric sensors or incremental encoders, enable reading pulses independent of the control. The device makes the read results available for further processing via its data interfaces.

The device basically detects the codes on any side on an object (single side reading). The objects can be at rest or moved in a conveyor system.

By combining several devices via CAN, multiple sides of an object can be recorded in one passage (multi-side reading).

To capture the codes, the device generates a scan line (line scanner).

In the raster scanner version, the device generates eight scan lines. The lines are offset parallel to each other.

### Block diagrams

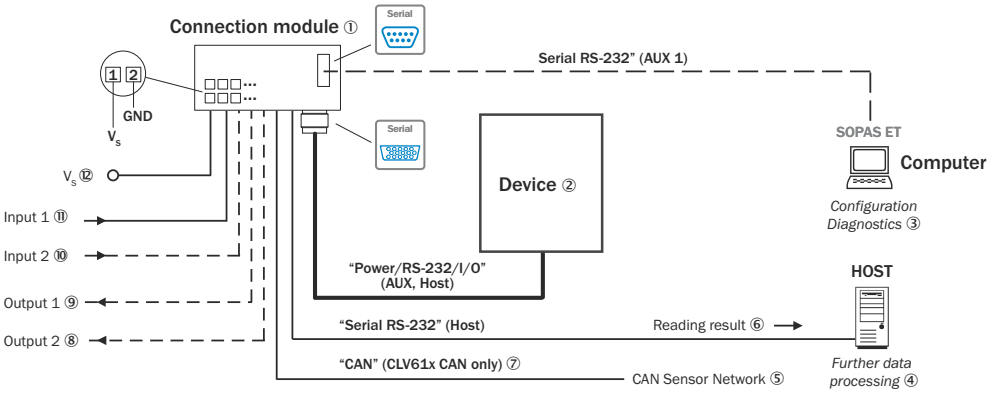



*Figure 6: Facilities for connecting for CLV61x (CAN)*

① Connection module (optional)
② Device (CLV61x CAN)
③ Configuration or diagnostics
④ Further data processing
⑤ CAN sensor network
⑥ Read result
⑦ CLV61x CAN only
⑧ Digital output 2, e.g. for connecting an LED
⑨ Digital output 1, e.g. for connecting an LED
⑩ Digital input 2, e.g. for connecting an incremental encoder
⑪ Digital input 1, e.g. for connecting a read cycle sensor
⑫ Supply voltage $V_S$

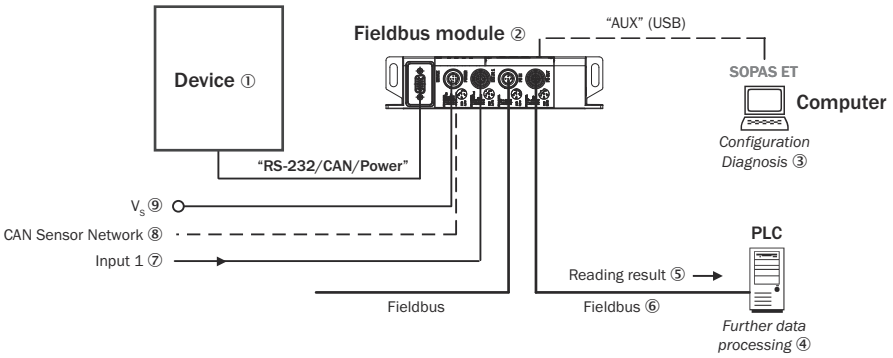



*Figure 7: Facilities for connecting for CLV61x, FIELDBUS variants*

① Device (CLV61x FIELDBUS)
② Fieldbus module (CDF600-22xx PROFINET or CDF600-21xx PROFIBUS)
③ Configuration or diagnostics
④ Further data processing

⑤ Read result
⑥ Fieldbus
⑦ Digital input 1, e.g. for connecting a read cycle sensor
⑧ CAN sensor network
⑨ Supply voltage $V_S$

### 3.2.4.1 Object trigger control

To start an object-related read operation, the device requires a suitable signal (trigger source) for reporting an object in the reading field. The start signal is provided by an external read cycle sensor (e.g. photoelectric sensor) as standard. As soon as an object has passed the read cycle sensor, the device opens a time window (“reading interval") for the reading process.

Alternatively, a command via a data interface or the SICK SENSOR network (CAN) starts the reading process. In Auto pulse mode, the device internally generates the reading interval itself with an adjustable clock ratio.

The read cycle can be terminated in various ways. In the event of external triggering, this is carried out via the read cycle source or a command, or internally via a timer or an evaluation condition that needs to be met.

**NOTE**
The SOPAS ET configuration software can be used to configure the trigger source.

#### 3.2.4.1.1 Reading operation mode

In start/stop mode, there is always only one object in the reading field during the reading process. This allows all read codes to be uniquely assigned to the object. As standard, starting and stopping of the reading process are controlled by one or two read cycle sensors at the start and end of the reading field.

The distance between the read cycle sensors determines the size of the reading field. The reading process can alternatively be controlled with command strings via the data interface.

**The device outputs the read results at the following time:**

- At the end of the read cycle, the trailing edge of the object has left the end of the reading field
- or by fulfilling the Good Read condition during the read cycle

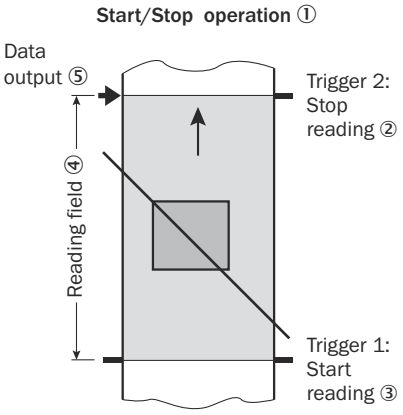



*Figure 8: Start/stop operating mode of the device in stand-alone operation*

① Start/stop operation
② Trigger 2: Stop reading
③ Trigger 1: Start reading

④ Reading field
⑤ Data output

**NOTE**
The SOPAS ET configuration software can be used to configure the reading operation mode.

**Support Portal**

**NOTE**
In the SICK Support Portal (supportportal.sick.com, registration required) you will find, besides useful service and support information for your product, further detailed information on the available accessories and their use.

# 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.

## 4.3 Transport inspection

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

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

**NOTE**

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

## 4.4 Storage

Store the device under the following conditions:

- Recommendation: Use the original packaging.
- Electrical connections are provided with a protective cap (as in the delivery condition).
- Do not store outdoors.
- Store in a dry area that is protected from dust.
- 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 61.

- Relative humidity: see "Technical data", page 61.
- For storage periods of longer than 3 months, check the general condition of all components and packaging on a regular basis.

# 5 Mounting

## 5.1 Overview of mounting procedure

- Selecting and preparing the mounting location.
- Mounting the device.
- Connect device to combined data and supply cable.
- Align the device towards object with bar code.
- Adjust the device.

**NOTICE**
**Danger due to damage to the device**

For reasons of safety, if a device shows visible signs of damage do not put it into operation. Immediately take a device that is in operation out of operation.

Damage includes, depending on the type of device, for example the following:

- Viewing window pane: Cracked or broken
- Housing: Cracked or broken
- Violation of the cable outlet on the housing or the cable itself
- Overtightening of the male connector unit, tearing or breakage of the housing
- Moisture penetration in the device

## 5.2 Preparing for mounting

### 5.2.1 Mounting requirements

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

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

**Space requirements**

- For typical space requirements for the device: See type-specific dimensional drawing and reading field diagram.
- The device requires a direct, unimpeded line of sight to the codes being read.
- Make sure path between the bar code and the viewing window of the device is of sufficient size. The light reflected from the bar code must be able to reach the viewing window without interference. This means that there must be a free corridor along the entire light path. The height of the corridor must be at least equal to the height of the viewing window.

**Environmental influences**

- Comply with technical data, e.g. permissible ambient conditions for operating the device (temperature range, EMC interference emission, ground potential), see "Technical data", page 61.
- To prevent the formation of condensation, avoid exposing the device to rapid changes in temperature.
- To avoid additional external heating of the device during operation or optical device dazzle, protect the device from direct or indirect sunlight.

**Enclosure rating**

- For further information, see "Conditions for specified enclosure rating", page 8

**Mounting**

- The device must only be mounted using the pairs of blind tapped holes provided for this purpose.
- Mount the device in a shock and vibration insulated manner.

**Equipment required**

- Mounting device (bracket) with sufficient load-bearing capacity and suitable dimensions for the device.
- 2 M5 screws – the maximum screw-in depth in the device is 5 mm from the housing surface.
- Tool and tape measure

The screws are for mounting the device on mounting equipment (bracket) supplied by the user. The screw length required depends on the mounting base (wall thickness of the bracket).

**NOTE**
The scope of delivery of a SICK bracket already includes the right screws for mounting the device to the bracket.

### 5.2.2 Mounting device

The device is mounted to the bracket via at least two M5 tapped blind holes. The blind tapped holes are located in pairs on both of the narrow sides of the device, see "Device view", page 17.

**SICK brackets**

The device can be installed using optional SICK brackets or customer-specific brackets.

SICK offers prefabricated brackets which are optimally suited for the mounting of the device in a wide range of applications. See:

- www.sick.com/CLV61x

Example: The design of the bracket with adapter plate supports many different installation variants, for example, as well as the alignment of the device in two axes.

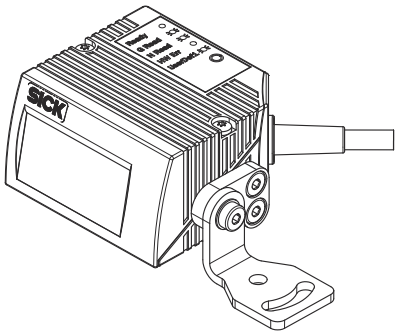



*Figure 9: Mounting example of a device with mounting bracket with adapter plate*

**User-supplied brackets**

Bracket requirements:

- Stable mounting device
  - Orientation of the device changeable in the x- and y-axis
  - The mounting device must be able to bear the weight of the device and connecting cables without shock.

- Depending on the device, at least two M5 screws for mounting the device
  - The screw length depends on the wall thickness of the mounting device.
  - The maximum screw in-depth in the device is 5 mm from the housing surface.

## 5.3 Mounting location

Observe the following aspects when selecting the installation location:

- Basic assignment of the scan line to the bar code
- Reading distance to bar code and aperture angle α
- Angular orientation of the device to the bar code
- Avoidance of surface reflections
- Counting direction of the reading angle (position of the bar code within the scan line)

### 5.3.1 Basic assignment of the scan line to the bar code

The principle assignment of the scan line to the bar code on the object depends on the sensor type of the device: Line scanner with line scanning or raster scanner with raster scanning

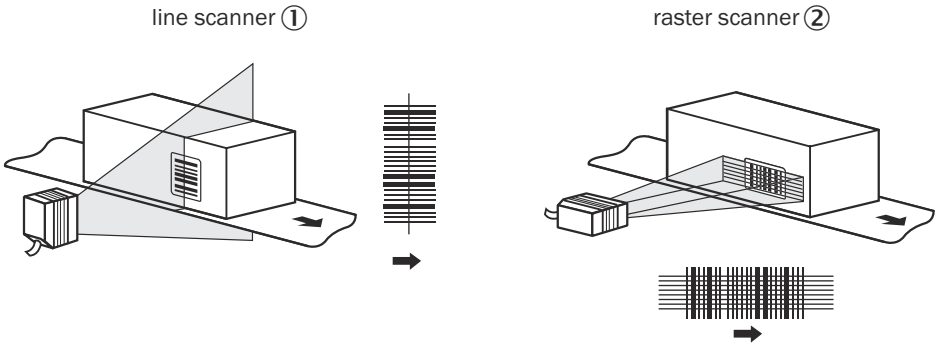



*Figure 10: Allocation of scan line(s) to bar code and conveyor direction*

① Line scanner

② Grid scanner

### 5.3.2 Reading distance to the bar code and aperture angle α

The maximum distance from the viewing window of the device to the bar code may not exceed the limit values for the device. Because of the V-shaped deflection of the beams, the usable length of the scan line for evaluation (reading field height) depends on the reading distance.

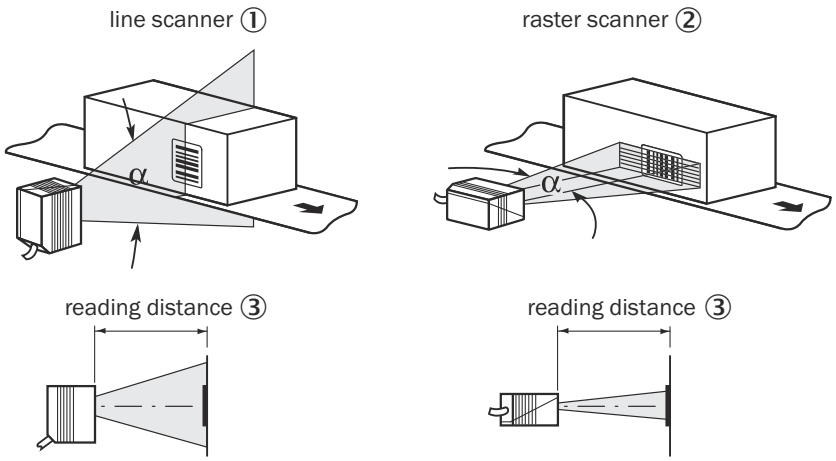



*Figure 11: Definition of the reading distance and the aperture angle α*

① Line scanner
② Grid scanner
③ Reading distance

In the specification diagrams (see "Reading field diagrams (working ranges)", page 64), the height of the reading field is shown as a function of the reading distance for different resolutions (module widths).

### 5.3.3 Angular orientation of the device

When the scan line sweeps across the bar code at nearly a right angle, the optimal alignment of the device has been achieved (azimuth and tilt). Possible reading angles that may occur between the scan line and the bar code must be taken into account. This applies to all three levels in the room.

To avoid surface reflections, select a rotation angle of approx. 15° from the perpendicular to the bar code, see "Avoiding surface reflections", page 30.

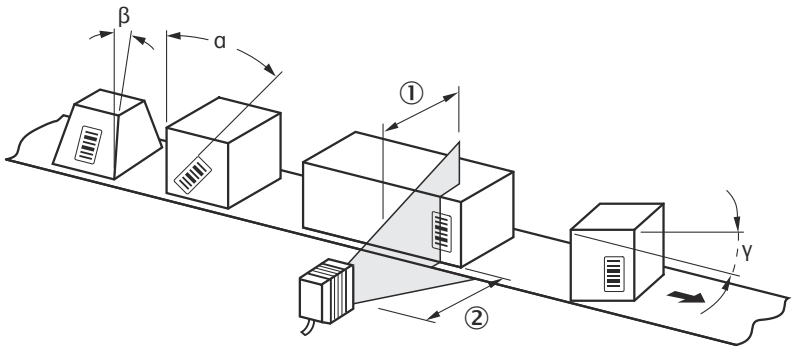



*Figure 12: Line scanner: Occurring reading angle between scan line and bar code*

① Depth of field
② Reading distance

*Table 7: Permitted read angle between scan line and bar code*

| Angle | Limit Value |
|---|---|
| Tilt α | Max. 30° |
| Pitch β | Max. 45° |
| Skew γ | Max. 45° |

**NOTE**
The specified maximum values can only be achieved if conditions are optimal. The actual maximum depends on module width, code type, print contrast, ambient light, distance and scanning frequency.

### 5.3.4 Avoiding surface reflections

If the light of the scan line(s) hits the surface of the bar code exactly perpendicular, disturbing reflections may occur.

To avoid this effect when receiving the backscattered light, mount the device so that the outgoing light is tilted relative to the perpendicular.

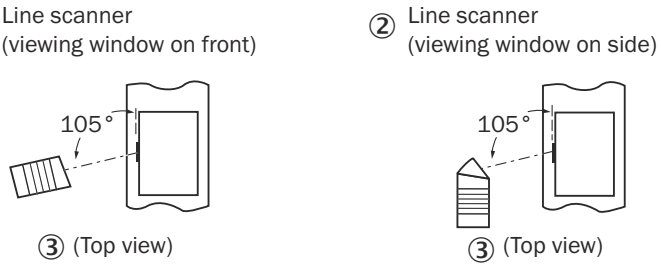



*Figure 13: Avoiding surface reflections on the example line scanner: Angle between light emitted and bar code (tilting away from vertical)*

① Line scanner (front viewing window)
② Line scanner (side viewing window)
③ Supervision

**NOTE**
When the scan line is tilted approx. 15° from the perpendicular, optimum results are obtained.

### 5.3.5 Counting direction of the reading angle

The device can scan and decode several bar codes at each reading.

The device determines the location-specific read diagnostics data per bar code and optionally outputs these data in the read result:

Reading angle (RA value)

- This value specifies the angle at which the deflected scanning beam detects the bar code center with the red scan line in the scan plane. This value is within the aperture angle of the device.

By determining the respective RA value, identical bar codes (code type, code length, and data content) can be separated, and the bar code data can be assigned based on its position on the object.

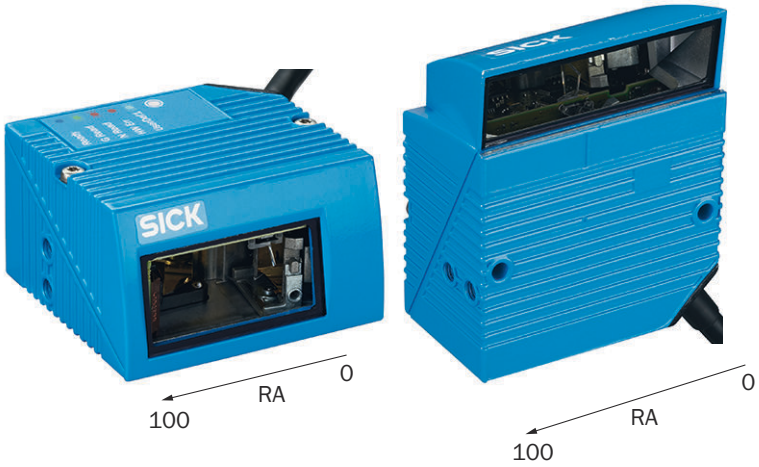



*Figure 14: Counting direction of the reading angle RA in the scan plane: For devices with a front viewing window (left) and side viewing window (right)*

## 5.4 Mounting device

**NOTICE**

**Risk of damage to the device**

the device will be damaged if the tightening torque of the mounting screws is too high or if the maximum screw-in depth of the blind hole threads is exceeded.

- ▶ Observe maximum tightening torque.
- ▶ Use suitable mounting screws for the blind hole threads of the device. Observe the maximum screw-in depth.

Maximum tightening torque: 2.5 Nm

Screw-in depth of the blind tapped holes see "Mechanics/Electronics", page 63 in the technical data.

1. Prepare the base for mounting the bracket of the device, see "Preparing for mounting", page 26.
2. Place the object with bar code at the intended reading point of the device in the viewing range of the device (no conveying movement).
3. Align device with the bar code by eye. When doing so, be aware of the following:
   - For devices with a front viewing window: The rear of the device with the laser warning label faces the viewer and is aligned approximately parallel to the bar code surface.
   - For devices with a side viewing window: The side panel with the LEDs faces the viewer and is aligned almost parallel to the bar code surface.
   - During reading, note the reading angle that occurs see "Angular orientation of the device", page 29.
   - If the position of the bar code within the scan line is relevant for the evaluation, observe the counting direction of the code position, see "Counting direction of the reading angle", page 30.
4. Mount the device bracket onto the base.
5. Screw suitable screws through the bracket into the blind tapped hole of the device. Tighten the screws lightly for the time being.
6. Configure the device, see "Adjusting the device for operational use", page 49.
7. After adjustment, tighten the screws. Do not exceed the maximum tightening torque.

## 5.5 Mounting external components

### 5.5.1 Mounting the connection module

If a connection module is used for device control, mount the connection module close to the device.

**NOTE**

**Observe the maximum cable length when connecting to the serial AUX interface.**

If the computer with the SOPAS ET configuration software accesses the AUX interface (RS-232; 57.6 kBd) of the device via the connection module, do not mount the connection module further than a 3 m cable length from the device.

1. Mount the connection module in the vicinity of the device.
2. Mount the connection module in such a way that the open module can be accessed at all times.

**NOTE**

For detailed information on mounting and electrical installation, please refer to the respective operating instructions for the connection module.

### 5.5.2 Mounting external read cycle sensor

If an external read cycle sensor (e.g. photoelectric sensor) triggers the device, mount the sensor close to the device.

**NOTE**

A large selection of photoelectric sensors and accessories (brackets, connecting cables) can be found at www.sick.com.

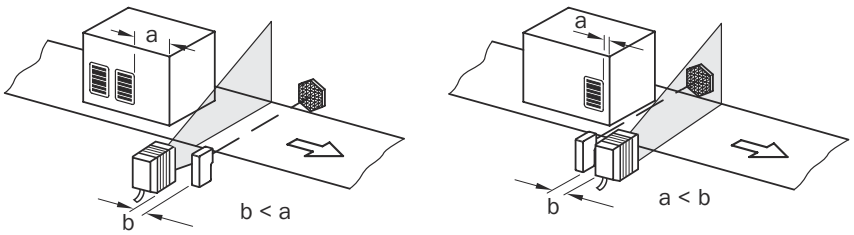



*Figure 15: Bar code at the end or start of the piece goods*

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

# 6 Electrical installation

## 6.1 Safety

### 6.1.1 Notes on the electrical installation

**NOTICE**
**Equipment damage due to incorrect supply voltage!**

An incorrect supply voltage may result in damage to the equipment.

- Only operate the device using a protected low voltage and safe electrical insulation as per protection class III.

**NOTICE**
**Equipment damage or unpredictable operation due to working with live parts.**

Working with live parts may result in unpredictable operation.

- Only carry out wiring work when the power is off.
- Only connect and disconnect electrical connections when the power is off.

- **The electrical installation must only be performed by electrically qualified personnel.**
- **Standard safety requirements must be observed when working on electrical systems!**
- Only switch on the supply voltage for the device when the connection tasks have been completed and the wiring has been thoroughly checked.
- When using an extension cable with an open end, make sure that bare wire ends are not touching (risk of short-circuit when the supply voltage is switched on). Wires must be properly insulated from each other.
- Wire cross-sections in the supply cable from the user's power system must be selected in accordance with the applicable standards. When this is done in Germany, observe the following standards: DIN VDE 0100 (Part 430) and DIN VDE 0298 (Part 4) or DIN VDE 0891 (Part 1).
- Circuits connected to the device must be designed as SELV circuits (SELV = Safety Extra Low Voltage).
- Protect the device with a separate fuse of max. 2 A at the start of the supply circuit.

**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.

**Enclosure rating**

For further information, see "Conditions for specified enclosure rating", page 8

### 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 designed and tested for electrical safety in accordance with EN 62368-1.

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

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

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

This is achieved by complying with the following conditions:

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

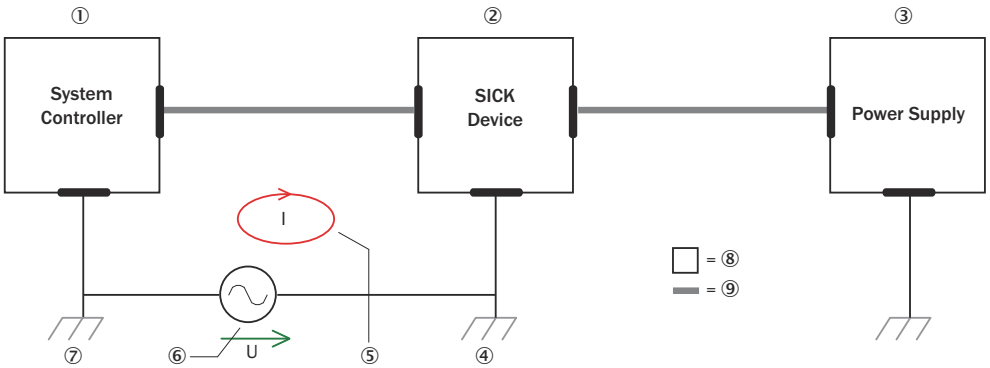



*Figure 16: Example: Occurrence of equipotential bonding currents in the system configuration*

① System controller
② Device
③ Voltage supply
④ Grounding point 2

⑤ Closed current loop with equalizing currents via cable shield
⑥ Ground potential difference
⑦ Grounding point 1
⑧ Metal housing
⑨ Shielded electrical cable

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

### Remedial measures

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

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

### Measures for widely distributed system installations

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

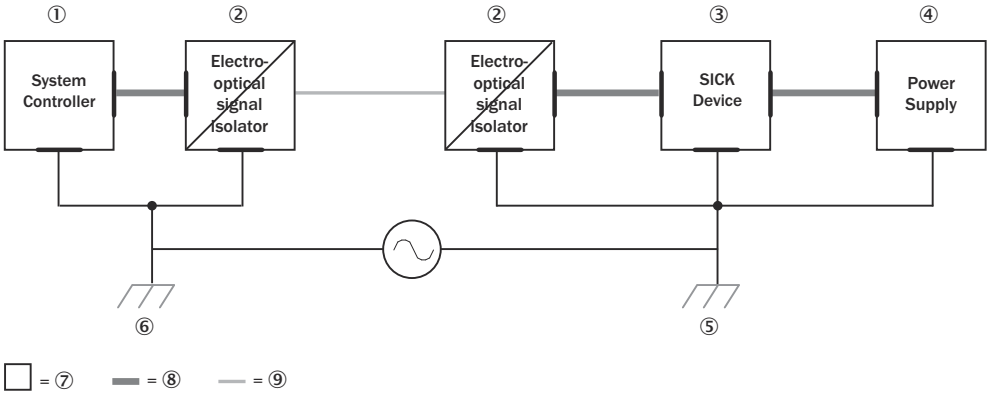



*Figure 17: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators*

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

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

**Measures for small system installations**

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

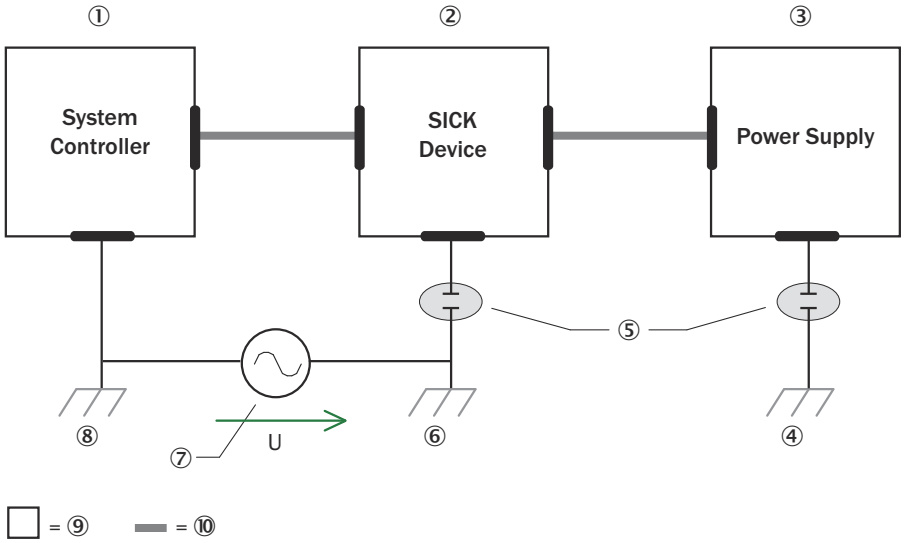



*Figure 18: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device*

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/CLV61x

**NOTE**

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

Information about pin, signal and wire color assignments can be found in the appendix, see "Signal assignment of cables with open cable end at one end", page 74.

**NOTICE**

**Faults during operation and device or system defects!**

Incorrect wiring may result in operational faults and defects.

- Follow the wiring notes precisely.

The electrical connection of the device is configured as a cable with a D-Sub HD male connector.

The enclosure rating stated in the technical data is achieved only with a screwed plug connector. If an extension cable is used, a corresponding rubber seal (SICK accessory) must be fitted between the two plug connectors.

### Shielding requirements

- To ensure a fault-free data transmission, an effective and comprehensive shielding solution must be implemented.
- Apply a cable shield at each end, i.e. in the control cabinet and at the device. The cable shield of the connecting cable is connected to the housing of the D-Sub plug connector. After plugging in and fixing the plug connector, the screen is connected to the device housing over a large area.
- The cable shield in the control cabinet must be connected over a large surface to the ground potential on the potential equalization conductor.
- Take appropriate measures (e.g. earthing method) to prevent equipotential bonding currents from flowing through the cable shield.
- During installation, pay attention to the different cable groups. The cables are grouped into the following four groups according to their sensitivity to interference or radiated emissions:
  - Group 1: cables very sensitive to interference, such as analog measuring cables
  - Group 2: cables sensitive to interference, such as device cables, communication signals, bus signals
  - Group 3: cables that are a source of interference, such as control cables for inductive loads and motor brakes
  - Group 4: cables that are a powerful source of interference, such as output cables from frequency inverters, welding system power supplies, power cables
  - ▶ Cables in groups 1, 2 and 3, 4 must be crossed at right angles (see figure 19).
  - ▶ Route the cables in groups 1, 2 and 3, 4 in different cable channels or use metallic separators (see figure 20 and see figure 21). This applies particularly if cables of devices with a high level of radiated emission, such as frequency converters, are laid parallel to device cables.

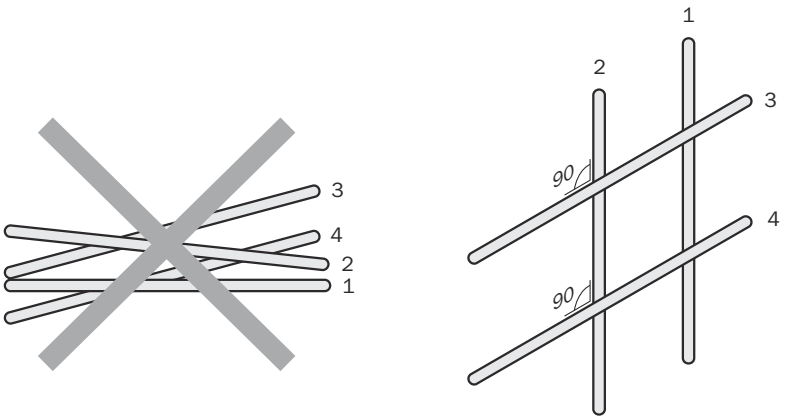



*Figure 19: Cross cables at right angles*

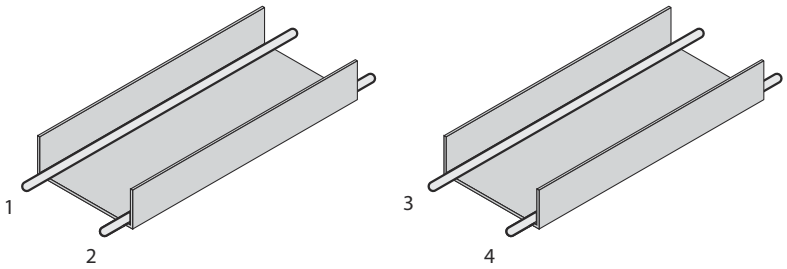



*Figure 20: Ideal laying – Place cables in different cable channels*

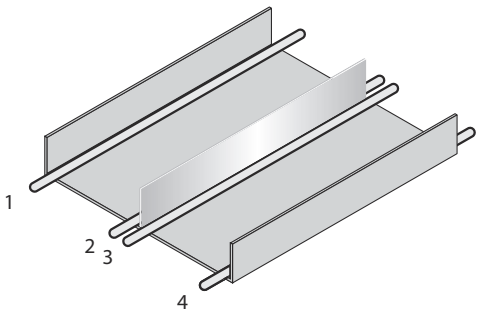



*Figure 21: Alternative laying – Separate cables with metallic separators*

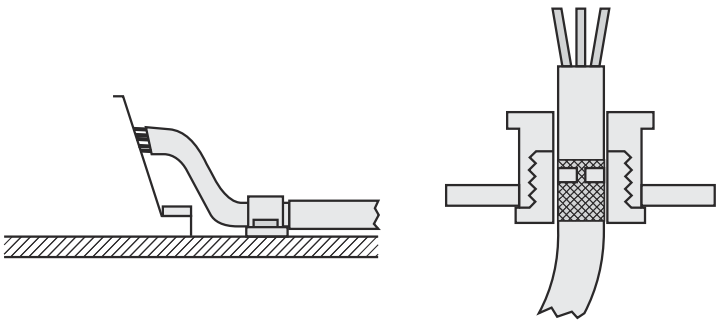


*Figure 22: Shield connection in plastic housings*

## 6.3 Pin assignments for electrical connections

### CLV61x CAN / FIELDBUS

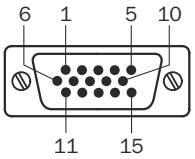


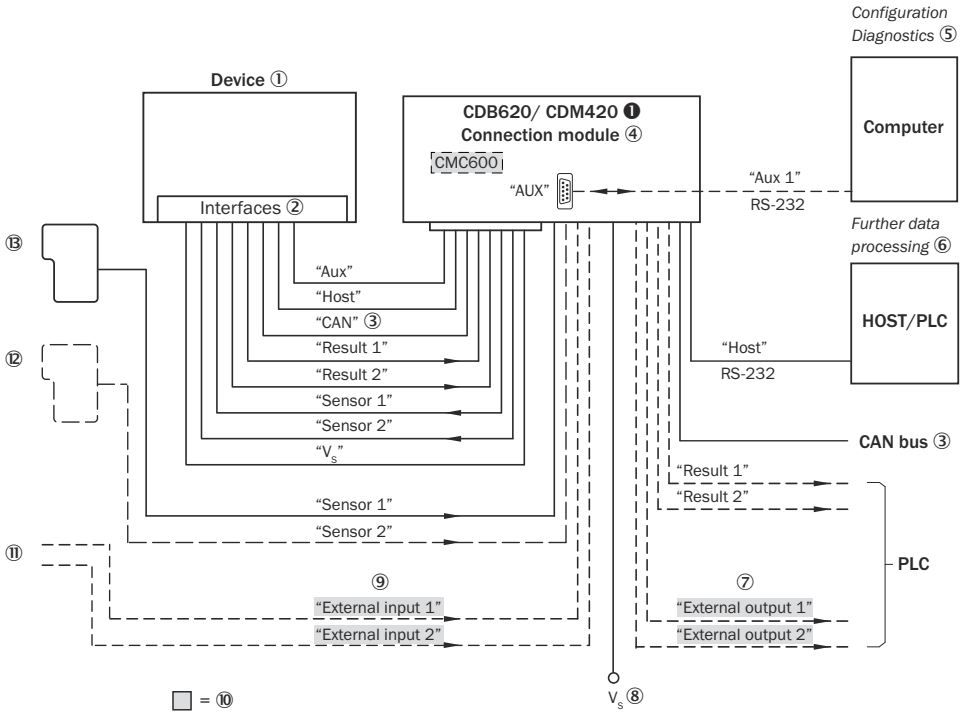

*Figure 23: Male connector, D-Sub-HD, 15-pin*

*Table 8: Male connector pin assignment, D-Sub-HD, 15-pin*

| Pin | Signal | Function |
|---|---|---|
| 1 | $V_S$ [1)] | Supply voltage |
| 2 | RxD (RS-232), Aux | AUX interface (receiver) |
| 3 | TxD (RS-232), Aux | AUX interface (sender) |
| 4 | Sensor 2 | Digital input (function adjustable, e.g., stop external reading pulse) |
| 5 | GND | Ground |
| 6 | n.c. | Not connected |
| 7 | RxD (RS-232), Host | Host interface (receiver) |
| 8 | n.c. | Not connected |
| 9 | TxD (RS-232), Host | Host interface (sender) |
| 10 | CAN_H | CAN bus (IN/OUT) |
| 11 | CAN_L | CAN bus (IN/OUT) |
| 12 | Result 1 | Digital output, function adjustable |
| 13 | Result 2 | Digital output, function adjustable |
| 14 | Sensor 1 | Digital input (function adjustable, e.g. start external reading pulse) |
| 15 | SensGND | Common ground of the digital inputs |
| – | – | Screen |

1) Level and type of supply voltage see "Mechanics/Electronics", page 63.

## 6.4 Connection diagrams




❶ CDB620-001 or CDM420
① Device
② Interfaces
③ CAN
④ Connection modules
⑤ Configuration or diagnostics
⑥ Data further processing
⑦ External digital outputs
⑧ Supply voltage $V_S$
⑨ External digital inputs
⑩ The CM600 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 Other functions
⑫ Application-specific alternative stop reading pulse (e.g., photoelectric sensor) or travel increment (incremental encoder)
⑬ Start/Stop reading pulse (e.g., photoelectric sensor)

## 6.5 Wiring interfaces

### 6.5.1 Connecting the supply voltage

Connect the device only to a power supply unit that has the following properties:

- Stabilized safety extra-low voltage SELV according to currently valid standards
- Supply voltage, depending on the length of the connecting cable:
  - 10 V DC to 30 V DC, for devices with connecting cable 0.6 m up to max. 3 m
  - 12 V DC up to 30 V DC, for devices with connecting cable 3 m up to max. 6 m

- Power source with at least 3.5 W power
- When using the optional CMC600 parameter cloning module in the connection module: Additional output power 0.5 W

#### Wiring with SICK connection module

Feeding supply voltage for the device via a connection module:

| Connection modules | Interface | Reference |
|---|---|---|
| CDB620-001 | Supply voltage | see "Connecting supply voltage for the device in CDB620-001", page 78 |
| CDM420-0001 | Supply voltage | see "Connecting supply voltage for the device in CDM420-0001", page 90 |
| CDM420-0006 | Supply voltage | see "Connecting supply voltage for the device in CDM420-0006", page 102 |

**NOTE**

For further connection modules see

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

If the supply voltage is connected via a connection module, observe the respective operating instructions of the module.

#### Protecting the supply cables

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

Observe the following standards in Germany:

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

Supply voltage directly via a SICK connection module or via customer-side supply voltage.

### 6.5.2 Wiring the data interface

#### 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 9: Data transmission rates*

| Interface type | Data transmission rate | Distance to the target computer (host) |
|---|---|---|
| RS-232 (Host) | Up to 19.2 kBd<br>38.4 kBd ... 57.6 kBd<br>115.2 kBd ... 500 kBd | Max. 10 m<br>Max. 3 m<br>Max. 2 m |
| RS-232 (AUX) | 57.6 kBd | Max. 3 m |

**NOTICE**

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

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

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

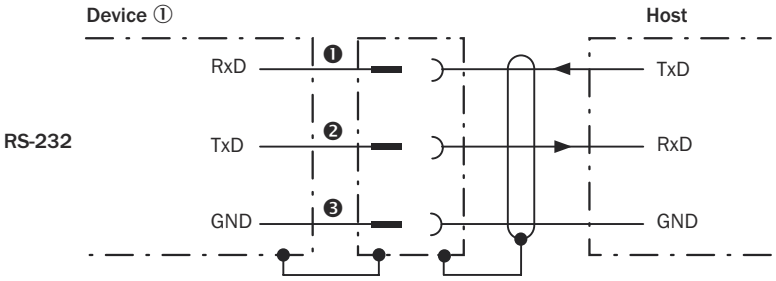



*Figure 24: Internal circuitry for RS-232 data interface*

① Device

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

**Wiring the serial data interface of the device (host interface) via a connection module:**

| Connection modules | Data interface | Reference |
|---|---|---|
| CDB620-001 | RS-232 | see "Wiring serial host interface RS-232 of the device in the CDB620-001", page 79 |
| CDM420-0001 | RS-232 | see "Wiring serial host interface RS-232 of the device in the CDM420-0001", page 90 |
| CDM420-0006 | RS-232 | see "Wiring serial host interface RS-232 of the device in the CDM420-0006", page 102 |

**NOTE**

For further connection modules see

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

If the data interface is wired via a connection module, observe the respective operating instructions of the module.

### 6.5.3 Wiring the CAN interface

**NOTE**

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

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

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

| Connection modules | Interface | Reference |
|---|---|---|
| CDB620-001 | CAN | see "Wiring the CAN interface in the CDB620-001", page 79 |
| CDM420-0001 | CAN | see "Wiring the CAN interface of the device in the CDM420-0001", page 91 |
| CDM420-0006 | CAN | see "Wiring the CAN interface of the device in the CDM420-0006", page 103 |

**NOTE**

For further connection modules see

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

If the CAN interface is wired via a connection module, observe the respective operating instructions of the module.

### 6.5.4 Wiring the digital inputs

Digital inputs can be used, for example, to start and end the reading pulse or to feed in an increment signal.

**Physical digital inputs on the device:**

*Table 10: Characteristic data of the digital inputs*

| | |
|---|---|
| **Type** | Switching |
| **Switching behavior** | Power to the input starts the assigned function, e.g., start of the internal reading interval of the device. |
| **Properties** | • Opto-decoupled, reverse polarity protected<br>• Can be wired with PNP output of a trigger sensor |
| **Electrical values** | The electrical values are identical for all digital inputs.<br>Low: $\lvert V_{in}$ [1] $\rvert \leq 2$ V; $\lvert I_{in}$ [2] $\rvert \leq 0.3$ mA<br>High: 6 V $\leq \lvert V_{in} \rvert \leq 32$ V; 0.7 mA $\leq \lvert I_{in} \rvert \leq 5$ mA |

1) Input voltage.
2) Input current.

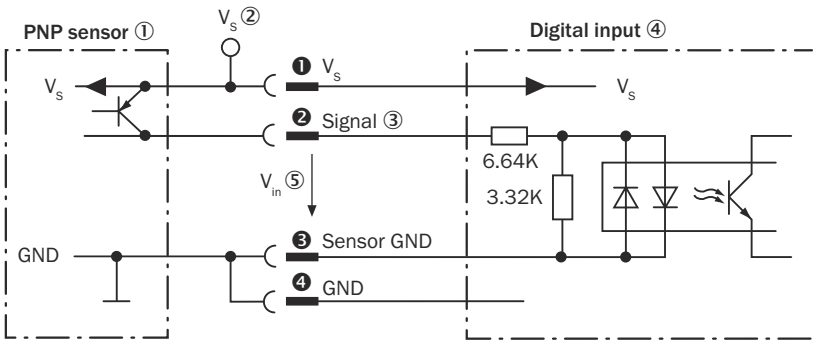



*Figure 25: Wiring of a digital input on the device with external PNP sensor*

① PNP sensor
② Supply voltage $V_S$
③ Input signal
④ Digital input
⑤ Input voltage $V_{in}$
❶...❹ For pin assignment, see respective device

**External digital inputs in the CDB/CDM connection module (optional):**

The optional CMC600 parameter cloning module provides two additional external digital inputs at the corresponding terminals in the connection module.

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

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

**Function assignment**

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

**Wiring the digital inputs via a connection module:**

| Connection modules | Digital inputs | Reference |
|---|---|---|
| CDB620-001 | “Sens 1”<br>“Sens 2” | see "Wiring digital inputs of the device in the CDB620-001", page 81 |
| | External input 1 (“In 1”)<br>External input 2 (“In 2”) | see "Wiring the external digital inputs of the device in the CDB620-001", page 83 |
| CMD420-0001 | “Sensor 1”<br>“Sensor 2“ | see "Wiring digital inputs of the device in the CDM420-0001", page 93 |
| | External input 1 (“Aux In 1”)<br>External input 2 (“Aux In 2”) | see "Wiring the external digital inputs of the device in the CDM420-0001", page 95 |
| CMD420-0006 | “Sensor 1”<br>“Sensor 2“ | see "Wiring digital inputs of the device in the CDM420-0006", page 105 |
| | External input 1 (“Aux In 1”)<br>External input 2 (“Aux In 2”) | see "Wiring the external digital inputs of the device in the CDM420-0006", page 107 |

**NOTE**
For further connection modules see
- www.sick.com/CDB
- www.sick.com/CDM

If the digital inputs are wired via a connection module, observe the respective operating instructions of the module.

### 6.5.5 Wiring the digital outputs

The digital outputs can be assigned, independently of each other, various functions for event status indication. If the allocated event occurs in the read process, then the corresponding digital output is live after the end of the reading pulse for the selected pulse duration.

**Physical digital outputs on the device:**

*Table 11: Characteristic data of the digital outputs*

| | |
|---|---|
| **Type** | Switching |
| **Switching behavior** | PNP switching against supply voltage $V_S$ |
| **Properties** | Short-circuit protected<br>Temperature protected<br>Not electrically isolated from $V_S$ |
| **Electrical values** | The electrical values are identical for all digital outputs.<br>$0\ V \leq V_{out}$ [1] $\leq V_S$<br>($V_S$ [2] $-1.5\ V$) $\leq V_{out} \leq V_S$ at $I_{out}$ [3] $\leq 100\ mA$ |

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

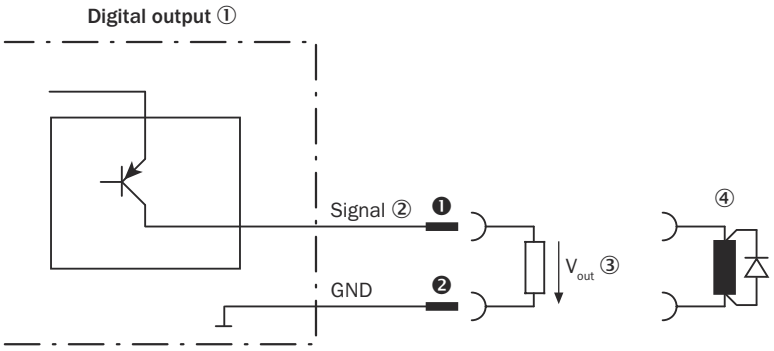



*Figure 26: Wiring a digital output on the device*

① Digital output
② Output signal
③ Output voltage $V_{out}$
④ With inductive load: see note
❶...❷ For pin assignment, see respective device

**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. The limit value is a maximum capacitance of 100 nF.

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

1. Connect the digital outputs according to the application.
2. For the thorough check of the switching functions, use a high resistance digital voltmeter and wire the digital outputs with a load.
   This prevents the display of incorrect voltage values/output states.

**External digital outputs in the CDB/CDM connection module (optional):**

The optional CMC600 parameter cloning module provides two additional external digital outputs at the corresponding terminals in the connection module.

**NOTE**
The digital outputs are not 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.

### Function assignment

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

**Wiring the digital outputs via a connection module:**

| Connection modules | Digital outputs | Reference |
|---|---|---|
| CDB620-001 | “Result 1”<br>“Result 2” | see "Wiring digital outputs of the device in the CDB620-001", page 84 |
| | External output 1 (“ Out 1”)<br>External output 2 ("Out 2") | see "Wiring the external digital outputs of the device in the CDB620-001", page 86 |
| CMD420-0001 | “Result 1”<br>“Result 2” | see "Wiring digital outputs of the device in the CDM420-0001", page 97 |
| | External output 1 (“Aux Out 1”)<br>External output 2 (“Aux Out 2”) | see "Wiring the external digital outputs of the device in the CDM420-0001", page 98 |
| CMD420-0006 | “Result 1”<br>“Result 2” | see "Wiring digital outputs of the device in the CDM420-0006", page 109 |
| | External output 1 (“Aux In 1”)<br>External output 2 (“Aux In 2”) | see "Wiring the external digital outputs of the device in the CDM420-0006", page 110 |

**NOTE**
For further connection modules see
- www.sick.com/CDB
- www.sick.com/CDM

If the digital outputs are wired via a connection module, observe the respective operating instructions of the module.

# 7 Commissioning

## 7.1 Overview of the commissioning steps

- Commissioning of the device with factory default
- Installing the SOPAS ET configuration software
- Connecting the device to a computer using the SOPAS ETconfiguration software
- Adjustment and configuration of the device to optimize functionality
- Test of the device for correct functionality in read operation

## 7.2 SOPAS ET configuration software

The SOPAS-ET configuration software can be used to adapt the device to the reading situation on site. The configuration data is stored and archived as a parameter set (project file) on the computer.

### 7.2.1 Functions of the SOPAS ET configuration software for the device (overview)

The general functions of the software and its operation are described in the online help in the SOPAS ETconfiguration software:

- Choice of the menu language (German, English)
- Setting up communication with the device
- Password-protected configuration for different operating levels
- Recording of the data in continuous operation (recording and analyzing data of certain memory areas of the device with the data recorder)
- Diagnostics for the system

### 7.2.2 Installing SOPAS ET

**NOTE**

The SOPAS ETconfiguration software, the current system prerequisites for the computer, and the instructions for downloading can be found online at:

- www.sick.com/SOPAS_ET

1. Start computer. Download the latest version of the configuration software.
2. If the installation does not start automatically, run setup.exe from the download folder.
3. Follow the operating instructions to complete the installation.

### 7.2.3 Starting the SOPAS ET configuration software and connecting to the device

1. Electrically connect one of the data interfaces of the device to the Internet-capable computer.
2. Download and install the latest version of the SOPAS ET configuration software as well as the current device description file (*.sdd) for the device as per the instructions.
   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.
3. Start the “SOPAS ET” program option after completing the installation.
   Path: Start > Programs > SICK > SOPAS ET Engineering tool > SOPAS.
4. Establish a connection between SOPAS ET and the device (RS-232) using the automatically launched wizard.
   Select the CLV61x from the list of available devices. The default data transmission rate of the serial connection is 57.6 kBd.

✓ SOPAS ET establishes communication with the device and loads the associated device description file. The project tree of the device opens.

## 7.3 Initial commissioning

### Parameterization (configuration)

The user adjusts the device to the reading situation on site. To do so, the device is usually connected directly to the computer (online method). With the help of the SOPAS ET configuration software, the user selects suitable values per parameter from an assigned value range.

The starting point for adjustment during the initial commissioning is a copy of the device's factory default settings in the working memory with predefined parameter values. Each of the parameter values can be changed within the value range to optimize the device. The result using the SOPAS ET configuration software is the creation of an application-specific, new parameter set, initially only in the working memory of the device.

After testing the desired functionality, the user permanently stores in the device the configured parameter set for reading operation. The factory default settings cannot be overwritten. The default settings remain available at all times in case the device needs to be reset (see figure 27, page 49).

The device can permanently save **one** application-specific parameter set.

To test the effect on the reading operation of changing the parameter values, save each different configuration on the computer in a separate file. Then download the parameter sets one after the other to the device for testing, without saving them permanently. Each download overwrites the previously transferred parameter set in the working memory. The "Permanent" option only saves in the device the last parameter set configured for the application.

### Manually saving the parameter set

**NOTE**
As part of a structured data backup concept, it is recommended to save the currently valid parameter set on the computer using a project file (SOPAS file) and thereby archive it. Use a meaningful name when doing so.

### Automatically backing up the parameter set

**NOTE**
External, optional parameter memories allow direct, automated parameter cloning outside the internal parameter memory of the device. In case of defects, it is possible to exchange the device quickly without losing configuration data.

The following components are available as storage media for the device:

- CMC600 parameter cloning module for the CDB or CDM connection modules

### Memory organization for parameter set

The diagram shows the memory management principle for the involved internal and external components:

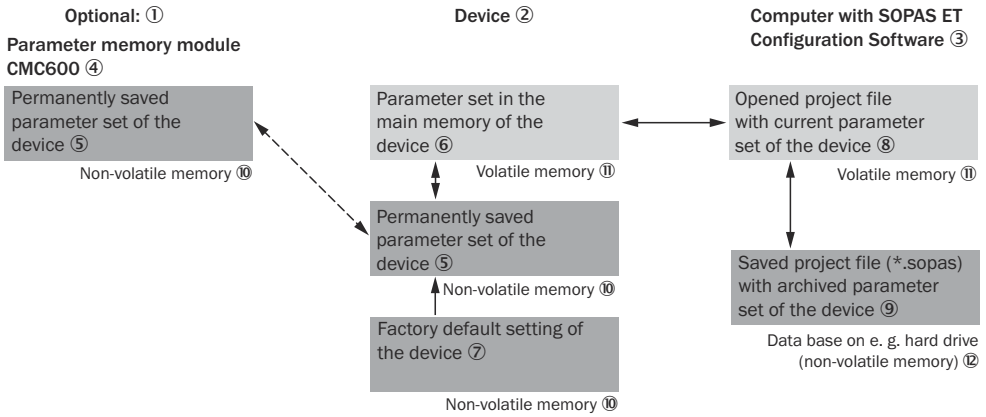



*Figure 27: Configuration with SOPAS ET and saving the parameter set*

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

**Saving behavior using the “Permanent” saving option:**

The device is connected to a CDB or CDM connection module. The connection module contains a CMC600 parameter cloning module: When the currently valid parameter set is saved in the device, this is also done externally in the CMC600.

**Defective device: Support for replacement with no manual reconfiguration required:**

**NOTE**
The device replacement will only be successful if the defective device is replaced by an exchange unit of the **same type**. The defective device must have been operated with automated parameter cloning before the failure.

To replace a defective device with an exchange unit, a CMC600 with the current parameter set must be present in the connection module connected to the defective device.

For more information, see "Device exchange with transmission of the current configuration data", page 59.

## 7.4 Adjusting the device for operational use

Before the final adjustment of the device, complete the electrical installation. Put the device into operation.

1. Loosen the bracket screws so that the device can be aligned.
2. Align the device so that the angle between the scanning line and the bar code stripes is almost 90°.

3. To prevent interference reflections, do not align the device so that it is plane parallel to the object surface.
4. Manually place objects with bar codes one after the other into the reading range of the device, see "Technical data", page 61.
5. Check the reading result with the SOPAS ET configuration software.
6. Place objects at different alignments (angles) in the reading field and ensure that the limit values for the permitted reading angles are not exceeded, see "Angular orientation of the device", page 29.
7. Align the device so that the good read rate is between 70% and 100%.
8. Tighten the screws on the device.

## 7.5 Fine adjustment and further configuration

**NOTE**
The additional settings and the fine adjustment depend on the respective application situation.

### User level, downloading parameters to the device

The user is automatically logged on to the device in the “Authorized client” user level. This allows the user to change parameters, which are then immediately transferred to the device (default).

### Commissioning via Quickstart

The Quickstart tab provides an overview of the most important parameters. The Quickstart can be used to quickly evaluate a code content. The Quickstart provides, amongst other things, functions such as evaluation window, percentage evaluation, code configuration and adjusting mode.

### Application wizard

The application wizard (“Magic Wand” icon) assists with configuring the device. Either as standalone device, or as a master and slave for a master/slave combination based on the CAN bus.

### Evaluation window

The evaluation window shows the code content, the object index, the code type, the code security, and the device number of the reading device.

### Percentage evaluation

Percentage evaluation permanently assesses the quality of the reading. Bar codes are not assessed. Here, the bar codes must not be subjected to any conveying movement. The device performs 100 scans at a time to evaluate the reading quality. The device continuously outputs read results every 2 s via the AUX interface, together with the read diagnostics data. A timer starts when percentage evaluation is called. If no manual abort occurs, the device automatically returns to reading operation after 5 minutes.

### Code configuration

In the factory default setting, the device decodes the following code types:

- Code 39
- 2/5 interleaved
- Code 128 family

You can activate further code types and configure advanced decoder properties (Device tree > Parameters > Code configuration).

### Scanning frequency

You can set the scan frequency in the range from 400 Hz to 1,000 Hz (Device tree > Parameters > Read configuration).

### Object trigger control

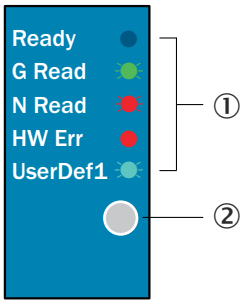
Device with an additionally connected read cycle sensor (for example a photoelectric sensor at the “Sensor 1” digital input): select the “Sensor 1” setting (Device tree > Parameters > Object trigger control).

Test the configured settings during operational use of the system. Modify the settings if necessary.

# 8 Operation

## 8.1 Operating and status indicators

### 8.1.1 Optical display




① Signal color assignment for device status or events, indicated by the sensor LED

② Sensor LED (RGB), 1 x

#### Sensor LED

*Table 12: CLV61x: Display behavior of the sensor LED*

| Display function | Color | Behavior LED | Device status |
|---|---|---|---|
| Ready | – | ○ | Device without supply voltage |
| **After switching on supply voltage:** | | | |
| Ready | Blue | ● | • Self-test successful, device ready for operation<br>• After parameter download or upload and successful firmware download: Device again ready for operation |
| HW Err | Red | ● | Hardware fault |
| **Read operation:** | | | |
| G Read | Green | ● | LED lights up briefly.<br>Reading successful (Good Read) |
| N Read | Red | ● | LED lights up briefly.<br>Reading unsuccessful (No Read) |
| UserDef1 | Light blue | ○ | UserDef1 (reserved) |
| **Parameter: Download to device or parameter upload from device** | | | |
| – | – | ○ | LED goes out.<br>Function is executed. |
| **Firmware update: Download to device** [1] | | | |
| | Red<br>Blue | ●● | LED flashes alternately in both colors.<br>Function is continued: The device replaces the previous data with the new data. |
| **Firmware update: Completion** | | | |
| Ready | Red | ● | Firmware download: Failed<br>Error: Completion not successful |

○ = LED off, ● = LED lit, ● = LED flashing, ●● = LED flashing alternately in different colors.

1) Combined signal colors are assigned to the function, if necessary.

### 8.1.2 Acoustic signaler (beeper)

Depending on the operating mode of the device, the beeper uses different melodies or individual sounds to indicate the following results:

- Fulfillment or non-fulfillment of a configured condition during reading operation (e.g., Good Read)
- The completion of device functions triggered by the user or ended by quitting (confirmation of operation steps)
- Completion of functions (positive or negative confirmation)

*Table 13: Beeper behavior*

| Operating mode | Function/Sound |
|---|---|
| Switch on device | Successful self-test and start of reading operation: Melody |
| Read operation | Confirmation of Good Read in default setting: sound.<br>Configurable event condition [1)] |
| Percentage evaluation | Start: melody<br>100 scans per reading: one tone<br>End: melody |
| Configuration | Downloading parameters to the device:<br>Start: melody, successful completion: melody<br>Parameter upload from device: No sound |
| Firmware download | **Firmware:** Start: one tone, successful completion: one tone<br>**Reboot device:** Successful completion: melody<br>**Loading the sdd file into the device:** Successful completion: Melody |

1) Assignment e.g., via the SOPAS ET configuration software

**Beeper Default Setting:**

Switched on, volume: quiet, reading operation: output condition “Good Read”.

## 8.2 Operating options

The device can be configured according to application in the following manner:

- Locally at the device with the SOPAS ET configuration software. Backup of the parameter set as a configuration file on the computer using SOPAS ET. Access to the device via AUX interface (RS-232).
- As an alternative to the SOPAS ET configuration software, command strings are available, upon which the operator interface of the configuration software is also based. These are also for the triggering of device functions (e.g. reading). Documents on the command strings can be obtained from SICK on request.

The SOPAS ET configuration software is used for device diagnostics in case of a fault.

The device operates fully automatically when operational.

# 9 Maintenance

## 9.1 Maintenance plan

During operation, the device works maintenance-free.

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

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 |

## 9.2 Cleaning

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

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

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

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

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

### Cleaning the 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 viewing window is made of glass, see "Technical data", page 61.

**Cleaning procedure:**

**CAUTION**
**Optical radiation: Class 2 Laser Product**
The human eye is not at risk when briefly exposed to the radiation for up to 0.25 seconds. Exposure to the laser beam for longer periods of time may cause damage to the retina. The laser radiation is harmless to human skin.

- Do not look into the laser beam intentionally.
- Never point the laser beam at people's eyes.
- If it is not possible to avoid looking directly into the laser beam, e.g., during commissioning and maintenance work, suitable eye protection must be worn.
- Avoid laser beam reflections caused by reflective surfaces. Be particularly careful during mounting and alignment work.
- Do not open the housing. Opening the housing may increase the level of risk.
- Current national regulations regarding laser protection must be observed.

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

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

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

### 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.

### Cleaning other, optically effective surfaces

Depending on the equipment of the reading station, additional local sensors with optically effective areas may be installed (e.g. photoelectric sensor for external read cycle). Contamination on these sensors can result in faulty switching behavior.

- To avoid faulty switching behavior, remove dirt from the optical surfaces of the external sensors.

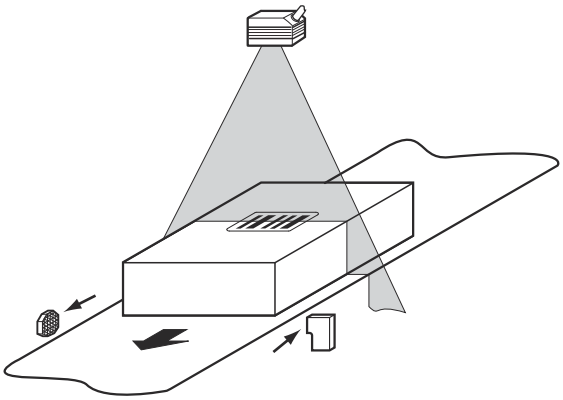


*Figure 28: Cleaning the external optical sensors (read pulse encoder)*

# 10 Troubleshooting

## 10.1 Overview of possible errors and faults

**NOTICE**

**Danger due to damage to the device**

For reasons of safety, if a device shows visible signs of damage do not put it into operation. Immediately take a device that is in operation out of operation.

**Damage includes, depending on the type of device, for example the following:**

- Viewing window pane: Cracked or broken
- Housing: Cracked or broken
- Violation of the cable outlet on the housing or the cable itself
- Overtightening of the male connector unit, tearing or breakage of the housing
- Moisture penetration in the device

Possible faults and corrective actions are described in the table below for troubleshooting.

*Table 15: Errors and faults*

| Situation | Error or fault |
|---|---|
| Mounting | ■ Device poorly aligned to objects with bar codes(e.g., dazzle)<br>■ Read cycle sensor incorrectly positioned, for example the internal reading interval is opened too early or closed too late. |
| Electrical installation | ■ Data interfaces of the device wired incorrectly<br>■ Voltage supply not sufficiently dimensioned or cables with too small a cross-section used |
| Configuration | ■ Functions not adapted to local conditions, e.g. parameters for the data interface not set correctly<br>■ Device limits not observed, e.g. reading distance, aperture angle<br>■ Trigger source for read cycle not selected correctly |
| Operation | ■ Control of the reading pulse not correct or not suitable for the object<br>■ Device faults (hardware/ software) |

## 10.2 Detailed fault analysis

### 10.2.1 LEDs on the device

The display of the LEDs can indicate possible faults or errors, see "Optical display", page 52. Further information on this can be found in the “System Information” section.

### 10.2.2 System information

The device reports any errors that occur in a number of ways. The error output is hierarchical. This hierarchical structure allows for an increasingly detailed level of analysis:

- Communication errors can occur while transmitting data to the device. The device then returns an error code.
- For errors that occur during reading, the device writes errors codes in the status log, see "Status log", page 58.

#### 10.2.2.1 Status log

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

The device distinguishes between four types of fault:

- Information
- Warning
- Error
- Critical fault

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

##### 10.2.2.1.1 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. Open CLV6xx in the project tree: Service > System status > System information tab

## 10.3 Repairs

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

If an error cannot be rectified, the device may be defective.

However, it is possible to quickly replace a device with a stocked device of the same type, see "Device exchange with transmission of the current configuration data", page 59.

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

**NOTE**
Before calling, make a note of all type label data as well as the connection technology used to ensure faster assistance.

Type label
- Type designation
- Device serial number

## 10.4 Disassembly

**Dismantling the device**

1. Switch off the supply voltage to the device.
2. Disconnect the connecting cable of the device.
3. To replace the device, mark the position and orientation of the device on the bracket or surrounding area.
4. Remove the device from the bracket.

## 10.5 Returns

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

**NOTE**

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

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

## 10.6 Device exchange with transmission of the current configuration data

**NOTE**

Backup concept with computer: If the parameter set of the defective device is saved, the parameter set can be transferred manually to the replacement device. For possible alternatives due to optional equipment, see the following section.

1. Check that the replacement device of the same type (repaired or new device) is de-energized.
2. Mount and align the replacement device (see "Mounting", page 26). When doing so, note the previously applied markings on the bracket or surroundings, see "Disassembly", page 58.
3. Connect the connecting cable of the replacement device to the CDB/CDM connection module.
4. Switch on the supply voltage for the device. The device starts with its previous settings (new device: defaults).
5. Depending on whether external storage media for the parameter set are present, the exchanged device responds as follows:
   - Automated configuration via the CMC600 parameter cloning module in the CDB/CDM connection module: The device transfers the parameter set from the cloning module to its permanent memory.
   - Manual configuration using the SOPAS ET configuration software is required if there is no CMC600 parameter cloning module in the CDB/CDM connection module. The device retains its previous settings. Connect to the device via SOPAS ET . Transfer the configuration saved on the computer to the device via download. Permanently save the configuration in the device.

# 11 Decommissioning

## 11.1 Disposal

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

**NOTICE**

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

Disposing of devices improperly may cause damage to the environment.

Therefore, observe the following information:

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

# 12 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/CLV61x

Please note: This documentation may contain further technical data.

## 12.1 Features

*Table 16: Technical data features*

| | CLV610 | CLV612 | CLV615 |
|---|---|---|---|
| **Work area** | Mid range | Short Range | Long Range |
| **Scanning methods** | Line scan or raster scan [1], type-dependent | | |
| **Sensor type** | Line scanner or raster scanner, type-dependent, identifier see "Type code", page 15 | | |
| **Orientation of viewing window** | Front or side [2] [3], type-dependent, identifier see "Type code", page 15 | | On the side [2] [3] |
| **Aperture angle** | ≤ 50° | | |
| **Optical focus** | Fixed focus | | |
| **Code resolution** | 0.2 mm ... 1.0 mm | 0.1 mm ... 0.2 mm | 0.35 mm ... 0.5 mm |
| **Reading ranges** | see "Reading field diagrams (working ranges)", page 64 | | |
| **Scanning frequency** | 400 Hz ... 1,000 Hz | | |
| **Light source** | Laser diode, visible red light (λ = 655 nm) | | |
| **Light spot** | Circular | | |
| **MTTF (laser diode)** | 40,000 hours at 25 °C | | |
| **MTBF** | 100,000 hours | | |
| **Laser class** | Class 2 according to EN/IEC 60825-1:2014. Identical laser class for issue EN/IEC 60825-1:2007.<br>Conforms to 21 CFR 1040.10 except for deviations per Laser Notice No. 50 of June 24, 2007, and subsequent versions. | | |
| **Laser power** | P = 1.5 mW maximum, P < 1.0 mW average | | |
| **Laser pulse duration** | < 300 µs | | |

1) Front viewing window: 8 lines, grid height approx. 15 mm at reading distance 200 mm.
Side viewing window: 8 lines, grid height approx. 15 mm at reading distance 185 mm.
2) Side viewing window: Light emission at 105° relative to the longitudinal axis of the device.
3) see "Device view", page 17.

## 12.2 Performance

*Table 17: Technical data for performance*

| | CLV610 | CLV612 | CLV615 |
|---|---|---|---|
| **Readable code structures** | 1D codes | | |
| **Bar code types** | Code 39, Code 128, Code 93, Codabar, UPC / GTIN / EAN, 2/5 Interleaved, Pharmacode | | |
| **Print ratio** | 2:1 ... 3:1 | | |

| | CLV610 | CLV612 | CLV615 |
|---|---|---|---|
| **No. of codes per scan** | 1 ... 10 (standard decoder)<br>1 ... 6 (SMART620) | | |
| **Number of codes per reading interval** [1] | 1 ... 50 (auto-discriminating) | | |
| **Number of characters per code/per reading interval** | Max. 50 characters Maximum 1,500 characters across all bar codes per reading interval, 500 characters for multiplexer function (CAN) | | |
| **Number of multiple readings** | 1 ... 99 | | |

1) Reading interval: The time window generated internally by the reading cycle for code detection and evaluation

**NOTE**
The bar codes being read must conform to at least quality level C in accordance with ISO/IEC 15416.

## 12.3 Interfaces

*Table 18: Technical data: Interfaces*

| | CLV610 | CLV612 | CLV615 |
|---|---|---|---|
| **2 x serial (RS-232)** | • Function: Host, AUX<br>• Data transmission rate: Host: 2.4 kBd ... 115.2 kBd, AUX: 57.6 kBd | | |
| **CAN** | • Only CLV61x CAN (CLV61x-Cxxxx) or FIELDBUS (CLV61x-Fxxxx)<br>• Function: SICK CAN sensor network (master/slave, multiplexer/server)<br>• Data transmission rate: 20 kbit/s ... 1 Mbit/s<br>• Protocol: CSN (SICK CAN Sensor Network) | | |
| **PROFINET** | – | – | CLV615 FIELDBUS (CLV615-Fxxxx) only PROFINET Dual Port optional over external fieldbus module CDF600-2 |
| **PROFIBUS DP** | – | – | CLV615 FIELDBUS (CLV615-Fxxxx) only PROFIBUS DP optional via external fieldbus module CDF600-2 |
| **Digital inputs** | • 2 inputs (“Sensor 1”, “Sensor 2”)<br>• Optionally 2 additional, external inputs [1]<br>• Opto-decoupled, $V_{in}$ [2] = max. 30 V, $I_{in}$ [3] = max. 5 mA, reverse polarity protected, can be wired with PNP output, debounce time adjustable (static, 0 ms ... 10,000 ms), default 10 ms | | |
| **Digital outputs** | • 2 outputs (“Result 1”, “Result 2”)<br>• Optionally 2 additional, external outputs [1]<br>• PNP, $I_{out}$ [4] = max. 100 mA, short-circuit protected, pulse duration adjustable (static, 10 ms ... 10,000 ms) | | |
| **Reading pulse** | • Pulse sources for start: Digital inputs “Sensor 1” and/or “Sensor 2”; Command (data interface), Auto pulse, CAN<br>• Pulse sources for stop: Reading cycle source, digital inputs “Sensor 1”, “Sensor 2” Command, Timer, Condition (e.g. Good Read) | | |
| **Optical displays** | 1 RGB LED, multicolor, with multifunctional signal color assignment for events | | |

| | CLV610 | CLV612 | CLV615 |
|---|---|---|---|
| **Acoustic indicators** | 1 beeper, can be switched off, can be allocated function for event status indication | | |
| **Control elements** | Configuration software | | |
| **Service function** | Backup of parameterization data (parameter cloning) outside the device memory: Optional CMC600 parameter cloning module in CDB or CDM connection module | | |
| **Configuration** | SOPAS ET configuration software, commands | | |

1) Via the optional CMC600 parameter cloning module in the CDB620 or CDM420 connection module.
2) Input voltage.
3) Input current.
4) Output current.

## 12.4 Mechanics/Electronics

*Table 19: Technical data mechanics/electrics*

| | CLV610 | CLV612 | CLV615 |
|---|---|---|---|
| **Connection type** | 1 standard cable (0.9 m +10 %) with male connector, D-Sub-HD, 15-pin | | |
| **Supply voltage $V_S$** | • 10 V DC ... 30 V DC, with connecting cable 0.6 m to max. 3 m<br>• 12 V DC ... 30 V DC, with connecting cable 3 m to max. 6 m<br><br>LPS or NEC Class 2<br>Reverse polarity protected | | |
| **Power consumption** [1] | Typical 2.8 W | | |
| **Housing** | Aluminum die cast | | |
| **Housing color** | Light blue (RAL 5012) | | |
| **Window material of the viewing window** | Glass, identifier see "Type code", page 15 | | |
| **Threaded mounting hole** | 2 x 2 blind tapped hole M5, 5 mm deep<br>Tightening torque for mounting screws: max. 2.5 Nm | | |
| **Laserwarnschild** | In combination with the type label, glued on | | |
| **Safety** | EN 62368-1: 2014-08 | | |
| **Enclosure rating** | IP 65, in accordance with EN 60529:1991-10 + A1:2002-02 | | |
| **Protection class** |  (Class 3)<br>For operation in SELV systems (EN 60950-1) or ES1 systems (EN 62368-1) | | |
| **Weight** [2] | Device with front viewing window: 265 g with cable 0.9 m<br>Device with side viewing window: 295 g with cable 0.9 m | | |
| **Dimensions (L x W x H)** [3] | Device with front viewing window: 61 mm x 66 mm x 38 mm<br>Device with side viewing window: 80 mm x 66 mm x 38 mm | | |
| **Conformities** | CE, UL [4]<br>For further conformities and certificates, see the product page on the Internet at: www.sick.com/CLV61x | | |

1) For digital outputs without load.
2) Without connecting cable and male connector, pane of the viewing window made of glass.
3) see "Device view", page 17.
4) Only UL-certified if the type label contains the UL logo and the UL conditions are complied with during device operation. For further information, see "UL conformity", page 74.

## 12.5 Ambient data

*Table 20: Technical data for ambient data*

| | CLV610 | CLV612 | CLV615 |
|---|---|---|---|
| **Electromagnetic compatibility (EMC)** | Radiated emission: EN 61000-6-4: 2007-01 + A1: 2011-02<br>Electromagnetic immunity: EN 61000-6-2: 2005-08 | | |
| **Vibration resistance** | EN 60068-2-6: 2008-02 | | |
| **Shock resistance** | EN 60068-2-27: 2009-05 | | |
| **Ambient operating temperature** | 0 °C ... +40 °C | | |
| **Storage temperature** | –20 °C ... +70 °C | | |
| **Permissible relative humidity** | 0% ... 90%, non-condensing | | |
| **Ambient light immunity** | 2000 lx, on bar code | | |
| **Bar code print contrast (PCS)** | ≥ 60 % | | |

## 12.6 Dimensional drawings

Dimensions see "Device view", page 17.

## 12.7 Reading field diagrams (working ranges)

### 12.7.1 Reading conditions for specification diagrams

| Properties | Value |
|---|---|
| Test code | Code 39 / ITF |
| Resolution | See reading field diagrams in each case |
| Scanning frequency | See characteristic curve fields for scanning frequencies |
| Print ratio | 2:1 |
| Print contrast | > 90% |
| Tilt | ±30° |
| Ambient light | < 2,000 lx |
| Good read rate | > 75% |
| Light spot | Circular |
| Window material of the viewing window | Glass (CLV61x-xxx**0**) |

**NOTE**
The reading distances are measured radially from the device.

### 12.7.2 CLV610: Mid Range

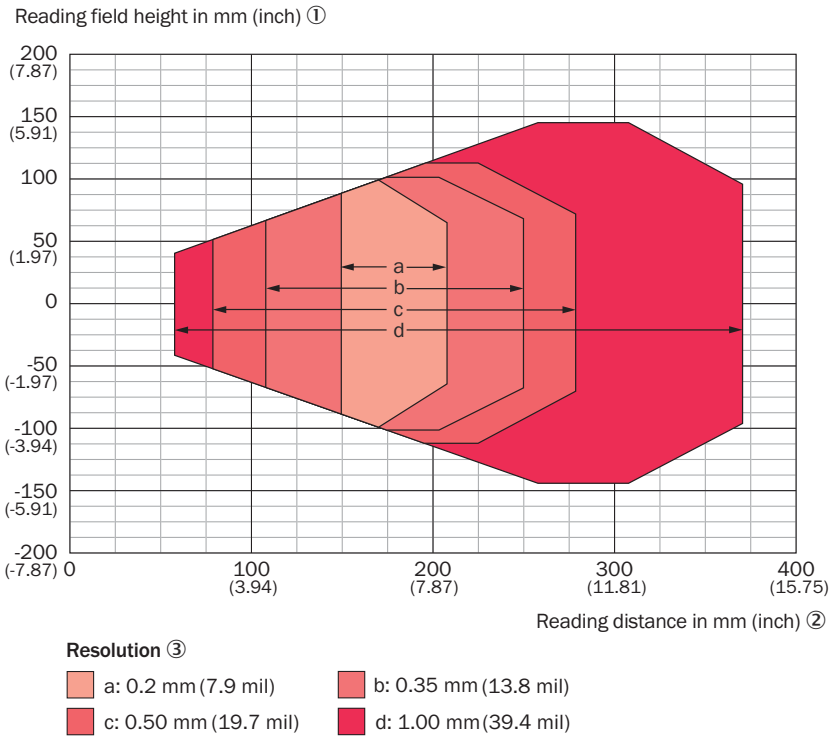



*Figure 29: Reading field diagram for CLV610, Mid Range, front viewing window*

① Reading field height in mm (inch)
② Reading distance in mm (inch)
③ Resolution

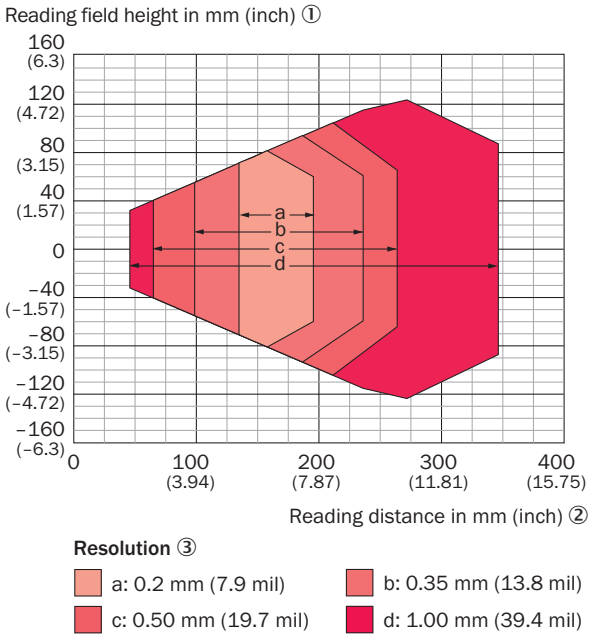



*Figure 30: Reading field diagram for CLV610, Mid Range, side viewing window*

① Reading field height in mm (inch)
② Reading distance in mm (inch)
③ Resolution

### Scanning frequencies

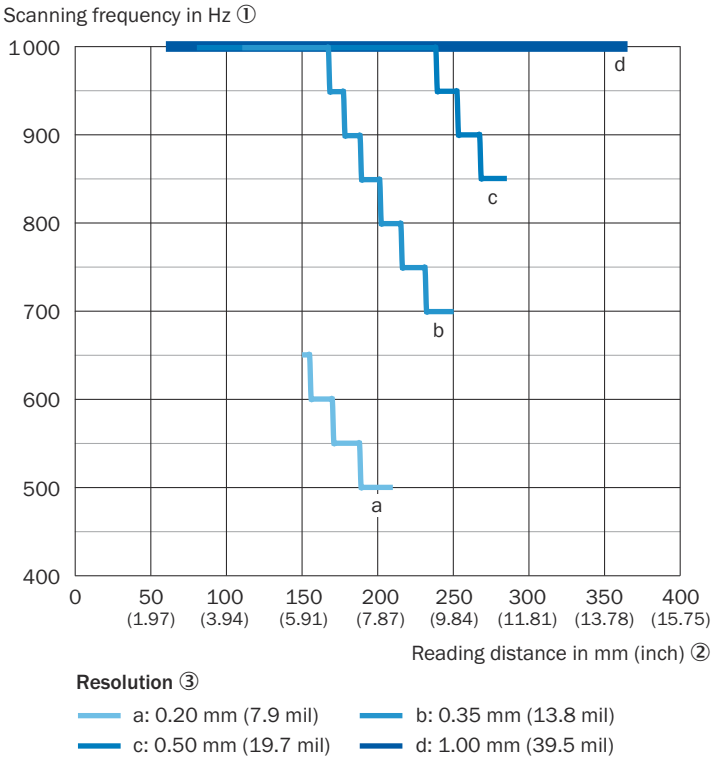



*Figure 31: Characteristic curve field for scan frequency for CLV610, mid range, front viewing window*

① Scanning frequency in Hz
② Reading distance in mm (inch)
③ Resolution

**NOTE**

**Correction of reading distance for devices with side viewing window:**

At all scan frequencies, the values for the reading distance shift towards the viewing window in each case by 16 mm (reduction of the reading distance).

### 12.7.3 CLV612: Short Range

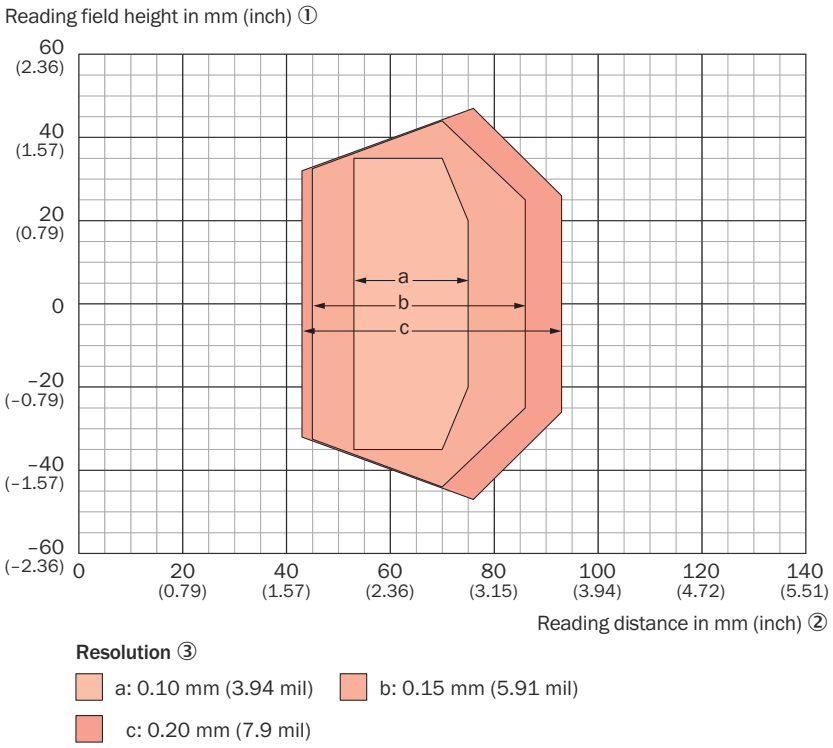



*Figure 32: Reading field diagram for CLV612, Short Range, front viewing window*

① Reading field height in mm (inch)

② Reading distance in mm (inch)

③ Resolution

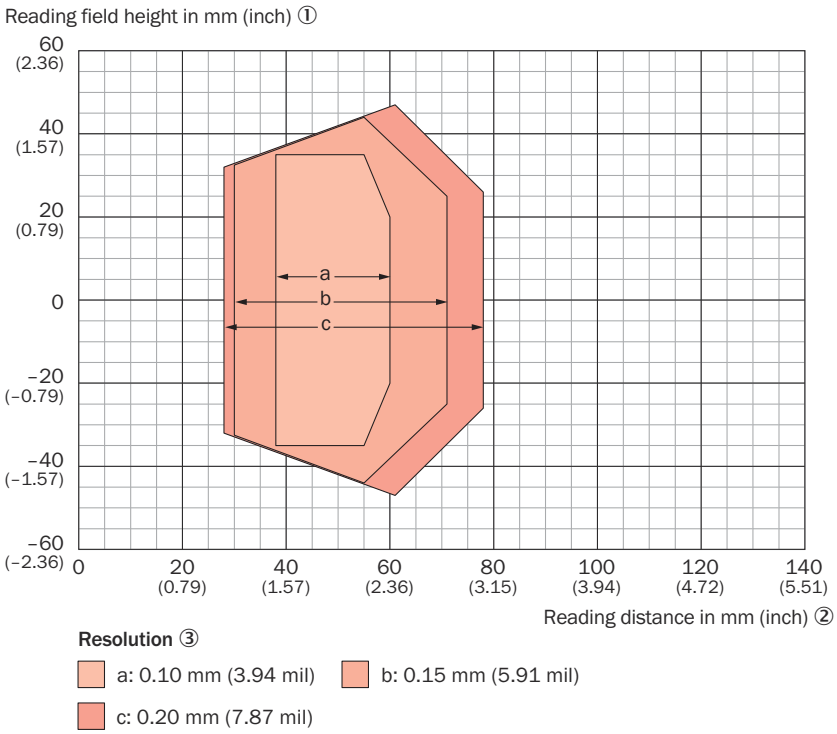



*Figure 33: Reading field diagram for CLV612, Short Range, side viewing window*

① Reading field height in mm (inch)

② Reading distance in mm (inch)

③ Resolution

### Scanning frequencies

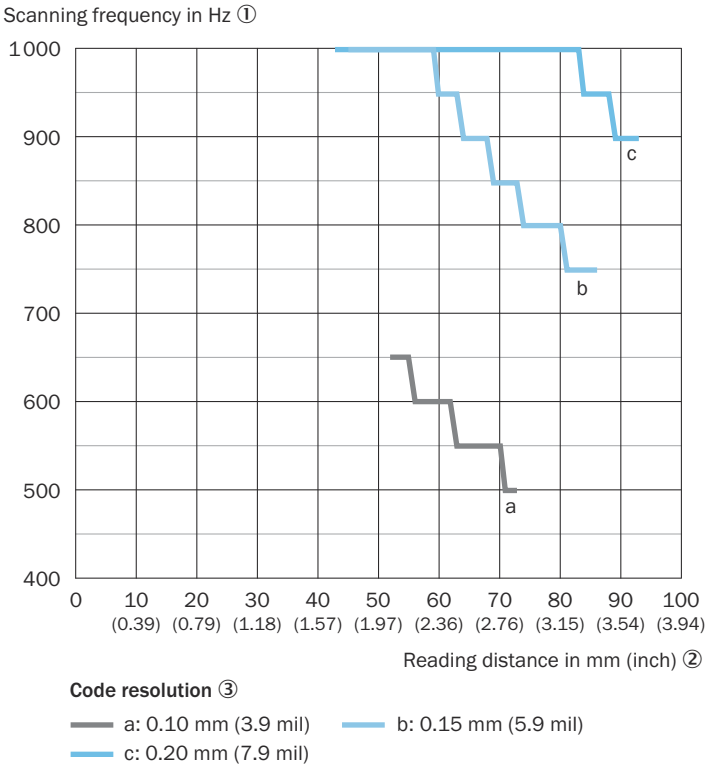



*Figure 34: Characteristic curve field for scan frequency for CLV612, short range, front viewing window*

① Scanning frequency in Hz

② Reading distance in mm (inch)

③ Resolution

**NOTE**

**Correction of reading distance for devices with side viewing window:**

At all scan frequencies, the values for the reading distance shift towards the viewing window in each case by 16 mm (reduction of the reading distance).

### 12.7.4 CLV615: Long Range

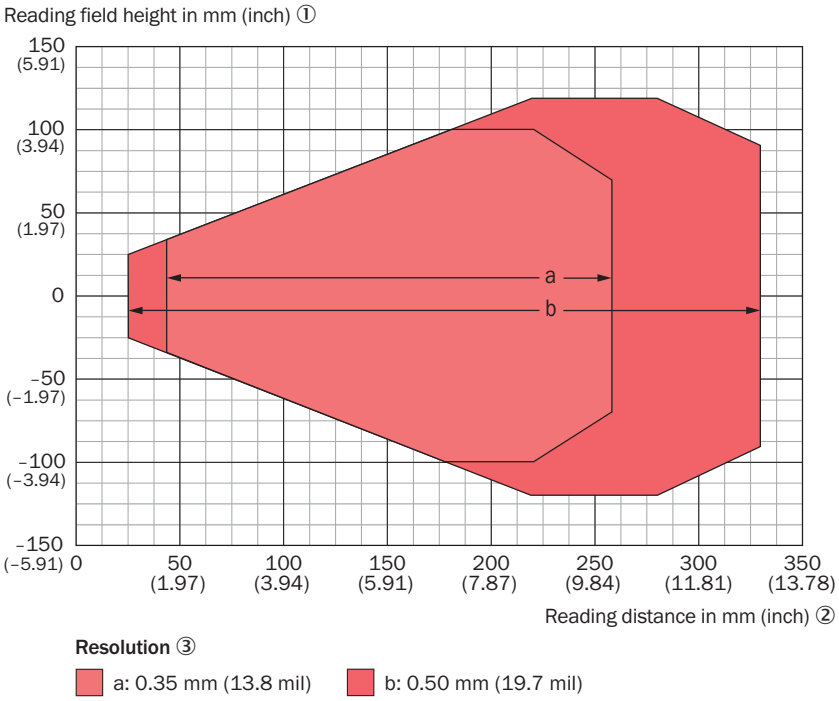



*Figure 35: CLV615 reading field diagram, Long Range, side viewing window*

① Reading field height in mm (inch)

② Reading distance in mm (inch)

③ Resolution

### Scanning frequencies

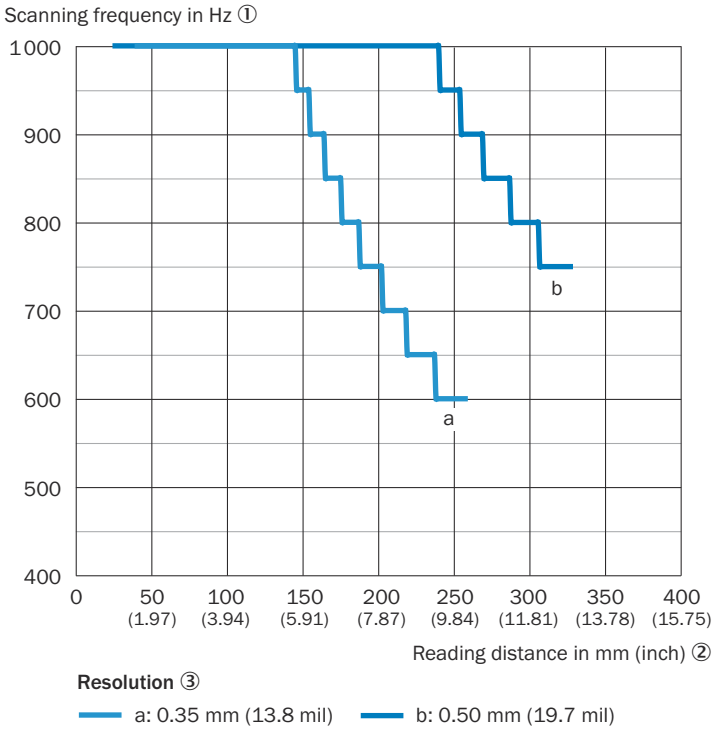



*Figure 36: Characteristic curve field for CLV615 scanning frequency, Long Range, side viewing window*

① Scanning frequency in Hz

② Reading distance in mm (inch)

③ Resolution

# 13 Accessories

**NOTE**
Accessories and, if applicable, mounting information can be found online at:

- www.sick.com/CLV61x

## 13.1 Dimensional drawings of brackets

The dimensional drawings for the SICK brackets as well as any mounting instructions can be found in the ACCESSORIES/Mounting systems category under:

- www.sick.com/CLV61x

This chapter shows how brackets in a combination of two or more individual fixing components are mounted.

### 13.1.1 Quick release in combination with mounting bracket

This chapter illustrates how to mount brackets on the device where the brackets involve a combination of two or more individual mounting components. Illustration may differ from actual device.

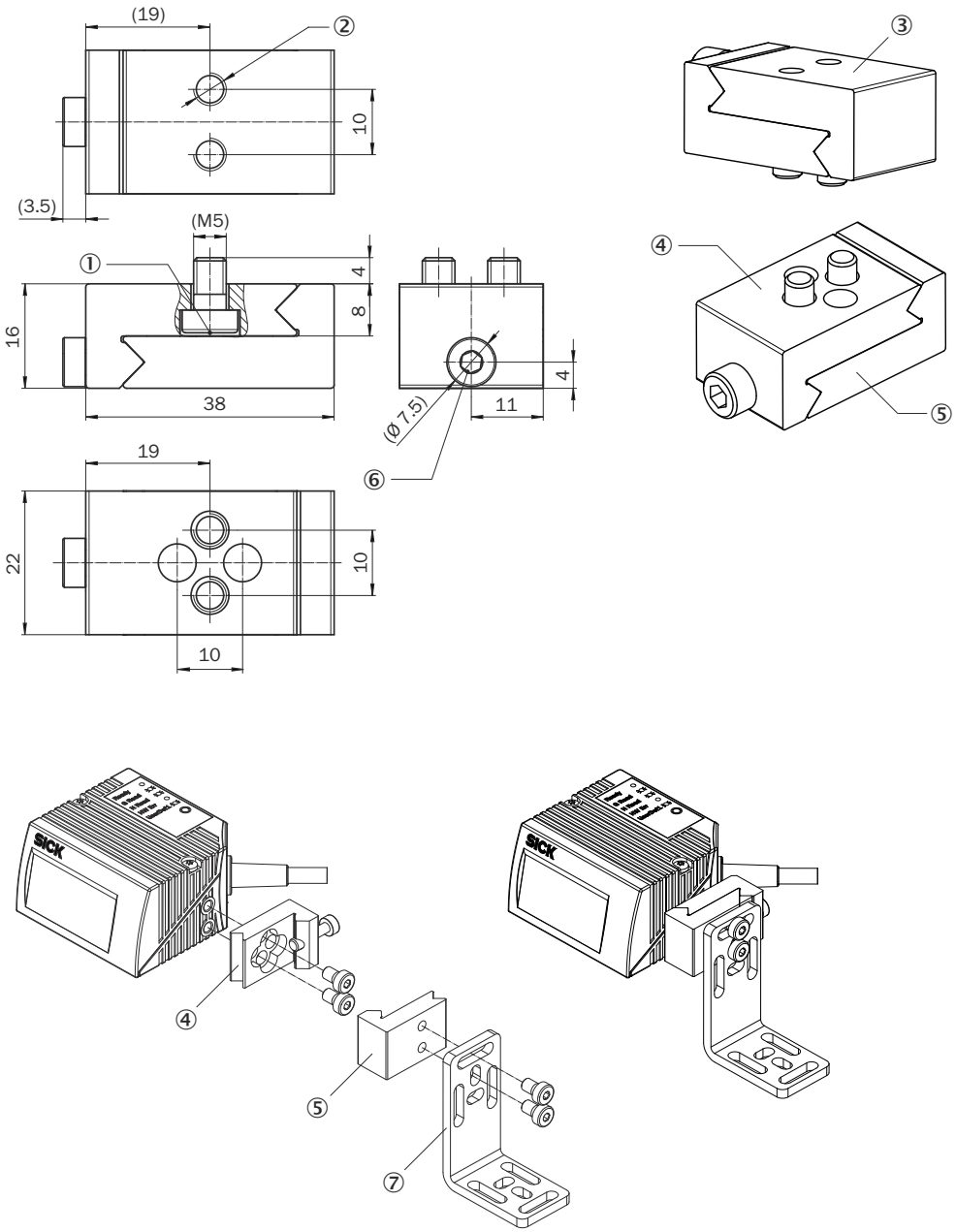



*Figure 37: View of the quick release (dimensions in mm) and combination with mounting bracket*

① Width across flats, size 3
② M5 threaded hole, max. screw-in depth 8 mm
③ Quick release (part number 2025526)
④ Quick release, part 1
⑤ Quick release, part 2
⑥ Width across flats, size 3
⑦ Mounting bracket (part number 2020410)

# 14 Annex

## 14.1 Declarations of conformity and certificates

The declarations of conformity and certificates can be downloaded from the Internet at:

- www.sick.com/CLV61x

## 14.2 UL conformity

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

The devices in the CLV61x Standard series are certified to UL60950-1. The UL file has the designation E244281-A6.

The devices must be supplied by LPS or Class 2 power supply units to ensure proper operation.

UL certification is only valid with corresponding device identification on the type label of the respective device; see see "Type label", page 14.

The IP65 enclosure rating of the devices is not checked by UL.

For additional information visit:

- www.sick.com/CLV61x
- Laser warnings and laser power, see "Operational safety and particular hazards", page 10 and see "Laser radiation", page 11

## 14.3 Dimensional drawings electronic formats

Current dimensional drawings and CAD data for your device in various electronic formats can be downloaded online:

- www.sick.com/CLV61x

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

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

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

Part no. 2043413 (2 m), shielded

For CLV61x

Ambient temperature range:

For fixed installation: –25 °C to +40 °C

The shield braid of the cable has contact with the metal housing of the female connector.

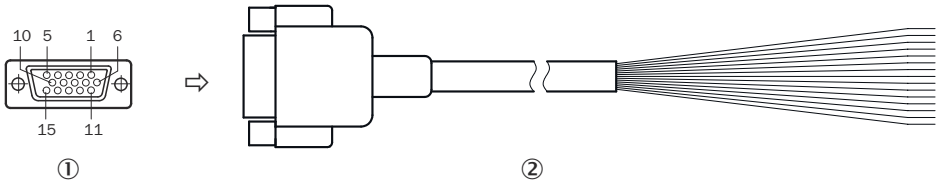



*Figure 38: Adapter cable, part no. 2043413*

① Female connector, D-Sub-HD, 15-pin (view from front)

② Illustration may differ

② Illustration may differ

*Table 21: Signal assignment of adapter cable with open end*

| Pin | Signal | Function | Wire color |
|---|---|---|---|
| 1 | $V_S$ | Supply voltage | Red |
| 2 | RxD (RS-232), Aux | AUX interface (receiver) | Violet |
| 3 | TxD (RS-232), Aux | AUX interface (sender) | Yellow |
| 4 | Sensor 2 | Digital input 2 | Red-black |
| 5 | GND | Ground | Black |
| 6 | RD+ (RS-422/485), host | Host interface (receiver+) | Light blue |
| 7 | RD– (RS-422/485), host<br>RxD (RS-232), host | Host interface (receiver–) | Blue |
| 8 | TD+ (RS-422/485), host | Host interface (sender+) | Light-gray or turquoise |
| 9 | TD– (RS-422/485), host<br>TxD (RS-232), host | Host interface (sender-) | Green |
| 10 | CAN H | CAN bus (IN/OUT) | Gray |
| 11 | CAN L | CAN bus (IN/OUT) | Pink |
| 12 | Result 1 | Digital output 1 | Brown |
| 13 | Result 2 | Digital output 2 | Orange |
| 14 | Sensor 1 | Digital input 1 | White |
| 15 | SensGND | Digital input ground | White-black |

### 14.4.2 Host interface RS-232 via connection module CDB/CDM to host (computer)

| Device | Connection module |
|---|---|
| CLV61x | CDB620-001, CDM420-0001, -0004, -0006, -0007 |

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

Part no. 2020319 (3 m), unshielded

Ambient temperature range:

For fixed installation: –25 °C to +40 °C

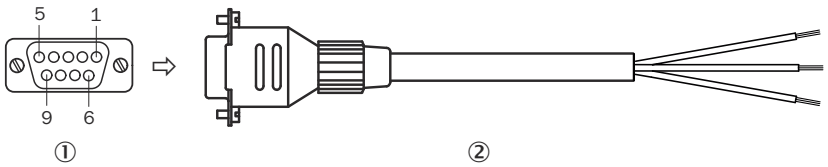



*Figure 39: Adapter cable, part no. 2020319*

① Female connector, D-Sub, 9-pin (front view)

② Illustration may differ

② Illustration may differ

*Table 22: Signal assignment of adapter cable with open end*

| Pin | Signal at computer | Function | Wire color |
|---|---|---|---|
| 1 | – | – | – |
| 2 | RxD (RS-232), host | Host interface (receiver) | Brown [1] |
| 3 | TxD (RS-232), host | Host interface (sender) | Blue [2] |
| 4 | – | – | – |
| 5 | GND | Ground | Black |
| 6 ... 9 | – | – | – |

1) Connect to the “TxD Host” terminal in the CDB/CDM connection module
2) Connect to the “RxD Host” terminal in the CDB/CDM connection module

## 14.5 Connection diagrams of connection module CDB620-001

### 14.5.1 Connection of the device to CDB620-001

**Device = CLV61x-xx0xxx (serial variant)**

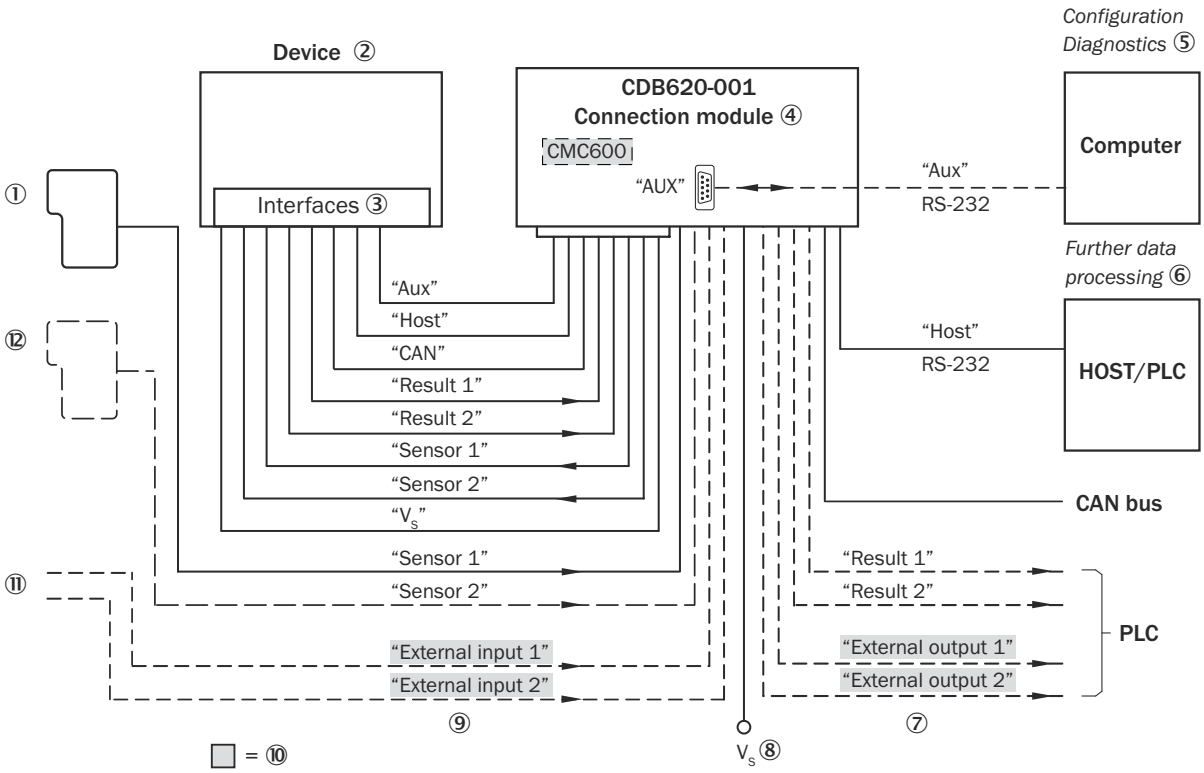



*Figure 40: Connection of the device to peripherals via CDB620-001 (overview)*

① External trigger sensor, e.g., for read cycle generation
② Device
③ Interfaces
④ Connection module
⑤ Configuration or diagnostics
⑥ Data further processing

⑦ External digital outputs
⑧ Supply voltage $V_S$
⑨ External digital inputs
⑩ The optional CMC600 parameter cloning module is required in the connection module in order to use the additional external digital inputs and outputs of the device (highlighted in gray).
⑪ Other functions
⑫ Application-dependent alternative stop read cycle (e.g. photoelectric sensor) or travel increment (incremental encoder)

### 14.5.2 Wiring overview of the CDB620-001

**Device = CLV61x-xx0xx (serial variant), 1 digital input used**

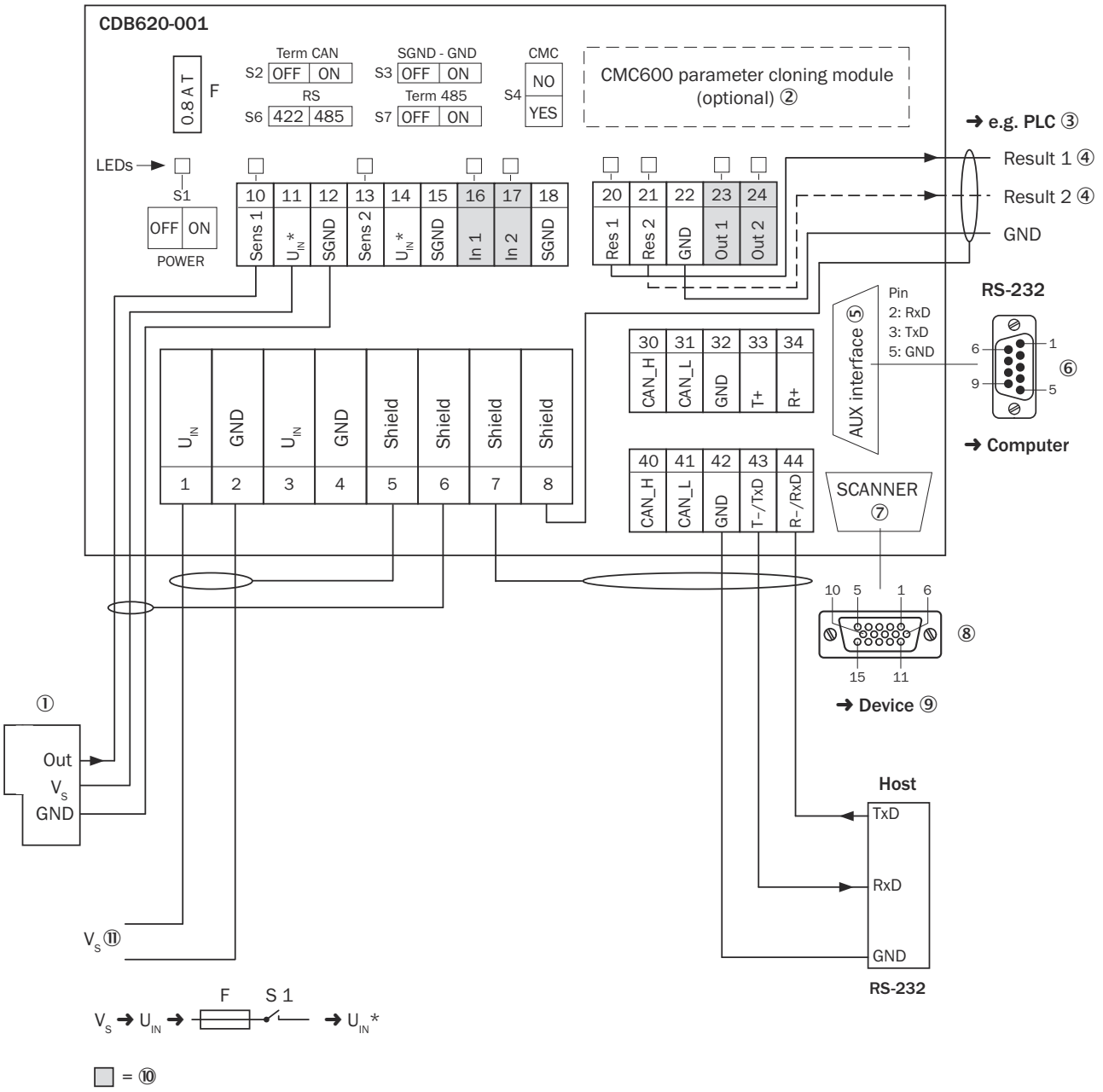



*Figure 41: Overview: connection of device and peripherals to the CDB620-001 connection module.*

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 SCANNER = Device
⑧ Female connector, D-Sub-HD, 15-pin
⑨ Device to be connected
⑩ The optional CMC600 parameter cloning module is required in the connection module in order to use the additional external digital inputs and outputs of the device (highlighted in gray).
⑪ Supply voltage $V_S$

### 14.5.3 Connecting supply voltage for the device in CDB620-001

**Device = CLV61x-xx0xxx (serial variant)**

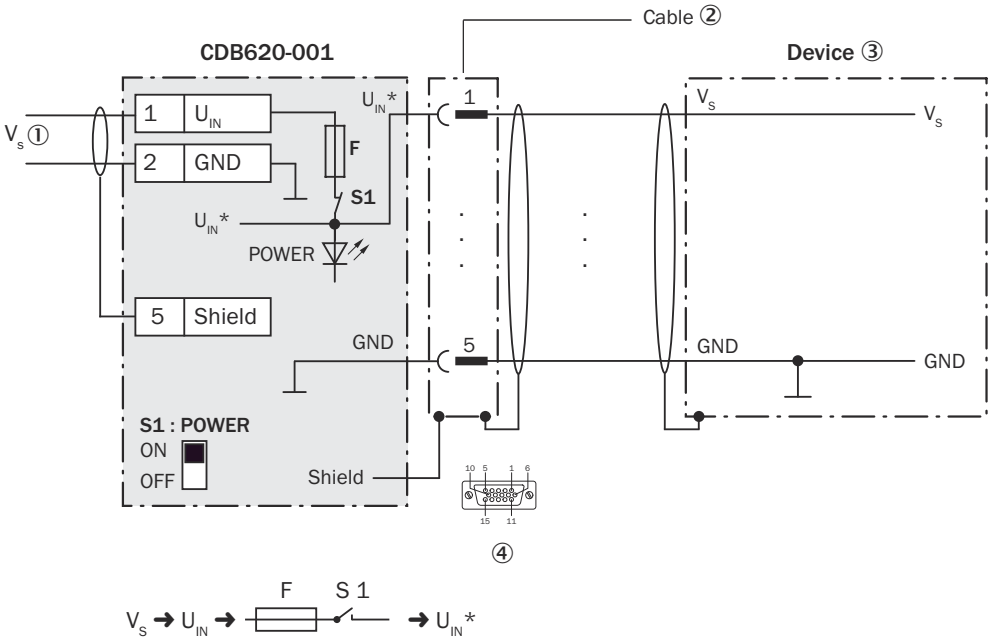



*Figure 42: Connecting supply voltage for the device in CDB620-001 connection module*

① Supply voltage $V_S$
② Connecting cable permanently connected with the device (male connector, D-Sub-HD, 15-pin)
③ Device
④ Connection module: female connector, D-Sub-HD, 15-pin

#### Function of switch S1

*Table 23: Switch S1: Power*

| Switch setting | Function |
|---|---|
| ON | Supply voltage $U_{IN}$ connected to CDB620-001 and device via fuse and switch S1 as a supply voltage $U_{IN}$*<br>Supply voltage $U_{IN}$* can be additionally tapped at terminals 11 and 14. |
| OFF | CDB620-001 and device disconnected from supply voltage<br>Recommended setting for all connection work |

### 14.5.4 Wiring serial host interface RS-232 of the device in the CDB620-001

**Device = CLV61x-xx0xxx (serial variant)**

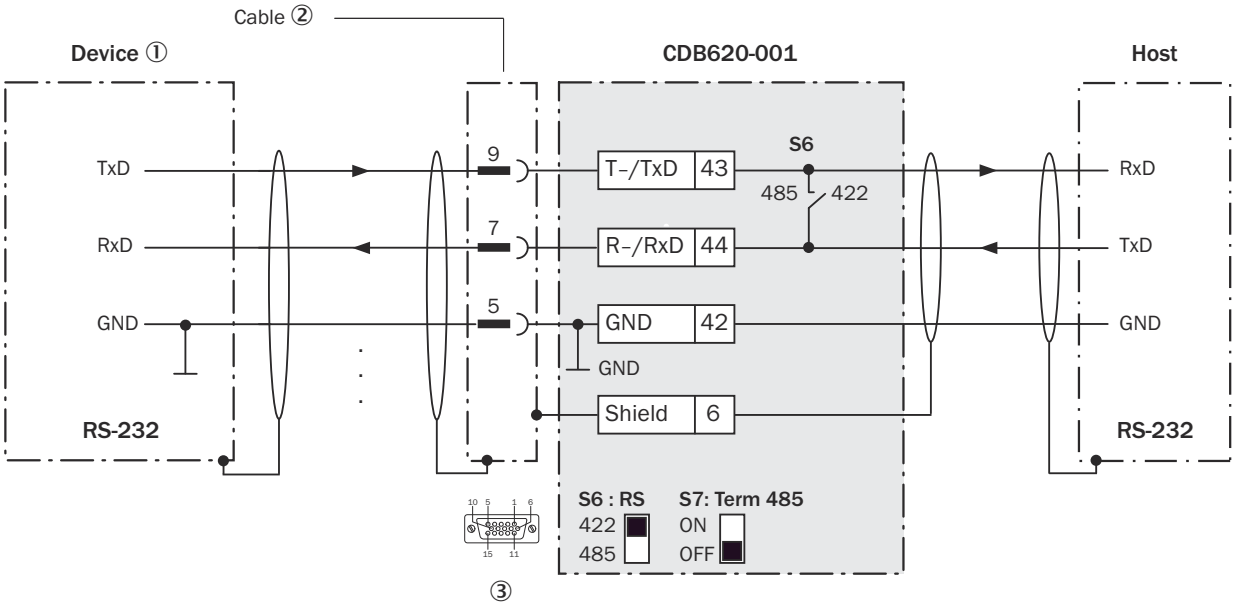



*Figure 43: Wiring data interface RS-232 of the device in the connection module CDB620-001*

① Device
② Connecting cable permanently connected with the device (male connector, D-Sub-HD, 15-pin)
③ Connection module: female connector, D-Sub-HD, 15-pin

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

### 14.5.5 Wiring the CAN interface in the CDB620-001

**Device = CLV61x-xx0xx (serial variant)**

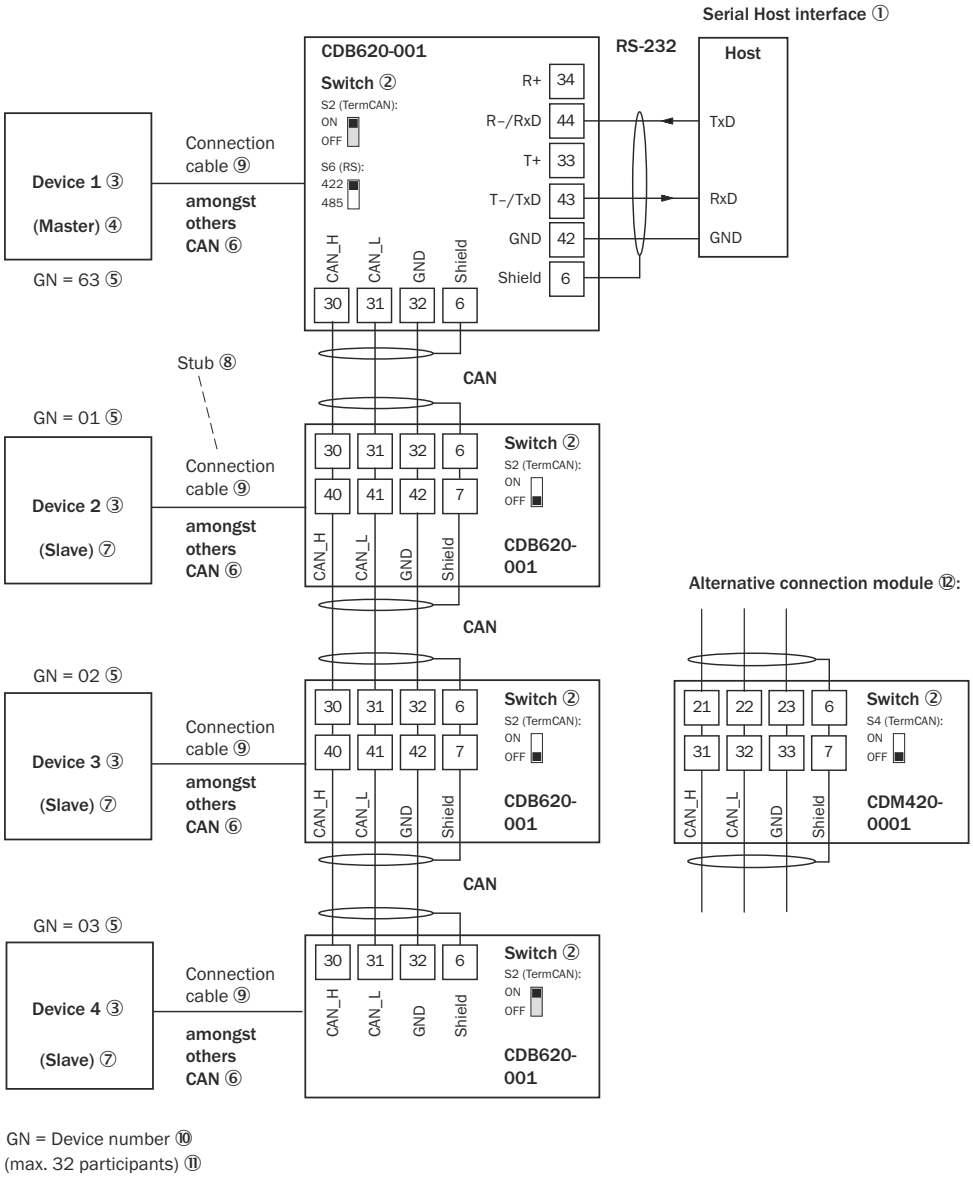



*Figure 44: Wire the CAN interface of the device in the CDB620-001 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the master, for example, are disregarded here!*

① Serial host interface
② Switch
③ Device
④ Master
⑤ Device number
⑥ CAN etc.
⑦ Slave
⑧ Branch line
⑨ Connecting cable permanently connected with the device (male connector, D-Sub-HD, 15-pin)
⑩ Device number (GN)
⑪ Maximum 32 users
⑫ Example of alternative connection module:

Alternative connection module for CLV61x: CDM420-0001 or CDM420-0006

**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.

### 14.5.6 Wiring digital inputs of the device in the CDB620-001

**Device = CLV61x-xx0xxx (serial variant)**

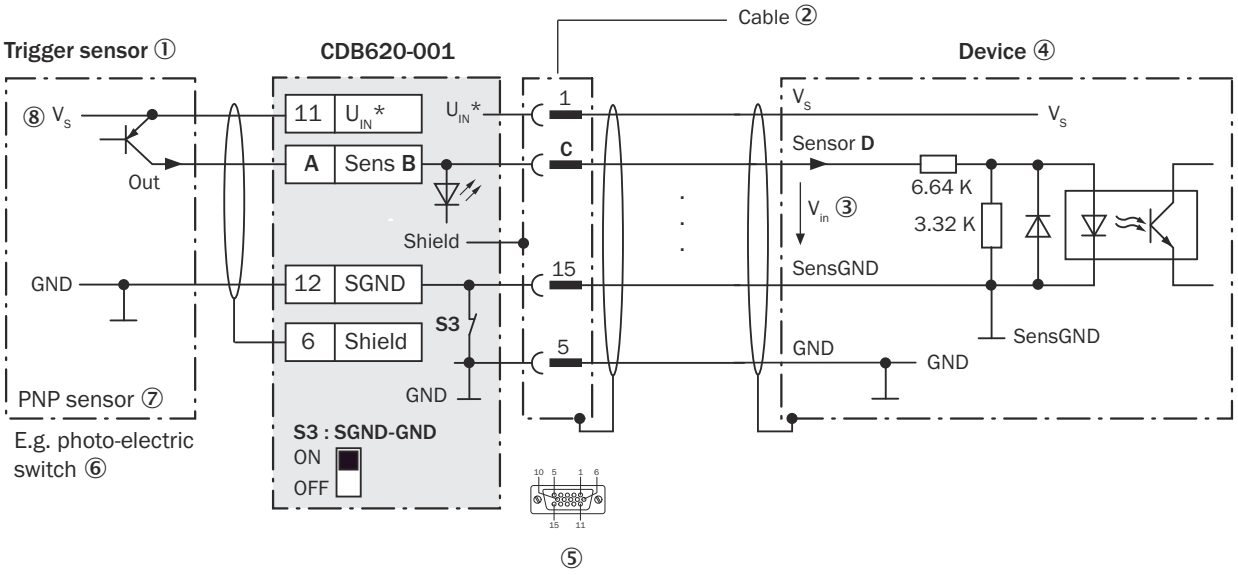



*Figure 45: Trigger sensor supplied with power by connection module CDB620-001*

① Trigger sensor, e.g., for read cycle generation
② Connecting cable permanently connected with the device (male connector, D-Sub-HD, 15-pin)
③ Input voltage $V_{in}$
④ Device
⑤ Connection module: female connector, D-Sub-HD, 15-pin
⑥ E.g. photoelectric sensor
⑦ PNP sensor
⑧ Supply voltage $V_S$

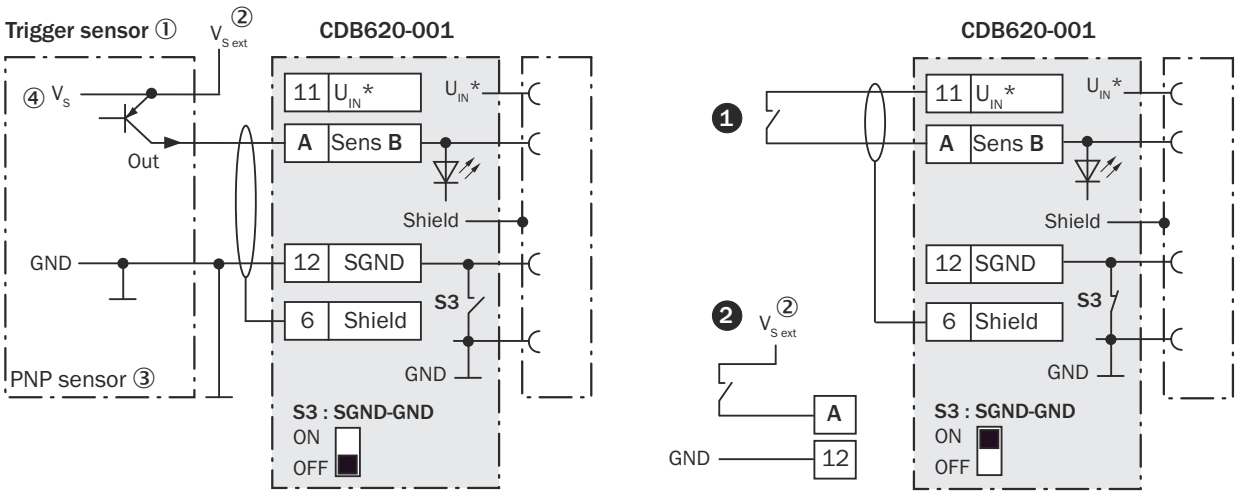



*Figure 46: Left: Trigger sensor connected potential-free and supplied with power externally. Right: alternative switch, ❶ supplied with power by connection module CDB620-001 or ❷ connected volt-free and supplied with power externally. Now select switch setting S3 as shown in the left figure.*

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

*Table 24: Assignment of placeholders to the digital inputs*

| CDB620-001 | | | Device |
|---|---|---|---|
| **Terminal A** | **Signal B** | **Pin C** | **Sensor D** |
| 10 | Sens 1 | 14 | 1 |
| 13 | Sens 2 | 4 | 2 |

### Function of switch S3

*Table 25: Switch S3: SGND - GND*

| Switch setting | Function |
|---|---|
| ON | GND of the trigger sensor is connected with GND of CDB620-001 and GND of the device |
| OFF | Trigger sensor is connected volt-free at CDB620-001 and the device. Common, isolated reference potential of all digital inputs is SGND. |

### Characteristic data of the digital inputs

*Table 26: Characteristic data of the digital inputs “Sensor 1” and “Sensor 2”*

| | |
|---|---|
| **Type** | Switching |
| **Switching behavior** | Power to the input starts the assigned function, e.g. start read cycle. |
| **Properties** | • Opto-decoupled, reverse polarity protected<br>• Can be wired with PNP output of a trigger sensor |
| **Electrical values** | Low: $V_{in}$[1)] ≤ 2 V; $I_{in}$[2)] ≤ 0.3 mA<br>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 digital inputs in the device using a configuration tool, e.g., the configuration software SOPAS ET.

### 14.5.7 Wiring the external digital inputs of the device in the CDB620-001

**Device = CLV61x-xx0xxx (serial variant)**

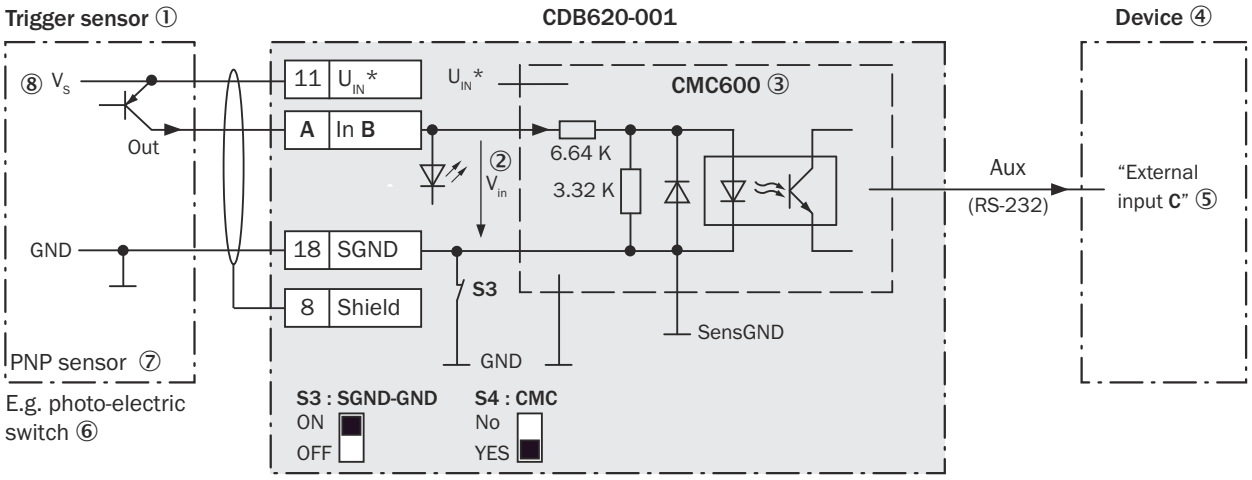



*Figure 47: Trigger sensor supplied with power by connection module CDB620-001*

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 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 $V_S$

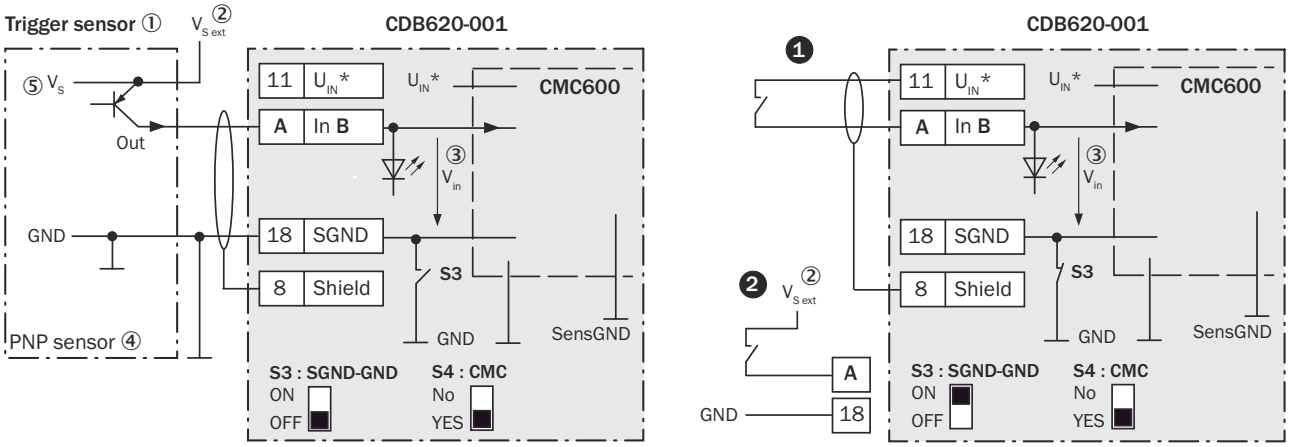



*Figure 48: Left: Trigger sensor connected potential-free and supplied with power externally. Right: alternative switch, ❶ supplied with power by connection module CDB620-001 or ❷ connected volt-free and supplied with power externally. Now select switch setting S3 as shown in the left figure.*

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

*Table 27: Assignment of placeholders to the digital inputs*

| CDB620-001 (physical inputs) | | Device (logical inputs) |
|---|---|---|
| **Terminal A** | **Signal B** | **External input C** |
| 16 | In 1 | 1 |
| 17 | In 2 | 2 |

### Function of switch S3

*Table 28: Switch S3: SGND - GND*

| Switch setting | Function |
|---|---|
| ON | GND of the trigger sensor is connected with GND of CDB620-001 and CMC600 |
| OFF | Trigger sensor is connected volt-free at the CDB620-001 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 29: 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. |
| **Properties** | • Opto-decoupled, reverse polarity protected<br>• Can be wired with PNP output of a trigger sensor |
| **Electrical values** | Low: $V_{in}$[1] ≤ 2 V; $I_{in}$[2] ≤ 0.3 mA<br>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 digital inputs in the device using a configuration tool, e.g., the configuration software SOPAS ET.

## 14.5.8 Wiring digital outputs of the device in the CDB620-001

**Device = CLV61x-xx0xxx (serial variant)**

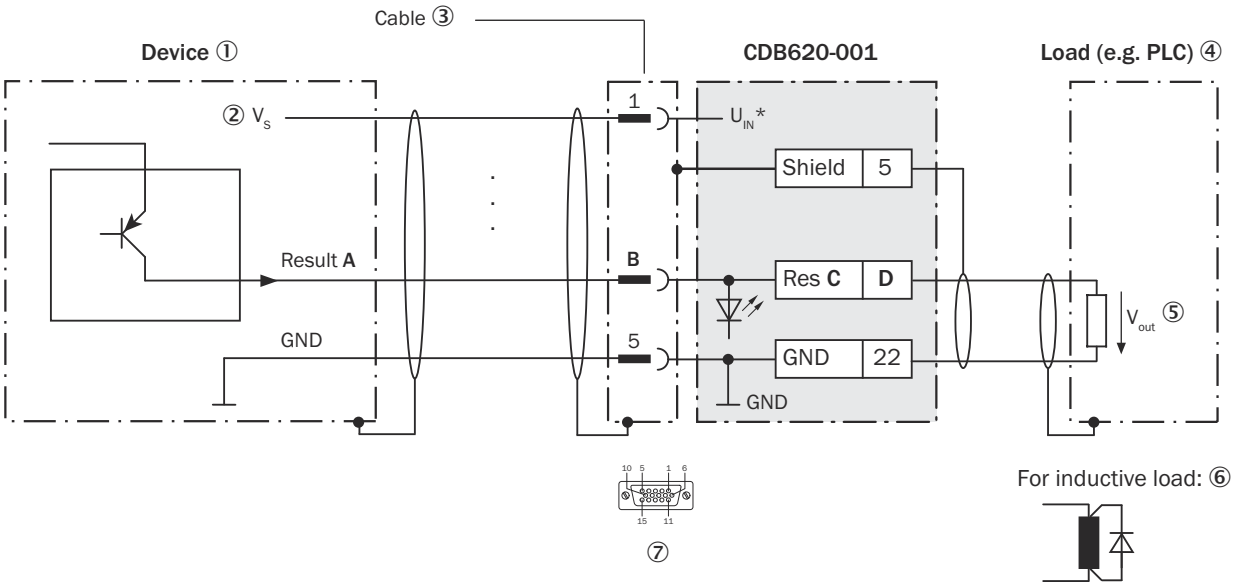



*Figure 49: Wiring the "Result 1" and "Result 2" digital outputs of the device in the CDB620-001 connection module.*

① Device
② Supply voltage $V_S$
③ Connecting cable permanently connected with the device (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

### 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 30: Assignment of placeholders to the digital outputs*

| Device | | CDB620-001 | |
|---|---|---|---|
| **Output A** | **Pin B** | **Signal C** | **Terminal D** |
| Result 1 | 12 | Res 1 | 20 |
| Result 2 | 13 | Res 2 | 21 |

### Characteristic data of the digital outputs

*Table 31: Characteristic data of the digital outputs "Result 1" and "Result 2"*

| | |
|---|---|
| **Type** | Switching |
| **Switching behavior** | PNP switching to supply voltage $V_S$<br>Default settings in the device: no function, logic: not inverted (active high) |
| **Properties** | • Short-circuit protected and temperature protected<br>• Not electrically isolated from the supply voltage $V_S$ |

| | |
|---|---|
| **Electrical values** | 0 V ≤ $V_{out}$ [1] ≤ $V_S$<br>($V_S$ −1.5 V) ≤ $V_{out}$ ≤ $V_S$ bei $I_{out}$ [2] ≤ 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.

### 14.5.9 Wiring the external digital outputs of the device in the CDB620-001

**Device = CLV61x-xx0xxx (serial variant)**

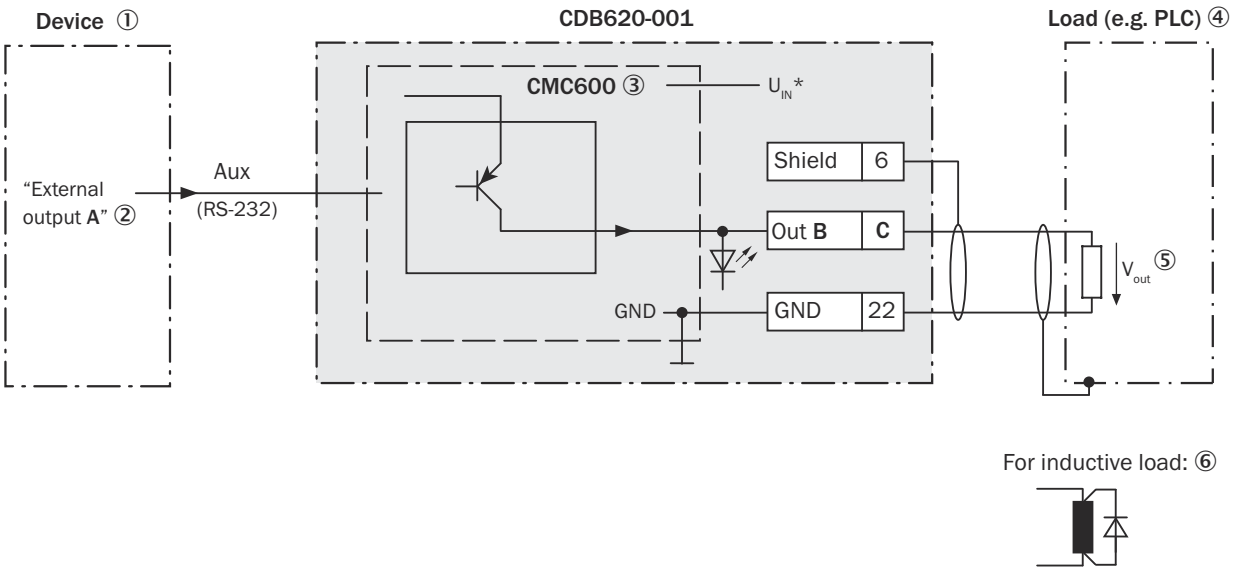



*Figure 50: Wiring "Out 1" and "Out 2" external digital outputs of the device in the connection module CDB620-001.*

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 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**

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

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

*Table 32: Assignment of placeholders to the digital outputs*

| Device (logical output) | CDB620-001 (physical output) | |
|---|---|---|
| **External output A** | **Signal B** | **Terminal C** |
| 1 | Out 1 | 23 |
| 2 | 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 33: Characteristic data of the digital outputs “External output 1” and “External output 2”*

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

## 14.6 Connection diagrams of connection module CDM420-0001

### 14.6.1 Connection of the device to CDM420-0001

**Device = CLV61x-xx0xxx (serial variant)**

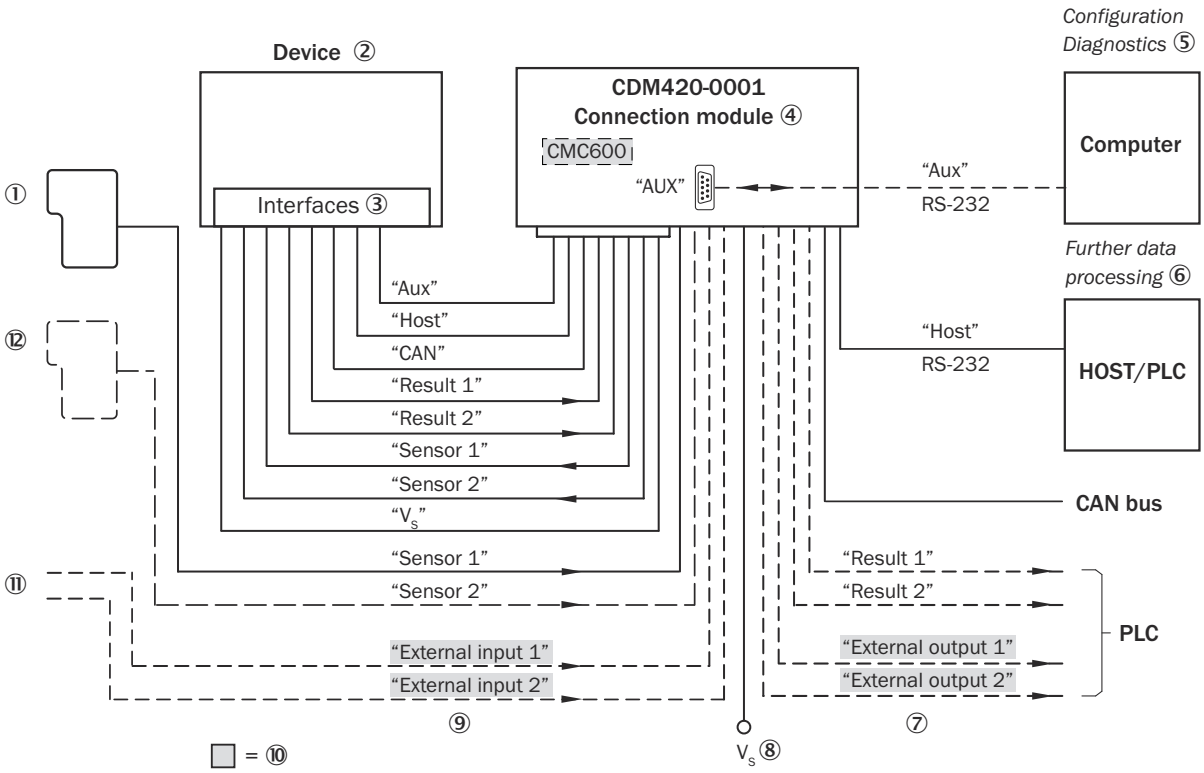



*Figure 51: Connection of the device to peripherals via CDM420-0001 (overview)*

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

### 14.6.2 Wiring overview of the CDM420-0001

**Device = CLV61x-xx0xxx (serial variant), 1 digital input used**

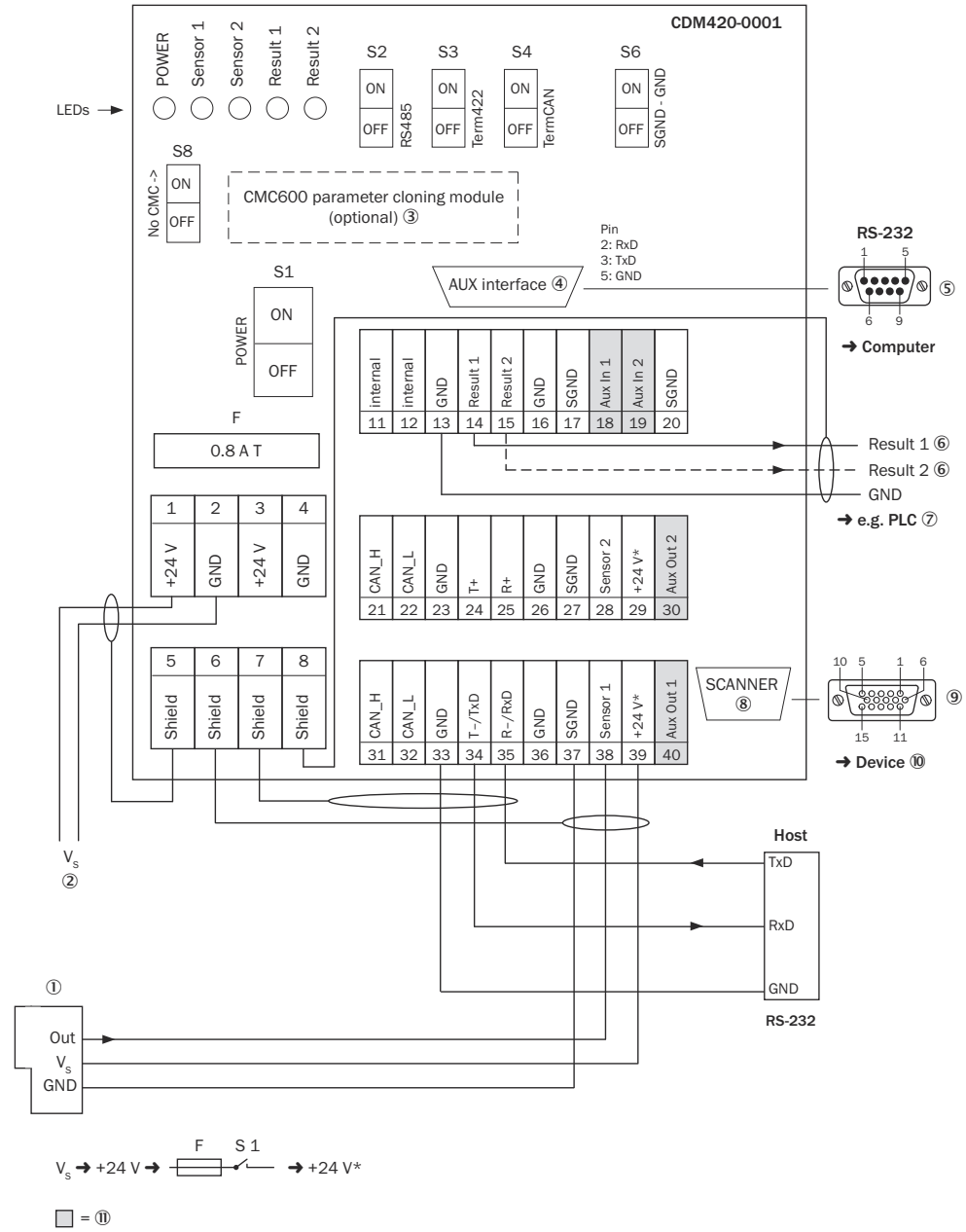



*Figure 52: Overview: connection of device and peripherals to the CDM420-0001 connection module*

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 use the additional external digital inputs and outputs of the device (highlighted in gray).

### 14.6.3 Connecting supply voltage for the device in CDM420-0001

**Device = CLV61x-xx0xxx (serial variant)**

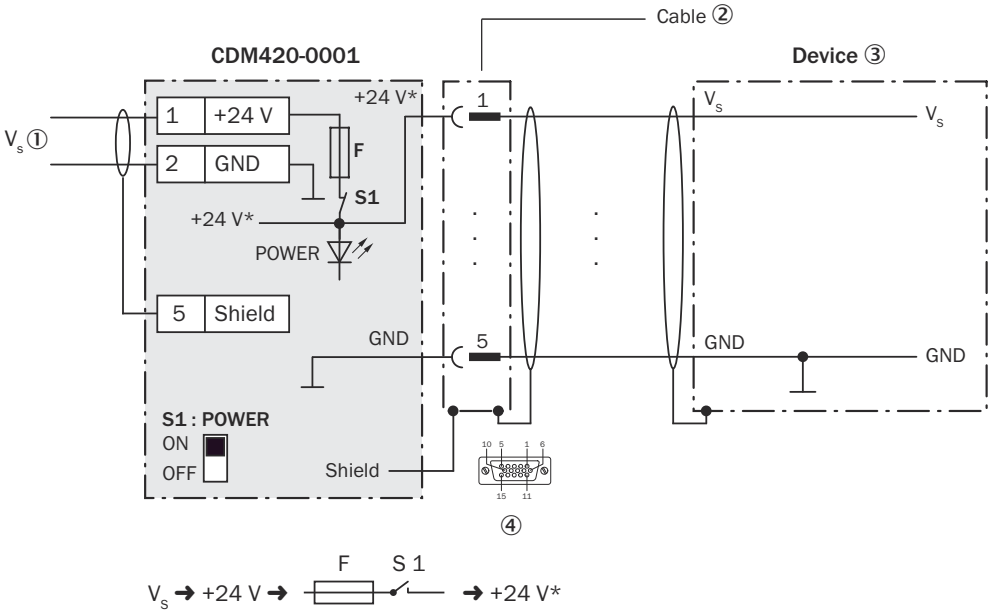



*Figure 53: Connecting supply voltage for the device in CDM420-0001 connection module.*

① Supply voltage $V_S$
② Connecting cable permanently connected with the device (male connector, D-Sub-HD, 15-pin)
③ Device
④ Connection module: female connector, D-Sub-HD, 15-pin

**Function of switch S1**

*Table 34: Switch S1: Power*

| Switch setting | Function |
|---|---|
| ON | Supply voltage +24 V connected to CDM420-0001 and device via fuse and switch S1 as supply voltage +24 V*<br>Supply voltage +24 V* can be additionally tapped at terminals 29 and 39 |
| OFF | CDM420-0001 and device disconnected from supply voltage<br>Recommended setting for all connection work |

### 14.6.4 Wiring serial host interface RS-232 of the device in the CDM420-0001

**Device = CLV61x-xx0xxx (serial variant)**

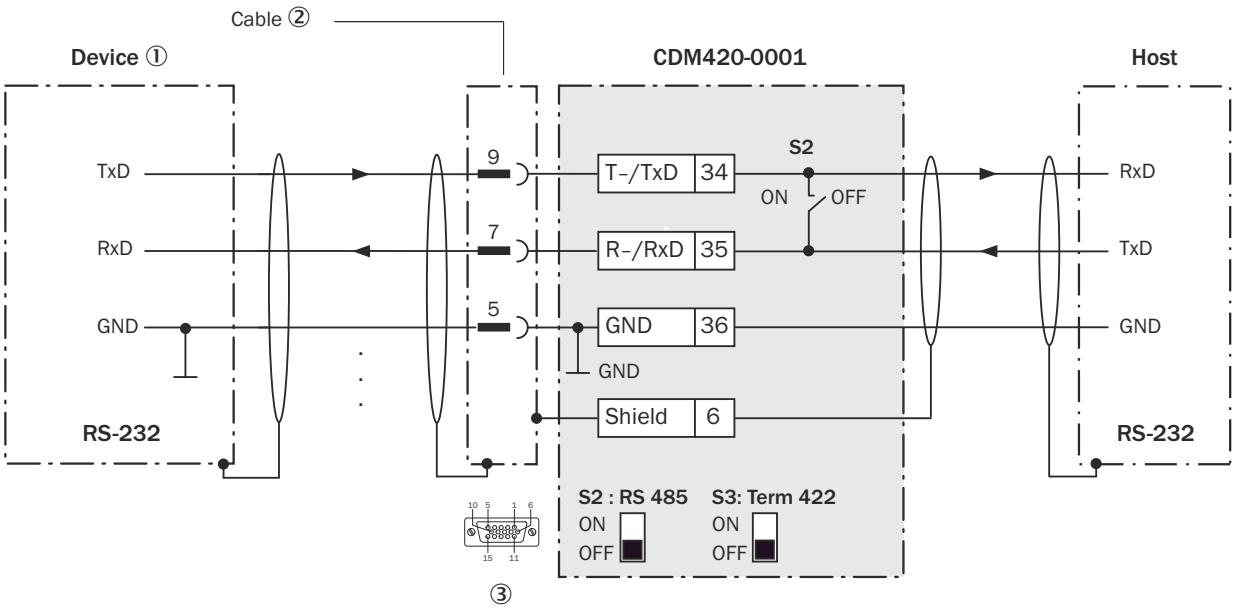



*Figure 54: Wiring data interface RS-232 of the device in connection module CDM420-0001.*

① Device
② Connecting cable permanently connected with the device (male connector, D-Sub-HD, 15-pin)
③ Connection module: female connector, D-Sub-HD, 15-pin

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

### 14.6.5 Wiring the CAN interface of the device in the CDM420-0001

**Device = CLV61x-xx0xx (serial variant)**

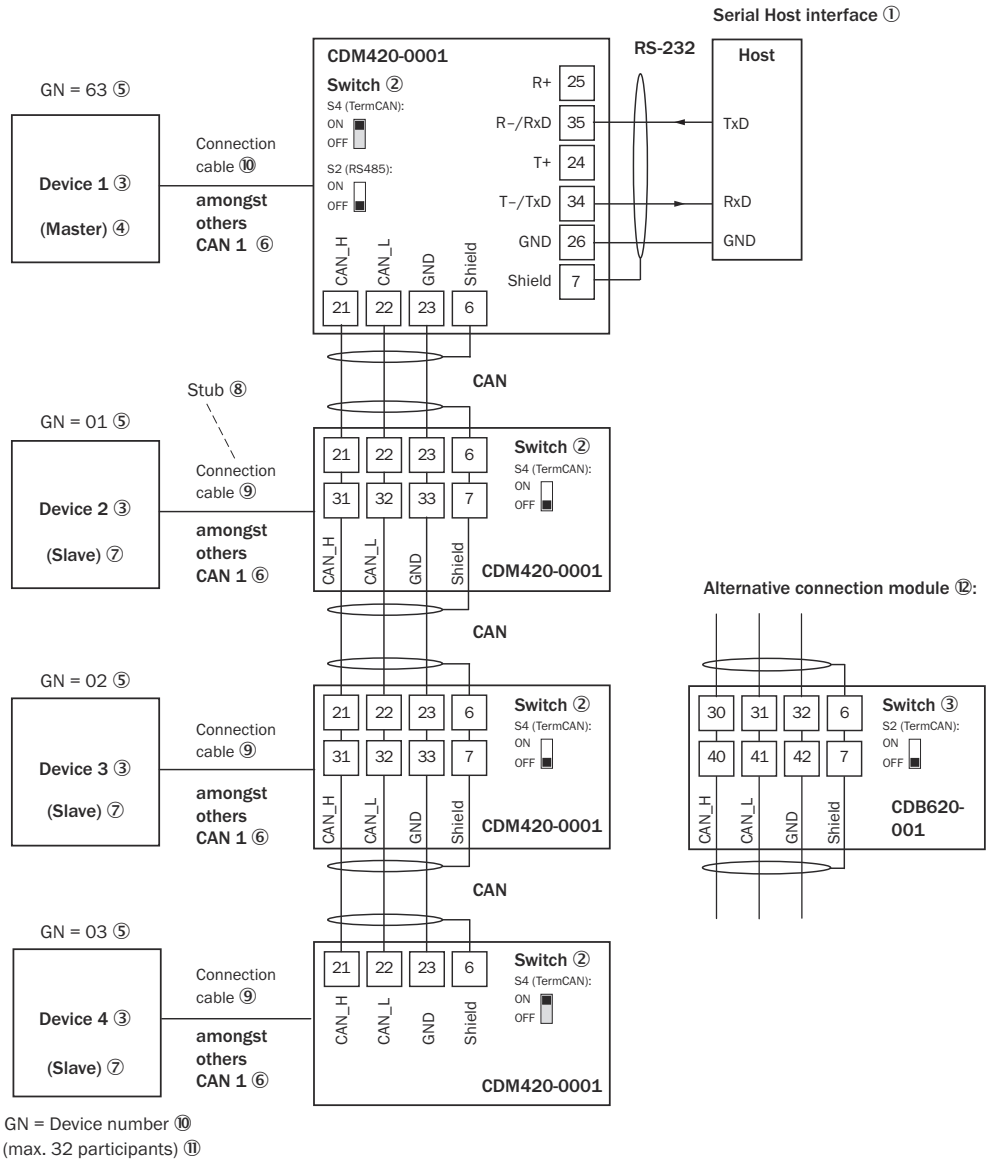



*Figure 55: Wire the CAN interface of the device in the CDM420-0001 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the master, for example, are disregarded here!*

① Serial host interface
② Switch
③ Device
④ Master
⑤ Device number
⑥ CAN etc.
⑦ Slave
⑧ Branch line
⑨ Connecting cable permanently connected with the device (male connector, D-Sub-HD, 15-pin)
⑩ Device number (GN)
⑪ Maximum 32 users
⑫ Example of alternative connection module:

Alternative connection modules for CLV61x: CDB620 or CDM420-0006

**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.

### 14.6.6 Wiring digital inputs of the device in the CDM420-0001

**Device = CLV61x-xx0xxx (serial variant)**

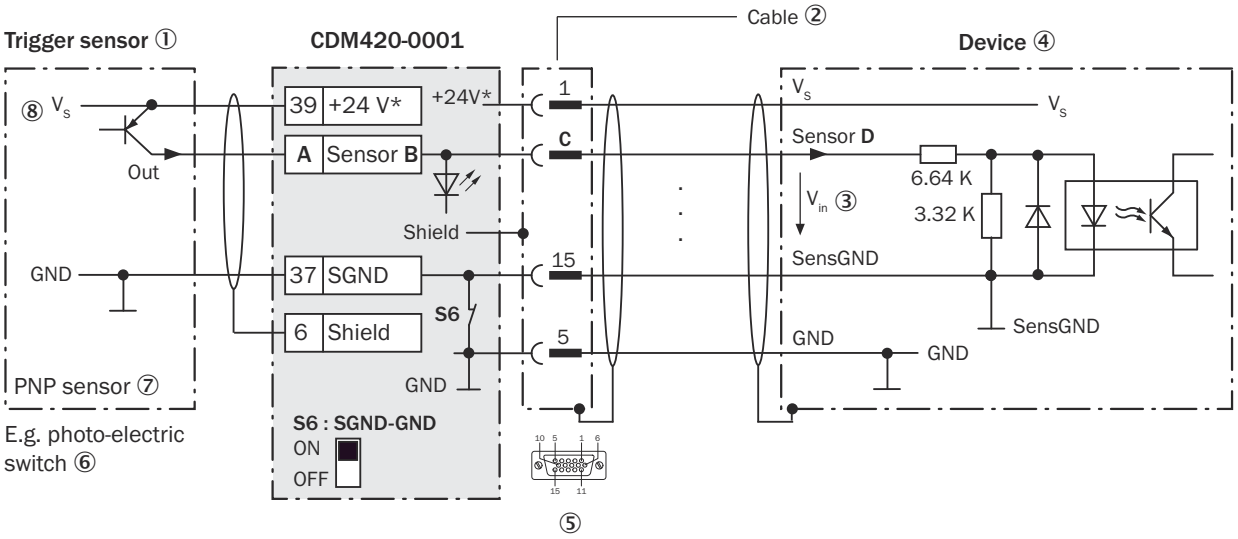



*Figure 56: Trigger sensor supplied with power by connection module CDM420-0001*

① Trigger sensor, e.g. for read cycle generation
② Connecting cable permanently connected with the device (male connector, D-Sub-HD, 15-pin)
③ Input voltage $V_{in}$
④ Device
⑤ Connection module: female connector, D-Sub-HD, 15-pin
⑥ E.g. photoelectric sensor
⑦ PNP sensor
⑧ Supply voltage $V_S$

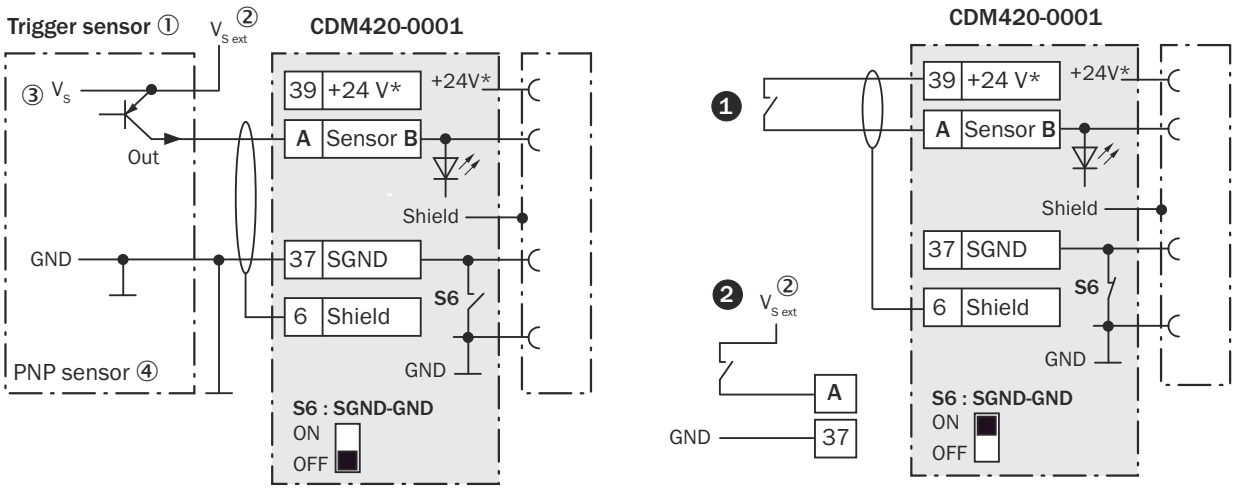



*Figure 57: Left: Trigger sensor connected potential-free and supplied with power externally. Right: alternative switch, ❶ supplied with power by connection module CDM420-0001 or ❷ connected volt-free and supplied with power externally. Now select switch setting S6 as shown in the left figure.*

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

*Table 35: Assignment of placeholders to the digital inputs*

| CDM420-0001 | | | Device |
|---|---|---|---|
| **Terminal A** | **Signal B** | **Pin C** | **Sensor D** |
| 38 | Sensor 1 | 14 | 1 |
| 39 | Sensor 2 | 4 | 2 |

### Function of switch S6

*Table 36: Switch S6: SGND - GND*

| Switch setting | Function |
|---|---|
| ON | GND of the trigger sensor is connected with GND of CDM420-0001 and GND of the device |
| OFF | Trigger sensor is connected volt-free at CDM420-0001 and the device. Common, isolated reference potential of all digital inputs is SGND. |

### Characteristic data of the digital inputs

*Table 37: 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. |
| **Properties** | • Opto-decoupled, reverse polarity protected<br>• Can be wired with PNP output of a trigger sensor |
| **Electrical values** | Low: $V_{in}$ [1] ≤ 2 V; $I_{in}$ [2] ≤ 0.3 mA<br>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 digital inputs in the device using a configuration tool, e.g., the configuration software SOPAS ET.

### 14.6.7 Wiring the external digital inputs of the device in the CDM420-0001

**Device = CLV61x-xx0xxx (serial variant)**

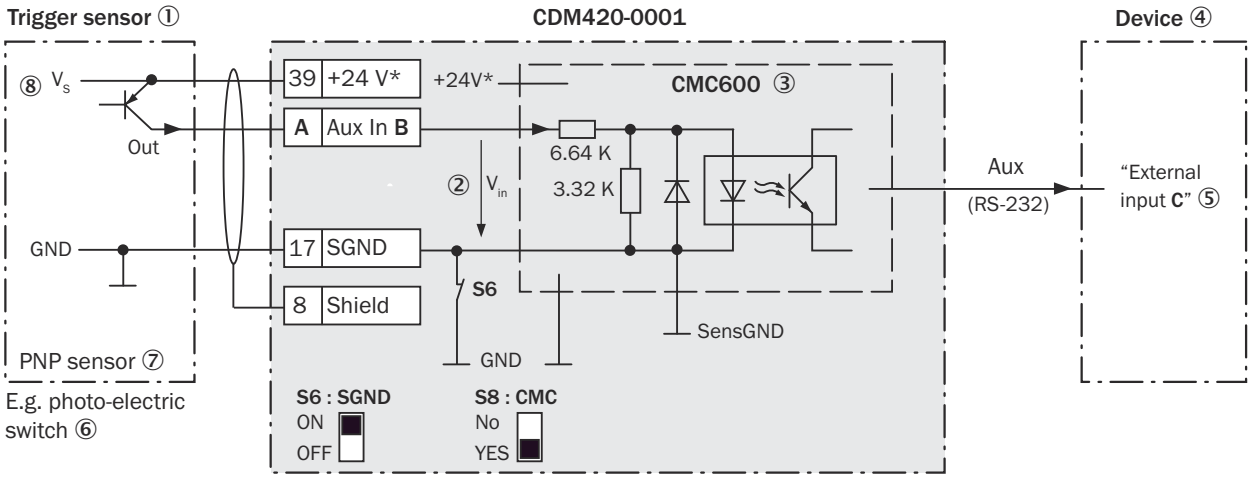



*Figure 58: Trigger sensor supplied with power by connection module CDM420-0001*

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 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 $V_S$

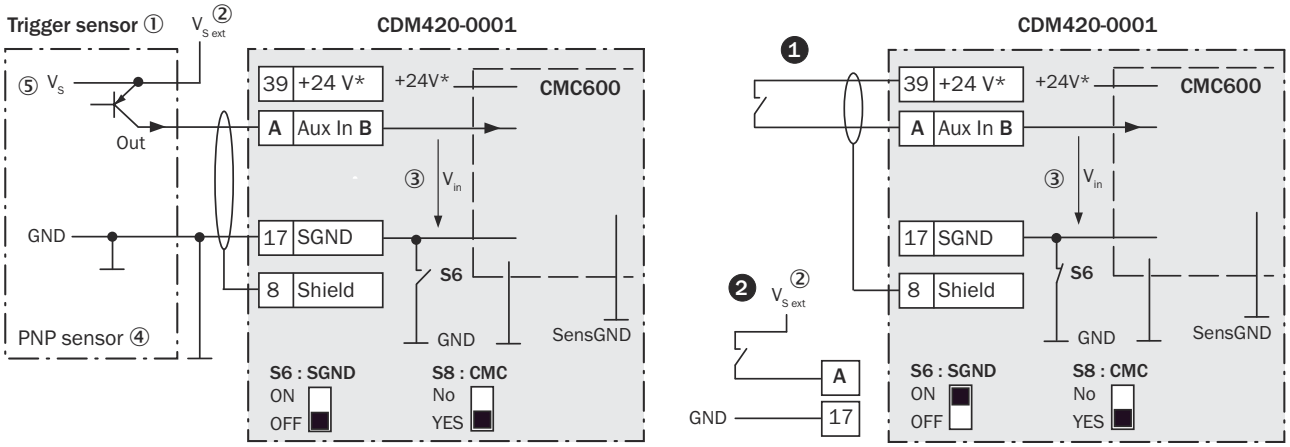



*Figure 59: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDM420-0001 or ❷ connected potential-free and supplied with power externally. Switch setting S3 then as in left figure.*

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 38: Assignment of placeholders to the digital inputs*

| CDM420-0001 | | Device |
|---|---|---|
| **Terminal A** | **Signal B** | **External input C** |
| 18 | Aux In 1 | 1 |
| 19 | Aux In 2 | 2 |

### Function of switch S6

*Table 39: Switch S6: SGND - GND*

| Switch setting | Function |
|---|---|
| ON | GND of the trigger sensor connected with GND of CDM420-0001 and CMC600 |
| OFF | Trigger sensor connected volt-free at CDM420-0001 and CMC600<br>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 40: 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.<br>Default setting in the device: logic not inverted (active high), debounce time 10 ms |
| **Properties** | • Opto-decoupled, reverse polarity protected<br>• Can be wired with PNP output of a trigger sensor |
| **Electrical values** | Low: $V_{in}$[1] ≤ 2 V; $I_{in}$[2] ≤ 0.3 mA<br>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 digital inputs in the device using a configuration tool, e.g., the configuration software SOPAS ET.

### 14.6.8 Wiring digital outputs of the device in the CDM420-0001

**Device = CLV61x-xx0xxx (serial variant)**

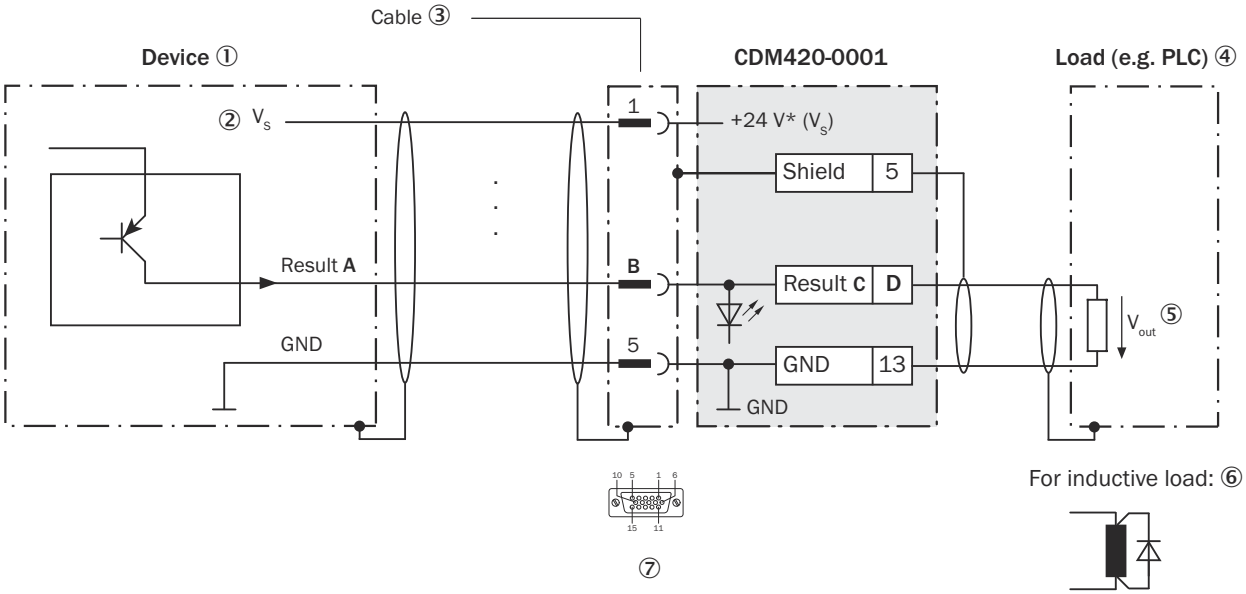



*Figure 60: Wiring the "Result 1" and "Result 2" digital outputs of the device in the CDM420-0001 connection module.*

① Device
② Supply voltage $V_S$
③ Connecting cable permanently connected with the device (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

#### 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 41: Assignment of placeholders to the digital outputs*

| Device | | CDM420-0001 | |
|---|---|---|---|
| **Output A** | **Pin B** | **Signal C** | **Terminal D** |
| Result 1 | 13 | Result 1 | 14 |
| Result 2 | 14 | Result 2 | 15 |

#### Characteristic data of the digital outputs

*Table 42: Characteristic data of the digital outputs "Result 1" and "Result 2"*

| | |
|---|---|
| **Type** | Switching |
| **Switching behavior** | PNP switching to supply voltage $V_S$<br>Default settings in the device: no function, logic: not inverted (active high) |

| | |
|---|---|
| **Properties** | • Short-circuit protected and temperature protected<br>• Not electrically isolated from the supply voltage $V_S$ |
| **Electrical values** | 0 V ≤ $V_{out}$[1] ≤ $V_S$<br>($V_S$ −1.5 V) ≤ $V_{out}$ ≤ $V_S$ at $I_{out}$[2] ≤ 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.

### 14.6.9 Wiring the external digital outputs of the device in the CDM420-0001

**Device = CLV61x-xx0xxx (serial variant)**

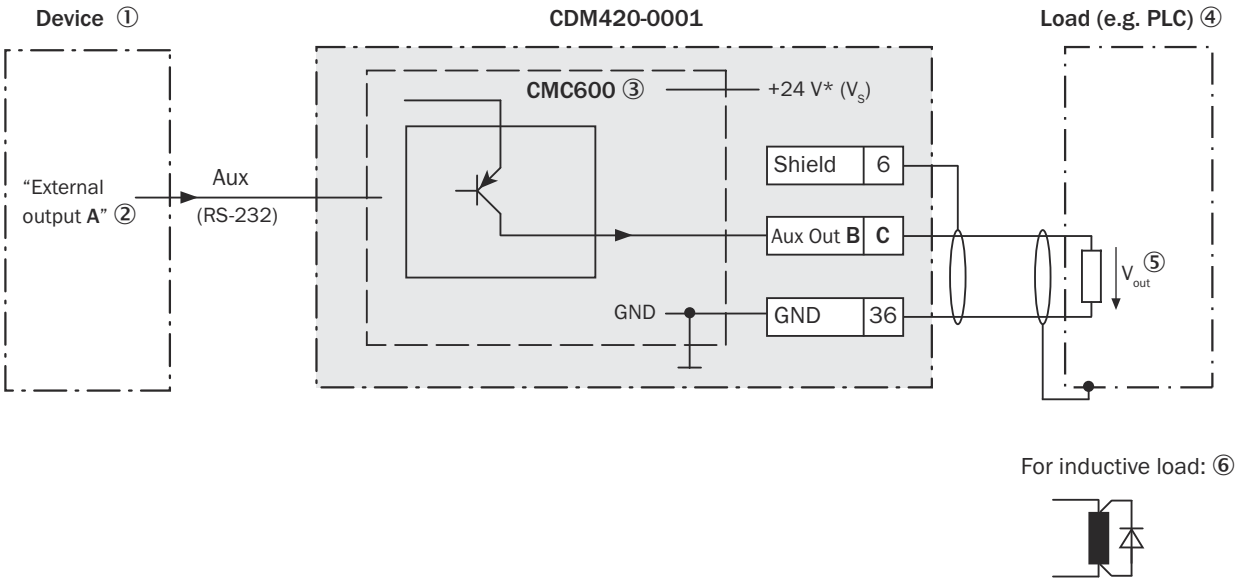



*Figure 61: Wiring external digital outputs "Aux Out 1" and "Aux Out 2" of the device in the connection module CDM420-0001.*

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 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**

**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 43: Assignment of placeholders to the external digital outputs*

| Device | CDM420-0001 | |
|---|---|---|
| **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”.

**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 44: Characteristic data of the digital outputs “External output 1” and “External output 2”*

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

## 14.7 Connection diagrams of connection module CDM420-0006

### 14.7.1 Connection of the device to CDM420-0006

**Device = CLV61x-xx0xxx (serial variant)**

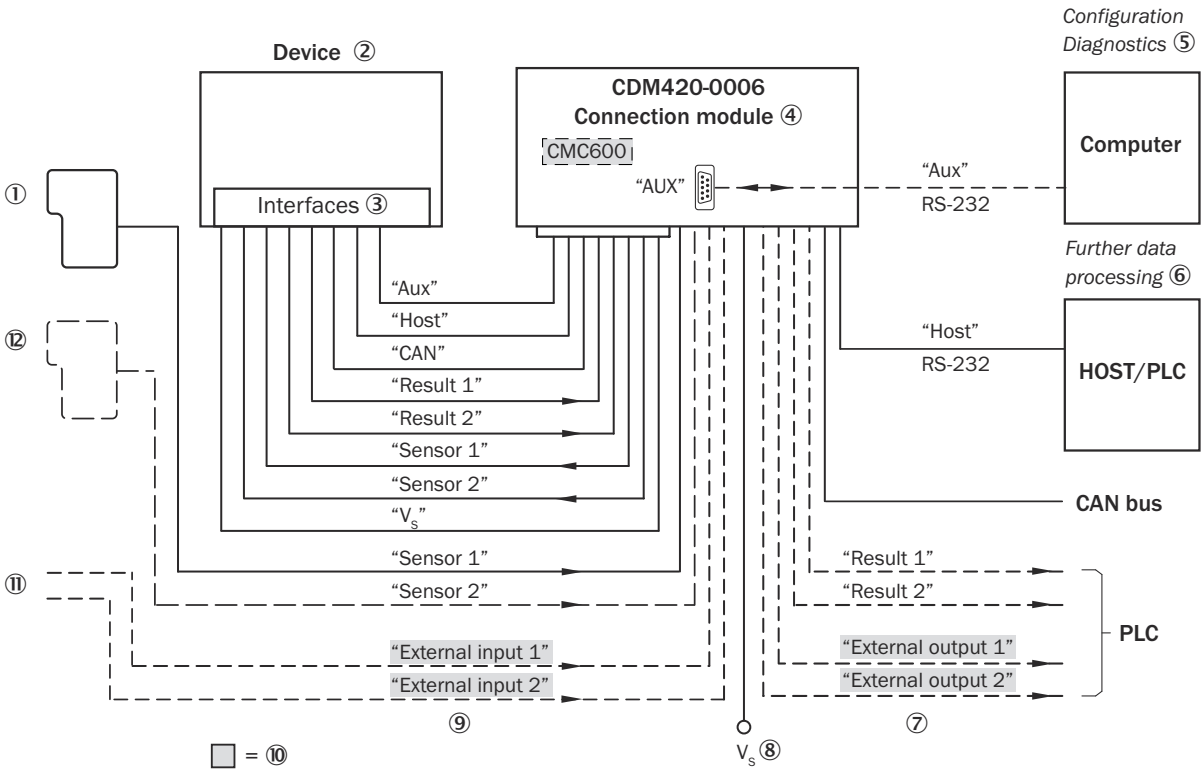



*Figure 62: Connection of the device to peripherals via CDM420-0006 (overview)*

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

### 14.7.2 Wiring overview of the CDM420-0006

**Device = CLV61x-xx0xxx (serial variant), 1 digital input used**

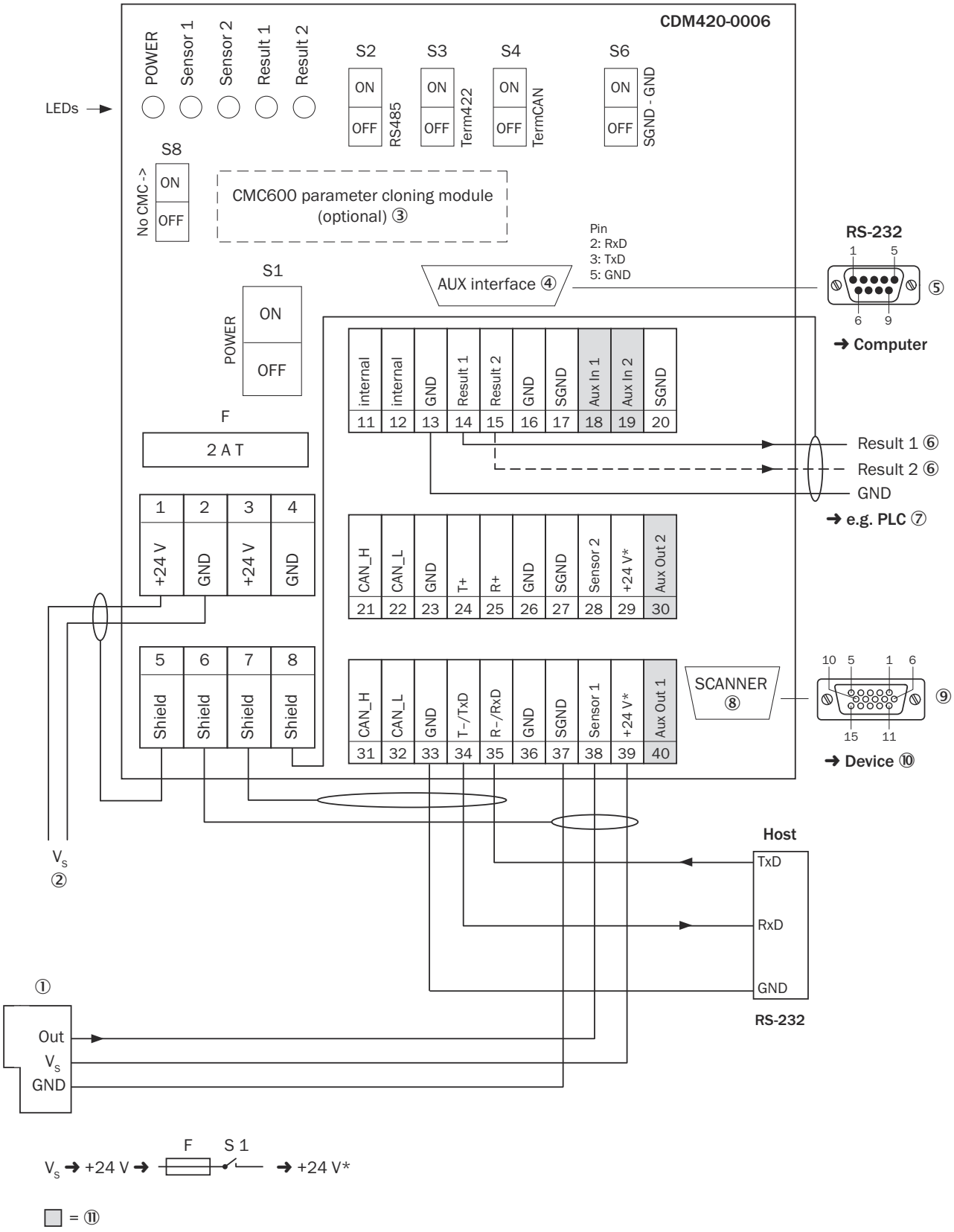



*Figure 63: Overview: connection of device and peripherals to the CDM420-0006 connection module*

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 use the additional external digital inputs and outputs of the device (highlighted in gray).

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

**Device = CLV61x-xx0xxx (serial variant)**

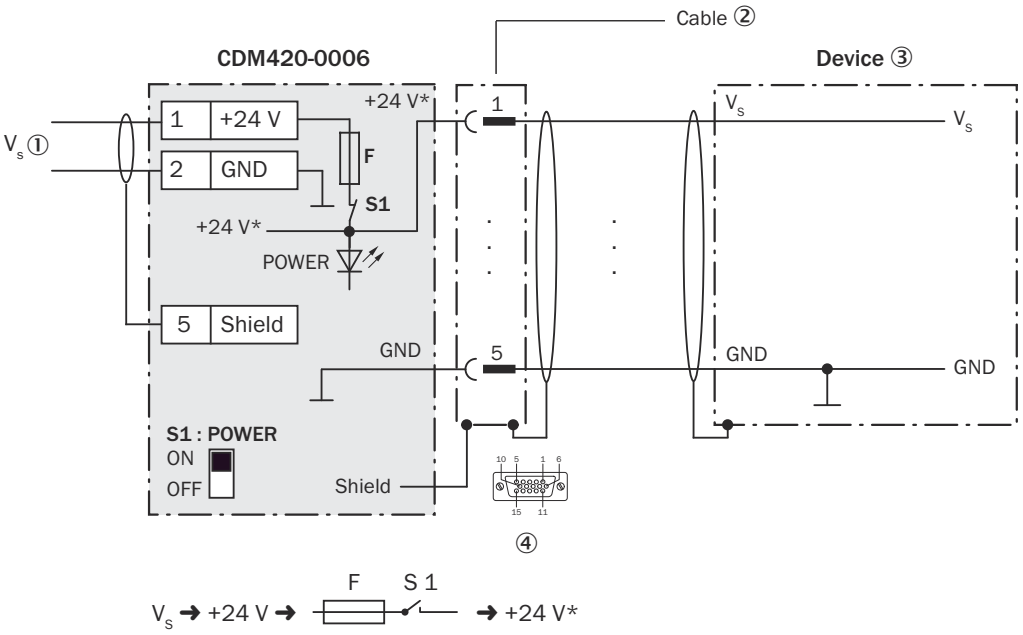



*Figure 64: Connecting supply voltage for the device in CDM420-0006 connection module*

① Supply voltage $V_S$
② Connecting cable permanently connected with the device (male connector, D-Sub-HD, 15-pin)
③ Device
④ Connection module: female connector, D-Sub-HD, 15-pin

**Function of switch S1**

*Table 45: Switch S1: Power*

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

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

**Device = CLV61x-xx0xxx (serial variant)**

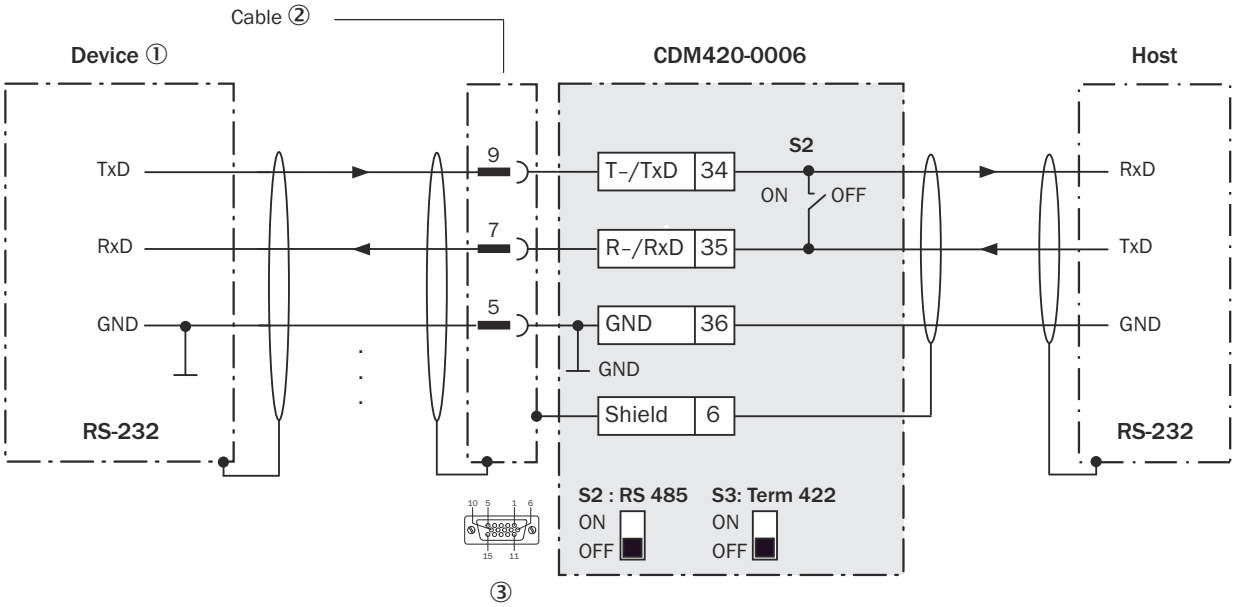



*Figure 65: Wiring data interface RS-232 of the device in connection module CDM420-0006.*

① Device
② Connecting cable permanently connected with the device (male connector, D-Sub-HD, 15-pin)
③ Connection module: female connector, D-Sub-HD, 15-pin

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

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

**Device = CLV61x-xx0xx (serial variant)**

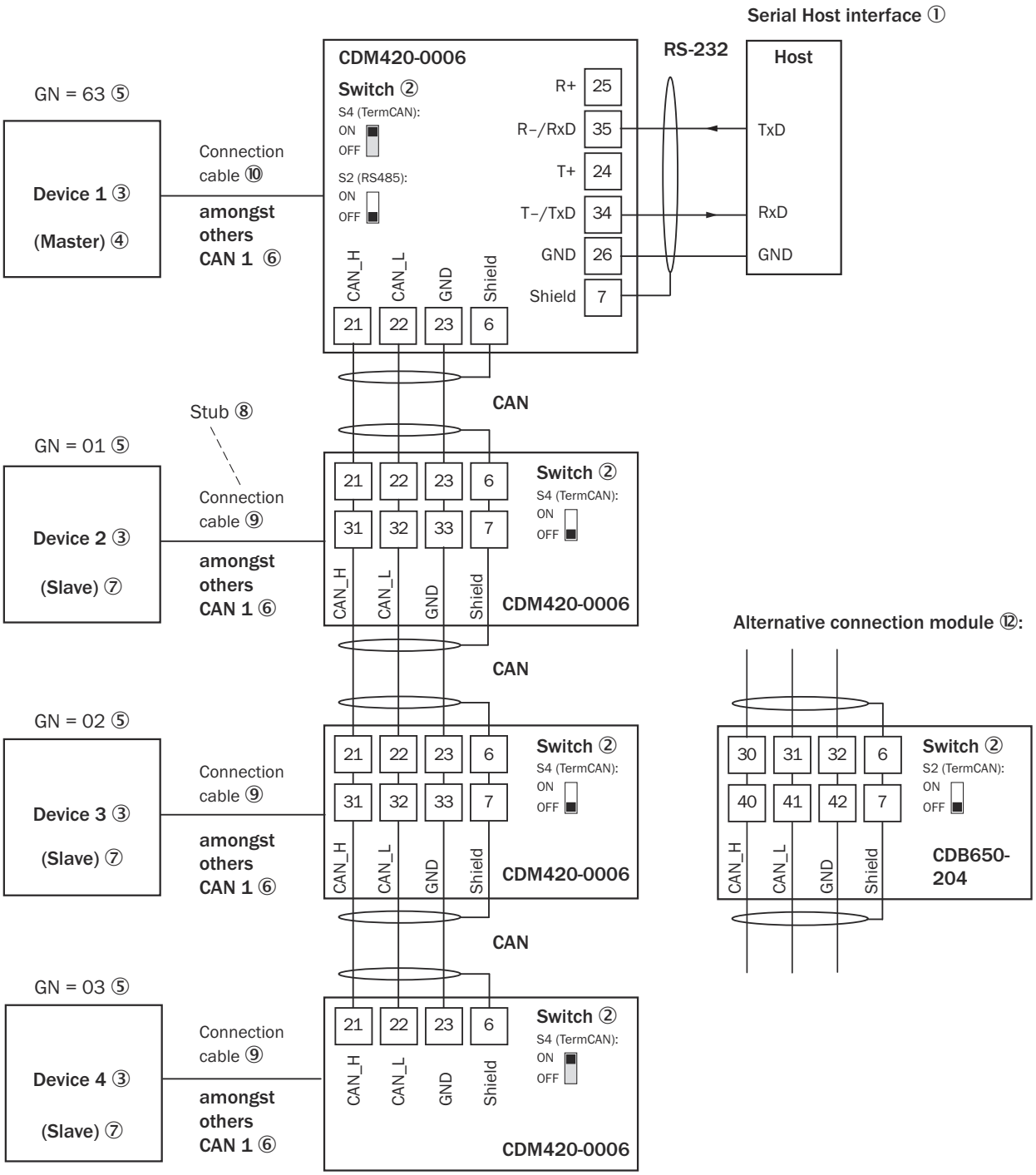



*Figure 66: Wire the CAN interface of the device in the CDM420-0006 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the master, for example, are disregarded here!*

① Serial host interface
② Switch
③ Device
④ Master
⑤ Device number
⑥ CAN etc.

⑦ Slave
⑧ Branch line
⑨ Connecting cable permanently connected with the device (male connector, D-Sub-HD, 15-pin)
⑩ Device number (GN)
⑪ Maximum 32 users
⑫ Example of alternative connection module

Alternative connection modules for CLV61x: CDB620 or CDM420-0001

**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.

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

**Device = CLV61x-xx0xxx (serial variant)**

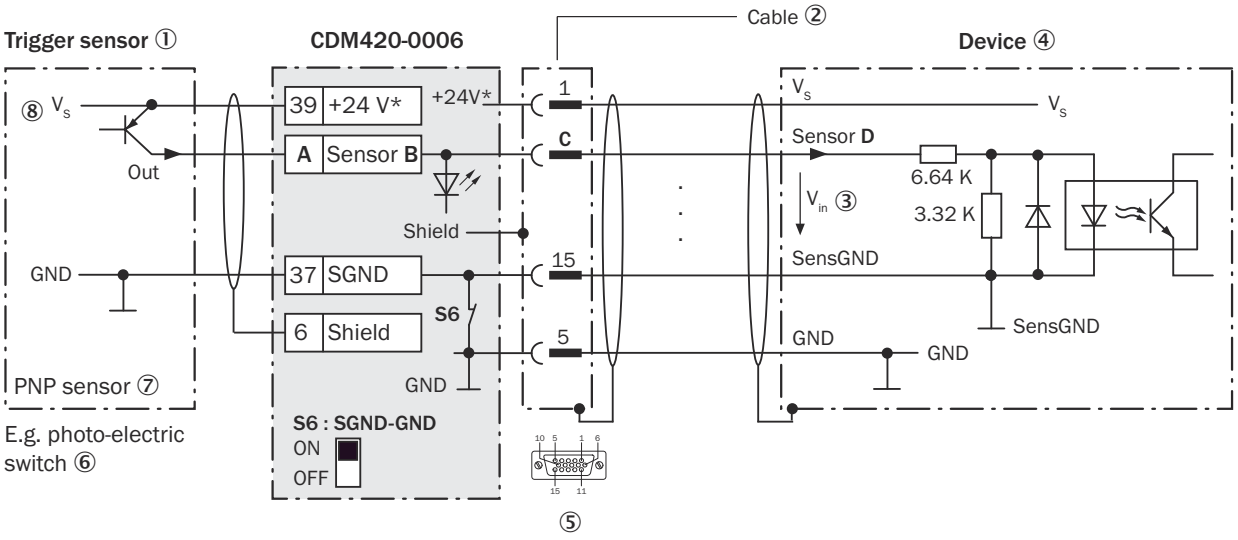



*Figure 67: Trigger sensor supplied with power by connection module CDM420-0006*

① Trigger sensor, e.g. for read cycle generation
② Connecting cable permanently connected with the device (male connector, D-Sub-HD, 15-pin)
③ Input voltage $V_{in}$
④ Device
⑤ Connection module: female connector, D-Sub-HD, 15-pin
⑥ E.g. photoelectric sensor
⑦ PNP sensor
⑧ Supply voltage $V_S$

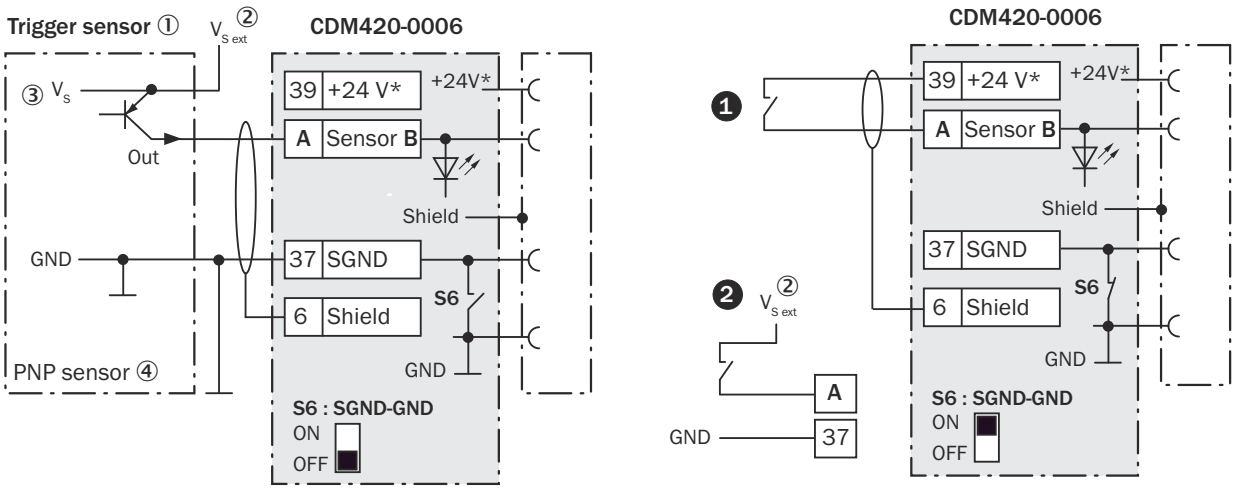



*Figure 68: Left: Trigger sensor connected potential-free and supplied with power externally. Right: alternative switch, ❶ supplied with power by connection module CDM420-0006 or ❷ connected volt-free and supplied with power externally. Now select switch setting S6 as shown in the left figure.*

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

*Table 46: Assignment of placeholders to the digital inputs*

| CDM420-0006 | | | Device |
|---|---|---|---|
| **Terminal A** | **Signal B** | **Pin C** | **Sensor D** |
| 38 | Sensor 1 | 14 | 1 |
| 28 | Sensor 2 | 4 | 2 |

### Function of switch S6

*Table 47: Switch S6: SGND - GND*

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

### Characteristic data of the digital inputs

*Table 48: 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<br>• Can be wired with PNP output of a trigger sensor |
| **Electrical values** | Low: $V_{in}$ [1] ≤ 2 V; $I_{in}$ [2] ≤ 0.3 mA |

1) Input Voltage
2) Input current

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

### 14.7.7 Wiring the external digital inputs of the device in the CDM420-0006

**Device = CLV61x-xx0xxx (serial variant)**

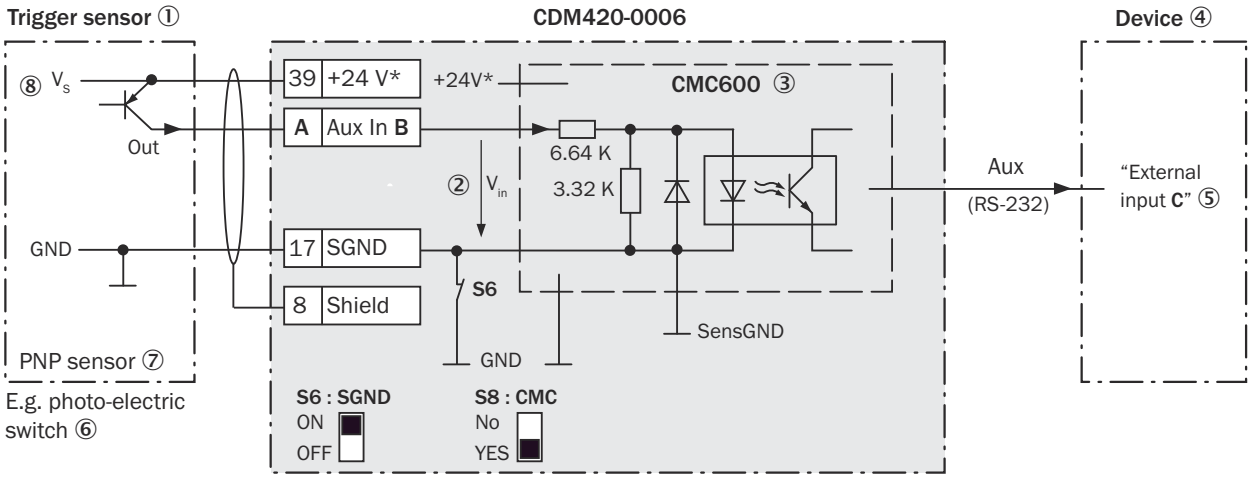



*Figure 69: Trigger sensor supplied with power by connection module CDM420-0006.*

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 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 $V_S$

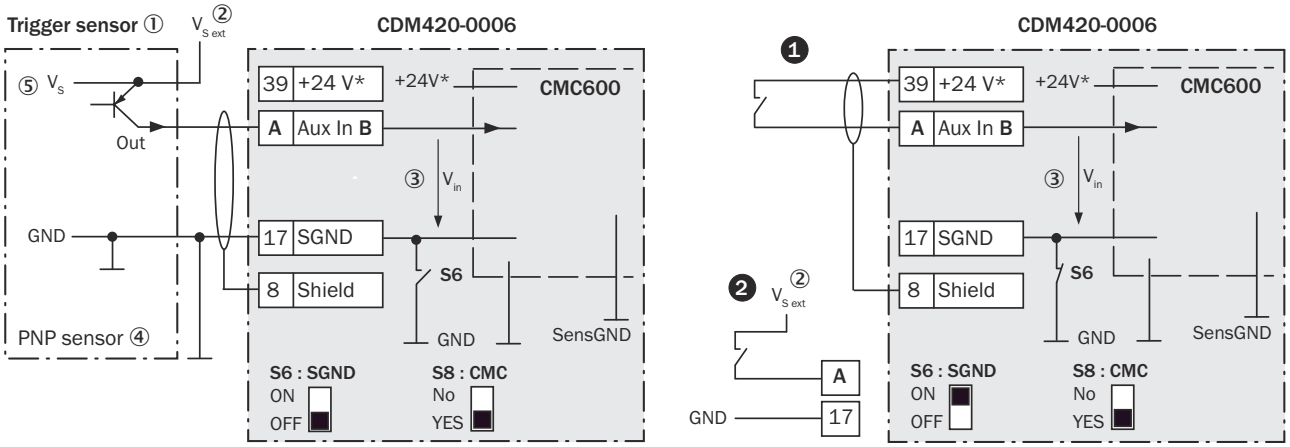



*Figure 70: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDM420-0006 or ❷ connected potential-free and supplied with power externally. Switch setting S3 then as in left figure.*

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 49: 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 50: 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 volt-free at CDM420-0006 and CMC600<br>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 51: 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.<br>Default setting in the device: logic not inverted (active high), debounce time 10 ms |
| **Properties** | • Opto-decoupled, reverse polarity protected<br>• Can be wired with PNP output of a trigger sensor |
| **Electrical values** | Low: $V_{in}$[1] ≤ 2 V; $I_{in}$[2] ≤ 0.3 mA<br>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 digital inputs in the device using a configuration tool, e.g., the configuration software SOPAS ET.

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

**Device = CLV61x-xx0xxx (serial variant)**

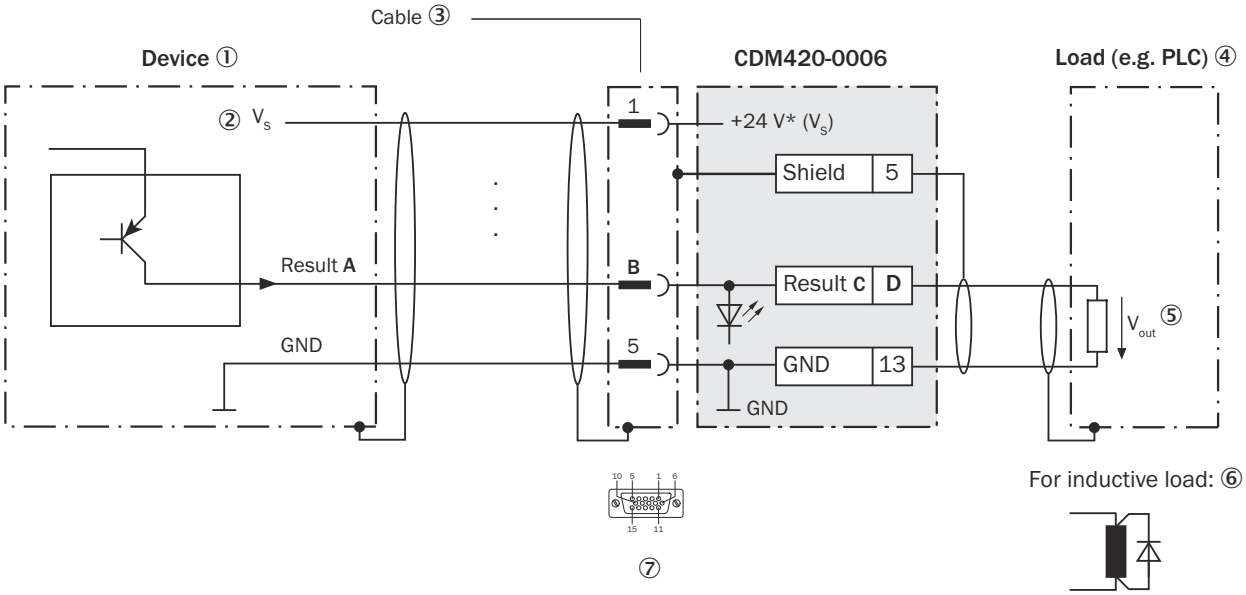



*Figure 71: Wiring the "Result 1" and "Result 2" digital outputs of the device in the CDM420-0006 connection module.*

① Device
② Supply voltage $V_S$
③ Connecting cable permanently connected with the device (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

#### 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 52: Assignment of placeholders to the digital outputs*

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

#### Characteristic data of the digital outputs

*Table 53: Characteristic data of the "Result 1" and "Result 2" digital outputs*

| | |
|---|---|
| **Type** | Switching |
| **Switching behavior** | PNP switching to supply voltage $V_S$<br>Default settings in the device: no function, logic: not inverted (active high) |
| **Properties** | • Short-circuit protected and temperature protected<br>• Not electrically isolated from the supply voltage $V_S$ |

| | |
|---|---|
| **Electrical values** | $0\ V \leq V_{out}$ [1] $\leq V_S$<br>$(V_S - 1.5\ V) \leq V_{out} \leq V_S$ 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.

### 14.7.9 Wiring the external digital outputs of the device in the CDM420-0006

**Device = CLV61x-xx0xxx (serial variant)**

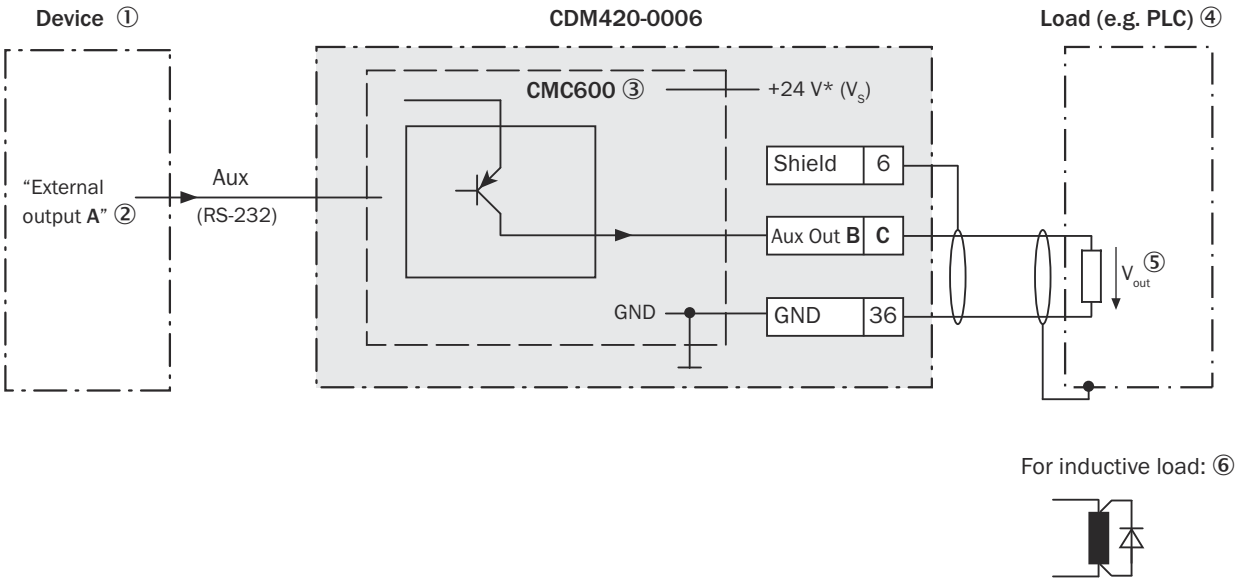



*Figure 72: Wiring "Aux Out 1" and "Aux Out 2" external digital outputs of the device in the connection module CDM420-0006.*

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 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**

**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 54: Assignment of placeholders to the external digital outputs*

| Device | CDM420-0006 | |
|---|---|---|
| **External output A** | **Signal B** | **Terminal C** |
| 1 | Aux Out 1 | 40 |

| Device | CDM420-0006 | |
|---|---|---|
| **External output A** | **Signal B** | **Terminal C** |
| 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”.

**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 55: Characteristic data of the digital outputs “External output 1” and “External output 2”*

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

## 14.8 Abbreviations used

*Table 56: Abbreviations used*

| | |
|---|---|
| **CAN** | **C**ontrolled **A**rea **N**etwork. Field bus log based on the CAN bus |
| **CDB** | **C**onnection **D**evice **B**asic |
| **CDF** | **C**onnection **D**evice **F**ieldbus |
| **CDM** | **C**onnection **D**evice **M**odular |
| **CE** | **C**ommunauté **E**uropéenne. European Community |
| **CLV** | **C**ode-**L**eser **V**-Prinzip [Code reader V principle] |
| **CMC** | **C**onnection **M**odule **C**loning |
| **CMD** | **C**onnection **M**odule **D**isplay |
| **CMP** | **C**onnection **M**odule **P**ower |
| **DOF** | **D**epth **O**f **F**ield. Depth of field |
| **ES** | **E**lectrical **s**ource. Electrical power source. |
| **ESD** | **E**lectro-**S**tatic **D**ischarge. Electrostatic discharge |

| | |
|---|---|
| **HTML** | **H**yper **T**ext **M**arkup **L**anguage (page description language on the Internet) |
| **I** | **I**nput |
| $I_{in}$ | Input current |
| $I_{out}$ | Output current |
| **LED** | **L**ight **E**mitting **D**iode. Light emitting diode |
| **LPS** | **L**imited **P**ower **S**upply |
| **MTBF** | **M**ean **T**ime **B**etween **F**ailure |
| **MTTF** | **M**ean **T**ime **T**o **F**ailure |
| **MTTR** | **M**ean **T**ime **T**o **R**epair |
| **O** | **O**utput |
| **PCS** | **P**rinted **C**ontrast **S**ignal |
| **PLC** | **P**rogrammable **L**ogic **C**ontroller |
| **PROM** | **P**rogrammable **R**ead **O**nly **M**emory. Programmable non-volatile memory |
| **RA** | **R**eading **A**ngle |
| **RAM** | **R**andom **A**ccess **M**emory. Direct-access volatile memory |
| **ROM** | **R**ead **O**nly **M**emory. Read-only memory (non-volatile) |
| **RTF** | **R**ich **T**ext **F**ormat (standardized document format with format description) |
| **SDD** | **S**OPAS **D**evice **D**escription (device description file, driver for SICK SOPAS ET software) |
| **SMART** | **S**ICK **M**odular **A**dvanced **R**ecognition **T**echnology |
| **SOPAS ET** | **S**ICK **O**pen **P**ortal for **A**pplication and **S**ystems **E**ngeneering **T**ool (computer software for Windows for device configuration) |
| **PLC** | **P**rogammable **L**ogic **C**ontroller |
| **SELV** | Safety Extra Low Voltage |
| $V_{in}$ | Input voltage |
| $V_{out}$ | Output voltage |
| $V_S$ | Supply voltage |

8017840/190F/2021-10-28/en

**Australia**
Phone +61 (3) 9457 0600
1800 33 48 02 – tollfree
E-Mail sales@sick.com.au

**Austria**
Phone +43 (0) 2236 62288-0
E-Mail office@sick.at

**Belgium/Luxembourg**
Phone +32 (0) 2 466 55 66
E-Mail info@sick.be

**Brazil**
Phone +55 11 3215-4900
E-Mail comercial@sick.com.br

**Canada**
Phone +1 905.771.1444
E-Mail cs.canada@sick.com

**Czech Republic**
Phone +420 234 719 500
E-Mail sick@sick.cz

**Chile**
Phone +56 (2) 2274 7430
E-Mail chile@sick.com

**China**
Phone +86 20 2882 3600
E-Mail info.china@sick.net.cn

**Denmark**
Phone +45 45 82 64 00
E-Mail sick@sick.dk

**Finland**
Phone +358-9-25 15 800
E-Mail sick@sick.fi

**France**
Phone +33 1 64 62 35 00
E-Mail info@sick.fr

**Germany**
Phone +49 (0) 2 11 53 010
E-Mail info@sick.de

**Greece**
Phone +30 210 6825100
E-Mail office@sick.com.gr

**Hong Kong**
Phone +852 2153 6300
E-Mail ghk@sick.com.hk

**Hungary**
Phone +36 1 371 2680
E-Mail ertekesites@sick.hu

**India**
Phone +91-22-6119 8900
E-Mail info@sick-india.com

**Israel**
Phone +972 97110 11
E-Mail info@sick-sensors.com

**Italy**
Phone +39 02 27 43 41
E-Mail info@sick.it

**Japan**
Phone +81 3 5309 2112
E-Mail support@sick.jp

**Malaysia**
Phone +603-8080 7425
E-Mail enquiry.my@sick.com

**Mexico**
Phone +52 (472) 748 9451
E-Mail mexico@sick.com

**Netherlands**
Phone +31 (0) 30 229 25 44
E-Mail info@sick.nl

**New Zealand**
Phone +64 9 415 0459
0800 222 278 – tollfree
E-Mail sales@sick.co.nz

**Norway**
Phone +47 67 81 50 00
E-Mail sick@sick.no

**Poland**
Phone +48 22 539 41 00
E-Mail info@sick.pl

**Romania**
Phone +40 356-17 11 20
E-Mail office@sick.ro

**Russia**
Phone +7 495 283 09 90
E-Mail info@sick.ru

**Singapore**
Phone +65 6744 3732
E-Mail sales.gsg@sick.com

**Slovakia**
Phone +421 482 901 201
E-Mail mail@sick-sk.sk

**Slovenia**
Phone +386 591 78849
E-Mail office@sick.si

**South Africa**
Phone +27 10 060 0550
E-Mail info@sickautomation.co.za

**South Korea**
Phone +82 2 786 6321/4
E-Mail infokorea@sick.com

**Spain**
Phone +34 93 480 31 00
E-Mail info@sick.es

**Sweden**
Phone +46 10 110 10 00
E-Mail info@sick.se

**Switzerland**
Phone +41 41 619 29 39
E-Mail contact@sick.ch

**Taiwan**
Phone +886-2-2375-6288
E-Mail sales@sick.com.tw

**Thailand**
Phone +66 2 645 0009
E-Mail marcom.th@sick.com

**Turkey**
Phone +90 (216) 528 50 00
E-Mail info@sick.com.tr

**United Arab Emirates**
Phone +971 (0) 4 88 65 878
E-Mail contact@sick.ae

**United Kingdom**
Phone +44 (0)17278 31121
E-Mail info@sick.co.uk

**USA**
Phone +1 800.325.7425
E-Mail info@sick.com

**Vietnam**
Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Detailed addresses and further locations at **www.sick.com**

SICK AG | Waldkirch | Germany | www.sick.com

SICK
Sensor Intelligence.