OPERATING INSTRUCTIONS

CLV61x

Fixed mount barcode scanner

SICK
Sensor Intelligence.

Described product

CLV61x CAN

CLV61x FIELDBUS (fieldbus access via CDF600 bus connection module)

Manufacturer

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Germany

Legal information

Original document

This document is an original document of SICK AG.

KC certification type-dependent

Contents

1 About this document

1.1 Information on the operating instructions

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

Prerequisites for safe work are:

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

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

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

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

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

1.2 Scope

This document applies to the following products:

- CLV61x CAN
- CLV61x FIELDBUS (fieldbus access via CDF600 bus connection module)

This document does not apply to the CLV61x Dual Port product.

1.3 Explanation of symbols

Warnings and important information in this document are labeled with symbols. Signal words introduce the instructions and indicate the extent of the hazard. To avoid accidents, damage, and personal injury, always comply with the instructions and act carefully.

DANGER
... indicates a situation of imminent danger, which will lead to a fatality or serious injuries if not prevented.

WARNING
... indicates a potentially dangerous situation, which may lead to a fatality or serious injuries if not prevented.

CAUTION
... indicates a potentially dangerous situation, which may lead to minor/slight injuries if not prevented.

NOTICE
... indicates a potentially harmful situation, which may lead to material damage if not prevented.

NOTE
... highlights useful tips and recommendations as well as information for efficient and trouble-free operation.

1.4 Further information

More information can be found on the product page.

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

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

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

The following information is available depending on the product:

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

2 Safety information

2.1 Intended use

The 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.

Only use the device in industrial environments (EN 61000-6-4). The device meets the applicable requirements for industrial robustness, interfaces and data processing.

The barcodes 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.

2.2 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

Overview

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

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

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

2.4 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 ▪ Knowledge of the current safety regulations in the workplace
Electrical installation, device replacement	▪ Practical electrical training ▪ Knowledge of current electrical safety regulations ▪ Knowledge of the operation and control of the devices in their particular application
Commissioning, configuration	▪ Basic knowledge of the computer operating system used ▪ Basic knowledge of the design and setup of the described connections and interfaces ▪ Basic knowledge of data transmission ▪ 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 ▪ Knowledge of the software and hardware environment for the particular application

2.7 Operational safety and specific hazards

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

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.

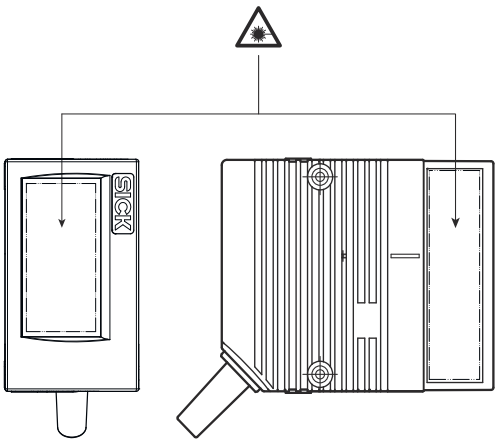


Figure 1: Laser output aperture for the two designs of the device

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 13.

If the device is installed inaccessibly, see "Features", page 58 in the technical data.

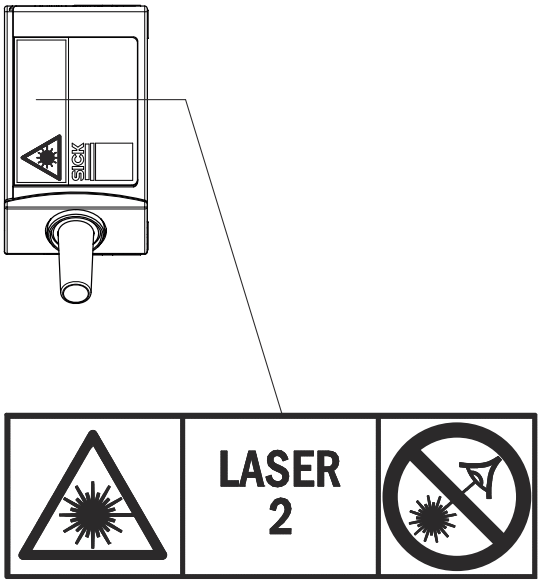


Figure 2: Position and contents of the laser warning label on the device

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.

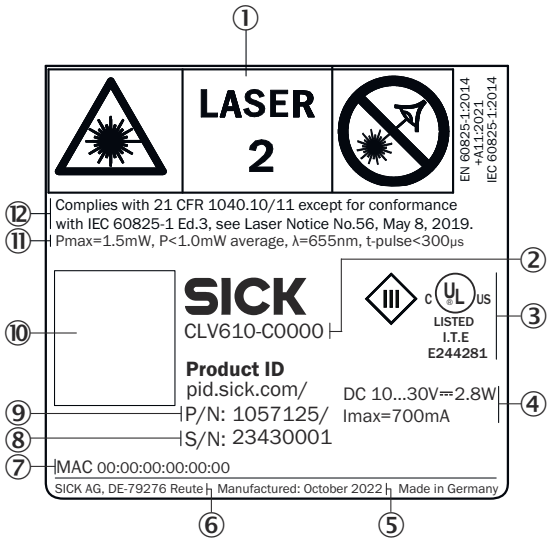


Figure 3: CLV61x: Example of type label of CLV610-C0000. Electrical values shown here for devices with connecting cable 0.9 m to max. 3 m. Figure may differ.

① Laser warning label
② Type designation according to type code
③ Conformity mark and certification mark
④ Supply voltage, power consumption, maximum current consumption
⑤ Production date
⑥ Manufacturer and production site
⑦ MAC address, only for Ethernet variants
⑧ Serial number
⑨ Part number
⑩ QR code, leads to SICK product ID
⑪ Laser power data: Maximum power, average power, wavelength, pulse duration
⑫ Complies with 21 CFR 1040.10/11 except for conformance with IEC 60825-1 Ed. 3., see Laser Notice No. 56, May 8, 2019

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 2: Short range 5: Long Range 8: Long range
5	Performance	C: CAN D: Dual Port PROFINET F: Fieldbus (Dual Port) over external fieldbus module CDF600-2 I: IO-Link
6	Reading method, orientation of viewing window [1]	0: Line scanner, viewing window on front side 1: Raster scanner, viewing window on front side 2: Line scanner, viewing window on the side 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 1 = Swivel connector with 1 male connector, M12, 5-pin, A-coded and 1 female connector, M12, 5-pin, A-coded 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 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 1: Host (Ethernet), AUX (Ethernet, USB [2]) 2: Host (Ethernet), AUX (Ethernet, USB [2]), 1 digital input 3: Host (Ethernet), AUX (Ethernet), 1 external parameter memory (microSD memory card) [3] 4: Host (Ethernet), AUX (Ethernet), 1 external parameter memory (microSD memory card [3]), 1 digital input 5: IO-Link, 1 digital input (hardware)
9	Window material of the viewing window	0: Glass 1: Plastic
10	Ambient operating temperature	Without marking: Standard (0 °C ... +40 °C) F0: Extended (-35 °C ... +40 °C, with integrated heating)

Position	Description	Characteristic
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.

3.2 Product characteristics

3.2.1 Device view

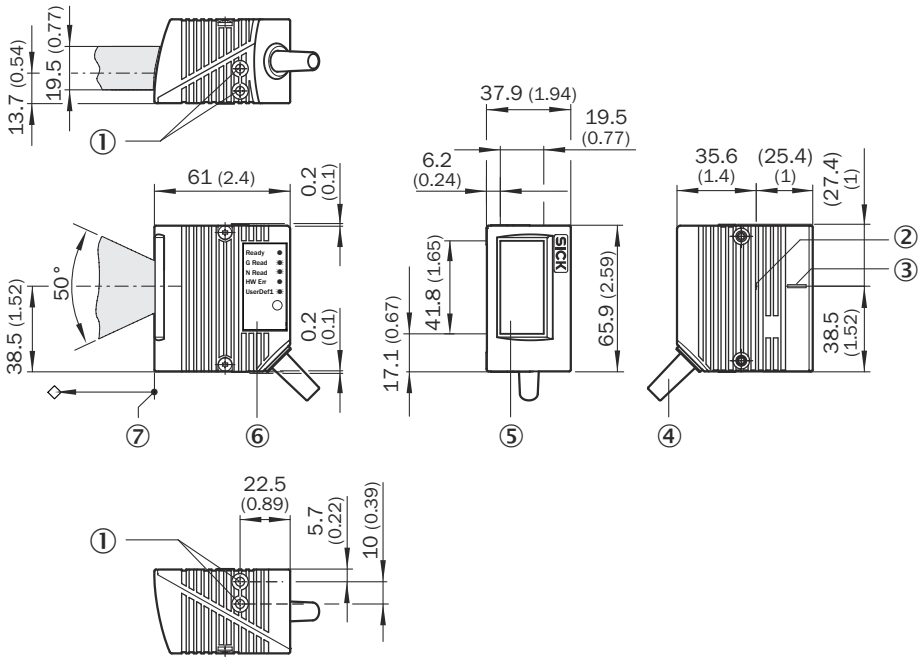


Figure 4: CLV61x with front viewing window: Structure and device dimensions, unit of measurement: mm (inch), decimal separator: Period

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)

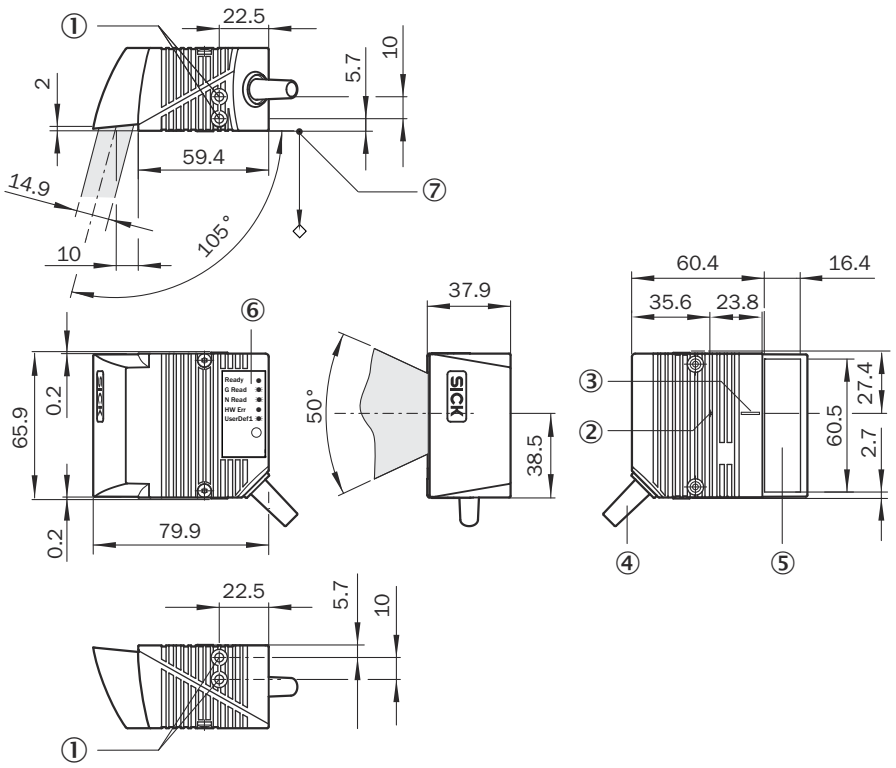


Figure 5: CLV61x with side viewing window: Structure and device dimensions, unit of measurement: mm (inch), decimal separator: Period

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 3: 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) • Mid Range (CLV610) • 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 • CLV615, CLV618: side		
Electrical Interfaces	• Power • RS-232 (Host, AUX) • CAN • 2 digital inputs • 2 digital outputs		• Power • Ethernet (Host, AUX) • USB or MicroSD memory card[1) 2) 3)] • 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 • Cable with 1 male connector, 4- or 5-pin, A-coded [1)] • 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 • 18 V DC ... 30 V DC [4)]
Power consumption			• Typically 5 W [5)] • Typically 15 W [4) 5)]
Memory card	–		Optional [1) 2)]
Heating	–		Optional [1)]
Ambient operating temperature	0 °C ... +40 °C		0 °C ... +40 °C –35 °C ... +40 °C [4)]
Storage temperature	–20 °C ... +70 °C		–20 °C ... +70 °C –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 Scope of delivery

The delivery of the device includes the following components:

Table 4: CLV61x: scope of delivery

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

The actual scope of delivery may differ for special designs, additional orders or due to the latest technical changes.

3.2.4 Product features and functions (overview)

Table 5: 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) • Laser Class 2, laser switches off if the output power is exceeded • Automatic self-test on system start • Diagnostic tools for system setup and (remote) system monitoring • Configurable output of reading diagnostic data in two reading results formats • Operating data polling, in case of error, issue of error code if required • Activatable test string function (heartbeat) to signal that the device is ready for operation • Password-protected configuration mode via SOPAS ET • Future-proof due to firmware update via data interface • Future-oriented SOPAS ET configuration software • Low power consumption • Additional supply voltage range • 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 • Type-dependent configuration via GSD parameterization and via CDF600-2xx for CLV61x-Fxxxx • LED status indicator • 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 • Pulse sources for stop: Read cycle source, digital inputs, data interface (command), timer, condition
Bar code evaluation	• All current 1D bar code types • Max. number of bar codes: 50 per reading interval • 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 • 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 • AUX interface: Fixed data output format that can be switched for various physical interfaces

3.2.5 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

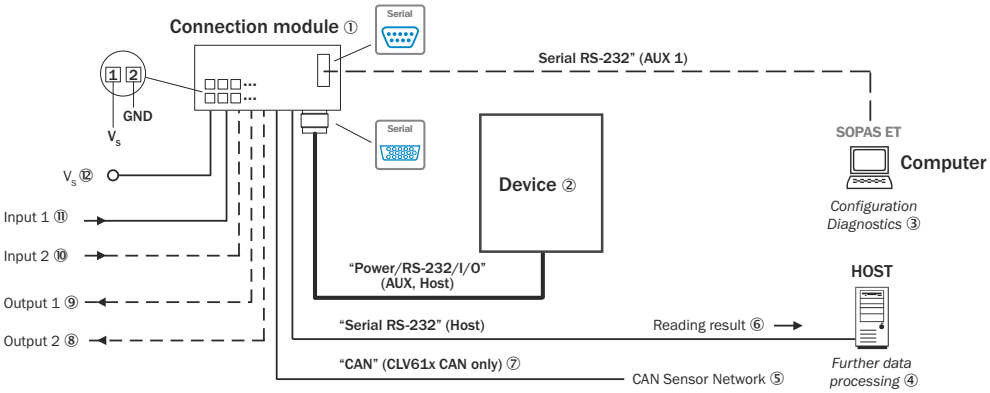


Figure 6: Facilities for connecting for CLV61x (CAN)

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

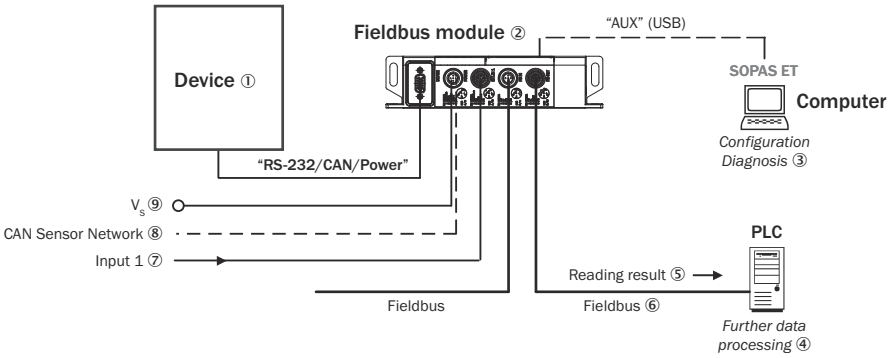


Figure 7: Facilities for connecting for CLV61x, FIELDBUS variants

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

3.2.5.1 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.

3.2.5.2 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

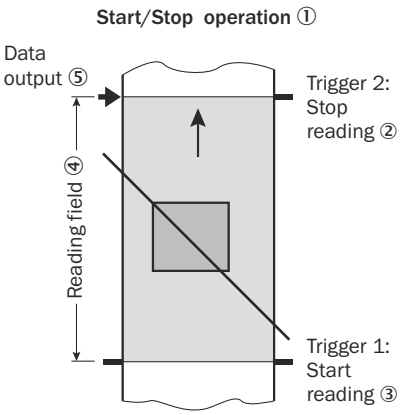


Figure 8: Start/stop operating mode of the device in stand-alone operation

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

NOTICE
Damage due to improper transport!

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

4.2 Unpacking

- To protect the device against condensation, allow it to equilibrate with the ambient temperature before unpacking if necessary.
- Handle the device with care and protect it from mechanical damage.

4.3 Transport inspection

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

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

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

4.4 Storage

- Electrical connections are provided with a protective cap.
- Do not store outdoors.
- Store in a place protected from moisture and dust.
- Recommendation: Use the original packaging.
- To allow any residual dampness to evaporate, do not package in airtight containers.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see "Technical data", page 58.
- Relative humidity: see "Technical data", page 58.
- 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 58.
- 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.

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 15.

SICK brackets

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

SICK offers prefabricated brackets that are suited for mounting the device in various applications. Information can be found on the product page.

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.

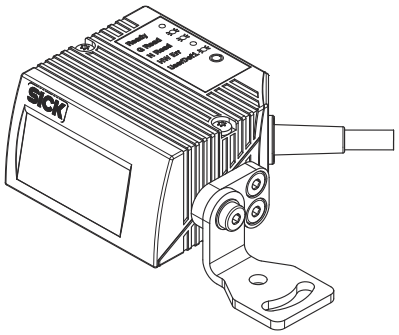


Figure 9: Mounting example of a device with mounting bracket with adapter plate

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

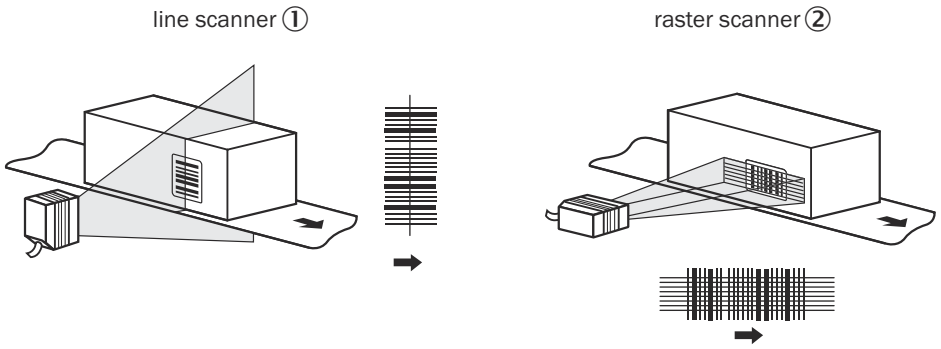


Figure 10: Allocation of scan line(s) to bar code and conveyor direction

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.

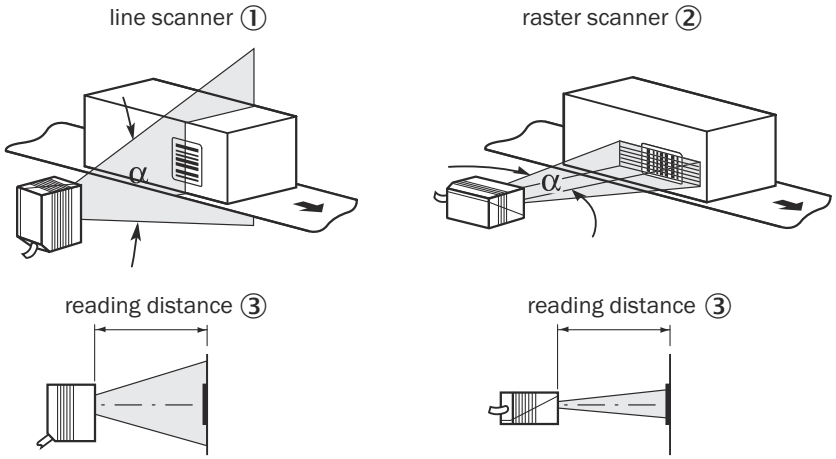


Figure 11: Definition of the reading distance and the aperture angle α

① Line scanner
② Grid scanner
③ Reading distance

In the specification diagrams (see "Reading field diagrams (working ranges)", page 61), 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 26.

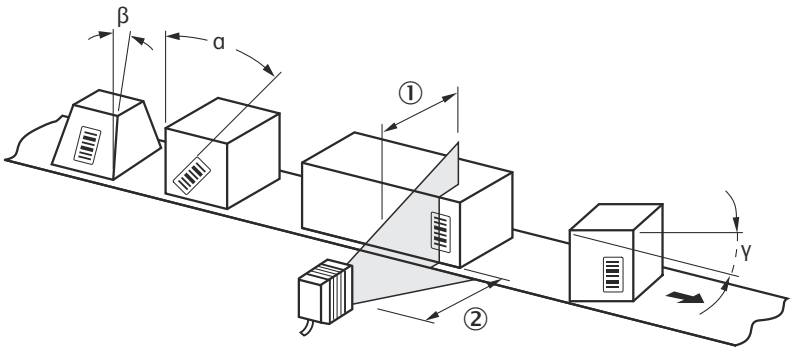


Figure 12: Line scanner: Occurring reading angle between scan line and bar code

① Depth of field

② Reading distance

Table 6: 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.

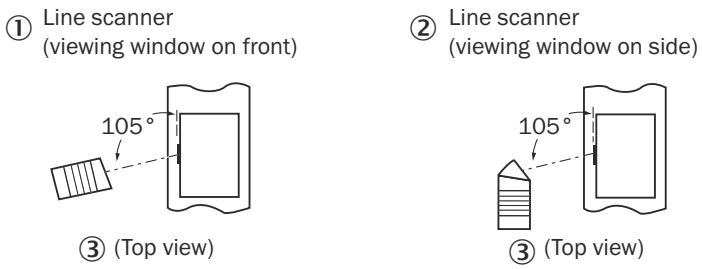


Figure 13: Avoiding surface reflections on the example line scanner: Angle between light emitted and bar code (tilting away from vertical)

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 60 in the technical data.

1. Prepare the base for mounting the bracket of the device, see "Preparing for mounting", page 23.
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 26.
   - 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 27.
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. Align device, see "Aligning the device for operational use", page 47.
7. After alignment, 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.

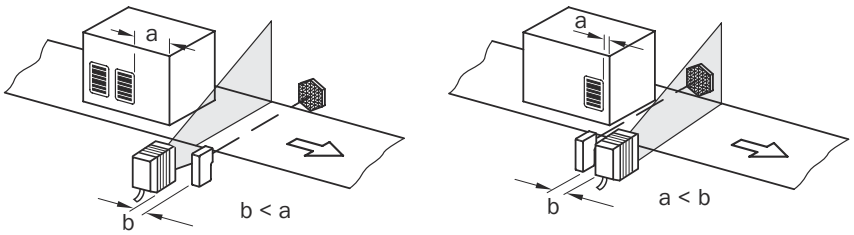


Figure 15: Bar code at the end or start of the piece goods

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.

6.2 Prerequisites for safe operation of the device

WARNING
Risk of injury and damage caused by electrical current!

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

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

Remedial measures

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

The device is 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

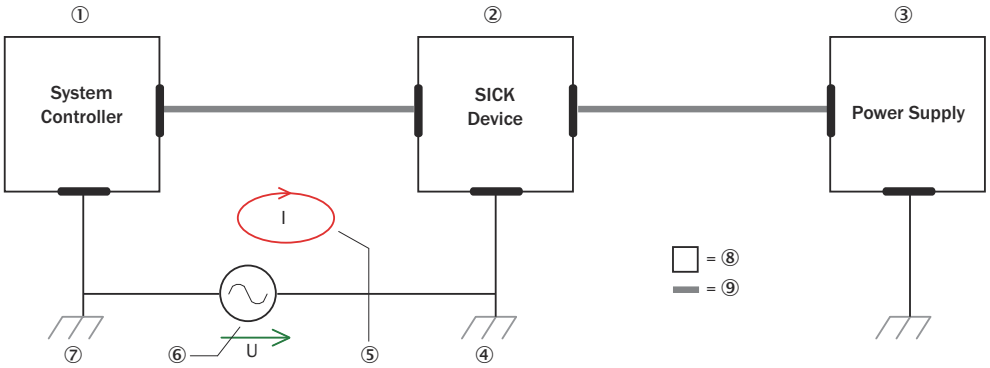


Figure 16: Example: Occurrence of equipotential bonding currents in the system configuration

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.

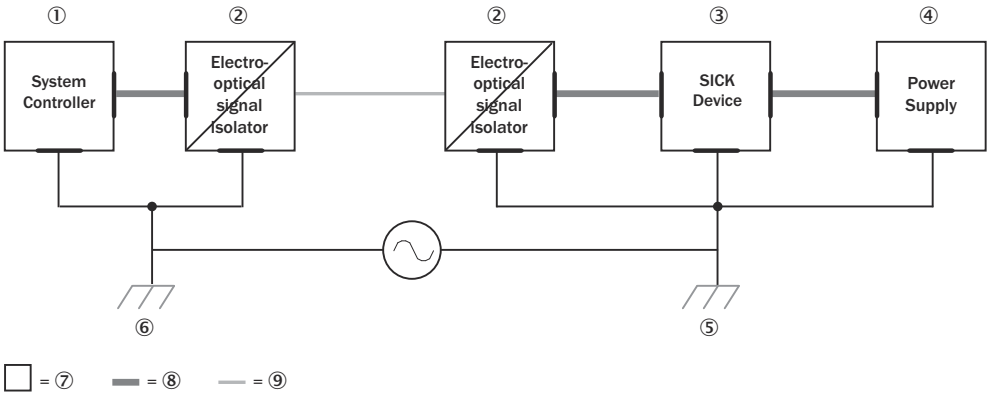


Figure 17: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

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.

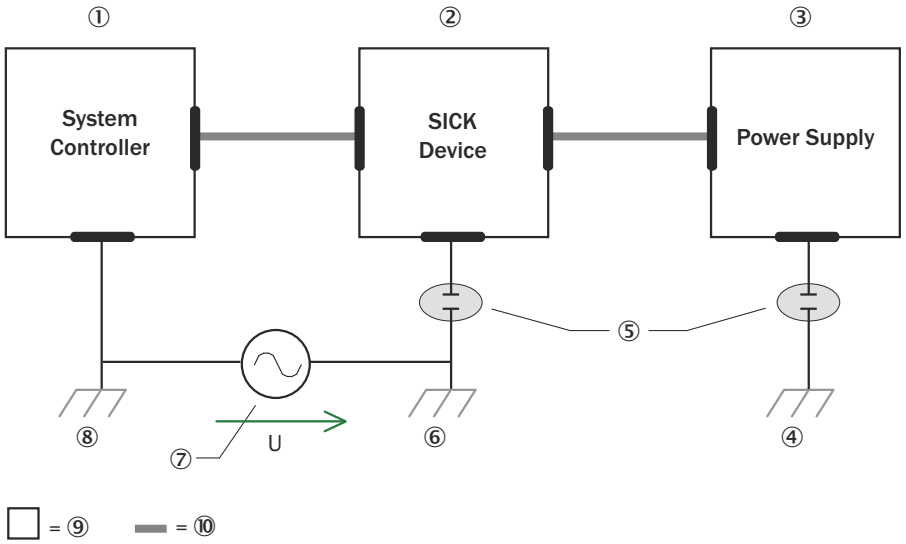


Figure 18: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

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.

6.3 Wiring instructions

NOTE

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

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

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

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

NOTICE

Faults during operation and defects in the device or the system

Incorrect wiring may result in operational faults and defects.

- Follow the wiring notes precisely.

NOTE

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

Information about pin, signal and wire color assignments can be found in the appendix, see "Signal assignment of cables with open cable end at one end", page 71.

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.

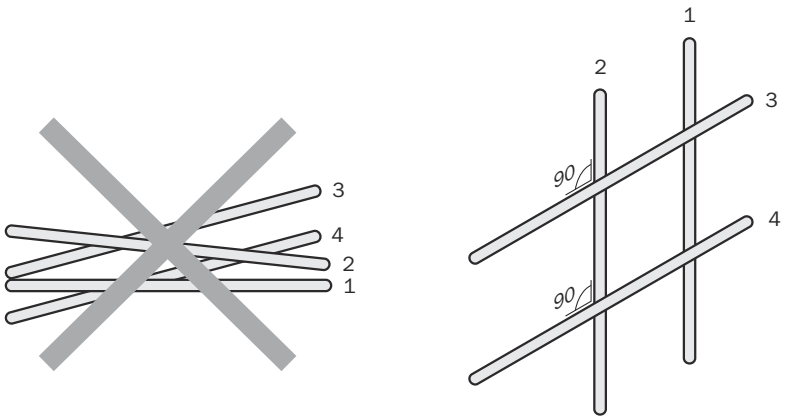


Figure 19: Cross cables at right angles

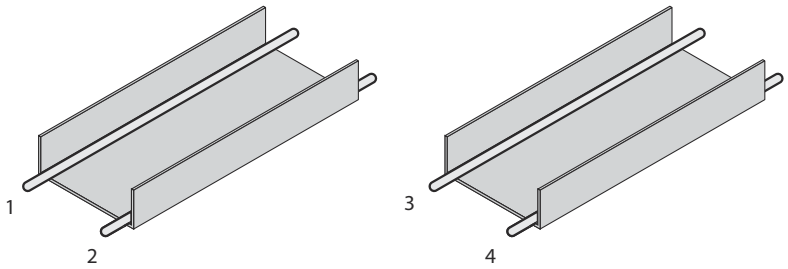


Figure 20: Ideal laying – Place cables in different cable channels

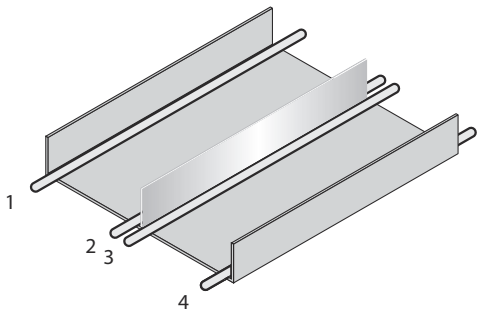


Figure 21: Alternative laying – Separate cables with metallic separators

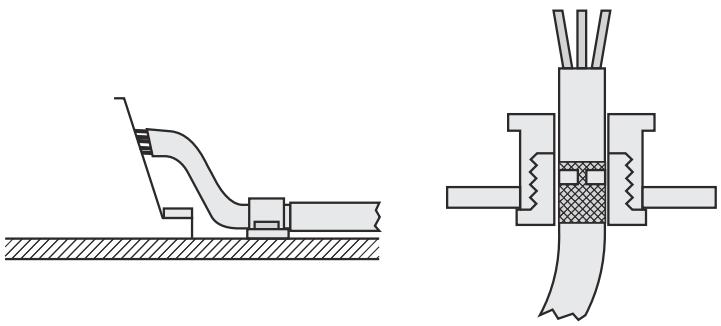


Figure 22: Shield connection in plastic housings

6.4 Pin assignments for electrical connections

CLV61x CAN / FIELDBUS

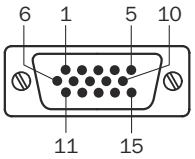


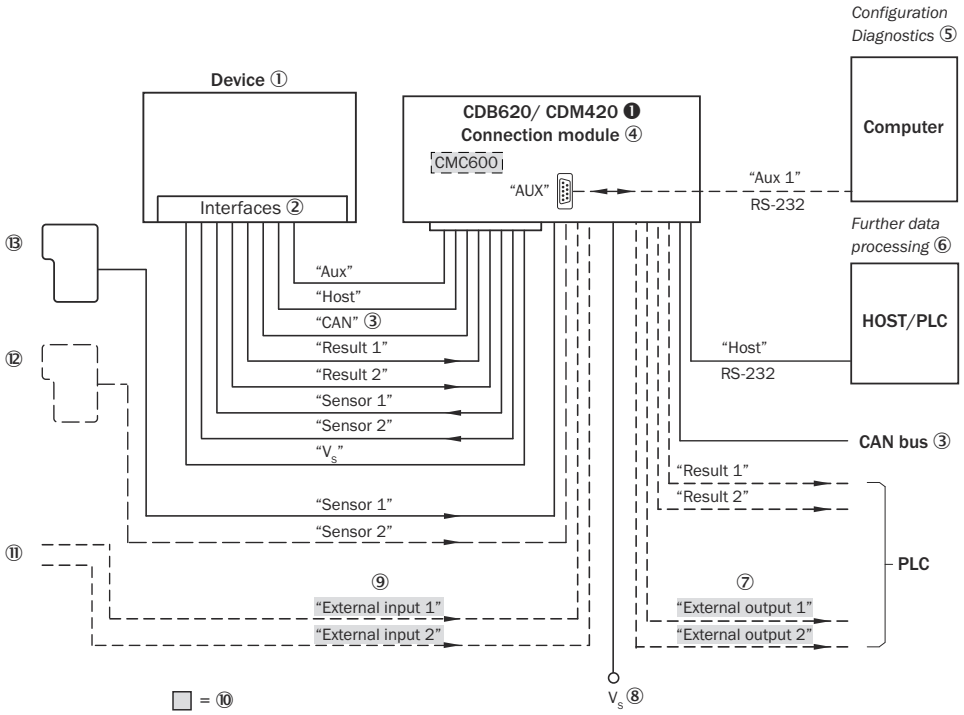
Figure 23: Male connector, D-Sub-HD, 15-pin

Table 7: 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 60.

6.5 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)

6.6 Wiring interfaces

6.6.1 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 76
CDM420-0001	Supply voltage	see "Connecting supply voltage for the device in CDM420-0001", page 88
CDM420-0006	Supply voltage	see "Connecting supply voltage for the device in CDM420-0006", page 100

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 user'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 a user voltage supply.

6.6.2 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 8: Data transmission rates

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

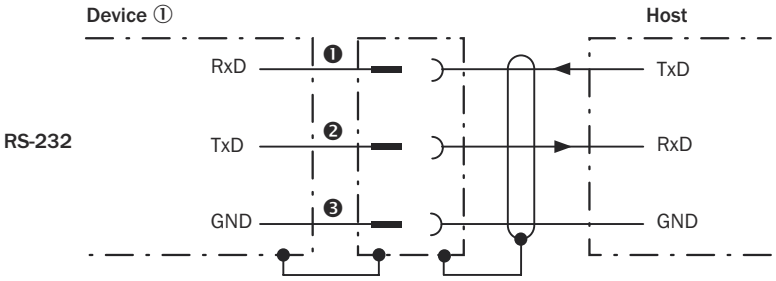


Figure 24: Internal circuitry for RS-232 data interface

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 76
CDM420-0001	RS-232	see "Wiring serial host interface RS-232 of the device in the CDM420-0001", page 88
CDM420-0006	RS-232	see "Wiring serial host interface RS-232 of the device in the CDM420-0006", page 101

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.

6.6.3 Wiring the CAN interface

NOTE

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

Configure further settings in the device according 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 77
CDM420-0001	CAN	see "Wiring the CAN interface of the device in the CDM420-0001", page 89
CDM420-0006	CAN	see "Wiring the CAN interface of the device in the CDM420-0006", page 101

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.

6.6.4 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 9: 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 • Can be wired with PNP output of a trigger sensor
Electrical values	The electrical values are identical for all digital inputs. Low: $\lvert V_{in}$ [1] $\rvert \leq 2$ V; $\lvert I_{in}$ [2] $\rvert \leq 0.3$ mA 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.

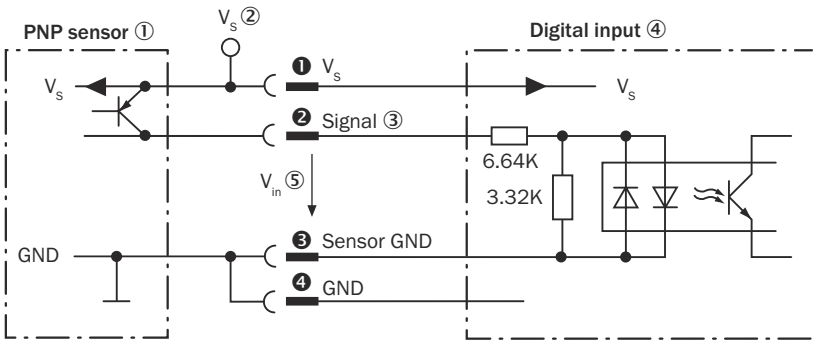


Figure 25: Wiring of a digital input on the device with external PNP sensor

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

Wiring the digital inputs via a connection module:

Connection modules	Digital inputs	Reference
CDB620-001	“Sens 1” “Sens 2”	see "Wiring digital inputs of the device in the CDB620-001", page 79
	External input 1 (“In 1”) External input 2 (“In 2”)	see "Wiring the external digital inputs of the device in the CDB620-001", page 81
CMD420-0001	“Sensor 1” “Sensor 2“	see "Wiring digital inputs of the device in the CDM420-0001", page 91
	External input 1 (“Aux In 1”) External input 2 (“Aux In 2”)	see "Wiring the external digital inputs of the device in the CDM420-0001", page 93
CMD420-0006	“Sensor 1” “Sensor 2“	see "Wiring digital inputs of the device in the CDM420-0006", page 103
	External input 1 (“Aux In 1”) External input 2 (“Aux In 2”)	see "Wiring the external digital inputs of the device in the CDM420-0006", page 105

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.

6.6.5 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 10: Characteristic data of the digital outputs

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

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

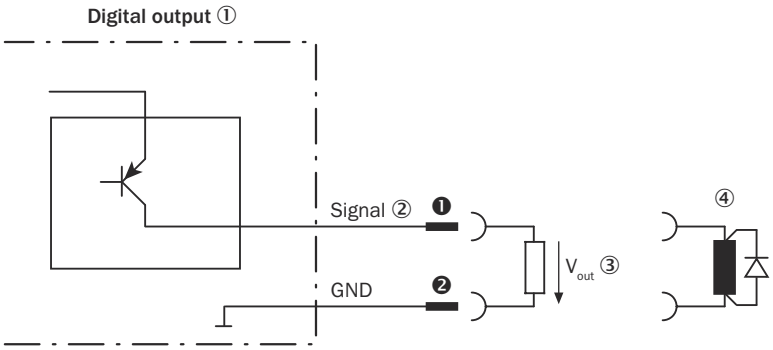


Figure 26: Wiring a digital output on the device

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

Wiring the digital outputs via a connection module:

Connection modules	Digital outputs	Reference
CDB620-001	“Result 1” “Result 2”	see "Wiring digital outputs of the device in the CDB620-001", page 82
	External output 1 (“ Out 1”) External output 2 ("Out 2")	see "Wiring the external digital outputs of the device in the CDB620-001", page 84
CMD420-0001	“Result 1” “Result 2”	see "Wiring digital outputs of the device in the CDM420-0001", page 95
	External output 1 (“Aux Out 1”) External output 2 (“Aux Out 2”)	see "Wiring the external digital outputs of the device in the CDM420-0001", page 96
CMD420-0006	“Result 1” “Result 2”	see "Wiring digital outputs of the device in the CDM420-0006", page 107
	External output 1 (“Aux In 1”) External output 2 (“Aux In 2”)	see "Wiring the external digital outputs of the device in the CDM420-0006", page 108

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
- Alignment and configuration of the device to optimize the 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 47).

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:

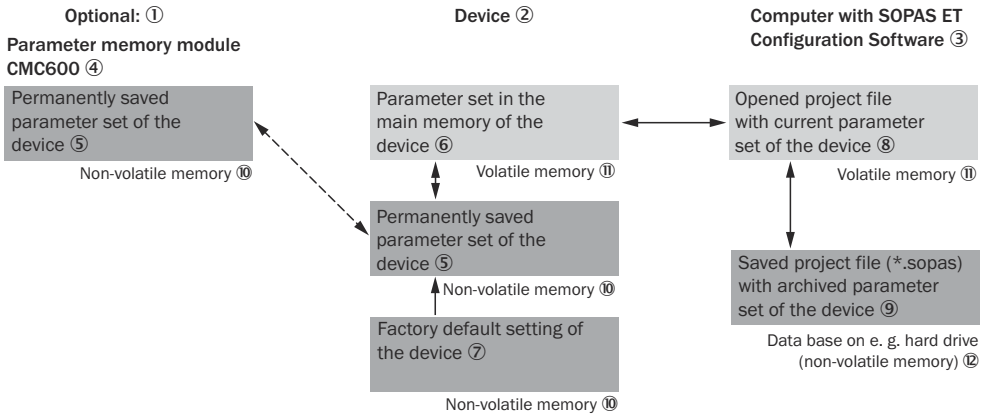


Figure 27: Configuration with SOPAS ET and saving the parameter set

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 56.

7.4 Aligning the device for operational use

Before the final alignment 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 58.
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 26.
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 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 access, among other things, to the evaluation window, percentage evaluation, code configuration, and alignment aid functions.

Application wizard

The application wizard (“Magic Wand” icon) assists with configuring the device. Either as standalone device, or as a primary (**master**) and secondary (**slave**) for a primary/master combination (**master/slave**) 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 **scanning frequency** in the range from 400 Hz to 1,000 Hz (Device tree > **Parameters** > **Read configuration**).

Object trigger control

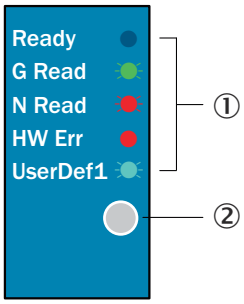
Device with an additionally connected read cycle sensor (for example a photoelectric sensor at the **Sensor 1** digital input): select the **Sensor 1** setting (Device tree > **Parameters** > **Read configuration** > **Object trigger control**).

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 11: 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 • 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. Reading successful (Good Read)
N Read	Red	●	LED lights up briefly. Reading unsuccessful (No Read)
UserDef1	Light blue	○	UserDef1 (reserved)
Parameter: Download to device or parameter upload from device			
–	–	○	LED goes out. Function is executed.
Firmware update: Download to device [1]			
	Red Blue	●●	LED flashes alternately in both colors. Function is continued: The device replaces the previous data with the new data.
Firmware update: Completion			
Ready	Red	●	Firmware download: Failed 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 12: 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. Configurable event condition [1)]
Percentage evaluation	Start: melody 100 scans per reading: one tone End: melody
Configuration	Downloading parameters to the device: Start: melody, successful completion: melody Parameter upload from device: No sound
Firmware download	**Firmware:** Start: one tone, successful completion: one tone **Reboot device:** Successful completion: melody **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 13: 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 viewing window

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

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

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

The viewing window is made of glass, see "Technical data", page 58.

Cleaning procedure:

- ► 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 optical 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.

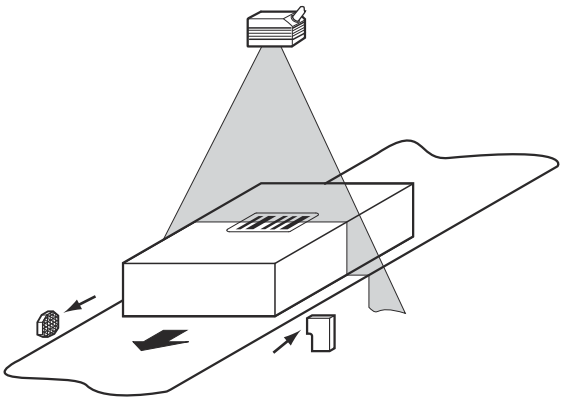


Figure 28: Cleaning the external optical sensors (read pulse encoder)

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 14: Errors and faults

Situation	Error or fault
Mounting	■ Device poorly aligned to objects with bar codes(e.g., dazzle) ■ 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 ■ 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 ■ Device limits not observed, e.g. reading distance, aperture angle ■ Trigger source for read cycle not selected correctly
Operation	■ Control of the reading pulse not correct or not suitable for the object ■ 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 50. 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 error codes in the status log.

10.2.2.1 Displaying the status log

Overview

The product saves only the last five entries for each error type. The status log is retained even after switching the product off and on again.

Error types

- Information
- Warning
- Error
- Critical fault

Approach

1. Connect the SOPAS ET configuration software to the product.
2. Opening the product 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 56.

► 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 23). When doing so, note the previously applied markings on the bracket or surroundings, see "Disassembly", page 55.
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 product page for your product, including technical data, dimensional drawing, and connection diagrams, can be downloaded, saved, and printed from the Internet.

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

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

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

Please note: This documentation may contain further technical data.

12.1 Features

Table 15: 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 14		
Orientation of viewing window	Front or side [2] [3], type-dependent, identifier see "Type code", page 14		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 61		
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 60825-1:2014 +A11:2021 / IEC 60825-1:2014. Identical laser class for issue EN/IEC 60825-1:2007. Complies with 21 CFR 1040.10/11 except for conformance with IEC 60825-1 Ed. 3., see Laser Notice No. 56, 8 May 2019.		
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 15.

12.2 Performance

Table 16: 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		

	CLV610	CLV612	CLV615
Print ratio	2:1 ... 3:1		
No. of codes per scan	1 ... 10 (standard decoder) 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 17: Technical data: Interfaces

	CLV610	CLV612	CLV615
2 x serial (RS-232)	• Function: Host, AUX • Data transmission rate: Host: 2.4 kBd ... 115.2 kBd, AUX: 57.6 kBd		
CAN	• Only CLV61x CAN (CLV61x-Cxxxx) or FIELDBUS (CLV61x-Fxxxx) • Function: SICK CAN sensor network (master/slave, multiplexer/server) • Data transmission rate: 20 kbit/s ... 1 Mbit/s • 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”) • Optionally 2 additional, external inputs [1] • 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”) • Optionally 2 additional, external outputs [1] • 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 • Pulse sources for stop: Reading cycle source, digital inputs “Sensor 1”, “Sensor 2” Command, Timer, Condition (e.g. Good Read)		

	CLV610	CLV612	CLV615
Optical displays	1 RGB LED, multicolor, with multifunctional signal color assignment for events		
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 18: 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, for 0.6 m to max. 3 m connecting cable • 12 V DC ... 30 V DC, for 3 m to max. 6 m connecting cable LPS or NEC Class 2 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 14		
Threaded mounting hole	2 x 2 blind tapped hole M5, 5 mm deep 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 [2]	IP 65 in accordance with EN 60529:1991-10 + A1:2002-02		
Protection class	 (Class 3) For operation in SELV systems (EN 60950-1) or ES1 systems (EN 62368-1)		
Weight [3]	Device with front viewing window: 265 g with cable 0.9 m 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 Device with side viewing window: 80 mm x 66 mm x 38 mm		

1) For digital outputs without load.
2) **Prerequisites for complying with enclosure rating IP65:**
   - The head of the connecting cable (D-Sub male connector) is firmly screwed to the contacted female connector.
   - If an extension cable is used, an IP-65 rubber seal (SICK accessory) must be fitted between the two D-Sub plug connectors. The plug connectors must be screwed together tightly.
3) Without connecting cable and male connector, pane of the viewing window made of glass.

12.5 Ambient data

Table 19: Technical data for ambient data

	CLV610	CLV612	CLV615
Electromagnetic compatibility (EMC)	Radiated emission: EN 61000-6-4: 2007-01 + A1: 2011-02 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 15.

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

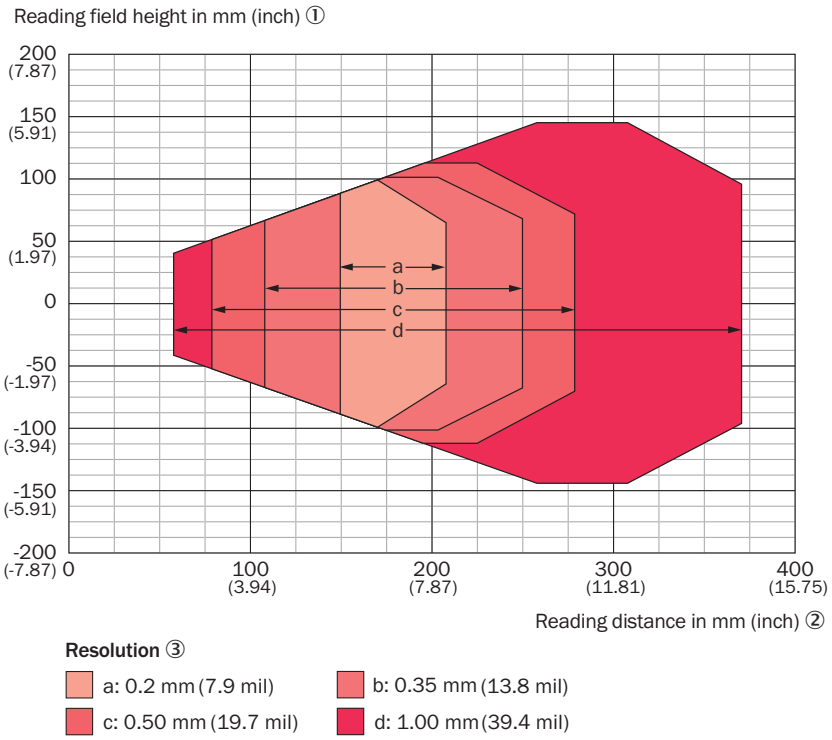


Figure 29: Reading field diagram for CLV610, Mid Range, front viewing window

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

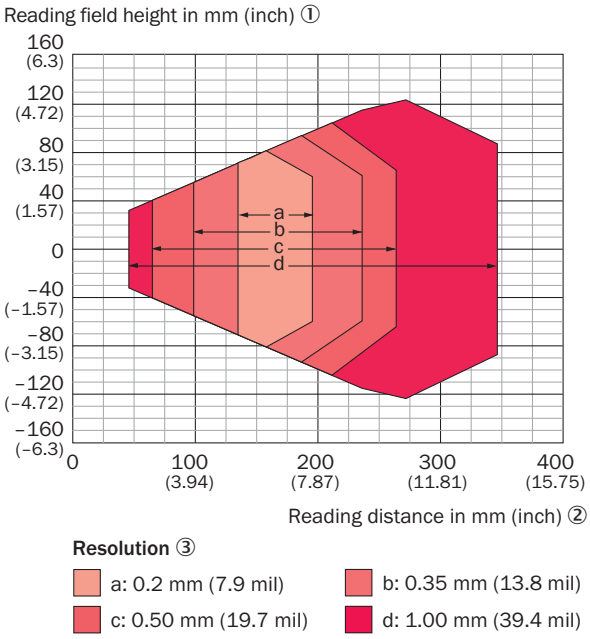


Figure 30: Reading field diagram for CLV610, Mid Range, side viewing window

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

Scanning frequencies

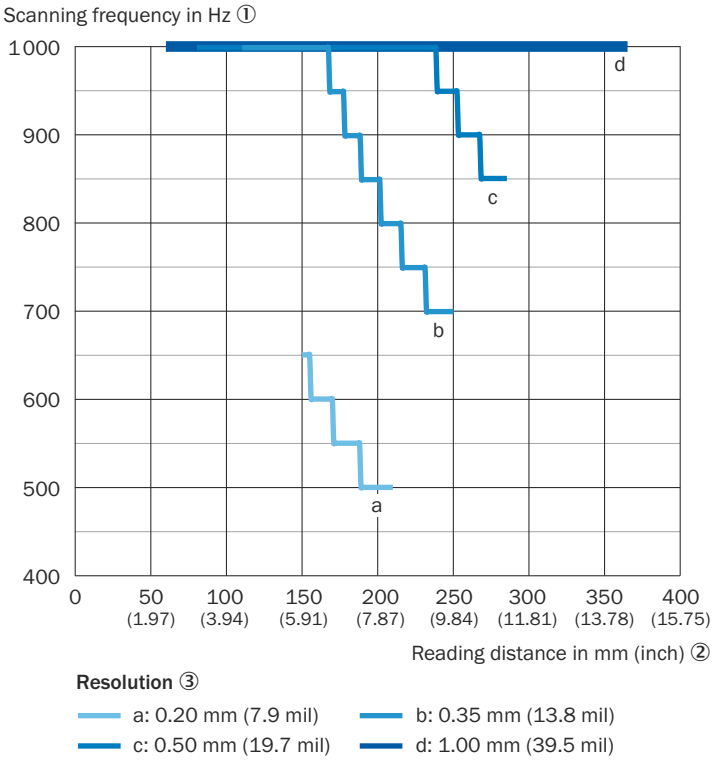


Figure 31: Characteristic curve field for scan frequency for CLV610, mid range, front viewing window

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

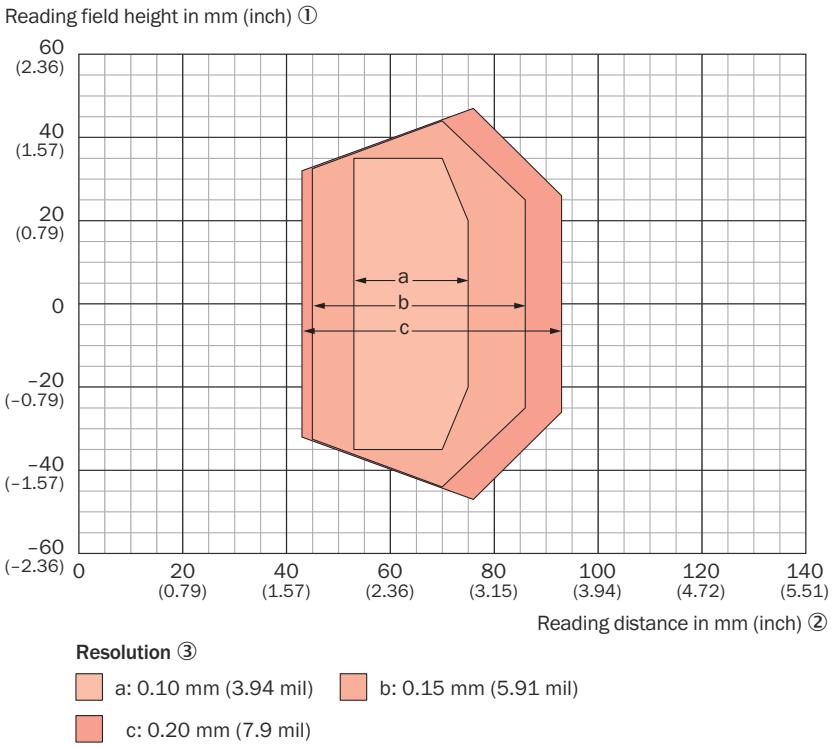


Figure 32: Reading field diagram for CLV612, Short Range, front viewing window

① Reading field height in mm (inch)

② Reading distance in mm (inch)

③ Resolution

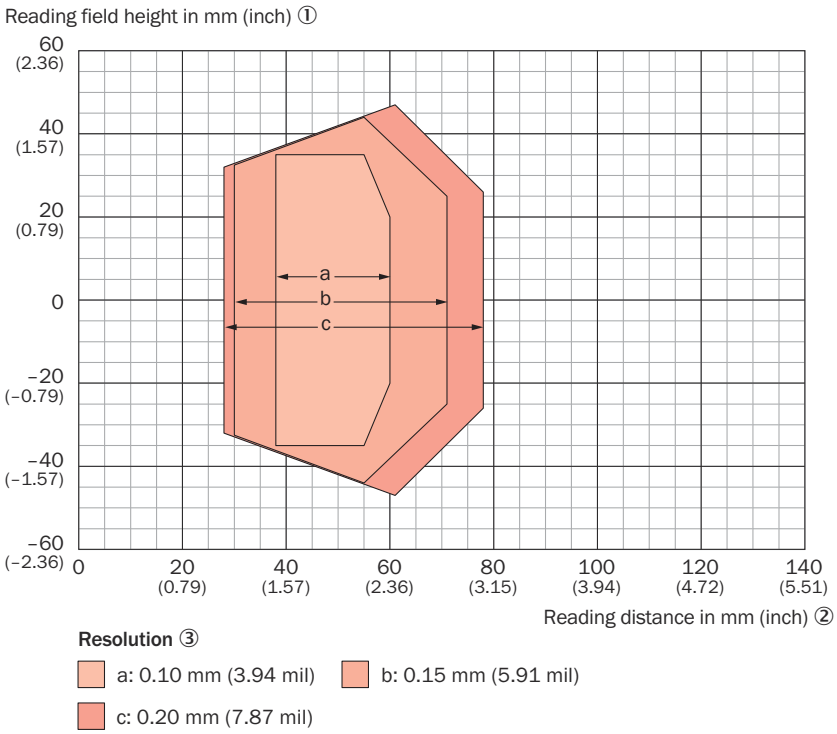


Figure 33: Reading field diagram for CLV612, Short Range, side viewing window

① Reading field height in mm (inch)

② Reading distance in mm (inch)

③ Resolution

Scanning frequencies

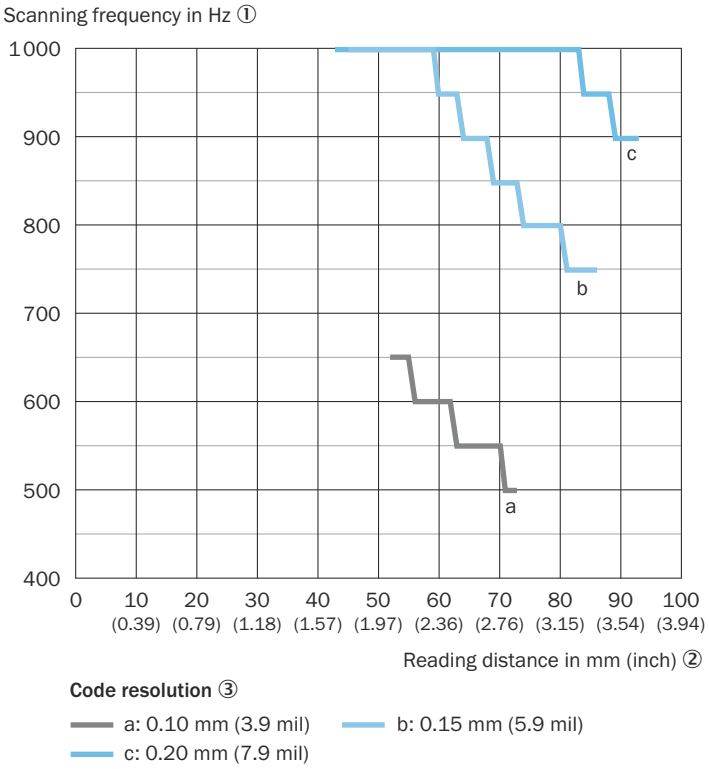


Figure 34: Characteristic curve field for scan frequency for CLV612, short range, front viewing window

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

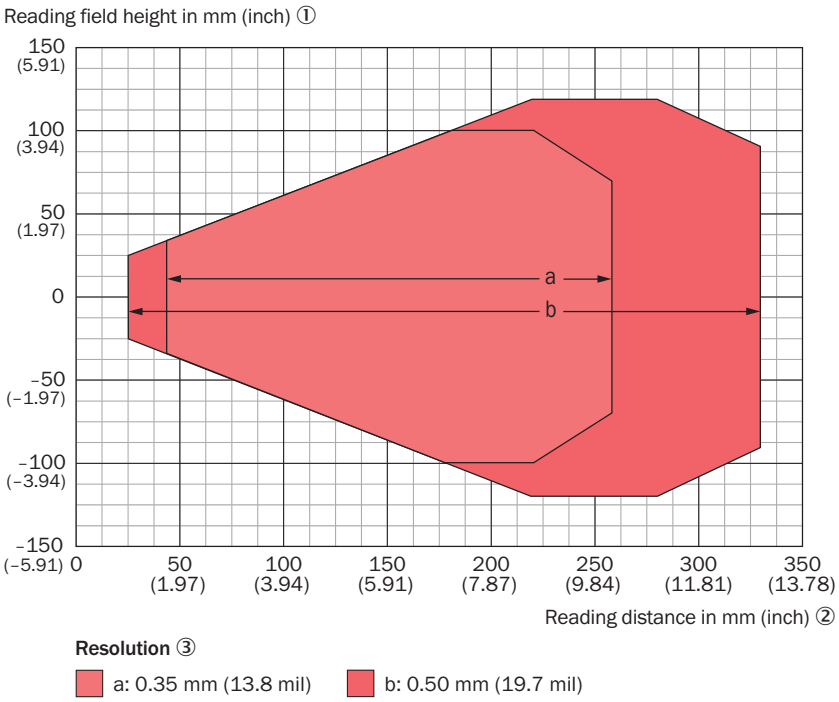


Figure 35: CLV615 reading field diagram, Long Range, side viewing window

① Reading field height in mm (inch)

② Reading distance in mm (inch)

③ Resolution

Scanning frequencies

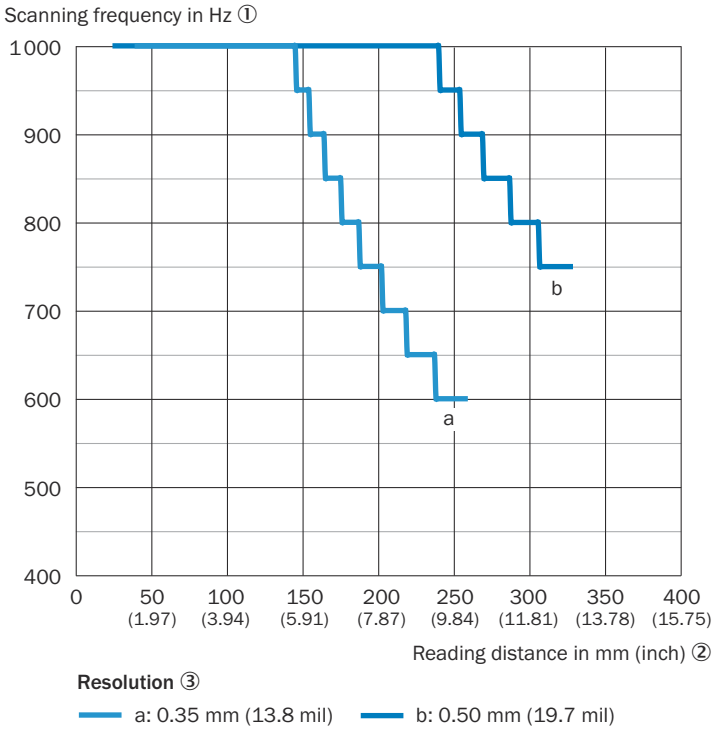


Figure 36: Characteristic curve field for CLV615 scanning frequency, Long Range, side viewing window

① Scanning frequency in Hz

② Reading distance in mm (inch)

③ Resolution

13 Accessories

NOTE

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

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

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

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

13.1 Dimensional drawings of brackets

The dimensional drawings for SICK brackets and, if applicable, mounting instructions can be found on the product pages in the ACCESSORIES/Mounting equipment section.

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

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

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

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.

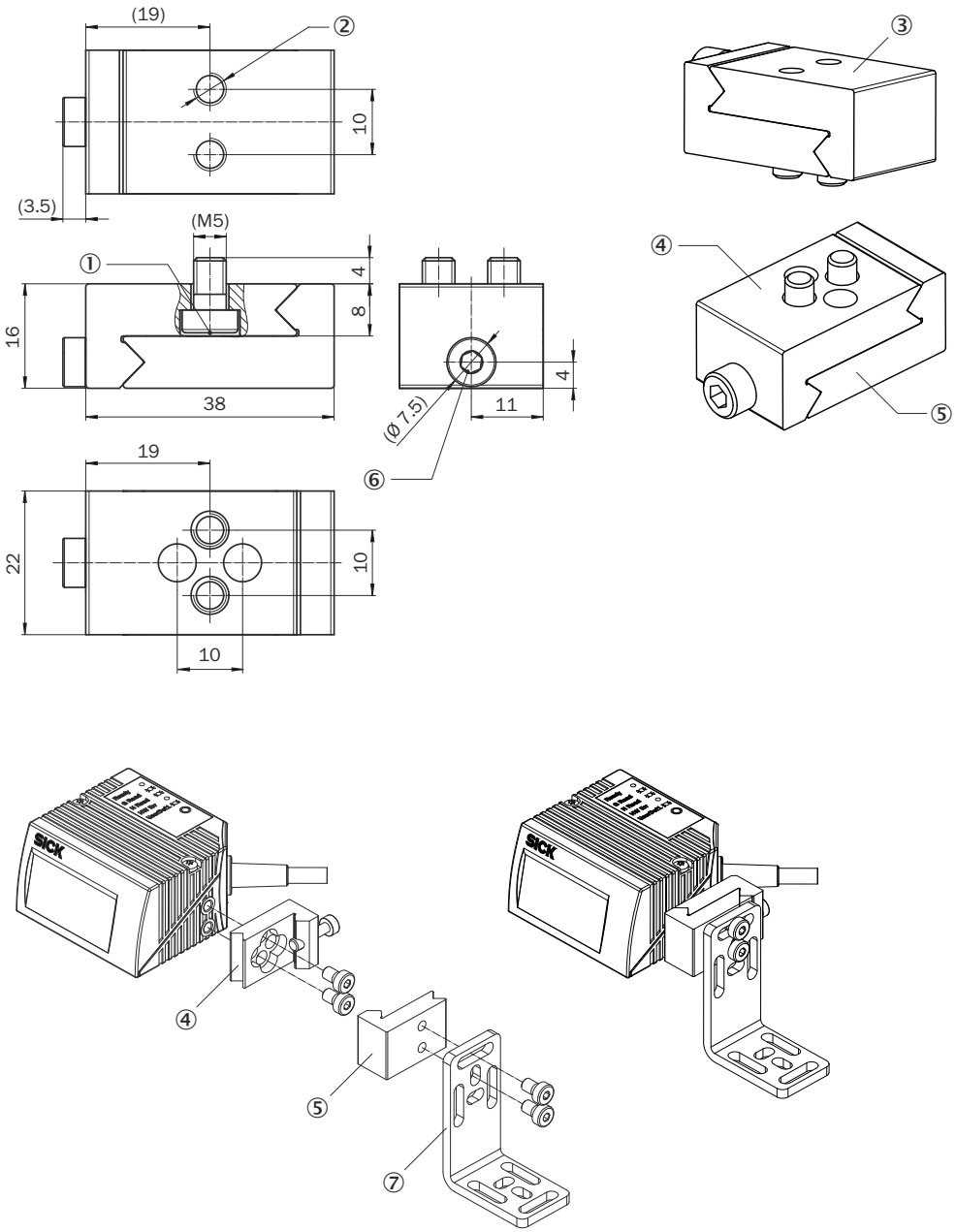


Figure 37: View of the quick release (dimensions in mm) and combination with mounting bracket

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

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

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

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

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

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 13.

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

More information can be found on the product page:

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

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

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

- Laser warnings and laser power, see "Operational safety and specific hazards", page 9 and see "Laser radiation", page 10

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

14.3.1 "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.

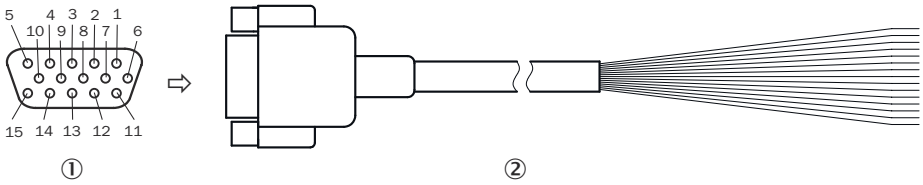


Figure 38: Adapter cable, part no. 2043413

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

② Illustration may differ

② Illustration may differ

Table 20: 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 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 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	Ground digital inputs	White-black

14.3.2 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

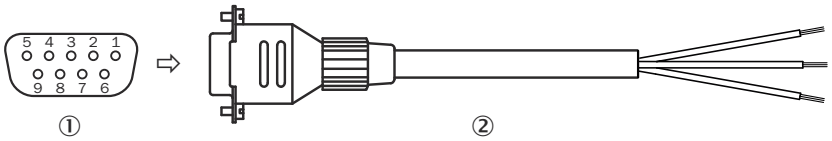


Figure 39: Adapter cable, part no. 2020319

① Female connector, D-Sub, 9-pin (front view)
② Figure may differ.
② Illustration may differ

Table 21: 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

14.4 Connection diagrams of connection module CDB620-001

14.4.1 Connection of the device to CDB620-001

Device = CLV61x-xx0xxx (serial variant)

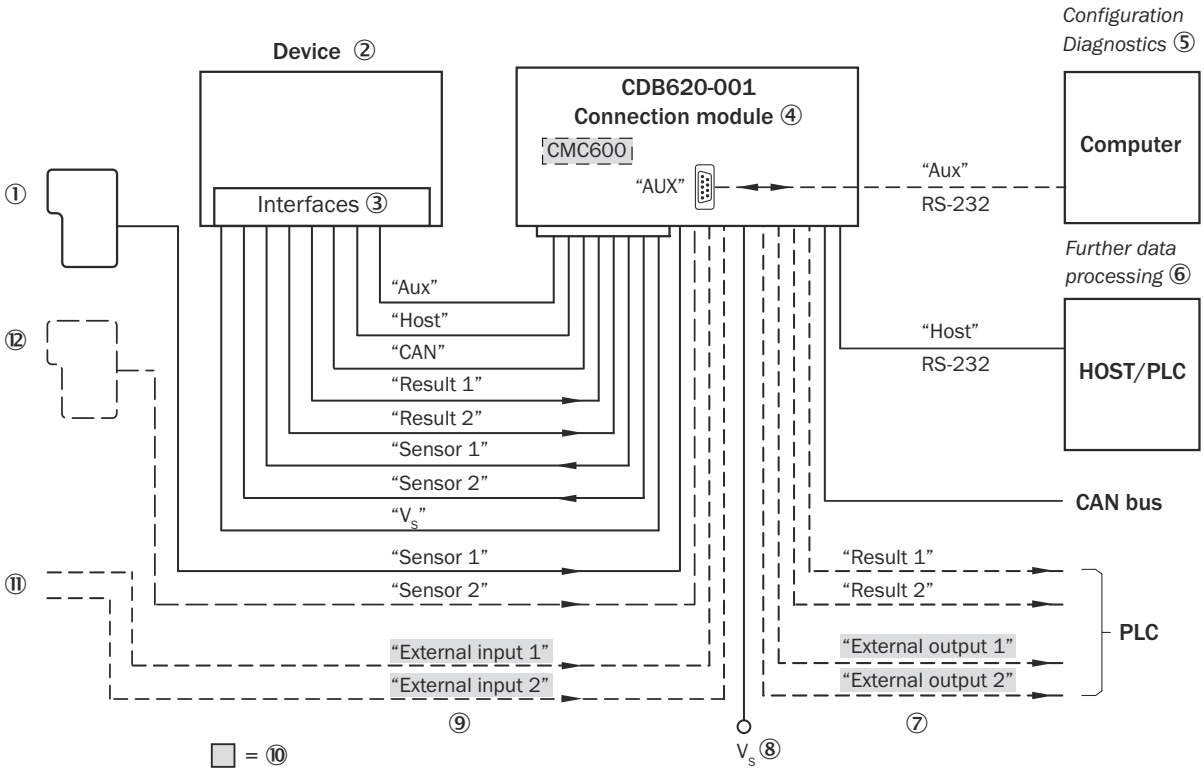


Figure 40: Connection of the device to peripherals via CDB620-001 (overview)

① External trigger sensor, e.g., for read cycle generation
② Device
③ Interfaces
④ Connection modules
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)

14.4.2 Wiring overview of the CDB620-001

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

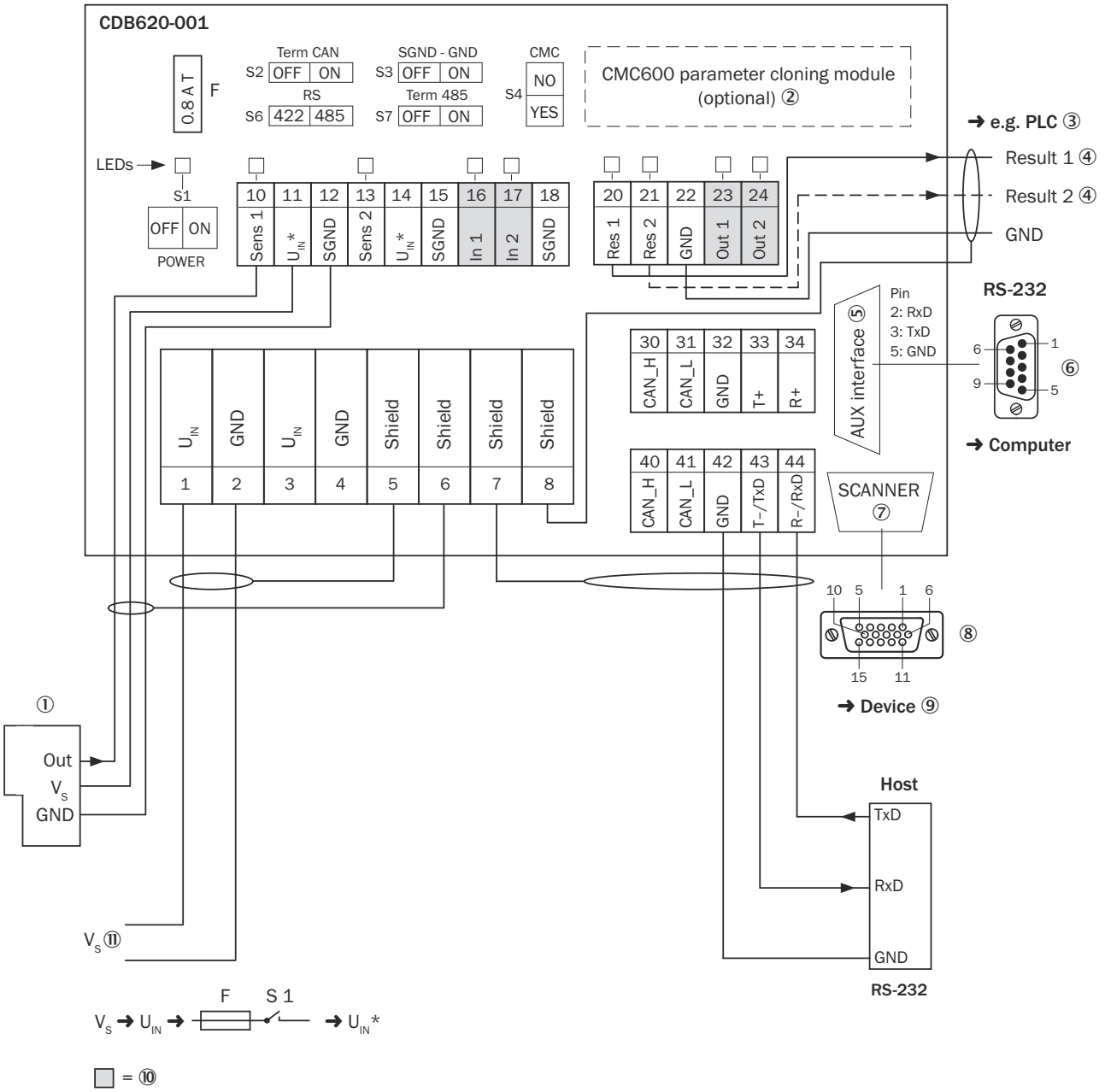


Figure 41: Overview: connection of device and peripherals to the CDB620-001 connection module.

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

14.4.3 Connecting supply voltage for the device in CDB620-001

Device = CLV61x-xx0xxx (serial variant)

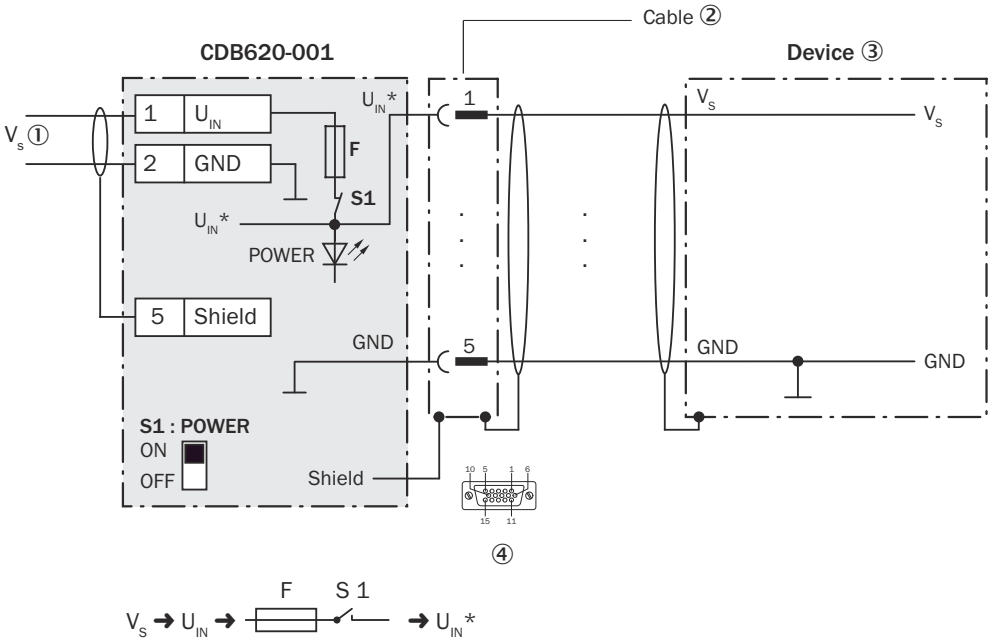


Figure 42: Connecting supply voltage for the device in CDB620-001 connection module

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 22: 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}* Supply voltage U_{IN}* can be additionally tapped at terminals 11 and 14.
OFF	CDB620-001 and device disconnected from supply voltage Recommended setting for all connection work

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

Device = CLV61x-xx0xxx (serial variant)

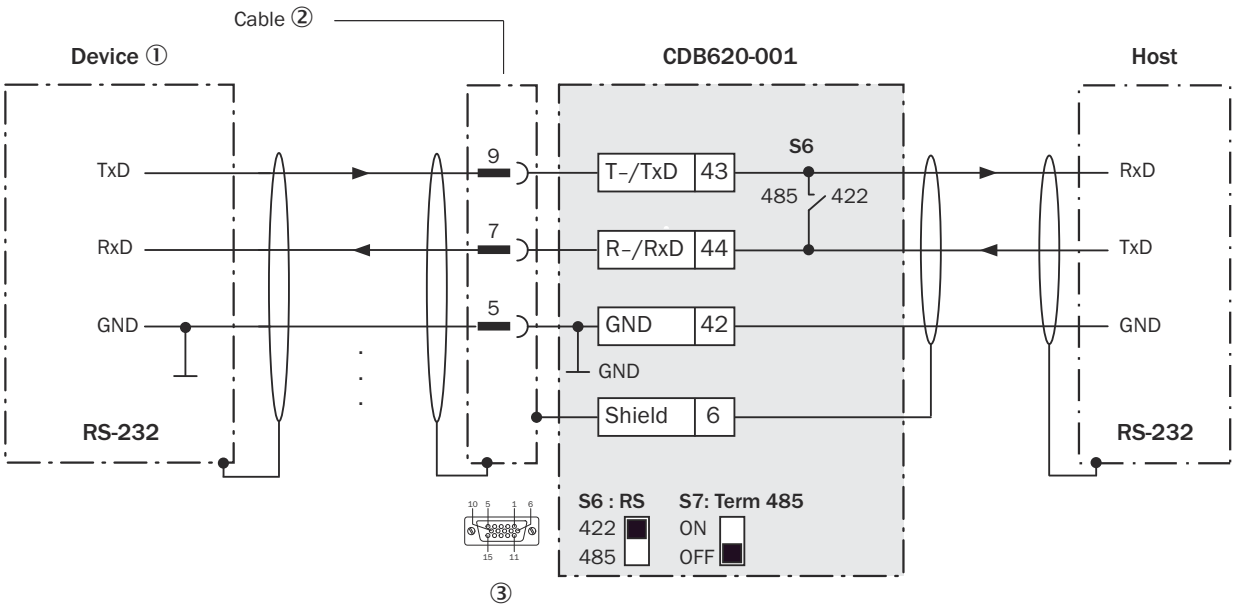


Figure 43: Wiring data interface RS-232 of the device in the connection module CDB620-001

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 using a configuration software, e.g., SOPAS ET.

14.4.5 Wiring the CAN interface in the CDB620-001

Device = CLV61x-xx0xx (serial variant)

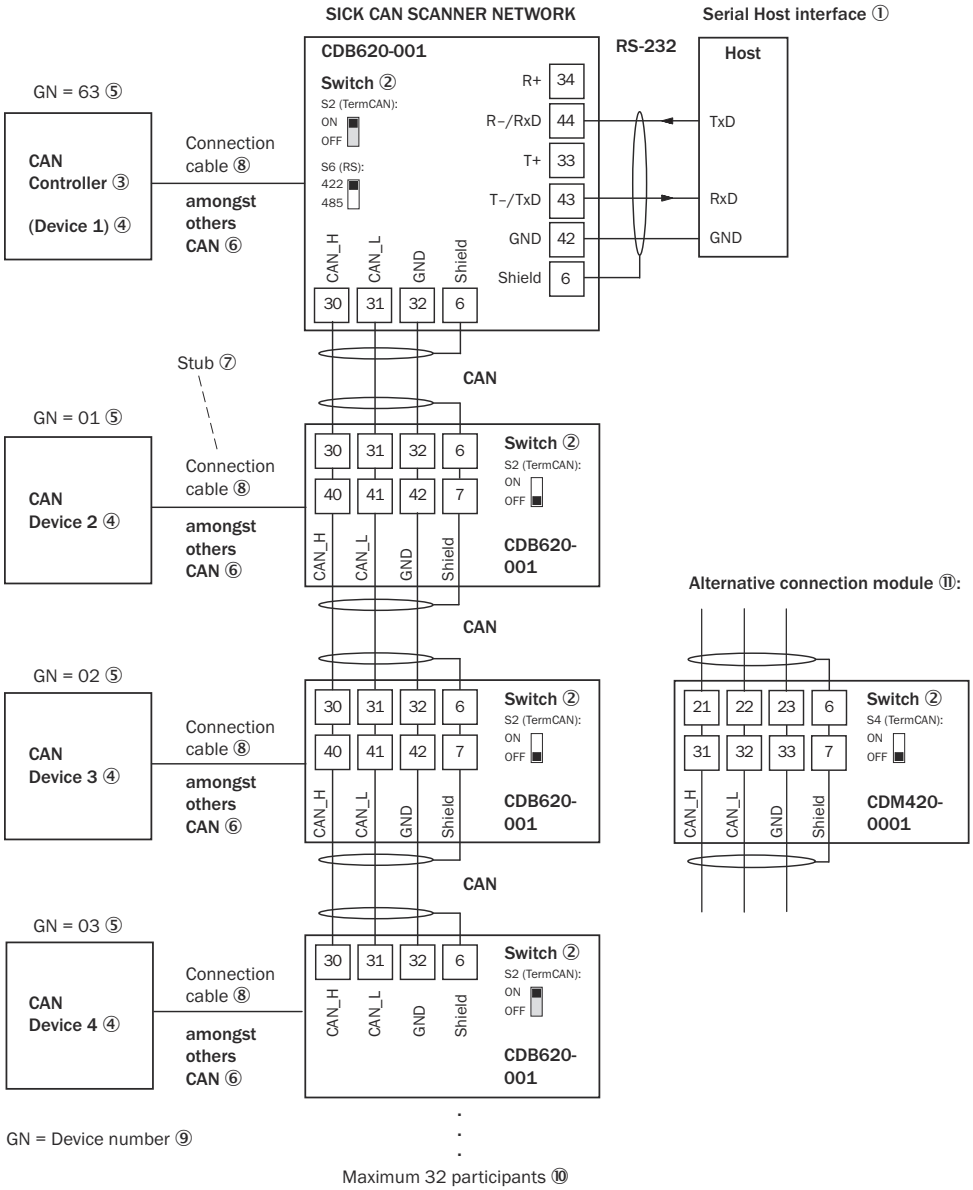


Figure 44: Wire the CAN interface of the device in the CDB620-001 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the CAN controller, for example, are disregarded here.

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

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

NOTE

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

Configure further settings in the device according to the function of the device in the system configuration.

14.4.6 Wiring digital inputs of the device in the CDB620-001

Device = CLV61x-xx0xxx (serial variant)

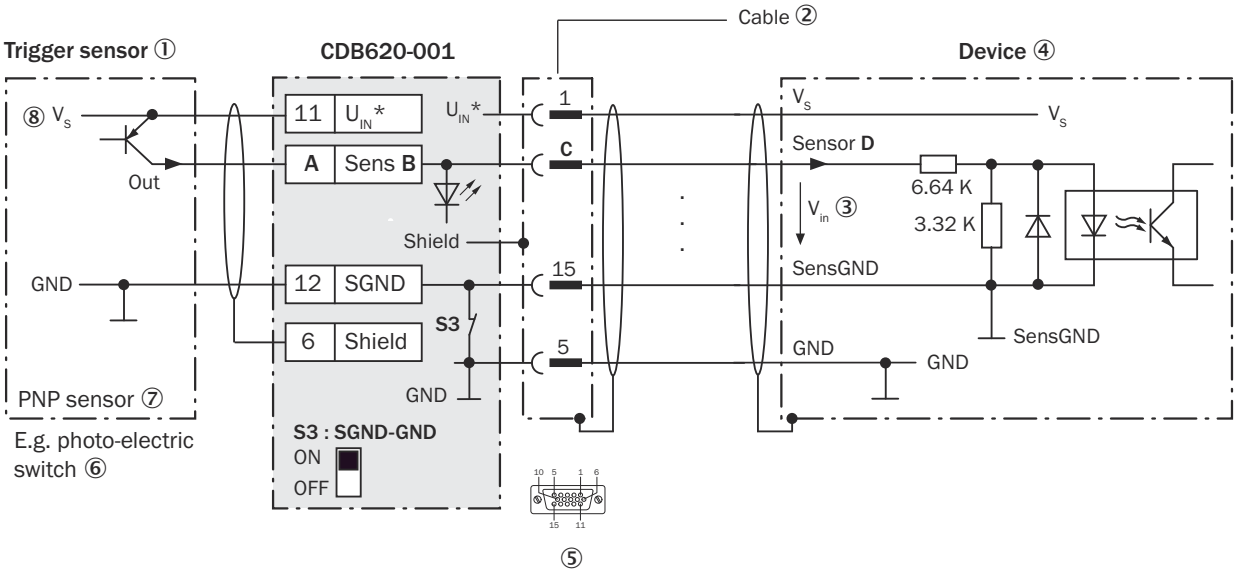


Figure 45: Trigger sensor supplied with power by connection module CDB620-001

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

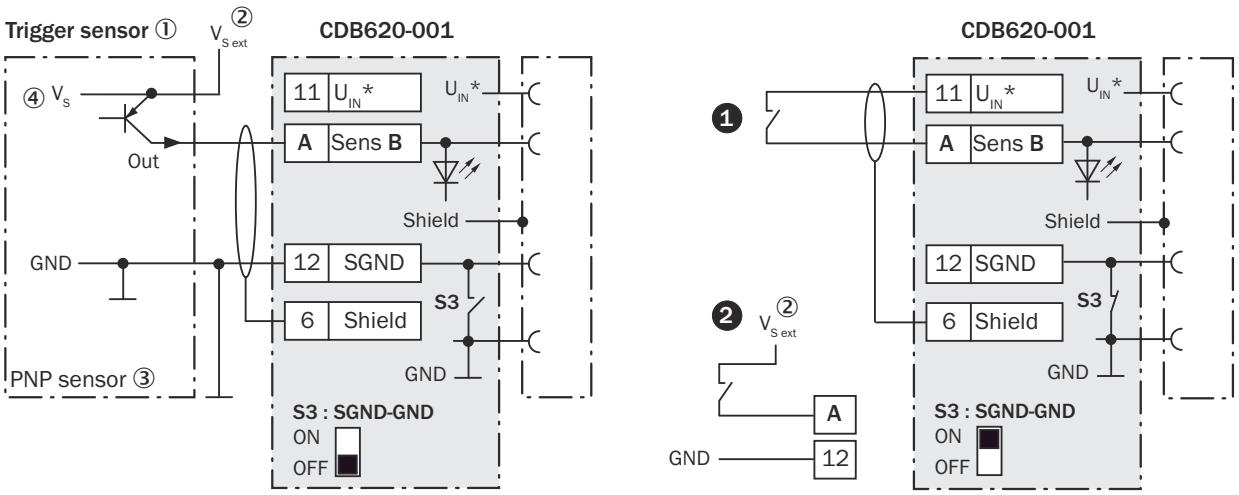


Figure 46: Left: Trigger sensor connected potential-free and supplied with power externally. Right: alternative switch, ❶ supplied with power by connection module CDB620-001 or ❷ connected volt-free and supplied with power externally. Now select switch setting S3 as shown in the left figure.

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 23: 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 24: 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 25: 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 • Can be wired with PNP output of a trigger sensor
Electrical values	Low: V_{in}[1] ≤ 2 V; I_{in}[2] ≤ 0.3 mA High: 6 V ≤ V_{in} ≤ 30 V; 0.7 mA ≤ I_{in} ≤ 5 mA

1) Input Voltage
2) Input current

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

14.4.7 Wiring the external digital inputs of the device in the CDB620-001

Device = CLV61x-xx0xxx (serial variant)

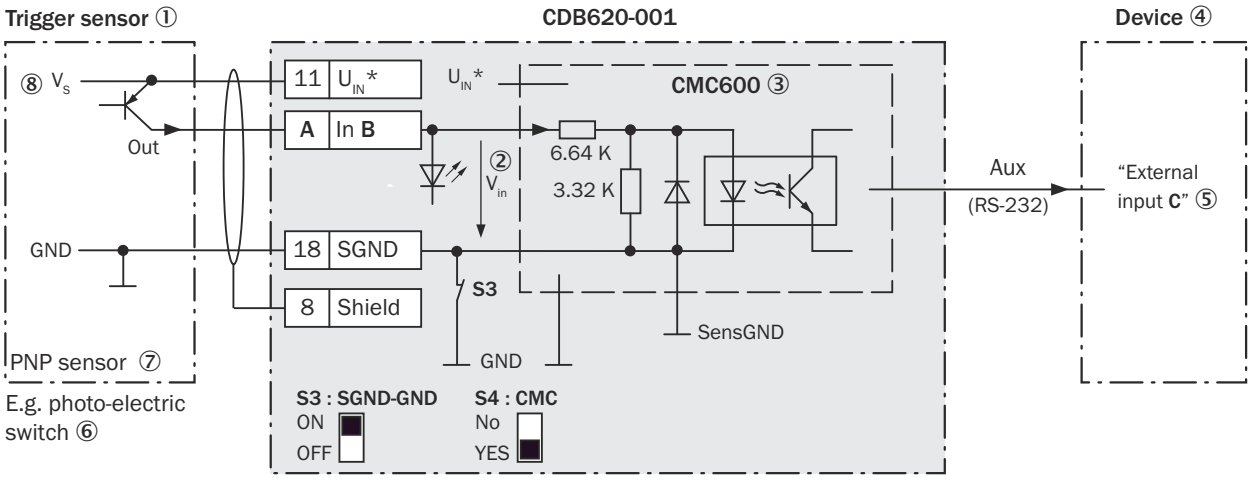


Figure 47: Trigger sensor supplied with power by connection module CDB620-001

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

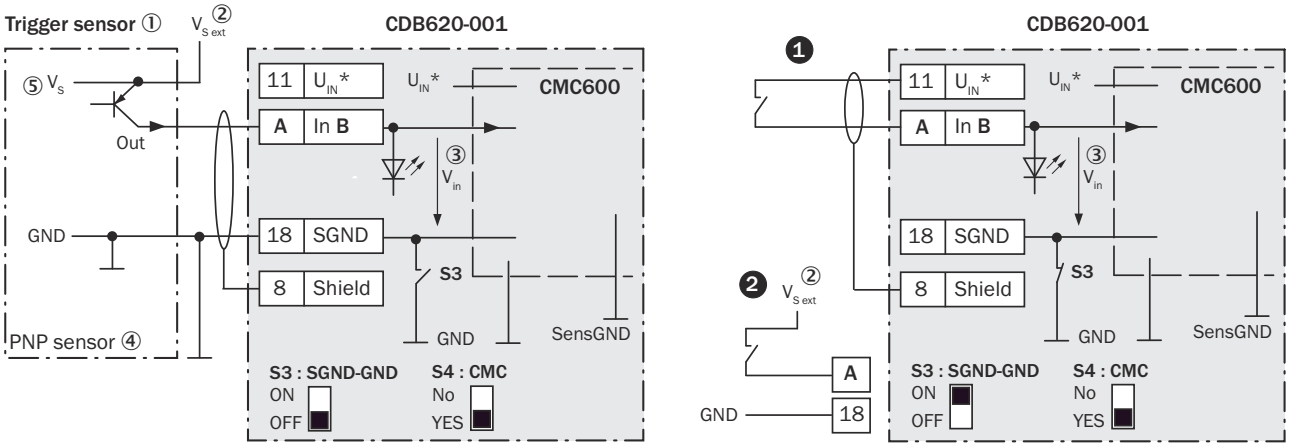


Figure 48: Left: Trigger sensor connected potential-free and supplied with power externally. Right: alternative switch, ❶ supplied with power by connection module CDB620-001 or ❷ connected volt-free and supplied with power externally. Now select switch setting S3 as shown in the left figure.

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 26: 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 27: 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 28: 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 • Can be wired with PNP output of a trigger sensor
Electrical values	Low: V_{in}[1] ≤ 2 V; I_{in}[2] ≤ 0.3 mA High: 6 V ≤ V_{in} ≤ 30 V; 0.7 mA ≤ I_{in} ≤ 5 mA

1) Input Voltage
2) Input current

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

14.4.8 Wiring digital outputs of the device in the CDB620-001

Device = CLV61x-xx0xxx (serial variant)

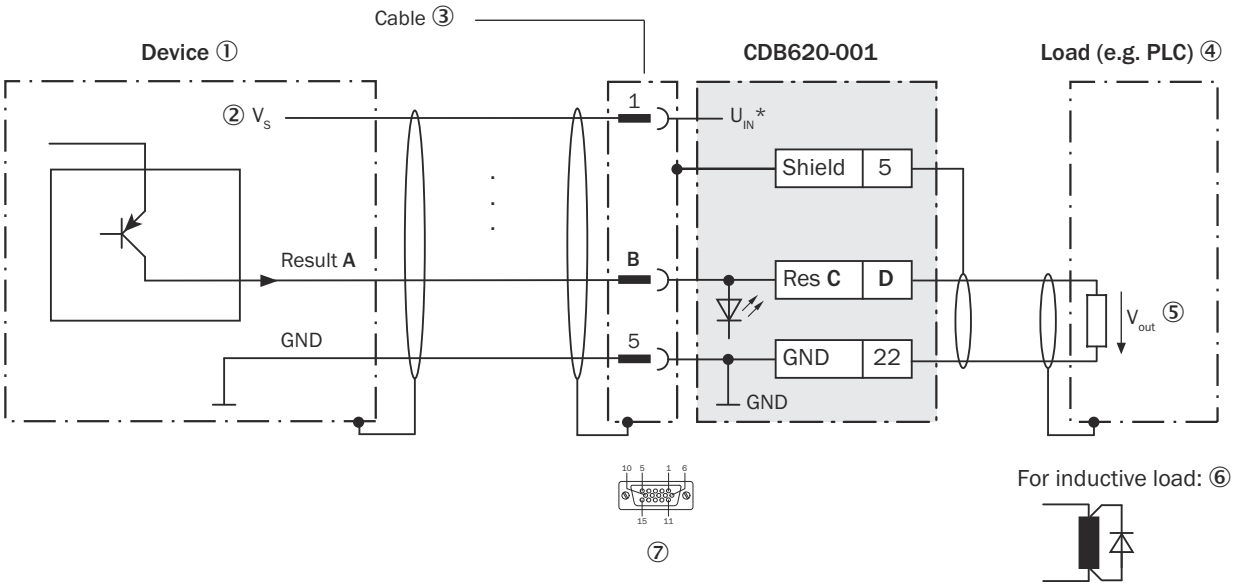


Figure 49: Wiring the "Result 1" and "Result 2" digital outputs of the device in the CDB620-001 connection module.

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 29: 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 30: Characteristic data of the digital outputs "Result 1" and "Result 2"

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

Electrical values	$0\ V \le V_{out}$ [1] $\le V_S$ $(V_S - 1.5\ V) \le V_{out} \le V_S$ bei I_{out} [2] $\le 100\ mA$

1) Output voltage
2) Output current

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

14.4.9 Wiring the external digital outputs of the device in the CDB620-001

Device = CLV61x-xx0xxx (serial variant)

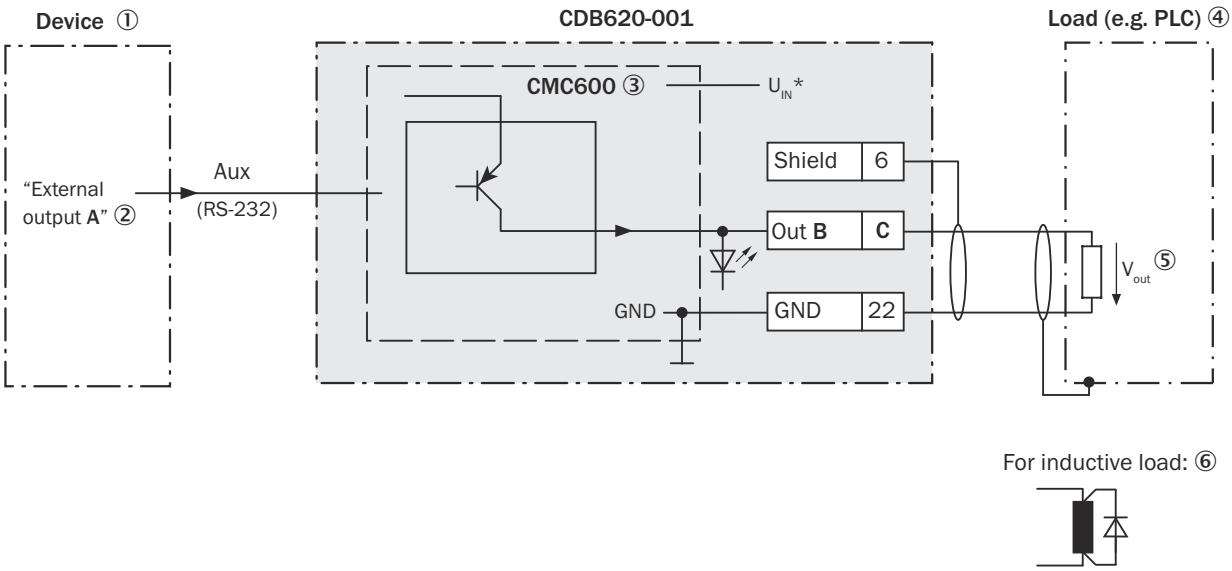


Figure 50: Wiring "Out 1" and "Out 2" external digital outputs of the device in the connection module CDB620-001.

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 31: 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 32: Characteristic data of the digital outputs “External output 1” and “External output 2”

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

1) Output voltage
2) Output current

NOTE

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

14.5 Connection diagrams of connection module CDM420-0001

14.5.1 Connection of the device to CDM420-0001

Device = CLV61x-xx0xxx (serial variant)

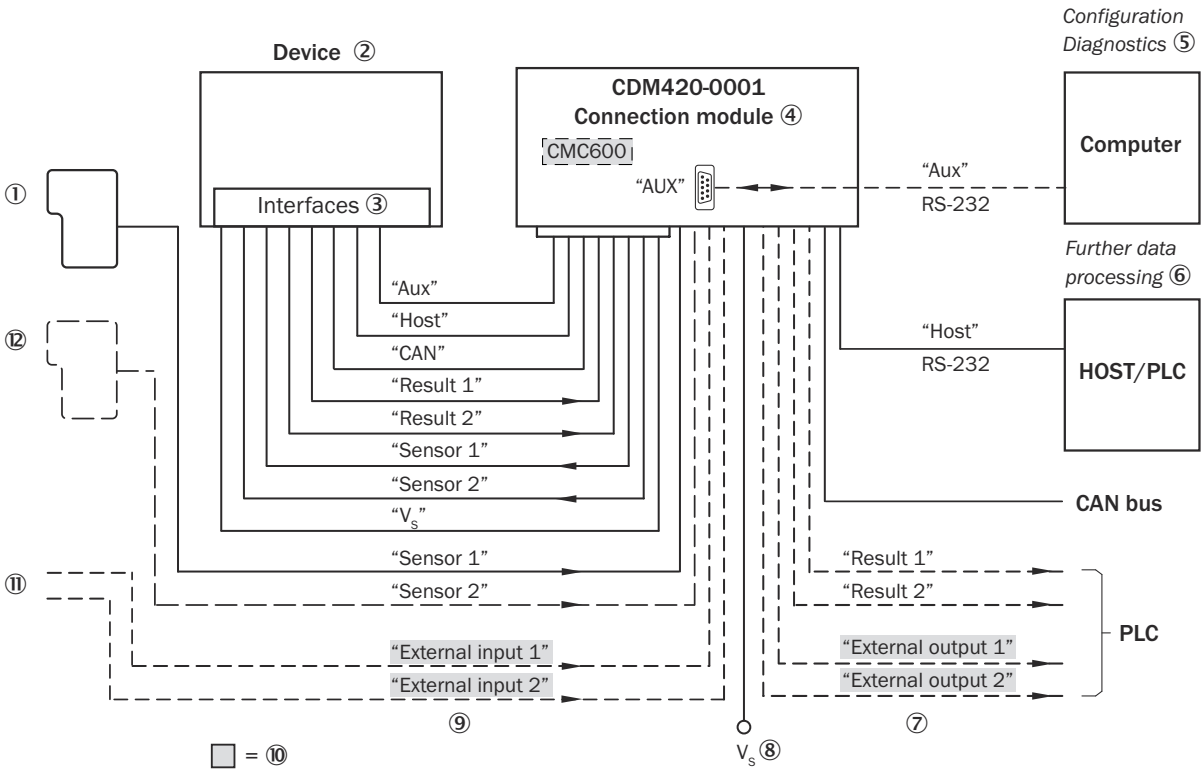


Figure 51: Connection of the device to peripherals via CDM420-0001 (overview)

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)

14.5.2 Wiring overview of the CDM420-0001

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

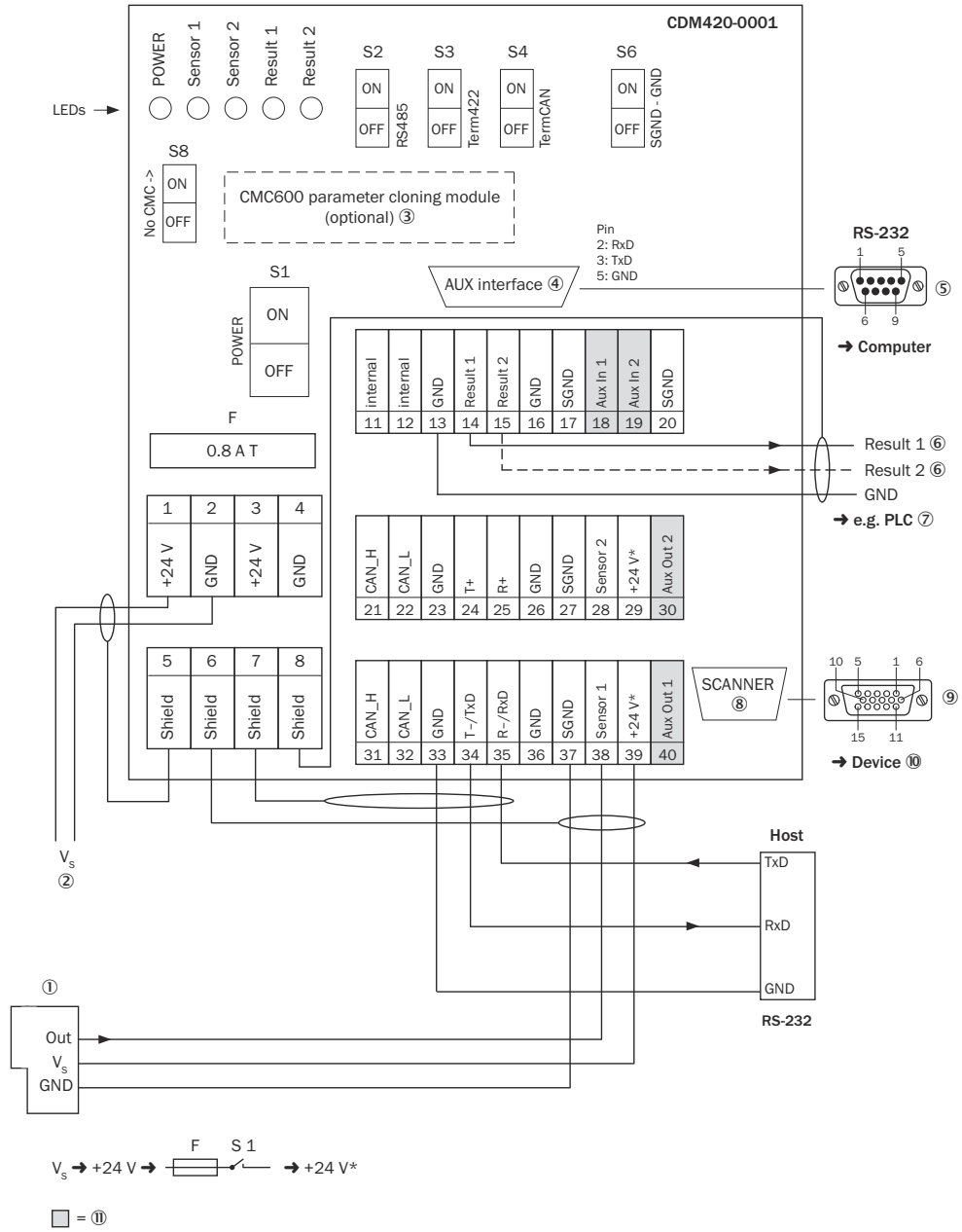


Figure 52: Overview: connection of device and peripherals to the CDM420-0001 connection module

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).

14.5.3 Connecting supply voltage for the device in CDM420-0001

Device = CLV61x-xx0xxx (serial variant)

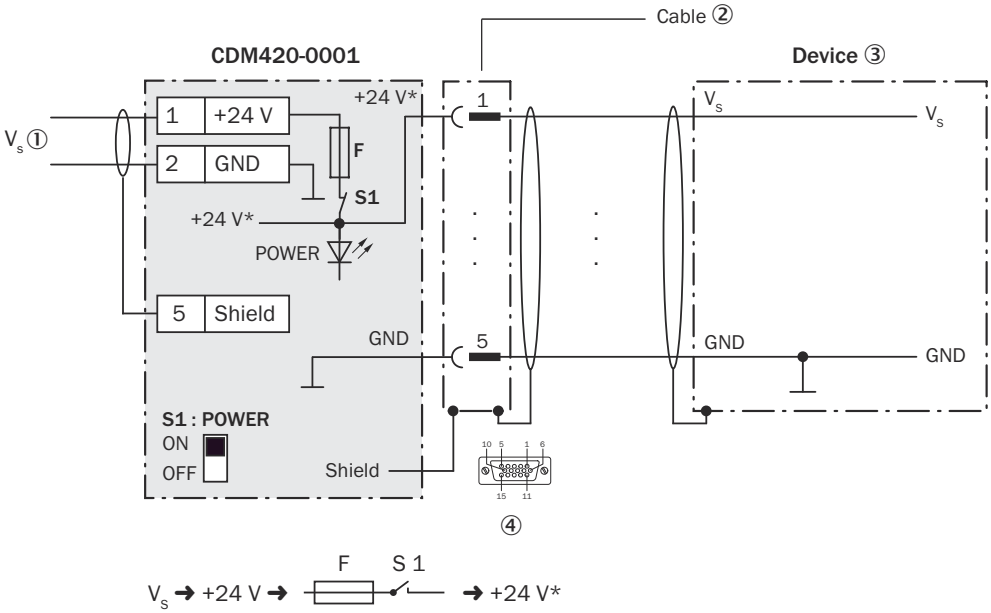


Figure 53: Connecting supply voltage for the device in CDM420-0001 connection module.

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 33: 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* Supply voltage +24 V* can be additionally tapped at terminals 29 and 39
OFF	CDM420-0001 and device disconnected from supply voltage Recommended setting for all connection work

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

Device = CLV61x-xx0xxx (serial variant)

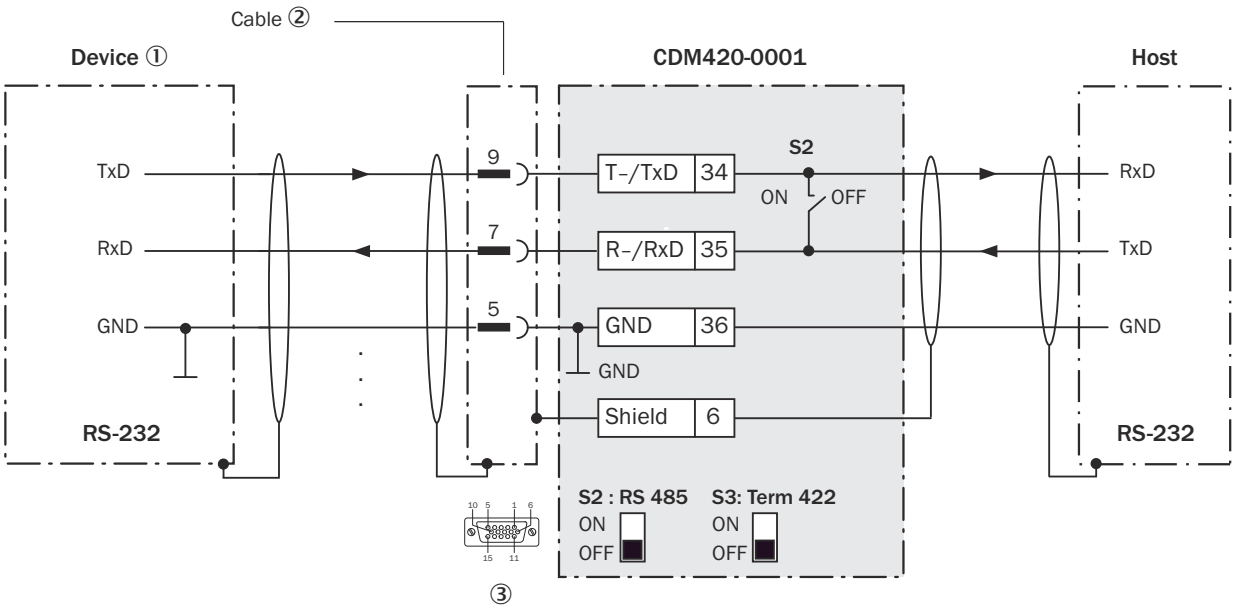


Figure 54: Wiring data interface RS-232 of the device in connection module CDM420-0001.

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 using a configuration software, e.g., SOPAS ET.

14.5.5 Wiring the CAN interface of the device in the CDM420-0001

Device = CLV61x-xx0xx (serial variant)

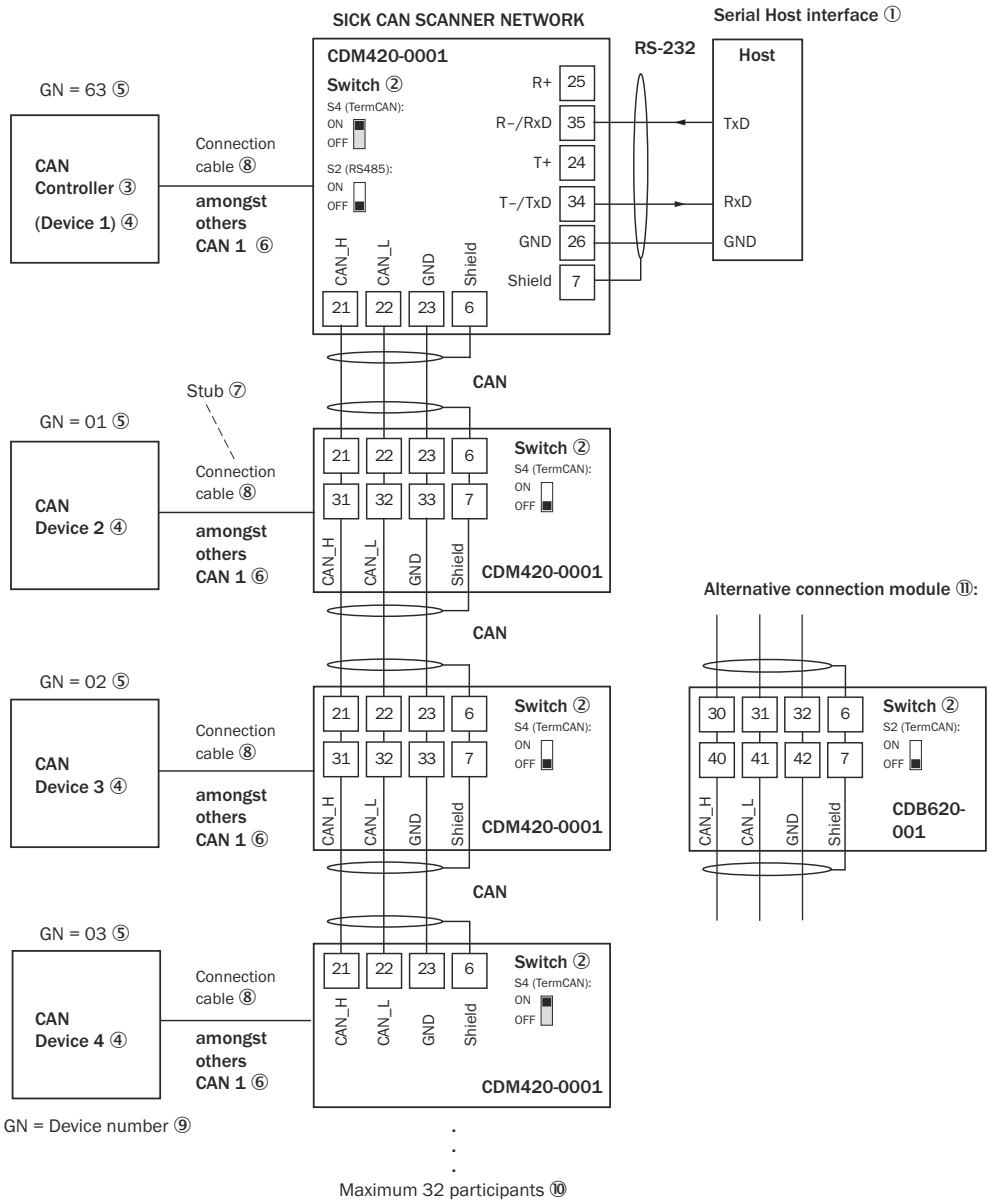


Figure 55: Wire the CAN interface of the device in the CDM420-0001 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the CAN controller, for example, are disregarded here.

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

Alternative connection modules for CLV61x: CDB620 or CDM420-0006

NOTE

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

Configure further settings in the device according to the function of the device in the system configuration.

14.5.6 Wiring digital inputs of the device in the CDM420-0001

Device = CLV61x-xx0xxx (serial variant)

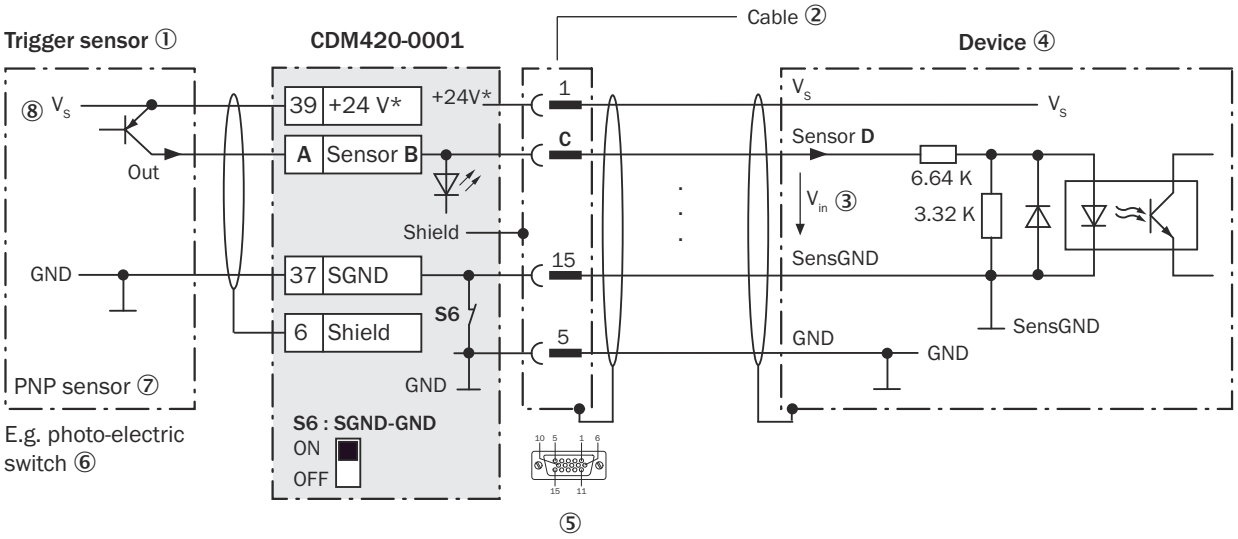


Figure 56: Trigger sensor supplied with power by connection module CDM420-0001

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

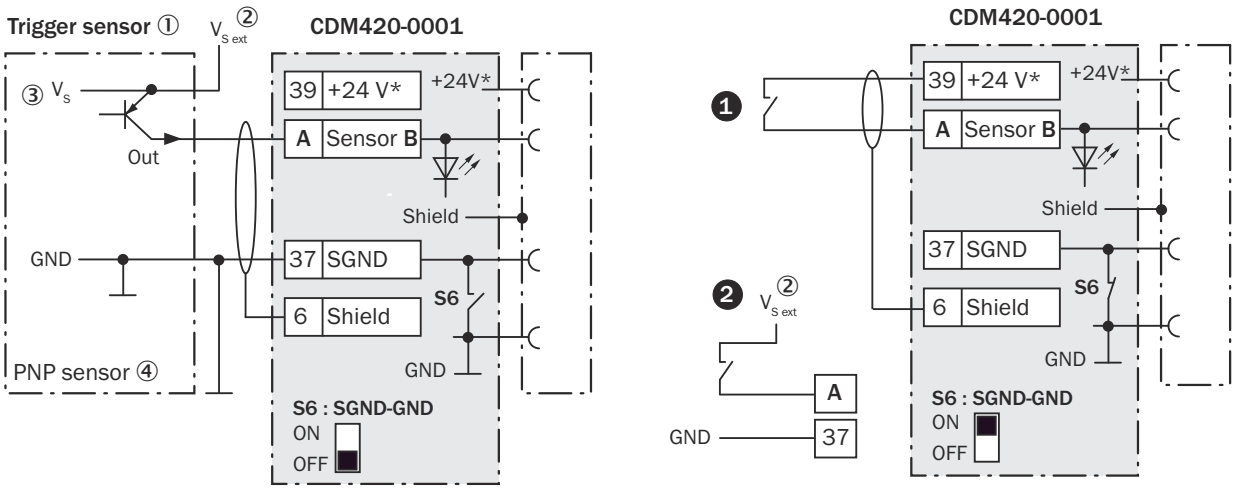


Figure 57: Left: Trigger sensor connected potential-free and supplied with power externally. Right: alternative switch, ❶ supplied with power by connection module CDM420-0001 or ❷ connected volt-free and supplied with power externally. Now select switch setting S6 as shown in the left figure.

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 34: 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 35: 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 36: 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 • Can be wired with PNP output of a trigger sensor
Electrical values	Low: V_{in} [1] ≤ 2 V; I_{in} [2] ≤ 0.3 mA High: 6 V ≤ V_{in} ≤ 30 V; 0.7 mA ≤ I_{in} ≤ 5 mA

1) Input Voltage
2) Input current

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

14.5.7 Wiring the external digital inputs of the device in the CDM420-0001

Device = CLV61x-xx0xxx (serial variant)

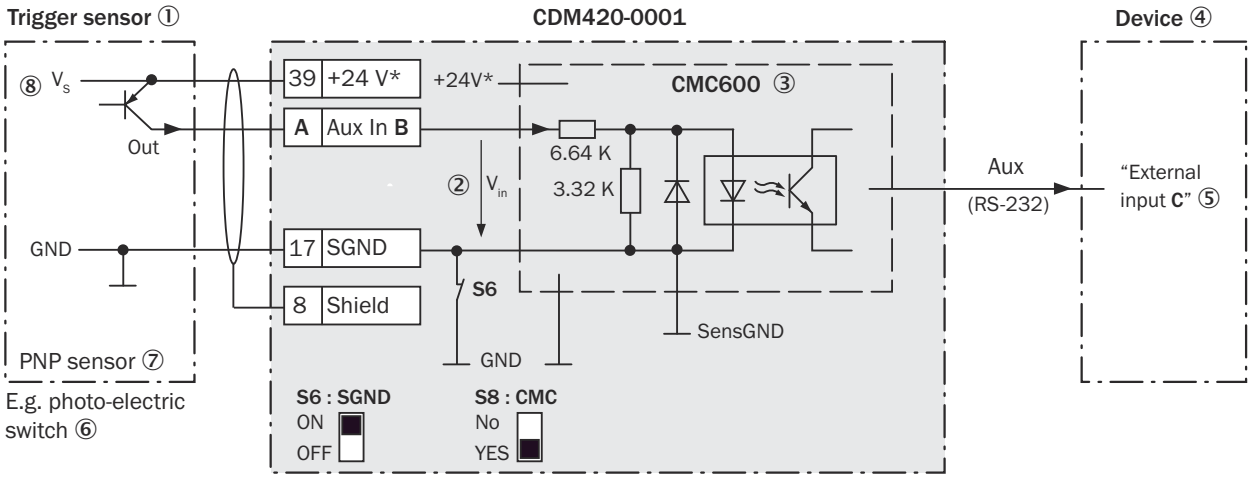


Figure 58: Trigger sensor supplied with power by connection module CDM420-0001

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

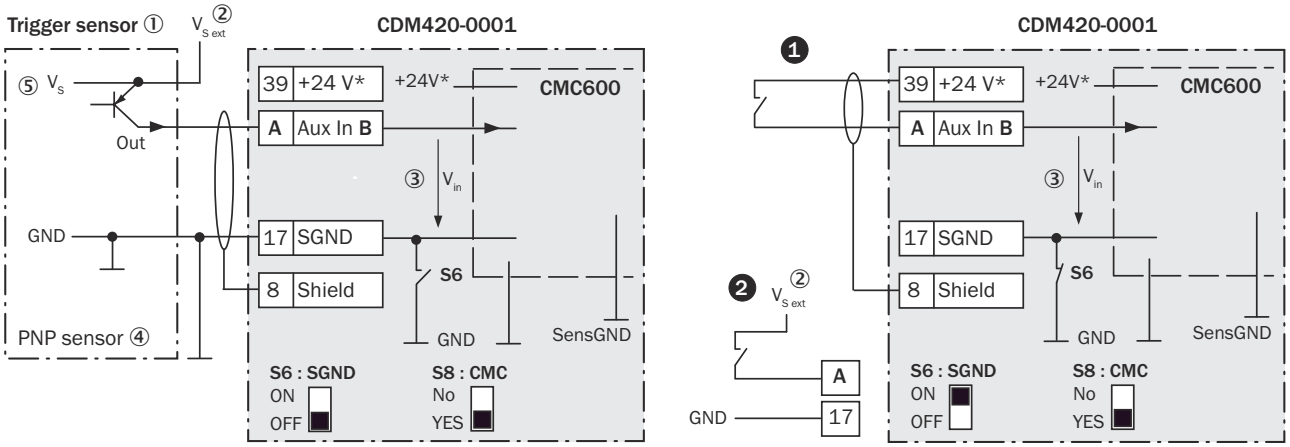


Figure 59: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDM420-0001 or ❷ connected potential-free and supplied with power externally. Switch setting S3 then as in left figure.

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 37: 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 38: 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 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 39: Characteristic data of the digital inputs “External input 1” and “External input 2”

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

1) Input Voltage
2) Input current

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

14.5.8 Wiring digital outputs of the device in the CDM420-0001

Device = CLV61x-xx0xxx (serial variant)

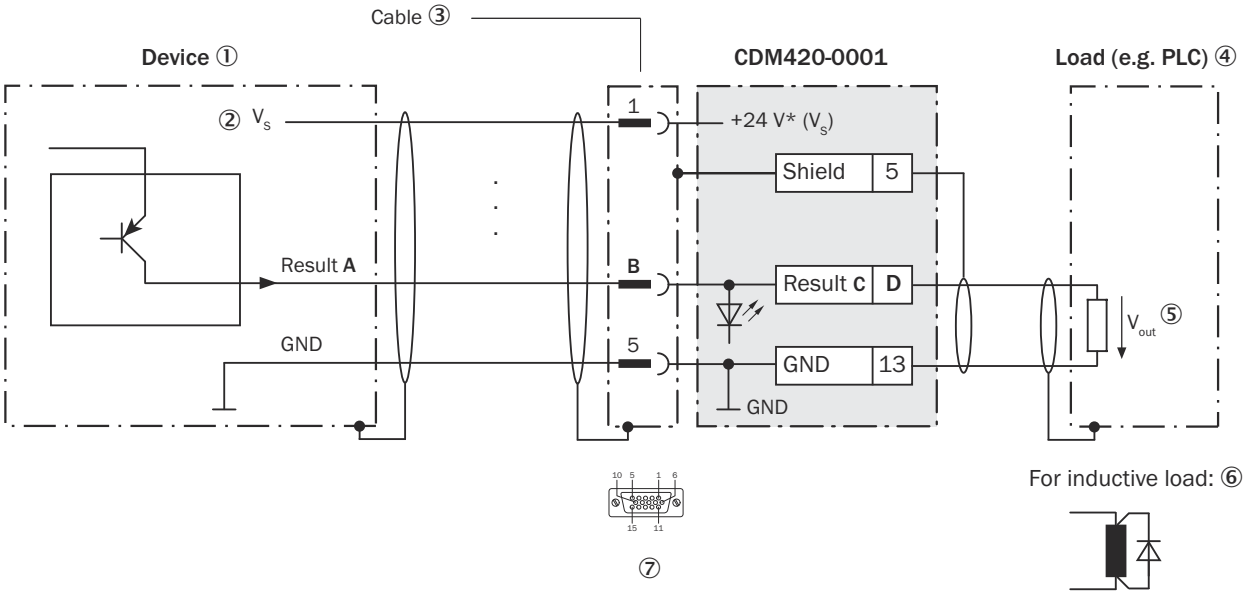


Figure 60: Wiring the "Result 1" and "Result 2" digital outputs of the device in the CDM420-0001 connection module.

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 40: 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 41: Characteristic data of the digital outputs "Result 1" and "Result 2"

Type	Switching
Switching behavior	PNP switching to supply voltage V_S Default settings in the device: no function, logic: not inverted (active high)

Properties	• Short-circuit protected and temperature protected • Not electrically isolated from the supply voltage V_S
Electrical values	0 V ≤ V_{out}[1] ≤ V_S (V_S −1.5 V) ≤ V_{out} ≤ V_S at I_{out}[2] ≤ 100 mA

1) Output voltage
2) Output current

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

14.5.9 Wiring the external digital outputs of the device in the CDM420-0001

Device = CLV61x-xx0xxx (serial variant)

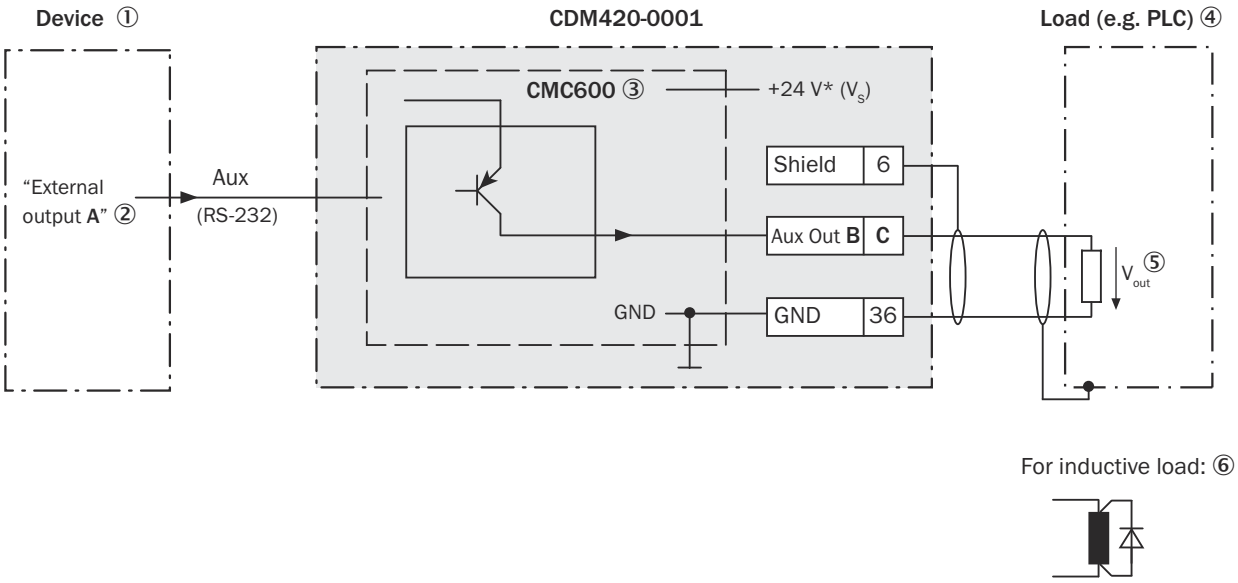


Figure 61: Wiring external digital outputs "Aux Out 1" and "Aux Out 2" of the device in the connection module CDM420-0001.

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 42: 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 43: Characteristic data of the digital outputs “External output 1” and “External output 2”

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

1) Output voltage
2) Output current

NOTE

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

14.6 Connection diagrams of connection module CDM420-0006

14.6.1 Connection of the device to CDM420-0006

Device = CLV61x-xx0xxx (serial variant)

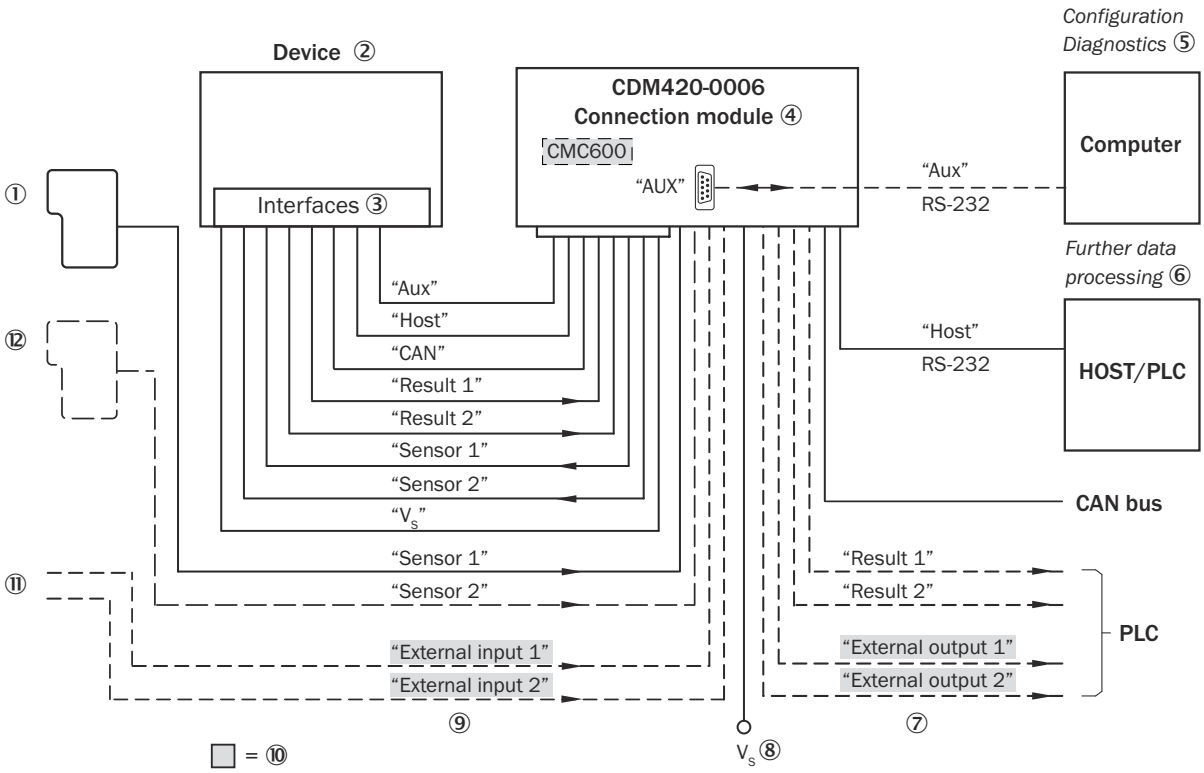


Figure 62: Connection of the device to peripherals via CDM420-0006 (overview)

① External trigger sensor, e.g. for read cycle generation
② Device
③ Interfaces
④ Connection modules
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)

14.6.2 Wiring overview of the CDM420-0006

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

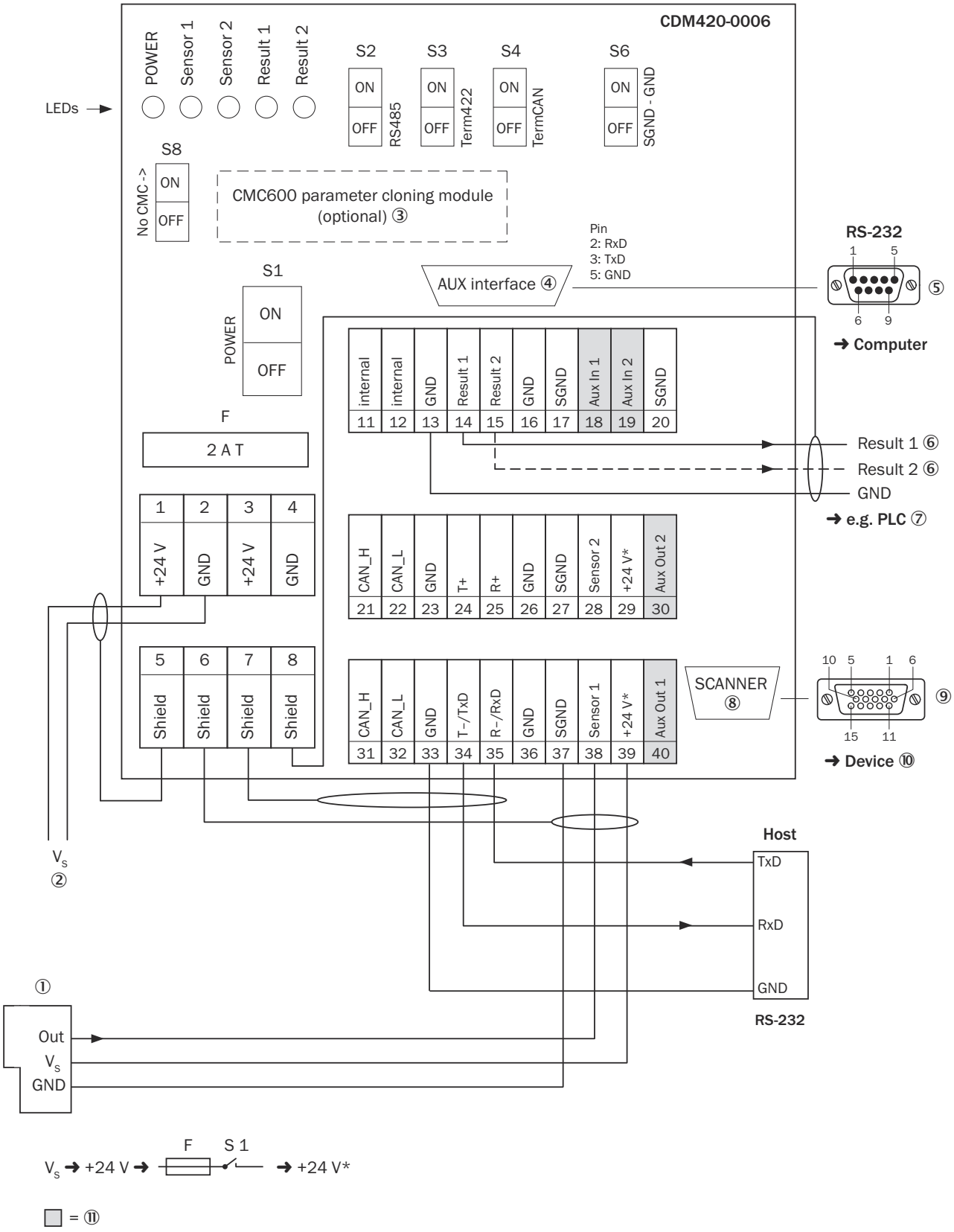


Figure 63: Overview: connection of device and peripherals to the CDM420-0006 connection module.

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).

14.6.3 Connecting supply voltage for the device in CDM420-0006

Device = CLV61x-xx0xxx (serial variant)

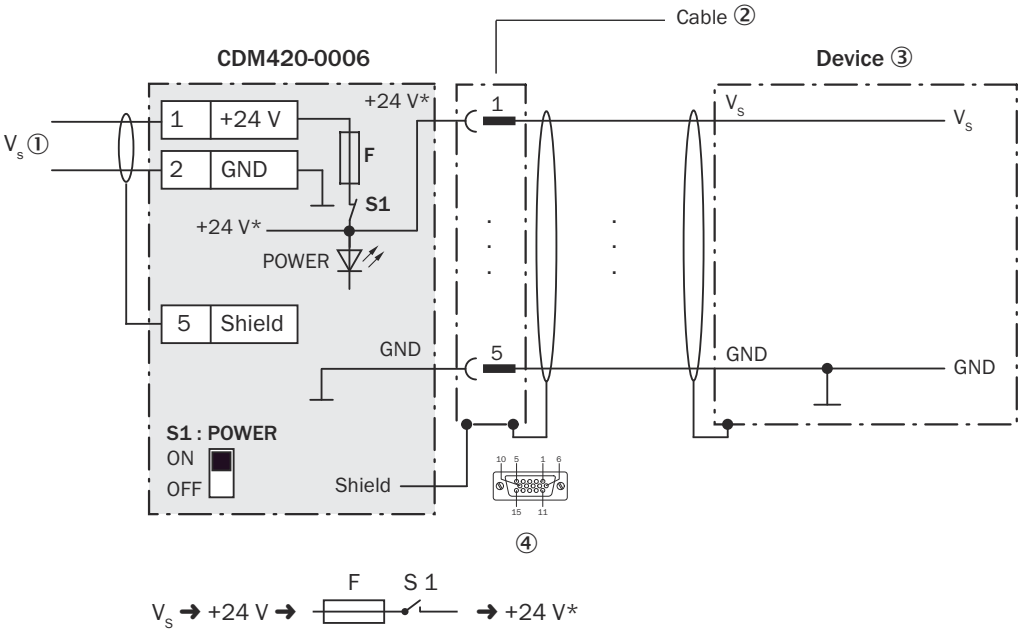


Figure 64: Connecting supply voltage for the device in CDM420-0006 connection module.

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 44: Switch S1: Power

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

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

Device = CLV61x-xx0xxx (serial variant)

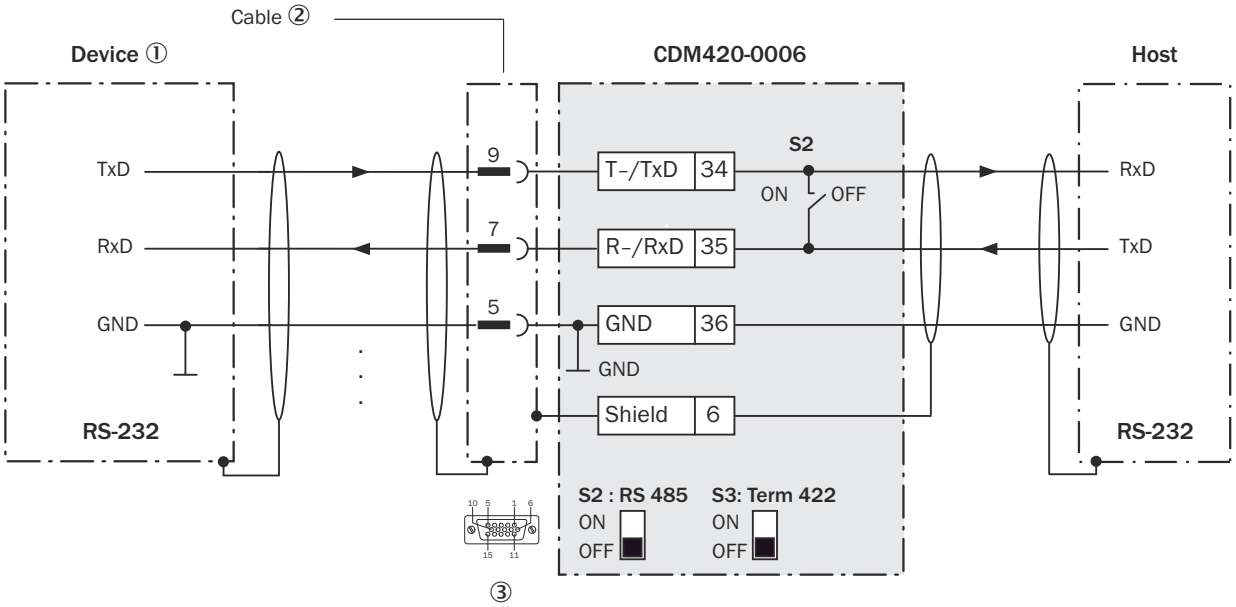


Figure 65: Wiring data interface RS-232 of the device in connection module CDM420-0006.

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 using a configuration software, e.g., SOPAS ET.

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

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

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

Device = CLV61x-xx0xx (serial variant)

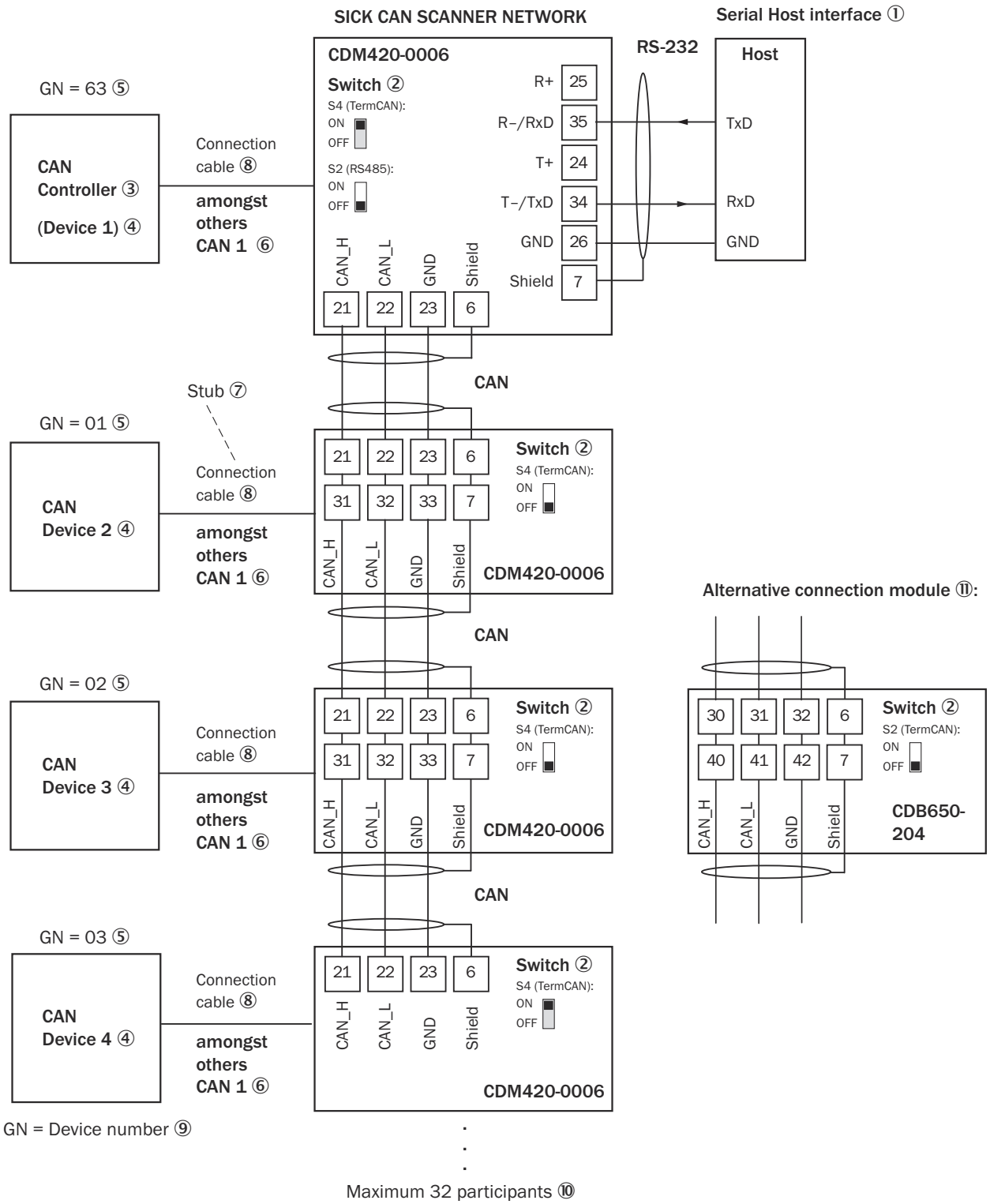


Figure 66: Wire the CAN interface of the device in the CDM420-0006 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the CAN controller, for example, are disregarded here.

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

Alternative connection modules for CLV61x: CDB620 or CDM420-0001

NOTE

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

Configure further settings in the device according to the function of the device in the system configuration.

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

Device = CLV61x-xx0xxx (serial variant)

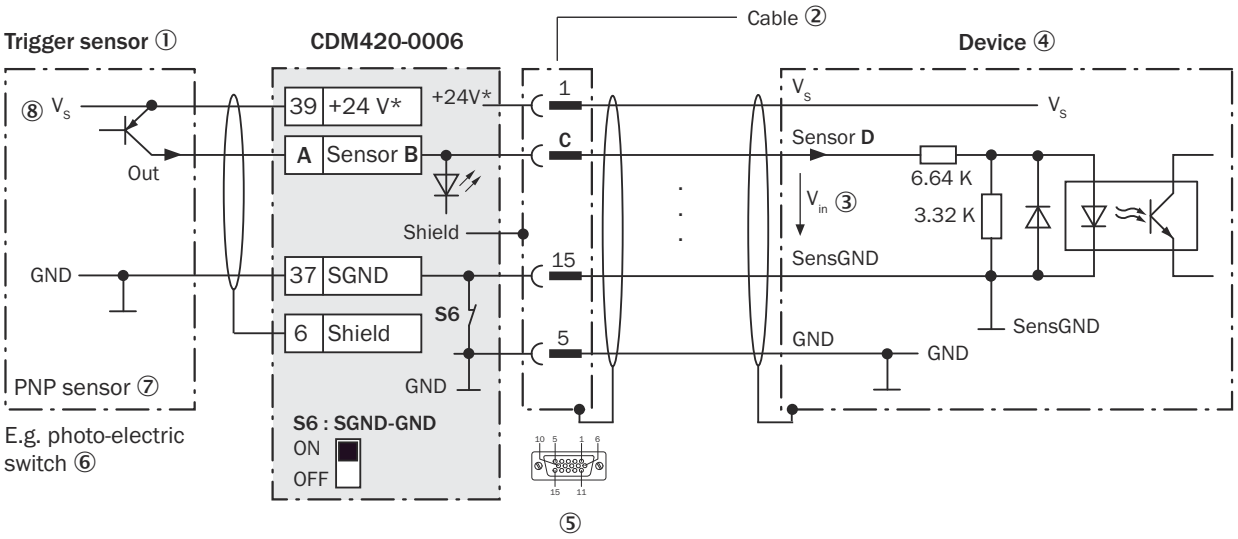


Figure 67: Trigger sensor supplied with power by connection module CDM420-0006

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

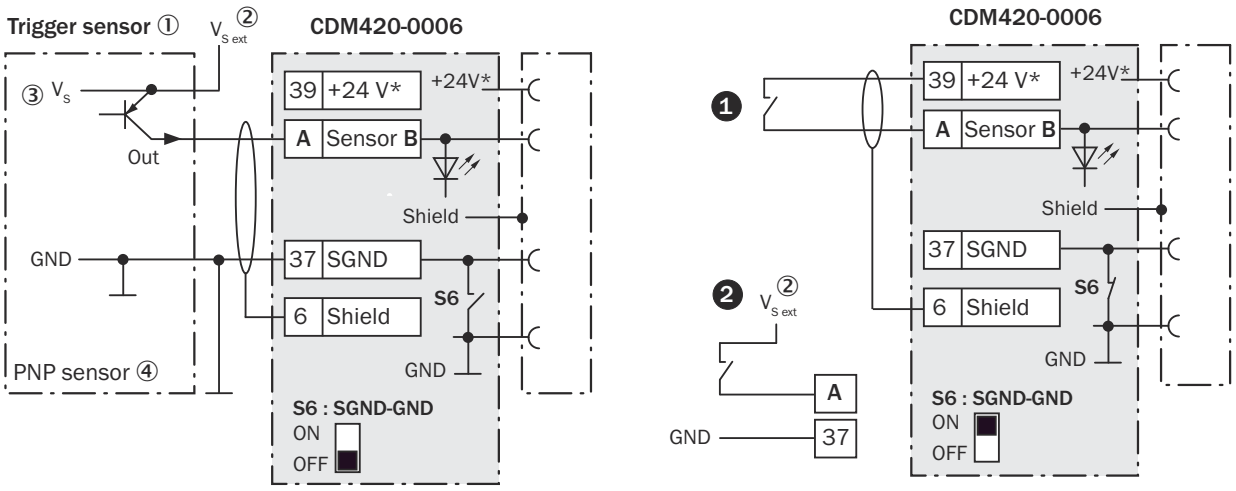


Figure 68: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDM420-0006 or ❷ connected potential-free and supplied with power externally. Now select switch setting S6 as shown in the left figure.

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

Table 45: 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 46: 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 47: Characteristic data of the digital inputs "Sensor 1" and "Sensor 2"

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

1) Input Voltage
2) Input current

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

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

Device = CLV61x-xx0xxx (serial variant)

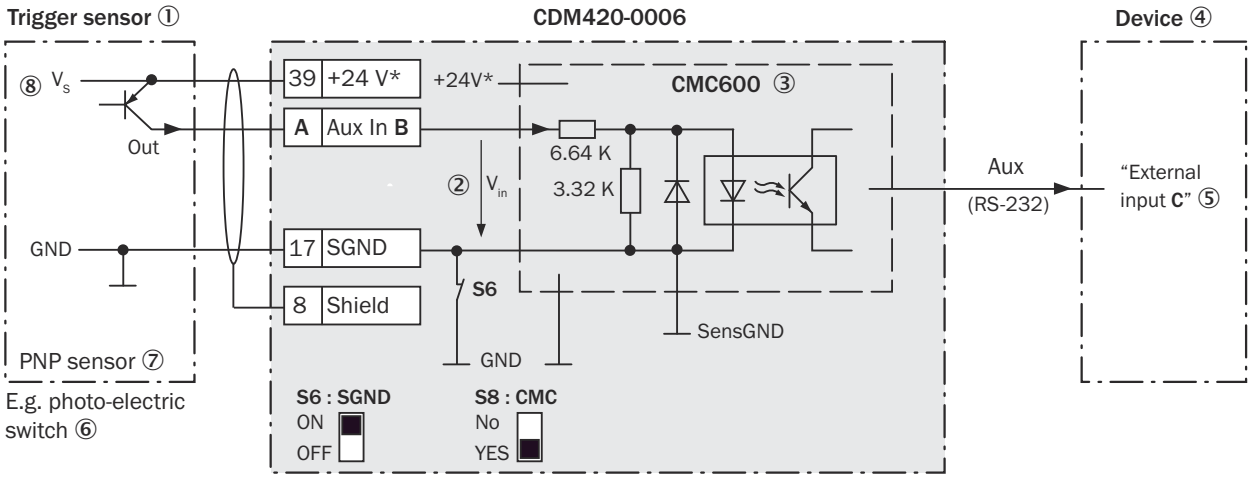


Figure 69: Trigger sensor supplied with power by connection module CDM420-0006

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

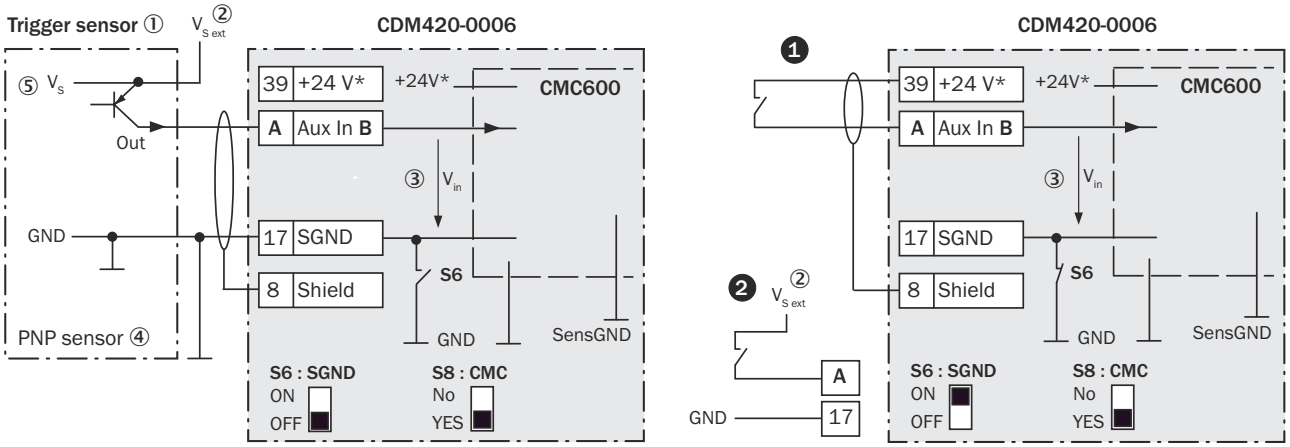


Figure 70: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDM420-0006 or ❷ connected potential-free and supplied with power externally. Switch setting S3 then as in left figure.

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 48: 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 49: 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 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 50: Characteristic data of the digital inputs “External input 1” and “External input 2”

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

1) Input voltage.
2) Input current.

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

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

Device = CLV61x-xx0xxx (serial variant)

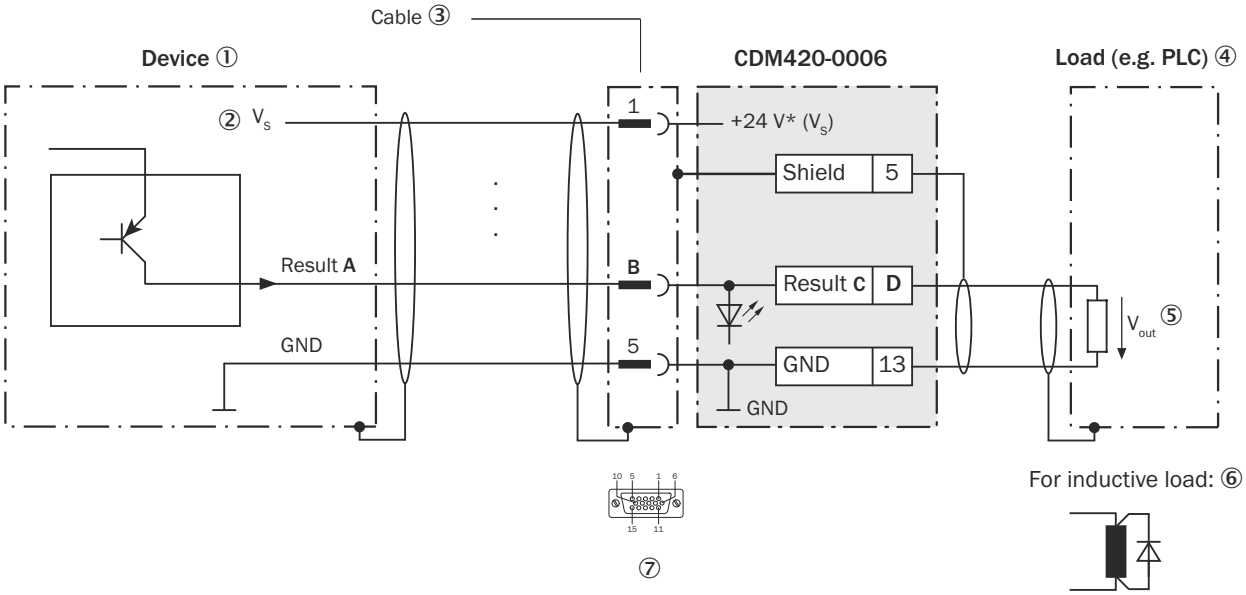


Figure 71: Wiring the "Result 1" and "Result 2" digital outputs of the device in the CDM420-0006 connection module.

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 51: 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 52: Characteristic data of the "Result 1" and "Result 2" digital outputs

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

Electrical values	0 V ≤ V_{out}[1)] ≤ V_S (V_S −1.5 V) ≤ V_{out} ≤ V_S at I_{out}[2)] ≤ 100 mA

1) Output voltage.
2) Output current.

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

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

Device = CLV61x-xx0xxx (serial variant)

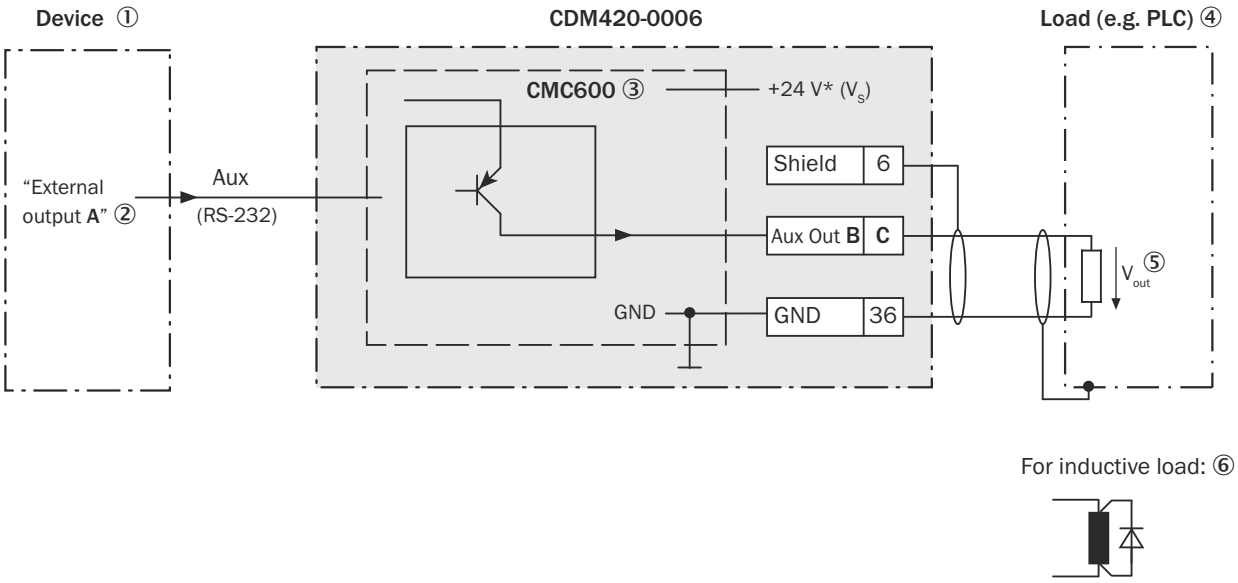


Figure 72: Wiring "Aux Out 1" and "Aux Out 2" external digital outputs of the device in the connection module CDM420-0006.

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 53: 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 54: Characteristic data of the digital outputs “External output 1” and “External output 2”

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

1) Output voltage.
2) Output current.

NOTE

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

14.7 Abbreviations used

Table 55: 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

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