OPERATING INSTRUCTIONS

CLV69x

Fixed mount barcode scanner

SICK
Sensor Intelligence.

Described product

CLV69x

Manufacturer

SICK AG
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79183 Waldkirch
Germany

Legal information

Original document

This document is an original document of SICK AG.

BIS 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 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.

1.3 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.

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

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

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 variants without heating (CLV69x-xxx**0**) must not be operated in the ambient temperature range below 0 °C.
- For device variants with an oscillating mirror (CLV69x-**1**xxx), only mounting brackets with vibration dampers from SICK must be used.
- 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

Activities	Qualification
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 660 nm.

Laser activity display

When the laser diode is switched on, the “Laser” LED on the device lights up.

Laser output aperture

The entire viewing window is a laser output aperture.

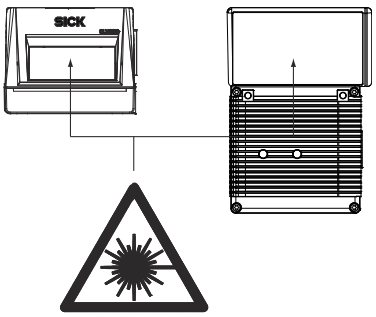

Figure 1: Laser output aperture for the two designs of the device

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 84 in the technical data.

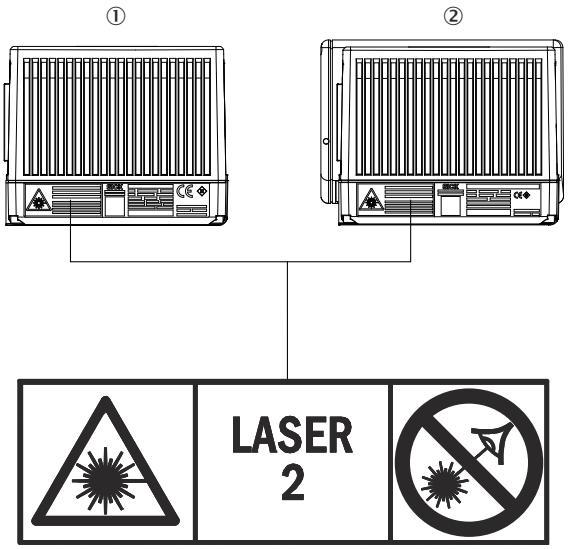

Figure 2: Position and contents of the laser warning label on the device

① Line scanner

② Line scanner with oscillating mirror

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
- During GSD parameterization with the “10_Object Trigger Ctrl” module (PROFINET or PROFIBUS)

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

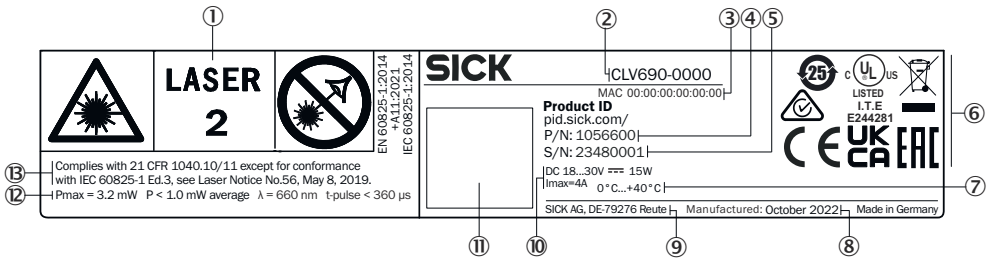

Figure 3: CLV69x: Example of type label of CLV690-0000, figure can differ.

① Laser warning label
② Type designation according to type code
③ MAC address
④ Part number
⑤ Serial number
⑥ Conformity mark and certification mark
⑦ Permissible ambient operating temperature
⑧ Production date
⑨ Manufacturer and production site
⑩ Supply voltage, power consumption, maximum current consumption
⑪ QR code, leads to SICK product ID
⑫ Laser power data: Maximum power, average power, wavelength, pulse duration
⑬ 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.

3.1.2 Type code

The devices of the CLV69x product family are arranged according to the following type code:

CLVxyz-abcd

CLV	x	y	z	–	a	b	c	d
1	2	3	4		5	6	7	8

Table 2: Type code

Position	Description	Characteristic
1	Code reader	V-principle
2 – 3	Product family	69: CLV69x
4	Resolution	0: Standard density 1: Low density 2: High density

Position	Description	Characteristic
5	Reading method, orientation of viewing window [1]	0: Line scanner, viewing window on front side 1: Line scanner with oscillating mirror, viewing window on the side
6	Electrical connection	0: 60-pin system connection [2] 9: Special connection
7	Window material of the viewing window	0: Glass 1: Plastic
8	Ambient operating temperature	0: Standard (0 °C ... +40 °C) 1: Extended (-35 °C ... +35 °C, with integrated heating)
Enclosure rating: IP65		

1) Refers to the longitudinal axis of the device.
2) For available interfaces, see the respective cloning plug (accessories).

3.2 Product characteristics

3.2.1 Device view

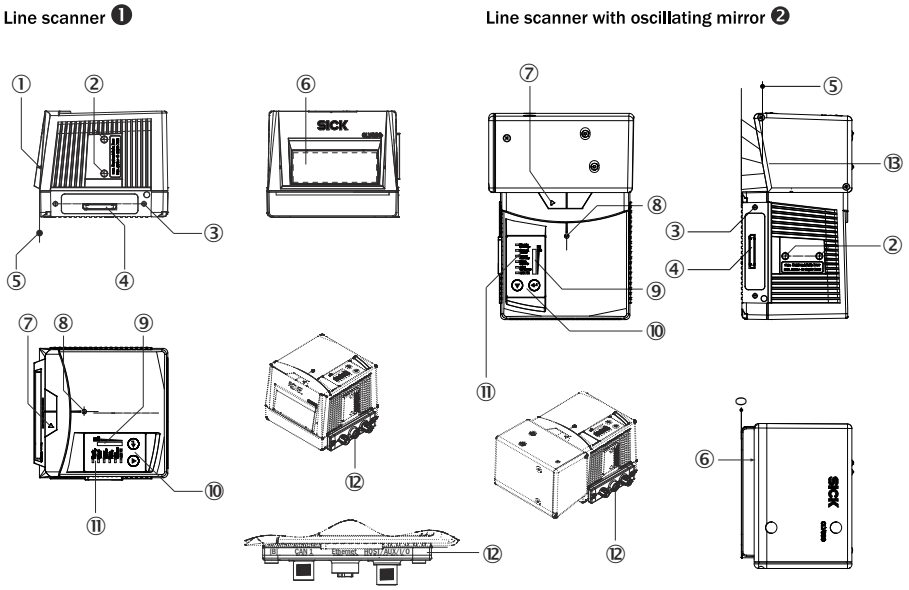

Figure 4: Line scanner (front viewing window) and line scanner with oscillating mirror (side viewing window)

❶ Line scanner
❷ Line scanner with oscillating mirror
① Mark for light emission plane
② Tapped blind hole M6, 7 mm deep (2x), for mounting the device
③ Tapped blind hole M4, 10 mm deep (2x), for mounting the cloning plug
④ Male connector, 60-pin for connecting a cloning plug
⑤ Reference point of the reading distance (from housing edge to object)
⑥ Viewing window
⑦ Mark for the direction of rotation of the mirror wheel and counting direction of the read diagnostics date RA (Reading Angle)
⑧ Internal impact point: rotation point of the variable direction beam
⑨ Bar graph
⑩ Function button (2 x)
⑪ LED status indicator (6 x)
⑫ Example of mounted cloning plug
⑬ Perpendicular to the device longitudinal axis for oscillating mirror

3.2.2 Scope of delivery

The delivery of the device includes the following components:

Table 3: CLV69x: scope of delivery

No. of units	Component	Notes
1	Device in the version ordered	Delivery state: • Without bracket • Without fixing screws

No. of units	Component	Notes
1	Mounting kit (plastic plate incl. screws)	Only included with delivery for device variants with integrated heating (CLV69x-xxx**1**). The mounting kit serves to thermally decouple the device from the bracket.
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

Not included with delivery of the device and must be ordered separately:

Table 4: CLV69x: additionally required scope of delivery

No. of units	Component	Remarks
1	Cloning plug in the version ordered	Mandatory for operation of device. Device type-dependent M12 connections are closed with protective elements of the appropriate type, e.g. protective caps.
	Connecting cables, depending on the type of cloning plug	For use of the device (CLV69x-xxx**0**) above 0 °C.
	Cold-resistant connecting cables, depending on the type of the cloning plug	For use of the device below 0 °C. Required for device variants with integrated heating (CLV69x-xxx**1**).

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

3.2.3 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)
	• Optional: IP65 housing with heating for cold storage applications
	• 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-oriented SOPAS ET configuration software
	• Low power consumption
	• Wide supply voltage range (devices without heating)
	• Optional parameter cloning:
	  ○ In the cloning plug of the device
	  ○ Type-dependent with external CMC600 parameter cloning module in the CDB/CDM connection module

Product feature/function	Characteristic
Convenient operation and configuration	• Configuration via SOPAS ET configuration software (online/offline) or commands • LED status indicators • Auto setup of the optical reading properties • Two pushbuttons on the device for executing preset functions without connecting a computer • Deactivatable acoustic signaling device for confirming device functioning • Application and network setup assistant
Reading Operation Mode	• Start/stop operation (one bar-code bearing object per reading pulse) • Tracking operation
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 by 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

3.2.4 Operating principle

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

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

By combining several devices , 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).

Line scanner with oscillating mirror

The oscillating mirror also deflects the scan line perpendicular to the scan direction to both sides, starting from the rest position in the center position. The movement runs at a low oscillation frequency. This enables the device to scan larger areas for bar codes.

The length of the scan line which can be used for evaluation (reading field height) depends on the reading distance as a result of the V-shaped light emission.

The device picks up the light patterns reflected from the bar code. In the process, the device converts the patterns into electrical signals that are processed and decoded. External sensors deliver information about the read cycle and conveyor speed (increment) to control this process. The device outputs the read results to its data interfaces, for forwarding to a coordinating host or computer.

For the detailed wiring of the device and the connections to the host or computer and to the external sensors, see see "Electrical installation", page 38.

Block diagrams

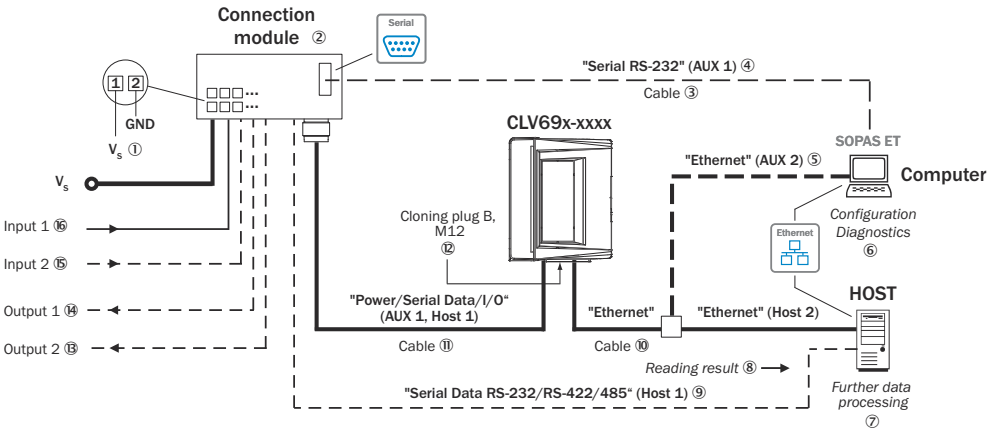

Figure 5: Connection option of the device in the CDB650-204 or CDM420-0006 connection module. For devices without heating (CLV69x-xxx0) or with integrated heating (CLV69x-xxx1).

① Supply voltage V_S

② Connection module (optional) CDB650-204 or CDM420-0006

③ Null modem cable (female connector, D-Sub, 9-pin/female connector, D-Sub, 9-pin), crossed TxD and RxD

④ Serial RS-232, alternative to Ethernet AUX port

⑤ Ethernet AUX port, alternative to serial RS-232

⑥ Configuration or diagnostics

⑦ Data further processing

⑧ Read result (configurable output format 1 or 2)

⑨ Serial data host, alternative to Ethernet host port

⑩ Adapter cable (male connector, M12, 4-pin, D-coded/male connector, RJ-45, 8-pin)

⑪ For CDB650-204: Connection cable 1:1 (female connector, M12, 17-pin, A-coded/male connector, M12, 17-pin, A-coded)

For CDM420-0006: Adapter cable (female connector, M12, 17-pin, A-coded/male connector, D-Sub-HD, 15-pin)

⑫ Cloning plug B, M12 (part no. 2062452)

⑬ Digital output 2, e.g. for connecting an LED

⑭ Digital output 1, e.g. for connecting an LED

⑮ Digital input 2, e.g. for connecting an incremental encoder

⑯ Digital input 1, e.g. for connecting a read cycle sensor

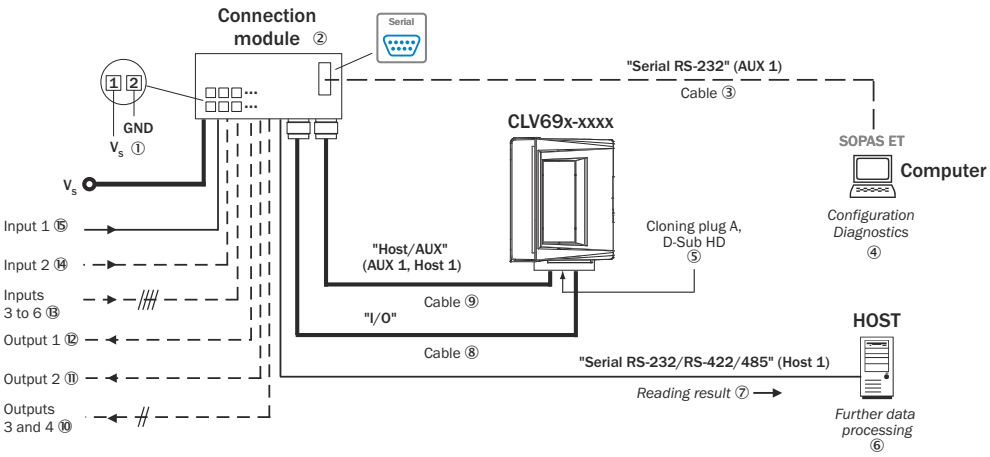

Figure 6: When replacing a CLV49x predecessor model: Connection options of the devices to CDM490-0001 connection module. For devices without heating (CLV69x-xxx0) or with integrated heating (CLV69x-xxx1).

① Supply voltage V_S

② Connection module (optional): CDM490-0001

③ Null modem cable (female connector, D-Sub, 9-pin/female connector, D-Sub, 9-pin), crossed TxD and RxD

④ Configuration or diagnostics

⑤ Cloning plug A, D-Sub HD (part no. 2062450)

⑥ Data further processing

⑦ Read result (configurable output format 1 or 2)

⑧ Connection cable 1:1 (male connector, D-Sub-HD, 15-pin/female connector, D-Sub-HD, 15-pin)

⑨ Connection cable 1:1 (female connector, D-Sub-HD, 15-pin/male connector, D-Sub-HD, 15-pin)

⑩ Digital outputs 3 and 4, e.g. for connecting an LED

⑪ Digital output 2, e.g. for connecting an LED

⑫ Digital output 1, e.g. for connecting an LED

⑬ Digital inputs 3 to 6

⑭ Digital input 2, e.g. for connecting an incremental encoder

⑮ Digital input 1, e.g. for connecting a read cycle sensor

3.2.4.1 Autofocus function

The autofocus function enables the device to detect the distance of the object without the help of external sensors and to independently adjust the focus position. To do so, the device measures the distance of the object in its field of view, creates a distance profile from this internally, and positions the focus on the object.

The autofocus function works in “Difference to background” mode. The device first learns the distance profile of the background in its unobstructed field of view. To do so, there must be no objects located in the field of view. Then the device focuses on the object, which the device detects by its difference to the background. This feature is used, for example, when there is a clear view of the object, however this view is restricted by structures that constantly protrude into the reading plane. Only one object with bar code(s) is in the reading field per read cycle.

The SOPAS ET configuration software can display the distance profile that was created for the background.

The desired autofocus area is set as follows:

- Select the aperture angle and the autofocus area
- Device with oscillating mirror: also select the oscillation amplitude (the angle of deflection).

The following parameters, among others, can be specified for the device:

- The park position (preferred position) of the focus position, from which the device refocuses at each reading
- A temporal and/or localized delay (timeout or hysteresis)

If required, an additional offset can be applied to the focus position set by measurement. This optimizes the radial depth of field for the object. The V principle of beam deflection causes the radial gradient in the direction of the scan line.

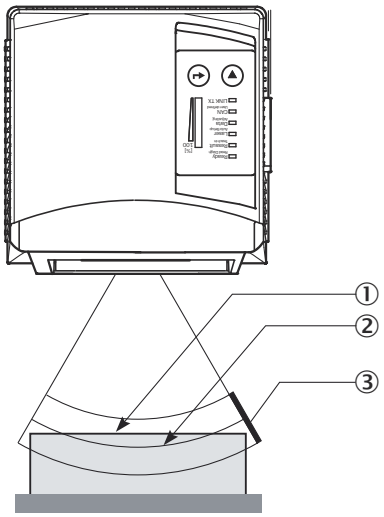

Figure 7: Auto-focus

① Measured distance

② Optimized focus position: measured distance plus offset for maximum

③ Depth of field (DOF)

NOTE

Configuration of the autofocus function using the SOPAS ET configuration software: Project tree, CLV6xx, parameters, read configuration, focus control, Options tab, autofocus parameters

3.2.4.2 Switchable focus position

As an alternative to the autofocus function (CLV65x only), the focus position can also be changed dynamically to cover a large reading range.

For this purpose, a maximum of eight reading ranges can be defined internally as a distance configuration and, during reading operation, moved to by the optics in any order.

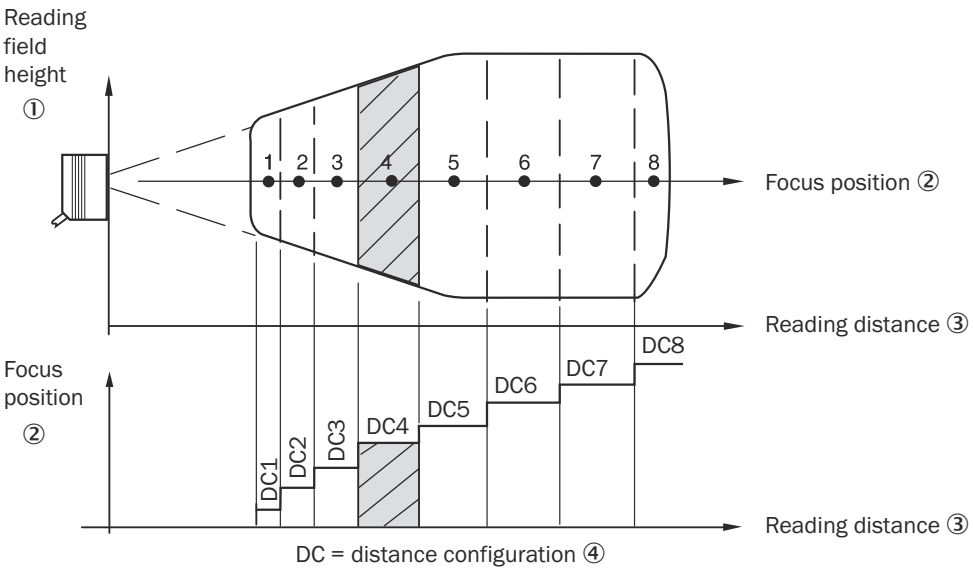

Figure 8: Focus switching: Division of the total reading range into distance configurations

① Reading field height
② Focus position
③ Reading distance
④ Distance configuration

The switching of the focus is carried out by the changing object distance (e.g. during reading from the top: object height detection).

Trigger sources for switching are:

- Signal at digital input, e.g., “Sensor 2”, for maximum 2-stage switching
- Command to the host interface or the integrated timer (e.g. for search run) for the maximum 8-step switchover
- Oscillating mirror reversal points of the bilateral deflections for the line scanner with oscillating mirror

The distance configurations are assigned to the switching order via a programmable assignment table.

NOTE
The SOPAS-ET configuration software can be used to configure the focus position:

- Project tree, CLV6xx, parameters, read configuration
- Project tree, CLV6xx, parameters, read configuration, oscillating mirror
- Project tree, CLV6xx, parameters, read configuration, focus control

3.2.4.3 Oscillating mirror control

In the case of a line scanner with oscillating mirror, the position of the scan line is affected by the configuration of the oscillating mirror.

In addition to “parking” (fixed, adjustable position of the scan line) or continuous oscillation, optimized functional sequences, related to the read cycle, are also possible by controlled operation of the oscillating mirror:

- N-fold oscillation around an adjustable start position within the read cycle
- One-Shot: single deflection (approach and return) per read cycle from an adjustable start position

In each oscillation mode, the deflection width can be set (amplitude) independently for each of the deflection directions. Within the selected cycle duration of the entire vibration process, the deflection speeds can be set in relation to each other for both deflection directions.

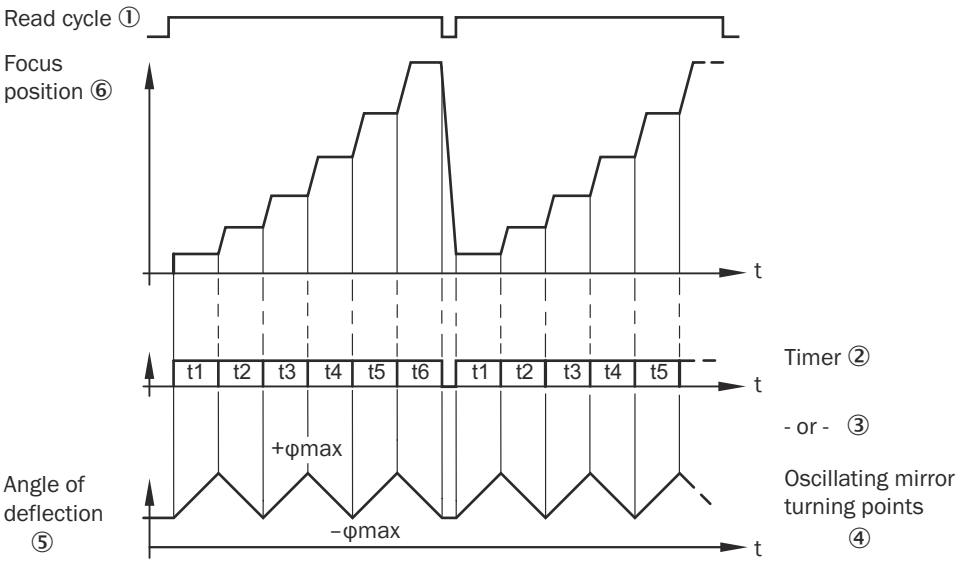

Figure 9: Oscillating mirror: Example for focus position control in a search run, here with 6 focus positions

① Read cycle
② Timer
③ - or -
④ Oscillating mirror reversal points
⑤ Angle of deflection
⑥ Focus position

NOTE
The SOPAS-ET configuration software can be used to configure the vibration behavior and the position of the oscillating mirror.

3.2.4.4 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 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 ended in several ways. For example, external triggering by the read cycle source or a command, or internally by a timer or a evaluation condition to be fulfilled.

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

3.2.4.4.1 Reading operation mode

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

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

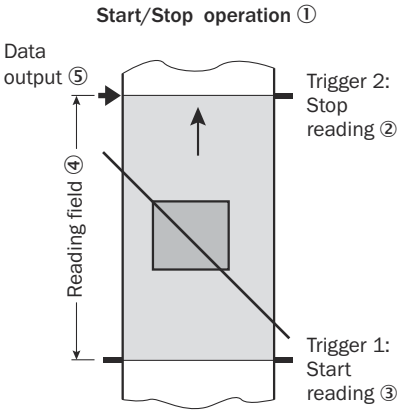

Figure 10: Start/Stop operating mode of the device in stand-alone operation

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.

3.2.4.4.2 Tracking operation

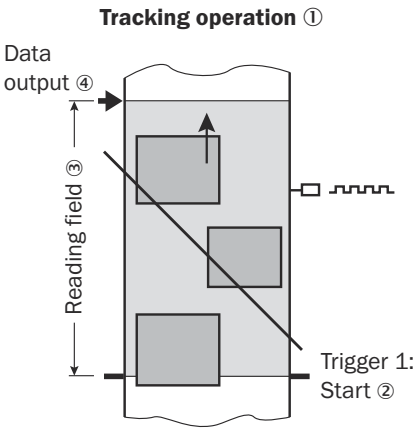

Figure 11: Tracking operating mode of the device in stand-alone operation

① Tracking operation
② Trigger 1: Start reading
③ Reading field
④ Data output

For the internal tracking operation of the device, there are a maximum of 10 objects behind each other in the reading field at the same time during the reading process.

By default, the start of the reading process is controlled by a read cycle sensor at the start of the reading field. The specified object release point defines the end of the reading field. This also defines the size of the resulting reading field.

In order to be able to track the transport of the objects in the reading field, a regular clock is required. The clock pulse is generated by an external incremental encoder, which constantly supplies one pulse to the device for at least every 1 mm movement in the conveying direction. This provides a clear temporal representation within the device of the path between the read cycle sensor and object release point.

The device also detects any fluctuations in transport speed when starting up the conveyor technology or in the event of slowing down (high load with lots of objects to convey). Alternatively, an internal clock in the device enables operation at a constant conveying speed at all times.

A gap of at least 50 mm is necessary for clear separation of successive objects.

The device outputs the read result for an object when the trailing edge of the object has passed the object release point. The reading process can alternatively be started with a command string via the data interface.

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 84.
- Relative humidity: see "Technical data", page 84.
- 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

NOTE
Special procedures are required for the mounting, installation and commissioning of devices with heating.

Observe the corresponding instructions see "Mounting device", page 27, see "Notes on the electrical installation", page 38 and see "Connecting the supply voltage", page 61.

- Selecting and preparing the mounting location.
- Mounting the device.
- Connect device to data cable 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 84.
- 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 M6 screws – the maximum screw-in depth in the device is 7 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 two M6 tapped blind holes. The blind tapped holes are located on the left side of the device, see "Dimensional drawings electronic formats", page 135.

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.

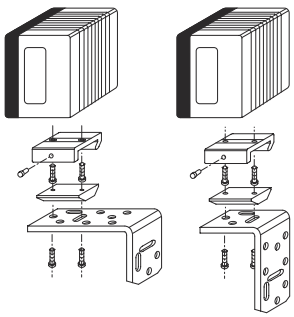

Figure 12: Mounting example of a CLV69x with combination of quick clamping device and mounting bracket

Addition for heated device variants

The scope of delivery for the heated devices includes an attachment kit for the thermal decoupled mounting.

When preparing for mounting, the plastic plate of the attachment kit must be mounted between the bracket and the device housing.

NOTE
The screws supplied with the mounting kit replace the screws of the previous mounting kits.

- The countersunk screws replace the screws of mounting kit 1.
- The cylinder head screws replace the screws of mounting kit 2 or 3.

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.
- Two M6 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 7 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 (see figure 13, page 29)
- 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 or line scanner with oscillating mirror

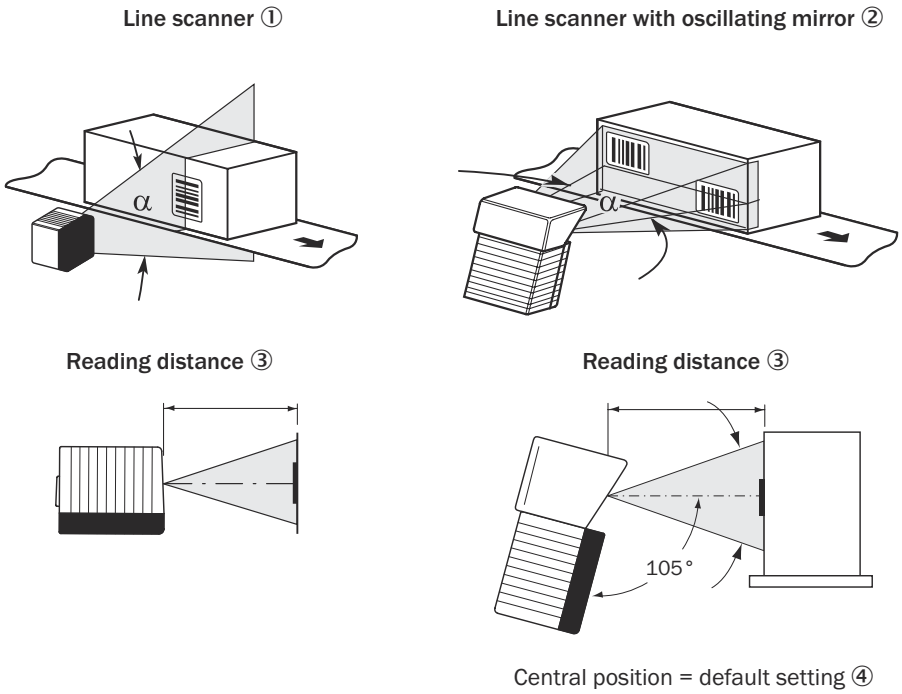

Figure 13: Allocation of scan line to bar code and conveyor direction

① Line scanner
② Line scanner with oscillating mirror
③ Reading distance
④ Middle position = default

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.

The specification diagrams show the height of the reading field as a function of the reading distance at different resolutions (module widths), see "Technical data", page 84.

5.3.3 Angular orientation of the device

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

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

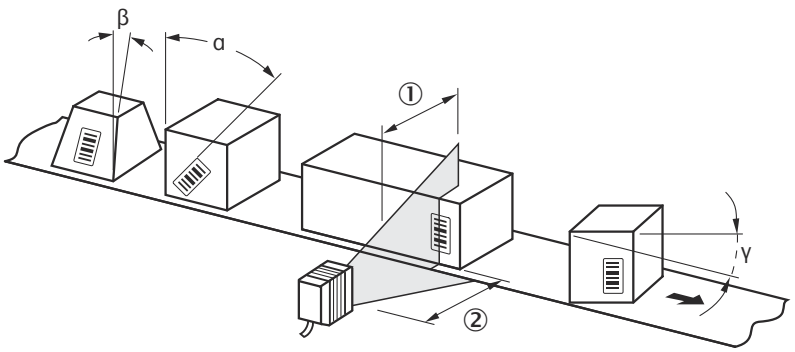

Figure 14: Line scanner: Occurring reading angle between scan line and bar code

① Depth of field

② Reading distance

Table 6: Permitted read angle between scan line and bar code

Angle	Limit Value
Tilt α	Max. 45°
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.

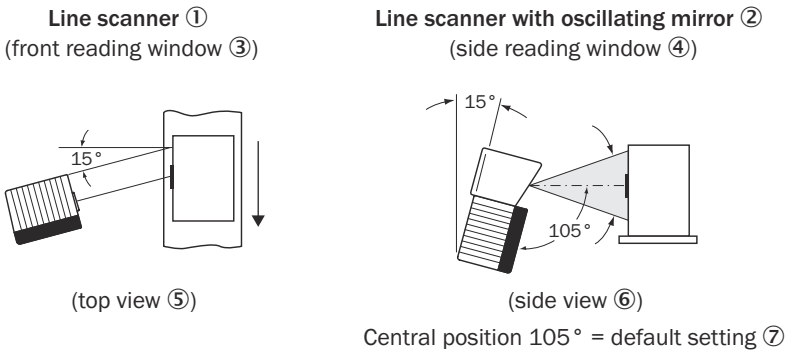

Figure 15: Avoiding surface reflections: Angle between light emitted and bar code (tilting away from vertical)

① Line scanner
② Line scanner with oscillating mirror
③ Front viewing window
④ Side viewing window
⑤ Supervision
⑥ Side view
⑦ Middle position 105° = default

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

With devices with oscillating mirror, these values refer to the center position of the scan field.

5.3.5 Counting direction of the reading angle and the code 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.

A device with oscillating mirror optionally also outputs:

Code angle (CW value)

- This value specifies the angle of deflection of the oscillating mirror at which the deflected scanning beam detects the center of the bar code with the red scan line. The deflection is perpendicular to the scan plane.

Identical bar codes (code type, code length and data content) can be distinguished by determining the RA and CW values. This allows the bar code data to be assigned based on the position on the object.

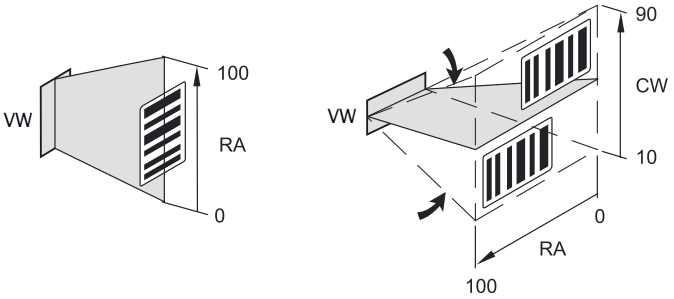

Figure 16: Example for count direction and RA/CA value determination in a line scanner (left) and a line scanner with oscillating mirror (right)

VW Viewing window
CA Code angle
RA Reading angle

5.4 Mounting device

Device with heating:

NOTE

Do not expose the device to strong air movement, e.g. a ventilation system. The device may otherwise not be able to provide the required heating power. If necessary, shield the device from air movement with suitable means.

If the device is used outside, we recommend installing it into an suitable protective housing. This prevents contamination of the viewing window by rain, snow or dust. The housing also protects from wind.

NOTICE
Risk of damage to components

Do not move the following components when the ambient temperature is below 0 °C:

- Connecting cables
- Swivel connector on device (type-dependent)
- Configuration switch in the optional connection module

General:

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.

Screw-in depth of the blind tapped holes see "Mechanics/Electronics", page 87 in the technical data.

1. Prepare the base for mounting the bracket of the device, see "Preparing for mounting", page 26.
2. Place the object with bar code at the intended reading point of the device in the viewing range of the device (no conveying movement).
3. Align device with the bar code by eye. When doing so, be aware of the following:

- For devices with a front viewing window: The rear of the device with the laser warning label faces the viewer and is aligned approximately parallel to the bar code surface.
- For a device with oscillating mirror: The back of the oscillating mirror is approximately parallel to the bar code surface.
- During reading, note the reading angle that occurs see "Angular orientation of the device", page 29.
- If the position of the bar code within the scan line is relevant for the evaluation, observe the counting direction of the code position, see "Counting direction of the reading angle and the code angle", page 31.

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 73.
7. After alignment, tighten the screws. Do not exceed the maximum tightening torque.

5.5 Mounting with shock mounts (optional)

In application areas with severe vibrations or shocks to the device, mount the device in conjunction with a suitable vibration damper. Faults are caused by vibrations, shakes or abrupt changes in directions, e.g. when the device is mounted on a manned forklift truck.

You can find suitable SICK mounting brackets with integrated vibration and shock damping (absorbing elements) on the product page at:

- www.sick.com/CLV69x

NOTICE
Device damage due to unsuitable devices!

When mounting devices with an oscillating mirror, only mounting brackets with vibration dampers from SICK must be used.

► Mounting bracket with integrated vibration and shock damping for devices with a front viewing window only.

Figure 17: Device without oscillating mirror: Mounting bracket with vibration damper, mounted horizontally

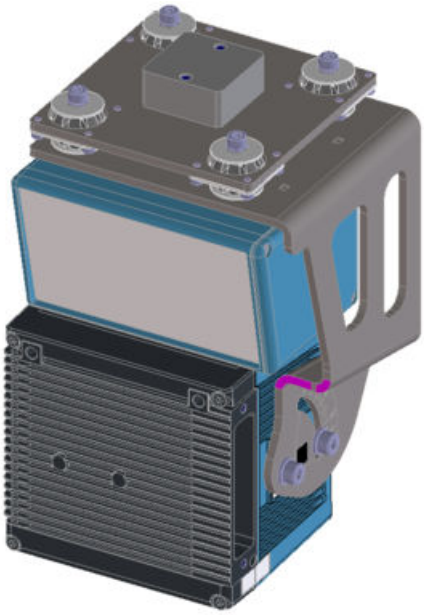

Figure 18: Device with oscillating mirror: Mounting bracket with vibration damper, mounted horizontally

Permissible mounting variants

The following mounting variants using a SICK mounting bracket with integrated vibration and shock damping are permitted for line scanners:

1 Horizontal line scanner: horizontal mounting bracket mounted above the device, suspended device.

Figure 19: Mounting with mounting bracket at the top, line scanner, horizontal scan line

2 Vertical line scanner: ball joint holder and SICK mounting bracket with integrated vibration and shock damping mounted vertically at the side, suspended device.

Figure 20: Mounting with mounting bracket at the top, line scanner, vertical scan line

3 Horizontal line scanner with oscillating mirror: SICK mounting bracket with integrated vibration and shock damping mounted horizontally at the side, suspended device (mounting the SICK mounting bracket on the device see figure 18).

NOTICE
Device damage due to incorrect installation position!

An incorrect installation position limits the absorption effect or amplifies the loads that occur.

► Implement only one of the two listed mounting variants.

Mounting the device

When mounting a bracket with vibration damper, observe the following points:

- Screw the mounting plate or mounting bracket directly onto the device.
- Attach the vibration damper as close to the device as possible.
- Depending on the device type, mount the vibration damper horizontally above the unit or vertically to the side (see below) to achieve an optimum damping effect.

NOTICE
Damage to device through improper mounting!

To avoid damage during mounting and subsequent operation of the device, observe the following:

► Use screws of suitable length.
► Allow a working distance of at least 25 mm in all axis directions of the device. This is particularly important when the device is installed at an angle
► To ensure strain relief, select an appropriate length for the connecting cables based on the working distance.

Observe the following during operation:

NOTICE

To avoid damage to the device during operation, observe the following:

- The ground traveled upon is in good condition, e.g., free of large expansion joints and potholes.
- Recommendation for mounting of the vibration damper by the customer: To prevent the mounting screws from loosening, wet them with a thread-locking screw, preferably LOCTITE 268.
- Forklift truck applications: Ensure appropriate driving behavior when lowering the forks, e.g., do not drive with the fork lowered, gently lift the load
- Recommendation: Use a soft drop system.

NOTICE

Device damage due to lack of maintenance of the mounting brackets!

Mounting brackets with integrated vibration and shock absorption are subject to wear and tear under heavier loads. The mounting brackets must therefore be assessed and maintained on a regular basis. The exchange interval is application-specific and depends on the level of exposure to vibrations and shocks.

5.6 Mounting external components

5.6.1 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.

5.6.2 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.

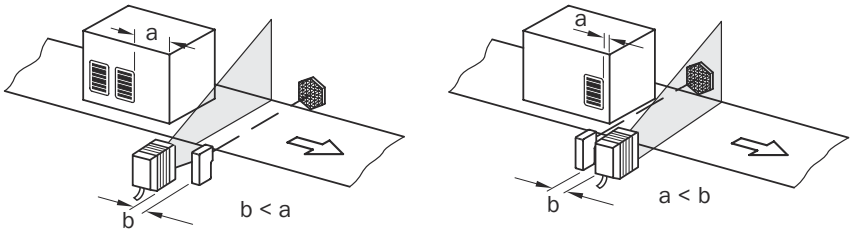

Figure 21: Bar code at the end or start of the piece goods

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).

5.6.3 Mounting incremental encoder

An incremental encoder is required to use the tracking function.

The incremental pulses must originate from the area of the conveying line on which the device is reading.

1. Mount a suitable incremental encoder in the vicinity of the device.
   Optimally, mount the incremental encoder in front of the device against the direction of travel of the conveying line.
2. Create direct and secure contact with the drive technology and ensure that friction wheel turns without slipping.

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).
- All circuits connected to the device must be designed as SELV circuits (EN 60950-1) or ES1 circuits (EN 62368-1).
- Only operate the device with an LPS (limited power source) in accordance with IEC 60950-1, PS2 in accordance with IEC 62368-1 or an NEC Class 2 power supply unit.
- Protect the device with a separate fuse at the start of the supply circuit. Protect devices without heating with a maximum of 2 A, heatable devices with a maximum of 4 A .

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.

Additional information on devices with heating

When using heatable devices, you must also keep in mind the following points:

- Use cables suitable for the environmental conditions. In case of doubt, consult SICK Service.
- Supply voltage range restricted: 21.6 V DC ... 28.8 V DC
- Connection work only in the temperature range: 0 °C ... +35 °C
- When mounting, make sure that a thermal transition between the device and the environment is largely reduced. To do this, insert the decoupling material supplied with the device between the device and the bracket. If necessary, use appropriate brackets (optional accessories).
- The device must be in a non-operating state (no mounting or connection work).

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

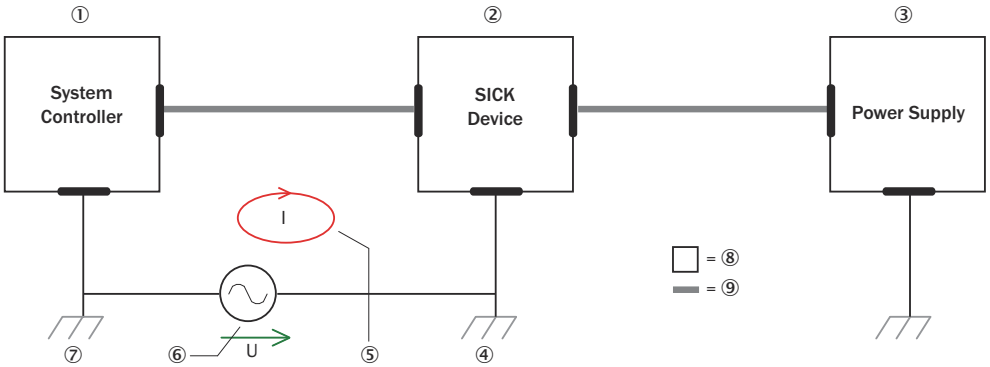

Figure 22: Example: Occurrence of equipotential bonding currents in the system configuration

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.

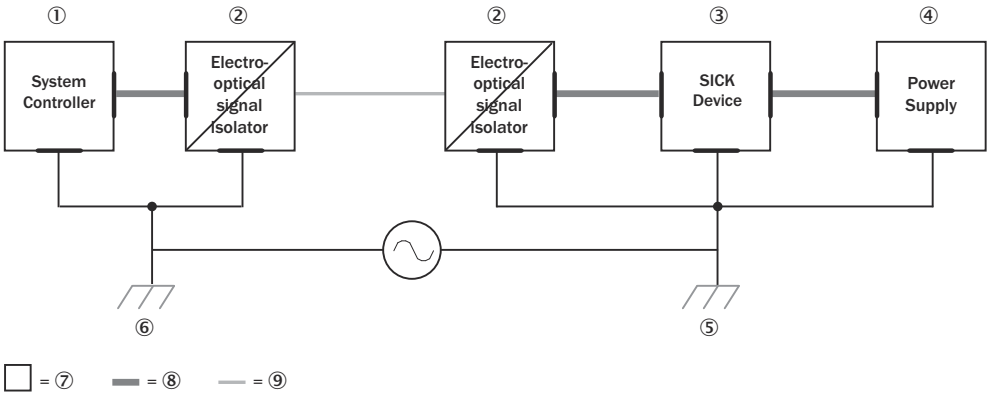

Figure 23: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

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.

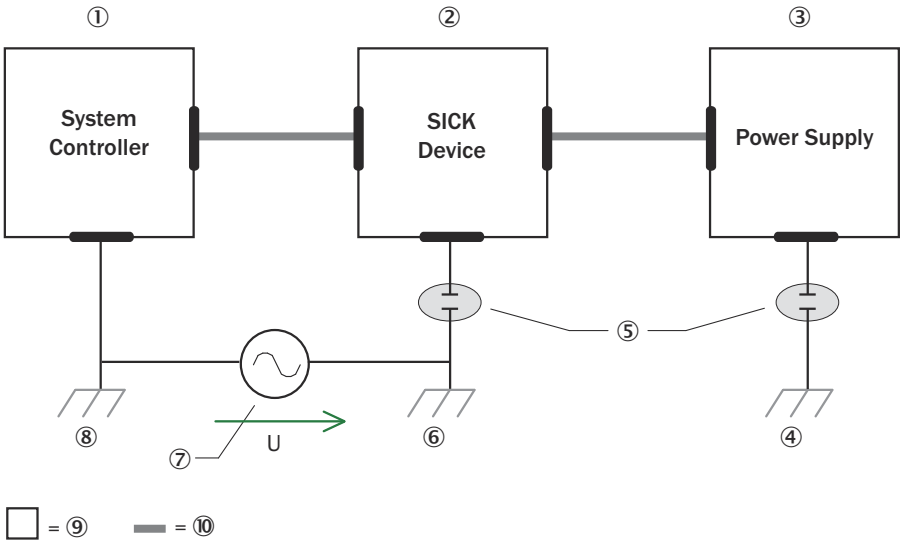

Figure 24: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

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 135.

Depending on the type of cloning plug used, all electrical connections of the device are designed as M12 round connectors or as D-Sub plug connectors.

The enclosure rating stated in the technical data is achieved only with screwed plug connectors and protective elements on any unused M12 connections.

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 pre-assembled cables is routed via the knurled nut (M12 plug connector) or the housing (D-Sub plug connector) of the cable heads, depending on the device.
- After plugging in and fixing the cable heads, 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 25).
  - ► Route the cables in groups 1, 2 and 3, 4 in different cable channels or use metallic separators (see figure 26 and see figure 27). This applies particularly if cables of devices with a high level of radiated emission, such as frequency converters, are laid parallel to device cables.

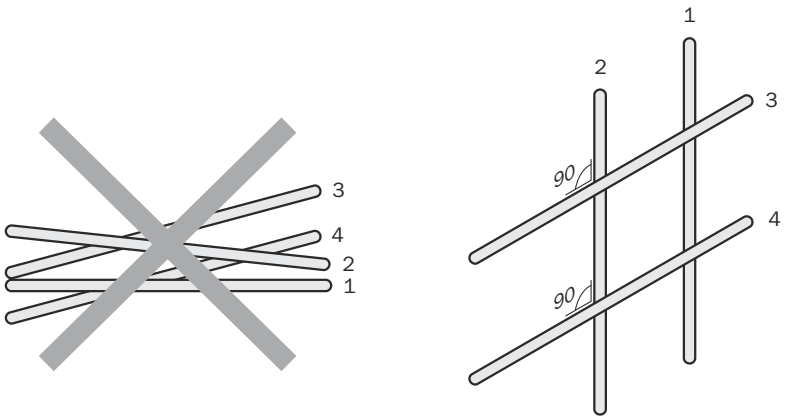

Figure 25: Cross cables at right angles

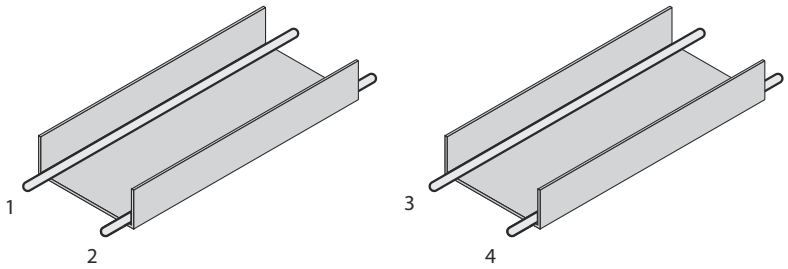

Figure 26: Ideal laying – Place cables in different cable channels

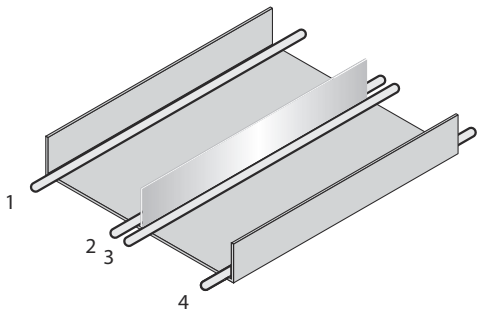

Figure 27: Alternative laying – Separate cables with metallic separators

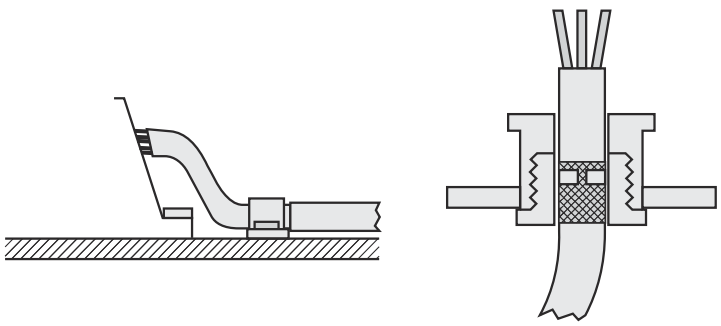

Figure 28: Shield connection in plastic housings

6.4 Pin assignments for electrical connections

6.4.1 Overview of the pin allocation for the cloning plug

NOTE

The assignment of the connections to the cloning plugs in this section is also available online at www.sick.com. Information of the respective product can be found in the technical data.

Table 7: Overview of cloning plugs and connection options

Short designation	Part no.	Label [1]	Connection type	Interfaces	Connection module Bus connection module System controller
D-Sub	2062450	A	D-Sub	Power, Serial Data, I/O, CAN 1, CAN 2	CDM490-0001
I/O Ethernet	2062452	B	M12	Power, Serial Data, I/O, Ethernet, CAN 1	CDB650-204 CDM420-0006 CDM420-0007 CDM420-0108 CDF600-2100 CDF600-2103 CDF600-2200 CDF600-2201
CAN IN/OUT	2062453	C	M12	Power, Serial AUX, CAN 1	MSC800 [2]
CAN redundant	2062454	D	M12	Power, Serial AUX, CAN 1, CAN 2	MSC800 [2]
CAN IN/OUT, Ethernet	2074708	E	M12	Power, Ethernet, CAN 1	MSC800 [2]
CAN redundant, Ethernet	2074710	F	M12	Power, Ethernet, CAN 1, CAN 2	MSC800 [2]

1) Printed on the outside of the cloning plug for reliable identification even when installed on the device. The marking is located on the top left side of the printed functionality of the connectors.
2) Modular system controller.

Table 8: Pin assignments for the connections of every cloning plug

Cloning plug					
D-Sub	**I/O Ethernet**	**CAN IN/OUT, Blower, AUX**	**CAN redundant, Blower, AUX**	**CAN IN/OUT, Ethernet**	**CAN redundant, Ethernet**
Part no. 2062450	**Part no. 2062452**	**Part no. 2062453**	**Part no. 2062454**	**Part no. 2074708**	**Part no. 2074710**
Label A	**Label B**	**Label C**	**Label D**	**Label E**	**Label F**
2 x D-Sub HD	**3 x M12**	**3 x M12**	**3 x M12**	**3 x M12**	**3 x M12**
Sensor 1 (sensor [3]) [1]	Sensor 1 [1]	-	-	-	-
Sensor 2 (IN 0 [3]) [1]	Sensor 2 [1]	-	-	-	-
Sensor 3 (IN 1 [3]) [1]	-	-	-	-	-
Sensor 4 (IN 2 [3]) [1]	-	Sensor 4 (IN 2 [3]) [1]	Sensor 4 (IN 2 [3]) [1]	-	-
Sensor 5 (IN 3 [3]) [1]	-	-	-	-	-
Sensor 6 (IN 4 [3]) [1]	-	-	-	-	-
Result 1 [2]	Result 1 [2]	-	-	-	-
Result 2 [2]	Result 2 [2]	-	-	-	-
Result 3 [2]	Result 3 [2] [4]	-	-	-	-
Result 4 [2]	Result 4 [2] [4]	-	-	-	-
Serial AUX	Serial AUX	Serial AUX	Serial AUX	-	-
Serial Host	Serial Host	-	-	-	-
CAN 1	CAN 1	CAN 1	CAN 1	CAN 1	CAN 1
CAN 2	-	-	CAN 2	-	CAN 2
-	Ethernet	-	-	Ethernet	Ethernet

Cloning plug					
D-Sub	**I/O Ethernet**	**CAN IN/OUT, Blower, AUX**	**CAN redundant, Blower, AUX**	**CAN IN/OUT, Ethernet**	**CAN redundant, Ethernet**
Part no. 2062450	**Part no. 2062452**	**Part no. 2062453**	**Part no. 2062454**	**Part no. 2074708**	**Part no. 2074710**
Label A	**Label B**	**Label C**	**Label D**	**Label E**	**Label F**
2 x D-Sub HD	**3 x M12**	**3 x M12**	**3 x M12**	**3 x M12**	**3 x M12**
-	-	24 V DC out [5]	24 V DC out [5]	-	-

1) Digital input.
2) Digital output.
3) Signal designations of the predecessor models CLV49x, CLV48x, CLX48x.
4) Signals are not available on the D-Sub-HD, male connector, 15-pin of all adapter cables.
5) For supplying an external fan.

Possible combinations: cloning plug on connection modules:

Cloning plug	Connection modules	Connecting cables
Variant B (Ethernet) Part no. 2062452	CDB650-204	**Device without heating:** Female connector, M12, 17-pin, A-coded / male connector, M12, 17-pin, A-coded **Device with heating:** Cable 1: Female connector, M12, 17-pin, A-coded / male connector, M12, 17-pin, A-coded Cable 2: female connector, M12, 5-pin, A-coded/open end
	CDM420-0006	**Device without heating:** Female connector, M12, 17-pin, A-coded / male connector, D-Sub-HD, 15-pin **Device with heating:** Cable 1: Female connector, M12, 17-pin, A-coded / male connector, D-Sub-HD, 15-pin Cable 2: female connector, M12, 5-pin, A-coded/open end
Variant A (D-Sub) Part no. 2062450	CDM490-0001	**Device without heating:** Cable 1: female connector, D-Sub-HD, 15-pin/male connector, D-Sub-HD, 15-pin Cable 2: male connector, D-Sub-HD, 15-pin/ female connector, D-Sub-HD, 15-pin **Device with heating:** Cable 1: female connector, D-Sub-HD, 15-pin/male connector, D-Sub-HD, 15-pin Cable 2: male connector, D-Sub-HD, 15-pin/ female connector, D-Sub-HD, 15-pin

6.4.1.1 Cloning plug A (D-Sub HD): Power, Serial Data, I/O, CAN 1/2

Structure

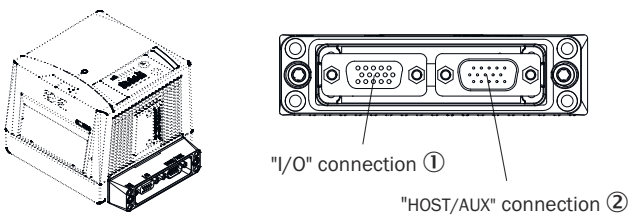

Figure 29: View of cloning plug A (D-Sub), part no. 2062450

① "I/O" connection
② “Host/AUX” connection

a) "I/O" connection

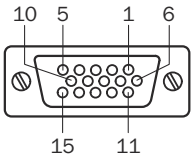

Figure 30: Female connector, D-Sub-HD, 15-pin

Table 9: Cloning plug A (D-Sub): pin assignment for "I/O" connection

Pin	Signal	Function
1	V_S [1)]	Supply voltage, max. input current 1 A
2	Sensor 3 (IN 1 [2)])	Digital input 3
3	Sensor 1 (sensor [2)])	Digital input 1
4	Result 1	Digital output 1
5	GND [3)]	Ground
6	Sensor 2 (IN 0 [2)])	Digital input 2
7	Sensor 4 (IN 2 [2)])	Digital input 4
8	Result 2	Digital output 2
9	SensGND	Digital input ground
10	Result 3	Digital output 3
11	Sensor 5 (IN 3 [2)])	Digital input 5
12	Sensor 6 (IN 4 [2)])	Digital input 6
13	–	Reserved [4)]
14	–	Reserved [4)]
15	Result 4	Digital output 4

1) Pin 1, female connector connected to pin 1, male connector (D-Sub).
2) Signal designations of the predecessor models CLV49x, CLV480, CLX480.
3) Pin 5, female connector connected to pin 5, male connector (D-Sub).
4) Do not use!

b) "Host/AUX" connection

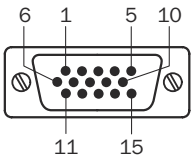

Figure 31: Male connector, D-Sub-HD, 15-pin

Table 10: Cloning plug A (D-Sub), pin assignment “Host/AUX” connection

Pin	Signal	Function
1	V_S [1)]	Supply voltage, max. output current 1 A
2	RxD (RS-232), Aux	AUX interface (receiver)
3	TxD (RS-232), Aux	AUX interface (sender)
4	Term (RS-422/485), Host	Termination of RS-422/485
5	GND [2)]	Ground
6	RD+ (RS-422/485), host	Host interface (receiver+)
7	RD– (RS-422/485), host RxD (RS-232), host	Host interface (receiver–)

Pin	Signal	Function
8	TD+ (RS-422/485), host	Host interface (sender+)
9	TD– (RS-422/485), host TxD (RS-232), host	Host interface (sender-)
10	CAN1_H	CAN bus 1 High (IN/OUT)
11	–	Reserved [3]
12	CAN2_H	CAN bus 2 High (IN/OUT)
13	CAN2_L	CAN bus 2 Low (IN/OUT)
14	CAN_GND	Ground of CAN bus
15	CAN1_L	CAN bus 1 Low (IN/OUT)

1) Pin 1, male connector connect to pin 1, female connector (D-Sub).
2) Pin 5, male connector connected to pin 5, female connector (D-Sub).
3) Do not use!

Dimensional drawings

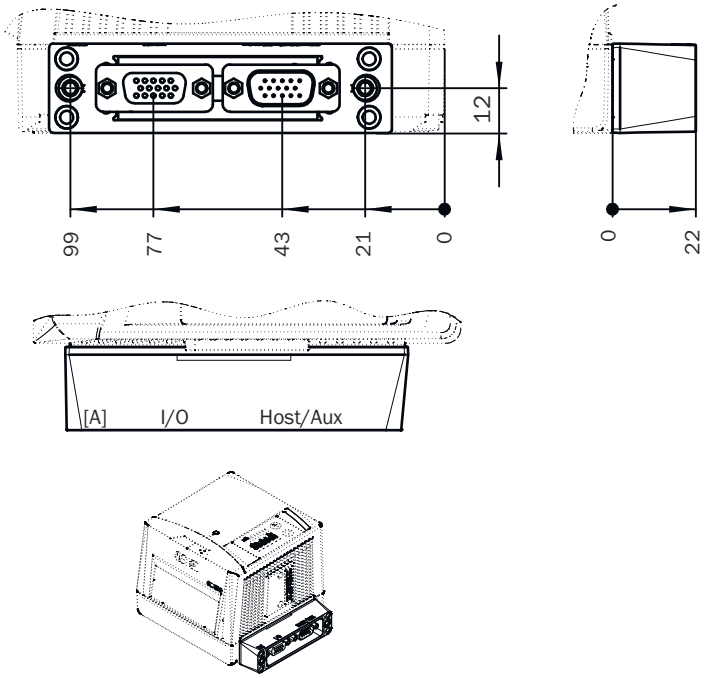

Figure 32: Dimensions of cloning plug A (D-Sub), all dimensions in mm

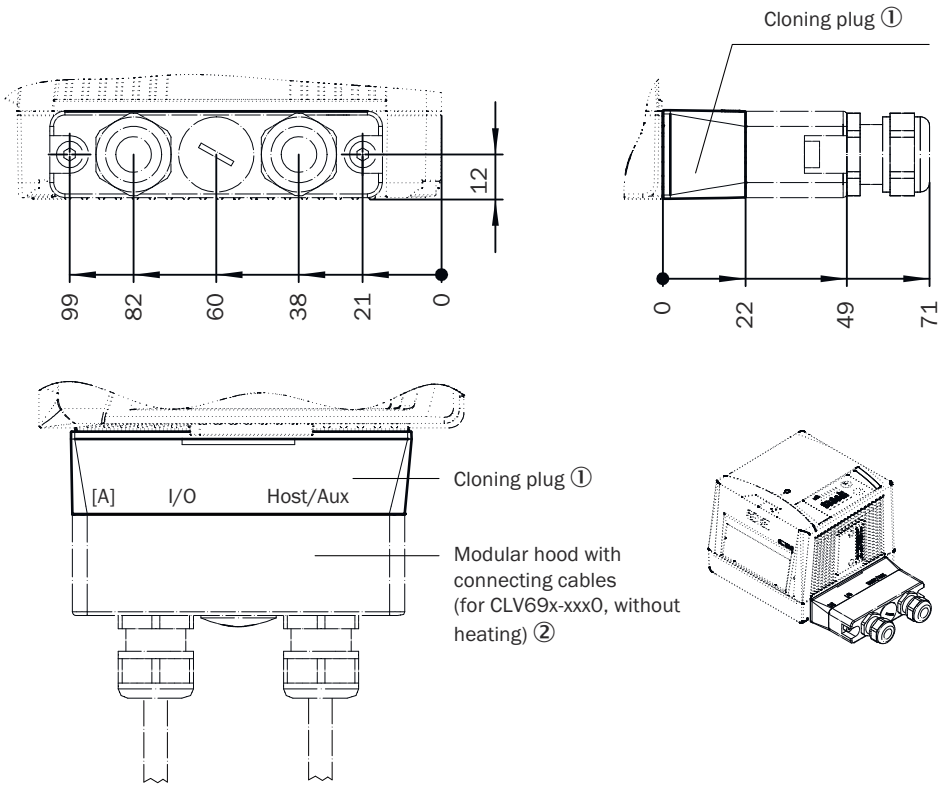

Figure 33: Dimensions of cloning plug A (D-Sub), with the hood of a connecting cable. All dimensions in mm.

① Cloning plug

② Hood with connecting cables (for CLV69x-xxx0, without heating)

6.4.1.2 Cloning plug B (M12): Power, Ethernet, Serial Data, I/O, CAN 1

Structure

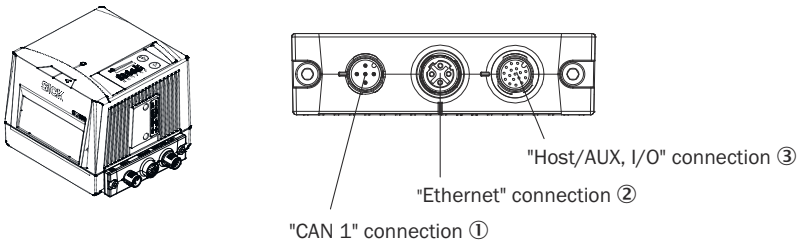

Figure 34: View of cloning plug B (M12), part no. 2062452

① Connection “CAN 1”

② “Ethernet” connection

③ “Host/AUX, I/O” connection

a) “CAN 1” connection

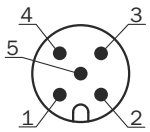

Figure 35: Male connector, M12, 5-pin, A-coded

Table 11: Cloning plug B (M12), pin assignment of “CAN 1” connection

Pin	Signal	Function
1	Shield	Shielding
2	V_S [1) 2)]	Supply voltage, max. input current 4 A
3	GND	Ground
4	CAN1_H	CAN bus 1 High (IN/OUT)
5	CAN1_L	CAN bus 1 Low (IN/OUT)

1) CLV69x-xxx0 (without heating): This contact or the corresponding contact of the “Host/AUX, I/O” connection is suitable for connecting the supply voltage.
2) CLV69x-xxx1 (with heating): Only this contact is suitable for connecting the supply voltage!

b) “Ethernet” connection

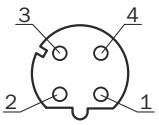

Figure 36: Female connector, M12, 4-pin, D-coded

Table 12: Cloning plug B (M12), pin assignment of “Ethernet” connection

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

c) “Host/AUX, I/O” connection

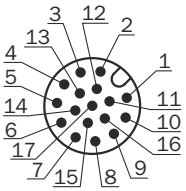

Figure 37: Male connector, M12, 17-pin, A-coded

Table 13: Cloning plug B (M12), pin assignment for “Host/AUX, I/O” connection

Pin	Signal	Function
1	GND	Ground
2	V_S [1)]	Supply voltage, max. input current 1.5 A
3	CAN1_L	CAN bus 1 Low (IN/OUT)
4	CAN1_H	CAN bus 1 High (IN/OUT)
5	TD+ (RS-422/485), host	Host interface (sender+)
6	TD– (RS-422/485), host TxD (RS-232), host	Host interface (sender-)
7	TxD (RS-232), Aux	AUX interface (sender)
8	RxD (RS-232), Aux	AUX interface (receiver)
9	SensGND	Digital input ground
10	Sensor 1	Digital input 1
11	RD+ (RS-422/485), host	Host interface (receiver+)

Pin	Signal	Function
12	RD– (RS-422/485), host RxD (RS-232), host	Host interface (receiver–)
13	Result 1	Digital output 1
14	Result 2	Digital output 2
15	Sensor 2	Digital input 2
16	Result 3	Digital output 3
17	Result 4	Digital output 4

1) CLV69x-xxx0 (without heating): This contact or the corresponding contact of the “CAN 1” connection is suitable for connecting the supply voltage.

Dimensional drawing

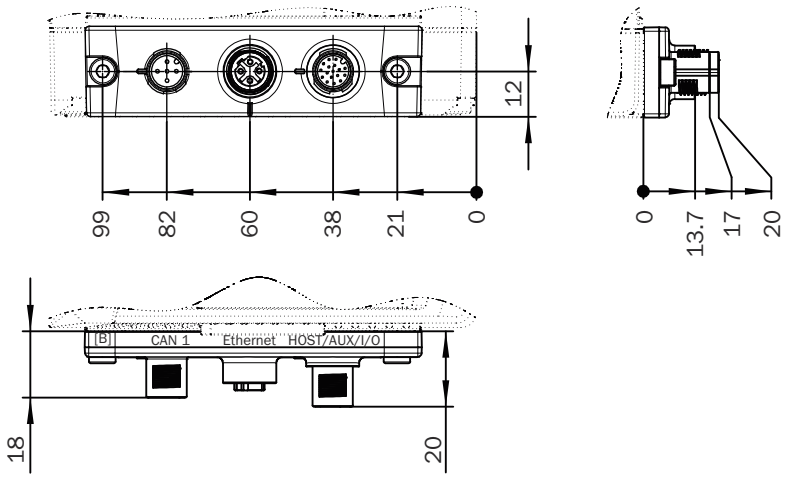

Figure 38: Dimensions of cloning plug B (M12), all dimensions in mm

6.4.1.3 Cloning plug C (M12): Power, Serial AUX, I/O, CAN 1

Structure

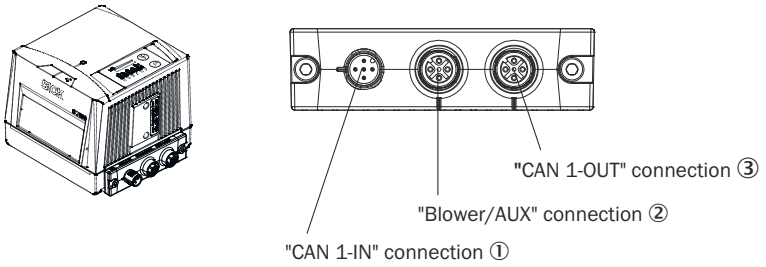

Figure 39: View of cloning plug C (M12), part no. 2062453

① “CAN 1-IN” connection
② “Blower/AUX” connection
③ “CAN 1-OUT” connection

a) “CAN 1-IN” connection

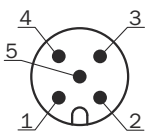

Figure 40: Male connector, M12, 5-pin, A-coded

Table 14: Cloning plug C (M12), pin assignment for “CAN 1-IN” connection

Pin	Signal	Function
1	Shield	Shielding
2	V_S	Supply voltage, max. input current 4 A
3	GND	Ground
4	CAN1_H	CAN bus 1 High (IN/OUT)
5	CAN1_L	CAN bus 1 Low (IN/OUT)

b) “Blower/AUX” connection

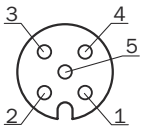

Figure 41: Female connector, M12, 5-pin, A-coded

Table 15: Cloning plug C (M12), pin assignment of “Blower/AUX” connection

Pin	Signal	Function
1	RxD (RS-232), Aux	Receiver
2	V_S OUT	Supply voltage, max. output current 4 A
3	TxD (RS-232), Aux	Sender
4	GND	Ground
5	Sensor 4 (IN 2 [1)])	Digital input 4

1) Pin assignment for CLV480/490 / CLX490.

c) "CAN 1-OUT" connection

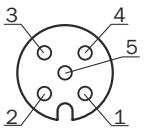

Figure 42: Female connector, M12, 5-pin, A-coded

Table 16: Cloning plug C (M12), pin assignment for “CAN 1-OUT” connection

Pin	Signal	Function
1	Shield	Shielding
2	V_S	Supply voltage, max. output current 4 A
3	GND	Ground
4	CAN1_H	CAN bus 1 High (IN/OUT)
5	CAN1_L	CAN bus 1 Low (IN/OUT)

Dimensional drawing

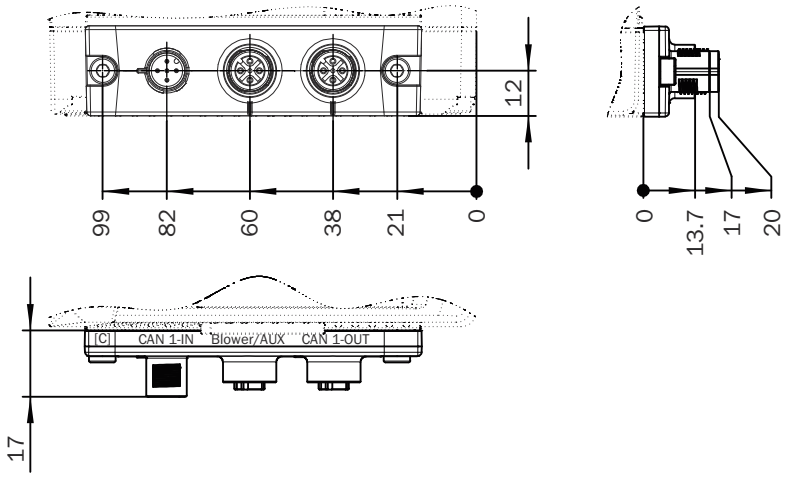

Figure 43: Dimensions of cloning plug C (M12), all dimensions in mm

6.4.1.4 Cloning plug D (M12): Power, Serial AUX, I/O, CAN 1/2

Structure

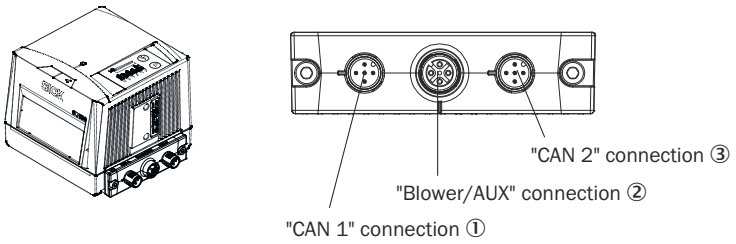

Figure 44: View of cloning plug D (M12), part no. 2062454

① Connection “CAN 1”
② “Blower/AUX” connection
③ “CAN 2” connection

a) “CAN 1” connection

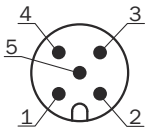

Figure 45: Male connector, M12, 5-pin, A-coded

Table 17: Cloning plug D (M12), pin assignment of “CAN 1” connection

Pin	Signal	Function
1	Shield	Shielding
2	V_S 1	Supply voltage 1, max. input current 4 A
3	GND	Ground
4	CAN1_H	CAN bus 1 High (IN/OUT)
5	CAN1_L	CAN bus 1 Low (IN/OUT)

b) “Blower/AUX” connection

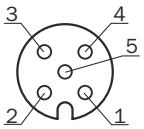

Figure 46: Female connector, M12, 5-pin, A-coded

Table 18: Cloning plug D (M12), pin assignment of "Blower/AUX" connection

Pin	Signal	Function
1	RxD (RS-232), Aux	Receiver
2	V_S OUT fan	Supply voltage for fan, max. output current = 2 x LPS
3	TxD (RS-232), Aux	Sender
4	GND	Ground
5	Sensor 4 (IN [1])	Digital input 4

[1] Pin assignment for CLV480/490 / CLX490

c) “CAN 2” connection

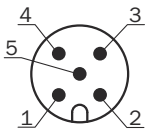

Figure 47: Male connector, M12, 5-pin, A-coded

Table 19: Cloning plug D (M12), pin assignment of “CAN 2” connection

Pin	Signal	Function
1	Shield	Shielding
2	V_S 2	Supply voltage 2, max. input current 4 A
3	GND	Ground
4	CAN2_H	CAN bus 2 High (IN/OUT)
5	CAN2_L	CAN bus 2 Low (IN/OUT)

Dimensional drawing

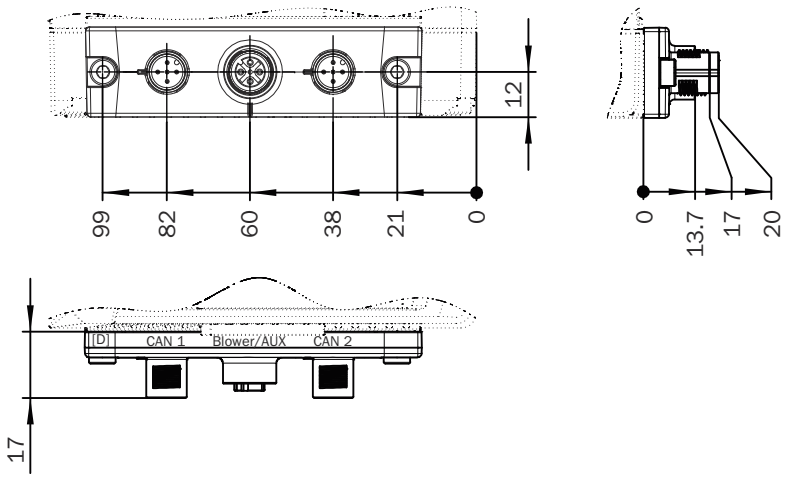

Figure 48: Dimensions of cloning plug D (M12), all dimensions in mm

6.4.1.5 Cloning plug E (M12): Power, Ethernet, CAN 1

Structure

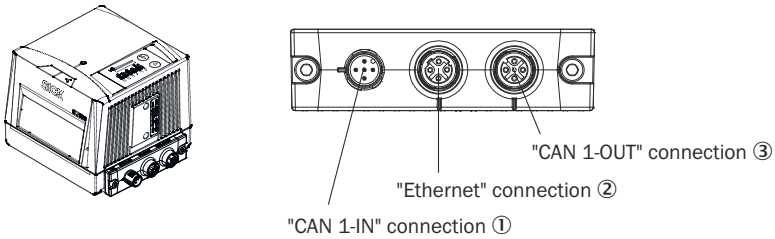

Figure 49: View of cloning plug E (M12), part no. 2074708

① “CAN 1-IN” connection
② “Ethernet” connection
③ “CAN 1-OUT” connection

a) “CAN 1-IN” connection

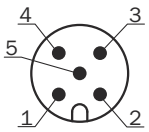

Figure 50: Male connector, M12, 5-pin, A-coded

Table 20: Cloning plug E (M12), pin assignment for "CAN 1-IN" connection

Pin	Signal	Function
1	Shield	Shielding
2	V_S	Supply voltage, max. input current 4 A
3	GND	Ground
4	CAN1_H	CAN bus 1 High (IN/OUT)
5	CAN1_L	CAN bus 1 Low (IN/OUT)

b) “Ethernet” connection

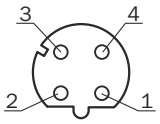

Figure 51: Female connector, M12, 4-pin, D-coded

Table 21: Cloning plug E (M12), pin assignment of “Ethernet” connection

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

c) "CAN 1-OUT" connection

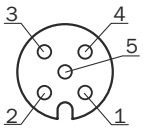

Figure 52: Female connector, M12, 5-pin, A-coded

Table 22: Cloning plug E (M12), pin assignment for "CAN 1-OUT" connection

Pin	Signal	Function
1	Shield	Shielding
2	V_S	Supply voltage 2, max. output current 4 A
3	GND	Ground
4	CAN1_H	CAN bus 1 High (IN/OUT)
5	CAN1_L	CAN bus 1 Low (IN/OUT)

Dimensional drawing

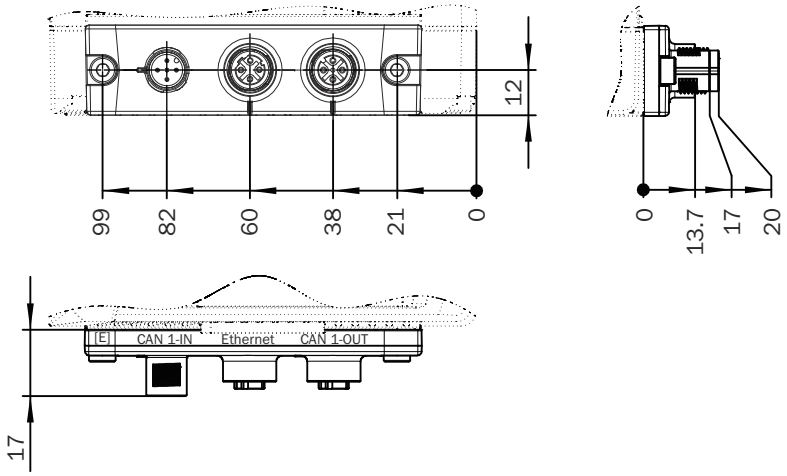

Figure 53: Dimensions of cloning plug E (M12), all dimensions in mm

6.4.1.6 Cloning plug F (M12): Power, CAN 1, Ethernet, CAN 2

Structure

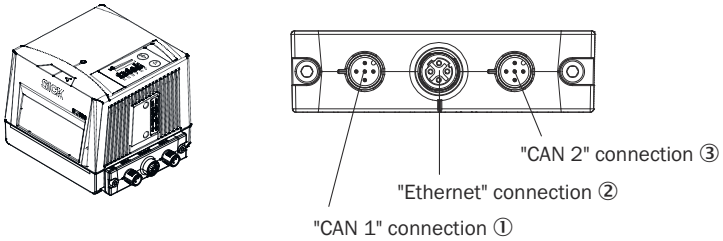

Figure 54: View of cloning plug F (M12), part no. 2074710

① Connection “CAN 1”
② “Ethernet” connection
③ “CAN 2” connection

a) “CAN 1” connection

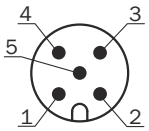

Figure 55: Male connector, M12, 5-pin, A-coded

Table 23: Cloning plug F (M12), pin assignment of “CAN 1” connection

Pin	Signal	Function
1	Shield	Shielding
2	V_S 1	Supply voltage 1, max. input current 4 A
3	GND	Ground
4	CAN1_H	CAN bus 1 High (IN/OUT)
5	CAN1_L	CAN bus 1 Low (IN/OUT)

b) “Ethernet” connection

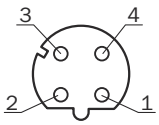

Figure 56: Female connector, M12, 4-pin, D-coded

Table 24: Cloning plug F (M12), pin assignment of “Ethernet” connection

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

c) “CAN 2” connection

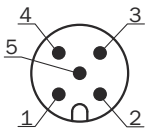

Figure 57: Male connector, M12, 5-pin, A-coded

Table 25: Cloning plug F (M12), pin assignment of “CAN 2” connection

Pin	Signal	Function
1	Shield	Shielding
2	V_S 2	Supply voltage 2, max. input current 4 A
3	GND	Ground
4	CAN2_H	CAN bus 2 High (IN/OUT)
5	CAN2_L	CAN bus 2 Low (IN/OUT)

Dimensional drawing

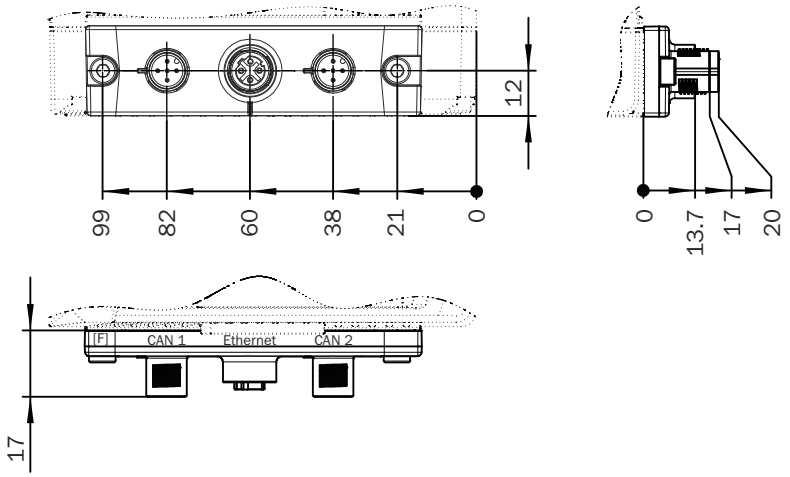

Figure 58: Dimensions of cloning plug F (M12), all dimensions in mm

6.5 Connection diagrams

CDB650-204 connection module

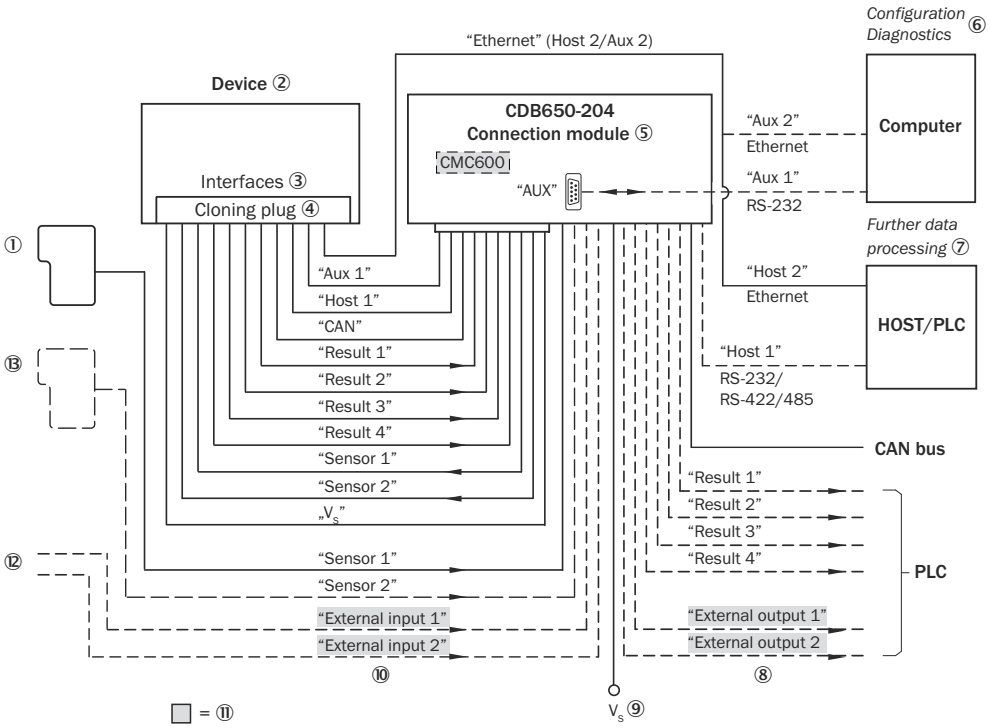

Figure 59: Connection of the device to the CDB650-204 connection module

① Trigger sensor for start/stop read cycle (for example a photoelectric retro-reflective sensor)
② Device: CLV69x-xxx0 (without heating) or CLV69x-xxx1 (with heating)
③ Interfaces
④ Cloning plug B (part no. 2062452)
⑤ Connection modules
⑥ Configuration or diagnostics
⑦ Data further processing
⑧ External digital outputs
⑨ Supply voltage V_S
⑩ External digital inputs
⑪ The optional CMC600 parameter cloning module is required in order to use the additional external digital inputs and outputs of the device (highlighted in gray).
⑫ Other functions
⑬ Application-dependent alternative stop reading cycle (e.g. photoelectric sensor) or travel increment (incremental encoder)

CDM420-0006 connection module

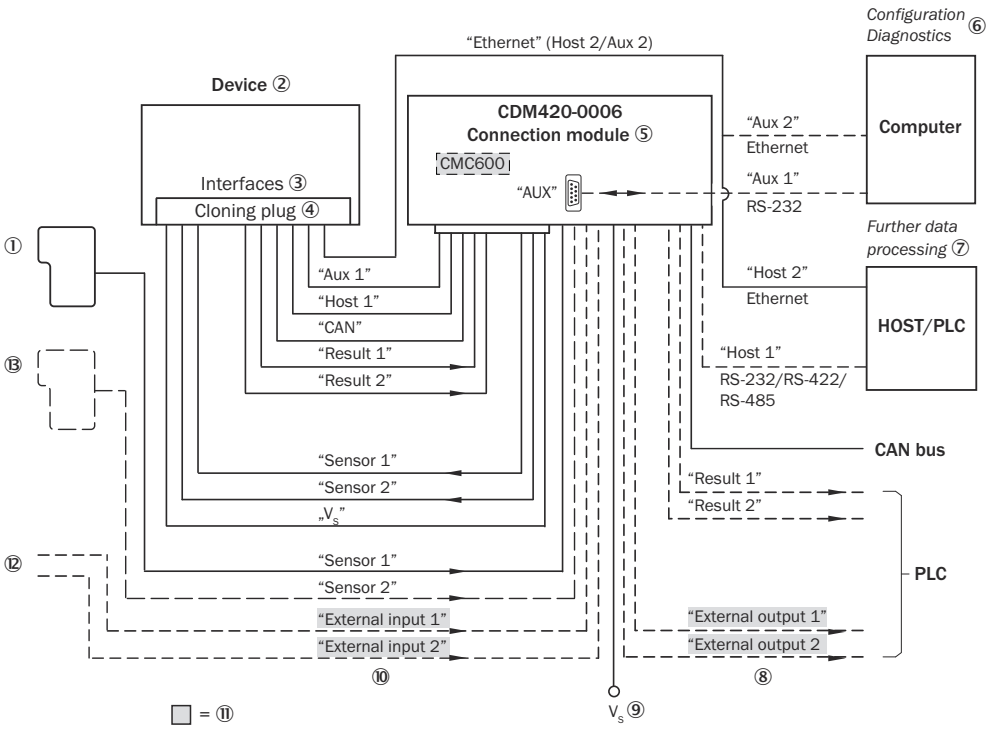

Figure 60: Connection of the device to the CDM420-0006 connection module

① Trigger sensor for start/stop read cycle (for example a photoelectric retro-reflective sensor)
② Device: CLV69x-xxx0 (without heating) or CLV69x-xxx1 (with heating)
③ Interfaces
④ Cloning plug B (part no. 2062452)
⑤ Connection modules
⑥ Configuration or diagnostics
⑦ Data further processing
⑧ External digital outputs
⑨ Supply voltage V_S
⑩ External digital inputs
⑪ The optional CMC600 parameter cloning module is required in order to use the additional external digital inputs and outputs of the device (highlighted in gray).
⑫ Other functions
⑬ Application-dependent alternative stop reading cycle (e.g. photoelectric sensor) or travel increment (incremental encoder)

CDM490-0001 connection module

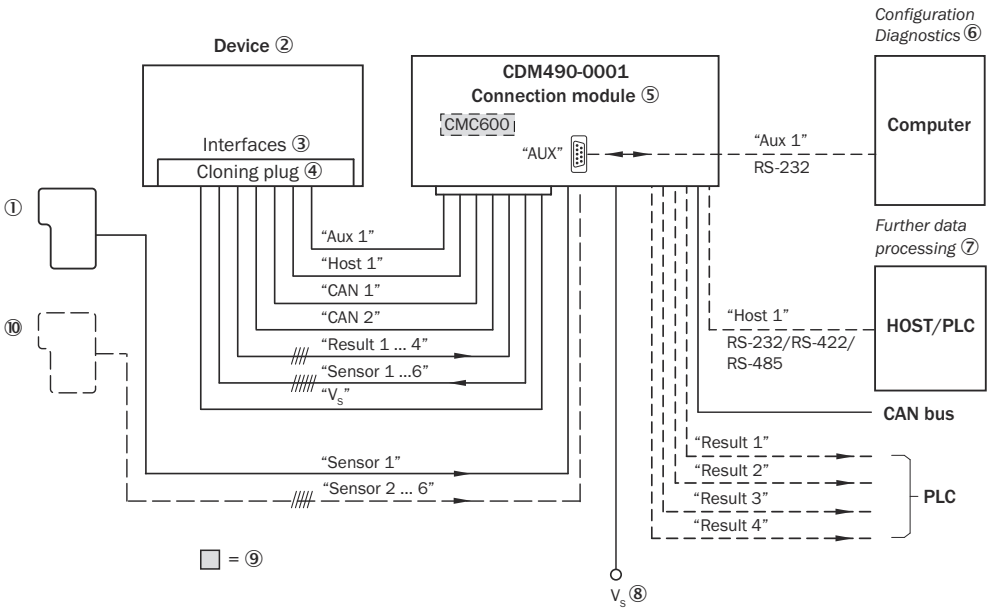

Figure 61: Connection of the device to the CDM490-0001 connection module

① External trigger sensor, e.g., for read cycle generation
② Device: CLV69x-xxx0 (without heating) or CLV69x-xxx1 (with heating)
③ Interfaces
④ Cloning plug A (part no. 2062450)
⑤ Connection modules
⑥ Configuration or diagnostics
⑦ Data further processing
⑧ Supply voltage V_S
⑨ The optional CMC600 parameter cloning module (highlighted in gray) is required for additional, external storage of the device parameters.
⑩ Application-dependent alternative stop read cycle (e.g., photoelectric sensor) or travel increment (incremental encoder)

6.6 Wiring interfaces

6.6.1 Connecting the supply voltage

Connecting supply voltage to devices without heating

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
- The voltage supply must meet the requirements of ES1 (EN 62368-1).
- Supply voltage 24 V DC ± 20%
- The electricity source must be able to release 144 W power or a maximum of 6 A for a short time. The switching on current of the device is a maximum of 5.5 A for 1 to 2 ms (depending on the length of the supply cable).
- When using the optional CMC600 parameter cloning module in the connection module: Additional output power 0.5 W
- An increased power-up delay may cause a drop in the supply voltage (24 V DC) when the device is started. Increased start-up currents may be up to 20 times the currents in the stable device state over a maximum period of 10 ms. If the supply voltage falls below a certain point, problems can occur when starting or booting the device. To prevent this, SICK recommend the use of the following power supply units:
  - PULS PISA11.CLASS2
  - Murrelektronik MICO 2.4
  - Devices with corresponding specification

Connecting supply voltage to devices with integrated heating

NOTE

Connect the supply voltage for devices with integrated heating only via the “CAN 1” connection (male connector, M12, 5-pin, A-coded) of the cloning plug.

Observe the commissioning steps for devices with integrated heating.

NOTE

When connecting to the supply voltage, no other external components may be connected to the cloning plug (e.g. fan, computer via serial interface).

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
- The voltage supply must meet the requirements of ES1 (EN 62368-1).
- Supply voltage 21.6 V DC ... 28.8 V DC
- The electricity source must be able to release 144 W power or a maximum of 6 A for a short time. The switching on current of the device is a maximum of 5.5 A for 1 to 2 ms (depending on the length of the supply cable).
- Additional 0.5 W output power when using the optional CMC600 parameter cloning module in the corresponding connection modules

1. Connect supply voltage at the “CAN 1” connection (male connector, M12, 5-pin, A-coded) of the cloning plug with suitable cable, e.g. part no. 6053224, 5 m. Pin and wire color assignment: V_S = red (1), GND =blue (2), shield = gray (3).
2. Switch on the supply voltage and check the device start-up: Device in operation? A successfully passed test (Status LEDs light up, mirror wheel activates) will confirm that the supply line is connected correctly, and the GND wire in particular.
3. Connect connecting cables to external components (e.g. fan, computer via serial interface, Ethernet) at the cloning plug.

Wiring with SICK connection module

Feeding supply voltage for the device with cloning plug B, M12 (part no. 2062452) via a connection module:

Connection modules	Interface	Reference
CDB650-204	Supply voltage	see "Connecting supply voltage for the device in CDB650-204", page 144
CDM420-0006	Supply voltage	see "Connecting supply voltage for the device in CDM420-0006", page 161

NOTE

For further connection modules see

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

Supply voltage for the device with cloning plug A, D-Sub (part no. 2062450) via a connection module:

Connection modules	Interface	Reference
CDM490-0001	Supply voltage	see "Connecting supply voltage for the device in CDM490-0001", page 178

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 Ethernet interface: Device with cloning plug B, M12 (part no. 2062452)

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

NOTE

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

Wiring the serial data interface

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

Table 26: 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
RS-422/485 (Host) [1]	Up to 38.4 kBd 38.4 kBd ... 57.6 kBd	Max. 1,200 m Max. 500 m

[1] For RS-422/485-suitable cable and corresponding cable termination as per specification.

NOTICE

Risk of damage to the internal interface modules!

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

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

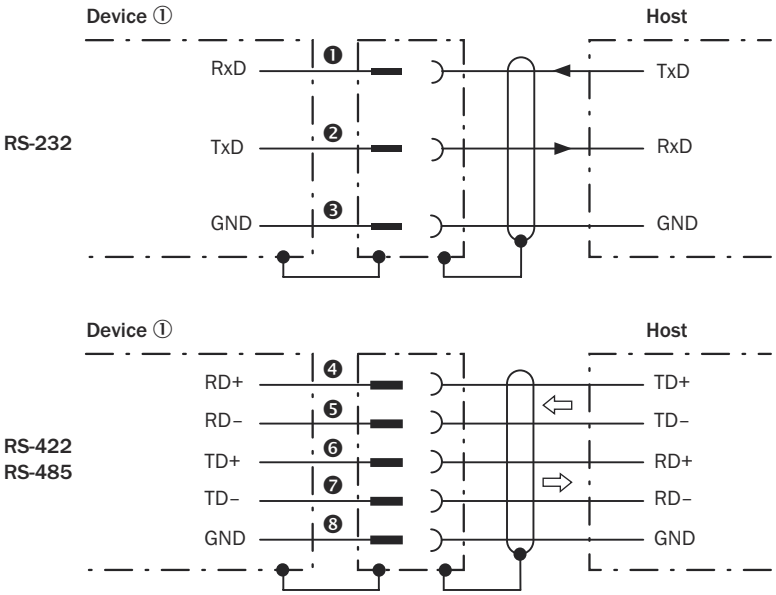

Figure 62: Internal circuitry for data interfaces: RS-232 and RS-422/485

① Device

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

❹...❽ Pin assignment: See RS-422/485 pin assignment for the respective device

Termination of the RS-422/485 data interface

The data interface can be terminated in the connection module via switches.

Additional information on this, specific to the connection module type, can be found in the appendix of this operating manual.

NOTE

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

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

Connection modules	Data interface	Reference
CDB650-204	RS-232	see "Wiring serial host interface RS-232 of the device in CDB650-204", page 145
	RS-422	see "Wiring serial host interface RS-422 of the device in CDB650-204", page 146
	RS-485	see "Wiring serial host interface RS-485 of the device in CDB650-204", page 147
CDM420-0006	RS-232	see "Wiring serial host interface RS-232 of the device in the CDM420-0006", page 162
	RS-422	see "Wiring serial host interface RS-422 of the device in the CDM420-0006", page 163
	RS-485	see "Wiring serial host interface RS-485 of the device in the CDM420-0006", page 164

NOTE

For further connection modules see

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

Connection modules	Data interface	Reference
CDM490-0001	RS-232	see "Wiring serial host interface RS-232 of the device in CDM490-0001", page 179
	RS-422	see "Wiring serial host interface RS-422 of the device in CDM490-0001", page 179
	RS-485	see "Wiring serial host interface RS-485 of the device in CDM490-0001", page 180

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.

Wire the CAN interface of the device with cloning plug B, M12, (part no. 2062452) via a connection module:

Connection modules	Interface	Reference
CDB650-204	CAN	see "Wiring the CAN interface of the device in the CDB650-204", page 148
CDM420-0006	CAN	see "Wiring the CAN interface of the device in the CDM420-0006", page 165

NOTE

For further connection modules see

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

Wire the CAN interface of the device with cloning plug A, D-Sub (part no. 2062450) via a connection module:

Connection modules	Interface	Reference
CDM490-0001	CAN	see "Wiring the CAN interface 1 of the device in the CDM490-0001", page 181

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 27: 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.

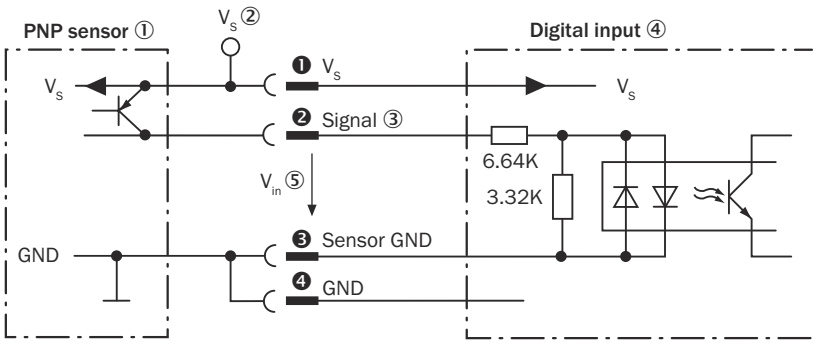

Figure 63: Wiring of a digital input on the device with external PNP sensor

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 CDB650-204 and CDM420-0006 connection module.

External digital inputs are not included in the CDM490-0001 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:

Device with cloning plug B, M12 (article no. 2062452)

Connection modules	Digital inputs	Reference
CDB650-204	“SENS/IN 1” ”SENS/IN 2”	see "Wiring digital inputs of the device in the CDB650-204", page 150
	External input 1 (“EXT. IN 1”) External input 2 (“EXT. IN 2”	see "Wiring the external digital inputs of the device in the CDB650-204", page 152
CMD420-0006	“Sensor 1” “Sensor 2“	see "Wiring digital inputs of the device in the CDM420-0006", page 167
	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 169

NOTE

For further connection modules see

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

Device with cloning plug A, D-Sub (part no. 2062450)

Connection modules	Digital inputs	Reference
CMD490-0001	“Sensor 1” ... “Sensor 6”	see "Wiring digital inputs of the device in the CDM490-0001", page 183

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:

Physical digital outputs are available at the connections. The number of them varies depending on the device, see "Pin assignments for electrical connections", page 45.

Table 28: 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.

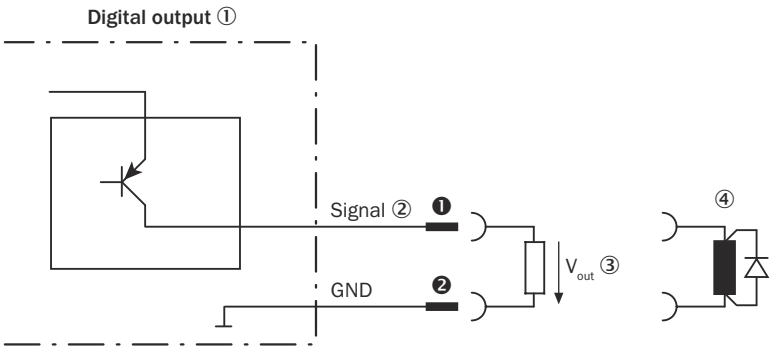

Figure 64: Wiring a digital output on the device

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 CDB650-204 and CDM420-0006 connection module.

External digital outputs are not included in the CDM490-0001 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:

Device with cloning plug B, M12 (article no. 2062452)

Connection modules	Digital outputs	Reference
CDB650-204	"Result 1" "Result 2"	see "Wiring digital outputs of the device in the CDB650-204", page 154
	External output 1 (“RES/OUT 1”) External output 2 (“RES/OUT 2”)	see "Wiring the external digital outputs of the device in the CDB650-204", page 155
CMD420-0006	“Result 1” “Result 2”	see "Wiring digital outputs of the device in the CDM420-0006", page 171
	External output 1 (“Aux Out 1") External output 2 (“Aux Out 2”)	see "Wiring the external digital outputs of the device in the CDM420-0006", page 172

NOTE

For further connection modules see

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

Device with cloning plug A, D-Sub (part no. 2062450)

Connection modules	Digital outputs	Reference
CMD490-0001	“Result 1” ... “Result 4”	see "Wiring digital outputs of the device in the CDM490-0001", page 185

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 using the automatically launched wizard.
   To do so, select the device under the devices available depending on the connected communication interface, e.g., Ethernet (default Ethernet address: IP address: 192.168.0.1, subnet mask: 255.255.255.0, baud rate: 57600 for serial connection).

✓ 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 65, page 72).

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:

- Cloning plug on 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:

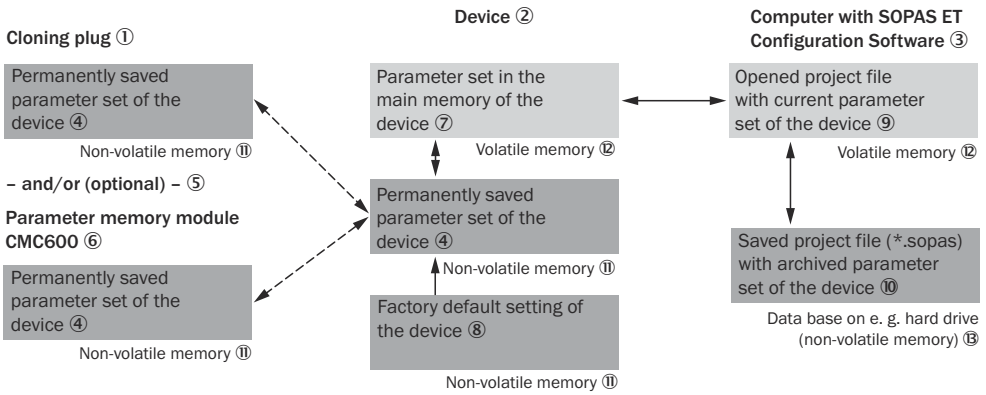

Figure 65: Configuration with SOPAS ET and saving the parameter set

① Cloning plug with external parameter memory
② Device
③ Computer with the SOPAS ET configuration software
④ Permanently saved device parameter set
⑤ And/or
⑥ Parameter cloning module CMC600, used here to expand the digital inputs and digital outputs.
⑦ Parameter set in the working memory of the device
⑧ Factory-set defaults for the device
⑨ Opened project file with current device parameter set
⑩ Saved project file with archived device parameter set
⑪ Nonvolatile memory
⑫ Volatile memory
⑬ Database on, for example, a hard drive (non-volatile memory)

Saving behavior using the “Permanent” saving option:

The device is equipped with a mandatory cloning plug. When the currently valid parameter set is saved in the device, this is also done permanently in the cloning plug.

The device is connected to a CDB or CDM connection module that 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, mount the previously used cloning plug on the exchange unit. At startup, the device adopts its current configuration data from the parameter memory of the cloning plug. If an optional CMC600 is also present in the CDB/CDM connection module, the exchange unit adopts the parameter set from the CMC600.

For more information, see "Device exchange with transmission of the current configuration data", page 82.

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 84.
5. Check the reading result with the SOPAS ET configuration software.
6. Place objects at different alignments (angles) in the reading field and ensure that the limit values for the permitted reading angles are not exceeded, see "Angular orientation of the device", page 29.
7. Align the device so that the good read rate is between 70% and 100%.
8. Tighten the screws on the device.

7.5 Fine adjustment and further configuration

NOTE
The additional settings 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.

Alignment aid

The **Adjustment mode** supports optimal placing of the center of the scan line on the object. To do this, the device hides half of the scan line.

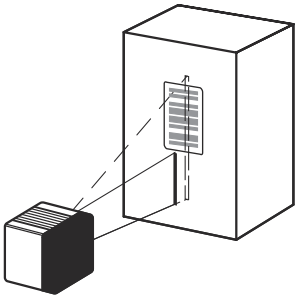

Figure 66: Appearance of the scan line in "Adjusting Mode"

This function is only available under **Adjustment mode** in **Quickstart** in the **Authorized client** user level.

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 1,200 Hz (Device tree > **Parameters** > **Read configuration**).

Focus setting

In the factory default setting, the device works with **auto focus**. Alternatively, the device can be operated in the modes **Dynamic Focus** and **Fixed Focus**: Device tree > **Parameters** > **Read configuration** > **Focus control**.

Ethernet interface

Use the Ethernet page to adjust the IP address and the subnet mask: Device tree > **Parameters** > **Network/Interfaces/IOs** > **Ethernet**.

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 Optical displays

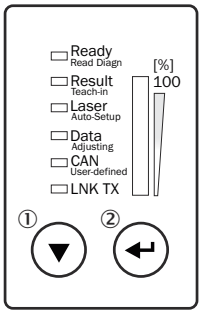

Figure 67: Display LEDs, bar graph display and operating keys on the CLV69x

① Arrow pushbutton

② Return pushbutton

Table 29: CLV69x: Display behavior of the LEDs in the first display level

Display	Color	Behavior LED	Device status
Ready	–	○	Device without supply voltage
After switching on supply voltage:			
Ready	Green	●	• After switching on: Self-test successful, device ready for operation • After successful parameter download or upload or successful firmware download: Device again ready for operation
	Red	●	Hardware or software error
Read operation:			
Laser	Green	●	Laser switched on
Result	Green	●	LED lights up briefly. Reading successful (Good Read)
Data transmission at the host interface:			
Data	Green	●	Data output via host interface
Data transmission at the CAN interface:			
CAN	Green	☼	Status of the internal termination of the cloning plug: All existing terminations are not active or not available
	Blue	☼	Status of the internal termination of the cloning plug: All existing terminations are active
	Violet	☼	Status of the internal termination of the cloning plug: Not all existing terminations are active
Data transmission at the Ethernet interface:			
LNK TX	Green	●	Physical Ethernet connection
	Green	☼	Data traffic via Ethernet

○ = LED off, ● = LED lit, ☼ = LED flashing.

Bar graph display 0 to 100%

In the “Percentage analysis” operating mode, the bar graph continuously shows the last recorded read rate in %. The percentage analysis is based on 100 readings. The bar graph display is deactivated in standard read mode.

Operating button and status displays on the second display level

The two ① and ② pushbuttons are used to manually call up device functions without using a computer. The selectable functions are signaled by the LEDs with the second display level. Currently, “Read Diagn (percentage evaluation) and “Adjusting” (adjustment aid) are available.

1. Press the Return pushbutton for approx. 2 seconds. The device switches to the operating mode of the pushbuttons. The “Ready” LED now lights up blue.
2. To select the desired function, press the arrow key repeatedly. The LED lights up blue.
3. Press the return key to confirm the selected function.
   The device starts the function. After 2 minutes, the device automatically returns to reading mode.
4. To abort the function manually, press the Return pushbutton again and hold for 2 seconds.

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 and the cloning plug. RS-232 or Ethernet, depending on the type.
- 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 30: 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 the mounting accessories and vibration dampers used.	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 type of material used for the viewing window can be found on the type label (see "Type code", page 13).

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.

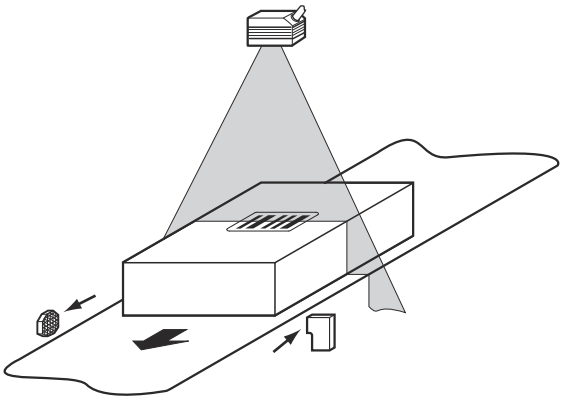

Figure 68: Cleaning the external optical sensors (read pulse encoder)

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 31: 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. ■ Incremental encoder incorrectly positioned
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 device LED on the housing (see "Optical displays", page 75) indicates the following states, among others :

- Operational readiness (Ready)
- Reading result status (Good Read or No Read)
- Hardware fault
- Firmware download status
- Connection status of the device

The LED display can indicate possible errors or faults. 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 82.

► 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 all connecting cables on 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.
5. Loosen the screws of the cloning plug. Remove the cloning plug.
6. Apply protective covering to the cloning plug.

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

1. Check that the replacement device of the same type (new or repaired device) is de-energized.
2. Insert the cloning plug of the defective device on the replacement device and screw it tight.
3. Mount and align the replacement device (see "Mounting", page 26). When doing so, note the previously applied markings on the bracket or surroundings (see "Disassembly", page 81).
4. Connect the connecting cables to the cloning plug of the replacement device.
5. Switch on the supply voltage for the device. The device starts with its previous settings (new device: defaults).
6. Depending on the selected configuration type, proceed as follows:
   - Local automated configuration via the cloning plug of the device: The replacement device automatically transfers the saved parameter set from the cloning plug into its permanent memory.
   - Local, manual configuration via SOPAS ET: Transfer the configuration stored on the computer as part of the backup concept to the device via download (serially or via Ethernet, depending on the type). Permanently save the configuration in the device.
   - Central configuration via GSD parameterization: When PROFINET is restarted, the PROFINET controller automatically parameterizes the device via the CDF600-22xx bus connection module.

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 32: Technical data features

		CLV690-0xxx / 1xxx Standard density	CLV691-0xxx / 1xxx Low Density	CLV692-0xxx / 1xxx High Density
Scanning methods		Line scanning		
Sensor type		Line scanner or line scanner with oscillating mirror, type-dependent, identifier see "Type code", page 13		
Oscillating mirror functions		Fixed (adjustable position), oscillating (variable or fixed amplitude), one-shot		
	Oscillation frequency:	0.5 Hz ... 4 Hz		
	Angle of deflection:	–20° ... 20° (adjustable using software)		
Orientation of viewing window	**Viewing window:**	Front or side [1) 2)], identifier see "Type code", page 13		
Aperture angle	**Front viewing window:**	≤ 60°		
	Side viewing window (oscillating mirror):	≤ 50°		
Optical focus	**Standard:**	Auto focus		
	Alternatively:	Dynamic focus setting of fixed focus		
Focus adjustment time		≤ 20 ms		
FocusTriggerSource		Data interface or digital inputs		
No. of distance configurations		≤ 8		
Code resolution		0.25 mm ... 1.0 mm	0.35 mm ... 1.2 mm	0.17 mm ... 0.4 mm
Reading distance		500 mm ... 2,100 mm	500 mm ... 2,200 mm	400 mm ... 1,600 mm
Reading ranges		see "Reading field diagrams (working ranges)", page 90		
Scanning frequency		400 Hz ... 1,200 Hz		
Light source		Laser LED, visible red light (660 nm)		

		CLV690-0xxx / 1xxx Standard density	CLV691-0xxx / 1xxx Low Density	CLV692-0xxx / 1xxx High Density
Light spot		Circular		
MTTF (laser diode)		40,000 hours at 25 °C		
MTBF		100000 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 = 3.2 mW maximum, P < 1.0 mW average		
Laser pulse duration		< 360 µs		

1) Side viewing window: Light emission at 105° relative to the longitudinal axis of the device.
2) see "Device view", page 15.

12.2 Performance

Table 33: Technical data for performance

	CLV690-0xxx / 1xxxx Standard Density	CLV691-0xxx / 1xxx Low Density	CLV692-0xxx / 1xxx High Density
Readable code structures	1D codes		
Bar code types	2/5 Interleaved, Codabar, Code 128, Code 39, Code 93, GS1-128 / EAN 128, UPC / GTIN / EAN		
Print ratio	2:1 ... 3:1		
No. of codes per scan	1 ... 20 (standard decoder) 1 ... 6 (SMART decoder)		
Number of codes per reading interval [1]	1 ... 50 (auto-discriminating)		
No. of characters per reading interval	5000		
Number of multiple readings	1 ... 100		

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

		CLV690-0xxx / 1xxx Standard density	CLV691-0xxx / 1xxx Low Density	CLV692-0xxx / 1xxx High Density
Serial (RS-232, RS-422/-485)		With cloning plug part no. 2062450 (A), 2062452 (B): Host, AUX With cloning plug part no. 2062453 (C) and 2062454 (D): AUX		
	Function:	Host (RS-232, RS-422/-485), AUX (RS-232)		
	Data transmission rate:	Host: 300 Bd ... 500 kBd, AUX: 57.6 kBd (RS-232)		
Ethernet		Only with cloning plug part no. 2062452 (B), 2074708 (E) and 2074710 (F)		
	Function:	Host, AUX		
	Data transmission rate:	10/100 Mbit/s		
	Protocols:	TCP/IP, EtherNet/IP, PROFINET Single Port or PROFINET Dual Port (optional via external fieldbus module CDF600-22xx)		
CAN bus	**Function:**	SICK CAN sensor network (master/slave, multiplexer/server)		
	Data transmission rate:	20 kbit/s ... 1 Mbit/s		
	Protocol:	CSN (SICK CAN sensor network)		
PROFIBUS		Optional via external fieldbus module CDF600-21xx		
DeviceNet		Optional via external connection module (CDM420 and CMF4xx)		
Digital inputs [1]		Cloning plug A (part no. 2062450): 6 x Cloning plug B (part no. 2062452): 2 x V_{in} = max. 30 V; I_{in} = max. 5 mA Opto-decoupled, reverse polarity protected, debounce time adjustable (0 ms ... 10,000 ms), default 10 ms		
Digital outputs [1]		Cloning plug A (part no. 2062450): 4 x Cloning plug B (part no. 2062452): 4 x V_{out} =V_S - 1.6 V; I_{out} ≤ 100 mA (typical) Short-circuit protected, temperature protected, not electrically isolated from the supply voltage		
Reading pulse	**Start:**	Digital input (type-dependent), fieldbus input (type-dependent), command, auto-pulse, CAN (type-dependent), free-running		
	Stop:	Read clock source, digital input (type-dependent), Command, Timer, Event (e.g. Good Read)		
Optical displays		6 x LED (Ready, Result, Laser, Data, CAN, LNK TX) Bar graph display for display of percentage read rate (10 x LED)		
Acoustic indicator		No display		
Control elements		2 pushbuttons		
Parameter memory		Contained in cloning plug. Alternatively also via an optional CMC600 parameter cloning module in the CDM/CDB connection module		

		CLV690-0xxx / 1xxx Standard density	CLV691-0xxx / 1xxx Low Density	CLV692-0xxx / 1xxx High Density
Configuration software		SOPAS ET		

1) Details, see "Overview of the pin allocation for the cloning plug", page 45 see table 8, page 45.

12.4 Mechanics/Electronics

Table 34: Technical data mechanics/electrics

		CLV690-0xxx / 1xxx Standard density	CLV691-0xxx / 1xxx Low Density	CLV692-0xxx / 1xxx High Density
Connection type	Plugs and sockets	60-pin system connector, for connection of a type-dependent cloning plug		
Supply voltage V_S		LPS (EN 60950-1) or NEC Class 2 or PS2 (EN 62368-1), SELV (EN 60950-1) or ES1 (EN 62368-1)		
	Device without heating (CLV69x-xxx0):	18 V DC ... 30 V DC (type-dependent), reverse polarity protected		
	Device with heating (CLV69x-xxx1):	21.6 V DC ... 28.8 V DC (type-dependent), reverse polarity protected		
Power consumption	**Device without heating (CLV69x-xxx0)**	I_{max} = 1 A: • Line scanner: Typ. 15 W • Line scanner with oscillating mirror: Typ. 17 W		
	Device with heating (CLV69x-xxx1)	I_{max} = 4 A: • Line scanner: Typ. 78 W • Line scanner with oscillating mirror: Typ. 80 W		
Housing		Aluminum die cast		
Housing color		Light blue (RAL 5012), black (RAL 9005)		
Window material of the viewing window		Glass (CLV69x-xx**0**x), optionally polycarbonate (CLV69x-xx**1**x)		
Threaded mounting hole		2 blind tapped hole M6, 7 mm deep		
Laserwarnschild		In combination with the type label, glued on		
Safety		EN 62368-1: 2014-08		
Enclosure rating		IP 65, in accordance with EN 60529: 1991-10; A1: 2002-02		
Protection class		 (Class 3) For operation in SELV systems (EN 60950-1) or ES1 systems (EN 62368-1)		
Weight	**Line scanner:**	1.5 kg		
	Line scanner with oscillating mirror:	2.2 kg		

		CLV690-0xxx / 1xxx Standard density	CLV691-0xxx / 1xxx Low Density	CLV692-0xxx / 1xxx High Density
Dimensions (L x W x H)	**Line scanner:**	117 mm x 117 mm x 94 mm		
	Line scanner with oscillating mirror:	182 mm x 128 mm x 97 mm		

1) For digital outputs without load.
2) **Prerequisites for complying with enclosure rating IP65:**
   - The cloning plug is plugged onto the device and fastened tight with both screws.
   - The cables plugged into the electrical M12 or D-Sub connections of the cloning plug (type-dependent) must be screwed on tightly.
   - Any unused electrical M12 connections of the cloning plug are closed with a protective element of the corresponding type (as in the delivery state).
3) With glass viewing window.
4) see "Dimensional drawings", page 89.

12.5 Ambient data

Table 35: Technical data for ambient data

	CLV690-0xxx / 1xxx Standard Density	CLV691-0xxx / 1xxx Low Density	CLV692-0xxx / 1xxx High Density
Electromagnetic compatibility (EMC)	Emitted interference: According to EN 61000-6-4: 2007-01 / A1: 2011-02 Shock resistance: According to 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	Device without heating (CLV69x-xxx**0**): 0 °C ... +40 °C Device with heating (CLV69x-xxx**1**): –35 °C ... +35 °C		
Storage temperature	–20 °C ... +70 °C		
Permissible relative humidity	0% ... 90%, non-condensing		
Ambient light immunity	2,000 lx, on bar code		
Bar code print contrast (PCS)	≥ 60 %		

12.6 Dimensional drawings

Front viewing window

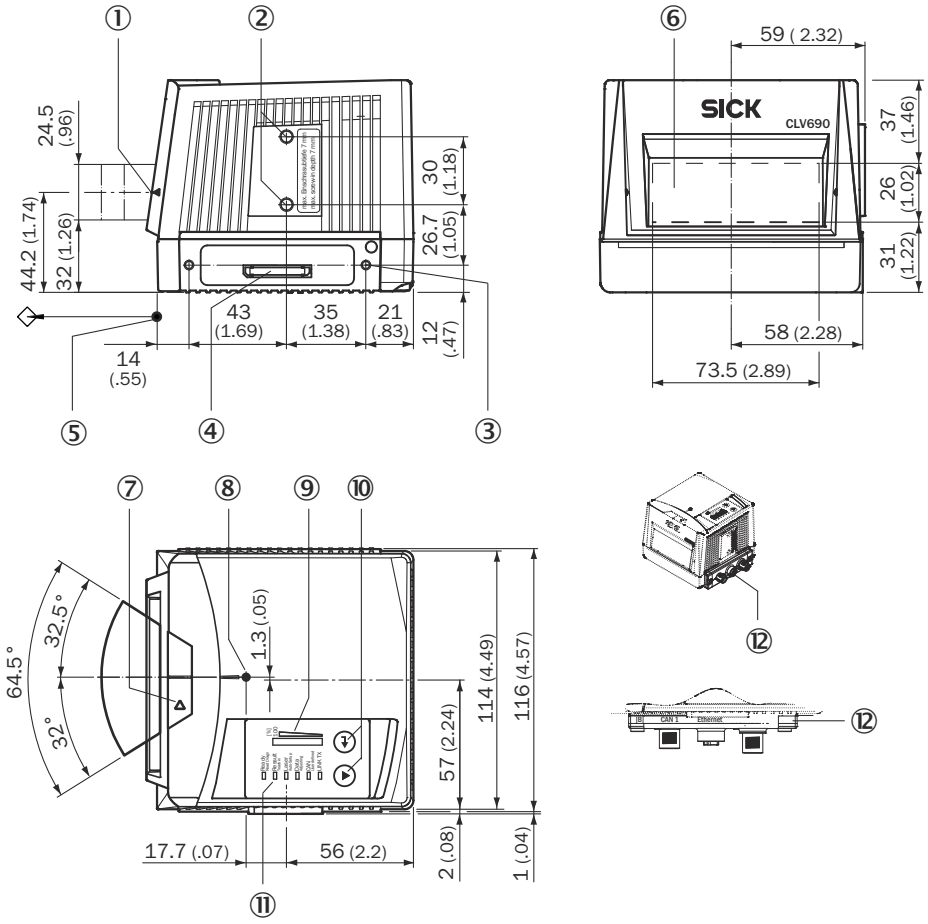

Figure 69: CLV69x with front viewing window and connection for cloning plug. structure and device dimensions, unit: mm (inch), decimal separator: period

① Mark for light emission plane
② M6 tapped blind hole, 7 mm deep (2 x), for mounting the device
③ M4 tapped blind hole, 10 mm deep (2 x), for mounting the cloning plug
④ System plug, 60-pin for connecting a cloning plug
⑤ Reference point for reading distance (housing edge) from device to object
⑥ Viewing window
⑦ Mark for the direction of rotation of the mirror wheel and counting direction of the read diagnostics date RA (Reading Angle)
⑧ Internal impact point: rotation point of the variable direction beam
⑨ Bar graph
⑩ Function button (2 x)
⑪ LED status indicator (6 x)
⑫ Example of mounted cloning plug

Side viewing window, oscillating mirror

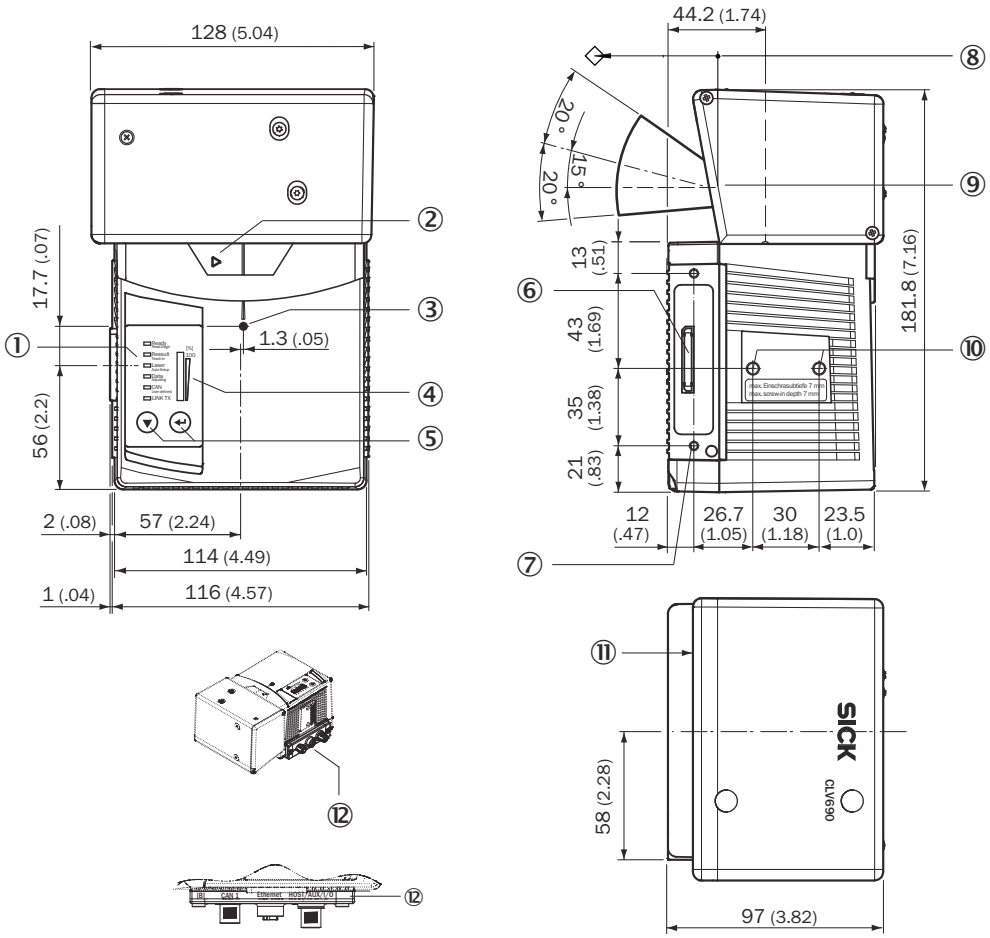

Figure 70: CLV69x with oscillating mirror (side viewing window) and connection for cloning plug. structure and device dimensions, unit: mm (inch), decimal separator: period

① LED status indicator (6 x)
② Mark for the direction of rotation of the mirror wheel and counting direction of the read diagnostics date RA (Reading Angle)
③ Internal impact point: rotation point of the variable direction beam
④ Bar graph
⑤ Function button (2 x)
⑥ Male connector, 60-pin for connecting a cloning plug
⑦ M4 tapped blind hole, 10 mm deep (2 x), for mounting the cloning plug
⑧ Reference point for reading distance (housing edge) from device to object
⑨ Perpendicular to the device longitudinal axis for oscillating mirror
⑩ M6 tapped blind hole, 7 mm deep (2 x), for mounting the device
⑪ Viewing window
⑫ Example of mounted cloning plug

12.7 Reading field diagrams (working ranges)

12.7.1 Reading conditions for specification diagrams

Properties	Value
Test code	Code 128
Scanning frequency	See characteristic curve fields for scanning frequencies

Properties	Value
Print ratio	2:1
Print contrast	> 90%
Tilt	±45°
Ambient light	< 2,000 lx
Good read rate	> 75%
Light spot	Circular
Window material of the viewing window	• Glass (CLV69x-xx**0**x) • Optional plastic (CLV69x-xx**1**x), see note in the caption of the reading field diagrams

NOTE
The reading distances are measured radially from the device.

12.7.2 Overview of reading field diagrams

Scanning procedure: line scanner

CLV69x-Type	Resolution	Diagram	Page
CLV690-0xxx	Standard Density	Reading field height/resolution over reading distance	page 92
		Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 40°	page 93
		Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 56°	page 95
		Min. and max. reading distance (DOF) for resolution 0.50 mm/aperture angle 40°	page 97
		Min. and max. reading distance (DOF) for resolution 0.50 mm/aperture angle 56°	page 99
		Scanning frequency characteristic curve	page 100
CLV691-0xxx	Low Density	Reading field height/tilt over reading distance for resolution 0.50 mm	page 111
		Min. and max. reading distance (DOF) for resolution 0.50 mm/aperture angle 40°	page 112
		Min. and max. reading distance (DOF) for resolution 0.50 mm/aperture angle 60°	page 114
		Scanning frequency characteristic curve	page 115
CLV692-0xxx	High Density	Reading field height/resolution over reading distance	page 119
		Min. and max. reading distance (DOF) for resolution 0.25 mm/aperture angle 40°	page 120
		Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 40°	page 122
		Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 56°	page 124
		Scanning frequency characteristic curve	page 125

Scanning procedure: line scanner with oscillating mirror

CLV69x-Type	Resolution	Diagram	Page
CLV690-1xxx	Standard Density	Reading field height/resolution over reading distance	page 101
		Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 40°	page 102
		Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 50°	page 104
		Min. and max. reading distance (DOF) for resolution 0.50 mm/aperture angle 40°	page 106
		Min. and max. reading distance (DOF) for resolution 0.50 mm/aperture angle 50°	page 108
		Scanning frequency characteristic curve	page 109
		Deflection width	page 110
CLV691-1xxx	Low Density	Reading field height/tilt over reading distance for resolution 0.50 mm	page 116
		Min. and max. reading distance (DOF) for resolution 0.50 mm/aperture angle 40°	page 112
		Min. and max. reading distance (DOF) for resolution 0.50 mm/aperture angle 60°	page 114
		Scanning frequency characteristic curve	page 117
		Deflection width	page 118

CLV69x-Type	Resolution	Diagram	Page
CLV692-1xxx	High Density	Reading field height/resolution over reading distance	page 126
		Min. and max. reading distance (DOF) for resolution 0.25 mm/aperture angle 40°	page 127
		Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 40°	page 129
		Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 50°	page 131
		Scanning frequency characteristic curve	page 132
		Deflection width	page 133

12.7.3 Standard Density: reading performance data, line scanner

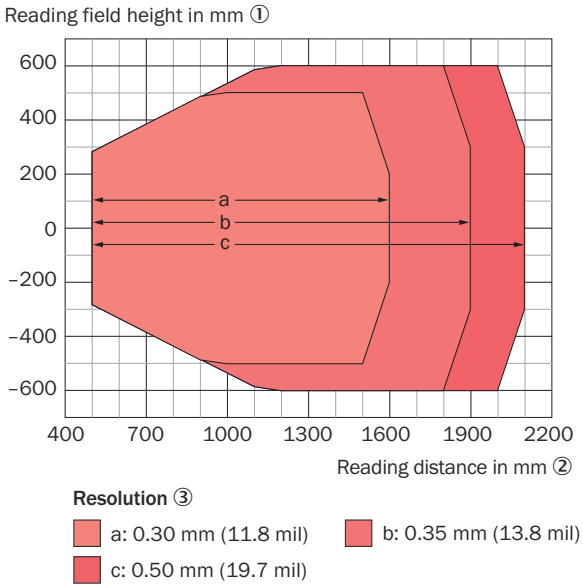

Figure 71: CLV690-0xxx (Standard Density): reading field height depending on the reading distance and resolution

① Reading field height in mm
② Reading distance in mm
③ Resolution

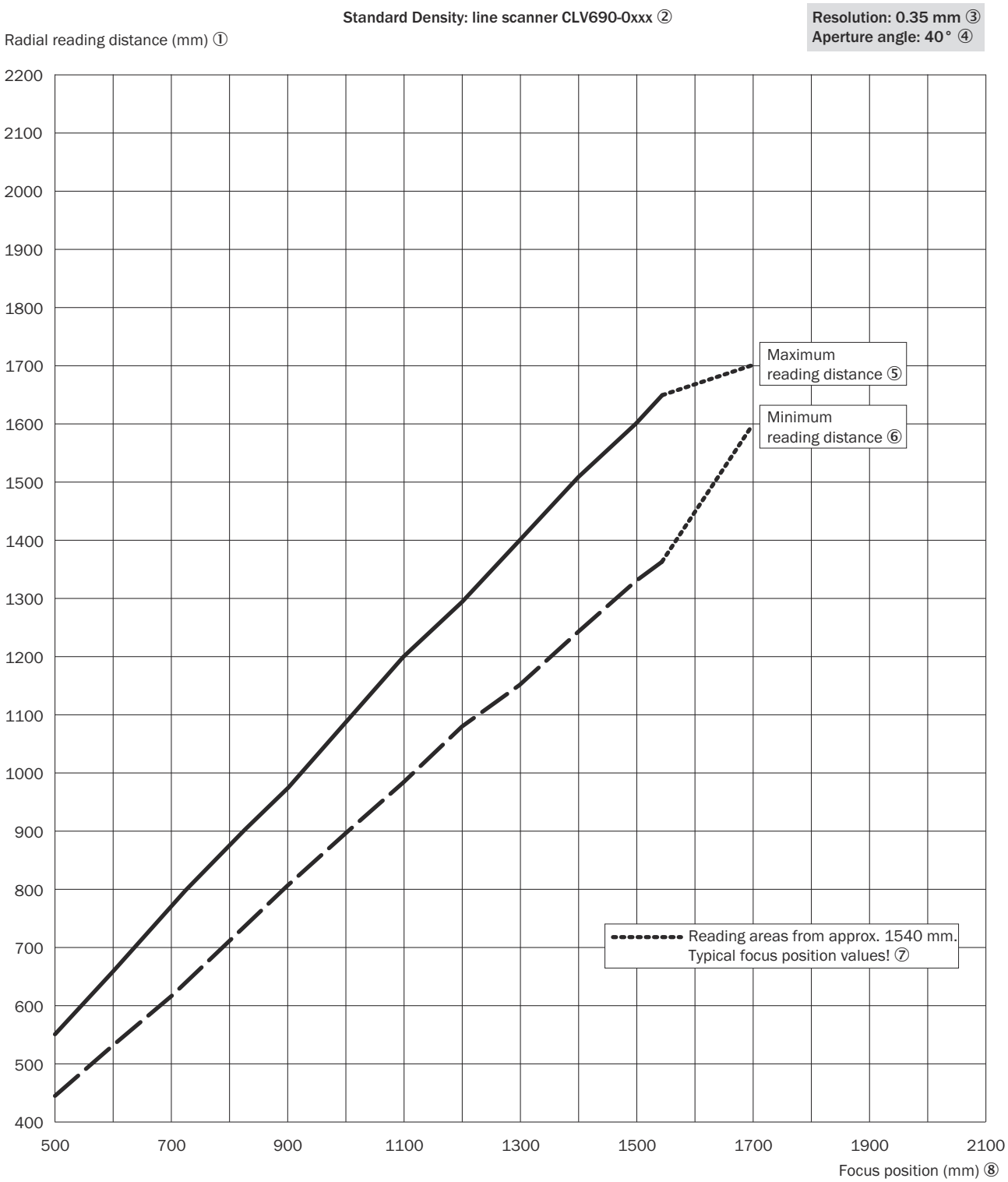

Figure 72: CLV690-0xxx (Standard Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.35 mm and aperture angle of α = 40°

① Radial reading distance (mm)
② Standard Density: line scanner CLV690-0xxx
③ Resolution: 0.35 mm
④ Aperture angle: 40°
⑤ Maximum reading distance
⑥ Minimum reading distance

⑦ Reading ranges from approx. 1,540 mm focus position - typical values!

⑧ Focus position (mm)

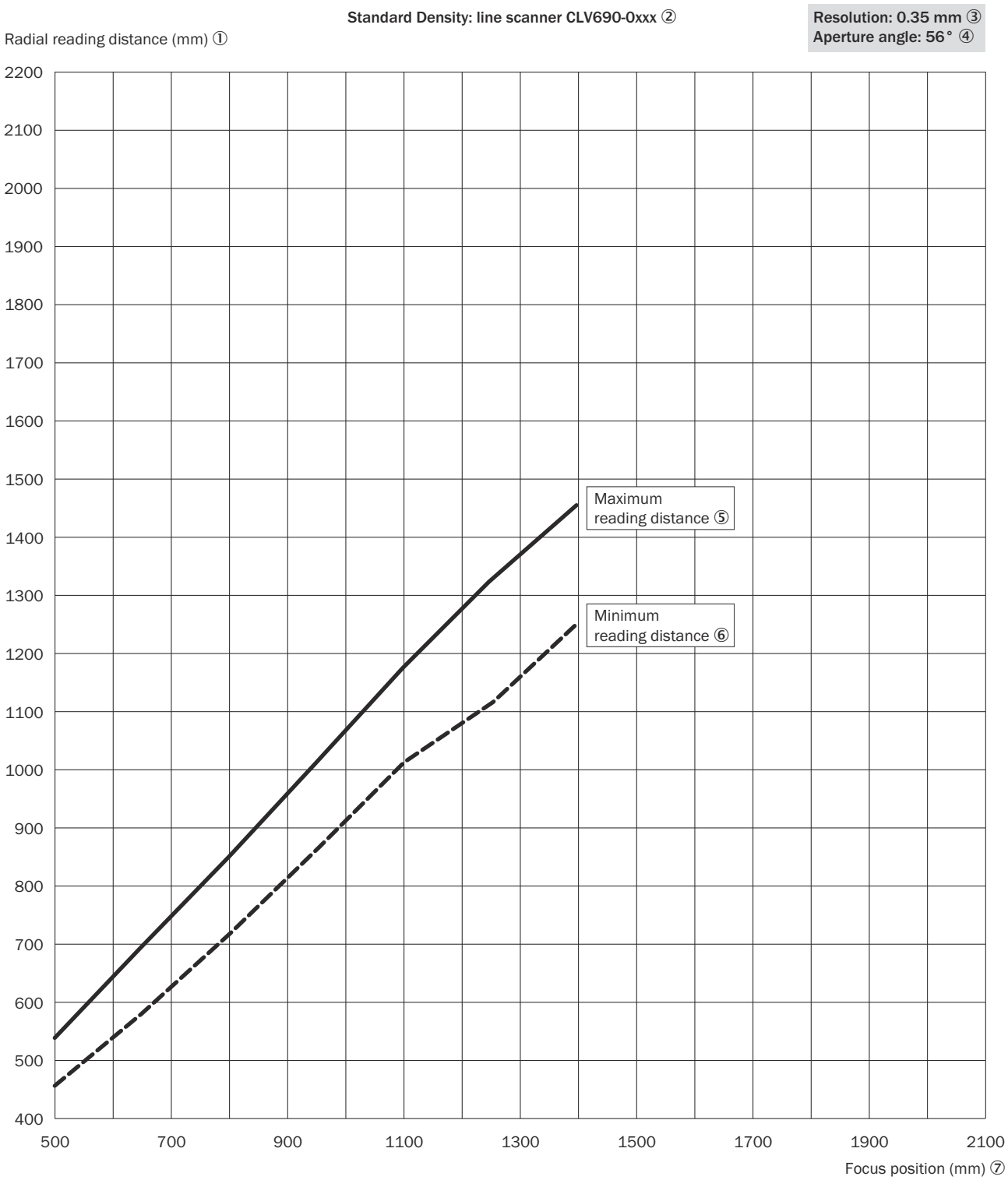

Figure 73: CLV690-0xxx (Standard Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.35 mm and aperture angle of α = 56°

① Radial reading distance (mm)
② Standard Density: line scanner CLV690-0xxx
③ Resolution: 0.35 mm
④ Aperture angle: 56°
⑤ Maximum reading distance

⑥ Minimum reading distance

⑦ Focus position (mm)

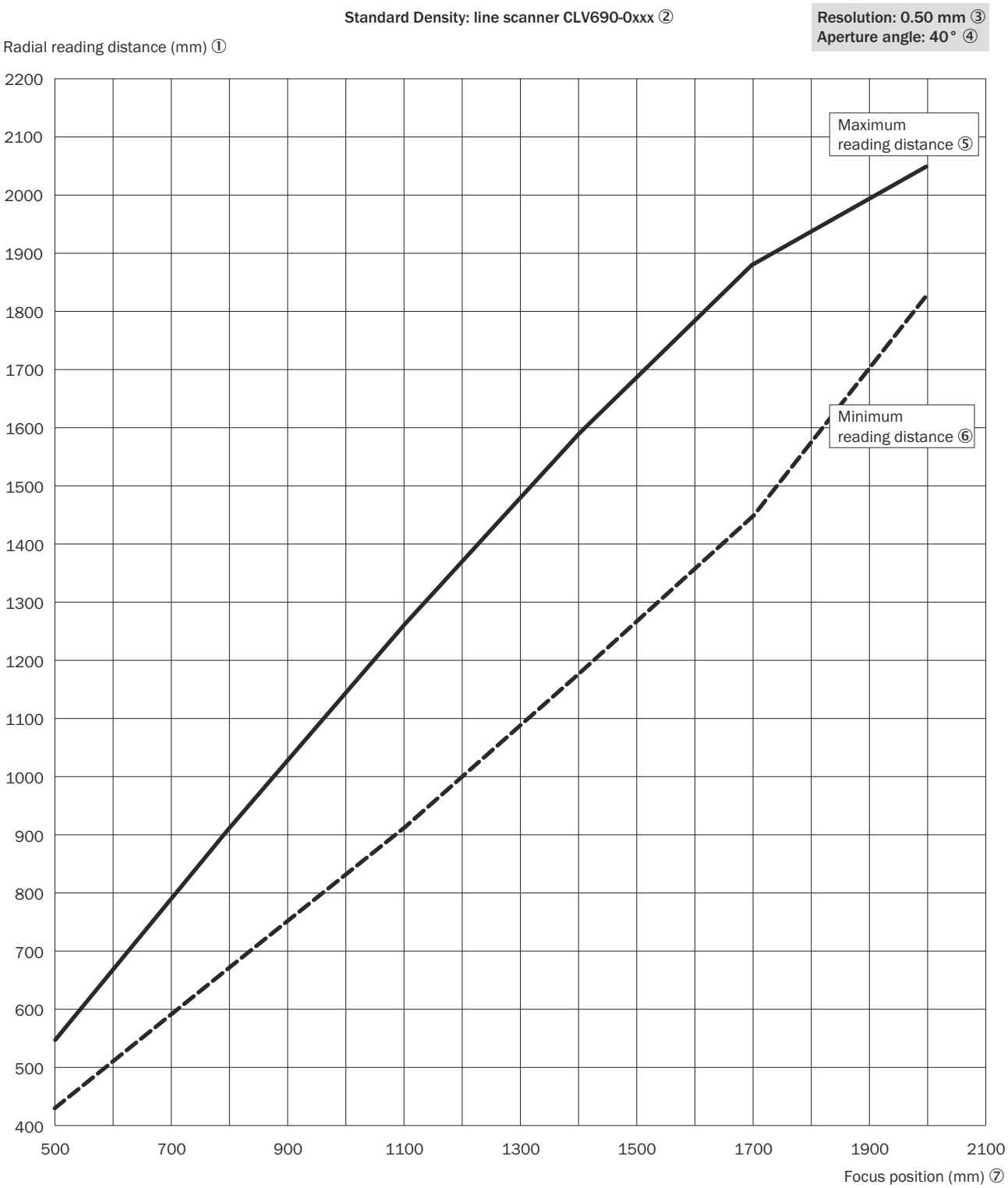

Figure 74: CLV690-0xxx (Standard Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.50 mm and aperture angle of α = 40°

① Radial reading distance (mm)
② Standard Density: line scanner CLV690-0xxx
③ Resolution: 0.50 mm
④ Aperture angle: 40°
⑤ Maximum reading distance
⑥ Minimum reading distance

⑦ Focus position (mm)

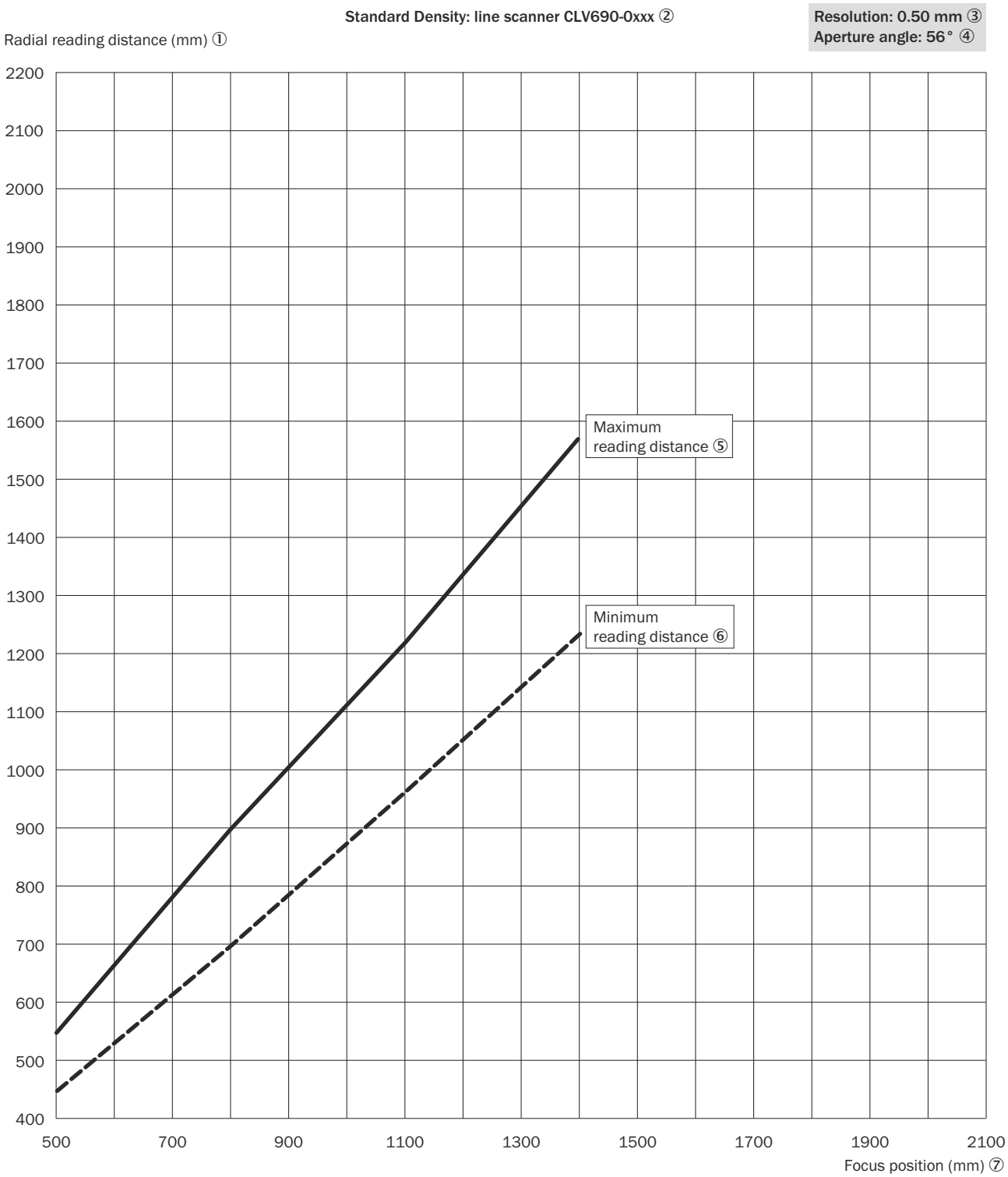

Figure 75: CLV690-0xxx (Standard Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.50 mm and aperture angle of α = 56°

① Radial reading distance (mm)
② Standard Density: line scanner CLV690-0xxx
③ Resolution: 0.50 mm
④ Aperture angle: 56°
⑤ Maximum reading distance
⑥ Minimum reading distance

⑦ Focus position (mm)

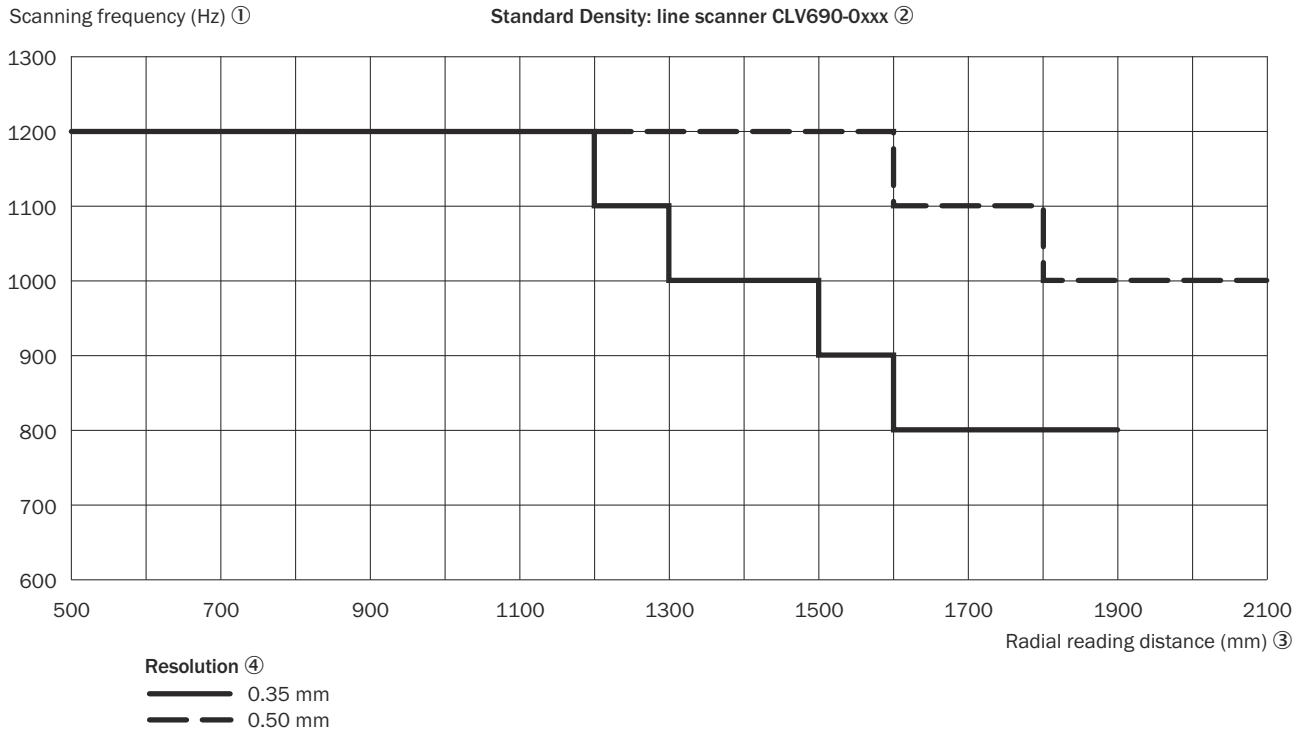

Figure 76: CLV690-0xxx (Standard Density): characteristic curve field scanning frequency depending on the radial reading distance and resolution

① Scanning frequency (Hz)
② Standard resolution: line scanner CLV690-0xxx
③ Radial reading distance (mm)
④ Resolution

12.7.4 Standard Density: reading performance data, line scanner with oscillating mirror

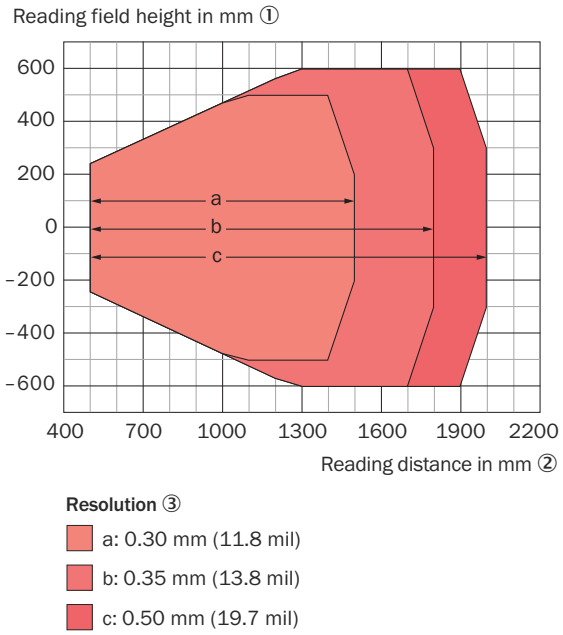

Figure 77: CLV690-1xxx (Standard Density): reading field height depending on the reading distance and resolution

① Reading field height in mm

② Reading distance in mm

③ Resolution

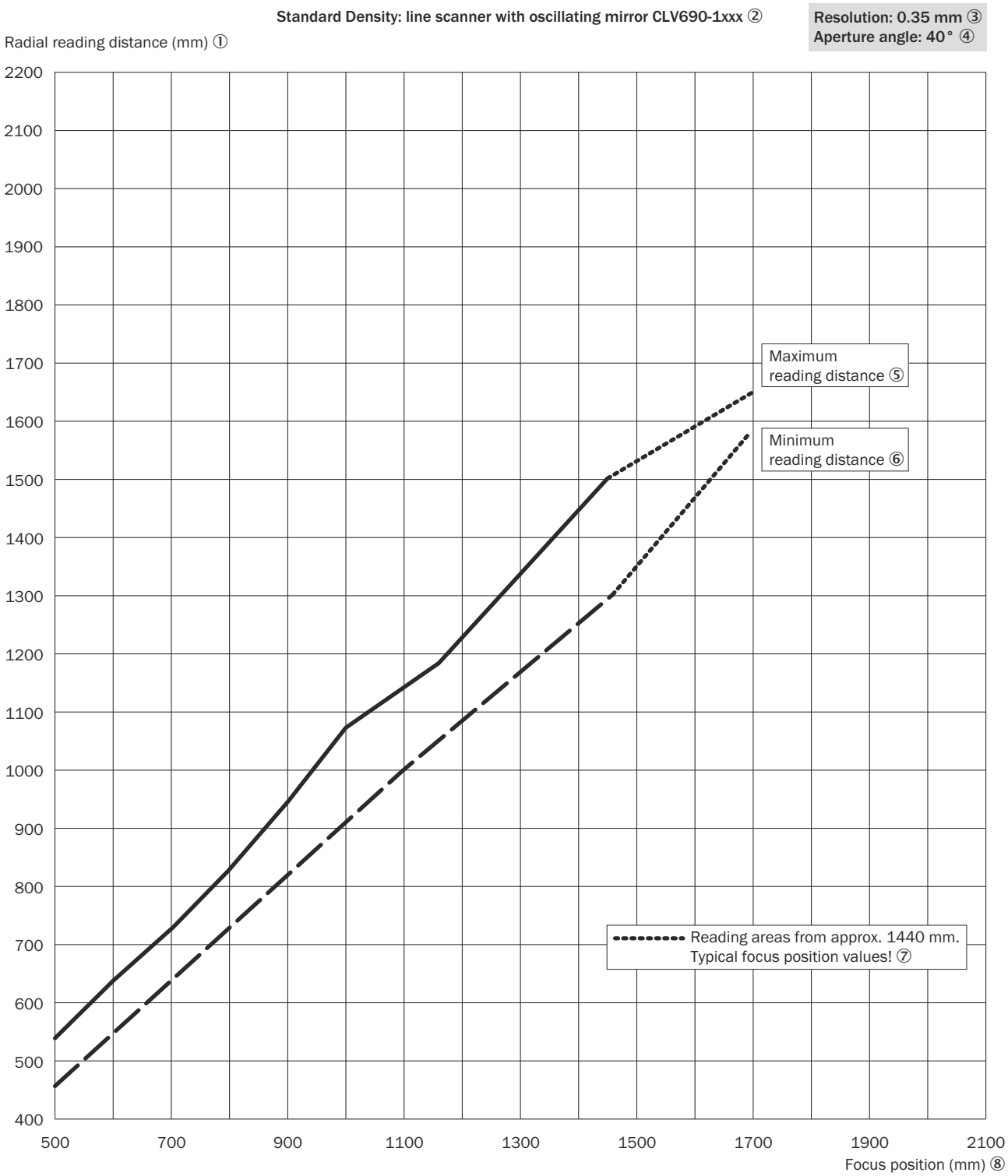

Figure 78: CLV690-1xxx (Standard Density): min. and max. radial reading distance as a function of focus position at a resolution of 0.35 mm and aperture angle of α = 40°

① Radial reading distance (mm)
② Standard Density: line scanner with oscillating mirror CLV690-1xxx
③ Resolution: 0.35 mm
④ Aperture angle: 40°
⑤ Maximum reading distance
⑥ Minimum reading distance

⑦ Reading ranges from approx. 1,440 mm focus position - typical values!

⑧ Focus position (mm)

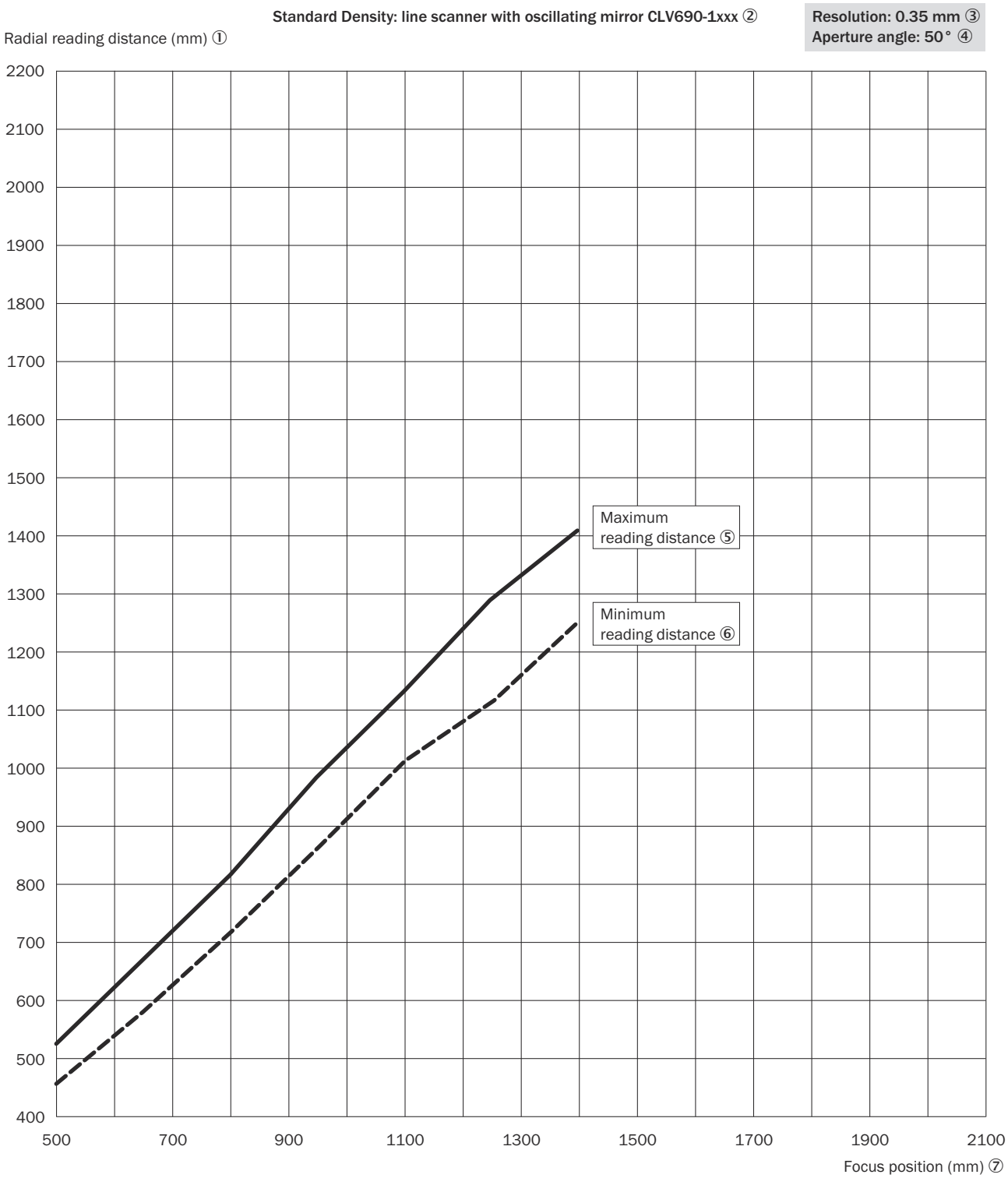

Figure 79: CLV690-1xxx (Standard Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.35 mm and aperture angle of α = 50°

① Radial reading distance (mm)
② Standard Density: line scanner with oscillating mirror CLV690-1xxx
③ Resolution: 0.35 mm
④ Aperture angle: 50°
⑤ Maximum reading distance
⑥ Minimum reading distance

⑦ Focus position (mm)

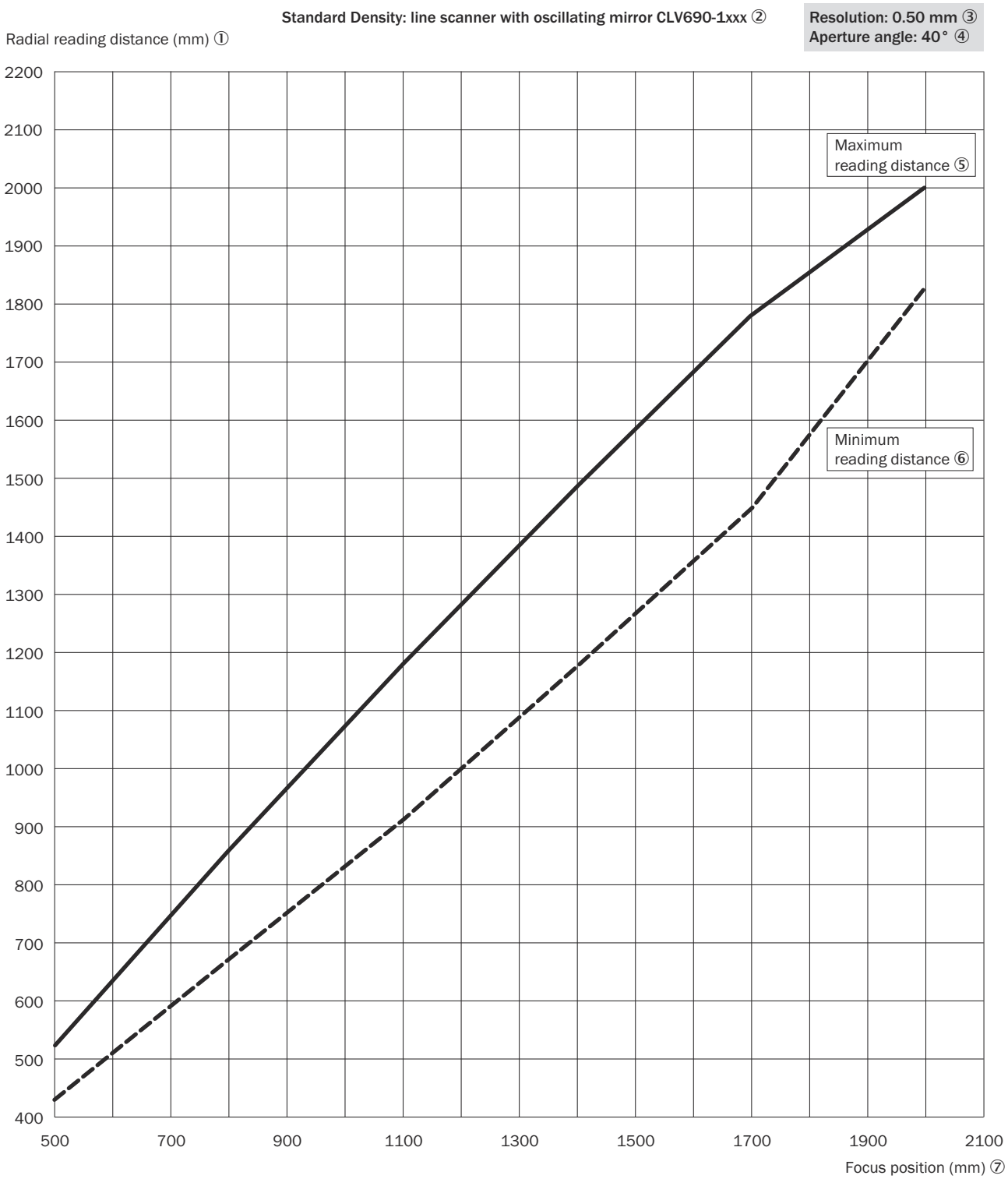

Figure 80: CLV690-1xxx (Standard Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.50 mm and aperture angle of α = 40°

① Radial reading distance (mm)
② Standard Density: line scanner with oscillating mirror CLV690-1xxx
③ Resolution: 0.50 mm
④ Aperture angle: 40°
⑤ Maximum reading distance
⑥ Minimum reading distance

⑦ Focus position (mm)

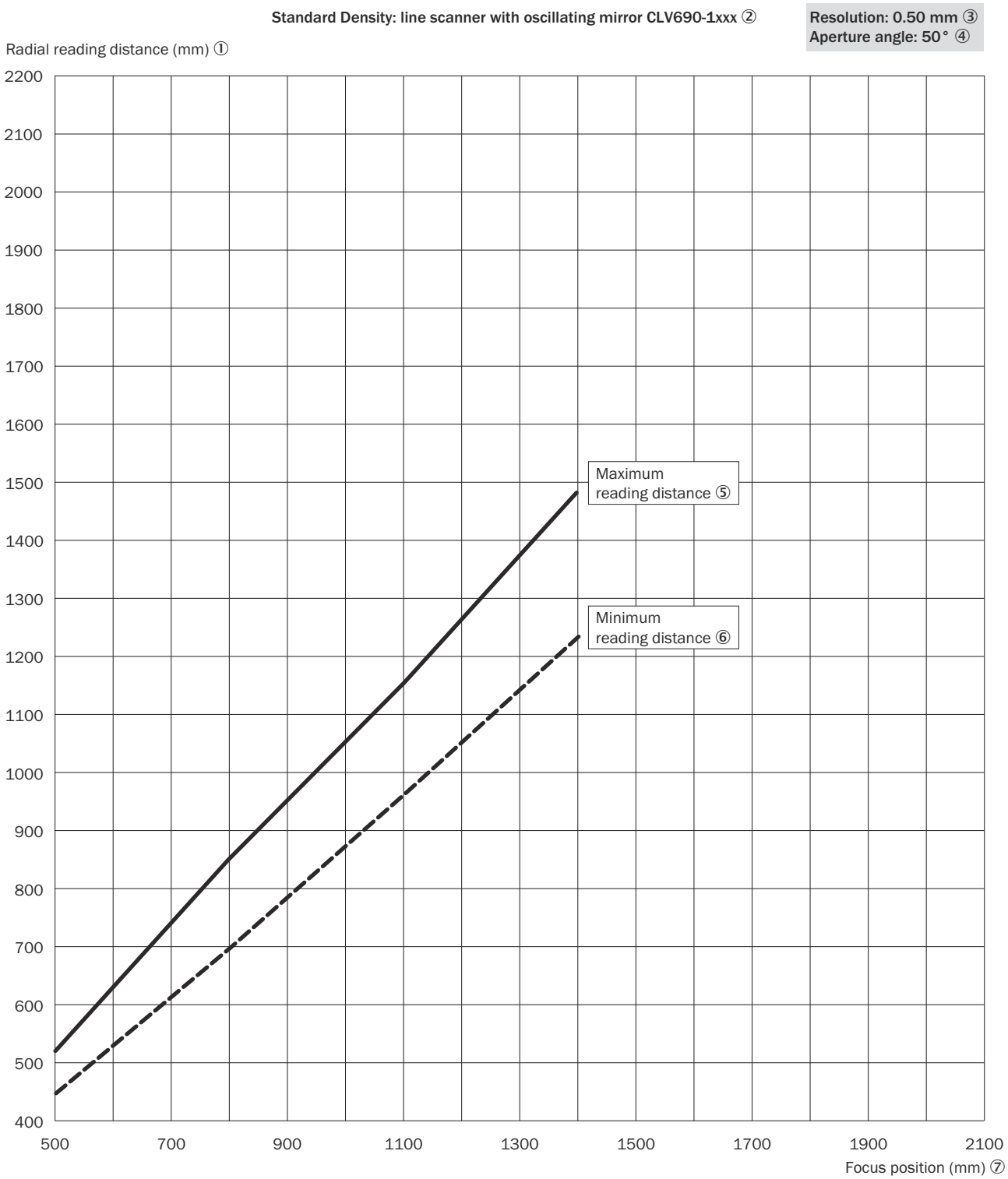

Figure 81: CLV690-1xxx (Standard Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.50 mm and aperture angle of α = 50°

① Radial reading distance (mm)
② Standard Density: line scanner with oscillating mirror CLV690-1xxx
③ Resolution: 0.50 mm
④ Aperture angle: 50°
⑤ Maximum reading distance
⑥ Minimum reading distance

⑦ Focus position (mm)

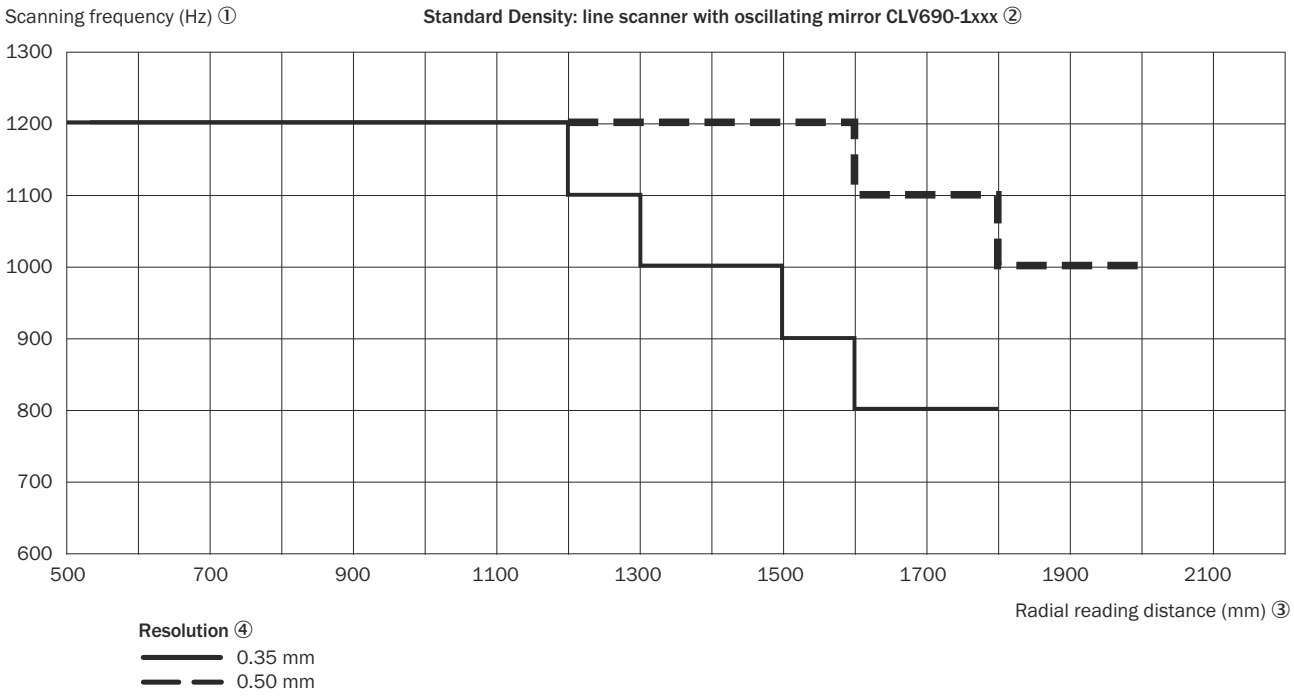

Figure 82: CLV690-1xxx (Standard Density): characteristic curve field scanning frequency depending on the radial reading distance and resolution

① Scanning frequency (Hz)

② Standard resolution: line scanner with oscillating mirror CLV690-1xxx

③ Radial reading distance (mm)

④ Resolution

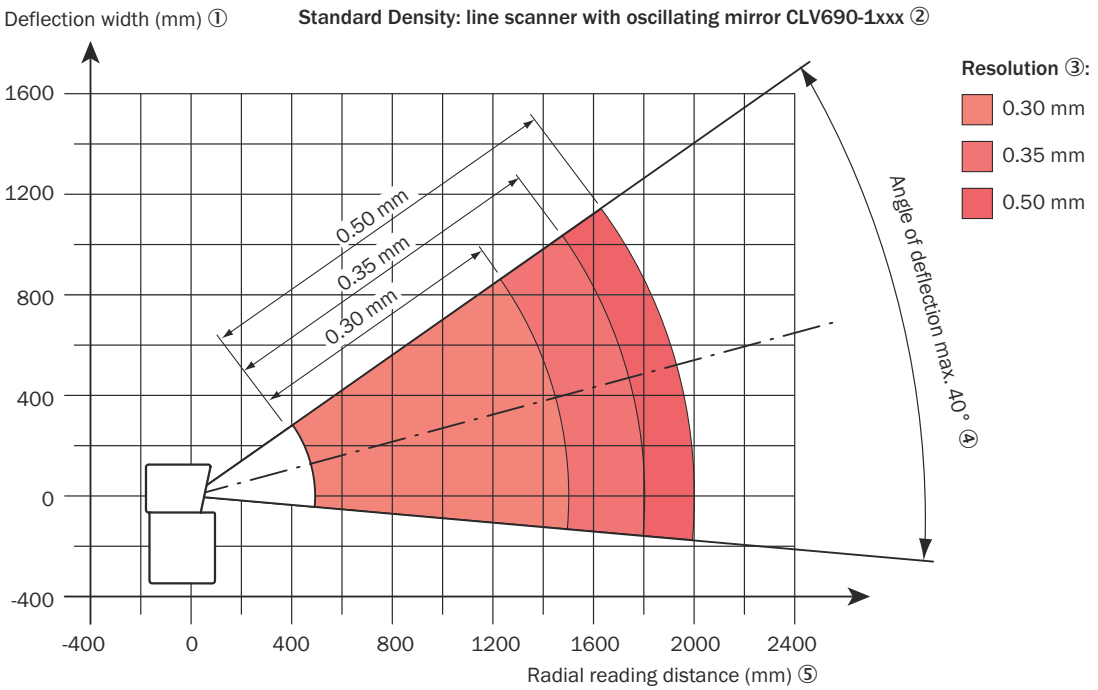

Figure 83: CLV690-1xxx (Standard Density): deflection width depending on the radial reading distance, angle of deflection and resolution

① Deflection width (mm)
② Standard Density: line scanner with oscillating mirror CLV690-1xxx
③ Resolution
④ Angle of deflection max. 40°
⑤ Radial reading distance (mm)

12.7.5 Low Density: reading output data of line scanner

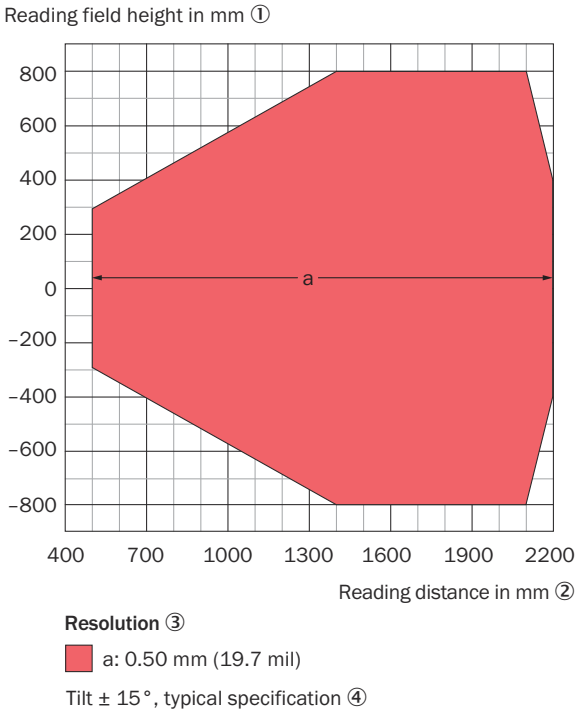

Figure 84: CLV691-0xxx (Low Density): reading field height depending on the reading distance and tilt at a resolution of 0.5 mm

① Reading field height in mm
② Reading distance in mm
③ Resolution
④ Tilt ± 15°, typical specification

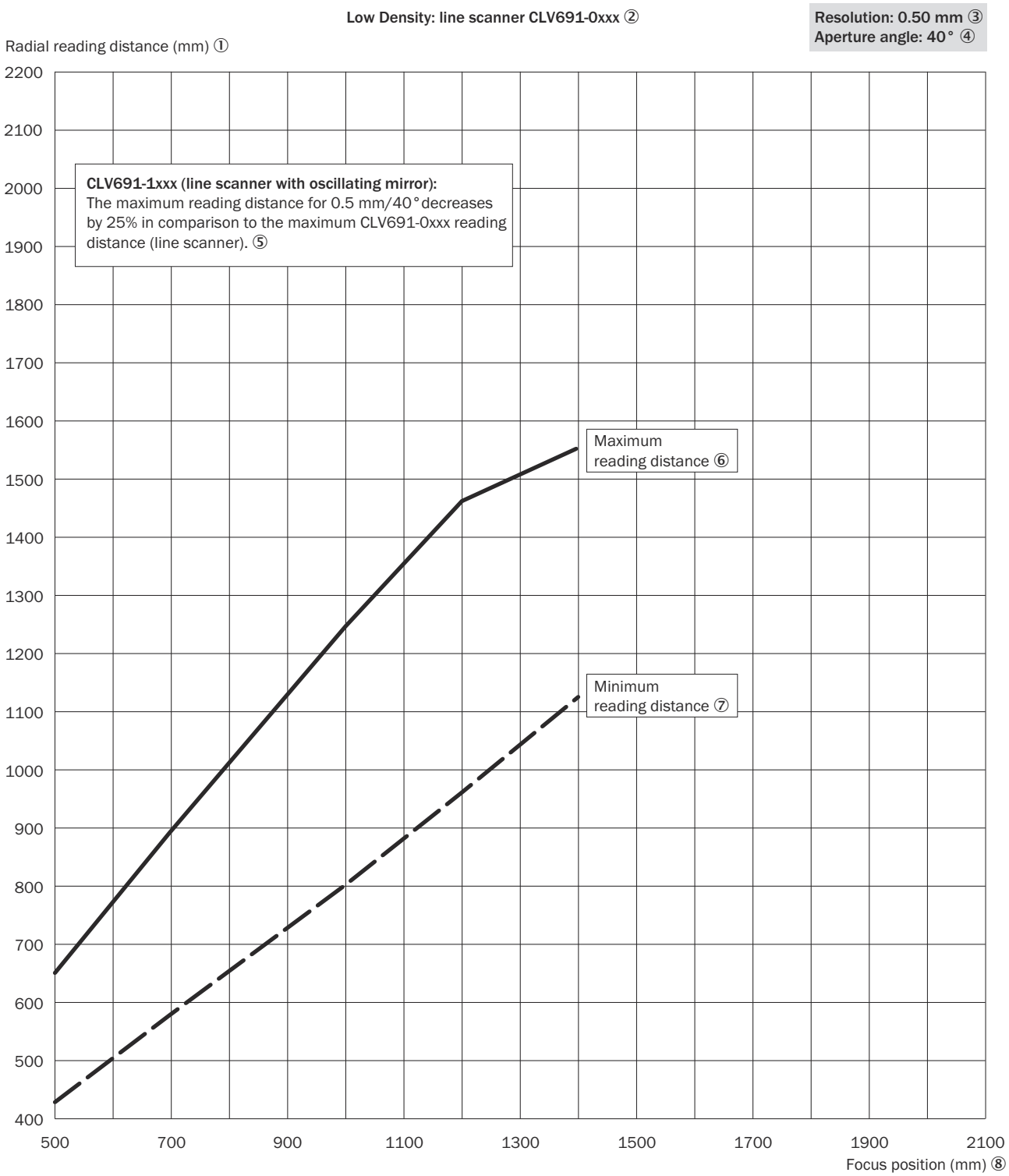

Figure 85: CLV691-0xxx (Low Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.5 mm and aperture angle of α = 40°

① Radial reading distance (mm)

② Low Density: line scanner CLV691-0xxx

③ Resolution: 0.50 mm

④ Aperture angle: 40°

⑤ CLV691-1xxx (line scanner with oscillating mirror): the maximum reading distance for 0.5 mm/40° reduces by 25% in comparison with the maximum reading distance of CLV691-0xxx (line scanner).

⑥ Maximum reading distance
⑦ Minimum reading distance
⑧ Focus position (mm)

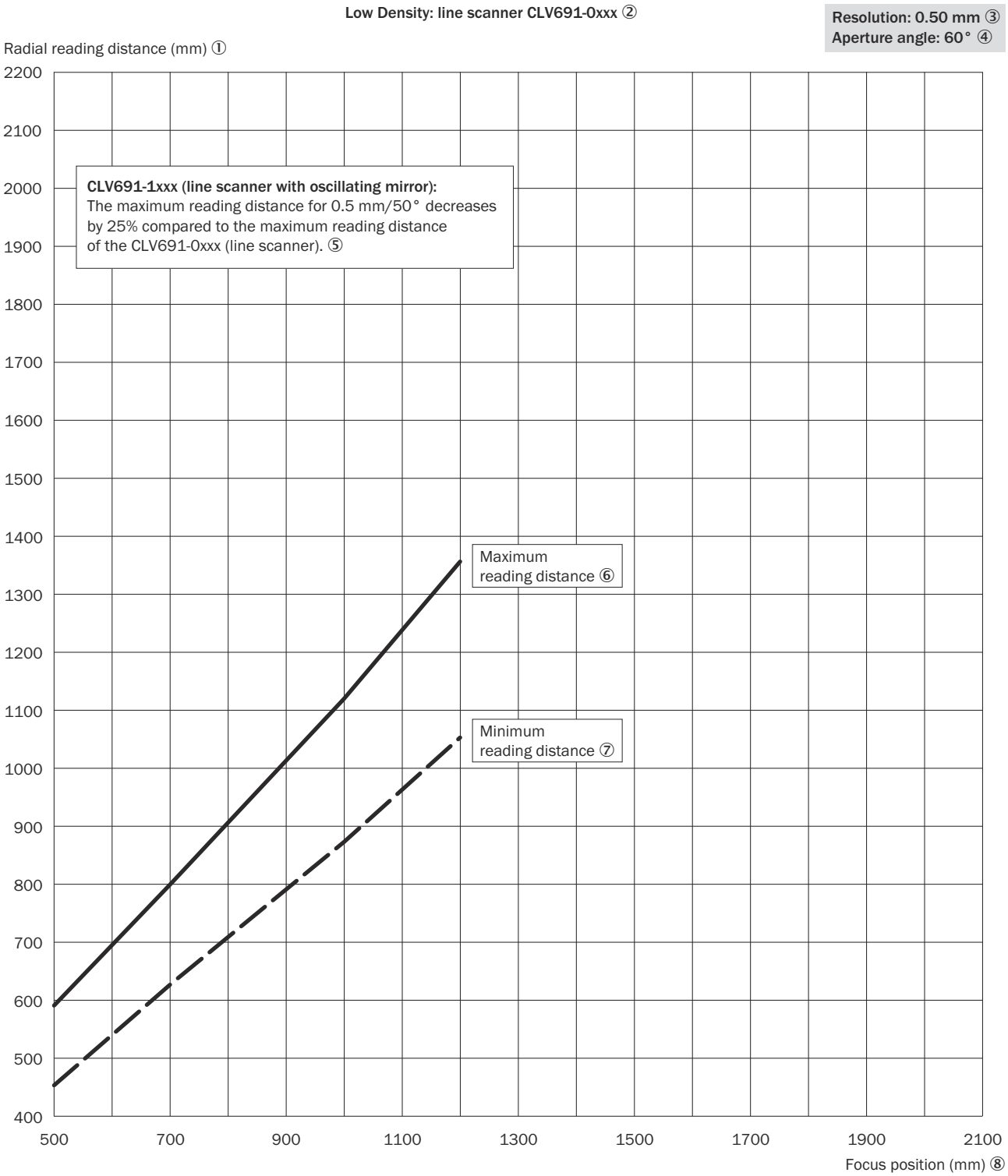

Figure 86: CLV691-0xxx (Low Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.5 mm and aperture angle of α = 60°

① Radial reading distance (mm)

② Low Density: line scanner CLV691-0xxx

③ Resolution: 0.50 mm

④ Aperture angle: 60°

⑤ CLV691-1xxx (line scanner with oscillating mirror): the maximum reading distance for 0.5 mm/50° reduces by 25% in comparison with the maximum reading distance of CLV691-0xxx (line scanner).

⑥ Maximum reading distance
⑦ Minimum reading distance
⑧ Focus position (mm)

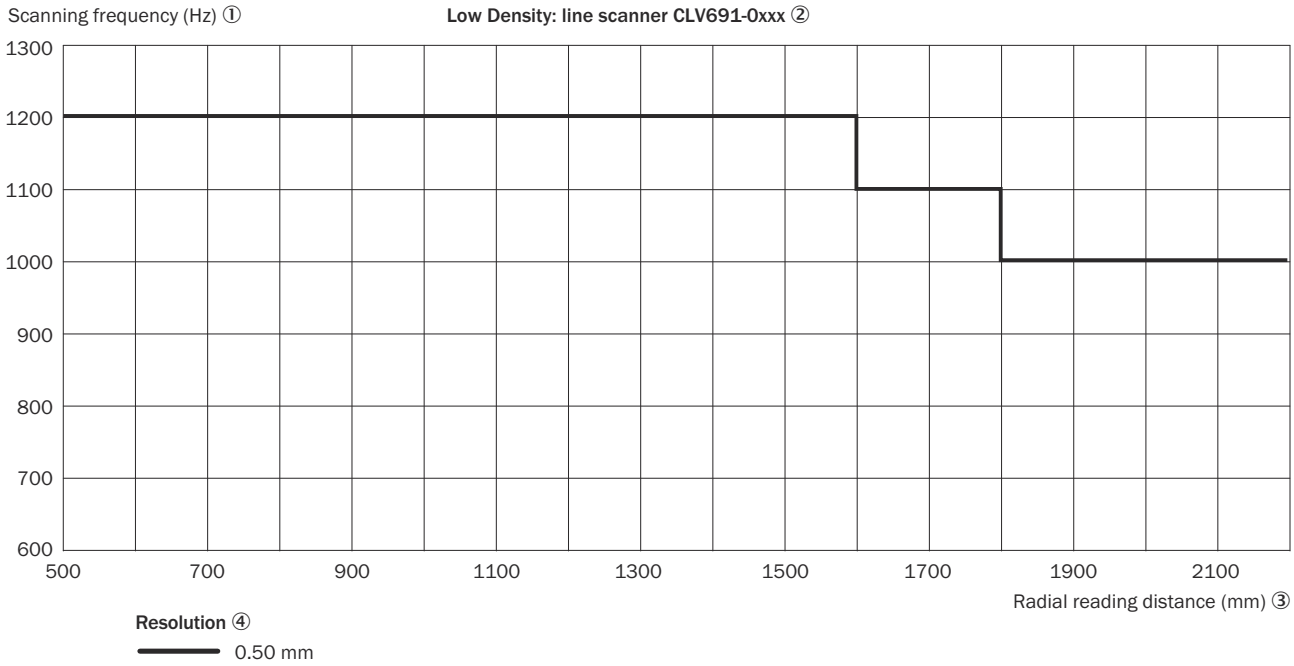

Figure 87: CLV691-0xxx (Low Density): characteristic curve field scanning frequency depending on the radial reading distance and resolution

① Scanning frequency (Hz)
② Low Density: line scanner with oscillating mirror CLV690-1xxx
③ Radial reading distance (mm)
④ Resolution

12.7.6 Low Density: reading performance data, line scanner with oscillating mirror

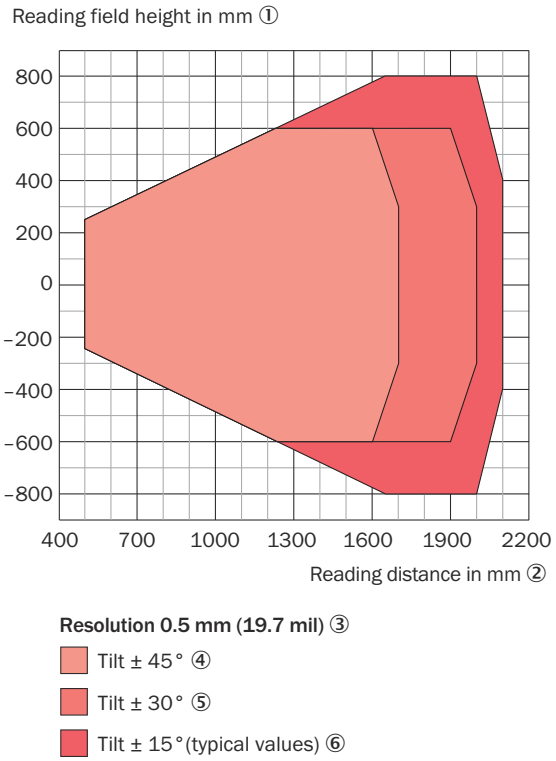

Figure 88: CLV691-1xxx (Low Density): reading field height depending on the reading distance and tilt at a resolution of 0.5 mm

① Reading field height in mm
② Reading distance in mm
③ Resolution
④ Tilt ± 45°
⑤ Tilt ± 30°
⑥ Tilt ± 15° (typical values)

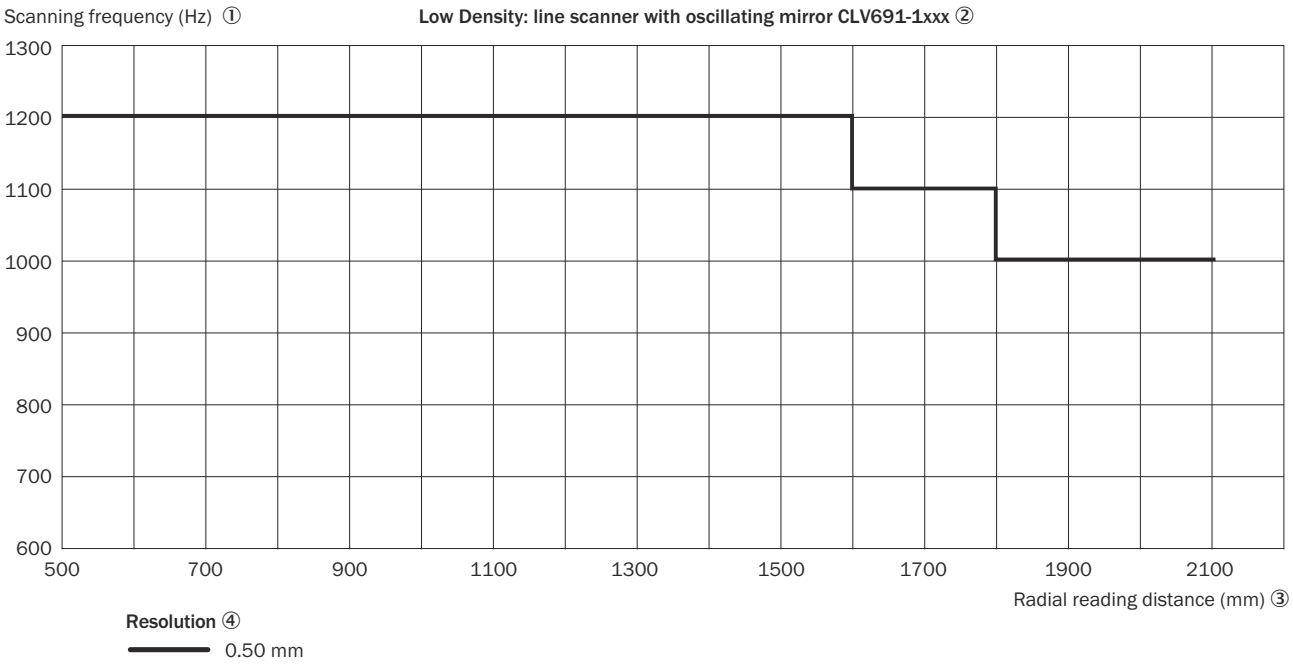

Figure 89: CLV691-1xxx (Low Density): characteristic curve field scanning frequency depending on the radial reading distance and resolution

① Scanning frequency (Hz)
② Low Density: line scanner with oscillating mirror CLV691-1xxx
③ Radial reading distance (mm)
④ Resolution

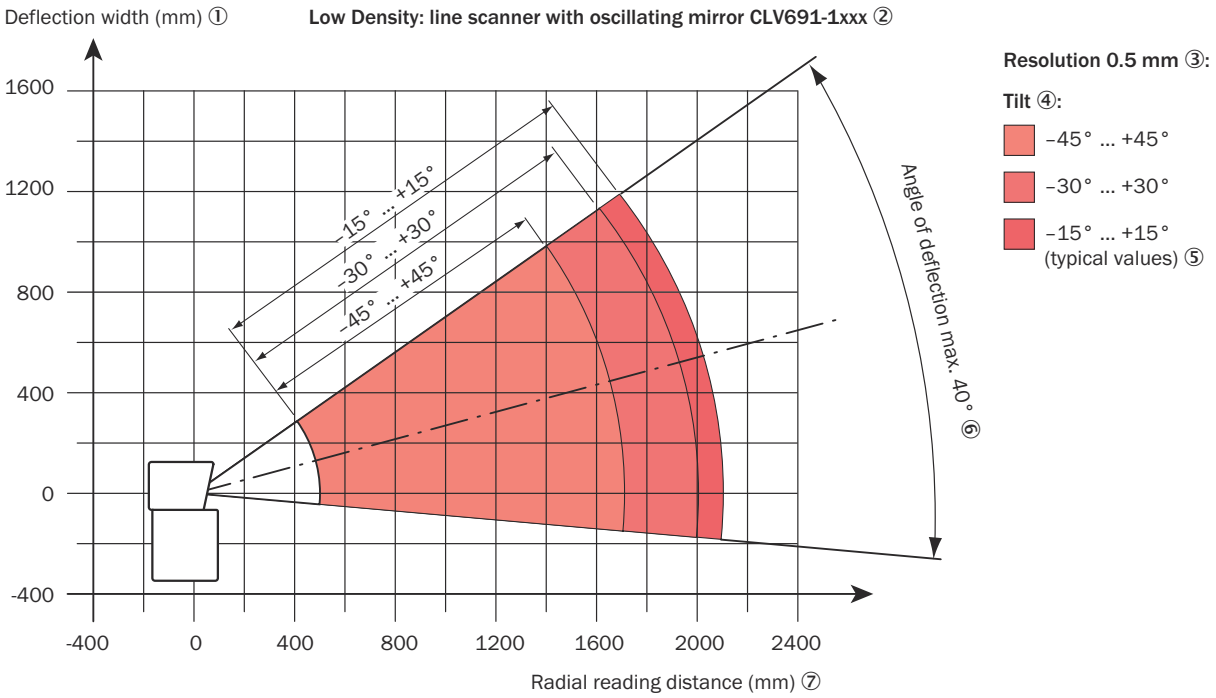

Figure 90: CLV691-1xxx (Low Density): deflection width depending on the reading distance, angle of deflection and tilt at a resolution of 0.5 mm

① Deflection width (mm)
② Low Density: line scanner with oscillating mirror CLV691-1xxx
③ Resolution: 0.5 mm
④ Tilt
⑤ (Typical values)
⑥ Angle of deflection max. 40°
⑦ Radial reading distance (mm)

12.7.7 High Density: reading performance data, line scanner

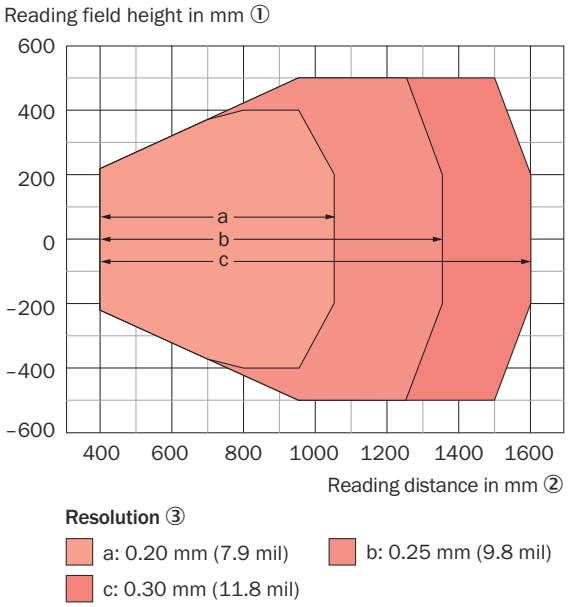

Figure 91: CLV692-0xxx (High Density): reading field height depending on the reading distance and resolution

① Reading field height in mm
② Reading distance in mm
③ Resolution

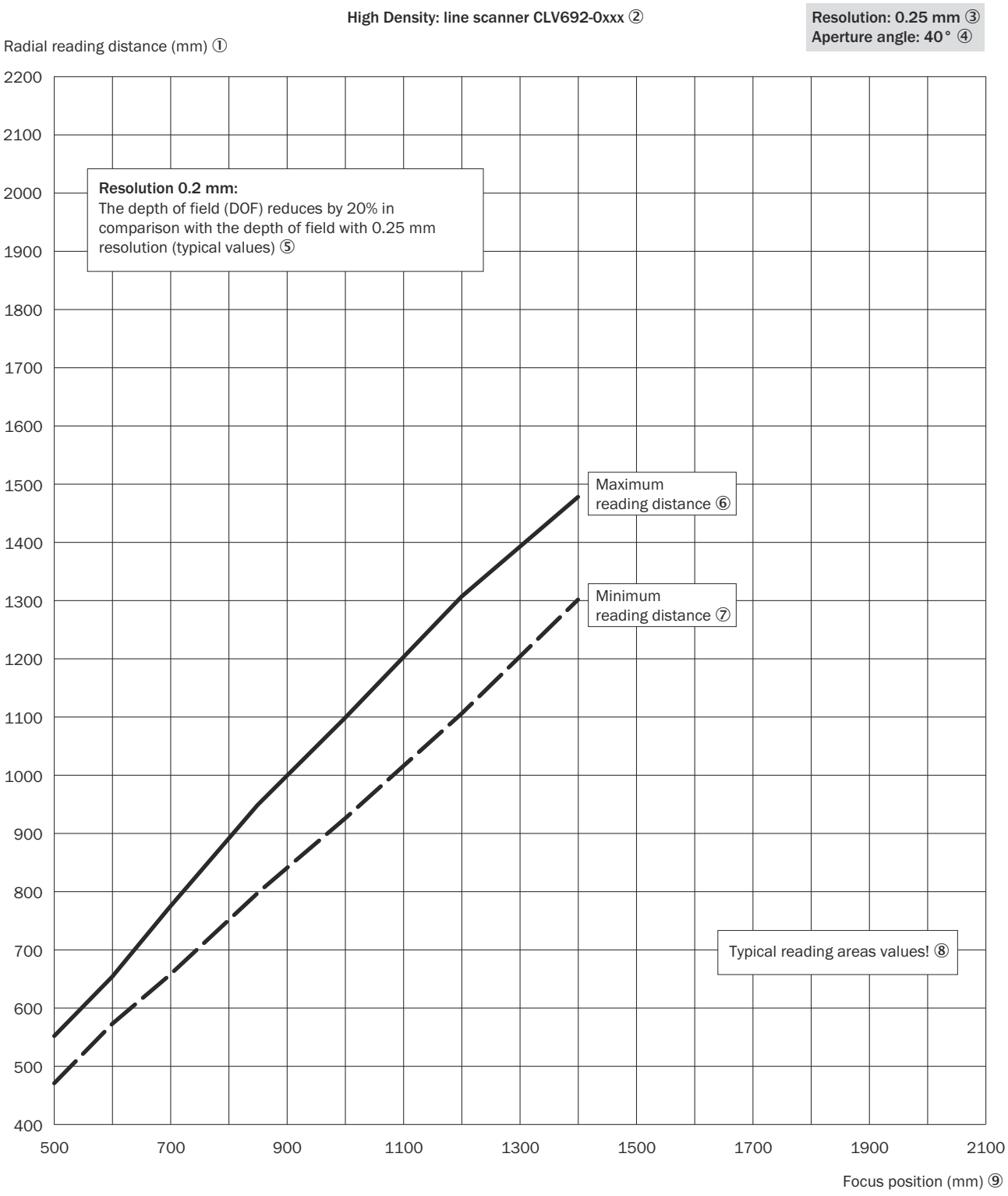

Figure 92: CLV692-0xxx (High Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.25 mm and aperture angle of α = 40°

① Radial reading distance (mm)

② High Density: line scanner CLV692-0xxx

③ Resolution: 0.25 mm

④ Aperture angle: 40°

⑤ Resolution 0.2 mm: the depth of field (DOF) reduces by 20% in comparison with the depth of field at a resolution of 0.25 mm (typical values).

⑥ Maximum reading distance
⑦ Minimum reading distance
⑧ Reading ranges - typical values!
⑨ Focus position (mm)

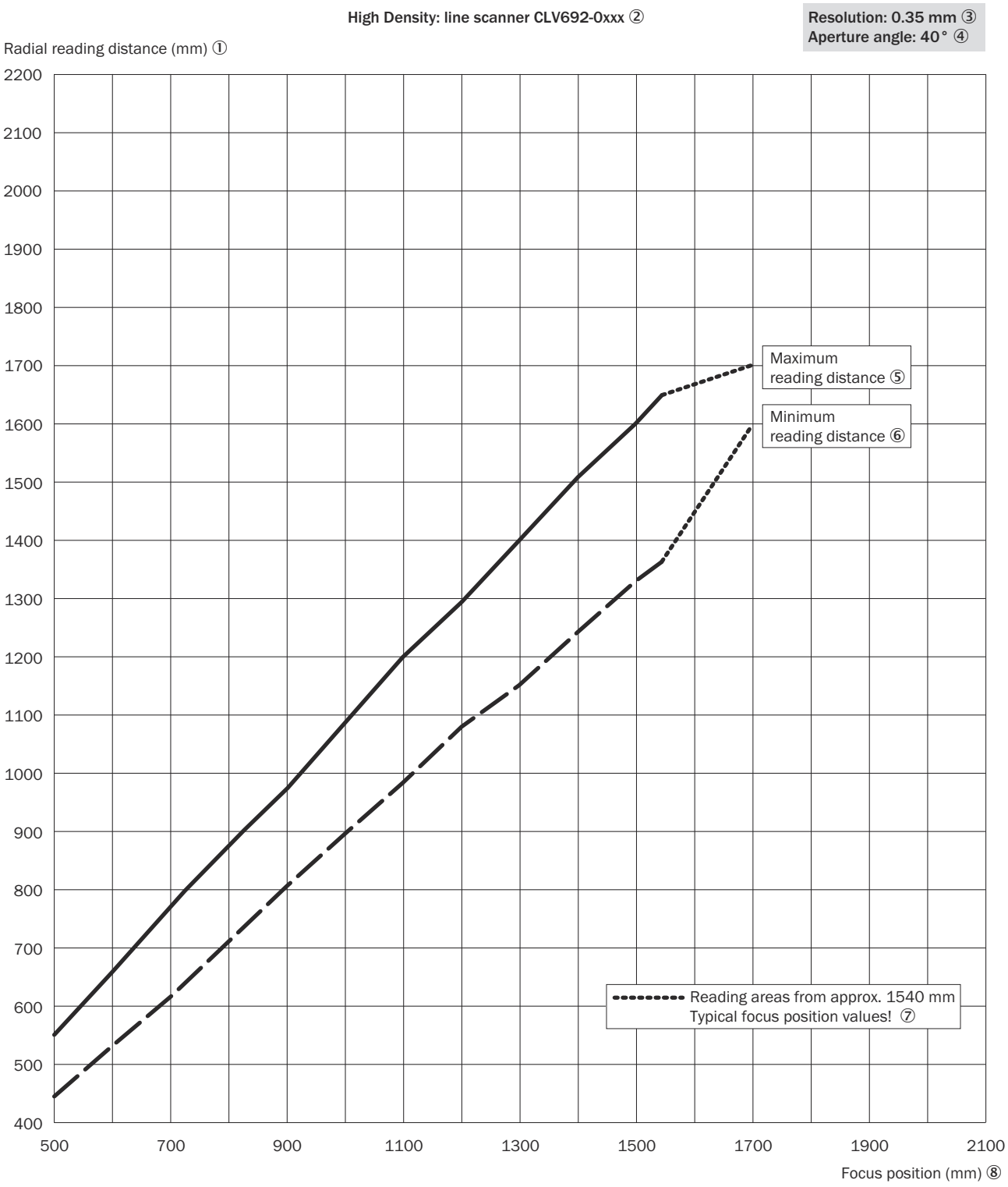

Figure 93: CLV692-0xxx (High Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.35 mm and aperture angle of α = 40°

① Radial reading distance (mm)
② High Density: line scanner CLV692-0xxx
③ Resolution: 0.35 mm
④ Aperture angle: 40°
⑤ Maximum reading distance
⑥ Minimum reading distance

⑦ Reading ranges from approx. 1,540 mm focus position - typical values!

⑧ Focus position (mm)

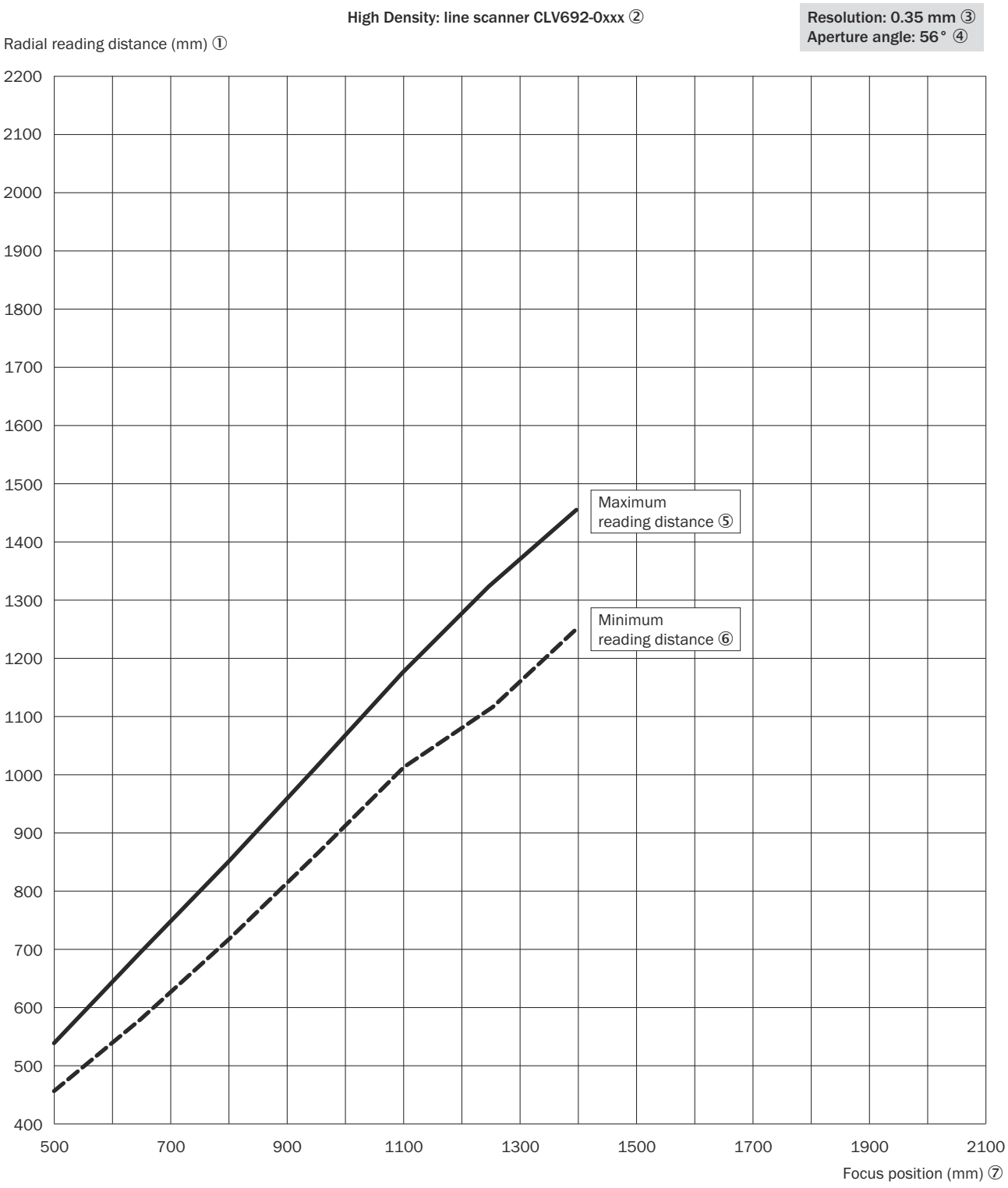

Figure 94: CLV692-0xxx (High Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.35 mm and aperture angle of α = 56°

① Radial reading distance (mm)
② High Density: line scanner CLV692-0xxx
③ Resolution: 0.35 mm
④ Aperture angle: 56°
⑤ Maximum reading distance
⑥ Minimum reading distance

⑦ Focus position (mm)

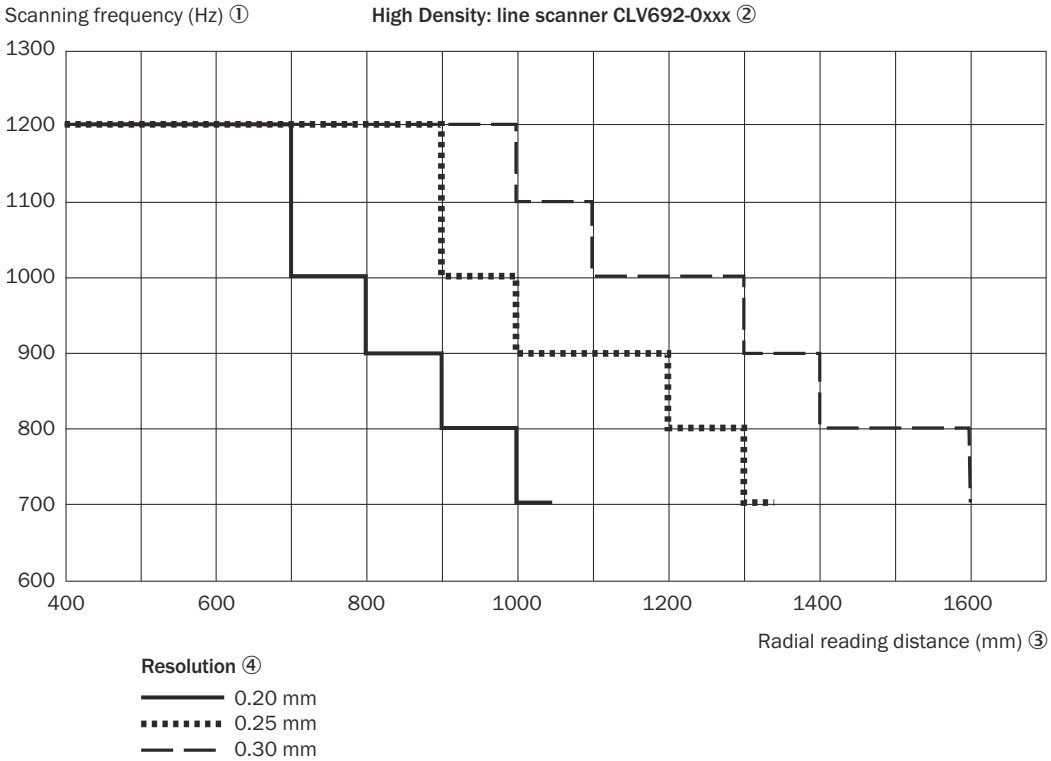

Figure 95: CLV692-0xxx (High Density): characteristic curve field scanning frequency depending on the radial reading distance and resolution

① Scanning frequency (Hz)
② High Density: line scanner CLV692-0xxx
③ Radial reading distance (mm)
④ Resolution

12.7.8 High Density: reading performance data, line scanner with oscillating mirror

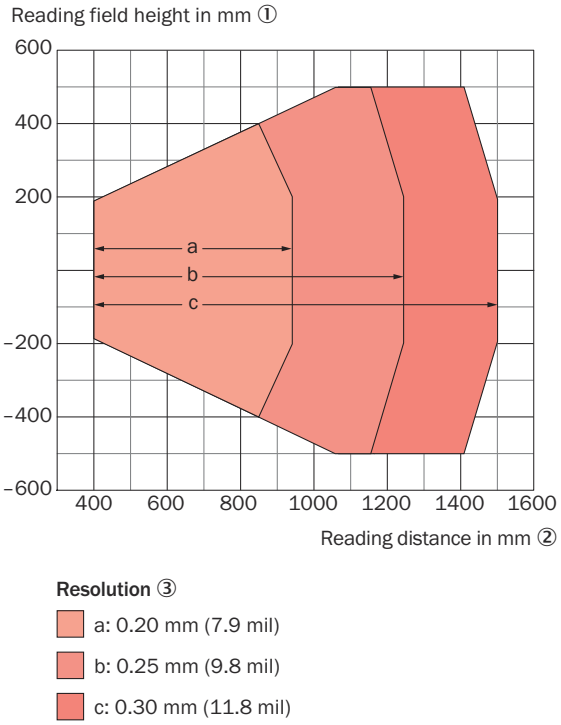

Figure 96: CLV692-1xxx (High Density): reading field height depending on the reading distance and resolution

① Reading field height in mm
② Reading distance in mm
③ Resolution

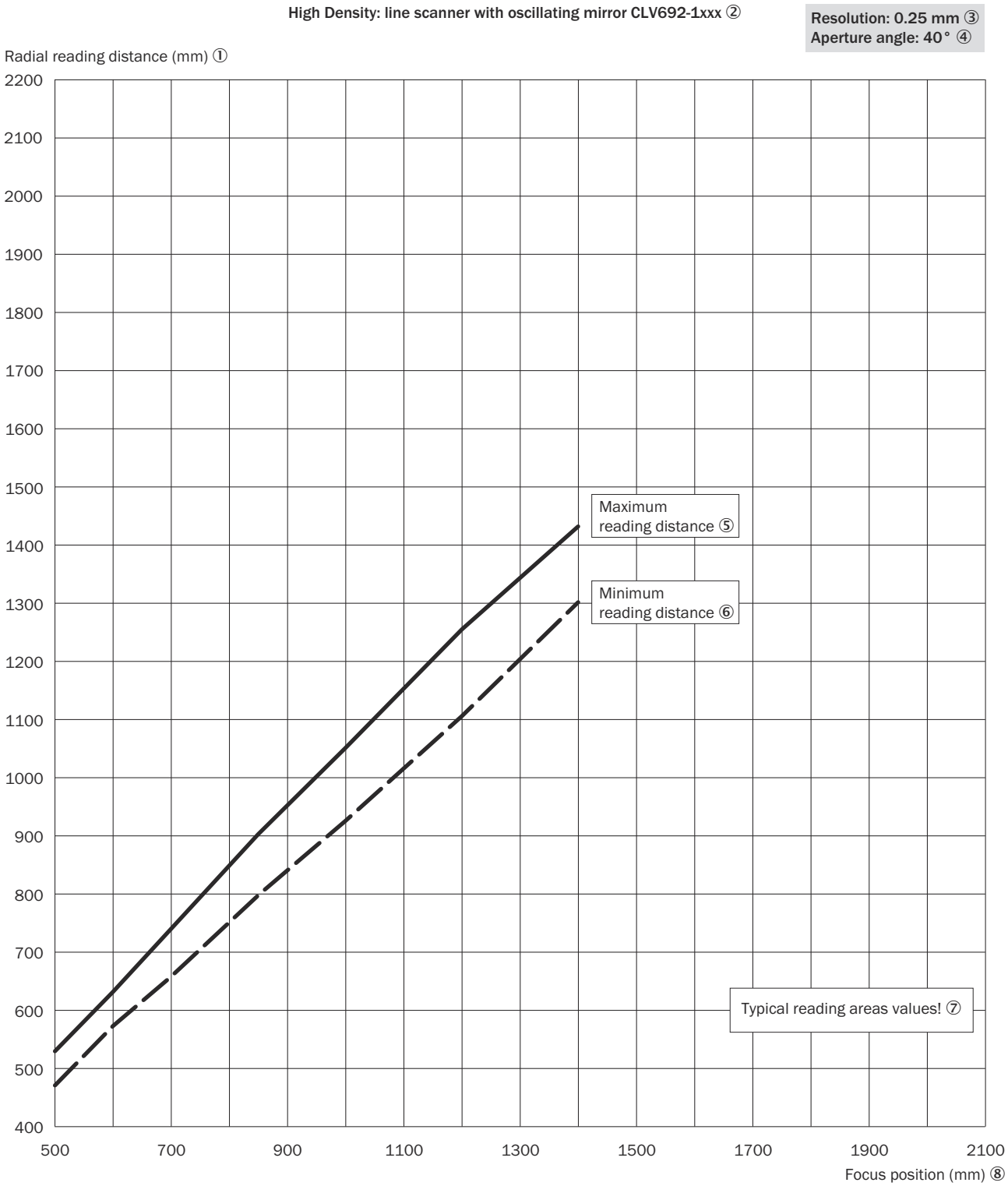

Figure 97: CLV692-1xxx (High Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.25 mm and aperture angle of α = 40°

① Radial reading distance (mm)
② High Density: line scanner with oscillating mirror CLV692-1xxx
③ Resolution: 0.25 mm
④ Aperture angle: 40°
⑤ Maximum reading distance
⑥ Minimum reading distance

⑦ Reading ranges - typical values!

⑧ Focus position (mm)

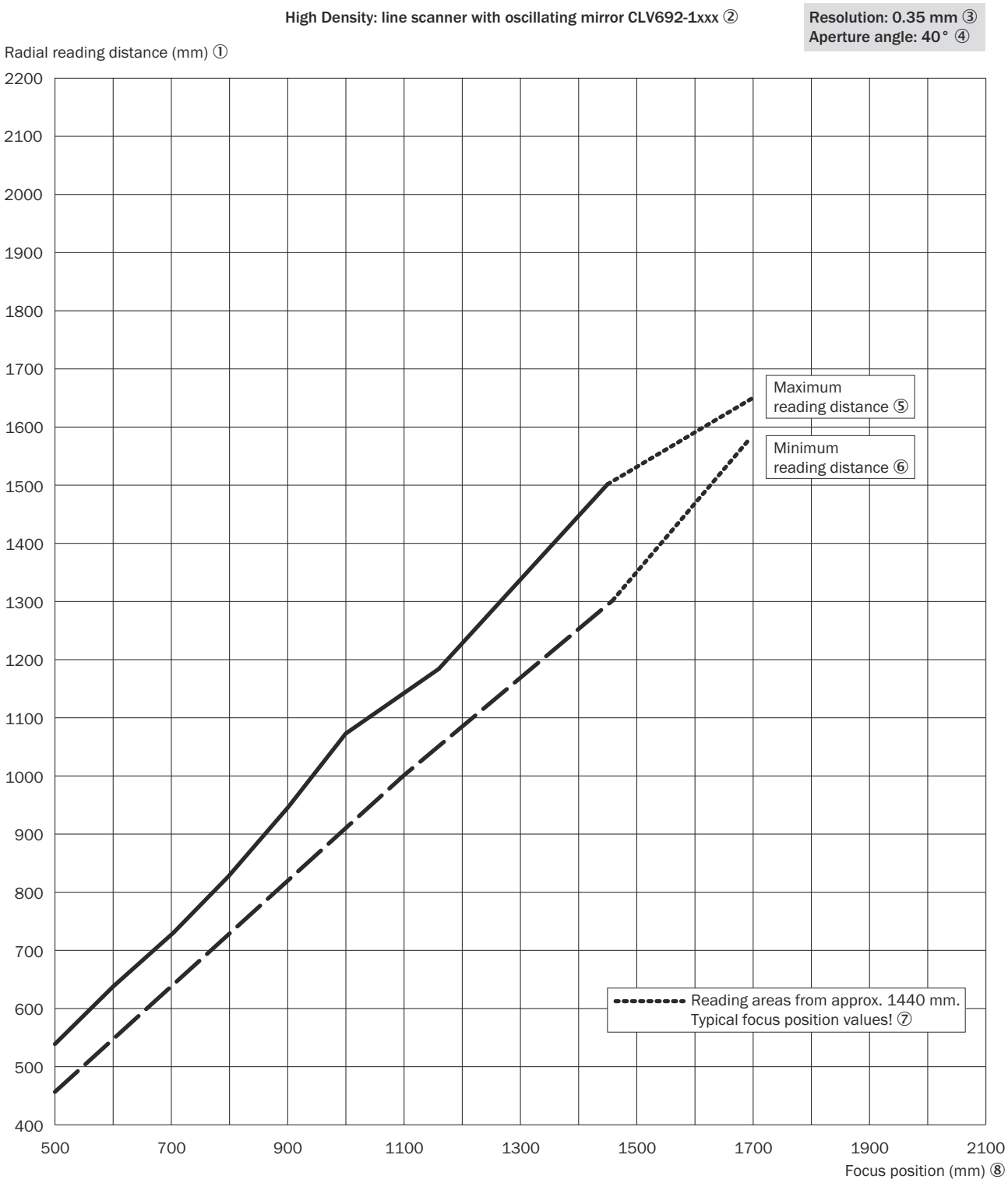

Figure 98: CLV692-1xxx (High Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.35 mm and aperture angle of α = 40°

① Radial reading distance (mm)
② High Density: line scanner with oscillating mirror CLV692-1xxx
③ Resolution: 0.35 mm
④ Aperture angle: 40°
⑤ Maximum reading distance
⑥ Minimum reading distance

⑦ Reading ranges from approx. 1,440 mm focus position - typical values!

⑧ Focus position (mm)

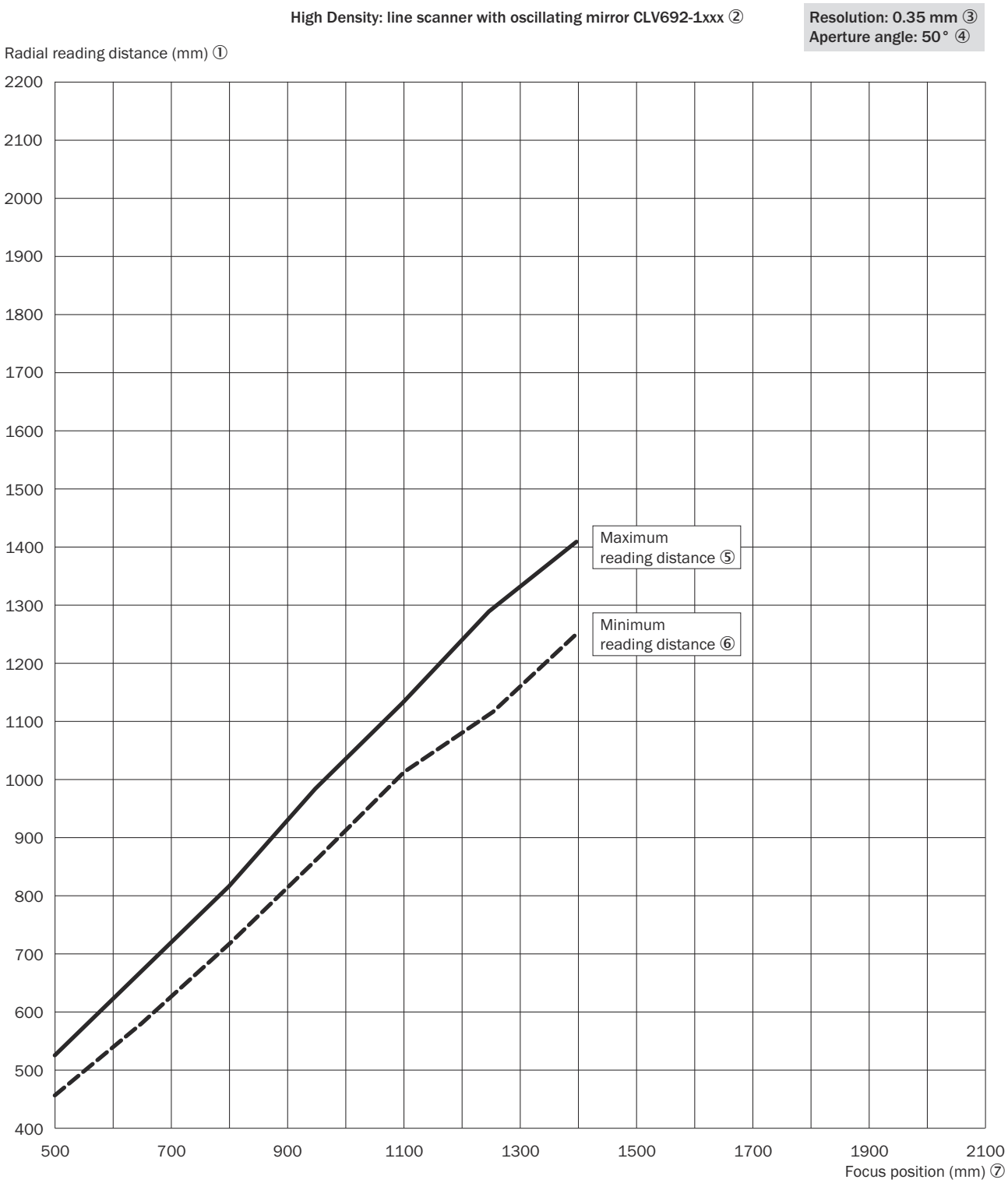

Figure 99: CLV692-1xxx (High Density): min. and max. radial reading distance depending on the focus position at a resolution of 0.35 mm and aperture angle of α = 50°

① Radial reading distance (mm)
② High Density: line scanner with oscillating mirror CLV692-1xxx
③ Resolution: 0.35 mm
④ Aperture angle: 50°
⑤ Maximum reading distance
⑥ Minimum reading distance

⑦ Focus position (mm)

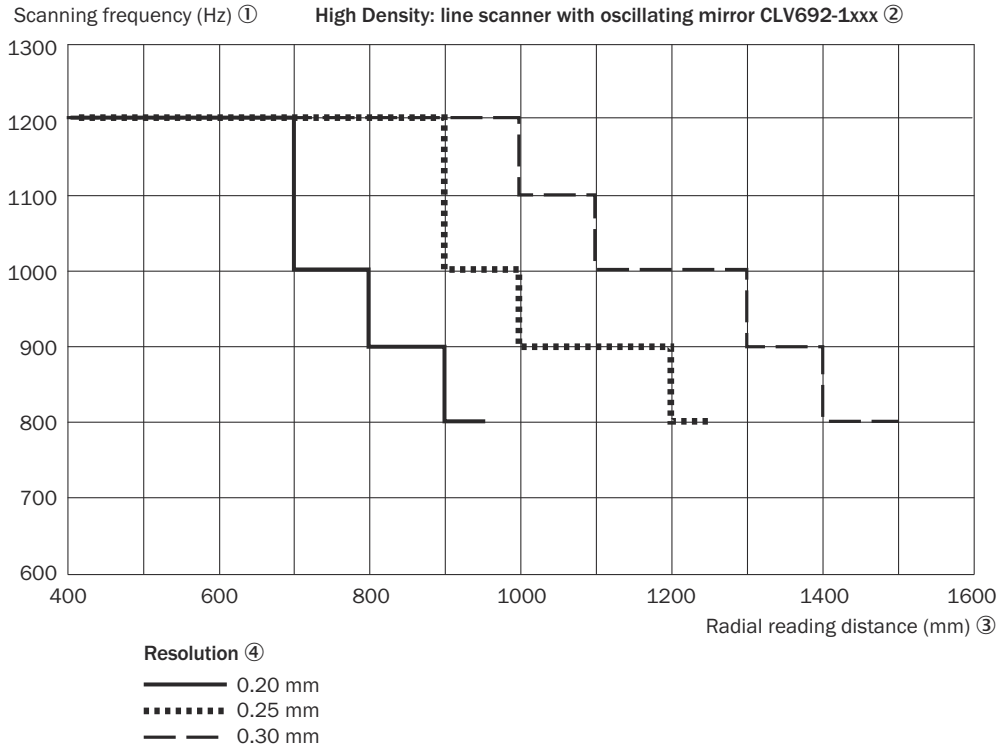

Figure 100: CLV692-1xxx (High Density): characteristic curve field scanning frequency depending on the radial reading distance and resolution

① Scanning frequency (Hz)

② High Density: line scanner with oscillating mirror CLV692-1xxx

③ Radial reading distance (mm)

④ Resolution

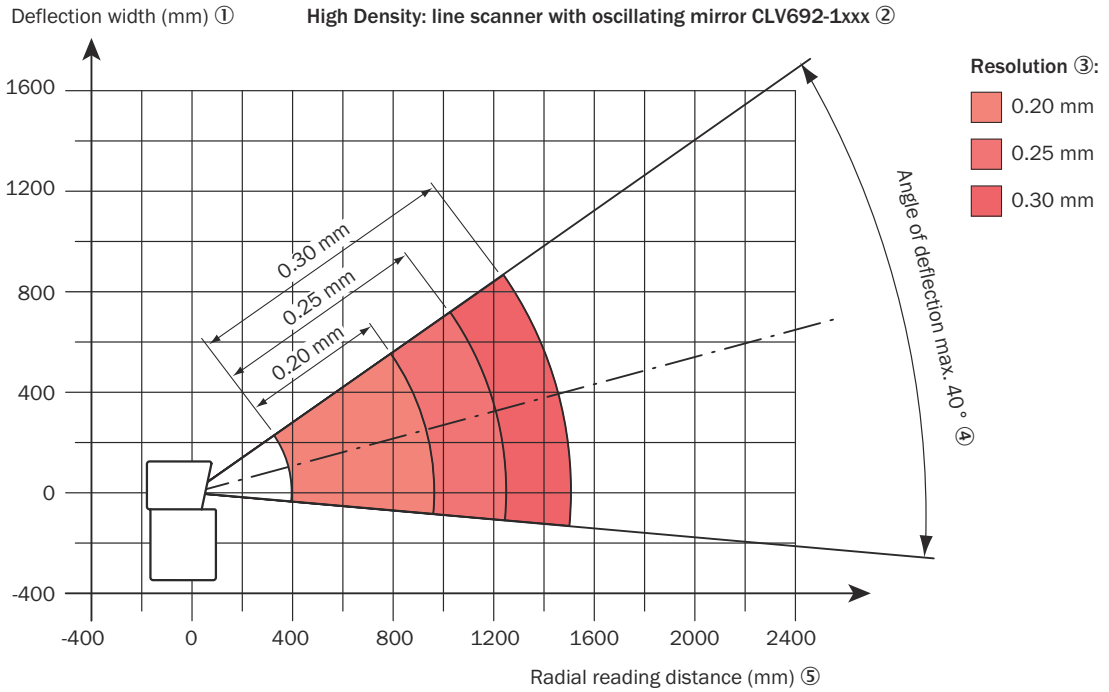

Figure 101: CLV692-1xxx (High Density): deflection width depending on the radial reading distance, angle of deflection and resolution

① Deflection width (mm)
② High Density: line scanner with oscillating mirror CLV692-1xxx
③ Resolution
④ Angle of deflection max. 40°
⑤ Radial reading distance (mm)

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).

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 CLV69x series are certified to UL60950-1.

The use of the following cloning plugs is covered by the UL certification: B (part no. 2062452), C (part no. 2062453), E (part no. 2074708), F (part no. 2074710).

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 Dimensional drawings electronic formats

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

- www.sick.com/CLV69x

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

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

Adapter cable, straight female connector, open end

Part no. 2070425 (3 m), part no. 2070426 (5 m), part no. 2070427 (10 m), shielded, suitable for 2 A, suitable for drag chain

For CLV69x-xxx0 (without heating), with cloning plug part no. 2062452 (B)

Ambient temperature range:

For mobile installation: –25 °C to +80 °C, for fixed installation: –40 °C to +80 °C

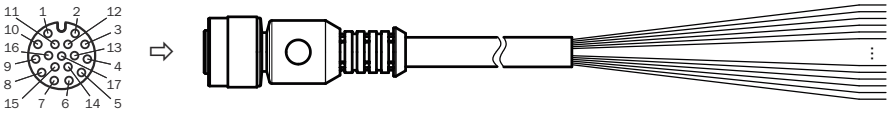

Figure 102: Adapter cable, e.g., part no. 2070425 (3 m)

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

② Figure may differ.

Table 36: Signal assignment of adapter cable with open end

Pin	Signal	Function	Wire color
1	GND	Ground	Blue
2	V_S	Supply voltage	Brown
3	CAN L	CAN bus (IN/OUT)	Green
4	CAN H	CAN bus (IN/OUT)	White
5	TD+ (RS-422/485), host	Host interface (sender+)	Pink
6	TD– (RS-422/485), host TxD (RS-232), host	Host interface (sender-)	Yellow
7	TxD (RS-232), Aux	AUX interface (sender)	Black
8	RxD (RS-232), Aux	AUX interface (receiver)	Gray
9	SensGND	Ground digital inputs	White-black
10	Sensor 1	Digital input 1	Violet
11	RD+ (RS-422/485), host	Host interface (receiver+)	Gray-pink
12	RD– (RS-422/485), host RxD (RS-232), host	Host interface (receiver–)	Red-blue
13	Result 1	Digital output 1	White-green
14	Result 2	Digital output 2	Brown-green
15	Sensor 2	Digital input 2	White-yellow
16	N. c.	Not connected	Yellow-brown
17	N. c.	Not connected	White-gray

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

Adapter cable, straight female connector, open

Part no. 2075220 (5 m), shielded, suitable for 2 A, suitable for drag chain, deep-freeze compatible

For CLV69x-xxx0 (without heating), with cloning plug part no. 2062452 (B)

Permitted currents for ambient temperature +40 °C:

- Contact 1 (blue) and contact 2 (brown): 2 A
- All other contacts: 1.5 A

Ambient temperature range:

For mobile installation: –25 °C to +40 °C, for fixed installation:: –35 °C to +40 °C

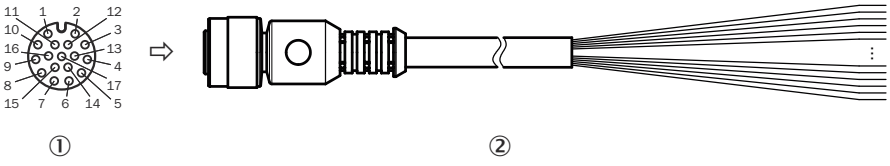

Figure 103: Adapter cable, part no. 2075220

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

② Figure may differ.

Table 37: Signal assignment of adapter cable with open end

PIN	Signal	Function	Wire color
1	GND	Ground	Brown
2	V_S	Supply voltage	Blue
3	CAN L	CAN bus (IN/OUT)	White
4	CAN H	CAN bus (IN/OUT)	Green
5	–	–	Pink
6	TxD (RS-232), host	Host interface (sender)	Yellow
7	–	–	Black
8	–	–	Gray
9	SensGND	Ground for digital inputs	Red
10	Sensor 1	Digital input 1	Violet
11	–	–	Gray-pink
12	RxD (RS-232), host	Host interface (receiver)	Red-blue
13	Result 1	Digital output 1	White-green
14	Result 2	Digital output 2	Brown-green
15	Sensor 2	Digital input 2	White-yellow
16	Result 3	Digital input 3	Yellow-brown
17	N. c.	–	White-gray

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

Adapter cable, Ecolab

Part no. 2081094 (2 m), shielded, Ecolab, suitable for 2 A

For CLV69x-xxx0 (without heating), with cloning plug part no. 2062452 (B): “Host/Aux, I/O” connection

Ambient temperature range:

For mobile installation: –25 °C to +80 °C, for fixed installation: –40 °C to +80 °C

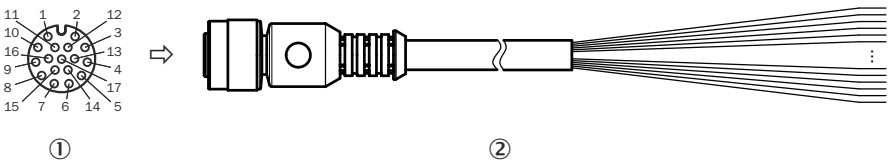

Figure 104: Adapter cable, e.g. part no. 2081094 (2 m)

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

② Figure may differ.

Table 38: Signal assignment of adapter cable with open end

Pin	Signal	Function	Wire color
1	GND	Ground	Blue
2	V_S	Supply voltage	Brown
3	CAN L	CAN bus (IN/OUT)	Green
4	CAN H	CAN bus (IN/OUT)	White
5	TD+ (RS-422/485), host	Host interface (sender+)	Pink
6	TD– (RS-422/485), host TxD (RS-232), host	Host interface (sender-)	Yellow
7	TxD (RS-232), Aux	AUX interface (sender)	Black
8	RxD (RS-232), Aux	AUX interface (receiver)	Gray
9	SensGND	Ground digital inputs	White-black
10	Sensor 1	Digital input 1	Violet
11	RD+ (RS-422/485), host	Host interface (receiver+)	Gray-pink
12	RD– (RS-422/485), host RxD (RS-232), host	Host interface (receiver–)	Red-blue
13	Result 1	Digital output 1	White-green
14	Result 2	Digital output 2	Brown-green
15	Sensor 2	Digital input 2	White-yellow
16	N. c.	Not connected	Yellow-brown
17	N. c.	Not connected	White-gray

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

Device	Connection module
CLV69x	CDB650-204, CDM420-0006, -0007, CDM490-0001

Adapter cable, straight female connector, open end

Part no. 2020319 (3 m), unshielded

Ambient temperature range:

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

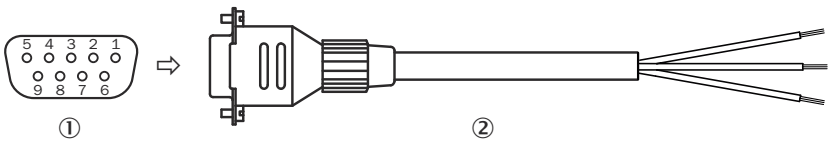

Figure 105: Adapter cable, part no. 2020319

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

② Figure may differ.

② Illustration may differ

Table 39: 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	–	–	–

Pin	Signal at computer	Function	Wire color
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

Adapter cable V24-only for CLV69x with heating (CLV69x-xxx1)

Part no. 2095608 (5 m), unshielded, suitable for drag chain, deep-freeze compatible

For mobile installation: –25 °C to +80 °C, for fixed installation: –40 °C to +80 °C

Ambient temperature range:

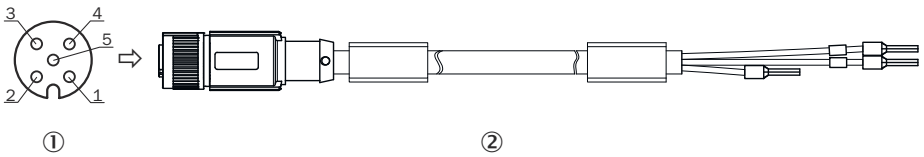

Figure 106: Adapter cable, e.g. part no. 2095608 (5 m)

① Female connector, M12, 5-pin, A-coded (front view)

② Illustration may differ

Table 40: Signal assignment of adapter cable with open end

Pin	Signal	Function	Wire color / characters
1	–	Shielding	Gray
2	V_S	Supply voltage	Red +
3	GND	Ground	Blue –
4	–	–	–
5	–	–	–

Adapter cable CAN-only for CLV69x

Part no. 6053720 (5 m), part no. 6053721 (10 m), shielded, deep-freeze compatible

For cloning plug part no. 2062453 (C) and part no. 2024708 (E): connection “CAN 1 OUT”

Ambient temperature range:

For mobile installation: –20 °C to +30 °C, for fixed installation: –40 °C to +80 °C

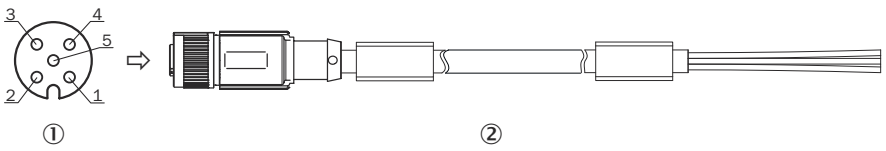

Figure 107: Adapter cable, e.g., part no. 6053720 (5 m)

① Female connector, M12, 5-pin, A-coded (view from front)

② Illustration may differ

Table 41: Signal assignment of adapter cable with open end

Pin	Signal	Function	Wire color
1	–	Shield	–
2	–	–	–

Pin	Signal	Function	Wire color
3	–	–	–
4	CAN_H	CAN bus	White
5	CAN_L	CAN bus	Blue

14.5 Connection diagrams of connection module CDB650-204

14.5.1 Connection of the device to CDB650-204

Device = CLV69x-x0xY (Y = 0 without heating, Y = 1 with heating), with cloning plug B (part no. 2062452)

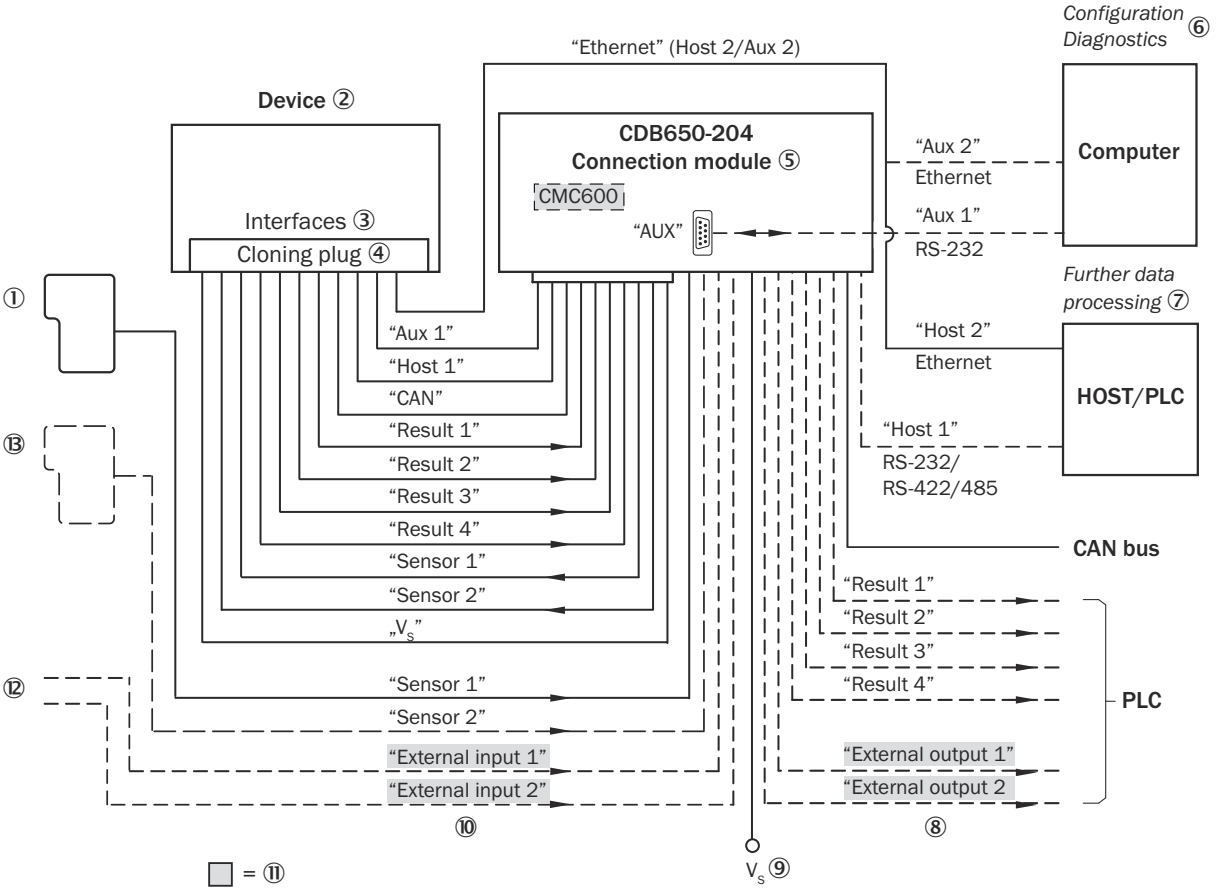

Figure 108: Connection of the device to peripherals via CDB650-204 (overview)

① External trigger sensor, e.g. for read cycle generation
② Device
③ Interfaces
④ Cloning plug B (part no. 2062452)
⑤ Connection module
⑥ Configuration or diagnostics
⑦ Data further processing
⑧ External digital outputs
⑨ Supply voltage V_S
⑩ External digital inputs
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).
⑫ Other functions
⑬ Can also be used as an alternative stop reading cycle (e.g., photoelectric sensor) or travel increment (incremental encoder), depending on the application

14.5.2 Wiring overview of the CDB650-204

Device = CLV69x-x0xY (Y = 0 without heating, Y = 1 with heating), with cloning plug B (part no. 2062452), 1 digital input used

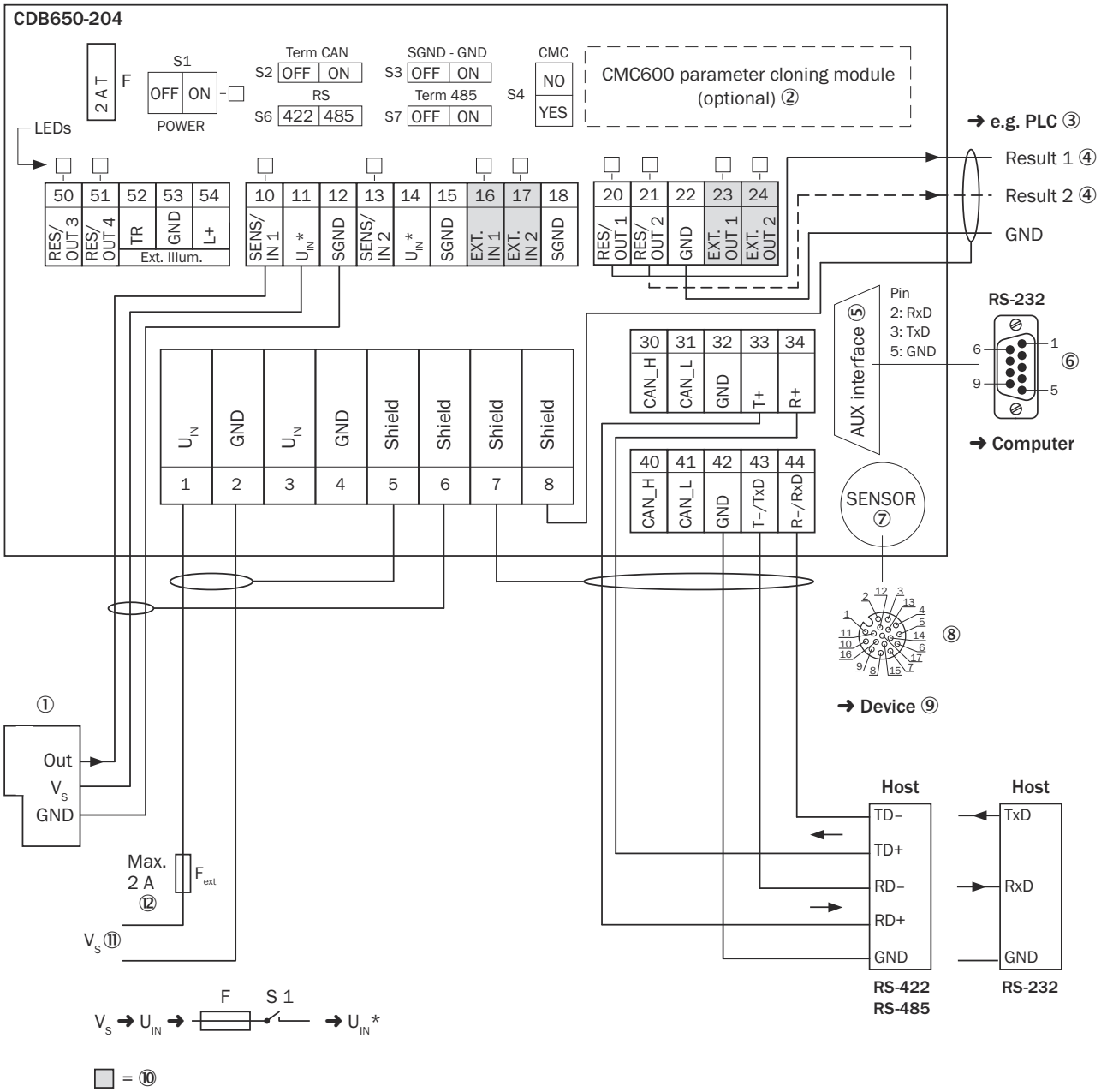

Figure 109: Overview: connection of device (without heating) and peripherals to the CDB650-204 connection module.

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 SENSOR = Device
⑧ Female connector, M12, 17-pin, A-coded
⑨ Device to be connected without heating
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
⑫ Protection of the supplied supply voltage by external fuse provided by the user at the start of the supply cable

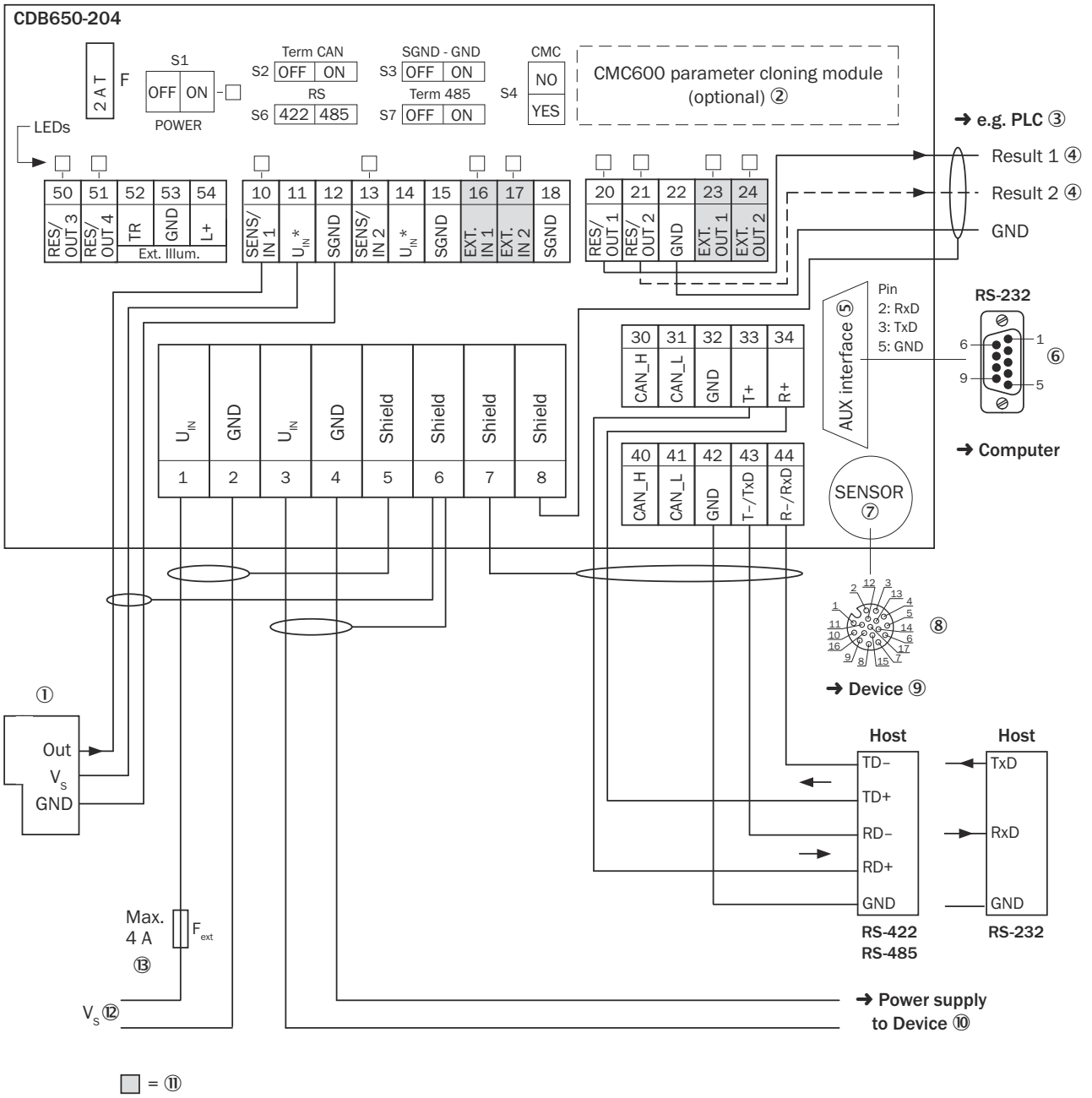

Figure 110: Overview: connection of device (with heating) and peripherals to the CDB650-204 connection module.

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 SENSOR = Device
⑧ Female connector, M12, 17-pin, A-coded
⑨ Device with heating to be connected: interfaces Host, AUX, I/O
⑩ Supply voltage to device with heating
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).
⑫ Supply voltage V_S
⑬ Protection of the supplied supply voltage by external fuse provided by the user at the start of the supply cable

14.5.3 Connecting supply voltage for the device in CDB650-204

Device = CLV69x-x0xY (Y = 0 without heating, Y = 1 with heating), with cloning plug B (part no. 2062452)

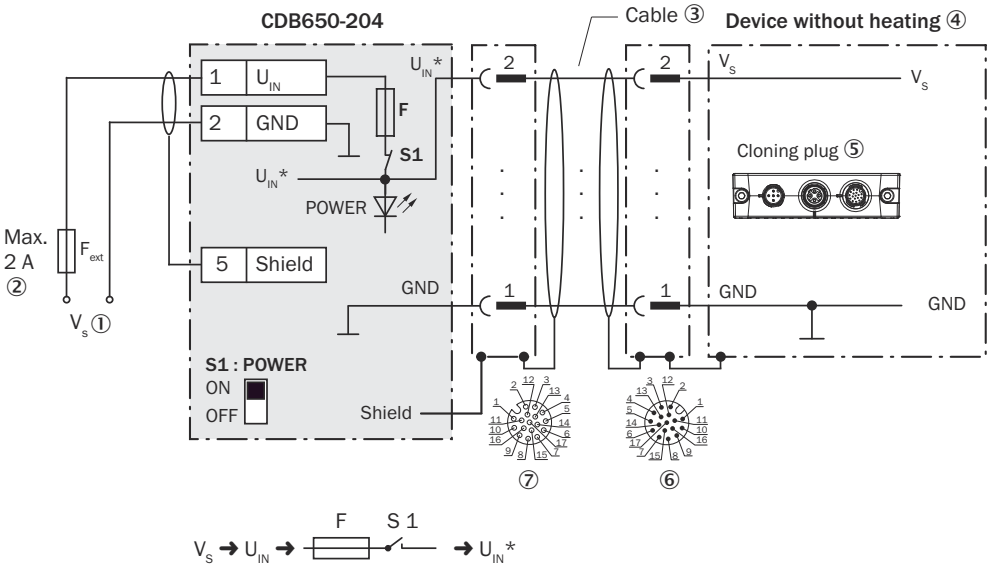

Figure 111: Device without heating: connect the supply voltage for the device in the CDB650-204 connection module.

① Supply voltage V_S
② Protection of the supplied supply voltage by external fuse provided by the user at the start of the supply cable
③ Connection cable 1:1 with male connector, M12, 17-pin, A-coded and female connector, M12, 17-pin, A-coded
④ Device without heating
⑤ Cloning plug B (part no. 2026452)
⑥ Device: male connector, M12, 17-pin, A-coded
⑦ Connection module: female connector, M12, 17-pin, A-coded

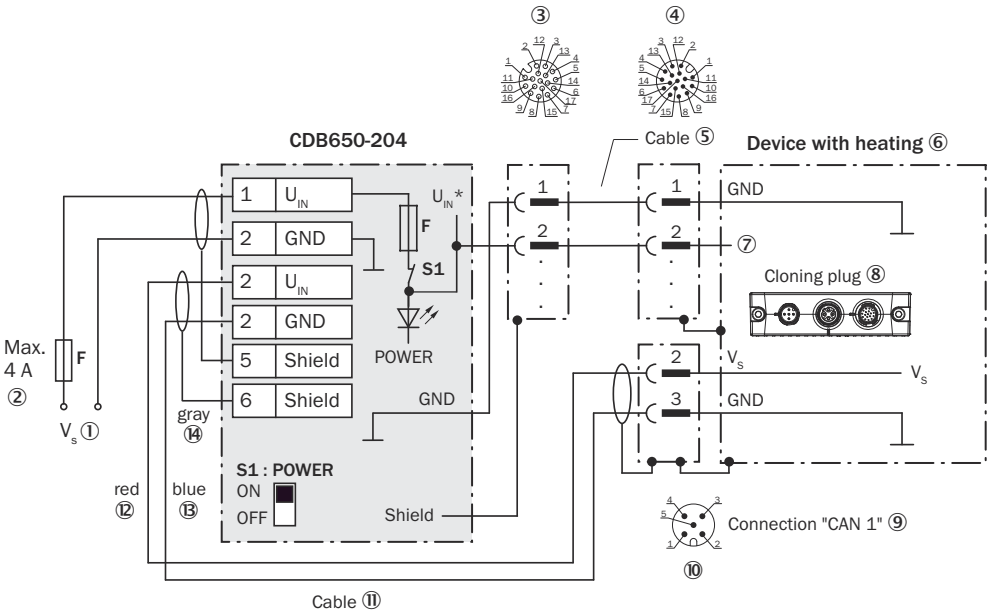

Figure 112: Device with heating: connect the supply voltage for the device in the CDB650-204 connection module.

① Supply voltage V_S
② Protection of the supplied supply voltage by external fuse provided by the user at the start of the supply cable
③ Connection module: female connector, M12, 17-pin, A-coded
④ Device: male connector, M12, 17-pin, A-coded
⑤ Connection cable 1:1 with male connector, M12, 17-pin, A-coded and female connector, M12, 17-pin, A-coded
⑥ Device with heating
⑦ Pin 2 not connected in device with heating
⑧ Cloning plug B (part no. 2026452)
⑨ Connection “CAN 1”
⑩ Device: male connector, M12, 5-pin, A-coded
⑪ Adapter cable with female connector, M12, 5-pin, A-coded and open end
⑫ Red wire (+), e.g. cable part no. 6053224, 2-wire, shielded, 5 m
⑬ Blue wire (-), e.g. cable part no. 6053224, 2-wire, shielded, 5 m
⑭ Gray wire (shield), e.g. cable part no. 6053224, 2-wire, shielded, 5 m

Function of switch S1

Table 42: Switch S1: Power

Switch setting	Function
ON	Supply voltage U_{IN} connected to CDB650-204 and device via fuse and switch S1 as a supply voltage U_{IN}* Supply voltage U_{IN}* can be additionally tapped at terminals 11 and 14.
OFF	CDB650-204 and device disconnected from supply voltage Recommended setting for all connection work

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

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B (part no. 2062452)

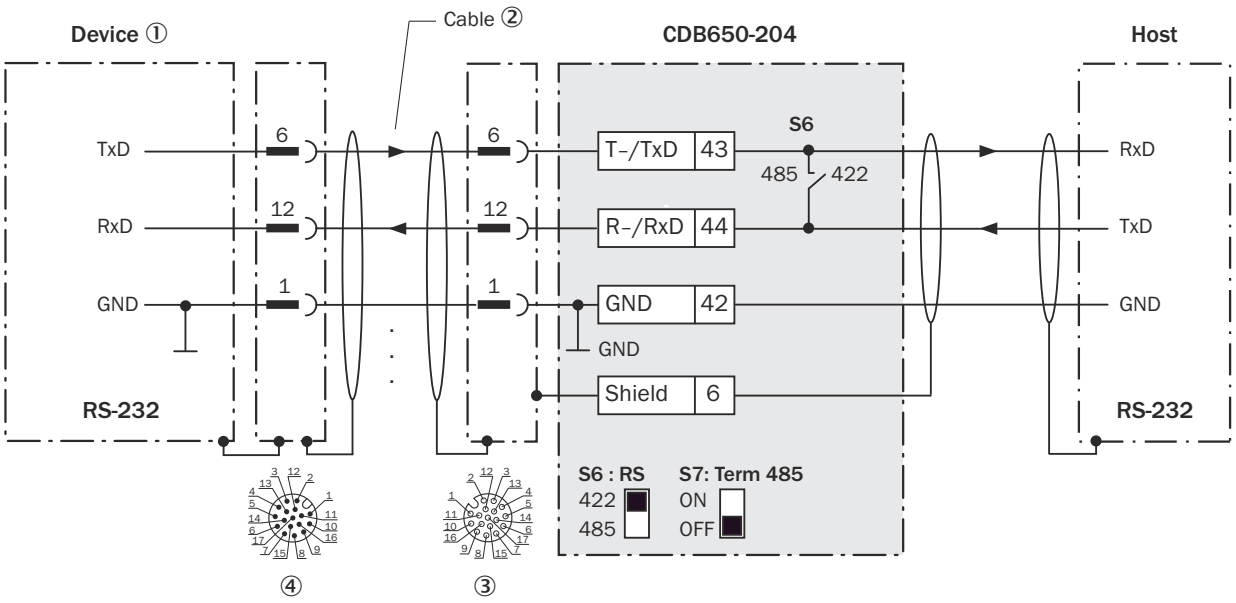

Figure 113: Wiring data interface RS-232 of the device in connection module CDB650-204.

① Device
② Connection cable 1:1 with female connector, M12, 17-pin, A-coded and male connector, M12, 17-pin, A-coded
③ Connection module: female connector, M12, 17-pin, A-coded
④ Device: male connector, M12, 17-pin, A-coded

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

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

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B (part no. 2062452)

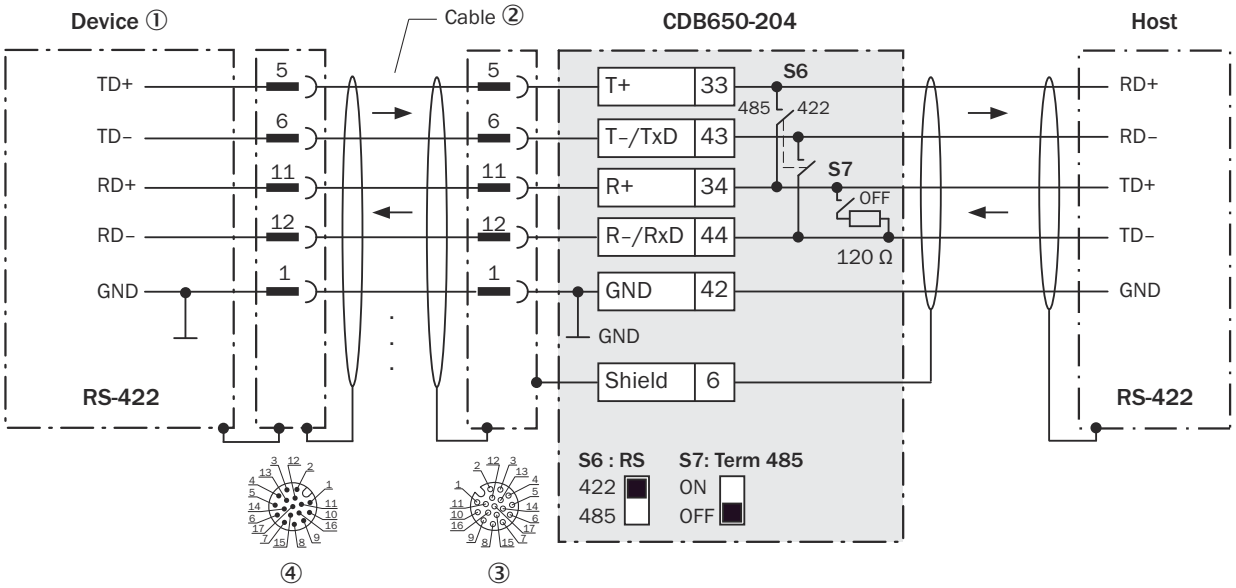

Figure 114: Wiring data interface RS-422 of the device in connection module CDB650-204.

① Device
② Connection cable 1:1 with female connector, M12, 17-pin, A-coded and male connector, M12, 17-pin, A-coded
③ Connection module: female connector, M12, 17-pin, A-coded
④ Device: male connector, M12, 17-pin, A-coded

Function of switch S7

Table 43: Switch S7: Term 485

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

NOTE
User of the RS-422 data interface:

- The relevant interface drivers for the device comply with the standard in accordance with RS-422 and RS-485.
- The connection shown above is configured for operation of the host with permanently activated drivers (often described as “RS-422 operation”), i.e. not RS-485 operation.
- Activate the RS-422 data interface (“Point-to-Point” option) in the device using a configuration software, e.g., SOPAS ET.

14.5.6 Wiring serial host interface RS-485 of the device in CDB650-204

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B (part no. 2062452)

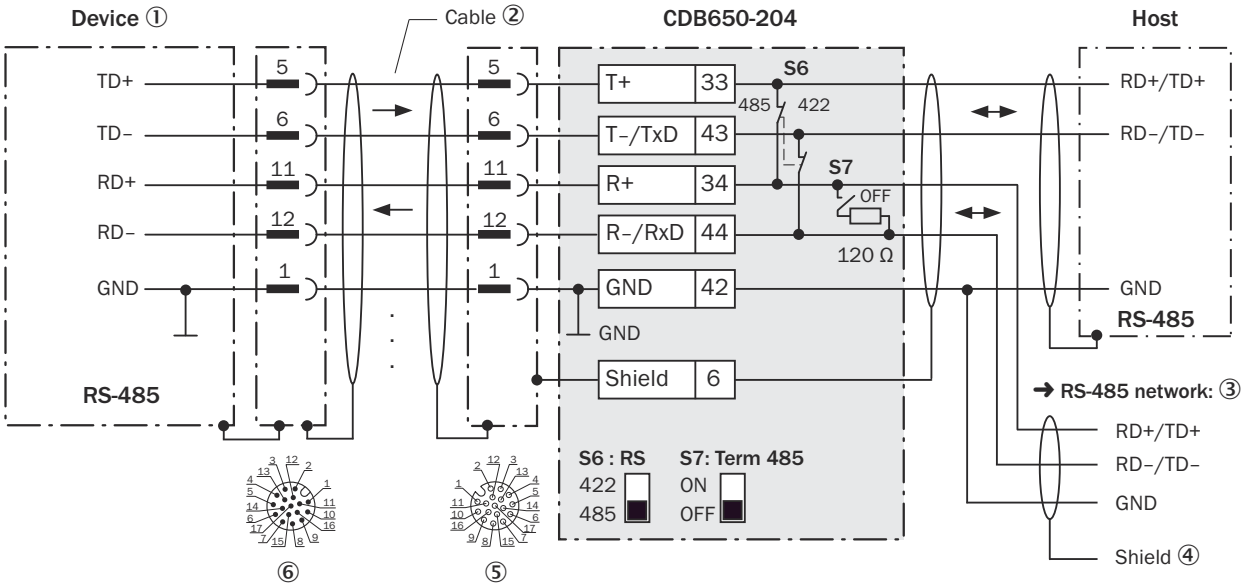

Figure 115: Wiring data interface RS-485 of the device in connection module CDB650-204.

① Device
② Connection cable 1:1 (female connector, M12, 17-pin, A-coded / male connector, M12, 17-pin, A-coded)
③ RS-485 network
④ Shielding
⑤ Connection module: female connector, M12, 17-pin, A-coded
⑥ Device: male connector, M12, 17-pin, A-coded

Function of switch S7

Table 44: Switch S7: Term 485

Switch setting	Function
ON	Terminates the device. Required if the device is located at the end of the RS-485 bus cable.
OFF	No termination

NOTE

User of the RS-485 data interface:

- The relevant interface drivers for the device comply with the standard in accordance with RS-422 and RS-485.
- This operating mode is only permitted if all connected devices use a corresponding RS-485 protocol.
- This configuration is not permitted when using the standard data output and protocol of the device. In case of doubt, contact SICK Service.
- Activate the RS-485 data interface (“Bus” option) in the device using a configuration software, e.g., SOPAS ET.

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

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B (part no. 2062452)

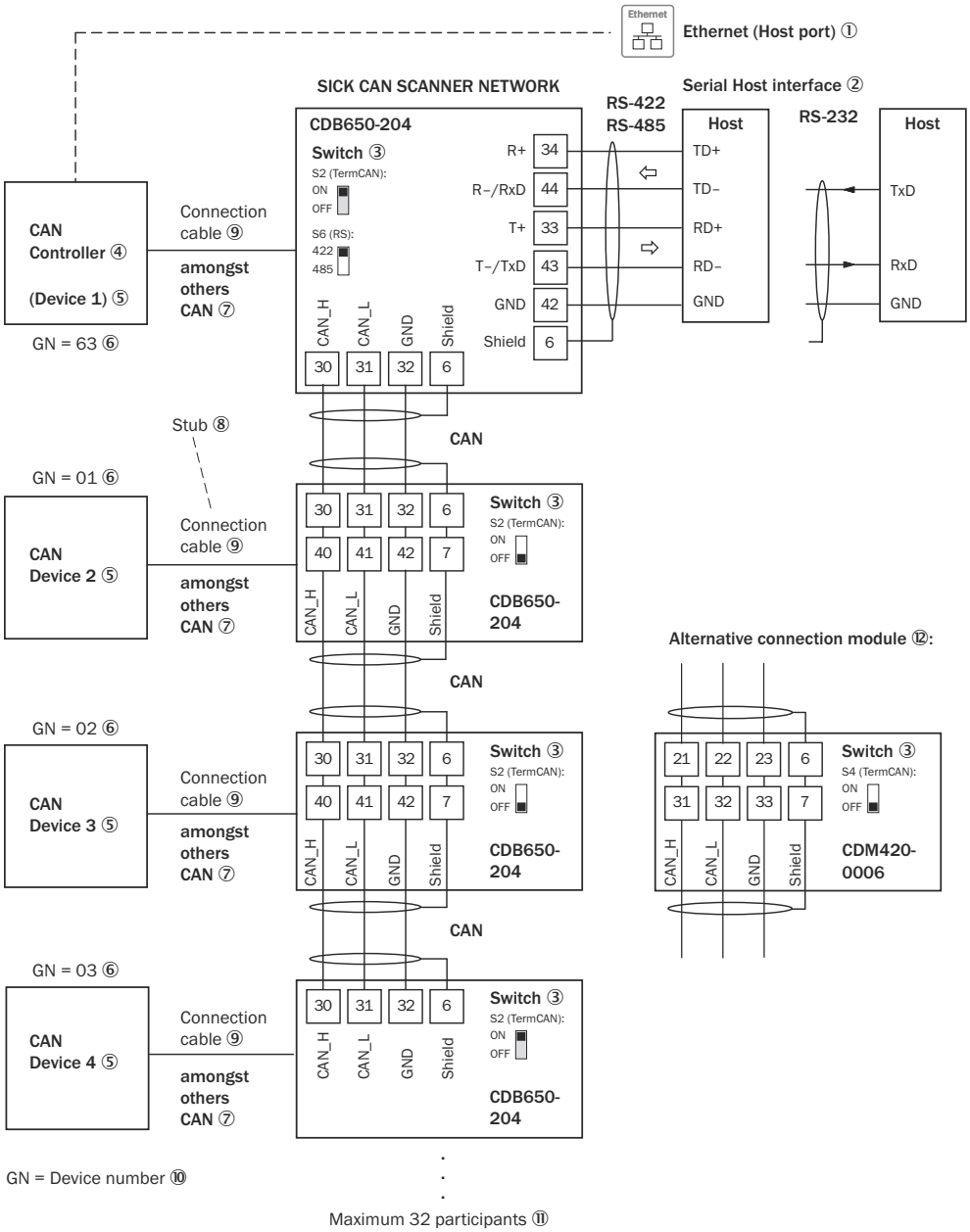

Figure 116: Wire the CAN interface of the device in the CDB650-204 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the CAN controller, for example, are disregarded here.

① Ethernet (host port): CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating) with cloning plug part no. 2062452 only
② Serial host interface
③ Switch
④ CAN controller
⑤ CAN device
⑥ Device number
⑦ CAN etc.
⑧ Branch line
⑨ CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating) with cloning plug B (part no. 2062452): connection cable 1:1 with female connector, M12, 17-pin, A-coded and male connector, M12, 17-pin, A-coded

Power is not supplied via this cable for CLV69x-xxx1 (device with heating).

CLV69x-xxxY (Y = 1 with heating) with cloning plug B: additional connecting cable required for supplying the supply voltage, with female connector, M12, 5-pin, A-coded and open end
⑩ Device number (GN)
⑪ Maximum 32 users
⑫ Example of alternative connection module

Alternative connection module for CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B (part no. 2062452): CDM420-0006

An adapter cable with female connector, M12, 17-pin, A-coded and male connector, D-Sub-HD, 15-pin is required to connect the CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating) with cloning plug B (part no. 2062452).

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.

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

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B (part no. 2062452)

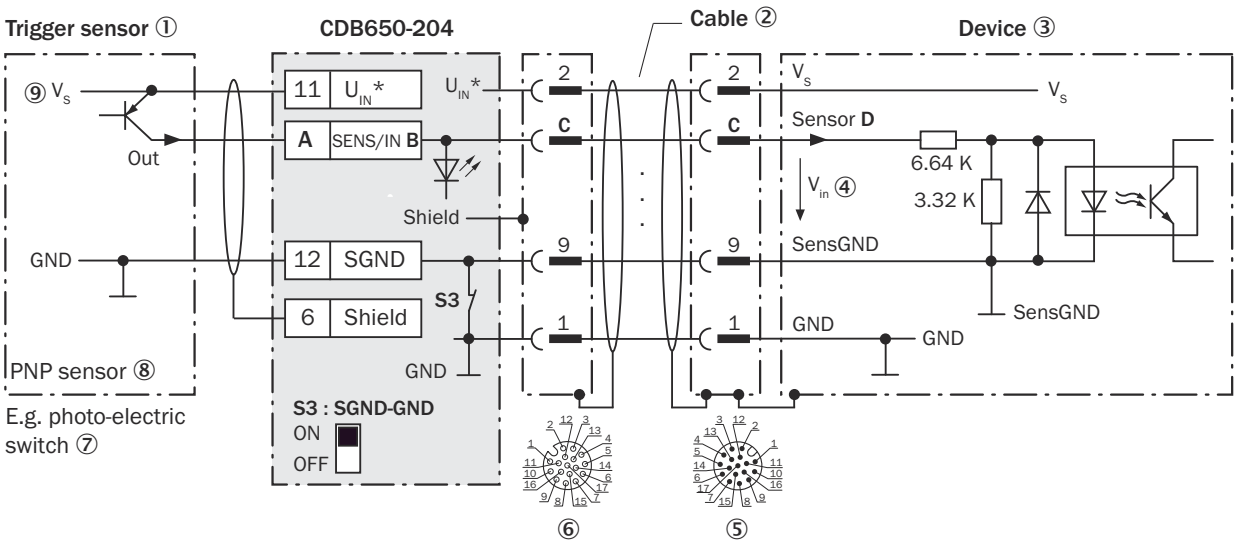

Figure 117: Trigger sensor supplied with power by connection module CDB650-204

① Trigger sensor, e.g. for read cycle generation
② Connection cable 1:1 with female connector, M12, 17-pin, A-coded and male connector, M12, 17-pin, A-coded
③ Device
④ Input voltage V_{in}
⑤ Device: male connector, M12, 17-pin, A-coded
⑥ Connection module: female connector, M12, 17-pin, A-coded
⑦ E.g. photoelectric sensor
⑧ PNP sensor
⑨ Supply voltage V_S

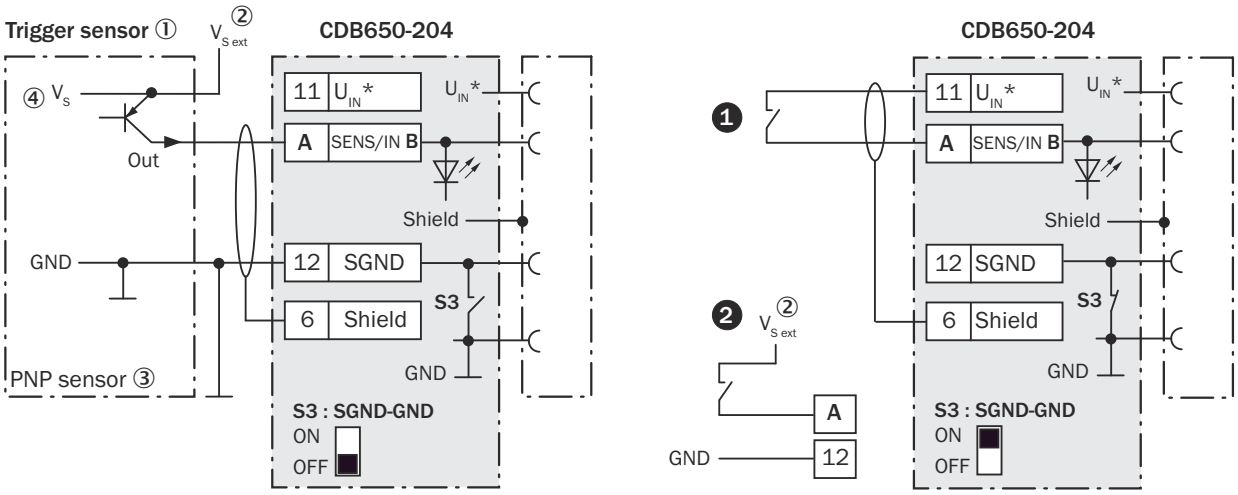

Figure 118: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDB650-204 or ❷ connected potential-free and supplied with power externally. Now select switch setting S3 as shown in the left figure.

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

Table 45: Assignment of placeholders to the digital inputs

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

Function of switch S3

Table 46: Switch S3: SGND-GND

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

Characteristic data of the digital inputs

Table 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 High: 6 V ≤ V_{in} ≤ 30 V; 0.7 mA ≤ I_{in} ≤ 5 mA

1) Input voltage.
2) Input current.

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

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

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B (part no. 2062452)

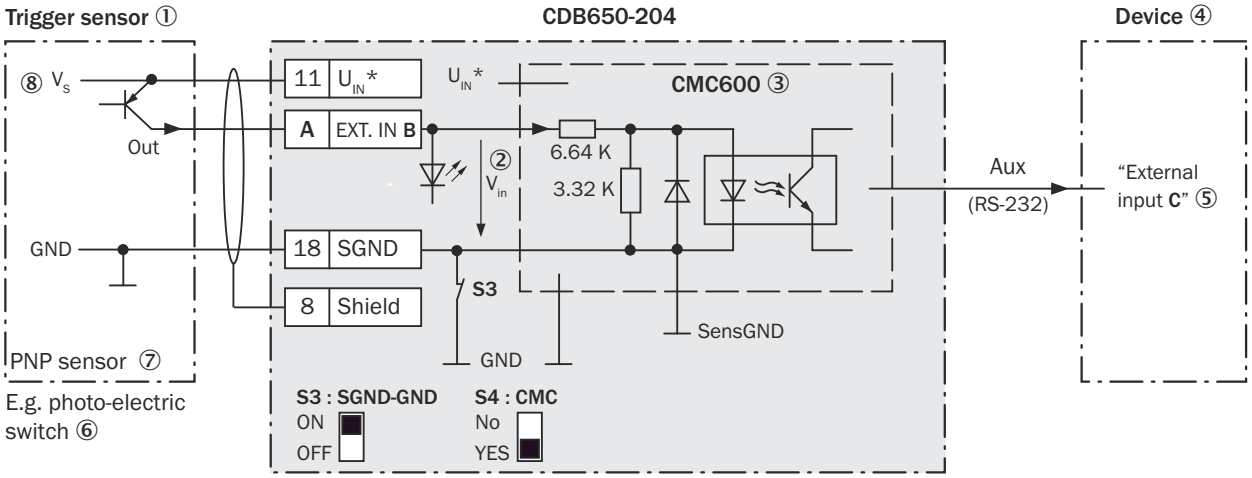

Figure 119: Trigger sensor supplied with power by connection module CDB650-204

① Trigger sensor, e.g. for read cycle generation
② Input voltage V_{in}
③ The optional CMC600 parameter cloning module is required in the connection module in order to use the additional external digital inputs and digital 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

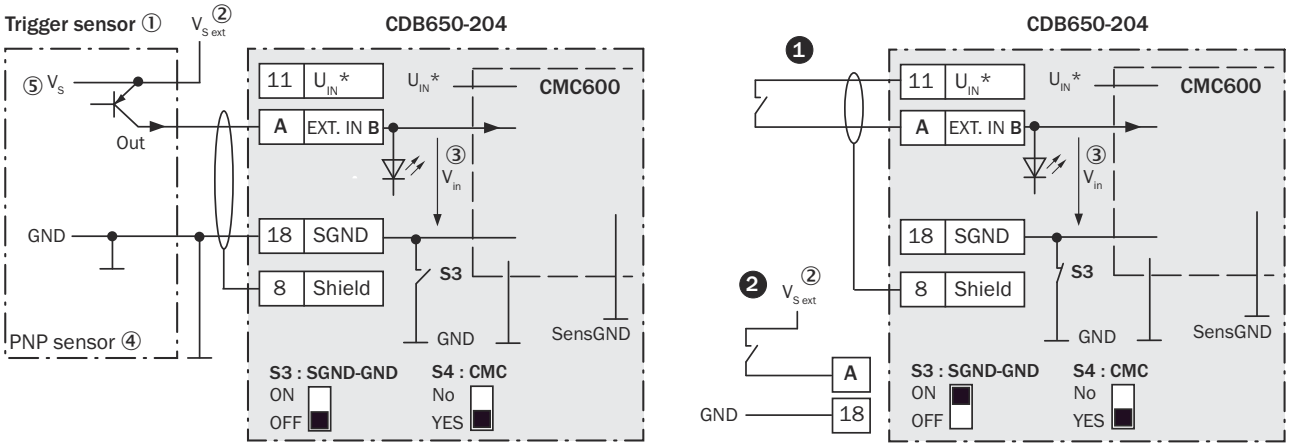

Figure 120: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDB650-204 or ❷ connected potential-free and supplied with power externally. Switch setting S3 then as in left figure.

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

Table 48: Assignment of placeholders to the external digital inputs

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

Function of switch S3

Table 49: Switch S3: SGND - GND

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

Functional principle of the external digital inputs

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

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

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

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B (part no. 2062452)

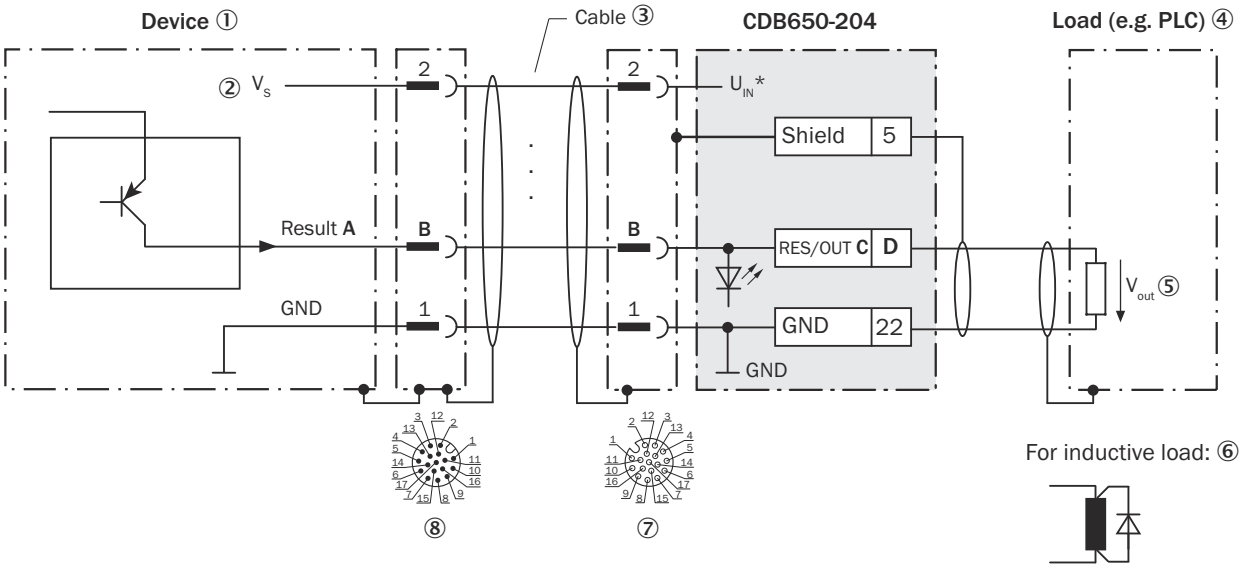

Figure 121: Wiring the "Result 1" to "Result 4" digital outputs of the device in connection module CDB650-204.

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

Inductive load

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

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

Table 51: Assignment of placeholders to the digital outputs

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

Characteristic data of the digital outputs

Table 52: Characteristic data of the "Result 1" to "Result 4" digital switching outputs

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

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

Device = CLV69x-x0xY (Y = 0 without heating, Y = 1 with heating), with cloning plug B (part no. 2062452)

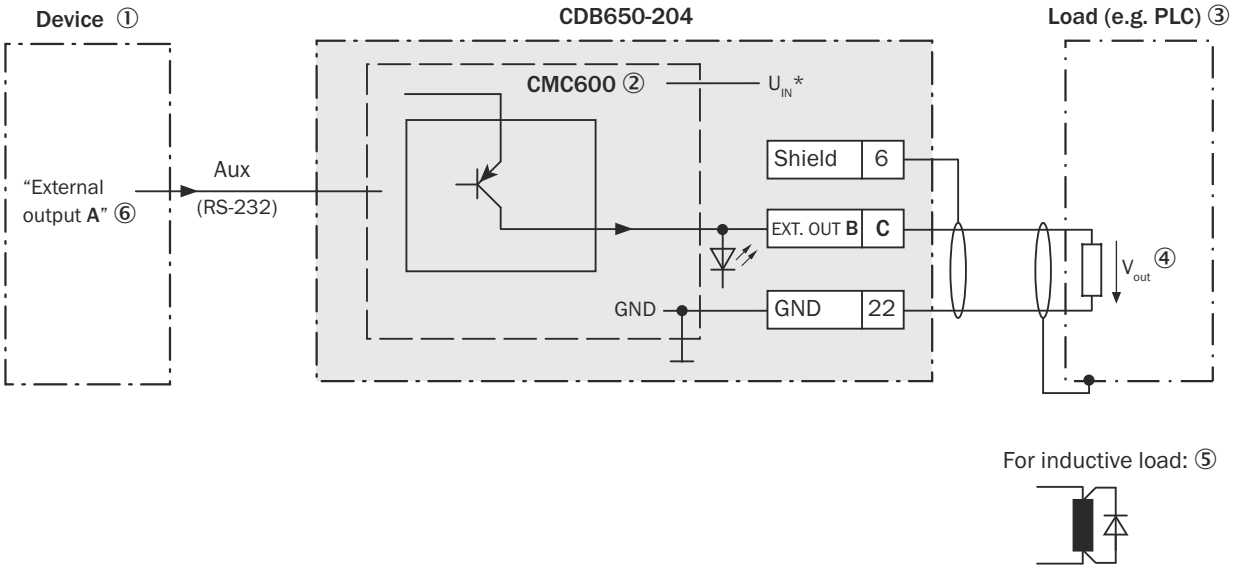

Figure 122: Wiring external "External output 1" and "External output 2" digital outputs of the device in the CDB650-204 connection module.

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

Inductive load

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

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

Table 53: Assignment of placeholders to the digital outputs

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

Functional principle of the external digital outputs

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

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

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

Characteristic data of the digital outputs

Table 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 the supply voltage V_S
Electrical values	$0\ V \le V_{out}$ [1] $\le V_S$ $(V_S - 1.5\ V) \le V_{out} \le V_S$ at I_{out} [2] $\le 100\ mA$

1) Output voltage.
2) Output current.

NOTE
Assign the functions for the external 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 = CLV69x-x0xY (Y = 0 without heating, Y = 1 with heating), with cloning plug B, part no. 2062452

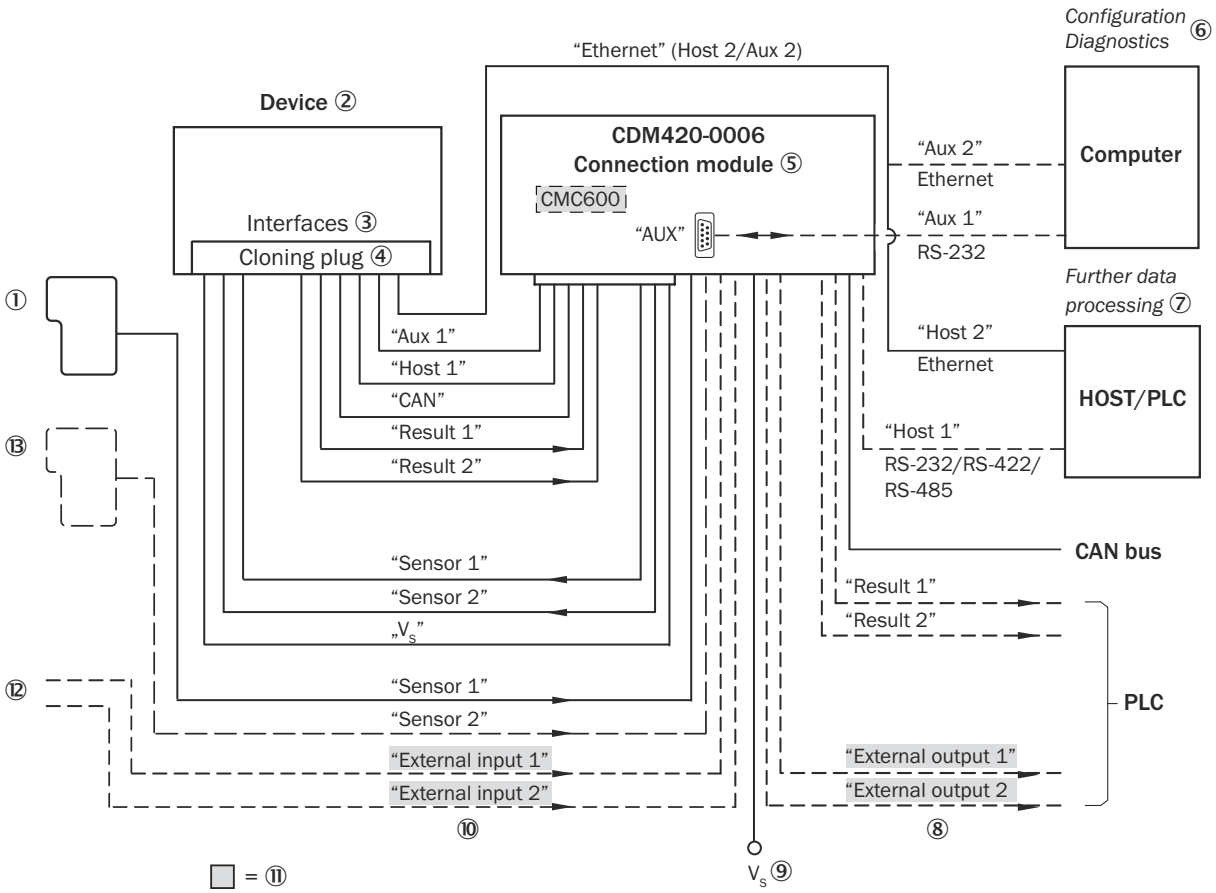

Figure 123: Connection of the device to peripherals via CDM420-0006 (overview)

① External trigger sensor, e.g. for read cycle generation
② Device
③ Interfaces
④ Cloning plug B, part no. 2062452
⑤ Connection modules
⑥ Configuration or diagnostics
⑦ Data further processing
⑧ External digital outputs (switching)
⑨ Supply voltage V_S
⑩ External digital inputs (switching)
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).
⑫ Other functions
⑬ 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 = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B, part no. 2062452, 1 digital input used

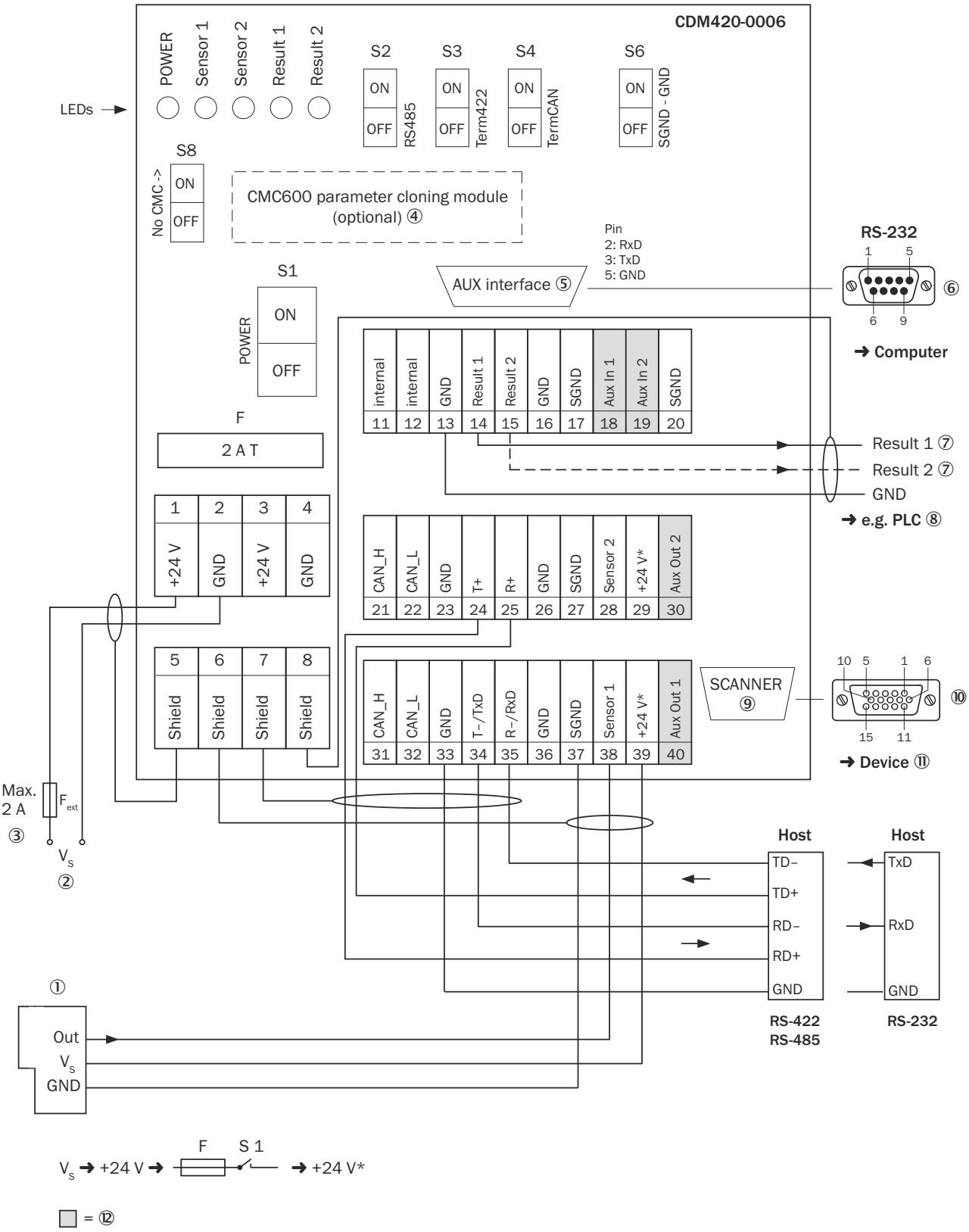

Figure 124: Overview: connection of device (without heating) and peripherals to the CDM420-0006 connection module.

① External trigger sensor, e.g. for read cycle generation
② Supply voltage V_S
③ Protection of the supplied supply voltage by external fuse provided by the user at the start of the supply cable
④ CMC600 parameter cloning module (optional)
⑤ Auxiliary interface “AUX”
⑥ Male connector, D-Sub, 9-pin
⑦ Name of the digital output
⑧ E.g., PLC (programmable logic controller)
⑨ SCANNER = Device
⑩ Female connector, D-Sub-HD, 15-pin
⑪ Device to be connected (CLV69x-xxx0, without heating), interfaces: Host, AUX, I/O, supply voltage
⑫ 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).

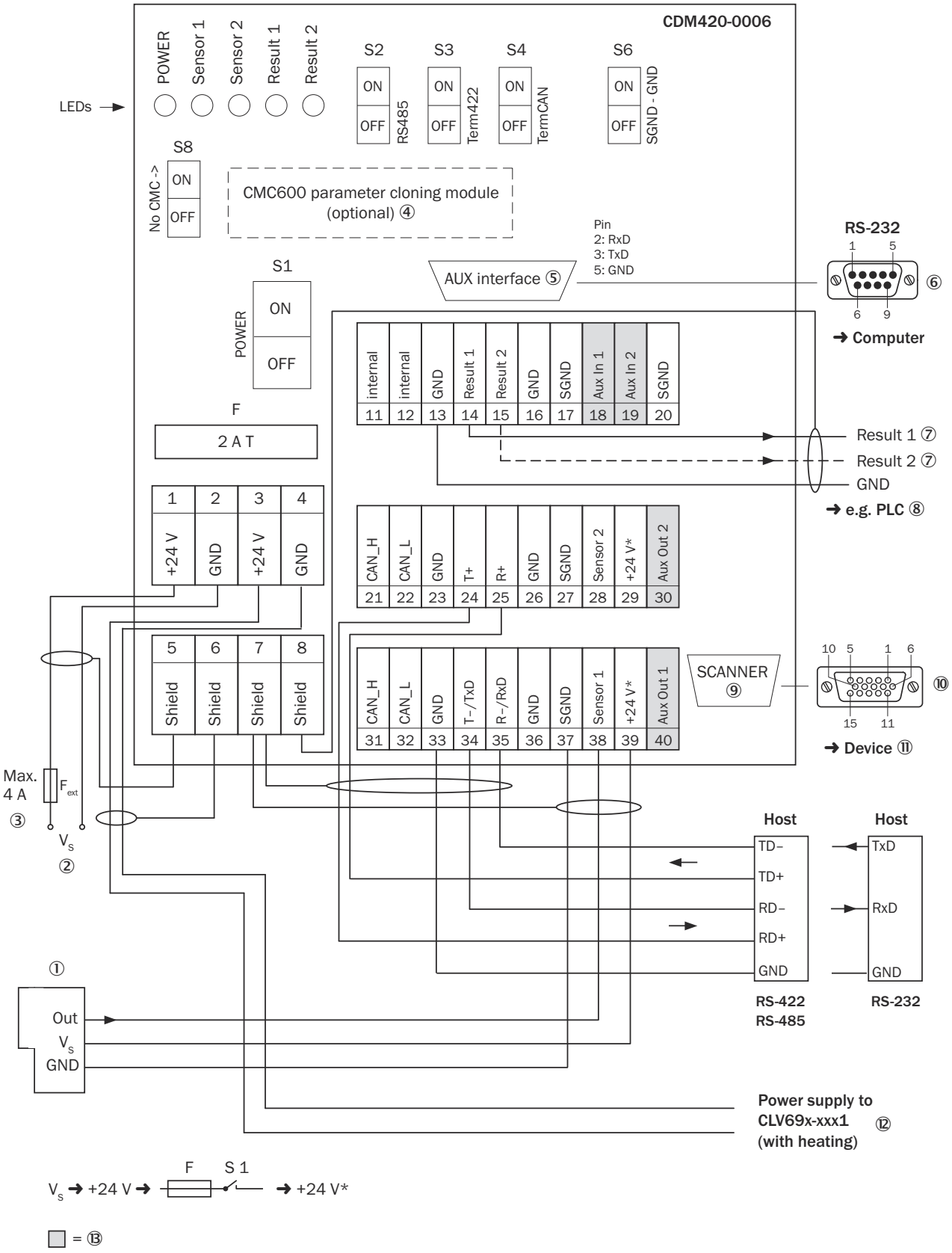

Figure 125: Overview: connection of device (with heating) and peripherals to the CDM420-0006 connection module.

① External trigger sensor, e.g. for read cycle generation
② Supply voltage V_S
③ Protection of the supplied supply voltage by external fuse provided by the user at the start of the supply cable
④ CMC600 parameter cloning module (optional)
⑤ Auxiliary interface “AUX”
⑥ Male connector, D-Sub, 9-pin
⑦ Name of the digital output
⑧ e.g. PLC (programmable logic controller)
⑨ SCANNER = Device
⑩ Female connector, D-Sub-HD, 15-pin
⑪ Device to be connected (CLV69x-xxx1, with heating), interfaces: Host, AUX, I/O
⑫ Supply voltage for device (CLV69x-xxx1, with heating)
⑬ 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 = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B, part no. 2062452

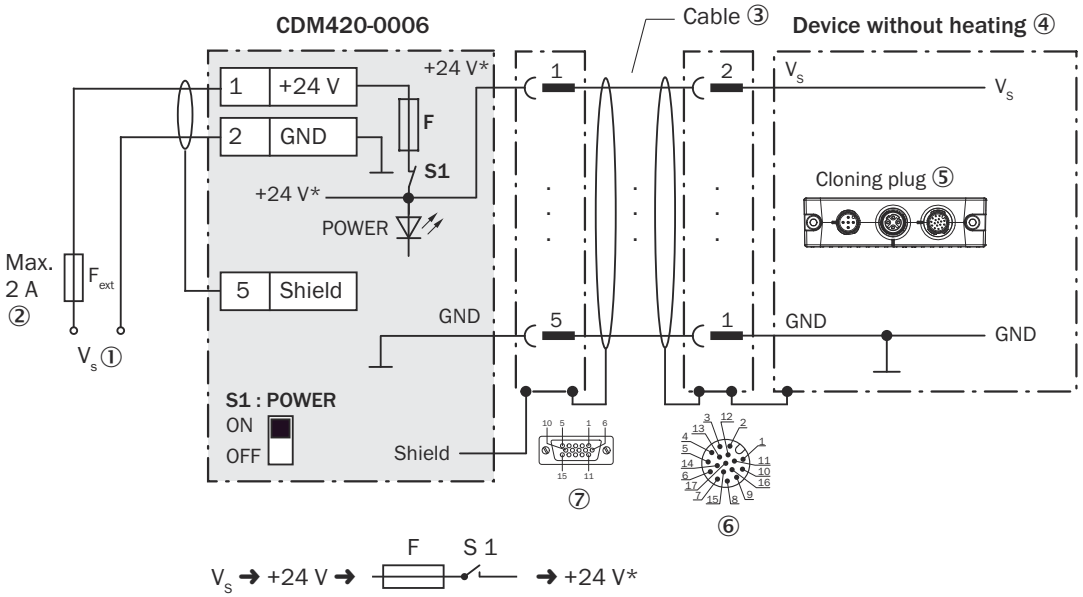

Figure 126: Device (without heating): connect the supply voltage in the CDM420-0006 connection module.

① Supply voltage V_S
② Protection of the supplied supply voltage by external fuse provided by the user at the start of the supply cable
③ Adapter cable with male connector, D-Sub-HD, 15-pin and female connector, M12, 17-pin, A-coded
④ Device without heating
⑤ Cloning plug B, part no. 2026452
⑥ Device: male connector, M12, 17-pin, A-coded
⑦ Connection module: female connector, D-Sub-HD, 15-pin

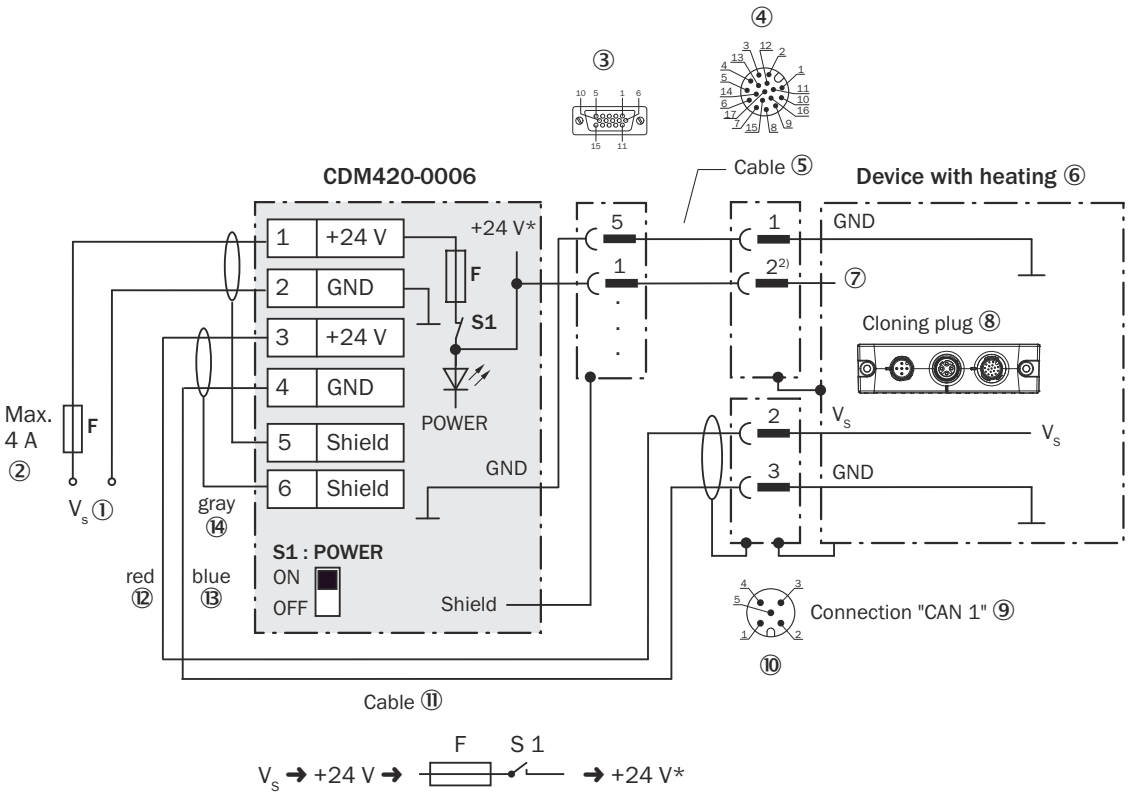

Figure 127: Device (without heating): connect the supply voltage in the CDM420-0006 connection module.

① Supply voltage V_S
② Protection of the supplied supply voltage by external fuse provided by the user at the start of the supply cable
③ Connection module: female connector, D-Sub-HD, 15-pin
④ Device: male connector, M12, 17-pin, A-coded
⑤ Adapter cable with male connector, D-Sub-HD, 15-pin and female connector, M12, 17-pin, A-coded
⑥ Device with heating
⑦ Pin 2 not connected in device with heating
⑧ Cloning plug B, part no. 2026452
⑨ Connection “CAN 1”
⑩ Device: male connector, M12, 5-pin, A-coded
⑪ Adapter cable with female connector, M12, 5-pin, A-coded and open end
⑫ Red wire (+), e.g. cable part no. 6053224, 2-wire, shielded, 5 m
⑬ Blue wire (-), e.g. cable part no. 6053224, 2-wire, shielded, 5 m
⑭ Gray wire (shield), e.g. cable part no. 6053224, 2-wire, shielded, 5 m

Function of switch S1

Table 55: 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 = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B, part no. 2062452

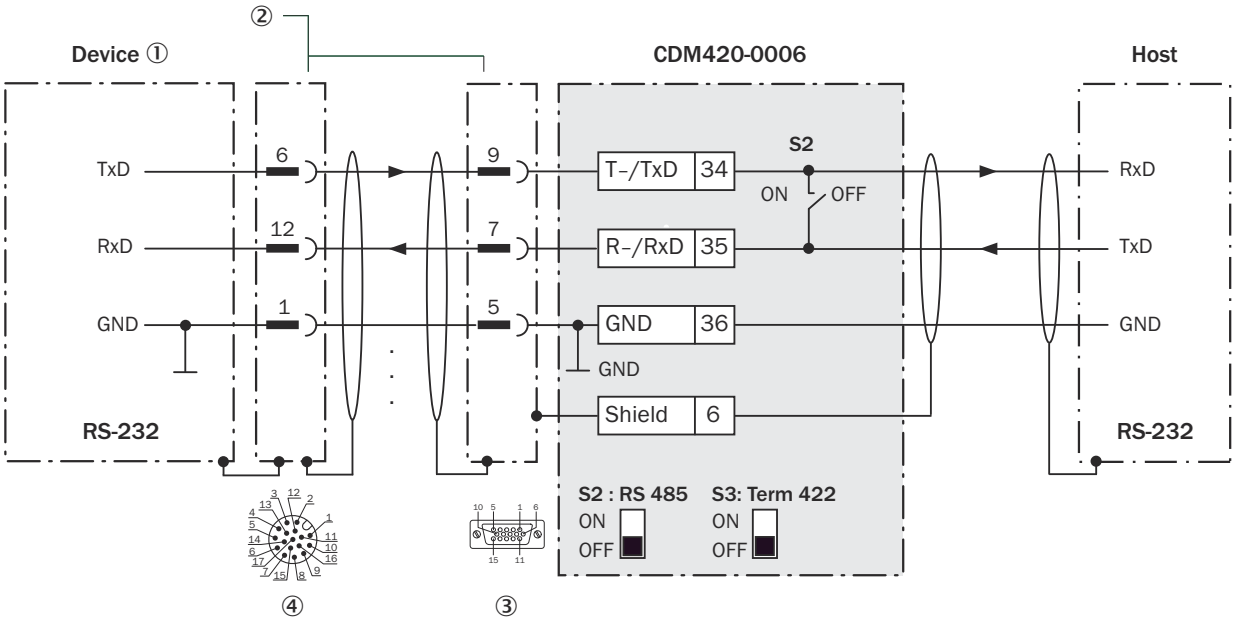

Figure 128: Wiring data interface RS-232 of the device in connection module CDM420-0006.

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

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

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B, part no. 2062452

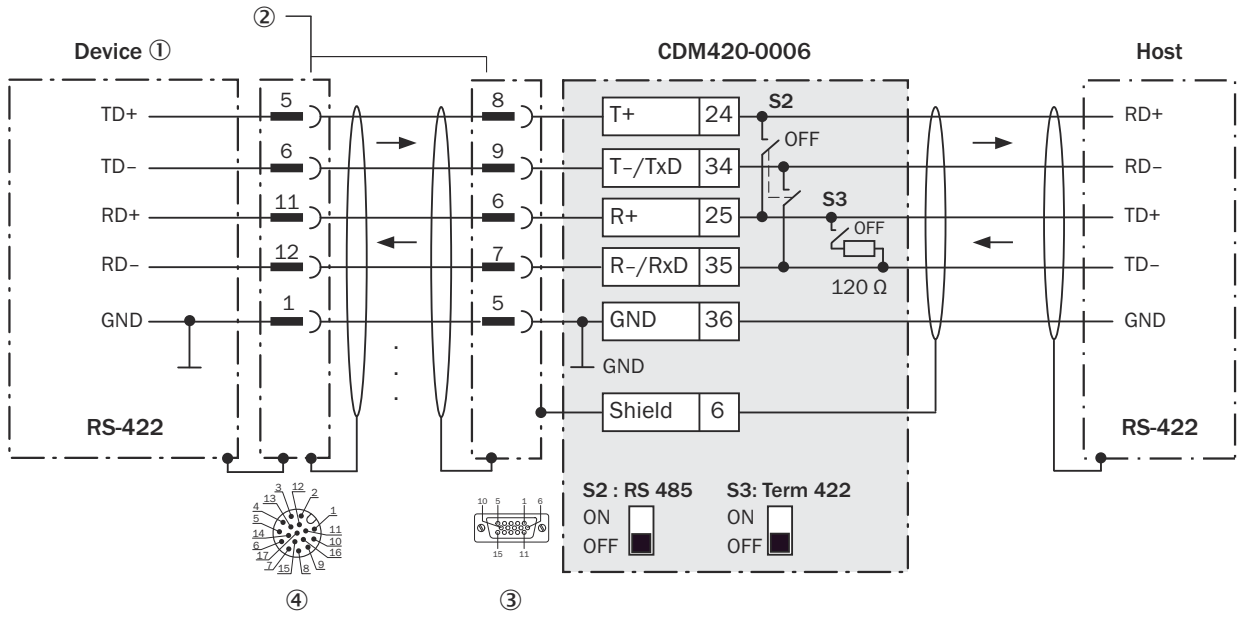

Figure 129: Wiring data interface RS-422 of the device in connection module CDM420-0006.

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

Function of switch S3

Table 56: Switch S3: Term 422

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

NOTE
Activate the RS-422 data interface (“Point-to-Point” option) in the device using a configuration software, e.g., SOPAS ET.

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

- The relevant interface drivers for the device comply with the standard in accordance with RS-422 and RS-485.
- The connection shown above is configured for operation of the host with permanently activated drivers (often described as “RS-422 operation”), i.e. not RS-485 operation.

14.6.6 Wiring serial host interface RS-485 of the device in the CDM420-0006

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B, part no. 2062452

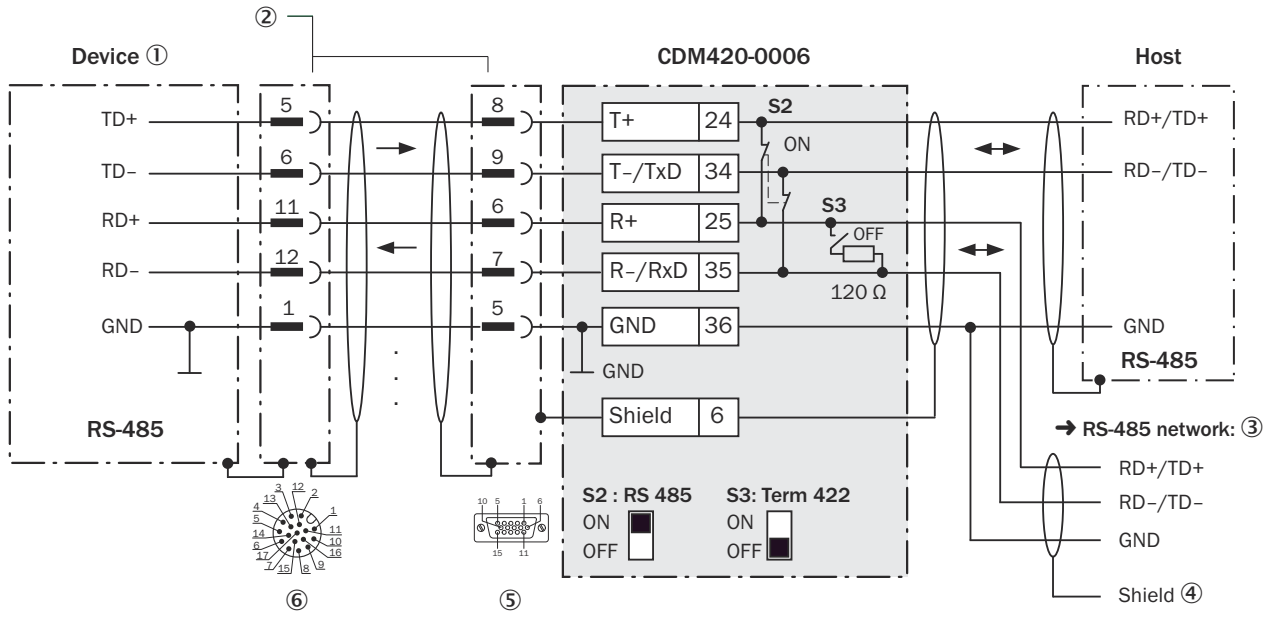

Figure 130: Wiring data interface RS-485 of the device in connection module CDM420-0006.

① Device
② Adapter cable (male connector, D-Sub-HD, 15-pin / female connector, M12, 17-pin, A-coded)
③ RS-485 network
④ Shielding
⑤ Connection module: female connector, D-Sub-HD, 15-pin
⑥ Device: male connector, M12, 17-pin, A-coded

Function of switch S3

Table 57: Switch S3: Term 422

Switch setting	Function
ON	Terminates the device. Required if the device is located at the end of the RS-485 bus cable.
OFF	No termination

NOTE
Activate the RS-485 data interface (“Bus” option) in the device using a configuration software, e.g., SOPAS ET.

The following requirements or restrictions apply when using the RS-485 data interface:

- The relevant interface drivers for the device comply with the RS-422 and RS-485standard.
- This operating mode is only permitted if all connected devices use a corresponding RS-485 protocol.
- This configuration is not permitted when using the standard data output and protocol of the device. In case of doubt, contact SICK Service.

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

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B, part no. 2062452

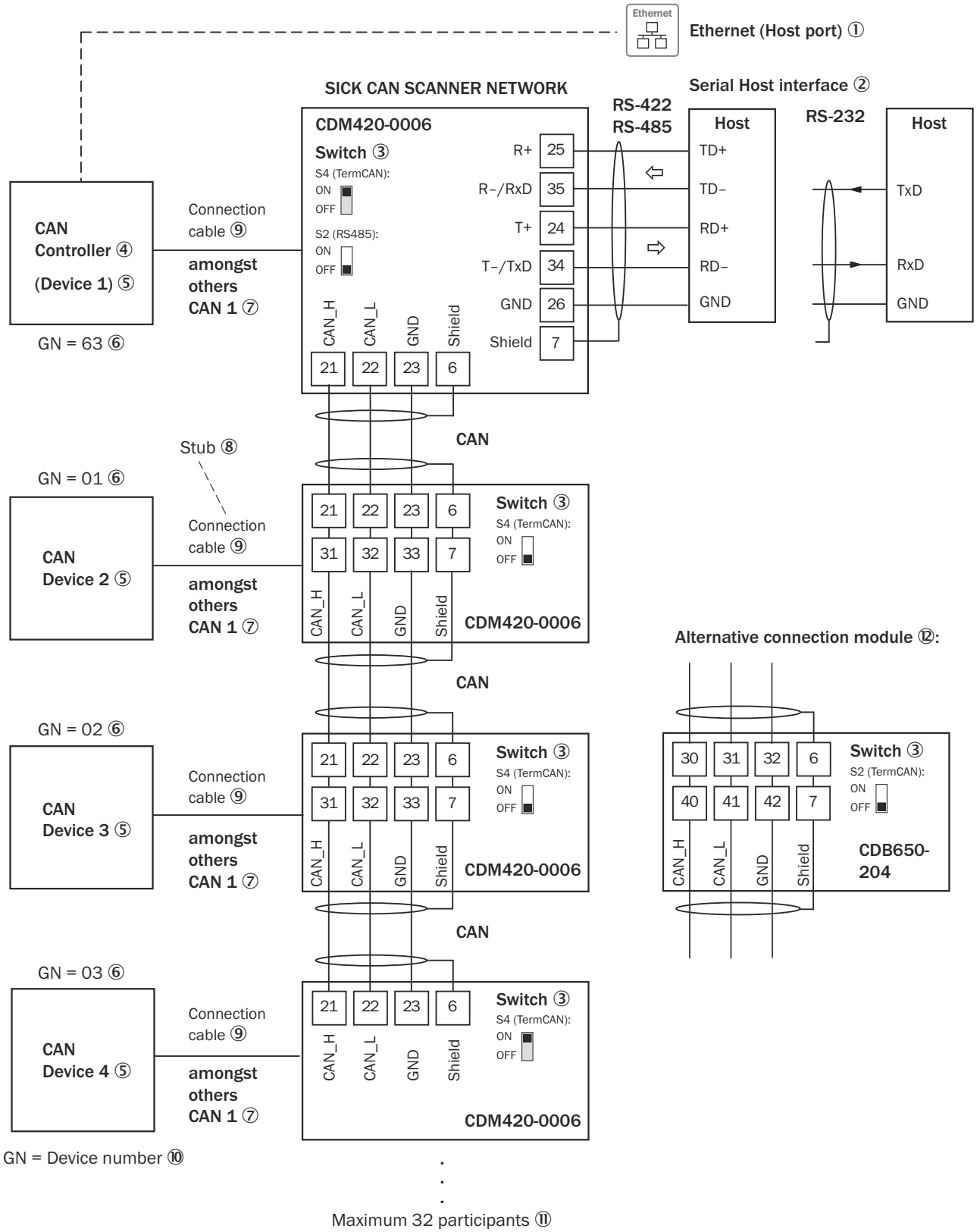

Figure 131: Wire the CAN interface of the device in the CDM420-0006 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the CAN controller, for example, are disregarded here.

① CLV69x-xxxY only (Y = 0 without heating, Y = 1 with heating), with cloning plug B part no. 2062452: Ethernet (host port)
② Serial host interface
③ Switch
④ CAN controller
⑤ CAN device
⑥ Device number
⑦ CAN etc.
⑧ Branch line
⑨ CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating) with cloning plug B, part no. 2062452: adapter cable with female connector, M12, 17-pin, A-coded and male connector, D-Sub-HD, 15-pin
⑩ Device number (GN)
⑪ Maximum 32 users
⑫ Example of alternative connection module:

Alternative connection module for CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating): CDB650-204

CDB650-204: A connection cable 1:1 with female connector, M12, 17-pin, A-coded and male connector, M12, 17-pin, A-coded is required to connect the CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating) with cloning plug part no. 2062452.

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.

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

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B, part no. 2062452

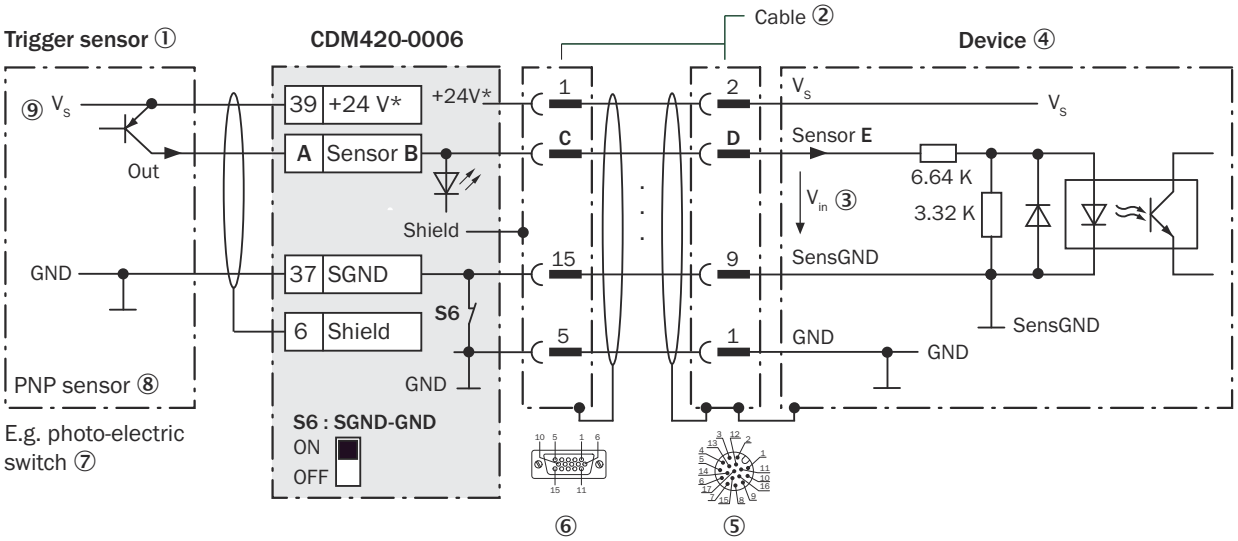

Figure 132: Trigger sensor supplied with power by connection module CDM420-0006

① Trigger sensor, e.g. for read cycle generation
② Adapter cable with male connector, D-Sub-HD, 15-pin and female connector, M12, 17-pin, A-coded
③ Input voltage V_{in}
④ Device
⑤ Device: male connector, M12, 17-pin, A-coded
⑥ Connection module: female connector, D-Sub-HD, 15-pin
⑦ E.g. photoelectric sensor
⑧ PNP sensor
⑨ Supply voltage V_S

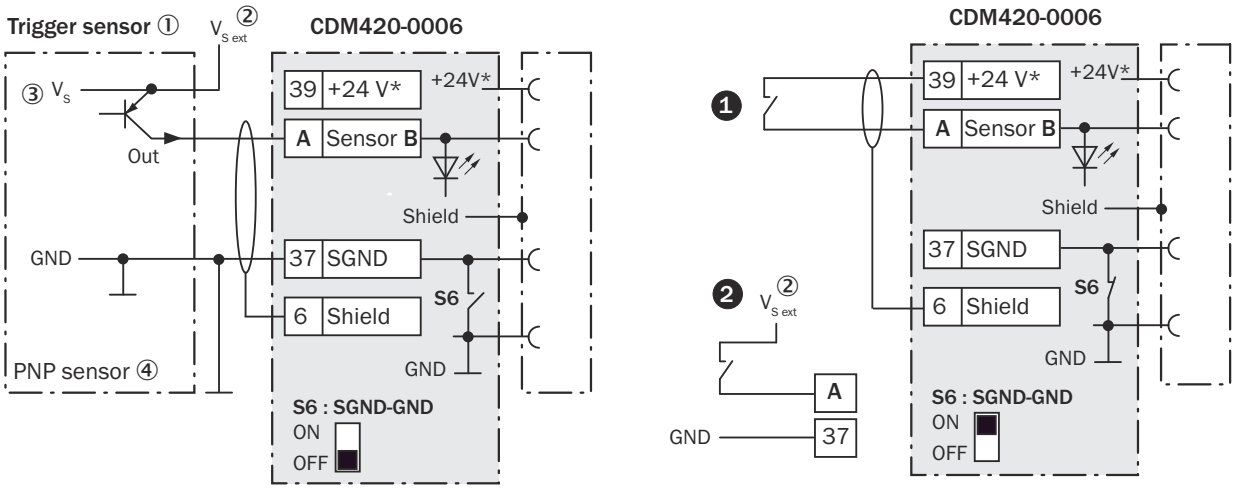

Figure 133: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDM420-0006 or ❷ connected potential-free and supplied with power externally. Now select switch setting S6 as shown in the left figure.

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 58: Assignment of placeholders to the digital inputs

CDM420-0006			Device	
Terminal A	**Signal B**	**Pin C**	**Pin D**	**Sensor E**
38	Sensor 1	14	10	1
28	Sensor 2	4	15	2

Function of switch S6

Table 59: 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 60: Characteristic data of the digital inputs “Sensor 1” and “Sensor 2”

Type	Switching

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

1) Input Voltage
2) Input current

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

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

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B, part no. 2062452

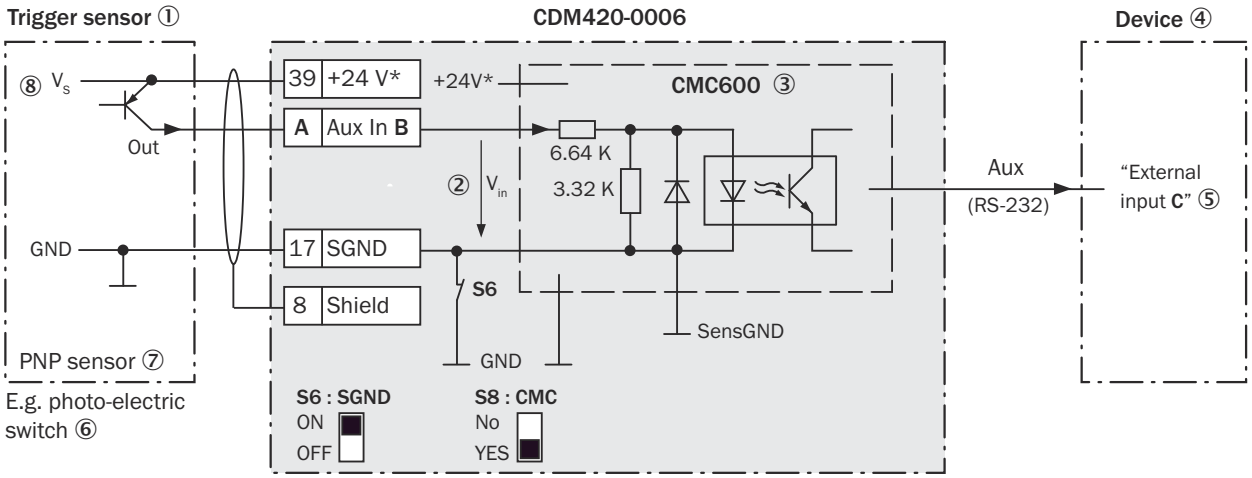

Figure 134: Trigger sensor supplied with power by connection module CDM420-0006

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

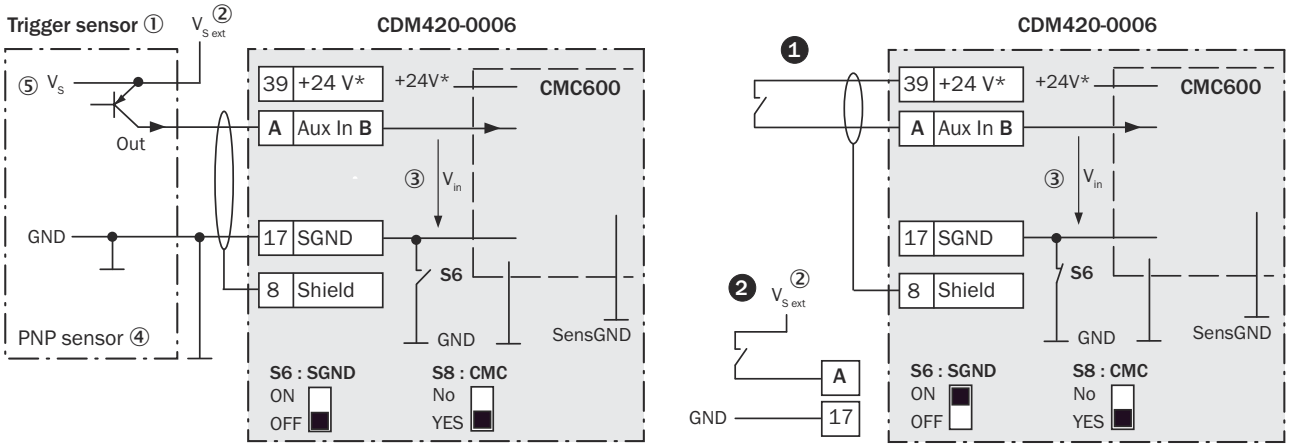

Figure 135: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDM420-0006 or ❷ connected potential-free and supplied with power externally. Switch setting S3 then as in left figure.

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 61: 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 62: 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”.

Characteristic data of the digital inputs

Table 63: 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

Type	Switching
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.

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

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B, part no. 2062452

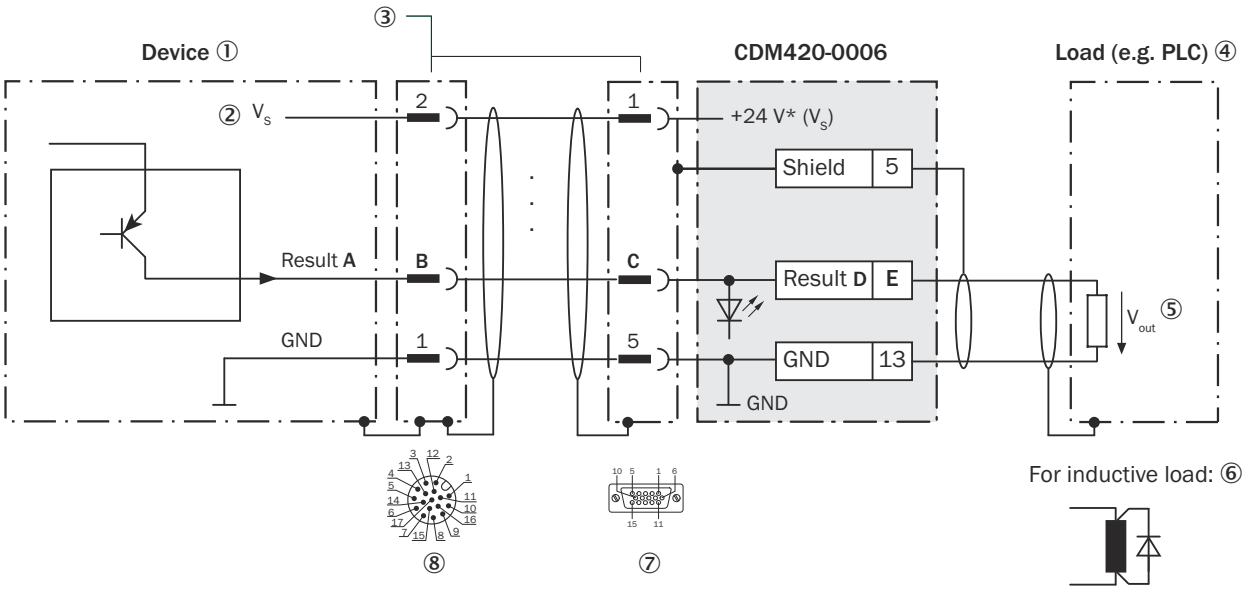

Figure 136: Wiring the "Result 1" and "Result 2" digital outputs of the device in the CDM420-0006 connection module.

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

Inductive load

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

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

Table 64: Assignment of placeholders to the digital outputs

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

Characteristic data of the digital outputs

Table 65: 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	$0\ V \leq V_{out}$ [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.

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

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug B, part no. 2062452

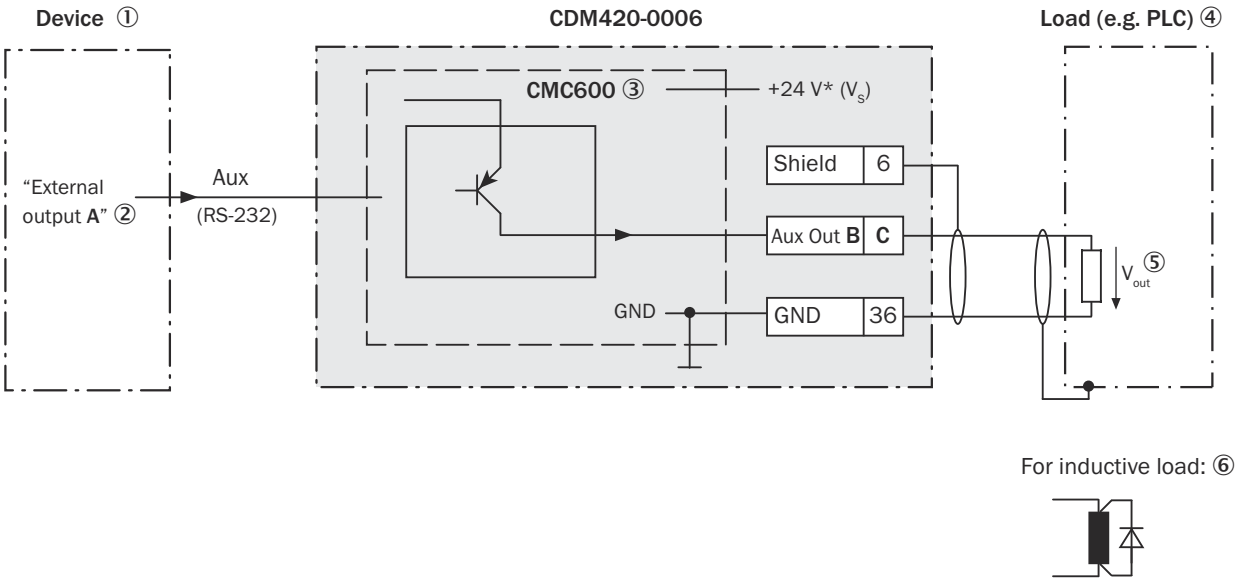

Figure 137: Wiring "Aux Out 1" and "Aux Out 2" external digital outputs of the device in the connection module CDM420-0006.

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 66: Assignment of placeholders to the external digital outputs

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

Functional principle of the external digital outputs

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

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 67: 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 Connection diagrams of connection module CDM490-0001

14.7.1 Connection of the device to CDM490-0001

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug A, part no. 2062450

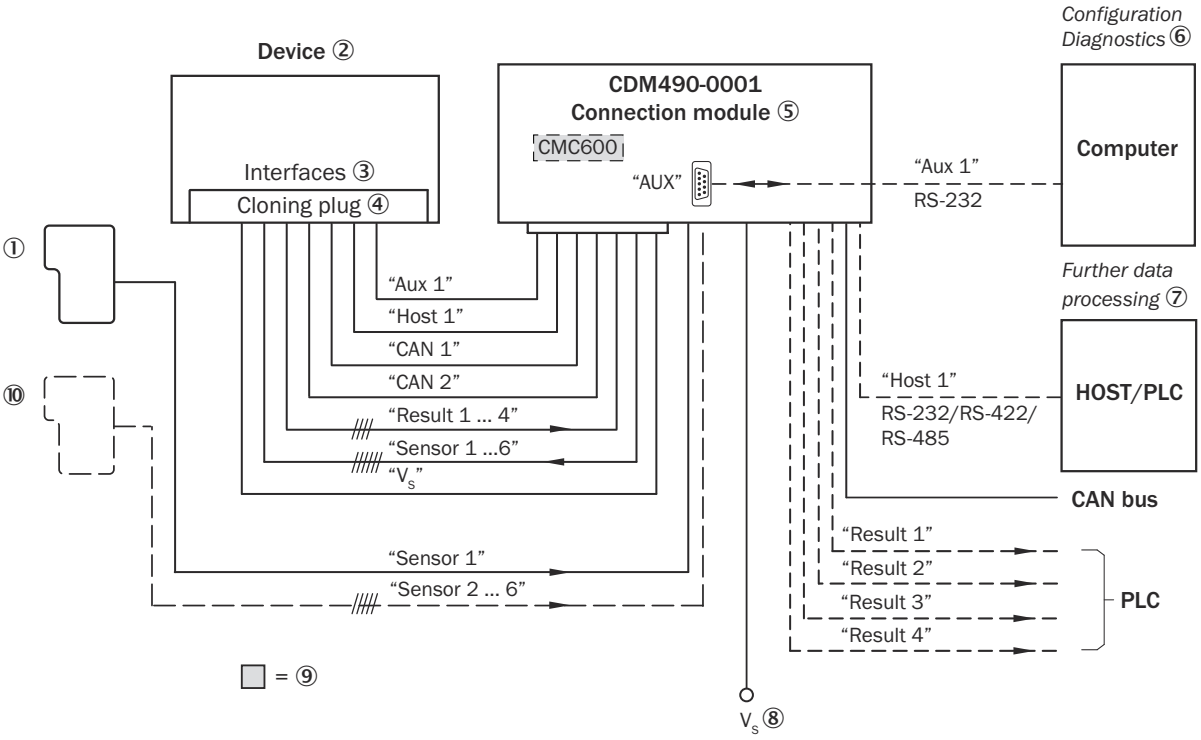

Figure 138: Connection of the device to peripherals via CDM490-0001 (overview)

① External trigger sensor, e.g., for read cycle generation
② Device: CLV69x-xxx0 (without heating) or CLV69x-xxx1 (with heating)
③ Interfaces
④ Cloning plug A (part no. 2062450)
⑤ Connection modules
⑥ Configuration or diagnostics
⑦ Data further processing
⑧ Supply voltage V_S
⑨ The optional CMC600 parameter cloning module (highlighted in gray) is required for additional, external storage of the device parameters.
⑩ Application-dependent alternative stop read cycle (e.g., photoelectric sensor) or travel increment (incremental encoder)

14.7.2 Wiring overview of the CDM490-0001

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug A, part no. 2062450

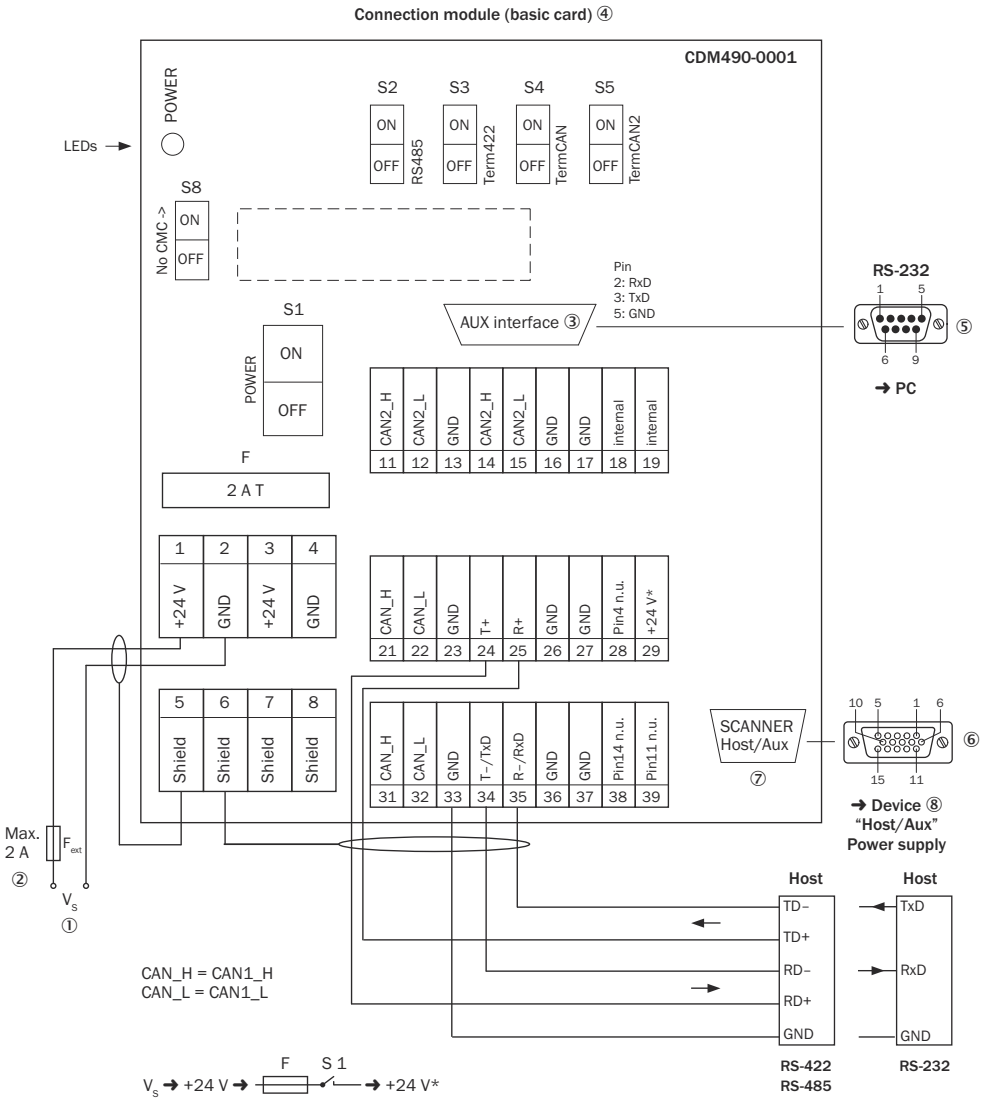

Figure 139: Overview: Connecting the device (without heating) and peripherals (via data interfaces) to the CDM490-0001 connection module

① Supply voltage V_S

② Protection of the supplied supply voltage by external fuse provided by the user at the start of the supply cable

③ Auxiliary interface “AUX”

④ Connection module (basic board)

⑤ Male connector, D-Sub, 9-pin

⑥ Female connector, D-Sub-HD, 15-pin

⑦ SCANNER = Device

⑧ Device to be connected (CLV69x-xxx0, without heating)

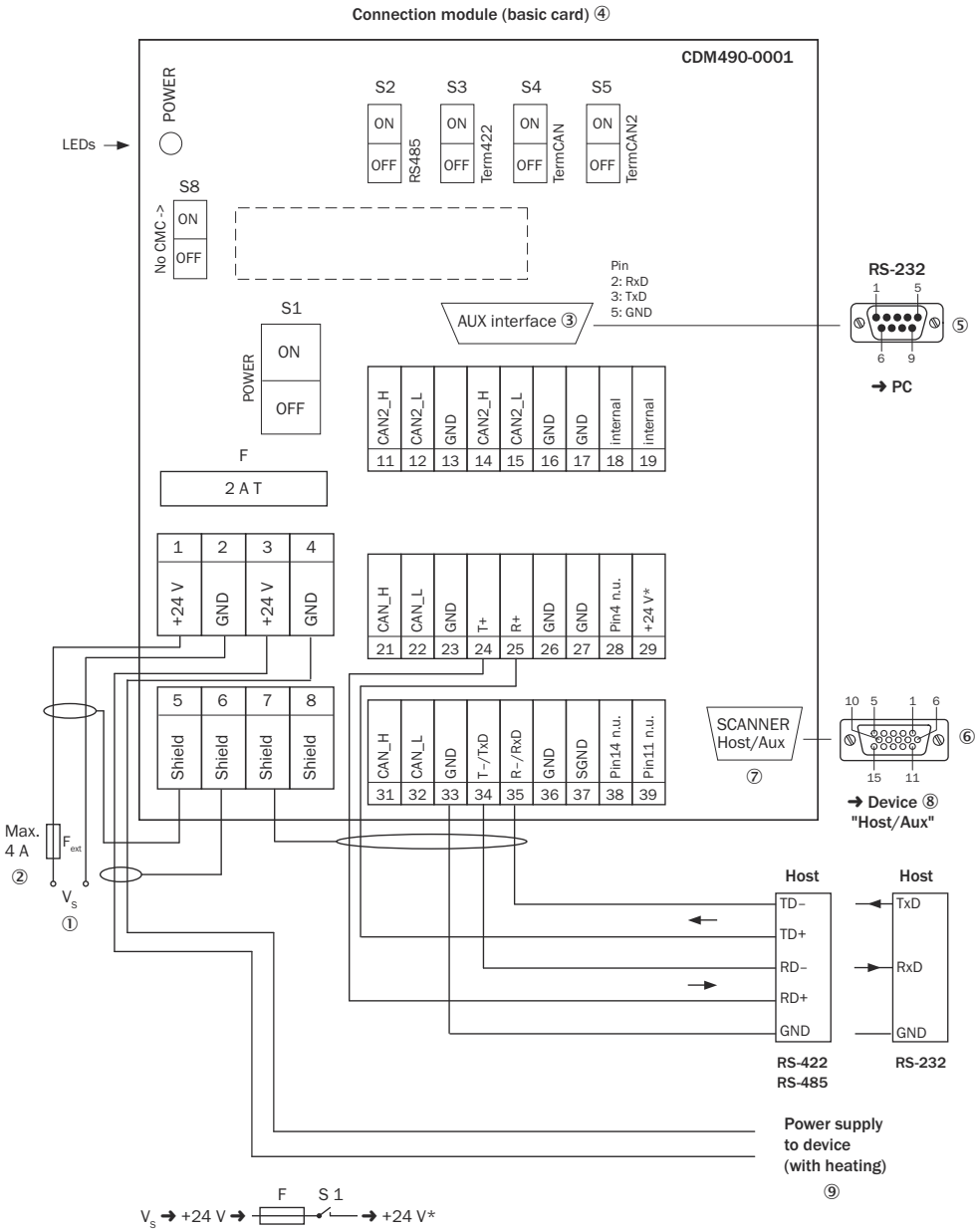

Figure 140: Overview: Connecting the device (with heating) and peripherals (via communication interfaces) to the CDM490-0001 connection module

① Supply voltage V_S

② Protection of the supplied supply voltage by external fuse provided by the user at the start of the supply cable

③ Auxiliary interface “AUX”

④ Connection module (basic board)

⑤ Male connector, D-Sub, 9-pin

⑥ Female connector, D-Sub-HD, 15-pin

⑦ SCANNER = Device

⑧ Device to be connected (CLV69x-xxx1, with heating)

⑨ Supply voltage for heater

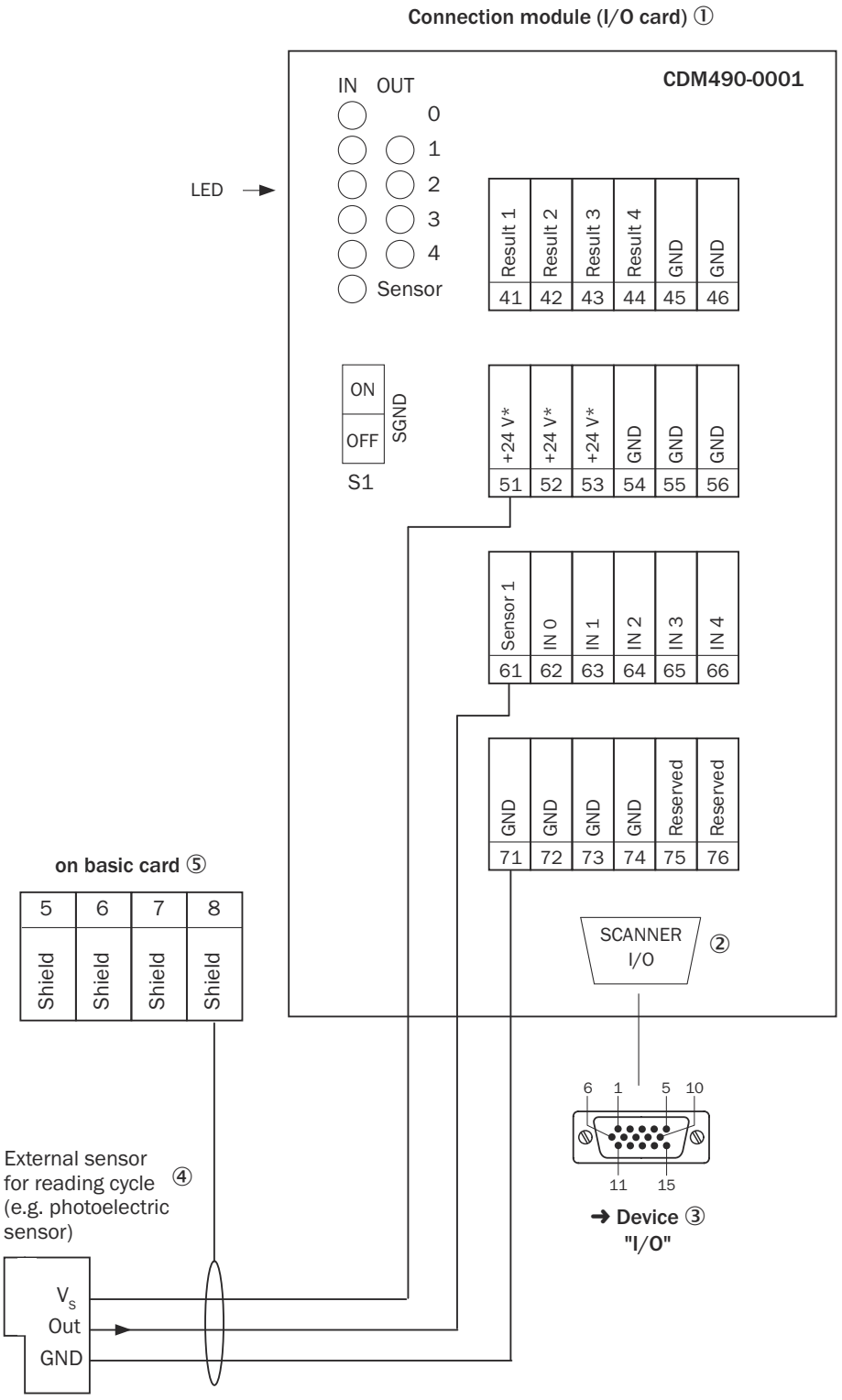

Figure 141: Overview: Connecting the device (without/with heating) and peripherals (via digital inputs and outputs) to the CDM490-0001 connection module

① Connection module (I/O card)
② SCANNER = Device
③ Male connector, D-Sub-HD, 15-pin
④ External trigger sensor for read cycle (e.g., photoelectric sensor)
⑤ On basic board

Table 68: CDM490-001: Assignment of digital inputs to devices

CDM420-0001		Device	
Terminal	**Signal [1)]**	**CLV69x signal**	**CLV49x signal**
61	Sensor	Sensor 1	Sensor
62	IN 0	Sensor 2	IN 0
63	IN 1	Sensor 3	IN 1
64	IN 2	Sensor 4	IN 2
65	IN 3	Sensor 5	IN 3
66	IN 4	Sensor 6	IN 4

1) Signal designations of the predecessor models CLV49x, CLV48x, CLX48x

14.7.3 Connecting supply voltage for the device in CDM490-0001

Device = CLV69x-xxxY (Y = 0 without heating), with cloning plug A, part no. 2062450

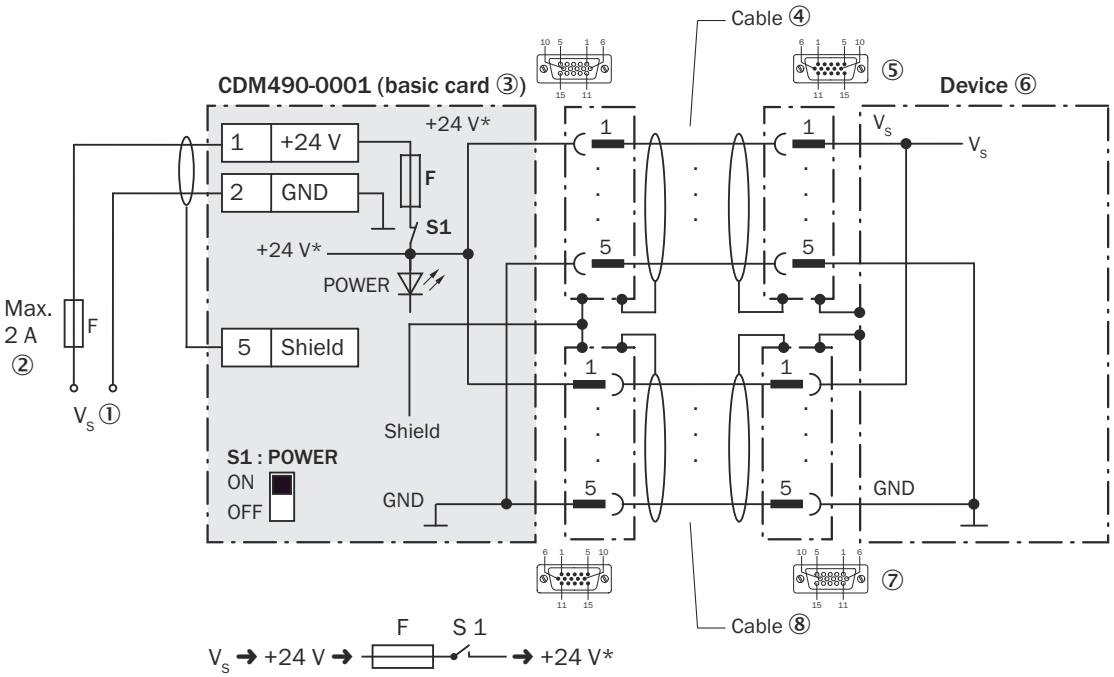

Figure 142: Connecting supply voltage for the device (without heating) in CDM490-0001 connection module

① Supply voltage V_S

② Protection of the supplied supply voltage by external fuse provided by the user at the start of the supply cable

③ CDM490-0001 (basic board)

④ Connection cable 1: 1 (male connector, D-Sub-HD, 15-pin / female connector, D-Sub-HD, 15-pin)

⑤ Device: Male connector, D-Sub-HD, 15-pin (“Host/Aux” connection)

⑥ Device

⑦ Device: Female connector, D-Sub-HD, 15-pin (“I/0” connection)

⑧ Connection cable 1: 1 (male connector, D-Sub-HD, 15-pin / female connector, D-Sub-HD, 15-pin). If no digital inputs and outputs of the CLV69x are used, this cable can be omitted.

Function of switch S1

Table 69: Switch S1: Power

Switch setting	Function
ON	Supply voltage +24 V connected to CDM490-0001 and device via fuse as +24 V* supply voltage. Supply voltage +24 V* can also be tapped at terminals 29 and 51 to 53.
OFF	CDM490-0001 and device disconnected from supply voltage. Recommended setting for all connection work.

14.7.4 Wiring serial host interface RS-232 of the device in CDM490-0001

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug A, part no. 2062450

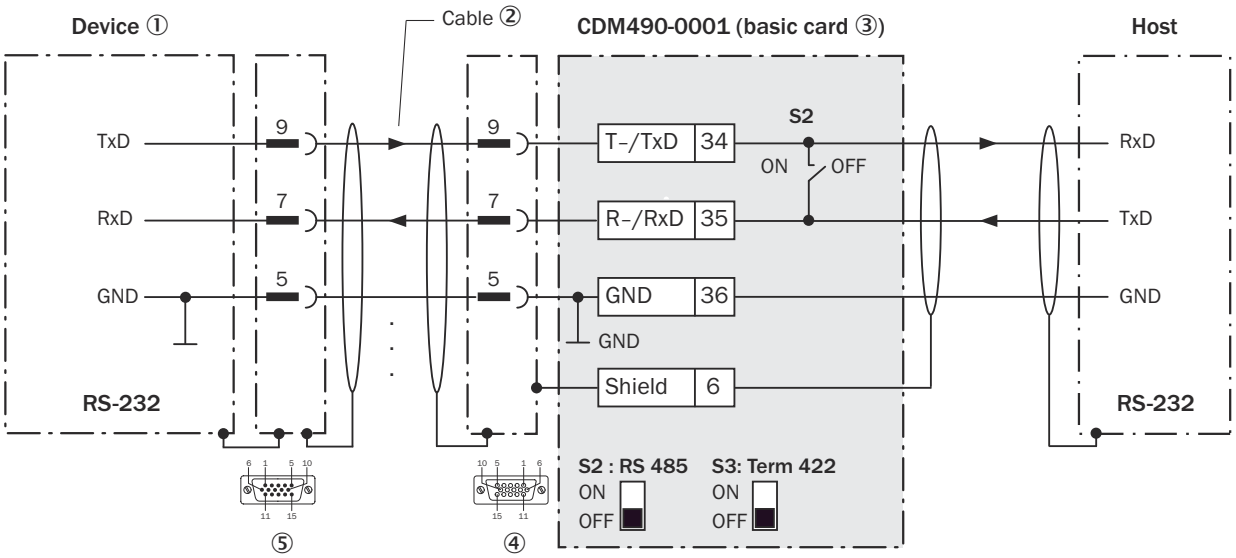

Figure 143: Wiring data interface RS-232 of the device in the connection module CDM490-0001

① Device
② Connection cable 1:1 (male connector, D-Sub-HD, 15-pin/female connector, D-Sub-HD, 15-pin)
③ Basic board
④ Connection module: female connector, D-Sub-HD, 15-pin
⑤ Device: Male connector, D-Sub-HD, 15-pin (“Host/Aux” connection)

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

14.7.5 Wiring serial host interface RS-422 of the device in CDM490-0001

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug A, part no. 2062450

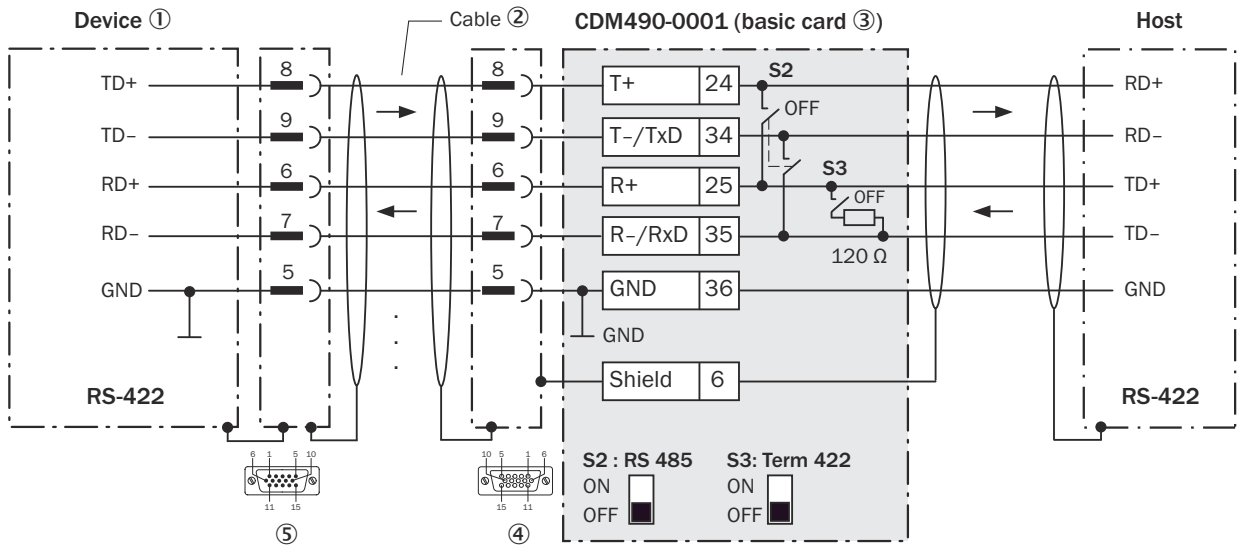

Figure 144: Wiring data interface RS-422 of the device in the connection module CDM490-0001

① Device

② Connection cable 1:1 (male connector, D-Sub-HD, 15-pin/female connector, D-Sub-HD, 15-pin)

③ Basic board

④ Connection module: female connector, D-Sub-HD, 15-pin

⑤ Device: Male connector, D-Sub-HD, 15-pin (“Host/Aux” connection)

Function of switch S3

Table 70: Switch S3: Term 422

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

NOTE

Activate the RS-422 data interface (“Point-to-Point” option) in the device using a configuration software, e.g., SOPAS ET.

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

- The relevant interface drivers for the device comply with the RS-422 and RS-485 standard.
- The connection shown above is configured for operation of the host with permanently activated drivers (often described as “RS-422 operation”), i.e. not RS-485 operation.

14.7.6 Wiring serial host interface RS-485 of the device in CDM490-0001

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug A, part no. 2062450

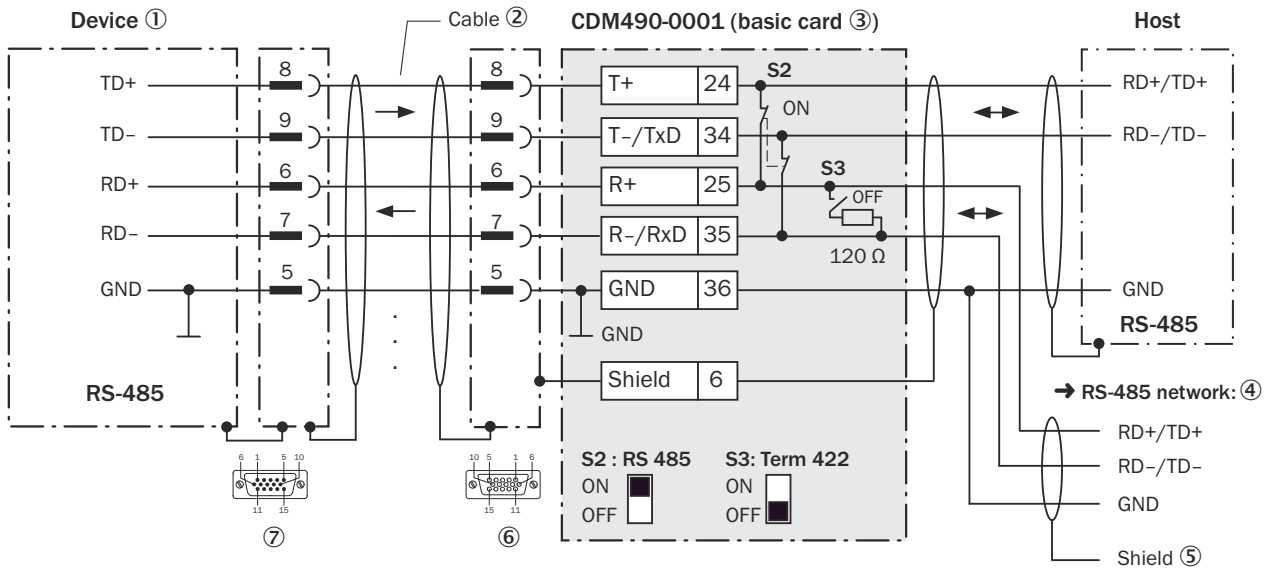

Figure 145: Wiring data interface RS-485 of the device in the connection module CDM420-0006

① Device
② Connection cable 1:1 (male connector, D-Sub-HD, 15-pin/female connector, D-Sub-HD, 15-pin)
③ Basic board
④ RS-485 network
⑤ Shield
⑥ Connection module: female connector, D-Sub-HD, 15-pin
⑦ Device: Male connector, D-Sub-HD, 15-pin (“Host/Aux” connection)

Function of switch S3

Table 71: Switch S3: Term 422

Switch setting	Function
ON	Terminates the device. Required if the device is located at the end of the RS-485 bus cable.
OFF	No termination

NOTE
Activate the RS-485 data interface (“Bus” option) in the device using a configuration software, e.g., SOPAS ET.

The following requirements or restrictions apply when using the RS-485 data interface:

- The relevant interface drivers for the device comply with the RS-422 and RS-485 standard.
- This operating mode is only permitted if all connected devices use a corresponding RS-485 protocol.
- This configuration is not permitted when using the standard data output and protocol of the device. In case of doubt, contact SICK Service.

14.7.7 Wiring the CAN interface 1 of the device in the CDM490-0001

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug A, part no. 2062450

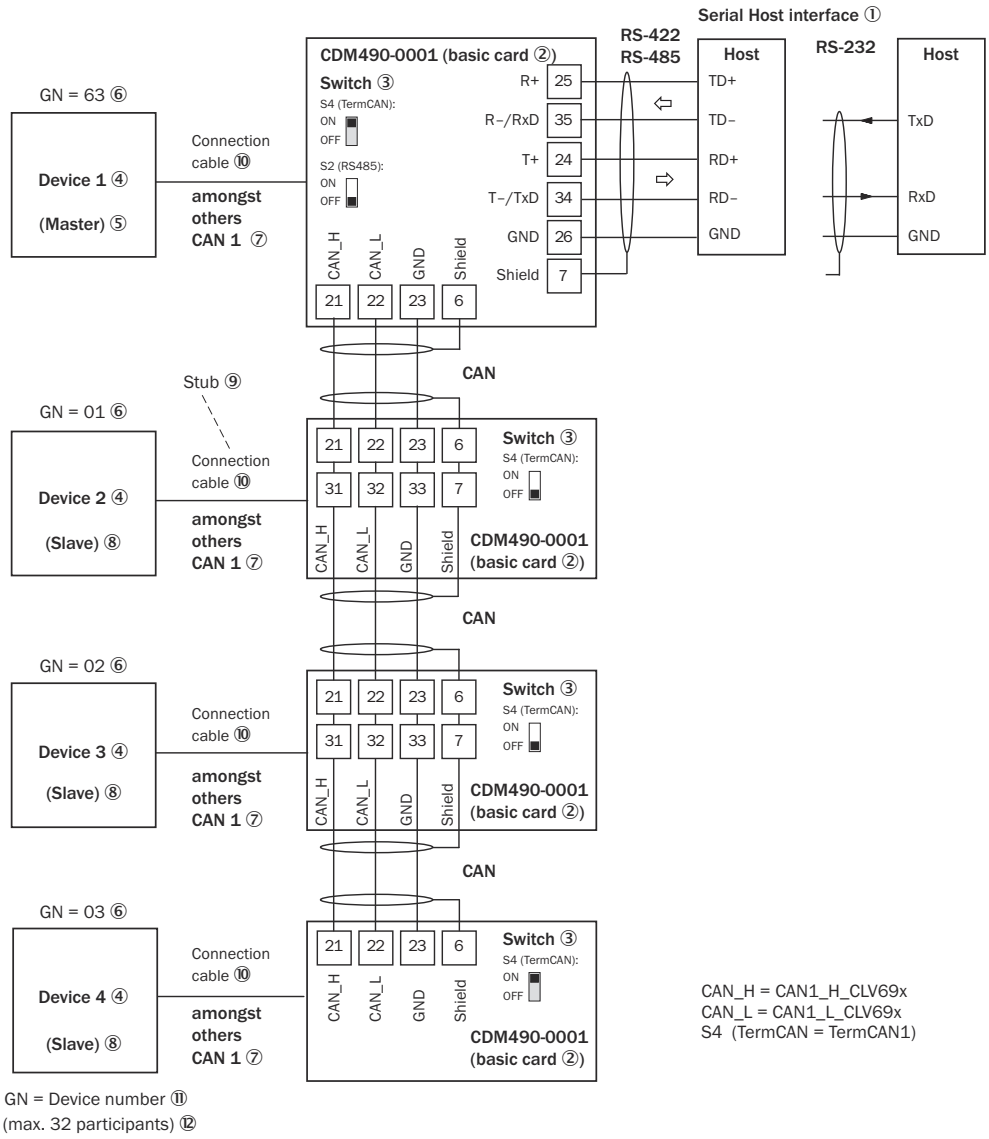

Figure 146: Wiring the CAN interface 1 of the device in the CDM490-0001 connection module. Connection and looping through of the supply voltage and connection of a trigger sensor for read cycle generation at the master, for example, are disregarded here!

① Serial host interface
② Basic board
③ Switch
④ Device
⑤ Master
⑥ Device number
⑦ CAN 1, among others
⑧ Slave
⑨ Branch line
⑩ CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating) with cloning plug A, part no. 2062450: connecting cable 1:1 (female connector, D-Sub-HD, 15-pin / male connector, D-Sub-HD, 15-pin)
⑪ Device number (GN)
⑫ Maximum 32 users

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.

14.7.8 Wiring digital inputs of the device in the CDM490-0001

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug A, part no. 2062450

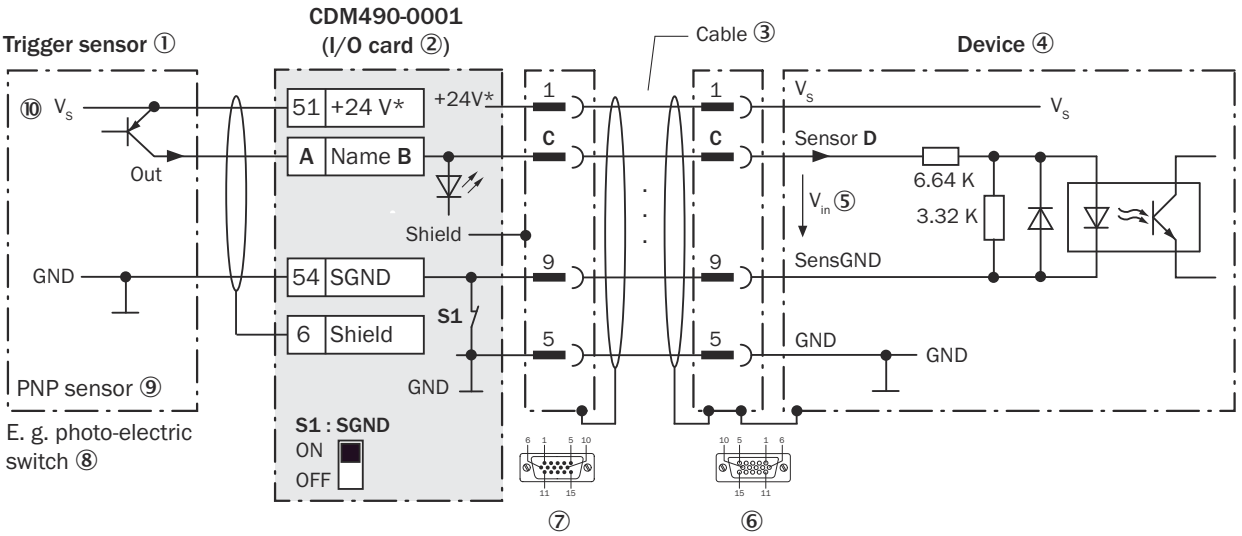

Figure 147: Trigger sensor supplied with power by connection module CDM490-0001

① Trigger sensor, e.g. for read cycle generation
② I/O card
③ Connection cable 1:1 (male connector, D-Sub-HD, 15-pin/female connector, D-Sub-HD, 15-pin)
④ Device
⑤ Input voltage V_{in}
⑥ Device: Female connector, D-Sub-HD, 15-pin (“I/O” connection)
⑦ Connection module: Male connector, D-Sub-HD, 15-pin
⑧ e.g. photoelectric sensor
⑨ PNP sensor
⑩ Supply voltage V_S

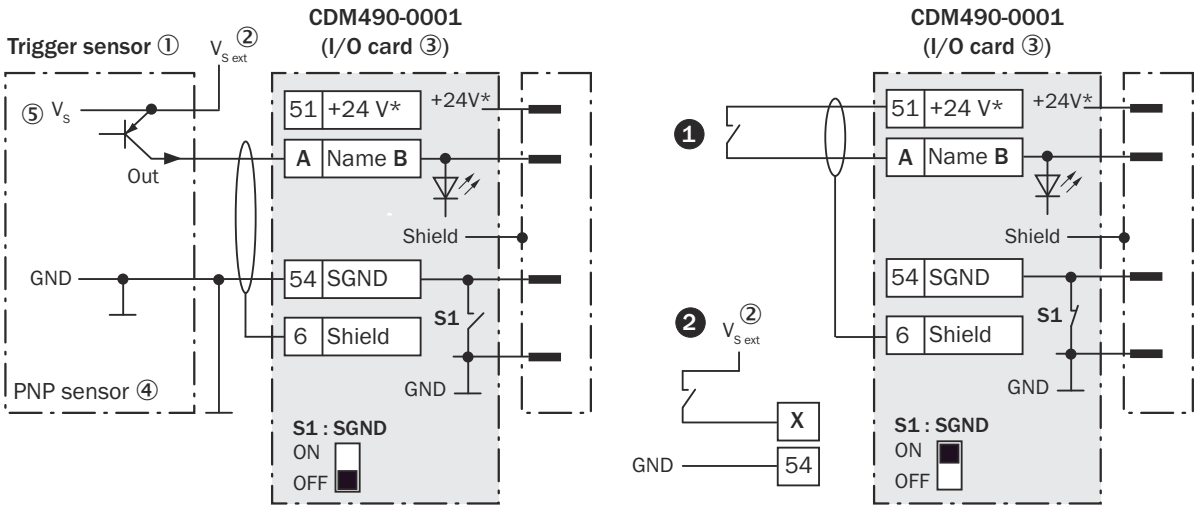

Figure 148: Left: Trigger sensor connected potential-free and supplied with power externally. Right: Alternatively switch, ❶ supplied with power by connection module CDM490-0001 or ❷ connected potential-free and supplied with power externally. Switch setting S1 then as in left figure.

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

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

③ I/O card

④ PNP sensor

⑤ Supply voltage V_S

Table 72: Assignment of placeholders to the digital inputs

CDM490-0001		Device	
Terminal A	**Name B**	**Pin C**	**Sensor D**
61	Sensor	3	Sensor 1 (sensor [1])
62	IN 0	6	Sensor 2 (IN0 [1])
63	IN 1	2	Sensor 3 (IN1 [1])
64	IN 2	7	Sensor 4 (IN2 [1])
65	IN 3	11	Sensor 5 (IN3 [1])
66	IN 4	12	Sensor 6 (IN4 [1])

[1] Signal designations of the predecessor models CLV48x, CLV49x, CLX49x.

Function of switch S1

Table 73: Switch S1: SGND (I/O card)

Switch setting	Function
ON	GND of the trigger sensor connected with GND of CDM490-0001 and GND of the device
OFF	Trigger sensor connected potential-free at CDM490-0001 and device. Common, isolated reference potential of all digital inputs is SGND.

Characteristic data of the digital inputs

Table 74: Characteristic data of the digital inputs "Sensor 1" to "Sensor 6"

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), debouncing 10 mm

Features	• 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} ≤ 0.3 mA High: 6 V ≤ V_{in} ≤ 32 V; 0.7 mA ≤ I_{in} ≤ 5 mA

1) V_{in} = input voltage.
2) I_{in} = input current.

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

14.7.9 Wiring digital outputs of the device in the CDM490-0001

Device = CLV69x-xxxY (Y = 0 without heating, Y = 1 with heating), with cloning plug A, part no. 2062450

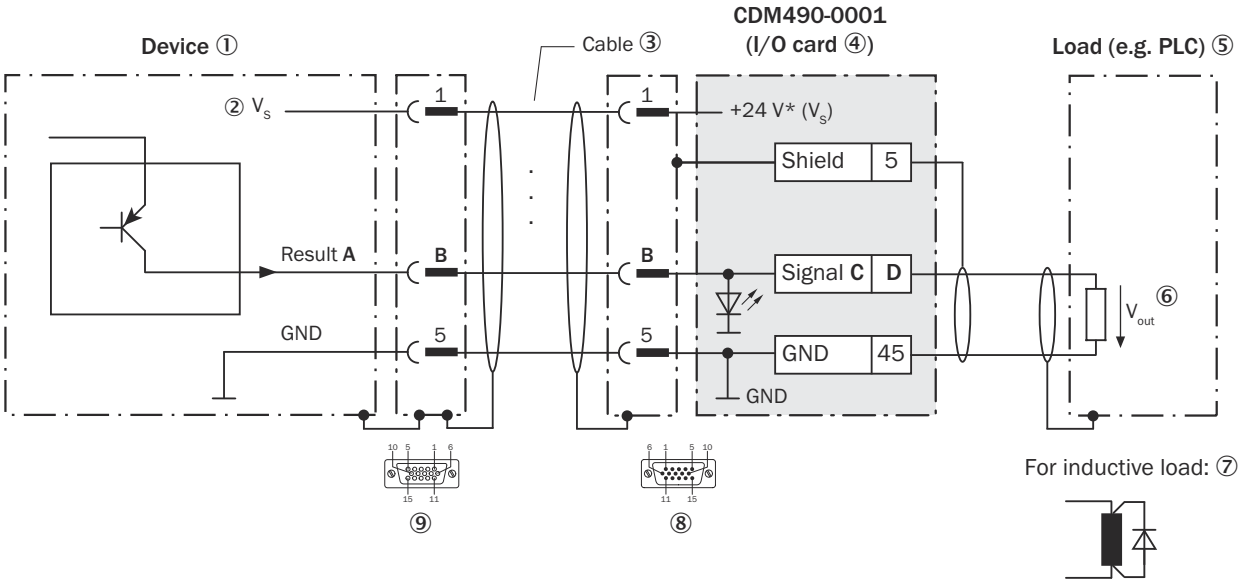

Figure 149: Wire the digital outputs "Result 1" to "Result 4" of the device in the CDM490-0001 connection module

① Device
② Supply voltage V_S
③ Connection cable 1:1 (female connector, D-Sub-HD, 15-pin/male connector, D-Sub-HD, 15-pin)
④ I/O card
⑤ Load (e.g. PLC)
⑥ Output voltage V_{out}
⑦ With inductive load: see note
⑧ Connection module: Male connector, D-Sub-HD, 15-pin
⑨ Device: Female connector, D-Sub-HD, 15-pin ("I/O" connection)

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 75: Assignment of placeholders to the digital outputs

Device		CDM490-0001	
Output A	**Pin B**	**Signal C**	**Terminal D**
Result 1	4	Result 1	41
Result 2	8	Result 2	42
Result 3	10	Result 3	43
Result 4	15	Result 4	44

Characteristic data of the digital outputs

Table 76: Characteristic data of the digital outputs "Result 1" to "Result 4"

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

1) V_{out} = output voltage
2) I_{out} = output current

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

14.8 Calculating code length of a bar code

The code length of a bar code corresponds to the number of useful characters in the printed image including the check digit (if available).

In order to decode a code, the code length must be specified via the SOPAS ET configuration software. Depending on the code type of a bar code, the code length can be calculated by counting the bars and gaps using the relevant formula from the table below:

1. Determine bar code type and count bars or wide elements (bars and gaps) incl. start and stop character according to the information in the table below.
2. Calculate bar code length using the relevant formula.
3. Enter the result using the SOPAS ET configuration software, as shown in column 4 of the table.

Table 77: Support table for calculating the code length of a bar code

Bar code type	Counting	Calculation of the bar code length[1)2)]	Entry in the SOPAS ET configuration software
Code 39	Number of bars	I_{Code} = (number - 10)/5	Calculated code length
2/5 interleaved	Number of wide elements (bars and gaps)	I_{Code} = (number - 1)/2	Calculated code length
EAN	Not applicable	13 characters (normal version)	Activate 13-digits
		8 characters (short version)	Activate 8-digits

Bar code type	Counting	Calculation of the bar code length[1)2)]	Entry in the SOPAS ET configuration software
UPC	Not applicable	12 characters (UPC A, normal version)	Activate version A
		6 characters (UPC E, short version)	Activate version E
Codabar	Number of bars	l_{Code} = (number - 8)/4	Calculated code length
Code 128 (character set A)	Number of bars	l_{Code} = (number - 10)/3	Calculated code length
EAN 128	Number of bars	l_{Code} = (number - 10)/3	Calculated code length
Pharmacode	Number of bars	Number	Number = code length

1) Check digit optional in code 39, 2/5 interleaved, Codabar Check digit according to specification always integrated in the bar code printing for EAN, UPC, Code 128, Code 93, EAN 128 (is suppressed automatically when the device reading result is issued)

2) Apart from a few exceptions, each printed character corresponds to an ASCII character that needs to be decoded.
In the case of Code 39 extended, Code 93, Code 128 and EAN 128, the number of characters in the device data string may be bigger than the number of characters in the printed image, because this consists of several character sets.

14.9 Glossary

For other terms, see also the online help for the SOPAS-ET configuration software.

Bar code

Field of dark bars and light gaps arranged in parallel (elements), which can be depicted according to a specific regulation (specification) on the medium (background) using various printing procedures. An appropriate number and combination of machine-readable bars and gaps results in an (alpha)numeric character which can be read by the user. As the entire coded information, bordered by start and stop characters, is completely available in one dimension, and is also usually recorded in lines, these bar codes are referred to as linear codes. The various code types differ in terms of the stock of characters that can be coded, the structure (number of elements per line, number of characters, start/stop characters, mark of conformity), the information depth, and the print tolerances. The length of the code bars and gaps is not significant for the information content. However, longer code bars and gaps can be interpreted more easily with the reading device.

Aspect ratio

The ratio of code height (bar length) to code length (number of characters) in bar codes.

AUX interface

Logical auxiliary data interface of the device with fixed data output format, physically switched to RS-232 (AUX) and Ethernet (port 2111). The device can be accessed for configuration at any time via this data interface using the computer and the SOPAS ET configuration software. The data interface is also used for diagnostics (output of read diagnostic data or monitoring of data traffic on the host interface). The following applies to the physical RS-232 interface: fixed data format, data transmission rate 57.6 kBd. The data output to the computer via RS-232 can be switched off; an existing communication of the AUX interface via the Ethernet interface (port 2111) still remains active.

User interface

Windows-oriented input interface in the SOPAS-ET configuration software for configuration of the device.

CAN interface

Physical data interface. Used for building a fast SICK-specific CAN SENSOR network with different functions (e.g., multiplexer, master/slave). Access to the device is possible for configuration via the CAN interface (network) with the aid of the SOPAS ET configuration software in remote mode.

Code geometry

Length and height dimensions of the code.

Decoder, decoding

Assessment routine, dependent on the code type, for the reconstruction of the read code in electronic form, in order to decrypt the data content from the code.

Data output string

Structured data telegram of the read result in two independent data output formats, which prepares the device from its database for issuing. The output formats can be issued via the host interface, optionally to the physical data interfaces RS-232/RS-422/485, Ethernet or CAN. The structure of the output formats is flexible (sequence of the code segments and elements, linking with event conditions, filter, sorter, etc.) and can be adjusted, within wide limits, to the application-specific requirements.

Download

Process of transmitting parameter values from the computer to the connected device using the SOPAS ET configuration software.

In “Online” communication mode with the “Immediate download” option (default setting), SOPAS ET always automatically temporarily transfers parameter values that have just been modified to the working memory (RAM) of the device in the background. With this option, the current parameter values in the device are constantly synchronized with the modifications made in the user interface.

With the “Download on demand” option, however, the adjustment is carried out manually and is the user's responsibility. If non-synchronized statuses occur for individual parameter values between SOPAS ET and the connected device, then SOPAS ET marks these parameters with a blue border. By right-clicking in the context menu, the modified parameter value of a tab (transfer parameters to the device) can be manually transferred to the device when needed. Via the communication menu, it is possible to transfer either only modified parameter values (download amended parameter to the device) or all parameter values of the device (download all parameters to the device).

Only when the “permanent” save option (CLV6xx menu) is used will the parameter values that have previously only been temporarily changed in the device be saved permanently. The transferable parameter values depend on the current user level in SOPAS ET.

Result status output

Adjustable function of each of the two independent digital outputs “Result 1” and "Result 2" of the standard version. Signals either the status of the read result (e.g., Good Read) or the fulfillment of an event-dependent assessment condition which can be defined for the read process (e.g., Match1). The digital outputs can also be switched off individually or both together. The Ethernet version does not provide digital outputs at its plug connections. The function of two digital inputs is nevertheless accessible via the CDB620 connection module in combination with the CMC600 parameter memory module.

The “Result” LED is not coupled with either of the two digital outputs. It displays only the “Good Read” status for approx. 100 ms when the read result is output via the data interfaces.

Ethernet interface

Physical data interface with transmission rate 10/100 MBit/s and TCP/IP protocol. The Ethernet interface can be used alternatively and also in parallel to the physical RS-232, RS-422/485 interfaces.

Port 2112 (host interface) used for the issue of the reading result and port 2111 (AUX interface) among other things for the output of reading diagnostic data and monitoring the data traffic on the host interface. The device can be configured via both ports. If the data output of the AUX interface is suppressed via RS-232, then existing communication via Ethernet remains active. This applies in the same way for the host interface, but in this case the data output via Ethernet can be suppressed separately.

Error messages

Messages in coded form with which the device displays a diagnosed error. The device differentiates between four error types: information, warning, error, severe error. The error messages can be displayed in the SOPAS ET configuration software in the system information tab.

No Read

The defined assessment condition(s) was (were) not met in the reading event during the last read cycle.

No Read format

Special, configurable output format for no reads in the data output string as a replacement for the output formats for reading where the assessment conditions are met. In the default, the device issues the string “No Read”, bordered by STX and EXT, as the no read format.

Focus position

Distance of the focal point of the lens in front of the viewing window. Due to the optics of the device, the distance determines the depth of field (DOF) range in which the code can be captured. The depth of field depends on the resolution.

Functional interfaces

Digital inputs and outputs of the device.

Default

The factory default of all parameter values of the device is saved in its fixed memory and can be restored again at any time when the device is connected via the CLV6xx menu in the working memory of the device. This means that all changes in an application-specific configuration are discarded, if they have not been permanently saved in SOPAS ET after the query. It is possible that the data connection to the device itself will also be lost.

The application-specific default, on the other hand, allows all parameter values apart from the communication parameters to be reset to the factory default. This means that the existing communication with the device is retained.

Good Read

The defined assessment condition(s) was (were) successfully met in the reading event during the last read cycle.

Host interface

Logical main data interface of the device with two independent data output formats, which can be configured. Among other things, this is used for outputting the read result in the form of a telegram to the host/PLC. Can be physically switched on RS-232/RS-422/485, and Ethernet (port 2112) or CAN. Works together with the SICK-specific CAN SENSOR network as a gateway. Provides different transfer protocols (apart from for CAN).

Access to the device is also possible for configuration and diagnosis via the host interface with the aid of the SOPAS ET configuration software. In the default, the data transmission rate is 57.6 kBd. The data output via RS-232/RS-422/485 can be switched off, and in this case an existing data output of the host interface via Ethernet remains active without change. However, it can also be suppressed separately.

Command strings, commands

User interface to the device as an alternative to the SOPAS ET configuration software. The command strings form a clearly structured command language for the online modification of the parameter value set in the device. Accesses the command interpreter of the device directly. Used by the host for programming work as needed. The SOPAS ET configuration software is based on the command strings.

Configuration file

Project file of the SOPAS ETconfiguration software, in which either only one complete parameter value set of a device is saved or, if several devices are combined for a project, a complete parameter set is saved for each device for archiving on the computer. The project file can be printed out in table form, transferred to the clipboard, and provided as a PDF.

Reading range (DOF)

Depth of field on both sides around the focus of the lens in the reading level. The size of the area depends on the resolution and the reading distance.

Read diagnosis data

Data related to a code, object, or device, which the device deduces directly from the read event. Among other things, the data allows for assessment of the quality of the reading and for conclusions to be made about the read event.

Reading result

Electronic representation and output of the data contents of the read bar codes together with read diagnosis data in a data output string at the defined output time.

Read cycle

Clock on the device for triggering of the internal reading interval in the device, carried out on an object-specific basis via an external trigger source such as, e.g., a photoelectric retro-reflective sensor on a switching input or a command string via a data interface. In the event of internal “Auto cycle” trigger source, the device generates the read cycle itself.

Reading interval

Time window in which the device switches on the scan line and attempts to identify valid bar codes from the read information. Depending on the selected output mode of the read result, the reading interval may be shorter than the read cycle applied from outside.

Reading angle (RA value)

Starting from the viewing window, the reading angle on the red scan line of the deflected scanning beam under which the center of a bar code is detected. Determined by the device per scan and used, for example, to separate bar codes with identical data contents. For the decoding process, the active evaluation range can be restricted along the scan line by specifying the minimum and maximum RA value for the application.

Line scanner

Scanner which deflects its focused laser beam very quickly using a polygon mirror wheel with mirrors parallel to the axis. This means that it creates a light point in the reading level, which repeatedly runs on a straight line and is visible to the human eye as a “static” scan line due to the relative inertia.

Line scanner with oscillating mirror

Line scanner which additionally deflects its laser beam at right angles to the scan direction using an oscillating mirror on both sides of a central position. This means that the device can also scan larger areas and room contents for bar codes. In this case, in addition to the simple deflection with maximum oscillation amplitudes, adjustable functional processes of the oscillating mirror are also possible.

Master/slave configuration

Special arrangement and switching connection of several devices to a read station (e.g., multi-side reading) with the aid of the CAN interface. Using the master, the connection to the host functions like a single device.

Multiple reading

Optional number of readings which must provide identical internal reading results for one and the same bar code before the device issues the reading result.

Aperture angle α

Angle, within the limits of which the device can detect codes (via the optics). In front of the viewing window, a V-shaped area is formed radially transverse to the conveyor direction (reading from above), in which the codes to be read must be located.

Parameter value set

Data set, which is used to initialize and activate the implemented functions in the device. This is transmitted from the device to the SOPAS ET configuration software or vice versa using an upload (only all parameter values) or download.

Grid scanner

Scanner which deflects its focused laser beam very quickly using a polygon mirror wheel with mirrors tilted against each other around the axis. This means that it creates a quickly moving light point in the reading level in several rows one above the other. The light point repeatedly moves in a straight line on each row. Several “static” scan lines are visible to the human eye across all rows due to the relative inertia.

Send time

Output time of the reading result in relation to the start of the read cycle and the assessment conditions that are met.

SMART620 decoder

Specially developed decoder for reading bar codes with poor or contaminated printing.

SOPAS ET

Computer configuration software, executable under Windows. Is used for online communication with the device in the dialog box (configuration, display of read results, diagnostics) and the prepared offline configuration of standalone devices or a combination of identical/different SOPAS ET-enabled SICK devices in one project. Via upload and download, the parameter values are exchanged with the devices in a device-specific manner.

SOPAS ET Help

Online help, which supports the use of the SOPAS ET configuration software. The functions of the device parameters are explained in the help. Runs in an HTML browser, e.g., “Internet Explorer”, and can be called up from the SOPAS ET configuration software.

Saving in the device

The parameter set with the application-specific parameter values can be saved temporarily or permanently in the device. In the case of temporary saving, the parameter set is only contained in the volatile working memory (RAM) and is lost when the supply voltage is switched off. In the case of permanent saving, the parameter set is also transferred to the non-volatile memory of the device and is retained as the current data set after switching off. The default is saved independently of this in a fixed, read-only memory (ROM).

Start/stop operation

In this read operating mode, there is only one object in the reading zone, the reading field per read cycle. As standard, two external sensors or command strings control the start and end of the read cycle on the device (stand-alone device). In this case, the reading field length is determined by the distance of the two read cycle sensors for starting (start of reading field) and stopping (end of reading field) the read cycle. The minimum read distance between two objects must always be larger than the reading field length.

In the event of joint use with other devices in the master/slave connection (e.g. 2-side reading), the device acting as the slave receives its cycle signals from another device (master). The networking between the devices is carried out via the CAN interface, the output of the read result of the master via its RS-232/RS-422/485 interface and/or the Ethernet interface.

Upload

Process for the transmission of all parameter values from the working memory of the connected device to the computer in the SOPAS ET configuration software for display and modification. Is carried out when connecting the device and successfully establishing communication after the scan process following a confirmed query in order to achieve synchronization between the user interface and the device. Can, if necessary, be triggered manually in the Communication menu (upload all parameters from the device). The parameter values must be displayed in the tabs in order to be able to modify the current parameter value set.

14.10 Abbreviations used

Table 78: Abbreviations used

CAN	**C**ontrolled **A**rea **N**etwork. Field bus protocol 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
CMF	**C**onnection **M**odule **F**ieldbus
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
MAC	**M**edium **A**ccess **C**ontrol
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
TCP/IP	**T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol
V_{in}	Input voltage
V_{out}	Output voltage
V_S	Supply voltage

8014396/1HZL/2024-03-06/en

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SICK
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