

CLV61x DualPort (PROFINET)

Fixed mount barcode scanner

SICK
Sensor Intelligence.



Described product

CLV61x Dual Port (PROFINET)

Manufacturer

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

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Original document

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1 About this document

1.1 Information on the operating instructions

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

Prerequisites for safe work are:

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

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



NOTE

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

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

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

1.2 Scope

This document applies to the following products:

- CLV61x Dual Port (PROFINET)

This document does not apply to the CLV61x Standard product.

1.3 Explanation of symbols

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



DANGER

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



WARNING

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



CAUTION

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

**NOTICE**

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

**NOTE**

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

1.4 Further information

More information can be found on the product page.

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

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

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

The following information is available depending on the product:

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

2 Safety information

2.1 Intended use

The device is an intelligent, opto-electronic SICK ID sensor and is used for automated, fixed identification and decoding of bar codes on moving or stationary objects. The data content of the decoded bar codes is sent by the device via PROFINET to the PROFINET controller (PLC) for further coordinating processing.

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

Applications:

- Package conveyor
- Picking stations

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

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

2.1.1 Conditions for devices with heating

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

- Use cables suitable for the ambient conditions. When in doubt, please consult SICK Service.
- Supply voltage range restricted: 18 V DC ... 30 V DC
- Connection work only in the temperature range: -25° C ... +40 °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).

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.
- Only the device variants with heating (CLV61x-DxxxFO) may be operated in the ambient temperature range below 0 °C.
- The device variant with heating must not be used in forklift applications in low temperature conditions.
- 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.

2.5.1 Exception: temporarily opening the cover on the device



NOTICE

Risk of damage to the product when the cover is open

When the cover is open, the device does not conform to a specified enclosure rating.

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

Temporarily open the cover for the following activities:

Depending on the device type:

- Insert or remove the optional storage medium (SD card)
- Temporary use of the USB interface as a service interface

For this purpose, open the corresponding black rubber cover fitted at the side over the corner on the device. After completing this task, close the cover again.

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

2.6 Requirements for skilled persons and operating personnel



WARNING

Risk of injury due to insufficient training.

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

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

The following qualifications are required for various activities:

Table 1: Activities and technical requirements

Activities	Qualification
Mounting, maintenance	<ul style="list-style-type: none"> ■ Basic practical technical training ■ Knowledge of the current safety regulations in the workplace
Electrical installation, device replacement	<ul style="list-style-type: none"> ■ Practical electrical training ■ Knowledge of current electrical safety regulations ■ Knowledge of the operation and control of the devices in their particular application
Commissioning, configuration	<ul style="list-style-type: none"> ■ Basic knowledge of the computer operating system used ■ Basic knowledge of the design and setup of the described connections and interfaces ■ Basic knowledge of data transmission ■ Basic knowledge of bar code technology
Operation of the device for the particular application	<ul style="list-style-type: none"> ■ Knowledge of the operation and control of the devices in their particular application ■ Knowledge of the software and hardware environment for the particular application

2.7 Operational safety and specific hazards

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



CAUTION

Optical radiation: Class 2 Laser Product

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

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

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

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



WARNING

Electrical voltage!

Electrical voltage can cause severe injury or death.

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



WARNING

Risk of injury and damage caused by potential equalization currents!

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

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

2.7.1 Laser radiation

Laser class

The device corresponds to laser class 2.



NOTE

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

Wavelength

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

Laser activity display**NOTE**

The device has no optical indicator for laser diode activity.

Laser output aperture

The entire viewing window is a laser output aperture.

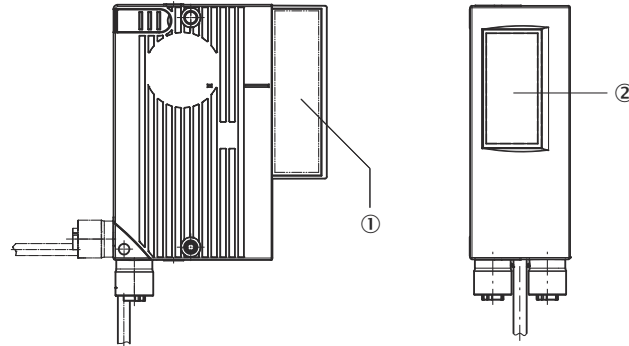


Figure 1: Laser output aperture for the two designs of the device

- ① Laser output on side
- ② Laser output on front

Warning symbol on the device

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

Laser output data

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

The laser power data consists of:

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

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

If the device is installed inaccessibly, [see "Features", page 64](#) in the technical data.

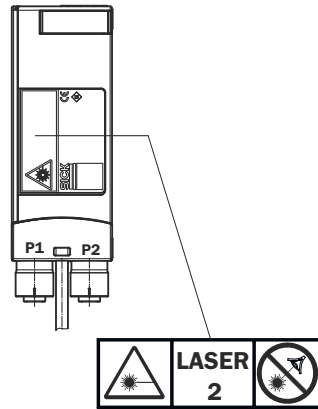


Figure 2: Position and contents of the laser warning label on the device

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



NOTE

Additional laser warning label

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

Controlling the laser diode

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

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

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

- Using the SOPAS ET configuration software, on the **Illumination Control** device page
- 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 necessary, information is moved to an additional label for space reasons.

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

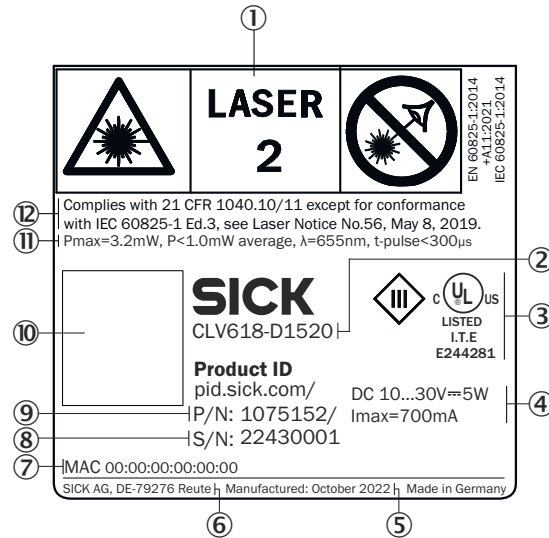


Figure 3: CLV61x Dual Port: Example of type label of the CLV618-D1520. Electrical values shown here for devices without heating. Figure may differ.

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

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

Additional label

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



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

3.1.2 Type code

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

CLVxyz-abcdef

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

Table 2: Type code

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

Position	Description	Characteristic
	Enclosure rating: IP65	

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

3.2 Product characteristics

3.2.1 Device view

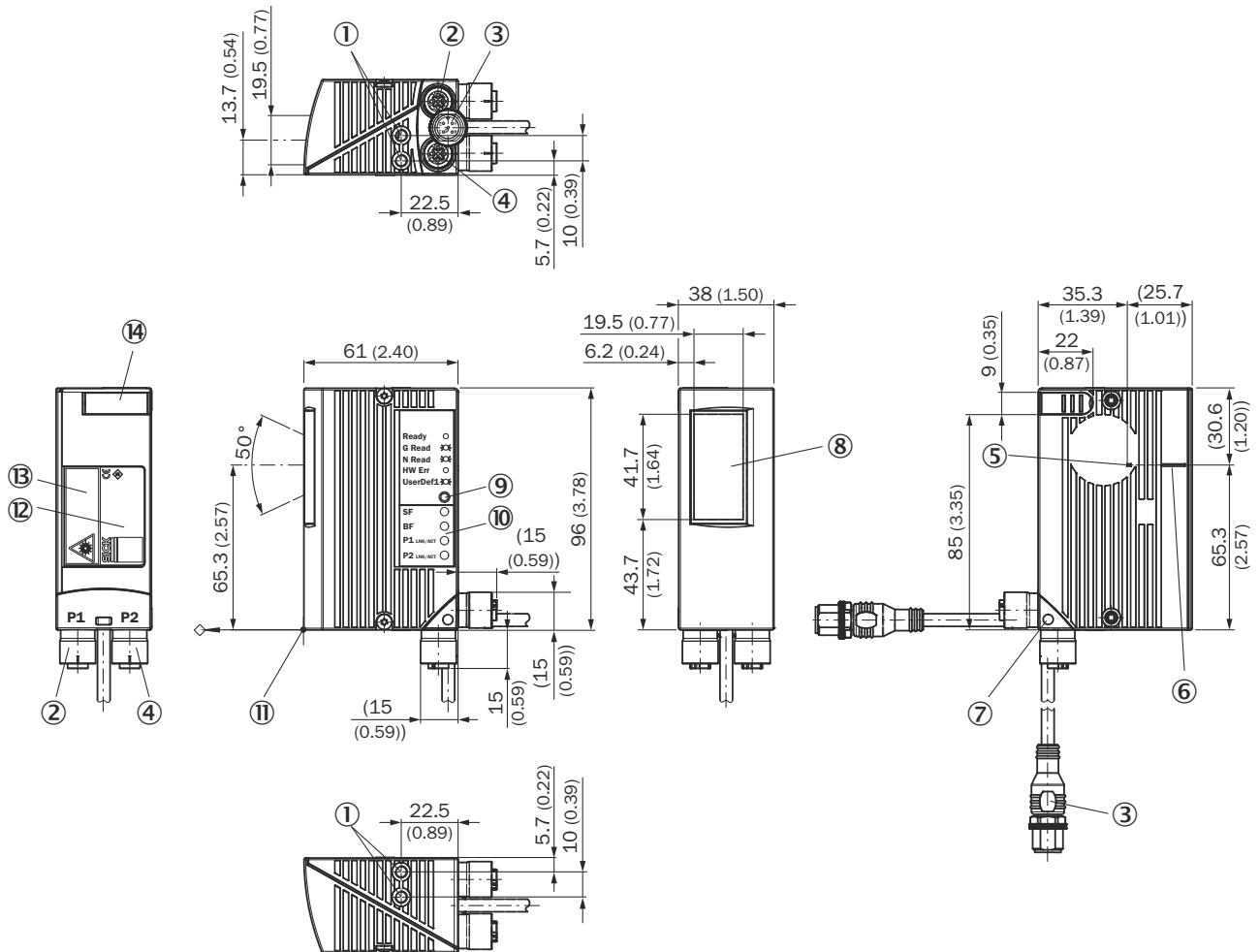


Figure 4: CLV61x Dual Port with front viewing window: Structure and device dimensions, unit of measurement: mm (inch), decimal separator: Period

- ① Tapped blind hole M5, 5 mm deep (2 x), for mounting the device
- ② P1 connection (PROFINET port 1), female connector, M12, 4-pin, D-coded
- ③ Cable (0.9 m). Type-dependent with POWER connection (male connector, M12, 4-pin, A-coded) or with POWER connection and trigger input (male connector, M12, 5-pin, A-coded)
- ④ P2 connection (PROFINET port 2), M12, female connector, 4-pin, D-coded
- ⑤ Internal impact point: Rotation point of the variable direction laser beam
- ⑥ Central position of the deflected laser beam in the V-shaped aperture angle
- ⑦ Swivel connector (angle of rotation max. 180°, from end position to end position)
- ⑧ Viewing window, front orientation
- ⑨ RGB LED (1 x), status display with signal color assignment for events
- ⑩ LED (4 x), status display for PROFINET
- ⑪ Reference point of the reading distance (from housing edge to object)
- ⑫ Type label
- ⑬ Laser warning label
- ⑭ Type-dependent: Cover for USB port ¹⁾ (female connector, 5-pin, Micro-B type) or for memory card slot (MicroSD)

1) service interface, for temporary use only

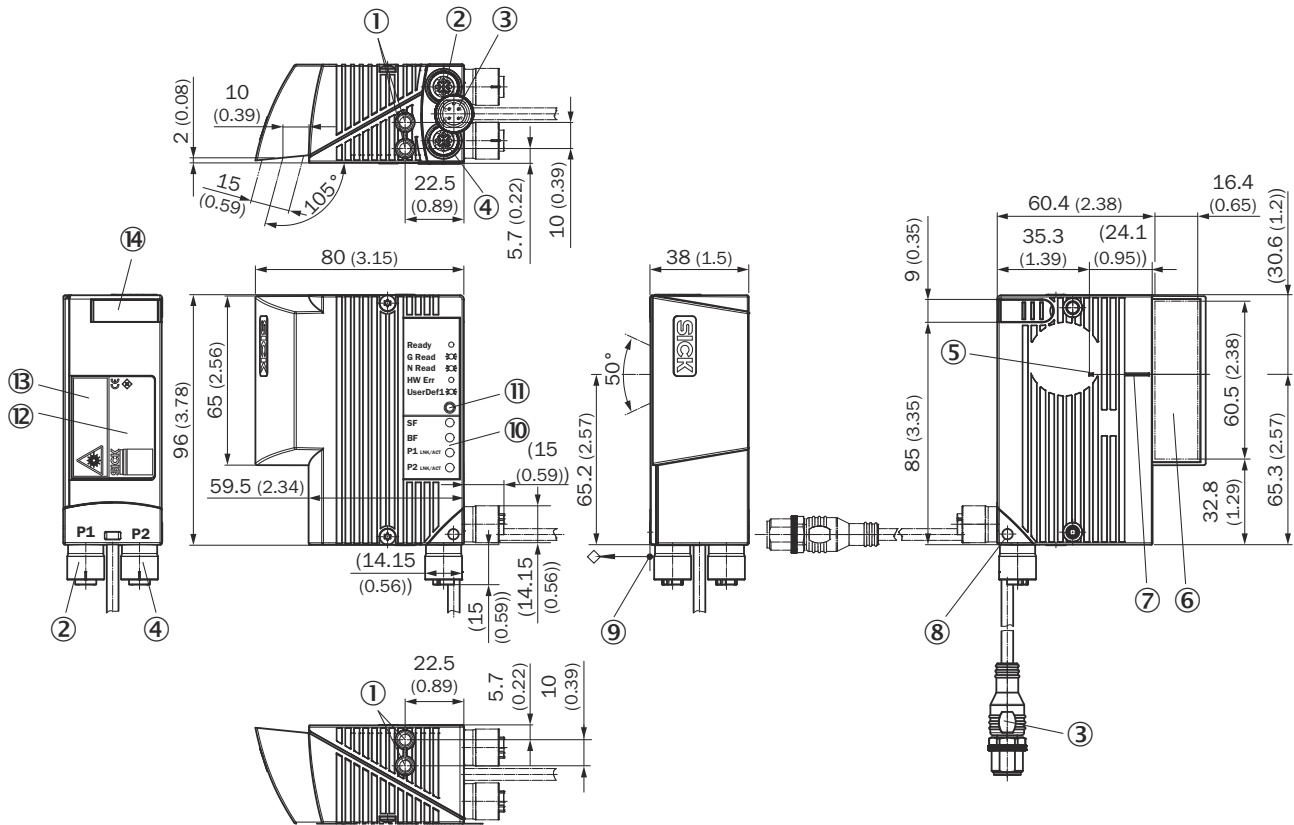


Figure 5: CLV61x Dual Port with side viewing window: Structure and device dimensions, unit of measurement: mm (inch), decimal separator: Period

- ① M5 tapped blind hole, 5 mm deep (2 x), for mounting the device
- ② P1 connection (PROFINET port 1), female connector, M12, 4-pin, D-coded
- ③ Cable (0.9 m), type-dependent with POWER connection (male connector, M12, 4-pin, A-coded) or with POWER + trigger input connection (male connector, M12, 5-pin, A-coded)
- ④ P2 connection (PROFINET port 2), M12, female connector, 4-pin, D-coded
- ⑤ Internal impact point: Rotation point of the variable direction laser beam
- ⑥ Viewing window, side orientation
- ⑦ Central position of the deflected laser beam in the V-shaped aperture angle
- ⑧ Swivel connector unit (max 180° rotation angle from end position to end position)
- ⑨ Reference point for reading distance from device (housing edge) to object
- ⑩ LED (4 x), status display for PROFINET
- ⑪ RGB LED (1 x), status display with signal color assignment for events
- ⑫ Type label
- ⑬ Laserwarnschild
- ⑭ Cover for USB port ²⁾ (female connector, 4-pin, Micro-B type) or for memory card slot (MicroSD), type-dependent

3.2.2 Device variants

The CLV61x product family offers four possible interface applications:

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

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

²⁾ service interface, for temporary use only

Table 3: Differences between the interface applications

Feature	CLV61x CAN	CLV61x FIELDBUS	CLV61x Dual Port (PROFINET)
Connection type	Data output to host via RS-232	Connection to fieldbus via optional CDF600-2 fieldbus module (dual port switch)	Direct integration in line or ring topology
Scanning methods	Line scanning or raster scanning, depending on type		
Sensor type	Line scanner or raster scanner, depending on type		
Reading ranges (working range)	<ul style="list-style-type: none"> Short Range (CLV612) Mid Range (CLV610) Long Range (CLV615) 		<ul style="list-style-type: none"> Long Range (CLV615 and CLV618)
Orientation of the viewing window	<ul style="list-style-type: none"> CLV610, CLV612: front or side CLV615, CLV618: side 		
Electrical Interfaces	<ul style="list-style-type: none"> Power RS-232 (Host, AUX) CAN 2 digital inputs 2 digital outputs 		<ul style="list-style-type: none"> Power Ethernet (Host, AUX) USB or MicroSD memory card^{1) 2) 3)} 1 digital input ¹⁾
Type of electrical connections	1 cable with male connector, D-Sub-HD, 15-pin		<ul style="list-style-type: none"> 2 female connectors, M12, 4-pin, D-coded in swivel connector Cable with 1 male connector, 4- or 5-pin, A-coded ¹⁾ 1 female connector, 5-pin, type USB Micro-B or MicroSD memory card ¹⁾
Supply voltage	10 V DC ... 30 V DC		<ul style="list-style-type: none"> 10 V DC ... 30 V DC 18 V DC ... 30 V DC ⁴⁾
Power consumption			<ul style="list-style-type: none"> Typically 5 W ⁵⁾ Typically 15 W ^{4) 5)}
Memory card	–		Optional ^{1) 2)}
Heating	–		Optional ¹⁾
Ambient operating temperature	0 °C ... +40 °C		0 °C ... +40 °C –35 °C ... +40 °C ⁴⁾
Storage temperature	–20 °C ... +70 °C		–20 °C ... +70 °C –35 °C ... +70 °C ⁴⁾
Dimensions for device with front viewing window	61 mm x 66 mm x 38 mm		61 mm x 96 mm x 38 mm
Dimensions for device with side viewing window	80 mm x 66 mm x 38 mm		80 mm x 96 mm x 38 mm

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

3.2.3 Scope of delivery

The delivery of the device includes the following components:

Table 4: CLV61x Dual Port (PROFINET): scope of delivery

No. of units	Component	Notes
1	Device in the version ordered	Delivery state: <ul style="list-style-type: none"> Both M12 female connectors are closed with screwed-on protective elements, e.g. protective caps. The black cover fitted at the side over the corner must be flush with the device. Without bracket and bus connection cables Without fixing screws
1	Printed Safety Notes (safety information), multilingual	The document contains: <ul style="list-style-type: none"> 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:

- Suitable cables for access to PROFINET

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

3.2.4 Product features and functions (overview)

Table 5: Overview of product features and functions of the device

Product feature/function	Characteristic
Safety and ease of use	<ul style="list-style-type: none"> 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-proof due to firmware update via data interface Future-oriented SOPAS ET configuration software Low power consumption Type-dependent, optional parameter cloning using a memory card in the device
Convenient operation and configuration	<ul style="list-style-type: none"> Configuration via SOPAS ET configuration software (online/offline) or commands Type-dependent configuration via GSD parameterization (via CDF600-2xx or PROFINET controller) LED status indicators
Reading Operation Mode	<ul style="list-style-type: none"> Start/stop operation (one bar-code bearing object per reading pulse)
Read cycle	<ul style="list-style-type: none"> Pulse sources for start: Digital inputs, data interface (command), auto pulse, free-running Pulse sources for stop: Read cycle source, digital inputs, data interface (command), timer, condition

Product feature/function	Characteristic
Bar code evaluation	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Output of read data configurable through event-dependent evaluation conditions Influencing the output string by filtering and output sorting
Data communication	<ul style="list-style-type: none"> Host interface: Two data output formats can be configured for the reading result, can be switched to various physical interfaces, parallel operation possible AUX interface: Fixed data output format that can be switched for various physical interfaces

3.2.5 Operating principle

The device consists of a laser scanner (laser diode and optics) with fixed focus and an electronics unit with integrated decoder, as well as a PROFINET module. The laser scanner and electronic unit are encased in a compact metal housing.

The light is emitted through the viewing window in the industrial housing, and the reflected light from the bar code then returns through this window.

The use of various focusing settings, resolutions, reading methods, integrated heating if applicable, mounting options and optics enables the device to be employed in most industrial applications.

Because of the integrated D-sub shell, when the viewing window is on the side the laser beam is emitted at angle of 105° relative to the longitudinal axis of the device. The device has three electrical M12 round connectors.

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 can scan the codes on one side of stationary or moving objects in a conveyor system (single-side reading). By combining several devices, multiple sides can be scanned in a single pass (multi-side reading). The device produces a scanning line (line scanner) in order to identify the code. In the grid scanner version, the device produces eight scanning lines that are offset parallel to one another.

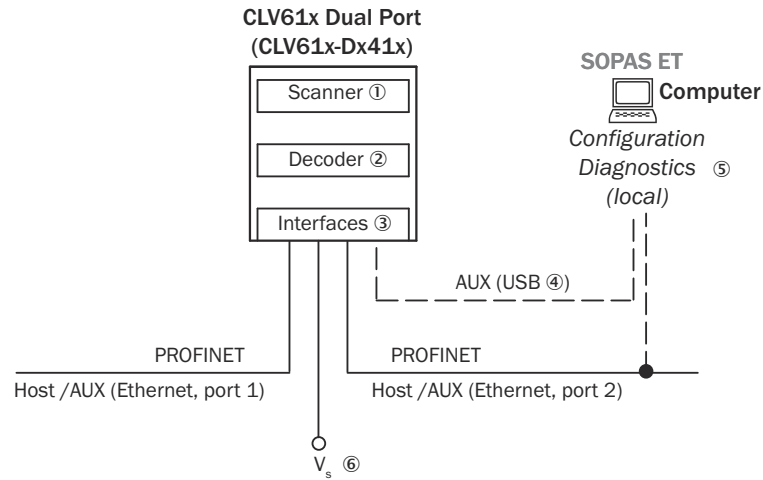
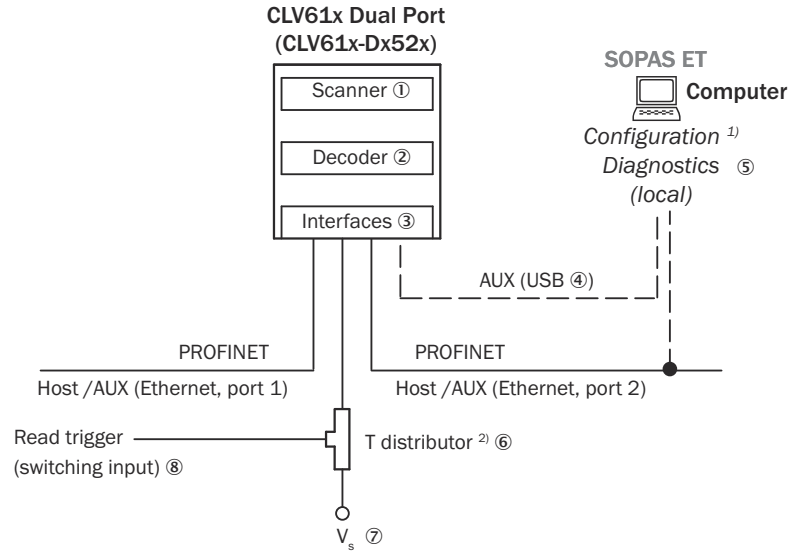


Figure 6: Block diagram for CLV61x-Dx41x (without digital input)

- ① Scanner
- ② Decoder
- ③ Interfaces
- ④ USB interface ³⁾ type-dependent. Not present on device variants with a memory card slot.
- ⑤ Configuration or diagnostics (local)
- ⑥ Supply voltage V_s

³⁾ Service interface, for temporary use only



1) Alternative: GSDML configuration (centrally via the PROFINET IO controller) ⑨
 2) Male connector, M12, 4-pin, A-coded splitted to 2 x female connector M12, 5-pin, A-coded) ⑩

Figure 7: Block diagram for CLV61x-Dx52x (with digital input)

- ① Scanner
- ② Decoder
- ③ Interfaces
- ④ USB interface ³⁾ type-dependent. Not present on device variants with a memory card slot.
- ⑤ Configuration or diagnostics (local)
- ⑥ T-connector
- ⑦ Supply voltage V_s
- ⑧ Read trigger (digital input)
- ⑨ Alternative: GSD configuration (central via PROFINET controller)
- ⑩ Male connector, M12, 4-pin, A-coded, split into 2 x female connectors, M12, 5-pin, A-coded

3.2.6 Memory card

Depending on the type, the device offers a card slot integrated into the housing that accommodates a memory card in MicroSD format.

NOTE
 The memory card is an optional accessory and is not included with delivery.

NOTE
 Only use types approved by SICK to ensure reliable function of the memory card.

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

Memory functions

An inserted memory card serves as a local external storage medium for the device outside the internal device memory, [see "Initial commissioning", page 51](#).

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

3) Service interface, for temporary use only

- **Cloning function: storage of the currently valid parameter set**
Automated additional storage of the current parameter set with the configuration data of the device on an external storage medium that is quickly accessible to the user. The procedure is carried out as part of the recommended backup concept for the parameter sets of the device. The externally stored parameter set is also updated automatically each time the currently valid configuration data is permanently saved.
 - The cloning function provides the basis for performing the following tasks, for example:
 - Manually transferring an identical parameter set to multiple devices of the same type on the PROFINET network (cloning). When doing so, the PN name of each device must be manually configured by the user in coordination with the PROFINET controller.
 - In the event of a device fault, a convenient and rapid manual transfer of the currently valid parameter set to an exchange unit of the same type in the read station.



NOTE

Use an empty memory card to save a parameter set or read diagnostic data for the first time.

- ▶ To do this, check the contents of the current card on the computer using a card reader. Delete existing content if necessary.

Device access to the memory card:



NOTE

The device does not indicate direct access (read, write) to the memory card.

When saving the parameter set, the Sensor LED indirectly indicates when the save process has completed:

- When the device starts saving, the sensor LED in the “**Device Ready**” indicator function goes out.
- When the device has finished saving, the sensor LED in the “**Device Ready**” indicator function LED lights up blue again.



NOTICE

Possible data loss!

- ▶ Do not remove the memory card or switch off the supply voltage as long as the following initiated operation is still being executed on the device using the SOPAS ET configuration software:
 - Permanent change to the parameter set when saving using the “permanent” option.

Inserting the memory card in the device:



NOTICE

Risk of damage to the memory card

- ▶ To safely install or uninstall the memory card, insert or remove the card only when the device is **de-energized**. To do this, disconnect the device from the supply voltage beforehand.

Access to the card slot

The card slot for the memory card is located beneath the black rubber cover fitted at the side over the corner on the device.

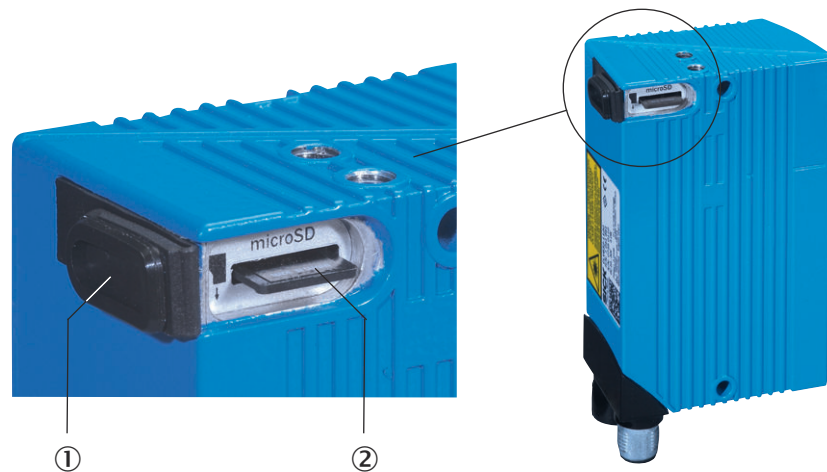


Figure 8: Slot for microSD memory card (CLV61x-DxxXxx only, where x = 3 or 4), illustration may differ IP65 standard housing

- ① Open cover on the device
- ② MicroSD memory card

1. Switch off the supply voltage to the device.
2. Open the black rubber cover.
To do so, carefully lift the flap of the rubber cover.
3. Making sure it is in the correct position, insert the memory card into the slot until it locks into place. When doing this, position the contacts so that they are facing to the rear and upwards, see the card symbol on the device.
4. Close the rubber cover. Make sure that the cover is completely flush with the housing.
5. Switch on the supply voltage for the device.

Interpretation of the card content

Once it is switched on, the device automatically detects the presence of a memory card. Depending on the content of the card, the device behaves as follows:

- If the card is empty or contains a parameter set that cannot be interpreted, the device saves its currently valid internal parameter set to the memory card. The prerequisite is adequate storage space on the card. The device then starts with the internal parameter set.
- If the card contains a parameter set that can be interpreted, the device permanently overwrites its previously valid internal parameter set with this parameter set. The device then starts with the now valid parameter set.
- The goal is for the internal parameter set and the parameter set saved externally to always be identical.

When using PROFINET, the device adopts the highest ranking parameter set in the following hierarchical sequence:

- 1 After starting, the device loads the last permanently stored internal parameter set to its working memory.
- 2 The device then searches for a valid parameter set in the optional memory card slot. If there is a positive search result, the device overwrites the existing parameter set in its working memory with this parameter set. The device starts with the new parameter set.
- 3 Centralized configuration of the nodes via PROFINET: When the PROFINET controller sends the parameter set of the device, the device temporarily overwrites the relevant parameter values in its working memory. These changes are lost again when the device is switched off. The PROFINET controller must then resend the valid parameter values each time the device is restarted (supply voltage is switched on).

Removing the memory card from the device:



NOTICE

Risk of damage to the memory card

- ▶ To safely install or uninstall the memory card, insert or remove the card only when the device is **de-energized**. To do this, disconnect the device from the supply voltage beforehand.
-

1. Switch off the supply voltage to the device.
2. Open the black rubber cover.
To do so, carefully lift the flap of the rubber cover.
3. Unlock the memory card in the slot and remove it.
To do so, carefully press down once on the memory card.
4. Close the rubber cover. Make sure that the cover is completely flush with the housing.
5. Switch on the supply voltage for the device.

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 64.
- Relative humidity: see "Technical data", page 64.
- 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 30](#), [see "Notes on the electrical installation", page 38](#) and [see "Connecting the supply voltage", page 46](#).

- Selecting and preparing the mounting location.
- Mounting the device.
- Connect device to data cable (PROFINET) 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 64](#).
- To prevent the formation of condensation, avoid exposing the device to rapid changes in temperature.

- Devices without heating: To avoid additional external heating of the device during operation or optical device dazzle, protect the device from direct or indirect sunlight.
- Devices with heating: To prevent optical device dazzle, protect the device against direct and indirect sunlight.

Mounting

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

Equipment required

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

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



NOTE

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

5.2.2 Instructions for mounting the device when the ambient temperature can fall below 0 °C

Notes on electrical installation see "[Instructions for electrical installation when the ambient temperature can fall below 0 °C](#)", page 38

The devices with integrated heating (CLV61x-DxxxxxFO) can be operated at low ambient temperatures down to –35 °C.

Prerequisites:

- Only perform mounting and connection work at ambient temperatures between –25 °C and 40 °C.
- The device may only be in a non-operating state at ambient temperatures below 0 °C
- When mounting, make sure that a thermal transition between the device and the environment is largely reduced. Use appropriate holders (optional accessories).



NOTE

Operating the device at the lower limit of the permissible ambient temperature range

The ensure that the device can produce the required heating power, do not expose it to strong air flows (e.g. from a ventilation system).

- ▶ If necessary, shield the device from air movement with suitable means.



NOTICE

If the ambient temperature is below 0 °C, please note:

- The black rubber cover fitted at the side over the corner must be flush with the device.
- **Do not** move the swivel connector on the device.

5.2.3 Mounting device

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

SICK brackets

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

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

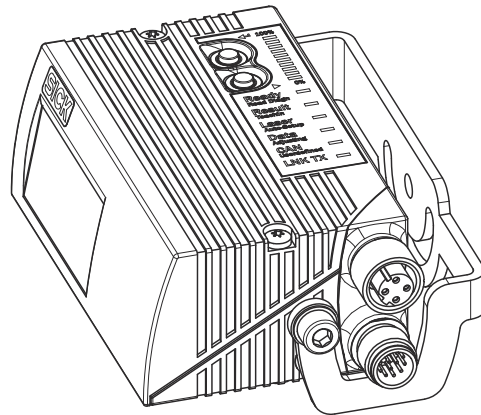


Figure 9: Mounting example of a device with bow-shaped mounting bracket. Illustration may differ from actual device.

Devices with heating



NOTE

In devices with heating, use special mounting brackets for thermal decoupling.

Suitable mounting brackets are available as accessories (part no. 2050705 and 2058082). Use the plastic insulating washers for thermal insulation of the device against the bracket. These insulating washers are included with the mounting brackets for thermal decoupling.

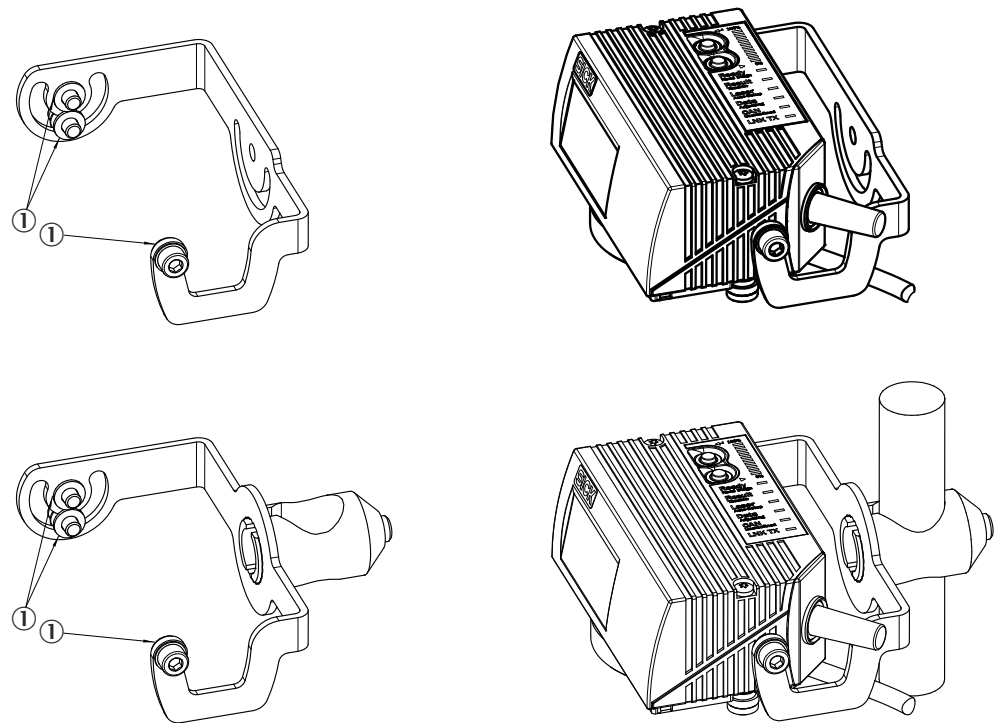


Figure 10: Mounting examples for device with heating: Mounting via bow-shaped mounting bracket (SICK accessories). Illustration of the device may differ.

① Plastic insulation panes

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.
 - Devices with heating: Thermal decoupling of the housing from the bracket
- Depending on the device, at least three M5 screws for mounting the device
- Devices with heating: Use three plastic insulating washers for heat decoupling with respect to the mounting bracket (bow-shaped).
 - The screw length depends on the wall thickness of the mounting device.
 - The maximum screw in-depth in the device is 5 mm from the housing surface.

5.3 Mounting location

When selecting the mounting location, the following factors are significant:

- Basic allocation of the scan line to the bar code.
- Reading distance to the bar code and aperture angle α
- Angular alignment of the device
- Avoidance of surface reflections
- Count direction of the reading angle (position of the bar code along the scan line)

5.3.1 Basic assignment of the scan line to the bar code

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

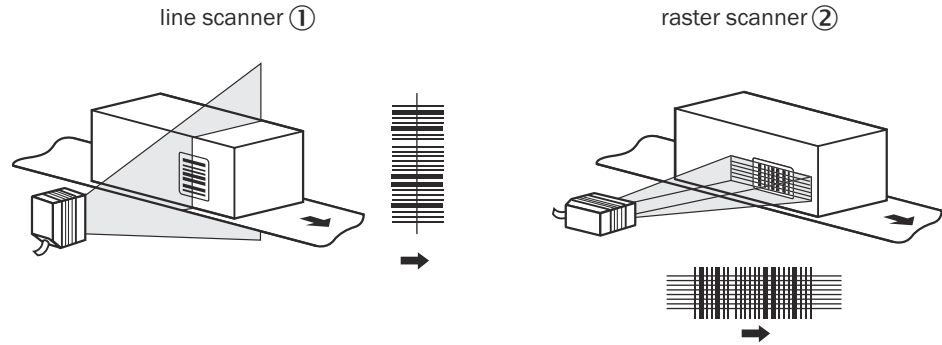


Figure 11: Allocation of scan line(s) to bar code and conveyor direction

- ① Line scanner
- ② Grid scanner

5.3.2 Reading distance to the bar code and aperture angle α

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

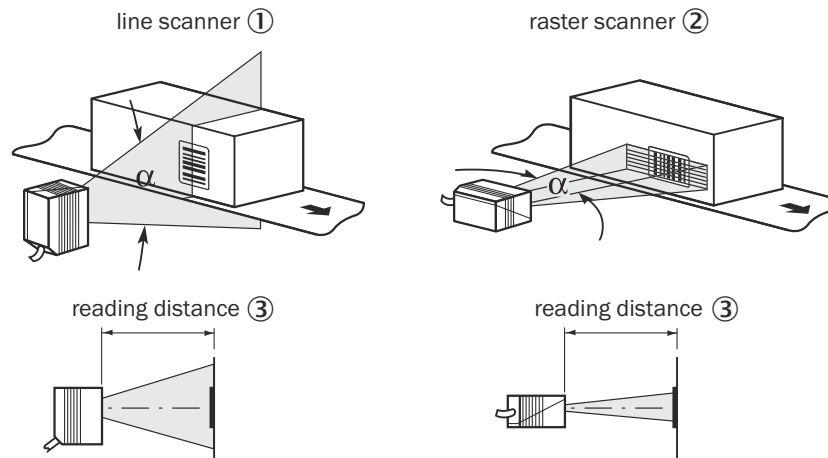


Figure 12: Definition of the reading distance and the aperture angle α

- ① Line scanner
- ② Grid scanner
- ③ Reading distance

In the specification diagrams (see ["Reading field diagrams \(working ranges\)", page 67](#)), the height of the reading field is shown as a function of the reading distance for different resolutions (module widths).

5.3.3 Angular orientation of the device

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

To avoid surface reflections, select a rotation angle of approx. 15° from the perpendicular to the bar code, see ["Avoiding surface reflections", page 33](#).

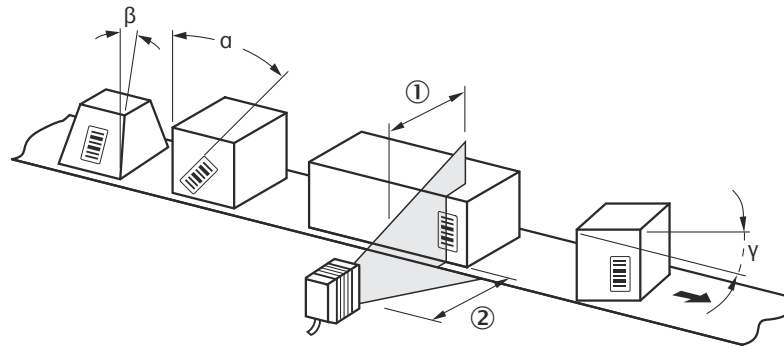


Figure 13: Line scanner: Occurring reading angle between scan line and bar code

- ① Depth of field
- ② Reading distance

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

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



NOTE

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

5.3.4 Avoiding surface reflections

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

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

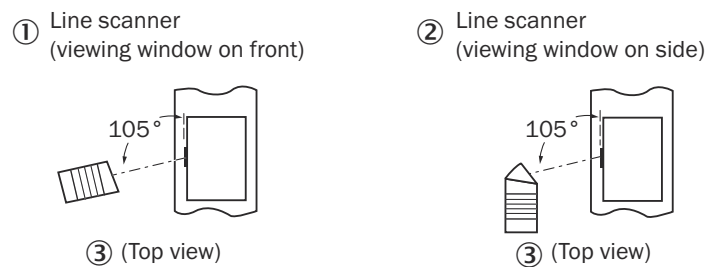


Figure 14: Avoiding surface reflections on the example line scanner: Angle between light emitted and bar code (tilting away from vertical)

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



NOTE

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

5.3.5 Counting direction of the reading angle

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

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

Reading angle (RA value)

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

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

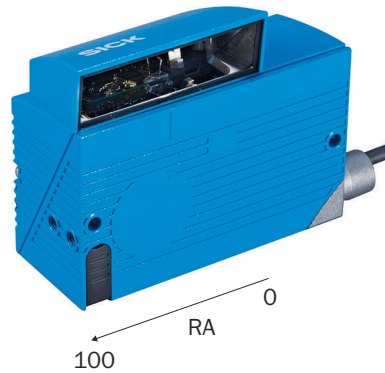


Figure 15: Counting direction of the reading angle RA in the scan plane: For devices with a front and side viewing window

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.



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.

Maximum tightening torque: 2.5 Nm

Screw-in depth of the blind tapped holes see ["Mechanics/Electronics", page 66](#) in the technical data.

1. Prepare the base for mounting the bracket of the device, see ["Preparing for mounting", page 28](#).
2. Place the object with bar code at the intended reading point of the device in the viewing range of the device (no conveying movement).
3. Align device with the bar code by eye. When doing so, be aware of the following:
 - For devices with a front viewing window: The rear of the device with the laser warning label faces the viewer and is aligned approximately parallel to the bar code surface.
 - For devices with a side viewing window: The side panel with the LEDs faces the viewer and is aligned almost parallel to the bar code surface.
 - During reading, note the reading angle that occurs see ["Angular orientation of the device", page 32](#).
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 50](#).
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) as accessories online on the product page.



Figure 16: Device with mounting bracket (top bracket)



Figure 17: Device with mounting bracket (bottom bracket)

Permissible mounting variants

The following two mounting variants using the SICK mounting bracket part no. 2042799 with integrated vibration and shock damping are permissible for line scanners (horizontal scan line):

1. Horizontal mounting bracket mounted above the device (suspended device)

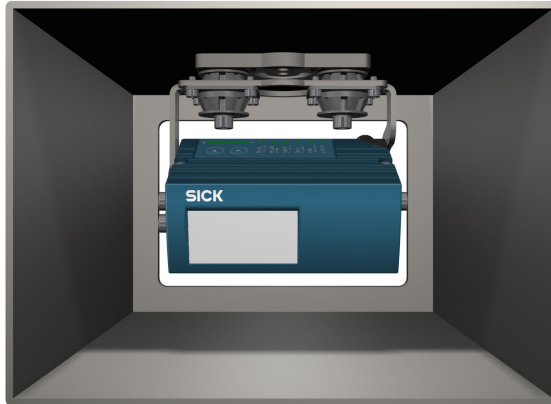


Figure 18: Mounting with top mounting bracket

2. Horizontal mounting bracket mounted below the device (standing device)

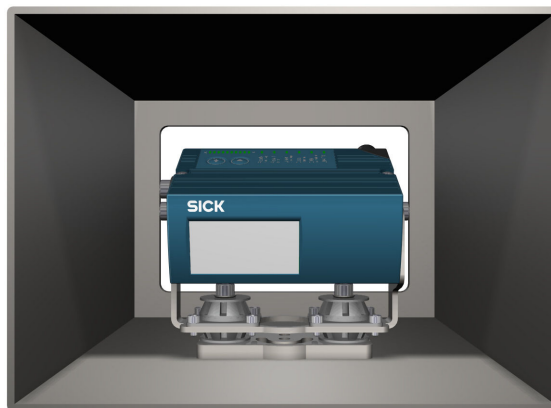


Figure 19: Mounting with bottom mounting bracket



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 bracket directly onto the device.
- Attach the vibration damper as close to the device as possible.
- Fasten the device to the bracket with vibration dampers. Use at least two M3 tapped blind holes when doing so. The blind tapped holes are located in pairs on both of the narrow sides of the device, [see "Device view", page 17](#).
- Mounting the device is the same as mounting using mounting brackets, [see "Mounting device", page 30](#).

**NOTICE****Damage to device through improper mounting!**

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

- Mount the vibration damper horizontally above or below the device.
- Only use the screws provided.
- 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.

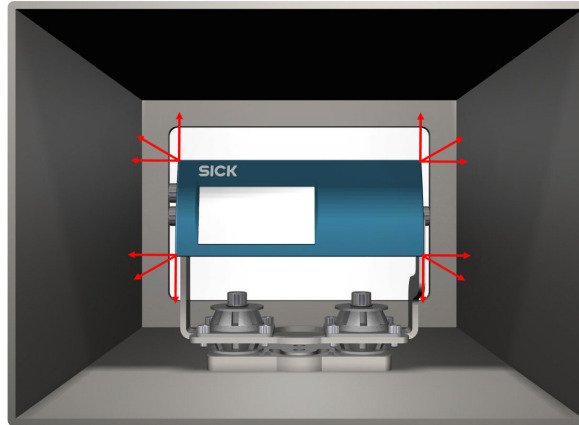


Figure 20: Mounting with mounting bracket: Taking into account the working distance.

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 user: 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.

6 Electrical installation

6.1 Safety

6.1.1 Notes on the electrical installation



NOTICE

Equipment damage due to incorrect supply voltage!

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

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



NOTICE

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

Working with live parts may result in unpredictable operation.

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

- **The electrical installation must only be performed by electrically qualified personnel.**
 - **Standard safety requirements must be observed when working on electrical systems!**
 - Only switch on the supply voltage for the device when the connection tasks have been completed and the wiring has been thoroughly checked.
 - When using an extension cable with an open end, make sure that bare wire ends are not touching (risk of short-circuit when the supply voltage is switched on). Wires must be properly insulated from each other.
 - Wire cross-sections in the supply cable from the user's power system must be selected in accordance with the applicable standards. When this is done in Germany, observe the following standards: DIN VDE 0100 (Part 430) and DIN VDE 0298 (Part 4) or DIN VDE 0891 (Part 1).
 - Circuits connected to the device must be designed as SELV circuits (SELV = Safety Extra Low Voltage).
 - Protect the device with a separate fuse at the start of the supply circuit. Protect devices without heating with a maximum of 2 A, heatable devices with a maximum of 3 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.
-

6.1.2 Instructions for electrical installation when the ambient temperature can fall below 0 °C



NOTE

For mounting instructions, see "[Instructions for mounting the device when the ambient temperature can fall below 0 °C](#)", page 29.

The devices with integrated heating (CLV61x-DxxxxFO) can be operated at low ambient temperatures down to $-35\text{ }^{\circ}\text{C}$.

Prerequisites:

- Only perform mounting and connection work at ambient temperatures between $-25\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$.
- The device may only be in a non-operating state at ambient temperatures below $0\text{ }^{\circ}\text{C}$.
- Supply voltage range restricted: 18 V DC ... 30 V DC
- Use cables suitable for the ambient conditions. SICK standard cables can be found online as accessories on the product page. When in doubt, please consult SICK Service.
- Secure connecting cables.

On the device:

- The cables plugged into the two electrical M12 female connectors must be screwed on tightly.
- Any electrical M12 female connector not in use at the end of a line must be sealed with protective plugs that are screwed on tightly (as in the delivery condition).
- The M12 male connector of the connecting cable must be tightly screwed to the contacted female connector.

6.1.3 Behavior of the device with heating when switched on

After application of the supply voltage and successful initialization, the device can immediately be addressed by the SOPAS ET configuration software.

The initialization time depends on the ambient conditions. Once the device has reached a certain internal housing temperature, it enters the warm-up phase and the sensor LED flashes magenta. The warm-up phase takes approx. 1 minute. After that, the sensor LED shows a steady blue light, and the device will have begun regular operation.

Once the supply voltage has been applied, the device uses integrated temperature sensors to measure its internal temperature. This is performed by the device while booting.

In addition, the device has an integrated heater that monitors its internal temperature at regular intervals during operation. The device switches the heater off once it has warmed up to $+5\text{ }^{\circ}\text{C}$, and switches it back on if the internal temperature drops to $-15\text{ }^{\circ}\text{C}$. A circuit protection device prevents the heater from overheating.

6.1.4 Note on the swivel connector



NOTICE

Damage to the male connector unit due to overtightening

The connector unit on the device has two opposite end positions.

- Do not rotate the connector unit from either of the two end positions by more than 180° .
- Always rotate the connector unit in the direction of the display LEDs.



Figure 21: Swivel connector unit, rotation direction from end position to end position

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

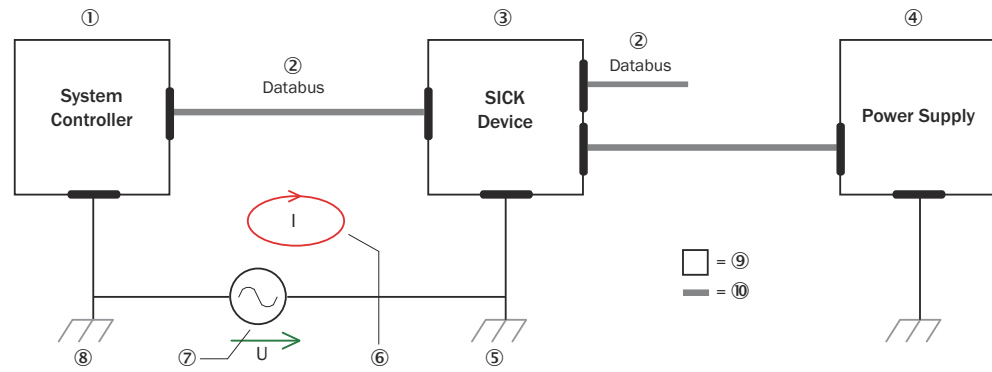


Figure 22: Example: Occurrence of equipotential bonding currents in the system configuration

- ① System controller
- ② Data bus
- ③ Device
- ④ Voltage supply
- ⑤ Grounding point 2
- ⑥ Closed current loop with equalizing currents via cable shield
- ⑦ Ground potential difference
- ⑧ Grounding point 1
- ⑨ Metal housing
- ⑩ 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.

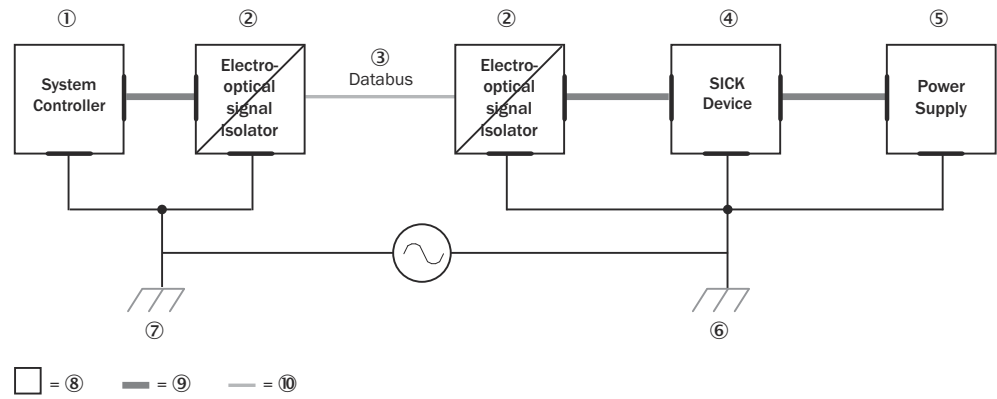


Figure 23: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

- ① System controller
- ② Electro-optical signal isolator
- ③ Data bus
- ④ Device
- ⑤ Voltage supply
- ⑥ Grounding point 2
- ⑦ Grounding point 1
- ⑧ Metal housing
- ⑨ Shielded electrical cable
- ⑩ 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.

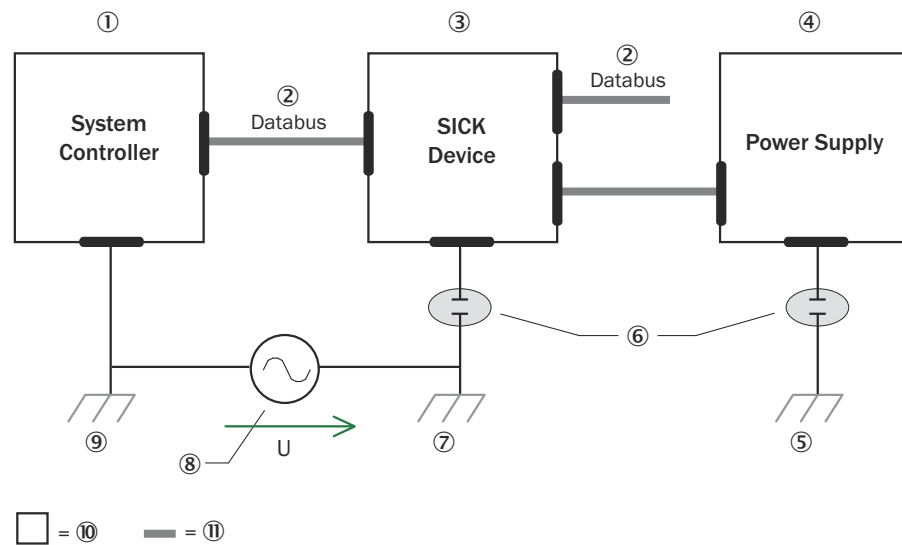


Figure 24: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

- ① System controller
- ② Data bus
- ③ Device
- ④ Voltage supply
- ⑤ Grounding point 3
- ⑥ Insulated mounting
- ⑦ Grounding point 2
- ⑧ Ground potential difference
- ⑨ Grounding point 1
- ⑩ Metal housing
- ⑪ 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 75.](#)

All electrical connections of the device are configured as M12 round 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 guided over the knurled nut of the cable heads.
- 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 [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.

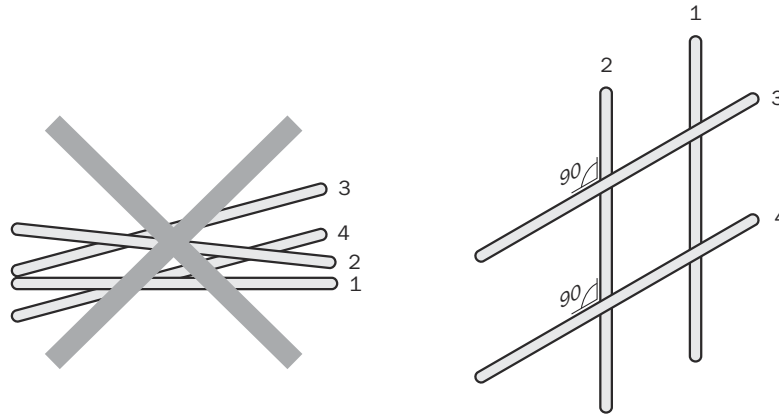


Figure 25: Cross cables at right angles

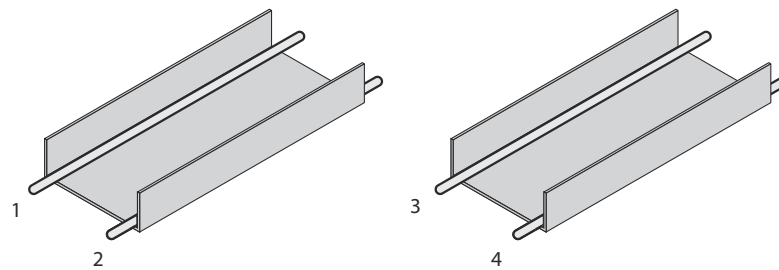


Figure 26: Ideal laying - Place cables in different cable channels

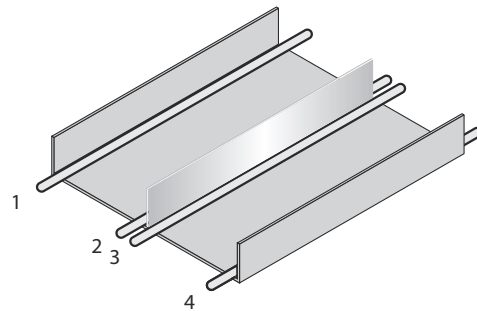


Figure 27: Alternative laying - Separate cables with metallic separators

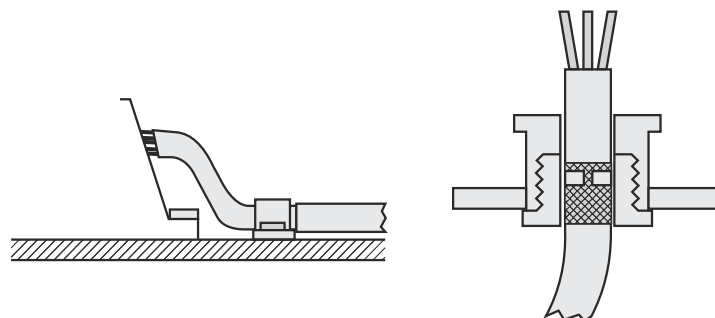


Figure 28: Shield connection in plastic housings

6.4 Pin assignments for electrical connections

“P1” and “P2” connections (PROFINET)

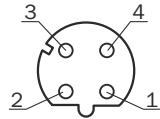


Figure 29: M12 female connector, 4-pin, D-coded

PIN	Signal	Function
1	TD+ (Ethernet)	Sender+
2	RD+ (Ethernet)	Receiver+
3	TD- (Ethernet)	Sender-
4	RD- (Ethernet)	Receiver-

“POWER” connection (CLV61x-Dx41x)

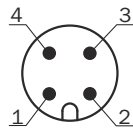


Figure 30: Male connector, M12, 4-pin, A-coded

Pin	Signal	Function
1	V _S	Supply voltage
2	Reserved	(Do not use)
3	GND	Ground
4	Reserved	(Do not use)

“POWER and trigger input” connection (CLV61x-Dx52x)

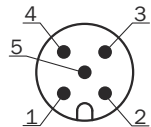


Figure 31: Male connector, M12, 5-pin, A-coded

PIN	Signal	Function
1	V _S	Supply voltage
2	Reserved	(Do not use)
3	GND	Ground
4	Reserved	(Do not use)
5	Sensor 1	Digital input for external reading cycle

6.5 Wiring interfaces

6.5.1 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 10 V DC ... 30 V DC
- Electricity source with at least 30 W power

Connecting supply voltage to devices with heating

- 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 18 V DC ... 30 V DC
- Electricity source with at least 40 W power

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.

6.5.2 Wiring the PROFINET interface

1. Connect the device using the pre-assembled cables to the left and right of the additional devices (IO devices) in the PROFINET network. Line or ring topology is possible. If only one Ethernet connection is needed (e.g., last device in a line topology), either the P1 or P2 connection can be used. Fit a protective element of the appropriate design onto the unused connection (as in delivery condition).
2. Switch on the supply voltage for the device. The device starts with a delay and uses the default parameters set in the factory for the initialization. After a successful self-test, the blue LED on the device lights up to indicate the "Device Ready" status.

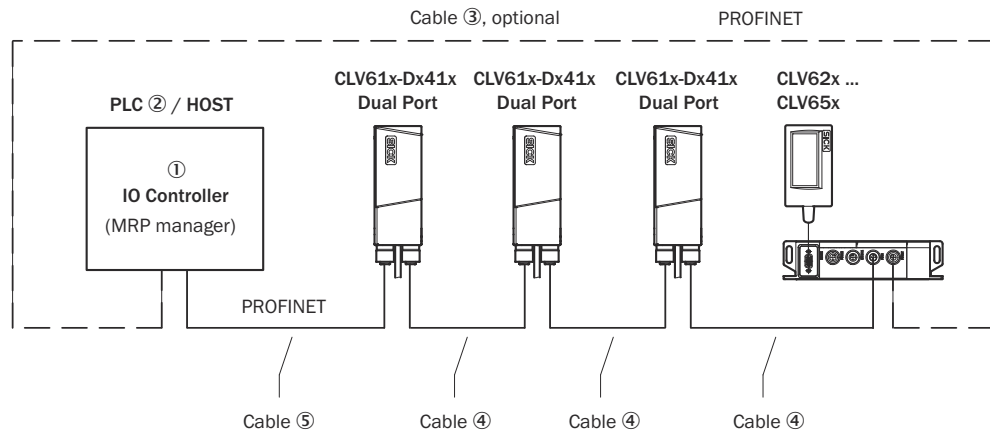


Figure 32: Example PROFINET network configuration with a line or ring topology (CLV61x-Dx41x)

- ① IO controller
- ② PLC
- ③ Adapter cable (male connector, RJ45, 8-pin / male connector, M12, 4-pin, D-coded), optional
- ④ Cable 1:1 (male connector, M12, 4-pin, D-coded / male connector, M12, 4-pin, D-coded)
- ⑤ Adapter cable (male connector, RJ45, 8-pin / male connector, M12, 4-pin, D-coded)

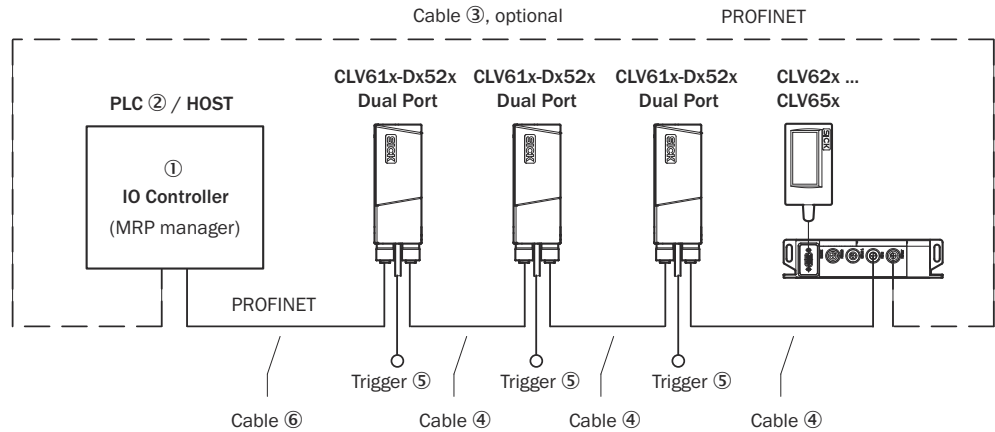


Figure 33: Example of a PROFINET network design with a line or ring topology (CLV61x-Dx52x)

- ① IO controller
- ② PLC
- ③ Adapter cable (male connector, RJ45, 8-pin / male connector, M12, 4-pin, D-coded), optional
- ④ Cable 1:1 (male connector, M12, 4-pin, D-coded / male connector, M12, 4-pin, D-coded)
- ⑤ Reading cycle trigger (local)
- ⑥ Adapter cable (male connector, RJ45, 8-pin / male connector, M12, 4-pin, D-coded)

When using a ring topology, a device, such as a switch or the PROFINET controller, must take over the function of the ring manager (MRP manager). The other devices must be able to work as an MRP-Client. The device can be used as an MRP client, but not as an MRP manager.



NOTE

The device-dependent USB interface provided is only for temporary connection to a computer for local configuration or device diagnostics.

6.5.3 Wiring digital input (CLV61x-Dx52x only)

If an external sensor triggers the reading process of the device, connect the trigger sensor to the digital input “Sensor 1”.

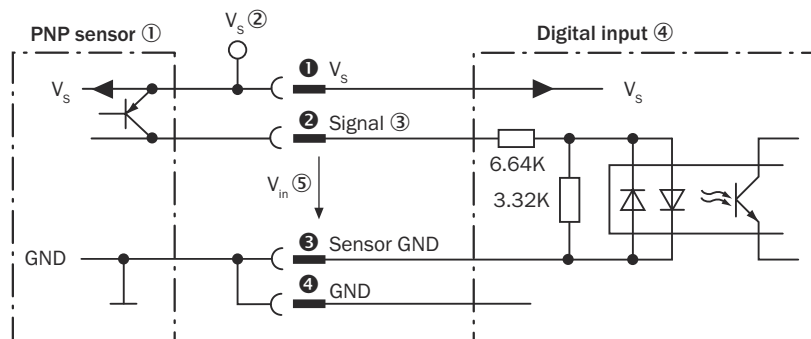


Figure 34: Wire digital input “Sensor 1”, supply of the trigger sensor by the device.

- ① Trigger sensor (PNP sensor)
- ② Supply voltage V_s
- ③ Input signal
- ④ Digital input of the device (“Sensor 1”)
- ⑤ Input voltage V_{in}
- ①...④ For pin assignment, see respective device

Table 7: "Sensor 1 digital input" characteristic data

Switching behavior	<p>Voltage at the input starts the internal reading interval of the device.</p> <ul style="list-style-type: none"> • Default: Active high • Debouncing: Max. 100,00 ms (default 10 ms)
Properties	<ul style="list-style-type: none"> • Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor
Electrical values	<ul style="list-style-type: none"> • Low: $V_{in} \leq 2 \text{ V}$; $I_{in} \leq 0.3 \text{ mA}$ • High: $6 \text{ V} \leq V_{in} \leq 32 \text{ V}$; $0.7 \text{ mA} \leq I_{in} \leq 5 \text{ mA}$

7 Commissioning

7.1 Overview of the commissioning steps

Commissioning, alignment, configuration and diagnostics of the device are performed by default using the SOPAS ET configuration software.

The configuration can differ from this if, for example, a general configuration of the device is performed centrally within the control environment by the PROFINET controller (e.g. PLC). In this case, the controller is parameterized using modules from the GSD file of the device. At each restart of PROFINET, the PROFINET controller overwrites and prioritizes the current device parameters of the device.

- Commission device using factory default settings.
- Connect the computer with the SOPAS ET configuration software to the device.
- To optimize the functionality of the device, adjust the device and adapt the configuration as needed. The configuration data are stored and archived as a parameter set (project file) on the computer as part of a backup concept. On device variants with the optional memory card, the device also creates a permanent backup of the configuration data on the card.
- Test the device for correct functionality in read operation.



NOTE

The procedure for incorporating the device into the PROFINET controller (PLC) and for central parameterization using the PROFINET controller is described in the supplementary information document “CLV61x Dual Port (PROFINET) fixed mount barcode scanner” (part no. 8017978). The supplementary information can be found under “Documentation” on the online product page.

7.2 Install and launch the SOPAS ET configuration software



NOTE

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

- www.sick.com/SOPAS_ET

1. Electrically connect one of the data interfaces of the device to the Internet-capable computer.
2. In accordance with the instructions, download and install the latest version of the configuration software SOPAS ET as well as the current device description file (*.sdd) for the device. 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 in the available devices list, which depends on the connected communication interface, e.g., Ethernet. (Default Ethernet address: IP address: 192.168.0.1, subnet mask: 255.255.255.0). SOPAS ET establishes communication with the device and loads the associated device description file. The device project tree opens.

7.3 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 64.
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 32.
7. Align the device so that the good read rate is between 70% and 100%.
8. Tighten the screws on the device.

7.4 Initial commissioning

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

Memory organization for parameter set

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

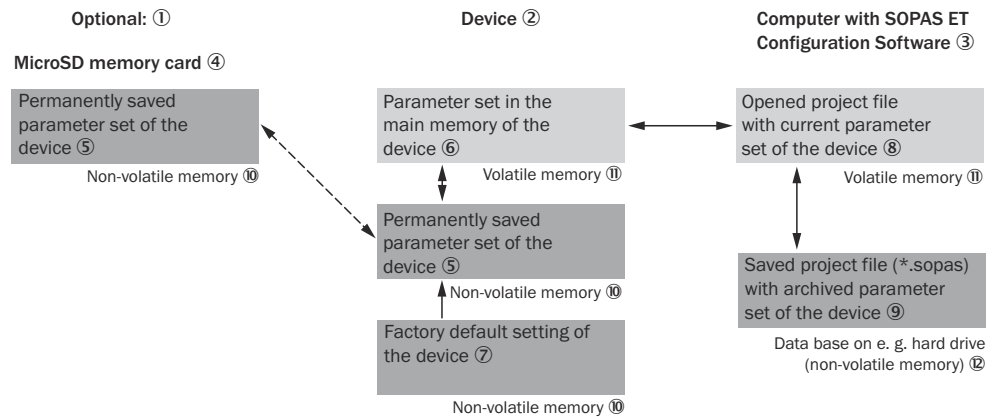


Figure 35: Configuring with SOPAS ET and saving the parameter set

- ① Optional (only CLV61x-DxxXxx, with X= 3 or 4)
- ② Device
- ③ Computer with the SOPAS ET configuration software
- ④ MicroSD memory card
- ⑤ Permanently saved device parameter set
- ⑥ Parameter set in the working memory of the device
- ⑦ Factory-set defaults for the device
- ⑧ Opened project file with current device parameter set
- ⑨ Saved project file with archived device parameter set
- ⑩ Nonvolatile memory
- ⑪ Volatile memory
- ⑫ Database on, for example, a hard drive (non-volatile memory)

Save process:

Depending on type, the device may be optionally equipped with a microSD memory card:

- When the current parameter set in the device is saved using the “Permanent” option, this parameter set is also permanently saved externally on the memory card.

8 Operation

8.1 Operating and status indicators

8.1.1 Optical displays

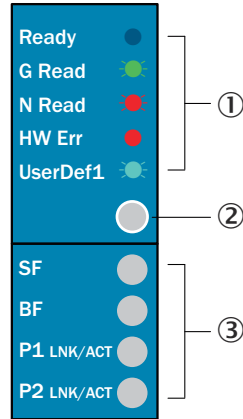


Figure 36: Display LEDs on the CLV61x Dual Port

- ① Assignment of signal colors for status and events, indicated by the sensor LED
- ② Sensor LED (RGB), 1 x
- ③ Network LED for communication via PROFINET, 4 x

Sensor LED

Table 8: CLV61x Dual Port: Display behavior of the sensor LED

Display function	Color	Behavior LED	Device status
Ready	-	○	Device without supply voltage
After switching on supply voltage:			
Ready	Magenta	☀	Device with heating (CLV61x-DxxxxF0): Device not yet ready for operation, is in the warm-up phase.
	Blue	●	<ul style="list-style-type: none"> • After switching on: Self-test successful, device ready for operation • After parameter download or upload and successful firmware download: Device again ready for operation
Read operation:			
G Read	Green	●	LED lights up briefly Reading successful (Good Read)
N Read	Red	●	LED lights up briefly. Reading unsuccessful (No Read)
HW Err	Red	●	Hardware fault
		☀	PROFINET is activated in the device: The device is either not connected to the IO controller (PLC) or not configured as a participant
UserDef1	Light blue	○	UserDef1 (reserved)
Parameter: Download to device or parameter upload from device			
-	-	○	LED goes out. Function is executed.

Display function	Color	Behavior LED	Device status
Firmware update: Download to device ¹⁾			
	Red Blue		LED flashes alternately in both colors. Function is executed
Firmware update: Download to device from memory card ¹⁾			
	Yellow		Function is executed
	Red Blue		LED flashes alternately in both colors. Function is continued: The device replaces the previous data with the new data.
Firmware update: Completion			
Ready	Red		Firmware update: Failed Error: Completion not successful

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

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

Network LEDs

Table 9: PROFINET operation: Display behavior of the network LEDs of the CLV61x Dual Port

Display	Color	Behavior LED	Device status
SF ¹⁾	Red	○	Device without internal error
		●	The device activates the internal PROFINET module
			Using the PROFINET TOOL, a blink request was sent to the device for device identification.
BF ²⁾	Red	○	Data exchange between device and PROFINET controller possible via PROFINET
		●	No connection between device and PROFINET controller Possible causes: <ul style="list-style-type: none"> • Bus not connected electrically • PROFINET controller not accessible or switched off • Incorrect PROFINET name • Wrong GSD file used • Wrong GSD modules selected
			LED flashes cyclically, flash frequency 0.5 Hz. Possible causes: <ul style="list-style-type: none"> • Parameterization error in the PROFINET controller (e.g. ID incorrect). No data exchange • Error in PROFINET controller during configuration with modules. No data exchange
P1 LNK/ACT	–	○	Device not connected to any active network, no data traffic possible
P1 LNK	Green	●	Device connected to active network, e.g. with an Ethernet switch (switched-on)
P1 ACT	Orange		LED flickers. Device is sending or receiving data.
P2 LNK/ACT	–	○	Device not connected to any active network, no data traffic possible

Display	Color	Behavior LED	Device status
P2 LNK	Green	●	Device connected to active network, e.g. with an Ethernet switch (switched-on)
P2 ACT	Orange	☉	LED flickers. Device is sending or receiving data.

○ = LED off, ● = LED is lit, ☉ = LED flashes or flickers.

- 1) SF = System Failure.
- 2) BF = Bus Failure.

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 (Ethernet or USB, depending on 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.
- Centrally through the PROFINET controller. This is carried out via PROFINET using GSD parameterization. Backup of the parameter set as a configuration file in the PROFINET controller. Each time PROFINET is restarted, the device is reconfigured.



NOTE

The procedure for incorporating the device into the PROFINET controller (PLC) and for central parameterization using the PROFINET controller is described in the supplementary information document “CLV61x Dual Port (PROFINET) fixed mount barcode scanner” (part no. 8017978). The supplementary information can be found under “Documentation” on the online product page.

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 10: 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 15).

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.

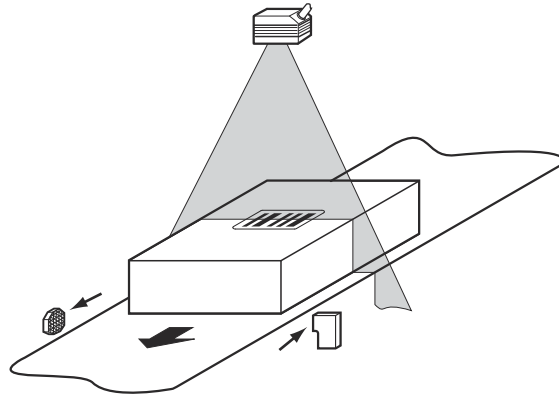


Figure 37: Cleaning the external optical sensors (read pulse encoder)

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 11: Errors and faults

Situation	Error or fault
Mounting	<ul style="list-style-type: none"> ■ Device poorly aligned to objects with bar codes(e.g., dazzle) ■ Read cycle sensor incorrectly positioned, for example the internal reading interval is opened too early or closed too late.
Electrical installation	<ul style="list-style-type: none"> ■ Data interfaces of the device wired incorrectly ■ Voltage supply not sufficiently dimensioned or cables with too small a cross-section used
Configuration	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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 statuses that can be read from the upper sensor LED on the housing of the device (see "Optical displays", page 53) include:

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

The status of communications with the PROFINET can be read from the four lower network LEDs:

- Connection status of the device with PROFINET
- Data traffic with the controller

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

10.2.2 System information

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

- Communication errors can occur when transmitting telegrams to the device. The device then returns a fault 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 61.

- ▶ 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. If available, remove the memory card (optional) with the saved parameter set from the defective device. To do this, carefully open the black rubber cover and press lightly on the memory card to unlock it.

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

Optional memory card

- Check whether there is a memory card in the card slot of the device. If yes, remove the memory card from the faulty device in **de-energized state**.
- Do not send in the memory card!



NOTE

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

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

10.6 Device exchange with transmission of the current configuration data



NOTE

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

1. Check that the replacement device of the same type (repaired or new device) is de-energized.
2. Mount and align the replacement device (see ["Mounting", page 28](#)). When doing so, note the previously applied markings on the bracket or surroundings (see ["Disassembly", page 60](#)).
3. Connect the connecting cables to the replacement device.
4. Switch on the supply voltage for the device. The device starts with its previous settings (new device: defaults).
5. Depending on the selected configuration type, proceed as follows:
 - Central configuration via GSD parameterization: When the PROFINET is restarted, the PROFINET controller automatically parameterizes the device.
 - Local automated configuration for device variants with an optional memory card: The replacement device automatically transfers the saved parameter set from the memory card into its permanent memory.
 - Local, manual configuration via SOPAS ET: Transfer the configuration stored on the computer to the device via download (via USB or Ethernet, depending on the type). Permanently save the configuration in the device.



NOTE

For further details, see the supplementary information “CLV61x Dual Port (PROFINET) barcode scanner” (part no. 8017978). The supplementary information can be found under “Documentation” on the online product page.

If automated PN name assignment for the device is configured and activated in the PROFINET controller, the following conditions apply:

- Central configuration: The entire permanently stored parameter set of the new device being installed must be set to **default** (same as the state of a new device upon delivery).
- Local configuration: At least the “PN Name” field in the device’s parameter set must be empty.

The device then automatically obtains the required PN names from the PROFINET controller when the supply voltage is switched on.

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 12: Technical data features

	CLV615 Dual Port	CLV618 Dual Port
Work area	Long Range	
Scanning methods	Line scan or raster scan ¹⁾ , type-dependent	
Sensor type	Line scanner or raster scanner, type-dependent, identifier see "Type code", page 15	
Orientation of viewing window	Frontal or side ^{2) 3)} , type-dependent, identifier see "Type code", page 15	
Aperture angle	≤ 50°	
Optical focus	Fixed focus	
Code resolution	0.35 mm ... 0.5 mm	0.35 mm ... 1 mm
Reading ranges	see "Reading field diagrams (working ranges)", page 67	
Scanning frequency	400 Hz ... 1,000 Hz	
Light source	Laser LED, visible red light (λ = 655 nm)	
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 = 1.5 mW maximum, P < 1.0 mW average	P = 3.2 mW maximum, P < 1.0 mW average
Laser pulse duration	< 300 μs	

1) Front viewing window: 8 lines, grid height approx. 15 mm at reading distance 200 mm.

Side viewing window: 8 lines, grid height approx. 15 mm at reading distance 185 mm.

2) Side viewing window: Light emission at 105° relative to the longitudinal axis of the device.

3) [see "Device view", page 17.](#)

12.2 Performance

Table 13: Technical data for performance

	CLV615 Dual Port	CLV618 Dual Port
Readable code structures	1D codes	
Bar code types	Code 39, Code 128, Code 93, Codabar, UPC / GTIN / EAN, 2/5 Interleaved, Pharmacode	

	CLV615 Dual Port	CLV618 Dual Port
Print ratio	2:1 ... 3:1	
No. of codes per scan	1 ... 10 (standard decoder) 1 ... 6 (SMART620)	
Number of codes per reading interval ¹⁾	1 ... 50 (auto-discriminating)	
No. of characters per reading interval	Max. 50 characters Maximum 1,500 characters across all bar codes per reading interval	
Number of multiple readings	1 ... 99	

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



NOTE

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

12.3 Interfaces


Table 14: Technical data on interfaces

	CLV615 Dual Port	CLV618 Dual Port
Ethernet (10/100 MBit/s)	Host interface: <ul style="list-style-type: none"> • PROFINET device function • Protocols: PROFINET, Conformance Class B and Ethernet TCP/IP • 2-port Ethernet according to IEEE 802.3 (100 MBit/s, full duplex transmission, 2-port switch, auto crossover) • Maximum data length limited to 4,000 bytes by communication mode (fragmentation protocol) AUX interface: Configuration or diagnostics	
USB ¹⁾	AUX interface (USB 2.0): Configuration or diagnostics. Type-dependent, identifier see "Type code", page 15	
Digital inputs	<ul style="list-style-type: none"> • 1 x software controlled via PROFINET control bits • 1 x hardware, type-dependent, identifier see "Type code", page 15. Debounce time adjustable (0 ms ... 10,000 ms) default 10 ms 	
Digital outputs	4 x software controlled via PROFINET control bits	
Reading pulse	<ul style="list-style-type: none"> • Fieldbus input, free, auto pulse, command (data interface) • Digital input, type-dependent, identifier see "Type code", page 15 	
Optical displays	1 x RGB-LED multi-color, with signal color allocation for events 4 x LED, for PROFINET	
Acoustic indicators	None	
Control elements	Configuration software	
Service function	Backup of parameterization data (parameter cloning) to a location outside the device memory: Externally by inserting optional microSD memory card into the device. Type-dependent, identifier see "Type code", page 15	
Configuration	SOPAS ET configuration software, commands, GSD parameterization	

¹⁾ Service interface, for temporary use only.

12.4 Mechanics/Electronics

Table 15: Technical data mechanics/electrics

	CLV615 Dual Port	CLV618 Dual Port
Connection type	Swivel connector with: <ul style="list-style-type: none"> ■ 2 x PROFINET connection (female connector, M12, 4-pin, D-coded) ■ 1 cable (0.9 m), depending on type: <ul style="list-style-type: none"> ○ "POWER" connection (male connector, M12, 4-pin, A-coded) or ○ "POWER and trigger input" connection (male connector, M12, 5-pin, A-coded) Identifier see "Type code", page 15	
Additional connections	Behind the black plastic cover, type-dependent: <ul style="list-style-type: none"> ● USB port, type Micro-B ¹⁾ or ● Card slot for microSD memory card Identifier see "Type code", page 15	
Supply voltage V_s	Devices without heating: 10 V DC ... 30 V DC Devices with heating: 18 V DC ... 30 V DC LPS or NEC Class 2 Reverse polarity protected	
Power consumption ²⁾	Devices without heating: Typically 5 W Devices with heating: Max. 15 W	
Housing	Aluminum die cast	
Housing color	Light blue (RAL 5012)	
Window material of the viewing window	Glass, identifier see "Type code", page 15	
Threaded mounting hole	2 x 2 blind tapped hole M5, 5 mm deep Tightening torque for mounting screws: max. 2.5 Nm	
Laserwarnschild	In combination with the type label, glued on	
Safety	EN 62368-1: 2014-08	
Enclosure rating	IP 65, in accordance with EN 60529:2014-09 ³⁾	
Protection class	 (Class 3) Intended for operation in SELV (Safety Extra Low Voltage) systems	
Weight ³⁾	Device with front viewing window: 290.5 g Device with side viewing window: 310 g Device with side viewing window and heating: 346 g	
Dimensions ⁴⁾	Device with front viewing window: 61 mm x 96 mm x 38 mm Device with side viewing window: 80 mm x 96 mm x 38 mm	

¹⁾ Service interface for temporary use.

²⁾ For digital outputs without load.

³⁾ Prerequisites for complying with enclosure rating IP65:

- The heads of the attached cables are screwed firmly to the two contacted M12 female connectors.
- When a M12 female connector of the device at the end of a line is not in use, it is closed with a tightly fastened protective element, e.g. a protective cap (as in the delivery state).
- The M12 male connector of the connecting cable of the device is firmly screwed to the contacted female connector.
- The black cover, which is fitted over the corner on the side, is closed. The cover is flush against the device.

⁴⁾ With connecting cable and male connector, pane of the viewing window made of glass.

⁵⁾ Without overruns due to electrical connections, see "Device view", page 17.

12.5 Ambient data

Table 16: Technical data for ambient data

	CLV615 Dual Port	CLV618 Dual Port
Electromagnetic compatibility (EMC)	Radiated emission: EN 61000-6-4: 2007-01 + A1: 2011-02 Electromagnetic immunity: EN 61000-6-2: 2005-08	
Vibration resistance	EN 60068-2-6: 2008-02	
Shock resistance	EN 60068-2-27: 2009-05	
Ambient operating temperature	Device without heating (CLV61x-Dxxxx): 0 °C ... +40 °C Device with heating (CLV61x-DxxxxF0): -35 °C ... +40 °C	
Storage temperature	Device without heating: -20 °C ... +70 °C Device with heating: -35 °C ... +70 °C	
Permissible relative humidity	0% ... 90%, non-condensing	
Ambient light immunity	2000 lx, on bar code	
Bar code print contrast (PCS)	≥ 60 %	

12.6 Dimensional drawings

Dimensions [see "Device view", page 17.](#)

12.7 Reading field diagrams (working ranges)

12.7.1 Reading conditions for specification diagrams

Properties	Value
Test code	Code 39 / ITF
Resolution	See reading field diagrams in each case
Scanning frequency	See characteristic curve fields for scanning frequencies
Print ratio	2:1
Print contrast	> 90%
Tilt	±30°
Ambient light	< 2,000 lx
Good read rate	> 75%
Window material of the viewing window	Glass (CLV61x-xxx0)



NOTE

The reading distances are measured radially from the device.

12.7.2 CLV615: Long Range

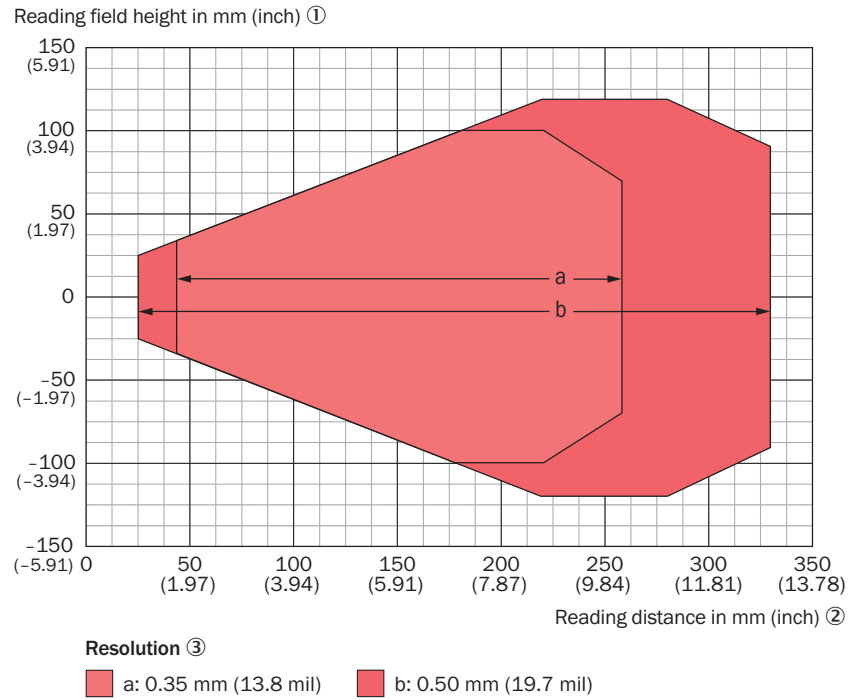


Figure 38: CLV615 reading field diagram, Long Range, side viewing window

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

Scanning frequencies

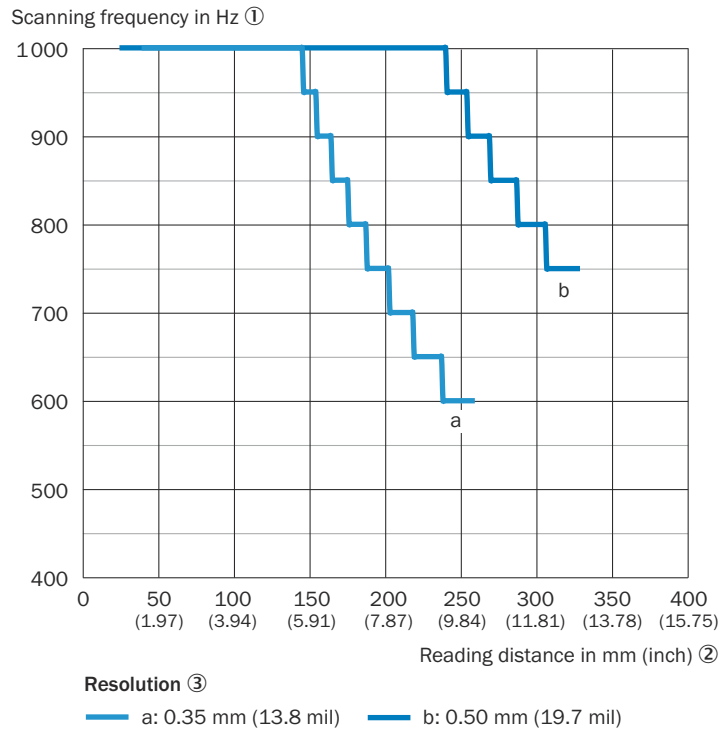


Figure 39: Characteristic curve field for CLV615 scanning frequency, Long Range, side viewing window

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

12.7.3 CLV618: Long Range

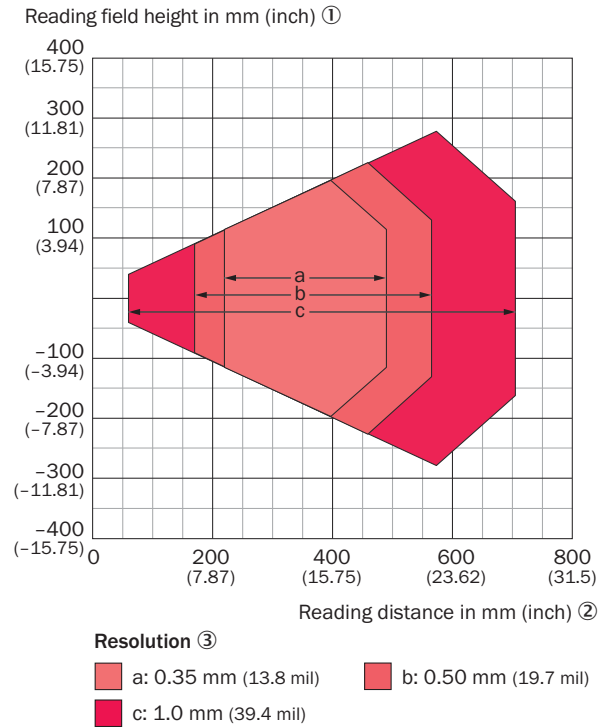


Figure 40: Reading field diagram CLV618, long range, front viewing window

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

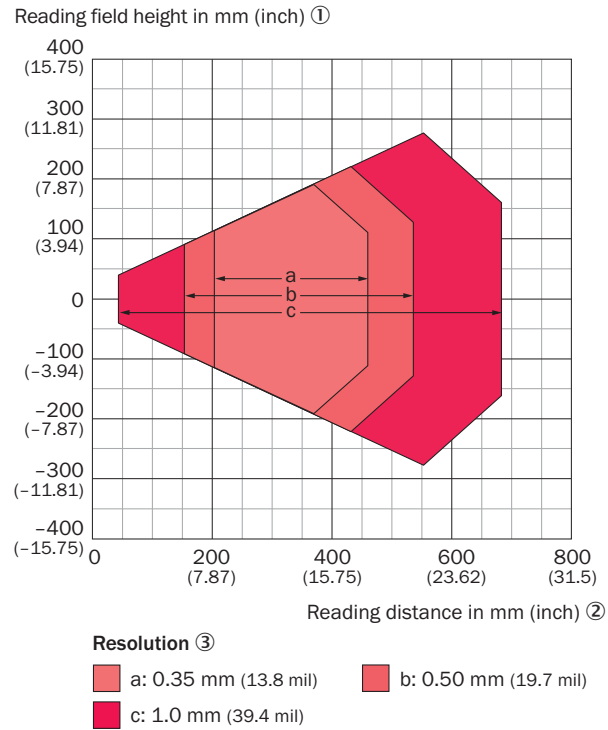
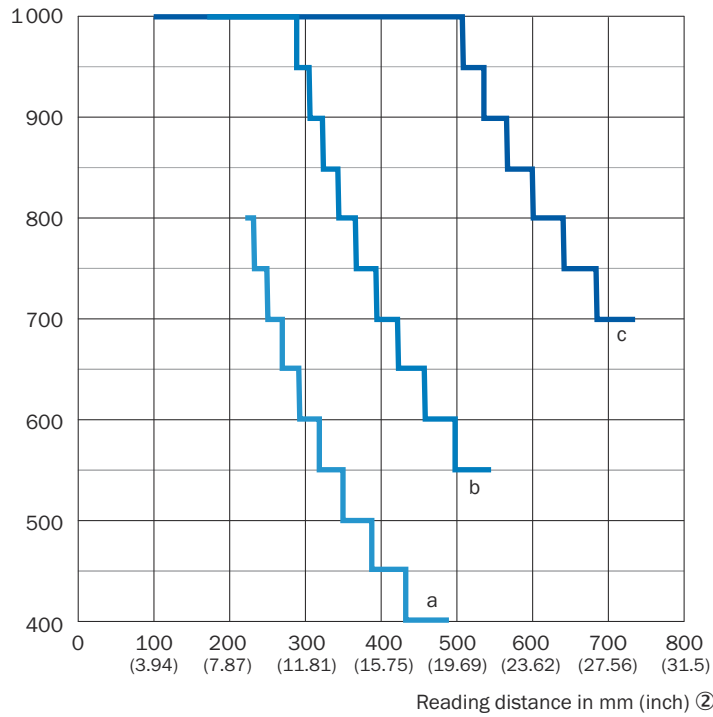


Figure 41: CLV618 reading field diagram, Long Range, side viewing window

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

Scanning frequencies

Scanning frequency in Hz ①



Code resolution ③

- a: 0.35 mm (13.8 mil)
- b: 0.50 mm (19.7 mil)
- c: 1.00 mm (39.5 mil)

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



NOTE

Correction of reading distance for devices with side viewing window:

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

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).

Accessories for CLV61x Dual Port fixed mount bar code scanner with heater**Brackets:**

- Bracket, part number 2050705
- Bracket, part number 2058082

13.1 Quick release in combination with mounting bracket

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

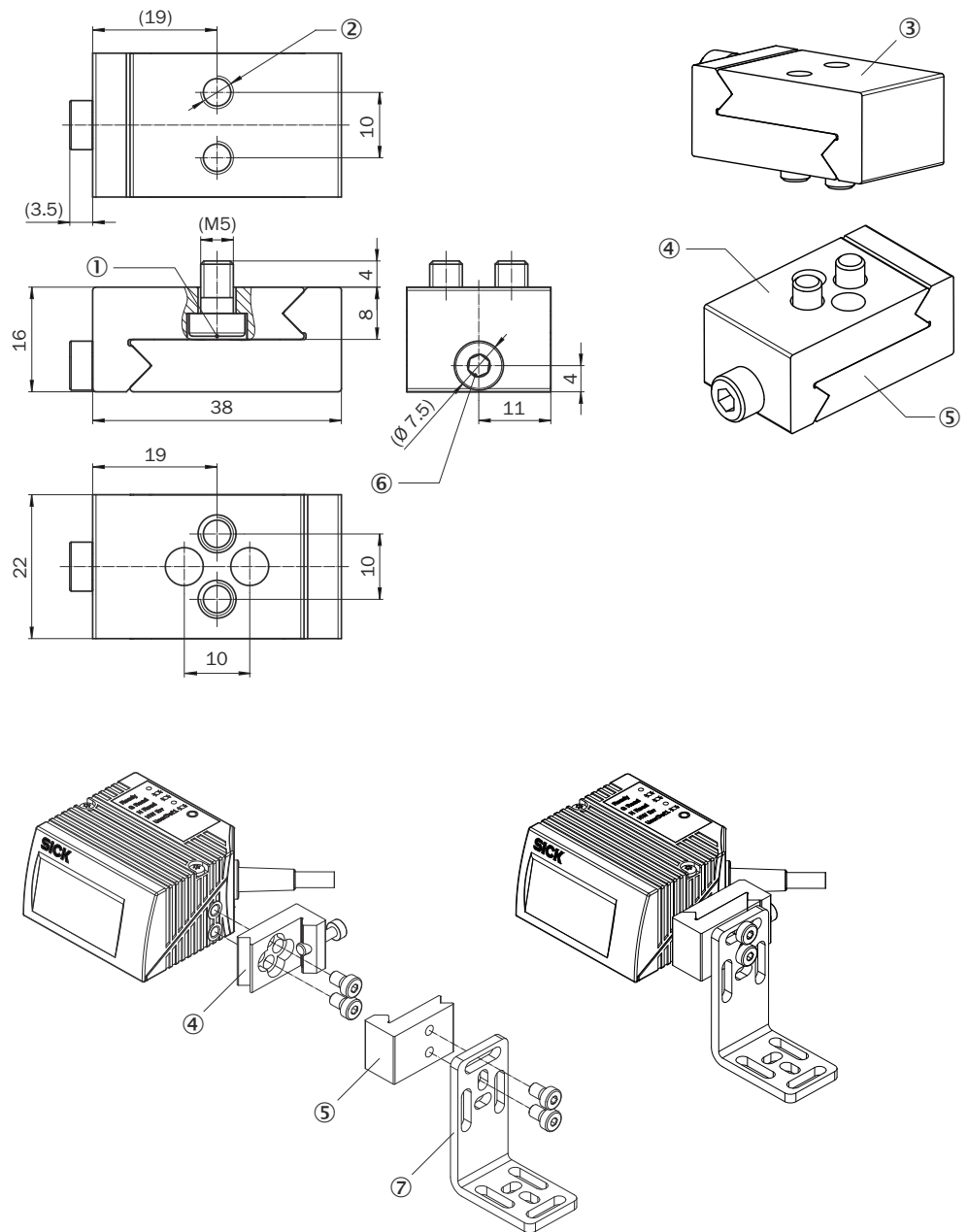


Figure 42: View of the quick release (dimensions in mm) and combination with mounting bracket

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

14 Annex

14.1 Declarations of conformity and certificates

You can download declarations of conformity and certificates via the product page. The product page can be accessed via the **SICK Product ID: pid.sick.com/{P/N}/{S/N}**. {P/N} corresponds to the part number of the product, see type label. {S/N} corresponds to the serial number of the product, see type label (if indicated).

14.2 UL conformity

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



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

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

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

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

More information can be found on the product page:

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

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

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

- Laser warnings and laser power, [see "Operational safety and specific hazards", page 9](#) and [see "Laser radiation", page 10](#)

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

14.3.1 Ethernet connection

Adapter cable, straight male connector, open end

Part no. 2106171 (2 m), part no. 2106172 (5 m), part no. 2106173 (10 m), suitable for drag chain, deep-freeze compatible

For CLV61x Dual Port PROFINET

Ambient temperature range:

For fixed installation: -40 °C to +80 °C

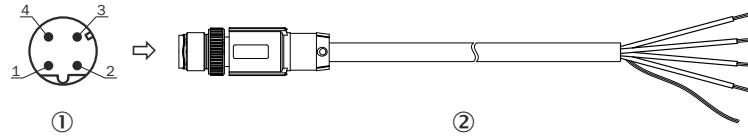


Figure 43: Adapter cable, e.g. part no. 2106171 (2 m)

- ① Male connector, M12, 4-pin, straight, D-coded (front view)
- ② Illustration may differ
- ② Illustration may differ

Table 17: Signal assignment of adapter cable with open end

Pin	Signal	Function	Wire color
1	TD+ (Ethernet)	Sender+	Yellow
2	RD+ (Ethernet)	Receiver+	White
3	TD- (Ethernet)	Sender-	Orange
4	RD- (Ethernet)	Receiver-	Blue

14.3.2 Ethernet connection

Adapter cable, angled male connector, open end

Part no. 2106174 (2 m), part no. 2106175 (5 m), part no. 2106176 (10 m), part no. 2106180 (25 m), shielded

For CLV61x Dual Port PROFINET

Ambient temperature range:

For fixed installation: -40 °C to +80 °C

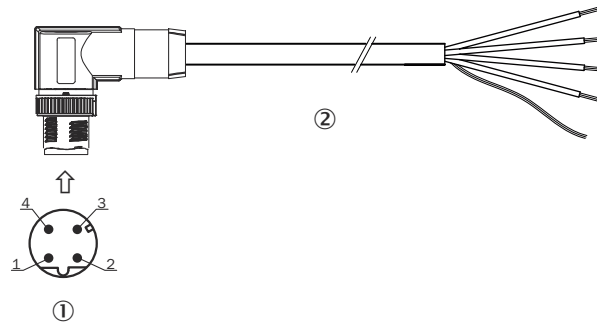


Figure 44: Adapter cable, e.g. part no. 2106174 (2 m)

- ① Male connector, M12, 4-pin, angled at 90°, D-coded (front view)
- ② Illustration may differ

Table 18: Signal assignment of adapter cable with open end

Pin	Signal	Function	Wire color
1	TD+ (Ethernet)	Sender+	Yellow
2	RD+ (Ethernet)	Receiver+	White
3	TD- (Ethernet)	Sender-	Orange
4	RD- (Ethernet)	Receiver-	Blue

14.3.3 “Power” connection to customer-specific connection equipment or control cabinet

Adapter cable

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

For CLV61x Dual Port (CLV61x-Dx41x), M12, 4-pin

For mobile installation: $-25\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$, for fixed installation: $-40\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$

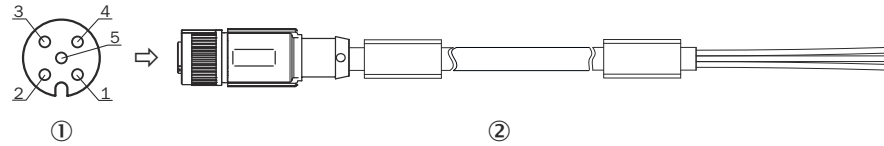


Figure 45: Adapter cable, part no. 2095608 (5 m)

- ① Female connector, M12, 5-pin, A-coded (view from front)
- ② Illustration may differ

Table 19: Signal assignment of adapter cable with open end

Pin	Signal	Function	Wire color
1	V_s	Supply voltage	Brown
2	Reserved	(Do not use.)	White
3	GND	Ground	Blue
4	Reserved	(Do not use.)	Black
5	N.c.	Not connected	-

14.3.4 “Power/digital input” connection to customer-specific connection equipment or control cabinet

Adapter cable

Part no. 2095618 (5 m), unshielded, suitable for drag chain, deep-freeze compatible

For CLV61x Dual Port (CLV61x-Dx52x), M12, 5-pin

Ambient temperature range:

For mobile installation: $-25\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$, for fixed installation: $-40\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$

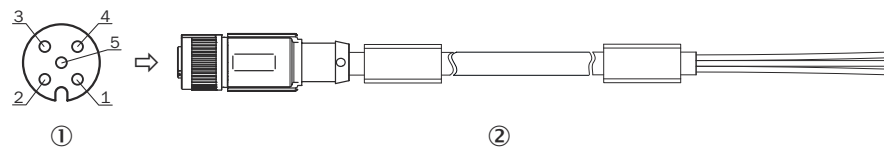


Figure 46: Adapter cable, part no. 2095618 (5 m)

- ① Female connector, M12, 5-pin, A-coded (view from front)
- ② Illustration may differ

Table 20: Signal assignment of adapter cable with open end

Pin	Signal	Function	Wire color
1	V_s	Supply voltage	Brown
2	Reserved	(Do not use.)	White
3	GND	Ground	Blue
4	Reserved	(Do not use.)	Black
5	Sensor 1	Digital input for external reading cycle	Gray

14.4 Notes on PROFINET

14.4.1 Basic information on PROFINET

SICK recommends familiarizing yourself with the basic information described in the planning guidelines and commissioning guidelines of the PI user organization (PROFIBUS & PROFINET International, homepage: www.profinet.com).

These guidelines can be found in the "Downloads" area at:

- www.profinet.com

14.4.2 General notes on PROFINET wiring

The wires of the signal cables must be wrapped in pairs (twisted pairs), and the cables must comply with at least CAT5 according to ISO/IEC 11801 Edition 2.0. Class D. The signal lines must also be shielded and grounded.

SICK recommends using components certified by PROFINET.

More detailed information can be found in the "PROFINET Cabling and Interconnection Technology" Installation Guide.

You can find the document in the "Downloads" area at:

- www.profinet.com

14.4.3 PROFINET Conformance Class

The device complies with PROFINET Conformance Class B (CC-B) and supports the properties defined within.

Further information on the PROFINET Conformance Classes can be found in the document of the PI user organization (PROFIBUS and PROFINET International).

You can find the document in the "Downloads" area at:

- www.profinet.com

14.4.4 General requirements on a switch suitable for PROFINET applications

For PROFINET Conformance Class B and C (CC-B / CC-C), use only a PROFINET-certified switch that can be configured as a PROFINET device.

For further information, refer to the commissioning guidelines of the PI "Installation Guideline PROFINET Part 2: Network Components".

You can find the document in the "Downloads" area under:

- www.profinet.com

14.4.5 Notes on installing the SICK bar code scanner into a PROFINET network

For 1-port devices, these include:

- LLDP (neighborhood detection) ¹⁾
- I&M 0-4 (device identification) ¹⁾
- Device exchange by topology check ¹⁾
- 16 bit digital "status word" for reading gate result
- 16 bit digital "control word" for controlling the device via PLC
- Heartbeat (for checking communication)
- GSD file for configuring the device using modules via the PLC ¹⁾

For 2-port devices, these include:

¹⁾ Properties of the CC-B

- LLDP (neighborhood detection) ¹⁾
- I&M 0-4 (device identification) ¹⁾
- Device exchange by topology check ¹⁾
- MRP (ring redundancy) ¹⁾
- 16 bit digital “status word” for reading gate result
- 16 bit digital “control word” for controlling the sensor via PLC
- Heartbeat (for checking communication)
- GSD file for configuring the sensor using modules via the PLC ¹⁾

14.4.6 Behavior of the digital outputs of the bar code scanner with “Fieldbus input” reading cycle source

The digital outputs can be configured so that the outputs show information from other network nodes (e.g., external output 1=fieldbus input).

If the fieldbus is interrupted, these outputs are no longer updated. The outputs will then each retain the last value before the interruption.

After switching on the fieldbus (power-up), all digital outputs are set to their “passive” values.

Status of digital outputs with	output value behavior
IOPS = Bad	Retain the last value before cancellation
Connection lost	Retain the last value before cancellation
Switching on the PROFINET network	Values are initialized to “passive”

The reading cycle input can also be controlled by the fieldbus. When the fieldbus is interrupted, the reading cycle input is no longer updated. Reading results may then get lost since the reading cycle input retains its last value before the interruption.

After switching on the fieldbus (power-up), the reading cycle input is set to its “passive” value.

14.5 Configuration of the device using command strings

As an alternative to the SOPAS ET configuration software, the device can also be configured with command strings via all data interfaces. Functions in the device can also be triggered. The command strings can be displayed individually in the SOPAS ET configuration software.



NOTE

Both the command strings and the SOPAS ET configuration software are based on a command language that has direct access to the command interpreter of the device. This command language must be used with care, as the commands sent to the device are carried out immediately.

Parameter values modified by means of commands are initially only active in the current parameter set in the volatile working memory of the device.

To ensure that modified parameter values are not lost, copy the parameter set to the permanent memory. This needs to be done using a special command before switching off the supply voltage.

Command strings for triggering the read pulse:

- START: <STX>sMN mTCgateon<ETX>
- STOP: <STX>sMN mTCgateoff<ETX>

When the commands are entered via the terminal emulator of the SOPAS ET configuration software, both control characters <STX> and <ETX> are omitted.

An overview of command strings for the device is available on request

14.6 Abbreviations used

Table 21: Abbreviations used

CE	Communauté Européenne. European Community
CLV	Code-Leser V-Prinzip [Code reader V principle]
CA	CodeAngle
DOF	Depth Of Field. Depth of field
ES	Electrical source. Electrical power source.
ESD	Electro-Static Discharge. Electrostatic discharge
GSD	General Station Description (generic station description for PROFIBUS/PROFINET)
HTML	Hyper Text Markup Language (page description language on the Internet)
I	Input
I_{in}	Input current
I_{out}	Output current
LED	Light Emitting Diode. Light emitting diode
LPS	Limited Power Supply
MAC	Medium Access Control
MTBF	Mean Time Between Failure
MTTF	Mean Time To Failure
MTTR	Mean Time To Repair
O	Output
PCS	Printed Contrast Signal
PLC	Programmable Logic Controller
PROM	Programmable Read Only Memory. Programmable non-volatile memory
RA	Reading Angle
RAM	Random Access Memory. Direct-access volatile memory
ROM	Read Only Memory. Read-only memory (non-volatile)
RTF	Rich Text Format (standardized document format with format description)
SD	Secure Digital
SDD	SOPAS Device Description (device description file, driver for SICK SOPAS ET software)
SMART	SICK Modular Advanced Recognition Technology
SOPAS ET	SICK Open Portal for Application and Systems Engineering Tool (computer software for Windows for device configuration)
PLC	Programmable Logic Controller
SELV	Safety Extra Low Voltage
V_{in}	Input voltage
V_{out}	Output voltage
V_S	Supply voltage

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Netherlands
Phone +31 (0) 30 204 40 00
E-Mail info@sick.nl

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Detailed addresses and further locations at www.sick.com