OPERATING INSTRUCTIONS

CLV61x DualPort (PROFINET)

Bar code scanner

SICK
Sensor Intelligence.

Described product

CLV61x Dual Port (PROFINET)

Manufacturer

SICK AG
Erwin-Sick-Str. 1
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Germany

Legal information

Original document

This document is an original document of SICK AG.

Contents

1 About this document

1.1 Information on the operating instructions

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

Prerequisites for safe work are:

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

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

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

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

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

1.2 Scope

These operating instructions explain how to incorporate the device into a customer system as an IO device. They are part of the documentation that is provided to users.

Additional information relevant to these operating instructions is provided by the supplementary information document “Bar code scanner CLV61x Dual Port (PROFINET)” (German: no. 8017977, English: 8017978). This supplementary information provides a more detailed description of the procedures for integrating the device in the PROFINET controller.

Step-by-step instructions are given for all required actions.

These instructions apply to all available variants of the device. For more detailed information for identification of the available device types, see "Type code", page 13.

Available device variants are listed on the online product page at:

- **www.sick.com/CLV61x_Dual_Port**

A device variant is used as an example for commissioning, based on the basic parameter settings for the device.

1.3 Explanation of symbols

Warnings and important information in this document are labeled with symbols. The warnings are introduced by signal words that indicate the extent of the danger. These warnings must be observed at all times and care must be taken to avoid accidents, personal injury, and material damage.

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

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

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

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

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

1.4 Further information

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

- www.sick.com/CLV61x_Dual_Port

The following information is available for download there:

- Model-specific online data sheets for device variants, containing technical data, dimensional drawing, and specification diagrams
- EU declaration of conformity for the product family
- Dimensional drawings and 3D CAD dimension models in various electronic formats
- Device GSD file
- This documentation, in English and German and other languages if applicable
- Additional information “CLV61x dual port (PROFINET) bar code scanner" in English (part no. 8017978) and German (part no. 8017977) to help with integrating the device into PROFINET
- Other publications related to the devices described here
- Publications dealing with accessories

Documents on request

Overview of command strings for the device.

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

2 Safety information

2.1 Intended use

The device is an intelligent, opto-electronic 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.

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

Applications:
- Package conveyor
- Picking stations

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

2.1.1 Operating restrictions

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

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

2.1.2 Conditions for specified enclosure rating

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

- The cables plugged into the 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.
- The black rubber cover fitted at the side over the corner must be flush with the device.

NOTICE
Operate the device with the black cover open only for a short time for the following (type-dependent) tasks as needed:
- Inserting or removing the optional memory card
- Temporary use of the optional USB interface as a service interface

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

2.1.3 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.
- Restricted supply voltage range: 18 V DC ... 30 V DC

- Connection work only within the temperature range: -25 °C ... +40 °C
- During mounting, make sure that heat transfer between the device and the surrounding environment is kept as small as possible. Use appropriate holders (optional accessories).
- The device must be in a non-operating state (no mounting or connection work).

2.1.4 Using the USB interface

Device variants with USB interface

NOTE

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

2.2 Improper use

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

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

WARNING

Danger due to improper use!

Any improper use can result in dangerous situations.

Therefore, observe the following information:

- Device should be used only in accordance with its intended use.
- All information in these operating instructions must be strictly observed.

2.3 Internet protocol (IP) technology

NOTE

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

SICK always assumes the following prerequisites:

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

2.4 Limitation of liability

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

- Non-adherence to the product documentation (e.g., operating instructions)
- Incorrect use

- Use of untrained staff
- Unauthorized conversions
- Technical modifications
- Use of unauthorized spare parts, consumables, and accessories

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

2.5 Modifications and conversions

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

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

2.5.1 Exception: temporarily opening the cover on the device

NOTICE
The user may open the housing only in order to obtain temporary access to the optional USB interface or the optional slot for a memory card, depending on type. For this purpose, the corresponding black rubber cover fitted at the side over the corner on the device can be opened temporarily.

In open state, the device does not conform to a specified enclosure rating. The device must be protected appropriately against moisture and dust.

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

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

2.6 Requirements for skilled persons and operating personnel

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

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

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

- **Instructed personnel** have been briefed by the operator about the tasks assigned to them and about potential dangers arising from improper action.
- **Skilled personnel** have the specialist training, skills, and experience, as well as knowledge of the relevant regulations, to be able to perform tasks delegated to them and to detect and avoid any potential dangers independently.
- **Electricians** have the specialist training, skills, and experience, as well as knowledge of the relevant standards and provisions to be able to carry out work on electrical systems and to detect and avoid any potential dangers independently. In Germany, electricians must meet the specifications of the BGV A3 Work Safety Regulations (e.g. Master Electrician). Other relevant regulations applicable in other countries must be observed.

The following qualifications are required for various activities:

Table 1: Activities and technical requirements

Activities	Qualification
Mounting, maintenance	■ Basic practical technical training ■ Knowledge of the current safety regulations in the workplace
Electrical installation, device replacement	■ Practical electrical training ■ Knowledge of current electrical safety regulations ■ Knowledge of the operation and control of the devices in their particular application
Commissioning, configuration	■ Basic knowledge of the Windows™ operating system in use ■ Basic knowledge of the design and setup of the described connections and interfaces ■ Basic knowledge of data transmission ■ Basic knowledge of bar code technology
Operation of the device for the particular application	■ Knowledge of the operation and control of the devices in their particular application ■ Knowledge of the software and hardware environment for the particular application

2.7 Operational safety and particular hazards

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

CAUTION
Optical radiation: Laser class 2

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.

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.

Additional information about laser radiation

The device uses a red light laser diode.

The entire reading window is a laser output aperture.

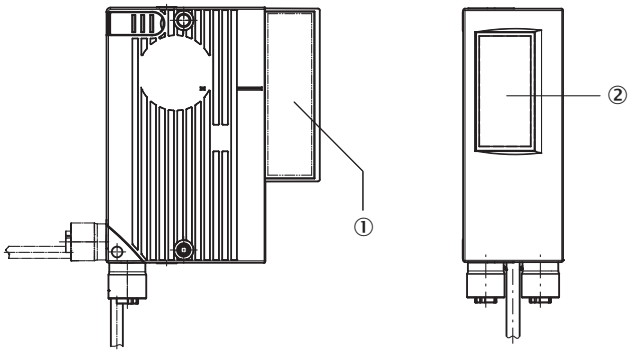


Figure 1: Laser output aperture in the housing

① Laser output on side

② Laser output on front

NOTE

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

Warning symbol on the device

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

In addition to other information, the type label also contains the relevant laser output data.

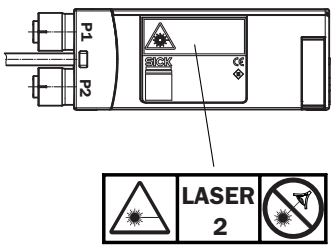


Figure 2: Laser warning label

Meaning of the laser warning label:

Laser radiation – Never look into the light beam – Laser Class 2

NOTE
Additional laser warning label

If the laser warning label affixed to the device is concealed when the device is installed into a machine or paneling, the laser beam outlet opening must be suitably labeled on the machine. For this purpose, an additional warning label must be affixed next to the output opening.

Controlling the laser diode

When operating properly in real conditions, the device will only switch the laser diode on if there is an object in the reading area, or if a reading is required (pulsed reading operation). This operating mode results in a longer laser diode service life than with a laser diode that is switched on in continuous operation.

A laser timeout can switch off the laser diode automatically in this type of object trigger control if **the pulse has been active for too long** (e.g., the conveyor system has stopped). 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.
- With GSD parameterization, using the “10_Object Trigger Ctrl” module.

In the default setting, the laser timeout is deactivated.

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

- In the “Percentage Evaluation” and “Auto Setup” operating modes (only used temporarily for configuration/diagnostics)
- In reading operation in the pulsing types “Auto pulse” (adjustable pulse/pause ratio) or “Free”.

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

NOTE
The device has no optical indicator (LED) for laser diode activity.

2.8 Switching off the device

When switching off the device, at the most, the following data will be lost:

- Application-specific parameter sets that were only temporarily stored in the device
- Last reading result
- 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.

2.10 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.

3 Product description

3.1 Product ID

3.1.1 Type label

The type label gives information for identification of the device. An existing UL certification can be found on the type label.

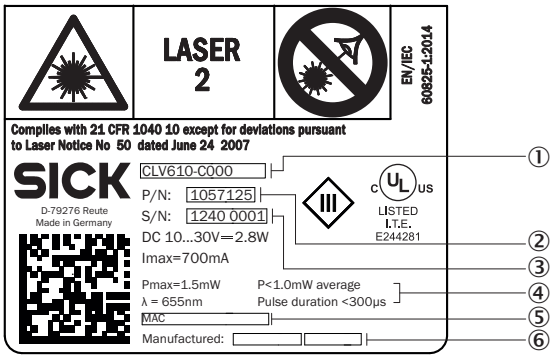


Figure 3: Type label design for the device, illustration may differ from actual type label

① Type designation
② Part number
③ Serial number
④ Laser output data
⑤ MAC address, if Ethernet interface is available
⑥ Date of manufacture

3.1.2 Type code

The devices of the CLV61x product subfamily are classified 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

Position	Description	Characteristic
6	Scanning method, reading window orientation [1]	0: Line scanner, reading window on front 1: Raster scanner, reading window on front 2: Line scanner, reading window on side 3: Raster scanner, reading window on side
7	Electrical connections (design)	0: Cable 0.9 m with male connector, D-Sub-HD, 15-pin 4: Swivel connector, 2 x female connectors, M12, 4-pin, D-coded +1 x cable 0.9 m with male connector, M12, 4-pin, A-coded 5: Swivel connector, 2 x female connectors, M12, 4-pin, D-coded +1 x cable 0.9 m with male connector, M12, 5-pin, A-coded
8	Interfaces	0: Host (RS-232), AUX (RS-232), digital I/Os [1] 1: Host (Ethernet), AUX (Ethernet, USB [2]) 2: Host (Ethernet), AUX (Ethernet, USB [2]), 1 x digital switching input 3: Host (Ethernet), AUX (Ethernet), 1 x external parameter storage (microSD memory card) [3] 4: Host (Ethernet), AUX (Ethernet), 1 x external parameter storage (microSD memory card) [3], 1 x digital switching input
9	Front screen material	0: Glass 1: Plastic
10	Application (ambient temperature)	Without label: Standard (0 °C ... +40 °C) F0: With integrated heating (–35 °C ... +40 °C)

1) 2 x digital switching inputs and 2 x digital switching outputs.
2) USB interface only for temporary use as a service interface.
3) For service functions such as parameter cloning.

NOTE

Not all combinations are possible according to the type code. The available device variants can be found online at:

- www.sick.com/CLV61x_Dual_Port

3.1.3 Device variants

The CLV61x product family consists of 3 variant lines:

- CLV61x CAN
- CLV61x FIELDBUS (in combination with the optional fieldbus module CDF600)
- CLV61x Dual Port

Among other things, the variant lines differ with respect to the following features:

Table 3: Differences between the variant lines

Feature	CLV61x CAN	CLV61x FIELDBUS	CLV61x Dual Port (PROFINET)
Purpose	Data output to host via RS-232	Connection to fieldbus via optional fieldbus module CDF600 (Dual Port switch)	Direct integration in line or ring topology

Feature	CLV61x CAN	CLV61x FIELDBUS	CLV61x Dual Port (PROFINET)
Electrical Interfaces	• Power • RS-232 (Host, AUX) • CAN • 2 digital switching inputs • 2 digital switching outputs	• Power • RS-232 (Host, AUX) • CAN • 2 digital switching inputs • 2 digital switching outputs	• Power • Ethernet (Host, AUX) • USB Micro-B or microSD memory card [1) 2) 5)] • 1 digital switching input [1)]
Type of electrical connections	1 x male connector, D-Sub-HD, 15-pin		2 x female connectors, M12, 4-pin, D-coded in swivel connector 1 x male connector, 4- or 5-pin, A-coded [1)] 1 x female connector, 5-pin, USB Micro-B type or microSD memory card [1)]
Supply voltage	DC 10 V ... 30 V		DC 10 ... 30 V DC 18 ... 30 V [3)]
Power consumption	Typically 2.8 W [4)]		Typically 4 W [4)] Typically 15 W [3) 4)]
Special evaluation feature	SMART620 decoder		
Memory card	–		Optional [1) 5)]
Heating	–		Optional [1)]
Ambient operating temperature	0 °C ... +40 °C		0 °C ... +40 °C –35 °C ... +40 °C [1) 3)]
Storage temperature	–20 °C ... +70 °C		–20 °C ... +70 °C –35 °C ... +70 °C [1) 3)]
Dimensions for device with front reading window	61 mm x 66 mm x 38 mm		61 mm x 96 mm x 38 mm
Dimensions for device with side reading window	80 mm x 66 mm x 38 mm		80 mm x 96 mm x 38 mm

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

Designation of device variants

- Device variants with serial data interfaces only (RS-232, RS422/485) are referred to as “serial variants”. They also feature a CAN interface. The connecting cable with a D-Sub male connector is permanently connected to the housing.
- Device variants with serial data interfaces and two additional Ethernet interfaces are referred to as “Dual Port variants”. They feature a swivel connector on the housing with two M12 female connectors and a separate connecting cable with an M12 male connector.
- The corresponding number of digital switching inputs and outputs depends on the design of the electrical connection.

3.2 Product characteristics

3.2.1 Device view

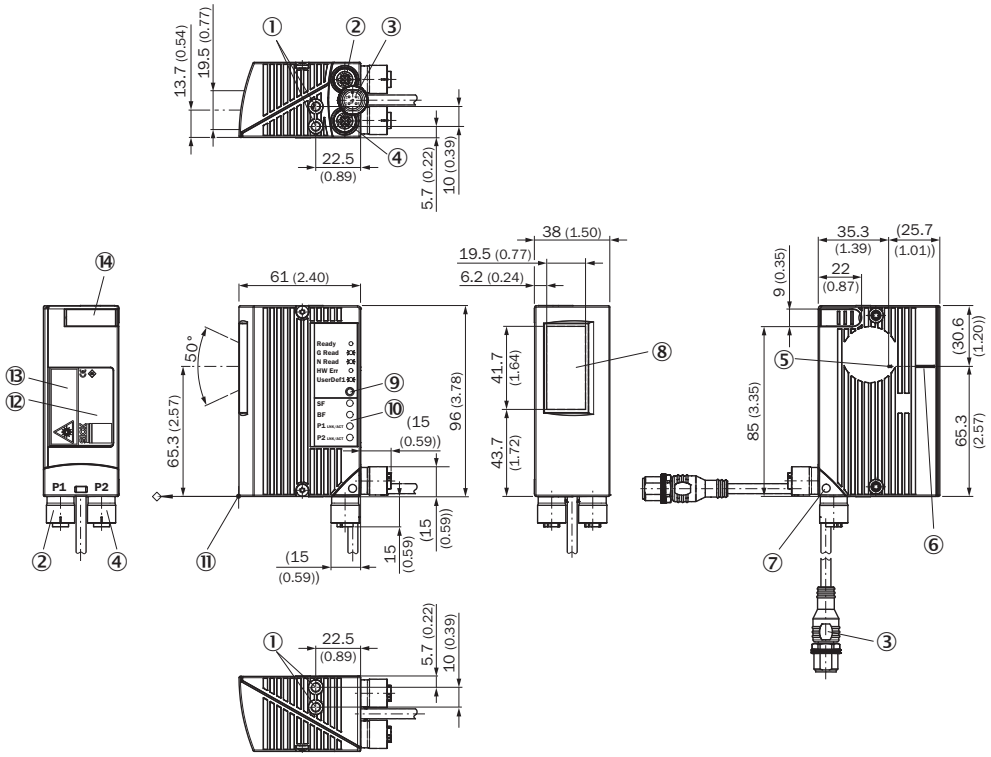


Figure 4: CLV61x Dual Port: design and device dimensions with front reading window (in mm or inches)

① M5 blind tapped holes, 5 mm deep (2 x), for mounting the device

② P1 (PROFINET port 1) connection, 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 (PROFINET port 2) connection, 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 unit (max 180° rotation angle from end position to end position)

⑧ Reading window, orientation on front

⑨ RGB LED (1 x), status indicator with signal color allocation for events

⑩ LED (4 x), status indicator for PROFINET

⑪ Reference point for reading distance from device (housing edge) to object

⑫ Type label

⑬ Laser warning label

⑭ Cover for USB connection [1] (female connector, 4-pin, Micro-B type) or for memory card shaft (microSD), type-dependent

1) Service interface, for temporary use only

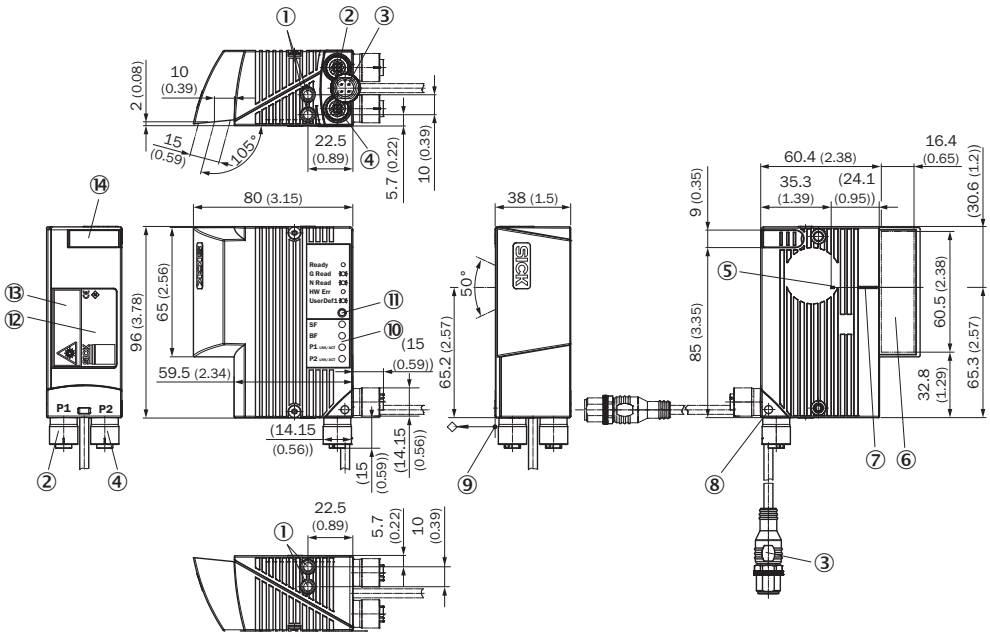


Figure 5: CLV61x Dual Port: design and device dimensions with side reading window (in mm or inches)

① M5 blind tapped holes, 5 mm deep (2 x), for mounting the device

② P1 (PROFINET port 1) connection, 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 (PROFINET port 2) connection, M12, female connector, 4-pin, D-coded

⑤ Internal impact point: Rotation point of the variable direction laser beam

⑥ Reading 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 indicator for PROFINET

⑪ RGB LED (1 x), status indicator with signal color allocation for events

⑫ Type label

⑬ Laser warning label

⑭ Cover for USB connection [2] (female connector, 4-pin, Micro-B type) or for memory card shaft (microSD), type-dependent

3.2.2 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	Both M12 female connectors sealed with tightly screwed on protective plugs. Without holders and bus connecting cables.
1	Multilingual safety notes in a printed document	Provides information about the requirements for safe use of the product.

Associated components not contained in the delivery:

2) Service interface, for temporary use only

Table 5: CLV61x Dual Port (PROFINET): scope of delivery, other components

Component	Notes
SOPAS ET configuration software and device description file (*.sdd file for SOPAS ET) for the CLV61x Dual Port (PROFINET)	Available online at: • www.sick.com/SOPAS_ET
GSD file for the PROFINET system controller (PLC)	Available online at: • www.sick.com/CLV61x_Dual_Port
Function block, e.g., for system controller S7 (PLC)	When is it needed? Available online at: • www.sick.com/CLV61x_Dual_Port
CLV61x Dual Port (PROFINET) operating instructions as PDF in English, German and French. Other languages also available online where applicable.	Provides information about mounting, electrical installation and technical data for the device. Available online at: • www.sick.com/CLV61x_Dual_Port
CLV61x Dual Port (PROFINET) supplementary information as PDF in English and German.	Provides additional description of the procedure for integrating the device into PROFINET from a data technology standpoint (line or ring topology). Available online at: • www.sick.com/CLV61x_Dual_Port

3.2.3 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 reading 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, scan processes, possibly integrated heating, mounting options and optics enables use in most industrial applications.

Because of the integrated D-sub shell, when the reading 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 M12 round connectors available for continuous electrical connection.

Interfaces to external timers, such as photoelectric sensors or incremental encoders, enable reading pulses independent of the control. The reading results are provided for further processing by the data interfaces. In principle, the codes can be identified on any one side of stationary or moving objects in a conveyor system (single-side reading). By combining several devices, multiple sides can be recorded in one passage (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.

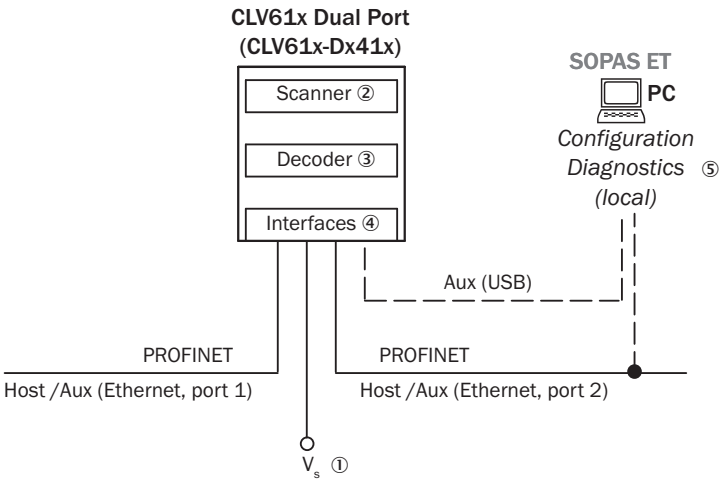
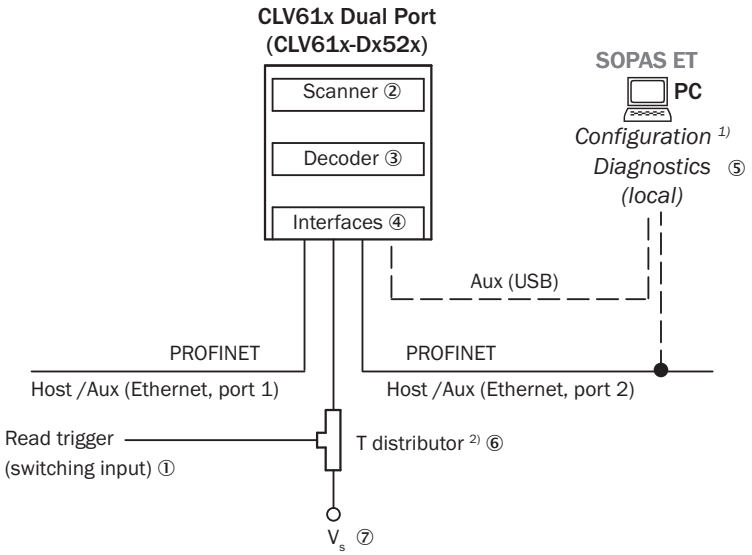


Figure 6: Block diagram for CLV61x-Dx41x (without switching input)

① Scanner
② Decoder
③ Interfaces
④ USB interface [3] depending on type. Not present on device variants with a memory card slot.
⑤ Configuration or diagnostics (local)
⑥ Supply voltage $V_S = U_V$



1) Alternative: GSD configuration (centrally via the PROFINET controller) ⑧
2) Male connector, M12, 4-pin, A-coded splitted to 2 x female connector M12, 5-pin, A-coded) ⑨

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

① Scanner
② Decoder
③ Interfaces
④ USB interface [3] depending on type. Not present on device variants with a memory card slot.
⑤ Configuration or diagnostics (local)
⑥ T-connector
⑦ Supply voltage V_s

3) Service interface, for temporary use only

⑧ Read trigger (switching 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

3.2.4 Product features and functions

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

Product feature/function	Characteristic
CLV61x Dual Port bar code scanner	■ Fixed focus ■ Red light line scanner or grid scanner ■ Reading range: Long range, optimized for intralogistics applications ■ Medium resolution ■ Additional scanning frequency range (400 Hz ... 1,000 Hz) ■ Option to adapt to code print quality ■ Evaluation range of scanning line can be limited ■ Trigger input for reading pulse, type-dependent, identifier see "Type code", page 13
Safety and ease of use	■ Rugged, compact metal housing, CE marking ■ Laser Class 2, laser switches off if the output power is exceeded ■ Automatic self-test on system start ■ Diagnostic tools for device setup and (remote) device 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 ■ Test string function (heartbeat) can be activated to signal that the device is ready for operation ■ Password-protected configuration mode via SOPAS ET ■ Protection of centrally configured parameter values in the PROFINET controller (e.g., PLC) via GSD parameterization ■ Optional backup of locally configured parameter values on microSD memory card in the device, type-dependent, identifier see "Type code", page 13 ■ Future-proof through firmware update (FLASH PROM) via data interface ■ Future-proof SOPAS ET configuration software ■ Low power consumption ■ Additional supply voltage range ■ Wide range of ambient operating temperatures ■ Device variants suitable for cold stores, type-dependent, identifier see "Type code", page 13)
Easy configuration/operation	■ Configuration centrally using PROFINET controller (e.g., PLC) via GSD parameterization or locally via SOPAS ET configuration software (incl. online help function) ■ Status display by five LEDs ■ Configuration via profile programming with bar codes, generated and printed with the help of SOPAS ET
Reading Operation Mode	■ Start/stop operation (one bar-code bearing object per reading pulse)
Read pulse generation	■ Pulse source for start: Fieldbus input, data interface (command), auto pulse, free ■ Pulse source for stop: Read pulse source, data interface (command), timer, condition
Bar code evaluation	■ All current 1D code types ■ Max. number of bar codes: 50 per read pulse ■ Separation of identical codes of the same code type by read angle
Data Processing	■ Influencing the output of the reading data by event-dependent evaluation conditions ■ Influencing the output string by filtering and output sorting

Product feature/function	Characteristic
Data communication	■ Host interface: Ethernet, PROFINET protocol, data output format can be configured ■ AUX interface: USB (2.0) [1]. Type-dependent, identifier see "Type code", page 13. Data output format configurable ■ Aux interface: Ethernet TCP/IP, data output format configurable
PROFINET	■ PROFINET with integrated switch (Dual Port) in accordance with IEEE 802.3 for incorporation in line or ring network topologies ■ Local trigger input (hardware) for reading pulse, type-dependent, identifier see "Type code", page 13
Electrical interfaces	■ Host interface (also AUX interface): 2 x Ethernet ■ Aux interface: 1 x USB [1], type-dependent, identifier see "Type code", page 13 ■ MicroSD memory card, type-dependent, identifier see "Type code", page 13 ■ Digital switching input (hardware): 1 x, type-dependent, identifier see "Type code", page 13 ■ Power supply
Wiring technique (design)	■ Space-saving, swivel connector on the device with two M12 round connectors, female connector, 4-pin, D-coded for Ethernet (PROFINET) ■ Cable (0.9 m), line connection integrated into the control unit. Type-dependent in the following forms: o With POWER connection (male connector, M12, 4-pin, A-coded), type-dependent, identifier see "Type code", page 13 o With POWER connection + trigger input (male connector, M12, 5-pin, A-coded), identifier see "Type code", page 13
Housing	■ Compact, industrial version in metal, IP 65, protection class III ■ Small dimensions, low weight ■ Various installation options via comprehensive range of mounting accessories

[1] Service interface, for temporary use only

3.2.5 Memory card

Depending on the type, the device has a card slot integrated in the housing. This slot accommodates a memory card in microSD format.

NOTE

The memory card is optional and is not included with the delivery of the device.

To ensure that the memory card functions reliably, only use card types (industrial standard) approved by SICK. You can find these as accessories online at:

- www.sick.com/CLV61x_Dual_Port

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

Functions

An inserted memory card serves as a local external storage medium for the device outside the internal device memory, see "Initial commissioning", page 43.

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

- **Cloning function: saving the currently valid parameter set**
  Automated additional storage of the parameter set with the configuration data of the device on an external storage medium that is quickly accessible to the user. This takes place as part of the recommended backup concept for the parameter sets of the 4Dpro devices. The externally stored parameter set is also updated automatically each time the currently valid configuration data is permanently saved.

    - The cloning function serves as a 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). The PN name of each device must be adjusted 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.

      Automated saving to the external storage medium is triggered by saving the parameter set in the device with the “permanent” option, e.g., via the SOPAS ET configuration software.
- Other functions available on request.

The first time a parameter set is stored, we recommend using an empty memory card.

▶ If necessary, check and delete the contents of your current card on the PC using a card reader.

Device access to the memory card

NOTE

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

By observing the sensor LED, it is possible to tell when the storage process has been completed when the parameter set is saved with the “permanent” option:

- 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 operations are still being executed on the device using the SOPAS ET configuration software:
    - Permanent change to the parameter set by saving with the “permanent” option.

Inserting the memory card in the device:

NOTICE

Risk of damage to the memory card!

▶ To avoid damaging the memory card, make sure the device is **de-energized** when you insert or remove the card. For this purpose, disconnect the device from the supply voltage accordingly.

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.

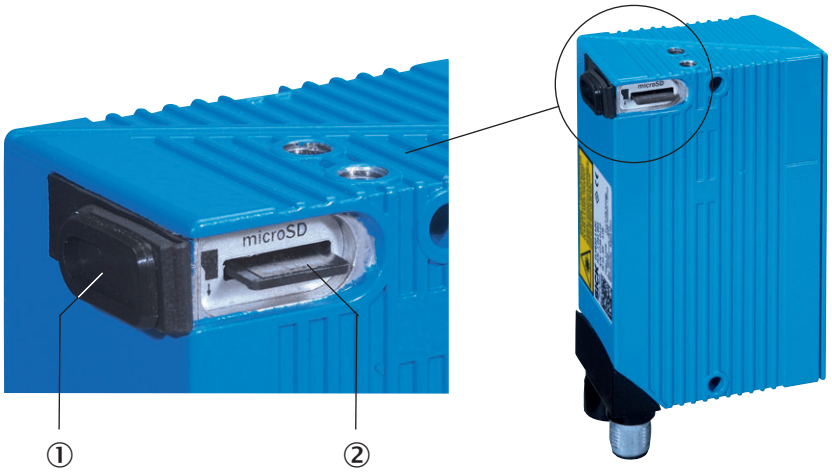


*Figure 8: Slot for microSD memory card (only CLV61x-DxxXxx, with **x** = 3 oder 4), illustration may differ*

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 stored parameter set

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

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

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

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

Removing the memory card from the device:

NOTICE
Risk of damage to the memory card!

- To avoid damaging the memory card, make sure the device is **de-energized** when you insert or remove the card. For this purpose, disconnect the device from the supply voltage accordingly.

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

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

NOTICE

Damage to the product due to improper transport.

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

4.2 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.

4.3 Storage

Store the device under the following conditions:

- Recommendation: Use the original packaging.
- Electrical connections are provided with protective caps and plugs (as they are on delivery).
- Do not store outdoors.
- Store in a dry area that is protected from dust.
- So that any residual damp can 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 55.
- Relative humidity: see "Technical data", page 55.
- For storage periods of longer than 3 months, check the general condition of all components and packaging on a regular basis.

5 Mounting

5.1 Overview of mounting procedure

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

WARNING
Risk of injury due to damage to the device

For reasons of safety, a device which is visibly damaged must not be operated or must be immediately taken out of operation. Damage includes, for example:

- Housing: Cracked or broken
- Reading window lens: Cracked or broken
- Device with connector: Over-rotation of the connector, cracks, or being torn from the housing
- Device with fixed cable: Damage to the cable outlet or cable itself

5.2 Preparation for mounting

5.2.1 Mounting requirements

NOTICE
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

- Typical space requirement for device, see type-specific dimensional drawing and reading field diagram.
- The device requires a direct, unimpeded line of sight to the codes being read.

Environmental influences

- Comply with technical data, such as the permitted ambient conditions for operation of the device (e.g., temperature range, EMC interference emissions, ground potential), see "Technical data", page 55.
- To prevent the formation of condensation, avoid exposing the device to rapid changes in temperature.
- Keep the device out of direct sunlight. The prevents additional external heating and potential optical dazzle of the device.

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 x M5 screws – the maximum screw-in depth in the device is 5 mm from the housing surface

NOTE
The screws are for mounting the device on mounting equipment (bracket) supplied by the user. The screw length depends on the mounting base (wall thickness of the bracket). When using an optional SICK bracket, the screws for mounting the device are included in the scope of delivery for the bracket.

- Tool and tape measure

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

NOTE
For the electrical installation procedure, see "Instructions for electrical installation when the ambient temperature can fall below 0 °C", page 33

The devices with integrated heating (CLV61x-DxxxxxF0) 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.
- During mounting, make sure that heat transfer between the device and the surrounding environment is kept as small as possible. Use appropriate holders (optional accessories).

NOTICE
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, take appropriate measures to shield the device from air flows.

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 on the bracket using at least two M5 blind hole threads that are in pairs on both of the narrow sides of the device, see "Device view", page 16.

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

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

- www.sick.com/CLV61x_Dual_Port

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

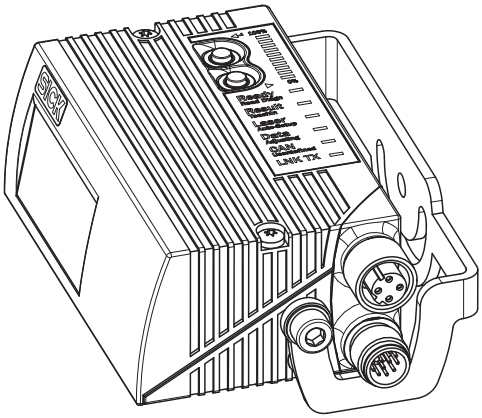


Figure 9: Example mounting of a device with bow-shaped mounting bracket (SICK accessories, illustration of the device can differ)

Devices with heating

NOTE

Three plastic insulation panes are to be used across from the bracket for heat insulation on devices with heating. These panes are included with the mounting brackets for thermal decoupling (SICK accessories).

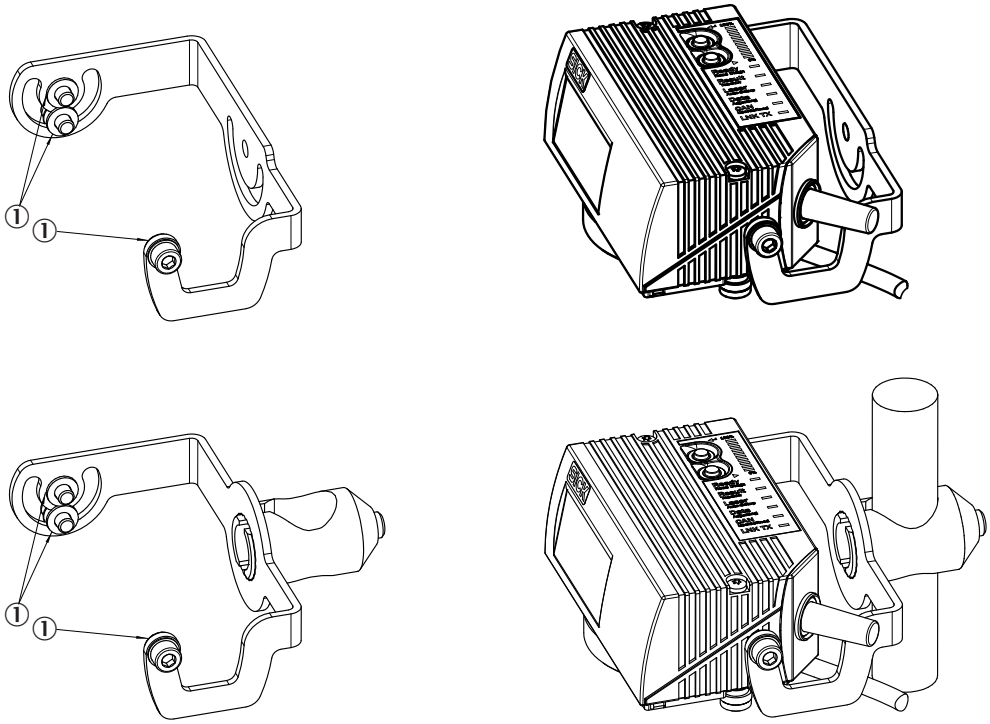


Figure 10: Example mountings of a device with external heating using bow-shaped mounting brackets (SICK accessories). Illustration of the device may differ.

① Plastic insulation panes

User-supplied brackets

The brackets should meet the following requirements:

- Stable mounting device

  - Alignment of the device in the x and y axes can be adjusted.
  - The mounting device must be able to bear the weight of the device and connecting cables without shock.
  - The housing must be thermally isolated from the bracket for devices with heating. To do so, attach appropriate plastic insulating slabs to the fixing screws between the housing and the bracket.
- Two or three M5 screws for mounting the device
  - The screw length depends on the wall thickness of the mounting device.
  - The maximum screw in depth in the device is 5 mm from the housing surface.

5.3 Mounting location

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 allocation of the scan line to the bar code

The basic allocation of the scan line to the bar code on the object depends on the version of the device (line scanner or grid scanner).

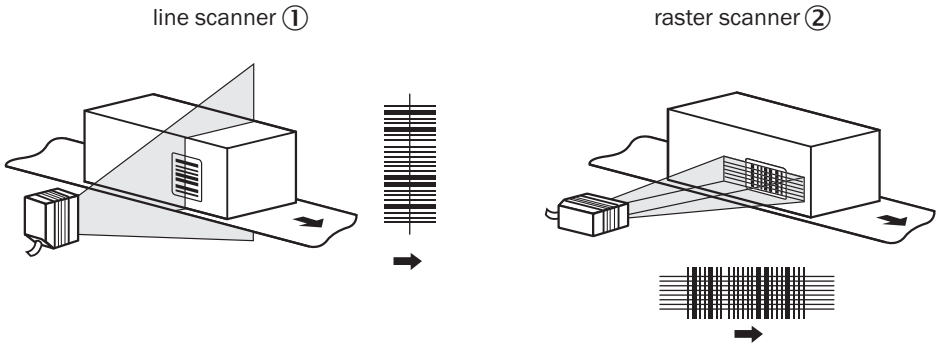


Figure 11: Allocation of scanning line(s) to bar code and conveyor direction

① Line scanner

② Grid scanner

5.3.2 Reading distance to the bar code and aperture angle α

The maximum distance from the reading window of the device to the bar code may not exceed the design 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.

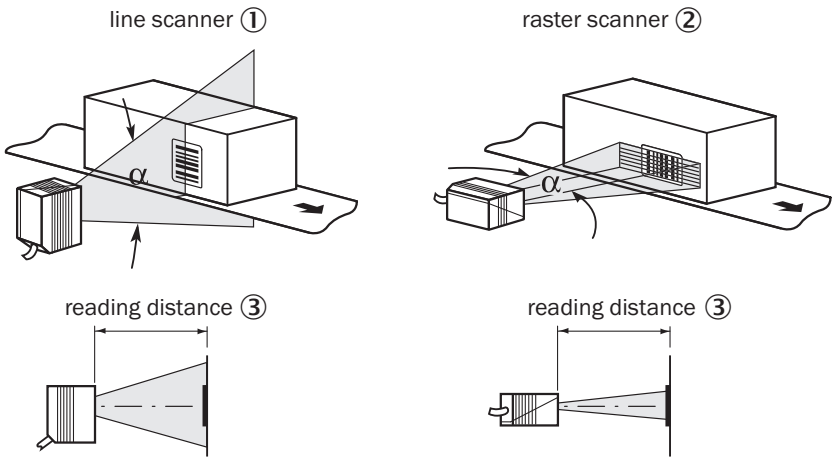


Figure 12: Definition of the reading distance and the aperture angle α

① Line scanner
② Grid scanner
③ Reading distance

In the specification diagrams (see "Reading field diagrams", page 58), the height of the reading field is shown as a function of the reading distance for differing resolutions (module widths).

5.3.3 Angle alignment of the device

The optimum alignment of the device is achieved when the scan line crosses the stripes of the bar code as close to a right angle as possible (tilt and inclination). Possible reading angles that can arise between scan line and bar code at all three levels in the area must be taken into account.

In order to prevent surface reflections, the angle of rotation must be approx. 15° out of plumb to the bar code, see "Avoidance of surface reflections", page 31.

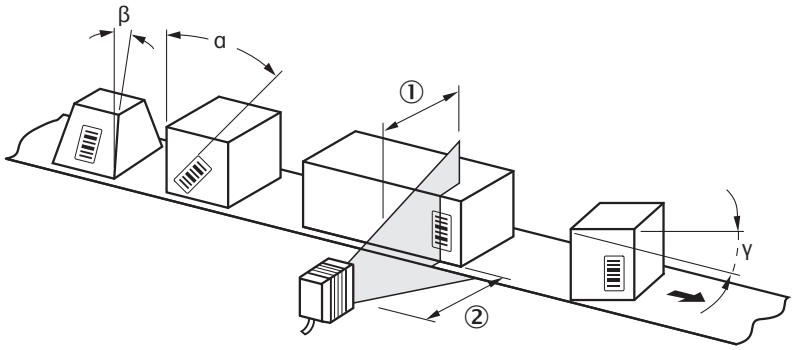


Figure 13: Line scanner: Read angle occurring between scanning line and bar code

① Depth of field
② Reading distance

NOTE
The specified maximum values can only be reached in optimum conditions. The actual maximum depends on module width, code type, print contrast, ambient light, distance and scanning frequency.

Table 7: Permitted read angle between scanning line and bar code

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

5.3.4 Avoidance of surface reflections

If the light of the scan line(s) hit(s) the surface of the bar code precisely vertically, this may cause interference when the light reflected back is received. To prevent this effect, the device must be mounted so that the light emitted is tilted relative to the vertical.

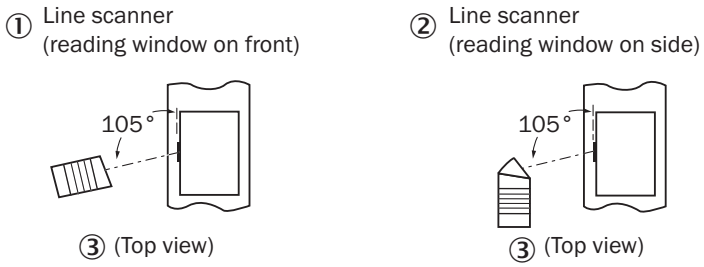


Figure 14: Avoiding surface reflections on the example line scanner: Angle between light emitted and bar code (tilting away from vertical)

① Line scanner (reading window on front)
② Line scanner (reading window on side)
③ Supervision

5.3.5 Count direction of the reading angle and the code angle

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

At the same time, the location-specific reading diagnostics data are determined for each of them.

- The reading angle, starting from the reading window, at which the device detects the bar code center on the red scanning line of the deflected scanning beam can be outputted as an RA (reading angle) value.

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.

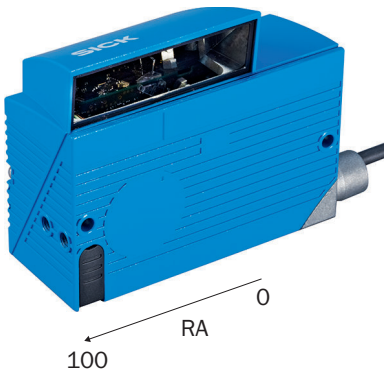


Figure 15: Counting direction of the reading angle RA in the scanning line on devices with front and side reading windows

5.4 Mounting the device

NOTICE

Risk of damaging the device!

Observe the maximum screw-in depth of the blind hole thread. Longer screws than specified damage the device.

- ▶ Use screws of suitable length.

1. Prepare the base for mounting the bracket of the device, see "Preparation for mounting", page 26.
2. Place the object with the bar code in the view of the device in the position where the reading is to take place (conveyor static).
3. Align device with the bar code by eye. When doing so, be aware of the following:
   - For a device with the reading window at the front, ensure that the rear side with the laser warning label points in the direction of the observer and is aligned as near as possible to being parallel to the bar code surface.
   - For a device with the reading window at the side, ensure that the side panel with the LEDs points in the direction of the observer and is aligned almost parallel to the bar code surface.
   - During reading, note the reading angle that occurs see "Angle alignment of the device", page 30.
   - If the position of the bar code within the scanning line is relevant for the evaluation, bear in mind the count direction of the code position see "Count direction of the reading angle and the code angle", page 31.
4. Mount the device bracket onto the base.
5. Screw screws through the bracket into the blind hole threads of the device and slightly tighten.
6. Configure the device, see "Adjust the device", page 43.

6 Electrical installation

6.1 Safety

6.1.1 Notes on the electrical installation

- **The electrical installation must only be performed by electrically qualified personnel.**
- **Standard safety requirements must be met 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 extension cables with open ends, ensure that bare wire ends do not come into contact with each other (risk of short-circuit when supply voltage is switched on!). Wires must be appropriately insulated from each other.
- Wire cross-sections in the supply cable from the customer's power system must be selected in accordance with the applicable standards. When this is being done in Germany, observe the following standards: DIN VDE 0100 (Part 430) and DIN VDE 0298 (Part 4) and/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 (type-specific max. 2 A (unheated) or 3 A (heated)) at the start of the supply circuit.

NOTE
Layout of data cables

- Use screened data cables with twisted-pair wires.
- Implement the screening design correctly and completely.
- To avoid interference, e.g. from switching power supplies, motors, clocked drives, and contactors, always use cables and layouts that are suitable for EMC.
- Do not lay cables over long distances in parallel with power supply cables and motor cables in cable channels.

The specified IP enclosure rating for the device is only achieved under the following conditions:

- The cables plugged into the connections are screwed tight.
- Any electrical M12 connections that are not being used must be fitted with tightly-fastened protective caps or plugs (as in the delivery condition), depending on the type.
- Any other possible coverings must be closed and lie flush on the device.

In the event of non-compliance, the IP enclosure rating will not apply for the device.

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 27

The devices with integrated heating (CLV61x-DxxxxxF0) 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.
- Restricted supply voltage range: 18 V DC ... 30 V DC
- Use cables suitable for the ambient conditions. For SICK standard cables for the specified ambient temperature range, see:
  - www.sick.com/CLV61x_Dual_Port

  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 °C, and switches it back on if the internal temperature drops to –15 °C. A circuit protection device prevents the heater from overheating.

6.1.4 Note on the swivel connector

NOTICE

Damage to the connector unit from over tightening!

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 16: Swivel connector: rotation direction from end position to end position. Illustration may differ from actual device.

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:

- Metal housings are vulnerable to dangerous currents.
- 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 (e.g., ensuring low-impedance and current-carrying equipotential bonding).

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

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

This is achieved by complying with the following conditions:

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

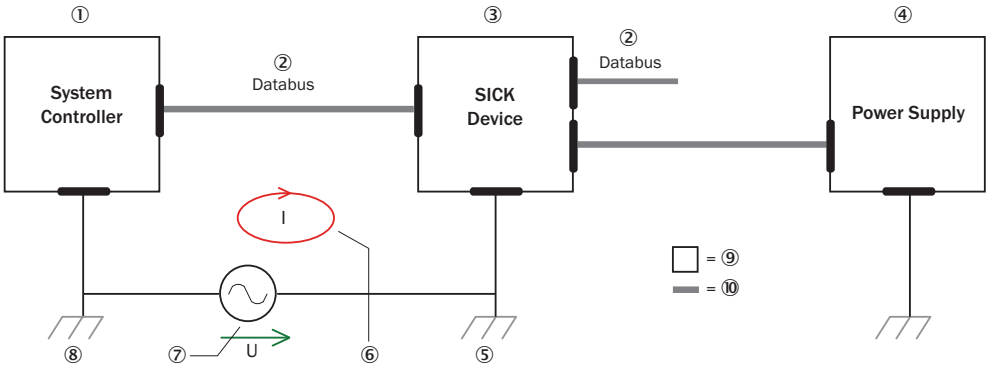


Figure 17: Example: Occurrence of equipotential bonding currents in the system configuration

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.

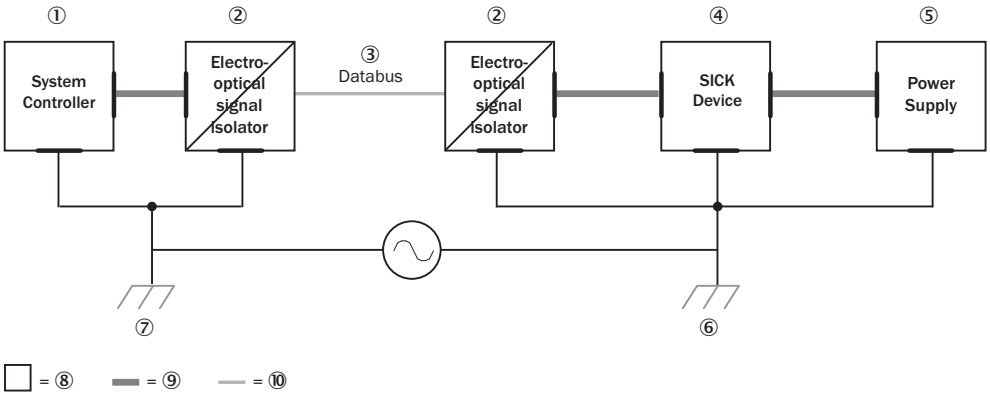


Figure 18: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

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.

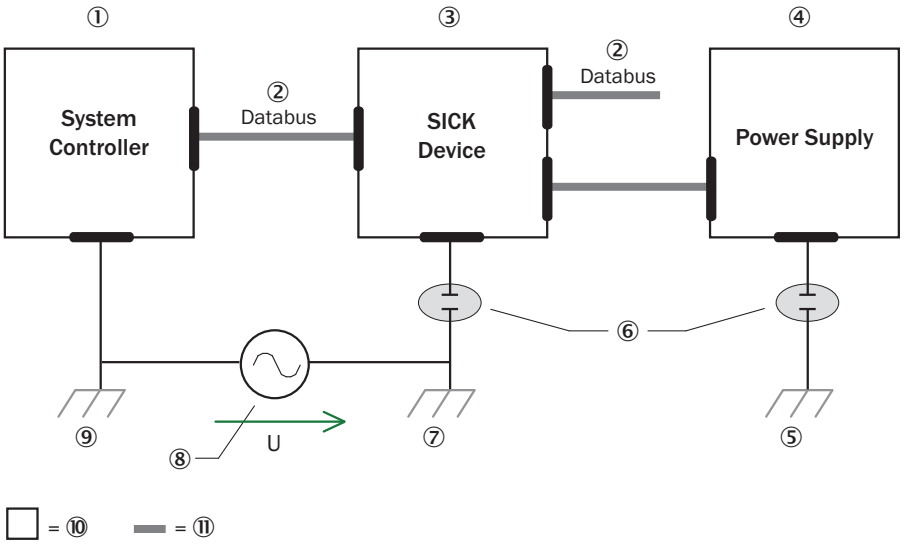


Figure 19: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

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

NOTICE
Faults due to incorrect wiring.
Incorrect wiring may result in operational faults.
- Follow the wiring notes precisely.

Pre-assembled cables

NOTE
Pre-assembled cables can be found online at: www.sick.com/CLV61x_Dual_Port

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

NOTE
Information about pin, signal and wire color assignments see "Signal assignment of cables with open cable end at one end", page 63 in the appendix.

6.4 Pin assignments for electrical connections

Connections P1 and P2 (PROFINET)

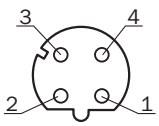


Figure 20: Female connector, M12, 4-pin, D-coded

Pin	Signal	Function
1	TD+ (Ethernet)	Sender+
2	TD– (Ethernet)	Sender–

Pin	Signal	Function
3	RD+ (Ethernet)	Receiver+
4	RD– (Ethernet)	Receiver

Connection for POWER (CLV61x-Dx41x)

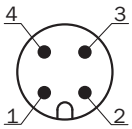


Figure 21: Male connector, M12, 4-pin, A-coded

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)

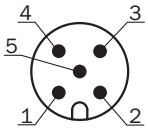


Figure 22: Male connector, M12, 5-pin, A-coded

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 switching input for external reading cycle

6.4.1 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 plug 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.

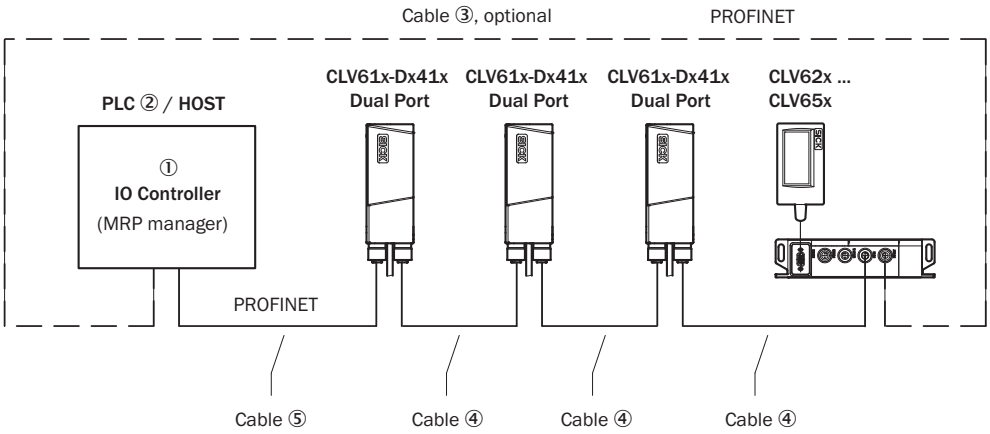


Figure 23: Example of a PROFINET network design with a line or ring topology (CLV61x-Dx41x)

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)

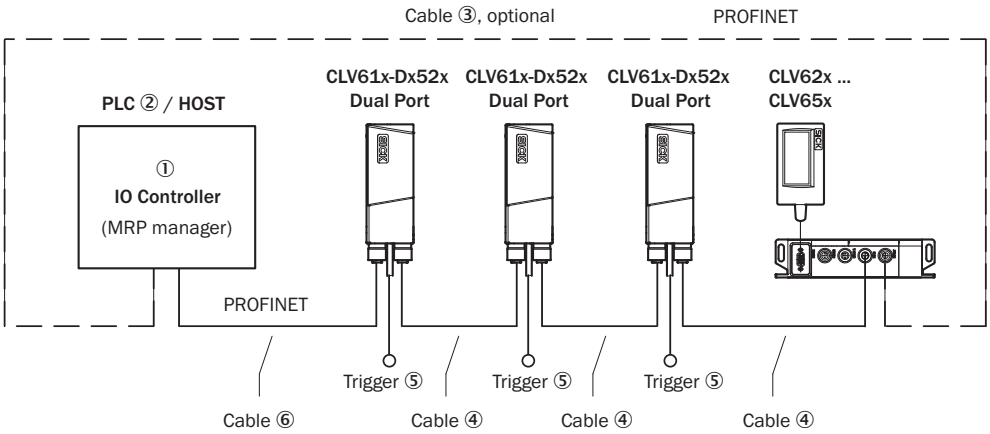


Figure 24: Example of a PROFINET network design with a line or ring topology (CLV61x-Dx52x)

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 ring topology is used, 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 USB interface available depending on the type is only for temporary connection to a PC for local configuration or device diagnostics.

6.4.2 Wiring the switching input (CLV61x-Dx52x only)

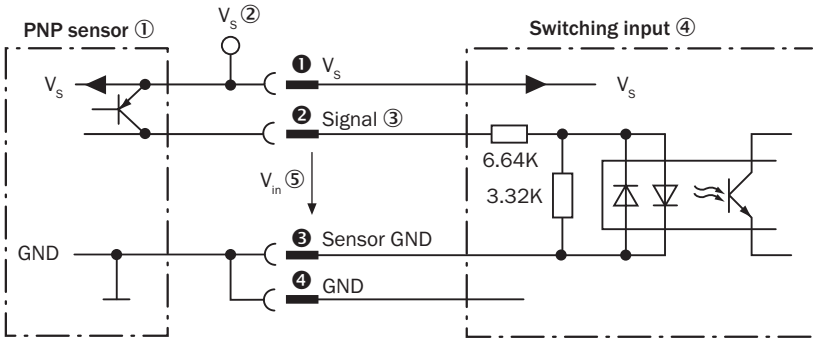


Figure 25: Wiring the switching input

① Trigger sensor (PNP sensor)

② Supply voltage V_S ($V_S = U_V$)

③ Input signal

④ Switching input of the device (“Sensor 1”)

⑤ Input voltage V_{in} ($V_{in} = U_e$)

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

If you would like an external sensor to trigger the read operation of the device, connect the trigger sensor to the “Sensor 1” switching input.

Table 8: Connecting the switching input according to the application

Switching behavior	Current to input starts the internal reading interval of the device. • Default: Active high • Debouncing: Max. 10,000 ms (standard 10 ms)
Properties	• Opto-decoupled, reverse polarity protected • Can be wired with PNP output of a trigger sensor
Electrical values	• Low: $\lvert V_{in} \rvert \leq 2$ V; $\lvert I_{in} \rvert \leq 0.3$ mA • High: 6 V $\leq \lvert V_{in} \rvert \leq 32$ V; 0.7 mA $\leq \lvert I_{in} \rvert \leq 5$ mA

7 Commissioning

7.1 Overview of the commissioning steps

Commissioning, adjustment, 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 an across-the-board configuration of the device is done centrally in the control environment by the PROFINET controller (e.g PLC) (configuration using modules in the GSD file of the device). At each restart of the PROFINET, the PROFINET controller overwrites and prioritizes the current device parameters.

- Commission device using factory default settings.
- Connect the PC 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 PC 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 “Bar code scanner CLV61x Dual Port (PROFINET)” in English (part no. 8017978) and German (part no. 8017977).

The supplementary information can be found under "Documentation" on the online product page at:

- www.sick.com/CLV61x_Dual_Port

7.2 Install and launch the SOPAS ET configuration software

NOTE

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

- www.sick.com/SOPAS_ET

1. Electrically connect a device data interface with a PC that can connect to the Internet.
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 selected by the installation wizard. Administrator rights may be required on the PC to install the software.
3. Start the "SOPAS ET" program after completing the installation. Path: Start > Programs > SICK > SOPAS ET Engineering Tool > SOPAS.
4. Establish communication between SOPAS ET and the device with the automatically launching wizard. To do so, select the device under the devices available depending on the connected communication interface, e.g., Ethernet. (Default Ethernet address: IP address: 192.168.0.1, subnet mask: 255.255.255.0).
SOPAS ET establishes communication with the device and loads the associated device description file. The device project tree opens.

7.3 Adjust the device

For complete adjustment of the device, the electrical installation must be complete and the device must have been commissioned.

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, arrange the device as close to being plane-parallel to the object surface as possible.
4. Manually place objects with bar codes one after the other into the reading range of the device, see "Technical data", page 55.
5. Check the reading result with the SOPAS ET configuration software.
6. When doing so, place objects at different positions (angles) in the reading field and ensure that the limit values for the permitted reading angles are not exceeded, see "Angle alignment of the device", page 30.
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 adjusted to the application situation on site using the SOPAS ET configuration software on the PC. The default factory settings of the device are the starting point for this. Their parameter values (configuration data) can be adapted in the working memory of the device for optimization purposes. To do so, the user creates an application-specific parameter set with the SOPAS ET configuration software or changes the set later as required. The user then loads the current parameter set to the permanent parameter memory of the device.

Memory organization for parameter set

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

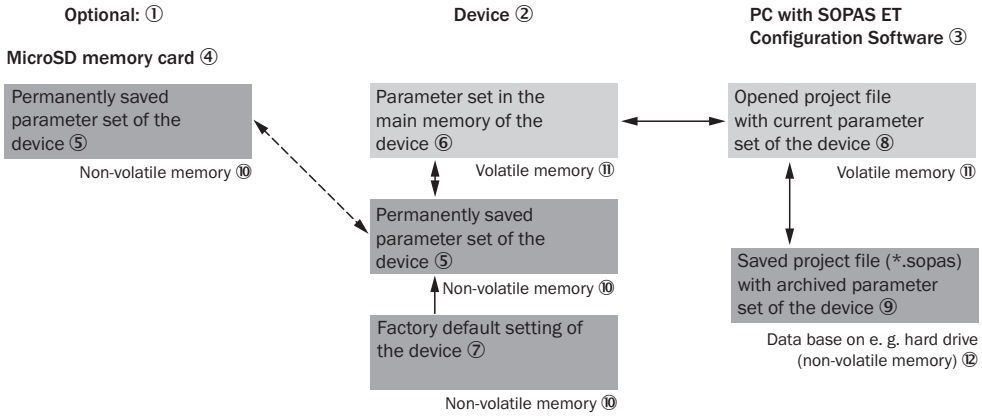


Figure 26: Configuring with SOPAS ET and saving the parameter set

① Optional (only CLV61x-Dxx**X**xx, with X= 3 or 4)
② Device
③ PC with 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 the hard drive, for example (nonvolatile memory)

Save process:

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

- Each time the currently valid parameter set is saved in the device with the “Permanent” option, the parameter set is also permanently saved externally on the memory card.

8 Operation

8.1 Operating and status indicators

8.1.1 Operator interface

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

- Locally at the device with the SOPAS ET configuration software. Protection of the parameter set as a configuration file on the PC in SOPAS ET. Access to the device via Aux interface (USB or Ethernet).
- 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).
- Centrally by the PROFINET controller via PROFINET using the GSD configuration. Protection of the parameter set as a configuration file in the PROFINET controller. Each time the 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 “Bar code scanner CLV61x Dual Port (PROFINET)” in English (part no. 8017978) and German (part no. 8017977).

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- www.sick.com/CLV61x_Dual_Port

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

In normal operation, the device operates fully automatically.

8.1.2 Optical status indicators on the device

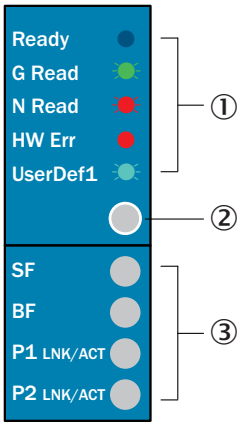

Figure 27: LEDs on the housing

① Signal color allocation for status and events, displayed by sensor LED

② Sensor LED (RGB), 1 x

③ Network LED for communication via PROFINET, 4 x

Sensor LED

Table 9: Display behavior of the sensor LED

Color	Display	LED	Status
–	–	Off	Device without supply voltage

Color	Display	LED	Status
Magenta	–	Flashing	Device with heating (CLV61x-DxxxxF0): Device not yet ready for operation, still in the warm-up phase.
Blue	Ready	Steadily lit	After switching on or after successful firmware download: Self-test successful, device ready for operation
–	–	Goes out	After switching on: Parameter download to / upload from device
Green	G Read	Lights up briefly	Reading successful (Good Read)
Red	N Read	Lights up briefly	Reading unsuccessful (No Read)
Red	HW Err	Steadily lit	Hardware error
Light blue	UserDef1	Off	UserDef1 (reserved)
Red Blue	Further indicators	Alternating flashing	Firmware download
Red		Steadily lit	Firmware download: Error: Completion not successful

Network LEDs

Table 10: Display behavior of the sensor LEDs

Display	LED	Color	Status
SF [1]	Off	–	Device without internal error
	Steadily lit	Red	The device activates the internal PROFINET module
	Flashing	Red	Using the PROFINET TOOL, a blink request was sent to the device for device identification
BF [2]	Off	–	Data exchange between device and PROFINET controller via PROFINET possible
	Steadily lit	Red	No connection between device and PROFINET controller. Possible causes: • Bus not connected electrically • PROFINET controller not available or switched off • Incorrect PROFINET name • Wrong GSD file used • Wrong GSD module selected
	Flashes cyclically	Red	Flash frequency 0.5 Hz. Possible causes: • Configuration error in the PROFINET controller (e.g. ID wrong), no data exchange • Error in the PROFINET controller when configuring with modules, no data exchange
P1 LNK/ACT	Off	–	Device not connected to any active network; no data traffic possible
P1 LNK	Steadily lit	Green	Device connected to active network, e.g. with an Ethernet switch (switched-on)
P1 ACT	Flickering	Orange	Device is sending or receiving data

Display	LED	Color	Status
P2 LNK/ACT	Off	–	Device not connected to any active network; no data traffic possible
P2 LNK	Steadily lit	Green	Device connected to active network, e.g. with an Ethernet switch (switched-on)
P2 ACT	Flickering	Orange	Device is sending or receiving data

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

9 Maintenance

9.1 Maintenance

During operation, the device works maintenance-free.

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

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

Table 11: Maintenance schedule

Maintenance work	Interval	To be carried out by
Clean housing and front screen	Cleaning interval depends on ambient conditions and climate.	Specialist
Check screw connections and plug connectors	Interval depends on the place of use, ambient conditions, or operational regulations. Recommended: At least every 6 months.	Specialist
Check that the unused connections are sealed with protective caps or plugs	Interval depends on ambient conditions and climate. Recommended: At least every 6 months.	Specialist

9.2 Cleaning

9.2.1 Cleaning the device

At regular intervals (e.g. weekly), check the reading window and the housing of the device for accumulated dirt. This is especially relevant in harsh operating environments (dust, abrasion, damp, fingerprints, etc.). The reading window lens must be kept clean and dry for reading.

This action, along with any cleaning, ensures full optical reading performance of the device, and allows it to adequately dissipate heat resulting from internal power loss.

NOTICE
Device damage due to improper cleaning
Improper cleaning may result in device damage.

- Never use cleaning agents containing aggressive substances.
- Never use sharp objects for cleaning.

Clean the reading window

The type of screen material used in the reading window can be found on the type label:

CLV61x-Dxxx**X**x, with X = 0: glass, X = 1: plastic

Glass lens

NOTICE
Damage to the Reading Window!

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

- Do not use any aggressive cleaning agent.
- Do not use any cleaning agent likely to cause increased abrasion (e.g. powder).
- Avoid any movements that could cause scratches or abrasions on the reading window.

Plastic lens

NOTICE
Damage to the Reading Window!

Reduced reading performance due to scratches or streaks on the reading window.

- Clean the reading 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 reading window.

NOTE

Static charge causes dust particles to adhere to the reading window. This effect can be avoided by using an anti-static SICK plastic cleaner (part number 5600006) in combination with the SICK lens cloth (part number 4003353).

Cleaning procedure:

CAUTION
Optical radiation: Laser class 2

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

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

- Switch off the device for the duration of the cleaning operation. If this is not possible, use suitable laser protection goggles. These must effectively absorb the radiation at the device's wavelength effectively, see "Technical data", page 55.
- Glass lens: Remove dust from the reading window using a soft, clean brush. If necessary, also clean the reading window with a clean, damp, lint-free cloth, and a mild anti-static lens cleaning fluid.
- Plastic lens: Clean the reading window only with a clean, damp, lint-free cloth, and a mild anti-static lens cleaning fluid.

NOTICE

If the reading window is damaged by scratches, cracks or breaks, the lens must be replaced. Contact SICK customer service to arrange this.

- If the reading window is cracked or broken, the device must be taken out of operation immediately and repair by SICK must be arranged immediately due to safety reasons.

Cleaning the housing

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

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

9.2.2 Cleaning surfaces that have an optical effect

Depending on how the reading station is equipped, additional local sensors may have other surfaces with an optical effect installed (e.g. single-beam photoelectric safety switches for an external reading pulse). Contamination on these sensors can result in faulty switching behavior.

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

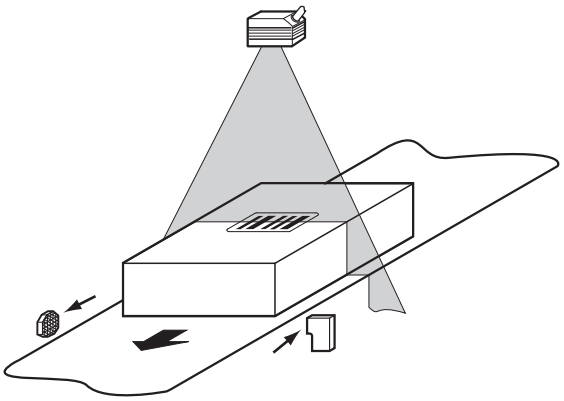

Figure 28: Cleaning the external optical sensors (read pulse encoder)

10 Troubleshooting

10.1 Overview of possible errors and faults

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

NOTE
Before calling, make a note of all type label data such as type designation, serial number, etc., to ensure faster assistance.

Table 12: Errors and faults

Situation	Error/fault
Mounting	▪ Device poorly aligned to objects with bar codes (e.g., dazzle).
Electrical installation	▪ Data interfaces of the device incorrectly wired.
Configuration	▪ Functions not adapted to local conditions, e.g., parameters for the data interface not set correctly. ▪ Device limits not observed, e.g., reading distance, aperture angle. ▪ Trigger source for reading pulse not selected correctly.
Operation	▪ Reading pulse control incorrect and/or not suitable for the object. ▪ Device faults (hardware/software).

NOTE
Further measures for eliminating possible errors and faults when incorporating the device into the PROFINET controller (PLC) are described in the supplementary information document “Bar code scanner CLV61x Dual Port (PROFINET)" in English (part no. 8017978) and German (part no. 8017977).

The supplementary information can be found under "Documentation" on the online product page at:

- www.sick.com/CLV61x_Dual_Port

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 device housing (see "Optical status indicators on the device", page 45) 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 outputs any occurring faults in different ways. Fault output is staggered, allowing for an increasingly detailed level of analysis:

- Communication errors can occur when transmitting telegrams to the device. The device then returns a fault code.
- For faults that occur during reading, the device writes fault codes in the status log (see "Status log", page 52).

10.3 Status log

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

The device distinguishes between four types of fault:

- Information
- Warning
- Fault
- Critical fault

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

10.3.1 Displaying the Status Log

To display the status log, the SOPAS ET configuration software must be connected with the device online.

1. Connect the SOPAS ET configuration software to the device.
2. Open CLV61x in the project tree: **SERVICE** > **SYSTEM STATUS** > **SYSTEM INFORMATION** tab.

10.4 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.

10.5 Returns

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

NOTICE
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 Replacing the device

Faulty or damaged devices must be dismantled and replaced with new or repaired devices of the same type.

10.6.1 Disassembling the device

1. Switch off the supply voltage to the device.
2. Detach all connecting cables from the device.
3. Remove the device from the bracket. When doing so, mark the position and alignment of the device on the bracket or surroundings.

10.6.2 Replacing the device

NOTE

For further details, see the supplementary information document “Bar code scanner CLV61x Dual Port (PROFINET)” in English (part no. 8017978) and German (part no. 8017977).

The supplementary information can be found under "Documentation" on the online product page at:

- www.sick.com/CLV61x_Dual_Port

1. Align and mount the new or repaired device (see "Mounting", page 26). When doing so, note the previously applied markings on the bracket or surroundings (see "Disassembling the device", page 53).
2. Reconnect the connecting cables to the device.
3. Switch on the supply voltage for the device. The device starts up with the default setting (new device).
4. 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 with SOPAS ET:
     Option a: Download the configuration previously stored on the PC as part of the backup concept to the device (via USB or Ethernet, depending on the type) and permanently store it in the device.
     Option b: Transfer the saved configuration of the previous device via profile programming. To do this, create and print out profile programing bar codes in SOPAS ET. When starting the device, hold the bar codes in the device’s reading area to permanently parameterize the scanner.

If automated PN name assignment for the device has been 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 state of 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 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 valid regulations on environmental protection.
- Separate the recyclable materials by type and place them in recycling containers.

12 Technical data

NOTE

The relevant online data sheet for your product, including technical data, dimensional drawing, and connection diagrams can be downloaded, saved, and printed from the Internet:

- www.sick.com/CLV61x_Dual_Port

These operating instructions provides additional technical data if required.

12.1 optical lens system

Table 13: CLV61x Dual Port: technical data for optics

	CLV615	CLV618
Working range	Long range	Long range
Scanning Method	Line or grid scanner [1], type-dependent, identifier see "Type code", page 13	
Reading window orientation	On the front or to the side (light emission at 105° relative to the longitudinal axis of the device), type-dependent, identifier see "Type code", page 13	
Aperture angle	≤ 50°	
Focus	Fixed focus	
Resolution	0.35 mm ... 0.5 mm	0.35 mm ... 1 mm
Reading areas	see "Reading field diagrams", page 58	
Scanning frequency	400 Hz to 1,000 Hz	
Light source	Laser LED, visible red light (λ = 655 nm)	
MTTF (laser diode)	40,000 h at 25 °C	
Laser class	Class 2 according to EN/IEC 60825-1:2014. Identical laser class for issue EN/IEC 60825-1:2007. Complies with 21 CFR 1040.10 except for tolerances according to Laser Notice no. 50 of June 24, 2007.	
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] Grid height approx. 15 mm at a reading distance of 200 mm

12.2 Performance

Table 14: CLV61x Dual Port: technical data for performance

Bar code types	Code 39, Code 128, Code 93, Codabar, UPC / GTIN / EAN, 2/5 Interleaved, Pharmacode
Print ratio	2:1 ... 3:1
No. of codes per scan	1 ... 10 (standard decoder) 1 ... 6 (SMART620)
No. of codes per reading interval	1 to 50 (auto-discriminating)
No. of characters per reading interval [1]	Max. 50 characters (max. 1,500 characters across all bar codes per reading interval)

No. of multiple readings	1 to 99

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

12.3 Interfaces

Table 15: CLV61x Dual Port: technical data for interfaces

Ethernet (10/100 MBit/s)	Host interface: • PROFINET device function • Protocols: PROFINET, Conformance Class B and Ethernet TCP/IP • 2-port Ethernet in accordance with 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) for configuration or diagnostics. Type-dependent, identifier see "Type code", page 13
Digital switching inputs	1 x software controlled via PROFINET control bits 1 x, type-dependent, identifier see "Type code", page 13
Digital switching outputs	4 x software controlled via PROFINET control bits
Reading pulse	• Fieldbus input, free, auto pulse, command (data interface) • Switching input, type-dependent, identifier see "Type code", page 13
Optical indicators	1 x RGB-LED multi-color, with signal color allocation for events 4 x LED, for PROFINET
Acoustic indicators	–
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 13
Configuration	SOPAS ET configuration software, commands, GSD parameterization

1) Service interface, for temporary use only.

12.4 Mechanics/electronics

Table 16: Technical data on mechanics/electronics

Electrical connection	Swivel connector with: ■ 2 x PROFINET connection (female connector, M12, 4-pin, D-coded) ■ 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). Code see "Type code", page 13 1 x USB connection [1], type-dependent, identifier see "Type code", page 13
Supply voltage V_s	Devices without heating: DC 10 V ... 30 V Devices with heating: DC 18 V ... 30 V LPS or NEC Class 2 Reverse polarity protected
Power consumption [2]	Devices without heating: Typically 5 W Devices with heating: Max. 15 W

Housing	Cast aluminum
Housing color	Light blue (RAL 5012)
Front screen	Glass (optionally plastic), identifier see see "Type code", page 13
Safety	EN 60950-1: 2011-01
Enclosure rating	IP 65 (EN 60529: 2014-09)
Protection class	 Intended for operation in SELV systems (safety extra low voltage).
Weight [3]	Device with front reading window: 290.5 g Device with side reading window: 310 g Device with side reading window and heating: 346 g
Dimensions	Device with front light emission: 61 mm x 96 mm x 38 mm Device with side light emission: 80 mm x 96 mm x 38 mm
Conformity	CE, UL [4]

1) Service interface, for temporary use only.
2) For switching outputs without load.
3) With connecting cable, male connector and glass reading window.
4) Only UL-certified if the type label contains the UL logo and the UL conditions are complied with during device operation. For further information, see "Certification in accordance with UL60950", page 63.

12.5 Ambient data

Table 17: CLV61x Dual Port: technical data for ambient conditions

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: 0 °C ... +40 °C Device with heating: –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	2,000 lx, on bar code
Bar code print contrast (PCS)	≥ 60 %

12.6 Dimensional drawings

Dimensions see "Device view", page 16.

12.7 Reading fields

12.7.1 Specification diagram for reading fields

Table 18: Reading conditions for reading field diagrams

Characteristic	Value
Test code	Code 39/ITF
Print ratio	2:1
Print contrast	> 90%
Tilt	±10°
Ambient light	≤ 2,000 lx

Characteristic	Value
Good read rate	> 75 %

12.7.2 Reading field diagrams

CLV615: Long Range

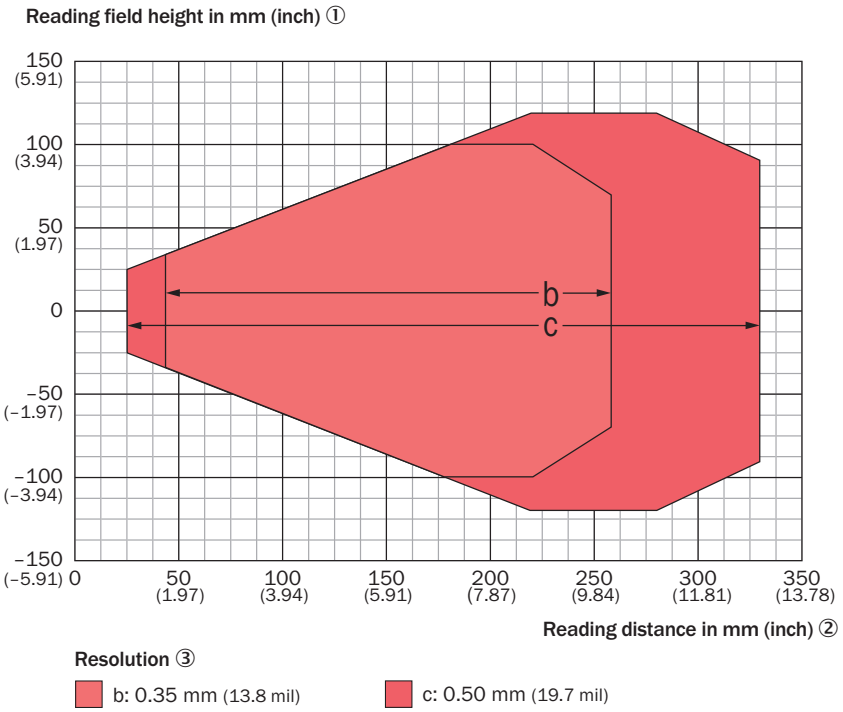

Figure 29: Reading field diagram: CLV615 with reading window on side

① Reading field height in mm (inch)

② Reading distance in mm (inch)

③ Resolution

CLV618: Long range

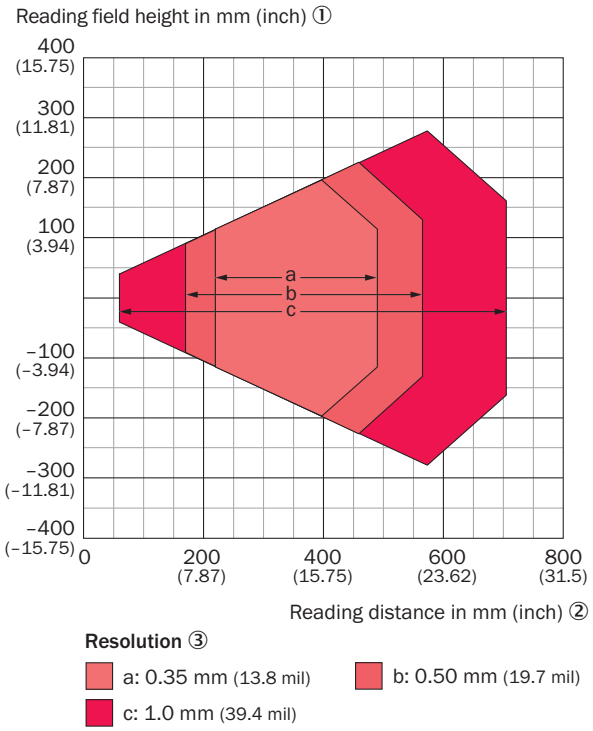

Figure 30: Reading field diagram: CLV618 with reading window on front

① Reading field height in mm (inch)

② Reading distance in mm (inch)

③ Resolution

CLV618: Long Range

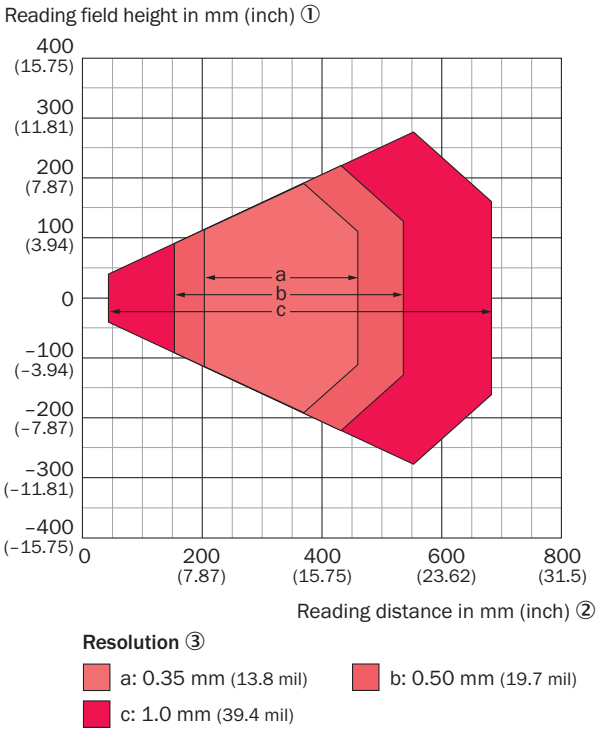

Figure 31: Reading field diagram: CLV618 with reading window on side

① Reading field height in mm (inch)

② Reading distance in mm (inch)

③ Resolution

13 Accessories

NOTE
Accessories and where applicable mounting information can be found online at:

- www.sick.com/CLV61x_Dual_Port

Accessories for CLV61x Dual Port bar code scanners with heating

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.

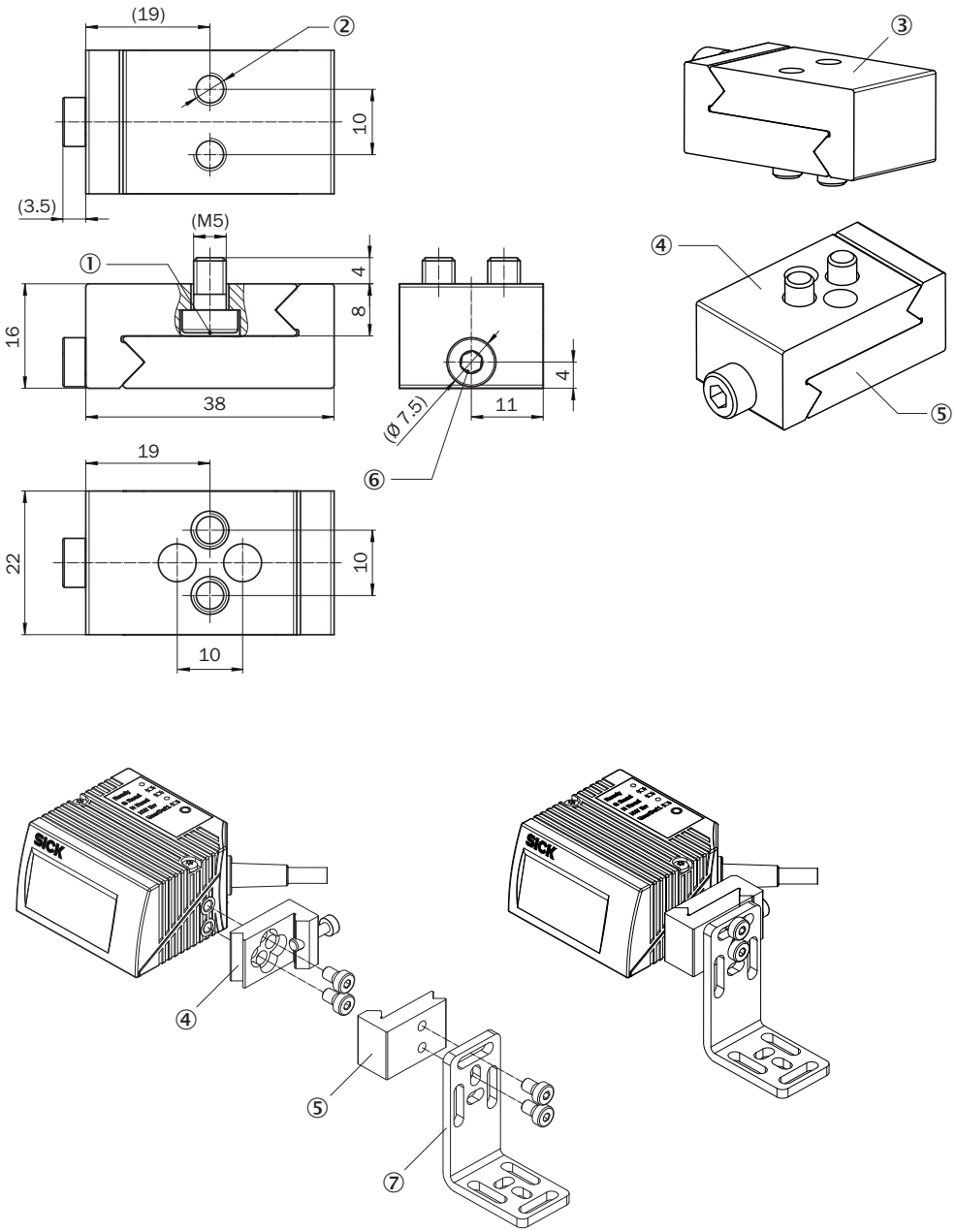

Figure 32: View of the quick release (dimensions in mm) and combination with mounting bracket

① Width across flats, size 3
② M5 thread hole, screw-in depth max. 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 Appendix

14.1 EU declaration of conformity / Certificates

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

- www.sick.com/CLV61x_Dual_Port

14.2 Certification in accordance with UL60950

The devices in the CLV61x, CLV61x Dual Port, CLV62x, CLV63x, CLV64x, CLV65x series are certified to UL60950-1; the UL file number is E244281-A6. The devices must be supplied by LPS or Class 2 power supply units in order to ensure UL-compliant operation.

UL certification is only valid with corresponding device identification on the type label of the respective device, see "Type label", page 13.

- Laser power and laser warning notes, see "Operational safety and particular hazards", page 10.
- IP65 enclosure rating of the devices not checked by UL.

14.3 Dimensional drawings (electronic)

Current dimensional drawings in various electronic formats can be downloaded online:

- www.sick.com/CLV61x_Dual_Port

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

14.4.1 PROFINET connection

Adapter cable, straight male connector

Part no. 6048247 (2 m), part no. 6048248 (5 m), part no. 6048249 (10 m), shielded

For CLV61x Dual Port PROFINET

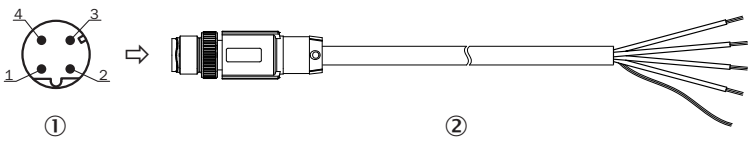

Figure 33: Adapter cable, e.g., part no. 6048247 (2 m)

① Male connector, M12, 4-pin, straight, D-coded (front view)

② Illustration may differ

Table 19: Signal assignment of adapter cable with open end

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

14.4.2 PROFINET connection

Adapter cable, angled male connector

Part no. 6048256 (2 m), part no. 6048257 (5 m), part no. 6048258 (10 m), part no. 6048259 (25 m), shielded

For CLV61x Dual Port PROFINET

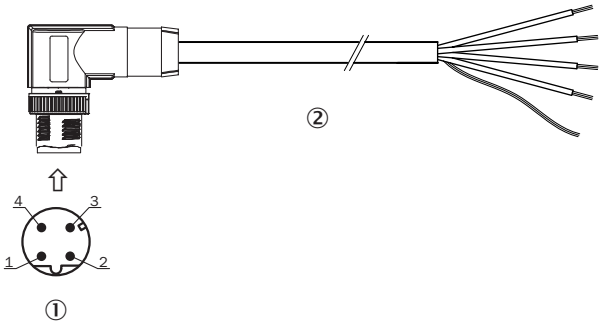

Figure 34: Adapter cable, e.g., part no. 6048256 (2 m)

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

② Illustration may differ

Table 20: Signal assignment of adapter cable with open end

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

14.4.3 “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-Dx**41**x), M12, 4-pin

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

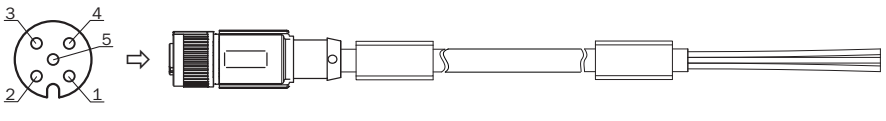

Figure 35: Adapter cable, part no. 2095608 (5 m)

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

② Illustration may differ

Table 21: 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

Pin	Signal	Function	Wire color
5	–	Not connected	–

14.4.4 “Power/Switching 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-Dx**52**x), M12, 5-pin

Ambient temperature range:

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

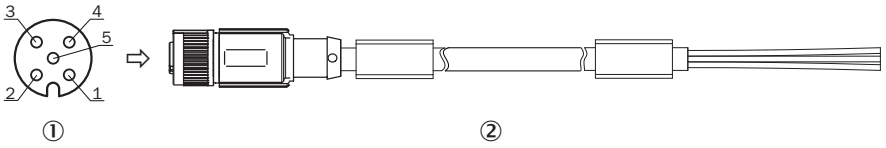

Figure 36: Adapter cable, part no. 2095618 (5 m)

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

② Illustration may differ

Table 22: 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 switching input for external reading cycle	Gray

14.5 Notes on PROFINET

14.5.1 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.profibus.com

14.5.2 General notes on PROFINET wiring

The signal lines must be wrapped in pairs (twisted pairs) and comply with at least CAT5 in line with 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.profibus.com

14.5.3 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.profibus.com

14.5.4 General requirements on a switch suitable for PROFINET applications

For PROFINET Conformance Class B and C (CC-B / CC-C), a PROFINET-certified switch which can be configured as a PROFINET device must be used.

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.profibus.com

14.5.5 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:

- 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)]

14.5.6 Behavior of the switching outputs of the bar code scanner with “Fieldbus input” reading cycle source

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

In the event that a fieldbus is interrupted, these outputs are no longer updated and keep the last value that existed 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	Contain the last value before cancellation
Connection lost	Contain the last value before cancellation

1) Properties of the CC-B

Status of digital outputs with	output value behavior
Switching on the PROFINET network	Values are initialized to “passive”

The reading cycle input can also be controlled by the fieldbus. If the fieldbus is interrupted, the reading cycle input is no longer updated. Reading results can get lost since the reading cycle input keeps the last value from before the interruption.

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

14.6 Configuration of the device using command strings

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

NOTICE
Both the command strings and the SOPAS ET configuration software are based on a command language that has direct access to the device command interpreter. This command language must be used with care, as the commands sent to the device are carried out immediately. Parameter values altered by commands are initially only active in the current parameter set in the volatile working memory of the device. For permanent storage, the altered parameter set must be copied with a special command into the permanent store, so that the alteration is not lost when the supply voltage is switched off.

Command strings for triggering the read pulse:

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

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

Overview of command strings for the device on request.

14.7 Abbreviations used

CAN	Controlled Area Network. Field bus log based on the CAN bus
CDB	Connection Device Basic (connection box)
CDM	Connection Device Modular (connection module)
CLV	Code reader V-principle
CMC	Connection Module Cloning
ID	Identification
MAC	Medium Access Control
MRP	Media Redundancy Protocol
PN	PROFINET
SOPAS ET	SICK Open Portal for Application and Systems Engineering Tool (PC software for Windows for configuration of SICK devices)
PLC	Programmable Logic Controller
SMART	SICK Modular Advanced Recognition Technology
TCP/IP	Transmission Control Protocol/Internet Protocol

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