OPERATING INSTRUCTIONS

CLV61x

Bar code scanner

SICK
Sensor Intelligence.

Described product

CLV61x CAN

CLV61x FIELDBUS (field bus access via CDF600)

Manufacturer

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

Legal information

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

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

© SICK AG. All rights reserved.

Original document

This document is an original document of SICK AG.

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 before starting any work on the device, in order to familiarize yourself with the device and its functions.

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 serve to incorporate the device into a customer system. Instructions are given by stages for all actions required.

These instructions apply to all available device variants of the device (CAN and FIELDBUS). More detailed information for the identification of the available device type see "Type code", page 12.

NOTE
These instructions do not apply to the bar code scanner CLV61x Dual Port.

The operating instructions for the model (CLV61x-Dxxxx) can be found under “Documentation” on the online product page at:

- www.sick.com/CLV61x_Dual_Port

Available device variants are listed on the online product page.

- www.sick.com/CLV61x

1.3 Explanation of symbols

Warnings in these operating instructions are labeled with symbols. The warnings are introduced by signal words that indicate the extent of the danger. To avoid accidents, damage, and personal injury, always comply with the instructions and act carefully.

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

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

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

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

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

1.4 Further information

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

- www.sick.com/CLV61x

The following information is available for download there:

- Model-specific online data sheets for device variants, containing technical data, dimensional drawings, and reading field diagrams
- EU declaration of conformity for the product family
- Dimensional drawings and 3D CAD dimension models in various electronic formats
- Reading field diagrams
- These operating instructions are available in German and other languages.
- Other publications related to the devices described here
- Publications dealing with accessories

1.4.1 Supplementary documents

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

1.4.2 Documents on request

Overview of command strings for the device.

1.5 Customer service

If you require any technical information, the SICK customer service department will be happy to help. To find your representative, 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 telephone processing.

2 Safety information

2.1 Intended use

The device is an intelligent, opto-electronic SICK ID sensor and is used for automatic, 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 to a higher-level control (PLC) for further coordinating processing.

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.

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

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

2.2 Incorrect use

- The device does not constitute a safety-relevant device according to the EU Machinery Directive (2006/42/EC).
- The device must not be used in explosion-hazardous areas.
- The CLV61x (CAN/FIELDBUS) must not be used in ambient temperatures below 0 °C.
- Any other use that is not described as intended use is prohibited.
- 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 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

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

- Failing to observe the operating instructions
- Improper use of the device
- Use by untrained personnel
- Unauthorized conversions
- Technical modification of the device
- 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.

2.6 Requirements for skilled persons and operating personnel

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

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

The operating instructions state the following qualification requirements for the various areas of work:

- **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

Activities	Qualification
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 Hazard warnings and operational safety

Please observe the safety notes and the warnings listed here and in other chapters of these operating instructions to reduce the possibility of risks to health and avoid dangerous situations.

2.7.1 Laser radiation

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 will not switch off the laser. Opening the housing may increase the level of risk.
- Current national regulations regarding laser protection must be observed.

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

Laser class

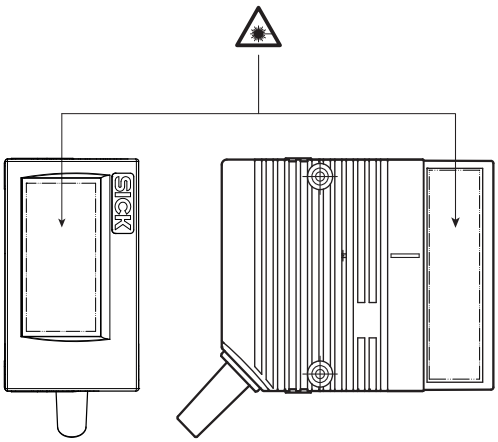


Figure 1: Laser output aperture with various designs

The device complies with laser class 2. The entire reading window is a laser output aperture.

NOTE
No maintenance is required to ensure compliance with laser class 2.

Warning symbol on the device

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

In addition to other information, the type label of the device in use also contains the laser output data. This consists of: Laser output power (maximum/average), wavelength or wavelength range, and pulse time duration. The data is located on the lower section of the type label, see "Type label", page 12.

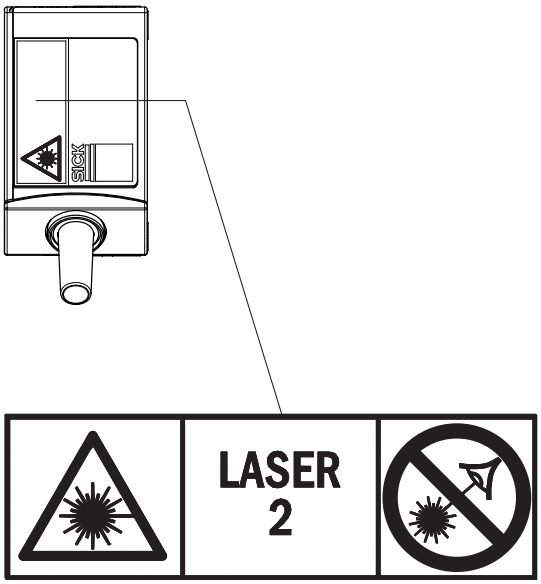


Figure 2: Position and contents of the laser warning label on the device

What the laser warning label means: Laser radiation – Never look into the light beam – Laser class 2

NOTE

Additional laser warning label

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

Controlling the laser diode

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

A laser timeout can switch off the laser diode automatically in this type of object trigger control if **the pulse has stopped for too long** (e.g. the conveyor system has stopped). In this case, the current internal reading interval of the device remains open.

Irrespective of the selected configuration type, the laser timeout can be set as follows:

- Using the SOPAS ET configuration software, on the **Illumination Control** device page
- During GSD configuration with the “10_Object Trigger Ctrl” module (Profinet/Profibus)

In the default setting, 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/diagnosis)
- In reading operation in the PSDI types “Auto pulse” (adjustable duty cycle) or “free.”

If timeout is activated, it will have no effect here.

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

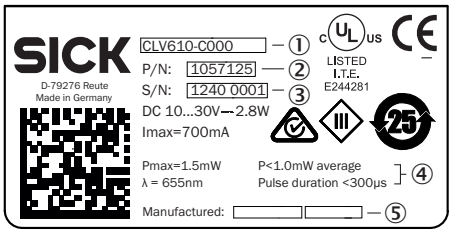
Repair work on the device may only be performed by qualified and authorized personnel from SICK AG. Interruptions or modifications to the device by the customer will invalidate any warranty claims against SICK AG.

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.



① Type designation
② Part number
③ Serial number
④ Laser output data
⑤ Date of manufacture

3.1.2 Type code

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

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
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

Position	Description	Characteristic
8	Interfaces	0: RS-232, digital I/Os [2] 1: Ethernet, USB 2: Ethernet, USB, 1 x digital input [3]
9	Front screen material	0: Glass 1: Plastic
10	Application (ambient temperature)	Without label: Standard (0 °C ... +40 °C)

1) Refers to the longitudinal axis of the device.
2) 2 x digital switching inputs and 2 x digital switching outputs.
3) 1 x digital switching input.

NOTE

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

- www.sick.com/CLV61x

Device Variants

The product family CLV61x consists of the three variant series Dual Port, CAN, and FIELDBUS (FIELDBUS in combination with the optional fieldbus module CDF600). Depending on the model, the variant series offer the following options/differences:

- Reading range variants
- Scanning method
- Reading window orientation
- Design of the electrical connections
- Dual Port for PROFINET

CAN and FIELDBUS variants

All devices have the two serial data interfaces (Host/Aux). The CAN and FIELDBUS variants also offer the SMART620 decoder for identifying partly damaged or low-quality bar codes as well as an additional CAN interface.

Dual Port variants

For a description, see operating instructions for CLV61x Dual Port (PROFINET).

3.2 Product characteristics

3.2.1 Device view

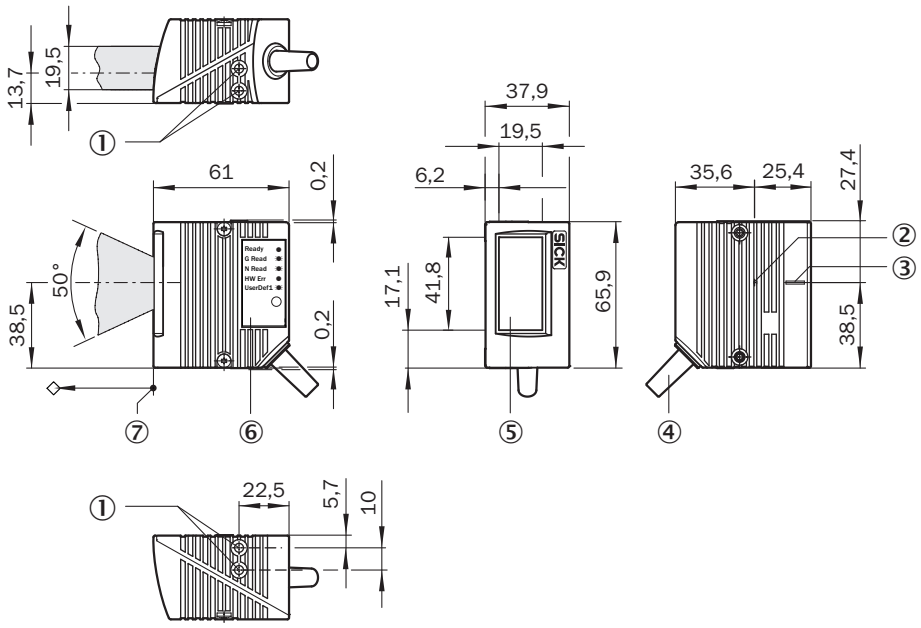


Figure 3: Structure and device dimensions with front reading window (in mm or inch)

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

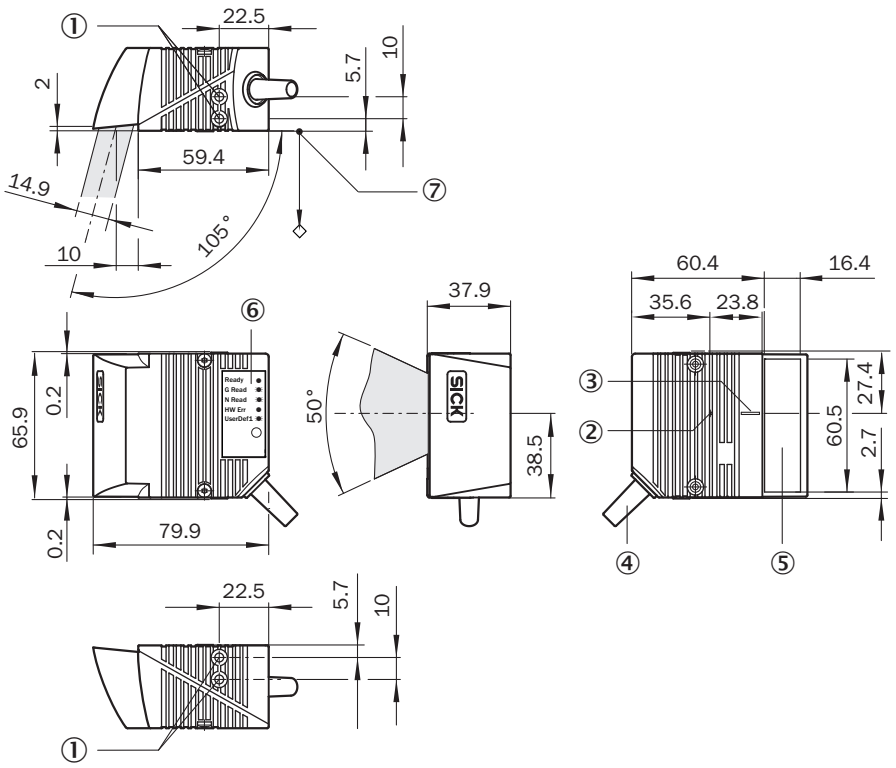


Figure 4: Structure and device dimensions with side reading window (in mm or inch)

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

3.2.2 Product features and functions (overview)

Table 3: Overview of product features and functions of the device

Product feature/function	Characteristic
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 system setup and (remote) system monitoring • Configurable output of reading diagnostic data in two reading results formats • Operating data polling, in case of error, issue of error code if required • Test string function (heartbeat) can be activated to signal that the device is ready for operation • Password-protected configuration mode via SOPAS ET • Future-oriented by firmware update (FLASH PROM) via data interface • Future-oriented SOPAS ET configuration software • Low power consumption • Additional supply voltage range • Optional parameter cloning with external CMC600 parameter memory module in the CDB/CDM connection module

Product feature/function	Characteristic
Convenient operation/ configuration	• Configuration via configuration software SOPAS ET (online/ offline) or commands • Configuration depending on the model via GSD configuration (via CDF600-2xx for CLV61x-Fxxxx) • Status displays via LEDs • Profile programming with bar codes, generated and printed via SOPAS ET • Buzzer, which can be switched off, to confirm the device function
Read operation modes	• Start/stop operation (one bar code bearing object per read pulse)
Read cycle	• Pulse sources for start: switching inputs, data interface (command), auto pulse, free, CAN • Pulse sources for stop: read pulse source, switching inputs, data interface (command), timer, condition
Bar code evaluation	• All current 1D bar code types • Max. number of bar codes: 50 per reading interval • Separation of identical codes of the same code type using the read angle
Data processing	• Influencing the output of the reading data by event-dependent evaluation conditions • Influencing the output string by filtering and output sorting
Data communication	• Host interface: two data output formats can be configured, can be switched to various physical interfaces, parallel operation possible • Aux interface: fixed data output format, can be switched to various physical interfaces

3.2.3 Operating principle

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

In principle, the codes can be recorded on any side on still or moving objects in a conveyor system (single-side reading).

By combining several devices via CAN, it is possible to record several sides in one passage (multi-side reading).

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

When designed as a raster scanner, the device generates eight scan lines which are offset parallel to each other.

Block diagrams

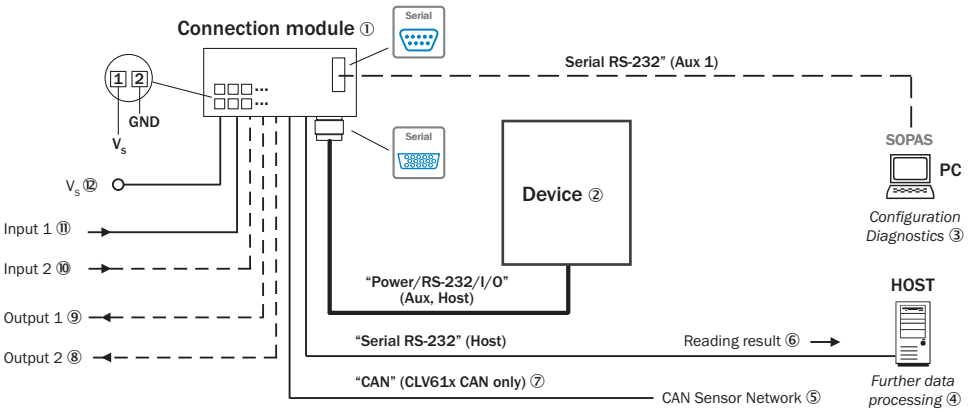


Figure 5: Facilities for connecting for CLV61x (CAN)

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

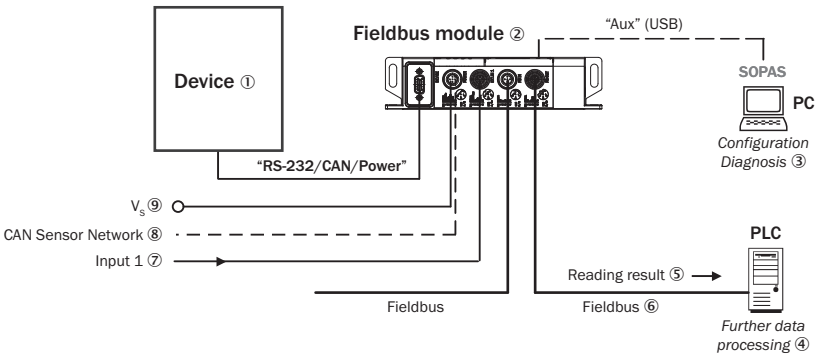


Figure 6: Facilities for connecting for CLV61x, FIELDBUS variants

① Device (CLV61x FIELDBUS)
② Fieldbus module (CDF600-22xx PROFINET or CDF600-21xx PROFIBUS)
③ Configuration or diagnostics
④ Further data processing
⑤ Read result
⑥ Fieldbus
⑦ Digital switching input 1, e.g., for connecting a read cycle sensor
⑧ CAN sensor network
⑨ Supply voltage V_S

3.2.3.1 Object trigger control

The device needs a suitable external signal (trigger source) as notification of an object being in the reading field to start an object-related read process. As standard, the start signal is issued via an external read cycle sensor (e.g. photoelectric sensor). As soon as an object has passed the reading cycle sensor, a time window (“reading interval”) is opened in the device for the reading process.

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

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

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

3.2.3.2 Reading operation mode

In “start/stop” operation, there is only ever one object in the reading field during the reading process, i.e., all read codes can be clearly assigned to the object. As standard, starting and stopping of the reading process are controlled by one or two read cycle sensor(s) at the start and end of the reading field.

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

The output of the read results is either carried out at the end of the read cycle (the rear edge of the object has left the end of the reading field) or even during the read cycle if certain configurable conditions are met.

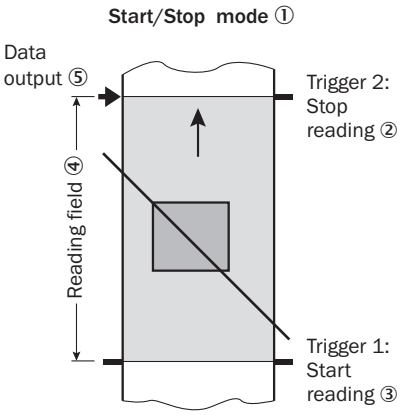


Figure 7: Start/stop operating mode of the device in stand-alone operation

① Start/stop operation
② Trigger 2: Stop reading
③ Trigger 1: Start reading
④ Reading field
⑤ Data output

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

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.
- 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 48.
- Relative humidity: see "Technical data", page 48.
- 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 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 Scope of delivery

The delivery of the device includes the following components:

Table 4: Scope of delivery

Item	Component	Comments
1	Device	Depending on version
1	Printed safety note	–

5.3 Preparation for mounting

5.3.1 Mounting requirements

- Typical space requirement for device, see type-specific dimensional drawing and reading field diagram.
- 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 48.
- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- Protect the device from direct sunlight.
- Device must only be mounted using the pairs of threaded mounting holes provided for this purpose.
- Shock and vibration-free mounting.

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 used for mounting the device on a mounting device supplied by the user. Screw length is dependent on the mounting base (wall thickness of the bracket). When using an optional SICK bracket, the screws for mounting the device are included with delivery.

- Tool and tape measure

5.3.2 Mounting device

The device is mounted using two blind hole threads (M5), that are in pairs on both of the narrow sides of the device, see "Dimensional drawings", page 50.

Optional SICK brackets

The device can be installed using 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**

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

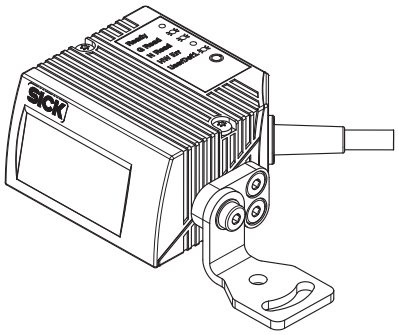


Figure 8: Example: Mounting the device using the bracket with adapter plate

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

5.4 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
▶ Angle alignment of the device
▶ Avoidance of surface reflections
▶ Count direction of the reading angle (position of the bar code along the scan line)

5.4.1 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).

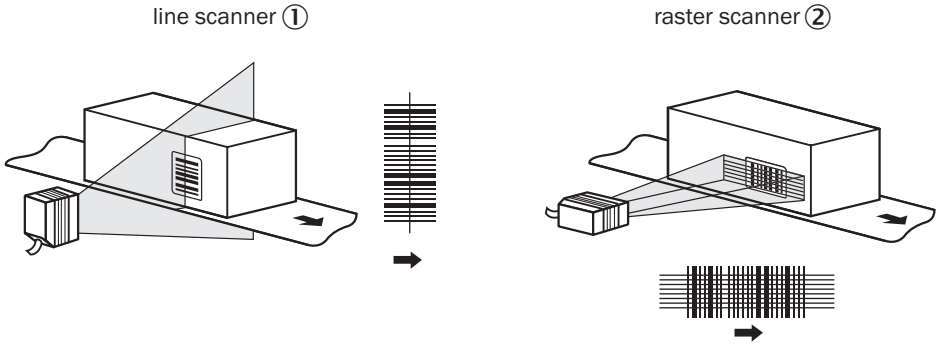


Figure 9: Allocation of scanning line(s) to bar code and conveyor direction

① Line scanner
② Grid scanner

5.4.2 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.

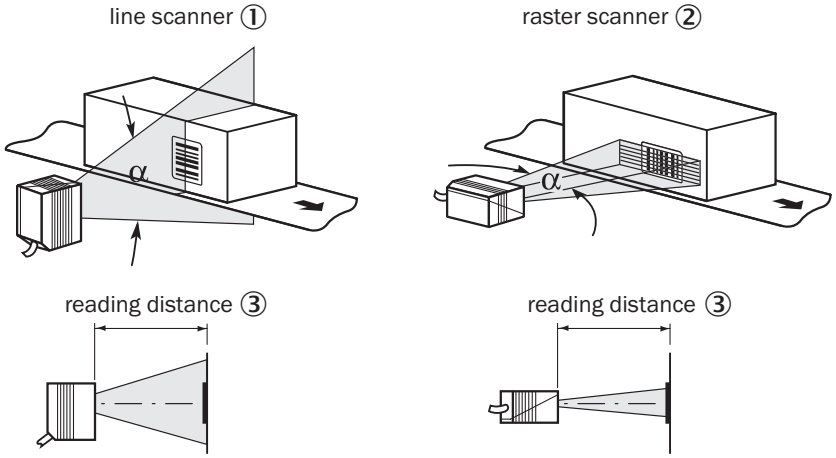


Figure 10: Definition of the reading distance and the aperture angle α

① Line scanner
② Grid scanner
③ Reading distance

In the specification diagrams (see "Reading field diagrams", page 51) the height of the reading field dependent upon the reading distance is shown for differing resolutions (module widths).

5.4.3 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 23.

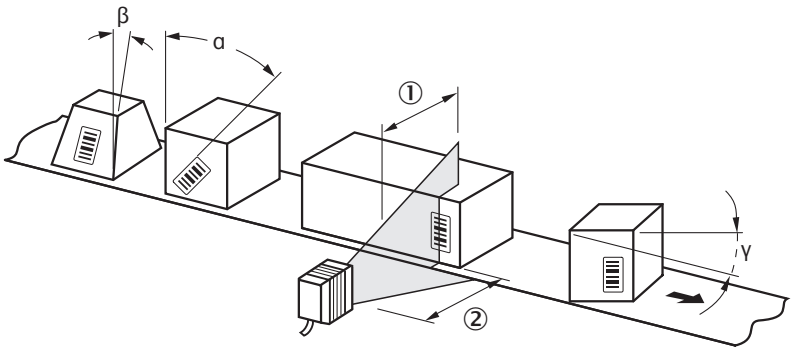


Figure 11: Line scanner: Read angle occurring between scanning line and bar code

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 5: Permitted read angle between scanning line and bar code

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

5.4.4 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.

① Line scanner (reading window on front)

② Line scanner (reading window on side)

Figure 12: 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

5.4.5 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 output as an RA (reading angle) value.

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

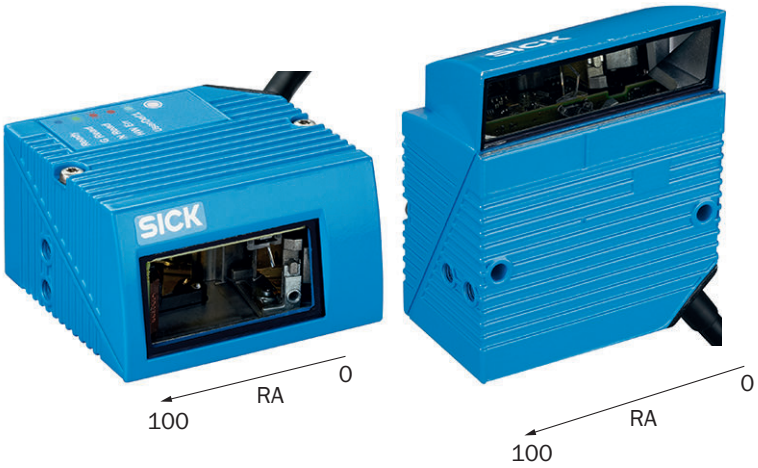


Figure 13: Example for the counting direction and RA value determination

5.5 Mounting the device

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 20.
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 22.
   - 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 23.
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 37.

5.6 Mounting of external components

5.6.1 Mounting the connection module

If the device activation is carried out via a connection module, then this must be mounted near to the device.

NOTE
If the PC with the SOPAS ET configuration software accesses the Aux interface (RS-232; 57.6 kBd) of the device via the connection module, the connection module should not be mounted more than 3 m of cable length away from the device.

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

NOTE
Detailed information on mounting and electrical installation can be found in the relevant operating instructions for the connection module.

5.6.2 Mount external read cycle sensor

If the device is triggered via an external read cycle sensor (photoelectric retro-reflective sensor), then the sensor must be mounted in the vicinity of the device.

NOTE
A wide range of photoelectric sensors as well as accessories (brackets, connecting cables) can be found at www.sick.com.

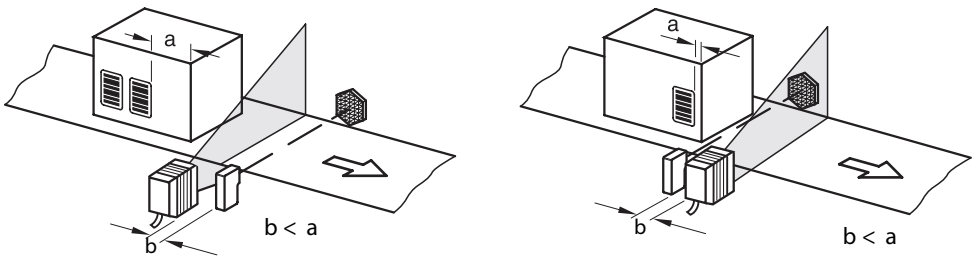


Figure 14: Bar code at the end or start of the piece goods

The mounting location of the device is dependent on the distance a from the bar code to the front object edge. Depending on the application, the device must be mounted so that bar codes on objects of different sizes can be read in full during the time window for evaluation (reading interval).

5.6.3 Mounting incremental encoder

An incremental encoder is needed during the separation of bar codes of the same code type and with identical contents.

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

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

6 Electrical installation

6.1 Safety

6.1.1 Notes on the electrical installation

- **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 of max. 2 A at the start of the supply circuit.

NOTE
Layout of data cables

- Use screened data cables with twisted-pair wires.
- Implement the screening design correctly and completely.
- To avoid interference, 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 male connector of the connecting cable is firmly screwed to the contacted connection socket.
- When using an extension cable, a suitable rubber seal (SICK accessories) is to be placed between both plug connectors.

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

6.2 Prerequisites for the safe operation of the device in a system

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.
- ▶ Ensure that the ground potential is the same at all grounding points.
- ▶ If the cable insulation is damaged, disconnect the voltage supply immediately and have the damage repaired.
- ▶ Where local conditions are unfavorable and therefore do not meet conditions for a safe grounding method (same ground potential at all grounding points), take measures in accordance with the following formats.

The device is designed and tested for electrical safety in accordance with EN 60950-1. It is connected to the peripheral devices (voltage supply, any local clock reading pulse sensor(s), PLC) via shielded cables. The cable shield – for the data cable, for example – rests against the metal housing of the device. The device can either be grounded through the cable shield or through one of the threaded mounting holes.

If the peripheral devices have metal housings and if the cable shields also lie on 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

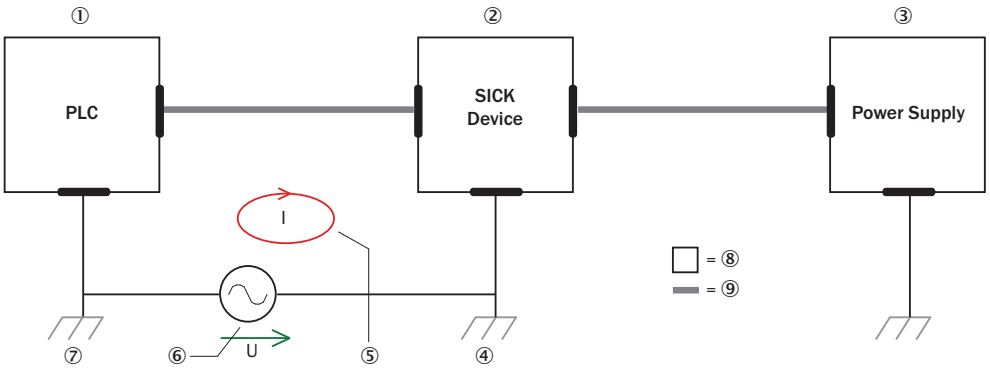


Figure 15: Example: Occurrence of equipotential bonding currents in the system configuration

① PLC (programmable logic controller)
② Device
③ Voltage supply
④ Grounding point 2
⑤ Closed current loop with equalizing currents via cable shield

⑥ Ground potential difference
⑦ Grounding point 1
⑧ Metal housing
⑨ Shielded electrical cable

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

Remedial measures

The most common solution to prevent equipotential bonding currents on cable shields is to ensure low-impedance and current-carrying equipotential bonding. If this 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 while at the same time complying with all the requirements of EN 60950-1.

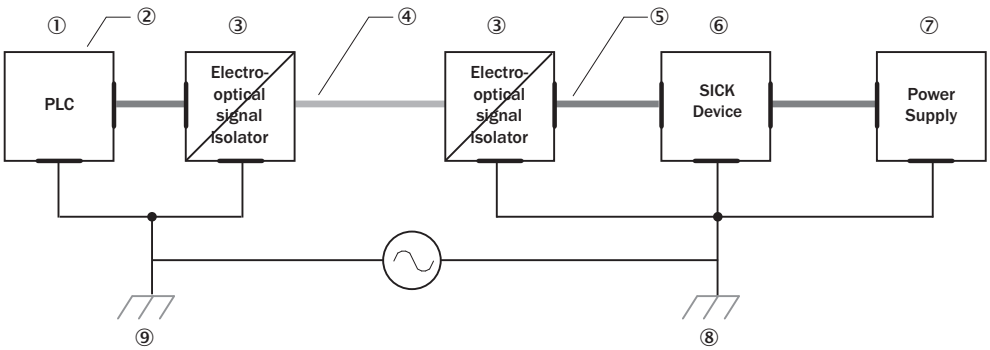


Figure 16: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

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

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 of peripheral devices may be a sufficient solution.

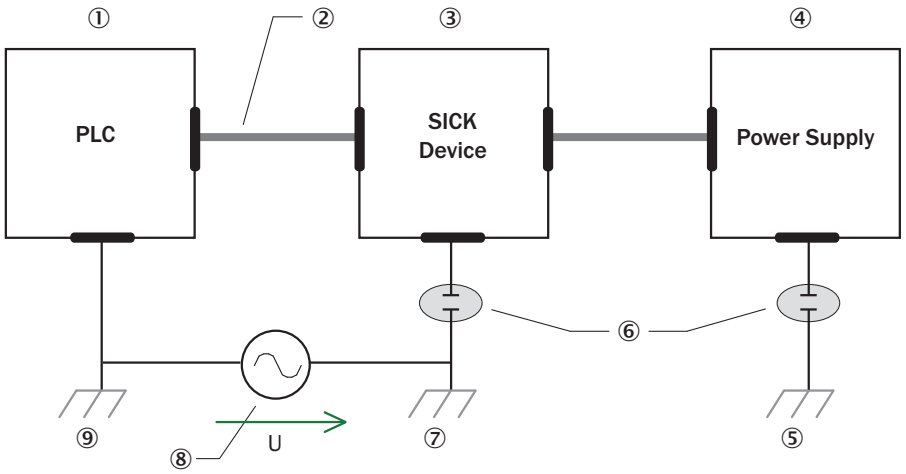


Figure 17: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

① PLC (programmable logic controller)
② Shielded electrical cable
③ Device
④ Voltage supply
⑤ Grounding point 3
⑥ Insulated mounting
⑦ Grounding point 2
⑧ Grounding potential difference
⑨ Grounding point 1

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 notes

NOTICE
Faults due to incorrect wiring.

Incorrect wiring may result in operational faults.

- For data transmission, use only screened cables with twisted-pair wires.
- Follow the wiring notes precisely.

NOTE
Preassembled cables can be found online at:

- www.sick.com/CLV61x

The electrical connection of the device is configured as a cable with D-Sub-HD male connector. The IP 65 enclosure rating is only achieved with screwed plug connector.

6.4 Pin allocation of the connections

CLV61x CAN / FIELDBUS

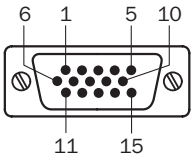
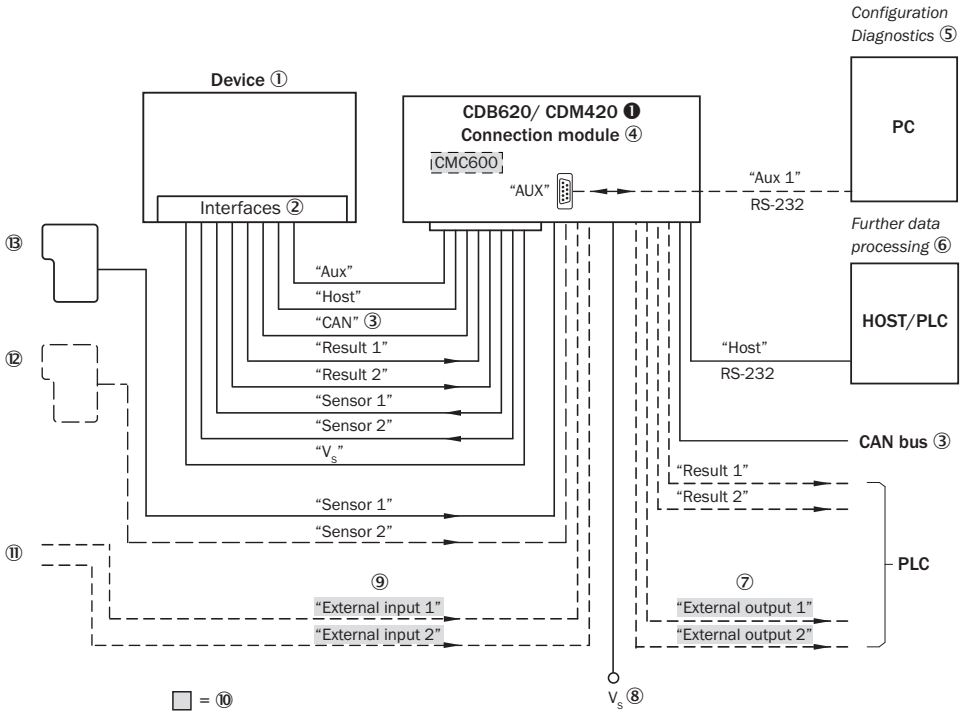


Figure 18: 15-pin D-Sub-HD male connector

Table 6: Pin assignment for 15-pin D-Sub-HD male connector

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

6.5 Connection diagrams



❶ CDB620-001 or CDM420
① Device
② Interfaces
③ CAN
④ Connection module
⑤ Configuration or diagnostics
⑥ Further data processing
⑦ External switching outputs
⑧ Supply voltage V_S
⑨ External switching inputs
⑩ CMC600 parameter memory module is required to be able to use the additional external switching inputs and outputs of the device (highlighted in gray)
⑪ Other functions
⑫ Application-dependent alternative stop reading cycle (e.g., photoelectric sensor) or travel increment (incremental encoder)
⑬ Start/Stop reading sensor (e.g., photoelectric sensor)

6.6 Wiring interfaces

6.6.1 Connecting the supply voltage

The device must be connected to a power supply unit with the following properties:

- Supply voltage DC 10 V ... 30 V (stabilized safety extra low voltage SELV as per currently valid standards)
- Electricity source with at least 3.5 W power.
- Additional 0.5 W output power when using the optional CMC600 parameter memory module in the corresponding connection modules

Protecting the supply cables

To ensure protection against short-circuits and overload in the customer's supply cables, the conductor cross sections used must be appropriately selected and protected.

The following standards must be observed in Germany:

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

The infeed of the supply voltage is carried out using a SICK connection module or the customer's voltage supply.

6.6.2 Wiring the

Wiring the

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

Table 7: Data transmission rates

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

NOTICE

Risk of damage to the internal interface modules!

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

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

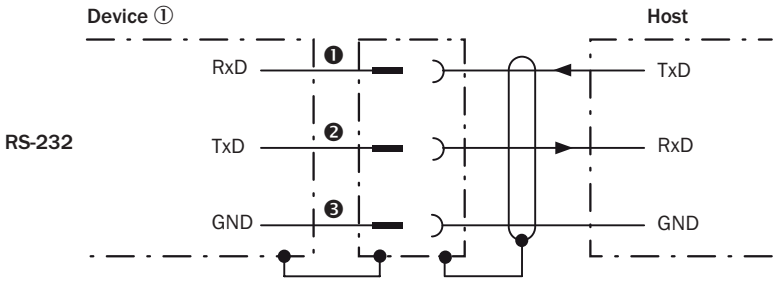


Figure 19: Internal circuitry for RS-232 data interface

① Device

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

6.6.3 Wiring the CAN interface

If the wiring of the CAN interface is carried out via a connection module, then the relevant operating instructions of the module used must be followed.

6.6.4 Wiring digital switching inputs

Physical switching inputs on the device

The physical switching inputs can be used for starting and/or ending the reading pulse or for feeding an incremental signal.

Table 8: Characteristic data for the switching inputs

Switching behavior	Power at the input starts the internal reading interval of the device [default: active high, debounce: max. 30 ms (standard)]
Properties	Opto-decoupled Reverse polarity protected
Electrical values	The electrical values are identical for all switching inputs. Low: $\|V_{in}\| \leq 2$ V; $\|I_{in}\| \leq 0.3$ mA High: 6 V ≤ $\|V_{in}\| \leq 32$ V; 0.7 mA ≤ $\|I_{in}\| \leq 5$ mA

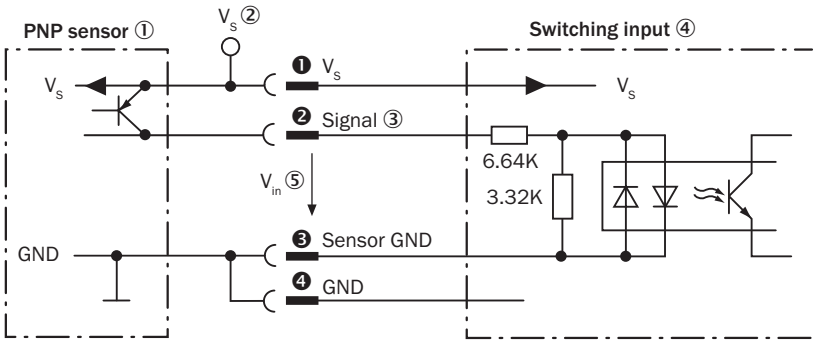


Figure 20: Wiring of a switching input with external PNP sensor

① PNP sensor
② Supply voltage V_S
③ Input signal
④ Switching input (“Sensor 1” or “Sensor 2”)
⑤ Input voltage V_{in}
❶...❹ For pin assignment, see respective device

Extension: additional logical switching inputs in the device in the case of physical “external” switching inputs on the optional connection module

Thanks to the optional CMC600 parameter memory module, the two external switching inputs “External input 1” and “External input 2” on the relevant terminals in the connection module are additionally available.

NOTE
These two external switching inputs are not suitable for time-critical applications.

If the wiring of the inputs is carried out via a connection module, the respective operating instructions for the module are to be observed.

6.6.5 Wiring digital switching outputs

Physical switching outputs on the device

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

Table 9: Characteristic data for the switching outputs

Switching behavior	PNP switching to supply voltage V_S
Properties	Short-circuit protected Temperature protected Not electrically isolated from V_S

Electrical values	The electrical values are identical for all switching outputs. $0\ V \leq V_{out} \leq V_S$ $(V_S - 1.5\ V) \leq V_{out} \leq V_S$ at $I_{out} \leq 100\ mA$

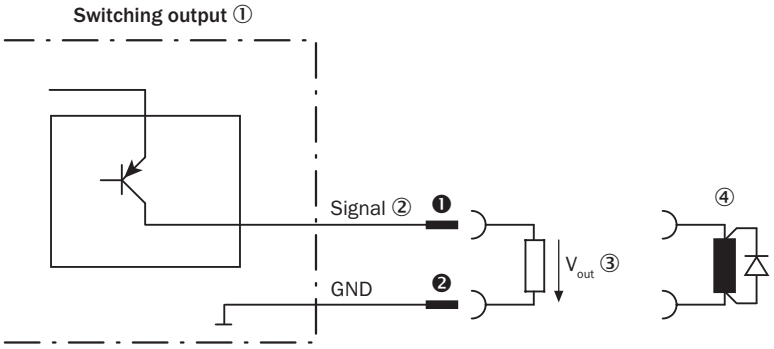


Figure 21: Wiring of a switching output

① Switching output (“Result 1” or “Result 2”)

② Output signal

③ Output voltage V_{out}

④ With an inductive load: Sweep-out circuit – attach a freewheeling diode directly to the load.

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

Extension: additional logical switching outputs in the device in the case of physical “external” switching outputs on the optional connection module

Thanks to the optional CMC600 parameter memory module, the two additional switching outputs “External output 1” and “External output 2” on the terminals in the connection module are additionally available.

NOTE
These two external switching outputs are not suitable for time-critical applications.

If the wiring of the outputs is carried out via a connection module, the respective operating instructions for the module are to be observed.

NOTE
Capacitive loads on the switching outputs have an effect on the switch-on and switch-off behavior. The maximum capacity of 100 nF is a limit value.

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

7 Commissioning

7.1 Overview of the commissioning steps

- Commissioning of the device with factory default
- Installing the SOPAS ET configuration software
- Connection of the device to PC/notebook with the SOPAS ET configuration software
- Adjustment and configuration of the device to optimize functionality
- Test of the device for correct functionality in read operation

7.2 SOPAS ET configuration software

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

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

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

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

7.2.2 Installing SOPAS ET

NOTE
The 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. Start the PC and download the current version from www.sick.com/SOPAS_ET.
2. If installation does not start automatically, launch setup.exe from the download directory.
3. Follow the operating instructions to complete the installation.

7.2.3 Start the SOPAS ET configuration software and connect to the device

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 SOPAS ET configuration software, as well as the current device description file (*.sdd) for the device.
   In this case, select the “Complete” option as proposed 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 device (RS-232) with the automatically launching wizard.
   To do so, select the CLV61x from the available devices (default data transmission rate: 57.6 kBd with serial connection).

✓ SOPAS ET establishes communication with the device and loads the associated

device description file. The device project tree opens.

7.3 Initial commissioning

The device is adjusted to the reading situation on site using the SOPAS ET configuration software. The starting point for this is the default factory settings, which can be adjusted to optimize the device. In order to do this, the SOPAS ET configuration software is used to create an application-specific parameter set, which can be loaded permanently into the device and saved and archived as a project file (Sopas file with configuration data) on the PC.

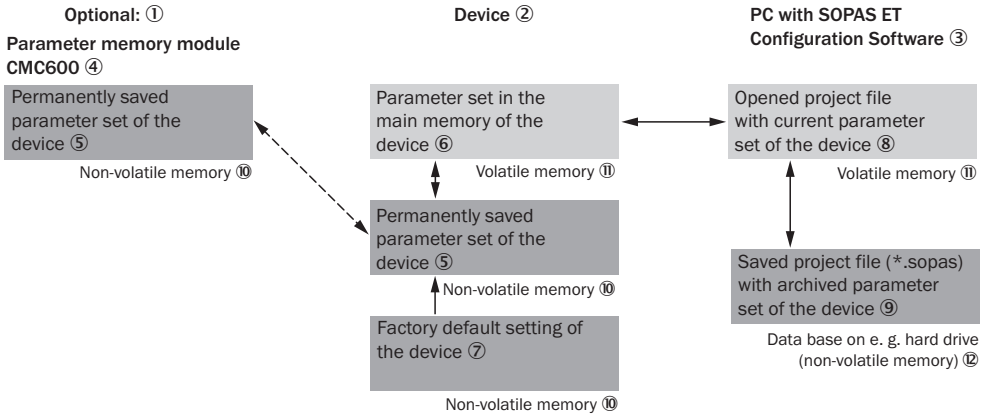


Figure 22: Saving the parameter set and configuration with SOPAS ET

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

If the device is connected to a CDB/CDM connection module with the CMC600 parameter memory module, the parameter set is also stored on the card or permanently in the module with every save.

Whenever the device is restarted, it loads the parameter set automatically from the CMC600 into its permanent memory. This means, for example, that a device can be replaced without losing configuration data.

7.4 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 48.
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 22.
7. Align the device so that the good read rate is between 70% and 100%.
8. Tighten the screws on the device.

7.5 Fine adjustment and further configuration

NOTE
The other settings and the fine adjustment depend on the relevant application situation.

User level, parameter download to the device

The user is automatically logged into the device in the “Authorized customer” level and can change parameters which are immediately transmitted to the device (default setting).

Configuration via “Quickstart”

The “Quickstart” tab offers an overview of the most important parameters and enables quick evaluation of code content. Functions such as evaluation window, percentage evaluation, code configuration, and adjusting tool are available via the Quickstart.

Application wizard

The application wizard (“Wand” icon) supports device configuration both as a stand-alone device and as a master or as a slave for a master/slave combination based on the CAN bus.

Evaluation window

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

Percentage evaluation

The percentage evaluation permanently assesses the quality of the reading. Bar codes are not assessed. Here, the bar codes must not be subjected to any conveying movement. The device performs 100 scans in each case and evaluates the reading quality. The device continuously emits read results every 2 s via the Aux interface, together with the read diagnostic data. A timer starts when percentage evaluation is called. If a manual abort is not carried out, the device automatically returns to read mode after 5 min.

Code configuration

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

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

You can activate further code types and set other decoder properties (Device Tree > Parameters > Code Configuration).

Scanning frequency

You can set the scanning frequency in the range from 400 Hz to 1000 Hz (Device Tree > Parameters > Reading Configuration).

Object trigger control

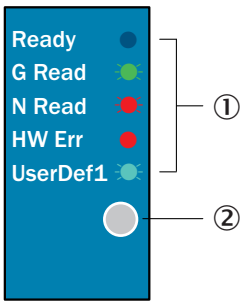
If the device is to be operated with an additional read pulse sensor, for example, a photoelectric sensor on the “Sensor 1” switching input, select the setting “Sensor 1” (Device tree > Parameters > Object trigger control).

Test and, if necessary, modify the specified settings when operating the system under real conditions.

8 Operation

8.1 Operating and status indicators

8.1.1 Optical indicators



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

② Sensor LED (RGB), 1 x

Sensor LED

Table 10: Display behavior of the sensor LED

Display	Color	LED	Status
Ready	–	○	Device without supply voltage
			After switching on: LED goes out Download parameters to or upload from device
	Blue	●	After switching on or after firmware download: Self-test successful, device ready for use
G Read	Green	●	Lights briefly. Reading successful (Good Read)
N Read	Red	●	Lights briefly. Reading unsuccessful (No Read)
HW Err	Red	●	Hardware error
Further indicators	Light blue	–	UserDef1 (reserved)
	Red Blue	●●	Firmware download
	Red	●	Firmware download: Error: Completion not successful

○ = LED off, ● = LED lights up, ● = LED flashes, ●● = LEDs flash alternately

8.1.2 Audible status indicator (beeper)

Depending on the operating mode of the CLV61x, the beeper uses different melodies or individual sounds to indicate the following results:

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

Table 11: Beeper behavior

Operating mode	Function/Sound
Switching on	Successful self-test and acceptance of read operation: melody

Operating mode	Function/Sound
Read operation	Confirmation of Good Read in default setting: sound. Adjustable event condition[1]
Percentage Evaluation	Start: melody 100 scans per read: sound End: melody
Configuration	Parameters download to CLV61x: Start: melody, successful completion: melody Parameters upload from CLV61x: no sound
Firmware download	**Firmware**: Start: sound, successful completion: tone **CLV61x reboot**: Successful completion: melody **Loading the sdd file to the CLV61x**: Successful completion: melody

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

Beeper default settings:

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

8.2 Operating options

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

- Locally at the device with the SOPAS ET configuration software: Protection of the parameter set as a configuration file on the PC in SOPAS ET. Access to the device via Aux interface (RS-232).
- As an alternative to the SOPAS ET configuration software, command strings are available, upon which the operator interface of the configuration software is also based. These are also for the triggering of device functions (e.g. reading). Documents on the commando strings can be obtained from SICK on request.
- Profile programming by reading a set of printed configuration bar codes. Can be created with SOPAS ET.

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

In normal operation, the device operates fully automatically.

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 12: 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 the screw connections and plug connections	Interval depends on the place of use, ambient conditions, or operational regulations. Recommended: At least every 6 months.	Specialist

9.2 Cleaning

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

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

Cleaning the reading window

At regular intervals, 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 during operation.

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

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

The type of screen material used in the reading window can be found on the type label (see "Type code", page 12).

NOTE
Static charge causes dust particles to adhere to the reading window. This effect can be avoided by using an anti-static cleaning agent in combination with the SICK lens cloth (can be obtained from www.sick.com).

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 will not switch off the laser. 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 absorb radiation of the device's wavelength effectively.
- ▶ Glass lens: Remove dust from the inspection window using a soft, clean brush. If necessary, also clean the inspection window with a clean, damp, lint-free cloth, and a mild anti-static lens cleaning fluid.
- ▶ Plastic lens: Clean the inspection window only with a clean, damp, lint-free cloth, and a mild anti-static lens cleaning fluid.

NOTICE

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

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

Cleaning the housing

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

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

Cleaning other optical surfaces

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

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

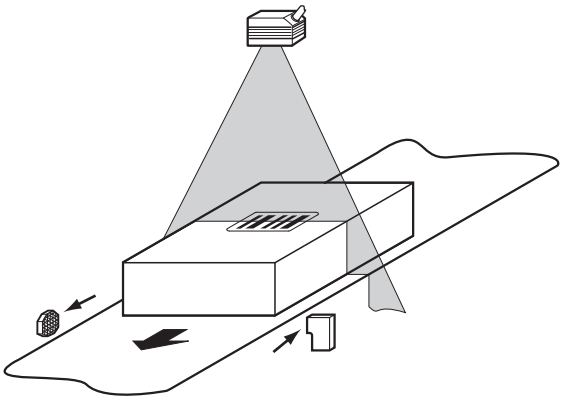


Figure 23: Cleaning the external optical sensors (read pulse encoder)

10 Troubleshooting

10.1 Overview of possible errors and faults

Table 13: Errors and faults

Situation	Error/fault
Mounting	■ Device poorly aligned to the object with the bar code (e.g. dazzle). ■ Read-cycle sensor incorrectly positioned (e.g., internal reading gate is opened too early or closed too late). ■ Incremental encoder incorrectly positioned.
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. ■ Read cycle trigger source not selected correctly.
Operation	■ Read cycle control incorrect and/or not suitable for the object. ■ Device faults (hardware/software).

10.2 Detailed fault analysis

10.2.1 LEDs on the device

The LED display can indicate possible errors or faults, see "Optical indicators", page 40. Further information on this can be found in the “System Information” section.

10.2.2 System information

The device outputs faults in different ways. Fault output is staggered and thus allows for an increasingly detailed level of analysis.

- Communication errors can occur when transmitting data 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 45).see "Status log", page 45.

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
- Error
- 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 CLV6xx in the project tree: Service > System Status > System Information tab.

10.4 SICK Support

If a fault cannot be rectified, the device may be defective.

The device must not be repaired by the user. Interrupting or modifying the device will invalidate any warranty claims against SICK AG.

Rapid replacement of a device by the user is however possible, see "Disassembly and disposal", page 47.

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

NOTE

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

11 Decommissioning

11.1 Disassembly and disposal

Dismantling the device

1. Switch off the supply voltage to the device.
2. Detach all connecting cables from the device.
3. If the device is being replaced, mark its position and alignment on the bracket or surroundings.
4. Remove the device from the bracket.

Putting the replacement device into operation

1. Mount and align the replacement device of the same type (see "Mounting", page 20). When doing so, note the previously applied markings on the bracket or surroundings.
2. Reinstall the connecting cables to the device (see "Electrical installation", page 27).
3. Switch on the supply voltage for the device.
   The device starts with the default setting.
4. If an optional CMC600 parameter memory module is inserted into the CDB620/CDM420 connection module, the exchanged device automatically adopts the saved parameter set from the CMC600 into its permanent memory.
   OR
   Without CMC600 parameter memory module: Establish a connection to the device via the SOPAS ET configuration software. Download the configuration previously stored on the PC to the device and permanently store it in the device.

Disposing of the device

Any device which can no longer be used must be disposed of in an environmentally friendly manner in accordance with the applicable country-specific waste disposal regulations. As they are categorized as electronic waste, the device must never be disposed of with household waste.

11.2 Returns

▶ Do not dispatch devices to the SICK Service department without consultation.

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

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 at:

▶ www.sick.com/CLV61x

12.1 Optical lens system

Table 14: Technical data for optics

	CLV610	CLV612	CLV615
Working range	Mid range	Short range	Long range
Scanning method	Line or grid scanner [1], identifier see "Type code", page 12		
Reading window orientation	On the front or to the side (light emission at 105° relative to the longitudinal axis of the device), identifier see "Type code", page 12		
Aperture angle	≤ 50°		
Focus	Fixed focus		
Scanning frequency	400 Hz ... 1,000 Hz		
Light source	Laser diode, visible red light (λ = 655 nm)		
Resolution	0.2 mm ... 1.0 mm	0.1 mm ... 0.2 mm	0.35 mm ... 0.5 mm
Reading areas	see "Reading field diagrams", page 51		
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		
Laser pulse duration	< 300 µs		

1) Grid height approx. 15 mm at a reading distance of 200 mm

12.2 Performance

Table 15: 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 ... 50 (auto-discriminating)
No. of characters per code/reading interval [1]	Max. 50 characters (max. 1,500 characters across all bar codes per reading interval, 500 characters for multiplexer function (CAN))
Number of multiple readings	1 ... 99

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

12.3 Interfaces

Table 16: Technical data for interfaces

	CLV610	CLV612	CLV615
Serial (RS-232)	Function: Host, Aux (RS-232 only) Data transmission rate for Host: 2.4 kBd ... 115.2 kBd, Aux: 57.6 kBd (RS-232)		
CAN	CLV61x CAN (CLV61x-Cxxxx) or FIELDBUS (CLV61x-Fxxxx) only Function: SICK CAN sensor network (master/slave, multiplexer/ server) Data transmission rate: 20 kbit/s ... 1 Mbit/s		
PROFINET			CLV615 FIELDBUS (CLV615-Fxxxx) only. PROFINET Dual Port optional over external fieldbus module CDF600-2
PROFIBUS DP			CLV615 FIELDBUS (CLV615-Fxxxx) only. PROFIBUS DP optional over external fieldbus module CDF600-2
Digital switching inputs	2 (“Sensor 1”, “Sensor 2”), 2 additional inputs via CMC600 in the CDB620 or CDM420 connection module Opto-decoupled, V_{in} = max. 30 V, I_{in} = max. 5 mA, reverse polarity protected, can be wired via PNP output, adjustable debouncing 0 ... 10,000 ms		
Digital switching outputs	2 (“Result 1”, “Result 2”), 2 additional outputs via CMC600 in the CDB620 or CDM420 connection module PNP, I_{out} = max. 100 mA, short-circuit protected, pulse duration adjustable (static, 10 ... 10,000 ms)		
Reading pulse	Pulse source for start: “Sensor 1” and/or “Sensor 2” switching inputs; command (data interface), auto pulse, CAN Pulse sources for stop: “Sensor 1”, “Sensor 2” reading cycle source, command, timer, condition (e.g., Good Read)		
Optical indicators	1 x RGB-LED multi-color, with signal color allocation for events		
Acoustic indicator	1 x beeper, can be switched off, can be allocated function for event status indication		
Configuration	SOPAS ET configuration software, commands, profile programming with bar codes		

12.4 Mechanics/electronics

Table 17: Technical data for mechanics and electronics

Electrical connection	Standard cable (0.9 m + 10%) with male connector, D-Sub-HD, 15-pin
Supply voltage U_V	10 V DC ... 30 V DC, LPS or NEC Class 2, reverse polarity protected
Power consumption	Typically 2.8 W with switching outputs without load
Housing	Aluminum die cast
Housing color	Light blue (RAL 5012)
Front screen	Glass (optionally plastic), identifier see "Type code", page 12
Safety	EN 60950-1

Enclosure rating	IP 65, according to EN 60529 (1991-10); A1 (2002-02)
Electrical protection class	III (EN 60950-1: 2011-01) Intended for operation in SELV systems (Safety Extra Low Voltage).
Weight [1]	Device with front reading window: 181 g Device with side reading window: 206 g
Dimensions	Device with front reading window: 61 mm x 66 mm x 38 mm Device with side reading window: 80 mm x 66 mm x 38 mm

1) Without connecting cable and male connector. Glass reading window.

12.5 Ambient data

Table 18: Technical data for ambient data

Electromagnetic compatibility (EMC)	Radiated emission: EN 61000-6-4 (2007-01) + A1: 2011-02 Electromagnetic immunity: EN 61000-6-2 (2005-08)
Vibration resistance	EN 60068-2-6: 2008-02
Shock resistance	EN 60068-2-27: 2009-05
Ambient operating temperature	0 °C ... +40 °C
Storage temperature	–20 °C ... +70 °C
Permissible relative humidity	0% ... 90%, non-condensing
Ambient light immunity	2,000 lx, on bar code
Bar code print contrast (PCS)	≥ 60 %

12.6 Dimensional drawings

Dimensional drawings see "Device view", page 14.

12.7 Reading field diagrams

12.7.1 Specification diagram for reading fields

Table 19: 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
Good read rate	> 75 %

12.7.2 Reading field diagrams

CLV610: Mid range

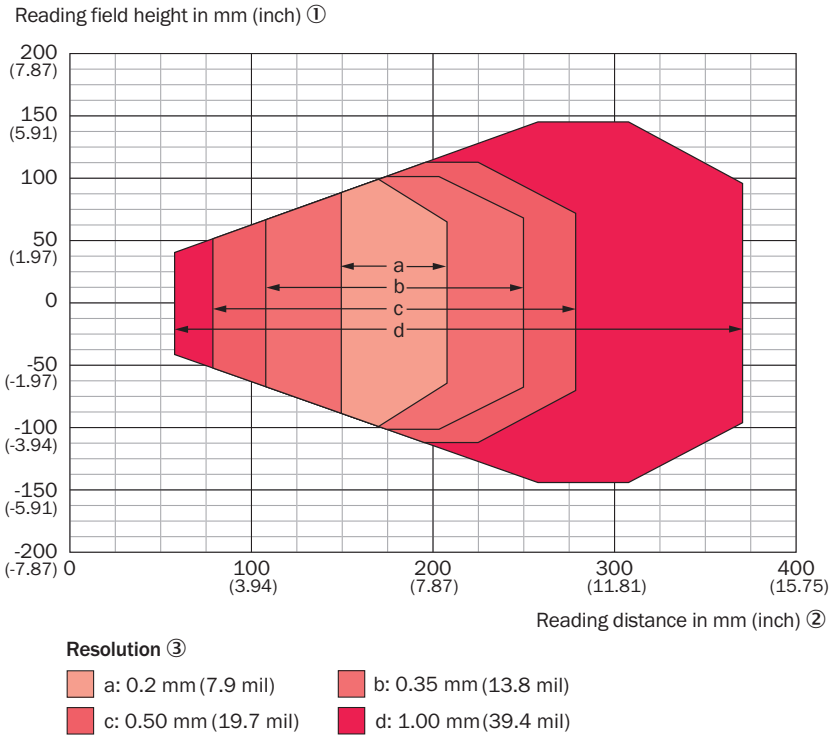


Figure 24: Reading field diagram CLV610, mid range, reading window on front

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

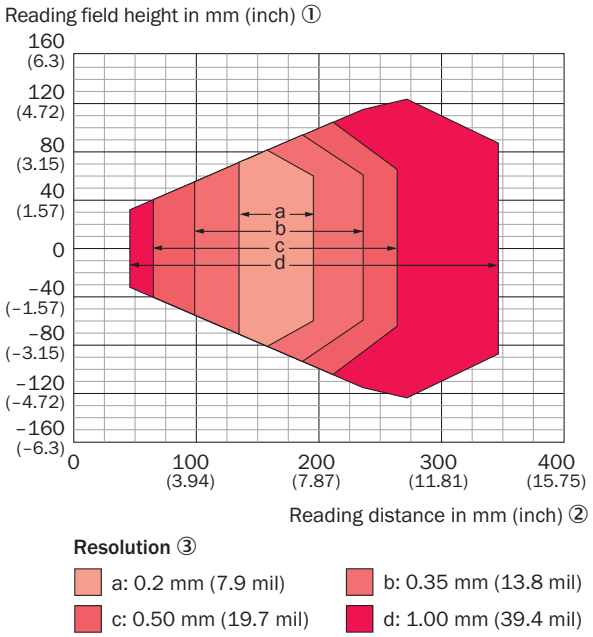


Figure 25: Reading field diagram CLV610, mid range, reading window on side

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

CLV612: Short range

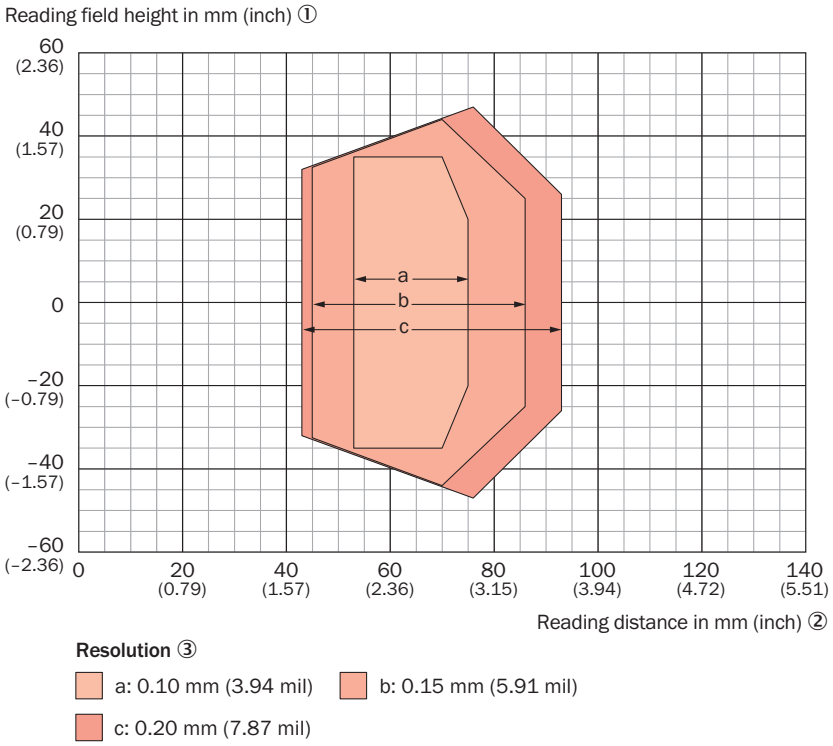


Figure 26: Reading field diagram CLV612, short range, reading window on front

① Reading field height in mm (inch)

② Reading distance in mm (inch)

③ Resolution

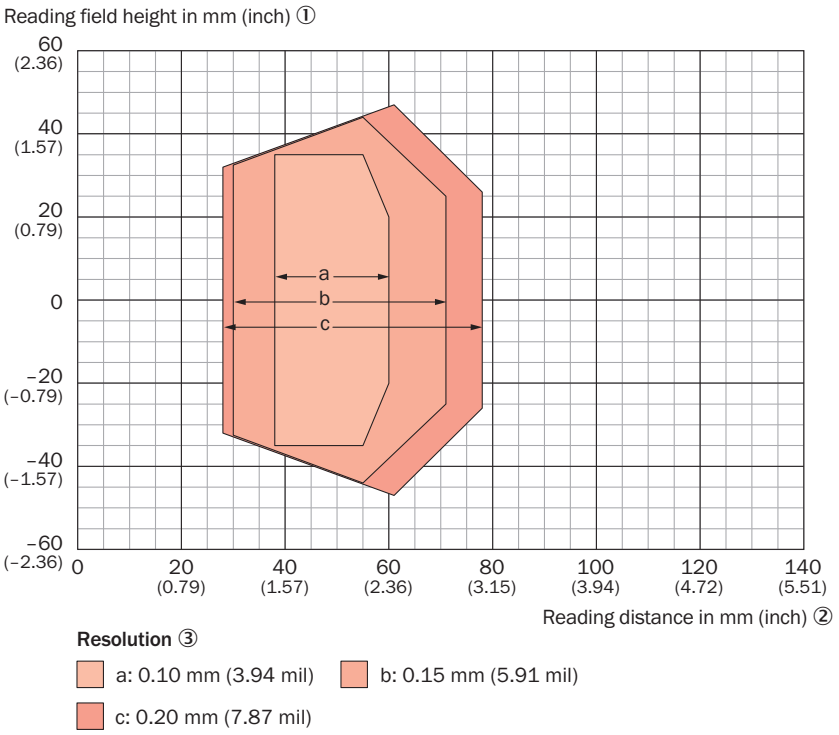


Figure 27: Reading field diagram CLV612, short range, reading window on side

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

CLV615: Long Range

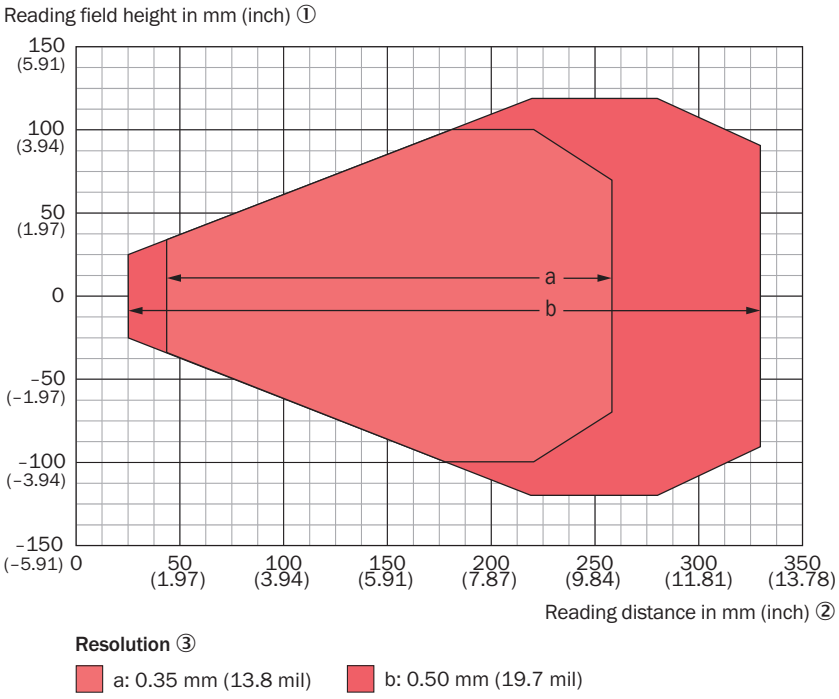


Figure 28: Reading field diagram CLV615, long range, reading window on side

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

13.1 Dimensional drawings of brackets

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

- www.sick.com/CLV61x

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

13.1.1 Quick release in combination with mounting bracket

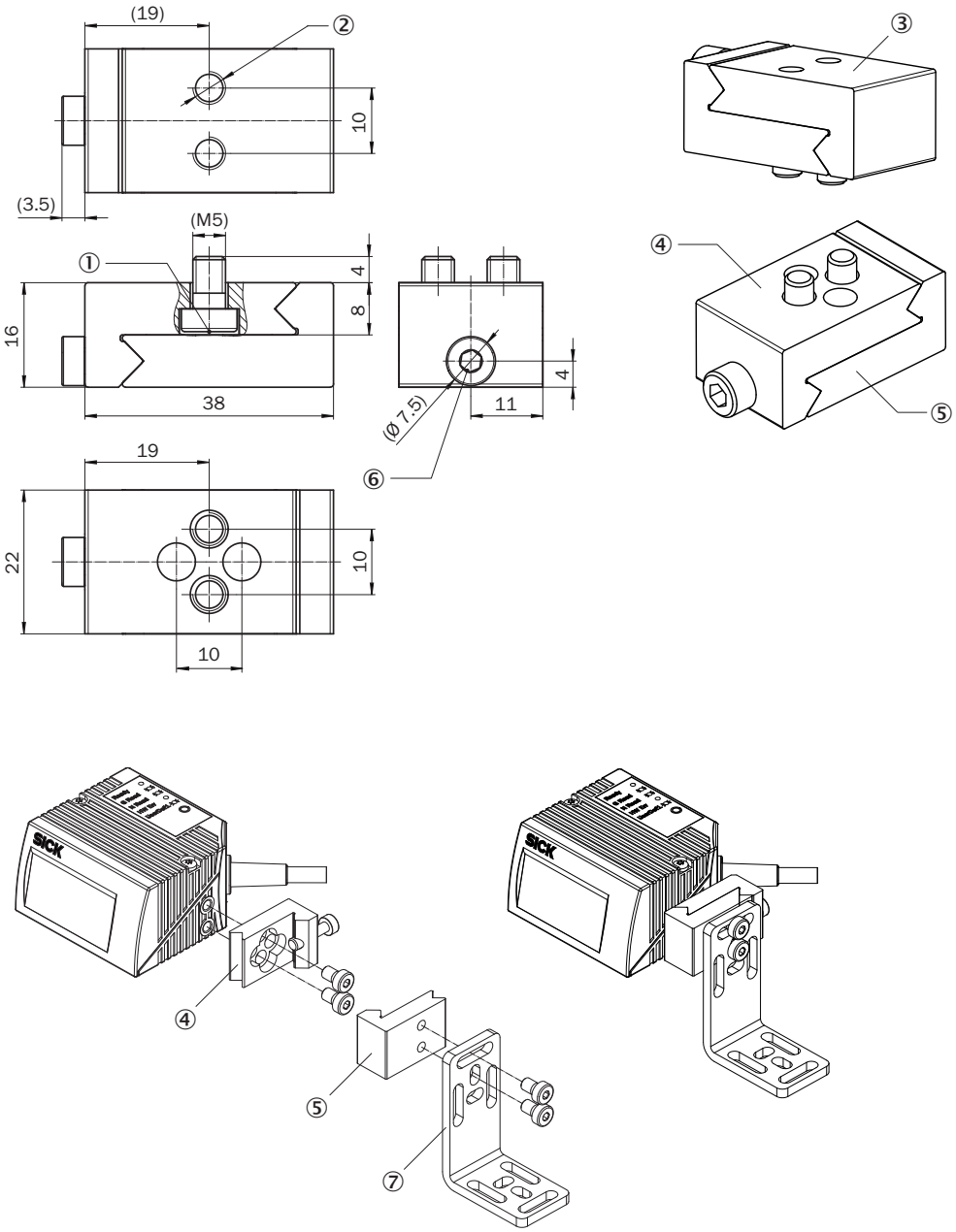


Figure 29: View of the quick release (dimensions in mm) and combination with mounting bracket

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

14.2 Certification in accordance with UL60950

The devices of series CLV61x, CLV62x, CLV63x, CLV64x, CLV65x are certified in accordance with UL60950-1, the UL file has the designation E244281-A6. The devices must be supplied by LSP or Class 2 power supply units in order to ensure proper operation.

The certification is only valid with corresponding device identification on the type label of the respective bar code scanner, see "Product description", page 12.

- Laser power and laser warning notes, see "Laser radiation", page 9.
- Bar code scanner IP 65 enclosure rating not checked by UL.

14.3 Dimensional drawings

Current dimensional drawings for your respective device can be found at:

- www.sick.com/CLV61x

14.4 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 control store
SMART	SICK Modular Advanced Recognition Technology
TCP/IP	Transmission Control Protocol/Internet Protocol

8017840/0000/2017-08-16/en

Australia
Phone +61 3 9457 0600
1800 334 802 – tollfree
E-Mail sales@sick.com.au

Austria
Phone +43 22 36 62 28 8-0
E-Mail office@sick.at

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

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

Canada
Phone +1 905 771 14 44
E-Mail information@sick.com

Czech Republic
Phone +420 2 57 91 18 50
E-Mail sick@sick.cz

Chile
Phone +56 2 2274 7430
E-Mail info@schadler.com

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

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

Finland
Phone +358-9-2515 800
E-Mail sick@sick.fi

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

Germany
Phone +49 211 5301-301
E-Mail info@sick.de

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

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

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

Israel
Phone +972 4 6881000
E-Mail info@sick-sensors.com

Italy
Phone +39 02 274341
E-Mail info@sick.it

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

Malaysia
Phone +6 03 8080 7425
E-Mail enquiry.my@sick.com

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

Netherlands
Phone +31 30 2044 000
E-Mail info@sick.nl

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

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

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

Romania
Phone +40 356 171 120
E-Mail office@sick.ro

Russia
Phone +7 495 775 05 30
E-Mail info@sick.ru

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

Slovakia
Phone +421 482 901201
E-Mail mail@sick-sk.sk

Slovenia
Phone +386 591 788 49
E-Mail office@sick.si

South Africa
Phone +27 11 472 3733
E-Mail info@sickautomation.co.za

South Korea
Phone +82 2 786 6321
E-Mail info@sickkorea.net

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

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

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

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

Thailand
Phone +66 2645 0009
E-Mail Ronnie.Lim@sick.com

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

United Arab Emirates
Phone +971 4 88 65 878
E-Mail info@sick.ae

United Kingdom
Phone +44 1727 831121
E-Mail info@sick.co.uk

USA
Phone +1 800 325 7425
E-Mail info@sick.com

Vietnam
Phone +84 945452999
E-Mail Ngo.Duy.Linh@sick.com

Further locations at **www.sick.com**

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

SICK
Sensor Intelligence.