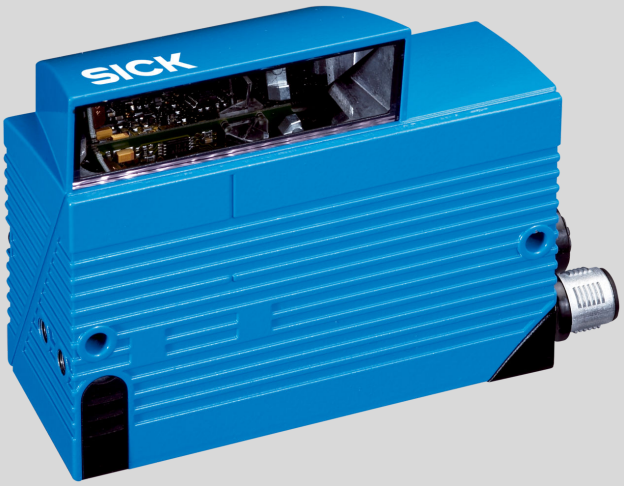
OPERATING INSTRUCTIONS

CLV61x IO-Link

Fixed mount barcode scanner

SICK
Sensor Intelligence.



Described product

CLV615-I2150

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

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

1.2 Scope

The documentation concept for the device includes the following publications:

- Safety Notes
- Operating instructions
- Technical Information IODD CLV61x IO-Link

Functions of publications:

The Safety Notes provide information about:
- Safe handling of the device
- Online access to the operating instructions and other documentation

The Safety Notes are printed and enclosed with the device at the time of delivery.

Operating instructions
- These operating instructions serve to incorporate the device into a customer system.
- The operating instructions provide step-by-step instructions for all necessary activities.

The operating instructions files can be found on the product page.

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

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

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

The operating instructions are valid for the available IO-Link variant of the device. More detailed information on the identification of the present device type, see "Type code", page 15.

Available device variants are listed on the online product page.

Technical Information IODD CLV61x IO-Link

- The Technical Information lists the available parameters and functions of the device in the parameterization and process data. This document assists the user when setting up the device for demonstration of operative use.

You can also download the Technical Information IODD CLV61x IO-Link as a PDF from the product page on the Internet.

Commissioning is based on the basic parameter setting of the device.

1.3 Explanation of symbols

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

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

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

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

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

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

1.4 Further information

More information can be found on the product page.

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

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

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

The following information is available depending on the product:

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

1.5 Complementary software

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.

You can download the following programs here:

- Function blocks for commonly used controllers (PLC)

2 Safety information

2.1 Intended use

The device is an intelligent, opto-electronic ID sensor and is used for automatic, fixed identification and decoding of bar codes on moving or stationary objects.

The device transmits the data content of the decoded barcodes to a higher-level control (PLC) for coordinating further processing via an IO-Link master.

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

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

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

2.1.1 Operating restrictions

NOTE

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 Improper use

Any use that goes beyond the areas specified below is considered improper use. This applies to use outside the technical specifications and the specifications for intended use.

- The device does not constitute a safety component in accordance with the respective applicable safety standards for machines.
- The device must not be used in explosion-hazardous or corrosive areas or under extreme ambient conditions.
- The device must not be operated in the ambient temperature range below 0 °C.
- The use of accessories not approved by SICK AG is at your own risk.

WARNING

Danger due to improper use!

Any improper use can result in dangerous situations.

Therefore, observe the following information:

- Product should be used only in accordance with its intended use.
- All information in these operating instructions must be strictly observed.
- Shut down the product immediately in case of damage.

2.3 Cybersecurity

Overview

To protect against cybersecurity threats, it is necessary to continuously monitor and maintain a comprehensive cybersecurity concept. A suitable concept consists of organizational, technical, procedural, electronic, and physical levels of defense and considers

suitable measures for different types of risks. The measures implemented in this product can only support protection against cybersecurity threats if the product is used as part of such a concept.

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

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

2.4 Limitation of liability

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

- Non-adherence to the product documentation (e.g., operating instructions)
- Incorrect use
- Use of untrained staff
- Unauthorized conversions or repair
- Technical modifications
- Use of unauthorized spare parts, consumables, and accessories

2.5 Modifications and conversions

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

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

2.5.1 Conditions for specified enclosure rating

To ensure compliance with the 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.

- “IO-Link” connection: The head of the connecting cable (M12 female connector) is firmly screwed to the contacted male connector of the device.
- “Sensor 1” connection: The head of the connecting cable (M12 male connector) for an external, local trigger is firmly screwed to the contacted female connector of the device. When the connection is not in use, it is closed with a tightly screwed protective element, e.g. a protective cap (as in the delivery state).
- The black cover, which is fitted over the corner on the side, is closed. The cover is flush against the device.

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

2.6 Requirements for skilled persons and operating personnel

WARNING
Risk of injury due to insufficient training.

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

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

The following qualifications are required for various activities:

Table 1: Activities and technical requirements

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

2.7 Operational safety and specific hazards

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

CAUTION
Optical radiation: Class 2 Laser Product

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

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

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

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

WARNING
Electrical voltage!

Electrical voltage can cause severe injury or death.

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

WARNING
Risk of injury and damage caused by potential equalization currents!

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

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

2.7.1 Laser radiation

Laser class

The device corresponds to laser class 2.

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

Wavelength

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

Laser activity display

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

Laser output aperture

The entire viewing window is a laser output aperture.

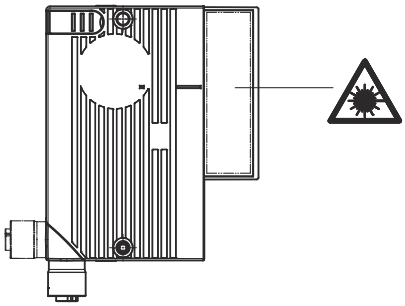


Figure 1: Laser output aperture of the device

Warning symbol on the device

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

Laser output data

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

The laser power data consists of:

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

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

If the device is installed inaccessibly, see "Features", page 45 in the technical data.

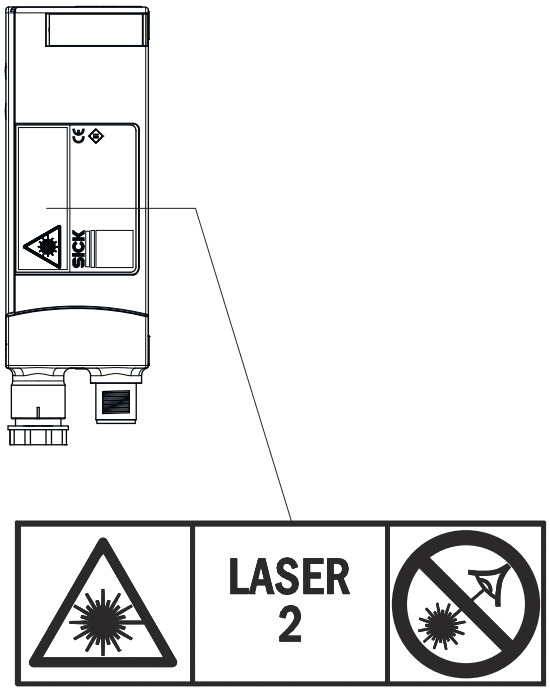


Figure 2: Position and contents of the laser warning label on the device

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

NOTE

Additional laser warning label

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

Controlling the laser diode

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

2.8 Switching off the device

When the device is switched off, a maximum of the following data is lost in the device:

- Last reading result
- State of the daily operating hours counter

2.9 Protection of the environment

During construction of the device, attention was paid to achieving the smallest environmental impact possible. Apart from the housing, the device contains no materials using silicon.

2.10 UL conformity

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

More information can be found on the product page:

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

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

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

3 Product description

3.1 Product ID

3.1.1 Type label

The type label is combined with the laser warning label on the device. The type label contains information for identifying the device as well as conformity marks and test marks. If necessary, information is moved to an additional label for space reasons.

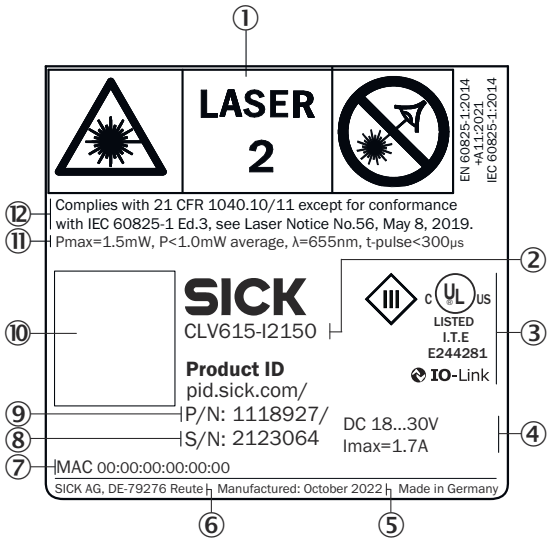


Figure 3: CLV61x-IO-Link: Example of type label of CLV615-I2150, figure can differ.

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

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

Additional label

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

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

3.1.2 Type code

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

CLVxyz-abcdef

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

Table 2: Type code

Position	Description	Characteristic
1	Code reader, V principle	–
2 – 3	Product family	61: CLV61x
4	Working range	0: Mid range 2: Short range 5: Long Range 8: Long range
5	Performance	C: CAN D: Dual Port PROFINET F: Fieldbus (Dual Port) over external fieldbus module CDF600-2 I: IO-Link
6	Reading method, orientation of viewing window [1]	0: Line scanner, viewing window on front side 1: Raster scanner, viewing window on front side 2: Line scanner, viewing window on the side 3: Raster scanner, viewing window on the side
7	Electrical connections (design)	0: Cable 0.9 m with male connector, D-Sub-HD, 15-pin 1 = Swivel connector with 1 male connector, M12, 5-pin, A-coded and 1 female connector, M12, 5-pin, A-coded 4: 1 swivel connector with 2 female connectors, M12, 4-pin, D-coded. 1 cable 0.9 m with male connector, M12, 4-pin, A-coded 5: 1 swivel connector with 2 female connectors, M12, 4-pin, D-coded. 1 cable 0.9 m with male connector, M12, 5-pin, A-coded
8	Interfaces, storage media	0: Host (RS-232), AUX (RS-232), 2 digital inputs, 2 digital outputs 1: Host (Ethernet), AUX (Ethernet, USB [2]) 2: Host (Ethernet), AUX (Ethernet, USB [2]), 1 digital input 3: Host (Ethernet), AUX (Ethernet), 1 external parameter memory (microSD memory card) [3] 4: Host (Ethernet), AUX (Ethernet), 1 external parameter memory (microSD memory card [3]), 1 digital input 5: IO-Link, 1 digital input (hardware)
9	Window material of the viewing window	0: Glass 1: Plastic
10	Ambient operating temperature	Without marking: Standard (0 °C ... +40 °C) F0: Extended (-35 °C ... +40 °C, with integrated heating)
Enclosure rating: IP65		

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

3.2 Product characteristics

3.2.1 Device view

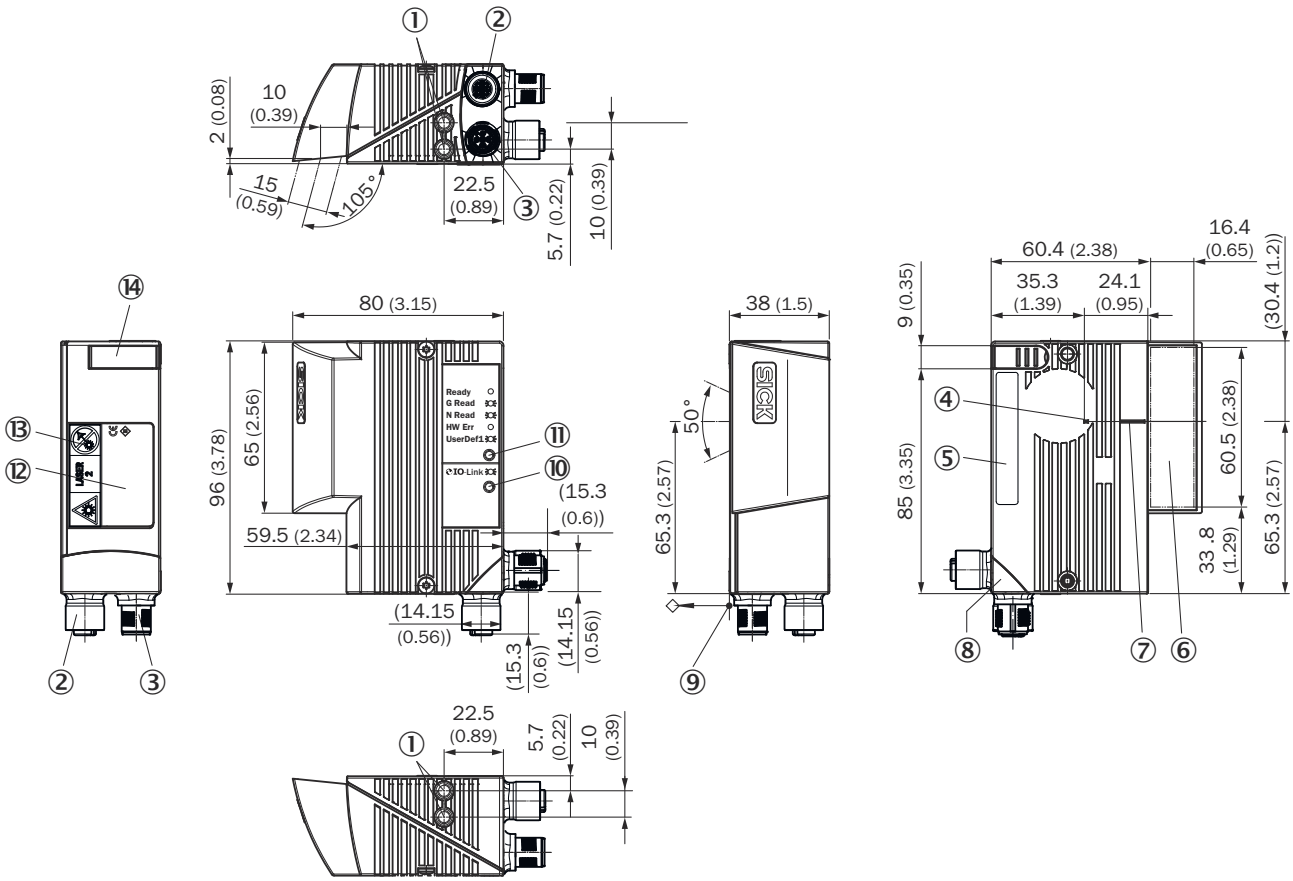


Figure 4: CLV61x IO-Link: Structure and dimensions, unit: mm (inch), decimal separator: Period

① Tapped blind hole M5, 5 mm deep (2x), for mounting the device
② "Sensor 1" connection, female connector, M12, 5-pin, A-coded
③ "IO-Link" connection, male connector, M12, 5-pin, A-coded
④ Internal impact point: Rotation point of the variable direction laser beam
⑤ Additional plate for type label
⑥ Viewing window, side orientation
⑦ Central position of the deflected laser beam in the V-shaped aperture angle
⑧ Swivel connector (maximum 180° rotation angle from end position to end position)
⑨ Reference point of the reading distance (from housing edge to object)
⑩ "IO-Link" status display (RGB LED)
⑪ "Sensor" status display (RGB LED), with signal color assignment for events
⑫ Type label
⑬ Laser warning label
⑭ Cover for "USB" port (female connector, 5-pin, Micro-B type). The interface can only be used by SICK Service.

3.2.2 Scope of delivery

The delivery of the device includes the following components:

Table 3: CLV61x IO-Link: Scope of delivery

No. of units	Component	Remarks
1	Device in the version ordered	**Delivery state:** • The female connector of the swivel connector is closed with a tightly screwed protective element, e.g. a protective cap. • The black cover fitted at the side over the corner must be flush with the device. • Without bracket • Without fixing screws
1	Printed Safety Notes (safety information), multilingual	**The document contains:** • Information on safe handling of the device • Note for online access to the operating instructions and other documentation

Accessories

The following accessories for setting up a reading station are not included in the scope of delivery of the device.

- Bracket
- Connecting cables
- If necessary, read cycle trigger sensor, e.g. photoelectric sensor for object-specific triggering

If required, order accessories separately.

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

3.2.3 Product features and functions (overview)

Table 4: Overview of product features and functions of the device

Product feature/function	Characteristic
Safety and ease of use	• Rugged, compact IP65 metal housing, CE marking (Europe) • Laser Class 2, laser switches off if the output power is exceeded • Automatic self-test on system start • Diagnostic tools for system setup and (remote) system monitoring • Output of the read result as well as error messages in IO-Link format • Future-oriented SOPAS ET configuration software • Supply voltage via IO-Link • Low power consumption • Standardized, simple commissioning and operation thanks to the integrated IO-Link interface • Backup of the configuration data of the device in the IO-Link master (data storage)
Convenient operation and configuration	• Device configuration for demonstrating the operating principle of the device in the SICK SiLink2 IO-Link master with SOPAS ET configuration software • Device configuration for operational use via the system controller (PLC) using an IO-Link master. Using the type-specific IO-Link device description file (IODD) of the device in the IO-Link Master and, if applicable, a function block in the configuration tool of the PLC • Optional function blocks for easier integration of the device into PLC programs • Status and process feedback indicator via LEDs

Product feature/function	Characteristic
Reading Operation Mode	• Start/stop operation (one bar-code bearing object per reading interval)
Read cycle	• Via PLC • Alternatively: Local, object-related triggering on site by external trigger sensor, e.g. with photoelectric sensor
Bar code evaluation	• Commonly used 1D bar code types, see "Performance", page 45 in the technical data • Max. number of bar codes per reading interval: 1
Data processing	• Time control for output of the read results • Read results supplemented by additional information
Data communication	• IO-Link interface (IO-Link V1.1 according to standard IEC 61131-9) for data exchange with the PLC
Electrical Interfaces	• IO-Link interface: IO-Link Port Class A, supply voltage and data transmission • 1 digital input for external trigger sensor
Design of the electrical interfaces	Space saving, swivel connector on the device with two round connectors: • “IO-Link” connection: male connector, M12, 5-pin, A-coded • “Sensor 1” connection: female connector, M12, 5-pin, A-coded
Housing	• Compact, industrial version in metal, IP 65, protection class III • Small dimensions, low weight • Various installation options via comprehensive range of mounting accessories

3.2.4 Operating principle

The device consists of a laser scanner (laser diode and optics) with fixed focus and an electronics unit with integrated decoder. The device offers an IO-Link interface as well as a connection for a local, external trigger sensor.

The external trigger sensor can be supplied with voltage by the device. If required, the trigger sensor enables a reading pulse that is independent of the controller. The device provides the read results via IO-Link to the IO-Link master for further processing in the system.

To capture the code, the device generates a scan line (line scanner). The light is emitted through the viewing window in the industrial housing. The reflected light from the bar code then returns through this viewing window. Because of the integrated D-sub shell, when the viewing window is on the side the laser beam is emitted at angle of 105° relative to the longitudinal axis of the device.

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

Block diagram

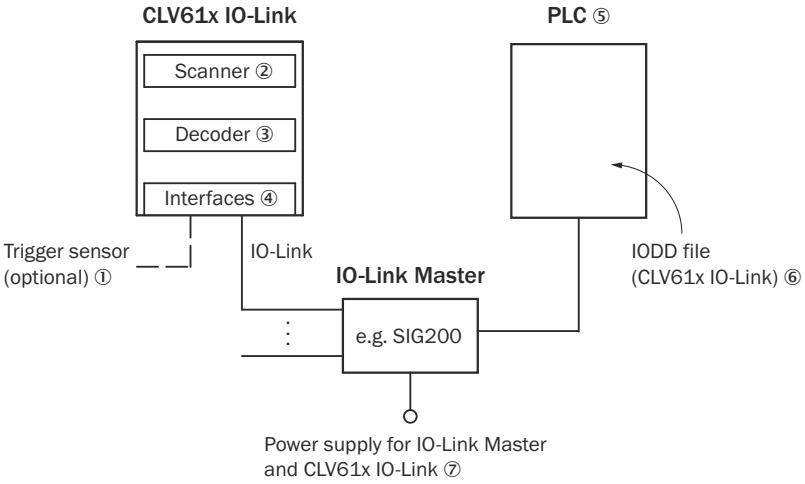


Figure 5: Connection diagram of the CLV61x IO-Link for operational use

① Read cycle sensor (optional)
② Scanner
③ Decoder
④ Interfaces
⑤ PLC
⑥ IODD file
⑦ Supply voltage for IO-Link master and CLV61x IO-Link

3.2.4.1 Object trigger control

To start an object-related read operation, the device requires a suitable signal (trigger source) for reporting an object in the reading field. The device receives the start signal either externally from the PLC via the IO-Link master or alternatively locally via a read cycle sensor (e.g. photoelectric sensor). As soon as an object has passed the read cycle sensor, the device opens a time window (“reading interval") for the reading process.

In Free-running mode (Auto pulse), the device internally generates the reading interval itself with an adjustable clock ratio.

The read cycle can be ended in two ways: When triggered externally by the read cycle source, internally by the fulfilled evaluation condition “Good Read”.

3.2.4.2 Reading operation mode

In start/stop mode, there is always only one object with a code in the reading field during the reading process. By default, the PLC controls the starting and stopping of the reading process via the IO-Link master or locally a read cycle sensor at the start of the reading field.

The device outputs the read results at the following time:

- At the end of the read cycle, the trailing edge of the object has left the end of the reading field
- or by fulfilling the Good Read condition during the read cycle

4 Transport and storage

4.1 Transport

NOTICE
Damage due to improper transport!

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

4.2 Unpacking

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

4.3 Transport inspection

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

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

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

4.4 Storage

- Electrical connections are provided with a protective cap.
- Do not store outdoors.
- Store in a place protected from moisture and dust.
- Recommendation: Use the original packaging.
- To allow any residual dampness to evaporate, do not package in airtight containers.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see "Technical data", page 45.
- Relative humidity: see "Technical data", page 45.
- For storage periods of longer than 3 months, check the general condition of all components and packaging on a regular basis.

5 Mounting

5.1 Overview of mounting procedure

- Selecting and preparing the mounting location.
- Mounting the device.
- Connect device to the IO-Link cable.
- Align the device towards object with bar code.
- Adjust the device.

NOTICE
Danger due to damage to the device

For reasons of safety, if a device shows visible signs of damage do not put it into operation. Immediately take a device that is in operation out of operation.

Damage includes, depending on the type of device, for example the following:

- Viewing window pane: Cracked or broken
- Housing: Cracked or broken
- Violation of the cable outlet on the housing or the cable itself
- Overtightening of the male connector unit, tearing or breakage of the housing
- Moisture penetration in the device

5.2 Preparing for mounting

5.2.1 Mounting requirements

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

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

Space requirements

- For typical space requirements for the device: See type-specific dimensional drawing and reading field diagram.
- The device requires a direct, unimpeded line of sight to the codes being read.
- Make sure path between the bar code and the viewing window of the device is of sufficient size. The light reflected from the bar code must be able to reach the viewing window without interference. This means that there must be a free corridor along the entire light path. The height of the corridor must be at least equal to the height of the viewing window.

Environmental influences

- Comply with technical data, e.g. permissible ambient conditions for operating the device (temperature range, EMC interference emission), see "Technical data", page 45.
- To prevent the formation of condensation, avoid exposing the device to rapid changes in temperature.
- To avoid additional external heating of the device during operation or optical device dazzle, protect the device from direct or indirect sunlight.

Mounting

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

Equipment required

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

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

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

5.2.2 Mounting device

The device is mounted to the bracket via at least two M5 tapped blind holes. The blind tapped holes are located in pairs on both of the narrow sides of the device, see "Device view", page 16.

SICK brackets

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

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

Example: The design of the bow-shaped mounting bracket can, for example, support a variety of mounting variants and the alignment of the device in two axes.

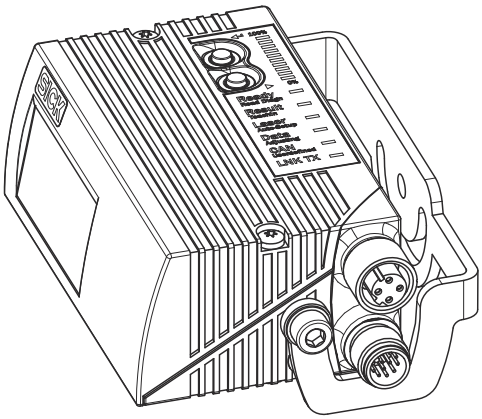


Figure 6: Mounting example of a device with bow-shaped mounting bracket. Illustration of the device and orientation of the viewing window may differ.

User-supplied brackets

Bracket requirements:

- Stable mounting device
  - Orientation of the device changeable in the x- and y-axis
  - The mounting device must be able to bear the weight of the device and connecting cables without shock.
- Depending on the device, at least two M5 screws for mounting the device
  - The screw length depends on the wall thickness of the mounting device.
  - The maximum screw in-depth in the device is 5 mm from the housing surface.

5.3 Mounting location

Observe the following aspects when selecting the installation location:

- Basic assignment of the scan line to the bar code
- Reading distance to bar code and aperture angle α
- Angular orientation of the device to the bar code
- Avoidance of surface reflections
- Counting direction of the reading angle (position of the bar code within the scan line)

5.3.1 Basic assignment of the scan line to the bar code

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

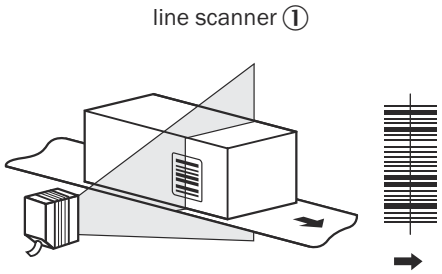


Figure 7: Allocation of scan line to bar code and conveyor direction Illustration may differ from actual device.

① Line scanner

5.3.2 Reading distance to the bar code and aperture angle α

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

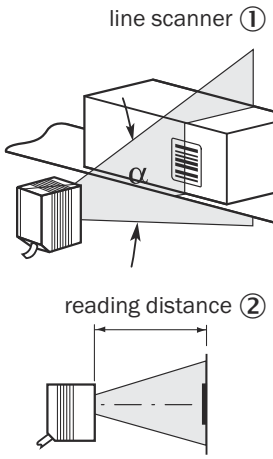


Figure 8: Definition of the reading distance and the aperture angle α

① Line scanner

② Reading distance

In the specification diagrams (see "Reading field diagrams (working ranges)", page 48), the height of the reading field is shown as a function of the reading distance for different resolutions (module widths).

5.3.3 Angular orientation of the device

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

To avoid surface reflections, select a rotation angle of approx. 15° from the perpendicular to the bar code, see "Avoiding surface reflections", page 24.

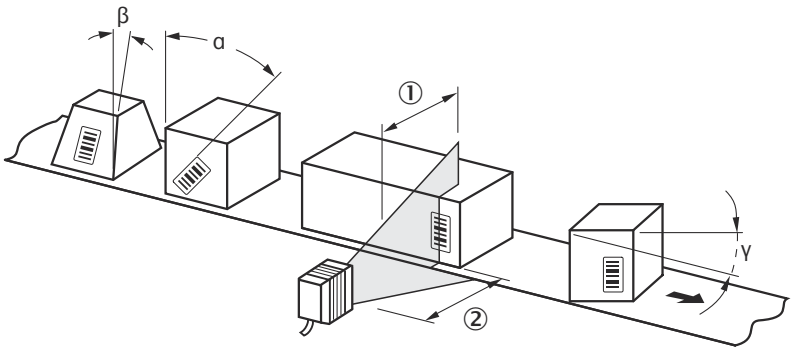


Figure 9: Line scanner: Occurring reading angle between scan line and bar code

① Depth of field

② Reading distance

Table 5: Permitted read angle between scan line and bar code

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

NOTE

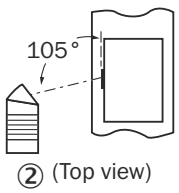
The specified maximum values can only be achieved if conditions are optimal. The actual maximum depends on module width, code type, print contrast, ambient light, distance and scanning frequency.

5.3.4 Avoiding surface reflections

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

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

① Line scanner
(viewing window on side)



② (Top view)

Figure 10: Avoiding surface reflections on the example line scanner: Angle between light emitted and bar code (tilting away from vertical)

① Line scanner (side viewing window)

② Supervision

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

5.4 Mounting device

NOTICE
Risk of damage to the device
the device will be damaged if the tightening torque of the mounting screws is too high or if the maximum screw-in depth of the blind hole threads is exceeded.

- ► Observe maximum tightening torque.
- ► Use suitable mounting screws for the blind hole threads of the device. Observe the maximum screw-in depth.

Maximum tightening torque: 2.5 Nm

Screw-in depth of the blind tapped holes see "Mechanics/Electronics", page 47 in the technical data.

1. Prepare the base for mounting the bracket of the device, see "Preparing for mounting", page 21.
2. Place the object with bar code at the intended reading point of the device in the viewing range of the device (no conveying movement).
3. Align device with the bar code by eye. When doing so, be aware of the following:
   - The side panel with the LEDs faces the viewer and is aligned almost parallel to the bar code surface.
   - During reading, note the reading angle that occurs see "Angular orientation of the device", page 24.
4. Mount the device bracket onto the base.
5. Screw suitable screws through the bracket into the blind tapped hole of the device. Tighten the screws lightly for the time being.
6. After alignment, tighten the screws. Do not exceed the maximum tightening torque.

5.5 Mounting external components

5.5.1 Mounting external read cycle sensor

If an external read cycle sensor (e.g. photoelectric sensor) triggers the device, mount the sensor close to the device.

NOTE
A large selection of photoelectric sensors and accessories (brackets, connecting cables) can be found at www.sick.com.

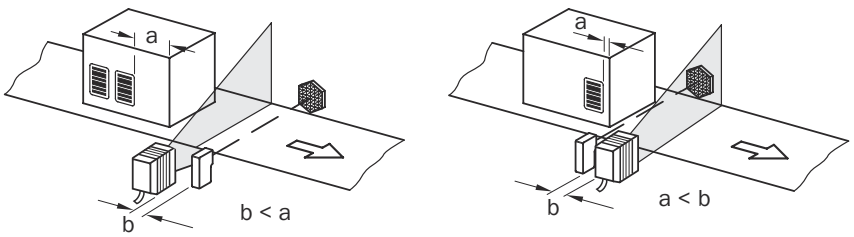


Figure 11: Bar code at the end or start of the piece goods

The mounting location of the device depends on distance “a” of the bar codes from the front object edge. Depending on the application, mount the device so that bar codes on objects of different sizes can be read completely during the evaluation time window (reading interval).

6 Electrical installation

6.1 Safety

6.1.1 Notes on the electrical installation

NOTICE
Equipment damage due to incorrect supply voltage!

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

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

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

Working with live parts may result in unpredictable operation.

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

- **The electrical installation must only be performed by electrically qualified personnel.**
- **Standard safety requirements must be observed when working on electrical systems!**
- Only switch on the supply voltage for the device when the connection tasks have been completed and the wiring has been thoroughly checked.
- When using a connecting cable with an open end, make sure that bare wire ends are not touching (risk of short-circuit when the supply voltage is switched on).
- Design circuits connected to the device as ES1 circuits according to IEC 62368-1.
- Protect the device and the connecting cable via the IO-Link master.

Laying the connecting cable

- To avoid interference, always lay and wire the cable in an EMC-compliant manner.
- Do not lay the cable in parallel with voltage supply and motor cables in cable channels.

6.1.2 Note on the swivel connector

NOTICE
Damage to the male connector unit due to overtightening

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

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

Figure 12: Swivel connector unit, rotation direction from end position to end position

6.2 Prerequisites for safe operation

WARNING
Risk of injury and damage caused by electrical current!

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

- Metal housings are vulnerable to dangerous electrical voltage.
- Devices will behave incorrectly or be destroyed.
- Cables will be damaged by overheating or 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, switch off the voltage supply immediately. Arrange for repair.
- Ensure that the ground potential is the same at all grounding points.
- Where local conditions do not meet the requirements for a safe earthing method, take appropriate measures. For example, ensure low-impedance and current-carrying equipotential bonding.

The device is connected to the peripheral devices (voltage supply, any local trigger sensor(s) and system controller) via cables.

The device can be grounded e.g. via a blind tapped hole of the housing.

If the peripheral devices also have metal 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

If these conditions are not fulfilled, equipotential bonding currents can flow along the cables between the devices due to differing ground potentials. The currents may lead to the above-mentioned hazards. This is, for example, possible in cases where there are devices within a widely distributed system covering several buildings.

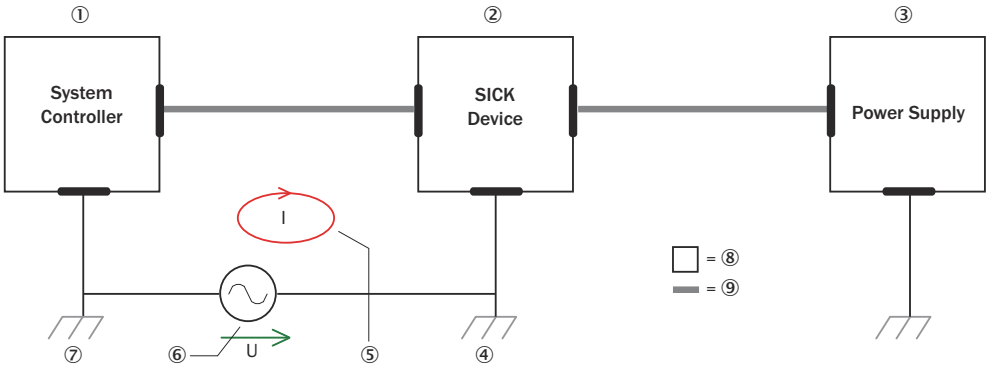


Figure 13: Example: Occurrence of equipotential bonding currents in the system configuration

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

Remedy

The most common solution to prevent equipotential bonding currents on the cables is to ensure low-impedance and current-carrying equipotential bonding.

Measure 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.

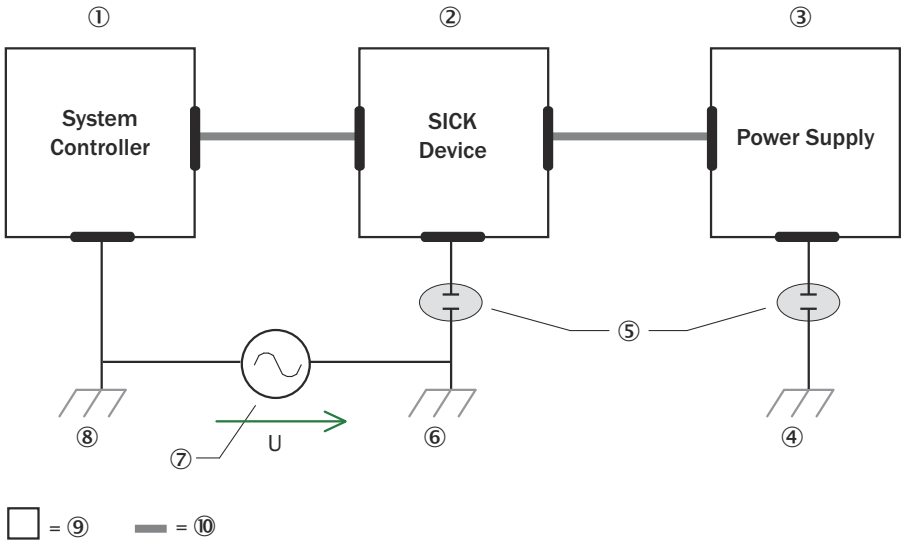


Figure 14: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

① System controller
② Device
③ Voltage supply
④ Grounding point 3
⑤ Insulated mounting
⑥ Grounding point 2
⑦ Ground potential difference
⑧ Grounding point 1
⑨ Metal housing
⑩ 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 and metal housing.

NOTICE

The voltage supply for the device and the connected peripheral devices must also guarantee the required level of insulation.

Under certain circumstances, a tangible potential can develop between the insulated metal housings and the local ground potential.

6.3 Wiring instructions

NOTE

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

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

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

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

NOTICE

Faults during operation and defects in the device or the system

Incorrect wiring may result in operational faults and defects.

- Follow the wiring notes precisely.

Use IO-Link standard cables for the specified ambient temperature range.

The two electrical connections of the device are configured as M12 round connectors.

6.4 Pin assignments for electrical connections

IO-Link connection

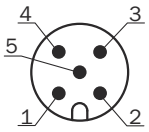
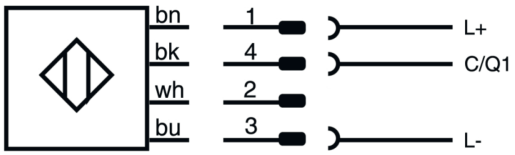


Figure 15: Male connector, M12, 5-pin, A-coded

Table 6: Pin assignment of "IO-Link" connection (Port Class Type A)

PIN	Signal	Function
1	L+	+ 24 V DC (supply voltage)
2	Reserved	(Do not use)
3	L–	0 V (supply voltage)
4	C/Q1	IO-Link communication according to IO-Link standard
5	Reserved	(Do not use)



“Sensor 1" connection (external trigger)

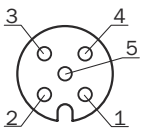


Figure 16: Female connector, M12, 5-pin, A-coded

Table 7: “Sensor 1” connection pin assignment

PIN	Signal	Function
1	$V_{S\ trigger}$ (L+)	Supply voltage for external trigger sensor
2	Reserved	(Do not use)
3	GND (L–)	Functional ground
4	Sensor 1	Digital input
5	Reserved	(Do not use)

6.5 Wiring interfaces

6.5.1 Connecting the supply voltage

The device receives the required supply voltage via the IO-Link interface of the IO-Link master. The stabilized supply voltage used for this purpose must meet the requirements of SELV/LPS (UL/IEC/EN 60950-1) or ES1 / PS2 (UL/IEC/EN 62368-1).

6.5.2 Wiring digital input

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

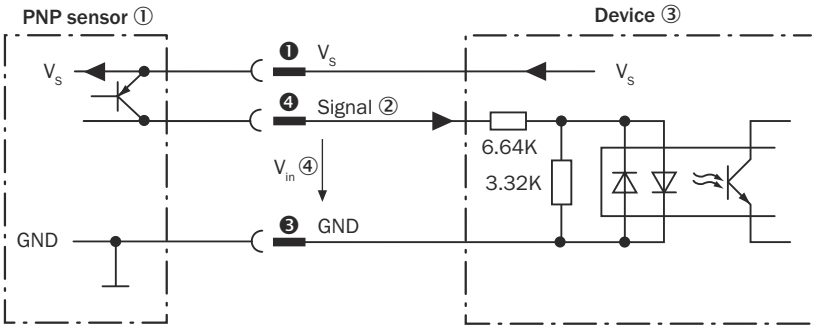


Figure 17: Wire digital input “Sensor 1”, supply of the trigger sensor by the device.

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

Table 8: “Sensor 1 digital input” characteristic data

Switching behavior	Voltage at the input starts the internal reading interval of the device. • Default: Active high • Debouncing: 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; $\lvert I_{in} \rvert \leq 5$ mA • High: 6 V $\leq \lvert V_{in} \rvert \leq 30$ V; 0.7 mA $\leq \lvert I_{in} \rvert \leq 5$ mA

NOTE

Avoidance of uncontrolled state changes of the digital input

In environments with high electromagnetic pollution, insufficient debounce times can cause undesirable changes in the state of the digital input of the device. For example, the uncontrolled start of a read process at debounce times < 10 ms.

The following measures are recommended to prevent uncontrolled changes in condition:

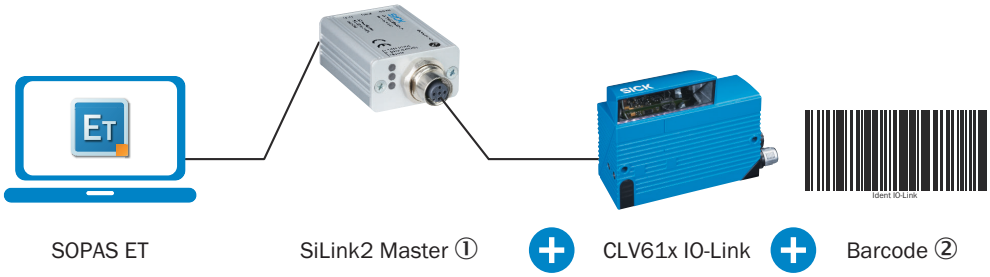
- Keep the length of cables from the signal source to the device as short as possible
- Reduce coupling to neighboring cables
- Shield affected cables

7 Commissioning

7.1 Overview of the commissioning steps

7.1.1 Device commissioning name with SOPAS ET for demonstration purposes

NOTE
The SOPAS ET configuration software can only be used for configuration of the device using the SICK SiLink2 or SIG200 IO-Link master.



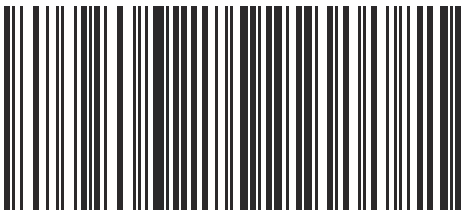
① SiLink2 IO-Link master (part no. 1061790)

② Bar code (default: Code39, 2/5 Interleaved, Code 128)

Prerequisites:

- SICK SiLink2 IO-Link master with wall plug and enclosed USB cable
- IO-Link device (CLV61x-IO-Link)
- IO-Link cable (male/female connector)
- Computer (Windows) with installed SOPAS ET configuration software
- Technical Information IODD CLV61x IO-Link
- Bar code from the following types (default: Code 39, 2/5 Interleaved, Code 128), code length max. 31 characters

Code 128 for test reading:



Procedure:

1. Connect IO-Link device to the voltage-free IO-Link master with IO-Link cable.
2. Connect the computer to the IO-Link master (Mini SUB B) via the USB interface.
3. Supply IO-Link master with voltage.
4. Start computer.
5. Call up the SOPAS ET configuration software.
6. In SOPAS ET, load the device description file (*. SDD) of the present device type. Start up the device on the basis of the factory default settings.
7. Configure the device as required with SOPAS ET.
   Support is provided by the Technical Information IODD CLV61x-IO-Link with a tabular overview of all device parameters and the selectable device parameter values, see "Scope of delivery", page 16.
   In the factory default setting, the device expects the read cycle trigger from the IO-Link master via the IO-Link process data.

8. Present a bar code to the device. Ensure that the device is optimally aligned with the bar code, see "Mounting device", page 25.
9. Trigger device via IO-Link.
   Observe the read results in the process data.
10. The device automatically saves optimized configuration data, if any. The data can also be stored on the computer as a parameter set (project file) for archiving purposes.

7.1.2 Integration and commissioning in the fieldbus system

The device is commissioned with the help of the PLC.

① PLC
② SIG200 (IO-Link Master)
③ Bar code depending on activated bar code type

Prerequisites:

- IO-Link master, e.g. SICK SIG200, connected to the PLC via fieldbus
- IO-Link device (CLV61x IO-Link)
- IO-Link cable (male/female connector)
- Common PLC configuration tool, if necessary function block for the device installed
- Electronic IODD CLV61x IO-Link for transfer to the PLC
- Technical Information IODD CLV61x IO-Link
- Bar code from the following types (default: Code 39, 2/5 Interleaved, Code 128), code length max. 31 characters

Procedure

1. Connect the device to the voltage-free IO-Link master via IO-Link.
2. Connect IO-Link master to PLC via fieldbus.
3. Supply the IO-Link master with voltage again.
4. Load IODD of the device into IO-Link master.
5. Optional: Select Data Storage in port configuration of the master.
6. Configure device as desired.
   Support is provided by the Technical Information IODD CLV61x IO-Link with a tabular overview of all device parameters and the selectable device parameter values, see "Scope of delivery", page 16.
7. Commissioning by communication via the function block of the device.
8. Present the device with a corresponding bar code. Generate continuous reading with the help of the PLC. Make sure the bar code is optimally aligned to the device when doing so, see "Mounting device", page 25.
9. Check selected parameter values for suitability in operational mode. Optimize if necessary.

8 Operation

8.1 Operating options

For operational use in a plant, the device is configured using the configuration tool of the PLC and the type-specific IODD file of the device. The PLC sequence program uses requests to control access via the fieldbus and the IO-Link master to the device for reading the bar code.

To demonstrate its operating principle, the device can also be set up with the SOPAS ET configuration software.

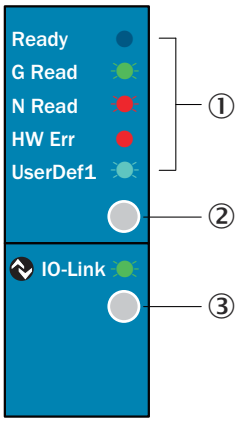
NOTE

In addition to these operating instructions, we recommend using the type-specific document "Technical Information IODD":

- For the parameterization and process data, the document lists the available parameters and functions of the device.
- This document assists the user when setting up the device for demonstration of operative use.

You can find the Technical Information IODD CLV61x IO-Link at www.sick.com/8026898.

8.2 Optical displays



① Signal color assignment for device status or events, indicated by the sensor LED

② Sensor LED (RGB) for device status or events

③ IO-Link LED (RGB) for data traffic via IO-Link

Table 9: CLV61x IO-Link: Display behavior of both LEDs

Display function	Color	Behavior LED	Device status
Sensor LED ② for device status or events:			
Ready	–	○	Device without supply voltage
After switching on supply voltage:			
Ready	Blue	●	• Self-test successful, device ready for operation • After parameter download or upload and successful firmware download: Device again ready for operation
HW Err	Red	●	Hardware fault

Display function	Color	Behavior LED	Device status
Read operation:			
G Read	Green	●	LED lights up briefly. Reading successful (Good Read)
N Read	Red	●	LED lights up briefly. Reading unsuccessful (No Read)
UserDef1	Light blue	○	UserDef1 (reserved)
Parameter: Download to device or parameter upload from device			
–	–	○	LED goes out. Function is executed.
Firmware update: Download to device [1]			
	Red Blue	☼● ●☼	LED flashes alternately in both colors. Function is continued: The device replaces the previous data with the new data.
Firmware update: Completion			
	Blue	●	Firmware update successful: Device Ready
	Red	●	Firmware download: Failed Error: Completion not successful
IO-Link LED ③:			
	Green	●	IO-Link interface ready for operation
		☼●	Data traffic via IO-Link

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

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

8.3 Operation via IO-Link

The device can exchange process data and parameters (also: ISDU, service data) via IO-Link. To do this, connect the device to a suitable IO-Link master.

The IO-Link interface of the device has the following properties:

Table 10: Properties of the IO-Link interface

IO-Link specification	V 1.1
Minimum cycle time	5 ms
Transmission rate	COM3 (230.4 kBd)
Process data width	32-byte outgoing (from IO-Link device to IO-Link master) 1 byte incoming (from IO-Link master to IO-Link device)
Process data type	Record
Parameter data storage in the IO-Link master (Data Storage)	Available

IO-Link is an international and manufacturer-independent standardized communication technology for communicating with devices such as sensors and actuators in an industrial environment (IEC 61131-9).

The IO-Link devices communicate with the superior control systems using an IO-Link master.

The IO-Link devices are connected to the IO-Link master in a serial, bidirectional point-to-point connection via an IO-Link interface (port). This arrangement does not represent a fieldbus. Different variants of IO-Link master are available. The IO-Link Master masters usually consist of remote, superior fieldbus gateways or input cards for the backplane bus of the controller used.

In order for an IO-Link device to communicate with the controller, the IO-Link master and the respective IO-Link sensor must be integrated into the controller. This is done via the hardware configuration in the engineering tool of the control manufacturer.

To simplify the integration process, SICK provides sensor-specific device description files (IODD = IO-Link Device Description) for the IO-Link devices.

In addition to process data, the IO-Link master and IO-Link device can also exchange device data (parameters, identification data and diagnostic information) depending on the device. To use this function, the IO-Link master needs the sensor-specific device description file (IODD).

The device description files are available for download on the product page in the Internet.

Not all control system manufacturers support the use of IODDs. If non-system IO-Link masters are used, the IO-Link sensor can also be integrated manually. This is done by entering the relevant sensor parameters directly during hardware configuration.

To ensure that the IO-Link sensor can be easily integrated into the control program, SICK also provides function blocks for many control systems. These function blocks facilitate, among other things, the reading and writing of the individual sensor parameters. The devices also support the interpretation of the process data supplied by the IO-Link sensor.

Download the function blocks from the Internet: **supportportal.sick.com**

8.3.1 Service data

NOTE

The device contains a rewritable memory (flash memory) for storing configuration data (parameters).

Recommendation:

Only write configuration data permanently during commissioning. Temporary storage is not affected, e.g. data storage (backup/restore) in the IO-Link master, which takes place in the volatile memory (RAM) of the device.

8.3.2 Process data

The device has 32 bytes PDIn (from the IO-Link device to IO-Link master) and 1 byte PDOut (from IO-Link master to IO-Link device).

Table 11: Overview of process data

	PDOut IO-Link master -> IO-Link device	Byte	PDIn IO-Link master -> IO-Link device
Status	Bit 0: Trigger	0	Bit 0: Device ready
	Bit 1: –		Bit 1: Good Read
	Bit 2: –		Bit 2: No Read
	Bit 3: –		Bit 3: Output string overrun [1]
	Bit 4: –		Bit 4: Reserved
	Bit 5: –		Bit 5: Trigger State [2]
	Bit 6: –		Bit 6: Status of digital input "Reading Trigger" (light switch) [3]
	Bit 7: –		Bit 7: Read Result Toggle
Data	–	1-31	Read data

1) The maximum length of the output string of 31 characters has been exceeded.
2) The trigger is active or deactivated.
3) Indicates the activity of the external trigger sensor (e.g. photoelectric sensor) on the device.

To perform a read operation, first select one of the following trigger sources:

- Triggering via process data from IO-Link master
- External trigger sensor (e.g. photoelectric sensor)
- Auto cycle

When the trigger is active, the device switches the laser on. 1D codes can now be read.

8.3.2.1 Process Data Output (PDOut)

In Process Data Out, the trigger can be set by the IO-Link master.

8.3.2.2 Process Data Input (PDIn)

In the PDIn, the device transmits the status information in byte 0 and the actual read data of the bar code in bytes 1 to 31.

The “Device Ready” state describes the current status of the device. 0 = device not OK, 1 = device OK.

The “Good Read” and “No Read” states provide the current status of the reading. These two states are mutually dependent, i.e. if Good Read = true / 1, then No Read = false / 0.

The “virtual Digital Output Result1” and “virtual Digital Output Result2” states are used to visualize two configurable virtual outputs.

The “Digital Input Reading Trigger” state describes the current state of the hardware triggers (on/off).

The “Read Result Toggle” state changes every time a read cycle is executed.

In the default setting of the device, the read data consists only of the bar code. However, it is possible to add additional information to the read data.

Up to six pieces of additional information can be selected under the “Data processing” menu item in the configuration software.

- Code type ('ID')
- Bar code length ('CL')
- Code reliability ('CS')
- Code reliability through scanning effort in percent (‘CG’)
- Number of reading intervals (‘NC’) and reading angle (‘RA’)

The output of the bar code can be limited in length if required.

9 Maintenance

9.1 Maintenance plan

During operation, the device works maintenance-free.

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

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

Table 12: Maintenance plan

Maintenance work	Interval	To be carried out by
Check device and connecting cables for damage at regular intervals.	Depends on ambient conditions and climate.	Specialist
Clean housing and viewing window.	Depends on ambient conditions and climate.	Specialist
Check the screw connections and plug connectors.	Depends on the place of use, ambient conditions or operating requirements. Recommended: At least every 6 months.	Specialist
Check that all unused connections are sealed with protective caps.	Depends on ambient conditions and climate. Recommended: At least every 6 months.	Specialist

9.2 Cleaning

Cleaning includes the viewing window and the housing of the device.

NOTICE
Damage to the inspection window.
Reduced read performance due to scratches or streaks on the window!

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

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

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

Cleaning the viewing window

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

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

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

The viewing window is made of glass, see "Technical data", page 45.

Cleaning procedure:

- ► Switch off the device for the duration of the cleaning operation. If this is not possible, wear suitable laser safety goggles. These must absorb radiation of the device's wavelength effectively.
- ► Glass window: remove dust from the viewing window using a soft, clean brush. If necessary, also clean the viewing window with a clean, damp, lint-free cloth, and a mild anti-static lens cleaning fluid.
- ► Plastic window: clean the viewing window only with a clean, damp, lint-free cloth, and a mild anti-static lens cleaning fluid.

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

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

Cleaning the housing

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

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

Cleaning other optical surfaces

Depending on the equipment of the reading station, additional local sensors with optically effective areas may be installed (e.g. photoelectric sensor for external read cycle). Contamination on these sensors can result in faulty switching behavior.

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

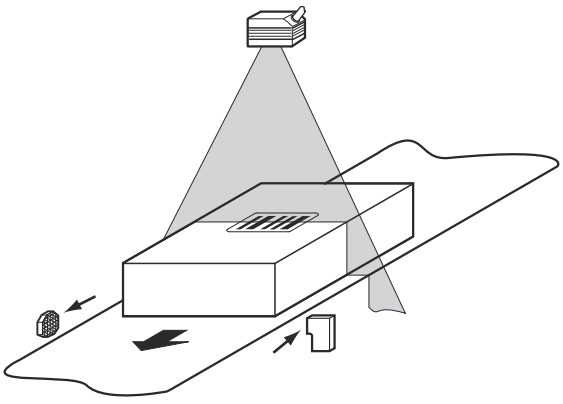


Figure 18: Cleaning the external optical sensors (read pulse encoder)

10 Troubleshooting

10.1 Overview of possible errors and faults

NOTICE

Danger due to damage to the device

For reasons of safety, if a device shows visible signs of damage do not put it into operation. Immediately take a device that is in operation out of operation.

Damage includes, depending on the type of device, for example the following:

- Viewing window pane: Cracked or broken
- Housing: Cracked or broken
- Violation of the cable outlet on the housing or the cable itself
- Overtightening of the male connector unit, tearing or breakage of the housing
- Moisture penetration in the device

Possible faults and corrective actions are described in the table below for troubleshooting.

Table 13: Errors and faults

Situation	Error or fault
Mounting	■ Device poorly aligned to objects with bar codes(e.g., dazzle) ■ Read cycle sensor incorrectly positioned, for example the internal reading interval is opened too early or closed too late.
Electrical installation	■ Data interface of the device incorrectly wired ■ Voltage supply not sufficiently dimensioned or cables with too small a cross-section used
Configuration	■ Functions not adapted to local conditions, e.g. parameters for the data interface not set correctly ■ Device limits not observed, e.g. reading distance, aperture angle ■ Trigger source for read cycle not selected correctly
Operation	■ Control of the reading pulse not correct or not suitable for the object ■ Device faults (hardware/ software)

10.2 Detailed fault analysis

10.2.1 LEDs on the device

The display of the LEDs can indicate possible faults or errors, see "Optical displays", page 35. Further information on this can be found in the “System Information” section.

10.3 Repairs

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

If an error cannot be rectified, the device may be defective.

However, it is possible to quickly replace a device with a stocked device of the same type.

► If a fault cannot be rectified, contact the SICK Service department. To find your agency, see the final page of this document.

NOTE

Before calling, make a note of all type label data as well as the connection technology used to ensure faster assistance.

Type label

- Type designation
- Device serial number

10.4 Disassembly

Dismantling the device

1. Switch off the supply voltage to the device.
2. Disconnect all connecting cables on the device.
3. To replace the device, mark the position and orientation of the device on the bracket or surrounding area.
4. Remove the device from the bracket.

10.5 Returns

- ► Only send in devices after consulting with SICK Service.
- ► The device must be sent in the original packaging or an equivalent padded packaging.

NOTE

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

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

10.6 Device exchange with transmission of the current configuration data

NOTE

In order to replace a device that may have failed quickly and without major configuration effort, it is recommended to implement a device replacement concept.

IO-Link offers the option of automatically backing up the device parameter values as a preventive measure using the "Backup/Restore" function in the IO-Link master and thus keeping them available. The same applies after a change parameterization. After exchanging a failed device with a device with the same device ID (identical type), the master automatically parameterizes the exchange device.

11 Decommissioning

11.1 Disposal

If a device can no longer be used, dispose of it in an environmentally friendly manner in accordance with the applicable country-specific waste disposal regulations. Do not dispose of the product along with household waste.

NOTICE

Danger to the environment due to improper disposal of the device.

Disposing of devices improperly may cause damage to the environment.

Therefore, observe the following information:

- Always observe the national regulations on environmental protection.
- Separate the recyclable materials by type and place them in recycling containers.

12 Technical data

NOTE

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

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

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

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

Please note: This documentation may contain further technical data.

12.1 Features

Table 14: Technical data features

	CLV615 IO-Link
Work area	Long Range
Scanning methods	Line scanning
Sensor type	Line scanner
Orientation of viewing window	Side [1], identifier see "Type code", page 15
Aperture angle	≤ 50 °
Optical focus	Fixed focus
Code resolution	0.35 mm ... 0.5 mm
Reading ranges	Reading distance 25 mm ... 330 mm, see "Reading field diagrams (working ranges)", page 48
Scanning frequency	400 Hz ... 1000 Hz, adjustable in steps of 100 Hz (default: 1000 Hz)
Light source	Laser diode, visible red light (λ = 655 nm)
Light spot	Circular
MTTF (laser diode)	40,000 hours at 25 °C
MTBF	100,000 hours
Laser class	Class 2 according to EN 60825-1:2014 +A11:2021 / IEC 60825-1:2014. Identical laser class for issue EN/IEC 60825-1:2007. Complies with 21 CFR 1040.10/11 except for conformance with IEC 60825-1 Ed. 3., see Laser Notice No. 56, 8 May 2019.
Laser power	P = 1.5 mW maximum, P < 1.0 mW average
Laser pulse duration	< 300 µs

1) Light emission at 105 ° relative to the longitudinal axis of the device, see "Device view", page 16

12.2 Performance

Table 15: Technical data for performance

	CLV615 IO-Link
Readable code structures	1D codes
Bar code types	Code 39, Code 128, Code 93, Codabar, UPC / GTIN / EAN, 2/5 Interleaved (Default: Code39, 2/5 Interleaved, Code 128)
Print ratio	2:1 ... 3:1
No. of codes per scan	1

	CLV615 IO-Link
Number of codes per reading interval [1]	1
Number of characters per code	Max. 31 characters
Number of multiple readings	1 ... 99 (Default: 3)

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

NOTE

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

12.3 Interfaces

Table 16: Technical data: Interfaces

	CLV615 IO-Link
IO-Link	
SICK Device ID	8389257
Part number (device)	1118927
Protocol	IO-Link V1.1 according to IEC 61131-9 standard [1]
Function [2]	Host: Process data, service data (parameterization, diagnostics), data storage
Process data length	IN (input, from CLV to IO-Link master): 32 bytes OUT (output, from IO-Link master to CLV): 1 byte
Data transmission rate	COM3 (230,4 kBd)
Minimum cycle time	5 ms
Wake up time	> 300 ms
Operating modes	• IO-Link mode (COM mode) for data exchange
Digital inputs	**2 inputs:** • 1 x hardware: “Sensor 1” V_{in} [3] = max. 30 V, I_{in} [4] = max. 5 mA, reverse polarity protected, can be wired with PNP output. Fixed debounce time 10 ms, see "Wiring digital input ", page 32 • 1 x via IO-Link Ctrl bits
Digital outputs	1x via IO-Link process data output (Ctrl bit)
Connecting cable [5]	• IO-Link mode: Standard 5-conductor industrial cable with two M12 cable heads
Reading pulse	**Pulse source for start/stop:** • IO-Link (default) • Digital input for local read cycle sensor • Free (auto cycle)
Optical displays	**2 displays (RGB LED):** • “Sensor”, with signal color assignment for device status or events • "IO-Link", for data traffic via IO-Link
Acoustic indicator	None

	CLV615 IO-Link
Configuration	• With fieldbus controller (PLC) and additional support by SICK function blocks [6] • With SOPAS ET configuration software via IO-Link master (e.g. SICK SiLink2 IO-Link master)

1) Serial, bidirectional point-to-point connection for signal transmission and power supply.
2) Process data is transmitted cyclically and service data acyclically.
3) Input voltage.
4) Input current.
5) Not included with delivery of the device.
6) Function blocks for PLC types from different manufacturers are available online at: supportportal.sick.com.

12.4 Mechanics/Electronics

Table 17: Technical data mechanics/electrics

	CLV615 IO-Link
Connection type	IO-Link **Swivel connector with 2 round connectors:** • 1 “IO-Link” connection (male connector, M12, 5-pin, A-coded), Port Class A (type A) • 1 “Sensor 1” connection (female connector, M12, 5-pin, A-coded) **Behind black plastic cover:** • 1 USB port, type Micro-B [1]
Supply voltage V_S	• 18 V DC ... 30 V DC , SELV/LPS (UL/IEC/EN 60950-1) or ES1 / PS2 (UL/IEC/EN 62368-1) reverse polarity protected, short-circuit protected
Power consumption	Typically 3.2 W
Current consumption [2]	Max. 700 mA. With a connected, external trigger sensor additionally max. 1 A.
Housing	Aluminum die cast
Housing color	Light blue (RAL 5012)
Window material of the viewing window	Glass, identifier see "Type code", page 15
Threaded mounting hole	2 x 2 blind tapped hole M5, 5 mm deep Tightening torque for mounting screws: max. 2.5 Nm
Laserwarnschild	In combination with the type label, glued on
Safety	EN 62368-1: 2014-08
Enclosure rating	IP 65, in accordance with EN 60529:1991 + A1:2002 + A2:2013 + A3:2016 [3]
Protection class	 (Class 3) For operation in SELV systems (EN 60950-1) or ES1 systems (EN 62368-1)
Weight	260 g

	CLV615 IO-Link
Dimensions (L x W x H) [3]	80 mm x 96 mm x 38 mm

1) The interface can only be used by SICK service.
2) Observe the maximum permissible supply output current of the IO-Link master at the IO-Link port used!
3) **Prerequisites for complying with enclosure rating IP65:**
   - "IO-Link" connection: The head of the connecting cable (M12 female connector) is firmly screwed to the contacted male connector of the device.
   - "Sensor 1" connection: The head of the connecting cable (M12 male connector) for an external, local trigger is firmly screwed to the contacted female connector of the device. When the connection is not in use, it is sealed with a tightly screwed protective element, e.g., a protective cap (as in the delivery state).
   - The black cover, which is fitted over the corner on the side, is closed. The cover is flush against the device.
4) see "Device view", page 16

12.5 Ambient data

Table 18: Technical data for ambient data

	CLV615 IO-Link
Electromagnetic compatibility (EMC)	Radiated emissions: EN 61000-6-4: 2019 Electromagnetic immunity: EN 61000-6-2: 2019
Vibration resistance	EN 60068-2-6: 2008-02
Shock resistance	EN 60068-2-27: 2009-05
Ambient operating temperature	0 °C ... +40 °C
Storage temperature	–20 °C ... +70 °C
Permissible relative humidity	0% ... 90%, non-condensing
Ambient light immunity	2000 lx, on bar code
Bar code print contrast (PCS)	≥ 60 %

12.6 Dimensional drawings

Dimensions see "Device view", page 16.

12.7 Reading field diagrams (working ranges)

12.7.1 Reading conditions for specification diagrams

Properties	Value
Test code	Code 39 / ITF
Resolution	See reading field diagrams in each case
Scanning frequency	See characteristic curve fields for scanning frequencies
Print ratio	2:1
Print contrast	> 90%
Tilt	±30°
Ambient light	< 2,000 lx
Good read rate	> 75%
Light spot	Circular

Properties	Value
Window material of the viewing window	Glass (CLV61x-xxx**0**)

NOTE
The reading distances are measured radially from the device.

12.7.2 CLV615: Long Range

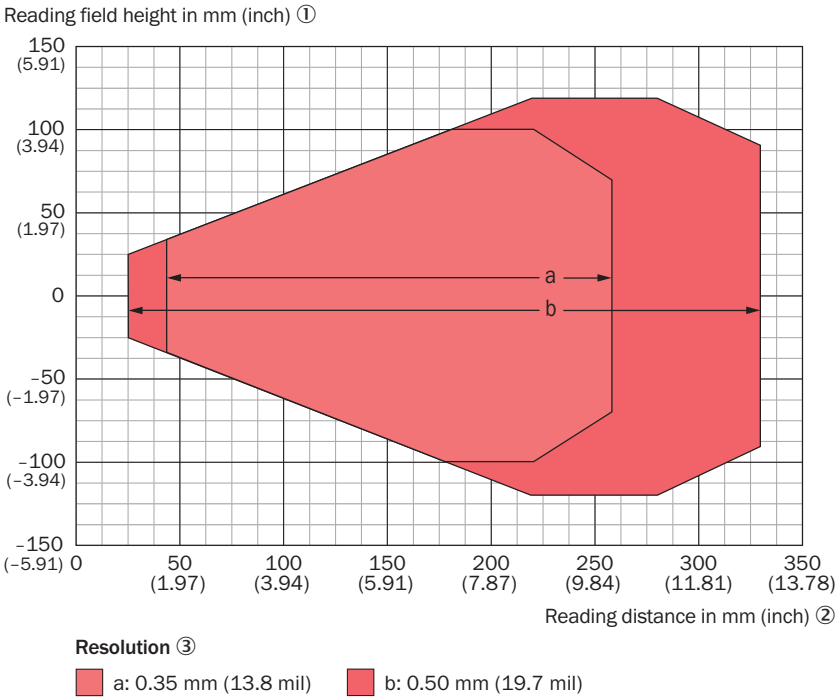


Figure 19: CLV615 reading field diagram, Long Range, side viewing window

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

Scanning frequencies

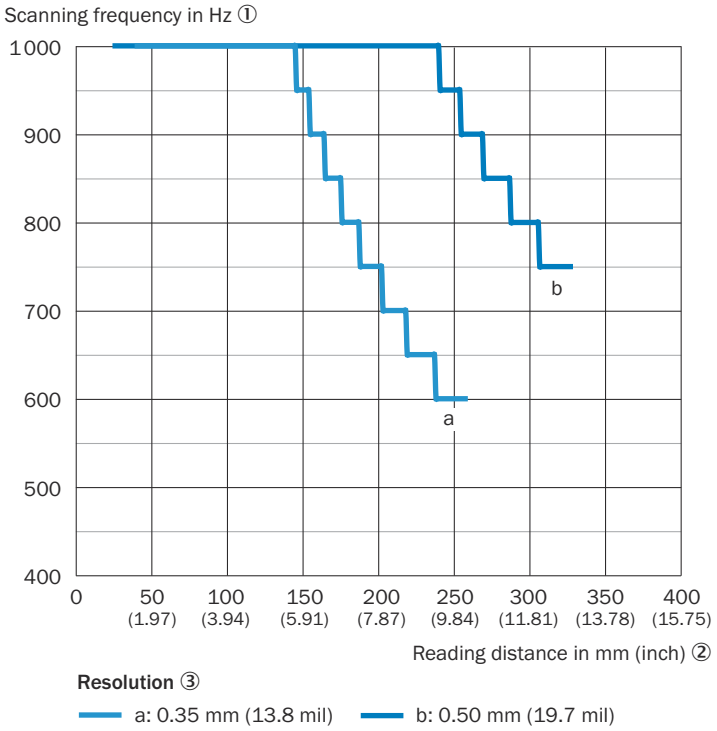


Figure 20: Characteristic curve field for CLV615 scanning frequency, Long Range, side viewing window

① Scanning frequency in Hz

② Reading distance in mm (inch)

③ Resolution

13 Accessories

NOTE

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

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

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

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

14 Annex

14.1 Declarations of conformity and certificates

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

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

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

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

14.2 Abbreviations used

Table 19: Abbreviations used

CE	**C**ommunauté **E**uropéenne. European Community
CLV	**C**ode-**L**eser **V**-Prinzip [Code reader V principle]
DOF	**D**epth **O**f **F**ield. Depth of field
ES	**E**lectrical **s**ource. Electrical power source.
ESD	**E**lectro-**S**tatic **D**ischarge. Electrostatic discharge
HTML	**H**yper **T**ext **M**arkup **L**anguage (page description language on the Internet)
I	**I**nput
I_{in}	Input current
I_{out}	Output current
LED	**L**ight **E**mitting **D**iode. Light emitting diode
LPS	**L**imited **P**ower **S**upply
MTBF	**M**ean **T**ime **B**etween **F**ailure
MTTF	**M**ean **T**ime **T**o **F**ailure
MTTR	**M**ean **T**ime **T**o **R**epair
O	**O**utput
PCS	**P**rinted **C**ontrast **S**ignal
PLC	**P**rogrammable **L**ogic **C**ontroller
PROM	**P**rogrammable **R**ead **O**nly **M**emory. Programmable non-volatile memory
RA	**R**eading **A**ngle
RAM	**R**andom **A**ccess **M**emory. Direct-access volatile memory
ROM	**R**ead **O**nly **M**emory. Read-only memory (non-volatile)
RTF	**R**ich **T**ext **F**ormat (standardized document format with format description)
SDD	**S**OPAS **D**evice **D**escription (device description file, driver for SICK SOPAS ET software)
SMART	**S**ICK **M**odular **A**dvanced **R**ecognition **T**echnology
SOPAS ET	**S**ICK **O**pen **P**ortal for **A**pplication and **S**ystems **E**ngeneering **T**ool (computer software for Windows for device configuration)
PLC	**P**rogammable **L**ogic **C**ontroller
SELV	Safety Extra Low Voltage
V_{in}	Input voltage
V_{out}	Output voltage
V_S	Supply voltage

IO-Link

COM 1 – 3	SDCI communication mode (data transmission rate). COM 1 (4.8 kBit/s), COM 2 (38.4 kBit/s), COM 3 (230.4 kBit/s)
IODD	IO Device Description (device description device of an IO-Link device)
ISDU	Indexed Service Data Unit (service data object in IO-Link)
SDCI	Single-drop digital interface (official specification of IO-Link technology)

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