Inspector83x

2D machine vision

SICK
Sensor Intelligence.

Described product

Inspector83x

Manufacturer

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Original document

This document is an original document of SICK AG.

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1 About this document

1.1 Information on the operating instructions

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

Prerequisites for safe work are:

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

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

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

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

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

1.2 Explanation of symbols

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

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

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

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

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

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

1.3   Related applicable documents

Related applicable documents from SICK

Document	Title	Part number	Source
Technical information	VI55I-xxxxxxHx Illumination unit	8029065	**www.sick.com/8029065**

1.4   Further information

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).

The following information is available depending on the product:
•   Data sheets
•   This document in all available language versions
•   CAD files and dimensional drawings
•   Certificates (e.g., declaration of conformity)
•   Other publications
•   Software
•   Accessories

2 Safety information

2.1 Intended use

The Inspector8xx is a programmable vision sensor for industrial use for tasks which require high-resolution images at long distances.

The device is programmed on a PC by using the development environment software SICK AppSpace. Depending on the application, a browser-based, graphical user interface (GUI) can be created, which provides opportunities defined by the application developer to influence an application at operator level. The device offers various interfaces for controlling, programming, and operating purposes, which can be activated as necessary via development environments, control systems (programmable logic controllers), or applications. However, configuration, programming, and control requires various technical skills, depending on how the device is connected and used.

The devices are primarily designed for use in industrial and logistics areas, and they meet the requirements for industrial ruggedness, interfaces and data processing. They are not safety components as per the Machinery Directive 2006/42/EC. They are not intended and not permitted to be used in areas with explosive atmospheres, in corrosive environments, or in extreme ambient conditions.

2.2 Improper use

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

- The device does not constitute a safety component in accordance with the respective applicable safety standards for machines.
- The device must not be used in explosion-hazardous areas, in corrosive environments or under extreme environmental conditions.
- The device must not be operated in the temperature range below 0 °C.
- 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:

- Product should be used only in accordance with its intended use.
- All information in the documentation 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)

Device capabilities and recommended use

As the device typically uses network communication extensively, please note the following when designing a cybersecurity concept for the system this device shall be part of:

- When correctly configured, the Nova 2D SensorApp offers basic authentication for the GUI to prevent unintentional or accidental misuse. However, the underlying browser-to-device communication is not authenticated.
- All communication (images, configuration, logs) between the device and network devices (e.g. a computer used for configuration), should be assumed to be unencrypted unless otherwise specified.
- It is recommended to always use the latest software to ensure that the latest security patches are applied.
- It is recommended to only connect the device to private isolated networks. At all points where there is a physical connection to external, possibly untrusted networks, it is strongly recommended to block all network traffic to and from the device using a firewall.
- A user who develops custom software running on the device (i.e. development in SICK AppSpace) is responsible for the security of the developed solution. For example, the web-based CROWN interface does not offer any authentication, and should be disabled when possible for increased security. For more information, see the SICK AppSpace Security Concepts document: **supportportal.sick.com/Product_notes/sick-appspace-security-concepts/**.

Network services

The device uses several network services for its operation.

Table 1: Default device settings for the EtherNet connection

Service	Physical port	Logical port	Encrypted	Authenticated	Default status	Description
SOPAS REST API web server	P3, USB [1)	TCP port 80	No	Yes	Listening	Used for configuration of the device
CROWN REST API server	P3, USB [1)	TCP port 80	No	No	Listening	Used for configuration of the device
CROWN Web socket server	P3, USB [1)	TCP port 80	No	No	Listening	Used for configuration of the device and image transfer to GUI
Web server	P3, USB [1)	TCP port 80	No	No	Listening	Used for configuration of the device
CoLa-2 server	P3, USB [1)	TCP port 2122	No	Yes	Listening	Used for configuration of the device
ColaScan	P3, USB [1)	UDP port 30718	No	No	Listening	Used for device detection and automatic IP configuration
FTP client	P3, USB [1)	TCP configurable port, default 21	No	No	Not used	Used for image recording with the Nova 2D SensorApp
DHCP client	P3	TCP port 68	No	No	Not used	Used when DHCP is enabled on device
DHCP server	USB	TCP port 67	No	No	Listening	Only listens on USB. Enables automatic IP configuration for RNDIS

Service	Physical port	Logical port	Encrypted	Authenti-cated	Default status	Description
SSH server	P3, USB [1]	TCP port 22	Yes	Yes	Not used	Used for device repair
TCP client	P3, USB [1]	TCP con-figurable port	N/A	N/A	Not used	Used by the Nova 2D SensorApp, tool TCP Cli-ent
TCP server	P3	TCP con-figurable port	N/A	N/A	Not used	Used by the Nova 2D SensorApp, tool TCP Cli-ent
EtherNet/IP ™	P1, P2	TCP port 44818 UDP ports 161, 2222, 44818, 68	No	No	Not used	Used by the Nova 2D SensorApp if Fieldbus with EtherNet/IP™ com-munication is set up
PROFINET	P1, P2	UDP ports 161, 34964, 49153	No	No	Not used	Used by the Nova 2D SensorApp if Fieldbus with PROFINET commu-nication is set up

[1] The USB interface is a service interface and is not intended for permanent connections in operational use.

In addition, custom SICK AppSpace Software can be used to enable additional network services. This is described in the LUA API.

2.4 Limitation of liability

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

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

2.5 Modifications and conversions

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

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

2.6 Requirements for skilled persons and operating personnel

⚠️ **WARNING**
Risk of injury due to insufficient training.

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

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

The following qualifications are required for various activities:

Table 2: 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 Knowledge of the configuration of image processing systems and network components
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.

Danger due to visible radiation is product-specific. See the technical data for more information.

⚠️ **CAUTION**
Optical radiation: LED risk group 1, visible radiation, 400 nm to 780 nm

The LEDs may pose a danger to the eyes in the event of incorrect use.

- Do not look into the light source intentionally.

- Do not open the housing. Opening the housing will not switch off the light source. Opening the housing may increase the level of risk.

- Comply with the current national regulations on photobiological security of lamps and lamp systems.

If the product is operated in conjunction with external illumination units, the risks described here may be exceeded. This must be taken into consideration by users on a case-by-case basis.

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.
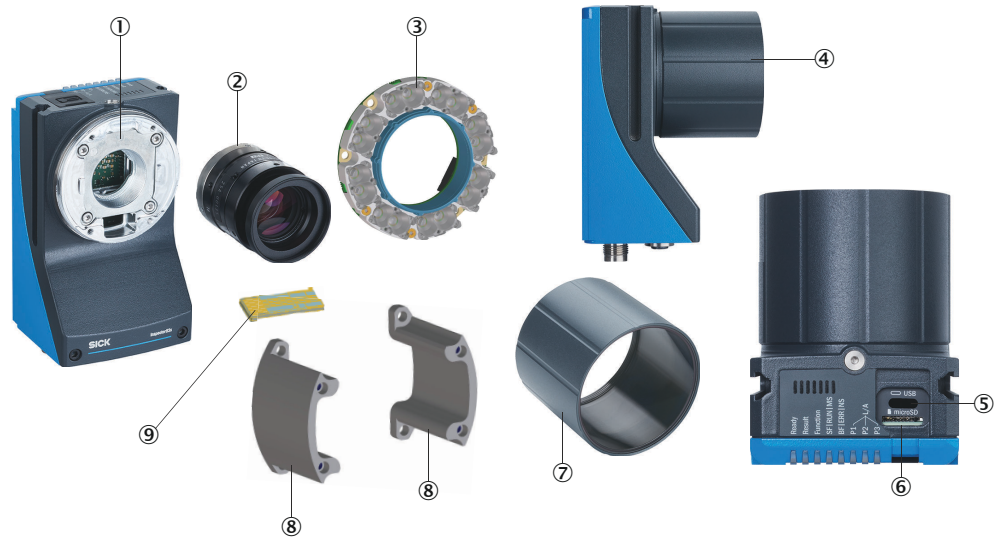
⚠ **CAUTION**
Risk of injury due to hot device surface.

The surface of the device can become hot.

- Before performing work on the device (e.g. mounting, cleaning, disassembly), switch off the device and allow it to cool down.
- Ensure good dissipation of excess heat from the device to the surroundings.

3 Product description

3.1 Product overview

① C-mount thread

② Lens

③ Illumination unit

④ Optics protection hood, mounted

⑤ USB-C (for temporary use as a service interface)

⑥ Slot for a microSD memory card (accessory)

⑦ Optics protection hood, not mounted

⑧ Spacer

⑨ Electrical connection for the integrated illumination unit

Further topics

- Dimensional drawing

3.2 Product features and functionality

The Inspector83x is a compact and flexible 2D vision sensor that offers a convenient solution to high-speed visual inspection tasks, such as sorting or finding defects during production.

With the AI inspection option, industrial machine vision becomes easier than ever through teaching by example and offers unprecedented inspections possibilities. Rule-based inspection gives detailed control over measurements and acceptance criteria.

The web interface of SICK Nova provides the main mean of configuration and can be accessed over the Gigabit Ethernet port or USB-C-based network interface. A programming interface provides additional customization options through plug-in or app development in Lua.

It is easy to capture great high-resolution images with the integrated illumination and high-quality lenses. For custom setups, the C-mount lens thread makes it possible to use unusual lenses. The external illumination connection makes it possible to use illumination accessories such as bar light, ring light, or backlight.

Integration features such as dual port fieldbus, Gigabit Ethernet, digital input and output, external illumination control, image logging over network, microSD card slot ensures convenient operation.

3.3 Product variants

Flex product variant

The Flex product variant is a camera housing with a C-mount thread. The product can be assembled from individual components to suit the particular application. The individual components can be ordered separately as accessories. Only certain lenses and illumination units are compatible depending on the product type. Use only products from SICK.

3.4 Scope of delivery

No. of units	Component	Note
1	Device in the version ordered	• Camera housing with C-mount threaded connection • Order individual components separately as accessories and mount them independently. • Light inlet is sealed with a protective cap. • Electrical connections are sealed with protective caps. • Without holders and connecting cables
2	Sliding nut, 5.5 mm deep, M5 threaded mounting hole	• Alternative mounting option for the device instead of the threaded mounting hole • Use in pairs.
1	Printed safety notes, multilingual	Brief information and general safety notes
	Nova InspectorP SensorApp	Pre-installed with Quality Inspection license

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

Associated components not contained in the delivery:

Table 3: Other components

Component	Remarks
SICK AppStudio software	Available online at: • www.sick.com/SICK_AppStudio
SICK AppManager software	Available online at: • www.sick.com/SICK_AppManager

3.5 Product ID

3.5.1 Type label

The type label contains information for identifying the product.

Figure 1: Inspector83x type label (example)

① Product and type designation
② Product characteristics
③ Product ID
④ Conformity mark and certification mark
⑤ Place of production
⑥ Supply voltage and maximum power consumption
⑦ MAC address
⑧ Date of production
⑨ QR code with a link to the product and more information

3.5.2 Type code

Type code structure

The devices of the Inspector83x product family are arranged according to the following type code:

V2D83yz-abcdefghij

V	2	D	8	3	y	z	-	a	b	c	d	e	f	g	h	i	j
1	2	3	4	5	6	7		8	9	10	11	12	13	14	15	16	17

Position	Description
1 .. 5	Product family V2D83 Inspector83x
6	Image sensor resolution 05: 5 Mpx (2.464 px x 2.048 px)
7	Function P: Machine Vision, programmable with SICK AppSpace
8	Generation 1: First generation
9	Image sensor type/color M: Monochrome
10	Optical/focusing system C: C-mount
11	Illumination unit X: Without K: White light, medium I: White light, wide
12	Focal length X: Without B: 8 mm C: 12 mm D: 16 mm E: 25 mm
13	FIlter X: Without
14	Processing unit A: Advanced
15	Connection modules F: Fieldbus
16	IP protection class and front screen 0: Without 1: IP65 plastic
17	Temperature range S: 0 °C … 40 °C (standard)

3.6 Integrated illumination unit

Overview
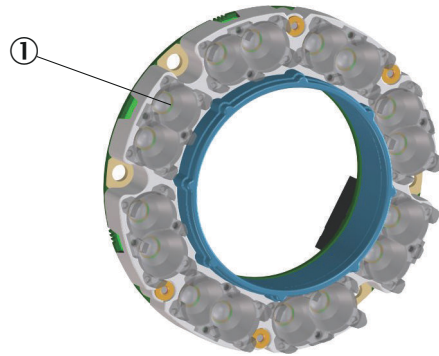
Figure 2: VI55I Illumination unit

①   16 illumination LEDs

3.7 Display and control elements
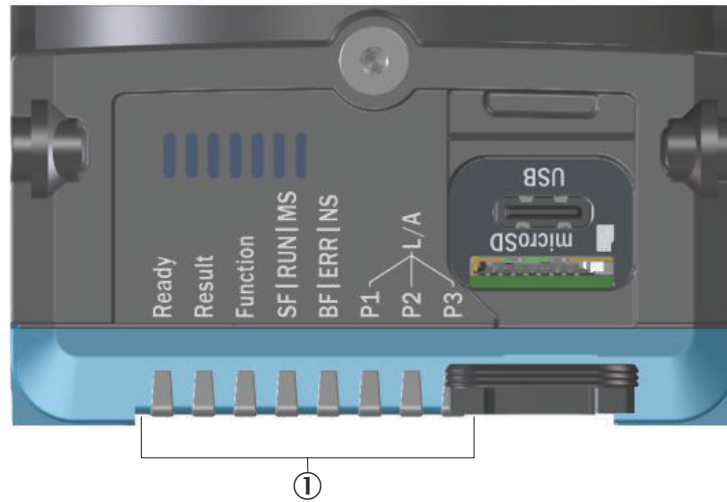
①   StatusLEDs

Status LEDs

Display	LED (color)	Description
Ready	🟢 (Green)	The device is switched on and ready for use
	🔴 (Red)	Error
	🟢 (Green)	Device is not ready for use. **Reasons** • Firmware update • Parameter change by the user • Parameter change by another device (e.g., PLC)
	🔵 (Blue)	Device powers up
Result	Red, green, blue, fuchsia, yellow, aqua, white	Configurable by the user
Function	Red, green, blue, fuchsia, yellow, aqua, white	Configurable by the user

| Display	LED (color)	Description
SF/RUN/MS	**PROFINET**: System failure (SF)	
	○	No error
	☀ (Red)	DCP signal service is initiated via the bus
	● (Red)	Error has occured
	EtherNet/IP™: Module status (MS)	
	● (Green)	Device in operation
	☀ (Green)	Standby/device is not configured, no IP address assigned
	☀ (Red)	Warning, but device still operational or firmware update
	● (Red)	Error, device not operational
	☀☀☀ (Green, red, green)	Self-test when switching on
	☀☀○ (Red, green, off)	Flash sequence for visually identifying the product . MS and NS LEDs flash simultaneously.
	○	No supply voltage or no EtherNet/IP™ app installed
BF/ERR/NS	**PROFINET**: Bus failure (BF)	
	○	No error
	☀ (Red)	No data exchange
	● (Red)	No configuration, low speed physical link, or no physical link
	EtherNet/IP™: Network status (NS)	
	● (Green)	Device has an IP address and a CIP connection
	☀ (Green)	No connection, device has an IP address, but no CIP connection
	☀ (Red)	Warning, connection time out, reset by performing a reset or establishing a new connection
	● (Red)	Error, IP address has already been assigned to a different device
	☀☀○ (Green, red, off)	Self-test when switching on.
	☀☀○ (Red, green, off)	Flash sequence for visually identifying the product . MS and NS LEDs flash simultaneously.
	○	No supply voltage or no IP address
L/A P1 FB	● (Green)	Connected to network (10/100 Mbit/s)
	● (Yellow)	Data transmission over the network (10/100 Mbit/s)
	○	No fieldbus connection

Display	LED (color)	Description
L/A P2 FB	● (Green)	Connected to network (10/100 Mbit/s)
	● (Yellow)	Data transmission over the network (10/100 Mbit/s)
L/A P3 GbE	● (Green)	Connected to network (10/100 Mbit/s)
	● (Green)	Data transmission over the network (10/100 Mbit/s)
	● (Blue)	Connected to network (1 Gbit/s)
	☀ (Blue)	Data transmission over the network (1 Gbit/s)
	○	No Ethernet connection

○ = off; ● = illuminated; ☀ = flashing

3.8 Working distance

Working distance and field of view size
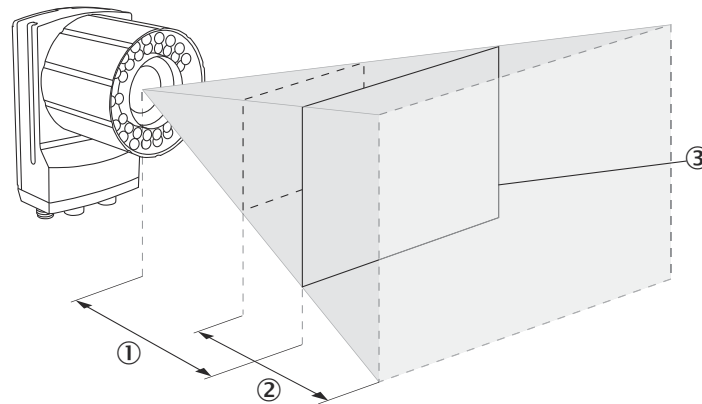
①   Working distance
②   Depth of field
③   Field of view size: horizontal x vertical (mm) in working distance ①

The perceived field of view area is determined by the focus position, the focal length of the lens, and the working distance. The necessary working distance can be determined from the field of view diagram.

Focus setting

The focus position can be adjusted manually on the lens.

The focus position is valid for one working distance. The device does not perform automatic tracking (auto focus) if, for example, the working distance changes significantly.

3.9 SICK AppSpace

The product family is part of the SICK AppSpace ecosystem, which consists of software tools and programmable sensors or devices. See figure 3 for an overview of SICK AppSpace.
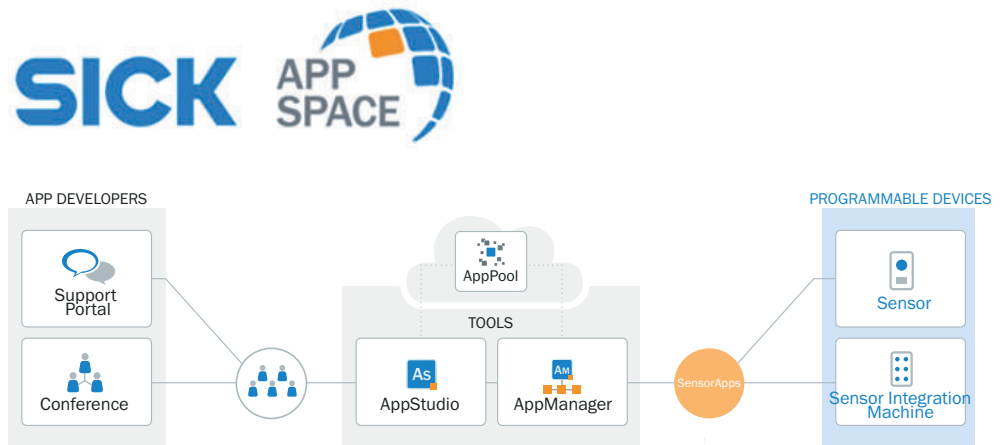
Figure 3: SICK AppSpace

SICK AppSpace includes the following components and resources:

- SICK AppManager: A software tool used for the installation and management of SensorApps and device firmware updates.
- SICK AppPool: A cloud-based repository for storing and sharing SensorApps. SICK AppPool can be accessed directly from SICK AppManager, SICK AppStudio, and from the web.
- SICK AppStudio: A Software Development Kit (SDK) for developing SensorApps on programmable SICK devices. Its user interface for machine operators can be created individually as a web GUI.
- The SICK Support Portal (supportportal.sick.com) contains tutorials and instructions for programming the in SICK AppStudio.

For more information about downloading SensorApps and programming the device, see "Commissioning", page 41.

For more information about SICK AppSpace, see www.sick.com/SICK_AppSpace.

4 Getting started

The purpose of this chapter is to quickly and easily connect the camera and capture initial images.

> **NOTE**
> Before using the product in a production environment, the complete operating instructions must have been read and understood.

For a complete guide to the software, see the Nova 2D operating instructions.

4.1 Mounting the product
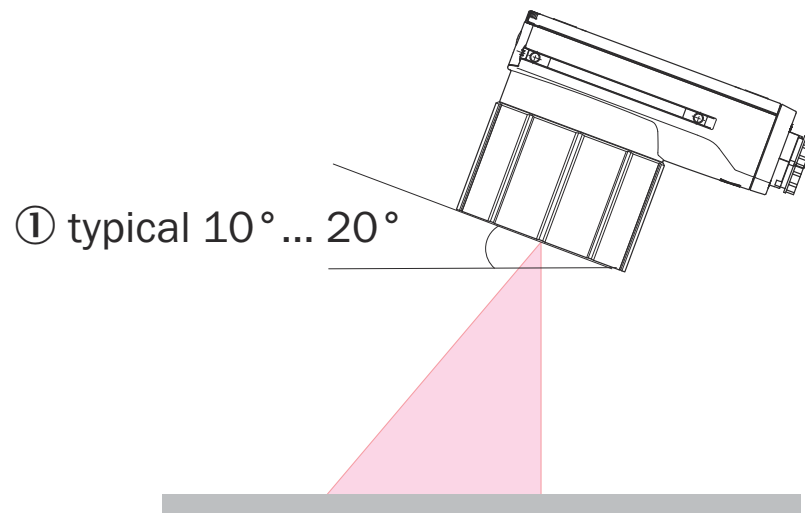
① typical 10°...20°

Figure 4: Mounting angle to use, depending on the application

①   Typical angle 10° ... 20°

- Mount the product so that it is tilted from the perpendicular to the surface.
- Make sure the product has a clear view of the objects to be scanned.

Further topics

- Mounting

4.2 Connecting the product

For an overview of the electrical connections for the installation, see "Electrical installation", page 32. The photoelectric sensor, external illumination, and connection module are optional accessories.

> **NOTE**
> The USB interface is recommended for easy setup and used for test, demo, and commissioning. The Gigabit Ethernet must be used for any permanent installation.

Inspector8xx

Ethernet or USB-C cable [1]

Computer with Gigabit [3]
Ethernet interface

Power I/O cable [2]

External [6]
illumination

Voltage supply [4]
24 V DC

Photoelectric sensor [7]

Connection module, [5]
i.e. CDB650
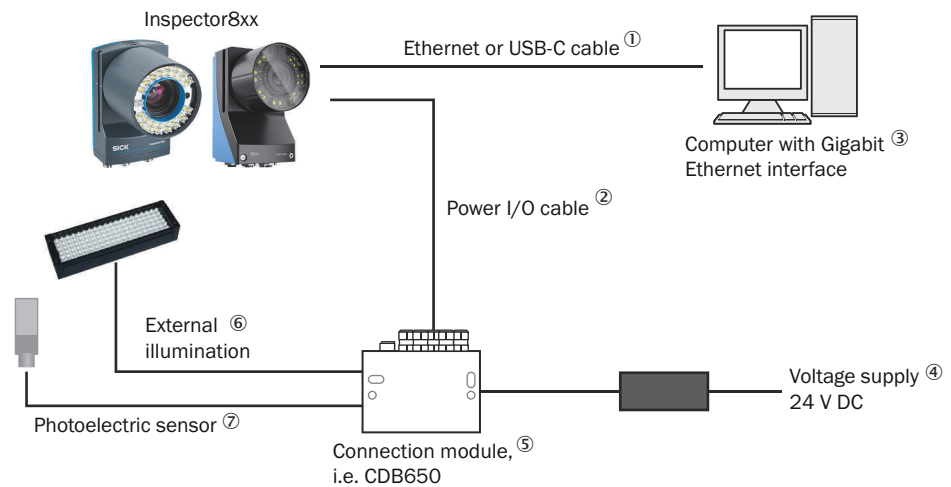
Figure 5: Connecting an Inspector8xx

[1]   Ethernet or USB-C cable

[2]   Power I/O cable

[3]   Computer with Gigabit Ethernet interface

[4]   Voltage supply 24 V DC

[5]   Connection module, i.e. CDB650

[6]   External illumination

[7]   Photoelectric sensor

> **NOTE**
> Preset IP addresses of the Ethernet interfaces:
>
> - Ethernet (default): 192.168.0.1
> - USB-C: 169.254.0.1
>
> When using USB-C, you can usually access the device at 169.254.0.1 without any configuration.

Further topics

- Electrical installation
- Setting up the Ethernet network
- Setting up the USB interface

4.3 Setting up the Ethernet network

The Ethernet network must be correctly set up, in order for the computer and device to communicate. The Ethernet network can be a factory or office network, or consist of only the computer and the device.

> **NOTE**
> Both the computer and the device must be set up for communication on the same network.

In this example, we connect the device directly to a Windows computer. The network consists of the computer, the device, and the Ethernet cable between them. Set the IP address and the Subnet mask so that each device has a unique IP address. The IP address must still be similar enough to belong to the same network.

4.3.1   Setting an IP address on the computer

If you have more than one Ethernet port, try to disconnect and reconnect the Ethernet cable between the device and computer. You can then identify which connection to adapt.
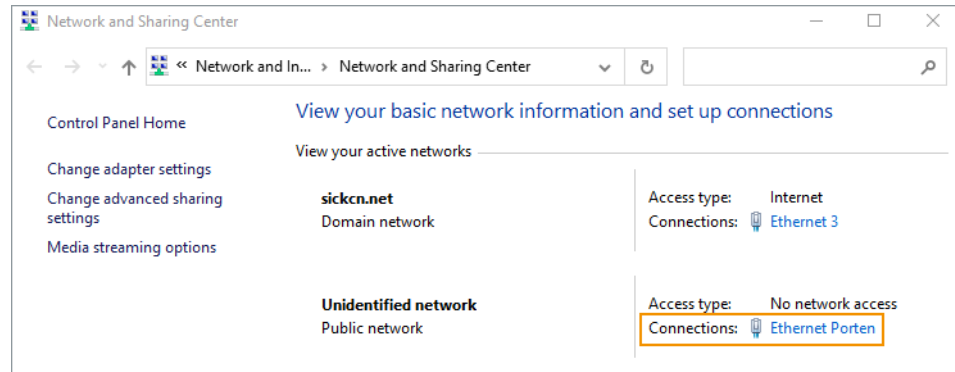
> **NOTE**
> You need to be authorized to change the computer settings.

1. Open the **Network and Sharing Center** on the computer.
2. Click on the link for the appropriate **Connection**.
3. Click on **Properties**.
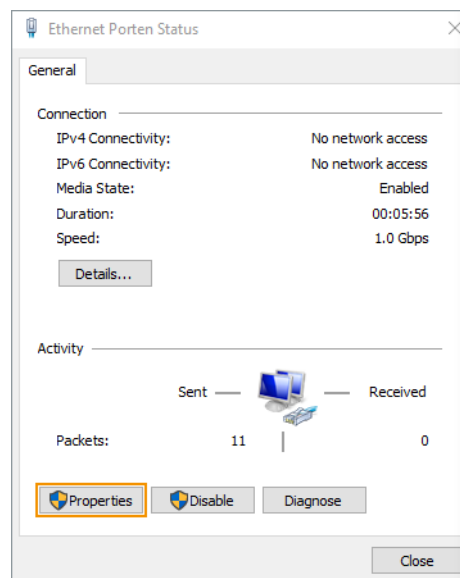
4. Select **Internet Protocol Version 4 (TCP/IPv4)** in the list, and click on **Properties**.
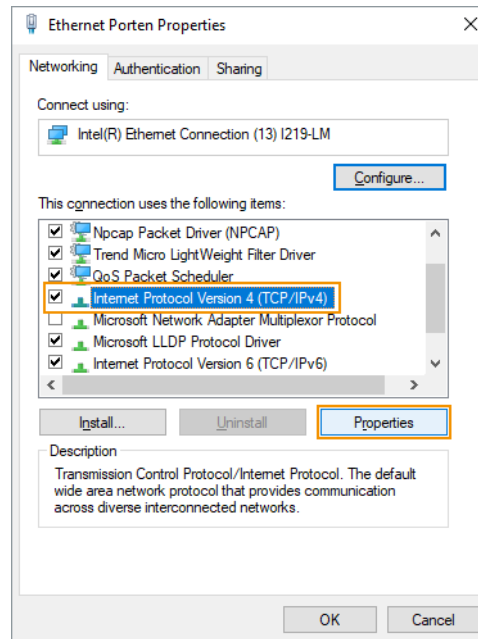
5. A DHCP-server automatically assigns IP addresses to recognized devices on the network. We have to manually assign an **IP address** and a **Subnet mask** to the computer, since there is no DHCP-server.
Set the **Subnet mask**. The subnet mask decides the size of the network.
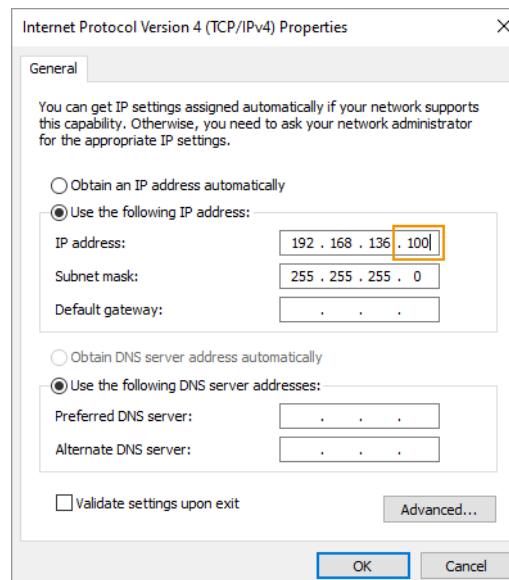
Each position in the subnet mask controls how many possible options that position can have in the corresponding IP address. However, a large number means fewer options and a small number means many possible options. The corresponding formula is:

$$\text{Number of options} = 256 - x$$

255 in a position means that there is only one possible option for that position in the IP-address. 0 means that you have all 256 possible options from 0 to 255 available for that position of the IP-address. 255.255.255.0 is sometimes called a C-network, and is the most commonly used network type. A C-network can, at the most, host 256 devices on the same network.

6. Set the **IP address**. Use the same IP address as the device for the first three sections. The last section in the IP address must be different.

In this example, we only have two devices to address. It does not matter what numbers you pick, as long as they all are smaller than 256.

7. Click **OK** and **Close** to complete the settings.

> **NOTE**
> If you use the same Ethernet port on your computer for connecting to your home, factory, or office network you have to remember to change back to your original settings in order for that to work when you are done connecting to the device. For that reason, it is usually a good idea to pick IP addresses that are compatible with that network in case you forget.

4.3.2   Setting an IP address on the device

Use the SICK AppManager to find connected devices on the local network, and change the settings on your device. If your device is powered up and connected to the computer when you start SICK AppManager, the device will show up as one or two lines in the **Device search** tab.

1. Open the **SICK AppManager** on the computer.
2. Select the line representing the desired device.
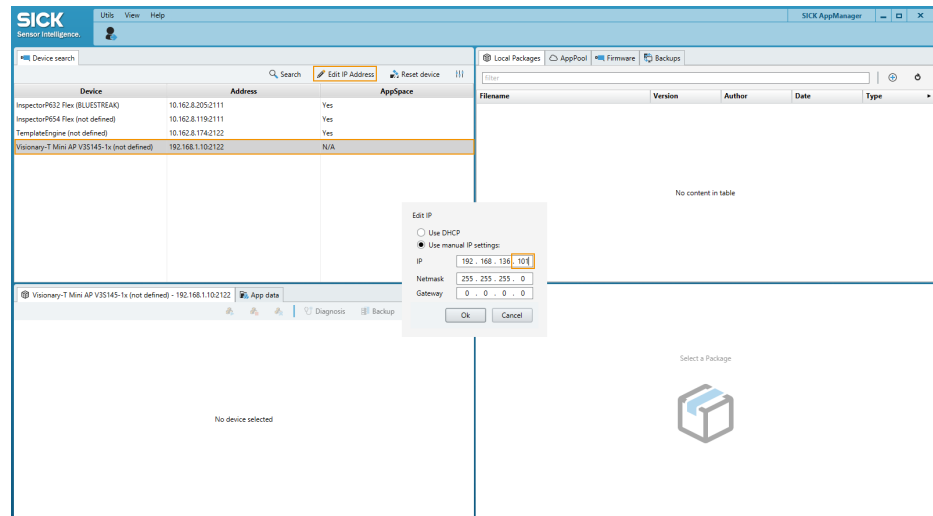
3. Click on **Edit IP Address**.
4. Set the **Netmask**. Enter the same subnet mask as the computer has.
5. Set the **IP**. Use the same IP address as the computer for the first three sections. The last section in the IP address must be different.
6. Click **OK**.

4.4   Setting up the USB interface

The device comes with a USB interface that supports the same functionality as the Ethernet interface. The USB interface is a service interface meant for temporary use. The interface can be used for commissioning the product. The interface is not intended for permanent connections in operational use.

The USB interface uses a virtual Ethernet link with the static IP address 169.254.0.1 on the device-side. This IP address cannot be changed. The device has a DHCP-server for the USB interface that automatically assigns IP addresses to connected computers. After connecting a computer to the device via USB, Windows will by default automatically assign an IP address to the associated network adapter. The device can be used directly by connecting to it via the IP address 169.254.0.1.

If you cannot connect to the device, verify that the network adapter associated with the USB interface has an IP address on the subnet 169.254.0.x. If this IP address is wrong or missing, make sure that the relevant network adapter is configured to obtain an IP address automatically.

> **NOTE**
> The network adapter associated with the USB interface is different from the network adapter associated with the Ethernet interface.

> **NOTE**
> Both the computer and the device must be set up for communication on the same network.

4.5 User interface

Opening the user interface

1. Open a web browser window.
2. Type the IP address of the device. The default IP address is 192.168.0.1.

> **NOTE**
> If you do not remember the device IP address, SICK AppManager will help you find it.

Overview of the user interface

Figure 6: User interface overview

①   Tool categories with tool boxes and tool tree

②   Job list

③   System/Jobs switch

④   Image source selection

⑤   Image viewer

⑥   Header information

⑦   Licensed toolset

⑧   Mode selection (Run/Configure)

⑨   Overall result, cycle time and issues list

⑩   Login and logout options

⑪   Save permanent

⑫   Import and export options, file explorer, language selection

⑬   Tool pane

⑭   Tool help

⑮   Footer information

⑯   Image controls

The footer shows information about the current setup, such as:

- Which toolset is active, i.e. Presence Inspection, Quality Inspection, or Intelligent Inspection.
- The connected device.
- The current **User level**.

5 Transport and storage

5.1 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.

5.2 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.
- To avoid ingress of dust and water, only remove the protective elements, e.g. protective caps of the electrical connections just before attaching the connecting cable.

5.3 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.

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

5.4 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 50.
- Relative humidity: see "Technical data", page 50.
- For storage periods of longer than 3 months, check the general condition of all components and packaging on a regular basis.

6 Mounting

6.1 Mounting instructions

- Observe the technical data.
- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- The mounting site has to be designed for the weight of the device.
- Mount the product in a shock and vibration insulated manner.

6.2 Mounting the lens and illumination unit

Overview

This mounting step is only required for the Inspector83x Flex product variant (basic device).
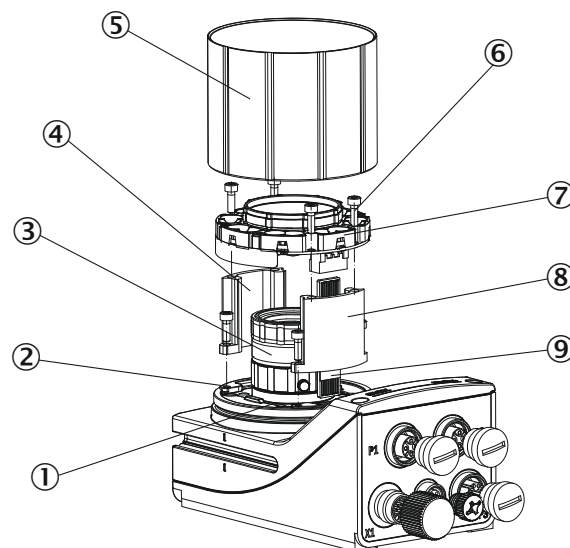
Figure 7: Mounting the lens and illumination unit

① Light inlet with threaded connection for the lens
② 4 tapped blind holes, M2.5, 6.2 mm deep, for mounting the spacer
③ Lens
④ Spacer, top
⑤ Optics protective hood
⑥ 4 holes and screws for mounting the illumination
⑦ Integrated illumination unit
⑧ Spacer, bottom
⑨ Electrical connection for the integrated illumination unit

Important information

> **! NOTICE**
> **Risk of damage due to electrostatic discharge**
>
> Electrostatic discharge from the human body may damage parts of the illumination unit or the camera housing.
>
> - Take the necessary ESD precautions when assembling the device.
> - Do not touch the open contacts of the electrical connection on the camera housing and the illumination unit.

ℹ **NOTE**

Make sure that the lens is sufficiently secured. Use a medium strength threadlocking adhesive, if there are high loads due to shocks and vibrations.

ℹ **NOTE**

Possible impairment of image quality

Contamination (e.g. dust, fingerprints) on the image sensor can impair the image quality and decoding performance of the product.

▶ Ensure a dust-free and dry environment when mounting components.
▶ Do not touch the image sensor in the light inlet opening of the product with your fingers.
▶ Do not touch the glass lenses at either end of the lens unit with your fingers.

Prerequisites

- There is a risk of burns at ambient temperatures above 30 °C. If the ambient temperature is above 30 °C, disassemble the optics cover and make fine adjustments to the mounted lens within 20 minutes after switching on the cooled device.
- Lens and illumination unit are compatible with the product. You can find compatible accessories on the product page on the Internet.
- SW 2-hex key
- SW 5 socket wrench, recommendation: as a torque wrench for 65 Ncm

Approach

1. Switch off the supply voltage to the device.
2. Place the camera housing on a nonslip base.
3. Remove the protection cap from the camera housing that covers the electrical connection for the illumination unit and the light inlet.
4. Insert the connection board for the illumination into the electrical connection slot in the device body. Do not touch the contacts to prevent ESD issues.
5. Screw the lens unit into the C-mount thread until it engages.
6. Take 2 pairs of screws and screw them into the tapped blind holes to mount each spacer on the camera housing.
7. Make sure that the illumination connection board is pushed into the electrical connection slot on the illumination.
8. Use the 4 screws to fasten the illumination unit to the two spacers.
9. In systems subjected to heavy vibrations, secure the screws used to mount the lens and illumination unit using threadlocking adhesive.
10. Manually preset the sharpness and aperture of the lens unit.
11. Check the adjustment using the WebGUI.
12. If the required adjustments to the lens are not carried out immediately, mount the optics protection hood for the lens.

6.3 Assembling the product

Approach

1. Mount the product on suitably prepared mounting equipment using M5 screws and by means of the threaded mounting holes or sliding nuts. Mounting equipment is available as an accessory.

- o   Screw the screws no more than 5 mm into the threaded mounting holes or sliding nuts.
- o   To do so, either use all 4 threaded mounting holes on the rear of the product or the two sliding nuts on the side of the product.
- o   Attach the optional SICK mounting equipment ordered separately using the sliding nuts on the product.

2. In application areas with severe vibrations or shocks caused by vibrations, jolts or abrupt changes in directions (e.g., when mounted to a manned forklift truck), mount the product with vibration dampers. Mount the product in a freely suspended manner.
3. Align the product taking into consideration the field of view and the application circumstances.
4. Connect the product to interfaces and supply voltage when disconnected from voltage.
5. Start the product.
✓ The **Ready** status LED lights up green.
6. Perform fine tuning.

7 Electrical installation

7.1 Wiring instructions

> **ℹ NOTE**
> Pre-assembled cables 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).

> **! 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.

The enclosure rating stated in the technical data is achieved only with screwed plug connectors or protective caps.

Configure the circuits connected to the device as ES1 circuits or as SELV circuits (SELV = Safety Extra Low Voltage). The voltage source must meet the requirements of ES1 (EN 62368-1) or SELV (EN 60950-1).

Connect the connecting cables in a de-energized state. Do not switch on the supply voltage until installation is complete and all connecting cables are connected to the device and control.

Wire cross-sections in the supply cable from the customer's power system must be implemented in accordance with the applicable standards.

In the case of open end cables, make sure that bare wire ends do not touch. Wires must be appropriately insulated from each other.

> **ℹ NOTE**
> System shall only be used with shielded cables and the shield must be connected to earth-potential on both ends.

7.2 Prerequisites for safe operation of the device

⚠ **WARNING**
Risk of injury and damage caused by electrical current!

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

- Dangerous voltages are applied to the metal housings.
- Devices will behave incorrectly or be destroyed.
- Cable shielding will be damaged by overheating and cause cable fires.

Remedial measures

- Only skilled electricians should be permitted to carry out work on the electrical system.
- If the cable insulation is damaged, disconnect the voltage supply immediately and have the damage repaired.
- Ensure that the ground potential is the same at all grounding points.
- Where local conditions do not meet the requirements for a safe earthing method, take appropriate measures. For example, ensure low-impedance and current-carrying equipotential bonding.

The device is connected to the peripheral devices (any local trigger sensor(s), system controller) via shielded cables. The cable shield – for the data cable, for example – rests against the metal housing of the device.

The device can be grounded through the cable shield or through a blind tapped hole in the housing, for example.

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

This is achieved by complying with the following conditions:

- Mounting the devices on conductive metal surfaces
- Correctly grounding the devices and metal surfaces in the system
- If necessary: low-impedance and current-carrying equipotential bonding between areas with different ground potentials
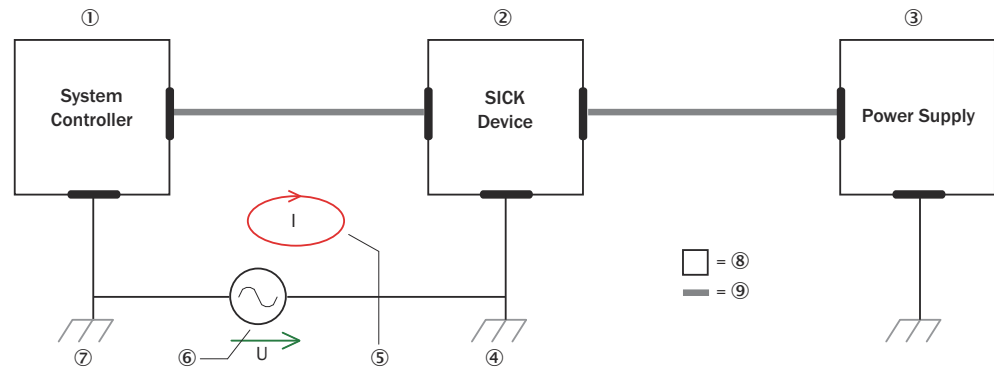
Figure 8: Example: Occurrence of equipotential bonding currents in the system configuration

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

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

Remedial measures

The most common solution to prevent equipotential bonding currents on cable shields is to ensure low-impedance and current-carrying equipotential bonding. If this equipotential bonding is not possible, the following solution approaches serve as a suggestion.

> **!**   **NOTICE**
> We expressly advise against opening up the cable shields. This would mean that the EMC limit values can no longer be complied with and that the safe operation of the device data interfaces can no longer be guaranteed.

Measures for widely distributed system installations

On widely distributed system installations with correspondingly large potential differences, the setting up of local islands and connecting them using commercially available **electro-optical signal isolators** is recommended. This measure achieves a high degree of resistance to electromagnetic interference.
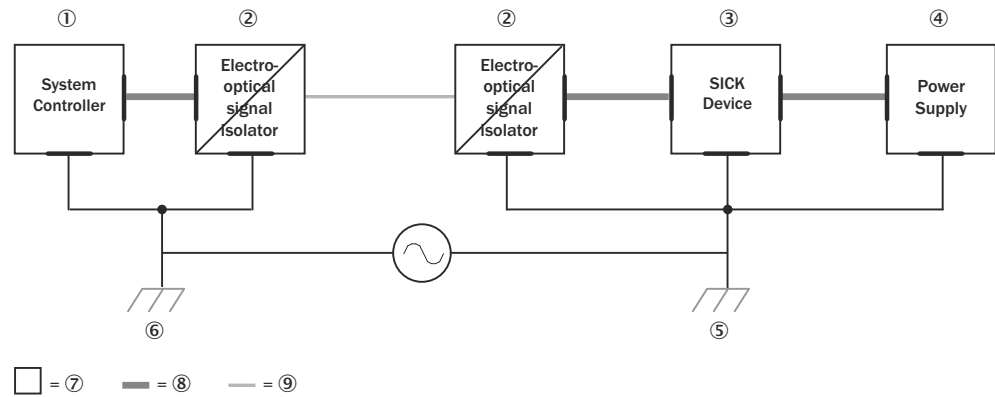
Figure 9: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

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

The use of electro-optical signal isolators between the islands isolates the ground loop. Within the islands, a stable equipotential bonding prevents equalizing currents on the cable shields.

Measures for small system installations

For smaller installations with only slight potential differences, insulated mounting of the device and peripheral devices may be an adequate solution.
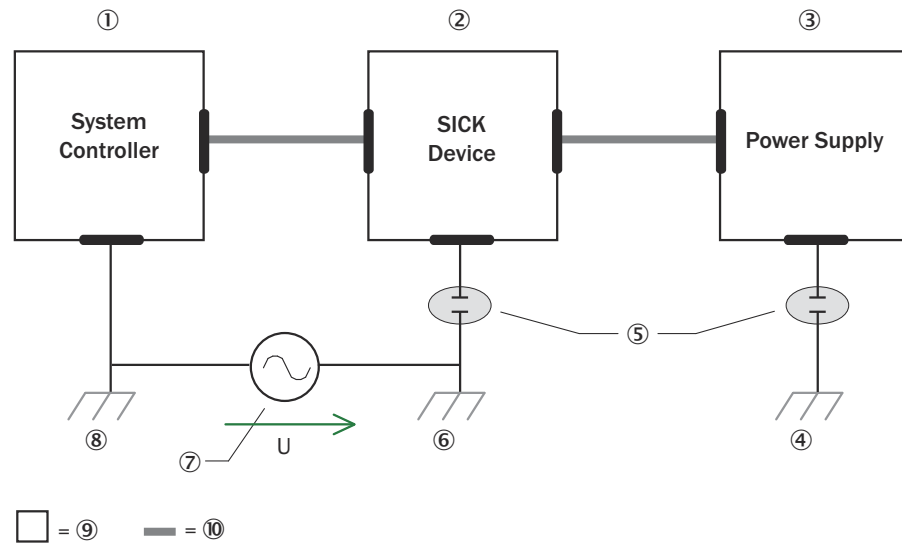
Figure 10: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

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

Even in the event of large differences in the ground potential, ground loops are effectively prevented. As a result, equalizing currents can no longer flow via the cable shields and metal housing.

NOTICE

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

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

7.3 Connections and pin assignment

Overview
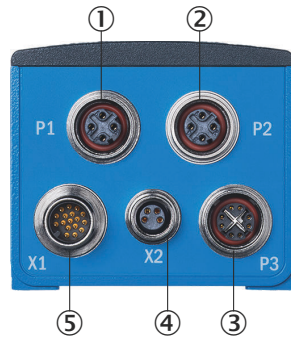
Figure 11: Connection overview

① P1: Fieldbus Ethernet 1
② P2: Fieldbus Ethernet 2
③ P3: GB Ethernet
④ X2: External illumination/IO
⑤ X1: Power/serial interface/IO

Important information

Prerequisites

General
- Connect the connecting cables in a de-energized state. Do not switch on the supply voltage until installation is complete and all connecting cables are connected to the device and control.
- Wire cross-sections in the supply cable from the user's power system must be implemented in accordance with the applicable standards.
- In the case of open end cables, make sure that bare wire ends do not touch. Wires must be properly insulated from each other.
- The maximum current consumption depends on how the product is used. If outputs are used, the current consumption will be higher. Ensure that the sum of the output currents at the outputs does not exceed 400 mA.

Data cables
- Use shielded data cables with twisted-pair wires.
- Implement proper and complete shielding concept.
- To avoid interference, always use EMC-compliant cables and layouts. This applies, for example, to cables for switched-mode power supplies, motors, clocked drives, and contactors.
- Do not lay cables over long distances in parallel with voltage supply cables and motor cables in cable ducts.

Voltage supply
- Configure the circuits connected to the device as ES1 circuits or as SELV circuits (SELV = Safety Extra Low Voltage). The voltage source meets the requirements of ES1 (EN 62368-1) or SELV (EN 60950-1).
- The device must be supplied with an energy-limited source as per UL61010-1, 3rd ed. cl. 9.4 or a limited current source as per UL62368-1 or Class 2 as per NEC.
- Required power output of the voltage source: at least 48 W

- For a supply voltage of DC 24 V ± 20%, protect the cables with a separate fuse. The type of fuse required depends on the cable used (typically cable M12 17-pin with 2 A fuse). Install the fuse in the supply circuit at the start of the supply cable.
- To ensure protection against short-circuits/overload in the customer's supply cables, choose and implement wire cross-sections in accordance with the applicable standards.

Power/serial interface/IO
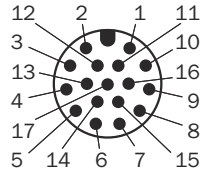
Figure 12: Male connector, M12, 17-pin, A-coded

PIN	Signal	Function
1	GND	Ground
2	V_S	Supply voltage: DC 24 V ± 20%
3	–	–
4	–	–
5	TD+ (RS-422)	Serial data interface (sender+)
6	TD- (RS-422) TxD (RS-232)	Serial data interface (sender-)
7	TxD (RS-232)	Serial service interface (sender)
8	RxD (RS-232)	Serial service interface (receiver)
9	SensGND	Ground digital inputs 1 and 2
10	Sensor 1	Digital input 1 (insulated)
11	RD+ (RS-422)	Serial data interface (receiver+)
12	RD- (RS-422) RxD (RS-232)	Serial data interface (receiver–)
13	IN/OUT 3	Digital input/output 3 (configurable)
14	IN/OUT 4	Digital input/output 4 (configurable)
15	Sensor 2	Digital input 2 (insulated)
16	IN/OUT 5	Digital input/output 5 (configurable)
17	IN/OUT 6	Digital input/output 6 (configurable)

External illumination/IO
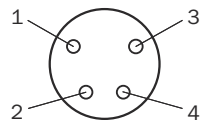
Figure 13: Female connector, M8, 4-pin

PIN	Signal	Description
1	V_{out} switchable[1] [2]	Switchable power out for external illumination
2	IN/OUT 7 or Trigger external illumination	Digital input/output (configurable) or Trigger for external illumination
3	GND	Ground

PIN	Signal	Description
4	IN/OUT 8 or Trigger external illumination	Digital input/output (configurable) or Trigger for external illumination

1) The maximum output current is configurable and fused internally with a self-resetting fuse:
   - 1.0 A
   - 0.2 A

2) The internal illumination is shut off when the power out via X2 connector is enabled depending on the fuse:
   - 1.0 A: Internal illumination shut off
   - 0.2 A: Internal illumination available

Fieldbus Ethernet
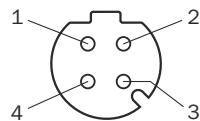
Figure 14: Female connector, M12, 4-pin, D-coded

PIN	Signal	Description
1	TX+	Sender+
2	RX+	Receiver+
3	TX–	Sender–
4	RX–	Receiver–

GB Ethernet
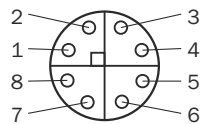
Figure 15: Female connector, M12, 8-pin, X-coded

PIN	Signal	Description
1	TRD0_P	Sender+/receiver+ 0
2	TRD0_N	Sender–/receiver– 0
3	TRD1_P	Sender+/receiver+ 1
4	TRD1_N	Sender–/receiver– 1
5	TRD3_P	Sender+/receiver+ 3
6	TRD3_N	Sender–/receiver– 3
7	TRD2_N	Sender–/receiver– 2
8	TRD2_P	Sender+/receiver+ 2

Complementary information

Pre-assembled cables 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).

Further topics

- Information on interfaces: Technical data

7.4 Connecting

7.4.1 Connecting the product electrically

Important information

> **!** **NOTICE**
> Observe the wiring instructions, see "Wiring instructions", page 32.

Approach

1. Ensure the voltage supply is not connected.
2. Connect the product according to the connection diagram.

Further topics

- see "Connections and pin assignment", page 37

7.4.2 Voltage supply

Prerequisites

- Configure the circuits connected to the device as ES1 circuits or as SELV circuits (SELV = Safety Extra Low Voltage). The voltage source meets the requirements of ES1 (EN 62368-1) or SELV (EN 60950-1).
- Required power output of the voltage source: at least 48 W
- To ensure protection against short-circuits/overload in the customer's supply cables, choose and implement wire cross-sections in accordance with the applicable standards.
- For a supply voltage of DC 24 V ± 20%, protect the cables with a separate fuse. The type of fuse required depends on the cable used (typically cable M12 17-pin with 2 A fuse). Install the fuse in the supply circuit at the start of the supply cable.
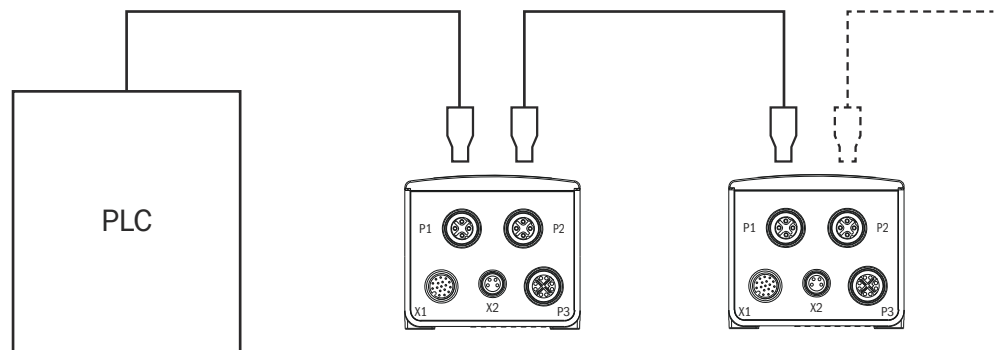
7.4.3 Fieldbus connection principle

Figure 16: Connection principle for fieldbus

① PLC (Programming Logic Controller)
② Fieldbus (Profinet, EtherNet/IP™)

8   Commissioning

> **NOTE**
> Update the device firmware version before you start using the device. Always use the latest version, unless there is a specific need to use an older version. Download the latest version of the firmware from the SICK Support Portal (supportportal.sick.com) and install it using SICK AppManager.

Inspector8xx is a programmable device. To use it, the following options are available:

- Using the default SensorApp Nova 2D with a pre-activated Quality Inspection license (see "Default SensorApp: Nova 2D", page 42).
- Using other SensorApps that are available for the device (see "Installing Sensor-Apps", page 43).
- Programming SensorApps for the device (see "Programming the device", page 44).

8.1   Password management

Overview

The standard password for Userlevel: Service is `Servicelevel`. However, each package can be built with a different password. If you are installing a beta release, ask the provider for the userlevel and password.

> **NOTE**
> For security reasons, it is strongly recommended to change the default password.

UserLevel passwords can be managed using the Sick Windows program SOPAS Engineering Tool (SOPAS ET). To use this program, download one of the variants of SOPAS ET and install it from www.sick.com.

Password change

To change the password of a UserLevel, add your device to a SOPAS ET project. The process for finding devices is described in the SOPAS ET manual under the section **Searching Result Area**. You can find the SOPAS ET manual in the folder help in the path where you installed SOPAS ET. By default, this path is:

- For installed version: `C:\Program Files (x86)\SOPAS ET\help`
- For portable version: `<path-to-download-location>\help`

Changing the password
1. Click **Login** on the device to open up the login dialog, and log in as `Service`. If you have not changed the default password, you will automatically be prompted to change it.
2. Select the device and press the ⋮ symbol in the upper right corner.
3. Select **Device/Change password…** to initiate a password change.

Password recovery

Password recovery is described in the section **Password Recovery** of the SOPAS ET manual.

8.2   Computer software

SICK AppManager

The SICK AppManager software can be used for the following actions:

- Installing a SensorApp on a device.
- Reading and changing the device's IP address.
- Starting, stopping or deleting an installed SensorApp.
- Installing firmware updates.

Download SICK AppManager from **www.sick.com/SICK_AppManager**. To install SICK AppManager on the computer, open the installation (.exe) file and follow the instructions on the screen.

SICK AppStudio

The SICK AppStudio development environment is used to program the device and to perform diagnostics in case of faults.

The use of SICK AppStudio requires a valid license. A one-year license (art no 1610199) is available from **www.sick.com/SICK_AppStudio**. After purchasing the license, download the SICK AppStudio software from the SICK Support Portal, **support-portal.sick.com**.

After downloading SICK AppStudio, follow the on-screen instructions to complete the installation.

8.3 Network communication settings

To connect to the device from a computer, make sure that the network communication settings are correctly set up:

- The device must be connected to the computer via Ethernet (P3) or USB.
- The computer must be on the same network as the device.
- The computer must not use the same IP address as the device.

Default IP addresses:
- Ethernet (P3): 192.168.0.1
- USB: 169.254.0.1

Editing the device's IP address

To change the device's IP address using SICK AppManager:

1. Open SICK AppManager.
✓ All connected devices on the network are listed on the **Device search** tab.
2. Select the correct device in the list.
3. Click **Edit IP address**.
4. Enter the new IP address for the device.

8.4 Default SensorApp: Nova 2D

The Nova 2D SensorApp with a pre-activated Quality Inspection license is pre-installed on the device and is also available for download from SICK AppPool. The Nova 2D SensorApp uses vision-based quality inspection to ensure that produced items have the exact qualities required regarding presence and measurements of details.

Opening the user interface

Nova 2D is configured through a web-based graphical user interface. To open the user interface from a web browser:

1. Open a web browser window.
2. Type the IP address of the device. The default IP address is 192.168.0.1.

Using tools

The Quality Inspection toolset contains a selection of software tools for image analysis, result output, and communication. A help text for each tool is accessible directly from the GUI. The tools are also listed and described in the Nova 2D Operating Instructions, art no 8025687.

The Quality Inspection toolset is based on SICK Nova, which allows the user to create and import additional tools. For a description of how to import a tool through SICK AppManager, see the Nova 2D Operating Instructions. Information on SICK Nova tool development is available from the SICK Support Portal, supportportal.sick.com.

8.5 Installing SensorApps

8.5.1 Available SensorApps

The available SensorApps for the device can be downloaded from SICK AppPool (http://apppool.cloud.sick.com/). The use of SICK AppPool requires a SICK ID, which can be obtained at the login page at the link above.

The **Apps** tab on each device page on www.sick.com contains a list of available Sensor-Apps for the device.

8.5.2 Installing or updating a SensorApp on the device

A SensorApp must be downloaded to the computer before installing it on the device. There are two different options for downloading a SensorApp:

- Online option: If the computer has Internet access when connected to the device, the SensorApp can be downloaded and installed directly from SICK AppPool as part of the installation procedure described below.
- Offline option: If the computer does not have Internet access when connected to the device, the SensorApp must be downloaded from the SICK AppPool to the computer via a web browser prior to the installation.

To install or update a SensorApp using SICK AppManager:

1. Connect the device to the computer via Ethernet.
2. On the computer, open SICK AppManager.
3. Under the **Device Search** tab in SICK AppManager, click **Scan** to search for available devices on the network.
4. In the list of available devices, select the device where you want to install the SensorApp.
5. If the device tab (lower left pane) contains any active applications, right-click the applications and delete them.
6. Online option: To download and install the SensorApp directly from the AppPool:
   a) Click **Login to SICK ID** (below the **Utils** menu in SICK AppManager) to log in to SICK AppPool.
   b) Click the **AppPool** tab.
   c) Select a SensorApp in the list of available SensorApps.
   d) Click **Download and install** to download the selected SensorApp to the computer and install it on the device.
   Or:
   Offline option: To install a downloaded SensorApp from the computer to the device:
   a) Click the **Local Packages** tab in SICK AppManager.
   b) Drag and drop the **SensorApp** into the file list.
   c) Click **Install** to install the SensorApp on the device.
   ✓ The SensorApp is now installed and running on the device.

8.5.3 Opening the web user interface

To access the user interface for an installed SensorApp:

1. Open a Google Chrome web browser window.
2. Type the IP address of the device. The default IP address is 192.168.0.1.

8.6 Programming the device

8.6.1 Starting SICK AppStudio

Before starting SICK AppStudio:

- Make sure that the network communication settings are correct (see "Network communication settings", page 42).
- When starting SICK AppStudio for the first time, a license dialog opens. To be able to use the software, make sure to have a valid license available (see "Computer software", page 41).

8.6.2 Lua scripting

The embeddable scripting language Lua is used to create scripts in SICK AppStudio. See **www.lua.org** for more information about Lua.

8.6.3 Programming API

SICK AppSpace has a large application programming interface (API) which includes algorithms and functionality for hardware configuration, result processing, and result communication. The API consists of functional groups called crowns, where each crown contains functions and events related to a specific topic.

The complete API documentation for each firmware release is available in the SICK Support Portal, **supportportal.sick.com**.

> **NOTE**
> The API is directly accessible from SICK AppStudio. To access it, click a free place in a lua file and press Ctrl+Space to display a list of all accessible functions and commands for the device.

8.6.4 Tutorials and code samples

Tutorials and code samples for general and device-specific topics are available to help the user get started with the programming of the device:

- Tutorials are available from the SICK Support Portal: **supportportal.sick.com/pages/appspace/documentation-and-more**.
- Code samples are available from Gitlab: **gitlab.com/sick-appspace/samples**.

The above pages can be accessed directly from the **Help** menu in SICK AppStudio.

8.7 MicroSD memory card

MicroSD memory card

The device has a card slot for a microSD memory card integrated in the housing. The memory card is used as an external storage medium. The microSD memory card can also be ordered as an optional accessory. To ensure that the memory card functions reliably, only use card types (industrial standard) approved by SICK.

Functions

Function	Description
Cloning	Save currently valid save parameter set on an external storage medium. The externally stored parameter set is also updated automatically each time the parameterization is permanently saved. The cloning function provides the means, for example in the event of a device fault, for manual transmission of the parameter set to an exchange unit of the same type.

Other functions are available upon request.

Further topics

*   Inserting and removing memory card

8.7.1 Inserting and removing memory card

Important information

> **!** **NOTICE**
> **Loss of configuration data**
> Do not remove the memory card or switch off the supply voltage while the parameter set is being saved. Otherwise all parameters not yet saved permanently will be lost.

Prerequisites

*   The supply voltage for the product is switched off.
*   If the cover is open, the product does not fulfill any specified enclosure rating. Only briefly open the cover. Protect the product against moisture and dust during this time.

Approach

Inserting the memory card
1. Open the rubber cover.
2. Making sure it is in the correct position, insert the memory card into the slot until it locks into place. To do so, align the product as per the card icon.
3. Close the cover again. Make sure that the cover is flush with product.
4. Switch on the supply voltage for the product.

Removing memory card
1. Push the memory card into the slot until it is released.
2. Remove the memory card.
3. Close the cover again. Make sure that the cover is completely flush with the product when closed.
4. Switch on the supply voltage for the product.

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.

> **NOTE**
> No maintenance is required to ensure compliance with the LED risk group.

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

Table 4: 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**
> **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.

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.

10 Troubleshooting

10.1 SICK service

If you require any technical information, our SICK Service will be happy to help. To find your agency, see the final page of this document.

> **NOTE**
> To help us to resolve the matter quickly, please note down the details on the type label.

10.2 Overview of possible errors and faults

Table 5: Errors and faults

Situation	Error/fault
Mounting	▪ Device poorly aligned to the object (e.g. dazzle).
Electrical installation	▪ Data interfaces of the device incorrectly wired.
Programming	▪ See SICK AppSpace interface documentation (troubleshooting of individual objects and functions).
Operation	▪ Trigger control incorrect and/or not suitable for the object. ▪ Device faults (hardware/software).

10.3 Detailed fault analysis

10.3.1 LEDs on the device

The LED display indicates the status of the device and its connections. When troubleshooting, see the information given for the different LEDs.

Further topics

- Display and control elements

10.4 Repairs

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

10.5 Returns

- ▶ 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

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

	Inspector83x
Typical application	Indoor area
Task	Quality Inspection Position determination Measuring 2D Code reading[1]
Technology	2D snapshot, image analysis, Deep Learning
Product category	Programmable, configurable
SensorApp	Nova 2D SensorApp included, with pre-activated Quality Inspection License or Intelligent Inspection License. [2] Based on the SICK Nova SensorApp foundation, which allows functional extensions via tool plug-ins and custom development.
Toolkit	SICK algorithm API HALCON
Sensor	CMOS matrix sensor, grayscale values Depends on type, see "Type code", page 15.
Shutter technology	Global shutter
Optical focus	Adjustable focus (manually)
Working distance	Typically 200 mm … 2,500 mm[3]
Sensor resolution	Depends on type, see "Type code", page 15.
Integrated Illumination	Order separately as an accessory, e.g. variant of the VI55I illumination unit **Variants of the VI55I illumination unit with 16 LEDs:** • Visible white light, medium, aperture angle: 31 ° • Visible white light, wide, aperture angle: 47 °
LED risk group of the illumination unit (visible white light variant)	Risk group 1 (low risk) according to IEC 62471-1: 2006-07 / EN 62471-1: 2008-09 **Radiance:** • L_B [4]: < 10 x 10^3 W/(m²sr) within 100 seconds; at a distance ≥ 200 mm • L_R [5]: < 2.5 x 10^6 W/(m²sr) within 10 seconds; at a distance ≥ 200 mm
Lens	C-mount Order separately as an accessory

	Inspector83x
Sensor format	V2D8305x–xxxxxxxxxx: 1/1.8"

[1] Not yet available in pre-installed Nova 2D SensorApp.
[2] The pre-activated license depends on device variant and configuration.
[3] Depends on lens used.
[4] L_B= Hazard from blue light.
[5] L_R= Hazard to the retina of the eye due to heating.

12.2 Mechanics and electronics

	Inspector83x
Connection type	• 1 male connector, M12, 17-pin, A-coded (Power, serial interface, I/O) [1] • 1 female connector, M8, 4-pin, (External illumination) [1] • 1 female connector, M12, 8-pin, X-coded (GB Ethernet) • 2 female connectors, M12, 4-pin, D-coded (Fieldbus Ethernet)
Supply voltage V_S	DC 24 V ± 20% Voltage source in accordance with ES1 (EN62368-1) or SELV (EN60950-1)
Power consumption	Operation: 21 W [2]
Current consumption	Max. 2.0 A
Output current	Output current per output: max. 200 mA Sum of output currents: max. 400 mA[3]
Housing material	Aluminum die cast
Housing color	Anthracite gray (RAL 7016)
Viewing window material	Plastic (PMMA), with scratch-proof coating
Cover (top of device)	Material: Rubber Function: For temporary access to the microSD memory card slot and the USB connection Hinged [4]
Enclosure rating	IP 65 (IEC 60529:2013 +C1:2013 +C2:2015 +AMD2 C1:2019, EN 60529:1991 +A1:2010 +A2:2013 +AC:2019-02) [5]
Electrical safety	EN 61010-1:2010 EN 61010-1:2010/A1:2019 EN 61010-1:2010/A1:2019/AC:2019-04
Dimensions (L x W x H)	108 mm x 63.1 mm x 55.4 mm [6]

[1] Maximum length of cable: 10 m
[2] Without load on digital outputs and power out.
[3] Ensure that the sum of power out current for external illumination and the output currents do not exceed 1050mA.
[4] When the cover is open, the device no longer conforms with the specified enclosure rating.
[5] Comply with the requirements to maintain the specified enclosure rating.
   Prerequisites:
   • The optics protection hood must be screwed tightly onto the device.
   • The cover on the top of the device at the rear must be inserted and flush with the device.
   • The cables plugged into the electrical connections must be screwed tight. Electrical connections that are not being used are sealed off with a tightly-fastened protective cap.
[6] Housing only, without lens and optics protection hood.

12.3 Performance

	Inspector83x
Sensor resolution	V2D8305x–xxxxxxxxxx: 5megapixel (2464px x 2048px)
Scan/frame rate[1]	30 Hz, at 5 megapixels resolution

[1] Maximum, lower at long exposure times. Image capture time only, does not include additional required processing time.

12.4 Interfaces

	Inspector83x
Ethernet	Protocol: TCP/IP **Function:** • FTP (image transfer) • Data interface (result output) • Command channel • Trigger interface • Device configuration (web user-interface) Kolla hur detta är skrivet på andra ställen Data transmission rate: 10/100/1000 Mbit/s
EtherNet/IP™ Dual Port	Protocol: EtherNet/IP™ **Function:** • Data interface (result output) • Trigger interface • Command channel Data transmission rate: 10/100 Mbit/s
PROFINET Dual Port	Protocol: PROFINET **Function:** • Data interface (result output) • Trigger interface • Command channel Data transmission rate: 10/100 Mbit/s
Optical displays	8 status LEDs
Operator interfaces	Web server
Configuration software	Web GUI (SensorApp configuration), SICK AppManager (IP determination and configuration, SensorApp installation), SICK AppStudio (programming)
Data storage and retrieval	Image and data storage via external FTP
Inputs/outputs	2 x insulated inputs, physical, switching 6 x configurable inputs/outputs, physical, switching (4 on Power-I/O connector, 2 on External illumination connector)
Maximum encoder frequency	50 kHz
External illumination	Powered by an external voltage supply, or by V_{out} (max 1 A) on external illumination 4-pol connector. Triggered via digital output on 17-pol connector, or on external illumination 4-pol connector.

12.5 Ambient data

	Inspector83x
Electromagnetic compatibility (EMC)	Immunity: IEC 61000-6-2:2016, EN IEC 61000-6-2:2019 Emission: IEC 61000-6-4:2018, EN IEC 61000-6-4:2019
Vibration resistance	EN 60068-2-6:2007, EN 60068-2-64:2019
Shock resistance	EN 60068-2-27:2008
Ambient operating temperature	0 °C … +40 °C
Storage temperature	–20 °C … +70 °C[1]
Permissible relative humidity	0% … 90%, non-condensing
Ambient conditions	Degree of contamination 2 (according to EN 61010-1)
Altitude	< 5000 m above sea level

[1] Store in a place protected from moisture and dust.

12.6 Field of view diagrams

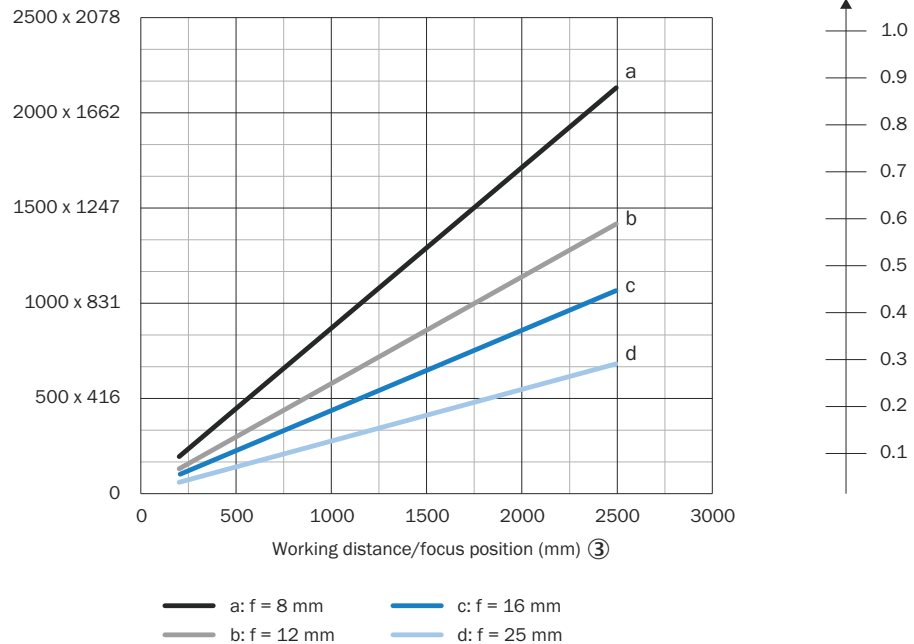**Inspector83x Flex**

Device type: V2D8305P-xxxxxxxxxx

Figure 17: Field of view diagram for Inspector83x Flex, 5 megapixel

① Field of view: horizontal x vertical in mm

② Approximate resolution in mm/px

③ Working distance/focus position in mm

Interpreting the diagrams

You can use the diagram to determine the following data:

- The dimensions of the field of view for a certain working distance and lens focal length

Interpretation aid for the field of view diagram

Using the diagram, you can determine the following data for each device type:
- The maximum working distance for a selected resolution
- The dimensions of the field of view that is available for this distance
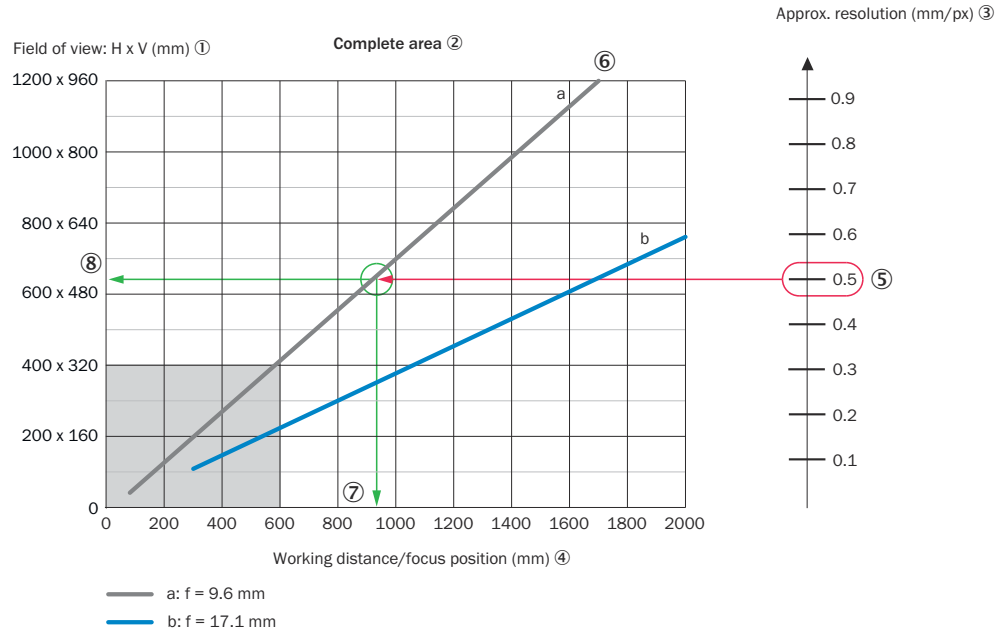

Figure 18: Example of field of view diagram

① Field of view: horizontal x vertical in mm
② Complete area
③ Approximate resolution in mm/px
④ Working distance/Focus position in mm
⑤ Selected resolution
⑥ Focal length of lens, here example for f = 9.6 mm
⑦ Reading off: resultant maximum working distance
⑧ Reading off: resultant field of view (mm x mm)

Given (in red):
- Resolution ⑤: approx. 0.5 mm/px
- Focal length of lens ⑥: 9.6 mm

Read off (in green):
- Maximum working distance ⑦: approx. 930 mm
- Field of view ⑧: approx. 640 mm x approx. 510 mm

Both axes of the diagrams must be interpreted linearly.
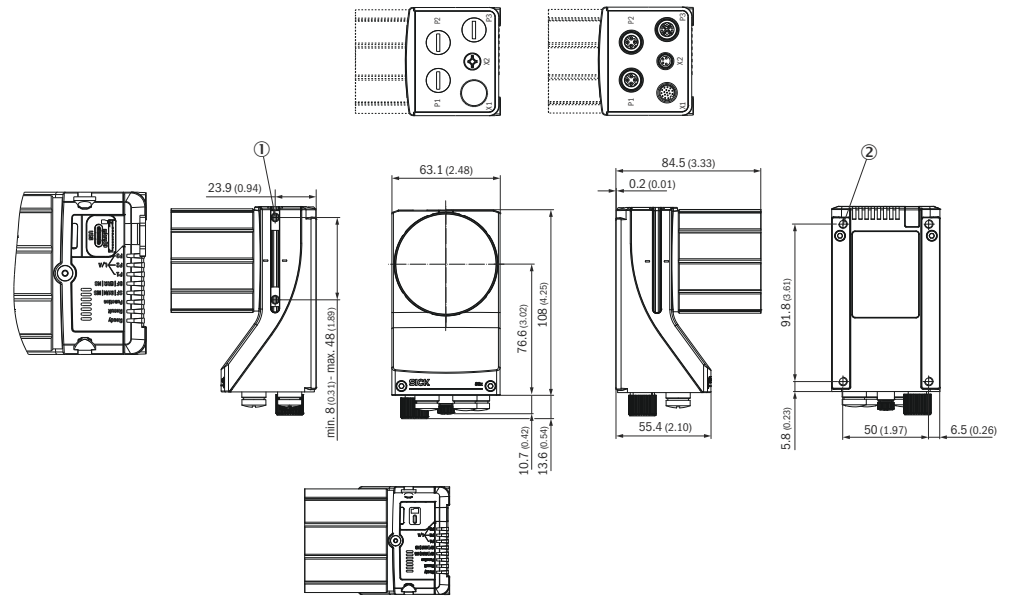
12.7　Dimensional drawing

Figure 19: Structure and device dimensions, unit: mm (inch), decimal separator: period

① 2 M5 sliding nuts; 5.5 mm deep; pivoting; as an alternative method of mounting the device

② 4 M5 tapped blind holes, 5.5 mm deep; for mounting the device

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 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).

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This program is provided for general use without warranty of any kind. This warranty disclaimer also extends to the implicit assurance of marketability or suitability of the program for a particular purpose.

More details can be found in the GNU General Public License.

For license texts see www.sick.com/licensetexts.

Printed copies of the license texts are also available on request.

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