

Inspector85x

2D machine vision

SICK
Sensor Intelligence.



Described product

Inspector85x

Manufacturer

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Original document

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1 About this document

1.1 Information on the operating instructions

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

Prerequisites for safe work are:

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

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



NOTE

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

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

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

1.2 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	VI83I-xxxxxxHx illumination unit	8027770	www.sick.com/8027770

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 Inspector85x 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. For information about the factory default settings when using the device with the Nova 2D SensorApp, see [table 1, page 9](#).

Table 1: Default device settings

Service	Physical port	Logical port	Encrypted	Authenticated	Default status	Description
SOPAS REST API web server	P3	TCP port 80	No	Yes	Listening	Used for configuration of the device
CROWN REST API server	P3	TCP port 80	No	No	Listening	Used for configuration of the device
CROWN Web socket server	P3	TCP port 80	No	No	Listening	Used for configuration of the device and image transfer to GUI
Web server	P3	TCP port 80	No	No	Listening	Used for configuration of the device
CoLa-2 server	P3	TCP port 2122	No	Yes	Listening	Used for configuration of the device
ColaScan	P3	UDP port 30718	No	No	Listening	Used for device detection and automatic IP configuration
FTP client	P3	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

Service	Physical port	Logical port	Encrypted	Authenticated	Default status	Description
DHCP server	USB	TCP port 67	No	No	Listening	Only listens on USB. Enables automatic IP configuration for RNDIS
SSH server	P3	TCP port 22	Yes	Yes	Not used	Used for device repair
TCP client	P3	TCP configurable port	N/A	N/A	Not used	Used by the Nova 2D SensorApp, tool TCP Client
TCP server	P3	TCP configurable port	N/A	N/A	Not used	Used by the Nova 2D SensorApp, tool TCP Client
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 communication is set up
PROFINET	P1, P2	UDP ports 161, 34964, 49153	No	No	Not used	Used by the Nova 2D SensorApp if Fieldbus with Ethernet/IP communication is set up

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

2.7 Operational safety and specific hazards

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

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

Optical radiation: Class 1 Laser Product

The accessible radiation does not pose a danger when viewed directly for up to 100 seconds. It may pose a danger to the eyes and skin in the event of incorrect use.

- 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.

For both radiation types:

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.
-



WARNING

Electric shock!

Non-insulated electrical conductors are located in the housing. Electrical voltage can cause severe injury or death.

- Do not open the housing.
 - Protect the housing from damage.
 - If the housing is damaged, disconnect the device from the voltage supply and do not put it into operation.
-



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.
-

3 Product description

3.1 Product overview



- ① C-mount thread
- ② Lens
- ③ Illumination unit
- ④ Spacer
- ⑤ Optics protection hood not mounted
- ⑥ Optics protection hood mounted
- ⑦ USB (for temporary use as a service interface)
- ⑧ Slot for a microSD memory card (accessory)

Further topics

- [Dimensional drawing](#)

3.2 Product features and functionality

The Inspector85x is a 2D vision sensor that offers a rapid and flexible solution. The Inspector85x is suitable for complex and demanding inspection tasks, including a wide variety of industrial tasks thanks to its programmable interface.

The dual-port fieldbus support ensures flexible, industry-ready integration.

The microSD memory card can be used to store images or backup copies of parameters. Thanks to SICK's 4Dpro feature, the Inspector85x can be integrated into numerous industrial networks.

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Alternative mounting option for the device instead of the threaded mounting hole • Use in pairs.
1	Hexagon key WAF 2	For mounting the VI83I illumination unit
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: <ul style="list-style-type: none"> • www.sick.com/SICK_AppStudio
SICK AppManager software	Available online at: <ul style="list-style-type: none"> • www.sick.com/SICK_AppManager

3.5 Product ID

3.5.1 Type label

The type label contains information for identifying the product.

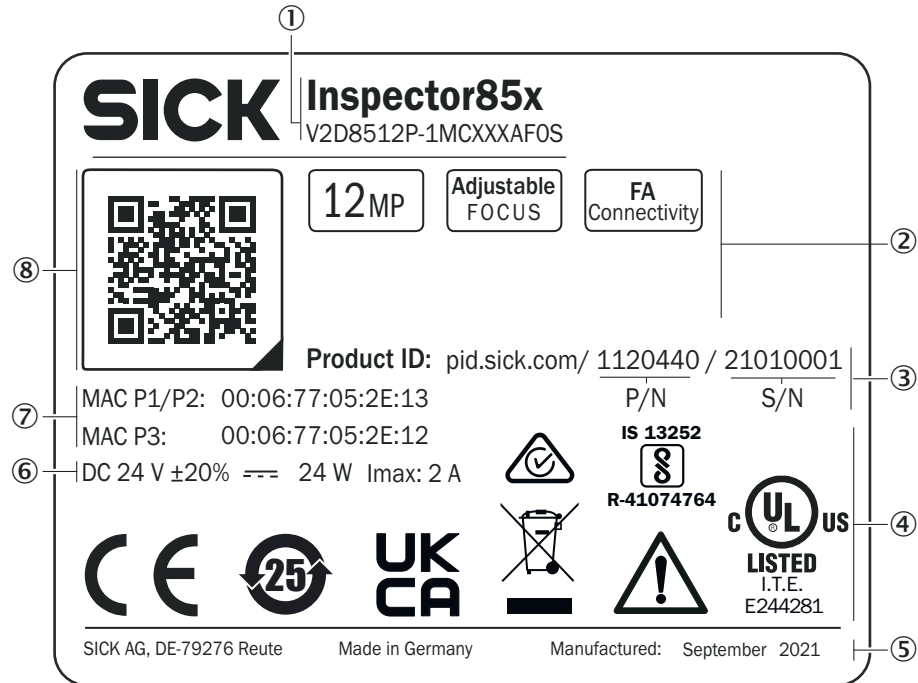


Figure 1: Inspector85x type label (example)

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

3.5.2 Type code

Type code structure

The devices of the Inspector85x product family are arranged according to the following type code:

V2D85yz-abcdefghijkl

V	2	D	8	5	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 V2D85 Inspector85x
6	Image sensor resolution 05: 5 Mpx (2.464 px x 2.048 px) 12: 12 Mpx (4.096 px x 3.008 px)
7	Function P: Machine Vision, programmable with SICK AppSpace
8	Generation 1: First generation
9	Image sensor type/color M: Monochrome

Position	Description
10	Optical/focusing system C: C-mount
11	Illumination unit X: Without
12	Focal length X: Without
13	Filter X: Without
14	Processing unit A: Advanced
15	Connection modules F: Fieldbus
16	IP protection class and front screen O: Without
17	Temperature range S: 0 °C ... 50 °C (standard)

3.6 Integrated illumination unit

Overview

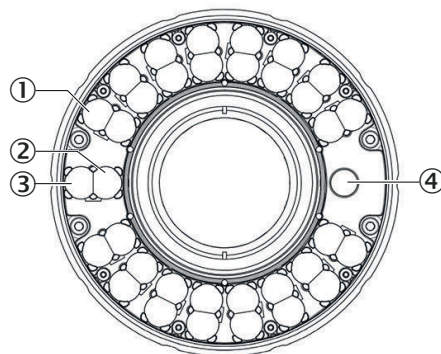


Figure 2: VI83I illumination unit

- ① 32 illumination LEDs, color: visible white light
- ② 1 Feedback LED, color: visible green light, e.g., for Good Read (not available)
- ③ 1 Feedback LED, color: visible red light, e.g., for No Read (not available)
- ④ Laser alignment aid, color: visible red light (not available)

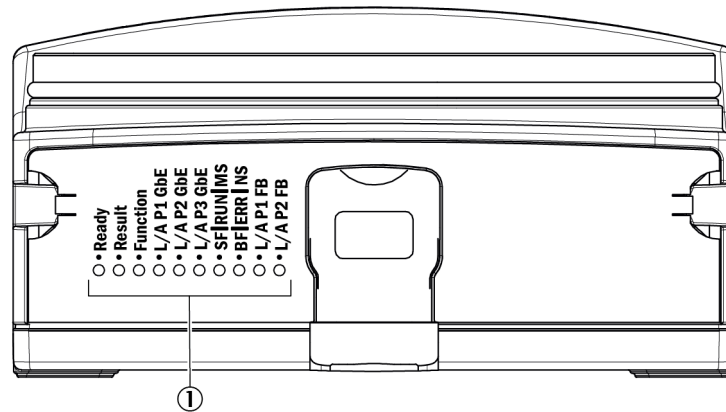
Feedback LED

The function of the feedback LED can be set using the configuration software. For example, the green feedback LED can be configured to briefly produce a green feedback spot within the field of view of the product after a successful read.

Laser alignment aid

The laser alignment aid produces a red spot (laser spot) in the field of view of the product. The alignment aid can be switched off.

3.7 Display and control elements



① Status LEDs

Status LEDs

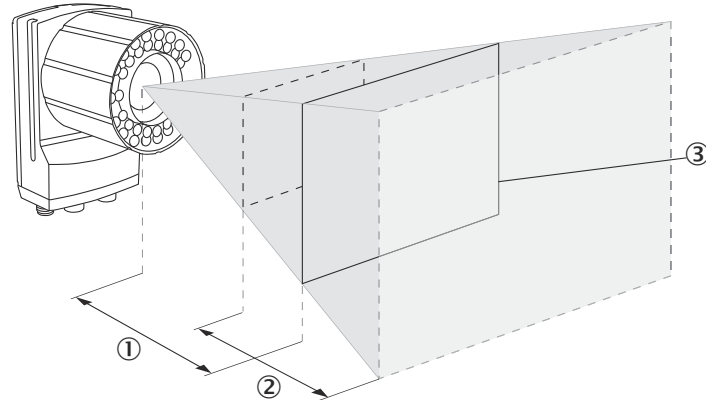
Display	LED (color)	Description
Ready	● (Green)	The device is switched on and ready for use
	● (Red)	Error
	⦿ (Green)	Device is not ready for use. Reasons <ul style="list-style-type: none"> • Firmware update • Parameter change by the user • Parameter change by another device (e.g., PLC)
	● (Blue)	Device 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
L/A P1 GbE		Not used
L/A P2 GbE		Not used
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

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 occurred
	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
	○	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
○		No supply voltage or no IP address
L/A P1 FB		● (Green)
	● (Yellow)	Data transmission over the network (10/100 Mbit/s)
	○	No fieldbus connection
L/A P2 FB	● (Green)	Connected to network (10/100 Mbit/s)
	● (Yellow)	Data transmission over the network (10/100 Mbit/s)
	○	No fieldbus 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 Inspector85x 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.

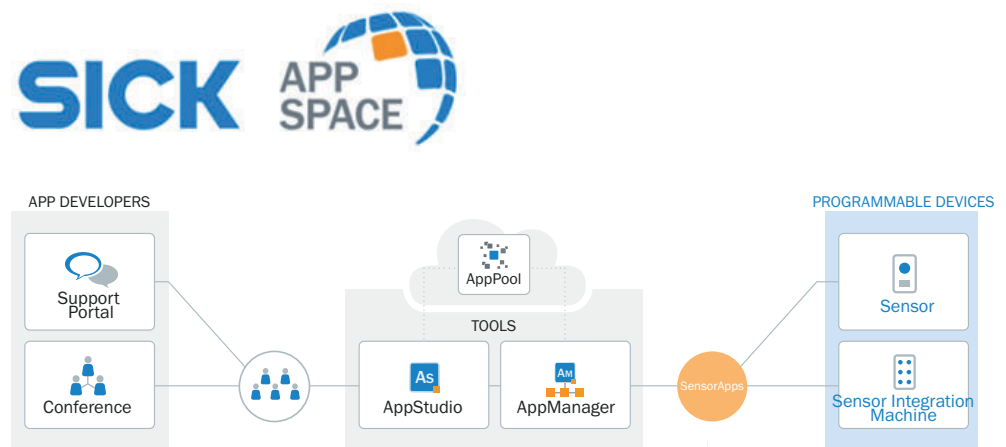


Figure 3: SICK AppSpace

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 Inspector85x in SICK AppStudio.

For more information about downloading SensorApps and programming the device, see "[Commissioning](#)", page 40.

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 operating instructions.

4.1 Mounting the product

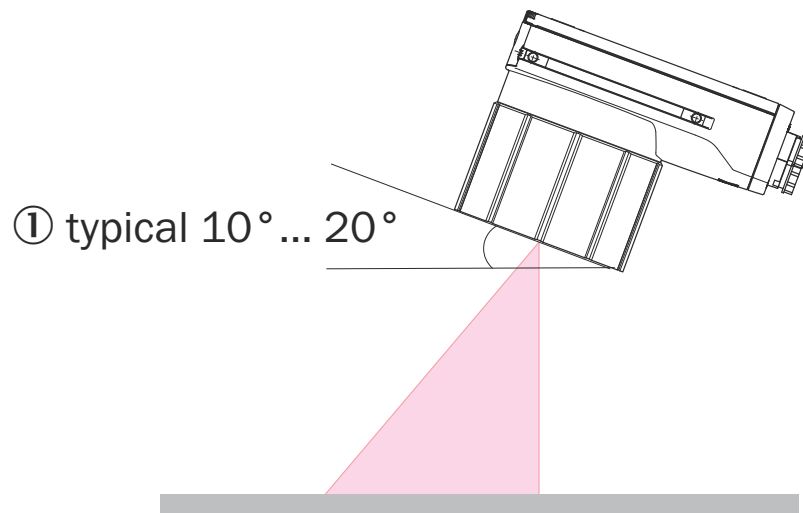


Figure 4: Mounting angle to use, depending on the application

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.

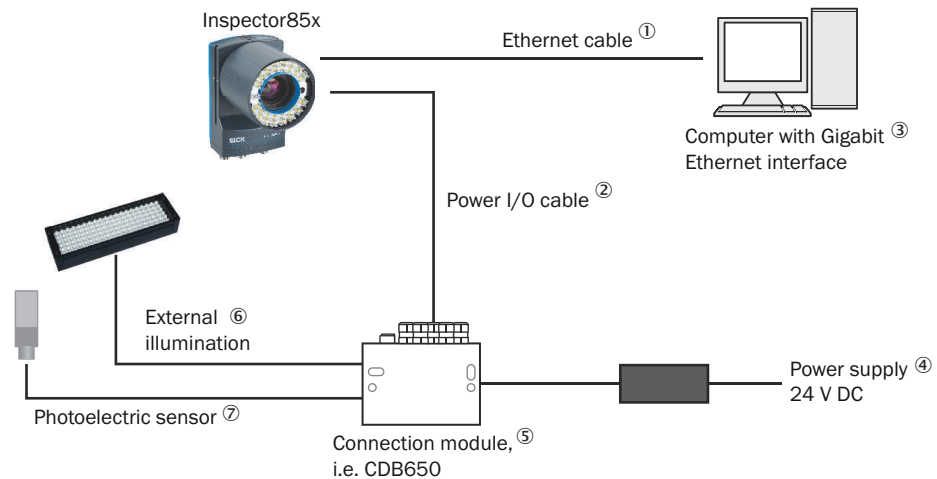


Figure 5: Connecting an Inspector85x

- ① Ethernet cable
- ② Power I/O cable
- ③ Computer with Gigabit Ethernet interface
- ④ Power supply 24 V DC
- ⑤ Connection module, i.e. CDB650
- ⑥ External illumination
- ⑦ Photoelectric sensor

Further topics

- [Electrical installation](#)

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.



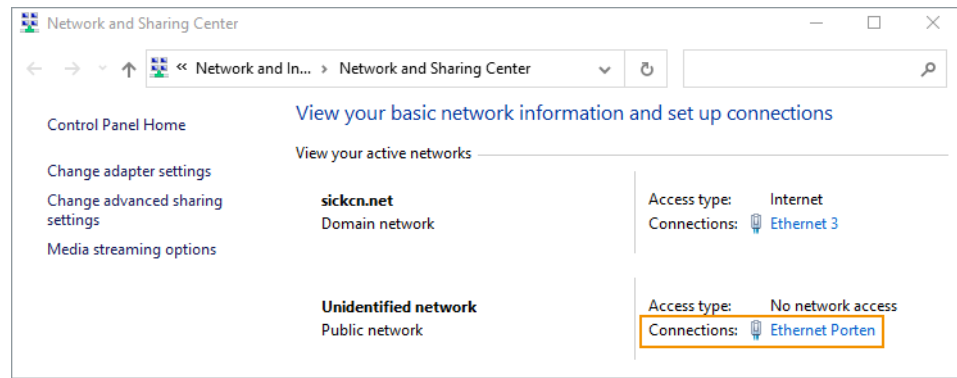
NOTE

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

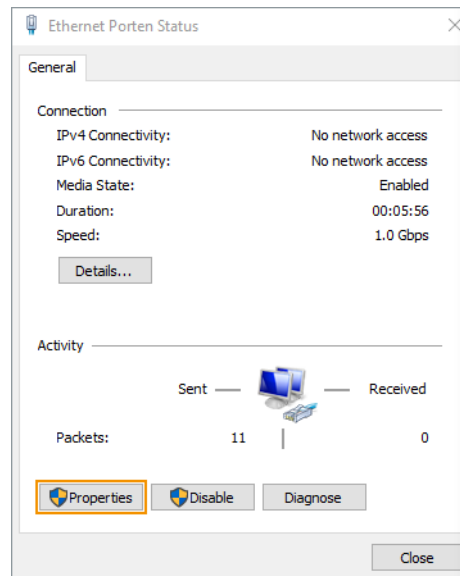
If you have more than one Ethernet port, try to disconnect and reconnect the Ethernet cable between the device and computer. You can then identify which connection to adapt.



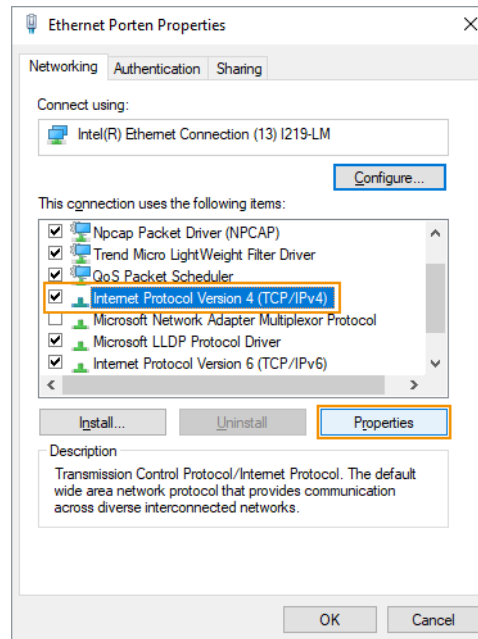
NOTE

You need to be authorized to change the computer settings.

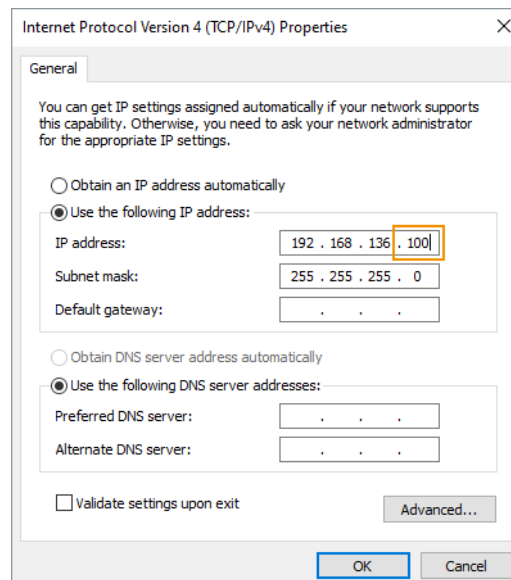
1. Open the **Network and Sharing Center** on the computer.
2. Click on the link for the appropriate **Connection**.
3. Click on **Properties**.



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.

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



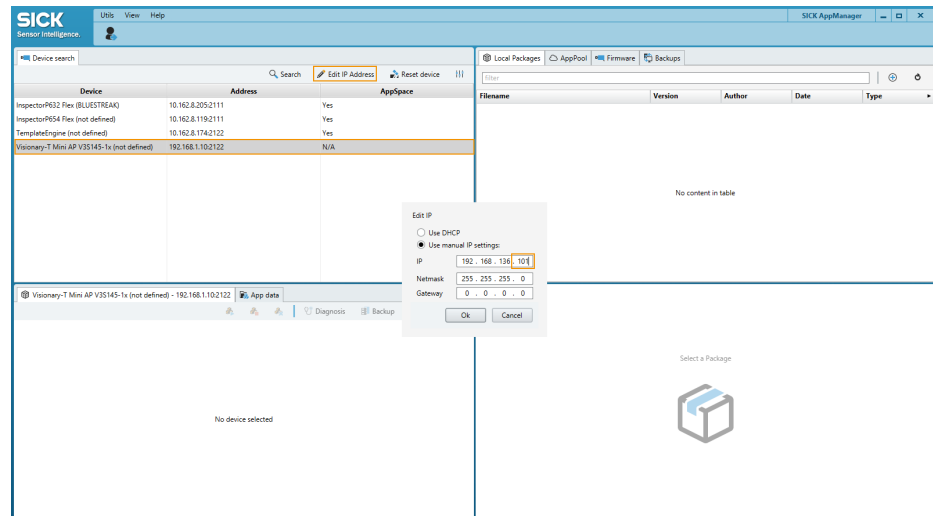
NOTE

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.

- Open the **SICK AppManager** on the computer.
- Select the line representing the desired device.



- Click on **Edit IP Address**.
- Set the **Netmask**. Enter the same subnet mask as the computer has.
- 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.
- Click **OK**.

4.4 User interface

Opening the user interface

- Open a web browser window.
- Type the IP address of the device. The default IP address is.



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.
-



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 49](#).
- Relative humidity: [see "Technical data", page 49](#).
- 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 Inspector85x Flex product variant (basic device).

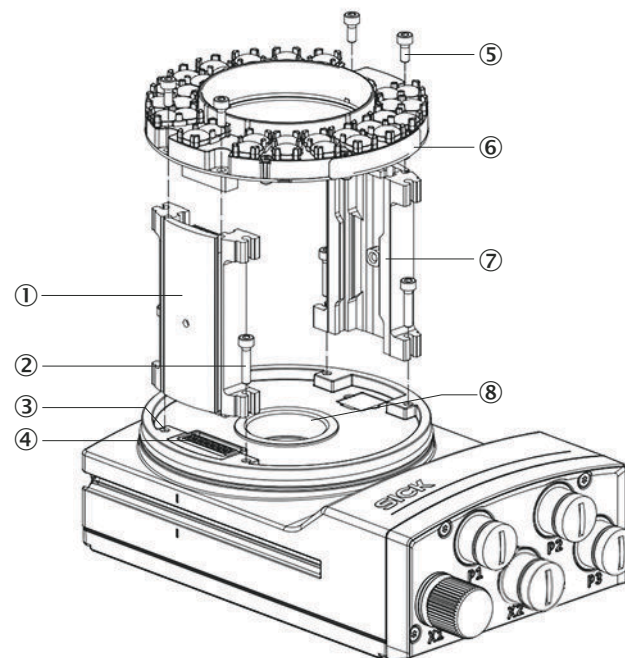


Figure 7: Mounting the lens and illumination unit

- ① Spacer, left with electrical connection
- ② 4 tapped blind holes, M2.5, 5.5 mm deep, for mounting the spacer
- ③ 4 long screws
- ④ Electrical connection for the integrated illumination unit
- ⑤ 4 short screws
- ⑥ Integrated illumination unit
- ⑦ Spacer, right
- ⑧ Light inlet with threaded connection for the lens

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.
-



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 32 °C. If the ambient temperature is above 32 °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 (included with delivery)
- SW 5 socket wrench, recommendation: as a torque wrench for 65 Ncm

Approach

1. Switch off the supply voltage to the device.
2. Peel off the white protective sticker on the camera housing that covers the electrical connection for the illumination unit.
3. Place the camera housing on a nonslip base.
4. Remove the protective cap from the round light inlet.
5. Screw the lens unit into the C-mount thread until it engages.
6. Take 2 pairs of long screws and screw them into the tapped blind holes to mount each spacer on the camera housing.
7. Use the 4 short screws to fasten the illumination unit to the two spacers.
8. In systems subjected to heavy vibrations, secure the screws used to mount the lens and illumination unit using threadlocking adhesive.
9. Manually preset the sharpness and aperture of the lens unit.
10. Check the adjustment using the WebGUI.
11. 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

Prerequisites

- If the ambient operating temperature will be $\geq 45\text{ }^{\circ}\text{C}$, ensure adequate heat dissipation when mounting the device. For example, mount the product using a mounting bracket on a suitable heat sink. A suitable heat sink is an aluminum profile with minimum dimensions 40 mm x 80 mm x 665 mm. To ensure air circulation, mount the product, for example, at an adequate distance from walls, ceilings and other devices.
- In order to avoid reflections from the surfaces to be scanned, mount the product so that it is tilted from the perpendicular to the surface. Depending on the application, an angle of 0° (brightfield illumination) or up to 45° (darkfield illumination) is appropriate.

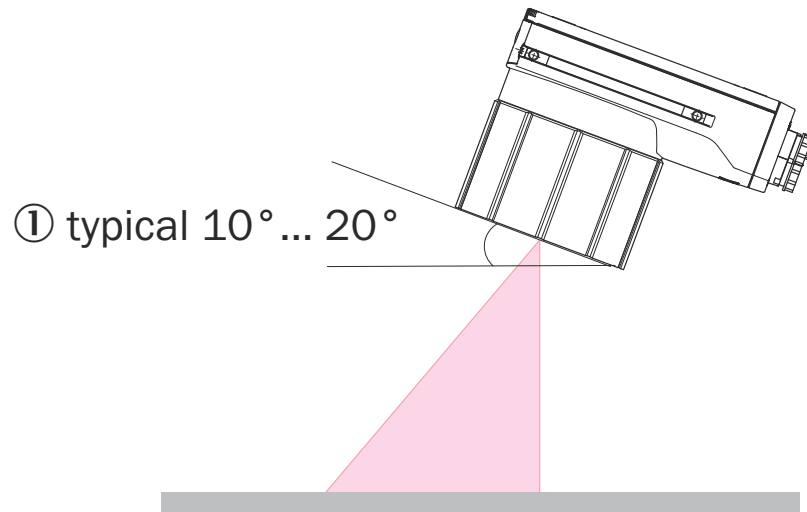


Figure 8: Mounting angle to use, depending on the application

① Typical angle 10° ... 20°

- Make sure the product has a clear view of the codes of the objects to be scanned.

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.
 - Screw the screws no more than 5 mm into the threaded mounting holes or sliding nuts.
 - 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.
 - 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 adjustment.

7 Electrical installation

7.1 Wiring instructions



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.

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

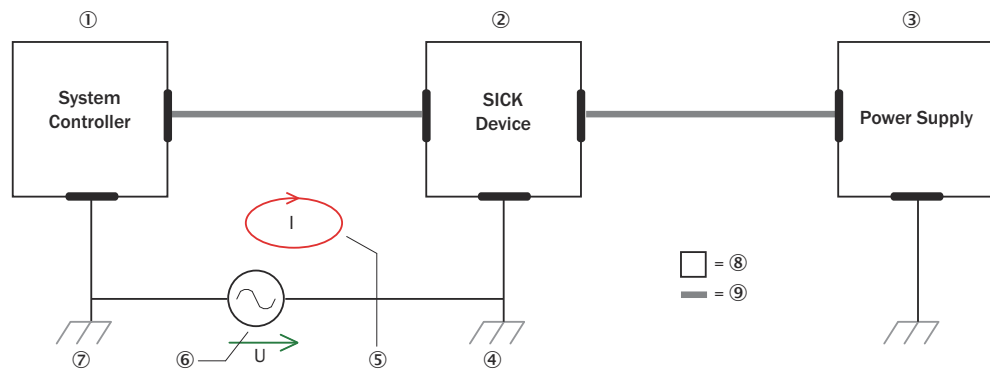


Figure 9: Example: Occurrence of equipotential bonding currents in the system configuration

- 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.

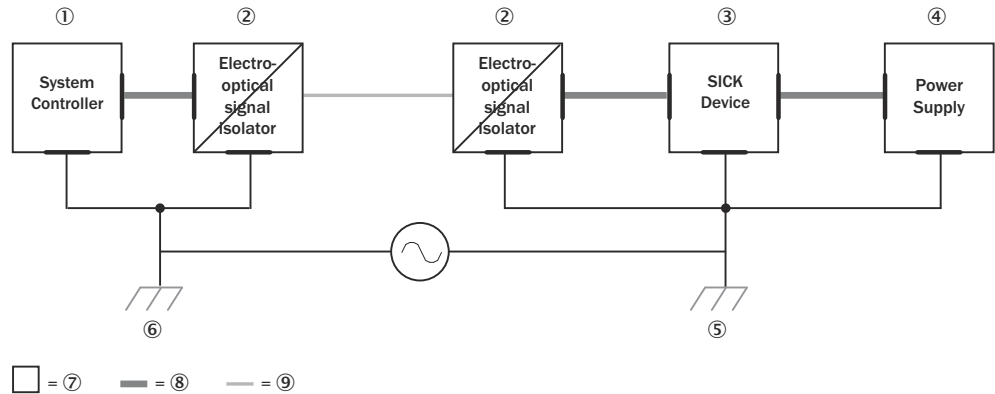


Figure 10: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

- 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.

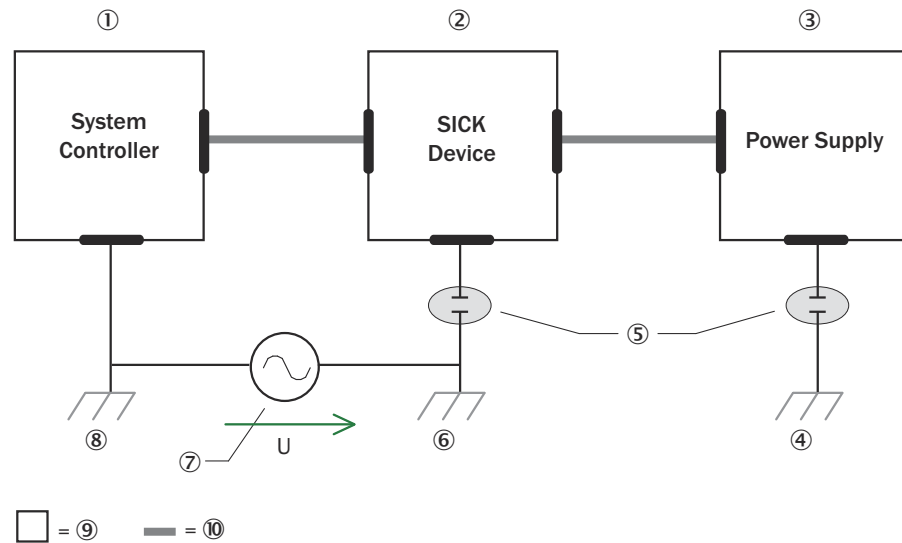


Figure 11: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

- 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

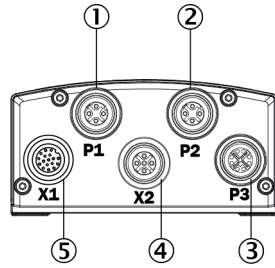


Figure 12: Connection overview

- ① P1: Fieldbus Ethernet 1
- ② P2: Fieldbus Ethernet 2
- ③ P3: GB Ethernet
- ④ X2: Power/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 \pm 20%, protect the cables with a separate fuse. The type of fuse required depends on the cable used (typically e.g. cable M12 17-pin with 2 A fuse, cable M12 5-pin with 4 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

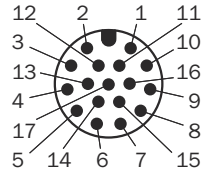


Figure 13: Male connector, M12, 17-pin, A-coded

PIN	Signal	Function
1	GND	Ground
2	V _s	Supply voltage: DC 24 V \pm 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	-	-
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)

Power/External illumination/IO

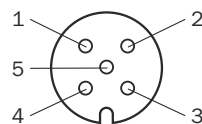


Figure 14: Female connector, M12, 5-pin, A-coded

PIN	Signal	Description
1	GND	Ground sensor
2	-	-
3	V _{out} switchable ^{1) 2)}	Switchable power out for external illumination
4	IN/OUT 7 or Trigger external illumination	Digital input/output (configurable) or Trigger for external illumination

PIN	Signal	Description
5	V _s	Supply voltage

- 1) The maximum output current is limited to 1.0 A and can only be enabled if the internal illumination is disabled. Ensure that the sum of output currents from all digital outputs and the power out do not exceed 1050 mA.
- 2) The internal illumination is shut off when the power out via X2 connector is enabled.

Fieldbus Ethernet

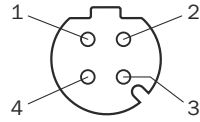


Figure 15: Female connector, M12, 8-pin, X-coded

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

GB Ethernet

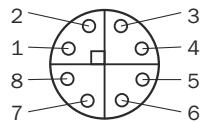


Figure 16: Female connector, M12, 8-pin, X-coded

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

- [Connections and pin assignment](#)

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 \pm 20%, protect the cables with a separate fuse. The type of fuse required depends on the cable used (typically e.g. cable M12 17-pin with 2 A fuse, cable M12 5-pin with 4 A fuse). Install the fuse in the supply circuit at the start of the supply cable.

7.4.3 Fieldbus connection principle

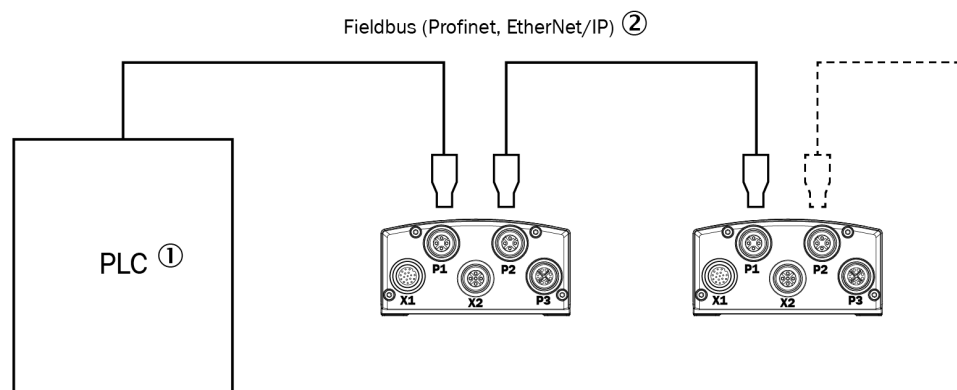


Figure 17: Connection principle for fieldbus

- 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.

Inspector85x 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 41).
- Using other SensorApps that are available for the device (see "[Installing SensorApps](#)", page 41).
- Programming SensorApps for the device (see "[Programming the device](#)", page 42).

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.

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

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, supportportal.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.
- The computer must be on the same network as the device.
- The computer must not use the same IP address as the device. The device's default IP is 192.168.0.1.

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 SensorApps 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 40).
- 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 40).

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 Inspector85x 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 reduced by using an anti-static cleaning agent in combination with the SICK lens cloth (part number 4003353).

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	<ul style="list-style-type: none"> ■ Device poorly aligned to the object (e.g. dazzle).
Electrical installation	<ul style="list-style-type: none"> ■ Data interfaces of the device incorrectly wired.
Programming	<ul style="list-style-type: none"> ■ See SICK AppSpace interface documentation (troubleshooting of individual objects and functions).
Operation	<ul style="list-style-type: none"> ■ 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 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

	Inspector850
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 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. Optional upgrade with Intelligent Inspection Upgrade License for deep learning-powered anomaly detection and object classification.
Toolkit	SICK algorithm API HALCON
Sensor	CMOS matrix sensor, grayscale values Depends on type, see "Type code", page 16.
Shutter technology	Global shutter
Optical focus	Adjustable focus (manually)
Working distance	Typically 500 mm ... 2,500 mm ³⁾
Sensor resolution	Depends on type, see "Type code", page 16.
Integrated illumination	Order separately as an accessory, e.g. variant of the VI83I illumination unit Variants of the VI83I illumination unit with 32 LEDs: <ul style="list-style-type: none"> • Visible white light Medium (T = 6,500 K ± 1,000 K), aperture angle: 31 ° • Visible white light Wide (T = 6,500 K ± 1,000 K), aperture angle: 47 °
LED risk group of the illumination unit (visible white light variant + feedback LED)	Risk group 1 (low risk) according to IEC 62471-1: 2006-07 / EN 62471-1: 2008-09 Radiance: <ul style="list-style-type: none"> • L_B ⁴⁾: < 10×10^3 W/(m²sr) within 100 seconds; at a distance ≥ 200 mm • L_R ⁵⁾: < 2.5×10^6 W/(m²sr) within 10 seconds; at a distance ≥ 200 mm Risk RG 0 (no risk group) corresponding to $L_B < 100$ W/(m ² sr) within 10×10^3 seconds for distances > 0.8 m.

	Inspector850
Feedback LED	Optional, e.g. variant of the V183I illumination unit 2 LEDs: <ul style="list-style-type: none"> • Visible green light ($\lambda = 525 \text{ nm} \pm 15 \text{ nm}$) • Visible red light ($\lambda = 645 \text{ nm} \pm 15 \text{ nm}$)
Laser alignment aid	1 laser, can be switched off Visible red light ($\lambda = 630 \text{ nm} \dots 680 \text{ nm}$)
Laser class	Laser alignment aid: Class 1 Laser Product according to EN/IEC 60825-1: 2014+A11:2021. Complies with 21 CFR 1040.10/11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56 dated 8 May 2019. $P < 0.39 \text{ mW}$
Lens	C-mount Order separately as an accessory
Sensor format	V2D8505x-xxxxxxx: 1/1.8" V2D8512x-xxxxxxx: 1/1.1"

- 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

	Inspector850
Connection type	<ul style="list-style-type: none"> • 1 male connector, M12, 17-pin, A-coded (Power, I/O) ¹⁾ • 1 female connector, M12, 5-pin, A-coded (External illumination)²⁾ • 1 female connector, M12, 8-pin, X-coded (Gigabit Ethernet) • 2 female connectors, M12, 4-pin, A-coded (Fieldbus Ethernet)
Supply voltage V_S	DC 24 V \pm 20% Voltage source in accordance with ES1 (EN62368-1) or SELV (EN60950-1)
Power consumption	Operation: 24 W \pm 20% typical ³⁾
Current consumption	Max. 2.0 A
Output current	Output current per output: max. 200 mA Sum of output currents: max. 400 mA ⁴⁾
Housing material	Aluminum die cast
Housing color	Anthracite gray (RAL 7016)
Viewing window material	Glass, 2 mm thick, 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 ⁵⁾ , screws (SW2 hexagon key), captive
Enclosure rating	IP 65 (IEC 60529:2013 +C1:2013 +C2:2015 +AMD2 C1:2019, EN 60529:1991 +A1:2010 +A2:2013 +AC:2019-02) ⁶⁾
Electrical safety	EN 61010-1:2010 EN 61010-1:2010/A1:2019 EN 61010-1:2010/A1:2019/AC:2019-04
Weight	Max. 640 g, without lens and connecting cables

Inspector850	
Dimensions (L x W x H)	143.4 mm x 90 mm x 46 mm ⁷⁾

- 1) Maximum length of cable: 10 m
- 2) Maximum length of cable: 30 m
- 3) Without load on digital outputs and power out.
- 4) Ensure that the sum of power out current for external illumination and the output currents do not exceed 1050mA.
- 5) When the cover is open, the device no longer conforms with the specified enclosure rating.
- 6) 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 is closed.
 - The cables plugged into the electrical connections must be screwed tight. Electrical connections that are not being used are sealed off with a protective cap.
- 7) Housing only, without lens and optics protection hood.

12.3 Performance

Inspector850	
Sensor resolution	V2D8505x-xxxxxxx: 5megapixel (2464px x 2048px) V2D8512x-xxxxxxx: 12megapixel (4096px x 3008px)
Scan/frame rate¹⁾	30 Hz, at 5 megapixels resolution 15 Hz, at 12 megapixels resolution

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

12.4 Interfaces

Inspector850	
Ethernet	Protocol: TCP/IP Function: <ul style="list-style-type: none"> • FTP (image transfer) • Data interface (result output) • Command channel • Trigger interface • Device configuration (web user-interface) Data transmission rate: 10/100/1000 Mbit/s
EtherNet/IP™ Dual Port	Protocol: EtherNet/IP™ Function: <ul style="list-style-type: none"> • Data interface (result output) • Trigger interface • Command channel Data transmission rate: 10/100 Mbit/s
PROFINET Dual Port	Protocol: PROFINET Function: <ul style="list-style-type: none"> • Data interface (result output) • Trigger interface • Command channel Data transmission rate: 10/100 Mbit/s
Optical displays	10 status LEDs 2 feedback LEDs of the VI83I illumination unit (green, red)

	Inspector850
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 4 x configurable inputs/outputs, physical, switching (3 on Power-I/O connector, 1 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 5-pol connector. Triggered via digital output on 17-pol connector, or on external illumination 5-pol connector.

12.5 Ambient data

	Inspector850
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 ... +50 °C ¹⁾
Storage temperature	-20 °C ... +70 °C ²⁾
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) If the ambient operating temperature will be ≥ 45 °C, ensure adequate heat dissipation when mounting the device, see "[Assembling the product](#)", page 31.
- 2) Store in a place protected from moisture and dust.

12.6 Field of view diagrams

Inspector85x Flex

Device type: V2D8505P-xxxxxxxxx

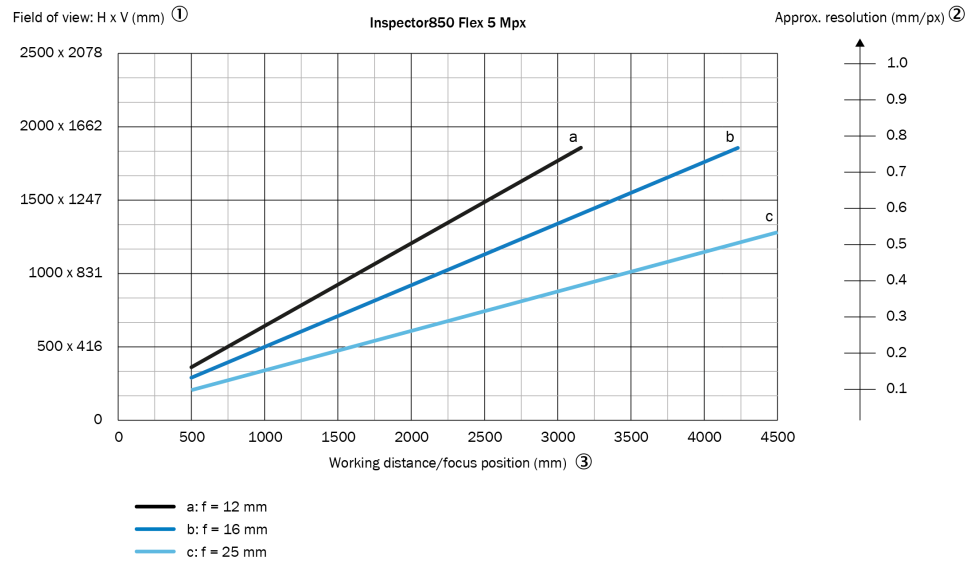


Figure 18: Field of view diagram for Inspector850, 5 megapixel

- ① Field of view: horizontal x vertical in mm
- ② Approximate resolution in mm/px
- ③ Working distance/focus position in mm

Device type: V2D8512P-xxxxxxxxxx

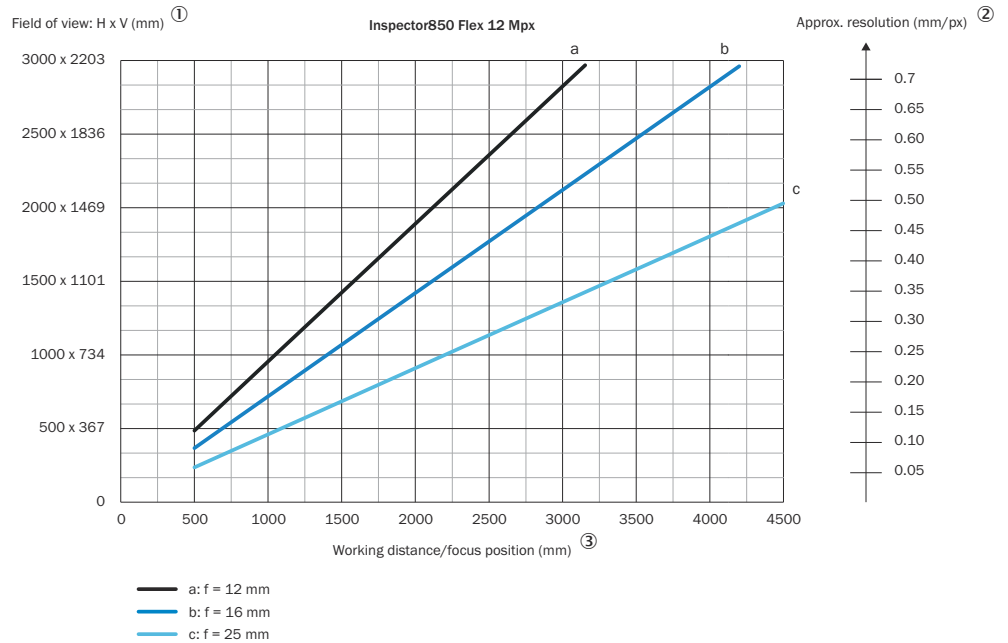


Figure 19: Field of view diagram for Inspector850, 12 megapixel

- 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

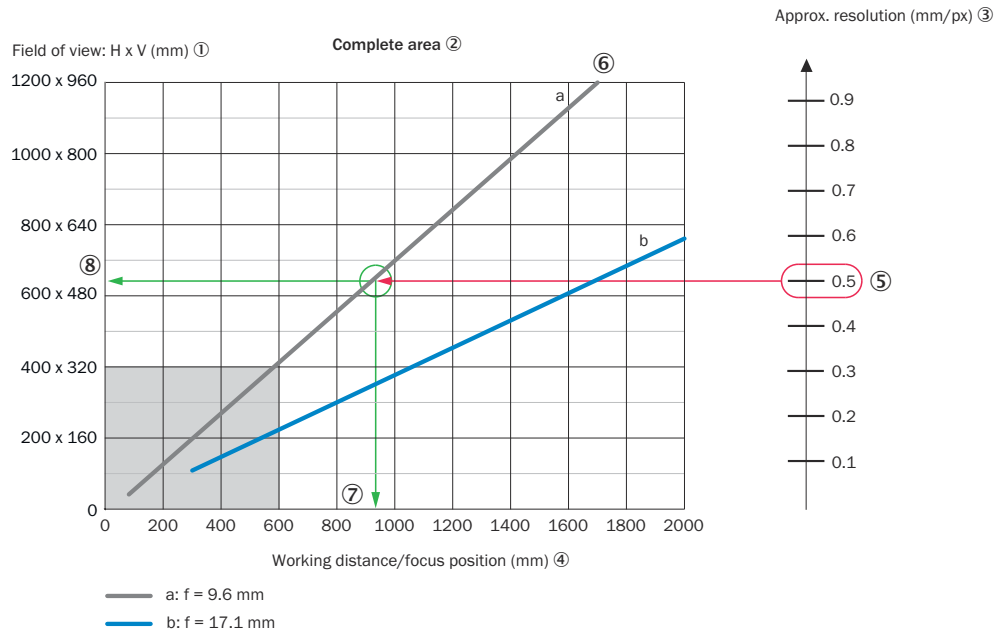


Figure 20: Example of field of view diagram

- 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

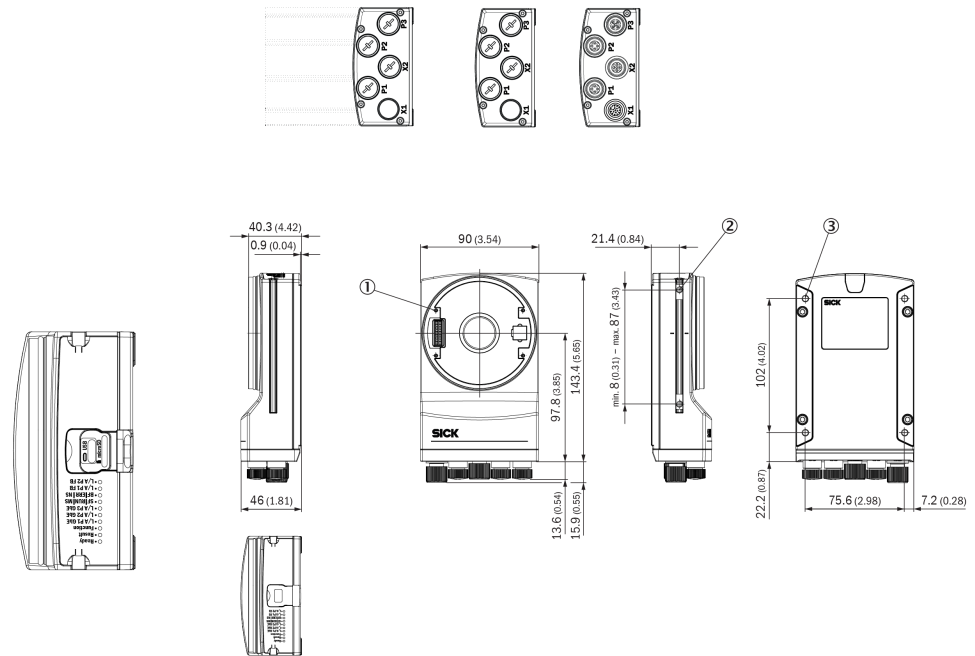


Figure 21: Structure and device dimensions, unit: mm (inch), decimal separator: period

- ① 4 tapped blind holes, M2.5, 5.5 mm deep, for mounting the spacer
- ② 2 M5 sliding nuts; 5.5 mm deep; pivoting; as an alternative method of mounting the device
- ③ 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 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).

14.2 Licenses

SICK uses open source software which is published by the rights holders under a free license. Among others, the following license types are used: GNU General Public License (GPL version 2, GPL version 3), GNU Lesser General Public License (LGPL), MIT license, zlib license and licenses derived from the BSD license.

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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