SICK.COM

OPERATING INSTRUCTIONS

Inspector85x

2D machine vision

PROFINET/EtherNet/IP™ adjustable focus

SICK Sensor Intelligence

Described product

Inspector85x PROFINET/EtherNet/IP™ adjustable focus

Manufacturer

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Original document

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1 About this document

1.1 Information on the operating instructions

Read these operating instructions carefully before starting any work in order to familiarize yourself with the product and its functions.

The operating instructions are an integral part of the product and should remain accessible to the personnel at all times. When handing this product over to a third party, include these operating instructions.

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

1.2 Further information

You can find the product page with further information via the SICK Product ID:
pid.sick.com/{P/N}/{S/N}
(see "Product identification via the SICK product ID", page 11).

The following information is available depending on the product:

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

1.3 Symbols and document conventions

Warnings and other notes

DANGER
Indicates a situation presenting imminent danger, which will lead to death or serious injuries if not prevented.

WARNING
Indicates a situation presenting possible danger, which may lead to death or serious injuries if not prevented.

CAUTION
Indicates a situation presenting possible danger, which may lead to moderate or minor injuries if not prevented.

NOTICE
Indicates a situation presenting possible danger, which may lead to property damage if not prevented.

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

Instructions to action

→ The arrow denotes instructions to action.

1. The sequence of instructions is numbered.
2. Follow the order in which the numbered instructions are given.

✔ The tick denotes the results of an action.

2 Safety information

2.1 Basic safety notes

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

CAUTION
Failure to observe the relevant work safety regulations may lead to physical injury or cause damage to the system.

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

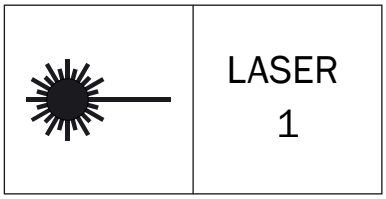
Laser notes

CAUTION
Optical radiation: Class 1 Laser Product

The accessible radiation does not pose a danger to the eyes or skin when viewed directly for up to 100 seconds.

Caution - if any operating or calibrating equipment other than those specified here are used or other methods are employed, this can lead to dangerous exposure to radiation.

→ Use only the tools and auxiliary equipment specified in this documentation.
→ Only carry out the procedures specified in this documentation.
→ Do not open the housing unless carrying out the mounting and maintenance operations provided in this documentation. Opening the housing will not switch off the laser. Opening the housing may increase the level of risk.



IEC 60825-1: 2014

EN 60825-1:2014+A11:2021

Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

Further laser protection regulations that need to be observed may apply (e.g. national laws).

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

LED notes

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.

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

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.

Mounting and electrical installation

CAUTION
Risk of injury due to hot surface!

The surface of the product can become hot.

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

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.

Repairs and modifications

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 product from the voltage supply and do not put it into operation.

2.2 Intended use

The Inspector85x is a programmable 2D vision sensor for industrial use for tasks which require high-resolution images at long distances. The product offers a rapid and flexible solution and is suitable for complex and demanding inspection tasks.

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

The base model of the product is a camera housing with 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 components from SICK intended for this product. Use a compatible variant of the VI83I illumination unit as the integrated illumination.

As a complete device, the product is already equipped with pre-mounted optics (lens, integrated illumination unit, spacer, optics protection hood).

The product is primarily designed for use in industrial and logistics areas, and meets the requirements for industrial ruggedness, interfaces and data processing.

The product may be used in safety functions.

The product must only be used in accordance with the specified technical specifications and operating conditions.

Incorrect use, improper modification or manipulation of the product will invalidate any warranty from SICK; in addition, any responsibility and liability of SICK for damage and secondary damage caused by this is excluded.

2.3 Improper use

Impermissible use

- As a safety component as defined in the relevant applicable safety standards for machines, e.g. Machinery Directive.

Impermissible ambient conditions

- Explosion-hazardous area
- Corrosive environment

2.4 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)

Further topics

- Interfaces
- Network services and ports
- Password management

2.4.1 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 SICK Nova 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 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.
- It is recommended to always use the latest software to ensure that the latest security patches are applied.
- 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.

2.5 Qualification of personnel

Any work on the product may only be carried out by personnel qualified and authorized to do so.

Qualified personnel are able to perform tasks assigned to them and can independently recognize and avoid any potential hazards. This requires, for example:

- technical training
- experience
- knowledge of the applicable regulations and standards

3 Product description

3.1 Scope of delivery

No. of units	Component	Note
1	Product in the type 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 product instead of the threaded mounting hole • Use in pairs.
1	Printed safety notes, multilingual	Brief information and general safety notes
	Nova Inspector 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.

3.2 Product identification

3.2.1 Product identification via the SICK product ID

SICK product ID

The SICK product ID uniquely identifies the product. It also serves as the address of the web page with information on the product.

The SICK product ID comprises the host name pid.sick.com, the part number (P/N), and the serial number (S/N), each separated by a forward slash.

For many products, the SICK product ID is displayed as text and QR code on the type label and/or on the packaging.

Figure 1: SICK product ID

3.2.2 Type label

The type label contains information for identifying the product.

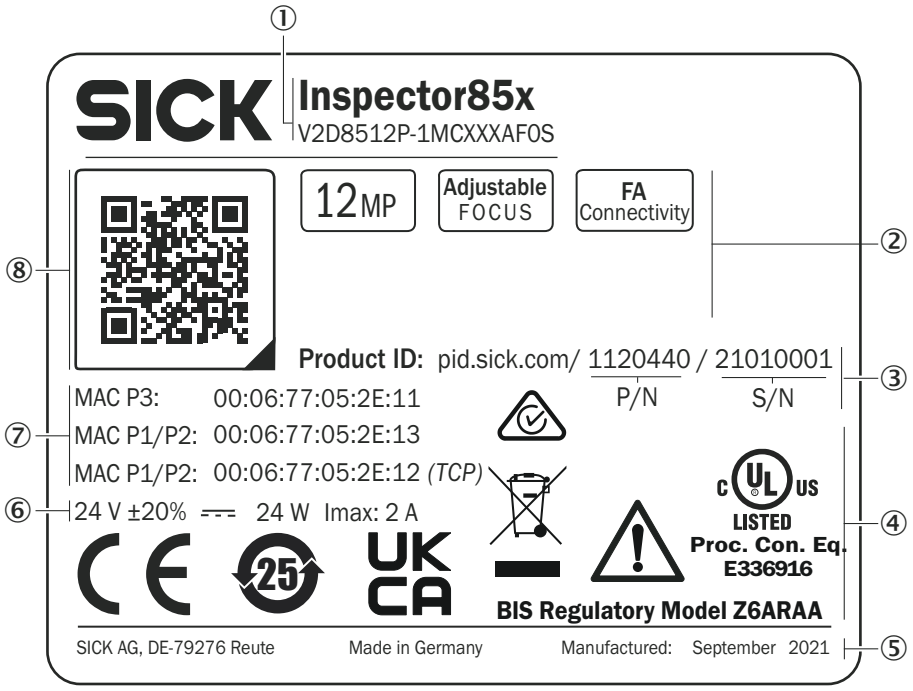


Figure 2: Inspector85x type label (example)

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

3.2.3 Type code

Table 1: Type code

1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	17
V	2	D	8	5	12	P	-	1	M	C	X	X	X	A	F	0	S

Table 2: Type code explanation

No.	Meaning	Description
1..5	Product family	V2D85 Inspector85x
6	Resolution of the image sensor	05: 5 megapixels (2,464 px x 2,048 px) 12: 12 megapixels (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
10	Optical/focusing system	C: C-mount
11	Illumination unit	X: Without M: Visible red light medium L: Visible red light wide K: Visible white light medium I: Visible white light wide

No.	Meaning	Description
12	Focal length	X: Without B: 8 mm C: 12 mm D: 16 mm E: 25 mm
13	Filter	X: Without
14	CPU	A: Advanced
15	Connection modules	F: Fieldbus
16	IP protection class and front screen	0: Without 2: IP65 Glas
17	Temperature range	S: 0 °C ... 50 °C (standard)

3.3 Overview of the product

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

3.4 Product characteristics

3.4.1 Integrated illumination unit

Overview

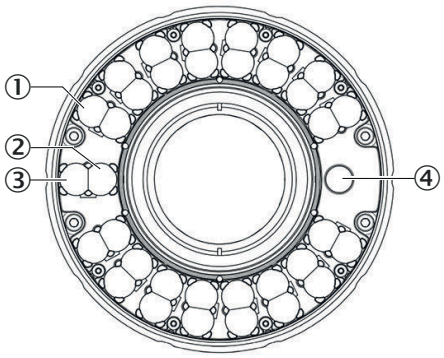


Figure 3: VI83I Integrated illumination unit

① 32 illumination LEDs

② 1 Feedback LED, e.g., for Good Read

③ 1 Feedback LED, e.g., for No Read

④ Laser alignment aid

Feedback LED

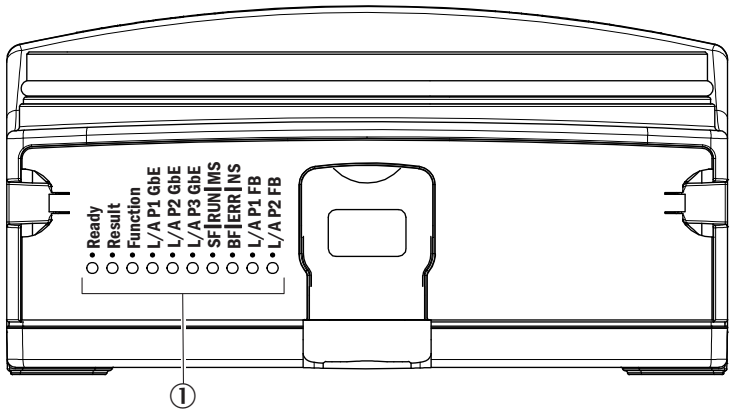
The function of the feedback LED can be set using the configuration software. For example, the green feedback LED can be configured to briefly produce a green feedback spot within the field of view of the product after a successful read.

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.

3.4.2 Status indicators

Overview



① Status LEDs

Status indicators

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
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
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
	○	No supply voltage or no Ethernet/IP app installed

Display	LED (color)	Description
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)	Connected to network (10/100 Mbit/s)
	● (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

3.4.3 Working distance and field of view size

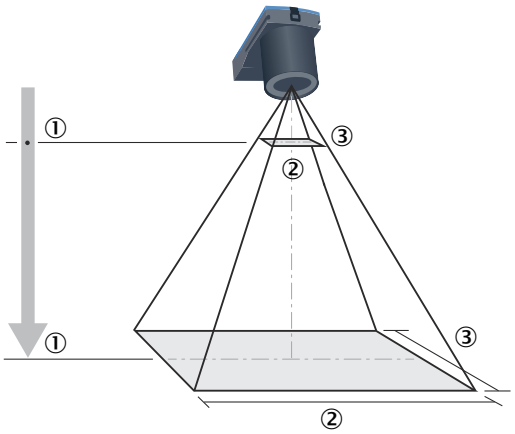


Figure 4: Working distance and field of view size

① Working distance in mm

② Perceived field of view area: horizontal (mm)

③ Perceived field of view area: vertical (mm)

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.

3.4.4 Focus and aperture adjustment

Focus and aperture are set manually on the lens.

4 Mounting

4.1 Planning for mounting

Installation site

- To prevent condensation, avoid exposing the product to rapid changes in temperature.
- The mounting site is suitable for the weight of the product.
- Mount the product in a shock and vibration insulated manner.
- Make sure the product has a clear view of the codes of the objects to be scanned.

Heat regulation

- If the ambient operating temperature will be ≥ 45 °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.

Strong light sources, lasers and retro-reflectors

- In order to avoid reflections from the surfaces to be scanned, mount the product so that it is tilted perpendicular to the surface. An angle of 0° up to 45° is appropriate depending on the application.

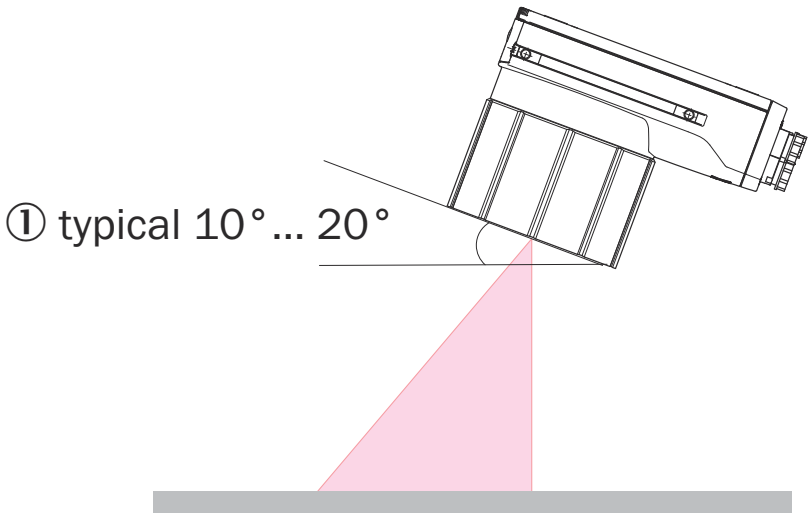


Figure 5: Mounting angle to use, depending on the application

① Typical angle 10° ... 20°

4.2 Mounting the lens and illumination unit

Overview

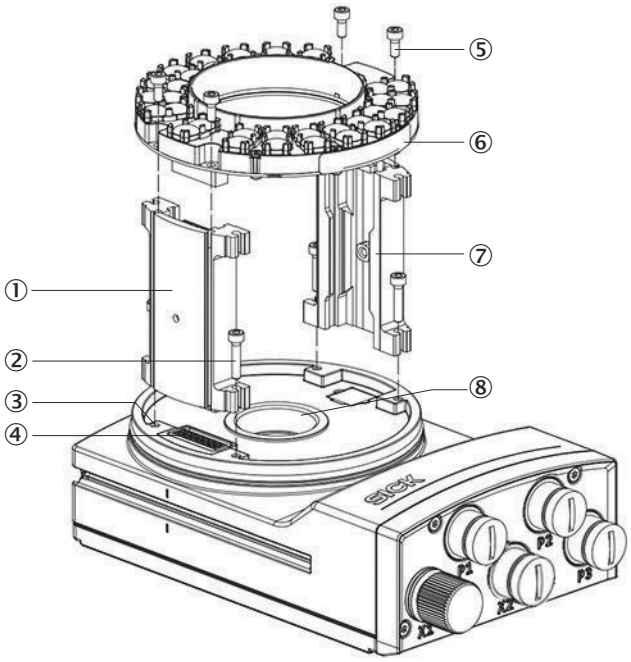


Figure 6: Mounting the lens and illumination unit

① Spacer, left with electrical connection
② 4 long screws: M2.5; length: 12 mm (ISO 4762, hexagon socket head screw)
③ 4 tapped blind holes, M2.5, 5.5 mm deep, for mounting the spacer
④ Electrical connection for the integrated illumination unit
⑤ 4 short screws: M2.5; length: 6mm (ISO 4762, hexagon socket head screw)
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 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

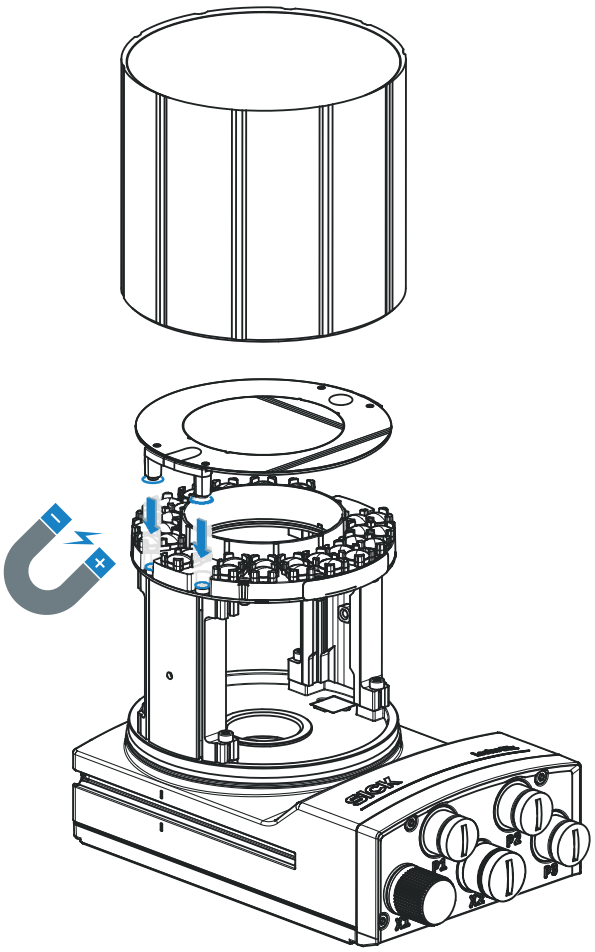
1. Switch off the supply voltage to the device.
2. Peel off the white protective sticker on the camera housing that covers the electrical connection for the illumination unit.
3. Place the camera housing on a nonslip base.
4. Remove the protective cap from the round light inlet.
5. Screw the lens unit 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.

4.3 Mounting the polarizing filter

Overview

The polarizing filter is an accessory for the product. A polarizing filter reduces reflections, e.g., for inspecting object with glossy surfaces or though glossy transparent materials. This can make inspection more reliable or easier to set up.

The filter can only be retrofitted with product type V2D85xxx-xxCxxxxxx.



Procedure

1. Turn optics cover counterclockwise.
2. Remove optics cover.
3. If the four screws for mounting the illumination unit are not magnetic, remove the screws.
4. The scope of delivery includes four magnetic screws. Use these four screws to remount the illumination unit.
5. Place the polarizing filter on the illumination unit. When aligned correctly, the polarizing filter clicks into place in the blue channel separation ring and is secured magnetically. The magnets in the polarizing filter are attracted by the screws of the illumination unit.
6. Put on optics cover.
7. Turn optics cover clockwise.

5 Electrical installation

5.1 Prerequisites for safe operation of the device

Important information

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.

Prerequisites for safe operation of the device

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

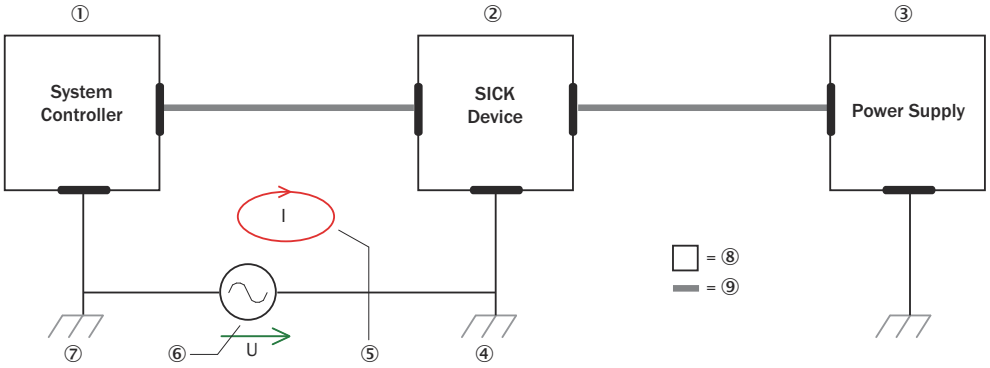


Figure 7: Example: Occurrence of equipotential bonding currents in the system configuration

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.

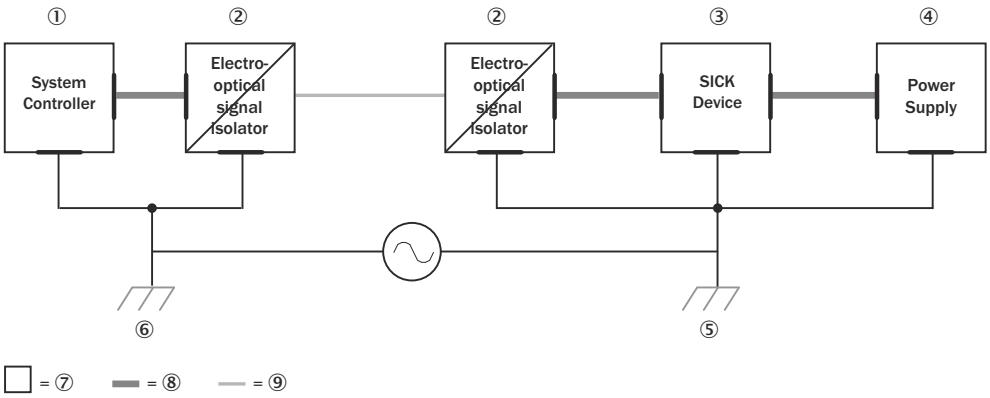


Figure 8: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

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 Fibers

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.

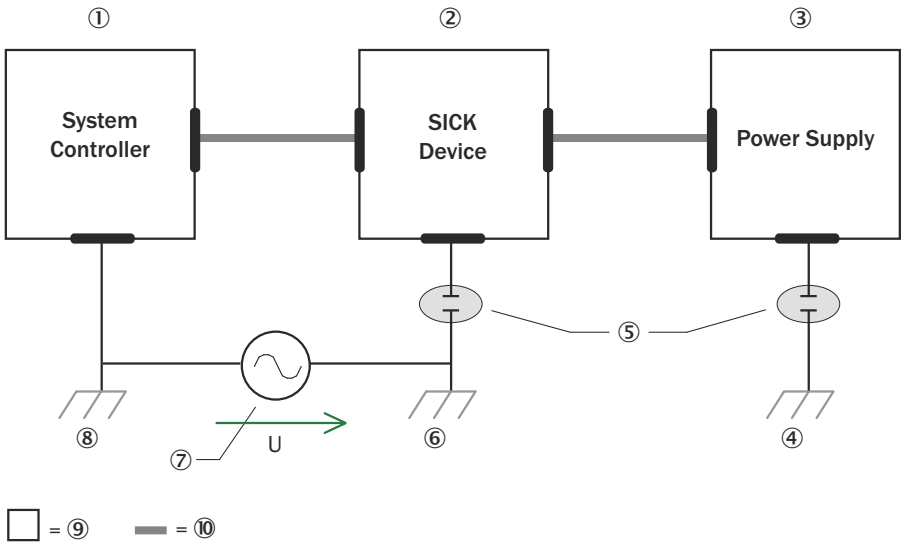


Figure 9: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

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.

5.2 Connections and pin assignment

Overview

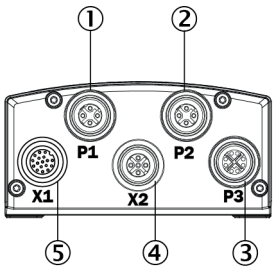


Figure 10: Connection overview

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

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 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

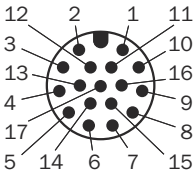


Figure 11: Male connector, M12, 17-pin, A-coded

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	–	–
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

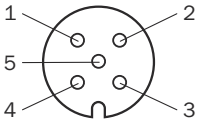


Figure 12: Female connector, M12, 5-pin, A-coded

PIN	Signal	Description
1	V_{out} switchable [1)2)]	Switchable current output for external illumination
2	DIO 7 or external illumination trigger	Configurable digital input and output 7 or trigger for the external illumination
3	GND	Supply voltage: 0 V
4	DIO 8	Configurable digital input and output 8
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

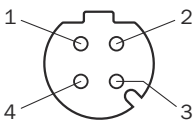


Figure 13: Female connector, M12, 4-pin, D-coded

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

GB Ethernet

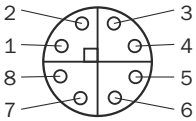


Figure 14: Female connector, M12, 8-pin, X-coded

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

5.3 Fieldbus connection principle

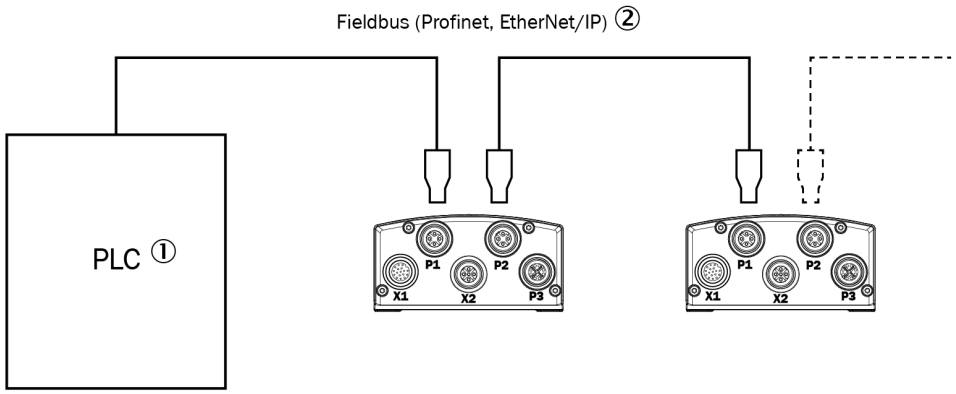


Figure 15: Connection principle for fieldbus

① PLC (Programming Logic Controller)

② Fieldbus (Profinet, EtherNet/IP™)

5.4 Network services and ports

The device uses several network services for its operation.

Table 3: 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
SSH server	P3, USB [1]	TCP port 22	Yes	Yes	Not used	Used for device repair
TCP client	P3, USB [1]	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 PROFINET communication 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.

6 Configuration

6.1 Configuring the product

6.1.1 Starting SICK Nova

Overview

The SICK Nova SensorApp uses vision-based quality inspection to ensure that produced items have the exact qualities required regarding presence and measurements of details.

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 (**support.sick.com**) and install it using SICK AppManager.

Prerequisites

- Product is connected to the computer via Ethernet (P3) or USB.
- Voltage supply is connected.
- Computer and product are located on the same network.
- Computer and product have different IP addresses.

Procedure

1. Open web browser (recommendation: Google Chrome).
2. Enter the IP address of the product in the address line.
   Default IP addresses:
   - P3: 192.168.0.1
   - USB: 169.254.0.1

✔ The user interface is displayed.

6.1.2 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.

6.1.3 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 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 SICK Nova 2D Operating Instructions. Information on SICK Nova tool development is available from the SICK Support Portal, **support.sick.com**.

6.2 Password management

6.2.1 Password assignment

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**.

Prerequisites

- When assigning a password for the first time, ensure the connection is secure, e.g. by using a point-to-point connection to the product.

Procedure

1. Establish a connection to the product in the web browser.
2. Log in with the default password `servicelevel`. If you have not changed the default password, you will automatically be prompted to change it.
3. Assign a new password.

✔ The new password is valid immediately.

4. Log in again with the newly assigned password.

6.2.2 Changing password

Overview

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`

Procedure

1. Click **Login** on the device to open up the login dialog, and log in as `Service`.
2. Select the device and press the ⋮ symbol in the upper right corner.
3. Select **Device/Change password...** to initiate a password change.

6.2.3 Password recovery

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

6.3 Programming the device

6.3.1 Starting SICK AppStudio

Overview

SICK AppStudio is a software tool for developing SensorApps on programmable SICK devices.

Prerequisites

- Make sure that the network communication settings are correct.
- 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.

6.3.2 Lua scripting

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

6.3.3 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 on the SICK Support Portal, **support.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.

6.3.4 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: **support.sick.com**.
- 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.

6.4 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

6.4.1 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.

Procedure

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.

7 Maintenance

7.1 Maintenance plan

Table 4: Maintenance schedule

Maintenance work	Interval
Check product and connecting cables for damage at regular intervals.	Depends on ambient conditions and climate.
Check the housing and viewing window for contamination and clean if necessary.	Depends on ambient conditions and climate.
Check the screw connections and plug connections.	Depends on the place of use, ambient conditions or operating requirements. Recommended: At least every 6 months.
Check that all unused connections are sealed with protective caps.	Depends on ambient conditions and climate. Recommended: At least every 6 months.

7.2 Cleaning the product

Important information

NOTICE

→ Never use sharp objects for cleaning.
→ Recommendation: Use anti-static cleaning agents.
→ Recommendation: Use anti-static plastic cleaners and lens cloths from SICK.

NOTICE

If the viewing window is scratched or damaged, take the product out of operation and have it repaired by SICK.

Procedure

1. If possible, switch off the voltage supply to the product. If this is not possible, wear suitable laser safety goggles. These must effectively absorb the radiation of the wavelength used by the product.
2. Clean the viewing window according to the material:
   - 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.
3. Remove any dust from the housing using a soft brush.

8 Troubleshooting

8.1 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).

Complementary information

For faults that cannot be rectified based on the error description, please contact SICK Service. To help us to resolve the matter quickly, please note down the details on the type label.

8.2 Repair

Repair work on the product may only be performed by qualified and authorized personnel from SICK AG. Interference with or modifications to the product on the part of the customer will invalidate any warranty claims against SICK AG.

9 Decommissioning

9.1 Removing the product

Procedure

1. Switch off the supply voltage.
2. Mark the position and alignment of the product on the bracket or surroundings.
3. Disconnect and remove the connecting cables of the product.
4. Remove the product from the bracket or surroundings.

Complementary information

If you replace the product, you can transfer the parameter values to the replacement product by downloading them. If only the camera housing and not the lens is replaced, readjust the focus position on the lens.

9.2 Disposal of the product

Procedure

→ Always dispose of unusable products in accordance with national waste disposal regulations.

Complementary information

SICK will be glad to help you dispose of these products on request.

10 Technical data

10.1 Features

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	SICK 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
Sensor resolution	V2D85**05**x-xxxxxxxxxx: 5 megapixel (2,464 px x 2,048 px) V2D85**12**x-xxxxxxxxxx: 12 megapixel (4,096 px x 3,008 px)
Shutter technology	Global shutter
Optical focus	Adjustable focus (manually)
Working distance	Typically 500 mm ... 2,500 mm [3]
Integrated illumination	Order separately as an accessory, e.g. variant of the VI83I illumination unit
Illumination color and aperture angle	**Variants of the VI83I illumination unit** • Visible white light medium, aperture angle: 31° • Visible white light wide, aperture angle: 47° • Visible red light medium, peak wavelength: λ = 660 nm ± 20 nm, aperture angle: 31° • Visible red light wide, peak wavelength: λ = 660 nm ± 20 nm, aperture angle: 47°
Number of LEDs	32
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:** • L_B [4]: < 10 x 10^3 W/(m^2sr) within 100 seconds; at a distance ≥ 200 mm • L_R [5]: < 2.5 x 10^6 W/(m^2sr) within 10 seconds; at a distance ≥ 200 mm Risk RG 0 (no risk group) corresponding to L_B < 100 W/(m^2sr) within 10 x 10^3 seconds for distances > 0.8 m.
LED risk group of the illumination unit (visible red light variant + feedback LED)	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/(m^2sr) within 100 seconds; at a distance ≥ 200 mm • L_R [5]: < 2.5 x 10^6 W/(m^2sr) within 10 seconds; at a distance ≥ 200 mm Risk RG 0 (no risk group) corresponding to L_B < 100 W/(m^2sr) within 10 x 10^3 seconds for distances > 0.3 m.
Feedback LED	Optional, e.g. variant of the VI83I illumination unit **2 LEDs:** • Visible green light (λ = 525 nm ± 15 nm) • Visible red light (λ = 645 nm ± 15 nm)

Alignment aid	1 laser, visible red light (λ = 660 nm ± 20 nm), can be deactivated
Laser class of the alignment aid	Class 1 Laser Product according to EN 60825-1:2014+A11:2021, IEC 60825-1: 2014. 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 mW
Lens	C-mount Order separately as an accessory
Sensor format	V2D85**05**x-xxxxxxxxxx: 1/1.8" V2D85**12**x-xxxxxxxxxx: 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.

10.2 Mechanics and electronics

Connection type	• 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 ± 20% Voltage source in accordance with ES1 (EN62368-1) or SELV (EN60950-1)
Power consumption	Operation: Typically 24 W [3]
Current consumption	Max. 2.0 A
Output current	Output current per utput: 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]
Degree of contamination	2 (EN 61010-1)
Product safety	EN 61010-1:2010 EN 61010-1:2010/A1:2019 EN 61010-1:2010/A1:2019/AC:2019-04
Weight	Typ. 640 g, without lens and connecting cables

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) The typical power consumption depends on the product configuration. The specified value applies to digital outputs without load.
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.

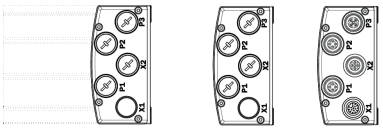
   Prerequisites:

   - 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) Only housing. Lens, integrated illumination unit, spacer and optics protection hood not included.ousing only, without lens and optics protection hood.

10.3 Dimensional drawing

Base device



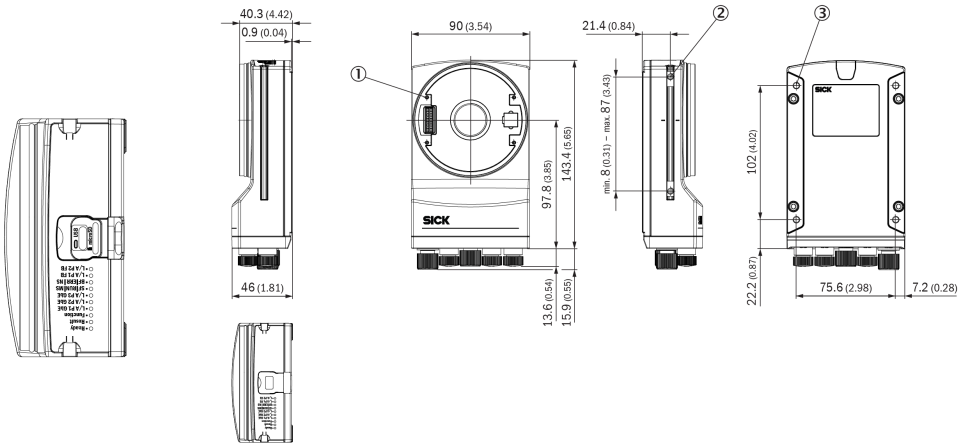


Figure 16: Structure and device dimensions, unit: mm (inch), decimal separator: period

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

Complete device

Product type: V2D8505x–xxxxxxxxx

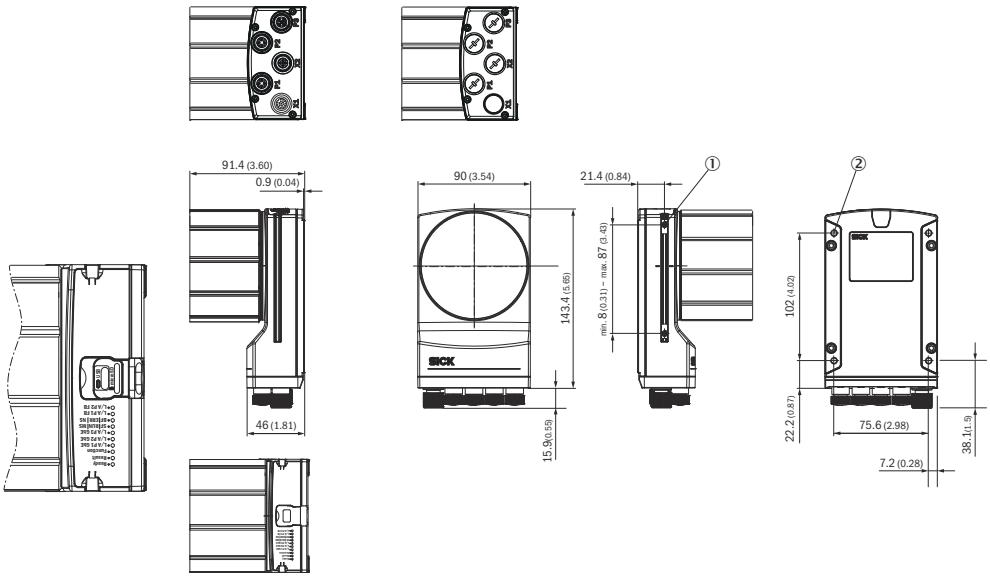


Figure 17: Structure and device dimensions, unit: mm (inch), decimal separator: period

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

Complete device

Product type: V2D8512x-xxxxxxxxx

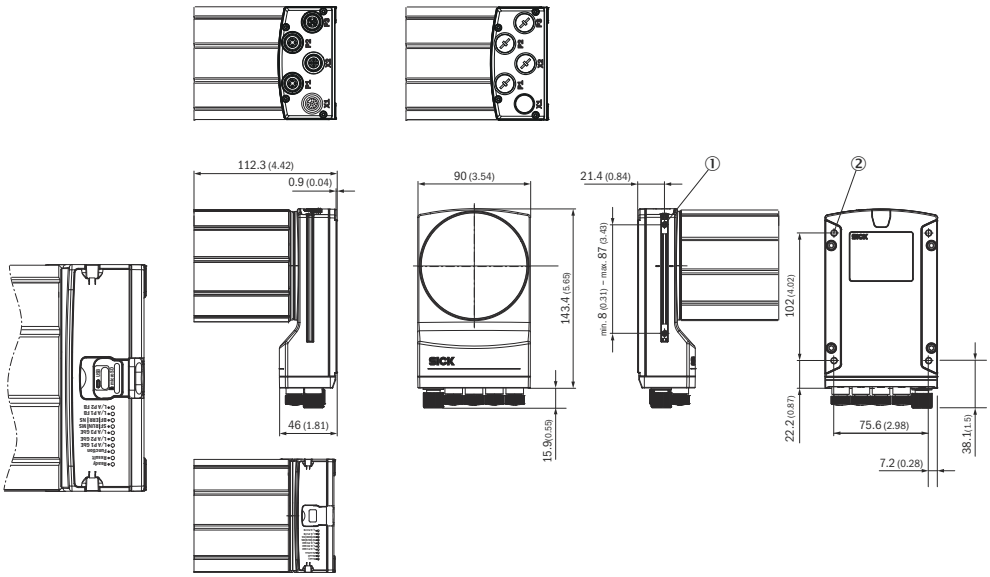


Figure 18: Structure and device dimensions, unit: mm (inch), decimal separator: period

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

10.4 Performance

Sensor resolution	V2D8505x-xxxxxxxxxx: 5megapixel (2464px x 2048px) V2D8512x-xxxxxxxxxx: 12megapixel (4096px x 3008px)

Scan/frame rate[1)]	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.

10.5 Interfaces

Ethernet	Protocol: TCP/IP **Function:** • 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:** • 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	10 status LEDs 2 feedback LEDs of the VI83I illumination unit (green, red)
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.

10.6 Ambient data

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 "Planning for mounting", page 18.

2) Store in a place protected from moisture and dust.

10.7 Field of view

Overview

The field of view data are typical valuesand do not take into account lens or product tolerances. The values apply to a vertical object.

V2D8505P-xxxxxxxxxx, focal length: 8 mm

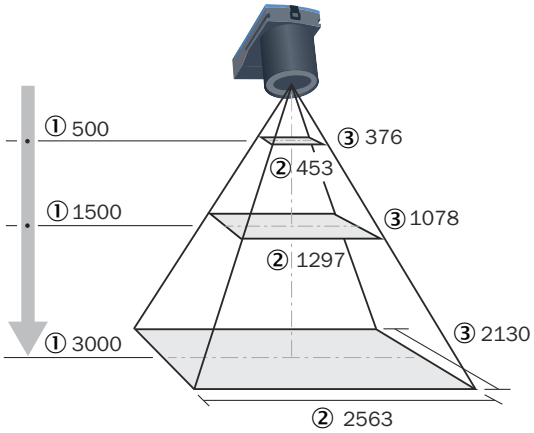


Figure 19: Field of view V2D8505P-xxxxxxxxxx, focal length: 8 mm

① Working distance in mm

② Perceived field of view area: horizontal (mm)

③ Perceived field of view area: vertical (mm)

Table 6: Perceived field of view area

Working distance (mm)	Horizontal (mm)	Vertical (mm)
500	453	376
1000	875	727
1500	1297	1078
2000	1719	1429
2500	2141	1779
3000	2563	2130

V2D8505P-xxxxxxxxxx, focal length: 12 mm

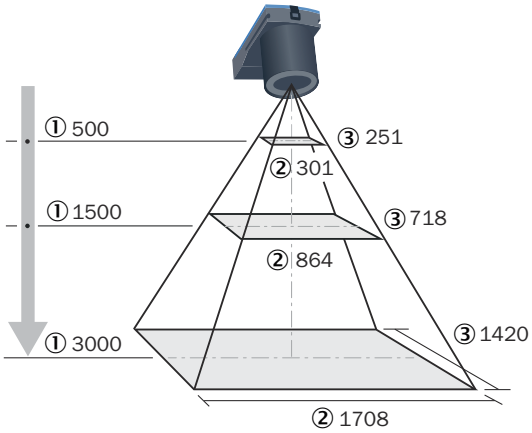


Figure 20: Field of view V2D8505P-xxxxxxxxxx, focal length: 12 mm

① Working distance in mm

② Perceived field of view area: horizontal (mm)

③ Perceived field of view area: vertical (mm)

Table 7: Perceived field of view area

Working distance (mm)	Horizontal (mm)	Vertical (mm)
500	301	251
1000	583	484
1500	864	718
2000	1145	952
2500	1427	1186
3000	1708	1420

V2D8505P-xxxxxxxxxx, focal length: 16 mm

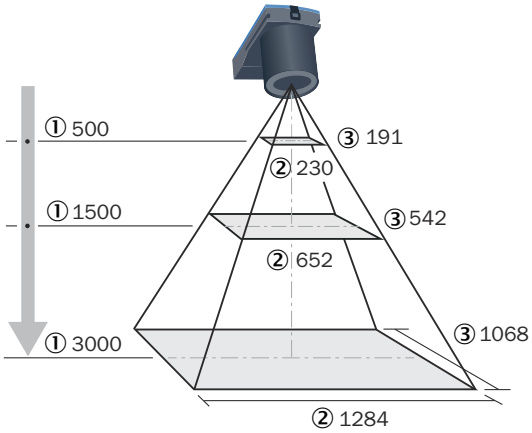


Figure 21: Field of view V2D8505P-xxxxxxxxxx, focal length: 16 mm

① Working distance in mm

② Perceived field of view area: horizontal (mm)

③ Perceived field of view area: vertical (mm)

Table 8: Perceived field of view area

Working distance (mm)	Horizontal (mm)	Vertical (mm)
500	230	191
1000	441	366
1500	652	542
2000	863	717
2500	1073	892
3000	1284	1068

V2D8505P-xxxxxxxxxx, focal length: 25 mm

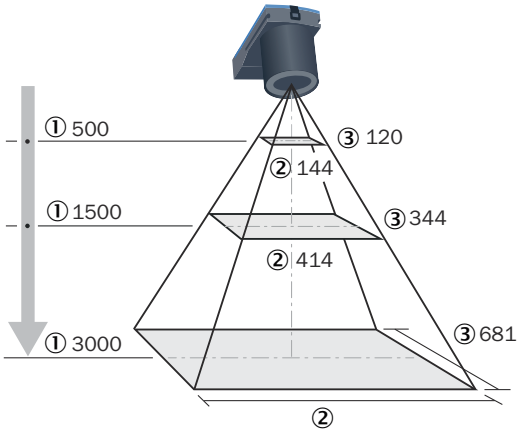


Figure 22: Field of view V2D8505P-xxxxxxxxxx, focal length: 25 mm, adjustable focus (manual)

① Working distance in mm

② Perceived field of view area: horizontal (mm)

③ Perceived field of view area: vertical (mm)

Table 9: Perceived field of view area

Working distance (mm)	Horizontal (mm)	Vertical (mm)
500	144	120
1000	279	232
1500	414	344
2000	549	456
2500	684	569
3000	819	681

V2D8512P-xxxxxxxxxx, focal length: 12 mm

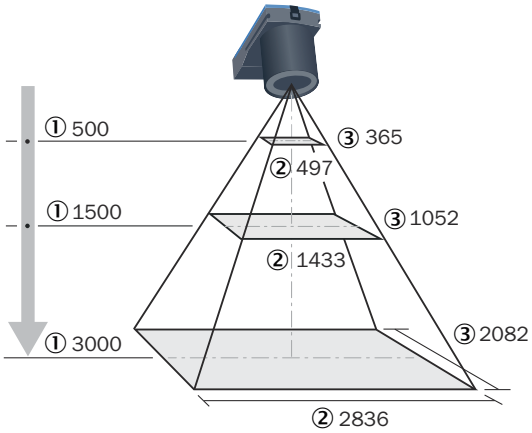


Figure 23: Field of view V2D8512P-xxxxxxxxxx, focal length: 12 mm

① Working distance in mm

② Perceived field of view area: horizontal (mm)

③ Perceived field of view area: vertical (mm)

Table 10: Perceived field of view area

Working distance (mm)	Horizontal (mm)	Vertical (mm)
500	497	365
1000	965	709
1500	1433	1052
2000	1900	1396
2500	2368	1739
3000	2836	2082

V2D8512P-xxxxxxxxxx, focal length: 16 mm

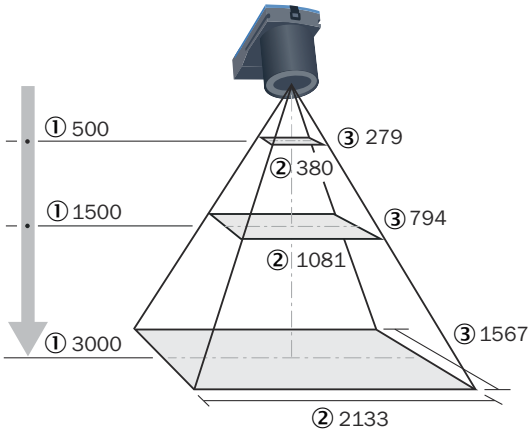


Figure 24: Field of view V2D8512P-xxxxxxxxxx, focal length: 16 mm

① Working distance in mm

② Perceived field of view area: horizontal (mm)

③ Perceived field of view area: vertical (mm)

Table 11: Perceived field of view area

Working distance (mm)	Horizontal (mm)	Vertical (mm)
500	380	279
1000	731	537
1500	1081	794
2000	1432	1052
2500	1783	1309
3000	2133	1567

V2D8512P-xxxxxxxxxx, focal length: 25 mm

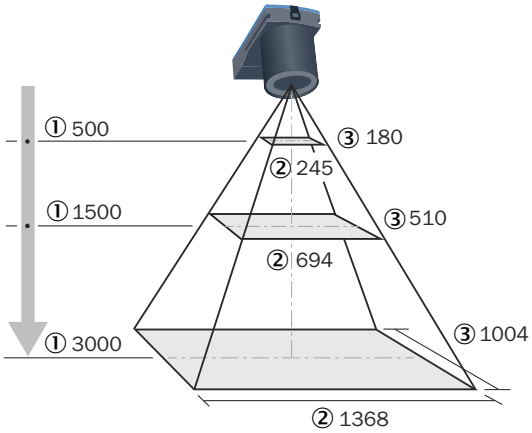


Figure 25: Field of view V2D8512P-xxxxxxxxxx, focal length: 25 mm, adjustable focus (manual)

① Working distance in mm

② Perceived field of view area: horizontal (mm)

③ Perceived field of view area: vertical (mm)

Table 12: Perceived field of view area

Working distance (mm)	Horizontal (mm)	Vertical (mm)
500	245	180
1000	470	345
1500	694	510
2000	919	675
2500	1143	840
3000	1368	1004

10.8 Field of view diagram

Overview

The field of view data are typical values and do not take into account lens or product tolerances. The values apply to a vertical object.

V2D8505P-xxxxxxxxxx

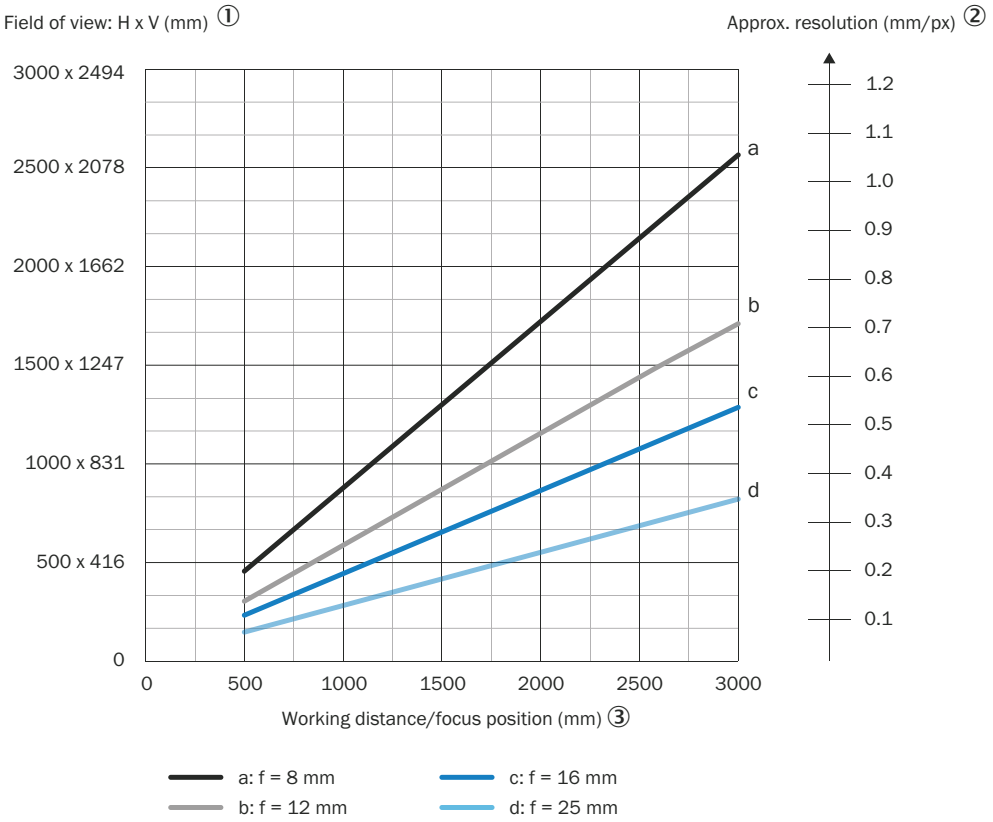


Figure 26: Field of view diagram V2D8505P-xxxxxxxxxx, adjustable focus (manual)

① Field of view: horizontal x vertical in mm

② Approximate resolution in mm/px

③ Working distance/focus position in mm

V2D8512P-xxxxxxxxxx

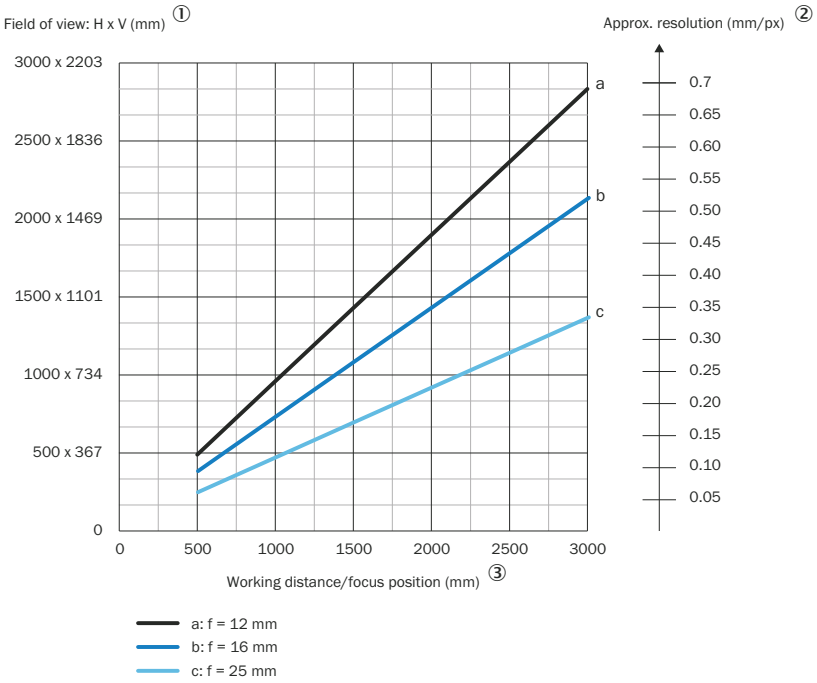


Figure 27: Field of view diagram V2D8512P-xxxxxxxxxx, adjustable focus (manual)

① Field of view: horizontal x vertical in mm

② Approximate resolution in mm/px

③ Working distance/focus position in mm

10.9 Interpreting the diagrams

Use the diagram to determine the following data:

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

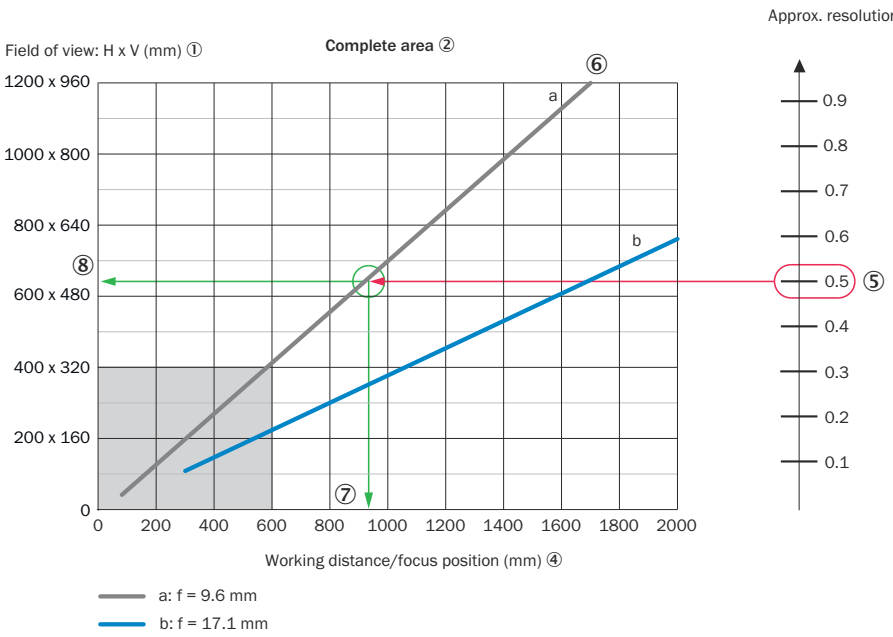


Figure 28: Example of field of view diagram

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.

11 Annex

11.1 Declarations of conformity and certificates

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

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

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

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

11.2 Open source software

This product may contain open source software components. The use of such components is subject to the terms of the respective open source licenses.

For additional information visit **www.sick.com/licensetexts**.

11.3 Data sheet for polarizing filter

Accessory group	Optical filter
Description	A polarizing filter is used to reduce reflections, e.g., for codes under a film or on glossy surfaces. This allows a better detection of codes.
Material	Magnet: NdFeB (neodymium iron boron), polarizing filter substrate: PMMA
Ambient operating temperature	0 °C ... +50 °C
Storage temperature	–20 °C ... +70 °C
Dimensions (W x H x L)	10.8 mm
Diameter	80.5 mm
Weight	8 g
MTBF	150,000 h [1]

[1] Protect the polarizing filter from direct sunlight to avoid material-related aging processes and impairment of the optical function.

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SICK AT A GLANCE

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