OPERATING INSTRUCTIONS

Visionary-B Two

3D machine vision

SICK
Sensor Intelligence.

Described product

Visionary-B Two

Manufacturer

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

Legal information

Original document

This document is an original document of SICK AG.

Contents

1 About this document

1.1 Information on the operating instructions

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 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.

1.3 Further information

More information can be found on the product page.

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

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

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

The 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 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.

Mounting and electrical installation

WARNING
Electrical voltage!

Electrical voltage can cause severe injury or death.

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

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

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

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

2.2 Intended use

The Visionary-B Two 3D vision camera is suitable for 3D environment perception.

Applications

- Object detection and position determination
- Size and volume measurement
- Landmark detection

Possible uses

- Measurement data output (GigE_Streamer_Basic SensorApp pre-installed)
- Other SensorApp
- Programming a SensorApp for the product

The product is programmed within SICK AppSpace using the SICK AppStudio software tool. SensorApps are installed using the SICK AppManager.

Depending on the application, a browser-based graphical user interface (HMI) can be created. The user interface offers options provided by the application developer for controlling an application at the operator level.

The product offers various interfaces and operating elements 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 product is intended for use in outdoor environments and mobile machines.

The product must only be used within the limits of the prescribed and specified technical specifications and operating conditions at all times.

Incorrect use, improper modification, or tampering with the product will invalidate any warranty offered by SICK AG. Furthermore, SICK AG shall not accept any responsibility or liability for any resulting damage and consequential damage.

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 Programmable device

The liability and warranty of SICK AG is limited to the device specification (hardware functionality and any programming interfaces) according to the agreed conditions.

Therefore, SICK AG is not liable, among other things, for damages that are caused by programming of the customer or third parties.

2.5 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)

Cybersecurity of GigE Vision® and GenICam™ standard

- The product does not support operator authentication. Anyone connecting to the product via Ethernet can carry out all processes (e.g., firmware update, restart, configuration) without entering a password.
- All communication between the product and the computer (images, configuration, protocols) is transmitted unencrypted via the UDP protocol.
- To receive security updates, update the product to the latest firmware.

- Device detection according to GigE Vision® occurs via UDP port 3956. Other communication occurs via dynamic UDP ports.
- When a product is connected, it must be located in a private network where the access control is performed, for example, by separate firewalls.

2.6 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	Depending on type
1	Printed safety notes, multilingual	Brief information and general safety notes

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

3.2 Type label

The type label contains information for identifying the product.

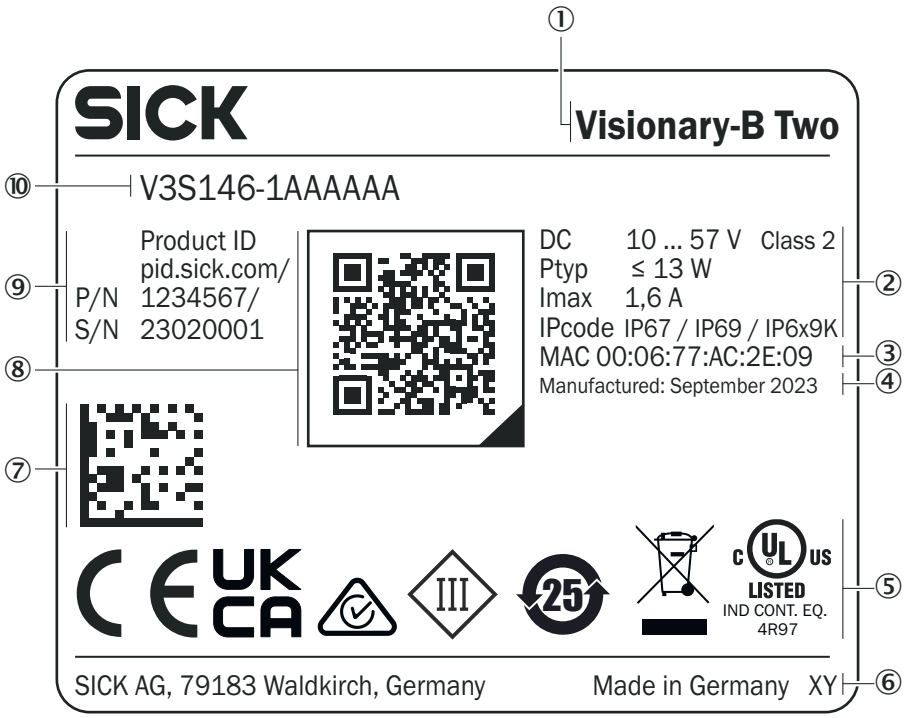

Figure 1: Visionary-B Two type label (example)

① Product
② Supply voltage, typical power, maximum power consumption, IP enclosure rating
③ MAC address
④ Production date
⑤ Conformity mark and certification mark
⑥ Production site
⑦ Data Matrix code
⑧ QR code with a link to the product and more information
⑨ Product ID
⑩ Type designation

3.3 Product overview

Product overview

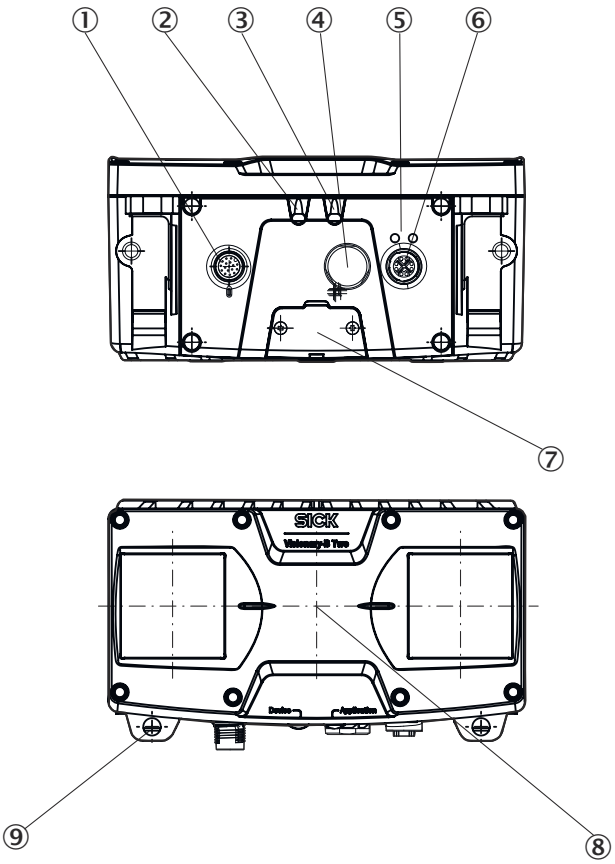

Figure 2: Product overview for Visionary-B Two

① Power/IO connection
② **Device** status LED
③ **Application** status LED
④ Pressure compensation element
⑤ Ethernet status LED
⑥ Gigabit Ethernet connection
⑦ Service interface
⑧ Device coordinate origin
⑨ Hole for mounting the mounting bracket (accessory)

Further topics

- Dimensional drawing

3.4 Display and control elements

Status LEDs

Device	Application	Description
● (all)	● (Blue)	Data transmission: API channel deactivated and diagnostic channel active
● (all)	● (Blue, flashing slowly)	Data transmission deactivated
● (all)	● (Green)	Data transmission: API channel active

Device	Application	Description
(Blue, flashing slowly)	○	System start
● (Green)	(Blue, flashing slowly)	Trigger mode active, waiting for trigger
(Orange, flashing slowly)	● (all)	Device warning, e.g. temperature exceeds warning level
(Red, flashing slowly)	● (Red)	Max. operating temperature exceeded

○ = off; ● = illuminated; = flashing

3.5 SICK AppSpace

SICK AppSpace comprises software tools and programmable devices.

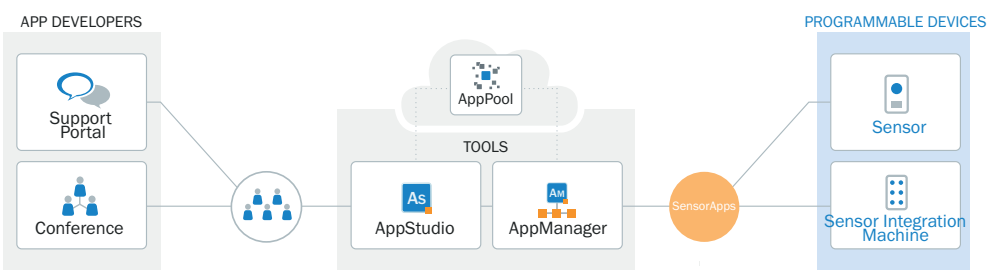

Figure 3: SICK AppSpace

Components and resources

- SICK AppManager: Software tool for installing and managing SensorApps and firmware updates
- SICK AppPool: Cloud repository for storing and sharing SensorApps. SICK AppPool can be accessed directly from SICK AppManager and SICK AppStudio as well as via the web.
- SICK AppStudio: Software tool for developing SensorApps on programmable SICK devices. The user interface for the machine operator can be created as a custom web interface.

Complementary information

- Information about SICK AppSpace: www.sick.com/SICK_AppSpace
- SICK Support Portal with tutorials and instructions for programming the device in SICK AppStudio: supportportal.sick.com

3.6 Functionality

The camera creates 3D images of the environment. Images are created using 3D snapshot stereoscopy technology.

The camera captures two 2D images of the same scene from different angles and superimposes the images. With the help of algorithms, a spatial representation of the scene (3D point cloud) is created from the image overlay, comparable to human spatial vision.

Figure 4: Camera image left

Figure 5: Camera image right

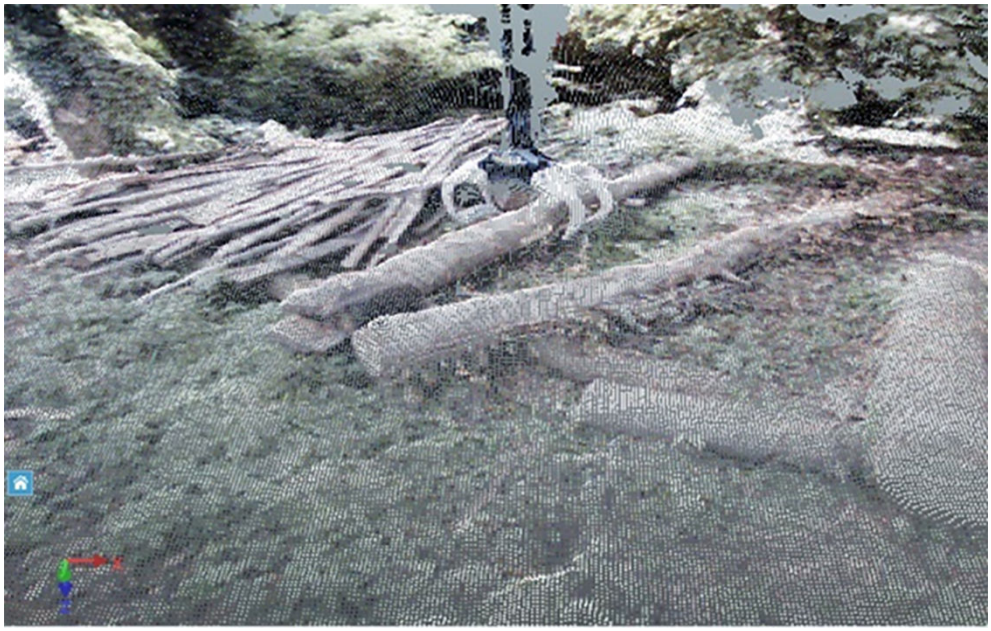

Figure 6: 3D point cloud

The camera calculates the depth values. Depending on the product variant, the depth map also contains color information for each measured value in the 3D point cloud.

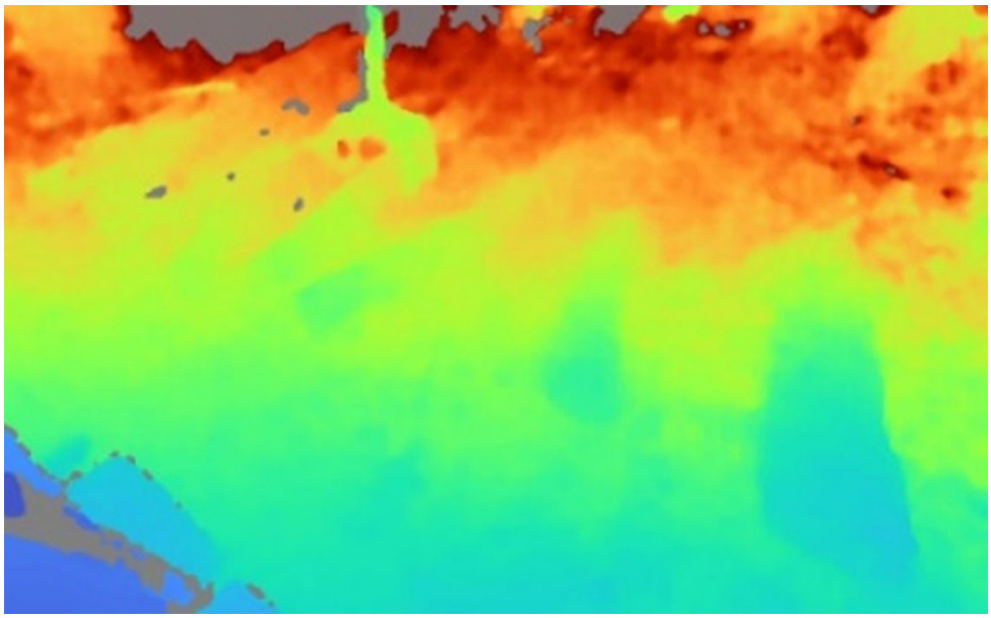

Figure 7: Depth map

The working range can be flexibly extended thanks to the switchable field of view. The working range and measurement accuracy can be adapted to the particular requirements.

With the corresponding SensorApp for measurement data output, the camera within a vision system can send the acquired measurement data to an external computing unit for further processing. Alternatively, it is possible to process the acquired data internally.

3.7 Interface standards

3.7.1 GenICam™

GenICam™

GenICam™ is a standard that provides a generic application programming interface for different kinds of cameras and devices. The standard is owned by EMVA (European Machine Vision Association) and consists of multiple modules.

Compatible modules

Module	Description
GenAPI	Application Programming Interface (API) for parameterizing the product
Standard Feature Naming Convention (SFNC)	Standardized designations and typifications for common product properties
GenTL	General interface characteristics of the transport layer
GenTL SFNC	Standardized names and types for features

Complementary information

Further information is available at www.emva.org/standards-technology/genicam/.

3.7.2 GigE Vision®®

GigE Vision®®

GigE Vision®® is an interface standard for cameras that is based on the Gigabit Ethernet communication protocol. The GigE Vision®® standard is owned by A3 (Association for Advancing Automation). GigE Vision®® cameras must support GenICam™.

Complementary information

Further information is available at https://www.automate.org/a3-content/vision-standards.

4 Mounting

4.1 Planning for mounting

Installation site

- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- The mounting site is suitable for the weight of the device.
- Mount the device in a shock and vibration insulated manner.
- Protect the device from direct sunlight with a protection hood.
- Secure the fixing screws with threadlocker to prevent loosening. We recommend using liquid threadlocker.
- Only mount the device using set screws in static applications or for short-term use. For applications with permanent vibrations, secure the device using the threads on the back of the housing.
- Do not seal off the ventilation element during installation.

Field of view

- Ensure a clear field of view for both cameras. Take the aperture angle into account when doing so. Distance measurement is only possible if both cameras can see the scene. An obstacle in one of the two fields of view can lead to gaps in the depth map.
- Focus the field of view on the main area of the application. To reduce the amount of sky in the picture, tilt the device forwards. Depth data can only be provided for scenes with distinguishable contrast in the image and within the valid working range.

4.2 Ventilation element

The ventilation element ensures an improved pressure equalization and allows the exchange of air and heat between the housing and surroundings.

The breathable membrane allows ambient air to either penetrate into the device, or escape again depending on the prevailing ambient conditions.

In particular for applications with frequently changing environmental influences (e.g., large temperature fluctuations or rapid temperature changes) or with standing water, the ventilation element ensures a reliable pressure equalization and thereby relieves the seals and adhesive joints of the housing. This can improve the expected service life of the device in the application.

Note the following information:

- Do not affix any labels or stickers to the ventilation element.
- Do not paint over the ventilation element.
- Devices that have been subjected to a long period of moisture or very rapid temperature changes need to first equilibrate after being switched on. In some circumstances, therefore, a period of time should be allowed before measurement readiness of the device because any moisture in the housing must first be taken up by the air in the housing, which is heated up through the operation of the device, so that it can then escape via the ventilation element. Depending on the nature of the precipitated moisture, this time period might be several minutes or even up to hours.

4.3 Mounting the product

Approach

1. Mount the product in a suitably prepared bracket using the fixing holes provided. Mounting brackets are available as accessories.
2. Make the electrical connection. Attach and tighten a voltage-free cable.
3. Align the vertical center line of the field of view of the product with the center of the area to be monitored.
4. Switch on the supply voltage.

✓ After successful initialization, the **Device** status LED lights up green. The product is ready for operation.

5. Carry out a functional and vibration test. Realign the product if necessary. Protect against excessive vibrations.

Further topics

- Pin assignment
- Dimensional drawing

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

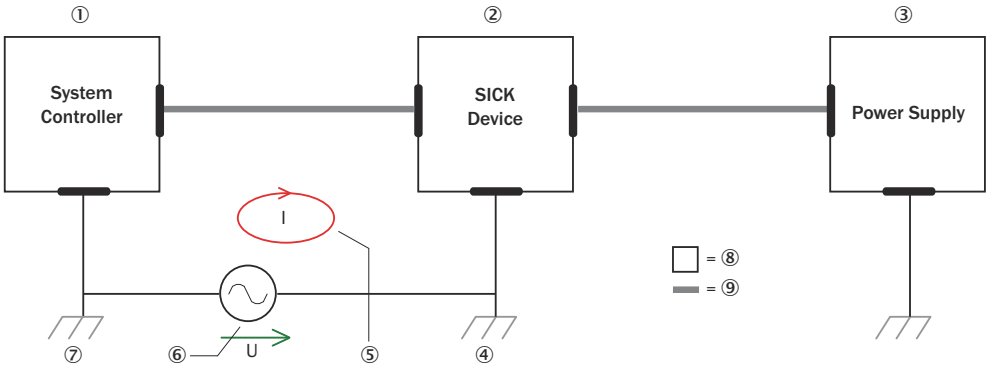

Figure 8: Example: Occurrence of equipotential bonding currents in the system configuration

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

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

Remedial measures

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

NOTICE

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

Measures for widely distributed system installations

On widely distributed system installations with correspondingly large potential differences, the setting up of local islands and connecting them using commercially available **electro-optical signal isolators** is recommended. This measure achieves a high degree of resistance to electromagnetic interference.

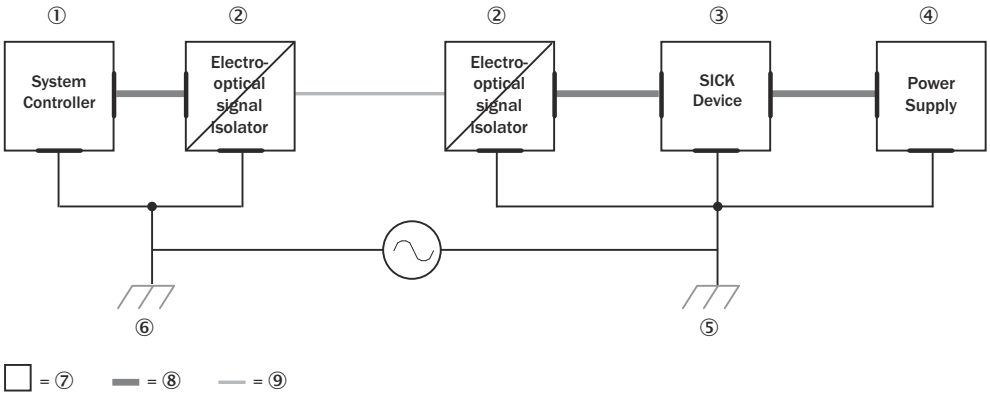

Figure 9: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

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

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

Measures for small system installations

For smaller installations with only slight potential differences, insulated mounting of the device and peripheral devices may be an adequate solution.

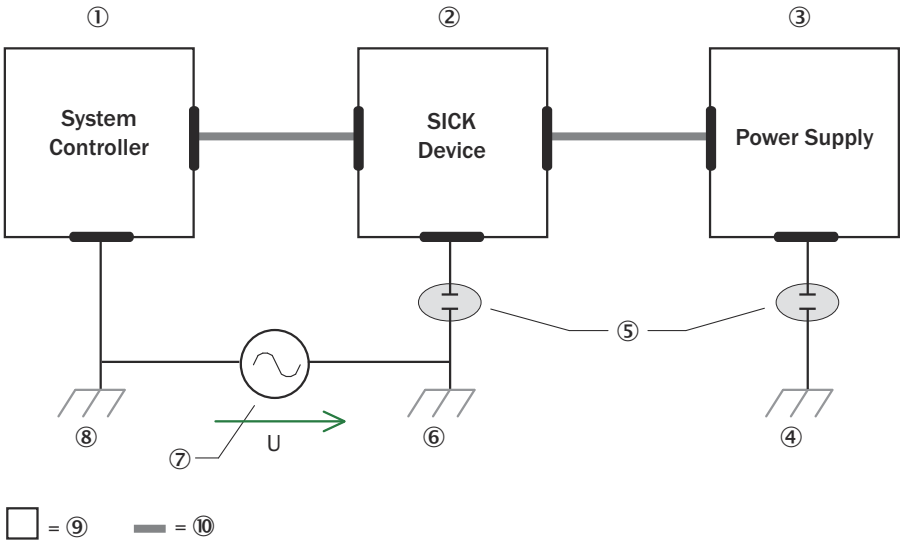

Figure 10: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

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

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

NOTICE

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

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

5.2 Calculation rule

Overview

The device can be connected via optional accessories.

The following formulas can be used to estimate the required cable lengths or supply voltages. Other conditions of the system must be considered in detail.

Prerequisites

- Steady state of the voltage supply
- Supported cables: M12, 17-pin

Formula for the voltage drop to be considered

$$\Delta V = (2 \bullet I_{System} + \sum_{1 \le i \le 4} I_{IO,i}) \bullet L \bullet r_L \bullet (1 + \alpha(T - T_0))$$

Formula for permissible length of cable

$$L = \frac{\Delta V}{(2 \bullet I_{System} + \sum_{1 \le i \le 4} I_{IO,i}) \bullet r_L \bullet (1 + \alpha(T - T_0))}$$

Sample calculations

Table 1: Values used in both example calculations

Cable properties	
r_L = 0.0695 Ω/m [1)]	Cable resistance [Ω/m]
$\alpha = 3.9 \bullet 10^{-3}$ K^{-1}	Temperature coefficient of copper [1/K]
Ambient conditions	
T_0 = 20 °C	Reference temperature [°C]
T = 80 °C	Cable temperature [°C]
Cable load	
P = 13 W	Power consumption of the device [W]
U= 24 V	Supply voltage U [V]
I_{System} = P/U = 542 mA	Device current without loaded IOs [mA]
$I_{IO,1}$ = 100 mA	Load current of IO1 [mA]
$I_{IO,2}$ = 100 mA	Load current of IO2 [mA]
$I_{IO,3}$ = 0 mA	Load current of IO3 [mA]
$I_{IO,4}$ = 0 mA	Load current of IO4 [mA]

1) The specified cable resistance only applies if both wires for VCC or GND are connected. This value is doubled for a VCC or GND wire (0.139 Ω/m).

Table 2: Example voltage drop to be considered for cable part number 2070427

L = 10 m	Length of cable [m]
$\Delta V = (2 \bullet I_{System} + \sum_{1 \le i \le 4} I_{IO,i}) \bullet L \bullet r_L \bullet (1 + \alpha(T - T_0)) = 1{,}11$ V	Voltage drop ΔV [V]

Table 3: Calculation of the cable length based on an allowed voltage drop of 1.11 V

ΔV = 1.11 V	Voltage drop on the cable [V]
$L = \frac{\Delta V}{(2 \bullet I_{System} + \sum_{1 \le i \le 4} I_{IO,i}) \bullet r_L \bullet (1 + \alpha(T - T_0))} = 10$ m	Permissible length of cable L [m]

5.3 Cable reserve on system plug

Allow for sufficient cable reserve of the supplied cables at the system plug. You can easily exchange the device with the cable reserve if needed.

Keep the cable reserve only long enough that the system plug cannot be accidentally plugged into an adjacent device when replacing the device! This prevents a device with an incorrect configuration being put into operation. Experience has shown that 200 to 300 mm of cable reserve on the device is ideal.

The reserve cable should be laid as a drip loop so no moisture (e.g., condensation) is directed towards the device but instead drips off the cable beforehand.

5.4 Pin assignment

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.
- Check the device configuration for the inputs/outputs before connecting the I/O cable.
- Avoid tensile loads to the connecting cables.
- Maximum cable lengths for the voltage supply, depending on the available power supply voltage. The maximum cable length and the permissible minimum voltage at the power supply unit can be calculated with the help of the calculation rule in the following sections.

Power/IO

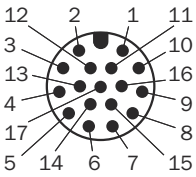

Figure 11: Male connector, M12, 17-pin, A-coded

Contact	Signal	Description	Information
1	GND	Zero potential, supply voltage: 0 V	Use in conjunction with pin 11.
2	Uv	Supply voltage: DC 10 V ... 57 V	Use in conjunction with pin 12.
3	CAN L	CAN-Bus LOW (IN/OUT)	Reserved
4	CAN H	CAN-Bus HIGH (IN/OUT)	Reserved
5	IGN_EN	Ignition plus activation	If an after-run time is required, connect to supply voltage.
6	IGN_PLUS	Ignition plus	After-run time starts when the supply voltage is disconnected. Connect to supply voltage during use. Standard after-run time: 300 seconds.
7	TxD	Serial service interface (Sender)	For SICK Service only.
8	RxD	Serial service interface (Receiver)	For SICK Service only.
9	SensGND	Zero potential digital inputs	
10	SENS In 1	Digital input 1	
11	GND	Zero potential, supply voltage: 0 V	Use in conjunction with pin 1.
12	Uv	Supply voltage: DC 10 V ... 57 V	Use in conjunction with pin 2.
13	DIO 1	Configurable digital input and digital output 1	
14	DIO 2	Configurable digital input and digital output 2	
15	SENS In 2	Digital input 2	

Contact	Signal	Description	Information
16	DIO 3	Configurable digital input and output 3	
17	DIO 4	Configurable digital input and output 4	

Gigabit Ethernet

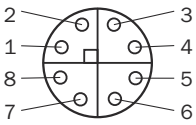

Figure 12: Female connector, M12, 8-pin, X-coded

Table 4: Pin assignment for Gigabit Ethernet

Contact	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_P	Sender/receiver+ 2
8	TRD2_N	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

6 Configuration

6.1 Software installation

6.1.1 Network settings

Prerequisites

- Gigabit Ethernet adapter supports jumbo frames and is intended for camera communication.
- Ethernet infrastructure between the device and computer supports jumbo frames.

Network settings

- The device delivers a large volume of data per second. Therefore connect the device to the computer via a separate Gigabit Ethernet network without any other interfering data traffic.
- The computer is on the same network as the device.
- The computer does not use the same IP address as the device.
  The factory default is IP configuration using DHCP. If no DHCP server is found, the devices assign a Link Local Address (LLA) in the format 169.254.x.y by default. Recommendation: Define a permanent IP address. Which IP configuration is used when the device is restarted is determined by the **TransportLayerControl** parameter.
- If the computer is connected to other devices (e.g., network printers), equip the computer with at least two network interface cards (NIC).
- Multiple devices can be connected to multiple connections or to multiple NICs via one NIC. If multiple devices are connected to a single NIC, the maximum speed of the devices is reduced. To ensure optimum performance, connect each device to a separate NIC.
- The NIC supports Gigabit Ethernet.
- The NIC supports jumbo frames.

Table 5: Jumbo frames

Recommended setting	9014
Default	Deactivated

Complementary information

Jumbo frames are frames with more than 1,500 bytes of Ethernet payload. Sending and receiving jumbo frames can improve performance due to the lower CPU load on the computer.

6.1.2 Installing SICK AppManager

Overview

Functions

- Install the SensorApp.
- Read out and change the IP address.
- Start, stop and delete an installed SensorApp.
- Install a firmware update.

Approach

1. Download SICK AppManager: www.sick.com/SICK_AppManager.
2. Run the installation file (EXE).
3. Follow the instructions.

6.1.3 Installing SICK AppStudio

Overview

Functions

- Program the device.
- Diagnostics in the event of a fault

Prerequisites

- Valid license

Approach

1. Download the SICK AppStudio software in the Support Portal: www.sick.com.
2. Follow the instructions.

6.1.4 Installing SensorApp

Prerequisites

- Computer with the SICK AppManager software
- A SICK ID is required to use SICK AppPool. Access the SICK ID here: http://app-pool.cloud.sick.com/.
- Latest version of the SensorApp (.SAPK file)
  Download options
  - Online: Download the SensorApp from the SICK AppPool using SICK AppManager. Install the SensorApp.
  - Offline: Download SensorApp from http://apppool.cloud.sick.com/ to the computer. Then install in SICK AppManager.
- The computer is on the same network as the device.
- The computer does not use the same IP address as the device.
- When the firmware is updated, the associated configuration file is deleted. To reuse the old configuration file, export it before the firmware update.

Procedure

1. Connect the device to the computer via Ethernet.
2. Open SICK AppManager.
3. To search for available devices on the network, click **Search** in the **Device Search** tab.
4. Select the device on which the SensorApp will be installed.
5. If active apps are displayed on the **Device** tab (e.g., old versions of the SensorApp), right-click on these apps and delete them.
6. Online option: Download and install the SensorApp from the SICK AppPool using SICK AppManager.
   a)  .
   b) Log in with the SICK ID.
   c) Click on the **AppPool** tab.
   d) Select SensorApp.
   e) Click on **Download and install.**
7. Offline option: Install the SensorApp via an SAPK file.
   a) In SICK AppManager, click on the **Local Packages** tab.
   b) Drag and drop the SensorApp (.SAPK file) into the file list.
   c) Click **Install.**
8. To display the user interface, enter the IP address of the device in the web browser.

6.2 Programming the device

Overview

Programming of the device for the specific application is performed by default using SICK AppStudio.

The existing SensorApps can be used to demonstrate device properties and as a starting point for programming. Depending on the version of SICK AppStudio used, the steps described below may differ.

Procedure

1. Start SICK AppStudio.
2. Select the directory (workspace) where all data and changes are automatically saved.
3. Establish a connection between the software and the device via Ethernet. The IP address is defined by the **GigE_Streamer_Basic** SensorApp. The IP address is primarily assigned via DHCP. If no DHCP server is available, the IP is assigned in the 169.254.x.y range via LLC.
4. Select the desired app. Transfer it to the device and activate it using **Run all Apps** in the top bar.
5. Start the Internet browser (recommendation: Chrome, Firefox or Safari) and enter the IP address of the device.
6. Familiarize yourself with how the app works and change parameters as needed.
7. In **AppExplorer**, configure the UI elements in the app under **pages** or change the functionality of the app under **scripts** (programming in LUA).
8. Transfer the changes to the device using **Run all apps** and update the browser for visualization.

Complementary information

For more information, visit supportportal.sick.com.

6.3 Parameterizing GigE_Streamer_Basic

Overview

The GigE_Streamer_Basic SensorApp is pre-installed on the device. The device can use the SensorApp to send the measurement results to an external computing unit via GigE Vision®. The SensorApp is run immediately after switching on the device. The integration examples, e.g., Python or C++, can be used to control the device.

To optimize the device for the application, adjust the following parameters.

Parameters: Data transmission and control via GenTL

Parameter	
ComponentSelector	Selected data components depending on the available functions Data components • **Range**: The distance image provides the distance between the device and the visible objects in the scene. • **Intensity**: The intensity image provides the color information for each pixel in RGB format or optionally a grayscale value (monochrome image sensors). • **IMUBasic**: This setting provides the IMU data that is acquired during an image interval. The sampling rate of the IMU is 100 Hz. This means that at least 3 measurements are available per image sequence at 30 fps.
AcquisitionStart	Starts data acquisition of the device.
AcquisitionStop	Stops data acquisition of the device.
AcquisitionFrameRate	Reduces the frame rate. This option is only available if **ExposureAuto** is switched off.
ExposureTime	Controls the exposure time. This option is only available if **ExposureAuto** is switched off. If ExposureAuto is set to **Continuous**, the function returns the currently used exposure time.
ExposureAuto	Automatically adjusts the exposure time of the image sensor. This function ensures that the captured image has the correct brightness and exposure. The exposure time can be controlled automatically or manually depending on the ambient conditions and image requirements. Values • **Off**: Automatic exposure is not used. The exposure time is controlled manually using the **ExposureTime** function. • **Continuous**: The device uses automatic exposure mode.
ExposureAutoFrameRateMin	If **ExposureAuto** is set to **Continuous**, this parameter defines the minimum required frame rate (in fps). Technically speaking, this sets the upper limit for the automatic exposure time in order to achieve the required frame rate.

Parameter	
MultiSlopeMode	Controls multi-slope exposure mode. Multi-slope exposure mode can improve the dynamic range of the acquired data. Values • **Off**: The default single exposure mode is active. Reduces motion artifacts and enables a higher frame rate. • **PresetAggressive**: High dynamic range (HDR) mode, which uses two separate exposures, is active. This mode is suitable for capturing scenes with very bright and dark areas. The mode can increase motion artifacts and reduce the maximum frame rate.
FieldOfView	Switches between different aperture angles. Aperture angle • **WFOV**: Wide field of view (default) is active. Can capture a larger area at close range, but leads to greater distortion due to fish-eye effects. • **NFOV**: Narrow field of view is active to obtain more details. The central pixels are less compressed. **NFOV** is therefore not a cropped version of the wide field of view. The physical resolution around the center is almost doubled.
Scan3dDataFilterSelector	Selects the data filters that can be activated or deactivated on the device.
ValidationFilter	Invalid pixels below the selected **Scan3dDepthValidationFilterLevel** threshold are filtered out.
Scan3dDataFilterEnable	The Boolean function enables you to activate and deactivate the data filter currently selected in **Scan3dDataFilterSelector**.
Scan3dDepthValidationFilterLevel	Sets the threshold value of the pixels used by the validation filter. A weaker filter means more valid points in the output, possibly with noise or artifacts. A stronger filter means that uncertain points are removed from the output, possibly valid measurements. Values • -9 = weakest level • 0 = balanced level • 9 = strongest level
GevSCPD	Controls the minimum inter-packet delay (in nanoseconds) inserted between successive data packet streams. This function is used for data flow control in the event of performance problems on the receiver side. If performance problems arise, use the function with caution. You can use the “StreamThroughputCalculator.html” help to determine an optimum value. The help is available at supportportal.sick.com.

Complementary information

A complete overview of the parameters (GenICam Feature Overview) is available on the product page under **Downloads** > **Software** > ZIP file.

Various interfaces are available to control the device. The drivers are available on the product page under **Downloads** > **Software**.

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

- GigE Vision®®

6.4 Changing the IP address using GigE_Streamer_Basic

Overview

Change the IP address for a device using the **GigE_Streamer_Basic** SensorApp via the Python interface provided.

Options

- **persistent_ip**: Define a fixed IP address that is retained even after a restart.
- **persistent_current**: Set the current IP address to persistent. The IP settings are retained after a restart.
- **persistent_dhcp**: IP address assigned via DHCP. The mode is retained after a restart.
- **persistent_lla**: IP address assigned via Link Local Address (LLA). The mode is retained after a restart.

Procedure

1. `ip_config.py` run:
   `python ip_config.py` [assignment option] -d [serial number] -i [IP] -s [subnet mask] -g [gateway]
   Example: `python ip_config.py persistent_ip -d 23120003 -i 192.168.1.10 -s 255.255.255.0 -g 0.0.0.0`
2. Check the response.
   Example:
   Writing persistent IP configuration to the device with serial number: 23120003
   Wrote following persistent IP configuration settings:
   - Persistent IP protocol active: True
   - DHCP protocol active: False
   - LLA protocol active: always active
   - Persistent IP address: 192.168.1.10
   - Persistent subnet mask: 255.255.255.0
   - Persistent default gateway: 0.0.0.0

6.5 Changing the IP address using SICK AppManager

Procedure

1. Open SICK AppManager.
✓ All devices in the network are displayed under **Device search**.
2. Select the desired device.
3. Click on **Edit IP address**.
4. Enter an IP address.

7 Maintenance

7.1 Maintenance

Table 6: Maintenance schedule

Maintenance work	Interval
Check device and connecting cables for damage at regular intervals.	Depends on ambient conditions and climate.
Clean housing and viewing window.	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.

Approach

1. Clean the housing using a soft cloth. The cloth is either dry or moistened with a mild cleaner diluted with water without powder additives.
2. Clean the viewing window at regular intervals and in the event of contamination.

8 Troubleshooting

8.1 Troubleshooting

Faults, warnings and errors

Table 7: Troubleshooting Q&A

Question / status	Answer/remedial actions
Several consecutive packets are lost, e.g., 31 consecutive packets are lost.	Increase the receive buffer.
Increased memory utilization.	Decrease the receive buffer
The device uses a smaller jumbo frame size, which means a higher CPU load on the computer.	Increase the jumbo frames.
Streaming data is not received by the device. A network component that does not support jumbo frames is connected between the device and the computer.	Decrease the jumbo frames.
The device and the NIC are not connected to the same DHCP server or only one end is connected to a DHCP server. The device cannot assign a correct IP address.	Ensure that the device and the NIC are connected to the same DHCP server. Ensure that all NICs and all devices are in the same subnet.

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

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

9 Decommissioning

9.1 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

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.

10.1 Features

Field of view	Wide: 130 ° x 105 °	Narrow: 90 ° x 60 °
Technology	3D snapshot stereoscopy	
2D image resolution	1,024 px x 576 px, 24 bits	
3D image resolution	1,024 px x 576 px, 16 bits	
Working distance	0.28 m ... 16 m	0.65 m ... 37 m
Base distance	112 mm	
Detection angle	130° x 105°	90° x 60°
Exposure mode	Manual, automatic Single, multiple (HDR)	
Shutter technology	Global shutter	
Task	• Classification • Identification • Position determination • Collision warning • Navigation • presence inspection • Robot guidance • Measuring, 2D • Measuring, 3D	

10.2 Mechanics and electronics

Connection type	Power/IO: M12, 17-pin, A-coded [1] Gigabit Ethernet: M12, 8-pin, X-coded
Supply voltage VS:	10 V DC ...57 V DC [2]
Power consumption	≤ 15 W 3 mA, at 24 V, standby
Output voltage	9 V ... 57 V
Output current	≤ 250 mA
Peak current	1.5 A
Protection class	III
Enclosure rating	IP67, IP69, IP6X9K [3]

Connection materials	Zinc (chromate coated)
Housing material	Aluminum
Housing color	Anthracite
Weight	1.5 kg
Dimensions (L x W x H)	162 mm x 93 mm x 78 mm

1) Plug connections up to 30 V: Adhere to contamination level 2 according to DIN EN 60664-1.
Plug connections of 30 V and above: Adhere to contamination level 1 according to DIN EN 60664-1.
2) The values are valid for the electrical voltage applied to the device. Take cable losses into account.
3) **Prerequisites:**
- The cables plugged into the electrical connections must be screwed tight. Unused electrical connections are sealed off with a protective cap.

10.3 Dimensional drawing

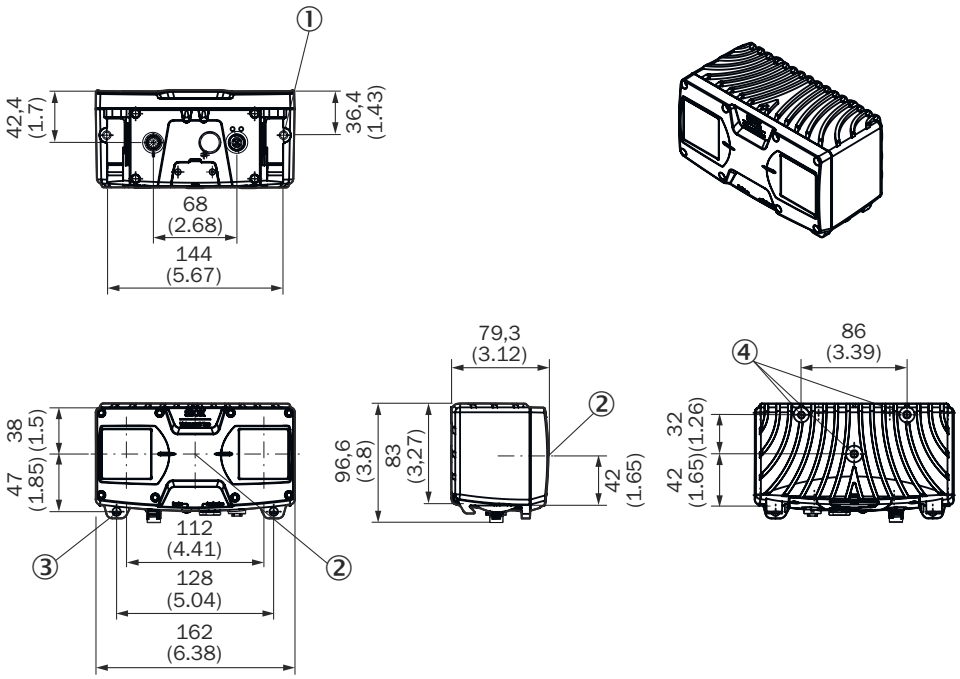

Figure 13: Structure and device dimensions, unit: mm (inch), decimal separator: period

① M6 threaded hole, 7 mm deep (2x), for mounting accessories
② Device coordinate origin
③ Hole for mounting the bracket (accessory), tightening torque: 3 Nm
④ M6 threaded hole, 10 mm deep (3x), for mounting accessories and the device, tightening torque: 5 Nm

10.4 Performance

Field of view	**Wide: 130 ° x 105 °**	**Narrow: 90 ° x 60 °**
Measurement accuracy (typical), at working distance	Approx. 5 mm, at 1 m Approx. 80 mm, at 4 m Approx. 300 mm, at 8 m Approx. 700 mm, at 12 m Approx. 1200 mm, at 16 m	Approx. 2 mm, at 1 m Approx. 35 mm, at 4 m Approx. 140 mm, at 8 m Approx. 300 mm, at 12 m Approx. 850 mm, at 20 m Approx. 1300 mm, at 25 m Approx. 2800 mm, at 37 m

Field of view	Wide: 130 ° x 105 °	Narrow: 90 ° x 60 °
Repeatability (typical), at working distance	Approx. 0.5 mm, at 1 m Approx. 12 mm, at 4 m Approx. 50 mm, at 8 m Approx. 100 mm, at 12 m	Approx. 0.6 mm, at 1 m Approx. 6 mm, at 4 m Approx. 30 mm, at 8 m Approx. 60 mm, at 12 m Approx. 260 mm, at 20 m
Switch-on delay (typical)	Approx. 20 seconds	
Frame rate	≤ 30 fps	
Response time	≥ 70 ms [1]	
Pixel count	1,024 px x 576 px	
Memory (for SICK AppSpace)	4 GB (3.8 GB)	
Processor	1.4 GHz, 4 × ARM Cortex A72 [2]	
Clock frequency	1,400 Mhz	

1) The response time is determined by the exposure time.
2) Part of the processor resources are required for internal processing. The current processor load is displayed in the CPU monitor in SICK AppStudio.

10.5 Interfaces

Gigabit Ethernet	Protocol: TCP/IP, UDP/IP Standard: GigE Vision Data transmission rate: 1,000 Mbit/s
Digital inputs	Quantity: 2 Logic: HIGH active Voltage range: 5 V ...60 V
Configurable digital inputs and digital outputs	Quantity: 4 Voltage range: 9 V ... 57 V
Ignition plus (ACC, EN)	Quantity: 2
Data output	• Depth map • 2D image (RGB) • IMU • Intrinsic camera parameters
IMU (inertial measuring unit)	Sampling rate: 100 Hz **Relative position of the IMU to the optical origin:** • X: −12.5 mm • Y: −12.1 mm • Z: −68.52 mm
Optical displays	2 status LEDs
Communication interface	Gigabit Ethernet, GigE Vision
Application programming interface	Python, C++ GenIStream, GenICam GenTL
Configuration software	Sick AppStudio, Sick AppManager, SOPASair
Operating system	Windows, Linux

10.6 Ambient data

Electromagnetic compatibility (EMC)	EN ISO 14982 (Agricultural and forestry machinery) EN 13766 (Earth-moving and building construction machinery) EN 12895 (Industrial trucks)
Vibration resistance	10 Hz ... 500 Hz, 5 g (IEC 60068-2-6) 10 Hz ... 250 Hz, 4.24 grms (IEC 60068-2-64)
Shock resistance	100 g, 6 ms (IEC 60068-2-27)
Ambient operating temperature	–40 °C ... +60 °C [1)2)]
Storage temperature	–40 °C ... +85 °C
Ambient light immunity	300 klx

1) Valid for supply voltage 10 V ... 40 V.
Supply voltages > 40 V: –40 °C ... +55 °C

2) Starting the device at –40 °C requires a warm-up time of 15 minutes with a 10 V supply voltage applied, or 5 minutes with a 24 V supply voltage applied. After the warm-up time, restart the device by briefly interrupting the power supply.

11 Accessories

Accessories and, if applicable, associated mounting information 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).

12 Annex

12.1 Declarations of conformity and certificates

You can download declarations of conformity and certificates via 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).

12.2 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.

See the GNU General Public License for more information.

For license texts, see www.sick.com/licensetexts. Printed copies of the license texts are also available on request.

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Australia
Phone +61 (3) 9457 0600
1800 33 48 02 – tollfree
E-Mail sales@sick.com.au

Austria
Phone +43 (0) 2236 62288-0
E-Mail office@sick.at

Belgium/Luxembourg
Phone +32 (0) 2 466 55 66
E-Mail info@sick.be

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

Canada
Phone +1 905.771.1444
E-Mail cs.canada@sick.com

Czech Republic
Phone +420 234 719 500
E-Mail sick@sick.cz

Chile
Phone +56 (2) 2274 7430
E-Mail chile@sick.com

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

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

Finland
Phone +358-9-25 15 800
E-Mail sick@sick.fi

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

Germany
Phone +49 (0) 2 11 53 010
E-Mail info@sick.de

Greece
Phone +30 210 6825100
E-Mail office@sick.com.gr

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

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

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

Israel
Phone +972 97110 11
E-Mail info@sick-sensors.com

Italy
Phone +39 02 27 43 41
E-Mail info@sick.it

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

Malaysia
Phone +603-8080 7425
E-Mail enquiry.my@sick.com

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

Netherlands
Phone +31 (0) 30 204 40 00
E-Mail info@sick.nl

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

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

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

Romania
Phone +40 356-17 11 20
E-Mail office@sick.ro

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

Slovakia
Phone +421 482 901 201
E-Mail mail@sick-sk.sk

Slovenia
Phone +386 591 78849
E-Mail office@sick.si

South Africa
Phone +27 10 060 0550
E-Mail info@sickautomation.co.za

South Korea
Phone +82 2 786 6321/4
E-Mail infokorea@sick.com

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

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

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

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

Thailand
Phone +66 2 645 0009
E-Mail marcom.th@sick.com

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

United Arab Emirates
Phone +971 (0) 4 88 65 878
E-Mail contact@sick.ae

United Kingdom
Phone +44 (0)17278 31121
E-Mail info@sick.co.uk

USA
Phone +1 800.325.7425
E-Mail info@sick.com

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

Detailed addresses and further locations at **www.sick.com**

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

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