OPERATING INSTRUCTIONS

RMS1000

Radar sensor

SICK
Sensor Intelligence.



Described product

RMS1000 Model RMS-A

RMS1000 Model RMS-C

RMS1000 Model RMS-E

Manufacturer

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Original document

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1 About this document

1.1 Information on the operating instructions

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

Prerequisites for safe work are:

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

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

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

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

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

1.2 Explanation of symbols

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

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

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

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

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

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

1.3 Related applicable documents

Related applicable documents from SICK

Document	Title	Part number	Source
Technical information	RMS1000	8026123	www.sick.com/8026123
Telegram listing	RMS1000 Radar Sensor	8026613	www.sick.com/8026613

1.4 Further information

More information can be found on the product page.

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

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

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

The following information is available depending on the product:

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

2 Safety information

2.1 Intended use

The RMS1000 radar sensor is used for area monitoring. The product detects static and moving objects within a defined detection field and triggers a switching signal upon detection of a relevant object. Distance zones can be defined. Different functions can be assigned to the distance zones. The distance and speed of the detected objects are determined and provided via the data telegram.

All object data can be provided via Ethernet. The ability to provide it via CAN J1939 is under development. The product is operated via the SOPASair software.

NOTE

The radar sensor is approved for operation in countries listed in the RMS1000 “Regulatory Notes” technical information (no. 8026123). This document is included with the product. The operation of the product in other countries can interfere with protected frequency ranges.

- Only use the product in countries in which it has been approved.
- When reselling the product, inform the buyer about the regional approval restrictions.

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

Health hazards as a result of high-frequency electromagnetic radiation

The radar sensor is designed for operation in accordance with ETSI EN 305550. During operation, the exposition limit values defined in EN 62311 must be adhered to.

In order to limit human exposure to electromagnetic fields, suitable safety distances must be maintained during both short-term and long-term work in the radiation range of the antenna. The minimum distance between the antenna and the human body during continuous operation is 20 cm.

Country-specific aspects which must be taken into account during operation of the device can be found in the RMS1000 “Regulatory Compliance Information” technical information publication (no. 8026123), which is included with the product.

2.2 Improper use

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

- The device does not constitute a safety component in accordance with the respective applicable safety standards for machines.
- The device must not be used in explosion-hazardous areas.
- Any use of accessories not specifically approved by SICK AG is at your own risk.

WARNING

Danger due to improper use!

Any improper use can result in dangerous situations.

Therefore, observe the following information:

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

2.3 Cybersecurity

Overview

To protect against cybersecurity threats, it is necessary to continuously monitor and maintain a comprehensive cybersecurity concept. A suitable concept consists of organizational, technical, procedural, electronic, and physical levels of defense and considers suitable measures for different types of risks. The measures implemented in this product can only support protection against cybersecurity threats if the product is used as part of such a concept.

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

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

2.4 Limitation of liability

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

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

2.5 Modifications and conversions

NOTICE

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

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

2.6 Requirements for skilled persons and operating personnel

WARNING

Risk of injury due to insufficient training.

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

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

The following qualifications are required for various activities:

Table 1: Activities and technical requirements

Activities	Qualification
Mounting, maintenance	▪ Basic practical technical training ▪ Knowledge of the current safety regulations in the workplace

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

2.7 Operational safety and specific hazards

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



WARNING
Electrical voltage!

Electrical voltage can cause severe injury or death.

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



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

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

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

3 Product description

3.1 Scope of delivery

The delivery of the device includes the following components:

No. of units	Component	Note
1	Device in the version ordered	Without connecting cables and brackets
1	SOPASair configuration software	integrated into the device, access via web browser
1	Protective caps for electrical connections	Included or possibly attached to the device
1	Printed RMS1000 “Regulatory Notes” technical information (no. 8026123)	Informs about the countries for which an approval exists. Names country-specific aspects which are to be taken into account during operation of the device.
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 Product variants

Model	Frequency band
RMS-A (ETSI)	61 GHz ... 61.5 GHz
RMS-C (Japan)	60.5 GHz ... 61 GHz
RMS-E (FCC)	61 GHz ... 61.5 GHz

You can find information about national approvals and country-specific particulars in the RMS1000 “Regulatory Compliance Information” technical information (no. 8026123). The technical information is enclosed with the product and also available at www.sick.com/8026123.

3.3 Connections and LEDs



Figure 1: Connections and LEDs

① LED 1 Device (Dev)
② LED 2 Application (App)
③ Connection Ethernet
④ CAN I/O connection (no function, planned to be provided in future)
⑤ Connection Power

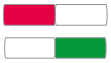
Connections

For details, see "Pin assignment", page 19.

LEDs

The LEDs indicate the following status information.

Device status	LED 1 Device (Dev) [1] LED 2 Application (App) [1]	Description
Device off		Off Off
Initialization phase		Permanently red Permanently red
Parameterization		Permanently red Permanently red
Field clear [2]		Permanently green Permanently green
Object detection [2]		Permanently green Permanently yellow
No field created		Permanently green Off
Error (can be remedied by the user)		Slowly flashing red Slowly flashing red Synchronous
Serious error (contact SICK Service)		Quickly flashing red Quickly flashing red Synchronous
Standby/save electricity		Permanently yellow Permanently red

Device status	LED 1 Device (Dev) [1] LED 2 Application (App) [1]	Description
Firmware update		Slowly flashing red Slowly flashing green Asynchronous

1 Colors:

- Red
- Yellow
- Green

Patterns:

- Off
- Permanently lit
- Flashing slowly (1 Hz)
- Flashing quickly (8 Hz)

2 The LEDs indicate the status of the object detection or evaluation in a field. The LEDs do not indicate the status of the digital output. If the result of the field evaluation is inverted before being placed on the digital output, this has no effect on the LEDs.

4 Transport and storage

4.1 Transport

NOTICE
Damage due to improper transport!

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

4.2 Unpacking

- To protect the device against condensation, allow it to equilibrate with the ambient temperature before unpacking if necessary.
- Handle the device with care and protect it from mechanical damage.
- To avoid ingress of dust and water, only remove the protective elements, e.g. protective caps of the electrical connections just before attaching the connecting cable.

4.3 Transport inspection

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

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

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

4.4 Storage

- Electrical connections are provided with a protective cap.
- Do not store outdoors.
- Store in a place protected from moisture and dust.
- Recommendation: Use the original packaging.
- To allow any residual dampness to evaporate, do not package in airtight containers.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see "Technical data", page 32.
- Relative humidity: see "Technical data", page 32.
- For storage periods of longer than 3 months, check the general condition of all components and packaging on a regular basis.

5 Mounting

5.1 Mounting instructions

- Observe the technical data.
- Protect the sensor from direct sunlight.
- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- The mounting site has to be designed for the weight of the device.
- It should be mounted so that it is exposed to as little shock and vibration as possible. Optional mounting accessories are available, see "Accessories", page 35.
- The 4 threaded mounting holes on the left and right side of the housing are used to mount the device on a bracket. Only use screws with M5 thread. Insert the screws into the thread by a maximum of 9 mm.
- Use of a mounting bracket is recommended. Information about optional accessories, "Accessories", page 35.
- Do not mount device tilted toward the ground in order to prevent ground reflections, which could be detected as objects.
- No detection is possible within the blind zone. The blind zone is specified in the technical data.

5.2 Mounting the device

1. Mount the device in a suitably prepared bracket using the fixing holes provided. Mounting brackets are available as accessories, "Accessories", page 35.
2. Make the electrical connection. Attach and tighten a voltage-free cable, see "Connecting the device electrically", page 21.
3. Align the device with the center of the area to be monitored.
4. Switch on the supply voltage.

✓ After successful initialization, the two status LEDs light up green. The device is ready for use.

6 Electrical installation

6.1 Wiring instructions

NOTE

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

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

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

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

NOTICE

Faults during operation and defects in the device or the system

Incorrect wiring may result in operational faults and defects.

- Follow the wiring notes precisely.

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

Isolate the wires of unused digital outputs at the control cabinet.

All circuits connected to the device must be designed as ES1 circuits. The voltage source must meet the requirements of ES1 and PS2 (EN 62368-1).

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

Use suitable connecting cables and connectors for the application and ambient conditions, see "Accessories", page 35.

The supply voltage must be as specified in the technical data, see "Technical data", page 32.

The voltage supply via a power supply unit must be capable of buffering a brief power failure of up to 20 ms.

Prevent product damage caused by short-circuit: The device supply voltage input is equipped with reverse polarity protection. The internal functional earth is directly connected to the metal housing of the device. The internal functional earth also corresponds to the negative pole of the supply voltage.

6.2 Prerequisites for safe operation of the device



WARNING
Risk of injury and damage caused by electrical current!

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

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

Remedial measures

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

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

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

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

This is achieved by complying with the following conditions:

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

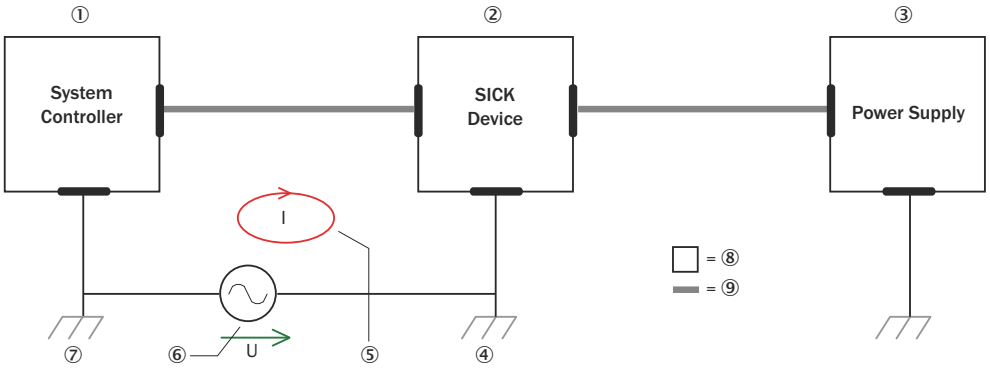


Figure 2: Example: Occurrence of equipotential bonding currents in the system configuration

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.

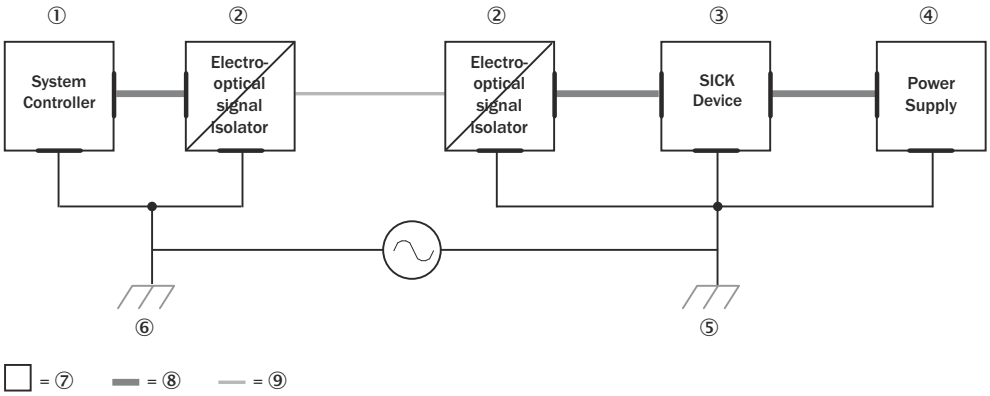


Figure 3: Example: Prevention of equipotential bonding currents in the system configuration by the use of electro-optical signal isolators

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.

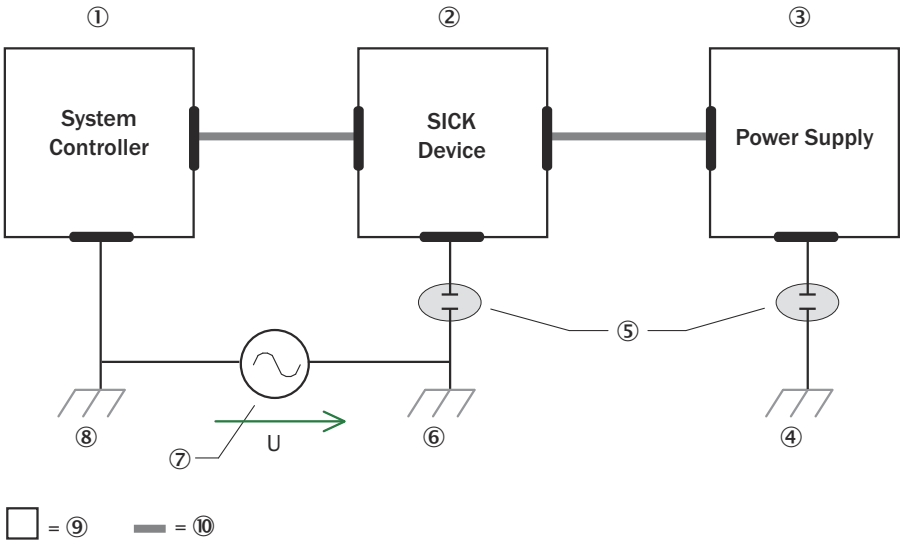


Figure 4: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

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

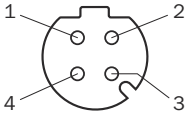
The voltage supply for the device and the connected peripheral devices must also guarantee the required level of insulation.

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

6.3 Pin assignment

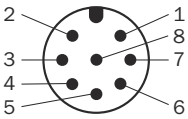
Ethernet

Table 2: Ethernet pin assignment

Connection	Pin	Short form	Signal description
M12 female connector, 4-pin, D-coded 	1	TX+	Send data positive
	2	RX+	Receive data positive
	3	TX-	Send data negative
	4	RX-	Receive data negative

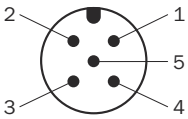
CAN I/O

Table 3: Pin assignment for CAN I/O

Connection	Pin	Short form	Signal description
M12 male connector, 8-pin, A-coded 	1	CAN H	CAN HIGH (no function, planned to be provided in future)
	2	CAN L	CAN LOW (no function, planned to be provided in future)
	3	IN2	Input 2
	4	GND IN1/2	Earth input 1/2
	5	OUT2	Output 2
	6	OUT3	Output 3
	7	GND	Earth
	8	OUT4	Output 4

Power

Table 4: Pin assignment for power

Connection	Pin	Short form	Signal description
Male connector, M12, 5-pin, A-coded 	1	L+	Supply voltage
	2	IN1	Input 1
	3	GND	Earth
	4	OUT1	Output 1
	5	GND IN1/2	Earth input 1/2

6.4 Connection options

The following figures illustrate connection examples.

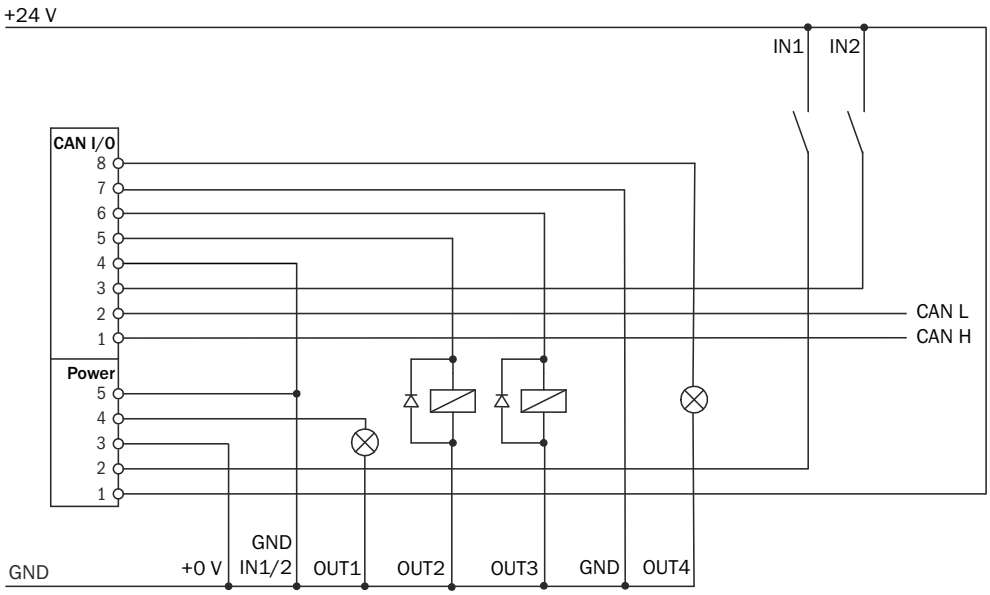


Figure 5: PNP outputs connection example

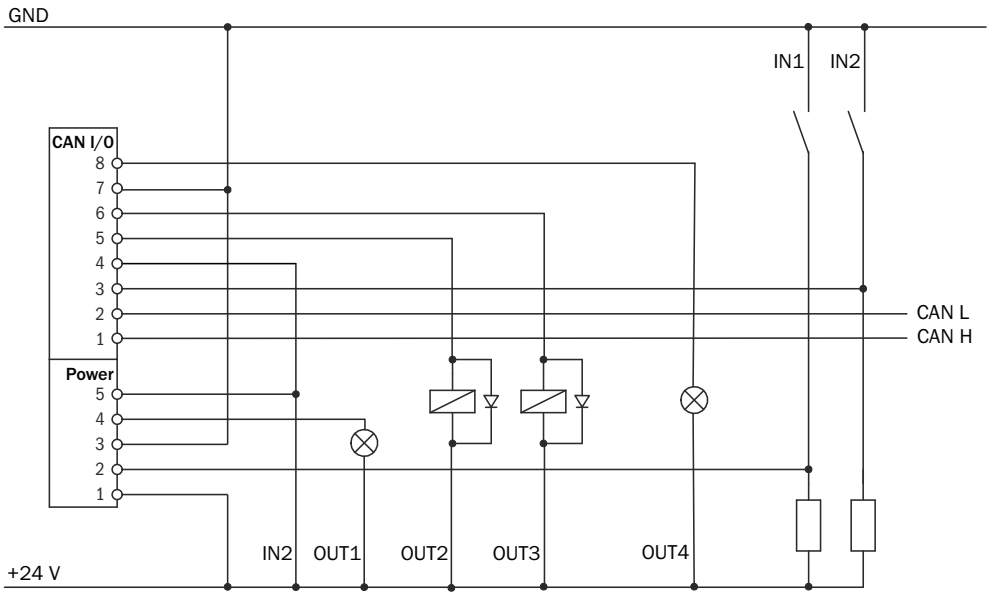


Figure 6: NPN outputs connection example

6.5 Connecting the device electrically

1. Ensure the voltage supply is not connected.
2. Connect the device according to the connection diagram, "Pin assignment", page 19.
3. Switch on the supply voltage.

7 Operation

7.1 General advice

The device works fully automatically in normal operation and requires no operator intervention.

Configuration of the device is performed using the browser-based SOPASair software. The device must be connected to a computer via an interface for this purpose.

The measurement data and measuring ranges can be check using the graphical view. Please note in this regard that the software cannot display the data in real time, therefore not all measured values that the device delivers will be displayed.

7.2 Switching off and on

1. To switch off the device, disconnect the device from the voltage supply.

✓ The device switches off. The device configuration remains unchanged, measured values are lost.

2. Connect the device to the voltage supply.

✓ The device starts with the last saved configuration data.

7.3 Operation using SOPASair

The browser-based SOPASair software can be used to parameterize the device and for service and diagnostic purposes.

To parameterize the device, you will require a computer with a web browser installed and a free Ethernet connection. Alternatively, the connection can be established via a USB connection using an Ethernet USB adapter.

7.3.1 Opening the web server user interface (SOPASair)

Before opening the user interface, perform the following work steps:

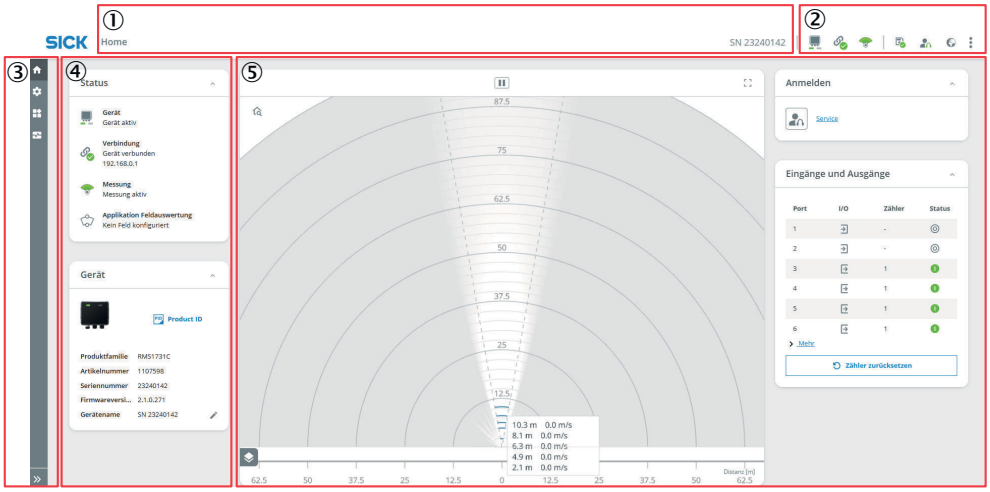
- Connect the device to the computer via Ethernet.
- Set up the voltage supply for the device.
- Ensure that the computer and device are located in the same network.
- Ensure that the computer uses a different IP address than the device, but is in the same IP address range (e.g. 192.168.0.xxx)

Open the user interface:

1. Open web browser (recommendation: Google Chrome).
2. Enter the device IP address into the address line. The standard IP address is: 192.168.0.1

✓ The SOPASair user interface is displayed.

7.3.2 Overview



① Menu path for opened menu, device name
② Status indicators | toolbar
③ Menu bar
④ **Status** and **Device** menu panels
⑤ Scan view (workspace with live image) and menu panels

Status indicators


Device status


Connection status


Application status

Toolbar


Save permanently


User level: Show activated user level and change user level, see below


Change user interface language


Device menu

Change user level

The device has different user levels.

The user levels have different authorizations for configuring the device.

1. Click on  in the toolbar.

✓ The user level input screen opens.

2. Select a user level, enter the **Password**.

User level (symbol)	Default password	Authorizations
Maintenance 	`main`	Display only, no configuration
Authorized Client (Integrator) 	`client`	Install and configure device

User level (symbol)	Default password	Authorizations
Service	servicelevel	Configure advanced configuration settings, show advanced service data

3. Click on the **Log in** button.

✓ The current user level is displayed.

Navigation

The menu bar can be expanded using the button.

► Click on the desired menu within a menu category in the menu bar.
Menu categories:
- **Home**
- **Configuration**
- **Application**
- **Diagnostics**

✓ The workspace changes depending on the selected menu.

Scan view

The scan view is a visualization of the working range.

In the **Legend** (), the graphical elements of the scan view are described and display settings can be configured.

Table 5: Legend

Function	Icon (color)	Description
Outside field	(Dark blue)	Objects detected outside the field. The signal strength is above the sensitivity threshold. The objects are detected. Display activated/deactivated: /
Inside field	(Red)	Objects detected inside the field. The signal strength is above the sensitivity threshold. The objects are detected. Display activated/deactivated: /
Filtered objects	(Gray)	Object detected. The signal strength is below the sensitivity threshold. The objects are filtered out. Display activated/deactivated: /
Object data	-	Measured values of the objects. Display activated/deactivated: /
No object detected		There are no detected objects in the field.
Object detected		There are detected objects in the field.

Function	Icon (color)	Description
Field deactivated		The field is deactivated.

7.3.3 Home

Status

Function	Description
Device	Displays the device status.
Connection	Displays the connection status. When a device is connected, the IP address is displayed. The IP address can be adapted if necessary.
Measurement	The measurement status is displayed.
Field evaluation application	The application status is displayed.

Device

Displays the device information. The device name can be changed.

Inputs/outputs

Displays information on the configuration and the switching status of the digital inputs and digital outputs. The counter for the switching events of the digital outputs can be reset.

7.3.4 Configuration > Basic settings

Basic settings

Function	Description
Start angle, Stop angle	Set the horizontal working range (focus range). The angles can be defined separately for the left side (**Start angle**) and the right side (**Stop angle**).
Autostart measurements	Start measurements automatically when restarting the device.
LED	Activate/deactivate the display elements on the device.
Measurement	: Start measurement zzz: Pause measurement (standby)
Advanced settings	
Inhibit side lobes	Radar sensors are also receiving signals from outside the working range (the main lobe). Interference signals from these areas (the side lobes) may be displayed as detections from the main lobe. This can lead to undesired triggerings (faulty alarms). Suppressing these signals reduces the risk of these kind of triggerings. Highly reflective objects in the side lobes may, however, still affect detections in the main lobe. Activate/deactivate function.
Higher sensitivity at close range	The sensitivity of the radar sensor is balanced out over the entire scanning range. The function increases the sensitivity at close range (typically up to 10 m). Note that this reduces the maximum scanning range and stronger side lobes arise at close range. Activate/deactivate function.

Function	Description
Signal strength threshold	The required signal strength for triggering can be configured. Weaker reflections are hidden. The setting can be configured for the entire scanning range or distance-dependent. Activate/deactivate function. When activated, a diagram appears on the left next to the scan view showing the signal strength as a function of the distance values. The signal strength threshold (violet line) can be configured ( ) either for the entire scanning range ( ) or for selected distance ranges when in edit mode. A distance range can be selected by dragging up a selection rectangle while keeping the mouse button pressed.

Date and system time

Function	Description
Synchronization	Not configurable
Date, System time, Apply computer time	Enter/select the date and system time or **Apply computer time**.

7.3.5 Configuration > Connection options

Ethernet

Function	Description
Addressing mode, IP address, Subnet mask, Default gateway	Configure network address. Restart the device by clicking on the **Apply** button. SOPASair must then be opened with the new IP address of the device.
MAC address	Display the MAC address of the device.
Calculated speed	Displays the calculated transmission speed.

7.3.6 Application > Field evaluation

Scan view

In scan view, the created fields are visualized as a frame, and objects as segments of a circle.

Field evaluation

Field evaluations are created within a group. The **Add group** button is used to create a new group. A maximum of 4 groups can be created.

Within a group, field evaluations can be configured via the input screens **Field settings**, **Evaluation** and **Output properties**. The button is used to create a new field evaluation within a group. A maximum of 4 field evaluations can be created across all groups.

Function	Description
Field settings	
Field	Open the **Field settings** input screen. A field is created automatically.
Field name	Edit the field name.
	Use drag and drop to adjust the **Start distance** or **Stop distance** or edit the distance values using the input fields.
Evaluation	

Function	Description
Evaluation	Open the **Evaluation** input screen.
Response time	Set the time for which an object needs to meet the trigger criteria for triggering to occur.
Holding time	Set the time for which the triggering will still be held even if the object no longer meets the trigger criteria.
Speed filter	The required speed and movement direction of an object for triggering can be configured. Deactivate/activate the speed filter. Define the criteria that an object needs to meet for triggering to occur.
Output mode	
Output	Open the **Output mode** input screen.
Port selection	Select a port.
Port name	Assign a port name.
Settings	
Logic	Select logic type.

7.3.7 Application > Inputs and outputs

Function	Description
Inputs and outputs	
Port x : In x or **Out x**	Configure digital inputs and digital outputs.
Output mode	
Global output mode	Select output mode.
Counter values	
Reset counters	Reset event counter for digital outputs.

7.3.8 Diagnostics > Overview

Displays status and operating information are displayed.

Function	Description
Status	see "Home", page 25.
Operating data	Displays data on the device parameters.
Messages	Displays warning and error messages.

7.4 Operation in SOPAS ET

Execute the functions listed below via the SOPAS ET configuration software.

Functions

- Terminal program
- Install firmware updates
- Import and export data

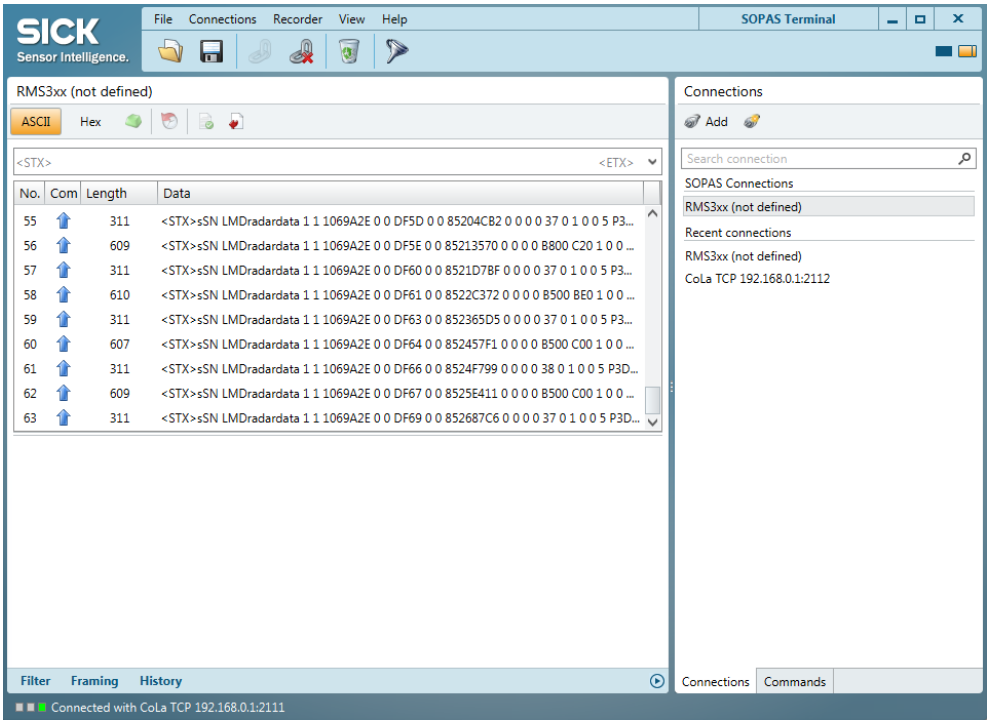
The most up-to-date version of the SOPAS ET software can be downloaded from www.sick.com/software, category: **Configuration software**, software type: **SOPAS ET**.

7.5 Terminal program

The terminal program is a component of the SOPAS ET software.

Terminal program description

The terminal program is started in the main window of SOPAS via the **Tools** > **Terminal** menu.



NOTE

A description of the telegrams can be found in the **Technical Information Telegram Listing RMS1000** publication (English, no. 8026613).

8 Maintenance

8.1 Maintenance plan

During operation, the device works maintenance-free.

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

Table 6: Maintenance plan

Maintenance work	Interval	To be carried out by
Check device and connecting cables for damage at regular intervals.	Depends on ambient conditions and climate.	Specialist
Clean housing.	Depends on ambient conditions and climate. Recommended: Every 3 months.	Specialist
Check the screw connections and plug connectors.	Depends on the place of use, ambient conditions or operating requirements. Recommended: At least every 6 months.	Specialist
Check that all unused connections are sealed with protective caps.	Depends on ambient conditions and climate. Recommended: At least every 6 months.	Specialist

9 Troubleshooting

9.1 General faults, warnings, and errors

Possible faults and corrective actions are described in the table below for troubleshooting. For faults that cannot be rectified using the information below, please contact SICK Service. To find your agency, see the final page of this document.

NOTE
Before calling, make a note of all type label data such as type designation, serial number, etc., to ensure faster assistance.

Table 7: Fault table

Fault description	Possible causes	Troubleshooting
LEDs do not light up.	No voltage supply connected.	Connecting the voltage supply.
No connection between the software and the device.	Connection dropped.	Verify connections.
Objects are not detected.	Objects in the detection area.	Check the alignment of the detection area.
No switching signals are output via the I/O interface.	No detection signals present. Device configuration faulty. Bad connection.	Check alignment of the detection area, device configuration and connections.
No data is output via the Ethernet interface.	Device configuration faulty. Poor data connection.	Check device configuration and connections.

9.2 Repairs

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

9.3 Returns

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

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

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

9.4 Disposal

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

NOTICE

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

Disposing of devices improperly may cause damage to the environment.

Therefore, observe the following information:

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

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

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

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

Please note: This documentation may contain further technical data.

10.1 Features

Type	RMSx6xxC-xxxxx	RMSx7xxC-xxxxx	RMSx8xxC-xxxxx
Application	Indoor and outdoor		
Measurement principle	FMCW		
Radio equipment approval	For country-specific restrictions see RMS1000 “Regulatory Compliance Information” technical information (no. 8026123)		
Frequency band	RMSxxxxC-xx**1**xx (RMS-A, ETSI): 61 GHz ... 61.5 GHz RMSxxxxC-xx**0**xx (RMS-C, Japan): 60.5 GHz ... 61 GHz RMSxxxxC-xx**5**xx (RMS-E, FCC): 61 GHz ... 61.5 GHz		
Transmitting power	max. 100 mW EIRP		
Aperture angle	Horizontal: ± 60° Vertical: ± 4°		
Working range	0.4 m ... 50 m	0.4 m ... 100 m	1.6 m ... 200 m
Blind zone	0.0 m ... 0.4 m	0.0 m ... 0.4 m	0.0 m ... 1.6 m
Detection capability	1 m^2 RCS [1]: ≤ 50 m 10 m^2 RCS [2]: ≤ 50 m	1 m^2 RCS [1]:≤ 50 m 10 m^2 RCS [2]:≤ 100 m	1 m^2 RCS [1]: 50 m≤ 10 m^2 RCS [2]:≤ 200 m
Distance accuracy	1 m^2 RCS [1] up to 20 m: ≥ 0.04 m 1 m^2 RCS [1] up to 50 m: ≥ 0.1 m	1 m^2 RCS [1] up to 20 m: ≥ 0.04 m 1 m^2 RCS [1] up to 50 m: ≥ 0.1 m	1 m^2 RCS [1] up to 20 m: ≥ 0.16 m 1 m^2 RCS [1] up to 50 m: ≥ 0.40 m
Distance resolution [3]	0.4 m	0.4 m	1.6 m
Speed range	-30 m/s ... +30 m/s	-30 m/s ... +30 m/s	-60 m/s ... +60 m/s
Speed resolution [3]	0.3125 m/s	0.625 m/s	0.625 m/s
Speed accuracy	1 m^2 RCS, up to 20 m: ≤ 0.03125 m/s 1 m^2 RCS, up to 50 m: ≤ 0.075 m/s	1 m^2 RCS, up to 20 m: ≤ 0.0625 m/s 1 m^2 RCS, up to 50 m: ≤ 0.15 m/s	1 m^2 RCS, up to 20 m: ≤ 0.0625 m/s 1 m^2 RCS, up to 50 m: ≤ 0.15 m/s
Angular resolution [3]	15°		
Angular accuracy	≥ 1.5°		

1) Typical radar cross section value for a pedestrian.
2) Typical radar cross section value for a car.
3) Resolution in the context of radar means that two signals can be separated if they differ in spacing, angle or speed by more than twice the specified values.

Detection area based on distance

Distance [m]	1	5	10	50	60 [1], [2]	80 [1], [2]	100 [1], [2]	200 [2]
Vertical [m]	0.1	0.7	1.4	7.0	8.4	11.2	14.0	28.0

Distance [m]	1	5	10	50	60 [1), 2)]	80 [1), 2)]	100 [1), 2)]	200 [2)]
Horizontal [m]	3.5	17.3	34.6	173.2	207.8	277.1	346.4	692.8

1) Type RMSx**7**xxC-xxxxx
2) Type RMSx**8**xxC-xxxxx

10.2 Mechanics/electronics

Connection type	1 x M12 male connector, 8-pin, A-coded 1 x M12 male connector, 5-pin, A-coded 1 x M12 female connector, 4-pin, D-coded
Supply voltage	9 V DC ... 32 V DC
Power consumption	4 W (typical, without digital output load) Max. 36 W
Housing color	Grey (RAL 7042)
Enclosure rating	IP67 and IP69 (EN 60529: 1991-10 / A2: 2000-02) [1]
Protection class	III (EN 61140:2006-08)
Electrical safety	PS2 (EN 62368-1)
Weight	300 g
Dimensions (L x W x H)	34 mm x 97 mm x 96 mm
MTBF	81 years

1 In connected state with suitable mating plug or protective cap mounted on the connections.

Dimensional drawing

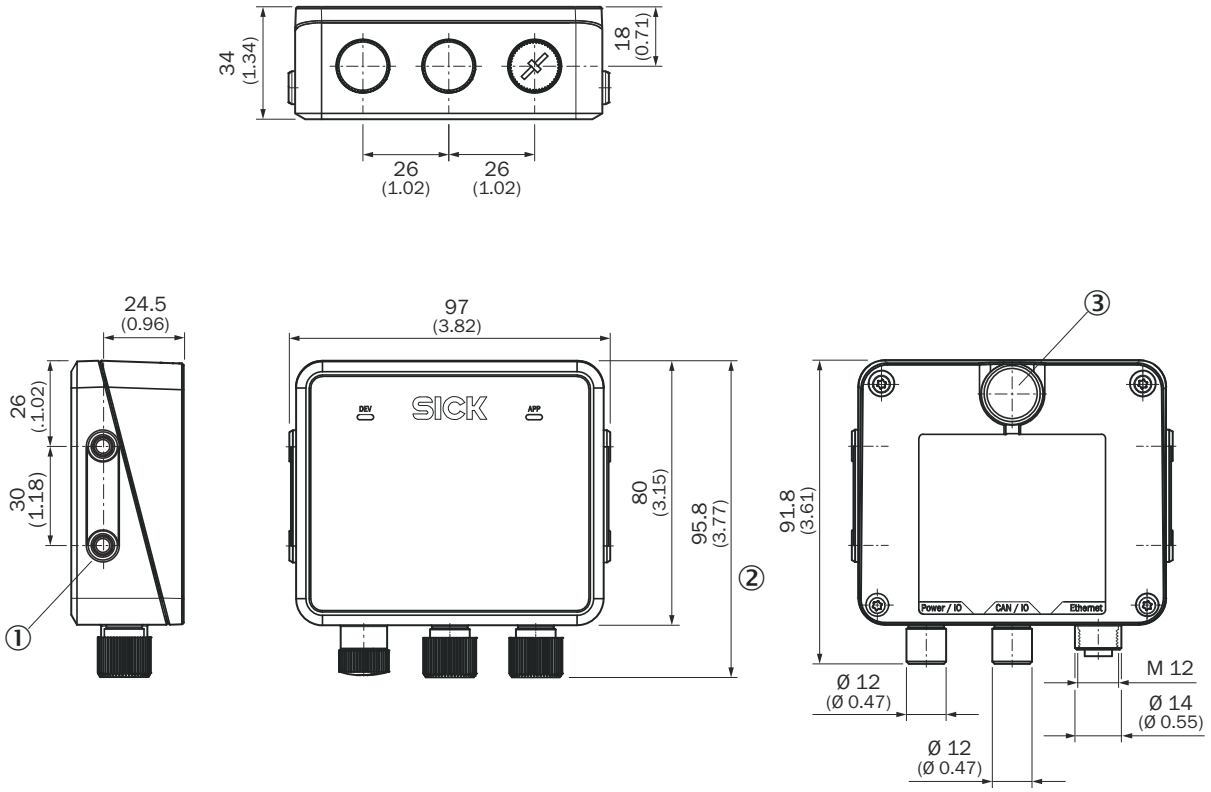


Figure 7: Device dimensions, unit: mm (inch), decimal separator: period

① 4 tapped blind holes, M5, 7.5 mm deep; for mounting the device
② Dimension with protective cap mounted on the connections
③ Pressure compensation diaphragm

10.3 Safety-related parameters

$MTTF_D$	> 100 years

10.4 Performance

Initialization time	Typically 20 seconds
Processing latency	1 measurement cycle
Measurement cycle duration	100 ms
Integrated application	Zone evaluation
Number of field sets	Up to 4 zones

10.5 Interfaces

Ethernet	✓, TCP/IP Function: parameterization, data output Data transmission rate: 10/100 Mbit
CAN	Note: currently no function, planned to be provided in future Protocol: SAE J1939
Digital inputs	2 (electrically isolated from the supply voltage , U_e = max. 32 V DC, I_e = max. 5 mA, opto-decoupled, reverse polarity protected, adjustable debounce time)
Digital outputs	4 (not electrically isolated from the supply voltage, PNP/NPN/PP configurable, $U_a = U_V$ - 1.5 V DC, I_A ≤ 200 mA (typical), short-circuit protected, temperature protected)

10.6 Ambient data

Electromagnetic compatibility (EMC)	ETSI EN 301 489-3 EN 61000-6-2 EN 61000-6-4
Radio standard	ETSI EN 305 550
Vibration resistance	EN 60068-2-6:2008-02
Shock resistance	EN 60068-2-27:2009-05
Ambient operating temperature	–40 °C ... +65 °C
Storage temperature	–40 °C ... +85 °C
Ambient humidity	0% ... 90%, non-condensing
Ambient conditions	Degree of contamination 4 (according to EN 61010-1)

11 Accessories

NOTE

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

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

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

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

12 Annex

12.1 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).

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

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