

TiM2xx

2D LiDAR sensors

SICK
Sensor Intelligence.



Described product

TiM2xx

Manufacturer

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Production location

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Legal information

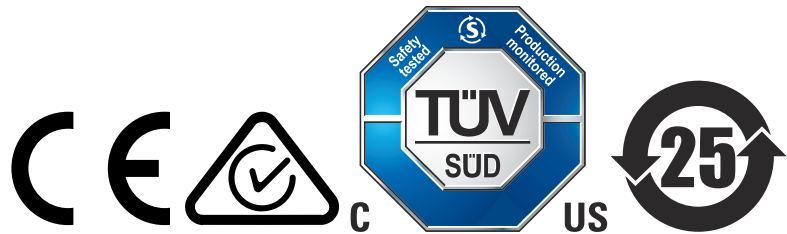
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Original document

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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 instructions constitute an integral part of the product and are to be stored 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 operating the machine or system in which the device is integrated. For information about this, refer to the operating instructions of the specific machine.

1.2 Explanation of symbols

Warnings and important information in this document are labeled with symbols. The warnings are introduced by signal words that indicate the extent of the danger. These warnings must be observed at all times and care must be taken to avoid accidents, personal injury, and material damage.



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 Scope of delivery

Included with delivery:

- 2D LiDAR sensor
- Optional: Accessories

Supplied documentation:

- Safety Notes



NOTE

All available documentation can be found online at

- ▶ www.sick.com/TiM2xx
-

2 Safety information

2.1 Intended use

The TiM2xx is an opto-electronic laser sensor that scans the perimeter of its surroundings at a single plane with the aid of laser beams. The TiM2xx measures its surroundings using two-dimensional polar coordinates based on its measurement origin. Scanning is performed across a 240° sector. The maximum scanning range of the TiM2xx is 10 m on light, natural surfaces with an object reflectivity (> 50 % (e.g. a white house wall)). The scanning range is 3 m in the case of dark surfaces with remission of > 10%.

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.

2.2 Improper use

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

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

- Device should be used only in accordance with its intended use.
- All information in these operating instructions must be strictly observed.

2.3 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
- Technical modifications
- Use of unauthorized spare parts, consumables, and accessories

With special variants, where optional extras have been ordered, or owing to the latest technical changes, the actual scope of delivery may vary from the features and illustrations shown here.

2.4 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.

2.5 General cybersecurity notice

Protection against cybersecurity threats requires a comprehensive and holistic cybersecurity concept that must be continuously monitored and maintained. Such a concept consists of organizational, technical, process-related, electronic and physical defense levels and sets up appropriate measures for the different types of risk. SICK's products and solutions must be regarded as an integral part of this concept.

Information on Cybersecurity can be found at: www.sick.com/psirt .

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.

This product documentation refers to the following qualification requirements for the various activities associated with the device:

- **Instructed personnel** have been briefed by the operator about the tasks assigned to them and about potential dangers arising from improper action.
- **Skilled personnel** have the specialist training, skills, and experience, as well as knowledge of the relevant regulations, to be able to perform tasks delegated to them and to detect and avoid any potential dangers independently.
- **Electricians** have the specialist training, skills, and experience, as well as knowledge of the relevant standards and provisions to be able to carry out work on electrical systems and to detect and avoid any potential dangers independently. In Germany, electricians must meet the specifications of the BGV A3 Work Safety Regulations (e.g. Master Electrician). Other relevant regulations applicable in other countries must be observed.

The following qualifications are required for various activities:

Table 1: Activities and technical requirements

Activities	Qualification
Mounting, maintenance	<ul style="list-style-type: none"> ■ Basic practical technical training ■ Knowledge of the current safety regulations in the workplace
Electrical installation, device replacement	<ul style="list-style-type: none"> ■ Practical electrical training ■ Knowledge of current electrical safety regulations ■ Knowledge of the operation and control of the devices in their particular application
Commissioning, configuration	<ul style="list-style-type: none"> ■ Basic knowledge of the Windows™ operating system in use ■ 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	<ul style="list-style-type: none"> ■ Knowledge of the operation and control of the devices in their particular application ■ Knowledge of the software and hardware environment for the particular application

2.7 Operational safety and particular hazards

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



CAUTION

Optical radiation: Laser class 1

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

- Do not open the housing. Opening the housing may increase the level of risk.
 - Current national regulations regarding laser protection must be observed.
-



WARNING

Electrical voltage!

Electrical voltage can cause severe injury or death.

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



WARNING

Risk of injury and damage caused by potential equalization currents!

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

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

3 Product description

3.1 Product characteristics

Measurement principle

The device is an opto-electronic LiDAR sensor that uses laser beams for non-contact scanning of the outline of its surroundings on a plane. The device measures its surroundings in two-dimensional polar coordinates, relative to its measurement origin. Its measurement origin is marked by a circular indentation in the center of the optics cover. If a laser beam strikes an object, the position of that object is determined in terms of distance and direction.

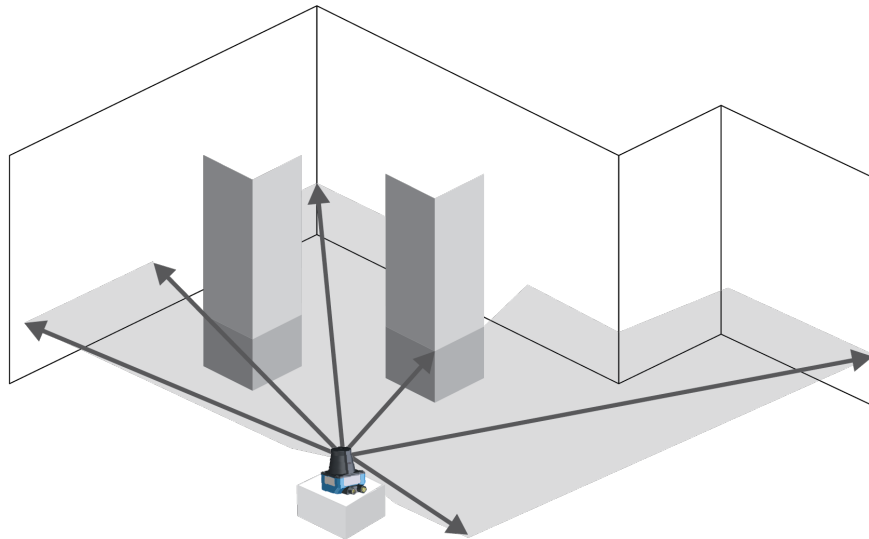


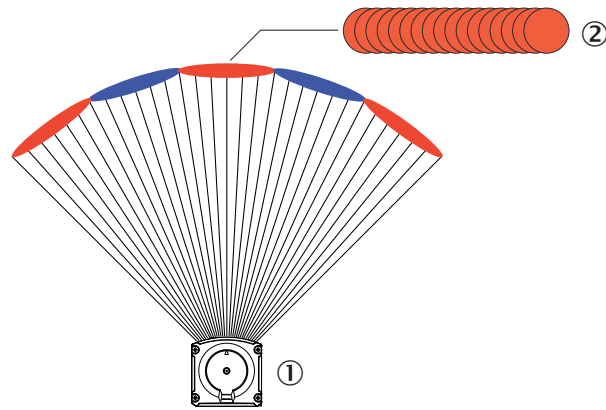
Figure 1: The 2D LiDAR sensor measurement principle

Range finding

The device emits beams pulsed by a laser diode. If a laser pulse hits an object or person, it is reflected on the surface of the object or person in question. The reflection is registered by a photosensitive element in the device receiver. The device uses SICK's own HDDM+ (High Definition Distance Measurement plus) technology. With this measurement process, a measured value is formed by evaluating multiple single pulses. The device calculates the distance from the object based on the elapsed time that the light requires between emitting the beam and receiving the reflection. Radar systems apply this "pulse time-of-flight measurement" principle in a similar way.

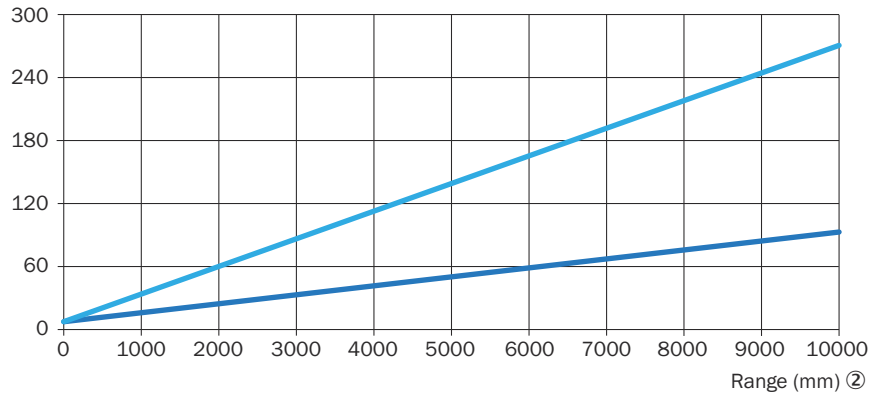
Direction measurement

The device uses a rotating mirror to deflect the emitted laser beams, thereby scanning its surroundings in a circular pattern. The measurements are triggered internally by an encoder in regular angle increments. The device has a scanning frequency of 14.5 Hz. The measuring procedure uses a histogram of multiple pulses to determine individual measured values.



- ① Device
- ② Laser pulse

Spot diameter (mm) ①



- Spot diameter of a submeasuring point.
Divergence 9 mrad, spot diameter on the front screen 6 mm ③
- Elongation of the overlaid submeasuring points in direction of deflection at angle step 1°.
Divergence 26.5 mrad, spot diameter on the front screen 6 mm ④

- ① Spot diameter (mm)
- ② Range (mm)
- ③ Spot diameter of a submeasuring point.
Divergence 9 mrad, spot diameter on the front screen 6 mm
- ④ Elongation of the overlaid submeasuring points in direction of deflection at angle step 1°.
Divergence 26.5 mrad, spot diameter on the front screen 6 mm

3.2 Particle filter

By using a digital particle filter to pre-process and optimize the measured distance values, the device can be tailored to the specific requirements of the respective application.

The particle filter blanks small, irrelevant reflection pulses in dusty environments which are caused by dust particles or the like. In doing so, successive scans are continuously evaluated in order to detect static objects.



NOTE

When using a particle filter, the measurement result is delayed by one cycle scan due to the additional calculation steps.

3.3 Setup and dimensions

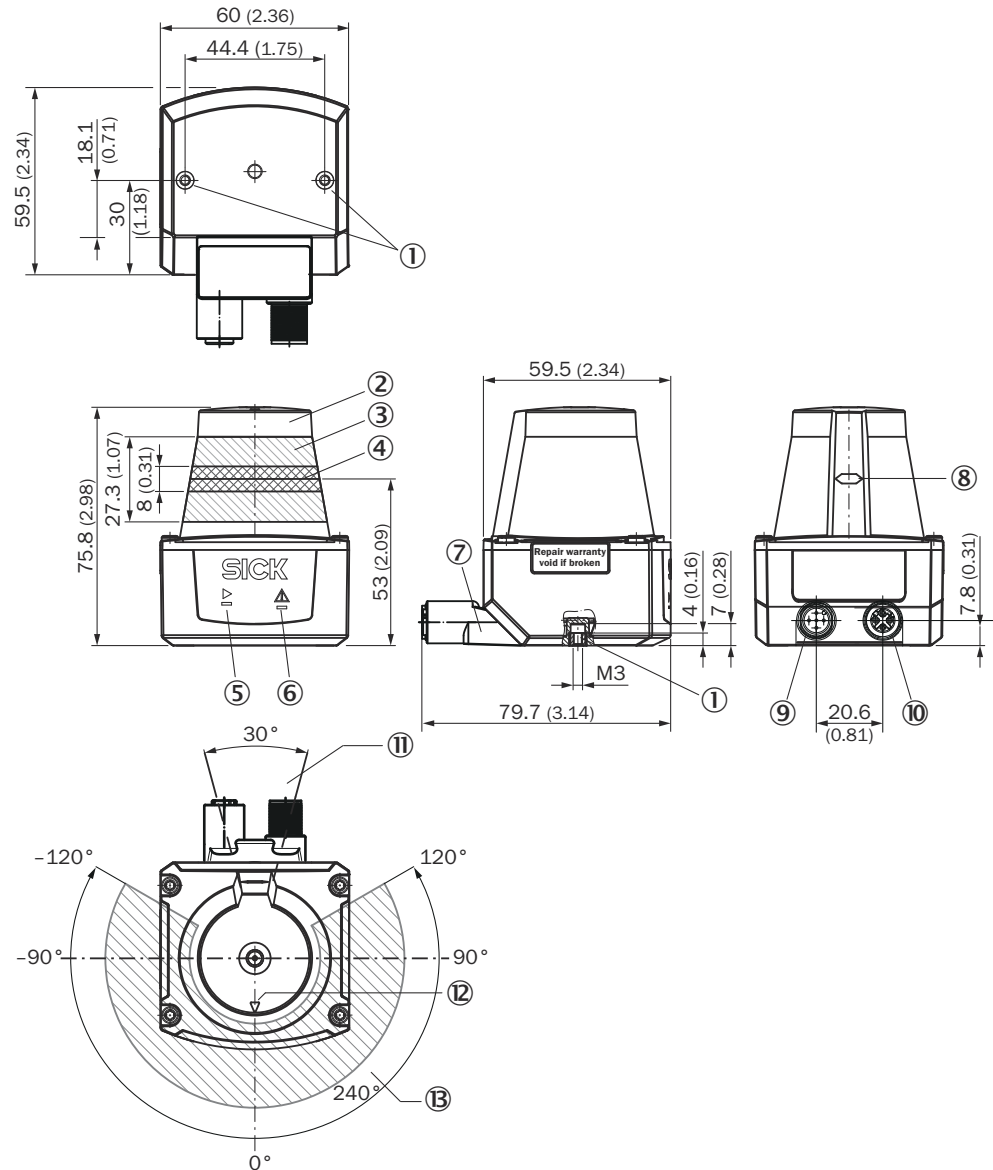


Figure 2: Setup and dimensions TiM2xx

- ① M3 threaded mounting hole, 2.8 mm deep (blind hole thread), tightening torque 0.7 Nm
- ② Optics cover
- ③ Receiving range (light inlet)
- ④ Transmission range (light emission)
- ⑤ Green LED
- ⑥ Red LED
- ⑦ Swivel connector unit with electrical connections ⑨ and ⑩
- ⑧ Marking for the position of the light emission level
- ⑨ Connection "Power/Synchronization output" 5-pin, M12 outlet
- ⑩ Ethernet connection, 4-pin M12 port

- ① The area in which no reflective surfaces are permitted when the device is mounted
- ② Bearing marking to support alignment (0° axis)
- ③ 240° aperture angle (visual range)

3.4 Status indicators

Status indicators

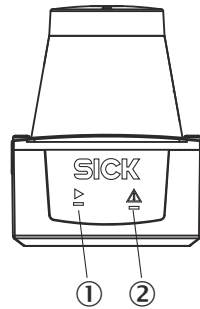


Figure 3: Status indicators

- ① Green LED
- ② Red LED

LED (green)	LED (red)	Description
-	●	Startup state (only during power cycle)
●	-	Normal operation state
-	● or ● with a horizontal line through it	Service required

3.5 Product ID

Type label

The following information can be read from the type label on the device:

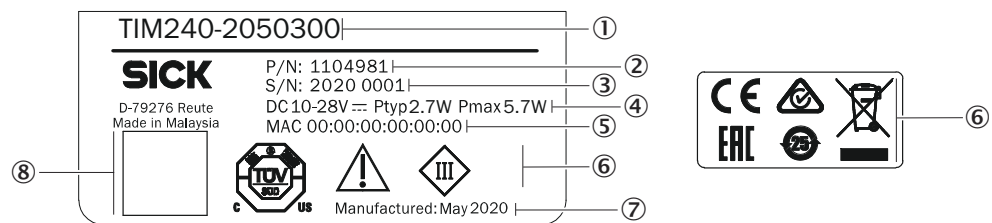


Figure 4: TiM2xx type label (example)

- ① Type designation
- ② Part number
- ③ Serial number
- ④ Electrical connections
- ⑤ MAC address
- ⑥ Conformity mark/certification mark
- ⑦ Production date
- ⑧ QR code with part number and serial number

4 Transport and storage

4.1 Transport

For your own safety, please read and observe the following notes:



NOTICE

Damage to the product due to improper transport.

- The device must be packaged for transport with protection against shock and damp.
- Recommendation: Use the original packaging as it provides the best protection.
- Transport should be performed by trained specialist staff only.
- The utmost care and attention is required at all times during unloading and transportation on company premises.
- Note the symbols on the packaging.
- Do not remove packaging until immediately before you start mounting.

4.2 Unpacking

- Before unpacking, it may be necessary to equalize the temperature to protect the device from condensation.
- Handle the device with care and protect it from mechanical damage.

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

Store the device under the following conditions:

- Recommendation: Use the original packaging.
- Do not store outdoors.
- Store in a dry area that is protected from dust.
- So that any residual damp can 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 31](#).
- Relative humidity: [see "Technical data", page 31](#).
- 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 and indirect 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.
- The device can be mounted in any position.
- 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 34](#).
- During mounting, make sure there is no reflective surface behind the reference target, [see "Setup and dimensions", page 12](#).
- To avoid inaccurate measurements when installing multiple devices: Make sure that the laser spot of one device is not in the visible range of another device, [see "Mounting multiple devices", page 15](#).
- Avoid having shiny or reflective surfaces in the scanning range, e.g., stainless steel, aluminum, glass, reflectors, or surfaces with these types of coatings.
- Protect the device from moisture, contamination, and damage.
- Make sure that the status indicator is clearly visible.
- Do not subject the device to excessive shock or vibrations. In systems subjected to heavy vibrations, secure the fixing screws with screw-locking devices.

5.2 Mounting device

1. Mount the LiDAR sensor using the designated fixing holes, [see "Setup and dimensions", page 12](#).

**NOTICE****Risk of damaging the device!**

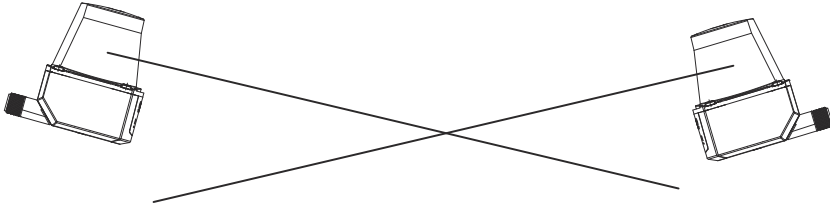
the device will be damaged if the tightening torque of the mounting screws is too high or if the maximum screw-in depth of the blind hole threads is exceeded.

- ▶ Observe maximum tightening torque.
- ▶ Use suitable mounting screws for the blind hole threads of the device and observe the maximum screw-in depth.

2. Make the electrical connection. Attach and tighten a voltage-free cable, [see "Electrical connection of the sensor", page 20](#).
3. Switch on the supply voltage.
4. Align the vertical center line of the field of view of the device with the center of the area to be monitored. The marking (90° axis) on the upper side of the optics cover serves as a alignment aid.

5.3 Mounting multiple devices

The device has been designed to minimize the probability of mutual interference with devices of the same type. To rule out even the slightest effects on the measurement accuracy, the devices should be arranged such the laser beams are not received by another device.



6 Electrical installation

6.1 Safety

**WARNING**

Personal injury due to improper supply voltage!

- Only operate the device using safety extra-low voltage and safe electrical insulation as per protection class III.

**NOTICE**

Equipment damage or unpredictable operation due to working with live parts.

Working with live parts may result in unpredictable operation.

- Only carry out wiring work when the power is off.
- Only connect and disconnect electrical connections when the power is off.

6.2 Wiring instructions

**NOTE**

Pre-assembled cables can be found online at:

- www.sick.com/TiM2xx

**NOTICE**

Faults during operation and device or system defects!

Incorrect wiring may result in operational faults and defects.

- Follow the wiring notes precisely.

The electrical connection of the device is configured as an M12 round connector.

The protection class stated in the technical data is achieved only with a screwed plug connector or cover cap.

6.3 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 (e.g., ensuring low-impedance and current-carrying equipotential bonding).

The device is connected to the peripheral devices (voltage supply, 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

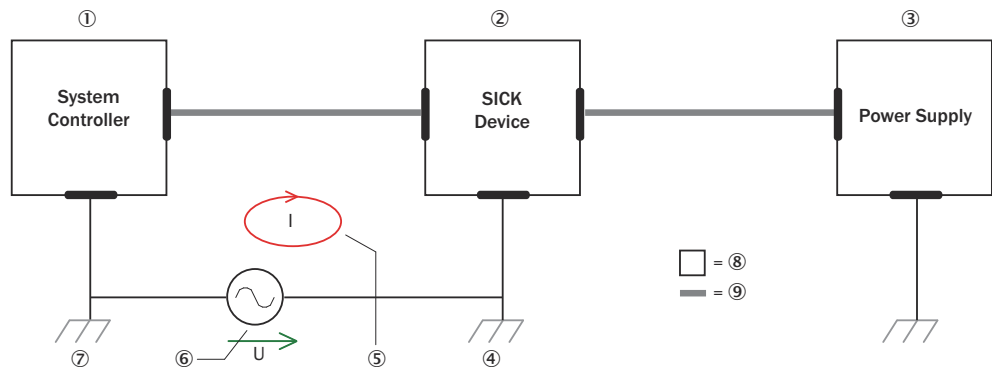


Figure 5: Example: Occurrence of equipotential bonding currents in the system configuration

- 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.

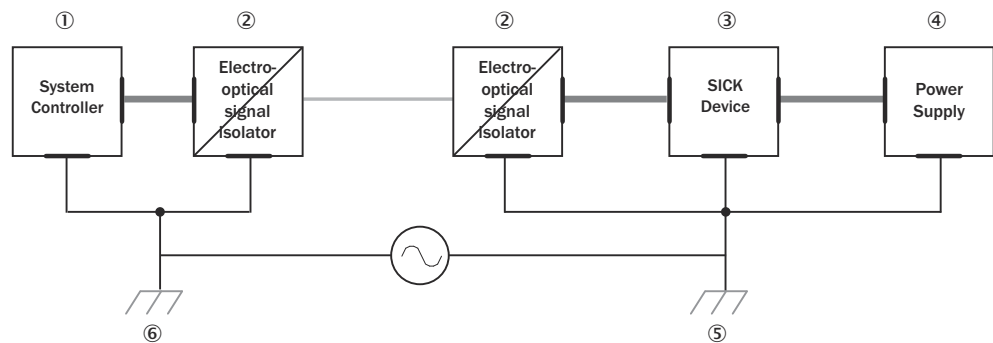


NOTICE

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.



□ = ⑦ — = ⑧ — = ⑨

Figure 6: 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.

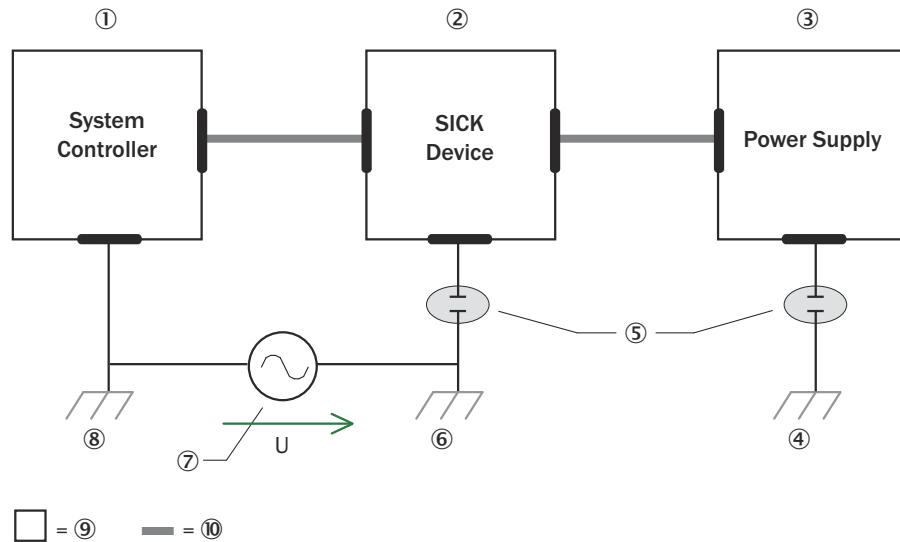


Figure 7: Example: Prevention of equipotential bonding currents in the system configuration by the insulated mounting of the device

- 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.

6.4 Electrical connection of the sensor



NOTICE

All electrical circuits must be connected to the device with safety extra-low voltage (SELV or PELV).

Protect the device with an external 0.8 A slow-blow fuse at the beginning of the supply cable.

**NOTICE**

Do not switch on the supply voltage for the device until the connection work has been completed and the wiring work has been checked carefully.

**NOTE**

To ensure that the device conforms with the CE standard, do not use connection cables longer than 10 m (32,8 ft).

Electrical block diagram

See [figure 8](#) for an overview of the electrical interfaces for the device.

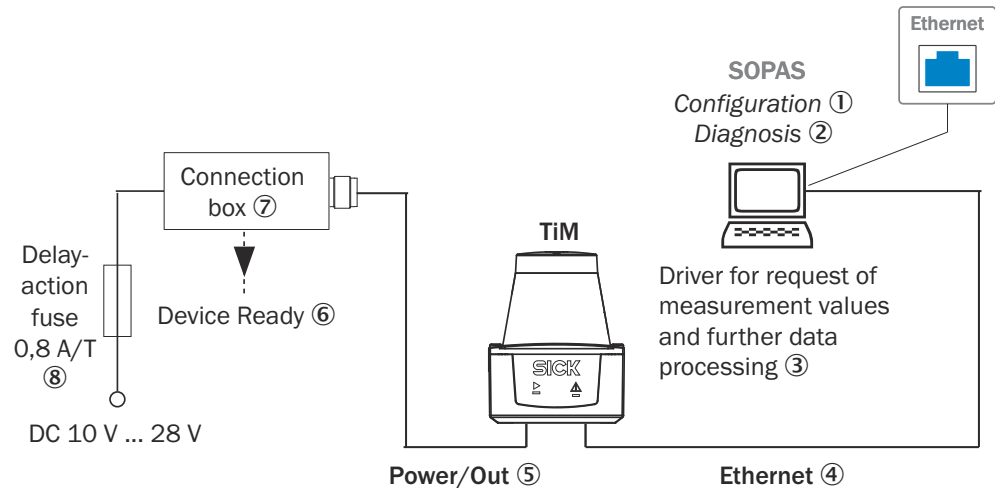


Figure 8: Electrical block diagram for operation

- ① Configuration
- ② Diagnosis
- ③ Driver for request of measurement values and further data processing
- ④ Ethernet
- ⑤ Power/Out
- ⑥ Device Ready
- ⑦ Connection box
- ⑧ Delay-action fuse 0,8 A/T

6.5 Pin assignment

**NOTICE**

Do not connect reserved pins.

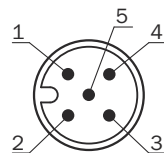
Power/Out connector

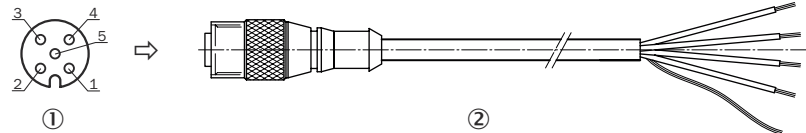
Figure 9: Power/Out connector (M12 male connector, 5-pin, A-coded)

Pin	Signal	Description
1	DC, 10 V ... 28 V	Supply voltage V_S

Pin	Signal	Description
2	DEVICE READY	Device Ready
3	GND	Ground
4	-	Reserved
5	-	Reserved
-	-	Shield

6.5.1 Optional accessory: Adapter cable

Adapter cable no. 6036159 (M12 female connector, 5-pin, A-coded, open end)

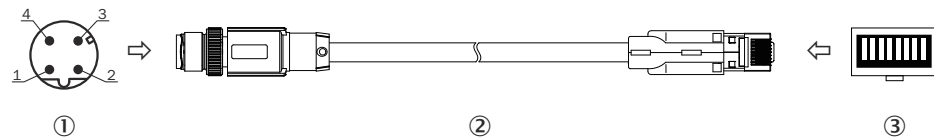


- ① Female connector, M12, 5-pin, A-coded (view from front)
- ② Illustration may differ

Pin	Signal	Wire color	Description
1	DC 10 V ... 28 V	Brown	Supply voltage V_s
2	DEVICE READY	White	Device Ready output
3	GND	Blue	Ground
4	-	-	Not connected
5	-	-	Not connected
-	-	Metal	Shield

6.5.2 Optional accessory: Ethernet cable

Ethernet cable no. 6034415 (M12 male connector, 4-pin, D-coded/Male connector, RJ45, 8-pin)



- ① Male connector, M12, 4-pin, straight, D-coded
- ② Illustration may differ
- ③ Male connector, RJ45, 8-pin, straight

Pin	Signal	Description
1	TD+ (Ethernet)	Transmitter+
2	RD+ (Ethernet)	Receiver+
3	TD- (Ethernet)	Transmitter-
4	RD- (Ethernet)	Receiver-
-	-	Shield

6.5.3 Wiring of digital output DEVICE READY

**NOTE**

With NPN wiring, the digital output is already activated during the device initialization phase.

The output is based on push-pull (PNP/NPN) and is not electrically isolated from the supply voltage. The default configuration is PNP, which is active low.

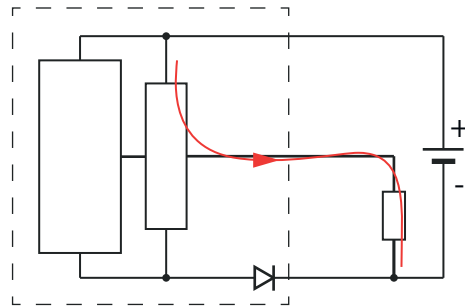
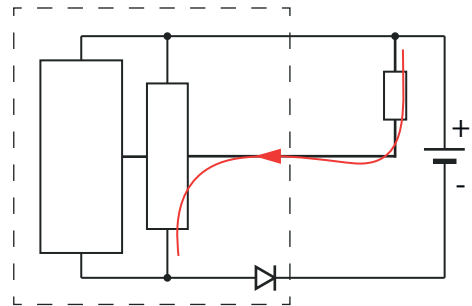
PNP**NPN**

Figure 10: Connection example, digital output

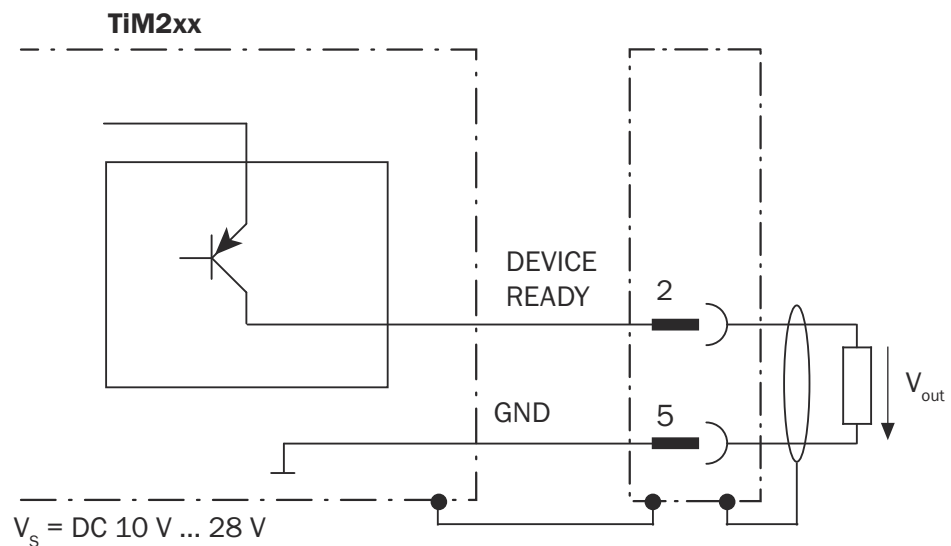


Figure 11: Structure and wiring principle of digital output DEVICE READY (pin 2)

For inductive load: Quenching circuit - Install an anti-surge diode directly at the load in default active low configuration.



7 Operation

7.1 Operation via SOPAS ET

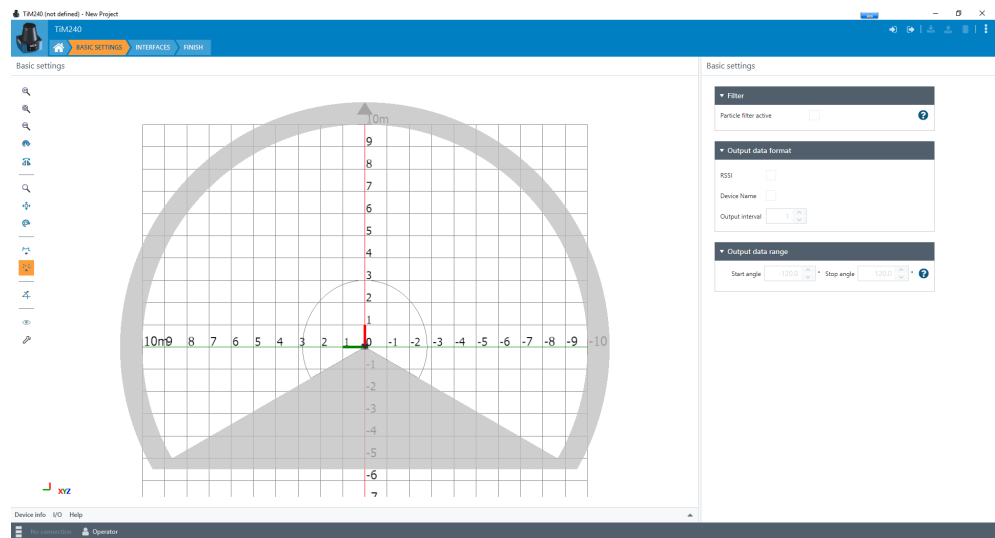
Version 3.3.3 or higher of the SOPAS Engineering Tool (SOPAS ET) software can be used for parameterization of the device and for service and diagnostic purposes. The latest version of SOPAS ET can be downloaded from www.sick.com/SOPAS_ET. The respective system requirements for installing SOPAS ET are also available there.

The use of SOPAS ET with the device requires a device description file (*.sdd) for the device. You can install this in SOPAS ET using the device catalog. An Internet connection is required to install the file. Following the installation of the device description file, the device can be selected from the device catalog and added to a project.

A connection to the device is established via the Ethernet communication interface. The connection must be activated for data transmission (online). Information about the device is displayed in the device window and the device can also be configured here (**Device > Open menu**).

The device window features various views, supporting a selection of functions described below.

7.1.1 Basic settings



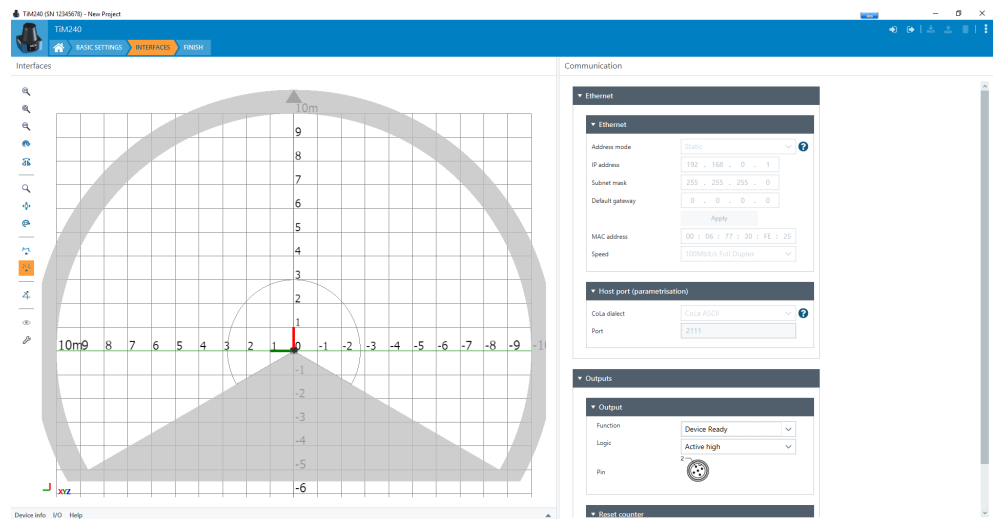
The **Basic settings** view contains the following settings:

Setting	Description
Particle filter active	Select this option if a particle filter is used in the device. There is no particle filter selection by default.
Interface	The output can be set to no function or as a device ready signal. The default setting is Device Ready and Active low output.
Output data format	The information that can be added to the data measurement provided by the TiM2xx device.
RSSI value	The Received Signal Strength Indicator (RSSI) denotes the signal strength of a measuring point, expressed as a normalized percentage or relative figure. The TiM2xx is capable of providing 8-bit or 16-bit RSSI value. RSSI value is not selected by default.

Setting	Description
Device Name	The device name of the TiM2xx can be added to the data measurement output. By default, the device name is not included in the output.
Output interval	This setting is used to define the data measurement output at every scan cycle. Based on the scanning frequency of 14.5Hz, the TiM2xx provides 14.5 scans per second. For example, if the Output interval is set to 3, data measurement will only be available after every third scan cycle of the device. The default setting is 1 which equates to one data measurement output per scan cycle.
Output data range	The output data range refers to the scanning angle of the device. The default range is -120° to $+120^{\circ}$.

7.1.2 Network settings

The **Interfaces** view contains settings for configuring the Ethernet communication.



NOTE

- 1 TiM2xx supports 100Mbits/s communication speed with full duplex.
- 2 TiM2xx uses communication port 2111 for parametrisation as well as streaming of measurement data. Maximum one connection is supported from a communication controller to the device.

7.2 Reading measured data output

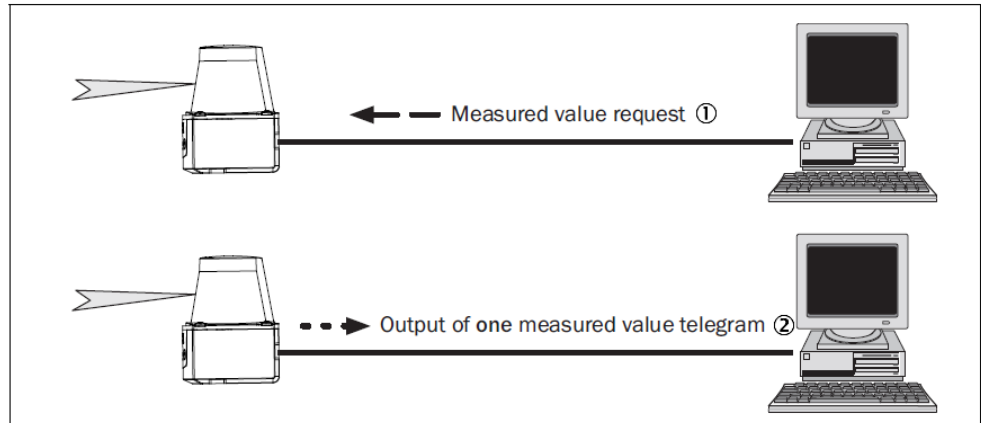
The section shows how to send telegrams via a terminal program using the SICK protocol CoLa A (ASCII and hexadecimal values, with TCP port 2111) or CoLa B (binary/hexadecimal values, with TCP port 2111) to TiM2xx.

After switching on the supply voltage, the TiM2xx initializes and the green LED lights up to indicate that it is ready for operation. The TiM2xx starts measuring automatically. It continuously scans the surrounding contour in its field of vision at a frequency of 14.5 Hz. It continuously saves the values determined in each measuring process (scan) in its measured value memory by overwriting the previous values.

7.2.1 Single measured value output

If the data from a measuring process are required, the TiM2xx sends the measured values from the most recent scan.

Example of single measured value output:



- ① Measured value request
- ② Output of one measured value telegram

Table 2: Telegram structure: sRN LMDscandata

Telegram part	Description	Variable	Length	Sensor	Values CoLa A (ASCII)	Values CoLa B (Binary)
Command type	Read	String	3	All	sRN	73 52 4E
Command	Only one telegram	String	11	All	LMDscandata	4C 4D 44 73 63 61 6E 64 61 74 61 61

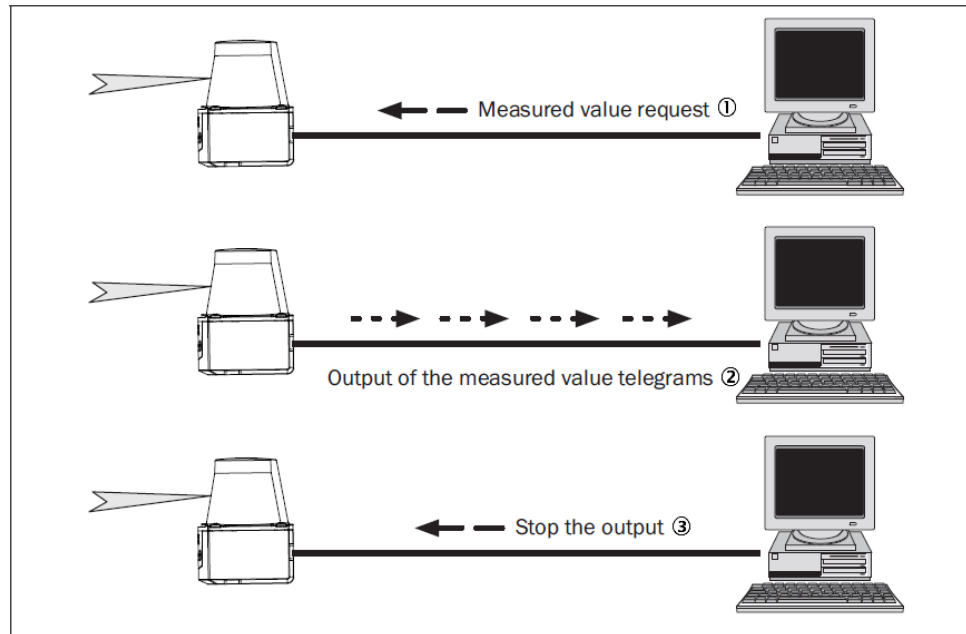
Table 3: Example: sRN LMDscandata

CoLa A	ASCII	<STX>sRN(SPC)LMDscandata<ETX>
	Hex	02 73 52 4E 20 4C 4D 44 73 63 61 6E 64 61 74 61 03
CoLa B	Binary	02 02 02 02 00 00 00 0F 73 52 4E 20 4C 4D 44 73 63 61 6E 64 61 74 61 05

7.2.2 Continuous measured value output

If the data from ongoing measuring processes are required, the TiM2xx sends measured values from successive scans until the output of measured values is stopped again using the same telegram.

Example of continuous measured value output:



- ① Measured value request
- ② Output of the measured value telegram
- ③ Stop the output

Table 4: Telegram structure: sEN LMDscandata

Telegram part	Description	Variable	Length	Sensor	Values CoLa A (ASCII)	Values CoLa B (Binary)
Command type	Event	String	3	All	sRN	73 52 4E
Command	Data telegram	String	11	All	LMDscandata	4C 4D 44 73 63 61 6E 64 61 74 61 61
Measurement	Start/Stop	Enum_8	1	All	Stop: 0 Start: 1	Stop: 00 Start: 01

Table 5: Example: sEN LMDscandata

CoLa A	ASCII	<STX>sEN(SPC)LMDscandata(SPC)1<ETX>
	Hex	02 73 45 4E 20 4C 4D 44 73 63 61 6E 64 61 74 61 20 31 03
CoLa B	Binary	02 02 02 02 00 00 00 11 73 45 4E 20 4C 4D 44 73 63 61 6E 64 61 74 61 20 01 33

See the Telegram Listing for Ranging sensors (art no 8014631) for details.

8 Maintenance

8.1 Cleaning



NOTICE

Equipment damage due to improper cleaning.

Improper cleaning may result in equipment damage.

- Only use recommended cleaning agents.
- Never use sharp objects for cleaning.

- ▶ Clean the optics hood at regular intervals and in the event of contamination using a lint-free lens cloth (part no. 4003353) and plastic cleaning agent (part no. 5600006). Rinse off coarse dirt first with water. The cleaning interval essentially depends on the ambient conditions.

8.2 Maintenance plan

The product does not require regular maintenance.

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.	Test interval depends on ambient conditions and climate.	Specialist
Cleaning the housing and optics cover	Cleaning interval depends on ambient conditions and climate.	Specialist
Checking screw connections and plug connectors	Interval depends on the place of use, ambient conditions, or operational regulations. Recommended: At least every 6 months.	Specialist
Checking that the unused connections are sealed with blind plugs	Interval depends on ambient conditions and climate. Recommended: At least every 6 months.	Specialist

9 Troubleshooting

9.1 Errors

Possible errors and corrective actions are described in the table below for troubleshooting. In the case of errors that cannot be rectified using the information below, please contact the SICK Service department. To find your agency, see the back 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.

Errors are signaled by the red LED. When an error is being displayed by the red LED, the green LED is always off.

Table 7: Flashing pattern of the red LED in the event of an error

LED light pattern (red)	Cause of error/Rectification
Flash/Steady	Power cycle device. If error persists, contact SICK Service department.

9.2 Detecting and displaying errors

Error memory

The device has an error memory where its internal error states are recorded. The content of the error memory is retained when the device is switched off and when the “Restore Factory Settings” function is used.

The SOPAS ET software can be used to create a diagnostics report containing error information (**Complete** view, **Configuration** tab, **Start Diagnosis** button).

9.3 Information for the service case

You should collect and write down the following device information ahead of time if you need to contact the manufacturer's service department:

- Information about the firmware version
- Information about the hardware
- Information about operating hours

The information can be called up in the SOPAS ET software (**Completion** view, **Device Info** tab).

9.4 Returns

- ▶ Do not dispatch devices to the SICK Service department without consultation.
- ▶ 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

9.5 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.

9.6 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 valid regulations on environmental protection.
 - Separate the recyclable materials by type and place them in recycling containers.
-

10 Technical data



NOTE

The relevant online data sheet for your product, including technical data, dimensional drawing, and connection diagrams can be downloaded, saved, and printed from the Internet:

- www.sick.com/TiM2xx

These operating instructions provide additional technical data if required.

10.1 Features

Device type	TiM2xx
Light source	Infrared (invisible; wavelength 850 nm; pulse length 2.5 ns; max. output power ≤500 mW)
Laser class	Laser class 1 according to EN/IEC 60825-1:2014. Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.
Aperture angle	240°
Angular resolution	1°
Scanning frequency	14.5 Hz
Working range	0.05 m ... 10 m
Sensing range with 10% remission	At least 2.8 m across entire aperture angle 3 m (0° axis)

Scanning range diagram

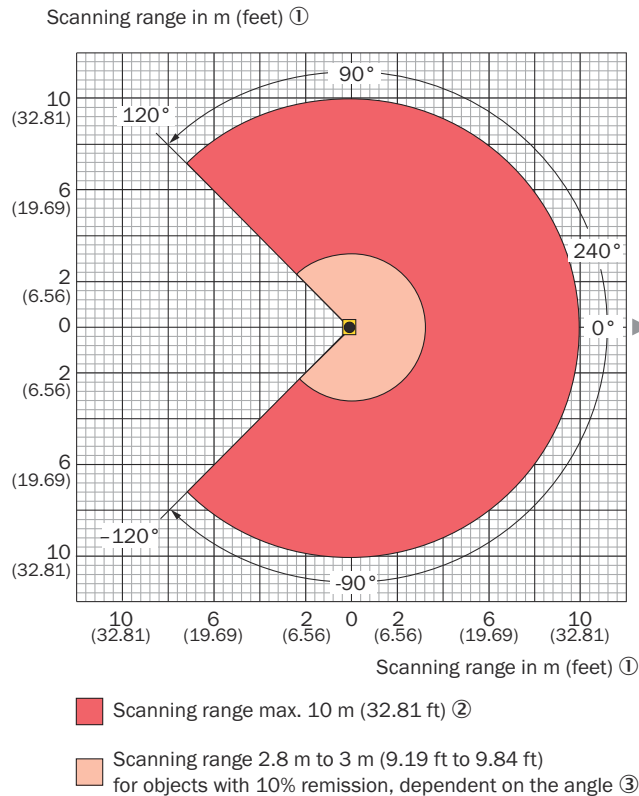


Figure 12: Scanning range diagram, TiM240

- ① Scanning range in m (feet)
- ② Scanning range max. 10 m (32.81 ft)
- ③ Scanning range 2.8 m to 3 m (9.19 ft to 9.84 ft) for objects with 10% remission, dependent on the angle

10.2 Performance

Device type	TiM2xx
Response time	Typ. ≥ 70 ms
Detectable object shape	Almost any
Systematic error	± 40 mm ¹
Statistical error	30 mm ¹
Scan field flatness	$\pm 3^\circ$

¹ Typical value; actual value depends on ambient conditions

10.3 Interfaces

Device type	TiM2xx
Ethernet	Function: Configuration, Data output
Digital outputs	1 (push-pull, each ≤ 100 mA, not electrically isolated from the supply voltage)
Delay time	70 ms ... 30,000 ms (programmable)
Optical indicators	2 LEDs (green, red)

10.4 Mechanics/electronics

Device type	TiM2xx
Supply voltage	10 V DC ... 28 V DC
Power consumption	Typ. 2.9 W, max. 5.7 W
Enclosure rating	IP 65 (IEC 60529:1989+AMD1:1999+AMD2:2013)
Protection class	III (IEC 61140:2016-01)
Weight	150 g, without connecting cables
Dimensions (L x W x H)	see "Setup and dimensions", page 12

10.5 Ambient data

Device type	TiM2xx
Electromagnetic compatibility (EMC)	IEC 61000-6-3:2007-01 / IEC 61000-6-2:2005-08 / IEC 61000-6-1:2007-10
Vibration resistance	IEC 60068-2-6:2007 Sine resonance scan: 10 Hz ... 1000 Hz Sine test: 10 Hz ... 150 Hz, 5g, 10 frequency cycles Noise test: 5 Hz ... 250 Hz, 4.24g RMS, 5 h
Shock resistance	IEC 60068-2-27:2008 50g, 3 ms, ± 3 single shocks per axis 25g, 6 ms, ± 1000 continuous shocks per axis 50g, 3 ms, ± 5000 shocks per axis
Ambient operating temperature	-10 °C ... +50 °C
Storage temperature	-30 °C ... +70 °C
Ambient light immunity	Indirect: 30,000 lx

11 Accessories



NOTE

Accessories and where applicable mounting information can be found online at:

- www.sick.com/TiM2xx
-

12 Annex

12.1 EU declaration of conformity / Certificates

The EU declaration of conformity and other certificates can be downloaded from the Internet at:

- www.sick.com/TiM2xx

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