

TiM51x

2D LiDAR sensor



SICK
Sensor Intelligence.



Intended use

The TiM51x LiDAR sensor is intended for use as a non-contact measurement sensor in standalone operation. It measures radial distances within a flat surface (circle segment) depending on reflectivity. The device displays the measured values of the recorded surrounding contour in its field of vision of 270° over the RS-232 interface for further processing as either a one-off or continuously on request. This requires a corresponding driver to be created by the user. The device is designed for portable or stationary use indoors in standalone operation, with a scanning range of up to 4 m.

The purpose of these operating instructions is to allow you to put the device into operation quickly and easily and to achieve the first outputs of measured values and the first detection results.

Further information on the mechanical and electrical installation as well as on the output of measured values is available in the [Technical Information TiM51x](#) (no. 8016424). This information is available for download on the device product page (www.sick.com/8016424).

The device is certified to IEC/EN/UL/CSA 61010-1:2007. These operating instructions may contain passages of text in a foreign language.

Safety information

- Read these instructions before commissioning the device in order to familiarize yourself with the device and its functions.
- The operating instructions must be kept in the immediate vicinity of the device where they can be accessed at all times.
- The device corresponds to laser class 1.
- Electrical connections between the device and other devices may only be made or separated in a voltage-free state. Otherwise, the devices may be damaged.
- The USB cables on the device may not exceed a length of 3 m in order to ensure that it conforms with the CE.
- Conducting cross sections of the supply cable from the customer's power system should be designed in accordance with the applicable standards. Protect the device with an external slow-blow fuse of 0.8 A at the beginning of the supply cable, viewed from the voltage supply.
- All electrical circuits connected to the device must be implemented as SELV or PELV electrical circuits (SELV = Safety Extra Low Voltage; PELV = Protective Extra Low Voltage).
- Use the device only under permitted environmental conditions (e.g. temperature, grounding potential, → see "Technical data, page 3").
- The device must not come into contact with moisture and dust when the cover of the USB port is open and/or the USB cable is connected. In this status, the device does not correspond to any specified IP protection class.
- Opening the screws of the device will invalidate any warranty claims against SICK AG.
- The device does not constitute personal protection equipment in accordance with the respective applicable safety standards for machines.

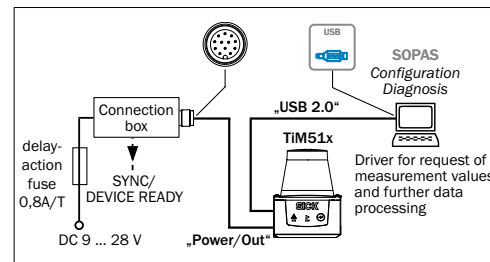
Commissioning and configuration

Step 1: Electrical installation

The USB interface is only for parameterization. Remove the USB cable for problem-free operation of the device.

1. Connect the communication interface of the device to the PC (RS-232 or USB; recommended RS-232, M12 female connector).
 - If using a USB, connect the device micro USB port (behind the black rubber plate on the side) to a free USB port (type A) on the PC using a suitable shielded high-speed USB cable (e.g. no. 6036106, 2 m). The USB cable may not exceed 3 m in length! When operating the USB interface, be aware that ESD/EMC influences may break the USB connection. To re-establish the data transmission, remove the USB cable on the device and plug it back into the contact. To re-establish communication between the device and PC, select the COMMUNICATION > GO ONLINE command in the SOPAS configuration software.
2. Switch on and start the PC.

3. Supply the device with voltage (M12 male connector) Using the power supply unit it must be ensured that the supply voltage does not drop below 8 V for longer than 2 ms and never rises above 30 V. Following successful initialization, the green LED lights up "►" (device ready for operation).



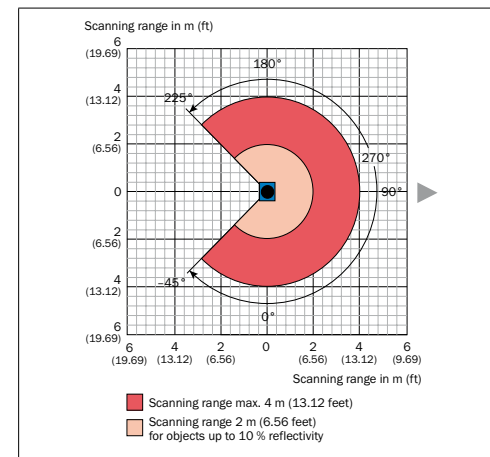
Measurement mode: Electrical block diagram for commissioning

Step 2: Mounting and alignment

NOTE

During mounting, make sure there is no reflective surface behind the reference target.

1. Optional: Mount the device to the separately ordered mounting accessories (mounting kit 2), see [Technical Information TiM51x](#) (no. 8016424).
2. Otherwise, mount the two fastening clips from the enclosed mounting kit 1 on the device using 2 M3 screws. Use the two blind-hole threads either on the underside or back of the housing (→ see "Device layout, page 2"). If the straight plates are not used, screw the screws provided by the customer max. 2.8 mm into the thread.
3. Mount the device on a prepared bracket. The device should be as free from shock and vibration as possible during operation (e.g. using vibration dampers).
4. Align the device with its 90° axis of the field of vision with the center of the area to be monitored. The ► marking on the lid of the optics cover serves as a bearing alignment aid (→ see "Device layout, page 2").



Scanning range diagram for TiM51x

Step 3: Commissioning/Configuration

a. Installing and launching the SOPAS configuration software

The SOPAS configuration software is used as standard to display the surrounding contour (measuring line) recorded by the device as well as diagnostic information in the event of an error.

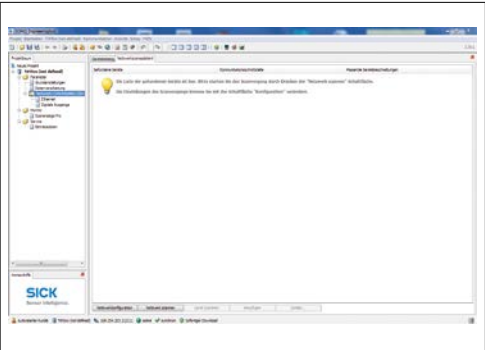
1. Download and install the software from the website www.sick.com/SOPAS_ET, software type SOPAS ET on the PC. In this case, select the "Complete" option as suggested by the installation wizard. Administrator rights may be required on the PC to install the software.
2. Start the "SOPAS" program option after completing the installation.

Path: Start > Programs > SICK > SOPAS Engineering Tool > SOPAS.

SOPAS will automatically install, if necessary, the necessary USB driver the first time it identifies a connected device. The PC may then have to be restarted.
3. Establish communication between SOPAS and the device using the wizard that automatically opens: To do so, select the TiM51x from the available devices and follow the steps of the connection wizard.
4. Click FINISH to quit the Connection Wizard.

SOPAS ET establishes communication with the device, loads its current device description (parameters), and displays it in the navigation tree.

SOPAS ET – program window for TIM51x



Navigation tree (left) and respective device pages (right)

Output of measured values

If the device receives one of the following two commands by telegram over the RS-232 or USB interface, it will start the output of measured values in real time over these data interfaces.

- **sRN LMDscandata** (one-off output of measured values)
- **sEN LMDscandata** (continuous output of measured values)

The detailed description of the construction of the output telegram as well as the flow of requests and outputs can be found in the [Technical Information TIM51x](#) (no. 8016424).

Activating the output of the measured values in SOPAS on a trial basis:

1. Start the terminal emulator with the button.
2. Select the CONNECT... command in the CONNECTIONS menu in the dialog window and establish communication to the device via the RS-232 or USB interface.
3. Enter one of the two telegrams in the "Send telegram" input line as they appear (automatically framed by STX and ETX when sending in the default setting). Pay attention to blank characters in the string.
4. Use the button to transmit the telegram to the device. The device responds by providing the data as a one-off or continuously in the display area of the terminal emulator.

Data output format of the measured values

The data output format per scan is comprised of the measured values (radial distance, RSSI), device and status information and time stamp.

In the default settings, the distance is output as a measured value (in mm).

In order to output remission values in the telegram, select theRSSI checkbox.

To display the remission values in the scan as well, select the RSSI... checkbox.

Output range of the measured values

The device scans an angle range of 270° (-45° to 225°) and outputs 271 measured values per scan in the default setting (at default baud rate 460800 and therefore 1° angular resolution).

The angle range for which measured values can be output can be set using the OUTPUT RANGE input field (resolution corresponds to the angular resolution of the device).

If the baud rate is reduced to 115200 in the DEFAULT SETTINGS tab in the RS-232 SETTINGS area, the device outputs data with a reduced angular resolution of 3°. The specification of the angular resolution is automatically changed in the CURRENT CONFIGURATION tab.

Some other useful functions

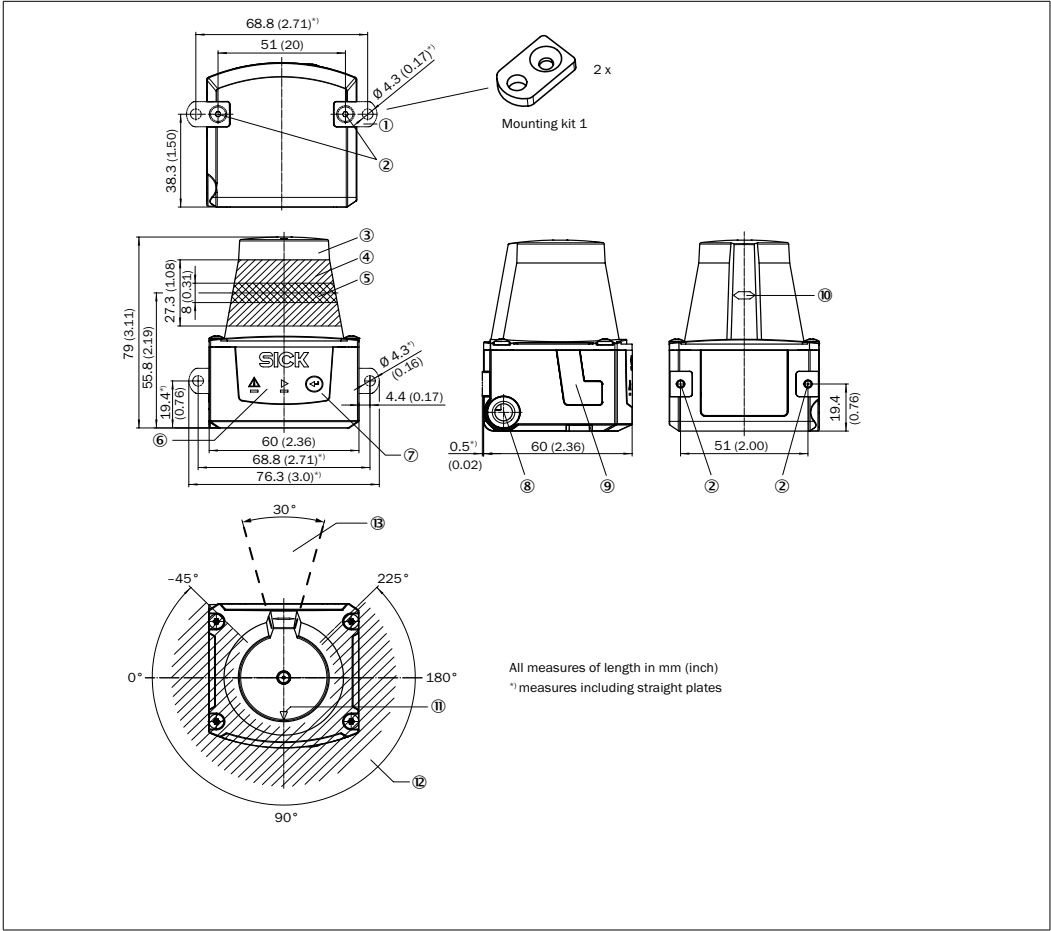
- button: Display the fields in the polar coordinate system
- button: Change the view of the device from above (TIM51x: black) to the view from below (TIM51x: blue)
- or button: Switch off the display the full measuring line or display a dotted measuring line.

Complete the configuration

- Permanently save the entire configuration:
Parameter set in device: Click the button
Configuration file on the PC: Click the button.

Device description

Device layout



- ① 2 x fastening clip with M3 x 5 mm countersunk screw, self-locking (included in scope of delivery)
- ② M3 threaded mounting hole, 2.8 mm deep (blind hole thread), max. tightening torque 0.8 Nm
- ③ Optical hood
- ④ Receiving range (light inlet)
- ⑤ Transmission range (light emission)
- ⑥ Red and green LED (status displays)
- ⑦ Pushbutton with no function
- ⑧ Exit of 0.3 m connecting cable with 12-pin M12 male connector ("Power/Sync/DeviceReady" connection).
- ⑨ Micro USB port, behind the black rubber plate ('Aux interface' connection for configuration with PC)
- ⑩ Marking for the position of the light emission level
- ⑪ Bearing marking to support alignment (90° axis)
- ⑫ 270° aperture angle (field of vision)
- ⑬ Area in which no reflective surfaces are allowed for mounted devices

⚠ 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 hazard 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.
- Applicable national regulations regarding laser protection must be observed.

Additional information → see "Technical data, page 3".

Status indicators, functions



* Push-button with no function

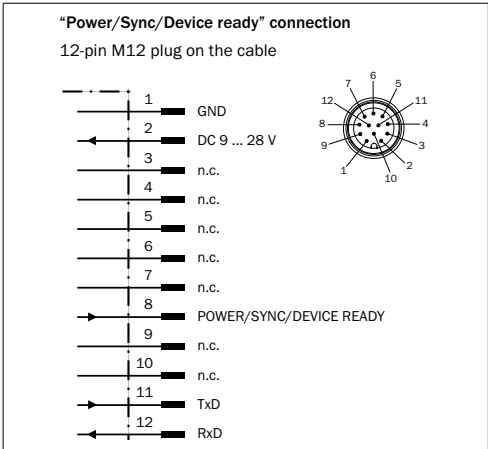
Status indicators

LED  (red)	LED  (green)	Status
–		Device ready/monitoring mode
	–	Error
–	–	Device without supply voltage

● = illuminated;  = flashing

Connection plug pin positions

POWER connection (supply voltage)



Function of the synchronization output (SYNC/Device Ready)

The synchronization output works with the following levels:

Function	Level
Device Ready	High
Index signal (15 Hz), corresponds to measurement at 90°	Low peaks
Error	Low

Technical data

Type	TiM510-9950000S01 (part no. 1062210)
Aperture angle	270° (horizontal)
Scan field flatness	Typ. ± 3°
Scanning frequency	15 Hz
Response time	Typ. 1 scan: 67 ms Max. 2 scans: 134 ms ¹⁾
Sensing range	0.05 m ... 4 m; typically 2 m at 10% remission
Radiance factor	4 % ... > 1,000% (reflectors)
Physical Minimum object size (cross-section)	121 mm at distance 4 m, 61 mm at distance 2 m and 10% remission
Measurement error	Statistical (1 σ): < 20 mm ²⁾ Systematic: ± 40 mm ²⁾ Temperature drift 0.5 mm/K
Spot size	Spot size on the optics cover: 7 mm Divergence: 8.6 mrad (0.49°)
Number of echoes evaluated	1
Scan/frame rate	4,065 measurement point(s)
Insensitivity to ambient light	80,000 lx
Light source	Laser diode, infrared (wavelength 850 nm, max. pulse power 880 mW, max. pulse width 5 ns, pulse frequency 550 kHz)
Device laser class	Laser class 1 (IEC 60825-1:2014, EN 60825-1:2014+A11:2021) ³⁾
USB interface	Micro USB, function: AUX, parameterization
Serial interface	RS-232, function: Host, data transmission rate: 460800 bit/s at 1° angular resolution, 115,200 bit/s at 3° angular resolution
Power-up delay	typ. 20 s
Digital inputs	–
Digital outputs	1 x Sync/Device Ready (I _L ≤ 100 mA), not electrically isolated from the supply voltage. Short-circuit protected / temperature protected
Electrical connections	1 x 0.3 m cable (+10%) with 12-pin M12 male connector 1 x micro USB female connector, type B (covered)
Optical indicators	2 x LEDs
Supply voltage	DC 9 ... 28 V, SELV and PELV (IEC 60364-4-41: 2005-12)
Power consumption	4 W typ. typical power consumption of 4 W with unloaded outputs; incl. start-up current
Housing	Lower part: Die-cast aluminum, optics hood: Polycarbonate with scratch-proof coating
Weight	Approx. 150 g without cables
Protection class	III (IEC 61140:2016-1)

Type	TiM510-9950000S01 (part no. 1062210)
Enclosure rating	IP65 (IEC 60529:1989+AMD1:1999+AMD2:2013). No specified enclosure rating for opened "Aux interface" connection and/or plugged in USB cable!
EMC	Radiation emitted: Residential area (EN 61000-6-3:2007+AMD:A1:2011) Electromagnetic immunity: Industrial environment (EN 61000-6-2: 2005)
Vibration resistance	Sine resonance scan: 10 Hz ... 1,000 Hz (IEC 60068-2-6:2007) Sine test: 10 Hz ... 500 Hz, 5 g, 10 frequency cycles (IEC 60068-2-6:2007) Noise test: 10 Hz ... 250 Hz, 4.42 g RMS, 5 h (IEC 60068-2-64:2008)
Shock resistance	50 g, 11 ms, ± 3 single shocks / axis (IEC 60068-2-27:2008) 25 g, 6 ms, ± 1,000 continuous shocks / axis (IEC 60068-2-27:2008) 50 g, 3 ms, ± 5,000 continuous shocks / axis (IEC 60068-2-27:2008)
Ambient temperature	Operation: –10 ... +50 °C (IEC 60068-2-14:2009) Storage: –30 ... +70 °C (IEC 60068-2-14:2009)
Air humidity	Operation: ≤ 80%, non-condensing (EN 60068-2-30:2005) Storage: ≤ 95%, non-condensing (EN 60068-2-30:2005)
Damp heat	25 °C r.h. ... 55 °C r.h., 6 cycles (EN 60068-2-30:2005)
Ambient conditions	Contamination level 3 outside housing (EN 61010-1:2011-07)
Altitude	< 5,000 m above sea level
1) Corresponds to max. 134 ms between +45° and +225° of the working range, max. 150 ms between -45° and +45° of the working range (see Figure "Scanning range diagram for TiM51x, page 1"). 2) Typical value at 90% remission up to maximum scanning range; real value depends on ambient conditions. 3) Complies with 21 CFR 1040.10 and 1014.11 except for conformance with IEC 60825-1 Ed.3., as described in Laser Notice No. 56 dated 8 May 2019.	

For further technical specifications, see the *Online data sheet* on the product page on the Internet (www.sick.com/TiM).

⚠ 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.

➤ For measures for eliminating hazards, see  *Technical Information TiM51x* (no. 8016424).

Scope of delivery

- Device including mounting kit 1 (two fastening clips, 2 M3 x 5 mm screws)
- Printed safety notes, multilingual
- Other optional accessories (if these have been ordered)

Maintenance and care

The device does not contain any components that require maintenance. Maintenance is also not necessary to ensure compliance with laser class 1.

➤ If it is dirty, clean the infrared light permeable, black optical hood for optimal measurement/detection performance. Do this carefully using a damp cloth (with a mild cleaning agent).

Transport and storage

The device must be transported and stored in its original packaging with the USB protective cap attached. Do not store outdoors. To ensure that any residual moisture present can escape, do not store the device in airtight containers. Do not expose to aggressive media (e.g. solvents).

Storage conditions: Dry, dust-free, no direct sunlight, as little vibration as possible.

Repair

Repair work on the device may only be performed by qualified and authorized service personnel from the company SICK AG.

Disassembly and disposal

Any device which can no longer be used at the end of the product life cycle must be disposed of in an environmentally friendly manner in accordance with the respective applicable country-specific waste disposal regulations. As it is categorized as electronic waste, the device must never be disposed of with household waste.

Sources for obtaining more information

The declarations of conformity, other certificates and additional information about the device and its optional accessories can be found on the online product page: www.sick.com/TiM

Support is also available from your sales partner: www.sick.com/worldwide.

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Annex

Resetting the password for the Service user level

If you have forgotten the password of the Service user level, you can reset it with the assistance of SICK.

NOTE

The responsible SICK sales company or the responsible SICK service partner carefully checks each code request to reset the password. A risk of deception by third parties nevertheless exists. The operating entity should therefore take suitable security measures.

The operating entity should also take suitable measures to limit, as best as possible, access to the product. This includes, in particular, physical access as well as access to the software interfaces of the product.

Requesting an unlock code

- 1. Open SOPAS ET.
- 2. Open the device window.
- 3. Open the device name > PASSWORD > RESET SERVICE PASSWORD.
- The RESET PASSWORD window appears.
- 4. Enter the relevant data.

NOTE

Do not press Generate if an unlock code has already been requested from SICK. Only press this button if a new device code is required when inquiring again.

- 5. Click GENERATE E-MAIL WITH DATA.
- Your SICK subsidiary will create the unlock code based on the information provided and send it to you.

The code is only valid once for the reset process. You can close the window by clicking on the x without interrupting the reset process. If you select Cancel or enter an incorrect code several times, the current reset process is terminated. The requested code is no longer valid. The process must be restarted.

- 6. Wait for the unlock code: The dialog box can be closed and the device switched off.

Entering the unlock code

Prerequisite: SICK has sent an unlock code.

- 1. Open SOPAS ET.
- 2. Open the device window.

- 3. Open the device name > PASSWORD > RESET SERVICE PASSWORD.
- The RESET PASSWORD window appears.

- 4. Click NEXT.
 - 5. Enter the code sent by SICK.
 - 6. Click OK.
- Password has been reset to the default password **servicelevel**. Parameters are not changed.

Assigning a new password for the Service user level

- 1. Open SOPAS ET.
- 2. Log on to the device with the Service user level and the default password **servicelevel**.
- 3. Open the device name > PASSWORD > CHANGE PASSWORD.
- 4. Assign the new password for the Service user level.