



SICK
Visionary-T Mini

Valid for the following part number:
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Detailed addresses and further locations at www.sick.com

Disclaimer

SICK uses standard IP technology in its products, for example IO-Link. The emphasis is placed on availability of products and services. SICK always assumes that the integrity and confidentiality of the data and rights affected by the use of the aforementioned products will be ensured by the customer.

In all cases, appropriate security measures, such as network separation, firewalls, virus protection, and patch management, must be taken by the customer based on the situation in question.

General cybersecurity note

To protect against cybersecurity threats, it is necessary to continuously monitor and maintain a comprehensive and holistic cybersecurity concept. A suitable concept comprises organizational, technical, procedural, electronic, and physical levels of defense and provides suitable measures for different types of risks. SICK's products and solutions must be viewed as a component of this concept.

You can find more information about cybersecurity at:
www.sick.com/psirt

Safety

- Visionary-T Mini CX does not constitute personal protection equipment in accordance with the respective applicable safety standards for machines.
- The mounting, electrical installation and configuration of the device must only be carried out by professionally qualified personnel.
- When mounting and electrical installation work is being carried out, always comply with standard operating procedures, and applicable health and environmental regulations.
- The camera is not suitable for use in explosion-hazardous areas.
- When installing the device, always consider the electrical connected loads.
- Replace faulty or damaged cables and male connectors immediately.
- Replace damaged or faulty components immediately and in consultation with SICK AG.
- When mounting the device, it is imperative that you use suitable mounting equipment and that you consider their specific tightening torques. The mounting equipment must be self-locking or secured appropriately.
- Ensure a constant voltage supply to the device within the set parameters.
- Operate the 3D camera only within the set operating parameters.
- Regularly check that the 3D camera is functioning properly.
- The infrared beams of the laser illumination unit do not pose a danger to the human eye if the 3D camera is operated within the specified parameters (laser class 1, EN/IEC 60825-1:2014; EN/IEC 60825-1:2007).
- Structural modifications to the 3D camera are strictly forbidden!
- During mounting, ensure there are no attachment parts in the detection volume of the 3D camera.
- The 3D camera must not be mounted behind a transparent screen since this will affect the system properties.

CAUTION

Optical radiation: Laser class 1

The accessible beam from the laser illumination unit integrated into the device does not pose a danger when exposed 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.

Scope of delivery

- Visionary-T Mini CX (3D camera)
- Quick start guide

Note: You can obtain detailed product documentation, drivers, SOPAS ET, a description of the API and application examples at www.sick.com/Visionary-T_Mini (Downloads - Accompanying Materials).

Product features

- Intended solely for outputting 3D image data via a Gigabit Ethernet interface
- Meets industrial requirements for data security and reliability
- Easy mounting and commissioning
- 3D data acquisition at up to 30 fps
- Convenient API connection for use of 3D camera in specialist applications
- Configuration and activity recording via SOPAS ET on a PC

Overview

Visionary-T Mini CX is a 3D camera based on the time-of-flight (ToF) principle. They provide real time 3D data at up to 30 frames per second (fps).

The SOPAS ET software can be used to configure the 3D camera and visualize the data.

SOPAS ET can also be used to define and configure different setups.

Once configured, the 3D camera runs in stand-alone operation, and continuously provides the outputs via the configured interface.

To use the 3D camera, you need to follow the steps below:

1. Complete the mechanical and electrical setup.
2. Install SOPAS ET.
3. Connect the 3D camera to SOPAS ET.
4. Configure the 3D camera.

Completing the mechanical and electrical setup and installing SOPAS ET

1. Prepare the mounting position in accordance with the dimensional drawing **A**.
2. Mount the 3D camera in the proper alignment for the desired detection volume. Ensure as far as possible that the detection volume is bordered by a surface **C**.
3. Connect the 3D camera via the Ethernet interface directly to your computer or to the network to which your computer is connected.
4. Use the system plug of the 3D camera to connect the voltage supply and signal transmission **B**.
5. Install the SOPAS ET software by running the installation file (as administrator).
6. Follow the instructions of the installation program.

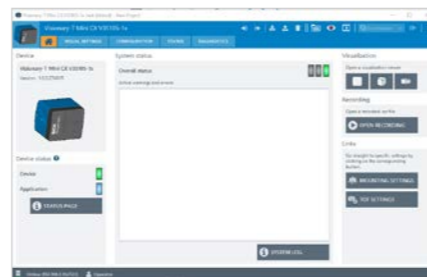
Connecting to SOPAS ET

SOPAS ET is a software for Windows systems for monitoring and configuring devices made by SICK AG.

This is how to connect SOPAS ET to the 3D camera:

1. Ensure the 3D camera is switched on and connected to the computer or the same network.
2. Start **SOPAS ET**.
3. SOPAS ET automatically attempts to identify connected devices when it starts. When the 3D camera is in the same network segment, it is displayed in the list of devices found.
4. Click the camera in the list of available devices and add it to the project. This installs the required device file directly from the internal storage device of the 3D camera.
5. Double click the 3D camera in the project list.

The device window opens.



Connecting to SOPAS ET

- If SOPAS ET cannot establish a connection to the camera, the connection assistant is displayed, which will allow you to change the IP address.

Note: The default IP address for the 3D camera is 192.168.1.10

- If the device is not listed, click **Search for devices** to open the connection wizard.

You can find additional information relating to the connection assistant in the online help for SOPAS ET.

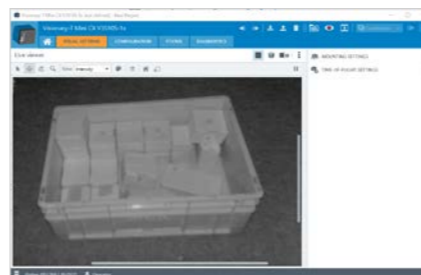
Pre-installing the device driver (alternative installation)

1. Start **SOPAS ET** and open the **Device Catalog** tab.
2. Open the device driver manager (⚙️), and select **Install**.
3. Select the **From a data card** option and search for the device file.
4. Select the file and follow the installation wizard instructions.

Toolbar in the sensor application

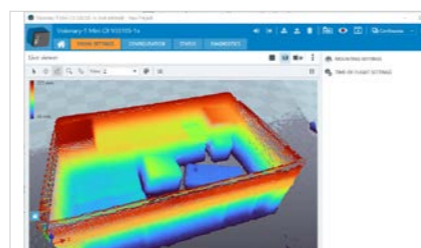
The visualization and control of the 3D camera is carried out in SOPAS ET via the **Visual settings**, the **Configuration** and the toolbar. Two different display options are available here.

2D view



The 2D view shows a grayscale image of the captured scene and can help you to position the 3D camera correctly, or to focus it on specific objects.

3D view



The 3D view provides a three-dimensional point cloud visualization. The visualization depends on the specific camera settings selected. The color scale and color range in both the 2D and 3D viewer can be customized in the view options.

SOPAS icons

- **Selection arrow**
Select individual points from the cluster of points and mark them.
- **Move**
Move the image section shown left/right or up/down (also Shift + Left Click + Move).
- **Rotate**
Rotate the image section shown around the current image center point (also: Ctrl +Left Click + Move).
- **Zoom**
Enlarge or reduce the currently displayed image section (also scroll wheel forward/back).
- **Display options**
Switch between the individual display forms of the collected points.
- **Reset**
Reset the perspective to default.
- **Select viewing angle**
Choose from various preset viewing angles by clicking the respective arrowhead.
- **Still image**
Interrupts the replay of the camera data, e.g., to store a still image

Toolbar in the sensor application

- **Log into the device**
Log in to change camera parameters or access detailed status information.
- **Log out of the device**
Log out to prevent unauthorized access to the camera.
- **Read device parameters**
Reads the current camera parameters and updates the SOPAS parameters.
- **Write camera parameters**
Transfers the current SOPAS parameters to the camera.
- **Save Setup**
Save configured setup permanently on device.
- **Record**
Starts and stops the stream recording which is saved as a *.srr file.
- **Replay**
Opens a new window to replay an *.srr file stored on a data card.
- **Save 3D point cloud**
Saves the 3D point cloud as a *.pcd file.
- **Trigger next image**
Displays the next triggered image in the trigger mode.
- **Question mark**
The "question mark" icon can be used to display additional information and help for each parameter.

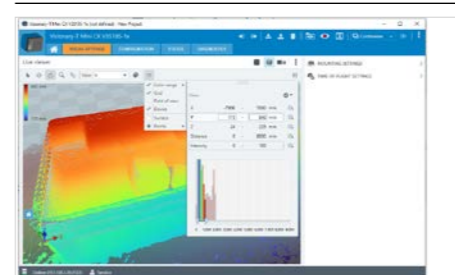
Configuring/visualizing the 3D camera

SOPAS ET can, amongst other things, be used to carry out diagnostics and visualizations. You can configure further settings via the **Authorized Customer** or **Service** user level.

Note: You can find information on how to change the user level in the online help for SOPAS ET. The passwords for the user levels can be obtained from the manufacturer's customer service department

1. Turn on the 3D camera and connect it to SOPAS ET (see "Connecting to SOPAS ET").
2. Click the "Visual settings" step to begin configuring the settings for your use case.
 - In the settings overview, click on **Mounting settings**, to open them:
The center of the disc with the status LEDs is the origin of the coordinates (x|y|z = 0|0|0).
 - Edit the parameters to transform the camera data into a global coordinate system of your choice.
3. Now close the **Mounting settings**.
4. Use the image and recording settings to configure the format as well as the recording cycle of the data.
5. Configure the data filter in the Filter settings.
6. Open the display control.
7. Use the display control to adjust the output so you can achieve as clear outputs as possible under real conditions.

Note: The grid in the display will identify the floor (as reference plane x/y). The 3D camera is aligned to this using the Mounting settings.



Configuring/visualizing the 3D camera

9. Check the output for clearly recognizable image fragments and make any necessary adjustments, for example to the filter or image or recording settings to eliminate these fragments as much as possible.
10. Permanently save your settings in the device.
 - Note:** You can save the parameters using **Device - Export** or load them using **Device - Import**.
11. To configure how the camera is controlled via the digital inputs, click "Configuration".
12. Open the other available views to obtain detailed information on the operational status and characteristics of the camera (temperature, operating hours counter, etc.).
 - Note:** The camera can be configured for further applications by programming the API interface (API code samples and/or the separate API documentation at www.sick.com/Visionary-T_Mini).
13. Permanently save your setups and quit SOPAS ET when you have collected the required information and finished configuring the sensor.

Programming the application

The Visionary-T Mini CX is normally integrated into customer-specific applications and communicated with via an API interface.

The settings selected under visualization in SOPAS ET can act as reference values and default settings.

A detailed description of the API interface and example codes for connecting to the 3D camera, I/O communication, and further examples are available at www.sick.com/Visionary-T_Mini.

The Visionary-T Mini CX provides continuous 3D data to the data interface. For this reason, ensure the communication interface is designed for large data quantities, and dimension the storage requirements accordingly.

Service and maintenance

The 3D camera contains no inner parts that the user needs to have serviced.

- Check the screw connections and terminals regularly.
- Clean the housing using a soft cloth. Either use a dry cloth, or dampen it with lukewarm water and a small amount of mild cleaning agent.
- Ensure adequate heat dissipation to guarantee the availability of the device in continuous operation.

Additional information

For additional information on the 3D camera, visit www.sick.com/Visionary-T_Mini or see the online help for SOPAS ET.

Please contact your local sales office in the event of any support queries.

Additional information about products and orders is available at: www.sick.com

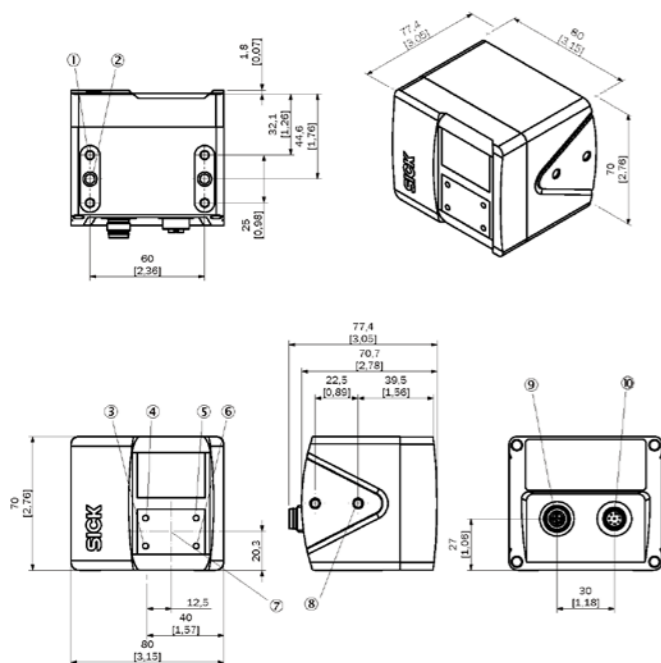
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You can obtain the source code for these software components from us on a data card within three years of delivery of the product (CD or DVD) by sending an inquiry to our customer service department at the following email address: foss.compliance@sick.de

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A Dimensional drawings in mm [inch]

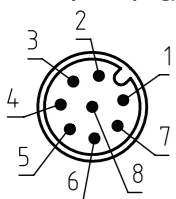


Labeling of dimensional drawing

1	Threaded mounting hole M5, 7.5 mm depth (4x)
2	Fit \varnothing 5H7, 7 mm depth (2x)
3	Device display
4	Application status display
5	Ethernet status display
6	Application status display
7	Origin of coordinate system
8	Threaded mounting hole M5, 5.5 mm depth (4x)
9	Gigabit Ethernet (8-pin, M12, X-coded)
10	Voltage/ digital I/O /service (8-pin, M12, system plug)

B Connections

Voltage/ digital I/O /service
(8-pin, M12, system plug)

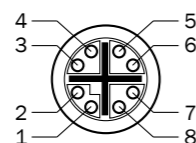


PIN	Signal	Description
1	24 V DC -30% ... +25%	Supply voltage
2	INOUT3	Programmable digital I/O (reserved)
3	GND	Reference potential
4	INOUT4	Programmable digital I/O (reserved)
5	INOUT1	Programmable digital I/O (reserved)
6	INOUT5	Programmable digital I/O (reserved)
7	INOUT6	Programmable digital I/O (reserved)
8	INOUT2	Programmable digital I/O (reserved)

PIN	Flex color ¹
1	Brown
2	White
3	Blue
4	Black
5	Gray
6	Pink
7	Violet
8	Orange

¹ Only applies to SICK AG accessories (see optional accessories)

Gigabit Ethernet
(8-pin, M12, X-coded)



PIN	Signal
1	TRD0_P
2	TRD0_N
3	TRD1_P
4	TRD1_N
5	TRD2_P
6	TRD2_N
7	TRD3_P
8	TRD3_N

C Working range and detection volumes

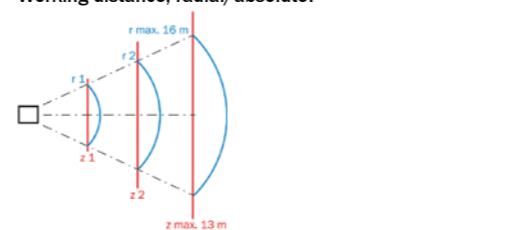
The working range and detection volumes of Visionary-T Mini CX depend on:

- ▶ the configuration;
 - ▶ the distance to a flat boundary surface, e.g., floor, ceiling, wall;
 - ▶ the mounting bracket relative to the boundary surface.
- The maximum detection distance – and therefore the 3D detection volume – also depends on environmental influences such as:
- ▶ lighting conditions
 - ▶ IR interference
 - ▶ air particle concentration
 - ▶ reflectivity (850 nm) of the objects in the detection zone
 - ▶ object transparencies (e.g., windows)

Note: The reliability of the detection is reduced by heavily reflective or absorbent materials (e.g., mirrors, black surfaces). Heavily reflective and shiny materials cause multiple reflections and lead to measurement errors (artifacts) due to the principle of operation.

Absolute measurement accuracy (typical) and repeatability (central detection volume) at 90% and 10% remission and without background light.

Working distance, radial/absolute:



Working distance radial (r)	Measurement accuracy (90% remission)	Repeatability (1 σ - 90% remission)
0.5 m	\pm 5 mm	\pm 0.8 mm
1.0 m	\pm 5 mm	\pm 0.8 mm
2.0 m	\pm 5 mm	\pm 1 mm
4.0 m	\pm 7 mm	\pm 2 mm
7.0 m	\pm 10 mm	\pm 5 mm
9.0 m	\pm 15 mm	\pm 10 mm
11.0 m	\pm 25 mm	\pm 25 mm
13.0 m	\pm 50 mm	\pm 50 mm

D Technical data

	Visionary-T Mini CX
Working distance ¹	up to 16 m
Detection angle	70° x 60°
Maximum frame rate	30 fps
Pixel count	512 x 424 pixels
Repeatability ²	\pm 0.8 mm, within a range of 1 m \pm 5 mm, within a range of 7 m
Ambient light immunity ³	50 klx
Connections	System plug: M12 8-pin, A-coded Gigabit Ethernet: M12, 8-pin X-coded
Supply voltage	24 V DC (-30% ... +25%)
Power consumption	< 12 W typically (without digital I/Os)
Peak current	2 A
Weight	520 g
Dimensions (L x W x H)	80 mm x 70 mm x 77 mm
Ambient operating temperature ⁴	-10 °C ... +50 °C
Storage temperature	-20 °C ... +80 °C
Shock resistance	EN IEC 60068-2-27 (30 g / 11 ms)
Vibration resistance	EN IEC 60068-2-6, EN IEC 60068-2-64 (5.0 g / 10 Hz ... 500 Hz)
Electromagnetic compatibility (EMC)	EN 61000-6-2:2005, EN 61000-6-4:2007, EN 6100-6-4 A1:2011
Protection class	III
Enclosure rating	IP65, IP67
Laser protection ⁵	Class 1 (λ : 850 nm, P_0 < 17 mW, t < 25 ns); EN IEC 60825-1:2007 (Ed.2), EN IEC 60825-1:2014 (Ed.3)
Switch-on delay	~20 s
Image acquisition time	< 10 ms
Interfaces	Gigabit Ethernet

¹ Depends on the infrared remission properties of the target object.

² See table for individual values.

³ Sunlight up to a measuring distance of 2.0 m

⁴ Housing operating temperature -10 °C ... +65 °C

⁵ Complies with 21 CFR 1040.10 except for conformance with Laser Notice no. 56 dated May 8, 2019 and subsequent versions.

E Status LEDs

Visionary-T Mini CX

Square	Circle	Description
Green	Off	System start
Green	Off	Data transmission: API channel deactivated and ready for data transmission
Green	Blue	Data transmission: API channel deactivated - SOPAS active
Green	Green	Data transmission: API channel active
Orange - flashing slowly	All	Device warning, e.g., temperature exceeds warning limit
Red - flashing slowly	Red	Max. operating temperature exceeded or short-circuit
Red - flashing quickly	Red	Illumination fault

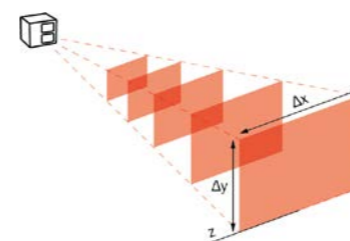
Optional accessories

Part no.	Description
2106258	Ethernet cable 2 m, M12 / RJ45, X-coded
2106259	Ethernet cable 5 m, M12 / RJ45, X-coded
2106260	Ethernet cable 10 m, M12 / RJ45, X-coded
6020663	M12 system cable, 2 m
6020664	M12 system cable, 5 m
6048434	M12 system cable, 10 m

System requirements

- ▶ Operating systems:
Windows 10, 4 GB RAM
Windows 7 Professional (32/64 bit), 4 GB RAM
Windows 8 Professional (32/64 bit), 4 GB RAM
- ▶ Min. Pentium i5, 2.6 GHz or comparable
- ▶ Min. Intel HD Graphics 3000 (or NVIDIA NVS 3100M 512 MB gDDR3) and OpenGL 2.0 Support
- ▶ Screen resolution 1,024 x 768 or higher, at least 256 colors (65,536 colors recommended)
- ▶ Free hard disk space: 450 MB
- ▶ Ethernet: 100 MBit/s or higher

Detection volume and 2D measuring ranges



Absolute working distance (z)	Measuring range (Δx)	Measuring range (Δy)
0.2 m	0.3 m	0.2 m
0.5 m	0.7 m	0.6 m
1.0 m	1.4 m	1.2 m
1.5 m	2.1 m	1.7 m
2.0 m	2.8 m	2.3 m
3.0 m	4.2 m	3.5 m
4.0 m	5.6 m	4.6 m
5.0 m	7.0 m	5.8 m
6.0 m	8.4 m	6.9 m
8.0 m	11.2 m	9.2 m
10.0 m	14.0 m	11.5 m
13.0 m	18.2 m	15.0 m