QUICK START

Visionary-T Mini CX

3D vision camera

EN

SICK

Visionary-T Mini CX

Valid for the following part number:
1112649

NFPA79 applications only.
Adapters providing field wiring leads are available.
Refer to the product information.
Enclosure Type 1.

Australia
Phone +61 (3) 9457 0600
1800 33 48 02 – tollfree
Austria
Phone +43 (0) 2236 62288-0
Belgium/Luxembourg
Phone +32 (0) 2 466 55 66
Brazil
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Canada
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Czech Republic
Phone +420 234 719 500
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China
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Detailed addresses and further locations at **www.sick.com**

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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 vision camera only within the set operating parameters.
- Regularly check that the 3D vision camera is functioning properly.
- The infrared beams of the laser illumination unit do not pose a danger to the human eye if the 3D vision camera is operated within the specified parameters.
- Structural modifications to the 3D vision camera are strictly forbidden!
- During mounting, ensure there are no attachment parts in the detection volume of the 3D vision camera.
- The 3D vision camera must not be mounted behind a transparent screen since this will affect the system properties.
- If heat dissipation is inadequate, the housing temperature can exceed the specified range. Ensure an adequate heat dissipation (see accessories) and, if necessary, adjust the device configuration.
- The 3D vision camera can be affected by external light sources, or interfere with other sensors (e.g., laser scanners) due to the active laser illumination unit.

⚠ 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 vision camera)
- Quick start guide

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

Product features

- The 3D vision camera is 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 frames per second (fps)
- Convenient API connection for using the 3D vision camera in specialist applications
- Configuration and activity recording via SOPAS ET on a computer

Overview

Visionary-T Mini CX is a 3D vision 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 vision camera and visualize the data.

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

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

To use the 3D vision camera, perform the following steps:

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

Completing the mechanical and electrical setup and installing SOPAS ET

Mount the device using the accessories provided. **E**

1. Prepare the mounting location in accordance with the dimensional drawing **A**.
2. Mount the 3D vision camera in the proper alignment for the desired detection volume.
   Ensure that the detection volume is bordered by a surface. **C**
   To avoid optical interference, ensure that the 3D vision camera is not on the same optical axis as other opto-electronic sensors when mounting it.
3. Connect the 3D vision 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 vision camera to connect the voltage supply and signal transmission **B**.
5. Install the SOPAS Engineering Tool (SOPAS ET) software by running the installation file (as administrator).
6. Follow the instructions of the installation program.

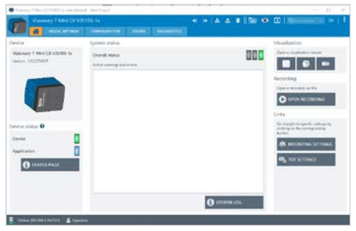
Connecting to SOPAS ET

SOPAS ET is a software program of SICK AG. It has been developed for Windows systems for monitoring and configuring devices.

Connecting SOPAS ET to the 3D vision camera:

1. Ensure the 3D vision 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. If the 3D vision camera is in the same network segment, the camera is displayed in the list of devices found.
4. Click the 3D vision camera in the list of available devices Add the 3D vision camera to the project. This installs the required device file directly from the internal storage device of the 3D vision camera.
5. Double-click the 3D vision camera in the project list.

   The device window opens.



Connecting to SOPAS Engineering Tool

- If SOPAS ET cannot establish a connection to the camera, the connection assistant, which can be used to change the IP address, is displayed.

  Note: The default IP address for the 3D vision 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.

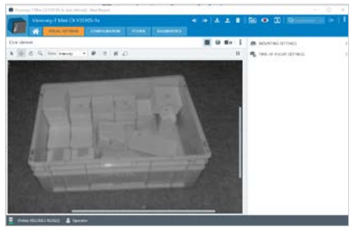
Pre-installing the device driver (alternative installation)

1. Start **SOPAS ET**. Open the **Device Catalog** tab.
2. Open the device driver manager (⚙). Click on **Install**.
3. Select the **From a data card** option. Search for the device file.
4. Select the file. Follow the instructions of the installation wizard.

Toolbar in the sensor application

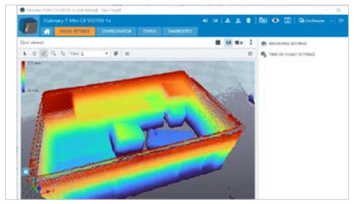
The visualization and control of the 3D vision camera is carried out in SOPAS ET via the **Visual settings**, the **Configuration**, and the toolbar. Two different display options are available for this.

2D view



The 2D view shows a grayscale image of the captured scene. This can help you to position the 3D vision 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 displayed image section left or right as well as up or down
(Also: Shift + Left Click + Move).

Rotate
Rotate the displayed image section 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, for example to store a still image.

Toolbar in the sensor application

Log into the device
After logging in, you can edit camera parameters and 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. Updates the SOPAS parameters.

Write camera parameters.
Transfers the current SOPAS parameters to the camera.

Save setup.
Saves the configured setup permanently on the device.

Record
Starts and stops the stream recording, which is saved as a *.ssr file.

Replay
Opens a new window to replay an *.ssr 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 and visualizing the 3D vision 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.

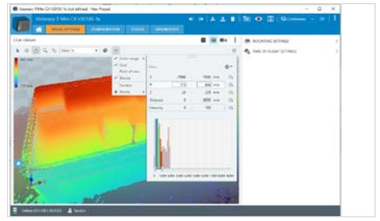
Note: You can find information on how to change the user level in the online help for SOPAS ET. The passwords for the user levels can be obtained from the customer service department.

1. Switch on the 3D vision camera. 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.

3. In the settings overview, click on **Mounting settings**:
   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 the world coordinate system.
4. Now close the **Mounting settings**.
5. Use the image and recording settings to configure the format as well as the recording cycle of the data.
6. Configure the data filter in the Filter settings.
7. Open the display control.
8. 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 vision camera is aligned to this using the Mounting settings.



Configuring and visualizing the 3D vision camera

9. If noticeable image fragments are present, you can if necessary adjust the filter or image and capture settings. This enables you to eliminate the fragments as far as possible.
10. We recommend permanently saving the settings.

    Note: The parameters can be saved using **Device – Export** or loaded using **Device – Import**.

11. "Configuration" can be used to configure the actuation of the digital outputs via the camera.
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. After entering the required information and configuration of the sensor is complete, we recommend permanently saving the setup. SOPAS ET can then be closed.

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 code examples for connecting to the 3D vision 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 ensure adequate storage space is available.

Service and maintenance

The 3D vision 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 (see accessories).

Additional information

You can find additional information on the 3D vision camera at www.sick.com/Visionary-T_Mini or in 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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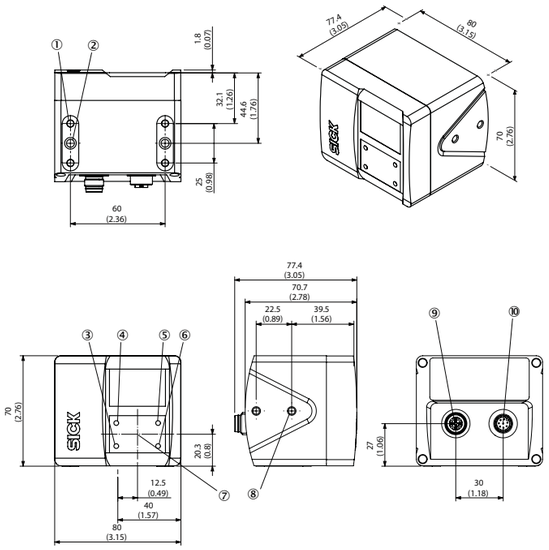
A Dimensional drawings in mm (inch) A period is used as the separator.

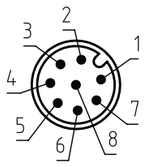


Labeling of dimensional drawing

1	Threaded mounting hole, M5, 7.5 mm depth (4x)
2	Fit ø 5H7, 7 mm depth (2x)
3	Device status display
4	Application status display
5	Ethernet status display
6	Application status display
7	Sensor coordinate origin
8	Threaded mounting hole M5, 5.5 mm depth (4x)
9	“Ethernet” connection, 8-pin M12 female connector, X-coded.
10	“Power/Serial/I/O” connection, 8-pin M12 male connector, A-coded

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[1]	Programmable digital I/O
3	GND	Reference potential
4	INOUT4[1]	Programmable digital I/O
5	INOUT1[1]	Programmable digital I/O
6	INOUT5[1]	Programmable digital I/O
7	INOUT6[1]	Programmable digital I/O
8	INOUT2[1]	Programmable digital I/O

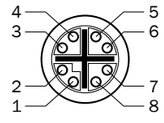
[1] Maximum current per digital output: 100 mA.
Maximum total current for all digital outputs: < 500 mA.
Voltage drop at output for 100 mA: < 2 V.
Short-circuit protected

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

PIN	Flex color 2[1] (angled cable)
1	White
2	Brown
3	Green
4	Yellow
5	Gray
6	Pink
7	Blue
8	Red

[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	TRD3_P
6	TRD3_N
7	TRD2_P
8	TRD2_N

C Working range

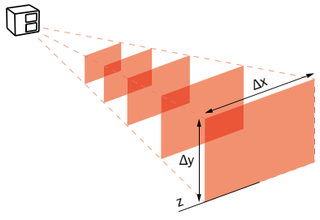
The working range and detection volumes of Visionary-T Mini CX depend on:

- 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)
- The optical axis may be tilted at up to 1.5° relative to the front of the housing (typically 0.3° ... 0.8°)

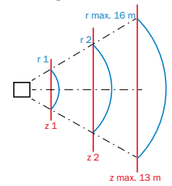
Field of view



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

Absolute measurement accuracy/repeatability

Working distance, radial/absolute:



90% remission

Working distance radial (r)	Measurement accuracy	Repeatability 1σ	Intensity
0.5 m	± 3 mm	± 0.8 mm	76 dB
1.0 m	± 3 mm	± 0.8 mm	64 dB
2.0 m	± 3 mm	± 1 mm	52 dB
4.0 m	± 7 mm	± 2 mm	40 dB
7.0 m	± 10 mm	± 5 mm	31 dB
8.0 m	± 13 mm	± 7 mm	28 dB
10.0 m	± 20 mm	± 15 mm	26 dB
13.0 m	± 50 mm	± 48 mm	20 dB

10% remission

Working distance radial (r)	Measurement accuracy	Repeatability 1σ	Intensity
0.2 m	± 3 mm	± 0.8 mm	72 dB
0.5 m	± 3 mm	± 0.8 mm	56 dB
1.0 m	± 3 mm	± 1.5 mm	44 dB
2.0 m	± 3 mm	± 4 mm	33 dB
4.0 m	± 10 mm	± 12 mm	21 dB
7.0 m	± 20 mm	± 50 mm	11 dB

Note: The specified numerical values are typical values and apply in the central 80% of the detection area, at room temperature, without ambient light, and at a frame rate of 25 fps.
At distances > 9 m, the reliability of the measured values will be lower and individual pixels or pixel groups may exhibit defective measured values.
The measurement accuracy may degrade by up to +–10 mm (typically +–5 mm) over the entire ambient operating temperature.

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]	± 0.8 mm, at a distance up to 1 m ± 5 mm, at a distance up to 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 load	IEC 60068-2-27:2008 (30 g / 11 ms)
Vibration load	IEC 60068-2-6:2008, IEC 60068-2-64:2008 (5.0 g / 10 Hz ... 500 Hz)
Electromagnetic compatibility (EMC)	IEC 61000-6-4:2018, EN IEC 61000-6-4:2019, IEC 61000-6-2:2005, EN 61000-6-2:2005, IEC 61000-6-2:2016, EN IEC 61000-6-2:2019
Protection class	III
Enclosure rating	IP65, IP67
Laser protection[5]	Class 1 (λ: 850 nm, P_0 < 17 mW, t < 25 ns); IEC 60825-1:2007 (Ed.2), EN 60825-1:2007 (Ed.2), IEC 60825-1:2014, EN 60825-1:2014
Camera coexistence mode[6]	Automatic
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] Conforms to 21 CFR 1040.10 except for deviations per Laser Notice No. 56 of May 8, 2019, and subsequent versions.
[6] Multiple cameras can reduce the repeatability by a factor of √(number of superimposed measuring ranges).

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
2124497	Visionary mounting kit
2127749	Visionary heat sink
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
2094783	Ethernet cable, angled, position of coding: 180°, 2 m, M12 / RJ45, X-coded
2094784	Ethernet cable, angled, position of coding: 180°, 5 m, M12 / RJ45, X-coded
2094785	Ethernet cable, angled, position of coding: 180°, 10 m, M12 / RJ45, X-coded
6020663[1]	M12 system cable, 2 m
6020664[1]	M12 system cable, 5 m
6048434[1]	M12 system cable, 10 m
2096218[2]	M12 system cable, angled, position of coding: 315°, 2 m
2096219[2]	M12 system cable, angled, position of coding: 315°, 5 m
2114689[2]	M12 system cable, angled, position of coding: 315°, 10 m

[1] Cable with flex color 1
[2] Cable with flex color 2

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
- Minimum Pentium i5, 2.6 GHz or equivalent
- Minimum Intel HD Graphics 3000 (or NVIDIA NVS 3100M 512 MB gDDR3) and OpenGL 2.0 Support
- Screen resolution 1024 × 768 or higher, at least 256 colors (65,536 colors recommended)
- Free hard disk space: 450 MB
- Ethernet: 100 MBit/s or higher