QUICK START

Visionary-T DT

3D sensor

EN

SICK
Visionary-T

Valid for the following part numbers:
1088889 and 1088890

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

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Czech Republic
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Detailed addresses and further locations at **www.sick.com**

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SICK uses standard IP technology in its products, e.g. 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 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

Safety

- Visionary-T DT 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 sensor must not be used in explosive environments!
- 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 power supply to the device within the set parameters.
- Operate the 3D sensor only within the set operating parameters.
- Regularly check that the 3D sensor is functioning properly.
- The infrared beams used pose no danger to the human eye if the 3D sensor is operated within the prescribed parameters (optical risk classification 0, EN 62471).
- Structural modifications to the 3D sensor are strictly forbidden!
- During mounting, ensure that there are no attachment parts in the detection volume of the 3D sensor.
- Mounting of the 3D sensor must not take place behind any transparent screen since this will affect the system properties.

Scope of delivery

- Visionary-T DT (3D sensor)
- Quick start instructions

Note: Detailed product documentation, drivers, SOPAS ET, API description and application examples are available at www.sick.com/Visionary-T (Downloads - Supporting Material)

Product features

- 3D detection sensor for indoor use
- Working distance up to at least 10 m
- Easy mounting and commissioning
- 2-in-1: active 3D sensor with integrated 2D live IR camera
- Optical and acoustic signal in case of detection (with buzzer or other actuator)
- Control via discrete inputs and signal via discrete outputs of device
- Configuration and activity recording via SOPAS ET on PC

Overview

Visionary-T DT is a 3D detection sensor for indoor use based on the time-of-flight (TOF) principle.

This 3D sensor can be used in diverse indoor applications, such as 3D collision warning, intrusion or security.

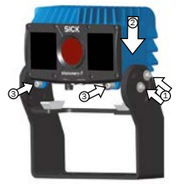
Different setups can be configured via SOPAS ET. These setups can be triggered via discrete inputs. The discrete output signals allow an easy integration, i.e. can be directly connected to an actuator.

Overview

In order to be able to use the 3D sensor, you must follow the operating steps below:

1. Complete the mechanical and electrical set-up.
2. Install SOPAS ET.
3. Connect 3D sensor to SOPAS ET.
4. Configure 3D sensor.

Completing the mechanical and electrical set-up and installing SOPAS ET



1. Fix the inner clamp to the outside edge (1). Attach the 3D sensor (2) and fix with the setscrews (3).
2. Prepare the mounting position in accordance with the dimensional drawing **A**.
3. Mount the 3D sensor with a suitable alignment to the detection volume. Ensure as far as possible that the detection volume is bordered by a surface **C**.
4. Connect the Ethernet interface of the 3D sensor directly to your computer or to the network to which your computer is connected.
5. Use the system plug of the 3D sensor to enable voltage and signal transmission **B**.
6. Install the SOPAS ET software by running the installation file (as administrator).
7. Follow the instructions of the installation program.

Connecting to SOPAS ET

SOPAS is a software platform for monitoring and configuring devices made by SICK AG. It can be installed on Windows computers and used on any device supported by SOPAS ET.

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

1. Ensure that the 3D sensor 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 sensor is in the same network segment, it is displayed in the list of devices found.
4. Click on the sensor in the list of available devices and add this to the project. This installs the required device file directly from the internal device storage.
5. Double click on the 3D sensor in the project list.

   This will open the sensor application.

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

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

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

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

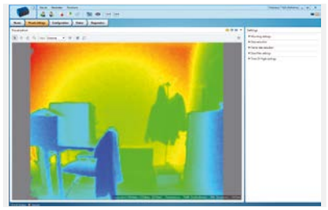
Pre-install device file (alternative installation)

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

Toolbar in the sensor application

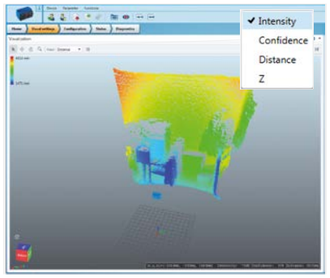
The visualization and control of the 3D sensor is carried out in SOPAS ET via the **visual settings**, the **configurations** and the toolbar. Two different display options are available here.

2D view



The 2D view provides a pseudo-color image picture of the scene and can help you to position the 3D sensor correctly or focus on certain objects.

3D view



The 3D view provides a three-dimensional point cloud visualization. The visualization dependents on the individual sensor settings made.

SOPAS icons

Selection arrow
Select individual points from the cluster of points and mark them.

Move
Move the currently displayed image section left/right or up/down (or with the Shift key held down).

Rotate
Rotate the currently displayed image section around the current image center point (or with the Ctrl key held down).

Zoom
Enlarge or reduce the currently displayed image section (or 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 on the respective arrow head.

Still image
Pause the playback to obtain a still image of the displayed image section.

Replay
Opens a new window to replay a stored *.ssr file.

Record
Record the stream to store it as a file on a storage space.

Save 3D point cloud
Saves the 3D point cloud as a *.pcd/*.ply file.

Question mark
The "question mark" icon can be used to display more information and help for each parameter.

Save setup
Saves the configured setup permanently on the device.

Trigger next image
Displays the next triggered image in the trigger mode.

Login to device
Login to change camera parameters or view detailed status reports.

Logout from device
Log out to avoid unauthorized changes of parameters and access in general.

Configuring/visualizing the 3D sensor

SOPAS ET can be used to carry out diagnoses and visualizations in order to verify the functionality of the 3D sensor.

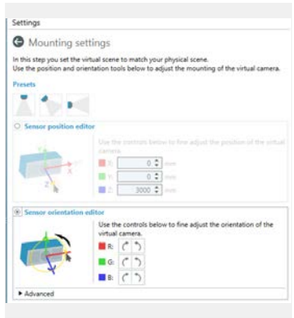
You can use the Authorized Customer or Service user levels to configure the camera parameters, e.g. adapting the integration time for optimal performance.

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 sensor and connect it to SOPAS ET (see "Connecting to SOPAS ET").
2. By clicking the "Visual settings" step, you can start configure the settings for your use case.

3. In the project tree, click on the two views **3D view** and **Mounting settings** to open them.

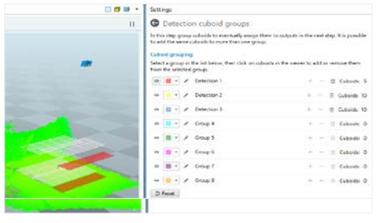
   Configure mounting settings by following HMI instructions. You can use presets for that or download example *.SOPAS files from www.sick.com/<part number>.



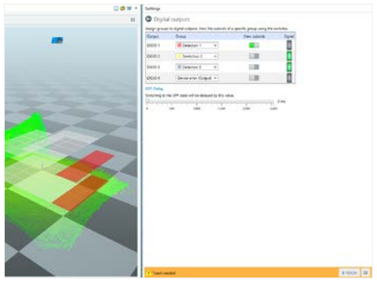
4. Configure Time-of-Flight settings
5. Configure data filters
6. Configure detection

   a. Define detection volume by moving and resizing the VOI cube or
   b. Define the height of all cuboids, a group of cuboids or a single cuboid.

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

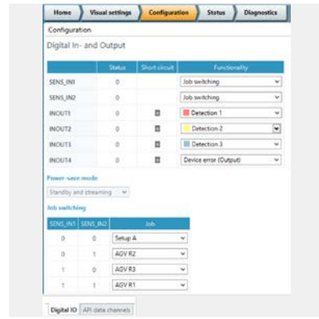


7.



Configuring/visualizing the 3D sensor

8. Adjust OFF-delay, multiple sampling and other detection relevant settings.
9. As a final step, press the "teach" button to learn the reference scene of your interest and permanently save the setup on the device.
10. By clicking on "Configuration" you can configure how to trigger the saved setups using digital inputs.
11. Verify your detection application. In case a digital output is active, you see a green light beside the respective output.



12. Open the other available views in order to obtain detailed information on the operational status and characteristics of the sensor (temperature, operating hours counter, etc.).
13. Permanently save your setups and quit SOPAS ET when you have collected the required information and finished the configuration of the sensor.

Ethernet interface

Note: In addition to digital outputs, it is possible to get the raw 3D data, as well as position and detection status of each cuboid and group, via Gigabit Ethernet (TCP/IP).

Commisioning and maintenance

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

- Check 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.
- Clean the area between the cooling ribs regularly.

Additional Information

You can find additional information on the 3D sensor at supportportal.sick.com 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 can be obtained at: www.sick.com/Visionary-T

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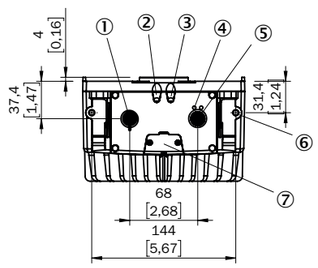
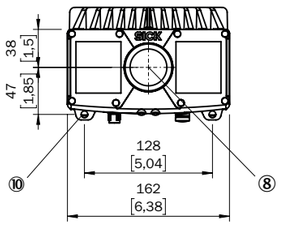
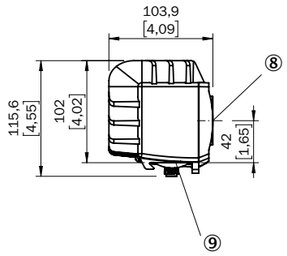
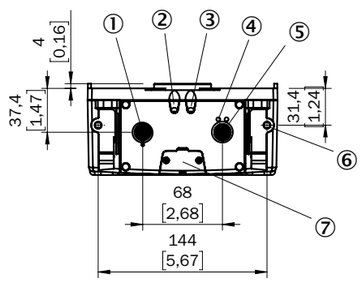
A Dimensional drawings in mm (inch)

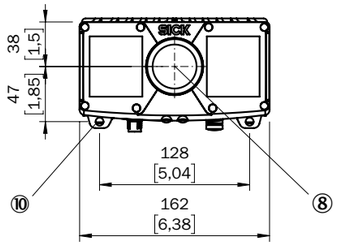


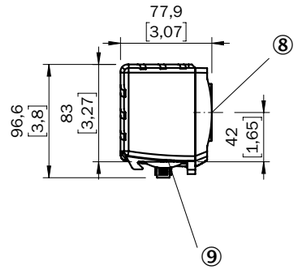




① Power connection / digital inputs and outputs / service
② Device display
③ Application display
④ Ethernet status displays
⑤ Ethernet connection
⑥ 7 mm deep M6 threaded mounting hole (2x) for mounting
⑦ Service interface
⑧ Origin of coordinate system
⑨ Bracket interface
⑩ Bracket mountings (accessory)







B Connections

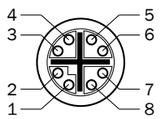
Power/digital I/O/service (17-pin, M12, system plug)

Pin	Signal	Description
1	GND	Ground potential
2	24 V DC +/-20% for integration times >2.5ms: 24 V DC +/-15%	Supply voltage
3	CAN L	Reserved, not executed. Do not connect to VCC!
4	CAN H	Reserved, not executed. Do not connect to VCC!
5	TD+ (RS-422/485), Host	Reserved, not executed. Do not connect to VCC!
6	TD- (RS-422/485) Host TxD (RS-232), Host	Reserved, not executed. Do not connect to VCC!
7	TxD (RS-232), Aux	Only service
8	RxD (RS-232), Aux	Only service
9	SENS GND	GND for electrically decoupled inputs
10	SENS IN1	Switching input, electrically decoupled
11	RD+ (RS-422) Host	Reserved, not executed. Do not connect to VCC!
12	RD- (RS-422/485) Host RxD (RS-232), Host	Reserved, not executed. Do not connect to VCC!
13	INOUT 1	Programmable digital I/O
14	INOUT 2	Programmable digital I/O
15	SENS IN2	Switching input, electrically decoupled
16	INOUT 3	Programmable digital I/O
17	INOUT 4	Programmable digital I/O

Pin	Flex color[1]
1	Blue
2	Brown
3	Green
4	White
5	Pink
6	Yellow
7	Black
8	Gray
9	White + black
10	Violet
11	Gray + pink
12	Red + blue
13	White + green
14	Brown + green
15	White + yellow
16	Yellow + brown
17	White + gray

[1] Only applies to SICK AG accessories (see operating instructions)

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 Detection volume

The detection volume of Visionary-T DT is dependent on:

- the configuration;
- the distance to a flat boundary surface, e.g., floor, ceiling, wall;
- the mounting bracket in relation to a boundary surface.

Further, the maximum detection distance – and therefore the 3D detection volume depends on environmental influences such as:

- Lighting conditions
- IR interference
- Air particle concentration
- Reflectivity (850 nm) of the objects in the detection volume
- Object transparency (e.g., windows)

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

Absolute accuracy (z-axis) and repeatability (central detection volume) at 100 % remission and without background light for intergation times of 1ms (0.5 m and 1 m distance) and 4 ms (all other distances).

Working distance radial (r)	Accuracy (100 % remission)	Repeatability (1σ - 100 % remission)
0.5 m	± 15 mm	± 2 mm
1.0 m	± 15 mm	± 2 mm
2.0 m	± 15 mm	± 2 mm
3.0 m	± 15 mm	± 3 mm
4.0 m	± 20 mm	± 3 mm
5.0 m	± 25 mm	± 4 mm
7.0 m	± 35 mm	± 7 mm
10.0 m	± 50 mm	± 15 mm
15.0 m	± 50 mm	± 30 mm
20.0 m	± 50 mm	± 50 mm

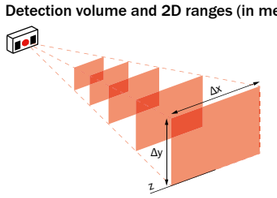
Actual detection accuracy and repeatability depend on your specific environment and setup. Below you find typical values for a few common applications.

Application[1)]	Detectable object size	Accuracy
Intrusion of observed scene at 1.5 m distance.	30 mm	± 15 mm
Goods protection at 2 m distance.	30 mm	± 15 mm
Empty box detection at 1.5 m distance.	30 mm	± 15 mm
Collision warning at 2.5 m	50 mm	± 30 mm

[1)] You will find detailed information including preconfigured setups for typical applications on the delivered data card.

Application example: empty box detection at 1.5 m distance

Detection volume and 2D ranges (in meters):



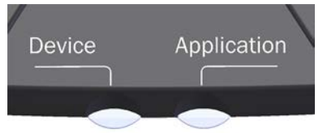
Working distance absolute (z)	Range (Δx)	Range (Δy)
0.5 m	0.7 m	0.5 m
1.0 m	1.4 m	1.0 m
1.5 m	2.1 m	1.6 m
2.0 m	2.8 m	2.1 m
3.0 m	4.1 m	3.1 m
4.0 m	5.5 m	4.2 m
5.0 m	6.8 m	5.3 m
10.0 m	13.7 m	10.6 m
15.0 m	20.6 m	15.9 m
20.0 m	27.4 m	21.2 m
40.0 m	54.9 m	42.5 m

D Technical data

	Visionary-T DT
Working distance	0.5 m ...60 m
Detection angle	69° x 56°
Example field of view	7 m x 5.3 m
Pixel count	176 x 144 pixels
Repeatability	≥ 2 mm, at 1 m range ≥ 7 mm, at 7 m range Typical values for common applications see tables below
Response time	< 100 ms, typically
Light sensitivity	< 50 klux (sunlight)
Connections	M12 17-pin (power supply/data), system plug Digital IOs (24 V) M12 8-pin Gigabit-Ethernet
Supply voltage	24 V DC (+/-20 %), < 2,5 ms integration time (+/-15 %), > 2,5 ms integration time
Power consumption	≤ 22 W typically (without digital I/Os)
Peak current	3 A
Mounting height	Variable
Mounting position	Variable
Weight	~1.9 kg (1.4 kg)[1]
Dimensions (L x W x H)	162 mm x 116 mm x 104 mm (162 mm x 93 mm x 78 mm)[1]
Ambient temperature (operation)	0 °C ... +50 °C (0 °C ... +45 °C)[1]
Ambient temperature (storage)	–20 °C ... +70 °C
Shock resistance	According to EN 60068-2-27:2009
Vibration resistance	According to EN 60068-2-6 and 60068-2-64
Electromagnetic compatibility (EMC)	EN 61000-6-2:2005-08 EN 61000-6-4:2007-01+A1:2011-03
Protection class	III
Enclosure rating	IP67
LED class	Risk group 0 in accordance with EN 62471

[1] Values are for housing variants with smaller cooling fins

E Status LEDs (current status)



Visionary-T DT

Device	Application	Description
blue - flashing slowly	off	System start
any	blue	API channel, data transmission inactive
orange - flashing slowly	blue	Device warning, e.g. temperature exceeds warning level
any	green	API channel, data transmission active
orange - flashing slowly	green	Device warning, e.g. temperature exceeds warning level, data transmission active
blue	off	Illumination off
red - flashing slowly	red	Max. operating temperature exceeded

Optional accessories

Part no.	Description
2077709	2x screws, 2x clamps
2077710	Mounting set (2-part) incl. clamps
2106258	Ethernet cable 2 m, M12/ RJ45, X-coded
2106259	Ethernet cable 5 m, M12/ RJ45, X-coded
2106260	Ethernet cable 10m, M12 / RJ45, X-coded
2094783	Ethernet cable 2m, angled, M12 / RJ45, X-coded
2094784	Ethernet cable 5m, angled, M12 / RJ45, X-coded
2094785	Ethernet cable 10m, angled, M12 / RJ45, X-coded

Part no.	Description
6051194	M12 cable, 2A, Ecolab, 3 m (CDB650)
2070425	M12 cable, 2A, Ecolab, 3 m
2070426	M12 cable, 2A, Ecolab, 5 m
2102509	M12 cable, angled, 2A, Ecolab, 3m
2102510	M12 cable, angled, 2A, Ecolab, 5m

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 equivalent
- Min. Intel HD Graphics 3000 (or NVIDIA NVS 3100M 512MB 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