QUICK START

3vistor-T CX/AG

3D camera

EN



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Exclusion from liability

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.

Safety

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

Scope of delivery

- 3vistor-T CX/AG (3D camera)
- Data card with SOPAS ET (v3), device file, product information and documentation
- Quick start instructions

Product features

- Intended solely for the output of 3D image data via a Gigabit Ethernet interface
- Meets industrial requirements for data security and reliability
- Easy mounting and commissioning
- 3D data collection with up to 30 fps
- Can be used in any indoor space
- Convenient API connection for use of 3D camera in specialist applications
- The AG variant extends the range of functions offered by the CX variant, offering preprocessing of data as standard (e. g. reduction in data)

Overview

3vistor-T is a 3D camera based on the time-of-flight (TOF) principle. It provides real time 3D data at up to 30 frames per second (fps).

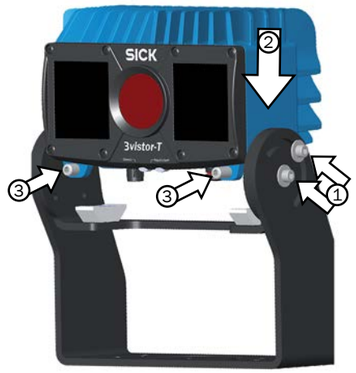
The 3D camera is configured and its images visualized via the SOPAS ET software.

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

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

1. Complete the mechanical and electrical set-up.
2. Install SOPAS ET.
3. Connect 3D camera to SOPAS ET.
4. Configure 3D camera, if necessary.
5. Adjust the display.

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



1. Fix the inner clamp to the outside edge (1). Attach the 3D camera (2) and fix with the setscrews (3).
2. Prepare the mounting position in accordance with the dimensional drawing **A**.
3. Mount the 3D camera with a suitable alignment to the detection zone. Ensure as far as possible that the detection zone is bordered by a surface **c**.
4. Connect the Ethernet interface of the 3D camera directly to your computer or to the network to which your computer is connected.
5. Connect the 3D camera via the system plug to voltage and signal transmission **B**.
6. Install the SOPAS ET software (≥ v3.0.2) by running the installation file from the data card provided (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 camera:

1. Ensure that 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 on the camera in the list of available devices and add this to the project. This installs the required device file directly from the internal storage device.
5. Double click on the 3D camera in the project list.

   This will open the camera application.



- 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 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.

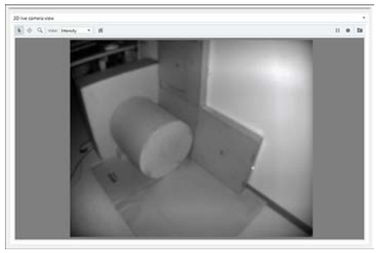
Pre-install device file (alternative installation)

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

Toolbar in the camera application

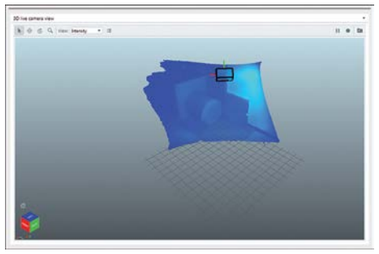
The visualization and control of the 3D camera is carried out in SOPAS ET via the **display control**, the **playback control** and the toolbar. Two different display options are available here.

2D view



The 2D view provides a grayscale picture of the scene and can help you to position the 3D camera correctly or focus on certain objects.

3D view



The 3D view provides a three-dimensional point cloud display. The display is dependent on the settings made. With the AG variant, this is the result of the data selected in the configuration tool, which is sent to the output interface.

Display control

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. The current image section is displayed according to the definitions set.
The most important displays here are confidence value, distance and intensity.

Reset
Reset the perspective to default.

Select viewing angle
Choose from various preset viewing angles by clicking the respective position highlighted on the cube.

Playback and record control

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

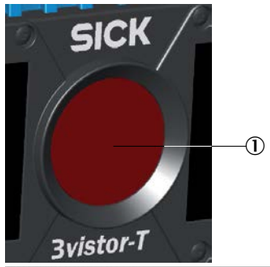
Record
Record the stream to store it as a file on a data card.

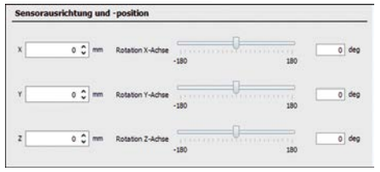
Stop/ store recording
Stop the recording of the stream and store it on the data card.

Load file
Load a stored scene from the data card in order to replay it.

Configuring/visualizing the 3D camera

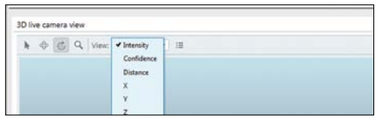
1. Turn on the 3D camera and connect it to SOPAS ET (see "Connecting to SOPAS ET").
2. In the project tree, double click on the two views **3D view** and **Mounting settings** to open them.





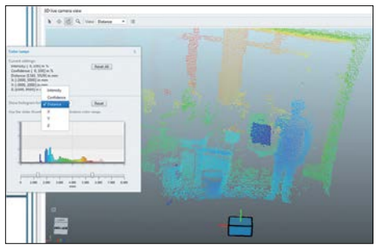
3. Set the sensor alignment and position in the **Mounting settings** panel manually to the location of the sensor center point (1) to mark the physical zero point:
   – The Z value indicates the position of the lens to the horizontal (90° = horizontal, 0° = directly upwards).
   – The X and Y values describe the other two spatial axes.

   The center of the front screen protection is the origin of the coordinates (x|y|z = 0|0|0).
4. Close the **Mounting settings** view.
5. Open the display control.



6. 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 via the configuration.



7. Check the output for clearly recognizable image fragments and make adjustments where necessary – to the confidence filter, for example – in order to eliminate these fragments as much as possible.
8. Note the settings in order to be able to use them later for programming.

Configuring/visualizing the 3D camera

9. Open the other available views in order to obtain detailed information on the operational status and characteristics of the camera (temperature, operating hours counter, etc.).

   Note: Configuration for additional use is executed via programming the API interface (see API example codes and/or separate API documentation on the data card).
10. Quit SOPAS ET when you have collected the required information for programming the application.

- Using the "Authorized Customer" or "Service" user levels, you can configure other settings e.g., for the coexistence of several 3D cameras or for the integration time.

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

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 service.

Programming the application

The 3vistor-T CX/AG 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 can be found on the data card provided.

The 3vistor-T provides continuous 3D data to the data interface. For this reason, ensure that 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 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 camera in the operating instructions 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

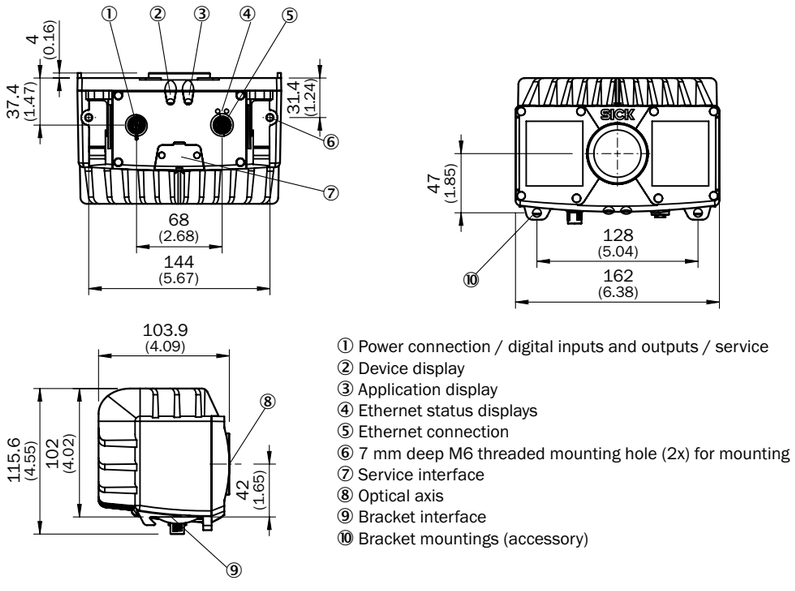
Software licenses

In the product 3vistor-T, SICK uses unmodified open-source software and, insofar as required and permitted in accordance with the relevant license conditions, modified open-source software.

An overview of the license and the associated license texts can be found on the data card provided.

Additional information on this can be found in the operating instructions.

A Dimensional drawings (mm/in)



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 Optical axis
⑨ Bracket interface
⑩ Bracket mountings (accessory)

B Connections

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

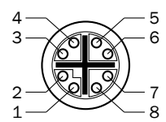


Pin	Signal	Description
1	GND	Ground potential
2	24 V DC –30%/+20%	Supply voltage
3	CAN L	Reserved, not executed. Do not connect to VCC!
4	CAN H	Reserved, not executed. Do not connect to VCC!
5	TD+ (RS-422/485), Host	Reserved, not executed. Do not connect to VCC!
6	TD- (RS-422/485) Host TxD (RS-232), 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 zone

The detection zone of 3vistor-T 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.

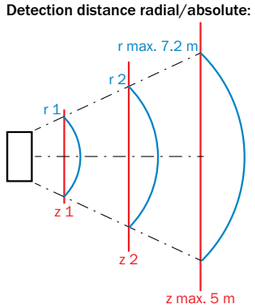
The maximum detection distance r is pre-set to 7.2 m. Due to environmental influences, this value – and therefore the 3D volumes detectable (detection zone) – may deviate:

- Lighting conditions
- IR interference
- Air particle concentration
- Reflectivity (850 nm) of the objects in the detection zone
- 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) on the basis of the principle of operation.

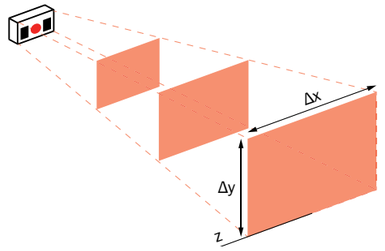
Absolute accuracy (z-axis) and repeatability at 100% remission and without background light (central detection zone)

Detection distance radial/absolute:



Distance r (in m)	Accuracy (absolute)	Repeatability (1σ)
0.50	± 15 mm	± 2 mm
1.00	± 15 mm	± 3 mm
2.00	± 15 mm	± 4 mm
3.00	± 15 mm	± 7 mm
4.00	± 20 mm	± 10 mm
5.00	± 25 mm	± 15 mm
7.00	± 35 mm	± 30 mm

Detection zone and 2D ranges (in meters):



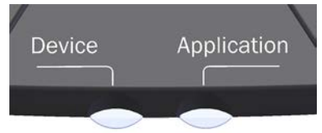
Distance (z)	Range (Δx)	Range (Δy)
0.50	0.70	0.53
1.00	1.40	1.06
1.50	2.10	1.60
2.00	2.80	2.13
2.50	3.50	2.66
3.00	4.20	3.19
3.50	4.90	3.72
4.00	5.60	4.25
4.50	6.30	4.79
5.00	7.00	5.32

D Technical data

	3vistor-T CX/AG		
Maximum radial detection distance	7.2 m		
Maximum detection angle	69° x 56°		
Minimum detection distance	0.5 m		
Minimum detection zone	0.70 m x 0.53 m		
Number of pixels	176 x 144 pixels		
Pixel size	40 µm		
Absolute accuracy at 100% remission (central detection zone) and repeatability	Distance	Accuracy	Repeatability (1σ)
	0.5 m	± 10 mm	± 3 mm
	7 m	± 40 mm	± 25 mm
Image repeatability rate	30 fps		
Sensor reaction time	< 66 ms		
Switching on	< 20 s		
Light sensitivity	< 50 kLux (sunlight)		
Connections	M12 17-pin (power supply/data), system plug		
	M12 8-pin Gigabit Ethernet, X-coded		
Power supply	24 V DC (–30%/+20%), > 1 ms latency		
Power consumption	16 W typically (without digital I/Os)		
Mounting height	Variable		
Mounting position	Variable		
Weight	~1.9 kg (1.4 kg)[1]		
Dimensions	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	EN 61000-6-2:2005-08		
	EN 61000-6-3:2007-01+A1:2011-03		
Protection class	III		
Protection category	IP67		
PSA (eye protection)	Risk group 0 in accordance with EN 62471		

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

E Status LEDs (current status)



3vistor-T CX and AG

Device	Application	Description
Flashing slowly	–	System start
–	Green	System and application started
On	Green	Data transmission active
On	Blue	Data transmission inactive
On	Blue, flashing slowly	Application inactive
Off	Red, flashing rapidly	Internal application error
Off	Red, flashing slowly	Application error (e.g., due to contamination or incorrect configuration)

3vistor-T AG - time schedule

Device	Application	Description
1. Off	Blue/red, flashing slowly	No pose information available
2. Off	Blue, flashing slowly	User input required
3. Off	Blue, flashing rapidly	Input confirmed, calculation phase
4. Off	Blue/red, flashing slowly	Configuration failed, try again

Optional accessories

Part no.	Description
2077709	2x screws, 2x clamps
2077710	Mounting set (2-part) incl. clamps
6049728	Ethernet cable 2 m, M12/ RJ45, X-coded
6049729	Ethernet cable 5 m, M12/ RJ45, X-coded
6051194	M12 cable, 2A, Ecolab, 3 m (CDB650)

Part no.	Description
2070425	M12 cable, 2A, Ecolab, 3 m
2070426	M12 cable, 2A, Ecolab, 5 m
2070427	M12 cable, 2A, Ecolab, 10 m
1064114	CDB650-204, Split Box

System requirements

- Operating systems:
  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