

Visionary-T Mini AP

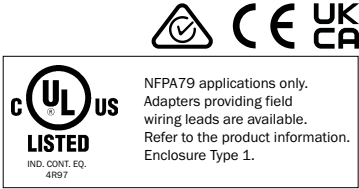
3D machine vision

EN



SICK
Visionary-T Mini AP

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.

Cybersecurity

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. Products and solutions from SICK must be viewed as a component of this concept.

For information on cybersecurity, visit: sick.com/psirt

Safety

- The Visionary-T Mini AP 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 3D vision camera is not suitable for use outdoors or 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.
- 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. Danger to eyes and skin is possible if not used as intended.

- 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

- The Visionary-T Mini AP (3D vision camera)
- Quickstart

Note: A description of the API, detailed product documentation and sample apps are available at supportportal.sick.com.

Product features

- Meets industrial requirements for data security and reliability
- Easy mounting and commissioning
- 3D data acquisition at up to 30 fps
- The Visionary-T Mini AP can solve certain application problems when combined with complete Key Apps without you having to develop your own software solutions.
- The Visionary-T Mini AP can be used as a programmable device for machine vision applications. Based on the 2D and 3D data, the software can be programmed and executed directly on a device.

Overview

The Visionary-T Mini AP is a 3D vision camera based on the time-of-flight (ToF) principle. It provides real time 3D data at up to 30 frames per second (fps).

The SICK AppStudio development environment is needed (license required) to program the Visionary-T Mini AP.

SICK AppManager is needed (no license required) to install SensorApps on the Visionary-T Mini.

To use the 3D vision camera, the following steps must be performed:

1. Complete mechanical and electrical setup.
2. Install SICK AppManager or SICK AppStudio.
3. Connect 3D vision camera with SICK AppManager or SICK AppStudio.
4. Parameterize the software or start programming.

Performing electrical and mechanical setup

Installation of the device with the accessories provided **A**.

1. Prepare the mounting position in accordance with dimensional drawing **A**.
2. Mount the 3D vision camera in the proper alignment for the desired detection volume. Ensure as far as possible that the detection volume is bordered by a surface **B**. Ensure that the 3D vision camera is not on the same optical axis as other opto-electronic sensors when mounting it. This prevents optical interference.
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**.

SICK AppSpace software tools

The Visionary-T Mini AP is part of the SICK AppSpace eco-system. This offers two software tools for installing and developing SensorApps.

SICK AppManager is a configuration software for the installation and re-provisioning of apps. The SICK AppStudio development environment is used to program the device.

License

SICK AppManager is a license-free tool.

A valid license is required to download and use SICK AppStudio. A one-year license can be purchased at sick.com (part number 1610199).

Installation

1. Register at the SICK Support Portal at supportportal.sick.com. A user account must be registered before logging in for the first time.
2. Download the latest version of SICK AppManager at sick.com/SICK_AppManager or SICK AppStudio at sick.com/SICK_AppStudio.
3. Administration rights are required to install the software.
4. Run the installation file. Follow the instructions on the screen.

When using SICK AppStudio for the first time, enter or load the personal license key to complete installation. If the license dialog box does not open automatically, select “Help” -> “About” -> “License information” in the menu.

The SICK AppManager can be used directly after installation (no license key required).

Use of SICK AppStudio

Detailed documentation on the use and operation of SICK AppStudio is available in the Support Portal:

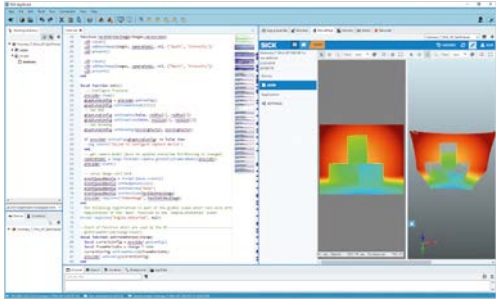
supportportal.sick.com/products/Software/SICK-AppSpace/sick-appstudio/

Connection of a Visionary-T Mini AP with SICK AppStudio:

1. Connect the device to the computer via Ethernet.
2. Configure the computer so that it is on the same subnet as the device but has a different IP address. The default IP address for the device is 192.168.1.10.
3. Start SICK AppStudio. The system then scans for available devices by default.
4. Select the device from the “Device” list.
5. Click on CONNECT.

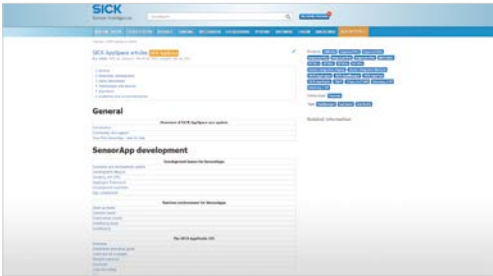
Opening a programming example on the Visionary-T Mini AP:

1. The device must be correctly connected to the computer via Ethernet and connected in SICK AppStudio.
2. Selection of the right working directory
3. Store the programming example you want in the working directory.
4. Right-click the programming example in SICK AppStudio and click “Activate”.
5. Click on “Run all Apps” to start the programming example.
6. The GUI of an application (e.g., Splitviewer) can be opened directly via the “Device Page”. Another option is via a web browser by entering the IP address of the 3D vision camera.



Tutorials

Tutorials on general and device-specific topics are available for assistance with programming the device. The relevant tutorials for the Visionary-T Mini AP are available at supportportal.sick.com in the SICK Support Portal.



Lua scripts

The script language “Lua” is used to generate scripts in SICK AppStudio. You can find additional information on “Lua” at lua.org.

SICK AppSpace API

SICK AppSpace provides a comprehensive API with functions for hardware parameterization, algorithms, result processing and result communication. The API can be accessed directly via the Lua scripts.

The API documentation for the device is available at supportportal.sick.com in the SICK Support Portal.

Use of SICK AppManager

Detailed documentation on the use and operation of SICK AppManager is available in the Support Portal:

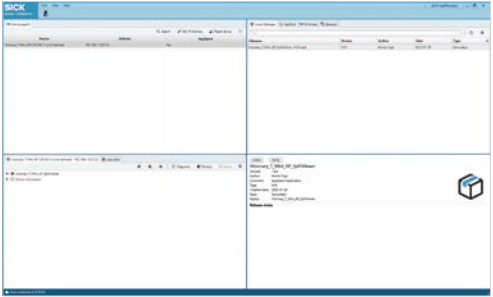
supportportal.sick.com/tutorial/manage-sensorapps-using-sick-appmanager/

Connection of a Visionary-T Mini AP with SICK AppManager:

1. Connect the device to the computer via Ethernet.
2. Configure the computer so that it is on the same subnet as the device but has a different IP address. The default IP address for the device is 192.168.1.10.
3. Start SICK AppManager. The system then scans for available devices by default.
4. Select the device from the “Device” list to establish a connection.

Installing an app on the Visionary-T Mini AP:

1. The device must be correctly connected to the computer via Ethernet and connected in SICK AppManager.
2. Click on “Add package to repository”. Select the desired app.
3. Click “Install” to initialize the installation process.
4. The package to be installed is automatically verified before installation.
5. Log in to the device with the appropriate user level to start installation.



Service and maintenance

The 3D vision camera does not contain any internal parts that need to be 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

More information can be found on the product page. It can be accessed via the SICK Product ID:

[pid.sick.com/\(P/N\)/\(S/N\)](http://pid.sick.com/(P/N)/(S/N))

(P/N) corresponds to the part number of the product, see type label.

(S/N) corresponds to the serial number of the product, see type label (if specified).

The following information is available depending on the product:

- Data sheets
- This document in all available language versions
- CAD files and dimensional drawings
- Certificates (e.g., declaration of conformity)
- Other publications
- Software
- Accessories

For additional information, visit supportportal.sick.com or see the online help for SOPAS ET.

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

Software licenses

SICK uses open source software which is published by the rights holders under a free license. Among others, the following license types are used: GNU General Public License (GPL version 2, GPL version 3), GNU Lesser General Public License (LGPL), MIT license, zlib license and licenses derived from the BSD license.

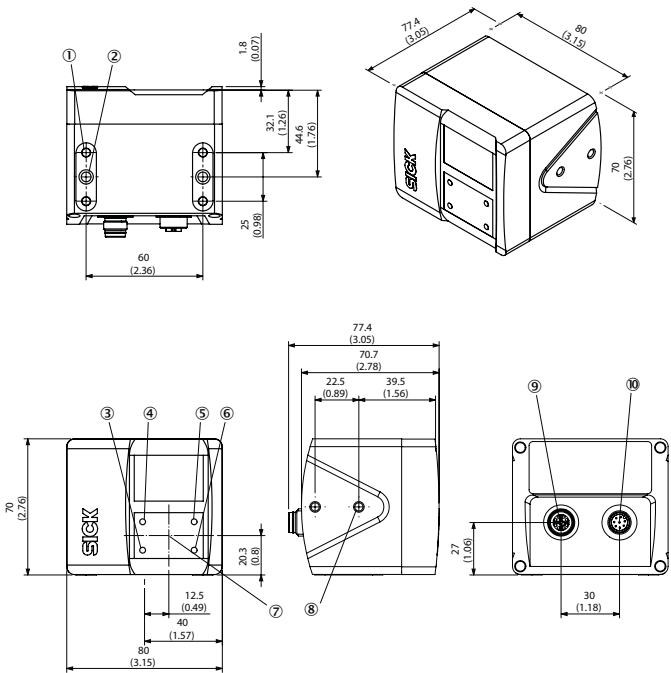
This program is provided for general use without warranty of any kind. This warranty disclaimer also extends to the implicit assurance of marketability or suitability of the program for a particular purpose.

See the GNU General Public License for more information.

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

For the license text, see www.sick.com/licensesetexts. Printed copies of the license texts are also available on request.

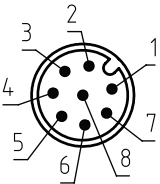
A Dimensional drawings in mm (inch) (A period is used as the separator.)



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 LED 
4	Application 1 status LED 
5	Ethernet status LED 
6	Application 2 status LED 
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

¹Maximum 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

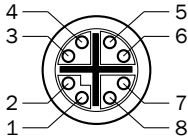
Pin	Flex color 1 ¹
1	Brown
2	White
3	Blue
4	Black
5	Gray
6	Pink
7	Violet
8	Orange

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

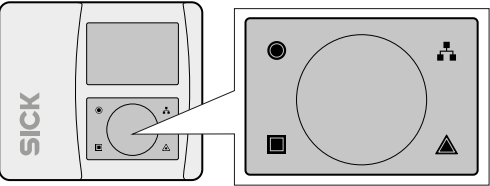
¹Only applies for the cables listed here (see optional accessories).

B Connections

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



C Status LEDs



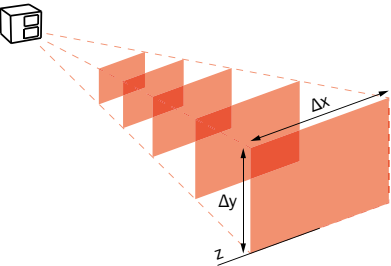
Device 	Application 1 	Application 2 	Description
Green	Off	Off	System start
Green	User-defined; Default: Off	User-defined; Default: Off	Device active
Orange: Flashing slowly	User-defined	User-defined	Device warning, e.g., temperature exceeds warning limit
Red: Slowly flashing	User-defined	User-defined	Maximum operating temperature exceeded or short-circuit
Red: Fast flashing	User-defined	User-defined	Illumination fault

D Working range

The working range and detection volumes of the Visionary-T Mini AP 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°)

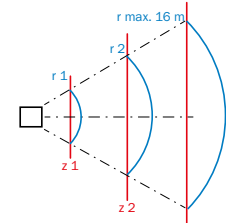
Field of view



Axial 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

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

Absolute measurement accuracy/repeatability
Radial/Absolute working distance:



Working distance radial (r)	Measurement accuracy	Repeat-ability 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

Working distance radial (r)	Measurement accuracy	Repeat-ability 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 for individual pixels 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.

E Technical data

	Visionary-T Mini AP
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
Processor (internal) ⁴	4 ARM Cortex A53, 1.8 GHz
Weight	520 g
Dimensions (L x W x H)	80 mm x 70 mm x 77 mm
Ambient operating temperature ⁵	–10 °C ... +50 °C
Camera housing temperature ⁶	–10 °C ... +65 °C
Storage temperature	–20 °C ... +80 °C
Impact 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 ⁷	IP65, IP67
Laser protection ⁸	Class 1 (λ: 850 nm, P ₀ < 17 mW, t < 25 ns) IEC 60825-1:2014, EN 60825-1:2014+A11:2021
Camera coexistence mode ⁹	Automatic
Switch-on delay ¹⁰	~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 Part of the processor resources are required for internal processing. The current process utilization is displayed in the CPU Monitor in SICK AppStudio.

⁵ After a warm-up time of 45 minutes (at ≥ –10 °C) and a frame rate of > 25 fps, the camera can also be operated at ambient temperatures from –20 °C.

⁶ If no adequate heat dissipation (mechanical connection, ventilation etc.) is present, heat sinks (see accessories) can keep the housing temperature below the maximum of 65 °C.

⁷ Prerequisites: The cables plugged into the electrical connections must be screwed tight. Unused electrical connections are sealed off with a protective cap.

⁸ Complies w ith 21 CFR 1040.10 and 1040.11 except for conformance w ith IEC60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

⁹ Multiple cameras can reduce the repeatability by a factor of √(number of superimposed measuring ranges).

¹⁰ The switch-on delay can increase considerably at ambient temperatures below 0 °C.

F 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, orientation of coding: 180°, 2 m, M12 / RJ45, X-coded
2094784	Ethernet cable, angled, orientation of coding: 180°, 5 m, M12 / RJ45, X-coded
2094785	Ethernet cable, angled, orientation of coding: 180°, 10 m, M12 / RJ45, X-coded
60206631	M12 system cable, 2 m
60206641	M12 system cable, 5 m
60484341	M12 system cable, 10 m
20962182	M12 system cable, angled, orientation of coding: 315°, 2 m
20962192	M12 system cable, angled, orientation of coding: 315°, 5 m
21146892	M12 system cable, angled, orientation of coding: 315°, 10 m

¹ Cable with flex color 1

² Cable with flex color 2

G 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
- At least Pentium i5, 2.6 GHz or comparable
- At least Intel HD Graphics 3000 (or NVIDIA NVS 3100M 512MB 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

Depending on the visualization requirements for the generated data, additional graphics hardware may be required.

Browser: Google Chrome ([google.com/chrome](https://www.google.com/chrome)) is recommended due to its extended support of WebGL and WebSockets.