PRODUCT INFORMATION

Visionary-T

3D SNAPSHOT – WIDE RANGE OF APPLICATIONS FOR INDOOR USE

SICK
Sensor Intelligence.

3D vision sensor

3D DETECTION WITH DIRECT DATA EVALUATION

The Visionary-T DT, a 3D detection sensor, delivers high-quality data for industrial applications, processes these directly in the sensor, and initiates appropriate actions where required – all without the support of a PC. Both the hardware and the software have been designed specifically for indoor use in industrial environments. The Visionary-T DT acting as a sensor can be used around the clock and, besides a IP67 enclosure rating and a reliable software interface, offers high-performance features to suit a wide variety of applications.

As a 3D detection sensor with a working distance of up to 60 m, the Visionary-T DT employs an innovative 3D snapshot technology based on time-of-flight measurement. The Visionary-T DT delivers real-time depth information for every pixel, and offers a range of high-performance features.

Principle of operation of time-of-flight measurement

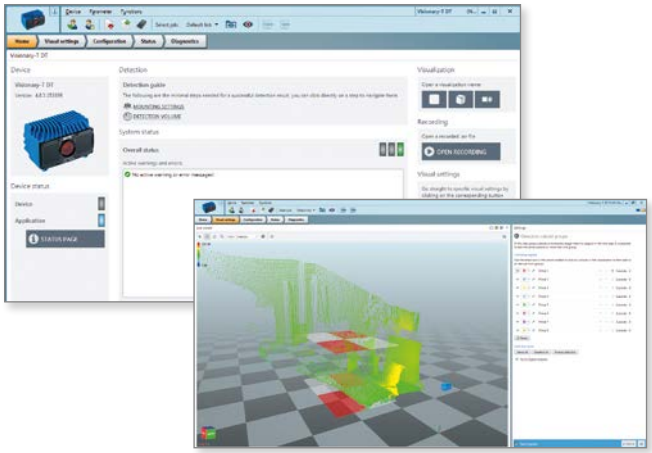
Like the other cameras in the 3D vision product family, the Visionary-T DT operates on the principle of time-of-flight measurement (3D Time-of-Flight, TOF). To capture an image, the Visionary-T DT sends a light signal in the direction of the measuring object. The sensor receives the reflected light for each pixel, and calculates the distance between the camera and the measuring object based on the phase shift. Different phase shifts equate to different distances. The thousands of pixels captured in a single shot thereby deliver a detailed three-dimensional distance image – a 3D snapshot – of the entire image area, virtually regardless of the surface characteristics of the object.

For more information on the principle of operation of time-of-flight measurement:
➜ see PI Visionary-T CX and Visionary-T AG, 8018964

8022204/2018-07-06
Subject to change without notice

Easy commissioning and configuration via SOPAS ET

The Visionary-T DT can be quickly and easily installed and configured, which already saves time and therefore money during commissioning. The user-friendly interface in SOPAS ET guides the operator through the individual configuration steps in a clear and self-explanatory manner.



The intuitive configuration interface in SOPAS ET provides a user-friendly means of configuring the Visionary-T DT with no special prior knowledge required.

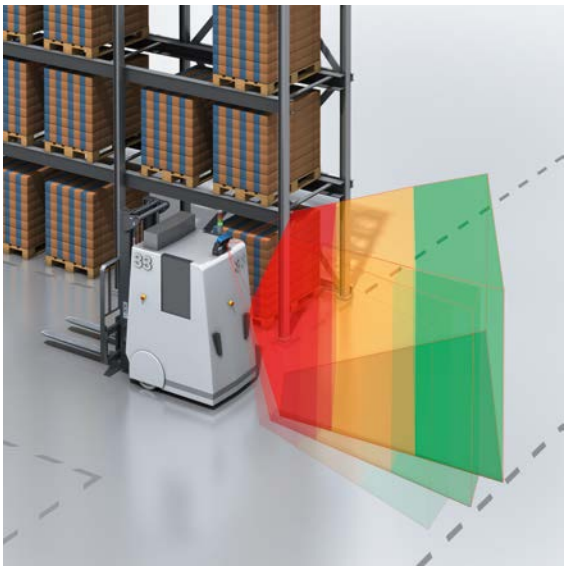
Direct data processing within the sensor

The Visionary-T DT delivers four digital output signals. The 3D data are processed directly within the sensor and without the need for a PC. The Visionary-T DT can send simple sensor responses to an actuator, an automated guided vehicle, or an industrial robot to initiate an action there. If necessary, it is also possible to access the 3D data in the camera via an Ethernet interface.

The Visionary-T DT evaluates the received 3D data directly without computer support, and delivers four digital output signals that can be used to initiate a variety of actions. This illustration shows four examples.

Flexible adaptation to changing application conditions

Up to 30 different configurations can be controlled via the digital inputs of the Visionary-T DT. This provides a great deal of flexibility, opens up a large range of application possibilities, and also allows fast adaptation to changes in application conditions during operation. For example, the Visionary-T DT can immediately and easily adjust its detection range in response to changes in driving direction of an automated guided vehicle.

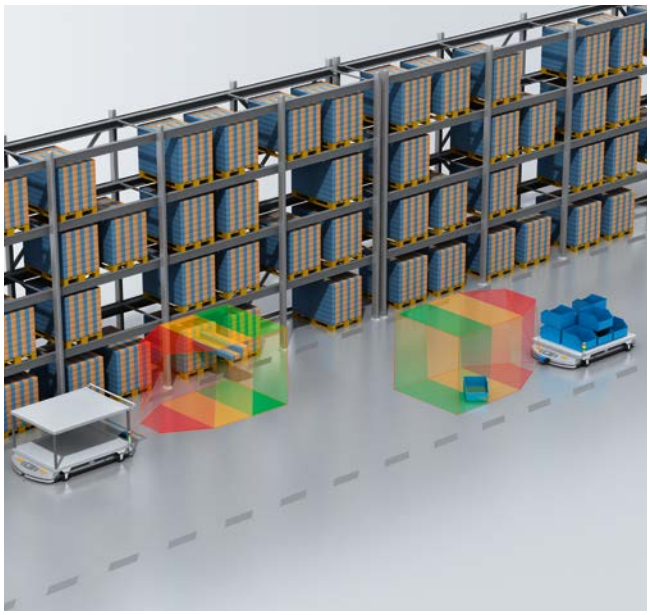


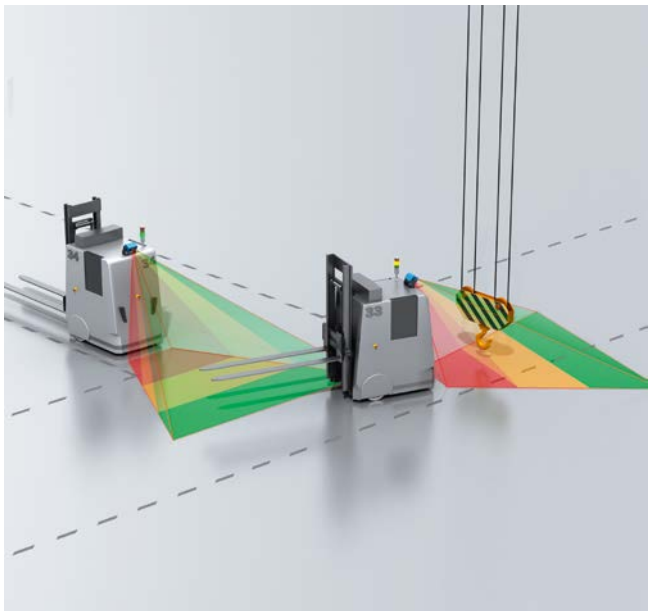
Thanks to the switchable configurations, the Visionary-T DT reliably outputs warnings whether traveling on a straight or curved pathway.

THREE DIMENSIONAL INFORMATION – SIMPLE RESPONSES

The Visionary-T DT, with its high-performance visualization tools and reliable 3D information, opens up numerous indoor application possibilities. Both in the area of logistics and in factory automation, the Visionary-T DT offers an effective solution wherever spatial detection can assist with quality control, process optimization, and collision warning, and where a direct evaluation of the 3D data offers decisive advantages.

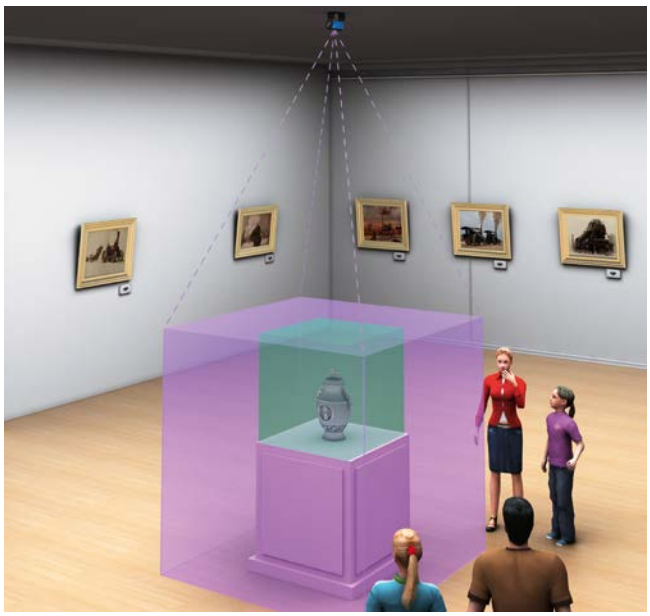
3D collision warning and navigation support for transport vehicles





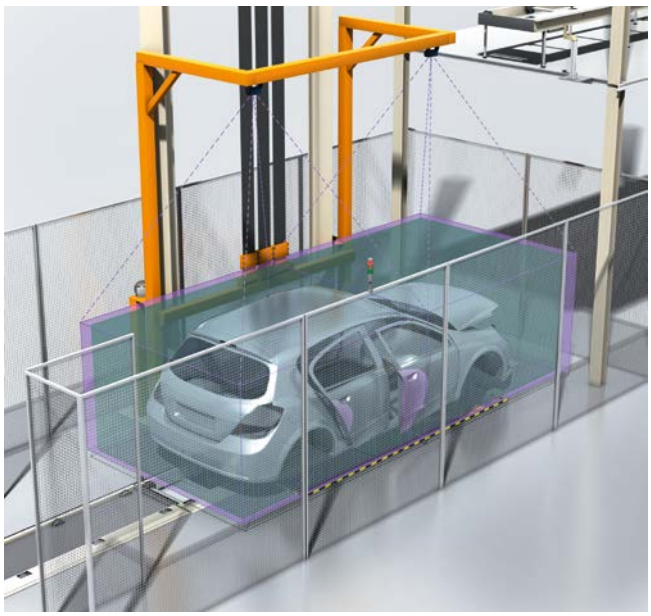
Both for manned and automated guided vehicles, the Visionary-T DT detects objects on or above the floor and, if the floor surface has been suitably taught-in, even any potential irregularities along the route.

3D volume monitoring to protect valuable objects from theft



A Visionary-T DT installed vertically above the object to be protected inconspicuously but reliably detects any changes in the monitored area and immediately activates an alarm in response to attempted theft.

3D detection of possible obstacles in measurement and transport processes

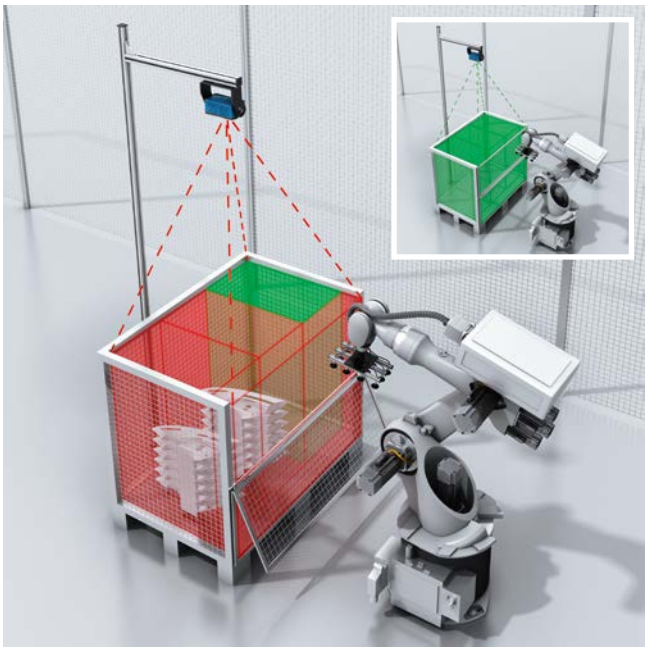


By recognizing any changes in the detection volume, for example due to open doors, the Visionary-T DT helps avoid damage during lifting processes in automotive manufacturing.

8022204/2018-07-06
Subject to change without notice

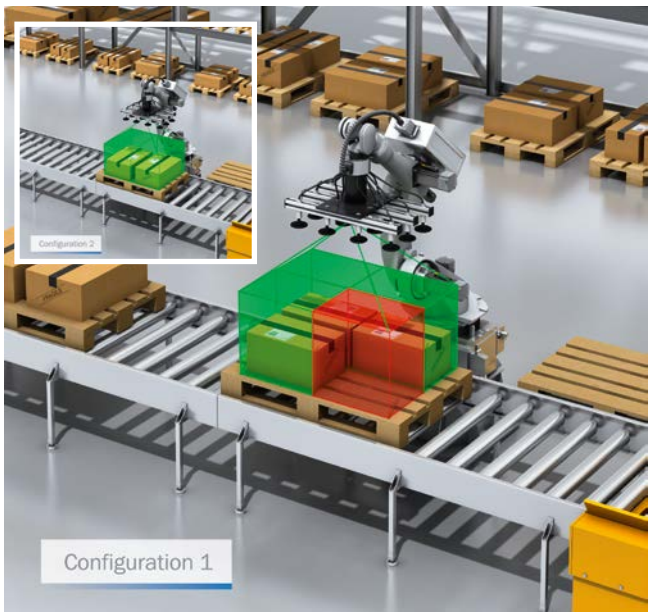
3D position and fill level determination for storage containers

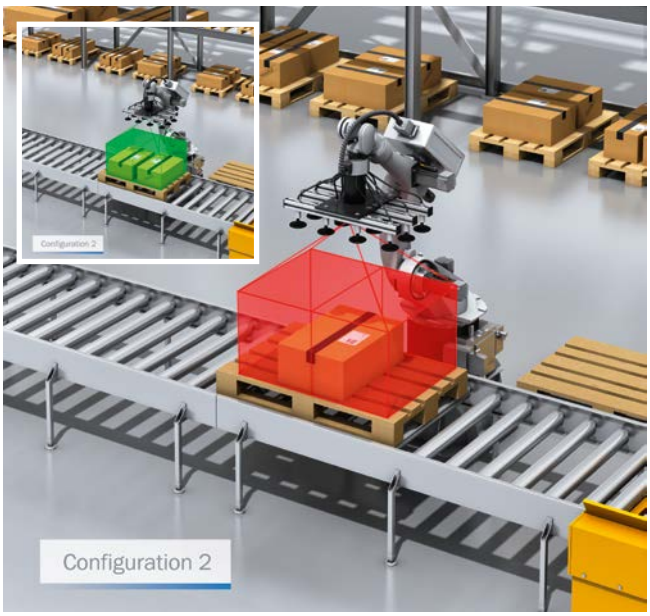
The Visionary-T DT recognizes immediately that a storage container has been filled to a predefined level. Before overflow can occur, the sensor issues a timely visual or acoustic warning resulting in an appropriate machine response (e.g., closing of the slide).



The Visionary-T DT installed vertically above the storage container reliably detects that the container is in the correct position and that the door is closed. It also reports whether there are any objects in the container and, if so, where. It therefore provides the robot with valuable information and prevents errors such as overloading.

3D data evaluation to control picking processes





The Visionary-T DT delivers 3D point clouds that are evaluated and then used to determine the position of crates and cartons. To do so, a robot arm moves over the pallet and the Visionary-T DT attached to it captures an image. The 3D data are processed into target coordinates to which the robot then precisely moves with its special gripper device. It picks up a crate and places it on the conveyor belt. This process is repeated until the pallet has been emptied.

APPLICATIONS FOR THE VISIONARY-T DT

In indoor applications, for example in large logistics centers or extensive production facilities, the Visionary-T DT 3D vision sensors from SICK provide a very simple way of implementing a reliable detection system.

One of the target markets for the sensor is automotive manufacturing. Producing precision parts is just as important in the automotive industry as the targeted tailoring of the logistics processes to the requirements of the customer. Automotive suppliers therefore seek to optimize their logistic workflows, for example by using pick and place robots. Automated handling of raw parts and finished components increases productivity but also creates new challenges for suppliers, in particular in relation to the ever increasing diversity of parts.
Materials are often moved around by means of lattice boxes that are unloaded and reloaded by pick and place robots at processing stations. The increasing diversity of parts, however, increases the risk of errors occurring in these processes. Simply positioning a lattice box incorrectly at a transfer station can be problematic. This is where the Visionary-T DT streaming camera can help. The 3D vision sensor is installed at the transfer station and directly records the geometry of a lattice box and its contents. It reliably detects whether an incorrect lattice box has been placed at the processing station, whether it might not be completely empty, and whether its door is slightly open.

8022204/2018-07-06

Configuring the complex 3D data is a simple process, thereby enabling the customer to install and commission the sensor themselves.

The Visionary-T DT can also be used as a collision warning system, for example on industrial trucks used for intralogistics. Driver assistance systems are required when the person at the wheel needs to pay full attention to their work, for example if they are moving bulky loads. Often the operator cannot see the vehicle's entire route, and therefore may not recognize potential risks or obstacles in the surrounding area. The Visionary-T DT gives a clear view of all the areas that cannot be seen by the naked eye because of blind spots.

The possible applications for these compact sensors go far beyond simple collision warning, though. They can also be used very well with collaborative robots. The sensors are so flexible, and can be configured and deployed so effectively, that robots can identify what is moving toward them. If it is an automated guided vehicle (AGV), for example, a robot with a Visionary-T DT installed on it will continue at full speed. If the detected object does not have the taught-in outline of an AGV, however, the movement of the robot can be restricted or slowed down, or even brought to a complete standstill.

By aiming to minimize the risk of errors, the likelihood of faults and production downtimes will decrease also with the help of the Visionary-T DT. The 3D vision sensor is very rugged, and therefore perfectly suited for use under harsh industrial conditions.

For further whitepapers on the subject of 3D snapshots and driver assistance, visit: www.sick.com/Visionary-T

3D SNAPSHOT – FOR VERSATILE USE INDOORS

Product description

Visionary-T 3D vision sensors from SICK offer maximum flexibility for indoor use due to their innovative 3D-snapshot technology. The Visionary-T provides real-time depth information for each pixel – even for stationary applications – based on time-of-flight measurement. From transferring the complete 3D raw data to application-specific pre-processed data to fully processed measurements which result in simple sensor output, Visionary-T always provides the information in a way customized to suit your application. High-performance visualization tools and reliable 3D information make Visionary-T the ideal solution in applications including intralogistics, robotics, or industrial vehicles.

At a glance

- Record up to 50 3D images per second
- Distance values: 144 x 176 pixels per snapshot
- Output from 3D data via a Gigabit Ethernet interface up to simplie digital outputs
- Solutions which provide the exact information required for the application
- Temperature range: 0 °C to 50 °C or up to 45 °C (depending on the housing), Enclosure rating: IP67

Your benefits

- More than 25,000 distance and intensity values in a single recording.
- 3D information is also available for stationary applications.
- Easy mounting and rapid sensor replacement
- Programming interface for using 3D data for further analysis on an external host
- Visionary-T AG supports intelligent data reduction
- Visionary-T DT is a configurable 3D detection sensor

CE

Additional information

Detailed technical data 2
Ordering information 4
Dimensional drawings 4
Accessories. 6

→ www.sick.com/Visionary-T

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

8022204/2018-07-06
Subject to change without notice

Detailed technical data

Features

Task	3D detection
Technology	3D-snapshot, image analysis
Working distance	0.5 m ... 60 m
Example field of view	7 m x 5.3 m [1]
Light source	Invisible infrared light (LED, 850 nm)
LED class	Risk group 0 in accordance with EN 62471
Grayscale measurements	✔
Factory calibrated	✔

[1] See table for individual values.

Performance

Repeatability	≥ 2 mm, at 1 m range [1] ≥ 7 mm, at 7 m range [2]
Response time	< 100 ms [3]
Integrated application	3D detection e. g., collision warning, emptiness check, layer check, Intrusion controll, object security

[1] Typical values for common applications see tables below.

[2] See table for individual values.

[3] Typical.

Interfaces

Ethernet	✔
Function	Complete data stream, device control, position and detection status of each cuboid and group
Data transmission rate	≤ 36 Mbit/s
Configuration software	SOPAS ET, Java API (Matlab), Webserver, Telegram Interface (universal use, e. g. Python, C++, C#, PCL), Webserver
Digital inputs	Over 16 inputs via 2 physical interfaces
Digital outputs	4
Optical indicators	2 status LEDs

Mechanics/electronics

Connections	M12 8-pin Gigabit Ethernet, X-coded M12, 17-pin (voltage supply/data), system plug, digital IOs
Supply voltage	24 V DC [1]
Power consumption	≤ 22 W Typical (without digital I/Os)
Enclosure rating	IP67
Protection class	III
Housing color	Blue, black
Mounting	Any or can be determined by raster

[1] (+/-20 %), < 2,5 ms integration time
(+/-15 %), > 2,5 ms integration time.

Ambient data

Electromagnetic compatibility (EMC)	EN 61000-6-2:2005-08, EN 61000-6-3:2007-01
Shock load	EN 60068-2-27:2009
Vibration load	EN 60068-2-6, EN 60068-2-64

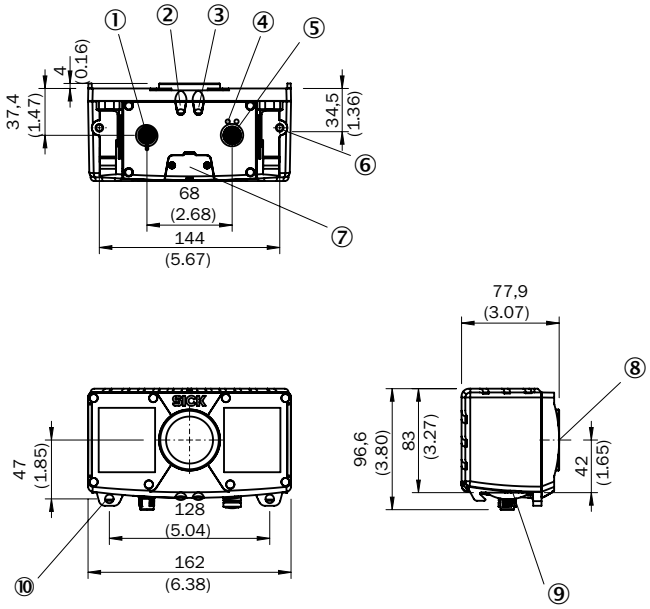
Ambient operating temperature	0 °C ... +50 °C, with cooling fins 0 °C ... +45 °C, without cooling fins
Ambient storage temperature	–20 °C ... +70 °C
Light sensitivity	< 50 klx, sunlight

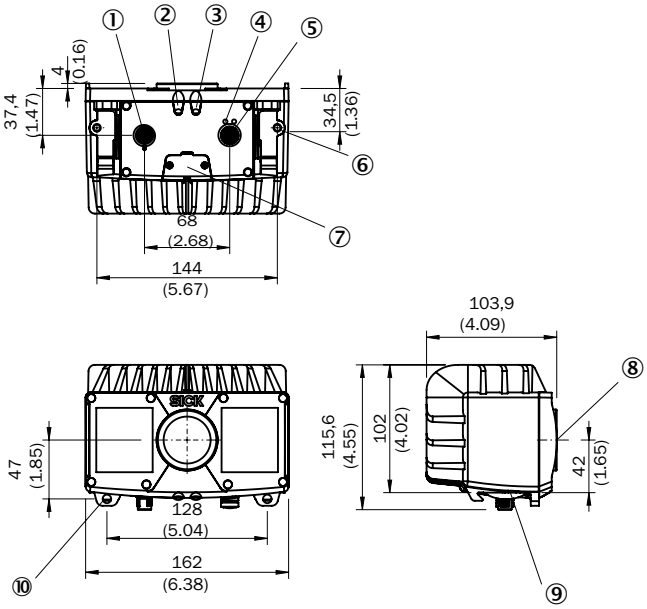
Ordering information

- **Sub product family:** Visionary-T DT
- **Integrated application:** 3D detection e. g., collision warning, emptiness check, layer check, Intrusion controll, object security

Temperature	Type	Part number
0 °C ... +50 °C, with cooling fins	V3S130-2AAAAAA	1088889
0 °C ... +45 °C, without cooling fins	V3S130-2AABAAB	1088890

Dimensional drawings (Dimensions in mm (inch))





① Power connection / digital inputs and outputs / service
② Device display
③ Application display
④ Ethernet status display
⑤ Ethernet connection
⑥ M6 blind tapped holes, 7 mm deep (2 x), for mounting
⑦ Service interface
⑧ Optical axis
⑨ Interface bracket
⑩ Bracket mounting (accessories)

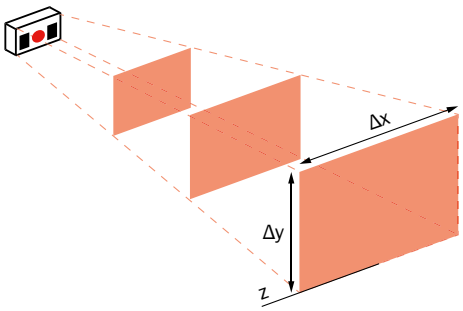
① Power connection / digital inputs and outputs / service
② Device display
③ Application display
④ Ethernet status display
⑤ Ethernet connection
⑥ M6 blind tapped holes, 7 mm deep (2 x), for mounting
⑦ Service interface
⑧ Optical axis
⑨ Interface bracket
⑩ Bracket mounting (accessories)

Accuracy/repeatability (under laboratory conditions)

Absolute accuracy (z-axis) and repeatability (centraldetection volume) at 100 % and 10 % remission and withoutbackground light for intergation times of 1ms (0.5 mand 1 m distance) and 4 ms (all other distances)

Working distance radial (r)	Accuracy (100 % remission)	Repeatability (1σ - 100 % remission)	Accuracy (10 % remission)	Repeatability (1σ - 10 % remission)
0,5 m	± 15 mm	± 2 mm	± 15 mm	± 2 mm
1,0 m	± 15 mm	± 2 mm	± 15 mm	± 3 mm
2,0 m	± 15 mm	± 2 mm	± 20 mm	± 6 mm
3,0 m	± 15 mm	± 3 mm	± 35 mm	± 10 mm
4,0 m	± 20 mm	± 3 mm	± 50 mm	± 20 mm
5,0 m	± 25 mm	± 4 mm	± 50 mm	± 25 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	-	-

Detection zone and field of view (Δx X Δy)



Working distance absolute (z)	Range (Δx)	Range (Δy)	Minimal object size (Δx)	Minimal object size (Δy)
0,5 m	0,7 m	0,5 m	8 mm	8 mm
1,0 m	1,4 m	1,0 m	16 mm	14 mm
1,5 m	2,1 m	1,6 m	24 mm	22 mm
2,0 m	2,8 m	2,1 m	32 mm	30 mm
3,0 m	4,2 m	3,1 m	46 mm	44 mm
4,0 m	5,5 m	4,2 m	62 mm	60 mm
5,0 m	6,8 m	5,3 m	78 mm	74 mm
10,0 m	13,7 m	10,6 m	156 mm	148 mm
15,0 m	20,6 m	15,9 m	234 mm	222 mm
20,0 m	27,4 m	21,2 m	312 mm	296 mm
40,0 m	54,9 m	42,5 m	624 mm	590 mm

Recognizable object size and measurement accuracy. Actual detection accuracy and repeatability depend on your specific environment and setup. In the table you find typical values for a few common applications.

Application[1)]	Detectable object size	Measurement 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 volume.

Accessories

Mounting systems

Terminal and alignment brackets

	Type	Part no.
	2x clamps, 2x screws	2077709
	Mounting set (2-part) incl. clamps and screws	2077710

Connection systems

Plug connectors and cables

- **Signal type/application:** Power, serial, CAN, digital I/Os

	Connection type head A	Connection type head B	Cable	Cable length	Type	Part no.
	Female connector, M12, 17-pin, straight, A-coded	Open cable ends	17-wire, suitable for 2 A, Changed color coding of the flying leads, stripped	3 m	Connecting cable (female connector - open)	2070425
				5 m	Connecting cable (female connector - open)	2070426
		Male connector, M12, 17-pin, straight, A-coded	To connection module CDB650, 17-wire, suitable for 2 A	3 m	Connection cable (male connector - female connector)	6051194

Plug connectors and cables

- **Signal type/application:** Gigabit Ethernet

	Connection type head A	Connection type head B	Cable	Cable length	Type	Part no.
	Male connector, M12, 8-pin, straight, X-coded	Male connector, RJ45, 8-pin, straight	8-wire, twisted pair, AWG26	2 m	SSL-2J08-G02MACE	6049728
				5 m	SSL-2J08-G05MACE	6049729

Reflectors and optics

Optics cloths

	Brief description	Type	Part no.
	Cloth for cleaning the front screen	Lens cloth	4003353

8022204/2018-07-06
Subject to change without notice

4D*pro*Connectivity

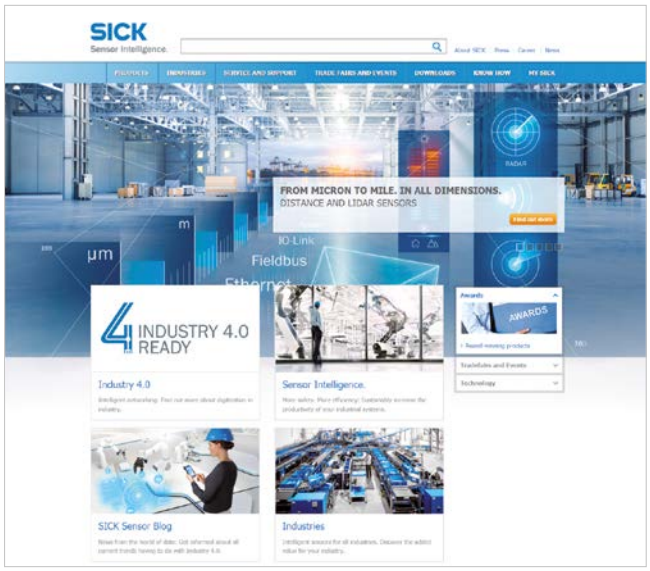
Modules

	Brief description	Type	Part no.
	Connection device basic for connecting one sensor with 2 A fuse, 5 cable glands and RS-232 interface to sensor via M12, 17-pin female connector, all outputs available on screw/spring-loaded terminals.	CDB650-204	1064114

8022204/2018-07-06
Subject to change without notice

REGISTER AT WWW.SICK.COM TO TAKE ADVANTAGE OF OUR FOLLOWING SERVICES FOR YOU

- ☑ Access information on net prices and individual discounts.
- ☑ Easily order online and track your delivery.
- ☑ Check your history of all your orders and quotes.
- ☑ Create, save, and share as many wish lists as you want.
- ☑ Use the direct order to quickly order a big amount of products.
- ☑ Check the status of your orders and quotes and get information on status changes by e-mail.
- ☑ Save time by using past orders.
- ☑ Easily export orders and quotes, suited to your systems.



SERVICES FOR MACHINES AND PLANTS: SICK LifeTime Services

Our comprehensive and versatile LifeTime Services are the perfect addition to the comprehensive range of products from SICK. The services range from product-independent consulting to traditional product services.

Consulting and design
Safe and professional

Product and system support
Reliable, fast, and on-site

Verification and optimization
Safe and regularly inspected

Upgrade and retrofits
Easy, safe, and economical

Training and education
Practical, focused, and professional

8022204/2018-07-06 · 9PMS · Pre USmod en48

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,800 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents, and preventing damage to the environment.

SICK has extensive experience in various industries and understands their processes and requirements. With intelligent sensors, SICK delivers exactly what the customers need. In application centers in Europe, Asia, and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes SICK a reliable supplier and development partner.

Comprehensive services round out the offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

That is "Sensor Intelligence."

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Hong Kong, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations → www.sick.com

SICK
Sensor Intelligence.