



# Visionary-B

3D SNAPSHOT - TWO EYES FOR EFFECTIVE USE OUTDOORS

3D vision

**SICK**  
Sensor Intelligence.

The SICK Visionary-B is a driver assistance system for industrial vehicles. It is well suited for working in outdoor environments, e.g. in mines, ports and construction sites. The Visionary-B supports drivers maneuvering large vehicles by continuously monitoring blind spots in three dimensions.



### Detecting objects

The Visionary-B detects relevant objects around the vehicle and displays the live image on a monitor. The 3D snapshot technology is based on evaluating not only the width, but also the height of the objects. Intelligent algorithms developed by SICK, filter out irrelevant information for the driver, such as curbs, small stones, rain or fog. This ensures, that the driver assistance system only warns the driver in really critical situations.

# DRIVER ASSISTANCE SYSTEM FOR COLLISION AWARENESS IN HARSH ENVIRONMENTS



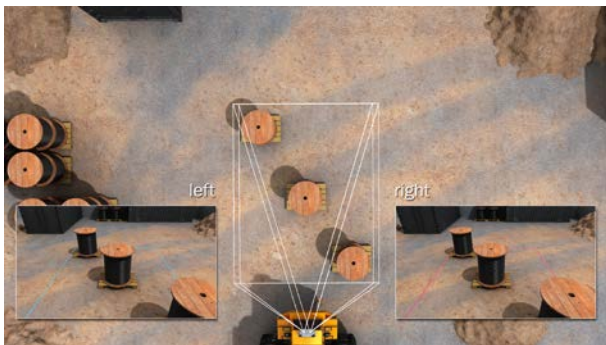
## Straightforward configuration

The Visionary-B is a plug and play solution. Simply select one of the proposed kits that fits your application best. The electrical and mechanical accessories included in the kit make installation considerably easier. Detection zones, sensor parameters, and vehicle parameters can be set directly via the monitor, which is also included. With an operating temperature

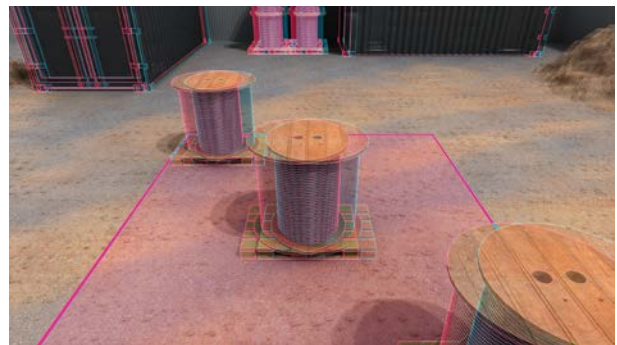
range of  $-40\text{ }^{\circ}\text{C}$  to  $75\text{ }^{\circ}\text{C}$  and an IP 69K enclosure rating for the housing, you can be sure the Visionary-B from SICK is rugged and reliable. Algorithms which have been validated in the field under real conditions ensure that the Visionary-B continues to work reliably in harsh environments.

# VISIONARY-B PRINCIPLE OF OPERATION

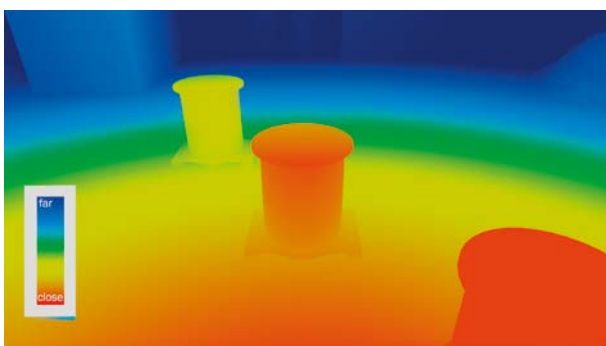
The Visionary-B is based on the stereoscopic principle. It records objects around the vehicle with two images from slightly different perspectives. The differences between these two images are used to calculate information about the depth, which represents the third dimension. The principle of operation is comparable to human spatial vision: The sensor head captures raw 3D data in much the same way as the eyes, and the evaluation unit is similar to the human brain - programmed to analyze the vehicle environment and warn the driver in critical situations. All of this makes the Visionary-B a highly intelligent driver assistance system for collision awareness.



First step: Take simultaneously two images from different positions



Second step: Find correspondences between the images.



Third step: Create depth image.

# OBJECT CLASSES

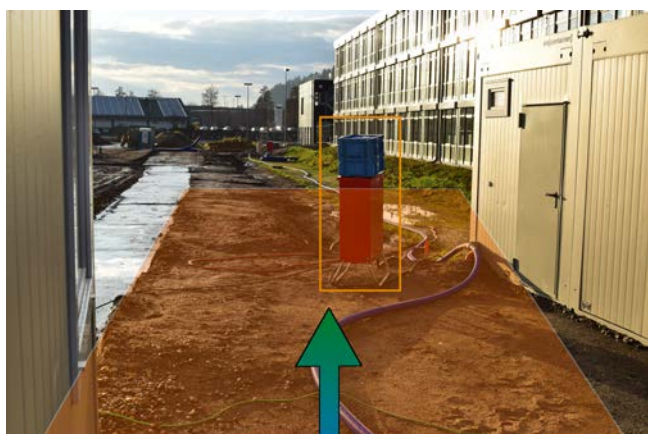
## Object class 1



Objects with dimensions about 40 cm x 80 cm and bigger are detected within object class 1.

Relevant objects within the zone like the walls or the power distribution box triggers the alarm when the zone is configured for this object class. The picture on the left shows three classified obstacles which are marked with an orange frame. Object class 1 selection fits well if an efficient and both high detection rate is desired.

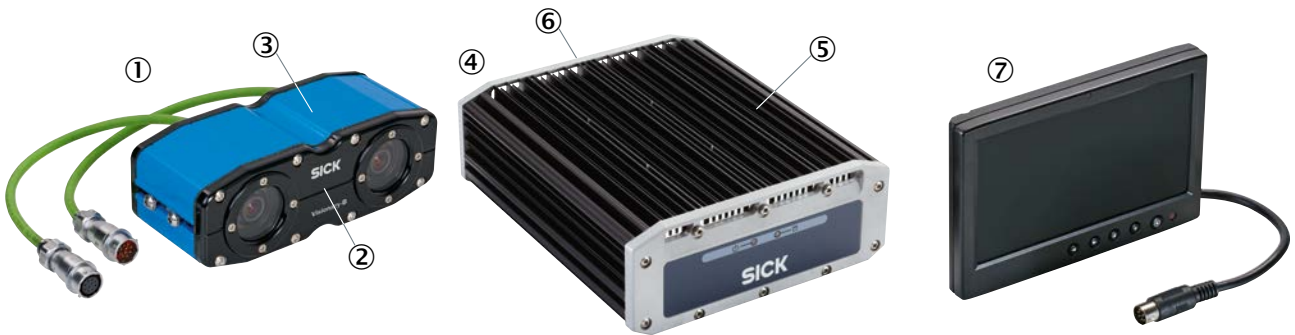
## Object class 2



Objects with dimensions about 40 cm x 160 cm are detected within object class 2.

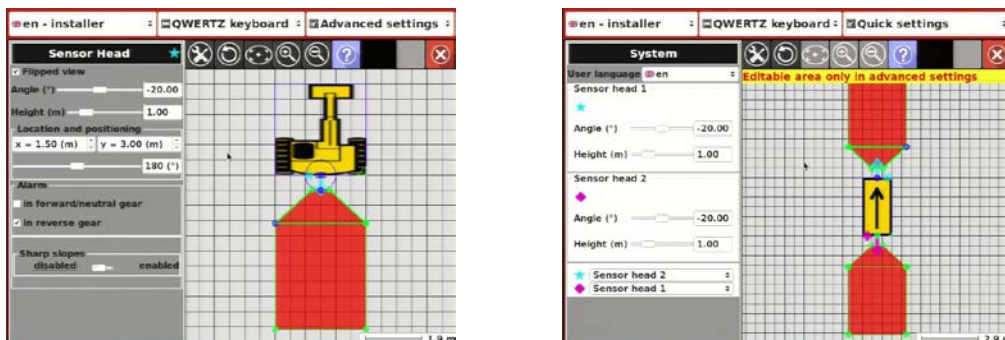
In this case, wider objects like the walls are ignored. In the picture on the left only the power distribution box triggers the alarm. Object class 2 selection fits well when the machine drives on narrow paths so that only typical movable goods like distribution box or other similar shapes are desired to be detected.

# PLUG-AND-PLAY SOLUTION



- ① Active 3D sensor and 2D camera in one system.
- ② Sensor head: The detection angle of  $105^\circ \times 90^\circ$  perfectly covers blind spots behind the vehicle at a maximum size of 6 m length and a width of 4 m.
- ③ Sensor head housing: Suitable for use in outdoor environments, as it has an enclosure rating IP 69K, and a temperature range from  $-40^\circ \text{C}$  to  $75^\circ \text{C}$ .
- ④ Evaluation unit: Compact dimensions, powerful, continuous and reliable evaluation of the data. The video recording the last hours of operation.
- ⑤ Evaluation unit housing: rugged, enclosure rating IP 67, temperature range from  $-20^\circ \text{C}$  to  $+40^\circ \text{C}$ .
- ⑥ Additional output for audiovisual alarm.
- ⑦ Monitor for detection zones configuration, sensor, and vehicle parameters, and to display objects in 2D. Visual and audible alarms activated when the previously defined 3D detection zone is breached.

## HMI configuration:



## EMC compatibility due to mobile machinery standards:

Electromagnetic compatibility (EMC)

EN 61000-6-2:2005-08
EN 61000-6-3:2007-01
EN 12895:2000-10 (industrial trucks)
EN 13309:2010-09 (construction machinery)
ISO 13766:2006-05 (earth-moving machinery)
ISO 14982:2014-12 (agricultural and forestry machines)
DIN EN 55022:2012-06
FCC PART 15:2006-08

# APPLICATIONS

The Visionary-B can be used on heavy-duty trucks in the following applications:

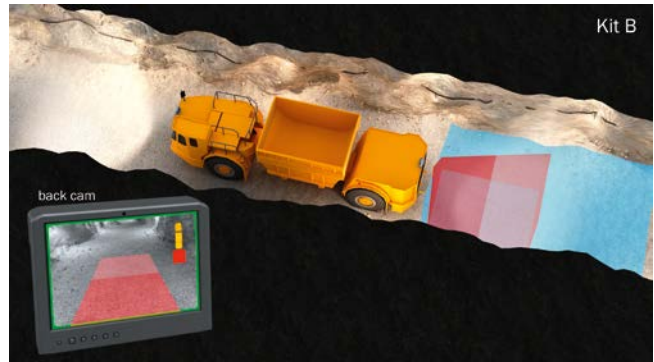
## Ports and cranes



e.g., for the following vehicle types

- Reach stackers
- Heavy capacity forklifts

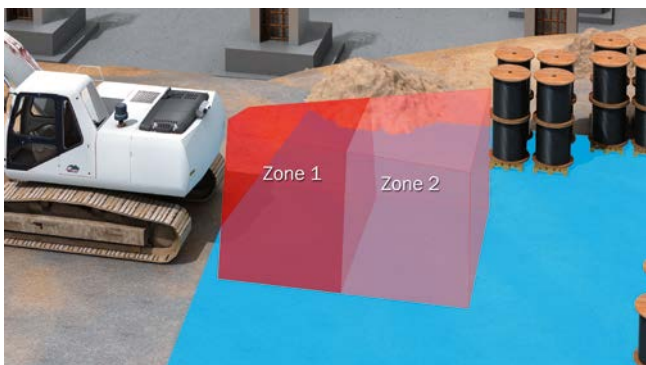
## Mining



e.g., for the following vehicle types

- Vehicles for tunnels and underground work
- Heavy trucks
- Diggers

## Construction sites



e.g., for the following vehicle types

- Diggers
- Front loaders
- Dumpers
- Rollers

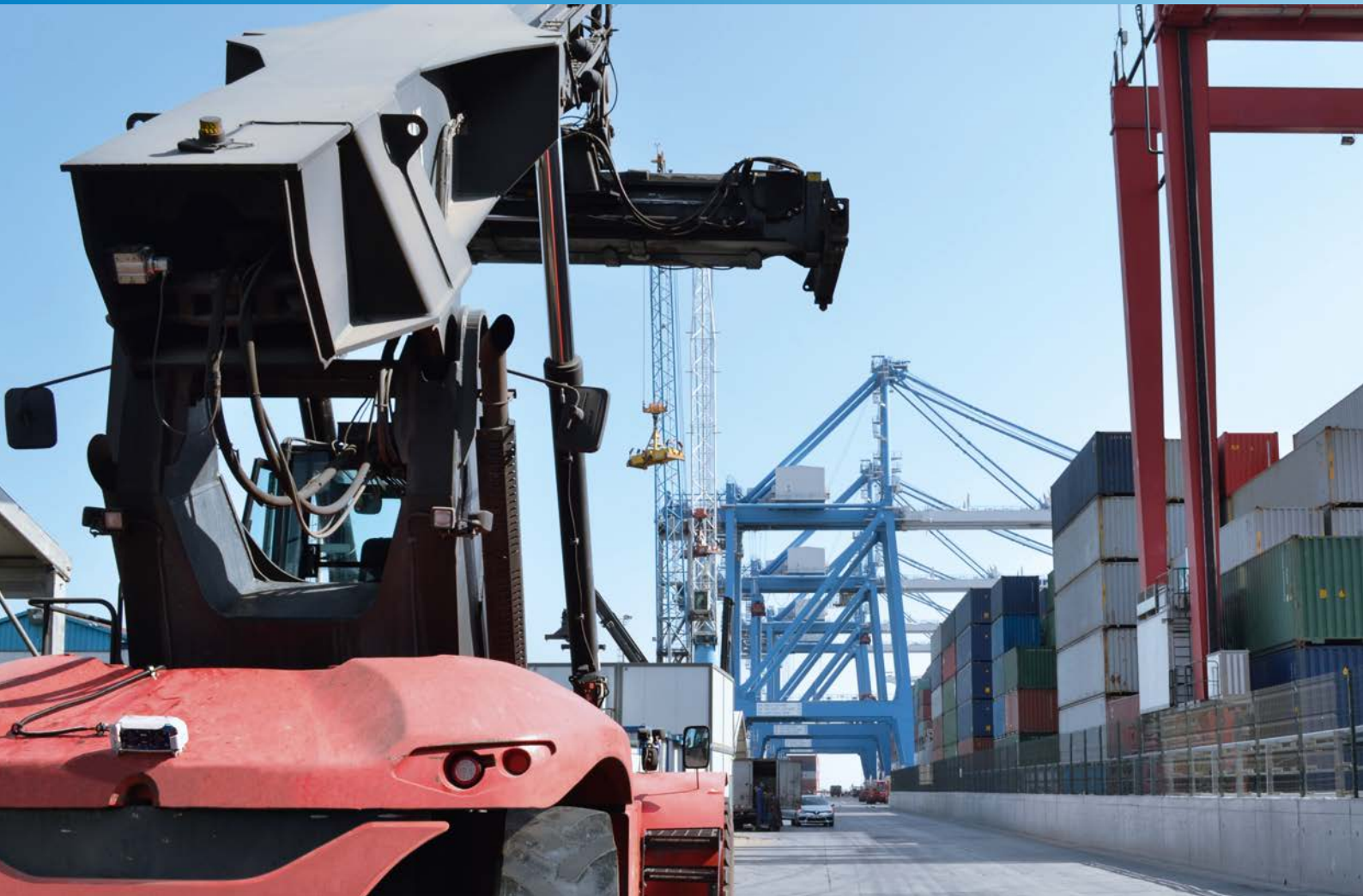
## Agriculture and forestry



e.g., for the following vehicle types

- Field choppers
- Wood harvesters

# 3D VISION TECHNOLOGY FOR DRIVER ASSISTANCE AT PORTS



Regardless of the weather conditions, you will find countless reach stackers in use at every port. The rugged Visionary-B CV 3D vision sensor with snapshot technology by SICK supports reach stacker operators with their frequent maneuvering and reversing operations. To help with this, the sensor detects relevant objects in the vehicle's environment and generates live images that appear on the monitor. At the same time, the sensor uses visual and acoustic signals to warn the driver of possible collisions in critical driving situations. As plug and play solution, the Visionary-B CV is a breeze to configure and operate, and is ready for use in a matter of moments.

A reach stacker operator needs to deal with many different tasks. Although this includes driving the reach stacker, that is not the operator's most critical task. Instead, the operator needs to be able to focus on container turnover. What's more, unlike normal cars, reach stackers are not just reserved for brief periods, but they maneuver backwards for several hours at a time. This is precisely where the Visionary-B CV can help

thanks to its 3D technology. The technology means that the operator does not need to constantly concentrate on the monitor as is the case for conventional passive camera systems. The Visionary-B CV lets the operator focus on the key tasks while still maintaining awareness of critical situations whenever they occur.



### Snapshot technology using the two-eye principle

The Visionary-B CV records objects around the vehicle with two images from slightly different perspectives. These two slightly different images are used to calculate information about the distance, which represents the third dimension. The principle of operation is similar to the way humans perceive space. Using this two-eye principle, the sensor head captures raw 3D data and transmits it to the evaluation unit. This unit is programmed to analyze the vehicle's environment and warn the operator only in the event of critical situations. The built-in data evaluation unit from SICK enables reliable detection of two classes of outdoor objects. In contrast to object class 2, object class 1 covers smaller objects. Wider objects, e.g. walls do not belong to object class 2 and thus are there ingored on purpose. A configuration that only warns of object class 2 is suitable for areas like narrow passages because it means that no unnecessary and distracting alarms are triggered. The sensor works as a standalone solution and also includes an integrated recording function, which can be used for continuous data recording.



### Making the blind spot visible again


The typical reach stacker rear end is 2 m tall and 3 m wide. This size creates blind spots directly behind the vehicle that need to be made visible to the operator. Several kits are available in version A, B, or C. Kit A for the Visionary-B CV fulfills this task with utmost efficiency. The kit consists of a sensor head, an evaluation unit, a monitor, and corresponding mounting tools. Anyone looking to equip a wider vehicle or anyone who finds that the vehicle's shape means that one sensor head is not enough can use kit C. Kit C is made up of two sensor heads and evaluation units, which apply a masterslave principle to send the merged signal via a discrete output to one or, if necessary, two monitors. Kit B is used if you wish to make the areas both in front of and behind the vehicle visible. Kit B is made up of two sensor heads, an evaluation unit, a monitor, and a switch box that switches between the necessary sensor heads. Variable configurations are available for the detection zones so that the driver assistance system triggers a warning only in truly critical situations. Matching the vehicle width to the detection zone ensures there are no superfluous warnings, such as when driving through narrow passages. Visionary-B CV kits from SICK are an indispensable aid in cases where a reach stacker operator is looking to focus on his main task of turning over containers instead of only concentrating on the driving.






# 3D SNAPSHOT – TWO-EYES PRINCIPLE FOR EFFECTIVE USE OUTDOORS

Stream

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## Product description

Visionary-B is perfectly designed for use on heavy duty off-road vehicles working in outdoor environments for example at ports, mines, construction sites and agricultural sectors. The live images appear on the monitor and the operator is notified of any breaches of the 3D

detection zone with visual and audible warnings. The system warns the operator only in critical driving situations, e.g. during maneuvering. As Visionary-B is a plug & play solution, it is easily configurable, ready for operation and proves itself with easy handling.

## At a glance

- Intelligent 3D assistant systems improve collision awareness in harsh outdoor environments
- High temperature range from -40 °C to +75 °C
- Rugged housing: IP 69K for the sensor head
- Sensing range up to 6 m
- 2-in-1 solution: Active 3D sensor with integrated 2D live camera
- Installation height between 1 m and 2.4 m
- Standalone system with monitor enables simple configuration
- Records activities from the last hours

## Your benefits

- This 3D solution provides a real image with a visual and audible warning enhances collision awareness
- Perfectly designed to work in challenging outdoor environments – even in strong sunlight or rain.
- You get everything in one package, suitable for retrofit business
- Assists operator to concentrate more on his duties, e.g. during maneuvering
- 3D vision helps to detect relevant objects in blind zones around the vehicle
- Recording feature helps for event analysis
- Simple and intuitive configuration

→ [www.sick.com/Visionary-B](http://www.sick.com/Visionary-B)

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.



## Detailed technical data

## Features

<b>Task</b>	3D driver assistance system for collision awareness outdoors
<b>Technology</b>	3D, snapshot, image analysis
<b>Working distance</b>	0.5 m ... 6 m
<b>Detection angle</b>	105° x 90°
<b>Adjustable detection zone (W x L)</b>	4 m x 6 m within specification
<b>Further functions</b>	Recording option integrated, 2D camera integrated

## Performance

<b>Detectable object shape</b>	See HMI and operating instruction
<b>On delay</b>	< 50 s
<b>Response time</b>	< 200 ms
<b>Integrated application</b>	3D driver assistance system for collision awareness outdoors

## Interfaces

<b>Configuration software</b>	Via provided monitor
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## Mechanics/electronics

<b>Connections</b>	1 x USB 2 x sensor head, male/female Monitor (VGA/sound) Additional alarm output; two discrete outputs Machine-to-machine interface (Kit C) External power supply (reserved, not implemented) Evaluation unit supply
<b>Supply voltage</b>	12 V DC, ± 30 % 24 V DC, ± 30 %
<b>Power consumption</b>	≤ 40 W Kit A ≤ 50 W Kit B ≤ 80 W Kit C (depending on type)
<b>Enclosure rating</b>	IP 69K sensor head IP 67 evaluation unit
<b>Weight</b>	1.3 kg <sup>1)</sup> 5 kg <sup>2)</sup>
<b>Mounting</b>	Height 1 m ... 2.4 m, angle according to the detection zone (must be delimited by the ground)

<sup>1)</sup> Sensor head.<sup>2)</sup> Evaluation unit.

## Ambient data

<b>Electromagnetic compatibility (EMC)</b>	EN 61000-6-2:2005-08, EN 61000-6-3:2007-01, EN 12895:2000-10 (industrial trucks), EN 13309:2010-09 (construction machinery), ISO 13766:2006-05 (earth-moving machinery), ISO 14982:2014-12 (agricultural and forestry machines), DIN EN 55022:2012-06, FCC PART 15:2006-08
<b>Shock load</b>	In accordance with EN 60068-2-27 1994-01 sensor head, 50 g / 6 ms
<b>Vibration load</b>	In accordance with ISO 16750-3 sensor head, 4.4 g / 100 Hz ... 2,000 Hz and evaluation unit, 1.62 g / 100 Hz ... 2,000 Hz
<b>Ambient operating temperature</b>	-40 °C ... +75 °C, sensor head -20 °C ... +40 °C, evaluation unit
<b>Light sensitivity</b>	200 lx ... 80,000 lx

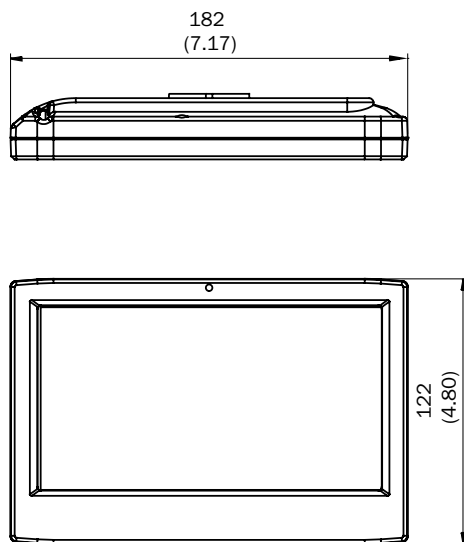
Ordering information

- **Further functions:** recording option integrated, 2D camera integrated
- **Enclosure rating:** IP 69K sensor head  
IP 67 evaluation unit

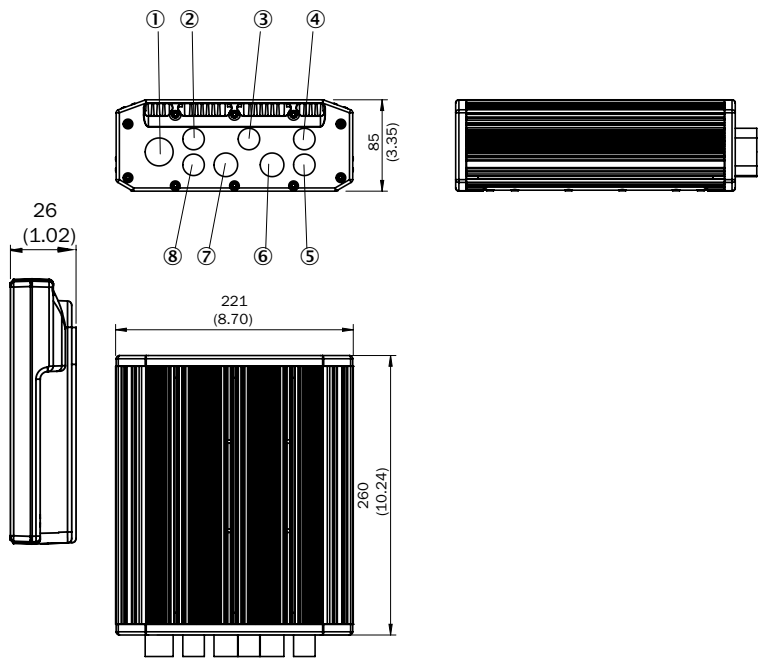
Description	Power consumption	Type	Part number
1 x sensor head 1 x evaluation unit 1 x 7" monitor Assembly accessories	≤ 40 W Kit A	V3S153-1AAAAAP01	1072939
2 x sensor head 1 x evaluation unit 1 x 7" monitor 1 x switchbox Assembly accessories	≤ 50 W Kit B	V3S153-1AAAAAP02	1074001
2 x sensor head 2 x evaluation unit 2 x 7" monitor Assembly accessories	≤ 80 W Kit C	V3S153-1AAAAAP03	1074002

Dimensional drawings (Dimensions in mm (inch))

Monitor

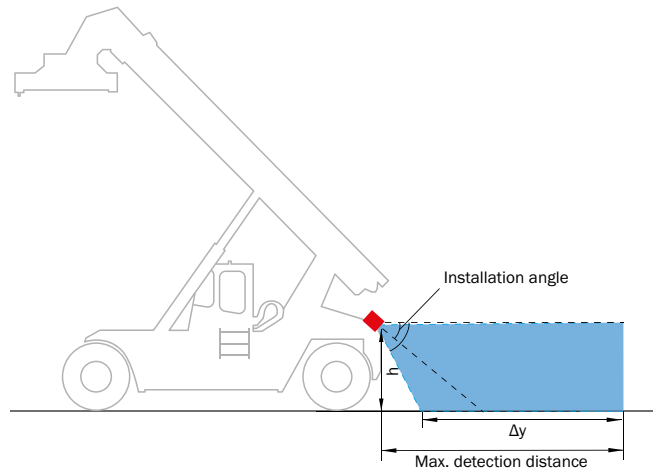
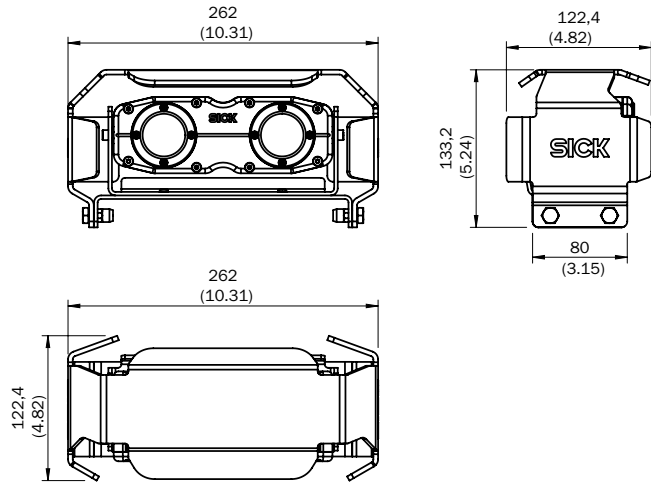


Evaluation unit



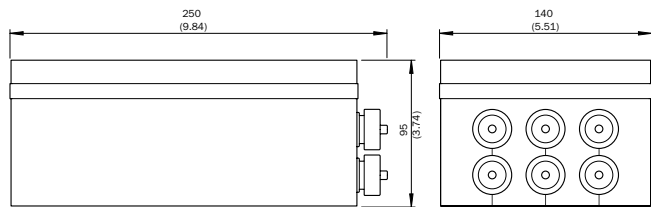
- ① M20, USB
- ② M14, 6-pin power supply EU,12/24 V
- ③ M14, 9-pin machine interface (Kit C)
- ④ M14, 2-pin external power supply (reserved, not implemented)
- ⑤ M14, 4-pin, additional alarm output
- ⑥ Bayonet, 10-pin sensor head, female
- ⑦ Bayonet, 10-pin sensor head, male
- ⑧ M14, 9-pin VGA/sound

Sensor head

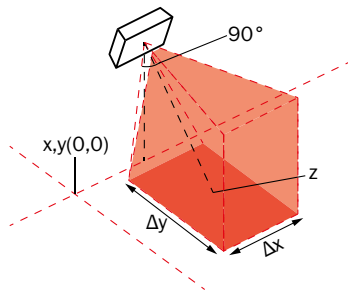


Mounting height (m)	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4
Mounting angle (°)	0	-6	-11	-17	-23	-29	-31	-33

Switchbox

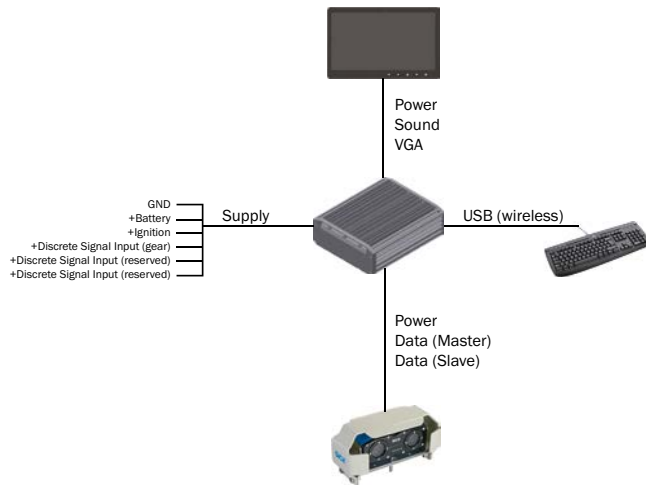


Field of view

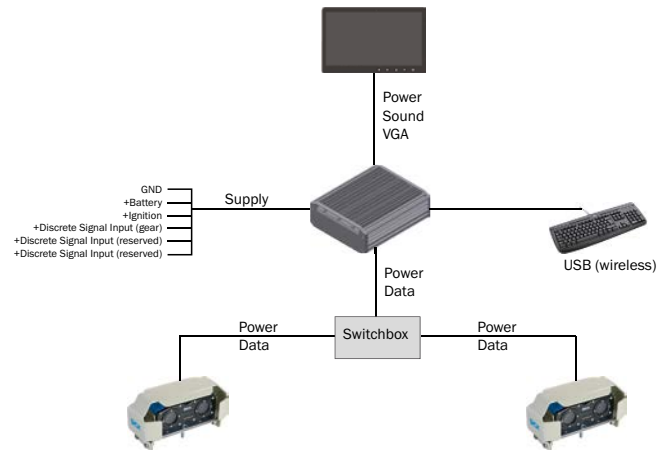


## Connection diagram

Kit A



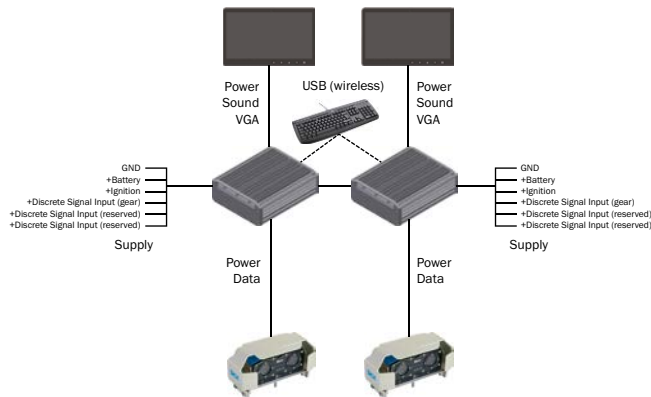
Kit B



Two sensors operate by-turns. Keyboard and cable sets are not included in any kit.

Keyboard and cable sets are not included in any of the kits

Kit C





For extended field of view. Keyboard and cable sets are not included in any kit.

## Accessories

### Connection systems

#### Plug connectors and cables

	Cable	Cable length	Type	Part no.
	Alarm cable for two discrete outputs, 0/12 V	5 m	Alarm cable	2086211
	Cable set for connecting the sensor head and evaluation unit (2 x 10 m), for kit B and C two cable sets are required!	10 m	Bayonet, 10-pin (10 m)	2078941
	Cable set for connecting the sensor head and evaluation unit (2 x 20 m), for kit B and C two cable sets are required!	20 m	Bayonet, 10-pin (20 m)	2078943

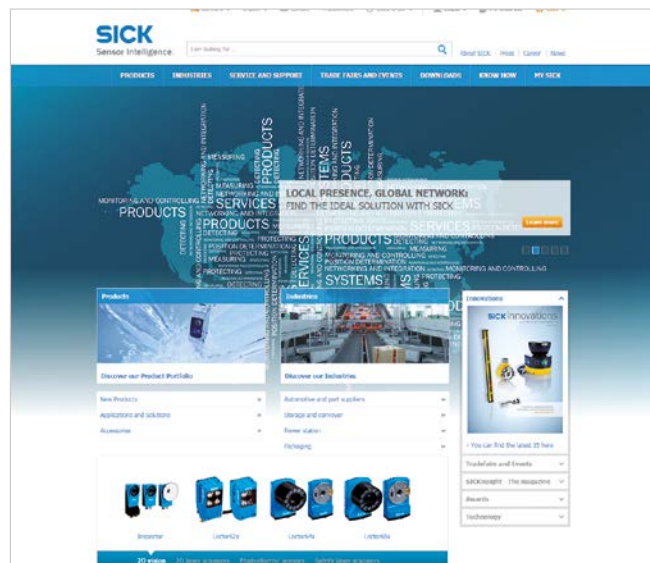
## Reflectors and optics

## Optics cloths

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

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## SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 7,400 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, we are always close to our 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.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our 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 us a reliable supplier and development partner.

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

**For us, that is “Sensor Intelligence.”**

### **Worldwide presence:**

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, 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](http://www.sick.com)