



# MRS1000

OUTDOORS IS OUR FOURTH DIMENSION

3D LiDAR sensors

**SICK**  
Sensor Intelligence.

# MORE LAYERS, LARGER FIELD OF VIEW, MORE BENEFITS – EVEN UNDER ADVERSE AMBIENT CONDITIONS



The MRS1000 simply offers more. With its integrated field evaluation, the 3D LiDAR sensor, also called 3D laser scanner, can detect on four layers at one time. It can therefore be used for a variety of applications and reduces your storage costs and expenditures for different variants – and all this without restrictions on measurement accuracy. Equipped with modern HDDM<sup>+</sup> technology, it evaluates three echo signals and always ensures stable and detailed measurement results with up to 165,000 measurement points per second, even under adverse ambient conditions. The reliability of this device, packaged in a housing with enclosure rating IP67, expands its performance range with the “outdoor” dimension, thereby increasing its flexibility in use.





## POWERFUL TECHNOLOGY IN A COST-EFFICIENT DEVICE



### HDDM+ technology for greater durability during measurement

The MRS1000 uses the HDDM+ technology. It enables measurement at long distances and is characterized by low noise in the measured value data as well as multi-echo capability.

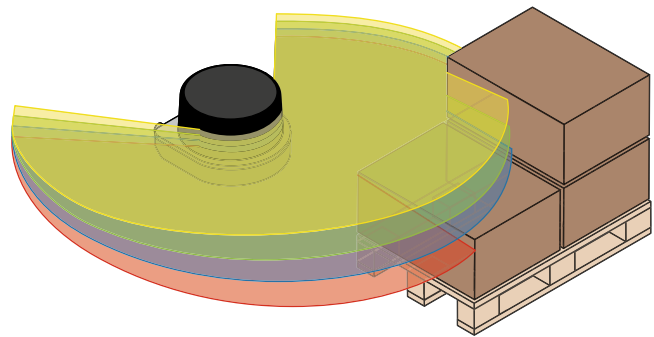
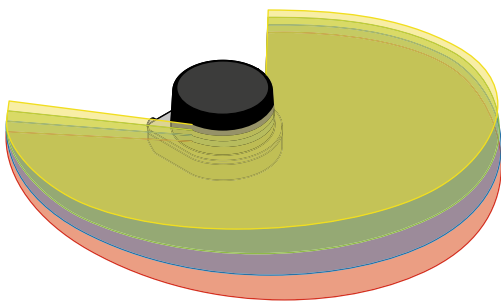
The principle of operation of the HDDM+ is clever: infrared laser pulses are generated in the device in a swift chronological sequence. The large quantity of measurement data per angle degree generated this way ensures gap-free

scanning, thereby enabling high edge precision, for example. Ambient conditions which could impair the measurement are filtered out. The MRS1000 is therefore very reliable when ambient light and other types of interference exist in the measuring range, for example rain, snow or fog, and provides high measurement certainty even when used outdoors.

### More layers for more performance

The MRS1000 stands out due to its high performance. It allows for scanning over four spread-out layers at a horizontal aperture angle of 275°, and can even measure at different angles nearly simultaneously. The layers are arranged horizontally, one on top of the other, and fan out from the sensor. At a distance of 20 m, for example, they cover an impressive height of 2.70 m. The fields can be easily configured on one plane and projected on the other planes. The MRS1000 therefore has a much more detailed level of visibility than a 2D LiDAR sensor.

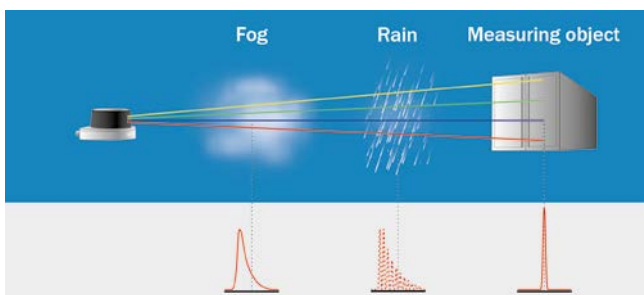
The MRS1000 can not only detect in two dimensions, but can also measure in three dimensions using the additional layers. The SOPAS ET configuration software or a web server is used to display the data. More data on several planes in a three-dimensional space results in high coverage and greater reliability. With its angular resolution of 0.25° and at a 50 Hz sampling rate in four layers, the MRS1000 detects up to 55,000 measurement points. With three echo values, a total of up to 165,000 measurement points are available per second.



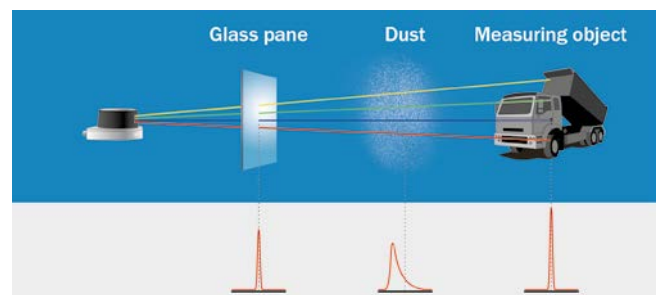
### Multi-echo evaluation for higher reliability

The distance between the LiDAR sensor and an object is calculated via the time-of-flight of the emitted pulse. The MRS1000 can evaluate up to three echo signals for each measuring beam, delivering reliable measurement results at all times, no

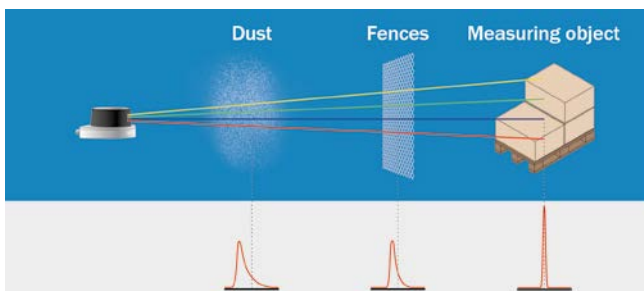
matter whether from behind glass or outside under unfavorable ambient conditions. Even for applications with poor visibility, such as in tunnels or in mines, the MRS1000 always has the best perspective.



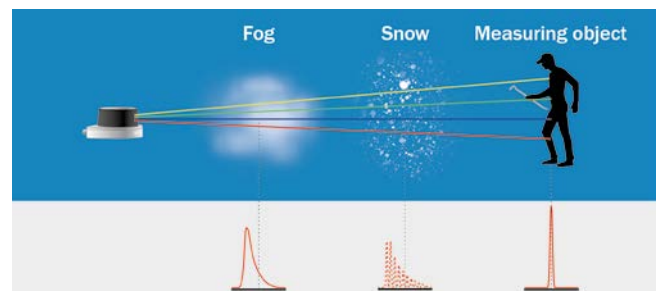
Industry applications: Ports, cranes and traffic.



Industry applications: Mining.



Industry applications: Industrial vehicles.



Industry applications: Building management.

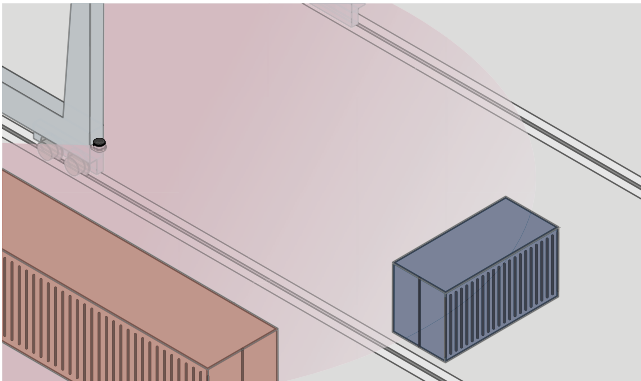
## ADDITIONAL PERFORMANCE INCREASE THANKS TO FILTERS

The MRS1000 is the ideal solution for indoor and outdoor applications, even for applications under adverse ambient conditions. This outstanding performance can be improved even more with additional digital filters for preparation and optimization of measured distance values. The user therefore has the option of adjusting the LiDAR sensor to the specific requirements of the respective application. This makes it possible to prevent virtually all faults.

SICK offers various filters to perfectly and efficiently adjust the MRS1000 to the present task.

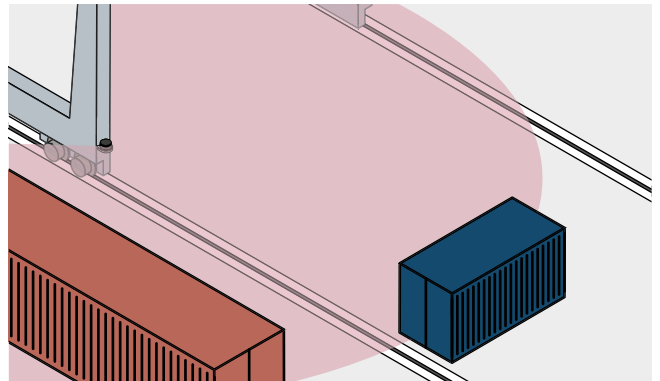
### Fog filter

Thanks to the fog filter, the LiDAR sensor eliminates unwanted echoes at close range.



Without a filter: Due to reflections, the object can only be detected through fog with difficulty.

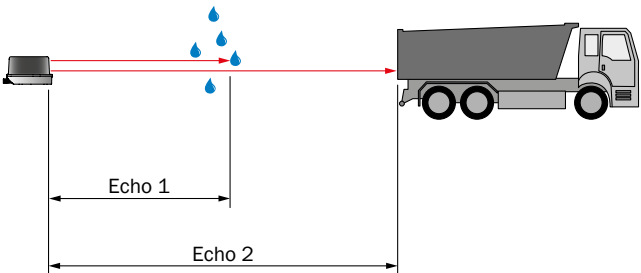
This considerably lowers the probability of false activations at close range in fog.



With a filter: Reliable object detection by blanking unwanted echoes.

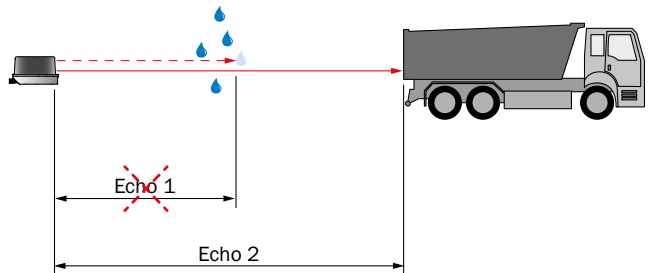
### Echo filter

Thanks to the echo filter, the LiDAR sensor screens out unwanted measurement data and signals caused by edge hits, rain, dust, snow and other ambient conditions. You can set whether the first, the last, or all three echoes are output.



Without a filter: The LiDAR sensor receives unwanted echoes from ambient conditions such as rain.

The other pulses triggered by undesirable ambient conditions are not taken into account. For more information, also see [→ „Multi-echo evaluation“ on page 5](#)

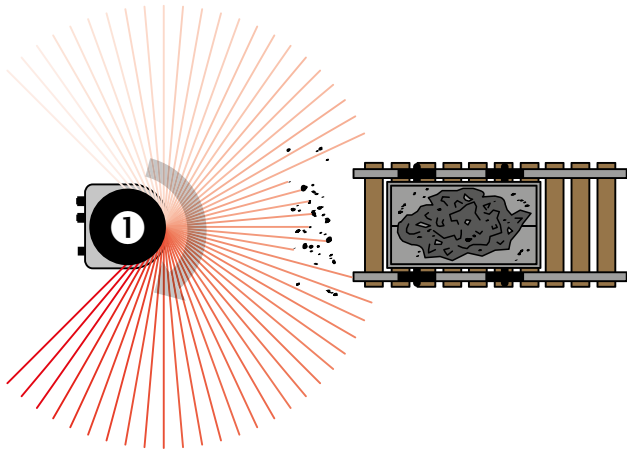


With a filter: The LiDAR sensor blanks unwanted echoes from ambient conditions in accordance with the specifications.

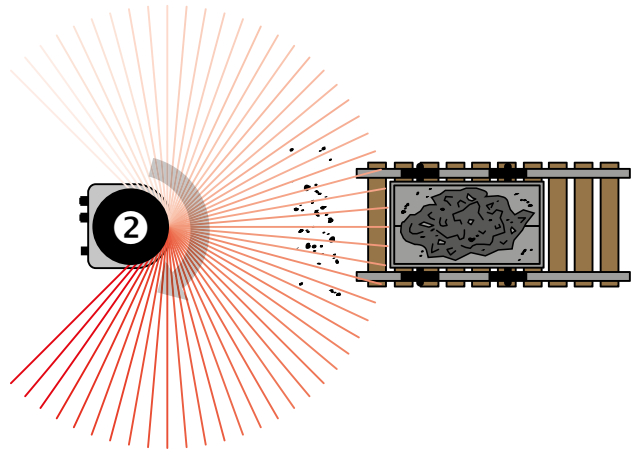
### Particle filter

The particle filter blanks small, irrelevant reflection pulses in dusty environments and in rain or snow which are caused by dust particles, raindrops, snowflakes or the like. In doing so,

successive scans are continuously evaluated in order to detect static objects.



Without a filter: Violation of the contour due to dust particles in the object environment.

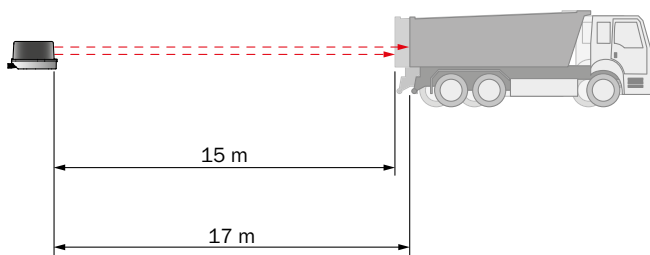


With a filter: The reaction to dust particles in the evaluation field is delayed by a scan. Particles can thereby be blanked.

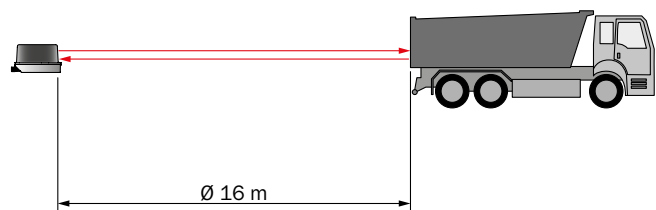
### Mean filter

With the mean filter, an average value is calculated from the number of scans configured and then output. The big advantage when using this filter: Potential noise, i.e. minimal

deviation of values, is reduced, which also lowers the quantity of data.



Without a filter: The LiDAR sensor detects and processes all received signal values.



With a filter: The LiDAR sensor calculates an average value from several signal values.

### The advantages of the MRS1000 at a glance

- ⊕ Outstanding availability even under unfavorable ambient conditions
- ⊕ Maximum reliability when detecting objects
- ⊕ High measurement field coverage due to high scan speed
- ⊕ Flexible and powerful SOPAS ET configuration software for three-dimensional display
- ⊕ Display in SOPAS ET and web server
- ⊕ Integrated field evaluation and measured data output makes it possible to tackle various applications with one sensor

## HIGHER FLEXIBILITY ON SEVERAL PLANES

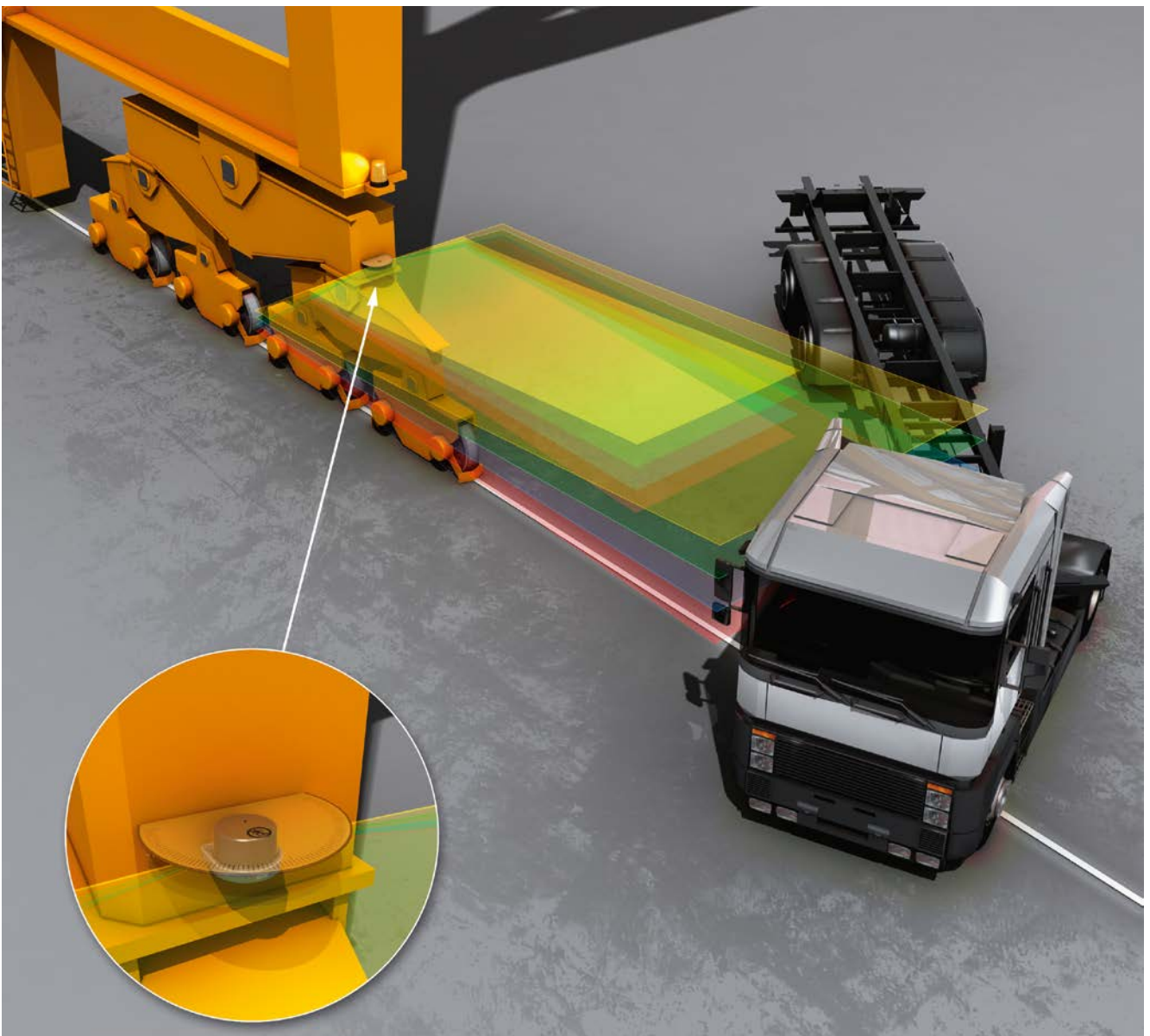
The MRS1000 covers a wide range of application areas. This increases flexibility when it comes to application possibilities in your industry, while at the same time reducing storage costs and expenditures for different variants as well as integration.

### Collision prevention and assistance systems on cranes, industrial vehicles and mobile work machines

The MRS1000 is the perfect solution for preventing collisions in challenging environments such as ports, warehouses, mines, etc.

#### Benefits

- + Reliable object detection thanks to excellent outdoor performance
- + Highly flexible during mounting thanks to rotatable connections



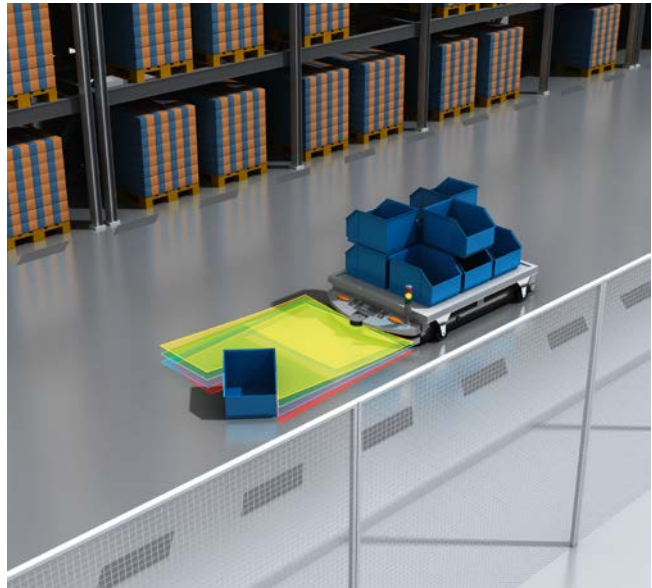


## Navigation support

When maneuvering and navigating, the MRS1000 provides support with simultaneous measurement on up to four planes. In this way, it can detect objects lying on the ground or protruding into the path.

### Benefits

- + More measurement data in several dimensions results in extremely high object detection
- + High economic efficiency thanks to outstanding weather resistance

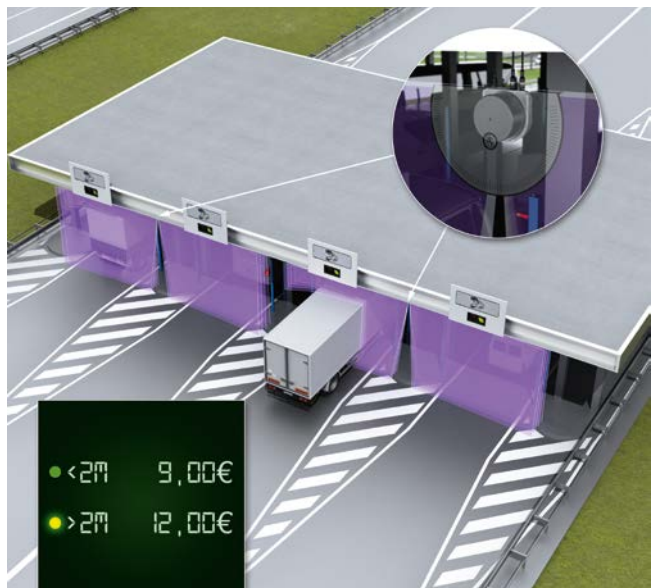


## Monitoring in traffic management

Due to its excellent outdoor capabilities, the MRS1000 is perfectly suited for reliable traffic monitoring at toll stations or road control posts.

### Benefits

- + More detected data in several dimensions results in higher reliability in object detection (55,000 ... 165,000 measurement points per second)
- + Thanks to HDDM\* technology with multi-echo evaluation, high availability is possible, even under unfavorable ambient conditions such as rain, snow, dust or glass panes



## Building safety and security and access control

The MRS1000 delivers reliable measurement results for perimeter protection, object protection and access control when protecting indoor and outdoor areas.

### Benefits

- + Fields that are easy to teach in save time during setup
- + A combination of field evaluation and measured data output makes it possible to cover various applications with only one sensor



## DISCOVER THE WORLD OF THE MRS1000

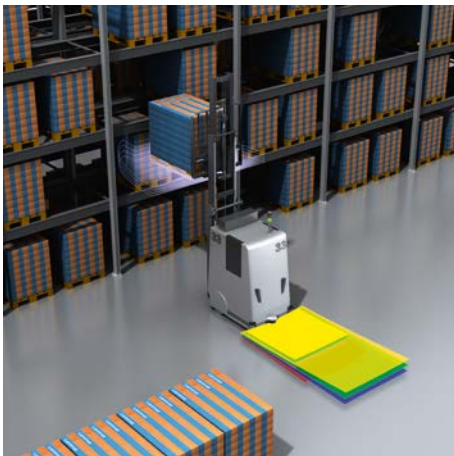
The MRS1000 is the perfect solution for a variety of different applications. Do you want a taste? We can show you excellent examples of how versatile the applications of the MRS1000 are on YouTube.



More information

→ [www.sick.com/MRS1000](http://www.sick.com/MRS1000)

### Positioning and collision protection



Smooth processes are essential in high-bay warehouses. Free storage spaces must be filled quickly and without complications. The MRS1000 enables exact positioning of transport forks in automated guided vehicle systems (AGVs), making collision-free movement into a free space possible. When moving backwards, the MRS1000 detects objects protruding into the space with its several scanning layers, ensuring reliable collision protection.

Automated guided vehicle systems navigate reliably on natural landmarks in space on four levels using the MRS1000 and its data output. For instance, the MRS1000 simplifies quick and collision-free entry into a truck by detecting and monitoring the driving path.

### Navigation on natural landmarks



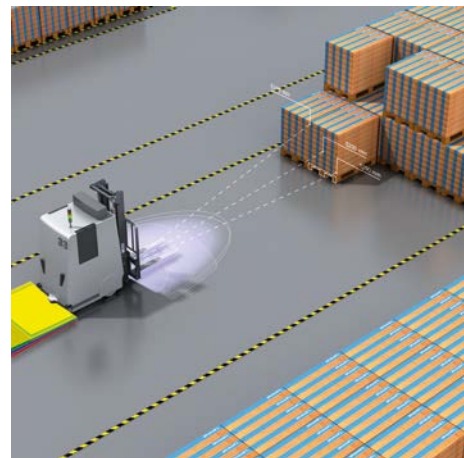
Visit us at → [www.youtube.com/user/SICKSensors](https://www.youtube.com/user/SICKSensors)



**You** **Tube**

The MRS1000 delivers measurement data on four planes, thereby detecting pallet openings, to name one example. It allows for the corresponding positioning of transport forks during the approach and reception of the pallet without stopping the AGVs. The recorded measurement data can be used to create a profile.

### Positioning

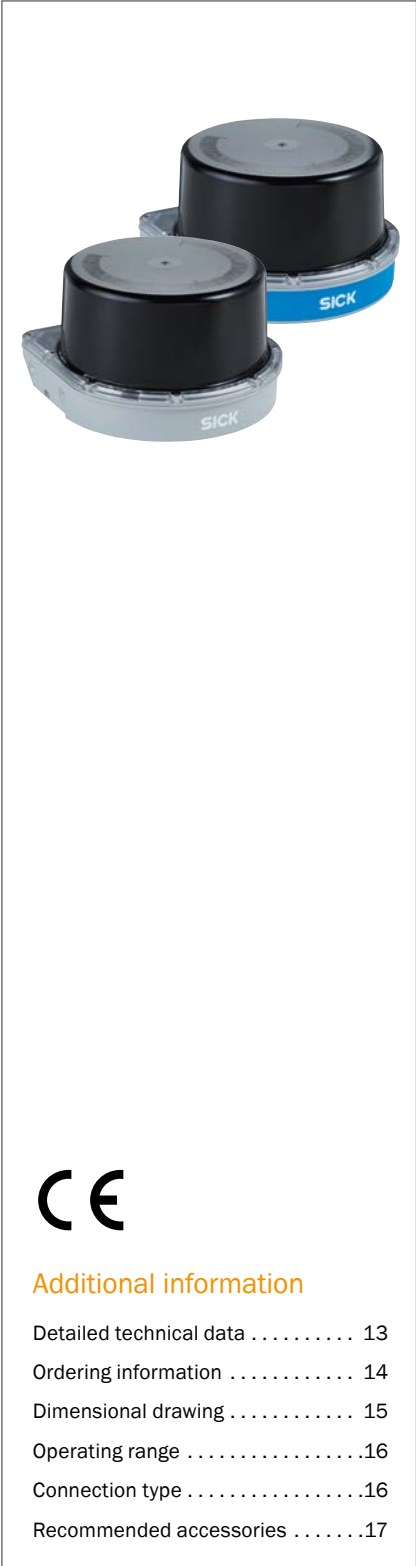


### Ground reference evaluation



The MRS1000 provides a ground reference evaluation (GRE) for mobile hazardous area protection in automated guided vehicle systems. The sensor can use this to distinguish and detect objects lying on the path (pallets or small load carriers) as well as steps and depressions in the ground. The object height to be detected can be set by adjusting the sensitivity of the LiDAR sensor. In addition, the four scan planes of the MRS1000 enable detection of objects protruding into the path. This is how the MRS1000 helps to prevent collisions, detect pallet openings and support the AGVs when entering a free space.

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### Additional information

Detailed technical data ..... 13  
 Ordering information ..... 14  
 Dimensional drawing ..... 15  
 Operating range .....16  
 Connection type .....16  
 Recommended accessories .....17

### Product description

With the MRS1000 multi-layer scanner, SICK has developed a 3D laser scanner which accurately and reliably detects and measures objects in good time and in multiple dimensions. By collecting large volumes of data on multiple scan layers and from different angles, it can detect and respond to objects on the floor as well as objects that are obstructing the path.

The MRS1000 is characterized by a high

degree of ruggedness even when subject to adverse environmental influences such as rain, dust, and fog. The new HDDM+ process, with multi-echo evaluation, ensures the reliable detection of objects and accurate measurement results. Versatile fields of application, both indoor and outdoor, make this an efficient all-rounder among 3D LiDAR sensors.

### At a glance

- Four spread layers and a 275° aperture angle
- High weather resistance and reliability through HDDM+ with multi-echo technology
- Field evaluation and measured data in one sensor
- Easy configuration, with the ability to adapt to a changing environment
- Convenient and customer-friendly diagnostics via web server

### Your benefits

- Collecting more data in multiple dimensions leads to higher measurement accuracy
- HDDM+ with multi-echo technology for high availability when subject to environmental influences like rain, dust, and fog
- Simultaneous measurement on 4 levels allows objects to be detected which are on the floor or obstructing the path
- High flexibility for installation thanks to rotating connectors
- Integrated field evaluation and measured data output makes it possible to tackle various applications with one sensor
- Low setup costs: Identical telegram, as for the 2D LiDAR sensors from SICK
- Fields that are easy to teach in save time during setup
- Low maintenance costs thanks to high weather resistance

→ [www.sick.com/MRS1000](http://www.sick.com/MRS1000)

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>Field of application</b>	Outdoor, Indoor (depending on type)	
<b>Light source</b>	Infrared (850 nm)	
<b>Laser class</b>	1 (IEC 60825-1:2014)	
<b>Aperture angle</b>	Horizontal	275°
	Vertical	7.5° (over 4 measurement layers)
<b>Scanning frequency</b>	50 Hz, 4 x 12.5 Hz	
<b>Angular resolution</b>	0.25°	
<b>Heating</b>	Self-heating	
<b>Operating range</b>	0.2 m ... 64 m	
<b>Scanning range</b>	At 10% remission	16 m
	At 90% remission	30 m
<b>Spot size (H x W)</b>	10.4 mrad x 8.7 mrad	
<b>Amount of evaluated echoes</b>	3	

## Performance

<b>Scan/frame rate</b>	55,000 ... 165,000 measurement points
<b>Response time</b>	20 ms (4 Layer) <sup>1)</sup>
	80 ms (1 Layer)
<b>Systematic error</b>	± 60 mm
<b>Statistical error</b>	≤ 30 mm
<b>Integrated application</b>	Integrated field evaluation with flexible fields on four layers, measurement data output
<b>Number of field sets</b>	Up to 24 fields
<b>Simultaneous evaluation cases</b>	6
<b>Filter</b>	Fog filter Particle filter Mean filter Median filter Ground reference evaluation (GRE)

<sup>1)</sup> Depending on object size.

## Interfaces

<b>Ethernet</b>	Function	✓, TCP/IP, UDP/IP
	Data transmission rate	Host, OPC, NTP, Measured data output (distance, RSSI) 10/100 MBit/s
	<b>Optical indicators</b>	LEDs
<b>Configuration software</b>		SOPAS ET, web server (display)

## Mechanics/electronics

<b>Electrical connection</b>	M12 round connectors (D-coded, aligned) with swivel connector
<b>Operating voltage</b>	10 V ... 30 V
<b>Power consumption</b>	≤ 13 W
<b>Housing</b>	AIMG4,5
<b>Housing color</b>	Gray (RAL 7042) / Light blue (RAL 5012) (depending on type)
<b>Enclosure rating</b>	IP65, IP67 (IEC 60529:1989+AMD1:1999+AMD2:2013) (depending on type)

Protection class	III
Weight	1.2 kg
Dimensions (L x W x H)	151.9 mm x 150 mm x 92.5 mm

## Ambient data

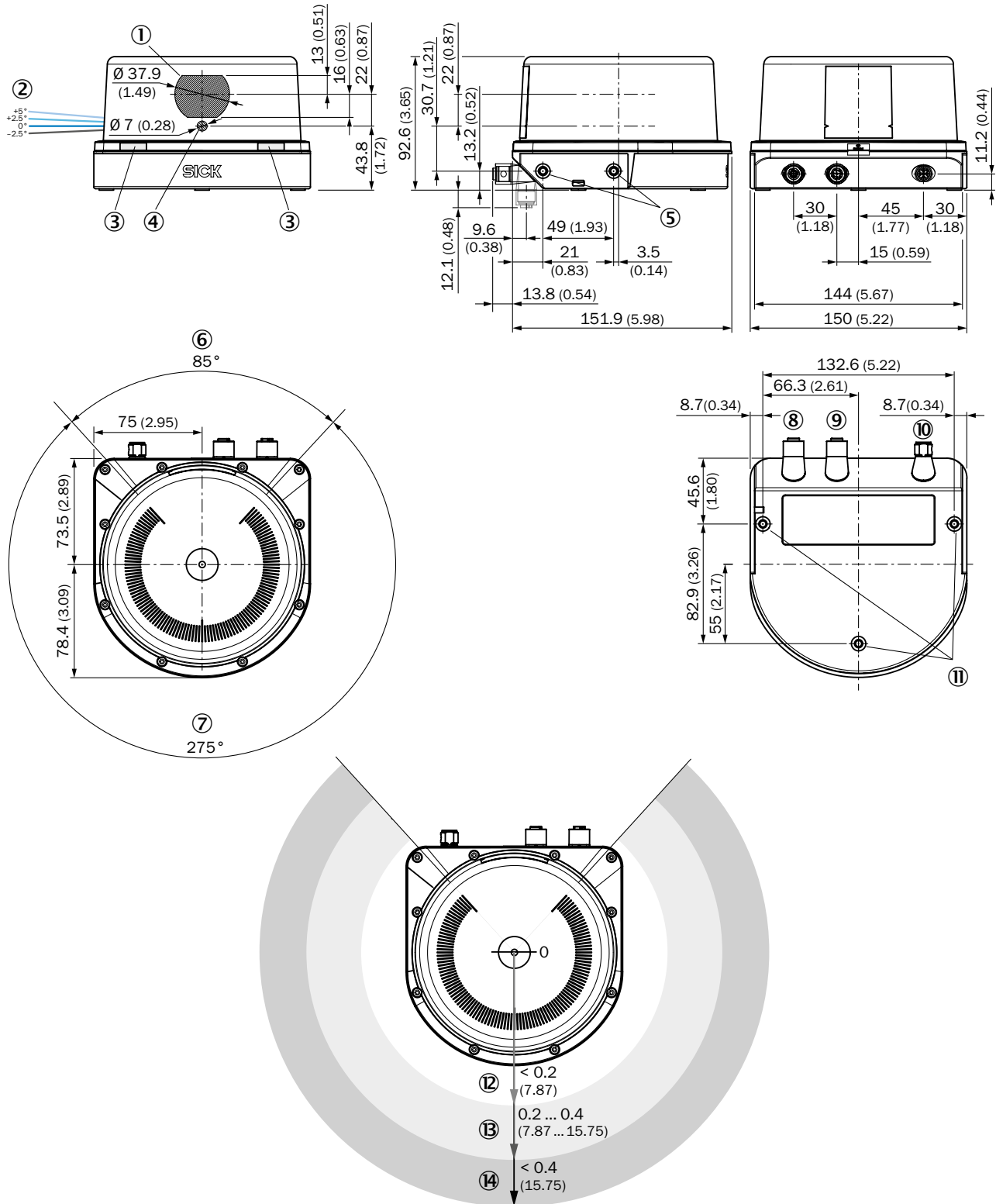
Object remission	2 % ... > 1,000 % (Reflector)
Electromagnetic compatibility (EMC)	EN 61000-6-1 (2007-10), EN 61000-6-2 (2005-08), EN 61000-6-4:2007+A1:2011
Vibration resistance	IEC 60068-2-6:2007
Shock resistance	IEC 60068-2-27:2008
Ambient operating temperature	-30 °C ... +50 °C (depending on type)
Storage temperature	-40 °C ... +75 °C
Ambient light immunity	80 klx

## Ordering information

- **Spot size (H x W):** 10.4 mrad x 8.7 mrad
- **Electrical connection:** M12 round connectors (D-coded, aligned) with swivel connector
- **Angular resolution:** 0.25°
- **Object remission:** 2 % ... > 1,000 %, Reflector

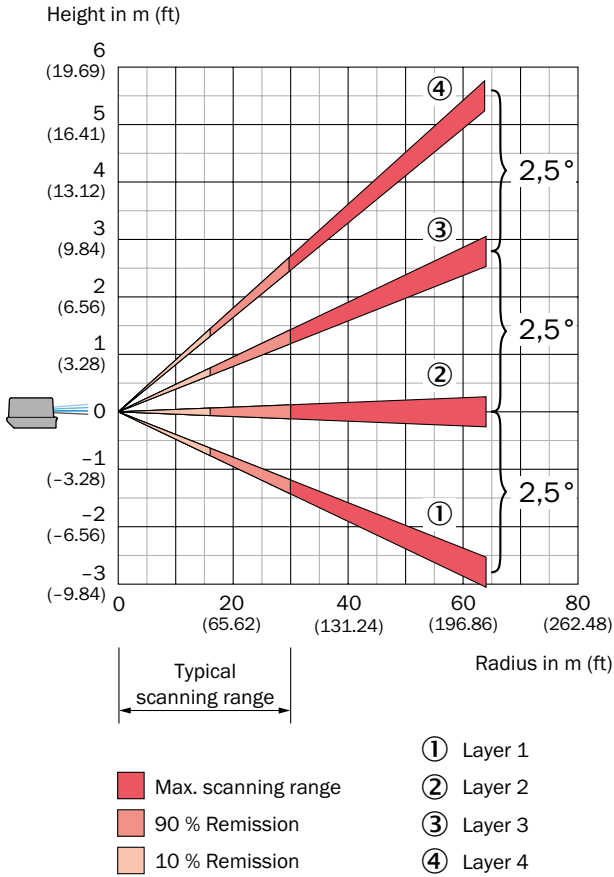
Field of application	Housing color	Type	Part no.
Outdoor	Gray (RAL 7042)	MRS1104C-111011	1081208
Indoor	Light blue (RAL 5012)	MRS1104C-011010	1075367

Dimensional drawing (Dimensions in mm (inch))

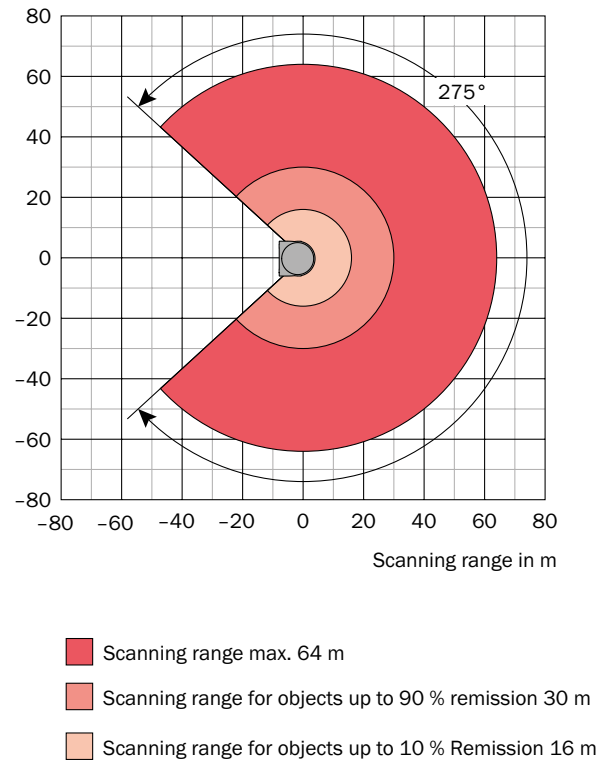


- ① Receiver
- ② Status LEDs
- ③ Sender
- ④ Mounting hole M5 x 7.5
- ⑤ Blind zone
- ⑥ Field of view
- ⑦ Ethernet connection
- ⑧ I/O connection
- ⑨ POWER connection
- ⑩ Mounting hole M5 x 7.5
- ⑪ Close range (no detection or measurement possible)
- ⑫ Detection zone
- ⑬ Measuring range

Operating range

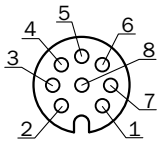


Scanning range in m



Connection type

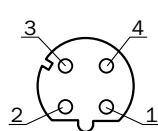
I/O



Connector M12, 8-pin, A-coded

- ① IN1/OUT1
- ② IN2/OUT2
- ③ IN3/OUT3
- ④ IN4/OUT4
- ⑤ IN5/OUT5
- ⑥ IN6/OUT6
- ⑦ GND INx/OUTx
- ⑧ IN7/OUT7

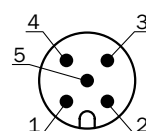
Ethernet



M12 female connector, 4-pin, D-coded

- ① TX+
- ② RX+
- ③ TX-
- ④ RX-

Power









Connector M12, 5-pin, A-coded

- ① VS 10...30 V
- ② Reserved
- ③ GND
- ④ IN8/OUT8
- ⑤ Reserved



## Recommended accessories

	Brief description	Type	Part no.
Terminal and alignment brackets			
	Easy mount	Mounting bracket	2093194
Device protection (mechanical)			
 Illustration may differ	Hood for protection of front screen against weather influences	Weather hood, 210°	2085939
Mounting brackets and plates			
 Illustration may differ	Adapter plate for mounting MRS1000 on accessories components, Aluminum (anodised), mounting hardware included	Adapter plate	2085937
Plug connectors and cables			
	Head A: female connector, M12, 5-pin, straight, A-coding Head B: cable Cable: Power, drag chain use, PUR, halogen-free, shielded, 5 m	DOL-1205-G05MAC	6036384
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: Ethernet, twisted pair, PUR, halogen-free, shielded, 5 m	SSL-2J04-G05ME	6034415
	Head A: male connector, M12, 8-pin, straight, A-coding Head B: cable Cable: drag chain use, PUR, halogen-free, shielded, 5 m	STL-1208-G05MAC	6036155

You can find additional accessories online → [www.sick.com/MRS1000](http://www.sick.com/MRS1000)



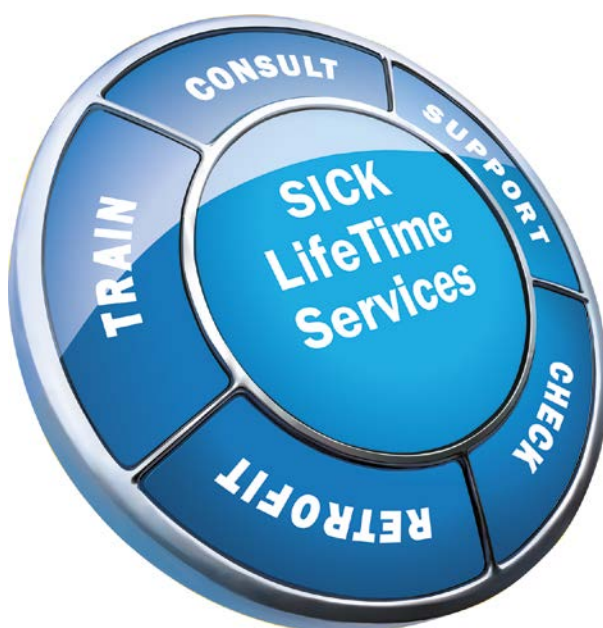
## REGISTER AT WWW.SICK.COM TO TAKE ADVANTAGE OF OUR FOLLOWING SERVICES FOR YOU






- ✔ 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

## SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,000 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, 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](http://www.sick.com)