

# VMS4x00/5x00, LMS4000

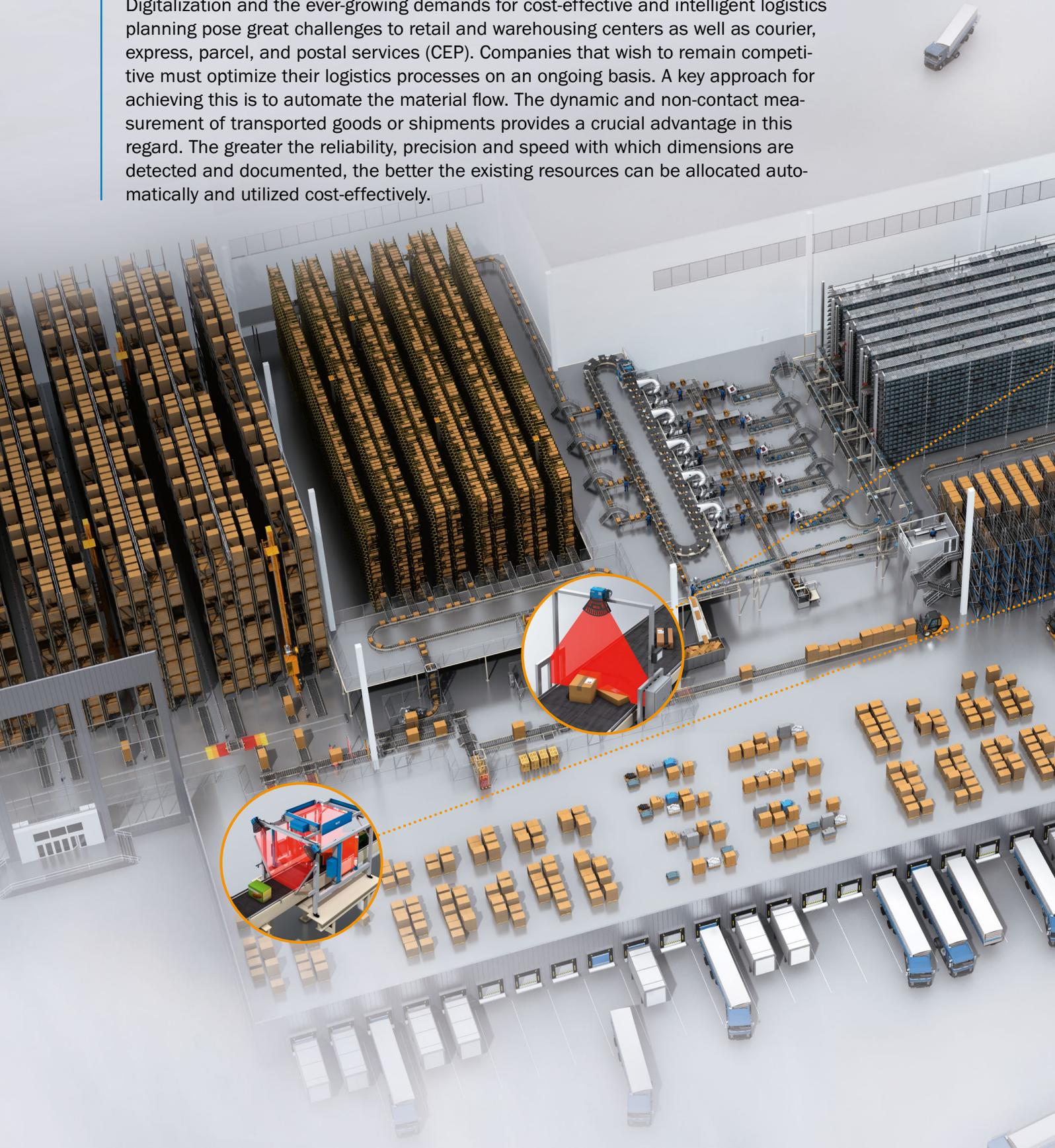
WHEN THE ACTUAL SIZE MATTERS

Track and trace systems, 2D LiDAR sensors



# MILLIMETER ACCURACY

Digitalization and the ever-growing demands for cost-effective and intelligent logistics planning pose great challenges to retail and warehousing centers as well as courier, express, parcel, and postal services (CEP). Companies that wish to remain competitive must optimize their logistics processes on an ongoing basis. A key approach for achieving this is to automate the material flow. The dynamic and non-contact measurement of transported goods or shipments provides a crucial advantage in this regard. The greater the reliability, precision and speed with which dimensions are detected and documented, the better the existing resources can be allocated automatically and utilized cost-effectively.



## PRECISION FOR EVERY APPLICATION

The VMS4x00 / 5x00 track and trace systems are ideal for challenging applications in the field of non-contact dynamic measurement and position determination for objects on a multitude of conveyor systems.



### VMS4x00/5x00 system solutions

**CEP:** The systems in the VMS4x00/5x00 range measure and count objects using a stored scale value so that accurate master data (length, width and height) can be output and the flow can be measured. They reliably capture cuboid and irregularly shaped objects, whether they are singulated or touching.

- Controlled presorting for sorter systems
- Monitoring and optimization of plant utilization
- Reliable data basis for billing the end customer
- Higher LFT rate (legal-for-trade)
- Optimization of load proposal lists



**Retail and warehousing centers:** Regardless of shape and size, the VMS4x00/5x00 track and trace systems reliably measure and count cubic and cuboid objects to output their dimensions.

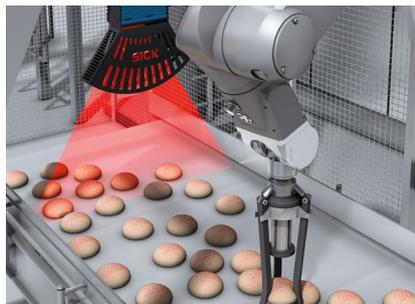
- Optimal storage place allocation
- Creation of load proposal lists



### LMS4000 as a standalone component

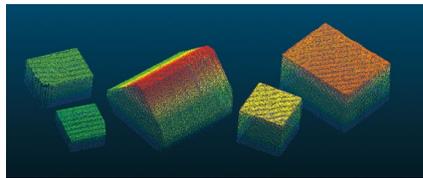
**Robotics:** Used as a standalone component in automated production, the LMS4000 2D LiDAR sensor, delivers precise data on the position and size of a wide variety of objects and transmits this data to an external evaluation unit, often in conjunction with an encoder.

- Creation of 3D point clouds for further processing and as a data basis for volume measurement
- Positioning tasks, such as pick-and-place, palletizing or depalletizing
- Shape and contour verification for quality control



## SIZE MEASUREMENT WITHOUT COMPROMISE

Individually combinable separate components open up a vast array of applications. The number of LMS sensors varies depending on the application and the object shape to be measured. These can also be combined with additional reading and weighing stations in many different ways.



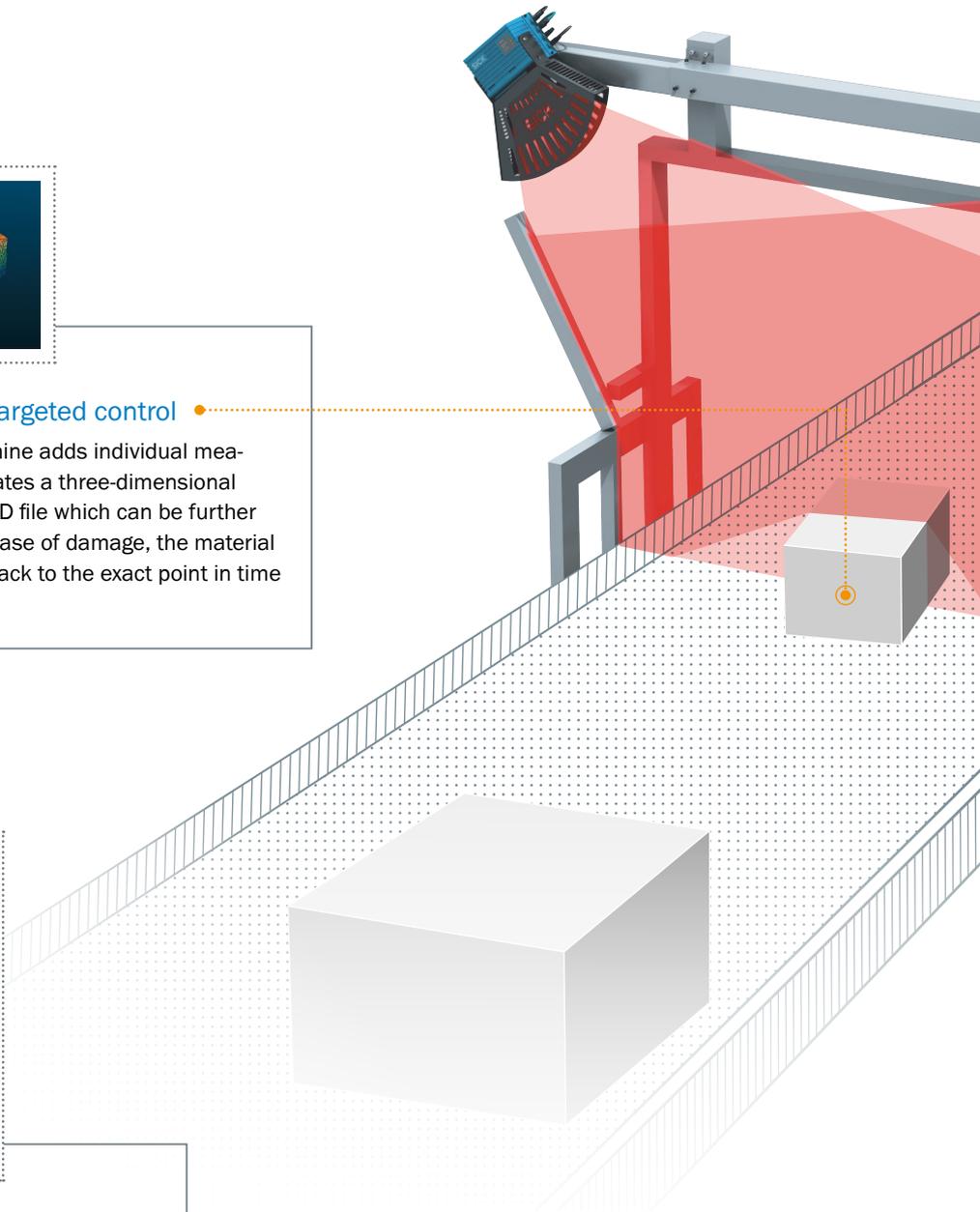
### + Three-dimensional view for targeted control

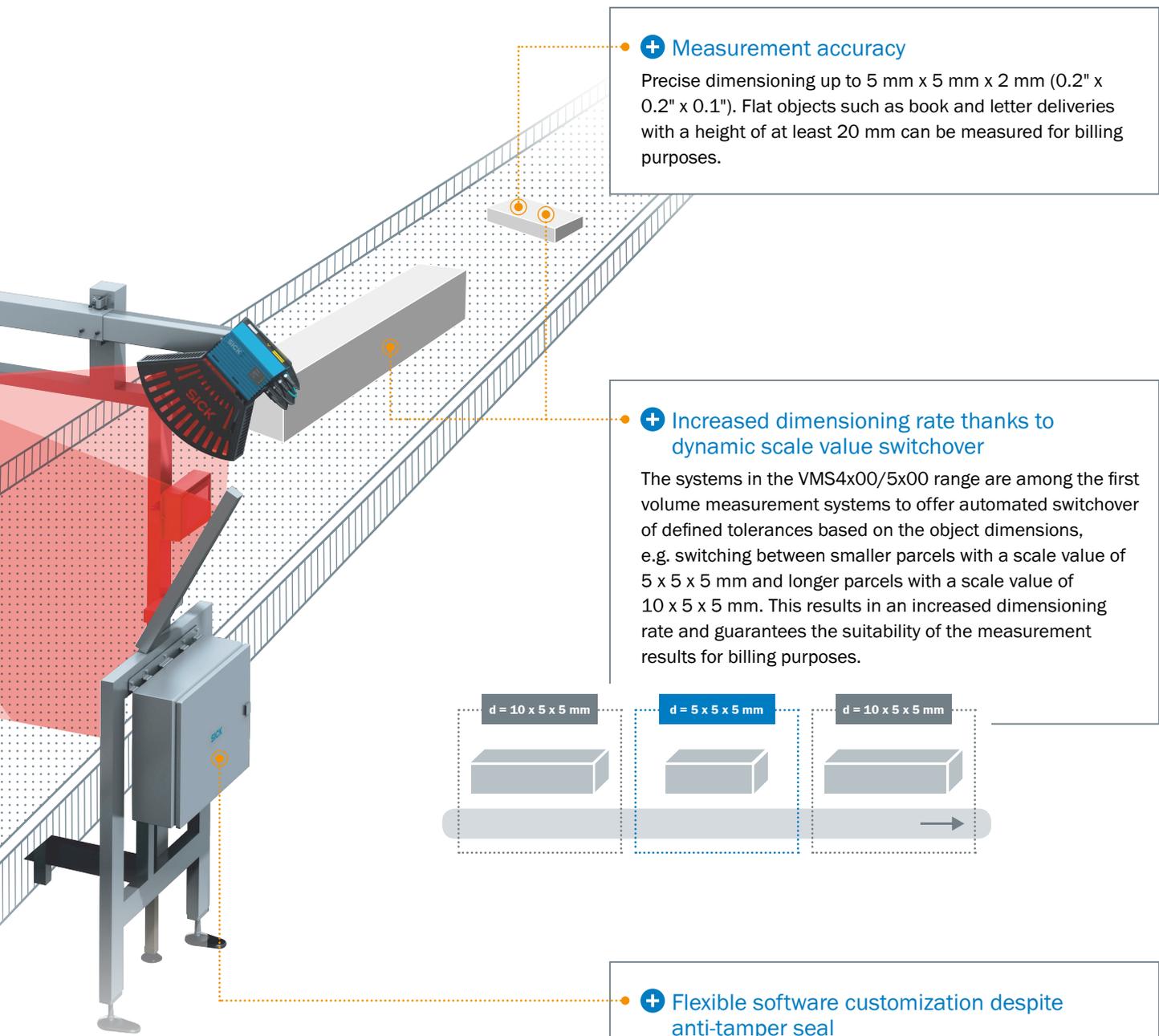
The SIM2000 Sensor Integration Machine adds individual measured values to a point cloud. This creates a three-dimensional image of the object in the form of a PCD file which can be further processed and saved if necessary. In case of damage, the material handling process can thus be traced back to the exact point in time at which the damage occurred.



### + Higher legal-for-trade rate thanks to touching/side-by-side functionality

The inline detection and measurement of touching objects for billing purposes increases system utilization. Singulation is no longer required.



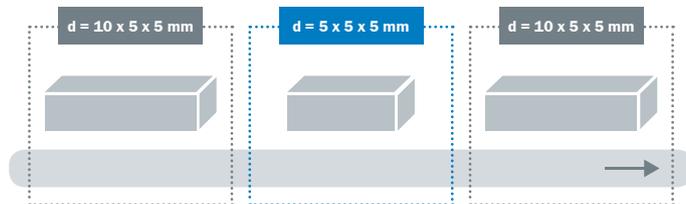


**+ Measurement accuracy**

Precise dimensioning up to 5 mm x 5 mm x 2 mm (0.2" x 0.2" x 0.1"). Flat objects such as book and letter deliveries with a height of at least 20 mm can be measured for billing purposes.

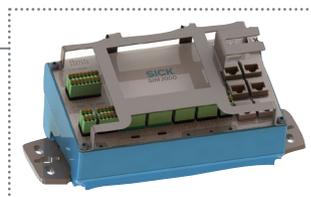
**+ Increased dimensioning rate thanks to dynamic scale value switchover**

The systems in the VMS4x00/5x00 range are among the first volume measurement systems to offer automated switchover of defined tolerances based on the object dimensions, e.g. switching between smaller parcels with a scale value of 5 x 5 x 5 mm and longer parcels with a scale value of 10 x 5 x 5 mm. This results in an increased dimensioning rate and guarantees the suitability of the measurement results for billing purposes.

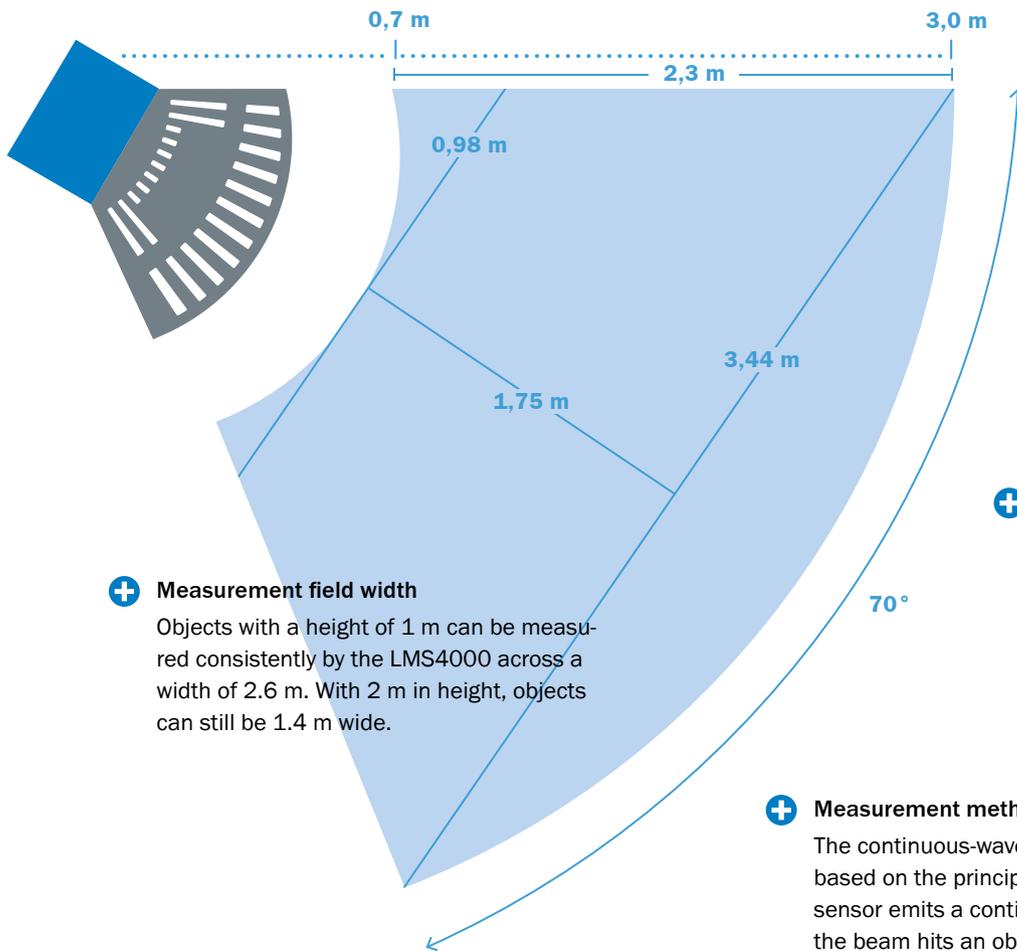


**+ Flexible software customization despite anti-tamper seal**

The SIM2000 Sensor Integration Machine is the central control unit and interface of the systems. In the case of the certified system variant VMS5x00, the metrologically relevant software component used for billing purposes has been separated from the application-specific area. No recertification is therefore required when the application-specific software component is customized, meaning that costs are reduced.



## THE HIGH PERFORMANCE EYE OF THE SYSTEM: THE LMS4000



**+ Measurement field width**  
Objects with a height of 1 m can be measured consistently by the LMS4000 across a width of 2.6 m. With 2 m in height, objects can still be 1.4 m wide.

**+ Controlling and reducing data transmission in a targeted manner**  
The laser scanner can be switched on and off via photoelectric sensors or software commands. This ensures data is only generated when objects are actually to be measured.

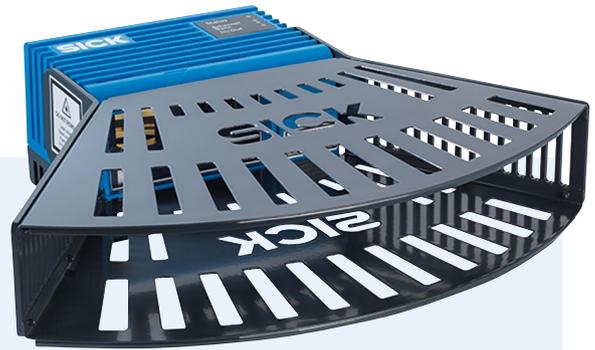
**+ Measurement method**  
The continuous-wave measurement method is based on the principle of phase correlation. The sensor emits a continuous laser beam. When the beam hits an object, it is reflected back onto the receiver of the laser scanner. The resultant phase delay between the emitted and received beam is used to determine the distance.

**+ SOPAS ET**  
Full control over the system: The LMS4000 can be conveniently parameterized using the SOPAS ET configuration software. This enables the measurement process to be tailored to individual requirements.

**+ Extending the measuring range**  
Using multiple laser scanners prevents shadowing effects and allows for larger measurement fields. The motors of the rotating mirrors are synchronized to ensure the devices do not mutually interfere with one another.

More than half a million measuring points per second – the VMS4x00/5x00 systems utilize a 2D LiDAR sensor with an especially high measurement point density to determine the object dimensions.

The LMS4000 measures objects quickly and precisely, independent of their shape, color or surface quality. The aperture angle of 70° results in a wide measurement area, scanned by a continuous laser at 600 Hz using the rotating hexagonal mirror. Every scan generates 841 individual measuring points. The use of a red light laser within the visible spectrum makes it easier to precisely align the component in the VMS4x00/5x00 systems.



### Digital filters for increased performance

Digital filters for pre-processing and optimizing the measured values increase the performance of the LMS4000 even further. This enables the laser scanner to be directly tailored to the relevant application. Faults are reliably prevented, and data quantities optimized for downstream processes.



#### Edge filter

Prevents erroneous or extreme distance values at edges.



#### Median filter

Smooths the measuring points with the help of neighboring points and corrects measurement outliers.



#### Average filter

Calculates an arithmetically averaged measurement value using a pre-defined number of scans.



#### Scan range filter

Records data only within a specified angular range.

## WHEN THE ACTUAL SIZE MATTERS



### Product description

The VMS4x00/5x00 track and trace system is ideal for challenging applications in the field of non-contact dynamic measurement and position determination for objects on a diverse range of conveyor systems. The smallest cuboid that fully encloses the object is precisely determined using one or several laser-based measuring heads, virtually regardless of the shape of the

object. With the certified system variant, the dimension data can be used for billing purposes. The SIM2000 system controller makes it possible to separate metrologically relevant software from application-specific software. The modular system construction ensures compatibility with existing solutions from SICK and enables adaptations to customer-specific applications.

### At a glance

- Measurement accuracy up to 5 mm x 5 mm x 2 mm
- Object sizes up to 5.500 mm x 1.600 mm x 1.100 mm
- Conveying speeds of up to 4.0 m/s
- Certified according to MID and NTEP (OIML)
- Option of output as point cloud
- Separation of metrologically relevant software and application-specific software
- Dynamic scale value

### Your benefits

- Increased throughput thanks to non-contact, dynamic measurement of objects virtually regardless of their shape
- Optimizes material handling processes and the use of vehicle and storage capacities
- Increased sales thanks to validated revenue recovery of freight costs
- Material flow optimization through inline object measurement
- Increased system availability and reduction in operating costs thanks to short MTTR
- Time savings thanks to easy installation with maximum modularity
- Range of options: stand-alone solution or in combination with reading station and weighing technology
- Flexible and individual software customization despite sealing



### Additional information

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→ [www.sick.com/VMS4x00\\_5x00](http://www.sick.com/VMS4x00_5x00)

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

The exact device specifications and performance data of the product may deviate from the information provided here, and depend on the application in which the product is being used and the relevant customer specifications.

### General notes

	VMS4100	VMS5100 MID	VMS4200	VMS5200 MID
<b>Items supplied</b>	1 x SIM2000 Controller 1 x encoder 1 x LMS4000 head 1 x photoelectric sensor (optional) Connection cables, holders, and frame options depending on the application	1 x display 1 x SIM2000 Controller 1 x encoder 1 x LMS4000 head 1 x photoelectric sensor (optional) Connection cables, holders, and frame options depending on the application	1 x SIM2000 Controller 1 x encoder 2 x LMS4000 head 1 x photoelectric sensor (optional) Connection cables, holders, and frame options depending on the application	1 x display 1 x SIM2000 Controller 1 x encoder 2 x LMS4000 head 1 x photoelectric sensor (optional) Connection cables, holders, and frame options depending on the application

### Features

	VMS4100	VMS5100 MID	VMS4200	VMS5200 MID
<b>Industry</b>	Courier, express, parcel, and postal Retail and warehousing			
<b>Tasks</b>	Object measurement (non-contact, dynamic) Volume measurement Position determination Checking object dimensions Package sorting Master data acquisition		Object measurement (non-contact, dynamic) Volume measurement Position determination Checking object dimensions Parcel and flats sorting Master data acquisition	
<b>Laser class</b>	2 (with laser protection cover)			
<b>Application</b>	Incoming and outgoing goods in retail and warehousing Material-handling processes in the CEP industry Storage processes in storage and conveyor systems	Incoming and outgoing goods in retail and warehousing Material-handling processes in the CEP industry Storage processes in storage and conveyor systems Billing processes in the CEP industry	Incoming and outgoing goods in retail and warehousing Material-handling processes in the CEP industry Storage processes in storage and conveyor systems	Incoming and outgoing goods in retail and warehousing Material-handling processes in the CEP industry Storage processes in storage and conveyor systems Billing processes in the CEP industry
<b>Conveyor type</b>	Conveyor belt			

### Performance

	VMS4100	VMS5100 MID	VMS4200	VMS5200 MID
<b>Transport speed</b>	≤ 0.1 m/s ... 3 m/s, start-stop operation possible		≤ 0.1 m/s ... 4 m/s, start-stop operation possible	
<b>Maximum object size</b>	5,500 mm x 1,200 mm x 1,100 mm 216 " x 47 " x 43 "		5,500 mm x 1,600 mm x 1,100 mm 216 " x 63 " x 43 "	
<b>Minimum object size</b>	50 mm x 50 mm x 20 mm 2 " x 2 " x 1 "			
<b>Minimum object distance</b>	50 mm, touching/Side-by-side possible		50 mm	
<b>Accuracy of object coverage</b>	± 5 mm x ± 5 mm x ± 2 mm ± 0.2 " x ± 0.2 " x ± 0.1 "			
<b>Certification</b>	-	MID (OIML) NTEP on request	-	MID (OIML) NTEP on request
<b>Dynamic scale value</b>	✓			

## Interfaces

	VMS4100	VMS5100 MID	VMS4200	VMS5200 MID
<b>Fieldbus, industrial network</b>	Ethernet-based or serial RS232, 422, 485			
<b>Optical indicators</b>	-	Display	-	Display
<b>Output data</b>	XML ASCII Customer protocol			
<b>Configuration interface</b>	Ethernet SOPAS Engineering Tool			

## Mechanics/electronics

<b>Enclosure rating</b>	IP 20 (DIN 40050)
<b>Supply voltage</b>	230 V AC 100 V AC ... 264 V AC
<b>Mains frequency</b>	50 Hz ... 60 Hz

## Ambient data

<b>Ambient temperature operation</b>	-10 °C ... +50 °C
<b>Ambient storage temperature</b>	-20 °C ... +70 °C
<b>Permissible relative humidity</b>	+ 95 %, Non-condensing
<b>Electromagnetic compatibility (EMC)</b>	EN 61000-4-2:2009, EN 61000-4-3:2011, EN 61000-4-4:2013, EN 61000-4-11:2005
<b>Object remission</b>	2 % ... 200 %
<b>Shock load</b>	EN 60068-2-65, -27, -29, -64
<b>Vibration load</b>	EN 60068-2-65, -27, -29, -64

## Ordering information

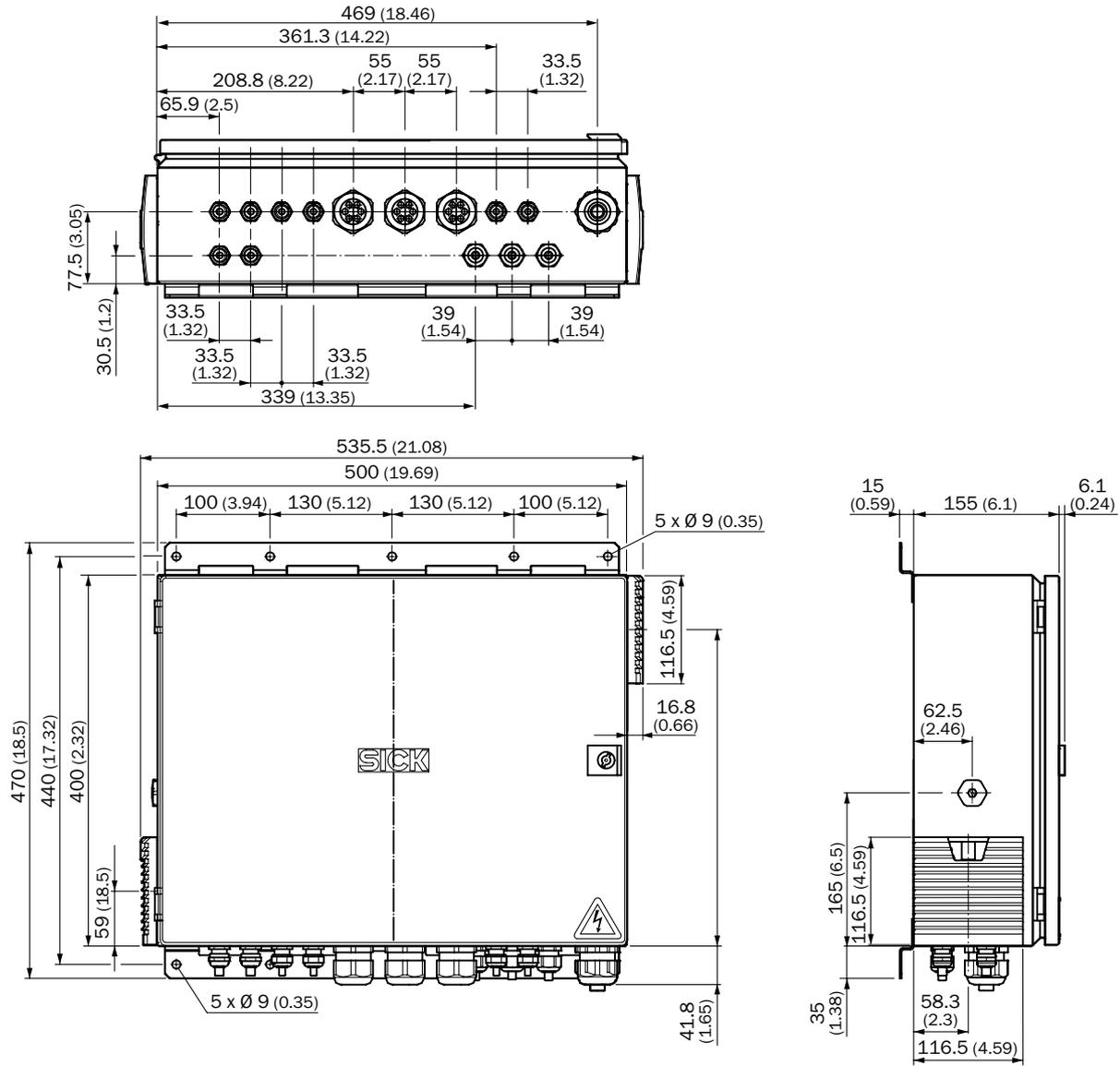
- **Min. object size (L×W×H):** 50 mm x 50 mm x 20 mm, 2 " x 2 " x 1 "
- **Accuracy:** ± 5 mm x ± 5 mm x ± 2 mm, ± 0.2 " x ± 0.2 " x ± 0.1 "

Transport speed	Max. object size (L×W×H)	Optical indicators	Certification	Type	Part no.
≤ 0.1 m/s ... 3 m/s, start-stop operation possible	5,500 mm x 1,200 mm x 1,100 mm 216 " x 47 " x 43 "	-	-	VMS4100	On request
		Display	MID (OIML), NTEP on request	VMS5100 MID	On request
≤ 0.1 m/s ... 4 m/s, start-stop operation possible	5,500 mm x 1,600 mm x 1,100 mm 216 " x 63 " x 43 "	-	-	VMS4200	On request
		Display	MID (OIML), NTEP on request	VMS5200 MID	On request



Dimensional drawing (Dimensions in mm (inch))

SIC2000 cabinet (includes SIM2000 controller)  
for example, SIC2000-2100





# LASER MEASUREMENT WITHOUT COMPROMISE - PRECISE, FAST AND RELIABLE



## Product description

The LMS4000 2D LiDAR sensor is particularly well-suited for use in intralogistics, material handling and in all areas in which goods must be quickly and systematically analyzed and moved. With the LMS4000, SICK is offering the ideal solution for measuring objects regarding their position, shape, volume or surface quality and evaluating

and processing them correspondingly. Regardless of the object position in containers, cartons or on pallets, or whether they are free-standing or touching one another, the sensor measures precisely with high sampling density and a wide dynamic range. A high throughput with comprehensive process reliability and low maintenance needs is the result.

## At a glance

- Precise measurement, even with very dark or glossy objects
- Fine angular resolution for high measurement point density
- High speed measurement with 600 Hz and fast data transmission with Gigabit Ethernet
- Synchronization of devices without mutual interference
- Industry-grade M12 connections

## Your benefits

- Precise measurement of quickly moving objects, large and small, independent of their shape, color or surface quality
- Very detailed object scanning with a high depth of field and a wide range of dynamics without external illumination or additional line lasers
- Need-based extension of the measuring range as several devices can be mounted next to one another without mutual interference
- Quick installation, high availability, simple maintenance



## Additional information

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→ [www.sick.com/LMS4000](http://www.sick.com/LMS4000)

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

The exact device specifications and performance data of the product may deviate from the information provided here, and depend on the application in which the product is being used and the relevant customer specifications.

### Features

	LMS4111R-13000	LMS4121R-13000
Application	Indoor	
Reading field	Front	
Light source	Visible red light	
Laser class	2 (IEC 60825-1:2014, EN 60825-1:2014)	
Aperture angle		
	Horizontal	70°
Scanning frequency	600 Hz	
Angular resolution	0.0833°	
Working range	0.7 m ... 3 m	
Scanning range		
	At 2% remission	3 m
	At 3,5% remission	3 m
	At 10% remission	3 m

### Performance

	LMS4111R-13000	LMS4121R-13000
Scan/frame rate	504,600 measurement point/s	
Response time	≥ 4.8 ms	
Detectable object shape	Almost any	
Systematic error	± 1.5 mm <sup>1)</sup>	± 1 mm <sup>1)</sup>
Statistical error	2.5 mm <sup>1)</sup>	1.5 mm <sup>1)</sup>
Integrated application	Data output	
Filter	Edge filter Median filter Average filter	

<sup>1)</sup> Typical value; actual value depends on environmental conditions.

### Interfaces

Ethernet	✓, TCP/IP, UDP/IP
Function	Measurement data output (distance, RSSI, angle)
Data transmission rate	100 Mbit/s ... 1,000 Mbit/s, half/full-duplex
Digital inputs	2
Encoder inputs	2 (phase A, phase B)
Digital outputs	3
Synchronization inputs/outputs	One (master / slave)
Optical indicators	4 LEDs
Configuration software	SOPAS ET
Maximum encoder frequency	50 kHz

Mechanics/electronics

	LMS4111R-13000	LMS4121R-13000
Electrical connection	1 x M12, 5-pin plug (Power + I/O + Sync) 1 x M12, 8-pin female connector (Ethernet) 1 x M12, 5-pin female connector (Encoder + I/O)	
Supply voltage	24 V DC, ± 25 %	
Power consumption	≤ 16 W, start-up phase max. 29 W	
Output current	≤ 100 mA	
Housing	Aluminum die cast	
Housing color	Light blue (RAL 5012)	
Enclosure rating	IP65	
Protection class	III	
Electrical safety	IEC 61010-1:2011	
Weight	2.4 kg	3.7 kg
Dimensions (L x W x H)	192 mm x 130 mm x 107 mm	397 mm x 370 mm x 107 mm

Ambient data

	LMS4111R-13000	LMS4121R-13000
Object remission	3.5 % ... 300 %	2 % ... 200 %
Electromagnetic compatibility (EMC)	EN 61000-6-3:2007+A1:2011, IEC 61000-6-3:2006+AMD1:2010	
Vibration resistance	EN 60068-2-6:2007	
Shock resistance	EN 60068-2-27:2008	
Ambient operating temperature	-10 °C ... +50 °C <sup>1)</sup>	
Storage temperature	-20 °C ... +70 °C	
Permissible relative humidity	≤ 90 %, Non-condensing	
Ambient light immunity	2,000 lx	

<sup>1)</sup> Initialization phase: 0 °C ... 50 °C.

Ordering information

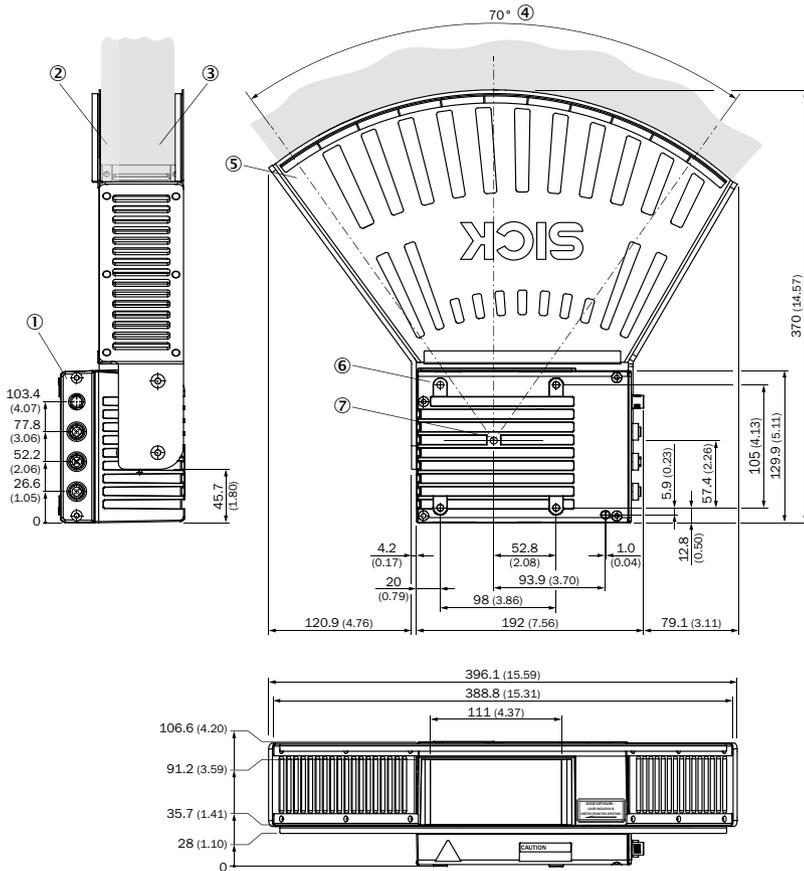
- **Application:** Indoor
- **Reading field:** front
- **Electrical connection:** 1 x M12, 5-pin plug (Power + I/O + Sync), 1 x M12, 8-pin female connector (Ethernet), 1 x M12, 5-pin female connector (Encoder + I/O)
- **Digital outputs:** 3
- **Angular resolution:** 0.0833°
- **Housing color:** Light blue (RAL 5012)

Statistical error	Object remission	Type	Part no.
2.5 mm <sup>1)</sup>	3.5 % ... 300 %	LMS4111R-13000	1091423
1.5 mm <sup>1)</sup>	2 % ... 200 %	LMS4121R-13000	1091393

<sup>1)</sup> Typical value, actual value depends on environmental conditions.

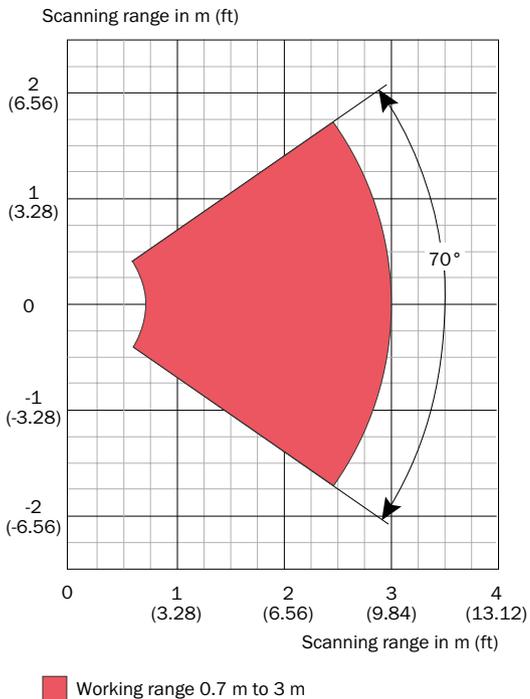
**Dimensional drawings** (Dimensions in mm (inch))

LMS4x2x head with laser protection cover



- ① Schnittstellen, Typen und Anzahl kann variieren
- ② Sendebereich
- ③ Empfangsbereich
- ④ Öffnungswinkel
- ⑤ Optikkaube
- ⑥ Justierbohrung
- ⑦ Nullpunkt der Entfernungsmessung

**Working range diagram**



Recommended accessories

	Description	Signal type/application	Connection type head A	Connection type head B	Cable	Length of cable	Type	Part no.
Terminal and alignment brackets								
	Holder for Item Profile	-	-	-	-	-	Alignment bracket	2030421
Plug connectors and cables								
	-	Sensor/actuator cable	Female connector, M12, 5-pin, straight, A-coded	Flying leads	5-wire, CE, UL	5 m	YF2A25-050UB6X-LEAX	2095733
	-	Digital I/Os	Female connector, M12, 5-pin, straight, A-coded	Male connector, M12, 5-pin, straight, A-coded	5-wire, UL	5 m	YF2A85-050UB-6M2A85	2096119
	-	Gigabit Ethernet	Male connector, M12, 8-pin, straight, X-coded	Male connector, RJ45, 8-pin, straight	8-wire, twisted pair, AWG26	5 m	SSL-2J08-G05MACE	6049729
Power supply units and power supply cables								
	-	-	-	-	-	-	PS50WE24V	7028789
Sets and kits								
	DFV60A-W2EZ0-S03 KIT, 1500 Lines (0,2 mm / increment), 10...32V, HTL/push pull, M12 connector, 5-pin-	-	-	-	-	-	Rotary pulse encoder with bracket	1051292

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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 9,700 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](http://www.sick.com)