



Laser measurement systems

Measurably more cost-effective

SICK sensors connect companies and markets



SICK is one of the world's leading producers of sensor systems for industrial use. SICK is a technology and market leader in both factory and process automation. The company, founded in 1946 and based in Waldkirch, Germany, is represented worldwide by numerous subsidiaries, participations and sales agents.



*LMS Outdoor
Laser Measurement
System*



*LMS Indoor
Laser Measurement
System*



*LD OEM and
LD PDS Laser
Scanners*



*NAV 200
Positioning system
for automated guided
vehicles*



*LMS 400
for automation
applications*



LD PeCo People Counter

LASER SCANNERS: THE KEY TO A WORLD OF APPLICATIONS

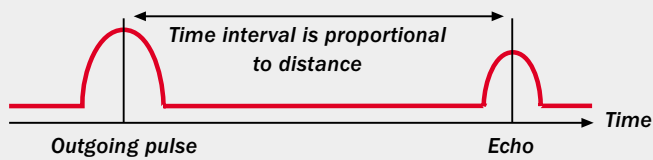
Laser measurement devices have a special status in SICK's product portfolio. Based on time-of-flight technology, they measure distances and detect the profiles of target objects.

SICK's measuring scanners provide solutions for demanding applications worldwide, e.g. preventing collisions and positioning cranes, vehicle classification in moving traffic, the control of vehicles and robots, the automatic positioning of vehicles, as well as for guarding property in building security and the counting of people in public areas.



Laser scanners: sensors for measurement, inspection and protection

SICK leads in time-of-flight technology. This principle forms the basis for many successful products and systems from SICK. Pulse time-of-flight and phase time-of-flight scanners measure areas with a rotating laser beam – and thus determine the profile of a plane.



Building security

THE PULSE TIME-OF-FLIGHT PROCESS

The distance between the sensor and an object is calculated by measuring the time interval between an emitted laser pulse and reception of the reflected pulse. The amplitude of this signal is used to determine the reflectivity of the object surface.



Traffic

THE PHASE TIME-OF-FLIGHT PROCESS

A sine wave is modulated on a visible laser beam. Distance measurement takes place on the basis of the difference between the phase time-of-flight of the transmitted wave and the wave reflected from the object.



Ports



Robots



Airports



Agriculture



Navigation

Measurably more efficient: LMS Laser Measurement Systems open up new areas of application

Pulse time-of-flight measurement in laser scanners allows what has up to now been impossible. SICK systems propelled innovation in crane automation, in automatic toll appraisals on motorways, and in demanding building security tasks. Measurement and anti-collision tasks, as well as access control and monitoring in outdoor areas, are no longer Utopian concepts – the expertise of the market leader in the area of pulse time-of-flight technology has been successfully implemented in many plants.



LMS 2XX SERIES

SICK's LMS Outdoor Laser Measurement Systems are designed for dark objects at long ranges and are found, for example, in port automation systems worldwide. In outdoor use for building security the systems are characterized by minimum false alarm rates under the poorest of environmental conditions. They have robust housings with an enclosure rating of IP 67. Integrated heating in the LMS 211 and LMS 221 systems permit use in ambient temperatures of -30°C to $+50^{\circ}\text{C}$. Internal fog correction also helps the systems maintain a clear view of their surroundings. In addition to a heated front screen, the LMS 211 offers a scanning angle of 100° . All systems can fulfil area monitoring tasks parallel to measurement tasks.

The LMS 291 Laser Measurement System has the same housing as the LMS 200, but is also equipped with internal fog correction. Its IP 65 enclosure rating makes it suitable for use in areas in which no supplementary heating system is necessary – such as collision prevention on transport systems, checking for projections, and in automatic multi-story car parks.





LMS 200



The LMS 200 is a non-contact laser measurement system that scans its surroundings two-dimensionally. As a result of its small light spot and high sensitivity over the first 10 m it is suitable for measuring contours, positioning tasks and checking for projections. Internal fields or distance data can be evaluated. It operates within a temperature range of 0 °C to +50 °C and requires no auxiliary passive components such as reflectors or position marks. The LMS 200's high resolution allows it to take on tasks that have been hitherto impossible or could only be achieved with difficulty or at great cost.

MST 200, LMI 200 AND LMI 400

Customer-specific measurement tasks are achieved rapidly and efficiently, and thus at a reasonable price, with the assistance of the MST 200 Measurement Software Tool for PCs.

The LMI 200 can be customer-specifically programmed – beyond the standard “maximum value” function. Up to two LMS sensors can be connected and their distance data processed. Digital and analogue outputs and an additional RS 485 interface are available for the output of results.

The LMI 400 interface communicates with up to four LMS 2xx-S15 via internal serial interfaces. Two of the four sensors can be processed simultaneously for evaluation; up to six independent monitored fields can be programmed. Six switching outputs can be occupied.



LMS Outdoor/Indoor

Max. range (with 10% reflectivity)	80 m (30 m Outdoor/10 m Indoor)
Angular resolution	1°/0.5°/0.25°
Scanning angle	90°/100°/180°
Response time	13/26/53 ms
Interfaces	RS 232/422
Dimensions in mm (W x H x D)	352 x 266 x 236 with heating, 155 x 210 x 156 without heating
Laser protection class	1 (eye-safe)
Switching outputs	3 x PNP 2 x relay /1 x PNP
Ambient operating temperature	-30 ... +50 °C (0 ... +50 °C Indoor)

Moving faster with greater precision and reliability



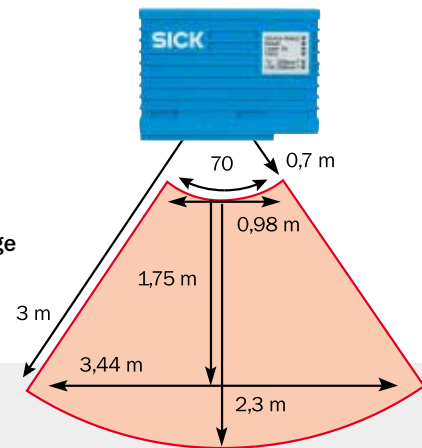
The world of material handling, logistics and manufacturing faces new challenges. Increasing quantities of goods must be accurately transported and processed in ever-shorter times. With the LMS 400, SICK provides a measurement solution with high cycle rates, comprehensive process reliability and improved measurement resolution for short-range applications.

LMS 400



The new LMS 400 positioning and handling scanner from SICK exploits the successful experience gained with the LMS 200. This newly developed device is based on time-of-flight measurement, which SICK has been using in the most varied of industrial applications for many years. The LMS 400 Laser Measurement System was developed for short ranges of up to 3 m, where object detection at maximum resolution is required for high-speed measurements.

The LMS 400 operating range



LMS 400

Max. range (with 10% reflectivity)	3 m
Angular resolution	0.125° ... 1° selectable
Scanning angle	70°
Scanning frequency	200 ... 500 Hz
Interfaces	RS 232/422, Ethernet
Dimensions in mm (W x H x D)	179 x 107 x 130
Laser protection class	2 (eye-safe)
Switching outputs	–
Ambient operating temperature	0 ... +40 °C

Precise all-round measurement with the “LD” family of laser scanners



LD OEM

The LD OEM Laser Measurement System is at the heart of the LD family. It is based on a dual-processor hardware structure. The first DSP (digital signal processor) controls laser measurement and I/O data flow, while a second one is dedicated for running application programs, e.g. profile detection for robots or positioning algorithms for free-moving vehicles. Both processors are connected via a high-speed bus, allowing efficient real-time data acquisition and processing.



LD PDS

By installing a laser scanner you protect both horizontal and vertical areas from intruders. With user-friendly configuration software you define the shape and size of the area to be monitored and can thus take all fixed structures and objects into account.



LD PECCO

The LD PeCo is used for counting people, e.g. in stations, museums and shopping arcades – either for safety reasons or to generate statistics and reports for commercial purposes.



	LD OEM	LD PDS
Range (with 10% reflectivity)	34 m	24 m
Max. range	250 m	24 m
Angular resolution	0.125°/0.25°/0.5°/1°	
Scanning angle	360°	
Scanning frequency	5 ... 20 Hz	
Interfaces*	RS 232/422/CAN	RS 232/422
Dimensions in mm	115 x 120 x 222 (W x H x D)	
Laser protection class	1 (eye-safe)	
Switching outputs	4 x PNP	2 x PNP
Ambient operating temp.	0 ... +45 °C	

* Ethernet in preparation

	LD PeCo
Corridor width	1 m ... 26 m
Installation height	2.5 m ... 15 m
Scanning angle	90°
Scanning frequency	10 Hz + 5%
Interface	RS 422 (DSUB 9) 2 x PNP
Housing colour	Silver (RAL 9006)
Dimensions in mm	350 x 365 x 180 (W x H x D)
Laser protection class	1 (eye-safe)
Weight	5.9 kg
Ambient operating temp.	0 ... +40 °C

The NAV 200 – the positioning system for navigational support



Modern positioning systems like the NAV 200 provide substantial advantages. The system offers maximum flexibility as a result of its unrestricted determination of position via reflectors outside the work area. Even vehicles that are temporarily off course find their own way back to their fixed routes.

NAV 200

The NAV 200 positioning system is a laser scanner with integrated evaluation. The laser scanner's measurement system scans its surroundings two-dimensionally over 360°, whereby it detects fixed defined reflector marks and transfers their positions to the internal evaluation system.

Typical areas of use for the NAV 200 positioning system are shuttle systems, free-moving stackers, and automated guided vehicles in general.



	NAV 200
Reflector memory	Up to 1280 reflectors in 40 layers
Reflector distance	1.2 m ... 28.5 m
Typ. positioning accuracy	Up to ± 4 mm
Typ. angular accuracy	0.1°
Scanning angle	360°
Range to reflector marks (width ≥ 10 cm)	28.5 m
Rotational frequency	8 Hz \pm 10% Positional data are calculated back to the time of their transfer

System overview



LMI 400

- Evaluation functions:**
- For collision prevention and monitored fields
- Data interfaces:**
- 4 x RS 422, 500 KB, LMS 2xx-S15
 - 1 x RS 232/422, Host
- Inputs/outputs:**
- 4 digital inputs
 - 2 incremental encoders
 - 6 digital outputs



LMI 200

- Evaluation functions:**
- Maximum value provision and evaluation
 - Programming platform for customer-specific applications
- Data interfaces:**
- 2 x RS 422, 500 KB; LMS
 - 1 x RS 232/422; Host
 - 1 x RS 485; bus connection
- Inputs/outputs:**
- 4 digital, 2 analogue inputs
 - 2 incremental encoder input pairs
 - 8 digital, 4 analogue outputs



MST 200

Software function library for implementing LMS measurement applications

PC version
Function blocks for programming language Microsoft® Visual C++, for implementation on standard PC



LD PECO

Corridor width	1 m ... 26 m
Installation height	2.5 m ... 15 m
Scanning angle	90°
Scanning frequency	10 Hz + 5%
Housing colour	Silver (RAL 9006)
Interface	RS 422 (DSUB 9) 2 x PNP
Laser protection class	1 (eye-safe)
Ambient operating temp.	0 ... +40 °C
Dimensions in mm	350 x 365 x 180 (W x H x D)
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NAV 200

Reflector memory	Up to 1280 reflectors in 40 layers
Reflector distance	1.2 ... 28.5 m
Typ. positioning accuracy	Up to ± 4 mm
Typ. angular accuracy	0.1°
Scanning angle	360°
Range to reflector marks (width = 10 cm)	28.5 m
Rotational frequency	8 Hz ± 10%

Positional data are calculated back to the time of their transfer

Product overview



LMS/LD laser scanners are not safety devices for personal protection within the sense of valid machine safety standards.



LMS 200-30106	LMS 211-30106 LMS 221-30106	LMS 291-S15
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Technical data				
Max. range with 10% reflectivity	80 m/10 m	80 m/10 m	80 m/30 m	
Scanning angle	180°	100° 180°	180°	
Angular resolution	0.25°/0.5°/1° adjustable	0.25°/0.5°/1° adjustable	0.25°/0.5°/1° adjustable	
Response time	53 ms/26 ms/13 ms	53 ms/26 ms/13 ms	53 ms/26 ms/13 ms	
Scanning frequency	18.7/37.5/75 Hz	18.7/37.5/75 Hz	18.7/37.5/75 Hz	
Resolution/systematic error	10 mm/typ. ± 15 mm	10 mm/typ. ± 35 mm	10 mm/typ. ± 35 mm	
Data interfaces	RS 232/RS 422	RS 232/RS 422	RS 232/RS 422	
Switching outputs	3 x PNP	3 x PNP	3 x PNP	
Laser protection class	1 (eye-safe)	1 (eye-safe)	1 (eye-safe)	
Ambient operating temperature	0 ... +50 °C	-30 ... +50 °C	0 ... +50 °C	
Enclosure rating	IP 65	IP 67	IP 65	
Dimensions in mm (W x H x D)	155 x 210 x 156	352 x 266 x 236 ¹ (without dust shield)	155 x 210 x 156	

¹Or 352 x 266 x 229 for LMS 221

- Further types, including the LMS 211-S15 and LMS 221-S15, are available for connection to the LMI 400.

- LMS 211-S07 and LMS 221-S07 also have relay outputs and are thus optimised for building security.



	LMS 211-30206 LMS 221-30206	LMS 211-S14	LMS 400	LD OEM LD PDS
	80 m/30 m	80 m/30 m	3 m/3 m	250 m/34 m
	100° (LMS 211 OD) 180° (LMS 221 OD)	90°	max. 70°	max. 360°
	0.25°/0.5°/1° adjustable	0.5°	0.125° ... 1° adjustable	0.125°/0.25°/0.5°/1°
	53 ms/26 ms/13 ms	13 ms	5 ... 2 ms	200 ... 50 ms
	18.7/37.5/75 Hz	75 Hz	200 ... 500 Hz	5 ... 20 Hz
	10 mm/typ. ± 35 mm	10 mm/typ. ± 35 mm	1 mm/typ. ± 4 mm	3.9 mm/typ. ± 25 mm
	RS 232/RS 422	RS 232/RS 422	RS 232/RS 422/Ethernet	RS 232/422/CAN/Ethernet ⁴
	3 x PNP ²	—	—	4 x PNP (LD PDS 2 x PNP)
	1 (eye-safe)	1 (eye-safe)	2 (eye-safe)	1 (eye-safe)
	-30 ... +50 °C	-30 ... +50 °C	0 ... +40 °C	0 ... +45 °C
	IP 67/LMS 211-30206 with front screen heating	IP 67/front screen heating	IP 65	IP 65
	352 x 266 x 236 ³ (without dust shield)	352 x 266 x 236 (without dust shield)	179 x 107 x 130	115 x 120 x 222

² Special devices with relay outputs

³ Or 352 x 266 x 229 for LMS 221

⁴ In preparation

RANGE OF EXPERTISE

INDUSTRIAL SENSORS

Our complete range of sensors provides answers to suit any application in the field of automation. Even under rugged ambient conditions objects are reliably detected, counted and positioned in respect of their form, location and surface finish, as well as their distances established with pin-point accuracy.



INDUSTRIAL SAFETY SYSTEMS

Comprehensive safeguarding of both personnel and machinery! As specialists in Sensor Technology, SICK develops and manufactures pioneering products for providing protection in hazardous zones, dangerous locations and for safeguarding access points. By providing services, which encompass all aspects of machine safety and security, SICK is setting new standards in Safety Technology.



AUTO IDENT

Whether the tasks involve identification, handling, classification or volume measurement, innovative Auto Ident systems and laser measuring systems function extremely reliably, even under rapid cycle times. They conform to the latest Standards and can be simply and speedily integrated in all industrial environments and external applications.



ANALYZERS AND PROCESS INSTRUMENTATION

System control, maintaining setpoints, optimising process control and monitoring the flow of materials – the instruments and services for Analysis and Process Measurement, supplied by SICK MAIHAK, are setting the standards for these applications in terms of Technology and Quality.



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