

Building security

Active area monitoring with
LMS laser scanners

up to 80 m radius
up to 180° field of vision

SICK

No entry to unauthorised persons !

The Laser Measurement System (LMS) from SICK is employed wherever large areas require complete protection against unauthorised entry. Even very difficult control functions can be handled because monitored fields can be individually programmed. The system does not just report infringements of monitored fields, it also provides the exact position of the intrusion into the field.

The measuring system consists of the LMS laser scanner and an optional evaluation unit such as the LMI interface from SICK.

The system's special advantages:

- Very long range (up to 80 m, up to 180° angle of vision)
- Field geometries can be set up as required
- Monitored fields are easy to change, e.g. after structural alterations
- Active, dynamic measurement principle, therefore completely independent of illumination
- No mutual interference when several laser scanners are used simultaneously
- Encoded device access for authorised operators only
- Easy to install with the minimum of fuss
- Not affected by stray light
- Optional heatable front window
- Small size



Fig. 1: Typical factory grounds as an example of monitoring.

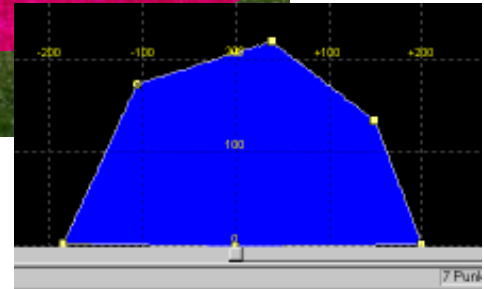


Fig. 2: The configured monitored field is displayed on screen.

Four examples:

Typical areas of application:

- Horizontal monitoring of access to industrial plants
- Surface monitoring, e.g. at power stations
- Monitoring buildings/areas in penal institutions
- Horizontal monitoring of flat roofs
- Vertical monitoring of facades
- Monitoring hazardous zones
- Securing shafts, sewage settling pools, stretches of water
- And many more

Monitoring access

The laser scanner is usually mounted horizontally when monitoring access.

Several reporting levels can be programmed for each scanner (standard function) so that segmented and differentiated alarm levels can be attained. These distinct levels mean that camera control can be initiated and the appropriate camera view of the activated monitored area can be switched to screen display.

This has the advantage that particular monitor views are displayed according to the actual events taking place. This is a great boon for security personnel and improves efficiency. Furthermore, cameras can be directed as required using tilting/turning equipment according to the coordinate values supplied.

Advantages:

- Any area shapes programmable
- Large areas covered
- Segmented alarms and camera control
- Installation on buildings themselves

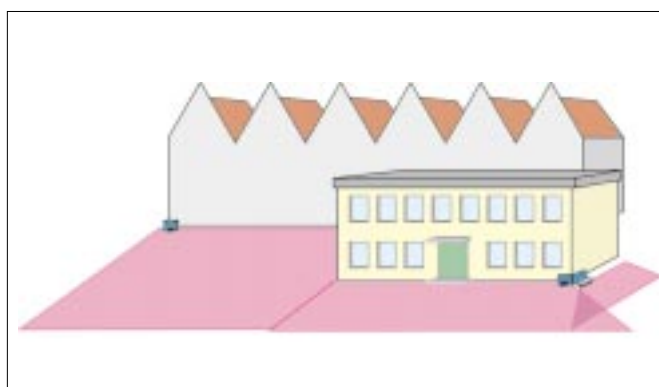


Fig. 3: Monitoring access with two laser scanners.

Monitoring shafts

When monitoring shafts the laser scanner's monitored fields form an optical "lid". Any attempt to break through this lid is immediately detected and leads to, for example, an alarm being triggered. The shaft walls represent the reference contour for the laser scanner so that areas around the shaft can be approached without triggering an alarm. The measurement system is capable of automatically teaching itself the complete extent of the area to be monitored.

Alarm signals can be segmented per shaft or each shaft can be provided with a designation so that, if necessary, video cameras can be controlled appropriately.

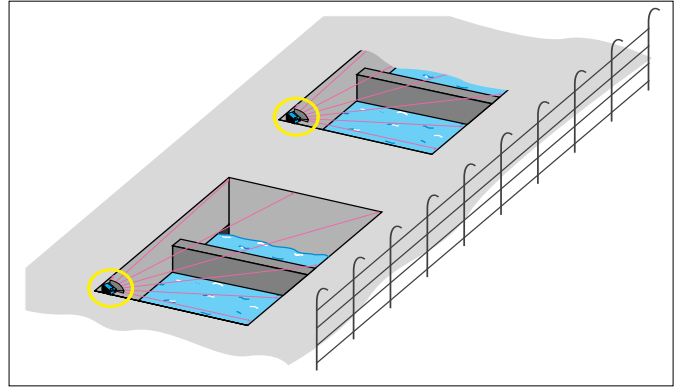


Fig. 4: Securing shaft openings.

Advantages:

- Automatic teaching-in of shaft geometry
- No effect on operations carried out at the edge of the monitored field
- Easy retro-fitting, easy integration
- Even very dark objects (e.g. Neoprene suits) are reliably detected

Monitoring flat roofs

When monitoring flat roofs the laser scanner is predominantly mounted on the building itself. No costly installations or roof structures are necessary. The system's monitored field is set up about 30 cm above the roof's surface so that any attempt to crawl beneath the alarm zone is detected and reported.

Furthermore, the edge of the field can be defined projecting out slightly over the edges of the roof so that any objects used to provide assistance (such as ladders) are detected in good time.

Animals (birds) or leaves passing through the field do not trigger any alarm as a result of the field arrangement and the flexibly adjustable reaction times (filter function).

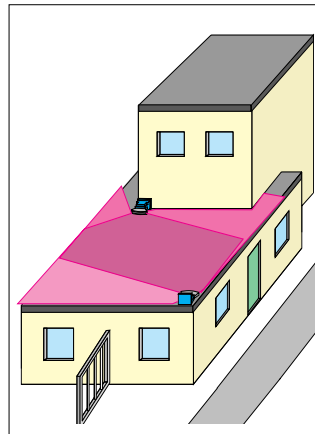


Fig. 5: Monitoring flat roofs.

Advantages:

- Area completely monitored
- Early reporting of any attempt to break in
- Easy retro-fitting
- High security against penetration

Monitoring facades

The laser scanner is usually mounted vertically when monitoring facades. The large sizes of the monitored fields provides effective and reasonably priced monitoring. The ground contour or the building's enclosing wall serves as the reference contour. This means that the system is continuously checking that this reference still exists (distance measurement). Any deviation of this contour, e.g. by movements of the earth (burrowing activities) within the monitored field, or manipulation of the laser scanner (removal) is reported as an alarm.

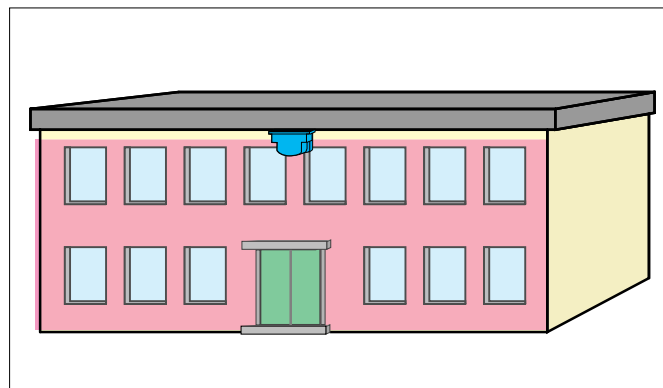


Fig 6: Monitoring facades.

Advantages:

- Large monitored area
- Any contours in the vicinity can be stored as references
- Tunnelling is ruled out
- Area illumination has no effect on efficiency
- Solid objects can be cut out (e.g. wall projections)

**Many more LMS applications
can be developed in practice.**

Building security provided by laser scanners - faster than sound.

The LMS laser scanner is a non-contact measuring system. It uses fan-shaped laser beams to scan a monitored area that can be geometrically defined as desired, and reports any attempt to enter it.

After installation the project-related data is entered into the laser scanner and/or LMI evaluation unit via a PC using the Windows-supported user interface supplied.

How the laser scanner measures its surroundings

The laser scanner operates on the principle of the time-of-flight measurement of a light impulse: an invisible, fan-shaped, pulsed laser beam is emitted at high speed as a kind of "measurement feeler". If it hits an object (a person, vehicle, etc) it is reflected and registered in the laser scanner's receiver unit.

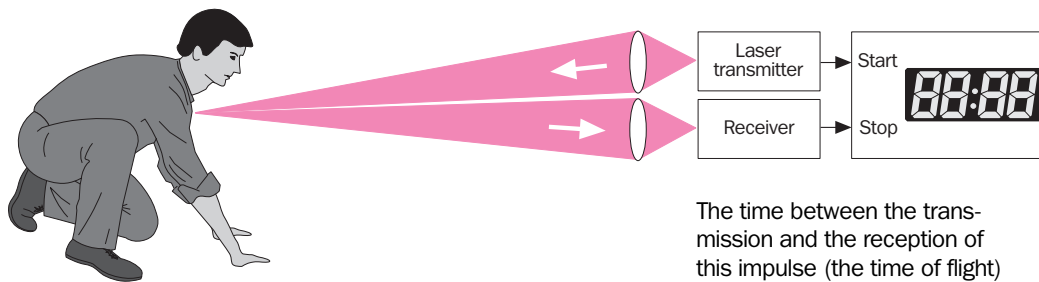


Fig. 7: How the laser scanner works

The time between the transmission and the reception of this impulse (the time of flight) is directly proportional to the distance between the scanner and the object.

The precise position of the object can be determined from the sequence of impulses received.

Infringements of the monitored areas are directly reported via the built-in switching outputs. The contour data can be transferred to an LMI interface or some other evaluation unit via the data interface.

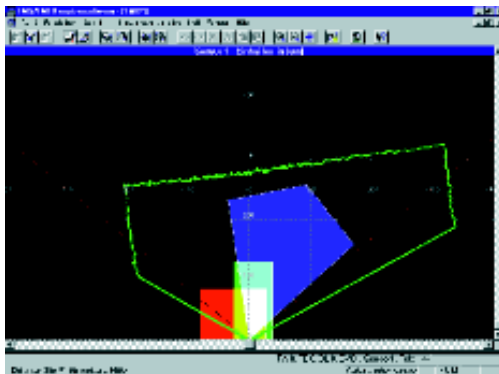


Fig. 8: User interface with display of the scanning line (green) and monitored areas.

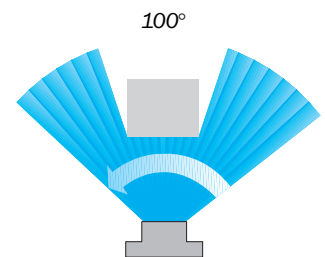


Fig. 9: LMS 211 scanner's laser „fan“.

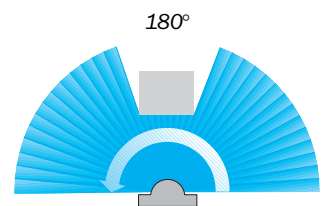


Fig. 10: LMS 221/LMS 291 scanners' laser „fan“.

The laser scanner as an intelligent protective shield.

- Large monitored areas with radii of up to 80 m and fields of vision of up to 180°
- Active system requiring no external illumination
- No gaps in monitored fields
- Individually adjustable alarm zones
- Suppression of rain and snow by intelligent evaluation
- Fog correction prevents false alarms
- Camera trigger and camera control possible
- Alarm raised on manipulation (vandalism)
- Self-testing
- Various mounting/sets for easy installation
- Ambient temperatures of -30°C to +50°C
- Extremely robust housing (IP 67/IP 65)



LMS 211 laser scanner
with dust prevention shield. 100° scanning angle. IP 67, with internal and front window heating.

Fig. 11: LMS 211 laser scanner.



LMS 221 laser scanner
Large scanning angle of 180°. IP 67, with internal heating.

Fig. 12: LMS 221 laser scanner.



LMS 291 laser scanner
in IP 65 metal housing for use in buildings. Large scanning angle of 180°.

Fig. 13: LMS 291 laser scanner.

Long-reaching.

The laser scanner's range is basically dependent on the object's surface. The greater the reflectivity of the object is, the longer the measurement system's range. The over-dimensioned range reserve, however, ensures that even weakly reflective objects are reliably detected.

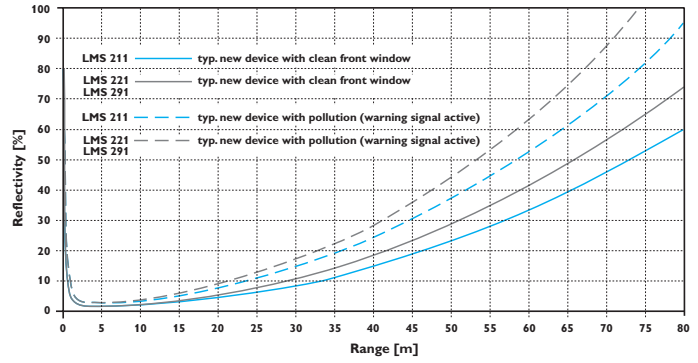





Fig. 14: Range in relation to the object's reflectivity.

	Material	Reflectivity
See the table for the reflectivity of some typical materials („Kodak Standards“).	Cardboard, matt black	10 %
	Wood (raw pine, dirty)	40 %
	PVC, grey	50 %
	Aluminium, black, anodised	110 - 150 %
	Plaster, white	100 %

Diversity.

	LMS type	max. scanning angle	Resolution/typ. measurement accuracy	Range with 10% reflectivity	Heating	Fog correction
	LMS 211-30206 LMS 211-S 07	100°	10 mm/± 60 mm	30 m	✓	✓
	LMS 221-30206 LMS 221-S 07	180°	10 mm/± 60 mm	30 m	✓	✓
	LMS 291-S 05	180°	10 mm/± 60 mm	30 m		✓

Weatherproof.

Rain and snow have no effect on the range of the measuring system. Please note special range details and minimum reflectivity values in foggy conditions.

LMS 211/221/291 technical data		
Range, max.	80 m	
Range for 10% reflectivity	30 m	
Resolution	1 cm	
Systematic error	typ. ± 6 cm	
Scanning angle	LMS 211	100°
	LMS 221/291	180°
Angular resolution	1°/0.5°/0.25°	
Response times	13 ms/26 ms/53 ms	
Power supply	24 V DC	
Outputs	switching signals	2 x N.O. relay contacts/1 x PNP or 3 x PNP
	data output	RS-422, max. 500 Kbaud
Enclosure rating	LMS 211/221	IP 67
	LMS 291	IP 65
Ambient temp.	LMS 211/221	-30° to +50°C
	LMS 291	0° to +50°C
Dimensions (W x H x D)	LMS 211	351.5 x 265.5 x 202 mm ³
	LMS 221	352 x 266 x 194.5 mm ³
	LMS 291	155 x 185 x 156 mm ³

Expandable.

The optional LMI interface is available for expanding the system. It is employed wherever more than 3 monitored fields or switching signals are required, or where special field types with logical linkages are necessary.

It communicates with the LMS laser scanners via a serial interface and processes their 2-dimensional contour data. The data provided by the LMS units are continuously compared with monitored fields stored in the LMI. According to its configuration, the LMI links the evaluations together in such a way that additional logical combinations are created for signalling.

The LMI registers any infringement of the fields at the corresponding switching output. The switching signals can be used, as in LMS stand alone applications, as alarm signal(s) and/or for controlling further security components (such as a video camera).

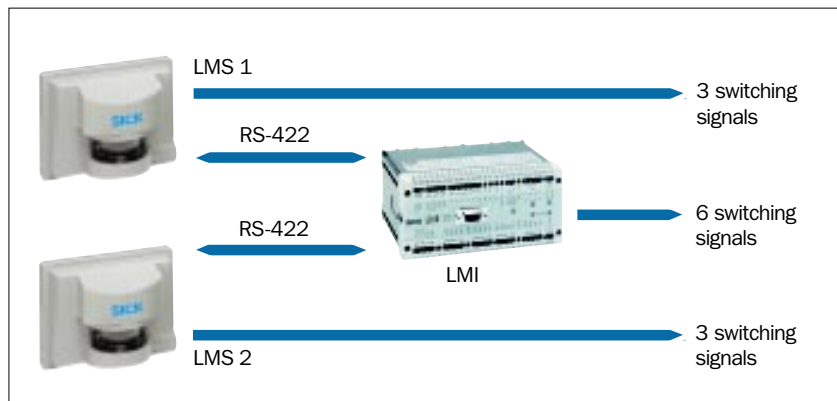


Fig. 15: Variant with two LMS

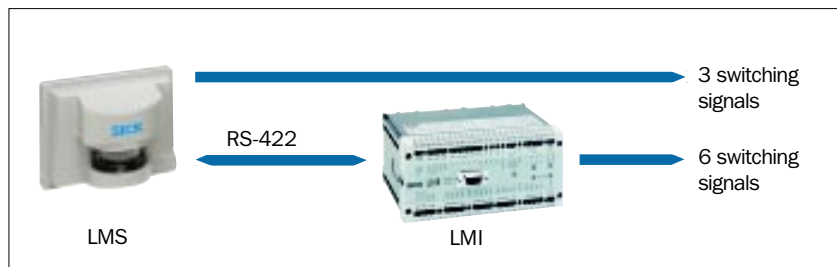


Fig. 16: Variant with one LMS

LMI 400 technical data	
Inputs for laser scanners	4
User interface	RS-232 or RS-422
Switching outputs	6 x PNP (typ. 24 V)
Power supply	24 V DC
Enclosure rating	IP 20
Ambient temperature	0° to +50°C
Dimensions (W x H x D)	152 x 73 x 118 mm ³
Terminal housing	for snap-in mounting

Advantages:

- Up to four laser scanners can be connected
- Up to 6 independently monitored fields can be defined
- 6 independent switching outputs
- Freely selectable evaluation cases and logical linkages of inputs and outputs
- Suppression of snow and rain
- Self-testing
- Simple system diagnosis
- LED indicators show operating states
- No maintenance required
- Compact design

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I am interested in a detailed consultation with one of your project consultants. Please arrange an appointment for me.

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