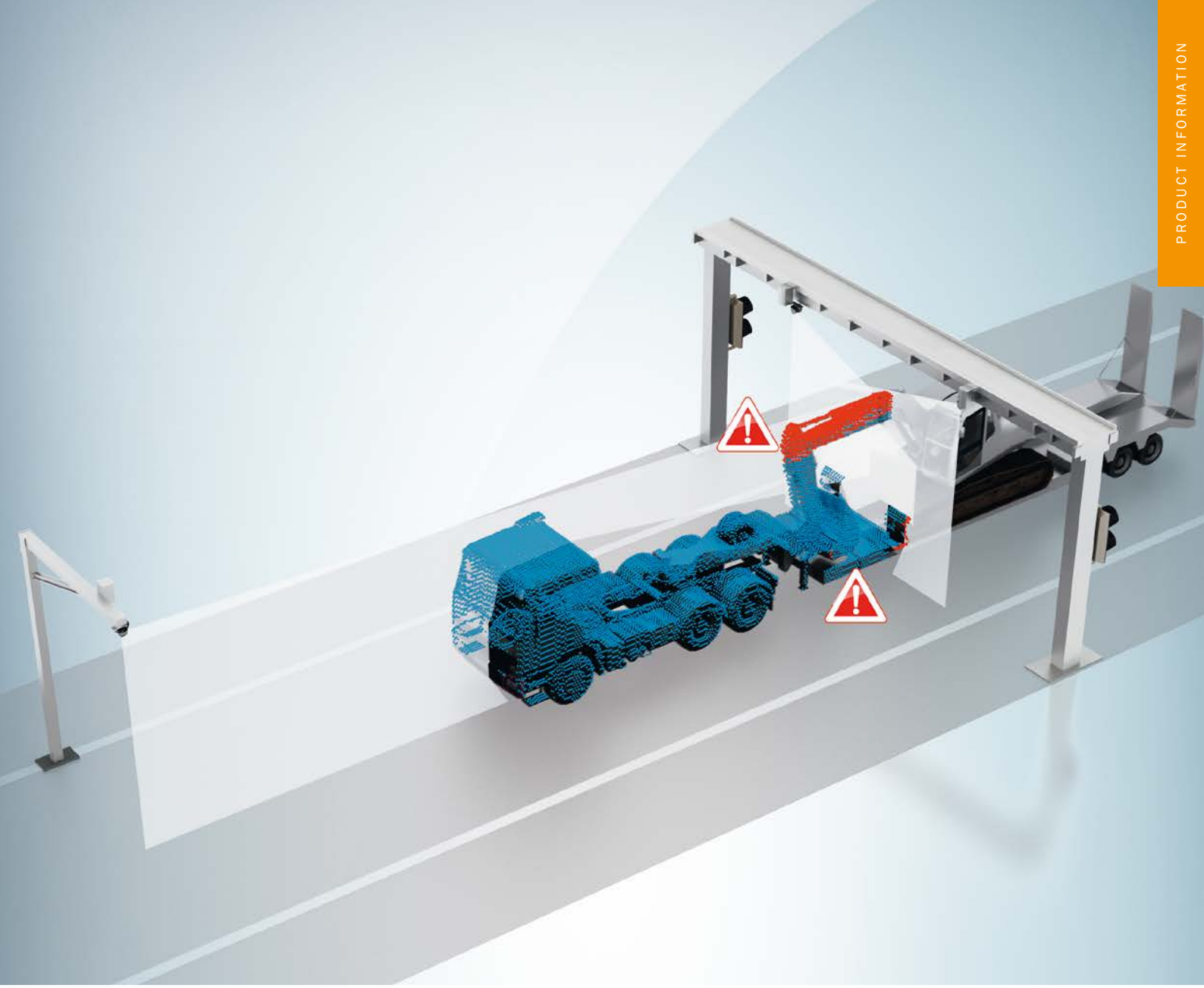
PRODUCT INFORMATION



VPS Pro

SETTING A BENCHMARK IN ROAD AND TRAFFIC TECHNOLOGY

Profiling systems

SICK
Sensor Intelligence.

TOO LONG, TOO WIDE, TOO HIGH?
VPS Pro – MEASURING LARGE OBJECTS WITH HIGH PRECISION IN A MATTER OF SECONDS

"Truck load too high, bridge damaged", "Heavy load will bring tunnel to a standstill", or "Truck too high, bridge too low": messages reporting structural damage caused by vehicles that are too wide or too high are not infrequent. The consequences include not only the massive costs of repairing bridges and tunnels but also the negative impact on the safety and efficiency of our roads.

For safety on the road

With the VPS Pro profiling system, SICK is able to offer a rugged and innovative solution for the automatic measurement of vehicle dimensions. Thanks to state-of-the-art 2D LiDAR sensors, the VPS Pro is even able to measure vehicles such as trucks. The high measurement precision of the VPS Pro makes the system suitable for certification by test authorities.
The VPS Pro supplements SICK's comprehensive portfolio of products for improving road safety. The wide range of sensor solutions, combined with a worldwide service and sales structure, has made SICK a market and technology leader in many fields of data acquisition in traffic engineering.

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Leading edge by innovation: there is much in favor of the VPS Pro

Straightforward configuration

With the user-friendly web-based TEMS Manager configuration tool for straightforward configuration and calibration. The graphical user interface visualizes vehicle data in the live view and facilitates monitoring of the VPS Pro.

Flexible implementation

The TEMS Info Sample-Client implementation complete with source code in the scope of supply of the VPS Pro enables the TCP/IP data flow to be used quickly and selectively. As a result, customers can individually poll VPS Pro-specific measured values, measurement results, and status signals.

Tried and tested components

Rugged and intelligent 2D LiDAR sensors provide the basis for optimum system performance.

Wide range of accessories

SICK offers a wide range of accessories for trouble-free mounting, electrical installation, and commissioning of the VPS Pro.

THE OPERATING PRINCIPLE OF THE VPS Pro

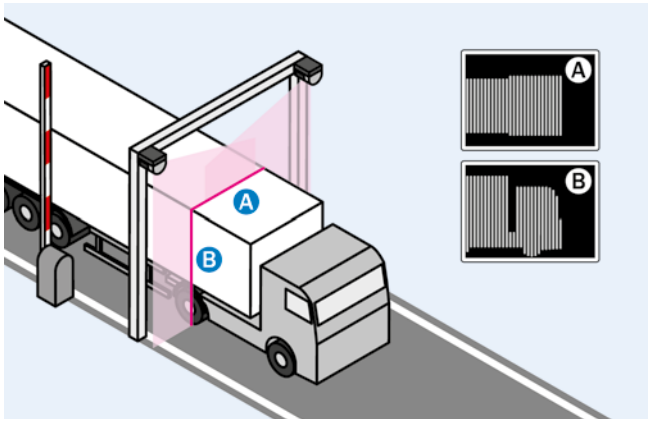
The VPS Pro profiling system consists of three SICK 2D LiDAR sensors. They scan the vehicle to be measured in accordance with the time-of-flight principle: when a target object reflects a laser beam, the position of the object is determined from the distance and angle parameters and this information is forwarded to the central control unit for use in further calculations.

Vehicles are measured in a three-stage process:

The profile of the vehicle is captured

Two 2D LiDAR sensors capture the profile of the vehicle. Mounted on the two brackets at the top of the measurement site gantry, they record the upper contour (A) and the side contour (B) of a vehicle as it passes through. The movement of the vehicle produces a point cloud made up of 2D profile sections.

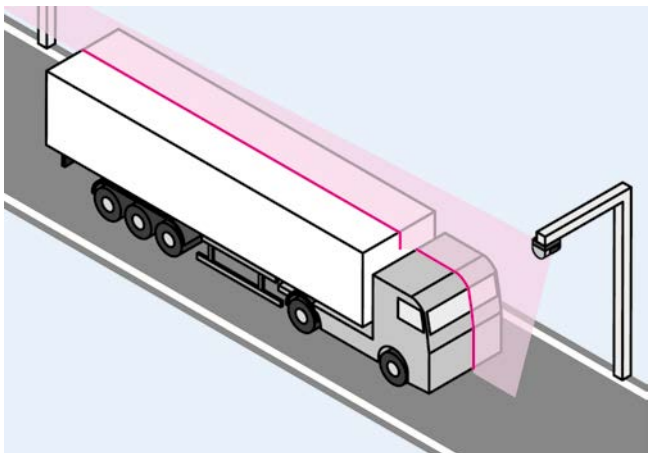
>> See Figure 1



The length of the vehicle is measured

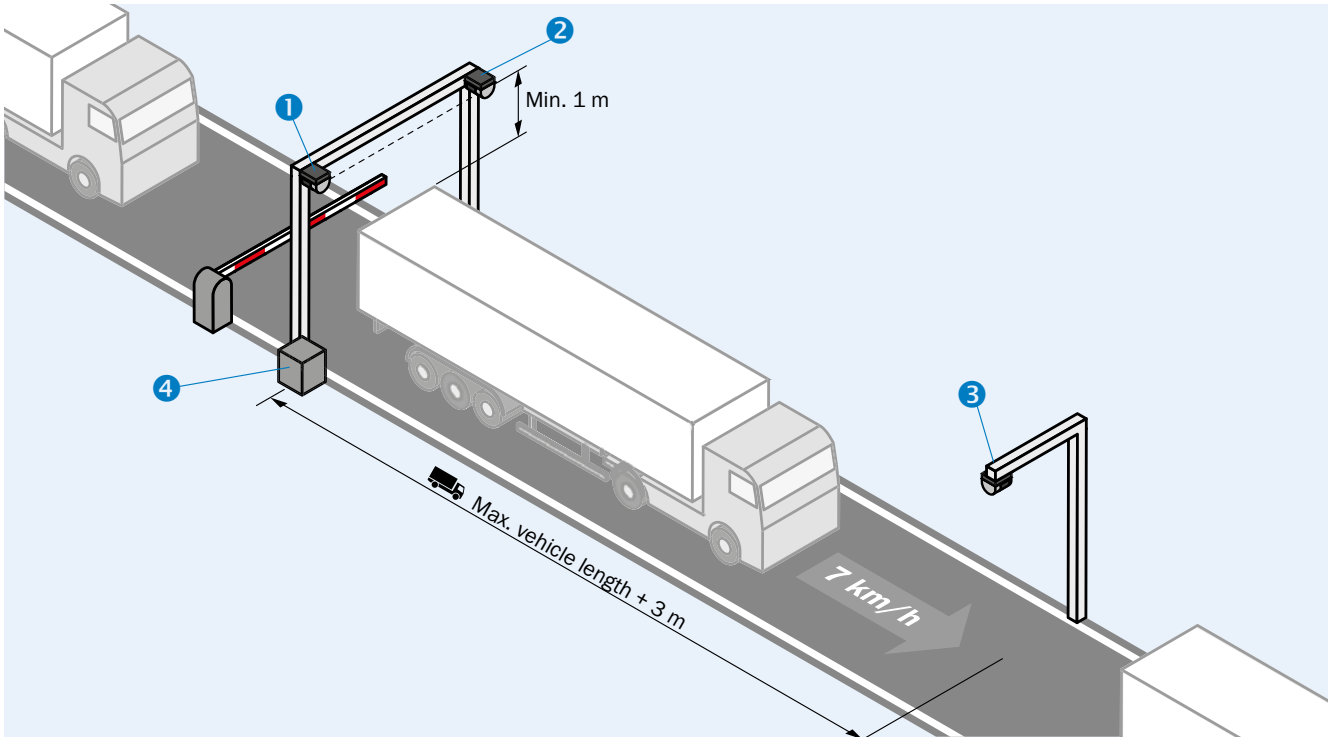
A third 2D LiDAR sensor is mounted at the end of the measurement site above the roadway or at the side of the roadway. This 2D LiDAR sensor scans the front of the vehicle as it approaches, returning the position of the individual 2D profile sections. The movement of the vehicle thus produces a 3D point cloud.

>> See Figure 2



Calculation of vehicle dimensions

All three 2D LiDAR sensors are connected to the Traffic Controller VPS, which is the central control unit of the measuring system. The Traffic Controller receives and filters the incoming sensor data and calculates the vehicle dimensions. It makes all vehicle and system information available via a TCP/IP interface.



System components

The VPS Pro consists of the following system components (>> see Figure 3):

- LMS Width ① and LMS Width ②
  The system variant determines which LMS series 2D LiDAR sensors are used: the VPS153 features two LMS111 2D LiDAR sensors and the VPS553 features two LMS511 2D LiDAR sensors.
- LMS Length ③
  The LMS511 Traffic is used in both the VPS153 and the VPS553.
- Traffic Controller VPS ④
  The central control unit from which all vehicle and system information is sent via the TCP/IP interface.

Measurement site

For the VPS Pro to deliver a reliable and precise result, the following requirements must be met by the measurement site:

- The vehicles to be measured must pass through the measurement site one by one.
- The distance between the maximum vehicle height and the two 2D LiDAR sensors LMS Width and LMS Width must be at least 1 m.
- The overall length of the single-lane measuring system path is determined by the maximum vehicle length to be measured plus 3 m. The path should run in a straight line and the road surface should be even.
- For maximum measurement accuracy, the speed at which vehicles pass through the system should not exceed 7 km/h.

SETTING A BENCHMARK IN ROAD AND TRAFFIC TECHNOLOGY

Product description

The VPS Pro (Vehicle Profiling System) is designed for automatic measurement of vehicle dimensions using eye-safe 2D LiDAR sensors. The VPS Pro measures, amongst other things, the height, length, width, speed, start and end times of the measurement process, and 3D measuring points of the vehicle, including excess dimensions. This information is outputted via a TCP/IP interface. The interface viewer that is supplied displays the information about the measured vehicle. To ensure exact measurement results are obtained, vehicles must pass through the measuring station one by one.

At a glance

- Automatic and precise measurement of vehicle dimensions
- Information about the measured vehicle via TCP/IP interface
- Step-by-step configuration wizard for commissioning
- 3D model of vehicle with colored oversize indication
- Additional engineering support; e.g., integration into a higher-level system

Your benefits

- High measurement accuracy thanks to state-of-the-art laser measurement technology
- Automated measurement process reduces manual labor
- No work is required on the road surface
- High efficiency thanks to short measurement time
- Certifications attainable thanks to precise measurement technology
- Low maintenance requirements save time
- Oversized dimensions are detected, even in hard to reach places
- Modular design enables customization based on your application

CE

Additional information

➜ www.sick.com/VPS_Pro

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.

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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.

Profiling system VPS Pro

General notes

	VPS153	VPS553
Items supplied	LMS511 SE LMS111-10100S05 (2 x) VPS Traffic Controller with VPS software incl. USB stick with TEMS info sample client, source code for TEMS info sample client, TEMS analyzer, and operating instructions	LMS511 SE (3 x) VPS Traffic Controller with VPS software incl. USB stick with TEMS info sample client, source code for TEMS info sample client, TEMS analyzer, and operating instructions

Features

Application	System for measurement of vehicle dimensions
Number of covered lanes	1
Integrated application	Measurement of dimensions for one vehicle at a time
Scanner design	3-scanner solution
Vehicle data	Vehicle dimensions (length, width, height) Vehicle speed 3D measuring points on the vehicle Start- and end measurement point of the measurement
Recommended vehicle distance	Vehicles must pass through the measuring station one by one
Calibration	Yes
Stop-and-go functionality	Yes

Performance

	VPS153	VPS553
Length measurement accuracy [1] [2]	± 100 mm with vehicle speed < 7 km/h	± 50 mm with vehicle speed < 7 km/h
Width measurement accuracy [1] [2]	± 60 mm with vehicle speed < 7 km/h	± 30 mm with vehicle speed < 7 km/h
Height measurement accuracy [1] [2]	± 60 mm with vehicle speed < 7 km/h	± 30 mm with vehicle speed < 7 km/h
Calibration accuracy [1] [3]	30 mm x 30 mm x 30 mm (L x W x H)	20 mm x 15 mm x 15 mm (L x W x H)
Driving speed	3 km/h ... 7 km/h, for full coverage, achievement of the maximum measurement accuracy of the length, width, and height measurement possible 7 km/h ... 100 km/h, reduction in length, width, and height measurement accuracy	
Minimum object size	1 m x 0.6 m x 0.6 m (L x W x H)	
Maximum object size	30 m x 5 m x 5 m (L x W x H)	

[1] Typical value; actual value depends on environmental conditions.

[2] Information refers to twice the standard deviation (2 sigma).

[3] Maximum deviation of the measuring points from the ideal test object.

Interfaces

Ethernet	✔
Function	Operator interface
Protocol	TEMS Info Interface (TCP/IP Interface) TEMS Manager (HTTP configuration software)

Mechanics/electronics

Measuring range requirements	Measuring range (spanned by the measuring sections of the LMS) must be optically free
Installation position	Distributed
Installation requirements	Height of LMS Width: 5 m ... 8 m, at least 1 m higher than the maximum vehicle height Height of LMS Width: 5 m ... 8 m, at least 1 m higher than the maximum vehicle height LMS Length: positioning distance from LMS Width and LMS Width, is maximum vehicle length + 3 m in the direction of travel, laterally or overhead

LMS111-10100S05

Features

Application	Outdoor
Version	Short Range
Light source	Infrared, 905 nm
Laser class	1 (IEC 60825-1:2014)
Aperture angle	270°
Scanning frequency	25 Hz 50 Hz
Angular resolution	0.25° 0.5°
Heating	Yes
Operating range	0.5 m ... 20 m
Max. range with 10 % reflectivity	18 m
Amount of evaluated echoes	2
Fog correction	Yes

Performance

Response time	≥ 20 ms
Detectable object shape	Almost any
Systematic error [1]	± 30 mm
Statistical error [1]	± 12 mm
Integrated application	Field evaluation
Number of field sets	10 fields
Simultaneous evaluation cases	10

[1] Typical value; actual value depends on environmental conditions.

Interfaces

Serial (RS-232)	✔
Function	Host, AUX
Data transmission rate	(9.6 kBaud ... 115.2 kBaud)
Ethernet	✔
Function	Host
Data transmission rate	10/100 MBit/s
Protocol	TCP/IP, OPC
CAN bus	✔
Function	Extension of outputs
PROFIBUS DP	–
PROFINET	–
DeviceNet™	–

Switching inputs	2
Switching outputs	3
Optical indicators	7-segment display (plus 5 LEDs showing device status, contamination warning and initial condition)

Mechanics/electronics

Electrical connection	1 x M12 round connector
Supply voltage	10.8 V DC ... 30 V DC
Power consumption	60 W
Housing color	Gray (RAL 7032)
Enclosure rating	IP67 (EN 60529, Section 14.2.7)
Protection class	III (EN 50178 (1997;10))
Weight	1.1 kg, without connecting cables
Dimensions (L x W x H)	105 mm x 102 mm x 162 mm

Ambient data

Object remission	2 % ... > 1,000 % (reflectors)
Electromagnetic compatibility (EMC)	EN 61000-6-2:2005, EN 61000-6-4 (2007-01)
Vibration resistance	EN 60068-2-6 (1995-04)
Shock resistance	EN 60068-2-27 (1993-03)
Ambient operating temperature	–30 °C ... +50 °C
Storage temperature	–30 °C ... +70 °C
Ambient light immunity	40,000 lx

LMS511 SE

General notes

Description	Configured 2D LiDAR sensor for profiling systems used for traffic applications. Complete specifications can be found under the standard resolution LMS511-10100 PRO (1046135).
Note on use	The sensor does not constitute a safety component as defined by relevant legislation on machine safety.

Features

Application	Outdoor
Version	Mid Range
Resolution power	Standard Resolution
Light source	Infrared (905 nm)
Laser class	1, eye-safe (IEC 60825-1:2014)
Aperture angle	190°
Heating	Yes
Amount of evaluated echoes	5
Fog correction	Yes

Interfaces

Ethernet	✔
Function	Host
Data transmission rate	10/100 MBit/s
Protocol	TCP/IP, OPC
Optical indicators	5 LEDs (Additional 7-segment display)

Mechanics/electronics

Electrical connection	4 x M12 round connector
Supply voltage	24 V DC (19.2 V DC ... 28.8 V DC)
Power consumption	22 W, + 55 W heating (typical)
Housing color	Gray (RAL 7032)
Enclosure rating	IP67 (EN 60529, Section 14.2.7)
Protection class	III (EN 60529, Section 14.2.7)
Weight	3.7 kg
Dimensions (L x W x H)	160 mm x 155 mm x 185 mm

Ambient data

Object remission	2 % ... > 1,000 % (reflectors)
Electromagnetic compatibility (EMC)	EN 61000-6-2:2005, EN 61000-6-3 (2007-03)
Vibration resistance	EN 60068-2-6 (1995-04)
Shock resistance	EN 60068-2-27 (1993-03), EN 60068-2-29 (1993-04)
Ambient operating temperature	–40 °C ... +60 °C
Storage temperature	–40 °C ... +70 °C
Ambient light immunity	70,000 lx

Traffic Controller VPS

General notes

Note on use	Receipt and filtering of sensor data Processing for VPS vehicle data Output of vehicle and diagnostic data via the user interface

Features

Application	Indoor
Internal memory	32 GB

Interfaces

Optical indicators	LED status and function display
Ethernet	✔ (2)
Function	Operator interface, sensor interface
Data transmission rate	1 Gbit/s, for each interface
Protocol	TEMS Info Interface (TCP/IP Interface) WCF TEMS Manager (configuration software)
Electrical connection	Connector LAN 1 (RJ45) for operator interface, connector LAN 2 (RJ45) for sensor interface
NTP synchronization	✔

Mechanics/electronics

Supply voltage	24 V DC (9 V DC ... 25 V DC)
Power consumption	10 W (typical)
Enclosure rating	IP20
Weight	0.7 kg
Housing dimensions (W x D x H)	180 mm x 121.2 mm x 33 mm
Fixing	Screwable

Ambient data

Electromagnetic compatibility (EMC)	EN 55024, EN 55022 Class A
Ambient temperature operation	–20 °C ... +60 °C
Ambient storage temperature	–40 °C ... +80 °C

Ordering information

Profiling system VPS Pro

- **Integrated application:** measurement of dimensions for one vehicle at a time

Items supplied	Length measurement accuracy [1] [2]	Width measurement accuracy [1] [2]	Height measurement accuracy [1] [2]	Type	Part no.
LMS511 SE, LMS111-10100S05 (2 x), VPS Traffic Controller with VPS software incl. USB stick with TEMS info sample client, source code for TEMS info sample client, TEMS analyzer, and operating instructions	± 100 mm with vehicle speed < 7 km/h	± 60 mm with vehicle speed < 7 km/h	± 60 mm with vehicle speed < 7 km/h	VPS153	1067558
LMS511 SE (3 x), VPS Traffic Controller with VPS software incl. USB stick with TEMS info sample client, source code for TEMS info sample client, TEMS analyzer, and operating instructions	± 50 mm with vehicle speed < 7 km/h	± 30 mm with vehicle speed < 7 km/h	± 30 mm with vehicle speed < 7 km/h	VPS553	1067557

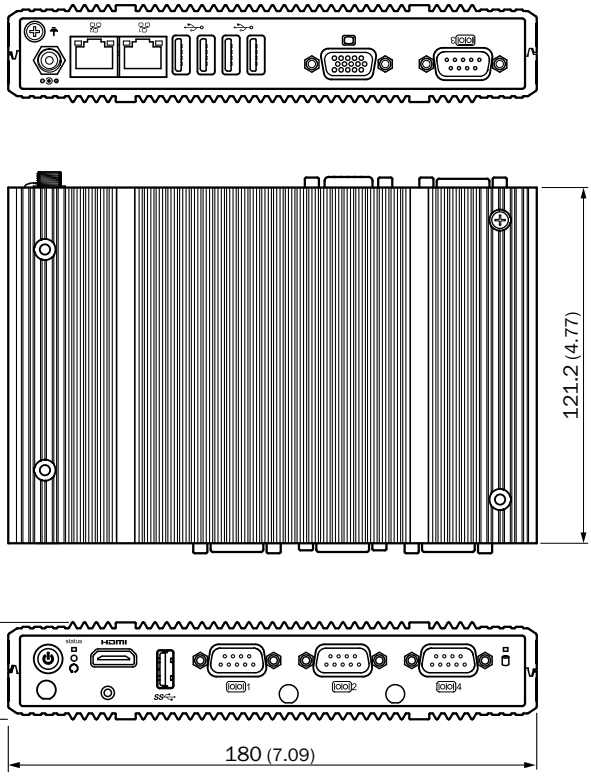
[1] Typical value; actual value depends on environmental conditions.

[2] Information refers to twice the standard deviation (2 sigma).

Type	Part no.
LMS111-10100S05	1055053
Traffic Controller VPS	2093267
LMS511 SE	1091458

Dimensional drawings (Dimensions in mm (inch))

Traffic Controller VPS



Accessories

Mounting systems

Device protection (mechanical)

Figure	Brief description	Type	Part no.	VPS153	VPS553	LMS111-10100S05	Traffic Controller VPS	LMS511 SE
	Protection hood	Protection cover	2056850	●	●	–	–	●
	Weather hood (180°), vertical mounting	Weather hood	2063050	●	●	–	–	●
	Weather hood, 190°	Weather protection cover 190°	2046459	●	–	●	–	–

Mounting brackets and plates

Figure	Brief description	Type	Part no.	VPS153	VPS553	LMS111-10100S05	Traffic Controller VPS	LMS511 SE
	Standard mounting set for weather hood	Mounting bracket	2046025	●	–	●	–	–
	Mounting bracket for LMS5xx (for retrofitting, if 2018303 is already in use)	Mounting bracket	2059271	●	●	–	–	●
	Mounting kit for wall-mounting (adjustment bracket), steel, zinc coated	Mounting kit	2018303	●	●	–	–	●
	Mounting bracket for direct mounting, from the rear, on wall or machine, not adjustable	Mounting kit 1	2015623	●	●	–	–	●
	Mounting bracket for rear mounting on wall or machine with protection of optics hood	Mounting kit 1b	2034325	●	–	●	–	–
	Mounting bracket, adjustable lateral axis, only in conjunction with mounting kit 1a (2034324) or 1b (2034325)	Mounting kit 2	2039302	●	–	●	–	–
	Mounting bracket for rear mounting on wall or machine, adjustable longitudinal and lateral axes, only in conjunction with mounting kit 1 (2015623)	Mounting kit 2	2015624	●	●	–	–	●
	Mounting plate, adjustable longitudinal axis, only in conjunction with mounting kit 2 (2039302)	Mounting kit 3	2039303	●	–	●	–	–
	Mounting bracket for rear mounting on wall, floor, or machine, adjustable longitudinal and lateral axes, only in conjunction with mounting kit 1 (2015623) and 2 (2015624)	Mounting kit 3	2015625	●	●	–	–	●

Other mounting accessories

Figure	Brief description	Type	Part no.	VPS153	VPS553	LMS111-10100S05	Traffic Controller VPS	LMS511 SE
	Strap lock	Adjustable strap lock	5306221	●	●	–	–	–
	Strap for mast bracket (sold by meter)	Tension strap	5306222	●	●	–	–	–

Terminal and alignment brackets

Figure	Brief description	Type	Part no.	VPS153	VPS553	LMS111-10100S05	Traffic Controller VPS	LMS511 SE
	Pole bracket requires additionally adapter bracket (2059271) or mounting set (2018303)	Mast mounting bracket	2018304	●	●	–	–	–

Connection systems

Modules and gateways

Figure	Brief description	Type	Part no.	VPS153	VPS553	LMS111-10100S05	Traffic Controller VPS	LMS511 SE
	Outdoor Ethernet-Switch, 8 ports, operating temperature range –40 °C ... +75 °C	Ethernet switch	6043482	●	●	–	–	–
	Indoor Ethernet-Switch, 8 ports, operating temperature range 0 °C ... +55 °C	Ethernet switch	6033013	●	●	–	–	–

Plug connectors and cables

- **Signal type/application:** Ethernet

Figure	Connection type head A	Connection type head B	Cable	Cable length	Type	Part no.	VPS153	VPS553	LMS111-10100S05	Traffic Controller VPS	LMS511 SE
	Male connector, M12, 4-pin, straight	Male connector, RJ45, straight	4-wire, AWG26	30 m	Connection cable (male connector-male connector)	6045311	–	–	●	–	–
	Male connector, RJ45	Male connector, RJ45	–	3 m	Ethernet data cable	6026083	●	●	–	●	–

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Figure	Connection type head A	Connection type head B	Cable	Cable length	Type	Part no.	VPS153	VPS553	LMS111-10100S05	Traffic Controller VPS	LMS511 SE
	Male connector, M12, 4-pin, straight, D-coded	Male connector, RJ45, 8-pin, straight	4-wire, twisted pair, AWG26, CAT5 (100 Mbit/s)	5 m	SSL-2J04-G05ME	6034415	●	–	●	–	–
				10 m	SSL-2J04-G10ME	6030928	●	–	●	–	–
				20 m	SSL-2J04-G20ME	6036158	●	–	●	–	–

Plug connectors and cables

- **Signal type/application:** Power

Figure	Connection type head A	Connection type head B	Cable	Cable length	Type	Part no.	VPS153	VPS553	LMS111-10100S05	Traffic Controller VPS	LMS511 SE
	Female connector, M12, 5-pin, straight, A-coded	Open cable ends	4-wire	5 m	Connecting cable (female connector - open)	6036159	●	–	●	–	–

Plug connectors and cables

Figure	Connection type head A	Connection type head B	Cable	Cable length	Type	Part no.	VPS153	VPS553	LMS111-10100S05	Traffic Controller VPS	LMS511 SE
	Female connector, M12, 5-pin, straight, A-coded	Open cable ends	4-wire	20 m	Connecting cable (female connector - open)	6042564	●	–	●	–	–
				10 m	Connecting cable (female connector - open)	6042565	●	–	●	–	–
	Female connector, M12, 4-pin, straight	Open cable ends	4-wire	5 m	DOL-1204-G05MAC0	6054495	●	●	–	–	●
				10 m	DOL-1204-G10MAC0	6054494	●	●	–	–	●
				20 m	DOL-1204-G20MAC0	6050687	●	●	–	–	●
	Female connector, M12, 12-pin, straight	Open cable ends	12-wire	20 m	DOL-1212-G20MAC0	6050688	–	●	–	–	–

Plug connectors and cables

- **Signal type/application:** Ethernet CAT5

Figure	Connection type head A	Connection type head B	Cable	Cable length	Type	Part no.	VPS153	VPS553	LMS111-10100S05	Traffic Controller VPS	LMS511 SE
	Male connector, M12, 4-pin, straight, D-coded	Male connector, RJ45, 8-pin, straight	4-wire	5 m	SSL-2J04-G05MAC0	6054493	●	●	–	–	●
				10 m	SSL-2J04-G10MAC0	6054492	●	●	–	–	●
				20 m	SSL-2J04-G20MAC0	6050685	●	●	–	–	●

Further accessories

Calibration tools

Figure	Brief description	Type	Part no.	VPS153	VPS553	LMS111-10100S05	Traffic Controller VPS	LMS511 SE
	Reference box 0.39 m x 1.0 m x 1.85 m (L x W x H)	Test object	–	●	●	–	–	–

Test and monitoring tools

Figure	Brief description	Type	Part no.	VPS153	VPS553	LMS111-10100S05	Traffic Controller VPS	LMS511 SE
	Scan finder, receiver to localize infrared scans	Scan-Finder LS-80L	6020756	●	●	–	–	●

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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 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."

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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.

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