# VMS4x00/5x00

## PRECISE OBJECT MEASUREMENT AT VERY HIGH SPEEDS

Track and trace systems

**SICK**

Sensor Intelligence.

# 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, position determination as well as deformation control for objects on a diverse range 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.
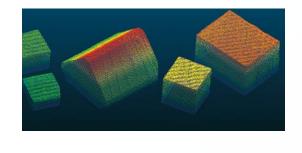
- Optimal storage place allocation
- Creation of load proposal lists
- Protection of conveyor systems and quality control of cuboid objects by means of deformation detection
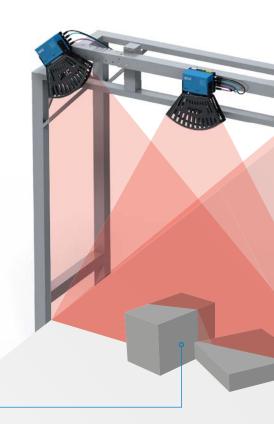
# SIZE MEASUREMENT WITHOUT COMPROMISE

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 Sensor Integration Machine combines the individual measured values into a point cloud to form a three-dimensional image
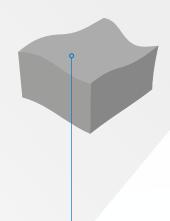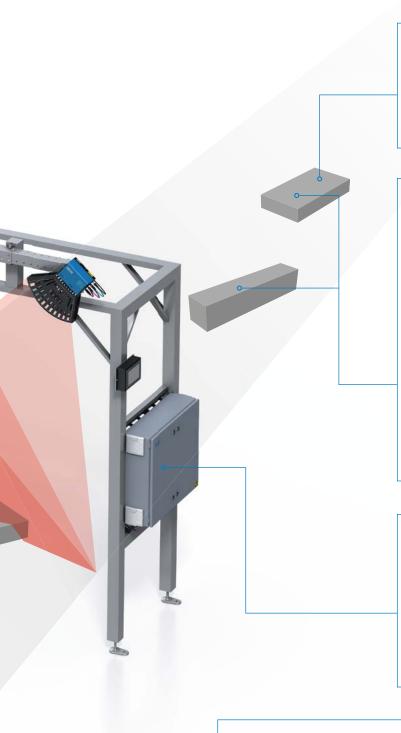- Provides traceability of the material handling process in the event of damage

**⊕ Higher legal-for-trade rate thanks to touching/side-by-side functionality**

- Inline detection and measurement of touching objects for billing purposes
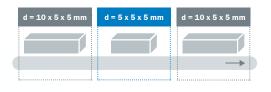- Singulation is no longer required

## ✚ 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

- Allows automatic switching 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

| d = 10 x 5 x 5 mm | d = 5 x 5 x 5 mm | d = 10 x 5 x 5 mm |
|---|---|---|

## ✚ Flexible software customization despite anti-tamper protection

- Separation of metrologically relevant software and application-specific software in the Sensor Integration Machine in the case of the certified VMS5x00 system variants
- No recertification required when the application-specific software component is modified, meaning that costs are reduced
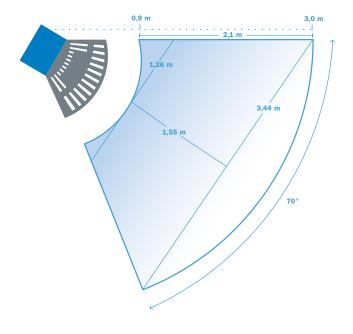
## ✚ Dynamic deformation detection

- Detection of deformations on all six sides of cuboid objects
- Deformations detectable down to 10 mm
- Two zones with individually configurable tolerance limits for the degree of deformation

# THE HIGH PERFORMANCE EYE OF THE SYSTEM: THE LMS4000

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.

**Measurement field width**
- Objects with a height of 1 m can be measured consistently by the LMS4000 across a width of 2.6 m. For 2 m high objects, the measuring field width can be up to 1.4 m

**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

**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

**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

**www.sick.com/LMS4000**

# PRECISE OBJECT MEASUREMENT AT VERY HIGH SPEEDS

## Product description

The VMS4x00/5x00 track and trace system is ideal for challenging applications in the field of non-contact dynamic measurement as well as position determination and deformation detection 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. When using a certified system, the dimension data of the objects can be used for billing purposes. The system variant for deformation control detects even the smallest deformations on any of the six sides of cuboid objects and provides a perfect monitoring tool to check objects during goods receipt and storage.

## 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 up to 4.0 m/s

- Certified according to MID, NTEP (OIML), MC and NMI
- Option of output as point cloud
- Dynamic scale value switchover
- Detection of 10 mm or larger deformations on all six sides

## 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
- Flexible and individual software customization despite anti-tamper protection
- Quality inspection of all six sides of moving cubic objects

MID $C\epsilon$

### Additional information

→ 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 | VMS4200(-x) / VMS5200(-x) MID | VMS4300 / VMS5300 | VMS4400 CV |
|---|---|---|---|---|
| **Items supplied** | 1 x SIM2000 Controller<br>1 x encoder<br>1 x LMS4000 head<br>1 x photoelectric sensor (optional)<br>Connection cables, holders, and frame options depending on the application<br>1 x display (depending on type) | 1 x display<br>1 x SIM2000 Controller<br>1 x SIM2000 dimension controller (optional for high throughput)<br>1 x alibi memory<br>1 x Array photoelectric sensor<br>2 x LMS4000 head<br>1 x photoelectric sensor (optional)<br>Connection cables, holders, and frame options depending on the application<br>1 x encoder (depending on type) | 1 x SIM2000 Controller<br>1 x encoder<br>3 x LMS4000 head<br>1 x photoelectric sensor (optional)<br>1 x APU8520<br>Connection cables, holders, and frame options depending on the application<br>1 x display (depending on type) | LMS (4x)<br>SIM<br>APU8520<br>Encoder (optional)<br>Brackets, conection cables, frame (customized) |

## Features

| | VMS4100 / VMS5100 | VMS4200(-x) / VMS5200(-x) MID | VMS4300 / VMS5300 | VMS4400 CV |
|---|---|---|---|---|
| **Industries** | Courier, express, parcel, and postal<br>Retail and warehousing | | | |
| **Products by tasks** | Dimensioning | | | |
| **Applications** | Object measurement (non-contact, dynamic)<br>Volume measurement<br>Position measurement<br>Checking object dimensions<br>Package sorting<br>Master data acquisition | Object measurement (non-contact, dynamic)<br>Volume measurement<br>Position measurement<br>Checking object dimensions<br>Parcel and flats sorting<br>Master data acquisition (depending on type) | Object measurement (non-contact, dynamic)<br>Volume measurement<br>Position measurement<br>Checking object dimensions<br>Parcel and flats sorting<br>Master data acquisition | Object measurement (non-contact, dynamic)<br>Volume measurement<br>Position measurement<br>Deformation detection |
| **Laser class** | 2, with laser protection cover | | | |
| **Legal-for-trade** | – / ✔ (depending on type) | | | – |
| **Conveyor type** | Conveyor belt | Cross belt<br>Conveyor belt (depending on type) | Conveyor belt | |

## Performance

| | VMS4100 / VMS5100 | VMS4200(-x) / VMS5200(-x) MID | VMS4300 / VMS5300 | VMS4400 CV |
|---|---|---|---|---|
| **Transport speed** | ≤ 0.1 m/s ... 3 m/s, start-stop operation possible | ≤ 0.1 m/s ... 4 m/s, start-stop operation possible (depending on type) | ≤ 0.1 m/s ... 2.5 m/s, start-stop operation possible | Start-stop operation possible |
| **Maximum object size** | 5,500 mm x 1,200 mm x 1,100 mm 216 ″ x 47 ″ x 43 ″ | 2,500 mm x 1,600 mm x 1,100 mm 98 ″ x 63 ″ x 43 ″ 5,500 mm x 1,600 mm x 1,100 mm 216 ″ x 63 ″ x 43 ″ (depending on type) | 5,500 mm x 1,600 mm x 1,250 mm 216 ″ x 63 ″ x 43 ″ | 2,000 mm x 1,000 mm x 1,000 mm 80 ″ x 40 ″ x 40 ″ |
| **Minimum object size** | 50 mm x 50 mm x 20 mm 2 ″ x 2 ″ x 1 ″ | 50 mm x 50 mm x 50 mm 2 ″ x 2 ″ x 2 ″ 50 mm x 50 mm x 20 mm 2 ″ x 2 ″ x 1 ″ (depending on type) | 50 mm x 50 mm x 20 mm 2 ″ x 2 ″ x 1 ″ | 200 mm x 100 mm x 100 mm 8 ″ x 4 ″ x 4 ″ |
| **Minimum object distance** | 50 mm, touching/ Side-by-side possible | 50 mm | 0 mm, 50 mm, Depending on operating mode | > max. object height incl. max. deformation on the top side |
| **Accuracy of object coverage** | ± 5 mm x ± 5 mm x ± 2 mm ± 0.2 ″ x ± 0.2 ″ x ± 0.1 ″ | ≥ 5 mm x ≥ 5 mm x ≥ 5 mm ≥ 0.2 ″ x ≥ 0.2 ″ x ≥ 0.2 ″ ± 5 mm x ± 5 mm x ± 2 mm ± 0.2 ″ x ± 0.2 ″ x ± 0.1 ″ (depending on type) | ± 5 mm x ± 5 mm x ± 2 mm ± 0.2 ″ x ± 0.2 ″ x ± 0.1 ″ | Only valid for dimensioning, not for deformation measurements. ± 0.2 ″ x ± 0.2 ″ x ± 0.2 ″ |
| **Minimum detectable deformation** | – | | | –10 mm [1] |
| **Certification** | MID (OIML) NTEP on request | | | – |
| **Dynamic scale value** | ✔ | | | – |
| **Maximum latency time data output** | – | | | 1 s |
| **Side-by-side** | ✔ | – | ✔ | – |
| **Touching objects** | ✔ | – | ✔ | – |
| **Deformation detection** | – | | | ✔ |

[1] (from enveloping box), no specification on achievable accuracy for measrued deformations, no distinction between convex and concave deformation structure, holes cn not be detected.

## Interfaces

| | VMS4100 / VMS5100 | VMS4200(-x) / VMS5200(-x) MID | VMS4300 / VMS5300 | VMS4400 CV |
|---|---|---|---|---|
| **Fieldbus, industrial network** | Ethernet-based or serial RS232, 422, 485 | | | |
| **Optical indicators** | 1, display | | | 1, optional |
| **Output data** | XML ASCII Customer protocol | | | |
| **Configuration interface** | Ethernet SOPAS Engineering Tool | | | Ethernet: SOPAS Engineering Tool |

## Mechanics/electronics

| | VMS4100 / VMS5100 | VMS4200(-x) / VMS5200(-x) MID | VMS4300 / VMS5300 | VMS4400 CV |
|---|---|---|---|---|
| **Enclosure rating** | IP20 (DIN 40050) | | | IP54 (EN60529) |
| **Supply voltage** | 230 V AC 100 V AC … 264 V AC | 230 V AC 100 V AC … 264 V AC (depending on type) | 230 V AC 100 V AC … 264 V AC | 100 V AC … 264 V AC |
| **Mains frequency** | 50 Hz … 60 Hz | | | |

## Ambient data

| | VMS4100 / VMS5100 | VMS4200(-x) / VMS5200(-x) MID | VMS4300 / VMS5300 | VMS4400 CV |
|---|---|---|---|---|
| **Ambient temperature, operation** | –10 °C … +50 °C | | 0 °C … +40 °C | |
| **Ambient temperature, storage** | –20 °C … +70 °C | | | |
| **Permissible relative humidity** | 95 %, Non-condensing | | | < 90 %, Non-condensing |
| **Electromagnetic compatibility (EMC)** | EN 61000-4-2:2009, EN 61000-4-3:2011, EN 61000-4-4:2013, EN 61000-4-11:2005 | | | |
| **Object remission** | 10 % … 200 %, based on Kodak White Paper and red light laser), non-glossy (e.g. tape) | | | |
| **Shock load** | EN 60068-2-65, –27, –29, –64 | | | |
| **Vibration load** | EN 60068-2-65, –27, –29, –64 | | | |
| **Requirements conveyor** | Straight and level conveyors with a uniform and level surface (in the measurement location area) | The cross belt conveyor system must run straight with no deviations (in the measurement location area) / Straight and level conveyors with a uniform and level surface (in the measurement location area) (depending on type) | Straight and level conveyors with a uniform and level surface (in the measurement location area) | Minimum 40 mm ± 2 mm conveyor gap, conveyor segments with synchrnized speed (max. 0,1% deviation reference to the max. object lenght), levelized conveyor segments (smooth object transitions) |

## Ordering information

| Transport speed | Accuracy | Certification | Deformation detection | Touching objects | Side-by-side | Type | Part no. |
|---|---|---|---|---|---|---|---|
| ≤ 0.1 m/s … 3 m/s, start-stop operation possible | ± 5 mm x ± 5 mm x ± 2 mm ± 0.2 ″ x ± 0.2 ″ x ± 0.1 ″ | – | – | ✔ | ✔ | VMS4100 | On request |
| | | MID (OIML), NTEP on request | – | ✔ | ✔ | VMS5100 MID | On request |
| 0.5 m/s … 4 m/s | ≥ 5 mm x ≥ 5 mm x ≥ 5 mm ≥ 0.2 ″ x ≥ 0.2 ″ x ≥ 0.2 ″ | MID (OIML), NTEP on request | – | – | – | VMS5200-x MID | On request |
| | | – | – | – | – | VMS4200-x | On request |
| ≤ 0.1 m/s … 4 m/s, start-stop operation possible | ± 5 mm x ± 5 mm x ± 2 mm ± 0.2 ″ x ± 0.2 ″ x ± 0.1 ″ | – | – | – | – | VMS4200 | On request |
| | | MID (OIML), NTEP on request | – | – | – | VMS5200 MID | On request |
| ≤ 0.1 m/s … 2.5 m/s, start-stop operation possible | ± 5 mm x ± 5 mm x ± 2 mm ± 0.2 ″ x ± 0.2 ″ x ± 0.1 ″ | – | – | ✔ | ✔ | VMS4300 | On request |
| | | MID (OIML), NTEP on request | – | ✔ | ✔ | VMS5300 MID | On request |
| Start-stop operation possible | Only valid for dimensioning, not for deformation measurements. ± 0.2 ″ x ± 0.2 ″ x ± 0.2 ″ | – | ✔ | – | – | VMS4400CV | On request |

## Type code

**VMS system type**

| | |
|---|---|
| 4 | Standard VMS (not certified) |
| 5 | LFT ( MID/OIML/NTEP/NMI/CWM...) |
| | ....tbd. |

**Number of VMD - / LMS4000 heads**

| | |
|---|---|
| 1 | 1 Laser Head (VMSx1xx) |
| 2 | 2 Laser Head (VMSx2xx) |
| 3 | 3 Laser Head (VMSx3xx) |
| 4 | 4 Laser Heads (VMSx4xx e.g. Contour Verification) |

**System Controller (additional iPC included)**

| | |
|---|---|
| 0 | mit MSC800+VMC800 (old systems might be combined with LMS4000 heads) |
| 1 | SIM1000 |
| 2 | SIM2000 |
| 3 | ... tbd. |
| 4 | SIM4000 |
| 5 | ... tbd. |
| X | without Controller |

**Head-type**

| | |
|---|---|
| 0 | LMS4000 - New Head Generation |
| 1 | VMD4xx/VMD5xx - Old Head Generation (old systems may be combined with SIM2000 in the future) |
| 2 | ... tbd. |

**Conveyor type**

| | |
|---|---|
| B | Belt conveyor |
| C | Cross belt sorter |
| K | Chain conveyor |
| R | Roller conveyor |
| T | Tilt-Tray - Sorter |
| | ....tbd. |

**Application**

| | |
|---|---|
| A | Standard Volume Measurement (singulated) |
| C | CV Contour Verification |
| P | Package Counter |
| | ....tbd. |

**Frame**

| | |
|---|---|
| A | Modular VMS Mount, twisted |
| B | Modular VMS Mount, straight |
| H | Hollow Shaft |
| U | Mounting bracket |
| | ... tbd. |

**Additional components (extensions)**

| | |
|---|---|
| 0 | Standard (without additional/special components) |
| 1 | ...tbd. |

**Extension of special functionalities (e.g. Software)**

| | |
|---|---|
| 0 | Standard |
| 1 | ... tbd. |

**System category**

| | |
|---|---|
| | Standard System (field remains blank) |
| S | Customer Specific |
| M | Prototype System |
| | ... = tbd. |

**Customer Specific Extensions**

| | |
|---|---|
| | Standard (no customer specific extensions - field remains blank) |
| 01 | First Custiomer Specific Extension |
| 02 | ... Increment for next Custiomer Specific Extension = "01" |
| 03 | VMS system without rotary encoder (signal from system e.g. scale) |
| 99 | ...tbd. |

| VMS | | | | - | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

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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 10,400 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.

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Detailed addresses and further locations ➜ **www.sick.com**

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