OPERATING INSTRUCTIONS


# VMS 100
# Volume Measurement System

SICK

## Software versions described

| Software/Tool | Function | Version |
|---|---|---|
| gnu960_VMS100_2-21 | Evaluation Software (Firmware) | V2.21 20-09-2001 |
| VMS100_setup | Commissioning Software | V2.11 20-09-2001 |

# Contents



## Abbreviations used

| | |
|---|---|
| HD | **H**igh **d**ensity |
| LED | **L**ight **e**mitting **d**iode |
| LMI | **L**aser **M**easurement **I**nterface |
| LMS | **L**aser **M**easurement **S**ystem |
| VMS | **V**olume **M**easurement **S**ystem |
| VMC | **V**olume **M**easurement **C**ontroller |

## Tables

## Illustrations



# 1 About this document

## 1.1 Function

This document provides instructions for commissioning, operating and maintaining the SICK VMS 100 Volume Measurement System.

The document contains information on:

- mounting and electrical installation,
- commissioning,
- operation and configuration (parameter-setting),
- maintenance,
- replacing system components.

The VMS 100 Volume Measurement System will simply be described as the VMS 100 in this document.

## 1.2 Target group

The target group of this document are persons carrying out the following activities:

### 1.2.1 Mounting, electrical installation, device replacement

Specialist personnel such as service technicians or factory electricians

### 1.2.2 Commissioning, maintenance

Specialist personnel such as technicians or engineers

### 1.2.3 Operation

Specialist personnel for operation and parameterisation of the transport system

## 1.3 Depth of information

This document contains all the information necessary for the mounting, electrical installation and commissioning of the VMS 100 with the basic operational settings. Step-by-step instructions are provided for all activities.

Configuration (parameter-setting) of the VMS 100 for on-site application is carried out using the VMS 100 Commissioning Software. Installation of the software and interaction with the user interface is described in *Chapter 6 Commissioning and parameter-setting*.

The document provides information on the working principle and the technical data of the VMS 100 Volume Measurement System. Details on the LMS 200 Laser Measurement System (Type 30106) and the VMC 100 evaluation unit (based on the SICK device LMI 200) can be found in the appropriate documentation, see *Chapter 10.4 Supplementary documentation*.

Further information on Volume Measurement Systems, Laser Measurement Systems and bar-code scanners can be obtained from SICK AG, Division Auto Ident.

## 1.4 Symbology used

Some information in this documentation is given particular emphasis to make it easier to find it quickly.

**ATTENTION**

**WARNING!**
Warnings prevent physical injury or serious damage to the VMS 100.

➢ Always read warnings attentively and follow instructions carefully.

**Recommendation** A recommendation helps you carry out an activity more efficiently.

**Please note** Such notes provide information on special features.

`Font` This style of writing signifies an input or term in the user interface of the VMS 100 Commissioning Software.

*Reference* Italics are used to refer to more detailed information elsewhere.

➢ You must do something here. This symbol signifies an action comprising a single-step instruction. Instructions involving more than one step are signified by the use of successive numbers.

# 2 For your safety

## 2.1 Authorised personnel

Sufficiently qualified personnel must mount and operate the VMS 100 to ensure proper and safe function.

The following qualifications are required for the various activities:

### 2.1.1 Mounting and maintenance

- Practical technical training
- Knowledge of current safety regulations for the workplace

### 2.1.2 Electrical installation and replacement of devices

- Practical training in electrical engineering
- Knowledge of the current electrical engineering safety regulations
- Knowledge on the operation and use of transport systems

### 2.1.3 Commissioning, operation and parameter-setting

- Knowledge of the mechanical and electrical engineering parameters of transport systems and the properties of transport systems regarding their operation and use
- Basic knowledge of Windows NT™/Windows 95
- Basic knowledge of data transfer

## 2.2 Proper use

The VMS 100 Volume Measurement System measures rectangular objects on transport systems. The VMS 100 determines the length, width and height of rectangular objects and transfers this information, via a data interface, to a higher-ranking computer for further processing.

**The measurement system is not a device for protecting persons as definded by current machine safety standards.**

The system consists of an LMS 200 Laser Measurement System of type 30106 (enclosure rating IP 65) and a VMC 100 Controller, also known as an evaluation unit (VMC 100-0000: enclosure rating IP 20, VMC 100-0100: enclosure rating IP 65). There is a switchable RS-232/RS-422 interface on the evaluation unit for data output. Devices such as a bar-code scanner or weighing machine can be connected to an RS-485 interface. A shaft encoder and photoelectric switch can be connected to the VMC 100.

All warranty claims against SICK AG are forfeited in the case of any other use, or alterations being made to devices, even as part of their mounting or electrical installation.

## 2.3 General safety information and protective measures

- Read the general safety information attentively and follow it carefully during all activities with the VMS 100. Similarly, pay attention to the warnings before instructions in the individual chapters of this document.

**ATTENTION**

**Danger of injury through electrical current**

The VMC 100 (DC 24 V) can also be connected to the power supply network (AC 230 V 50 Hz) via a power supply unit.

- Follow the current safety regulations when working with electrical equipment.

**ATTEN ION**

**Laser radiation**

The LMS 200 operates using a Class 1 infrared laser.

- Follow laser protection regulations according to DIN EN 60825-1 (latest version).

**Laser warning plate**

The laser warning plate and laser warning symbol (*Fig. 2-1*) are located on the right-hand side of the LMS 200 Laser Measurement System, as seen from the front.

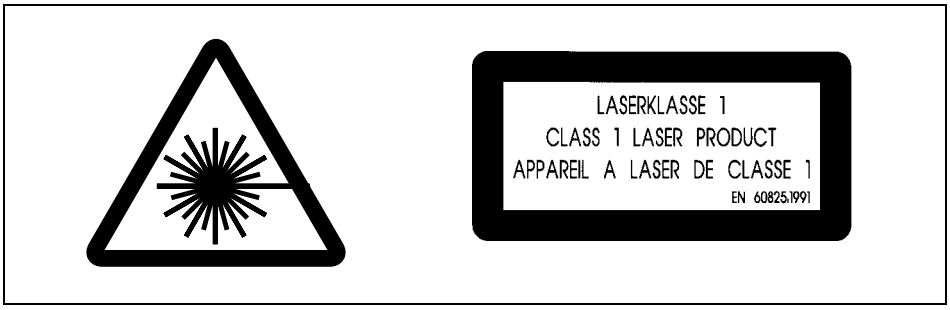



Fig. 2-1: Laser warning plates attached to the LMS 200.

**Please note:**

**If the Laser Measurement System is installed within a machine/casing in such a way that the laser warning plates are covered up, more warning plates (not supplied) must be attached to the machine/casing next to the laser beam exit window!**

## 2.4 Quick stop and quick start

### 2.4.1 Switching off the VMS 100

- Switch off the VMC 100's power supply.
  The VMS 100 retains permanently stored parameters in its internal memory. Measurement data are lost.

### 2.4.2 Switching on the VMS 100

- Switch on the VMC 100's power supply.
  The VMS 100 restarts operation with the parameters that were most recently saved.

## 2.5 Environmental friendliness

The VMS 100 is constructed in such a way that it adversely affects the environment as little as possible.

### 2.5.1 Energy requirement

The VMS 100, with the LMS 200 and VMC 100, has a maximum consumption of approx. 60 W.

### 2.5.2 Disposal after final decommissioning

Dispose of unusable or irreparable devices in an environmentally friendly manner according to the particular waste disposal regulations valid in the country of use. The VMS is constructed to allow separation into recyclable secondary raw materials and special waste (electronic scrap). See *Chapter 7.3 Disposal.*

SICK AG does not currently take back any unusable or irreparable devices.

# 3 Product description

## 3.1 System components

### 3.1.1 Equipment supplied

The VMS 100 is supplied with:

- one LMS 200-30106 Laser Measurement System,
- one Mounting Set for adjusting the LMS 200-30106, two-axis, fine adjustment,
- one VMC 100 Volume Measurement Controller with VMS 100 Evaluation Software installed.
  VMC 100-0000 with Mounting Set for wall mounting.
  VMC 100-0100 with switching cabinet incl. power supply unit,
- one Set for the electrical connection of the LMS 200-30106 to the VMC 100,
- one diskette with VMS 100 Commissioning Software for a PC under Windows NT™/Windows 95,
- one set of VMS 100 Operating Instructions

*Chapter 10.3 Available accessories (order details)* provides an overview of the accessories for operation, installation and electrical connection, as well as supplementary documentation.

### 3.1.2 System requirements

The following are required for commissioning and operating the VMS 100:

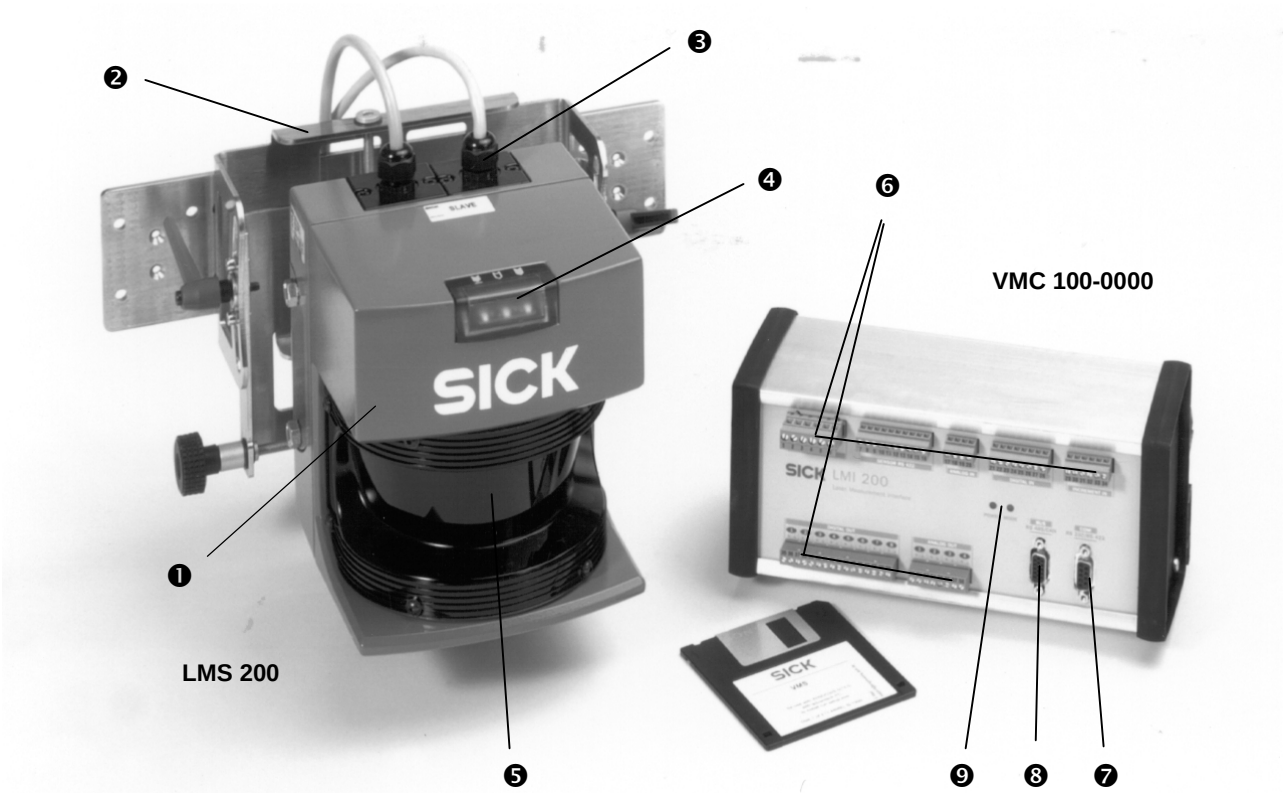
- Installation of the LMS 200 typically requires 1300 mm space above the tallest object.
- VMC 100-0000 operating voltage DC 24 V ± 15% acc. to IEC 742 (functional low voltage), consumption ca. 60 W. VMC 100-0100 operating voltage AC 230 V -15%/+10% 50 Hz.
- PC with Windows NT™/Windows 95 operating system and RS-232 interface.
- RS-232 data connection cable with two 9-pin D-sub sockets, e.g. order no. 2 016 401.
- RS-232 or RS-422 data interface on measurement result destination computer.
- Connection module for bus systems available on request.
- Transport system: constant transport speed or shaft encoder (resolution min. 1 incr./mm, see *Chapter 10.3 Available accessories*) and a flat transport surface.

Optional:

- A switch or host telegram to start the measurement process if "limited measurement readiness" is selected as the operating mode.
- An auxiliary device (e.g. bar-code scanner) with data output via telegram for joint output of separately determined information.

### 3.1.3 System view

**LMS 200 and VMC 100-0000**




**Legend:**

- ❶ Laser Measurement System
- ❷ Mounting Set
- ❸ Connection module
- ❹ LED indicators
- ❺ Read windo
- ❻ Electrical connections
- ❼ "COM" connection (data output)
- ❽ Connection for optional devices
- ❾ LED indicators

Fig. 3-1: Structure of the system with the VMC 100-0000 evaluation unit.

**VCM 100-0100**

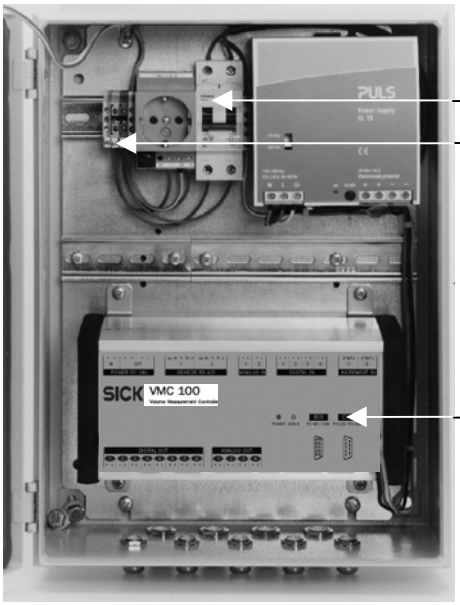



Fig. 3-2: View inside the VMC 100-0100 evaluation unit.

The VMC 100-0000 is integrated inside a switching cabinet (not yet completely wired up in the picture).

## 3.2 The operating principle of the VMS 100

The VMS 100 Volume Measurement System determines the length, width and height of rectangular objects in any alignment on transport systems without contact and in real time. An optional input and output of separately determined information (e.g. bar-codes) can take place.

### The operating principle of the LMS 200-30106

The Laser Measurement System LMS 200-30106 scans a two-dimensional measurement area without contact. The LMS requires no reflectors or position marks. No illumination of objects is necessary as it is an active system with an infrared laser.


Fig. 3-3: The LMS 200-30106.

The LMS operates according to the time-of-flight principle. The distance from the object to the system is determined from the time between the transmission of a light pulse and the reception of the light reflected by the object, as measured by the LMS.

### The operating principle of the VMC 100

The VMC 100 Laser Measurement Interface is based on the LMI 200. The LMI 200 is a multifunctional evaluation unit specially developed for processing LMS data. The LMI 200 can process and transmit, via digital and analogue interfaces, the process data obtained for various measurement commands. The MST 200 Measurement Software Tool is available for the development of customer-specific evaluation software.

Fig. 3-4: The LMI 200.

According to its configuration, the LMI 200 processes data supplied by the LMS 200 Laser Measurement System together with other information. These data are processed in real time and given out at the interfaces as measurement results.

### The operating principle of the VMS 100

An LMS 200 Laser Measurement System is installed above the transport system. It scans the surface of the transport system and the transported objects about every 13.3 ms. The distance data obtained by the LMS 200 are transferred to the VMC 100 in real time. The speed of the transported objects is set as a constant or can be provided using an optional shaft encoder.

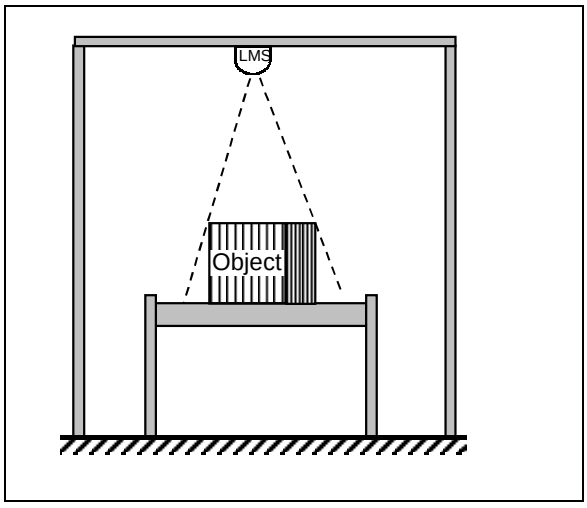



Fig. 3-5. Sketch of the VMS 100 with its frame above the transport system.

The three-dimensional information on the rectangular object is available after the distance data have been determined and the speed calculated in. The VMS program calculates the length, width and height of the rectangular object from the measurement data. Output of the data takes place at the VMC 100's selectable RS-232/RS-422 interface.

**VMS 100 layout**

The measurement data is made available at an RS-232/RS-422 interface. Connection to a data transfer system can take place via gateways or interface converters.
A shaft encoder can be connected to the VMC 100. The VMC 100 can receive results from auxiliary devices (e.g. bar-code measurements) via the RS-485 interface and give them out in real time together with the dimensional data at the RS-232/RS-422 interface of the VMC 100.

**Please note:**
Customers require their own Windows NT/Windows 95 PC with RS-232 interface and a data cable (e.g. 2016401) for commissioning and parameter-setting.

The following schematic diagram shows the components of the VMS 100.

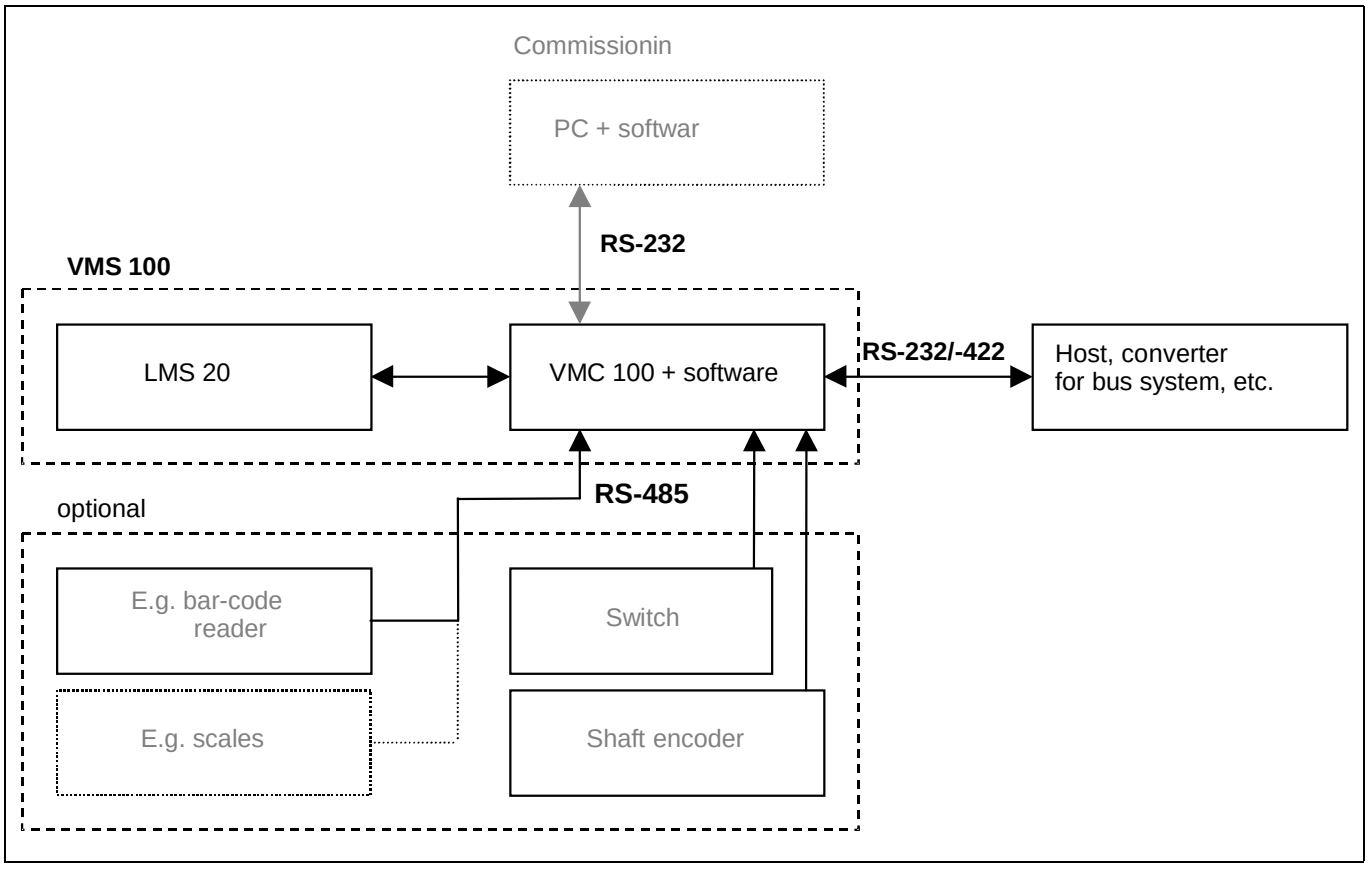



Fig. 3-6: Schematic diagram of VMS 100 components and peripheral devices.

## 3.3 Indicators and operating elements

### 3.3.1 Operating elements

Parameterisation of the VMS 100 takes place via the supplied VMS 100 Commissioning Software, installed on the PC by the customer. The VMS 100 can be operated with permanent or limited measurement readiness:

- With permanent measurement readiness objects are automatically detected and the data recorded. The object data is calculated and given out after the end of the object has been reached.
  - Automatic Mode
- With limited measurement readiness the next object is only automatically detected and the data recorded after activation. The object data is calculated and given out after the end of the object has been reached; the VMS 100 is then only ready for renewed measurement after reactivation. Activation can be carried out by:
  - a digital switch (falling flank),
  - a host telegram (renewed host request only after object measurement completed).

### 3.3.2 Functions of the LED indicators

Two LED indicators on the VMC 100 provide optical information on the operating state and errors. The LED indicators are located on the front panel.

| LED | Indicator | VMC 100 state |
|---|---|---|
| POWER | green | switched on (DC 24V supplied) |
| | off | switched off (no power supply) |
| MODE | green | Measurement Mode active |
| | off | Setup Mode |
| | 10% green blinking | Service Mode |
| | 90% green blinking | Measurement Mode is being activated |
| | red | Software Download Mode (VMC 100 busy) |
| | green/red blinking | Warning (e.g. front window contamination entered in error log), Measurement Mode is still acitve[1)] |
| | red blinking | VMC 100 error (error entered in error log)[1)] |
| 1) Run VMC 100 Diagnostics with User Software | | |

Table 3-1: VMC 100 LED indicators.

Three LED indicators on the LMS 200 provide optical information on the operating state and errors.

| LED | Normal operation | Initialisation | Contamination warning | Contamination error | Error | Fatal error |
|---|---|---|---|---|---|---|
| Green | 100% on | off | | off | off | off |
| Yellow (1 Hz) | off | 100% on | 50% on / 50% off | 90% on / 10% off | 10% on / 90% off | 50% on / 50% off |
| Red | off | 100% on | | on | on | on |

Table 3-2: LMS 200 LED indicators.

## 3.4 Requirements and measurement accurac

### Object requirements

The VMS 100 is designed for determining the volumes of rectangular objects. Rectangular objects have straight sides with no curves or projections. The minimum and maximum object dimensions are summarised in the following table:

| Object dimension | Minimum value | Maximum value |
|---|---|---|
| Length along direction of transport | 200 mm | 1500 mm to 7500 mm |
| At right angles to direction of transport | 200 mm | 1500 mm |
| Height on the transport system | 100 mm | 1500 mm |

Table 3-3: Minimum and maximum dimensions of rectangular objects.

**Please note:**
The maximum value for the dimension along the direction of transport is 1500 mm as standard. How the maximum value can be varied is described in *Table 6-1* in *6.2 Setting para eters*.

The transport speed must be at least 0.1 m/s and at most 2 m/s. The time periods between objects must typically be: at least 1/10 of the maximum object dimension along the direction of transport. See following table.

| Object dimension along the direction of transport | Gaps required between objects |
|---|---|
| < 1000 mm | 100 mm |
| < 1500 mm | 150 mm |

Table 3-4: Object gaps typically required.

### VMS 100 measurement accurac

Typical levels of accuracy are provided in *Table 3-5*.

| Speed | Typical accuracy |
|---|---|
| Speed < 1 m/s | ± 15 mm in length, width and height |
| 1 m/s ≤ speed ≤ 2 m/s | ± 25 mm in length<br>± 20 mm in width and height |

Table 3-5: Typical accuracy for an object with dimensions > 200 x 200 x 200 mm³ (L x W x H).

The following accuracies apply at room temperature, with an object reflectivity of 10% to 1000% and for recommended device structures corresponding to SICK documentation. Restricted ranges for object reflectivity and object dimensions provide higher levels of accuracy. Highly reflective surfaces and other effects can lower accuracy.

| Speed | Accuracy |
|---|---|
| Speed < 1 m/s | ± 30 mm in length, width and height |
| 1 m/s ≤ speed ≤ 2 m/s | ± 50 mm in length<br>± 35 mm in width<br>± 30 mm in height |

Table 3-6: Levels of accuracy for an object with dimensions > 200 x 200 x 200 mm³ (L x W x H).

### Transport system requirements

The typical space requirement for installation of the LMS is about 1300 mm above the tallest object. The distance between the LMS and the upper surface of the tallest object must be at least about 700 mm, while a distance of about 1000 mm is recommended. Central mounting above the middle of the transport system is recommended, see *Fig.3-2*. If the objects are fed in at one of the transport system's sides mounting can be carried out asymmetrically above the transport system.

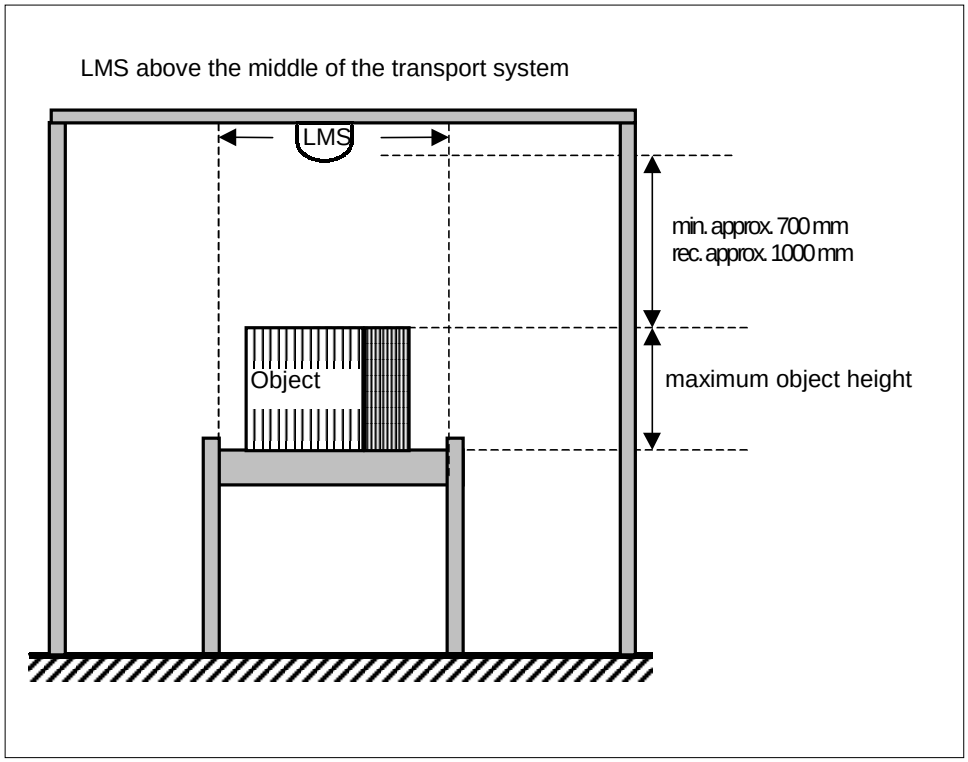



Fig. 3-7: Schematic diagram showing LMS 200 installation above a transport system.

Objects can be moved using any transport system with a flat transporting surface.

Rotation, vibration, rolling motion and slippage of objects on the transport system, or uneven transport surfaces, can reduce accuracy and have an adverse effect on data capture by the VMS. Curves, induction lines, start-stop sections, rising/falling sections and gaps in the transport system should be a sufficient distance from the measurement area for high accuracy and proper data capture.

The LMS 200 must have a clear view of the transport system.

The transport system must either have a constant transport velocity or a shaft encoder signal with a resolution of at least 1 Incr./mm must be installed, see *10.3 Available accessories (order details)*.

**LMS 200 mounting requirements**

The LMS 200 must be mounted in such a way that it is:

- stable above the transport system (an LMS 200 unit weighs approx. 4.5 kg),
- shock-free and vibration-free,
- above the transport system.

*Fig. 3-2* shows an LMS 200 installation above the transport system with typical distances.

**Please note:**
The Mounting Set is easy to attach to an 8 mm item aluminium profile as it is designed for this profile. The dimensional drawing in *Fig. 4-1* is to be complied with for mounting using other equipment.

## 3.5 Overview of commissioning

1. Mount the LMS 200 (see *4 Mounting*).
2. Connect the LMS 200 to the VMC 100 with a data cable (see *5 Electrical installation*).
3. Connect the LMS 200 to the VMC 100 with a power supply cable (see *5 Electrical installation*).
4. Connect the power supply to the VMC 100 (see *5 Electrical installation*).
5. Adjust the LMS 200 (see 4 *Mounting*).
6. Set VMS 100 parameters (see *6 Commissioning and parameter-setting*).

# 4 Mounting

## 4.1 Overview of the steps involved in mounting

- If necessary: mount the frame in the desired area of the transport system
- Attach the LMS Mounting Set to the frame or onto stable equipment
- Attach the LMS 200 to the Mounting Set
- Mount the VMC 100 evaluation unit

## 4.2 Preparing for mounting

### 4.2.1 Prepare the components for mounting

- The LMS 200 Laser Measurement System
- The LMS 200 Mounting Set
- The VMC 100 evaluation unit

### 4.2.2 Prepare the accessories

The following accessories will be needed for the Mounting Set and LMS 200-30106:

- Screws for attaching the Mounting Set to the frame or other equipment. The Mounting Set has 8xD6.6 drilled holes, see *Fig. 4-1*.
  The LMS 200 weighs approx. 4.5 kg
- Four M8x12 screws with washers (supplied) for attaching the LMS 200 to the Mounting Set

### 4.2.3 Prepare mounting aids

- Plumbline
- Spirit level
- Measurement tape (up to 3000 mm) or folding metre-rule
- Scanfinder
- Pencil
- Tools, M6 screws

### 4.2.4 Selecting the mounting location

The VMS 100 is supplied with a power supply cable and data transfer cable that are each 10 m long. Select an appropriate mounting location for the LMS 200 and VMC 100.

### 4.2.5 Mounting accessories

A Mounting Set is supplied for mounting the LMS 200. It can be finely adjusted in two axes.

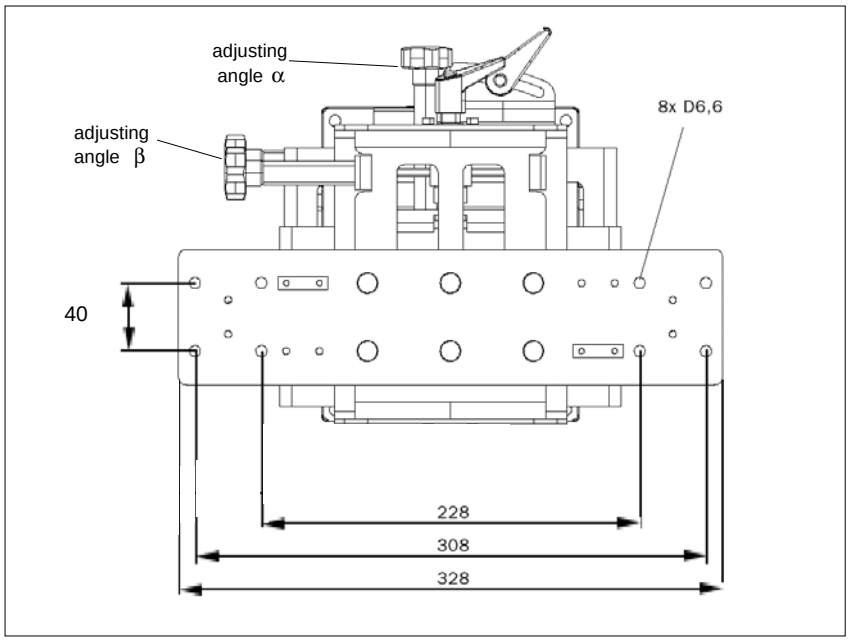



Fig. 4-1: Dimensional drawing for Mounting Set with LMS 200

Measurements in mm. Total LMS 200 weight is approx. 4.5 kg. The angles are based on *Fig. 4-3*.

## 4.3 Mounting the LMS 200

*Fig. 4-2* shows the mounting of the LMS 200 from above the transport system. The angles α, β and γ are defined in *Fig. 4-3*.

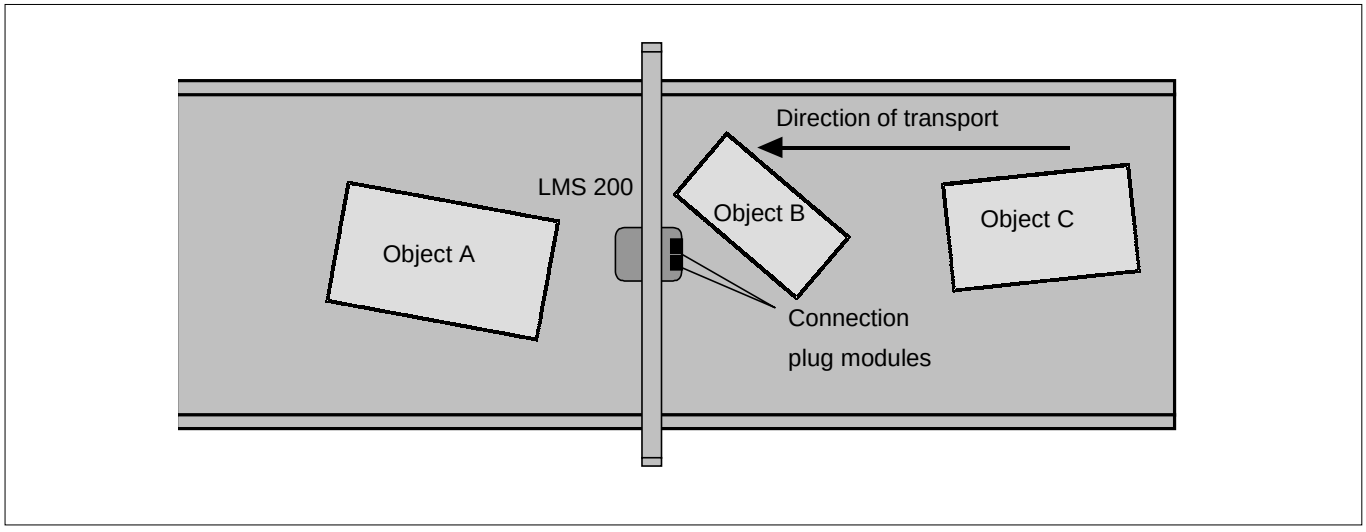



Fig. 4-2: Mounting of the LMS 200 from above the transport system.

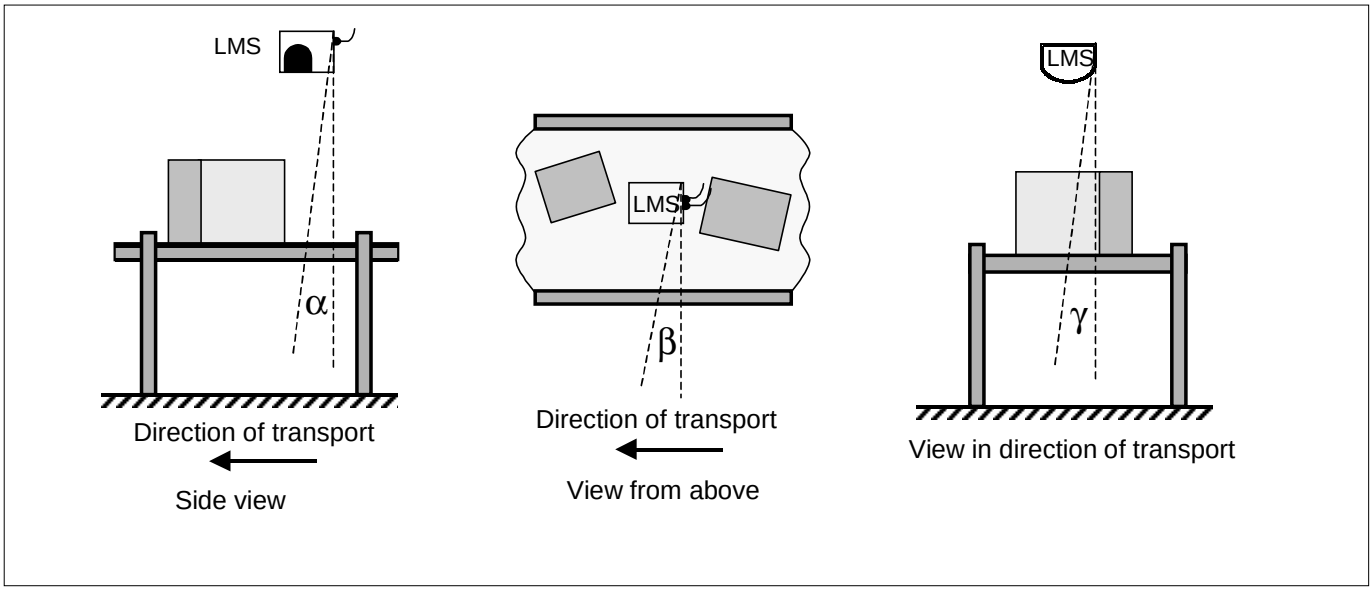



Fig. 4-3: Definition of the LMS 200 angles α, β and γ.

During preparation ensure that the LMS 200 and the Mounting Set can be mounted horizontally to the transport system: α, β, γ = 0.

LMS 200 angles α and β can be adjusted with the Mounting Set.

To align the LMS 200 above the middle of the transport area turn an M6 screw in the middle drilled hole at the base of the LMS 200 and attach the plumbline to it with the lead touching the transport system. Determine the middle of the transport area with transported objects on the transport system. Align the LMS 200 until the lead touches the middle of the transport area.

## 4.4 Mounting the VMC 100

The VMC 100 must be freely accessible so that the electrical supply and data cables can be connected. The VMC 100-0000 can be mounted on a standard mounting rail or the supplied bracket can be used. The VMC 100-0100 is supplied as a version with a switching cabinet.

## 4.5 Adjusting the LMS 200

**Please note:**
Electrical installation (*5 Electrical installation*) must be completed before adjustment.

**Spatial alignment of the LMS 200**

1. Turn an M6 screw in the middle drilled hole in the base of the LMS 200. Attach the plumbline in such a way that it meets the end of the housing.
2. Turn the adjustment screw that is perpendicular to the direction of transport until the measurement line of the LMS 200 is located below the LMS 200 exactly 6.3 cm from where the plumbline meets the transport system in the direction of transport, see *Fig. 4-4*. Use the switched on Scanfinder to detect the measurement line (IR laser light).
3. Turn the adjustment screw that is in the direction of transport until the measurement line is on the transport system and perpendicular to the transport direction, see *Fig. 4-4*. For this purpose, use the switched on Scanfinder to detect the measurement line (IR laser light) on the left or right side of the transport system.

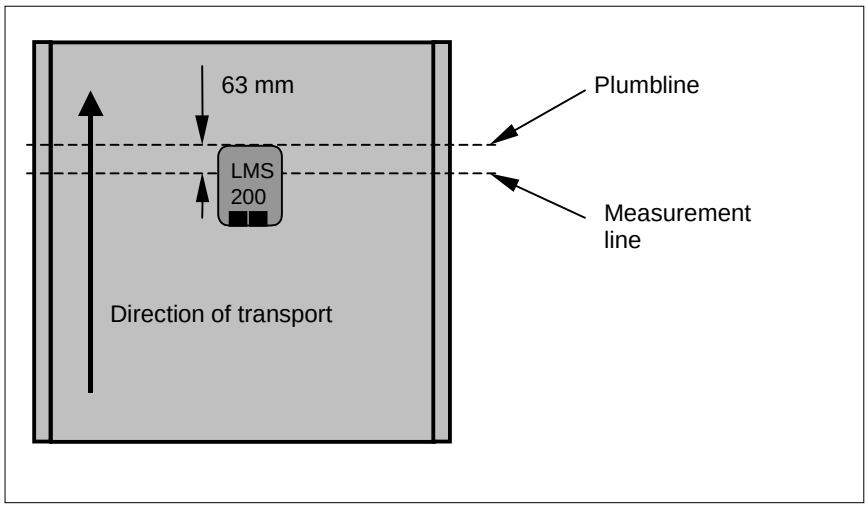



Fig. 4-4: View from above the LMS 200 with plumbline and measurement line.

**Recommendation:**
Mount and adjust the LMS 200 carefully to achieve the highest levels of measurement value accuracy.

## 4.6 Dismantling the system

1. Switch off the power supply to the VMC 100 evaluation unit.
2. Remove the data cable, power supply cable and, if necessary, the clock-pulse cable from the VMC 100.
3. Remove the cables between the VMC 100 and the LMS 200 Laser Measurement System.
4. Remove the LMS 200 from the Mounting Set above the transport system.
5. Unscrew the VMC 100.

In the final decommissioning follow the instructions in *Chapter 7.3 Disposal* for environmentally friendly disposal.

# 5 Electrical installation

## 5.1 Overview of the installation steps

- Connect the VMC 100 to the LMS 200 (data transfer and power supply)
- Connect the VMC 100 with the higher-ranking destination computer (data transfer)
- Temporarily: connect the VMC 100 with a PC for commissioning, parameterisation and diagnostics

## 5.2 Electrical connections and cables

The electrical connection of the VMS 100 consists of interfaces within the system and interfaces to the outside.

**LMS 200:**

Via 9-pin D-sub plug connections with plug modules:

- power supply (the "DC 24 V power supply" connection)
- a serial data interface (the "RS-422" connection)

**VMC 100:**

Via plug-in terminal strips and a 9-pin D-sub / 15-pin D-sub HD plug connection on the front panel:

- power supply (the "DC 24 V power IN" connection)
- power supply to LMS 200 (the "DC 24 V power OUT" connection)
- a data interface to the LMS 200 (the "RS-422 sensor" connection)
- four digital switching inputs (the "digital IN" connections)
- two inputs for shaft encoder signals (the "shaft encoder IN" connections)
- a data interface to higher-ranking destination computer or temporarily to PC (the "COM" connection)
- a data interface to connect optional devices (the "BUS" connection)

The LMS 200 is connected to the VMC 100 via two pre-assembled cables each 10 m long.

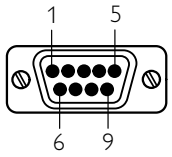
- cable 1 (power supply):
  plug module with 9-pin D-sub socket (LMS 200) on 6-pin connector strip nos. 1-6 (VMC 100)
- cable 2 (data transfer):
  plug module with 9-pin D-sub plug (LMS 200) on 10-pin connector strip nos. 7-16 (VMC 100)

## 5.3 Pin configuration for the connections

### 5.3.1 LMS 200 connections

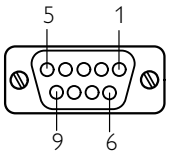
#### The "DC 24 V power supply" connection




| PIN | Signal | Function | Cable colour |
|---|---|---|---|
| 1 | GND | Ground | Brow |
| 2 | New start | - | Blue |
| 3 | 24 V DC | Power supply | Red |
| 4 | n.c. | - | - |
| 5 | OUT C | Output C | Grey |
| 6 | n.c. | - | - |
| 7 | n.c. | - | - |
| 8 | OUT B | Output B | Turquoise |
| 9 | OUT A | Output A | Orange |

Table 5-1: LMS 200: pin configuration on the 9-pin D-sub device plug.

#### The "RS-422" connection (data interface)




| PIN | Signal RS-422 | Function | Cable colour |
|---|---|---|---|
| 1 | RxD- | Receiver - | Yello |
| 2 | RxD+ | Receiver + | Green |
| 3 | TxD+ | Transmitter + | White |
| 4 | TxD- | Transmitter - | Brow |
| 5 | GND | Ground/screen | Black |
| 6 | n.c. | - | |
| 7 | bridged with PIN 8 | Switches to RS-422 | |
| 8 | bridged with PIN 7 | Switches to RS-422 | |
| 9 | n.c. | - | |

Table 5-2: LMS 200: pin configuration on the 9-pin D-sub device socket.

### 5.3.2 VMC 100 connections

*Fig. 5-1* shows the location of the terminal strips and D-sub plug connections on the front panel.

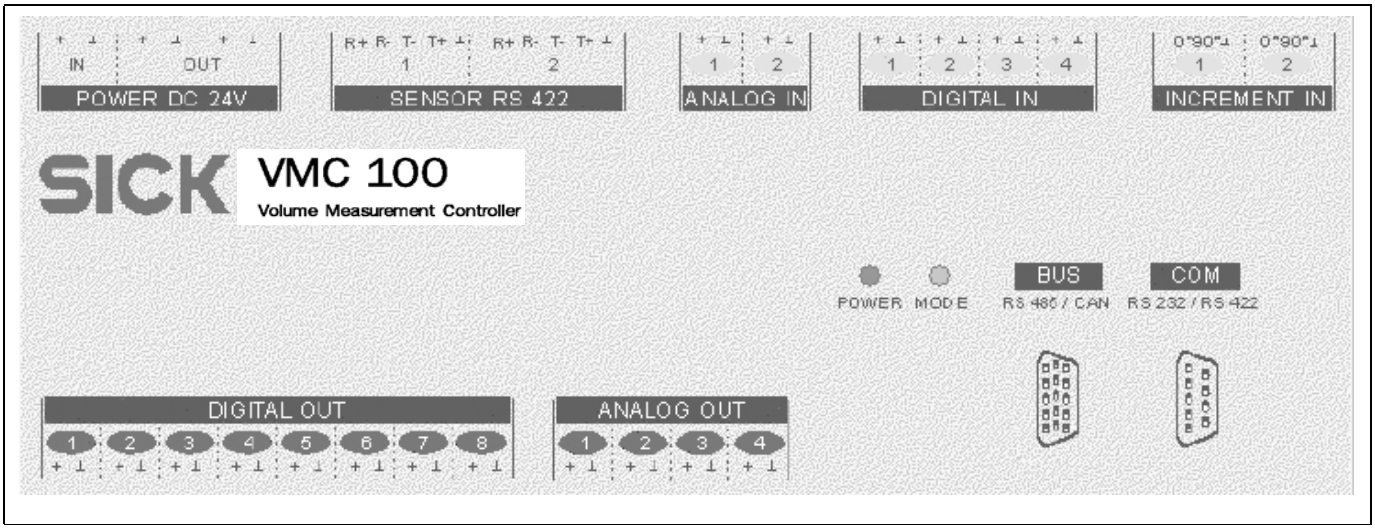



Fig. 5-1: VMC 100: position of the terminal strips and D-sub plug connections on the front panel.

The VMC 100 is based on the LMI 200 and has the same plug connections.

**Terminal strips (functional interfaces)**

The terminal strips, with a total of 58 terminals, are organised in seven functional groups.

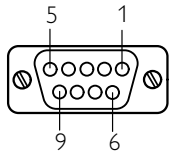
| Terminal | VMC 100 connection | VMC 100 signal | Connected device signal | Function |
|---|---|---|---|---|
| 1 | POWER DC 24V IN | DC +24 V | DC +24 V | Power supply VMC 100 |
| 2 | POWER DC 24V IN | GND | GND | Ground |
| 3 | POWER DC 24V OUT | DC +24 V | DC +24 V | Power supply to LMS 200 |
| 4 | POWER DC 24V OUT | GND | GND | Ground |
| 5 | POWER DC 24V OUT | DC +24 V | - | - |
| 6 | POWER DC 24V OUT | GND | - | - |
| 7 | SENSOR RS-422 (1) | R+ | T+ (pin 3, white) | Data transfer to LMS 200 |
| 8 | SENSOR RS-422 (1) | R- | T- (pin 4, brown) | Data transfer to LMS 200 |
| 9 | SENSOR RS-422 (1) | T- | R- (pin 1, yellow) | Data transfer to LMS 200 |
| 10 | SENSOR RS-422 (1) | T+ | T+ (pin 2, green) | Data transfer to LMS 200 |
| 11 | SENSOR RS-422 (1) | GND | GND (pin 5) | Ground |
| 12 - 16 | SENSOR RS-422 (2) | - | - | - |
| 17 - 20 | ANALOGUE IN | - | - | - |
| 21 | DIGITAL IN 1 (+) | - | - | Photoelectric switch Q |
| 22 | DIGITAL IN 1 (ground) | - | - | Ground |

| Terminal | VMC 100 connection | VMC 100 signal | Connected device signal | Function |
|---|---|---|---|---|
| 23 | DIGITAL IN 2 (+) | - | - | Photoelectric switch /Q |
| 24 | DIGITAL IN 2 (ground) | - | - | - |
| 25 | DIGITAL IN 3 (+) | DC +24V | DC +24V | Switch (optional: 'Digital Switch' Mode): measurement readiness on brief switching (falling flank min. 20 ms before object on measurement line) activate, no pallet |
| 26 | DIGITAL IN 3 (ground) | GND | GND | Ground |
| 27 | DIGITAL IN 4 (+) | DC +24V | DC +24V | Switch (optional: 'Digital Switch' Mode): measurement readiness on brief switching (falling flank min. 20 ms before object on measurement line), pallet height taken into account |
| 28 | DIGITAL IN 4 (ground) | GND | GND | Ground |
| 29 | INCREMENT IN 1 (0°) | IN (+24V) | +24V | Shaft encoder 0° (optional) |
| 30 | INCREMENT IN 1 (90°) | IN (+24V) | +24V | Shaft encoder 90°(optional) |
| 31 | INCREMENT IN 1 (ground) | GND | GND | Ground |
| 32 - 34 | INCREMENT IN 2 | - | - | - |
| 35 | DIGITAL OUT 1 | 0 V bei AUS,<br>+ 24 V wenn aktiv | 0 V bei AUS,<br>+ 24 V wenn aktiv | Measurement readiness indicator (blinking: LMS error) |
| 36 | DIGITAL OUT 1 (ground) | GND | GND | Ground |
| 37 - 38 | DIGITAL OUT 2 | as 35 - 36 | as 35 - 36 | |
| 39 - 40 | DIGITAL OUT 3 | as 35 - 36 | as 35 - 36 | |
| 41 | DIGITAL OUT 4 | 0 V when OFF,<br>+ 24 V when active | 0 V when OFF,<br>+ 24 V when active | Measurement process active indicator<br>(blinking: LMS error) |
| 42 | DIGITAL OUT 4 (ground) | GND | GND | Ground |
| 43 - 44 | DIGITAL OUT 5 | as 41 - 42 | as 41 - 42 | |
| 45 - 46 | DIGITAL OUT 6 | as 41 - 42 | as 41 - 42 | |
| 47 | DIGITAL OUT 7 | 0 V when OFF,<br>+ 24 V when active | 0 V when OFF,<br>+ 24 V when active | Indicator warning: object too long |
| 48 | DIGITAL OUT 7 (ground) | GND | GND | Ground |
| 49 -50 | DIGITAL OUT 8 | - | - | |
| 51 -58 | ANALOGUE OUT 8 | n.c. | n.c. | |

Table 5-3: VMC 100: Configuration of the plug-in terminal strips for VMS 100 functions.

### "COM" connection (data interface)




| | VMC 100 RS-232/RS-422 | | Connected device | |
|---|---|---|---|---|
| **PIN** | **RS-232** | **RS-422** | **RS-232** | **RS-422** |
| 1 | n.c. | R- | n.c. | T- |
| 2 | RxD | R+ | TxD | T+ |
| 3 | TxD | T+ | RxD | R+ |
| 4 | n.c | T- | n.c. | R- |
| 5 | GND | GND | GND | GND |
| 6 | n.c. | n.c. | n.c. | n.c. |
| 7 | n.c. | Bridge to PIN 8 | n.c. | n.c. |
| 8 | n.c. | Bridge to PIN 7 | n.c. | n.c. |
| 9 | n.c. | n.c. | n.c. | n.c. |

Table 5-4: VMC 100: Pin configuration for the 9-pin D-sub device socket ("COM" connection).

| Communication parameter | Value |
|---|---|
| Baud rate | 9600 bit/s |
| Data bits | 8 |
| Parity | none |
| Stop bit | 1 |

Table 5-5: LIM 200: "COM" data interface communication parameter values.

**Please note:**
After a configuration of the VMS 100 by means of the VMS 100 Commissioning Software the power supply to the VMC 100 evaluation unit must be briefly interrupted.
After the restart interface parameters are set as shown in *Table 5-5*.

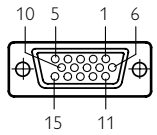
### The "BUS" connection (data interface)

The RS-485 interface allows the input of additional information (e.g. bar-code or weight information) from the appropriate devices.

**Please note:**
The entire external telegram must be received by the VMC 100 while the object is crossing the measurement line.

*Table 5-6* shows the pin configuration. A termination resistance of 120 Ohms must be used on the receiver for cable lengths of more than 50 m.




| VMC 100 | | Connected device |
|---|---|---|
| **PIN** | **Signal RS-485** | **External device: e.g. bar-code scanner** |
| 11 | R- | T- |
| 12 | R+ | T+ |
| 13 | T- | (R-) |
| 14 | T+ | (R+) |
| 15 | GND | GND |

Table 5-6: VMC 100: pin configuration for 15-pin D-sub HD device socket ("BUS" connection).

The interface also operates with the communication parameters shown in *Table 5-5.*

## 5.4 Carrying out the electrical installation

Data output takes place at the front panel via a 9-pin D-sub RS-232/RS-422 plug connection. The connection of further devices takes place at the front panel via a 15-pin D-sub RS485 plug connection.

The data and power supply lines between the LMS 200 and VMC 100 are supplied with cabled LMS 200 plug modules and with VMC 100 plugs for connector strips for connecting the LMS 200 to the VMC 100. Connect the LMS 200 to VMC 100:

1. Connect data cable plug module to LMS 200
2. Wire up the data cable connection strip to the connection strip and plug into the VMC 100 plug connection
3. Connect power supply plug module to LMS 200
4. Wire up the power supply cable connection strip to the connection strip and plug into the VMC 100 socket

**Please note:**
Only operate the LMS 200 with correctly attached plug modules.
Waterproofing is only guaranteed, with the device corresponding to IP65 and with EMC requirements (EMD) according to CE, when the plug modules have been completely mounted onto the scanner. The plug modules must be provided with locking screws or PG screws with seals and D-sub device plugs.

5. Connect the VMC 100-0000 according to *Table 5-3* (PIN 1 and 2) or VMC 100-0100 to the power supply.

The VMC 100 and LMS 200 commence operation after the power supply has been switched on. The start process can take a few minutes. The LMS 200 and VMC 100 are in an operating state when the green LEDs on both devices are lit.

Adjustment of the LMS 200 (*4.5 Adjusting the LMS 200*) can take place after the electrical installation.

# 6 Commissioning and parameter-setting

A PC with the Windows '95™ or Windows NT™ operating system and an RS-232 interface and an RS-232 male/female-crossed data cable (see *10.3 Available accessories (order details))* is required for commissioning and parameter-setting.

## 6.1 Starting the VMS 100 Commissioning Software

VMS 100 parameters are set using the VMS 100 Commissioning Software. The VMS 100 Commissioning Software is started on the PC.

1. Connect PC to the VMC 100 RS-232 COM interface with an RS-232 male/female-crossed data cable.
2. Insert the diskette with the VMS 100 Commissioning Software in diskette drive.
3. Copy files into their own directory on the PC.
4. Select and run the `VMS100_Setup` file using the Start menu.

The VMS 100 Commissioning Software starts and opens a window labelled
`VMC 100 User Software for VMS 100`.

**Recommendation:**
After commissioning keep the diskette with the VMS 100 Commissioning Software in a safe place to allow subsequent re-setting of parameters.

## 6.2 Setting parameters

The VMS 100 can be parameterised after the VMS 100 Commissioning Software has been started.

➢ Click on the `Parameters` entry in the sub-menu `VMS 100` in the `Start` menu.
The menu window `Parameters for the VMS 100` `Volume Measurement System` appears.
The menu window is divided up into six sections and shows a schematic representation of the VMS 100.

In the

- `LMS/conveyor position`
- `Zone of detection`
- `Velocity`
- `Process`
- `Peripherics`

sections there are fields, some of which have pull-down menus, for entering parameter values.

In the

- `Controls` section

there are four buttons for operating and checking the menu window and for data exchange from the PC to VMC 100.

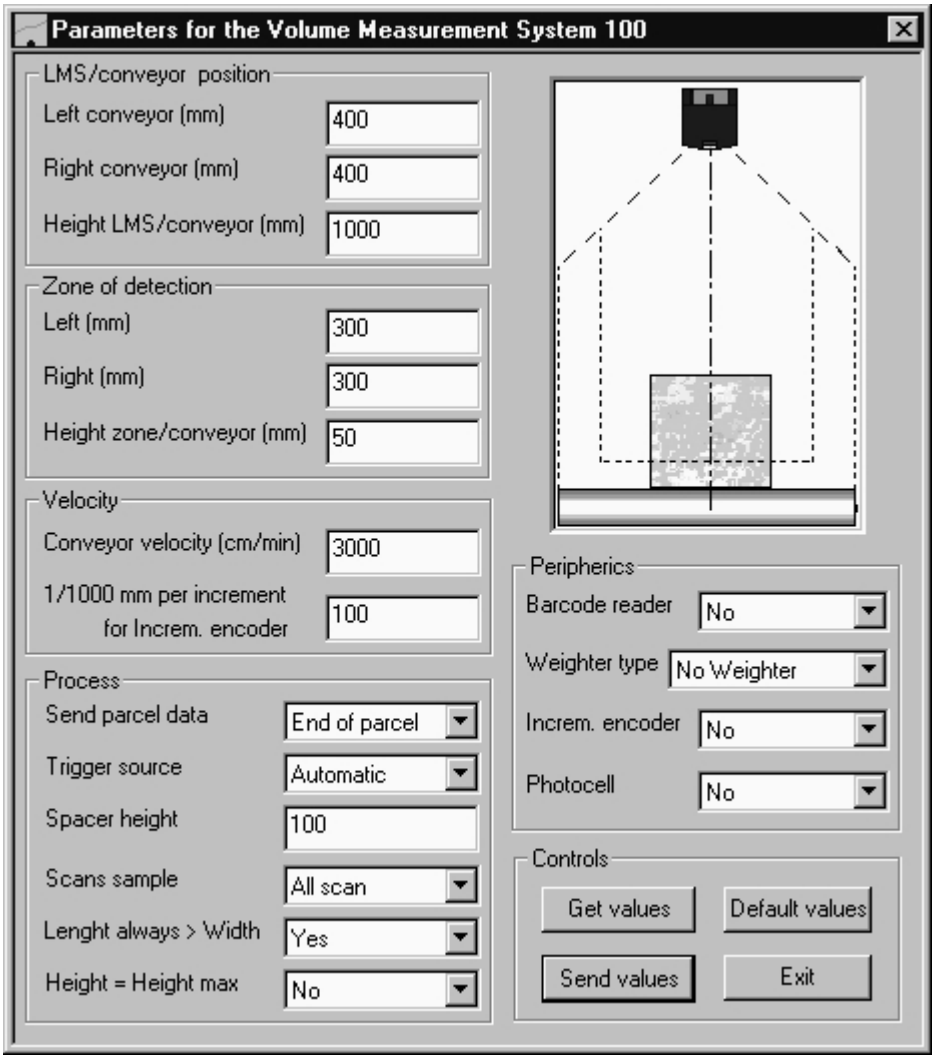



Fig. 6-1: VMS 100 Commissioning Software: example of the `Parameters for VMS 100` window.

**Please note:**
All parameters in the `Parameters for the Volume Measurement System VMS 100 Vx.xx` menu window must be entered as positive values.

➢ Close window with `Exit`.

In order to achieve greater accuracy, it is recommended that parameters are reset if the LMS 200 is replaced.

### 6.2.1 Setting measurement area parameters

Turn an M6 screw in the middle drilled hole in the base of the LMS 200 and attach the plumbline and let the lead weight touch the transport system. Note the distance to the left and right sides of the transport system from the lead weight, see *Fig. 6-2*.

The measurement area is defined in the `LMS/conveyor position` section on the basis of the LMS 200 position.

1. Enter the distance to the left edge of the transport area from the lead weight of the LMS 200 in mm in the `Left conveyor (mm)` field.

2. Enter the distance to the right edge of the transport area from the lead weight of the LMS 200 in mm in the `Right conveyor (mm)` field.
3. Enter the height of the LMS 200 above the transport system in the `Height LMS/conveyor (mm)` field.

**Please note:**
No object other than the object to be measured may be detectable for the LMS 200 in the measurement area during Measurement Mode.

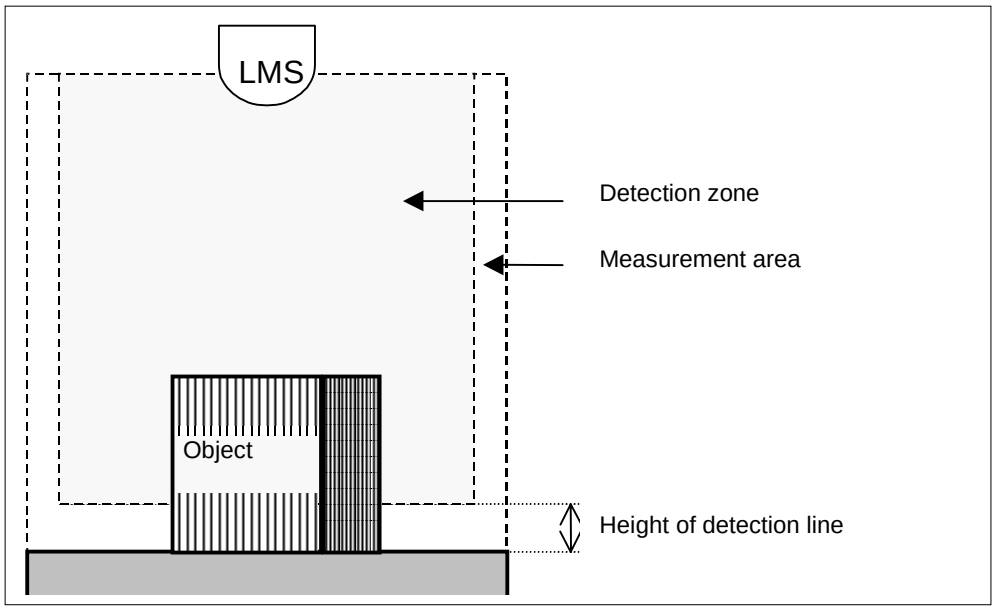



Fig. 6-2: Sketch of the measurement area and detection zone with the height of the detection line.

The left/right limits of the measurement are to be entered in the `Left/Right conveyor (mm)` fields as seen when looking at the bottom of the LMS 200, and similarly for the detection zone.

### 6.2.2 Setting detection zone parameters

The detection zone is defined in the `Zone of Detection` section. When ready for measurement a volume measurement is started as soon as an object enters the detection zone, see *Fig. 6-2*. The detection zone parameters must be at least 50 mm smaller on each side than the values of the measurement area. No objects except the target object may be present in the detection zone.

1. Enter the left limit of the detection zone in mm from the lead weight of the LMS 200 in the `Left (mm)` field. This value should not exceed the value in the `Left conveyor (mm)` field.
2. Enter the right limit of the detection zone in mm from the lead weight of the LMS 200 in the `Right (mm)` field. This value should not exceed the value in the `Right conveyor (mm)` field.
3. Enter the height of the detection line above the transport system in the `Height Zo (mm)` field. This switching limit allows objects with lower heights to be suppressed. The height of the detection line should be at least 50 mm and at most 200 mm.

### 6.2.3 Setting velocity parameters

Speed parameters are set are in the `Velocity` section.

1. Enter the transport speed in the `Conveyor velocity (cm/min)` field. The value is required if no shaft encoder is used.
2. Select whether a shaft encoder or a constant speed is to be used in the `Incremental encoder` field (the `Peripherics` section).
3. Enter shaft encoder resolution in the `1/1000 mm per increment` field. The value is required if a shaft encoder is used. E.g., a `1000` entry means 1 mm/Incr.

### 6.2.4 Setting process control parameters

Parameters for process control are selected from pull-down menus in the `Process` section.

- Selection in the `Send parcel data` field is about whether the data is to be transmitted automatically at the end of every measurement and calculation (entry: `End of parcel`) or whether only the values for the last object are to be sent in response to a host request (entry: `Host`). A host telegram can call up the last measurement data repeatedly.
- Selection in the `Trigger source` field is about whether the start of a measurement should be triggered automatically (entry: `Automatic`), after a brief switching of the VMC 100 (entry: `Digital Output`), or after a host request (entry: `Host`). The `Digital Output` entry: by switching two different digital switches on the VMC 100 decisions can be made on when pallet height is to be taken into account for each object. The flanks of the switching signal must fall at least 20 ms before the object crosses the measurement line. The `Host` entry: the entire telegram must be received by the VMS 100 at least 20 ms before the object crosses the measurement line.
- A pallet height can be entered in the `Spacer height` field. The entry is only active with the `Digital Output` setting.
- The entry in the `Scans sample` field defines whether all the scans are to be used for determining volume. With the default setting `All scan` the maximum object length is 1500 mm at speeds of from 0.5 m/s to 2 m/s. *Table 6-1* shows the possible maximum object lengths and speeds.

| | **At speeds of 0.5 m/s to 2 m/s:** | | **At maximum object lengths of 1500 mm:** |
|---|---|---|---|
| **Entry in 'Scans sample' field** | **Max. object length** | **Entry in 'Scans sample' field** | **Speed** |
| All scan | 1500 mm | All scan | 0.50 m/s to 2.0 m/s |
| 1/2 | 3000 mm | ½ | 0.25 m/s to 0.5 m/s |
| 1/3 | 4500 mm | 1/3 | 0.20 m/s to 0.25 m/s |
| 1/4 | 6000 mm | ¼ | 0.15 m/s to 0.25 m/s |
| 1/5 | 7500 mm | 1/5 | 0.10 m/s to 0.15 m/s |

Table 6-1: Setting parameters for maximum detectable object lengths and possible speed ranges.

- If `No` is entered in the `Length always > Width` field it defines that the length along the direction of transport is provided. If `Yes` is entered, the length value provided is the length of the longest side of the object.
- Height output can be modified in the `Height = Height max` field. An entry of `No` provides the most accurate value for the height of the rectangular object. An entry of `Yes` can be selected to take the maxi-

mum height value more into account at speeds of less than 0.5 m/s, which can result in the values provided being less accurate.

### 6.2.5 Setting optional device parameters

The VMS 100 Commissioning Software is informed about the optional connectable devices in the `Peripherics` section.

- If a bar-code reader is connected to the RS-485 interface of the VMC 100 as an auxiliary device it must be defined in the `Barcode reader` field (entry of `No` if no bar-code reader is connected). The following time window is available for receiving bar-code telegrams: the telegram starts no earlier than 20 ms after the object has crossed the measurement line, the telegram ends no later than 20 ms after the object has left the measurement line.
- The `Weighter type` field is used to define whether one of the selectable weighing machines is connected to the RS-485 interface of the VMC 100 as an auxiliary device (the entry `No Weighter` is used when no scales are connected). This auxiliary device is contacted after the end of the object. Connection should be carried out by SICK Service.
- The `Increm. encoder` field is used to define whether a shaft encoder is used: `No` = no shaft encoder, `Yes` = operation with a shaft encoder.
- The `Photocell` field can be used to register an optional photoelectric switch at the VMS 100. Such a photoelectric switch should be installed perpendicular to the direction of transport directly above the measurement line of the LMS 200.

### 6.2.6 Data transfer

The handling of parameterisation data is defined in the `Controls` section.

- The `Get values` button inserts the parameterisation data available in the VMC 100 into the menu window. Data previously entered in the menu window are deleted.
- The `Default values` button provides the fixed standard parameterisation data. These provide guidelines for a standard application. Data previously entered in the menu window are deleted.
- The `Send values` buttons transmits the data visible in the menu window to the VMC 100. Data previously available in the VMC 100 are deleted.
- The `Exit` button closes the menu window without triggering any data transfer.

## 6.3 Output of measurement data on the screen

VMS 100 measurement values can be received on the PC in real time after starting the VMS 100 Commissioning Software. This display is useful for testing the parameterisation – the display is not suitable for normal measurement operation. Click on the `See Values` entry in the sub-menu `VMS 100` of the `File` menu. The `Volume Measurement System 100` menu window appears. The menu window shows the measurement data and two buttons.

Under Volume Measurement there is:

- the `Length` field showing the length of the object,
- the `Width` field with the width of the object, and
- the `Height` field showing object height.

Furthermore, the results of any optional connectable devices are also displayed if available:

- the `Weight` field may show the weight of the object,
- the `Barcode` field may show the bar-code on the object. Display is limited to 15 characters.

As regards the buttons:

- The `Test Request` button transmits a telegram for measurement readiness.
- The `Exit` button closes the window.

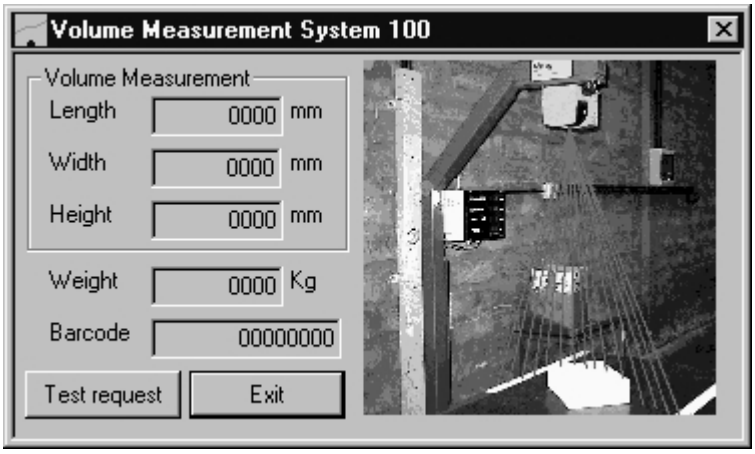



Fig. 6-3: Display of measurement data, an example after a restart.

## 6.4 Completion and test measurements

➢ Log all the parameters in the commissioning log and save the document somewhere safe.

Customers should select a typical measurement object for the test measurements, selecting the following properties:

- typical object surface material
- typical object surface colour
- typical object size

➢ Carry out several measurements with the object.
Measure the object precisely with a measuring tape or metre-rule and note the values for its length, width and height, and compare them with the VMS 100 measurement values.

➢ If necessary, reset the parameters.
The output of the object dimension along the direction of transport can be optimised with the parameters `Conveyor velocity` or `1/1000 mm per increment`. The `LMS/conveyor position` parameter affects the output of the height and the object dimension across the direction of transport of the object. Angle α must be carefully adjusted for a correct output of height readings. The LMS 200 angle γ can be re-adjusted to optimise object dimension values across the direction of transport.

**Recommendation:**
Parameterise and adjust the VMS 200 carefully to achieve high accuracies.

# 7 Maintenance

## 7.1 Maintenance during operation

To retain maximum performance the LMS 200 Laser Measurement System needs a clean front window (reading window). A weekly front window contamination check is recommended in harsh operating environments (dust, grindings, damp, etc.), in particular. More frequent checks may be required depending on the conditions. Clean the LMS 200 housing every six months to ensure sufficient cooling.

**Contamination indicator:**

Depending on the degree of front window contamination the LMS 200 provides the following warnings by means of the yellow LED (middle) and red LED (left):

| LED behaviour | Meaning |
|---|---|
| Yellow LED blinks at rate of 1 Hz, 50% on and 50% off | Warning: weak contamination.<br>The LMS 200 can still be used in this condition. |
| Yellow LED blinks at rate of 1 Hz, 90% on and 10% off.<br>The red LED is continuously lit | Contamination error: strong contamination.<br>The LMS 200 is no longer capable of operation. |

Table 7-1: LMS 200: LED error indicators on contamination of the front window.

Depending on the degree of front window contamination the VMC 100 also issues the following warning by means of the "MODE" LED:

| "MODE" LED behaviour | Meaning |
|---|---|
| Green / red blinking | Warning (weak contamination).<br>Measurement Mode still active. |
| Red blinking | Error (strong contamination).<br>The VMC 100 is no longer capable of operation. |

Table 7-2: VMC 100: LED error indicators on contamination of the LMS front window.

**Cleaning the front window of the LMS 200:**

**ATTENTION**

**Damage to the front window!**

The front window is made of plastic. System performance can be reduced as a result of scratches and streaks on the front window.

- Use mild detergent without any powder.
- Avoid scratching and scouring movements.

- Clean the front window at regular intervals, e.g. with an anti-static glass cleaning liquid. Use a soft, non-fluffy cloth for cleaning.
- If necessary also clean the LED indicators of the LMS 200 and the front panel of the VMC 100.

## 7.2 Maintenance

The VMS 100 operates without the need for maintenance. Any errors that crop up are reported by the system via the "MODE" LED on the front panel of the VMC 100 and by the output of the device status, separately for the LMS 200 and the VMC 100, in the measurement results. See also *Table 7-2* and *Chapter 3.3.2 Functions of the LED indicators.*

**Test measurement:**

A test measurement every month is recommended with a typical rectangular reference object with known dimensions.

- Measure the object several times with the VMS 100 and compare the values received with the known object dimensions.

## 7.3 Disposal

Dispose of unusable or irreparable devices in an environmentally friendly manner after a final decommissioning:

1. Follow valid local waste disposal regulations.
2. Dismantle the housing.
3. Dismantle the electronic assemblies.
4. Remove the front window (LMS 200) and dispose of it for plastic recycling.
5. Remove the chassis and dispose of it for aluminium die cast recycling.
6. Dispose of the electronic assemblies as special waste.
7. Dispose of cable wiring for metal recycling

SICK AG does not currently accept the return of devices that are unusable or irreparable.

# 8 Troubleshooting

## 8.1 Overview of possible faults and problems

### 8.1.1 Mounting error

- The LMS 200 is not well aligned upon the object on the transport system
- The shaft encoder (optional) is wrongly sited

### 8.1.2 Error in the electrical installation

- VMC 100 data interface (COM connection) wrongly wired
- Bad connection between LMS 200 and VMC 100

### 8.1.3 Parameterisation error

- Functions not adapted to the conditions on site
- Trigger source wrongly selected
- Technical device limits not taken sufficiently into account

### 8.1.4 Operating difficulties

- Object gap too small
- Device fault (hardware/software)

## 8.2 Monitoring signs of faults and problems

The VMS 100 monitors itself during operation:

- After switching on the power supply the VMS 100 carries out a self-test before initialisation (loading of the parameter set and initialisation of the device functions) involving the testing of important hardware components.
- If the VMS 100 discovers a device fault during the self-test or during self-monitoring, the VMC 100 gives out appropriate numerical values in the measurement result output telegram for VMC 100 status and LMS 200 device status in a coded form.
  See *Chapter 10.2.2 VMC 100 status and 10.2.3 LMS 200 device status.*
- The red and yellow LEDs of the LMS 200 and the "Mode" LED of the VMC 100 signal the system's error state.
  See *Chapter 3.3.2 Functions of the LED indicators*.

## 8.3 Identifying faults and remedying them

The following aids are necessary for remedying the faults described in the table below:

- these Operating Instructions
- tools
- a measuring tape (up to 2000 mm)
- a digital measurement device (current / voltage measurements)
- a PC with VMS 100 Commissioning Software
- RS-232 data connection cable, e.g. order no. 2 016 401

| Problem | Possible cause | Remedial action |
|---|---|---|
| VMC 100: "power" LED does not light | VMS 100 has no power supply | - Check the cables<br>- Measure power supply |
| VMC 100: "mode" LED blinks first green and then red/green | Bad connection to LMS 200 | Check cables |
| VMC 100: "mode" LED blinks red/green | The system is issuing a warning: e.g. LMS 200 front window contaminated | Check the values for VMC 100 status and LMS 200 device status in the measurement results using the PC. See *Chapter 10.2.2 VMC 100 status and 10.2.3 LMS 200 device status* |
| VMC 100: "mode" LED blinks red | Device fault | Run Diagnostics with software |
| LMS 200: yellow LED blinks at rate of 1Hz (50% on and 50% off) | LMS 200 front window slightly contaminated.<br>VMS 100 still ready for operation | Clean LMS 200 front window. See *Chapter 7.1 Maintenance during operation* |
| LMS 200: yellow LED blinks at rate of 1Hz (90% on and 10% off).<br>Red LED lit constantly | LMS 200 front window strongly contaminated.<br>VMS 100 not ready for operation | Clean LMS 200 front window. See *Chapter 7.1 Maintenance during operation* |
| Higher-ranking computer cannot receive measurement results | - VMC 100 data interface wrongly wired<br>- Destination computer interface not adapted | - Check wiring<br>- Set communication parameters correctly |
| Object is not detected | - Parameter value "Height above transport system“ selected too high<br>- Trigger source wrongly selected<br>- Problem with connection to LMS 200 | - Enter the correct value<br>- Select the right trigger source<br>- Check connection |
| Measurement result: data given out contains 9999, 9999, 9999 | Detection zone too large | Adapt detection zone |
| Measurement result: data incorrect | Object gap too small | - Correct measurement area<br>- Increase object gap |
| Measurement result: dimension at right angles to direction of transport too small | Parameter values for measurement area "left & right limits" too small | Increase parameter values |
| Measurement result: object height too small/large | Parameter value "height" is too large/small | Correct the value |
| Measurement result: dimension of object along direction of transport is too small/large | Parameter value "speed" or "increments/mm" is too large/small | Correct the value |
| Measurement result: object length is always zero | `Incr. encoder` option is activated, but no signal available | Deactivate `Incr. encoder` option or connect shaft encoder |

Table 8-1: Troubleshooting table.

## 8.4 SICK Support

If a fault cannot be remedied by any of the above-mentioned measures, the VMS 100 may be defective. The system does not contain any components whose functionality can be restored by the user repairing them after a breakdown.

Please contact your local SICK office or subsidary:

- The telephone and fax numbers are listed on the *back page* of these Operating Instructions.

➢ Please do not send in the device without contacting SICK Service.

# 9 Technical data

## 9.1 Data sheet for the VMS 100 Volume Measurement System

| **Type** | **VMS 100** |
|---|---|
| Read window (LMS 200-30106) | plastic, semi-circular |
| Laser diode | IR light, 905 nm |
| Laser protection class (LMS 200-30106) | 1 (eye-safe), acc. to DIN EN 60825-1 |
| Usable slit angle | max. 180° |
| Detectable object shape | rectangles |
| Min. object dimensions (L x B x H) | 200 mm x 200 mm x 100 mm |
| Max. length x width x height | 7500 mm x 1500 mm x 1500 mm |
| Min. object gap | typ. > 100 ms |
| Transport velocity | 0.1 ... 2 m/s, constant or variable (shaft encoder required) |
| Typ. accuracy (L, W, H)<br>up to 1 m/s<br>up to 2 m/s | with min. object size of 200 mm x 200 mm x 200 mm:<br>±15 mm, ±15 mm, ±15 mm<br>±25 mm, ±20 mm, ±20 mm |
| Optical indicators | LMS 200: 3 LEDs, VMC 100: 2 LEDs |
| Data interface COM (VMC 100) | RS-232 or RS-422 (configurable) |
| Communication parameter | 9600 bits/s, 8 data bits, no parity, 1 stop bit |
| Output data | length, width, height, optional: e.g. bar-code when bar-code scanner connected |
| Data interface BUS (VMC 100) | RS-485 |
| Communication parameter | 9600 bits/s, 8 data bits, no parity, 1 stop bit |
| Functional switching inputs | 4 x digital DC 24 V, 2 x shaft encoder 24V / 100 max. KHz |
| Functional switching outputs | 3 x digital DC 24 V |
| Electrical connections (VMC 100) | 7 connection strips, 1 x 9-pin D-sub socket, 1 x 15-pin D-sub HD socket |
| Operating voltage/power consumption | VMC 100-0000: DC 24 ±15% / 56 W total<br>VMC 100-0100: AC 230 V -15%+10% / 50 Hz |
| Housing | LMS 200-30106: die-cast aluminium; VMC 100-0000: aluminium continuous cast profile, -0100: lacquered sheet steel, PC windo |
| Protection class | LMS 200-30106: Class 2/ VMC 100-0000: Class 2, acc. to DIN 40 050 |
| Enclosure rating (acc. to VDE 0106/IEC 1010-1) | LMS 200-30106: IP 65<br>VMC 100-0000: IP 20, acc. to VDE 0106/IEC 1010-1, VMC 100-0100: IP 65 |
| EMC test | acc. to IEC 801, Part 2-4; EN 50081-1/50082-2 |
| Vibration/shock tests | LMS 200-30106: acc. to IEC 68-2-6, Tab. 2c/ IEC 68-2-27, Tab. 2<br>VMC 100-0000: acc. to DIN EN 60068-2-6/ DIN EN 60068-2-27<br>VMC 100-0100: acc. to DIN EN 60068-2-6 Test FC/ DIN EN 60068-2-27 Test EA |
| Weight | LMS 200-30106: ca. 4.5 kg, VMC 100-0000: ca. 1.7 kg, VMC 100-0100: ca. 11 kg |
| Temperature (operating/storage) | LMS 200-30106: 0 ... +50 °C/ –30 ... +70 °C<br>VMC 100-0000: 0 ... +50 °C/ –20 ... +70 °C, 0100: 0 ... +50 °C/ –25 ... +70 °C |

Table 9-1: Technical specifications for the VMS 100.

## 9.2 Dimensional drawings

### 9.2.1 LMS 200-30106 Laser Measurement System dimensional drawing

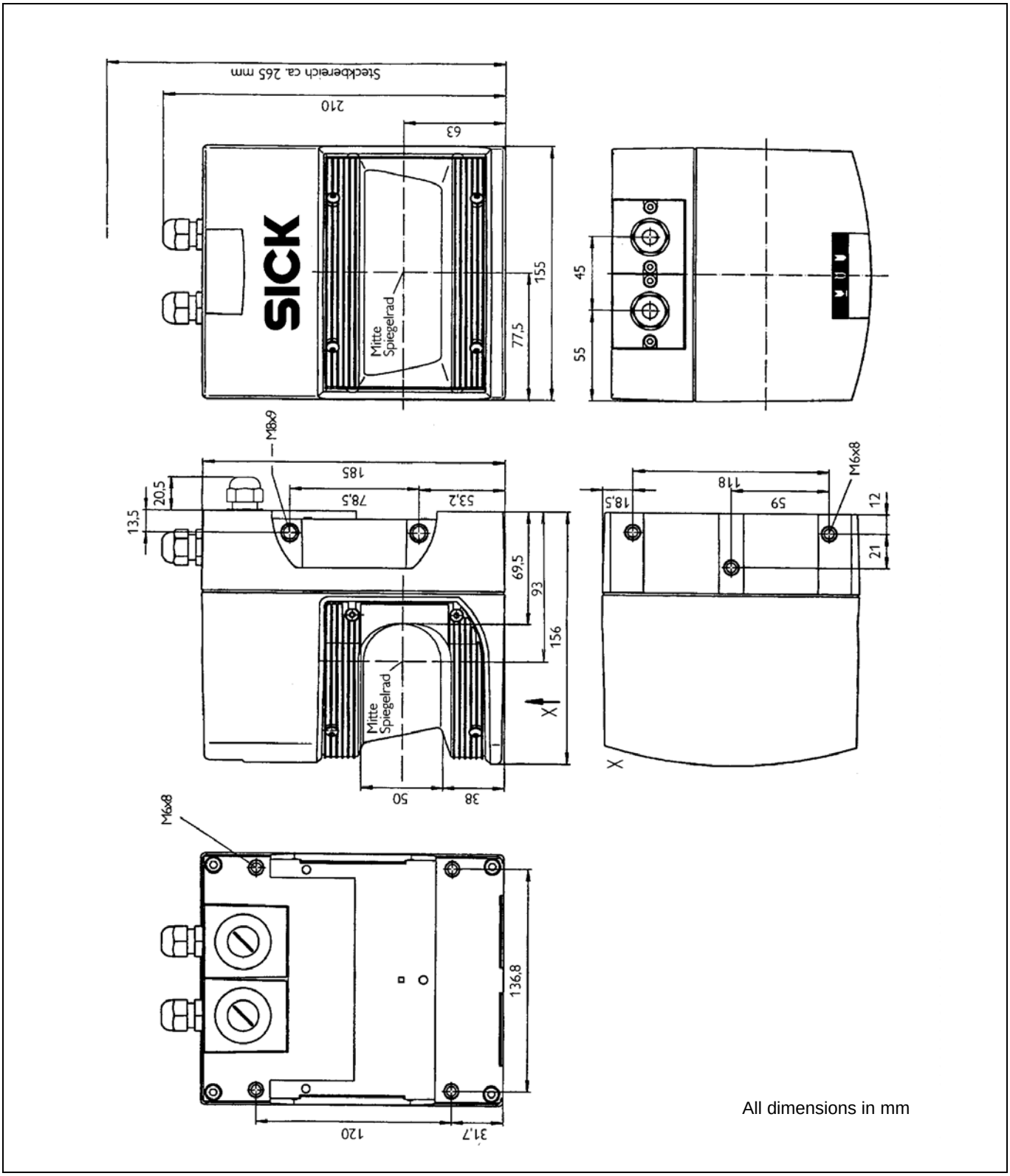



Fig. 9-1: Dimensions of the LMS 200-30106 Laser Measurement System

### 9.2.2 VMC 100-0000 evaluation unit dimensional drawing

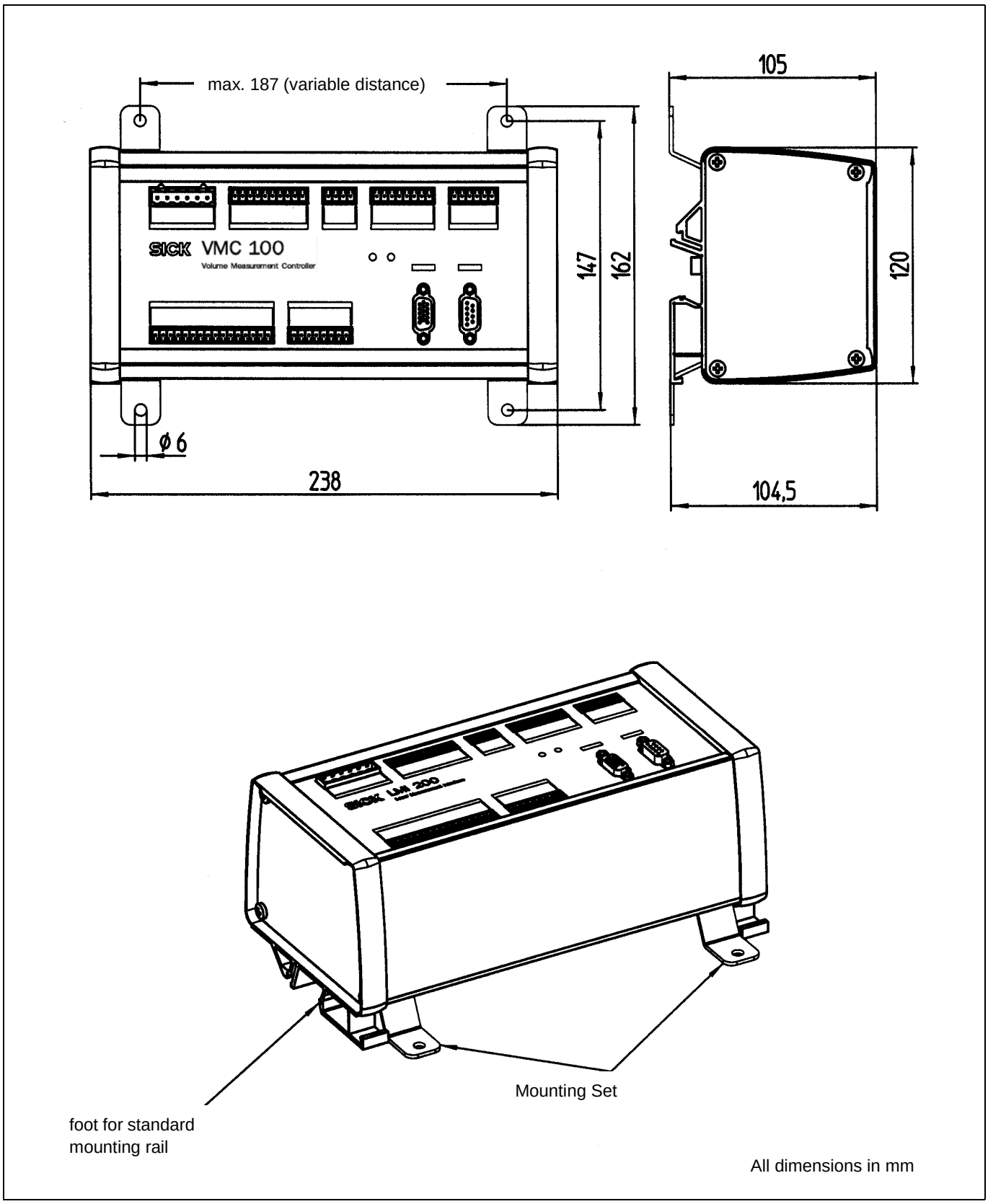



Fig. 9-2: Dimensions of the VMC 100-0000 evaluation unit

### 9.2.3 View of Mounting Set for LMS 200-30106

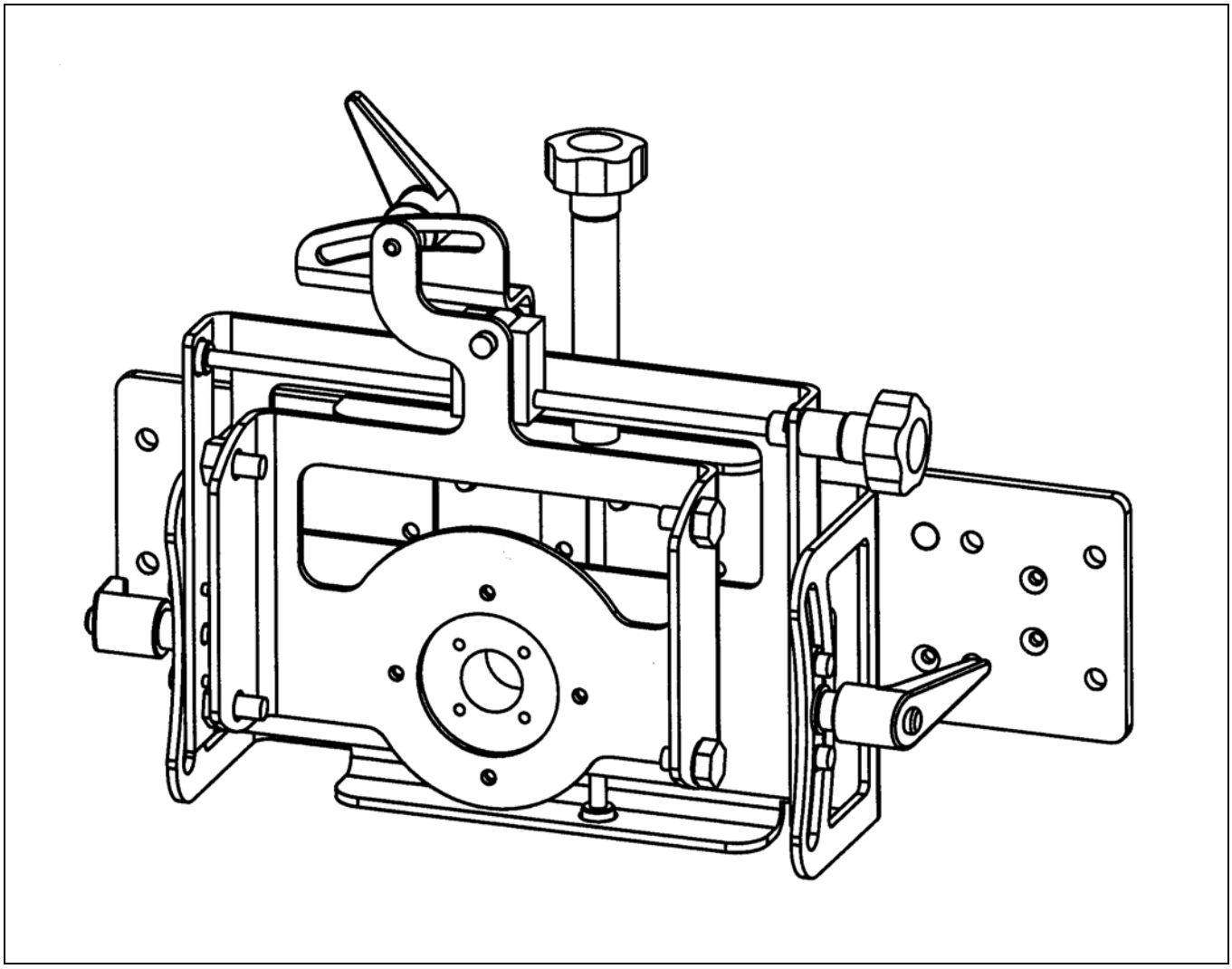


Fig. 9-3: Structure of Mounting Set no. 2 020 925

### 9.2.4 View of VMC 100-0100

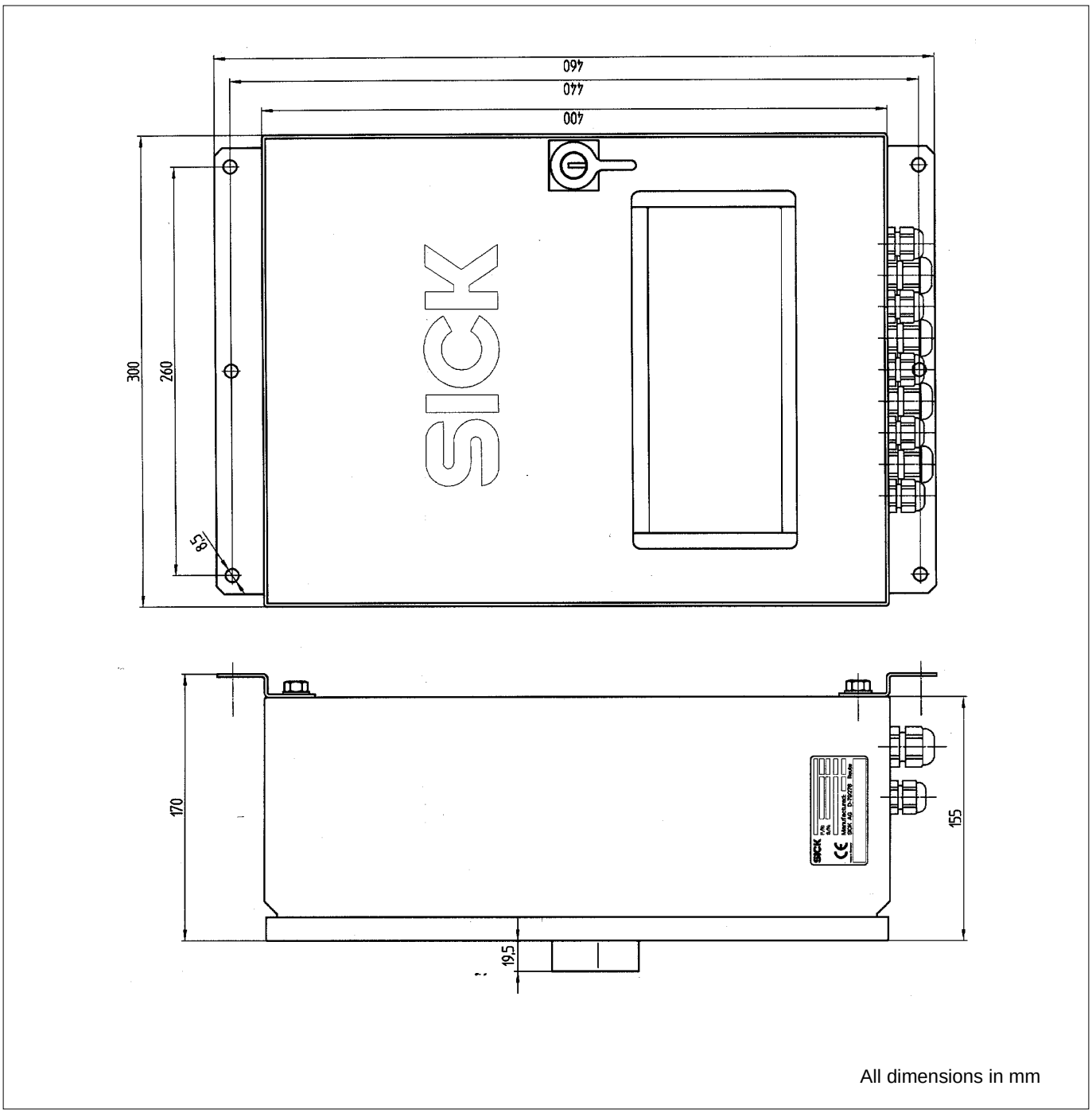



Fig. 9-4: Dimensions of the VMC 100-0100 evaluation unit.

# 10 Appendix

## 10.1 Overview of the Appendix

The appendix contains the following supplements and auxiliary information:

- Telegram structure
- System or component replacement
- Available accessories (order details)
- Information on supplementary documentation
- The EU Declaration of Conformity
- Index

## 10.2 Telegram structure

### 10.2.1 Telegram format

The telegram given out by the VMC 100 as the measurement result via its COM data interface, is composed as follows in *Tab. 10-1* from the top downwards:

| Description | Bytes | Meaning |
|---|---|---|
| Header | 8 | Header, beginning with ST |
| Object length in mm | 4 | ASCII data |
| Separator | 1 | 09(hex) |
| Object width in mm | 4 | ASCII data |
| Separator | 1 | 09(hex) |
| Object height in mm | 4 | ASCII data |
| Separator | 1 | 09(hex) |
| Object weight in kg | 4 | ASCII data |
| Separator | 1 | 09(hex) |
| Bar-code length | 2 | ASCII data |
| Separator | 1 | 09(hex) |
| Bar code | n | ASCII data |
| Separator | 1 | 09(hex) |
| Device status | 1 | he |
| VMC 100 status | 1 | he |
| Checksum | 2 | CRC 16 |

Table 10-1: Telegram format at the COM data interface (VMC 100).

The VMS 100 can receive an external telegram during Measurement Mode and integrate it in the output telegram. The entire external telegram must be received by the VMC 100 during the measurement of the object. A measurement is active while an object is on the measurement line.

The structure of a telegram that can be sent from an auxiliary device to the RS-485 interface of the VMS 100, is defined as follows:

| Description | Bytes | Meaning |
|---|---|---|
| Start characters | 1 | STX |
| Number of characters in bar code | 2 | Separator, CL code length, before code<br>(trigger for digital in: flank high) |
| Bar code | | Length depending on application |
| Block check (BCC) | | Block check, XOR linkage via all preceding characters<br>(hex-ASCII format) |
| End characters | 1 | ETX |

Table 10-2: Structure of external telegrams.

### 10.2.2 VMC 100 status

The VMC 100 device status transferred in the telegram has the following meaning:

| Code | Meaning |
|---|---|
| 0 | Normal Measurement Mode |
| 1 | Warning: LMS window contaminated |
| 2 | Problem LMS 200 |
| 3 | Problem bar-code scanner |
| 4 | Problem weighing machine |

Table 10-3: Output telegram: meaning of the VMC 100 status.

### 10.2.3 LMS 200 device status

In the LMS 200 status byte information is provided bit-wise.

| Bit | Meaning |
|---|---|
| 0 - 2 | Classification:<br>0 = Normal Measurement Mode<br>1 = Information<br>2 = Warning<br>3 = Error<br>4 = Fatal error |
| 3 - 4 | Cause:<br>0 = Software VMC 100<br>1 = Software VMS 100<br>2 = LMS 200<br>3 = Not used (reserved) |
| 5 | Contamination:<br>0 = None<br>1 = Contamination of LMS windo |
| 6 - 7 | Not used (reserved) |

Table 10-4: Output telegram: meaning of the LMS 200 device status.

**Triggering measurement readiness with a telegram from the host:**

If the system is in "Limited measurement readiness" mode (`Request`) measurement readiness is activated by the following telegram to the VMC 100: 02 00 08 00 7D 74 08 06 C0 01 00 07 8F 56
See also the `Test Request` button in *Fig. 6-3* in *Chapter 6.3 Output of measurement data on the screen*. The telegram shown above is sent to the VMC 100 by pressing this button.

**Request for measurement values with telegram from host**

The measurement values of the VMS 100 can be requested with the following telegram:
02 00 08 00 7D 74 08 06 C0 01 00 02 8A 56. The telegram can be sent to the VMS 100 several times for repeated requests.

### 10.2.4 Replacing a system or components

Proceed as follows if the system or individual components need replacement:

**LMS 200:**

1. Switch off VMC 100 power supply.
2. Loosen and remove the plug modules of both connection cables on the LMS 200.
3. Loosen and remove the Mounting Set screws on the LMS 200 and remove the device.
4. Mount and connect the replacement device appropriately.
5. Switch on the VMC 100 power supply.
6. Connect PC to the VMC 100 "COM" connection via the data cable and start up PC.
7. Start the VMS 100 Commissioning Software and completely reset the system parameters as described in *Chapter 6*.
   This ensures that a high level of measurement accuracy is also achieved with the new LMS 200.

**VMC 100:**

1. Note all the parameters with the help of the Commissioning Software.
2. Switch off the VMC 100 power supply.
3. Remove all connection cables on the VMC 100.
4. Disassemble the VMC 100. Unscrew the VMC 100-0000 with its wall bracket from the base or unclip the VMC 100-0000 from the mounting rail. Or remove the VMC 100-0100 from the attachment equipment.
5. If necessary remove the VMC 100 from the wall bracket.
6. Mount the new device. First screw the new VMC 100-0000 onto the wall bracket and then together with it onto the base, or snap the device onto the mounting rail. Or mount the VMC-0100 onto the attachment equipment.
7. Re-attach all the connection cables to the VMC 100.
8. Switch on the VMC 100 power supply.
9. Connect the PC to the VMC 100 COM connection via the data cable and start the PC up.
10. Start the VMS 100 Commissioning Software and enter the parameters that were noted before with the parameterisation software or completely reset the system parameters as described in *Chapter 6*.

See *Chapter 7.3 Disposal* for disposal of unusable or irreparable devices.

## 10.3 Available accessories (order details)

### 10.3.1 The complete VMS 100 systems

| Order no. | Description |
|---|---|
| 1 022 987 | The complete VMS 100-0000 system, consisting of:<br>- 1 LMS 200-30106 Laser Measurement System<br>- 1 Connection Set 2 for the LMS 200:<br>2 cables for electrical supply and data transfer, each 10 m long,<br>with one connection plug module each for the LMS 200<br>- 1 Mounting Set, two-axis, fine adjustment<br>- 1 VMC 100-0000 evaluation unit with installed VMS 100 Evaluation Software, for clip-on mounting rail, with a mounting set for wall mounting<br>- 1 diskette (3½ inch) with VMS 100 Commissioning Software for Windows-NT/Windows 95 |

Table 10-5: Order details: the complete VMS 100 system.

Also available on request as a device version, with VMC 100-0100 in an IP 65 protective cabinet with power supply.

### 10.3.2 Accessories

**Optional accessories for operation:**

| Order no. | Description |
|---|---|
| On request | Photoelectric switch |
| On request | Shaft encoder, resolution min. 1 mm |
| On request | Bar-code scanner |
| On request | Power supply unit |
| On request | Adapter for connection to Bus systems |
| 2 019 522 | Heating plate for LMS 200 for operation between –12°C ...+50°C, though no LMS operation outdoors<br>230 VAC ± 10 %, 30 W (cyclic, thermostat-controlled), IP 65 |

Table 10-6: Order details: optional accessories for operation.

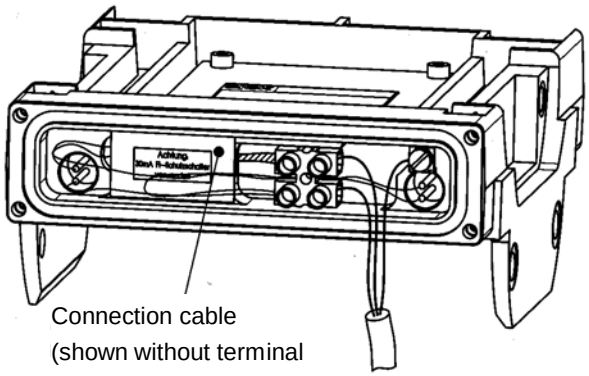
**Accessories for commissioning:**

| Order no. | Description |
|---|---|
| 2 016 401 | Data cable for connection of PC/Laptop to VMC 100, with 2 x 9-pin D-sub plugs, length 3 m (RS-232 male/female-crossed) |
| 6 020 756 | Scan finder |

Table 10-7: Order details: optional accessories for commissioning.

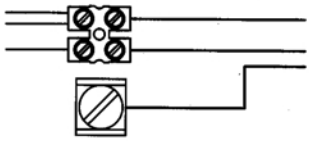
### 10.3.3 View of the accessories

**Heating plate**



Connection cable
(shown without terminal
compartment
cover with PG 9 cable)

Connection of the heating plate



230 V AC ± 10 %[1)]

Proctective
conductor


**ATTENTION!**
Proctective conductor
must be connected.

1) Connection cable:
wire cross-section up to 1.5 mm$^2$

Fig. 10-1: Structure and electrical connection of the heating plate no. 2 019 522

## 10.4 Supplementary documentation

| Order no. | Title |
|---|---|
| 8 008 969 | Technical Description "LMS 210 ... 290", German |
| 8 008 970 | Technical Description "LMS 210 ... 290", English |
| 8 008 871 | Technical Description "LMI 200", German |
| 8 008 872 | Technical Description "LMI 200", English |
| 8 008 930 | Operating Instructions "LMI 200 User Software", German |
| 8 008 931 | Operating Instructions "LMI 200 User Software", English |
| 8 008 929 | Technical Description "MST 200 - LMI 200 version“, German/English |

Table 10-8: Supplementary documentation.

## 10.5 The EU Declaration of Conformit

### 10.5.1 The LMS 200 EU Declaration of Conformit

SICK

**EC Declaration of Conformity**

**In Compliance with the EC Directive on Electromagnetic Compatibility 89/336/EEC**

We hereby declare that the devices (see page 2)

**of the product family LMS2..-.....**

comply with the basic requirements of the EC Directive specified under Point 1. If an item of equip-ment listed overleaf is modified without our approval then this declaration loses its validity for this equipment.

We employ a quality system certified by the DQS (German Quality Assurance Society), No. 19 462-01, as per ISO 9001 and have therefore observed the regulations in accordance with module H as well as the following EC directives and EN standards during development and production:

| | | | |
|---|---|---|---|
| 1. ***EC directives*** | EC EMC directive 89/336/EEC as per 92/31/EEC, 93/68/EEC, 93/465/EEC | | |
| 2. ***Harmonized standards and preliminary standards used*** | EN 50081-1 | Emitted interference, residential commercial and light industry | Ed. 92-01 |
| | EN 50082-2 | Immunity, industry | Ed. 95-03 |

Conformance of a type sample belonging to the above-mentioned product family with the regulations from the listed EC directives has been certified by:

***Test authority*** } The tests were carried out and documented on our own responsibility.

Reute, 1998-08-16

i. V. Pierenkemper
(Manager Development Division Auto Ident)

i. V. Walter
(Manager Production Division Auto Ident)

The declaration certifies conformance with the listed directives, but does not guarantee product characteristics.
The safety instructions contained in the product documentation must be observed.

**Mat. No.: 9 055 675**
**Page 3, engl.**
Update no.: see page 2

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Fig. 10-2: The EU Declaration of Conformity for the LMS 200, Page 3 (reduced in size).

The EC Declaration of Conformity No. 9055675 is valid for the following types of the product family LMS:

| Type | Id.-No. |
|---|---|
| LMS200-30106 | 1015850 |
| LMS210-20201 | 1013859 |
| LMS210-20202 | 1013856 |
| LMS210-20204 | 1013860 |
| LMS210-30206 | 1017812 |
| LMS211-20201 | 1013853 |
| LMS211-20202 | 1013854 |
| LMS211-20204 | 1013855 |
| LMS211-30206 | 1018023 |
| LMS220-20203 | 1013865 |
| LMS220-30106 | 1015945 |
| LMS220-30206 | 1017811 |
| LMS221-20203 | 1015833 |
| LMS221-30206 | 1018022 |
| LMS290-S01 | 1016024 |
| LMS291-S01 | 1016078 |
| LMS209-S02 | 1016414 |
| LMS299-S03 | 1016829 |
| LMS200-S04 | 1016828 |
| LMS290-S05 | 1018027 |
| LMS291-S05 | 1018028 |
| LMS219-S06 | 1018761 |
| LMS229-S06 | 1018764 |
| LMS211-S07 | 1018966 |
| LMS221-S07 | 1018965 |

**end of list -**

**Mat.-No.: 9 055 675**
**Page 2**
**Update no.: K438**

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Fig. 10-3: The EU Declaration of Conformity for the LMS 200, Page 2 (reduced in size).

  

### 10.5.2 The VMC 100 EU Declaration of Conformit

SICK

## EC Declaration of Conformity

**In Compliance with the EC Directive on Electromagnetic Compatibility 89/336/EWG**

We hereby declare that the devices (see page 2)

**of the product family VMC100**

comply with the basic requirements of the EC Directive specified under Point 1. If an item of equipment listed overleaf is modified without our approval then this declaration loses its validity for this equipment.

We employ a quality system certified by the DQS (German Quality Assurance Society), No. 462, as per ISO 9001 and have therefore observed the regulations in accordance with module H as well as the following EC directives and EN standards during development and production:

| | | | |
|---|---|---|---|
| 1. ***EC directives*** | EC EMC Directive 89/336/EEC as per 92/31/EEC, 93/68/EEC, 93/465/EEC | | |
| 2. ***Harmonized standards used*** | EN 55011 | Emitted interference, industry | Ed. 98-05 |
| | EN 61000-6-2 | Immunity, industry | Ed. 00-03 |

Conformance of a type sample belonging to the above-mentioned product family with the regulations from the listed EC directives has been certified by:

The tests were carried out and documented on our own responsibiliy.

Reute, den 2001-11-07

ppa. Pierenkemper
(Manager Development
Division Auto Ident)

ppa. Walter
(Manager Production
Division Auto Ident)

The declaration certifies conformance with the listed directives, but does not guarantee product characteristics. The safety instructions contained in the product documentation must be observed.

**Mat. No.: 9 066 207**
**Page 3**
**Update no.: see page 2**

8.006.440.0499.BK - BK II - 16866

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Fig. 10-4: The EU Declaration of Conformity for the VMC 100, Page 3 (reduced in size).

SICK

| Type | Id.-No. |
|---|---|
| VMC100-0100 | 1022172 |
| | |
| VMC100-0000 | 1022163 |
| | |
| | |
| | |

**- end of list -**

**Mat. No.: 9 066 207**
**Page 2**
**Update no.: AE 0**

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Fig. 10-5: The EU Declaration of Conformity for the VMC 100, Page 2 (reduced in size).

  

## 10.6 Commissioning log

Prepared by: Date:

| Parameter | Unit | Value / entry |
|---|---|---|
| **LMS/conveyor position** | | |
| Left conveyor | mm | |
| Right conveyor | mm | |
| Height LMS/conveyor | mm | |
| **Zone of detection** | | |
| Left | mm | |
| Right | mm | |
| Height zone/conveyor | mm | |
| **Velocity** | | |
| Conveyor velocity | cm/min | |
| 1/1000 mm per incr. | | |
| **Process** | | |
| Send parcel data | - | |
| Trigger source | - | |
| Spacer height | mm | |
| Scans sample | - | |
| Length always > Width | - | |
| Height = max height | - | |
| **Peripherics** | | |
| Barcode reader | - | |
| Weighter Type | - | |
| Increm. encoder | - | |
| Photocell | - | |

## 10.7 Index



  

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8 009 406/14-02-2002 · 5M/TR <WinW97/PM 6.0> · SMD · Printed in Germany · AfE3305sw

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