OPERATING INSTRUCTIONS

VMS410/VMS510
Volume Measurement System

The benchmark for reliable object dimensioning

SICK
Sensor Intelligence.

Software versions described

Software/tool	Function	Status
VMD410-1000	Firmware	V 2.00 or higher
VMD510-1000	Firmware	V 2.00 or higher
Device description VMD410	Device specific software module for SOPAS	V 01.02.00 or higher
Device description VMD510	Device specific software module for SOPAS	V 01.02.00 or higher
SOPAS	Configuration software	V 02.12 or higher

ATTENTION

The VMS volume measurement system is intended exclusively for use in industrial environments. When used in residential areas, the device can cause radio interference.

Trademarks

Windows 98, Windows NT 4.0, Windows 2000, Windows XP and Internet Explorer are registered trademarks of Microsoft Corporation in the USA and other countries.

Version of the operating instructions

The newest version of these operating instructions can be obtained as PDF at **www.sick.com**.

Getting started ...

- **Delivery**
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- **WARNING!**
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- **Mounting and adjusting the device**
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Installation steps (overview)

1. Check delivery for completeness.
2. Mount the VMD over the conveyor system.
3. Connect VMD to voltage supply.
4. Switch on PC and start Windows (minimum requirement: Windows 98).
5. Install enclosed SOPAS configuration software from CD-ROM on PC.
6. Connect the PC to the VMD using the Ethernet interface.
7. Start the SOPAS configuration software user interface and add a new project.

ATTENTION

Don't switch off the voltage supply during configuration!

Switching off the voltage supply during configuration causes all parameters already configured to be lost.

8. Configuration of the scan assistant (SCAN ASSISTANT file card, CONFIGURATION button). Enter the IP address for the VMD and check setting for the CoLa dialect.
9. Scan for devices connected (SCAN ASSISTANT file card, SCAN button) and add the VMD to the SOPAS project tree.
10. From the EXTRAS menu select the LOGIN DEVICE command and log in to the system as AUTHORISED CLIENT using the password "client".
11. Deactivate preset laser control settings during adjustment (PROJECT TREE, VMDX10_XX00, PARAMETER, DIGITAL INPUTS/TRIGGER, area LASER CONTROL).
12. Adjust the VMD so that the middle of the sensor is over the middle of the conveyor system and the beam is normally incident on the conveyor system.
13. Configure the position of the VMDs with the aid of the installation setup (VMDX10_XX00 menu, COMMISSIONING, START INSTALLATION SETUP).
14. Configure the VMD with the aid of the options on the PROJECT TREE, VMDX10_XX00, PARAMETER for the desired application.
15. Checking the measurement area of the system (PROJECT TREE, VMDX10_XX00, MONITOR).
16. Reactivate the laser control (PROJECT TREE, VMDX10_XX00, PARAMETER, DIGITAL INPUTS/ TRIGGER, area LASER CONTROL).
17. Test the configuration under real conditions.

Recommendation

Use the graphic scan view in SOPAS to verify the generated measured values and to verify the measurement area online. During this process, note that the monitor cannot display the data in real-time and therefore does not display all measured values.

18. If necessary, correct and optimise the parameters set.
19. Save parameter record as a configuration file (extension "*.spr") (menu PROJECT, SAVE PROJECT AS).
20. Save parameter set permanently to the VMD (menu VMDX10_XX00, PARAMETER, SAVE PERMANENT). The parameter set is then saved on the EEPROM.
21. The VMS410/510 is ready for use with the application-specific configuration.

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Abbreviations

BCC Block Character Check

CAN Controller Area Network = standardised fieldbus system with message-based protocol for exchanging data

CCD Charge-coupled Device, CCD camera = line camera, e.g. for reading bar-codes

CS Checksum

EEPROM Electrically Erasable Programmable Read-only Memory

HTML Hypertext Markup Language = page description language on the Internet

LED Light Emitting Diode

RAM Random Access Memory = volatile memory with direct access

RIS Remission Information System

ROM Read-only memory (permanent)

SOPAS SICK OPEN PORTAL for APPLICATION and SYSTEMS Engineering Tool = configuration software for the configuration of the VMS

SST Interface

VMD Volume Measurement Device = scanner head

VMS Volume Measurement System = SICK AG volume measurement system

Tables

Figures

1 About this document

Please read this chapter carefully before working with this documentation and the VMS410/510 volume measurement system.

1.1 Function of this document

These operating instructions are designed to address **the technical personnel** in regards to safe mounting, configuration, electrical installation, commissioning, operation and maintenance of the VMS volume measurement system.

1.2 Target group

The intended audience for this document is people in the following positions:

1.2.1 Mounting, electrical installation, maintenance and replacement

Factory electricians and service engineers

1.2.2 Commissioning, operation and configuration

Technicians and engineers

1.3 Depth of information

Note The VMS410 as well as the VMS510 will be referred to as “VMS” in the following.

These operating instructions contain the following information on the VMS:

- mounting
- electrical installation
- commissioning and configuration
- maintenance
- fault, error diagnosis and troubleshooting
- ordering information
- conformity and approval

Planning and using measurement systems such as the VMS also require specific technical skills which are not detailed in this documentation.

The VMS is configured on-site for the related application using the SOPAS configuration software. How to use the software is described in *Chapter 7 “Configuration and adjustment” on page 42*.

When operating the VMS volume measurement system, the national, local and statutory rules and regulations must be observed.

Note Please refer also to the VMS information in the Internet at www.sick.com.

1.4 Symbology used

Reference Text in italics indicates a reference to more detailed information.

Recommendation Recommendations are designed to give you assistance in the decision-making process with respect to a certain function or a technical measure.

Note Refer to notes for special features of the device.

Explanation Explanations provide background knowledge on technical relationships.

MENU COMMAND This typeface indicates a term in the SOPAS user interface.

Terminal output This typeface indicates messages that the VMS outputs via its terminal interface.

➢ Take action ... Instructions for taking action are shown by an arrow. Read carefully and follow the instructions for action.

This symbol refers to additionally available documentation.

ATTENTION

Warning!

A warning indicates an actual or potential hazard. They are designed to help you to prevent accidents and to protect the device from being damaged.

Read carefully and follow the warning notices!

Software notes show you where the related setting can be made in the SOPAS configuration software.

2 For your safety

This chapter deals with your own safety and the safety of the equipment operators.

➢ Please read this chapter carefully before working with the VMS or with the conveyor system equipped with the VMS.

2.1 Authorised personnel

The VMS volume measurement system must be installed, commissioned and serviced only by adequately qualified personnel.

The following qualifications are necessary for the various tasks:

2.1.1 Mounting and maintenance

- basic technical training
- knowledge of the current safety regulations in the workplace

2.1.2 Electrical installation and replacement

- practical electrical training
- knowledge of current electrical safety regulations
- knowledge on the use and operation of devices in the related application (e.g. conveyors)

2.1.3 Commissioning, operation and configuration

- knowledge on the use and operation of devices in the related application (e.g. conveyors)
- knowledge on the software and hardware environment in the related application (e.g. conveyors)
- basic knowledge of the Windows operating system
- basic knowledge of the usage of an HTML browser (e.g. Internet Explorer)
- basic knowledge of data transmission

2.2 Applications of the device

The VMS volume measurement system is intended exclusively for use in industrial environments. When used in residential areas, the device can cause radio interference.

It measures cuboid objects on flat conveyor systems.

- The VMS410 determines length, width and height, and calculates from this information the volume of the smallest enclosing cuboid, the box volume.
- The VMS510 determines length, width and height.

This information is passed by the related system over a data interface to the customer's computer for further processing.

2.3 Correct use

The VMS volume measurement system must be used only as defined in *Section 2.2 "Applications of the device" on page 13*. It is only allowed to be used by qualified personnel and only in industrial environments on the conveyor system on which it has been installed and initially commissioned by specialist personnel in accordance with these operating instructions.

If the device is used for any other purpose, opened or modified in any way — also during mounting and installation — any warranty claim against SICK AG shall become void.

2.4 General safety notes and protective measures

Safety notes

ATTENTION

Please observe the following items in order to ensure the correct and safe use of the VMS volume measurement system.

- The notices in these operating instructions (e.g. on use, mounting, installation or integration into the existing machine controller) must be observed.
- National/international rules and regulations apply to the installation, commissioning, use and periodic technical inspections of the volume measurement system, in particular:
  - work safety regulations/safety rules
  - other relevant health and safety regulations
- Manufacturers and users of the system are responsible for obtaining and observing all applicable safety regulations and rules.
- The tests must be carried out by specialist personnel or specially qualified and authorised personnel and must be recorded and documented to ensure that the tests can be reconstructed and retraced at any time.
- The operating instructions must be made available to the operator of the system where the VMS volume measurement system is fitted. The operator of the system is to be instructed in the use of the device by specialist personnel and must be instructed to read the operating instructions.

Risk of injury from electrical power!

ATTENTION

The VMS volume measurement system is connected to 24 V DC.

➢ Observe the current safety regulations when working on electrical systems.

The VMS volume measurement system is intended exclusively for use in industrial environments. When used in residential areas, the device can cause radio interference.

ATTENTION

WARNING

Damage to the eye from laser radiation!

The VMS uses a red laser of class 2. On extended beam exposure, the retina in the eye may be damaged.

The entire front screen serves as the laser output opening.

Warning — inappropriate use of the VMS can result in hazardous exposure to radiation and the laser class may be exceeded.

- Never look directly into the beam (similar to sunlight).
- Do not point the device laser beam at people.
- During mounting and adjustment of the VMS, pay attention to possible reflections of the laser beam on reflective surfaces.
- Do not open the housing. (Opening the housing does not interrupt the power to the laser diode during the read cycle.)
- Observe the latest valid version of the laser safety regulations.

Laser output opening

The laser output opening is the front screen of the VMD.

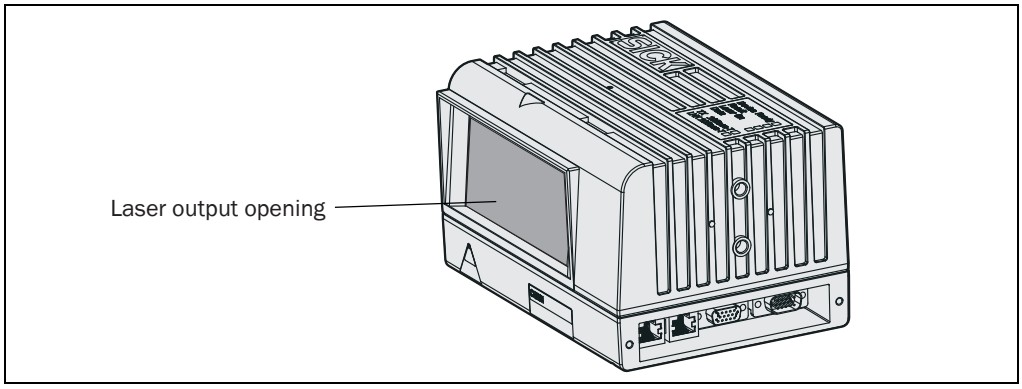


Fig. 1: Laser output opening

Laser power

The laser operates at a wavelength λ = 650 nm (visible red light). The output power of the laser beam at the laser output opening is max. 7.5 mW.

The radiation emitted is not harmful to the skin.

The VMS corresponds to laser class 2 as per EN 60825-1 (for publication date see laser warning label on the device). Complies with 21 CFR 1040.10 with the exception of the deviations as per Laser Notice No. 50, July 26, 2001.

Note When operated with trigger, the laser diode is only switched on when the power on signal is present and is switched off again with the shut down signal. For continuous data output the laser diode is continuously switched on.

Laser warning label

On the VMS410/510 volume measurement system are several laser warning labels and laser warning symbols (see *Fig. 2*).

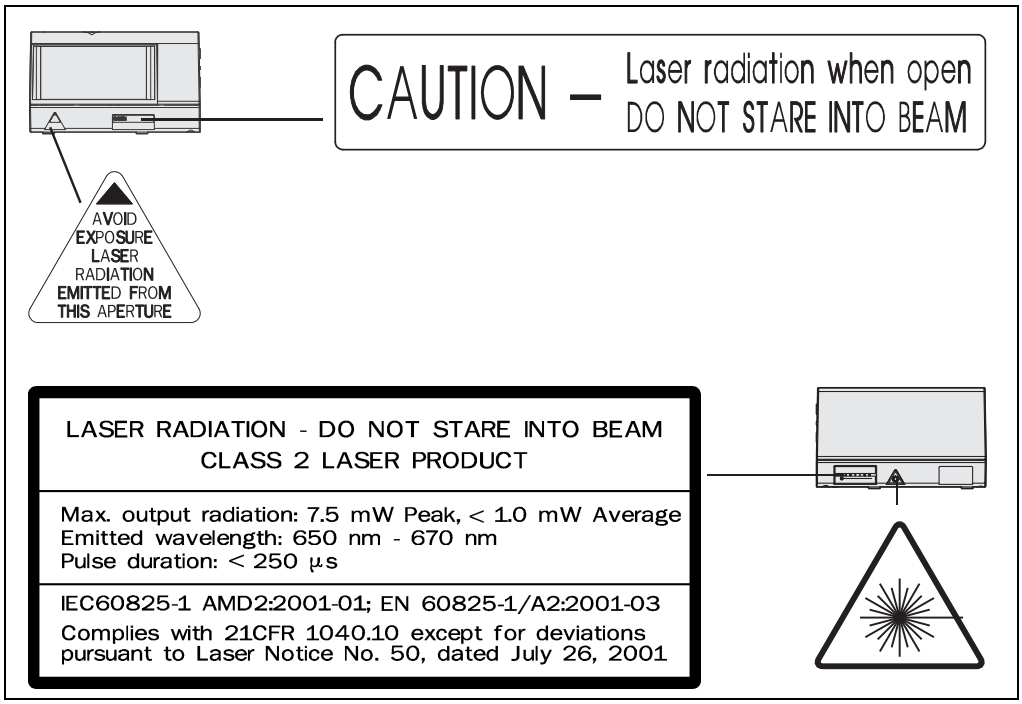


Fig. 2: Laser warning labels on the VMS

Notes

- Prior to commissioning, the warning label in English on the device “LASER LIGHT - DO NOT STARE INTO BEAM” is to be replaced with a laser warning label in a language understood by the operators of the system. Laser warning labels in German/English and French/English are in the delivery. Leave the “CAUTION ...” and “AVOID EXPOSURE LASER ...” laser warning labels in English.
- If the VMS volume measurement system is installed in a system/a panel mounting such that the laser warning labels are covered, further warning labels (not in the delivery) are to be affixed beside the outlet aperture for the laser beam on the system/on the trim panel!
- The VMS automatically monitors the beam generation and automatically shuts down the generation of the beam in case of irregularities. In this case the red LED lights up and the scanner transmits no more measured values.
- No regular maintenance is necessary to ensure the retention of the laser class 2.

2.5 Quick stop and Quick restart

2.5.1 Switch off VMS

➢ Switch off the voltage supply for the VMS or disconnect the supply cable.

The VMS retains parameters stored in the internal, non-volatile memory. Measured values on the interface are lost.

2.5.2 Switch VMS back on

➢ Switch on the voltage supply for the VMS or reconnect the supply cable.

The VMS re-commences operation with the parameters last saved.

2.6 Environmental protection

The VMS volume measurement system has been designed to minimise environmental impact. It uses only a minimum of power.

While working, always act in an environmentally responsible manner. For this reason please note the following information on disposal.

2.6.1 Power consumption

The VMS consumes max. 25 W of power.

2.6.2 Disposal after final de-commissioning

- Always dispose of unserviceable or irreparable devices in compliance with local/ national rules and regulations on waste disposal.
- Dispose of all electronic assemblies as hazardous waste. The electronic assemblies are straightforward to dismantle.

On this topic see *Section 8.2 “Disposal” on page 51*.

Note SICK AG does not accept any devices returned that have become unusable or are irreparable.

3 Product description

This chapter provides information on the special features and properties of the VMS volume measurement system. It describes the construction and the operating principle of the device, in particular the different operating modes.

Note Please read this chapter before mounting, installing and commissioning the device.

3.1 Delivery

The VMS volume measurement system as delivered comprises:

- a VMD volume measurement device
- one mounting kit for mounting and adjusting the VMD (three axes)
- a CD-ROM containing the following:
  - SOPAS configuration software
  - "VMS Volume Measurement System" operating instructions in German and English as PDF file
  - the freely available "Adobe Acrobat® Reader™" software for reading PDF files

3.2 Special features

- non-contact, active measurement technique
- volume measurement of cuboid objects
- works with a very wide range of surface structures and on various flat conveyor systems
- flexible system configurations
- calculation of the smallest enclosing cuboid (box volume)
- scale interval d ≥ 5 mm (≥ 0.2 in) (in industrial environments, without interference due to contamination, vibration or extremely low object remission, without slip between object and conveyor system or temperature drift; for conveyor system velocities up to 1.2 m/s (236.22 ft/min))
- data processing and data output in real-time at a conveyor system velocity of up to 2 m/s (393.7 ft/min) (achievable scale interval d ≥ 10 mm (≥ 0.39 in) for length and breadth as well as d ≥ 5 mm (≥ 0.2 in) for height)

VMS510 volume measurement system

Measurement system certified in accordance with the Measuring Instruments Directive 2004/22/EC (MID) and in accordance with OIML R129 with measured values that can be standardized (see *Fig. 32 on page 75* and *Fig. 33 on page 76*).

3.3 Operating principle of the device

3.3.1 Operating principle VMS

Determining the distance data

The VMD is installed above the conveyor system and opto-electronically scans the surfaces of the conveyor system and transported objects. The VMD does not require any reflectors or position markers. This is an active system with a red laser; it is not necessary to illuminate the objects. The VMD uses the principle of phase shift (continuous wave).

The VMS volume measurement system measures cuboid objects on flat conveyor systems. The VMS opto-electronically determines the box volume of the object from its length, width and height.

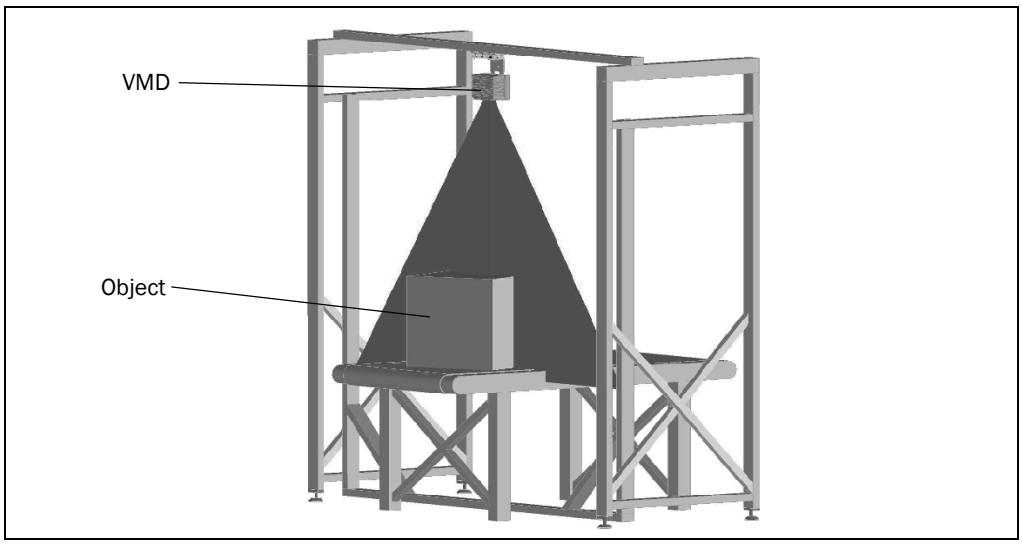


Fig. 3: Illustration of a VMS with frame above a conveyor system

Velocity

The velocity of the object is constantly set in the parameters, or can be determined using an optional incremental encoder.

Resulting volume

The information on the three-dimensional object is available after the acquisition of the distance data and calculation using the velocity.

- The VMS410 determines length, width and height, and calculates from this information the volume of the smallest enclosing cuboid, the box volume.
- The VMS510 determines length, width and height.

The data are available for further processing on the interfaces of the VMS.

3.3.2 Measuring modes

The VMS can either operate with a **trigger** or **Free running**.

Free running mode

In the free running mode the VMS automatically detects the objects to be detected. The measurement starts when an object enters the scan line and ends when the object leaves the scan line. There must be a minimum gap ① between objects.

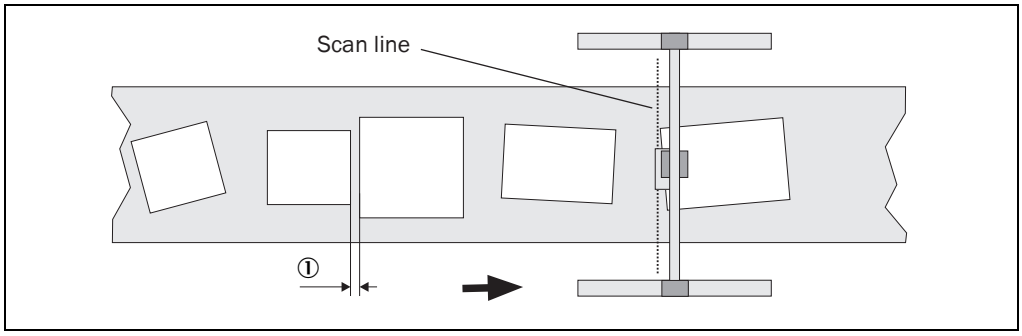


Fig. 4: Free running mode

Triggered measurement with gate

With the triggered measurement the start and end of the measurement is defined by a so-called gate.

Unlike the free running measurement, it is does not matter whether an object enters or leaves the scan line. There is also no differentiation between multiple objects between the start and end of the measurement, instead just one measurement is made.

PROJECT TREE, VMDX10_XX00, PARAMETER, DIGITAL INPUTS/TRIGGER, areas TRIGGER SETTINGS and GATE SETTINGS

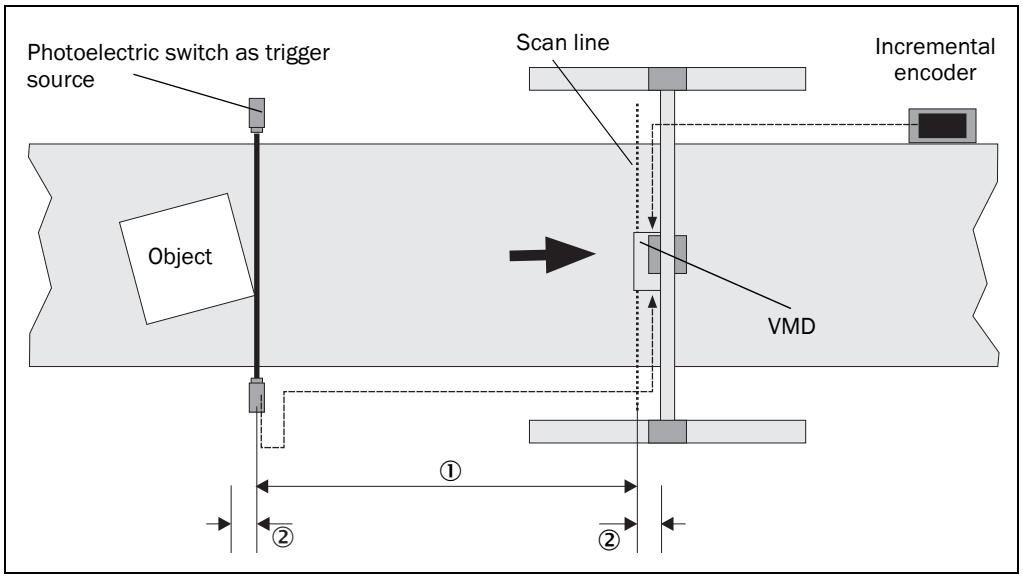


Fig. 5: Triggered measurement

The gate in which VMS measures is defined by a trigger source, a distance delay ① and an expansion distance ②.

Digital inputs are available as the trigger source, or software triggers based on messages can be used.

In the example, the object initialises the measurement by entering the photoelectric switch (trigger source). Once the distance defined by the distance delay (defined in SOPAS) has been covered ①, the VMS starts the measurement.

An expansion distance, also defined in SOPAS, expands the gate at the start and end ②. In this way, e.g. a tolerance can be realised.

Track controlled triggering

For the track controlled triggering described in *Fig. 5* an incremental encoder must be connected and configured. Using this encoder the distance covered by an object is determined from the conveyor velocity. With track controlled triggering it is not necessary to take into account different conveyor velocities or a conveyor system stop. The measurement starts and stops after a defined distance has been covered.

As an alternative, time-controlled triggering can also be configured in SOPAS: PROJECT TREE, VMDX10_XX00, PARAMETER, DIGITAL INPUTS/TRIGGER, area COMMON SETTINGS

Laser control

Note With laser control active, the laser diode remains switched off if no objects are transported on the conveyor system. This increases the service life of the system. Without laser control, the laser remains on all the time. This has a negative effect upon the service life of the system.

PROJECT TREE, VMDX10_XX00, PARAMETER, DIGITAL INPUTS/TRIGGER, area LASER CONTROL

With laser control active, the switching on of the laser is controlled by the gate configured or is controlled independently by a dedicated source.

- controlled by the gate
  The laser is controlled by the start and stop trigger source configured in the GATE SETTINGS area (see *"Triggered measurement with gate" on page 20*).
- depending on source
  The laser is controlled by the source configured in SOPAS. The control is independent of the settings made in the Gate settings area.

  A photoelectric switch can be connected to the VMS as a trigger for this purpose. If an object passes through the photoelectric switch, the laser is switched on.

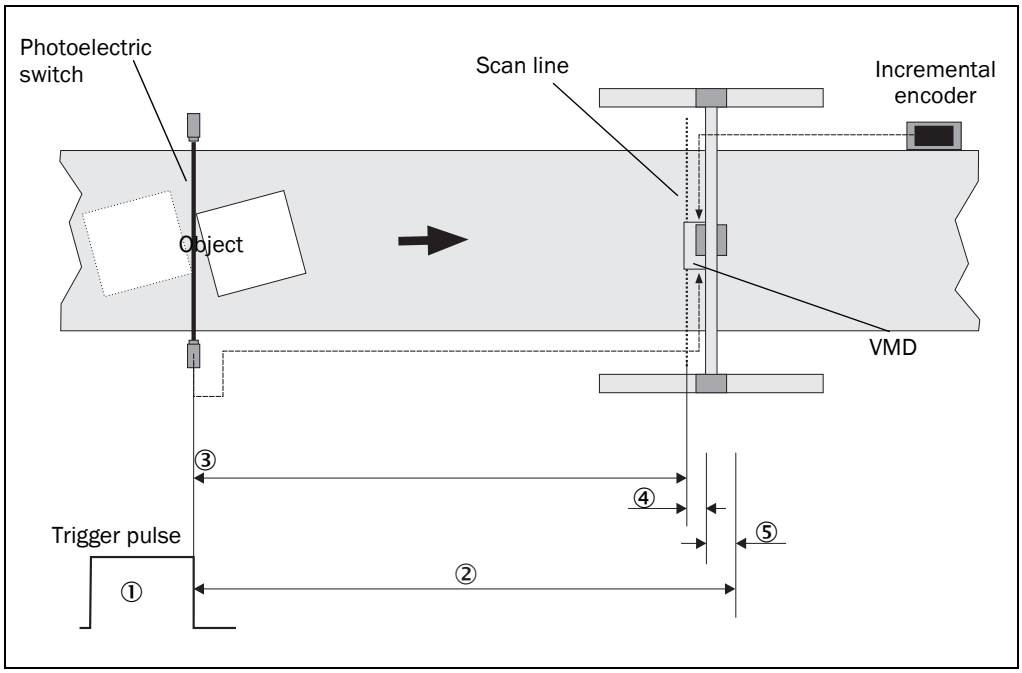


Fig. 6: Laser off distance

When the rear edge of the object passes through the photoelectric switch (trigger is deactivated) ①, the VMS starts to calculate the path of the object starting from the photoelectric switch. For this purpose, an incremental encoder must be connected which can be used to determine the velocity of the conveyor system (see *11.4.2 "Accessories/ spare parts" on page 70*).

A laser off distance ② is configured in SOPAS (see *Fig. 6*). This distance is formed from the addition of the distance from the photoelectric switch to the scan line ③, the defined minimum object gap (default 30 mm (1.81 in)) ④ and a safety supplement (200 mm (7.87 in) recommended) ⑤.

As soon as the VMS has calculated that the object has passed through the scan line of the VMS (based on the incremental encoder pulses), it switches off its lasers.

If another object has passed through the photoelectric switch in the meantime, the distance calculation is reset to zero and initiated for the new object. The lasers therefore **remain switched on** if several objects are transported sequentially. Each object is measured individually.

In addition, a laser timeout can be configured. If the conveyor system stops automatically following a trigger pulse or due to a fault, the laser diode is deactivated after the configured laser timeout has elapsed.

3.3.3 Evaluation of the RIS values

To increase the accuracy of the measured result, the VMS can also evaluate the RIS values for the objects measured in addition to the distance values. As a consequence the measured result and the evaluation will be more stable.

Depending on the transporting surface, its properties and condition, you may need to adjust the parameters for the RIS evaluation in SOPAS: PROJECT TREE, VMDX10_XX00, PARAMETER, ALGORITHM SETTINGS, RIS EVALUATION

3.3.4 Camera focusing

The VMS410/510 is able to function in an overall system for volume measurement and package identification. The overall system comprises the VMS, the camera system and a modular system controller (MSC) for processing the data and sending the data to a host.

The VMS measures objects on a conveyor system and transfers the coordinates and the trigger data to the camera system over the CAN interface. The CCD cameras in the system are focused based on this data.

You must configure the camera focus function in SOPAS: PROJECT TREE, VMDX10_XX00, PARAMETER, CAMERA FOCUS SETTINGS

If you do not use the camera focusing function, you must deactivate it.

3.3.5 Increment settings

To calculate a three-dimensional volume from the two-dimensional data measured, the VMS requires the velocity of the conveyor system. For this purpose either the pulses from an incremental encoder can be used, or a constant velocity can be used as the basis for the calculation.

Note Use the incremental encoder available as an accessory (see *11.4.2 "Accessories/spare parts" on page 70*) for VMS510 to achieve MID/OIML conformity. We also recommend that the same incremental encoder be used for VMS410.

PROJECT TREE, VMDX10_XX00, PARAMETER, INCREMENT CONFIG./SYNC.

System increment

The resolution of the encoder that the VMS needs for the volume calculation is relatively fine. Devices that are connected to the VMS over a CAN bus and that also use the data from the encoder are often not able to utilise these fine data. For this reason a so-called system increment can be calculated from the pulses from the encoder and output on the CAN interface (see also *3.8.4 "CAN interface" on page 32*).

- You define the system increment resolution using a divisor.
- With an system increment output divisor you can also define the output interval for the system increment.

3.4 Planning

The maximum working range of the VMS is 3 m (9.84 ft). The minimum distance between the zero point of the VMS measurement and the object to be measured is 700 mm (27.56 in). The zero point is marked both on the top of the housing and on the underside of the housing. The working area of the VMS covers an angle of 70°.

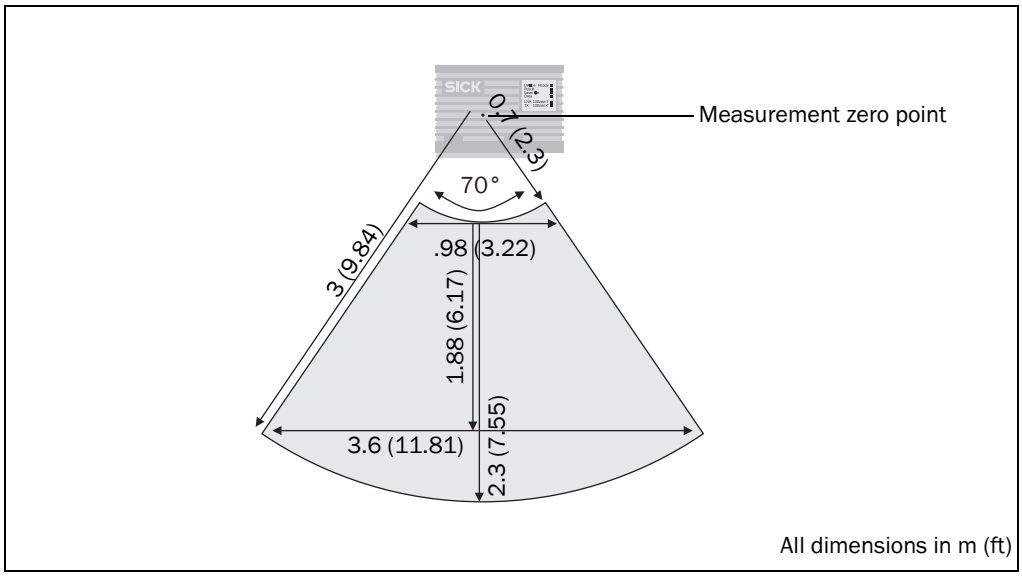


Fig. 7: Working area of the VMS volume measurement system

3.4.1 System requirements for the VMS volume measurement system

For the operation of the VMS volume measurement system the following are required:

- operating voltages:
  VMD: DC 24 V ± 15% in compliance with IEC 364-4-41 (protective extra-low voltage), output max. 25 W
- data interface RS-232, RS-422 or Ethernet

3.4.2 Requirements on the conveyor system

- The conveyor system must have a constant conveyor velocity or an incremental encoder with a resolution of at least 0.2 mm/inc (0.008 in/inc) must be installed.
- The conveyor velocity for the VMS510 is allowed to be a maximum of 2 m/s (393.7 ft/min).
- The objects can be moved on a conveyor system with a flat transporting surface. Rotation, vibration, swaying and slipping of the objects on the conveyor system and uneven transporting surfaces can reduce the accuracy and degrade the acquisition of data by the VMD.

Note Use the incremental encoder available as an accessory (see *11.4.2 “Accessories/spare parts” on page 70*) for VMS510 to achieve MID or OIML conformity. We recommend using this incremental encoder also for the VMS410.

3.4.3 Object specifications

The minimum and maximum dimensions of the objects are summarised in the following table.

Object dimensions	Minimum value	Maximum value
Longitudinal to the transporting direction	50 mm (1.97 in)	2000 mm (78.74 in)
Transverse to the transporting direction	50 mm (1.97 in)	1000 mm (39.37 in)
Height above the conveyor system	50 mm (1.97 in)	1000 mm (39.37 in)

Tab. 1: Minimum and maximum object dimensions

Note To keep to the certified scale intervals for the VMS510, requirements are placed on the objects as a function of the conveyor velocity (see *Tab. 3* and *Tab. 4: on page 26*).

3.4.4 Mounting requirements

The VMS must be mounted as follows:

- securely above the conveyor system (weight of the VMD: approx. 2.3 kg (5.07 lb) without mounting kit)
- without vibration or oscillations

Recommendation The mounting kit is easy to mount on an 80-mm-item (3.15 in) aluminium profile. The mounting kit is matched to these profiles (see *Section 10.2.2 "Dimensional drawing mounting kit for VMD" on page 56*).

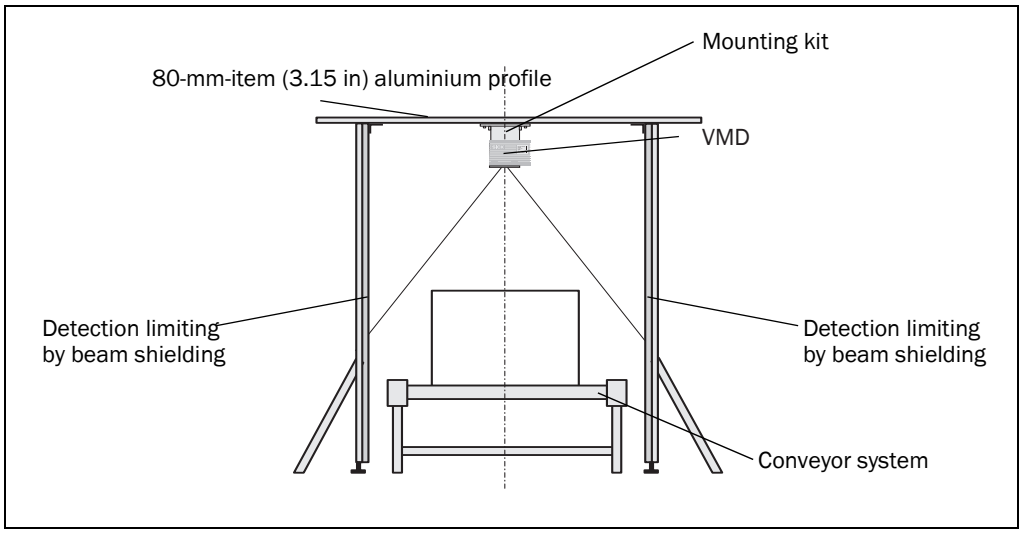


Fig. 8: Illustration of a VMS above a conveyor system

To obtain an optimal measurement result, the following points should be noted:

- typical space required for the VMD installation above: around 700 mm (27.56 in) above the highest object
- The VMD must have a clear view of the conveyor system.
- The laser beams of the VMD should not reach beyond the application area so that persons or items transported on neighbouring conveyor systems are not detected (detection limiting by beam shielding).
- The maximum detection must be limited to the working range of three metres as otherwise measuring inaccuracies can occur.

- adequate distance of the VMD from bends, induction lines, start-stop areas, inclined areas and separators on the conveyor system

Minimum distance between the top edge of the object and the measurement zero point

This minimum distance between the top edge of the object and measurement zero point depends on the width of the conveyor system.

A [mm] (A [in])	500 to 900 (19.69 to 35.43)	1000 (39.37)	1100 (43.3)	1200 (47.24)	1300 (52.18)	1400 (55.12)	1500 (59.06)
B [mm] (B [in])	700 (27.56)	750 (29.53)	800 (31.5)	875 (34.45)	950 (37.4)	1025 (40.35)	1100 (43.3)
C [mm] (C [in])	Max. 1000 mm (39.37 in)						

Tab. 2: Minimum distance between the top edge of the object and the measurement zero point

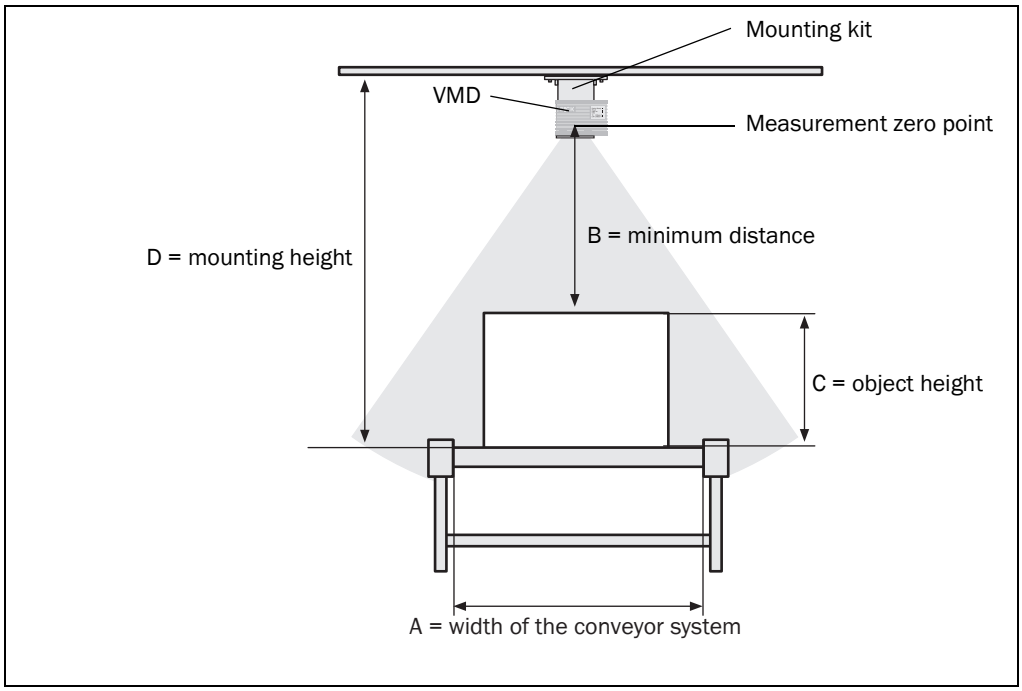


Fig. 9: Illustration of the mounting height

Mounting height above the conveyor system

The mounting height above the conveyor system depends on the maximum object height and the required minimum distance between the top edge of the object and the measurement zero point.

How to determine the mounting height:

Mounting height D = B + C + 195 mm (7.68 in) (mounting kit height)

3.5 Standardisation of the VMS510

The VMS510 has been tested and certified by the accredited certification institute NMi, Nederlands Meetinstituut in accordance with the Measuring Instruments Directive 2004/22/EC (MID) and in accordance with the requirements in OIML R129, edition 2000 (see *Fig. 32 on page 75* and *Fig. 33 on page 76*). Copies of the certificates are available on request from SICK.

By means of the metrological tests, the following values were certified for the measurement of cuboid objects that are not reflective or transparent.

At conveyor velocities between 0.5 m/s (98.43 ft/min) and maximum 1.2 m/s (236.22 ft/min):

Object dimensions	Minimum value	Maximum value	Achievable scale interval d
Longitudinal to the transporting direction	50 mm (1.97 in)	2000 mm (78.74 in)	≥ 5 mm (≥ 0.2 in)
Transverse to the transporting direction	50 mm (1.97 in)	1000 mm (39.37 in)	≥ 5 mm (≥ 0.2 in)
Height above the conveyor system	50 mm (1.97 in)	1000 mm (39.37 in)	≥ 5 mm (≥ 0.2 in)

Tab. 3: Certified, measurable object sizes at 1.2 m/s (236.22 ft/min) conveyor velocity

At conveyor velocities between 0.5 m/s (98.43 ft/min) and maximum 2 m/s (393,7 ft/min):

Object dimensions	Minimum value	Maximum value	Achievable scale interval d
Longitudinal to the transporting direction	100 mm (3.94 in)	2000 mm (78.74 in)	≥ 10 mm (≥ 0.39 in)
Transverse to the transporting direction	100 mm (3.94 in)	1000 mm (39.37 in)	≥ 10 mm (≥ 0.39 in)
Height above the conveyor system	50 mm (1.97 in)	1000 mm (39.37 in)	≥ 5 mm (≥ 0.2 in)

Tab. 4: Certified, measurable object sizes at 2 m/s (393.7 ft/min) conveyor velocity

A maximum of 960 objects per minute can be measured. The operating temperature must be between 0 and 40 °C (32 and 104 °F).

Notes

- Due to the certification of the VMS510 with a scale interval of d ≥ 5 mm (≥ 0.2 in) and d ≥ 10 mm (≥ 0.39 in), all higher scale intervals such as d ≥ 20 mm (≥ 0.79 in) are also covered.
- When using the VMS510 in standardized applications, observe the relevant national law. SICK can provide advice on this topic if required. However this advice is no substitute for legal advice.
- A scale interval d ≥ 5 mm (≥ 0.2 in) is only possible in industrial conditions in optimal applications. These applications must not be affected by soiling or vibration, by slip between object and conveyor system, by high temperature drift or extremely low object remission. For this reason an application must be checked by SICK before a binding statement on a scale interval can be made.

- After a thorough application check, scale intervals for length, width and height must be fixed. These scale intervals must be entered on the certification label included (see *Fig. 10*) in the “d>=” line in permanent ink. The certification label must be fitted to the system such that it can be seen by the operator and can be allocated to the volume measurement system.

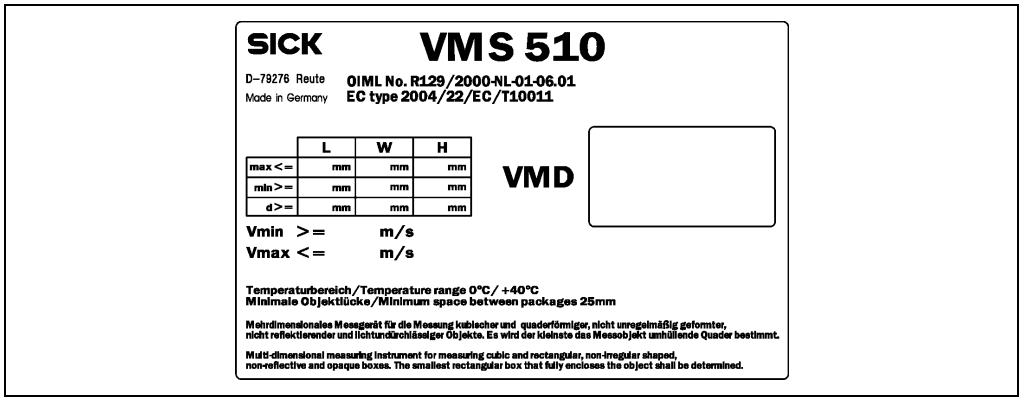


Fig. 10: Certification label for the VMS510 to be fitted

How to use the standardisation of the VMS510:

- ➢ Check national laws and regulations to ascertain the steps required for standardisation. SICK can provide advice on this topic if required. However this advice is no substitute for legal advice.
- ➢ We suggest that you attach seals to specified parts of the VMS510 and any existing accessories to protect against manipulation. The operator must discuss and agree these suggestions with the corresponding national testing authority. Ensure even when planning your application that standardisation seals can be fitted to the VMD510 after installation and standardisation.

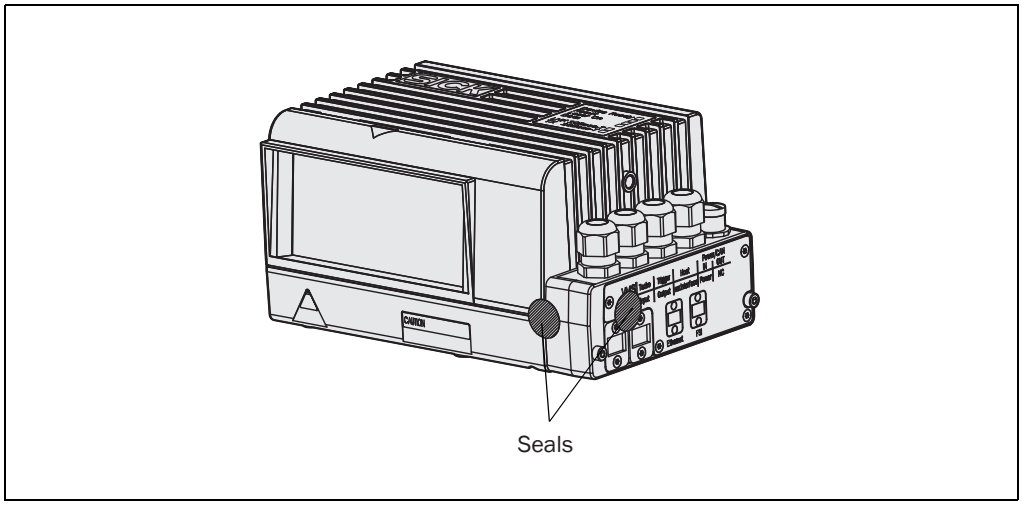


Fig. 11: Possible places where the seals could be attached to the VMD510

3.6 Scale intervals of the VMS

The following scale intervals apply for object remissions of 10 to 200% and for recommended structures as per the SICK documentation. Restricted ranges for object remission and object size enable higher accuracy to be achieved. Glossy surfaces, shadowed areas of the objects and other effects can reduce the accuracy.

The following table shows typical scale intervals[1]:

Velocity	Scale interval
Velocity 2 m/s (393.7 ft/min) in normal industrial environments	d ≥ 10 mm (≥ 0.39 in)
Velocity 1.2 m/s (236.22 ft/min) in optimal applications, without effect of contamination, vibration, extremely low object remission, without slip between object and conveyor system or high temperature drift	d ≥ 5 mm (≥ 0.2 in)

Tab. 5: Typical scale intervals

3.6.1 Dynamic scale intervals

The VMS has different scale intervals depending on the velocity of the conveyor system. In principle the following applies:

- The lower the velocity, the finer the scale intervals.
- The higher the velocity, the coarser the scale intervals.

The actual scale intervals that can be achieved and used must be determined during the standardisation or the VMS510 or during the commissioning of the VMS410 and entered in SOPAS: PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, UNIT/SCALE INTERVALS

The scale intervals are output in basic measured data message 2 (see *11.3.3 on page 63*) in addition to the length, width and height of an object. In addition, you can configure the user-defined measured data message such that the scale intervals are output using the message (see *"User defined output format" on page 31*). Also the length, width and height of an object can be rounded to the scale intervals (see *"Rounding for dimension results" on page 31*).

1) The application must be checked by SICK before a binding statement on a scale interval can be made.

3.7 Status indicators

Six LEDs on the VMS volume measurement system provide a visual indication of the operating state and any errors that have occurred.

LED	Display	Function
Device Ready	Green	Illuminates after power on when initialisation and self-testing have been completed successfully. Device ready for operation
	Red	Error during initialisation or self test
Result	Green	Measurement condition met
Laser On	Green	Laser diode on
Data	Green	Flashes when the VMS is transmitting data to the computer over the host interface
LNK 10Base-T	Green	10BASE-T: Ethernet link
TX 10Base-T	Green	10BASE-T: Flashes when the VMS is transmitting data to the computer over the Ethernet interface

Tab. 6: Significance of the LEDs

3.8 Data interfaces specification

The VMS has four different interfaces for the configuration and the transmission of measured values:

- You can set the VMS parameters with SOPAS using the host interface, the terminal interface and the Ethernet interface.
- The VMS outputs the measured data in the form of messages on the host interface.
- In parallel, diagnostic data for a Remote Diagnostic Tool (RDT) can be output on the terminal interface.
- The CAN interface is needed for sending the focusing data to the camera system if the camera focus function is used.

3.8.1 Terminal interface

The terminal interface allows the configuration of the VMS as well as the output of measured values. However, this feature is primarily intended to provide a reliable data connection for configuration (also with simultaneous operation of the host interface). Therefore, the following interface parameters cannot be changed:

- 9600 Baud
- 8 data bits
- 1 stop bit
- no parity

You will find a description of the electrical interface in *Section 5.3.4 ""Serial" connection" on page 38*.

3.8.2 Host interface

The host interface allows the configuration of the VMS as well as the output of measured values.

You can choose whether to configure the pins 6 to 9 as RS-232 or as RS-422: PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area SERIAL HOST INTERFACE, option HARDWARE

The interface parameters are freely configurable. The factory setting for the host interface is as follows:

- RS-232
- 9600 Baud
- 8 data bits
- 1 stop bit
- no parity

Note The interface parameters for the host interface can be configured only using the terminal interface or the Ethernet interface.

You will find a description of the electrical interface in *Section 5.3.4 ""Serial" connection" on page 38*.

Frame and coding for the messages

The VMS uses messages to communicate with the connected application.

The frame for the host interface can be configured in SOPAS: PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area SERIAL HOST INTERFACE

In this way, you can use two stop bytes, for example (e.g. to terminate messages with CR/LF), or insert a block check byte before or after the stop byte.

Messages on the host interface

	Frame	Message	Frame
Code	STX	Data (see *11.2*)	ETX
Length (byte)	1	≤2498	1 or 2
Description	Start of text character	ASCII coded. The length is dependent on the previous send message.	End of text character

Tab. 7: Frame for the messages on the host interface

Output unit

In SOPAS you can define whether the data are output in the measured data message as metric values or in inches: PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, UNIT/SCALE INTERVALS

Rounding for dimension results

The measured results are output to 1 mm (0.04 in) or 1/100 inch depending on the settings. However, you can also output rounded to the scale intervals for the VMS (see *3.6.1 on page 28*): PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, UNIT/SCALE INTERVALS

	Example 1	**Example 2**
Scale interval	5 mm (0.2 in)	10 mm (0.39 in)
Measured object length	56 mm (2.2 in)	56 mm (2.2 in)
Output object length	55 mm (2.17 in)	60 mm (2.36 in)

Tab. 8: Example rounded measured results

Output timing

In SOPAS you can define when a measured data message is output: PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, OUTPUT CONTROL

- as soon as possible after leaving the scan line ①
- after a specific distance from the X position referred to the rear edge of an object ②
- after a specific distance from the X position referred to the front edge of an object ③

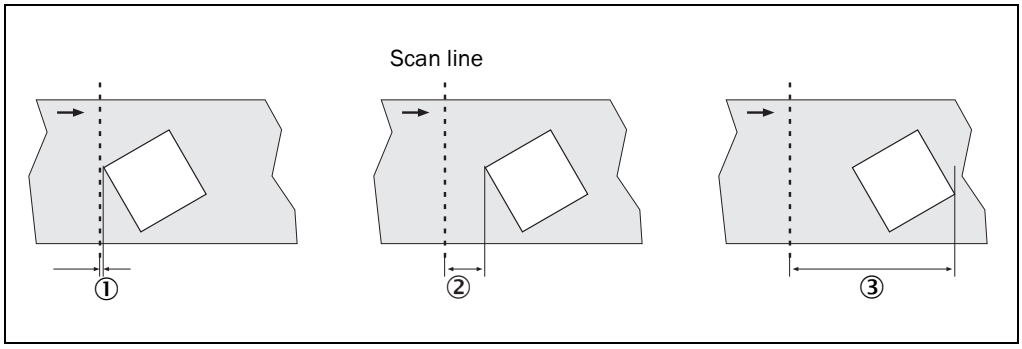


Fig. 12: Output timing diagram

Note If you select the RELATED TO LEADING EDGE option, you must ensure that the distance entered is greater than the longest object to be measured.
When an object reaches the distance entered, but has not yet left the scan line (that is it is still being measured), no measured data message is output. The message will be output in this case only after the object has left the scan line — that is “as soon as possible”.

User defined output format

You can define a custom measured data message for measured data output on the host interface: PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, OUTPUT FORMAT

In this measured data message you can, for instance, enter fixed strings, select and insert variables (such as object length or width), change and define the attributes of the variables or conditions.

3.8.3 Ethernet interface

The Ethernet interface has a data transmission rate of 10 MBaud (10BaseT). The interface is a TCP/IP peer to peer interface. Only half duplex is supported. Please ensure that the interface of your application is set to half duplex.

The factory setting for the Ethernet interface is as follows:

- IP ADDRESS: 192.168.0.1
- SUBNET MASK: 255.255.255.0
- TCP/IP PORT: 2111
- COLA PROTOCOL: COLA ASCII

If necessary, adjust the TCP/IP configuration for the Ethernet interface to enable a connected PC (client) to communicate with the VMS via Ethernet: PROJECT TREE, VMDX10_XX00, INTERFACES, ETHERNET, area ETHERNET

You will find a description of the electrical interface in *Section 5.3.1 ""Ethernet" connection" on page 36*.

3.8.4 CAN interface

The VMS has a CAN interface with which it can be connected to a CAN bus.

For data communication using CAN (Controller Area Network) you must ...

- set the correct operating mode for the CAN bus on the VMS.
- set identical baud rate parameters on all devices on the bus.
- assign a unique device number from 1 to 63 to each device on the CAN bus.

PROJECT TREE, VMDX10_XX00, INTERFACES, CAN, area CAN

You will find a description of the electrical interface in *Section 5.3.4 ""Serial" connection" on page 38*.

4 Mounting

4.1 Overview of the mounting steps

- Install the mounting kit for the VMD.
- Mount VMD on mounting kit.
- Detection limiting by beam shielding.

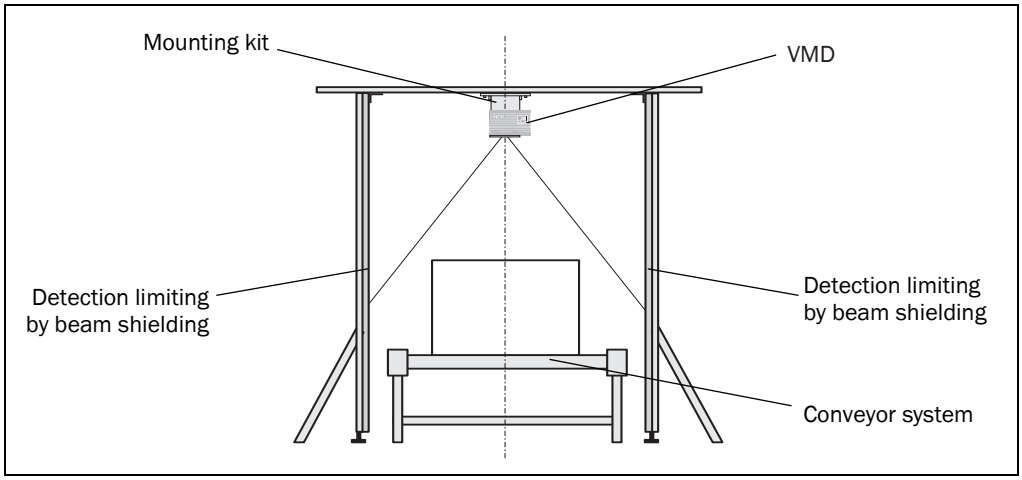


Fig. 13: Overview of the mounting above a conveyor system

4.2 Preparations for mounting

- A VMD weighs approx. 2.3 kg (5.07 lb) without mounting kit.

4.2.1 Components to be mounted

- VMD volume measurement device
- mounting kit for the VMD

4.2.2 Place material at hand

The following materials are required for the mounting kit and for the VMD:

- M6 screws for mounting the mounting kit to the frame or other assembly. (The mounting kit has eight D6.6 holes.)
- three M8×2 screws with washers for fastening the VMS to the mounting kit (included with delivery)
- tool set

4.2.3 Mounting accessories

A mounting kit for mounting the VMD is included. This can be finely adjusted in three axes.

Recommendation The mounting kit is easy to mount on an 80-mm-item (3.15 in) aluminium profile. The mounting kit is matched to these profiles.

You will find the dimensional drawing for the mounting kit in *Section 10.2.2 “Dimensional drawing mounting kit for VMD” on page 56*.

4.3 Mounting the VMD

1. Mount the mounting kit in the defined position on the frame using four M8 screws ①.
2. Fit the VMD in the lugs ② fitted to the mounting kit and fasten with three M6 screws ③.

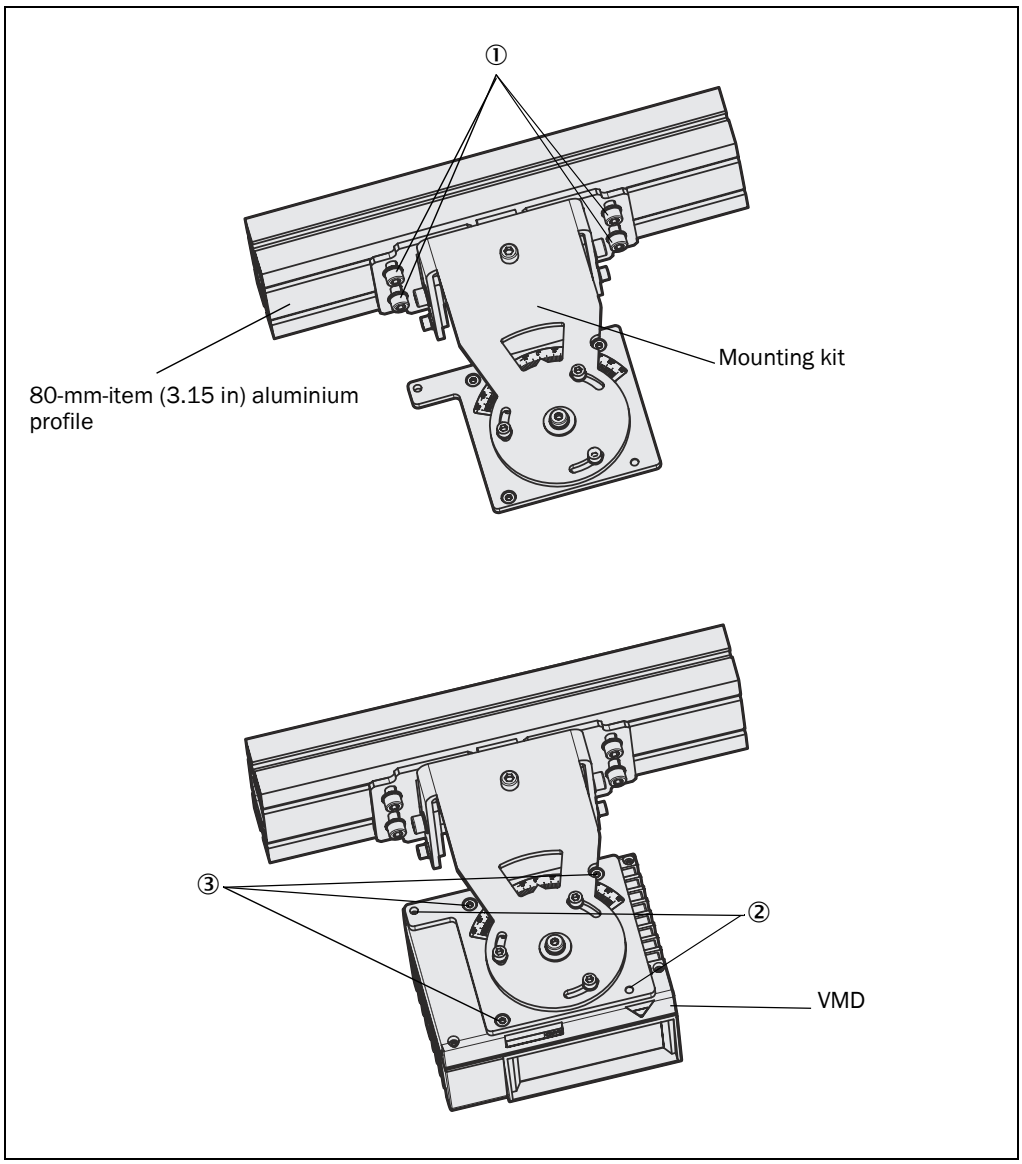


Fig. 14: Mounting of the VMD above a conveyor system

4.4 Dismounting the system

1. Switch off supply voltage.
2. Remove the connection cables.
3. Remove VMD from mounting kit over the conveyor system.

Note On final decommissioning, please observe the disposal requirements in *Section 2.6.2 "Disposal after final de-commissioning" on page 17*for environmentally correct disposal.

5 Electrical installation

ATTENTION

Switch the entire machine/system offline!

The machine/system could inadvertently start up while you are connecting the devices.

➢ Ensure that the entire machine/system is disconnected during the electrical installation.

Note The VMS volume measurement system complies with the requirements in the standard on the radiated emissions as defined for class A (industrial environment). It may cause radio interference in residential areas. If radio interference occurs, the person(s) affected may demand that the operator take appropriate action for suppressing interference.

5.1 Overview of the installation steps

- Connect supply voltage to the VMD.
- Connect PC to the terminal interface of the VMD.

5.2 Electrical connections and cables

In the electrical connections, the VMS has interfaces for communication to the exterior as well as connections for external sensors.

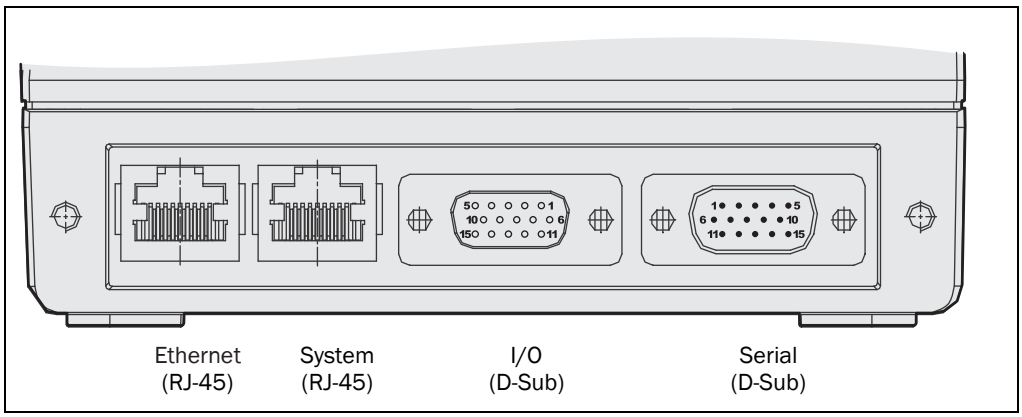


Fig. 15: Position of the electric connections of the VMS

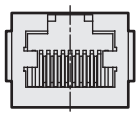
Connection	Type	Function
Ethernet	RJ-45	TCP/IP communication, exchange of messages
System	RJ-45	Not used
I/O	D-Sub	Connection of external sensors, supply voltage
Serial	D-Sub	Serial communication, exchange of messages, supply voltage

Tab. 9: Function of the electric connections of the VMS

5.3 Pin assignment of the connections

5.3.1 “Ethernet” connection

The VMS can be connected with a commercially available Cat. 5 crossover cable.

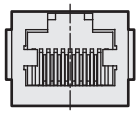


Pin	Signal	Function
1	TPOP	Ethernet interface
2	TPON	Ethernet interface
3	TPIP	Ethernet interface
4	Not assigned	–
5	Not assigned	–
6	TPIN	Ethernet interface
7	Not assigned	–
8	Not assigned	–

Tab. 10: Pin assignment of the “Ethernet” connection

5.3.2 “System” connection

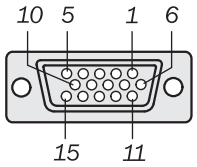
The “System” connection on the VMS is not used. The individual connections must not be assigned.



Pin	Signal	Function
1	Reserved	Do not use!
2	Reserved	Do not use!
3	Reserved	Do not use!
4	Not assigned	–
5	Not assigned	–
6	Reserved	Do not use!
7	Not assigned	–
8	Not assigned	–

Tab. 11: Pin assignment of the “System” connection

5.3.3 “I/O” connection



Pin	Signal	Function
1	V_S	Supply voltage VMD
2	IN3	Digital input 3 (trigger)
3	IN1	Digital input 1 (trigger)
4	Reserved	Do not use!
5	GND	Ground VMD
6	IN2	Digital input 2 (incremental encoder)
7	IN4	Digital input 4 (incremental encoder)
8	Reserved	Do not use!
9	SENS_GND	Ground Digital Inputs
10	Reserved	Do not use!
11	Reserved	Do not use!
12	Reserved	Do not use!
13	Reserved	Do not use!
14	Reserved	Do not use!
15	Reserved	Do not use!
Housing	–	Screen/earth

Tab. 12: Pin assignment of the “I/O” connection

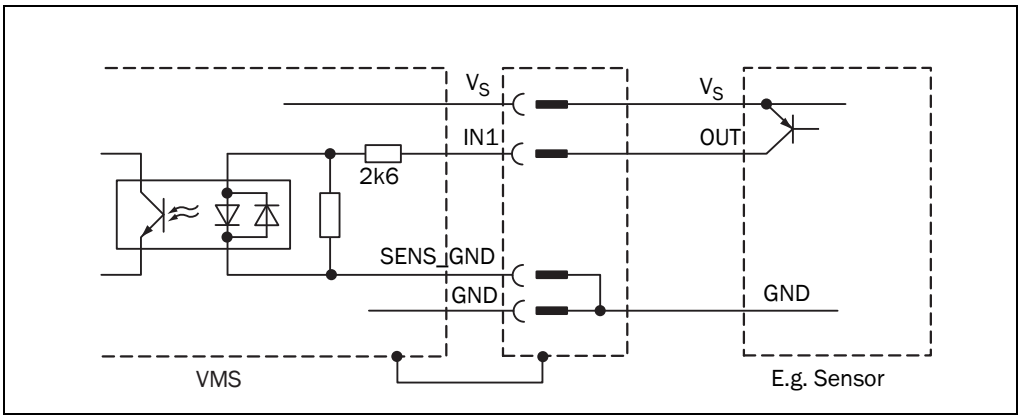
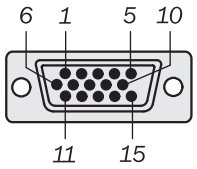


Fig. 16: Wiring of the digital input

5.3.4 “Serial” connection

You can choose whether to configure the pins 6 to 9 as RS-232 or as RS-422.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area SERIAL HOST INTERFACE, option HARDWARE



Pin	Signal				Function
1	V_S				Supply voltage VMD
2	RS-232	RxD_TRM			Terminal interface (receiver)
3	RS-232	TxD_TRM			Terminal interface (sender)
4	Not assigned				–
5	GND				Ground VMD
6	RS-232	Not assigned	RS-422	RD+ (HST)	Host interface (receiver)
7	RS-232	RxD (HST)	RS-422	RD– (HST)	
8	RS-232	Not assigned	RS-422	TD+ (HST)	Host interface (sender)
9	RS-232	TxD (HST)	RS-422	TD– (HST)	
10	CAN_H				CAN interface 1 (IN/OUT)
11	Not assigned				–
12	CAN_H_2				CAN interface 2 (IN/OUT)
13	CAN_L_2				CAN interface 2 (IN/OUT)
14	Not assigned				–
15	CAN_L				CAN interface 1 (IN/OUT)
Housing	–				Screen/earth

Tab. 13: Pin assignment of the “Serial” connection

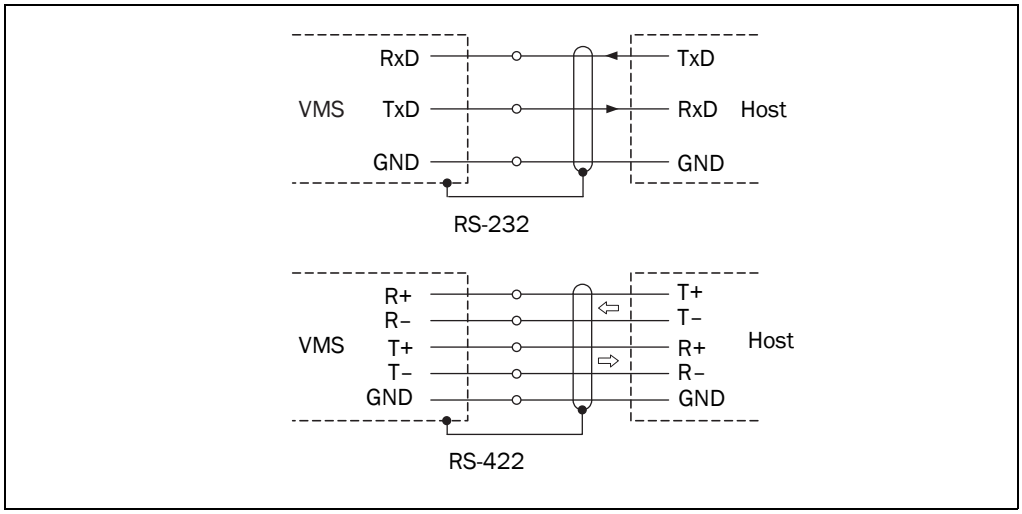


Fig. 17: Wiring of the RS-232 or RS-422

5.4 Connection via the plug cover

The VMS can also be connected using plug covers. Since the plug covers cover the electrical connections of the VMS, IP 65 degree of protection is achieved (see *"Plug cover sets" on page 71*).

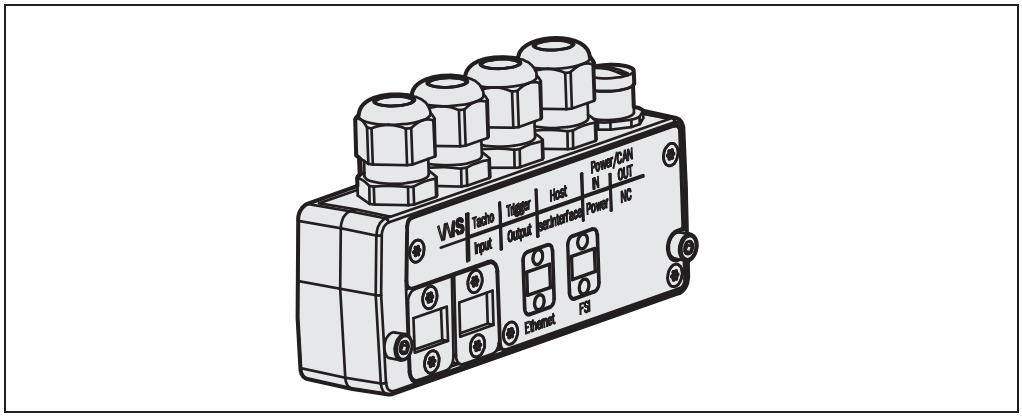


Fig. 18: Example of a plug cover

The plug covers contain a parameter memory. This allows the VMS to be replaced easily. The configuration is stored in the plug cover and transmitted to the newly connected VMS after replacement.

Notes

- The parameter memory function is disabled in the default delivery status.
- The parameter set stored in the parameter memory always overwrites the configuration of the VMS. An already configured device, for example, is reset to factory settings by a new plug cover.
- Special Ethernet cables are required to connect the plug cover (see *"Accessories for plug covers" on page 71*).

A detailed description of the electrical connections of the plug cover can be found in Document 8010817 — "Plug Covers for VMS4xx/5xx Volume Measurement System and LMS400 Laser Measurement System".

5.5 Performing electrical installation

5.5.1 Overview of the connection steps

- Connecting the voltage supply.
- Connect host interface.
- Connect PC (connect terminal interface).

5.5.2 Equipment

- tool set
- digital multimeter (current/voltage measurement)

5.5.3 Connecting the voltage supply

Note You can connect the supply voltage alternatively at the "I/O" connection or at the "Serial" connection.

1. Ensure that the supply voltage is switched off.
2. Connect the “Supply voltage” 24 V input on the VMS to the corresponding connection on the voltage supply using a cable.

5.5.4 Connecting the PC

The VMD is operated and configured using the SOPAS configuration software.

1. Switch off PC and supply voltage.
2. Connect the PC and the Ethernet interface of the VMD using a Cat. 5 crossover cable.
3. Switch on the PC and the supply voltage.
4. Configure (see *Chapter 7 “Configuration and adjustment” on page 42*).

6 Commissioning

Commissioning requires a thorough check by qualified personnel!

Before you operate a system equipped with the VMS volume measurement system for the first time, make sure that the system is first checked and released by qualified personnel. On this issue, observe the notes in *Chapter 2 "For your safety" on page 13*.

Overview of the commissioning steps

- Mount the VMS as per the version ordered (see *Chapter 4 "Mounting" on page 33*).
- Performing electrical installation (see *Chapter 5 "Electrical installation" on page 35*).
- Configure and adjust the VMS using the SOPAS configuration software (see *Chapter 7 "Configuration and adjustment" on page 42*).

Note The RS-232 and RS-422 host interfaces cannot be used simultaneously during operation.

7 Configuration and adjustment

The VMS volume measurement system is adapted to the on-site measurement situation by means of the configuration. In this way parameters can be set to suit the characteristics of the measurement, analysis and output. The interactive configuration is carried out using the provided SOPAS configuration software.

Help for the program user interface as well as for the different options can be found in SOPAS:

- menu HELP, HELP: comprehensive online help for the program interface and the different options
- HELP window (on the bottom left in the program user interface): context sensitive help for the activated dialog area
- tool tips: Move the mouse pointer over an input field. A short text (“tool tip”) with information about valid entries appears.

Note Software access to the VMS is password protected. The default password for maintenance personnel is “main” and for authorised clients it is “client”. Following completion of the configuration, you should change the password so that it can perform its protective function.

7.1 Preparing the configuration and adjustment

To configure and adjust the VMS volume measurement system, you need:

- SOPAS configuration software on CD-ROM
- PC/notebook with Windows 98/NT 4.0/2000/XP and a serial interface (RS-232). PC/notebook not included
- a commercial quality cat. 5 cross-over cable for connecting the PC and VMS
- plumb line
- carpenter’s square
- tape measure (up to 3000 mm (118.11 in))
- test object (see *“General accessories” on page 70*)
- felt-tip pen (the colour should be quite different from that of the transporting surface)
- tool set
- white adhesive tape for black transporting surfaces

How to prepare the configuration and adjustment:

1. Ensure that the VMD has been correctly mounted and that the electrical connections are also correct.
2. Install the provided SOPAS configuration software from CD-ROM.
3. Connect the PC with the Ethernet interface of the VMD.
4. Start SOPAS and add a new project.
5. Configure the Scan assistant (SCAN ASSISTANT file card CONFIGURATION button).

Note Check whether the CoLa dialect is set to AUTO DETECT and enter the IP address for the VMD (see *Section 3.8.3 “Ethernet interface” on page 32*).

6. The scan for devices connected (SCAN ASSISTANT file card, SCAN button) and add the VMD to the SOPAS project tree.

7. Log in to the device as AUTHORISED CLIENT (EXTRAS menu, LOG IN TO DEVICE, default password “client”).
8. In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the DIGITAL INPUTS/TRIGGER device page and in the LASER CONTROL field select the OFF option.

   This switches the laser of the VMS permanently on; the scan line of the VMS is now visible and the VMS can be adjusted.

7.2 Mechanically adjusting VMD

The mounting kit for the VMD can be finely adjusted in three axes.

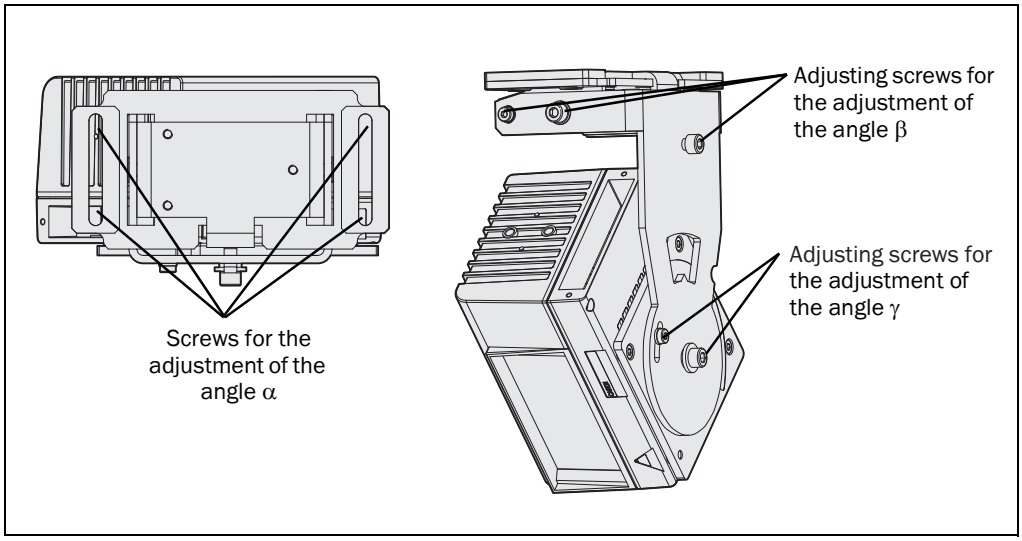


Fig. 19: Mounting kit for VMD

7.2.1 Adjustment above a conveyor system

➢ Adjust the mounting kit such that the middle of the sensor is exactly over the middle of the conveyor system. For this purpose, a plumb line can be attached to the adjusting screw used to adjust angle γ.

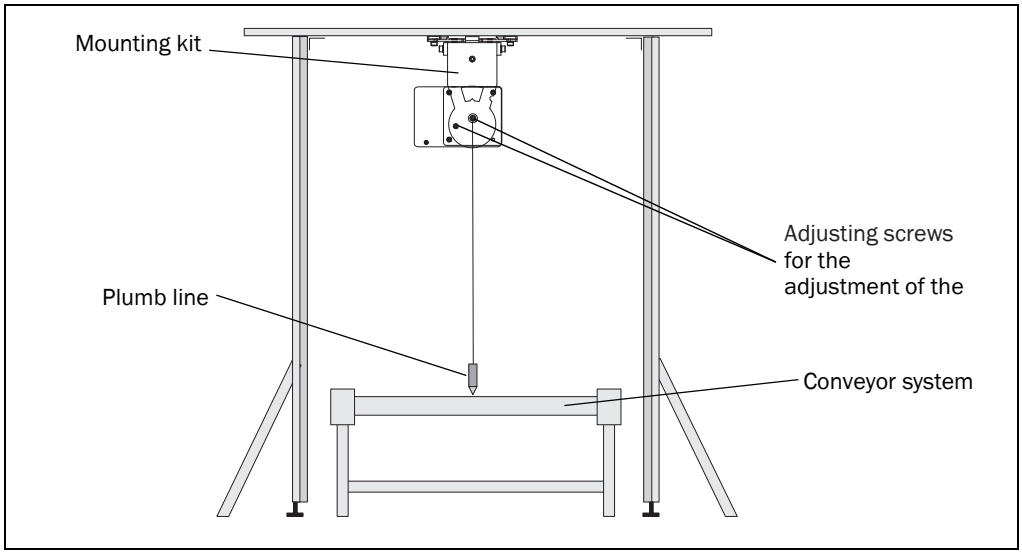


Fig. 20: Adjustment above a conveyor system

7.2.2 Adjustment of the angle γ

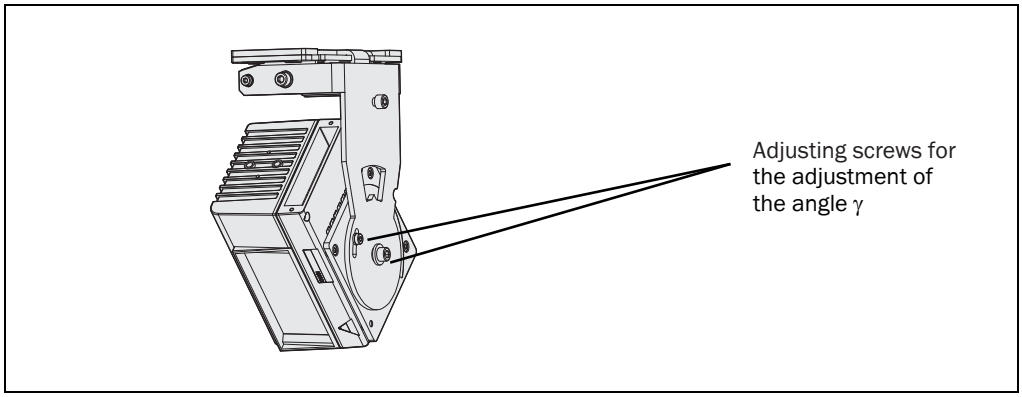


Fig. 21: Adjustment of the angle γ

1. Loosen the adjusting screws on the mounting kit used to adjust angle γ.
2. Adjust the angle γ to 0°.
3. Tighten the two adjusting screws again.

7.2.3 Adjustment of the angle β

1. Place a carpenter's square on the edge of the conveyor system. The scan line must be visible on the vertical side of the carpenter's square.
2. Loosen the two M8 and M6 screws ①.
3. Adjust the VMD with the help of the adjusting screw ② so that the scan line is perpendicular to the conveyor system.
4. Tighten the M8 and M6 ① screws again.

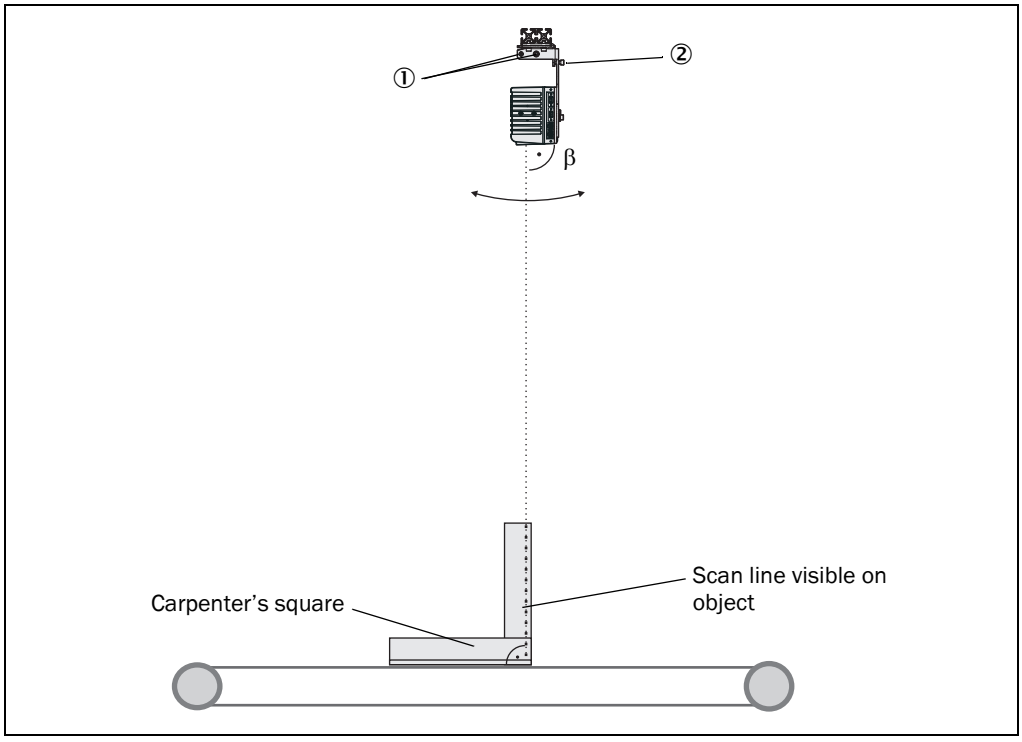


Fig. 22: Adjustment of the angle β

7.2.4 Adjustment of the angle α

- Use a felt-tip pen to draw a line in the transporting direction. For this purpose start the conveyor system and hold the felt-tip pen over the moving surface.
- Loosen the four screws ① of the mounting kit.

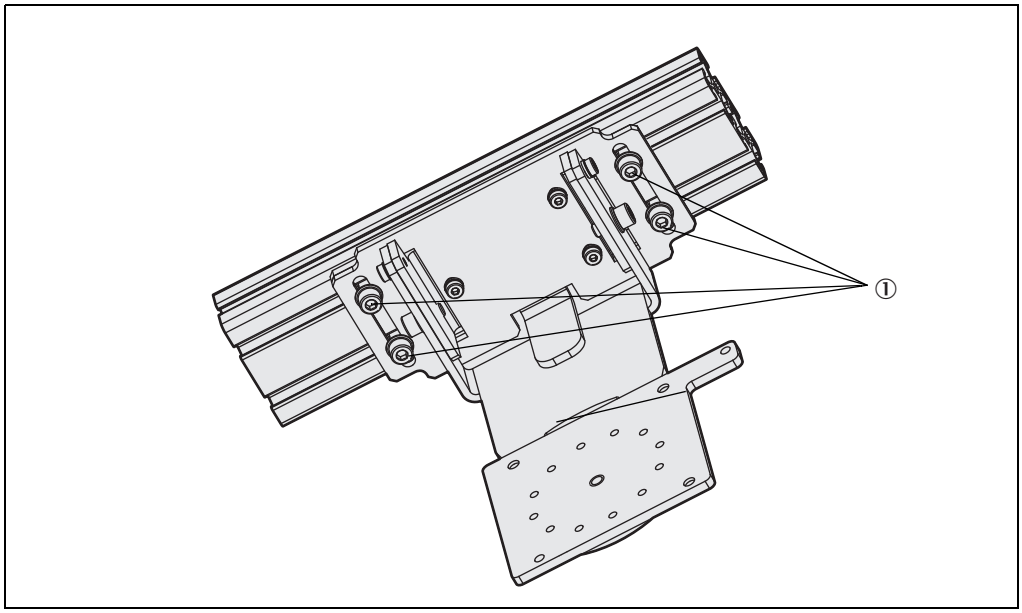


Fig. 23: Screws on the mounting kit for the adjustment of the angle α

- Align the scan line of the VMD at a right angle with the line on the conveyor system. A carpenter's square can be placed along the line on the conveyor system for this purpose.

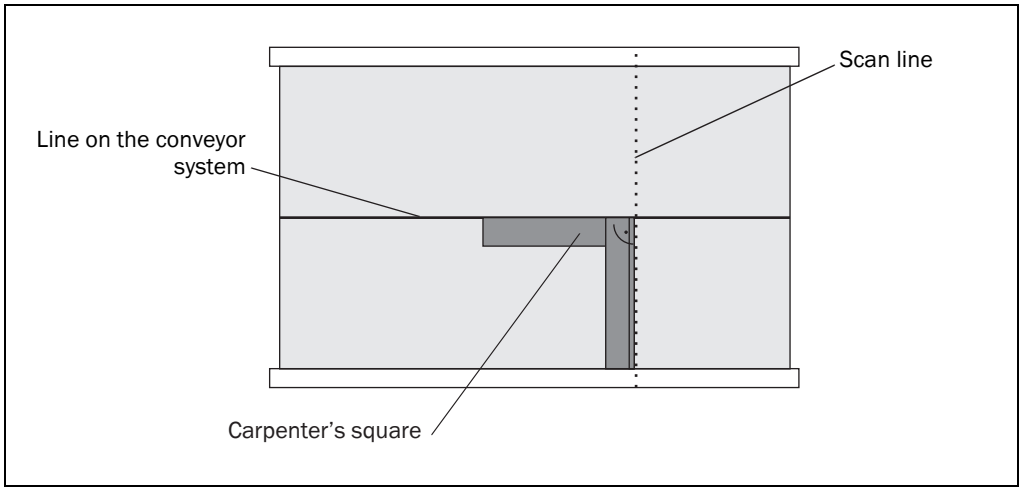


Fig. 24: Adjustment of the angle α

- Tighten the four screws ① of the mounting kit again.

7.3 Define the coordinates and the angle gamma using the installation setup

There is an installation setup for the configuration of the position of the VMD. You will find detailed step-by-step instructions on commissioning in the assistant.

Note To be able to use the installation setup, the VMD must be able to scan the transporting surface. Apply, for example, a piece of white tape along the scan line on a black surface.

7.3.1 Defining the angle γ, the Y and the Z coordinates

- Start the assistant on the VMDX10_XX00 menu, COMMISSIONING, START INSTALLATION SETUP.
- Enter the GAMMA, Y COORDINATE AND Z COORDINATE parameters (see *Fig. 25*). A rough entry is adequate. The assistant will determine the exact parameters during the subsequent steps.

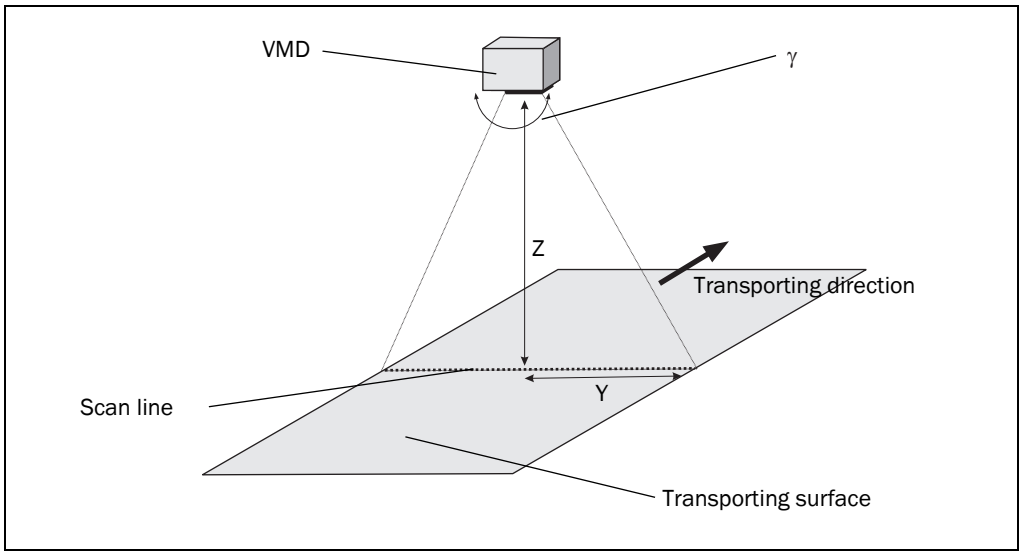


Fig. 25: Angle γ and Y coordinate and Z coordinate

7.3.2 Defining the transporting surface

In the next step the assistant scans the surrounding contour and displays the scan line seen. However, the assistant cannot yet identify which part of the scan line corresponds to the transporting surface.

You therefore define the position of the transporting surface by marking it.

➢ Position two marks using the right mouse button (M1 and M2). Ensure that the marks are as close as possible to the right and left edge of the conveyor system (see *Fig. 26* ①).

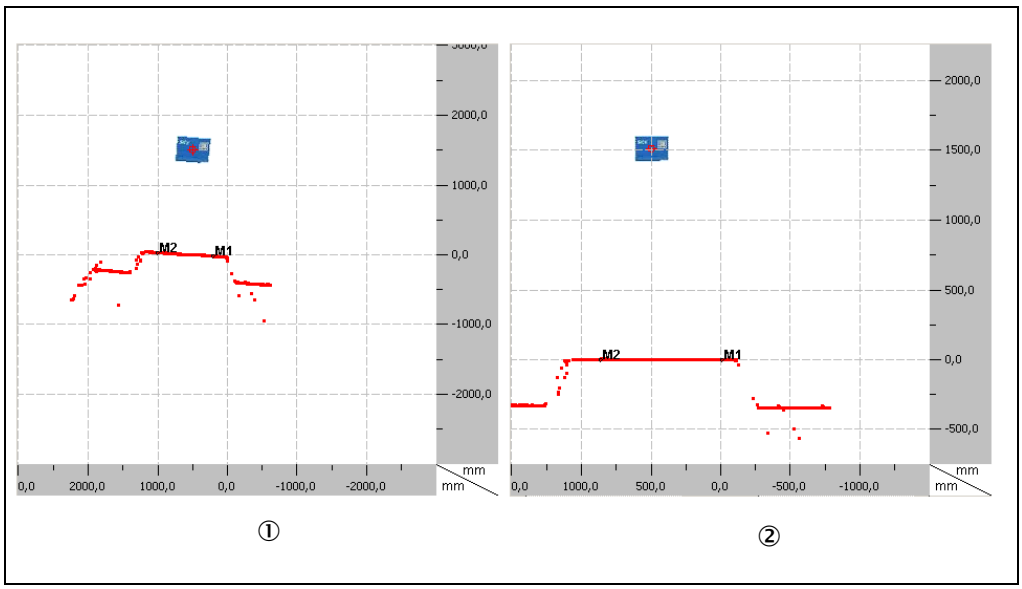


Fig. 26: Example scanned conveyor system

➢ In the assistant, click CALCULATE.
The angle γ and the Z coordinate are calculated and the scan line drawn horizontally in the diagram (see *Fig. 26* ②).

7.3.3 Defining the Y coordinate

➢ Place the test object on end on the left side of the transporting surface.

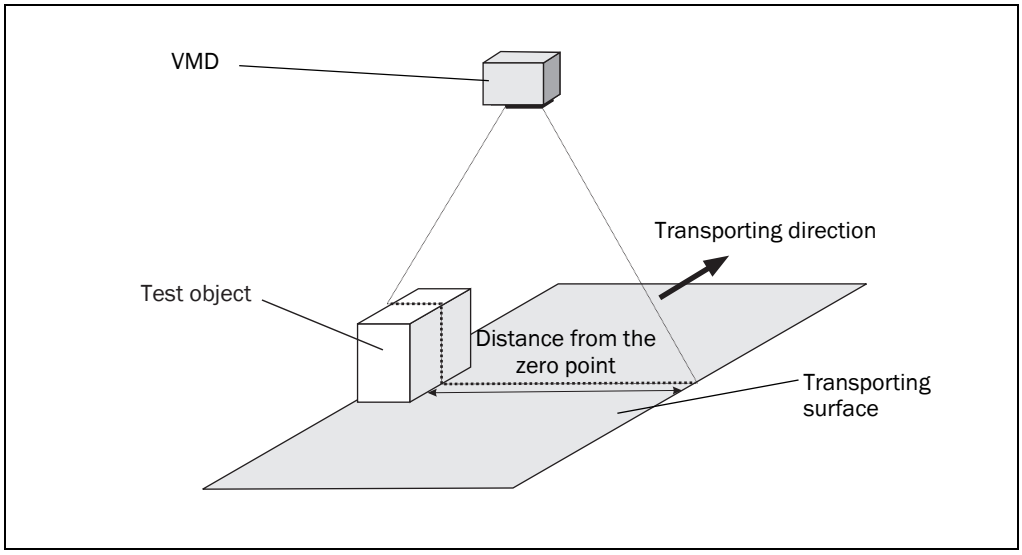


Fig. 27: Entry of the distance from the zero point

In the next step in the assistant enter the DISTANCE FROM THE ZERO POINT, the WIDTH OF OBJECT and HEIGHT OF OBJECT.

Note The test object is 200 mm (7.87 in) wide and 300 mm (11.81 in) high. You must measure the distance from the zero point.

The assistant scans the surrounding contour and displays the scan line seen. However, the assistant cannot identify which part of the scan line corresponds to the test object.

➢ Define on the scan line which part of the surrounding contour on the right side corresponds to the object. For this purpose position two marks using the right mouse button (see *Fig. 28* part 1).

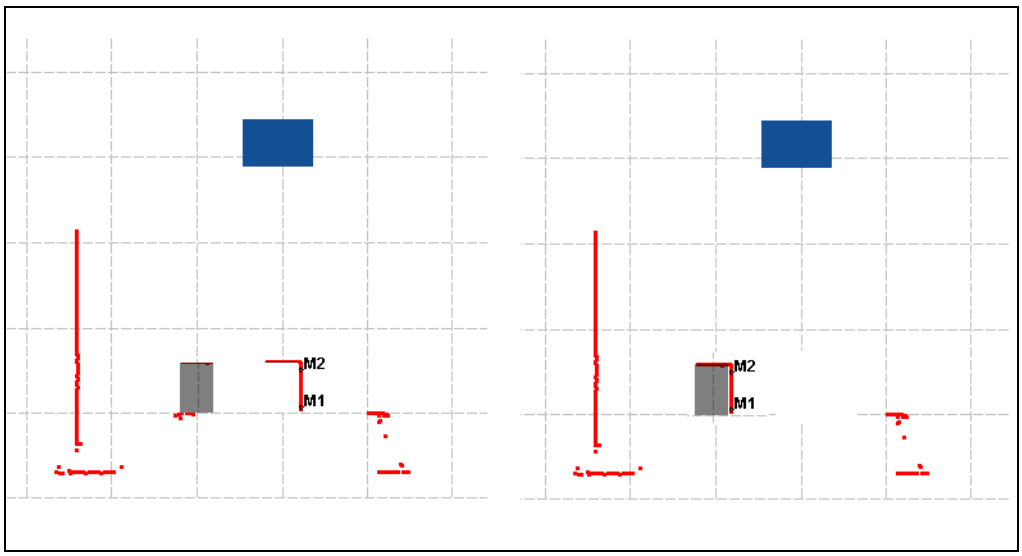


Fig. 28: Scanned test object

➢ In the assistant, click CALCULATE.
The assistant now wraps the scan line around the test object (see *Fig. 28* part 2) and calculates the distance from the VMD to the zero point and therefore its Y coordinate.

7.3.4 Applying the parameters

Finally, the assistant displays the new parameters. If you apply the new parameters, they will be saved in the device.

Note The values are not yet displayed on the SOPAS user interface in PARAMETER, POSITION. The values are only displayed after the data have been uploaded from the device.

COMMUNICATION menu, UPLOAD ALL PARAMETERS FROM DEVICE

7.4 Defining the scan settings, encoder settings and the measured data message in SOPAS

To configure the VMS ready for use, a few settings are required in SOPAS.

7.4.1 Configuring the scan settings

PROJECT TREE, VMDX10_XX00, PARAMETER, BASIC PARAMETERS

➢ In the SCAN SETTINGS area, SCAN AREA define the following parameters:
– STARTING ANGLE: 55°
– ANGULAR RANGE: 70°

➢ In the CURRENT DEVICE PARAMETERS area, open the SCAN FREQUENCY ASSISTANT.

➢ Under MODE, select the FREQUENCY option and enter 270 Hz.

➢ In the next step select a setting with an angular resolution of at least 0.25°.

7.4.2 Encoder settings

➢ Choose the type of encoder connected and configure its resolution.

PROJECT TREE, VMDX10_XX00, PARAMETER, INCREMENT CONFIG./SYNC., area INCREMENT SETTINGS

7.4.3 Measured data message

➢ Select the measured data message to be output (*11.3 "Measured data message reference" on page 61*) on the host interface.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area OUTPUT VIA HOST INTERFACE

7.5 Testing of the configuration

Use the graphic view in the SOPAS monitor to verify the generated measured values and to verify the measurement area online. During this process, note that the monitor cannot display the data in real-time and therefore does not display all measured values.

7.5.1 Display of the measurement results

With the VMS application started the VMS measured values are displayed in the measurement results display as they are output in the measured data message.
VMDX10_XX00, MONITOR, DISPLAY OF THE MEASUREMENT RESULTS

7.5.2 VMS results list

If the VMS application is started, the last ten measured results from the VMD are displayed in a table in the VMS RESULT LIST area.
VMDX10_XX00, MONITOR, DISPLAY OF THE RESULTS LIST

7.5.3 Noise statistics

Depending on wear, surface finish, etc., the transporting surface will generate noise in the measurement on crossing the scan line. To determine a trigger threshold for object detection, it is helpful to determine the magnitude of the noise.

The noise statistics makes it possible to scan parts of the transporting surface or the entire transporting surface and to record the noise.
PROJECT TREE, VMDX10_XX00, MONITOR, VIEW NOISE STATISTICS

7.5.4 Scan view

With the aid of the graphic scan view in SOPAS you verify the measurement area for a VMD and the measured values online.
VMDX10_XX00, MONITOR, SCAN VIEW

7.5.5 3D object view

The 3D object view shows the objects measured on the conveyor system. Use the view, e.g. when setting up the system or for checks when it is in operation.
VMDX10_XX00, MONITOR, 3D OBJECT VIEW

8 Maintenance

8.1 Maintenance during operation

The VMS volume measurement system is maintenance-free apart from the maintenance measures listed below. No maintenance is necessary to ensure the retention of laser class 2 (complies with 21 CFR 1040.10 with the exception of the deviations as per Laser Notice No. 50, July 26, 2001).

Recommendation To obtain the full optical performance of the VMS, the front screens and any additional front screens should be regularly checked for contamination. This applies particularly in harsh operating environments (dust, powder, moisture, finger marks).

WARNING

Damage to the eye from laser radiation!

The VMS uses a red laser of class 2. On extended beam exposure, the retina in the eye may be damaged.

The entire front screen serves as the laser output opening

Warning — inappropriate use of the VMS can result in hazardous exposure to radiation and the laser class may be exceeded.

- Never look directly into the beam (similar to sunlight).
- Do not point the device laser beam at people.
- During mounting and adjustment of the VMS, pay attention to possible reflections of the laser beam on reflective surfaces.
- Do not open the housing. (Opening the housing does not interrupt the power to the laser diode during the read cycle.)
- Observe the latest valid version of the laser safety regulations.

ATTENTION

Front screen damaged!

The front screen is made of glass. The optical power is reduced by scratches and smearing on the front screen.

- Do not use aggressive detergents.
- Do not use abrasive cleaning agents.
- Avoid scratching and scouring movements on the front screen.

Note Static charges cause dust particles to be attracted to the front screen. You can prevent this effect by using the antistatic plastic cleaner (SICK Part No. 5600006) and the SICK lens cloth (Part No. 4003353).

How to clean the front screen and/or the additional front screen (optional extra):

- Use a clean and soft brush to remove dust from the front screen.
- Then wipe the front screen with a clean and damp cloth.

8.2 Disposal

After de-commissioning, dispose of unusable or irreparable devices in an environmentally correct manner:

1. Observe national waste disposal regulations.
2. Dismantle the housing of the VMD.
3. Remove electronics assemblies.
4. Remove glass window of the laser output opening and send for glass recycling.
5. Send chassis and cover for die-cast aluminium recycling.
6. Dispose of all electronic assemblies as hazardous waste.

SICK AG does not accept any devices returned that have become unusable or are irreparable.

8.3 Replacement of a system or replacement of components

If the system or individual components are replaced, proceed as follows:

1. Switch off the voltage supply for the VMD and undo the connection.
2. Remove the connection cables from the VMD.
3. Undo three screws M6 (see ③ in *Fig. 14 on page 34*) and replace the VMD.
4. Mounting and adjusting a replacement device (see *Chapter 4 “Mounting” on page 33*).
5. Configuring a replacement device (see *Chapter 7 “Configuration and adjustment” on page 42*).

9 Troubleshooting

This chapter describes how to identify and rectify errors and malfunctions of the VMS volume measurement system.

9.1 In the event of faults or errors


ATTENTION

Cease operation if the cause of the malfunction has not been clearly identified!

Stop the machine/system if you cannot clearly identify or allocate the error and if you cannot safely rectify the malfunction.

9.2 Error on beam generation

The VMS automatically monitors the beam generation and automatically shuts down the generation of the beam in case of irregularities. In this case:

- The LED “Device Ready” turns red.
- The scanner transmits no more measured values.

To cancel error status:

➢ Switch the VMS off and back on again.

➢ If the error is still present when the device is switched on again, check the device status with the aid of SOPAS (see *9.3.1*). If errors are listed there, please contact SICK service.

9.3 Detailed error analysis

9.3.1 Query system status

The VMS saves errors internally in a logfile. You can display this logfile using SOPAS:

➢ Connect SOPAS to the device.

PROJECT TREE, VMDX10_XX00, SERVICE, SYSTEM STATUS, areas OPERATING DATA and SYSTEM STATUS

Notes

- The SYSTEM STATUS log is retained also after the device is switched off and on again.
- The VMS differentiates between four error types: “Information”, “Warning”, “Error” and “Serious error”. For each error type, the system saves only the last five occurrences.

9.3.2 Logging data during operation

In the SOPAS configuration software, menu TOOLS, the DATA RECORDER is available. In this way you can specifically log and analyse data in certain memory areas in the VMS during operation.

10 Technical specifications

10.1 Data sheet VMS410/510 volume measurement system

Type	VMS410	VMS510
Version	1 scanner solution	
Laser output opening	On front	
Laser diode (wavelength)	Visible light (λ = 650 nm)	
Laser power	Max. 7.5 mW	
Laser class of the device	2 (Complies with 21 CFR 1040.10 with the exception of the deviations as per Laser Notice No. 50, July 26, 2001)	
Useful field of view	Max. 70°	
Angular resolution	0.1°	
Max. conveyor velocity v	2 m/s (393.7 ft/min)	
Detectable object shape	Cuboid objects	
Max. object size (L × W× H)	2000 mm × 1000 mm × 1000 mm (78.74 in × 39.37 in × 39.37 in)	
Min. object size (L × W × H) at v = 2 m/s (393.7 ft/min) at v = 1.2 m/s (236.22 ft/min)	 100 mm × 100 mm × 50 mm (3.94 in × 3.94 in × 1.97 in) 50 mm × 50 mm × 50 mm (1.97 in × 1.97 in × 1.97 in)	
Certified scale interval d (L × W × H)[1)] at v = 2 m/s (393.7 ft/min) at v = 1.2 m/s (236.22 ft/min)	 ≥10 mm × ≥10 mm × ≥5 mm (≥0.39 in × ≥0.39 in × ≥0.2 in) ≥5 mm × ≥5 mm × ≥5 mm (≥0.2 in × ≥0.2 in × ≥0.2 in)	
Min. object gap with free running measurement with triggered measurement	 25 mm (0.98 in) 50 mm (1.97 in)	
Object remission	10 to 200%	
Optical indicators	6 LEDs	

Tab. 14: VMS data sheet

1) Only in optimal applications, without effect of contamination, vibration, at extremely low object remission, without slip between object and conveyor system or high temperature drift, a scale interval d = 5 mm (0.2 in) is possible in industrial environments! For this reason an application must be checked by SICK before a binding statement on a scale interval can be made.

Type	VMS410	VMS510
Host interfaces	RS-232 or RS-422, data output format can be adjusted	
Output data	• maximum dimensions (length, width, height) • box volume • real volume	• maximum dimensions (length, width, height)
Operating voltage/power consumption	DC 24 V ± 15%/max. 25 W	
Housing	Aluminium die-cast	
Enclosure rating/protection class	IP 20 (as per DIN 40050); with plug cover IP 65	
EMC test	In compliance with EN 61000-6-2:2001, EN 61000-6-4:2001	
Vibration/shock test	In compliance with EN 60068-2-6, -27, -29, -64	
Weight	Approx. 2.3 kg (5.07 lb)	
Temperature (operation/storage)	0...+40 °C/–20...+70 °C (32...104 °F/–4...158 °F)	

Tab. 14: VMS data sheet

10.2 Dimensional drawings

10.2.1 Dimensional drawing VMD volume measurement system

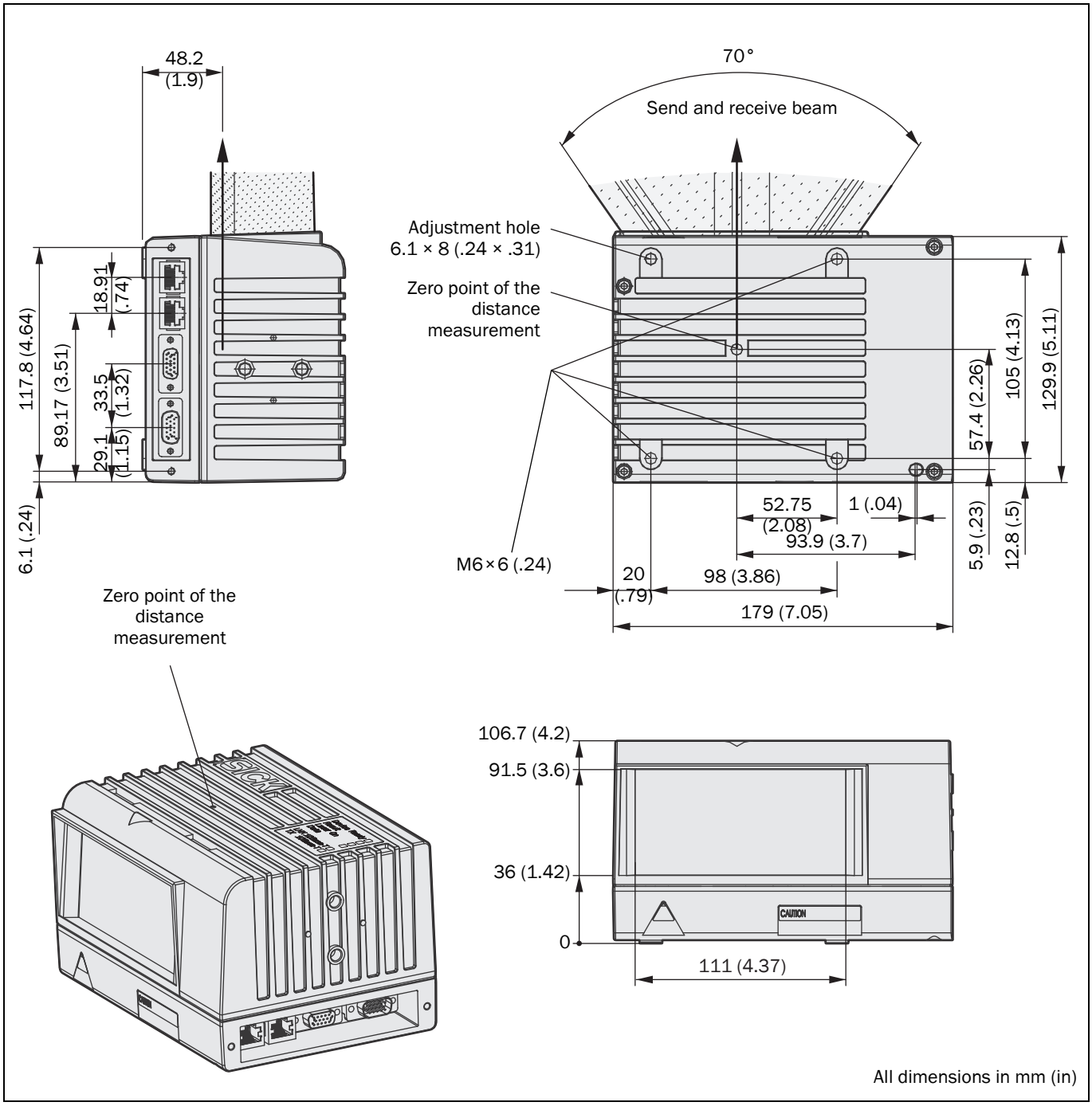


Fig. 29: Dimensional drawing VMD

10.2.2 Dimensional drawing mounting kit for VMD

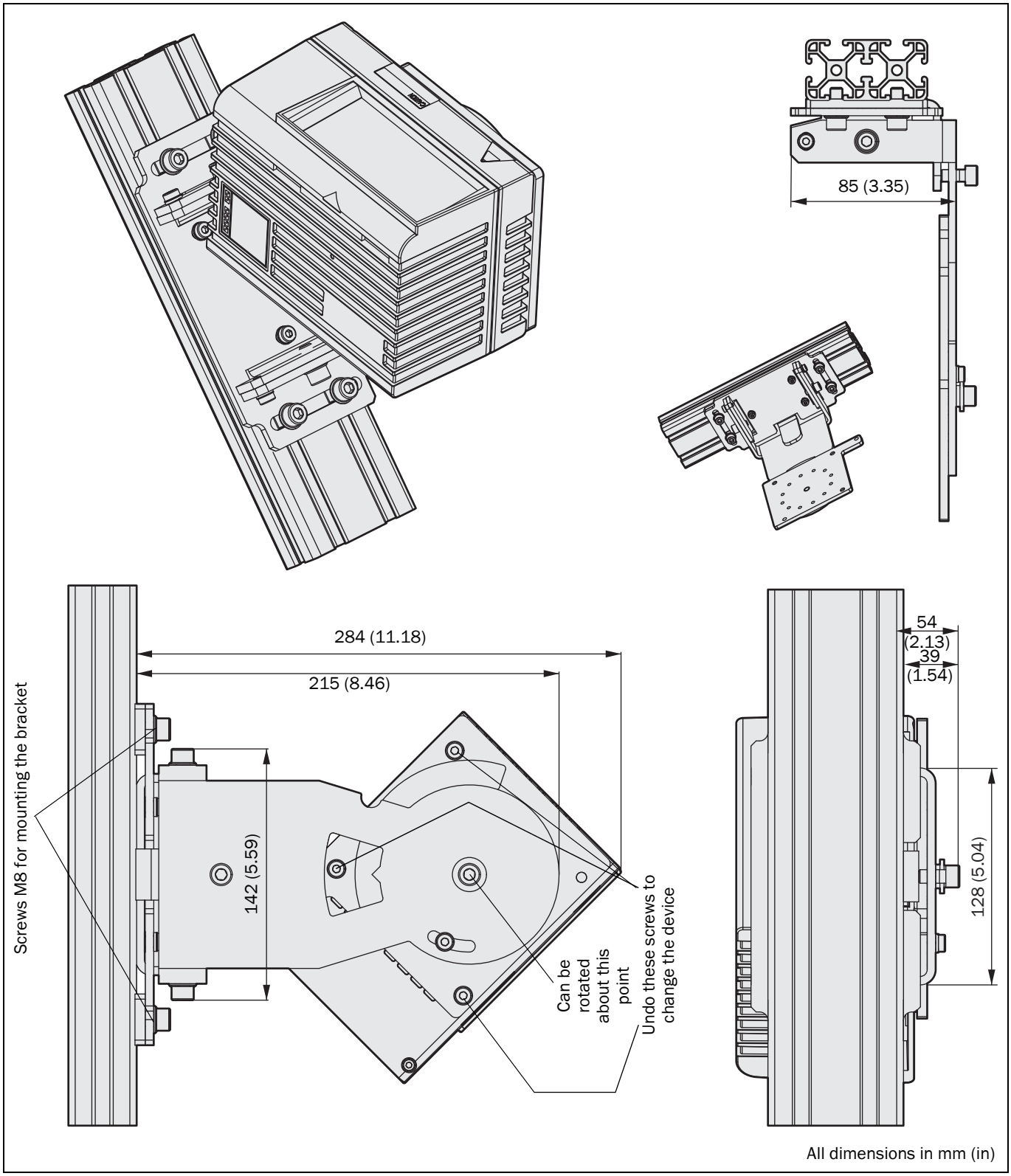


Fig. 30: Dimensional drawing mounting kit for VMD

11 Annex

11.1 Overview of the annexes

The annex contains the following supplementary information:

- message reference
- ordering information
- glossary
- illustration containing the EU Declaration of Conformity
- illustration of the MID conformity certificate
- illustration of the OIML conformity certificate

11.2 Control messages reference

Notation

The individual message sections are each to be separated by a space (ASCII code 59, hex 3B).

All the examples used in the following message lists refer to the CoLa A protocol.

Syntax error

If the VMS detects an error in the syntax of a received message, it outputs an error message with an error code.

Message structure: **sFA** ErrorCode

Message part	Description	Variable type	Length (byte)	Value range
Type of command	Syntax error or logical error	string	3	**sFA**
Error code	Contains the error type (see *Tab. 15*)	string	4	**FF00h** ... **FFFFh**

Message syntax I: Syntax error or logical error

Error code	Possible cause	Solution
FF79h	Unknown name	The procedure or parameter name used is unknown. Check for spelling mistakes.
FFC8h FFC9h	User level too low	A higher user level is required to access the procedure or parameter. Change to required user level.
FF??h	General syntax error	Check message syntax: type of command, command, parameter number and value range

Tab. 15: Syntax error or logical errors

11.2.1 Object start

The VMS generates this message when an object enters the scan line (see *Fig. 4 on page 19*). You must activate the message in SOPAS.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area OUTPUT VIA HOST INTERFACE, option ENABLE OBJECT START MESSAGE

Message structure: **2B**

Message part	Description	Variable type	Length (byte)	Value range
Type of command	Indicates the object start	string	2	**2B**

Message syntax II: Object start

11.2.2 Object end

The VMS generates this message when an object leaves the scan line (see *Fig. 4 on page 19*). You must activate the message in SOPAS.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area OUTPUT VIA HOST INTERFACE, option ENABLE OBJECT START MESSAGE

Message structure: **2E**

Message part	Description	Variable type	Length (byte)	Value range
Type of command	Indicates the object end	string	2	**2E**

Message syntax III: Object end

11.2.3 Heartbeat

The VMS generates this message after a configurable interval has elapsed during which no object was measured. In this way, the connected application can cyclically check the device status even if it is idle. You must activate the message in SOPAS.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area OUTPUT VIA HOST INTERFACE, option ENABLE HEARTBEAT MESSAGE

Message structure: **HH**

Message part	Description	Variable type	Length (byte)	Value range
Type of command	A heartbeat is output according to the interval set in SOPAS.	string	2	**HH**

Message syntax IV: Heartbeat

11.2.4 Stand-by

This message puts the VMS into stand-by mode.

Request

Message structure: **2I**

Message part	Description	Variable type	Length (byte)	Value range
Type of command	Set the VMS to the “Idle/Stand-by” state	string	2	**2I**

Message syntax V: “Stand-by” request

Answer

Message structure: **2I**

Message part	Description	Variable type	Length (byte)	Value range
Type of command	VMS in the “Idle/Stand-by” state	string	2	**2I**

Message syntax VI: Answer to the “Stand-by” request

Example

Request: 2I

Answer: 2I

11.2.5 Measuring mode

This message puts the VMS into measuring mode.

Note It is not necessary to send this message to the VMS when the VMS is powered up. The system enters measuring mode automatically and signals this by outputting the value “201”.

Request

Message structure: **20**

Message part	Description	Variable type	Length (byte)	Value range
Type of command	Set the VMS to the measuring mode	string	2	**20**

Message syntax VII: “Measuring mode” request

Operation

Message structure: **20**

Message part	Description	Variable type	Length (byte)	Value range
Type of command	The VMS is set to the measuring mode	string	2	**20**

Message syntax VIII: Confirmation of the “Measuring mode” request

Answer

Message structure: **201**

Message part	Description	Variable type	Length (byte)	Value range
Type of command	The VMS enters measuring mode approx. 120 seconds after receiving the request or 180 seconds after being switched on	string	3	**201**

Message syntax IX: Answer to the “Measuring mode” request

Example

Request: 20

Confirmation: 20

Answer: 201

11.3 Measured data message reference

11.3.1 Basic measured data message (metric values)

You can select the basic measured data message in SOPAS.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area OUTPUT VIA HOST INTERFACE, selection field MEASURED DATA MESSAGE
PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, UNIT/SCALE INTERVALS, area UNIT/ROUNDING, selection field UNIT

Message structure: **DI;**Unit;Length;Width;Height;SerialNumberMaster; SerialNumberSlave;Index;Measurement status;CS

Message part	Description	Variable type	Length (byte)	Value range
Command	Start of the measured data output	string	2	**DI**
Unit	M for metric in mm	string	1	**M** Metric values
Length	Longest side of the smallest enclosing cuboid in mm	string	4	**0000** **9999**
Width	Width of the smallest enclosing cuboid in mm	string	4	**0000** **9999**
Height	Height of the smallest enclosing cuboid in mm	string	4	**0000** **9999**
SerialNumberMaster	Outputs the VMD serial number	string	8	**00000000** **99990000**
SerialNumberSlave	Outputs always 00000000	string	8	**00000000**
Index	Message counter initialised with 1	string	4	**0000** **9999**
Measurement status	0 = OK	string	4	**0000** **9999**
CS	Checksum for the commands described above to CRC 16	string	4	**0000h** **FFFFh**

Message syntax X: Basic measured data message (metric values)

Example

Output: DI;M;0500;0400;0350;03404711;00000000;0123;0000;AC34

11.3.2 Basic measured data message (values in inch)

You can select the basic measured data message in SOPAS.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area OUTPUT VIA HOST INTERFACE, selection field MEASURED DATA MESSAGE
PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, UNIT/SCALE INTERVALS, area UNIT/ROUNDING, selection field UNIT

Message structure: **DI;**Unit;Length;Width;Height;SerialNumberMaster; SerialNumberSlave;Index;Measurement status;CS

Message part	Description	Variable type	Length (byte)	Value range
Command	Start of the measured data output	string	2	**DI**
Unit	I for inch values	string	1	**I** Values in inch
Length	Longest side of the smallest enclosing cuboid in inch/100	string	5	**00000** **99999**
Width	Width of the smallest enclosing cuboid in inch/100	string	5	**00000** **99999**
Height	Height of the smallest enclosing cuboid in inch/100	string	5	**00000** **99999**
SerialNumberMaster	Outputs the VMD serial number	string	8	**00000000** **99990000**
SerialNumberSlave	Outputs always 00000000	string	8	**00000000**
Index	Message counter initialised with 1	string	4	**0000** **9999**
Measurement status	0 = OK	string	4	**0000** **9999**
CS	Checksum for the commands described above to CRC 16	string	4	**0000h** **FFFFh**

Message syntax XI: Basic measured data message (values in inch)

Example

Output: DI;I;00500;00400;00350;03404711;00000000;0123;0000;AC34

11.3.3 Basic measured data message 2 (metric values)

You can select the basic measured data message 2 in SOPAS.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area OUTPUT VIA HOST INTERFACE, selection field MEASURED DATA MESSAGE
PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, UNIT/SCALE INTERVALS, area UNIT/ROUNDING, selection field UNIT

Message structure: **DI;**Unit;Length;Width;Height;ScaleIntervalLength; ScaleValueWidth;ScaleIntervalHeight;SerialNumberMaster; SerialNumberSlave1;SerialNumberSlave2; SerialNumberSlave3;Index;MeasurementStatus;CS

Message part	Description	Variable type	Length (byte)	Value range
Command	Start of the measured data output	string	2	**DI**
Unit	M for metric in mm	string	1	**M** Metric values
Length	Longest side of the smallest enclosing cuboid in mm	string	4	**0000** **9999**
Width	Width of the smallest enclosing cuboid in mm	string	4	**0000** **9999**
Height	Height of the smallest enclosing cuboid in mm	string	4	**0000** **9999**
ScaleIntervalLength	Scale intervals for length, width and height in mm	string	4	**0000** **9999**
ScaleValueWidth	The related value is dependent on the values defined in SOPAS and the velocity of the conveyor system.	string	4	**0000** **9999**
ScaleIntervalHeight		string	4	**0000** **9999**
SerialNumberMaster	Outputs the serial number of the VMD Master	string	8	**00000000** **99990000**
SerialNumberSlave1	Outputs always 00000000	string	8	**00000000** **99990000**
SerialNumberSlave2	Outputs always 00000000	string	8	**00000000** **99990000**
SerialNumberSlave3	Outputs always 00000000	string	8	**00000000** **99990000**
Index	Message counter initialised with 1	string	4	**0000** **9999**
Measurement status	0 = OK	string	4	**0000** **9999**
CS	Checksum for the commands described above to CRC 16	string	4	**0000h** **FFFFh**

Message syntax XII: Basic measured data message 2 (metric values)

Example

Output: DI;M;0500;0400;0350;0010;0010;0005;03404711;00000000;
00000000;0000000;0123;0000;AC34

11.3.4 Basic measured data message 2 (values in inch)

You can select the basic measured data message 2 in SOPAS.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area OUTPUT VIA HOST INTERFACE, selection field MEASURED DATA MESSAGE
PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, UNIT/SCALE INTERVALS, area UNIT/ROUNDING, selection field UNIT

Message structure: **DI;**Unit;Length;Width;Height;ScaleIntervalLength;
ScaleValueWidth;ScaleIntervalHeight;SerialNumberMaster;
SerialNumberSlave1;SerialNumberSlave2;
SerialNumberSlave3;Index;MeasurementStatus;CS

Message part	Description	Variable type	Length (byte)	Value range
Command	Start of the measured data output	string	2	**DI**
Unit	I for inch values	string	1	**I** Values in inch
Length	Longest side of the smallest enclosing cuboid in inch/100	string	5	**00000** **99999**
Width	Width of the smallest enclosing cuboid in inch/100	string	5	**00000** **99999**
Height	Height of the smallest enclosing cuboid in inch/100	string	5	**00000** **99999**
ScaleIntervalLength	Scale intervals for length, width and height in inch/100 The related value is dependent on the values defined in SOPAS and the velocity of the conveyor system.	string	4	**0000** **9999**
ScaleValueWidth		string	4	**0000** **9999**
ScaleIntervalHeight		string	4	**0000** **9999**
SerialNumberMaster	Outputs the serial number of the VMD Master	string	8	**00000000** **99990000**
SerialNumberSlave1	Outputs always 00000000	string	8	**00000000** **99990000**
SerialNumberSlave2	Outputs always 00000000	string	8	**00000000** **99990000**
SerialNumberSlave3	Outputs always 00000000	string	8	**00000000** **99990000**

Message syntax XIII: Basic measured data message 2 (values in inch)

Message part	Description	Variable type	Length (byte)	Value range
Index	Message counter initialised with 1	string	4	**0000** **9999**
Measurement status	0 = OK	string	4	**0000** **9999**
CS	Checksum for the commands described above to CRC 16	string	4	**0000h** **FFFFh**

Message syntax XIII: Basic measured data message 2 (values in inch)

Example

Output: DI;I;00500;00400;00350;0400;0400;0200;
03404711;00000000;00000000;0000000;0123;0000;AC34

11.3.5 Extended measured data message (metric values)

You can select the extended measured data message in SOPAS.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area OUTPUT VIA HOST INTERFACE, selection field MEASURED DATA MESSAGE

PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, UNIT/SCALE INTERVALS, area UNIT/ROUNDING, selection field UNIT

Message structure: **DI;**Unit;Length;Width;Height;BoxVolume;RealVolume; Angle; Measurement status;Index;CS

Message part	Description	Variable type	Length (byte)	Value range
Command	Start of the measured data output	string	2	**DI**
Unit	M for metric in mm	string	1	**M** Metric values
Length	Longest side of the smallest enclosing cuboid in mm	string	4	**0000** **9999**
Width	Width of the smallest enclosing cuboid in mm	string	4	**0000** **9999**
Height	Height of the smallest enclosing cuboid in mm	string	4	**0000** **9999**
BoxVolume	Box volume of the smallest enclosing cuboid in cm^3	string	7	**0000000** **9999999**
RealVolume	Same value as box volume	string	7	**0000000** **9999999**
Angle	Angle of the smallest enclosing cuboid in 1/10 degrees	string	4	**±000** **±999**
Measurement status	0 = OK	string	4	**0000** **9999**
Index	Message counter initialised with 1	string	4	**0000** **9999**
CS	Checksum for the commands described above to CRC 16	string	4	**0000h** **FFFFh**

Message syntax XIV: Extended measured data message (metric values)

Example

Output: DI;M;0500;0400;0350;0070000;0070000;+433;0000;0123;AC34

11.3.6 Extended measured data message (values in inch)

You can select the extended measured data message in SOPAS.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area OUTPUT VIA HOST INTERFACE, selection field MEASURED DATA MESSAGE

PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, UNIT/SCALE INTERVALS, area UNIT/ROUNDING, selection field UNIT

Message structure: **DI;**Unit;Length;Width;Height;Volume;RealVolume;Angle; Measurement status;Index;CS

Message part	Description	Variable type	Length (byte)	Value range
Command	Start of the measured data output	string	2	**DI**
Unit	I for inch values	string	1	**I** Values in inch
Length	Longest side of the smallest enclosing cuboid in inch/100	string	5	**00000** **99999**
Width	Width of the smallest enclosing cuboid in inch/100	string	5	**00000** **99999**
Height	Height of the smallest enclosing cuboid in inch/100	string	5	**00000** **99999**
BoxVolume	Box volume of the smallest enclosing cuboid in $inch^3/10$	string	7	**0000000** **9999999**
RealVolume	Same value as box volume	string	7	**0000000** **9999999**
Angle	Angle of the smallest enclosing cuboid in 1/10 degrees	string	4	**±000** **±999**
Measurement status	0 = OK	string	4	**0000** **9999**
Index	Message counter initialised with 1	string	4	**0000** **9999**
CS	Checksum for the commands described above to CRC 16	string	4	**0000h** **FFFFh**

Message syntax XV: Extended measured data message (values in inch)

Example

Output: DI;I;00500;00400;00350;0070000;0070000;+433;0000;0123;AC34

11.3.7 Extended measured data message 2 (metric values)

You can select the extended measured data message in SOPAS.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area OUTPUT VIA HOST INTERFACE, selection field MEASURED DATA MESSAGE
PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, UNIT/SCALE INTERVALS, area UNIT/ROUNDING, selection field UNIT

Message structure: **DI;**Unit;Length;Width;Height;Angle;Index;Measurement status; Measurement status2;CS

Message part	**Description**	**Variable type**	**Length (byte)**	**Value range**
Command	Start of the measured data output	string	2	**DI**
Unit	M for metric in mm	string	1	**M** Metric values
Length	Longest side of the smallest enclosing cuboid in mm	string	4	**0000** **9999**
Width	Width of the smallest enclosing cuboid in mm	string	4	**0000** **9999**
Height	Height of the smallest enclosing cuboid in mm	string	4	**0000** **9999**
Angle	Angle of the smallest enclosing cuboid in 1/10 degrees	string	4	**±000** **±999**
Index	Message counter initialised with 1	string	4	**0000** **9999**
Measurement status	0 = OK	string	4	**0000** **9999**
Measurement status2	0 = OK	string	8	**00000000** **99990000**
CS	Checksum for the commands described above to CRC 16	string	4	**0000h** **FFFFh**

Message syntax XVI: Extended measured data message 2 (metric values)

Example

Output: DI;M;0500;0400;0350;+433;0123;0000;00000000;AC34

11.3.8 Extended measured data message 2 (values in inch)

You can select the extended measured data message in SOPAS.

PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, HOST, area OUTPUT VIA HOST INTERFACE, selection field MEASURED DATA MESSAGE

PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, UNIT/SCALE INTERVALS, area UNIT/ROUNDING, selection field UNIT

Message structure: **DI;**Unit;Length;Width;Height;Angle;Index;Measurement status; Measurement status2;CS

Message part	Description	Variable type	Length (byte)	Value range
Command	Start of the measured data output	string	2	**DI**
Unit	I for inch values	string	1	**I** Values in inch
Length	Longest side of the smallest enclosing cuboid in inch/100	string	5	**00000** **99999**
Width	Width of the smallest enclosing cuboid in inch/100	string	5	**00000** **99999**
Height	Height of the smallest enclosing cuboid in inch/100	string	5	**00000** **99999**
Angle	Angle of the smallest enclosing cuboid in 1/10 degrees	string	4	**±000** **±999**
Index	Message counter initialised with 1	string	4	**0000** **9999**
Measurement status	0 = OK	string	4	**0000** **9999**
Measurement status2	0 = OK	string	8	**00000000** **99990000**
CS	Checksum for the commands described above to CRC 16	string	4	**0000h** **FFFFh**

Message syntax XVII: Extended measured data message 2 (values in inch)

Example

Output: DI;I;00500;00400;00350;+433;0123;0000;00000000;AC34

11.4 Ordering information

11.4.1 Available systems

11.4.2 Accessories/spare parts

Part number	Device type	Code
1025985	VMS410	Volume measurement system
1025986	VMS510	OIML and MID certified volume measurement system with measured values that can be standardized

Tab. 16: Available systems

General accessories

Interface sets

Part number	Part	Description
2039457	Incremental encoder	0.2 mm/inc (0.008 in/inc) resolution
2034693	Photoelectric switches set	WL18 with fixing bracket, flying lead
4040035	Test object	Test object 202 × 302 × 402 mm³ (7.95 × 11.89 × 15.83 in³), imperative for commissioning

Tab. 17: General accessories

Part number	Part	Description
2034148	Interface set CDM	1 CDM490-0001 2 cables, plug/socket, 10 m (32.81 ft) 1 set of hardware (sliding nuts, screws)
2034151	Interface set CDM/ CMP	1 CDM490-0001 1 CMP490 2 cables, plug/socket, 10 m (32.81 ft) 1 set of hardware (sliding nuts, screws)

Tab. 18: Interface sets

Plug cover sets

Part number	Part	Description
2030439	Plug cover set, M-fitting	1 plug cover, M-fitting
2034152	Plug cover set, M12-fitting	1 plug cover, M12-fitting 1 connection cable Power, CAN, 3 m (9.84 ft) 1 plug for trigger and tacho 1 socket for the connection “Host” 1 cable, socket with insulation stripped, 10 m (32.81 ft)
2034153	Plug cover set, cables (3 m (9.84 ft)) with CDM	1 plug cover with cable 2 × 3 m (6.56 × 9.84 ft) 1 CDM490-0001 1 set of hardware (sliding nuts, screws)
2034154	Plug cover set cables (3 m (9.84 ft)) with CDM + voltage supply	1 plug cover, with cable, 3 m (9.84 ft) 1 CDM490-0001 1 CMP490 1 set of hardware (sliding nuts, screws)

Tab. 19: Plug cover sets

Accessories for plug covers

Part number	Part	Description
2031372	Communication cable	1 communication cable to the terminal interface in the plug cover, 3 m (9.84 ft)
2030467	Cat. 5 patch cable	10 m (32.81 ft) Cat. 5 patch cable with RJ-45 plugs (IP 65 degree of protection).
2030465	Cat. 5 cable	10 m (32.81 ft) Cat. 5 cable with RJ-45 plug (IP 65 degree of protection) and open cable end

Tab. 20: Accessories for plug covers

Spare parts/measuring head

Part number	Part	Description
1027887	VMD410-1000	Volume measurement device
1027888	VMD510-1000	Volume measurement device, can be standardized
2030421	Mounting kit	For mounting on an 80-mm-item (3.15 in) aluminium profile

Tab. 21: Spare parts measuring head

11.5 Glossary

Note For other terms, see also the online help for the SOPAS configuration software.

Box volume

The VMS determines length, width and height of an object, and calculates from this information the volume of the smallest enclosing cuboid, the box volume.

Download

Transmission of the parameter set that has been modified offline in the SOPAS configuration software from the PC to the VMD. SOPAS transmits either always a complete copy to the memory (RAM) in the VMD (menu COMMUNICATION, DOWNLOAD ALL PARAMETERS TO DEVICE) or only the parameter that has just been edited with the aid of the context menu opened using the right mouse button (menu COMMUNICATION, DOWNLOAD MODIFIED PARAMETERS TO DEVICE). With menu VMDX10_XX00, PARAMETER, SAVE PERMANENT, the parameter set is saved permanently in the EEPROM of the VMD.

Field of view α

Angle that defines the limits to which the laser beam is deflected by the polygon mirror wheel. A v-shaped area is formed radially in the scan direction in front of the laser output opening; this area must contain the objects to be measured.

Function interfaces

Switching inputs and outputs of the VMS.

Host interface

Primary data interface of the VMS with data output format that can be configured. Is used, amongother tasks, for the output of the measuring result in message format to the host/ the PLC. Used to integrate the VMS in the SICK network. Can be connected electrically as RS-232 or RS-422. Provides various transmission protocols.

Line scanner

Scanner that very rapidly deflects its focused laser beam with the aid of a polygon mirror wheel with mirrors parallel to the axis. In this way the scanner generates a dot of light in the measuring plane that repeatedly runs along a straight line and appears to be a “stationary” scan line due to the relative slow response of the human eye.

Parameter set

Data set using which the functions implemented in the VMD are initialised and activated. Is transmitted from the VMD to SOPAS and in the reverse direction using UPLOAD or DOWNLOAD respectively.

RIS

Remission Information System: The RIS value corresponds to the remission value without application of the scaling factor. It states the reflectivity of the object at the measurement point in percent determined by the system. A small RIS value signifies a low reflectivity (as a rule a dark object).

Scan line

See line scanner.

SOPAS

Configuration software, can be used with Windows 98/NT 4.0/2000/XP. Used for the offline configuration (adaptation to the read situation on-site) and the online operation of the VMS in the dialog box.

SOPAS setup help

Online Help that supports the usage of the SOPAS configuration software. The functions of the parameters for the VMS are explained in the Help and the related value ranges given. Can be used with an HTML browser, e.g. Internet Explorer or I-ViewPro as supplied and can be opened from SOPAS setup.

Terminal interface

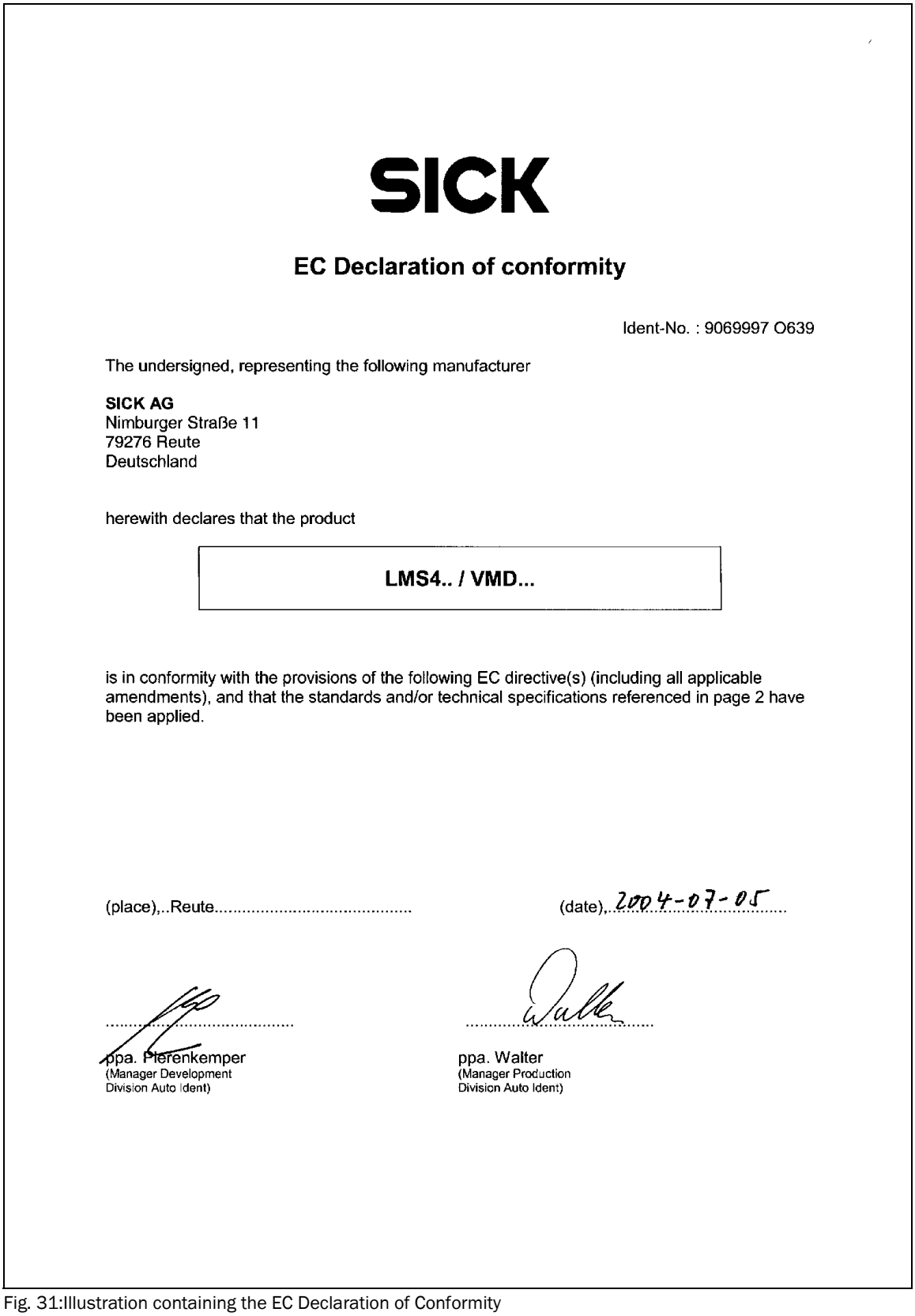
Auxiliary data interface (RS-232) on the VMS with fixed data output format. Using this interface it is always possible to access the VMD using the SOPAS configuration software. Is used, among other tasks, for the output of system messages and error messages.

Upload

Transmission of the parameter set from the VMS to the PC into the SOPAS configuration software. The values for the parameters are displayed on the file cards of the configuration software. Prerequisite for the modification of the current parameter set.

11.6 Illustration containing the EC Declaration of Conformity

Fig. 31 shows page 1 of the EC Declaration of Conformity (size reduced). The full EC Declaration of Conformity is available on request.



SICK

EC Declaration of conformity

Ident-No. : 9069997 O639

The undersigned, representing the following manufacturer

SICK AG
Nimburger Straße 11
79276 Reute
Deutschland

herewith declares that the product

LMS4.. / VMD...

is in conformity with the provisions of the following EC directive(s) (including all applicable amendments), and that the standards and/or technical specifications referenced in page 2 have been applied.

(place),..Reute..... (date),..2004-07-05.....

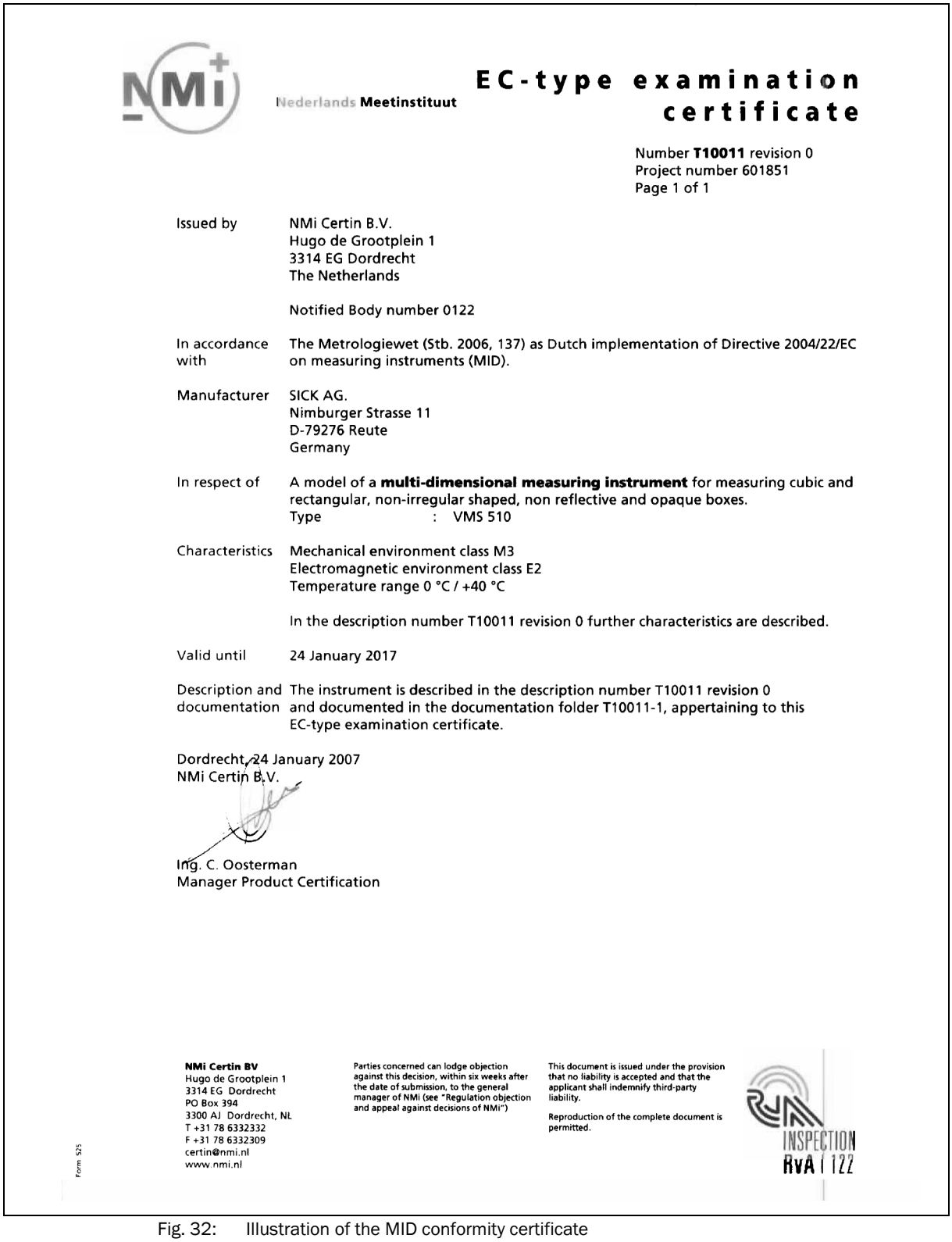
ppa. Pierenkemper
(Manager Development
Division Auto Ident)

ppa. Walter
(Manager Production
Division Auto Ident)

Fig. 31:Illustration containing the EC Declaration of Conformity

11.7 Illustration of the MID conformity certificate

Fig. 32 shows page 1 of the MID conformity certificate (size reduced). You can obtain a complete certificate on request.



Nederlands **Meetinstituut**

EC-type examination certificate

Number **T10011** revision 0
Project number 601851
Page 1 of 1

Issued by	NMi Certin B.V. Hugo de Grootplein 1 3314 EG Dordrecht The Netherlands Notified Body number 0122
In accordance with	The Metrologiewet (Stb. 2006, 137) as Dutch implementation of Directive 2004/22/EC on measuring instruments (MID).
Manufacturer	SICK AG. Nimburger Strasse 11 D-79276 Reute Germany
In respect of	A model of a **multi-dimensional measuring instrument** for measuring cubic and rectangular, non-irregular shaped, non reflective and opaque boxes. Type : VMS 510
Characteristics	Mechanical environment class M3 Electromagnetic environment class E2 Temperature range 0 °C / +40 °C In the description number T10011 revision 0 further characteristics are described.
Valid until	24 January 2017
Description and documentation	The instrument is described in the description number T10011 revision 0 and documented in the documentation folder T10011-1, appertaining to this EC-type examination certificate.

Dordrecht, 24 January 2007
NMi Certin B.V.

Ing. C. Oosterman
Manager Product Certification

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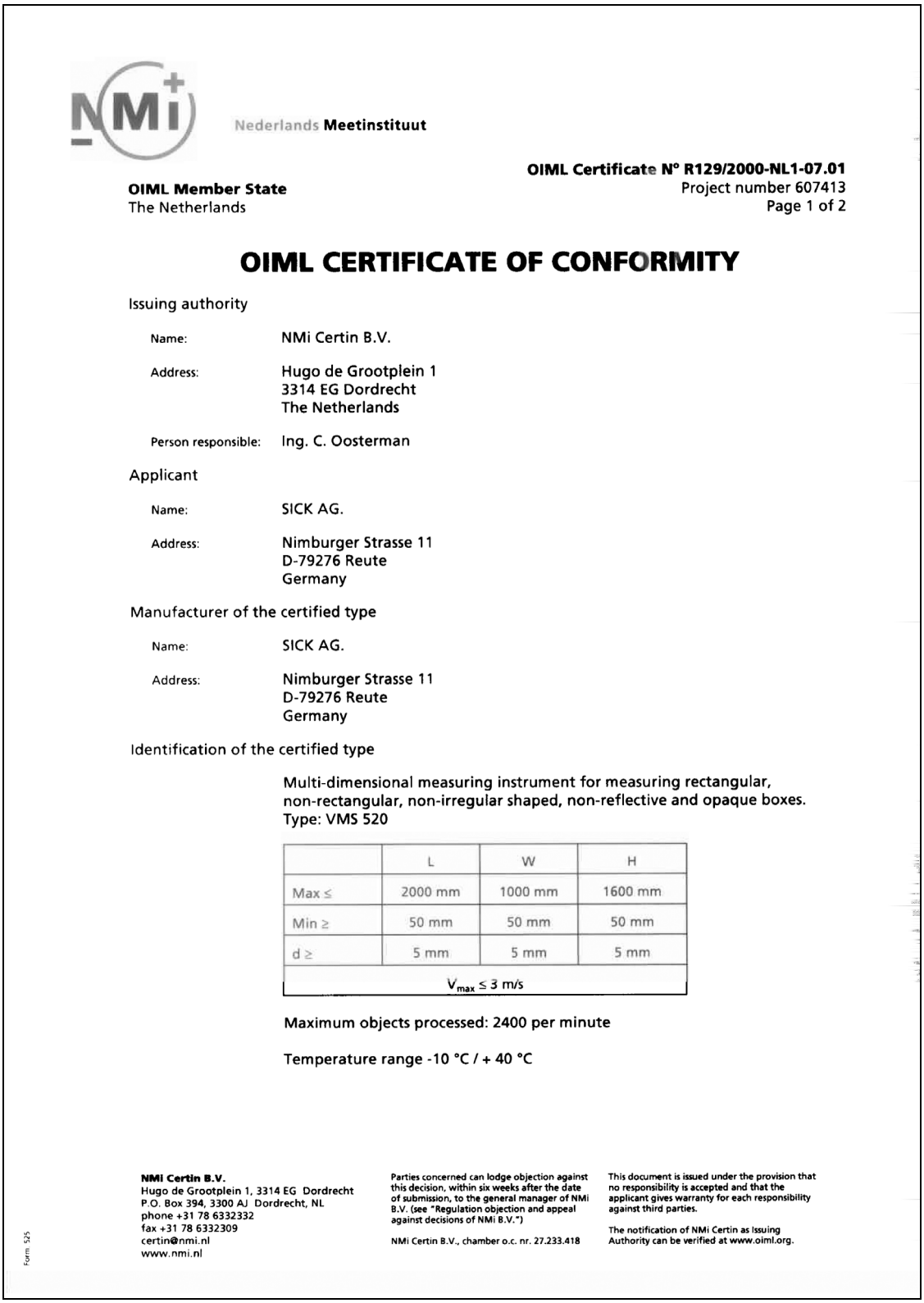
INSPECTION
RvA I 122

Form 525

Fig. 32: Illustration of the MID conformity certificate

Note When using the VMS510 in standardized applications, observe the relevant national law. SICK can provide advice on this topic if required. However this advice is no substitute for legal advice.

11.8 Illustration of the OIML conformity certificate



Nederlands **Meetinstituut**

OIML Member State
The Netherlands

OIML Certificate N° R129/2000-NL1-07.01
Project number 607413
Page 1 of 2

OIML CERTIFICATE OF CONFORMITY

Issuing authority

Name: NMi Certin B.V.

Address: Hugo de Grootplein 1
3314 EG Dordrecht
The Netherlands

Person responsible: Ing. C. Oosterman

Applicant

Name: SICK AG.

Address: Nimburger Strasse 11
D-79276 Reute
Germany

Manufacturer of the certified type

Name: SICK AG.

Address: Nimburger Strasse 11
D-79276 Reute
Germany

Identification of the certified type

Multi-dimensional measuring instrument for measuring rectangular, non-rectangular, non-irregular shaped, non-reflective and opaque boxes.
Type: VMS 520

	L	W	H
Max ≤	2000 mm	1000 mm	1600 mm
Min ≥	50 mm	50 mm	50 mm
d ≥	5 mm	5 mm	5 mm
V_{max} ≤ 3 m/s			

Maximum objects processed: 2400 per minute

Temperature range -10 °C / + 40 °C

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The notification of NMi Certin as Issuing Authority can be verified at www.oiml.org.

Form 525

Fig. 33: Illustration of the OIML conformity certificate

Note When using the VMS510 in standardized applications, observe the relevant national law. SICK can provide advice on this topic if required. However this advice is no substitute for legal advice.

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