

[ONLINE HELP](#)

VMS410/VMS510 Volume Measurement System



The benchmark for reliable object dimensioning



SICK
Sensor Intelligence.

Software versions described

Software/tool	Function	Status
Device description VMD410/510 (VMDX10_XX00)	Device specific software module for SOPAS	V 01.02.00 or higher
SOPAS	Configuration software	V 02.12 or higher

Copyright

Copyright © 2007
SICK AG Waldkirch
Auto Ident, Werk Reute
Nimburger Straße 11
79276 Reute
Germany

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.

Table of contents

1	About this document	6
1.1	Function of this document	6
1.2	Target group	6
1.3	Depth of information	6
1.4	Symbology used	6
2	For your safety	7
2.1	Authorised personnel	7
2.2	General safety notes and protective measures	7
3	Configuration	8
3.1	Preparing the configuration	8
3.2	Camera focus settings	9
3.2.1	Control of the camera focus function	9
3.2.2	Output with CAN operating mode "Application"	9
3.2.3	ICR focus settings	9
3.3	Position	11
3.3.1	Coordinates	11
3.3.2	Angles	12
3.3.3	Measurement area	13
3.3.4	Measurement area for the RIS values	14
3.4	Algorithm settings	14
3.4.1	RIS evaluation	17
3.5	Object size	18
3.6	Data processing	19
3.6.1	Output delay	19
3.6.2	Output timing	19
3.6.3	Output format	20
3.6.4	Definition of the object length	20
3.6.5	Unit/rounding	21
3.6.6	Scale intervals for objects	22
3.7	Basic parameters	22
3.7.1	Current device parameters	23
3.7.2	Scan settings	24
3.7.3	Other settings	24
3.8	Advanced parameters	25
3.9	Digital inputs/trigger	25
3.9.1	Measurement triggering	25
3.9.2	Common settings	26
3.9.3	Digital inputs	26
3.9.4	Gate	27
3.9.5	Laser control	28
3.9.6	Advanced I/O settings	29
3.10	Encoder and synchronisation	29
3.10.1	Master/slave synchronisation	29
3.10.2	Conveyor system velocity	29
3.10.3	System increment	30

3.11	Interfaces	30
3.11.1	Host protocol for camera focus	30
3.11.2	Message output via the host interface	31
3.11.3	Host interface	32
3.11.4	Message output via the terminal interface	32
3.11.5	Ethernet interface	33
3.11.6	CAN protocol for camera focus	33
3.11.7	CAN protocol for SICK network	34
3.11.8	CAN interface	34
4	Monitor	35
4.1	Display of the measurement results	35
4.1.1	Start or stop VMS application	35
4.1.2	Measurement results	35
4.2	Display of the results list	36
4.2.1	Start or stop VMS application	36
4.2.2	VMS results list	36
4.3	Noise statistics	37
4.4	Scan view	37
4.5	3D object view	39
5	Service	41
5.1	Version information	41
5.2	Operating data	41
5.3	System status	41
6	Glossary	42
7	Index	44

Abbreviations

BCC	Block Character Check
CAN	Controller Area Network = standardised fieldbus system with message-based protocol for exchanging data
CS	Checksum
EEPROM	Electrically Erasable Programmable Read-only Memory
FSI	Fast Serial Interface = SICK communication interface
HTML	Hypertext Markup Language = page description language on the Internet
LED	Light Emitting Diode
RAM	Random Access Memory = volatile memory with direct access
RDT	Remote Diagnostic Tool = software for remote diagnostics on SICK devices
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 VMS410/510
VMS	Volume measurement system = SICK AG volume measurement system

Tables

Tab. 1: Passwords	8
Tab. 2: Example for measured results rounded to the scale intervals	21

Figures

Fig. 1: ICR focus settings	10
Fig. 2: VMD coordinates above a conveyor system	11
Fig. 3: Gamma angle	12
Fig. 4: Measurement area in transporting direction	13
Fig. 5: Measurement area for RIS values in transporting direction	14
Fig. 6: Irregular span height threshold	16
Fig. 7: Irregular height average tolerance band	16
Fig. 8: Background evaluation options	17
Fig. 9: Output timing diagram	19
Fig. 10: Definition of the object length	21
Fig. 11: Scan area of the VMD	24
Fig. 12: Errors in the entry of the scan area	24
Fig. 13: Noise statistics	37
Fig. 14: Scan view in the monitor	38
Fig. 15: 3D object view	39

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

This document **provides technical personnel** information on the configuration and diagnostics for the VMS410/510 volume measurement system using the SOPAS configuration software.

1.2 Target group

The target group for this document are people such as technicians, service technicians and engineers who configure and perform diagnostics on the VMS410/510.

1.3 Depth of information

This document contains information on the configuration, diagnostics and troubleshooting for the VMS410/510 volume measurement system with the aid of the SOPAS configuration software.

Planning and using measurement systems such as the VMS410/510 also require specific technical skills which are not detailed in this documentation.

When operating the VMS410/510 volume measurement system, the national, local and statutory rules and regulations must be observed.

1.4 Symbology used

<i>Reference</i>	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 VMS410/510 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.



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 SOPAS.

2 For your safety

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

- Please read this chapter carefully before configuring the VMS410/510.

2.1 Authorised personnel

The VMS410/510 volume measurement system must be configured and commissioned only by adequately qualified personnel.

The following qualifications are necessary for the various tasks:

- 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 General safety notes and protective measures



Safety notes

Please observe the following items in order to ensure the correct and safe use of the VMS410/510 volume measurement system.

- The notices in this online help (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.

3 Configuration

The VMS volume measurement system is adapted to the on-site measurement situation by means of the configuration. You can configure and test the measurement properties, the analysis behaviour and the output properties of the system as required.



Don't switch off the voltage supply during configuration!

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

Password protection

Software access to the VMS is password protected. As supplied the following passwords are defined:

Firmware	User level	Password
V 1.14 or higher	Maintenance personnel	main
	Authorised client	client

Tab. 1: Passwords

Recommendation

After completion of configuration, you should change the default passwords so that the passwords can provide the intended protection.

Save parameters permanently

The data are initially saved in RAM in the VMS so that you can check the effect immediately. On completion of the configuration, you must save the parameters in non-volatile memory, that is in the EEPROM in the VMS410/510.

How to save the parameters in non-volatile memory in the VMS:

- From the VMDX10_XX00 menu, choose the command PARAMETER, SAVE PERMANENT. In this way the parameters are saved in the EEPROM in the VMS and will also be available after the device is switched off and on again.



3.1 Preparing the configuration

To configure 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
- connecting cable between PC and VMS

How to prepare the configuration:

- Ensure that the VMS volume measurement system has been correctly assembled and that the electrical connections are also correct.
- Plan all the necessary adjustments.
- Install the provided SOPAS configuration software from CD-ROM.
- Connect the PC/notebook via the terminal interface to the VMS. The connection of the PC is described in the [chapter "Electrical installation" in the operating instructions](#) for the VMS410/510.

3.2 Camera focus settings

3.2.1 Control of the camera focus function

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 cameras in the system are focused based on this data.

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

How to activate the camera focus function:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page CAMERA FOCUS SETTINGS.
- In the CONTROL area activate the ENABLE CAMERA FOCUS option.

3.2.2 Output with CAN operating mode “Application”

Note The parameters in this area are only relevant if you output the data in the CAN operating mode “Application” (see [3.11.8 “CAN interface” on page 34](#)).

The zero levels for the top camera and the left and right camera in the camera system are defined using the parameters in this area. In addition, the positions of the left and right belt limit are defined. Please see, e.g. the application drawing for these values or the documentation on the camera used.

Camera trigger distance

If an object enters the scan line the focusing data are not output immediately to the camera. This action is only performed when the object has reached a distance after the scan line as defined in SOPAS.

This distance is defined in the CAMERA TRIGGER DISTANCE field. It should not be less than 150 mm (5.91 in).

How to define the output data for the CAN operating mode “Application”:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page CAMERA FOCUS SETTINGS.
- Enter the values for the parameters in the OUTPUT area.

3.2.3 ICR focus settings

Note The parameters in this area are only relevant if you output data in the CAN operating mode “SICK network” (see [3.11.8 “CAN interface” on page 34](#)).

The VMS outputs the focusing data to the camera. These data are not output continuously, instead a dynamic algorithm decides when the data are output.

The VMS detects an object immediately as soon as it enters the scan line. However, at this moment it is still not clear whether the object is relevant, or simply an insect for instance. For this reason the VMS only outputs the focusing data when the point behind the scan line entered in the parameter **OUTPUT POINT FOR FOCUS DATA** is reached (1) and the object is still in the scan line.

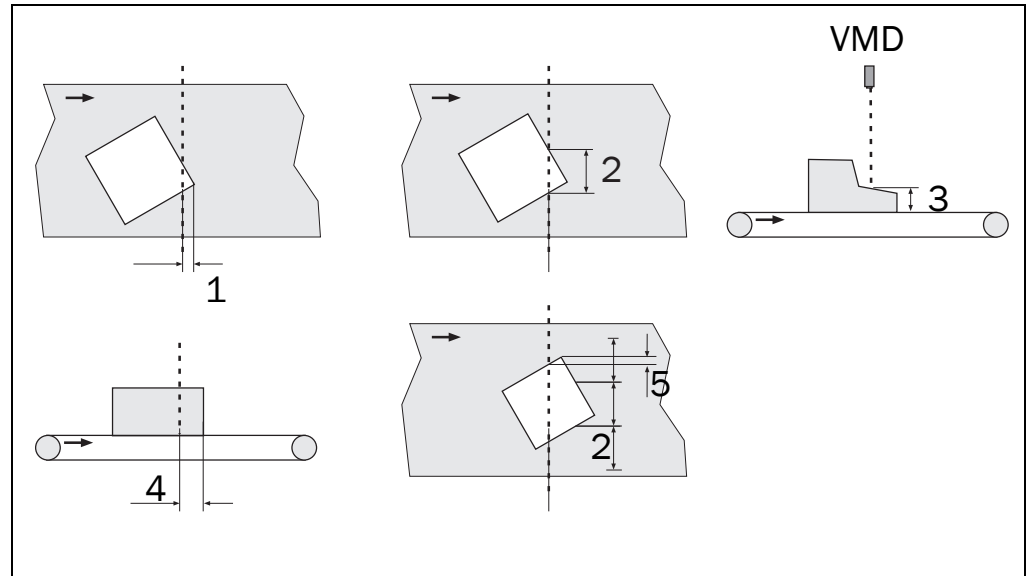


Fig. 1: ICR focus settings

The VMS always outputs further data if ...

- the maximum Y difference is reached (2).
- the maximum Z difference is reached (3).
- the maximum X distance is reached (4).
- the threshold for extreme values is reached (5).

Threshold for extreme values

The example in the illustration at the bottom right shows that with a relatively small object and a relatively large value entered for the Y difference, there is no data output at the corners of the object. The threshold for extreme points ensures that data are output if, at the corner of an object, there is first a rise and then a drop in the values measured (5).

How to define the output data for the CAN operating mode "SICK network":

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page CAMERA FOCUS SETTINGS.
- Enter the values for the parameters in the ICR FOCUS SETTINGS area.



3.3 Position

3.3.1 Coordinates

In the COORDINATES area define the position of the VMD over the conveyor system.

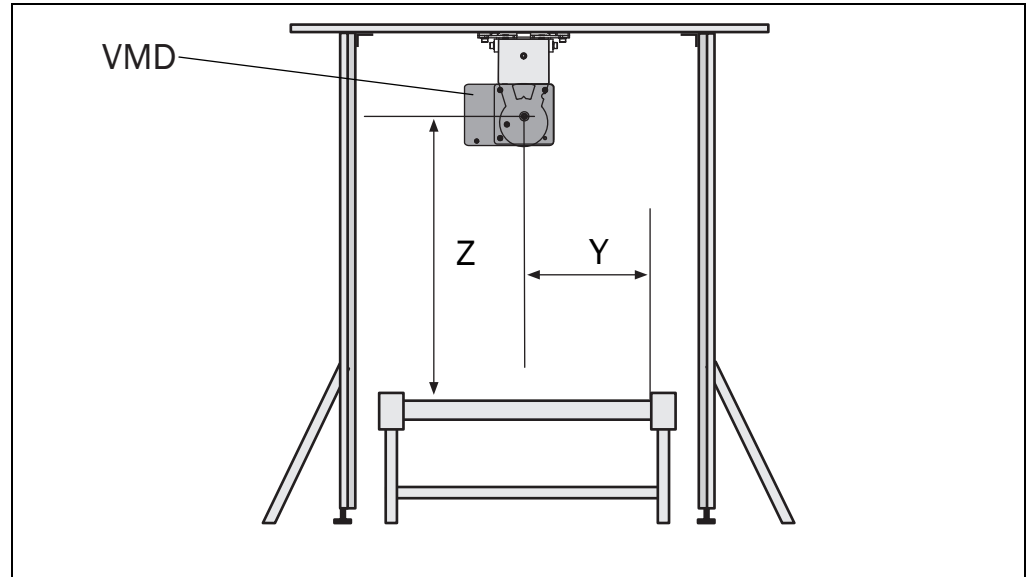


Fig. 2: VMD coordinates above a conveyor system

X coordinate

In the case of a free running measurement, the coordinate defines the position of the scan line in relation to the front edge of the object. As a rule this is 0 mm.

In the case of a triggered measurement or with the camera focus function activated, the coordinate generally defines the position of the trigger photoelectric switch.

Y coordinate

The value for the Y COORDINATE is the distance between the vertically incident beam and the edge of the conveyor system. If you have positioned the VMS exactly over the middle of the conveyor system, then Y is equal to half the width of the conveyor system.

A plumb line positioned in the middle of the sensor is helpful.

Z coordinate

The value for the Z COORDINATE is the same as the distance from the top edge of the transporting surface of the conveyor system to the measurement zero point.

How to define the coordinates:

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page POSITION.
- Enter the related values in the X COORDINATE, Y COORDINATE, Z COORDINATE fields.



3.3.2 Angles

Using the fields on the device page you can define the angles at which the VMD is mounted in relation to the conveyor system.

Alpha

The angle ALPHA between the device and the conveyor system is generally 90° .

Beta

The angle BETA between the device and the conveyor system is generally 0° .

Gamma

You read the angle GAMMA for the device on the VMS mounting kit, generally this angle is 0° .

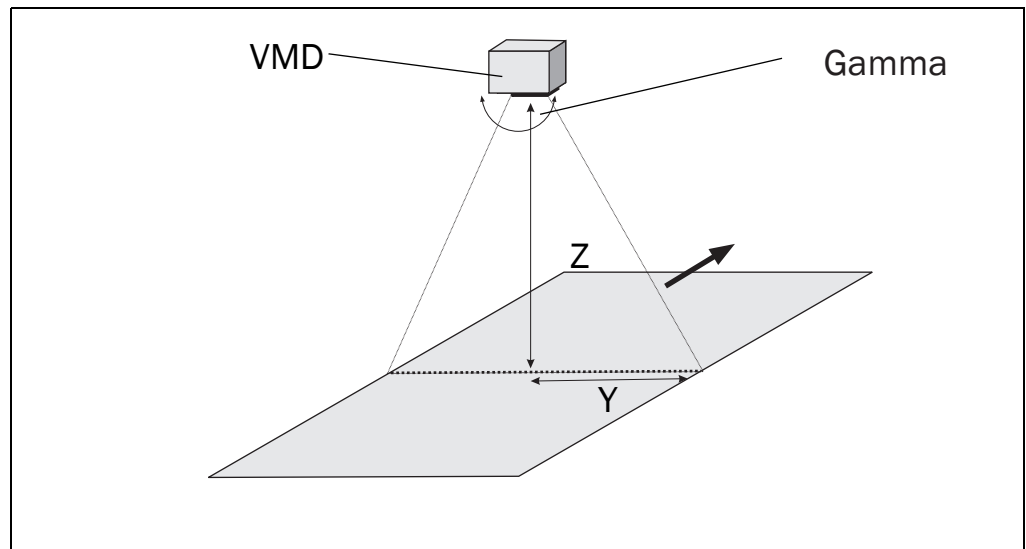


Fig. 3: Gamma angle

3.3.3 Measurement area

Using the measurement area you can limit the area in which the VMS measures objects to the dimensions of the conveyor system. Objects that are outside this area are not measured.

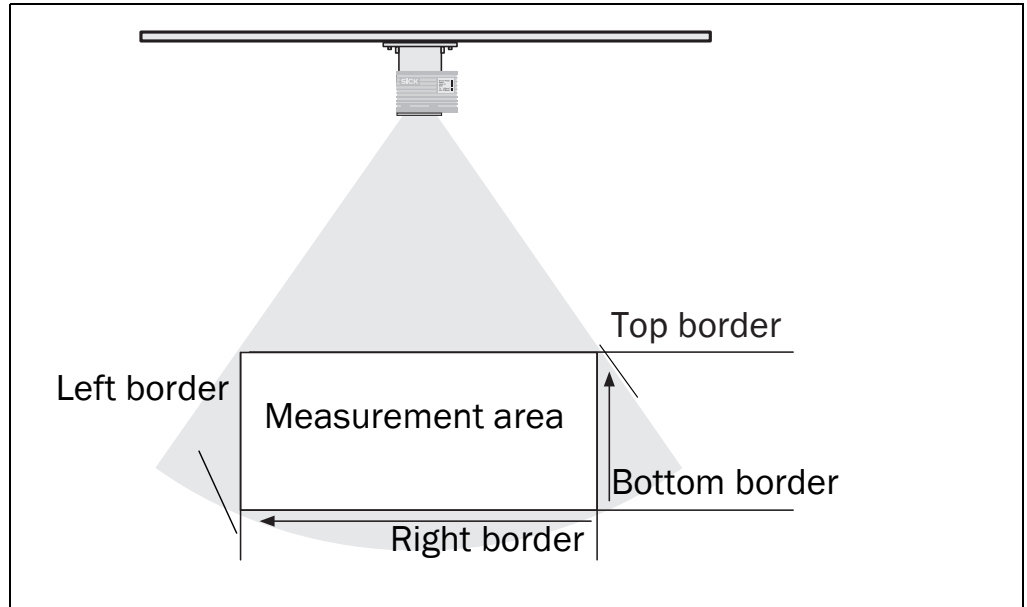


Fig. 4: Measurement area in transporting direction

Bottom border

Using the `BOTTOM BORDER` field you can define the position of the conveyor system less a tolerance of approx. -20 mm (-0.79 in).

Left border

Using the `LEFT BORDER` field you can define the left edge of the conveyor system (seen in the transporting direction). This value is therefore the same as the width of the conveyor system less the necessary tolerance (e.g. for side borders or guides approx. -30 mm (-1.18 in)).

Right border

Using the `RIGHT BORDER` field you can define the right edge of the conveyor system (seen in the transporting direction). This value is therefore 0 plus or minus the necessary tolerance (e.g. for side borders or guides approx. $+30\text{ mm}$ ($+1.18\text{ in}$)).

Top Border

Using the `TOP BORDER` field you can define the maximum height of the objects to be measured plus a tolerance of approx. $+50\text{ mm}$ ($+1.97\text{ in}$).

How to define the measurement area:



- In the PROJECT TREE, `VMDX10_XX00`, PARAMETER, open the device page POSITION.
- In the MEASUREMENT AREA area enter the values for the measurement area borders in the fields.

3.3.4 Measurement area for the RIS values

In RIS MEASUREMENT AREA you can define the measurement area in which the RIS evaluation is performed. (See 3.4.1 “RIS evaluation” on page 17). This measurement area for the RIS values is independent of the measurement area for the volume measurement (see 3.3.3 “Measurement area” on page 13).

Borders at the side or guides are generally made of a different material to the surface of the conveyor system. The reflections from these mostly metal borders or guides can result in imprecise measured values.

Define the measurement area for the RIS values such that only the surface of the conveyor system and the objects on it are measured.

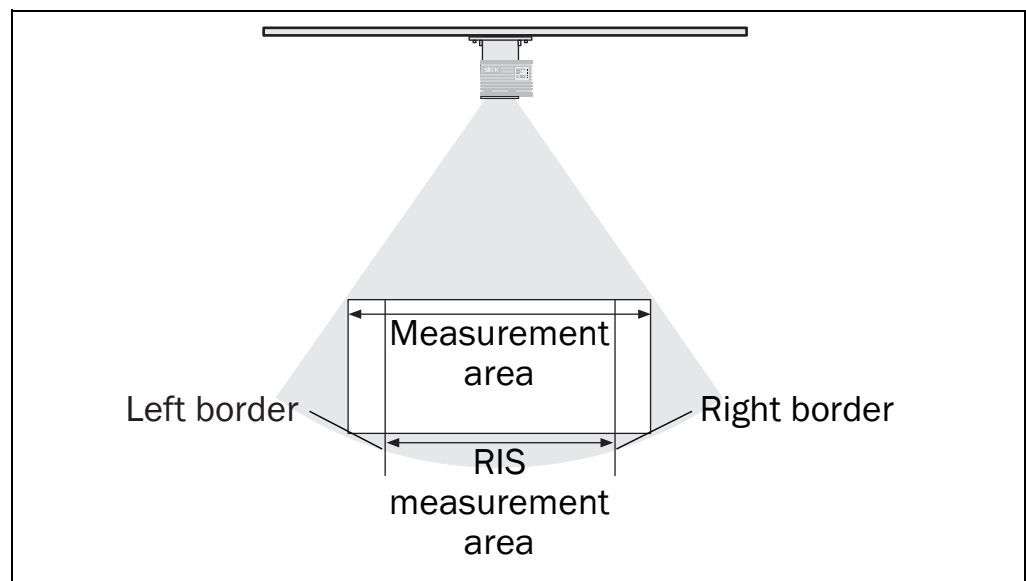


Fig. 5: Measurement area for RIS values in transporting direction

Left border

Using the LEFT BORDER field you can define the left side of the measurement area (seen in the transporting direction).

Right border

Using the RIGHT BORDER field you can define the right side of the measurement area (seen in the transporting direction).

How to define the measurement area for the RIS values:

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page POSITION.
- In the RIS MEASUREMENT AREA area enter the values for the measurement area borders in the fields.



3.4 Algorithm settings

The VMS uses various algorithms to detect objects, to categorise objects as cuboid or not, and to measure their volume. You should only make changes to the settings on this device page if you are very familiar with the VMS and you have discussed the changes with SICK Service.

Interval per scan

The number of scans for an object is limited to 1300 due to the size of the memory in the VMS. At slow conveyor velocities it would then only be possible to measure shorter objects than at faster conveyor velocities.

For this reason the X direction on the conveyor system is divided into intervals. Only one scan per interval is used in the calculation, the remaining scans within this interval are ignored.

Using the INTERVAL PER SCAN field you can define the length of the interval. The longer the interval, the longer the object to be measured can be or the slower the conveyor velocity.

Minimum object length

With the aid of the MINIMUM OBJECT LENGTH field you can define how small the minimum length of an object is allowed to be. Values are not output for objects with a shorter length.

Maximum object gap

If, e.g., an object has a black strap around it, the VMS measures an object gap. To ensure that this gap does not result in the measurement of a second object, define the maximum size of a measured gap within an object using the MAXIMUM OBJECT GAP field.

Object detection (triggering)

In the case of free running triggering (see [3.9.1 "Measurement triggering" on page 25](#)) the VMS independently detects objects on the conveyor system. An algorithm is used to detect the objects.

The VMS detects an object if the average of three measured values is higher than the TRIGGER THRESHOLD FOR MOVING AVERAGE entered.

Before this moving average is formed by the VMS, the system first checks whether the Y distances between the individual measured values are plausible (black surfaces on a conveyor system can, e.g. result in large distances between the measured values). If the distance is not plausible, the measured value is not used for forming the average.

Using the entry in the MAXIMUM Y AXIS DISTANCE FOR MOVING AVERAGE field you can define the maximum distance allowed between two measured points.

Calculation of the object height

The TRIGGER THRESHOLD FOR THE OBJECT HEIGHT CALCULATION field defines the threshold for measurement points that are used for determining the height.

Note Only if very low objects are always to be measured is it sensible to change the default value.

Analysis: cuboid object or irregular object

To analyse whether the object is cuboid or irregular-shaped, tolerance bands are placed around the object in all three dimensions. If values for an object are outside of one of the tolerance bands, the object is categorised as irregular.

In the measured data message output for the object the status is set to **Fault** and the volume of the smallest enclosing cuboid is output.

Using the CUBOID SCAN HEIGHT TOLERANCE BAND, HORIZONTAL TOLERANCE BAND FOR CUBOID OBJECTS and VERTICAL TOLERANCE BAND FOR CUBOID OBJECTS field you can define the size of these tolerance bands.

Displaying invalid VMS results

If an error occurs during the measurement, all measured results (length, volume, etc.) are set to 0. Measured values are then not output in the SOPAS monitor (see [4.1.2 "Measurement results" on page 35](#)), nor in the measured data message output (see [3.11.2 "Message output via the host interface" on page 31](#)), nor on the terminal interface (see [3.11.4 "Message output via the terminal interface" on page 32](#)).

If you activate the DISPLAY INVALID VMS RESULTS option, erroneous measured results are also output.

Calculation of irregular objects

To calculate the volume of an irregular, non-cuboid object, two dedicated parameters are required.

Note The parameters IRREGULAR SPAN HEIGHT THRESHOLD and IRREGULAR HEIGHT AVERAGE TOLERANCE BAND are not relevant for cuboid objects.

Using the IRREGULAR SPAN HEIGHT THRESHOLD field you can define which Z values for an object are included in the volume calculation. All values that are above the trigger threshold are used in the volume calculation, all those below the threshold are discarded.

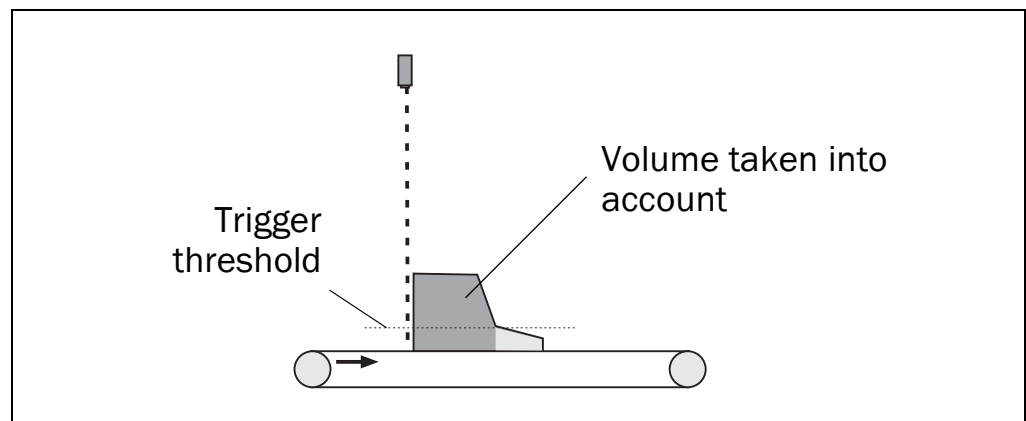


Fig. 6: Irregular span height threshold

First the VMS measures all Z values for an irregular object. The height of the object is then **not** output as the maximum Z value, instead the height is determined from the average of the Z values. You can define which values are used for the averaging in the IRREGULAR HEIGHT AVERAGE TOLERANCE BAND field.

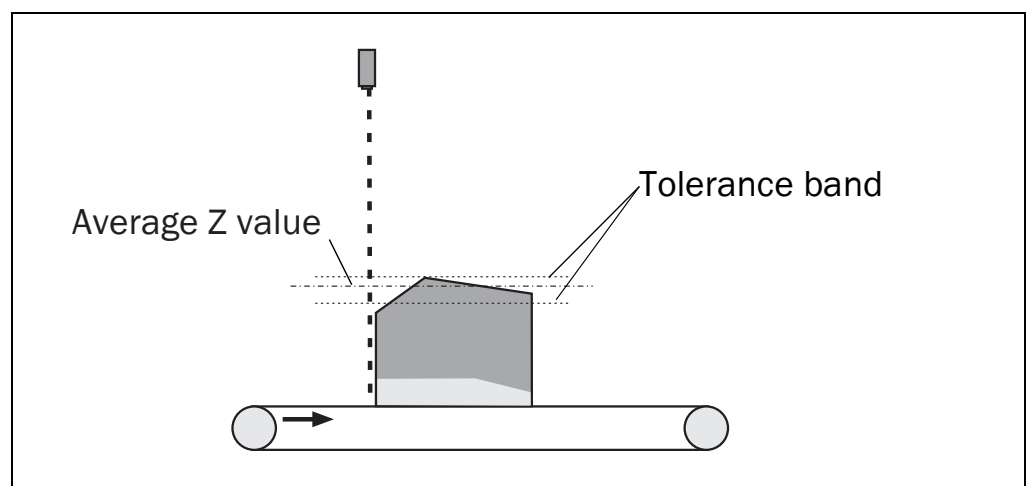


Fig. 7: Irregular height average tolerance band

Note During the averaging the arithmetic mean is determined, not the average value between the top and bottom tolerance band limits.

How to define the algorithm settings:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page ALGORITHM SETTINGS.
- Make the necessary settings there.

3.4.1 RIS evaluation

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. In this way it is possible to more accurately measure flat and irregular objects in particular.

During the evaluation, the delta for the RIS values provided by the transporting surface and the objects transported is evaluated. Depending on the properties and condition of the transporting surface, you may need to adjust the values in the RIS EVALUATION PARAMETER area.

Background evaluation

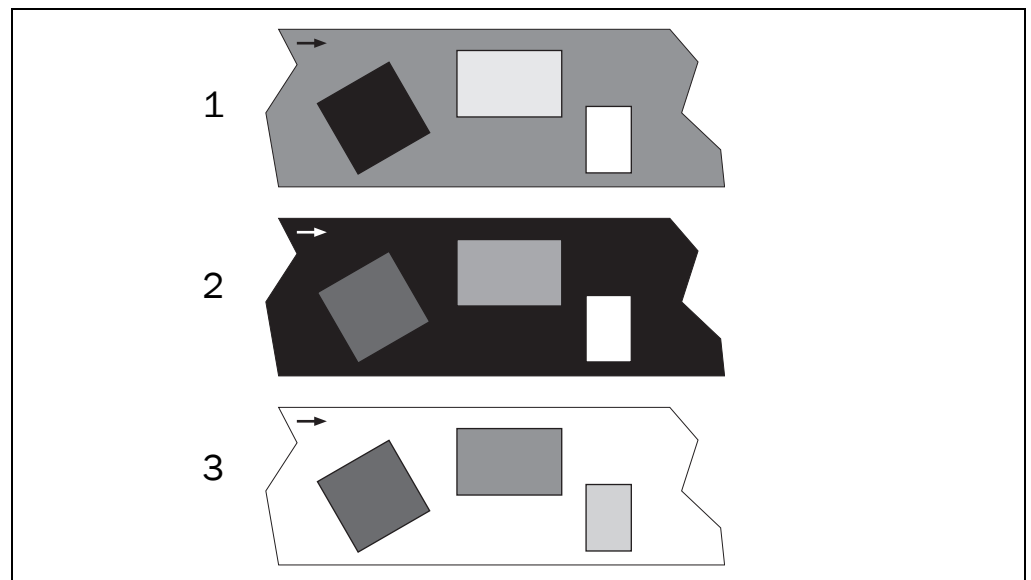


Fig. 8: Background evaluation options

The correct background evaluation is dependent on the colour of the transporting surface and the colour of the objects transported.

- The AUTOMATIC option makes it possible to evaluate objects that are both darker and lighter than the transporting surface (1). Objects that are just as bright or just as dark as the transporting surface are not taken into account.
If, in this example, you select the DARK CONVEYOR option, then the black package would not be detected. If you select the LIGHT CONVEYOR option, then the white package would not be detected.
- The DARK CONVEYOR option makes it possible to evaluate objects that are lighter than the transporting surface (2). Objects that are darker or just as dark as the transporting surface are not taken into account.

- The LIGHT CONVEYOR option makes it possible to evaluate objects that are darker than the transporting surface (3). Objects that are lighter or just as light as the transporting surface are not taken into account.

RIS difference threshold

The RIS DIFFERENCE THRESHOLD function acts as a trigger threshold for the RIS evaluation. Only if the RIS value measured changes by the value entered is the change evaluated as an object.

The value to be entered is dependent on the characteristics and condition of the transporting surface. With homogeneous transporting surfaces, the value can be relatively low, in case of transporting surfaces with marks or that are worn the value must tend to be higher.

Note You can enter a minimum of 0 digits and a maximum of 512 digits. With 0 digits everything is evaluated continuously, including the transporting surface. With 512 digits nothing, not even a white package on a black conveyor.

In general a value range between 20 and 80 digits is appropriate.

Minimum width and length

Using the MINIMUM WIDTH (Y) and MINIMUM LENGTH (X) fields you can define the physical size that an object on the conveyor system must have for its RIS values to be evaluated.

Objects that are smaller than the values entered are not evaluated. In this way you can prevent the evaluation of marks, joints, seams, etc. on the conveyor system.

How to have the RIS values evaluated by the VMS:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, ALGORITHM SETTINGS, open the device page RIS EVALUATION.
- In the RIS EVALUATION PARAMETER area select the ENABLE RIS EVALUATION check box and make the necessary settings.

3.5 Object size

The minimum and maximum object size defines the object sizes for which valid object data are output by the VMS. They act as a filter on the measured results. If the object is smaller or larger than the object size configured, the measurement status in the measured data message is set accordingly. It is therefore output that an object has been measured that does not match the object settings configured.

How to define the object size:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page OBJECT SIZE SETTINGS.
- In the MINIMUM OBJECT SIZE area enter the length, width and height in mm of the smallest object to be measured.
- In the MAXIMUM OBJECT SIZE area enter the length, width and height in mm of the largest object to be measured.

3.6 Data processing

Every measured object in the measured data message has an object index. In the OBJECT INDEX area you can define the index for the first object measured and the final value up to which the index counter is to count.

Note In some applications the object index is not defined by the VMS, but by a modular system controller (MSC). In this case the entry in the OBJECT INDEX area has no effect.

How to define the object index:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page DATA PROCESSING.
- There enter the required values in the START VALUE FOR INDEX and END VALUE FOR INDEX fields.

3.6.1 Output delay

After switching on the VMS automatically enters the measurement mode and indicates this action by outputting the value 201 on the host interface. Objects can then be measured.

This output of the value 201 can, e.g. if necessary for the host, be delayed by up to 1000 seconds.

How to define the output delay:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, open the device page OUTPUT CONTROL.
- In the ENABLE DATA OUTPUT AFTER POWER ON field enter the required delay.

3.6.2 Output timing

Once an object has left the scan line, the VMS calculates its volume and can then output the measured data message.

In the DATA TRANSMISSION POINT area you can define when the measured data message is output:

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

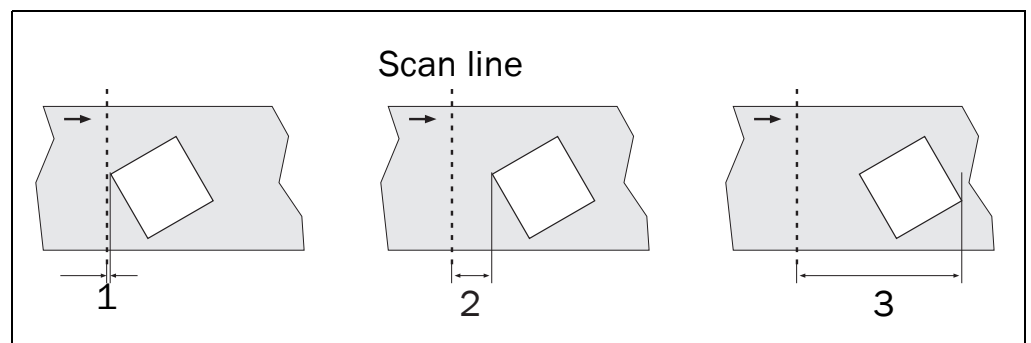


Fig. 9: Output timing diagram

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”.

How to define the output timing:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, open the device page OUTPUT CONTROL.
- Select in the DATA TRANSMISSION POINT area the output timing and enter its reference size.

3.6.3 Output format

In the USER-DEFINED MEASURED DATA MESSAGE area you can define a custom measured data message (see also [“Message output via the host interface” on page 31](#)). You can ...

- enter fixed strings.
- select variables (such as object length or width) using the right mouse button and insert.
- change the attributes of variables by clicking the format label.
- select conditions with the right mouse button and insert them, and defined these conditions.

How to define the output format:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, open the device page OUTPUT FORMAT.
- In the OUTPUT FORMAT area define the format for the measured data message.

3.6.4 Definition of the object length

For the measured objects you can define which edge of the object is used as its length in the measured result and in the measured data message. The following options are available:

- object length = longest object side (1)
The longest edge on an object is defined as the object length.

- object length = length in transporting direction (2)
 The edge of the object that is pointing in the transporting direction is defined as the object length (defined by which edge has the smallest angle to the transporting direction Z).

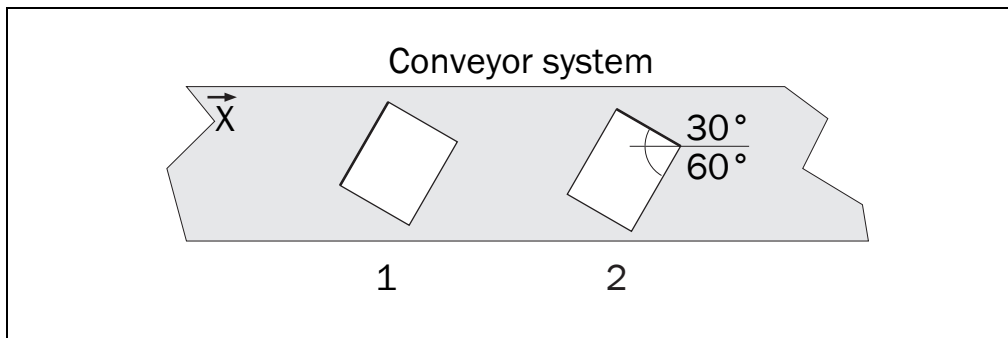


Fig. 10: Definition of the object length

Note If the object is at an angle of exactly 45° on the conveyor system, the longer of the two edges is defined as the length.

How to define the object length:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, open the device page OUTPUT CONTROL.
- Select the required option in the DEFINITION OBJECT LENGTH area.

3.6.5 Unit/rounding

Output unit

The measured data are sent to the host connected using messages (see 3.11.2 “Message output via the host interface” on page 31). In the UNIT field you can define whether the data are to be output as metric values or in inches.

How to define the output unit:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, open the device page UNIT/ROUNDING.
- In the UNIT/ROUNDING area select in the UNIT field whether the data are to be output in metrics units or in inches (imperial).

Rounding for dimension results

The measured results are output to 1 mm or 1/100 inch depending on the settings. However, you can also output rounded to the scale interval for the VMS.

	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. 2: Example for measured results rounded to the scale intervals

You can define in the SCALE INTERVALS FOR CUBOID OBJECTS and SCALE INTERVALS FOR IRREGULAR OBJECTS areas the intervals to which rounding is to be performed (see [3.6.6 "Scale intervals for objects" on page 22](#)).

How to define whether the output values are rounded:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, open the device page UNIT/SCALE INTERVALS.
- If desired, in the UNIT/ROUNDING area activate the ROUNDING FOR DIMENSION RESULTS TO SCALE INTERVALS option.

3.6.6 Scale intervals for objects

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 scale intervals achieved and actually used must be determined during the standardisation of the VMS510 or during the commissioning of the VMS410.



On this subject please read in the operating instructions for the VMS410/510 chapter "[Product description](#)", section "[Scale intervals of the VMS](#)".

In the SCALE INTERVALS FOR CUBOID OBJECTS and SCALE INTERVALS FOR IRREGULAR OBJECTS areas you can enter different scale intervals for three different velocities in the SCALE INTERVAL LENGTH, SCALE INTERVAL WIDTH, SCALE INTERVAL HEIGHT fields. Enter in the fields the scale intervals determined during the standardisation.

Note If you enter the value 0 in one of the MAX. SPEED RANGE fields, the related column is ignored.

Output of the scale intervals

The scale intervals are output using basic measured data message 2 (see [3.11.2 on page 31](#)). In addition, you can configure the user defined measured data message such that the scale intervals are output using the message (see [Fig. 3.6.3 on page 20](#)).

During the volume measurement, the VMS determines the velocity of the object using the encoders connected and outputs (depending on whether the object is cuboid or irregular) the related scale intervals.

If you use the ROUNDING OF DIMENSION RESULTS TO SCALE INTERVALS option, then the length, width and height of an object are rounded to the scale intervals configured and output in the measured data message (see [3.6.5 on page 21](#)).

How to define the dynamic scale intervals:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, DATA PROCESSING, open the device page UNIT/SCALE INTERVALS.
- Enter the scale intervals determined in the SCALE INTERVALS FOR CUBOID OBJECTS and SCALE INTERVALS FOR IRREGULAR OBJECTS fields.

3.7 Basic parameters

To be able to perform measurements with the VMS, the basic parameters must be configured. For this purpose configure the angular resolution and the scan frequency in the scan settings.

3.7.1 Current device parameters

The CURRENT DEVICE PARAMETER area indicates to you the scan frequency and angular resolution set as well as the resulting measured value quality.

Note Values are only displayed if you configure a device online, that is the PC is connected to the device.

Measured value quality

You **cannot** configure the measured value quality directly. The system calculates the measured value quality based on the configured angular resolution and the scan frequency. A larger value corresponds to better measured value quality.

How to display the actual device parameters:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page BASIC PARAMETERS. The CURRENT DEVICE PARAMETER area indicates to you the SCAN FREQUENCY and ANGULAR RESOLUTION actually set and the resulting MEASURED VALUE QUALITY.

Defining the scan frequency

For the VMS you must configure a scan frequency of 270 Hz in SOPAS. Determine the scan frequency using the scan frequency assistant.

- Select the FREQUENCY option and enter a frequency of 270 Hz in the VALUE field. Various configuration options are displayed in the next step. The recommended options (measured value quality ≥ 7) have a green dot in the RECOMMENDED column.
- Select a configuration with at least 0.25° angular resolution. Finer angular resolutions are not allowed to be used, these would result in an "Error during initialisation or self test" (LED indication = red).

Once you have completed the assistant the new parameters will be displayed in the CURRENT DEVICE PARAMETER area.

Note Master and Slave must be configured to the same scan frequency and angular resolution.

How to open the scan frequency assistant:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page BASIC PARAMETERS.
- Click in the CURRENT DEVICE PARAMETER area the SCAN FREQUENCY ASSISTANT button.

3.7.2 Scan settings

Scan area

The scan area of a VMD covers an angle of maximum 70° , the minimum starting angle is 55° (see [Fig. 11](#)). Using the STARTING ANGLE and ANGULAR RANGE fields you can adjust the scan area.

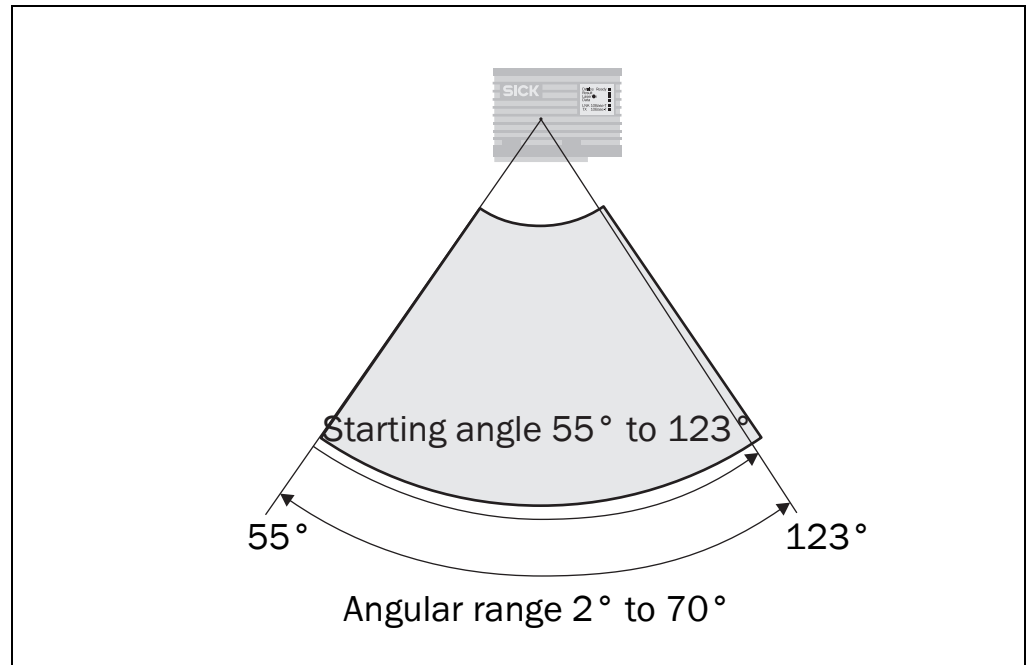


Fig. 11: Scan area of the VMD

How to define the scan area:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page BASIC PARAMETERS.
- In the SCAN SETTINGS area enter a value between 55° und 123° in the STARTING ANGLE field.
- Enter a value between the maximum 70° und minimum 2° in the ANGULAR RANGE field.

Explanation The values that can be entered are dependent on each other. If, for example, 95° are given as the STARTING ANGLE, the ANGULAR RANGE can only be a maximum of 30° . If, for instance you enter 60° as the angular range, the starting angle can be a maximum of 65° .

Invalid entries are displayed in SOPAS with a red border (see [Fig. 12](#)).

The screenshot shows a configuration window titled "Scan area". It contains two input fields: "Start angle" with the value "95.0000 °" and "Angular range" with the value "55.0000 °". Both input fields are enclosed in a red rectangular border, indicating that these values are invalid.

Fig. 12: Errors in the entry of the scan area

3.7.3 Other settings

In the MISCELLANEOUS SETTINGS area you can define a device name for the VMS. The device name will then be displayed on the project tree. Use this field, for example, to make it easier to differentiate between different applications.



How to enter a device name:

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page BASIC PARAMETERS.
- In the MISCELLANEOUS SETTINGS area enter a device name with a maximum of 16 characters in the DEVICE NAME field.
- Press the Return key.

If the PC is connected to the VMS410/510 and the device is switched online, the device name is displayed in the project tree.

3.8 Advanced parameters

Note The advanced parameters are only available in the “Authorised client” user level.

Enable extended RIS detectivity

If you want to measure objects with remission values smaller than the values given in the data sheet for the VMS, you can extend the so-called Remission-Information-System (RIS) in the VMS410/510. In this way the RIS facilitates, e.g., the improved detection of dark bodies with reduced accuracy.

For measured values that are measured using extended RIS detectivity the following applies:

- The distance value may not have the defined measuring accuracy.
- The same measurement point/the same object will not necessarily be detected by another VMS410/510 because the remission value determined is dependent on the factory calibration of the system, outside the specified range the calibration may be subject to minor variations.

With extended RIS detectivity, your application must therefore evaluate, based on additional criteria, whether the distance value is to be used or not.

How to activate extended RIS detectivity:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, BASIC PARAMETERS, open the device page ADVANCED PARAMETERS.
- Activate there the ENABLE EXTENDED RIS DETECTIVITY option.

3.9 Digital inputs/trigger

Using the settings on the device page you can define whether the start and end of the measurement are defined by triggers.

You can select whether the settings for the triggering are to be time or track controlled.

You can define the sources for the triggering and if necessary the logic and debounce for the digital inputs.

You can also define whether the laser in the VMD is switched on by a trigger or remains switched on continuously.

3.9.1 Measurement triggering

The settings define what determines the start and end of the measurement.

- free running
No triggering – the measurement is controlled by the algorithm settings. The object moving into the scan line starts the measurement, the object leaving the scan line stops the measurement. Object start and end are determined based on the algorithms configured (see *“Object detection (triggering)” on page 15*).
- triggered (gate)
The measurement is triggered by an external signal. Object start and end are determined, e.g. by a photoelectric switch on the digital inputs or by a message on the interfaces.

How to define the trigger settings:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page DIGITAL INPUTS/TRIGGER.
- In the TRIGGER SETTINGS area in the OPERATING MODE field select whether the VMS is to perform free running measurements or triggered measurements.

3.9.2 Common settings

In the COMMON SETTINGS area you can select whether the remaining settings for the triggering are to be time or track controlled.

- In the case of time-dependent control, enter the debounce, delay, etc. in ms.
- In the case of track-dependent control, enter the debounce, delay, etc. in mm.

Note The debounce, delay, etc. are determined for track controlled triggering using the actual distance determined by the encoder. Velocity fluctuations in the conveyor system are then irrelevant.

How to define the common settings:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page DIGITAL INPUTS/TRIGGER.
- In the COMMON SETTINGS area select whether the measurement is to be triggered time or track controlled.

3.9.3 Digital inputs

The digital inputs 1 and 3 (IN1 and IN3) are used for triggering the VMS410/510, for example using external switches or sensors.



You will find the pin assignment for the inputs in the operating instructions for the VMS410/510 in the chapter *“Electrical installation”*.

To bridge bounce times on external switches, you can configure an input delay for the inputs. For both inputs you can also select whether they are to be active high or active low.

Note Depending on whether the measurement is triggered time or track controlled (see [3.9.2 “Common settings” on page 26](#)), you must enter the debounce for the inputs in ms or mm.



How to configure the settings for the digital inputs 1 and 3:

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page DIGITAL INPUTS/TRIGGER.
- In the LOGIC selection field select whether the related input is to be ACTIVE HIGH or ACTIVE LOW.
- In the DIGITAL INPUT SETTINGS area in the DEBOUNCING IN1 or DEBOUNCING IN3 field enter the path for the conveyor system in mm that is necessary to debounce the switches or sensors connected.

Or

- In the DIGITAL INPUT SETTINGS area in the DEBOUNCING IN1 or DEBOUNCING IN3 field enter the input delay in ms that is necessary to debounce the switches or sensors connected.

3.9.4 Gate

In the case of a triggered measurement, the measurement is started or stopped by an external trigger signal. It does not matter whether an object enters or leaves the scan line. Between the trigger start and the trigger stop, there is also no differentiation between multiple objects, instead just one measurement is performed.

The VMS can process either hardware triggers, software triggers or a test trigger.

- The digital inputs of the VMS serve as hardware triggers.
- A software trigger triggers the output of a measured value using a message.
- The test trigger is generated internally in the device. In this way test measurements can even be performed with the conveyor system stationary (see [3.9.6 “Advanced I/O settings” on page 29](#)).

The trigger sources can stop or start the measurement immediately, or trigger a delayed measurement start and/or stop.

In addition, you can extend the gate produced by the triggering with a so-called expansion distance.

Note Depending on whether the measurement is triggered time or track controlled (see [3.9.2 “Common settings” on page 26](#)), you can enter the delay and expansion as a distance or as a time.

Example:

A photoelectric switch is mounted 1000 mm (39.37 in) in front of the scan line. It initialises the start of the measurement on the entry of the object into the photoelectric switch. You initialise the measurement when the object leaves the light barrier.

1000 mm (39.37 in) are entered as the distance delay. In this way the measurement is actually only started when the object reaches the scan line, and only stops when it leaves the scan line.

If an expansion distance of 50 mm (1.97 in) is now entered, the measurement starts 50 mm (1.97 in) **before** the object reaches the scan line and stops 50 mm (1.97 in) **after** it leaves the scan line.

You can start and stop the measurement using one trigger source or you can use one source to start and a second to stop.

How to configure the trigger settings:

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page DIGITAL INPUTS/TRIGGER.
- In the GATE SETTINGS area in the START TRIGGER SOURCE and STOP TRIGGER SOURCE selection field select the source for the triggering.

3.9.5 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.



On this subject please read in the operating instructions for the VMS410/510 chapter "[Product description](#)", section "[Measuring modes](#)".

- controlled by the gate
The laser is controlled by the start and stop trigger source configured in the Gate settings area (see [3.9.4 "Gate" on page 27](#)).
- depending on source
The laser is controlled by the source configured in the SOURCE selection field. The control is independent of the settings made in the GATE SETTINGS area.

Switching off the laser with independent laser control

As soon as the VMS has calculated, based on encoder pulses (see [3.10.2 "Conveyor system velocity" on page 29](#)) that a certain distance (the laser off distance) has been reached, it switches off the laser. In addition, a laser timeout ensures that after a certain amount of time, the laser is switched off in all circumstances.

If, between switching on and off the laser, the start trigger is set again (for instance by a new object passing a photoelectric switch), the distance calculation and the laser timeout counter are set to zero and re-started. The laser therefore **remains switched on**.

How to configure the laser control:

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page DIGITAL INPUTS/TRIGGER, area LASER CONTROL.
- In the LASER CONTROL area select the GATE CONTROLLED or DEPENDING ON SOURCE... option.
- In the case of independent laser control, in the SOURCE selection field select the DIGITAL INPUT IN1 or DIGITAL INPUT IN3 option if the laser is to be triggered by switches or sensors that are connected to inputs. Select the SOFTWARE TRIGGER option if the laser is to be triggered using a message over one the interfaces.
- In the LASER TIMEOUT field enter the time in minutes after which the laser is to be switched off.
- In the LASER OFF DISTANCE field enter the distance after which the laser is to be switched off.

Note

The VMS can count a maximum of 30000 encoder pulses from the time the trigger is activated until the lasers are switched off. With the encoder resolution of 0.2 mm/inc (0.008 in/inc) of the recommended encoder this results in $30000 \times 0.2 \text{ mm}$ (0.008 in) = 6000 mm (236.22 in).

3.9.6 Advanced I/O settings

In the TEST TRIGGER SETTINGS area you can configure the pulse length and the pause length for the test trigger.

Here ...

- the pulse length defines the length between the start of triggering and the stop of triggering.
- the pause length defines the pause between triggers.

Using the test trigger you can trigger the gate and the laser control to perform the test measurements.

How to configure the test trigger settings:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, DIGITAL INPUTS/TRIGGER, open the device page ADVANCED I/O SETTINGS.
- Enter the required values in the PULSE LENGTH and PAUSE LENGTH fields.

3.10 Encoder and synchronisation

3.10.1 Master/slave synchronisation

The VMD410/510 must always be operated with the NoSync option.

How to configure the devices as a master or slave:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page INCREMENT CONFIG./SYNC.
- In the SYNCHRONISATION MASTER/SLAVE area in the TYPE selection field select the NoSync option.

3.10.2 Conveyor system velocity

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

How to configure the velocity evaluation:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page INCREMENT CONFIG./SYNC.
- In the INCREMENT SETTINGS area in the selection field INCREMENT SOURCE select between:
 - DISABLE
 - CONSTANT VELOCITY
 - ENCODER AT IN2
 - ENCODER ON IN2, IN4 (DIRECTION VIA LEVEL)
 - ENCODER ON IN2, IN4 (DIRECTION VIA PHASE)
- If you have selected an encoder as an increment source, enter the resolution of the encoder in mm/increment in the ENCODER RESOLUTION field.
- If you have selected CONSTANT VELOCITY, enter the constant velocity in m/s in the CONSTANT VELOCITY field.

3.10.3 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 [3.11.7 “CAN protocol for SICK network” on page 34](#)).

- Using an **Divisor** the resolution of the encoder is reduced and in this way the system increment resolution defined.
Example: If the divisor is 5, an encoder resolution of 0.2 mm/inc (0.008 in/inc) will be converted to the system increment resolution of 1 mm/inc (0.04 in/inc). The system increment is therefore increased by 1 every mm (0.04 in) and not every 0.2 mm (0.008 in).
- The output interval for the system increment is also defined using a **System increment output divisor**.
Example: If the divisor is 10, the system increment is output every 10 increments (10, 20, 30 etc.). In the case of a system increment resolution of 1 mm/inc (0.04 in/inc), that is every 10 mm (0.39 in).

How to configure the system increment:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, open the device page INCREMENT CONFIG./SYNC.
- In the DIVISOR and SYSTEM INCREMENT OUTPUT DIVISOR fields enter the parameters necessary for the devices connected.
- The calculated output values are displayed in the SYSTEM INCREMENT RESOLUTION and OUTPUT INTERVAL read-only fields.

3.11 Interfaces

The VMS has various interfaces.

- 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.

3.11.1 Host protocol for camera focus

In addition to the output data over the CAN interface (see [“CAN protocol for camera focus” on page 33](#) and [“CAN protocol for SICK network” on page 34](#)) the two messages (trigger start message and trigger stop message) can be output to the camera system. These are transferred over the host interface.

You can activate the two messages in the HOST PROTOCOL/CAMERA FOCUS area.

Note If you do not use the camera focus function, you must deactivate the message output.



How to activate the messages for the camera focus function:

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, open the device page HOST.
- In the HOST PROTOCOL/CAMERA FOCUS area activate the related messages.

3.11.2 Message output via the host interface

Measured data output via messages

The measured data are sent to the host connected using messages. Various measured data messages are available for this purpose. Depending on the message selected, different data are output (see also [3.6.5 "Unit/rounding" on page 21](#)).



On this subject please read in the operating instructions for the VMS410/510 chapter "Annex", section "[Measured data message reference](#)".

Note For the VMS510 select the BASIC MEASURED DATA MESSAGE 2 for the output of the measured data. The scale intervals are also sent in this message (see [3.11.4 on page 32](#)). Or configure the user defined measured data message such that the scale intervals are given using this message (see [3.6.3 on page 20](#)).

How to configure the output of messages over the host interface:



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, open the device page HOST.
- Select which message is to be output to the interface used in the OUTPUT VIA HOST INTERFACE area in the MEASURED DATA MESSAGE field.

Object start and object end



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, open the device page HOST.
- In the MEASURED DATA MESSAGE field select which message is to be output on the interface used.

In the case of free running measurement (see [3.9.1 "Measurement triggering" on page 25](#)), the VMS can output a message as soon as an object enters the scan line or/and as soon as an object leaves the scan line.



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, open the device page HOST.
- Activate the ENABLE OBJECT START MESSAGE or ENABLE OBJECT END MESSAGE option to output the related message.

Heartbeat message

The heartbeat message enables the connected application to cyclically check the device status even if it is idle. The message is then always output if there is no object measured and as a result no object start, object end or measured data message can be output.



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, open the device page HOST.
- Activate the ENABLE HEARTBEAT MESSAGE option so that the VMS generates the related message
- In the HEARTBEAT INTERVAL field enter the length of the interval in seconds.

3.11.3 Host interface

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

With the aid of the fields and selection fields on the device page define the parameters for the host interface so that they match the interface in the application connected.

How to configure the host interface:

Note The parameters for the host interface can only be configured using SOPAS if the PC is connected via the terminal interface or the Ethernet interface. If the PC is connected using the host interface, the parameters described below are hidden.



- In the PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, open the device page HOST.
- In the SERIAL HOST INTERFACE area select in the BAUD RATE selection field a baud rate between 1200 and 115200 BAUD.
- With the aid of the STOP BITS selection field define whether the interface uses one or two stop bits.
- With the aid of the DATA/PARITY BITS selection field define the relationship between data and parity bits.
- In the HARDWARE selection field (depending on the hardware used) select RS-232 or RS-422/RS-485.
- In the BLOCK CHECK BYTE selection field define whether the block check byte is sent and if yes, whether it is sent before or after the stop character.
- Define the start and stop characters for sending and receiving messages over the host interface. In this way, for example, you can use two stop bytes (e.g. to end messages with CR/LF).
For this purpose click the CHANGE button and select the character in the window that opens.

Note If only one stop character is to be used, then set the second character to ZERO.

3.11.4 Message output via the terminal interface

Note The terminal interface is primarily intended to be used to provide a safe data connection for setting parameters, for this reason the interface parameters for the terminal interface **cannot** be changed.

In parallel to the output of measured data over the host interface, the VMS can also output data over the terminal interface. This feature is used to connect a so-called Remote Diagnostic Tool (RDT) with which the SICK devices can be monitored and diagnostics performed.

For the VMS it is necessary to configure a unique RDT number so that the RDT recognises the VMS. In addition, the VMS can send a heartbeat message. In this way the RDT can cyclically check the device status even when it is idle (when no objects are being measured).



How to configure the output of messages over the terminal interface:

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, open the device page TERMINAL INTERFACE.
- In the OUTPUT VIA TERMINAL INTERFACE area activate the ENABLE RDT OUTPUT option.
- In the RDT DEVICE NUMBER field enter a unique device number for the VMS.
- Activate the ENABLE HEARTBEAT MESSAGE option so that the VMS generates the related message.

3.11.5 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
- TCP/IP PORT: 2111
- SUBNET MASK: 255.255.255.0

Recommendation

To check the availability of the VMS, at the command prompt on the PC enter ping *IP address*, e.g. ping 192.168.0.1.



How to configure the Ethernet interface:

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, open the device page ETHERNET.
- In the ETHERNET area enter an IP address for the VMS410/510 in the IP ADDRESS field.
- If you access the VMS410/510 via a gateway in your network, in the DEFAULT GATEWAY field enter the gateway's IP address. Otherwise leave the default numbers 0.0.0.0.
- In the SUBNET MASK field enter the number for the network segment to which the application connected belongs.
In the MAC ADDRESS field the Media Access Control address for the VMS410/510 is displayed.
- In the TCP/IP PORT enter the port over which the application connected communicates.
- In the CoLA PROTOCOL selection field select whether the data communication is in binary or in ASCII.

Note Changes to the Ethernet interface parameters will only be effective after the VMD is re-started. The CoLa protocol cannot be changed using the Ethernet interface.

3.11.6 CAN protocol for camera focus

In the CAN operating mode "Application" the VMS must send a heartbeat message to the camera system.

In the CAN PROTOCOL/CAMERA FOCUS area you can define how often this message is sent.

Note In addition to the output of data over the CAN interface, data are also output over the host interface (see "[Host protocol for camera focus](#)" on page 30).

How to configure the CAN protocol for camera focus:

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, open the device page CAN.
- In the CAN PROTOCOL/CAMERA FOCUS area enter the necessary value.

3.11.7 CAN protocol for SICK network

In the CAN PROTOCOL/SICK NETWORK area you can define which data are transferred in the message (see [3.11.8 “CAN interface” on page 34](#)).

You can define the following output data:

- system increment (see [3.10.3 “System increment” on page 30](#))
- VMS result (see [4.1.2 “Measurement results” on page 35](#))
- object polygon
The object polygon is output to the modular system controller (MSC) to make it possible for the controller to allocate the measured object to a bar-code detected.

How to configure the CAN protocol for the SICK network:

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, open the device page CAN.
- In the CAN PROTOCOL/SICK NETWORK area activate the required options.

3.11.8 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 2 to 63 to each device on the CAN bus.

How to configure the CAN interface:

- In the PROJECT TREE, VMDX10_XX00, PARAMETER, INTERFACES, open the device page CAN.
- In the CAN area in the OPERATING MODE and Baud rate fields enter the valid values for the CAN bus.
- In the DEVICE NUMBER field enter a valid device number from 2 to 63.

4 Monitor

In the SOPAS monitor the measured results from the VMS are displayed in various forms. Use these displays to observe the measurement during operation or during testing.

4.1 Display of the measurement results

On the device page VIEW VMS RESULTS you will find the two areas VMS APPLICATION and VMS RESULTS.

You must start the VMS APPLICATION to be able to display results in the VMD RESULT LIST.

4.1.1 Start or stop VMS application

In the VMS application area you can start and stop the VMS measurement.

You can use the test trigger for testing if the conveyor system is stationary (see [3.9.4 "Gate" on page 27](#)).

How to start and stop the output of measured values:



- In the PROJECT TREE, VMDX10_XX00, MONITOR, open the device page VIEW VMS RESULTS.
- In the VMS APPLICATION area, click the START button.
The measured values are displayed in the VMS RESULTS area and output on the selected interface.
- Click the STOP button.
No more measured values are displayed in the VMS RESULTS area and no more measured values are output on the selected interface.

4.1.2 Measurement results

With the VMS application started (see [4.1.1 "Start or stop VMS application" on page 35](#)) the VMS measured values are displayed in the VMS RESULT area as they are output in the measured data message.



- In the PROJECT TREE, VMDX10_XX00, MONITOR, open the device page VIEW VMS RESULTS.
- In the VMS RESULTS area the following individual measured values are displayed:

- LENGTH
longest side of the smallest enclosing cuboid in mm
- WIDTH
width of the smallest enclosing cuboid in mm
- HEIGHT
height of the smallest enclosing cuboid in mm
- ANGLE
rotation angle of the object to the Y direction (transporting direction)
- NUMBER OF SCANS
number of scans that the VMS requires to determine the measured result
- CONVEYOR VELOCITY
the conveyor velocity determined by the VMS with the aid of the encoder connected
- INDEX
measured values counter

- BOX VOLUME
box volume of the smallest enclosing cuboid in cubic centimetres
- REAL VOLUME
real volume in cubic centimetres
- STATUS
object status (0 = OK)
- STATUS 2
object status (0 = OK)

Note The measured values are displayed independent of the rounding configured, unit selected (see [3.6.5 “Unit/rounding” on page 21](#)) and measured data message selected (see [3.11.2 “Message output via the host interface” on page 31](#)).

4.2 Display of the results list

On the device page VIEW VMS RESULT LIST you will find the two areas VMS APPLICATION and VMD RESULT LIST.

You must start the VMS APPLICATION to be able to display results in the VMD RESULT LIST.

4.2.1 Start or stop VMS application

In the VMS application area you can start and stop the VMS measurement.

You can use the test trigger for testing if the conveyor system is stationary (see [3.9.4 “Gate” on page 27](#)).

How to start and stop the output of measured values:



- In the PROJECT TREE, VMDX10_XX00, MONITOR, open the device page VIEW VMS RESULTS.
- In the VMS APPLICATION area, click the START button.
The measured values are displayed in the VMS RESULT LIST area and output on the interface.
- Click the STOP button.
No more measured values are displayed in the VMS RESULT LIST area and no more measured values are output on the interface.

4.2.2 VMS results list

If the VMS application is started (see [4.2.1 “Start or stop VMS application” on page 36](#)), the last ten measured results from the VMD are displayed in a table in the VMS RESULT LIST area. When an eleventh measured result appears, the oldest measured result is deleted from the table and so on.

Note The measured results in the results list are not saved in the VMD.

How to display the results list:



- In the PROJECT TREE, VMDX10_XX00, MONITOR, open the device page VIEW VMS RESULT LIST.
- In the VMS RESULT LIST area the following individual measured values are displayed.

4.3 Noise statistics

Depending on wear, surface finish, etc., the transporting surface will generate noise in the measurement on crossing the scan line. To determine the trigger threshold for the object detection (see [“Object detection \(triggering\)” on page 15](#)) it is helpful to measure the amount of noise.

The noise statistics makes it possible to scan parts of the transporting surface or the entire transporting surface and to record the noise.

On the device page NOISE STATISTIC you have the following options:

- Using the DISPLAY SCAN button you can display the scan line in the diagram.
- Using START you can start the recording and with STOP you can stop the recording.
- Using the IN, OUT, AUTO and ORIGIN buttons you can change the diagram view.

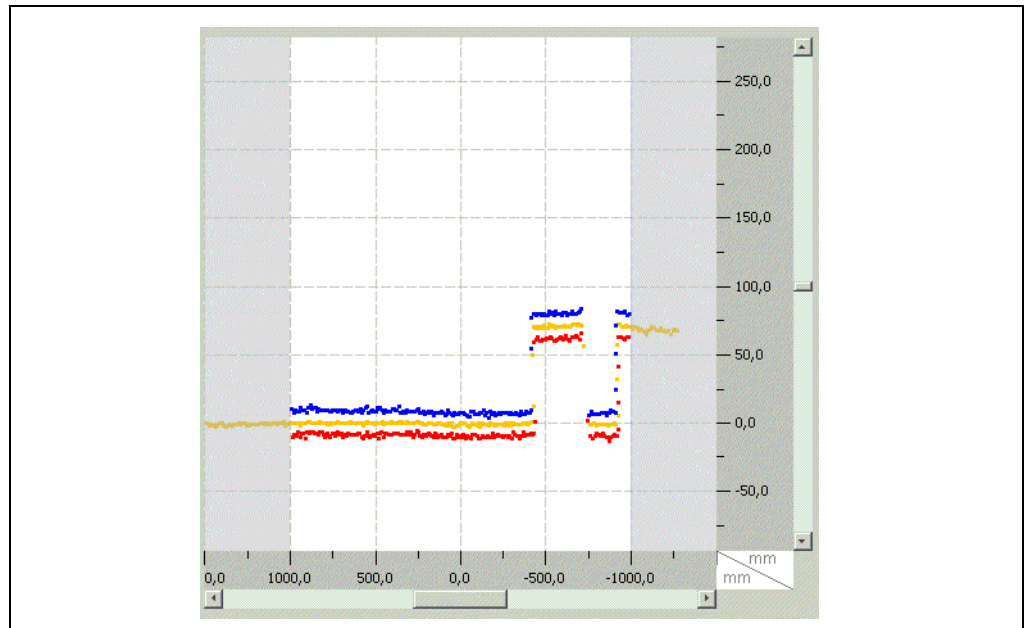


Fig. 13: Noise statistics

The values recorded are displayed in the form of colour scan dots. Blue dots represent minimum values, red dots the maximum values and yellow dots the average values.

Note The distance values always refer to the position of the scanner.

How to open the noise statistics:



- In the PROJECT TREE, VMDX10_XX00, MONITOR, open the device page VIEW NOISE STATISTICS.
- Click the DISPLAY SCAN button.
The scan line of the VMS is displayed.

4.4 Scan view

Use the graphic scan view in SOPAS to verify the measured values generated and to verify the measurement area online.

- Notes**
- The scan view in the Monitor is dependent on the available computing power of the connected PC and is **not** output in real-time. For this reason not all measured values are displayed. The same limitation also applies when saving measured values displayed in a file.

- The monitor displays the measured values **unfiltered**, i.e. the action of filters can **not** be checked with the aid of the monitor.

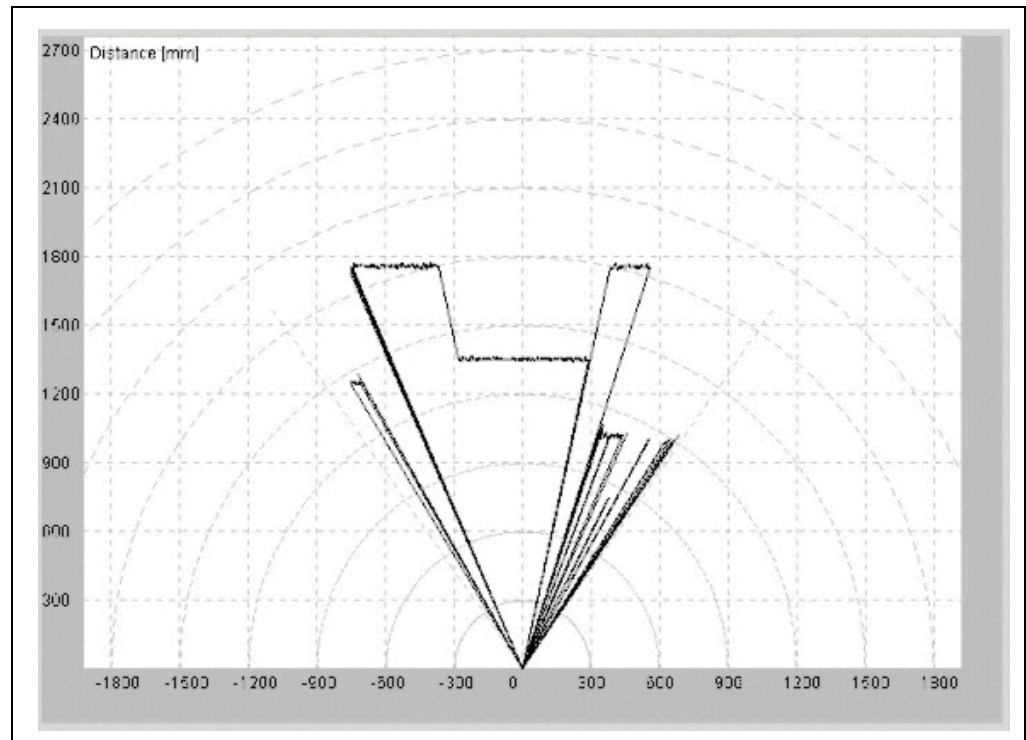


Fig. 14: Scan view in the monitor

In the scan view you have the following additional options:

- You can display distance values, RIS values or distance and RIS values.
- You can change the diagram display.
- You can save the scan data to a file.

How to display the measured values:



- In the PROJECT TREE, VMDX10_XX00, MONITOR, open the device page SCAN VIEW.
- Click the START button.
The scan line of the VMS is displayed.

How to zoom in or zoom out the display:

- Click the ZOOM+ button.
The scan view is increased in size, the values on the diagram axes become smaller.
- Click the ZOOM- button.
The scan view is reduced in size, the values on the diagram axes increase.

How to display distance, RIS values or both values:

- Select the DISTANCE option.
The distance data are displayed as a red line/dots.
- Select the RIS VALUES option.
The RIS data are displayed as a blue line/dots.
- Select the DISTANCE AND RIS VALUES option.
The distance data are displayed as a red line/dots, the RIS data as a blue line/dots.

How to display the curves as lines or dots:

- Select the LINE option.
The distance and RIS values are displayed as a continuous line.
- Select the POINTS option.
The distance and RIS data are displayed as individual dots.

How to save the scan data:

- Select the SAVE SCAN DATA option.
- In the field underneath enter a path and file name or select these using the button beside the field.

4.5 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.

Note The object data can only be displayed once the object has left the scan line; only then is the calculation of the size of the object complete. For this reason the flow of objects on the conveyor system is displayed with a slight delay.

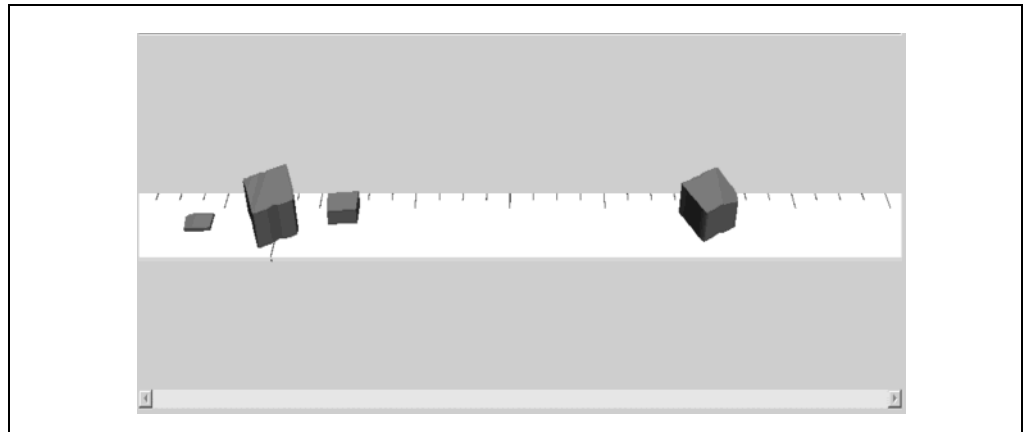


Fig. 15: 3D object view

In the 3D object view you have the following additional options:

- You can record the object flow and save it in a file.
- You can play back recordings saved and slow down or speed up the play back.
- You can zoom in or zoom out the display and adjust the viewing angle.
- Using the OPTIONS button you can open a dialog box in which you can set the representation of the objects, the conveyor system and the background as required.

The measured data for the object are displayed in a table underneath the view. You can hide or show the columns displayed in the 3D object view options. Using the OPTIONS button you can view detailed coordinates for each object.

How to display objects in the 3D object view:

- In the PROJECT TREE, VMDX10_XX00, MONITOR, open the device page 3D OBJECT VIEW.
- Click the CONNECT button at the top left in the 3D OBJECT VIEW area.
The measured objects are being displayed.



**How to change the 3D object view:**

- In the PROJECT TREE, VMDX10_XX00, MONITOR, open the device page 3D OBJECT VIEW.
- Click the OPTIONS button.
The Options dialog opens where you can setup to the view to suit your needs.

5 Service



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.

5.1 Version information

In the VERSION INFO field when the device is switched online you will find the SERIAL NUMBER, SOPAS DEVICE IDENT NAME and SOPAS DEVICE IDENT VERSION for the VMS. In addition here you can see additional information on so-called VMS sub-systems. Keep this information at hand if, for example, you have questions for SICK support.

How to display the version information:



- In the PROJECT TREE, VMDX10_XX00, SERVICE, open the device page SYSTEM STATUS.
In the VERSION INFO area when the device is switched online you will see information on the VMS.

5.2 Operating data

How to display the operating data:



- In the PROJECT TREE, VMDX10_XX00, SERVICE, open the device page SYSTEM STATUS.
In the OPERATING DATA area in the POWER ON COUNTER read-only field the number of times the device has been switched on since initial commissioning is displayed.
In the OPERATING HOURS SINCE POWER ON field the number of operating hours the device has been running since the last power on is displayed.
- In the OPERATING HOURS field the total number of operating hours since the initial commissioning of the device is displayed.

5.3 System status

The VMS410/510 saves events internally in a log file.

- Notes**
- The SYSTEM STATUS log is retained also after the device is switched off and on again.
 - The VMS410/510 differentiates between four error types: “Information”, “Warning”, “Error” and “Serious error”. For each error type, the system saves only the last five occurrences.

How to display the system status:



- In the PROJECT TREE, VMDX10_XX00, SERVICE, open the device page SYSTEM STATUS.
In the SYSTEM STATUS area you will find “Information”, “Warning”, “Error” And “Serious error” displayed in the form of a table.

6 Glossary

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

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 VMD400, 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, among other 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.

Master/slave configuration

Special arrangement and connection of two VMD volume measurement devices.

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. Netscape Navigator 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. Can be used with various functions.

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.

7 Index

Numerics

3D object view 39

A

Alpha 12

Angles of the VMD 12

Angular range 24

ASCII 33

Authorised client 8

B

Background evaluation 17

Basic parameters 22, 32

Baud rate of the CAN interface 34

Baud rate of the host interface 32

Beta 12

Binary 33

C

Camera focus 9

Camera trigger distance 9

CAN bus output of a system increment 30

CAN interface 34

CAN operating mode 9

CoLa protocol 33

Common settings for the triggering 26

Connection layout for the inputs 26

Conveyor system velocity 29

D

Data output after power on	19
Debounce	26
Delay on the output of measured data	19
Device ident name.....	41
Device name	24
Device number.....	34
Device parameters	23
Digital inputs	26
Display of the results list.....	36
Display of the VMS result.....	35
Displaying measured values graphically.....	37
Dividing the resolution of the encoder.....	30
Dynamic scale intervals	22

E

Encoder	29
Error.....	41
Ethernet.....	33
Expansion distance	27

G

Gamma.....	12
Gate	27

H

Hardware trigger	27
Heartbeat message.....	31, 33
Heartbeat message for camera focus	33
Host interface	31, 32
Host protocol for camera focus	30

I

Imperial	31
Inch.....	31
Increment.....	29
Information	41
Input logic.....	26
Inputs	26
Interface – Ethernet.....	33
Interface – Host.....	32
Interface – RS-232/422/485.....	32
Interfaces of the LMS	30
IP address	33

L	
Laser control.....	28
Laser off distance	28
Laser timeout	28
M	
Master.....	29
Measured data message, user defined.....	20
Measured data messages	31
Measured value quality	23
Measurement area for RIS values	14
Metric.....	31
N	
Noise statistics	37
O	
Object length, definition	20
Object polygon, output via CAN.....	34
Object size	18
Object start and object end	31
Object view	39
Operating data	41
Operating hours.....	41
Operating mode 'SICK network'	34
Operating mode of the CAN interface.....	34
Output control	19
Output delay	19
Output interval for the system increment	30
Output timing.....	19
Output unit.....	21
P	
Password protection	8

R

Remote Diagnostic Tool	32
RIS detection, advanced	25
RIS difference threshold	18
RIS evaluation.....	17
RIS measurement area	14
RIS values for the objects	17
Rounding for dimension results	21
RS-422/485	32
RS-232	32

S

Save scan data	39
Scale intervals	22
Scan area	24
Scan data, save	39
Scan frequency.....	23
Scan frequency assistant.....	23
Scan view	37
Serial interface	32
Serial number for the device	41
SICK network (operating mode CAN)	9
Slave	29
Software trigger	27
Start of the measured value output	35, 36, 37
Start or stop measured value output.....	35, 36
Starting angle.....	24
Stop of the measured value output	35, 36, 37
Subnet mask.....	33
Synchronisation	29
System increment.....	30
System increment, output via CAN.....	34
System status	41

T

TCP/IP port.....	33
Terminal interface	32
Test trigger settings.....	29
Time-dependent control.....	26
Track-dependent control	26
Trigger for laser control.....	28
Trigger messages for camera focus.....	30
Trigger threshold for object detection.....	37

U

Unit for the output.....21

User level 8

V

Version information.....41

VMD coordinates..... 11

VMS application35, 36

VMS result35

VMS result, output via CAN34

VMS results list.....36

W

Warnings.....41

X

X coordinate 11

X position on data output19

Y

Y coordinate.....11

Z

Z coordinate11

Zero level of the cameras..... 9

Australia

Phone +61 3 9497 4100
1800 33 48 02 – tollfree
E-Mail sales@sick.com.au

Belgium/Luxembourg

Phone +32 (0)2 466 55 66
E-Mail info@sick.be

Brasil

Phone +55 11 5091-4900
E-Mail sac@sick.com.br

Ceská Republika

Phone +420 2 57 91 18 50
E-Mail sick@sick.cz

China

Phone +852-2763 6966
E-Mail ghk@sick.com.hk

Danmark

Phone +45 45 82 64 00
E-Mail sick@sick.dk

Deutschland

Phone +49 211 5301-270
E-Mail info@sick.de

España

Phone +34 93 480 31 00
E-Mail info@sick.es

France

Phone +33 1 64 62 35 00
E-Mail info@sick.fr

Great Britain

Phone +44 (0)1727 831121
E-Mail info@sick.co.uk

India

Phone +91-22-2822 7084
E-Mail info@sick-india.com

Italia

Phone +39 02 27 43 41
E-Mail info@sick.it

Japan

Phone +81 (0)3 3358 1341
E-Mail support@sick.jp

Nederlands

Phone +31 (0)30 229 25 44
E-Mail info@sick.nl

Norge

Phone +47 67 81 50 00
E-Mail austefjord@sick.no

Österreich

Phone +43 (0)22 36 62 28 8-0
E-Mail office@sick.at

Polska

Phone +48 22 837 40 50
E-Mail info@sick.pl

Republic of Korea

Phone +82-2 786 6321/4
E-Mail kang@sickkorea.net

Republika Slovenija

Phone +386 (0)1-47 69 990
E-Mail office@sick.si

Russia

Phone +7 495 775 05 34
E-Mail denis.kesaev@sick-
automation.ru

Schweiz

Phone +41 41 619 29 39
E-Mail contact@sick.ch

Singapore

Phone +65 6744 3732
E-Mail admin@sicksgp.com.sg

Suomi

Phone +358-9-25 15 800
E-Mail sick@sick.fi

Sverige

Phone +46 10 110 10 00
E-Mail info@sick.se

Taiwan

Phone +886 2 2365-6292
E-Mail sickgrc@ms6.hinet.net

Türkiye

Phone +90 216 587 74 00
E-Mail info@sick.com.tr

USA/Canada/México

Phone +1(952) 941-6780
1 800-325-7425 – tollfree
E-Mail info@sickusa.com

More representatives and agencies
in all major industrial nations at
www.sick.com