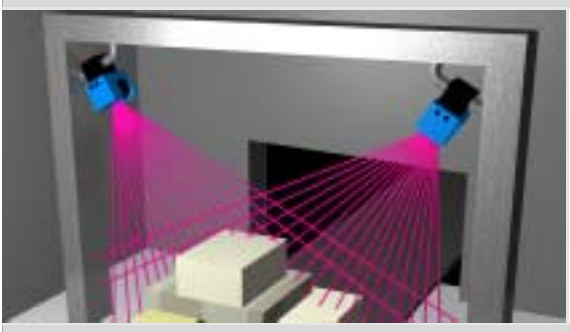
TECHNICAL DESCRIPTION



VMS 200 IPC
Volume Measurement System
Version 2.0

SICK

Software Versions

Software	Version
Software VMS 200	V 04031005
Software VMS 200	V 04031006
Software VMS 200	V 04031020

Contents

1 Product description

1.1 System components

1.1.1 System constituents

The VMS 200 IPC Volume Measurement System (*Fig. 1-1*) consists of the following components:

Fig. 1-1: VMS 200 IPC Volume Measurement System

- Two LMS 200-30106 **L**aser **M**easurement **S**ystems
- Two mounting sets for the LMS (fine adjustment possible along two axes)
- Two connection sets no. 1 for the LMS units, with cable
- One industrial PC (IPC) with:
  - one RS 232 interface
  - one RS 232/422 interface (switchable)
  - one RS 422 High-Speed interface card (500 kBaud)
  - VMS 200 software with licensing agreement
- Connection box for synchronisation
- Technical Description for VMS 200 IPC
- Technical Description for LMS 200 INDOOR
- Telegram Listing for LMS/LMI 400

1.2 Optional accessories

- RS 422 data cable (per metre) for data connection between IPC and the LMS units
- Digital I/O card (encoder card CI0-D1024/CTR3, 24 digital I/Os and 3 counters) for the IPC
- Scanfinder (for alignment of the LMS units, required for commissioning)

Fig. 1-2: Scanfinder

For order numbers please see Chapter *11. Order numbers.*

2 The measurement process

2.1 The measurement task

1. The measurement system determines the space occupied volume of a moving object (transported freight).
2. The measurement system calculates the length, width and height of the space occupied volume as well as the actual volumes of the objects (freight).

2.1.1 Preconditions

The *maximum* size of the freight may not exceed the following dimensions:

Parameter	Value
Length	7000 mm
Width	3000 mm
Height	3000 mm

Tab. 2-1: Maximum processable object sizes

The *minimum* size of the freight may not be lower than the following dimensions:

Parameter	Value for speed < 1,5 m/s	Value for speed > 1,5 m/s
Length	100 mm	150 mm
Width	100 mm	150 mm
Height	100 mm	100 mm

Tab. 2-2: Minimum processable object sizes

Further conditions *Minimum Object gap*
The minimum object gap has to be at least 100ms. This means a object gap of >200mm at a speed of 2m/s.

2.2 The measurement principle

1. Two LMS units scan the surface of the object (freight) two-dimensionally during its transport.
   - A laser beam is rotated in each LMS and scans the object in 1° steps (laser radar).
   - The LMS operates on the principle of measuring the time of flight of light pulses.
   - The maximum measurement zone for an LMS is 180° (with 1° resolution).
2. The LMS units combine the measured distances of a single scan in a measured value telegram.
   The LMS units send a telegram in interlaced mode to the evaluation unit (IPC) every 13 ms.
3. The evaluation unit (IPC) transforms the measured value telegrams from both LMS units into Cartesian co-ordinates and compiles them in a combined co-ordinate system.
4. In addition, the evaluating unit (IPC) reads the speed of the transport system via an encoder input or uses a constant speed as a basis for calculations.
5. A three-dimensional image of the freight is saved by the evaluation unit (IPC) after the package/pallet has been measured and the measurement data has been processed with the transport speed.

2.3 Determining space occupied volume

1. The evaluation unit (IPC) determines the boundary points of the freight's top view from the stored three-dimensional image.
2. The evaluation unit (IPC) translates the resulting polygonal progression into a rectangle, whereby the outer points of the polygon touch the sides of the rectangle.
3. By rotating the polygon in increments, the evaluation unit (IPC) optimises its position in such a way that it forms the rectangle with the smallest surface area.
4. The length and width of the rectangle provide the length and width of the space occupied volume.
5. The evaluation unit (IPC) determines the point with the maximum height from the stored three-dimensional image of the freight, and defines this as the height of the space occupied volume.
6. The evaluation unit (IPC) calculates the volume of the space occupied volume from the length, width and height.
7. A two-dimensional image of the object's planar section is saved in the evaluation unit (IPC) after every scan.
8. The evaluation unit (IPC) determines the surface content of the planar sections by numerical integration. This is then combined with the transport speed to find the actual volume of the object.

2.4 The measurement process

1. The measurement system can be put into measurement mode by pressing a button (F4), by a telegram request from the host computer, by the automatic triggering of measurement or by setting a digital input.
2. The measurement system automatically detects the start of the package/pallet and proceeds to determine its surface contour.
3. The calculation of the space occupied volume, the actual volume, **and the length, width and height** takes place when the end of the package/pallet has been detected.
4. Then the evaluation unit (IPC) sends the corresponding specified telegram response to the host computer.
5. The host computer's request to measure the next package/pallet can only be made when the measurement of the last package/pallet has been completed by the evaluation unit (IPC).
6. The interval between packages/pallets must be at least 500 ms.
7. The evaluation unit (IPC) continuously saves the data from the last 500 measured values of the object. These can be called up, if necessary, (e.g. for transfer to Excel).

3 Specification of error margins

The margins of error specified apply if the system has been constructed in accordance with Chapter *5. Technical and construction requirements*. Construction deviating from this leads to larger measurement errors.

3.1 Error margins for space occupied volume of cubed objects

Cubed objects have straight edges and have no projections or buckled sides.

3.1.1 V ≤ 1m/s

Objects > 100 x 100 x 100 mm and <200 x 200 x 200 mm edge length

Error: ± 25 mm in length, width and height (95% practical limit of error)

Objects > 200 x 200 x 200 mm edge length

Error: ± 20 mm in length, width and height (95% practical limit of error)

3.1.2 V>1m/s and ≤ 2m/s

Objects > 150 x 150 x 100 mm and <200 x 200 x 200 mm edge length

Error: ± 30 mm in length
± 25 mm in width and height (95% practical limit of error)

Objects > 200 x 200 x 200 mm edge length

Error: ± 25 mm in length
± 20 mm in width and height (95% practical limit of error)

3.2 Error margins for space occupied volume of irregularly shaped objects

Error: ± 30 mm in length, width and height (95% practical limit of error)

3.3 Error margins for actual object volumes

Error: < 8 % of measured value for objects larger than 50 l (95% practical limit of error)
< 15 % of measured value for objects smaller than 50 l (95% practical limit of error)

4 Standard telegram traffic between evaluation unit (IPC) and HOST computer

- The evaluation unit (IPC) uses a standardised protocol with a checksum test for telegram traffic to the HOST computer. The specifications for the protocol for serial communication are described in the telegram listing (see *LMS/LMI Telegram listing*).
- Telegrams that can be used to initiate functions in the evaluation unit have been specified for this application.
- An additional telegram has been specified for package/pallet measurement using the command number "0x7F" and the subsequent SUBCMD byte.
- All telegrams specific to package/pallet measurement must have the command byte "0x7F“.
- The first **DATA** byte (SUBCMD) then specifies which particular telegram is sent.
- Request telegrams must always contain the command number "0x7F" and the appropriate SUBCMD.
- The corresponding response telegrams are always sent back with the command number "0x7F" + "0x80" as well as the appropriate SUBCMD.
- The evaluation unit (IPC) always sends an ACK (0x06H) after the receipt of a telegram (CRC sum correct).
- The evaluation unit (IPC) remains silent should there be a false CRC sum.
- The VMS switches to measurement mode if a measurement is requested. If new measurement requests are triggered during the measurement process the VMS 200 only reacts with an ACK if the CRC sum is correct.
- A new measurement can only take place after the measurement that has first been triggered is completed.
- The evaluation unit (IPC) sends a power-on telegram after successful initialisation of both LMS (see *Section 4.7*).
- The evaluation unit (IPC) remains silent during the initialisation process.

Interface parameters:

Parameter	**Value**
Baud rate	9600
Stop bit	1
Data bits	8
Parity	none

Tab. 4-1: Interface parameters

4.1 Request for measured values (VMS) (CMD: 7FH; SUBCMD: 00H) through HOST computer

Telegram number: 0x7F hex	
Transfer parameter:	
SUBCMD DATA TYPE: BYTE	(PAKETE/PALETTENMWANF_TGM) Telegram requesting package/pallet measured values
Pallet status DATA TYPE: BYTE	00H > 00 Cut out pallet 01H > 01 Do not cut out pallet
Pallet height DATA TYPE: LONG	Standard pallet height in mm
Object status DATA TYPE: BYTE	00H > Package/pallet 01H >Freight
Description: Request for measured values telegram - the telegram triggers the measurement process in the evaluation unit (IPC) - an in-coming telegram requesting measured values is ignored while a measurement is in progress	

Tab. 4-2: Telegram to request measured values

4.2 Request for STATUS (VMS) (CMD: 7FH; SUBCMD: 01H) through HOST computer

Telegram number: 0x7F hex	
Transfer parameter:	
SUBCMD DATA TYPE: BYTE	01 (PAKETE/SSANF_TGM) Telegram requesting VMS status
Description: Status request telegram – demands info on VMS status	

Tab. 4-3: Telegram to request VMS status

4.3 Request error telegram (VMS) (CMD: 7FH; SUBCMD: 03H) through HOST computer

Telegram number: 0x7F hex	
Transfer parameter:	
SUBCMD DATA TYPE: BYTE	03 (PAKETE/ERRANF_TGM) Telegram requesting current VMS error
Description: Error telegram request – demands info on the current VMS error	

Tab. 4-4: Telegram requesting the VMS error

4.4 Request for last measured values (VMS) (CMD: 7FH; SUBCMD: 04H) through HOST computer

Telegram number: 0x7F hex	
Transfer parameter:	
SUBCMD DATA TYPE: BYTE	04 (PAKETE/MW _TGM) Telegram requesting last VMS measured values
Description: Telegram requesting measured values – demands the last measured values from the VMS	

Tab. 4-5: Telegram requesting the last VMS measured values

4.5 Evaluation unit's response to request for measured values (VMS) (CMD: FFH; SUBCMD: 00H)

Telegram number: 0xFF hex (PAKETE/PALETTENMW_TGM)	
Transfer parameter:	
SUBCMD DATA TYPE: BYTE	00 (PAKETE/PALETTENMW_TGM) Response telegram to a request for measured values
Length DATA TYPE: LONG	Freight length of space occupied volume [mm]
Width DATA TYPE: LONG	Freight width of space occupied volume [mm]

Height DATA TYPE: LONG	Freight height of space occupied volume [mm]
Volume DATA TYPE: FLOAT	Freight volume of space occupied volume [dm^3]
Actual volume DATA TYPE: FLOAT	Actual freight volume [dm^3]
Error status DATA TYPE: SHORT	Current VMS system status: 0x0000 no error 0x0001 fatal error 0x0002 error 0x0004 warning 0x0008 info - codes are added when several errors occur simultaneously
Description: Data on the measured object	

Tab. 4-6: Telegram response to request for measured values

Example:

1. Request for measured values:

02	00	08	00	7F	00	00	78	00	00	00	00	4B	B8
STX	ADR	LEN Low	LEN High	CMD	SUB CMD	Pallet height	Pallet height	Pallet height	Pallet height	Pallet height	Object status	CRC	CRC

Explanation:

Pallet height: 120 mm
Pallet status: 00: cut out pallet
Object status: 00: object is a package/pallet (cubed)

2. Telegram response to request for measured values:

02	00	18	00	FF	00

1F	02	00	00
8A	01	00	00
B1	00	00	00
8F	78	17	42

51	03	C6	41

00	00
0F	C9

Explanation:

Package/pallet length: 543 mm
Package/pallet width: 394 mm
Package/pallet height: 177 mm
Volume: 37.8677 dm³
Actual volume: 24.7516 dm³
Status: no error, no warning

4.6 Response to request for status (VMS) (CMD: FFH; SUBCMD: 01H)

Telegram number: 0xFF hex (PAKETE/SSANF _TGM)	
Transfer parameter:	
SUBCMD DATA TYPE: BYTE	01 (SSANF_TGM) Telegram response to request for status
SW version	Software version – 8 ASCII characters e.g. 04031001
Error status DATA TYPE: SHORT	Current VMS system status 0x0000 no error 0x0001 fatal error 0x0002 error 0x0004 warning 0x0008 info - codes are added when several errors occur simultaneously
Description: Current system status	

Tab. 4-7: Telegram response to request for status

4.7 Power-on telegram (VMS) (CMD: FFH; SUBCMD: 02H)

Telegram number: 0xFF hex (PAKETE/POWERON _TGM)	
Transfer parameter:	
SUBCMD DATA TYPE: BYTE	02 (PAKETE/POWERON _TGM) Telegram response to request for measured values.
System desc.:	Description – 7 ASCII characters: "VMS200;"
SW version	Software version – 8 ASCII characters, e.g. 04031001
Description: Is sent after initialisation of the system	

Tab. 4-8: Power-on telegram

4.8 Response to request for error telegram (VMS) (CMD: FFH; SUBCMD: 03H)

Telegram number: 0xFF hex (PAKETE/ERR_TGM)		
Transfer parameter:		
SUBCMD DATA TYPE: BYTE	03 (PAKETE/ERR _TGM) Response to request for error telegram	
Error number 1 DATA TYPE: BYTE		
Error number 2 DATA TYPE: BYTE		
Error number ... DATA TYPE: BYTE		
Description: Error currently occurring in VMS.		
00	ERR communication left LMS	Interference in communication to left LMS
01	ERR communication right LMS	Interference in communication to right LMS
02	ERR time out error	Time between start measurement and package start > 20 sec
03	ERR object in measurement zone	Object in the measurement zone at start of measurement
04	ERR max. length	> 7000 mm
05	ERR min. length	< 50 mm
06	ERR request error	Measurement cannot be requested
07	WARN no increment	(Wrong trigger source – see parameter description)
08	WARN implausible speed	Speed value too great
09	WARN Reinit. archive package	Archive file deleted and laid down anew
0A	WARN Reinit. archive error	Archive file deleted and laid down anew
0B	WARN dimension implausible	Object dimensions outside the limits of plausibility

Tab. 4-9: Telegram response to request for error

4.9 Response to request for last measured values (VMS) (CMD: FFH; SUBCMD: 04H)

Telegram number: 0xFF hex (PAKETE/MW_TGM)	
Transfer parameter:	
SUBCMD DATA TYPE: BYTE	04 (PAKETE/MW_TGM) Response to request for last measured value.
Length DATA TYPE: LONG	Length of freight space occupied volume [mm]
Width DATA TYPE: LONG	Width of freight space occupied volume [mm]
Height DATA TYPE: LONG	Height of freight space occupied volume [mm]
Volume DATA TYPE: FLOAT	Volume of freight space occupied volume [dm^3]
Real volume DATA TYPE: FLOAT	Real freight volume [dm^3]
Error status DATA TYPE: SHORT	Current VMS system status 0x0000 no error 0x0001 fatal error 0x0002 error 0x0004 warning 0x0008 info The codes are added should more than one incident occur.
Description: Data on the object measured.	

Tab. 4-10: Telegram response to request for last measured values

5 Technical and construction requirements

5.1 Construction

5.1.1 Pre-conditions

1. The distance between the packages/pallets must be at least sufficient to ensure that only one package/pallet at a time is ever on the transport sector below the LMS for measurement.
2. The transport system is to be arranged in such a way that no swaying can take place at transport height during transport (error specification).
3. Packages/pallets must lie on the conveyor belt in such a way that during transport they are fully detectable by the measurement system.
4. Areas of shadow, that the LMS cannot measure, are to be avoided as they can lead to erroneous measurements.
5. Protruding parts can only be detected when their minimum width is two light spots (see LMS documentation).
6. Pallets to be measured must be either completely covered or have a minimum surface width of two spots.
8. A screening sheet should be mounted between the LMS units. This screening sheet simultaneously acts as a reference target for compensating drift.

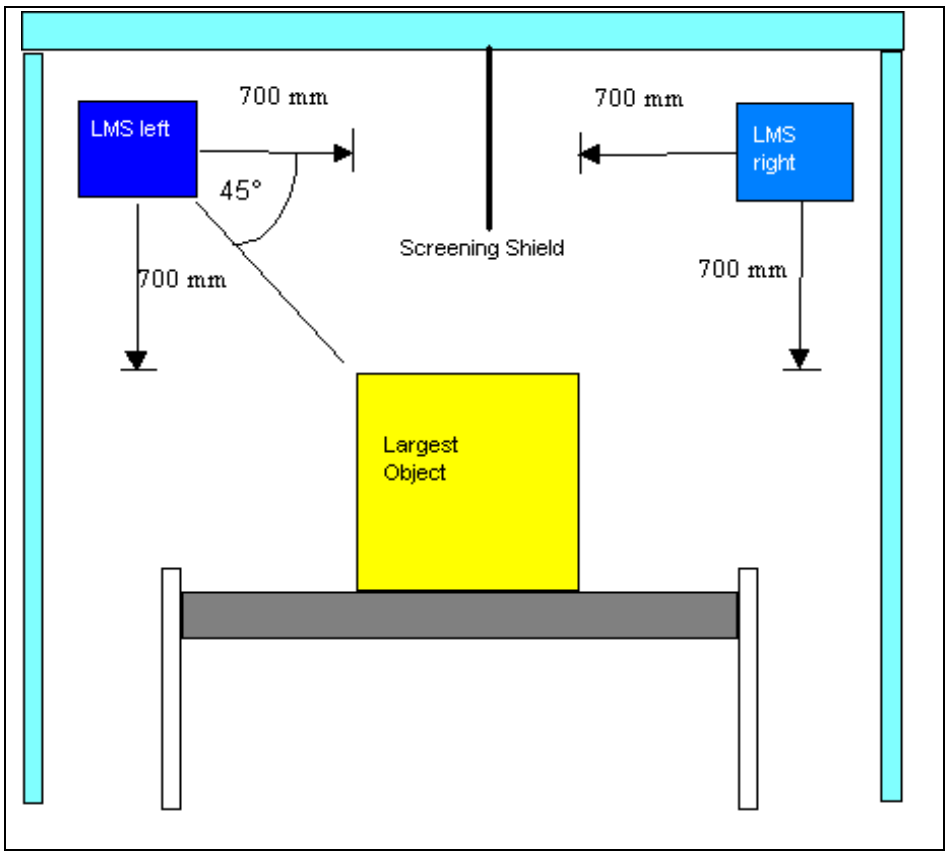


Fig. 5-1: Recommended construction of the Volume Measurement System

Fig. 5-1 shows the ideal arrangement of the components above the transport system:
- the angle between the LMS and external upper edges of packages/pallets is approx. 45°,
- the minimum distance to the package/pallet is 700 mm.

5.2 Determining transport speed

- The evaluation unit (IPC) records the transport speed via an encoder signal or uses a set constant speed as the basis for calculations.
- The minimum speed is 0.15 m/s.
- The encoder's minimum resolution must be 1 increments/mm.

6 System components

6.1 LMS 200-30106 Laser Measurement System

- 1° angular resolution
- 0.25° interlaced mode
- 13 ms scanning period per rotation
- RS 422 interface, data transfer rate 500 kBaud
- Laser class 1

6.2 Industrial PC (IPC)

- Standard IPC
- Operating system: Windows NT 4.0
- One serial RS 422 interface for communication with the HOST computer
- One serial RS 232 interface
- Serial RS 422 High-Speed interface card (500 kBaud), 2 ports for connection to LMS units.
- VMS 200 software
- VGA monitor, keyboard and mouse (not part of supply)

6.3 Supplementary cards for IPC

- Optional: digital I/O card: CI0-D1024/CTR3 encoder card, 24 digital I/Os + 3 counters (software supports a counter input to determine the increment).

6.4 Accessories

- Scanfinder for alignment of the LMS units
- Plumbline

7 Description of VMS 200 software

Definition: The description "left LMS" always refers to the LMS unit shown on the left of the display.

Fig. 7-1 defines the angle as it is to be described in the following text.

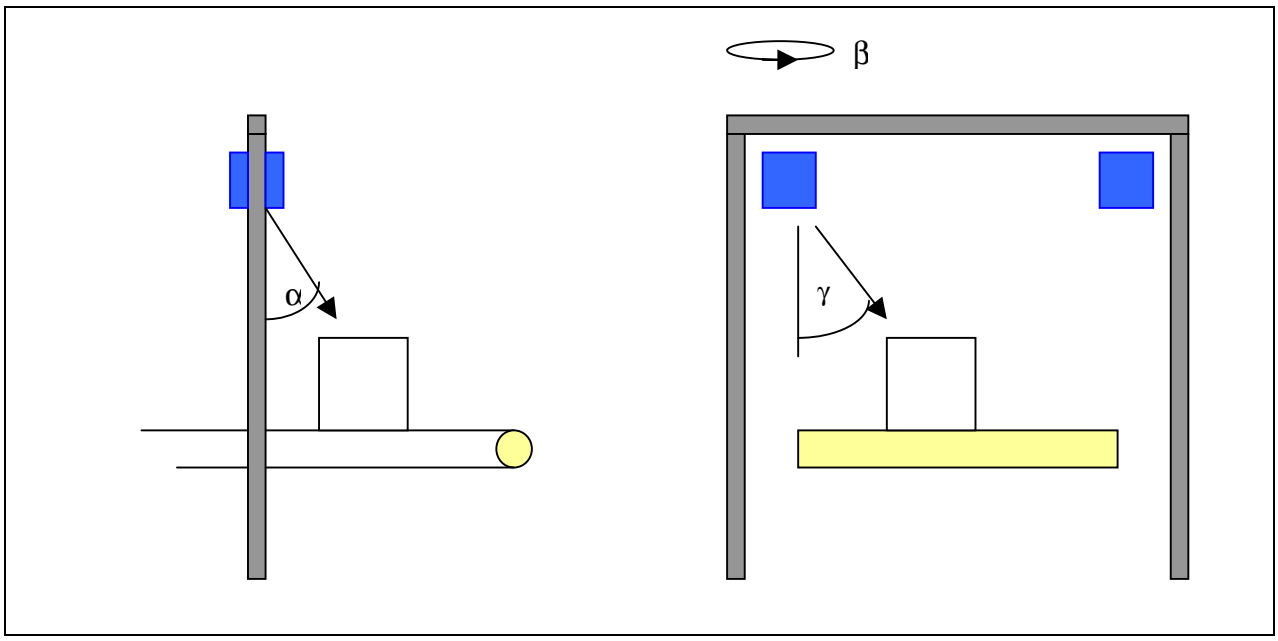


Fig. 7-1: Alignment of the LMS

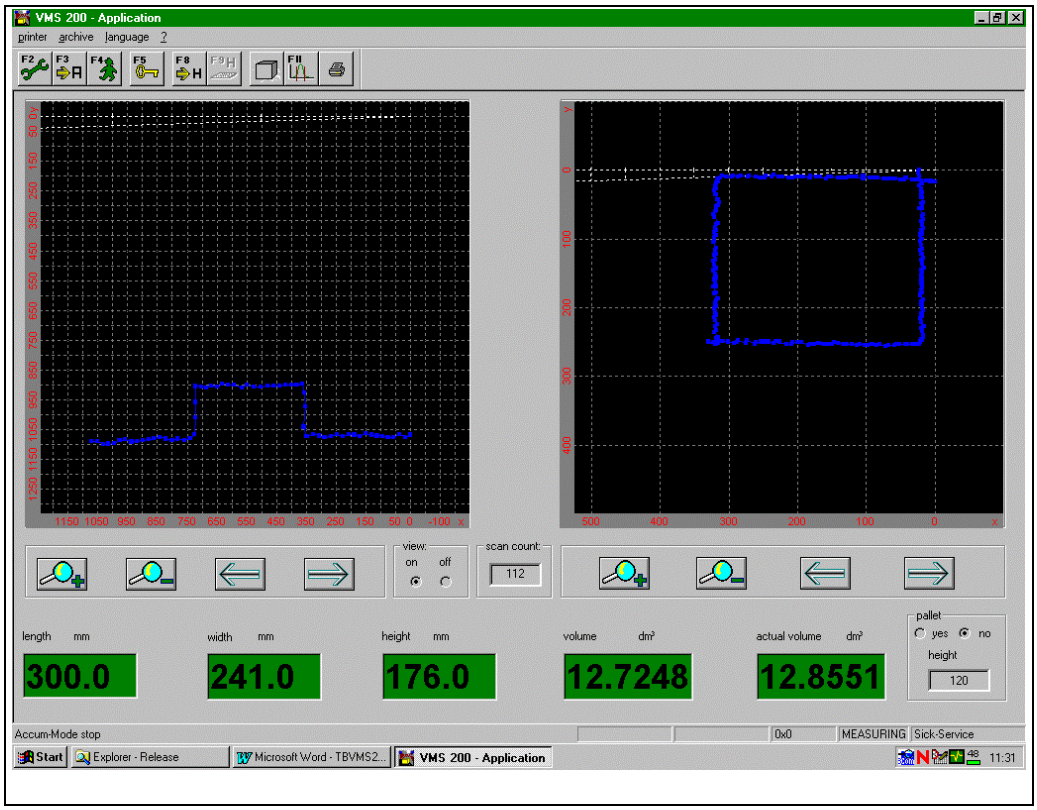


Fig. 7-2: View of the screen in measurement mode

7.1 Measurement mode

7.1.1 Starting the VMS 200

Pre-requisites:
The LMS units should always have finished their boot procedure before the (IPC) software is started up.
The LMS boot procedure (with synchronisation) can take 1 or 2 minutes.
The LMS LEDs are lit green after booting is finished.

7.1.2 Display on the screen

- Two display windows for front view and top view of the package/pallet
- Numerical values for length, width, height, space occupied volume and actual volume
- Standard pallet height ("Pallet height")
- Status "Pallet yes/no“
- Operating mode
- Operating condition
- Error status
- Warning status
- Number of scans of the object

7.1.3 Commands

Key	Function
F2	Change to parameter administration
F3	Initialise automatic operation
F4	Initiate measurement
F5	Change to password input
F7	Print parameters
F8	Initialise manual mode
F9	Call up dialog box for manual input
F10	Test host telegram
F11	Regression analysis

Tab. 7-1: Functions allocated to keys F2 to F11

- Button "View on/off“
- Button "Pallet yes/no“

7.2 Switching the display off

The front view can be switched off using an options button.
In general, this view should be switched off during measurement.
This increases the measurement system's processing speed.

7.3 The administration of parameters

Operation using buttons:

Description	Function
Activate configuration	Evaluation unit accepts parameter into the measurement process.
Transfer configuration	The evaluation unit saves parameters in a restart file and they are thus valid after a restart in the measurement process. Parameters must be **activated** first.
Cancel	Return to measurement mode.
Next & Back	Change to the next parameter menu.

Table 7-2: Buttons

Fig. 7-3 illustrates the most important measurement system parameters.

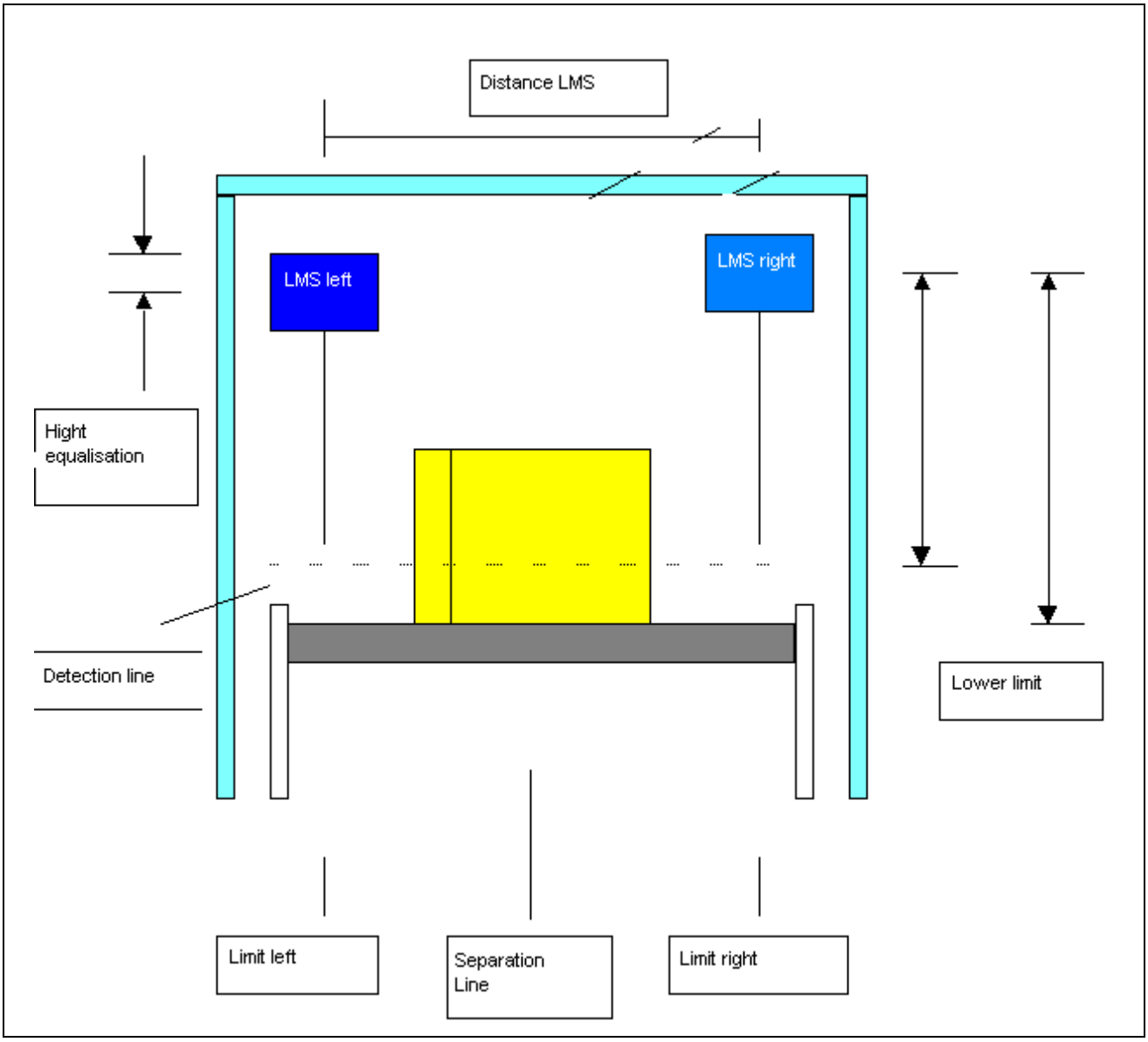


Fig. 7-3: Volume Measurement System parameters

7.3.1 Transfer speed configuration

Enter:

Parameter	Function	Value store	Remarks
Speed	Enter transfer speed	0 ... 2 m/s	- the speed must always be entered even when the VMS is operating with a shaft encoder
Increments/mm	Conversion factor for encoder increments	0 ... 1000 mm	-
Station name	Customer specific name for the station		*Example:* End control 1

Tab. 7-3: Entries

7.3.2 LMS configuration

Buttons:

Parameter	Function	Value store	Remarks
Test	Static measurement of the edges of an object	- 100-fold averaging	
Calibration	Calls up "Calibration" menu		

Tab. 7-4: Buttons

Enter:

Parameter	Function	Value store	Remarks
Separation line	Border between the two LMS units, at which the two scans are combined	0 < separation line < distance LMS	Recommendation: separation line = 0.5 x distance
Angle of rotation LMS right	Angle through which the scan from the right LMS can be rotated	-10° ... +10°	γ-axis
Angle of rotation LMS left	Angle through which the scan from the left LMS can be rotated	-10° ... +10°	γ-axis
Height equalisation	Offset for vertical equalisation of the scan	-100 ... +100 mm	-
Distance LMS	Horizontal distance between the two LMS units	0 ... 5000 mm	-

Tab. 7-5: Inputs

Display:

Parameter	Function	Units	Remarks
Left edge	Displays the left edge detected	mm	Display is refreshed after using the button "Test" (100-fold averaging).
Right edge	Displays the right edge detected	mm	Display is refreshed after using the button "Test" (100-fold averaging).
Width	Width of the object	mm	Display is refreshed after using the button "Test" (100-fold averaging).
Left height	Height of the object measured from the left LMS	mm	Display is refreshed after using the button "Test" (100-fold averaging).
Right height	Height of the object measured from the right LMS	mm	Display is refreshed after using the button "Test" (100-fold averaging).

Tab. 7-6: Display

7.3.3 Calibration with the commissioning tool

A correction of the LMS parameters may prove necessary after the two LMS units have been installed. The Commissioning Tool can be used to automatically take LMS measurements regarding:
- any twisting in the scanning plane (γ axis, *see Figs. 8-1 and 8-3*), and
- any difference in their installation heights.

The parameters for equalising angles and heights can be entered in the parameter administration and activated.

Operation using buttons:

Description	Function
Transfer OK	The newly calculated values are accepted after the button is used.
Start	Start the measurement cycle.

Tab. 7-7: Buttons

Entries:

Parameter	Function	Value store	Remarks
Limit left	Left measurement area border	- 1000 ... 5000 mm	
Limit right	Right measurement area border	- 1000 ... 5000 mm	
Averaging time	Time period during which measured scans are averaged	10 ... 600 s	Recommendation: 60 s

Tab. 7-8: Entries

Display:

Description	Function
Gain LMS left	Increase in left straight lines
Gain LMS right	Increase in right straight lines
Offset LMS left	Offset of left straight lines
Offset LMS right	Offset of right straight lines
Height adjustment correction	New correction value that will be added to the old height adjustment after use of OK button
Angle adjustment correction left	New correction value that will be added to the old angle adjustment after use of OK button
Angle adjustment correction right	New correction value that will be added to the old angle adjustment after use of OK button
Height adjustment offset	Height offset in mm
Angle adjustment offset left	Rotation angle offset LMS left in °
Angle adjustment offset right	Rotation angle offset LMS right in °

Tab. 7-9: Display

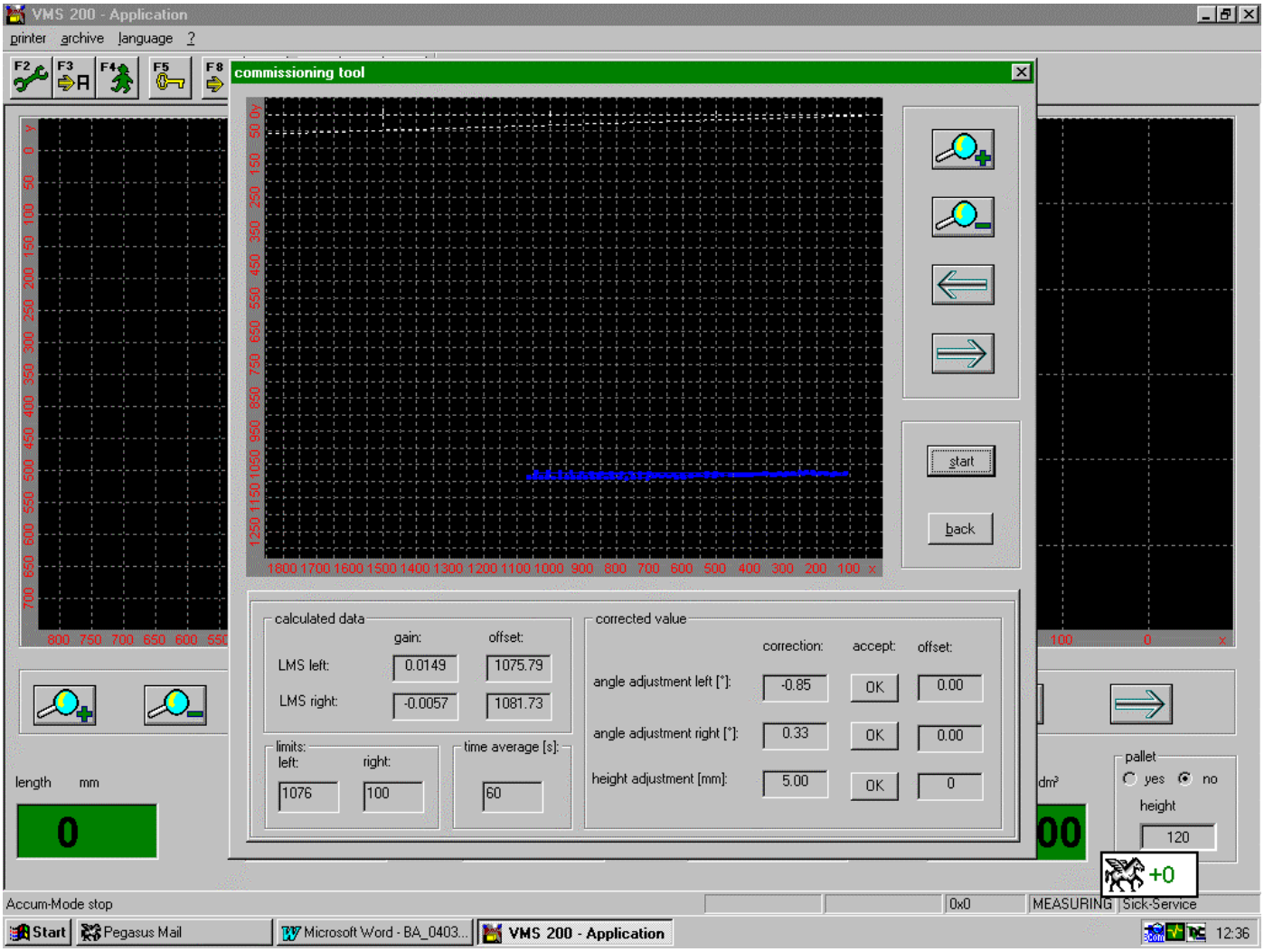


Fig. 7-4: Commissioning Tool

Fig. 7-4 shows the Commissioning Tool. The averaged scans from the left and right LMS, required for the calculation of correction values, are shown in the graphic display. Proceed as follows to measure out the LMS:

1. Lay a homogenous white board or panel horizontally on the transport belt surface between the LMS units.
2. Enter an averaging period for the scan determination in the software.
3. The left and right limits of the measurement field (the board) must also be entered.
4. Measurement is started by using the "START" button.
   The computer now averages a definite number of scans and calculates the adjustment lines.
   After measurement has been concluded the software displays the averaged scans.
5. The gain and offset of the adjustment lines for the left and right LMS units are shown in the calculated data field.
6. Both the OK buttons for the angle adjustment left and right must now be used
   (ATTENTION: not the one for the height adjustment).
   The PC will now accept the newly calculated offset angles.
7. Then press the START button again.
   The PC will now calculate using the new angle offsets of the adjustment lines.
8. After the calculation has been completed the OK button for the height adjustment should be used and a new assessment carried out by pressing the START button again.

9. If the plausibility criteria have been fulfilled after this measurement then the setting up of the LMS units has been completed.
10. Leave the menu by using the BACK button.

A plausibility assessment is to be made after every calculation:

Plausibility criteria for a correct measurement:
- the averaged blue characteristic lines are straight and without peaks,
- the newly calculated correction values for the angle adjustment are < 0.1° (this value is hardly attainable when very high installation heights [> 2 m] are used).

Causes of incorrectly calculated curves:
1. The measurement area is larger than the board on the belt's surface.
2. The LMS are not synchronised.
3. The averaging period is too short.

Finally, a visual check of the evenness of the scanning line must be carried out in the main menu display.

7.3.4 Measurement field configuration

Buttons:

Parameter	Function	Value store	Remarks
Test	Static measurement of the edges of an object	- 100-fold averaging	

Tab. 7-10: Buttons

Entries:

Parameter	Function	Value store	Remarks
Limit left	Left measurement field limit, up to which the package/pallet is detected	Limit right < limit left > 5000 mm	Recommendation: the limit is vertically below the left LMS
Limit right	Right measurement field limit, up to which the package/pallet is detected	-1000 mm < limit right < limit left	Recommendation: the limit is vertically below the right LMS
Limit bottom	Bottom measurement field limit, always corresponds to the transport surface	Detection line < bottom limit < 5000 mm	-
Detection line	Serves detection of the package edges	500 mm < detection line < bottom limit	Recommendation: 50 mm smaller than limit
Standard pallet height	Height of standard pallet	< 300 mm	-

Tab. 7-11: Entries

Display:

Parameter	Function	Units	Remarks
Left edge	Display the left edge detected	mm	Display is refreshed after use of "Test" button (100-fold averaging)
Right edge	Display the right edge detected	mm	Display is refreshed after use of "Test" button (100-fold averaging)
Width	Object width	mm	Display is refreshed after use of "Test" button (100-fold averaging)
Height left	Height of object measured from left LMS	mm	Display is refreshed after use of "Test" button (100-fold averaging)
Height right	Height of object measured from right LMS	mm	Display is refreshed after use of "Test" button (100-fold averaging)

Tab. 7-12: Display

7.3.5 Plausibility checks

Enter:

Parameter	Function	Value store	Remarks
Length of smallest package/pallet	Plausibility limit for smallest possible measurement	0 ... 7000 mm	-
Width of smallest package/pallet	Plausibility limit for smallest possible measurement	0 ... 3000 mm	-
Height of smallest package/pallet	Plausibility limit for smallest possible measurement	0 ... 3000 mm	-
Volume of smallest package/pallet	Plausibility limit for smallest possible measurement	0 ... 67000 dm³	-
Actual volume of smallest package/pallet	Plausibility limit for smallest possible measurement	0 ... 67000 dm³	-
Length of largest package/pallet	Plausibility limit for largest possible measurement	0 ... 7000 mm	-
Width of largest package/pallet	Plausibility limit for largest possible measurement	0 ... 7000 mm	-
Height of largest package/pallet	Plausibility limit for largest possible measurement	0 ... 7000 mm	-
Volume of largest package/pallet	Plausibility limit for largest possible measurement	0 ... 67000 dm³	-
Actual volume of largest package/pallet	Plausibility limit for largest possible measurement	0 ... 67000 dm³	-

Tab. 7-13: Entries

7.3.6 Trigger source for package start, units

Entries:

Parameter	Function	Value store	Remarks
F4 Button	Measurement is started		
Automatic	Measurement is always started when the beginning of the package is detected		
Host request	Measurement is triggered by a telegram request from the host computer		
Digital input	Measurement is triggered by the setting of a digital input	Port B0, Pin 10 TTL level	0 V: logical high 5 V: logical low **Please note:** if the input is not used or no measurement is requested, the input is always to be switched with logical low.
Units	Selection of units in mm, dm^3 and inches, cubic inches		
Drift control on / off	Drift control for a metal sheet mounted between the LMS units		

Tab. 7-14: Entries

Interfaces:

Parameter	Function	Value store	Remarks
Calibration	Start reference measurement of reference target		Time period: approx. 30 s

Tab. 7-15: Entries

Displays:

Parameter	Function	Value store	Remarks
Drift offset LMS left	Corrective offset for the whole left scan		
Drift offset LMS right	Corrective offset for the whole right scan		
Distance to reference target LMS left	Currently measured distance to reference target		
Distance to reference target LMS right	Currently measured distance to reference target		

Tab. 7-16: Display

7.3.6.1 Reference measurement drift check

This function is used for compensating long-term LMS drift. A precondition for the operation of this function is that a screening sheet is fixed between the LMS (*see Fig. 5-1*). This sheet acts as the reference target. After commissioning has been carried out the teach-in process for this reference target is started by using the CALIBRATION button in the "Trigger source for package start, units" menu. The software then saves the distance to the reference target. Drift compensation is carried out while the measurement system is in operation by comparing the taught-in and the actual measured distances.
The measurement system issues a warning if a drift of more than 20 mm is found to have taken place.

Please note:
The drift calibration must take place after configuration of the LMS units. It is vital that drift control is switched off during LMS configuration.

7.3.7 Parameter file

All the parameters activated in the parameter administration and transferred to the restart file are saved in the file "VMSWorkspace.cfg".

7.4 Passwords

There are three password levels:

Level	Status	Password (Standard)
1	Machine operator	no password necessary
2	Authorised customer	SICK_VMS
3	SICK Service	EXPERT

Tab. 7-17: Password levels

7.5 Printing

This function allows all measurement system parameters to be printed out with station name, date and time.

7.6 Initialisation of "manual input"

Initialisation for manual operation is possible if measurement system components fail.
The data for the package/pallet can be gathered by manual measurement and entered in the appropriate menu.

7.7 "Manual input" menu

The length, width and height of the package/pallet can be entered and sent to the HOST computer.

7.8 Regression tool

The calculated edge positions are displayed in this menu after a measurement has been completed. Not only is the average position of all the points provided for each edge, but also the outermost point (the extreme value).
The averaged value is always used for determining package dimensions. If both values are the same too few points have been detected at the edge. In this case the software uses the outermost point (the extreme value) for determining the package's dimensions.

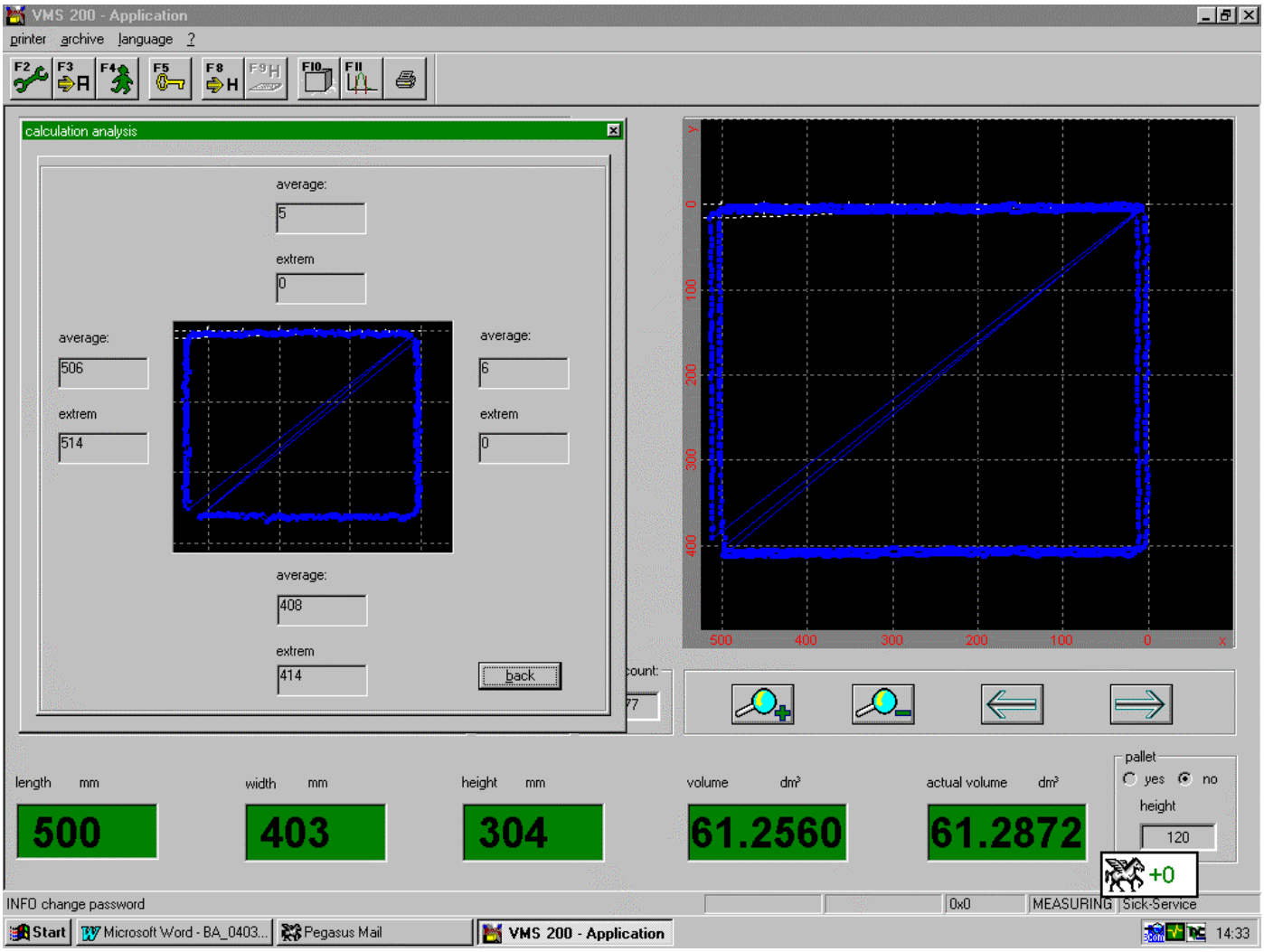


Fig. 7-5 Regression Tool

Display:

Description	Function
Average	Average edge value
Extreme value	Outermost point of the edge

Tab. 7-18: Display

7.9 Test "host requests"

This menu can be used to send telegrams, required for communication with the VMS 200 software, via the interface. This function serves as a test and aid to connection of a HOST computer to the VMS 200.

7.10 Changing the language

Another language file can be loaded under the menu point "Load language". A German and an English language file are supplied as standard. The construction of these language files allows their translation into other languages.

1. Copy one of the language files on hand into the VMS application directory and save it under a new name.
2. Open this file with any ASCII text editor.
   Translate all the terms included in the file.

The language with the name "Standard.lng" is always loaded during the program start.
The syntax that has been defined must be closely adhered to when editing the language file as otherwise the file cannot be loaded.

7.11 System messages (internal)

The file "SickErr.log" can be opened in this archive. Internal system messages regarding the current behaviour of the software is saved in this file.

7.12 Error archive

All currently occurring error messages and the last 500 error messages are archived and displayed in this menu. The "Status" column shows that the error has occurred with a "1". A "0" is used to show that the particular error state displayed is ended. The following error classes are distinguished.

Error class	Code
Fatal error	0x01H
Error	0x02H
Warning	0x04H
Info	0x08H

Tab. 7-19 Error classes

Please note:
If several errors occur simultaneously the evaluation unit (IPC) adds the particular error codes in the status bar of the screen display.

7.13 Package archive

The menu "Package archive" contains the last 500 packages measured. The dimensions, time and measurement system's error state during measurement are all displayed. The archive can be saved in a structured ASCII file by using the "Export" button. This allows the subsequent import of the file into an evaluation programme such as Excel. Points are used to show the decimal point and under some programs this may need to be exchanged for a comma.

7.14 I/O functions

The CIO-DIO24/CTR3 I/O card must be installed in order to use the I/O functions. The complete pin allocation can be found in the card's Technical Description. The VMS 200 software uses the following inputs and outputs.

Port functions:

Port	Pin	I/O	Function
Port A 0	37	Output	Is switched on FATAL ERROR
Port A 1	36	Output	Is switched on ERROR
Port A 2	35	Output	Is switched on WARNING
Port A 3	34	Output	Is switched on continuous measurement
Port B 0	10	Input	Start measurement – see "Trigger source for package start, units" section

Tab. 7-20: Port functions

8 Commissioning

8.1 Electrical installation

8.1.1 Overview

The individual components are electrically connected to each other as in *Fig. 8-1*.

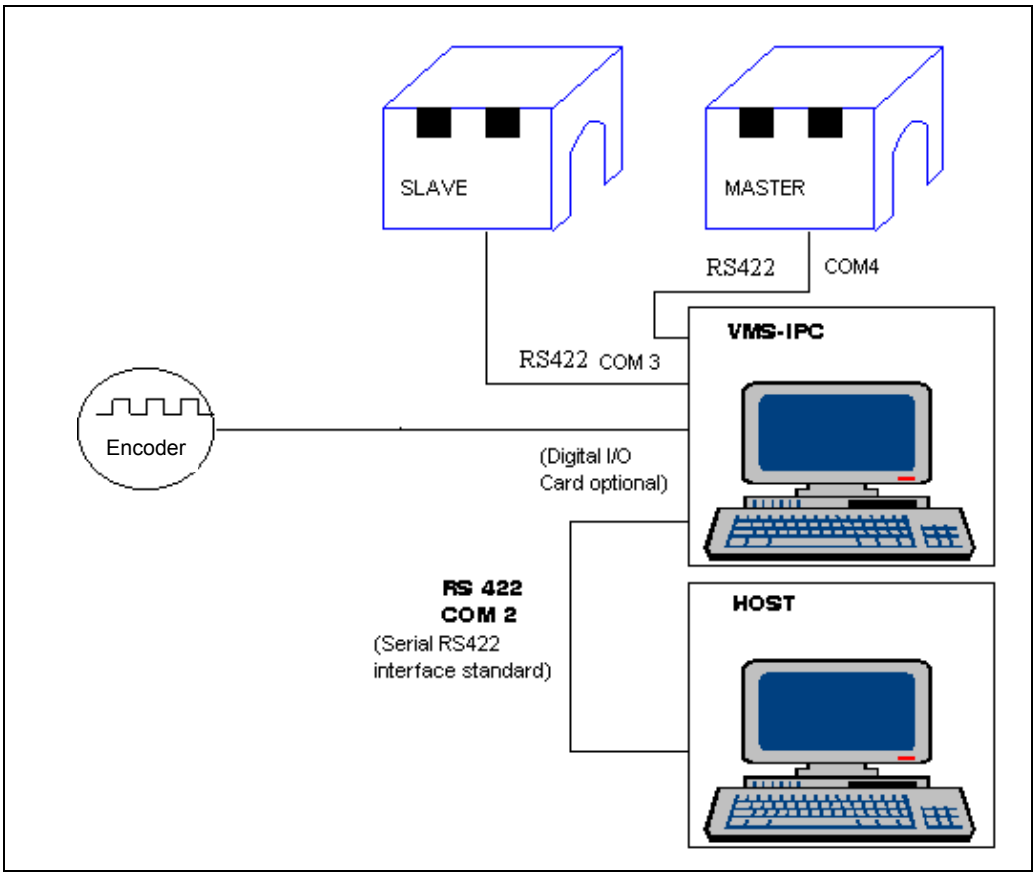


Fig. 8-1: Electrical connection of the system's components

8.1.2 Communication between the evaluation unit (IPC) and HOST computer

Pin	Signal (RS 422)
1	TxD-
2	TxD+
3	RxD+
4	RxD-
5	GND
6	n.c
7	n.c
8	n.c
9	n.c

Tab. 8-1: Pin configuration in the 9-pin Sub-D socket on the PC

8.1.3 Communication between evaluation unit (IPC) and LMS

PC: RS-422 High-Speed card, 500 kBaud		**LMS**	
Pin	**Signal (RS 422)**	**Pin**	**Signal (RS 422)**
1	TxDA	1	RxD-
2	TxDB	2	RxD+
3	RxDB	3	TxD+
4	RxDA	4	TxD-
5	GND	5	GND/Shield
6	RTSA	-	n.c.
7	RTSB	-	n.c.
8	CTSB	-	n.c.
9	CTSA	-	n.c.

Tab. 8-2: Pin configuration of the 9-pin Sub-D socket on the High-Speed card (one of them shown)

Please note: The LMS units have a switchable data interface (RS 232 / 422).

Activating the RS 422 interface

➢ **Place bridges between pin 7 and pin 8 in each of the LMS sockets.**

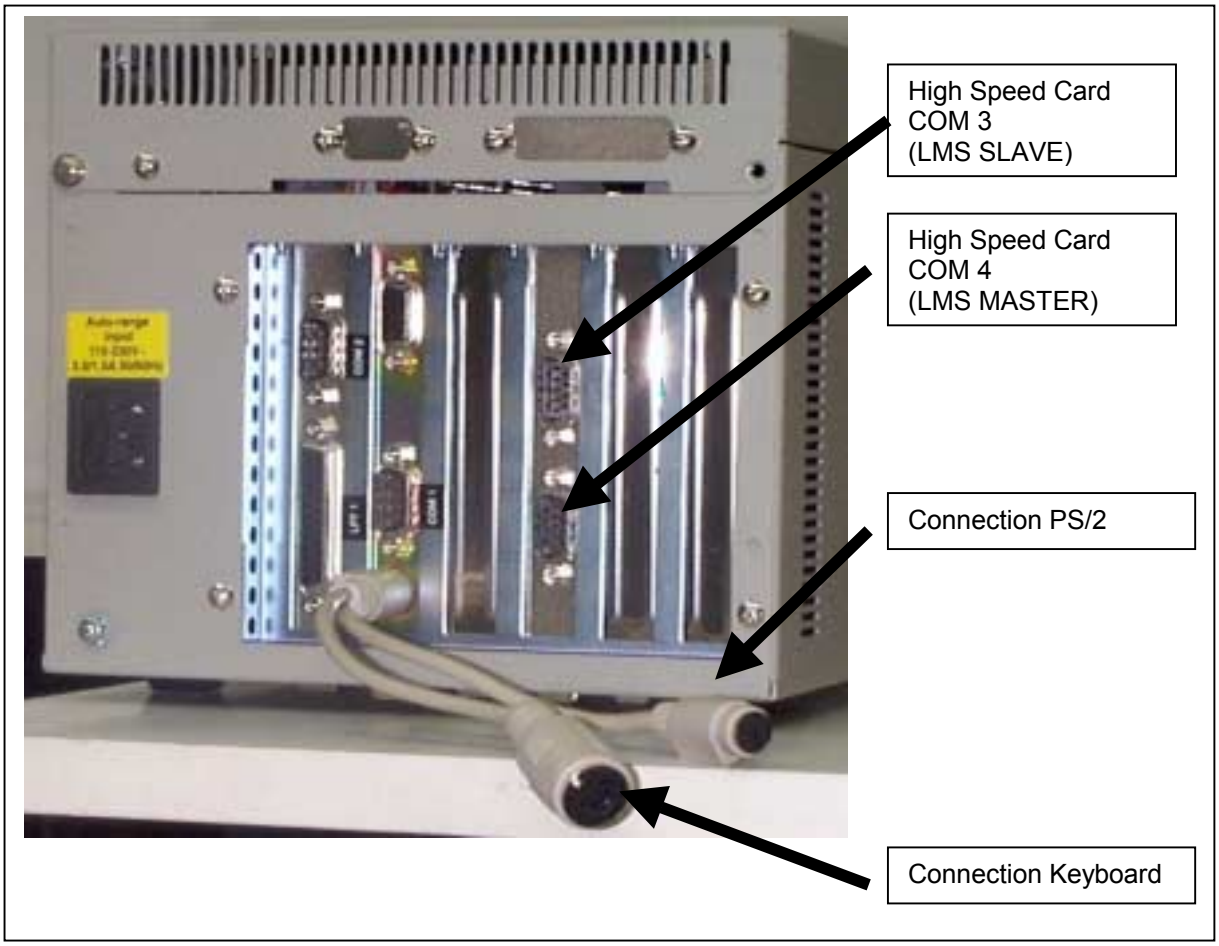
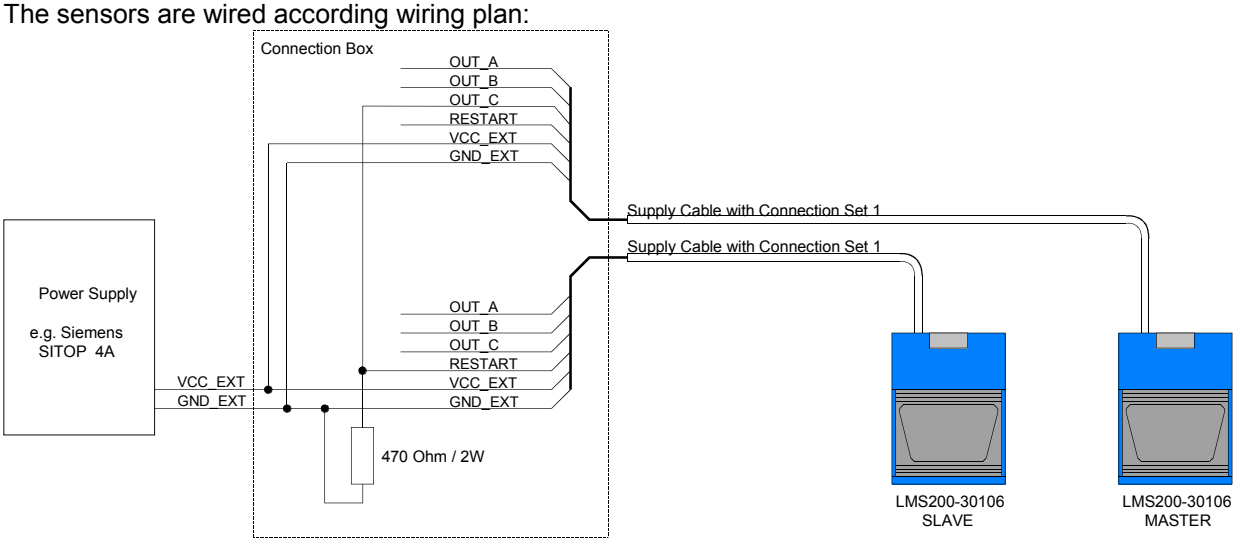


Fig. 8-2: Connection Industrial PC VMS 200

8.1.4 Pre-conditions for synchronisation

The VMS 200 is using synchronised LMS. The system software of the LMS is version 02.02 and upwards.
The scanners are already configured as MASTER, the other as SLAVE (see label on LMS).

The sensors are wired according wiring plan:



Please note:

- The maximum length of the two supply cables must not exceed 5m each.
- Both sensors must be supplied from one main power supply !
- The division of the voltage supply for the two sensors must take place in the connection box, see wiring plan (Upon request).
- The output OUT_C of the MASTER sensor is connected to the RESTART of the SLAVE sensor.
- Connect a pull-down resistance of 470W / 2W to GND_EXT. Linkage takes place in the distributor box.

The remaining sensor outputs can be laid down from the connection box to the switching cabinet without any further special measures.
Scanner data cables need not be connected via the connection box. Please consult the Technical Description LMS 200 when choosing the type of interface and permissible cable lengths.

8.2 Installation of the software

Installation of the hardware and software components in the IPC takes place at the factory so that mounting and connection of the external components and the commissioning of the system can start *in situ* as soon as delivery has taken place.
Chapter 12.1 Installation of the system's hardware and software components provides more information on this procedure.

8.3 Installing the LMS units above the transport system

The following aids are required for mounting and alignment of the LMS units:

1. Plumbline
2. Spirit level
3. Level board or plank (minimum length = distance between LMS units + 50 mm)
4. Scanfinder
5. Pencil
6. Measurement tape or folding metre-rule, etc

The two LMS units are mounted above the transport system using the mounting sets as follows:

1. Mount the LMS units in such a way that their common scanning plane forms a right angle to the transport direction.
2. The LMS are mounted so that they both face in the same direction (see *Fig. 8-3*).
3. **Place each LMS into its mounting in such a way that the mounting set plug is pointing in the direction of the middle adjustment screw (see Fig. 8-4)!**
4. Mount the LMS units horizontal to the transport system!
5. **During LMS alignment only switch on one LMS unit at a time as otherwise the Scanfinder cannot detect the scans!**
6. Carry out a visual examination after the LMS have been mounted, to check that they are in line.

Alignment of the LMS in one scanning plane takes place after the LMS have been mounted. This involves the following steps (the LMS units are symbolically described as left LMS left and right LMS):

1. Lay a board or plank or something similar on the transport system below the LMS.
2. Turn an M6 screw into the middle thread of the left LMS and attach the plumb-line to it.
3. Mark the vertical point of the plumb-line on the board.
4. Then carry out points 2 and 3 on the right LMS in the same way.
5. Draw a further point below each of the LMS units transposed by 63 mm in the direction of the centre of the rotating mirror wheel.
6. Join these two points up with a line, the scanning line (*see Fig. 8-2*).

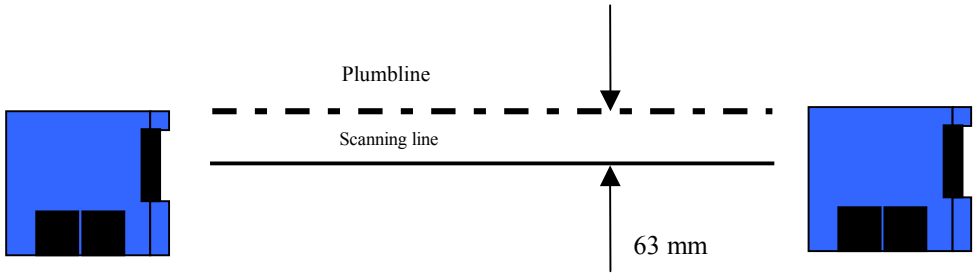


Fig. 8-3 View of the LMS units from above with the plumb-line and scanning line.

7. Switch on the **left LMS**.
8. Look for the scan with the Scanfinder vertically below the **left LMS**.
9. The **left LMS** is adjusted with the help of the middle adjusting screw on the mounting set until the scan below the LMS is lying upon the scanning line drawn earlier.
10. Now lay the Scanfinder below the opposite **right LMS**.
11. The **left LMS** is adjusted with the help of the side adjusting screw on the mounting set until the scan below the **right LMS** is lying upon the scanning line drawn earlier.
12. Then switch off the left LMS and switch on the right LMS.
13. Points 8 to 11 are now carried out on the right LMS in the same way.
14. Both LMS units are now aligned in one scanning plane.

Please note:
There are feather keys on the fine adjustment mounting sets (*Fig. 8-4*). these feather keys are intended for use with 80 x 80mm² ITEM aluminium profiles (two slots). This profile system is recommended for the mounting frame in order to simplify mounting and alignment (*Fig. 8-5 and Fig. 8-6*).

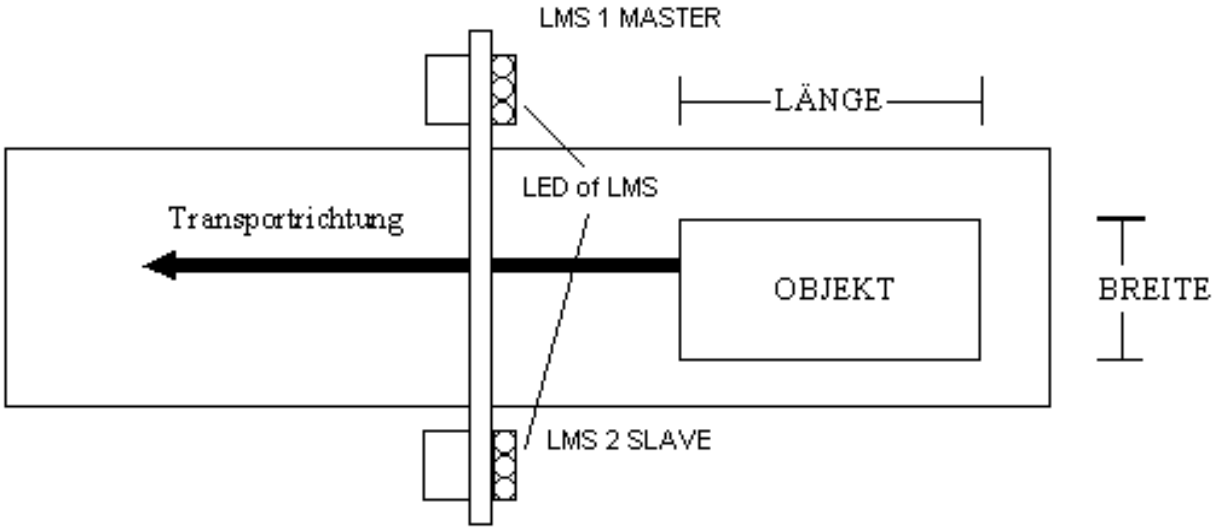


Fig. 8-4: Mounting the components above the transport system.

Fig. 8-5: LMS with fine adjustment mounting set.

Fig. 8-6: Mounting on ITEM aluminium profiles

8.4 Setting up the VMS 200 software

8.4.1 Initialising automatic operation

1. Start the "... Sick \ VMS200.exe“ program.
2. Enter the password for the "Authorised customer" level (SICK_VMS).
3. Switch on display.
4. Use the buttons "Zoom in“ or "Zoom out“ (+ or –), until the scan is visible in the window in the left half of the screen.

8.4.2 Calling up parameter administration

- Use **function key F2** to change to parameter administration.

Please note:

Entries made in the parameter administration must be activated within the software. The particular effect can be seen immediately in the scan. Use the "Activate configuration" button for this.

8.4.3 Configuring the transport speed ("Transfer speed" menu)

1. Select one option for determining the speed (constant or incremental).
2. Enter the speed.
   The speed must always be entered – even if the transfer speed is determined using a shaft encoder.
3. Optional: enter the increment per mm.
4. Enter a station name.
5. Use the "Activate configuration" button.

8.4.4 LMS configuration (LMS configuration menu)

1. Use the **"Next"** button to change to the LMS configuration menu.
2. Measure the distance between the two LMS units and enter it in the menu in mm.
3. Enter the value for the separation line.
   As the separation line represents the co-ordinate at which the scan from the left LMS joins the scan of the right LMS the value should equal the distance between the two LMS units divided by 2.
4. Use the "Activate configuration" button.

Now the LMS units are defined within a shared co-ordinate system. The input of a height equalisation and the supplementary angle of rotation (γ-axis) for the left and right LMS units is described in *Section 7.3.3*.

8.4.5 Configuring the measurement field

1. Change to the "Measurement field configuration" menu.
2. Enter the left and right limits of the measurement field.
   These limits delineate the outer measurement field to left and right. Objects can only be measured if they are moving within this measurement field. **Objects that are less than 30 cm from the LMS are cut out.**
   Recommendation: right limit = 0
   left limit = distance between the two LMS units (see "LMS configuration" menu).
   The lower limit corresponds to the vertical distance between the centre of the rotating mirror wheel and the transport system surface (measure with measurement tape and enter).

3. Enter the detection line.
   The detection line is required for determining the object edges.
   Recommendation: Detection line = lower limit minus 50 mm.
4. Enter standard pallet height in mm.

This defines the measurement field of the VMS 200.

8.4.6 Test using static measurement of a package

The following parameters can be tested and optimised using this test:

1. Lower limit
2. Detection line
3. LMS distance
4. Height equalisation

The following procedure is recommended:

1. Place a test package on the transport system surface.
2. Measure the width and height of the test package with a measurement tape, etc.
3. Use the "Test" button in the "LMS configuration" menu or in the "Measurement field configuration" menu.
   The program then calculates the position of the left and right edges and the width and height of the test package from the left LMS and from the right LMS (100-fold averaging).
   The results are shown after calculation in the right menu half.
4. First change the height equalisation in such a way that the height measured by the left and the right LMS units are increasingly similar.
5. Use the "Test" button again.
6. Change the lower limit in such a way that the package height shown equals the actual package height.
7. Use the "Test" button again.
8. Change the input value "LMS distance" in such a way that the package width shown equals the actual package width.
9. Use the "Test" button again.

In this way the system can be statically (without linear transport of the object) tested for its correct settings, and any retro-adjustments carried out can also be tested!

Please note:
Check the value entered for the detection line if the system calculates no data at all after using the "Test" button. The detection line must pass through the height of the package (also see *Section 7.4.5*).

8.4.7 Defining the plausibility criteria

1. Change to the "Plausibility" menu using the "**Next**" button.
2. Enter the dimensions of the largest and smallest package/pallet that could possibly be measured.
3. Use the "Activate configuration" button.

Please note:
The system carries out a plausibility test based on these dimensions after every measurement and generates an appropriate warning if they are not fulfilled.

8.4.8 Defining the trigger source for start measurement and the units used

1. Change to the "Trigger source for start measurement and units" menu.
2. Use the "Next" button for this.
3. Select the trigger source that is to trigger measurement.
4. Select the units in which the measured values are to be displayed and sent to the host computer.
5. Use the "Activate configuration" button.

8.4.9 Carrying out check for drift

1. The drift check is to be carried out at this point. In order to do this please follow the instructions provided in the "Reference measurement drift check" section.
2. Use the CALIBRATION button in the "Define trigger source for start measurement and units" menu.

8.4.10 Creating a start file

- Use the "Create start file" button.
  The complete measurement system configuration is saved in a restart file ("VMSWorkspace.cfg").

8.4.11 Test measurement

1. Leave the parameter administration by pressing the "Cancel" button.
2. Switch display off.
3. Place a test package on the transport system diagonal to the direction of transport and carry out a measurement.
4. Check the measured values and display of the view from above (right half of the screen).

Problems (and their causes and solutions) that can occur during the test measurement are described in *Table 9-2*. Further errors and warning states are described in *Tab. 9-1*.

8.4.12 Archiving the data entered

When commissioning is over, print out the parameter protocol or complete the enclosed master copy with the parameters used! See Chapter *12. Appendix*.

9 Troubleshooting

9.1 Description of error and warning messages

9.1.1 Specified evaluation unit (IPC) errors and warnings

Status	Code	Name	Possible causes	Remedial action
Error	0x00	Communication LMS left	1. Malfunction in LMS 2. Data cable defective 3. System crash	1. Check LED on LMS 2. Check data cable 3. Restart PC
Error	0x01	Communication LMS right	1. Malfunction in LMS 2. Data cable defective 3. System crash	1. Check LED on LMS 2. Check data cable 3. Restart PC
Error	0x02	Timeout between the request and package/pallet start	1. Transport unit defective 2. Package/pallet not within measurement zone 3. Wrong parameters set: Detection line too high	1. Check transport unit 2. Check alignment of package/pallet 3. Move detection line down
Error	0x03	Object in measurement zone	An object was already below the LMS when measurement commenced	Check whether objects are jutting out into the measurement field
Error	0x04	Max. length	1. Package/pallet too long 2. Package/pallet not in measurement area 3. Transport unit has stopped moving	1. Check alignment of package/pallet 2. Check transport unit
Error	0x05	Min. length:	1. Encoder signal missing 2. Package/pallet exceeds plausibility criteria 3. Freak value in scan due to shiny surfaces	1. Check transport unit's shaft encoder 2. Check package/pallet
Error	0x06	Error in request	A measurement has been requested in the wrong measurement system operational state	Measurement can only be requested when the measurement system has finished the last measurement and the correct trigger source is set
Warning	0x07	No increment	No impulses are available at the digital input	1. Check encoder wiring 2. Check TTL level at PC input 3. Check power supply for encoder
Warning	0x08	Implausible speed	The speed used for internal calculations is implausible	1. Check the wiring 2. Check the signal pattern from the shaft encoder 3. If necessary improve the encoder's EMC stability
Warning	0x09	Reinitialisation package archive	Package file is newly set up	
Warning	0x0A	Reinitialisation error archive	Error file is newly set up	

Warning	0x0B	Implausible dimension	Package dimensions lie outside the specified max. and min. object sizes	Check max. and min. object sizes (see "Parameter administration")
Info		Access to a parameter	A parameter has been changed	
Info		Change of password level	The password level has been changed	
Warning	0x0C	Drift check left	Drift > 20 mm	- Check LMS and screening sheet mounting - Reteach-in reference target - Check parameter in LMS configuration
Warning	0x0D	Drift check right	Drift > 20 mm	- Check LMS and screening sheet mounting - Reteach-in reference target - Check parameter in LMS configuration

Tab. 9-1: Error and warning states

9.1.2 Specified LMS errors and warnings

The error and warning states of both LMS units are also recorded in the error archive with the corresponding identification number. The allocation of the identification number to the description of the error or warning state is listed in the LMS 200 documentation.

9.1.3 Problems during measurement and their causes and solutions

Problem	Possible causes	Solution
- Package is moving below the LMS units but measurement will not start	- The detection line lies above the package - The trigger source for starting the measurement has been wrongly selected - Wrong telegram request from host - LMS units have no power supply - LMS data transfer interrupted	- Adjust the parameter in the parameter administration - Telegram request (*see Section 4*) and "Test host telegram" menu
- Package dimensions are wrong	- Package moves out of the measurement field during measurement - LMS distance, height equalisation, angle of rotation or lower limit wrong - Wrong transport system speed entered	- Adjust the parameter in the parameter administration - Check the alignment of the LMS units - Check the signal at the encoder input with an oscilloscope - Switch off display in the

	- LMS are not set up in a plane - LMS are not set up in line - LMS scanning plane is not at a right angle to the transport direction - LMS are mounted at too great a distance - Transport speed inconstant - Shaft encoder determines the speed but the I/0 card is not installed in the IPC - Shaft encoder input detects interference peaks on the encoder connection - Interfering parts have jutted into the measurement field during measurement - Display is switched on	main menu
- View from above (right-hand display) shows polygon instead of right angles	- Wrong transport speed entered - Wrong entry for increments/mm	- Adjust the parameter in the parameter administration
- Protruding parts are not measured	- Part too narrow (min. width = 2 light spots)	- Reduce distance from object to LMS
- Screen content in front view (left display) is implausible	- Wrong COM interfaces used - LMS wrongly mounted - Wrong angle of rotation or height equalisation	- Adjust the parameter in the parameter administration
- The mouse does not work	- Wrong BIOS setting	- Call up BIOS set-up - Set the PS/2 adapter to ENABLED in the "INTEGRATED PERIPHERALS" menu
- Program fails to initialise the LMS units	- LMS power supply interrupted - LMS data cable interrupted - MOXA card set up with wrong parameters - COM interface settings defined on MOXA card are not identical to those in Windows / Control panel / System - The IPC was not rebooted after the program was installed - A mouse is attached to a COM interface and not, as intended, to the PS/2 adapter	- Boot the LMS then reboot the IPC - Check the wiring - Check the power supply - Take a look at the "SickErr.log“ file and check the last few error entries

Tab. 9-2: Problems during measurement and their causes and solutions

10 Maintenance

Three-monthly maintenance including the following work is recommended:

1. Check both LMS units for dirt.
2. Carry out a test measurement as in Chapter *8.4 Setting up the VMS 200 software*.
   If necessary, re-adjust "Lower limit" and the left and right angles of rotation.

11 Order numbers

11.1 Volume Measurement System

Order number	Description
1 019 221	VMS 200 IPC Volume Measurement System complete, consisting of: - 2 x LMS 200-30106 Laser Measurement Systems (No. 1 015 850) - 2 x Mounting sets for LMS (No. 2 020 925) - 2 x Connection set 10m cable (No. 2 022 655) - 1 x IPC-industrial PC (No. 2022653) including High speed interface card and VMS 200 software with licensing agreement - 1 x connection box for synchronisation (No. 2021520)

Tab. 11-1: Order details for VMS 200 IPC Volume Measurement System

11.2 Accessories

Order numbers	Description
6 011 103	Data cable, per metre
6 021 045	CI0-D1024/CTR3 digital I/O card
2 022 679	Spare part Industrial PC with high speed interface card (without SW-Licence)
6 020 756	Scanfinder

Tab. 11-2: Order details for optional accessories

12 Appendix

12.1 Installation of the system's hardware and software / SW-Update

The VMS200-SW is already installed on the delivered systems.

12.1.1 Have the following components ready (optional)

- I/O card (optional)
- DOS boot diskette
- 4 "INSTACAL“ diskettes for installing the I/O card (optional)
- 3 diskettes for installing the "VMS 200“ software

12.1.2 Setting up the system and connecting the components electrically

1. Position the IPC
2. Connect the mouse and keyboard to the IPC using the PS/2 adapters provided
3. Connect the LMS data cables to the IPC's COM 3 and COM 4
4. Connect the IPC to a power supply (230 V) and switch on
5. Switch on the power supply to the LMS units

12.1.3 Installing additional cards in the IPC (optional)

1. Separate the IPC from its power supply (switch off)
2. Open the computer, remove the slot cover, insert the High-Speed interface card into a free ISA slot
3. Insert the "CIO-DIO24/CTR3“ I/O card into a free ISA slot (optional)
4. Re-close the computer
5. Switch on the IPC

Logging in and installing the High-Speed interface card in the IPC (already installed when delivered):

1. Boot the IPC with the DOS boot diskette
2. Insert diskette with the file "io-irq.exe“ and start "io-irq.exe“
3. Install the High-Speed interface card according to the instructions for installation and operation of the card
4. Re-boot the computer after installing the card
5. Switch to the BIOS set-up during the boot process using the "DEL“ key
6. Call up the "INTEGRATED PERIPHERALS“ menu in the BIOS set-up
   Set the "PS/2 mouse function" to ENABLED
7. Leave the menu
8. Change to the Standard CMOS Set-up menu
9. Set the **Halt On:** entry to 'no errors'
10. Leave the menu
11. Save the BIOS set-up and leave BIOS
12. Re-boot the IPC

12.1.4 Setting the automatic boot process (optional)

Windows NT calls up a menu during every boot process for logging-in the particular user and thus stops the PC. The following steps are to be carried out if the PC, after it has been switched on, is to run completely automatically until the VMS 200 program has been opened.

1. Call up "Program/Administration/User manager“ submenu via the task-bar "START" button in Windows NT
2. Call up the "User/New user“ point
3. Create a new user
4. Enter the user's name and password
   (recommended password: "SICK“, recommended name: the particular customer's name)
5. Leave the menu with **OK**
6. Open Windows NT Explorer and change to the installation directory for the VMS 200 software
7. Call up the "**autolog.exe**“ program
8. Enter the newly configured user and their password – all other settings remain unchanged
9. Use the "**Enable**“ button and leave the program
10. Re-boot the computer
11. The new user must be confirmed once again during the boot process
12. Thereafter, the automatic boot configuration is in place and the PC now always automatically boots up until the VMS 200 software has been opened

Please note:
As a user, one is not authorised with all the rights for configuring the PC. It is necessary to be logged in again as the "Administrator“ so the shift key must be pressed during the boot process in Windows NT. Afterwards the log-in dialog box is called up again, wherein the Administrator can be entered.

Configuring Windows NT and Logging in and installing the optional I/O card in the IPC :

1. Call up WindowsNT-Explorer
2. Insert diskette 1 of the "INSTACAL“ installation diskettes
3. Open the "setup.exe“ file
4. Call up the "Components to be installed" menu
5. Select the component "32-bit Universal Library and Instacal“ for installation
6. Follow the subsequent program instructions
7. Re-boot the computer after installation
8. Call up the "Instacal“ program
9. Call up the "Add board" function in the "Install" menu
10. Select the "CIO-DIO24/CTR3“ board from the designations listed
11. Allocate the board the board number "0“ and confirm with the "Add" button
12. Close the program
13. Call up the sub-menu "Settings/Control panel/System" under Windows NT using the "START" button
14. Select port "COM3“ and use the "Settings" button
15. Use the "Expanded" button
16. In the menu set the identical settings for the input and output addresses and the interrupt request (IRQ) as were selected during the installation of the High-Speed interface card
17. Confirm settings with "OK" button
18. Select the "COM4“ port and use the "Settings" button
19. Use the "Expanded" button
20. In the menu set the identical settings for the input and output addresses and the interrupt request (IRQ) as were selected during the installation of the High-Speed interface card

21. Confirm settings with the "OK" button
22. Call up the "Settings/Control panel/Connections“ submenu in Windows NT via the "START“ button on the task-bar
23. Change to the "Devices" menu
24. Select the "Serial mouse device“ as device
25. Use the **Start-up** button and set the start option in the subsequent menu to DISABLE
26. Leave the system settings
27. Re-boot the IPC

12.1.5 Installing the "VMS 200" software (already installed when delivered)

1. Call up WindowsNT-Explorer after booting
2. Insert diskette 1 of the "VMS 200“ software
3. Start the file "setup.exe“ and follow the installation instructions
4. Re-boot the computer after finishing installation
5. Start the "VMS 200“ software

12.1.6 Update VMS 200" software

1. De-Install the existing SW with the WIN-NT De-Installer
2. Remove all VMS 200 directories from the hard-disk
3. Re-Install the new SW

12.2 VMS 200 parameter log

Prepared by:
Date:
Station name:

Parameter	Unit	Value
I/O configuration		
Speed	m/s	
Increments/mm	Incr/mm	
Station name		
Measurement field configuration		
Limit left	mm	
Limit right	mm	
Lower limit	mm	
Detection line	mm	
Standard pallet height	mm	
LMS Configuration		
Separation line	mm	
Rotation angle equalisation LMS right	°	
Rotation angle equalisation LMS left	°	
Height equalisation	mm	
Distance between LMS units	mm	
Plausibility		
Length smallest package/pallet	mm	
Width smallest package/pallet	mm	
Height smallest package/pallet	mm	
Volume smallest package/pallet	m^3	
Actual volume smallest package/pallet	m^3	
Length largest package/pallet	mm	
Width largest package/pallet	mm	
Height largest package/pallet	mm	
Volume largest package/pallet	m^3	
Actual volume largest package/pallet	m^3	

VMS 200 parameter log (continued):

Trigger source for measurements		
F4 button		
Digital input		
Automatic		
Host request		
Units		
mm, dm³		
inches, cubic inches		

12.3 Technical checklist

TECHNICAL CHECK LIST
VMS 200 IPC Volume Measurement System
(Inquiry / Commissioning)

1 Customer

Customer:

Name, Adress

Contact Person:

Name, Department

phone:
fax:
email:

Project:

Location:

Sick-Sales Person:

Name

Name

(Only for commissioning: The installation of the LMS and wiring of the VMS system should be done by the customer.

See technical description VMS 200)

2 Objects (Parcels, Paletts, etc.)

◯ Parcels (box):

	length	width	hight
max size			
min size			

◯ freight (paletts):

	length	width	hight
max size			
min size			

reflectivity of objects*:

miscellenous:

* (Concerning Remmission) i.e. shiny, black to white

3 record of conveyor speed

Type of conveyor*

◯ constant speed (m/s):

◯ incremental speed (m/s): maximal minimal

Increments/mm:

cable length between shaft encoder and IPC

electrical level of shaft encoder: des Inkrementalgebers:
z.B. TTL

* e.g.: conveyor, sorter tray, linear motion unit (LMS), etc.

4 Parcel/ Pallets

Time gap between parcels/pallets

Distance between parcels/pallets

Parcels/pallets per hours:

Remarks:

Location of IPC:
e.g.: service cabinett, table, etc.

5 Enviromental Conditions

Range of temperature

Location ◯ indoor ◯ outdoor

Pollution:

6 Electrical supply

Customer related:

IPC: ◯ 230V AC/50 Hz ◯ 115 V AC/60 Hz

Availability of 24 V DC (LMS): ◯ yes ◯ no

Cable length between LMS und 24V supply: _____

7 Transport / Mounting

Mounting hight of LMS above ground: _____

Mounting hight of LMS above conveyor: _____

Width of conveyor: _____

Distance between LMS: _____

_____

_____

8 Systemfunction

Desired method of activating measuring system:

◯ Button

◯ Digital input

◯ Host telegram

◯ Automatic

For operating the VMS 200 the following components are required!

1. Mouse
2. Keyboard
3. Monitor

Would you like to order any of these from SICK? ◯ yes ◯ no

9 Remarks

9 Sketch

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