LORENZ MESSTECHNIK GmbH
Obere Schloßstr.131
D-73553 Alfdorf
☎ +49 7172/93730-0
Fax +49 7172/93730-22

Operation Manual for Configuration and Evaluation Software VS3



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2 Imprint

Manufacturer, Place	Lorenz Messtechnik GmbH, D-73553 Alfdorf.
Valid for...	VS3 V1.01
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Modification	Technical changes reserved.

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3 Remarks

This manual describes the installation under Windows 7. The installation under Windows 2000, XP, Vista and Windows 8 occurs accordingly.

Please note that Windows imperatively requires administrator rights for the installation of drivers! Please speak to your administrator if you do not have those rights!

3.1 License Terms for Lorenz Software

The copyrights for this software remain at:

Lorenz Messtechnik GmbH
Obere Schlossstrasse 131
73553 Alfdorf

Germany

http://www.lorenz-sensors.com

During the software installation, the license conditions will be displayed and must be accepted, otherwise the installation will be aborted. After the installation, the license conditions can be viewed in menu **'Help → Advice'**.

3.2 Intended Use

The VS3 software was designed for the adjustment, control and read-out of the LCV-USB2&3, SI-USB or the SI-ETH. Further functions of the VS3 are reception, display and storing of measured values. Any use beyond this is considered as not intended.

3.3 Designation of the Remarks

If possible remaining dangers emerge during the operation with VS3; this will be indicated by the following symbols in this operation manual:



Note:
Important points to consider

3.4 System Requirements

The operation of VS3 requires a PC with following system conditions:

- Windows 2000, Windows XP, Windows Vista or Windows 7 / Windows 8
- For SI-USB or LCV-USB2/3: USB-Interface
- For SI-ETH an Ethernet-Interface
- For SI-RS485: RS485-Interface or RS232-Interface when DRE/IF01 interface converter is used
- Maximal two monitors will be supported

Recommended Hardware Requirements:

- Application process without diagram: Single-Core from 2,0 GHz
- Application process with diagram: Dual-Core from 1,8 GHz
- The higher the sampling rate and the longer a measurement lasts, the higher the required main storage should be. The measurement ends as soon as the system does not provide anymore free main storage space. The absolute size of the main storage is depending on the operation system and the components installed in addition.

4 Preamble

4.1 Product Description

This operation manual describes characteristics and operation courses of the VS3.

4.2 Setup of the Software

The VS3 consists of following components:

- Configuration possibilities for the VS3
- Storage of sensor-related scaling and adjustment data
- Display for the presentation of measured data (actual value, tare value, minimal value and maximal value)
- Display and storage of measured data evaluations
- Presentation of the measured data in a diagram
- Storage of measured data in CSV-format (output configurable)
- Storage of the diagram in BMP-format (output size configurable)
- Print-out of the diagram (output size defined)
- Presentation of the sensor information

4.3 Safe and Correct Use

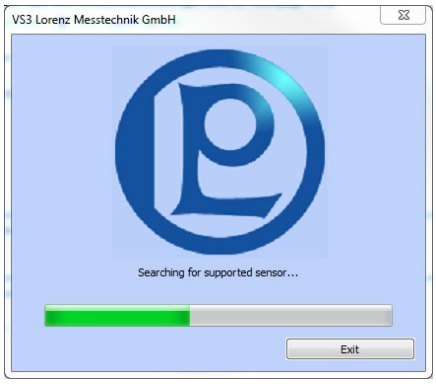
Observe the correct sensor adjustment.

Consider the correct VS3 configuration.

Choose a significant file identification/prefix when storing measured data.

5 Starting the Software

The software starts only if it identifies a compatible sensor[1] at the ETH connection. After starting the executable file, the search for a compatible ETH sensor[1] is displayed. If the search is unsuccessful, check whether the ETH circuit at the sensor is connected to the PC and whether the ETH drivers have been installed. Then click on **'Search again'** to restart the search for a compatible sensor. If a compatible sensor was found, the sensor-related data will be read-out automatically.





[1] Compatible sensors: LCV-USB2, SI-ETH, SI-USB and SI-RS485

6 Description of the Operating Mode

The software consists of a menu bar, navigation bar, status bar and a workspace. The functions of the menu bar comply with the navigation bar. The digital measured values of the physical values, the valuation display and the diagram can be seen in **'Operating Mode → Meas./Diagram Mode'**. In the workspace the consolidated dialogs are displayed in **'Operating Mode'**.

- **Adjust. Mode** (see chapter 6.2)
- **Meas./Diagram Mode** (see chapter 6.3)

Switching between the dialog boxes can be done through the navigation bar as well as through the coequal menu bar. Adjustment changes in the dialog box will be accepted without confirmation.
All adjustments are stored when quitting the application and will be loaded when the application gets restarted.
The status bar displays current status information of the application

- 'Ready for use. Sensor connected'
- 'Sensor disconnected'
- 'Measure...'
- 'wait for trigger start event'
- 'Measure! Wait for trigger stop event'

Furthermore, information from the menu bar and navigation bar through the control elements as well as the storage progress in a CSV-file are indicated in the status bar.

6.1 The Menu Bar/Navigation Bar of the Program

6.1.1 File → Save Measvalue (Shortcut 'Ctrl+M')

From here, the measured data of the last measurement[2] are stored in a CSV-file. The output format of the file is adjustable in dialog box **'Operating Mode → Adjust. Mode → Documentation'** under the headline **'Output measured values'** (see chapter 6.2.4.1 Documentation → Output Measured Values). In the first column of the CSV-file, the measured values are numbered ascending. The output of columns two to maximal three will be taken over by adjustment **'Operating Mode → Adjust. Mode → Measure Adjust.'** under the **'Diagram'** headline. Here, each adjusted physical value will be written into the file. The sequence: [X-Axis], [Y1- Axis], [Y2- Axis].

Caution: all output adjustments must be carried out before the measurement.

Caution: a CSV-file is a text file for the storage of simply structured data. The abbreviation CSV stands for Character Separated Values or Comma Separated Values. These values are separated from each other by special delimiters, e.g. by a comma or a semicolon. A CSV-file can be started by Excel® through double-click (Windows Excel® 2007 - import via data → "from text").
The denotation of list/field/line-ending marks is not explicitly determined. The definitions under 6.2.4.1 Documentation → Output Measured Values → **'End of line character' / 'Column separator' / 'Decimal separator'** must possibly be adjusted in VS3 or in your spreadsheet. For this, see the manual of your spreadsheet.

Headline:		
Messung 1.4		
Address:		
Lorenz Messtechnik GmbH		
Obere Schlossstraße 131		
73553 Alfdorf		
Comment:		
Dipl. Ing. K. Mustermann		
Measurement informations:		
Sensor: SI-USB	SG	Torque
Sensortype:	2009	
Serial number:	123456	
Serial number (Channel):	A12345	B12345
Upper range value:	SG	1,00 kN·m
Accuracy class:	0,10%	0,10%
Uncertainty of measurement:	n.a.	0,01%
Sampling rate:	2500/sec	
moving average:	512	128
Sampling rate reduction with averaging over 125 values.		
Factory adjustment:	05/07/2006 inactive	
User adjustment:	09/25/2009 active	
Start (Date Time):	09/28/2009	8:20:27 AM
#	Channel A (mV/V)	Channel B (kN·m)
0	0,000 mV/V	-1,6384 kN·m
1	0,000 mV/V	-1,6384 kN·m
2	0,000 mV/V	-1,6384 kN·m
3	0,000 mV/V	-1,6384 kN·m
4	0,000 mV/V	-1,6384 kN·m
5	0,000 mV/V	-1,6384 kN·m
6	0,000 mV/V	-1,6384 kN·m
7	0,000 mV/V	-1,6384 kN·m
8	0,000 mV/V	-1,6384 kN·m
9	0,000 mV/V	-1,6384 kN·m
10	0,000 mV/V	-1,6384 kN·m

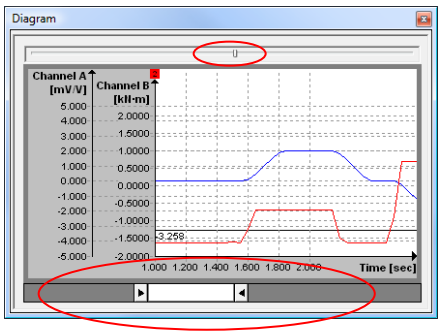
[2] Measurement: recording of a measured value series in the configured measuring rate of Start […] to Stop […].

6.1.2 File → Save Diagram (Shortcut 'Ctrl+D')

From here, measured data of the previous measurement2 can be stored in a BMP-file.
Predefined output variables can be adjusted in **'Operating Mode → Adjust. Mode → Documentation'** under the **'Output diagram'** heading in box **'Memory size'**. There are following possibilities:

- **max:**
  Adjustment is only available, if the running system recognizes two monitors. On these two monitors, the diagram is maximum size stretched and stored.
- **normal:**
  The diagram is stretched to approx. screen size and stored.
- **min:**
  The diagram is stretched to approx. 800x600 pixel of the monitor and stored.
- **Window:**
  The diagram gets stored the way it was adjusted by the user.

Any measurement range can be selected by the range slider and the interval slider.



→ Range slider

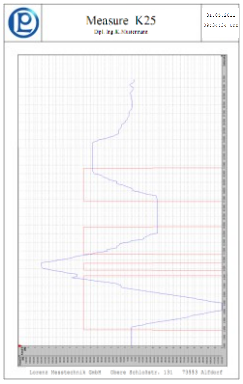
→ Interval slider

The diagram has a context menu. By right-click on the mouse key, following functions are available:

- **Zoom in:**
  The mouse pointer becomes cross-shaped. By pressing the left mouse key and moving the mouse in the diagram, a rectangle appears which can be zoomed by releasing the mouse key.
- **Zoom out:**
  The diagram indicates the complete range of the previous measurement.
- **Scrolling:**
  The mouse pointer becomes cross-shaped with arrows. By holding the left mouse key in the diagram, the curve can be shifted.
- **Grid on/off:**
  The dashed lines in the diagram form the grid. By this function, the dashed lines can be faded in/out.
- **Show legend:**
  The legend indicates the physical variables and their units. By this function, it can be faded in/out.

Caution: When storing the diagram, only the currently presented part of the measurement will be stored.

6.1.3 File → Print (Shortcut 'Ctrl+P')



This function enables the print-out of the diagram with print time, configurable heading, configurable remark, configurable address as well as a customized logo (picture to the right).
The user can carry out the configuration by the navigation bar "documentation"[3].
Line breaks in remark and address are converted into blanks.
Following restrictions are valid

- The heading is restricted to 20 characters
- The remark is restricted to 57 characters
- The address is restricted to 82 characters

In order to contain a customized logo, it must be stored under the file name "Custom_Print_Logo.bmp" and copied to the folder "%USERPROFILE%\AppData\Local\Lorenz"[4].

Caution: the recommended properties of the "BitMap „Custom_Print_Logo.bmp" are:

- Resolution: 160 pixel *160 pixel
- Maximum bit depth: 32bit

If there is no file named "Custom_Print_Logo.bmp" placed in the folder "%USERPROFILE%\AppData\Local\Lorenz", the Lorenz logo will be contained.

6.1.4 File → Exit (Shortcut 'Ctrl+E')

Closes the program. If the program is still in the measuring mode while closing, the measurement will be ended. If automatic storage is adjusted (see chapter 6.2.4.1 Documentation → Output Measured Values and chapter 6.2.4.2 Documentation → Output Diagram) it will be executed before the program is closed.

6.1.5 Operating Mode

This umbrella term contains all sensor-specific adjustments **'Adjust. Mode'** as well as the **'Meas./Diagram Mode'**. By selecting a mode it will be displayed in the workspace. Following dialog boxes can be displayed:

- Adjust. Mode → Sensor Connection (see chapter 6.2.1)
- Adjust. Mode → Sensor Information (see chapter 6.2.2)
- Adjust. Mode → Measure Adjust. (see chapter 6.2.3)
- Adjust. Mode → Documentation (see chapter 6.2.4)
- Adjust. Mode → Sensor Adjustment (see chapter 6.2.5)
- Meas./Diagram Mode (see chapter 6.3)

When restarting the software it will start with the previous active dialog box. The next menu can be entered via the shortcut 'Ctrl+TAB'; the previous menu can be entered by 'Ctrl+Shift+TAB'

[3] see chapter 6.2.4
[4] The environment variable %USERPROFILE% stores the current Windows® path of the registered user.
This path is defined during the Windows® installation and can be changed in the system control and through the group guidelines.
The user name is also included in the path...
As default, this path under Windows® 7 reads:
C:\Users\<Username>

6.1.6 View

The control elements under **'View'** are responsible for fade in/out of bars and displays as well as setting back the windows view. In the menu/navigation bar a checkmark indicates faded in/out bars and displays. The digital displays and the diagram can only be switched in the measuring and diagram mode, otherwise they are grey (disabled). While executing **'View → Reset Views'** (e. g. via the shortcut 'Ctrl+R') the digital displays, the diagram and the main window are set back to original condition.

6.1.7 Language

Here, the language of the VS3 can be adjusted.
All indications of the application are changed in accordance with the selected language.
Following languages are supported:

- German
- English
- French

At restart of the software, the previously adjusted language will show.

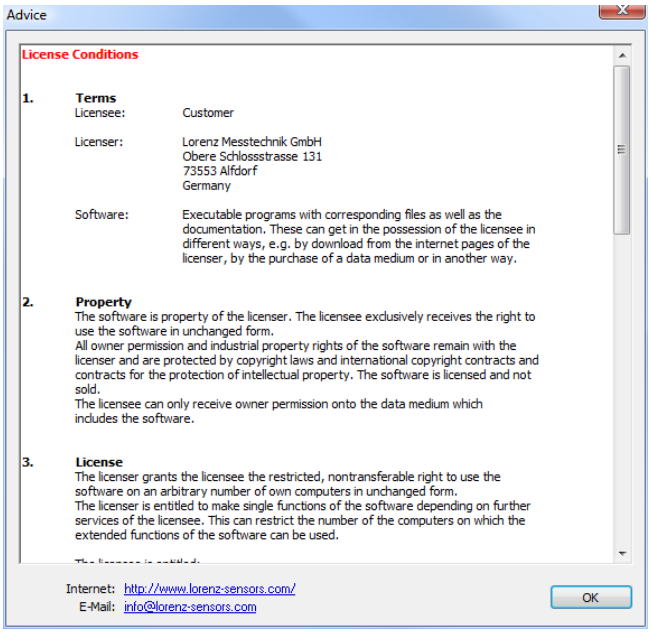
6.1.8 Help → Info



Here, the version number of the software is indicated.

6.1.9 Help → Advice

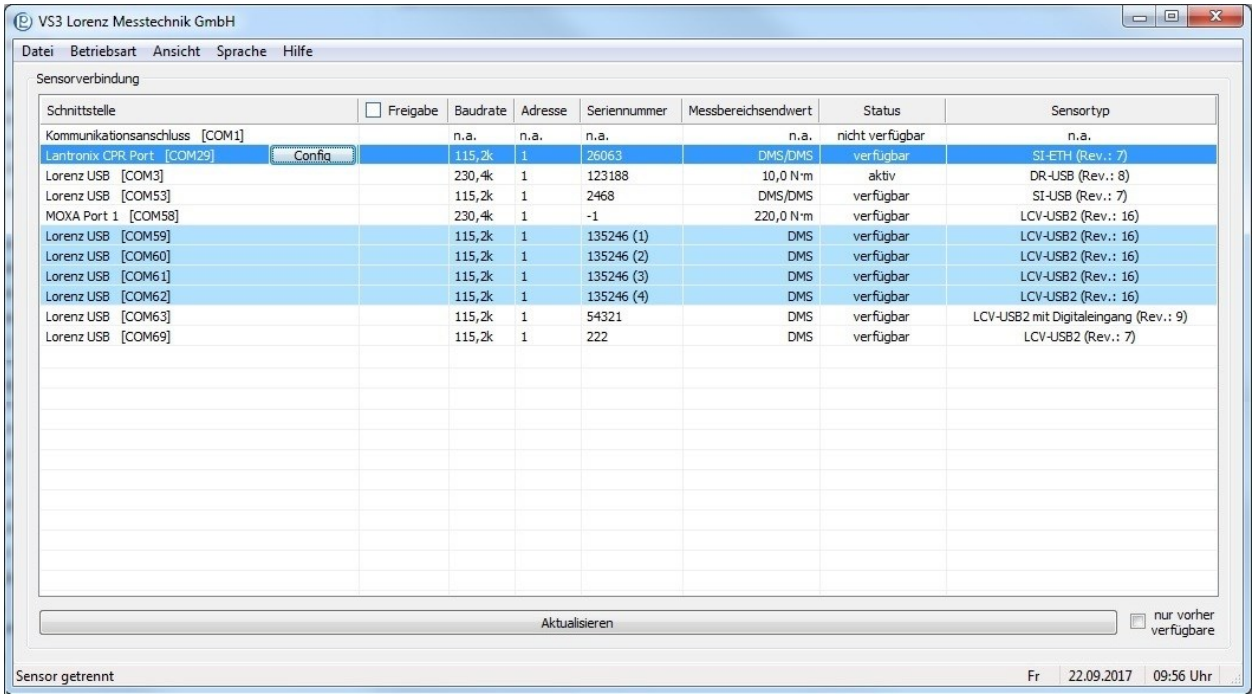
Contains the license conditions for this software, the address as well as the website and e-mail links.



6.2 Configuration Mode

The configuration mode contains all of the sensor-, measurement- and documentation adjustments as well as the output of sensor information. The adjustment dialog boxes are presented in the work space through the menu/navigation bar. In the following chapters, the adjustments are introduced and the functions are explained.

6.2.1 Sensor Connection



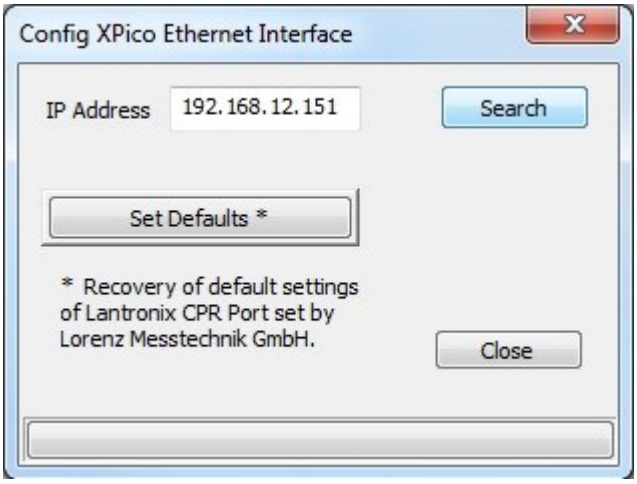
This software exclusively supports Lorenz devices of the type LCV-USB2/3,SI-ETH,SI-USB and SI-RS485. If a Lorenz device is connected directly or indirectly to a PC, it will be automatically activated by the VS3. The VS3 can only activate one sensor at a time. The selected sensor gets activated by double-click in one of the displayed lines where the ‘State’ is shown as ‘available’. Sensors and devices in columns with ‘State’ ‘not available’ cannot be activated. ‘Not available’ means that the VS3 could not open or activate the interface, or that the device did not respond. If another process or application takes access on the required interface, this access must be closed. Then search for free interfaces by the ‘Update’ key. The status ‘not available’ indicates Lorenz devices which are not compatible with this software.
The list indicates further information about a device such as baud rate (115.2 or 230.4 kBaud), address, serial number, final value of the measuring range and sensor type. The final value of the measuring range indicates the actual nominal value of the channels or the interface type SG, Current, or Voltage. At the two-channel SI-USB or SI-ETH, the measuring ranges are presented separated with a slash (channel A / channel B).
The deactivation of a device occurs either by the activation of another device or by double-clicking on the active device. When deactivating, the COM interface gets released and can be used by other applications.

6.2.1.1 Special case SI-USB3

All detected LCV-USB of the device are shown in one line of the table. All these lines get the same status, the light blue background and the numbering of sensors inside the device. If more SI-USB3 are connected, other pastel colors will be added

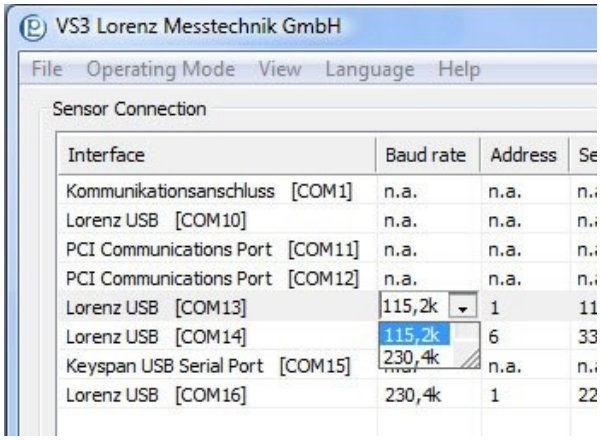
used accordingly. With a double-click in a grouped line, all LCVs of the device are switched to another status.

6.2.1.2 Special case SI-ETH



If a SI-ETH is connected but not available, the settings of the corresponding port may be the reason. To check this, please click on the corresponding line. Now the button "Config" should be visible. Clicking on this opens the dialog for restoring the default settings. Write the IP address of the searched SI-ETH in the field or search for it. If several IP addresses are offered, select the corresponding IP address. Then click on the button "Set Defaults"

6.2.1.3 Device Connection → Baud Rate



The baud rate can be switched between 115.2 kBaud and 230.4 kBaud by a click on column 'Baud rate' on the corresponding interface (see example on the left 'Interface' "Lorenz USB [COM 13]").

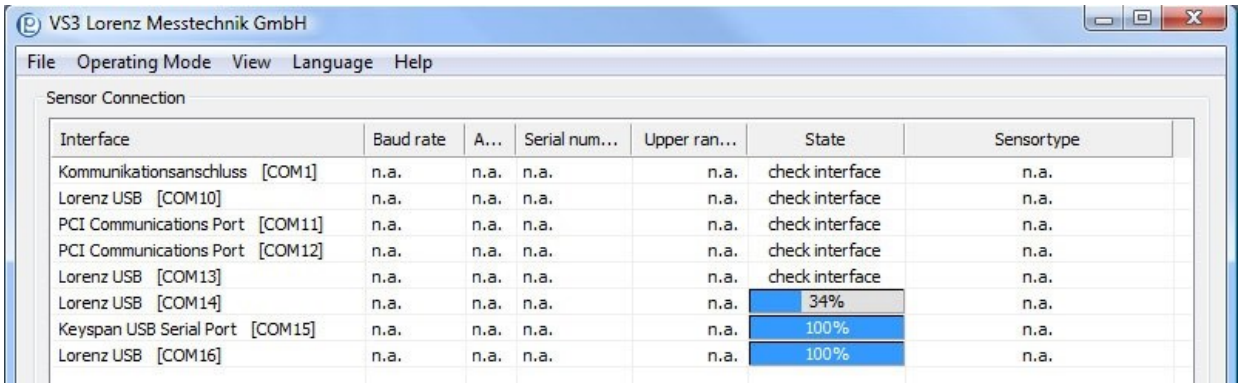
Baudrate in Baud	maximal adjustable Measurerate single-channel	co-channel
115200	2500/s	1250/s
230400	5000/s	2500/s

The changed baud rate is constantly stored in the sensor. This adjustment is also valid for the interplay with other applications.

The maximal adjustable sampling rate is depending on the adjusted baud rate and the used processor of the PC.

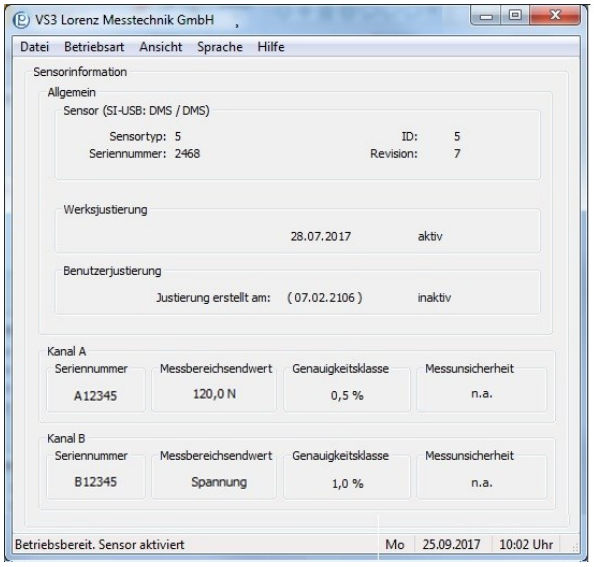
6.2.1.4 Device Connection →Update

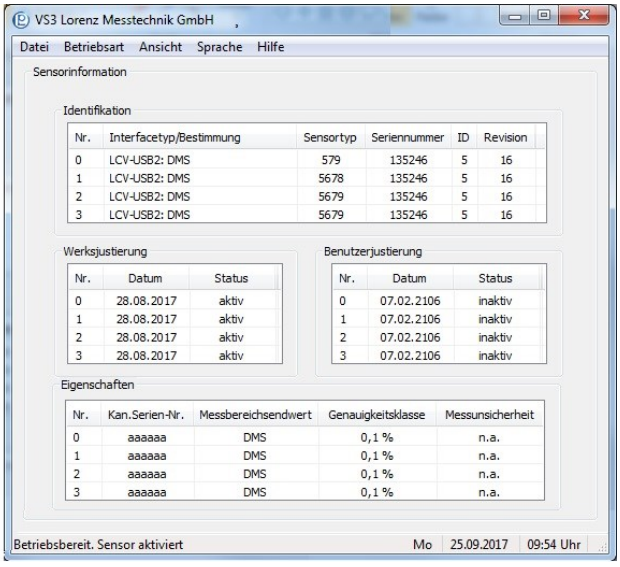
During this update all "Lorenz ETH" interfaces which are incorporated in the PC will be checked and read-out. Herewith, the baud rate as well as the device address is detected and automatically adjusted. Furthermore the complete sensor data and sensor information will be read-out. The course of the update will be visually presented (see following image).



Caution: The state of SI-RS485 devices must be updated manually with the button “Update”

6.2.2 Sensor Information





This dialog box shows information and characteristics of the activated sensor. The VS3 reads the data during the sensor activation. If no sensor is activated, all indications are ‘n.a.’ (not available). If the uncertainty of measurement shows ‘n.a.’ it means that the uncertainty of measurement is not stored in the activated sensor. This value is determined in % from a Lorenz proprietary calibration or a DKD calibration. The detected value can be stored in the active sensor in menu **‘Sensor Adjustment’** under **‘Store uncertainty of measurement in the sensor’**.
LCV-USB2/3, SI-ETH, SI-USB and SI-RS485 have two storage spaces for adjustment values, an unchangeable proprietary block and a changeable user adjustment block. At user adjustment, the condition ‘active’ is also marked with ‘*’,in case this adjustment uses the same factors as the proprietary adjustment. This is the case at subsequent filing of the uncertainty of measurement at active proprietary adjustment.

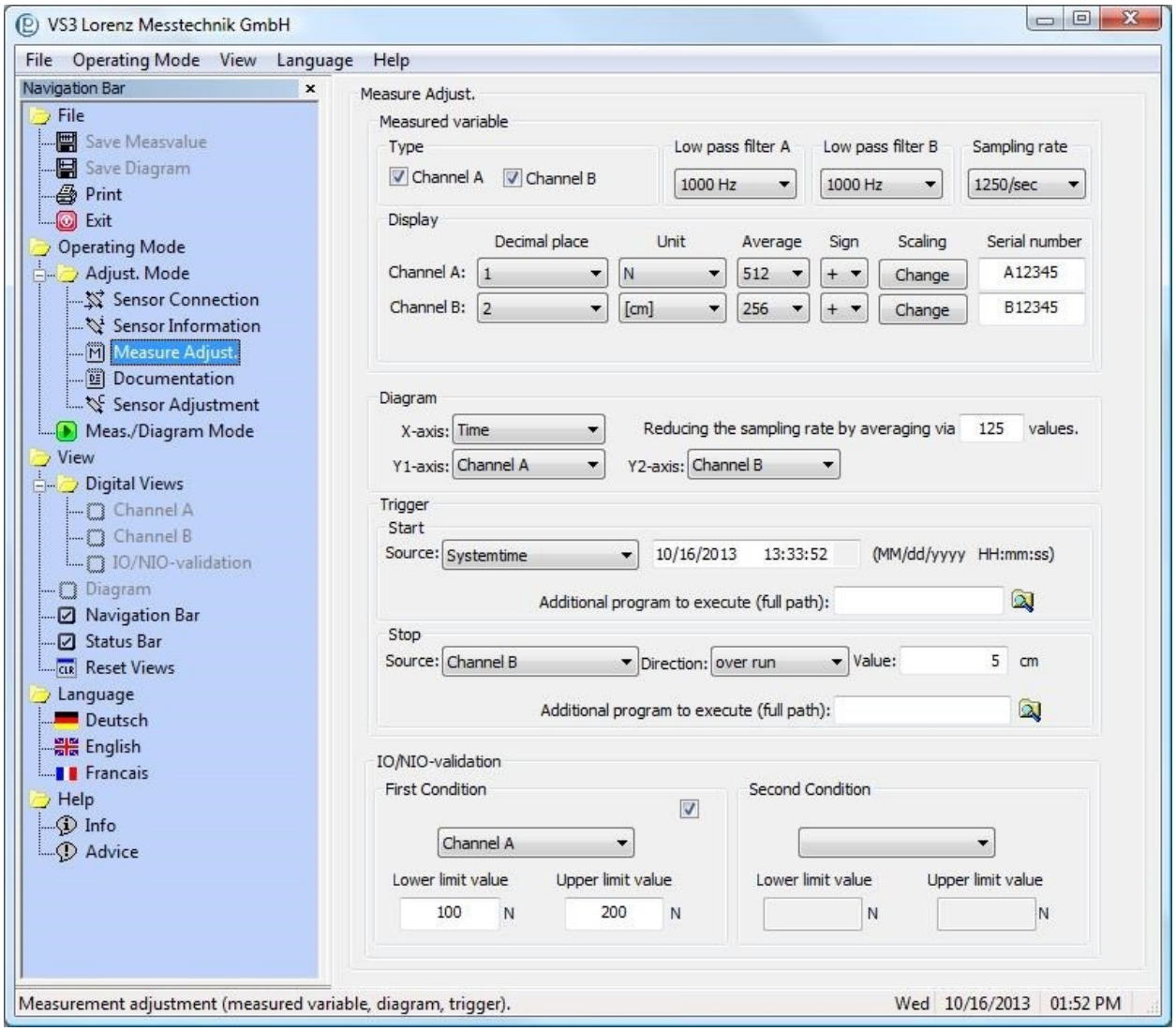
6.2.2.1 Sensor Information → Common

This shows the general information of the connected sensor. Under the headline “Sensor” the sensor designation LCV-USB2/3, SI-ETH, SI-USB or SI-RS485 with indication of the sensor type (SG, Voltage, Current, Torque, Force, …) is listed in brackets, whereby channel A and channel B are separated by a slash "/". Sensor type, serial number, ID, Revision and proprietary calibration are non-modifiable default parameters.

6.2.2.2 Sensor Information → Channel A/B

These fields contain information of the respective measuring channel. In case of the LCV-USB2/3, only channel A is viewable and in case of SI-ETH, SI-USB or SI-RS485, channel A and channel B can be viewed. The serial number can be changed by the user in dialog box 'Measure Adjust.' under **Measured variable→Display→ Serial number** (see following chapter 6.2.3 Measurement Adjust.). Lorenz Messtechnik GmbH recommends entering the serial number of the connected sensor.

6.2.3 Measurement Adjust.



In this dialog box all measuring adjustments can be viewed and changed. The measurement adjustments are subdivided into measured variable, diagram, trigger and OK/NOK-evaluation. Except for the serial number, these adjustments will be accepted without confirmation.
The serial number field is secured by a query. The query appears after the first adjustment in the field. The serial number is limited to maximal 6 digits. Possible characters are capital and lower case letters from A-Z as well as numeracy from 0 to 9.
The adjustments in **Measured variable→Type, Measured variable→Sampling rate, Measured variable→Display** and **Measured variable→Diagram→Reducing the sampling rate by averaging via X values** are sensor related data and are saved in the sensor. Herewith an automatic configuration of the software to the connected sensor is warranted.
When the application is finished, the previously not mentioned values are stored in the Windows registry under the logged in user and restored after a restart of the software.

6.2.3.1 Measurement Adjustments → Measured variable → Type

This workspace is for the configuration of the measured variables which were recorded by VS3. Before adjusting it must be decided which channels shall be collected. This adjustment is selected accordingly under Measured variable→Type. After switching, the control elements and their contents will be adapted accordingly in Measured variable→Display, Measured variable→Diagram.

Caution: Selection of two channels is only possible if a Lorenz device of type **'SI-USB', SI-ETH, SI-RS485** or **'LCV-USB2/3 with digital input'** is connected. At type **'LCV-USB2/3'** channel A is a default adjustment and cannot be changed.

6.2.3.2 Measure Adjust. → Measured variable → Low pass filter

Caution: This selection option is only available for 'SI-USB' and 'SI-ETH'

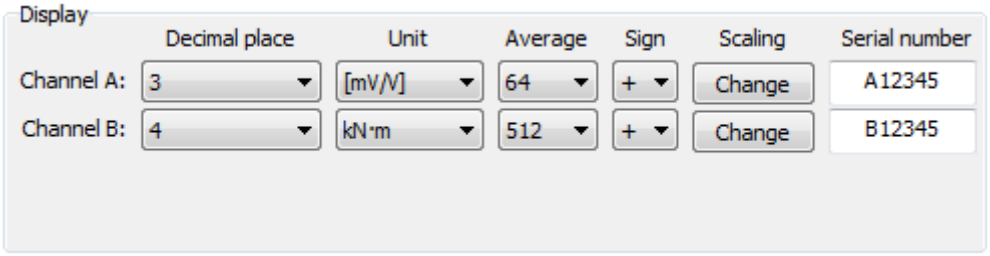
The integrated analog input filter is configured with this setting. The adjustment is made separately for each measuring channel.
The following 3dB-frequencies are adjustable: 30 Hz, 300 Hz, 1000 Hz, 3000 Hz.

6.2.3.3 Measure Adjust. → Measured variable → Sampling Rate

Following measuring/sampling rates are adjustable: 5000/sec, 2500/sec, 1250/sec, 1000/sec, 500/sec, 250/sec, 200/sec, 185/sec, 100/sec, 50/sec, 33/sec, 25/ sec, 20/sec, 10/sec, 1/sec, 50/min, 20/ min, 10/ min, 1/ min.
The maximal adjustable sampling rate is depending on the adjusted baud rate and the PC system (see chapter 7.2.1.1 sensor connection → baud rate).

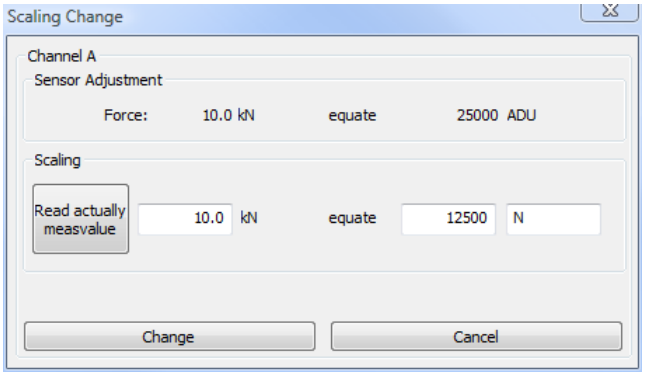
6.2.3.4 Measure Adjust. → Measured variable → Display

The configuration view differs depending on the connected device. At the LCV-USB2/3 only one channel will be displayed. At SI-RS485, SI-ETH and at SI-USB there are two channels.



The adjustments under 'Measured variable→Display' determine the output and display of the respective channel. Hereby, the number of decimal places, the unit, gliding averaging and the leading sign can be selected and configured. Furthermore an own serial number can be assigned to each channel.
Up to four decimal places can be indicated for every physical size. This adjustment is considered in the digital displays, in the diagram and in the readout of the CSV-file. For the adjustment of the unit of a physical size, German, English and American units can be selected. The selection is dependent on the type class of the connected device. The conversion onto the adjusted unit is automatically carried out by the software. The under "Scaling" additionally defined unit is shown in square brackets. A gliding average can be formed for each physical size of 1 to 512 values, with a grading in raster 2^n of the adjusted sampling rate. The leading sign of the channel is predefined in the sensor and through the adjustment 'Measured variable→Display→Sign' it can be changed.

Key 'Change'[5] under Scaling opens a dialog which allows scaling as well as the definition of an additional unit. In the choice box 'Measured variable→Display→Unit', the additional unit is marked with square brackets.

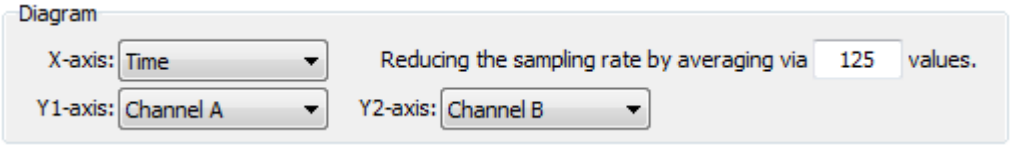


In dialog 'Scaling Change' the input variable (see previous image 'Scaling Change' under headline 'Measure Adjust.') can be scaled with an arbitrary unit. The 'Sensor adjustment' displays the defined proprietary calibration and/or the user adjustment of the channel. In the image channel A with the input variable force which reads out 25000 ADU at 10.0 kN nominal value was selected.

A readjustment of these values can carried out through the input boxes in Scaling. In the left input box either a certain force value can be entered or the actual measured value of the sensor can be read. In the middle input box the new output value which corresponds to the input value of the left box must be entered. In the right input box a unit with a maximum length of 5 digits can be entered. By pressing key change5, these inputs will be saved in the sensor.

Caution: The closer the scaling value to the final value of the sensor, the more precisely is the display of the measured value during the measurement.

6.2.3.5 Measure Adjust. → Diagram



In input box 'Reducing the sampling rate by averaging via X values.' it is possible to decrease the measuring points which should be saved by entering a value for **X**. Hence, the adjusted sampling rate e.g. 200/sec at X=10 will be reduced to 20 displayed values in the diagram. This is also valid for storing the measured values in a file. When reducing the sampling rate, an averaging over the last **X** values is carried out.

The adjustment 'Reducing the sampling rate by averaging via X values.' has no effect on the represented values in the digital displays.

The adjustments under 6.2.3.4 Measure Adjust. → Measured variable → Display → Average of the individual physical sizes and the adjustment 'Reducing the sampling rate by averaging via X values.' act cumulatively.

During the update of the diagram during an ongoing measurement, the complete measurement is represented at a resultant sampling rate less than or equal to 20 measurements/sec. At sampling rates higher 20 measurements/sec, only the last 5 seconds of the measurement are represented. After the termination of the measurement, the complete measurement is always shown in the diagram.

The adjustment of this configuration should be started with the X-axis. Resulting from the adjustment of the X-axis, the application updates the number of Y-axis as well as their selectable contents. All combinations of measuring variables can be represented in a diagram.

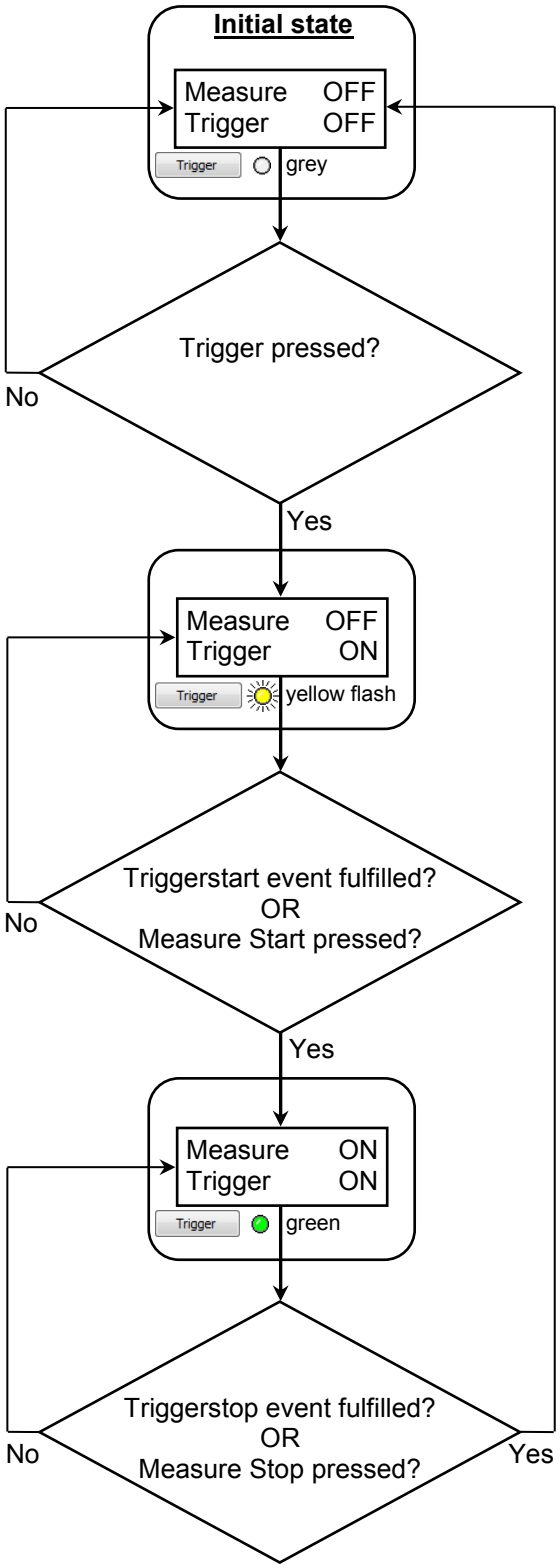
[5] If no scaling was stored, 'Create' will appear instead of 'Change' and the selection in the unit box is limited to the device type without an additional unit.

Caution: The measured values are written in a CSV-file with the adjusted channels. The writing sequence is: [X-axis], [Y1-Achse], [Y2-axis]. If a Y-axis is not required, it is also possible to set them to “Off”. Nevertheless, the application assures that minimum one variable on the Y-axis has not been set to “Off”.

Measure Adjust. → Trigger

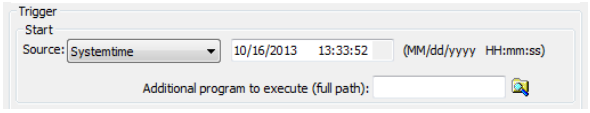
Course:

1. Select a start event.
2. Select a stop event.
3. Enter trigger key.
4. Actuate a trigger start event.
5. Actuate a trigger stop event.
6. Measurement recorded.

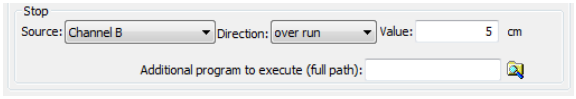


In the previous signal flowchart, the general course of measurement by means of a triggering is described. The activation button **'Trigger'** can be found in the **'Meas./Diagram Mode'** under **'Measure Stop'**. The software triggering consists of two events which are adjustable according the requirements as follows:

- **Trigger start → Source:**
  - **Off/Measure Start:**
    Entering **'Measure Start'** releases the Trigger start event. (The function to start an event can also be entered in the following sources).
  - **Channel A / Channel B:**
    See chapter 6.2.3.5.1 Trigger.
  - **System time:**
    The application shows an input box where the date and the time of the measurement start can be adjusted. The adjustment is limited to the current time plus 15 seconds. These values must be re-adjusted after each measurement; otherwise the following measurement will start immediately by pressing the trigger, because the previously adjusted time lies in the past.



- **Trigger stop → Source:**
  - **Off/Measure Stop:**
    Entering **'Measure Stop'** releases the Trigger stop event. (The function to stop an event can also be entered in the following sources).
  - **Channel A / Channel B:**
    See chapter 6.2.3.5.1 Trigger.
  - **Measurement duration:**
    For this selection an input box is available. The time unit (seconds, minutes) is taken from the sampling rate. The number of measurements is calculated and displayed by the application next to the input box.
  - **Number of measurements:**
    For this selection, an input box is available to indicate the number of measuring points. The measurement duration is displayed and calculated next to the input box. The time unit (seconds, minutes) is taken from the sampling rate.

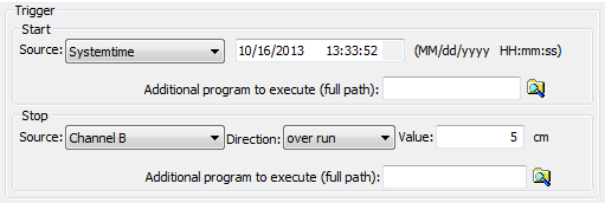


Remark: The source adjustments of trigger start and trigger stop can be optionally combined with each other.

Remark: The adjustments "Measurement duration" and "Number of measurements" refer to the adjusted sampling rate and not to the reduction of the sampling rate.

After executing Start/Stop: Two trigger events can be assigned actions through these fields.
After the event occurrence and/or evaluation and storage actions, the program specified in this field will be executed.
Any executable files and batch files are admissible. These files can be manually specified with full path or selected via requester through the folder icon.

6.2.3.5.1 Trigger

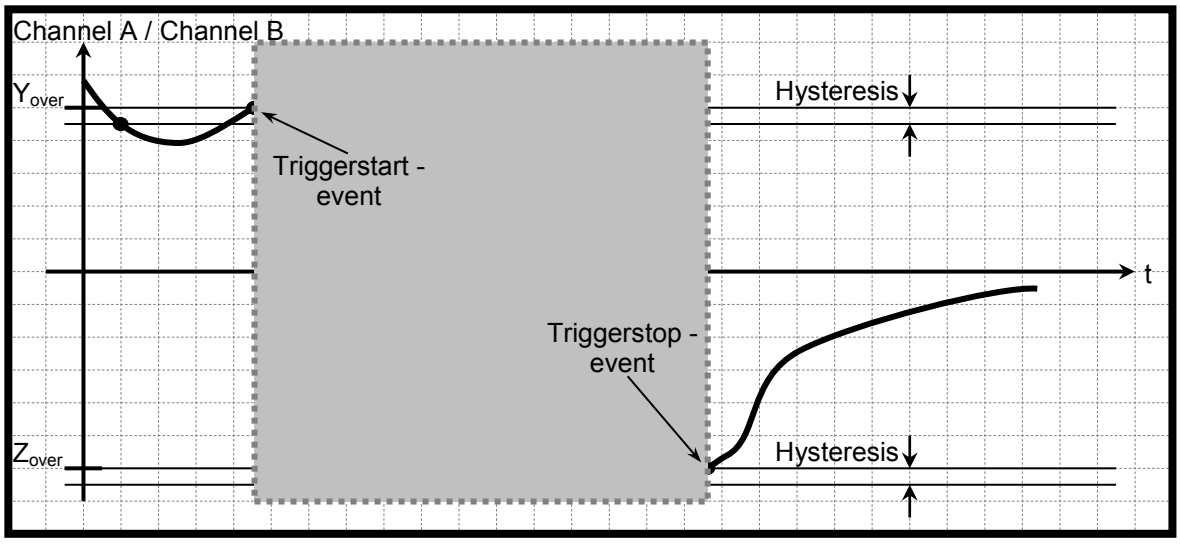


The picture on the following page shows an example of how a measurement by means of triggering can be recorded to a physical variable. At excess, the hysteresis value will be deducted from the threshold and at under-run it will be added. The hysteresis calculation for each possible physical size is shown under the example diagram on the next page. At this triggering not only the value of threshold (Y_{over}; Z_{over}) of a physical variable, but also a direction must be indicated. In the example diagram, the direction **'over run'** is triggered. This means that the measured value must drop below the hysteresis value first, before the trigger is responsive to the exceeding of the threshold. In contrast, the setting "drop below" means that the measured value must rise over the hysteresis value before the trigger is responsive to dropping below the threshold value. The grey boxed area of the example diagram corresponds to the display in the diagram of the VS3 after the measurement. This area can be saved in a CSV-file.

- Y_{over} = Trigger start value of a physical variable with directional adjustment 'over run'
- Z_{over} = Trigger stop value of a physical variable with directional adjustment 'under run'

At over run, the value of the hysteresis is deducted from the value of threshold; when below, it will be added. The calculation of hysteresis for each possible physical variable is shown beneath the example diagram on the next page.

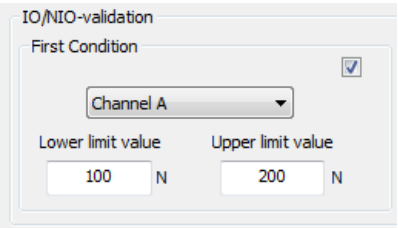
6.2.3.5.2 Example Diagram



6.2.3.5.3 Hysteresis

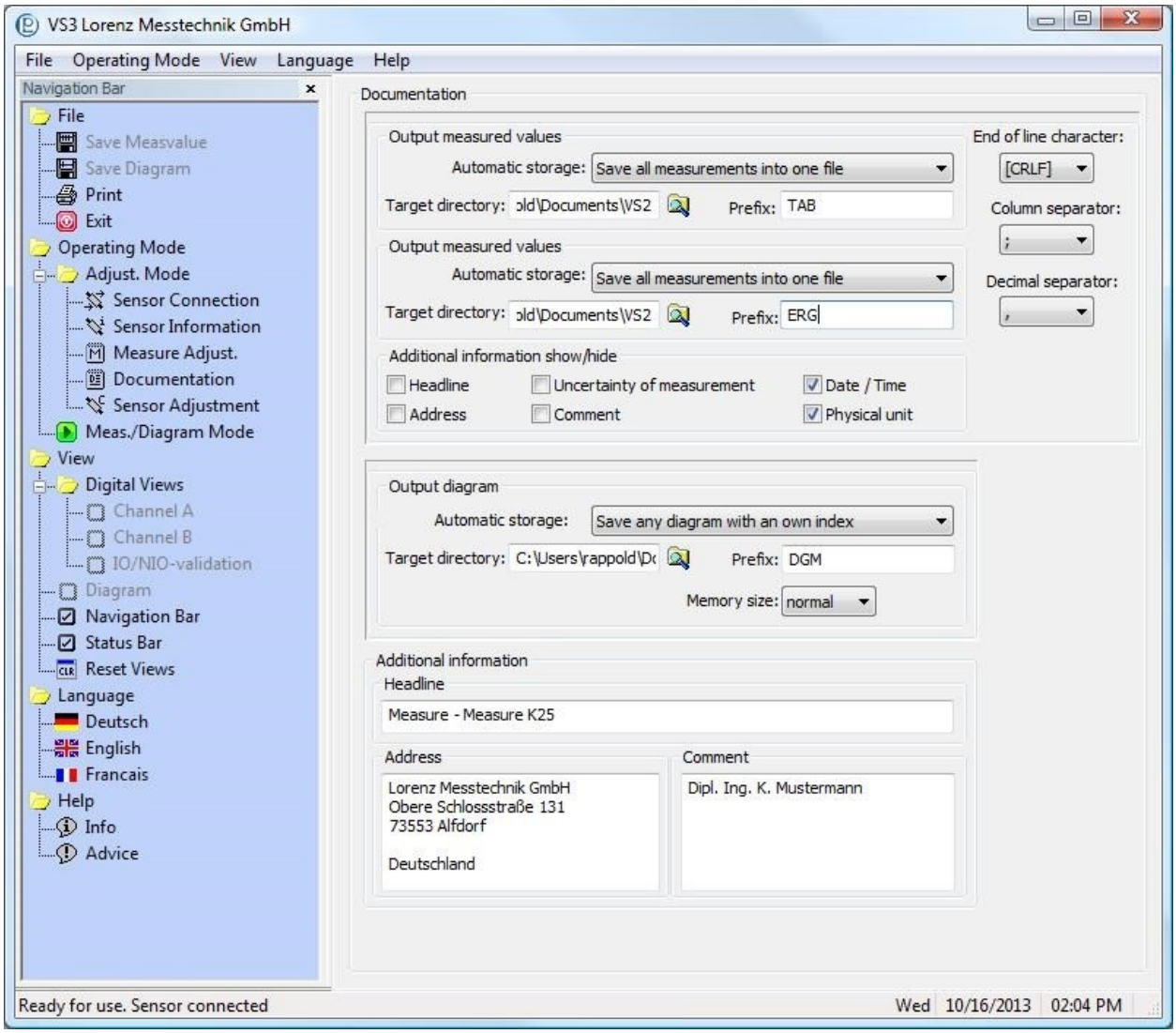
The size of the hysteresis is 1% of the indicated nominal value of the connected sensor. Except for type classes SG, Current and Voltage the hysteresis will be scaled to maximal 1% of the input value because the nominal value is usually not known.

6.2.3.6 Measurement Adjustments → OK/NOK Evaluation



These settings affect the evaluation of a measurement series. After a trigger stop event occurs, the max. values of these measurement series are determined and compared with the stored limits. In order to obtain an OK-display, the max. value of a measurement series must be above the lower and below the upper limit.
If two conditions are defined, both conditions must meet the OK criteria for a total OK-display.

6.2.4 Documentation



Here, the user can carry out documentation configuration. The adjustments refer to the storage of measurements as BMP and/or CSV-file.

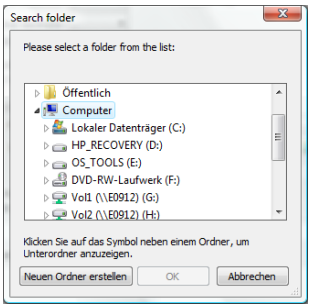
6.2.4.1 Documentation → Output Measured Values

- **Automatic storage:**
  The storage of the measured value into an output file can occur automatically by the software. Three adjustment possibilities can be selected:
  - **None:** The automatic storage is disabled.
  - **Save all measurements into one file:** This option files each measurement in the same CSV-file at the end. The name from the prefix field is used as the file name. The file is saved in the registered target directory.
  - **Save each measurement with its own index:** This option creates a separate CSV-file at the end of each measurement. The file name consists of the prefix and the index YYYYMMDDHHmmss#### ('####' number beginning with leading zeros 0000; 0001; ...)

The path length is limited by the operating system.

Remark: Definition "Measurement" see chapter 6.1.1File → Save Measvalue (Shortcut 'Ctrl+M').

- **Target directory:**
  The target path is entered in 'Target directory' (Standard adjustment ...\<user name>\My documents\VS3). Likewise you can click on the folder and select a directory.
- **Prefix:**
  Please enter the file name which is used for the automatic storage in this input box. (Further details about file name/prefix can be found under headline "Automatic Storage".

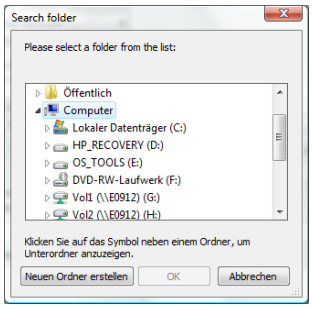


6.2.4.2 Documentation → Output Diagram

- **Automatic storage:**
  The software can automatically save the diagram in an output file. For this, two adjustment possibilities are available:
  - **None:** the automatic storage is disabled.
  - **Save any diagram with an own index:** this option creates a separate BMP-file at the end of each measurement. The file name is a combination of the prefix and the index YYYYMMTTHHmmss#### ('####' number beginning with leading zeros 0000; 0001; …).

The path length is limited by the running system.

- **Target directory:**
  The target path is registered in 'Target directory' (standard adjustment ...\<user name>\my documents\VS3). Instead of this, you can click on the folder and select a directory.
- **Prefix:**
  Enter the file name which shall be used for the automatic storage in this input box (further details regarding file name/prefix can be found under the headline 'Automatic storage').



6.2.4.3 Common Settings Output Values and Output OK/NOK-Evaluation

- **End of line character:**
  The desired line ending mark for the output in a file gets adjusted in this box.
  Following possibilities can be selected:
  CRLF : **C**arriage **R**eturn / **L**ine **F**eed Carriage return line feed (MS-DOS, Windows)
  LFCR : **L**ine **F**eed / **C**arriage **R**eturn Line feed carriage return (Linux Console)
  CR : **C**arriage **R**eturn Carriage return (Apple II, Apple Mac OS up to Version 9)
  LF : **L**ine **F**eed Line feed (Unix-Derivate, Mac OS X)
- **Column separator:**
  The column delimiter will be read out at the first execution of the application from Windows system control (country selection) and will be set accordingly. At each further restart of the application, the previously adjusted delimiter will be used. Following selection is possible in this box:
  TAB : Tabulator
  ; : Semicolon
  , : Comma
  . : Point
  Space : Space character

- **Decimal separator:**
  The decimal delimiter is carried out the same way as described for the column separator. Following selection is possible in this box:
  , : Comma
  . : Point

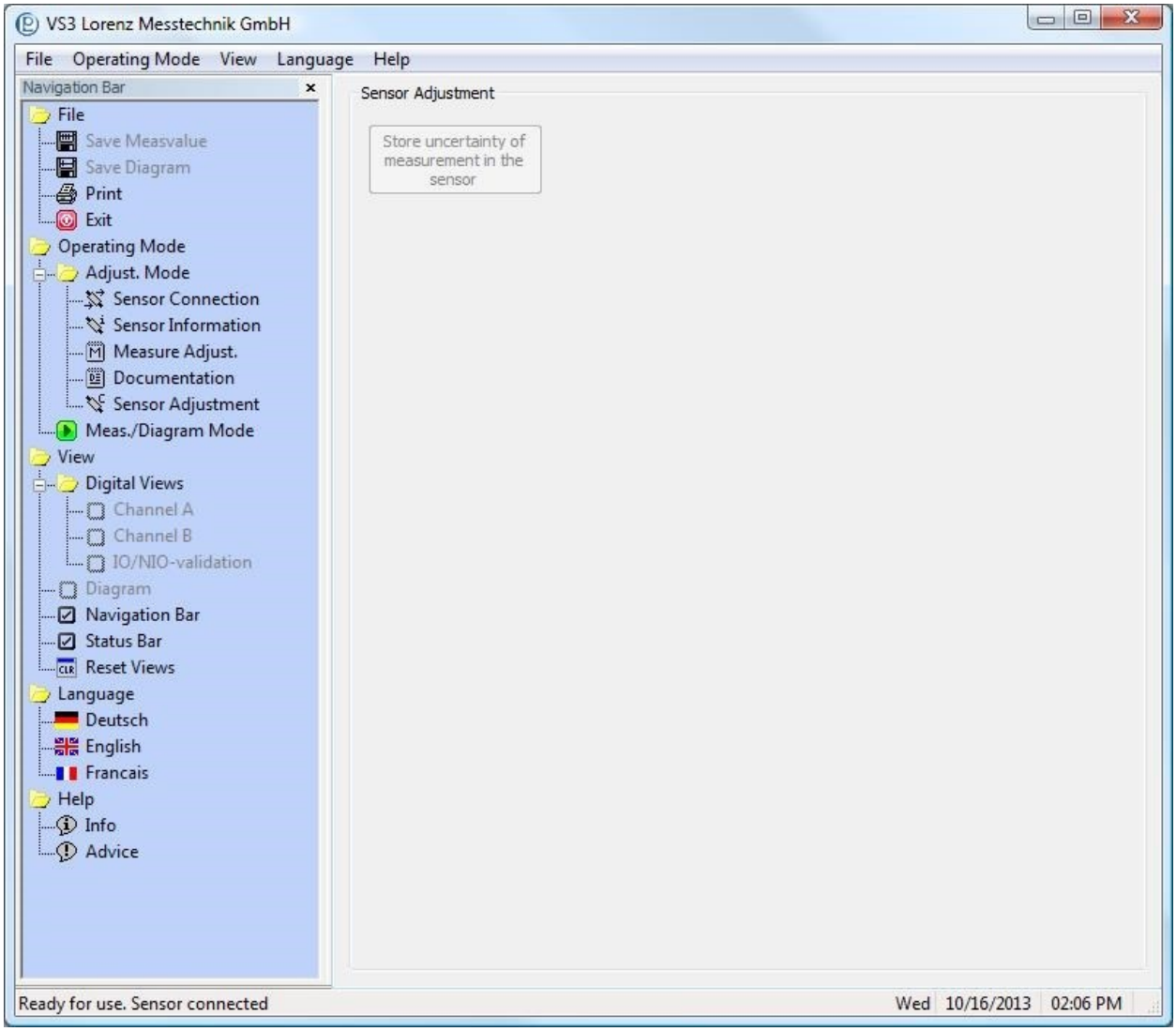
Remark: Supplementary changes of the country adjustments in the operating system have no influence on the once adjusted values of this software.

- **Additional information show / hide:**
  In this group, checkmarks can be placed to add further information to the output of measured values. The entries in the three entry boxes **'Headline'**, **'Address'** and **'Comment'** can be specified arbitrarily. With the checkmark, these entries will be recorded in the output file. The **'Uncertainty of measurement'** - if the connected sensor has one - can also be displayed in the output file. By a checkmark in **'Date / Time'** the measurement period can also be recorded in the output file. By a checkmark in **'Physical unit'** it is also possible to systematically fade in/out the physical units in the output file.

6.2.4.4 Documentation → Additional Information

This is free text which can be activated in 'Documentation → Output measured values → Additional information show / hide'.

6.2.5 Sensor Adjustment

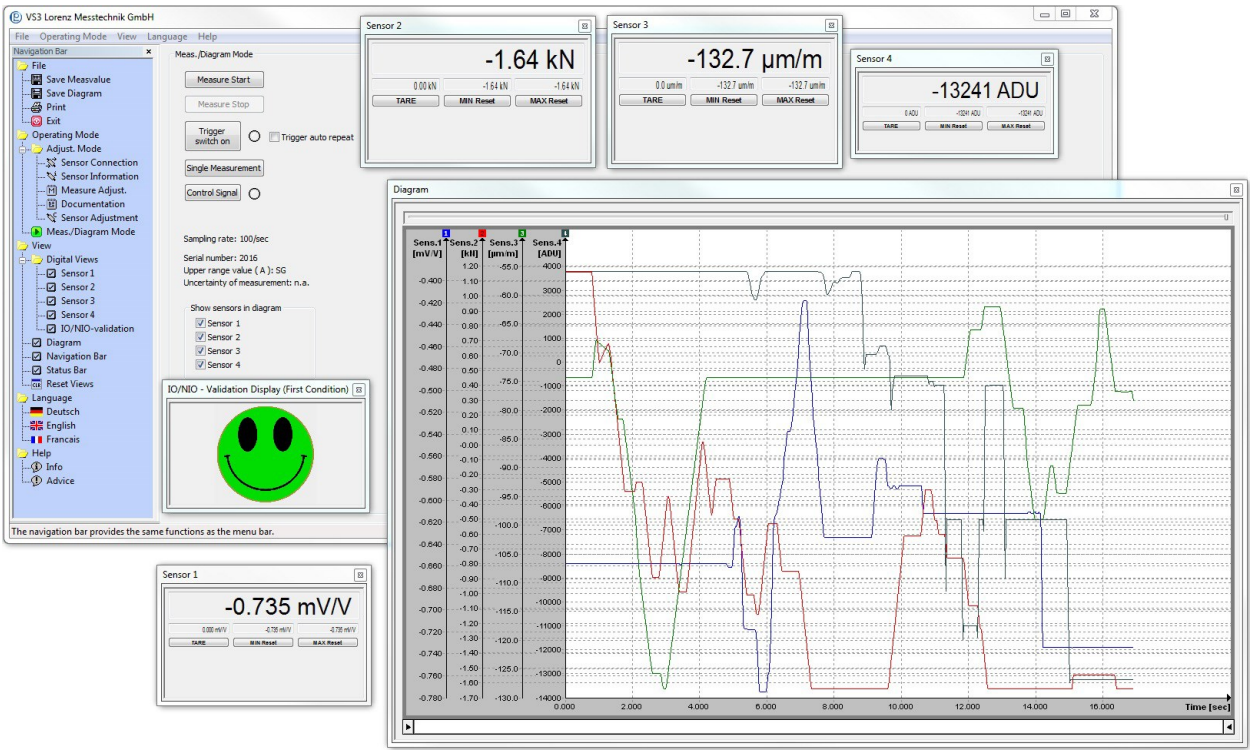


In this dialog, the uncertainty of measurement in % can be stored in the connected sensor. This variable - if available - shows the application in the 'Meas./Diagram Mode' and in the 'Sensor Information' dialog. The uncertainty of measurement can also be read out in a CSV output file (see chapter 6.2.4.1 Documentation → Output Measured Values).

- **Store uncertainty of measurement in the sensor:**
  This function allows storing a maximum value for the uncertainty of measurement in the sensor. This value is usually determined at a proprietary or DKD calibration. If the proprietary adjustment of the connected sensor is active and if a value for the uncertainty of measurement was indicated, it means that the sensor had a proprietary or a DKD calibration at Lorenz Messtechnik GmbH.
  Permissible values for the uncertainty of measurement are [5 % > uncertainty of measurement > 0 %]. If the sensor is connected, this value will be displayed in the **'Meas./Diagram Mode'**, in the **'Sensor Information'** and if required in the CSV-output file. This value is only for documentation purposes and has no influence on the measured values.

6.3 Meas./Diagram Mode

Caution: During a measurement it is not allowed to interrupt the data connection to the PC !



In the **'Meas./Diagram Mode'** the digital displays of the physical variables and the diagram can be activated. Only the displays which were check-marked in 'Measure Adjust. → Measured variable → Type' are active.

Each, the digital displays and the diagram are in an independent window. These windows can be positioned to the main window or they can freely be placed on the monitor. In order to scroll the windows, the mouse pointer must be placed on the title bar of the respective window. By keeping the left mouse key pressed, the window can be shifted or positioned. The contents of the window automatically adapts to the window size. By key 'Ctrl' the positioning in the main window can be avoided.
Due to system-relevant restrictions under operating systems Windows 2000 and Windows XP it is not possible to draw the diagram out of the main window of the application. Also, with these operating systems, the application cannot be placed outside of the monitor. When trying, it will always go back to the visible workspace.

Each digital display has four output fields for the current measured value, the tare value, the minimum value and the maximum value. The minimum and maximum value can be set back by the buttons **'MIN Reset'** and **'MAX Reset'**. If the tare-button shows **'TARE'** and is kept pressed, this will set the current measured value to zero and the tare difference will be displayed above in the output field. Afterwards this button shows **'TARA=0'**, hereby the tare can be cancelled.

The OK/NOK display always shows the total of all defined criteria. If the criteria is met, a green indicator appears. If at least one criterion is not met, the indicator turns red. A grey indicator means that there is currently no evaluation, e.g. after start-up or after a new series of measurements was started.

Measure Start:
With this button, a measurement gets started. The digital displays and the diagram will be fed with measured values after pressing this button. Unnecessary keys are deactivated during the measurement. Also, the status of the application “Measuring…” is indicated in the status bar.

➔ Software trigger start event

Measure Stop:
Can only be used during active measurement. As soon as the key was pressed, the measurement will be stopped and will initiate possible automatic storage (see chapter 6.2.4 Documentation). At active automatic storage into a file, the progress is shown on the status bar as well as the idle state ‘Ready for use. Sensor connected’.

➔ Software trigger stop event

Trigger:
This key activates a software triggering as explained in chapter 6.2.3.5.1 Trigger. The status lamp on the side of the key blinks yellow at active triggering. By pressing again, the triggering will be deactivated. The course of a software trigger is described in chapter **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.**

Trigger LED	Condition
grey	Trigger OFF
flashing yellow	Trigger waits for a trigger start event. Only the digital displays are updated.
green	Trigger Measurement ON. Digital displays and diagram are updated with values.

Trigger Auto Repeat:
By a check mark, the trigger gets reactivated as soon as all actions of the Trigger-Stop-Event are processed (e.g. write file. See chapter 6.2.4.1 Documentation → Output Measured Values and chapter 6.2.4.2 Documentation → Output Diagram)

Activate only if an automatic storage from 6.2.4.1 or 6.2.4.2 is active.

Single Measurement:
With this key, a single current measured value gets requested from the active sensor. This function can only be carried out in the idle mode/measuring stop of the application.

Control:
The button ‘Control’ is only activated during the measurement at low sampling rates (<20/sec) and in idle mode.
By means of the control, the measuring bridge in the sensor gets detuned and issues the nominal range. A red lamp next to the button indicates active control. By clicking on ‘Control’ again, it will be deactivated.

7 Debugging

This chart helps to find frequent errors and the measures for debugging.

Error	Possible Cause	Debugging
Application does not start	WIN98 or older versions are used	Required operating system: WIN 2000; WIN XP; WIN VISTA, WIN 7, WIN 8
	No drivers for USB sensors	Refer to the installation manual for Lorenz USB drivers.
	No drivers for ETH sensors	Refer to the installation manual for Lorenz ETH drivers.
	Sensor is not connected to the PC	Connect sensor to the PC
Sensor is connected to the PC but the application won't start or communication not available.	Driver problems or misconduct of the ETH connection	Terminate the application. Unplug the ETH-connection between sensor and PC and reconnect it.

8 Related Documents

Following documents contain reference information about the VS3:

- Document number 090313, "Operation Manual for Configuration and Evaluation Software VS3" (German: 090312).
- Document number 090232, "Operation Manual for Sensor Interface LCV-USB2/3" (German: 090205).
- Document number 080727, data sheet "Sensor-Interface with USB" (German: 080726).
- Document number 090315, "Operation Manual for Sensor Interface SI-USB (2-Channel)" (German: 090314).
- Document number 080757, data sheet "Sensor-Interface with ETH (Type: SI-ETH 2-Channel)" (German: 080758).
- Document number 080742 , data sheet „SI-RS485-Sensor-Interface" (German: 080741)
- Document number 090110 Lorenz protocol "A flexible command set for digital sensors and interfaces".