

Operating instructions

FMS **Connect**

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1 Table of contents

2	General information.....	4
2.1	System requirements	4
3	Installation.....	4
4	The Manager	8
5	Measuring window PU41	9
5.1	Quick access buttons.....	10
5.2	Quick access bar	11
5.2.1	Preset.....	11
5.2.2	Measuring variable.....	11
5.3	Trend bar	12
5.4	Analogue display	12
5.5	Measuring axis Y and Z.....	13
5.6	Inductive measuring axis.....	13
5.7	Main menu	14
5.8	Menu group general.....	14
5.8.1	“Temperature” menu	15
5.8.2	“Excel transfer” menu	16
5.8.3	“Digital measuring tools” menu	17
5.8.4	“Factory settings” menu.....	17
5.8.5	"Service" menu.....	18
5.9	Menu group of channels	19
5.9.1	“Definition” menu	19
5.9.2	“Resolution" menu	19
5.9.3	“Grid” menu	20
5.9.4	“Measuring method” menu / probe constants (inside measurement / outside measurement).....	20
5.9.5	“Support point correction” menu	22
5.9.6	“Calibration” menu.....	22
6	Measuring window PU42	24
6.1	Toolbar	24

6.2	Connection bar	25
6.3	Detail information measuring axis PU42.....	26
6.4	Main menu	27
6.5	Menu group general.....	27
6.5.1	“Temperature” menu	28
6.5.2	“Excel transfer” menu	29
6.5.3	“Factory settings” menu.....	30
6.5.4	"Service" menu.....	30
6.6	“Channel” menu group.....	32
6.6.1	“Definition” menu	32
6.6.2	“Resolution" menu	32
6.6.3	“Calibration” menu.....	33
7	Measuring window PU41motion.....	34
7.1	Motion manager.....	34
7.2	Toolbar	35
7.2.1	Programme information.....	35
7.2.2	Main menu	36
7.2.3	Menu group general.....	36
7.2.4	Menu groups “Measuring system & channel X2 & Y1 & Y2“	41
7.3	Menu configuration.....	46
7.3.1	Settings PU42 (EMP).....	46
7.3.2	Settings PU41 (KLM & LM)	47
7.3.3	Settings PU41motion (MFP30 & MFP100)	52

2 General information

The program "FMS Connect" is a software tool by Feinmess Suhl GmbH. It has been developed for the measuring value acquisition and analysis of the measuring devices MFP30, MFP100, EMP, BMD and BMG in combination with the device controllers PU41, PU42 and PU41motion.

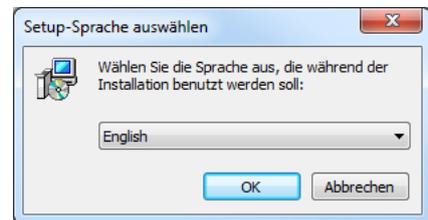
2.1 System requirements

- CPU: 1.4GHz and higher (recommended 2GHz +)
- RAM: at least 1GB (2GB recommended)
- Hard disk: HDD, SSD, at least 4.5GB (Installation inclusive Microsoft®.NET Framework)
- Interface: USB2.0
- Operating system: Microsoft® Windows 7, 8, 10 (32/64Bit)
- Graphics: 1920x1080 Pixel
- Framework: Microsoft® .NET Framework 4.5 (auto. installation, internet connection required)
- Optional: Microsoft® Excel (as of version 2010) for transfer of measuring data

3 Installation

The software installation is started with a double click on the file >FMS_Connect_Setup.exe<.

In a first step, you select the language for the installation process. You get to the welcome page with a click on the >OK< button.



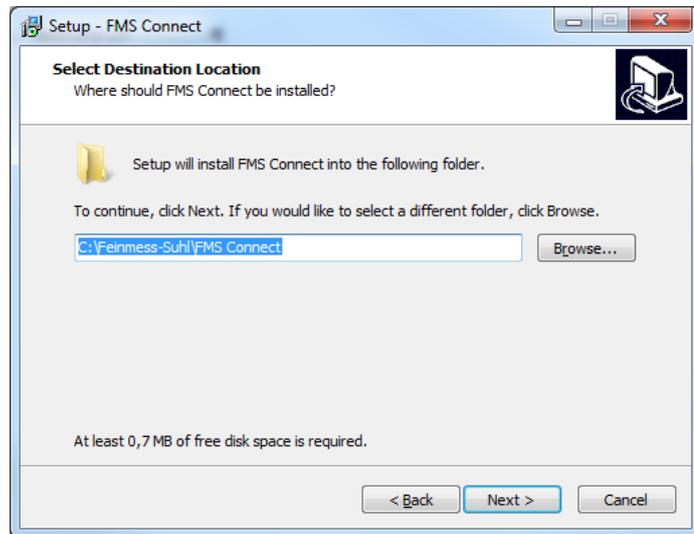
You can leave the welcome page by clicking on the >Next< button to get to the next step.



You will be asked for the installation location on your PC in the next window.

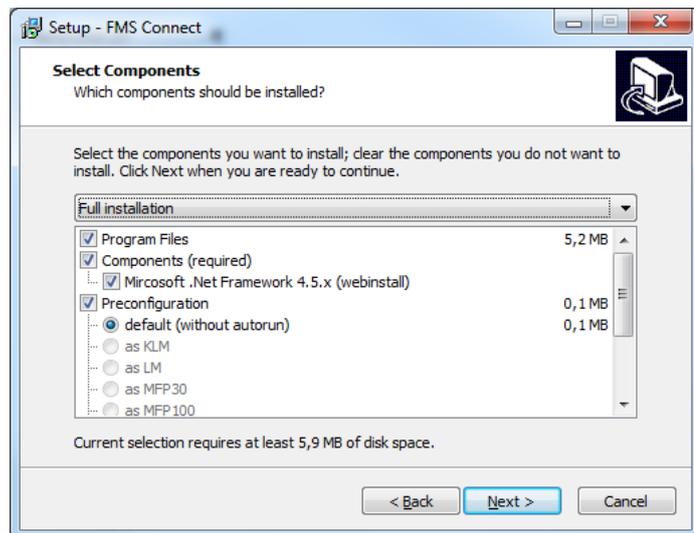
If possible, use the default settings of the program and confirm with >Next<.

If you want to change the default settings, then you should note the installation location for future software updates.



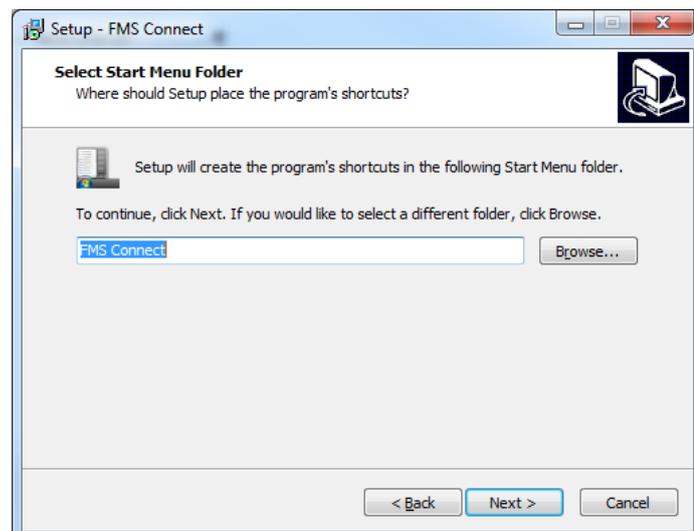
The next step asks you about the type and extent of the installation type. You can customize the installation to your wishes by changing the selection. For new installations, we recommend "full installation".

Confirm with >Next<.



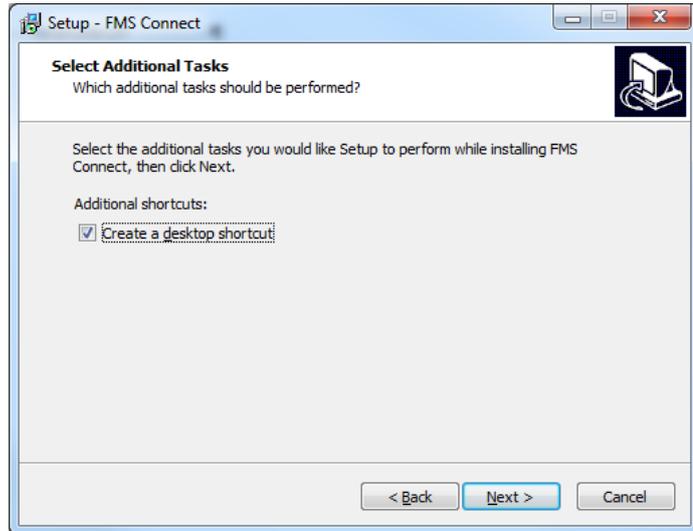
In the following window, you will be asked if you want to rename the programme group in the Windows menu. We recommend to accept the default settings and to not change it.

Confirm with >Next<.



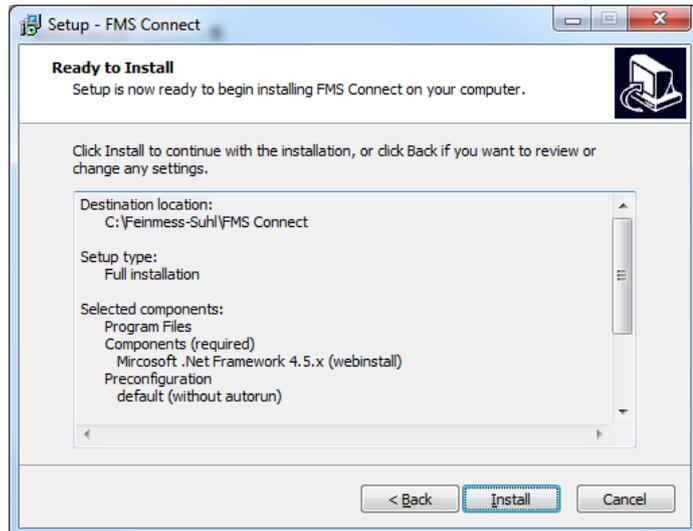
If you do not want to have a start symbol on your desktop, then please remove the tick.

Confirm with >Next<.

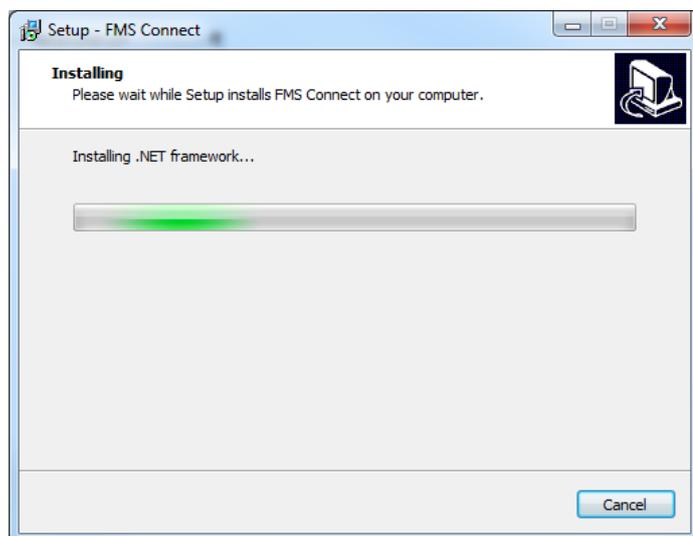


You can view here an overview of the components which are being installed.

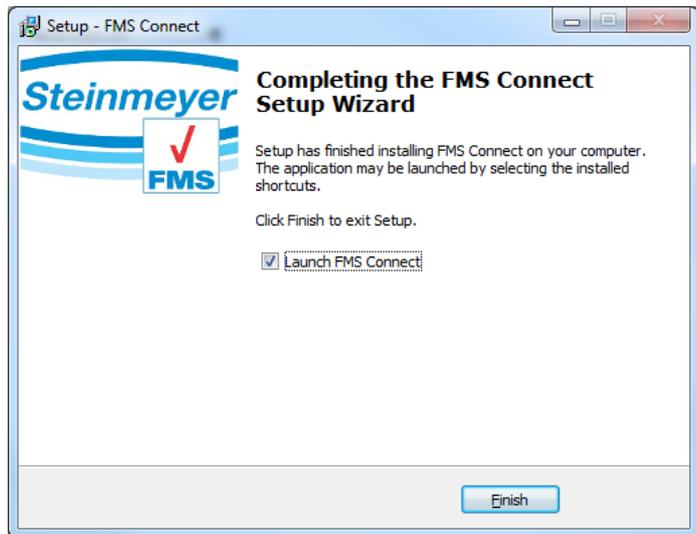
Click on the >install< button to start the installation.



An installation process bar informs you about the current status.



Once the installation is completed and all the necessary software components have been installed, you can decide if the programme should start immediately or if you only want to end the set-up programme.



4 The Manager

The Device Manager is used for the basic configuration of the software FMS Connect. Select your device by clicking on the relevant symbol. The following measuring interface is then automatically adapted to your measuring device. If you don't want to display the Manager again during the next start-up, then please set the tick on the bottom right (refer to following image).

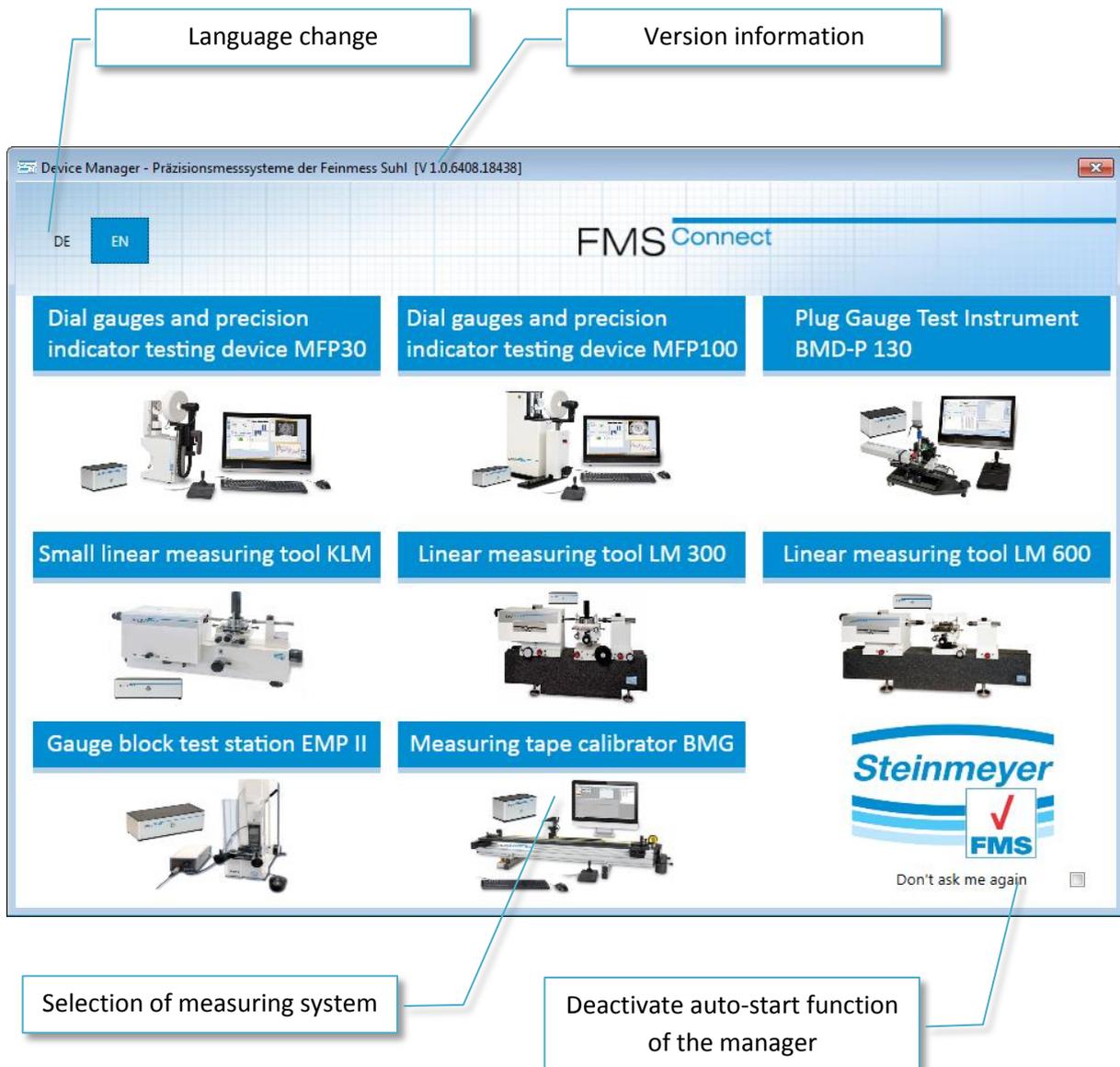


Figure 1: Device manager

Each PU has its own ID, thus a PU41 functions e.g. only with a length meter LM300 and LM600 as well as KLM. The measuring interfaces are also adapted to this identifier. Thus, always start with the correct interface. Otherwise, you will not be able to connect to the PU.

5 Measuring window PU41

The measuring window for the PU41 (LM300/ LM600/ KLM) starts in the following view. It is structured into the menu area, the individual measurement axes and the connection bar. You can also adapt the window according to your requirements (show/hide axes, assign names etc.). The relevant settings are saved.

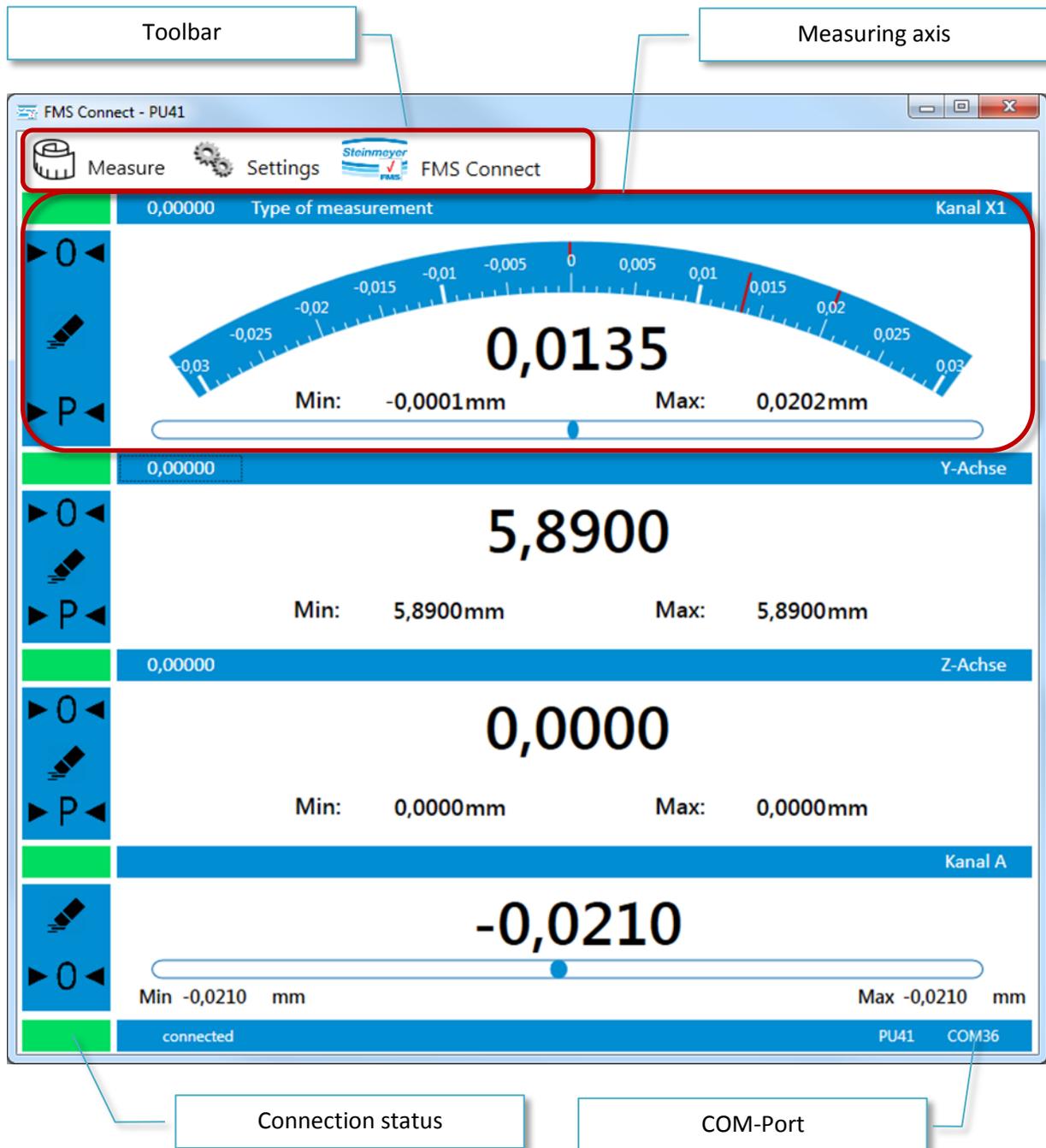
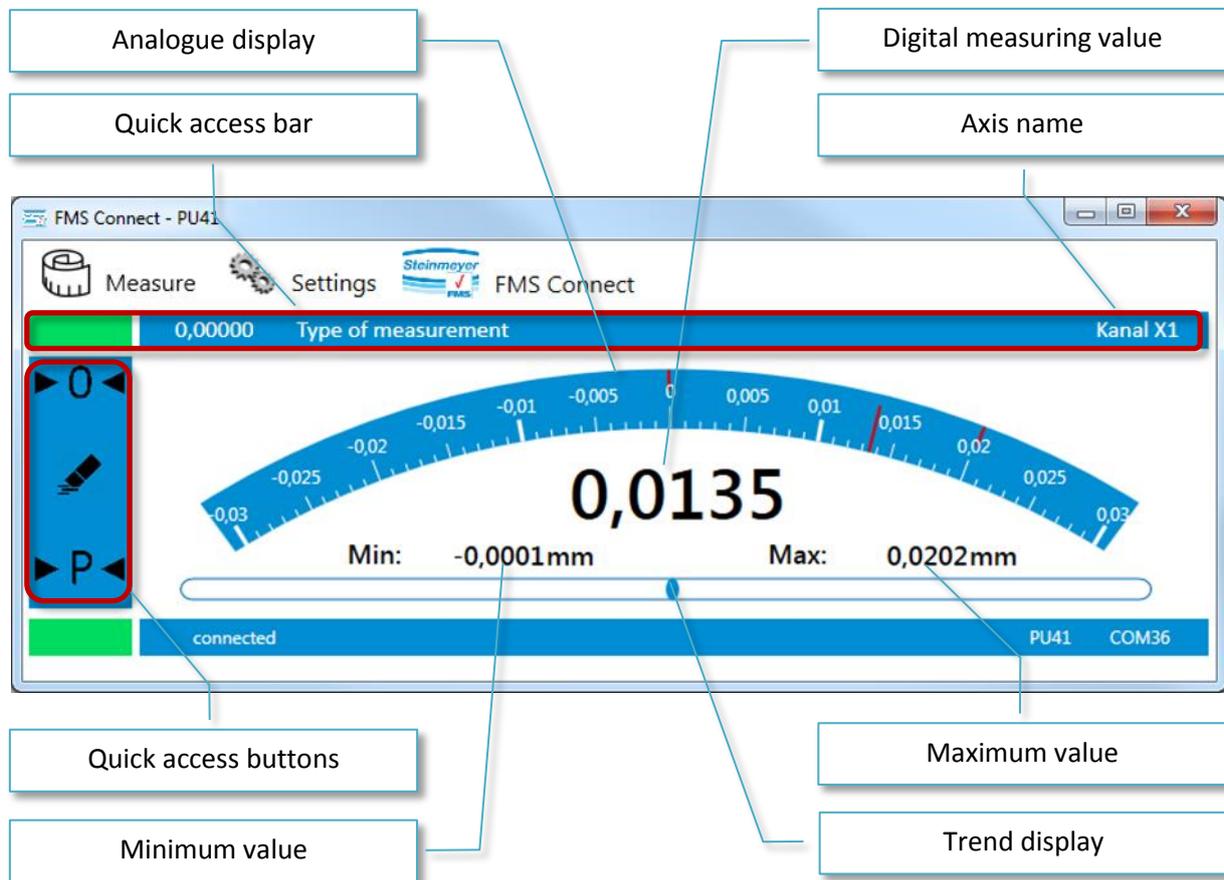
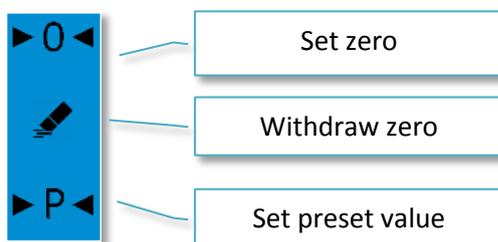


Figure 2: Measuring window PU41 for LM300/ LM 600 and KLM

The following entries are in the menu bar: measuring, settings and FMS Connect. Currently, you are in the “measuring” window. In settings, you can define your measurement, set the axes etc. (refer to relevant chapter).



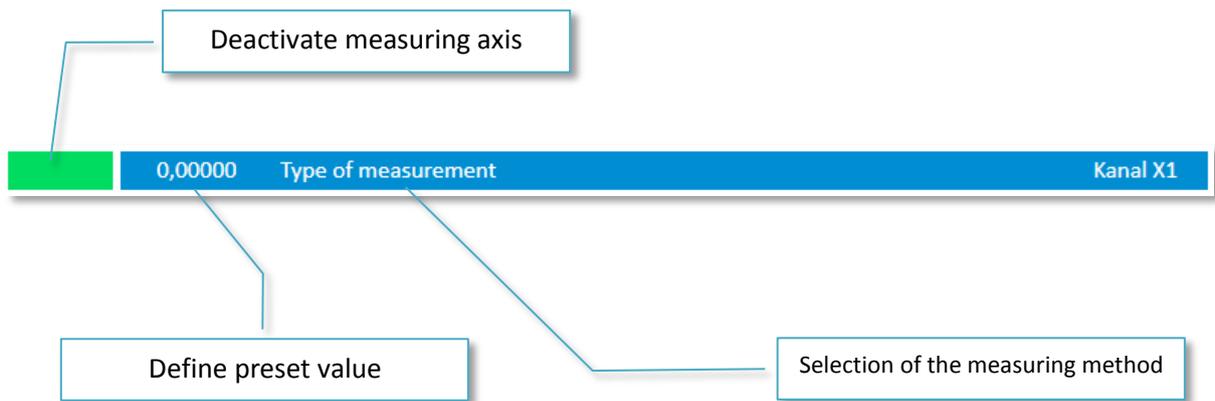
5.1 Quick access buttons



The quick access buttons allow zeroing the measuring value as well as deleting an active zero offset. The extreme values (minimum value as well as maximum value) are also reset when deleting. Scaling the analogue display automatically adapts to the current measuring value.

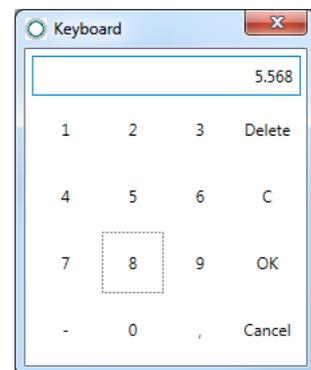
5.2 Quick access bar

You can deactivate or hide the measuring axes by clicking on the green area in the quick selection bar. Activating and showing a measuring axis is done in the “setting” menu in the respective axis menu.



5.2.1 Preset

In order to be able to set a preset value using quick selection buttons, you have to first define it by clicking with the mouse on the numerical value in the quick selection bar. This opens a separate input window in which you can define the preset value. You only have to confirm the window with >OK< to accept the value. The defined value is then displayed in the bar.

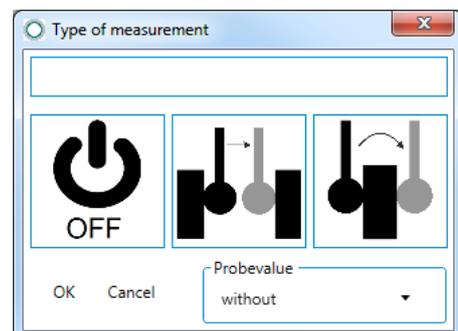


Caution: you only defined the desired value as a default. To set the value in the measuring axis, you have to activate the preset using the quick selection buttons.

5.2.2 Measuring variable

The measuring method can be selected for a measuring process which is carried out with a probe. Inner measuring as well as outer measuring is available. The size of the probe can be defined in the “settings/X1” menu via the probe constants.

Information: This particular selection is only available for the main measuring axis (connection X1). To deactivate the measuring method, you only have to confirm the >OK< button.



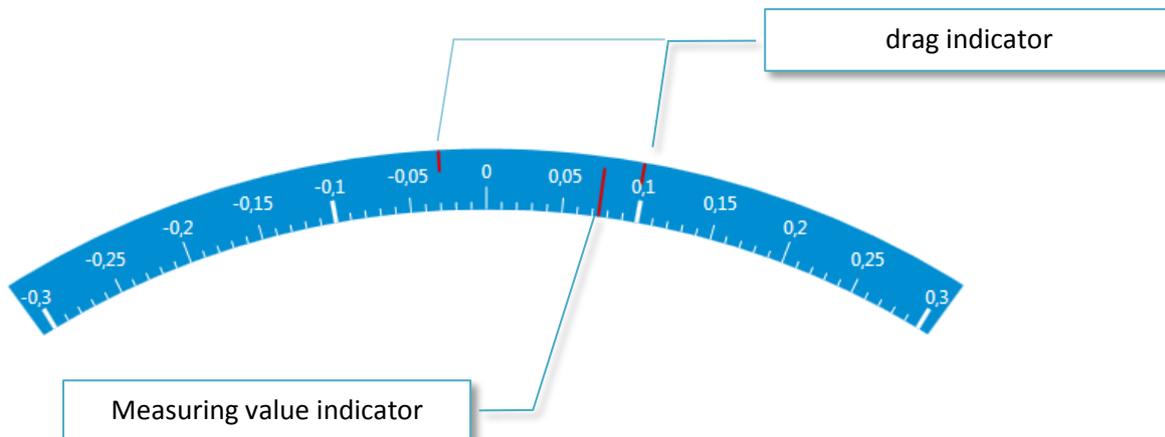
5.3 Trend bar

The trend bar underneath the measuring value shows the direction in which the measuring value moves. If the measuring value is positive, then the bar is in the right area and for negative measuring values in the left area. The left as well as right area of the trend bar shows a measuring range of 500µm respectively.



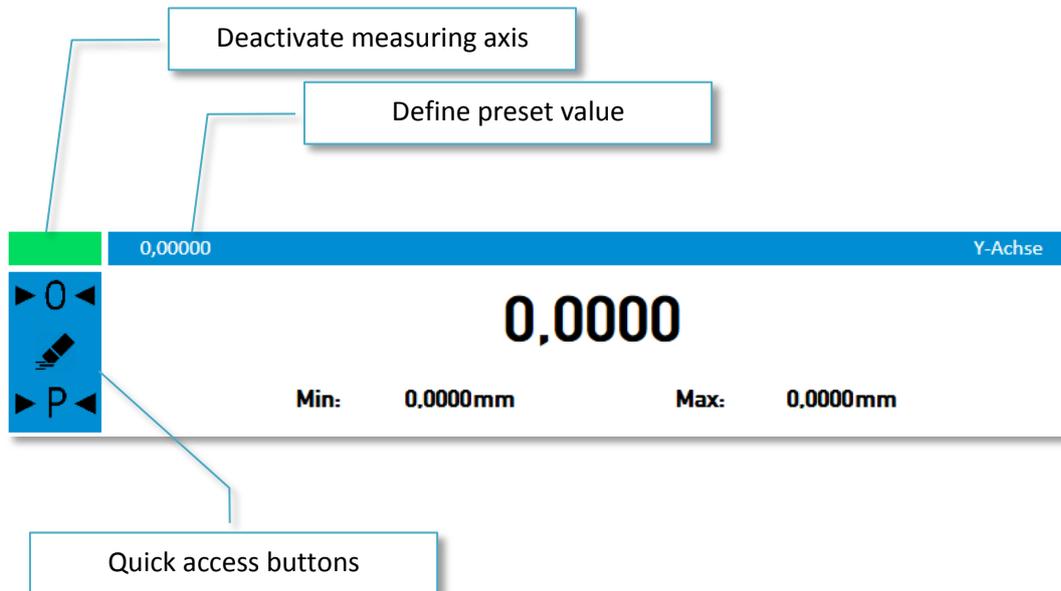
5.4 Analogue display

The analogue display switches the scale automatically as soon as the displayed range is exceeded. The displayed range cannot be influenced manually. Two drag indicator are available in the upper area of the analogue display for the extreme values which are simultaneously displayed as numerical value in the measuring axis. A quick access button has to be activated to reset the extreme values and the drag indicator.



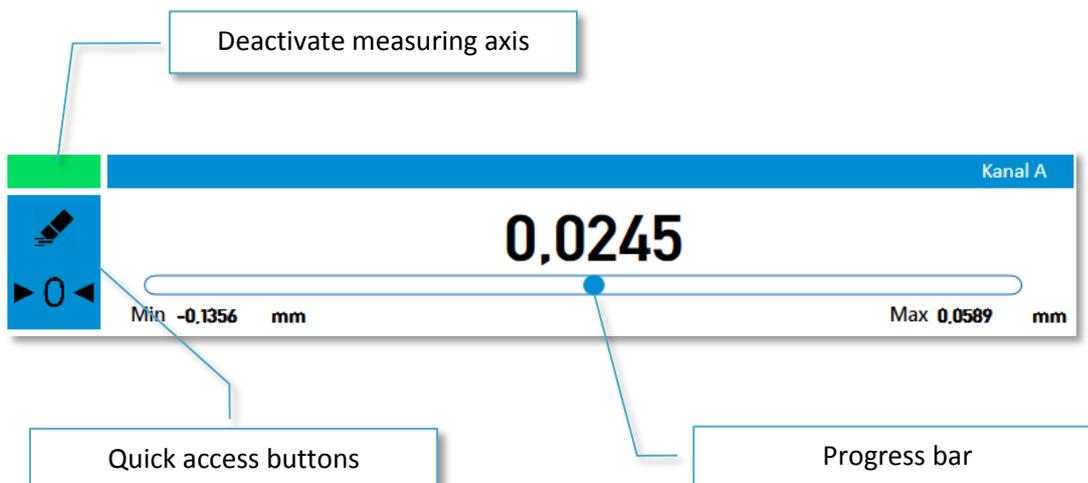
5.5 Measuring axis Y and Z

The display area for the Y measuring axis and Z measuring axis are structured the same and are similar to the configuration of the X measuring axis. The difference is only that no analogue display nor trend bar are available since these are only auxiliary axes in the measurement application.

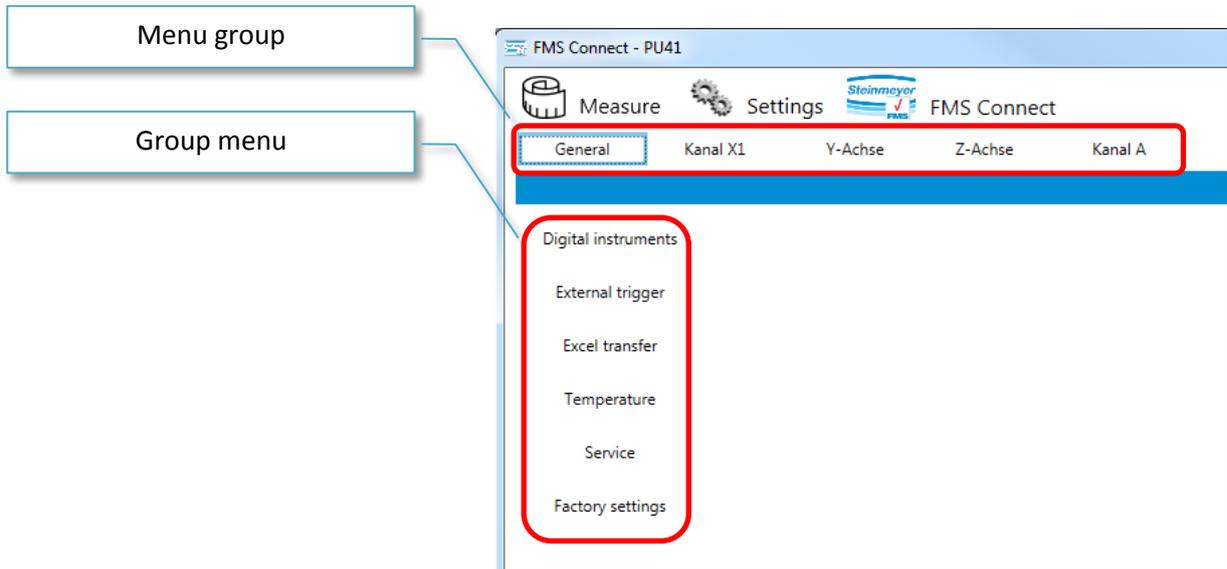


5.6 Inductive measuring axis

The inductive measuring axis “channel A” or also referred to as IG-channel is used to define an absolute measuring point as reference to a measurement in interaction with the main measuring axis. The display area is structured the same as for the measuring axes Y and Z but has additionally a progress bar to be able to visually quickly find the reference point (zero point) during a measurement. Furthermore, the quick access buttons are optimised to the absolute inductive probe, there is no setting of an alternative preset value.



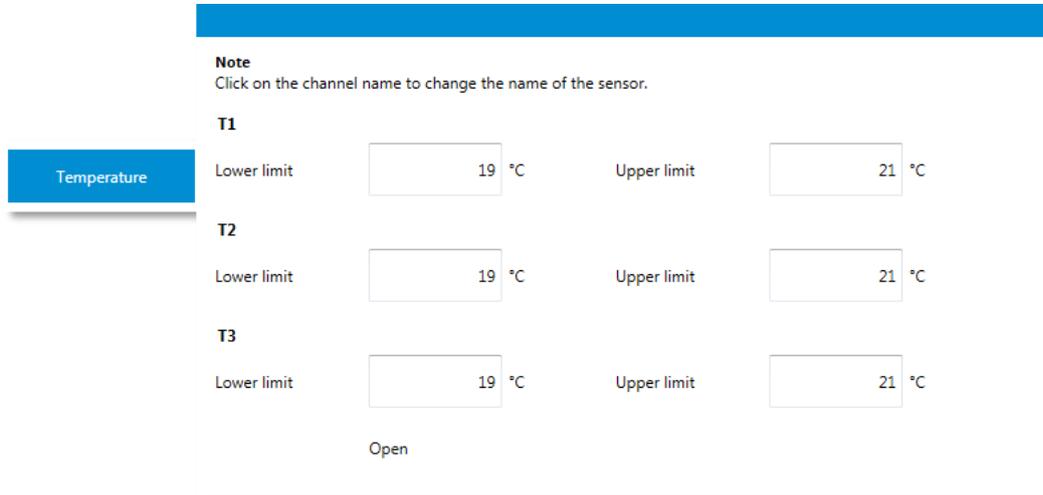
5.7 Main menu



5.8 Menu group general

All settings are made in the menu group general, which have no direct relation to the measuring axes.

5.8.1 "Temperature" menu

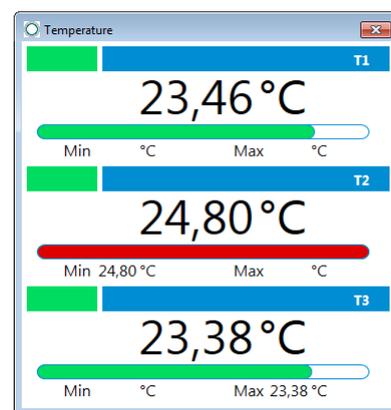


Using the "temperature" menu item, it is possible to specify the temperature measuring values limits for the sensors, which are connected to the device terminals T1, T2 and T3 on the device rear of the PU4x.

Simply click on the port name T1, T2 or T3 to change the sensor name. Then a cursor appears immediately, which allows you to change the identifier at one's own discretion.

The "open" button has to be clicked to visualise the measuring values. Then an independent programme window is opened.

In the independent programme window, the relevant temperature value is displayed with the associated extreme values. The status bar underneath the measuring value signals with its colour if the temperature is within (green), colder than (blue) or warmer than (red) than the previously defined limit values. An unneeded temperature value can be deactivated by clicking on the green area left above the measuring value.

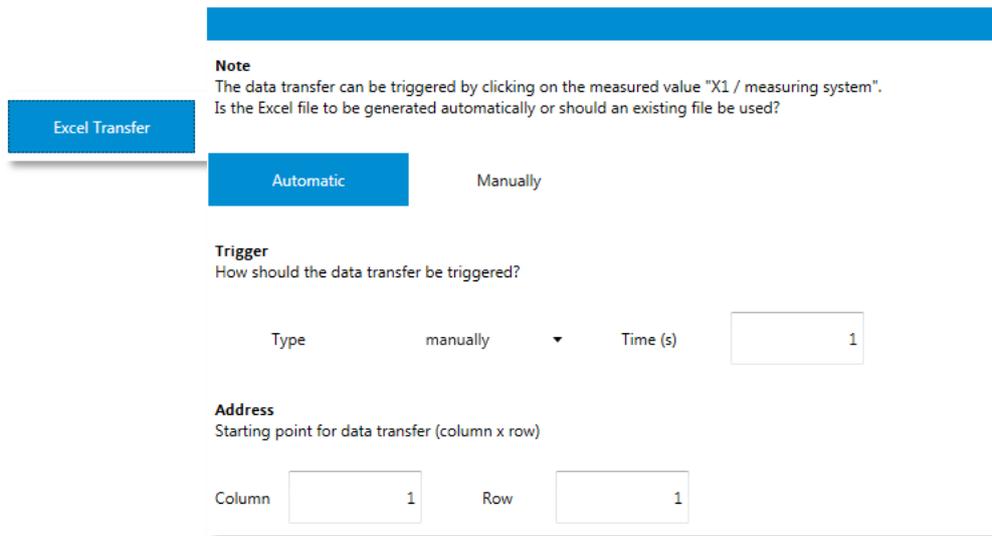


be

a

The temperature measuring values are documented during possible EXCEL transfer, however, not offset with another axis measuring value.

5.8.2 "Excel transfer" menu



Excel Transfer

Note
The data transfer can be triggered by clicking on the measured value "X1 / measuring system".
Is the Excel file to be generated automatically or should an existing file be used?

Automatic Manually

Trigger
How should the data transfer be triggered?

Type: manually Time (s): 1

Address
Starting point for data transfer (column x row)

Column: 1 Row: 1

Automatic mode:

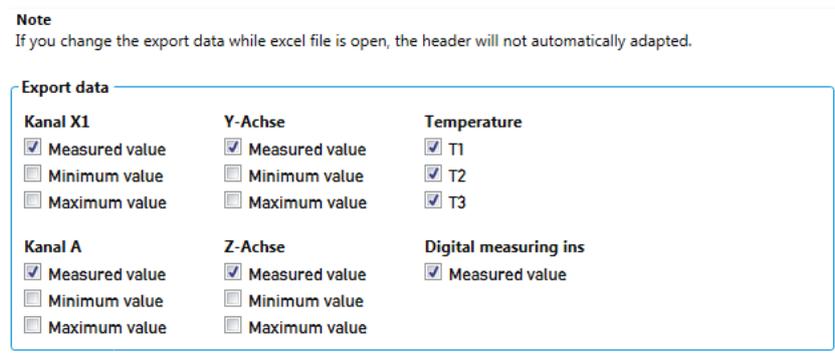
A new temporary Excel file is created with a click on the measuring value in the measuring window. This file is automatically populated with a table header, however, only filled with the first measuring value on the second click.

Manual mode:

In the manual mode, an existing Excel file is selected via dialog box and automatically opened. No table header is generated!

There are three options to trigger the data transfer into Excel. Manually by clicking on the measuring value, by pressing the F9 key or at a time interval with timer.

For some applications, an additional parameter block is displayed in order to be able to specifically select the data to be transferred.



Note
If you change the export data while excel file is open, the header will not automatically adapted.

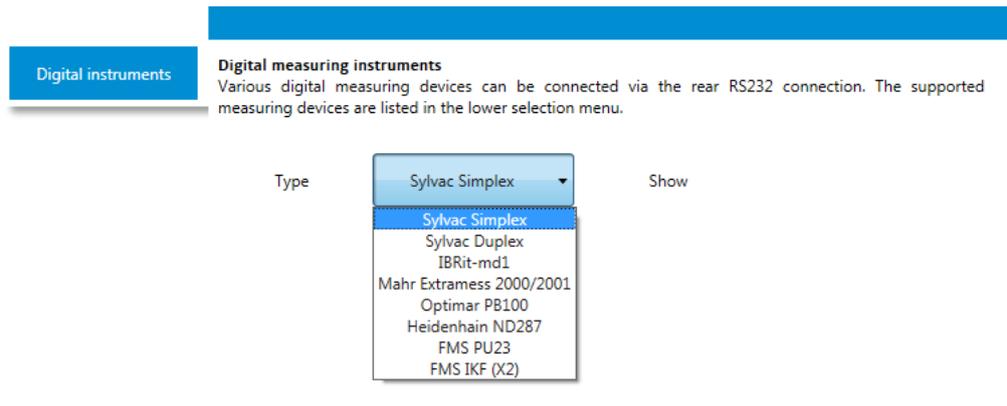
Export data

Kanal X1	Y-Achse	Temperature
<input checked="" type="checkbox"/> Measured value	<input checked="" type="checkbox"/> Measured value	<input checked="" type="checkbox"/> T1
<input type="checkbox"/> Minimum value	<input type="checkbox"/> Minimum value	<input checked="" type="checkbox"/> T2
<input type="checkbox"/> Maximum value	<input type="checkbox"/> Maximum value	<input checked="" type="checkbox"/> T3
Kanal A	Z-Achse	Digital measuring ins
<input checked="" type="checkbox"/> Measured value	<input checked="" type="checkbox"/> Measured value	<input checked="" type="checkbox"/> Measured value
<input type="checkbox"/> Minimum value	<input type="checkbox"/> Minimum value	
<input type="checkbox"/> Maximum value	<input type="checkbox"/> Maximum value	

5.8.3 “Digital measuring tools” menu

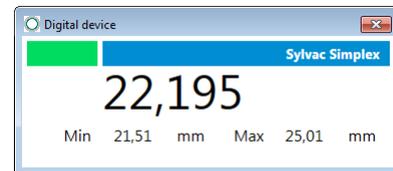
Some measuring tools can be integrated via the digital interface to provide auxiliary measuring axes. For this, only the relevant supported protocol or device in the selection box has to be selected and the >show< button has to be activated.

Information: This function is supported only via the RS232 interface on the device rear of the PU4x. USB measuring tools cannot be read using this software.



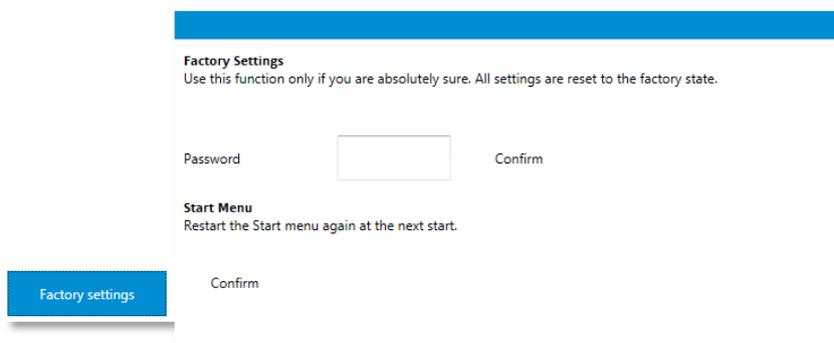
Then an independent programme window opens in which the measuring value of the digital measuring tool is displayed.

The measuring values are documented during a possible Excel transfer, however, not offset with another axis measuring value.



5.8.4 “Factory settings” menu

You can reset the device to the factory state in this menu item. **Caution!** The factory state has nothing to do with the delivery state. The equipment will lose thus, e.g. important settings, which have been made specifically for your measurement application.



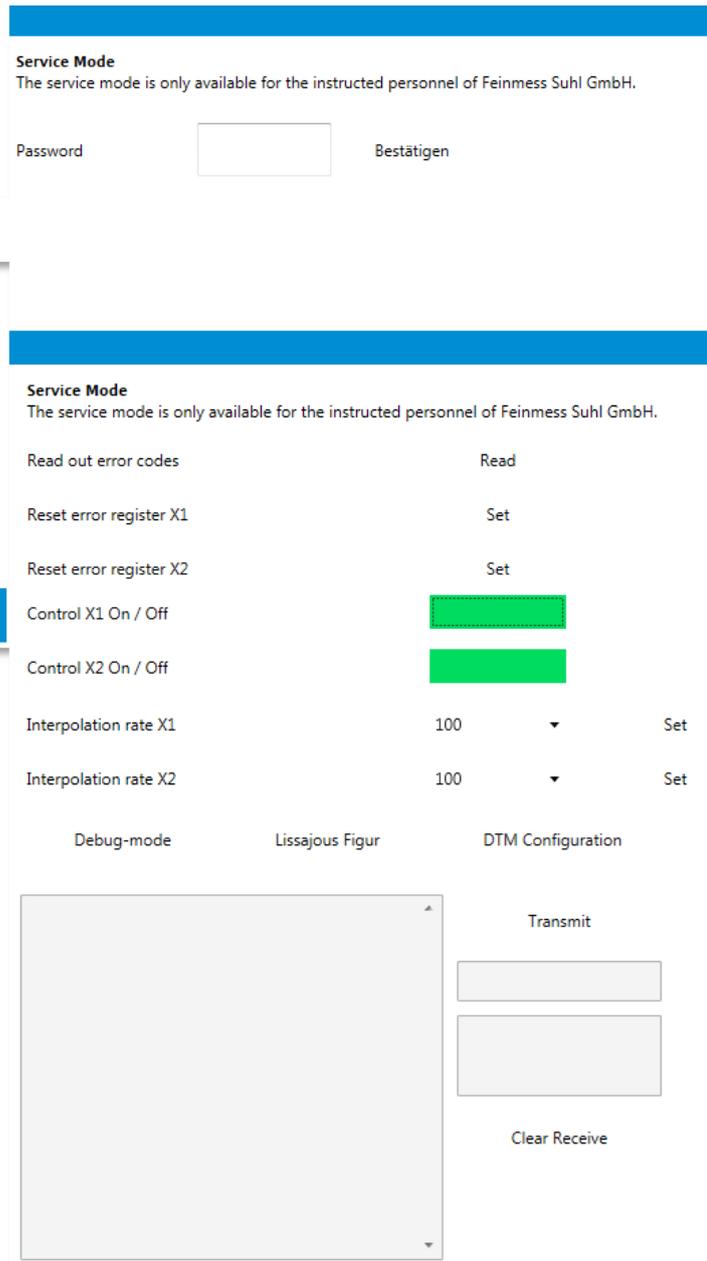
Furthermore, an activated automatic start of a special device can be withdrawn in order to access the manager selection at the next programme start. This should only be done by instructed personnel, since each measuring interface works individually with the device.

5.8.5 "Service" menu

The service menu enables the instructed expert staff at Feinmess Suhl GmbH to have an advanced control option for the connected devices. Access is password protected.



Each service menu is adapted to the connected hardware as well as the related measurement application and are thus different in their display.

Service Mode
The service mode is only available for the instructed personnel of Feinmess Suhl GmbH.

Password Bestätigen

Service Mode
The service mode is only available for the instructed personnel of Feinmess Suhl GmbH.

Read out error codes	Read
Reset error register X1	Set
Reset error register X2	Set
Control X1 On / Off	<input checked="" type="checkbox"/>
Control X2 On / Off	<input checked="" type="checkbox"/>
Interpolation rate X1	100 ▼ Set
Interpolation rate X2	100 ▼ Set

Debug-mode Lissajous Figur DTM Configuration

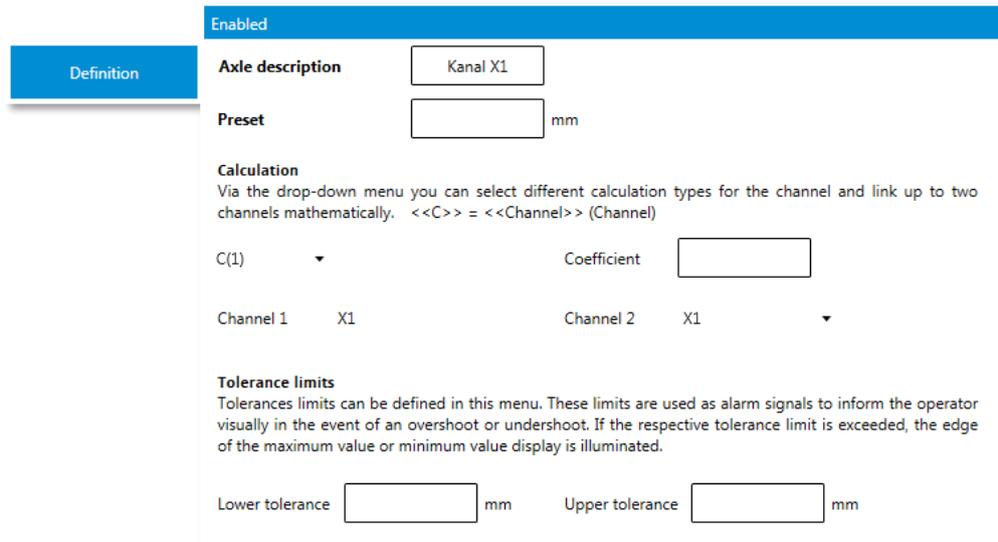
Transmit

Clear Receive

5.9 Menu group of channels

5.9.1 "Definition" menu

In this menu, you can give the selected measuring channel its own name and define a preset. Furthermore, it is possible to offset the measuring channel with a factor or with another measuring channel.



Enabled

Definition

Axle description

Preset mm

Calculation
Via the drop-down menu you can select different calculation types for the channel and link up to two channels mathematically. <<C>> = <<Channel>> (Channel)

C(1) ▾ Coefficient

Channel 1 X1 Channel 2 X1 ▾

Tolerance limits
Tolerances limits can be defined in this menu. These limits are used as alarm signals to inform the operator visually in the event of an overshoot or undershoot. If the respective tolerance limit is exceeded, the edge of the maximum value or minimum value display is illuminated.

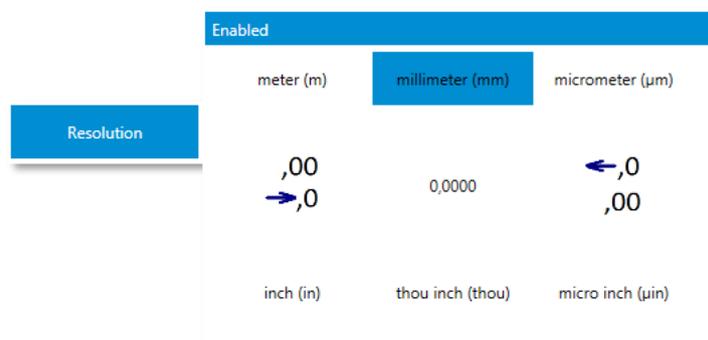
Lower tolerance mm Upper tolerance mm

Tolerance limits can be defined to monitor a measuring range. The fields should remain empty if no limits are to be monitored. Exceeding the limits colours the associated extreme value as well as the measured value red.

For channel A, this menu item behaves equivalent, however, without the option to input a preset value!

5.9.2 "Resolution" menu

In this menu, you can specify the number of decimal places for the measuring values as well as the unit of measure.



Enabled

Resolution

meter (m)	millimeter (mm)	micrometer (µm)
,00	0,0000	←,0
→,0	,00	,00
inch (in)	thou inch (thou)	micro inch (µin)

5.9.3 “Grid” menu

The connected measuring system has a signal period specified by the manufacturer with which the measuring device can properly calculate the measured length. The value to be entered here is already pre-configured or is provided by the manufacturer. If the measuring system provides a reference, then this can also be activated.

Enabled

The set value for incremental 1Vss / 11µAss probes corresponds to the distance in µm per period (raster constant) of the transducer **before interpolation**. Values from 0.01 µm to 999.99 µm are possible.

Feinmess Suhl measuring systems have a step of 8µm (0.008mm).

Grid

Grid

mm
Set

It can be switched between reference point On and reference point Off. When the reference point On is activated, the measured value is set to 0 if reference point was detected. When the unit is switched on with the reference function enabled, REF will shown until the reference point is detected.

Reference point off

Information: Changes in this menu should be carried out conscientiously!

5.9.4 “Measuring method” menu / probe constants (inside measurement / outside measurement)

For measurements with probes, a faulty measuring value is generated due to the size of the used probe. In order to compensate for this, up to 10 probes can be defined here with regards to their diameter and be given a freely selected name.

Enabled

Normal

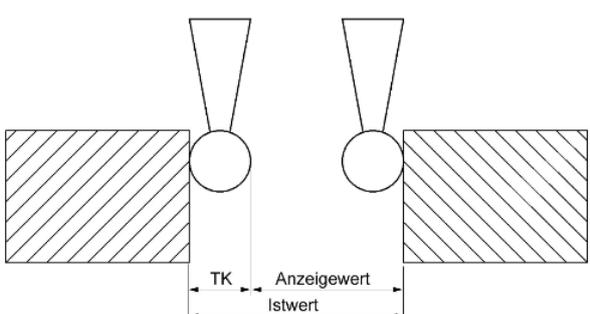
Internal measurement

External measurement

Probe value

Name	Wert	Control
without	0	OK
TK00	2.542	New
TK01	3.000	Edit
		Delete

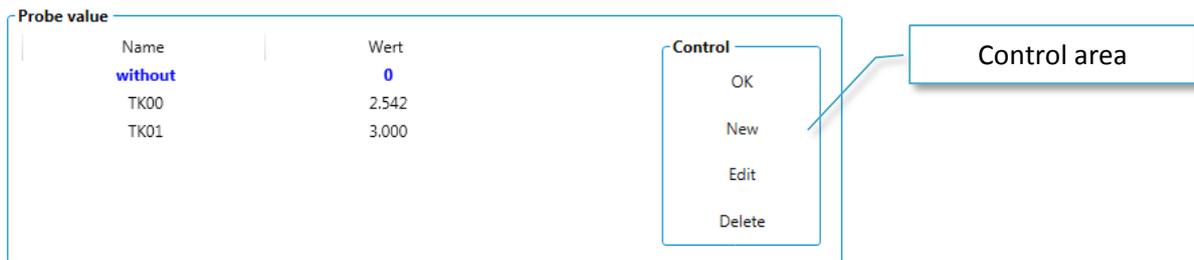
Internal measurement: real value = displayed value + probe value



The first entry “without” with the value "0" is set by the system and can not be modified or deleted. This special entry is used to calculate the measuring method “normal” i.e. without probe.

To active an entry for a calculation, you can either click with the mouse on the “OK” button or double click on the entry itself. An active entry is identifiable by its distinctive blue display.

Should you want to create a new entry or change one, then confirm the relevant button in the control area on the right side.



Then the input field is shown in which you can make the appropriate adjustments.

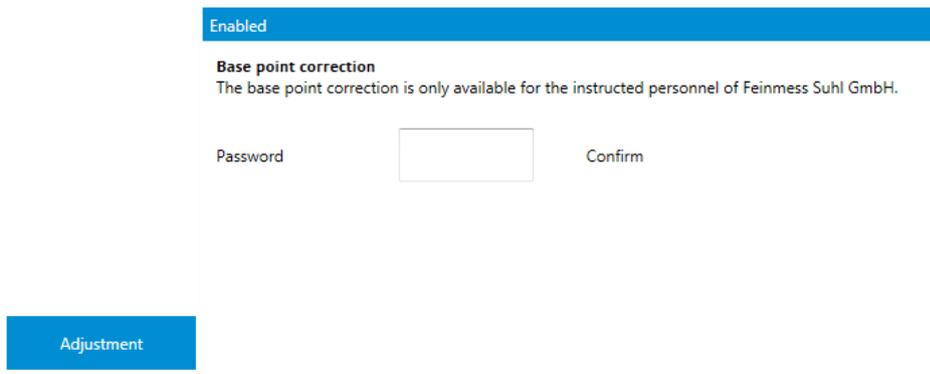


For the value input, you have to use the unit of millimetres!

Information: Every change is made immediately and can not be undone!

5.9.5 “Support point correction” menu

It is possible to make a correction of the incremental measuring channels. This function is reserved to instructed staff and thus password protected.

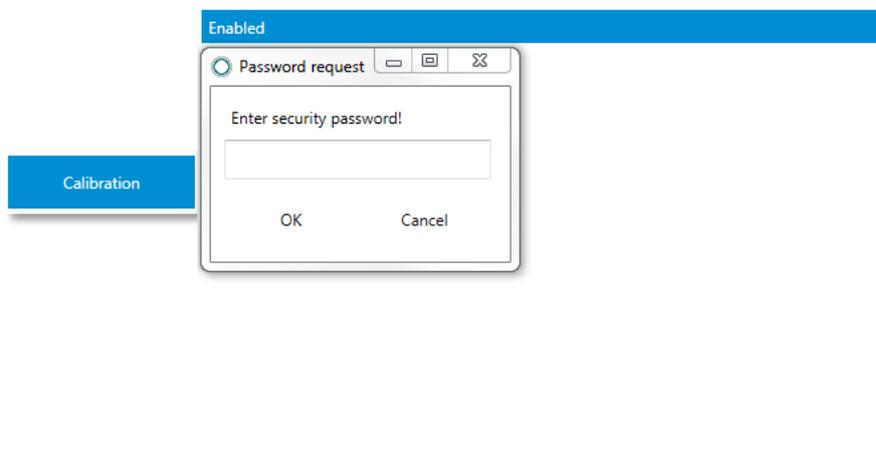


The screenshot shows a software window titled "Enabled" with a blue header. Below the header, the text "Base point correction" is displayed, followed by a note: "The base point correction is only available for the instructed personnel of Feinmess Suhl GmbH." Below this text, there is a "Password" label, an empty text input field, and a "Confirm" label. At the bottom left of the window, there is a blue button labeled "Adjustment".

The function of support point correction is explained in a separately available document.

5.9.6 “Calibration” menu

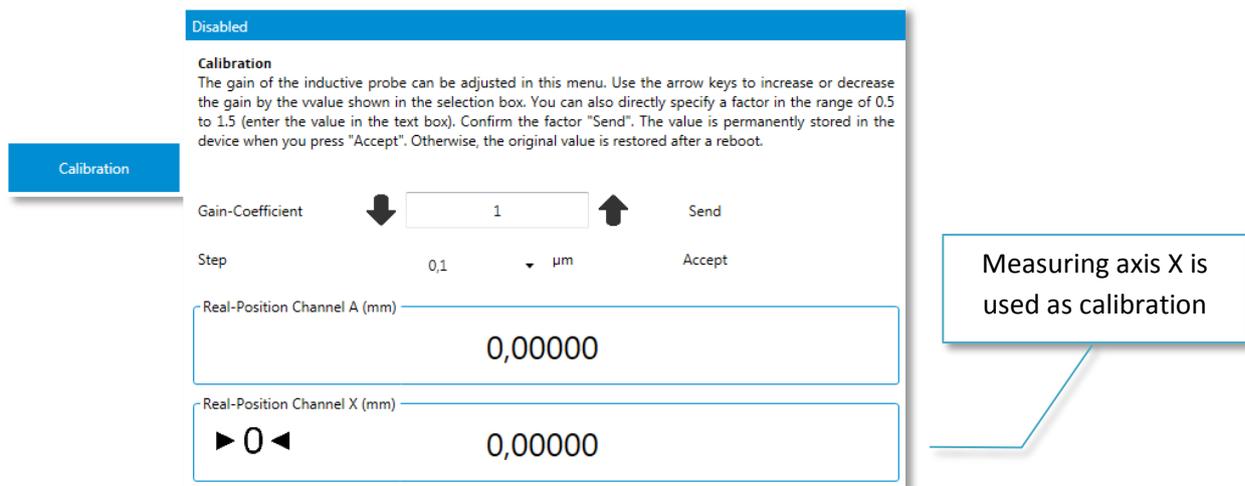
The calibration function is only available for the inductive measuring channel. After entering the safety password, a signal amplification or pitch can be set here.



The screenshot shows a software window titled "Enabled" with a blue header. A blue button labeled "Calibration" is visible on the left side. A "Password request" dialog box is overlaid on the main window. The dialog box has a title bar with "Password request" and standard window controls. The main text in the dialog says "Enter security password!". Below this text is an empty text input field. At the bottom of the dialog, there are two buttons: "OK" and "Cancel".

It is possible to manually enter the factor into a text field or to increase or reduce the measuring value in set increments using automatic factor calculation until the desired actual position of the measuring channel is displayed. During the automatic calculation, the new factor is also automatically transferred to the device which does not occur during manual input. Here, the **“transfer”** button has to be pressed after input.

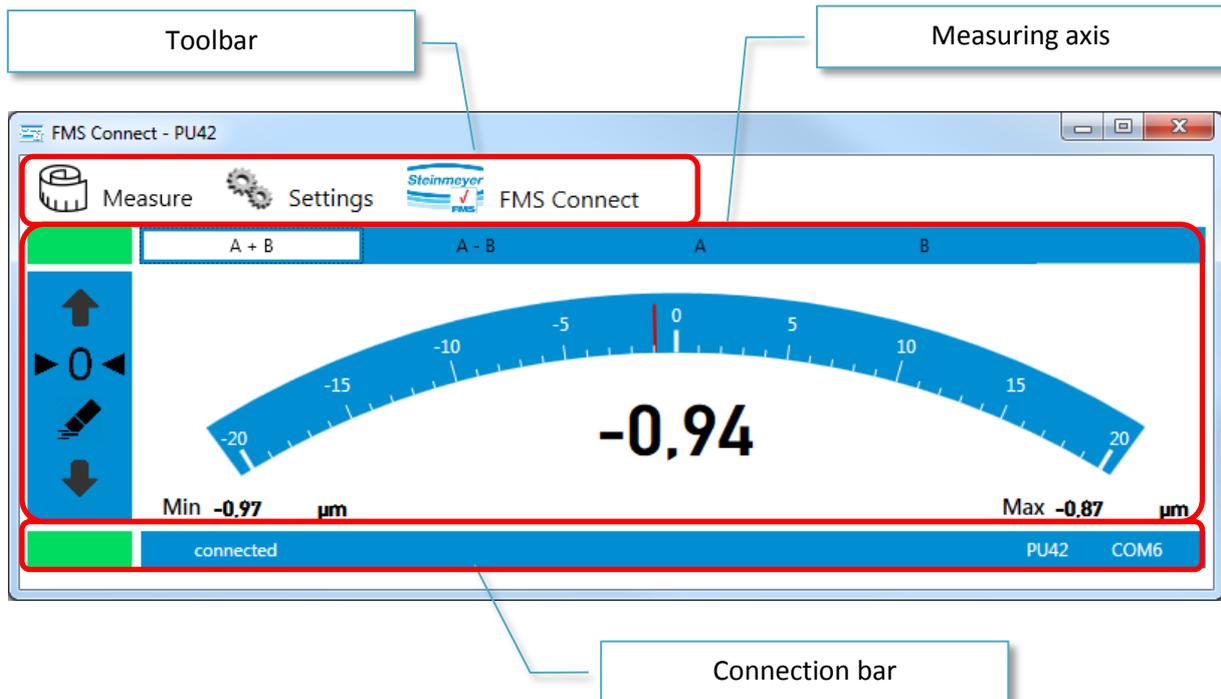
This calibration is specific to the button and thus not transferable to other buttons!



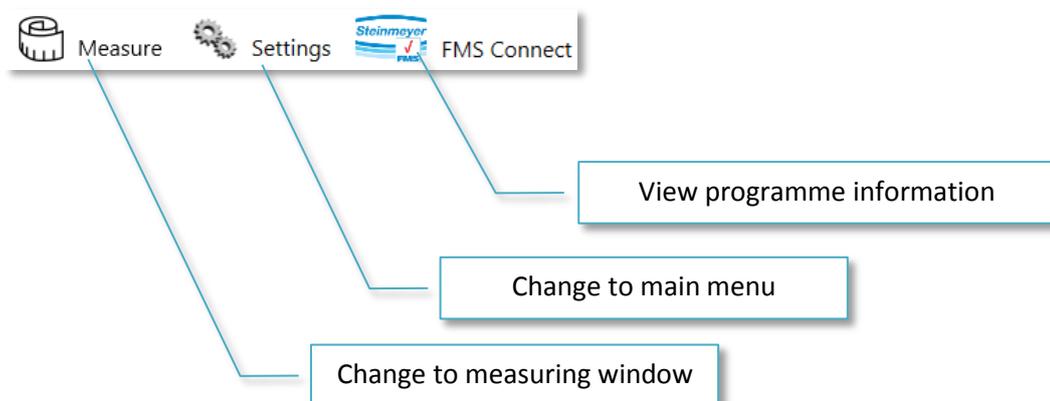
To finish calibration, the **“accept”** button should be activated, as otherwise the new factor will be reset to the original value upon restarting of the device!

6 Measuring window PU42

The measuring window for the PU42 (EMP II) starts in the following view. It is structured into the menu area, the measurement axes and the connection bar. You can adapt the window according to your demands (switch axes or mathematical connections, change scale of analogue bar). The relevant settings are saved.

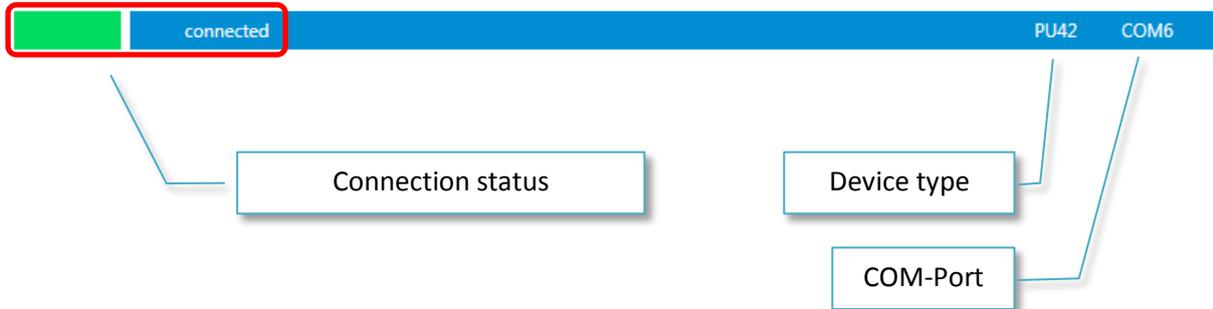


6.1 Toolbar



6.2 Connection bar

The connection bar provides all information, which concern the device communication.

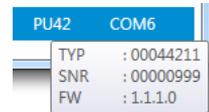


The connection status displays if a connection is present, disconnected or cannot be established.



Furthermore, the supported device type and the used virtual COM-Port (VCP) is displayed.

You can find out the serial number and firmware of the connected device by using the so-called tool tip. For this, the computer mouse has to be directly above the device type, then the additional information is displayed for 5 seconds.



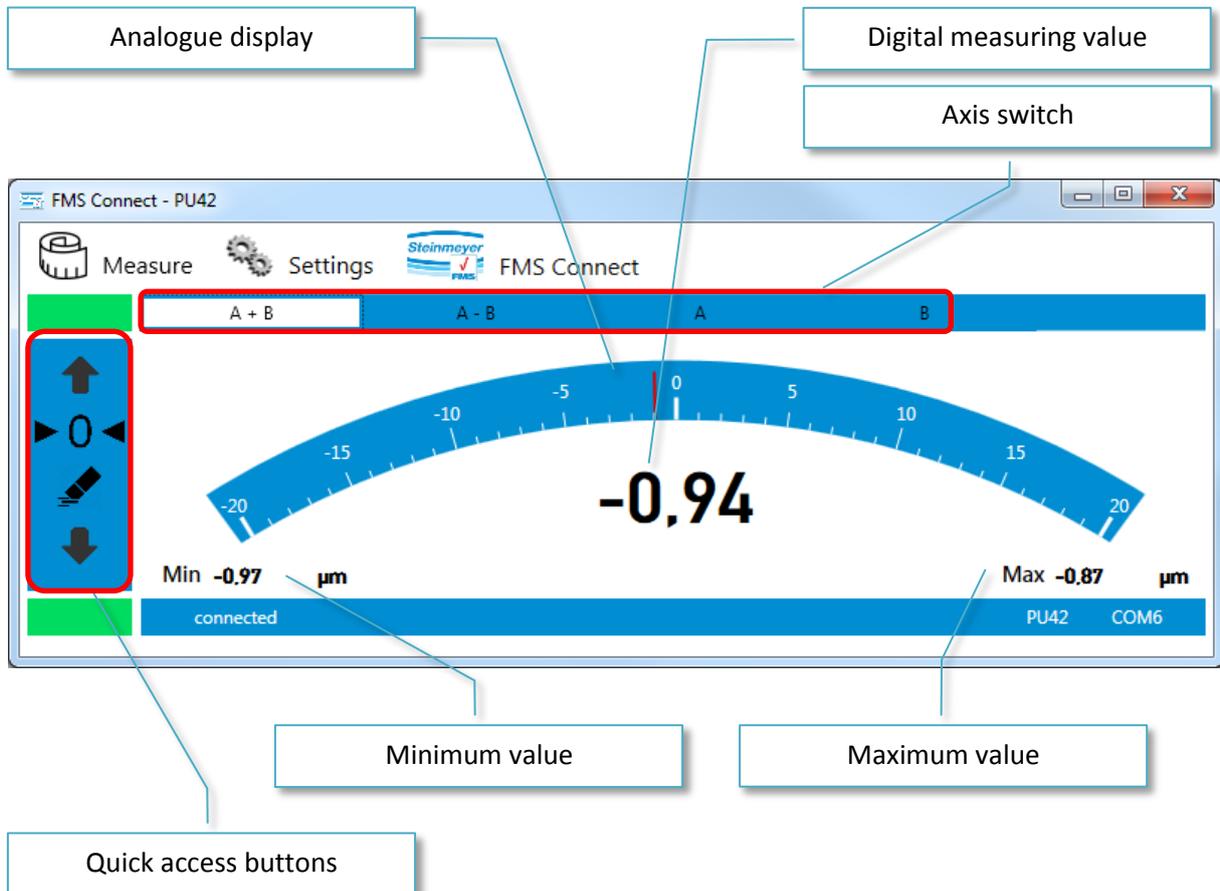
Information:

If no device of the expected application type is connected to the PC or switched on upon programme start or is already connected to another programme, then this can be seen on the connection bar, which looks like this:



Furthermore, as a digital measured value the information "no device" is displayed.

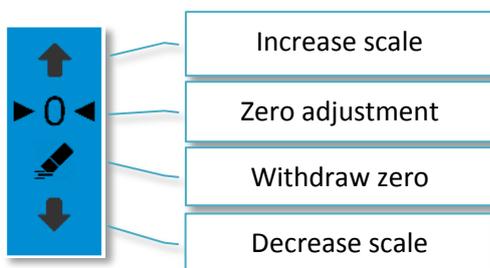
6.3 Detail information measuring axis PU42



With axis switch, the individual inductive channels can be displayed separately or offset.



Addition and subtraction of the two channels are available as calculation methods.



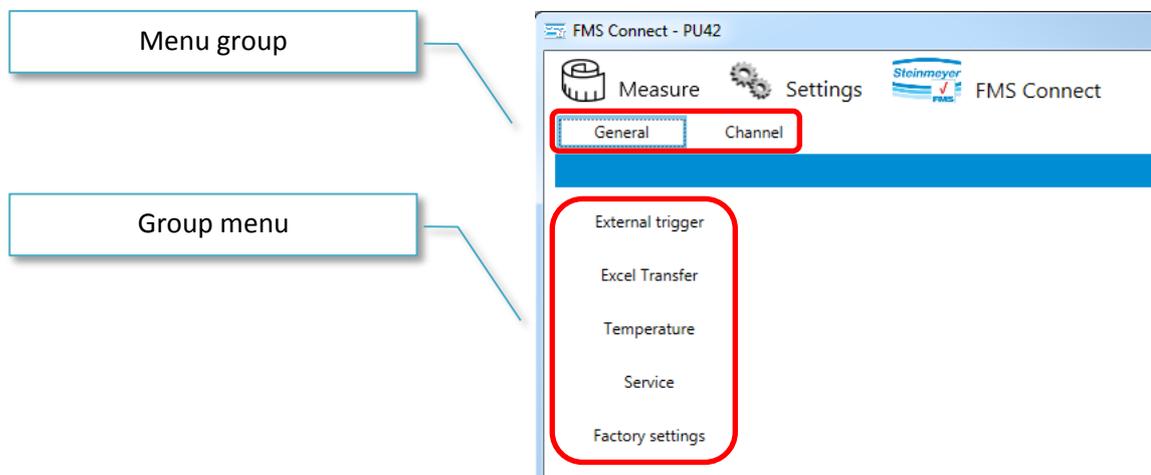
The quick access button allow zeroing the measuring value as well as deleting an active zero offset. The extreme values (minimum value as well as maximum value) are also reset when deleting. The scale of the analogue display can be switched in three stages with the arrows.



The digital measured value displays the offset or the individual channel measuring value.

The measuring value can be transferred to an installed Excel by clicking on the measuring value. For this, please read the chapter Excel-transfer.

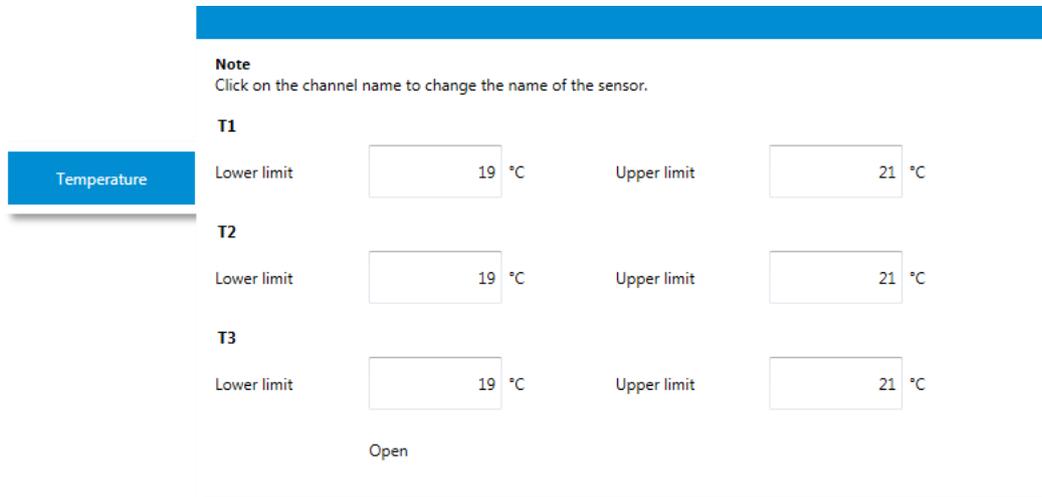
6.4 Main menu



6.5 Menu group general

All settings are made in the menu group general, which have no direct relation to the measuring axes.

6.5.1 “Temperature” menu

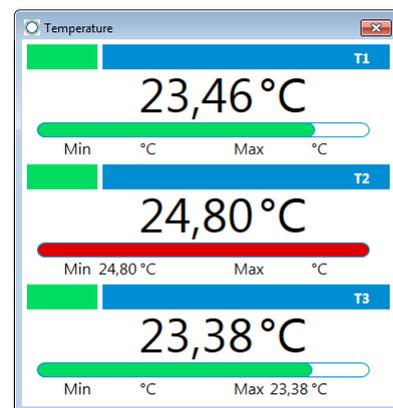


Using the “temperature” menu item, it is possible to specify the temperature measuring values limits for the sensors, which are connected to the device terminals T1, T2 and T3.

Simply click on the port name T1, T2 or T3 to change the sensor name. Then a cursor appears immediately, which allows you to change the identifier at one's own discretion.

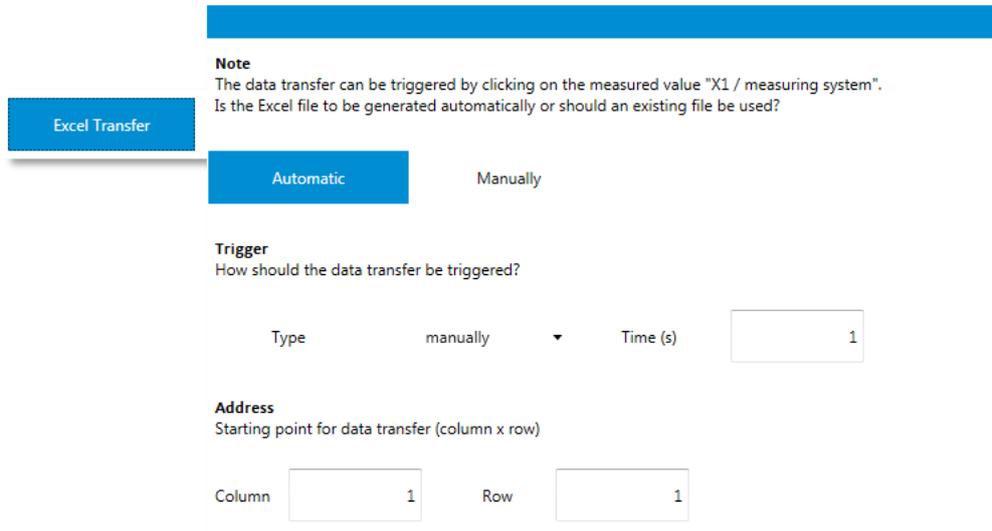
The “open” button has to be clicked to visualise the measuring values. Then an independent programme window is opened.

In the independent programme window, the relevant temperature value is displayed with the associated extreme values. The status bar underneath the measuring value signals with its colour if the temperature is within (green), colder than (blue) or warmer than (red) than the previously defined limit values. An unneeded temperature value can be deactivated by clicking on the green area left above the measuring value.



The temperature measuring values are documented during a possible EXCEL transfer, however, not offset with another axis measuring value.

6.5.2 "Excel transfer" menu



Note
The data transfer can be triggered by clicking on the measured value "X1 / measuring system".
Is the Excel file to be generated automatically or should an existing file be used?

Excel Transfer

Automatic Manually

Trigger
How should the data transfer be triggered?

Type manually Time (s)

Address
Starting point for data transfer (column x row)

Column Row

Automatic mode:

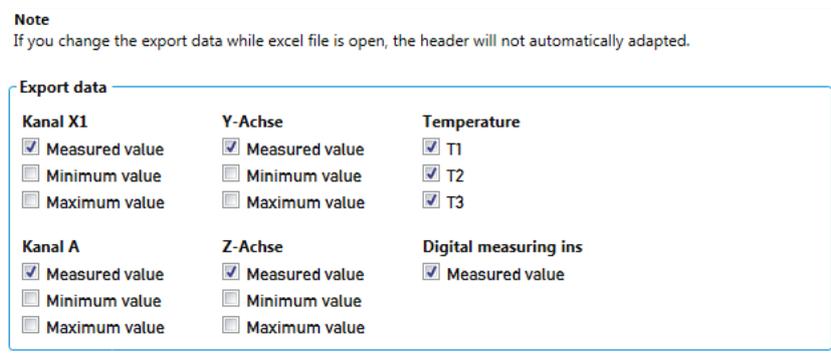
A new temporary Excel file is created with a click on the measuring value in the measuring window. This file is automatically populated with a table header, however, only filled with the first measuring value on the second click.

Manual module:

In manual mode, an existing Excel file is selected via dialog box and automatically opened. No table header is generated!

There are three options to trigger the data transfer into Excel. Manually by clicking on the measuring value, by pressing the F9 key or at a time interval with timer.

For some applications, an additional parameter block is displayed in order to be able to specifically select the data to be transferred.



Note
If you change the export data while excel file is open, the header will not automatically adapted.

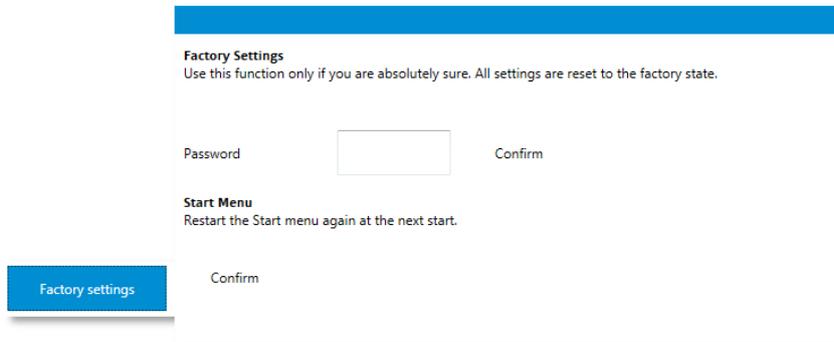
Export data

Kanal X1	Y-Achse	Temperature
<input checked="" type="checkbox"/> Measured value	<input checked="" type="checkbox"/> Measured value	<input checked="" type="checkbox"/> T1
<input type="checkbox"/> Minimum value	<input type="checkbox"/> Minimum value	<input checked="" type="checkbox"/> T2
<input type="checkbox"/> Maximum value	<input type="checkbox"/> Maximum value	<input checked="" type="checkbox"/> T3
Kanal A	Z-Achse	Digital measuring ins
<input checked="" type="checkbox"/> Measured value	<input checked="" type="checkbox"/> Measured value	<input checked="" type="checkbox"/> Measured value
<input type="checkbox"/> Minimum value	<input type="checkbox"/> Minimum value	
<input type="checkbox"/> Maximum value	<input type="checkbox"/> Maximum value	

6.5.3 "Factory settings" menu

You can reset the device to the factory state in this menu item.

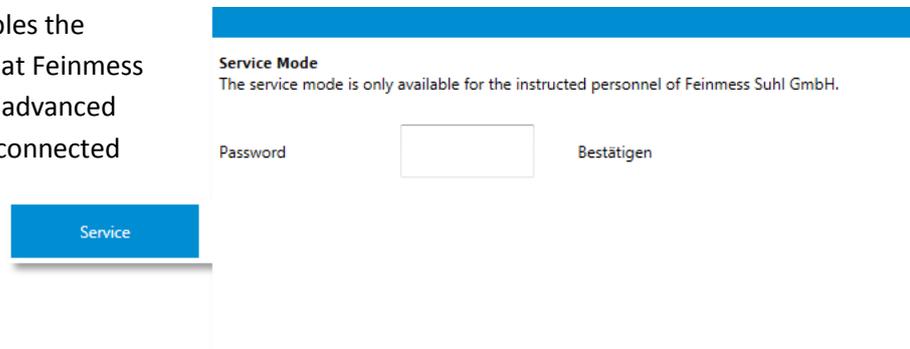
Caution!!! The factory state has nothing to do with the delivery state. The equipment will lose thus, e.g. important settings, which have been made specifically for your measurement application.



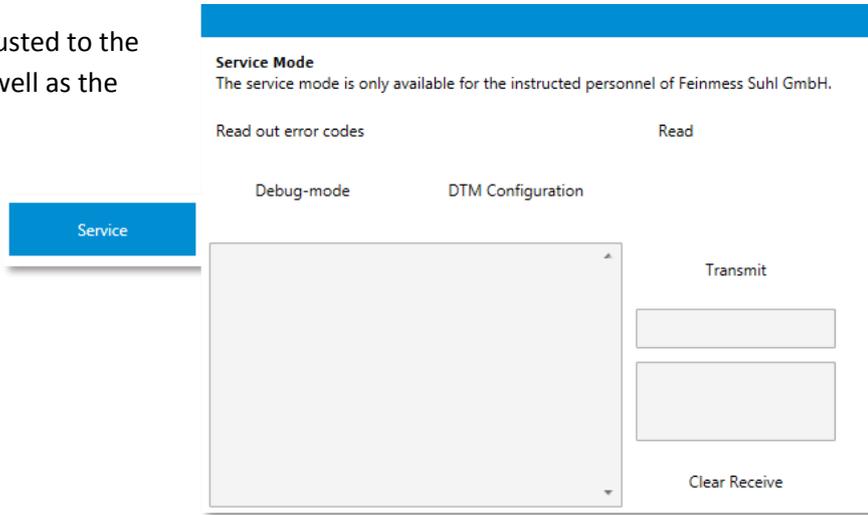
Furthermore, a set automatic start can be withdrawn in order to access the manager selection at the next programme start. This should only be done by instructed personnel, since each measuring interface works individually with the device.

6.5.4 "Service" menu

The service menu enables the instructed expert staff at Feinmess Suhl GmbH to have an advanced control option for the connected devices. Access is password protected.



Each service menu is adjusted to the connected hardware as well as the related measurement application and are different in their display.

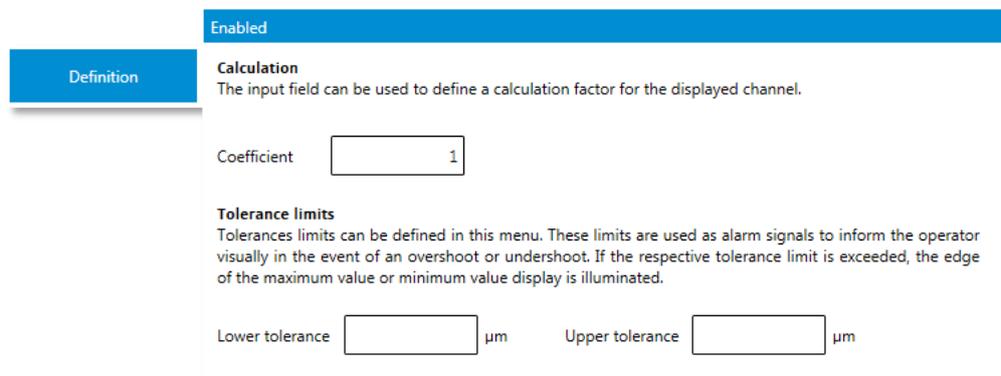


6.6 “Channel” menu group

In the menu group “channel”, all settings are made which have only an impact on the currently displayed measuring value. These settings are not directly linked to the measuring channel!

6.6.1 “Definition” menu

In this menu, it is possible to also offset the currently displayed measuring value with a factor.



Enabled

Definition

Calculation
The input field can be used to define a calculation factor for the displayed channel.

Coefficient

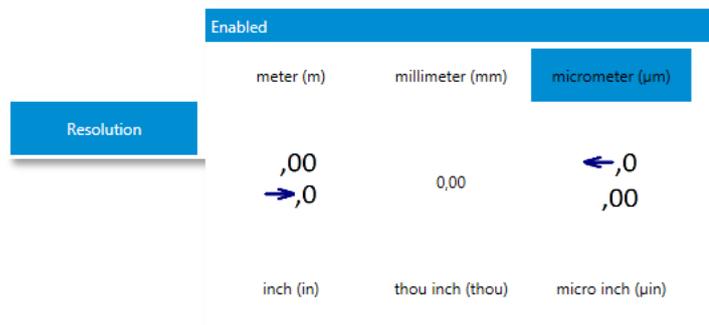
Tolerance limits
Tolerances limits can be defined in this menu. These limits are used as alarm signals to inform the operator visually in the event of an overshoot or undershoot. If the respective tolerance limit is exceeded, the edge of the maximum value or minimum value display is illuminated.

Lower tolerance µm Upper tolerance µm

Tolerance limits can be defined to monitor a measuring range. The fields must remain empty if no limits are to be monitored.

6.6.2 “Resolution” menu

In this menu, you can specify the number of decimal places for the measuring values as well as the unit of measure.



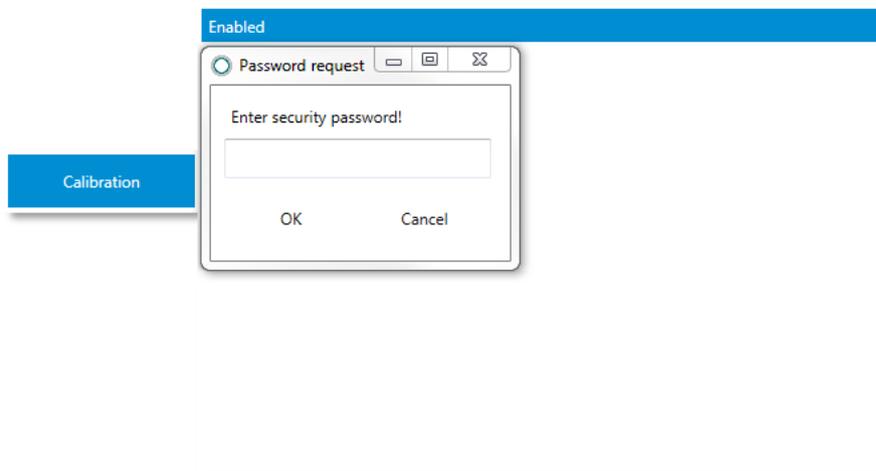
Enabled

Resolution

meter (m)	millimeter (mm)	micrometer (µm)
0,00 →,0	0,00	←,0 0,00
inch (in)	thou inch (thou)	micro inch (µin)

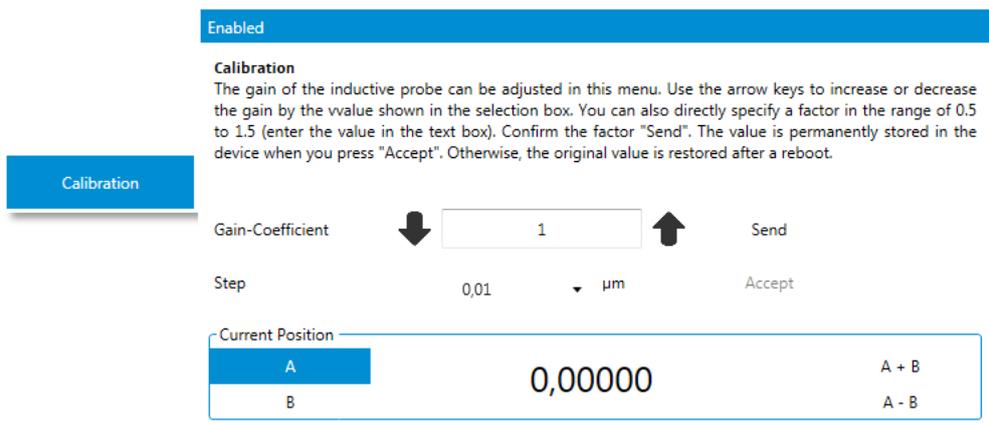
6.6.3 “Calibration” menu

The calibration function is only available for the inductive measuring channels. After entering the safety password, a signal amplification or pitch can be set here.



It is possible to manually enter the factor into a text field or to increase or reduce the measuring value in set increments using automatic factor calculation until the desired actual position of the measuring channel is displayed. During the automatic calculation, the new factor is also automatically transferred to the device which does not occur during manual input. Here, the “transfer” button has to be pressed after input. You can select the channel to be calibrated on the left side in the area “current position”.

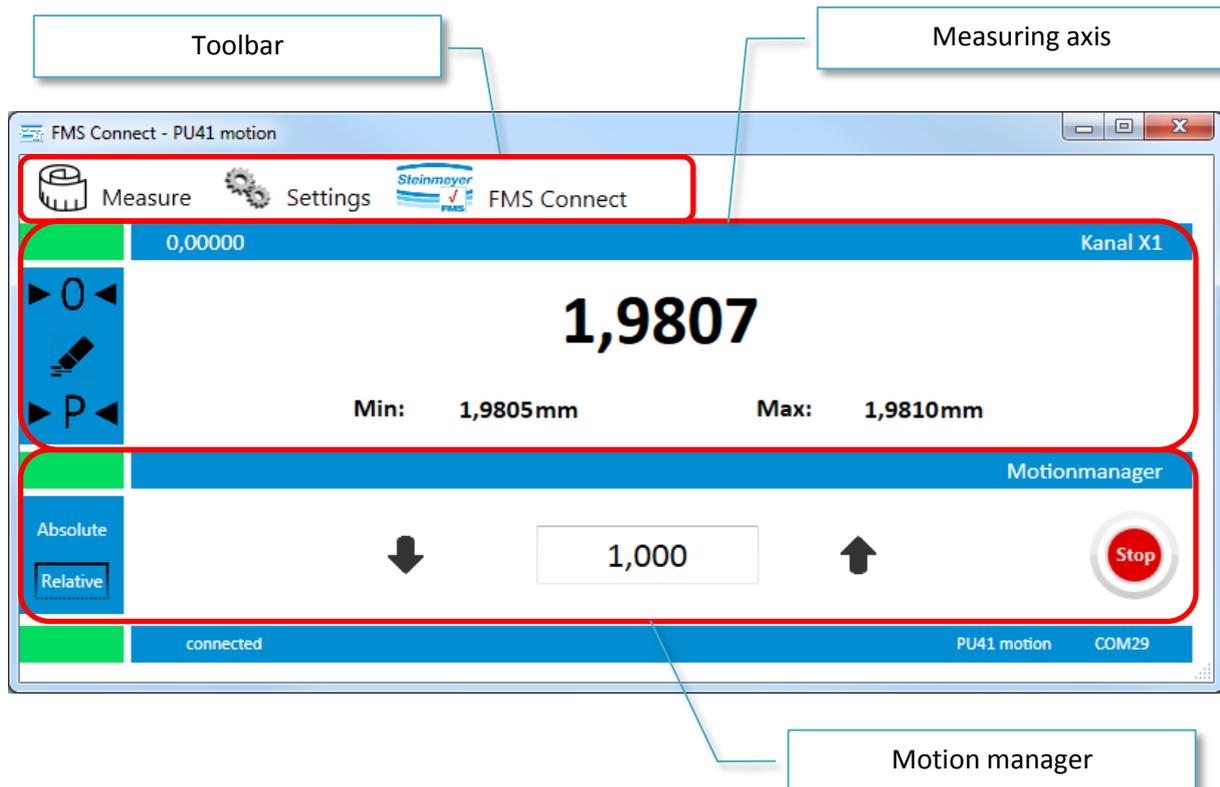
This calibration is specific to the button and thus not transferable to other buttons!



To finish every channel calibration, the “accept” button should be activated, as otherwise the new factor will be reset to the original value upon restarting of the device!

7 Measuring window PU41motion

The measuring window for the PU41motion (MFP30/MFP100) starts in the following view. It is structured into the menu area, the measurement axes, the motion manager and the connection bar. You can also adapt the window according to your requirements (show/hide an additional axis, assign names etc.). The relevant settings are saved.



7.1 Motion manager

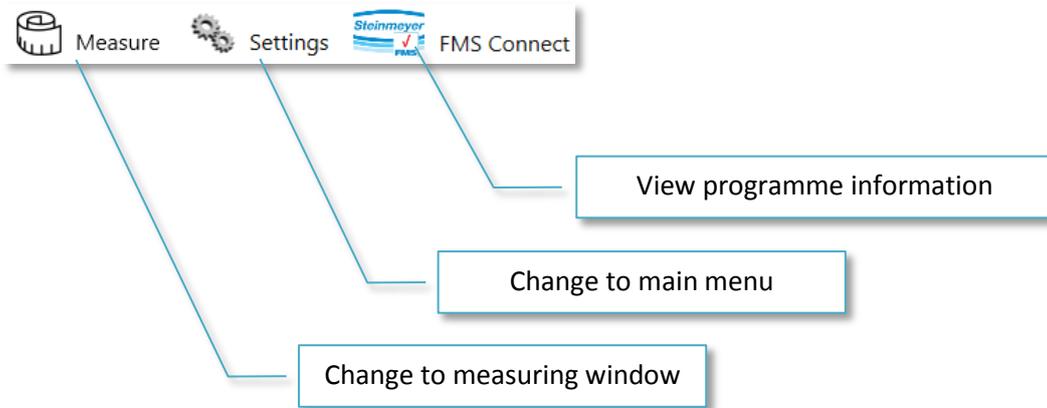


Active motor movements can be interrupted with the stop button. This is necessary, e.g., when positions are to be approached which may lead to damage of the measuring object as well as test pieces.



The entered position can have an effect in two different ways on the position of the encoder. In relative mode, only the difference between the current measuring position is driven. For this purpose, the movement of the encoder can be controlled into the desired position using the directional arrows. In absolute mode, the desired position can be directly approached, here both directional arrows have the same function.

7.2 Toolbar

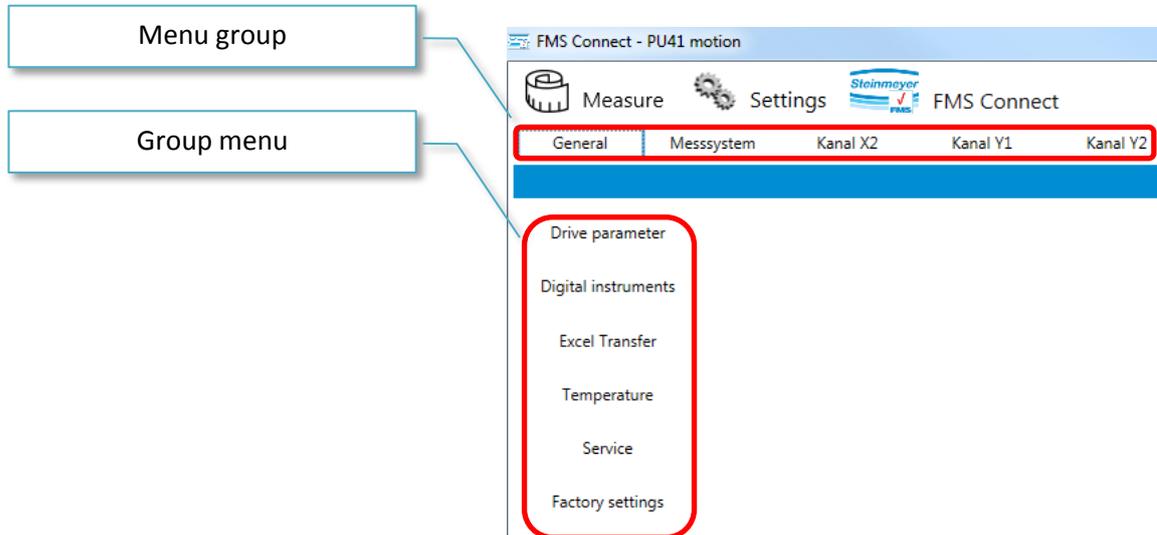


7.2.1 Programme information

You get to an overview of the most important key data of the programme with the programme information menu item. Here, you can also switch to voice support for the program.



7.2.2 Main menu



7.2.3 Menu group general

7.2.3.1 Motor parameters

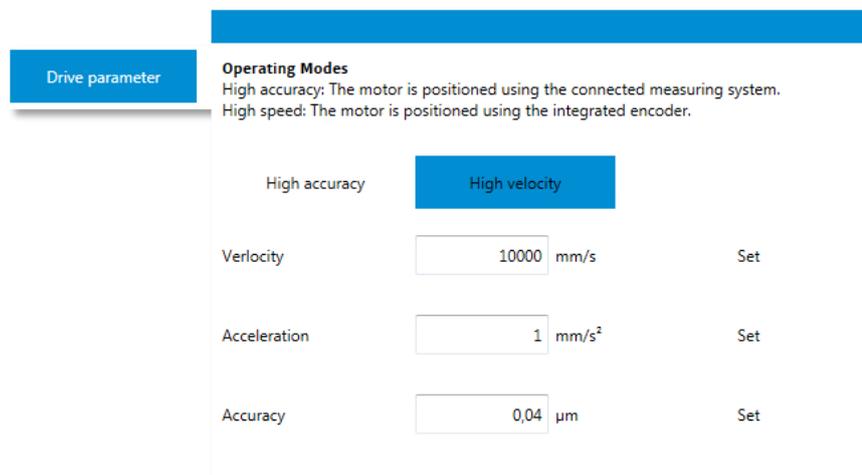
The behaviour of the position is affected with the motor parameters.

For a position, a travel distance is determined internally with a drive train using the “high speed” button. This positioning method is quick but also relatively inaccurate.

The “high accuracy” button employs additionally the highly accurate measuring

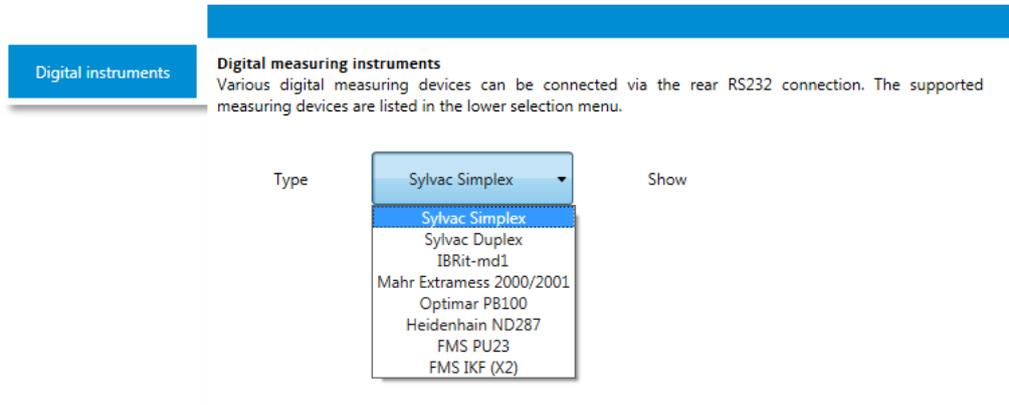
system for positioning. Here, the “positioning accuracy” parameter applies with which the so-called target range is defined by ending the automatic positioning.

This enables exact positioning, however, the positioning time is significantly longer.



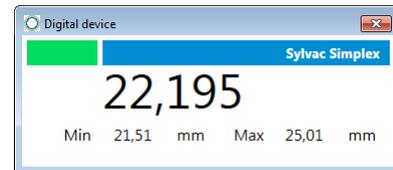
7.2.3.2 “Digital measuring tools” menu

Some measuring tools can be integrated via the digital interface to provide auxiliary measuring axes. For this, only the relevant supported protocol or device in the selection box has to be selected and the SHOW button has to be activated.

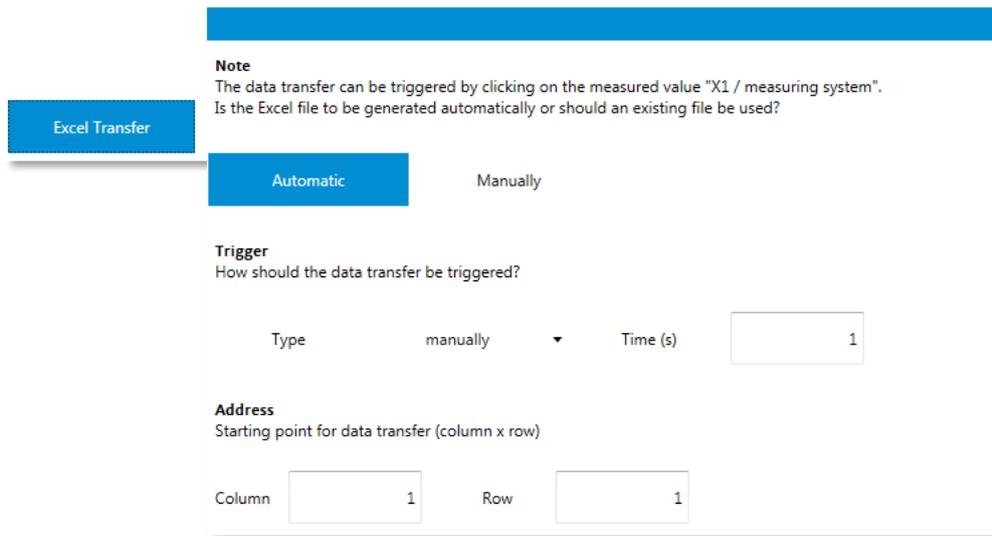


Then an independent programme window opens in which the measuring value of the digital measuring tool is displayed.

The measuring values are documented during a possible Excel transfer, however, not offset with another axis measuring value.



7.2.3.3 "Excel transfer" menu



The screenshot shows a dialog box titled "Excel Transfer". On the left, there is a blue button labeled "Excel Transfer". The main content area has a blue header bar. Below the header, there is a "Note" section with the text: "The data transfer can be triggered by clicking on the measured value 'X1 / measuring system'. Is the Excel file to be generated automatically or should an existing file be used?". Below the note are two radio buttons: "Automatic" (which is selected) and "Manually". Underneath is a "Trigger" section with the question "How should the data transfer be triggered?". It features a "Type" dropdown menu set to "manually" and a "Time (s)" input field containing the value "1". The "Address" section is titled "Starting point for data transfer (column x row)" and contains two input fields: "Column" with the value "1" and "Row" with the value "1".

Automatic mode:

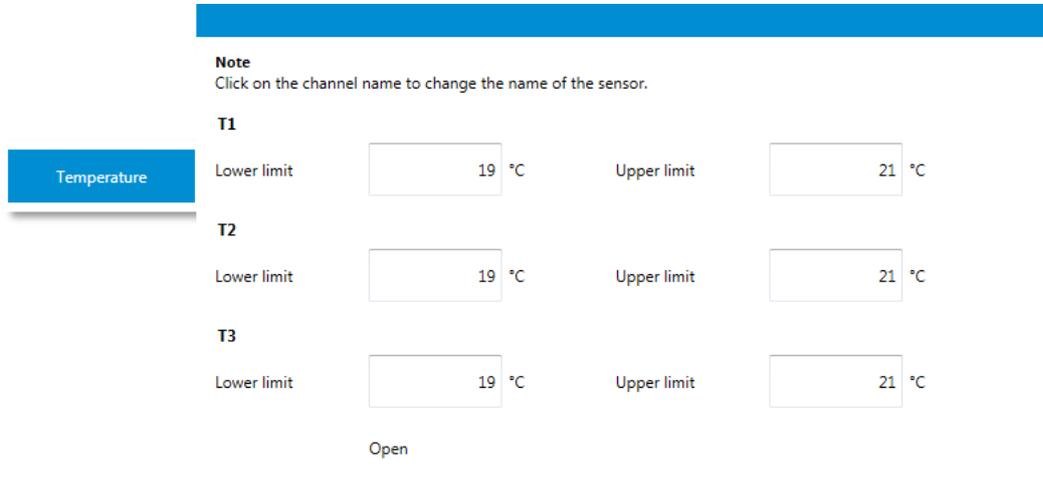
A new temporary Excel file is created with a click on the measuring value in the measuring window. This file is automatically populated with a table header, however, only filled with the first measuring value on the second click.

Manual module:

In manual mode, an existing Excel file is selected via dialog box and automatically opened. No table header is generated!

There are three options to trigger the data transfer into Excel. Manually by clicking on the measuring value, by pressing the F9 key or at a time interval with timer.

7.2.3.4 "Temperature" menu

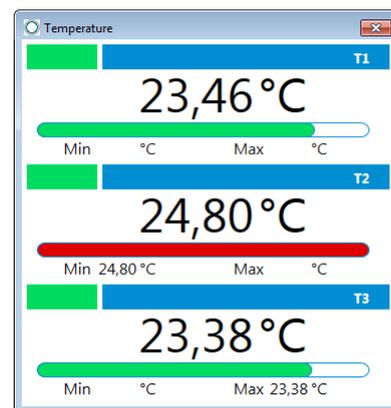


Using the "temperature" menu item, it is possible to specify the temperature measuring values limits for the sensors, which are connected to the device terminals T1, T2 and T3.

Simply click on the port name T1, T2 or T3 to change the sensor name. Then a cursor appears immediately, which allows you to change the identifier at one's own discretion.

The "open" button has to be clicked to visualise the measuring values. Then an independent programme window is opened.

In the independent programme window, the relevant temperature value is displayed with the associated extreme values. The status bar underneath the measuring value signals with its colour if the temperature is within (green), colder than (blue) or warmer than (red) than the previously defined limit values. An unneeded temperature value can be deactivated by clicking on the green area left above the measuring value.

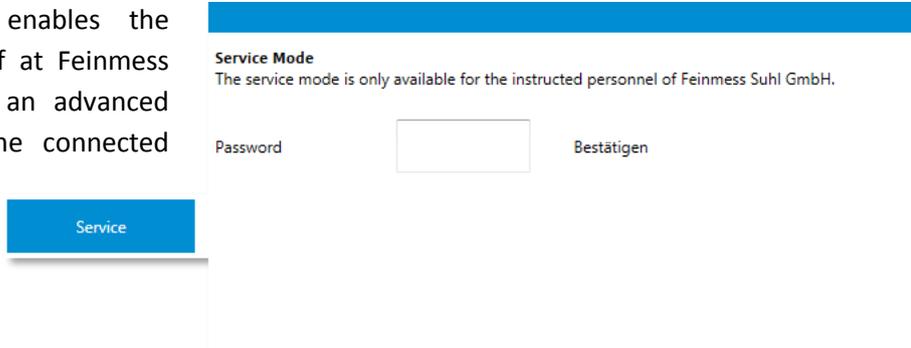


be

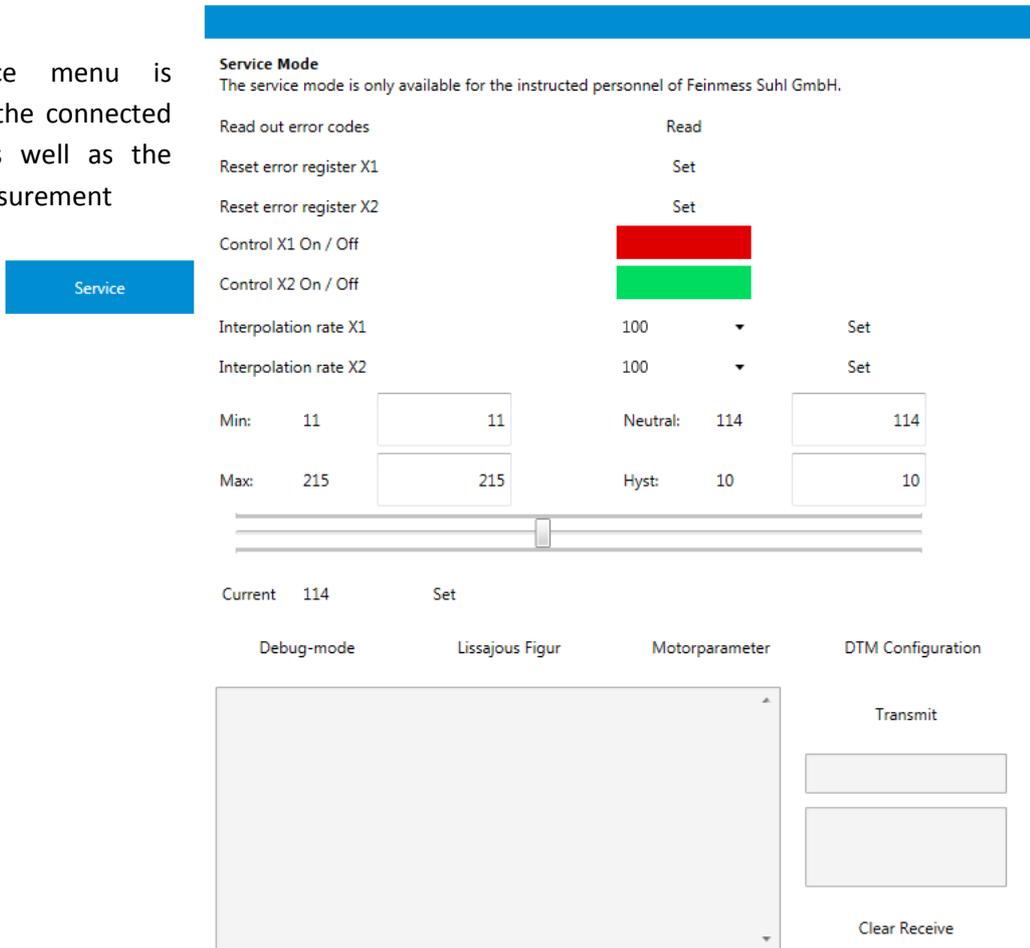
The temperature measuring values are documented during a possible EXCEL transfer, however, not offset with another axis measuring value.

7.2.3.5 "Service" menu

The service menu enables the instructed expert staff at Feinmess Suhl GmbH to have an advanced control option for the connected devices. Access is password protected.

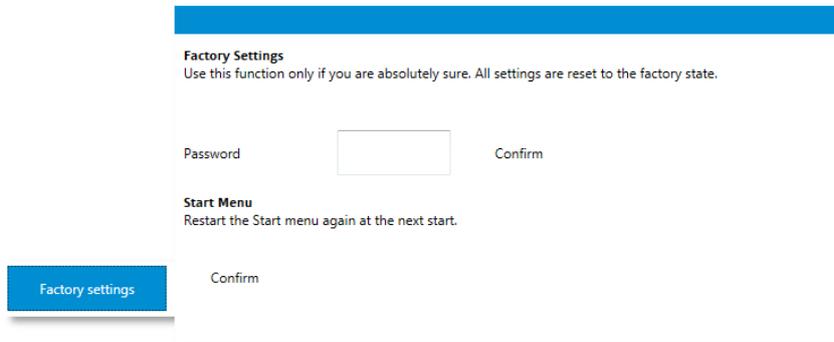


Each service menu is adjusted to the connected hardware as well as the related measurement application and are different in their display.



7.2.3.6 “Factory settings” menu

You can reset the device to the factory state in this menu item. Caution: The factory state has nothing to do with the delivery state. The equipment will lose thus, e.g. important settings, which have been made specifically for your measurement application.

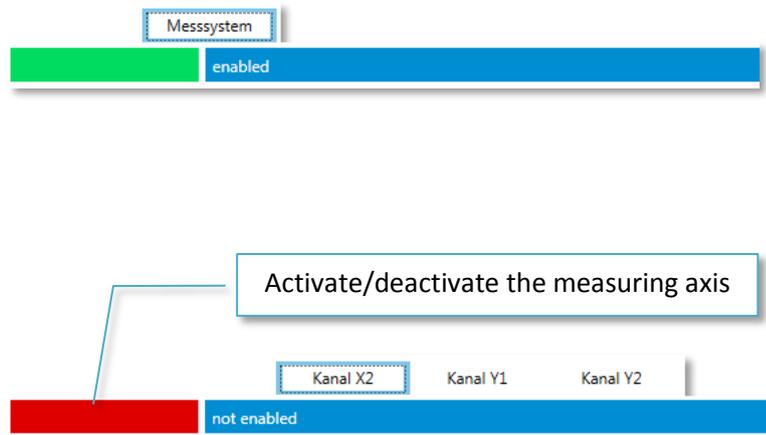


Furthermore, a set automatic start can be withdrawn in order to access the manager selection at the next programme start. This should only be done by instructed personnel, since each measuring interface works individually with the device.

7.2.4 Menu groups “Measuring system & channel X2 & Y1 & Y2”

These menus group the most important settings for the individual measuring channels of PU41motion.

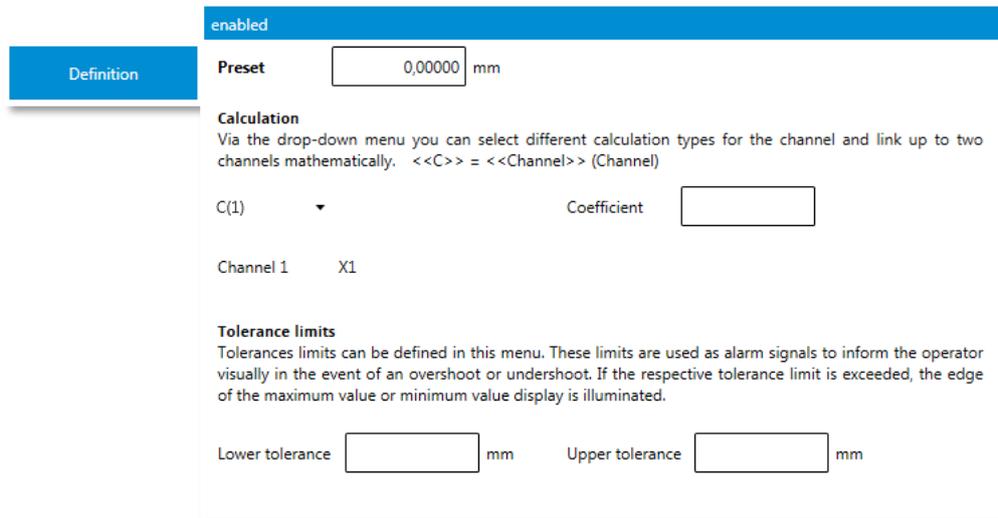
The measuring system is always active and also cannot be deactivated accidentally.



Activating or deactivating an additional measuring channel is done by clicking on the coloured area in the relevant active channel selection bar. **Please note, that only one additional measuring channel can be active.** If another channel is activated, then the already activated measuring channel is deactivated.

7.2.4.1 "Definition" menu

In this menu, you can define a preset and it is possible to offset the measuring channel with a factor or another measuring channel.



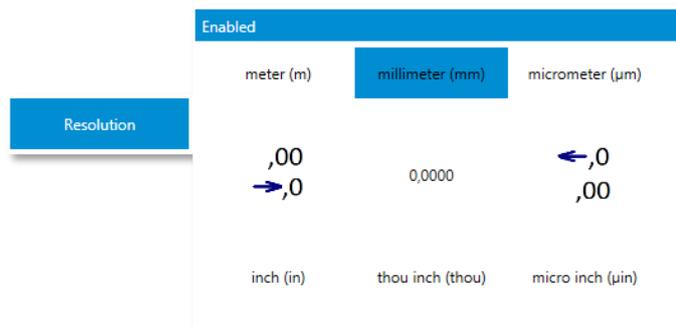
The screenshot shows the 'Definition' menu with the following fields and options:

- enabled** (status)
- Preset**: mm
- Calculation**: Via the drop-down menu you can select different calculation types for the channel and link up to two channels mathematically. $<<C>> = <<Channel>> (Channel)$
- C(1)**: (dropdown menu)
- Coefficient**:
- Channel 1**:
- Tolerance limits**: Tolerances limits can be defined in this menu. These limits are used as alarm signals to inform the operator visually in the event of an overshoot or undershoot. If the respective tolerance limit is exceeded, the edge of the maximum value or minimum value display is illuminated.
- Lower tolerance**: mm
- Upper tolerance**: mm

Tolerance limits can be defined to monitor a measuring range. The fields must remain empty if no limits are to be monitored.

7.2.4.2 "Resolution" menu

In this menu, you can specify the number of decimal places for the measuring values as well as the unit of measure.



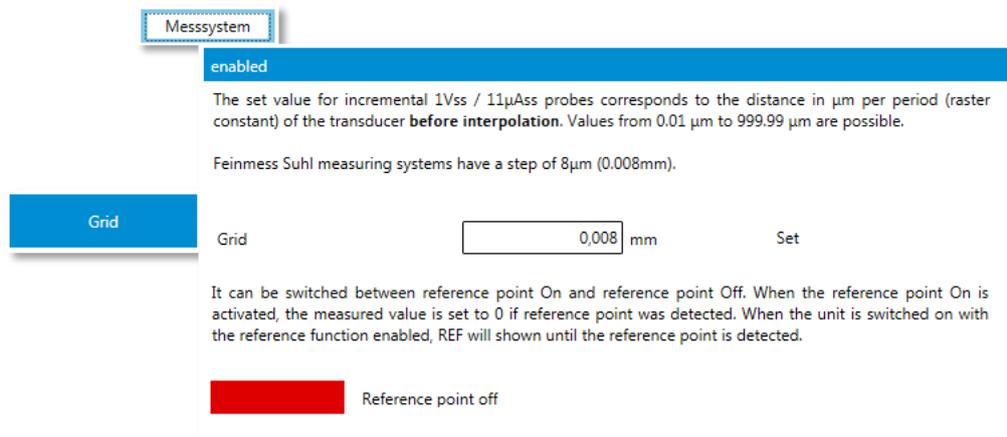
The screenshot shows the 'Resolution' menu with the following options:

- Enabled** (status)
- Resolution** (tab)
- meter (m)**: (with arrow pointing right)
- millimeter (mm)**: (highlighted)
- micrometer (µm)**: (with arrow pointing left)
- inch (in)**:
- thou inch (thou)**:
- micro inch (µin)**:

7.2.4.3 "Grid" menu

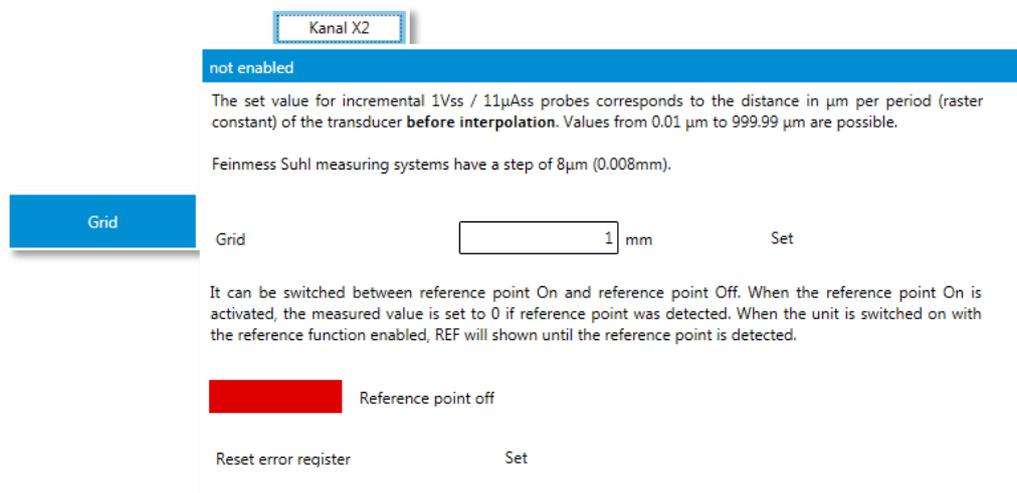
Information: Changes in this menu should be carried out conscientiously!

The connected measuring system has a signal period specified by the manufacturer with which the measuring device can properly calculate the measured length. The value to be entered here is already pre-configured or is provided by the manufacturer. If the measuring system provides a reference, then this can also be activated.

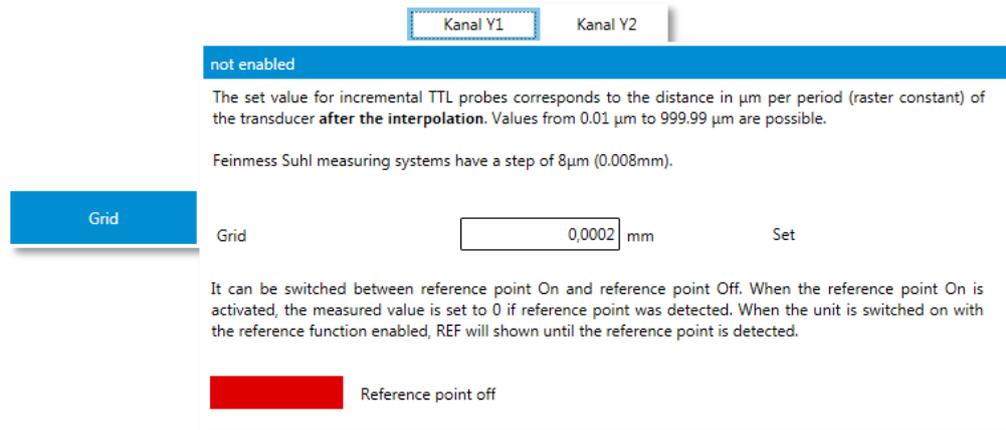


Caution: The reference point function for the measuring system has to be deactivated in the application as MFP30 as well as MFP100. This function may only be used by instructed Feinmess Suhl GmbH expert staff.

The channel X2 is designed for analogue incremental systems so that the grid of the measuring system can be specified directly since the interpolation takes place in PU41motion. In addition, an available reference point for specific measurement tasks can be activated here. Resetting the error memory is supported in order to be able to change the incremental system at channel X2. **Please note that the measuring value is also reset during this resetting.**

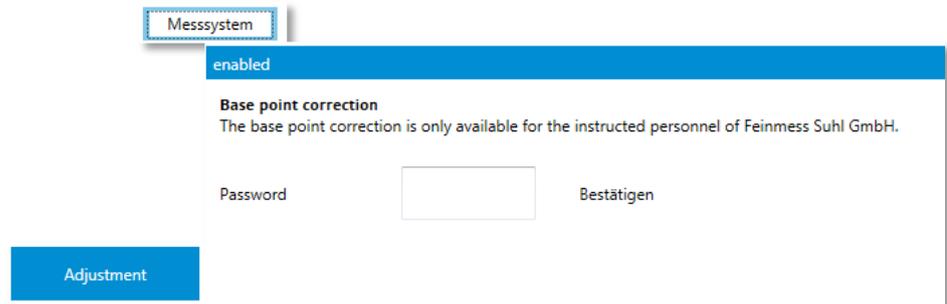


The channels Y1 and Y2 have been designed for digital incremental systems. Here the grid, to which the system outputs, has to be specified. This means that the smallest measuring step has to be specified since for these systems, the interpolation is not performed by the PU41motion but by the measuring system to be connected.



7.2.4.4 "Support point correction" menu

Caution! The menu item is password protected and only to be operated by instructed Feinmess Suhl GmbH expert staff. The complete measuring system may become useless through incorrect use.

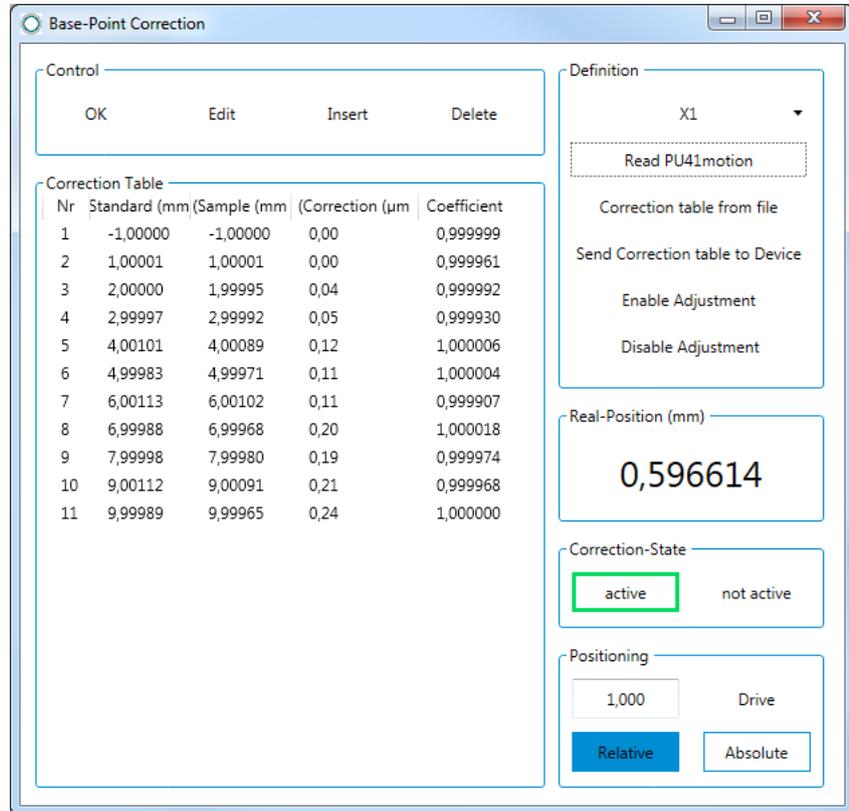


This menu can only be achieved in the "measuring system" channel, since this impacts the accuracy of the measuring system.

After entering the correct password and confirming it, another application window opens.

The support point correction is a very complex calculation which has to be determined with a very complicated measuring method.

For this purpose, a separately available document can be requested.



7.3 Menu configuration

7.3.1 Settings PU42 (EMP)

- **General**
 - External trigger
 - Print Mode (Push, Latch)
 - External trigger (Print, Zero, etc.)
 - Excel Transfer
 - Automatic/Manual
 - Trigger (Manual, F9 Button, Timer, etc. ...)
 - Line address (starting point of the data record)
 - Temperature
 - T1 -> lower limit value, upper limit value
 - T2 -> lower limit value, upper limit value
 - T3 -> lower limit value, upper limit value
 - Open the temperature measuring window
 - Service
 - Service mode -> only accessible to expert staff!
 - Factory settings
 - Establish factory state -> only accessible to expert staff!
 - Start menu -> reset start behaviour
- **Channel**
 - Definition
 - Factor
 - Tolerance, lower as well as upper
 - Resolution
 - Measuring unit
 - metric (metre, millimetre, micrometre)
 - imperial (inch, thou, micro-inch)
 - Accuracy (number of decimal places)
 - Calibration

7.3.2 Settings PU41 (KLM & LM)

- General

- Digital measuring tools
 - Type selection (Sylvac simpl., dupl., IBR_md1, etc.)
 - Opening the digital measurement window
- External trigger
 - Print Mode (Push, Latch)
 - External trigger (Print, Zero, etc.)
- Excel Transfer
 - Automatic/Manual
 - Trigger (Manual, F9 Button, Timer, etc. ...)
 - Line address (starting point of the data record)
 - Export (measuring value selection..)
- Temperature
 - T1 -> lower limit value, upper limit value
 - T2 -> lower limit value, upper limit value
 - T3 -> lower limit value, upper limit value
 - Open the temperature measuring window
- Service
 - Service mode -> only accessible to expert staff!
- Factory settings
 - Establish factory state -> only accessible to expert staff!
 - Start menu -> reset start behaviour

- Channel X1

- Measuring channel active / inactive
- Definition
 - Adapt axes names
 - Preset value
 - Factor
 - Channel link
 - Tolerance, lower as well as upper
- Resolution
 - Measuring unit
 - metric (metre, millimetre, micrometre)
 - imperial (inch, thou, micro-inch)
 - Accuracy (number of decimal places)
- Grid
 - Grid constant of incremental measuring system
 - Reference point active / inactive
- Measuring method/probe constants
 - Inner measurement
 - Outer measurement

- Support point correction
 - Only accessible to expert staff!
- **Channel Y1 and Channel Y2 (only LM)**
 - Measuring channel active / inactive
 - Definition
 - Adapt axes names
 - Factor
 - Channel link
 - Tolerance, lower as well as upper
 - Resolution
 - Measuring unit
 - metric (metre, millimetre, micrometre)
 - imperial (inch, thou, micro-inch)
 - Accuracy (number of decimal places)
 - Grid
 - Grid constant of incremental measuring system
 - Reference point active / inactive
- **Channel A**
 - Measuring channel active / inactive
 - Definition
 - Adapt axes names
 - Factor
 - Channel link
 - Tolerance, lower as well as upper
 - Resolution
 - Measuring unit
 - metric (metre, millimetre, micrometre)
 - imperial (inch, thou, micro-inch)
 - Accuracy (number of decimal places)
 - Calibration
 - Adjust amplification factor

7.3.3 Settings PU41motion (MFP30 & MFP100)

- **General**
 - Motor parameters
 - Mode speed / accuracy
 - Speed, acceleration, positioning accuracy
 - Digital measuring tools
 - Type selection (Sylvac simpl., dupl., IBR_md1, etc.)
 - Opening the digital measurement window
 - Excel Transfer
 - Automatic/Manual
 - Trigger (Manual, F9 Button, Timer, etc...)
 - Line address (starting point of the data record)
 - Export (measuring value selection..)
 - Temperature
 - T1 -> lower limit value, upper limit value
 - T2 -> lower limit value, upper limit value
 - T3 -> lower limit value, upper limit value
 - Open the temperature measuring window
 - Service
 - Service mode -> only accessible to expert staff!
 - Factory settings
 - Establish factory state -> only accessible to expert staff!
 - Start menu -> reset start behaviour
- **Measuring system**
 - Definition
 - Preset value
 - Factor
 - Channel link
 - Tolerance, lower as well as upper
 - Resolution
 - Measuring unit
 - metric (metre, millimetre, micrometre)
 - imperial (inch, thou, micro-inch)
 - Accuracy (number of decimal places)
 - Grid
 - Grid constant of incremental measuring system
 - Reference point active / inactive
 - Support point correction
 - Only accessible to expert staff!
- **Channel X2 & Y1 & Y2**
 - Measuring channel active / inactive
 - Definition

- Factor
- Channel link
- Tolerance, lower as well as upper
- Resolution
 - Measuring unit
 - metric (metre, millimetre, micrometre)
 - imperial (inch, thou, micro-inch)
 - Accuracy (number of decimal places)
- Grid
 - Grid constant of incremental measuring system
 - Reference point active / inactive
 - Reset error memory (only channel X2!)