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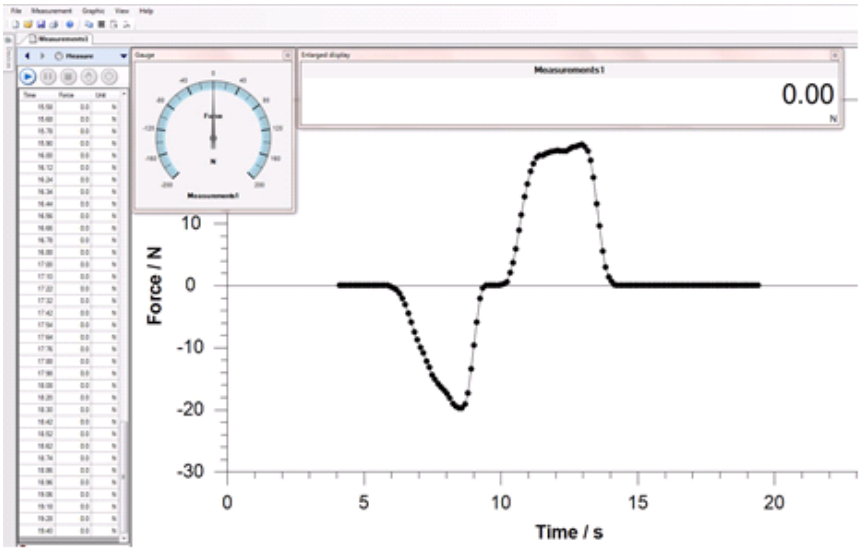
Instruction Manual Software

SAUTER AFH LD/FGT

Version 2.0
04/2020
GB



PROFESSIONAL MEASURING

AFH_LD_FGT-BA-e-2020

GB

SAUTER AFH LD/FGT

V. 2.0 08/2020

Instruction Manual Software

The AFH LD / AFH FGT program is specially designed for repeat tests, e.g. fatigue tests. The number of repetitions can be specified and managed in the software. The respective reversal point can be specified as distance-based (in mm) or force-based (in N). For force/stroke cycles, the software can automatically switch off the test cycle by specifying a maximum force reduction (in N). (Non-destructive material test)
It is used to transfer data from a Sauter force gauge to a PC. The measured data can be saved as an XML file and thus imported into any XML-compatible software. Measurement data can also be displayed graphically and saved as an image file.

Table of contents:

1 What's new?

This program allows the control of the test bench within the AFH LD and AFH FGT software (only for FH and FL instruments), it is possible to search for newly connected measuring instruments and to define a safety stop.
Furthermore, the graphic can be mirrored horizontally and an action can be defined if the limit values are exceeded.

The software is used to use SAUTER displacement measuring units of the LD series (with AFH LD) and the LB series (with AFH FGT). It enables repeat functions to be triggered by force or displacement.

So here's what you can do:

- Execute action if the limit values are exceeded
- Flip graphic horizontally
- Find connected devices
- Safety stop
- Control test bench
- Force Reduction

2 System requirements

AFH LD / AFH FGT has been developed for Microsoft Windows and makes special demands on the software and hardware of the system. The software is distributed as a standard installation package. More about installing the software can be found in the Installation chapter.

2.1 Hardware:

- IBM-compatible PC
- At least one serial port (RS-232) or USB-to-serial converter
- 256 MB RAM
- 10 MB free space on the hard disk
- SAUTER test stand, force gauge and displacement measuring unit LD or LB

2.2 operating system:

Microsoft Windows 2000/XP/Vista/7/8/10 (32 or 64 bit)
Further requirements: NET Framework 2.0

3 Installation

AFH LD and AFH FGT are distributed as standard installation packages. The product has been developed for the Microsoft Windows platform (Windows XP, Windows 7, Windows 8, Windows 10) and has special requirements for the software and hardware of the system (see system requirements).

How is AFH LD / AFH FGT installed?

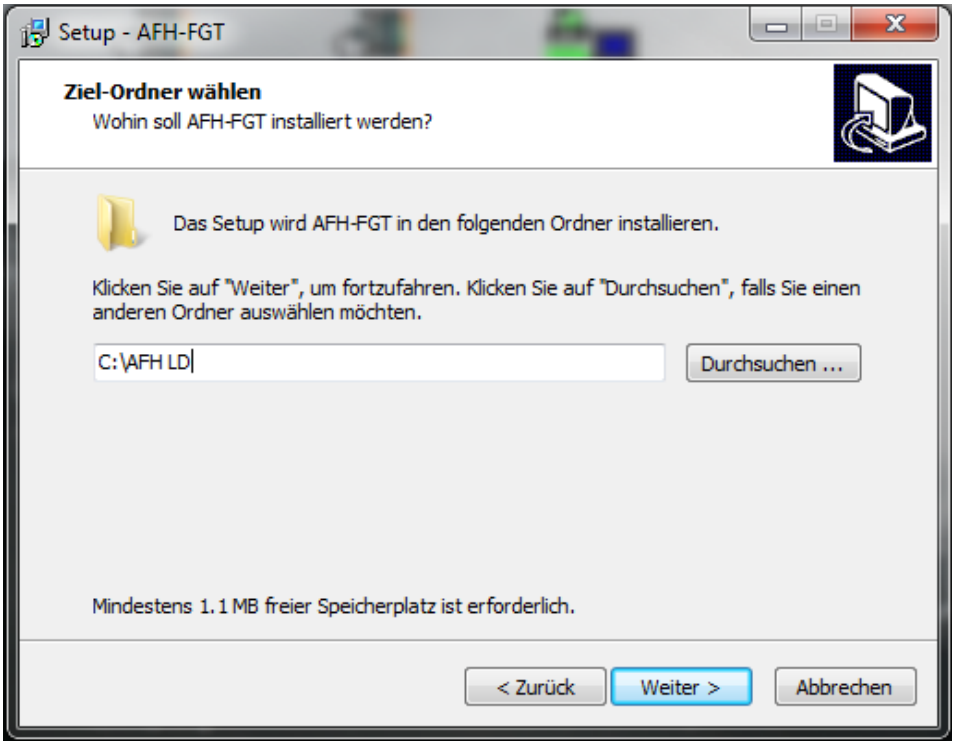
Run the "Setup" installation program on the CD and follow the instructions of the setup wizard. Under Windows Vista/7/8/10, administrator rights must be available for the user account. When the installation program starts, you will be asked to select the language in which AFH LD or AFH FGT is to be installed

The choices are:
German, English

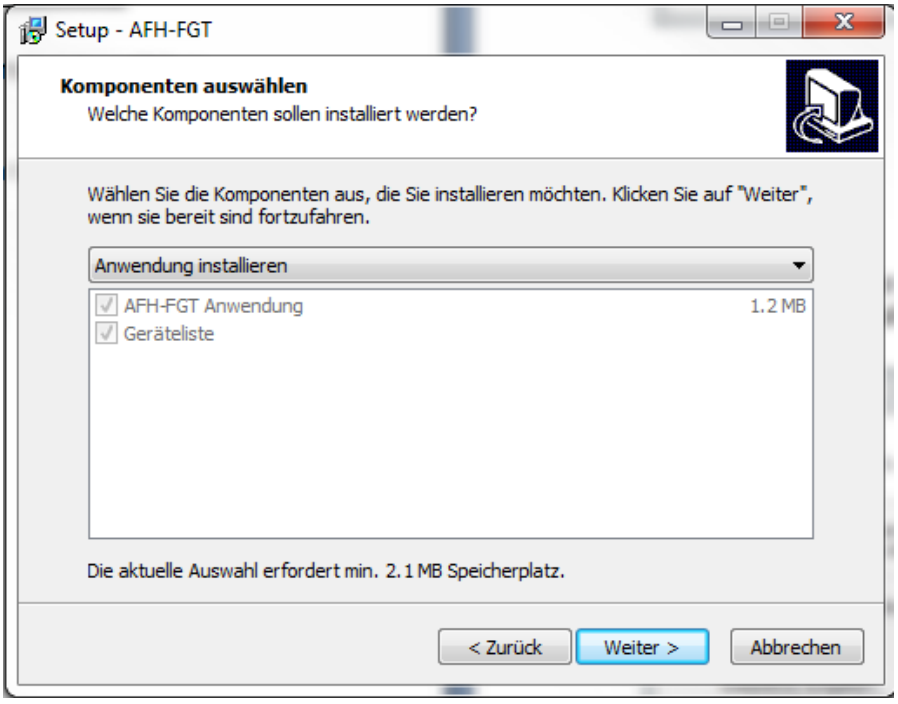
- Select the desired language and press OK.

- Next, the welcome window of the setup wizard appears. (In this example the installation of the AFH FGT is shown :)

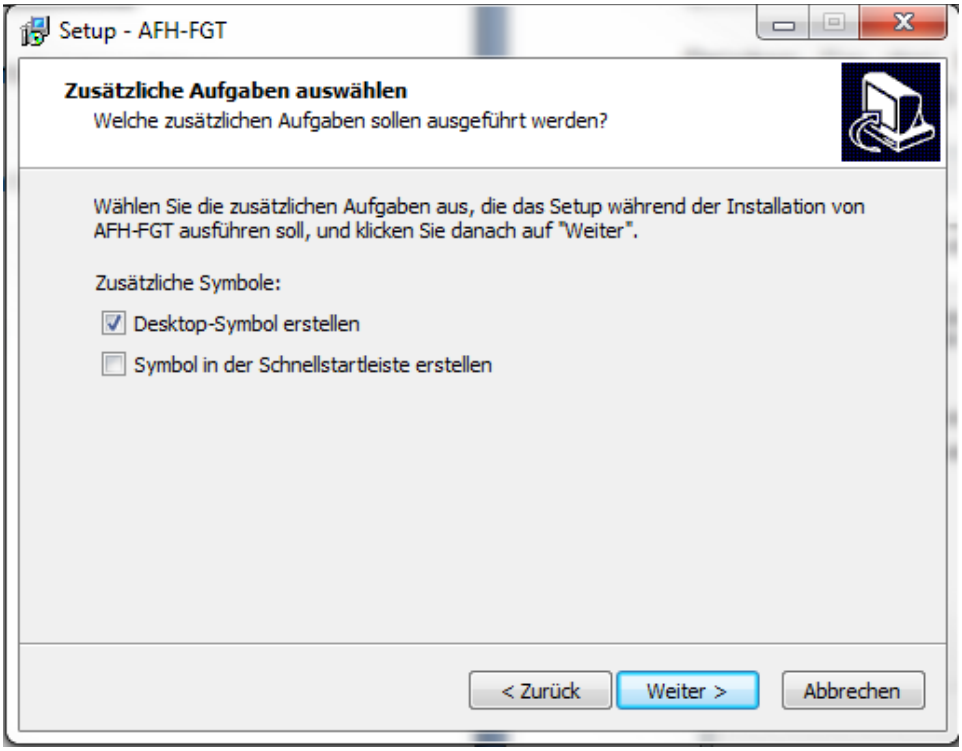
- Press the Next button to display the destination directory dialog. Here you can change the folder in which **AFH FGT** (or AFH LD) is to be installed.



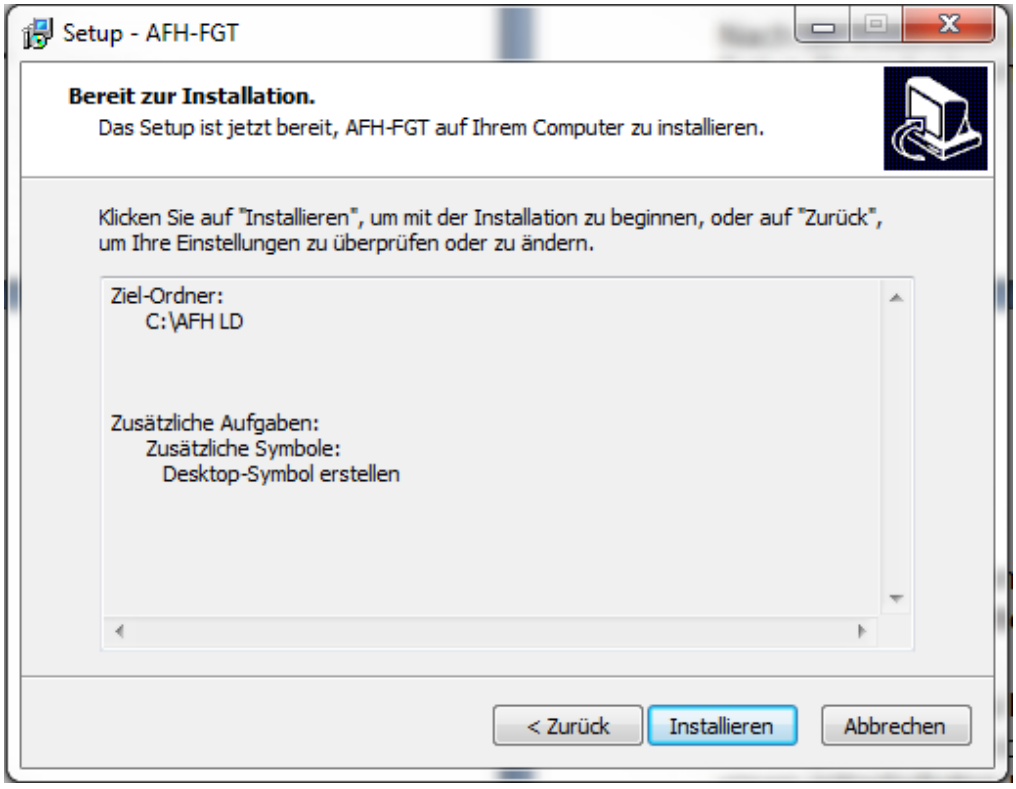
- The next window gives you the opportunity to select the installation type.
- The choices are:
  - →Install application The application and the corresponding device list are installed
  - Install device list Only the device list is installed→



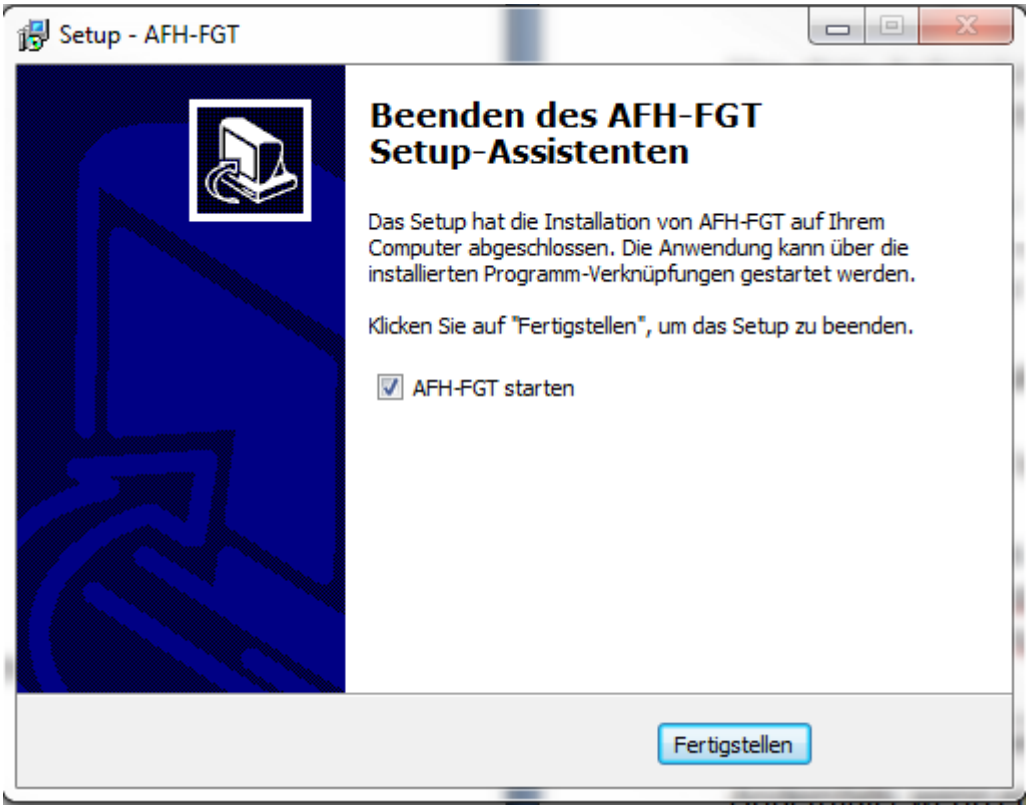
- Press the Next button to choose whether to create a desktop and/or quick start icon.



- The next window displays a summary of the installation options. Click Install to install the application.



- After installation, you have the option of starting AFHFGT (or AFH LD) while the setup procedure is being completed.



- Click the Finish button to complete the installation.

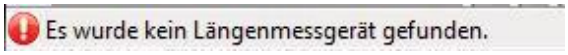
4 Hardware Installation

Preparations:

Before recording measurement data from the SAUTER FH force gauge, there are a few preparatory steps to be taken.

- Install the software on your PC
- Connect the **force gauge** (or test stand and displacement encoder) to the PC (either directly to a serial interface or with one USB-serial converter each for length measuring device and test stand)
- **Linear encoder**, connect to the PC with the USB cable
- **Test stand**. by means of serial cable to the PC. If no COM 1 port is available, a RS232 to USB converter can be used.
- Switch on all devices
- Start the software.

When started, the program searches the serial ports of your PC for SAUTER force gauges and displacement measuring units. If no displacement unit could be found, a message is displayed in the status bar.



Otherwise, if a distance measuring unit is found, the following message appears:

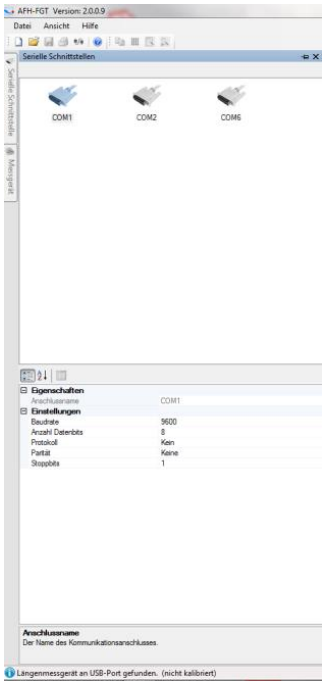
Hint:
If you do not have a test stand with a displacement measuring device, you will not be able to perform force-displacement measurements. You can then only carry out force-time measurements. If you connect the devices after starting the AFH FGT (or AFH LD), you must close and restart the corresponding software to search again for all connected devices.

5 Main features

Below you will find an overview of important and interesting
Product features of the AFH LD / AFH FGT software.

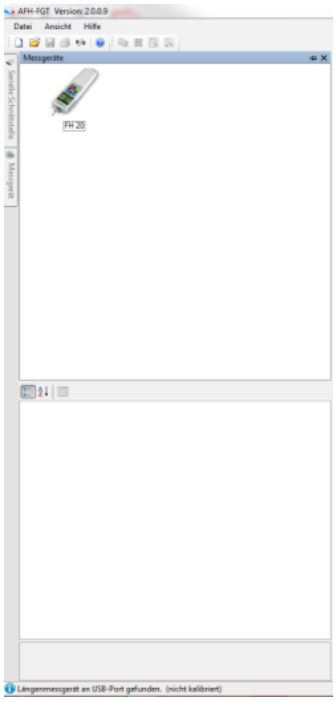
5.1 Managing the serial interfaces

This window shows information about the interfaces found. Here you can make changes to the parameters. However, this is not necessary, as the software automatically adjusts the parameters with the peripheral devices. Wrong parameters can influence the software functions.



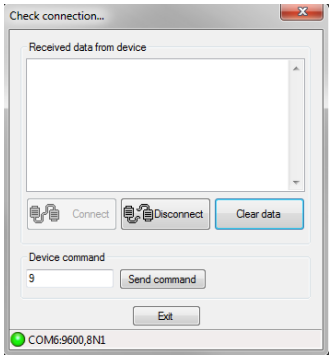
5.2 Measuring instruments window

To manage measuring instruments, you must display the "Measuring instruments" window. You can create new encoders, delete encoders, change their properties or check the connection to the encoder. If the window for managing encoders is not visible, it can be displayed with the menu function View→Encoders.



5.3 Check connection to the measuring instrument

To check the connection to the meter, you must display the "Check Connection" dialog. You can do this by double-clicking on a device icon or by right-clicking on the device icon and selecting Check Connection from the context menu.



5.4 Control test bench

To control the test bench with the AFH LD program, the "Control Test Bench" dialog must be displayed. You can display this dialog with the menu function View→Test Bench in the main menu.

5.5 Recording of measurement series

To record measurement series, you must create a new measurement document with the menu function File→New.
When recording measurement series with more than 500,000 measuring points, no further measurement series should be open.

6 List of all characteristics

Here is the list of all features of the AFH LD product. A detailed description of individual features can be found in the User Interface chapter.

6.1 Basic features

- Recording of several force-time and/or force-displacement measurement series
- Managing the serial interfaces
- Managing the measuring instruments
- Display or print the recorded measurement data in a diagram
- Save the recorded measurement series in an XML file
- Multilingual user interface (see installation) with context-sensitive help function
- Modern user interface, simultaneous working with several diagrams using tabs - see User Interface

6.2 Recording of measurement series

- Several series of measurements can be recorded (force-time and/or force-displacement) - (Series of measurements with up to 500 000 measured values should be recorded individually)
- Print and print preview for the displayed measurement data
- Analogue display of the current value
- Diagram display of the entire measurement series with zoom function

6.3 Save / Export

- XML: Use the "Save" or "Save as" command to save the measurement data in an XML file
- EMF: Use the "Save image as" command to save the measurement data in an EMF file
- PNG: Use the "Save image as" command to save the measurement data in a PNG file
- BMP: Use the "Save image as" command to save the measurement data in a BMP file

7 The user interface

The aim of this chapter is to provide brief information about the use and functionality of the application, depending on where the user is.
If you cannot find the help you need here, please try the "How can I...?" chapter.

7.1 Basic elements of the user interface

- Main menu
- Register bar
- Status bar

7.2 Further windows and dialogs

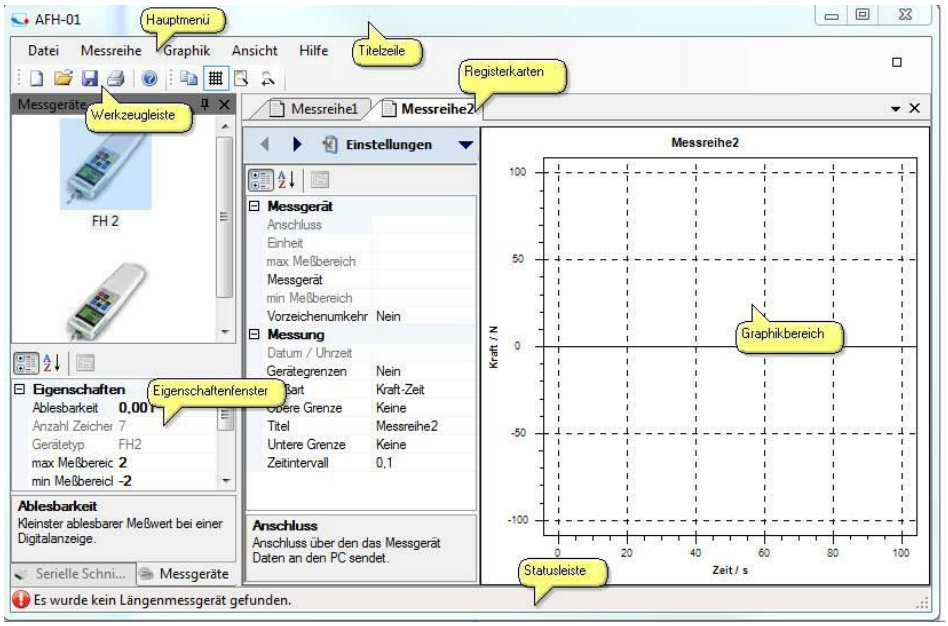
- Control test bench
- Serial interfaces
- Devices
- Settings
- Analogue display
- Large display
- Info about...Dialog

7.3 Extensions (Addins)

The interpretation of the various device protocols is managed by separate program parts (add-ins). There is an add-in for each special device type.
To download the current Addins use the "Settings" dialog.

8 Basic elements of the user interface

The following picture shows the basic elements of the user interface of the AFH LD product.



8.1 Overview of the elements of the user interface

- Main menu
- Toolbars
- Tab bar
- Graphics area
- Properties window
- Status bar

8.2 Main menu

The main menu consists of the following submenus:

- File menu
- Measurement series menu
- Graphics menu
- View menu
- Help menu

8.2.1 File menu

The File menu contains the following commands:

- New - Creates a new document
- Open - Opens an existing document
- Close - Closes an open document
- Save - Saves the current document with its file name
- Save As - Saves the current document under a new name
- Page Setup - Allows you to select a printer format
- Print - Prints the current document
- Printer Preview - Allows you to preview the document to be printed
- Exit - Exits AFH LD

8.2.2 New

Command **New** (File menu)
Use this command to create a new document in AFH LD. To open an existing document, use the Open command.

- Toolbar:→ 
- Keyboard: CTRL+N→

8.2.3 Open

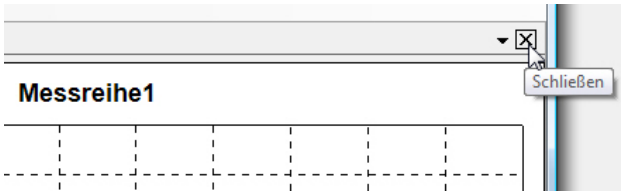
Open command (File menu)
Use this command to open an existing document in a new window. You can open several windows at once. Use the Window List menu to switch between the opened documents.

New documents can be created with the New command.

- Toolbar:→ 
- Keyboard: CTRL+O→

8.2.4 Close

Close command (File menu)
Use this command to close all windows containing the current document. AFH LD recommends that you save any changes you have made to the document before closing the document. If you close a document without saving, all changes made since the last save are lost. Before you close an unnamed document, AFH LD displays the Save As dialog to name and save the document.
You can also use the close icon as shown below:



8.2.5 Save

Save command (File menu)
Use this command to save the current document under its current name. When a document is saved for the first time, AFH LD displays the "Save As" dialog so that you can name the document. If you want to change the name or directory of an existing document, you can also use the "Save As" command.

- Toolbar:→ 
- Keyboard: CTRL+S→

8.2.6 Save under

Save As command (File menu)
Use this command to name and save the active document. AFH LD displays the Save As dialog box, allowing you to enter a name for the document. To save a document under its current name, use the Save command.

Save under Dialog
The following entries allow you to specify the location and name under which the document is saved:

- File name: Enter a new name to save the document under a different name. AFH LD adds the file extension to the file name, as shown in the File Type field.
- Drives: Select the drive where the file is to be saved
- Directories: Select the directory where the document is to be saved.
- Network: Use this button to access your network.

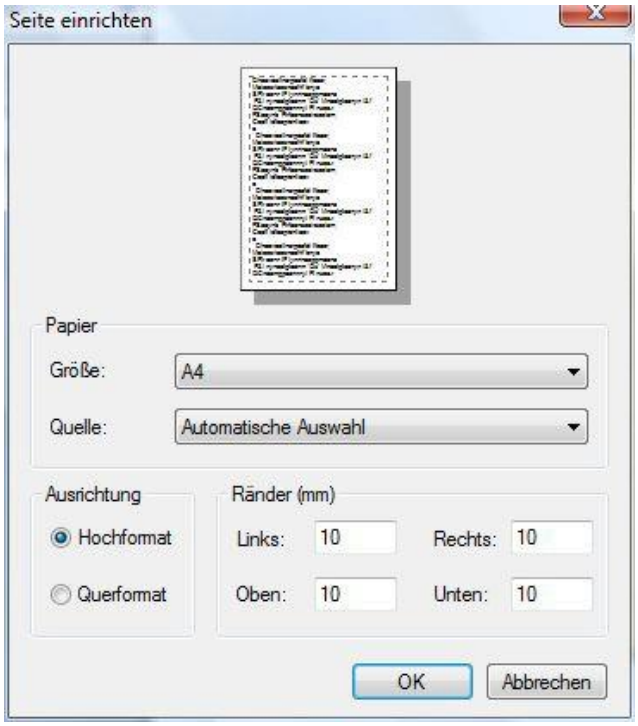
8.2.7 Search for measuring instruments

Search measuring instruments command (File menu)
Use this command to search for newly connected measuring instruments and serial interfaces.

- Toolbar:→ 

8.2.8 Set up pages

Page Setup command (File menu)
This dialog allows you to change the printer settings and the paper size.



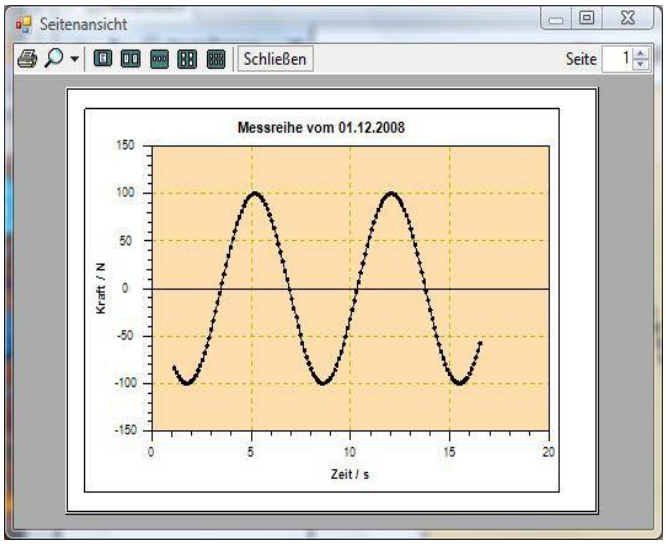
8.2.9 Print

Print command (File menu)
Use this command to print a document. When you use this command, the printer dialog appears where you can select the number of pages, the printer and the printer settings.

- Toolbar:→ 
- Keyboard: CTRL+P →

8.2.10 Printer Preview

Command **Printer Preview** (File menu)
Use this dialog if you want to see how the printed document will look on paper.



8.3 Measurement series menu

The **measurement series menu** contains the following commands:

- Start: Starts the recording of measurement data
- Interrupt: Interrupts the recording of measurement data
- Exit: Ends the recording of measurement data
- Send manually: Sends the defined device command to the measuring device
- Time-controlled transmission: Sends the defined device command to the measuring device at regular intervals

These commands are also available in the Measure toolbar:

Force/time measurements

Force/displacement measurements

8.3.1 Graphics menu

The **Graphics menu** contains the following commands:

- Display grid: Show or hide a grid in the graphics window
- Save image as: Saves the image to a file (EMF, PNG, BMP)
- Copy: Copies the graphic area to the Windows clipboard

8.3.2 View menu

The **View menu** contains the following commands for managing serial ports and meters and changing program settings:

- Serial interfaces: Shows or hides the window for managing serial ports
- Encoders: Shows or hides the window for managing the encoders
- Settings: Opens the window for managing the program settings
- Status bar: Shows or hides the status bar
- Test bench: Shows or hides the test bench dialog

8.3.3 Help menu

The **Help menu** contains the following commands:

- Contents: Shows the table of contents of this help file.
- Index: Shows the index of this help file
- Search: Allows you to search for specific terms in this help file
- Info about: Shows more information about the AFH LD program.

9 Toolbars

There are two different toolbars in the AFH LD program. One for the main menu commands and one for the graphic commands.

9.1 Main menu commands

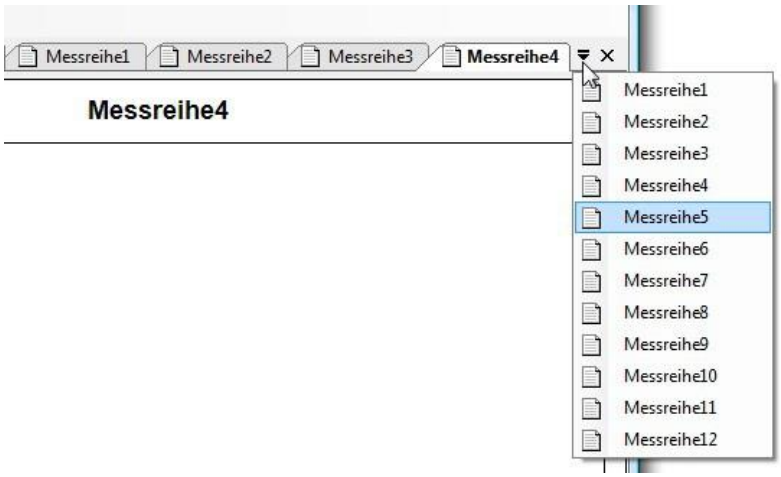
- New - Creates a new document
- Open - Opens an existing document
- Save - Saves the active document under its file name
- Print - Prints the active document
- Find meters - Finds recently connected meters
- Help - Displays this help file

9.2 Graphic commands

- Copy- Copies the graphic to the Windows clipboard
- Grid - Shows or hides the grid in the graphics display
- Zoom all - displays the entire measurement series in the graphics window
- Zoom Before - Returns to the previous zoom setting

9.3 Window bar

Use this menu to switch between the individual windows



9.4 Tab bar

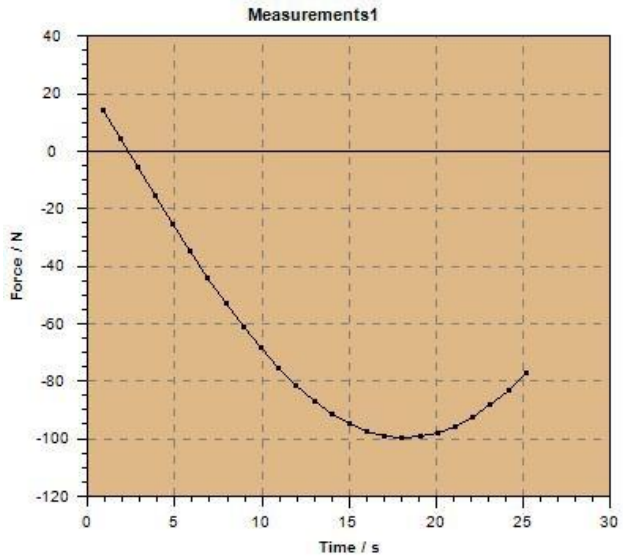
The tab bar is used to switch between the currently opened measurement series documents.

You can switch between the visible tabs (pages) or remove (close) them from the window list.
Switching between documents can be done (except by clicking with the mouse) with the keyboard - using the key combination **Ctrl+Tab** and
Shift+Ctrl+Tab The key combination for closing a tab (page) is Ctrl+F4. The order of the tabs can be changed by dragging them with the mouse.
If you right-click on a tab, a context menu opens, which you can use to display an analog or enlarged view of the current measured value.

- Meter: Shows the current measured value in an analog meter display
- Large display: Displays the current measured value enlarged in a separate window

9.5 Graphic view

The graphic view displays the measurement series in diagram form. The appearance can be changed using the settings dialog. There you can adjust the background color, the diagram color etc.



9.6 Status bar

The status bar is displayed at the bottom of the AFH LD / AFH FGT program window. You can show or hide the status bar with the Status Bar command in the View menu.

9.7 Further windows and dialogs

The application includes further windows and dialogs that were not described in the previous chapters. Here are the links to the corresponding chapters.

The settings dialog is especially worth mentioning.

9.8 List of the different windows and dialogs

- Test bench Dialog
- Serial interfaces
- Measuring instruments
- Settings
- Info about - Dialog

9.9 Test bench control dialogue

This dialog is used to control the test bench. It is only available if a linear encoder was found at program start.

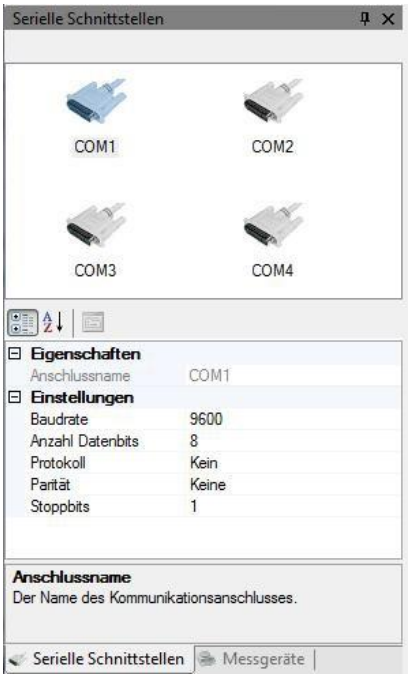
The dialog contains three buttons to control the movement of the test stand, one to zero the force gauge and a display that shows the current direction of the test stand movement. Furthermore, the position and the calculated speed of the test stand are also displayed here.

Hint:

If you connect devices after starting the AFH LD / AFH FGT, the program must be closed and restarted or the menu item Find measuring devices must be executed in order for the measuring devices to be recognized.

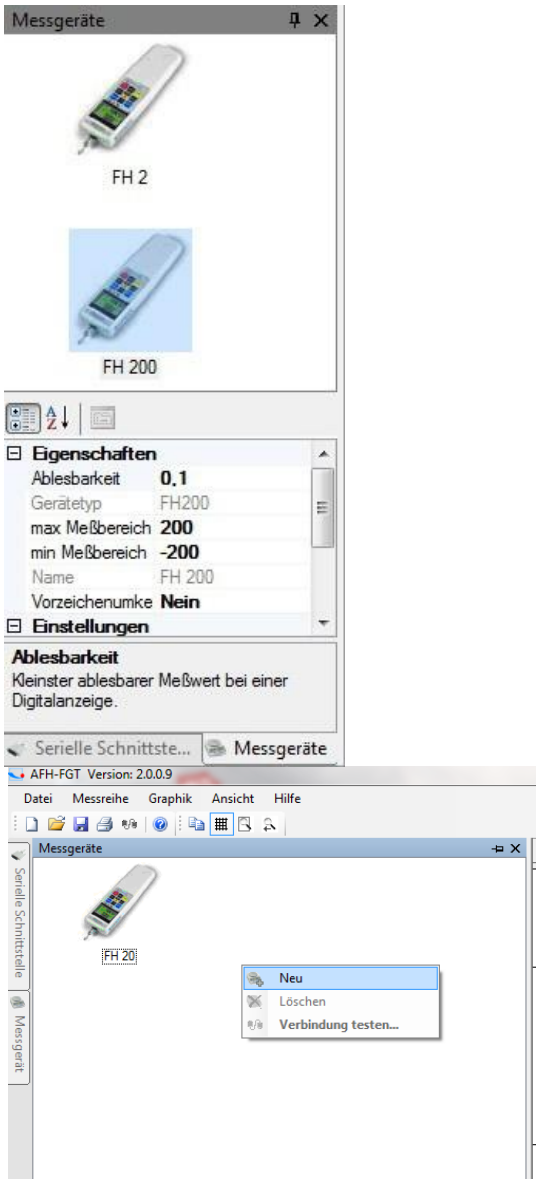
9.10 Serial interfaces

This window shows all serial interfaces available in the PC. To view or change the settings, the corresponding interface must be selected. In the lower window the corresponding settings can then be adjusted.



9.11 Measuring instruments

This window displays all the instruments created. To change the properties of a specific device, the device must be selected and the desired properties adjusted. A new measurement device can be added by right-clicking in the window.



9.12 Settings

The settings dialog is the place where the **application parameters** can be changed. Some parameters (e.g. changes in device properties) are automatically saved and others (the appearance of the diagram display) are additionally available via the AFH LD / AFH FGT toolbars. But the most important settings of the application can be found in this dialog.

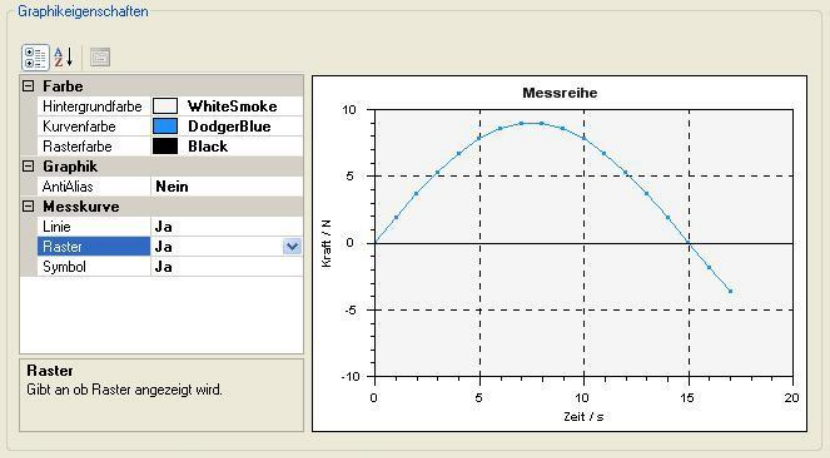
This dialog is divided into different categories **(Graphic, Display and Add-In)**, according to the content and importance of the parameters. In this chapter you will find a description of each of these categories and each parameter.

9.13 Graphic

Graphic

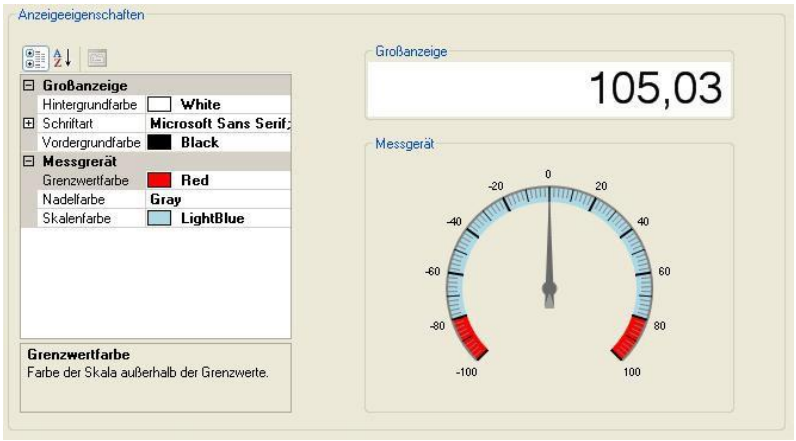
Change **the background of** the graphic display, the color of the trace or the color of the grid

- **Graphics** - Enables/disables the Anti Alias function to improve the quality of the trace
- **Trace** - switch grid on or off, switch lines between the measuring points on or off, display of the measured values as point symbol.



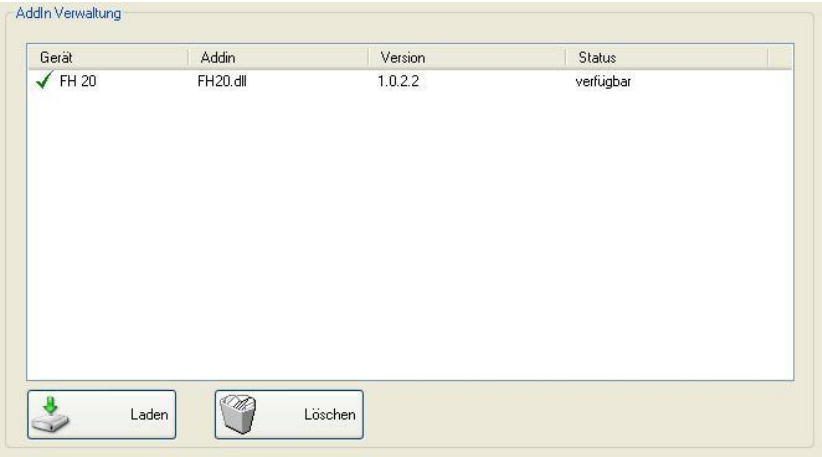
9.13.1 Display

- **Measuring instrument** - Adjust limit value color, color of the scale and needle of the analog measuring instrument
- **Large display** - Select background color, font and font color of the large display



9.13.2 Add-in

- Download - Download the latest add-ins for the interpretation of the measuring instrument protocols (an Internet connection is required)
- **Delete** - Delete unneeded add-ins from the hard disk



9.13.3 Analogue display

This window displays the current measured value in the form of an analog meter. The limit value range can be indicated by a different color using the settings dialog.

To switch on the window, press the right mouse button above the measurement series

9.13.4 Enlarged display

This window displays the current measured value in enlarged form. The font and color can be changed using the settings dialog.

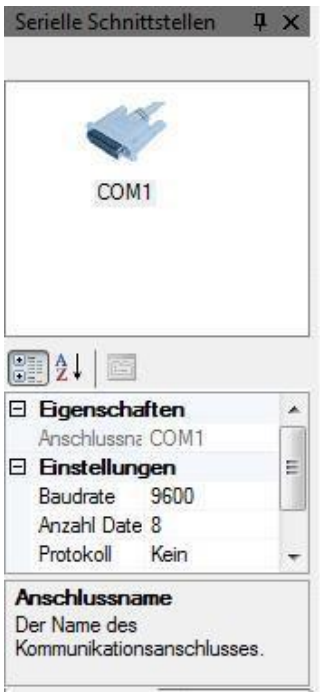
10 AFH FGT / LD Help menu: How can I...?

In this help chapter you will find examples to help you understand the tasks you can perform with the **AFH LD / AFH FGT** product. The list below contains links to these examples.

- **Export measurement results:** You can export measurement series to EXCEL

10.1 Manage serial interfaces

The program displays all existing serial interfaces. To change the settings of an interface, select the icon of the interface and then adjust the corresponding values (baud rate, parity, etc.) in the lower part of the window. If the window for managing serial ports is not visible, it can be displayed using the *View->Serial ports* menu function.



10.2 Manage measuring instruments

The program displays all created measuring instruments. In this window you can create new gauges, delete gauges, change their settings or check the connection to the gauge. If the window for managing encoders is not visible, it can be displayed with the menu function *View->Encoders.*

10.3 Measurement series

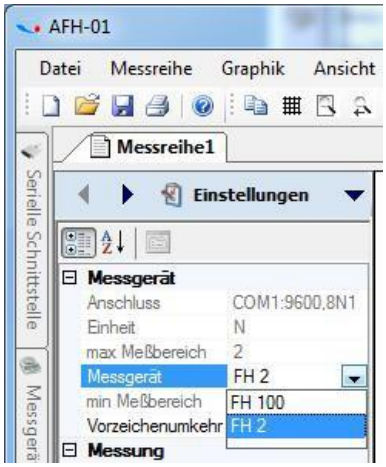
To record measurement series you must carry out the following steps:

- Create a new measurement series document with menu item *File->New* of the main menu
- Select a measuring instrument from which the measured data are received
- Adjust settings of the measuring device and the measurement
- Switch to the measuring menu
- Start measurement, record measured values manually or time-controlled
- Stopping the measurement and saving or printing the data
- Closing the measurement series document

10.4 Record measurement series

10.4.1Create a new measurement series document

10.4.2 Select the meter from the device list



10.4.3 Change the properties of the meter and/or measurement according to your needs

The only device property that can be changed is the *sign inversion.* When this property

is set to *Yes*, the sign of the measured value is reversed, e.g. if the meter sends 40 N, the measured value is changed to -40 N. All other device properties are taken from the device properties window.

10.4.4 The following measurement series properties can be changed:

- *Action at limit* allows the test bench to stop or reverse the test bench movement when the equipment limits are exceeded
- *Date/time* is automatically entered at the start of the measurement
- *Device limits* allow to record only measured values within a predefined bandwidth
- *Mirror Horizontally* allows the graphic view of the measured values to be mirrored horizontally
- *Measurement type* can be either *force-time*, *force-displacement* or *memory readout*
- *Upper limit* of measurement series (only active if *device limits* are set to *yes*)
- *Title of* the measurement series for saving and displaying the measurement data
- *Lower limit* of the measurement series (only active if *device limits* are set to *yes*)
- Travel reversal is used to invert the travel values (only visible if *measurement type* is set to *force/travel*)
- *Time interval* in which the device command to request a measured value is sent (This setting influences the number of stored measured values for long-term measurements and thus also the maximum test time. A maximum of 500 000 measured values can be stored for force/displacement or force/time measurements)

10.4.5 Switch to the measuring menu

After switching to the measuring menu, you are able to record series of measurements. Depending on the type of measurement, this menu looks slightly different:

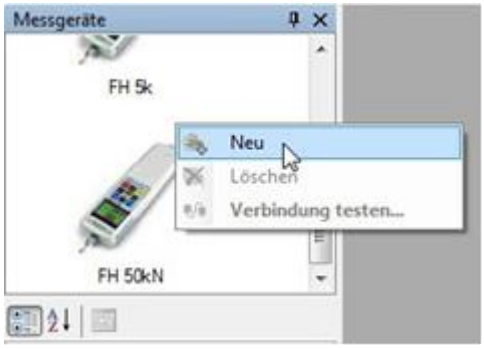
Force Time

Force-Distance

10.4.6 Export measured data to EXCEL

To export measurement data to *EXCEL* (or any other XML-compatible software), you only need to save the document with Save or Save As. The file is then loaded into *EXCEL* with the *Open* command (File menu) by selecting the document type XML when loading.

10.4.7 Create device



To create a new gauge, right-click in the gauge window to display the context menu. Then select the menu item *New*. The *Create Measurement Device* dialog appears. Select the device type from the list and enter the name for the device (or accept the default name), then press the *OK button*. The created measurement device should now appear in the measurement device window.

10.4.8 Delete device

To delete a meter, right-click on the meter icon to display the context menu. Then select the menu item *Delete*. A message confirming the deletion appears.
To confirm, press the *Yes button* in the message window.

10.4.9 Changing device settings

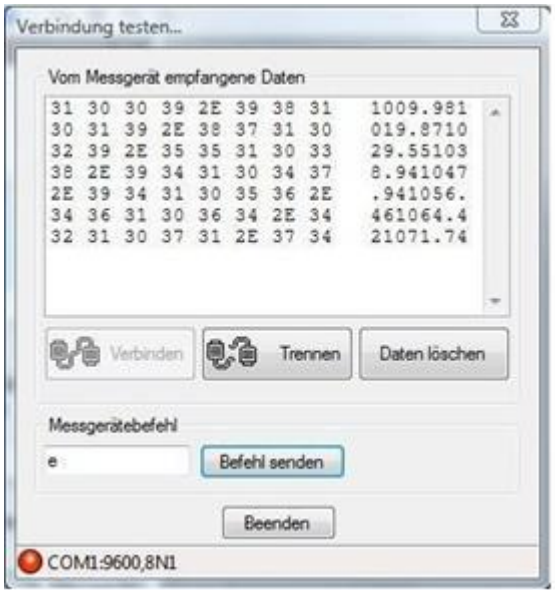
All device-specific settings can be changed in this properties window. On the left side is the name of the property and on the right side are the corresponding property values. The lower area displays a short description of the property.

The measuring instruments have the following characteristics:

- Device type
- Max., Min. measuring range
- Device name
- Number of data bytes sent by the device
- Readability
- Sign reversal (the received measured values are inverted)
- Port (COM port to which the device is connected)
- Unit
- Safety stop
- Device command for a stable measured value

10.4.10 Test device connection

This dialog can be used to check whether there is a connection to the relevant measuring instrument and whether the instrument is communicating with AFH-FGT / AFH LD without errors.
To establish the connection, press the *Connect button*. The red LED indicates whether the COM port has been opened without error. The current connection parameters appear to the right of it.
When the instrument sends data, the data is displayed in the window (*Data received from the instrument)* in hexadecimal form and as ASCII characters.
Use the *Clear Data button* to delete all received data from the window.
Use the *Send command button* to send the encoder command to the encoder.
Before you close this dialog, end the connection to the measuring instrument by pressing the *disconnect button.*



10.4.11 Change interface properties

All interface-specific settings can be changed in this properties window. On the left side is the name of the property and on the right side are the corresponding property values. The lower area displays a short description of the property.
The serial interface has the following properties:

- COM port number
- Baud rate (the transmission speed in bits/sec)
- Number of data bits (number of data bits per byte)
- Handshake Protocol
- Parity
- Number of stop bits

10.4.12 Control test bench

The *test stand dialog* allows to control the movement of the test stand and to reset the force gauge to zero. It can only be displayed if a displacement encoder was found when the program was started. Otherwise the menu item in question is inactive.

10.4.13 Controlling the movement of the test bench

With these three buttons you can move the test bench up or down and stop it. The movement display shows the current movement status.

10.4.14 Set the measuring instrument to zero

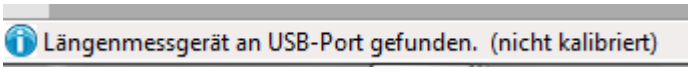
Use this button to set the meter to zero.

10.4.15 Display of the current movement status of the test bench

This motion indicator shows whether the test bench is moving up or down or is at rest.

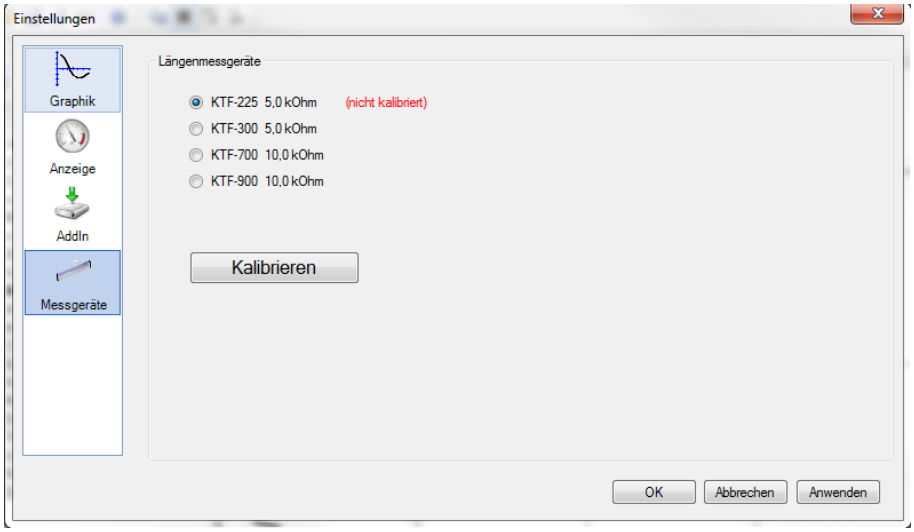
11 AFH LD: Calibration of the linear potentiometer

Before the measurement can be started, the linear encoder must be calibrated if the AFH LD software is used. For this purpose, a 100mm long reference rod for calibration is included in the delivery.



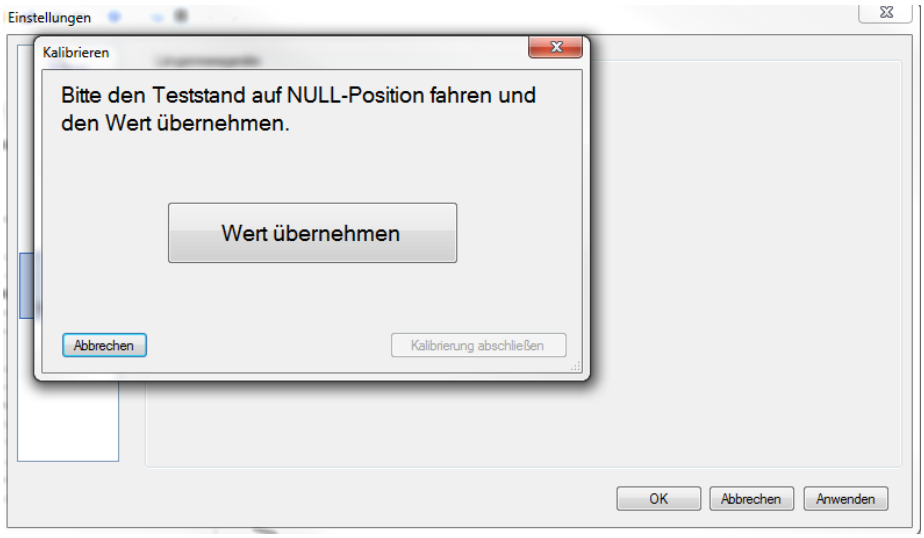
The following procedure must be followed for calibration:

- Under View --> Settings you will reach the following tab.

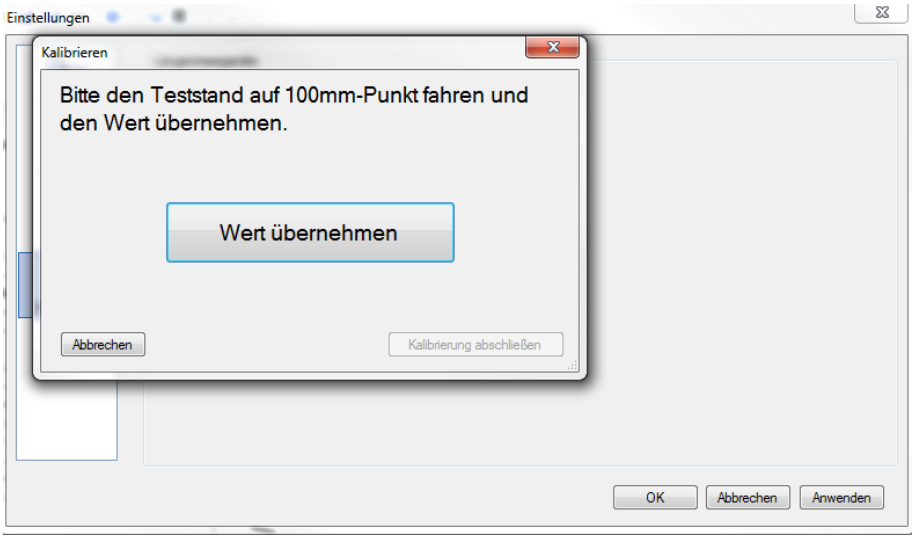


- The appropriate linear encoder is selected under the item Encoders. The number describes the length in mm that the linear encoder can be used.

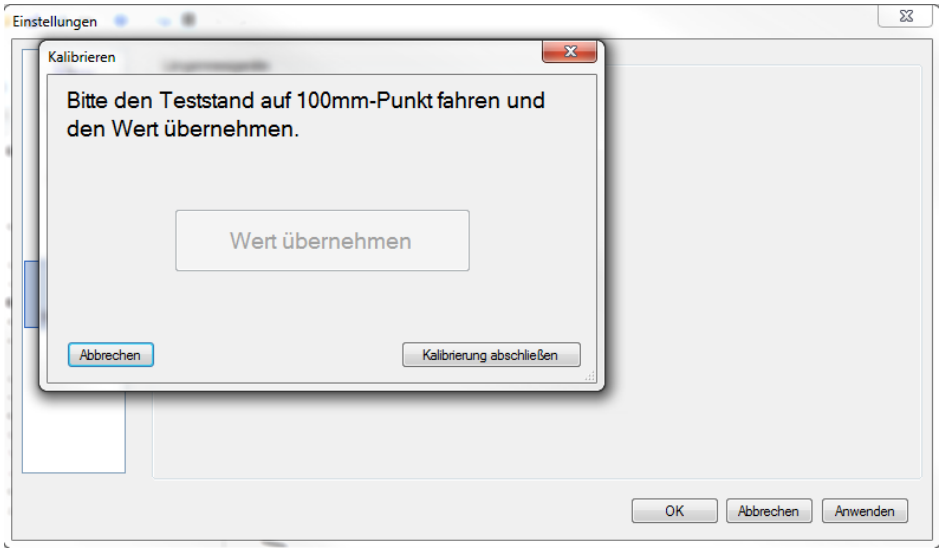
- To start the calibration, the test bench is moved to the lowest position.



- Then press accept value.

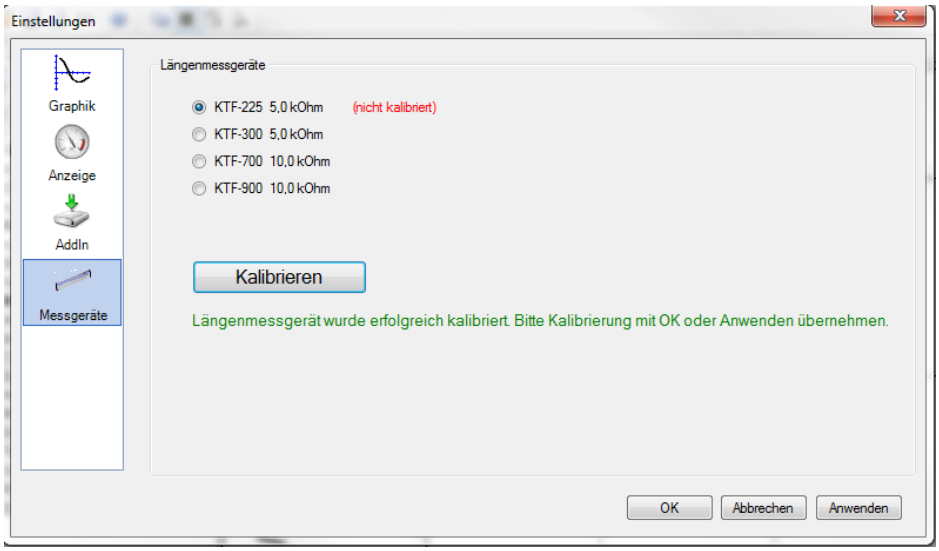


- Then the test stand is moved upwards for more than 100 mm. When the test stand is slowly lowered, the reference rod is placed on the lower setting ring in such a way that the limit switch switches off the motor when the lower limit switch reaches 100 mm. Test stand stands still (caution: danger of crushing!)
- Press to accept value.

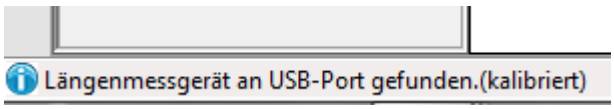


- Press Finish calibration. Remove reference rod.

- Press OK. Calibration completed.



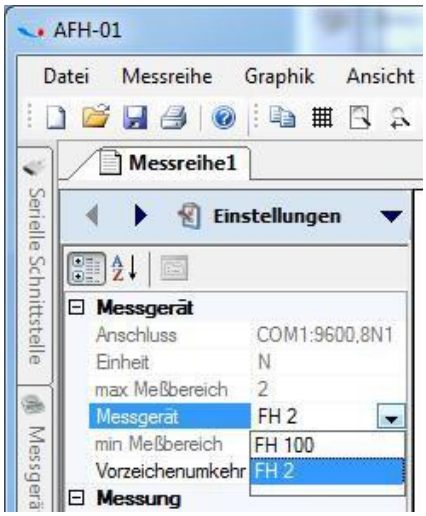
Status is displayed lins below.
Values are stored and are available at the next program start until a new calibration is performed. We recommend this in case of a longer pause or in case of deviations a new calibration. Now everything is ready for the first measurement.



12 First measurement (cycle measurement)

- Creating a new measurement series document

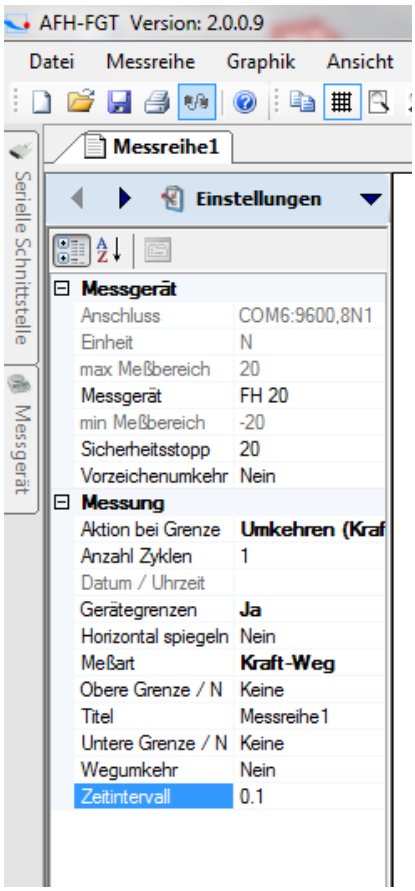
- Select the meter you want to use from the list (if your device is not displayed, you can select it in the Meter window. window.



12.1 Adjustable parameters:

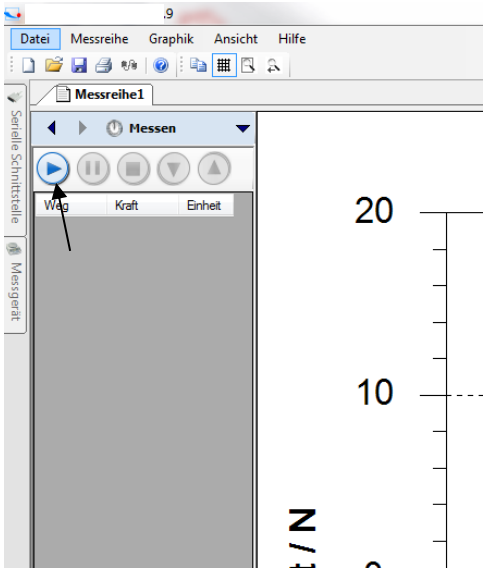
- Measuring device: here the measuring device is selected by drop-down
- Safety stop: here you can set a value at which the test stand stops (do not set a value higher than the max. load of the used force gauge)
- Reverse sign causes a change in the display direction of the curve
- Action at limit: here a reversal of the direction of movement is forced, either when a distance is reached (Invert path Path→ Path constant) or when a force is reached (reversing force →Force constant)
- Number of cycles: the number of cycles is defined here. With high values (>10000) the software may become slow.
- Device limits: in this example: Yes. Here it is generally determined whether limits are used
- Mirror horizontally: mirrors the course of the trace
- Measurement type: here you can choose between force-displacement, force-time and memory readout. Compression force measurements are displayed with minus values, e.g. -50N
- Upper limit: Value for force or displacement is entered here
- Title: the measurement can be named here
- Lower limit: Value for force or displacement is entered here
- Reverse: yes or no

- Time interval: here you can set the value of the measurement data acquisition within the software. (Time interval in which measured values are requested from the force measuring device)

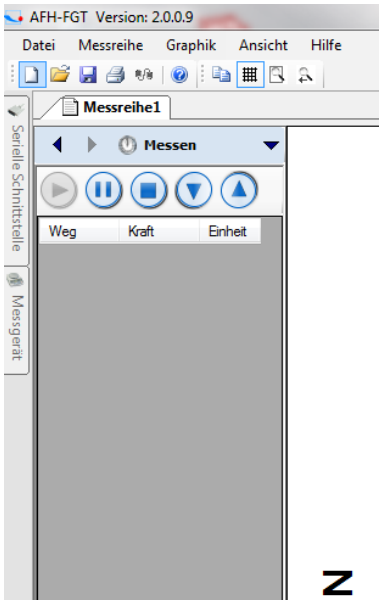


The setting of the time interval as well as the number of cycles influences the number of stored measured values for long-term measurements and thus also the maximum test time. A maximum of 500,000 measured values can be stored for force/ distance or force/time measurements.

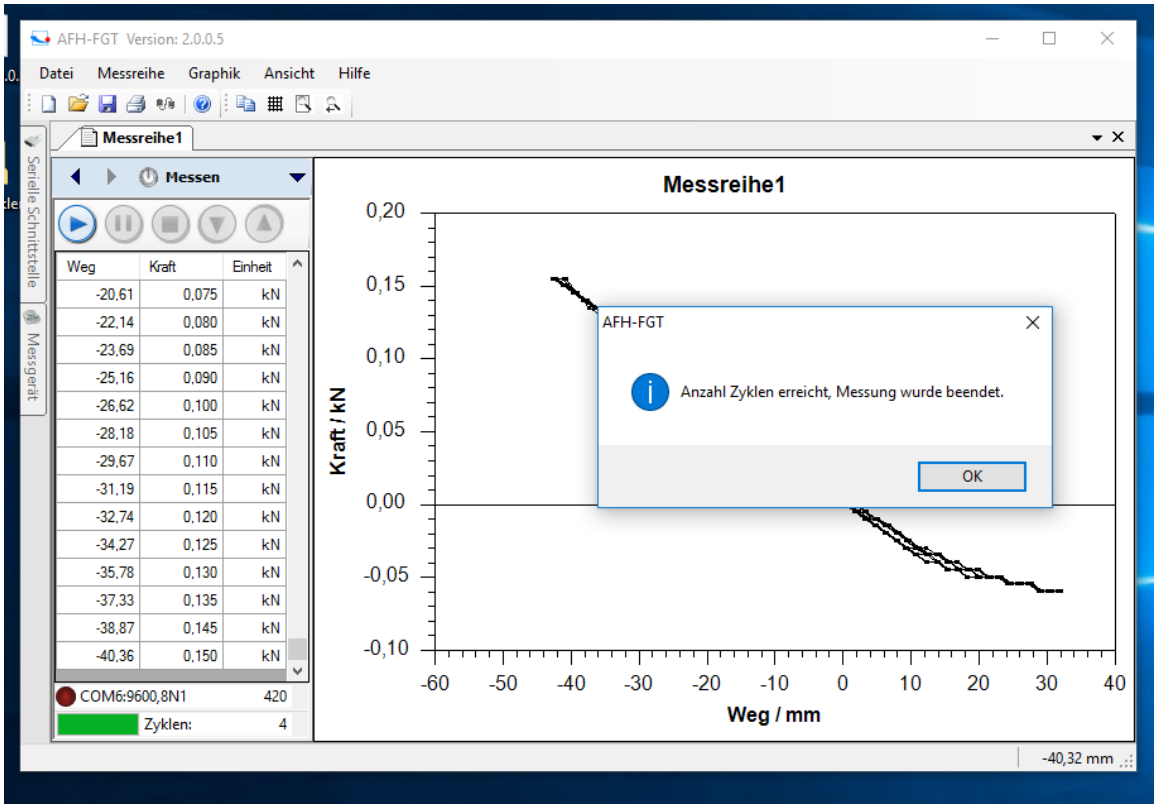
- Then continue  measurement with the . Click on the arrow pointing to the right



- Press the buttons up or down to set the test bench in motion, which then sends the measured data to the software.



- When the number of cycles is reached, the measurement is finished.



When the measurement is finished, it can be stored at any location.
Then the software is closed and the devices are all switched off.

13 Further Information

Additional sources of assistance

Here you will find links to other sources of help (operating instructions, technical data sheets, etc.).

13.1 AFH LD / AFH-FGT documentation

13.2 AFH-LD / FGT - Licence agreement

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