

Sigma HF User Manual



Technology leader in bond testing worldwide



xyztec

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T e c h n o l o g y l e a d e r i n b o n d t e s t i n g w o r l d w i d e

1 Machine specifications of the Sigma HF

Force sensors

Ranges 500 kgf, 1000 kgf, ONLY shear, NO pull

Max. shear force in x direction	500 kgf
Max. shear force in y direction	1000 kgf
Accuracy	±1 %
ADC resolution	24 bit
Min. landing/touchdown force	200 gf

Axes

Resolution of optical encoders	± 1 µm
x-axis	600 mm
y-axis	600 mm
z-axis	200 mm
Work area (xy)	500 x 500 mm
Axis speed	250 mm/s
Axis accuracy	± 10 µm
Reproducibility accuracy	± 20 µm
Rotational accuracy	± 1°

Dimensions

x footprint	1250 mm
y footprint	1250 mm
Height	2150 mm
Weight	1800 kg

Forces up to 1000 kgf

Sigma HF includes full 360° shear tool rotation with vectored shear direction

Sigma HF is dedicated to test IGBT power modules and other high force applications

Range of tooling ensures precise load application to the test point

Quick release sample clamping options ensure accurate testing together with rapid load and unloading

Large work area (LxWxH: 500 x 500 x 200) provides the flexibility to test multiple samples

System stiffness of 0.1 mm / 1000 kgf tool to work holder

High tool to sample positional accuracy enables automation of the most complex circuit architecture

Single Measurement Unit (SMU)

The Sigma HF head interface is suitable for:

- either a high force single head measurement unit for forces up to 500 kgf, or
- a single head measurement unit forces up to 1000 kgf

Automation & Auto Grading

Production tolerances in bond and wire positions are automatically corrected with multiple nested fiducial and individual wire detect capabilities

Advanced image processing software provides the option to automatically grade sheared samples using optical inspection

The area of remaining bulk material is calculated as a percentage of the whole

Result and a picture with graphical overlay are stored on the system

Built-in image capture

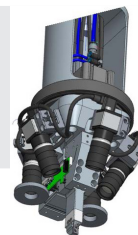
Sigma HF can be equipped with up to five high speed camera with 6 megapixel for easy positioning and programming

Perfect tool alignment is possible with:

- either up to three side-view, or
- up to three front-view tool cameras

on a 360° rotational head

Sigma HF can be equipped with up to two perpendicular fiducial cameras for sample clamping detection using fiducial mark recognition



Software

Supports from Microsoft Windows 7, 32 and 64 bit systems

Intuitive, no special knowledge required

Customization of the user interface according to customer requirements

Integrated Report editor and data export

Integrated SPC and GR&R analyses

Different languages and user hierarchies

Export to xls, docx, pptx, pdf, xps, csv, xml, etc.

Easy data sorting, grouping and filtering

Customizable screens, optimized for wide and touch screens

Handling and control

Ergonomic layout according to SEMI S8

Ergonomic joysticks with each 6 buttons for fast control

Safety housing protects operator from bodily harm caused by high impact on sample during test

Three cameras provide „microscope-like“ view

Operator free handling possible



2 Warning/safety instructions and procedures

This bond tester complies with current safety requirements. Inappropriate use can, however, lead to personal injury and damage to property. To avoid the risk of accidents and damage to the machine, it is required to read these instructions carefully before using it for the first time. It is the responsibility of the user to maintain knowledge of these instructions over time. They contain important information on its safety, use and maintenance. In case any part of this document or of the tester usage is unclear to the reader or the user, discontinue usage immediately and contact XYZTEC in written form.

Correct application

- Bond testers are designed as an invaluable tool during the design process and for manufacturing quality control to ensure optimum yield and the very best product reliability.
- This machine is not suitable for outdoor use and must be used in a safe and stable indoor environment.
- It must only be used to test bonds. Any other use is not permitted. XYZTEC cannot be held liable, accountable or culpable for damage resulting from any usage of the machine, including incorrect or improper use or operation.
- This bond tester is not intended for use by people with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning its use by a person responsible for their safety. The tester also may not be used by children. Never attempt to use the machine when any safety feature is not in place or operational, or when any person or animal is inside the tester.

Technical safety

- Observe the instructions in described in chapter 4 at all times.
- Before setting up or using the machine, check it for any externally visible damage. Do not install or use a damaged machine.
- The electrical disconnecter must be easily accessible after installation so that the machine can be disconnected from the electricity supply if necessary.
- Unauthorised repairs can result in unforeseen dangers for the user. Repairs may only be undertaken by a XYZTEC authorised service technician. Failure to comply with this requirement voids the warranty. The end user is always responsible for the operation of the tester.
- After activation of the EMO-button control circuits and the computer remain active.

In order to correctly and safely use the system described in this document, it is essential that the safety procedures and the safety precautions specified in this manual are followed!



2.1 Personnel requirements

Operation, adjustment, maintenance, and repair of any system may only be carried out by qualified and trained personnel.

In this document, the assumption is made that operators, maintenance personnel and service personnel are properly trained in the tasks that they are intended to perform. The following training levels are defined:

- Maintenance/Service
- Supervisor
- Operator

NOTE: For each level a training is available.

2.2 Machine (un)packing

2.2.1 Handling of packed machine

Keep in mind that the machine weighs 1750 kg (approx. 3860 lb)! Do not lift the machine higher than absolutely necessary!

Make sure to use equipment which can handle this weight!

When using a forklift make sure that it supports lifting a weight of at least 3000 kg (approx. 6615 lb) as safety margin!

For a stable handling and transport of the machine, be sure to always lift the machine with the packaging from the back side. The packaging is clearly marked with the following symbols:

- Do not lift on this side (front and sides)



- Lift on this side (back side)



2.2.2 Unpacking

Make sure to unpack the machine with at least two persons.



1. Place the packaging with the machine on a stable floor
2. Unwrap the box and remove all plastic on the outside
3. Remove the top panel first and one of the side panels next
4. Remove the front or back next
5. Remove the second side panel, make sure one person supports the remaining panel!
6. Remove the last panel

Step 1 to 6 are only needed when the machine was delivered boxed

7. Unwrap the machine and remove all packaging material
8. Remove boxes and unpack

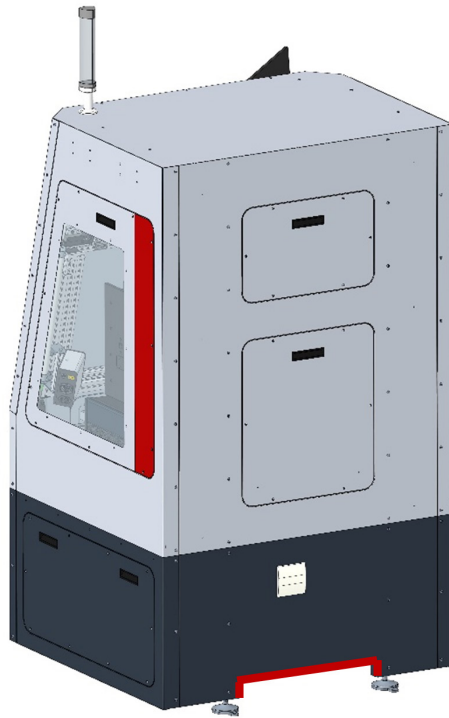
2.2.3 Taking the machine off the pallet

Before the machine is taken off the pallet, move it close to, or on its final position. Handling the machine on the pallet is the safest and it prevents damages to the machine.

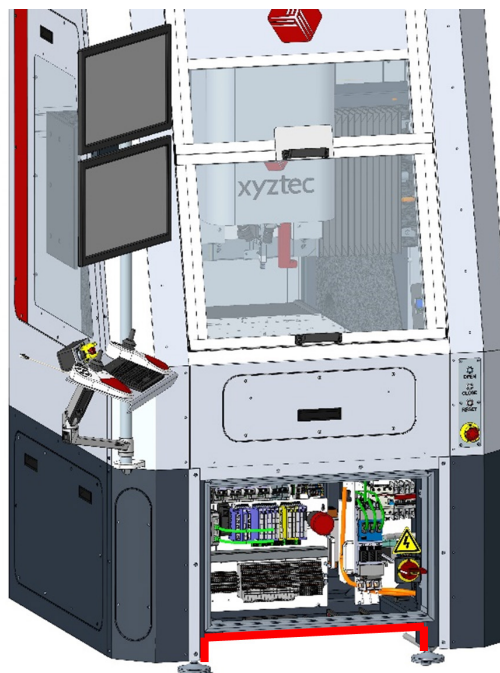
1. Once the machine on the pallet is on a stable floor, remove the 4 screws on the feet



2. Make sure all 4 screws are removed and lift the machine off the pallet, again lift it from the back-side, on the position shown below, when possible. Be careful when positioning the pallet truck not to damage the machine covering!



3. Remove the pallet from underneath the machine and gently position the machine on the floor.
4. In case of an emergency, or for small repositioning, the machine can be lifted from the front. To do so, please remove the front panel as shown in the picture below. Also make sure the forks of the pallet truck are at least 1200 mm long.



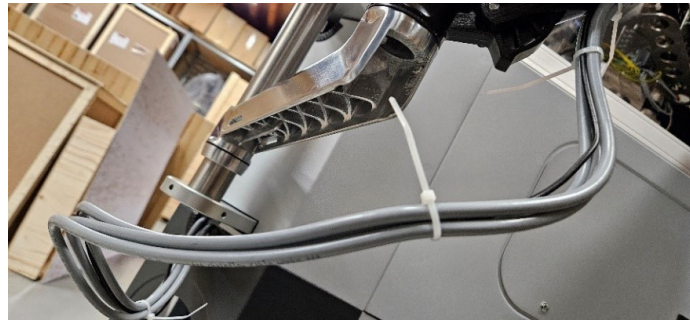
Do not lift the machine more than 5cm up from the floor, when lifting from the front!

2.2.4 Parts assembly

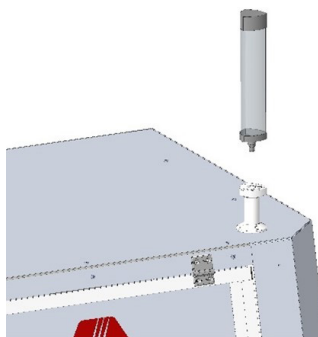
After positioning the machine on the floor, the parts which needed to be removed before transport, need to be re-assembled. After opening the door remove all fixing material (straps etc.) when applicable.

The parts which need to be reassembled are:

1. **Keyboard plate with joysticks:** Take this carefully out of the machine, unpack it and mount it on the HMI support. This step is only needed when the machine was delivered boxed.



2. **Monitors:** The monitors are packed in boxes inside the machine. They need to be unpacked and re-connected according to the stickers on the cables and monitors. Also only needed when the machine was delivered boxed.
3. **LED stack light:** This is packed separately in a box inside the machine and needs to be reconnected and assembled on the top right of the machine. The picture on the left shows the inside of the machine. Unmount the interface tube from the lamp. Feed the cable from the inside of the machine through the hole so it's on top of the machine. Feed it through the interface tube and mount the interface on the top. Connect the cable to the lamp and mount it on the interface tube.

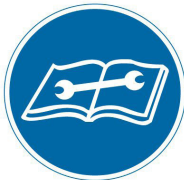


2.3 Basic safety rules

- Do not use the system in an environment where flammable gasses are present or where it is extremely dirty.
- If any personal protection equipment (PPE) is mentioned, it should be used in accordance with the manufacturer's instructions.
- Do not defeat or bridge safety devices, connectors, etc.
- Use only XYZTEC recommended spares and tools.
- Keep your fingers and other body parts outside the machine.

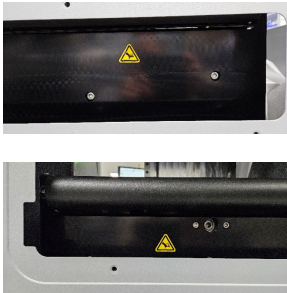
2.4 Safety labels

The XYZTEC Sigma HF system contains safety labels as described below.

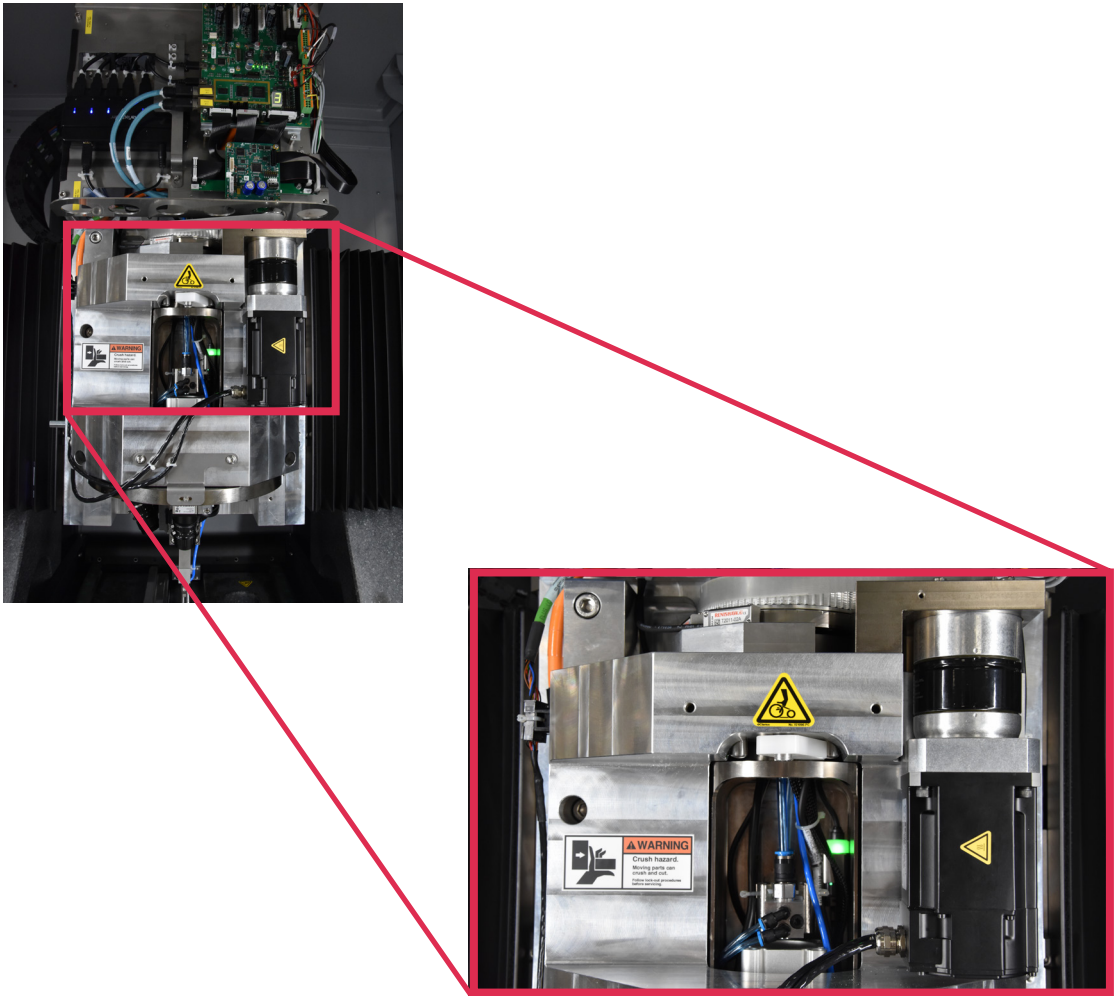
Category	Pictogram	Description	Location
INSTRUCTION		Read in the Technical manual the Safety chapters	

WARNING High voltage		Contact may cause electric shock or burn. Turn off & lock out system before servicing. Follow the Lockout Tagout procedure described in chapter 2.5	
WARNING Entanglement		Serious injury to hands. Keep hands away from moving parts. Follow the Lockout Tagout procedure described in chapter 2.5	  
WARNING Entanglement		Serious injury to hands. Keep hands away from moving parts. Follow the Lockout Tagout procedure described in chapter 2.5	
WARNING Entanglement	 ⚠ WARNING Moving parts can crush and cut. Keep guards in place. Lock out power before servicing.	Serious injury to hands. Keep hands away from moving parts. Follow the Lockout Tagout procedure described in chapter 2.5	



WARNING Hand crush roller pinch point		Serious injury to hands. Keep hands away from moving parts. Follow the Lockout Tagout procedure described in chapter 2.5	
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2.5 Location of the warning and safety labels



2.6 Description of safety devices and procedures

Safety device	Prevented hazard	Detection method	Machine condition after device activation
Safety interlock	Hazardous moving parts	Safety circuit interruption by opening the front guard	All moving parts will be stopped and the servo power is removed.
EMO (Emergency Off)	Hazardous moving parts	Safety circuit interruption by operating the EMO button	All moving parts will be stopped and the servo power is removed.
Electrical disconnect „Lockout Tagout“		Main power supply to the machine is disconnected and locked out.	
Electrical disconnect	Hazardous voltage	Main power supply to the machine is disconnected by turning the electrical main switch "off"	All power to the system is turned OFF except the PC power supply.
Air disconnect „Lockout Tagout“	Hazardous air pressure	Main air supply to the machine is disconnected by turning the main air switch "off"	
		Main air supply to the machine is disconnected and locked out. Shut down the equipment in an orderly manner. Disconnect the systems air supply by turning the pressure down to 0 bar. (2) .	
		Shut down the equipment in an orderly manner. Disconnect the systems air supply by turning the pressure down to 0 bar. (2) .	



Remote control disconnect
„Lockout Tagout“



Shut down the equipment in an orderly manner. Disconnect the systems air supply by turning the pressure down to 0 bar. (2) .

Disconnect the RJ45 cable from the jack module. Snap the blockout device into the RJ45 jack module (1).

Affix tagout notice that the remote control has been disabled.

The blockout device can be retracted using the special removal tool (2). Tools delivered are for supervisor level use only.

The RJ45 jack lockout device prevents any remote access to the equipment.

2.7 Low speed mode for commissioning and observation

NOTE: This low speed mode is strictly intended for commissioning and observation only. For servicing any part of the system, follow the “lockout/tagout” procedure described in chapter 2.5 so that the system is de-energized and locked out.

Being careless and/or not following this safety procedures can cause serious injury. Before activating the “slow speed mode” the following safety procedure must be followed:

1. Disable the remote control functionality by following the remote control “Lockout Tagout” Procedure as described in chapter 1.5. The RJ45 jack blockout device prevents any remote access to the equipment while in the “low speed mode”.
2. The “low speed mode” can only be enabled by activating the safety override switch and after accepting the pop-up screen warning.

Only qualified service personnel have access to the key for activating the “low speed mode” switch, tools for lockout/tagout procedures and tools for taking off the covers or opening the controller box. The key together with the conscious acceptance in the software overrides the safety interlock function and puts the servo drive into “slow speed mode”. Once the equipment is switched to this “low speed mode” keep body parts away from all moving parts in the system.

3 Installation and connection

The Sigma HF is a stand-alone machine with a footprint of 1250 mm by 1250 mm.

The Sigma HF tester is especially designed to work with high forces for testing heavy bonds such as IGBT products or wafer-to-wafer bonded samples.

This tester is equipped with full safety guarding for more extensive safety precautions and a stack light on top of the safety guarding to represent the machine mode. Placement of certain parts or the look of certain items may vary.



Figure 1: Isometric view of Sigma HF bond tester

3.1 Installing the Sigma HF

The following steps need to be performed to correctly install the machine:

1. Unpack the machine
2. Place the machine on a stable floor
3. Take off all covers (see chapter 4.4 for instructions)
4. Anchor the machine for protection during earthquakes (see chapter 4.2 for instructions)
5. Level the machine correctly by adjusting all four feet
6. Connect the cable to the power supply (3 phase). The equipment should be protected by an exter-

nal fuse type 50A Class J and 300 mA Earth Protection Switch

7. Plug in the air supply with at least 6 bar of air pressure
8. Put back all covers before switching on the machine
9. Switch on the pc
10. Switch on the machine

3.2 Anchoring the Sigma HF (seismic protection)

For protection during an earthquake or other heavy vibration the machine can be anchored to the floor:

1. Mark the holes in the feet with an e.g. felt-tip marker on the floor
2. Take the machine away to get access to the hole positions
3. Drill the holes and place the floor anchors or rawl bolts
4. Replace the machine
5. Check the leveling of the machine.
6. Secure the machine by tightening the lock nuts using a hook spanner.

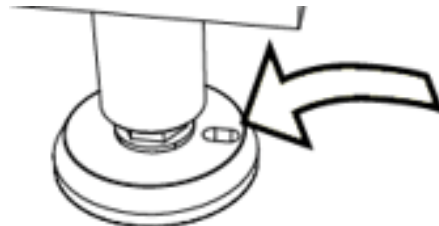


Figure 2: Feet of the Sigma HF with holes to anchor the machine to the floor

3.3 Taking off and mounting the safety covers

The following steps need to be performed to take off the covers:

1. Make sure the machine head is in a safe position
2. Open the door
3. Switch off the machine
4. Turn off the power switch
5. Lock the main switch with a padlock to prevent it from being switched on while the machine is not in a safe position
6. Use a Philips screwdriver to take off the covers and always start with the upper covers
7. Take off upper covers
8. Take off lower covers

To mount the covers, follow the steps in reverse order.



3.4 Opening the front door while machine is powerless (for technical service only!)

The following steps are needed to do this:

1. Switch off the machine
2. Turn off the power switch
3. Lock the main switch with a padlock to prevent it from being switched on while the machine is not in a safe position
4. Use a Philips screwdriver to take off the covers and always start with the upper covers
5. Open the upper right (window)cover
6. Use a flat screwdriver to unlock the safety interlock by turning the small disable switch to the right
7. Now the interlock will not lock the door anymore
8. Make sure that the interlock is set to safe position after maintenance

4 Before using the Sigma HF

4.1 After unpacking the machine

Take off all plastic protection from the windows in the side panels and door, when applicable. Remove the red transport brackets from the X-axis, shown in the picture on the right. Keep the brackets for future transport of the machine.



Figure 3: Inside the Sigma HF

Make sure to remove the supporting studs, which are mounted under the Z-axis. Keep them as tooling together with the machine. They could be necessary when supporting the machine.

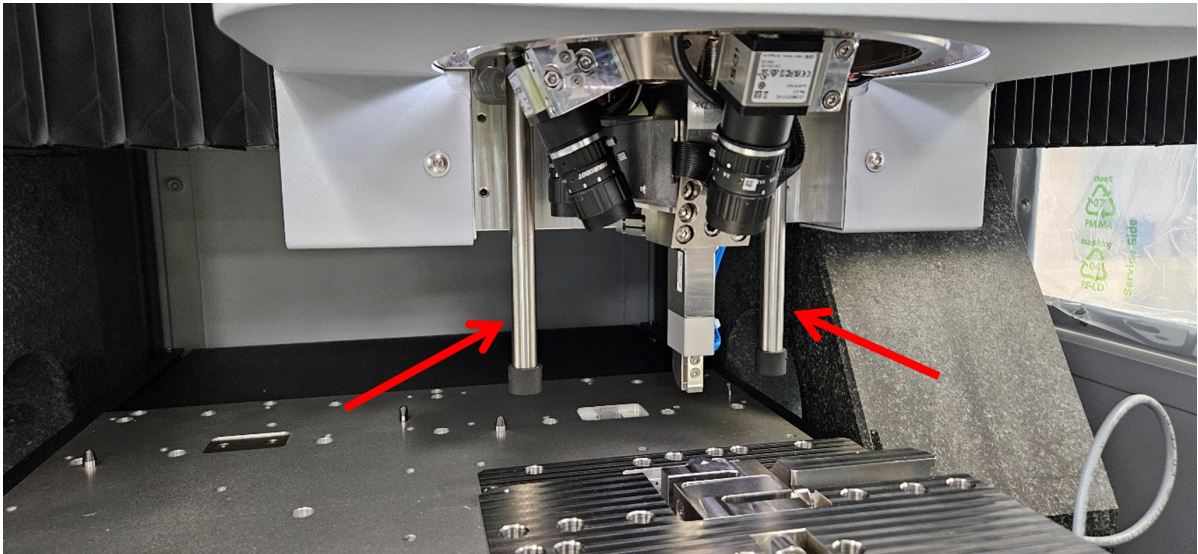


Figure 4: Inside the Sigma HF: removal of supporting studs

Before starting the Sigma HF make sure the door is closed. Start the machine by turning the power switch in front of the safety guarding. The color of the stack light flashes blue. After starting the software on the desktop the stack light changes to white which means the machine is referenced and ready to load.

4.2 Loading and unloading the Sigma HF

Request the machine to open the door by pressing the open button. During this request this button flashes blue. The door is released to open when the button remains blue.

When the door is open, the machine is in standby mode and blocked. A sample can be placed and the door can be closed. The door should be locked with the close button, otherwise the machine will not be released. If the close button remains white, the Sigma is ready to use and perform a test.

4.3 Emergency switch

Stop the machine by pressing the red emergency switch. The stack light on top of the machine flashes red. The test is stopped and the machine is switched off automatically. By turning the emergency switch clockwise and press the Reset button in the software, and turn on the motor drives in the **PLC Motion Service** to re-enable them. Now, the Sigma restarts and the stack light changes to white. The Sigma HF is ready to use. Only reactivate the tester after making absolutely sure it is safe to do so.

5 XYZTEC Sigma hardware

5.1 Joysticks

The joysticks to control the axes movements are located on the left of the machine on the swiveling table.

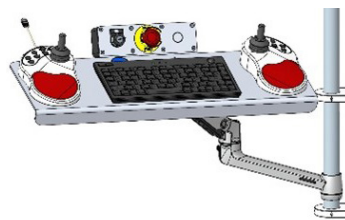


Figure 5: Joysticks of Sigma HF

Both joysticks, the left and right one, have six buttons each and the actual controlling joystick unit. A short description above each button shows what the buttons are for. The joysticks work intuitive, thus the direction the operator pushes it to, the axis moves accordingly. The left joystick controls x and y movement, whereas the right one controls z direction and, if available, rotation of the tool (p axis). Pushing the left joystick to the left will move the x stage to the left and vice versa. Pushing it towards you will move the y stage to towards you and vice versa.

When pushing the right joystick towards you the z axis moves downwards, hence the RMU resp. the head. Upwards movements is performed vice versa. By pushing to the left or to the right the tool rotates either clockwise (left) or counter clockwise (right).



Figure 6: XYZTEC Sigma joysticks for axes movement

5.2 Cameras

The Sigma HF machine is equipped with three cameras in standard configuration. The front view camera (camera ①) and the side looking camera (camera ②) allow accurate positioning of the tool seeing it from two directions. As the Sigma HF does not have a microscope however, these two cameras ensure an even more detailed view at the test region. The third camera ③ is mounted perpendicular to the sample thus showing top view. This camera is used for fiducial check and automation purposes.

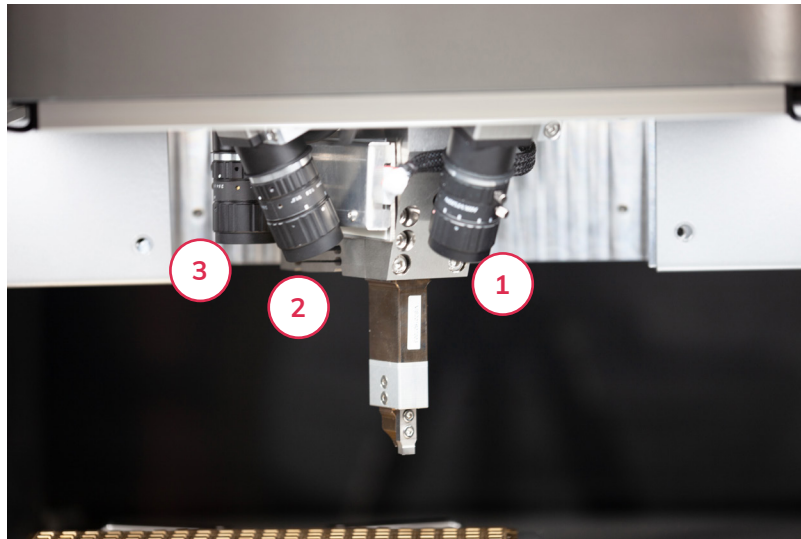
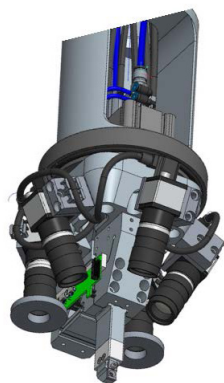


Figure 7: Camera of Sigma HF



5.3 LED Stack light

To reliably monitor the status and the point-of-use of machine, it is equipped with a smart LED stack light. This signal light conveniently visualizes the information you need. The LED stack light displays important or critical machine conditions and uses a color scale to show trends for physical variables.



Figure 8: LED stack light

The following table describes the different color assignments:

Situation	Stack light color	Light pattern	Segments used	Buzzer usage
No overrules for stack light and software has not yet send a E10 state update	White	Solid	Top segment	No buzzer
Emergency switch(es) pressed	Red	Blinks twice every second	All segments	2 short beeps
Safety PLC in error state or not running	Red	Solid	All segments	5 seconds continuous beep
Machine needs safety reset	Yellow	Blinks twice every second	All segments	No buzzer
Service mode activated (only possible as xyztec)	Blue	Blinks twice every second	All segments	3 short beeps
Motion while door is opened in service mode	Blue	Blinks twice every second	All segments	Short beeps whiles till moving

6 XYZTEC Sigma software

6.1 Starting the software

Before starting the Condor Sigma software make sure the Sigma tester is powered on and connected. The software can be used without a tester, but functionality will be limited. XYZTEC also offers a simulator software that can be used to simulate the Condor Sigma tester. If the simulator software is running the Condor Sigma software will not detect the connected Condor Sigma tester. Make sure to close the simulator software before starting the software if the real tester is required.

To start up the software just double click on the Condor Sigma icon on the desktop.



Figure 9: XYZTEC Sigma software

If this icon is not available you can start the Windows Explorer and browse to the directory where the Condor Sigma is installed. By default this is the directory **C:\Program Files\XYZTEC\ Condor Sigma** or **C:\Program Files (x86)\XYZTEC\Condor Sigma** on a 64 bit operating system. Look for the file **xyz_sigma.exe**. To create a shortcut to this program just right click on the file and select Send to. In the submenu select Desktop (create shortcut).

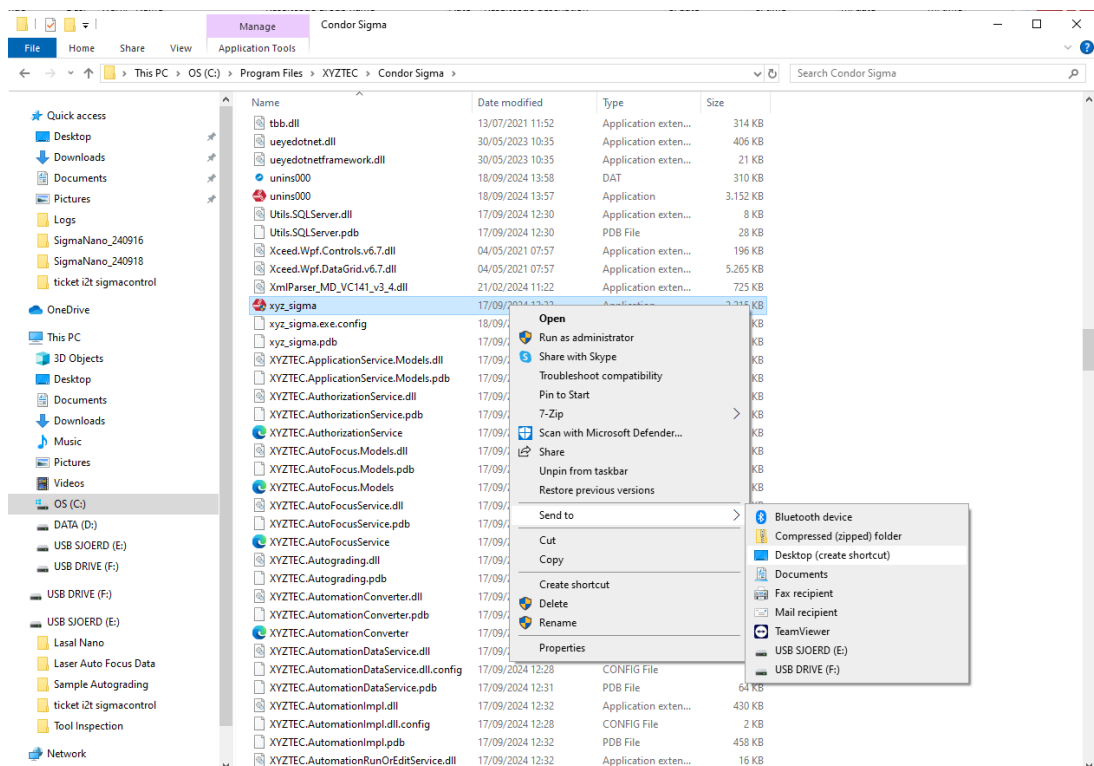


Figure 10: Creating a short cut for the XYZTEC Sigma software

You can also double click the file name to just run the program without making a shortcut. Depending on the Windows version it is also possible to use the options Pin to Taskbar to pin the application to the taskbar or Pin to Start Menu to pin the application to the start menu. This also makes it easy to start the application quickly.



Figure 11: XYZTEC Sigma application pinned to the task bar

6.2 Screen layout

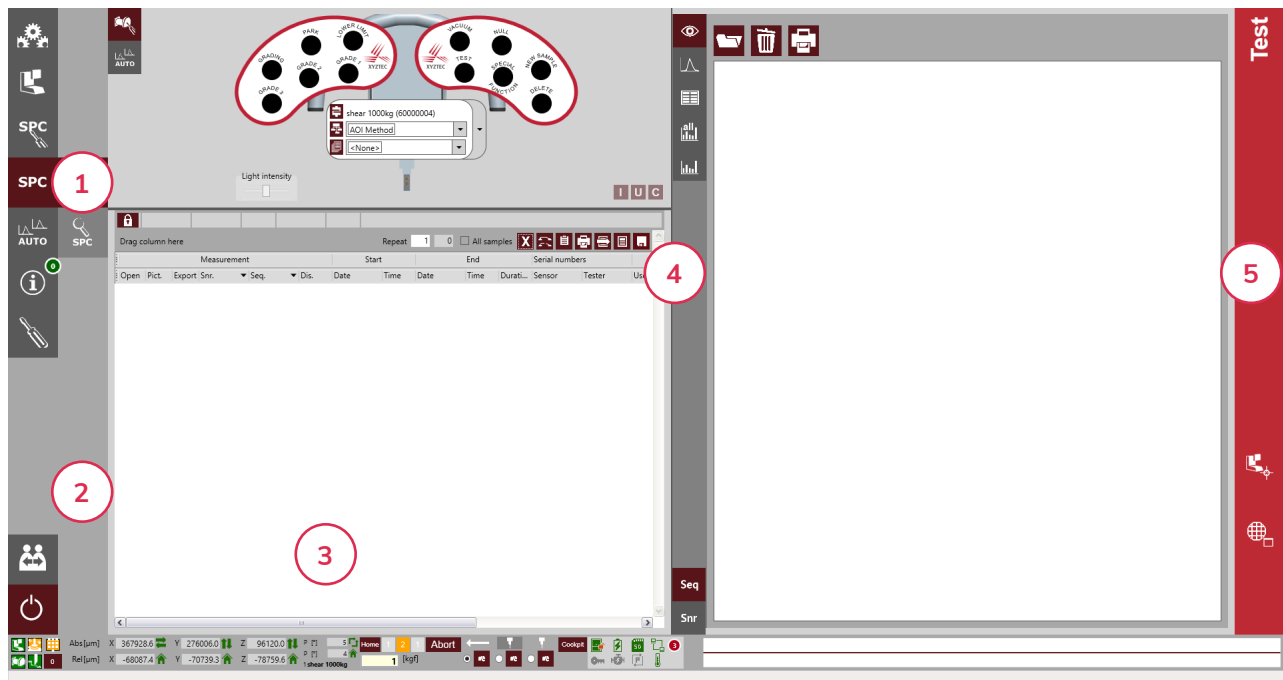


Figure 12: Screen layout with indication of layout areas

The picture shown above shows the screen layout for the Sigma software. Six areas on this picture have a number.

Area	Description
1	Main menu structure: The main menu is actually a vertical bar with tiles. Depending on the selected tile a submenu can be shown. This is also a vertical bar directly to the right side of the main menu. The selected tile is colored red. The available options are shown as grey tiles. The icons will be explained in the next chapter.
2	Control tiles: Two options are available. The upper tile opens the login dialog. This can be used to switch from the current user to a different available user. The lowest tile shuts down the software.
3	Status bar: The status bar shows information about the tester, the current positions for the stages, the live measurement graph, currently selected sensor as well as the currently applied force and the general status of the machine condition, e.g. front door status, etc.
4	Active screen area: This shows the screen that belongs to the currently selected menu option.
5	Vertical information bar: This bar shows the currently selected menu option. In the figure above this is the users screen. The vertical text will change if a different main or sub menu option is selected.

The XYZTEC Sigma software uses tool tips to help you understand the available icons and controls. If the mouse cursor is over an active area and the mouse is not moved for a few seconds a tool tip will pop up. The text in the tool tip gives the operator information about the specific icon or control.

The title bar also displays information about the software, the currently logged in user and the currently used test method.

The XYZTEC Sigma software is designed for a wide screen monitor with a resolution of 1400x900 or more. Using this software on a standard monitor or a monitor with a lower resolution will make certain screen areas difficult to reach.

6.3 Main menu and sub menu structure

6.3.1 Main menu

The menu interface of the XYZTEC Sigma software consists of tiles and icons. This chapter explains the different icons and also explains how to navigate the main menu. The main menu is the most left vertical bar with icons. Below is a display of the main menu:

	General settings:	Software settings, users and authorizations
	Tester settings:	Tester setup, measurement unit setup, calibration and GR&R
	SPC settings:	Result codes and groups, methods, forms and Assignment
	SPC screen:	Test screen showing all test results, statistics and graphs, query screen
	Automation:	Automation selection and editor
	Information:	Information and messages

The selected option has a dark red background color. Depending on the selected option a submenu may be shown if the specific choice also offers additional options. In the submenu the selected option is also displayed with a dark red background. For all tiles in the main menu and the sub menu's tooltips are available.

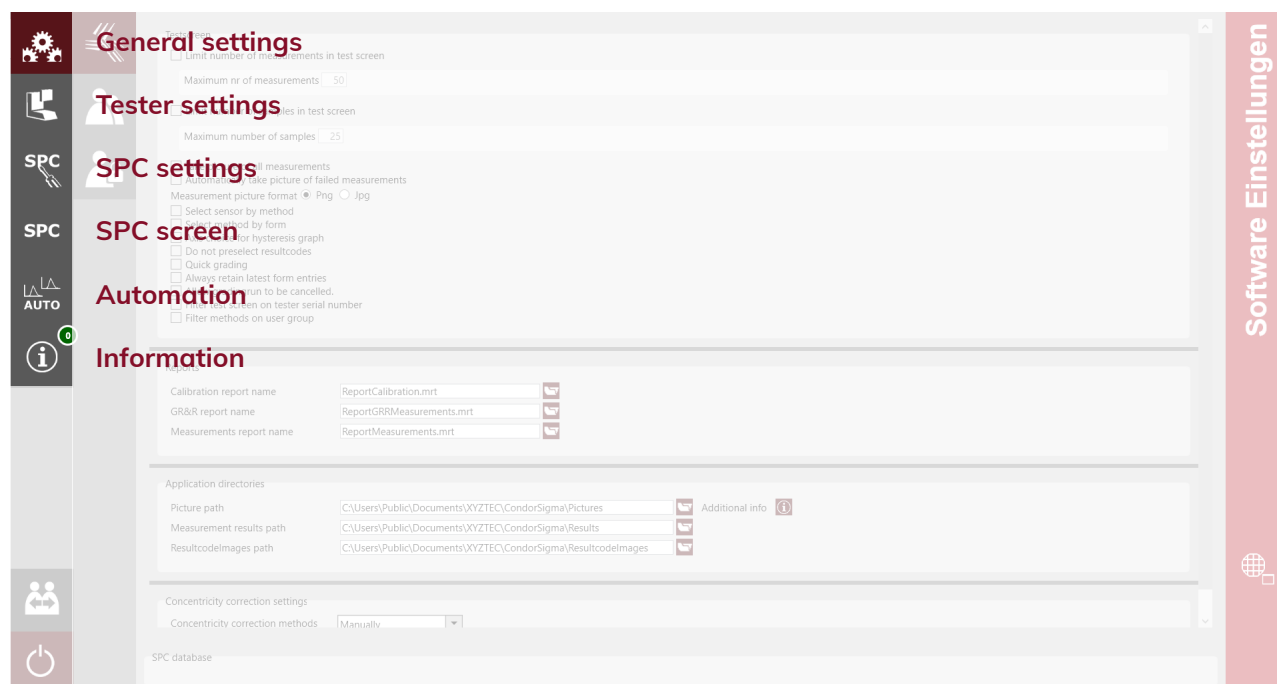


Figure 13: Main menu side barW

6.3.2 Sub menu

Below is the sub menu for the **General settings** and a short explanation of each option:

	Software settings:	General software settings for the Sigma software
	Users:	Manage the users for the Sigma software
	User groups:	Manage the available user groups that set the authorizations

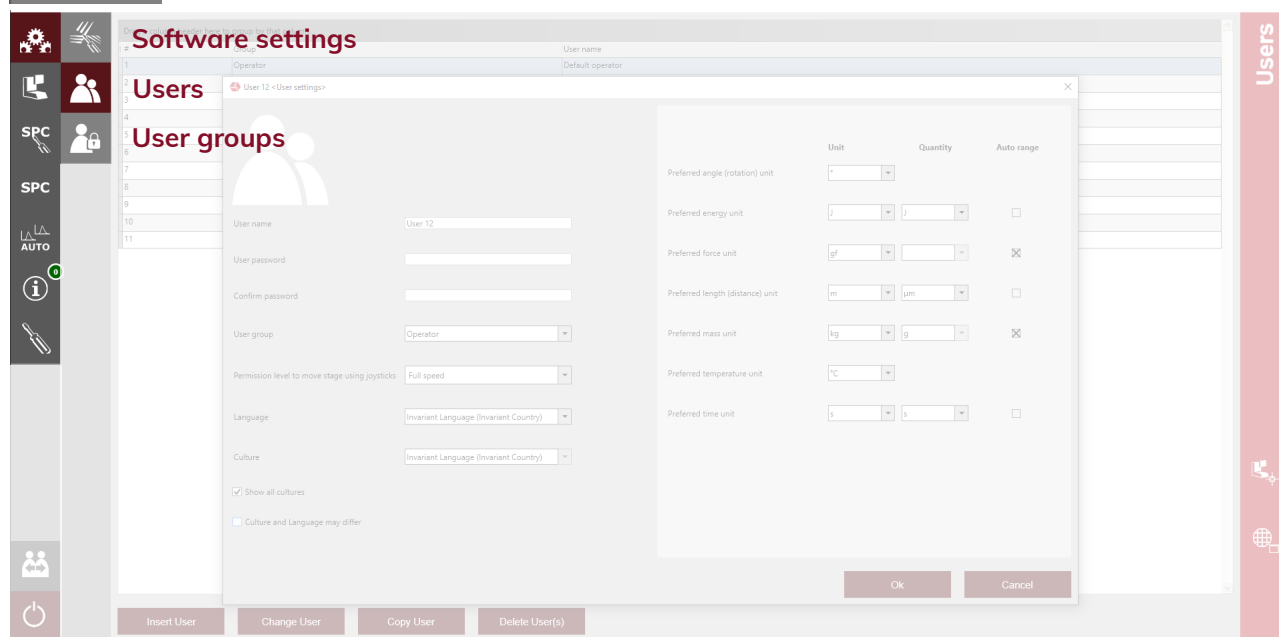


Figure 14: Sub menu: General settings

The sub menu of **Tester settings** looks as follows:

	Tester platform:	Set the tester settings, joysticks and the stages
	Measurement unit:	Setup the measurement unit and sensor settings
	Calibration:	Sensor calibration
	GR&R:	GR&R statistics with SPC

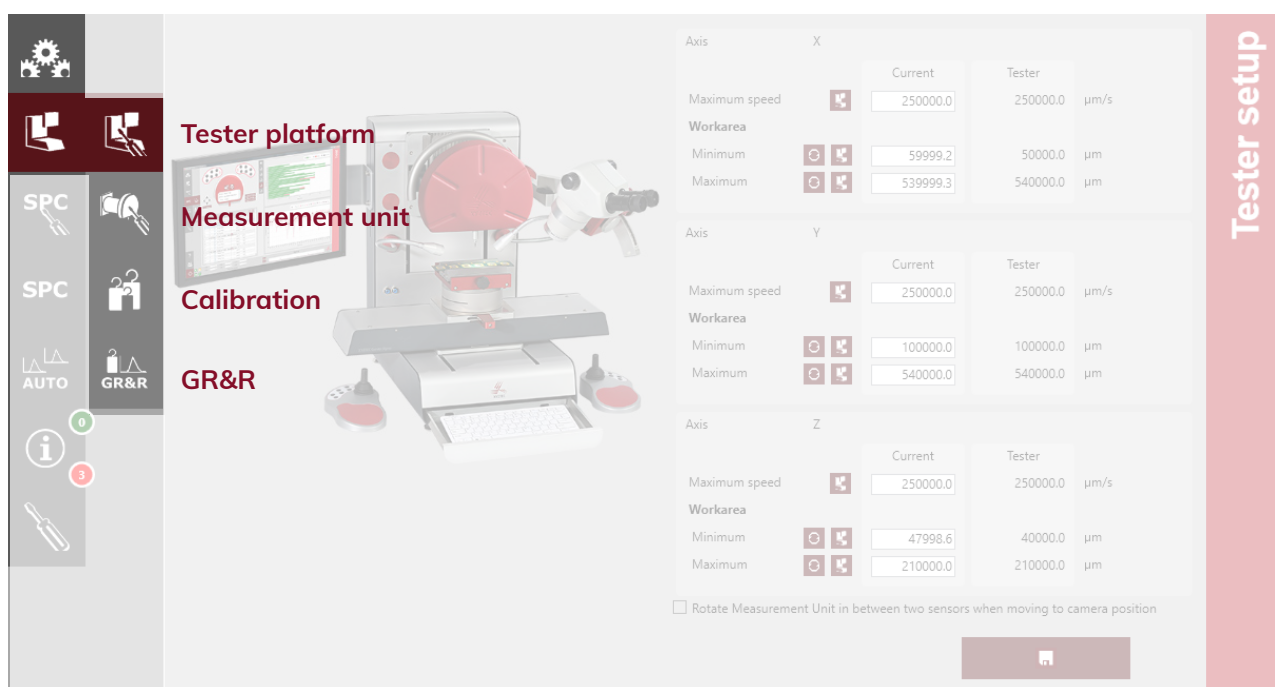


Figure 15: Sub menu: Tester settings

The sub menu of the **SPC settings** looks as follows:

	Result codes:	Result code groups and result codes for grading a measurement
	Test methods:	Management of test methods
	Form editor:	Management of forms for a new sample
	Export editor:	Management of automated file and report export

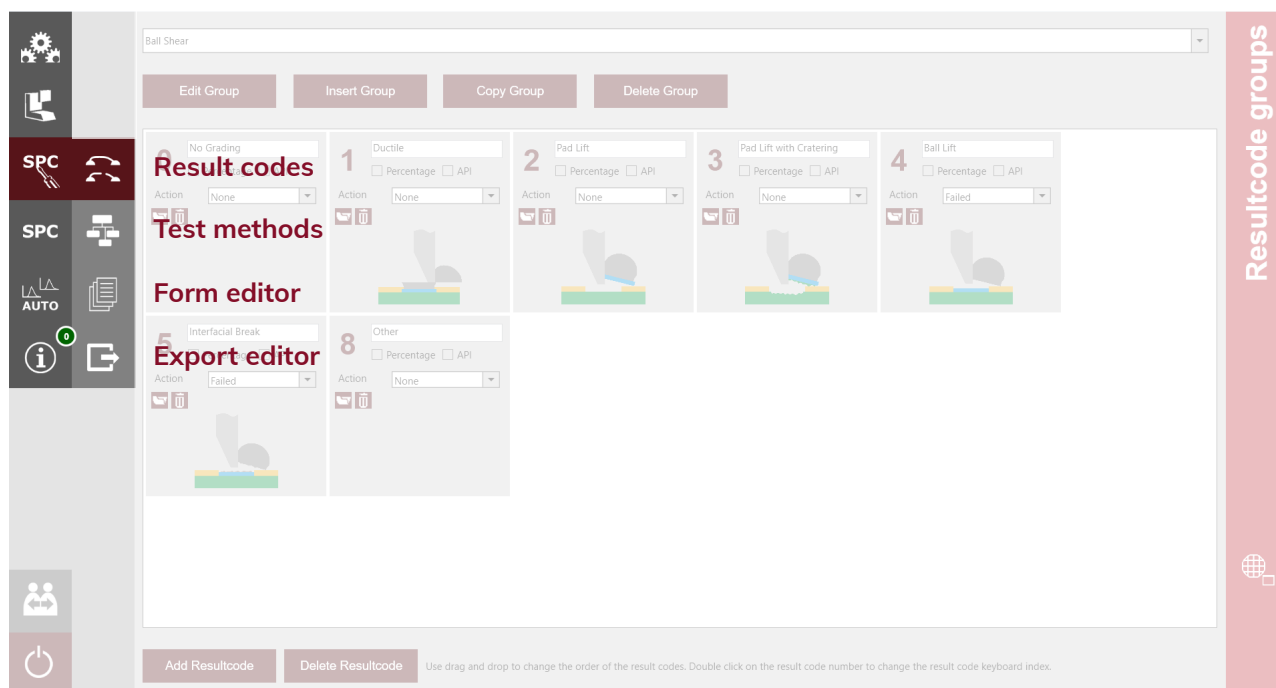


Figure 16: Sub menu: SPC settings

The sub menu of the **SPC screen** looks as follows:

	SPC:	Test screen with SPC: numerical and graphical display of test results
	Query:	Query screen with SPC to filter for required information

When the **Automation** menu is selected only one option is available in the sub menu:

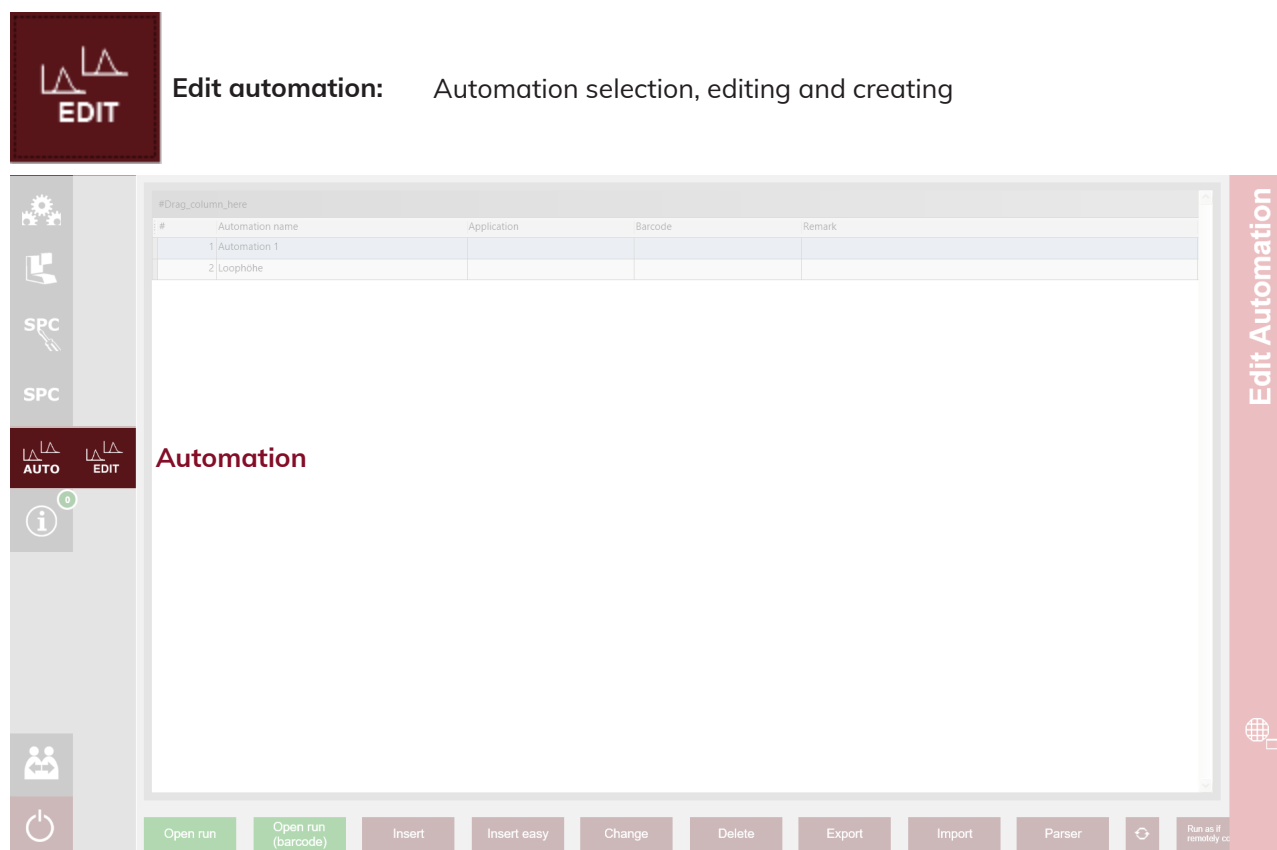
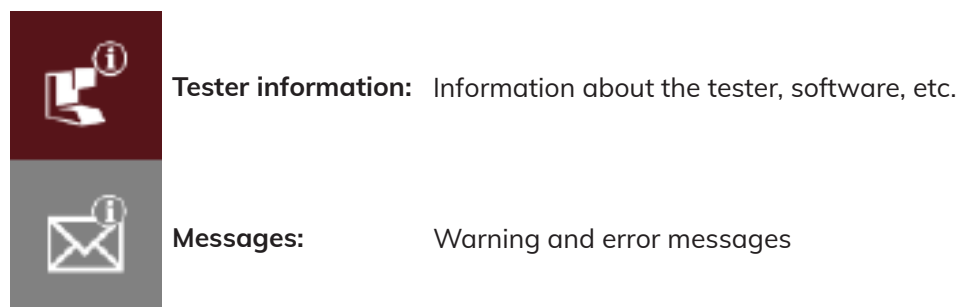


Figure 17: Sub menu: Automation

The sub menu of the **Information** looks as follows:



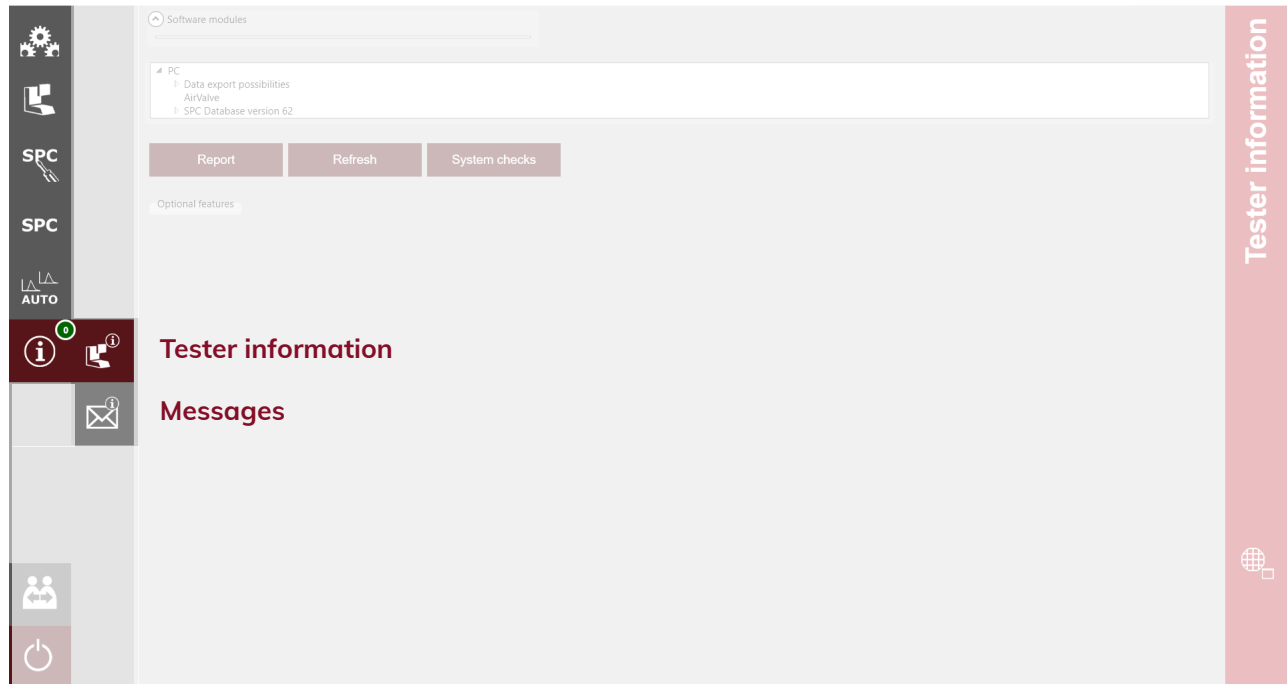


Figure 18: Sub menu: Tester information

With the tool tips and by remembering the icons for the different options navigating through the XYZTEC Sigma software is easy.

The Information menu button in the main menu can also show a small green or red circle with a number. This indicates if there are any warnings (green circle) or errors (red circle).

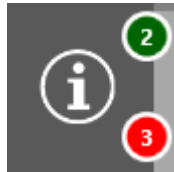


Figure 19: Information icon

Check the messages area to find out more. In the messages screen the **Resolve** button after a messages can be used to resolve a warning or error, if possible. Resolving errors can only be performed if the currently logged in user has at least supervisor or engineer rights. An operator cannot resolve any messages.

Resolvable errors				
	Description			
Resolve	Please resolve how cameras are mapped to positions (One camera is not connected)			
Resolve	The current firmware version of the Sigma is '5.18.9026.57574'. The software was originally shipped with version '5.18.8997.0'. Consider downgrading			
Resolve	The 'startup as xyztec user' option is enabled			

Messages list				
Time	Sev	Error	#	Description
24-09-19 14:55:29	Advice	5.1	2	Sensor 3 ('Pull 100gf Tweezer') is configured with a tweezer (with serial number '00841110'). This tweezer is not connected. Please plug in the tweezer's USB connector
24-09-19 14:55:29	Advice	100.11	1	Sensor 'Pull 1kgf Tweezer': The 'collision detect force' is set to 0.15 [N], which is low for a 11.8 [N] tool. 1.18 [N] is a good default. Complaining stops when between [0.5883
24-09-19 14:55:11	Advice	2.4	1	FactoryMode = True, please change this

Figure 20: Messages shown in XYZTEC Sigma software



6.4 Working with a data grid

In the Condor Sigma software data is sometimes shown in the form of a data grid. The data grid is comparable with a table, but offers a lot more and nicer features. These features will be demonstrated in the Methods screen.

The screenshot shows the 'Methods' screen in Condor Sigma software. It features a large data grid with columns for Test, U.group, Order, Type, Range, Des., Warn., Name, Resultcode group name, Auto, Resultcode description, C. date, C. time, M. date, and M. time. The grid is organized into several groups, each with a collapse/expand icon. The first group is 'AOI (1 item)' with one method. The second group is 'F (11 items)' with methods 11 through 16. The third group is 'F (9 items)' with methods 21 through 26. The fourth group is 'D (1 item)' with method 2. The fifth group is 'D (1 item)' with method 4. The sixth group is 'F (1 item)' with method 3. The seventh group is 'F (1 item)' with method 3. At the bottom of the grid, there are buttons for 'Insert', 'Change', 'Copy', 'Delete method(s)', 'Import method(s)', and 'Export method(s)'.

Figure 21: Data grid showing the available test methods

The picture above shows the Methods screen. The large table area on the screen shows a list of all available methods. In the beginning when using our Sigma software this will be a list you can easily oversee. After a while a lot of methods can make the overview more difficult. The data grid can help you by sorting, grouping (multiple columns and nesting supported) and filtering. This chapter shows how to get the most of the data grid.

A first helpful feature of the data grid is sorting data. Sorting data is very easy. Just click on the column header (not the arrow besides the header) to sort the data in ascending order for this specific column. Click again on the same column header to sort the data in descending order. A third click will fall back to the default of an unsorted dataset.

The first screenshot shows the data grid sorted in ascending order by method number (#). The second screenshot shows the data grid sorted in descending order by method number (#).

#	Type	Destructive	Name
1	F	☐	Jig shear ca
2		☐	Just record
3	F	☒	Gold ribbon
4	F	☒	Aluminium
5	F	☒	Ribbon ribt
6	F	☒	Copper ribt
7	F	☒	Gold wire p

#	Type	Destructive	Name
17	F	☐	Weight calil
16	F	☒	Die shear
15	F	☒	Ball shear
14	F	☒	Aluminium
13	F	☒	Gold wire sl
12		☐	Scriptable n
11	F	☒	Gold wire p

Figure 22: Ascending and descending sort on the method number (#) column

In the data grid it is only possible to sort the data on one column. It is however still possible to sort on multiple columns by using the grouping options for data.

Grouping data on a specific column is very easy. Just left click on the column header, keep the mouse button pressed and drag the header to the grouping area. Then release the left mouse button to drop the column header. The grouping area can be recognized on the text “Drag a column header here to group by that column” or the text “Drag column here”.

#	Test	p	Order	Type	Range
40			40	F	
41			41	F	
21			21	F	
22			22	F	
19			19	F	
18			18	F	
20			20	F	
17			17	F	
16			16	F	
39			39	F	
24			24	F	
26			26	F	

Figure 23: Grouping the methods on method type

The figure shown above shows the drag and drop of the column Type to the grouping area. After dropping the column the methods will be grouped on the method type. All pull methods, peel methods, shear methods etc. will be grouped together as shown below.

#	Test	U.group	Order	Type	Range	Des.	Warn.	Name	Result...	Auto	Result...	C. date	C. time
F (12 items)													
40			40	F		☒		Battery test	☐			09/18/2024	10:58:33
41			41	F		☒		Battery test long	☐			09/18/2024	11:17:30
21			21	F		☒		Die shear	☐			09/12/2022	11:33:08
22			22	F		☒		Finetune camera offset (...)	☐			09/12/2022	11:33:08
19			19	F		☒		Shear 100x1000µm alumi...	☐			09/12/2022	11:33:08
18			18	F		☒		Shear 150µm aluminum...	☐			09/12/2022	11:33:08
20			20	F		☒		Shear 200x2000µm alumi...	☐			09/12/2022	11:33:08
17			17	F		☒		Shear 25µm aluminum wire	☐			09/12/2022	11:33:08
16			16	F		☐		Shear 25µm gold wire	☐			09/12/2022	11:33:08
39			39	F	0.10	☒		test export count test	☐			02/19/2024	11:16:25
24			24	F		☒		test jig	☐			09/12/2022	11:34:00
26			26	F		☒		UPH shear 500mmps	☐			02/08/2023	10:30:35
F (15 items)													
11			11	↓↑F		☒		Cold bump pull 100 µm b...	☐			09/12/2022	11:33:08
12			12	↓↑F		☒		Cold bump pull 300 µm b...	☐			09/12/2022	11:33:08
13			13	↓↑F		☒		Cold bump pull 450 µm b...	☐			09/12/2022	11:33:08
14			14	↓↑F		☒		Cold bump pull 500 µm b...	☐			09/12/2022	11:33:08
15			15	↓↑F		☒		Cold bump pull 750 µm b...	☐			09/12/2022	11:33:08
33			33	↓↑F		☒		die pull test	☐			09/26/2023	13:16:39
34			34	↓↑F		☒		DvE die pull test test for...	☐			11/27/2023	10:56:51
25			25	↓↑F		☒		Jig test	☐			09/12/2022	15:04:31

Figure 24: Methods grouped by type of method

It is also possible to group on multiple levels. If the Destructive column is additionally drag and dropped, the methods would be grouped by method type first and then by fact whether the method is destructive or not. This way all destructive pull methods are grouped together. Even when the data is grouped you can still choose to sort on a specific column to make it more easy to find a method or get a better overview.

Each group gets a header that shows the group contents and the number of items in the group. When a lot of data is available it is also possible to use groups for a faster navigation. Just click on the arrow besides the method content and select the group that is needed

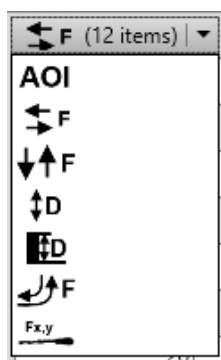


Figure 25: Navigating the methods by selecting a group (type)

The example in the picture above shows how to filter on the method name (Name). Move the mouse cursor over the column header. An arrow is shown on the right side of the header. Just click on this arrow. A list of all column values is shown. This is a unique list. If a specific value is checked (click on the check box in front of the name) this item will be part of the filtered data. Multiple items can be checked. The data grid immediately shows the filtered data. After filtering on specific items the column will show a filter icon. To remove a filter just click on the arrow/filter and click Clear filter or uncheck the checked items. The Condor Sigma software contains multiple nested filters. Filtering is especially useful in the query screen.

6.5 Users and user groups

Click software settings and then users in the main menu. The picture below shows the selected menu options. The users screen shows all available users in a data grid. Just as explained in the chapter before the data can be sorted, group the data or use a filter. The image shown below shows the users that are pre-defined as default in the XYZTEC Sigma software. They can be changed, modified, deleted and adjusted any time by the operators' needs as long as the user group has the rights to do so.

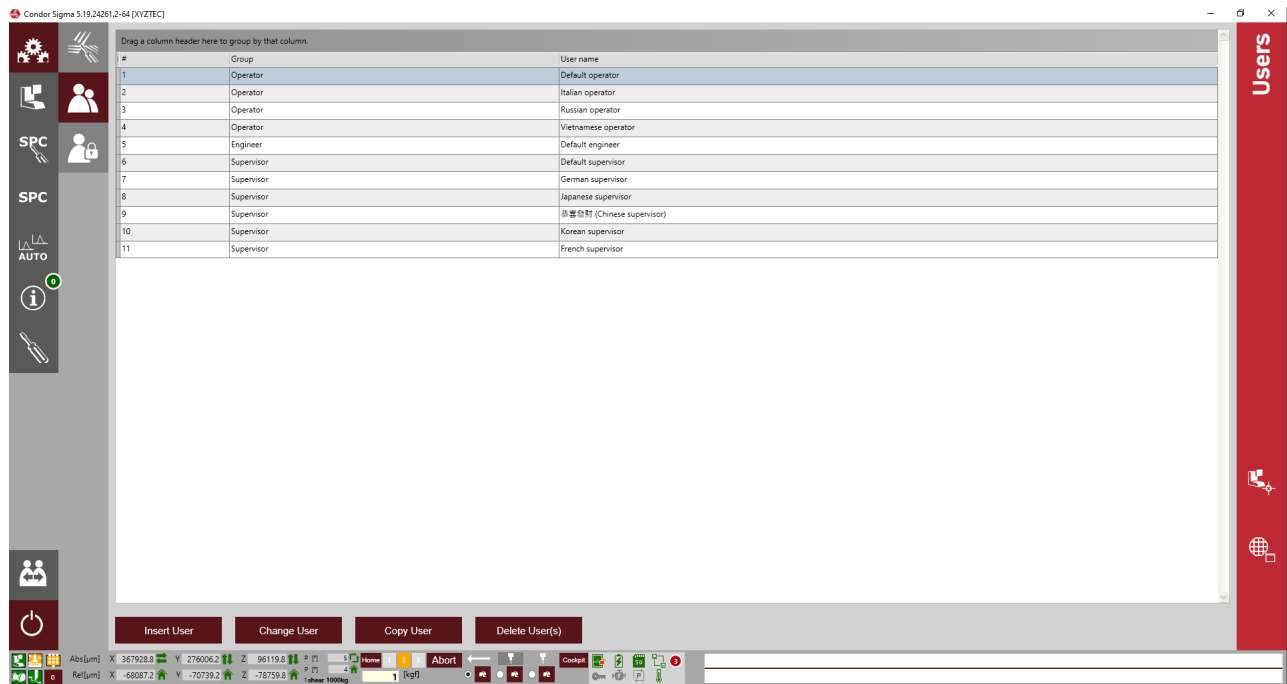


Figure 26: Users screen

Below the data grid the buttons **Insert User**, **Change User**, **Copy User** and **Delete User(s)** are available. If a user is selected and **Change User** is clicked the window below will open. The User name should identify the user with an unique name. The User group determines the authorizations.

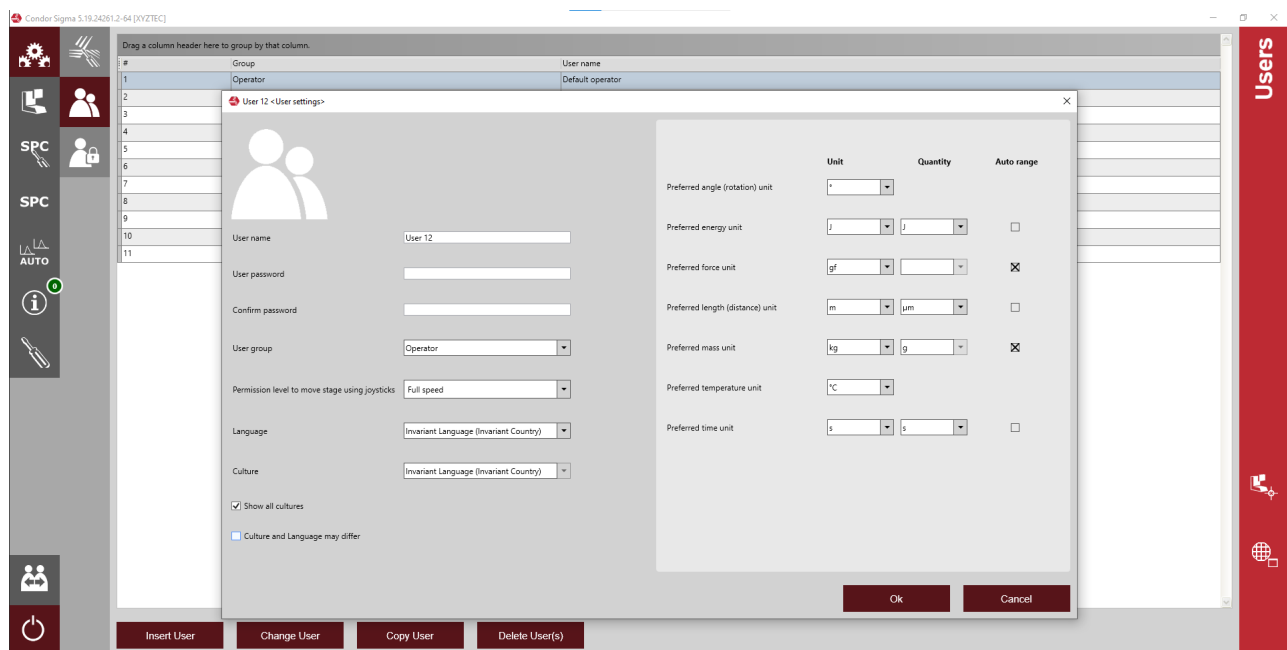


Figure 27: User settings screen



The user settings can be used to change the preferred unit, the settings for the culture or language and the user group (authorisations). The culture settings are used to determine the way numerical data or date/time is shown. The default Culture is Invariant language/Invariant country. Numerical data uses a decimal point. Date and time use the format month/day/year. Make sure to choose the correct setting for your country.

The Language setting can be used to set the language for the Condor Sigma software. If **Show all cultures** is checked the list of cultures and languages is the same as Windows offers. If this is not checked the list will only show the cultures that also offer a translation.

In most cases the option **Culture and language** may differ and can be unchecked. In some cases, for example a German user that likes to get the English language, but the German culture settings (decimal comma), it is necessary to check this option. If checked it is possible to select a different settings for the language and the culture.

The unit settings can be used to arrange the setting the Preferred angle unit, Preferred energy unit, Preferred force unit, Preferred length (distance) unit, Preferred mass unit, Preferred temperature unit and Preferred time unit. The unit angle offers a choice between degree (°, default) and radial (rad). For energy the only choice is joule (J). Force offers a choice between Newton (N) and gram force (gf). Length offers a choice between the metric system (m) or inches (inch). The unit for the mass is kg. This setting is used when entering a weight in calibration mode. For temperature we offer degrees Celsius (°C, default), Kelvin (K) and degrees Fahrenheit (°F). Time only offers a choice for seconds (s).

The Auto range setting automatically selects a specific unit quantity when a value is in a specific scope. If enabled for the force the system will automatically show kgf if the selected sensor has a force range above 1000 gf. To define and manage the different user rights you have to edit this in the **User group** settings as shown below:

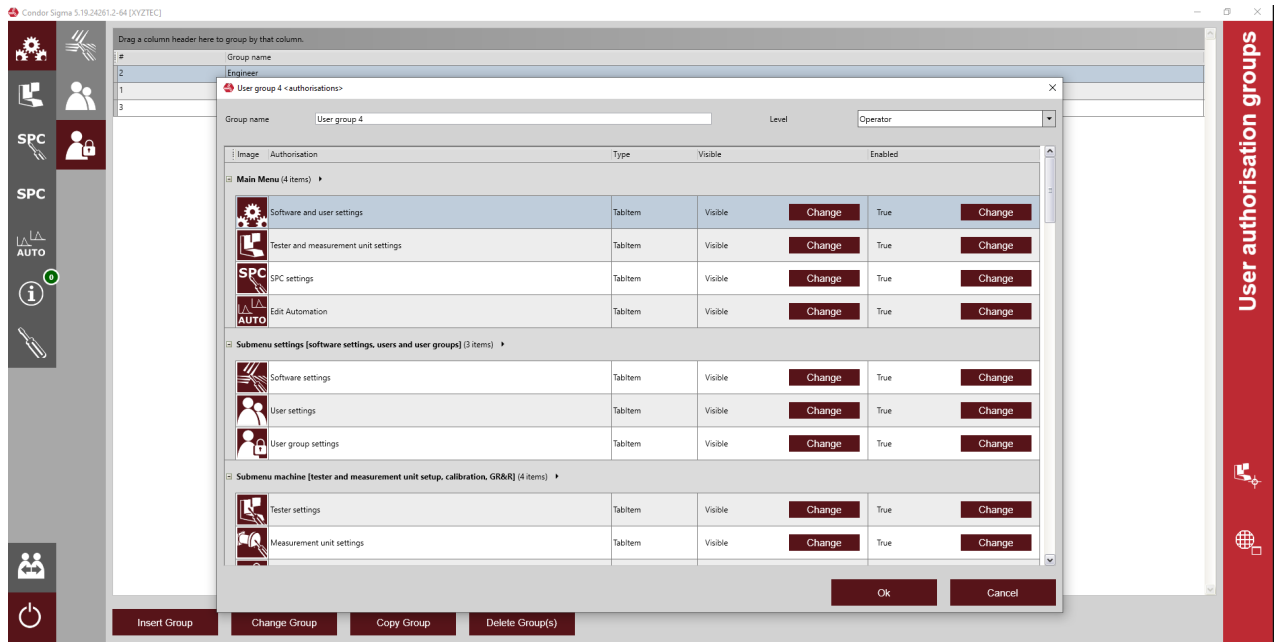


Figure 28: How to insert and edit a user group

The XYZTEC Sigma software divides into the following three user groups that can be equipped with dif-

ferent rights according a defined right hierarchy:

1. Operator
2. Engineer
3. Supervisor

The user group **Supervisor** has the right to give and take rights per default. There it can be selected whether the **Operator** and/or **Engineer** is allowed to see all available software settings or not. The columns **Visible** and **Enabled** define if the user can see the software settings without the option to click it or if the functions are hidden. For instance, when the **Supervisor** wants the operator to just see and change the test settings without the possibility to modify anything else, all other software settings can be disabled and/or made invisible.

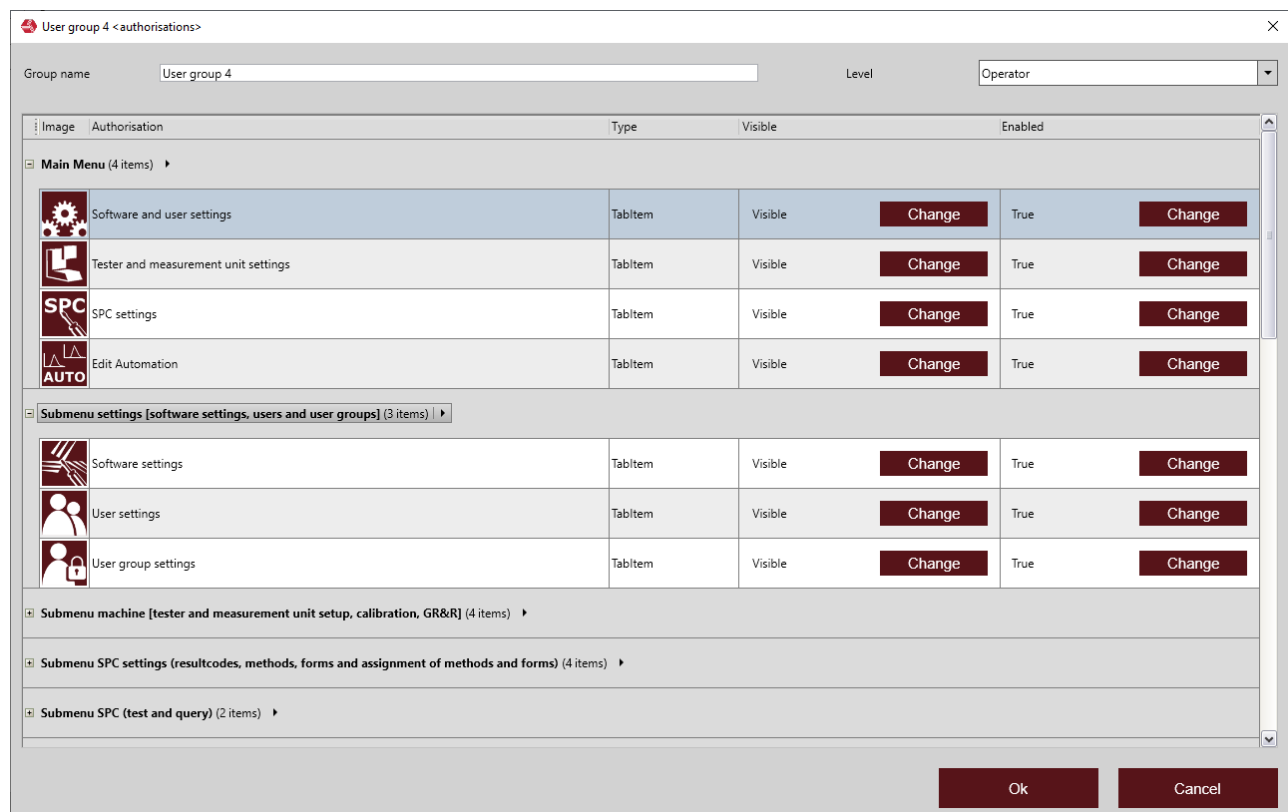


Figure 29: Right management of user groups

6.6 Result codes and result code groups

After a test is performed in most cases the operator will need to visually check the result and determine a grading or failure code. For a pull test for example after pulling the wire the operator will need to visually determine if the wire broke, or if the bond (wedge or ball) broke. Other situations like a neck break or heel break are also possible. The XYZtec Sigma software offers an easy-to-use way to define the available result codes and result code groups.

Setting up result codes and groups is a job for the engineer. If setup correctly the operators can work efficiently and make less mistakes when performing a grading. Click **SPC settings** and then **Result code**

groups in the main menu. The picture below shows the selected menu options.

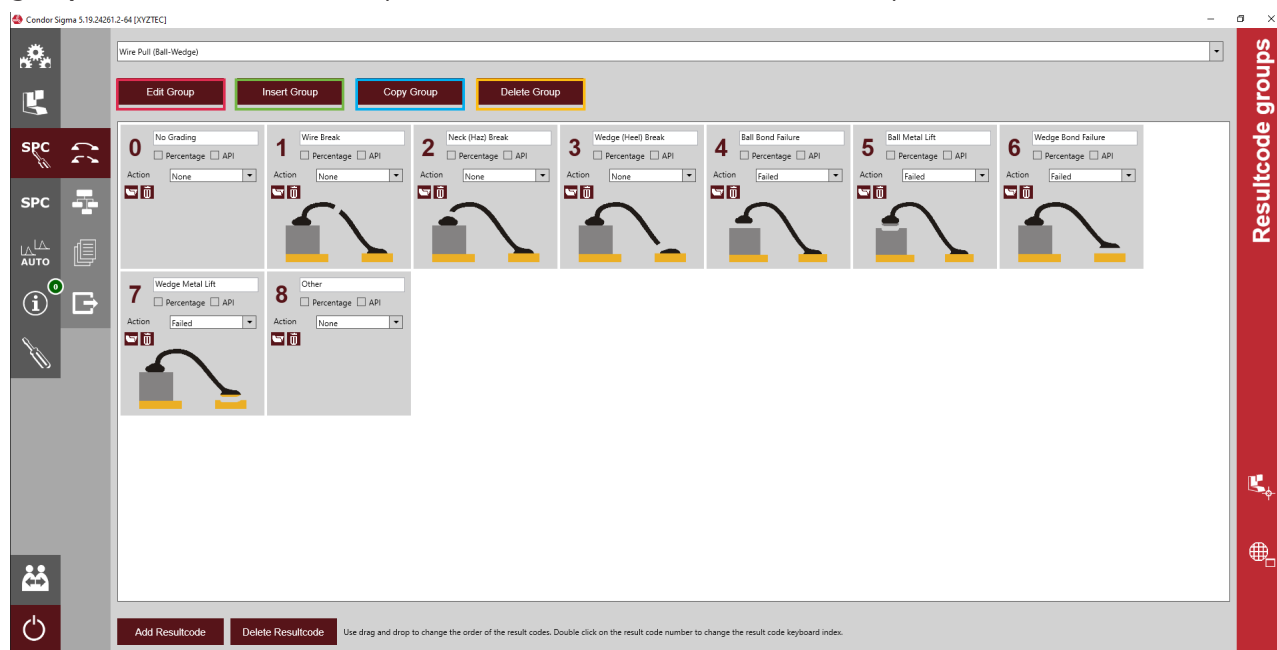


Figure 30: Result codes and result code groups

A default pre-set of result code groups and result codes are available, including helpful pictures that clearly show when to choose a specific result code. In the upper part of the screen you select a result code group by clicking the drop-down menu. By default the Wire pull (Ball-Wedge) result code group is selected. With the **Edit group** button the name of the selected group can be changed. **Insert group** will insert a new group. **Copy group** will copy a group, including all available resultcodes. **Delete group** will delete the selected group.



Figure 31: Result code groups

The lower part shows tiles. Each tile contains a result code. Each result code shows a Number, a Name, a checkbox to enable a grading percentage, the resultcode action for the selected code and a picture for the result code. The number can be a number from 0 to 9. The number corresponds with a keyboard key that can be used to quickly select the result code on the joystick when a grading is performed. The name of the result code is important. It should clearly describe the kind of grading to make it more easy for the operator to understand. If Percentage is checked after performing the grading the operator also needs to select a percentage from 0 to 100.

The percentage setting is mostly used for (total) ball shear testing to describe how much of sheared area is ductile or brittle. The operator can make an estimate and store this with the measurement.

Result code actions can be used to perform a certain action when this specific grading is chosen. Below

is a list of the possible result code actions:

Fail:	The measurement result should always be considered a fail , when the test was performed incorrectly but still should be taken into account for calculating the statistics even if the result is within the fail limits. The corresponding measurement will be highlighted in red color.
Disable:	The measurement result is disabled . The result is still available, but not taken into account when calculating the statistics.
Reject:	The measurement will not be stored (is rejected). If the test is not performed correctly due to an operator error a result code with the result code action reject can be used to not store the result.
Remark:	When a result code with the remark action is selected the operator needs to type in a remark after performing the grading.

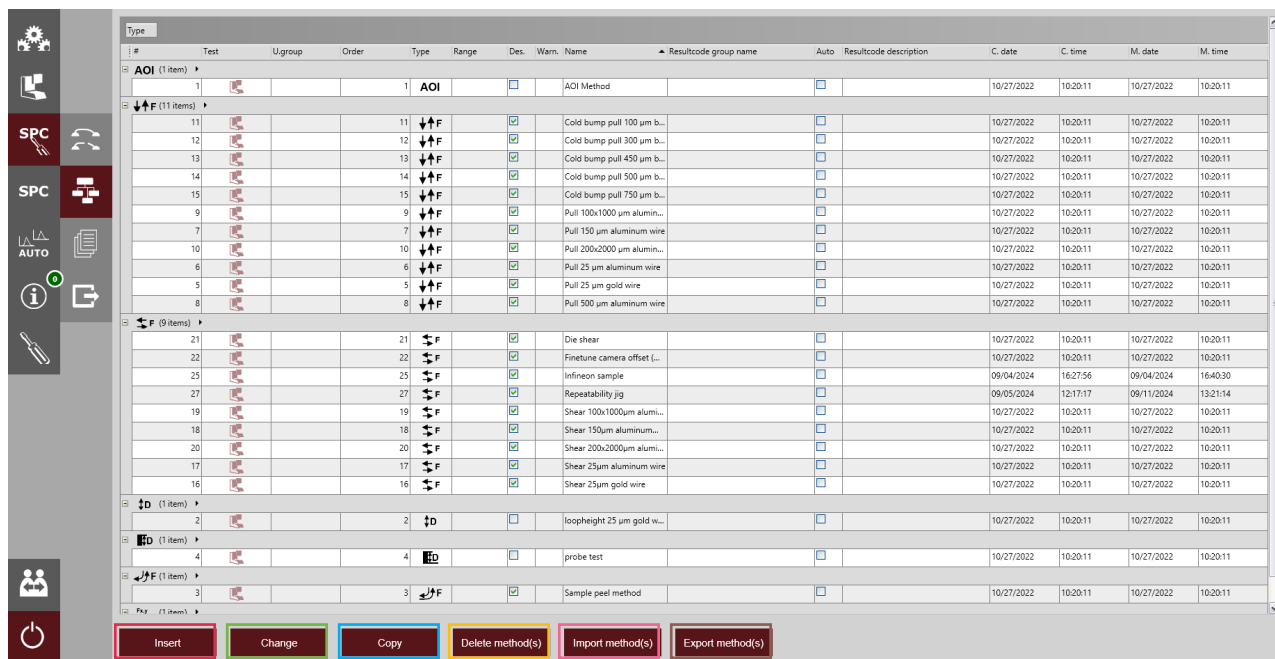
The result code picture can help the operator to select the correct code. By default schematic pictures are used, but photos are also supported. To help the operator make a good choice the picture must clearly show the situation after a test. The operator can then compare the result with the picture and make a good choice.

To add or change a picture just click on the button with the open folder icon. Then select a picture. The picture will be copied to a special folder that contains all result code pictures and the name for the picture is changed to RCOD_XXXXXX_YYYYYY.ZZZ, where XXXXXX is the result code group number, YYYYYY is the result code number and ZZZ is the extension (wmf, jpg gif, png or bmp are supported).

Changing a result code is very easy. Just click on the part that needs to be changed (the name, percentage, action or picture) and change the current setting. All changes are stored immediately. With Insert Resultcode a new code is inserted. Delete Resultcode removes the currently selected code.

6.7 Test methods and method settings

After defining the result code groups and result codes it is time to see how to define or change the **Method settings**. In this chapter the method screen itself and the procedures of how to change the method settings will be explained. To open the methods screen go to **SPC Settings** and then click the **Methods** button. The below picture shows the selections in the main menu.



Type	#	Test	U.group	Order	Type	Range	Des.	Warn.	Name	Resultcode group name	Auto	Resultcode description	C. date	C. time	M. date	M. time
AOI (1 item)	1				AOI				AOI Method				10/27/2022	10:20:11	10/27/2022	10:20:11
F (11 items)	11				F				Cold bump pull 100 µm b...				10/27/2022	10:20:11	10/27/2022	10:20:11
	12				F				Cold bump pull 300 µm b...				10/27/2022	10:20:11	10/27/2022	10:20:11
	13				F				Cold bump pull 450 µm b...				10/27/2022	10:20:11	10/27/2022	10:20:11
	14				F				Cold bump pull 500 µm b...				10/27/2022	10:20:11	10/27/2022	10:20:11
	15				F				Cold bump pull 750 µm b...				10/27/2022	10:20:11	10/27/2022	10:20:11
	9				F				Pull 100x1000 µm alumin...				10/27/2022	10:20:11	10/27/2022	10:20:11
	7				F				Pull 150 µm aluminum wire				10/27/2022	10:20:11	10/27/2022	10:20:11
	10				F				Pull 200x2000 µm alumin...				10/27/2022	10:20:11	10/27/2022	10:20:11
	6				F				Pull 25 µm aluminum wire				10/27/2022	10:20:11	10/27/2022	10:20:11
	5				F				Pull 25 µm gold wire				10/27/2022	10:20:11	10/27/2022	10:20:11
	8				F				Pull 500 µm aluminum wire				10/27/2022	10:20:11	10/27/2022	10:20:11
F (9 items)	21				F				Die shear				10/27/2022	10:20:11	10/27/2022	10:20:11
	22				F				Finetune camera offset (...)				10/27/2022	10:20:11	10/27/2022	10:20:11
	25				F				Infineon sample				09/04/2024	16:27:56	09/04/2024	16:40:30
	27				F				Repeatability jig				09/05/2024	12:17:17	09/11/2024	13:21:14
	19				F				Shear 100x1000µm alumin...				10/27/2022	10:20:11	10/27/2022	10:20:11
	18				F				Shear 150µm aluminum...				10/27/2022	10:20:11	10/27/2022	10:20:11
	20				F				Shear 200x2000µm alumin...				10/27/2022	10:20:11	10/27/2022	10:20:11
	17				F				Shear 25µm aluminum wire				10/27/2022	10:20:11	10/27/2022	10:20:11
	16				F				Shear 25µm gold wire				10/27/2022	10:20:11	10/27/2022	10:20:11
D (1 item)	2				D				Loopheight 25 µm gold w...				10/27/2022	10:20:11	10/27/2022	10:20:11
D (1 item)	4				D				probe test				10/27/2022	10:20:11	10/27/2022	10:20:11
F (1 item)	3				F				Sample peel method				10/27/2022	10:20:11	10/27/2022	10:20:11

Figure 32: SPC settings screen listing the created (and available) test methods

The XYZTEC Sigma software offers a selection of predefined methods by default. With **Insert Method** a new method can be added. **Change Method** will open the method settings screen for the currently selected method. **Copy Method** copies the selected method to a new method and opens the method settings. **Delete Method(s)** will delete the selected method(s). **Import Method** can be used to import these XML files. **Export Method(s)** will export the method settings in one or multiple XML files. The Condor Sigma software supports multiple method types. For example the pull test and the shear test. Each type of method is identified with an icon. Below is an overview of these icons and the kind of test they belong to.

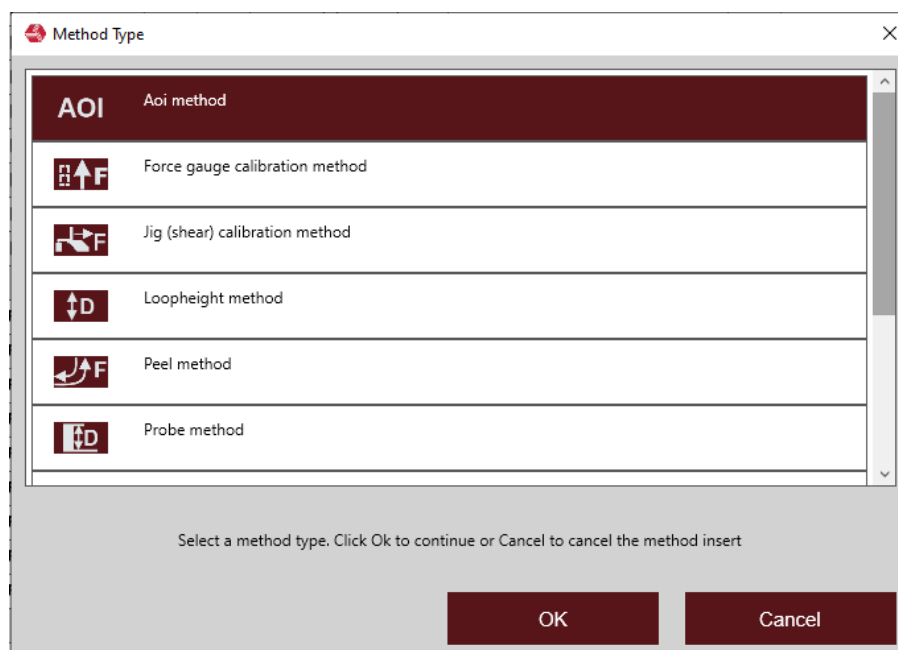


Figure 33: Menu to insert a new method type

	AOI method
	Calibration method
	Jig (shear) calibration method
	Loop height method
	Peel method
	Probe method
	Pull method
	Shear method
	Scratch method
	Weight calibration

If the Insert Method button is clicked the dialog window shown above is opened. Select a method type and then click **OK** to continue or Cancel to cancel creating the method. Each method type shows the icon for the type and a short description. After the **OK** button is clicked a window will open with the settings for this specific method. In the first example the pull method is selected before clicking **OK**.

6.7.1 How to set up a Shear method

Accordingly to the procedure of setting up a pull method, a shear test method will be inserted and edited in the same way.

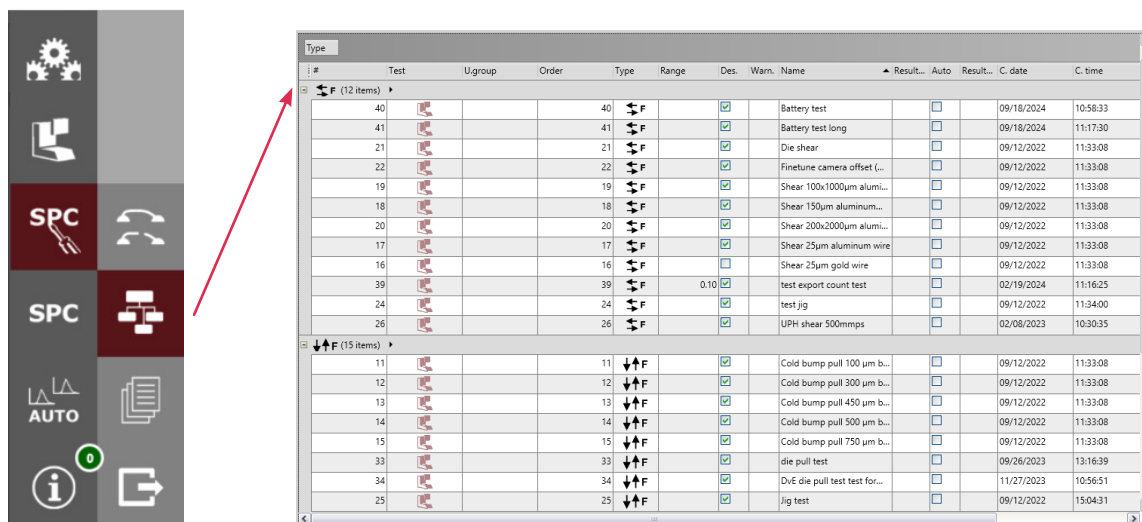


Figure 34: How to set up a new test method

On the left side there is the same vertical menu with the known six icons. The first icon on the left side bar are the General settings , followed by the Method settings  selected by default, the SPC settings , SPC warnings , Measurement graph settings  and last the Grading settings  defining the result codes. Click the icon for the Method settings. The window with the method settings will now show the settings for a shear test.

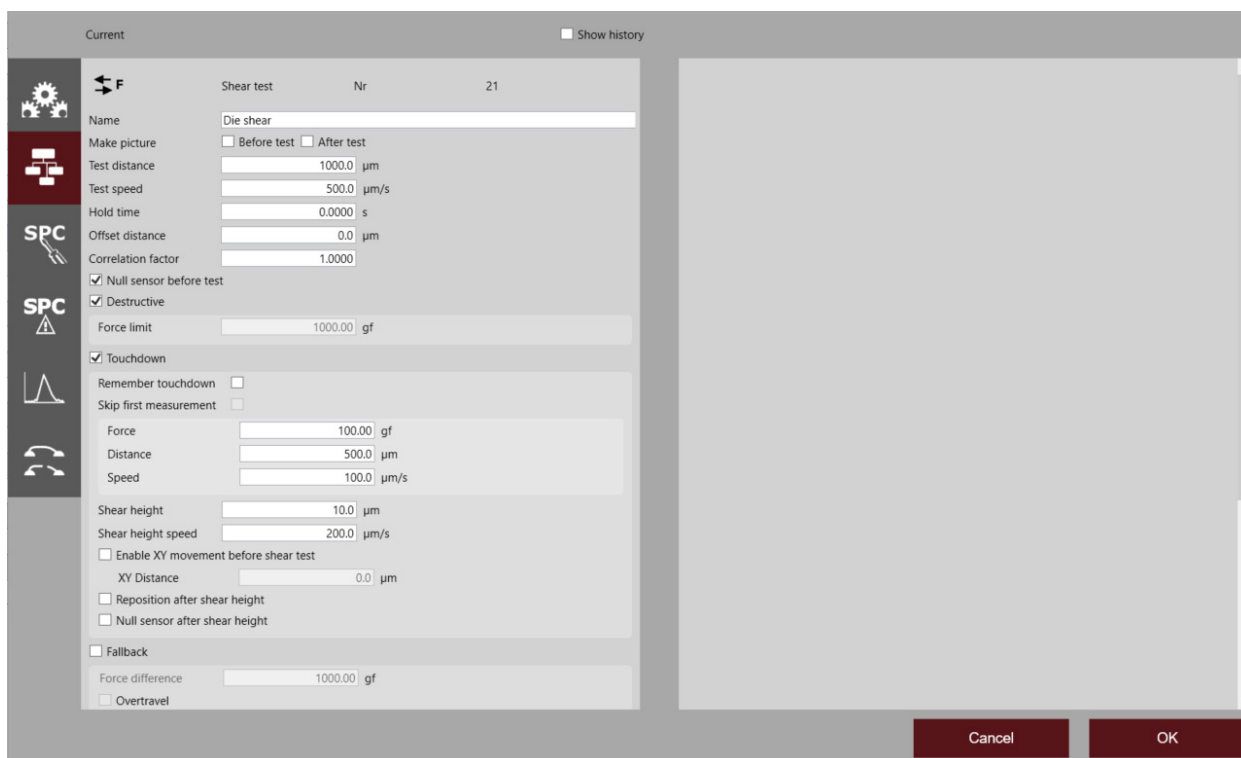


Figure 35: Shear test method settings to define the required parameters

The first line shows the icon for a shear test  and a field to give the shear method a name. As stated before make sure that the name describes the method in such a way that it is easy for the operator to recognize what the method does.

The **Test distance** is the distance that the system will move the Y-stage to perform the test. A positive distance will shear away from the operator, whereas a negative distance start the shear towards the operator. Make sure the test distance is sufficient to shear the component, e.g. the die. For shear sensors with force ranges lower than 10kgf (<10kgf) the shear test can be performed in any direction. The shear direction then is depending on the angle, in which the shear chisel is positioned and where the flat side, the side where we shear with, faces to.

Test speed sets the speed during the test. The best test speed is determined by the required units per hour and the required accuracy. A good starting point is always 250 $\mu\text{m/s}$ as this speed also was found to work best for all applications regardless of wire thickness and tool size.

Hold time can be used to wait after the test or to simulate creep behavior, thus this setting can be used in two cases.

- Case 1: If the operator needs more time to check the grading the hold time can help.
- Case 2: During a non-destructive test the pre-set force limit will be applied for the pre-set hold time, hence creep behavior.

Null sensor before test is checked by default. The sensor is automatically nulled before a test. In some very rare cases this setting needs to be disabled. For example when a preload is already applied to the sensor when the test is started, but this preload still needs to be part of the measurement.

Most shear tests are **destructive test** by default. The goal of the test is to break the bonded component apart from the substrate beneath, no matter whether the component was glued, sintered or bonded either by solder balls or Au studs. To perform a destructive test the box in front of **Destructive** must be checked. To perform a non-destructive test the box must be unchecked. When Destructive is unchecked the Force limit must be set. This should be the force the tested part should be able to withstand during the test.



Figure 36: Software setting for non-destructive testing with force limit (destructive testing is unchecked and therefore disabled)

The **Fallback** in the XYZTEC Sigma software can be used to optimize the number of tests per hour. In a lot of cases the customer is interested in the force graph until the peak has been reached and a small distance after the peak. The rest of the graph does not add real value. Since less distance is moved the total test time is shorter and when many tests are performed this setting will increase the number of tests per hour. If this is important the Fallback should be checked.

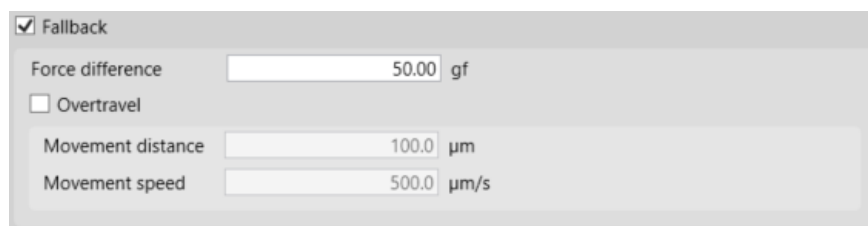


Figure 37: Software setting for testing with Fallback (Fallback is checked and therefore enabled)

If fallback is enabled a **Force difference** needs to be set. When the force drops more than the force difference defined in method settings the software will stop the test. Check **Overtravel** to enable the overtra-

vel feature to clear the region of interest. This makes it possible to move further in the test direction for the **Movement distance** with the defined **Movement speed**. In most cases the movement distance is relatively short and is set to clear the region of interest to classify the grading and validate the intermetallic connection (IMC) or phase. This setting can sometimes help to remove the pulled wire from the hook. It also adds additional data to the measurement graph.

By default **Return to start position** is checked. After the test has finished the stages will move back to the start position. In most cases this is exactly what is needed. In some cases, however, we may not want to move back. Uncheck the box in those cases. If the box is checked the **Movement speed** for the move to the start position can be set. If the box in front of **Include in graph** is checked the movement to the start position is also recorded as part of the force graph. By default this option is not checked and the move back is not part of the graph.

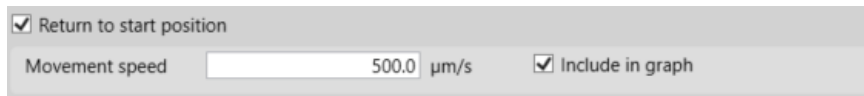


Figure 38: Software setting to return to start position after the test is performed

6.7.2 Test method history

When a method has been stored and is opened again for further editing you can see the history of the method settings on the right side. This way the software keeps track of the changes in the method. The upper right side shows all the history for the current method. If you change any settings and click the **OK** button, these settings are stored as the current method settings and the latest history and the previous settings can be found under the previous history. This list shows a history number, the modification date and the modification time. When a test is performed a reference is stored to the latest history.

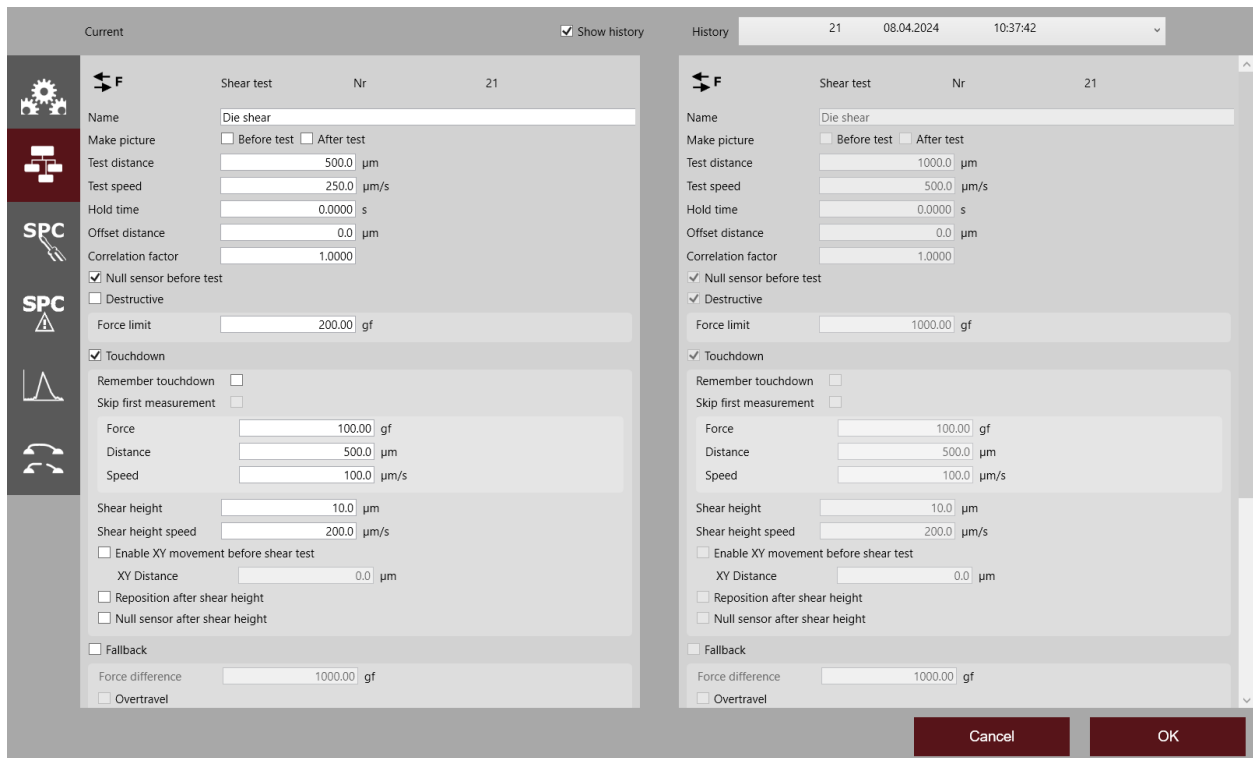


Figure 39: Test method history for shear method „Die shear“

The advantage of this system is that it is always possible to see the exact settings that have been used for a specific test. Especially when a test method has just been created the method settings may be changed a few times, before the setting is correct. The history makes sure it is still possible to track the changes and even see if specific settings give better results.

6.7.3 SPC result settings

The third menu choice in the vertical menu are the SPC result settings.

Current ☐ Show history

☐ Fixed sample size

Sample size

☐ Enable enhanced close sample options for OCAP

Passed measurements

Result type ☐ Filter

Statistical calculations

USL [gf] LSL [gf] # times

Graphs

Max [gf] UCL [gf] TA [gf] LCL [gf] Min [gf]

Cancel OK

Figure 40: SPC result setting to define tolerances and limits

Every test method can have one or multiple results. For the standard pull and shear test currently only the **Peak force** is offered as the result. Depending on the settings for measuring tensile strength, loopheight and the additional measurement results more settings may be available. The Result type shows the current type of result. This type cannot be changed.

The **Spec limits** are used for the calculation of the C_{pk} . It is important to set a correct **lower (LSL)** and **upper spec limit (USL)** to get a valid C_{pk} value. When set to +/- Infinity the value is not used and the C_{pk} is not calculated.

The **# of times sigma** setting is by default set to 3. The control limits in this case are the average minus 3*sigma and the average plus 3*sigma. If **# of times sigma** is set to 4 the calculation becomes the average plus or minus 4*sigma.

The graphs settings are available for the **maximum (Max)**, **upper control limit (UCL)**, **target average (TA)**, **lower control limit (LCL)** and **minimum (Min)**.

The information on the right side of the SPC result settings also explains all these settings and show the graph settings in action. In most cases the method is created first and a few tests are performed. The results are used to optimize the SPC result settings. When a lot of experience is available for specific tests, the settings can be done immediately. If these settings are adjusted the test screen or the graphs will immediately reflect the changes.

6.7.4 SPC warnings

Warning	Parameter	Value	Operator	Threshold	Action
Warning 1	Peak force		<	1.00 [gf]	Consider fail
Warning 2	Peak force		<	1.50 [gf]	Consider warning
Warning 3	Peak force		>	8.00 [gf]	Force measurement remark
Warning 4	Peak force		<	0.50 [gf]	Unlock by engineer
Warning 5	Peak force		<	0.00 [gf]	Reject measurement

Context menu for Warning 5:

- Consider fail
- Consider warning
- Force measurement remark
- Unlock by engineer
- Reject measurement

Buttons: Add, Delete, Cancel, OK

Figure 41: SPC warnings and intervention limits

The lower fail limit and the upper fail limit can be edited under the SPC warnings. Under SPC warnings a new warning can be added by clicking the **Add** button. Give the warning a meaningful name (like lower fail limit or fail for the fail limit). Select the test result. Any available test result can be chosen. Select if the force is smaller (<), or smaller or equal (<=), or larger (>) or larger or equal (>=). After this set the quantity to compare the test result with. In this case the measured peak force is compared with 55 gf and if this peak force is smaller than 55 gf the action **Consider fail** is performed. When a measurement result is a failed result the software will show this with a red background. Also in the statistics the number of failed measurements is shown.

The action **Consider warning** only shows an orange background. This is not shown in the statistics. The action **Force measurement remark** forces the operator to enter a measurement remark, to explain why the measurement is below or above the pre-set value. The option **Unlock by engineer** will show the login screen. Only an engineer can unlock the software now. It is also possible to reject a previous measurement after it was done by choosing **Reject measurement**. Treat this action always with caution as this measurement will not show up for the statistics, hence will be missing in the report. That can cause confusing.

6.7.5 Measurement graph settings

In the method there are also some settings for the measurement graph that can also influence the measurement result. It is possible to set an area of interest for the measurement graph. This area of interest can also have an influence on the measurement result. It is also shown in the measurement graph.

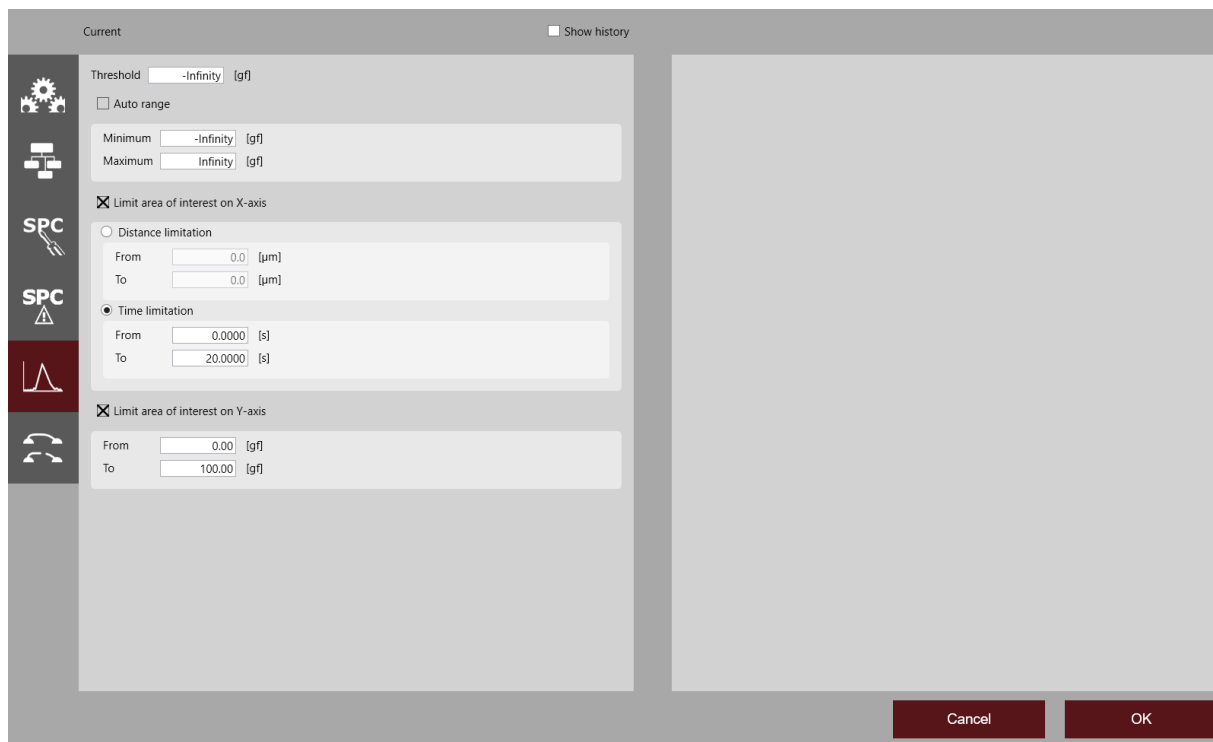


Figure 42: Measurement graph settings

Check **Limit area of interest on X-axis** to set an area of interest for the X axis. Select **Distance limitation** or **Time limitation**. For the distance enter a **From distance** and a **To distance**. For the time enter a **From time** and a **To time**. Check **Limit area of interest on Y-axis** to set an area of interest for the Y axis. Set a **From value** and **To value** for the force. In the measurement graph this would look as below picture shows:



Figure 43: Measurement graph with area of interest

6.7.6 Result codes and result code groups

The last menu choice in the vertical menu is used to choose the result code group and set a default result code.

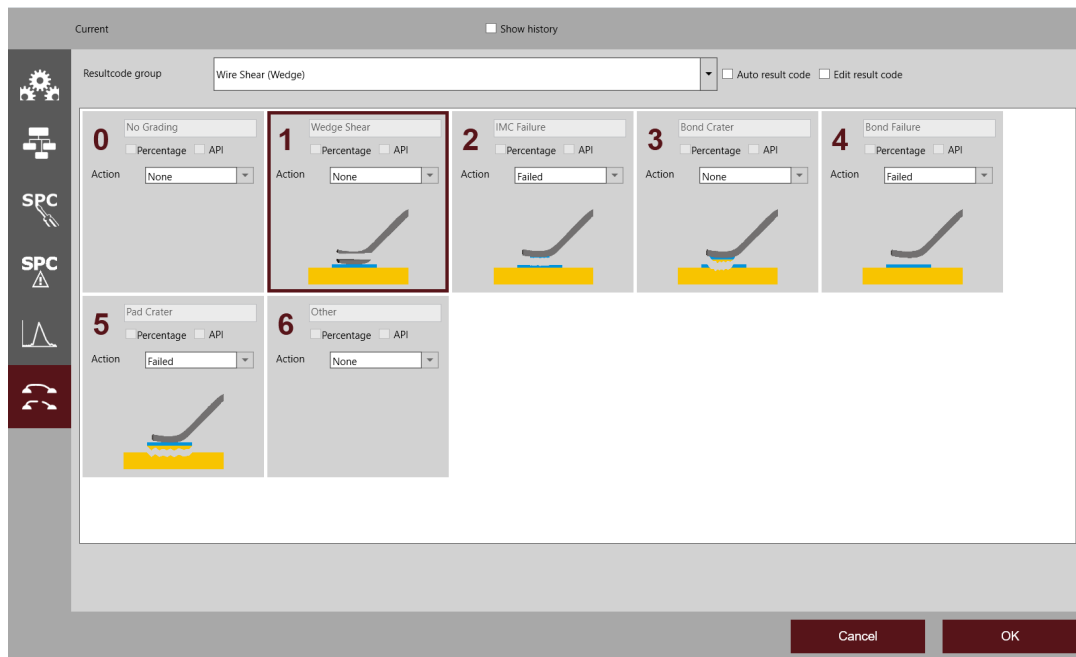


Figure 44: Software screen to select a resultcode

By default the Result code group is set to **<none>**. In this case grading is disabled and after a test a grading or failure mode can not be set. If a result code group is selected grading will become available. A drop-down menu shows all the result codes available.

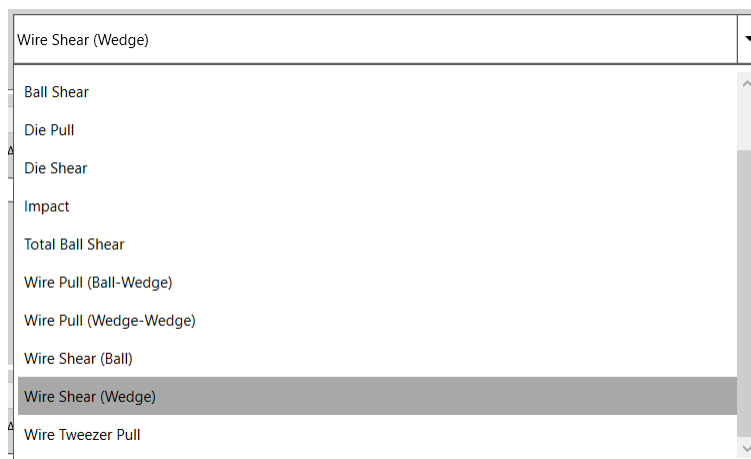


Figure 45: Result code options

The result code group list will show all available result code groups. It is important to define the resultcode group before trying to use this in a method. If a resultcode group is selected the option **Auto result code** can be checked. It is possible to change a resultcode by checking **Edit resultcodes**. After checking this option the resultcodes can be edited.

If **Auto result code** is checked and a result code is selected (tile with a dark red boundary) the XYZTEC Sigma software will automatically use this result code if the measurement is not considered a fail (see the SPC warnings). In the case demonstrated above the software will assume the **Wedge Shear** as the

default result code. It is still possible to change this afterwards by regrading the measurement.

6.8 Forms and fields



In the past when bond testers were not controlled by PC software the information for the current sample/measurement was written on a card or form. An engineer created this form and printed it. The operator fills out the important data. For different parts or different tests different forms may be required.

This concept is also used in the XYZTEC Sigma software. The engineer can create a form and create fields. These fields can be used on the form. When a new sample is created this form is opened and the operator needs to fill in the required data. This data is stored with the sample and can be used for statistical analysis and look ups. The fields on the form will also be available as columns in the test and the query screen.

Line	Field Nr	Filter	Field name
1	1	☐	Product
2	2	☐	Badge#
3	3	☐	Production line
4	4	☐	Product ID
5	5	☐	Product group

Figure 46: Form „Sigma machine demo“ with fields

The upper left side of this screen shows a selection for the form. By default no forms are available. To create a new form click the **Insert Form** button. To copy an available form click the **Copy Form** button. To delete the selected form click the **Delete Form** button.

The area below the form selection shows the contents of the form. Each form has a **Form name** and a **Form description**. Every form also offers the setting **Limit samples** to limit the number of samples in the tests screen. If **Limit samples** is checked the Nr of Samples can be set. **Auto print** will automatically print a pdf file when this number of samples has been created.

Figure 47: Settings to edit a form

These pdf files are stored in the C:\Users\Public\Documents\XYZTEC\CondorSigma\AutoPrint directory. The Method selection can be used to select a default method when a form is selected. Below this an empty area is available to add the required fields.

The right side of the screen shows the available fields. By default no fields are available. To create a field just click the **Insert Field** button. To delete the selected field click the **Delete Field** button. The available fields are shown as tiles with all the required data directly available for editing. The first important part of the field is the **Field name**. Use a clear field name so other engineers also understand what the field is used for. The **Control** shows the kind of control that is used on the form. The XYZTEC Sigma software offers multiple types of controls.

	Operator can select available items and add new items
	Operator can only select available items
	Operator can only select available items. Items show a picture to facilitate choosing the correct one
	Operator can only add new items. The added item must have a complete new and different name
	Operator can type in the item. The item name can already exist
	Operator can select a date from a calendar control.

The **Manage** button opens a new screen where the engineer can add or delete field items. Select only items can be added this way.

The **Input mask** can be used to ensure a predefined format when a new field item is entered. Especially numerical data, date or time needs to be formatted, to make sure that the input is always the same. Using the calendar control also ensures the correct format for a date. To support the engineer with creating a mask a button is available after the mask. Click the button to open the dialog window below.

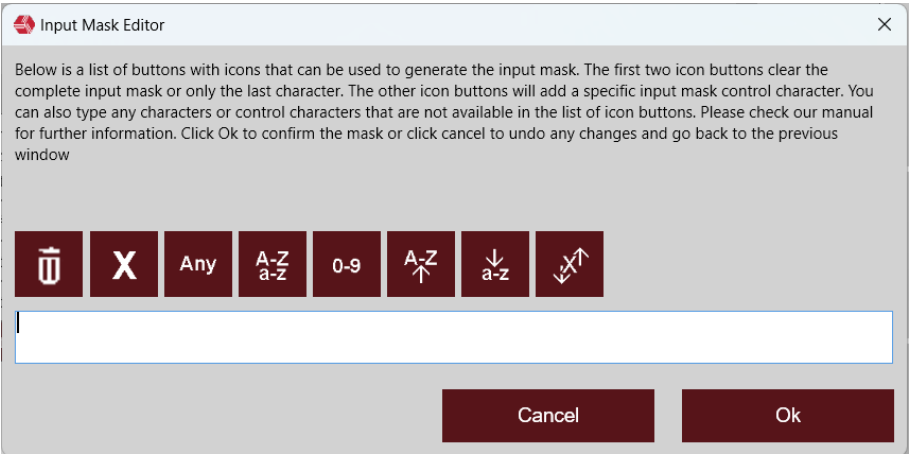


Figure 48: Input mask editor

The input mask editor offers multiple buttons that can help the engineer to create an input mask. Below is a list of all the buttons and their function.



Clears the complete mask.



Clears the last character of the mask.



The character C is added to the mask, an input of the character is needed. This can be any character.



The character L is added to the mask. Input of a letter A to Z or a to z is required.



The character 0 is added to the mask. Input of any number 0-9 is required.



The character > is added to the mask. All characters after this character will be converted to upper case.



The character < is added to the mask. All characters after this character will be converted to lower case.



The character | is added to the mask. The lower case or upper case function is disabled from this character.

A few examples of a mask:

0000 Input of four numbers (0-9) required. For example 1103 is okay.

0000_LL Input can be 1234_aa or 1234_AA.

0000_>LL	Input can now only be 1234_AA. If 1234_aa is typed it is converted to 1234_AA.
00:00	Input for time. Input can be 13:30 or 05:59.
00/00/00	Input for data. Input can be 05/01/12.

The mask checks if the input confirms to the mask but does not check if the input is a valid time or date. XYZTEC advises to use the calendar control for more control. When the mask is created click the **OK** button to confirm or Cancel to exit without saving.

6.8.1 Adding and or deleting items

Click the **Manage** button for a specific field to add new items or delete available items. This is especially important if the control has been set to a select only list. When a new sample is created the user cannot select any values if these are not already available.

The Manage field items window is opened. On the right side the current field is shown. It is no problem to change the field parameters. The upper left part shows the part where the item can be changed. The lower left part shows all available items. The **Insert** button inserts a new item to the list. The **Delete** button removes the selected item.

Be careful not to delete items that have been used to create a sample. In that case the link to the item will be lost and it may become more difficult to find this sample. The sample will however still be available.

To add a new item click **Insert** and type in the name for the item in the area on the upper left corner. If a mask is used it is possible that certain characters cannot be used for input. If the control with pictures is used it is also possible to select a picture for each item.

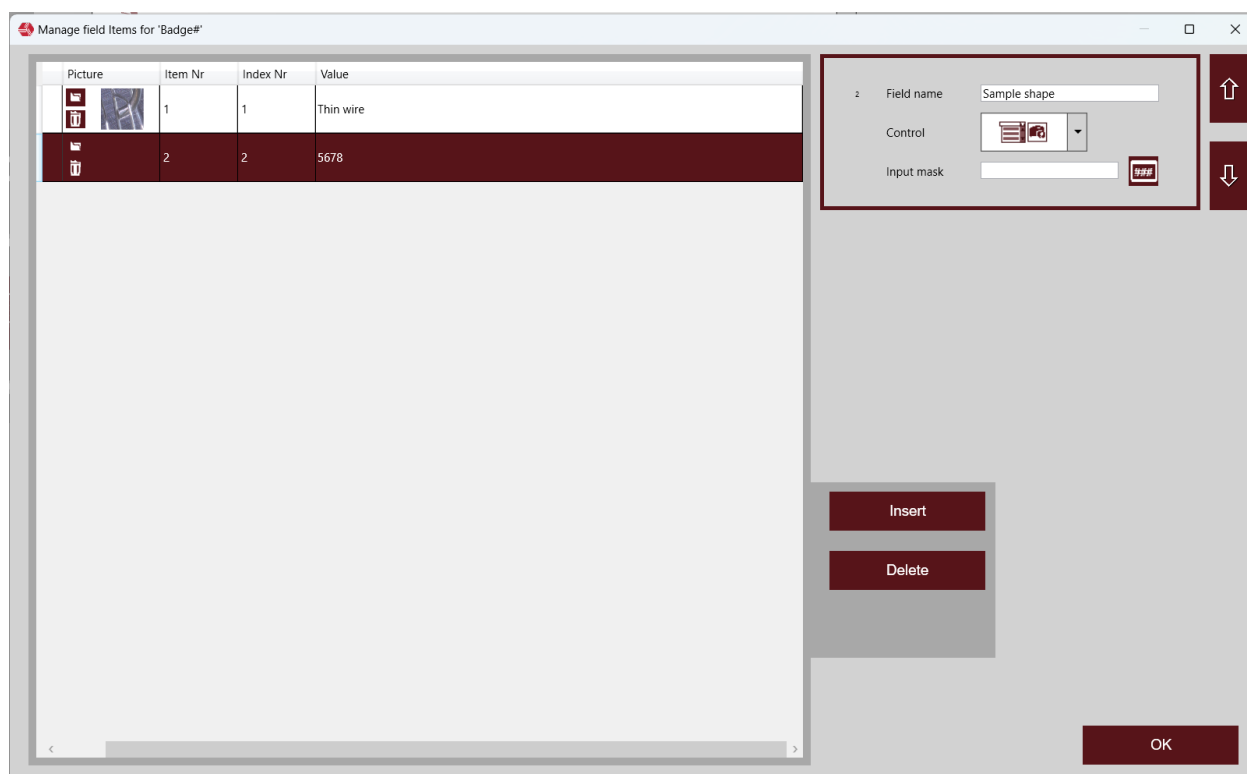


Figure 49: Form editor to manage field item with pictures

It is not necessary to go back to the Forms screen to manage the items for a different field. The scroll bar on the upper right corner can be used to change the field to a different field. After this new items can be added for this field.

6.8.2 Adding and or removing field from form

Back in the forms screen the available fields can be added to the form with drag and drop or by clicking the **arrows** between the form area and the fields area. For drag and drop click with the left mouse button on a field and hold the mouse button while the mouse cursor is moved over the white form area. The mouse cursor will change and the left mouse button can be released to drop the field on the form.

Form: 1 Sigma machine demo

All available fields.

Form name: Sigma machine demo

Form description:

☐ Limit samples Nr samples: ☐ Auto print

Line	Field Nr	Filter	Field name
1	1	☐	Product
2	2	☐	Badge#
3	3	☐	Production line
4	4	☐	Product ID
5	5	☐	Product group

Preview Parser

Field area details:

- Field name: Product
Control: [ab] Manage
Input mask: [###]
- Field name: Badge#
Control: [ab] Manage
Input mask: [###]
- Field name: Production line
Control: [ab] Manage
Input mask: [###]
- Field name: Product ID
Control: [ab] * Manage
Input mask: [###]
- Field name: Product group
Control: [ab] Manage
Input mask: [###]

Figure 50: Arrows between form area and (left side) field area (right side)

To use the arrow buttons between the form area and the field area just select a field. Then click the upper arrow that points from the fields area to the form area. To remove a field from the form just select this field on the form and click the lower arrow that points from the form area to the fields area. A form can hold up to 4,294,967,296 fields and the same number of forms is supported.

6.8.3 Previewing a form

When the form is finished and all required fields are on the form the **Preview** button can be used to test the form. A window will open with the form preview. For each field the field name is shown and the control. For the Product and the Lot Nr the operator will need to select a value from the list. By default a value is already selected.

1 Product

2 Sample shape 1234

3 Production line

4 Product ID

5 Product group

Integrated scanner I.Scanner Control External scanner Cancel OK

Figure 51: Preview of the created form

6.9 Automatic SPC Export settings

Export type	Export description	Enabled	Mode	Settings	Format
File export	File export	☐	Sample closed	Edit	Edit
File export	File export	☐	Sample closed	Edit	Edit
File export	File export	☐	Sample closed	Edit	Edit

SPC SPC AUTO

SPC Export

Insert Delete Run

Figure 52: Software screen to manage automatic SPC file export

After defining the test methods and maybe also one or multiple forms the next step can be to define an automatic SPC export. The XYZTEC Sigma software offers a specially developed SPC export formatter that can be used to format the data in the system to any required format. The formatter also allows basic calculations. This formatted data can be stored in a specific file, send to a COM port or in the future send to other interfaces. Although the formatter does require some basic knowledge of programming the inter-

face is still easy enough to learn and setup your own export.

The software supports multiple exports that can be enabled when needed. Click the checkbox in the **Enabled** column to enable an automatic export.

Export type	Export description	Enabled	Mode	Settings	Format
File export	File export	☒	Sample closed	Edit	Edit
File export	File export	☐	Sample closed	Edit	Edit
File export	File export	☐	Sample closed	Edit	Edit

Figure 53: File export editor with **Enabled** checked

Data can be exported when the sample is closed or when a measurement is made. In most cases (especially when measurements need to be graded) it is most practical to export when a sample is closed.

Click below **Mode** on the selection box and choose **Sample closed** or **Measurement based**, depending on your needs.

Click the **Insert** button to create a new export. Click the **Delete** button to remove an export. Click the **Run** button to test the export on the latest sample and measurements. To change the export settings click the **Edit** button in the **Settings** column. To change the format click the **Edit** button in the **Format** column. In the example above a file export is created by clicking Insert. Click the **Edit** button in the **Settings** column to view the export settings. Depending on the type of export different settings may be available. For file export it is important to set a base directory for the export.

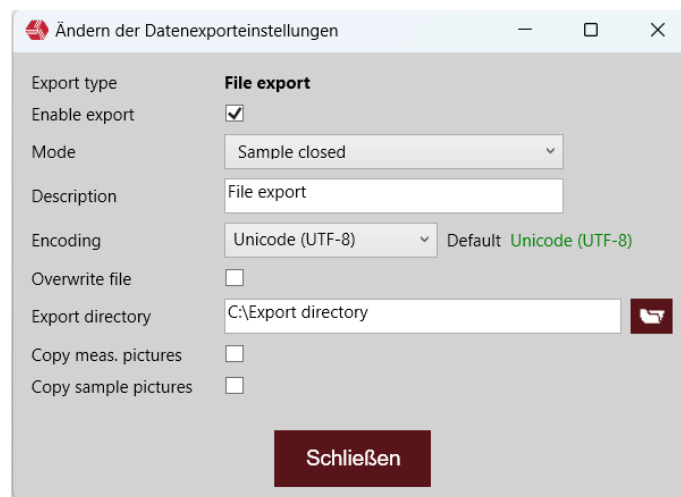


Figure 54: Change of file export settings

For file export the export can be enabled or disabled, the mode can be changed. When the data is exported and the export file already exists the software can add the new data to the file or overwrite the current file with a new file. If Renew file is enabled the file is overwritten with the new data. If this option is disabled the data is added. The Description shows a clear name for the export. To set the Export directory click the  button and select or even create the directory for the export. In the example above all the exported data is stored in the C:\Export directory. The automatic software can also store data on a network drive. To change or set the actual format click the Edit button in the Format column. A window is

opened that shows the export format.

Figure 55: SPC export formatter

The export formatter offers an area to set the file name, an area to set the header, an area to set the data definition, an area for the export data and a footer at the end of the file/export. Make sure to enable this checkbox to export to a file. When the file name is enabled the **Add before**, **Add after** and **Delete** buttons become enabled and can be used to add items to the file name area. Click the **Add after** button to open a new Window showing all available text items and predefined tokens.

Figure 56: Text items and predefined tokens to edit the file export

Text items can be separators like a comma, semi colon, end of line etc. Custom items can also be created. The predefined tokens contain all available data. For example the token `Sample_Nr` contains the sample number. In this example click the `Sample_Nr` token. The token is added to the file name area.



Figure 57: Sample Nr token added to file export

Now by default the data has sample number 1 the file name would be 1. For sample number 15 the file name would be 15. When you exporting the data and looking in the export directory the sorting of the file name would look like 1,10,11,2,3 etc. It is better manageable to get something like 00001, 00002, 00003 ... 00010 etc. To change how the sample number should be formatted during export double click on the token. A window with the tokens settings is opened.

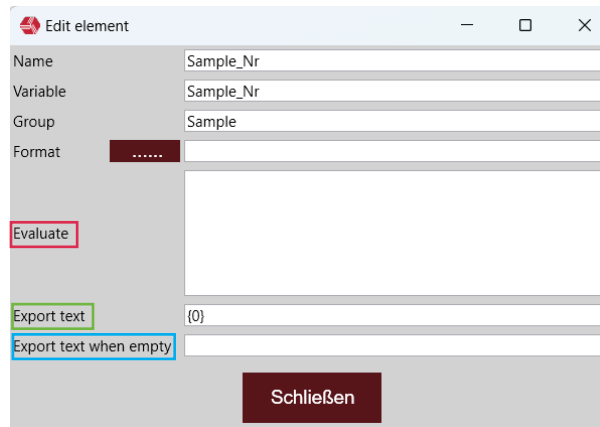


Figure 58: Edit element to modify the token

The **Name**, **Variable** and **Group** are preset and cannot be changed. To change the format click the button. A special format builder window is opened that can help to format the value correctly.

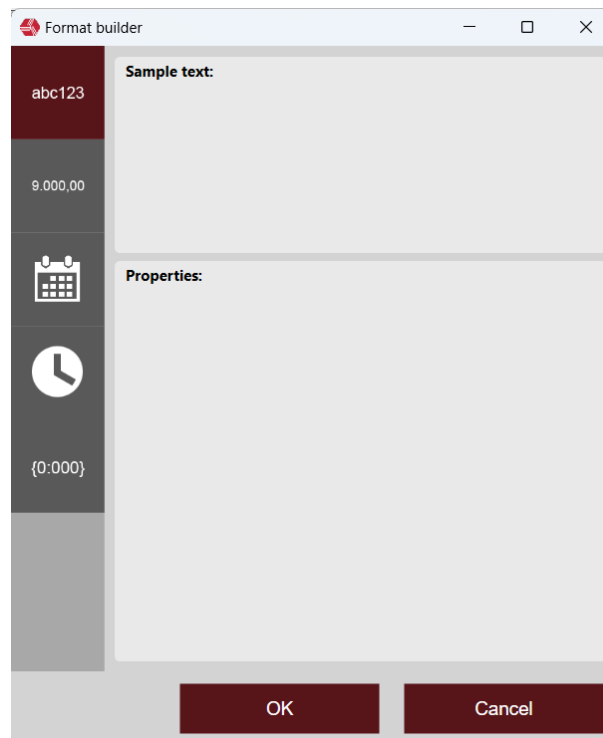


Figure 59: Format builder to edit the value output

On the left side a menu bar offers multiple format options. The default for a text value is no format at all. The text AaBbCc1234 would be exported as AaBbCc1234. Only in rare cases a text value should be

formatted.

The **abc123** choice will not perform any formatting. The **9.000,00** choice offers settings for numerical formatting. The  choice offers settings for formatting a date. The  choice offers settings for formatting a time. The **{0:000}** choice offers settings for some custom formatting.

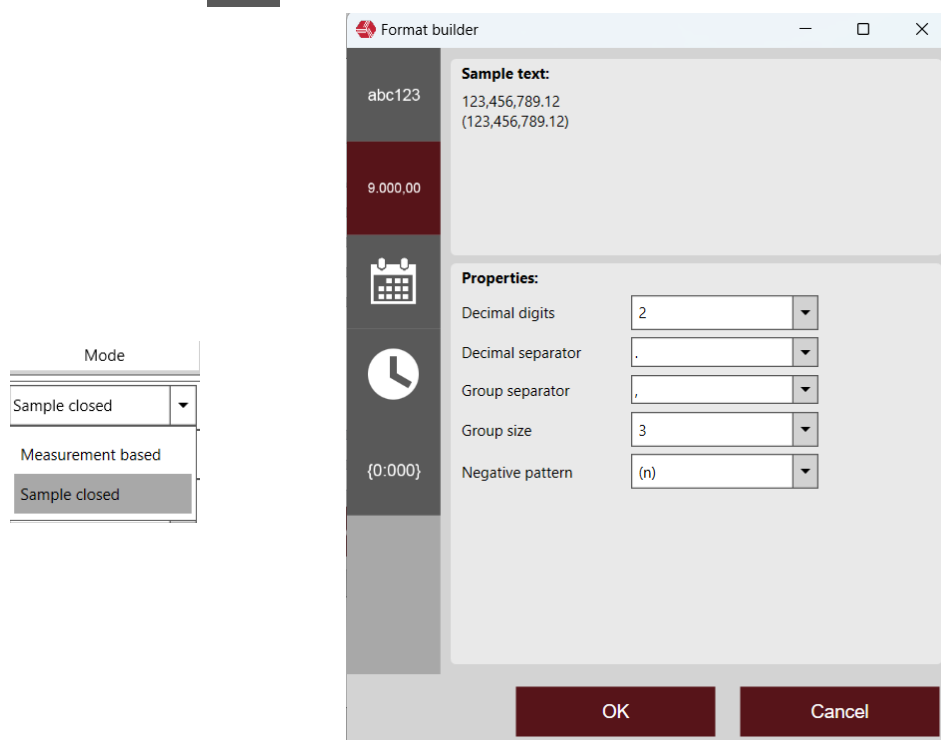


Figure 60: Format builder to edit numerical outputs

The formatting options for a numerical format are:

Decimal digits	Number of decimal digits. If set to 2 digits a value like 2124.3456 is exported as 2124.34.
Decimal separator	The decimal separator used. This can be a point (.) or a comma (,). With a comma the value 2124.3456 is exported as 2124,3456.
Group separator	The separator for numeric grouping. In some countries a separator is used for all thousands. The numeric value 123456.456 becomes 123,345.456 if the grouping separator is set to a comma. To not use any grouping make sure to select the empty separator. Grouping helps to make large numbers more readable.
Group size	By default grouping is often done with every thousand (group size 3). This can also be set to every hundred. The value 123456.456 becomes 12,34,56.456.
Negative pattern	Negative numbers can be displayed like: (1) => setting (n) for the value -1, -1 => setting -n for the value -1, - 1 => setting - n for the value -1, 1- => setting n- for the value -1 1 - => setting n - for the value -1

With these settings most numerical values can be formatted as required.

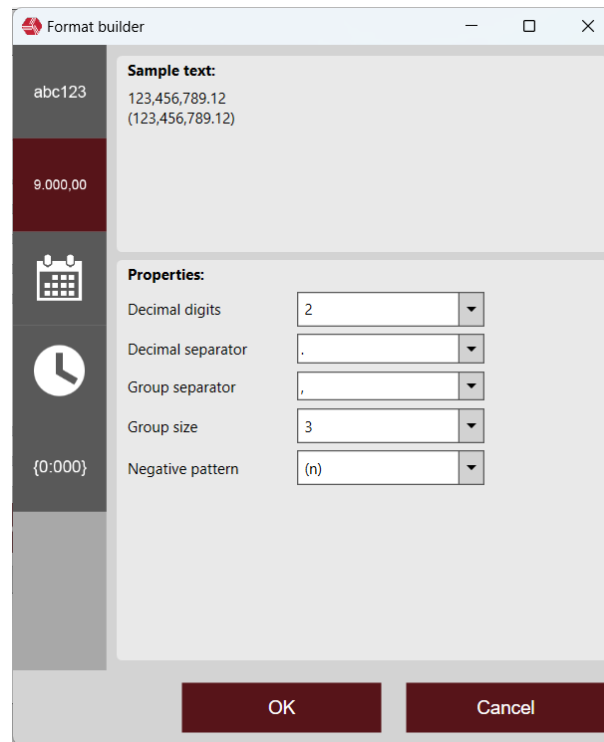


Figure 61: Format builder to edit date outputs

For formatting a date the following options are available:

<code>{0:M/d/yyyy}</code>	The 6th September 2016 becomes 9/6/2016
<code>{0:MM/dd/yyyy}</code>	The 6th September 2016 becomes 09/06/2016
<code>{0:MM/dd/yy}</code>	The 6th September 2016 becomes 09/06/16

In general M is the month number. MM would show month number 1 as 01. The d is the day of the month, day 1 would show as 1, dd would show day 1 as 01. The yyyy shows the full year number. The yy shows only the last two digits. For the separation of the month, day and year and the order (month, day year or day, month, year for example) multiple options are available. Choose the best fit for the date. It is also no problem to generate your own date format, e.g. something like `{0:yyyyMMdd}` would give you 20160906 for the 6th September 2016. You can also use the format to get the year, month or date separately. For example `{0:Y}` would export 2016 only for the 6th September 2016.

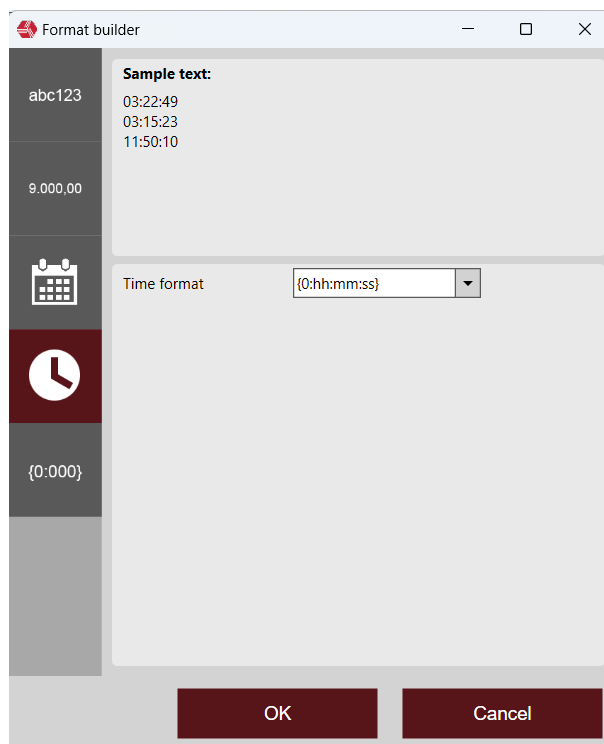


Figure 62: Format builder to edit time outputs

For the time h shows the hour. One h shows 1 o'clock like 1:00:00. The hh would show 1 o'clock as 01:00. This is the time based on a 12 hours scale. HH would show the time based on a 24 hours scale. The m stands for the minutes. A mm would show 1 as 01. The s stands for the seconds. The ss shows 01 for one second. The separator by default is a double colon. The XYZTEC Sigma software also offer the underscore. You can also use the format to get the hour, the minutes or the seconds for a specific time. For example {0:H} would export 14 for the time 14:09:45.

Besides that, custom formats ({0:000} button) are also supported within the software. For example to format a number to 000100 (trailing zero's, 6 digits). The list of custom formats may also grow in future software versions. Currently the software offers trailing zero's with 3 digits, trailing zero's with 6 digits, trailing zero's with 10 digits and trailing zero's with 19 digits. We will choose the latest one for the sample number.

If a predefined format is not available it is possible to generate your own format.

The **Evaluate** can be used to perform calculations, this will be shown this later in this chapter.

The **Export text** shows how the formatted value is exported. By default the value is exported with the specified format. The label {0} is replaced with the formatted value. In this example we will export the sample number trailed with SAM and we also add the file extension .scv. The sample with number 19 is now exported as SAM00000000000000000019.csv. This would be a useful file name when each sample is exported separately.

The **Export text when empty** would be the text exported when the value is empty. A sample number will always be available. More specific data may not always be available. After this our token for the sample number looks like figure 86.

Figure 63: Edit element with formatted sample number in the file name

We now have defined a file name. Next we will add some data for the export.

Figure 64: SPC export formatter: Sample Nr is used for file name

Make sure that **Enable data** is checked and click **Add after**. Select **Meas_SeqNr** from the predefined tokens and click **Add after**. Select the predefined text item called Comma and click **Add after**. Select **Meas_ResultcodeNr** for the number of the selected grading and click **Add after**. Select the predefined text item called Comma and click **Add after**. Select **Result_ForcePeakValue** for the peak force measurement and click **Add after**. Select the predefined text item called **CR\LF**. This is actually a carriage return followed by a line feed, this is the end of a line in the export.

Now double click on *Result_ForcePeakValue*, choose a correct format for the force and also perform a calculation. For the format choose the settings in the format builder as shown in the following figure.

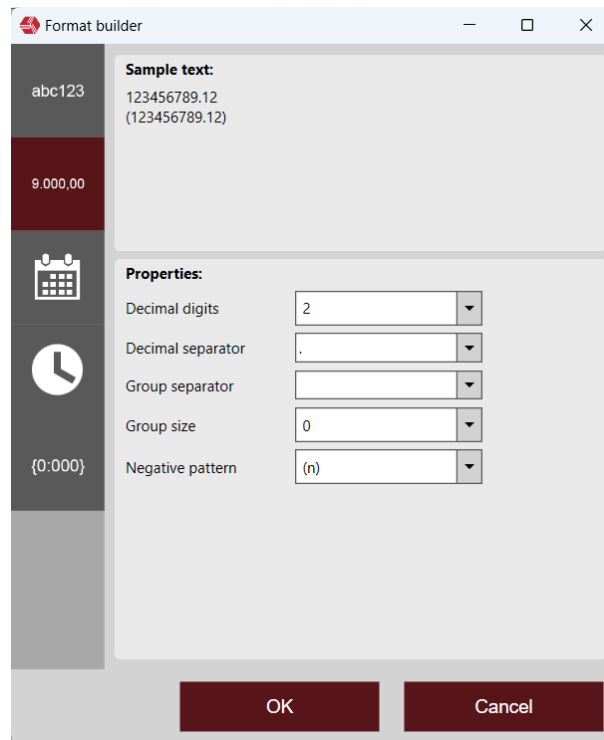


Figure 65: Format for the peak force

The format is set to 2 decimals, a point as separator and no grouping. Negative numbers are exported with a trailing minus. For the Evaluate we will enter **101.97*Data["Result_ForcePeakValue"]**. The Data["Result_ForcePeakValue"] is actually the peak force. This force is in Newton. If we multiply with 101.97 we have calculated from N to gf. The factor 101.97 is not the most accurate, but sufficient for this export.

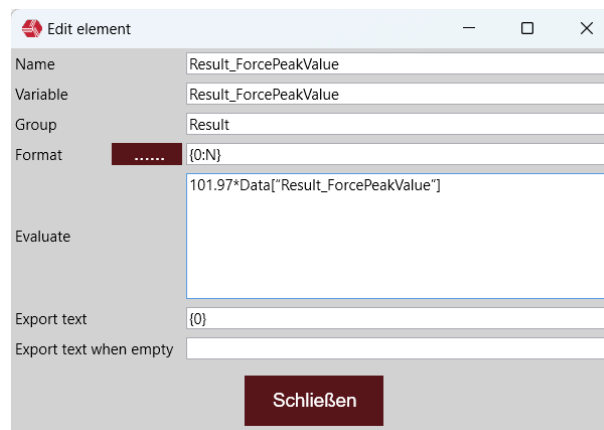


Figure 66: Format settings for the peak force

Be careful when performing evaluations. A typing error will generate problems with the export. We now have a very basic export that exports all the measurements in a sample and shows the sequence number, a comma, the grading, a comma, the peak force and a end of line. The complete export looks like below:

☒ Enable file name

Sample_Nr	Meas_SeqNr	Comma	Meas_ResultcodeN	Comma	Result_ForcePeakV	CRLF
0	0	,	0	,		\n

Add before Add after Delete

☐ Enable header ☐ Header in column

Add before Add after Delete

☐ Enable definition

Add before Add after Delete

☒ Enable data

Sample_Nr
0

Add before Add after Delete

☐ Enable footer ☐ Footer in column

Add before Add after Delete

Import format Export format Test format

Schließen

Figure 67: SPC export formatter: Export settings as described above

Click **Test format** to see a small example of how this can look. Click **Export format** to export the defined format to a xml file. Click **Import format** to import from an existing format file. Click **Schließen** (Close) to go back to the export definition.

6.10 Test screen: Test results on one sight

After setting up all SPC Settings the first tests can be performed. Under SPC the first option in the sub-menu is the Test screen.

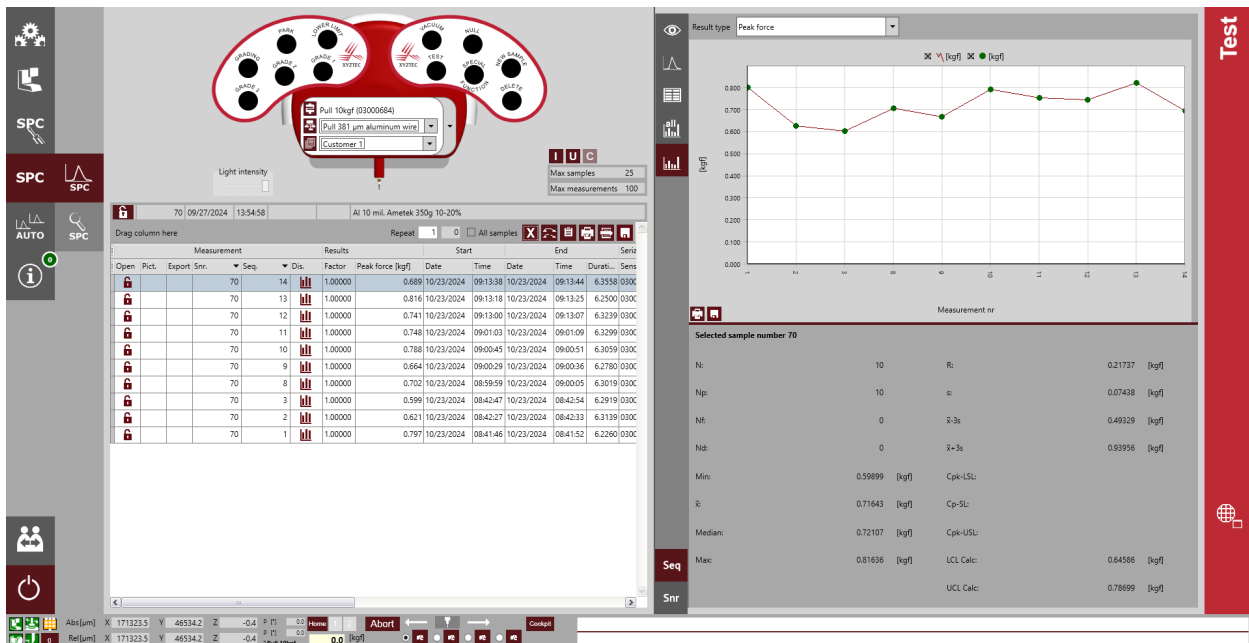


Figure 68: Sigma test screen showing the test results

The upper left side of the test screen shows the measurement unit, surrounded by the control panels with buttons for the left and right joystick. The buttons on the control panels can be used to trigger the same function as the real joystick buttons. The selection box on the measurement unit can be used to select a different sensor, a different method or a different form if the user is authorized to do so.

To change the method settings the  button (method settings) can be used. The methods settings Window from the previous methods chapter is opened and the changes for the method can be set. However, it is not possible to change the force range or the form selection here.

To change the form settings the  button can be used. The forms window will be opened. In the forms window the form selection is disabled.

The area in the lower left corner shows the available measurements. When no measurements are available the right side of the screen would only show empty tabs.

To perform a measurement just press the  button on the joysticks or click the **Test** button on the control panels. Before starting a test, however it is important to first check what tool is available on the current sensor and depending on the test change the tool to a different tool. The second step is to check if the work holder can be used to perform the specific test on the current application. If not change the work holder to a more appropriate type and mount the test sample on the work holder. When the work holder and tool are okay the joysticks can be used to position the tool on the correct position to start the test. After this press the **Test** button.

During the test a second press on the **Test** button on the joystick or on the screen will abort the running test. Use this to abort when the test seems to go wrong. Depending on the kind of test and the method settings by most tests a force will be applied and a measurement is made. In most cases the stages will also move back to the start position after the test. During the test the status bar will show the different stages of the test and also show if a problem occurs. When the test is finished without errors the measurement is stored and shown in the list on the lower left side.

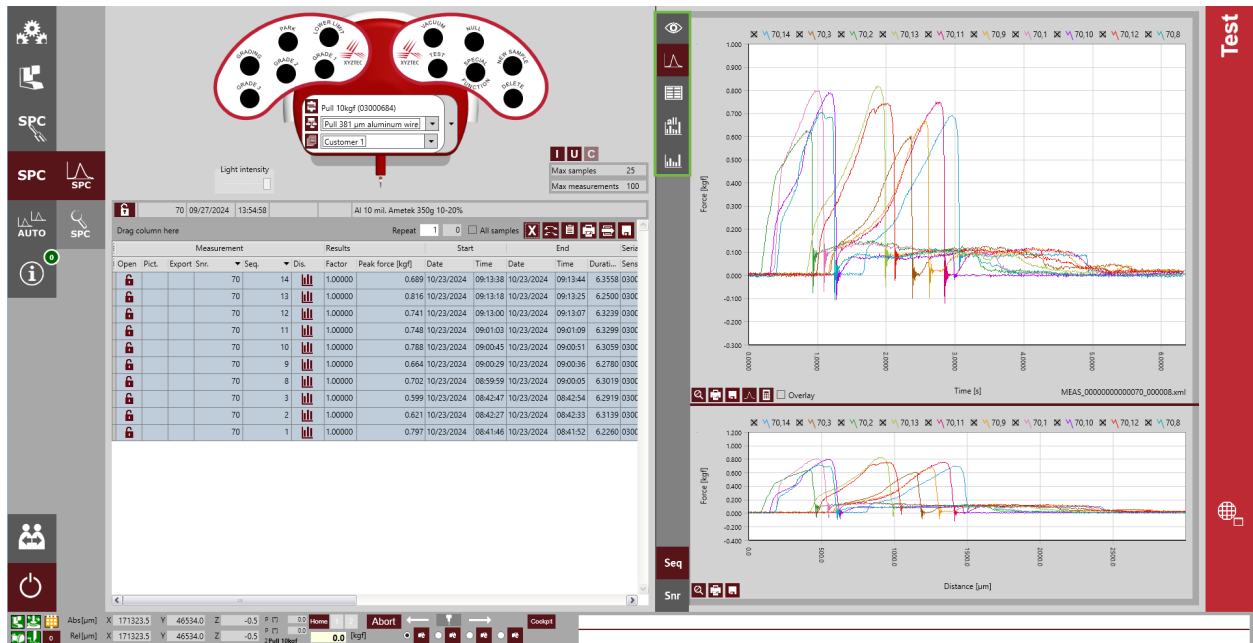


Figure 69: Sigma test screen with overlaid graphs from multiple measurements

The right area shows a **vertical bar** with buttons. By default if All samples is unchecked five buttons are available. The red coloured button is always the currently active feature. In the screen above the all measurement statistics are shown.

	First button:	opens the camera window
	Second button:	shows any pictures stored for the selected measurement
	Third button:	shows the measurement graphs
	Fourth button:	shows the statistics for all measurements
	Fifth button:	shows general statistics of the sample

If **All samples** is checked and grading is enabled within the test method three additional buttons become available.



Sixth button: shows the trend graphs for the available samples

Seventh button: shows the graphs for the grading statistics

Eighth button: shows trend graphs for the averages and the standard deviation

In the lower left corner the measurement data is shown. The upper area shows the currently active and open sample. The button with a lock shows if the sample is open or closed . If this button is showing the open icon and is clicked the sample will be closed and the button shows the close icon. A sample is closed when the end date and time are set. Below this is the area that is used for grouping the data on a specific column. Click on a column header and drag and drop this in the area indicated with **Drag column here**. After this the data will be grouped on the values for this column. When a grouping is created the trend graphs for the grouping will also become available.

After performing a number of measurements and creating multiple samples the test screen may look as shown below.

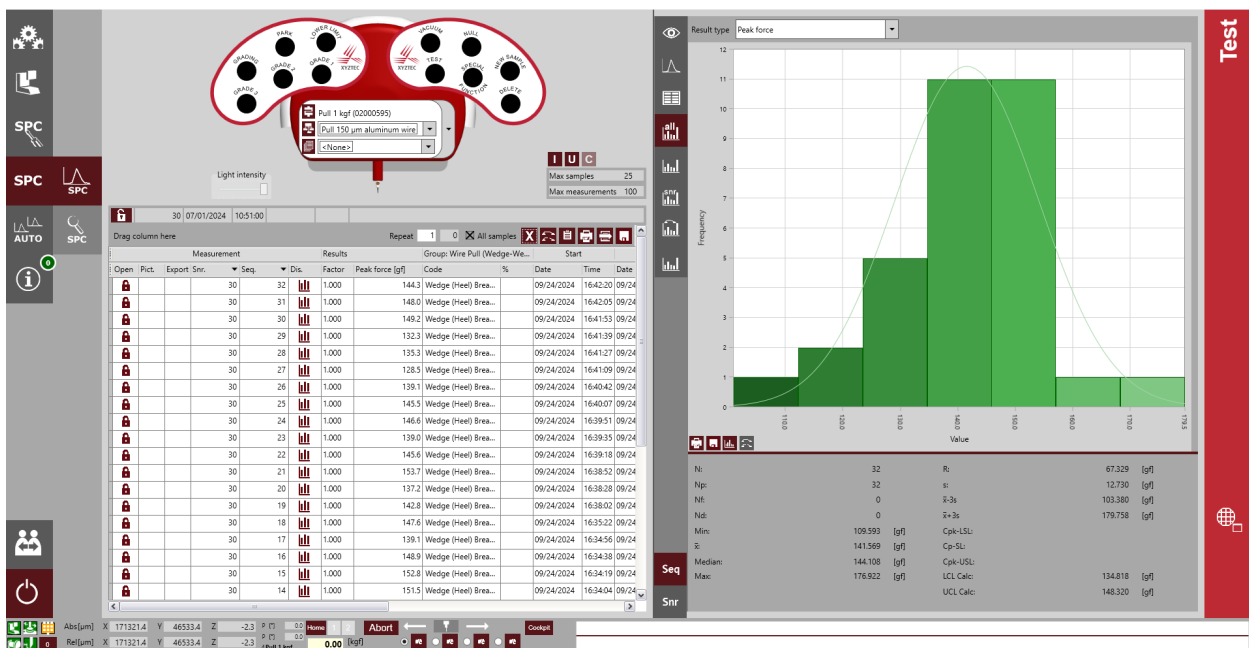


Figure 70: Sigma test screen with multiple measurements belonging to sample number 30

Sometimes a test needs to be repeated a pre-set number of times. Change the number in the **Repeat** field to the number of times the test should be performed. This option can be very helpful when a non-destructive test needs to be performed multiple times on the same part to indicate alternating load.

The button (export button) can be used to export all currently shown measurement data to an Excel-, pdf-, Word-, Powerpoint- or csv file. The button (print button) can be used to print the measurement data. The button (save button) is used to save the layout of the data grid. Just as described in chapter 7.4 the data grid can be sorted, grouped, filtered and columns can be made visible or hidden. These

changes can be stored with this **Save** button. If no form is set the changes will be for the selected method. If a form is selected these changes will be stored for the specific combination of form and method. Screens with trend graphs are displayed in the following.

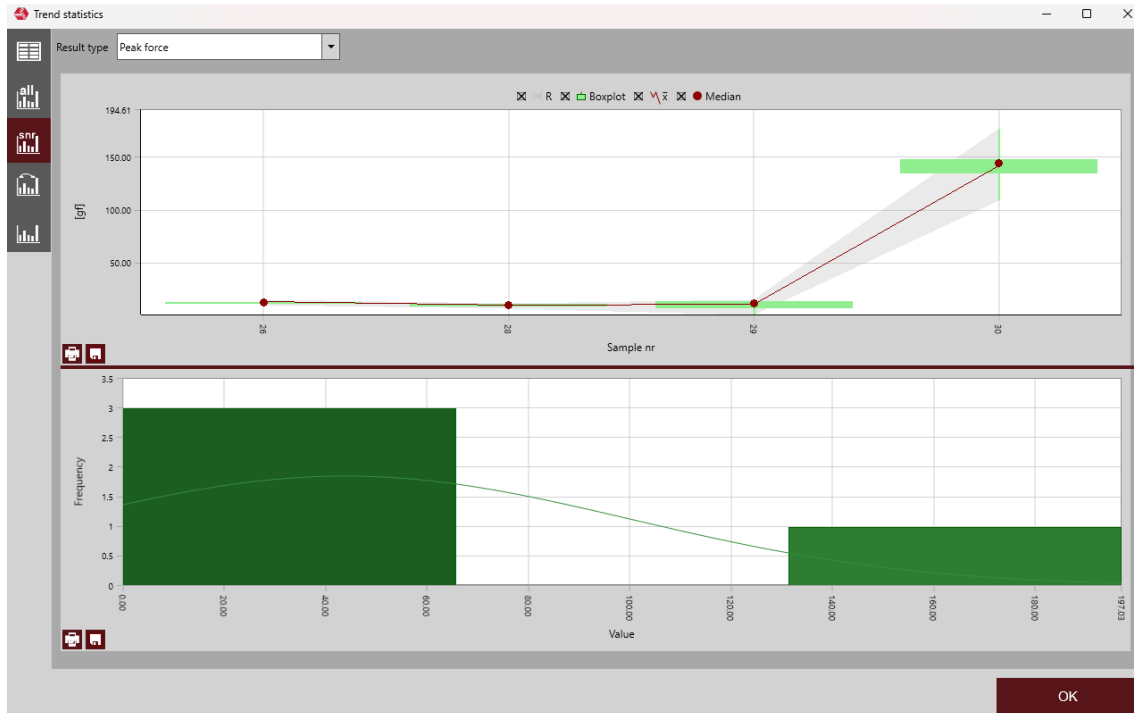


Figure 71: Trend graphs sorted by sample number

If the current method uses a result code group the measurements will be graded and the trend graphs for the grading statistics becomes available.



Figure 72: Trend graphs sorted by grading

The XYZTEC Sigma software can keep track of the statistics for all measurements, the samples, the grading and the group statistics. This makes the software very flexible, but still easy to use. The software will also only keep track of this statistics if it is required.

The next step is to perform some tests using a form. Make sure a form is available with the required data. Select this form in the test screen. When a measurement is performed a new sample needs to be created and the below dialog window will open.

Figure 73: New sample dialog

In this case a bonder, wire size, wire material and bond tool has to be defined for each new sample that will be created and opened. The Sigma software also supports using a barcode scanner. Both a special automatic integrated barcode scanner and a standard manual barcode scanner are supported. Please contact XYZTEC for more information about this.

The fields bonder, wire size, wire material and bond tool will now also be available as columns in the measurement grid. It is now also possible to group on specific data, like for example the bonder. When this option is used the software will show the statistics for each bonder. With sufficient data this gives a very good idea about the bonder performance.

When a test is performed and the method uses a result code group the grading window will open after a test. All available result codes for the methods result code group are shown. In the lower area the measurement graph and the measurement result including the lower and upper fail limits are shown. If the box in front of **Edit resultcodes** is checked the available codes can be changed.

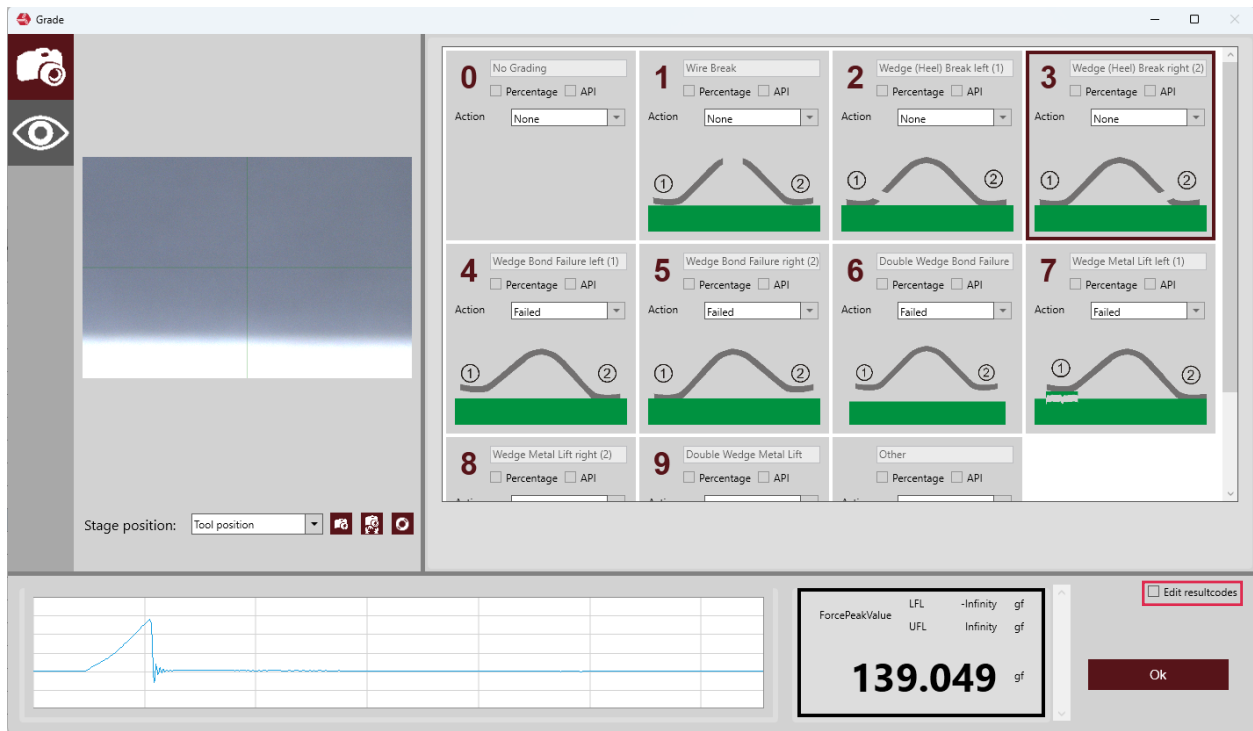


Figure 74: Grading window to match the result code to the occurred test behavior

To select a grading use the numeric keys 0-9, select the grading with the mouse, or use the Grade 1, Grade 2 or Grade 3 buttons on the left joystick or the screen. The Grading button on the joysticks or the screen changes the selected grading. The Test button confirms the selection.



Figure 75: Left joystick to select the short cut gradings 1, 2 and 3

The data grid on the lower left side also offers a popup menu. If the sample is open the menu will offer more options than when the sample is closed. Right click on the measurement and a window pops up showing the actions that can be made for both the sample and the measurement itself.

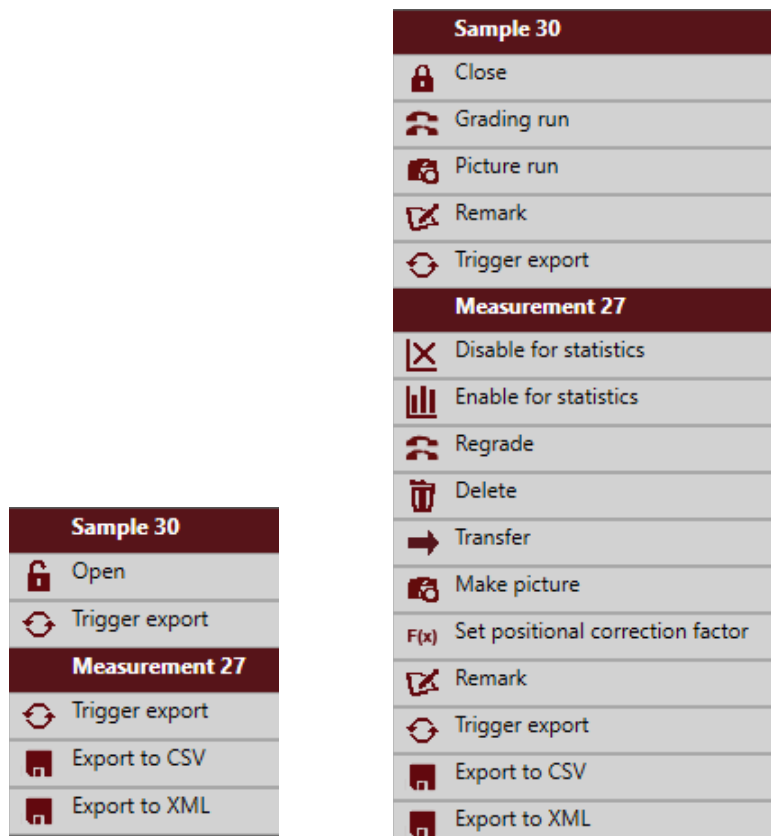
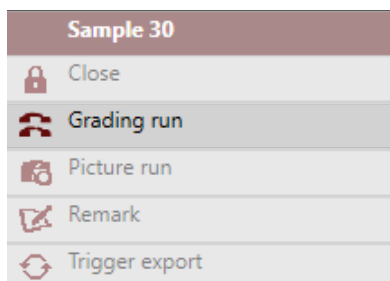


Figure 76: Right click menu for measurements, left side is a closed sample, right side is open sample

The popup menu always shows the currently selected sample and the currently selected measurement. The menu options under the sample are sample related. **Open** or **Close** will open or close the sample. If a sample is closed no measurements can be added. It is also not possible to change the grading or make any changes that influence the sample statistics when the sample already was closed.

Picture run will make a picture for all measurements in the sample. The **Remark** for a sample can be used to type a sample related remark.

6.10.1 Open sample



Grading run is used to grade all the measurements in a sample. The grading run opens a screen with some settings for the grading run. By right-clicking on the measurement the grading run can be performed. This is only possible when the sample is still editable hence open.

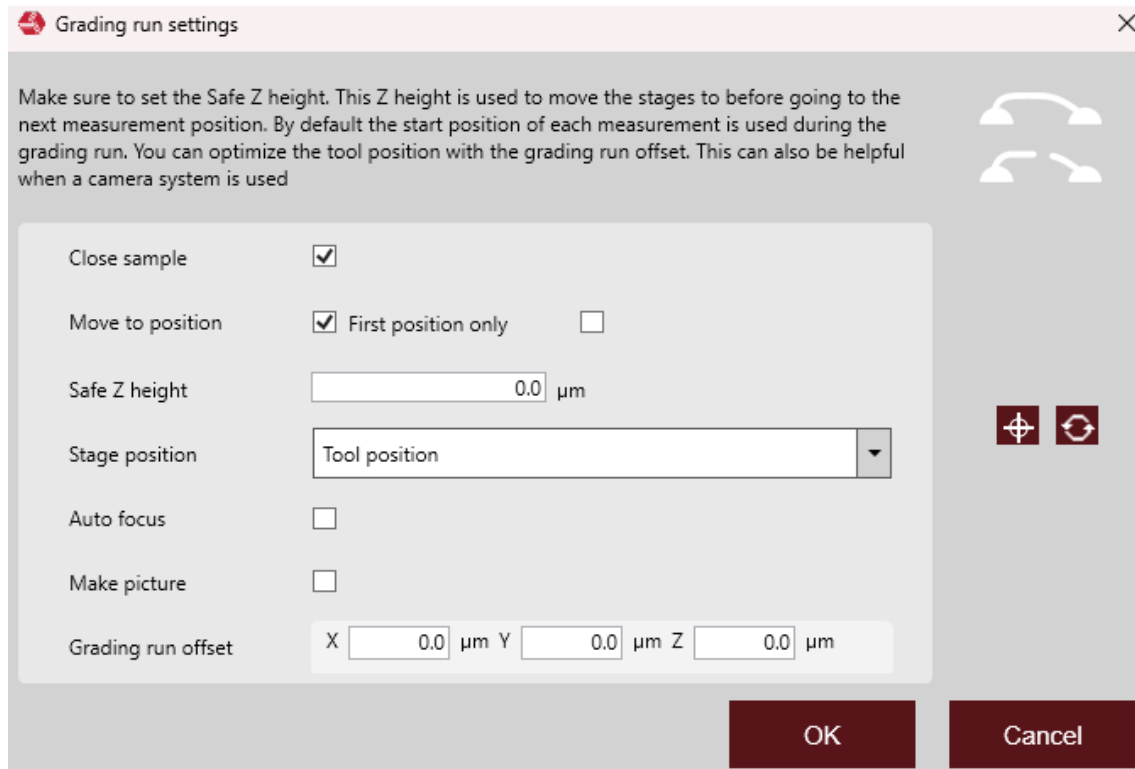


Figure 77: Grading run settings

Close sample can be used to automatically close the selected sample after the grading run. **Move to position** moves the test position under the selected camera or the microscope/tool position. The **Safe Z height** is used to move between test positions to avoid collisions. The  button (refresh) and  button (position) buttons can be used to get the current z-height (refresh) or move to the set z-height (position). The Stage position selects using the tool/microscope position, the left camera or the right camera. Grading run offset can be used to optimize the position to determine the grading. This is a relative offset from the test position. Confirm with **OK** to start the grading run.

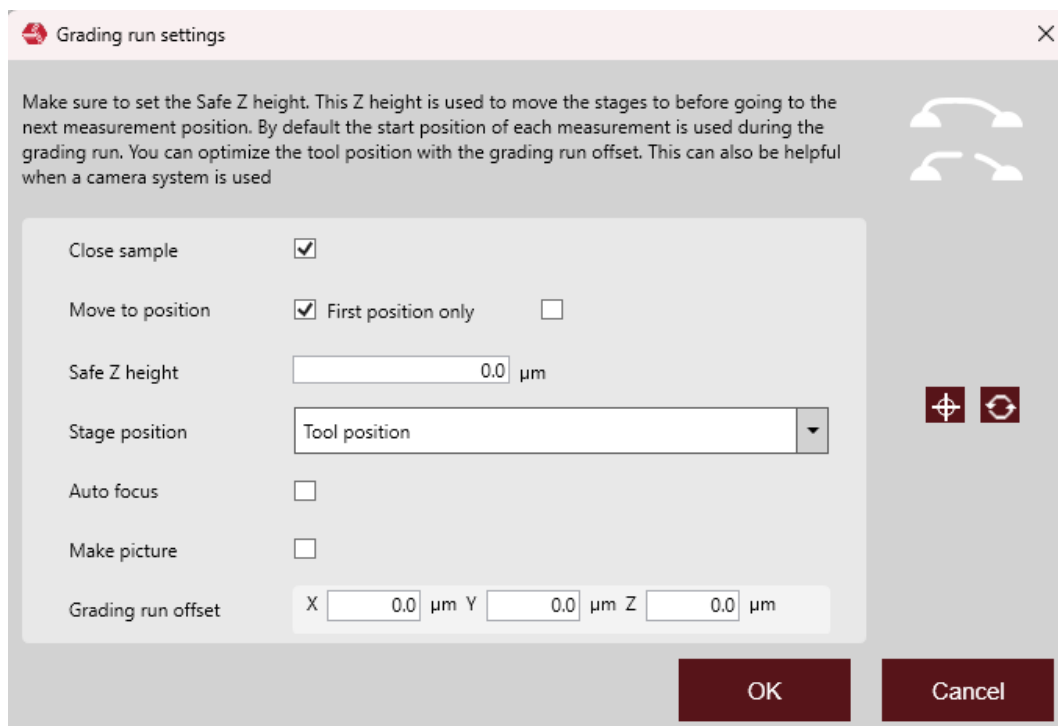


Figure 78: Grading window during grading run



The title bar for the grading window shows the current sample and sequence number. The buttons **Prev** and **Next** are only available for the grading run. The **Next** button selects the next measurement. If **Move to position** is enabled in the previous screen the system will automatically move the test position under the microscope/tool position or camera. The **Prev** button will select the previous measurement and when

Sample 30	
	Close
	Grading run
	Picture run
	Remark
	Trigger export

Move to position is enabled in the previous screen the system will automatically move the test position under the microscope/tool position or camera. Click **OK** when the grading is finished for this sample.

Trigger export can be used together with the Sigma Export software to force a new export for the selected sample.

6.10.2 Measurement in an open sample

Measurement shows the measurement related options.

Measurement 27	
	Disable for statistics
	Enable for statistics
	Regrade
	Delete
	Transfer
	Make picture
	Set positional correction factor
	Remark
	Trigger export
	Export to CSV
	Export to XML

Disable for statistics will disable the selected measurement from the statistics. The software will show the number of disabled measurements. These measurements are however not used for the statistical calculations but still visible in the statistics overview. This avoids gaps in the measurement results relevant for the statistics.

Enable for statistics will undo the function mentioned before. When a measurement was set to be disabled by mistake, it can easily be enabled for statistics again without causing issues.

Regrade will open the grading window (see figure 86) to change the grading for the selected measurement.

Delete will delete the selected measurement(s). The software will ask the operator to really delete the measurement as this step cannot be undone.

Transfer is used to move a measurement from one sample number to a different sample number. A window will open with the available sample numbers for the transfer. This function can be used when the operator did collect test results that were stored in the currently opened sample but wants it to be in another one for e.g. better traceability, allocation or just because the new data does not belong to the previous one. Then, the new test results can be either transferred into an existing sample or into a new one.

Make picture opens the camera window to make a picture for the selected measurement. When more cameras are mounted and available on the Sigma the

Set positional correction factor opens a Window to set the positional correction factor. This factor can be used if the wire lengths are different, to make the test results comparable. It can also be used to compensate for the force triangle.

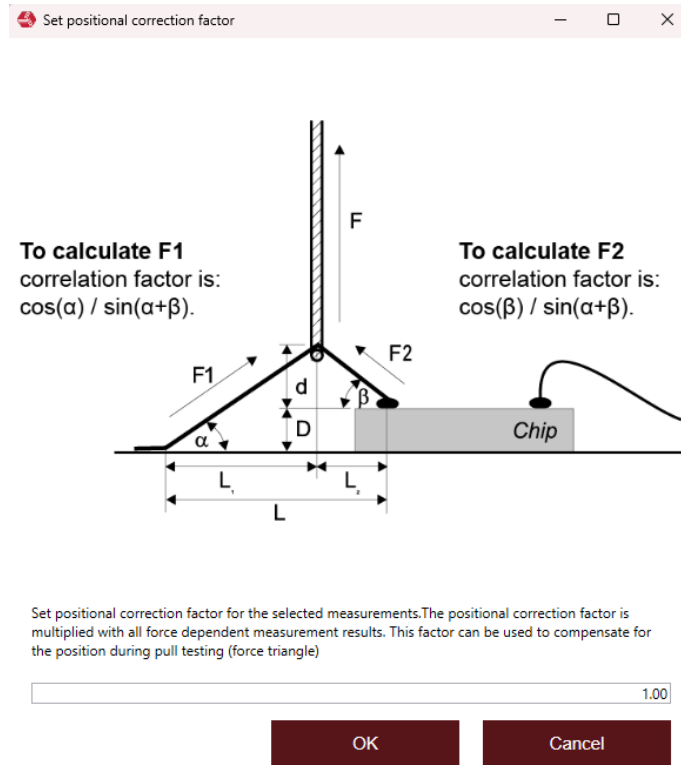


Figure 79: Definition of positional correction factor

Remark in this case is the measurement remark. The measurement remark can be used to document any specific situations for the tested part (for example when a wire was damaged before the test).

Trigger export can be used together with the Sigma Export software to force a new export for the selected measurement(s).

Export to CSV creates a csv file with the force graph data for the selected measurement(s).

Export to XML creates an XML file with the force graph data for the selected measurement(s).

Both export files are stored in the C:\Users\Public\Documents\XYZTEC\CondorSigma\Results directory.

Besides the data grid with the measurement data it is also possible to switch the view from measurement data to the sample statistics. Click **Snr** to select the sample statistics and **Seq** to select the measurement data.

If multiple results are available it is also possible to get the statistics for a different result type. Below example shows how to select the result type. For the selected method a lot of result types are available.

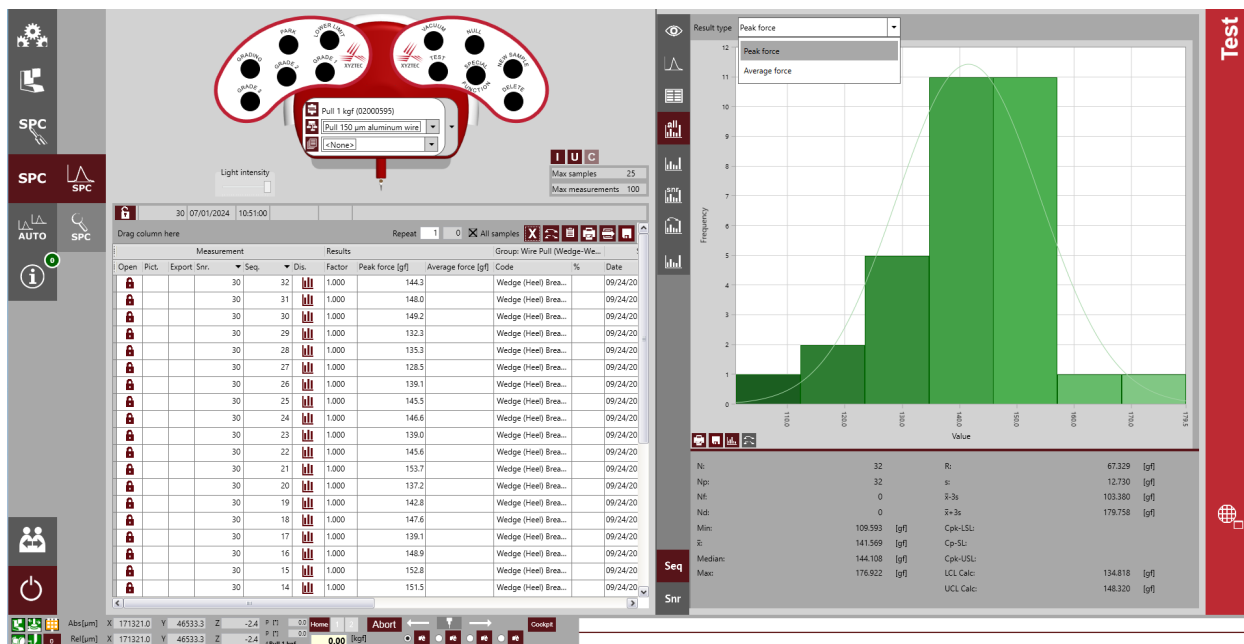


Figure 80: Selecting a different result type. Available result types must be set in the test method definition

If a different result type is selected the trend graphs and all measurements statistics will immediately reflect this. The XYZTEC Sigma software offers full SPC on all available test results. In the next screen the trend graph for the sample statistics is shown.

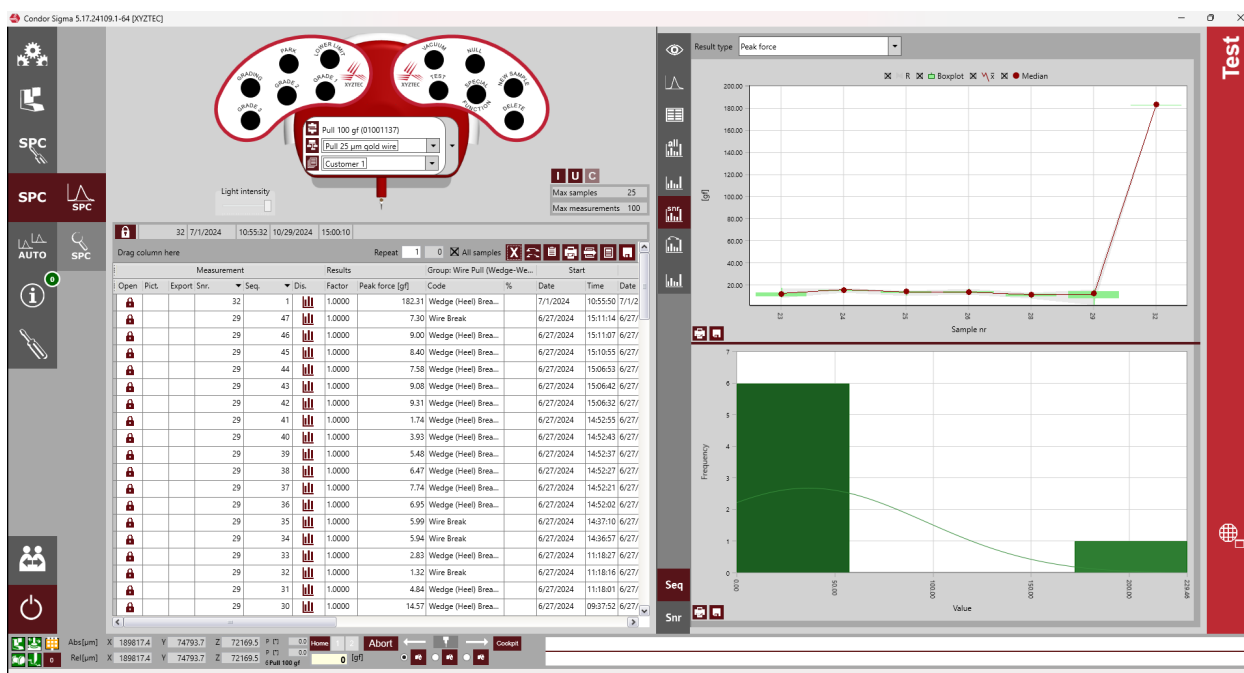


Figure 81: SPC test screen with trend graphs sorted by sample number

6.10.3 Individual programmable functions

The XYZTEC Sigma software offers the option of assigning a desired function to some of the buttons available in the software. The SPC screen itself offers the option of defining three machine actions using the three buttons to teach an **Initial position**, a **Loading/unloading position** as well as a **Cleaning position**.

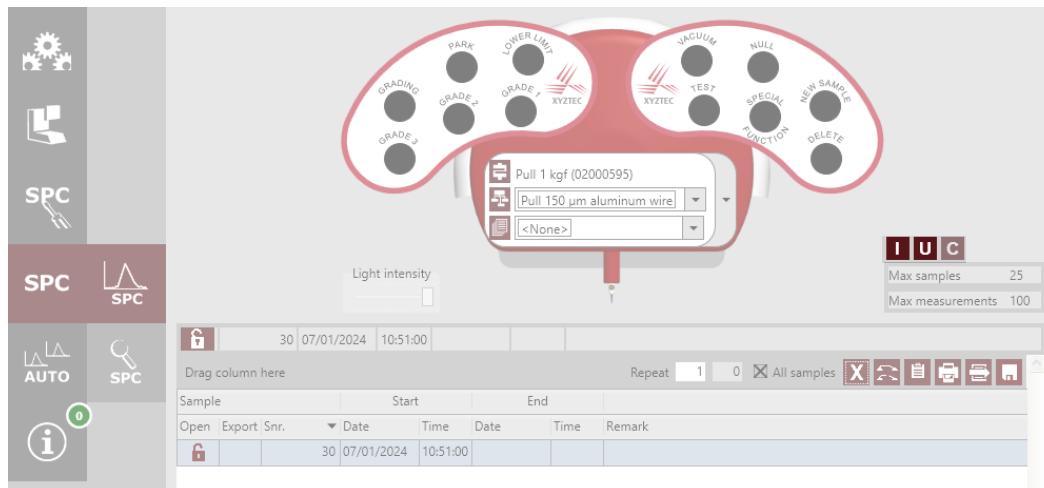


Figure 82: Available self-assignable software settings for machine actions

These **IUC** buttons can be programmed in the **Measurement unit and sensor settings** screen for each sensor.

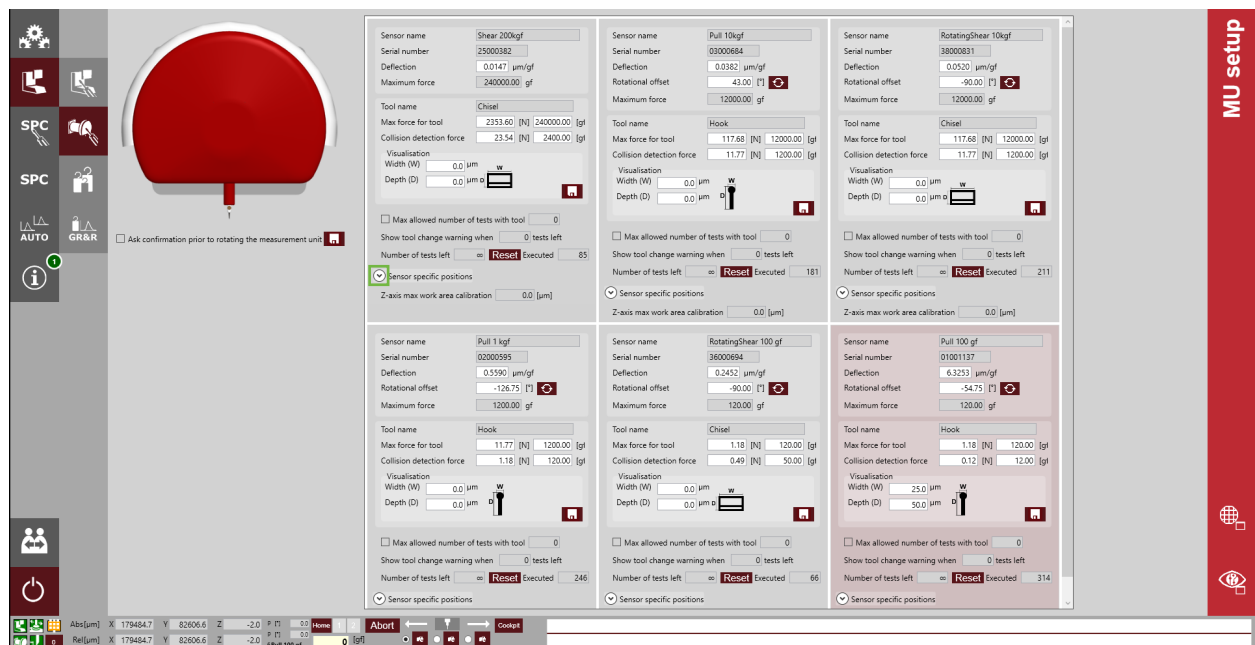


Figure 83: MU setup: Sensor settings for programming default locations

Click on the **little arrow** symbolizing a drop down menu for the corresponding sensor to define the required positions for initializin, loading/unloadind and cleaning. The cleaning position becomes applicable once a cleaning unit such as to clean the tweezer tip jaws or shear chisels from residues like solder balls.

Figure 84: MU setup: Sensor settings. Drop down menu to set default locations

The joysticks both the left and right one also provide self assignable buttons to facilitate the handling and operation of the Sigma machine. Both joysticks are equipped with six buttons each:

- five buttons on the left joystick can be defined individually, and

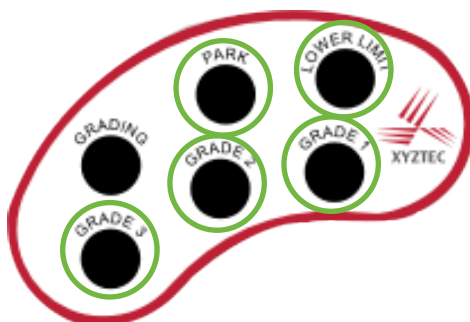


Figure 85: Left joystick

- one button on the right joystick can be defined individually.

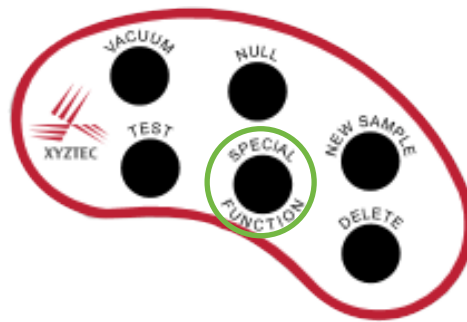


Figure 86: Right joystick

- PARK:** Moves the RMU to absolute $z = 0$, thus the RMU move up
- LOWER LIMIT:** Sets the current z position as the lowest RMU positions. Even when conducting a test the RMU will not move further down than that newly defined lower limit. To undo this setting/delete the temporarily stored position press **Lower Limit** button + **alt**.
- GRADE 1:** Grades the occurred code to the grading that is stored as position 1 to expedite the grading process, e.g. when performing a grading run. Gradings order can be modified in SPC settings.
- GRADE 2:** Grades the occurred code to the grading that is stored as position 2 to expedite the grading process, e.g. when performing a grading run. Gradings order can be modified in SPC settings.
- GRADE 3:** Grades the occurred code to the grading that is stored as position 3 to expedite the grading process, e.g. when performing a grading run. Gradings order can be modified in SPC settings.
- SPECIAL FUNCTION:** Performs any action that was stored as a special function, such as Grade 4-8, Clear lower Limit, Clean tool by blowing residues. Ask your local XYZTEC contact person.

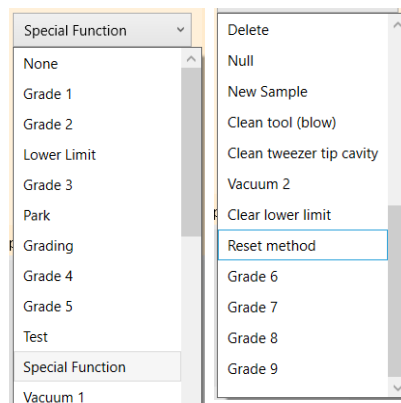


Figure 87: Options for Special Function assignment. This can be done by XYZTEC service only.

6.11 Status indication and hidden right mouse clicks

6.11.1 General software settings

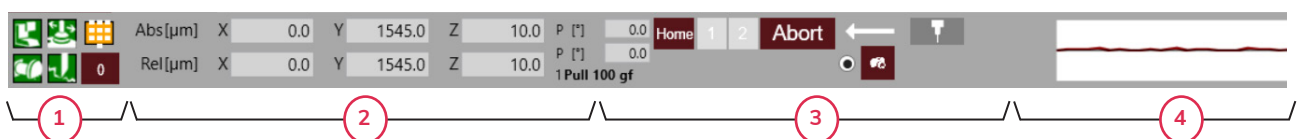
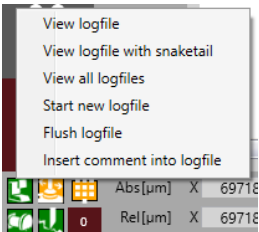
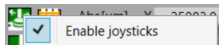
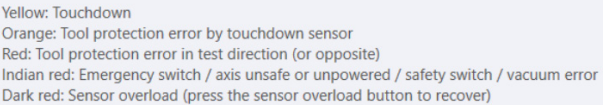
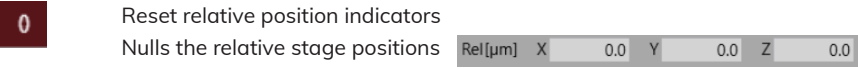


Figure 88: Status indication bar

The bottom of the XYZTEC Sigma software screen shows always the above shown status indication bar. This bar can be divided into four sections:



Section	Description
1	Tester status: These little icons show the general tester status important for conducting proper bond tests. Tester ok Icon must always be green. When orange or red right mouse click to get the following pop up menu:  From there logfiles can be generated and the machine can be set to perform again Joysticks active Joysticks are enabled when this icon is green. When the machine went into overload and tool protection is active the joysticks will disable to avoid damaging the sensor, thus they have to be enabled. To enable right mouse click on the joystick icon and check Enable Joysticks.  Move stages using arrow keys on keypad This function is enabled when the icon is green. As soon as it gets orange, the relative stage positions have to be modified, i.e. when negative. Measurement Unit ok When the communication from machine to RMU is lost the icon will indicate this. When taking off the RMU this icon gets red as the machine is not able to correspond to the measurement unit. Touchdown protection This function protects the sensor from each applied overload such as when moving the z axis too fast in positive direction (downwards movement) to eventually hit the surface of the sample to be tested.  Reset relative position indicators Nulls the relative stage positions 

2

Relative and absolute axes positions:

The upper line shows the absolute axes positions that go from 0.00 μm (minimum) to the respective absolute maximum of the axis. For the standard Sigma machine that would be:

- x axis: 368,000.0 μm , i.e. 368 mm
- y axis: 168,000.0 μm , i.e. 168 mm
- z axis: 168,000.0 μm , i.e. 168 mm

Abs[μm] X 368000.0 Y 168000.0 Z 168000.0

The absolute maximum axes position for the Sigma HF are as follows:

- x axis: 600,000.0 μm , i.e. 600 mm
- y axis: 600,000.0 μm , i.e. 600 mm
- z axis: 200,000.0 μm , i.e. 200 mm

These values cannot be changed manually by typing in a new position. They can only be changed by moving the axes using the joysticks. When the absolute maximum positions are reached the displayed axes positions are highlighted red as in the example above.

The lower line shows the relative axes positions. The relative positions can be changed by clicking the 0 button to null them.

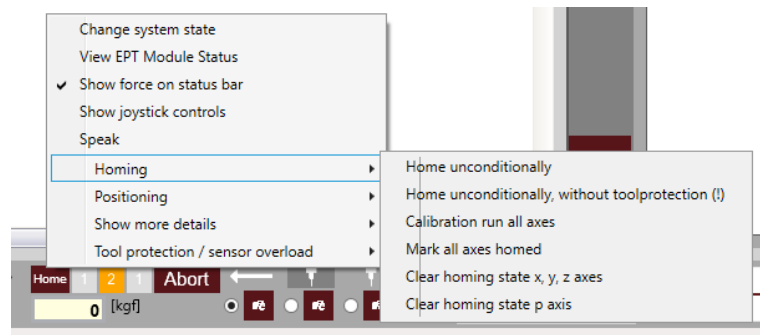
Rel[μm] X -20346.9 Y -20346.9 Z -20346.9

3

Activation of machine enhancements:

In this section not only the camera views can be enabled but also facility provided features such as air pressure and vacuum. Besides that the stages can be moved from tool position to right or left camera position.

The Home button will trigger the machine to perform another homing procedure. A right mouse click on that button will display the following pop up menu for additional homing options:



The 1 button enables the right valve on the machine. When the Sigma is connected to either vacuum or air pressure you can hear the significant noise directly at the valve, in case no work holder is connected to it.

The 2 button enables the right valve on the machine. When the Sigma is connected to either vacuum or air pressure you can hear the significant noise directly at the valve, in case no work holder is connected to it.

The Abort button will stop the machine movement.

The button will move the stages to tool position, unless the machine is already in that position. The tool position is always stored as default.

The button will move the stages to the left camera position when the machine is equipped with a right camera. If not, the field will be empty.

The button will move the stages to the right camera position when the machine is equipped with a right camera. If not, the field will be empty.

The button will show the left camera view when the machine is equipped with a right camera. If not, the field will be empty. Make sure the sample is place underneath the respective camera.

The button will show the scope camera view when the machine is equipped with a right camera. If not, the field will be empty. Make sure the sample is place underneath the respective camera.

The button will show the right camera view when the machine is equipped with a right camera. If not, the field will be empty. Make sure the sample is place underneath the respective camera.

4

Live force load:

The live force load graph shows the currently applied force to the sensor in action according to the force-time diagram. This graph is NOT meant for any statistical analyses or other representative assessments but it provides a first quantitative overview. When the machine idles the curve shows the baseline:



6.11.2 Sigma HF related settings

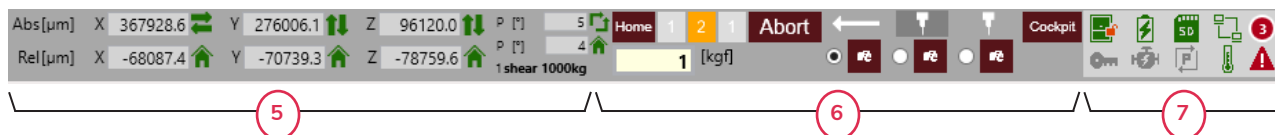


Figure 89: Status indication bar at Sigma HF machine software

5

Enhanced relative and absolute axes positions:

to follow soon

6

Enhanced activation of machine enhancements:

to follow soon

7

Additional machine information:

Icon	Meaning
	The status of the safety door is unknown.
	The safety door is open and unlocked.
	The safety door is closed and unlocked.
	The safety door is open and locked.
	The safety door is closed and locked.
	The status of the PLC battery health is unknown.
	The PLC battery health is no longer ok.
	The PLC battery is healthy.
	The health of the SD-card is unknown.
	The health of the SD-card dropped to 50% or below.
	The health of the SD-card dropped to 20% or below.
	The SD-card is healthy (>50%)
	There is no connection with the PLC.
	The PLC is connected.

	The service key is inactive, or the status is unknown.
	The service key is active.
	The x, y, and z-axes are unpowered, or the status is unknown.
	There is an error in one or more of the linear axes (x, y, or z).
	The linear axes (x, y, and z) are all powered.
	The p-axis is unpowered, or the status is unknown.
	There is an error in the p-axis.
	The p-axis is powered.
	The PLC's CPU temperature is unknown.
	The PLC's CPU temperature is too high (> 105 °C).
	The PLC's CPU temperature is ok.
	There are one or more errors.

When the  icon turns red  the battery of the PLC needs to be changed. An unhealthy PLC battery condition leads to position issues as the machine is no longer able to home so that all prestored and defined positions get lost. To avoid that however, xyztec recommends changing the battery once a year during service visit.

In the unlikely event that the machine loses the connection to the PLC only the user that is assigned to have supervisor rights will be able to connect the systems again. Therefore press the  icon on the left menu bar and the following screen will open:

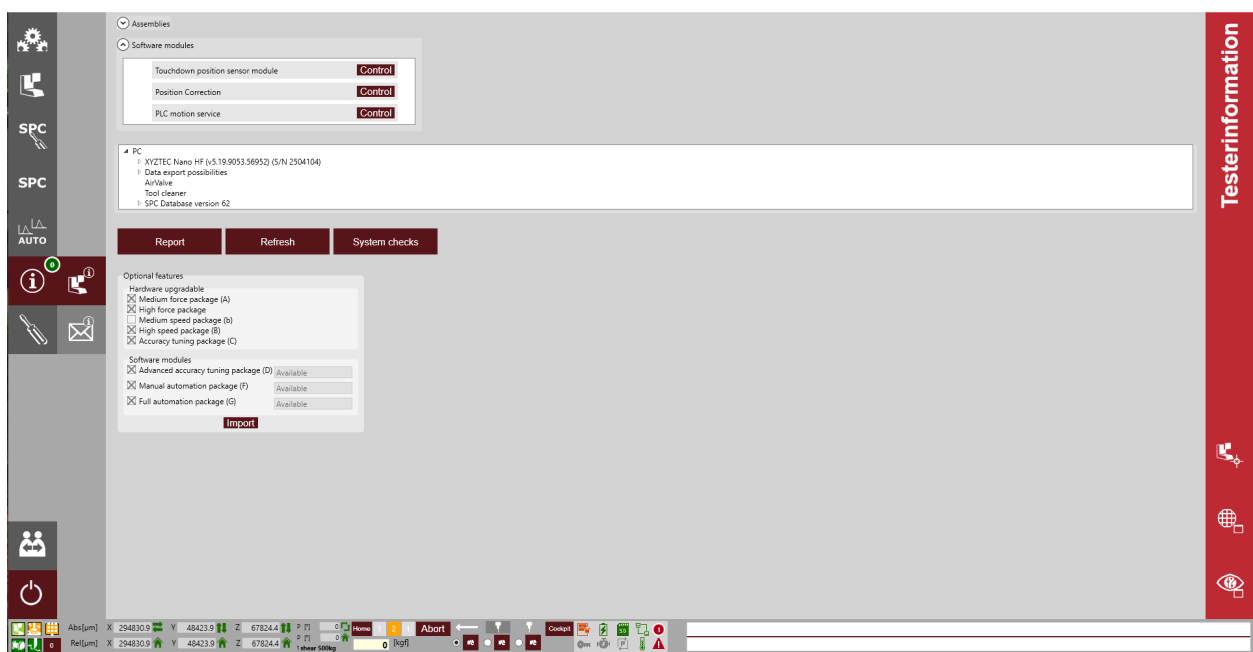


Figure 90: Tester information screen (supervisor rights necessary)

To reconnect the machine to the PLC click **PLC motion service** **Control**. The window that will open does not only show the connection state between machine and PLC but also the status of the motor drives. Besides, it shows the serial number of the PLC and its software version.

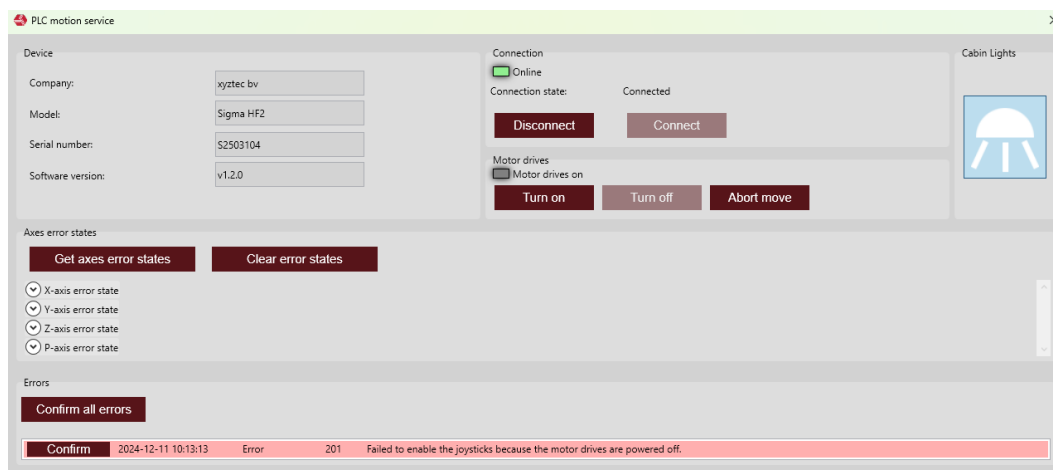


Figure 91: Software screen: PLC motion service

6.12 Error codes

The XYZTEC Sigma software distinguishes between ten different error codes that can occur in an unlikely event. To better understand what the software feedbacks from any unlikely action the following table give a brief explanation.

Error code	Description
-7	Move failed because of an LMC CMD error
-6	Move failed because of an axis error
-5	Move failed because axis is off/unutilized
-4	Move failed because axis already busy
-3	Move failed because move direction is blocked
-2	Move failed because is would go outside the work area
-1	Move failed because entered speed is not allowed
0	Move is executed correctly
1	Move is executed correctly with slow speed
2	???

6.13 Query screen

The XYZTEC Sigma software also offers a very easy to use option to query the measurements. In the SPC sub menu the second choice shows SPC with a magnifying glass. Under this menu choice you can find the query screen.

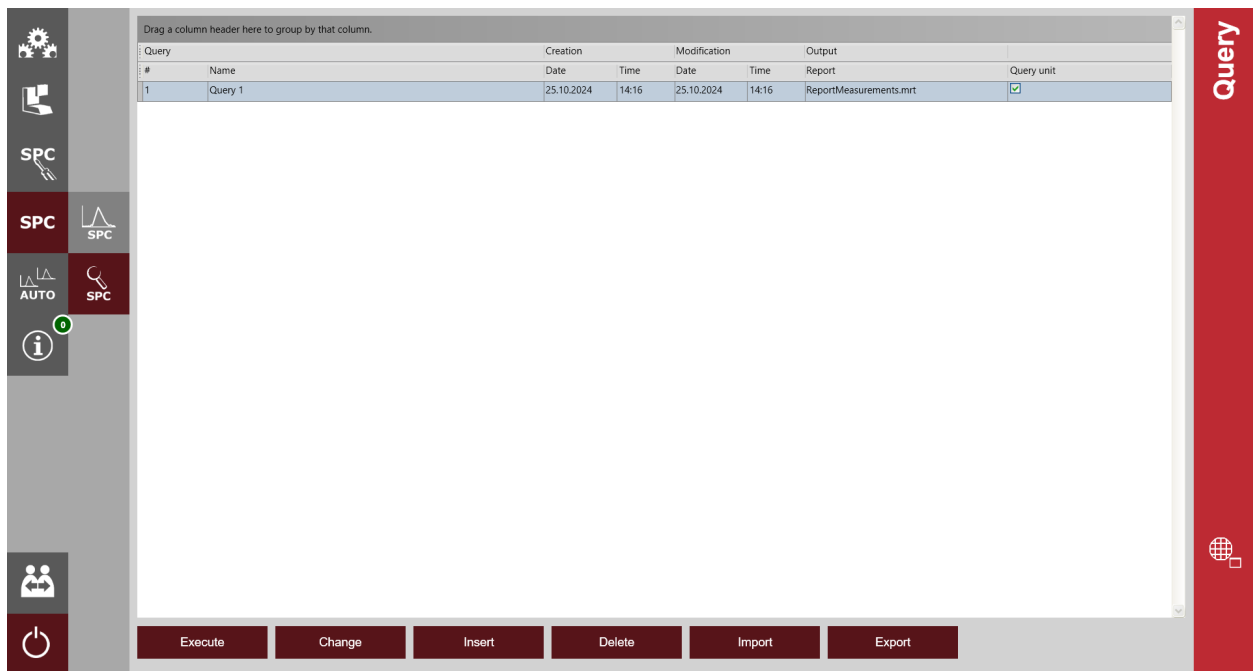


Figure 92: Query screen, showing one query

By default no query is selected and the data grid with the query results is empty. Click the **Insert** button to create a new query.

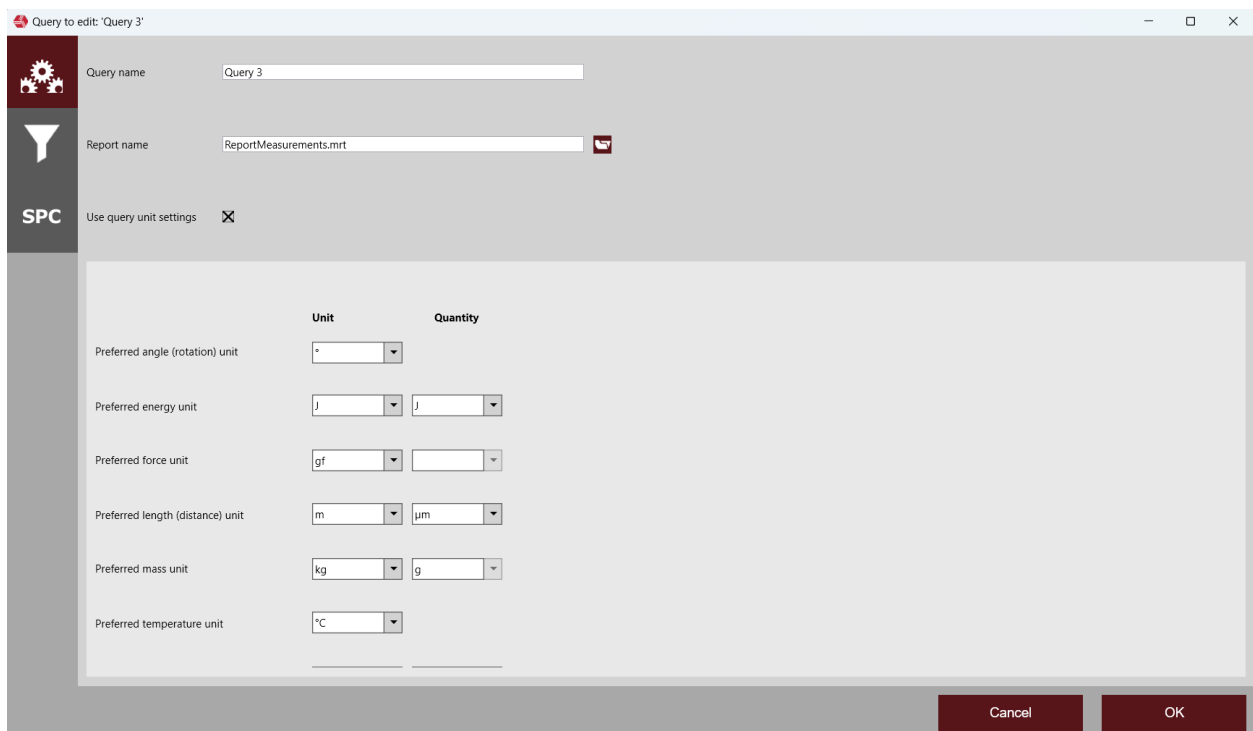


Figure 93: Pop up window to insert a new query

The Insert/Edit query dialog window offers a query number that cannot be changed and a query name. Use clear names for the query to make it easier to locate specific queries. Click **OK** to confirm and go back to the query screen.

The new query is now created and all measurement data is shown in the data grid with the results. Only a default set of columns are shown. The idea behind the query screen is to limit this complete set until only the required data is left. To limit the data you can use the filter options in the column headers. If the

mouse cursor is moved over the column header an arrow is shown after the name of the column. Click on the arrow to see the unique values available for this column. Select the values that are needed. It is possible to select multiple values. The figure shown below screen shows the filter for the sequence column.

#	Sample Nr	Seq. Nr	Pict.	Dis.	Code	%	Meas. S. date	Meas. S. time	Meas. E. date	Meas. E. time	Test time	Export	Result	Unit	Result type
1	1	1	☐	☐			08.04.2024	11:18	08.04.2024	11:18	0.2240 [s]	☐	10,13	gf	Max Kraft
2	1	2	☐	☐			08.04.2024	11:57	08.04.2024	11:57	0.2440 [s]	☐	9,93	gf	Max Kraft
3	2	1	☐	☒			10.04.2024	11:40	10.04.2024	11:40	0.0040 [s]	☐	6,04	gf	Max Kraft
4	2	2	☐	☒			10.04.2024	11:43	10.04.2024	11:43	0.0000 [s]	☐	3,83	gf	Max Kraft
5	2	3	☐	☐			10.04.2024	11:43	10.04.2024	11:43	0.2940 [s]	☐	10,18	gf	Max Kraft
6	2	4	☐	☐			10.04.2024	11:44	10.04.2024	11:44	0.3060 [s]	☐	10,21	gf	Max Kraft

Figure 94: All measurement results and default columns

A right mouse click on the column headers will open the following screen:

#	Sample Nr	Seq. Nr	Pict.	Dis.	Code	%	Meas. S. date	Meas. S. time	Meas. E. date	Meas. E. time	Test time	Export	Result	Unit	Result type
1	2	4	☐	☐			10.04.2024	11:44	10.04.2024	11:44	0.3060 [s]	☐	10,21	gf	Max Kraft
2	2	3	☐	☐			10.04.2024	11:43	10.04.2024	11:43	0.2940 [s]	☐	10,18	gf	Max Kraft
3	1	2	☐	☐			08.04.2024	11:57	08.04.2024	11:57	0.2440 [s]	☐	9,93	gf	Max Kraft
4	2	2	☐	☒			10.04.2024	11:43	10.04.2024	11:43	0.0000 [s]	☐	3,83	gf	Max Kraft
5	1	1	☐	☐			08.04.2024	11:18	08.04.2024	11:18	0.2240 [s]	☐	10,13	gf	Max Kraft
6	2	1	☐	☒			10.04.2024	11:40	10.04.2024	11:40	0.0040 [s]	☐	6,04	gf	Max Kraft

Figure 95: Right mouse click to show checked settings

To add additional columns right click on any column header. Select the required columns by clicking on the column name. It is also possible to hide available columns. A check mark shows if a column is visible. The number of available columns also depends on the number of available fields. Up to 30 fields can be shown.

Sample Nr
Sample start date
Sample start time
Sample end date
Sample end time
Sample remark
Method
Form name
Form description
User
Automation name
Automation barcode
Tester serial Nr
Resultcode group
Sensor serial Nr
Resultcode
Measurement Nr
Measurement start date
Measurement start time
Measurement end date
Measurement end time
Measurement remark
Measurement designation
Matrix location
Measurement result
Product
Sample shape
Production line
Product ID
Product group

Figure 96: Available columns for query screen

In the example above the form name, bonder, lot, batch and package columns are added to the default set. After this the query screen looks as below. It is now possible to filter on the form name or one or more specific fields.

When the result set is below the 1000 records the results can be printed  or exported . The  button will store the current query layout, with the selected filters. The  button opens a window with query specific settings for the units. By default the user setting and the currently selected sensor are used as the base setting. This makes it possible for a operator that works with the unit gf to print a report with the unit N.

	Unit	Quantity
Preferred angle (rotation) unit	°	
Preferred energy unit	J	J
Preferred force unit	gf	
Preferred length (distance) unit	m	µm
Preferred mass unit	kg	g
Preferred temperature unit	°C	
Preferred time unit	s	s

Figure 97: Unit settings for query

Make sure to uncheck the option **Enable user units**. After this the units for the angle, energy, force, length, mass, temperature and time can be selected. For some units the quantity can also be set. Click **OK** to confirm. Unit settings are also stored with the query. Make sure to click the save button after making adjustments.

The  and  buttons can only be used when a grouping is used. Plus will open all groups, minus will close all groups.

The query screen also offers to group the data on a specific column. By clicking on the **Seq Nr.** header, keeping the left mouse button pressed and dragging the column header in the area for grouping the data, the table is sorted by the sequence number.

Drag a Seq. Nr. column here to group by that column.

#	Seq. Nr.	sample Nr.	Pict.	Dis.	Code	%	Meas. S. date	Meas. S. time	Meas. E. date	Meas. E. time	Test time	Export	Result	Unit	Result type
1	1	2					10.04.2024	11:40	10.04.2024	11:40	0.0040 [s]		6,04	gf	Max Kraft
2	1	1					08.04.2024	11:18	08.04.2024	11:18	0.2240 [s]		10,13	gf	Max Kraft
3	2	1					08.04.2024	11:57	08.04.2024	11:57	0.2440 [s]		9,93	gf	Max Kraft
4	2	2					10.04.2024	11:43	10.04.2024	11:43	0.0000 [s]		3,83	gf	Max Kraft
5	3	2					10.04.2024	11:43	10.04.2024	11:43	0.2940 [s]		10,18	gf	Max Kraft
6	4	2					10.04.2024	11:44	10.04.2024	11:44	0.3060 [s]		10,21	gf	Max Kraft

Figure 98: Drag and drop desired column to change sorting criteria

The query screen will now show the data with the grouping.

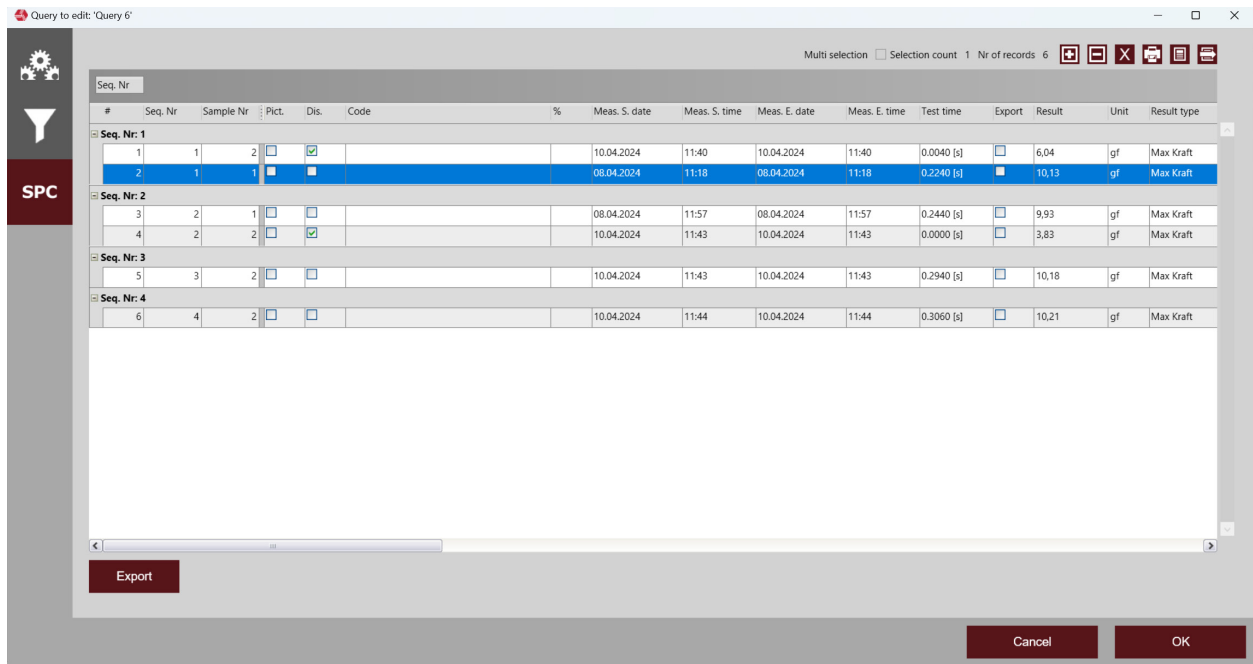


Figure 99: Query screen with grouping by sequence number

A right click on a measurement result shows a popup menu.

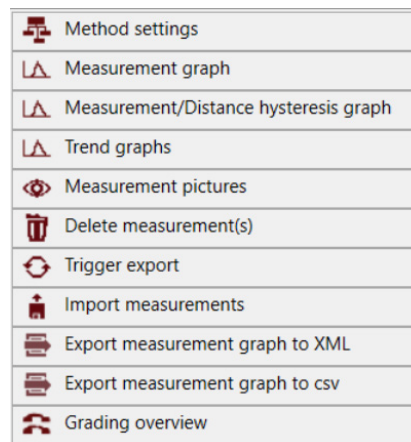


Figure 100: Query pop up menu after right click on result (peak force)

The option **Method settings** opens a window with the method settings used to get this measurement result. The method settings window is opened. The left side of the window shows the current method settings, the right side shows the settings used when the measurement was made.

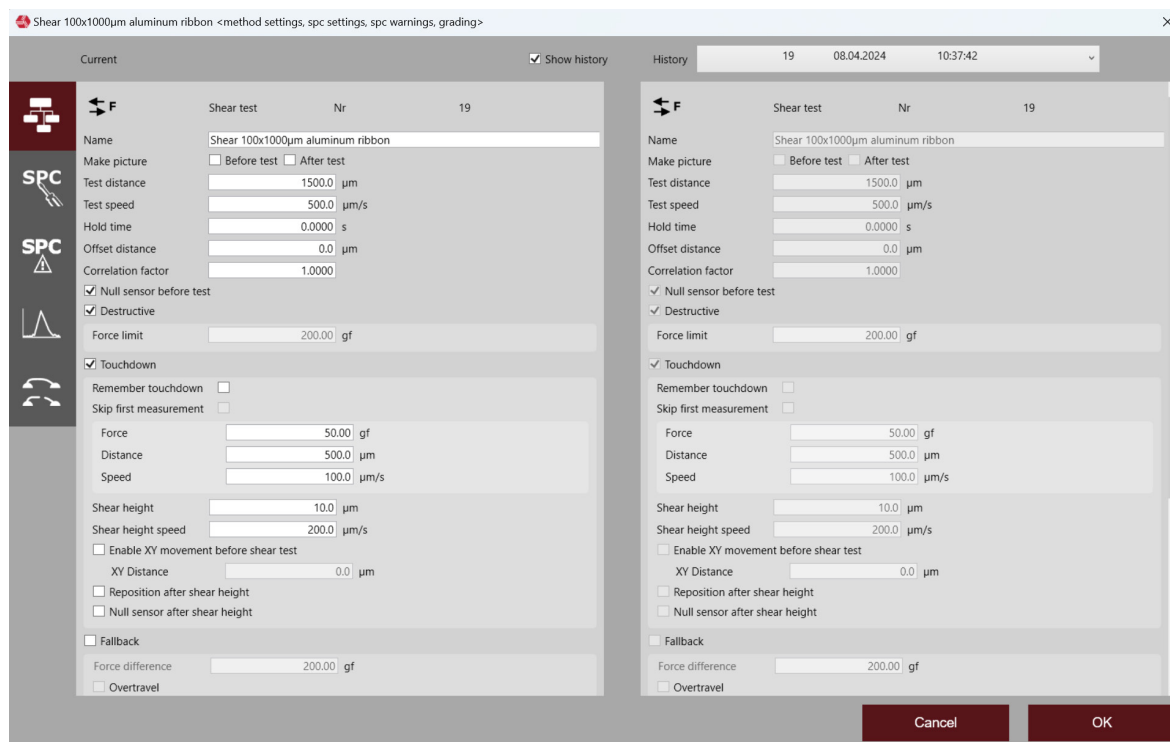


Figure 101: Method settings shown in query mode

Measurement graph opens the measurement graph for the selected measurement result. **Measurement/Distance hysteresis graph** opens the hysteresis graph for the selected measurement result.

Trend graphs generates the statistics for the currently available measurement results by opening a window. This window offers the same statistical options and graph options as the test screendoes too.

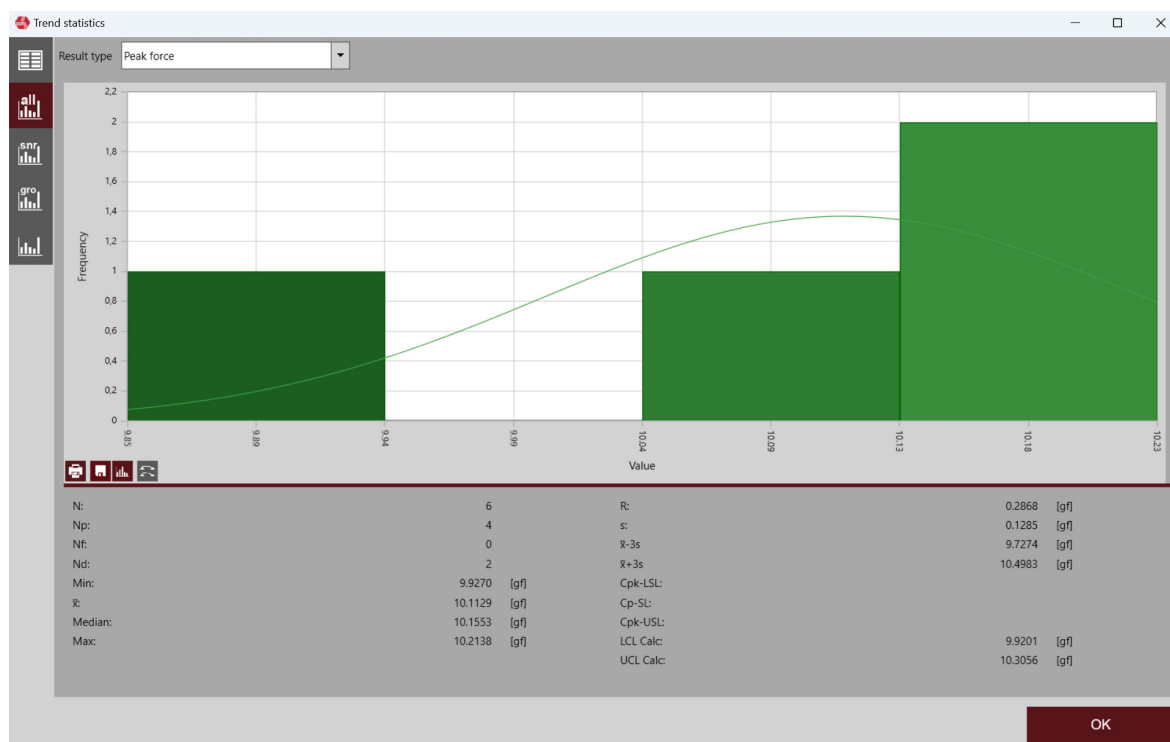


Figure 102: Trend graph and statistics shown in query mode

Measurement pictures opens a window showing any available pictures for the selected measurement.

Delete makes it possible to delete the selected result(s).

Trigger export automatically exports the sample the measurements belongs to.

Import measurements will import desired measurements stored in another sample to be added to the currently selected sample.

Export measurement graph to XML exports the selected measurement result(s) to an xml file. This works the same as the export feature in the test screen.

Export measurement graph to csv will export the selected measurement results to a csv file.

Grading overview will show the failure modes that were selected for each measurement when grading was enabled for the respective test method.

It is also possible to sort the data in the query screen in a special way. To sort the **Sample Nr** in ascending order left click the column header once. Click again to sort in descending order. A third click will remove the sort order. The query table can also be sorted by the **Sample Nr** according to sorting by **Seq Nr**.

Query edit: 'Query 6'

Multi selection ☐ Selection count 1 Nr of records 6

Sample Nr	Seq Nr	Pict.	Dis.	Code	%	Meas. S. date	Meas. S. time	Meas. E. date	Meas. E. time	Test time	Export	Result	Unit	Result type
Sample Nr: 1														
1	1	1				08.04.2024	11:18	08.04.2024	11:18	0.2240 [s]	☐	10,13	gf	Max Kraft
2	2	1				08.04.2024	11:57	08.04.2024	11:57	0.2440 [s]	☐	9,93	gf	Max Kraft
Sample Nr: 2														
3	1	2	☐	☒		10.04.2024	11:40	10.04.2024	11:40	0.0040 [s]	☐	6,04	gf	Max Kraft
4	2	2	☐	☒		10.04.2024	11:43	10.04.2024	11:43	0.0000 [s]	☐	3,83	gf	Max Kraft
5	3	2	☐	☐		10.04.2024	11:43	10.04.2024	11:43	0.2940 [s]	☐	10,18	gf	Max Kraft
6	4	2	☐	☐		10.04.2024	11:44	10.04.2024	11:44	0.3060 [s]	☐	10,21	gf	Max Kraft

Export

Cancel OK

Figure 103: Query screen with grouping by sample number

6.14 Position Correction Service

6.14.1 General information

The position correction service is a new method of mapping the complete machine. This service is implemented in software version 5.19 and higher. Previous software versions had the tool to camera offset to map the machine. With the position correction service, a reference mark on the machine is used to map

the machine. Now there are reference to tool offsets and camera to reference offsets, all mapped to the same point within the machine's dimensions.

The position correction service has a new wizard that guides the user through the different tasks to completely map the machine. With the position correction service installed and correctly setup on two or more machines it is easy to copy automations from one to the other machine. Automations that are copied require minimal work to become functional on the other machine.

The position correction wizard can be opened by clicking on the icon indicated in the following figure.

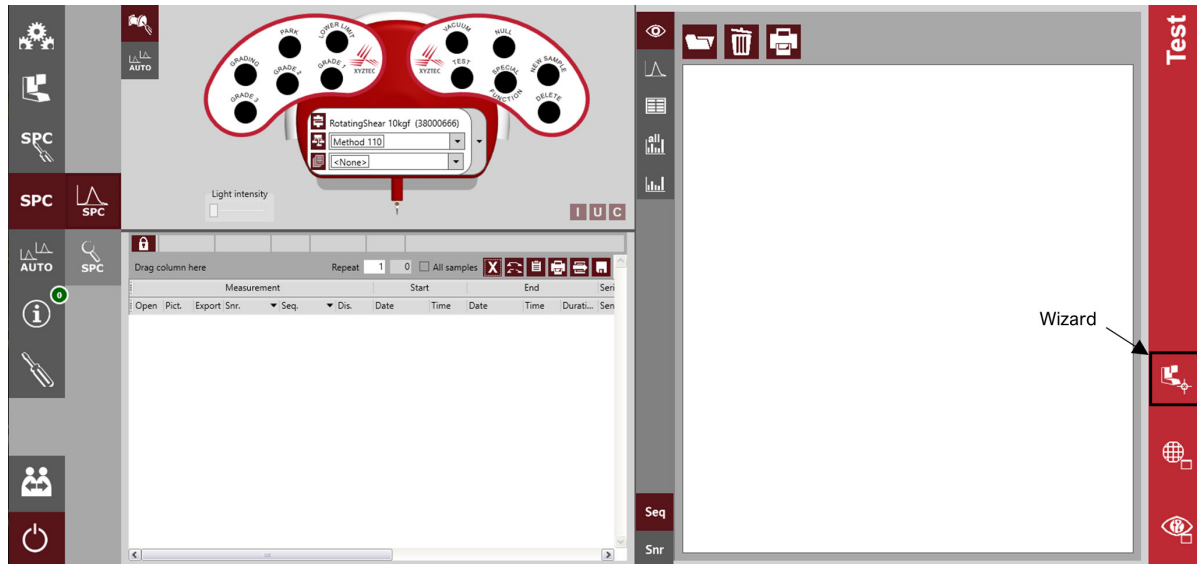


Figure 104: Position correction button

The first time the machine is installed no values are stored in the specific offsets. After the first time setting the offsets, they only need to be checked/adjusted when something is changed. The parts that are changed are used in the wizard as a guide to check/adjust the correct offsets.

6.14.2 The wizard

The wizard has different columns dividing the necessary actions. The first column asks the user what has changed, based on the selection the sub-menu (that helps with what needs to be done) also changes. The options here are:

- sensor/tool changed,
- offset camera changed,
- measurement unit changed, and
- workholder/reference changed.

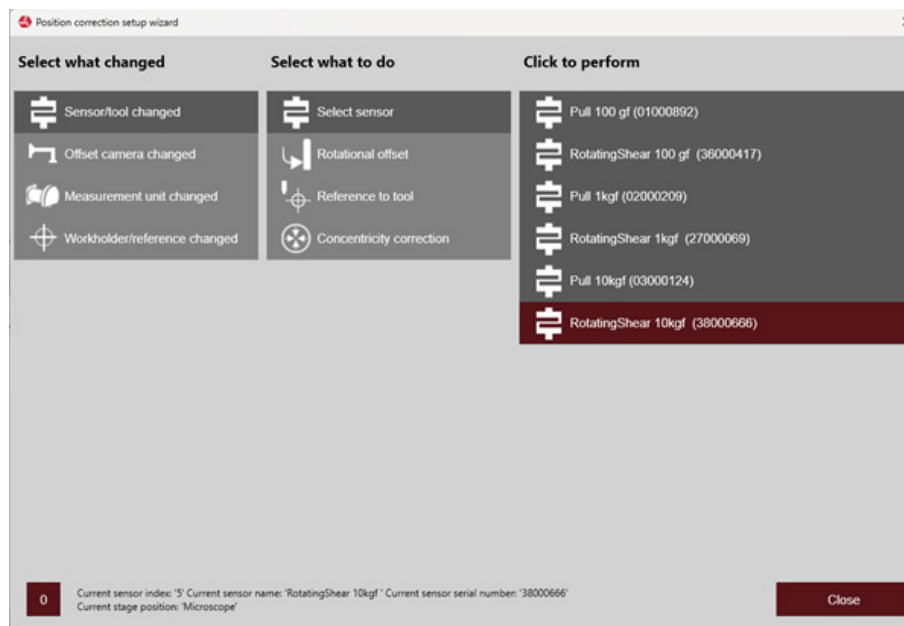


Figure 105: Position correction wizard

The following chapters are in order of the wizard and contain a description on how to set that specific feature. When an option is clicked in the column “Click to perform” an action is performed, or an additional wizard opens assisting with the actual action.

6.14.3 Sensor/tool changed

The first tab of the wizard is the **Sensor/tool changed** tab. In Figure 124 the settings that belong to this tab are shown.

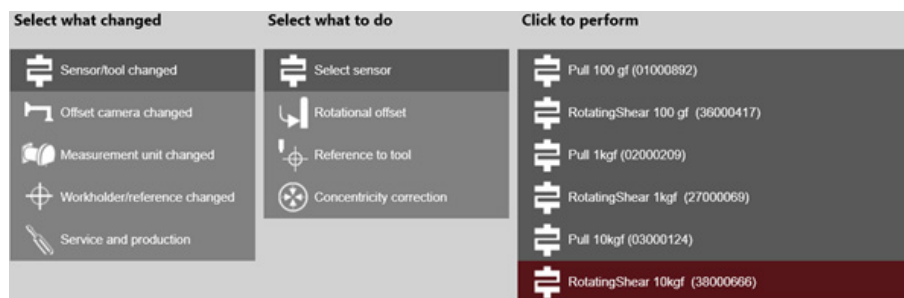


Figure 106: Sensor/tool changed

Select a sensor

The first thing that needs to be done is selecting the correct sensor. During first installation all sensors need to be setup correctly therefore it is useful to change sensors in the wizard itself. When a sensor is clicked in the **Click to perform** column the RMU starts to rotate.

Rotational offset

The second thing that needs to be done is setting the rotational offset for each rotating sensor. To set this, first select the sensor you want to use and go to the second sub-menu **Rotational offset**.



Figure 107: Rotational offset

Click **Rotational offset** in the **Click to perform** column to open the wizard where the rotational offset can be set. This wizard needs to be used to set the rotational offset. When the rotational offset is set click **OK** after this a message asking to perform a p-axis homing is shown if safe click on **OK**.

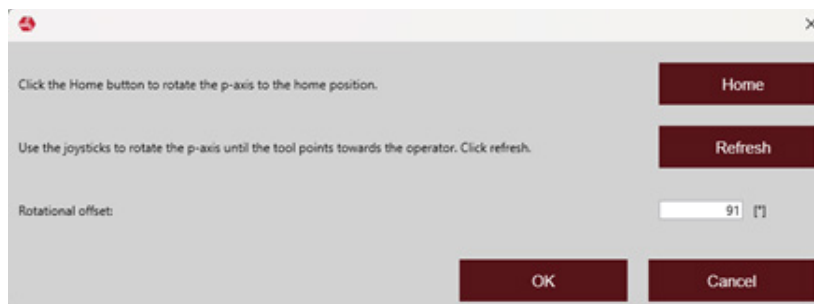


Figure 108: Rotational offset wizard

Reference to tool

Setting the reference to tool is the next step in the position correction wizard. For the users already familiar with the procedure that was used to set the 'tool to camera offset' the procedure here is similar only now a distinctive reference must be used.

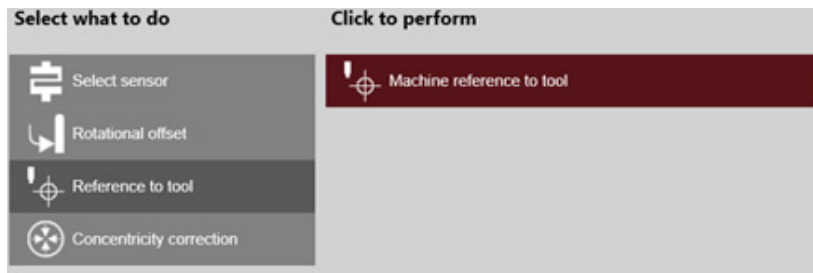


Figure 109: Reference to tool

A new wizard is designed to instruct about what needs to be done.

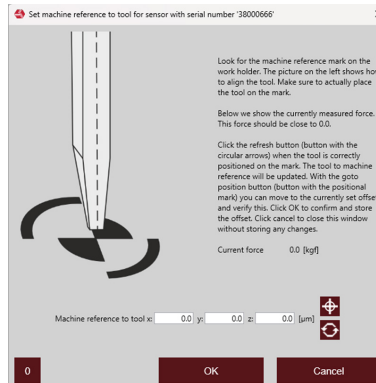


Figure 110: Reference to tool wizard

The general order of setting the reference to tool is as follows:

- move with the tool to the reference mark,
- align one side of the tool (left/right) with the mark (Figure 129-1),
- zero the relative coordinates with the '0' in the left-bottom corner of the wizard.
- move the tool until the centre of the tool is aligned with the mark (Figure 129-2). The relative coordinates can be used to move exactly half the width of the tool.

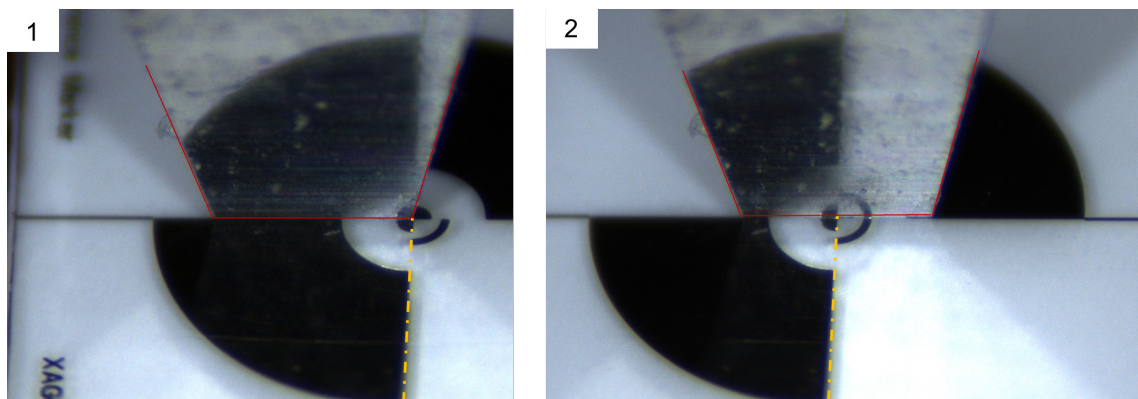


Figure 111: Reference to tool steps

When the tool is in the centre of the mark the refresh button can be pressed, and the current position is taken. The coordinates are shown in the reference to tool wizard.

Note: these do not match with the absolute coordinates shown in the bottom of the screen.

For pull sensor/pull hooks the procedure is the same. Only then the tool centre point is the centre point of the hook shaft.

Concentricity correction using a microscope

The concentricity correction can be set with two methods, one of those methods is with the microscope.

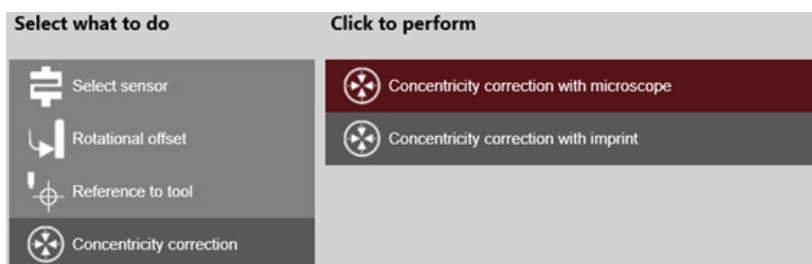


Figure 112: Concentricity correction using microscope

A new wizard is opened when the to be used method is clicked. This method starts with aligning the centre of the tool to the reference mark or another useful mark. The first setpoint is with the sensor at 0°. When correctly aligned click on the next button. The image in the wizard changes and now the sensor needs to be rotated to 90°. When at 90° the centre of the tool needs to be aligned to the reference mark again

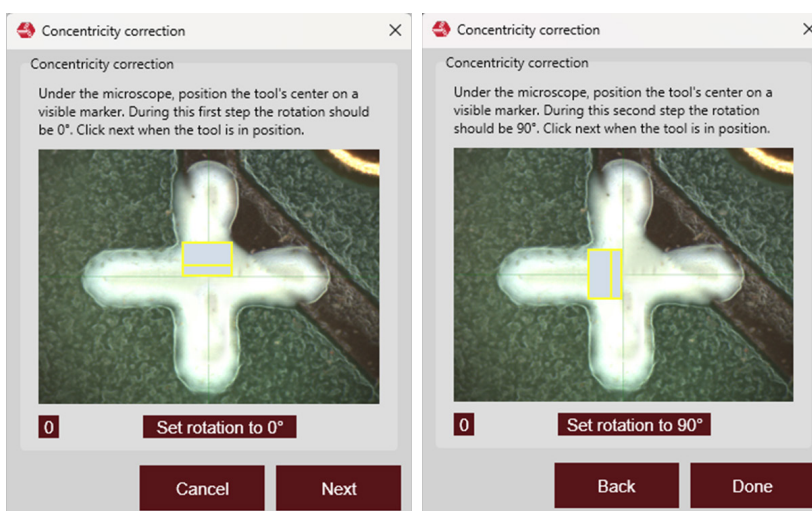


Figure 113: Concentricity correction

Note: the width of the tool needs to be aligned to the reference mark not the depth.

Make sure there is space left between the tool and the sample; the sensor rotates back to 0 when  is pressed.

Concentricity correction using imprint

To use this method the tool visualisation needs to be set in the sensor specific settings. Also, the camera that will be used needs to be mapped to the reference mark (Camera to reference).

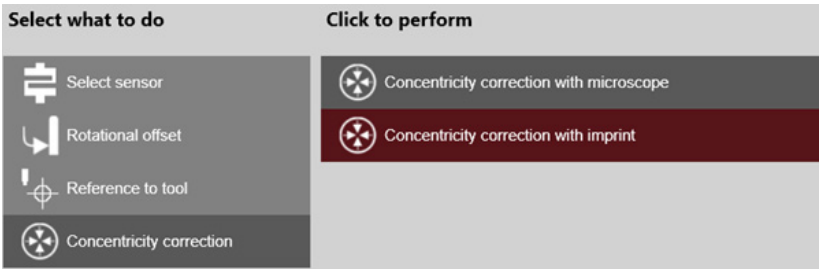


Figure 114: Concentricity correction by imprint

The concentricity correction with imprint uses an imprint and a camera. The imprint is a soft claylike material as shown on the right.

When the imprint is used the tool needs to be positioned just above the imprint material. When the 'Next' button is pressed in the wizard the machine will automatically make an imprint in the material. After that, the machine will move to the selected camera and the camera image is shown with the tool overlay. Move the machine with the joysticks to position the tool overlay in the imprint.

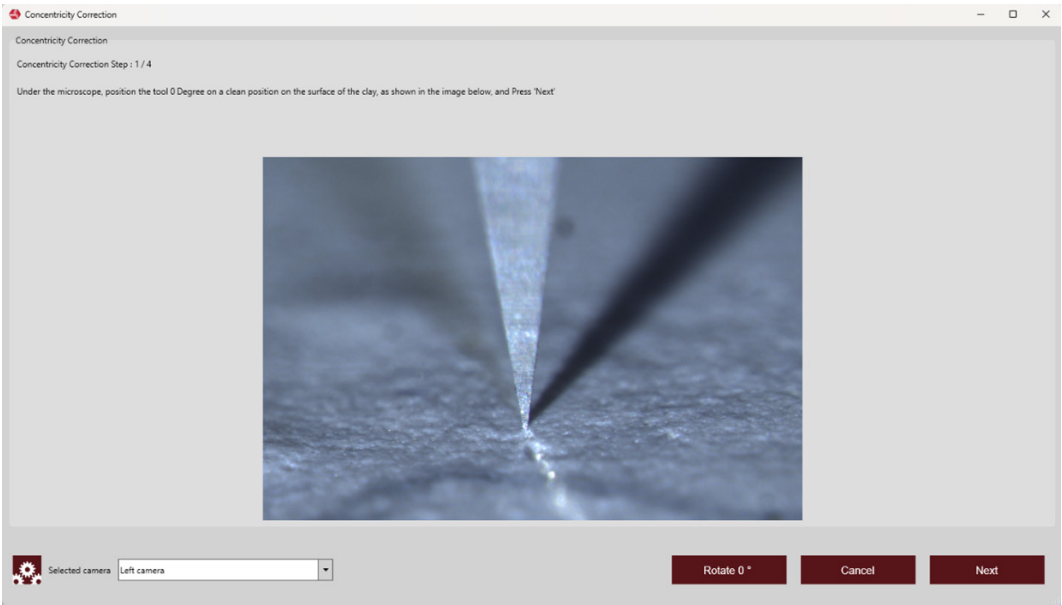


Figure 115: Concentricity correction using imprint, step 1

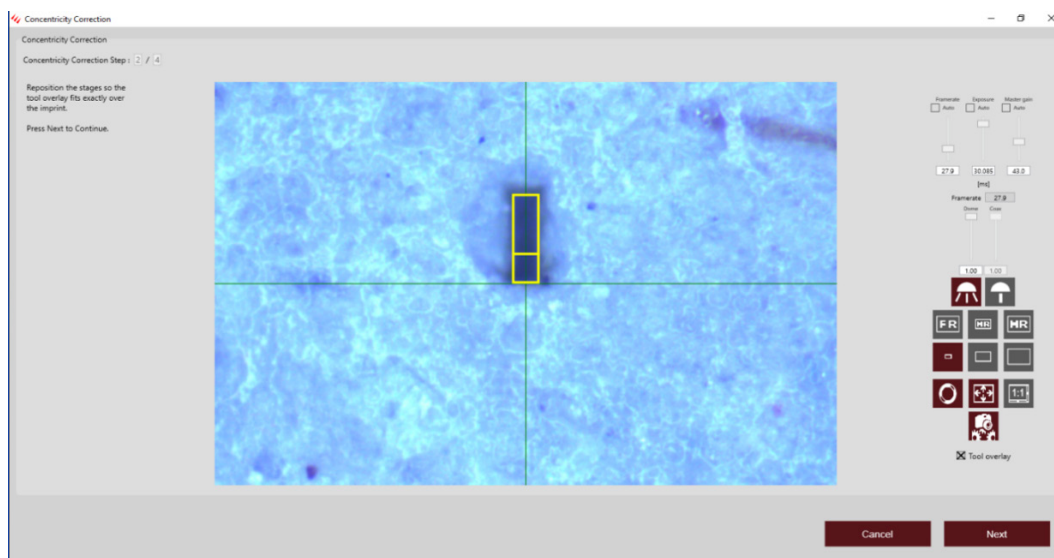


Figure 116: Concentricity correction using imprint, step 2

Step 3 and 4 of the concentricity correction with imprint are the same as step 1 and 2 but with the sensor rotated to another angle (default 180°). When the tool is positioned correctly in step 4 process can be finished by pressing **Done** and the correction values will be calculated and stored.

6.14.4 Offset camera change

The second tab in the **What has changed** column is **Offset camera changed**. These settings also need to be set during the first installation or checked when something changed. Changes can happen because of a service visit or when adding a new camera to the system.

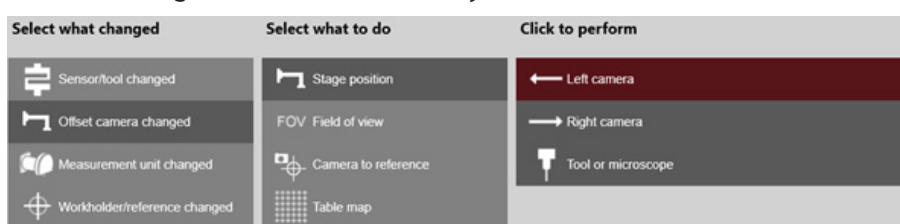


Figure 117: Offset camera changed

Stage position

The first thing is **Stage position** that can be used to switch between machine positions. To make all settings visible in this tab the machine needs to be on a camera position.

Field of view

In order to use the cameras for fiducials or double-click movements the field of view needs to be set.

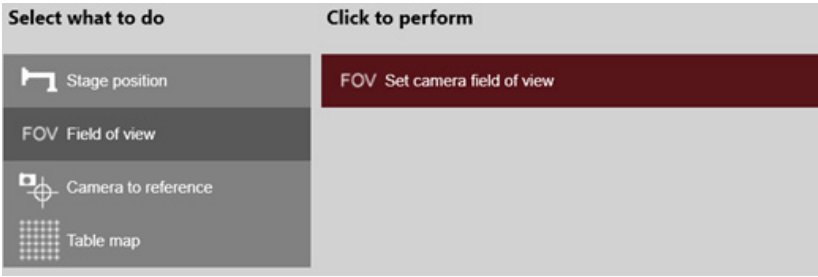


Figure 118: Field of view

When clicking on **FOV Set camera field of view** the live image of the current camera is opened. This live image starts with an informational message about setting the field of view. This message can be disabled to get a clear camera image.

Set the image resolution to high resolution and the field of view to the full field of view.

Center the fiducial in the camera view by moving the joysticks.

Click the fiducial area button under the drawing tools on the right side  and draw an area to define your fiducial. Make sure to set the score to 0.985 or better. The fiducial recognition result on the left side will show the set fiducial. The fiducial score should be better than the set score threshold.

Click the field of view button to perform the automatic field of view procedure.



Field of view procedure will be performed. If successful a dialog window will open and show the field of view that was determined. Click Yes to confirm or No to try again.

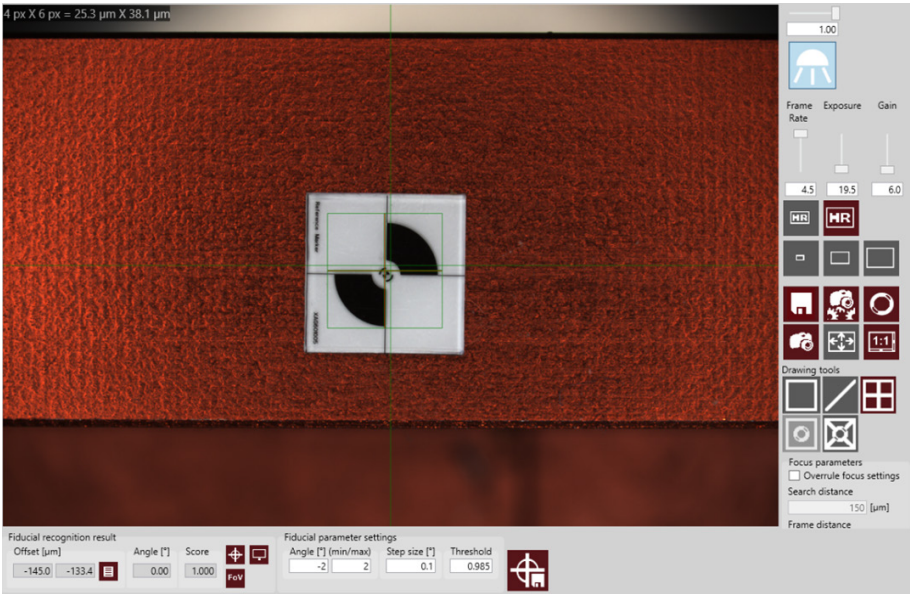


Figure 119: Field of view wizard

Camera to reference



Camera to machine reference

is to set the offset between the camera and the reference mark.

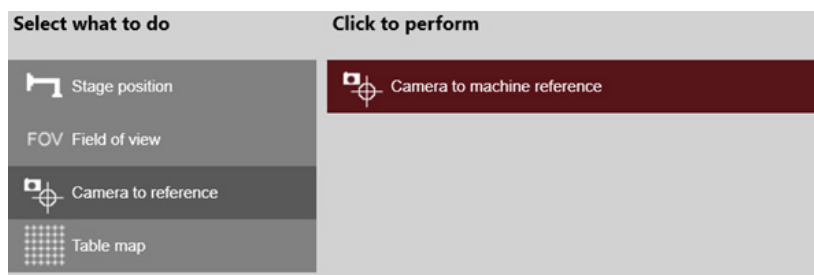


Figure 120: Camera to machine reference

Same as with the field of view the live image is opened when “Camera to machine reference” is pressed. Here as well an informational message is shown at first and can be disabled.

Move the crosshair over the machine reference, until the crosshair is in the center of the machine reference.

Click the Save button on the right side.



A dialog window will open and show the machine reference to camera offset.

Confirm with Yes if this is OK.

The offset will be stored.

Work holder/refen

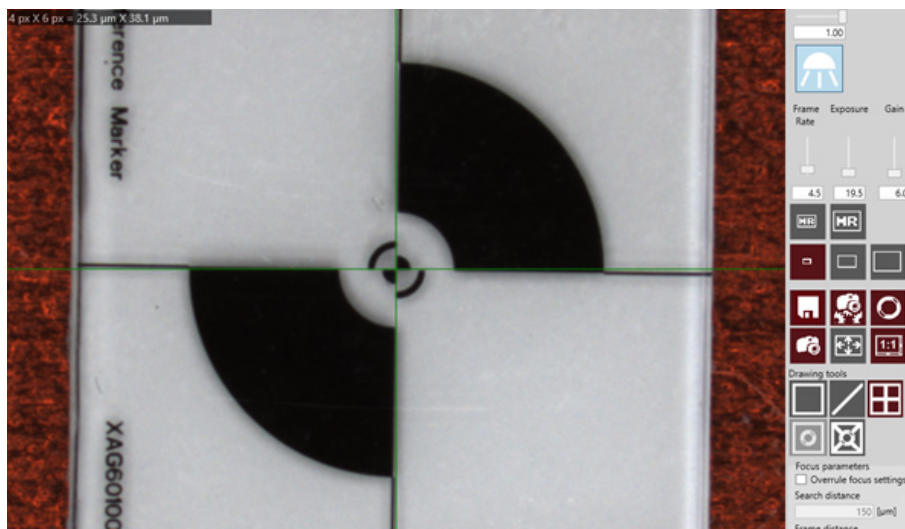


Figure 121: Camera to reference

6.14.5 Measurement unit changed

The third tab is dedicated to when the measurement unit has been changed. Because only the sensors are positioned in the RMU the possible actions in this tab are the same as for the sensor/tool change tab.

Select what changed	Select what to do	Click to perform
Sensor/tool changed	Select sensor	Pull 100 gf (01000892)
Offset camera changed	Rotational offset	RotatingShear 100 gf (36000417)
Measurement unit changed	Reference to tool	Pull 1kgf (02000209)
Workholder/reference changed	Concentricity correction	RotatingShear 1kgf (27000069)
		Pull 10kgf (03000124)
		RotatingShear 10kgf (38000666)

Figure 122: Measurement unit changed

This tab will be used to check the positions after the RMU has been taken off for service or any other reason.

6.14.6 Work holder/reference changed

The last tab is when the workholder/reference has been changed. This is suitable for the machines where the reference mark is positioned on the workholder. In this tab the camera to reference and the reference to tool offsets can be set as those are the only values that might have changed.

Select what changed	Select what to do	Click to perform
Sensor/tool changed	Stage position	Left camera
Offset camera changed	Camera to reference	Right camera
Measurement unit changed	Select sensor	Tool or microscope
Workholder/reference changed	Reference to tool	

Figure 123: Work holder/reference changed

7 Maintenance schedule

Item	When				Who
	As necessary	Daily	12 months	Required when disassembled	
Clean machine and empty debris collection tray	X				Operator
Check quick release interface clamp	X				Operator
Check test tools for damage or wear	X	X			Service
Cleaning linear encoder				X	Service
Lubricate linear rails and leadscrews			X		Service
Lubricate RMU locking pin			X		Service
Lubricate shear clamp gears			X		Service
Inspect all cables for wear or damage			X		Service
Lubricate RMU locking pin (Sigma, Sigma HF only)				X	Service

7.1 How to's...

7.1.1 ...adjust the shear tool

Before doing an actual sheartest, the tool has to be mounted properly. First fit the tool on the sensor with the two bolts and tighten the screws so the tool can just move as shown in the figure below.

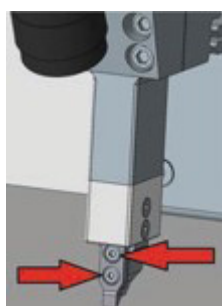


Figure 124: Set screws to adjust the shear tool

Put a touchdown load of 200gf on the tool, so it is pushed to the top stop of the sensor. Fix the two bolts, with the load applied, with a torque of 1,25 Nm. The touchdown load depends on the sensor force range hence a 100gf shear sensor just needs a touchdown load of 2 - 10 gf whereas the 200kgf shear sensor can go up to 200gf.

7.1.2 ...clean the machine and empty the debris collection tray

Open the drawer of the machine and clean the debris collection tray carefully as necessary with a vacuum

cleaner.

7.1.3 ...check quick release interface clamp and the test tools

Inspect the test tools and interface clamp for damage or wear and replace these if needed. In the event of any faults which you cannot remedy yourself, please contact XYZTEC.

7.1.4 ...lubricate linear rails and leadscrews

Lubrication of the linear rails and leadscrews should be done with Arcanol MULTITOP grease. The lubricant should be applied on the leadscrew and rails with a cloth. No big particles of the grease should be left, only a film is taken care of the lubrication of leadscrew and linear guides.

7.2 Service

Maintenances marked with “Service” should only be undertaken by a XYZTEC authorized service technician. Failure to comply voids the warranty. The contact details for XYZTEC are given at the back of these instructions.



T e c h n o l o g y l e a d e r i n b o n d t e s t i n g w o r l d w i d e