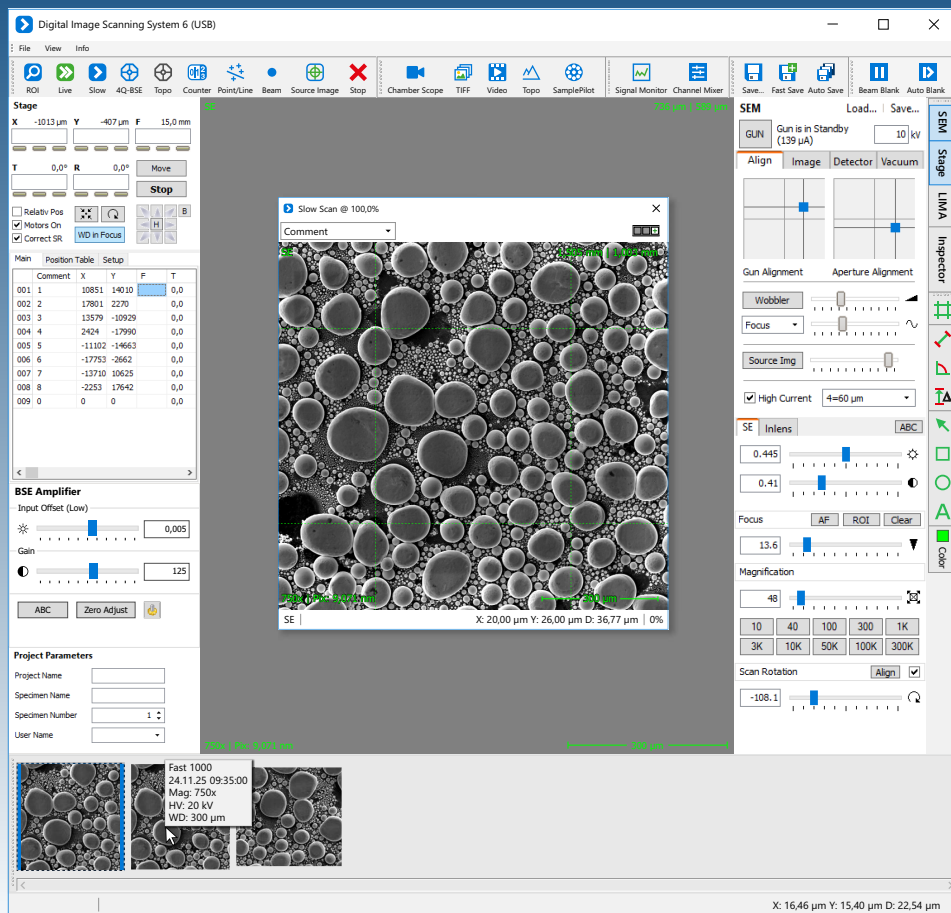




DISS 6 Software

Image Acquisition and Control for ZEISS Gemini

Reference guide

Version: 6.6.8.0

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Translation of German original

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- Product information** Product: Image Acquisition and Control for ZEISS Gemini
Name: DISS 6 Software
Manufacturer: point electronic GmbH

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1 Introduction

Chapter overview

Purpose This chapter contains information to simplify working with this document.

Contents This chapter contains the following information:

- › Basic provisions 8
- › User groups of this document. 9
- › Structure of this document 10
- › Representations in this document. 11
- › Identification of the warning notices. 13

Basic provisions

State of the art The software conforms to the state of the art and will be delivered factory-tested. Errors can never be ruled out.

point electronic GmbH cannot be held liable for any direct or indirect damage, especially damage to other software, hardware damage, damage due to downtime, damage due to software failure as well as damage to or loss of data.

Any user has to ensure that the software has been installed properly and is exclusively used in a way that does not compromise safe application.

No software modification The software must not be modified, neither by the acquirer nor by any third parties. The software must not be disintegrated, unencrypted or decompiled, neither as a whole nor in part.

Data loss The loss of data (e. g. measurement/analysis/control data etc.) may lead to interruptions of work flows, software failure and/or erroneous measurement results and evaluations.

- Make sure to back-up your data regularly.
- Make sure to back-up your data before updating the software or resetting it to default settings.

Cyber security actions Cyber attacks on the software and its environment can never be ruled out completely.

We thus strongly recommend to employ safety measures against potential cyber attacks like antivirus software, firewalls, access control etc. in the software environment.

User groups of this document

Operators "Operators" are persons with right of disposal over the DISS 6 Software who use it for acquisition or other purposes.

Technical staff "Technical staff" are those persons that the operators entrust with tasks related to use and operation. Technical staff are trained by the operators to carry out their assigned tasks and are informed on the potential hazards that may arise due to improper handling.

Technical staff need to undergo a training by point electronic GmbH or a partner company of point electronic GmbH covering the following topics:

- handling the connected SEMs
- areas of application and operation of the DISS 6 Software
- operating the hardware and connected peripherals
- basic maintenance tasks and troubleshooting

Service technicians "Service technicians" are staff members whose specialist training, knowledge and experience as well as familiarity with the relevant safety regulations mean they are able to assess the tasks they have been entrusted with and anticipate potential hazards.

Service technicians may be:

- employees of point electronic GmbH or
- employees of partner companies of point electronic GmbH

Structure of this document

- Outline** This document is structured into chapters which are organized by technical aspects.
- Numbering** The chapters are numbered by Arabic numerals. Chapters may be structured in sections. Sections are numbered as second numbering level (e. g. 3.1). Sections are used to structure large chapters into sub-chapters.
- All pages of this document are numbered consecutively.
- Overviews** Each chapter and section contains an overview detailing contents and page numbers. This allows for direct access to a topic and independent use of single parts of this document.
- Related information** Related information within the user guide is marked by the note "Continuation next page ..." resp. "... Continuation". Please pay attention to the completeness of thus marked information when copying parts of the document.
- Cross references** The content of this document is structured by topics. If further information on one topic may be found elsewhere in the document, the relevant chapter and page are pointed out.

Representations in this document

Illustrations Illustrations used in this document do not always contain all details or special cases. They only represent the relevant information.

Menu functions In this document, available menu functions are presented as follows:

Finding a menu item: File > Open

Keyboard shortcuts Frequently used functions and commands may be activated by using certain key combinations. Keyboard shortcuts are presented as follows:

Keyboard shortcut	Depiction
Key	[Ctrl]
Key combination	[Ctrl]+[Alt]

Inputs and outputs Certain recurring symbols or descriptions are used to symbolize possible screen inputs and outputs. They are used as follows:

Input and output	Depiction
Buttons	Button
Dialog windows	Dialog window
Elements of the user interface	GUI element

Mouse functions The following table explains the concepts used in this document to describe the handling of the mouse:

Term	Explanation
Click	Singular pressing of the left mouse button.
Double-click	Quick double pressing of the left mouse button.
Right click	Singular pressing of the right mouse button.
Pressed mouse button	Left or right mouse button is kept pressed during a process.
Drag & Drop	Click on an element of the user interface, drag the element with pressed mouse button to another position, release the mouse button to drop the element to this position.

Continuation next page ...

Icons The following icons are used to mark certain information visually:

Icon	Meaning
	Notice Example:  The selected parameter will not be inserted in the parameter order.
	Reference to another part of this guidebook Example:  see "Cross references" on page 10
	Use of a tool Example:  Screwdriver TX 10

Notice In this document, notices are presented as follows:

NOTICE

Mind the notices in this document!

Notices explain relations that even for expert users might not be evident at first glance.

Neglecting a notice does not pose a direct security risk. However, it can lead to disturbances in the work flow.

Identification of the warning notices

Purpose This document includes warning notices that may lead to serious consequences if disregarded. Warning notices are not only listed in the “Safety regulations” chapter, but especially in places where hazards for people, equipment and operation may arise.

Identification of hazards There are three classes of hazards. These classes are indicated by specific signal words and colors. They include the following:

Signal word	Meaning
 DANGER	Warning notice, which if disregarded will surely or very likely result in death or serious injury.
 WARNING	Warning notice, which if disregarded will probably result in serious injury, permanent damage to health or serious property loss.
 CAUTION	Warning notice, which if disregarded will probably result in injury or property loss including financial losses due to operational impairment.
ATTENTION	Warning notice, which if disregarded will probably result in property loss including financial losses due to operational impairment.



2 System Overview

Chapter overview

Purpose This chapter describes the DISS 6 Software. It contains information on system requirements as well as general descriptions of the software functions.

Contents This chapter contains the following information:

- › System requirements. 15
- › System description 16
- › Sliders and input fields 17

System requirements

Computer system The following table contains information on the minimum requirements of the computer's system:

Component	Minimum requirement
Computer	IBM-compatible from Core i3 Recommendation: Core i5
Operating system	From Windows 10 (32/64 Bit)
RAM	8GB
Graphics	Resolution at least 1280x1024 pixels, true color Recommended resolution: 1920x1200 pixels
Interfaces	Minimum three available USB 2.0 or USB 3.0 slots Minimum one available RS-232 slot Recommendation: 6 available USB slots, one available RS-232 slot
Periphery	Mouse with mouse wheel

System description

Introduction A SEM upgrade will turn an existing electron microscope into an up-to-date device and install current electronics and software.

The SEM upgrade includes new power supply for lenses and scanning coils, controls for vacuum, high voltages and sample stage, detector amplifiers and a completely new image system for high-resolution scans and precise signal acquisition.

Components The overall systems consists of:

- DISS 6 image system,
- controls for optoelectronic devices, emitters, detectors,
- vacuum logic,
- motor control of the sample stage,
- SEM panel,
- joystick panel,
- DISS 6 software,
- DIPS software for image processing.

DISS 6 image system With the DISS 6 image system, up to 8 analog and 12 impulse input signals may be recorded simultaneously.

Image format and resolution are customizable.

A region scan with zoom function facilitates focusing and astigmatism correction.

For improvement of the signal-to-noise ratio, functions like adjustable scan time and line and frame averaging are available.

SEM control SEM control includes the control of all functions of the electron microscope. All settings can be saved in configuration files and can be reloaded as necessary.

DIPS software All acquired images may be processed, labeled, captioned, measured, printed and saved with the DIPS software. A specific layout technology facilitates handling of several related images and supports documentation and storage.

Sliders and input fields

Operation of the sliders Use of the sliders with the mouse allows for a very fine setting for high-resolution D/A converters as well as simple manipulation for fast coarse setting.

As a default, the slider function **Standard** is activated, however, this might be changed in the file DISS6.ini.

The following table contains information on operating the sliders with the mouse:

Slider function	Operation
Standard Entry in DISS6.ini: HiResSliders=1	The mouse button does not have to be pressed during slider setting. - Click a slider. → The slider is coupled to the mouse pointer (X/Y). - Any further click: Switches between fine and coarse setting. In the coarse setting, the slider is displayed in red. - Move the mouse to change the slider value. - Right-click the slider to uncouple the slider from the mouse pointer. → The slider flashes. - Optional: Adjust the slider value by turning the mouse wheel (see slider function Blink). - Perform any other action (e. g. select a different slider, click a button, etc.) to end mouse operation. i Pressing the [Esc] key cancels the mouse operation and resets the slider to its initial value.
Alternative Entry in DISS6.ini: HiResSliders=2	The mouse button has to be pressed during slider setting. - Click a slider and keep the mouse button pressed. - Press the space bar to switch between fine and coarse setting. In the coarse setting, the slider is displayed in red. - Move the mouse or turn the mouse wheel (see slider function Blink) to modify the slider value. - Release the mouse button. → Mouse operation ends. → The set values are saved.
Basic Entry in DISS6.ini: HiResSliders=0	Direct control of the sliders with the mouse button. - Click a slider and keep the mouse button pressed. - Press the space bar to switch between coarse and fine setting. In the fine setting, the slider is displayed in green. - Move the mouse or turn the mouse wheel (see slider function Blink) to modify the slider value. - Release the mouse button. → Mouse operation ends. → The set values are saved.

Continuation next page ...

Slider function	Operation
Blink	Operating the sliders with the mouse wheel in the Standard, Alternative and Basic functions. 1. Right-click a slider. → The slider is selected and flashes. 2. Turn the mouse wheel to change the slider value as follows: – Turning the mouse wheel: Changes the value in X direction. – Pressing [Shift] and turning the mouse wheel: Changes the value in Y direction. – Additionally holding the [Ctrl] key: Changes the value by the factor 10. – Additionally holding the [Ctrl]+[Alt] keys: Changes the value by the factor 100. 3. Optional: Set the slider to a central position as follows: – Press [*] in the number pad for horizontal central position – Press [Shift]+[*] (number pad) for vertical central position 4. Perform any other action (e. g. select a different slider, click a button, etc.) to end mouse operation. → Mouse operation ends.

Input fields The preferred values may be entered in the white input fields. When the values are confirmed with the Return key, the numbers change from red to black.



3 Installation

Chapter overview

Purpose This chapter contains information and instructions on installation of the DISS 6 Software.

Contents This chapter contains the following information:

- › Software installation 20

Software installation

Installer The DISS 6 Software is provided on a USB flash drive. Running the file "diss6setup.exe" launches the installer.

The installer installs the following components:

- PE USB driver (compatible from Windows 10, 32/64 bit)
- DISS 6 Software
- Digital Image Processing System DIPS
- Configuration files
- Documentation

NOTICE

Install the software before connecting the hardware!

Always install the DISS 6 Software first before connecting the hardware to the PC.

Continuation next page ...

Steps Complete the following steps to install the DISS 6 Software:

1. Connect the provided flash drive to the computer.
2. Start the file "diss6setup.exe" from the flash drive.
3. Follow the instructions on the screen.
→ The installation proceeds. Application and necessary driver are installed.

NOTICE

User interface language

The user interface of the DISS 6 Software is only available in English.

CAUTION

Maintaining software settings during upgrades!

During upgrading an older version, two confirmation prompts will appear on the screen. You will have to confirm whether or not the current installation is to override the existing configuration files.

- Click **No** in both confirmation prompts to maintain your software settings and to use them for the DISS 6 Software.



4 User Interface

Chapter overview

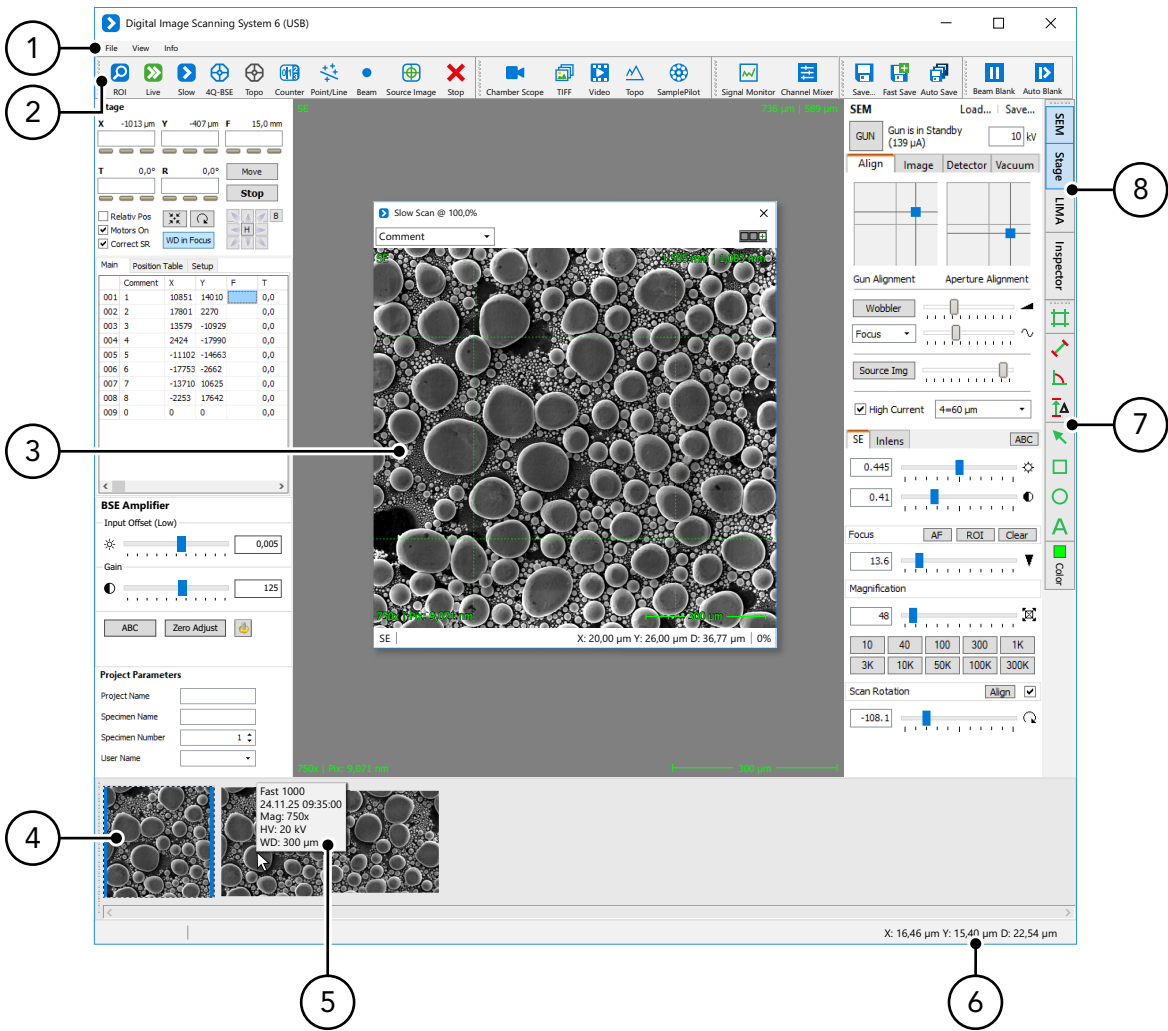
Purpose This chapter contains descriptions of the structure and function of the image acquisition software's user interface.

Contents This chapter contains the following information:

- › Overview 23
- › Menu bar 25
- › Toolbars 27
- › Image acquisition window 31
- › Image preview 33
- › Hint 34

Overview

Structure The following figure shows user interface of the DISS 6 Software with its main components:



Function The following table contains information on the main components of the user interface:

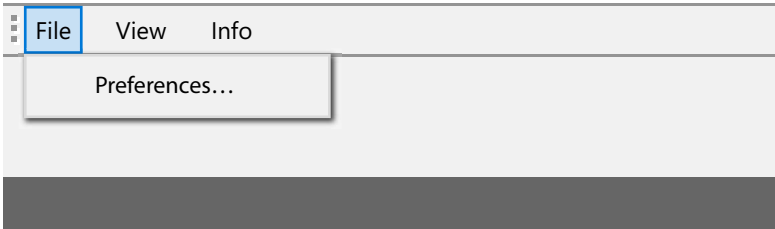
No.	Main component	Function
1	Menu bar	Global settings. 📖 see "Menu bar" on page 25
2	Toolbars	Tools for acquisition, settings and management of images. 📖 see "Toolbars" on page 27
3	Image Acquisition window	Shows the current scanning process of one or multiple signal sources with differing parameter values (depending on settings). 📖 see "Image acquisition window" on page 31

Continuation next page ...

No.	Main component	Function
4	Image preview	Clipboard of acquired images.  see "Image preview" on page 33
5	Hint	Displays selected metadata of images.  see "Hint" on page 34
6	Status bar	Shows the values of the current measurement (e. g. X/Y position and working distance).
7	Measurement and callout tools	Contains tools for measurements and captions in acquired images.  see "Measuring and Labelling" on page 215
8	Control panels	Control panels for differing functions.  The available control panels depend on the specific configuration of the DISS 6 Software.

Menu bar

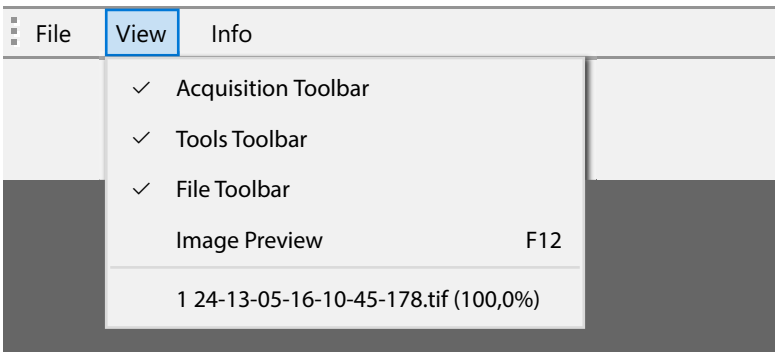
File menu The following figure shows the File menu with its components:



The following table contains information on the components of the File menu:

Component	Function
Preferences...	Opens the Preferences dialog window for global preferences for saving and naming images.

View menu The following figure shows the View menu with its components:

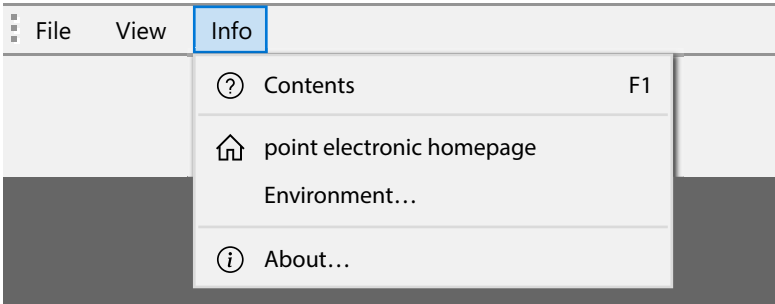


The following table contains information on the components of the View menu:

Component	Function
Acquisition Toolbar	Activates/deactivates the “Acquisition” toolbar with scanning functions.
Tools Toolbar	Activates/deactivates the “Tools” toolbar.
File Toolbar	Activates/deactivates the “File” toolbar with saving functions.
Image Preview	Activates or deactivates the image preview.
File name	Shows the name of the current image.

Continuation next page ...

Info menu The following figure shows the Info menu with its components:



The following table contains information on the components of the Info menu:

Component	Function
Contents	Opens the reference guide in a separate window.
point electronic homepage	– Establishes a connection to the Internet. – Opens the website pointelectronic.de in a browser window.
Environment...	Opens a dialog window that shows the saving locations of the configuration files and loaded plugins.
About...	Opens a dialog window with information on the installed version of the DISS 6 Software and the connected DISS 6 hardware.

Toolbars

Acquisition The following figure shows the Acquisition toolbar with its buttons:



The following table contains information on the Acquisition toolbar buttons:

Button	Function	Description
	Region scan (Page 142)	Starts a Region scan.
	Live scan (Page 145)	Starts a continuous live preview.
	Slow scan (Page 149)	Starts a Slow scan.
	4Q-BSE scan (device-dependent)	Starts a scan for image acquisition with a 4-quadrant BSE detector.
	Topo scan (optional) (Page 210)	Starts a scan with advanced settings for topography image acquisition. i Only available with BSE topography.
	Counter scan (Page 153)	Starts a Counter scan for counting TTL impulses.
	Line Scan/Point Measurement (Page 157)	Opens a dialog window for set-up and operation of line and point measurements.
	Beam positioning (Page 174)	For positioning the electron beam on the sample.
	Source Image (Page 175)	Starts the aperture mapping and supports aperture adjustment.
	Stop (Page 194)	Cancels an ongoing scanning process.

Continuation next page ...

Optional extensions The following figure shows the optional extensions toolbar with its buttons:



The following table contains information on the optional extensions buttons:

Button	Function	Description
	Chamber Scope (optional) (Page 137)	Shows a live view of the sample chamber camera.
	TIFF Recorder (optional) (Page 183)	Opens a dialog window for setting and recording bit-map images in a continuous scan.
	Video Recorder (optional) (Page 185)	Opens a dialog window for set-up and recording of videos in a continuous scan.
	BSE Topography (optional) (Page 199)	Opens a dialog window for generation, visualization and export of a 3D surface model in Live mode.
	SamplePilot (optional) (Page 102)	Opens a dialog window for optical navigation and control of motorized sample stages.

Continuation next page ...

Tools The following figure shows the Tools toolbar with its buttons:



The following table contains information on the Tools toolbar buttons:

Button	Function	Description
	Signal Monitor (Page 196)	Opens the Signal Monitor.
	Channel Mixer (Page 190)	Opens a dialog window for live mixing of image signals.

File The following figure shows the File toolbar with its buttons:



The following table contains information on the File toolbar buttons:

Button	Function	Description
	Save (Page 238)	Opens a dialog window for saving the current image or layout.
	Fast Save (Page 239)	Saves the current image or layout without opening a dialog window. i The current image or layout will be saved in the pre-set saving location under the preset automatically assigned file name.
	Auto Save (Page 240)	If Auto Save is activated, the current image or layout will be saved automatically after completion of the scanning process. i The current image or layout will be saved in the pre-set saving location under the preset automatically assigned file name.

SEM functions The following figure shows the SEM Control toolbar with its buttons:

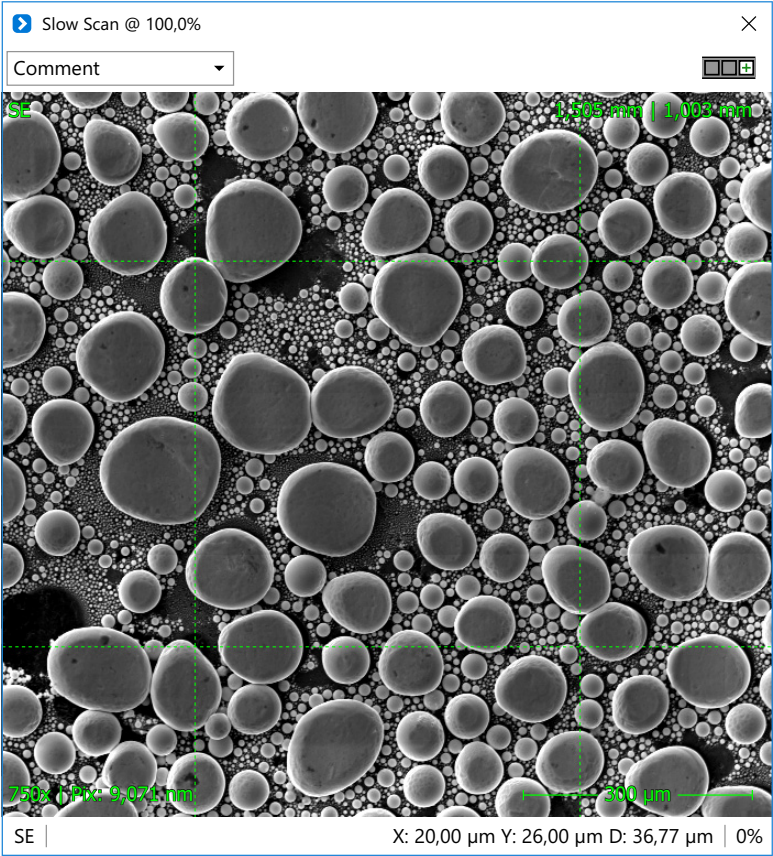


The following table contains information on the SEM Control buttons:

Button	Function	Description
	Beam Blank	Interrupts/activates the electron beam. If Beam Blank has been activated, the electron beam will be set to the Blank position of the multiple-hole aperture.
	Auto Blank (optional)	Auto function for beam interruption.

Image acquisition window

Structure The following figure shows the Image acquisition window with its components:



Function The following table contains information on the components of the Image acquisition window:

Component	Function
Title bar	Shows the name of the current scan and the window magnification as percentage.
Comment field	For entering an image comment. Previously entered comments may be chosen from a history.
	Deposits the scanned image in the image preview bar.
Image	Shows the current scanning process.
Header within image  Page 52	Shows values of several parameters that may be set in the Live Overlay settings.

Continuation next page ...

Component	Function
Footer within image 📄 Page 51	– Shows values of several parameters that may be set in the Live Overlay settings. – On the bottom right in the footer, the micron bar showing the scale of the image will always be displayed.
Status bar	Shows information on the current scanning process: – Current input signal source – Measurement data (📄 see “Reading out the measurement values” on page 219) – Scanning progress in percent

Multiple input signal sources Depending on the scan settings, multiple (analog and digital) signal sources may be acquired and displayed in the Image Acquisition window.

The following figure shows the Image acquisition window with several input signal sources:

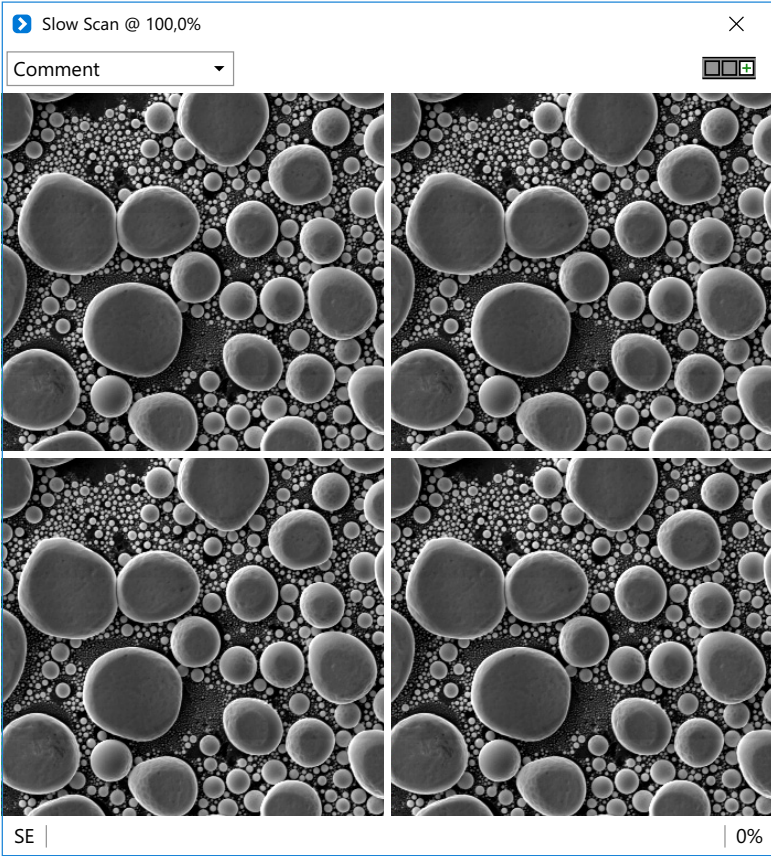
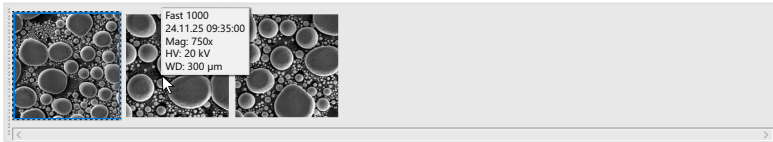


Image preview

Description The acquired images are temporarily saved in the image preview and will be shown there as thumbnails.

By clicking on a thumbnail, the corresponding image opens up. The selected thumbnail is highlighted in blue.

Structure The following figure shows the image preview with the hint:



Context menu Right-clicking a thumbnail opens a context menu.

The following table contains information on the components of the context menu:

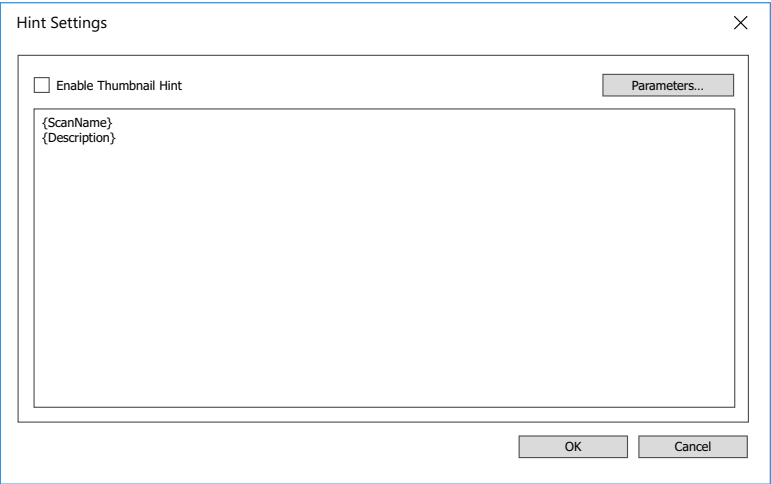
Component	Function
Delete	Deletes the image.
Hint Settings...	Opens the Hint Settings dialog window.  see “Hint Settings” on page 34

Hint

Description The Hint field shows image data of an image in the image preview. Image hints will be displayed as soon as the mouse cursor is placed on that image.

The information shown is saved as meta data in XMP format with the acquired image. Such meta data may for instance contain image comments, acquisition date or magnification.

Hint Settings Use the right mouse button to click on an image in the image preview and choose **Hint Settings ...** from the context menu to open the **Hint Settings** window:



The following table contains information on the components of the **Hint Settings** dialog window:

Component	Function
Enable Thumbnail Hint	Activates/deactivates the display of hints in the image preview.
Parameters ...  Page 55	Opens the Parameters window for setting and inserting global parameters for hints display.
Parameter field	In the Parameter field, parameters are inserted and arranged. Parameters are displayed symbolically as parameter name in curly brackets. Between parameters, any text (including special characters or breaks) may be inserted.
OK	Closes the dialog window. The preset parameters are saved.
Cancel	Closes the dialog window. The preset parameters are rejected.



5 Software Information

Chapter overview

Purpose This chapter describes the structure and function of dialog windows that provide information on the software and the software environment.

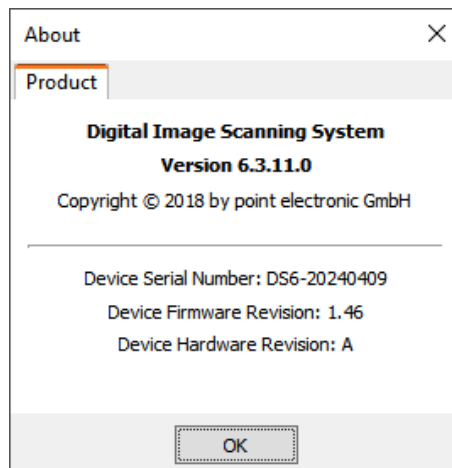
Contents This chapter contains the following information:

- › About. 36
- › Environment 37

About

Description The About function opens a dialog window with product information on the version of the installed image acquisition software as well as the connected image acquisition electronics.

Dialog window The following figure shows the **About** dialog window:

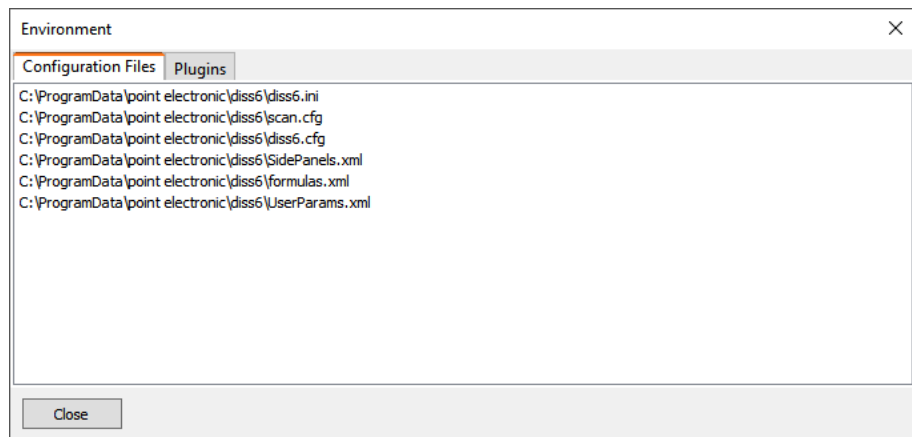


Environment

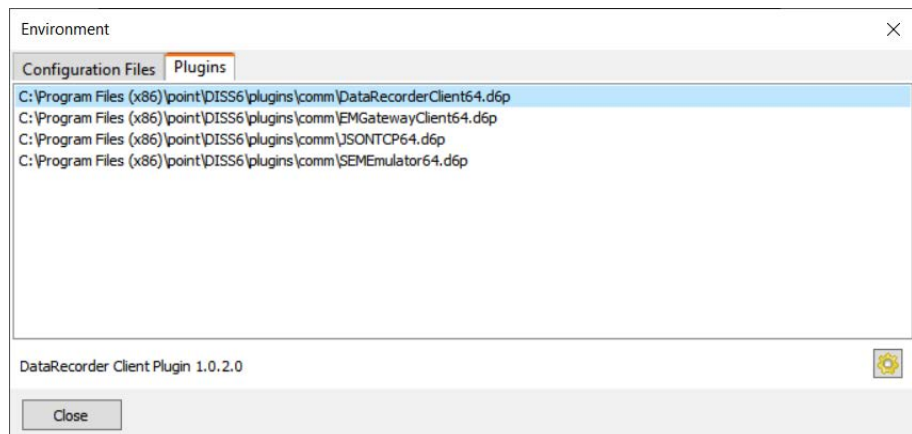
Description The Environment function opens a dialog window which shows the saving locations of the configuration files and installed plugins.

The savings locations may not always be the same but instead depend on the operation system. The **Environment** dialog window shows the saving locations' paths.

Configuration Files tab The Configuration Files tab shows the saving locations of all configuration files.



Plugins tab The Plugins tab shows all currently loaded plugins including their version numbers.



Continuation next page ...

- Opening a configuration file** Complete the following steps to open the configuration files or savings locations:
1. Switch to the -Configuration Files tab in the **Environment** dialog window.
 2. Click an item within the configuration file list to select it.
 3. Click this item with the right mouse button and select the needed function in the context menu.
- Configuring a plugin** Complete the following steps to configure a plugin:
1. Switch to the Plugins tab in the **Environment** dialog window.
 2. Click the needed plugin in the list to select it.
 3. Click the cog icon.
→ A dialog window for configuring the selected plugin opens.

6 Default Settings and Configuration

Chapter overview

Purpose This chapter contains descriptions of and instructions on setting up the software.

Contents This chapter contains the following information:

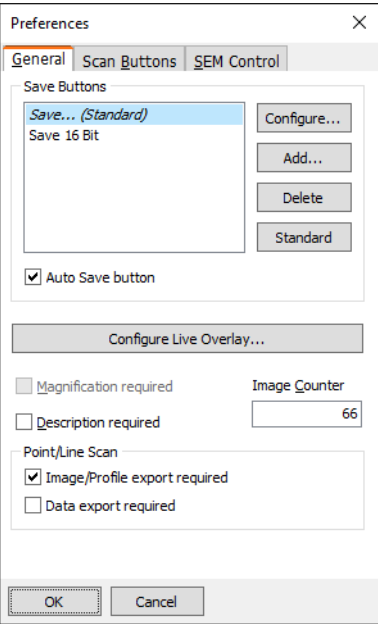
- › Preferences 40
- › Configuring Save buttons 44
- › Configuring Live Overlay. 50
- › Configuring parameters 55

Preferences

Description The Preferences function sets the global preferences for the DISS 6 Software.

General tab In the General tab, general settings for the DISS 6 Software can be found.

The following figure shows the **Preferences** dialog window with the General tab:



The following table contains information on the components of the General tab:

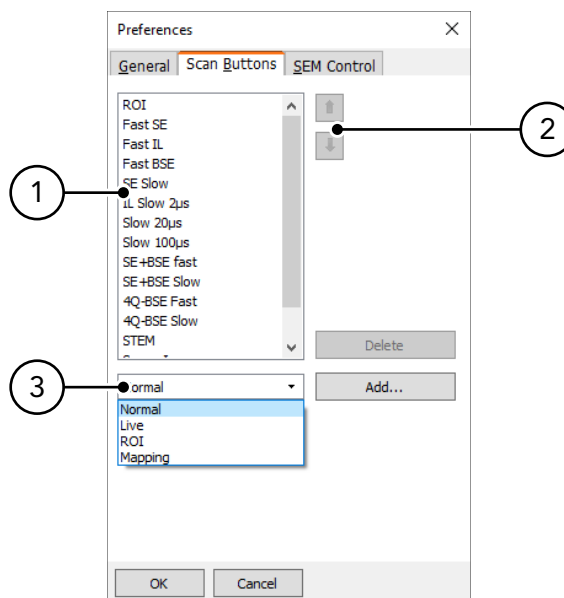
Component	Function
Save Buttons	Shows the configured Save buttons. Save buttons may be selected by clicking on them.
– Configure... (Page 44)	Configures the selected Save button. Opens the Save Settings dialog window.
– Add...	For adding Save buttons. Opens the Save Settings dialog window.
– Delete	Deletes the selected Save button.
– Standard	For defining the selected Save button as default. The default Save button will be used: – for the Save Image... function in the channel mixer – for the Image Export... function in Line Scan/Point Measurement
– Auto Save button	Hiding or unhiding the Auto Save button.

Continuation next page ...

Component	Function
Configure Live Overlay... (Page 50)	Configures header and footer of the Image Acquisition window. Opens the Live Overlay Settings window.
Magnification required	Activates a warning if no value is entered in the Mag field. i This function will be deactivated if the magnification is read out automatically.
Description required	Activates a warning if no image description has been entered for the image acquisition.
Image Counter	Enables setting/resetting the consecutive image number.
Point/Line scan	Activates warnings when closing the Point/Line Measurement dialog window.
– Image/Profile export required	Activates a warning if no image or diagram is exported.
– Data export required	Activates a warning if no data is exported.
OK	Closes the dialog window. The settings are applied.
Cancel	Closes the dialog window. All settings are rejected.

Scan Buttons tab The Scan Buttons tab contains functions for configuring the Scan buttons.

The following figure shows the **Preferences** dialog window with the **Scan Buttons** tab:



Continuation next page ...

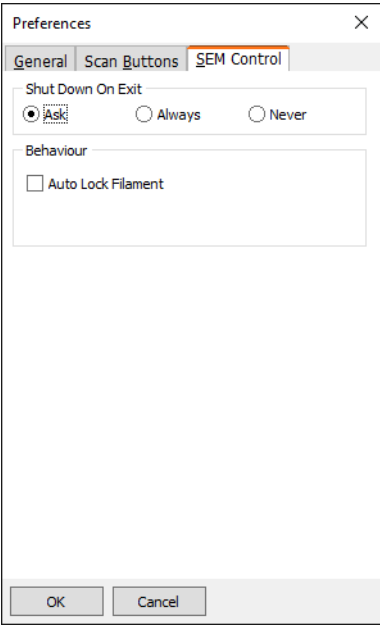
The following table contains information on the components of the Scan Buttons tab:

No.	Component	Function
1	Button order	Preview of the Scan button order in the image acquisition bar. Scan buttons may be selected by clicking on them.
2	Sorting buttons	 selected Scan button up  selected Scan button down
	Delete	Deletes the selected Scan button from the button order. <i>i</i> Scan buttons for topography image acquisition (Topo scan) cannot be deleted.
3	Template selection	Selecting a configured template for a Scan button.
	Add...	Creating a new Scan button from a selected template. Opens the Scan Button Caption dialog window for defining a Scan button caption.
	OK	Closes the dialog window. The settings are applied. <i>i</i> After creating new Scan buttons and clicking OK , a warning tells you that you have to close and restart the software. Without restarting the software, new Scan buttons will not be displayed, and all changes to existing Scan buttons settings from this point on will be lost.
	Cancel	Closes the dialog window. All settings are rejected.

Continuation next page ...

SEM Control tab The SEM Control tab contains functions to set up the DISS 6 Software.

The following figure shows the **Preferences** dialog window with the SEM Control tab:



The following table contains information on the components of the SEM Control tab:

Component	Function
Shut Down On Exit	Defines the shut-down behavior of SEM when closing the DISS 6 Software.
– Ask	Opens a dialog window with shut-down options for the SEM after closing the DISS 6 Software.
– Always	SEM shuts down automatically after closing the DISS 6 Software.
– Never	SEM keeps running after closing the DISS 6 Software.
Behaviour	
– Auto Lock Filament (device-dependent)	Activates or deactivates a checkbox in the Beam field of the SEM control panel. With this checkbox, the Filament slider can be locked or unlocked.
OK	Closes the dialog window. The settings are applied.
Cancel	Closes the dialog window. All settings are rejected.

Configuring Save buttons

Description Save button saving functions may be configured in the **Save Settings** dialog window. Saving functions may include image format and image captions among others.

The **Save Settings** dialog window opens after a right-click on a Save button or after clicking the **Configure...** or **Add...** buttons in the **Preferences** dialog window in the General tab.

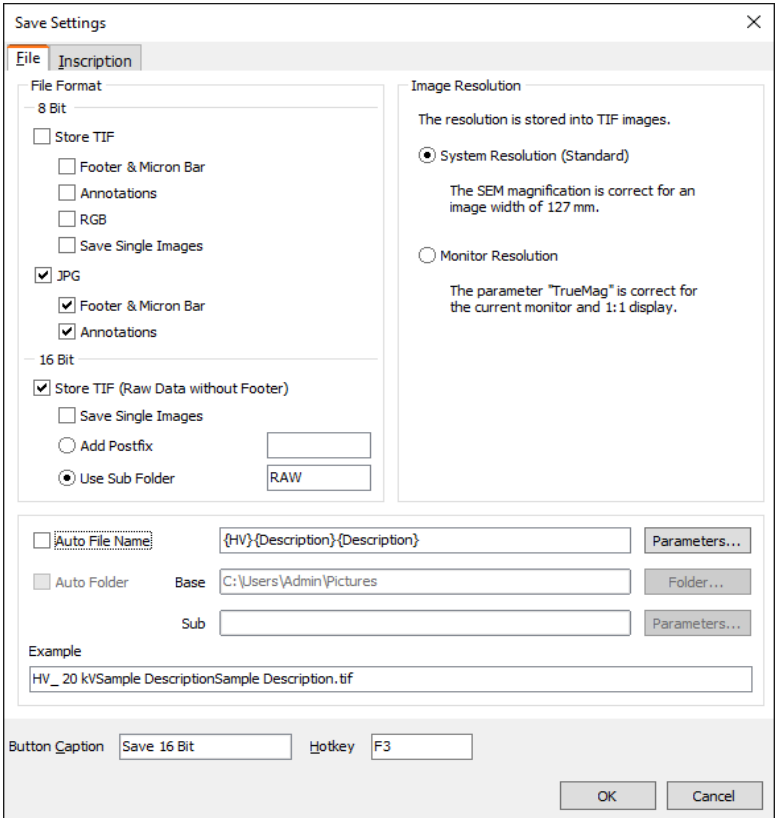
General settings The general settings in the **Save Settings** dialog window may be entered regardless of the chosen tab.

The following table contains information on the general settings in the **Save Settings** dialog window:

Component	Function
Button Caption	For entering the Save button caption.
Hotkey	For entering a Save button hotkey. For recording a hotkey, place the cursor in the Hotkey text field and press the particular key or key combination.
OK	Closes the dialog window. The settings are applied.
Cancel	Closes the dialog window. All settings are rejected.

Continuation next page ...

File tab The following figure shows the **Save Settings** dialog window with the **File** tab:



The following table contains information on the components of the **File** tab:

Component	Function
File Format	Setting one or more formats for saving the acquired images.
8-bit	Settings for the 8-bit format.
– Store TIF	Activated: Acquired images are saved as 8-bit TIFF file.
– Footer & Micron Bar	Activated: Footer and micron bar are saved within the 8-bit TIFF image.
– Annotations	Activated: Measurements and captions are saved within the 8-bit TIFF image.
– RGB	Activated: The image is saved in RGB colors. Deactivated: The image is saved in 256 gray scales.
– Save Single Images	Activated: Images acquired with multiple input signal sources are saved as single frames. The signal names will be added as file name extension. Deactivated: The images are saved in a 8-bit multipage TIFF file.
– JPG	Activated: Acquired images are saved as 8-bit JPG file.

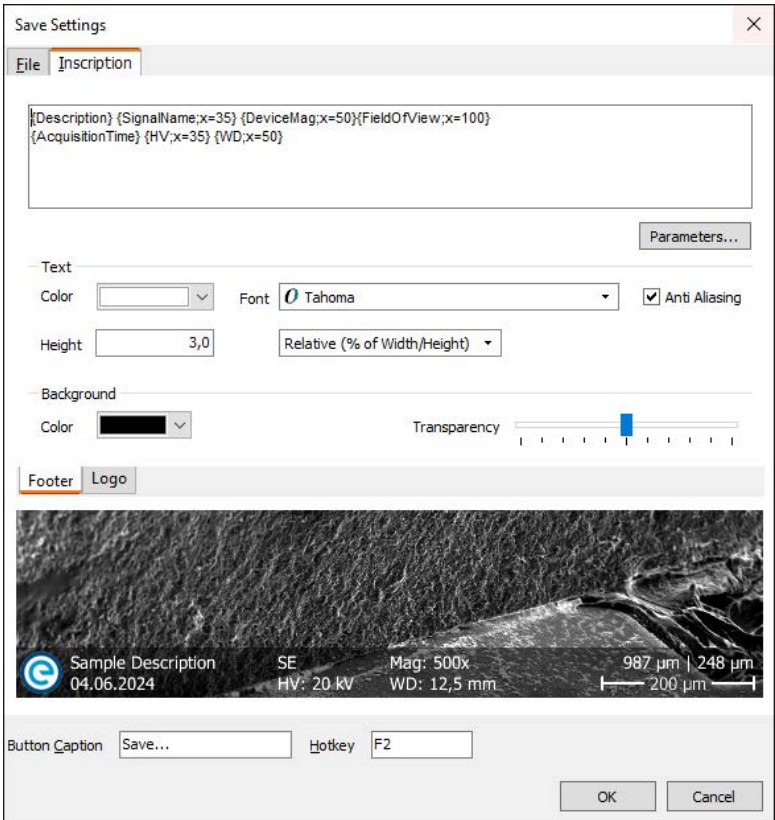
Continuation next page ...

Component	Function
– Footer & Micron Bar	Activated: Footer and micron bar are saved within the 8-bit JPG image.
– Annotations	Activated: Measurements and captions are saved within the 8-bit JPG image.
16-bit	Settings for the 16-bit format.
– Store TIF (RAW Data without Footer)	Activated: Acquired images are saved as 16-bit TIFF file in RAW format. i Only the image's raw data will be saved. It is not possible to save footers in the image.
– Save Single Images	Activated: Images acquired with multiple input signal sources are saved as single frames. The signal names will be added as file name extension. Deactivated: The images are saved in a 16-bit multipage TIFF file.
– Add Postfix	Enter a postfix. The entered postfix will be added to the file name of the images in 16-bit format during saving.
– Use Sub Folder	Enter the name of the subfolder. When saving the images, a subfolder will be generated at the selected saving location under the entered name. The images in 16-bit format will be saved in this folder.
Image Resolution	For setting the image resolution that will be saved in the TIFF files (8-bit and 16-bit format).
– System Resolution (Standard)	The magnification set in SEM will be used as resolution and is correct at an image width of 127 mm.
– Monitor Resolution	The resolution set for the connected monitor will be used. Thus, the {TrueMag} parameter will be correct at display at true size (1:1).
Auto File Name	For activating/deactivating the automatic generation of file names. The chosen file name is automatically suggested when images are saved. i After activation of the checkbox, the configured Save button will be used as "Fast Save".
– Text field	For inserting and arranging the parameters of the automatically generated file name. Parameters are displayed symbolically as parameter name in curly brackets. Between the parameters, text, space and/or dividers may be entered.
– Parameters ... (Page 55)	Opens the Parameters window for selecting, setting and inserting the global parameters for the automatic generation of file names.
Auto Folder	For activating/deactivating the automatic generation of folders. i After activation of the checkbox, the configured Save button will be used as "Fast Save".
– Base	Displays the path of the selected saving location.

Continuation next page ...

Component	Function
– Folder...	Opens a dialog window for selection of the saving location.
– Sub	For inserting and arranging the parameters of the automatically generated subfolder structure. This structure will be generated during saving of images at the selected saving location. Parameters are displayed symbolically as parameter name in curly brackets.
– Parameters ... (Page 44)	Opens the Parameters window for selecting, setting and inserting the global parameters of the automatic generation of folders.
Example	Shows a preview of the automatic file name in the automatic folder structure.
OK	Closes the dialog window. The settings are applied.
Cancel	Closes the dialog window. All settings are rejected.

Inscription tab for footer The following figure shows the **Save Settings** window with the **Inscription** tab and the settings for the footer within the image:



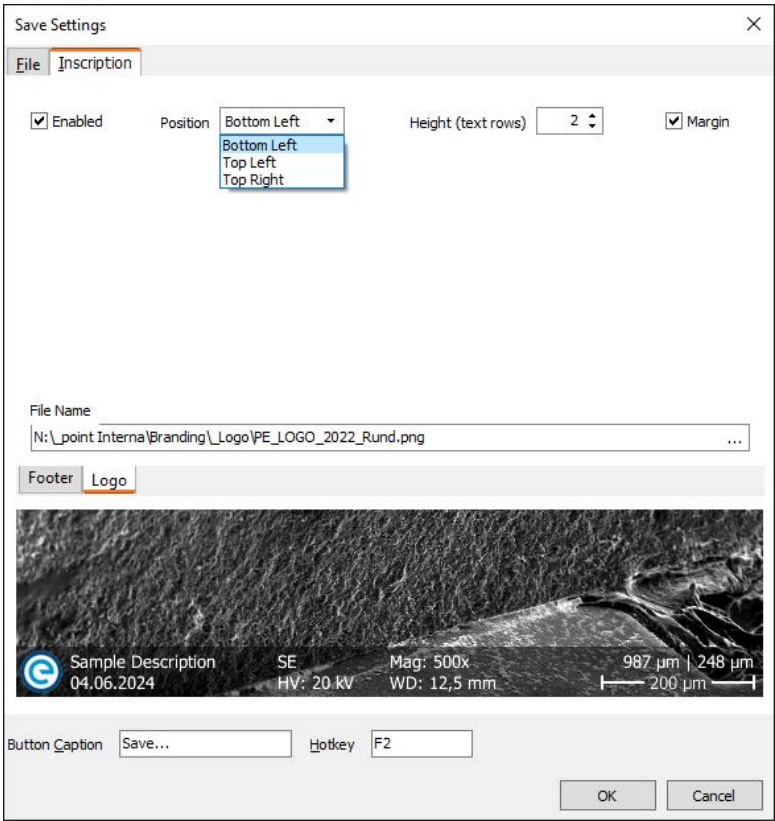
Continuation next page ...

The following table contains information on the settings of the footer in the Inscription tab:

Component	Function
Text field	For inserting and arranging the parameters in the footer. Parameters are displayed symbolically as parameter name in curly brackets. After the parameter name, within the curly brackets, the percentage of the parameter indentation (from left) may be inserted separated by a semicolon, e. g.: – {SignalName;x=35} – This parameter will be indented from the left by 35% of the total image width in the footer. – {FieldOfView;x=100} – This parameter will be aligned in the footer to the right-hand margin of the image. Between parameters, any text (including special characters or breaks) may be inserted.
Parameters ... (Page 55)	Opens the Parameters window for selecting, setting and inserting the footer parameters.
Text	
– Color	Setting the text color.
– Font	Setting the font.
– Anti Aliasing	Activating/deactivating anti-aliasing.
– Height	Setting the font size.
– Height selection list	Setting the font size unit: – Relative (% of Width/Height) – Font size as percentage relative to image width and image height. – Relative (% of Height) – Font size as percentage relative to image height. – Absolute (dots) – Font size as absolute value in pixels.
Background	
– Color	Setting the background color.
– Transparency	Setting the background transparency.
Preview	Preview of the footer with the selected settings.

Continuation next page ...

Inscription tab for the logo The following figure shows the **Save Settings** dialog window with the **Inscription** tab and the settings for a logo within the image:



The following table contains information on the settings of the logo in the **Inscription** tab:

Component	Function
Enabled	Activating/deactivating the logo within the image.
Position	Selection of a predefined position of the logo within the image.
Height (text rows)	Setting the logo height in text rows. The height of a text row always depends on the font size that has been set in the Height field of the Footer settings.
Margin	Activating/deactivating the logo distance from the image frame and/or the footer text.
File Name	Selecting the logo file's saving location. Displays the path of the selected saving location.

Configuring Live Overlay

Description Live Overlay shows parameters in the header and/or footer of the Image Acquisition window. The parameters displayed and the formatting of header and footer may be configured.

Live Overlay Settings For opening the **Live Overlay Settings** dialog window:

4. Click Preferences... in the File menu.
5. Click **Configure Live Overlay...** in the General tab.

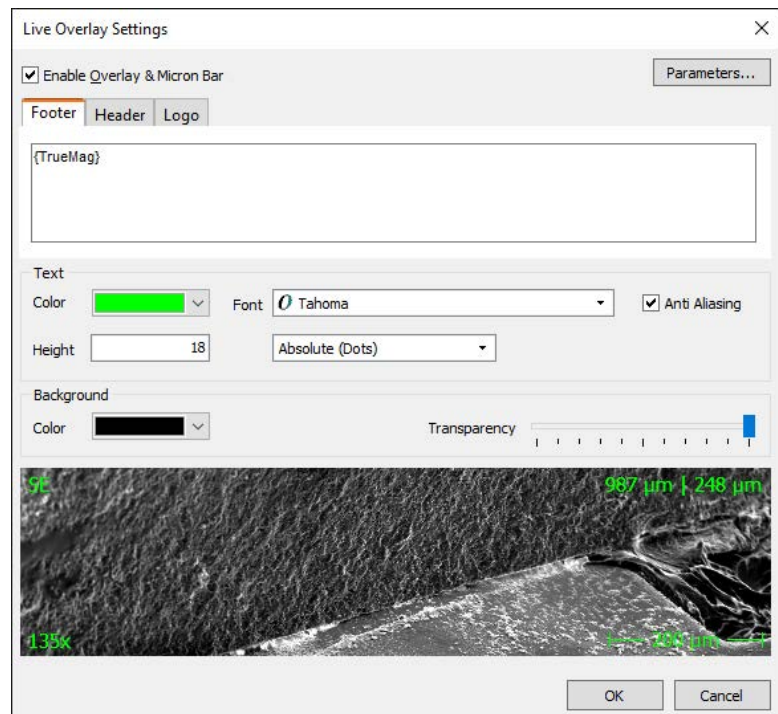
General settings The general settings in the **Live Overlay Settings** dialog window may be entered regardless of the chosen tab.

The following table contains information on the general settings in the **Live Overlay Settings** dialog window:

Component	Function
Enable Overlay & Micron Bar	Activates/deactivates Live Overlay. If Live Overlay is active, the micron bar (image scale) will always be visible on the bottom right in the footer.
Parameters...  Page 55	Opens the Parameters dialog window for selecting, setting and inserting the global parameters for live overlay entries (header and footer).
Text	
– Color	Setting the text color.
– Font	Setting the font.
– Anti Aliasing	Activating/deactivating anti-aliasing.
– Height	Setting the font size.
– Height selection list	Setting the font size unit: – Relative (% of Width/Height) – Font size as percentage relative to image width and image height. – Relative (% of Height) – Font size as percentage relative to image height. – Absolute (dots) – Font size as absolute value in pixels.
Background	
– Color	Setting the background color.
– Transparency	Setting the background transparency.
Preview	Preview of live overlay with selected settings.
OK	Closes the dialog window. The settings are applied.
Cancel	Closes the dialog window. All settings are rejected.

Continuation next page ...

Footer tab The following figure shows the **Live Overlay** dialog window with the Footer tab:

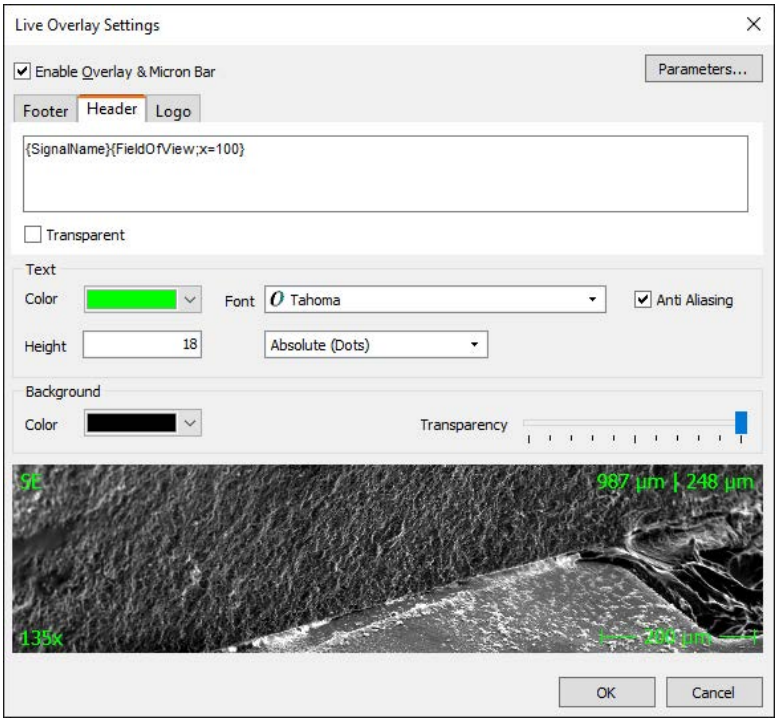


Continuation next page ...

The following table contains information on the components of the Footer tab:

Component	Function
Text field	For inserting and arranging the parameters in the footer. Parameters are displayed symbolically as parameter name in curly brackets. After the parameter name, within the curly brackets, the percentage of the parameter indentation (from left) may be inserted separated by a semicolon, e. g.: – {Description;x=35} – This parameter would be indented from the left by 35% of the total image width in the footer. – {Description;x=100} – This parameter would be aligned in the footer to the right-hand margin of the image. Between parameters, any text (including special characters or breaks) may be inserted. On the bottom right in the footer, the micron bar showing the scale of the image will always be displayed.

Header tab The following figure shows the **Live Overlay Settings** dialog window with the Header tab:

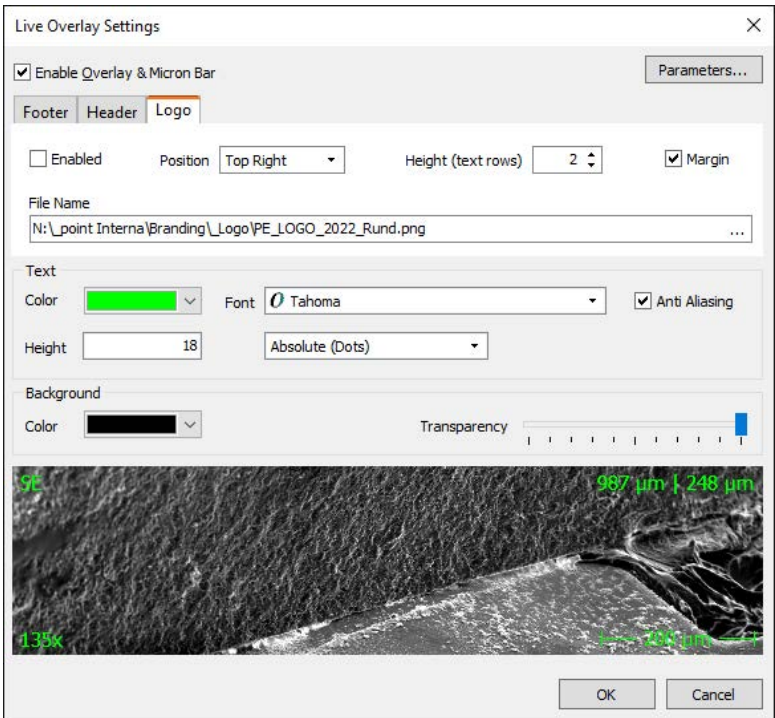


Continuation next page ...

The following table contains information on the components of the Header tab:

Component	Function
Text field	For inserting and arranging the parameters in the header. Parameters are displayed symbolically as parameter name in curly brackets. After the parameter name, within the curly brackets, the percentage of the parameter indentation (from left) may be inserted separated by a semicolon, e. g.: – {Description;x=35} – This parameter would be indented from the left by 35% of the total image width in the header. – {Description;x=100} – This parameter would be aligned in the header to the right-hand margin of the image. Between parameters, any text (including special characters or breaks) may be inserted.
Transparent	Activates/deactivates the background color of the header. If the checkbox is activated, the header background color is turned off (100% transparent).

Logo tab The following figure shows the **Live Overlay Settings** dialog window with the Logo tab:



Continuation next page ...

The following table contains information on the components of the Logo tab:

Component	Function
Enabled	Activates/deactivates the logo within the image.
Position	Selection of a predefined position of the logo within the image.
Height (text rows)	Setting the logo height in text rows. This means, the height of a text row always depends on the font size that has been set in the Height field of the general settings.
Margin	Activates/deactivates the logo's distance to the image frame and/or footer text.
File Name	Selecting the logo file's saving location. Displays the path of the selected saving location.

Configuring parameters

Description In addition to the image data, meta data in XMP format will be saved with each image acquired in DISS 6. These meta data include information like image comment, acquisition date or magnification.

Meta data in XMP format may be displayed and processed with XMP-compatible image processing software.

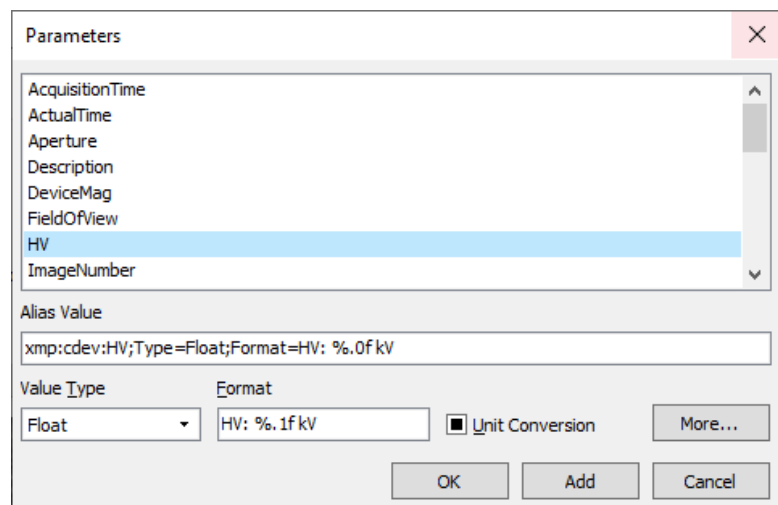
These meta data may be displayed as live overlay, as footer in the saved image or as hint in the image preview and may be used for the automatic assignment of file names.

In the Parameters dialog window, the parameters to be displayed and their format may be configured.

Parameters dialog window The Parameters dialog window may be opened via the following windows:

- Live Overlay Settings (see Page 50)
- Hint Settings (see Page 34)
- Save Settings (see Page 44)

The following figure shows the Parameters dialog window with its components:



Continuation next page ...

The following table contains information on the components of the Parameters dialog window:

Component	Function
Parameter list	– Contains all available preconfigured parameters. – Parameters may be selected by clicking them. – By double-clicking, parameters may be inserted in the order of the parameter list.
Alias Value	Shows name and attributes of the selected parameter in XMP format. Name and each single attribute will be separated by semicolons.
Value Type	Changes the default data type of the selected parameter. [default] maintains the default data type of the selected parameter. i Generally, there is no need to change the Value Type [default].
Format	Changes the display format of the parameter. Example: The display of the acquisition time is to be changed from the preconfigured default format (d.m.yy h:nn:ss) including date and time to only display the date. Select the parameter "AcquisitionTime" in the parameter list and enter the following value in the Format field: dd.mm.yyyy → Thus, only the date will be displayed. Days and months will always be displayed with two digits, years with four digits, for instance 13.05.2024.
Unit Conversion	Controls the automatic conversion of units: – ☐ Maintain default. – ☒ Enable unit conversion. – ☐ Disable unit conversion.
More...	Opens a dialog window for displaying and adapting the changed parameter properties.
OK	Closes the dialog window, the settings for the selected parameter are applied. i The selected parameter will not be inserted in the order of the parameter list.
Add	Inserts the selected parameter into the order of the parameter list.
Cancel	Closes the dialog window, the settings for the selected parameter are rejected.



7 Calibration

Chapter overview

Purpose This chapter contains instructions that support you with calibrating the DISS 6 Software.

Contents This chapter contains the following information:

- › Calibration of the magnification 58

Calibration of the magnification

Description For calculating the scale bar (micron bar) and for distance measurement in the image, image acquisition uses the SEM magnification (Magnification) and a SEM-specific calibration constant.

To determine the SEM constant, it is necessary to carry out a calibration with a sample with known structures.

NOTICE

Mind authorizations!

You will need admin rights to carry out the calibration.

NOTICE

The precision of measurement depends on the linearity and accuracy of the magnification of the SEM.

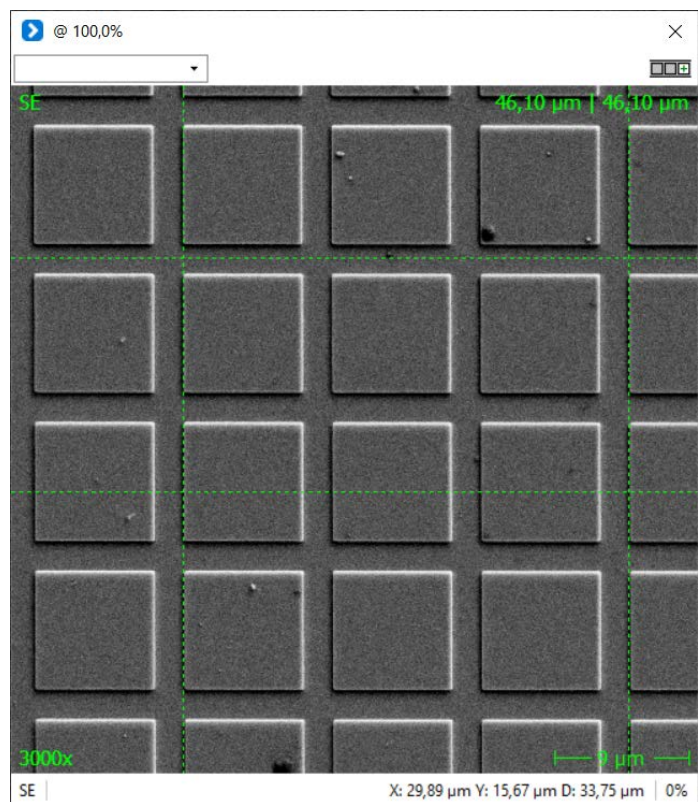
Continuation next page ...

Steps Complete the following steps to calibrate the magnification:

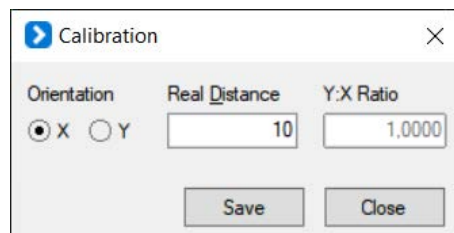
1. Set an image with a known structure in the SEM.
2. Start a Slow scan with the following settings:
 - Minimum Width 1000 pixels
 - Activated Line synchronization
3. During the Slow scan, press [Ctrl] + [Alt] + [C] to start calibration.

 see "Slow scan" on page 149

→ A double cross with green lines appears in the Image Acquisition window. The lines of the double cross form a square.



→ Additionally, the **Calibration** window opens:



4. Adjust the vertical green lines to the known structure.

Continuation next page ...

-  By clicking and dragging the lines while pressing the [Ctrl] key, the lines of the double cross will form a square.
5. In the **Calibration** dialog window:
- Select the direction in the **Orientation** field.
 - Enter the real distance value in the **Real distance** field.
-  If the lines of the double cross do not form a square, the aspect ratio of the rectangular double cross will be displayed in the **Y:X Ratio** field.
 -  If you enter the distance value without unit, the value is adopted in nanometers. You may also enter the particular unit directly after the distance value.
6. Click the **Save** button in the **Calibration** window to confirm the settings.



8 SEM Control

Chapter overview

Purpose This chapter contains descriptions of the structure and functions of the SEM control panel.

Contents This chapter contains the following sections:

- › 8.1 User interface 62
- › 8.2 Starting and turning off 80

8.1 User interface

Overview

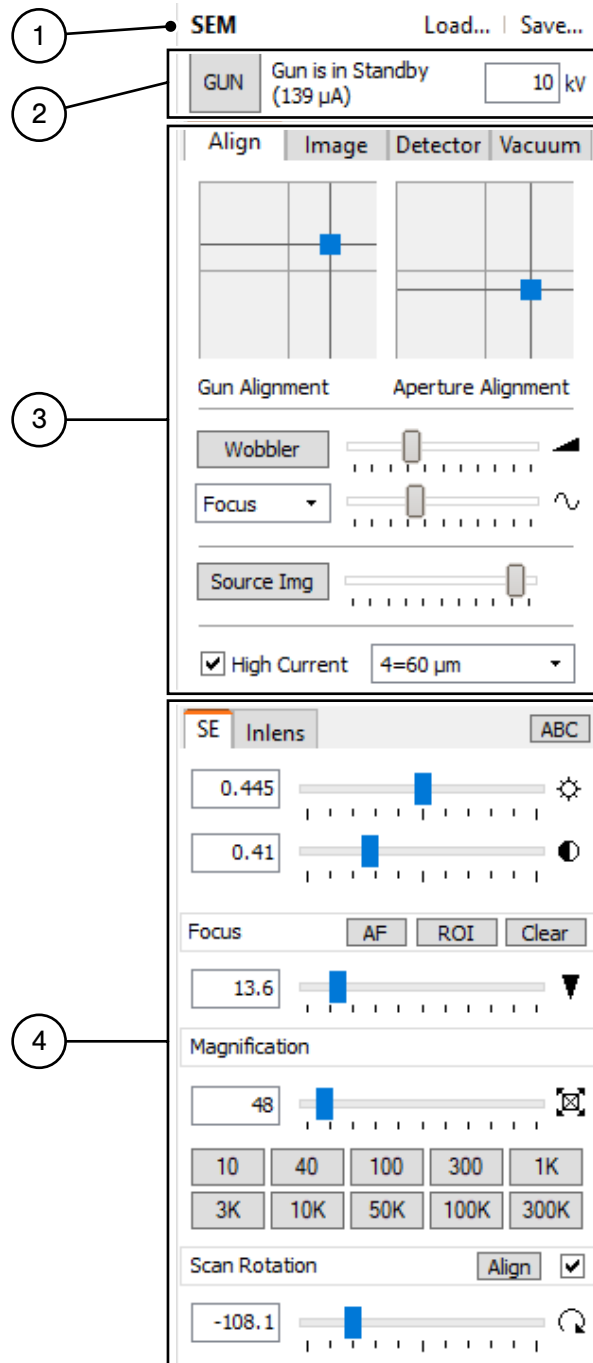
Purpose This section describes structure and functions of the SEM control user interface.

Contents This sections contains the following information:

- › Overview63
- › Menu bar65
- › Gun control66
- › Align67
- › Image.70
- › Detector71
- › Vacuum72
- › Main field.78

Overview

Structure The following figure shows the SEM control user interface with its main components:



Continuation next page ...

... continuation: Overview

Function The following table contains information on the main components of the SEM control:

No.	Main component	Function
1	Menu bar (Page 65)	– Load...: Loading of configurations – Save...: Saving of configurations
2	Gun control (Page 66)	– Switching on and off several functions. – Shows the status of the relevant function.
3	Tabs	Contains functions for controlling the SEM.
	– Align (Page 67)	Set-up of the stigmator coils.
	– Image (Page 70)	Set-up of the scan area.
	– Detector (Page 71)	Set-up of detector signals and functions (device-dependent).
	– Vacuum (Page 72)	Set-up and display of vacuum system functions.
4	Main field (Page 78)	Set-up of the following functions: – Brightness/Contrast – Focus – Magnification – Scan Rotation

Menu bar

Structure The following figure shows the SEM control menu bar with its components:

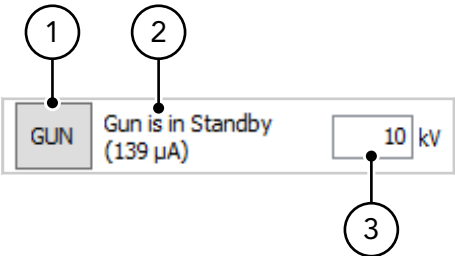


Function The following table contains information on the components of the menu bar:

Component	Function
Load	Opens a dialog window for loading a saved configuration.
Save	Opens a dialog window for saving all set parameters in a configuration file.

Gun control

Structure The following figure shows Gun control with its components:

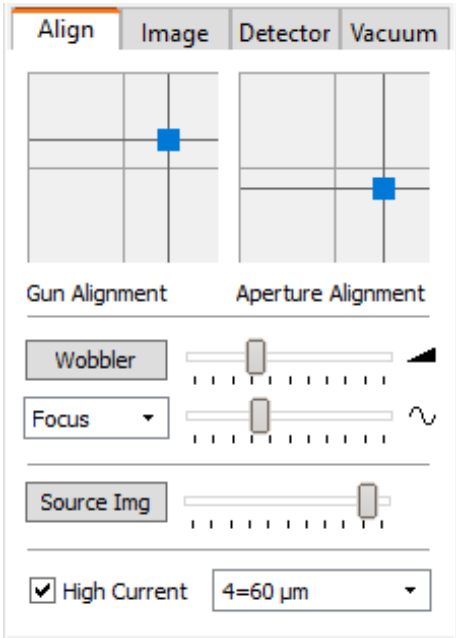


Function The following table contains information on the components of the Gun control:

No.	Component	Function
1	Gun	Turning SEM electronics on and off Clicking the button enables the following options: – On = accelerating voltage and detector power are turned on. – Standby = accelerating voltage is turned off. – Off = The gun is turned off.
2	Status information	Shows the following status information: – Gun status – current value of the extractor voltage
3	Input field	Set-up of the accelerating voltage value in kV.

Align

Structure The following figure shows the Align tab with its components:



Function The following table contains information on the components of the Align tab:

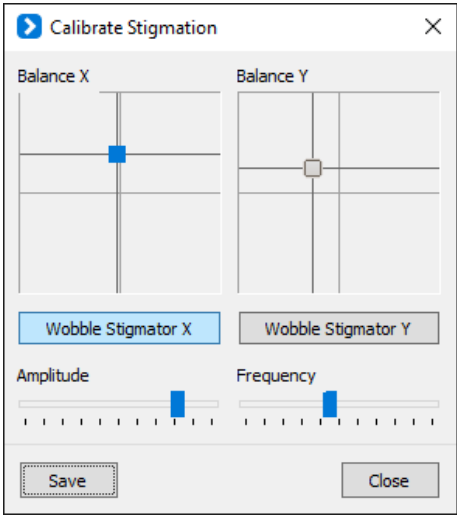
Component	Function
Gun Alignment	Centering the electron beam with focus wobbler activated. By right-clicking the aperture select list, the alignment of the current aperture can be saved.
Aperture Alignment	Centering the selected aperture. By right-clicking the aperture select list, the alignment of the current aperture can be saved.
Wobbler	Activating the wobbler. Activating the focus wobbler.
	For setting up wobble amplitude.
Focus/HV selection list	Selecting whether focus or high voltage are to be wobbled.
	For setting up wobble frequency.
Source Img	– For activating aperture mapping. – Automatically starts a corresponding scan.
Slider	For setting the magnification.
High Current	Activates or deactivates High Current mode using the condenser lens.

Continuation next page ...

... continuation: Align

Component	Function
Aperture selection list	– Selection of the aperture by moving the electron beam. – Saved values for gun alignment, aperture alignment and stigmator are loaded. – With a right-click, the alignment of the current aperture is saved.
– Context menu	A right-click on the aperture selection list opens a context menu with the following items: – Save: Saves the alignment of the current aperture – Calibrate Stigmation: Opens the Calibrate Stigmation dialog window for stigmator shift matching. The matching has to be set and saved for the currently activated aperture. This function is device-dependent.

Calibrate Stigmation (device-dependent) The following figure shows the **Calibrate Stigmation** dialog window:



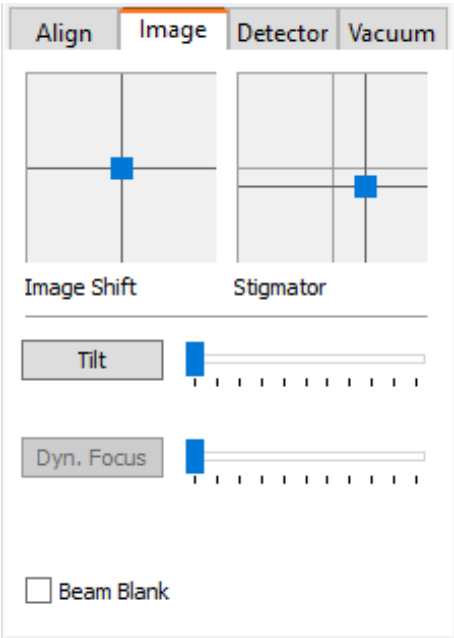
The following table contains information on the components of the **Calibrate Stigmation** dialog window:

Component	Function
Balance X	Setting the X balance of the activated stigmator with a two-dimensional slider.
Balance Y	Setting the Y balance of the activated stigmator with a two-dimensional slider.
Wobble Stigmator X	Activates the X stigmator.
Wobble Stigmator Y	Activates the Y stigmator.
Amplitude	Setting the wobble amplitude of the activated stigmator with a slider.
Frequency	Setting the wobble frequency of the activated stigmator with a slider.

Component	Function
Save	Saves the settings of the currently activated aperture.
Close	Closes the dialog window.  Settings that are not saved before closing the dialog window will be lost.

Image

Structure The following figure shows the Image tab with its components:



Function The following table contains information on the components of the Image tab:

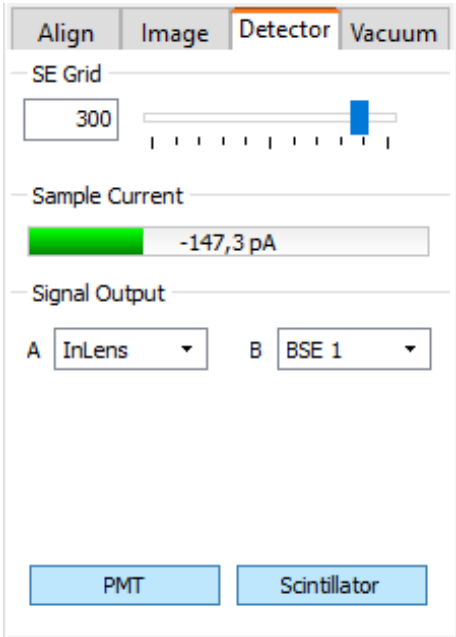
Component	Function
Image Shift	– By moving the slider, the image of the sample may be shifted. – By double-clicking the caption, the slider is centered to the 0 / 0 position.
Stigmator	– By moving the slider, the stigmator coils' currents may be set. – By double-clicking the caption, the slider is centered to the 0 / 0 position.
Tilt	Turning on image correction for a sample tilted in Y direction.
– Slider	Setting up the image correction.
Dyn. Focus	Turning on focus correction while scanning a tilted sample.
– Slider	Setting up the focus correction.
Beam Blank	Interrupting the electron beam. By shifting the alignment, the electron beam will be shifted to a position off the sample stage.

Detector

- Description

In the Detector tab, the SE extraction voltage may be set and the high voltage of photo multiplier and scintillator may be turned on and off.
- Structure

The following figure shows the Detector tab with its components:



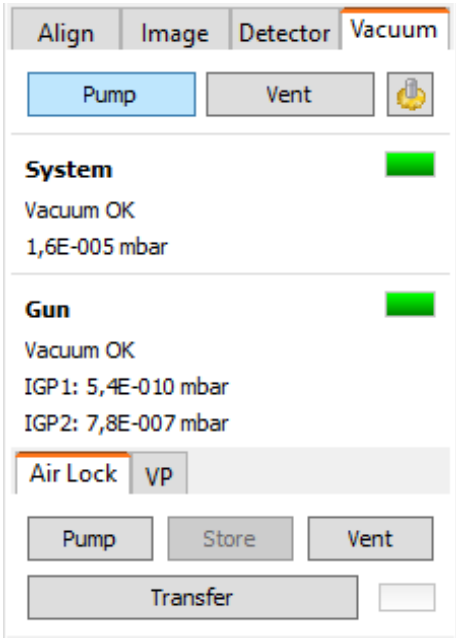
- Function

The following table contains information on the components of the Detector tab:

Component	Function
SE Grid	Sets the SE extraction voltage with the slider or by direct value input
Sample Current	Shows the effective sample current value in pA.
Signal Output	Contains selection lists A and B for selecting the output signals of the external scan interface.
PMT	Turning photo multiplier voltage on and off.
Scintillator	Turning scintillator high voltage on and off.

Vacuum

Structure The following figure shows the Vacuum tab with its components:



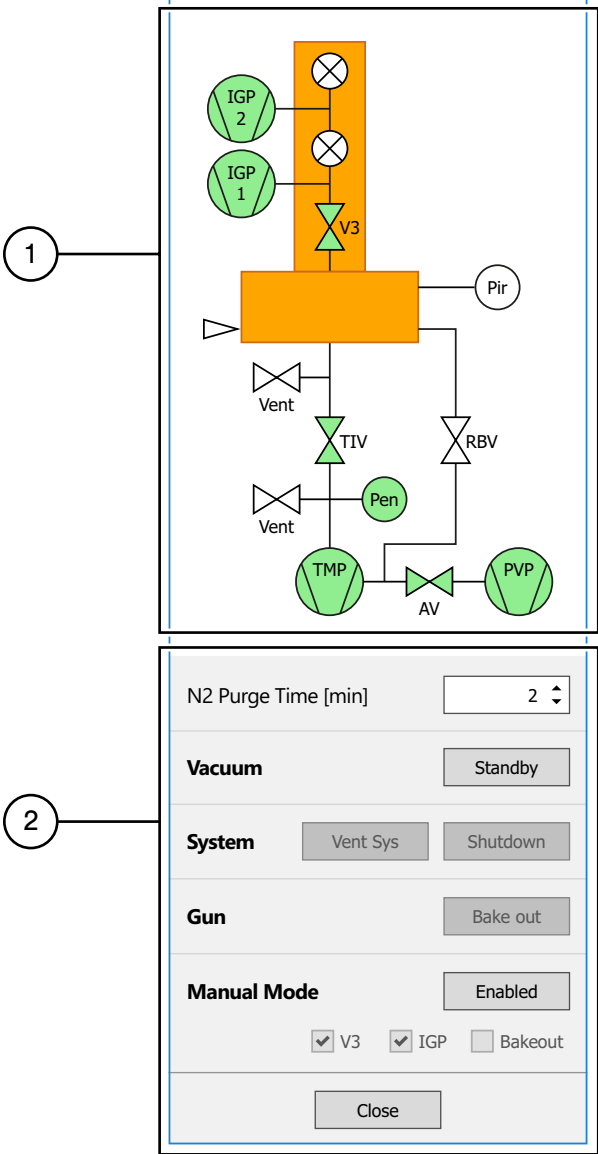
Function The following table contains information on the components of the Vacuum tab:

Component	Function
Pump	Build-up of the vacuum.
Vent	Venting the sample chamber (e.g. before changing of samples).
	Opens the Vacuum System Options dialog window. (Page 73)
System	Shows status messages and the current value of the system vacuum.
Gun	Shows status messages and the current value of the gun vacuum.
Air Lock	Contains functions for controlling the sample chamber air lock. (Page 76)
VP	Contains functions for controlling the Variable Pressure mode. (Page 77)

Continuation next page ...

... continuation: Vacuum

Vacuum system options The following figure shows the **Vacuum System Options** dialog window with its components:



the components of the **Vacuum System Options** dialog window:

No.	Component	Function
1	Scheme (device-dependent)	Graphical representation of the vacuum system including status displays of the individual components.

Continuation next page ...

... continuation: Vacuum

No.	Component	Function
	Labels (device-dependent)	– V = valve – P = pressure sensing gauge – Pen = Penning gauge (high vacuum) – Pir = Pirani gauge (initial vacuum) – PVP = pre-vacuum pump – ODP = oil diffusion pump – IGP = ion getter pump – TMP = turbomolecular pump – AV = angle valve – TIV = turbo isolation valve – RBV = roughing backing valve – CCG = cold cathode gauge
	Status displays (Colors)	– green = active – white = inactive – yellow = turned on, but nominal value not reached – red = error
2	Input fields and buttons	
	N2 Purge Time	Setting the purge time in minutes.
	Standby	Switches the vacuum system to standby mode. This will: – close the gun isolation valve, – turn off backing pump and turbo pump, – partially vent the sample chamber.
	Bake out	Starts the automatic baking. Clicking the button opens a dialog window that displays the baking duration. Only after baking has been completed, the gun can be started again. In case of overload, IGP will turn off and the baking will be canceled. i Automatic baking may only be started if IGP is not on overload. i After baking, the gun must be powered down, and the gun HV plug must be disconnected.
	Vent Sys	Starts venting of the sample chamber and the cathode tip (e.g. when replacing the emitter). All pumps including IGP are turned off. i Before the venting, the bypass valve has to be opened manually.
	Shutdown	Turns off the vacuum system. This will: – close the gun isolation valve, – turn off backing pump, turbo pump and IGP, – partially vent the sample chamber. i Shutdown is only available in Administrator mode. Shutdown is only available if: – the gun has been turned off
	Manual Mode	Required for maintenance purposes (e. g. baking after emitter replacement).
	– Enabled	Activates / deactivates Manual mode

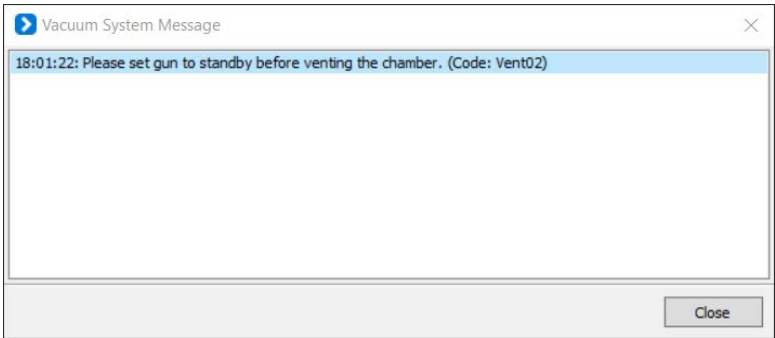
Continuation next page ...

... continuation: Vacuum

No.	Component	Function
	– Check box	For controlling single components in activated Manual mode: – V3: opens / closes the gun isolation valve. – IGP: activates / deactivates the IGP (regardless of overload) – Bakeout: activates / deactivates baking (regardless of IGP overload)
	Close	Closes the dialog window.

Vacuum System Message The **Vacuum System Message** dialog window shows current status messages of the vacuum system.

The following figure shows the **Vacuum System Message** dialog window with its components:



The following table contains information on the components of the **Vacuum System Message** dialog window:

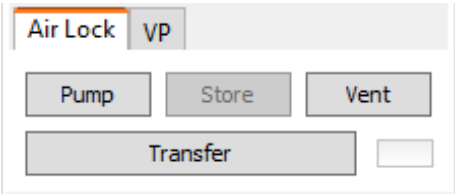
Component	Function
Skip Bakeout	Skips the preset baking time.
Close	Closes the dialog window.

Continuation next page ...

... continuation: Vacuum

Air Lock (device-dependent) The functions in the Air Lock tab control the sample chamber air lock.

The following figure shows the Air Lock tab with its components:



The following table contains information on the components of the Air Lock tab:

Component	Function
Pump	Evacuation of the airlock.
Store	Keeping the sample in the vacuum without purging the air lock. (device-dependent)
Vent	Purging the airlock.
Transfer	Device-dependent function. Opens a dialog window with confirmation for opening the sample chamber slider. After confirmation, the Airlock Transfer Message dialog window opens with a transfer progress bar. For transfer: – the sample stage enters the transfer position and – the gun switches to Standby mode.
Status	Shows the current status of the activated function (e. g. evacuation or purge).

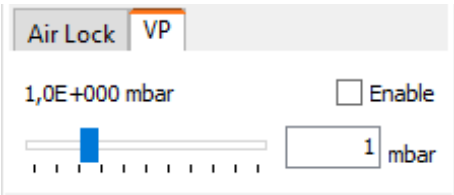
Continuation next page ...

VP (Variable Pressure) device-dependent The functions in the VP tab control the Variable Pressure mode.

This mode is used for analysing and depicting nonconductive, strongly gassing or wet samples. A special pumping system allows to set partial pressures between 1 and 133 pa (1.01 to 1.33mBar) in the sample chamber while maintaining the ultra-high vacuum of emitter and in the beam path.

VP mode may only be used if the SEM is capable of this mode.

The following figure shows the VP tab with its components:

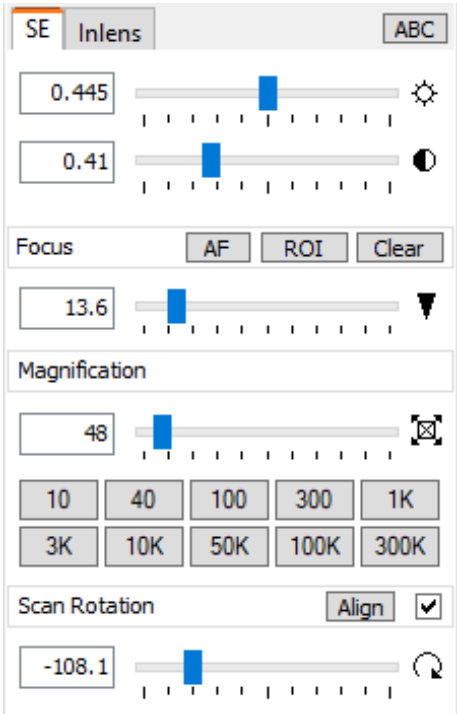


The following table contains information on the components of the VP tab:

Component	Function
Value display	Shows the measured pressure in the sample chamber during activated VP mode.
Enable	Activates/deactivates the Variable Pressure mode.
Slider	For setting the required pressure.
Input field	

Main field

Structure The following figure shows the main field with its components:



Function The following table contains information on the components of the main field:

Component	Function
ABC	Executes automatic brightness contrast. The button will remain activated until the automatic is completed.
SE/BSE/...	
☀ (Brightness)	– Modifies the brightness of the image within a range of -100% to 100%. – Can be set with the slider or by direct input of values.
● (Contrast)	– Modifies the contrast of the image within a range of 0% to 100%. – Can be set with the slider or by direct input of values.
Focus	– Modifies the objective lens current. Thus, the image is focused, and the working distance in millimeter can be preselected. – Can be set with the slider or by direct input of values.
AF	Executes automatic focus stigmator. The button will remain activated until the automatic is completed. i It is recommended to start a Region scan before autofocus and to focus on the area containing the particular structures.

Continuation next page ...

... continuation: Main field

Component	Function
ROI	Starts a Region scan.
Clear	Executes lens clearing (i.e. sets the focus to maximum value for a short amount of time)
Magnification	For setting the magnification with the slider or by direct value input.
Fixed mag values	Selection of preset magnification values that may be entered in "semcontrol.xml".
Scan Rotation	– Rotating the scan area on the sample within a range of -180° up to +180°. – Can be set with the slider or by direct input of values.
Align	Activates mouse click rotation (see Page 93).
Check box	Activates or deactivates scan rotation.

8.2 Starting and turning off

Overview

Purpose This section contains instructions on starting the emitter and shutting it off.

Contents This sections contains the following information:

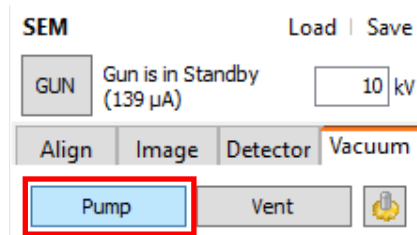
- › Turning the vacuum system on and off. 81
- › Using the SEM parameters 83
- › Starting the emitter 85
- › Emitter standby mode. 86
- › Shutting down the emitter 87

Turning the vacuum system on and off

Starting After turning on power, the IGP will be turned on automatically. Thus, the cathode chamber will always be purged automatically (e. g. after power outages).

Complete the following steps to start sample chamber purging:

1. Click the **Pump-** button in the Vacuum tab.



→ The vacuum system is turned on.

i If IGP is off (e.g. due to insufficient pressure or previous manual shut-down), IGP will be turned on as well.

Continuation next page ...

... continuation: Turning the vacuum system on and off

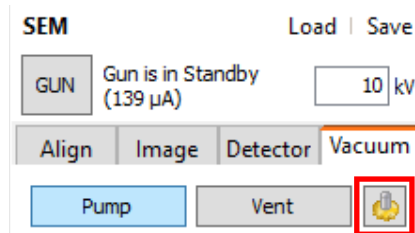
Turning off Before turning off power as planned, the vacuum system should be turned off in a controlled manner.

Complete the following steps to turn off the vacuum system:

1. Shut down the emitter.

 see "Shutting down the emitter" on page 87

2. In the Vacuum tab, click the Vacuum System Options () button.



→ The **Vacuum System Options** dialog window opens.

3. Click the button **Shutdown** in the dialog window.

→ The gun isolation valve is closed.

→ The sample chamber is partially vented.

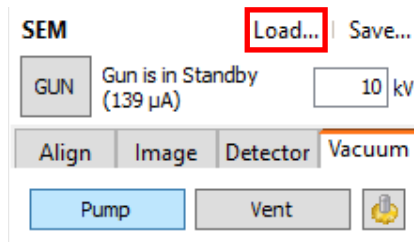
→ IGP, turbo and rotation pumps are turned off.

Using the SEM parameters

Description All SEM parameters are saved in a configuration file and may be loaded and saved.

Loading the SEM parameters Complete the following steps to load the SEM parameters from a configuration file:

1. In the menu bar, click Load.



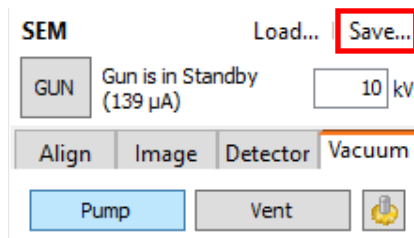
→ A dialog window opens where the saved configuration file may be selected and loaded.

2. In the dialog window, click the configuration file with the particular settings and click **OK**.

→ The selected settings are loaded.

Saving the SEM parameters Complete the following steps to save modified SEM parameters in a configuration file:

1. In the menu bar, click Save.



→ A dialog window opens where an existing configuration file may be overwritten or a new configuration file may be saved.

Continuation next page ...

... continuation: Using the SEM parameters

Automatic saving of the SEM parameters When turning off the DISS 6 Software, modified SEM parameters will be saved automatically in the following file:
C:\ProgramData\point electronic\DISS6\semcontrol.val

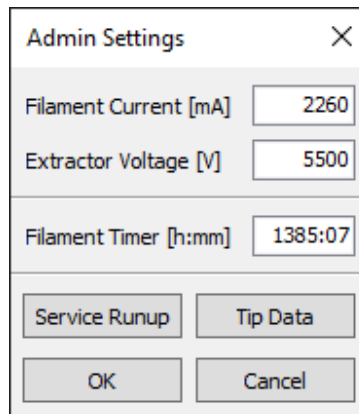
NOTICE

At the next start-up of the DISS 6 Software, the saved SEM parameters will be reloaded.

Modifying the emitter settings Complete the following steps to modify the emitter settings:

⚠ Emitter settings should only be modified after emitter replacement or after a request by a service technician.

1. Press the [Ctrl]+[Alt]+[Z] key combination.
→ The **Admin Settings** window opens.



2. Enter the particular values in the respective input fields.
3. Press the Return key to confirm the input.
→ The entered values will be set with the configured ramp.
4. Click the **OK** button.
→ The dialog window is closed. All entered values are saved as initial values.

NOTICE

Click the **Tip Data** button to display a list of all previously installed emitters.

In this list, a new emitter and its data may be added.

Starting the emitter

With configured settings Complete the following steps to start the emitter with configured settings:

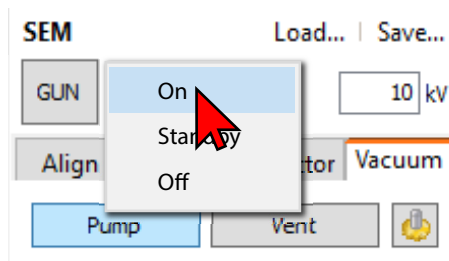
NOTICE

Check vacuum system and vacuum status!

Before turning on the emitter, please make sure that the vacuum system is turned on and the vacuum status is OK.

- The current vacuum status is displayed in the status bar.

1. Click the **Gun** button.
→ A context menu opens.



2. In the context menu, click the item On.
→ The emitter is started with the configured settings.

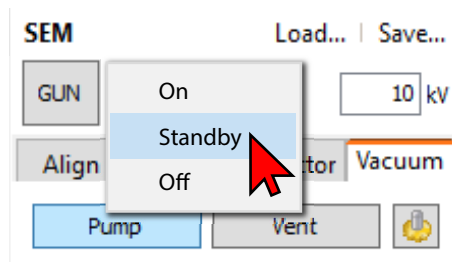
Emitter standby mode

Description In standby mode, acceleration voltage and detector power supply are turned off.

This mode is recommended whenever the SEM is not used.

Steps Complete the following steps to switch the emitter to standby mode:

1. Click the **Gun** button.
→ A context menu opens.



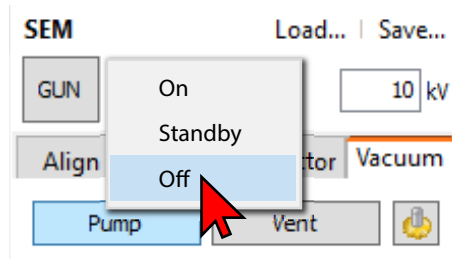
2. In the context menu, click the item Standby.
→ High voltages is slowly shut down, liner tube and detectors are turned off.

Shutting down the emitter

Description Before turning off the power supply, the emitter needs to be shut down in a controlled manner.

Steps Complete the following steps to shut down the emitter in a controlled manner:

1. Click the **Gun** button.
→ A context menu opens.



2. In the context menu, click the item Off.
→ High voltage and filament are shut down gradually.

9 Stage Control

Chapter overview

Purpose The Stage control panel and the optional SamplePilot extension can be used to control a motorized sample stage.

This chapter contains descriptions of the structure and functions of the control panel and the extension.

Contents This chapter contains the following sections:

- › 9.1 Control panel 89
- › 9.2 SamplePilot (optional). 102

9.1 Control panel

Overview

Purpose This section describes the structure and function of the Stage control panel.

Contents This sections contains the following information:

- › User interface 90
- › Main field. 92
- › Main tab 97
- › Position table tab 99
- › Setup tab. 101

User interface

Description The Stage control panel controls a motorized sample stage. This means that fixed positions may be saved and approached. It also allows to move the stage by image fields or to optionally move it with a connected joystick.

Structure The following figure shows the Stage control panel with its main components:

Stage

X 0 μm Y 0 μm Z 0,0 mm

T 0,0° R 0,0° S 0,0°

Move ☐ Relativ Pos ☒ Motors On ☒ Correct SR WD in Focus

Stop

1/20 1/3
1/10 1/2
1/5 1
1/4 2

Main Position Table Setup

	Comment	X	Y	F	T
001	1	10851	14010		0,0
002	2	17801	2270		0,0
003	3	13579	-10929		0,0
004	4	2424	-17990		0,0
005	5	-11102	-14663		0,0
006	6	-17753	-2662		0,0
007	7	-13710	10625		0,0
008	8	-2253	17642		0,0
009	0	0	0		0,0

2

Continuation next page ...

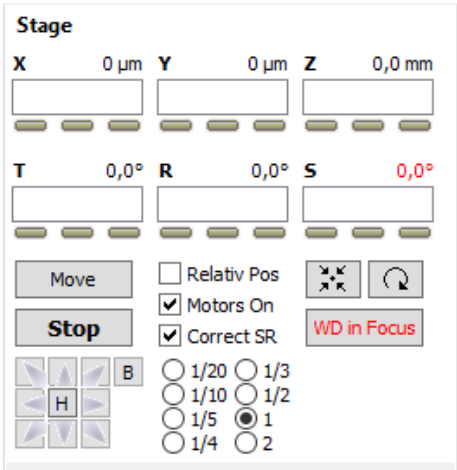
... continuation: User interface

Function The following table contains information on the main components of the Stage control panel:

No.	Main component	Function
1	Main field (Page 92)	Contains functions for controlling and monitoring the sample stage.
2	Tabs	
	– Main (Page 97)	Shows a set (table) of predefined positions. By double-clicking a table row, the stage will be moved to the corresponding position.
	– Position Table (Page 99)	Allows for creating, saving, loading and using customized position sets.
	– Setup (Page 101)	Contains functions for setting up the sample stage control.

Main field

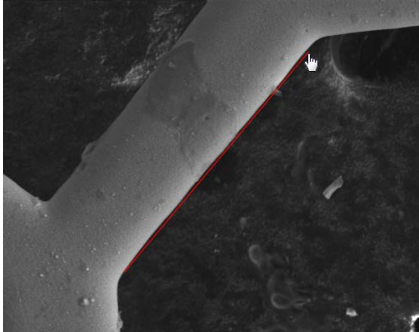
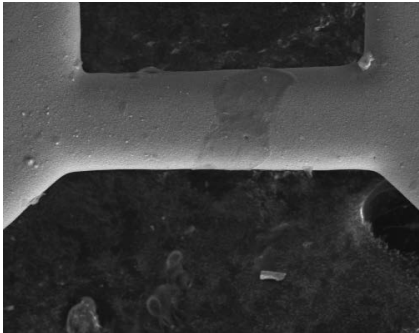
Structure The following figure shows the main field of the Stage control panel with its components:



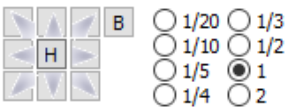
Function The following table contains information on the components of the main field:

Component	Function
Input fields X, Y, Z, T, R, S	Entering of values for moving the sample stage: – X and Y for planar moves – Z for distance from the sample (only with motorized Z axis) – T for sample stage tilt (device-dependent) – R for sample stage rotation (only with motorized rotation) – S for Z fine tune (device-dependent) The current position of the axis is displayed above the input fields. Underneath the input fields, 3 status displays are visible,  see “Status” on page 94
Move	Moving the sample stage to the set position.
Stop	Stopping the sample stage.
Relative Pos	With activated checkbox, the positions entered in the input fields will be approached relative to the respective current position.
Motors On	Turning the sample stage motors on and off.
Correct SR	Correct scan rotation. Activating/deactivating the approach correction of the sample stage. With activated checkbox, the movement of the sample stage will be corrected according to the preset scan rotation. This means that the sample stage always takes the correct approach to the SEM image. With deactivated checkbox, the sample stage moves in correction to the camera image.

Continuation next page ...

Component	Function
	Activation/deactivation of the mouse click shift. If shifting by mouse click has been activated, the double-clicked image area is moved to the center of the image.
	Activation/deactivation of mouse click rotation (only available with motorized rotation). If rotating by mouse click has been activated, a line can be drawn in the Image Acquisition window by moving the mouse:
	
	The first click sets the beginning of the line. The second click sets the end. → After the second click, the sample stage will be rotated so that the line drawn in the Image Acquisition window will be horizontal:
	
	i If you keep the Shift key pressed during the second click, the line will be turned vertical. i The sample is rotated in the sample center. This means, X and Y will also be shifted. The accuracy of this functions depends on the used device. i This function only works if the rotation center of the sample stage is the home position.

Component	Function
WD in Focus	Working distance is in focus (only available with motorized Z axis). - Focus on the sample and click WD in Foc to couple the sample stage's Z axis to the focus. → WD in Foc remains activated, and the caption of the input field Z is changed to F. - In the input field F, enter the particular value for the working distance (inverted to Z). → When shifting the height, the focus will follow automatically. Additionally, a software limit is activated to prevent collision with the pole piece. By clicking the activated WD in Foc button, the function will be deactivated, and Z axis and focus will become uncoupled. The limit will be calculated from current working distance and current sample position minus a configurable safety distance: $Z_{\max} = WD_{\text{current}} + Z_{\text{current}} - \text{safety distance}$

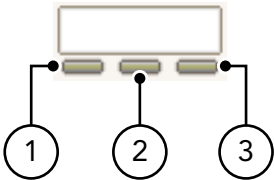


Defined movement of the sample stage:

- Click the **H** button to return the sample stage to Home position.
- Click the **B** button to perform a manual backlash (e. g. when using a trackball or joystick).
- Click the arrow buttons to move the sample stage by image fields in the indicated direction.

The settings in the checkboxes on the right-hand side define the distance of the stage's movements. Setting 1 corresponds to moving along the length of the image in the Image Acquisition window, 1/2 corresponds to one half of the image length, 1/3 corresponds to one third etc.

Status Underneath each of the X, Y, Z, T, R and S input fields, three different status displays are visible:



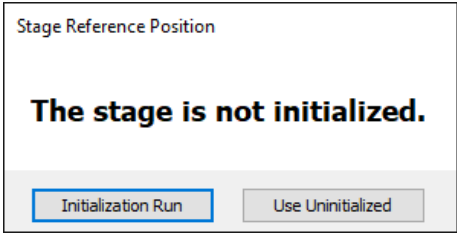
The following table contains information on the different status displays:

No.	Status display	Color	Status
1	Left-side limit	gray	No limit
		green	Software limit
		red	Hardware limit
2	Motor status	gray	Motor off
		green	Motor on

... continuation: Main field

No.	Status display	Color	Status
		 red	Motor error i The motors have to be turned off via the Motors on checkbox and turned on again.
3	Right-side limit	 gray	No limit
		 green	Software limit
		 red	Hardware limit

Initialization If the control happened electroless, the sample stage is not initialized anymore. During starting SEM Control, the dialog window **Stage reference position** will be displayed:



Click the button **Initialization Run** in the **Stage Reference Position** dialog window to initialize the sample stage.

During the initialization run:

1. The lower limit of Z will be searched for and the sample will be moved downwards.
2. The limit of all other axes will be searched for.
3. The sample stage will be moved to Home position after successful initialization.

Continuation next page ...

... continuation: Main field

Use Uninitialized If you click the button **Use Uninitialized** in the **Stage Reference Position** dialog window, no initialization run will be performed. The limits will not be determined. An uninitialized sample stage will be displayed with red numbers in the main field:

The screenshot shows the 'Stage' control panel. It features input fields for X (0 µm), Y (0 µm), Z (0,0 mm), T (0,0°), R (0,0°), and S (0,0°). The S field value is highlighted in red. Below the input fields are 'Move' and 'Stop' buttons. To the right of 'Move' are checkboxes for 'Relativ Pos' (unchecked), 'Motors On' (checked), and 'Correct SR' (checked). Further right are icons for a four-way move and a circular arrow. Below these are a 3x3 directional pad with 'B' and 'H' labels, and a set of radio buttons for speed selection: 1/20, 1/10, 1/5, 1/4, 1/3, 1/2, 1 (selected), and 2. A red 'WD in Focus' indicator is also present.

NOTICE

If the sample stage has not been initialized, the absolute position cannot be determined. The calibration of the axes will not be affected. Thus relative travel paths will still be correct.

Main tab

Structure The following figure shows the Main tab of the Stage control panel:

	Comment	X	Y	F	T
001	1	10851	14010		0,0
002	2	17801	2270		0,0
003	3	13579	-10929		0,0
004	4	2424	-17990		0,0
005	5	-11102	-14663		0,0
006	6	-17753	-2662		0,0
007	7	-13710	10625		0,0
008	8	-2253	17642		0,0
009	0	0	0		0,0

Function The Main tab contains a table with a set of preset positions. By double-clicking a table row, the corresponding position will be approached.

Main Table editing mode If the Main Table editing mode checkbox is activated in the Setup tab, the Main tab will display additional buttons for changing the table values:

	Comment	X	Y	Z	T
001	1	10851	14010		0,0
002	2	17801	2270		0,0
003	3	13579	-10929		0,0
004	4	2424	-17990		0,0
005	5	-11102	-14663		0,0
006	6	-17753	-2662		0,0
007	7	-13710	10625		0,0
008	8	-2253	17642		0,0
009	0	0	0		0,0

In Main Table editing mode, the values in the Main tab as well as the values in the Position Table tab may be modified.

Continuation next page ...

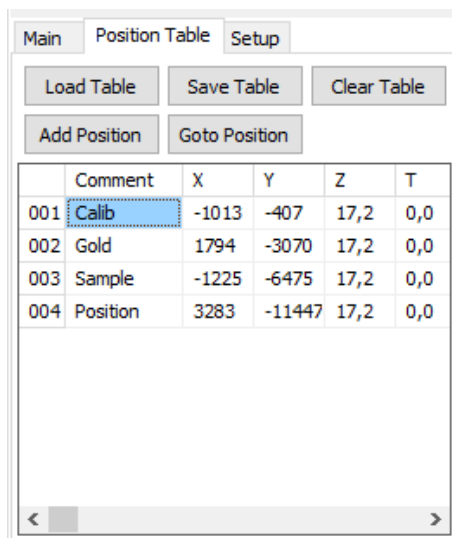
... continuation: Main tab

The following table contains information on the additional buttons in the Main Table editing mode:

Button	Function
Load Table	Loads a set of positions from an excel file.
Save Table	Saves a set of positions to an excel file.
Clear Table	Deletes all values from the table.
Add Position	Adds the current stage position to the table.
Goto Position	Moves the sample stage to the position selected in the table.

Position table tab

Structure The following figure shows the Position Table tab of the Stage control panel:



Function The following table contains information on the components of the Position Table tab:

Component	Function
Table	Defining customized position sets. Each row contains the data of a sample stage position as well as a comment on this position. By double-clicking a row, the stage will be moved to the corresponding position. By clicking a cell in the Comment column, the corresponding comment may be modified. A right-click on a row opens a context menu with the following functions: – Goto Position: Moves the sample stage to the position of the selected row. – Insert Position: Inserts the current position as new row after the selected row. – Replace Position: Replaces the selected row with the current position. – Delete Position: Deletes the selected row. – Set Inputs: Transfers the positions of the selected row to the input fields in the main field. – Load Table: Loads a set of positions from an excel file. – Save Table: Saves a set of positions to an excel file.
Load Table	Loads a set of positions from an excel file.
Save Table	Saves a set of positions to an excel file.
Clear Table	Deletes all values from the table.

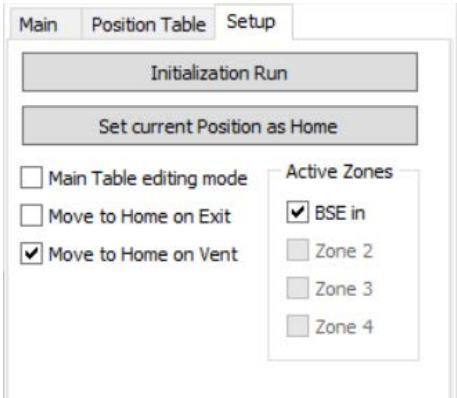
Continuation next page ...

... continuation: Position table tab

Component	Function
Add Position	Adds the current stage position to the table.
Goto Position	Moves the sample stage to the position selected in the table.

Setup tab

Structure The following figure shows the Setup tab of the Stage control panel:



Function The following table contains information on the components of the Setup tab:

Component	Function
Initialization Run	Manually starts an initialization run.  see "Initialization" on page 95
Set current Position as Home	Defines the current position as Home.
Main Table editing mode	If activated, the values in the Main tab may be modified as well as the values in the Position Table tab.
Move to Home on Exit	If activated, the sample stage will be moved to Home position when the program is closed.
Move to Home on Vent	If activated, the sample stage will be moved to Home position when the sample chamber is vented.
Active Zones	Activation/deactivation of up to 4 cuboid zones that the sample stage will not enter.  These zones may be defined by an administrator.

9.2

SamplePilot (optional)

Overview

Purpose

This section contains descriptions of the structure, function and usage of the optional SamplePilot extension.

Contents

This sections contains the following information:

› Introduction

› User interface

› Setup tab

› Navigation tab

› Image Capture dialog window

› Reference Images dialog window

› Setting up SamplePilot

› Managing Positions

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Introduction

Used terms The following table contains information on terms that are necessary and helpful for using SamplePilot:

Term	Description
Marker board	A marker board is a board with a receptacle for a sample holder and markers. Structure and coordinates of this board are described in a file. A marker board has to be used to capture a navigation image with a camera.
Marker	Markers are necessary identifiers to control the sample stage with captured camera images.
Reference image	A reference image is a 2D drawing that is used for assignment to a marker board defined in SamplePilot. A reference image is required when no marker board is available and/or no navigation image can be captured with a camera. A reference image may be used as substitute for a navigation image.
Navigation image	A navigation image is any image that is loaded into SamplePilot and may be used for sample stage navigation. If a camera image is used as navigation image, created positions may be saved directly as metadata in or for the image. If a reference image is used as a substitute for a navigation image, created positions cannot be saved directly as metadata in or for the image. In this case, the positions are saved in a separate position file (*.pos).
USB camera provided by point electronic GmbH	The USB camera provided by point electronic GmbH is an optional hardware solution for SamplePilot. This solution consists of: – a USB camera, – a camera tripod, and – a foot with a receptacle for marker boards.

Description SamplePilot is an extension for DISS 6 that allows a sample stage to be controlled via a navigation image.

Navigation images can be captured with any camera and can be loaded into SamplePilot. With a camera connected to the computer, navigation images may directly be captured and used in SamplePilot.

Continuation next page ...

Camera requirements To capture navigation images in SamplePilot, the USB camera provided by point electronic GmbH may be used.

Alternatively, cameras supporting DirectShow and having an integrated color sensor can be used.

i The USB camera provided by point electronic GmbH has been tested with -SamplePilot.

Used coordinate systems For navigation and internal data communication, SamplePilot uses the following coordinate systems:

Coordinate system	Description
Coordinate system for the navigation	The zero point is in the center of the sample holder. X rises to the right, Y ascends upwards, Z rises towards the viewer, R rises clockwise around the Z axis. i The coordinate system for navigation is used in the Navigation tab for displaying mouse positions.
Coordinate system of the navigation image	The zero point is the top left corner. X rises to the right. Y descends downwards. Z and R are not present. i The coordinate system of the navigation image is necessary for creation of reference images.
Coordinate system of the sample stage	The zero point is at zero of the sample stage. With the configuration installed for viewing from the viewpoint of the electron beam (horizontal X axis and vertical Y axis): X rises to the left, Y descends downwards, Z rises towards the electron beam, R rises clockwise around the beam axis/Z axis.

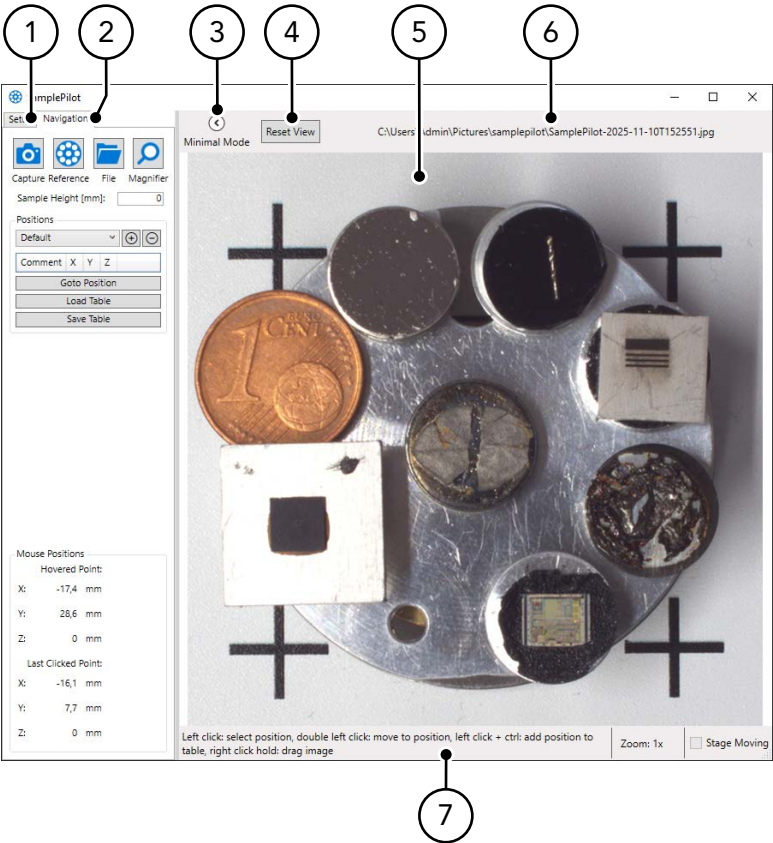
Button SamplePilot is integrated in DISS 6 and can be opened via a button in the "Optional extensions" toolbar.

Clicking the following button opens the **SamplePilot** dialog window:



User interface

Structure The following figure shows the user interface of the SamplePilot extension with its main components:



Function The following table contains information on the main components of the user interface:

No.	Main component	Function
1	Setup tab (Page 107)	Contains settings for the extension and the navigation.
2	Navigation tab (Page 110)	Contains functions for navigating the stage directly in the navigation image.
3	Minimal Mode	Hiding and unhiding the tabs and status bar.
4	Reset View	Centers the image and sets the zoom factor to 2x.

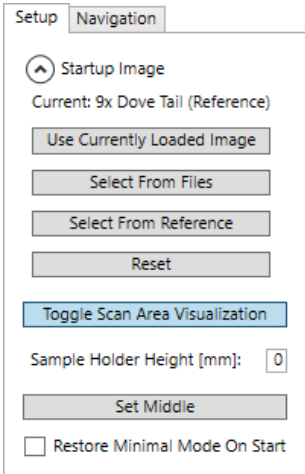
Continuation next page ...

... continuation: User interface

No.	Main component	Function
5	Navigation area	Shows the loaded camera image or reference image. For navigating the sample stage using the navigation image and the mouse. The following functions are generally available: – Mouse wheel = zooming in/out. – Moving the mouse with pressed right mouse button = moving the image section in X or Y direction. The following functions are available with activated Navigation tab: – Click = marking the position to display the coordinates. – [Ctrl] + Click = transferring the position to the table and marking it in the image. – Double click = moving the sample stage to the mouse position. The following function is available with activated "Set Middle" function in the Setup tab: – Click = marking the center of the sample holder
6	Image information	Shows: – for an opened navigation image, the saving location (file path) of the navigation image – for reference images, the name of the reference image
7	Status bar	Shows: – context-sensitive help texts – the current zoom factor – the moving status of the sample stage

Setup tab

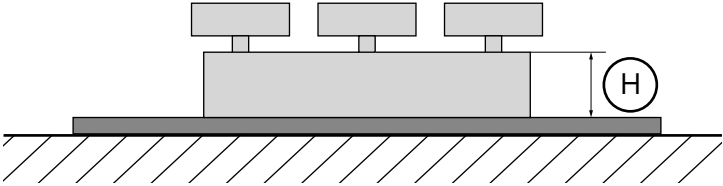
Structure The following figure shows the Setup tab with its components:



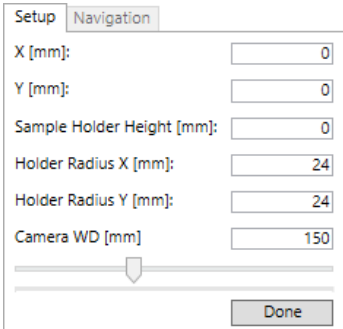
Function The following table contains information on the components of the Setup tab:

Component	Function
Startup Image	Contains settings for the image to be loaded during SamplePilot startup. Enables hiding and unhiding the startup image settings.
Current	Shows the currently used startup image. i If a reference image is used as startup image, this will be indicated by the text extension "(Reference)".
Use Currently Loaded Image	Uses the image currently loaded in the navigation area as startup image.
Select From Files	Opens a dialog window for selecting any camera image in JPEG/ PNG format. i The image has to contain markers. An image without markers may be selected but cannot be used as startup image for the next startup of SamplePilot.
Select From Reference	Opens a dialog window for selection of a reference image.
Reset	Resets all startup image settings and selects a default startup image.
Toggle Scan Area -Visualization	Activates/deactivates a blue hair cross that indicates the center and the size of the scan area.

Continuation next page ...

Component	Function
Sample Holder Height	Sets the distance (H) between the surface of the markers and the surface of the sample holder in millimeters.  i If the markers are higher than the sample holder surface, a negative value has to be entered. i If the markers are lower than the sample holder surface, a positive value has to be entered. ? see "Defining the height of the sample holder" on page 121
Set Middle	Opens the settings of the sample holder (sample holder center and height, camera working distance). ? see "Defining the working distance of the camera" on page 121
Restore Minimal Mode On Start	If the checkbox is activated, the setting for minimal mode that is active when closing the software will be saved. The saved setting will be used for the next startup of SamplePilot.

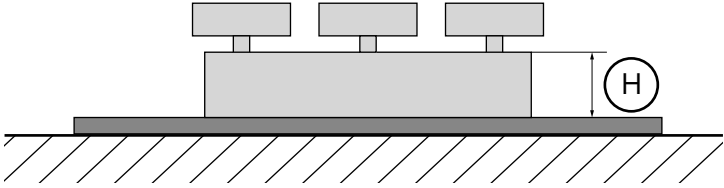
Set Middle The following figure shows the Setup tab with the settings for the sample holder:



The following table contains information on the settings for the sample holder:

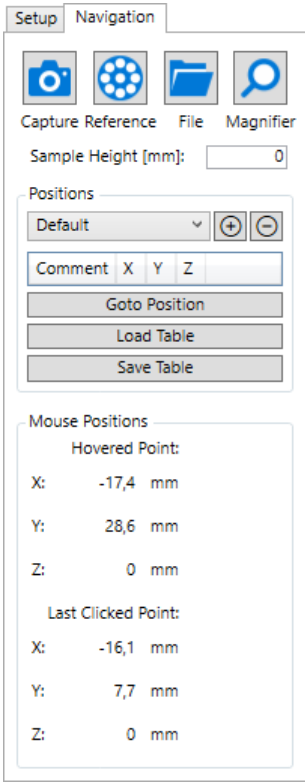
Setting	Function
X, Y	Setting the center of the sample holder in millimeters. i May also be set by clicking in the navigation image.

... continuation: Setup tab

Setting	Function
Sample Holder Height	Sets the distance (H) between the surface of the markers and the surface of the sample holder in millimeters.  i If the markers are higher than the sample holder surface, a negative value has to be entered. i If the markers are lower than the sample holder surface, a positive value has to be entered. 🔗 see "Defining the height of the sample holder" on page 121
Holder Radius X, Y	Setting the dimensions of the sample holder in millimeters with specification of the radius in X and Y directions.
Camera WD	Setting the working distance of the camera (camera distance from sample holder) in millimeters. i The distance can be set with the slider or entered as value in the input field.

Navigation tab

Structure The following figure shows the Navigation tab with its components:

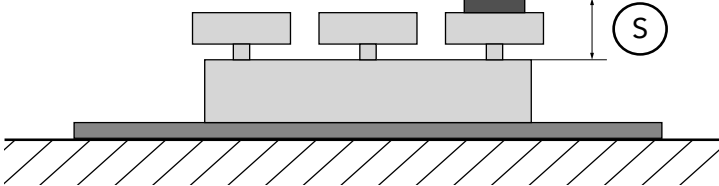


Function The following table contains information on the components of the Navigation tab:

Component	Function
 Capture	Opens the Image Capture dialog window for capturing an image.  see "Image Capture dialog window" on page 113  see "Capturing a camera image" on page 117
 Reference	Opens the Reference Images dialog window for selecting and loading a reference image.  see "Reference Images dialog window" on page 115  see "Using a reference image" on page 120
 File	Opens a dialog window for opening an image. When opening an image, a message may appear indicating one of the following situations: – Position data cannot be read (position data are not available in either the image or a XMP file). – Position data are read from a XMP file.  see "Using a saved navigation image" on page 119

Continuation next page ...

... continuation: Navigation tab

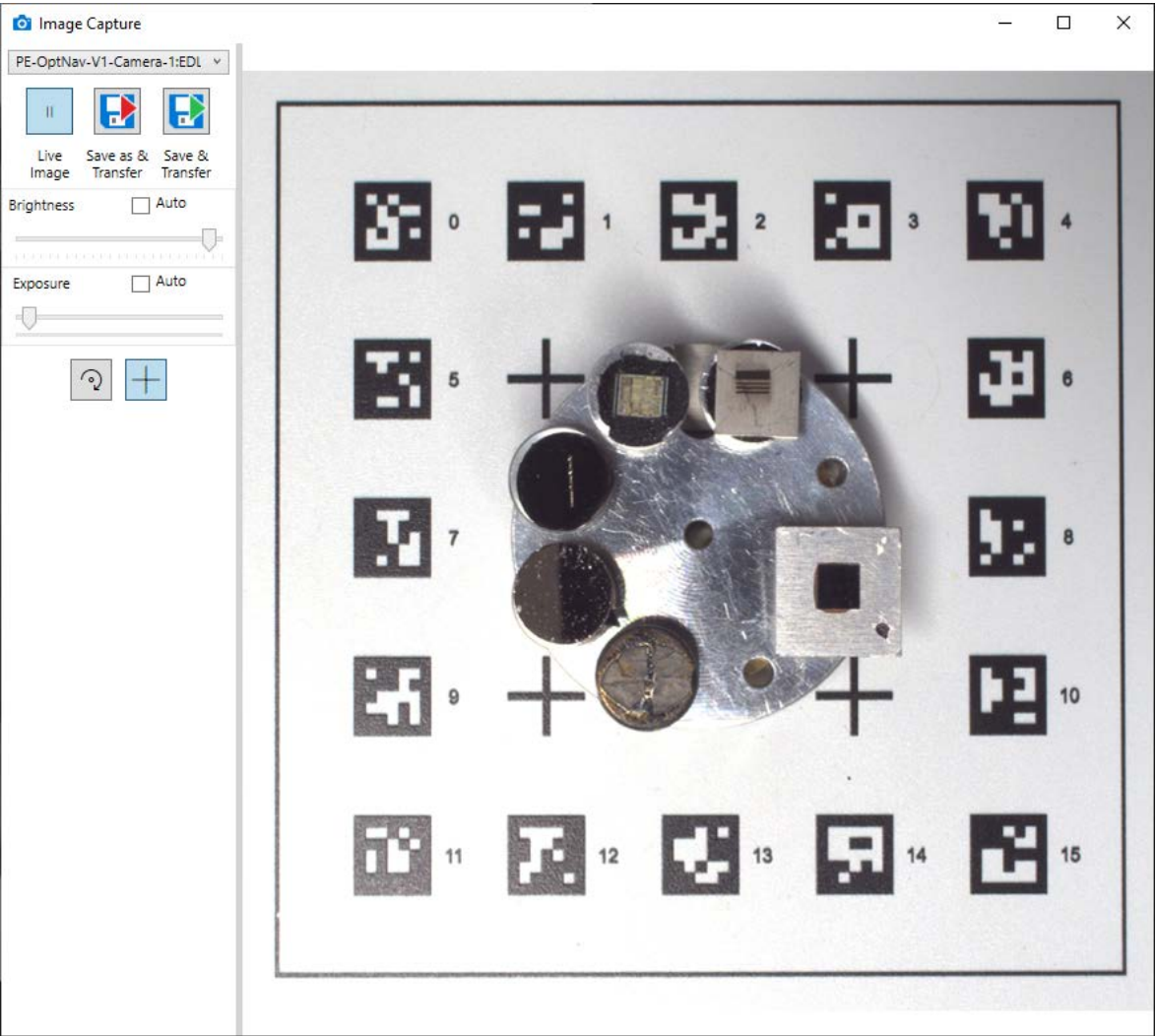
Component	Function
 Magnifier	Activates a magnifier on the mouse cursor. The magnifier area may be enlarged or reduced with the mouse wheel. i Markers for the saved positions are not shown in the magnifier area.
Sample Height	Setting the distance (S) between the surface of the sample holder and the surface of the sample in millimeters. 
Positions	Allows to create or select tables in which sets of any position items may be created or loaded. Selection list: Selection and activation of saved position tables. Plus icon (Add table): Opens the Table Name dialog window for creation of a new position table. Multiple position tables can be created for each image. i After creation of the tables, the table names cannot be modified.  see "Creating a position table" on page 124 Minus icon (Delete table): Deletes the currently selected table. i When removing a position table, all included positions will be deleted from the image and the image's metadata.  see "Deleting a position table" on page 125 Table: Contains one saved position per row. By double-clicking a table row, the corresponding position will be approached. Goto Position: Moves the sample stage to the position selected in the table. Load Table: Loads a position table from a file with *.pos file format.  see "Loading a position table" on page 126 Save Table: Saves all position tables created for an image with all positions in the image's metadata. Thus, the saved positions will be available when the image is opened again. i If the metadata cannot be saved in the image, an XMP file is created for the image, in which all positions are saved. The XMP file is saved in the same location as the image under the same file name as the image. i When using reference images, the position table with all positions is saved as a file in *.pos format.  see "Saving the positions as metadata" on page 126
Mouse Positions	Shows the coordinates of the current mouse cursor position and the last clicked position in millimeters.

Continuation next page ...

... continuation: Navigation tab

Image Capture dialog window

Structure The following figure shows the **Image Capture** dialog window with its components while connected to a USB camera provided by point electronic GmbH:



Function The following table contains information on the components of the **Image Capture** dialog window:

Component	Function
Selection field	Selection of a connected camera. Only cameras supporting DirectShow and having an integrated color sensor can be used. The USB camera provided by point electronic GmbH has been tested with SamplePilot.

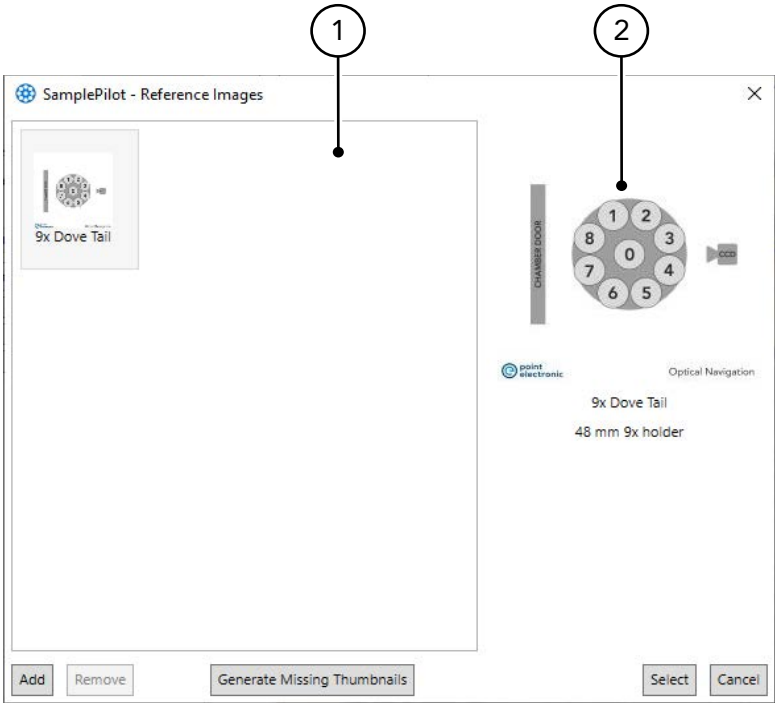
Continuation next page ...

... continuation: Image Capture dialog window

Component	Function
 Live Image	Switching between live camera image and still image.
 Save as & Transfer	Opens a dialog window for selecting the saving location of the captured image. After saving the image, – the Image Capture dialog window is closed, and – the saved image is loaded into the navigation area.
 Save & Transfer	Saving the captured image in the default image folder. Default image folder: C:\Users\[user name]\Pictures\SamplePilot After saving the image, – the Image Capture dialog window is closed, and – the saved image is loaded into the navigation area.
Brightness	Setting the brightness. Auto checkbox for enabling/disabling automatic brightness. i Applies to the USB camera provided by point electronic GmbH. Other cameras with DirectShow may offer other options with or without Auto function. Preciseness and functions of the offered options are under responsibility of the respective camera manufacturers.
Exposure	Setting the exposure time. Auto checkbox for enabling/disabling automatic exposure time. i Applies to the USB camera provided by point electronic GmbH. Other cameras with DirectShow may offer other options with or without Auto function. Preciseness and functions of the offered options are under responsibility of the respective camera manufacturers.
 Rotate	Rotates the image clockwise in 90° increments.
 Hair cross	Hiding/unhiding the hair cross in the image.

Reference Images dialog window

Structure The following figure shows the **Reference Images** dialog window with its components:



Function The following table contains information on the components of the **Reference Images** dialog window:

No.	Component	Function
1	Overview	Shows all available reference images with thumbnails and name.
2	Preview	Shows an enlarged preview of a selected reference image with name and description.
	Add	Adding a new reference image.
	Remove	Removing a selected reference image from the dialog window. ⚠ There will be no warning message before a selected reference image is removed!
	Generate Missing Thumbnails	If reference images are added outside of the SamplePilot user interface, thumb nails will not be created automatically. After clicking the button, missing thumbnails are created and will be shown in the overview.
	Select	Setting a selected reference image. After setting the reference image, – the Reference Images dialog window is closed, and – the selected reference image is used for the particular function.

Continuation next page ...

... continuation: Reference Images dialog window

No.	Component	Function
	Cancel	Closes the dialog window. A selected reference image will not be used for the particular function.

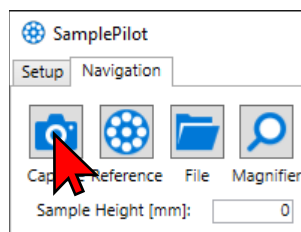
Setting up SamplePilot

Preparation Ensure that the following components are available:

- Sample holder and stubs (with samples)
- Marker board (alternatively, reference image for the used marker board)
- Camera (alternatively optional USB camera provided by point electronic GmbH)

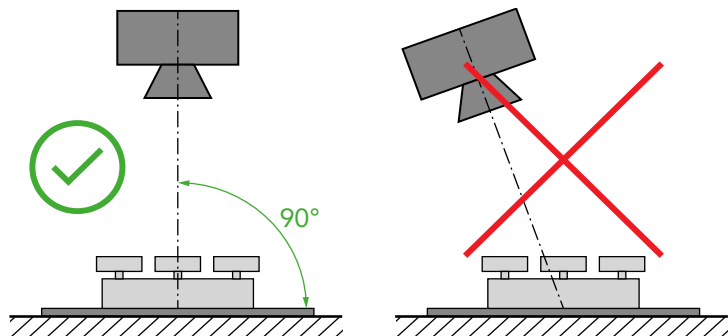
Capturing a camera image Complete the following steps to capture a navigation image with a camera:

1. Place the marker board on a level, non-slip working surface.
2. Place the sample holder in the receptacle on the marker board.
3. Open SamplePilot.
4. Click the **Capture** button in the Navigation tab.



→ The **Image Capture** dialog window opens.

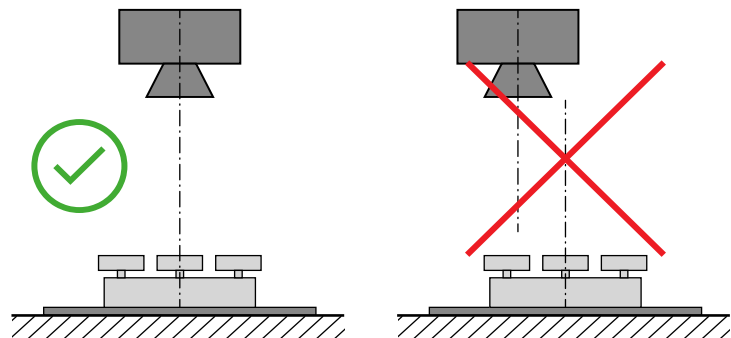
5. Align the camera above the marker board to ensure that all markers are visible in the image section.
 - i** Using a tripod might facilitate aligning the camera.
 - i** Ensure that the camera is placed as uprightly as possible above the marker board.



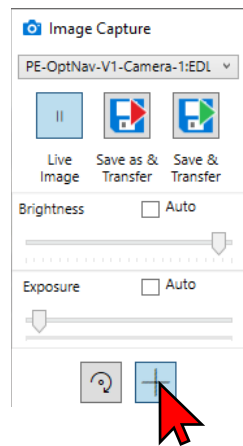
Continuation next page ...

... continuation: Setting up SamplePilot

- i** Ensure that the center of the camera lens is aligned with the center of the sample holder as precisely as possible.



- i** For visual assistance, click the **Hair Cross** button to display the hair cross in the image.



6. Click the **Save & Transfer** button to save the camera image in the default image folder and load it into the SamplePilot navigation area.
Alternatively, click the **Save as & Transfer** button to specify the saving location for the image.

Continuation next page ...

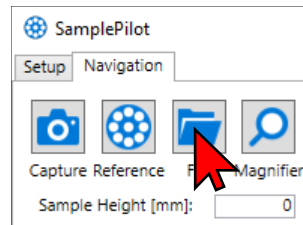
... continuation: Setting up SamplePilot

Using a saved navigation image

Navigation images with saved positions may be loaded into SamplePilot and used for controlling the sample stage.

Complete the following steps to use a saved navigation image:

1. Click the **File** button in the Navigation tab.



→ A dialog window opens for selecting a file.

2. Select the particular file.

i The selected file may contain position data. The positions may be saved as metadata directly in the image or in an external metadata file (*.xmp) assigned to the image.

i SamplePilot will display a notification if:

- no position data can be found/read, or
- position data is read from a metadata file.

→ An image with saved positions is loaded into the navigation area. The saved positions are displayed in the navigation image and in the position table.

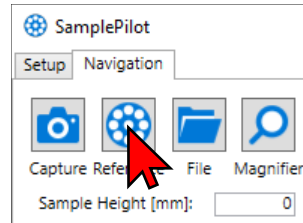
Continuation next page ...

... continuation: Setting up SamplePilot

Using a reference image If no marker board is available and/or it is not possible to capture a camera image, a reference image may be used.

Complete the following steps to use a reference image for navigation and controlling the sample stage:

1. Click the **Reference-** button in the Navigation tab.



→ The **Reference Images** dialog window opens.

2. Select the particular reference image in the dialog window.



3. Click the **Select** button.

→ The **Reference Images** dialog window is closed.

→ The selected reference image is loaded into the navigation area.

→ The values for Sample Height and Sample Holder height are set to 0.0.

i For reference images, the values for Sample Height and Sample Holder Height must be 0.0.

Continuation next page ...

... continuation: Setting up SamplePilot

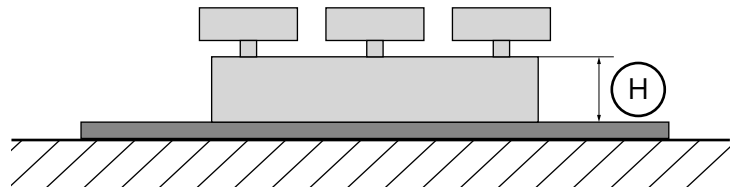
Defining the height of the sample holder

The height of the sample holder is the distance between the surface of the markers and the top edge of the sample holder.

This height is required to define the working distance of the camera.

Complete the following steps to define the height of the sample holder:

1. Place the sample holder in the receptacle on the marker board.
2. Measure the distance (H) between the surface of the markers and the top edge of the sample holder.



3. Enter the measured value in the Sample Holder Height field in the Setup tab.

Defining the working distance of the camera

For navigation on the sample holder, it is necessary to determine the working distance of the camera. For this, the dimensions of the sample holder have to be known.

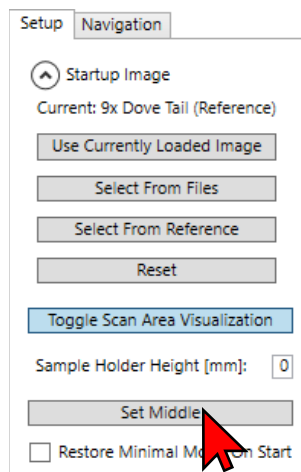
Complete the following steps to define the working distance of the camera:

1. Determine the dimensions of the used sample holder (diameter/radius).
2. Check that the entered value of the sample holder height is correct.

Continuation next page ...

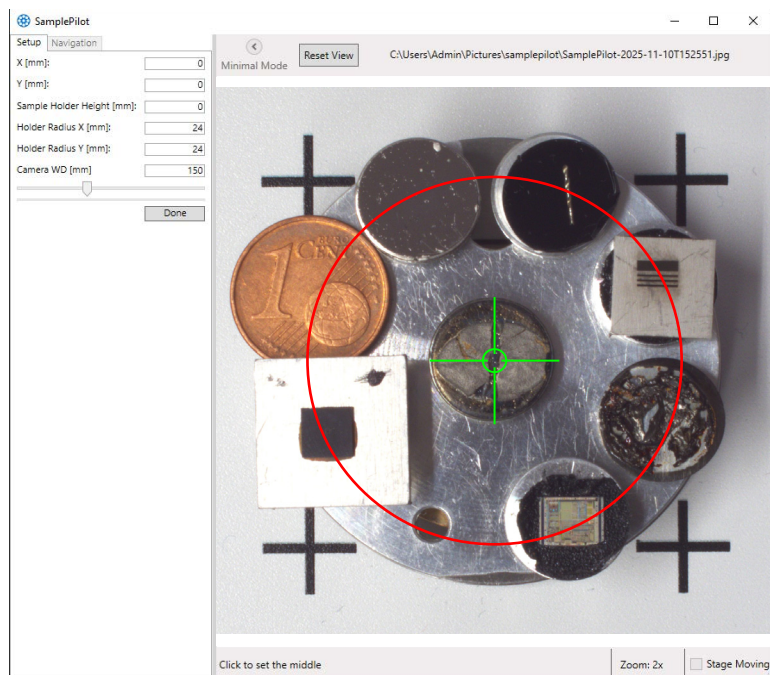
... continuation: Setting up SamplePilot

- Click the **Set Middle-** button in the Setup tab.



→ The navigation area displays the following information for the sample holder:

- a circle with red border to indicate the diameter
- a hair cross with green lines to mark the center point

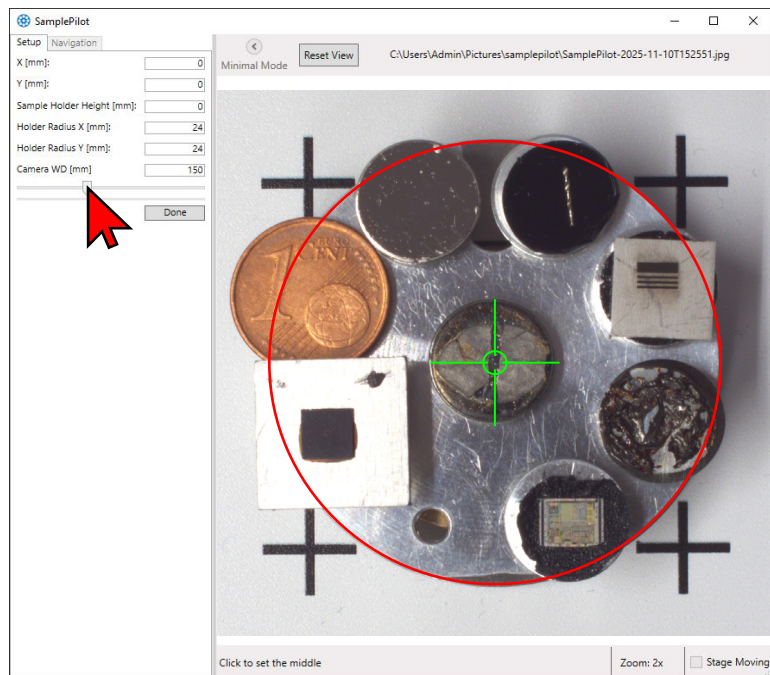


- Enter the determined radius of the used sample holder in the Holder Radius X and Holder Radius Y fields.
- Find the center of the sample holder and set it in the navigation image with a click.
- Adjust the Camera WD slider so that the red frame line of the circle in the navigation area matches the edge of the sample holder.

Continuation next page ...

... continuation: Setting up SamplePilot

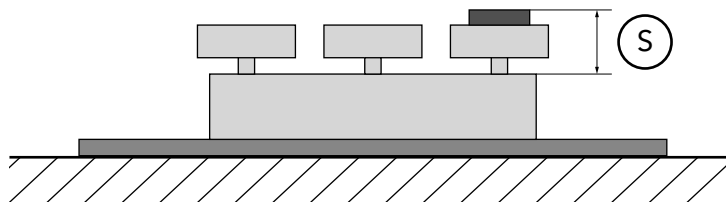
i Alternatively: Enter the value for the working distance in the Camera WD input field.



Defining the sample height The sample height is the distance (S) between the surface of the sample holder and the surface of the sample in millimeters.

Complete the following steps to define the sample height of the sample to be analyzed:

1. Determine the height (S) for each sample.



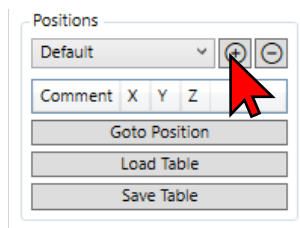
2. Enter the height of the sample to be analyzed in the Sample Height field in the Navigation tab.

Managing Positions

Basic principle Positions are managed in the navigation area and in the Navigation tab.

Creating a position table Complete the following steps to create a new position table:

1. Click the "Add table" button.



→ The **Table Name** dialog window opens.

2. Enter the preferred name for the position table in the dialog window.
3. Click the **OK** button.

→ A new empty position table is created with the entered name.

i It is not possible to change the entered name after clicking OK.

Adding a position to a position table Complete the following steps to add a position to a position table:

1. Select a created (empty) position table.
OR: Open the particular image with saved positions.

2. Click on the image while pressing the [CTRL] key.

→ The position clicked on in the image is added to the position table.

i If necessary, use the zoom function to specify the position (in the image, turn the mouse wheel).

i Positions may be adjusted in the position table after they have been added.

Continuation next page ...

... continuation: Managing Positions

Deleting a position from a position table

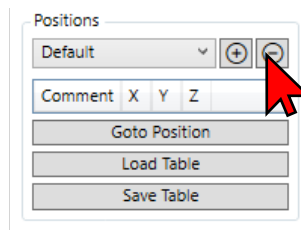
Complete the following steps to to delete a position from a position table:

1. Open the particular image with saved positions.
→ The position table is displayed in the selection field.
2. Click the particular position (row) in the position table to select the position.
3. Press the [DEL] key.
→ The selected position is deleted from the position table and as meta information from the image.

Deleting a position table

Complete the following steps to to delete a position table including all positions:

1. Open the particular image with saved positions.
→ The position table is displayed in the selection field.
2. Click the "Delete table" button.



→ The position table including all positions is removed from the image metadata.

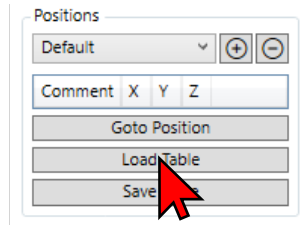
⚠ There will be no warning message before deleting a position table including all saved positions!

Continuation next page ...

Loading a position table Complete the following steps to to load a saved position table from an external file:

i The position table has to be saved in *.pos format.

1. Click the **Load Table** button.

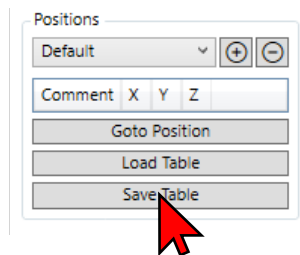


→ A dialog window opens for selecting a file.

2. Select the particular file saved in *.pos format.
 3. Click the **OK** button in the dialog window.
- The position table is loaded with all saved positions.

Saving the positions as metadata Complete the following steps to to save the created positions as metadata in or for the image:

1. Click the **Save Table** button.



→ The positions are saved as metadata in the image.

- i** If the metadata cannot be saved in the image, an XMP file is created for the image, in which all positions are saved. The XMP file is saved in the same location as the image under the same file name as the image.
- i** When using reference images, the position table with all positions is saved as a file in *.pos format.

10 Detector Control

Chapter overview

Purpose This chapter contains descriptions of and guidance for functions to control, set-up and monitor detectors.

Contents This chapter contains the following sections:

- › 10.1BSE 128
- › 10.2LIMA 132
- › 10.3Chamber Scope (optional) 137

10.1

BSE

Overview

Purpose This section contains descriptions of the structure and functions of the optional BSE Amplifier control panel.

Contents This sections contains the following information:

- › Control panel. 129
- › Matching individual channels 131

Control panel

Description The BSE Amplifier control panel sets brightness and contrast of a backscattered electron detector.

The BSE Amplifier control panel will only be displayed with the Multi Channel Signal Amplifier (MICS) hardware option.

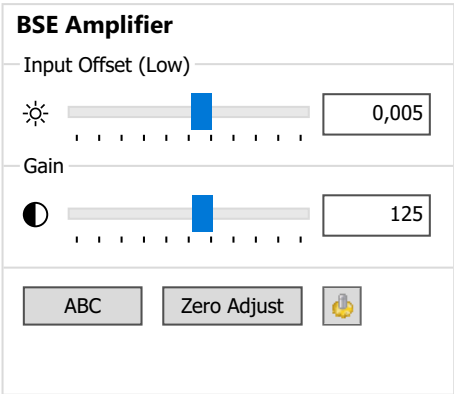
NOTICE

The name of the control panel depends on the current application!

If other detectors are used (e. g. CL), the control panel may also be used for set-up of these signals, depending on the selected signal.

Thus, the name of the panel may vary.

Structure The following figure shows the BSE Amplifier control panel with its components:



Function The following table contains information on the BSE Amplifier control panel components:

Component	Function
Input Offset (Low)	Set-up of the offset method by right-clicking the caption. The following offset methods are available: – Input Offset: Complete setting range that may be necessary for very high offsets. i For Input Offset, brightness is set before Gain. Thus, the sensitivity depends on Gain. – Input Offset (Low): Attenuated setting range. – Output Offset
☀ (Brightness)	Global set-up of the brightness by slider or direct value input.
🌑 (Contrast)	Global set-up of the gain (contrast) by slider or direct value input.

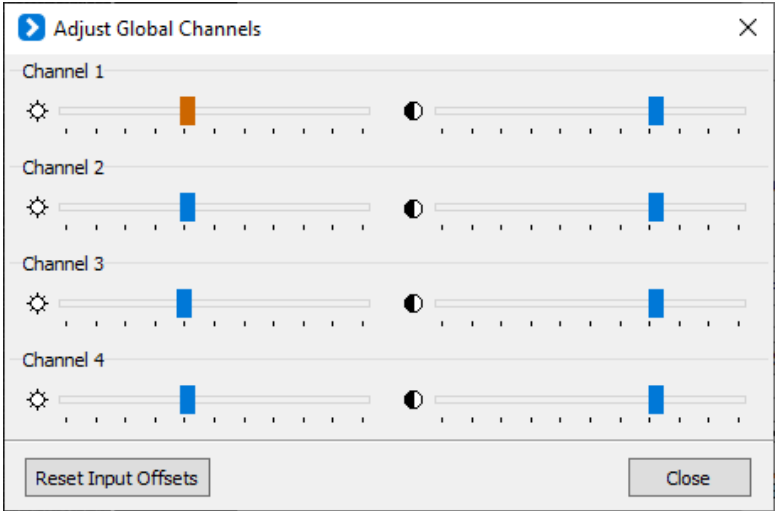
Continuation next page ...

... continuation: Control panel

Component	Function
ABC	Executes automatic brightness contrast.
Zero Adjust	Performs an automatic zero balance. ⚠ Before the matching, electron beam and the chamberscope illumination must be turned off.
 (Settings) (Page 131)	Opens the Adjust Global Channels window for matching the individual channels. The set ratio will be used for modifying brightness and contrast in the BSE control panel.

Matching individual channels

Adjust Global Channels The **Adjust Global Channels** window is used to set the brightness and contrast ratio of individual channels. The set ratio will be used for modifying brightness and contrast in the BSE Amplifier control panel:



The following table contains information on the components of the **Adjust Global Channels** dialog window:

Component	Function
☀ (Brightness)	Set-up of the brightness of a specific channel.
⦿ (Contrast)	Set-up of the gain (contrast) of a specific channel.
Reset Input Offsets	Performs an automatic zero balance. ⚠ Before the matching, electron beam and the chamberscope illumination must be turned off.
Close	Closes the dialog window. All settings are saved.

10.2

LIMA

Overview

Purpose This section contains descriptions of the structure, function and usage of the optional LIMA (Linear Insertion Mechanical Arm) control panel.

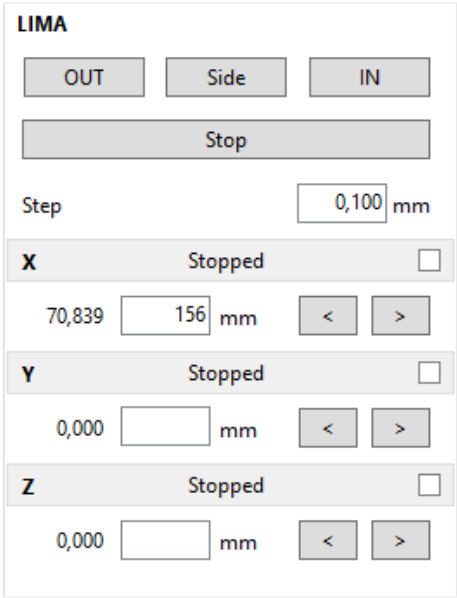
Contents This sections contains the following information:

- › Control panel. 133
- › Controlling the detector arm 135

Control panel

Description The LIMA control panel controls a motorized detector arm in BSE and STEM applications. Thus, the detector arm may be moved directly or in steps in different directions to positions that can be set or saved.

Structure The following figure shows the LIMA control panel with its components:



Function The following table contains information on the LIMA control panel components:

Component	Function
OUT	Completely extends the detector arm. i This position is defined in the settings and may be adjusted via the context menu.
Side	Moves the detector arm to a safe parking position.
IN	Completely retracts the detector arm. i This position is defined in the settings and may be adjusted via the context menu.
Stop	Stops the detector arm at the current position.
Step	For setting the step size for moving the detector in steps in available directions with the arrow keys.

Continuation next page ...

... continuation: Control panel

Component	Function
X, Y, Z	Available moving directions of the detector arm. Any direction: – Shows the current moving status. – Shows the current position of the detector arm. – Allows for entering the target position in an input field. – Allows for moving the detector arm in steps with the arrow keys. i The moving directions Y and Z are used for adjusting the detector arm and are optional.

Moving status The following table contains information on the possible moving status:

Status	Color	Description
Velocity	 (green)	The detector arm is moving.
Stopped	 (white)	The detector arm has been stopped.
Soft Limit	 (light green)	The software limit has been exceeded.
Hard Limit	 (red)	The hardware limit has been exceeded.
Ctrl Error	 (yellow)	The detector arm is blocked (possible motor or settings error).

Context menu Right-clicking the control panel opens a context menu.

The following table contains information on the functions of the context menu:

Item	Function
Initialize	Starts an initialization run of the detector arm. i see "Performing an initialization run" on page 135
Save ... Position	Saves the currently set position values for the position IN, OUT or Side. i see "Saving the positions" on page 136
Settings...	Opens dialog window with global settings. i Only available in Service mode.

Controlling the detector arm

Performing an initialization run If the detector arm has not been initialized, all position values will be displayed in red in the control panel.

An initialization run of the detector arm is necessary to be able to approach the exact positions afterwards.

Complete the following steps to perform an initialization run:

1. Click the LIMA control panel with the right mouse button.
→ The context menu opens.
2. In the context menu, click the item Initialize.
→ The initialization run is started.

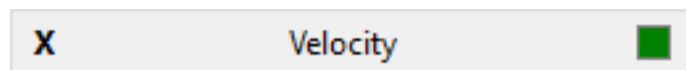
After completion of the initialization run, the detector arm is moved to home position.

The initialization run is completed as soon as the position values in the control panel are displayed in black.

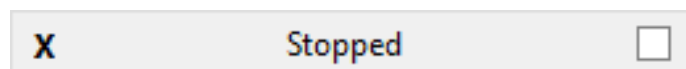
Positioning the detector arm After successful initialization, the detector arm may be positioned.

Complete the following steps to move the detector arm to a particular position:

1. Enter the value of the target position in the entry field of the particular moving direction.
 If the value exceeds predefined limits or causes an error, a corresponding status message will occur.
 see "Moving status" on page 134
2. Press the Return key to confirm the value input.
 → The detector arm is moved to the entered target position.
 → The status Velocity will be displayed in the moving direction.



→ As soon as the detector arm reaches the target position, it stops, and the status Stopped will be displayed.



3. If necessary, adjust the position by the arrow keys of the particular moving direction.

Continuation next page ...

... continuation: Controlling the detector arm

Saving the positions A set position may be saved as IN, OUT or Side position.

Complete the following steps to save a set position:

1. Click the LIMA control panel with the right mouse button.
→ The context menu opens.
2. In the context menu, click one of the items **Save ... Position** to save the set position values as respective position (IN, OUT or Side).

10.3

Chamber Scope (optional)

Overview

Purpose

This sections contains descriptions of the Chamber Scope function when using different sample chamber cameras.

Contents

This sections contains the following information:

› Analog sample chamber camera

› USB sample chamber camera

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Analog sample chamber camera

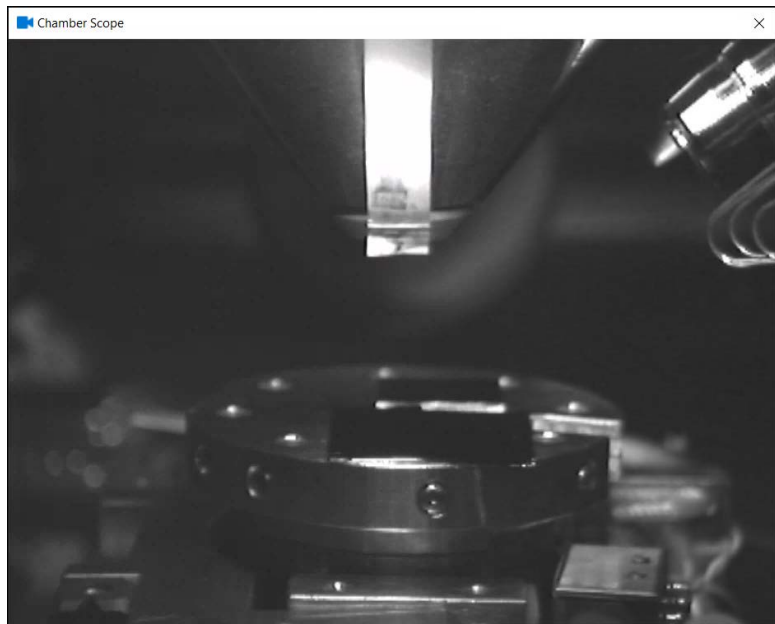
Description The optional Chamber Scope function may display a live image of the sample chamber camera.

Button Clicking the following button will display the **Chamber Scope** dialog window:



Hiding the live image To hide the live image, the **Chamber Scope** dialog window may be closed.

Live image The following figure shows the **Chamber Scope** dialog window with the live image of an analog sample chamber camera:

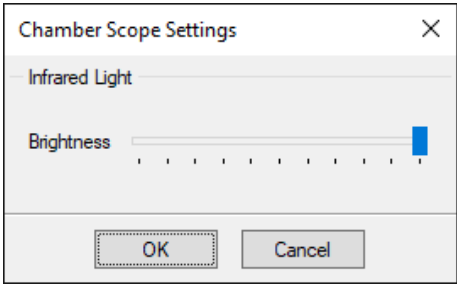


Setting the Chamber Scope A right-click on the Chamber Scope button opens the **Chamber Scope Settings** dialog window to set up the parameters of the Chamber Scope.

Continuation next page ...

... continuation: Analog sample chamber camera

Chamber Scope Settings The following figure shows the **Chamber Scope Settings** dialog window with its components:



The following table contains information on the components of the **Chamber Scope Settings** dialog window:

Component	Function
Brightness	Sets the lighting of the sample chamber.
OK	Closes the dialog window. The settings are applied.
Cancel	Closes the dialog window. All settings are rejected.

USB sample chamber camera

Description If the optional USB sample chamber camera of provided by point electronic GmbH is used, the **Video Monitor** dialog window will open when the Chamber Scope button is clicked.

Structure The following figure shows the **Video Monitor** window with its components:



Function The following table contains information on the components of the **Video Monitor** dialog window:

No.	Component	Function
1	Input signal source	For changing the input signal source in the case of multiple connected USB sample chamber cameras.
2	Overview	Shows the live image of the selected input signal source in full perspective. If Overview is deactivated, a zoomed in image section will be shown. The zoom factor can be configured.
3	Slider	Sets the lighting of the sample chamber.

11 Image Acquisition Functions

Chapter overview

Purpose This chapter contains descriptions of the structure and function of the image acquisition functions. Availability of the separate functions depends on the device and/or the respective system configuration.

Contents This chapter contains the following information:

› Region scan	142
› Live scan	145
› Slow scan	149
› Counter scan	153
› Line Scan/Point Measurement	157
› Measurement tools in Line Scan/Point Measurement	167
› Beam positioning	174
› Source Image	175
› TIFF Recorder (optional)	183
› DISS 6 Video Recorder (optional)	185
› Channel Mixer	190
› Stop	194

Region scan

Description Region scan is a fast continuous scan of a selected image section. Among other things, it is suitable for setting the focus.

Region scan may be started in an acquired Live or Slow scan image.

By pressing the Region scan button, a scan will be started in the size of the displayed selection box.

The size of the selection box may be rescaled by changing its frame with the mouse or via Scan Settings.

Zoom function Region scan contains a Zoom function.

The image in the selected area may be zoomed in and out with the mouse wheel.

Button Pressing the following button initializes a Region scan:

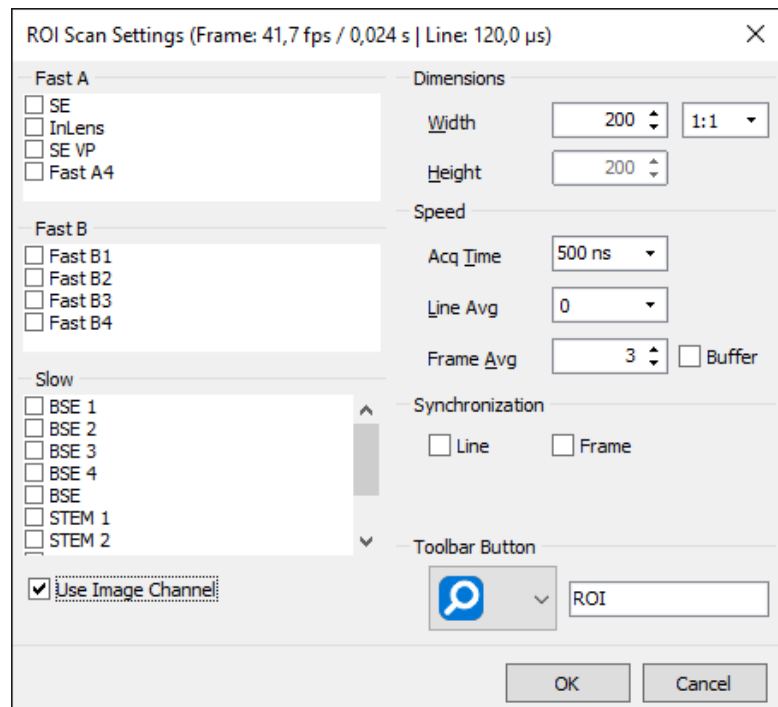


Cancel Region scan will be canceled when the **Stop** button or another scan button is pressed.

Set-up of Region scan A right-click on the Region scan button opens the **Scan Settings** dialog window to set up the relevant parameters.

Continuation next page ...

Scan Settings The following figure shows the **Scan Settings** dialog window with its components:



The following table contains information on the components of the **Scan Settings** dialog window:

Component	Function
Title bar	Displays the calculated scan time per frame based on the scan settings.
Fast A Fast B Slow	Contain checkboxes for selecting an analog input signal source.
Use Image Channel	If the checkbox is activated, the input channel of the ROI uses the input of the image on which it is applied.
Dimensions	
– Width	Sets the width of a displayed image in predefined pixel values. Manual input of pixel values is available. Depending on the aspect ratio selected in the Ratio field, any entry in the Width field leads to an automatic change of the Height value.
– Ratio	Sets the aspect ratio of the displayed image. The available values are 1:1, 5:4, 4:3 and Any.
– Height	Sets the height of a displayed image in pixels. Depending on the aspect ratio selected in the Ratio field, any entry in the Height field leads to an automatic change of the Width value.

Continuation next page ...

Component	Function
Speed	
– Acq Time	Sets the acquisition time per pixel. The value may be set manually within a 10 ns grid. Thus, the signal-to-noise ratio (SNR) may be improved. The acquisition time may be changed by using the [left arrow] and [right arrow] keys.
– Line Avg.	Activates line averaging. This means that each line is repeatedly scanned with a preset amount of scans. Image signals per line are shown averaged. i The use of line averaging is not possible if line synchronization is activated.
– Frame Avg	Activates frame averaging. This means that images are shown averaged by a preset frame rate. Frame averaging may be changed by using the [arrow up] and [arrow down] keys.
Synchronization	
– Line	Activates line synchronization. With every new line, the scan is synchronized to the mains voltage in order to reduce interferences. i The use of line synchronization is not possible if line averaging is activated.
– Frame	Activates image synchronization. With every new image, the scan is synchronized to the mains voltage in order to reduce interferences.
Toolbar button	– Selecting the Scan button to be shown in the toolbar. – Entering a name to be displayed below the Scan button.
OK	Closes the dialog window. The preset parameters are saved.
Cancel	Closes the dialog window. The preset parameters are rejected.

Live scan

Description Live scan is a fast, continuous scan exclusively intended for image preview.

The images displayed in the Live scan cannot be saved.

The display size of the image may be rescaled by changing the frame with the mouse or via Scan Settings.

In the Live scan, the amount of pixels of the displayed image corresponds to the amount of scanned pixels.

Full screen mode Full screen mode can be activated by double-clicking the Live scan image. In this mode, the image is only scanned with half the displayed pixels.

Example image resolution of 1024 x 768:

If the full screen mode is activated, the image will be scanned with a resolution of 512 x 384 pixels.

For smoothing the image, use the key combination [Ctrl]+[I] to switch to an interpolated display.

Button Pressing the following button starts a Live scan:

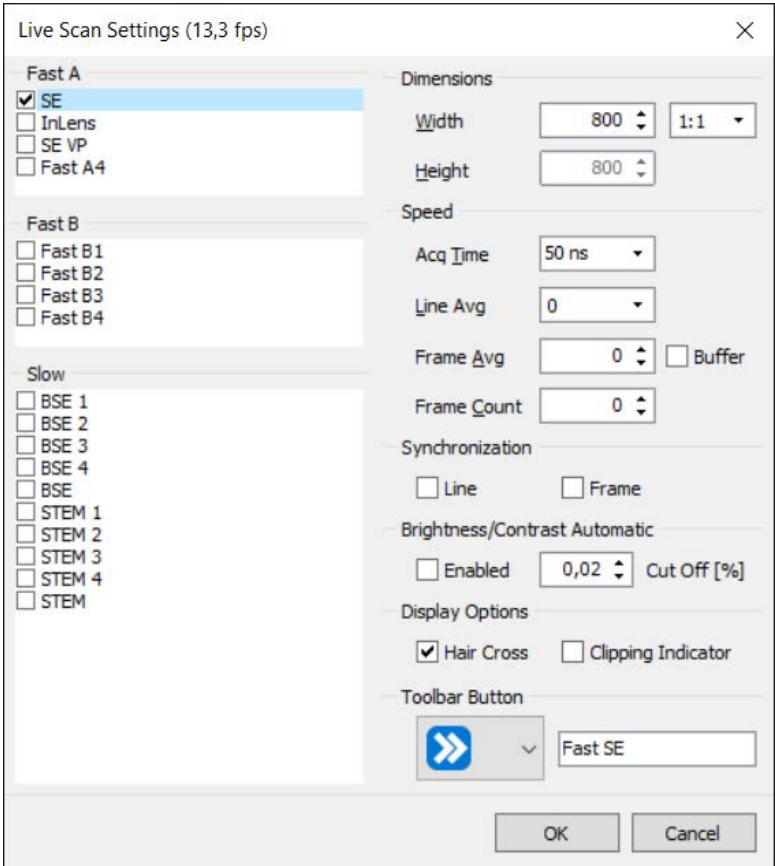


Cancel Live scan will be canceled when the **Stop** button or another scan button is pressed.

Continuation next page ...

Set-up of Live scan A right-click on the Live scan button opens the **Scan Settings** dialog window to set up the relevant parameters.

Scan Settings The following figure shows the **Scan Settings** dialog window with its components:



The following table contains information on the components of the **Scan Settings** dialog window:

Component	Function
Title bar	Displays the calculated scan time per frame based on the scan settings.
Fast A Fast B Slow	Contain checkboxes for selecting an analog input signal source.
Dimensions	
– Width	Sets the width of a displayed image in predefined pixel values. Manual input of pixel values is available. Depending on the aspect ratio selected in the Ratio field, any entry in the Width field leads to an automatic change of the Height value.

Continuation next page ...

Component	Function
– Ratio	Sets the aspect ratio of the displayed image. The available values are 1:1, 5:4, 4:3 and Any.
– Height	Sets the height of a displayed image in pixels. Depending on the aspect ratio selected in the Ratio field, any entry in the Height field leads to an automatic change of the Width value.
Speed	
– Acq Time	Sets the acquisition time per pixel. The value may be set manually within a 10 ns grid. Thus, the signal-to-noise ratio (SNR) may be improved. The acquisition time may be changed by using the [left arrow] and [right arrow] keys.
– Line Avg.	Activates line averaging. This means that each line is repeatedly scanned with a preset amount of scans. Image signals per line are shown averaged. i The use of line averaging is not possible if line synchronization is activated.
– Frame Avg	Activates frame averaging. This means that images are shown averaged by a preset frame rate. Frame averaging may be changed by using the [arrow up] and [arrow down] keys.
– Frame Count	Sets the frame count.
Synchronization	
– Line	Activates line synchronization. With every new line, the scan is synchronized to the mains voltage in order to reduce interferences. i The use of line synchronization is not possible if line averaging is activated.
– Frame	Activates image synchronization. With every new image, the scan is synchronized to the mains voltage in order to reduce interferences.
Brightness/Contrast Automatic	
– Enabled	Activates the brightness/contrast automatic
– Cut Off (%)	The percentage of the brightest and darkest pixels set in the Cut Off field will not be included in the calculation of brightness and contrast to ignore outliers.
Display Options	
– Hair Cross	Shows a hair cross for adjustment of the grid in the center of the image.
– Clipping Indicator	Activates/deactivates the display of an overdriven image signal. If the checkbox is ticked, all absolutely white pixels will be displayed in red and all absolutely black pixels will be displayed in green.

Continuation next page ...

Component	Function
Toolbar button	– Selecting the Scan button to be shown in the toolbar. – For entering a name to be displayed below the Scan button.
OK	Closes the dialog window. The preset parameters are saved.
Cancel	Closes the dialog window. The preset parameters are rejected.

Slow scan

Description Slow scan is used for the simultaneous image acquisition from up to four analog signal sources.

The display size of the images may be rescaled by changing the frame with the mouse.

The image resolution is set in Scan Settings. The number of scanning cycles may also be set in Scan Settings.

Images simultaneously acquired from several sources are displayed in a multi-divided window.

Button Pressing the following button starts a Slow scan:



Ending The following table contains information on finishing the Slow scan and the corresponding actions:

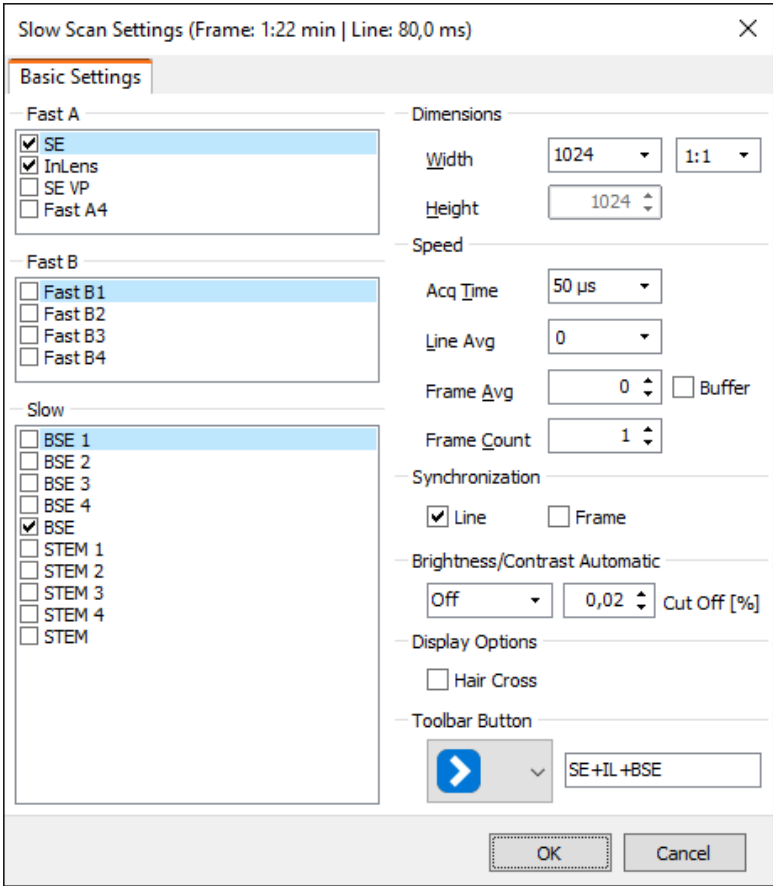
Ending	Action
At the end of a scanning process	When the preset amount of scans is reached.
At the end of the current image rolling	After repeated pressing of the Slow scan button.

Canceling Slow scan will be canceled when the **Stop** button or another scan button is pressed.

Set-up of Slow scan A right-click on the Slow scan button opens the **Scan Settings** dialog window to set up the relevant parameters.

Continuation next page ...

Scan Settings The following figure shows the **Scan Settings** dialog window with its components:



The following table contains information on the components of the **Scan Settings** dialog window:

Component	Function
Title bar	Displays the calculated scan time per frame based on the scan settings.
Fast A Fast B Slow	Contain checkboxes for selecting analog input signal sources.
Dimensions	
– Width	Sets the width of a displayed image in predefined pixel values. Manual input of pixel values is available. Depending on the aspect ratio selected in the Ratio field, any entry in the Width field leads to an automatic change of the Height value.
– Ratio	Sets the aspect ratio of the displayed image. The available values are 1:1, 5:4, 4:3 and Any.

Continuation next page ...

Component	Function
– Height	Sets the height of a displayed image in pixels. Depending on the aspect ratio selected in the Ratio field, any entry in the Height field leads to an automatic change of the Width value.
Speed	
– Acq Time	Sets the acquisition time per pixel. The value may be set manually within a 10 ns grid. Thus, the signal-to-noise ratio (SNR) may be improved. The acquisition time may be changed by using the [left arrow] and [right arrow] keys.
– Line Avg.	Activates line averaging. This means that each line is repeatedly scanned with a preset amount of scans. Image signals per line are shown averaged. i The use of line averaging is not possible if line synchronization is activated.
– Frame Avg	Activates frame averaging. This means that images are shown averaged by a preset frame rate. Frame averaging may be changed by using the [arrow up] and [arrow down] keys.
– Frame Count	Sets the frame count.
Synchronization	
– Line	Activates line synchronization. With every new line, the scan is synchronized to the mains voltage in order to reduce interferences. i The use of line synchronization is not possible if line averaging is activated.
– Frame	Activates image synchronization. With every new image, the scan is synchronized to the mains voltage in order to reduce interferences.
Brightness/Contrast Automatic	Controls the brightness/contrast ratio of analog image signals
– Options	– Off: Deactivates the brightness/contrast automatic. – Single: Brightness/contrast minimum and maximum will be determined for each image signal and applied accordingly. – Global: Brightness/contrast minimum and maximum will be determined for each image signal. The resulting minima and maxima will be applied to all image signals to keep the image signal ratio.
– Cut Off (%)	The percentage of the brightest and darkest pixels set in the Cut Off field will not be included in the calculation of brightness and contrast to ignore outliers.
Display Options	
– Hair Cross	Shows a hair cross for adjustment of the grid in the center of the image.

Continuation next page ...

Component	Function
Toolbar button	– Selecting the Scan button to be shown in the toolbar. – Entering a name to be displayed below the Scan button.
OK	Closes the dialog window. All preset parameters are saved and used for the next scanning process.
Cancel	Closes the dialog window. The preset parameters are rejected.

Counter scan

Description The Counter scan is used for image acquisition of digital mapping images and analog signal sources. It is possible to acquire images simultaneously from up to twelve digital and up to four analog signal sources (optional).

The display size of the images may be rescaled by changing the frame with the mouse or via Scan Settings.

Image resolution and measure time of the images to be scanned may be set in Scan Settings.

Images simultaneously acquired from several signal sources are displayed in a multi-divided window.

Button Pressing the following button initializes a Counter scan:



Ending The following table contains information on ending the Counter scan and the corresponding actions:

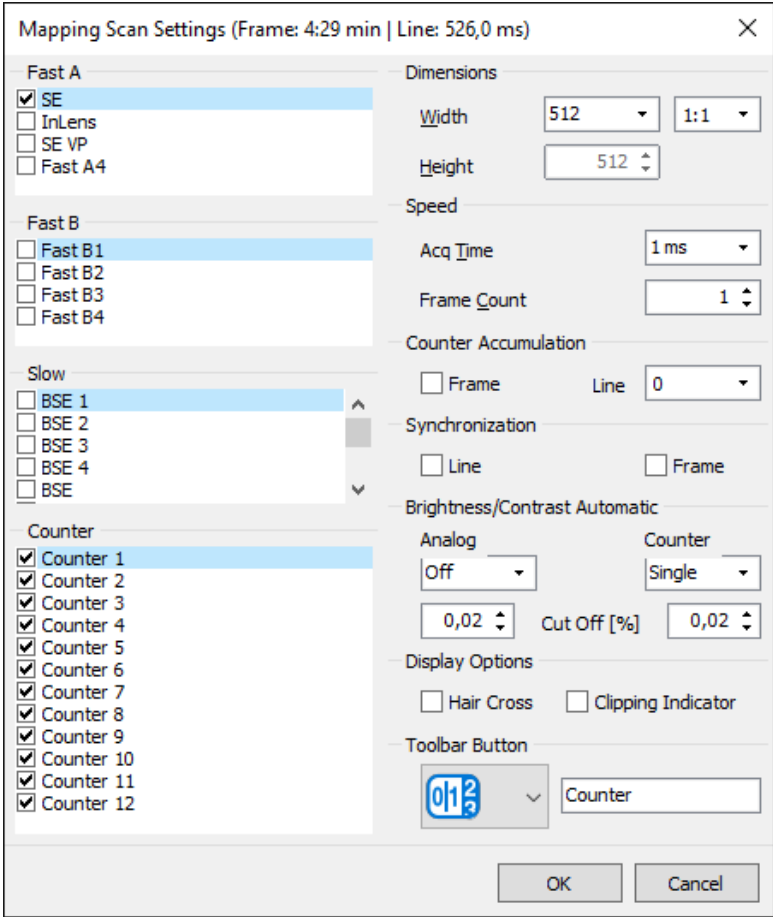
Ending	Action
At the end of a scan	When the preset amount of scans is reached.
At the end of the current image rolling	By repeated pressing of the Counter button.

Cancel Counter scan will be canceled when the **Stop** button or another scan button is pressed.

Continuation next page ...

Set-up of Counter scan A right-click on the Counter scan button opens the **Scan Settings** dialog window to set up the Counter scan parameters.

Scan Settings The following figure shows the **Scan Settings** dialog window with its components:



The following table contains information on the components of the **Scan Settings** dialog window:

Component	Function
Title bar	Displays the calculated scan time per frame based on the scan settings.
Fast A Fast B Slow	Contain checkboxes for selecting analog input signal sources.
Counter	Contains checkboxes for selecting up to twelve digital input signal sources.
Dimensions	

Continuation next page ...

Component	Function
– Width	Sets the width of a displayed image in predefined pixel values. Manual input of pixel values is available. Depending on the aspect ratio selected in the Ratio field, any entry in the Width field leads to an automatic change of the Height value.
– Ratio	Sets the aspect ratio of the displayed image. The available values are 1:1, 5:4, 4:3 and Any.
– Height	Sets the height of a displayed image in pixels. Depending on the aspect ratio selected in the Ratio field, any entry in the Height field leads to an automatic change of the Width value.
Speed	
– Acq Time	Sets the acquisition time per pixel. The value may be set manually within a 10 ns grid. Thus, the signal-to-noise ratio (SNR) may be improved. The acquisition time may be changed by using the [left arrow] and [right arrow] keys.
– Frame Count	Sets the frame count.
Counter Accumulation	Counter Accumulation is used to add up the impulses at each pixel for the set number of line repetitions.
– Frame	Activates/deactivates Counter Accumulation.
– Line	Sets the number of line repetitions.
Synchronization	
– Line	Activates line synchronization. With every new line, the scan is synchronized to the mains voltage in order to reduce interferences.
– Frame	Activates image synchronization. With every new image, the scan is synchronized to the mains voltage in order to reduce interferences.
Brightness/Contrast Automatic	Controls the brightness/contrast ratio of image signals.
– Analog	Contains options for brightness/contrast automatic of the analog image signals (see Options).
– Counter	Contains options for brightness/contrast automatic of the digital image signals (see Options).
– Options	– Off: Deactivates the brightness/contrast automatic. – Single: Brightness/contrast minimum and maximum will be determined for each image signal and applied accordingly. – Global: Brightness/contrast minimum and maximum will be determined for each image signal. The resulting minima and maxima will be applied to all image signals to keep the image signal ratio.

Continuation next page ...

Component	Function
– Cut Off (%)	The percentage of the brightest and darkest pixels set in the Cut Off field will not be included in the calculation of brightness and contrast to ignore outliers. This percentage may be set differently for analog and digital image signals.
Display Options	
– Hair Cross	Shows a hair cross for adjustment of the grid in the center of the image.
– Clipping Indicator	Activates/deactivates the display of an overdriven image signal. If the checkbox is ticked, all absolutely white pixels will be displayed in red and all absolutely black pixels will be displayed in green.
Toolbar button	– Selecting the Scan button to be shown in the toolbar. – For entering a name to be displayed below the Scan button.
OK	Closes the dialog window. All preset parameters are saved and used for the next scanning process.
Cancel	Closes the dialog window. The preset parameters are rejected.

Line Scan/Point Measurement

Description The Line Scan/Point Measurement function scans any line or point on the sample.

Thus captured signals may be displayed graphically or exported as table.

Before a Line Scan may be started, a Slow Scan image has to be acquired and the magnification of the microscope has to be entered. Entering the magnification is not necessary for devices with automatic parameter transfer controlled by Image Acquisition.

Button Pressing the following button opens the **Point/Line Measurement** window to set up and to do line scans and/or point measurements:



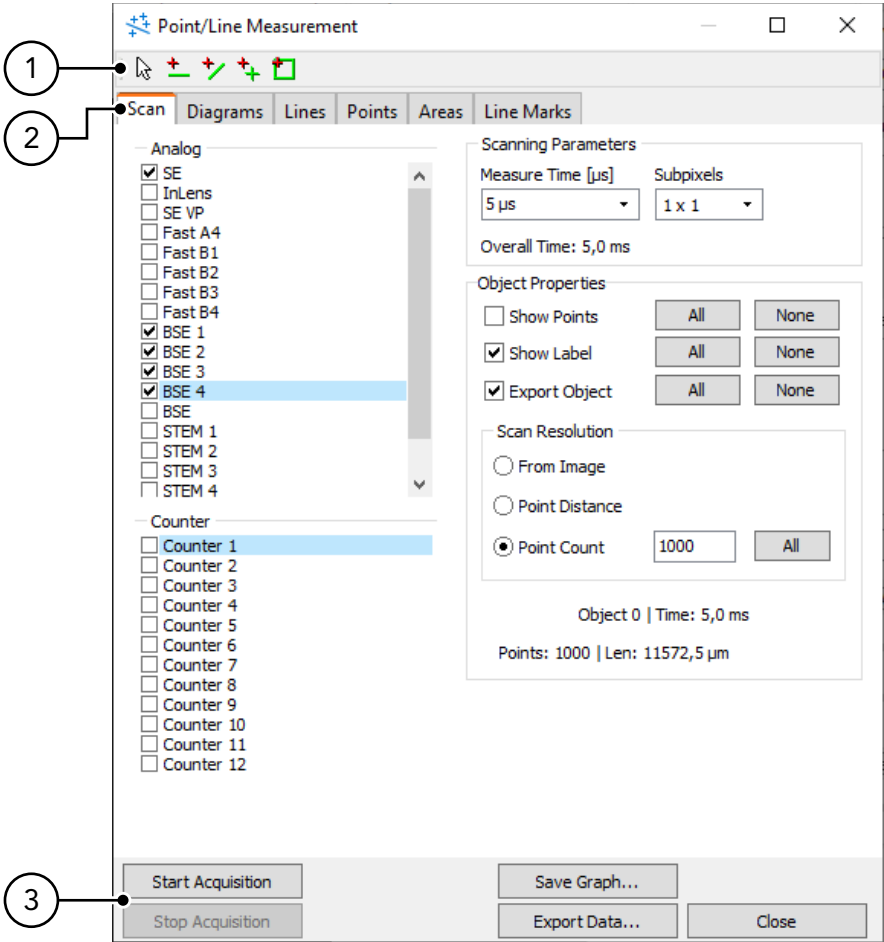
NOTICE

No other scan function may be processed during activity of the Line Scan/Point Measurement function.

Ending The function may be stopped by closing the **Point/Line Measurement** window.

Continuation next page ...

User interface The following figure shows the Line Scan user interface with its main components:



The following table contains information on the main components of the user interface of the Line Scan:

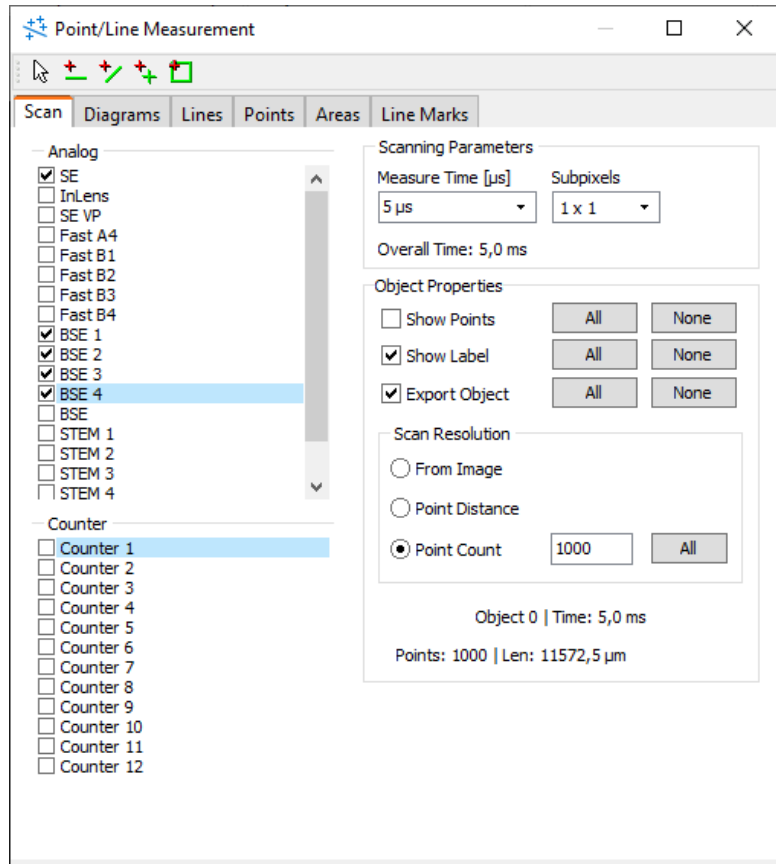
No.	Component	Function
1	Measurement tools	Buttons for selection or creation of the following measuring objects: – Horizontal measuring lines (Page 168) – Free measuring lines (Page 169) – Measurement points (Page 171) – Measurement areas (Page 172)
2	Tabs	
	– Scan	Contains functions to set up the scan (Page 160).
	– Diagrams	Contains functions to set up the diagram display (Page 162).
	– Lines	– Shows the values of the created measuring lines in a table. – Changing of displayed values. – Contains checkboxes for activating / deactivating single measuring lines for the Export Data... function.

Continuation next page ...

No.	Component	Function
	– Points	- Shows the values of the created measurement points in a table. - For changing the displayed values and deletion of the applied measurement points. - Contains checkboxes for activating / deactivating single measurement points for the Export Data... function.
	– Areas	- Shows the values of the created measurement areas in a table. - For changing the displayed values and deletion of the applied measurement areas. - Contains checkboxes for activating / deactivating single measurement areas for the Export Data... function.
	– Line Marks	Shows the markers set in the diagram with their position and the measured value in a table. Markers may be set in the diagram and deleted with a right-click. i Setting/deleting markers is only possible if the per Line option is activated in the Line/Diagram Assignment.
3	Function keys	
	– Start Acquisition	Starts the scanning process with the preset values.
	– Stop Acquisition	Ends the scanning process.
	– Save Graph...	Opens a dialog window for exporting the acquired image with measuring line, measurement points and diagrams as TIFF file. Additionally, the data export can be activated. Thus, the measuring object's tables will be saved as XLS or CSV file with the same file name.
	– Export Data...	Opens a dialog window for exporting the line, point and area tables as XLS or CSV file.
	– Save Table...	Opens a dialog window for saving the currently displayed measuring object table. i Will only be displayed with the Points oder Lines, Areas and Line Marks tabs.
	– Close	Closes the dialog window. The scan is canceled, all settings are rejected.

Continuation next page ...

Scan tab The following figure shows the Scan tab with its components:



The following table contains information on the components of the Scan tab:

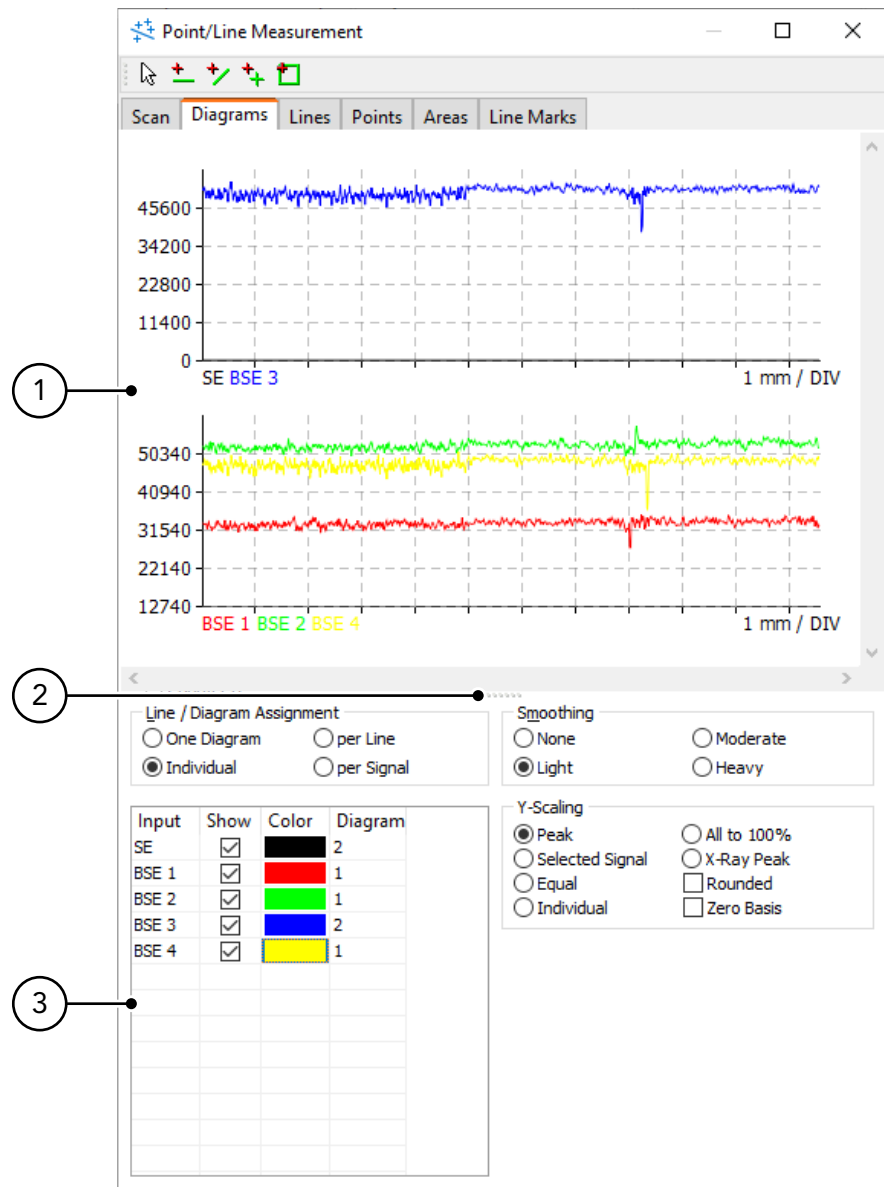
Component	Function
Analog	Contains checkboxes for selecting up to four analog input signal sources.
Counter	Contains checkboxes for selecting up to twelve digital input signal sources.
Scanning Parameters	Contains global settings for Line Scan/Point Measurement.
– Measure Time	Sets the measure time of the mapping counters. During that time, digital image signals for each pixel are accumulated.
– Subpixels	Contains a selection of possible subpixel ranges that may additionally be measured around each measuring point. i If a subpixel range larger than 1×1 is selected, the measuring points will be displayed as squares instead of crosses if the Show Points function is activated.
– Overall Time	Displays the calculated scan time based on the scan settings.

Continuation next page ...

Component	Function
Object Properties	Contains settings of the currently selected measuring object.
– Show Points	Activates or deactivates the display of measurement points on the selected measuring object. – All activates the display for all measuring objects created. – None deactivates the display for all measuring objects created. i If the display is activated, the measuring points will be displayed as crosses.
– Show Label	Activates or deactivates the display of the numbering of the selected measuring object. – All activates the display for all measuring objects created. – None deactivates the display for all measuring objects created.
– Export Object	Activates or deactivates the Export Data function of the selected measuring object. – All activates the export for all measuring objects created. – None deactivates the export for all measuring objects created.
Scan Resolution	– Contains functions for scan resolution set-up within the Object Properties. – The scan resolution is defined by the amount of measurement points for the currently selected measuring object.
– From Image	The scan resolution for the currently selected measuring object conforms with the resolution of the current image in pixels.
– Point Distance	Direct input (in μm) of the distance between the measurement points of the currently selected measuring object in the input field.
– Point Count	Direct input of the amount of measurement points for the currently selected measuring object in the input field.
– All	Applies the set value for Point Distance and/or Point Count to all measuring objects.

Continuation next page ...

Diagrams tab The following figure shows the Diagrams tab with its components:



The following table contains information on the components of the Diagrams tab:

No.	Component	Function
1	Diagram display	Shows diagrams for created measuring lines on the basis of values set in the Diagrams tab.
2	View switch	Enlarges or reduces the Diagram view in the dialog window.
	Line/Diagram Assignment	Contains functions to display input signal sources in one or multiple diagrams.

Continuation next page ...

No.	Component	Function
	– One Diagram	All input signal sources will be displayed in one diagram.
	– Individual (Page 166)	Individual display of the input signal sources in one or multiple diagrams. In the Lines field, the individual input signal sources may be attributed to the individual diagrams.
	– per Line	For each created measurement line, a diagram which shows all contained input signal sources will be generated. i In this view, markers (line marks) may be set in a diagram or deleted from it by right-click.
	– per Signal	Each input signal source will be displayed in a diagram.
3	Lines	– Contains specifications for all created measuring line. – Distributes input signal sources to different diagrams.
	– L	– Activates or deactivates measuring line. – Only shown if several measuring lines were applied.
	– Input	Contains the created measuring lines and the corresponding input signal sources.
	– Show	Activates or deactivates input signal sources.
	– Signal	Contains the elements of the input signal sources as comment.
	– Color	– Shows the current color for each measurement line. – Sets a color for each measurement line.
	Smoothing	Contains functions to smooth the signal curve(s) in the diagram.
	– None	No smoothing of the signal curve(s).
	– Moderate	Normal smoothing of the signal curve(s).
	– Light	Light smoothing of the signal curve(s).
	– Heavy	Intense smoothing of the signal curve(s).
	Y-Scaling	Contains functions on setting the diagram scaling in Y direction.
	– Peak	The scaling of individual diagrams ends at the maximum value of the contained input signal source.
	– Selected Signal (Page 165)	The scaling of all displayed diagrams follows one selected input signal source.
	– Equal (Page 165)	Manual setting of scaling for all displayed diagrams. The lowest and the highest value of the Y axis may be set. The sectioning of the Y axis will be calculated automatically.
	– Individual (Page 166)	Manual setting of scaling for each displayed diagram. For each diagram, the lowest and the highest value of the Y axis may be set. The sectioning of the Y axis will be calculated automatically.
	– Zero Basis	If the checkbox is activated, scaling of all diagrams starts at zero.

Continuation next page ...

Line/Diagram Assignment – Individual The following figure shows a detail of the Diagrams tab with the components of the Line/Diagram Assignment – Individual function:

Line / Diagram Assignment

☐ One Diagram

☐ per Line

☒ Individual

☐ per Signal

Input	Show	Color	Diagram
SE	☒		2
BSE 1	☒		1
BSE 2	☒		1
BSE 3	☒		2
BSE 4	☒		1

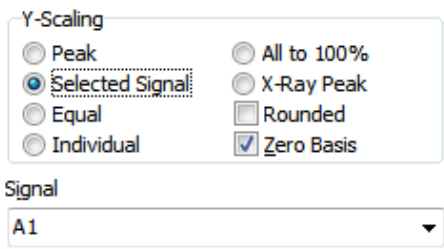
1

The following table contains information on the components of the Line/Diagram Assignment – Individual function:

No.	Component	Function
1	Diagram assignment	Distribution and/or combination of the input signal sources in different diagrams.

Continuation next page ...

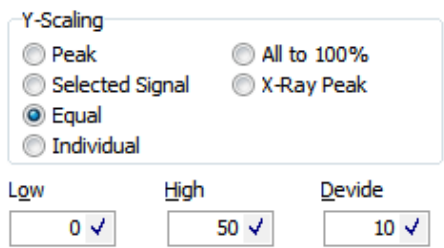
Y-Scaling – Selected Signal The following figure shows a detail of the Diagrams tab with the components of the Y-Scaling – Selected Signal function:



The following table contains information on the components of the Y-Scaling – Selected Signal function:

Component	Function
Signal	Defines the preferred input signal source to whose amplitude the scaling of all displayed diagrams will conform.

Y-Scaling – Equal The following figure shows a detail of the Diagrams tab with the components of the Y-Scaling – Equal function:

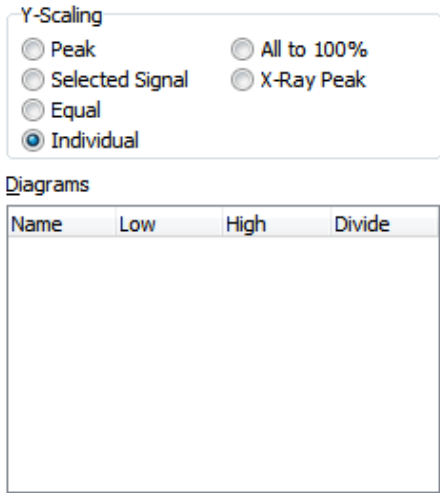


The following table contains information on the components of the Y-Scaling – Equal function:

Component	Function
Low	Sets the lower scale value for all diagrams.
High	Sets the upper scale value for all diagrams.
Divide	Sets the scale divider for all diagrams.

Continuation next page ...

Y-Scaling – Individual The following figure shows a detail of the Diagrams tab with the components of the Y-Scaling – Individual function:



The following table contains information on the components of the Y-- Scaling – Individual function:

Component	Function
Diagrams	Contains functions on setting the diagram scaling in Y direction.
– Name	– Contains all created measuring lines when the function Line/Dia-gram Assignment – per Line is activated. – Contains all input signal sources when the function Line/Diagram Assignment – per Signal is activated.
– Low	Sets the lower scale value for each measurement line or input signal source.
– High	Sets the upper scale value for each measurement line or input signal source.
– Divide	Sets the scale divider for every diagram.

Measurement tools in Line Scan/Point Measurement

Description In an acquired Slow scan image, different measurement points, measuring lines and measurement areas may be determined.

After clicking the **Start Acquisition** button, the scan will be carried out exactly on these determined positions.

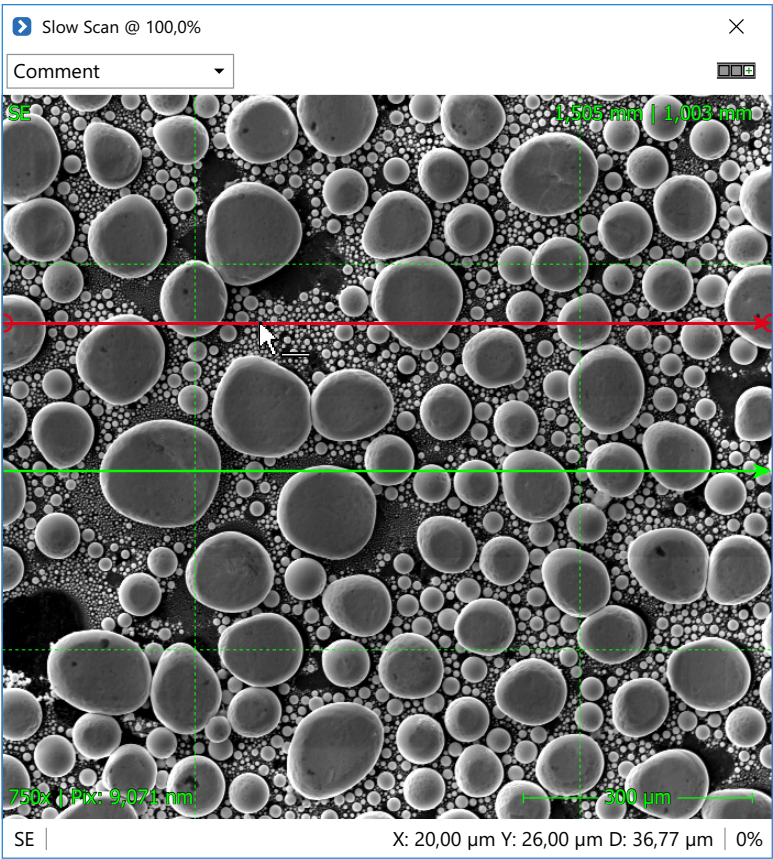
Measurement tools The following table contains an overview of the measurement tools in the **Point/Line Measurement** dialog window:

Measurement tool	Function
	Selection of created measuring lines, measurement points and measurement areas.
	Creation of horizontal measuring lines in an acquired image (Page 168).
	Creation of free measuring lines in an acquired image (Page 169).
	Creation of measurement points in an acquired image (Page 171).
	Creation of rectangular measurement areas in an acquired image (Page 172).

Continuation next page ...

... continuation: Measurement tools in Line Scan/Point Measurement

Creation of horizontal measuring lines In the Image Acquisition window, horizontal lines that cross the whole scan with a 0° angle from left to right will be created. The arrow indicates the measurement direction.



The following table contains information on options for creating and modifying horizontal measuring lines:

Measurement line ...	Steps
Creation	– Click the tool for horizontal measuring lines in the Point/Line Measurement dialog window. – Click into the Image Acquisition window. → A horizontal measurement line will be created.
Selection	Use the selection tool to click the particular measurement line in the Image Acquisition window. → The measurement line is selected and highlighted in red.
Moving	– Select the particular measurement line. – Click the selected measurement line and keep the mouse button pressed while moving the line.
Copying	– Select the particular measurement line. – Keep the [Ctrl] key pressed, click the selected measurement line and keep the mouse button pressed while moving the line. → During moving, the measurement line will be copied.

Continuation next page ...

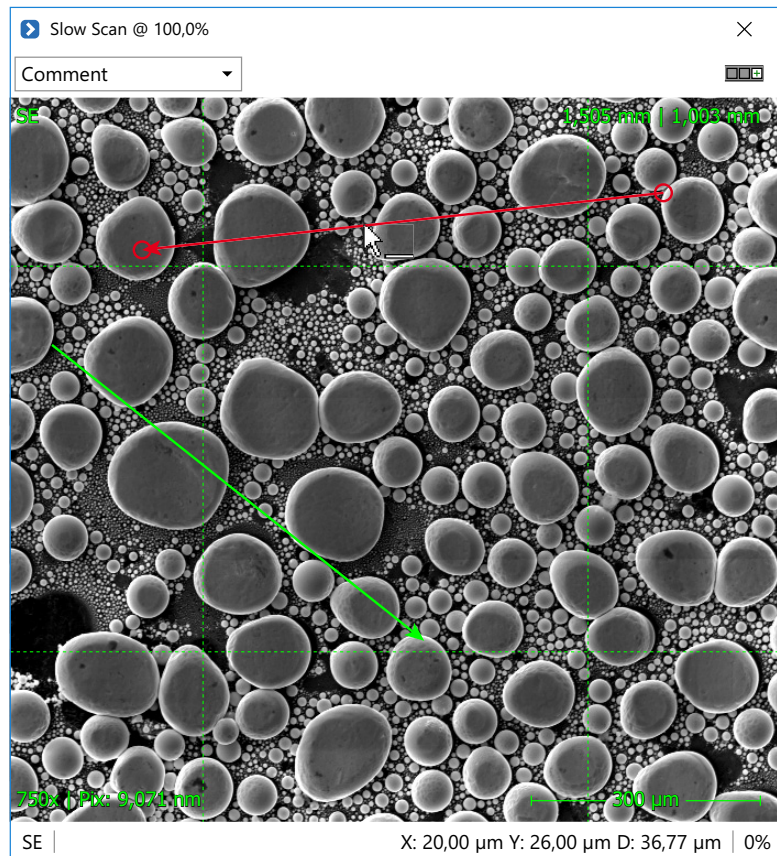
... continuation: Measurement tools in Line Scan/Point Measurement

Measurement line ...	Steps
Deletion	– Select the particular measurement line. – Press the [Del] key. → The selected measurement line will be deleted.

The values of the created measuring lines (e. g. coordinates, length, angle) may be read and modified changed in the Lines tab in the **Point/Line Measurement** dialog window. In this tab, several measuring lines may also be selected by clicking them while keeping the [Ctrl] or [Shift] key pressed and may then be deleted with the [Del] key.

Creation of free measuring line

In the Image Acquisition window, free measuring lines of any length, direction and angle may be created. The arrow indicates the measurement direction.



Continuation next page ...

... continuation: Measurement tools in Line Scan/Point Measurement

The following table contains information on options for creating and modifying free measuring line:

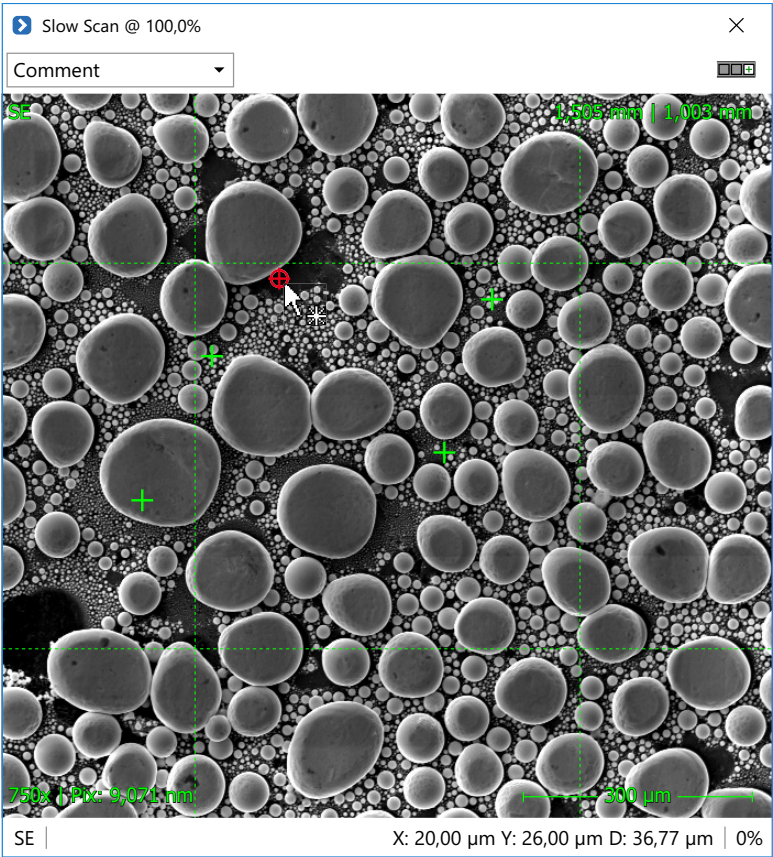
Measurement line ...	Steps
Creation	– Click the tool for free measuring lines in the Point/Line Measurement dialog window. – Click into the Image Acquisition window to set the zero point of the free measurement line. – Click again into the Image Acquisition window to set the end point of the free measurement line. → The free measurement line is created. Measurement direction will be indicated by an arrow. Measurement will always take place from zero to end point.
Selection	Use the selection tool to click the particular measurement line in the Image Acquisition window. → The measurement line is selected and highlighted in red.
Modification	– Select the particular measurement line. – Click the zero or end point of the selected measurement line and keep the mouse button pressed while moving it. i Zero and end points of selected measuring lines will be highlighted with little circles when moving the mouse cursor over them.
Creation with fixed angle	Keep the [Ctrl] key pressed to lock the line angle in 45° steps while completing one of the following actions: – determining the end point of a free measurement line. – moving the zero point or end point of a selected free measurement line during modification of a measurement line.
Moving	– Select the particular measurement line. – Click the selected measurement line and keep the mouse button pressed while moving the line.
Copying	– Select the particular measurement line. – Keep the [Ctrl] key pressed, click the selected measurement line and keep the mouse button pressed while moving the line. → During moving, the measurement line will be copied.
Deletion	– Select the particular measurement line. – Press the [Del] key. → The measurement line will be deleted.

The values of the created measuring lines (e. g. coordinates, length, angle) may be read and modified in the Lines tab in the **Point/Line Measurement** dialog window. In this tab, several measuring lines may also be selected by clicking them while keeping the [Ctrl] or [Shift] key pressed and may then be deleted with the [Del] key.

Continuation next page ...

... continuation: Measurement tools in Line Scan/Point Measurement

Creation of measurement points Creates measurement points in the Image Acquisition window.



The following table contains information on options for creating and modifying measurement points:

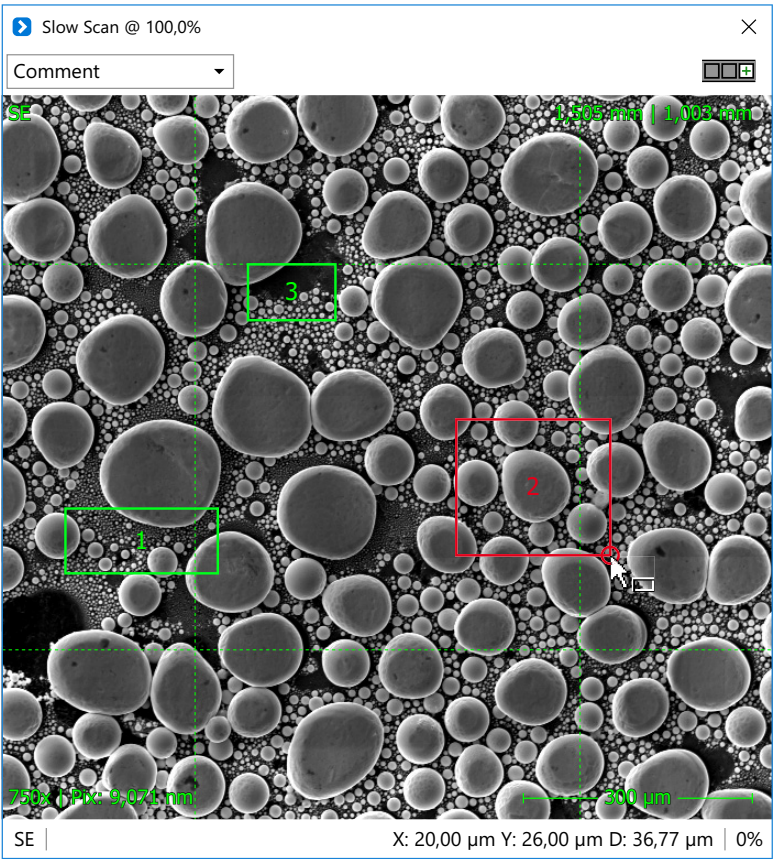
Measurement point ...	Steps
Creation	– Click the tool for measurement points in the Point/Line Measurement dialog window. – Click into the Image Acquisition window. → A measurement point will be created.
Selection	Use the selection tool to click the particular measurement point in the Image Acquisition window. → The measurement point is selected and highlighted in red.
Moving	– Select the particular measurement point. – Click the selected measurement point and keep the mouse button pressed while moving it.
Deletion	– Select the particular measurement point. – Press the [Del] key. → The measurement point will be deleted.

Continuation next page ...

... continuation: Measurement tools in Line Scan/Point Measurement

The values of the created measurement points (e. g. coordinates) may be read and modified in the **Points** tab in the **Point/Line Measurement** dialog window. In this tab, several measurement points may also be selected by clicking them while keeping the [Ctrl] or [Shift] key pressed and may then be deleted with the [Del] key.

Creation of rectangular measurement areas Creates rectangular measurement areas of any size in the Image Acquisition window.



The following table contains information on options for creating and modifying rectangular measurement areas:

Measurement area ...	Steps
Creation	– Click the tool for rectangular measurement areas in the Point/Line Measurement dialog window. – Click into the Image Acquisition window to determine the upper left corner of the measurement area. – Click again into the Image Acquisition window to determine the bottom right corner of the measurement area. → The rectangular measurement area will be created.

Continuation next page ...

... continuation: Measurement tools in Line Scan/Point Measurement

Measurement area ...	Steps
Selection	Use the selection tool to click the particular measurement area in the Image Acquisition window. → The measurement area is selected and highlighted in red.
Modification	– Select the particular measurement area. – To modify height and width at the same time, click one of the corners of the selected measurement area. Keep the mouse button pressed while moving the corner. – To modify either height or width, click one of the edges (between 2 corners) of the selected measurement area. Keep the mouse button pressed while moving the edge. i The corners of the selected measurement area will be highlighted with little circles when moving the mouse cursor over them.
Deletion	– Select the particular measurement area. – Press the [Del] key. → The measurement area will be deleted.

The values of the applied measurement areas (e. g. coordinates) may be read and modified in the Area tab in the **Point/Line Measurement** dialog window. In this tab, several measurement areas may also be selected by clicking them while keeping the [Ctrl] or [Shift] key pressed and may then be deleted with the [Del] key.

Beam positioning

Description Beam positioning allows to position the electron beam on the sample.

Button Beam positioning may be started and ended with the following button:



Positioning of the electron beam Complete the following steps to position the electron beam on the sample:

3. Perform a Slow scan.
4. Click the button in the Image Acquisition toolbar to start beam positioning.
→ The mouse cursor will change when placed in the Image Acquisition window.
5. Click on any position in the Image Acquisition window.
→ The electron beam will be placed on the corresponding position on the sample.

Cancel Beam positioning will be canceled when the button in the Image Acquisition toolbar, the **Stop** button or any other scan button is pressed.

Source Image

Description The "Source Image" function starts aperture mapping and supports aperture adjustment and checking.

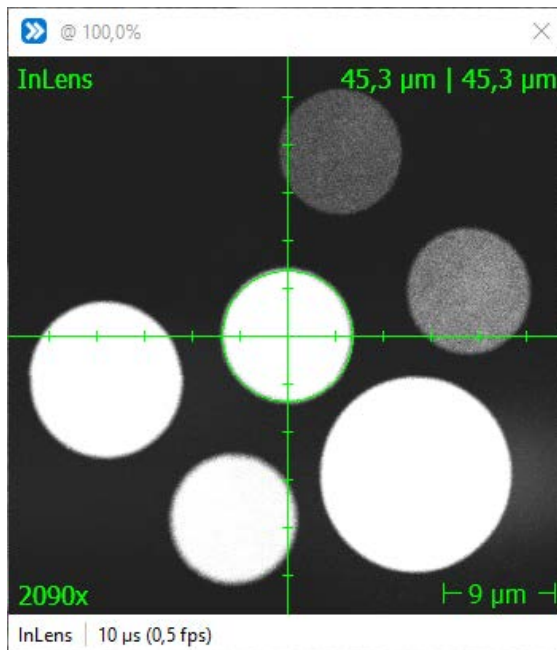
NOTICE

Aperture mapping shift during fast scans!

When performing fast scans, the aperture mapping shifts. This means that the image center cannot be used for aperture adjustment.

- When using the "Source Image" function, the maximum scanning speed (acquisition time per pixel) will automatically be restricted.
- A hair cross can be positioned in the image.
( see "Positioning the hair cross" on page 179)

Aperture mapping The following figure shows the aperture mapping window:



Button Clicking the following button will start aperture mapping and open the window:

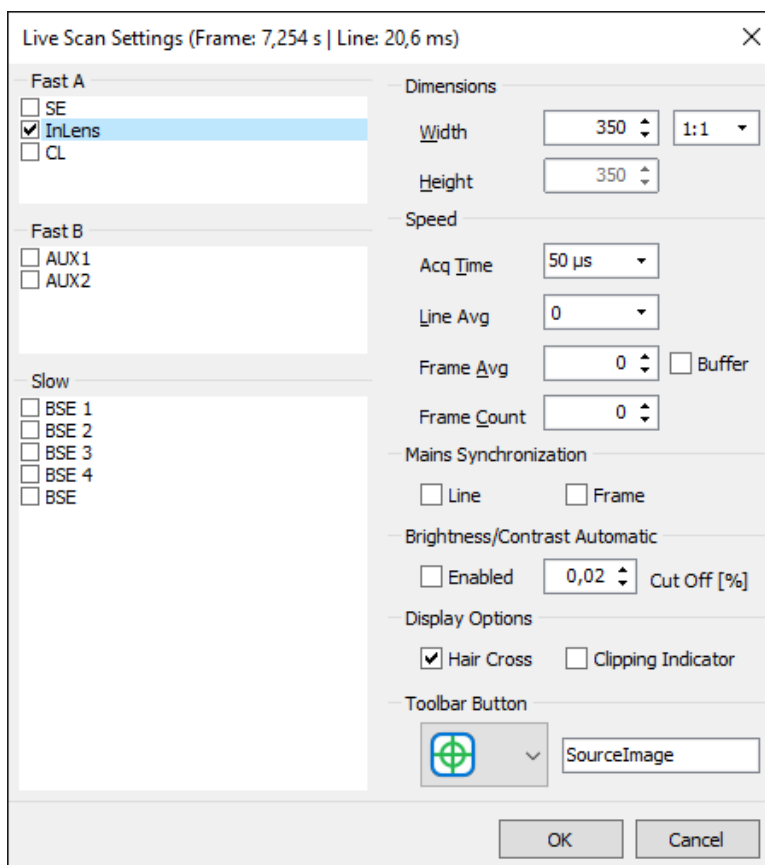


Ending Aperture mapping will be stopped when the window is closed.

Continuation next page ...

Setting the aperture mapping A right-click on the **Source Image** button opens the **Scan Settings** dialog window to set up the aperture mapping parameters.

Scan Settings The following figure shows the **Scan Settings** dialog window with its components:



Continuation next page ...

The following table contains information on the components of the **Scan Settings** dialog window:

Component	Function
Title bar	Displays the calculated scan time per frame based on the scan settings.
Fast A Fast B Slow	Contain checkboxes for selecting an analog input signal source.
Dimensions	
– Width	Sets the width of a displayed image in predefined pixel values. Manual input of pixel values is available. Depending on the aspect ratio selected in the Ratio field, any entry in the Width field leads to an automatic change of the Height value.
– Ratio	Sets the aspect ratio of the displayed image. The available values are 1:1, 5:4, 4:3 and Any. i Recommendation: Use the 1:1 aspect ratio.
– Height	Sets the height of a displayed image in pixels. Depending on the aspect ratio selected in the Ratio field, any entry in the Height field leads to an automatic change of the Width value.
Speed	
– Acq Time	Sets the acquisition time per pixel. The value may be set manually within a 10 ns grid. Thus, the signal-to-noise ratio (SNR) may be improved. The acquisition time may be changed by using the [left arrow] and [right arrow] keys. i The acquisition time is automatically restricted. Acquisition time should not be less than 5 µs.
– Line Avg.	Activates line averaging. This means that each line is repeatedly scanned with a preset amount of scans. Image signals per line are shown averaged. i The use of line averaging is not possible if line synchronization is activated.
– Frame Avg	Activates frame averaging. This means that images are shown averaged by a preset frame rate. Frame averaging may be changed by using the [arrow up] and [arrow down] keys.
– Frame Count	Sets the frame count. ⚠ Do not modify the preset value 0 (zero)!
Synchronization	

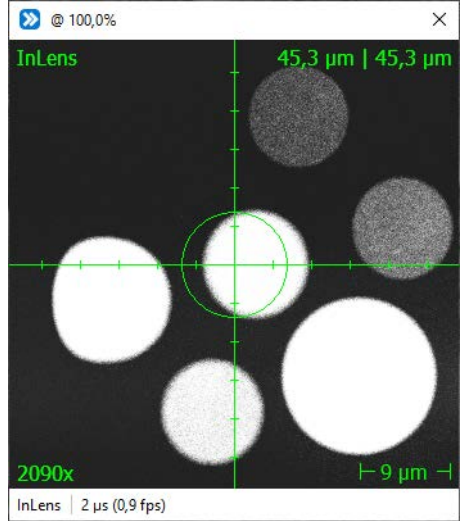
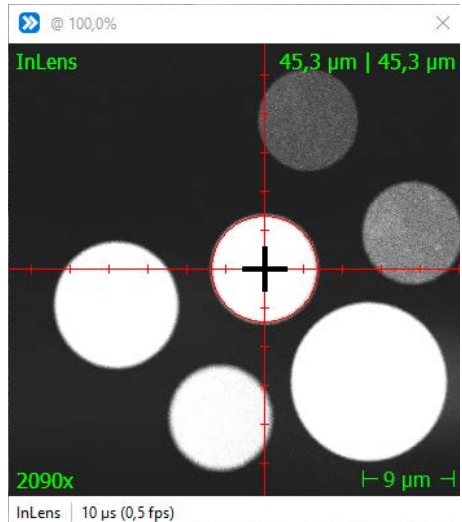
Continuation next page ...

Component	Function
– Line	Activates line synchronization. With every new line, the scan is synchronized to the mains voltage in order to reduce interferences.  The use of line synchronization is not possible if line averaging is activated.
– Frame	Activates image synchronization. With every new image, the scan is synchronized to the mains voltage in order to reduce interferences.
Brightness/Contrast Automatic	Regulates the brightness/contrast ratio of analog image signals
– Enabled	Activates the brightness/contrast automatic
– Cut Off (%)	The percentage of the brightest and darkest pixels set in the Cut Off field will not be included in the calculation of brightness and contrast to ignore outliers.
Display Options	
– Hair Cross	Activates an adjustable hair cross for adjustment of the grid in the center of the image.  see “Positioning the hair cross” on page 179
– Clipping Indicator	Activates/deactivates the display of an overdriven image signal. If the checkbox is ticked, all absolutely white pixels will be displayed in red and all absolutely black pixels will be displayed in green.
Toolbar button	– Selecting the Scan button to be shown in the toolbar. – Entering a name to be displayed below the Scan button.
OK	Closes the dialog window. The preset parameters are saved.
Cancel	Closes the dialog window. The preset parameters are rejected.

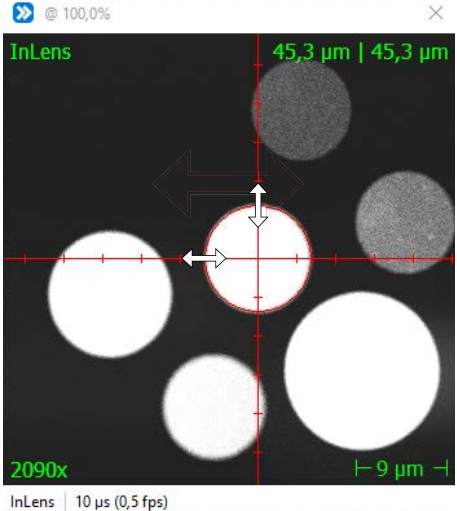
Continuation next page ...

Positioning the hair cross Positioning the hair cross in the aperture mapping allows for adjustment of gun alignment during faster scanning speeds.

The hair cross may be positioned with the following actions:

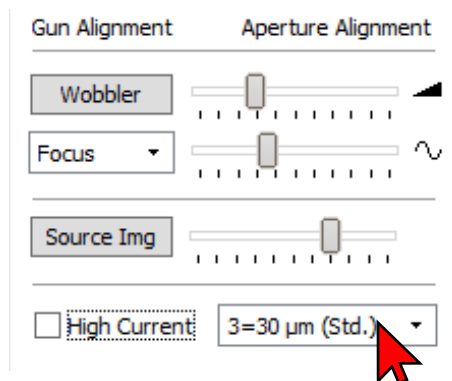
Action and result	Depiction
Action Click the center of the hair cross while keeping the [Ctrl] key pressed. Result The hair cross is centered in the aperture mapping.	 The screenshot shows the InLens software interface at 100.0% zoom. It displays a grayscale image of several circular features. A green hair cross is centered on the image. The top right corner shows '45,3 μm 45,3 μm'. The bottom left corner shows '2090x'. The bottom right corner shows '9 μm'. The bottom status bar shows 'InLens 2 μs (0,9 fps)'.
Action Move the center of the hair cross in X and/or Y direction while keeping the mouse button pressed. Result The hair cross is highlighted in red.	 The screenshot shows the InLens software interface at 100.0% zoom. It displays the same grayscale image of circular features. A red hair cross is centered on the image. The top right corner shows '45,3 μm 45,3 μm'. The bottom left corner shows '2090x'. The bottom right corner shows '9 μm'. The bottom status bar shows 'InLens 10 μs (0,5 fps)'.

Continuation next page ...

Action and result	Depiction
Action Press the mouse button to adjust the size of the auxiliary circle to the size of the selected aperture. i The size of the auxiliary circle can only be changed at the intersections to the X or Y axis.	

Adjusting the hair cross Complete the following steps to to adjust the hair cross once for fast scanning speeds:

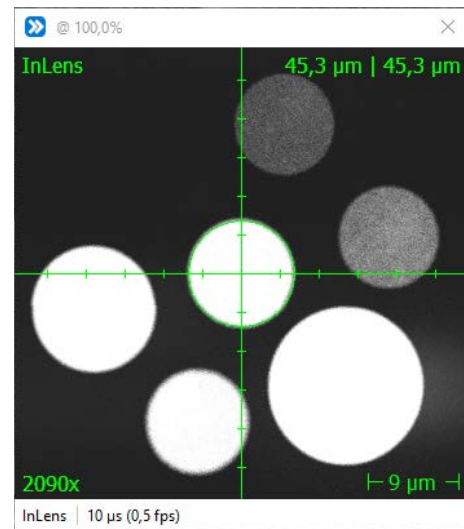
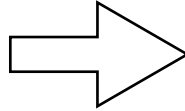
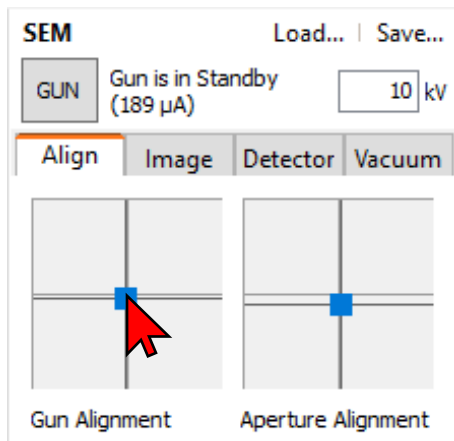
1. Start the "Source Image" function.
2. Select the center hole aperture (recommendation).



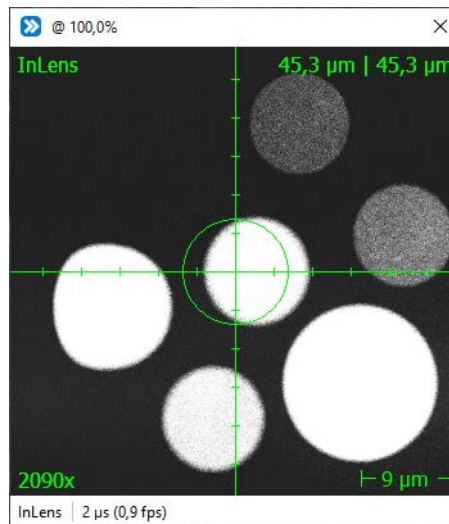
3. Set the scanning speed in the Acq Time field of the Scan Settings to 50 µs.
4. Click the center of the hair cross while keeping the [Ctrl] key pressed to center the hair cross in the aperture mapping.

Continuation next page ...

5. Center the aperture in the hair cross using the Gun Alignment function (slider or hardware control panel).

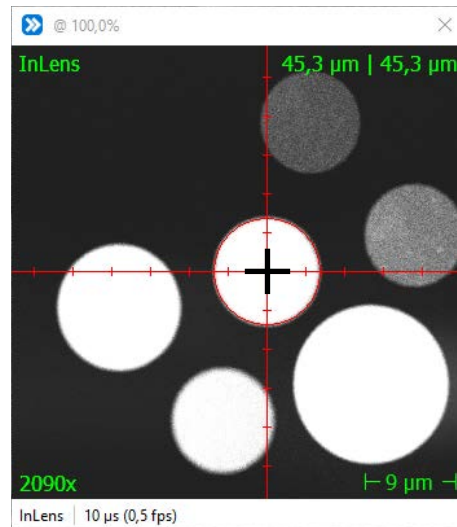


6. Set the scanning speed in the Acq Time field of Scan Settings to 5 µs.
→ The aperture mapping shifts.



Continuation next page ...

7. Center the hair cross on the aperture while keeping the mouse button pressed.



→ The red hair cross may now be used for adjustment during fast scanning speeds.

TIFF Recorder (optional)

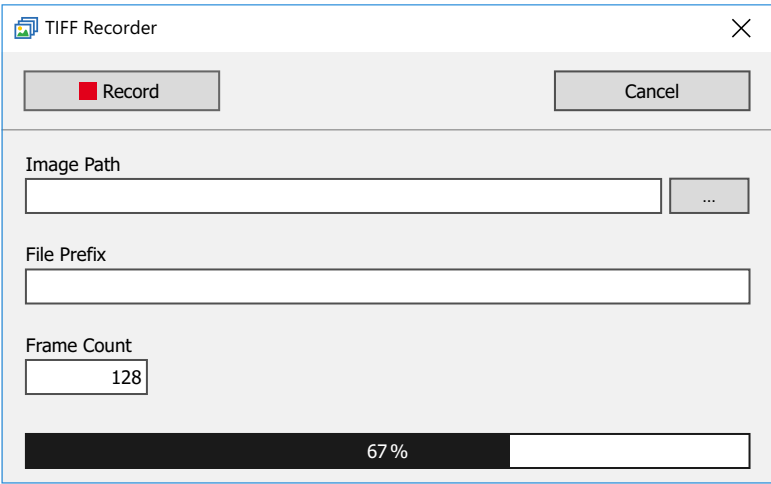
Description The optional TIFF Recorder plugin records bitmaps in a continuous scan and saves them in a 8 Bit multipage TIFF file.

In the case of multiple channels, one TIFF file per channel will be created and saved.

Button Pressing the following button opens the **TIFF Recorder** dialog window:



Dialog window The following figure shows the **TIFF Recorder** dialog window with its components:



The following table contains information on the components of the **TIFF Recorder** dialog window:

Component	Function
Record	Starts/ends the recording. i If the recording is stopped before reaching the preset bitmap number, all TIFF files are saved with the bitmap number reached by the end of the recording.
Cancel	Cancels the recording. No TIFF files will be saved.
Image Path	Display and selection of the saving location.
File Prefix	Entering the prefix for the file name.
Frame Count	Setting the number of bitmaps that will be saved in a multipage TIFF file.

Continuation next page ...

Component	Function
Progress bar	Shows the scanning progress.

- Recording**
- Complete the following steps to record images with the TIFF Recorder plugin:
1.

Start a continuous scan (Frame Count = 0).
2.

Click the **TIFF Recorder** button.
→ The **TIFF Recorder** window opens.
3.

Select the preferred saving location in the Image Path field.
4.

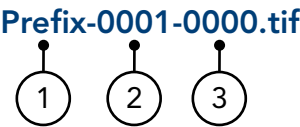
Enter the preferred file name in the File Prefix field.
5.

Enter the preferred number of bitmaps per multipage TIFF file in the Frame Count field.
6.

Click the **Record** button.
→ Recording starts. During the recording, the images will be saved in a TEMP folder. As soon as the number entered in the Frame Count field is reached, all TIFF files will be saved in the selected saving location.

TIFF file name

The TIFF files are saved with a file name that consists of the following elements:



No.	Description
1	Text entered in the File Prefix field.
2	Number of recorded TIFF files. i The numbers are counted starting from zero: – 0000 = TIFF 1 – 0001 = TIFF 2 – ...
3	Channel number. i The numbers are counted starting from zero: – 0000 = Channel 1 – 0001 = Channel 2 – ...

DISS 6 Video Recorder (optional)

Description The optional “DISS 6 Video Recorder” extension records a video in MP4 format with H.264 codec in a continuous scan.

In the case of multiple input signal sources (channels), one video per channel may be created and saved. With the Grid Pattern option, multiple input signal sources can be saved in a video with a grid view.

Restrictions Due to system limitations and used technologies, the following restrictions apply to the “DISS 6 Video Recorder”:

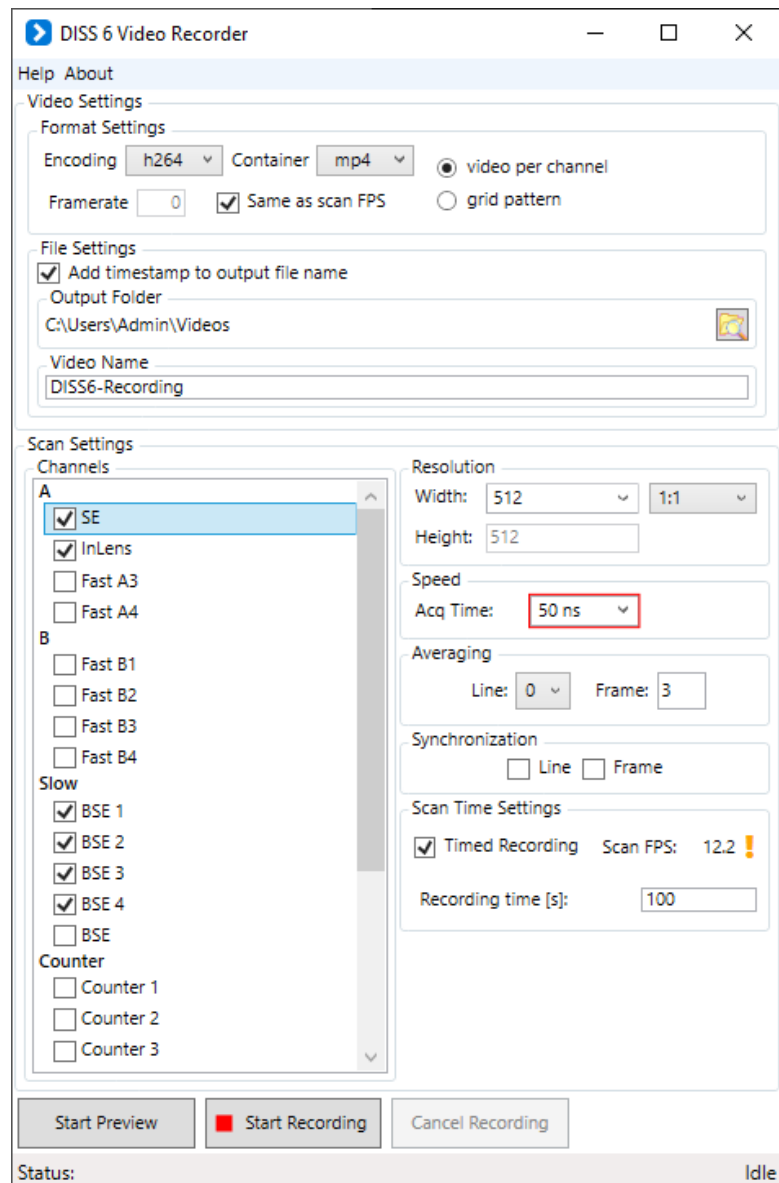
- Videos may be recorded with a frame rate in a range of 18 to 120 frames per second.
- Due to the compression algorithms used in the video encoding, the videos will be recorded in lossy quality.

Button Pressing the following button opens the **DISS 6 Video Recorder** dialog window:



Continuation next page ...

Dialog window The following figure shows the **DISS 6 Video Recorder** dialog window with its components:



The following table contains information on the components of the **DISS 6 Video Recorder** dialog window:

Component	Function
Help	Opens a dialog window with a description of the DISS 6 Video Recorder.
About	Opens a dialog window with information on the version number and compatibility of the DISS 6 Video Recorder.
Video Settings	Contains settings for format and saving location of the video.

Continuation next page ...

Component	Function
Format Settings	Contains setting for the video format.
– Encoding	Sets the video codec. i Currently, only video codec H.264 is available.
– Container	Sets the file format for the video. i Currently, only file format MP4 is available.
– video per channel	A separate video is saved for each input signal source.
– Framerate	Setting the frame rate (amount of images per second) for the video. i Due to systemic reasons, the frame rate may be set in a range of 18 to 120 frames per second.
– Same as scan FPS	Activated: The frame rate per seconds for the video corresponds to the scan's frame rate.
– grid pattern	All input signal sources will be saved with a grid view in a video.
File Settings	Contains settings for the saving location and file name of the video.
– Add timestamp to output file name	Activated: A timestamp is automatically added to the file name.
– Output Folder	Sets a saving location for the video.
– Video Name	Sets a file name for the video.
Scan Settings	Contains settings for image acquisition.
– Channels	Activation/deactivation of input signal sources: – Analog: A, B, Slow – Digital: Counter
Resolution	
– Width	Sets the width of a displayed image in predefined pixel values. Manual input of pixel values is available. Depending on the aspect ratio selected in the Ratio field, any entry in the Width field leads to an automatic change of the Height value.
– Ratio	Sets the aspect ratio of the displayed image. The available values are 1:1, 5:4, 4:3 and Any.
– Height	Sets the height of a displayed image in pixels. Depending on the aspect ratio selected in the Ratio field, any entry in the Height field leads to an automatic change of the Width value.
Speed	
– Acq Time	Sets the acquisition time per pixel. The value may be set manually within a 10 ns grid. Thus, the signal-to-noise ratio (SNR) may be improved. The acquisition time may be changed by using the [left arrow] and [right arrow] keys.
Averaging	

Continuation next page ...

Component	Function
– Line	Activates line averaging. This means that each line is repeatedly scanned with a preset amount of scans. Image signals per line are shown averaged. i The use of line averaging is not possible if line synchronization is activated.
– Frame	Activates frame averaging. This means that images are shown averaged by a preset frame rate. Frame averaging may be changed by using the [arrow up] and [arrow down] keys.
Synchronization	
– Line	Activates line synchronization. With every new line, the scan is synchronized to the mains voltage in order to reduce interferences. i The use of line synchronization is not possible if line averaging is activated.
– Frame	Activates image synchronization. With every new image, the scan is synchronized to the mains voltage in order to reduce interferences.
Scan Time Settings	
– Timed Recording	Activation/deactivation of a fixed, customizable recording time.
– Scan FPS	Shows the calculated frame rate of the scan. i The value is calculated from the preset image size (Width and Height) and the recording time per pixel (Acq Time).
– Recording time	Setting the recording time in seconds.
Start Preview	Opens an Image Acquisition window according to the settings in Scan Settings.
Start Recording	Starts the recording.
Cancel Recording	Cancels the recording.
Status bar	Shows the operating state of the video recorder.

Continuation next page ...

Recording a video Complete the following steps to record a video with the DISS 6 Video Recorder:

1. Start a continuous scan (Frame Count = 0).
2. Click the **Video Recorder** button.
→ The **DISS 6 Video -Recorder** dialog window opens.
3. In the Frame Rate field, manually enter the frame rate of the video or activate the Same as scan FPS checkbox to use the frame rate of the continuous scan.
 Due to systemic reasons, the frame rate may be set in a range of 18 to 120 frames per second.
4. Select an output option for the video:
 - Video per channel to save a separate video per each selected input signal source
 - Grid Pattern to save the selected input signal sources in a video with grid view
5. Select the preferred saving location in the Output Folder field.
6. Enter the preferred file name in the Video Name field.
7. Optional: Activate the Add Timestamp to output file name checkbox to add an automatically generated timestamp to the file name.
8. Select the input signal sources to be recorded in the Channels field.
9. Click the **Record** button to start the video recording.
10. Click the **Record** button again to end the video recording.
→ The video will be encoded and saved at the selected saving location.

Channel Mixer

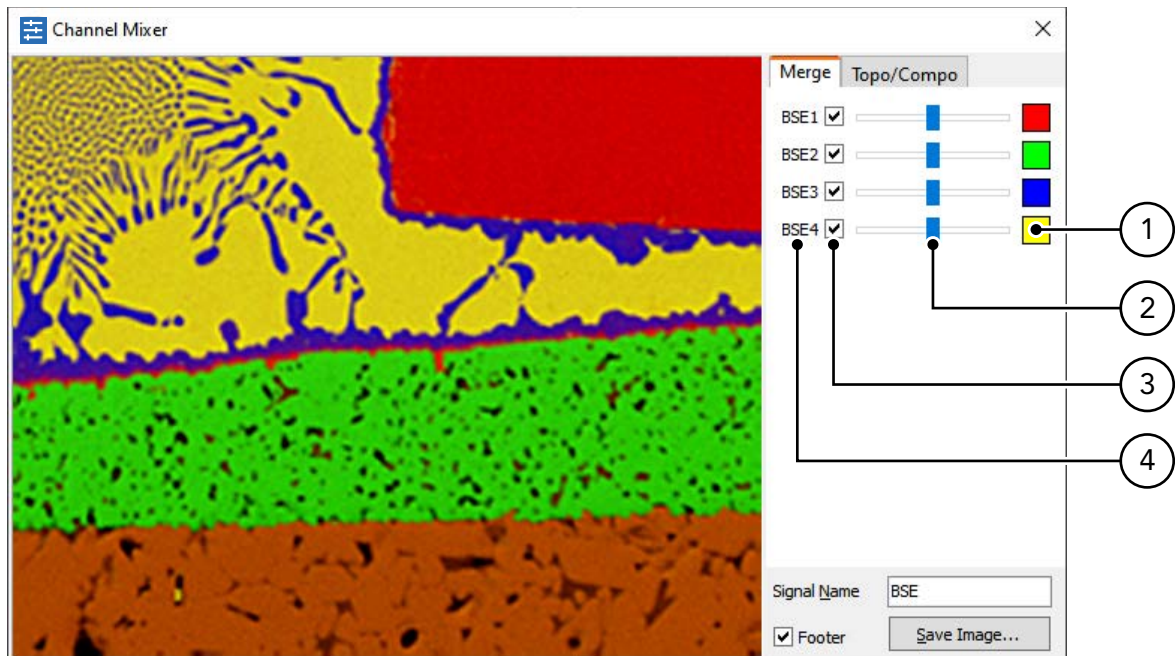
Description Channel Mixer allows to live-mix image signals. All image signals of the current active scan may be mixed. Each image signal may be allocated a color.

Button Pressing the following button opens the Channel Mixer:



Merge tab In the Merge tab, all image signals of the active scan may be dyed and mixed.

The following figure shows the **Channel Mixer** dialog window with the Merge tab:



Continuation next page ...

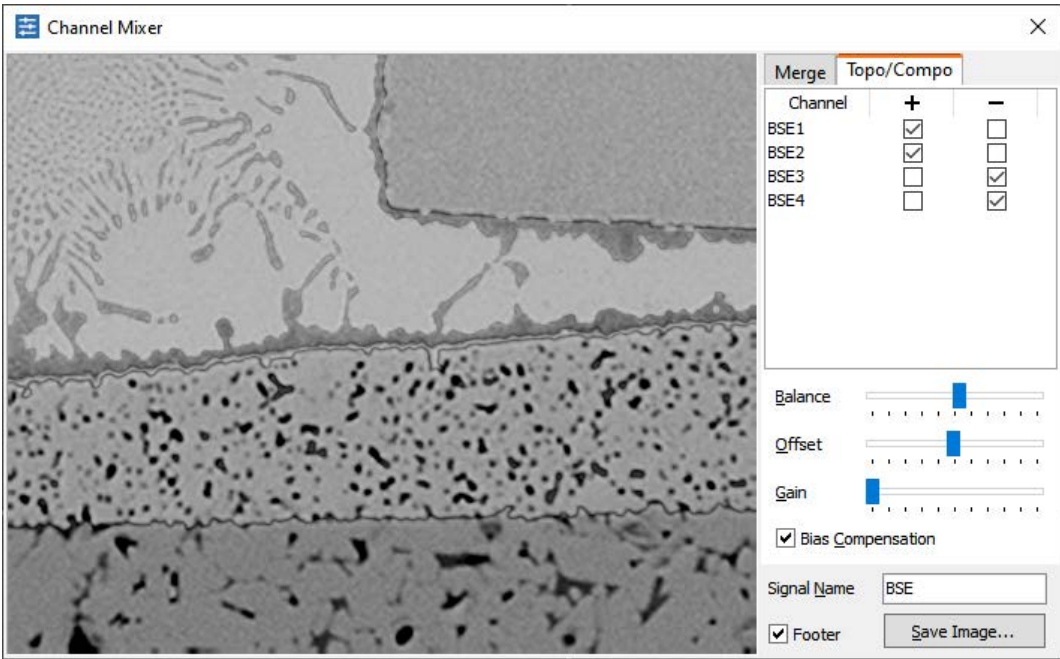
The following table contains information on the components of the Merge tab:

No.	Component	Function
1	Color field	Shows the color that symbolizes a channel in the mixer. By clicking the color, b/w and color mode may be toggled. In color mode, a right-click opens a dialog window for choosing colors.
2	Slider	Sets channel intensity.
3	Check box	Activates or deactivates the channel.
4	Name	Name of the channel.
	Image	Shows the result of the mixed images. Double-clicking the image activates the full screen mode. A right-click on the image opens a context menu (XREF context menu) with the following functions: – Hair Cross – Draw Circle – Interpolation
	Signal Name	The text entered into the Signal Name text field determines the parameter "SignalName".
	Save Image...	Opens the Save Image dialog window to save the mixed image as calibrated TIFF.

Continuation next page ...

Topo/Compo tab In the Topo/Compo tab, up to 4 image signals of analog signal sources can be added or subtracted. In the Topo mode (subtraction), the balance of subtracted signals may be changed with a slider. With opposite BSE detectors, the material contrast may be minimized to a degree that only the topography of the sample is visible.

The following figure shows the **Channel Mixer** dialog window with the **Topo/Compo** tab:



The following table contains information on the components of the Topo/Compo tab:

Component	Function
Channel	– Displays the available BSE detector channels. – Defines which channel (-) is subtracted from which channel (+).
Balance	Sets the ratio between the channels to be combined.
Offset	Sets the brightness of the mixed image.
Gain	Sets the contrast of the mixed image.
Bias Compensation	Activates or deactivates the automatic brightness adaptation.
Signal Name	The text entered into the Signal Name text field determines the parameter "SignalName".
Save Image...	Opens the Save Image dialog window to save the mixed image as calibrated TIFF. For the footer, the settings of the Save button set as default will be applied (Page 40).

Reference image Reference images are used to compare image acquisition results. After completed image acquisition, an image may be added by Drag & Drop as reference image. It will be archived as "Ref" in the channel mixer.

The images (channels) of the next scan will be added to the reference image.

After completed image acquisition, the reference image may be deleted with the [Esc] button.

Stop

Description With the Stop function, the various scan modes may be canceled.

Button Pressing the following button immediately cancels the scanning process:





12 Analysis and Check

Chapter overview

Purpose This chapter describes functions for analysing and checking image data in scans.

Contents This chapter contains the following information:

- › Signal Monitor 196
- › Inspector 198

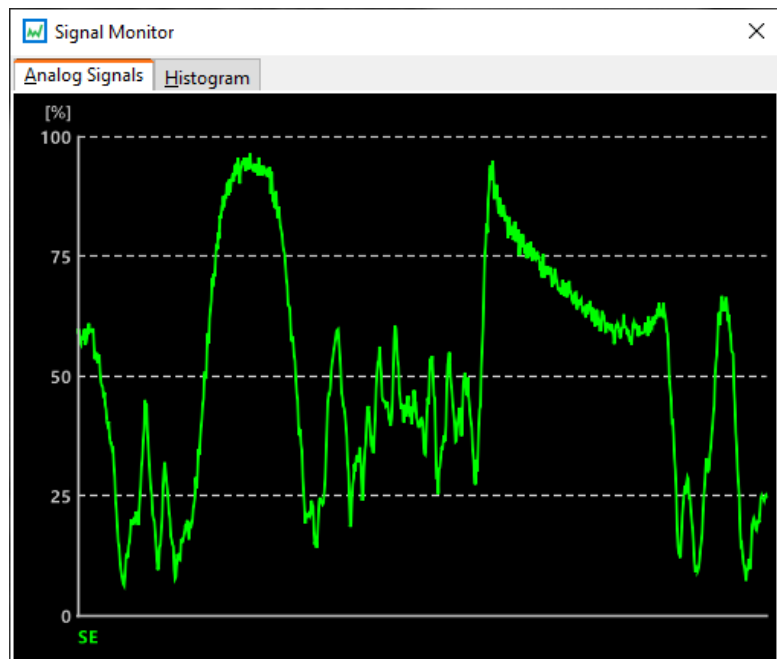
Signal Monitor

Description The Signal Monitor shows the levels of the input signals during the scanning process in a separate window.

Button Pressing the following button opens the Signal Monitor:



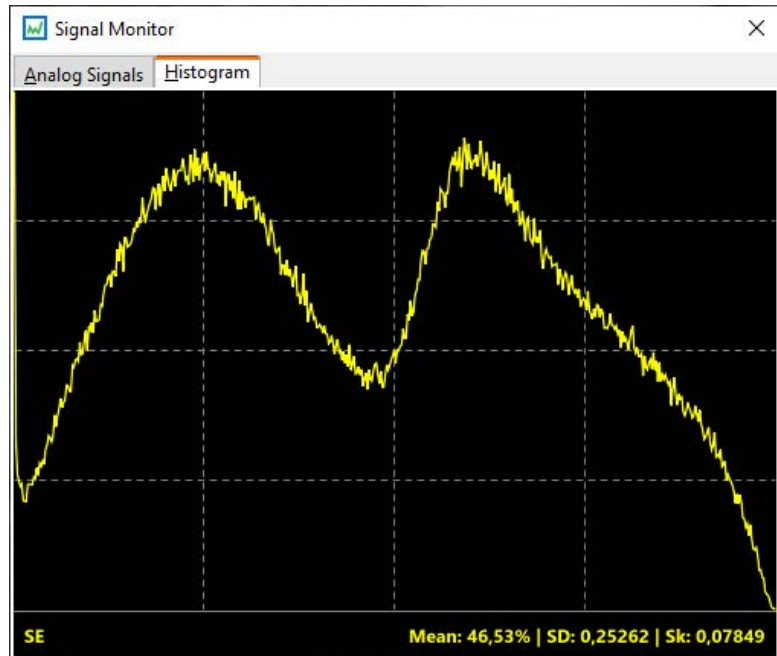
Analog Signals tab The following figure shows the Signal Monitor with the Analog Signals tab:



Continuation next page ...

Histogram tab The Histogram tab shows a live histogram as well as specifications of the mean value and standard deviation.

The following figure shows the Signal Monitor with the Histogram tab:

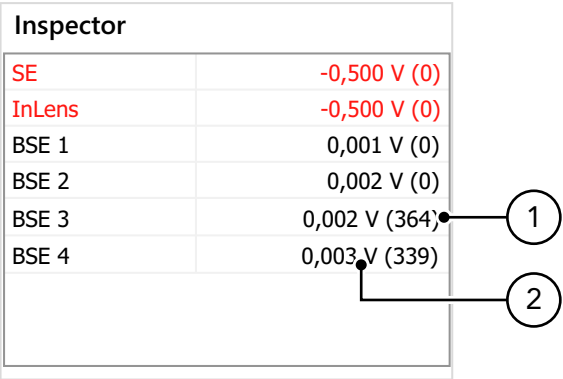


Inspector

Description The Inspector control panel shows the physical and digital values of the currently acquired signals at the position of the mouse.

For calculation of the physical values, a formula may be entered.

Structure The following figure shows the Inspector control panel with its components:



Function The following table contains information on the Inspector control panel components:

No.	Function
1	Digital values
2	Physical values

13 BSE Topography (optional)

Chapter overview

Purpose This section contains descriptions of the structure, function and usage of the optional 3D topography function.

Contents This chapter contains the following information:

› Introduction	200
› User interface	201
› View tab	203
› Corrections tab	205
› Settings tab	207
› Info tab	209
› Topography image acquisition	210
› Using BSE topography	212

Introduction

Description In connection with a four-quadrant BSE signal source, the optional 3D BSE topography module allows for generation, visualization and export of a 3D surface model in Live mode.

The resolution of the calculated 3D model depends on the resolution of the SEM image data.

Supported formats The generated 3D data may be saved/exported in the following formats:

Format	Data
Surface Data Format (*.sdf)	Topography (3D model)
Alicona 3D (*.al3d)	Topography (3D model) and BSE total (mean)
Tagged Image File Format (.TIF)	Topography (3D model), BSE total (mean) and other image channels if applicable  16-bit data, scaling will be saved in the XMP header
Windows Bitmap (.BMP)	3D view
Calibration file in ASCII format (*.cal)	Settings for corrections including respective correction values.

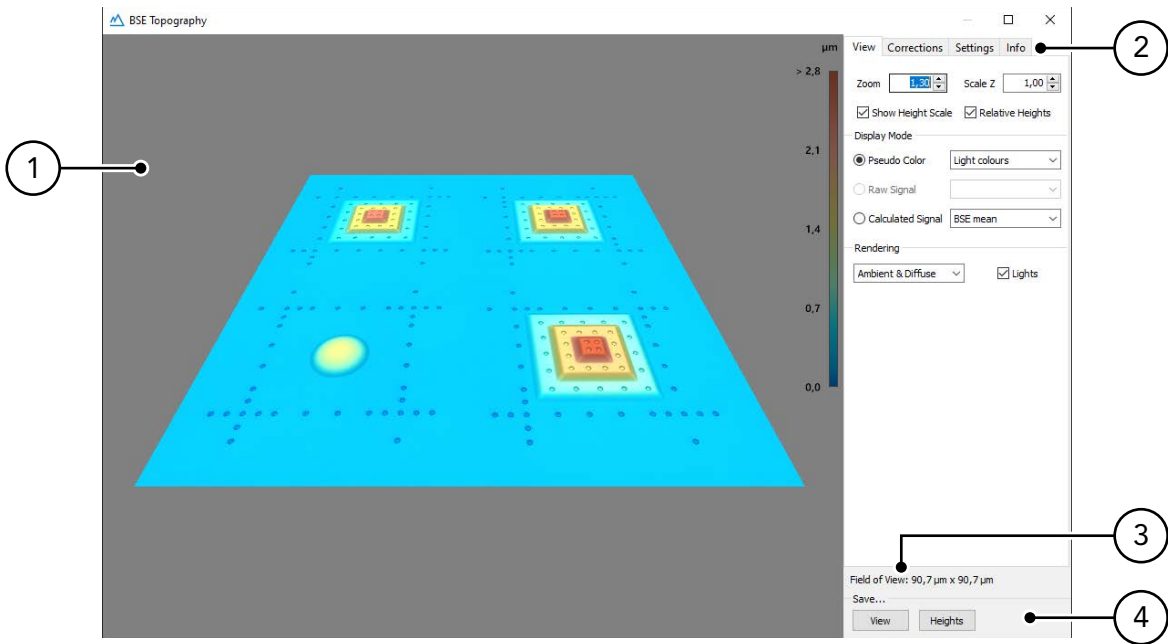
Buttons The following buttons are available for Topography functions:

Button	Function	Description
	BSE Topography	Opens a dialog window: – for generation, visualization and export of a 3D surface model in Live mode, as well as – for set-up and system calibration.  see "User interface" on page 201
	Topo scan	Starts a scan with advanced options for topography image acquisition.  see "Topography image acquisition" on page 210

Continuation next page ...

User interface

Structure The following figure shows the **BSE- Topography** dialog window with its main components:



Function The following table contains information on the main components of the **BSE Topography** dialog window.

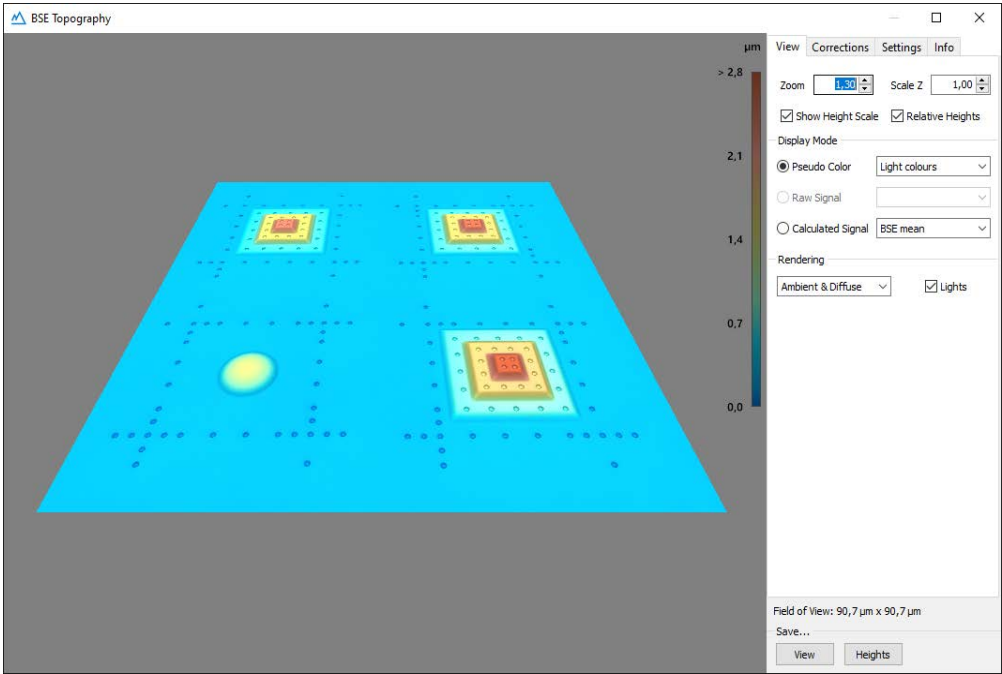
No.	Component	Function
1	3D view	– Rotating the view with the mouse and pressed left mouse key. – Shifting the view with the mouse and pressed right mouse key. – Changing the zoom factor with the mouse wheel. – Resetting the view by double-clicking.
2	Tabs	– View Contains settings for displaying the calculated surface model.  see “View tab” on page 203 – Corrections Contains settings and functions for correction of scale and sphere  see “Corrections tab” on page 205 – Settings Contains setting for the topography system.  see “Settings tab” on page 207 – Info Shows information on the installed 3D topography module.  see “Info tab” on page 209
3	Field of View	Shows the dimensions of the scan area.

Continuation next page ...

No.	Component	Function
4	Save...	
	View	Saves the current 3D view in an image file.
	Heights	Saves the data of the calculated 3D model in a supported topography format  see "Supported formats" on page 200 The saved data may be opened in a suitable application for further evaluation.

View tab

Structure The following figure shows the **BSE- Topography** dialog window with the **View** tab:



Function The following table contains information on the components of the **View** tab:

Component	Function
Zoom	Set-up of the zoom factor for the 3D view. i The zoom factor may also be adjusted with the mouse wheel in the 3D view.
Scale Z	Set-up of the elevation factor for the heights in the 3D view. The setting will exclusively be used for the 3D view and will not be taken into account when saving the data.
Show Height Scale	Activates or deactivates the display of the scale for the heights in the 3D view.
Relative Heights	Shows the height scale zero-based
Display Mode	
– Pseudo Color	Selection of a color palette for the heights display in the 3D view.
– RAW Signal	Selection of an input signal source (SEM channel) for the 3D view texture. i The corresponding input signal sources have to be activated in the settings of the topography acquisition. b see “Scan Settings” on page 210

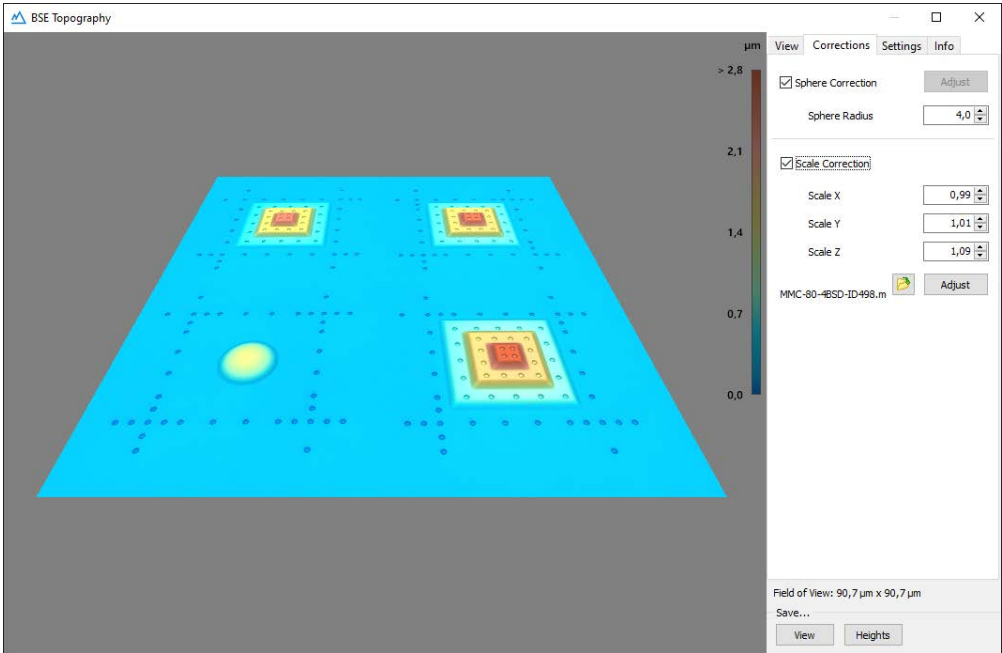
Continuation next page ...

Component	Function
– Calculated Signal	Selection of a calculated channel for the 3D view texture: – BSE mean image: texture value is the mean of all four BSE channels – BSE values: calculation of the backscatter value in consideration of topography – Gradient norm: standardized gradient of the surface element as texture value – Gradient direction: direction of the gradient as texture value – Gradient x: gradient in x direction as texture value – Gradient y: gradient in y direction as texture value
Rendering	
– Selection list	Selection of the display mode for the rendering of the 3D view.
– Lights	Activates or deactivates the lighting for the rendering of the 3D view.

Continuation next page ...

Corrections tab

Structure The following figure shows the **BSE Topography** dialog window with the Corrections tab:



Function The following table contains information on the components of the Corrections tab:

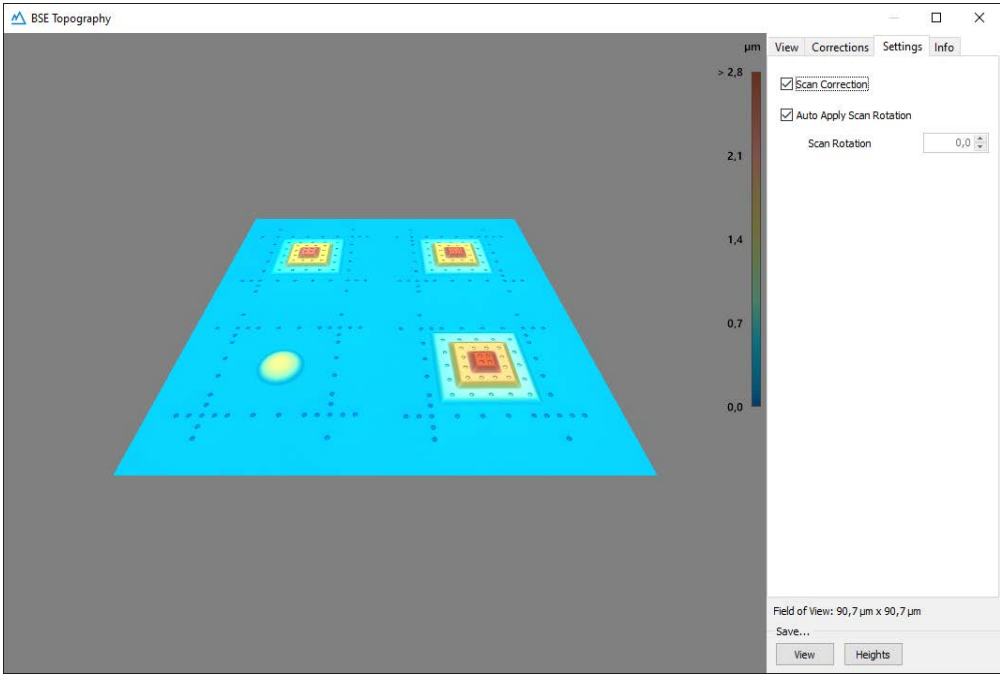
Component	Function
Sphere Correction	Activates or deactivates sphere correction. This takes into account the decrease of backscatter intensity from the center point to the edge of the scan. Without correction, this decrease leads to a spherical deviation in the height data. Before activating the sphere correction, the radius of the spherical deviation needs to be determined or entered (particularly for acquisitions with low magnification).
Adjust	Automatically determines the radius of the spherical deviation if a flat calibration sample is used. This automatic determination should be performed before activating sphere correction.
Sphere Radius	Manual setting of the radius of the spherical deviation. The manual setting is necessary whenever no automatic determination is performed.

Continuation next page ...

Component	Function
Scale Correction	Activates or deactivates the use of indicated scales for the scale correction. The indicated scales will be used for the 3D view and for saving the data. The correction values of the scales have to be reloaded from a calibration file after each modification of acquisition parameters or have to be determined again by a new calibration sample.
Scale X	Set-up of the correction value for the X axis scale.
Scale Y	Set-up of the correction value for the Y axis scale.
Scale Z	Set-up of the correction value for the Z axis scale.
Display of reference file	Shows the name of the loaded reference file (*.mcr) when using a 3D calibration structure i Will only be displayed when a reference file has been loaded.
	Selection and loading of the reference file for the 3D calibration structure.
Adjust	Automatically determines the correction values for the scales of all axes when using a 3D calibration structure. Before this automatic determination, it is necessary to: 1. Insert a 3D calibration structure in the sample chamber, 2. Load the reference file for the reference file and 3. Start an image acquisition with Slow scan with 1024 x 1024 pixels and as little noise as possible.
Context menu	A right-click within the tab opens a context menu with the following items: – Save Settings: All settings will be saved in the device configuration and used subsequently. The saved settings will also be used for BSE image acquisition. – Load Calibration: Opens a dialog window for selection and loading of a calibration file with saved settings for the corrections and the respective correction values. – Save Calibration: Opens a dialog window for saving the settings of the corrections and the respective correction values in a calibration file. i The Save Calibration function should be used if the task requires differing application settings, especially for SEM parameters (high voltage, aperture current, working distance).

Settings tab

Structure The following figure shows the **BSE Topography** dialog window with the **Settings** tab:



Function The following table contains information on the components of the **Settings** tab:

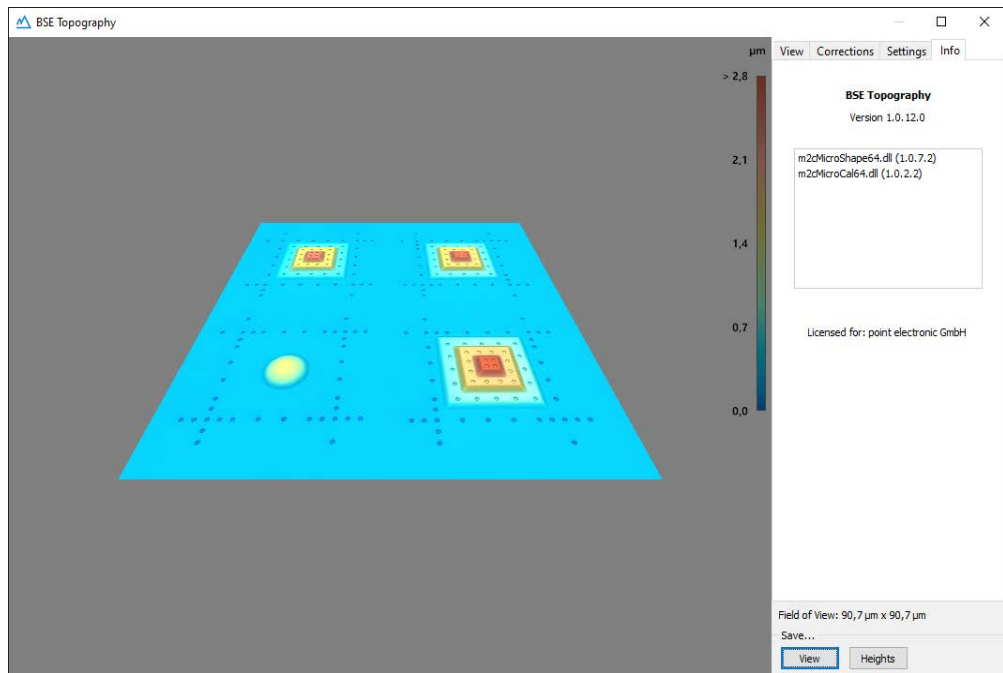
Component	Function
Scan Correction	Activates or deactivates scan correction. This takes into account deviations of the electron beam off the perpendicular. These deviations especially affect acquisitions with low magnification. Scan correction should always be activated.
Auto Apply Scan Rotation	Activates or deactivates the automatic reading of the current scan rotation. i The value of the scan rotation needs to be known for the correct calculation of the topography. i This function should only be deactivated if automatic reading of the scan rotation is not possible.
Scan Rotation	– Shows the value of the scan rotation with activated Auto Apply Scan Rotation function – Manual input of the value of the scan rotation with deactivated Auto Apply Scan Rotation function.

Continuation next page ...

Component	Function
Context menu	A right-click within the tab opens a context menu with the following items: – Save Settings: All settings will be saved in the device configuration and used subsequently. The saved settings will also be used for BSE image acquisition. – Load Calibration: Opens a dialog window for selection and loading of a calibration file with saved settings for the corrections and the respective correction values. – Save Calibration: Opens a dialog window for saving the settings of the corrections and the respective correction values in a calibration file. i The Save Calibration function should be used if the task requires differing application settings, especially for SEM parameters (high voltage, aperture current, working distance).

Info tab

Function The Info tab shows information on the installed version of the 3D Topography module as well as the software license:



Topography image acquisition

Description Topography image acquisition is an optional function that allows to:

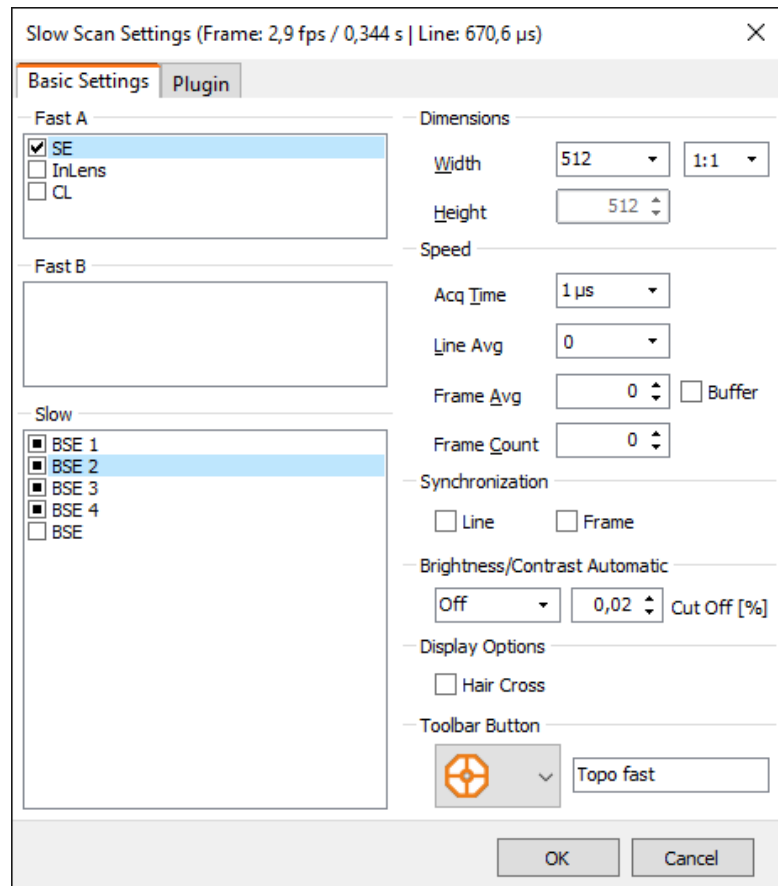
- show the calculated topography data as additional channels in the Image Acquisition window,
- save the calculated topography data as 16-bit single images,
- save the calculated topography data together with other image acquisition data in a 16-bit multipage TIFF file and
- automate processing of the calculated topography data.

For displaying the calculated topography data, scan functions are available. The display may be configured in the Scan Settings of the functions.

Scan Settings A right-click on the button of a scan function opens the **Scan Settings** dialog window to set up the relevant parameters.

The following figure shows the **Scan Settings** dialog window of a scan function for topography image acquisition:

Continuation next page ...



In the Basic Settings tab, the analog input signal sources can be activated for display and/or calculation.

In the Plugin tab, the calculated topography channels can be activated or deactivated for display.

Checkboxes' function For using input signal sources, checkboxes with the following functions are available in the Basic Settings tab:

- ☐ Signal source not activated
- ☒ Signal source activated for calculation but not visible
- ☒ Signal source activated for calculation and visible

Using BSE topography

Purpose This topic describes recommended basic procedures for using BSE topography and topography image acquisition.

Scan functions For topography image acquisition, preconfigured scan functions are available in the Acquisition toolbar.

 see "Toolbars" on page 27

These scan functions cannot be removed from the toolbar.

The scan function parameters may be adjusted in the particular scan settings.

 see "Scan Settings" on page 210

The following scan functions are available as a default:

Scan function	Use
Topo fast	– Preview – Zero balance of individual channels.
Topo cal	Calibration of the topography. Recommended settings: – Width = 1024 pixels – FrameCount = 1
Topo slow	Performing topography measurements.

Continuation next page ...

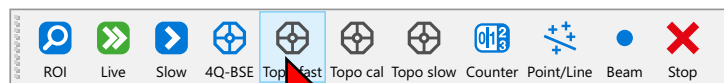
Typical procedure The following describes a typical procedure for using the scan functions for BSE topography as guidance.

The following steps are part of a typical procedure:

1. Performing zero balance
2. If necessary: Performing a calibration
 -  see "Performing the calibration" on page 213
3. Performing a topography measurement
 -  see "Performing a topography measurement" on page 214

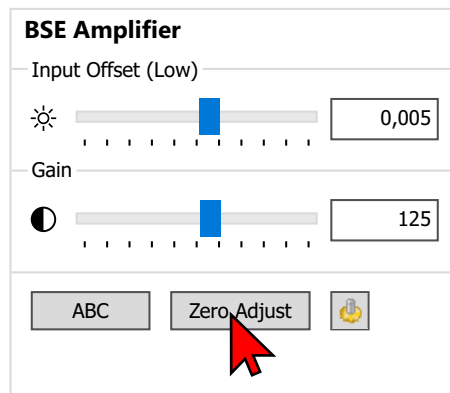
Performing zero balance Complete the following steps to perform a zero balance:

1. Click the **Topo fast** button to start a preview scan.



→ The Image Acquisition window for the preview scan opens.

2. Turn off the electron beam with the Beam Blank function.
3. In the BSE Amplifier control panel, click the **Zero Adjust** button to perform the zero balance.



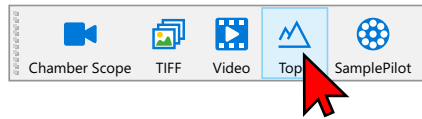
 For information on the BSE Amplifier control panel, see "Control panel" on page 129

4. Turn on the electron beam with the Beam Blank function.
5. Position the sample.
6. If necessary, adjust brightness and contrast in the BSE Amplifier control panel.

Performing the calibration Complete the following steps to perform a calibration and apply the determined corrections:

Continuation next page ...

1. Click the **BSE Topography** button to open the **BSE Topography** dialog window.



2. Close the Image Acquisition window of the preview scan.
3. Click the **Topo cal** button to start a calibration scan.
4. In the Corrections tab of the **BSE Topography** dialog window, execute the calibration functions and activate the determined corrections.
5. Open the context menu with a right click in the tab.
6. In the context menu, click the item Save Settings.
7. Optional: In the context menu, click the item Save Calibration, to save the corrections for further use.

Performing a topography measurement

Complete the following steps to perform a topography measurement and save the results:

1. Click the **BSE Topography** button to open the **BSE Topography** dialog window.
2. Close the Image Acquisition window of the preview or calibration scan.
3. Click the **Topo slow** button to start a scan for topography measurement.
4. In the View tab of the **BSE Topography** dialog window, select the preferred settings for the topography display.
5. Click the **Save Heights** button or use the saving functions in the DISS 6 toolbar to save the results of the topography measurement.

 For information on saving functions of DISS 6, see "Saving functions" on page 237

14 Measuring and Labelling

Chapter overview

Purpose This chapter contains descriptions of and instructions for the measurement and callout tools.

Contents This chapter contains the following information:

- › Tool overview 216
- › Use of measuring lines 217
- › Use of line measurements 221
- › Use of angle measurements 224
- › Use of differential measurements 228
- › Captioning acquired images 233

Tool overview

Description All tools for measuring, labelling, captioning and marking acquired images are combined in a toolbar.



Function The following table contains information on the available tools:

Button	Function	Description
	Measurement lines (Page 217)	Activates or deactivates horizontal and vertical measuring lines in the Image Acquisition window.
	Line measurement (Page 221)	Activates the function for creating a line measurement.
	Angle measurement (Page 224)	Activates the function for creating an angle measurement.
	Differential measurement (Page 228)	Activates the function for creating a differential measurement.
	Arrow (Page 233)	Allows for drawing a marker arrow.
	Rectangle (Page 233)	Allows for drawing a marker rectangle.
	Ellipse (Page 234)	Allows for drawing a marker ellipse.
	Text (Page 234)	Opens the Text Annotation dialog window after clicking the Image Acquisition window for entering a caption text. The caption text will be inserted at the clicking location in the Image Acquisition window after creation.
	Color	Opens a dialog window for setting a color of the currently selected object (measurement/label/caption/marking). The selected color will be used for all subsequent objects until the color setting is changed again.

Use of measuring lines

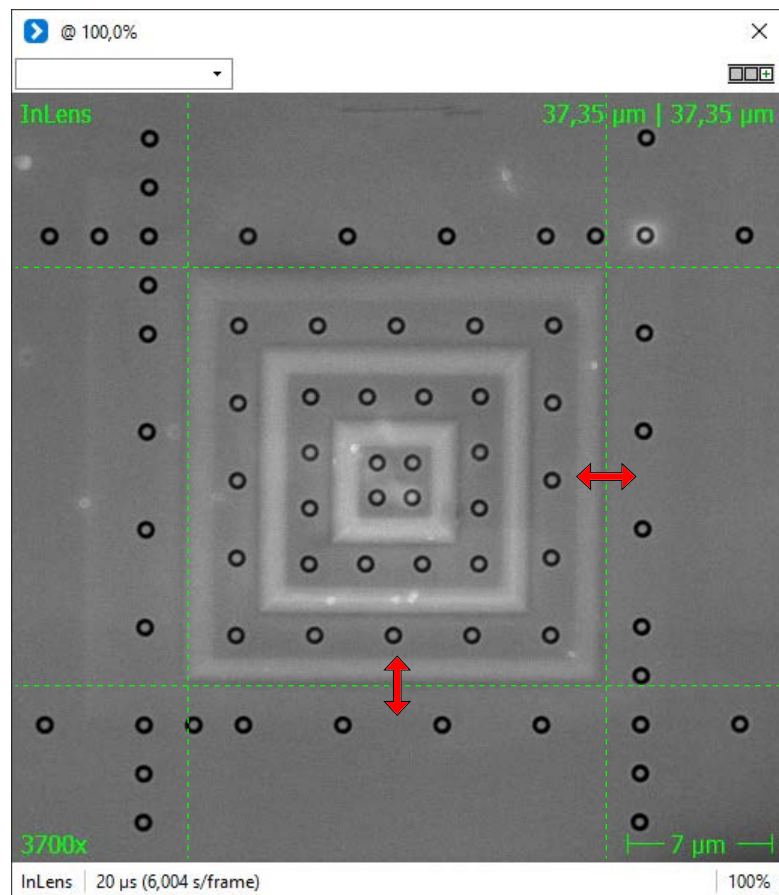
Description Horizontal and vertical measuring lines are used for fast measurements of distances in X and Y directions.

All measuring lines can be hidden and unhidden, but will not be saved in the image.

The preset positions will remain saved for the current acquired image. This means, the preset positions will be preserved after hiding and subsequent unhiding of the measuring lines.

Positioning of the measuring lines After unhiding, the measuring lines may be positioned in the Image Acquisition window with the mouse.

Moving single measuring lines in X or Y directions:

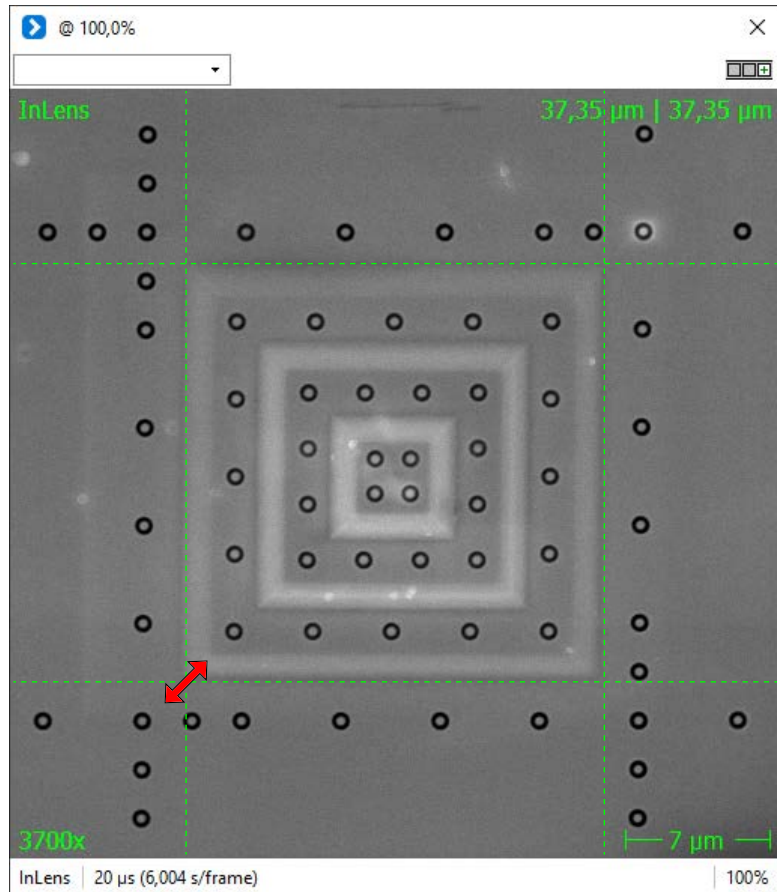


Continuation next page ...

NOTICE**Square measuring line area**

When keeping the [Ctrl] key pressed, the measuring lines will enclose a square area. The size of the area may be modified by moving an auxiliary line.

Moving measuring lines at the section in X and Y directions:

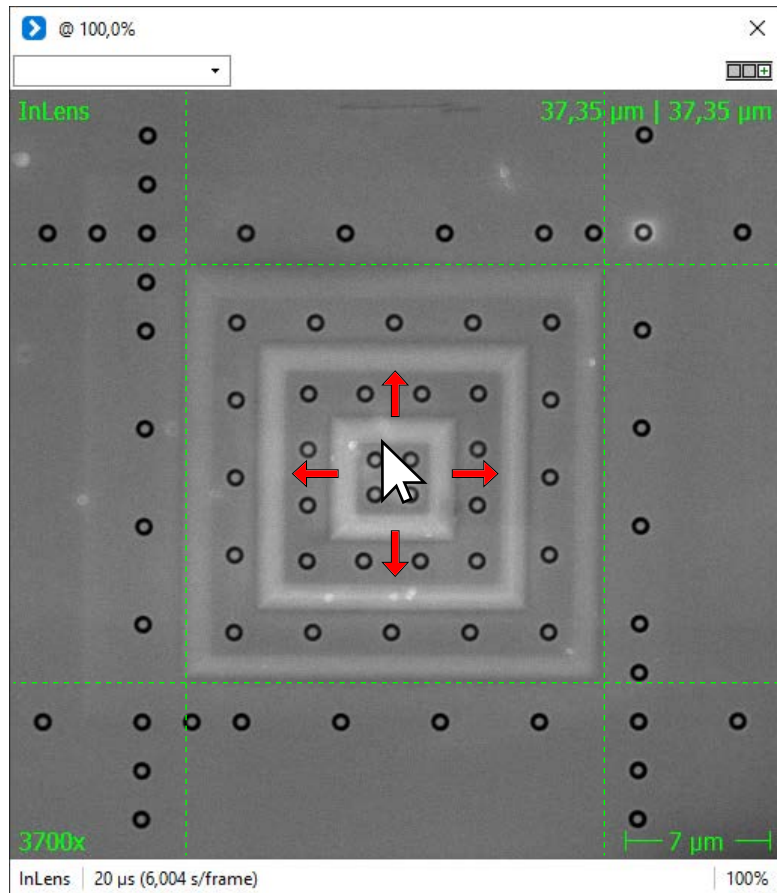
**NOTICE****Square measuring line area**

When keeping the [Ctrl] key pressed, the measuring lines will enclose a square area. The size of the area may be modified by moving a section point.

Continuation next page ...

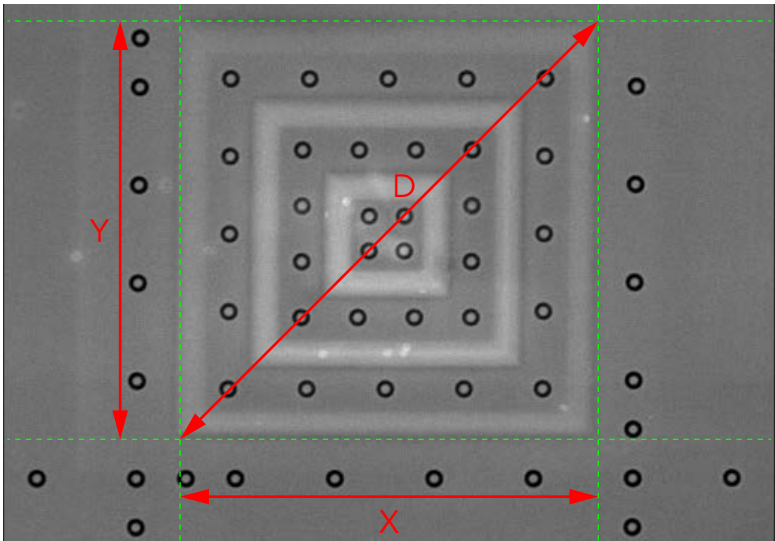
Positioning of the measurement area

If the mouse cursor in the measurement area is positioned within the measuring lines, the measurement area may be positioned in the Image Acquisition window by moving it with pressed mouse key.

**Reading out the measurement values**

The distances determined by the measuring lines are calculated as follows:

Continuation next page ...



After activation of the measuring lines, the measurement values are displayed as follows:

Measuring lines ...	Display of measurement values ...
In Idle scan	In the status bar of the DISS 6 main window.
In a scan function	In the status bar of the Image Acquisition window of the currently active scan function.

The measurement values will be updated for each adjustment.

Use of line measurements

Description Line measurements are used to measure any number of distances or lengths within an acquired image and to display the determined values.

All line measurements in an acquired image may be saved in the image in 8-bit format.

 see "Configuring Save buttons" on page 44

Creating a line measurement Complete the following steps to create a line measurement in an acquired image:

1. Click the line measurement tool.

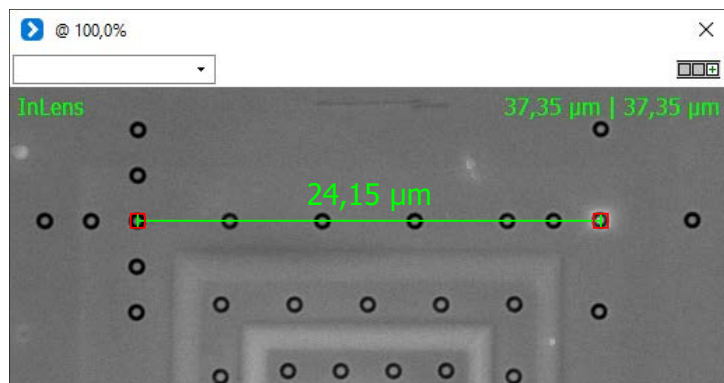


2. In the Image Acquisition window, click the particular point for the line measurement's starting point.

 Keep the [Ctrl] key pressed to create lines in the 45-degree grid.

3. In the Image Acquisition window, click the particular point for the line measurement's end point.

→ The created line will be displayed with the determined value.



Continuation next page ...

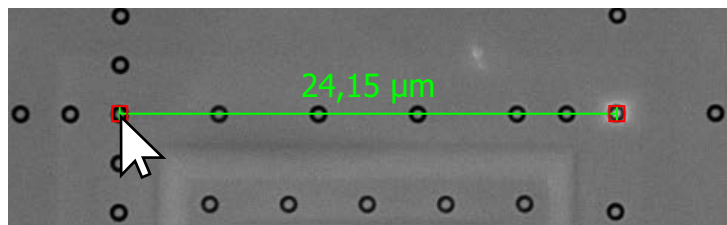
Editing a line measurement Complete the following steps to edit a line measurement subsequently:

1. If differing measurements (e.g. line and angle measurements) are already present in the acquired image: Click the line measurement tool.



→ The end points of the existing line measurements are marked with red grip points.

2. If several line measurements are already present: Click the particular measurement to select it.
3. Move the grip points of the selected measurement with the mouse to the new position.

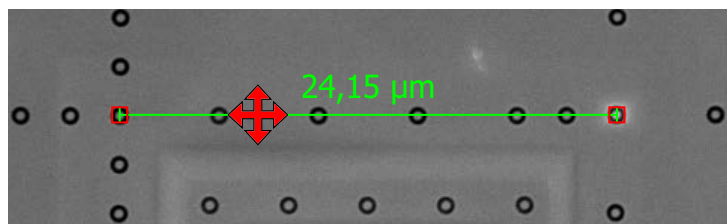


→ The value of the changed line will be updated.

4. Optional: Click the Color function in the toolbar to change the color of the selected measurement.

Moving a line measurement Complete the following steps to move a created line measurement within the acquired image:

1. Place the mouse cursor on the line.



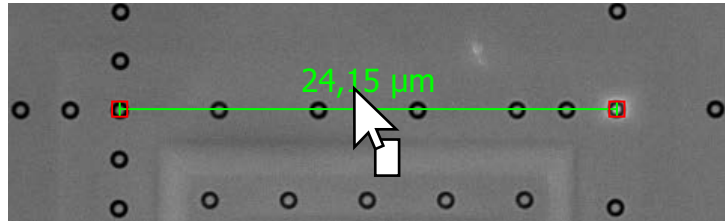
2. Move the line to the new position while keeping the mouse button pressed.

Continuation next page ...

Positioning the label After creation of a line measurement, the determined value will be shown as label centered on the line.

Complete the following steps to place the automatically inserted label manually at a new position:

1. Place the mouse cursor on the label.



2. Move the label to the new position while keeping the mouse button pressed.

Use of angle measurements

Description Angle measurements are used to measure any number of angles within an acquired image and to display the determined values.

All angle measurements in an acquired image may be saved in the image in 8-bit format.

 see "Configuring Save buttons" on page 44

Creating an angle measurement Complete the following steps to create an angle measurement in an acquired image:

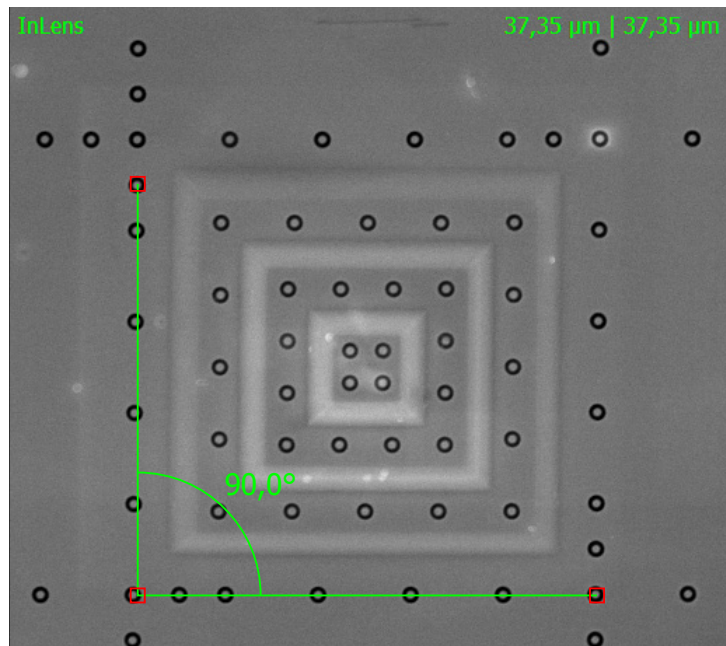
1. Click the angle measurement tool.



2. In the Image Acquisition window, click the particular location of the endpoint of the angle's first angle leg.

 Keep the [Ctrl] key pressed to create lines in the 45-degree grid.

3. In the Image Acquisition window, click the particular location of the angular point.
4. In the Image Acquisition window, click the particular location of the endpoint of the angle's second angle leg.
5. The created angle will be displayed with the determined value.



Continuation next page ...

Editing an angle measurement

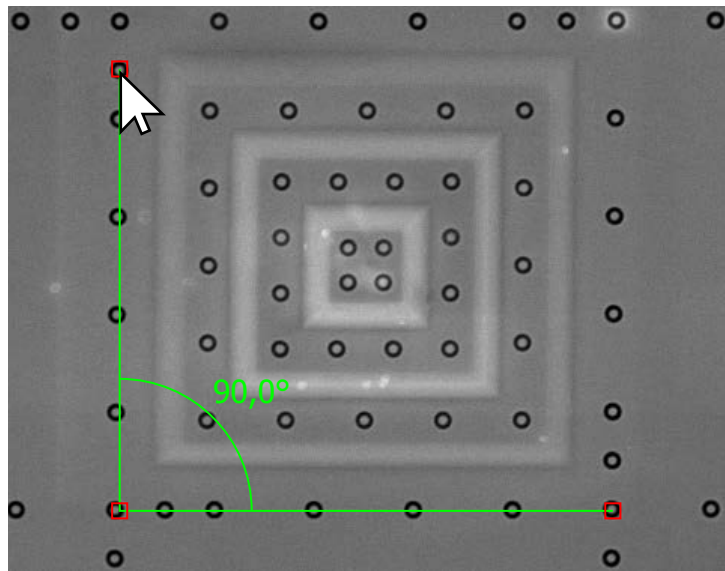
Complete the following steps to edit an angle measurement subsequently:

1. If differing measurements (e.g. line and angle measurements) are already present in the acquired image: Click the angle measurement tool.



→ The end and angular points of the existing angle measurements are marked with red grip points.

2. If several angle measurements are already present: Click the particular measurement to select it.
3. Move the grip points of the selected measurement with the mouse to the new position.



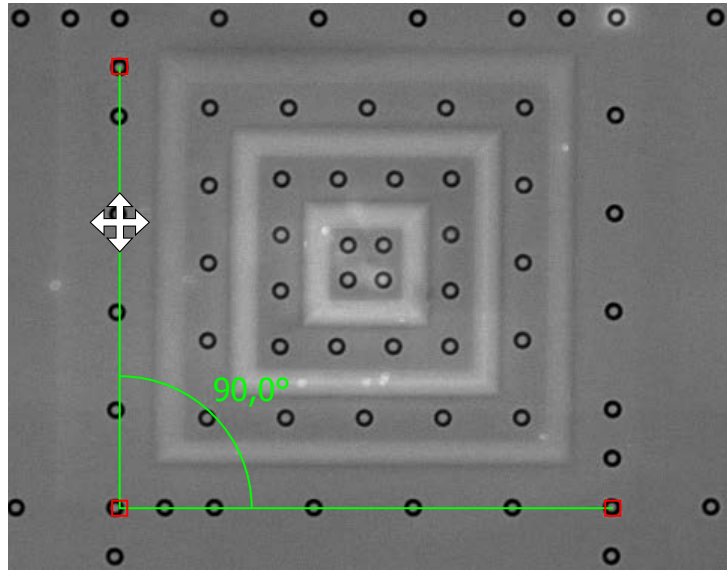
→ The value of the changed angle will be updated.

4. Optional: Click the Color function in the toolbar to change the color of the selected measurement.

Continuation next page ...

Moving an angle measurement Complete the following steps to move a created angle measurement within the acquired image:

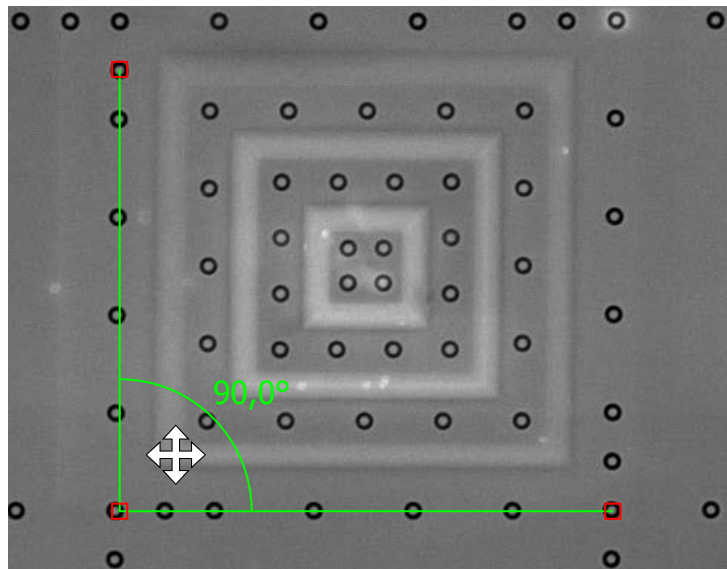
1. Place the mouse cursor on one of the angle's legs.



2. Move the angle to the new position while keeping the mouse button pressed.

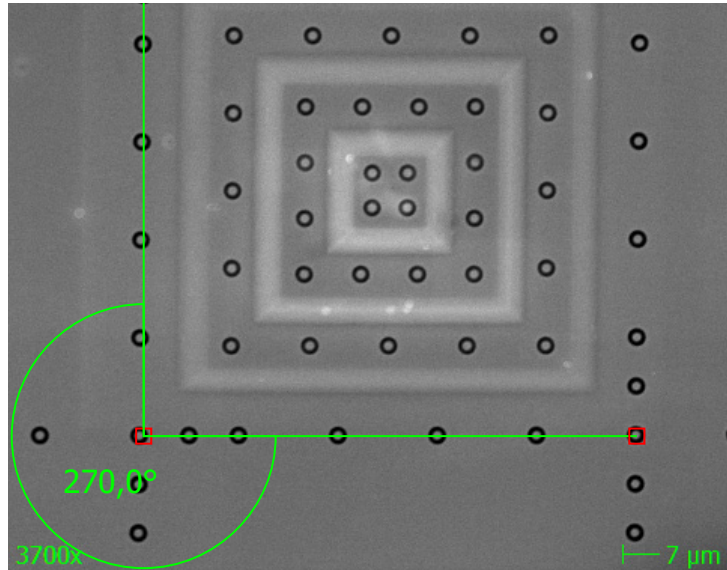
Display of the reflex angle Complete the following steps to display the reflex angle in an angle measurement:

1. Place the mouse cursor in the determined angle.



2. Double-click the determined angle.
→ The reflex angle will be displayed.

Continuation next page ...

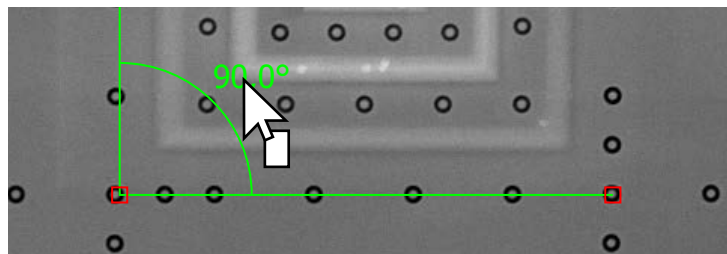


i Double-clicking the reflex angle will display the originally determined angle again.

Positioning the label After creation of an angle measurement, the determined value will be shown as label centered on the angle.

Complete the following steps to place the automatically inserted label manually at a new position:

1. Place the mouse cursor on the label.



2. Move the label to the new position while keeping the mouse button pressed.

Use of differential measurements

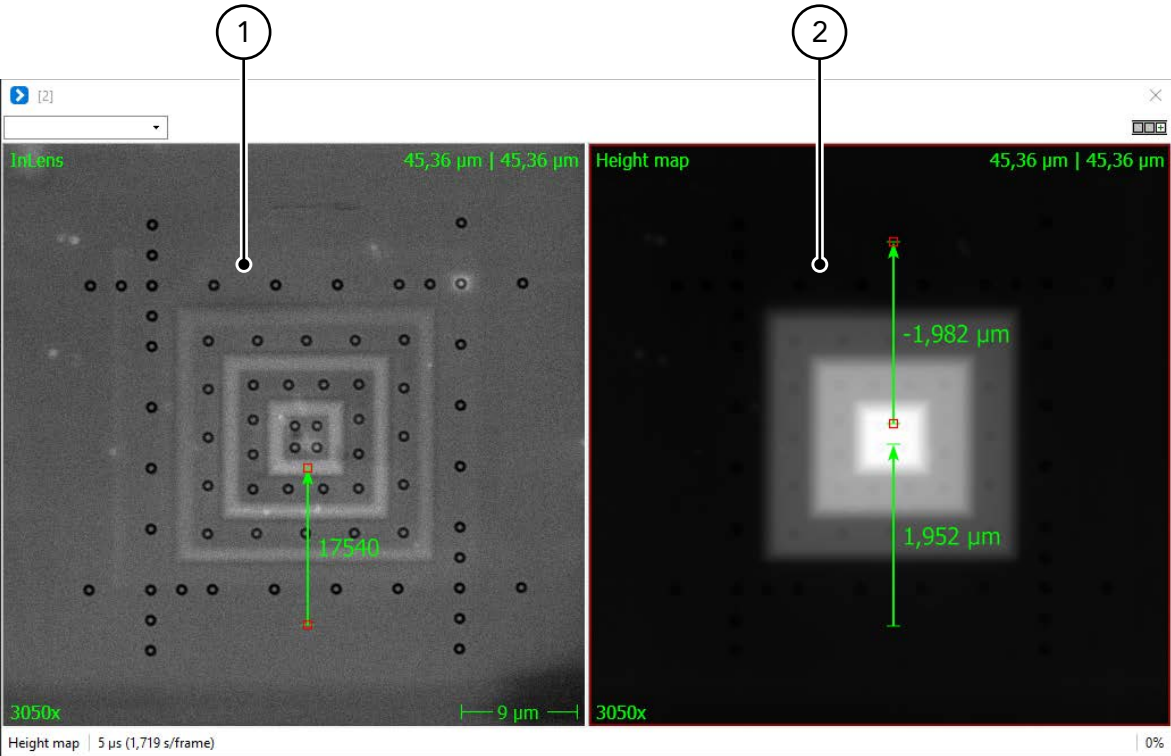
Description In relation with BSE topography, the differential measurement is used to determine height differences. The height differences will be determined in the calculated "Height Map" topography channel.

 see "Topography image acquisition" on page 210

The basis of differential value determination is the direction of the measurement.

If the differential measurement is created in an analog input signal source (SEM channel), the differential measurement will determine the gray values in measurement direction. The gray values will be displayed as 16-bit gray values.

The following figure shows the differential measurement in a SEM channel and the calculated "Height Map" topography channel:



The following table contains information on the displayed differential measurements:

Continuation next page ...

No.	Description
1	Differential measurement in the SEM channel Display of the determined gray values in measurement direction (arrow direction) as 16-bit value
2	Differential measurement in the calculated "Height Map" topography channel Display of the determined height differences in measurement direction

All differential measurements in an acquired image may be saved in the image in 8-bit format.

 see "Configuring Save buttons" on page 44

Creating a differential measurement

Complete the following steps to create a differential measurement in an acquired image:

1. Click the tool for differential measurement.



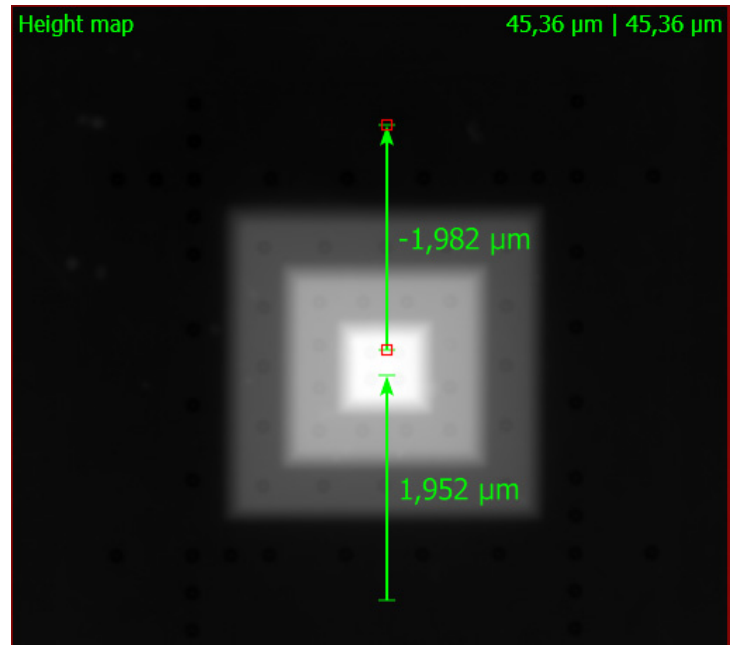
2. In the Image Acquisition window, click the particular point for the differential measurement's starting point.

 Keep the [Ctrl] key pressed to create lines in the 45-degree grid.

3. In the Image Acquisition window, click the particular point for the differential measurement's end point.
→ The created line will be displayed in measurement direction (arrow direction) with the determined value.

Continuation next page ...

... continuation: Use of differential measurements



Continuation next page ...

Editing a differential measurement

Complete the following steps to edit a differential measurement subsequently:

1. If differing measurements (e.g. line and angle measurements) are already present in the acquired image: Click the tool for differential measurement.



→ The end points of the existing differential measurements are marked with red grip points.

2. If several differential measurements are already present: Click the particular measurement to select it.
3. Move the grip points of the selected measurement with the mouse to the new position.



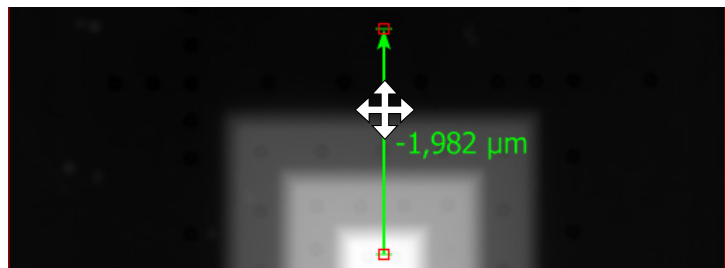
→ The value of the changed line will be updated.

4. Optional: Click the Color function in the toolbar to change the color of the selected measurement.

Moving a differential measurement

Complete the following steps to move a created differential measurement within the acquired image:

1. Place the mouse cursor on the line.

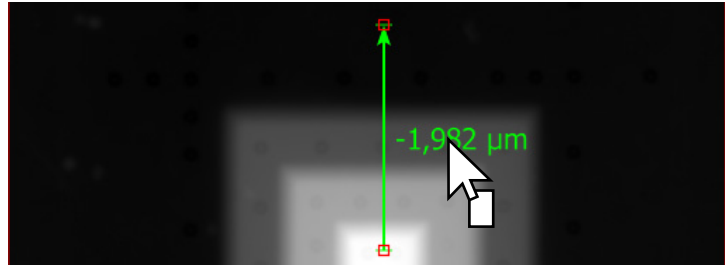


2. Move the line to the new position while keeping the mouse button pressed.

Positioning the label After creation of a differential measurement, the determined value will be shown as label centered on the line.

Complete the following steps to place the automatically inserted label manually at a new position:

1. Place the mouse cursor on the label.



2. Move the label to the new position while keeping the mouse button pressed.

Captioning acquired images

Description Callout tools are provided for shapes and text for markings, labels and captions in acquired images.

All labels and captions in acquired images may be saved in the image in 8-bit format.

 see "Configuring Save buttons" on page 44

Creating an arrow label Complete the following steps to label an acquired image with an arrow:

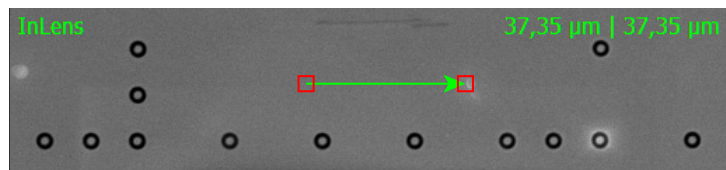
1. Click the "arrow" callout tool.



2. In the Image Acquisition window, click the particular point for the arrow's starting point.

 Keep the [Ctrl] key pressed to create an arrow in the 45-degree grid.

3. In the Image Acquisition window, click the particular point for the arrow's end point.



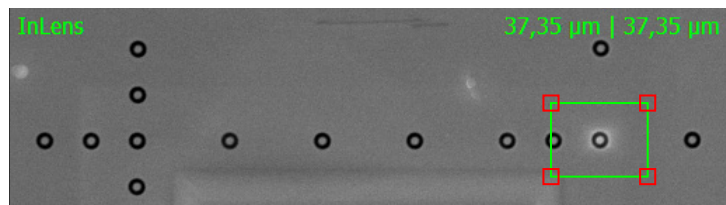
Creating a rectangular label Complete the following steps to label an acquired image with a rectangle:

1. Click the "rectangle" callout tool.



2. In the Image Acquisition window, click the particular point for the rectangle's starting point.

3. In the Image Acquisition window, click the particular point for the rectangle's end point.



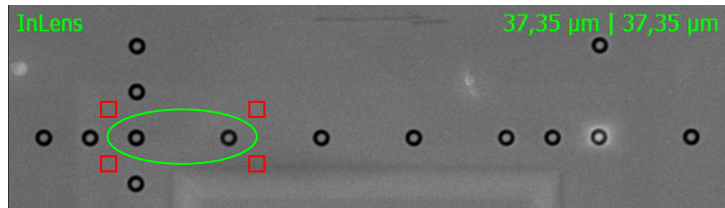
Continuation next page ...

Creating an ellipse label Complete the following steps to label an acquired image with an ellipse:

1. Click the "ellipse" callout tool.



2. In the Image Acquisition window, click the particular point for the ellipse's starting point.
3. In the Image Acquisition window, click the particular point for the ellipse's end point.

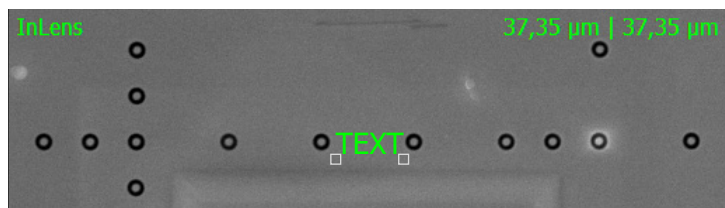


Creating a text label Complete the following steps to label an acquired image with text:

1. Click the "text" callout tool.



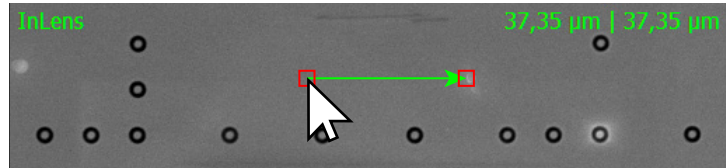
2. In the Image Acquisition window, click the particular point to place the text.
→ The **Text Annotation** dialog window opens.
3. Enter the particular text in the dialog window.
4. Click the **OK** button in the dialog window.
→ The text will be inserted in the Image Acquisition window at the location of the mouse click.



Continuation next page ...

Editing a label Complete the following steps to edit a label subsequently:

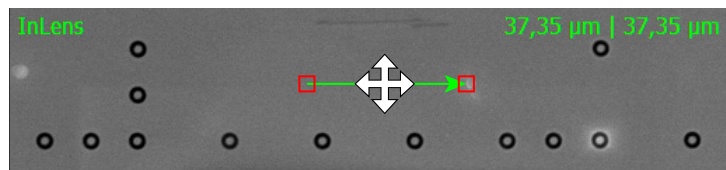
1. If differing labels (e.g. arrows, shapes) are present in the acquired image: Click the particular callout tool.
→ All labels of the selected tool will be activated.
2. Click the particular label to select it.
i If necessary: Press the [DEL] key to delete the selected label.
3. Move the grip points of the selected label to the new position with the mouse.



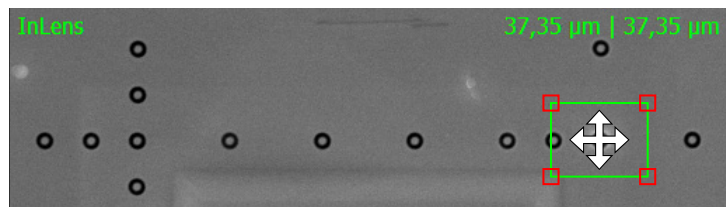
4. Optional: Click the Color function in the toolbar to change the color of the selected label.

Moving a label Complete the following steps to move a created label within the acquired image:

1. Place the mouse cursor on the label.



- i** For rectangles and ellipses, place the mouse cursor within the object.



2. Move the label to the new position while pressing the mouse key.



15 Saving and Administration

Chapter overview

Purpose This chapter describes functions for saving acquired images and creating extended parameters for saving and naming.

Contents This chapter contains the following sections:

- › 15.1 Saving functions 237
- › 15.2 Extended image information 241

15.1 Saving functions

Overview

Purpose This section contains descriptions for using the available saving functions.

Contents This sections contains the following information:

- › Save 238
- › Fast Save 239
- › Auto Save 240

Save

Description The Save function may be used for saving the currently acquired image or layout.

Button Pressing the following button opens the **Save Image** window:



Configuring the function The Save function's parameters may be configured in the **Save Settings** dialog window. This dialog window may be opened as follows:

- By right-clicking the button.
- In the **Parameters** dialog window.

 see "Configuring Save buttons" on page 44

Fast Save

Description The Fast Save function saves the currently acquired image or layout with an automatically assigned file name directly to a predefined saving location.

If the Auto File Name and Auto Folder fields of a Save button have been accordingly configured, this button will be activated as Fast Save in the toolbar.

Button By clicking the following button, the currently acquired image or layout will be saved directly:



Configuring the function The Fast Save function's parameters may be configured in the **Save Settings** dialog window. This dialog window may be opened as follows:

- By right-clicking the button.
- In the **Parameters** dialog window.

 see "Configuring Save buttons" on page 44

Auto Save

Description The Auto Save function saves the currently acquired image or layout with an automatically assigned file name to a pre-defined saving location after completion of the scanning.

The Auto Save function's button may be activated or deactivated in the **General** tab of the **Preferences** dialog window.

Button Clicking the following button activates or deactivates the Auto Save function:



Configuring the function The Auto Save function's parameters may be configured in the **Save Settings** dialog window. This dialog window may be opened as follows:

- By right-clicking the button.
- In the **Parameters** dialog window.

 see "Configuring Save buttons" on page 44

15.2 Extended image information

Overview

Purpose This section contains descriptions of the structure, functions and configuration of the optional control panel for extended image information.

Contents This sections contains the following information:

- › Configurable control panel 242
- › Control panel configuration 243

Configurable control panel

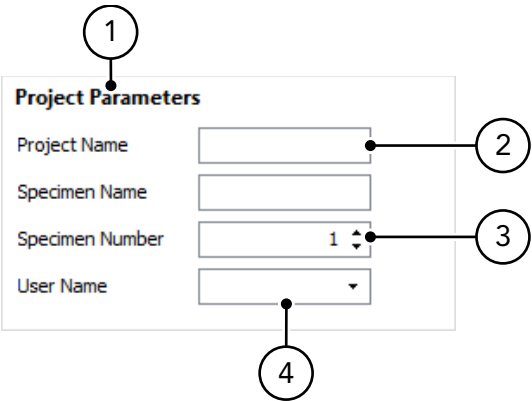
Description The configurable control panel may be used to add user-specific information to acquired images. These will be available for saving and naming images, together with the default parameters.

 see "Configuring Save buttons" on page 44

 see "Configuring parameters" on page 55

After configuration, input fields for the respective parameters will be displayed in the control panel. Depending on the configuration, the parameter values for each image acquisition might be entered manually or counted automatically.

Structure The following figure shows the configurable control panel with its components:



Function The following table contains information on the components of the configurable control panel

No.	Function
1	Configurable title of the control panel.
2	Input field of text type.
3	Input field of number type.
4	Selection list with configurable selection options.

Control panel configuration

CAUTION

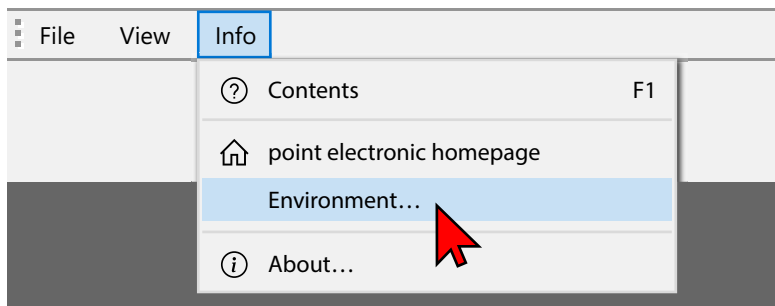
Malfunction due to faulty configuration!

Configuration faults (e. g. write errors, accidental deletion or modification of configuration file entries etc.) may lead to malfunction of the DISS 6 Software.

- Configuration should only be performed by a service technician. (see "Service technicians" on page 9)

Before getting started Complete the following steps before configuring the control panel:

1. In the Info menu, open the **Environment** dialog window to locate the configuration file saving location.



2. Close the DISS 6 Software.

Process To be able to use the control panel and user-specific parameters, the following process must be followed:

1. Add a control panel.
2. Create a parameter.
3. Activate the parameter.

Continuation next page ...

Adding a control panel Complete the following steps to add the control panel:

1. At the saving location of the configuration files, open the file "SidePanels.xml" with a text editor (e. g. Notepad++).
2. Create a line with the following structure:

 **Mind the correct writing!**

```
<sidepanels>
  <!-- Panel X, Y, Z, ... -->
  <!-- Panel group A, B, C, ... -->
  <panel id="usp" caption="Project Parameters"/>
</sidepanels>
```



No.	Component	Description
1	XML element panel	Creates a control panel.
2	Attribute id	Identifies the control panel.  The value of the attribute must be "usp"!
3	Attribute caption	Name of the control panel.  Any value may be used.

3. Save the file "SidePanels.xml" at the saving location of the configuration files (overwrite existing file).

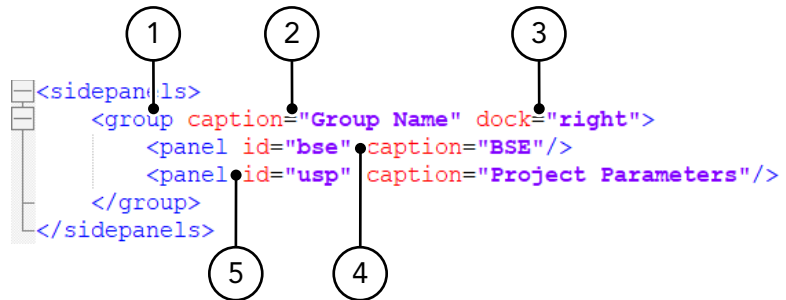
... continuation: Control panel configuration

Grouping control panels Control panels may be grouped. If a control panel of a group is opened in the user interface of the DISS 6 Software, all control panels of this group will be displayed.

Complete the following steps to group control panels:

1. At the saving location of the configuration files, open the file "SidePanels.xml" with a text editor (e. g. Notepad++).
2. Create a block with the following structure:

⚠ Mind the correct writing!



No.	Component	Description
1	XML element group	Creates a control panel group.
2	Attribute caption	Name of the control panel group. i Any value may be used.
3	Attribute dock	Defines on which side of the user interface the control panel group is to be displayed. Possible values: left and right
4	First control panel	The order of the control panels sets the order within the user interface.
5	Second control panel	The order of the control panels sets the order within the user interface.

3. Save the file "SidePanels.xml" at the saving location of the configuration files (overwrite existing file).

Continuation next page ...

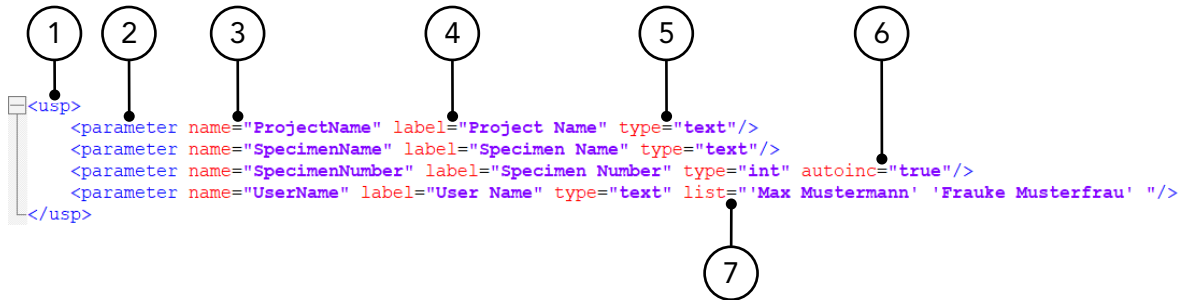
... continuation: Control panel configuration

Adding parameters After the control panel has been added, the parameters may be created.

Complete the following steps to create parameters within the control panel:

1. At the saving location of the configuration files, open the file "UserParams.xml" with a text editor (e. g. Notepad++).
2. Create the following block:

⚠ Mind the correct writing!



```

1 <usp>
2   <parameter name="ProjectName" label="Project Name" type="text"/>
3   <parameter name="SpecimenName" label="Specimen Name" type="text"/>
4   <parameter name="SpecimenNumber" label="Specimen Number" type="int" autoinc="true"/>
5   <parameter name="UserName" label="User Name" type="text" list="Max Mustermann' 'Frauke Musterfrau' "/>
6
7 </usp>
  
```

No.	Component	Description
1	XML element usp	Defines the control panel. ⚠ The name of the element must be "usp"!
2	XML element parameter	Creates a parameter.
3	Attribute name	Defines the name of the parameter. ⚠ Do not use space or special characters in the name!
4	Attribute label	Defines the parameter caption in the user interface. i Any value may be used.
5	Attribute type	Defines the type of the parameter. The following types may be used: – text: Defines a text field. – int: Defines a number field within which the value may be raised or lowered manually with the arrow keys.
6	Attribute autoinc	Activates an automatic counter in number fields. Apart from the automatic count, the value of the number fields may also be edited manually by using the arrow keys. Double-clicking an automatic number field resets the value. i This attribute may only be used for parameters of int type.
7	Attribute list	Modifies a text field to a selection list with predefined options. The options are entered as values with single quotation marks and space-delimited into the attribute. i This attribute may only be used for parameters of text type.

Continuation next page ...

... continuation: Control panel configuration

- 3. Save the file "UserParams.xml" at the saving location of the configuration files (overwrite existing file).

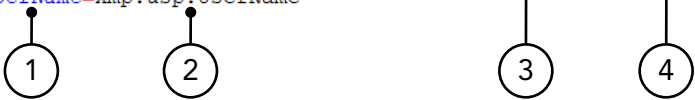
Activating the parameters To use created parameters, they have to be activated for the DISS 6 Software.

Complete the following steps to activate created parameters:

- 1. At the saving location of the configuration files, open the file "DISS6.cfg" with a text editor (e. g. Notepad++).
- 2. In the file "DISS6.cfg" scroll to the [ParameterAliases] part.
- 3. Create a line for each parameter as follows:

 **Mind the correct writing!**

```
[ParameterAliases]
ProjectName=xmp:usp:ProjectName
SpecimenName=xmp:usp:SpecimenName
SpecimenNumber=xmp:usp:SpecimenNumber;Type=Int;Format=%.3d
UserName=xmp:usp:UserName
```



No.	Component	Description
1	Parameter Name	The defined name of the parameter.  Use the same spelling as in UserParams.xml!  see "Adding parameters" on page 246
2	Alias value	Name of the parameter in XMP format.
3	Alias Type	Type of the parameter in XMP.
4	Alias Format	Format of the parameter in XMP.

- 4. Save the file "DISS6.cfg" at the saving location of the configuration files (overwrite existing file).

16 Image Processing

Chapter overview

Purpose This chapter gives information on the image processing software DIPS. It contains descriptions of the structure and function of the software.

Contents This chapter contains the following sections:

- › 16.1 User interface 249
- › 16.2 Functions in the File menu 266
- › 16.3 Functions in the Image menu 277
- › 16.4 Functions in the Tools menu 292

16.1 User interface

Overview

Purpose This section contains descriptions of the structure and function of the DIPS image processing software.

Contents This sections contains the following information:

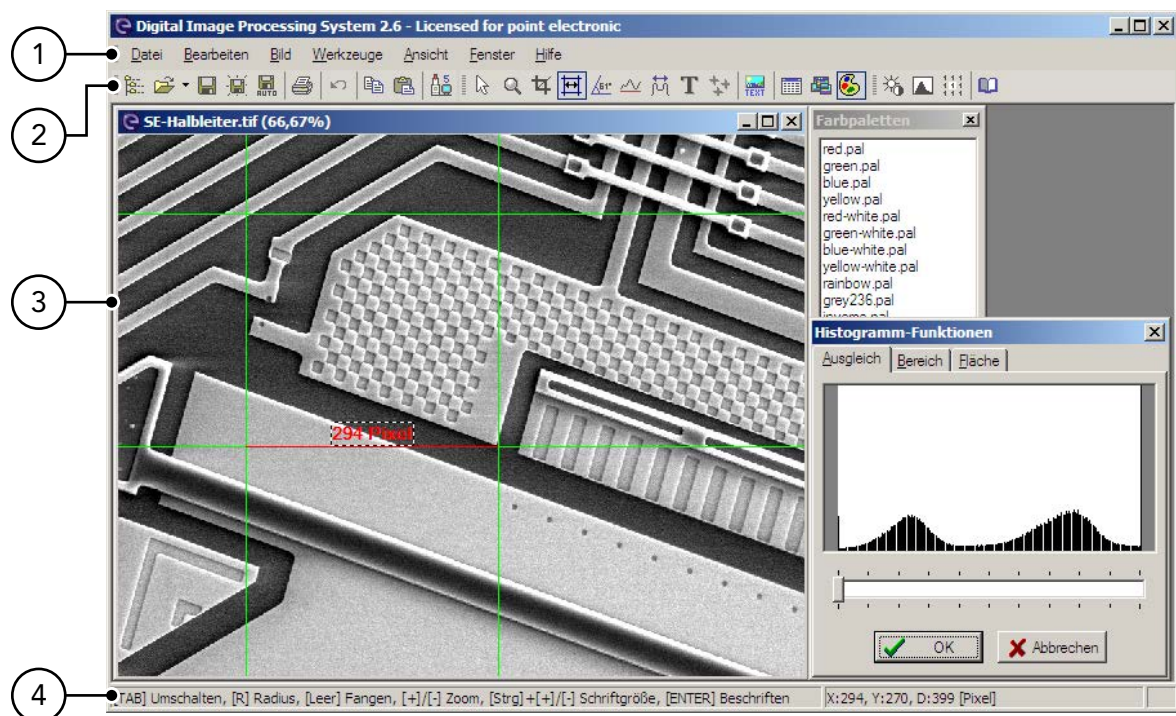
- › Overview 250
- › Toolbars. 252
- › File menu. 256
- › Edit menu 258
- › Image menu. 259
- › Tools menu 261
- › View menu. 263
- › Window menu 264
- › Help menu. 265

Overview

Description With DIPS, the digital imaging processing system of DISS 6, digitized images may be processed, captioned, measured, printed and saved easily.

A special layout technique facilitates the processing of several related images as well as their documentation and archiving.

Structure The following figure shows the DIPS user interface with its components:



Function The following table contains information on the components of the DIPS user interface:

No.	Component	Function
1	Menu bar	Contains all DIPS functions. The display of the menus may be customized.  see "Commands tab" on page 254
2	Toolbars	Contain functions of DIPS as command buttons. The content of the toolbars may be customized either via the preferences or according to user-specific requirements.  see "Toolbars tab" on page 253
3	Work area	Contains all opened image windows as well as dialog windows of the active tools or functions.

Continuation next page ...

... continuation: Overview

No.	Component	Function
4	Status bar	– Displays possible functions or actions of the active tool. – Displays measurement results of the active tool (e. g. size of an angle).

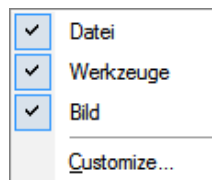
Toolbars

Introduction Toolbars contain some frequently used menu functions. The functions are represented in three groups. DIPS provides the following options to organize the functions according to specific requirements:

- Display or hide toolbars
- Expand existing toolbars
- Delete functions from existing toolbars
- Create user-specific toolbars
- Set-up of display options for menus

Context menu Show, hide or customize all available toolbars via the context menu. The context menu may be opened by a right-click on the toolbars or menu bars.

The following figure shows the context menu of the toolbars and menu bars:

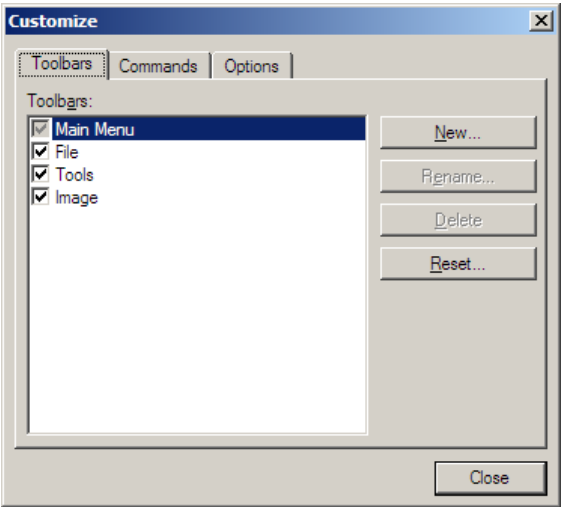


Customizing toolbars Open the **Customize** dialog window with three tabs via the context menu to customize the toolbars.

Continuation next page ...

... continuation: Toolbars

Toolbars tab The following figure shows the **Customize** dialog window with the Toolbars tab:



The following table contains information on the components of the Toolbars tab:

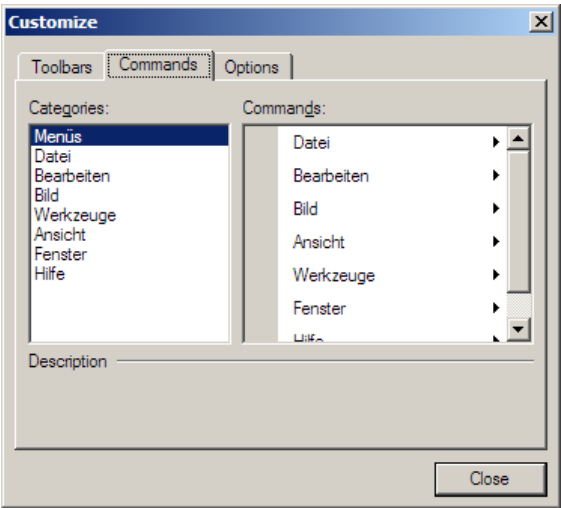
Component	Function
Toolbars	Shows all available toolbars. Each toolbar may be shown or hidden by using the checkbox.
New...	Opens a dialog window for creating a new toolbar.
Rename...	Opens a dialog window for renaming the selected toolbar. i The standard toolbars (Main Menu, File, Tools and Image) cannot be renamed.
Delete...	Deletes the selected toolbar. i The standard toolbars (Main Menu, File, Tools and Image) cannot be deleted.
Reset...	Resets a modified standard toolbar to default. i Only the standard toolbars (Main Menu, File, Tools and Image) may be reset.

Continuation next page ...

... continuation: Toolbars

Commands tab As soon as the Commands tab is opened, the edit mode for all menus and toolbars is activated. In this mode, menus and tools may be deleted or moved via Drag & Drop.

The following figure shows the **Customize** dialog window with the Commands tab:



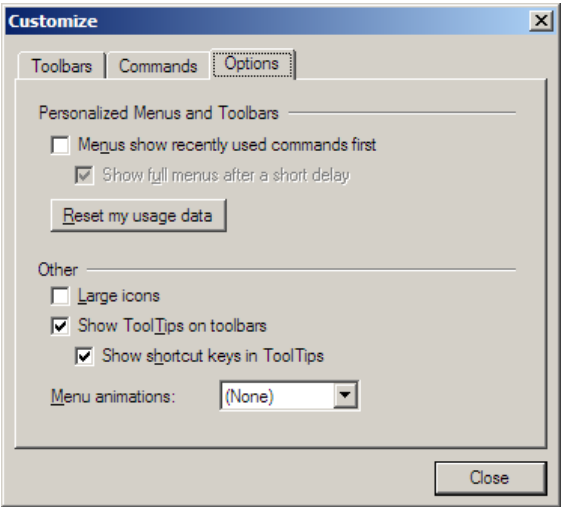
The following table contains information on the components of the Commands tab:

Component	Function
Categories	Displays all available menus.
Commands	Displays the content of the menu which is selected in the Categories field.

Continuation next page ...

... continuation: Toolbars

Options tab The following figure shows the **Customize** dialog window with the Options tab:

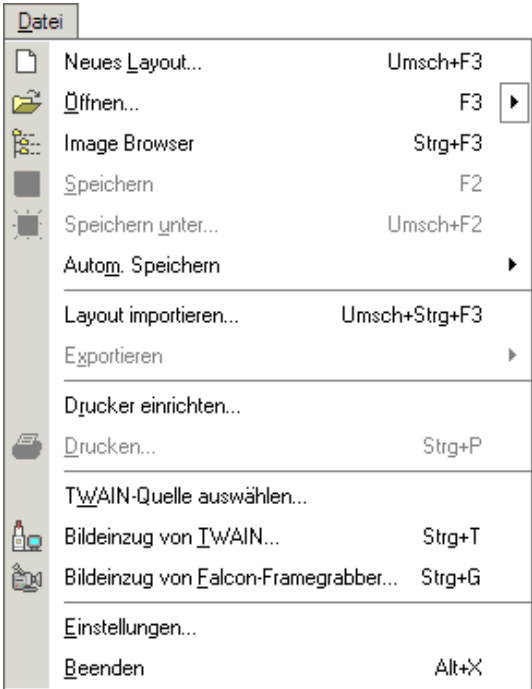


The following table contains information on the components of the Options tab:

Component	Function
Personalized Menus and Toolbars	
– Menus show recently used commands first	Displays only the most commonly used commands in the menus.
– Show full menus after a short delay	Shows all commands in the menus after a short delay.
– Reset my usage data	Deletes the personal usage data. All menus will be displayed with all commands.
Other	
– Large icons	Shows large icons in the toolbars.
– Show ToolTips on toolbars	Shows a tool tip if the cursor is on an icon in the toolbar.
– Show shortcut keys in ToolTips	Shows shortcut keys in the tool tips.
– Menu animations	Contains a list of animation effects for showing menus.

File menu

Structure The following figure shows the File menu with its components:



Function The following table contains information on the components of the File menu:

Component	Function
New Layout...	Opens a dialog window for creating layout templates. (Page 267) A layout template consists of several empty fields in which different images may be arranged.
Open...	Opens the Load image dialog window to select image files or layout files and open them in DIPS. i DIPS supports the following file formats: – Tagged Image File Format (.TIF) – Windows Bitmap (.BMP) – Joint Picture Expert Group (.JPG) – Portable Network Graphics (.PNG) – Graphics Interchange Format (.GIF) – DOS-DISS format (.PSD)
Image Browser	Opens the visual image manager where saved images are displayed in a preview. (Page 268)

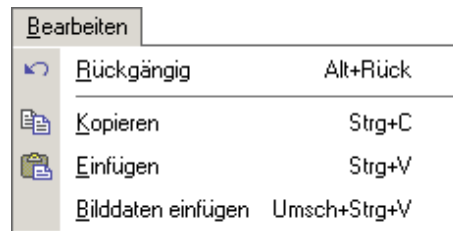
Continuation next page ...

... continuation: File menu

Component	Function
Save	Saves the active image window or layout window. If the active image or layout has not previously been saved, the Save image dialog window opens.
Save As...	Opens the Save image dialog window. Images and layouts may be saved with another name in specific folders. (Page 269) i Images and layouts may be saved in one of the following file formats: – Tagged Image File Format (.TIF) – Windows Bitmap (.BMP) – Joint Picture Expert Group (.JPG) – Portable Network Graphics (.PNG) – Graphics Interchange Format (.GIF) – DOS-DISS format (.PSD)
Auto Save	Opens a menu for activating or setting additional options. (Page 271)
Export	Exports point scan or linescan data acquired from the DISS 6 TWAIN source to ASCII or Excel format.
Printer Setup...	Opens a dialog window for selecting and/or setting up the connected printers.
Print...	Opens the Print dialog window with functions to prepare and carry out the printing of the active image or layout. (Page 272)
Select TWAIN Source...	Shows all available TWAIN sources. One source may be selected as default.
Acquire From TWAIN...	Opens the default TWAIN source for acquiring images or layouts.
Acquire From Falcon Grabber...	Opens the TWAIN source for acquiring analog video signals (e. g. from an optical microscope) with a frame grabber card.
Preferences	Opens the Preferences dialog window for setting user-specific defaults. (Page 274)
Ending	Closes the application.

Edit menu

Structure The following figure shows the Edit menu with its components:

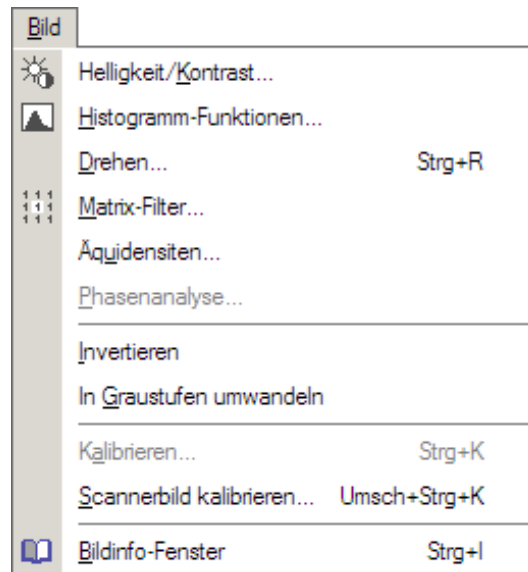


Function The following table contains information on the components of the Edit menu:

Component	Function
Undo	Undoes the most recent action.
Copy	Copies the selected image to the clipboard of the computer.
Paste	Pastes an image from the clipboard into a new image window.
Paste Image Data	Pastes an image acquired with another image processing software from the clipboard of the computer.

Image menu

Structure The following figure shows the Image menu with its components:



Function The following table contains information on the components of the Image menu:

Component	Function
Brightness/Contrast...	Opens a dialog window for setting up brightness and contrast. (Page 278)
Histogram Functions...	Opens a dialog window for setting up functions for modifying the histogram. (Page 279)
Rotate...	Opens a dialog window for rotating the selected image. (Page 281)
Matrix Filter...	Opens a dialog window for setting up different filters. (Page 282)
Equidensities...	Opens a dialog window for setting and dyeing several gray areas of an image. (Page 284)
Phase Analysis... (optional)	Starts an application to identify different chemical phases in elemental mapping images.
Invert	Shows the selected image in the inverted mode.
Convert To Gray Scale	Converts the active image to gray scales.

Continuation next page ...

... continuation: Image menu

Component	Function
Calibrate...	Opens a dialog window for calibrating DIPS. (Page 288) i This function is only available in measuring mode.
Calibrate Scanned Image...	Opens a dialog window for calibrating images acquired with another source (e. g. frame grabber or scanner). (Page 290)
Image Info Window	Opens a dialog window that shows information saved with the active image. (Page 291)

Tools menu

Structure The following figure shows the Tools menu with its components:



Function The following table contains information on the components of the Tools menu:

Component	Function
Standard	Switches to Standard mode. Zoom mode and measuring mode will be deactivated. i Drag & Drop is only available in Standard mode.
Zoom	Activates zoo mode. (Page 293)
Crop	Crops rectangular sections from the selected image. (Page 294)
Measurement Cursor	Activates measuring mode. (Page 295)
Angle Measurement	Activates angle measuring mode. (Page 297)
Line Profile	Activates line profile measuring mode. (Page 298)

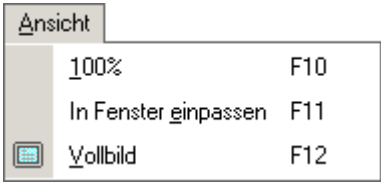
Continuation next page ...

... continuation: Tools menu

Component	Function
Structure Measurement	Activates structure measuring mode. (Page 299)
Caption...	Opens a dialog window for creating an image caption. (Page 301)
Caption	For entering label text on any position in the image. (Page 304)
Arrow	Callout tool: Creates an arrow on any position in the selected image. (Page 306)
Rectangle	Callout tool: Creates a rectangle on any position in the selected image. (Page 306)
Ellipse	Callout tool: Creates an ellipse on any position in the selected image. (Page 306)
Measurement Data Window	Opens the Measurement Values dialog window in which the measured distances, radii and angles of the selected image are displayed as tables. The data may be saved either as XLS, HTML or TXT format. (Page 310)
Mix Window	Opens a dialog window for dyeing and/or mixing images. (Page 311)
Color Palette Window	Opens the Color Palette Window. Via Drag & Drop, a color palette may be assigned to an image in an image window or a layout window.

View menu

Structure The following figure shows the View menu with its components:

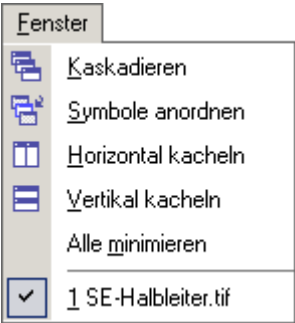


Function The following table contains information on the components of the View menu:

Component	Function
100%	Displays the current image or layout in standard view. One screen pixel corresponds to one image pixel.
Fit In Window	Fits the current image or layout into the image window. The aspect ratio will be maintained.
Full Screen	Displays the current image or layout in full screen mode. Performing this function again switches back to standard view.

Window menu

Structure The following figure shows the Window menu with its components:

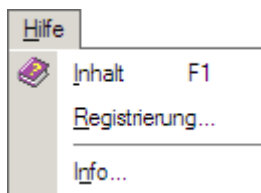


Function The following table contains information on the components of the Window menu:

Component	Function
Cascade	Cascades all opened image windows one after the other graded at an angle on the DIPS user interface.
Arrange	Arranges all symbols (minimized image windows) on the lower edge of the DIPS user interface.
Tile Horizontally	Arranges all opened image windows one beneath another on the DIPS user interface.
Tile Vertically	Arranges all opened image windows side by side on the DIPS user interface.
Minimize All	Minimizes all opened image windows to symbols (minimized image windows).

Help menu

Structure The following figure shows the Help menu with its components:



Function The following table contains information on the components of the Help menu:

Component	Function
Contents	Opens the help file.
Registration...	Opens the Registration dialog window for entering registration data. This information may be sent to point electronic GmbH by email or may be saved as TXT file.
About...	Opens a window with copyright information, software version and serial number.

16.2 Functions in the File menu

Overview

Purpose This section contains descriptions of the functions in the File menu.

Contents This sections contains the following information:

- › New Layout267
- › Image Browser268
- › Save as.269
- › Auto save.271
- › Print...272
- › Program Preferences.274

New Layout

Description With a layout, several acquired images can be arranged in one window.

This is useful e. g. for a comparison of images with different settings or a creation of print layouts.

This function opens the **New Layout** dialog window in which new layout templates for the arrangement of several images can be created.

Structure The following figure shows the **New Layout** dialog window with its components:



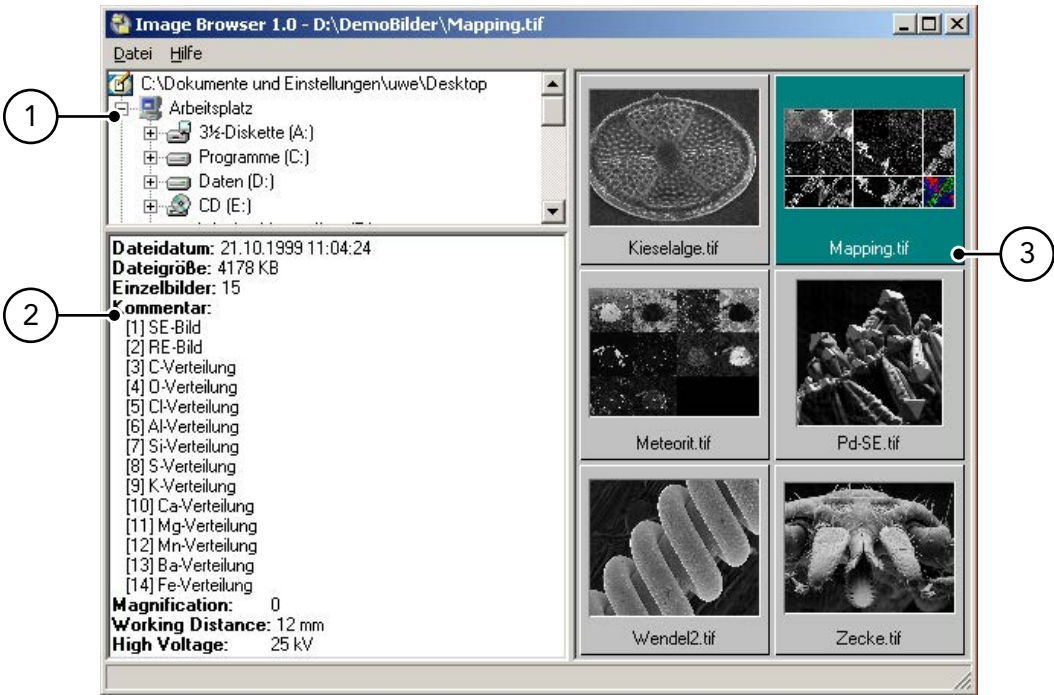
Function The following table contains information on the components of the **New Layout** dialog window:

Component	Function
Columns	For entering a preferred number of columns for a layout template.
Rows	For entering a preferred number of rows for a layout template.
Ratio	For entering a preferred aspect ratio of a layout template.
OK	Closes the dialog window. A new layout template is created with the given values and is displayed on the work area of DIPS.
Cancel	Closes the dialog window. The settings are rejected. No new layout template is created.

Image Browser

Description The Image Browser is a visual image manager integrated in DIPS. It allows for a preview of saved images as thumbnails. With a double-click on a thumbnail, the image is opened in DIPS.

Structure The following figure shows the Image Browser with its main components:



Function The following table contains information on the main components of the Image Browser:

No.	Main component	Function
1	Directory	Displays disk drives and folders of the computer.
2	File properties	Displays information saved with a selected image.
3	Preview	Displays thumbnails and file names of the images in a selected folder.

Save as...

Description With the Save as... function, selected images or layouts can be saved under a different name in the following file formats:

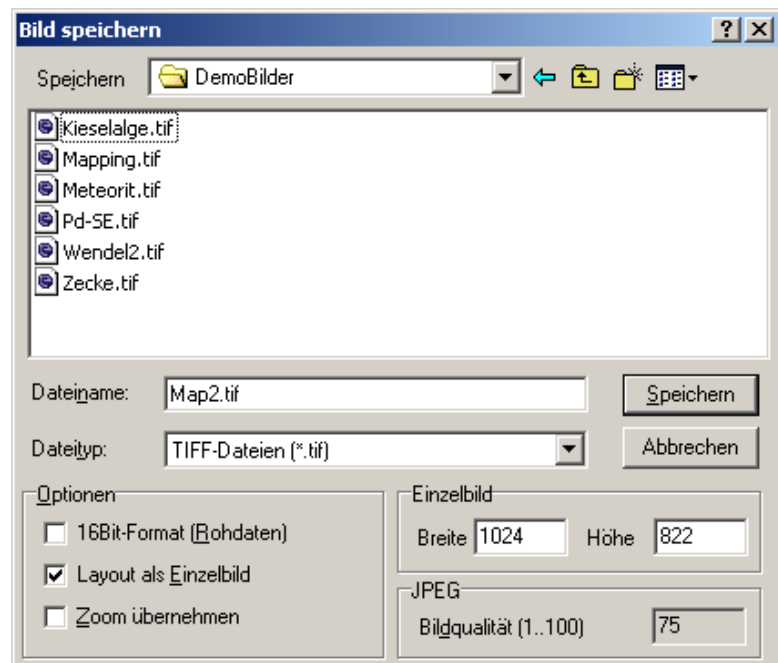
- Tagged Image File Format (.TIF)
- Windows Bitmap (.BMP)
- Joint Picture Expert Group (.JPG)
- Portable Network Graphics (.PNG)
- Graphics Interchange Format (.GIF)

NOTICE

Only in a TIF file format, image parameters like calibration and comment may be saved with the image.

The function opens the **Save Image** dialog window.

Structure The following figure shows the **Save Image** dialog window with its main components:



Continuation next page ...

... continuation: Save as...

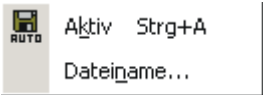
Function The following table contains information on the main components of the **Save Image** dialog window:

Main component	Function
Options	
– 16 bit format (raw data)	Saves the raw data of the selected image in 16-bit format. This option is only available if the image data to be saved is available in 16-bit format. i If the 16-bit format (raw data) checkbox is activated, all modifications of the image will be rejected.
– Layout as single image	Saves a layout as single image. Such a layout may also be imported into different graphics applications. i With layouts saved as single images, it becomes impossible to process the individual images of a layout afterwards.
– Use image zoom	Causes the layout to be saved as shown on the screen. i The zooming degree of the individual images of a layout is preserved.
Single image	Sets width and height of the image to be saved in pixels.
JPEG	Sets the quality of the image to be saved by entering a value between 1 and 100. i The higher the value, the better the quality of the saved image.

Auto save

Description The Auto save function enables the fast saving of several images under the same name. While saving several images, the chosen file name is extended with a four-digit number starting at 0001. The number is raised by one for any further saving.

Structure The following figure shows the Auto save menu with its components:



Function The following table contains information on the components of the Auto save menu:

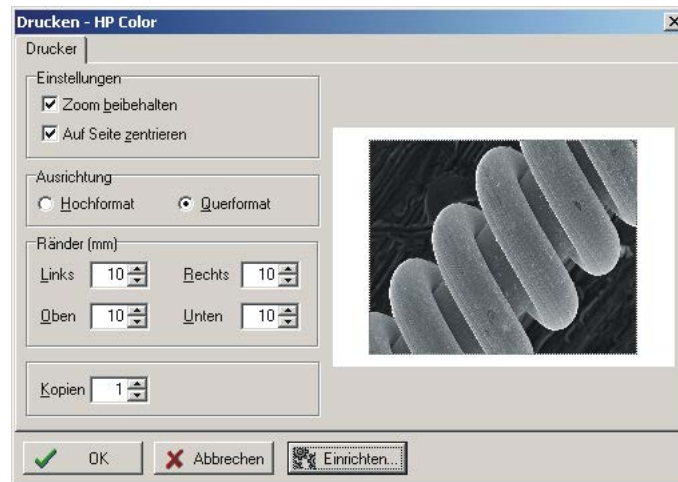
Component	Function
Active	Activates the Auto Save mode.
Filename...	Opens a dialog window for choosing a file name and to set some saving options. This dialog window is basically the same as the Save image dialog window (Page 269). In the Options field, a Close image automatically function is available. If this function is activated, the image is closed directly after the saving. i The Layout as single image function cannot be activated.

Print...

Description With the Print function, the active image or layout can be prepared for printing and can be printed out.

The function opens the **Print** dialog window.

Structure The following figure shows the **Print** dialog window with its components:



Function The following table contains information on the components of the **Print** dialog window:

Component	Function
Controls	
– Use Image Zoom	Prints the active image or layout as shown on the screen.
– Center On Page	Prints the active image or layout centered on the page.
Orientation	Contains the options Portrait and Landscape to set the page orientation.
Margins (mm)	For setting the page margins in millimeters. i As a default, images and layouts are aligned on the upper left edge.
Copies	For entering the number of image or layout copies to be printed.
OK	Closes the dialog window. The image is printed with the preset settings.
Cancel	Closes the dialog window. The image is not printed. The preset settings are rejected.
Setup...	Opens a dialog window for selecting and setting up the printer.

Continuation next page ...

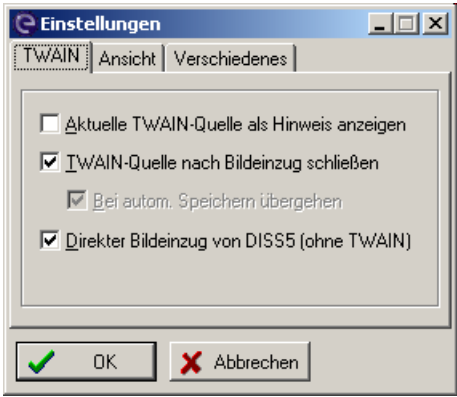
... continuation: Print...

Program Preferences

Description With the Program Preferences function, user-specific defaults for DIPS can be set.

The function opens the **Program Preferences** dialog window with three tabs.

TWAIN tab The following figure shows the **Program Preferences** dialog window with the TWAIN tab:



The following table contains information on the components of the TWAIN tab:

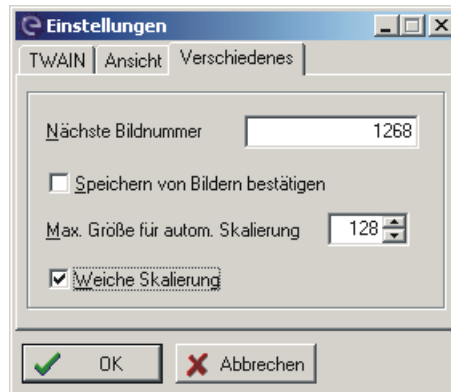
Component	Function
Show current TWAIN source as hint	Displays the current TWAIN source as tool tip if the cursor is placed on the Acquire From TWAIN button.
Close TWAIN source after acquisition	Closes the TWAIN source after acquisition and transfer of an image to DIPS. Otherwise, the TWAIN source stays open until the image acquisition is canceled. This mode allows to acquire several images one after another and to transfer them to the image processing software without having to open the TWAIN source again.
Override in Auto Save mode	The TWAIN source is not closed in Auto Save mode.
Acquire directly from DISS5 (without TWAIN)	Activates direct data transfer from the image acquisition software. If image acquisition software is available, it will open automatically when the Acquire from TWAIN... function is used without using the TWAIN source. i Only available as package with DISS 5.

Continuation next page ...

... continuation: Program Preferences

View tab The View tab contains a function that displays the toolbar buttons in a flat style.

Miscellaneous tab The following figure shows the **Program Preferences** dialog window with the Miscellaneous tab:



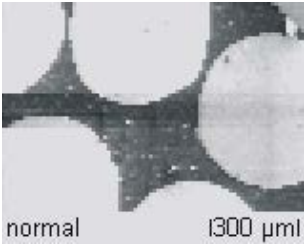
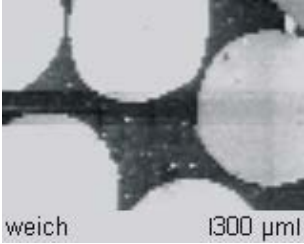
The following table contains information on the components of the Miscellaneous tab:

Component	Function
Next image number	For entering a number to be used for the next image saved.
Confirmation for saving images	If this checkbox is activated, the saving of an existing image must always be confirmed. This prevents an original image from being overwritten. i This function should always be activated.
Max. size for auto scale	When an image is acquired from the TWAIN source and as long as its width and/or height do not exceed the given values, the image will automatically be converted to twice its size. As this function improves the pixel resolution of an image, it is particularly well suited for layouts with small elemental mapping images that are provided with an image caption. i The automatic scaling may be prevented by entering the value "0" (zero) in this field.
Smooth Scaling	Activates an interpolating procedure used for automatic scaling. Otherwise, the image is scaled with a simple pixel duplication.

Continuation next page ...

... continuation: Program Preferences

Scaling The following images show the effect of scaling. For this purpose, an SE image was acquired with 80 x 64 pixels and labeled with a caption.

Scaling	Image
Without	
Regular	
Smooth	

16.3 Functions in the Image menu

Overview

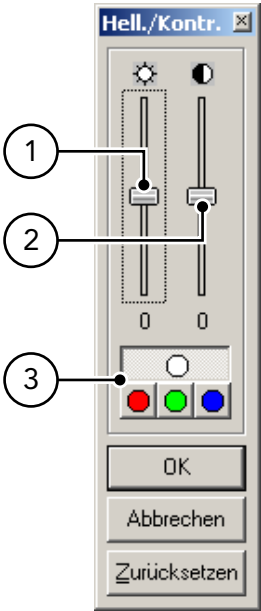
Purpose This section contains descriptions of the functions in the Image menu.

Contents This sections contains the following information:

- › Brightness/Contrast.....278
- › Histogram functions.....279
- › Rotate... ..281
- › Matrix filter... ..282
- › Equidensities... ..284
- › Calibrate... ..288
- › Calibrate Scanned Image... ..290
- › Image Info window ..291

Brightness/Contrast...

Structure The following figure shows the **Brightness/Contrast** dialog window with its main components:



Function The following table contains information on the main components of the **Brightness/Contrast** dialog window.

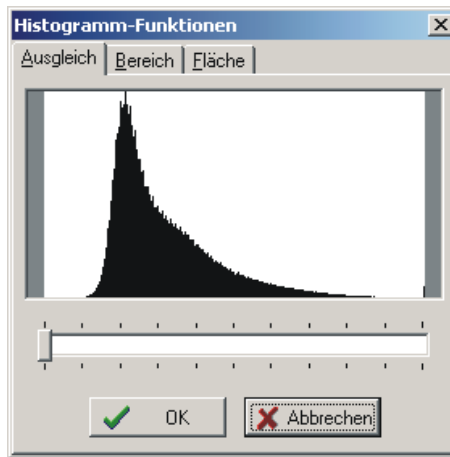
No.	Main component	Function
1	"Brightness" slider	Modifies the brightness of the selected image within a range of -100% to +100%.
2	"Contrast" slider	Modifies the contrast of the selected image within a range of -100% to +100%.
3	Color mode buttons	Selects a color mode (gray scales, red, green or blue) to which the values of brightness and/or contrast may be adapted.
	OK	Closes the dialog window. All settings are applied.
	Cancel	Closes the dialog window. All settings are rejected.
	Reset	Resets the sliders to the value "0" (zero).

Histogram functions...

Description A histogram shows the frequency distribution of the gray values in an image.

This function opens the **Histogram Functions** dialog window with three tabs containing several functions to modify the histogram of a selected image.

Equalization tab The following figure shows the **Histogram Functions** dialog window with the Equalization tab:



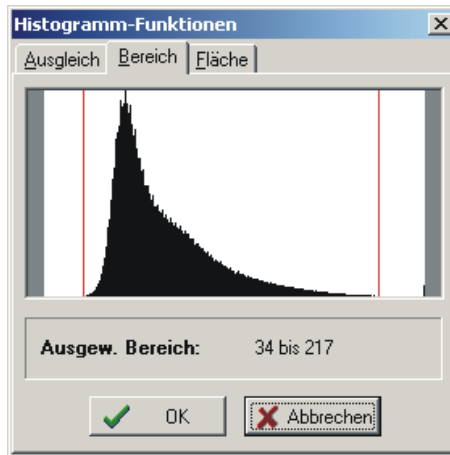
A histogram equalization often leads to an improvement of the image. During equalization, narrow gray scale ranges due to suboptimal image acquisition conditions are widened.

With the slider, the intensity of the histogram equalization may be adjusted within a range from 0% to 100%. After recalculation, these modifications will instantly be visible in the histogram as well as the image. As these recalculations might take some time with larger images, the status will be displayed in the title bar of the dialog window.

Continuation next page ...

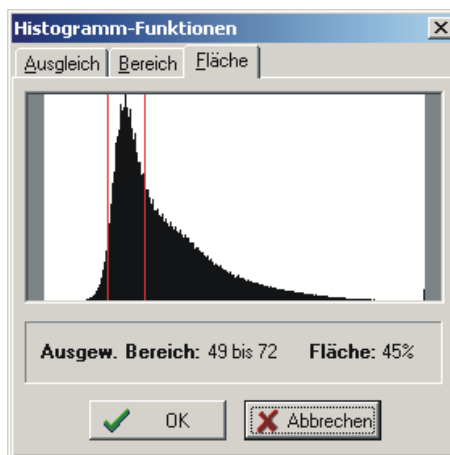
... continuation: Histogram functions...

Range tab The following figure shows the **Histogram Functions** dialog window with the Range tab:



Using the mouse, the two red bars from the right and/or left edge may be dragged over the histogram to define a certain range of gray values in the active picture. Only those pixels of the current image will be shown whose gray value lays within the two markers.

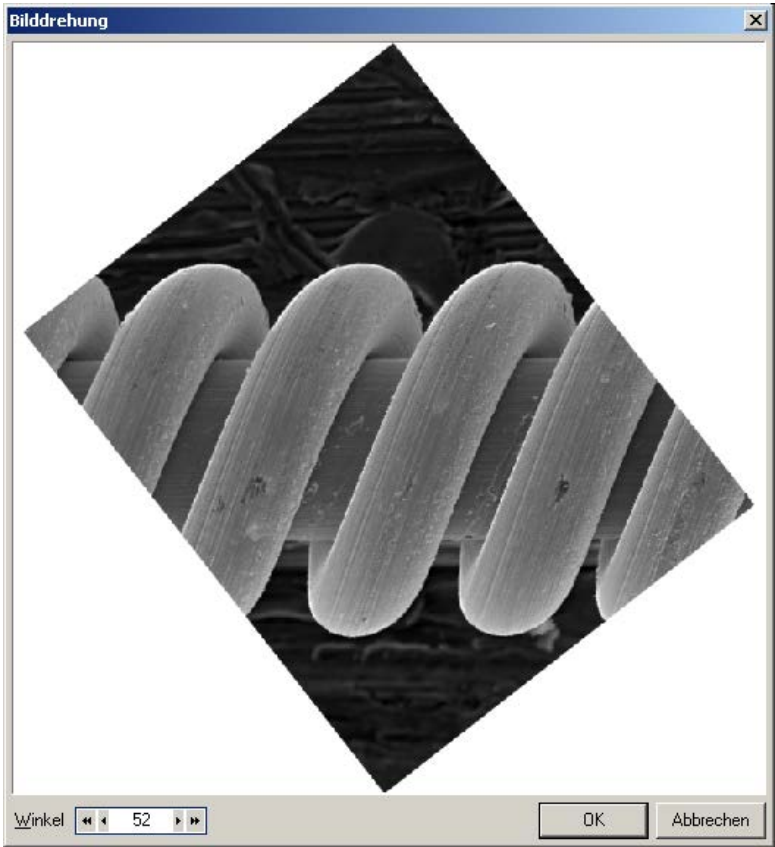
Area tab The following figure shows the **Histogram Functions** dialog window with the Area tab:



Using the mouse, the two red bars from the right and/or left edge may be dragged over the histogram to determine percentages of areas with a certain gray value. In the current image window, these areas are shown in red, and the gray value range and percentage will be displayed.

Rotate...

Structure The following figure shows the **Image Rotation** dialog window with its components:



Function The following table contains information on the components of the **Image Rotation** dialog window:

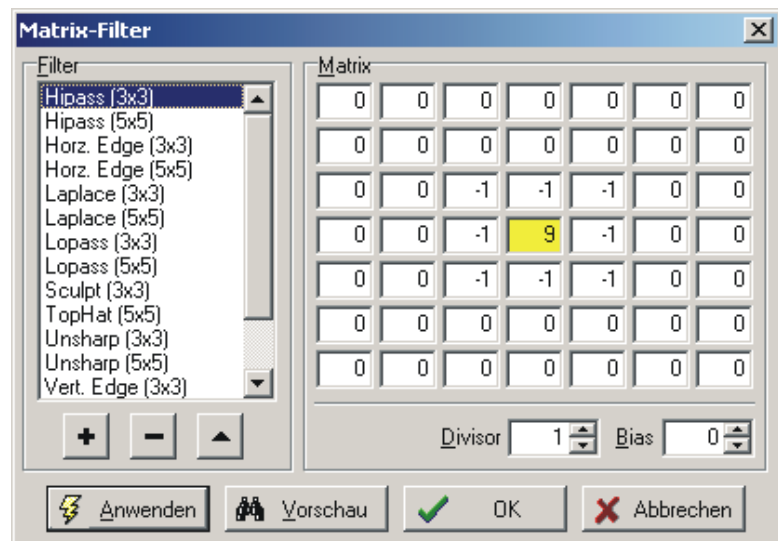
Component	Function
Angle	For entering an angle around which the image is rotated.
– Arrow buttons	Raise or lower the value of the angle in single steps.
– Double arrow buttons	Raise or lower the value of the angle in increments of ten.
OK	Closes the dialog window. The image is rotated with by entered value.
Cancel	Closes the dialog window. The entered angle value is rejected. The image is not rotated.

Matrix filter...

Description Matrix filters modify a pixel's intensity depending on the intensity of the original and the surrounding pixels. An appropriate filter matrix leads to certain filter functions, such as smoothing or sharpening of images or emphasizing edges.

With the **Matrix Filter** dialog window, existing filters may be selected or modified, and new filters may be created.

Structure The following figure shows the **Matrix Filter** dialog window with its components:



Function The following table contains information on the components of the **Matrix filter** dialog window:

Component	Function
Filter	Displays a list of all available filters.
– Plus	Adds a new filter for user-specific settings.
– Minus	Deletes the selected filter from the list.
– Arrow	For renaming the selected filter.
Matrix	Displays the coefficients of the selected filter. The coefficients may be modified within a range from -128 to +127.
– Divisor	- Standardizes the calculated intensities after the application of a matrix filter. - Corresponds to the sum of the matrix coefficients.
– Bias	Shifts the calculated intensities by the entered value.

Continuation next page ...

... continuation: Matrix filter...

Component	Function
Apply	Closes the dialog window. The selected filter is applied to the image. Modifications of the filter are saved.
Preview	Shows a preview of the filter effect on the selected image. The filter is not applied to the image.
OK	Closes the dialog window. Modified and/or newly created filters are saved but not applied to the image.
Cancel	Closes the dialog window. Modified and/or newly created filters are not saved. Modifications are not applied to the image.

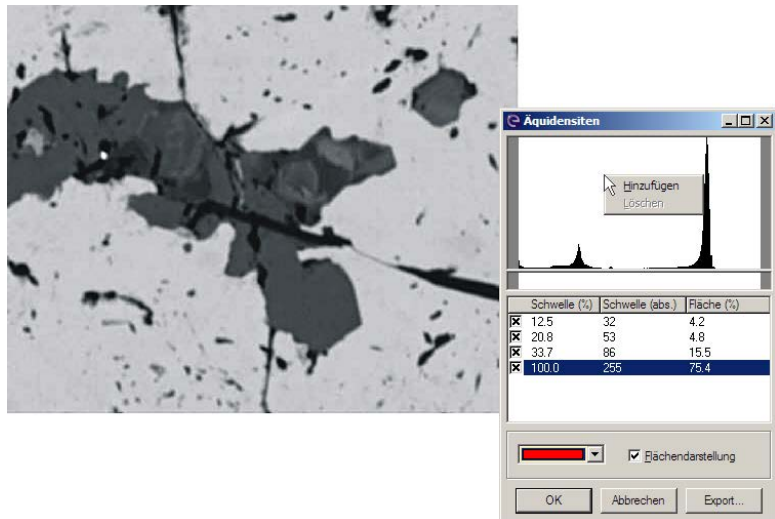
Equidensities...

Description Equidensities are lines or areas which connect pixels with equal optical or color densities. In the **Equidensities** dialog window, threshold values for the optical density may be defined. In the selected image, these densities will be displayed as equidensities in two different ways.

Equidensities may be helpful to highlight image areas that show very little difference in B/W images or to quickly determine percentages of areas with equal optical density, e. g. phases.

The Equidensities function basically is an extension of the Area tab from the **Histogram Functions** dialog window. There, one gray value range may be selected and its percentage calculated. With the Equidensities function, several gray value ranges may be defined and allocated to different colors. The percentages of the individual areas will also be determined.

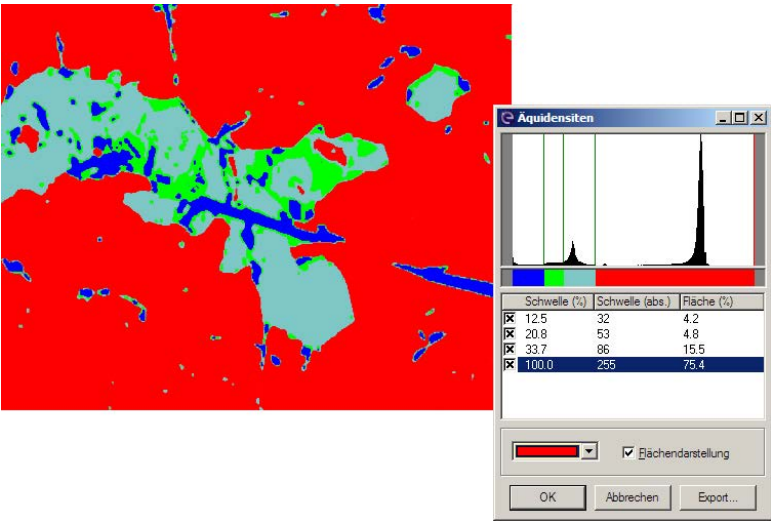
Original image and Equidensities dialog window



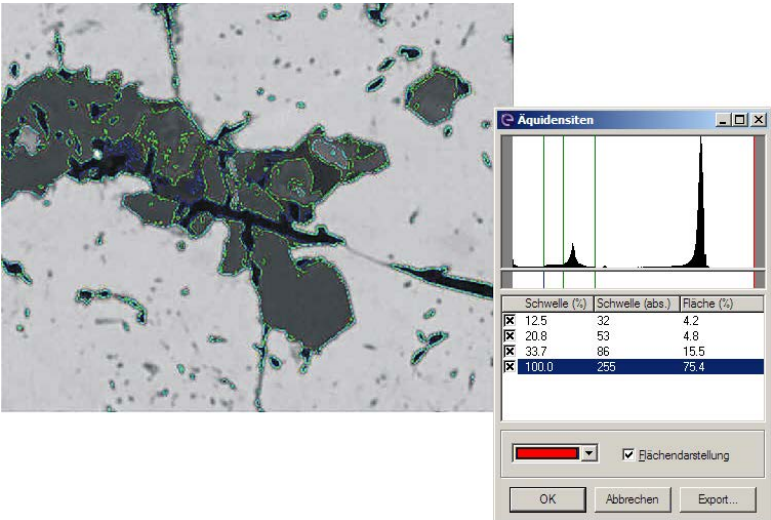
Continuation next page ...

... continuation: Equidensities...

Equidensities as area representation



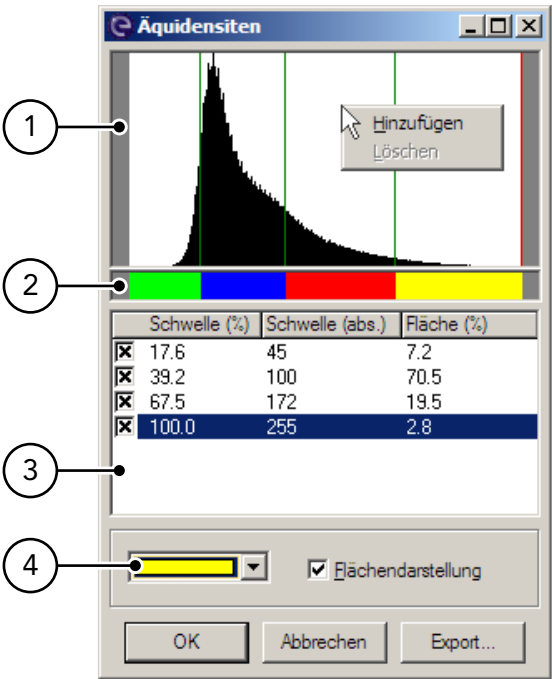
Equidensities as dotted graphics



Continuation next page ...

... continuation: Equidensities...

Structure The following figure shows the **Equidensities** dialog window with its components:



Function The following table contains information on the components of the **Equidensities** dialog window:

No.	Component	Function
1	Histogram	Displays the distribution of gray scales in the selected image: – left: 0 = black – right: 255 = white A right-click on the histogram opens a context menu with two functions: – Add: Adds a new threshold to the histogram. A vertical bar is displayed, which may be shifted with the mouse to set the threshold. – Delete: Deletes the threshold selected in the list and shows all activated thresholds as vertical bars. All bars may be moved with the mouse to readjust the thresholds.
2	Area	Displays an area of a threshold in the color selected for the threshold.

Continuation next page ...

... continuation: Equidensities...

No.	Component	Function
3	Threshold list	Displays all defined thresholds in a list: – Checkbox: Activates or deactivates the threshold. – Threshold (%): Displays the percentage position of the threshold in the total gray scale area (between 0% and 100%). – Threshold (abs.): Displays the absolute position of the threshold in the total gray scale area (between 0 and 255). – Area (%): Displays the area within a threshold as a percentage of the total area (between 0% and 100%). A right-click on the threshold list opens a context menu with two functions: – Add: Opens the New Threshold dialog window with two input fields to define the percentage or the absolute position of a new threshold. – Delete: Deletes the selected threshold.
4	Threshold color	Assigns a color to the selected threshold.
	Area display	Dyes the area of the threshold with the selected color in the active image.
	OK	Closes the dialog window. The selected image is dyed with all defined and activated thresholds.  Dyed images cannot be reconverted to gray scale images.
	Cancel	Closes the dialog window. All thresholds defined for the selected image are rejected.
	Export...	Opens the Export Table dialog window to export the threshold list as an XLS file.

Calibrate...

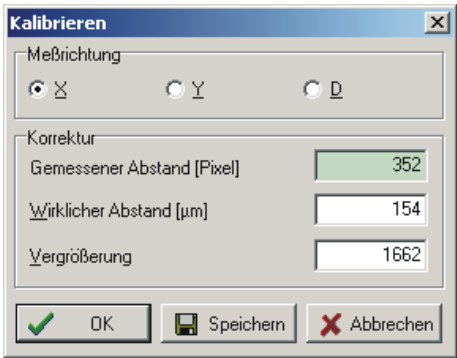
Description The Calibrate function is only available in measuring mode.

With this function, DIPS may be calibrated. For the calibration, an image with structures (test grid) is acquired with a high resolution and known dimensions. After entering the magnification, the image is transferred to the DIPS user interface.

In measuring mode, the corresponding vertical or horizontal measurement cursors are placed on these structures.

The function opens the **Calibrate** dialog window.

Structure The following figure shows the **Calibrate** dialog window with its components:



Function The following table contains information on the components of the **Calibrate** dialog window:

Component	Function
Measurement Direction	Contains checkboxes X, Y for the selection of the measurement direction to be calibrated and checkbox D for the selection of the distance.
Correction	Contains three input fields to calibrate the selected measurement direction.
– Measured distance [pixel]	For entering the measured distance in pixels.
– Real distance [µm]	For entering the true distance in micrometer.
– Magnification	For entering the magnification.
OK	Closes the dialog window. All settings are applied to the active image, but are not saved for further image acquisitions.
Save	Closes the dialog window. All settings are saved. i This button should only be clicked after the calibration of DIPS.

Continuation next page ...

... continuation: Calibrate...

Component	Function
Cancel	Closes the dialog window. All settings are rejected.

In the dialog window, the true distance is entered in X or Y direction. By clicking the **Save** button, the system is calibrated and the dialog window is closed.

The determined correlations between pixel and micrometer are saved under Registry/DISS5.ini.

If images contain a structure with known dimensions, non-calibrated images may also be calibrated in retrospect. For this, the measurement cursor must be positioned at the known structure, and the known value for the distance in X or Y direction must be entered. Then click the **OK** button.

NOTICE

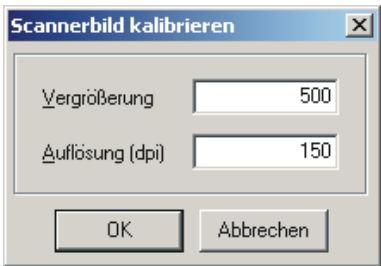
If the system was calibrated after installation, the **Save** button must not be clicked when calibrating an image in retrospect. Clicking this button would override the calibration.

Calibrate Scanned Image...

Description The Calibrate Scanned Image... function is used to calibrate images not acquired from the DISS 6 Software TWAIN source but from another source (e. g. frame grabber or scanner). An image is calibrated with known structures and with the specification of the used magnification.

This function opens the **Calibrate Scanned Image** dialog window.

Structure The following figure shows the **Calibrate Scanned Image** dialog window with its components:



Function The following table contains information on the components of the **Calibrate Scanned Image** dialog window:

Component	Function
Magnification	For entering the current magnification.
Resolution (dpi)	For entering the resolution in dpi.
OK	Closes the dialog window. The connected acquisition source is calibrated with the entered values.
Cancel	Closes the dialog window. The settings are rejected. The connected acquisition source is not calibrated.

Image Info window

Description The Image Info window displays information saved with the current image. In the window, the information is grouped as device, image and scan parameters.

Additional information like an image comment or device name may also be entered.

NOTICE

Additional image information is saved only if the image is saved in TIF format.

This function opens the **Image info** dialog window with two tabs.

Structure The following figure shows the **Image Info** dialog window:

The screenshot shows a dialog window titled 'Bild-Informationen' with two tabs: 'Seite 1' and 'Seite 2'. The 'Seite 1' tab is active and displays three sections of parameters:

Geräteparameter	
Vergrößerung	1662
Hochspannung [kV]	10
Arbeitsabstand [mm]	22

Bildparameter	
Kommentar	
Aufnahmezeit	27.04.2002 16:15:15
Bildnummer	145
Kalibrierung [µm/Pixel]	0,375137
Bildbreite	400
Bildhöhe	320

Scan-Parameter	
Modus	Slow
Eingang	A1/Integrator
Integrationszeit [µs/Pixel]	50
H/K-Automatik	☐
Scanbreite [µm]	150,1
Scanhöhe [µm]	120,0

16.4 Functions in the Tools menu

Overview

Purpose This section contains descriptions of the functions in the Tools menu.

Contents This sections contains the following information:

- › Zoom293
- › Crop.294
- › Measurement cursor295
- › Angle measurement297
- › Line profile.298
- › Structure Measurement (optional)299
- › Image Caption.301
- › Caption304
- › Callout tools306
- › Point Scan Data.....308
- › Measurement Values window310
- › Mix Images window.311

Zoom

Description The Zoom function activates zoom mode.

In this mode, the mouse cursor is displayed as a magnifier over the active image.

A click on the left mouse button magnifies the image, a click on the right mouse button reduces the image magnification. The clicked point is moved to the center of the image.

The current magnifying factor is displayed in the title bar of the image window.

Pressing the [Ctrl] key in zoom mode changes the mouse cursor from magnifier to a hand symbol. This is used to move the section for the image view.

The Zoom function is also available in full screen mode.

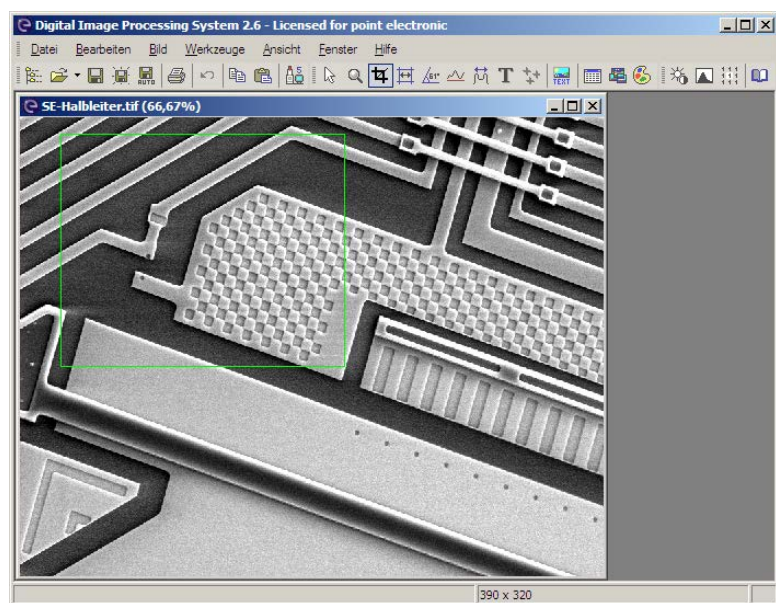
Crop

Description The Crop function allows to crop rectangular sections from an image. The cropped sections may be combined to create a new image.

Position the mouse pointer in the active window, keep the left mouse button pressed and draw the preferred rectangle. Width and height of the drawn rectangular section are displayed in the status bar.

By pressing the return key, a new image with the data of the selected section will be created.

The following figure shows the Crop function:



Measurement cursor

Description The Measurement cursor function activates the measurement function.

This function allows to determine distances in X, Y and diagonal direction with the help of the double cross measurement cursor.

Measurement data for all directions are displayed in the status bar.

For all non-calibrated images, the unit for measuring distances is pixel.

If they contain known structures or a measuring bar, these images might be calibrated in retrospect via the **Image > Calibrate** menu.

All images acquired and transferred into DIPS are automatically calibrated provided the SEM magnification has been entered or automatically read-out after image acquisition.

The double cross measurement cursor may be positioned with the mouse. Lines or corners of the measurement cursor may be moved with pressed left mouse button. By pressing the left mouse button while pressing the [Ctrl] key, the closest corner will be caught. Pressing the space bar catches the whole measurement cursor in the active image section.

In high resolution images, the measurement cursor may easily be positioned when zooming the image. With the [+] and [-] keys of the numeric keypad, the zoom may be changed in the measuring mode.

While directly switching from measuring to zoom mode, the deactivated measurement cursor will remain visible. Thus, the relevant image section may be zoomed before switching back to measuring mode for positioning the measurement cursor more precisely.

The highlighted measuring length of the measurement cursor including the dimensioning may be added to the image. Pressing the return key opens the **Caption** dialog window (Page 304) for entering the predefined caption.

When pressing the tab key, another measuring length of the measurement cursor will be selected for a caption.

With the mouse, the dimension caption may be moved to any position in the image.

Continuation next page ...

... continuation: Measurement cursor

To modify the font size, use [Ctrl] + [+] or [-] on the numeric keypad.

A confirmed caption is fixedly integrated into the image and saved as image information. Before confirming captions, the original image should be backed-up. Via Edit > Undo or by clicking the Undo button in the toolbar, the most recent caption may be rejected.

Angle measurement

Description Use the mouse to select the two end points of the angle arms. Then determine the vertex.

By clicking the mouse on the preferred location, the position of the displayed angle may be modified. The nearest point will be caught.

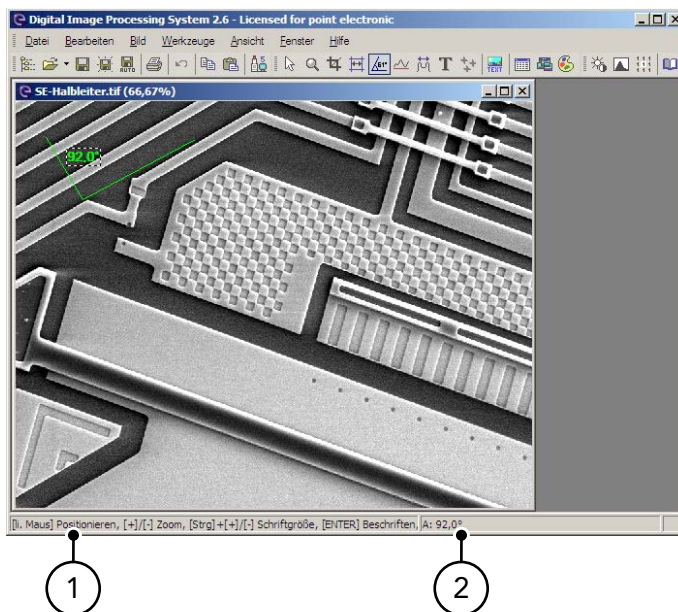
Use the mouse to move the angle caption to another position. To modify the font size, use [Ctrl] + [+] or [-] on the numeric keypad.

By pressing the return key, the shown angle is integrated into the image. The **Caption** dialog window (Page 304) opens where you may confirm or change the preset angle caption.

During angle measurement, the status bar shows the following information:

- 1: Description of the keys for angle measurement settings including function
- 2: Size of the currently measured angle

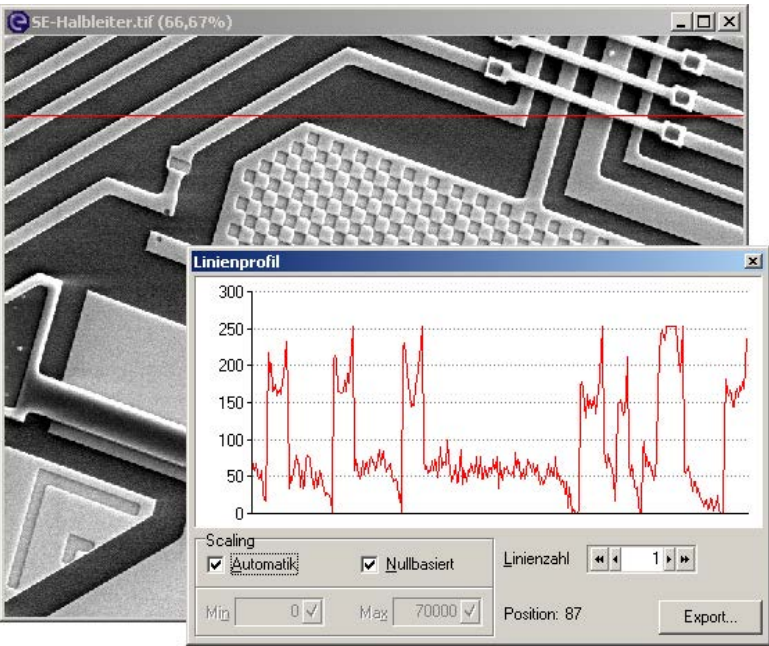
The following figure shows the angle measurement:



Line profile

Description The line profile displays the structure of a surface along a horizontal measurement line over the entire image.

Structure The following figure shows the **Line Profile** dialog window with its components:



Function The following table contains information on the components of the **Line Profile** dialog window:

Component	Function
Scaling	
– Automatic	Scales the diagram depending on the minimal and maximal values.
– Zero Based	Scales the diagram starting from the zero base.
– Min, max	For manual scaling of the diagram with disabled automatic.
Line Count	Expands the measuring area in vertical direction by the measurement line. The measuring area is displayed with a green line.
Position	Displays the vertical position of the measuring line in the active image.
Export...	Exports the measurement data as CSV format.

Structure Measurement (optional)

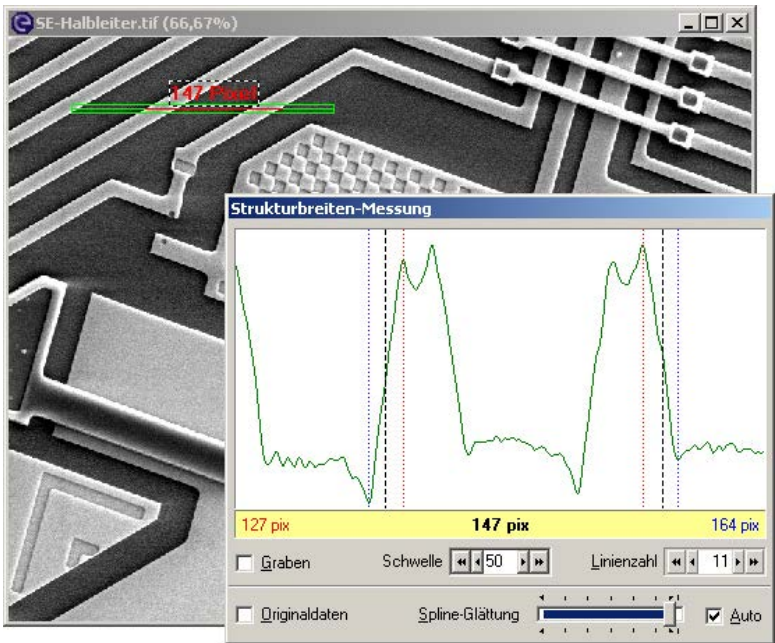
Description The structure measurement allows measurements in a sub-pixel range. Measurements may be averaged over one or several lines.

After the activation of structure measurement, a measuring line may be put into the image. To do this, starting point and final point have to be marked with the mouse.

The structure below this measuring line as well as the thresholds of the measurement are found automatically and are displayed in the **Structure measurement** dialog window.

The length of the measuring line may be modified by moving the left and right edge with the mouse. The position of the measuring line may be changed by moving the line with the mouse. The position of the caption may be changed in the same kind.

Structure The following figure shows the **Structure Measurement** dialog window with its components:



Function The following table contains information on the components of the **Structure Measurement** dialog window:

Component	Function
Diagram	Displays the measurement area in graphical and numerical style.
Red value and red bar	Display the minimal value.

Continuation next page ...

... continuation: Structure Measurement (optional)

Component	Function
Black value and black bar	Display the threshold value.
Blue value and blue bar	Display the maximal value.
Drain	Measures the structure as a drain.
Level	Sets the threshold value in single steps or steps of ten.
Line Count	Sets the number of measuring lines in the measuring area. This expands the measuring area in vertical direction.
Original Data	Additionally displays the unsmoothed original data.
Spline Smoothing	Changes the value of the smoothing.
Auto	Sets the value of the smoothing automatically.
Vertical	Measures distances in vertical direction.
Indirect Measurement	Measures distances which do not lie on a line.

Saving measuring data in the image After the determination of the measuring data, a captioned measuring line may be integrated into the active image.

Pressing the return key opens the **Caption** dialog window.
(Page 304)

Image Caption

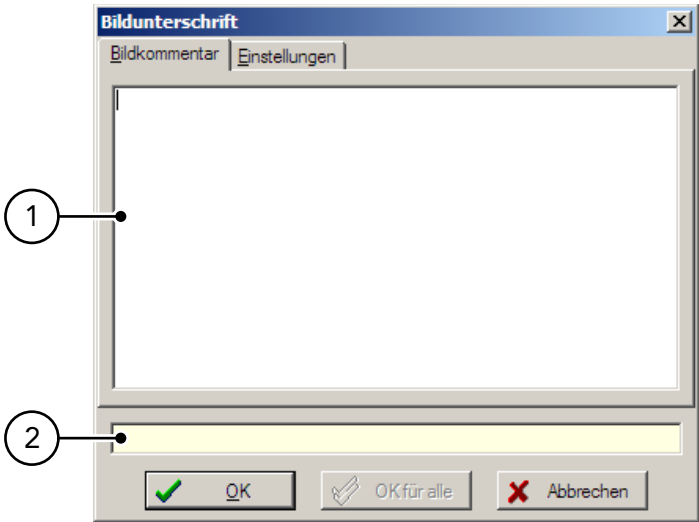
Description The Image Caption function allows to create and save an image comment for the active image. The first line of the entered comment is displayed as image caption. Any additional text in the following lines is saved with the image if the image is saved in TIF format.

NOTICE

Integrated text overwrites the pixels of the image at the position where it is applied.

The function opens the **Image Caption** dialog window with the Image comment and Settings tabs.

Image comment tab The following figure shows the **Image Caption** dialog window with the Image comment tab:



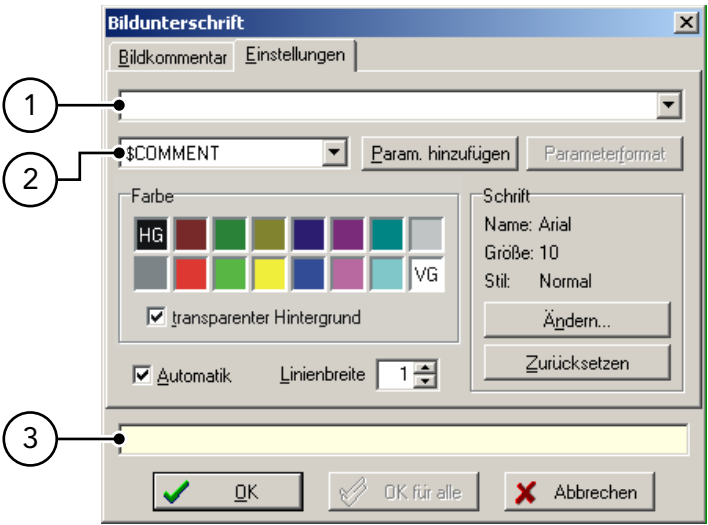
The following table contains information on the components of the Image comment tab:

No.	Component	Function
1	Text field	For entering, editing and displaying the whole text saved with the active image. i Only the first text line is displayed in the image. Any additional text in the following lines is saved with the image if the image is saved in TIF format.
2	Preview	Displays a preview of the comment text in the active image.

Continuation next page ...

... continuation: Image Caption

Settings tab The following figure shows the **Image Caption** dialog window with the **Settings** tab:



The following table contains information on the components of the **Settings** tab:

No.	Component	Function
1	Text line	Displays the selected parameter in the order of their selection and the freely definable image comment.
2	Parameter list	Contains all parameters which are available for the image caption.
	Add Parameters	Adds the selected parameter to the text line.
	Parameter Format	Opens a dialog window for editing the display format of the selected parameter.
	Color	Contains two lines with different color fields to select the foreground color and the background color of the text field. A left-click in a color field selects the foreground color. The letters FG are added to the selected color. A right-click in a color field selects the background color. The letters BG are added to the selected color.
	– Transparent Background	Displays the text field without background.
	Automatic	Adapts the font size to the resolution of the active image.
	Line Width	For setting the width of the measuring bar in pixels.
	Font	Contains information on the used font and functions to modify and/or reset the font.
	– Change...	Opens a dialog window for setting up some font properties.
	– Reset	Resets the font properties to the default.
3	Preview	Displays a preview of the comment text in the active image.

Continuation next page ...

... continuation: Image Caption

No.	Component	Function
	OK	Closes the dialog window. The image caption is displayed with the preset settings in the selected image. i In a layout with several images, the image caption is only displayed in the selected single image.
	OK for all	Closes the dialog window. The image caption is displayed with the preset settings in all images of a selected layout. This process may only be undone for the most recent image of a layout. i This function is only available if a layout window with several images is selected on the DIPS interface.
	Cancel	Closes the dialog window. The settings are rejected.

Caption

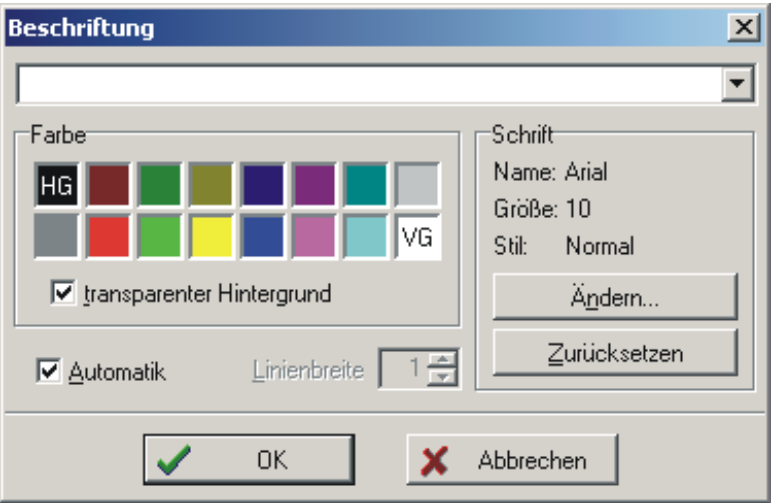
Description The Caption function allows to add text to any position in the active image. A left-click into the active image sets the position of the text.

NOTICE

Integrated text overwrites the pixels of the image at the position where it is applied.

The function opens the **Caption** dialog window.

Structure The following figure shows the **Caption** dialog window with its components:



Function The following table contains information on the components of the **Caption** dialog window:

Component	Function
Text line	For entering a caption text.
Color	Contains two lines with different color fields to select the foreground color and the background color of the text field. A left-click in a color field selects the foreground color. The letters FG are added to the selected color. A right-click in a color field selects the background color. The letters BG are added to the selected color.
Transparent Background	Displays the text field without background.
Automatic	Adapts the font size to the resolution of the active image.
Line Width	For setting the width of the measuring bar in pixels.

Continuation next page ...

... continuation: Caption

Component	Function
Font	Contains information on the used font and functions to modify and/or reset the font.
– Change...	Opens a dialog window for setting up font properties.
– Reset	Resets the font properties to the default.
OK	Closes the dialog window. The comment is displayed with the preset settings in the active image. Use the mouse to move the text to another position. The Caption function only ends when another mode is activated.
Cancel	Closes the dialog window. The settings are rejected.

Callout tools

Description DIPS contains three callout tools to add graphic elements permanently to the active image.

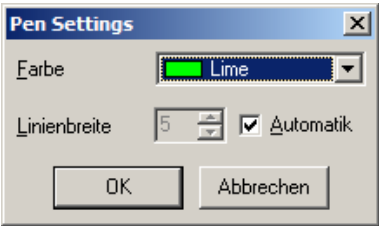
The following table contains information on the available callout tools:

Icon	Tool	Function
	Arrow [Ctrl] + [A]	Adds an arrow to any position in the active image. A click into the image with the left mouse button sets the target point of the arrow. With pressed mouse button, length and angle of the arrow may be set. Length, position and angle of an inserted arrow may be modified by clicking the red intersections with the mouse. Pressing the return key opens the Pen Settings dialog window for setting line width and color of the arrow.
	Rectangle [Ctrl] + [R]	Adds a rectangle to any position in the active image. A click into the image with the left mouse button sets the upper left corner of the rectangle. With pressed mouse button, width and height of the rectangle may be set. Width and height of an inserted rectangle may be changed by clicking the red intersections with the mouse. By clicking the mouse button within the rectangle and pulling it while pressing the mouse button, the position of the rectangle may be shifted. Pressing the return key opens the Pen Settings dialog window for setting line width and color of the rectangle.
	Ellipse [Ctrl] + [E]	Adds an ellipse to any position in the active image. A click into the image with the left mouse button sets the upper left corner of the ellipse. With pressed mouse button, width and height of the ellipse may be set. Width and height of an inserted ellipse may be changed by clicking the red intersections with the mouse. By clicking the mouse button within the ellipse and pulling it while pressing the mouse button, the position of the ellipse may be shifted. Pressing the return key opens the Pen Settings dialog window for setting line width and color of the ellipse.

Continuation next page ...

... continuation: Callout tools

Dialog window The following figure shows the **Pen Settings** dialog window
Pen Settings with its components:



The following table contains information on the components of the **Pen Settings** dialog window:

Component	Function
Color	Sets the line color of the drawn element.
Line width	Sets the line width of the drawn element.
Automatic	Automatically adapts the line width to the resolution of the active image.
OK	Closes the dialog window. The settings are applied to the drawn element. i After pressing the OK button, the drawn element is fixed into the image. Afterwards, the drawn element can neither be shifted nor can its settings be modified.
Cancel	Closes the dialog window. The settings are rejected.

Point Scan Data

Description The Point Scan Data function activates the display mode for point scan data.

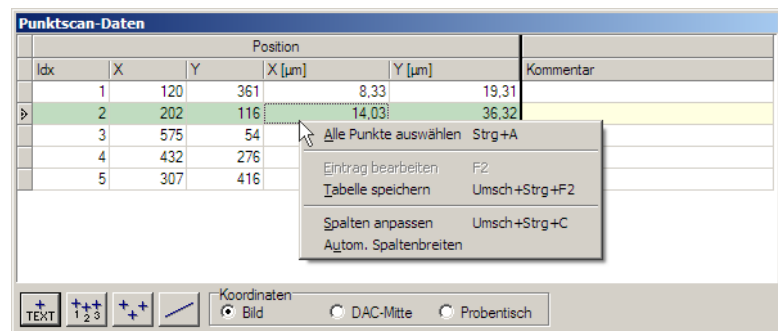
This mode is only available with the DDEPlus option and if the selected image contains point scan data.

A right-click on the point scan data table opens a context menu with edit options for the following functions:

- Captioning scan points in the active image
- Selection of columns to be displayed
- Saving the table in ASCII, HTML or XLS format

The function opens the **Point Scan Data** dialog window.

Structure The following figure shows the **Point Scan Data** dialog window with its components:



Function The following table contains information on the components of the **Point Scan Data** dialog window:

Component	Function
 Caption selected point	– Marks and captions the point of the image which is selected in the table. – Opens the Caption dialog window to set up the caption settings.
 Caption all selected points	– Marks and captions all selected points of the image with a consecutive number. The numbers are assigned according to the index of the points. Thus, number 2 from the table will be captioned with the digit 2. If only one point in the table is selected, only that point will be captioned in the image. All other points will simply be marked. – Opens the Caption dialog window to set up line width and the color of the marker.
 Mark all points	– Shows all points in the image. The point selected in the table will be highlighted. – Opens the Caption dialog window to set up line width and the color of the marker.

Continuation next page ...

... continuation: Point Scan Data

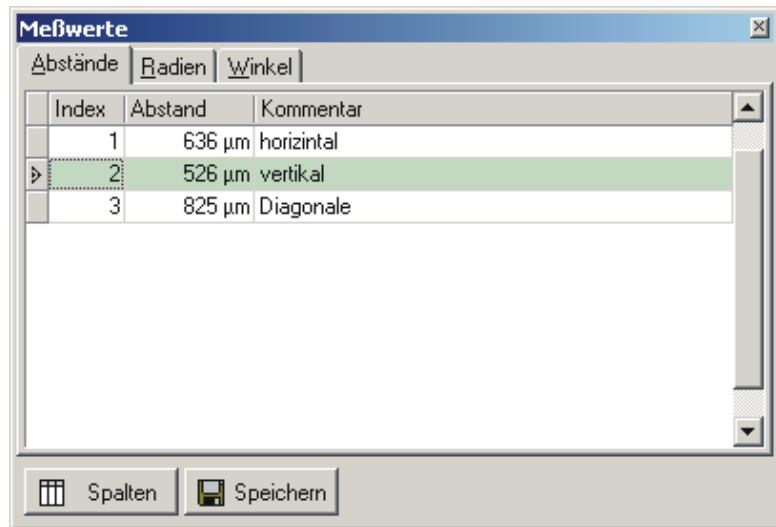
Component	Function
 Line marker	– Connects the first and last point with a line. – Opens the Caption dialog window to set up line width and the color of the line.  This function is useful to display concentration profiles.
Coordinates	
– Image	Displays the coordinates of the points in the table originating in the lower left corner of the image.
– DAC center	Displays the coordinates of the points in the table originating from the center of the image.
– Stage	Displays the coordinates of the points in the table as stage coordinates if the system is connected to a motorized microscope stage.
Context menu	
– Select all points [Ctrl] + [A]	Selects all points listed in the table.
– Edit item [F2]	For editing a point which is selected in the table.
– Save table [Shift] + [Ctrl] + [F2]	Opens a dialog window for saving the table as XLS, CSV or HTML format.
– Customize columns [Shift] + [Ctrl] + [C]	Opens the Customize dialog window with two tabs to customize the columns.
– Auto column widths	Sets the widths of all columns automatically to fit the table within the window.

Measurement Values window

Description In the Measurement Values window, the measured distances, radii and angles of the selected image are displayed as tables. The data may be saved either as XLS, HTML or TXT.

The function opens the **Measurement Values** dialog window.

Structure The following figure shows the **Measurement Values** dialog window with its components:



Function The following table contains information on the components of the **Measurement Values** dialog window:

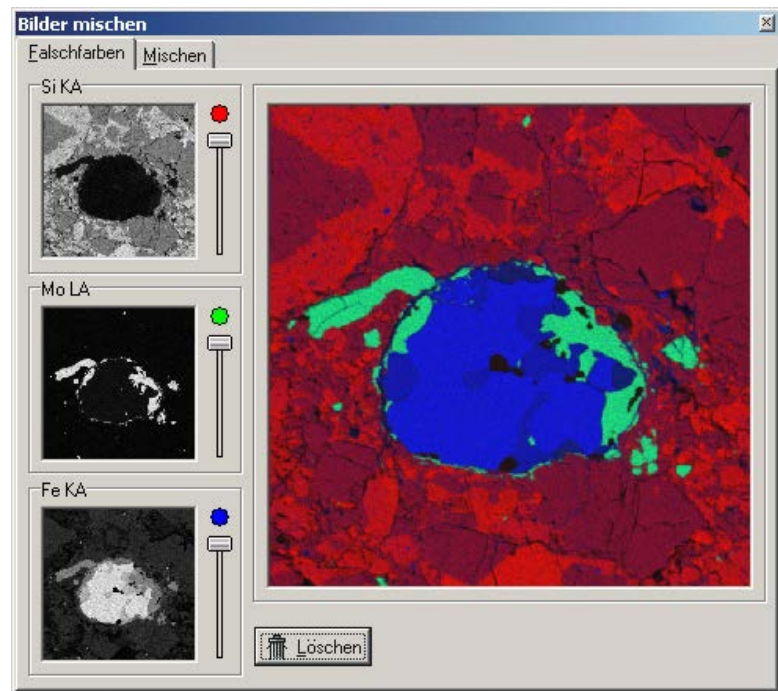
Component	Function
Distances tab	Displays information on all measured distances in the selected image.
Radii tab	Displays information on all measured radii in the selected image.
Angles tab	Displays information on all measured angles in the selected image.
Columns	Opens the Customize dialog window to customize the table columns.
Save	Closes the dialog window. All displayed measurement data are saved as tables in XLS, HTML or TXT format.

Mix Images window

Description The Mix Images function allows to overlay images, to combine images into false color images or to color images.

The function opens the **Mix images** dialog window with the False Colors and Merge tabs.

False Colors tab The following figure shows the **Mix Images** dialog window with the False Colors tab:



In the False Colors tab, elemental mapping images may be overlaid or combined into false color images.

The images to be mixed are assigned by Drag & Drop to the three color channel fields in the Mix window.

NOTICE

All three fields must be filled with images in the following order: 1. the upper field 2. the center field 3. the lower field.

The images to be mixed must have the same dimensions and pixel resolution.

Continuation next page ...

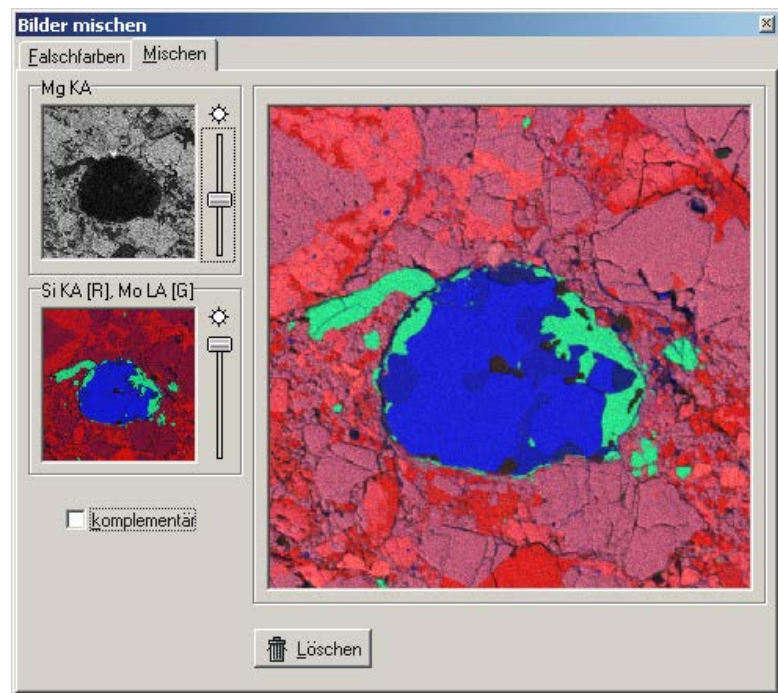
... continuation: Mix Images window

Only gray scale images may be mixed and/or colored.

The colors may be set with the sliders.

Via Drag & Drop, a mixed image may be transferred from the dialog window into the DIPS work area or into an open layout.

Merge tab The following figure shows the **Mix Images** dialog window with the Merge tab:



The Merge tab contains two fields. Images may be assigned to the fields via Drag & Drop. The tab also contains an empty mix window to display the mixing result.

NOTICE

Both fields must be filled with images in the following order: 1. the upper field, 2. the lower field.

The images to be mixed must have the same dimensions and pixel resolution.

Gray scale images as well as color images may be mixed.

With the sliders, the weighting for each image for entering the mix field may be adjusted.

If the "complementary" checkbox is activated, the sliders move in mutual dependence.

Continuation next page ...

... continuation: Mix Images window

Via Drag & Drop, a mixed image may be transferred from the dialog window into the DIPS work area or into an open layout.