Software Manual

ZEISS Labscope 4.6 for Windows

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Original Manual

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Content

1 General Information

1.1 Welcome

Labscope is your easy-to-use imaging app for connected microscopes. Be it in the laboratory, university, school or even for your hobby – with Labscope you snap images, record videos and measure your microscopic samples, easier than ever. Transform your ZEISS network-compatible microscopes into Wi-Fi-enabled imaging systems. You can easily create digital classrooms or digital labs. Connect to microscopes at any point in time, from anywhere within your room. And then, share your images with the touch of your fingers.

> **Info**
>
> This manual is applicable only to Labscope for Windows. Note there are certain function and application differences between iOS, Android and Windows version of Labscope. You will find a detailed overview of the different functions in the product info under https://www.zeiss.com/labscope.

Digital Classroom With the imaging app Labscope you can transform your student lab into a digital classroom via a WiFi-enabled network. Simply integrate your microscopes into the network - and you're ready to display all the live images at any time and from anywhere in the room in real-time. Project images onto the wall or a TV screen and foster teamwork among the students. With Labscope 'lecture & listen' becomes 'show & see'.

Routine Applications Labscope transforms your ZEISS network-compatible microscopes into a WiFi-enabled imaging system. You can easily create digital labs – just connect to any of the microscopes at any point in time and from anywhere in your room. Be it in your histology, cytology, hematology or pathology lab - Labscope snaps images and records videos of your microscopic samples. You even acquire multi-channel fluorescence images easier than ever.

1.2 Explanation of Warning Messages and Additional Information

CAUTION, and NOTICE are standard signal words used to determine the levels of hazards and risks of personal injury and property damage. Read all safety messages in the respective chapters carefully. Failure to comply with these instructions and warnings can result in both possible personal injury and property damage and involve the loss of any claims for damages.

The following warning messages indicating dangerous situations and hazards are used in this document.

> **⚠ CAUTION**
>
> **Type and source of danger**
>
> CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

> ***NOTICE***
>
> **Type and source of danger**
>
> NOTICE indicates a potentially harmful situation which, if not avoided, may result in property damage. In addition, NOTICE warns of data loss or corrupt data as well.

> **Info**
>
> Provides additional information or explanations to help the user better understand the contents of this document.

1.3 Further Applicable Documents

Instruction Manuals

For detailed information on how to use the hardware (e.g. microscope or microscope system), refer to its Instruction Manual or ask your ZEISS Sales & Service Partner.

Brochures and Certificates

For brochures, certificates (e.g. ISO, CSA, SEMI), and declarations of conformity (e.g. EU, UK) ask your ZEISS Sales & Service Partner.

Local and National Health and Safety Regulations

Observe local and national health and safety regulations for the location of installation and during the use of the microscope.

Consult with your ZEISS Sales & Service Partner if these regulations are in conflict with the installation requirements of the microscope.

System and Third-Party Components, Accessories

Information about the individual components, enhancements, and accessories can be obtained from your ZEISS Sales & Service Partner. Also refer to the documentation of third-party manufacturers.

1.4 Contact and Addresses

ZEISS Contact

Find your contact at ZEISS Microscopy at www.zeiss.com/microscopy/contact.

ZEISS Academy

For information on microscopy courses, training, and education visit the ZEISS Academy Microscopy at www.zeiss.com/microscopy-training.

Legal Manufacturer

Carl Zeiss Microscopy GmbH
Carl-Zeiss-Promenade 10
07745 Jena
Germany

Authorized Representatives, Importers, etc.

This section informs about responsible entities for certain obligations in the identified country or jurisdiction.

UK Responsible Person

Carl Zeiss Ltd
1030 Cambourne Business Park, Cambourne
CB23 6DW Cambridge
United Kingdom

CH REP

Carl Zeiss AG
Feldbachstrasse 81
8714 Feldbach
Switzerland

2 Safety

This chapter contains general requirements for safe working practices. Any person using the software or commissioned with installation or maintenance must read and observe these general safety instructions. Knowledge of basic safety instructions and requirements is a precondition for safe and fault-free operation. Operational safety of the supplied software is only ensured if it is operated according to its intended purpose.

If any work is associated with residual risks, this is mentioned in the relevant parts of this document in a specific note. When microscope components must be handled with special caution, they are marked with a warning label. These warnings must always be observed.

Any serious incident that has occurred in relation to the software shall be reported to these institutions:

- the competent authority of the Member State in which the user is established
- ZEISS
  - for users within the EU:
    Carl Zeiss Microscopy GmbH, Jena, Germany
  - for users outside the EU:
    Carl Zeiss Suzhou Co., Ltd., Suzhou, China

2.1 Intended Purpose

Intended purpose of Labscope for Windows

Labscope for Windows is a microscope software used to control and acquire images through connected and compatible microscopes. This combined system is used for in-vitro examination of images to obtain information about physiological or pathological processes or conditions. Labscope for Windows is intended to be used by professional users, among others in the field of life science, cytology, pathology. The connected microscopes are themselves CE-IVD products. For IVD examinations, ensure that the displayed image on the monitor shows the equivalent information as visible through the eyepieces of the microscope. Labscope AI modules are not intended for IVD examinations and may only be used in research.

Note: This Manual is applicable only to the Labscope for Windows. There are separate versions of the product for education, routine and research use only: Labscope for Android and Labscope for iOS. These Labscope for Android and iOS are mobile versions and do neither fulfill the definition of IVD device nor accessory to an IVD device, nor the definition according 2014/35/EU. The intended purpose of mobile versions documented here is just for the sake of clarification.

Intended purpose of Labscope for iOS / Android

Labscope for iOS / Android is a microscope software used to control, image acquisition, image processing and image analysis. Typical application fields of the software are general tasks and applications in microscopy or image acquisition, among others for education, routine and research. The software is not intended to directly or indirectly produce medical diagnostic results.

2.2 Applicable Standards & Regulations

This software product and the corresponding documentation has been designed, created and tested in compliance with the following regulations and directives:

- In Vitro Diagnostic Medical Devices Regulation (EU) 2017/ 746 (IVDR)
- Risk analysis for medical devices according to DIN EN ISO 14971
- Quality management system certified to DIN EN ISO 13485
- Documentation and Safety Notes according to DIN EN 82079-1 (VDE 0039-1)
- If necessary the user has to establish, document, implement and maintain a special process to fulfill all the requirements to be conform with the validate rules of law and standards.

2.3 Explanation of Symbols

CH REP	Swiss authorized representative
	Importer
	Manufacturer
UK CA	UKCA marking (UK conformity assessed)
IVD	In vitro diagnostic medical device
CE	CE marking (Conformité Européene)

3 Installing Labscope

For Windows

Procedure

1. Download the latest **Labscope** for Windows via the product website: https://www.zeiss.com/labscope
   → You will be directed to the ZEISS portal for downloading the installation files.
2. Double-click on **Labscope_Setup_x.x.exe** to install the software.
3. Perform the required steps shown by the installation wizard. Agree if you are asked to install additional drivers.
   → Some modules of Labscope require additional installation, e.g. **AI_Modules_Setup_x.x.exe**, which is for **AI Modules like AI Cell Counting, Confluency, etc.**

NOTICE **Labscope AI modules are not intended for IVD examinations and may only be used in research.**

Alternatively, you can install **Labscope** via ZEISS Microscopy Installer. After the installation you see the **Labscope** program icon on your desktop.

4 First Start & Overview

Click on the app icon on your device to start the app.

Establish connection for the Labscope device with your microscope(s) and camera(s).

- WiFi, USB and ethernet connection is supported.

Info

Different microscopes and cameras support various connectivity options. Refer to the respective manuals for instructions on how to connect them.

After connection is established, the microscopes will be automatically shown up in Labscope. When there are no microscopes found in current connection, Labscope will show virtual microscopes. The below image is an example after connecting with several microscopes at the same time.

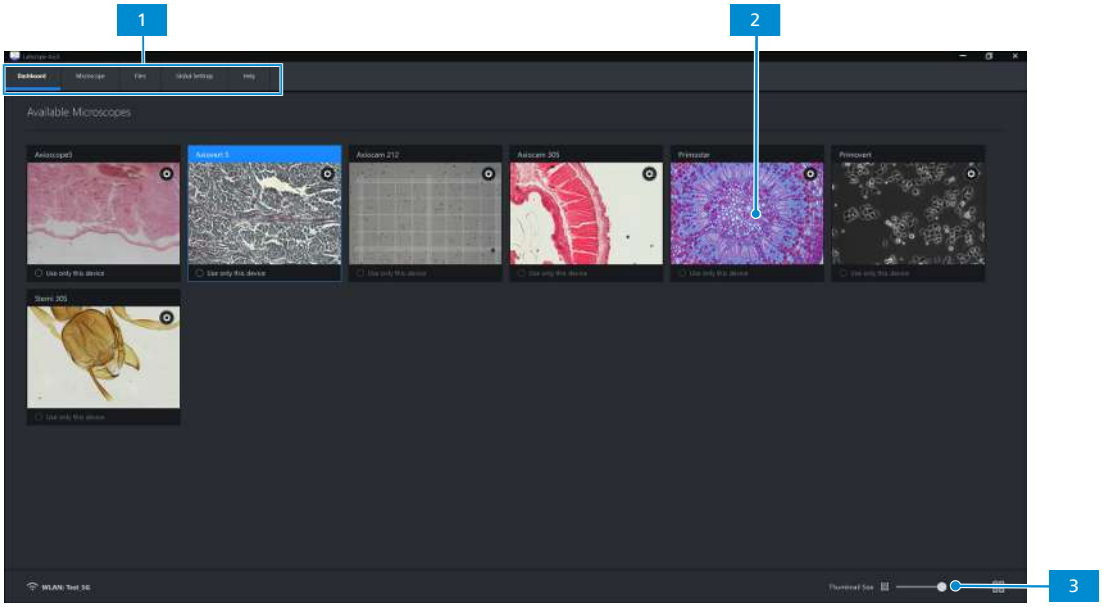


Fig. 1: Dashboard View

1 **Navigation Tab**, see *Navigation Tab [▸ 13]*.

2 **Thumbnail View** of the connected microscopes.

If you click on the individual **Gear** button, the **Microscope Configuration** is opened, see *Microscope Configuration [▸ 11]*.

If you click on **Use only this device**, this is a favorite microscope selection, the other connected devices will not be shown here.

3 Changes the size of the thumbnail view.

Info

All the images of this manual are according to Labscope for Windows.

Some of the UI updates for each version may not be reflected in the screenshots of this manual.

5 Microscope Configuration

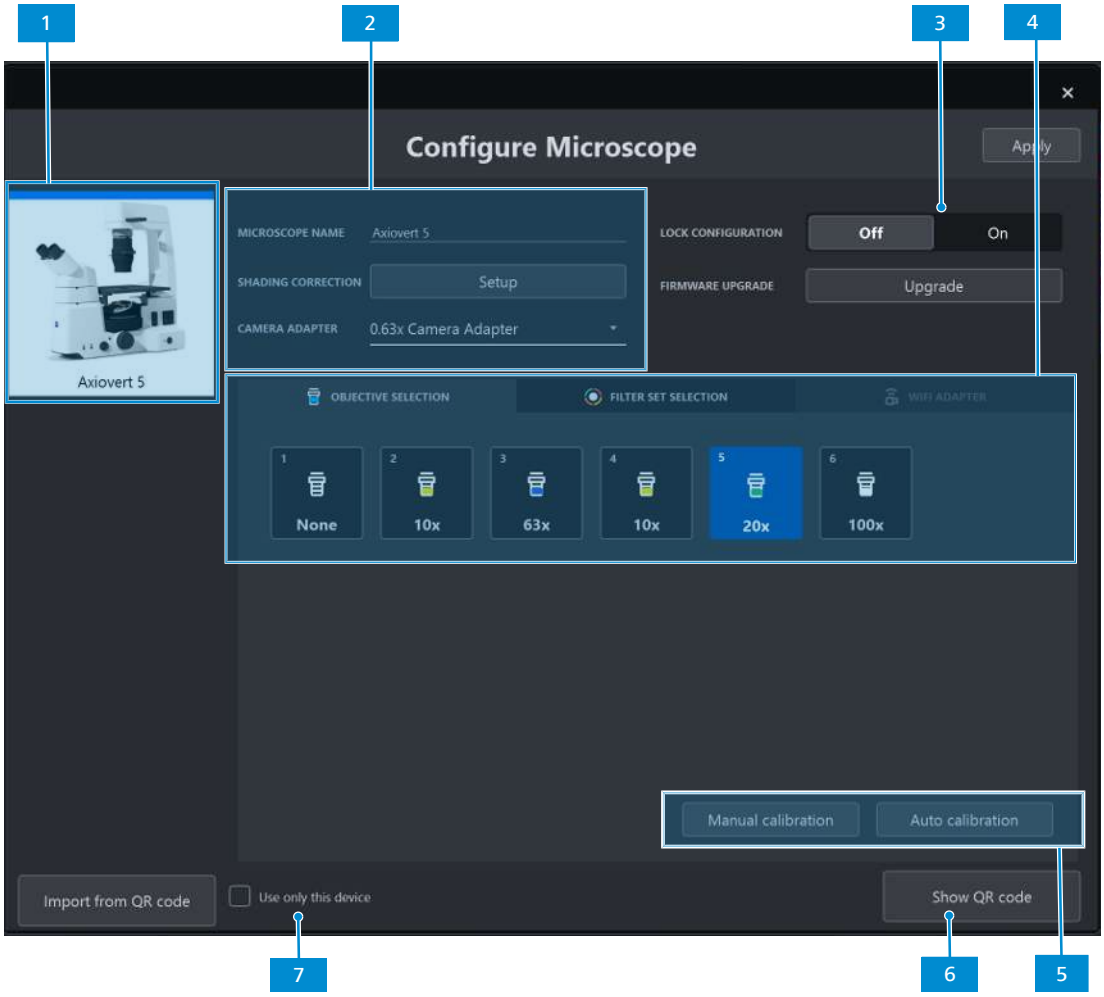


Fig. 2: Microscope Configuration

1 **Select Microscope/Camera**

Select the connected microscope or camera from the list. If the microscope is encoded, the microscope will be recognized automatically.

2 **Microscope Name, Shading Correction and Camera Adapter**

This fields allow you to enter a name for the microscope and select the camera adapter.

Click **Setup** to open the **Shading Correction Setup**.

We recommend to perform a shading correction for each objective of any newly configured microscope before you start to work with the device.

NOTICE **When working in the shading correction setup window, you need to remove the sample out of the microscope view for transmitted light or use a mirror for reflected light. Read the on-screen hints in Labscope carefully. The shading correction is correlated to each objective, which means wrong selection of an objective in the setup window or microscope view can lead to a wrong live image effect.**

3 **Lock Configuration**

If activated, you can enter a 4 digits PIN to lock the microscope configuration. If you forget the PIN code, the universal PIN code to unlock is: **h!%jPYtt34**

The configuration lock will also lock the status of "**favorite microscope**" / "**Use only this device**" selection.

4 **Select Objective, Filter Set and configure WiFi Adapter**

Depending on the connected microscope the available positions (e.g. 1-6) will be displayed. If you click on an Objective or Filter position, you can select the attached component from the list.

In WiFi Adapter configuration page, you can choose between AP mode and Connecting to Existing WLAN mode. In AP mode, the default WIFI SSID is the camera or microscope name, and default password is **ZEISS1846**. Or you could set a WIFI SSID and password and apply then you can use laptop to find the WiFi and establish the Labscope connection. In Connecting to Existing WLAN mode, you can establish a WiFi connection between the camera and another WiFi router, therefore, your Labscope will be able to connect to the camera via the WiFi router.

Not all camera and microscope types support the configuration of Filter and WiFi adapter in Labscope. Refer to the relevant camera and microscope manual.

NOTICE **Cautiously configure the objective and filler sets according to the actual physical setup on each positions. A wrong configuration in Labscope can lead to wrong scaling info and wrong measurements.**

5 **Scaling calibration**

In manual calibration mode drag the measurement line to a known size object from your sample. To finish the scaling calibration of the objective, input the correct length. If you have a ZEISS standard calibrator, you can also use Auto Calibration mode to easily calibrate.

NOTICE **The calibration is correlated to each objective. There is an indicator on a calibrated objective in the Microscope Configuration window. A wrong selection or changing the camera adapter selection can lead to wrong scaling info and wrong measurements.**

6 **QR code configuration**

Show QR code and **Import from QR code** can easily transfer the microscope configurations of different Labscope devices.

7 **Use only this device**

If activated, only the current microscope is displayed in the microscope view. This is a recommended option if the current Labscope device is intended to be used exclusively with a particular microscope. For example, this setup is ideal for student devices in a classroom environment. It has the same function as the radio button labeled **Only use this device** in the Dashboard.

6 Navigation Tab

The **Navigation** tab is the central element for navigating through the different views of the app. The following views are available and will be explained in the next chapters:

- **Dashboard View**, see *First Start & Overview [▸ 10]*.
- **Microscope View**, see *Microscope View [▸ 14]*.
- **Image View**, see *Image View [▸ 20]*.
- **Files View**, see *Files View [▸ 47]*.
- **Global Settings**, see *Global Settings [▸ 49]*.

7 Microscope View

The Microscope view shows the live image from the connected camera on the selected microscope.

Fig. 3: Microscope View

1 **Microscope Configuration, Light Control, Objective and Reflector Filter Info**

This area of tool sets is specifically designed for microscope control and information display. You can access the microscope configuration from this section.

The **Light Control** feature, available for encoded microscopes, provides direct visibility of light information. **TL** indicates the **Transmitted Light** and **RL/FL** indicates the **Reflected Light / Fluorescence Light**, the following number in percentage refers to the light intensity. You can adjust the light intensity and switch the LED lights after opening the light panel. After the Multi Channel module is activated, the Colibri light can be controlled directly in the light panel. The labeled name and color for each light have been mapped to the channel buttons in **Multi Channel Fluorescence** mode (MCF). An option for **light always on after snapping** is provided in MCF mode. This option is intended for continuous acquisition needs and prevents the light from switching off automatically.

Additionally, the objective and reflector information is displayed here. For non-encoded microscope types, you can click on the objective button and select the corresponding objective slot to match the actual magnification in use.

NOTICE **Ensure that the current selection of objective magnification is matching with the current physical objective in use, and the camera adapter to be checked from microscope configuration or image meta data is matching with the actual one in use. A wrong selection can lead to wrong scaling info and wrong measurements.**

2 **Focus Indicator**

Displays a focus indicator bar, see *Focus Indicator [▸ 18]*.

3 **Over Brightness Indicator**

Displays the areas with over brightness by red masks, see *Over Brightness Indicator [▸ 17]*.

4 **Camera Exposure Info**

Displays the current values for exposure time and gain of the camera.

5 **Snap Button**

Acquires an image (or short a "Snap"). Depending on the selected acquisition mode you can perform different types of acquisition.

6 **Change Acquisition Mode**

Select the desired acquisition mode, see *Acquisition Modes [▸ 23]*.

7 **Annotation and Measurements**

This function is available for both Microscope view and Image view, see *Annotations and Measurement Tools [▸ 41]*.

8 **Split View**

Open the split (Comparison) view, see *Split View [▸ 18]*.

9 **Graticule Overlay**

Add various overlays to the live image, see *Graticule Overlay [▸ 17]*.

10 **AI Modules**

Select the AI modules to process the current image. Additionally, see *Acquiring images with cell confluency and counting results in normal snap mode [▸ 34]* and *Acquiring Multi Channel images with cell nucleus counting or transfection efficiency [▸ 38]*.

11 **Histogram**

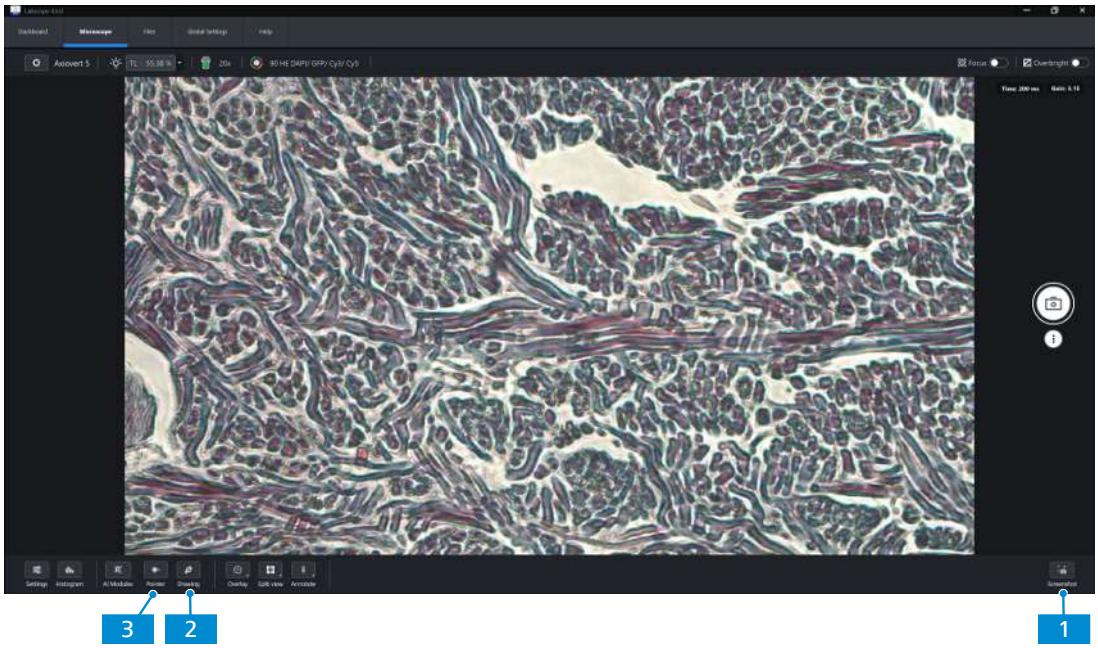
Opens the histogram panel, see *Histogram View [▸ 22]*.

12 **Camera Acquisition Settings**

Opens the camera acquisition settings, see *Acquisition Settings [▸ 25]*.

8 Other Tools in Microscope View

The other tools availability is depending on the settings of Available Tools in Global settings. There are also tools related to MultiChannel and AI Modules which are explained in *Acquiring Multi-Channel Images [▸ 29]* and *Acquiring images with cell confluency and counting results in normal snap mode [▸ 34]*.



The following functions are available:

1 **Screenshot**

Take a screenshot of Labscope window and the image will be saved into Files.

2 **Drawing Mode**

This function is available for both Microscope view and Image view.

Displays a combined view of both microscopy view and camera view. This can be useful for drawing sketches from a sample image.

We recommend to use a tablet holder (not included) for the drawing process.

3 **Pointer**

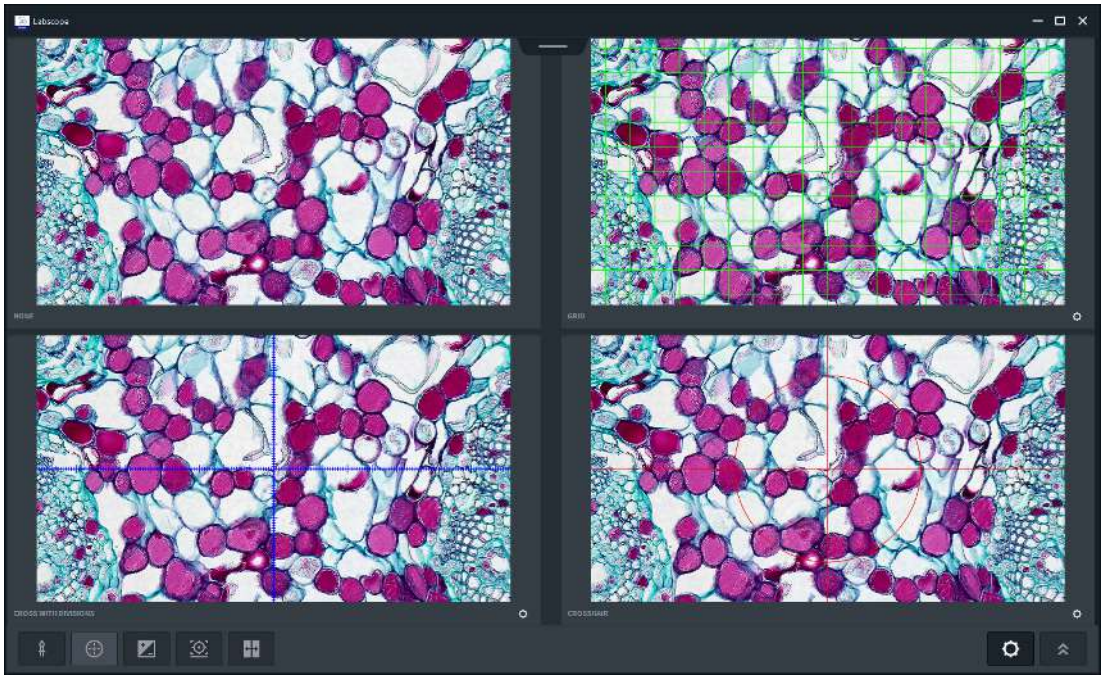
This function is available for both Microscope view and Image view.

Displays a pointer with red dot. It will follow the mouse or finger movement on the screen. This is useful for teaching or presentation purposes.

8.1 Graticule Overlay

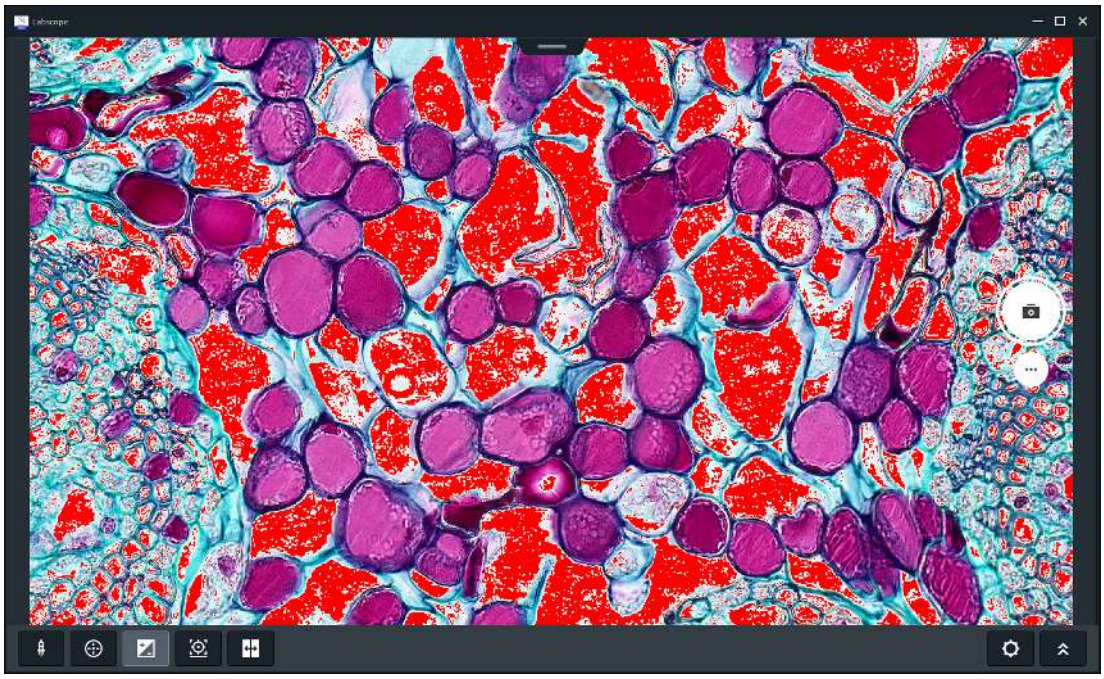
Graticule Overlay

You will see 4 windows where you can select the following overlays: no graticule, grid, cross with divisions and crosshair. Select the desired overlay by clicking on it.



8.2 Over Brightness Indicator

This function is available for both Microscope view and Image view. After clicking, the regions having over brightness will be shown with red masks.



8.3 Focus Indicator

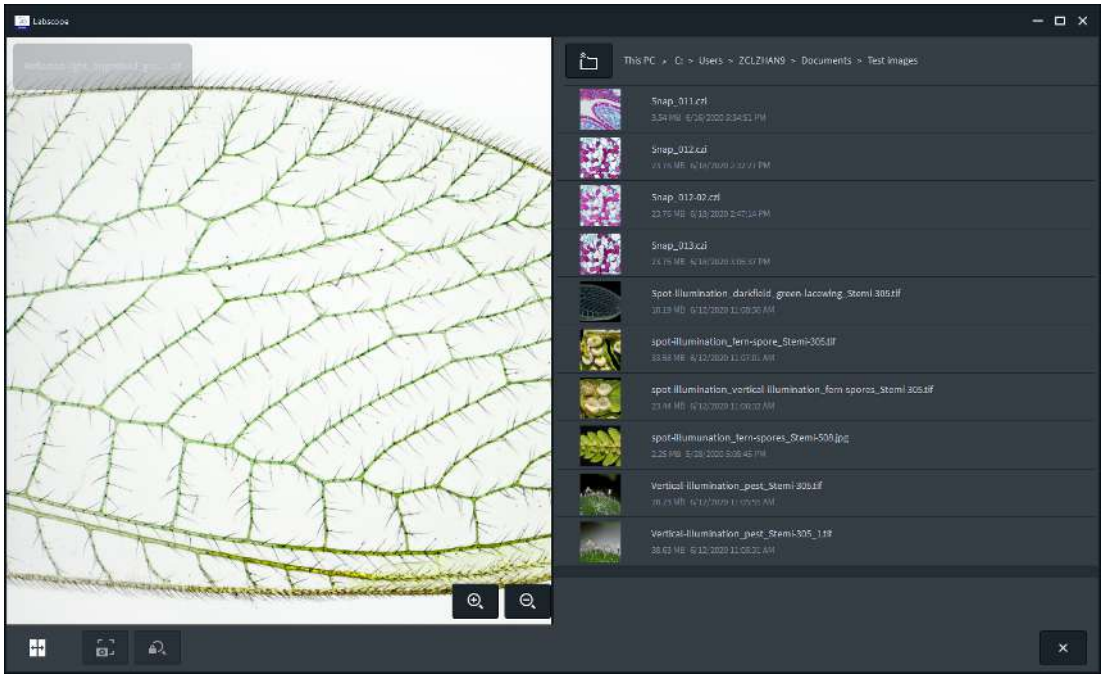
After clicking on the icon in the main toolbar, the focus indicator bar will show up at the central bottom of the **Microscope** view. When the focus changes, the indicator will also change dynamically.

You can even manually calibrate the default status of the focus indicator. Firstly adjust the fine focus of the microscope to make the image clear. Then click on the indicator bar and it will be calibrated.

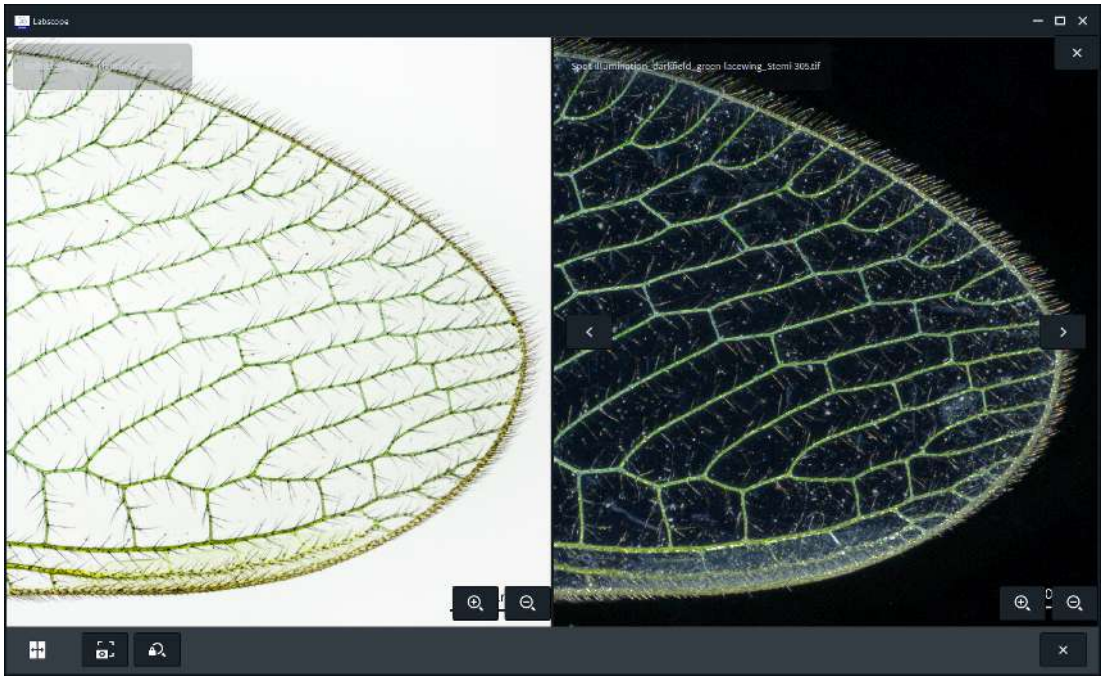
8.4 Split View

This view is available for **Live** and **Image** view.

After clicking on the Split view icon, two panels are displayed initially. The left side shows the current view (Live or Image view) and the right side shows the files of Labscope.



By selecting another file from the list it will be displayed in a comparison view together with the image on the left side:



9 Image View

After you have acquired an image you can click on the preview or find and open the stored image from Files View. The image will be opened in an Image View. You can configure the tools' availability through Available Tools and Module Manager in global settings.

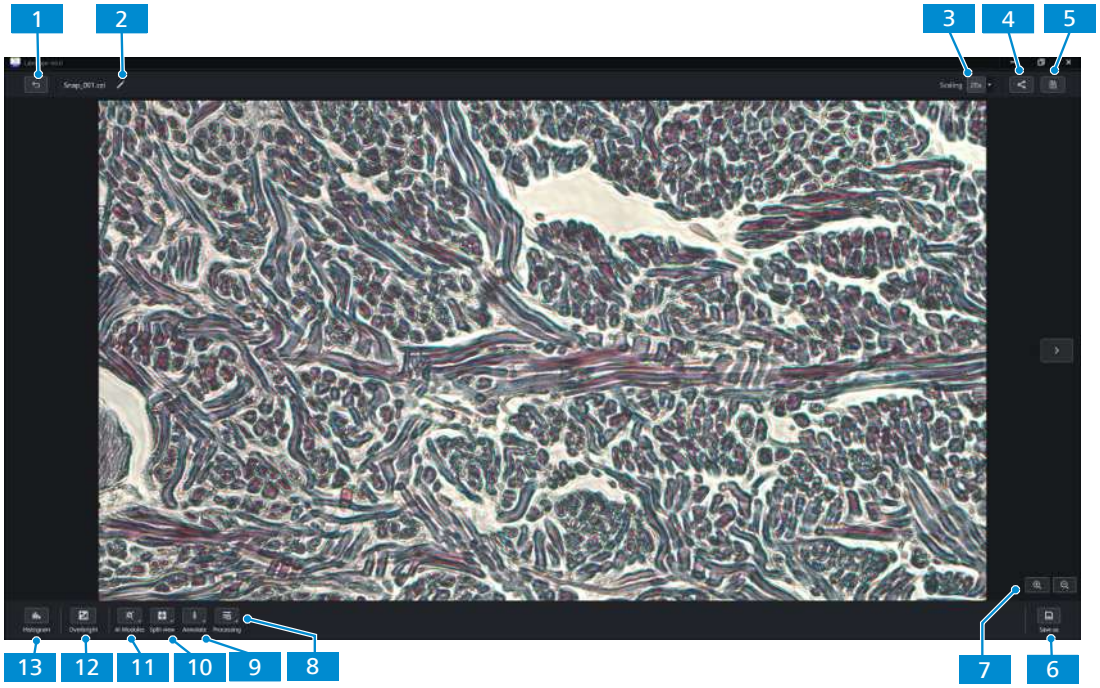


Fig. 4: Image View

1 **Return**

Click to return to the previous view. If the image is opened from Microscope View, it will return to Microscope View. Same logic for opening from Files View.

2 **Edit File Name**

Either change the file name or configure the file name template.

3 **Change Scaling**

Shows the current image scaling. Click to change the scaling by referring to another image.

NOTICE **Ensure that the current selection of objective magnification is matching with the current physical objective in use, and the camera adapter to be checked from microscope configuration or image meta data is matching with the actual one in use. A wrong selection can lead to wrong scaling info and wrong measurements.**

4 **Share Image**

Shares the image directly via email or other tools.

5 **Create Report**

Generates a report with the current image.

6 **Save Image and Save As Other Formats**

Save the changes made on the image or save the image as other formats between CZI, TIF, and JPG.

7 **Zoom In / Zoom Out**

8 **Image Processing**

Display the image processing panel. You can edit the value of gamma, brightness, contrast, color intensity and sharpness, see *Image Processing [▸ 48]*.

9 **Annotations and Measurement Tools**

Shows the available annotations and measurement tools which can be added to the image, see chapter *Annotations and Measurement Tools [▸ 41]*.

10 **Split View**

Open the split (Comparison) view, see *Split View [▸ 18]*.

11 **AI Modules**

Select the AI modules to process the current image. Additionally, see *Acquiring images with cell confluency and counting results in normal snap mode [▸ 34]* and *Acquiring Multi Channel images with cell nucleus counting or transfection efficiency [▸ 38]*.

12 **Over Brightness Indicator**

Display the areas with over brightness by red masks, see *Over Brightness Indicator [▸ 17]*.

13 **Histogram**

Shows the histogram panel.

10 Histogram View

This function is available for both **Microscope view** and **Image view**. Click the button in main toolbar to open the histogram panel.

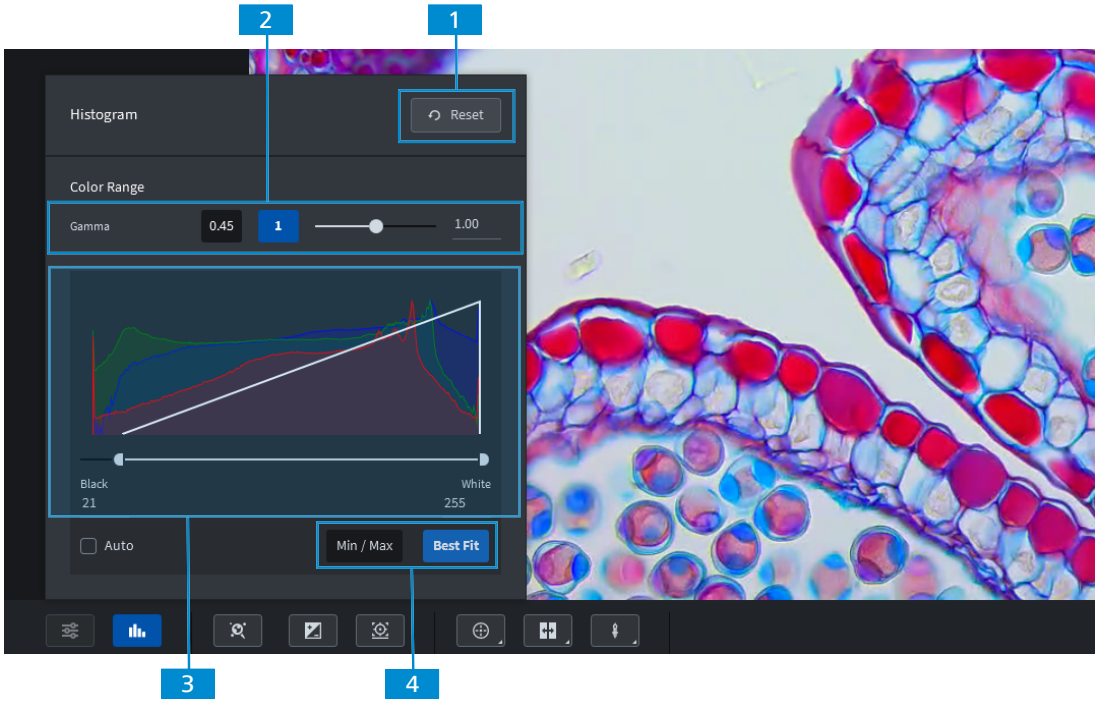


Fig. 5: Histogram View

1 **Reset**

Click to reset the histogram settings.

2 **Gamma**

Adjust the gamma value by clicking, dragging or inputting.

3 **Histogram Display and Manual Adjustment**

Adjust the histogram value of **Black** and **White** by dragging the scroll bar or inputting in the dialog boxes.

4 **Min/Max and Best Fit**

Click **Min/Max** or **Best Fit** to adjust the histogram range to improve the image display contrast. For Microscopy Live View, you can check Auto + Min/Max or Best Fit to enable a continuous response to the live view image.

Info

For JPEG or TIF format, after the histogram is changed and image saved, the black and white value will be extracted again to 0 - 255 (example of 8 Bit depth image).

11 Image & Video Acquisition

Image acquisition is directly done in the **Microscope View**. First you have to select the desired acquisition mode. Per default, the single image acquisition mode is selected.

> **Info**
>
> Availability of each acquisition mode is depending on camera and microscope types and also licensed modules.

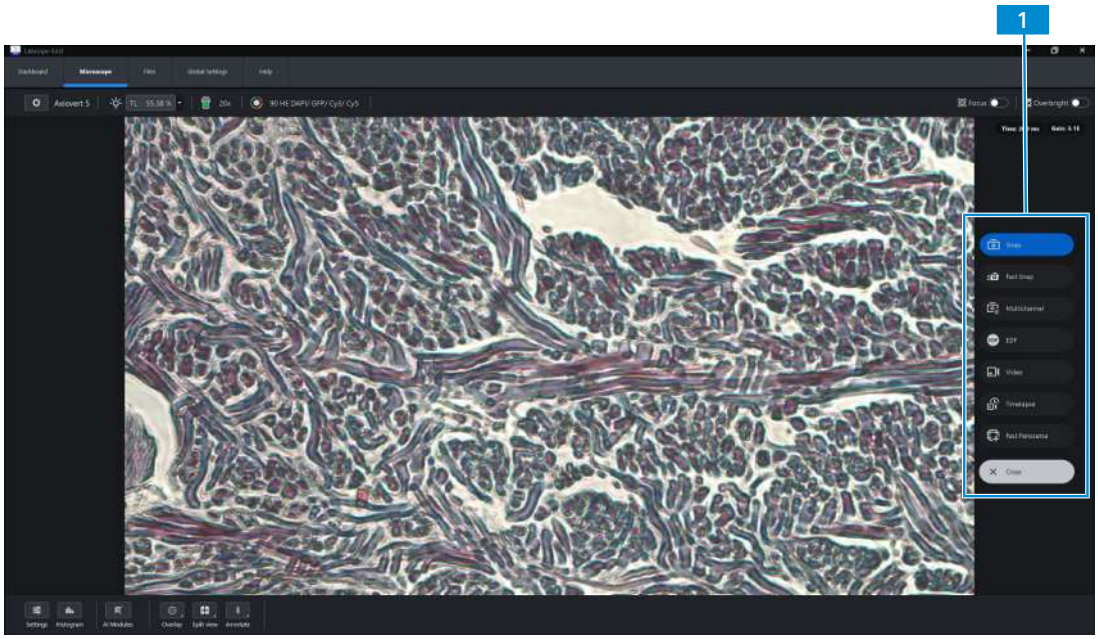


Fig. 6: Image & Video Acquisition

1 **Acquisition Mode Selection**

Select the desired acquisition mode, see *Acquisition Modes [▶ 24]*.

See also

- Acquiring Multi-Channel Images [▶ 29]
- Acquisition Settings [▶ 25]

11.1 Acquisition Modes

The following acquisition modes are available and can be selected by tapping on the corresponding mode icon on the right side:

Icon	Mode	Description
	Single Image Acquisition (Snap)	Acquires a single image (also called a **Single Snap** or **Normal Snap**).
	Fast Snap	Acquires an image from microscope view at high capture speed. In this mode, multiple users can acquire an image simultaneously.
	Multi Channel Acquisition	Only available if you have licensed the **Multi Channel** module. Acquires fluorescence and transmitted light images in independent channels. The module supports adding false-color, comparing channels and creating reports with display of individual channels, see *Acquiring Multi-Channel Images [▸ 29]*.
	Extended Depth of Field (EDF) Acquisition	Acquires an EDF image, see *Acquiring EDF Images [▸ 32]*.
	Video Recording	Records a video. This functionality allows to record the current live image as a movie.
	Time Series Recording	Records a time series video, see *Recording Time Series Videos [▸ 33]*. This functionality allows to set up time intervals (e.g. each 5 seconds) where an image is taken. The images are then combined to a video.
	Fast Panorama	Only available if you have licensed the **Fast Panorama** module. Acquire whole slide images with your manual microscope, see *Acquiring Fast Panorama Image [▸ 26]*.
	Snap with AI Modules	Only available if you have licensed AI Modules. Acquire images and get the confluency, counting, or transfection efficiency results based on the microscope view, see *Acquiring images with cell confluency and counting results in normal snap mode [▸ 34]* and *Acquiring Multi Channel images with cell nucleus counting or transfection efficiency [▸ 38]*. ***NOTICE*** **Labscope AI modules are not intended for IVD examinations and may only be used in research.**

11.2 Acquisition Settings

Based on the camera type and microscope system, the content of acquisition settings may vary. Using the **Reset all** button you can restore the default settings. The Acquisition Settings panel is scrollable, and each section is foldable.

Parameter	Description
Exposure	
– Time	Adjust exposure time manually. It will be disabled when it is in Auto Exposure mode.
– Gain	Adjust the Gain value manually. Note that higher gain will result in a noisier image.
– Intensity	Adjust the auto exposure target intensity. It is available only in Auto exposure mode.
– Auto	Check the Auto checkbox to enable Auto exposure. Uncheck it to back to manual exposure.
– Calculate Exposure / Push	Use the current target intensity and applies auto exposure once.
White Balance	
– Color slider / RGB Gain	Manually adjust the temperature slider or RGB gain values to adjust the white balance.
– Picker	Use picker to select a point from background area of the image as a benchmark of white then Labscope will adjust the white balance accordingly and keep it in a Manual white balance mode.
– Auto White Balance	Enable the Auto White Balance, or uncheck it to back to manual white balance.
– Calculate Balance	Apply an Auto White Balance once.
Light Intensity	Only available for Axiolab 5, Axioscope 5 + Axiocam 202/208; or Axiovert 5 SCB.
– Slider	Adjust the intensity of the light source. **CAUTION Be cautious about the glare from the light source while adjusting the light intensity from software if somebody is looking through the eyepiece. Looking into eyepiece from a too high light intensity could lead to eye damage from the glare.**
– RL / TL	Switch the light path between reflected light (RL) and transmitted light (TL).

Camera Modes, Processing and Info

Parameter	Description
Microscope Name	Shows the microscope name.
MAC Address	Shows the MAC address of the connected microscope.
IP Address	Shows the IP address of the connected microscope.

Parameter	Description
Firmware Version	Shows the version of the currently installed firmware of the camera.
Live Quality	Adjust the settings for the live image quality here.
Live Resolution	Adjust the live view image resolution.
Snap Resolution	Adjust the snapping image resolution.
Image Orientation	Adjust the image orientation.
Color	Switch between **Color** mode and **Grey** mode for the color camera.
Gamma	Adjust the gamma settings.
Denoise	If enabled, denoising is automatically applied on the image.
Sharpening	If enabled, sharpening is automatically applied on the image.
Pixel Correction	If enabled, pixel correction is automatically applied on the image.
HDR (High Dynamic Range)	If enabled, HDR is automatically applied on the image.

Info

The availability of these settings is according to the camera types.

11.3 Acquiring Fast Panorama Image

The module **Fast Panorama** allows for easy acquisition of whole slide images (WSI) with manual microscopes. By manually moving the stage, images of the specimen will be stitched together automatically into a panoramic image. See the following steps for acquiring Fast Panorama images.

Info

Currently the module is only available for Windows since Labscope v3.3. The supported camera types are Axiocam 305 mono/color.

Procedure

1. After putting your sample on the microscope, adjust the focus to see a clear view. Set the correct objective in microscope configuration and set the shading correction accordingly, see *shading correction [▶ 11]*.
2. In acquisition settings, choose manual exposure (the recommendation is below 2ms) and manual white balance. You may need to increase the light intensity and gain to a certain level to get a good brightness.
3. Select Fast Panorama mode  . Move the sample to the desired position, then click the button again to start Fast Panorama acquisition.
4. Move the stage, the live images will be stitched together to a panorama picture. There are some hints and tools to support your panorama acquisition process, see below.
5. After finishing the Fast Panorama acquisition, click  to finish and save your panorama picture. The image will be saved to your folder. You can adjust the histogram, do annotations and measurements, or save as JPG or TIF in the image view.

Important tips for getting a good panorama result:

- A good performance Laptop/PC is the basis for the performance of Fast Panorama process, see the required PC spec for Fast Panorama in *Application and System Requirements [▸ 53]*.
- Apply proper shading correction as preparation.
- Use manual exposure and manual white balance.
- Use low exposure time. Exposure time below 2ms is recommended, the lower the better performance.
- When moving the microscope view, having a certain overlap with the surrounding stitched images will improve the stitching quality.
- Try to use the tools Position search and Undo to support your process.
- For dense structure samples, e.g. tissue and blood, you could use a higher magnification objective for stitching once you meet the situation of frequent popup of the yellow box. Go from 10x to 20x, or from 20x to 40x, etc.

1 **Hints**

Hints show up during Fast Panorama acquisition. They will show the information of how many images are stitched, the current whole image resolution and current FPS data.

2 **Preview of the stitched panorama image**

The red box shows the current position of microscope view.

3 **Microscope view window with focus indicator**

The outline color of the microscope view has two colors with different meanings. **White** is the normal status with successful stitching. **Yellow** means the confidence level of the current stitching attempt is low or the current image is unable to be stitched. This can be caused by no matching area, or the matching area is too small.

Once it completely lost position or cannot stitch, a reminder occurs above the microscope view for reminding users to move it back slowly. The bar below the live window is the focus indicator which shows the calculated focus status. During the stage moving and stitching process, a blue outline always shows in the background which indicates the last successfully stitched position.

4 **Stitched images as background**

5

Position search This button is enabled when the position is completely lost. After clicking on the button, the microscope view image will be searched from the whole stitched image background. If the correct position is found, Labscope will route to the correct position. If not, try to move the microscope view to other areas where may be an overlap with the background, then try gain.

Undo Click to delete the last stitched image. It supports continuous clicks, then multiple stitched images will be deleted.

Cancel Click to stop the panorama acquisition.

Save Click to save the panorama result.

11.4 Acquiring Multi-Channel Images

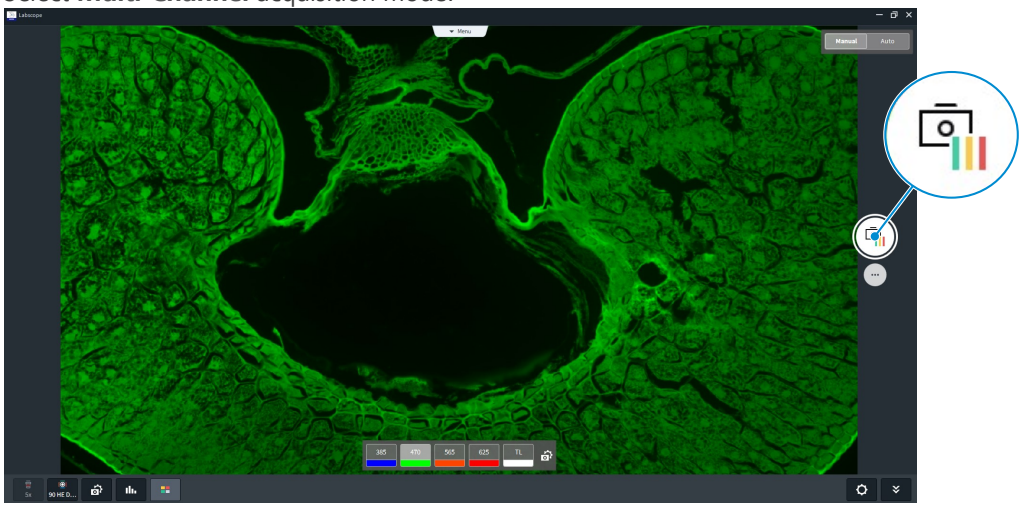
Labscope provides an easy solution for multi-channel acquisitions. Enhanced functions are available, like editing pseudo color, auto and repeat multi-channel acquisition, comparison view, and report with displaying each channels, etc..

> **Info**
> Currently the multi channel module function is available for Labscope for iPad and Windows.

Manual Mode

Procedure

1. Select **Multi-Channel** acquisition mode.



2. Click on the corresponding channel button to select the channel you want to snap.

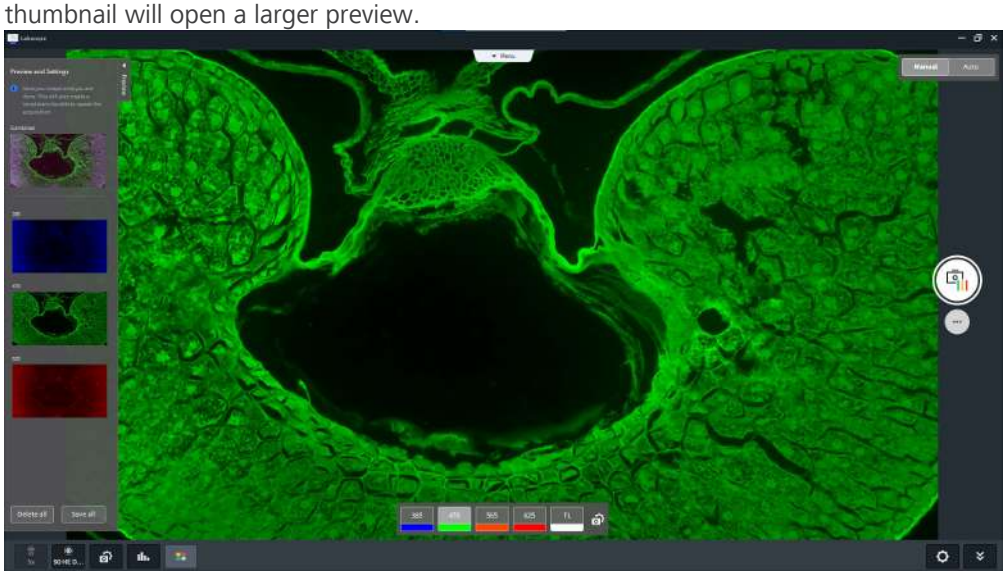
→ If it is an encoded **Axioscope 5** or **Axiovert 5 with Colibri 3** light source, the light is turned on when the channel is activated.

→ If it is an encoded **Axiolab 5**, the activated channel is synchronized with the light source.

→ If it is a non-encoded microscope, the channel can only be activated manually on the microscope.
Info: The availability of channel buttons is dynamically changing according to the filter set. E.g. for a single DAPI bandpass filter, only the 385 LED / DAPI channel will be displayed. The mapping logic is according to the excitation range of filter set and the LED's wavelength.

3. Activate the pseudo color panel of the current channel by right click on the individual channel button. Then select the pseudo color by clicking on it.
   Info: By clicking the button in the main toolbar you can switch the image view between false color and b/w mode.

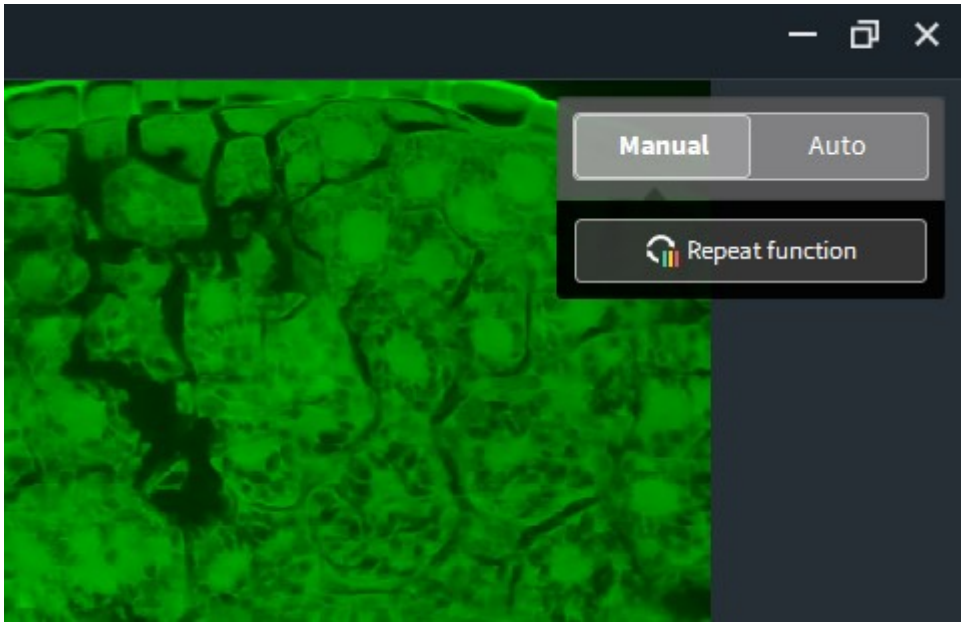
4. Adjust the acquisition, histogram settings and channel name for the current channel. The acquisition settings and channel name will be stored in Labscope.
5. Click **Snap** to acquire the image for selected channel.
   → The preview of multi-channel image will be shown on the left side. Clicking on each thumbnail will open a larger preview.



6. Acquire the images for other channels.
7. After the acquisition for all needed channels is done, click **Save all**.
   → The multi-channel image will be saved.

Auto and Repeat Mode

For encoded microscope, e.g. Axioscope 5, Axiolab 5 and Axiovert 5, the Auto and Repeat Modes will show beside the Manual Mode.



- **Auto Mode:**
  Each channel's exposure will be locked to auto exposure, and light intensity is set to 50 (in the middle of the light intensity range) automatically, therefore the Acquisition Settings button will be locked and become grayed out status. The multi-selection check boxes will be shown below the channel buttons. By selecting channels and clicking on the multi-channel snap button, Labscope will automatically start to acquire and you will get a multi-channel image.
- **Repeat Mode:**
  After a multi-channel acquisition in Manual Mode or Auto Mode, a repeat template will be generated. The template includes all the acquired channels and their exposure and light intensity settings from the last acquisition. Therefore, after switching to Repeat Mode, click on the multi-channel **Snap** button, you will get a repeated acquisition and image in a short time.

> **Info**
>
> To use the Auto and Repeat functionality for **Axiolab 5 FL**, you have to switch the channel manually on the microscope. A message will appear: “Please switch to channel... ".

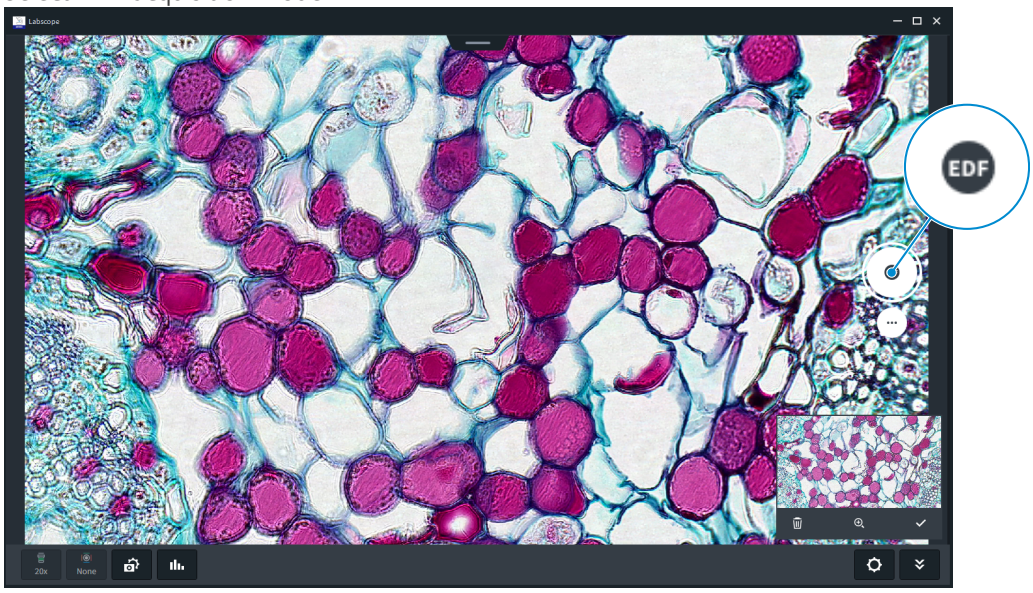
11.5 Acquiring EDF Images

For samples with a different depth of field, it can be difficult to acquire a clear image for the whole area. In that case we recommend the EDF (Extended Depth of Field) acquisition mode to acquire combined in-focus images with different depths of field.

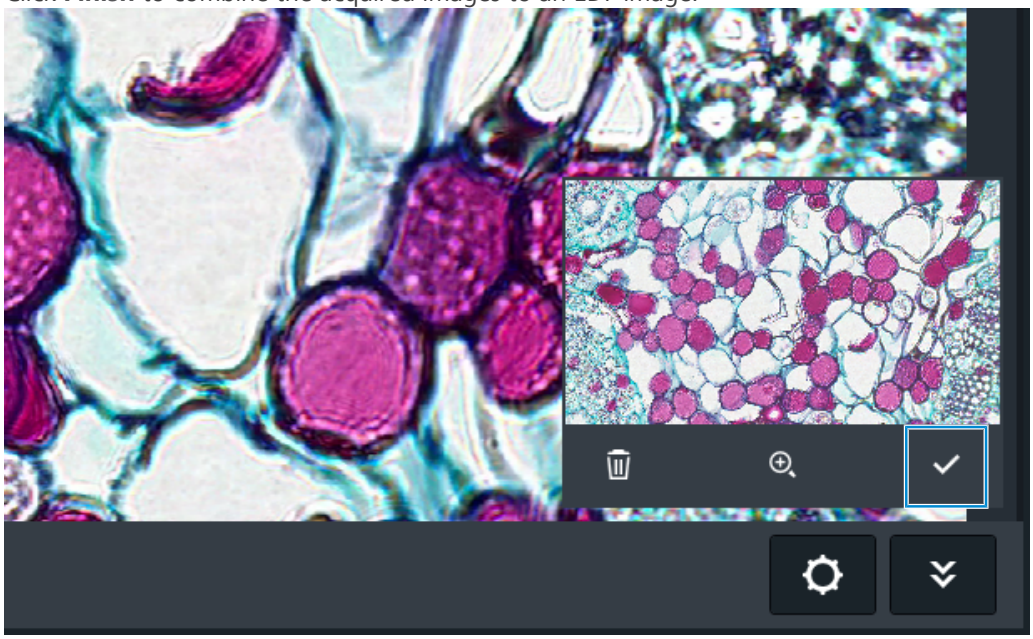
> **Info**
>
> The EDF acquisition only works with compound microscopes. It is not suitable for use with stereo microscopes.

Procedure

1. Select **EDF** acquisition mode.



2. Adjust the focus for a certain area and click **Snap**.
   → An image is acquired and a preview window pops up.
3. Adjust the focus and acquire another image. You can repeat this procedure until all areas are acquired in focus.
4. Click **Finish** to combine the acquired images to an EDF image.

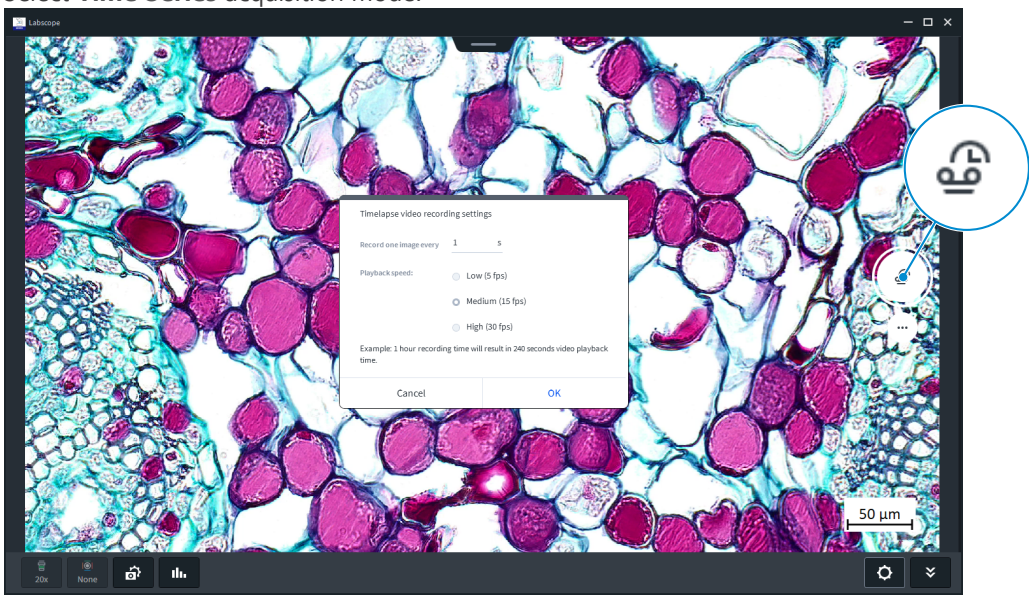


11.6 Recording Time Series Videos

For viewing a slow changing dynamic sample, e.g. to observe slow movement, gradual evolution or morphology changes in a certain period of time, the **Time Series** (or Time Lapse) is a good acquisition mode to use.

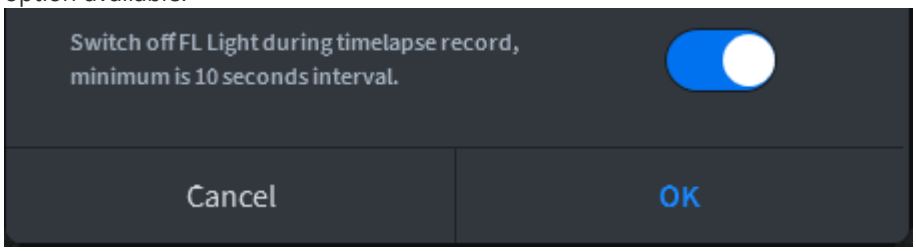
Procedure

1. Select **Time Series** acquisition mode.



2. Click **Snap**.
   → The Time Series settings dialog will be displayed.
3. Select the preferred recording settings (see Time Series Recording Settings) and click **OK**.
4. Click **Snap** again to finish the recording.
   → The output time series video is generated and stored in the file system.

When you have Fluorescence LED lights enabled and readable by Labscope, there will be another option available:



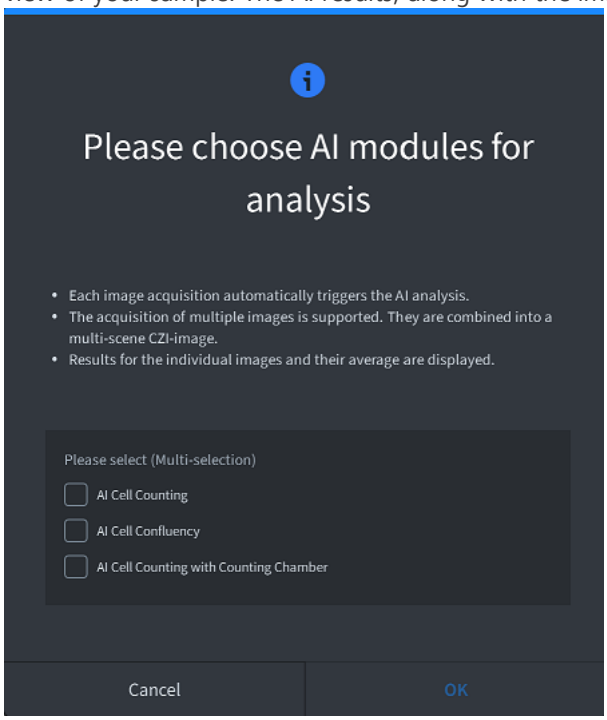
11.7 Acquiring images with cell confluency and counting results in normal snap mode

The Labscope modules **AI Cell Confluency**, **AI Cell Counting** and **AI Cell Counting with Counting Chamber** are AI based solutions that automatically determine the confluency level of the adherent cell culture, the number of adherent cells, and trypan blue stained floating cells with counting chamber, respectively. They deliver repeatable, objective results and do not require manual parameter adjustments.

> **Info**
>
> You need to install Labscope, then install **AI_Modules_Setup.exe** on your Windows PC / Laptop / Tablet. Both are available to download from ZEISS Portal. Labscope AI modules are not intended for IVD examinations and may only be used in research.

Procedure

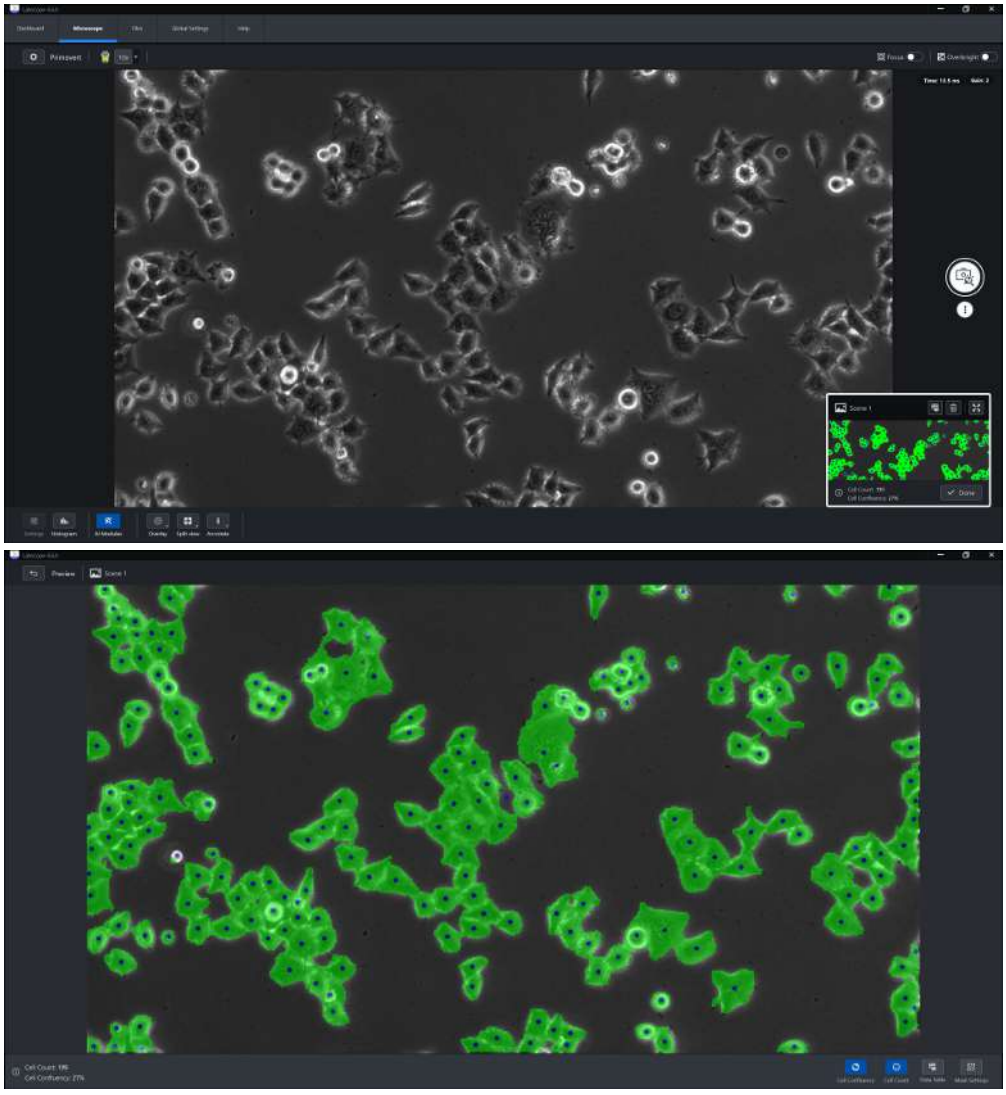
1. In the microscope view, click on the **AI Modules** button  .
2. Select the corresponding desired running models from the dialog. Then, capture the desired view of your sample. The AI results, along with the image, will be displayed in a preview.



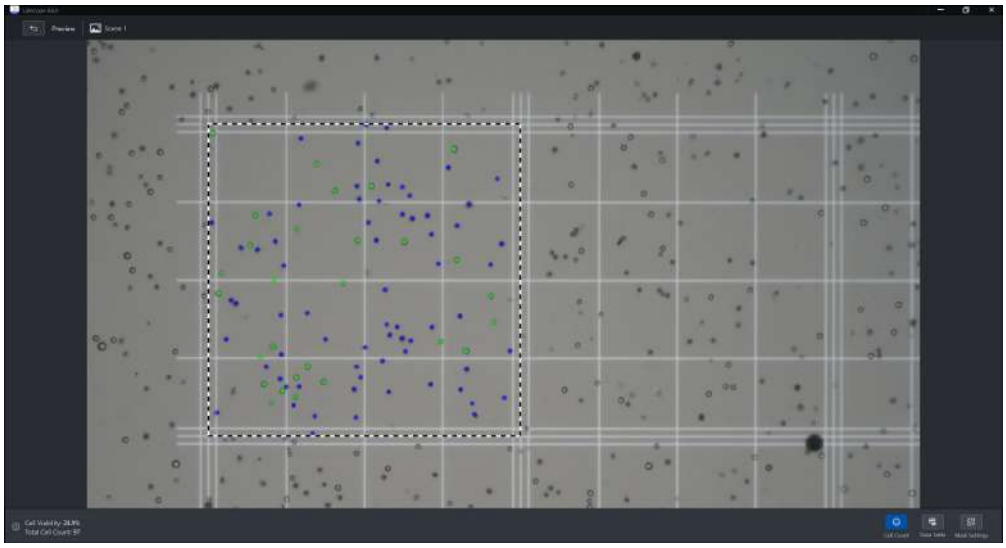
→ The Labscope module **AI Cell Counting** is an AI based solution that automatically determines the number of adherent cells in the field of view. It does also support cell nuclei counting in fluorescence. Primarily optimized for phase contrast images of adherent cell cultures.

→ The Labscope module **AI Cell Confluency** is an AI based solution that automatically determines the confluency level of the adherent cell culture. Primarily optimized for phase contrast images of adherent cell cultures.

Info: The **AI Cell Counting** and **AI Cell Confluency** features can be selected together for processing, and the AI-detected results will be displayed directly on the captured preview.



→ The Labscope module **AI Cell Counting with Counting Chamber** is an AI-based solution that automatically recognizes the cell counting chamber grids of most common hemocytometers. The algorithm recognizes and counts the viable and non-viable cells within a square area. The output of this AI module is the total cell count per ml, viable cells per ml and dead cells per ml. Trypan blue staining is required for the dead/live cell count.



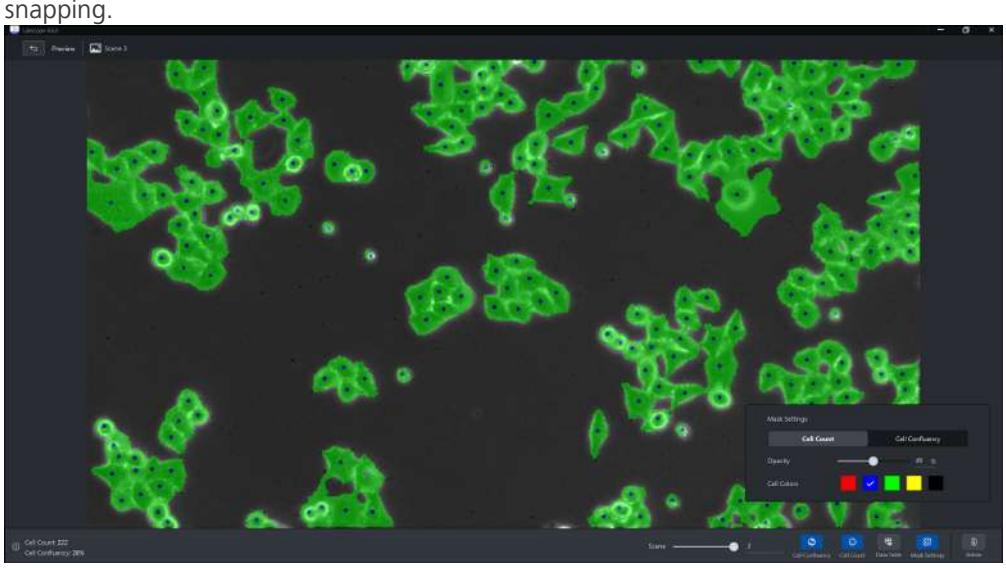
Info: For the **AI Cell Counting Chamber**, configuring the correct objective and camera adapter is essential for successful AI detection of the chamber square (16 small grids, total 1mm x 1mm). And uses a color camera to assess cell viability with trypan blue. First, ensure the configurations match the actual setup. Then, position the hemocytometer under the microscope to show a full square (1mm x 1mm) in the view and click to snap. Labscope will detect the square, outline it and count live and dead cells within that square. If it fails to detect the square, it will count cells in the entire view instead.

3. Move the field of view to other interested area of the sample and acquire multiple images if necessary.
4. For enlarged preview, click **Zoom-In**  .

→  is for displaying the data table from the confluency and/or counting results. In the AI Cell Counting data table dialog, you can choose a cell container type or input customized area value, then it will output calculated total cell numbers.
In the AI Cell Counting Chamber data table, you can choose a chamber type or input customized volume value to get calculated cell density.

→ In the larger preview, the colors and transparency of AI Modules masks can be edited. If you acquired multiple images (Multi-scene) for one CZI file, you can use the Scene slider to browse between different scenes.

→ You can delete a particular selected scene and continue the workflow by going back to snapping.



5. To save your data, click **Done** in the small preview.
   → In Image View, you can check the confluency and/or counting masks and the data. You can also export the data table in csv format or generate Report from the selected image.
   → The AI Modules also supports to trigger the AI Analysis from an already acquired image.

11.8 Acquiring Multi Channel images with cell nucleus counting or transfection efficiency

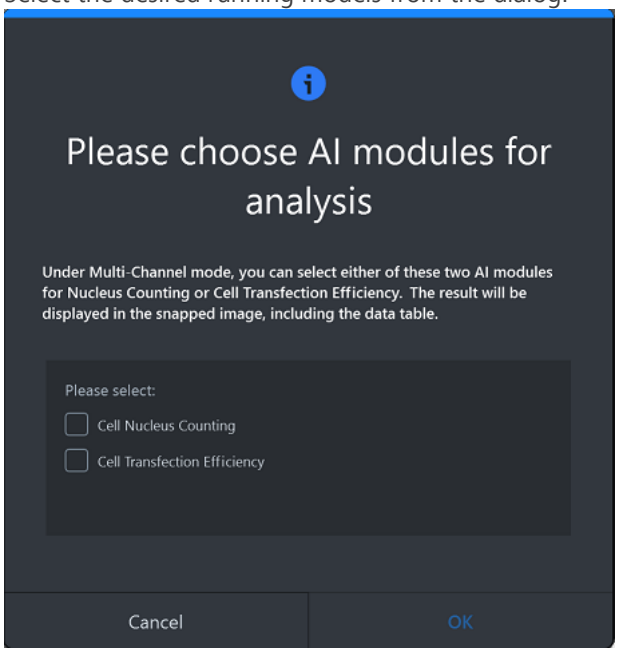
The **AI Cell Nucleus Counting** feature will be automatically available once the Multi Channel module and AI Cell Counting module are activated. This feature is designed to count cell nuclei under a fluorescence light channel.

The **AI Cell Transfection Efficiency** feature requires a Multi Channel CZI image to process and output transfection efficiency results. To acquire a Multi Channel CZI image, the Multi Channel module must be activated. This feature can automatically detect transfected cells using fluorescence markers among all cells in the field of view of the microscope camera and outputs the results of transfection efficiency.

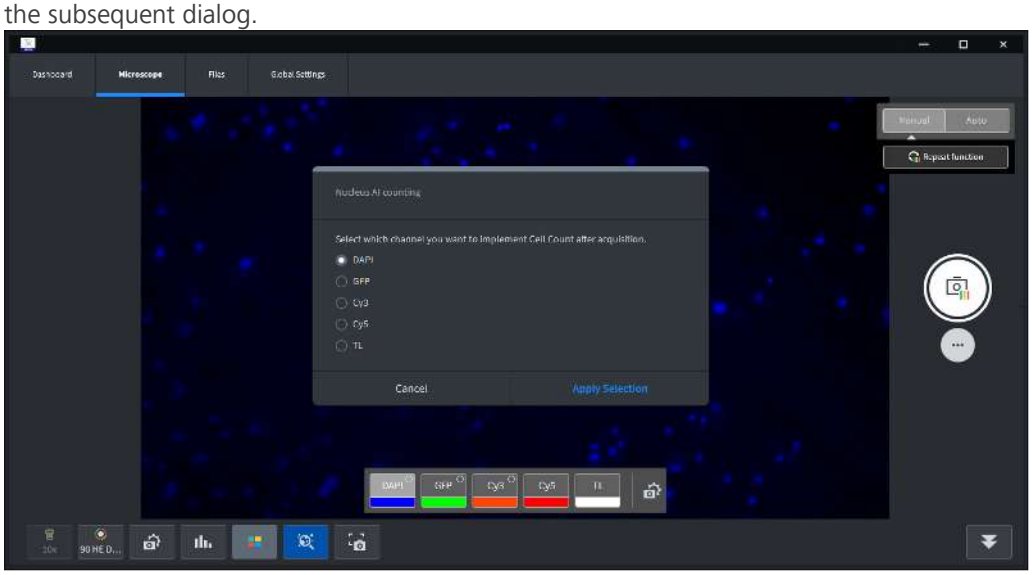
> **Info**
>
> You need to install Labscope, then install **AI_Modules_Setup.exe** on your Windows PC / Laptop / Tablet. Both are available to download from ZEISS Portal. Labscope AI modules are not intended for IVD examinations and may only be used in research.

Procedure

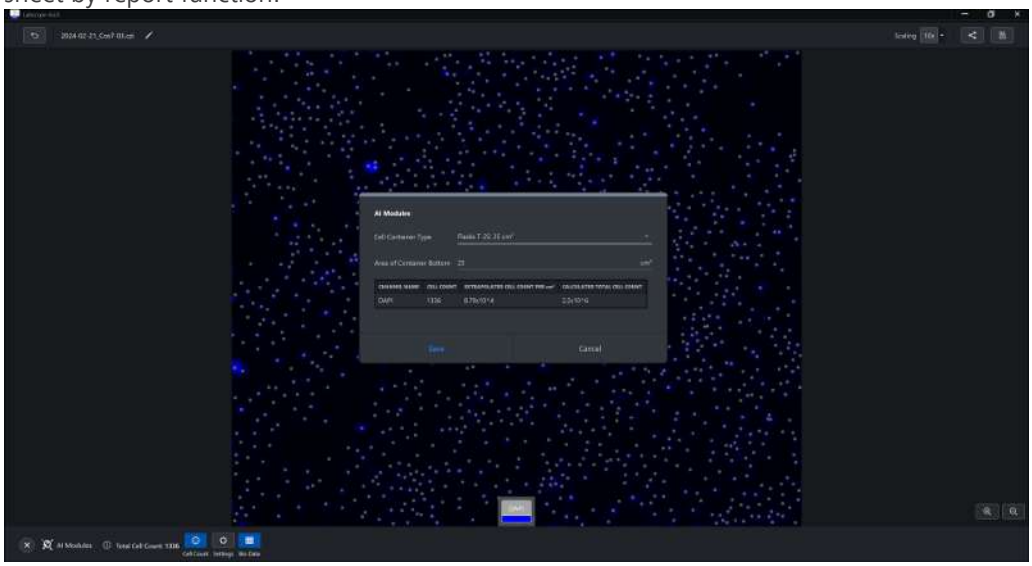
1. Choose the Multi Channel acquisition mode in Microscope live view, then click on the **AI Module** button.
2. Select the desired running models from the dialog.



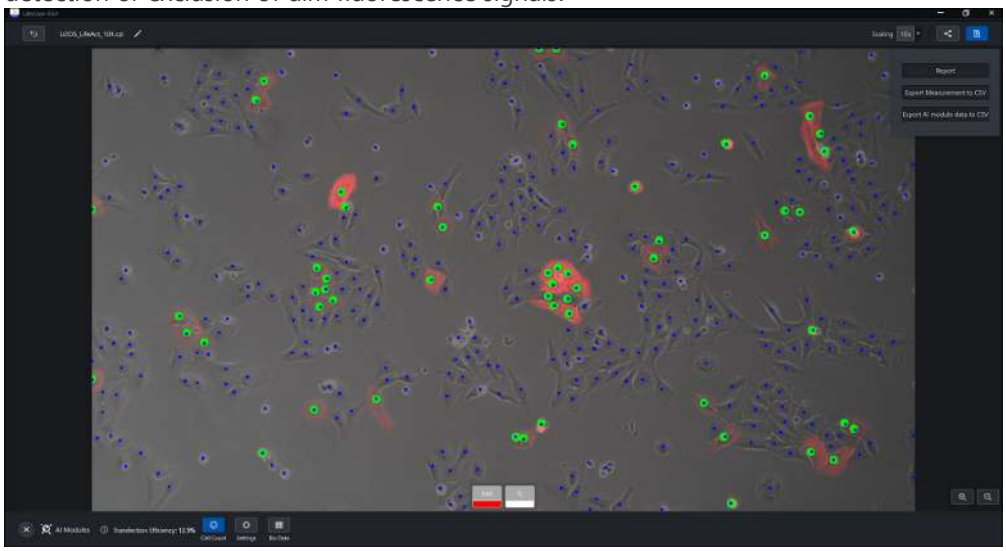
3. Choose the appropriate channel for nucleus counting or for transfected cell detection from the subsequent dialog.



4. Check the image with counting data and you also have the option to export the data to csv sheet by report function.



→ For AI Transfection Efficiency, in the Mask Settings, a threshold is provided for tuning the detection or exclusion of dim fluorescence signals.



5. The Auto and Repeat function of MultiChannel acquisition do also apply for the AI nucleus counting and AI cell transfection efficiency. In addition, it also supports to do the AI nucleus counting and AI cell transfection efficiency analysis on an already acquired multi-channel CZI image.

11.9 File Name Template Configuration

Labscope provides the possibility to automatically set the snapped file name according to configured template naming rules. The access of File Name Template Configuration is in global settings. Below is how it works:

Parameter	Description
Configure File Name Template	Open the file name template configuration dialog. There you can select or add templates on the left side. The following 5 elements for configuring a file name template are available: **Text**, **Auto Numbe**r, **Date Time**, **Microscope Name** and **Objective Magnification**. If you activate **Ask on save**, every time when a snap is taken, a dialog will pop up and ask you whether you want to change the name for the snapped file. You can also scan a barcode of your sample to input the file name, by using a barcode scanner, see *Global Settings [▸ 49]*.

After a File Name Template is configured, each snapped image will be automatically named according to the Template rules.

After opening an image and click on the rename button, there will be an option Auto Rename, clicking on it will overwrite the current file name according to File Name Template.

12 Annotations and Measurement Tools

You can add measurements, markers or text annotations either to the live image or an acquired image. For live view and saved CZI images with annotations, you can always access into Annotation tool and click on the annotations of the image to edit them. For TIF and JPG images, the saved annotations will be burnt into the image and become uneditable. The following list shows the available annotations and measurement tools:

Parameter	Description
Distance 	Draws a line and measures the length.
Rectangle 	Draws a rectangle and measures area and perimeter.
Circle 	Draws a circle and measures the area, perimeter and diameter.
Polygon 	Draws a polygon and measures the area and perimeter.
Arrow 	Draws an arrow.
Angle 	Allows to measure an angle.
Count 	Allows to draw in markers with ascending numbering.
Text 	Allows to enter text in a box.
Scale bar 	Allows to add a scale bar to the image.
Polyline 	Draws a polyline and measures the distance.
Spline Contour 	Draws a spline contour and measures the area and perimeter.
Spline 	Draws a spline and measures the distance.

Parameter	Description
Disconnected Angle 	Draws a disconnected angle and measure the angle.
Caliper 	Draws a single caliper and measures the distance.
Multi Calipers 	Draws a multi-caliper and measures the distances.

Info

For measuring, ensure a correct configuration of camera adapter, objectives and filter sets in accord to the actual components on your microscope. And in the microscope view, always check and confirm the current selected objective magnification in Labscope is identical as the current objective on the nosepiece.

See also

Global Settings [▶ 49]

13 Reports

13.1 Generating Reports

There are two ways to generate a report.

Generating a Report from Image View

Procedure

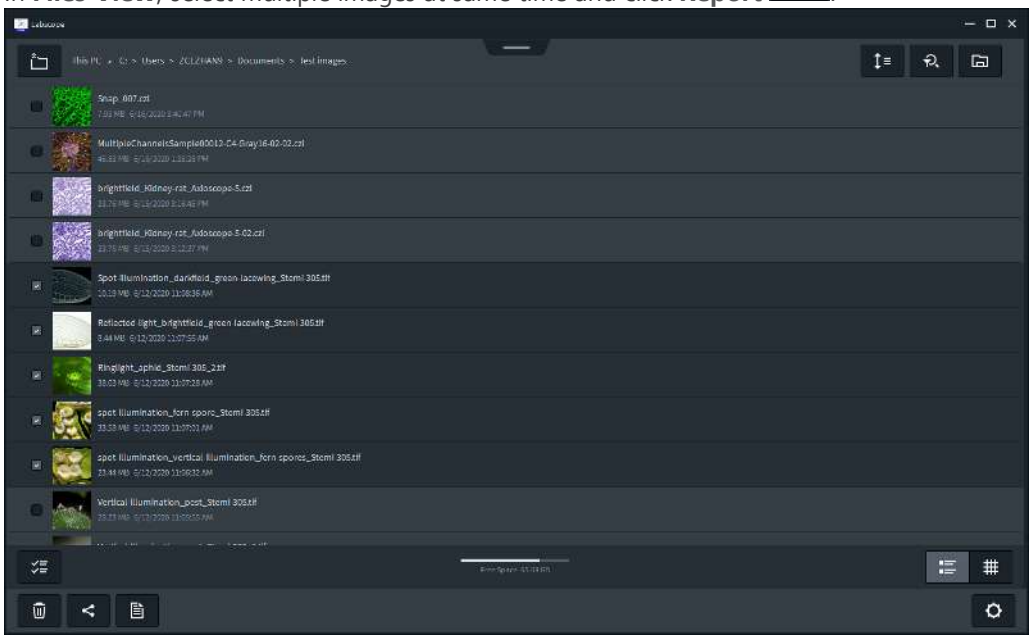
1. In **Image View**, click **Report**  .
   → A panel with **Report** and **Export as CSV** will be displayed.

2. Click **Report** to generate a PDF or RTF report based on selectable templates.
3. Click **Export as CSV** to export all measurements data from the image into a spreadsheet.

Generating a Report from Files View

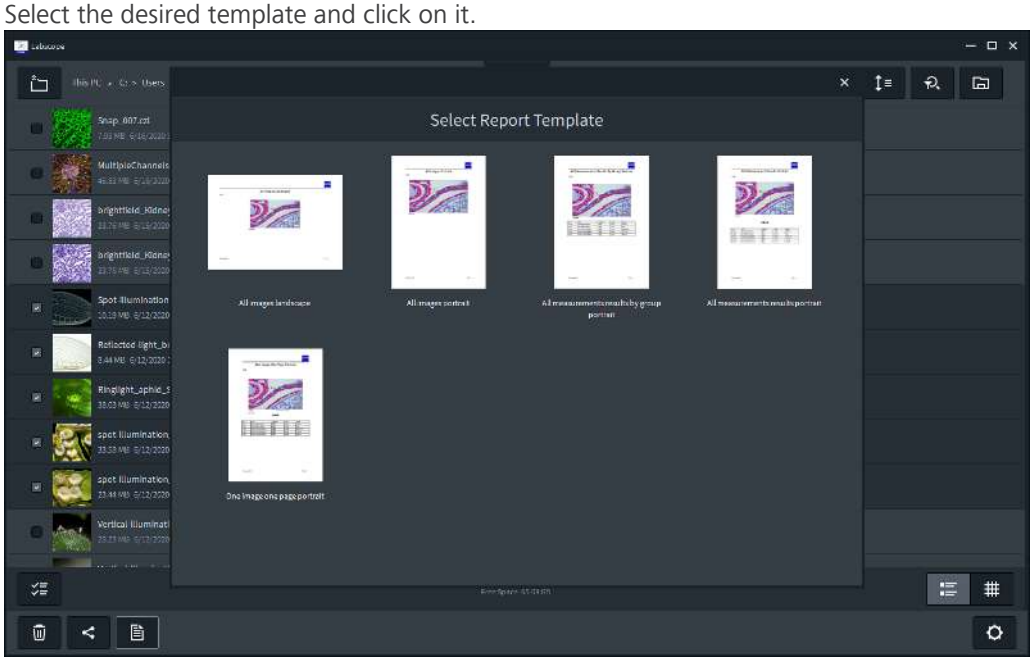
Procedure

1. In **Files View**, select multiple images at same time and click **Report**  .



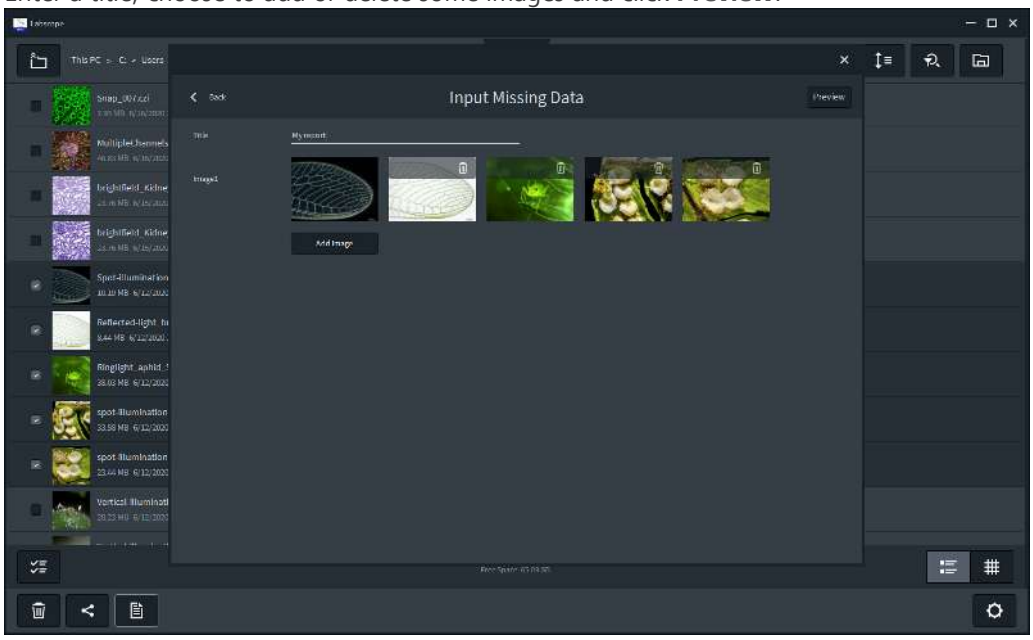
   → No matter which way you have chosen to create the report, the window **Select Report Template** will show up.

2. Select the desired template and click on it.

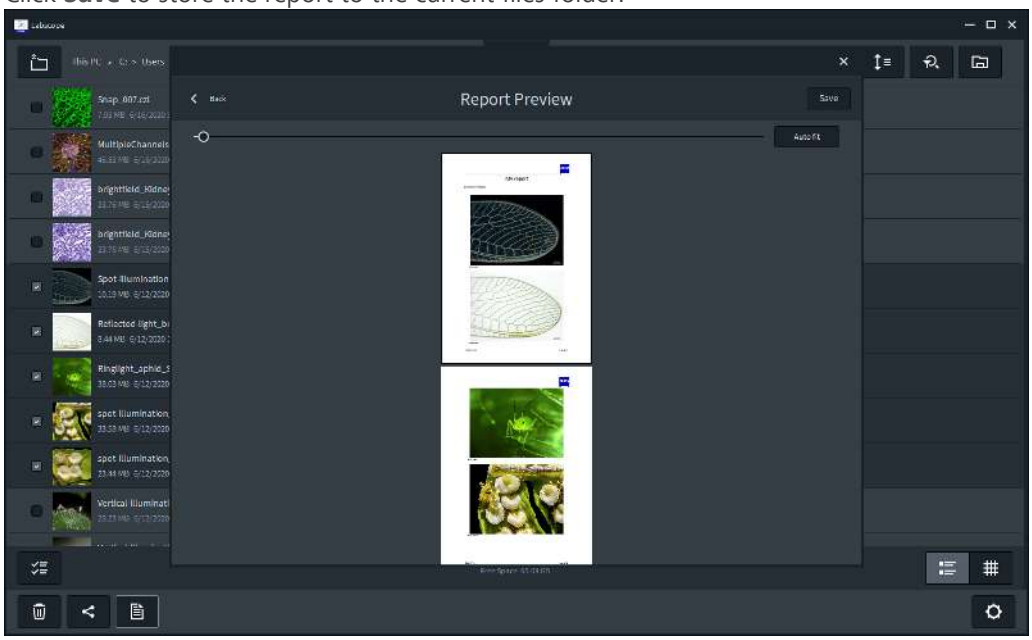


→ The window of **Input Missing Data** will be displayed.

3. Enter a title, choose to add or delete some images and click **Preview**.



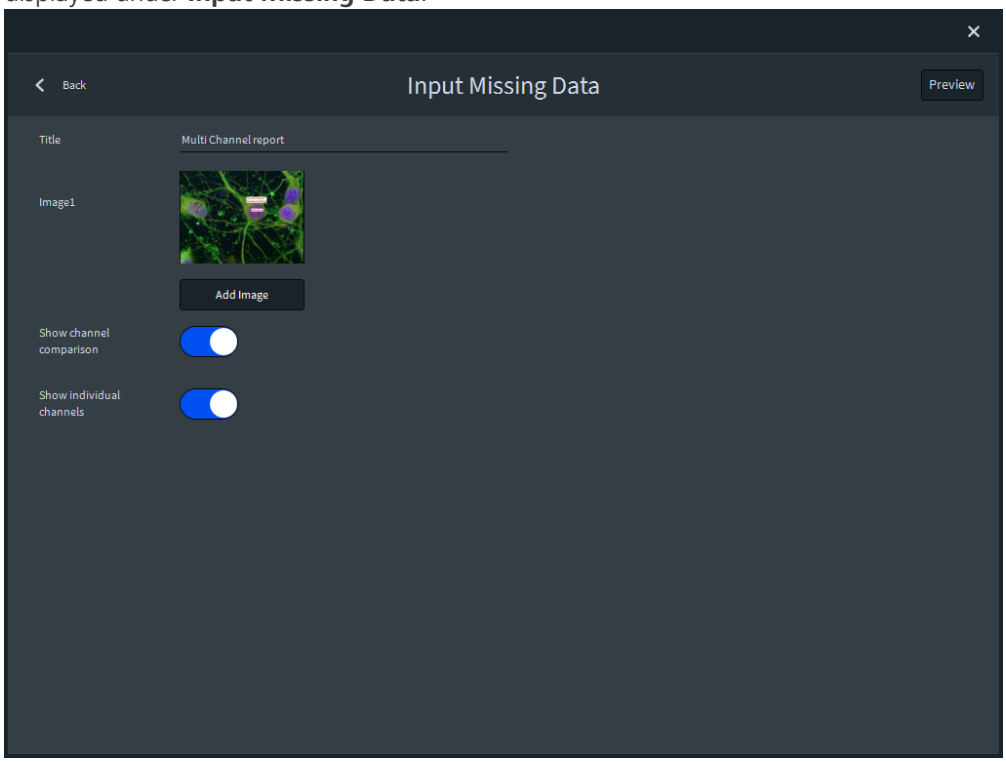
4. Click **Save** to store the report to the current files folder.



13.2 Generating Reports for Multi-Channel Images

Procedure

1. Activate the **Multi-Channel** module.
2. Create a report as explained in chapter *Generating Reports [▶ 43]*.
   → 2 additional toggles (**Show channel comparison** / **Show individual channels**) will be displayed under **Input Missing Data**.

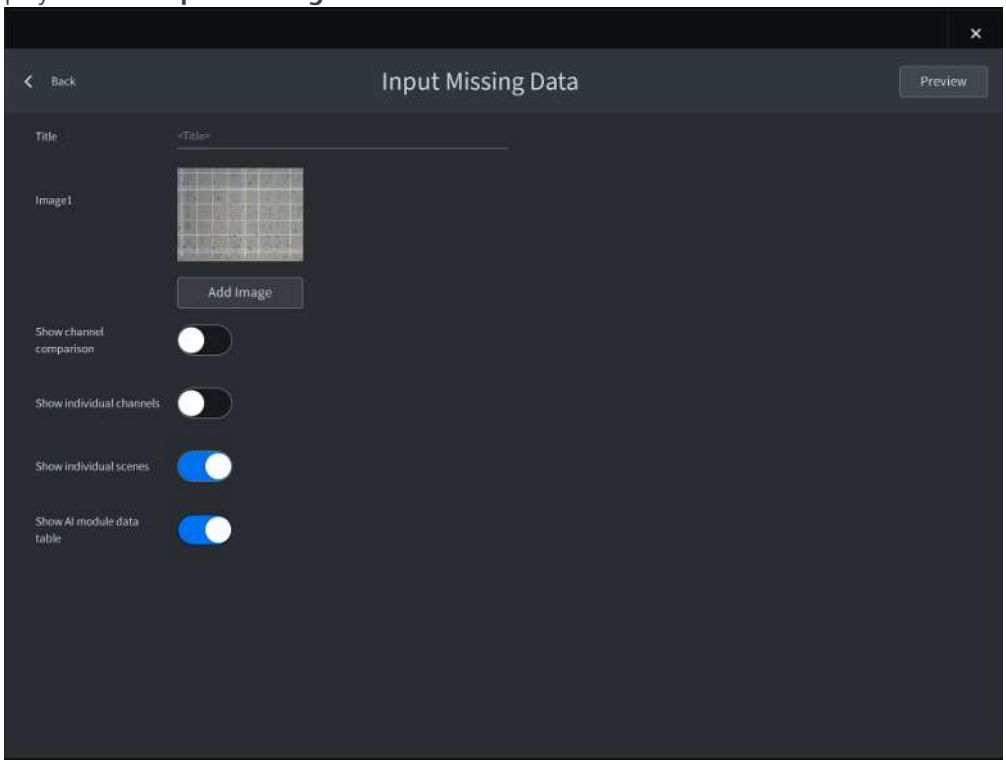


3. Select **Show channel comparison** to display the image of all channels (like in **Comparison / Split View**) in the report.
4. Select **Show individual channels** to display each individual channel image in the report.

13.3 Generating Reports for AI Modules Images

Procedure

1. Activate **AI Modules** from module manager in settings.
2. For acquired image with AI Modules data, access into the Report function as mentioned above.
   → Additional toggles (**Show AI module data table** / **Show individual scenes**) will be displayed under **Input Missing Data**.



3. Follow the wizard to complete the Report generation.

14 Files View

In this view you can manage relevant files on your device.

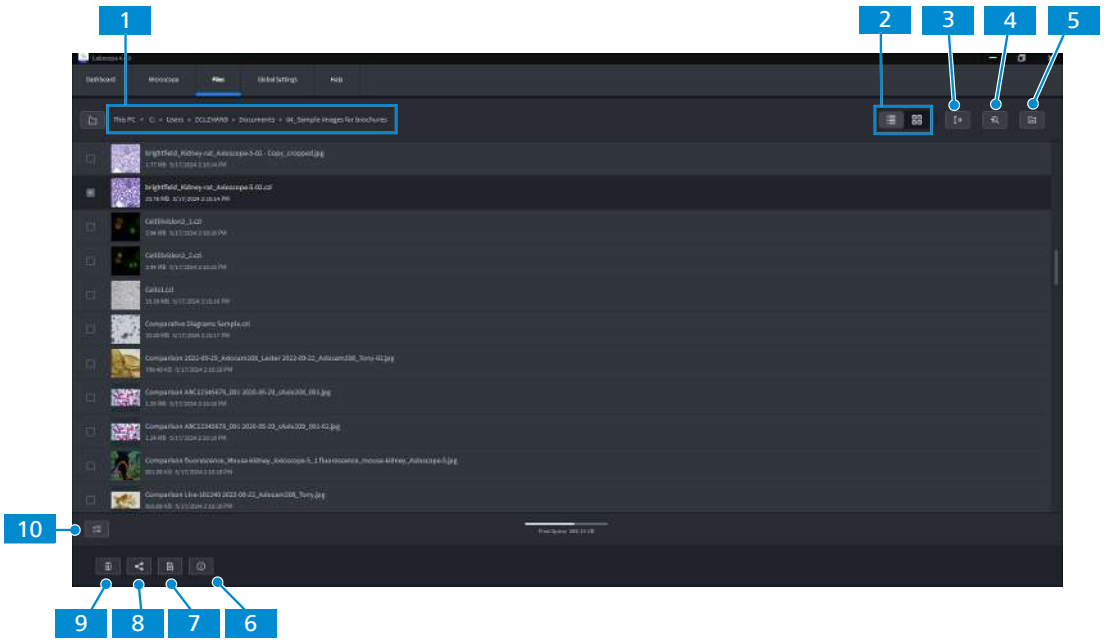


Fig. 7: Files View

1 File Location

It displays the current Labscope file saving path. To change a saving path, click on the directory to access to parent directory or root directory, then browse in the file regions and double-click on any folder then it becomes the current saving directory.

2 Switch File Views

3 Sort Files

Sort files according to the desired options.

4 Search Files

5 Open Folder

Opens the folder of the current file location.

6 File Info

Select a single image and check the meta data.

7 Report

See in chapter *Generating Reports [▸ 43]*.

8 Share

Select files and share them via QR code or email, or implement a batch export to other format.

For QR code file sharing, Labscope allows seamless file sharing between devices under the same WLAN connection, including connections via Wi-Fi adapters. It supports cross-platform file sharing between Windows, iOS, and Android devices by using Labscope.

9 Delete

Select files and delete. Deleted files will be moved into your Windows Recycle Bin.

10 Select All Files

15 Image Processing

Image processing can only be performed on an acquired single channel image. You can use the image processing functions to improve the display of the image.

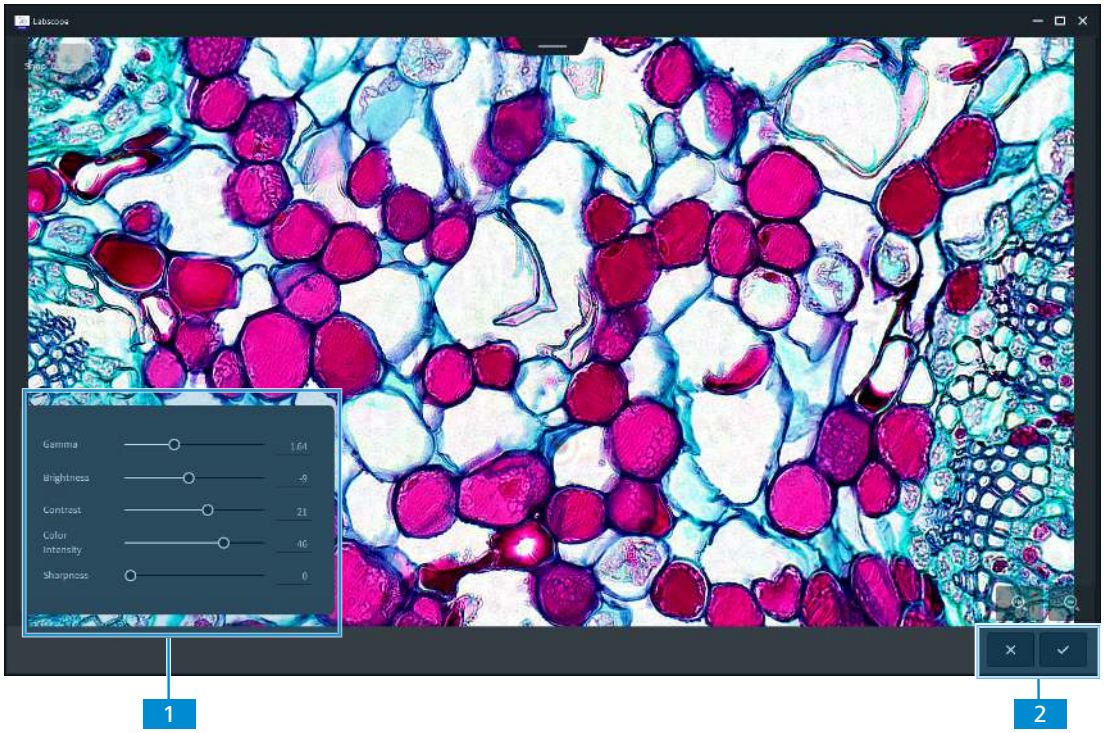


Fig. 8: Image Processing

1 **Adjust Settings**

Adjust the sliders of the individual functions to perform the changes of Gamma, Brightness, Contrast, Color Intensity and Sharpness.

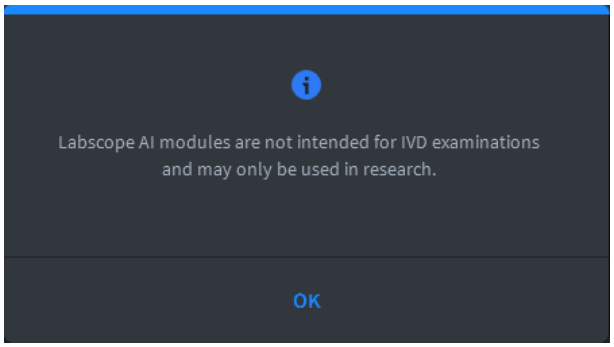
2 **Apply Settings or Cancel**

16 Global Settings

Parameter	Description
General	
– **Language**	Select the language of the application.
– **Show virtual microscopes**	If activated, the virtual microscope will displayed on the Microscope view screen.
– **Microscopes can be added manually**	If activated, you can manually add a microscope by typing in the IP address. Use this when microscopes are in different VLANs or subnets with the Labscope devices.
– **Default file format for snapped images**	Choose the default image formats for image acquisition, e.g. CZI, JPG, TIF, CZI+JPG and CZI+TIF.
– **Overwrite image on save**	When saving an image, the previous image will be deleted.
– **Theme**	Select between dark and light theme.
– **Hotkey for acquisition**	Set the default acquisition hotkey for snapping and recording for the use of input devices like foot pedal or keyboard. If you use a foot pedal, you will need to set the hotkey of foot pedal in its driver to be same as the hotkey of Labscope. **Info:** The default acquisition hotkey is *Space*.
– **Auto histogram acquisition**	Set auto histogram (min/max or best fit) for each acquisition. The relevant histogram effect will be applied automatically for your acquisition each time.
– **Show Text Label For Tools**	Enable it and tools' names will be labeled on toolbar.
– **Reset Labscope**	Reset Labscope to its default settings after restart the program.
Available tools	To configure the availability and display of tools in toolbar. You can use the Quick Selection to apply some recommended tool sets between Default, Digital Classroom Use and Laboratory Use.
Annotation	Different from the annotation adjustment in Microscope View or Image View, the settings here are for changing the default annotation properties.
– **Measurement Unit**	Change the unit of measurements here.
– **Show measurements by default**	If activated, measurements are displayed by default when you add them to an image.
– **Default color**	Set the default color for annotations here.
– **Transparent**	If activated, the annotations are displayed with a transparent background.

Parameter	Description
– **Text background color**	Set the background color for text annotations here.
– **Default size**	Set a default text size here.
– **Decimal places**	Set the default decimal places for the measurements.
– **File Name Template configuration**	You can configure and apply a template for auto naming for each snapped image.
File Name Template Configuration	Automatically set file name for each acquisition, according to configured file name template rules.
Module Manager	Here you can enable/disable the corresponding modules. Note for some modules, there will be a hint showing that you have to restart the application to apply to the module changes. When you click **Info**, detailed module information will show up. Here you can also select **Free trial** or **Purchase** directly.
– **Connect to Labscope Teacher** (included)	This module is for students' Labscope to be able to connect to the **Labscope Teacher**. **Info:** Labscope Teacher is a licensed software. Consult your sales representatives for an enquiry, demo and free trial.
– **Multi Channel** module	It provides an easy solution for acquisition of fluorescence and transmitted light images in independent channels. It also supports adding false-color, comparing channels and reporting with displaying each channel. **Info:** The one-click solution of Auto and Repeat Multi Channel mode are only available for encoded microscopes like Axiolab 5, Axioscope 5 and Axiovert 5 SCB.
– **Fast Panorama** module	This module provides an easy acquisition of whole slide images (WSI) with manual microscopes. By manually moving the stage, images of the specimen will be stitched together automatically into a panoramic image. **Info:** The supported camera types are: Axiocam 305 mono/color.
AI Cell Confluency module	The Labscope module **AI Cell Confluency** is an AI based solution that automatically determines the confluency level of the adherent cell culture. Primarily optimized for phase contrast images of adherent cell cultures.
AI Cell Counting module	The Labscope module **AI Cell Counting** is an AI based solution that automatically determines the number of adherent cells in the field of view. It does also support cell nuclei counting in fluorescence. Primarily optimized for phase contrast images of adherent cell cultures, and fluorescently stained cell nuclei.
AI Cell Counting with Counting Chamber module	The Labscope module **AI Cell Counting with Counting Chamber** is an AI-based solution that automatically recognizes the cell counting chamber grids of most common hemocytometers. The algorithm recognizes and counts the viable and non-viable cells within a square area. The output of this AI module is the total cell count per ml, viable cells per ml and dead cells per ml. Trypan blue staining is required for the dead/live cell count.

Parameter	Description
AI Cell Transfection Efficiency module	The Labscope module **AI Cell Transfection Efficiency** is an AI-based solution that automatically detects transfected cells using fluorescence markers among all cells in the field of view of the microscope camera and outputs the results of transfection efficiency. The output of this AI module includes the number of transfected cells, the total cell count, and the transfection efficiency as a percentage. Fluorescence and phase contrast are required for this AI module. In addition, the Labscope module **Multi Channel** is required if you want to use the AI transfection module in the live mode of the microscope.
Publisher	Displays product name with version info, legal information regarding the publisher, intended purpose, UDI label, data protection notice, and end user license agreement.



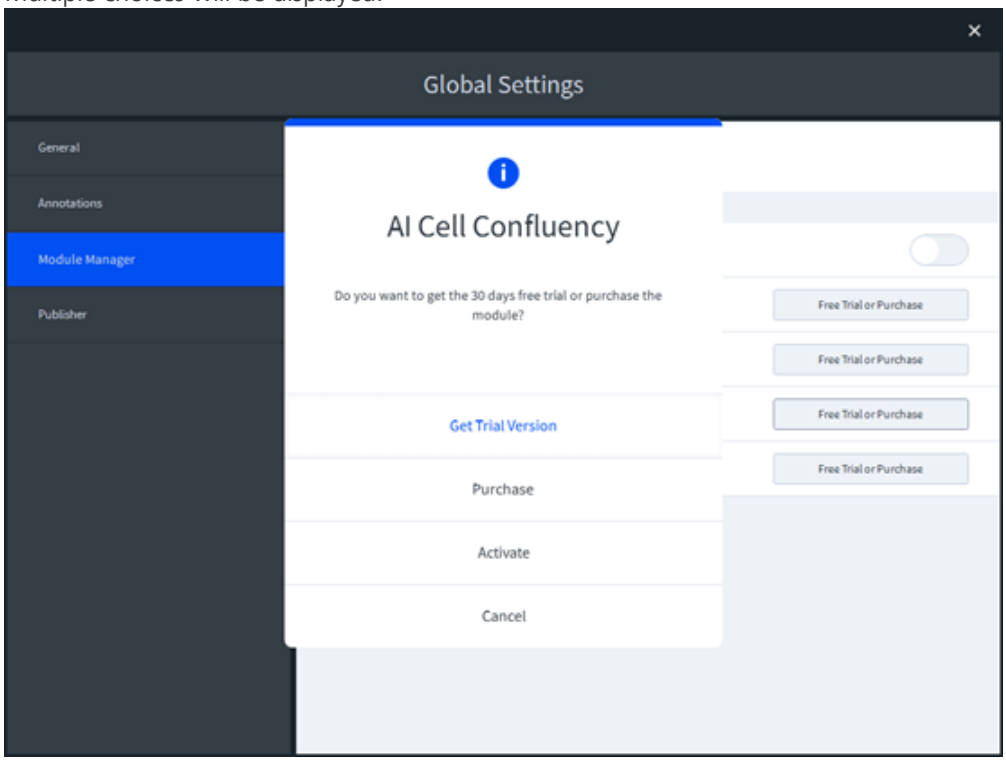
NOTICE **Labscope AI modules are not intended for IVD examinations and may only be used in research.**

16.1 License Trial, Purchase or Activation

> **Info**
>
> Note that for this action an internet connection is required.

Procedure

1. Under **Global Settings**, click **Module Manager**.
2. Click **Free Trial or Purchase**
   → Multiple choices will be displayed.



- **Trial Version:** It will route to ZEISS Portal where you can apply for a 30-day trial license.
- **Purchase:** It will route to ZEISS Online Shop where you can purchase a license. Online shop purchase is only available for specific regions. Consult with your local sales representatives for license ordering.
- **Activate:** After getting your license, you can enter the license key here to activate it when the device is in internet connection.

You can also activate or manage the licenses via ZEISS License Management Tool (ZLMT).

The ZEISS License Management Tool (ZLMT) will be installed together with Labscope installation. You can find the software from your Windows start. The activated license can be revoked and re-activated on another PC/Laptop by the ZLMT. Read more in the ZEISS Software Licensing Manual.

17 Application and System Requirements

Info

Starting with Labscope 4.5 for Windows, it is compatible with ARM64 Snapdragon chip devices, such as the Surface Pro 11, all ZEISS network cameras and Axiovert 5 SCB/digital. Note that standalone ZEISS USB camera connections are not supported on the ARM64 Windows devices.

Application

Category / Field of Application	Education, Documentation, Microphotography, Laboratory, Research, and IVD examinations (Labscope for Windows only)
Compatible ZEISS microscopes	Primostar 3, Primo Star HDcam, Primotech, Primovert, Stemi 305 cam, Axioscope 5/7/Vario, Axiolab 5 and Axiovert 5
Compatible ZEISS cameras	Axiocam ERc 5s, Educam 105, Axiocam 202 mono, Axiocam 203 mono, Axiocam 208 color, Axiocam 212 color, Axiocam 105 color (Windows only) and Axiocam 305 mono/color (Windows only)
Languages	English, Czech, French, German, Italian, Japanese, Korean, Polish, Portuguese, Russian, Simplified Chinese, Spanish

System Requirements

	Labscope for Windows
Operating System	Windows 10 & 11 (64-bit)
Minimum Hardware Requirements	CPU: i3 (8th generation) dual-core @ 2.5GHz RAM: 6GB
Recommended Hardware Requirements	CPU: i5 (9th generation) quad-core @ 3.0GHz or above RAM: 8GB or above

System Requirements ZEISS Labscope Module Fast Panorama

Operating system	Windows 10 & 11 (64-bit)
Minimum hardware	CPU: i5 (8th generation) quad-core @ 3.0 GHz RAM: 8 GB or above
Recommended hardware	CPU: i7 (9th generation) hexa-core @ 4.0 GHz or above RAM: 16 GB or above
Supported camera types	Axiocam 305 mono/color Note that not all performance specifications of the used cameras can be supplied in the Labscope environment due to application specific restrictions.

18 Troubleshooting

This chapter contains information on how to tackle common problems while installing Labscope for Windows.

18.1 Manually Install Camera Drivers for USB Connections

If there are camera drivers not successfully installed during Labscope installation process, follow these steps to trigger a manual installation:

Procedure

1. Finish installation of Labscope.
2. Open the folder **C:\Program Files\Carl Zeiss\Labscope\DriverInstaller**
3. Open the relevant camera driver folder.
4. To install the driver, double click the file **DPInst.exe**.

18.2 Version Check for Installations

If this reminder pops up during the installation, “The version (xx) you want to install is earlier than the already installed version (xx)”, check the Labscope version and install the latest version of Labscope.

18.3 Check the LabscopeService in the Task Manager

If Labscope does not open after double clicking on the Labscope icon, open the Task Manager of your Windows device and check the LabscopeService. End the service, then start Labscope again.

18.4 Check Camera Network Connections

If Labscope failed to discover the camera automatically under network connection, check the camera connections and ensure your Labscope device is in the same network of the camera. Try to use different router or different connection ways to sort out the possible reason. If the devices are under MultiVlan network, you can use the function Manually Add Microscope to establish connection.

Carl Zeiss Microscopy GmbH
07745 Jena, Germany
www.zeiss.com/microscopy

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