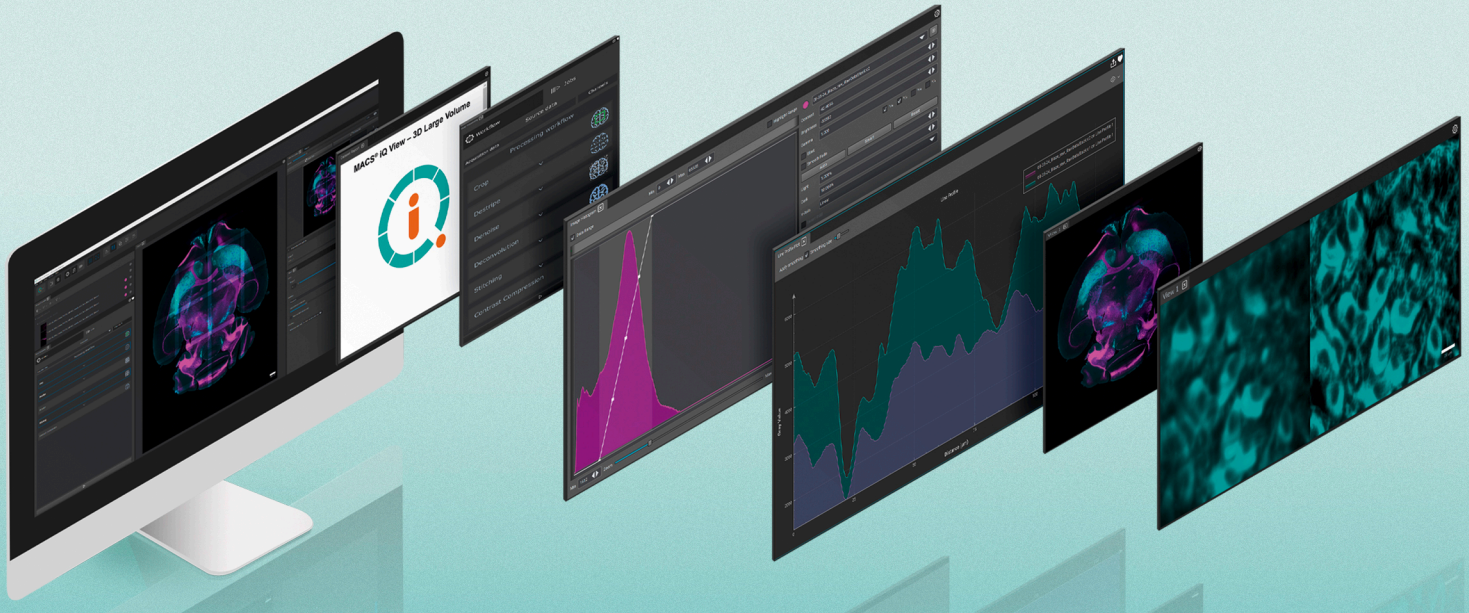
Miltenyi Biotec

MACS® iQ View – 3D Large Volume 1.2

User manual



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MACS® iQ View – 3D Large Volume 1.2

User manual

Original instructions

Issued: 2025-09
140-006-421-002.02

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1 Introduction

MACS iQ View – 3D Large Volume is a light sheet microscopy image processing software designed for managing and processing large 3D datasets acquired by the UltraMicroscope Blaze Imaging System or the UltraMicroscope Choros Imaging System. Its user-friendly interface simplifies navigation and operation, making it accessible to users of all skill levels. The software can be used for 3D cropping, destriping, denoising, deconvolution, stitching, and contrast compression.

2 Getting started

2.1 System requirements

To achieve optimum performance and user experience, this software requires a high-end workstation PC. The minimum and recommended system requirements are listed in **Table 2.1**. As a general rule, newer, more powerful systems are better.

System requirements		
	Minimum	**Recommended**
Operating system	Windows 10 Pro (64-bit)	Windows 11 Pro (64-bit)
CPU	Intel® Xeon® with 12 cores	AMD Ryzen™ Threadripper™ with 16 cores or more
Memory	256 GB DDR4 RAM	256 GB DDR5 RAM or more
Free space	16 TB M.2/NVMe SSD	16 TB M.2/NVMe SSD or more
Graphics hardware	Dedicated PCIe NVIDIA® Graphics Card with CUDA support and 8 GB of vRAM	Dedicated PCIe NVIDIA® Graphics Card with CUDA support and 16 GB of vRAM or more
Display (resolution in pixel)	FHD (1920 × 1080)	4K UHD (3840 × 2160)

Table 2.1: System requirements

2.2 Installation

To install MACS iQ View – 3D Large Volume, perform the following steps:

1. Unpack the ZIP file using the **Windows Explorer**.
2. Right-click the executable file and select **Run as administrator**. This is why administrator privileges are needed for the installation.
3. Enter the license key.

The license key is linked to the hardware of the workstation PC. Changes to the hardware may require a new license key.

3
Graphical user interface

This chapter describes the graphical user interface (see **Figure 3.1**). Most functions can be accessed via the menu bar (1). Frequently used functions can also be accessed directly from the toolbar (2).

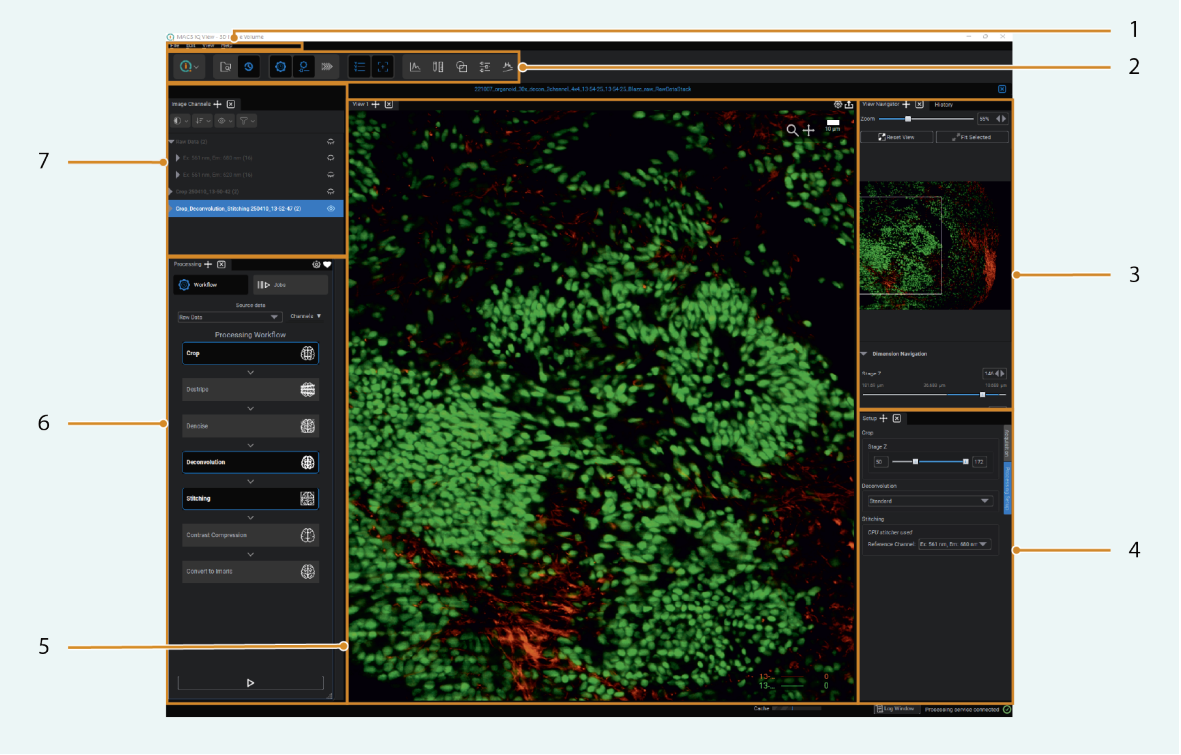


Figure 3.1: Graphical user interface

Position	Element	Description
1	Menu bar	Read more on the next page
2	Toolbar	Read more on page 12
3	**View Navigator** window	Read more on page 18
4	**Setup** window	Read more on page 18
5	**View** window	Read more on page 21
6	**Processing** window	Read more on page 15
7	**Image Channels** window	Read more on page 25

3.1 Menu bar

The following menus can be accessed via the menu bar:

- File
- Edit
- View
- Help

3.1.1 File menu

The **File** menu (see **Table 3.1**) can be used to load and save files, images, and projects. Blue icons refer to windows that are already open.

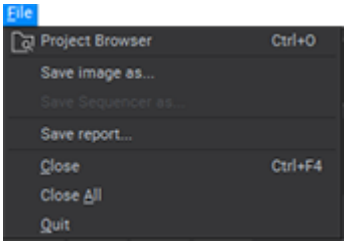


Figure 3.2: File menu

Project Browser	Opens the **Project Browser** window (see **Project Browser window on page 20**)
Save image as...	Saves the current view as an image
Save Sequencer as...	Saves the Sequencer (see **Sequencer window on page 26**)
Save report	Saves a report of the current project
Close	Closes the current project
Close All	Closes all projects
Quit	Closes the software

Table 3.1: File menu

3.1.2 Edit menu

The **Edit** menu can be used to open the **Preferences...** window (see **Preferences on page 27**).

3.1.3 View menu

The **View** menu (see **Table 3.2**) can be used to change the window contents and open additional windows for processing, image manipulation, or tools. Blue icons refer to windows that are already open.

Zoom	Zooms in/out of the image or to specific presets
Fit To View	Fits the image into the **View** window
Delete Selected	Deletes the selected object (drawing or measuring tools)
Full Screen	Switches to full screen mode
Next Tab	Switches to the next window tab
Previous Tab	Switches to the previous window tab
Main Toolbar	Toggles the main toolbar
Main Toolbar Titles	Toggles the main toolbar titles
Project Browser	Opens or closes the **Project Browser** (see **Project Browser window on page 20**)
Image Channels	Opens or closes the **Image Channels** window (see **Image Channels window on page 13**)
View Navigator	Opens or closes the **View Navigator** (see **View Navigator window on page 18**)
Properties	Opens or closes the **Properties** window (see **Properties window on page 21**)
Tools	Opens or closes the **Tools** window (see **Tools window on page 23**)
Image Histogram	Opens or closes the image histogram
Image Overlays	Opens or closes the **Image Overlays** window (see **Image Overlays window on page 25**)
Sequencer	Opens or closes the **Sequencer** window (see **Sequencer window on page 26**)
Reference Browser	Opens or closes the **Reference Browser**
Process Log	Opens or closes the **Process Log** window
Image Errors	Opens or closes the **Image Errors** window

Table 3.2: View menu

3.1.4 Help menu

The **Help** menu (see **Table 3.3**) can be used to obtain information about the software, the system, and the licensing information about the software modules used. The most important shortcuts and a function for exporting log files can also be found here.

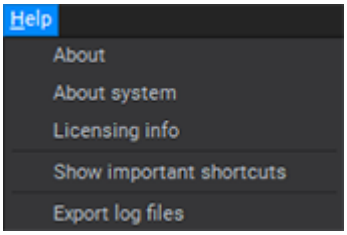


Figure 3.3: Help menu

About	Shows the MACS iQ View – 3D Large Volume Software version and build
About system	Shows system information like operating system, paths, etc.
Licensing info	Shows the licensing information about the software modules used
Show important shortcuts	Shows the most important shortcuts
Export log files	Exports the log files as a ZIP file

Table 3.3: Help menu

3.2 Toolbar

Often used functions and features of the software can be accessed via the toolbar. Blue icons refer to windows that are already open. By clicking on the blue icons, the windows are closed.



Figure 3.4: Toolbar

About/Layout	• Shows details about the software • Opens a predefined layout, restores or saves a custom layout
Project Browser	Opens or closes the **Project Browser** (see **Project Browser window on page 20**)
History	Opens or closes the **History** window
Processing	Opens or closes the **Processing** window (see **Processing window on page 15**)
Setup	Opens or closes the **Setup** window (see **Setup window on page 18**)
Batch Processing	Starts the batch processing
Image Channels	Open or closes the **Image Channels** window (see **Image Channels window on the facing page**): • Opens list view of imaged channels • Selects or changes the color of a channel • Enables turning channels on and off
View Navigator	Opens or closes the **View Navigator** (see **View Navigator window on page 18**): • Adjusts current zoom settings for the image region shown • Moves field of view (FOV) to different areas of the image
Image Histogram	Shows fluorescence histogram for adjusting image contrast, brightness, and minimum/maximum pixel intensity values

	Tools	Opens or closes the **Tools** window (see **Tools window on page 23**)
	Image Overlays	Opens or closes the **Image Overlays** window (see **Image Overlays window on page 25**)
	Properties	Opens or closes the **Properties** window (see **Properties window on page 21**)
	Line Profile Plot	Opens or closes the **Line Profile Plot** window

Table 3.4: Buttons of the toolbar

3.3 Windows

The software functions can be accessed via various windows. The windows can be accessed either via the menu bar or via the toolbar. When the software is started for the first time, the windows are arranged in the Processing layout.

Each window has a dock and a close widget (see **Figure 3.5**). To move a window freely or to dock it to another location, you can click and hold the dock widget. A blue dock indicator appears when docking (see **Figure 3.6**).



Figure 3.5: Dock (left) and close (right) widget of the **Image Channels** window

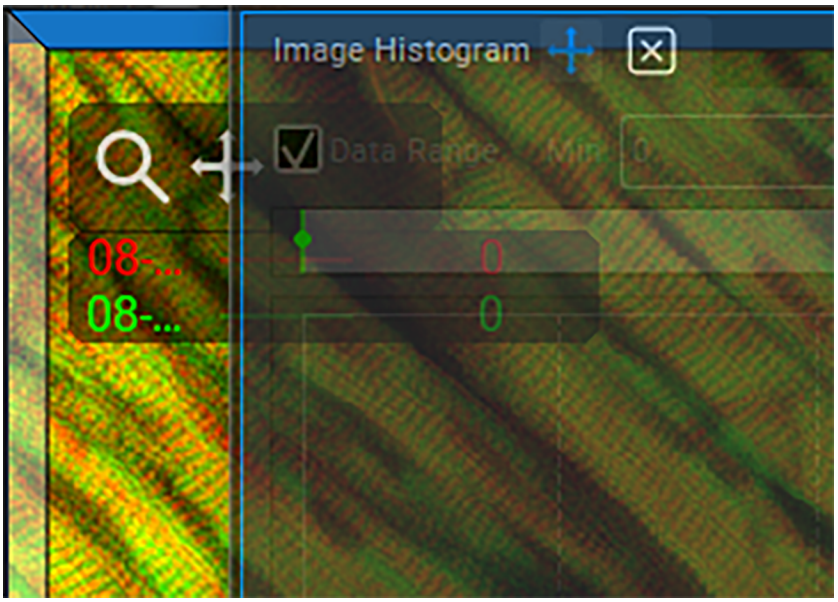


Figure 3.6: Blue dock indicator

3.3.1 Image Channels window

The **Image Channels** window can be used to adjust the contrast of different channels, sort them, show or hide them, and filter them. The channels are arranged in a tree structure. The processing status of the data is at the top level, followed by the channel(s) and finally the dye(s) used.

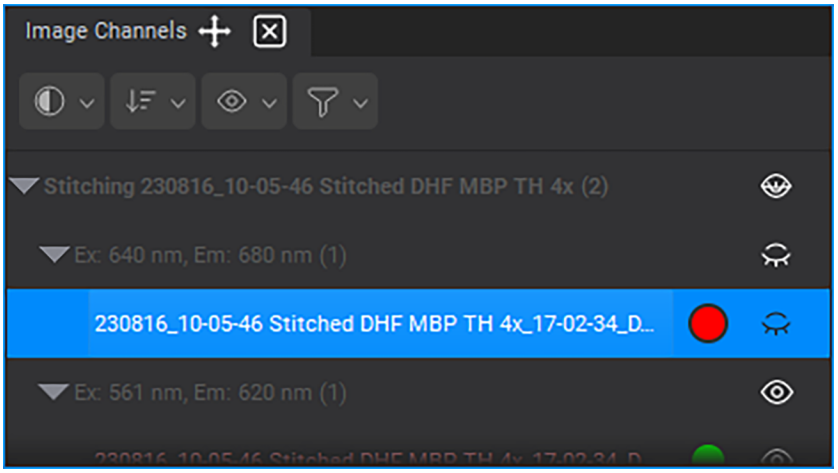


Figure 3.7: Image Channels window

Contrast	Accesses different **Covenient Auto Contrast** options, **Edit** display settings, as well as color, visibility, and contrast options, or **Special Use Cases**
Sorting	Sorts channels by metadata, name, or visibility
Visibility	Shows visible or selected channels
Filter	Filters by plain text or visibility
FullyVisible	Visible channel – click to hide this channel
Hidden	Hidden channel – click to make this channel visible
Mixed	Group contains visible and hidden channels

Table 3.5: Image Channels window icons

To create a new group of channels or copy the colormap settings, you can right-click the data. A group is visible as a tree structure.

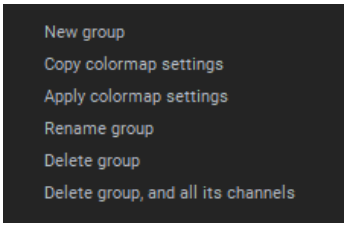


Figure 3.8: Image Channels group

To show or hide the channel or make it blink, you can right-click a channel (see **Figure 3.7**).

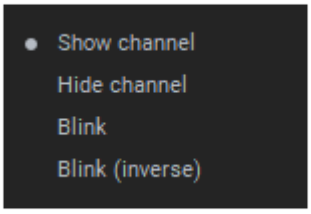


Figure 3.9: Image Channels options

3.3.2 Processing window

In the **Processing** window, the desired jobs for the processing workflow (see **Table 3.6**) can be selected under **Workflow**.

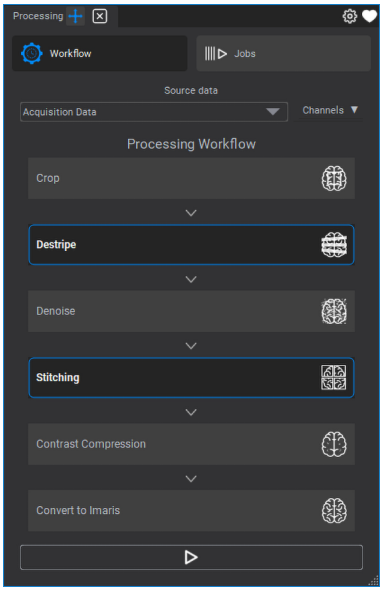


Figure 3.10: Processing window

Crop	Crops the data along the x-, y-, and z-axis by defining a region of interest
Destripe	Removes striping artifacts caused by light scattering or absorption (only available if data is not stitched)
Denoise	Reduces image noise while maintaining the spatial resolution of the image (only available if Deconvolution mode is not used in processing and data is not stitched)
Deconvolution	Enhances resolution in all three spatial directions in combination with the Deconvolution mode integrated in the ImSpector software (only available if **Denoise** is not used in processing and data was acquired in Deconvolution mode and is not stitched)
Stitching	Enables seamless stitching of 3D mosaic images (only available if mosaic image was acquired)
Contrast Compression	Compresses the dynamic range to display both bright and dim structures at the same time
Convert to Imaris	Converts into an Imaris compatible format (available if not a mosaic image was acquired or if **Stitching** is also selected)

Table 3.6: Processing window icons

The processing workflow can be started by clicking the **Start processing / add workflow to processing queue** button at the bottom of the **Processing** window.

The progress of the processing can be viewed by switching between **Workflow** and **Jobs**. At the bottom of the **Jobs** window, it is possible to **Remove finished** jobs or **Remove all** jobs by clicking the corresponding button.

Heart menu

In the **Heart** menu, the following options are available:

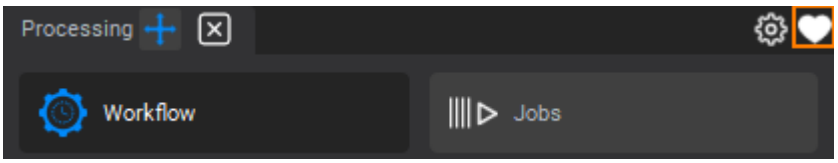


Figure 3.11: Heart menu

Function	Description
Processing Presets	Selects predefined processing presets
Custom Workflows	Selects customized workflows with options to add and manage them. Clicking **Manage Workflows** opens a dialog in which selected custom workflows can be removed
Workflow Filtering	Shows only workflows matching the data type, for example: • workflows with a stitching step appear only when mosaic data is opened, • workflows with a **Deconvolution** step are available only when data was acquired in the corresponding mode

Table 3.7: Heart menu functions

3.3.3 Batch Processing window

The **Batch Processing** window can be used to start jobs without importing the data. Since importing large datasets (>500 GB) can be time-consuming, this widget is especially recommended for large-scale automated processing workflows.

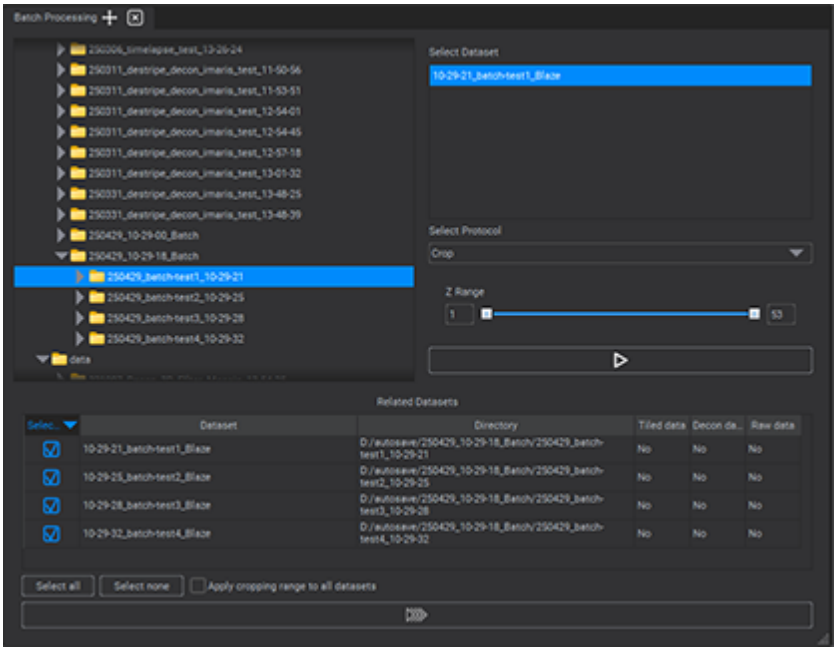


Figure 3.12: Batch Processing window

Function	Description
Select Dataset	Shows all datasets in the selected folder
Select Protocol	Lists all available processing workflows applicable to the selected dataset. These include: • Standard (e.g., **Crop**) • Combined (e.g., **Stitching and Imaris**) • User-defined
Z Range	Restricts processing to a specific z-plane range, useful for trimming unused parts of the acquisition
Start button	Adds the selected job to the processing queue. Jobs are executed in the order they were added

Table 3.8: Batch Processing window functions

If the **Stitching** workflow is selected, **Channel Selection** becomes available. By this, a specific image channel can be selected on which the stitching algorithm is calculated. This ensures optimal alignment based on the most informative channel.

If the dataset was acquired using the **Batch Measurement Mode** of the imaging system, the widget automatically recognizes this and activates batch-specific controls:

- A list of all subdatasets is shown with checkboxes
- Multiple measurements can be processed all at once
- A **Start Batch Processing** button is shown at the bottom of the window, allowing the selected jobs to be added to the queue together

3.3.4 View Navigator window

The **View Navigator** window can be used to zoom into and out of the image in the **View** window, navigate through the z-stage, and change the horizontal focus. This can either be done by moving the slider or entering a number in the corresponding field.

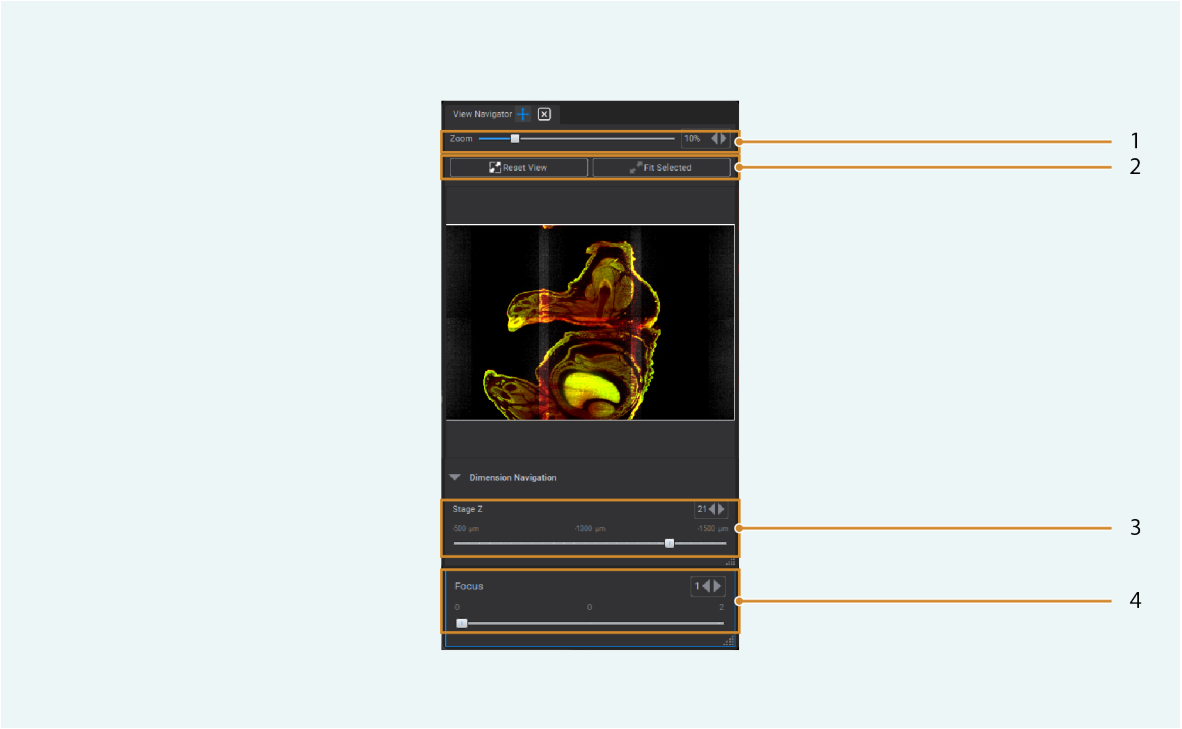


Figure 3.13: View Navigator window

Position	Function	Description
1	**Zoom** slider	Percentage to zoom into or out of the image
2	**Reset View** or **Fit Selected**	Resets the view or fits the image to the **View** window
3	**Stage Z** slider	Navigates through the z-stage
4	**Focus** slider	Changes the horizontal focus

3.3.5 Setup window

The **Setup** window can be used to set various parameters for the selected step from the **Processing window on page 15** or to show the acquisition data info.

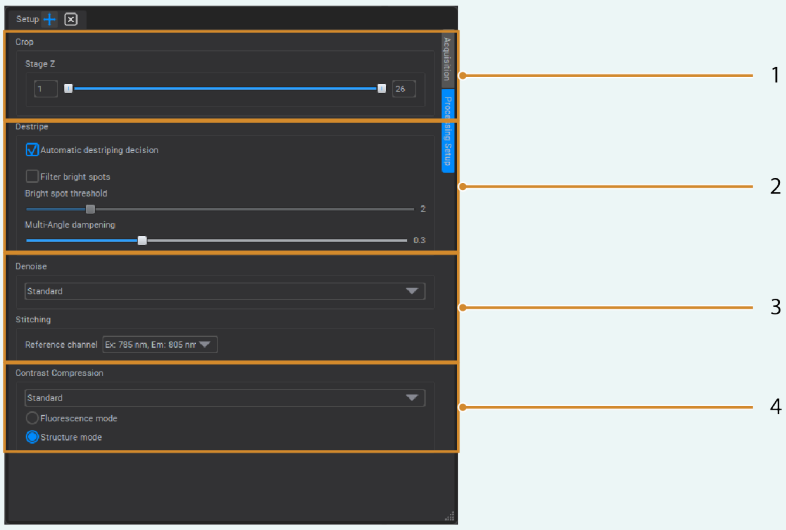


Figure 3.14: Setup window

Position	Function	Description
1	**Crop**	Crops the entire view
2	**Destripe**	
	• **Automatic destriping decision**	Determines automatically which stacks require destriping
	• **Filter bright spots**	Reduces artifacts by filtering bright spots
	• **Bright spot threshold** slider	Classifies pixels exceeding a set number of standard deviations above the mean as bright
	• **Multiangle dampening** slider (only available based on the data's acquisition setup, e.g., use of all or the outer two light sheets)	Reduces artifacts when processing multiple angles
3	**Denoise**	
	• **Standard**, **Progressive**, or **Subtle**	Customizes the intensity of the denoise effect
4	**Deconvolution**	
	• **Standard**, **Progressive**, or **Subtle**	Customizes the intensity of the deconvolution effect

3.3.6 Project Browser window

The **Project Browser** window can be used to open projects or browse files.

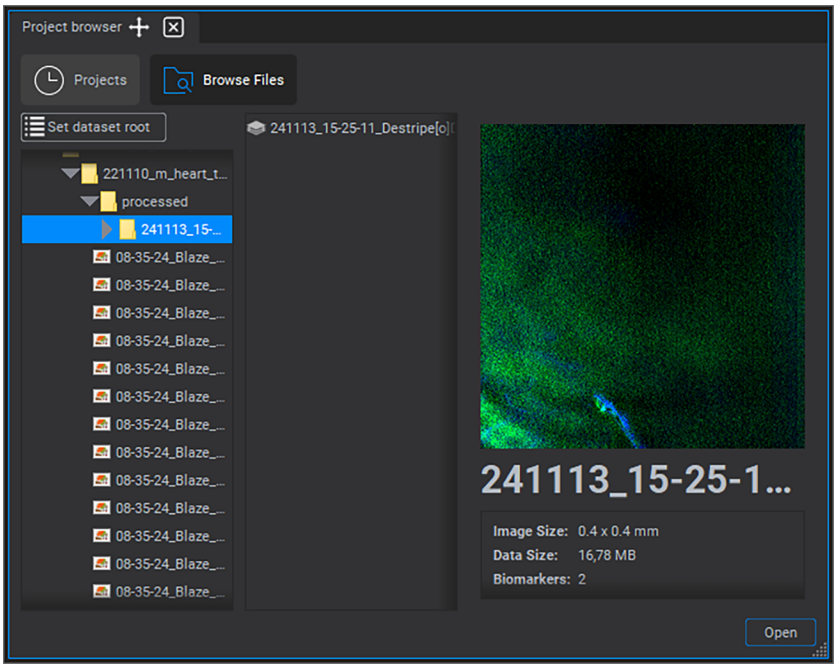


Figure 3.15: Project Browser window

Projects

1 Click **Projects** and navigate to the data folder.

2 To open the project, select the project and click **Open**.

Browse Files

1 Click **Browse Files** and navigate to the data folder.

2 To select the root folder for the project, click **Set dataset root**.

3 To open the file, select the file or folder and click **Open**.

3.3.7 Properties window

The **Properties** window can be used to change the properties of the **View** window in the vertical **View** register or a selected channel of an open dataset in the vertical **Channel** register. Additionally, the properties of the vertical **Annotation** register can be set.

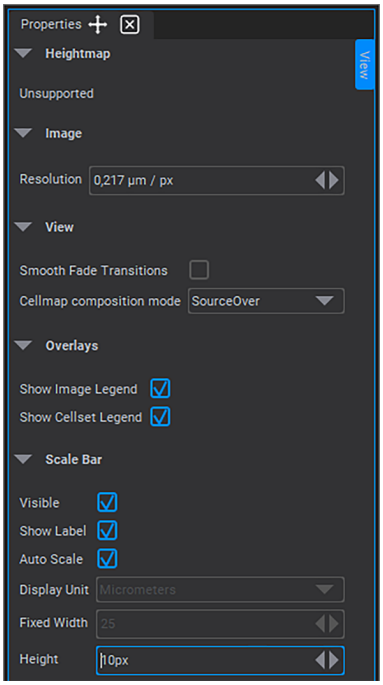


Figure 3.16: Properties window of vertical **View** register

Function	Description
Image	**Resolution**: changes the image resolution
View	• **Smooth Fade Transitions**: smoothly transitions opacity and reduces visual jarring • **Cellmap composition mode**
Overlays	• **Show Image Legend**: shows an image legend in the **View** window • **Show Cellset Legend**: shows a cell set legend in the **View** window
Scale Bar	• **Visible**: shows the scale bar • **Show Label**: shows the label under the scale bar • **Auto Scale**: lets the software decide the scaling • **Display Unit** • **Fixed Width** • **Height**: changes the height of the scale bar

Table 3.9: Properties window functions

Channel properties

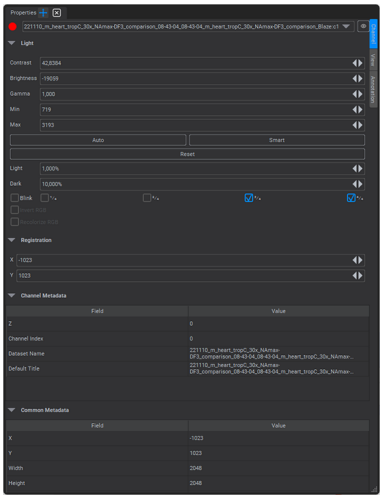


Figure 3.17: Properties window of vertical **Channel** register

Function	Description
Light	Shows colormap information and includes buttons **Auto** and **Smart** for automatic or smart adjustments
Registration	Shows x-y-registration (modifiable, but typically read from metadata)
Channel Metadata	Shows channel metadata which, while not directly useful to users, may help diagnose data issues

Table 3.10: Properties window functions of vertical **Channel** register

Annotation properties

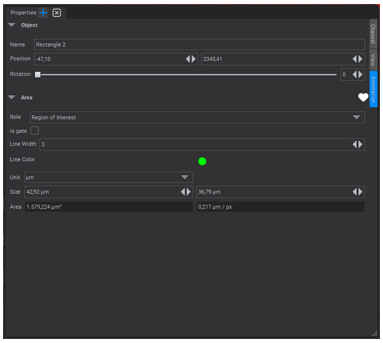


Figure 3.18: Properties window of vertical **Annotation** register

Function	Description
Object	Shifts position of the named object
Area	• Allows adjustments to annotations (for example, region of interests (ROIs)), including location, line width, and line color • Shows basic ROI information, for example, area

Table 3.11: Properties window functions of vertical **Annotation** register

3.3.8 Tools window

The **Tools** window can be used to draw and measure in the **View** window.

Drawing register

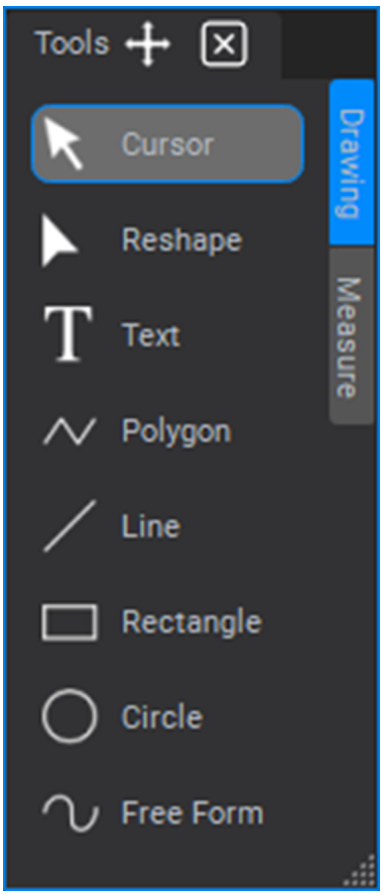


Figure 3.19: Drawing register

Tool	Description
Cursor	Selects an object or a group of objects
Reshape	Reshapes a free form
Text	Creates a text box
Polygon	Creates a polygon
Line	Draws a line
Rectangle	Creates a rectangle
Circle	Creates a circle
Free Form	Draws freehand lines

Table 3.12: Drawing register functions

Measure register

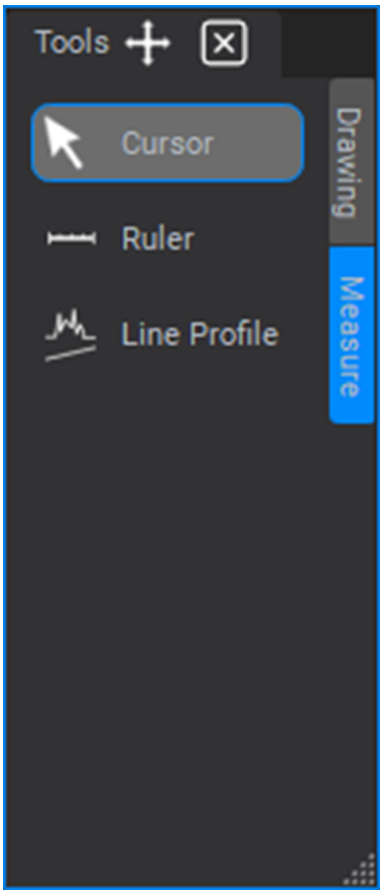


Figure 3.20: Measure register

Tool	Description
Cursor	Selects an object or a group of objects
Ruler	Draws a ruler
Line Profile	Draws a line profile plot in a new **Line Profile Plot** window (see **Figure 3.21**)

Table 3.13: Measure register functions

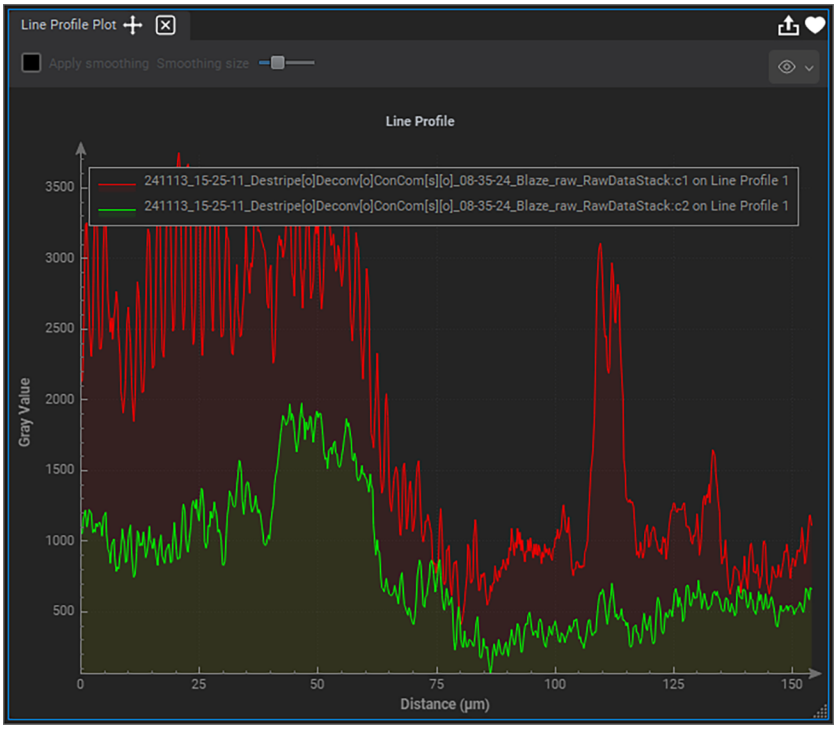


Figure 3.21: Line Profile Plot window

3.3.9 Image Overlays window

The **Image Overlays** window can be used to rename and show or hide the image overlays (for example, Rectangle or Ruler) created with the **Tools** window.

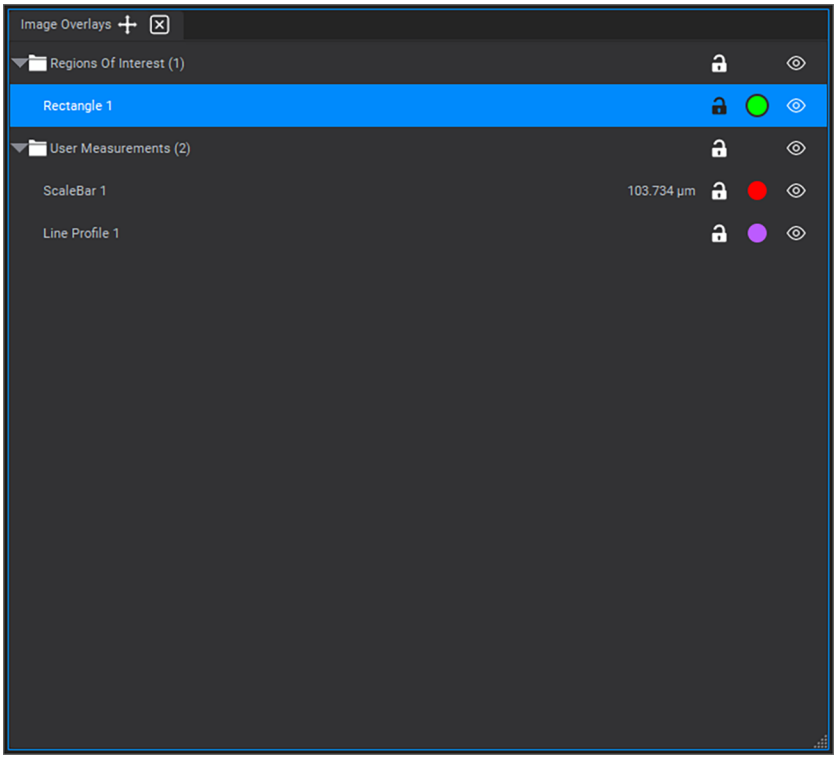


Figure 3.22: Image Overlays window

Function	Description
Double click	Changes the name of the image
Lock icon	Locks the image overlay
Color icon	Changes the color of the overlay
Eye icon	Changes the visibility of the image overlay

Table 3.14: Image Overlays icon functions

3.3.10 Sequencer window

The **Sequencer** window can be used to create and play short movie sequences from snapshots of the **View** window.



Figure 3.23: Sequencer window

	**Reset playback**	Resets the playback to the beginning of the sequence
	**Move back playback**	Moves the playback back to the previous snapshot
	**Start sequencer playback**	Starts the sequencer playback
	**Forward sequencer playback**	Forwards the playback to the next snapshot
	**Loop playback indefinitely until it is stopped manually**	Loops playback indefinitely until it is stopped manually
	**Save snapshot to file**	Saves the current snapshot to a file (TIFF, PNG, or JPEG)
	**Add snapshot to timeline**	Adds a snapshot from the **View** window to the timeline

Table 3.15: Sequencer window icons

4 Preferences

This chapter describes how to define various folders, manage the license, configure the memory management, the user interface, and scripts. The preferences can be accessed by clicking **Edit > Preferences** in the menu bar.

4.1 General

The preferences open with the **General** tab.

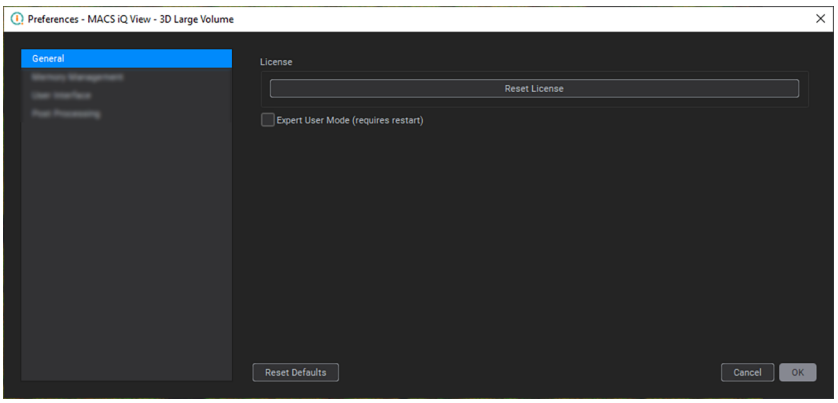


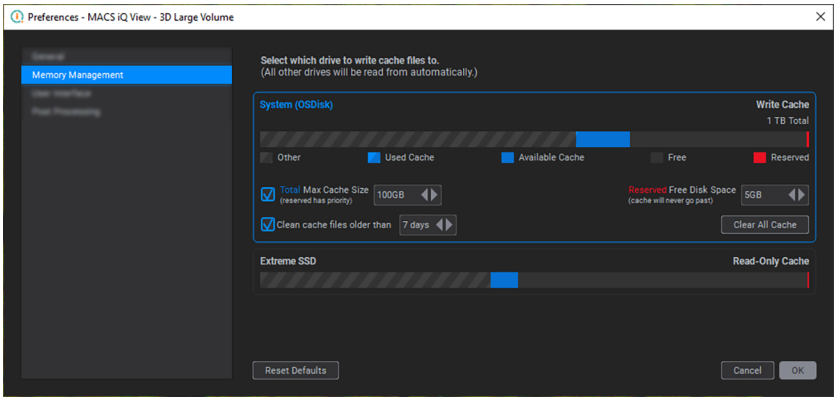
Figure 4.1: General tab

To reset your software licence, you can click **Reset Licence**. Do not select **Expert User Mode**.

4.2 Memory Management

It is recommended to manage the data and the cache on separate internal SSDs (2× 4 TB SSD-RAID cache drive).

1 To select a different drive than system, click **Memory Management**.



2 Optional: Click **Clear All Cache** to instantly clear the cache.

3 Select the drive to be used for the **Write Cache**.

4 Restart the software.

4.3 User Interface

The user settings regarding touchscreens and general settings can be changed under **User Interface**. The settings are set if the corresponding checkbox is selected. **Reset Defaults** activates only the last three settings.

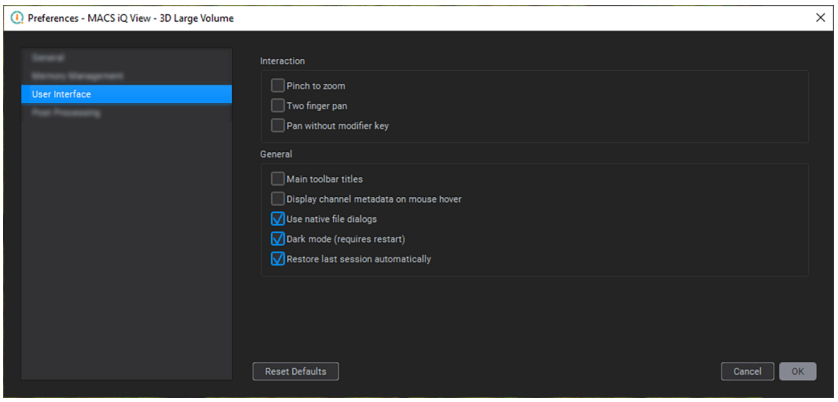


Figure 4.2: User Interface tab

Interaction (for touchscreens only)

Function	Description
Pinch to zoom	Pinches the screen for zooming
Two finger pan	Activates the two-finger pan gesture
Pan without modifier key	Pans without using the keyboard

Table 4.1: Interaction functions

General

Function	Description
Main toolbar titles	Shows titles on the toolbar
Display channel metadata on mouse hover	Shows metadata when the pointer is moved over a channel
Use native file dialogs	Shows file dialogs in the style of the operating system
Dark mode	Softens the screen with a dark theme (requires restart)
Restore last session automatically	Restores the last open project

Table 4.2: General functions

4.4 Processing

The user settings regarding output location, stitcher options, output options, communication protocol, ImSpector, and workflow between acquisition and processing software can be changed under **Processing**. Most of the settings are set if the corresponding checkbox is selected.

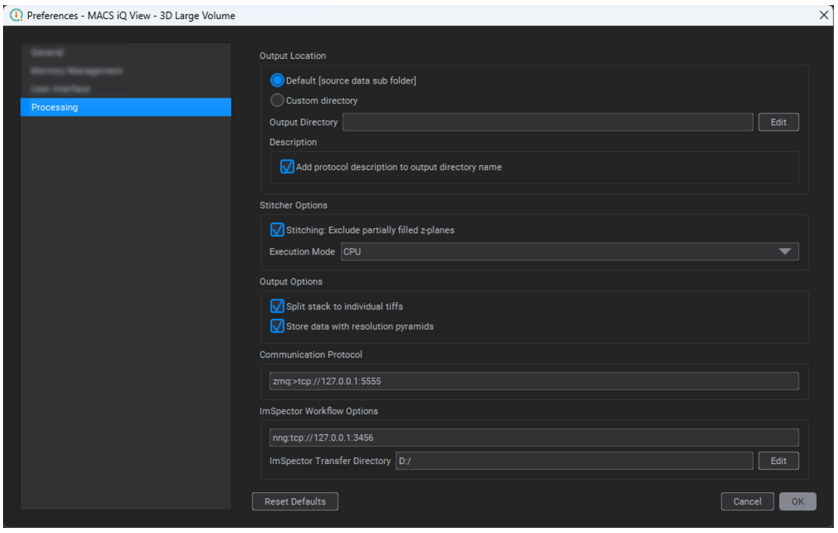


Figure 4.3: Processing tab

Function	Description
Output Location	Saves processed data either in default or custom folder
Stitcher Options	• **Stitching**: Exclude partially filled z-planes: filters out z-planes that are not completely filled, which may occur due to sample shifts at the beginning or end of an acquisition
Output Options	• **Split z stack to individual tiffs**: saves each z-plane as a separate TIFF image • **Store data with resolution pyramids**: enables multiresolution storage, which is useful if data is opened, but increases file size
Communication Protocol	Defines the protocol used to communicate with the backend processing service (change only if processing is running on a different workstation)
ImSpector Workflow Options	These settings are essential for the integrated workflow between acquisition software and processing software. If properly configured, this setup enables seamless handoff between acquisition and processing, launching workflows automatically as soon as acquisition is complete

Table 4.3: Processing functions

5 Technical support

For technical support, contact your local Miltenyi Biotec representative or Miltenyi Biotec Technical Support at Miltenyi Biotec headquarters:

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Visit **www.miltenyibiotec.com** for local Miltenyi Biotec Technical Support contact information.

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140-006-421-002.02