

The Pathology Company

**Leica**  
BIOSYSTEMS

# Aperio AT2 Console

## User's Guide



## Aperio AT2 Console User's Guide

This document applies to eSlide Manager Release 12.3 and later.

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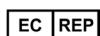
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# Contents

<b>1 Getting Started .....</b>	<b>8</b>
Installation and Prerequisites .....	8
Monitor Requirements .....	8
Using the Console with eSlide Manager .....	8
Selecting the Scan Data Group .....	9
What If the Scanner Is Not Connected to eSlide Manager? .....	9
Starting the Console .....	9
Selecting the Console Language .....	9
Connecting to the Scanner .....	9
Quick Tour of the Console .....	10
The Console Rack View .....	10
(1) – Information Banner .....	10
(2) – Working Area .....	11
(3) – Command Center .....	11
Console Slide View .....	12
The Console Batch View .....	13
Judging Scan Quality .....	14
Scan Quality Tips .....	15
Glossary .....	16
<b>2 Scanning a Batch of Slides .....</b>	<b>17</b>
Batch Scanning Concepts .....	17
Batches and Selections .....	17
Replacing a Rack .....	18
Including Slides in a Scan Batch .....	19
Selecting/Unselecting Slides and Racks .....	21
Setting the Scan Order .....	21
Setting Scan Magnification .....	22
Simple Batch Scanning .....	22
Using the Batch View .....	25
Viewing a Slide's Snapshot .....	26
Viewing a Slide After the Scan .....	27
Viewing the Slide Label .....	27
Rescanning Failed Slides .....	27
Marking Slides for Rescanning .....	28

Fine-tuning Batch Scans.....	28
Scanning Multiple Groups of Slides.....	29
<b>3 Manually Scanning a Slide on the Stage .....</b>	<b>30</b>
Place the Slide on the Stage .....	30
Take a Snapshot.....	30
Set the Scan Magnification.....	31
Set the Scan Area .....	31
Verify the Calibration Point Position.....	32
Set Focus Points.....	33
Z-Stack Scanning .....	34
Scan the Slide .....	34
View the Scanned Image.....	36
View the Slide Label .....	37
Options for Manual Scans .....	37
For More Information .....	38
<b>Reference Guide .....</b>	<b>39</b>
<b>4 Using Snapshots.....</b>	<b>41</b>
Taking Snapshots .....	41
Reviewing Snapshots.....	42
Setting Scan Magnification .....	44
Saving Slide Settings.....	45
Deleting Slide Settings.....	45
Set the Scan Area.....	46
Verify the Calibration Point Position .....	47
Set Focus Points .....	48
Viewing a Slide's Snapshot .....	49
Viewing a Slide After the Scan .....	49
<b>5 Working with Focus Points .....</b>	<b>50</b>
Introduction .....	50
Automatically Placing Focus Points.....	51
Adding, Deleting, and Moving Focus Points .....	51
Automatically Focusing the Focus Points.....	52
Manually Focusing Focus Points.....	52
Manually Focusing the Tissue.....	55
The Video Monitor Window Controls .....	56
<b>6 Z-Stack Scanning .....</b>	<b>57</b>
Basic Z-Stack Settings.....	58
Advanced Z-Stack Settings .....	58

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Saving Z-Stack Settings as a Slide Setting .....	59
Viewing Z-Stacks .....	59
<b>7 Calibration .....</b>	<b>60</b>
What Is Calibration? .....	60
Capturing a Calibration Image .....	60
Using a Default Calibration Image .....	62
Calibration Reports .....	62
<b>8 Console Tools.....</b>	<b>63</b>
Simple Maintenance (Making a Presnap) .....	63
Motion Control .....	63
System Properties .....	63
Tissue Finder Configuration (Creating Slide Types).....	64
Creating a Slide Type.....	64
Setting the Maximum Focus Point Area.....	66
Tips on Using the Maximum Focus Point Area Rectangle .....	67
Saving, Modifying, Testing, and Deleting Slide Types .....	67
<b>A Troubleshooting .....</b>	<b>69</b>
Setting Line Camera Gains .....	71
Setting Area Camera Gains.....	71
Error Handling .....	71
<b>B System Properties.....</b>	<b>72</b>
Property Values.....	72
Overwriting a Slide Type .....	72
Slide Types Override Console Options .....	73
Properties.....	73
Controller Properties .....	73
Image Filtering.....	76
Alignment Threshold .....	77
Compression Types .....	77
Slide Types .....	78
Slide Settings.....	79
<b>Index .....</b>	<b>80</b>
<b>Symbols.....</b>	<b>83</b>

# 1

# Getting Started

This chapter introduces the Console and contains information on basic concepts and features.

The Console provides an intuitive user interface tailored to the advanced features of the newest generation of Aperio scanners. For details on using the scanner, refer to your scanner user's guide.



CAUTION: Keep hands clear of the mechanical stage assemblies when the scanner is operating.

## Installation and Prerequisites

The Console has the following requirements:

- ▶ Windows 7
- ▶ 4GB memory, 50MB free disk space, network connection, .NET Framework 4.0.
- ▶ Minimum monitor resolution: 1600 x 1020

The Console software is generally installed on the workstation connected to the scanner at the Leica Biosystems Imaging factory. If you have questions about how to obtain this software to install it on additional workstations to access the scanner over the network, please contact your service representative.

## Monitor Requirements

Because eSlides are by design high resolution and information rich, for best results you should use a high quality monitor to view them. Make sure the monitor is at the proper viewing height and in a room with appropriate lighting.

We recommend any high quality LCD monitor meeting the recommendations discussed in *Aperio ePathology System Requirements*.

## Using the Console with eSlide Manager

eSlide Manager is the web-based digital pathology information management system developed for advanced visualization, eSlide viewing, conferencing, workflow management, data archival, intelligent retrieval, and image analysis. If you are using eSlide Manager, the Console automatically sends scanned slide images to the eSlide Manager database.

## Selecting the Scan Data Group

By default, scanned images will be cataloged in eSlide Manager in the Default data group. However, the scanner operator can choose which data group his or her eSlides will be added to by logging into eSlide Manager, going to the eSlide Manager Administrative menu, selecting **My Settings**, and choosing the data group to add the scanned images to from the **Data Group for Scanning** drop-down list.

## What If the Scanner Is Not Connected to eSlide Manager?

If this scanner has not been configured to use a DataServer on your Digital Slide Repository (DSR), or if the DataServer is off line, you will still be allowed to use the Console—in this case, however, any eSlides created will not be cataloged in eSlide Manager, but will be saved locally. Please contact Technical Services for assistance in moving the local images into eSlide Manager.

If the network connection is lost to the Digital Slide Repository (DSR) where the scanner normally saves scanned images, the Console displays a window that gives you several choices:

- ▶ Retry the connection
- ▶ Continue the scan and save images locally

Continuing the scan results in the scanned image not being cataloged by eSlide Manager, but the image will be saved on the scanner itself or, if another location is defined as the local image share, in that location.

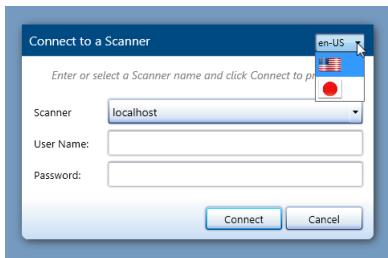
## Starting the Console

Start the Console by double-clicking the **Console** icon on the Windows Desktop or from the Windows Start menu by clicking **Start**, pointing to **All Programs > ScanScope**, and then selecting **ScanScope Console**.

Although you can use the Console on a workstation not directly connected to the scanner by using the network, note that only one instance of the Console can be connected to the scanner at one time.

## Selecting the Console Language

If your version of the Console is configured for multiple languages a drop-down list appears at the upper right corner of the connection screen from which you can select the language you want to use.



## Connecting to the Scanner

When you first start the Console you see a connection screen that asks you to log on. Enter the name of the scanner followed by the user name and password required to log onto that scanner. If you are not sure what user name and password to use, contact your system administrator for help.

At any time you can connect to another scanner by going to the Console Connect menu and selecting **Connect**.

If someone else is already running the Console on the scanner you select, you see a message giving you the option of disconnecting the other Console: "There is currently another Console connected to this Scanner. Multiple simultaneous connections are not allowed. You must forcefully disconnect the other Console to continue. Would you like to disconnect the other Console?"

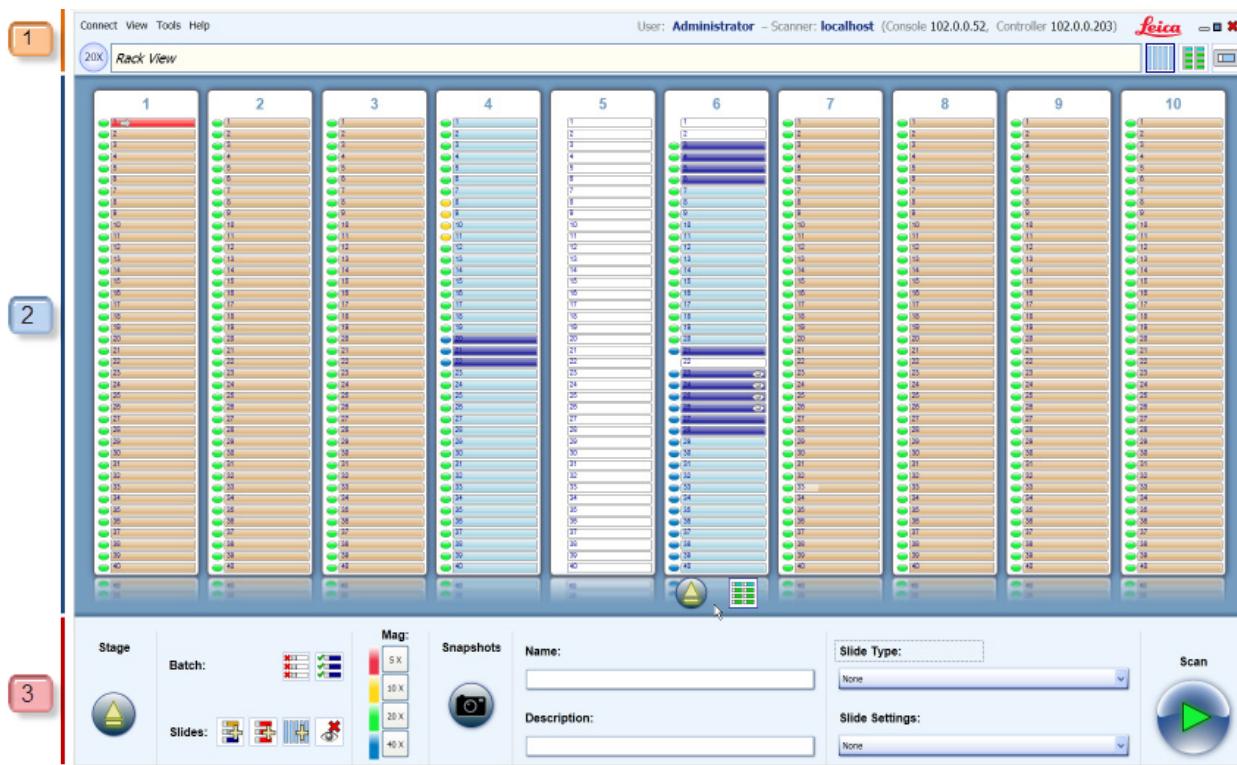
Please be sure the other instance of the Console is not actively being used to scan or take snapshots before you disconnect it.

## Quick Tour of the Console

The following sections give a brief look at the Console. The chapters that follow contain detailed instructions on using each of the features of the Console.

### The Console Rack View

When you first start the Console, you see the rack view, which contains a representation of the racks installed in the scanner. This graphic differs depending on what model of scanner you are using. The sample below shows a 400-rack AutoLoader.



#### (1) – Information Banner

At the top of the page is the scanner information banner which contains status information on the scanner and the scan. Also on the information banner are icons that select different Console modes, such as batch view and single slide view. Note that the currently selected icon is displayed with a darker border.

The menus contain tools and settings that affect the scanner operation. The special symbols in the information banner include:

Symbol	Description
 20x	Indicates the magnification in effect for the slide currently selected as the start slide.
 	Selects rack view. See <i>"The Console Rack View" on page 10.</i> Selects batch view. See <i>"The Console Batch View" on page 13.</i>
	Selects single slide view for selected slides. (Disabled if no slides are selected.) See <i>"Console Slide View" on page 12.</i>

## (2) – Working Area

The central section of rack view, the working area, gives a quick look at the racks in the scanner and their status. For example, the light blue status color indicates slides for which snapshots have been taken, the dark blue status color indicates snapshots that have been reviewed or slides that have been marked for scanning, and the light brown status color indicates other slides that are included in the current scan batch for which snapshots have not been taken. Controls at the top and bottom of the individual racks allow you to select/unselect the slides in the racks from the current scan batch to perform operations on them and to eject a rack from the scanner. For a quick reference to all of the status colors, go to the Help menu and select **Slide Status Legend**. See *"Judging Scan Quality" on page 14* to see this status quick reference.

## (3) – Command Center

The command center contains text boxes, lists, buttons and icons that direct the scanning of the slides:

Symbol	Description
	Moves the stage into the access position for manual scanning.
	Selects all slides that are in the scan batch.
	Selects all slides that failed to scan.
	Selects all slides in all racks.
	Removes all Slide Viewed indicators,  .
	Excludes all selected slides from the scan batch.

Symbol	Description
	Marks selected slides for rescanning.
 <b>Mag:</b> 5 X 10 X 20 X 40 X	Sets magnification for selected slides. See <i>“Setting Scan Magnification” on page 22</i> .
	Takes snapshots of selected slides. (Snapshots are used to fine-tune your scans.) See <i>“Chapter 4: Using Snapshots” on page 41</i> .
	Begins scan.

Other elements in the Command Center include:

- ▶ **Name and Description** – The Name field allows you to specify a name that will be used as the basis of the file name for the scanned image files. The text you enter in the Description field is saved with the scanned images in eSlide Manager and can be used to differentiate the slides. You can apply different name and descriptions to different groups in the scan batch. As you type the name and description a Save icon appears: . Click it to save your text.
- ▶ **Slide Type and Slide Settings** - The Slide Type and Slide Settings drop-down lists allow you to assign types and settings that affect how the slides are in the current scan batch are scanned. For example, a slide type is defined that optimizes scanning for very faintly stained slides. Slide types are predefined for your scanner, while slide settings consist of parameters that you define and save in the slide view window (see *“Chapter 4: Using Snapshots” on page 41* for details). You can apply different slide types and slide settings to different groups in the scan batch.

## Console Slide View

To see details on a slide that has had a snapshot taken of it or that has been scanned (that is, a slide for which a macro image has been taken):

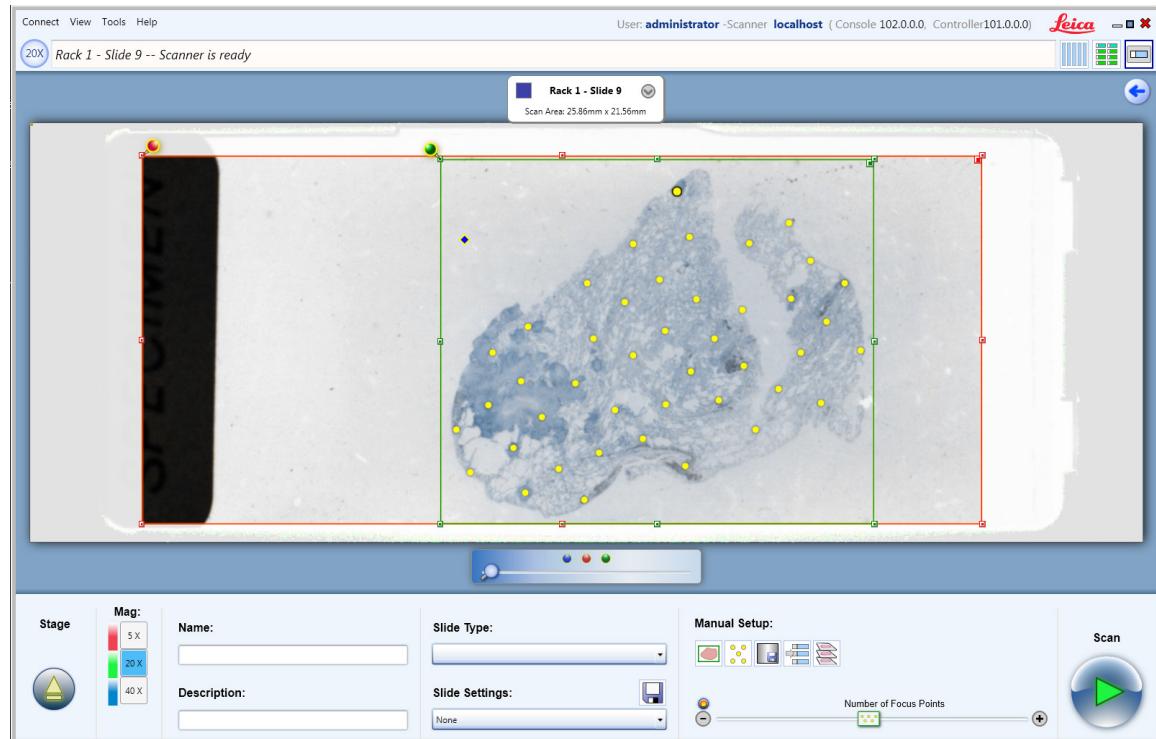
1. Put your cursor over it in rack view or batch view. You see the **View Slide** icon:



2. Click this icon to see this slide in the slide view window.

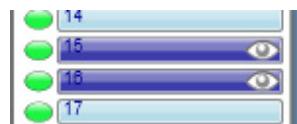
If multiple slides are selected, clicking this icon takes you to the detailed view of the first selected slide. You can use the arrow symbols below the slide display to navigate between all of the selected slides.

If one or more slides are selected, you can also click the **Slide View** icon at the top of the rack view window to see the first selected slide.



You will be able to use the tools in the command center at the bottom of the window to fine-tune scanning parameters for this slide. You will also be able to save the settings you make to apply to other slides. For more information, see *“Chapter 4: Using Snapshots” on page 41*.

Once you have viewed a slide, the **Slide Viewed** indicator appears on that slide in rack view during the current Console session:



The dark blue status color indicates either that the slide has been edited or that it has been manually marked for scanning. The light blue status color means a snapshot has been made of the slide but you have not edited its scanning parameters. If you see the **Slide Viewed** indicator on the slide, you know that you have viewed the slide (whether or not you have edited it) during this Console session.

To return to the previous view, click the back-arrow: .

## The Console Batch View

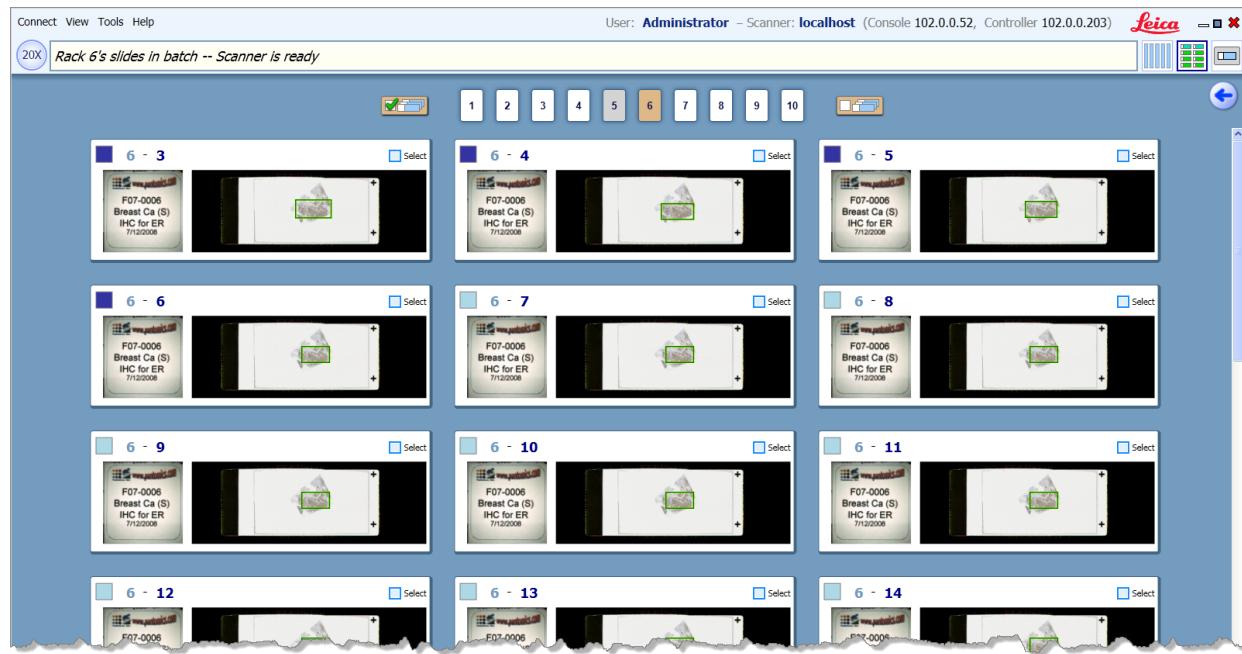
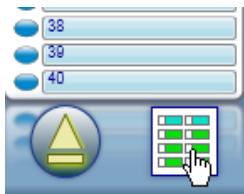
The batch view provides another way of looking at the slides in a scan batch.

Click the **Batch View** icon:



at the top of the Console window to see slides in the current scan batch. (If snapshots have been taken or the slides have been scanned, you see the macro images of the slides.) The batch view provides another way to look at the slides in the batch at a more detailed level and to select/unselect slides. Numbers at the top of the window allow you to select a specific rack to view.

You can also go to the bottom of a specific rack and select the **Batch View** icon there to see that rack displayed in batch view.

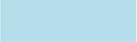


To return to the previous view, click the back-arrow:

For more information, see *“Using the Batch View” on page 25*.

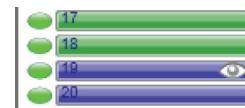
## Judging Scan Quality

After the slide is scanned, the rack view gives you an indication of the success of the scan. The slide tray or rack graphic will display a color for each slide processed.

Slide Status Legend		
	STATUS	NOT SELECTED    SELECTED
Excluded	<b>Excluded</b> - No slide is in this position or the slide is not part of the batch.	 N/A White
	<b>Included</b> - This slide is part of the batch.	  Wood
	<b>Has Snapshot</b> - A snapshot was made of this slide and it is available to be visited and reviewed.	  Light Blue
To Be Scanned	<b>Marked for Scanning</b> - A snapshot was made of this slide and the slide has been edited or marked for scanning.	  Dark Blue
	<b>Scanned</b> - The slide was scanned and the ScanScope was able to focus the tissue.	  Green
	<b>Questionable</b> - The slide was scanned, but the image should be reviewed to ensure acceptable image quality.	  Orange
Already Scanned	<b>Failed</b> - The ScanScope attempted to get a snapshot of or scan this slide, but it failed.	  Red

The scanning status colors displayed on the rack view indicate how well the scanner was able to focus the tissue on the slide. Although a well-focused slide is likely to result in a better image than a poorly-focused slide, status colors should not be interpreted as an absolute indicator of image quality. Instead, they should be used as a diagnostic tool alerting you to possible problems with a scan. Regardless of the scan status color displayed by the Console, all slides should be reviewed for acceptable image quality.

For example, the following status colors indicate that the scanner was able to focus tissue on the first two slides when they were scanned, and that the other slides are marked for scanning.



To see this complete list of status colors and their meaning, go to the Help menu and select **Slide Status Legend**.

## Scan Quality Tips

Here are some things to look for when reviewing an eSlide for scan quality. A good quality scan:

- ▶ Does not have visible seams between stripes
- ▶ Has uniform white balance within a stripe (that is, one edge of the stripe should not be darker than the other)
- ▶ Is uniformly in focus with no blurry areas
- ▶ Is not too dark or too faint

For help in correcting possible scanning problems, refer to *“Appendix A: Troubleshooting” on page 69*.

## Glossary

Here are the terms used in this guide that you should be familiar with:

Concept	Description
AutoLoader	The mechanism used in some scanner models to feed slides from racks to the scanner stage for scanning.
Batch	The set of slides included in the current scanning session.
Batch view	A view in which the macro images of slides that are in the current scan batch are displayed.
Calibration	The scanner makes a calibration image and then uses the image to obtain a shading correction that will be applied during the scanning process. See <i>“Chapter 7: Calibration” on page 60</i> for a more detailed explanation of calibration.
Calibration point	The blue diamond symbol on the slide macro image that marks the area from which the calibration image is calculated. This must be under the coverslip but must be placed in a clear area without tissue.
Camera gains	Adjustment to the camera signal levels.
Focus point	Focus points create a 3D map of your specimen. Each focus point is assigned a value based on the perceived depth of the surface of the specimen at that point. A minimum of four focus points (that can be focused) are required to scan.
Global slide type	A slide type that applies to every slide in the scan batch.
Macro focus	A method of focusing the tissue plane so that focus points are relatively closer to the tissue.
Macro image	The image captured by the scanner area camera that gives a rough image of the entire slide.
Manual scan	A scan made by loading a slide onto the scanner stage, and then manually setting scan parameters.
Maximum scan area (MSA)	This is maximum area on the glass slide that can physically be scanned. Within the MSA is the Scan area (SA), the actual scan area to be scanned.
Presnap	A presnap is an image that the scanner uses to calculate correction for the light reflection from the glass slide surface.
Rack	The container that holds the slides in the AutoLoader.
Rack view	The Console view that shows the status of the AutoLoader racks and from which you can include/exclude slides in and from the current scan batch.
Scan area (SA)	This is the actual area of the glass slide to be scanned, and cannot lie outside of the maximum scan area.
Selected slides	A group of slides on which operations (taking snapshots, naming, etc.) will be performed.
Slide setting	Scan parameters saved from a snapshot review or manual scan.
Slide type	Scan parameters optimized for specific types of slides.
Slide view	The Console view that shows the most detailed image of a slide during snapshot review or manual scan.
Snapshot	A quick image of the slide that you can use to pre-set scanning adjustments such as placing focus points.
Stage	The hardware component that holds the slide to be scanned and moves under the objective for scanning.
Z-stack	Collection of multiple images of a slide at different focal depths.

# 2

# Scanning a Batch of Slides

This chapter discusses how to scan multiple slides in the scanner racks.

The Console is designed to work with the latest generation of scanners that features an AutoLoader containing hundreds of slides.

This chapter discusses different ways of scanning a batch of slides in AutoLoader racks.

Some operators feel the most efficient method of scanning is to fill the racks with a large number of slides without doing fine-tuning of scanning parameters, and accept that some slides may not scan successfully—in that case, the operators will rescan just the slides that failed scanning. See *“Rescanning Failed Slides” on page 27* for details.

Other operators want to fine-tune scanning parameters for slides before scanning by using snapshots to eliminate or greatly reduce rescans.

Still other operators want to scan multiple groups of slides in the same scan batch—for example, one group of slides that belongs to one doctor and another group of slides that belongs to another doctor. Or one group of slides that uses IHC staining and another group that uses a different stain.

This chapter contains hints for all of these basic batch scenarios.

## Batch Scanning Concepts

The main screen of the Console shows the rack view, which gives status information on the contents of the AutoLoader racks. For details on the rack view, see *“The Console Rack View” on page 10*.

If a slide position is white, that position in the AutoLoader rack is either empty or a slide in that position is not included in the current scan batch. Different colors indicate the status of a slide (for example, dark blue means a snapshot has been taken of the slide and it has been reviewed and gray means there is no rack in that position). For a complete list of all slide status colors, go to the Help menu and select **Slide Status Legend**.

See *“Judging Scan Quality” on page 14* for more on status colors.

## Batches and Selections

The most important concept to understand when using the rack view is the difference between including slides in the current scan batch and *selecting* slides.

Any slides in the slide positions shown in the rack display that have a white color are *not* included in the current scan batch nor are they selected. A white status color means that the status of the slide in that position is not known—there may be a

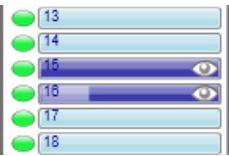
slide in that position or the position may be empty.



Any slides in the slide positions shown in the rack display that have a status color other than white *are* included in the current scan batch.



If the slide position has a status color and shows a lighter bar on the left, the slide is selected:



A selected slide means that the slide is both included in the current scan batch *and* certain buttons and icons in the command center of the window (such as the Name field or the Snapshot button) will apply to that slide. In addition, if a macro image exists for a selected slide or slides, those slides can be viewed in slide view.

To summarize:



*Slides with a status color other than white are included in the current scan batch. Only slides that are selected are affected by the Snapshot button, Name, Description, Slide Type, and Slide Settings controls in the command center, and can be viewed in the detailed slide view.*

---

See the following sections on how to include/exclude slides and racks from a scan batch and how to select/unselect slides and racks.

## Replacing a Rack

To replace an AutoLoader rack, eject the rack—this tells the scanner to move the rack to the access position. Then remove the rack from the scanner, re-load it or replace it with another loaded rack and place it back in the scanner.

To eject a rack:

1. Place your cursor at the bottom of the graphic of the rack you want to load and you see the following tool at the bottom of the rack display:



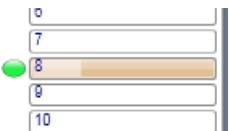
2. Clicking the **Eject** button tells the scanner to move the rack to the loading position so you can remove it. Also, note the **Batch View** icon which you can click to display this rack in batch view.

See the user's guide for your scanner for information on removing a rack and loading it with slides.

When you replace a rack and shut the AutoLoader door, the Console knows that you have replaced the rack and automatically includes all slide positions in the rack in the scan batch.

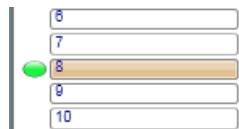
## Including Slides in a Scan Batch

Remember that any slide positions that show a color other than white are included in the current scan batch. Only *selected* slides will be affected by most of the buttons and commands in the command center of the Console window.

If you want to...	Do this
Include all the slides in a rack in the current scan batch	Insert a new rack in the Console. This automatically includes the slides in that rack in the scan batch.
Include a single slide in the scan batch	Click a white slide position in a rack in rack view. This includes the slide in the scan batch and selects it for further action. A selected slide looks like this:  

The lighter bar on the left indicates the slide is selected. The colored ellipse indicates the scan magnification set for that slide. If you want to unselect that slide, hold down the Control key and click the slide again.

An unselected slide that is included in a scan batch looks like this:



If you want to...	Do this
Add a group of slides to the scan batch	<ul style="list-style-type: none"> <li>Click the first slide in the group, hold down the Shift key, and click the last slide in the group. This selects the first and last slides and all slides in between. If you want to unselect these slides but leave them in the scan batch, hold down the Control key and click each slide.</li> <li>To add the slides in an entire rack to a scan batch, click the top of the rack to select all of the slides in it. Then click the top of the rack again to unselect the slides but leave them in the batch.</li> </ul>
Add specific racks to the scan batch	Hold down the Control key while you click the tops of the racks. If you want to unselect these slides, click the tops of the racks again to unselect the slides but leave them in the batch.
Add all slides in all racks to the scan batch and select them	<p>Click the <b>Select all racks</b> icon:</p> 

## Excluding Slides from a Scan Batch

Remember that any slide position that shows a color of white is excluded from the current batch.

If you want to...	Do this
Remove a group of selected slides from the current scan batch	<ul style="list-style-type: none"> <li>Place the cursor on a group of selected slides and right click. Select <b>Exclude selected slides</b> on the context menu. The status color of the slides turns white, indicating they are neither selected nor included in the current scan batch.</li> <li>Click the <b>Exclude selected slides</b> icon in the command center:</li> </ul> 
Remove an entire rack from the current scan batch	<p>Click the top of the rack to select all slides in the rack. Then right-click on the group of selected slides and select <b>Exclude selected slides</b> on the context menu.</p>

## Selecting/Unselecting Slides and Racks

If you want to...	Do this
Select a single slide	Click a slide position in a rack to select a single slide. (If the slide was not included in the scan batch, clicking it both includes it in the scan batch and selects it.) The lighter bar on the left indicates the slide is selected
Select a group of slides	<ul style="list-style-type: none"> <li>Click the first slide in the group, hold down the Shift key, and click the last slide in the group. This selects the first and last slides and all slides in between.</li> <li>Or, hold down the Control key while you click specific slides to select them.</li> </ul>
Select or unselect all slides in a rack	Click the top of the rack
Select all slides in all racks	Click the <b>Select all racks</b> icon:  <p>This both includes all slides in the scan batch and selects them.</p>
Select slides in multiple racks	Hold down the Control key while you click the top of each rack.
Select all slides in the scan batch	Click the <b>Select All Slides in Batch</b> icon: 

## Setting the Scan Order

To set which slide the scan will start with, right click on a scan position in rack view and select **Set start slide** from the context menu.

Or, if you are in slide view, click the **Set Start Slide** icon:



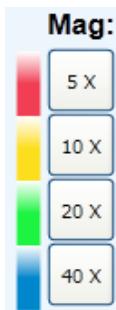
to make this slide the starting slide.

When you begin the scan, the scan will begin with the start slide, then move to the next slide position in that rack that is included in the current scan batch. For example, if you have set slide 7 as the start slide, the scan will begin with that slide, then scan slide 8 in that rack (if that slide is in the scan batch) and so on. When it is finished with the slides in this rack, it continues with slides in the next rack that are included in the scan batch. When finished with the slides in the last rack, it then moves to the first rack, continuing to scan any slides that are in the current scan batch.

However, note that the scanner will skip scanning slides that show a green status color (because they have already been successfully scanned) and slides that show orange or red status colors (because they need to be reviewed and adjusted before they can be rescanned).

## Setting Scan Magnification

It is very easy to set the scan magnification for one slide or a group of slides. The default magnification is 20x, but you can see all magnifications available by looking at the magnification buttons on the rack view display.



To set the scan magnification, select one or more slides and click the magnification setting you want to use for those slides. For instructions on selecting a slide, a group of slides, or an entire rack, see *"Selecting/Unselecting Slides and Racks" on page 21*.

Note that the scan magnification you have selected is indicated by a colored ellipse on the rack view display:



You can also set the scan magnification:

- ▶ When reviewing snapshots by clicking the magnification button in the snapshot review window. See *"Chapter 4: Using Snapshots" on page 41* for information on making and reviewing snapshots.
- ▶ When manually scanning a slide when reviewing a snapshot of the slide or by selecting the scan magnification in the Manual Scan window that appears when you click the **Eject** button to eject the stage. See *"Chapter 3: Manually Scanning a Slide on the Stage" on page 30* for details.
- ▶ You can set scan magnification for a slide or group of slides by applying a saved slide setting that specified a scan magnification. See *"Saving Slide Settings" on page 45* for information on creating and saving slide settings.

## Simple Batch Scanning

Suppose that you want to perform the fastest scan possible and are not concerned with having to rescan slides later that may need fine-tuning for a successful scan.

1. Eject each rack on the Console window as discussed in *"Replacing a Rack" on page 18* and either load the rack and replace it or take it out and replace it with another loaded rack.
2. Optionally set a name for all selected slides (this text will be used as the basis for the file names for these slide images).

3. Optionally set a description for all selected slides (this text will be sent to eSlide Manager along with the scanned images).
4. Optionally select a slide type or setting for this scan batch.
5. Click the **Scan** button:

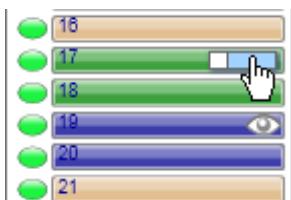


As the scan proceeds, you see a green progress indicator on each slide position as the slide is being scanned.

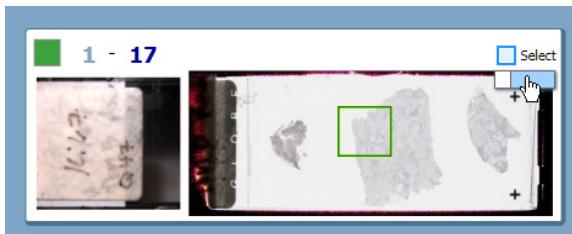
When the scan is finished, review the scanned slides, giving special attention to slides that show a status color other than green. To review a slide:

1. Put your cursor over it in rack view or batch view. You see the **View Slide** icon.

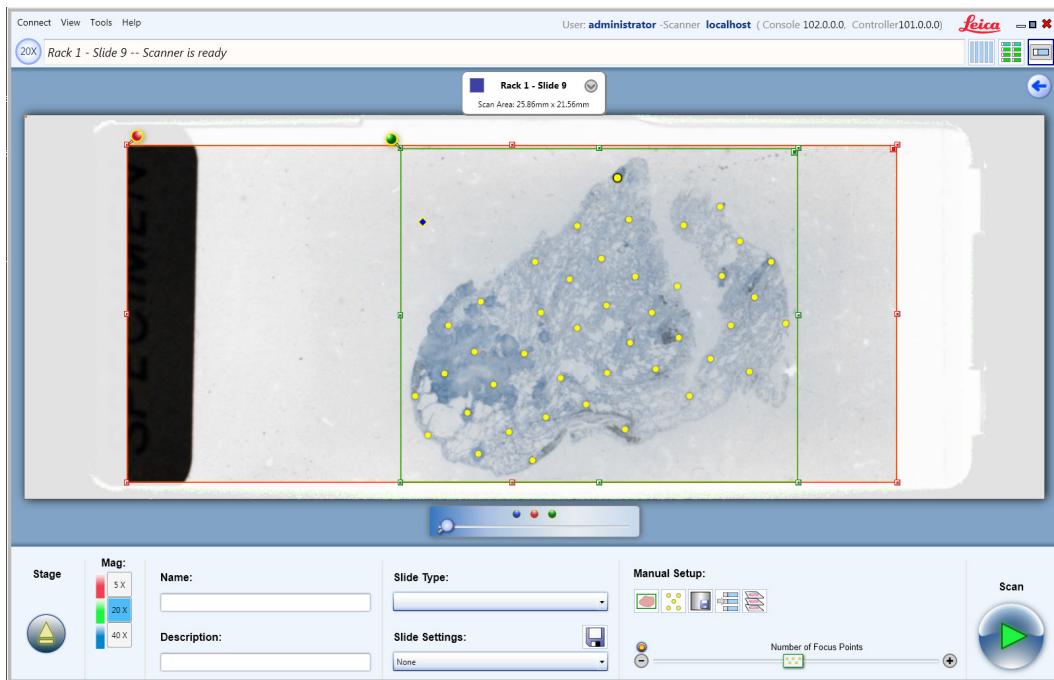
In rack view:



Or in batch view:



2. Click this icon to see this slide in the slide view window.



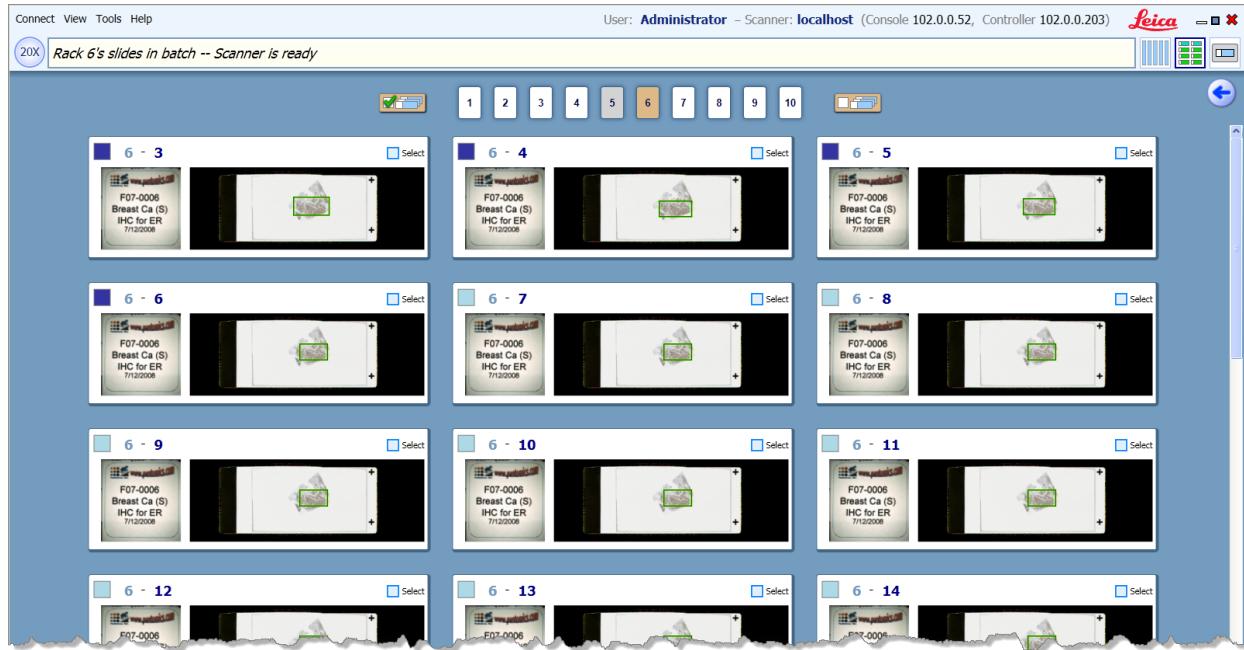
On the slide view window you will be able to use the tools at the bottom of the window to prepare the slide for rescanning if necessary:

- ▶ Set a name and description for this slide. The Name field allows you to specify a name that will be used as the basis of the file name for the scanned image files. The text you enter in the Description field is saved with the scanned images in eSlide Manager and can be used to differentiate the slides.
- ▶ Set the slide type and apply slide settings to it to optimize scanning. See “*Chapter 4: Using Snapshots*” on page 41 for more information on slide types and settings.
- ▶ Click the **Auto select tissue**  to reset the scan area.
- ▶ Add, delete, or move focus points. See “*Adding, Deleting, and Moving Focus Points*” on page 51.
- ▶ Perform a scan of multiple focal depths. See “*Chapter 6: Z-Stack Scanning*” on page 57.
- ▶ Set this slide as the starting slide for the scan. See “*Setting the Scan Order*” on page 21.
- ▶ Click the magnification button for the scan magnification you want to use.
- ▶ Use a default calibration image. See “*Using a Default Calibration Image*” on page 62.
- ▶ Scan the slide again and other reviewed slides in the scan batch by clicking the **Scan** button. 
- ▶ To return to the previous view, click the back arrow: .

For more information on these options, “*Chapter 4: Using Snapshots*” on page 41.

## Using the Batch View

The batch view provides another way of reviewing all of the slides included in the scan batch. For any slides for which snapshots have been taken or that have been scanned, you see the macro image of the slide.

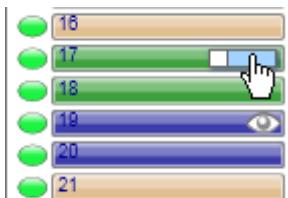


Features on this window include:

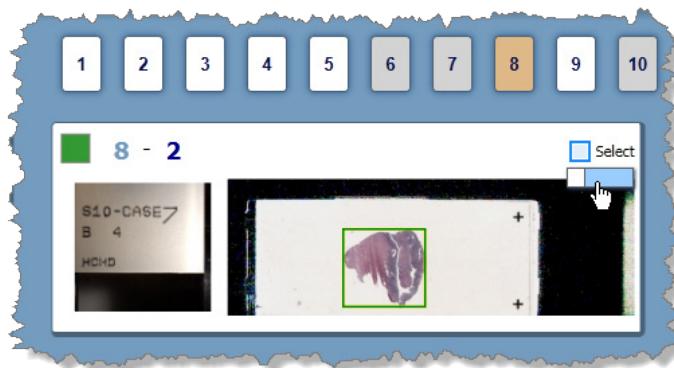
- ▶ Status colors give the status of the slides. For example, green means the slide was scanned (and the scanner could focus on the tissue) and dark blue means it has been reviewed and is ready to scan.
- ▶ Check boxes allow you to select or unselect slides.
- ▶ Numbered boxes at the top of the window allow you view the slides in a specific rack by selecting that rack by its position number.
- ▶ To select all slides on this window, click the **Select all slides** icon:
- ▶ To unselect all slides on this window, click the **Deselect all slides** icon:
- ▶ To return to the previous view, click the back arrow:

## Viewing a Slide's Snapshot

From the rack view, click the **View Slide** icon on the position of the scanned slide to view the slide in detail:



Or, from the batch view, click the **View Slide** icon on the scanned slide to view the slide in detail:



Once you have viewed a slide, the **Slide Viewed** indicator  appears on that slide in rack view during the current Console session:



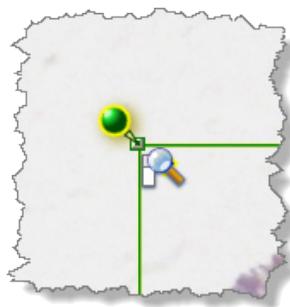
A dark blue status color indicates either that the slide has been edited or that it has been manually marked for scanning. A light blue status color means a snapshot has been made of the slide but you have not edited its scanning parameters. If you see the **Slide Viewed** indicator on the slide, you know that you have viewed the slide (whether or not you have edited it) during this Console session.

To clear all **Slide Viewed** indicators from the rack view, click the **Clear slide viewed indicators** button at the bottom of the rack view:



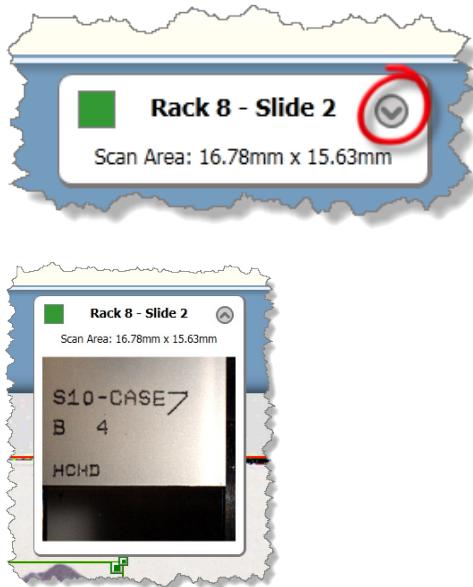
## Viewing a Slide After the Scan

After opening the slide in slide view (see the previous section), click the magnifying glass to view the slide in the Console viewer.



## Viewing the Slide Label

After the scan is complete, you can click the down arrow on the slide information box to see the label:



Double click the label image if you want to rotate it. Double-click on the right side of the label to rotate the label clockwise; double-click on the left side of the label to rotate it counter clockwise. The label rotation orientation will be applied to all slides in the current scan batch.

## Rescanning Failed Slides

The Console makes it very easy to rescan just those slides that the scanner could not scan (indicated with a red status color) by using the **Select failed slides** icon on the Console command center:



This selects all failed scans so you can easily take snapshots to review them. Before rescanning, you will want to review it to see why the scan failed, and to adjust the parameters so that the scan will succeed. (See “*Chapter 4: Using Snapshots*” on page 41 for details on adjusting parameters.)

When you click the **Scan** button, the scanner includes all reviewed failed scans (after you review a failed slide, the status color turns to dark blue instead of red) in the scan batch, but does not scan unreviewed failed slides.

## Marking Slides for Rescanning

When scanning, the scanner skips over slides with green, orange, or red status colors as those slides have already been successfully scanned or require review before being scanned again. However, in certain cases you may want to scan slides without reviewing them. For example, if you know that a set of slides failed to scan because the lightbulb in your light source burned out and that they were otherwise adjusted for a successful scan, you can select them and click the **Mark Selected Slides for Scanning** icon:



This turns the status color of the selected slides to dark blue and adds those slides to the current scan batch.

## Fine-tuning Batch Scans

A more hands-on approach to scanning than the simple batch scanning discussed in the previous section involves taking snapshots of the slides before scanning them so that you can view them to fine-tune their scanning parameters to achieve optimal scanning.

An efficient method of doing this would be to:

1. Select all of the slides included in the current scan batch.
2. Start taking snapshots of the selected slides by clicking the **Snapshot** button:



3. After a few of the snapshots have been taken, select those slides and double-click with your cursor on one of the selected slides to open the group in slide view to review the snapshots. You can fine-tune scanning parameters in the slide view window. In the slide view window, click the forward arrow or back arrow to move between snapshots.



4. Use the zoom slider to zoom into the image—click the blue dot to zoom into the entire macro image, the red dot to zoom into the maximum scan area, and the green dot to zoom into the scan area.

By the time you have finished reviewing the first group of slides, more snapshots have been taken and you can review those slides. By the time all snapshots have been taken, you have only a few remaining snapshots to review.

When finished with all snapshot review, click the **Scan** button to start scanning the slides.

Another workflow is:

1. Include all the slides you want to scan in the current scan batch.
2. Make snapshots of all the slides.
3. Start scanning the scan batch.
4. During the scan, you can review slides that have snapshots or that have been scanned and edit their scan parameters if necessary. (Note that you cannot take snapshots while a scan is underway, but you can review snapshots.)
5. If you have changed the scanning parameters for slides during the scan, their status color turns to dark blue (indicating they have been reviewed), and the scanning process will wrap around to scan them (again, if already scanned) as their review status has changed.

For details on optimizing scanning settings in the snapshot window, see *“Chapter 4: Using Snapshots” on page 41*.

## Scanning Multiple Groups of Slides

You may want to select a slide type in the Console Slide Type drop-down list in the command center to optimize scanning for particular types of slides.

If you have a mix of slides in the scan batch, select just the slides to which you want to apply one slide type, then select the slide type from the **Slide Type** drop-down list.

Unselect those slides, and select another group of slides and select the slide type appropriate for those slides from the drop-down list.

As each group of slides is selected, you can optionally type a name and description in the Name and Description text boxes, which will be saved with the slide images in eSlide Manager.

You can also use the Slide Settings drop-down list to select an entire set of parameters for a group of slides. (Slide settings are defined and optionally saved when using snapshots or during a manual scan. For details, see *“Saving Slide Settings” on page 45*.)

# 3

# Manually Scanning a Slide on the Stage

This chapter discusses how to scan a slide on the scanner stage.

There are several reasons to perform a manual scan:

- ▶ You simply want to scan a single slide.
- ▶ You want to interrupt a batch scan to quickly scan a higher priority slide.
- ▶ You want to perform system maintenance by creating a presnap or setting camera gains. (See “*Chapter 8: Console Tools*” on page 63.)
- ▶ You want to make a calibration image. (See “*Chapter 7: Calibration*” on page 60.)

## Place the Slide on the Stage

To place the slide on the scanner stage:

1. First, eject the stage by clicking the **Eject** button in the command center at the bottom of the Console window:



2. Place the slide on the stage with the coverslip up (see the user guide for your scanner for instructions on the orientation or label of the slide on the stage).

The Manual Scan window appears.

On this window you can set scanning options such as the slide description (this text will be saved with the image in eSlide Manager), a name (used as a basis for the file name of the image), slide type and slide settings (discussed in “*Reviewing Snapshots*” on page 42) as well as the scan magnification to use.

## Take a Snapshot

Although you could just click the **Scan** button on the Manual Scan window to start scanning the slide, you will probably want to take a snapshot to get a macro image of the slide by clicking the **Take Snapshot** button.

After you see the macro image, you can set scanning parameters as discussed below.

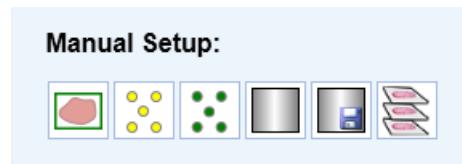
You can use the slider under the macro image to zoom into the image:



Use the zoom slider to zoom into the image—click the blue dot to zoom into the entire macro image, the red dot to zoom

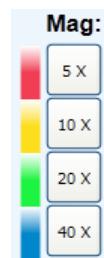
into the maximum scan area, and the green dot to zoom into the scan area.

The Manual Setup section of the slide view window contains several icons, some of which are only used for manual scanning. See the following sections for details on using these tools.



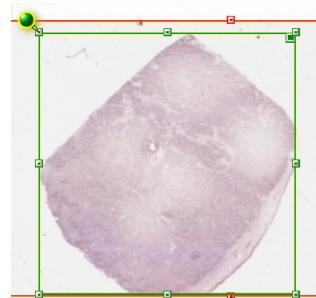
## Set the Scan Magnification

To set the scan magnification to use for this slide, click the magnification button for the setting you want to use:



## Set the Scan Area

On the macro image, a green box indicates the scan area, the area of the slide that will be scanned:

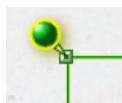


To reset the scan area by letting the scanner detect the tissue area on the slide, click the **Auto select tissue** icon:



Or, you can manually change the area of the slide that will be scanned:

1. Click the green pin on the scan area box:



and the cursor changes to a pen so you can draw a new scan area:



2. Or click a handle on the scan area box to drag the edges or corners of the scan area to a new position.



3. Or click the dark box at the upper right corner and you will be able to drag the scan area where you want it to be:



Include all of the tissue you want to scan in the scan area box.

Note that you can use the same techniques to redraw, adjust, or move the maximum scan area (shown in red), however it is not recommended to change the maximum scan area except in rare circumstances.

## Verify the Calibration Point Position

Make sure the calibration point (the blue diamond) is on a clear area of the slide that does not contain tissue and that it is under the coverslip.



If a calibration image has already been captured for this slide, placing your cursor over the calibration point shows you the message "Calibration image available (right click to view)."

Right-click and you can select **View Calibration Image** from the context menu to see the calibration image.

During the scan, the scanner will use the area around the calibration point to make a calibration image which will be used to calibrate the scanner. For information on calibration, see *"Chapter 7: Calibration" on page 60*.

The scanner must be able to focus at least four focus points to create a calibration image.

If during the scan you see a message that the scanner could not create a calibration image, you can:

- ▶ Work with the focus points to improve the ability of the scanner to focus the tissue. See *"Chapter 5: Working with Focus Points" on page 50* for information on adding, moving, focusing, and deleting focus points, and for information on performing a macro focus.
- ▶ Manually create a calibration image. See *"Capturing a Calibration Image" on page 60* for information on creating a calibration image.
- ▶ If the characteristics of a specific slide makes it difficult for the scanner to create a calibration image, you can use a previously saved default calibration image for this slide. To use the default calibration image, click the **Use default calibration image** icon:

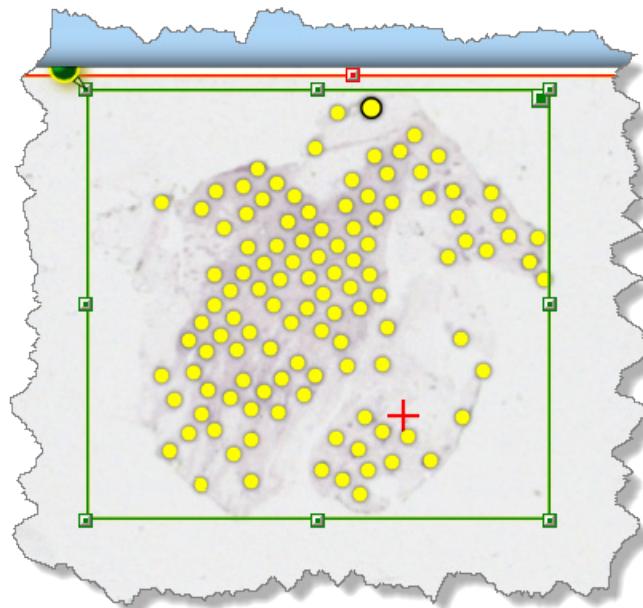


## Set Focus Points

In the Manual Setup area, click the **Auto Select Focus Points** icon to create focus points in the scan area:



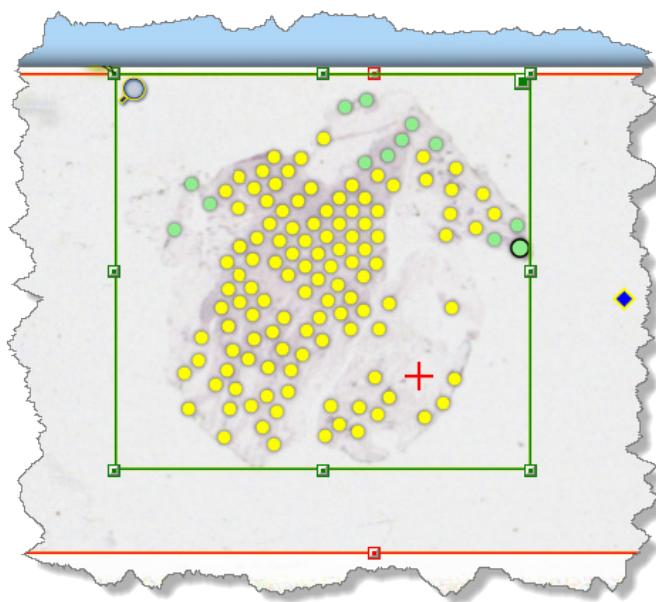
You need at least four focus points in order to scan.



You can either test the focus points before the scan by clicking the **Auto Focus** icon:



Or you can let the scanner focus the focus points during the scan by simply scanning. Focus points turn green as they are focused.



You can also open the video monitor window to manually focus a focus point. For more information on using the video monitor window, and for information on adding, deleting, focusing, or moving focus points, see *“Chapter 5: Working with Focus Points” on page 50*.

## Z-Stack Scanning

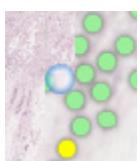
Another option you can use when manually scanning a slide is to click the z-stack icon  to configure z-stack scanning, which directs the scanner to create multiple images at different focal depths to create a 3D image. For details, see *“Chapter 6: Z-Stack Scanning” on page 57*.

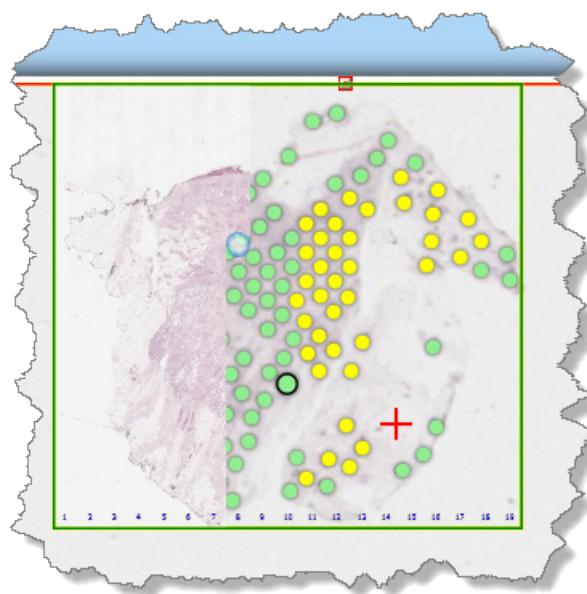
## Scan the Slide

To scan the slide, click the **Scan** button:



As the scan proceeds, you can see the stripes scanned as the focus points disappear (note the stripe numbers at the bottom of the image). The blue sphere represents the objective and shows the progress of the scan:





You also see status information in the information box at the top of the window:

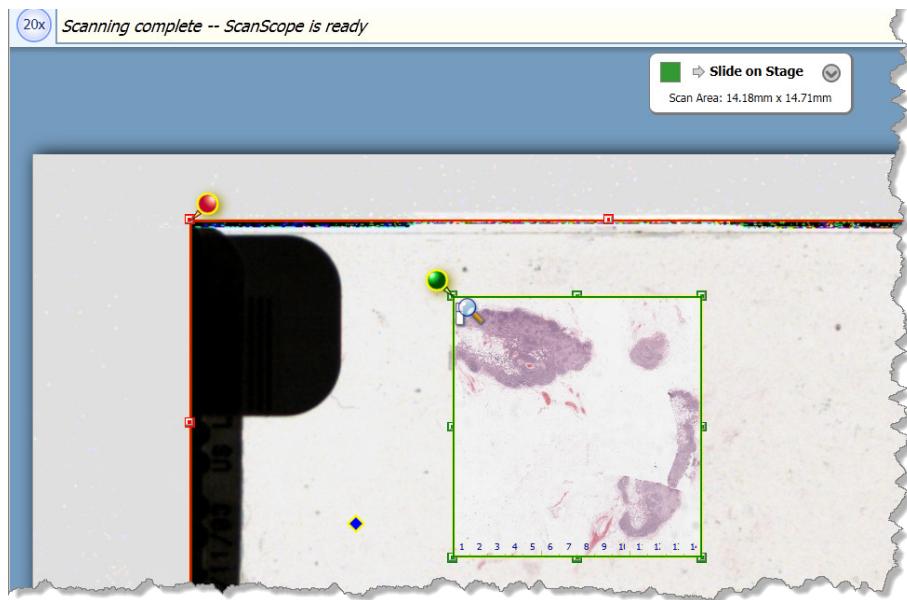


If you need to stop the scan, click the **Stop** button (which replaces the **Scan** button when the scanner is busy):

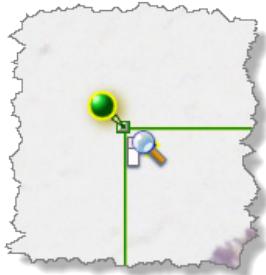


## View the Scanned Image

When the scan is complete, you see the scan status color displayed on the slide information box (in the example below, the status color is green):



To view the scanned image, click the magnifying glass in the scan area to open the image in the Console viewer:



If you are in rack view, you can view the slide on the stage by clicking the **Slide View** icon at the top of the page:



If you currently have slides selected in the rack view (and those slides have a macro image), you can choose whether to view the first selected slide or the slide on the stage by right-clicking on the **Slide View** icon and selecting **View manual slide** from the context menu.

## View the Slide Label

After the scan is complete, you can click the down arrow on the slide label information box to see the label:



Double click on the label image if you want to rotate it. Double-click on the right edge to rotate the label clockwise, on the left edge to rotate the label counter clockwise. This is a global setting that affects label orientation for all slides in the current scan batch.

## Options for Manual Scans

Certain features of the Console are only available when manually scanning a slide on the stage. This is because, unlike slides in the AutoLoader, a slide on the stage is physically under the scanner objective while you are reviewing it.

Features only available when manually scanning a slide include:

- ▶ Creating a calibration image
- ▶ Setting a calibration image as the default.
- ▶ Performing a manual macro focus
- ▶ Auto focusing focus points before the scan
- ▶ Focusing a focus point
- ▶ Any action that uses the Video Monitor window

## For More Information

Details on some of the procedures discussed in this chapter are covered in more depth in other chapters:

- ▶ For information on specifying name, description, slide type, and slide settings, see *“Chapter 4: Using Snapshots” on page 41*.
- ▶ For information on adding, deleting, and focusing focus points, see *“Chapter 5: Working with Focus Points” on page 50*.
- ▶ For information on making calibration images, see *“Chapter 7: Calibration” on page 60*.
- ▶ For information on z-stack scanning, see *“Chapter 6: Z-Stack Scanning” on page 57*.

# Reference Guide

This section contains details on the features used in the basic scenarios discussed earlier in this guide. We also discuss using the Console to configure the scanner.

Chapters included in this section are:

- ▶ *“Chapter 4: Using Snapshots” on page 41*
- ▶ *“Chapter 5: Working with Focus Points” on page 50*
- ▶ *“Chapter 6: Z-Stack Scanning” on page 57*
- ▶ *“Chapter 7: Calibration” on page 60*
- ▶ *“Chapter 8: Console Tools” on page 63*

The following appendices are also included:

- ▶ *“Appendix A: Troubleshooting” on page 69*
- ▶ *“Appendix B: System Properties” on page 72*



# 4 Using Snapshots

This chapter discusses how to take and use snapshots to improve your scanning workflow.

The scanner provides an automated workflow that is optimized to provide the best scanning experience in most cases. Many operators find it easiest to load hundreds of slides into an AutoLoader and click the scanner green Start button on the front panel, letting the scanner automatically find the tissue on the slide, set focus points, and scan. In most cases, this default operation provides excellent results. Operators can also manually perform all of these pre-scan steps on one slide at a time.

In some cases, however—for example when the operator knows that only a small portion of the glass slide needs to be scanned—workflow is improved if the operator first views a quick snapshot of the slides, manually sets the scan areas, sets focus points, chooses slide type, and so on, before scanning. The advantages of doing so are:

- ▶ Smaller scan areas can be preselected by the operator, reducing the amount of time needed to scan the slides.
- ▶ Snapshots of slides that are difficult to scan, such as slides containing high background staining, can be adjusted before scanning, yielding better results.
- ▶ Re-scans are reduced as the operator reviews the slide snapshots before the slides are scanned, spotting and correcting potential problems before scanning.
- ▶ If after review some scans are found to be of poor quality, snapshots of those slides can be reviewed and adjusted to correct the problem before rescanning.

Here is a summary of how snapshot review works (more details are below):

1. Load the slides you want to scan.
2. Instead of immediately scanning those slides, choose a subset (or choose all) of the slides and tell the scanner to take quick snapshots of those slides.
3. Review the snapshots before scanning to set scan areas, focus points, scanning parameters, and so on.
4. After reviewing and adjusting all the snapshots, start scanning those slides.

## Taking Snapshots

To take snapshots, select one or more slides in rack view:

And click the **Snapshot** button:



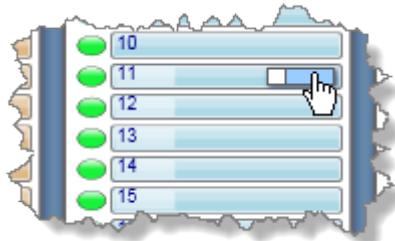
The information box tells you the status of the snapshots:



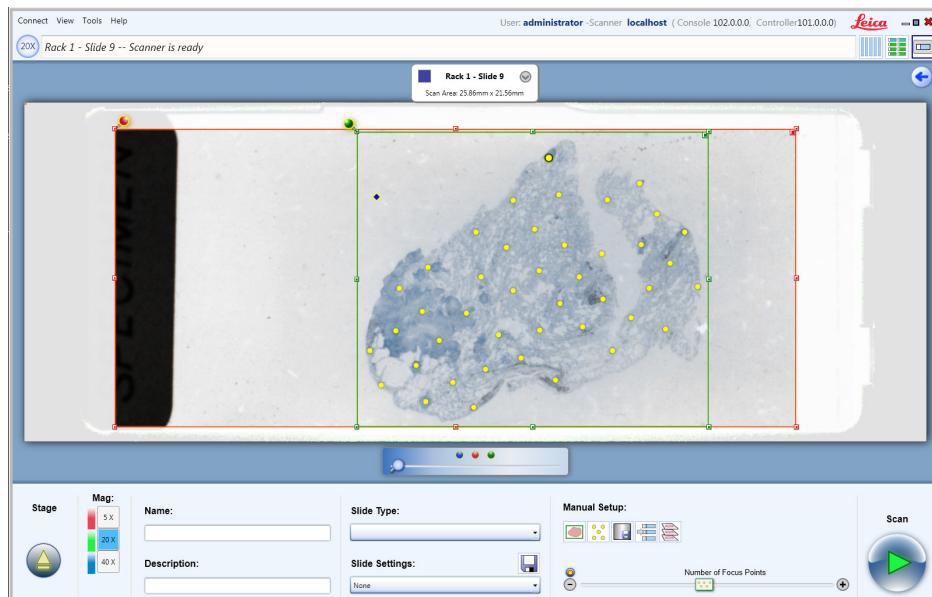
Note that you can also take a snapshot of a slide on the stage by clicking the **Take Snapshot** button on the Manual Scan window after having loaded the slide onto the stage. See “*Chapter 3: Manually Scanning a Slide on the Stage*” on page 30 for details.

## Reviewing Snapshots

After snapshots have been made, select slides on rack view that display the light blue status color. While your cursor is over one of the selected slides, click the **View Slide** icon:



The slide view window appears:



Features of this window include:

- ▶ **Viewing Controls** – By using the slider control you can zoom in and out of the slide image:



Use the zoom slider to zoom into the image—click the blue dot to zoom into the entire macro image, the red dot to zoom into the maximum scan area, and the green dot to zoom into the scan area.

If your mouse contains a scroll wheel, you can use it to zoom in and out of the image.

If multiple slide snapshots were selected to review, the forward and back arrows appear—use them to navigate between the snapshots you want to review.

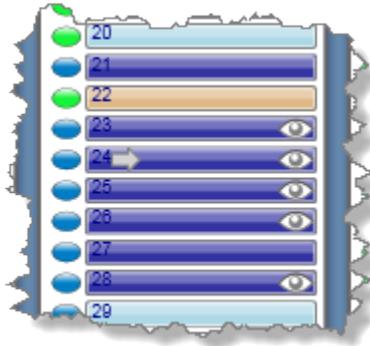
- ▶ **Name and Description** – The Name field allows you to specify a name that will be the basis of the file name for the scanned image files. The text you enter in the Description field is saved with the scanned images in eSlide Manager and can be used to differentiate the slides.
- ▶ **Standard Scan Controls** – On this window you can select many of the same options you would select if you were manually scanning a single slide, but you are presetting these options for a later scan.

Tool	Description
	The <b>Auto select tissue</b> icon selects the scan area based on the detection of tissue on the slide. You can also manually change the scan area. See “ <i>Set the Scan Area</i> ” on page 46 for more information.
	The <b>Auto select focus points</b> icon automatically sets focus points. You can also manually place, move, and delete focus points. For information on setting focus points, see “ <i>Chapter 5: Working with Focus Points</i> ” on page 50.
	The <b>Use default calibration image</b> icon tells the scanner to use a previously saved calibration image. See “ <i>Chapter 7: Calibration</i> ” on page 60 for information.
	You can click the <b>Set Start Slide</b> icon to make the slide being reviewed the starting slide for the scan. See “ <i>Setting the Scan Order</i> ” on page 22 for more information.
	To configure this slide for z-stack scanning, or to save z-stack configuration settings as a slide setting, click the <b>z-stack</b> icon. See “ <i>Chapter 6: Z-Stack Scanning</i> ” on page 57.

Note that you can set scanning parameters for just this slide, or on the rack view you can apply a slide type or slide setting to a group of slides.

- ▶ **Selecting Slide Settings and Slide Types** – You can apply a slide type or slide setting to this slide by using the Slide Type and Slide Settings drop-down lists. (See “*Saving Slide Settings*” on page 45 for information on creating your own slide settings.)

Once you have viewed a slide, the **Slide Viewed** indicator  appears on that slide in rack view during the current Console session:



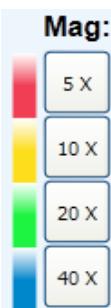
The dark blue status color indicates either that the slide has been edited or that it has been manually marked for scanning. The light blue status color means a snapshot has been made of the slide but you have not edited its scanning parameters. If you see the **Slide Viewed** indicator on the slide, you know that you have viewed the slide (whether or not you have edited it) during this Console session.

To clear all **Slide Viewed** indicators from the rack view, click the **Clear slide viewed indicators** button at the bottom of the rack view:



## Setting Scan Magnification

Click the magnification buttons to select the scan magnification you want to use for this slide:

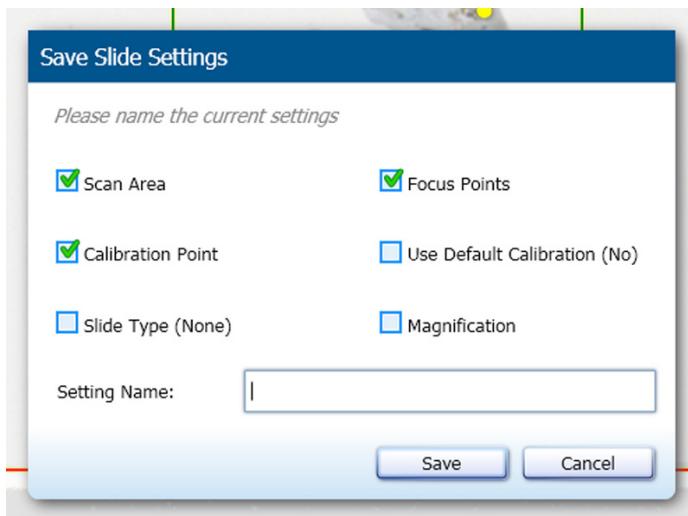


## Saving Slide Settings

After you have made scan settings for this slide, note that you can save the settings to apply to other slides. Type a name in the Slide Settings box and click the **Save** icon:



You see the Save Slide Settings window:



Choose the parameters you want to save in the slide setting, type a name for the slide setting, and click **Save**.

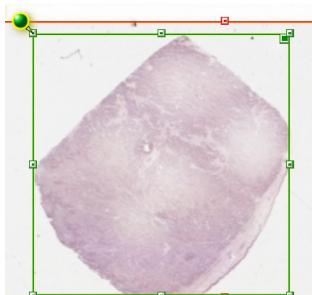
You will be able to apply this slide setting in snapshot review as well as apply it to a group of slides on the main rack view or apply it to a single slide in slide view when manually scanning the slide.

## Deleting Slide Settings

If you want to delete any of the slide settings you previously saved, click the Slide Settings drop-down list and click the red X next to the setting you want to delete.

## Set the Scan Area

On the macro image, a green box indicates the scan area, the area of the slide that will be scanned:

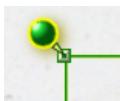


To reset the scan area by letting the scanner detect the tissue area on the slide, click the **Auto select tissue** icon:



Or, you can manually change the area of the slide that will be scanned:

1. Click the green pin on the scan area box:



and the cursor changes to a pen so you can draw a new scan area:



2. Or click a handle on the scan area box to drag the edges or corners of the scan area to a new position.



3. Or click the dark box at the upper right corner and you will be able to drag the scan area where you want it to be:



Include all of the tissue you want to scan in the scan area box.

Note that you can use the same techniques to redraw, adjust, or move the maximum scan area (shown in red), however it is not recommended to change the maximum scan area except in rare circumstances.

## Verify the Calibration Point Position

Make sure the calibration point (the blue diamond) is on a clear area of the slide that does not contain tissue and that it is under the coverslip.



During the scan, the scanner will use the area around the calibration point to make a calibration image which will be used to calibrate the scanner. For information on calibration, see *“Chapter 7: Calibration” on page 60*.

If a calibration image has already been captured for this slide, placing your cursor over the calibration point shows you this message: “Calibration image available (right click to view).” Right-click and you can select **View Calibration Image** from the context menu to see the calibration image.

The scanner must be able to focus at least four focus points to create a calibration image.

If during the scan you see a message that the scanner could not create a calibration image, you can:

- ▶ Work with the focus points to improve the ability of the scanner to focus the tissue. See *“Chapter 5: Working with Focus Points” on page 50* for information on adding, moving, and deleting focus points.
- ▶ If the characteristics of a specific slide makes it difficult for the scanner to create a calibration image, you can use a previously saved default calibration image for this slide. To use the default calibration image, click the **Use default calibration image** icon:

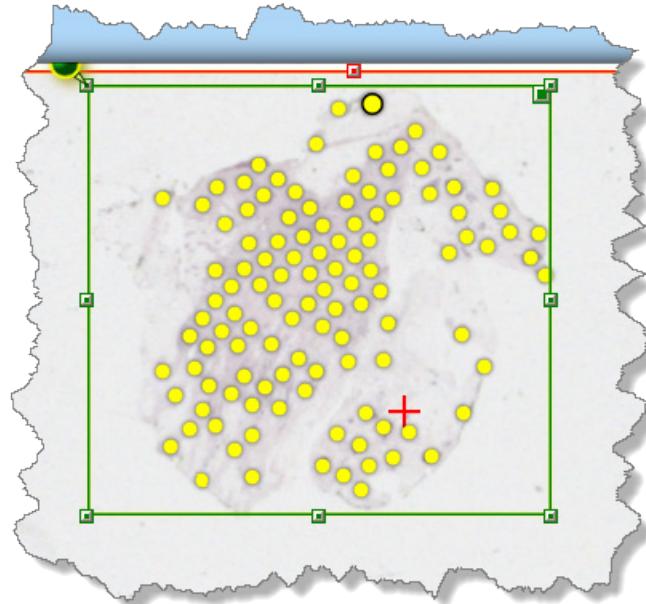


## Set Focus Points

In the Manual Setup area, click the **Auto Select Focus Points** icon to create focus points:



You need at least four focus points in order to scan.



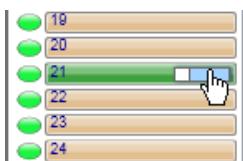
For information on adding, deleting, focusing, or moving focus points, see *“Chapter 5: Working with Focus Points”* on page 50.

## Scanning After Snapshots Are Reviewed

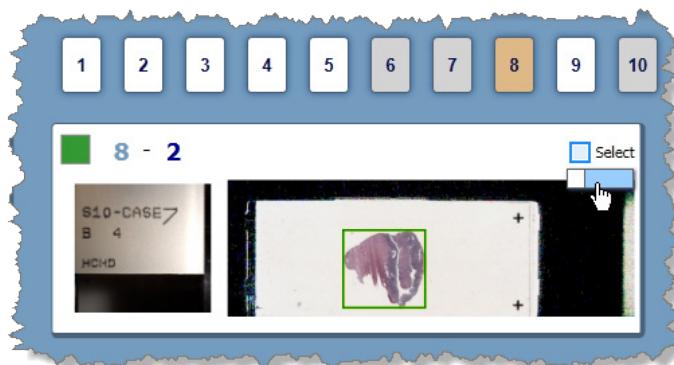
To start scanning after reviewing the snapshots, click the **Scan** button. The scanning will begin with whichever slide is the starting slide and proceed through the rest of the slides in the AutoLoader racks or stage (whether or not snapshots have been taken of those slides). The starting slide has an arrow next to it in the rack view. The scan will skip red and orange slides (which need to be reviewed and adjusted before they can be scanned again) and green slides (which have already been successfully scanned).

## Viewing a Slide's Snapshot

From the rack view, click the **View Slide** icon on the position of the scanned slide to view the slide in detail:

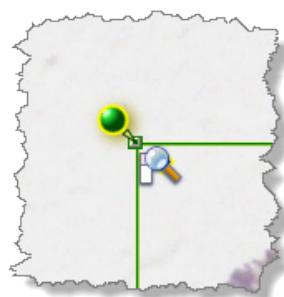


Or, from the batch view, click the **View Slide** icon on the scanned slide to view the slide in detail:



## Viewing a Slide After the Scan

After opening the scanned slide in slide view (see the section above), click the magnifying glass to view the slide in the Console viewer.



# 5

# Working with Focus Points

This chapter discusses how to work with focus points.

The most important factor in determining whether the scanned image will be of excellent quality is whether the scanner can successfully focus the tissue on the slide. In most cases, you can let the scanner automatically place and focus the focus points. However, in some cases where the slide contains tissue of uneven thickness or staining is faint, or there is not much tissue on the slide, you may get best results by placing focus points yourself.

This chapter discusses how to place focus points, and how to move and delete them. We also discuss how to manually focus a focus point and how to perform a macro focus.

## Introduction

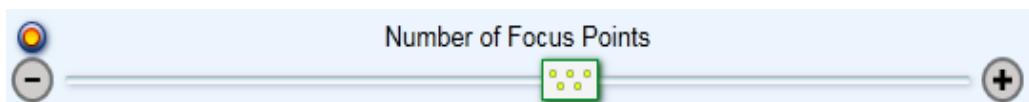
The Console provides multiple levels of working with focus points from the most automatic to the most manual:

Level	Category	Description
Level 1	Completely Automatic	Let the scanner focus the tissue and place focus points for you by simply loading slides and clicking the <b>Scan</b> button.
Level 2	Optimized Automatic	Set scan parameters yourself to improve focusing and automatically set focus points: Resize the scan area to cover just the tissue you are interested in scanning. Optionally use the <b>Number of Focus Points</b> slider to adjust the density of the focus points and place them or click the <b>Select focus points</b> icon to automatically place the focus points. See the section below.
Level 3	Manually Adjust Focus Points	Set scan parameters yourself (as in Level 2) but also manually place focus points by adding, deleting, and moving focus points. See “ <i>Adding, Deleting, and Moving Focus Points</i> ” on page 51.
Level 4	Manually Focus Focus Points	Place a slide on the stage for manual scan, set scan parameters yourself (as in Levels 2 and 3), but manually focus the focus points as discussed in “ <i>Manually Focusing Focus Points</i> ” on page 52.
Level 5	Manually Focus the Entire Slide	Place a slide on the stage for manual scan, set scan parameters yourself, manually focus the focus points (as in Levels 2, 3, and 4), and perform a macro focus to focus the tissue (as discussed in “ <i>Manually Focusing the Tissue</i> ” on page 55).

## Automatically Placing Focus Points

You can automatically place focus points in two ways on the slide view window.

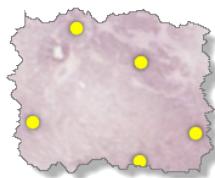
Use the **Number of Focus Points** slider to place a small number or large number of focus points.



Or click the **Auto Select Focus Points** icon to tell the scanner to automatically place focus points at the default density.



Each focus point appears as a yellow dot.



To restore the Number of Focus Points slider to its default value, click the **Reset Focus Point Radius to Default** button on the control.

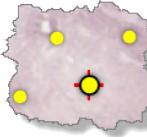


After the focus points are automatically placed, you may decide to manually add more, move focus points, or delete focus points. For example, if a focus point has been placed in a clear area of the slide without tissue, you will want to delete it or move it to an area that contains tissue. See the following section for details.

## Adding, Deleting, and Moving Focus Points

There are several different techniques for adding, deleting, and moving focus points.

If you want to...	Do this
Add a focus point	To add a focus point, double-click on the macro image at the position at which you want to add a focus point. The new focus point appears as a yellow dot. Or, right-click on the position where you want to add a focus point and select <b>Add Focus Point Here</b> from the context menu.

If you want to...	Do this
Delete focus points	<ul style="list-style-type: none"> <li>Click the focus point to select it and press the Delete key on your keyboard.</li> <li>Click the focus point to select it, right-click on the focus point and select <b>Delete This Point</b> from the context menu.</li> <li>Holding down the Control key on your keyboard, click multiple focus points to select them. When a focus point is selected, it is shown with a dark outline.</li> </ul>  <p>Then press the Delete key or right-click on a selected focus point and select <b>Delete Selected Points</b> from the context menu.</p> <ul style="list-style-type: none"> <li>To delete all focus points, click on an area of the tissue that does not contain a focus point, right-click and select <b>Delete All Focus Points</b> from the context menu.</li> </ul>
Move a focus point	Click a focus point to select it and then drag it to its new position.

## Automatically Focusing the Focus Points

If you are manually scanning a slide on the stage, you can tell the scanner to automatically focus the focus points before scanning. This allows you to test that all focus points can be focused.

To automatically focus the focus points before the scan, click the **Auto Focus All Focus Points** icon:



The focus points turn from yellow to green as they are focused. If some of the focus points remain yellow instead of green, you may want to manually focus them as discussed in *"Manually Focusing Focus Points" on page 52*.

If you want to revert the focus points to an unfocused state, right-click on an area of the image that does not contain a focus point and select **Clear All Focus Values** from the context menu.

## Manually Focusing Focus Points

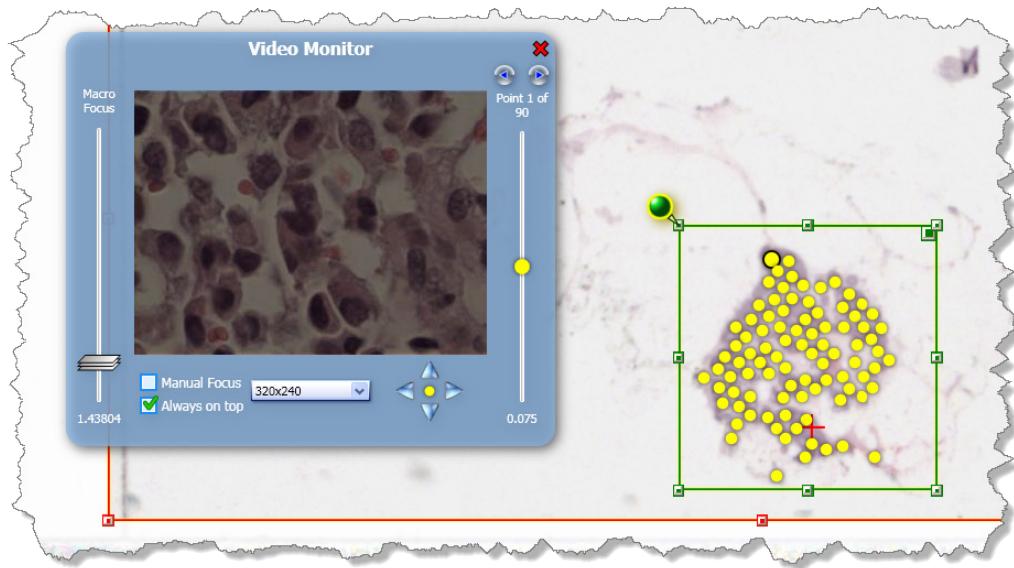
The simplest way to focus a single focus point is to click a focus point to select and select **Focus This Point** from the context menu.

However, a more visual way to focus one or more focus points is to use the Video Monitor window as discussed below.

When manually scanning a slide on the stage, you can manually focus the focus points one at a time. If you manually focus focus points, if you don't want the scanner to override those focus values when you scan, select the **Manual Focus** check box on the Video Monitor window (see below).

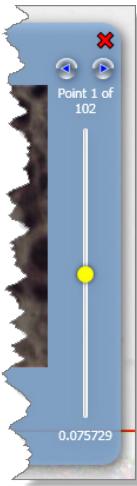
To manually focus focus points:

1. Go to the View menu and select **Video Monitor**. This opens a window showing a live video feed from the scanner of the slide under the objective.



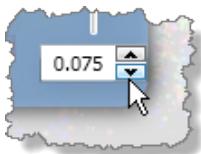
2. Double-click a focus point (a yellow dot) on the slide image or use the arrows on the focus slider on the Video Monitor window to move between focus points.
3. Now use the controls on the Video Monitor window to focus that point:

- ▶ **Focus the Focus Point** – To focus the focus point, move the **Focus Point** slider:



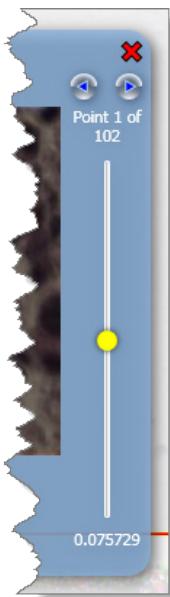
And observe the tissue at that point on the Video Monitor window—when the image is clear and the focus point on the slider turns green, you have focused the focus point.

As an alternative to moving the slide, you can enter a specific value by clicking on the number at the bottom of the slider, where you can use the controls to increment or decrement the value or type in a new value:

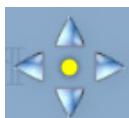


The focus point value is based on the perceived depth of the surface of the specimen at that point. For example, a focus point on the “peak” of the tissue is a lesser number than a focus point in the “valley” of the tissue. Based on the focus point values, the scanner determines the range of focus for the piece of tissue, and will adjust the scanner objective while scanning.

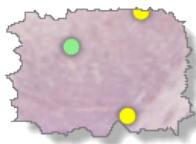
- ▶ **Navigate Between Focus Points** – To move between focus points, use the arrows at the top of the focus point slider:



- ▶ To move the selected focus point by small increments, use the arrows tool:



When the points are in focus (which you can verify by observing the tissue view in the Video Monitor window), close the Video Monitor window. You see that the focus point on the slide image is now green, indicating it has been focused.



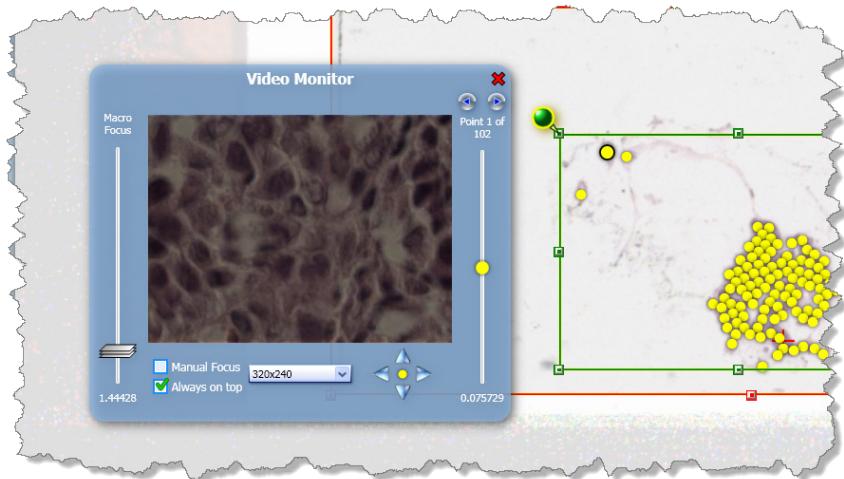
For information on additional features of the Video Monitor window, see “*The Video Monitor Window Controls*” on page 56.

## Manually Focusing the Tissue

Performing a manual macro focus allows you to view and focus the tissue using a live video feed from the scanner. This feature is only available when manually scanning a slide on the stage.

Performing a macro focus changes the focal plane so that when new focus points are placed (automatically or manually), they are relatively closer to (ideally on) the tissue.

1. Go to the View menu and select **Video Monitor**. This opens a window showing a live video feed from the scanner of the slide under the objective.



2. Right-click on a position on the slide image and select **Macro Focus Here** from the context menu.
3. Now use the controls on the Video Monitor window to focus that section of the slide as discussed in *"Manually Focusing Focus Points" on page 52*.
4. To perform both a coarse and fine focus, slide the Macro Focus slider up or down until the image of the tissue in the Video Monitor window is in focus. You can also enter a specific value by clicking on the number at the bottom of the slider, where you can use the controls to increment or decrement the value or type in a new value:



5. When the tissue is in focus, close the Video Monitor window.

For information on additional features of the Video Monitor window, see the next section.

## The Video Monitor Window Controls

Using the Video Monitor window is discussed in “*Manually Focusing Focus Points*” on page 52 and in “*Manually Focusing the Tissue*” on page 55. In addition to the task-specific tools discussed in those sections, the Video Monitor window also contains the following options:

- ▶ **Window size** – From the drop-down list select the size in pixels in which you want to display this window.



- ▶ **Manual Focus Check Box** – The scanner automatically focuses focus points as you scan. If you wish to turn off that automatic focus (so that the focus values you set manually are not overridden) select the **Manual Focus** check box.
- ▶ **Always on Top Check Box** – To keep the Video Monitor window in front of any other window, select this check box.

# 6

## Z-Stack Scanning

This chapter discusses how to configure the scanner to scan multiple images of a slide at different focal depths.

The Aperio scanner can create multiple digital images of slide tissue scanned at different focal depths, creating a 3D image that you can visually navigate through much as a microscope user can navigate through different tissue focal depths by using the microscope objective fine and coarse adjustments. This ability to create a 3D image is called “z-stack scanning.”

Use z-stack settings to scan a single slide as a z-stack, or save those settings as a permanent slide setting that can be used to scan groups of slides as z-stacks in the future.

For all types of scanning, the Aperio scanner determines the layer within the tissue that provides the optimal focus—this is called the *best focus layer*. For z-stack scanning, by default the best focus layer is placed in the middle of the z-stack, with an equal number of layers above and below it.

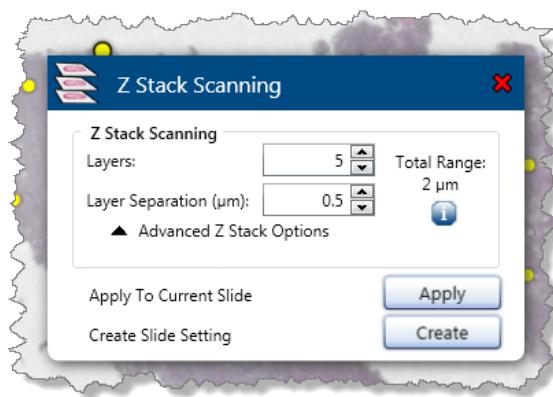
Note that you can create z-stack scan settings:

- ▶ For a manually scanned slide that is directly under the objective or
- ▶ For a slide that is in a scan batch.

To configure a z-stack scan:

1. Open a slide in detailed slide view.
2. Click the  icon in the Manual Setup section of the slide view window.

You see the Z-Stack Scanning window.



Now adjust the basic or, optionally, the advanced settings as discussed in the sections below.

To apply the settings to the slide you are viewing in the slide view window, click **Apply**.

For a visual reminder of how the z-stack layers are arranged and for tips on using the controls, hover over the **Info** icon in either the basic or the advanced configuration sections.

## Basic Z-Stack Settings

Configure the basic z-stack scan settings by telling the scanner:

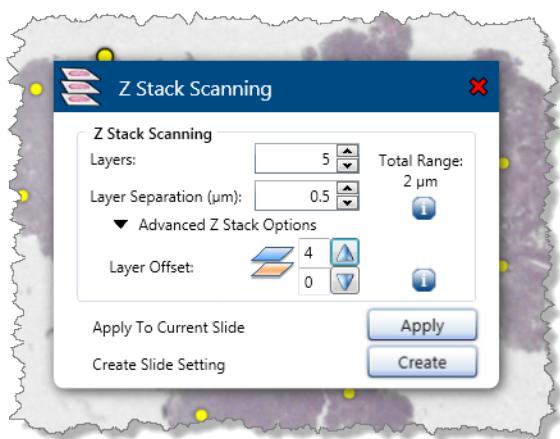
- ▶ How many focal layers you want to scan and
- ▶ The distance between the layers in microns.

For example, if you configure the z-stack to use 5 layers separated by .5 microns, there are two layers above the best focus layer and two layers below it.

## Advanced Z-Stack Settings

To see the Layer Offset controls, click **Advanced Z-Stack Options** on the Z-Stack Scanning window.

Use the advanced settings to change where the best focus layer is positioned in the stack. For example, the settings below show that the best focus layer is at the bottom of the stack, with four layers above it:



Use the arrow controls in the Advanced Z-Stack Options section to set the number of layers above and below the best focus layer.



*The advanced z-stack settings require a thorough understanding of the tissue or type of tissue you want to create a z-stack for.*

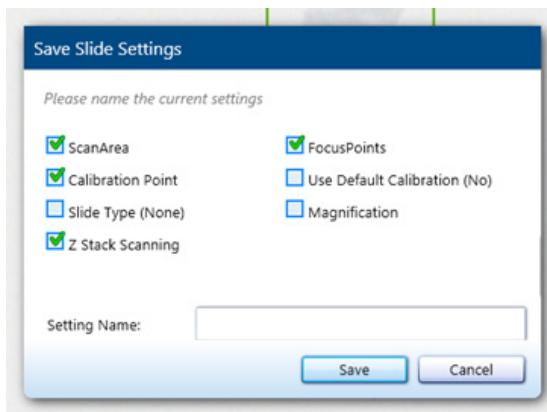
*For example, if you know that the best detail in the tissue occurs above the best focus layer and if you are not interested in the tissue below the best focus layer, place the best focus layer at the bottom of the stack and scan layers above the best focus layer.*

*It may take some experimentation to determine the optimal placement of the best focus layer to achieve the best results..*

## Saving Z-Stack Settings as a Slide Setting

To save the settings as a slide setting to apply to scans in the future:

1. Click **Create** on the Z-Stack Scanning window.
2. On the Save Slide Settings window, select the **Z-Stack Scanning** check box.
3. Type a name for the slide setting.
4. Click **Save**.



## Viewing Z-Stacks

For information on viewing the 3-dimensional z-stack image, refer to the *ImageScope User's Guide*.

# 7

# Calibration

This chapter discusses how the scanner is automatically calibrated during a scan, and contains information on how to create a calibration image.

The scanner is calibrated and verified at the factory before shipment. No further manual calibration or verification is required by the customer. However, we recommend annual preventive maintenance, performed by Technical Services, to make sure the scanner is operating correctly.

The scanner provides automatic Calibration every time a slide is scanned by performing calibration during the scan.

## What Is Calibration?

Every time you scan, the scanner calculates adjustments for minor illumination differences to ensure that the scanner performs consistently to scan high-quality images.

The scanner makes a calibration image of the white background at the location of the blue diamond (which must be positioned at a location that does not appear to have tissue) and then uses the image to obtain a shading correction that will be applied during the scanning process. Calibration then performs white-balancing. The final step of calibration is to measure intensity across the entire calibration image, and then normalizing the calibration image to a predefined value. Not only does this provide uniformity for images made by a single scanner, but calibration also ensures images are similar in intensity across multiple scanners.

Some slides contain very little clear non-tissue area, and you may find it is difficult to make a calibration image for those slides. What happens if a good calibration image is not able to be obtained when a slide is scanned? Or what if the final scanned image is not of the quality you desire and you suspect that a poor calibration image is to blame?

You can manually capture a calibration image by following the steps in this chapter. You can optionally select that image as a default calibration image that can be used if a scan cannot create a calibration image for a specific slide.

## Capturing a Calibration Image

To manually make a calibration image, you must be manually scanning a slide on the scanner stage on the stage.

1. First, eject the stage by clicking the **Eject** button in the command center at the bottom of the Console window:



2. Place the slide on the stage with the coverslip up (see the user guide for your scanner for instructions on the orientation of label of the slide on the stage).

3. Take a snapshot to get a macro image of the slide by clicking the **Snapshot** button:



After the snapshot is taken, you see the macro image of the slide in the window.

4. Set at least four focus points, preferably more. You can click the Auto Select Focus Points icon:



To tell the scanner to automatically set focus points.

5. You may want to perform a macro focus to verify that scanner can focus on the tissue:
  - ▶ Open the video window by going to the View menu and selecting **Video Monitor**.
  - ▶ Then right-click on the tissue in the macro image at a point that does not contain a focus point and select **Macro Focus Here**. The video window allows you to manually focus that spot on the slide.

For more information on performing a macro focus, see *“Chapter 5: Working with Focus Points” on page 50*.

6. Click the **Capture a calibration image** icon.



The focus points turn green as they are focused.

When the calibration operation is complete, the calibration image appears.



The calibration image should be consistent with non-tissue areas of a slide, typically light gray. (The illustration above shows a good sample of a calibration image for slide scanned in 20x.) Note that this image may look different depending on the magnification and stripe width you are using.

If the calibration image is too dark or displays shadowing, the bulb may need replacing. If the calibration image shows tissue, move the blue diamond calibration point out of the tissue area and make a new calibration image.

If you want to save this image to use as a default calibration image, click the **Save as Default** icon on the

calibration image window:



## Using a Default Calibration Image

Some types of slides contain very little clear area (for example, blood smear slides or bone marrow slides). In this case, you may not be able to successfully make a calibration image.

If you have previously made a good calibration image, you may have clicked the **Set as Default** icon to save it as a default calibration image. If you have a default image saved, you can click the **Use default calibration image** icon:



in the Manual Setup area of the window to use that image

## Calibration Reports

As part of their regulatory compliance process, some laboratories and clinics require a written record of equipment calibration. The scanner calibrates itself each time you scan a slide and sends the calibration information to eSlide Manager where you can access a complete report of calibrations. See the *eSlide Manager Administrator's Guide* for details.

# 8

# Console Tools

This chapter discusses using the Console tools to configure the scanner and to perform simple maintenance.

The Console Tools menu contains advanced options for configuring the scanner and scanning options.

To use these tools, go to the Tools menu and select one of the options below.

## Simple Maintenance (Making a Presnap)

Some customers prefer to make a presnap every day before starting scanning to ensure that the scanner is operating at peak efficiency. Other maintenance options discussed below may be done when necessary.

Making a presnap allows the scanner to correct for light reflection from the slide surface. This may improve the accuracy and sensitivity of the Tissue Finder.

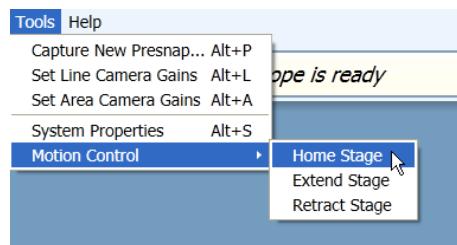
Eject the stage and place a clean, blank slide with no markings on the stage.

Go to the Console Tools menu and click **Presnap**. This will create a new presnap image. We recommend performing a presnap each day the scanner is in use before the first scan. Always perform a presnap before setting line camera gains.

## Motion Control

The Motion Control options allow you to move the scanner stage: extend it to the stage access position, retract it to move the stage back inside the scanner, and home the stage (move the stage back to its normal position under the objective).

Go to the Tools menu and select **Motion Control**. Then select the action you want to perform:



## System Properties

The System Properties window contains settings for configuring the scanner. To see the System Properties window, go to the Tools menu and select **System Properties**. Details on using the System Properties window are contained in *“Appendix B: System Properties” on page 72*.

## Tissue Finder Configuration (Creating Slide Types)

The Console automated tissue finder provides optimal scanning for most glass slides. However, scanning certain slides can prove a challenge because of characteristics of those slides such as faint tissue, artifacts on the slides, and so on, that can result in images that are not of optimal quality.

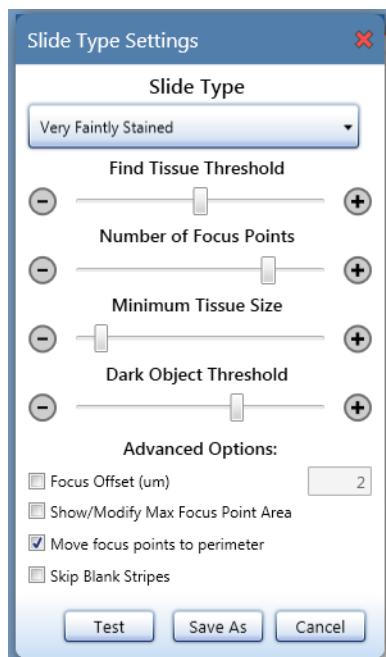
Adjusting the tissue finder to fit the characteristics of a specific type of slide can increase the scan success rate for those slides. By saving those tissue finder configuration settings as a slide type, that configuration can be used again when scanning similar slides in the future.

### Creating a Slide Type

To create a new slide type:

1. Open a slide in slide view.
2. Go to the Console **Tools** menu and select **Slide Type Settings**.

You see the Slide Type Settings window:



*You must be in slide view to open the Slide Type Settings window.*

For information on saving and working with slide type settings, see *“Saving, Modifying, Testing, and Deleting Slide Types”* on page 67.

This table contains quick reference information on each of these settings.

Feature	Description
Find Tissue Threshold slider	<p>Adjusting this slider increases or decreases the sensitivity of the tissue finder to faint tissue: to the right increases its sensitivity to faint tissue (also increasing sensitivity to noise and residue on the slide); to the left decreases its sensitivity (resulting in omitting more residue and only capturing darker, more heavily stained tissue).</p> <p>This slider controls two tissue finder parameters: <code>TFNoiseSigmaMultiplier</code> and <code>TFBackgroundThreshold</code>. When <code>TFNoiseSigmaMultiplier</code> drops below a value of 4, <code>GoodFocusThreshold</code> is reduced from its default value of 350 to 100.</p>
Number of Focus Points slider	<p>Moving this slider to the right results in more focus points closer together; moving it to the left results in fewer focus points spread further apart. Having more focus points increases scan time but often improves image quality for tissue that is not completely flat.</p> <p>This slider serves the same purpose as the Number of Focus Points slider on the slide view window, but its setting can be included in the slide type.</p> <p>This slider controls the tissue finder parameter <code>MacroFocusPointRadius</code>, which determines the minimum radius between focus point placement.</p>
Minimum Tissue Size slider	<p>Moving this slider affects the size of the object on which the tissue finder will place a focus point (to the right increases the size; to the left decreases the size). This slider is useful for avoiding placing focus points on dirt, coverslip scratches, or coverslip edges, but it may remove focus points from faint or sparsely spaced tissue segments if moved too far to the right. The slider starts with a low threshold and should only be adjusted if there is debris you want the tissue finder to avoid. Well defined tissue is required for this slider to be effective.</p> <p>This slider controls two tissue finder parameters: <code>TFMinObjectSize</code> and <code>TFFocusPointEdge</code>.</p>
Dark Object Threshold slider	<p>This slider determines how dark an object must be before it is discarded as "not tissue" and is useful to avoid placing focus points on pen marks and slide markers. Adjusting the slider to the right requires marks to be darker in order to be discarded; to the left allows lighter objects to be discarded.</p> <p>This slider may need to be adjusted if the tissue is extremely overstained and very dark compared to typical tissue.</p> <p>This slider controls the tissue finder parameter: <code>TFBlackThreshold</code>.</p>
Focus Offset check box	<p>Selecting this check box allows you to edit the focus offset value by entering a value in microns in the text box next to the check box.</p> <p>Due to the thickness of the specimen and limited depth of field at high magnification, some slides require a focus offset. This is a function of the specimen, and may be different for every slide. Typical offset values are between -0.3 to +0.3 microns, although they may be outside of that range. Best scans are obtained by determining the offset by trial and error.</p>

Feature	Description
Show/Modify Max Focus Point Area check box	When selected, this check box shows a gold rectangle on the slide view that allows you to select the area in which focus points can be placed. See <i>Setting the Maximum Focus Point Area</i> below for more information.
Move Focus Points to Perimeter check box	This check box tells the tissue finder to place focus points beginning at the edge of the detected tissue, moving inward to the center of the tissue instead of the normal order of center out. This is useful if you are having trouble getting focus points on the edge of the tissue.
Skip Blank Stripes	This check box modifies the TFFocusPointOrder parameter in the tissue finder.
Skip Blank Stripes	Selecting this check box enables the scanner to skip any stripes in which tissue is not detected. This increases the speed of the scan, but can cause cropping of faint tissue. To get acceptable results while using this feature, tissue finder must first be adjusted to accurately detect all tissue on the slide.

## Setting the Maximum Focus Point Area

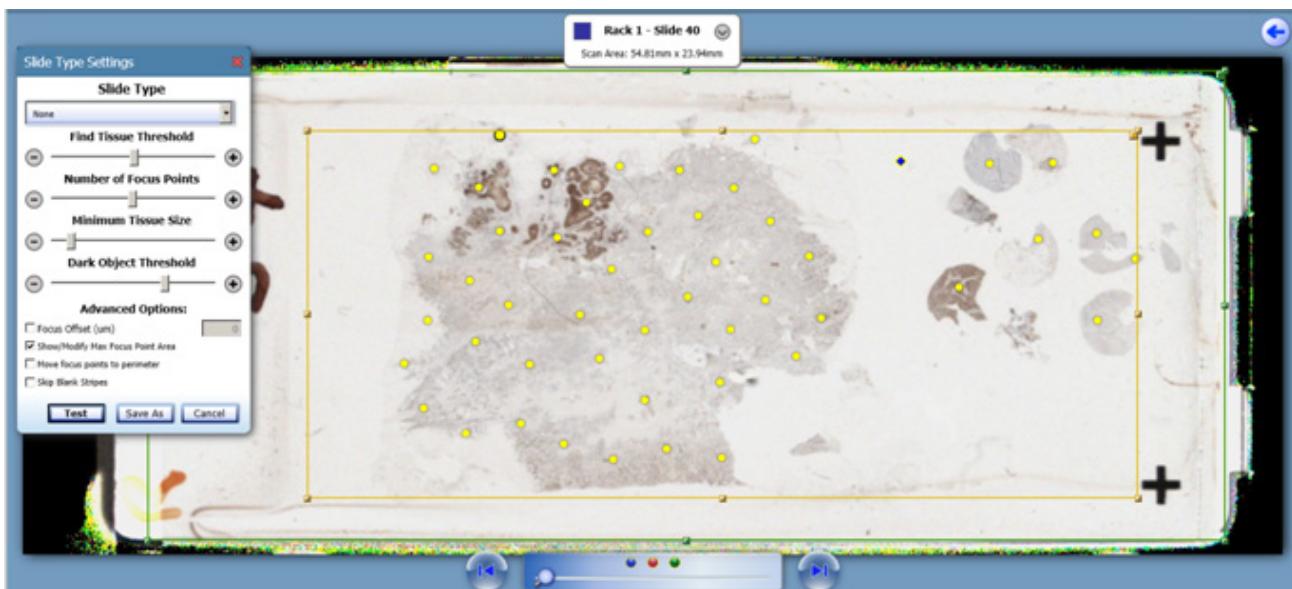
Selecting the **Show/Modify Max Focus Point Area** check box allows you to specify the area in which focus points can be placed. Focus points can only be placed in the area specified.

This feature is useful when you have a batch of slides that contain artifacts on the edges of the slide that could be mistaken for tissue by the tissue finder. If focus points are placed on residue on the edge, poor image quality can result because the scanner cannot achieve the best plane of focus. In the past, the best solution for this problem was to adjust the maximum scan area (red rectangle) to prevent the residue along the edges from being scanned at all; however, if the tissue extends to the residue or beyond it, cropping of the tissue can occur. For some sites, cropping any tissue is not acceptable. Setting the maximum focus point area allows the scanner to scan the entire area and still maintain good focus on just the tissue.

To set the maximum focus point area:

1. Select the **Show/Modify Max Focus Point Area** check box on the Slide Type Settings window.

A gold rectangle appears on the slide view and the scan area rectangle is hidden.



2. To adjust the size of this rectangle, grab and drag the boxes on the corners and edges of the gold rectangle.

### Tips on Using the Maximum Focus Point Area Rectangle

- ▶ The maximum focus point area rectangle is only visible when the Slide Type Settings window is open.
- ▶ The maximum focus point area does not affect the scan area.
- ▶ If the detected scan area (green rectangle) resides within the maximum focus point area, the scan area takes precedence for focus point placement.
- ▶ If the maximum focus point area is larger than the maximum scan area (red rectangle), the maximum scan area is used instead.

### Saving, Modifying, Testing, and Deleting Slide Types

You can view all of the slide type settings available on your scanner by clicking the down arrow on the drop-down list at the top of the Slide Type Settings window.

Here are some tips on working with the slide type settings:

If you want to...	Do this
Test slide type settings	As you are modifying the settings on this window, you can see the effect of the settings on the image in the slide view window by clicking the <b>Test</b> button.
Save slide type settings	To save your slide type settings, click <b>Save As</b> . You are asked to type a slide type name. Note that you cannot overwrite a factory slide type setting; you will see an error message if you try.  If you want to replace a non-factory slide type setting, type its name and you will be asked to confirm that you want to overwrite the slide type setting.

If you want to...	Do this
Delete slide type settings	<p>If you want to delete a slide type setting:</p> <ol style="list-style-type: none"><li>1. Display the list of slide type settings by clicking the down arrow on the drop-down list at the top of the Slide Type Settings window.</li><li>2. If a slide type setting has a red X next to it, click the X to delete the setting. (If a slide type does not have red X next to it, it is a factory slide type setting and cannot be deleted.)</li></ol>

# A Troubleshooting

This appendix gives tips for troubleshooting the most common problems you may encounter with your scanner.

If the information below does not help you find or fix the problem you are having, for further scanner technical support contact your local technical support representative. Refer to the first few pages of this manual for contact information.

Symptom	Solution
Scanner fails to start up or initialize.	<ol style="list-style-type: none"><li>1. Verify that the power switch at the back of the unit is on.</li><li>2. If your scanner contains an AutoLoader, make sure all scanner doors and the AutoLoader cover and access door are closed as a scanner with AutoLoader cannot start unless all doors are shut.</li><li>3. Click the Service Manager icon  in the Windows taskbar and check that the entry for the Controller has a green dot and says "Stop Controller Service." If it has a red dot and says "Start Controller Service," click the entry to restart it.</li></ol>
Console or LCD displays "Failed to move stage" or "Check stage locks."	If the stage is locked, you cannot scan. See the instructions in " <i>Locking and Unlocking the Stage</i> " in your scanner user's guide.
Trouble scanning a particular slide.	<ol style="list-style-type: none"><li>1. Is the slide tissue extremely thick or thin? If manual macro focus does not allow you to bring the tissue into focus, call customer service for assistance.</li><li>2. Is the slide extremely dark or faint? Use the Console manual macro focus or a parameter set such as <i>faint</i> or <i>gain adjust low</i>.</li><li>3. Is the label large or located inside the area of interest? Remove the label or adjust the area of interest.</li><li>4. Are there pen marks on the coverslip? Remove the marks or perform a manual scan.</li><li>5. Is there dust or debris on the coverslip or bottom surface? Clean the slide.</li><li>6. Are there air pockets under the coverslip? Perform a manual scan.</li><li>7. Is there excess adhesive around edges of the coverslip? Clean or perform manual scan.</li></ol>

Symptom	Solution
During the scan, the Tissue Finder included a non-tissue area in the scan area of interest.	Perform a new presnap with a very clean, blank slide and repeat the manual load. See “ <i>Simple Maintenance (Making a Presnap)</i> ” on page 63.
Entire image is out of focus.	<ol style="list-style-type: none"> <li>1. Verify that the slide is being held flat and not moving in the tray during scanning (tape down the slide if necessary).</li> <li>2. Optic surfaces (such as the objective) may contain finger prints. See your scanner user guide for information on cleaning the objective.</li> </ol>
Individual stripes of the image are poorly focused but a neighboring stripe is perfect.	<p>This may indicate that the slide is moving during scanning.</p> <ol style="list-style-type: none"> <li>1. Verify that the stage is clean.</li> <li>2. Verify that the slide is sitting flat and not rocking.</li> </ol>
Autofocus did not detect at least four focus points.	<ol style="list-style-type: none"> <li>1. The tissue may be too faint to scan; use the <i>faint</i> parameter set.</li> <li>2. Try performing a new presnap. See “<i>Simple Maintenance (Making a Presnap)</i>” on page 63 for more.</li> </ol>
Calibration image is displayed but error message “bulb may be unusable” is displayed.	<ol style="list-style-type: none"> <li>1. If the calibration image is clear but too dark or too bright, perform <i>set line camera gains</i>. See “<i>Setting Line Camera Gains</i>” on page 69.</li> <li>2. If the calibration image contains considerable tissue, while looking at the video monitor display, click on a clear glass area without tissue and verify that location is clear. Then move the blue diamond (calibration point) to that clear area.</li> <li>3. If the calibration image contains coverslip or other defects, try the parameter set <i>coverslip</i> to help scanner ignore edges or defects. If problem persists, either select the scan area manually or adjust the area of interest for all slides to avoid defects.</li> <li>4. If the calibration image is very uneven, verify the slide is sitting flat. Repeat with another slide. An uneven calibration may also indicate optical misalignment due to mishandling which requires a service visit or factory repair.</li> </ol>
An error message tells you that the scanner cannot create a calibration image.	Set the line camera gains. (For instructions, see “ <i>Setting Line Camera Gains</i> ” on page 69.)
Slide seems to scan correctly, but the resulting eSlide file is very small and does not contain an image.	The <i>TemplImageLocation</i> property must point to a valid disk location. If that directory does not exist or is not accessible, a useless 1K file will be created for the eSlide that does not contain an image. You can set <i>TemplImageLocation</i> to the correct directory by using the scanner Properties command of the Tools menu.

## Setting Line Camera Gains

You only need to set line camera gains when prompted to do so when the scanner cannot create a calibration image or if there is a problem with the calibration image (see the troubleshooting hints above).

To set the line camera gains, eject the stage and place a clean slide containing tissue (no scratches or markings) on the stage. Go to the Console **Tools** menu and click **Set Line Camera Gains**. The scanner will automatically place focus points on the slide, check the calibration, then adjust the line camera gains as required.

You will need to set line camera gains multiple times, once for each magnification setting available on your scanner (for example, once with 20x enabled, once with 40x enabled, and so on).

If the scanner cannot create a calibration image after setting the line camera gains, the LED light source may need to be replaced or adjusted—contact your service representative for assistance.

## Setting Area Camera Gains

The Console Video Monitor window shows the slide image. If there is not enough light to see the slide well or if there is too much light (washing out the image because of overexposure), then you will want to set the area camera gains.

To set the area camera gains, eject the stage and place a clean slide containing tissue (no scratches or markings) on the stage. Go to the Console **Tools** menu and click **Set Area Camera Gains**. The scanner will automatically adjust the area camera gains as required. A progress bar indicates the status of the adjustment, which can take ten minutes or more.

## Error Handling

Because a great deal of slide scanning is automated, if an error occurs during scanning, rather than halting the scanning process the scanner displays and logs the error and continues scanning. After the scan is complete, you can review the error log to see if any errors occurred and then take action to repair any errors.

View the log by going to the View menu and selecting **Error Log**.

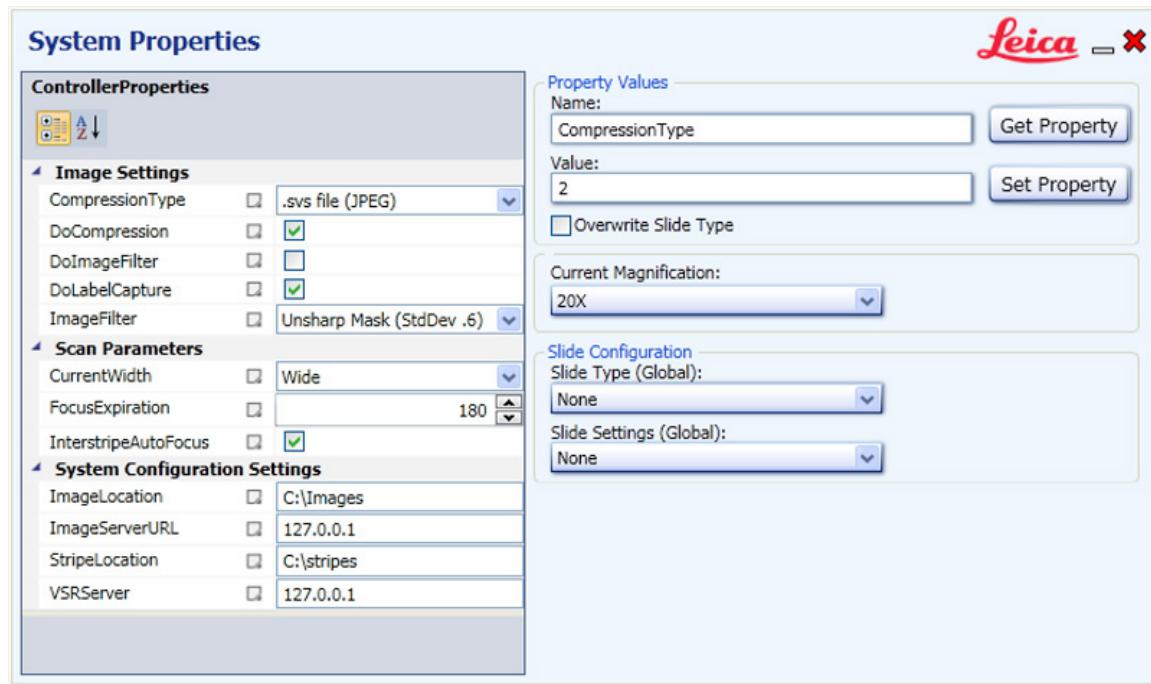
When you see this error window, for additional information click on the **Scanner Log** radio button to see a log of status and error conditions. This information may be requested by Technical Support if they are helping you troubleshoot an issue.

# B

# System Properties

This appendix contains information on using the Console System Properties window to configure the scanner.

The System Properties window contains settings for configuring the scanner. To see the System Properties window, go to the Tools menu and select **System Properties**.



## Property Values

The Property Values section of the System Properties window allows you to set values for specific properties.

## Overwriting a Slide Type

By default, you cannot change a property when it is contained in the currently applied slide type. Selecting the **Overwrite Slide Type** check box allows you to change a property even if it is in the slide type applied. Note that this option allows you to overwrite just the property in the slide type that you are changing, but does not disable any other property in the slide type.

## Slide Types Override Console Options

If a Console option setting is required for a particular slide type, choosing that slide type will automatically override the existing option settings.

## Properties

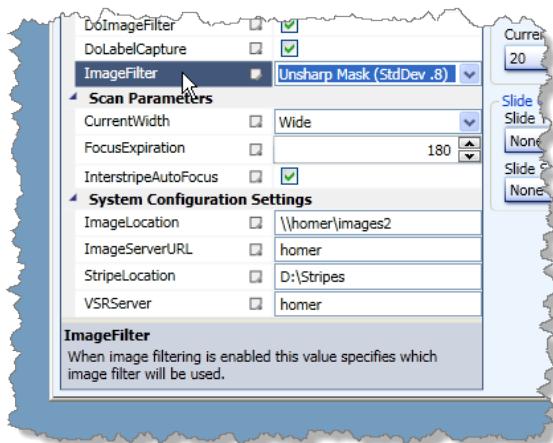
1. To view a property setting, enter the **Name** and click **Get Property**.
2. To modify a property setting, enter the **Name** and the **Value** and click **Update Property**.

*Many of these properties are factory settings that should not be changed in the field. In fact, mixing these settings improperly can have serious consequences—please contact Technical Services for advice if you are not sure how to use these properties.*

## Controller Properties

The Controller Properties section of the System Properties window contains the properties most frequently used to directly configure the scanner. Note that you can sort these properties alphabetically in ascending order by clicking the  icon at the top of the list. To return to a categorized list, click .

Also note that when you select a property, helpful text at the bottom of the window gives information on the property:



Properties and slide types are stored in the controller.xml file, but we advise you to use the Console configuration options to select/change them instead of editing the xml file directly.

Here are some of the properties that you may wish to change or that Technical Support may advise you to change if they are assisting you to troubleshoot a problem:

Property	Description
AlignThreshold	See “ <i>Alignment Threshold</i> ” on page 77.
AutoLoader	Set to True if AutoLoader is present; otherwise, False.
BlueGain	This parameter is the Basler line-camera blue gain setting.

Property	Description
BlueGainAdjust	See the DoGainAdjust property.
CacheSlideSettings	Saves the macro image of the slide in the tray. To enable, set to True.
CompressionBackground	Specifies the RGB value of the background color the compressor uses to fill in the background of tiles where there is no image data. Usually you want to set this color to a neutral gray color so it matches the clear space of the slide. The number is an RGB value in hexadecimal of the format 00rrggb. For example, 00FF0000 is all red. You must convert this number to decimal before using it as a CompressionBackground value.
CompressionQuality	Controls the JPEG and JPEG2000 compression quality. We recommend a value larger than 20 and no more than 80. A quality factor of 30 typically results in acceptable image quality at 30:1 compression (JPEG2000) or 15:1 compression (JPEG).
CompressionType	Settings: 0=None, 1=LZW, 2=SVS with JPEG, 5=SVS with JPEG2000 using Kakadu library, 10=CWS, 12=JP2. See <i>“Compression Types” on page 77</i> for more information.
CompressionTypeZStack	Compression types used for storing z-stack images. Settings: 0=None, 1=LZW, 2=SVS with JPEG, 5=SVS with JPEG2000 using Kakadu library, 10=CWS, 12=JP2. See <i>“Compression Types” on page 77</i> for more information.
DefaultAlignXOffset	See <i>“Alignment Threshold” on page 77</i> .
DefaultAlignYOffset	See <i>“Alignment Threshold” on page 77</i> .
DoCompression	Creates the file using the type of compression specified in CompressionType. For example, if SVS is selected as the compression type, this parameter converts the file to an .SVS file.
DoFastAlign	If set to true, takes advantage of Release 8 higher performance alignment. Performance benefits vary depending on the model of scanner.
DoGainAdjust	Configures the scanner to scan thicker or darker specimens such as smears. To enable, set to True. To use this property you will also need to adjust the settings in RedGainAdjust, BlueGainAdjust and GreenGainAdjust. When the tissue is too dark, everything looks black and the scanner cannot focus. To solve this problem, we offset the gains while focusing and scanning. Calibration does not use the gain offsets. So, for example, if the RedGain value is set to 300, when you use DoGainAdjust with offset of 200, RedGain will be 500 while focusing and scanning but it will be 300 during calibration. The best way to use this functionality is to set up a Parameter Set; please contact Technical Services for advice.
DolmageFilter	If set to true, you can use ImageFilter to select from several unsharpmask algorithms to apply to the scanned image. See <i>“Image Filtering” on page 76</i> below for an explanation of the unsharpmask filters available.
DoLabelCapture	Controls whether a label image should be captured during macro image processing.
DoWrite	Controls whether the scanner should write raw stripes to disk.
DSRFailureResponse	Controls what happens if the scanner is not able to save the scanned image to eSlide Manager because the connection to the DSR has failed. The two options are: 1) ask the user if he wants to continue the scan saving the image locally or stop the scan (“Ask”) or 2) continue the scan and save it locally without asking the user (“Continue”).
ExerciseCount	Determines the number of times the nanomotor stages will perform an exercise.

Property	Description
ExerciseEvery	Determines how often the exercise routine will execute.
FileShare	The name of the MS file share that points to the Stripes directory.
FocusOffset	Fine-tunes autofocus; in microns.
GammaFile	Specifies the gamma file to use if DoGamma is true.
GoodFocusThreshold	The contrast number used to reject a bad focus point.
GreenGain	The Basler line-camera green gain setting.
GreenGainAdjust	See the DoGainAdjust property.
ImageFilter	If DolmageFilter set to true, you can specify unsharpmask filters using this property. See <i>"Image Filtering" on page 76</i> for more information.
ImageLocation	The location where compressed slides are stored. Typically a network address.
ImageLocationByDate	If set to True, all compressed slides will be stored in ImageLocation in a folder with the current date.
ImageServerPort	Specifies which port is used by the ImageServer.
ImageServerURL	Must be set to your ImageServer name to use TelePath Live (Remote Revisit). See the <i>ImageScope User's Guide</i> for details.
LCDPort	Specifies which port is used by the LCD display.
MacroAoiBottomPix	This number establishes the Area of Interest in which the search for tissue will occur. This is the bottom coordinate where 0,0 is the upper left corner.
MacroAoiLeftPix	This number establishes the Area of Interest in which the search for tissue will occur. This is the left coordinate where 0,0 is the upper left corner.
MacroAoiRightPix	This number establishes the Area of Interest in which the search for tissue will occur. This is the right coordinate where 0,0 is the upper left corner.
MacroAoiTopPix	This number establishes the Area of Interest in which the search for tissue will occur. This is the top coordinate where 0,0 is the upper left corner.
MacroFocusPointRadius	Used by the tissue finder routines to control the number of focus points placed on tissue.
MacroMaxNumberFocusPoints	Used by the tissue finder routines to control the number of focus points placed on tissue.
MacroMinNumberFocusPoints	Used by the tissue finder routines to control the number of focus points placed on tissue.
MacroNoiseErosionNumber	Used by the tissue finder routines to select tissue and control the number of focus points placed on tissue.
MacroSpatialSigmaThreshold	Used by the tissue finder routines to select tissue and control the number of focus points placed on tissue.
MacroUseBimodalNoiseReject	Used by the tissue finder routines to select tissue and control the number of focus points placed on tissue.
MacroUseColorOnly	Used by the tissue finder routines to select tissue and control the number of focus points placed on tissue.
MacroWhiteSigmaThreshold	Used by the tissue finder routines to select tissue and control the number of focus points placed on tissue.

Property	Description
QuickSnapAfterHome	If set to true, then the controller will take snapshots of all the slides in the tray after starting up (homing). This can be useful when combined with the CacheSlideSettings property. After the machine starts up, you see all the macro images in the Console. This is only useful for scanners that use a multi-stage.
RedGain	The Basler line-camera red gain setting.
RedGainAdjust	See the DoGainAdjust property.
RemoveRevisitLicense	Stores the license value for the TelePath Live (Remote Revisit) feature.
SaturationAdjust	Affects TelePath Live (Remote Revisit) and the Console's video monitor. A value of 1 means "do nothing"; a value greater than 1 makes colors richer; a value less than 1 makes colors duller.
SkipBlankStripes	Skips areas of the slide where there is no tissue. To enable set to True.
StripeLocation	The location where raw stripes are stored. Typically C:\Stripes.
TemplImageLocation	If ImageLocation is unreachable, this location will be used temporarily. This must define a valid disk path.
VSRPort	Specifies the TCP/IP port used by the DataServer.
VSRPswd	Specifies the password used to authenticate with the DataServer.
VSRServer	Specifies the name of the DataServer.
VSRUser	Specifies the user name used to authenticate with the DataServer.

## Image Filtering

If you set DolmageFilter to true, you can then use the ImageFilter property to select from several unsharpmask algorithms to apply to the scanned image. These image enhancements become a permanent part of the scanned image and will slow down the scanning to some degree. The image filtering options are:

Filter Number	Filter Description	Standard Deviation
1	Unsharpmask 6	.6
2	Unsharpmask 7	.7
3	Unsharpmask 8	.8
4	Unsharpmask 9	.9
5	Unsharpmask 10	1.0
6	K1	—
7	K2	—

Unsharp mask filters are used in image processing to enhance edge sharpness. An unsharp mask filter works by evaluating the contrast between adjacent pixels, and increasing that contrast when it's relatively high. (A large contrast difference between adjacent pixels usually represents an edge, which can be increased to improve image "sharpness.")

The unsharp mask filters listed above have different standard deviation values from .6 (Unsharpmask 6) to 1.0 (Unsharpmask 10). The higher the standard deviation, the more sharpening the filter performs.



**CAUTION:** Using image filters may affect analysis of the image. While unsharp filters tend to provide a more pleasing image to the human eye, they may compromise analysis performed by analysis algorithms because the image has been altered.

K1 and K2 are edge enhancement filters. They are usually too harsh for most image touch-up, but can be useful for very soft images, particularly those that are zoomed up from the original scanned resolution.

The best way to choose a filter to use with a specific image is to experiment. From within Digital Slide Studio, open the image, select a filter and see the results.

## Alignment Threshold

At times during a scan there are stripes that must be aligned but do not have enough visible image to use for alignment. These situations will generate a low alignment success number. You can use the following properties to detect these cases and to supply a default alignment between the stripes: AlignThreshold, DefaultAlignXOffset, DefaultAlignYOffset.

## Compression Types

By default, the scanner creates an eSlide using the SVS file format using compression type 2 (JPEG). You can use the CompressionType and CompressionTypeZStack properties to set the compression and file type for the main image and for z-stacks:

Setting	Compression	File Format	Extension
0	None – Output file is a raw TIFF file with no compression.	TIFF	.TIF
1	LZW – Compressed TIFF file with lossless Lempel-Ziv Welch compression. This typically results in a compression ratio of 2:1-3:1.	TIFF	.TIF
2	JPEG – Lossy compression using arithmetic encoding. You may specify image quality using CompressionQuality (20-90). Output is an SVS (TIFF) file. Compression ratios are in the range 15:1-20:1.	TIFF	.SVS
5	JPEG2000/Kakadu - Lossy compression using wavelets, implemented by the Kakadu image library. You may specify the target compression ratio using CompressionQuality (20-90). Output is an SVS file. Compression ratios are in the range 20:1-25:1.	TIFF	.SVS
8	JPEG – Lossy compression using arithmetic encoding. Output is a JFIF file. Compression ratios are in the range 15:1-20:1. NOTE: it is not possible to scan directly to this format, but it can be output from DSS and ImageScope	JFIF	.JPG
10	CWS – Lossy compression using arithmetic encoding. You may specify the target image quality using CompressionQuality (20-90). Output is a Composite WebSlide (directory). Compression ratios are in the range 15:1-20:1.	CWS directory containing multiple JFIF files	(directory)
12	JPEG2000/Kakadu – Lossy compression using wavelets, implemented by Kakadu Image Library. You may specify the target image quality using CompressionQuality (20-90). Output is a JP2 file. Compression ratios are in the range 20:1-25:1.	JP2	.JP2

If you set compression type to 0 (uncompressed), you can potentially create an image file greater than 4GB, which Windows may not be able to open. If you have a need for uncompressed images, but they are too large for you to use, contact Technical Support for alternative methods of creating uncompressed files that will be easier to use.

## Slide Types

The Slide Configuration area of the System Properties window allows you to apply slide types to the current scan batch. Slide types (also known as slide type) are predefined settings which have been provided for scanning certain types of tissue. By default, the parameter set is **None**.

1. To change the slide type, click on the arrow to the right of the **Slide Type** box. You will see a list of slide types.
2. Select a slide type from the list and wait for the window to update.

Here are some of the most commonly used slide types:

Slide Type	Description
Coverslip	This reduces selecting coverslip edges, scratches, and visible mounting media when scanning.
Faintly Stained	This parameter set is for faintly stained specimens
Very Faintly Stained	This parameter set is for very faintly stained specimens.
Serial Section	This parameter set is designed for scanning a slide containing serial sections.
Cytology	This parameter set has been designed to ensure that enough focus points are placed in a round pattern consistent with the preparation of cytology slides.
Blood Smear	This parameter set has been designed to ensure that enough focus points are placed on a blood smear slide for optimal results.
Gain Adjust High	For extremely dense slides. Sets the following properties: <ul style="list-style-type: none"> <li>▶ DoGainAdjust=True</li> <li>▶ RedGainAdjust=300</li> <li>▶ GreenGainAdjust=300</li> <li>▶ BlueGainAdjust=300</li> </ul>
Gain Adjust Low	For dense (dark) slides. Sets the following properties: <ul style="list-style-type: none"> <li>▶ DoGainAdjust=True</li> <li>▶ RedGainAdjust=100</li> <li>▶ GreenGainAdjust=100</li> <li>▶ BlueGainAdjust=100</li> </ul>
Gain Adjust Medium	For very dense slides. Sets the following properties: <ul style="list-style-type: none"> <li>▶ DoGainAdjust=True</li> <li>▶ RedGainAdjust=200</li> <li>▶ GreenGainAdjust=200</li> <li>▶ BlueGainAdjust=200</li> </ul>

Slide Type	Description
None	The default set.
2 x 3 Support	Switch to using a slide tray that holds 2-inch x 3-inch (5.08 cm x 7.62 cm) slides. To switch back to 1-inch x 3-inch (2.54 cm x 7.62 cm) slides, choose another slide type (or <b>None</b> ).
Tissue Micro Array	This set has been designed to ensure that all TMA cores have focus points placed on them to ensure scan quality.

When you have completed scanning with a slide type, reset it back to **None**; leaving a slide type active will cause all future scans to be performed with the selected slide type.

You may define your own slide types—see “*Tissue Finder Configuration (Creating Slide Types)*” on page 64.

## Slide Settings

Choosing a slide setting from the **Slide Settings** drop-down box applies those settings to all slides on the stage or racks. See “*Reviewing Snapshots*” on page 42 for more on slide settings.

# Index

## A

alignment threshold 77  
AutoLoader 16

## B

batch  
  concepts 17  
  definition 16  
  excluding slides 20  
  including slides 19  
  options 24  
  scanning 22  
  scenarios 28  
batch view 13, 25  
best focus layer 57

## C

calibration 60  
  report 62  
calibration image 47, 60  
  default 62  
  using default 47  
calibration point 16, 32  
  position 47  
camera gains 16  
compression 77  
compression types 77  
configuration  
  Controller properties 73  
Console  
  batch view 13  
  connecting to the scanner 9  
  quick tour 10  
  rack view 10  
  scanning 48

slide status colors 14  
slide view 12  
snapshots, reviewing 42  
starting 9  
continue/retry when DSR connection lost 9  
controller properties 73  
Controller properties 73  
creating batches 17

## D

data group, selecting 9  
default calibration image 62

## E

edge enhancement filters 77  
error handling 71  
error log 71  
eSlide  
  data group 9

## F

failed scans, rescanning 27  
focus points 50  
  adding 51  
  automatically placing 51  
  automatic focusing 33  
  definition 16  
  deleting 51  
  introduction 50  
  manually focusing 52  
  moving 51  
  placing 33  
  setting 48

**H**

homing stage 63

**I**

image filtering 76

**J**

judging scan quality 14

**L**

language, selecting 9

**M**

macro focus 16

maintenance

making presnap 63

manual scan 30

options 37

marking slides for rescanning 28

maximumn focu point area, setting 66

maximum scan area 16, 46

motion control 63

**N**

network connection 18

**P**

presnap 63

definition 16

problems 69

**R**

rack 16

removing from batch 20

replacing 18

rack view 10, 16

regulatory compliance, calibration reports 62

rescanning 28

rotating slide label 37

**S**

saving images locally 9

scan area 16, 31, 46

Scanned Image 36

scanning 48

errors 71

manually 34

quality 14

tips 15

scan order 21

selecting racks 21

selecting scan data group 9

selecting slides 17, 21

slide settings 16, 79

saving 45

z-stack 59

slide status

colors 14

slide type 16, 77

assigning to snapshots 43

creating 64

deleting 64

modifying 64

overwriting property 72

slide types 78

slide view 12

Slide Viewed indicator 26, 44

clearing 26, 44

snapshot 16

manual scan 30

snapshots

introduction 41

reviewing 42

stage 16

system properties, setting 72

**T**

tissue finder 31, 46

configuration 64

tissue, manually focusing 55

troubleshooting 69

**U**

uncompressed files 78

unsharp mask filters 76

**V**

video monitor window 56  
viewing scanned image 36  
viewing slide label 27, 37

**Z**

z-stack scanning  
  advanced options 58  
  basic options 58  
  best focus layer 57  
  slide settings 59

## Symbols

- The following symbols may appear on your product label or in this user's guide:

	Manufacturer
	Date of manufacture (year - month - day)
	European Union Authorized Representative
	In vitro diagnostic device
	Serial number
	Catalog number
	Relative humidity range
	Storage temperature range
	Electronic and electrical equipment waste disposal
	<p>The exclamation point within an equilateral triangle is intended to alert you to the presence of important operating and maintenance (servicing) instructions.</p> <p><i>Le point d'exclamation dans un triangle équilatéral vise à avertir l'utilisateur qu'il s'agit d'instructions d'utilisation et d'entretien importantes.</i></p>
	<p>The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert you to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.</p> <p><i>Le symbole de l'éclair avec la pointe de flèche dans un triangle équilatéral vise à avertir l'utilisateur que le boîtier du produit présente une « tension dangereuse » non isolée d'une amplitude suffisante pour constituer un risque d'électrocution.</i></p>
	<p>The flat surface with waves symbol within an equilateral triangle is intended to alert you to the presence of hot surfaces which could cause burn damage.</p> <p><i>Le symbole d'une surface plane et de vagues dans un triangle équilatéral vise à avertir l'utilisateur de la présence de surfaces chaudes qui peuvent causer des brûlures.</i></p>
	<p>The UV lamp within an equilateral triangle is intended to alert you to the presence of UV light within the product's enclosure that may be of sufficient magnitude to constitute a risk to the operator.</p> <p><i>La lampe UV dans un triangle équilatéral vise à avertir l'utilisateur de la présence de rayonnement UV dans le boîtier du produit qui peut être d'une amplitude suffisante pour constituer un risque pour l'utilisateur.</i></p>

[www.LeicaBiosystems.com/ePathology](http://www.LeicaBiosystems.com/ePathology)

