

# Aperio GT 450

## Quick Reference Guide

For research use only. Not for use in diagnostic procedures.

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## Aperio GT 450 Quick Reference Guide

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# Introduction

This guide provides basic steps for using the Aperio GT 450 digital slide scanner. See below for additional resources.

Please watch the videos (accessible from the touchscreen interface) before working with the scanner.

## Help Videos

Access training videos and this guide from the touchscreen:

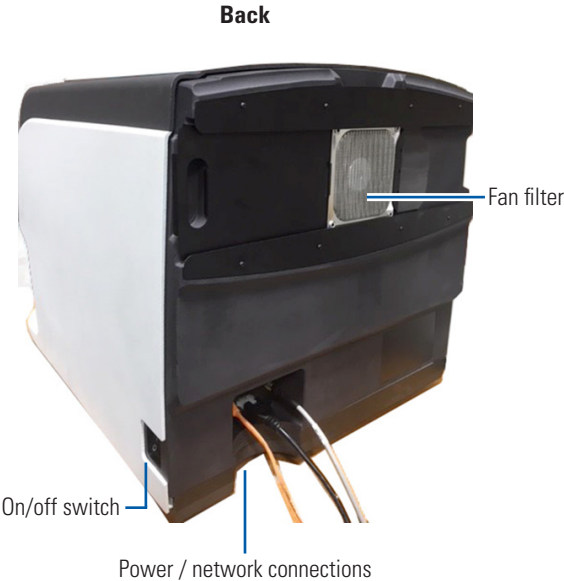
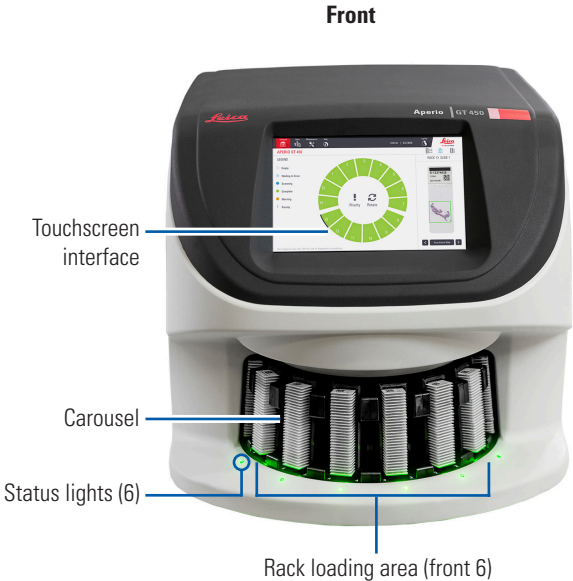


## User Guides

In addition to this guide, the following guides are available on the Leica Biosystems website:

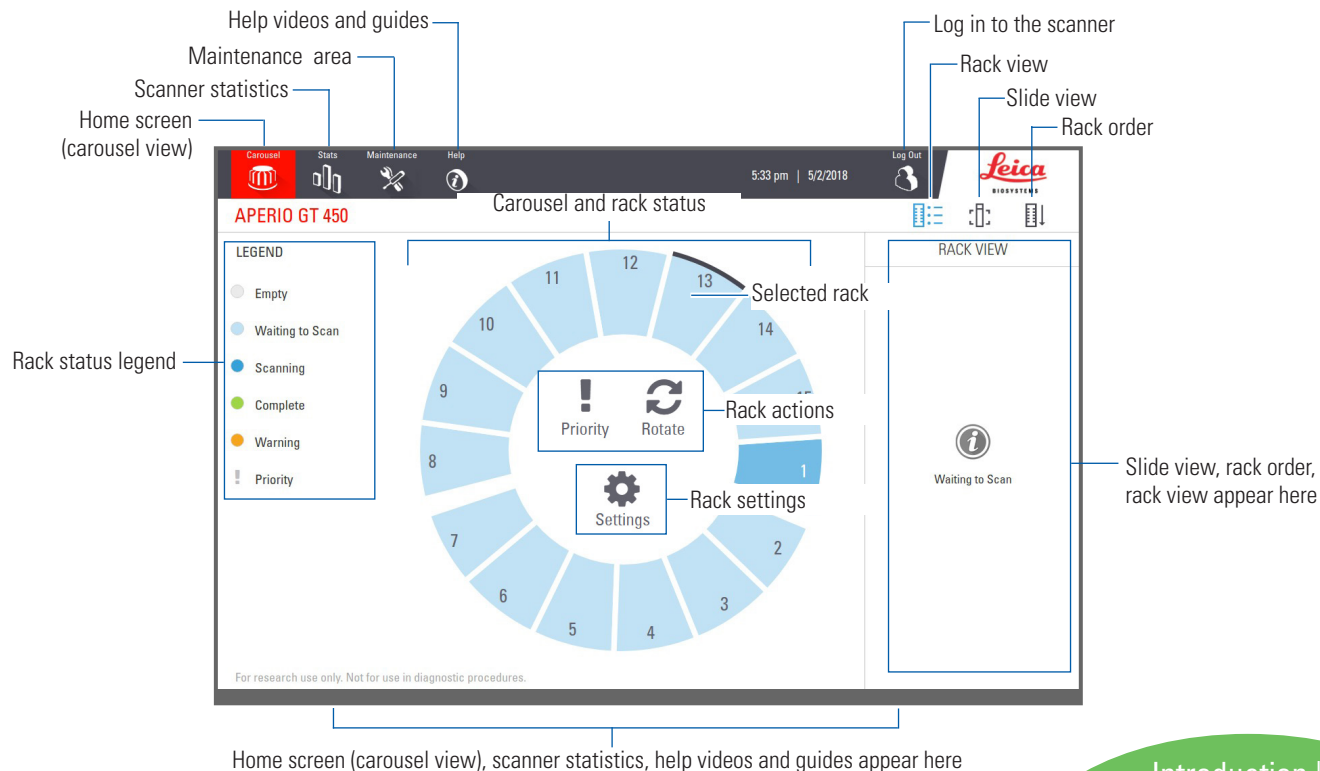
- ▶ *Aperio GT 450 User's Guide*
- ▶ *Aperio GT 450 IT Manager and Lab Administrator Guide*
- ▶ *Aperio GT 450 Specifications*

# Scanner Overview



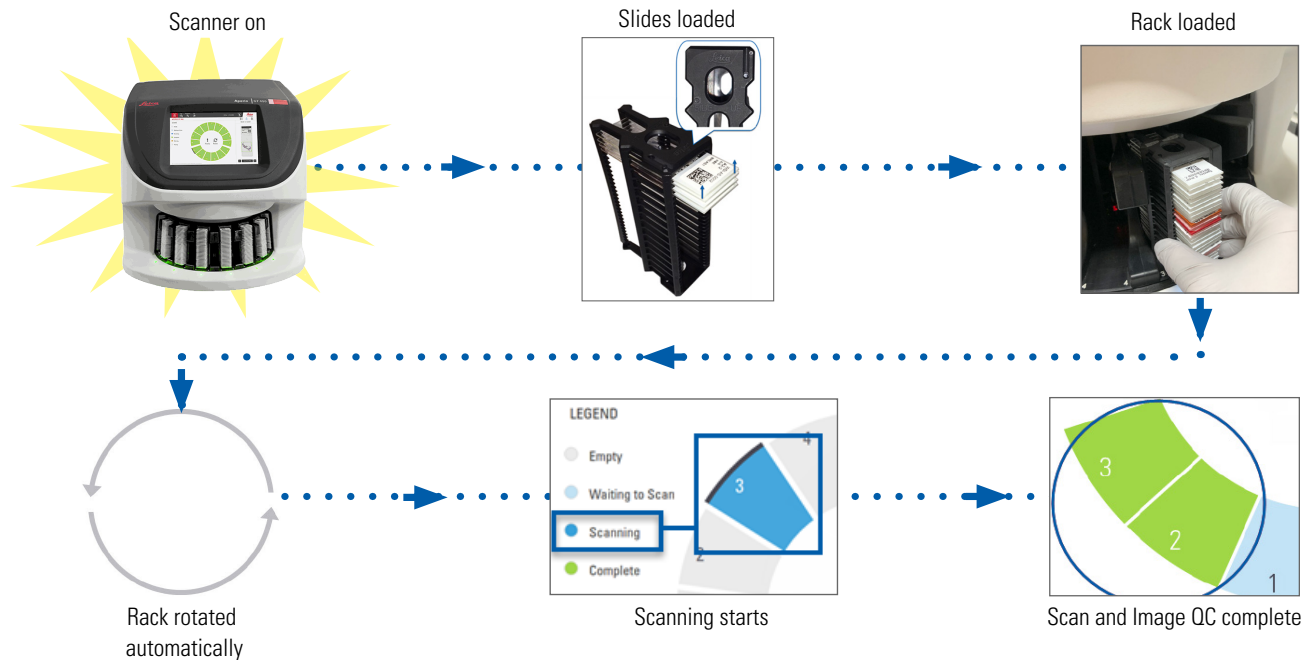
# Touchscreen Interface Overview

The example below shows the Home screen.



## Scanning Workflow

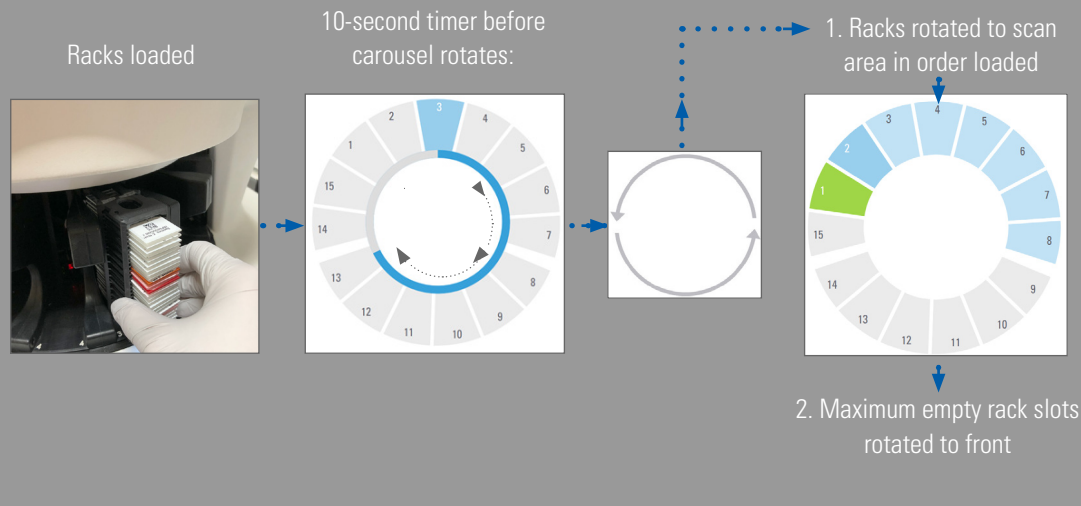
This workflow shows the scanning process for one rack of slides. For step-by-step instructions, go to *"Scan Slides"* on page 13.





## Carousel Rotation

The carousel automatically rotates after you load racks:



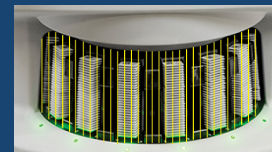
**WARNING:** Keep hands away from the carousel and pinch point areas when the carousel is rotating.

**AVERTISSEMENT:** Garder les mains éloignées du carrousel et des zones de points de prise quand le carrousel est en rotation.



## Safety light curtain

An infrared safety light curtain detects objects in the loading area:



If an object breaks the light curtain:

- the carousel does not rotate
- the 10-second timer starts again

## Key Concepts

<b>Scanner settings</b>	Your lab administrator defines the scan settings and sets the PIN codes.
<b>Scan magnification</b>	The Aperio GT 450 always scans at 40x.
<b>Rack scanning</b>	All actions, such as setting priority, are applied to an entire slide rack (not individual slides).
<b>Image quality</b>	The Auto-Image QC feature automatically checks image quality as each slide is scanned. If the rack status is green, the scan and Image QC were successful for all slides in the rack.
<b>Slide calibration</b>	Each slide is calibrated when it's scanned.
<b>Continuous loading</b>	The Aperio GT 450 is a continuous loading scanner. You can continue to load new racks and unload completed racks without interruption.
<b>Automatic carousel rotation</b>	The carousel rotates the racks automatically. For details, see <i>"Carousel Rotation" on page 9</i> .
<b>Visual status indicators</b>	The carousel view on the touchscreen and the status lights in front of the rack slots provide real-time status.
<b>PIN code / scanner login</b>	If the scanner asks for a PIN code, enter the 5-digit code provided by your Lab Administrator.

## Icon Glossary

The following icons appear on the touchscreen interface.



**Carousel** – Carousel view (Home screen).



**Stats** – Scanner statistics. (See page 18.)



**Help** – Instructional videos and user guides.



**Login** – Scanner login, where you enter your 5-digit PIN code.



**Logout** – Lock the touchscreen interface.



**Slide View** – Macro image for the scanned slide.  
(See page 20.)



**Rack Order** – Scan order for racks. (See page 20.)



**Rack View** – Scan status for each slide in the selected rack. (See page 19.)



**Scan completed** – In Rack View, indicates the slide scanned successfully, passed image QC, and that the image was saved to the specified image location. (See page 19.)



**Slide warning** – In Rack View, alerts you of a slide issue. (See page 21.)



**Priority scan** – On the rack position in the carousel view and in Rack View, indicates the rack's priority scan order, from 1 to 3. (See page 16.)



**Rotate** – Appears on the touchscreen interface when the carousel is rotating.



**Rack Settings** – In Carousel view, appears in the center. It also appears on the rack position when rack setting is applied. (See page 22.)

# ■ Slide Preparation Checklists

## Slides

- ☐ Slides stained according to manufacturer's instructions.
- ☐ Slides are clean. Wipe with clean lint-free cloth (no chemical cleaners).
- ☐ No dirt, fingerprints, markings, writing, extra mounting media, broken slides, chips, or scratches.
- ☐ Slides are fully cured (not "wet").
- ☐ No mounting media around slide edges.
- ☐ No tissue on coverslip edges or overlapping the label.
- ☐ No stain residue around slide edge.

## Coverslips

- ☐ Fully cured coverslip is in place. You must use coverslips with Aperio GT 450.
- ☐ Minimal mounting media used.
- ☐ No air pockets under coverslip.
- ☐ Coverslip is not hanging over the side of the slide.
- ☐ Only one coverslip per slide.

## Slide Labels

- ☐ Only one label per slide.
- ☐ Labels do not extend past edges of the slide.
- ☐ Labels do not cover any tissue.
- ☐ Labels are not under the coverslip.
- ☐ Labels are firmly attached.
- ☐ Labels are not applied to the bottom surface of the slide.

## Barcodes

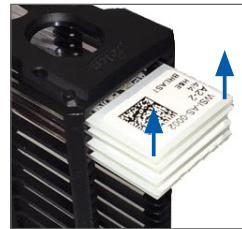
- ☐ Barcode labels meet the same application requirements as slide labels.
- ☐ Barcode labels applied to the slide label region.
- ☐ Only one barcode label per slide.
- ☐ Use only supported barcode labels.
- ☐ Use only high-quality printed barcode labels.

# Scan Slides

This section contains instructions for scanning slides.

## Load Slides in the Rack

1. Make sure the Leica logo and "SIDE UP" text on the rack is facing up.
2. Make sure the slide labels are facing out and up.



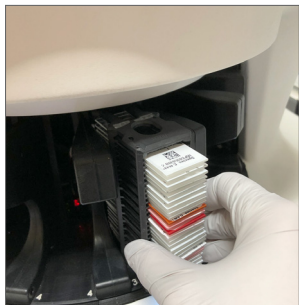
3. Push the slides into the rack until they touch the back of the rack.



## Load Racks in the Carousel

Slides are scanned in the order loaded.

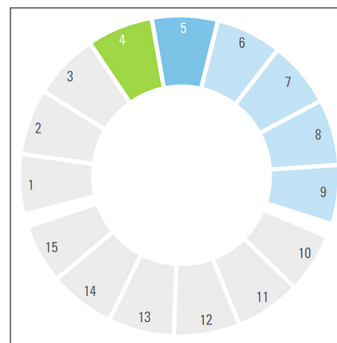
1. Place the loaded rack into an open slot in the carousel in the orientation shown on page 13.
2. Push the rack forward until it stops.



When the rack is fully inserted, there is a “click” sound, and the rack position on the Home screen turns light blue.

3. Continue loading racks as needed or until you fill the front-six rack slots.
4. Wait for the carousel to rotate more empty rack slots to the loading area.

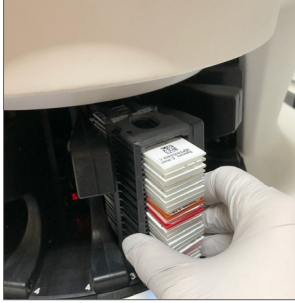
5. Continue loading racks as needed.
6. When a rack is scanned successfully, the rack status turns green.



7. You can now remove the completed rack and load another rack.

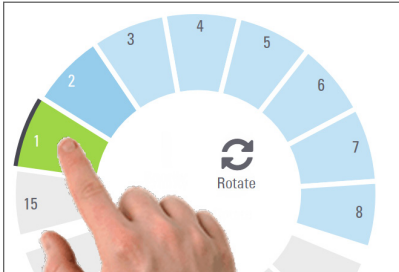
## Unload Racks from the Carousel

1. Remove the rack from the rack slot.

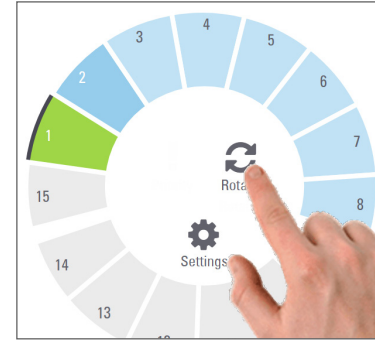


### To unload a rack that is not in the loading area:

1. Tap the rack position.



2. Tap **Rotate** to rotate the rack to the loading area.



3. After the rack is rotated to the front, carefully remove the rack.

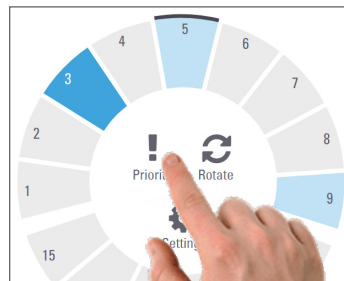
## Priority Scanning

Use Priority to move one or more racks to the front of the scan queue. You can apply the Priority option on up to three racks at a time.

1. Tap the rack position.



2. Tap **Priority**.



The Priority icon and scan queue number appear:



3. To view the rack scan order, see page 19.

**i** To cancel a priority, you have to remove the rack.



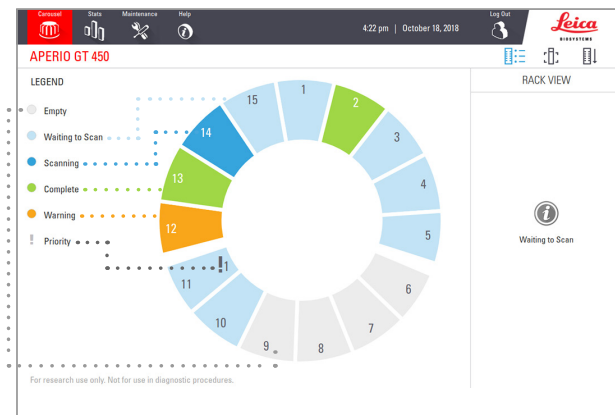
## Scan Status



**CAUTION:** If you must remove a rack before all slides in the rack are scanned, note the rack and slide status. After removal, the rack's scan status is no longer available.

To check the scan status of a rack:

1. Check the rack position status color against the Legend:



2. The rack statuses are:

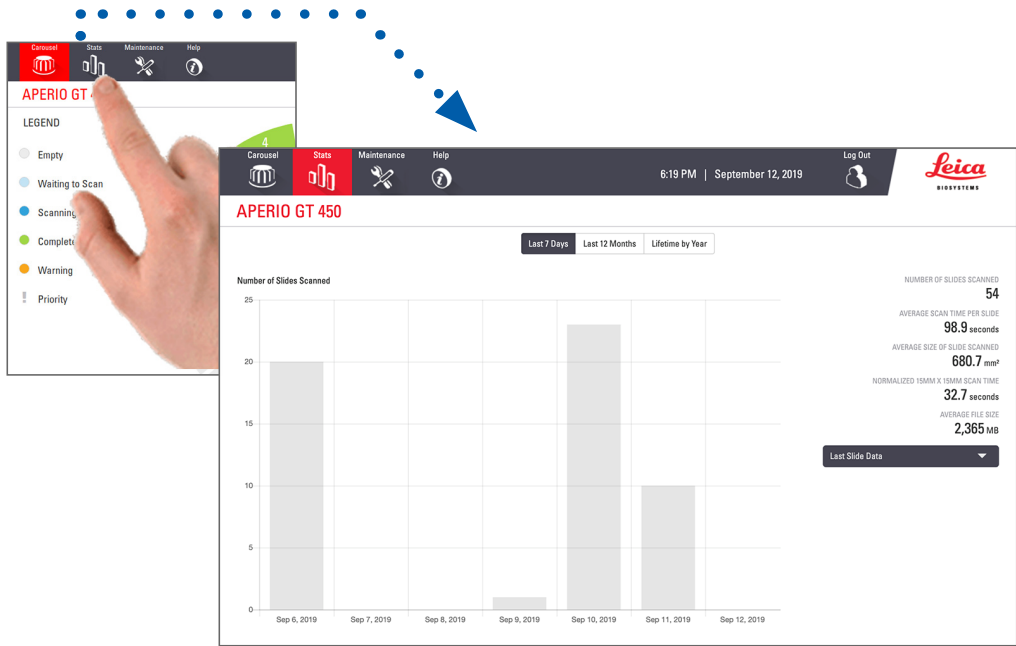
<b>Empty</b>	Rack is empty and available for use.
<b>Complete</b>	All slides in the rack scanned successfully and passed image QC. Scanned images are saved to the specific location.
<b>Scanning</b>	The rack is currently being scanned.
<b>Waiting to Scan</b>	The rack is loaded successfully and waiting to scan.
<b>Warning</b>	There is an issue with one or more slides in the rack. See page 21.
<b>Priority</b>	The rack is set for priority scanning (see page 16).

### Rack Error on Current Scan

If there is an error on at least one slide in the rack that is currently scanning, the rack position pulses blue and orange. See page 21.

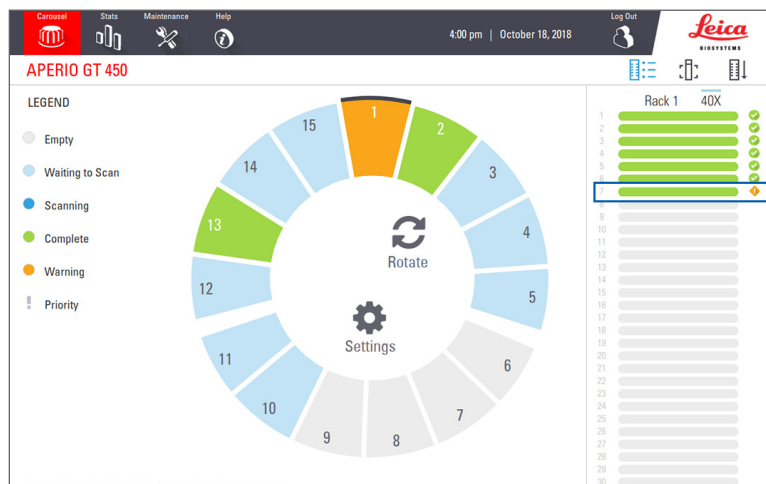
# Scan Statistics

To view scan statistics, tap **Stats**. To change the time frame of the statistics, tap the buttons above the graph.



# Rack View

1. Tap the **Rack View** icon to show the scan status for each slide in the rack.

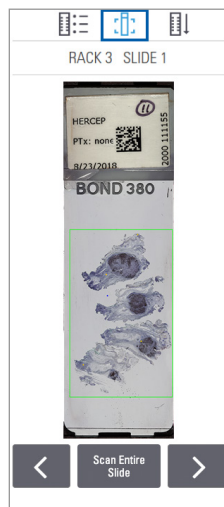


Slide status colors correspond to the Legend:

	The slide is scanning
	The slide is waiting to scan
	The slide slot is empty.
	The scanned image was successfully transferred to the specific image location.
	No scanned image was created. (See page 21.)
	The slide scanned successfully, passed image QC, and was transferred to the specified image location.
	The slide has a warning. (See page 21.)

## Slide View

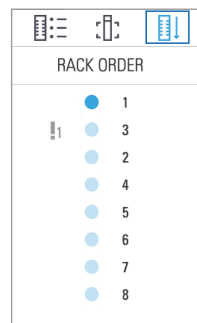
1. Select the rack by tapping it on the touchscreen.
2. Tap the **Slide View** icon to individual images for the selected rack.



- Tap **<** and **>** to view other slides in the rack.
- If any tissue is outside the scan area (the green box), you can tap **Scan Entire Slide** to rescan the whole slide.
- If there is an error scanning the slide, a message appears in the box. (See page 21.)

## Rack Order

1. Tap the **Rack Order** icon to show the scan order of the racks.



- Racks in the list appear in the scan order.
- The scan status is indicated for each rack.
- In the example, rack 3 is set as priority.

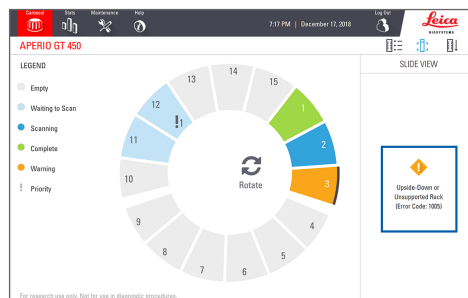
## Rack Warnings

An orange rack position indicates a problem with the rack, or one or more slides in the rack.


1. Tap to select the rack position with the warning.
2. Note the error message and number, and go to *"Errors and Solutions"* on page 29.

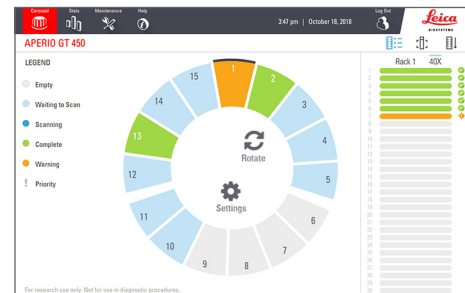
### Rack issues:

Error message and number appears.

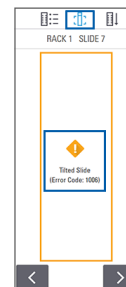


### Slide issues:

Orange warning symbol  in Rack View indicates slide error.



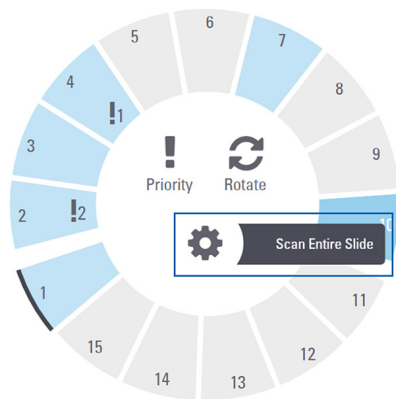
Slide error message and number appear in Slide View.



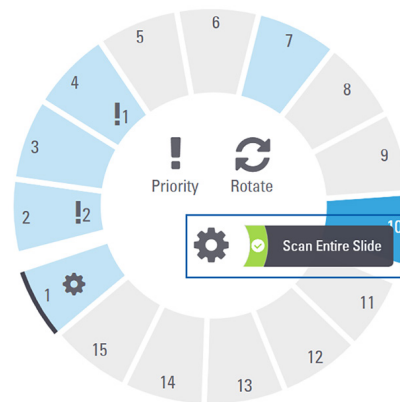
## Scan Entire Slide for Whole Rack

This feature enables you to scan the full slide area for a rack of slides.

1. Load only the slides that require a full slide area scan in the rack.
2. Load the rack in the carousel.
3. Tap to select the rack position.
4. Tap **Settings** ⚙️, and then tap **Scan Entire Slide**.



5. The Scan Entire Slide option is selected, and the Settings icon ⚙️ appears on the rack position.



# Maintenance

## Maintenance Checklists

To maximize scanner performance and image quality, follow this recommended maintenance schedule.

### Daily (recommended)

- ☐ Restart the scanner. (See page 24.)

### Six Month

- ☐ Clean the objective and Koehler
- ☐ Clean the stage slide tray
- ☐ Clean the carousel
- ☐ Clean the slide racks
- ☐ Clean the fan filter
- ☐ Clean the touchscreen
- ☐ Clean the scanner cover

The Six Month Maintenance procedures are provided in the *Aperio GT 450 User's Guide* "Maintenance" chapter.

### Yearly

- ☐ Leica Biosystems Technical Services annual maintenance visit. (Contact Leica Biosystems to schedule. See page 2 for contact details.)

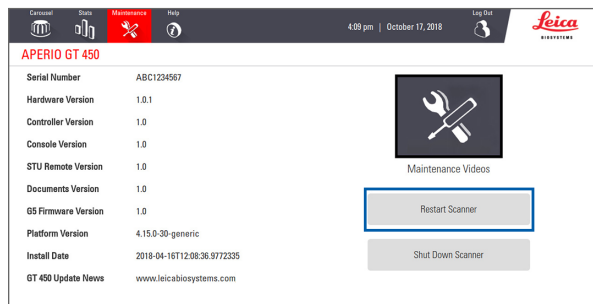
## Restart the Scanner

Restart the scanner once daily for maintenance.



**CAUTION:** Restarting the scanner with a slide on the stage may damage the slide.

1. Ensure all racks are unloaded, no slides are scanning, and there are no errors displayed.
2. Tap **Maintenance**, then tap **Restart Scanner**.

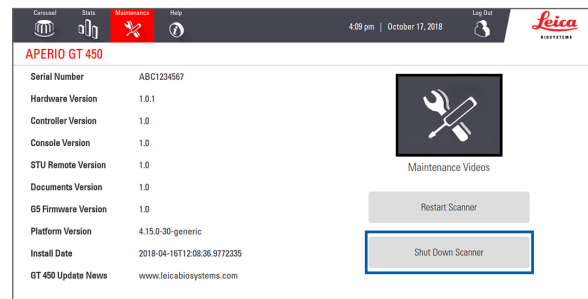


You can use the scanner again after initialization is complete and the Home screen appears.

## Shut Down the Scanner

Use this procedure to safely turn off the scanner.

1. From the touchscreen interface, tap **Maintenance**.



2. Tap **Shut Down Scanner**.
3. After the touchscreen goes dark, turn the scanner off using the On/Off switch.



# ■ Troubleshooting

This section provides some common troubleshooting issues and solutions. For a comprehensive list of troubleshooting issues, see the *Aperio GT 450 User's Guide*.

## Additional Resources

- ▶ **Aperio GT 450 User's Guide** contains a comprehensive "Troubleshooting" chapter.
- ▶ The Maintenance Videos available from the touchscreen interface include common troubleshooting procedures. Tap **Maintenance**, then tap **Maintenance Videos**.

## Serial Number and Firmware Version

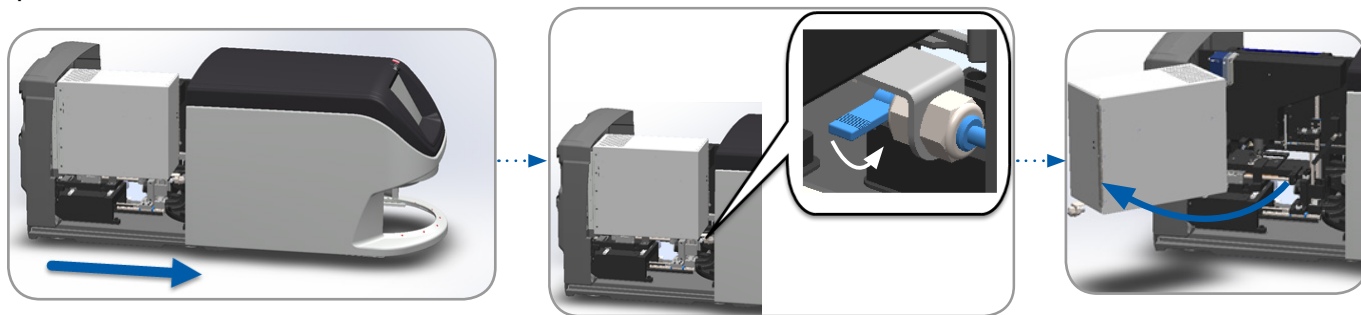
You need the serial number and current software version if you call Leica Biosystems Technical Support.

- ▶ Tap **Maintenance** on the touchscreen to view the serial number, firmware version, and other system information.
- ▶ The serial number and firmware version are also available from the Aperio GT 450 SAM Application Software. See the *Aperio GT 450 IT Manager and Lab Administrator Guide*.

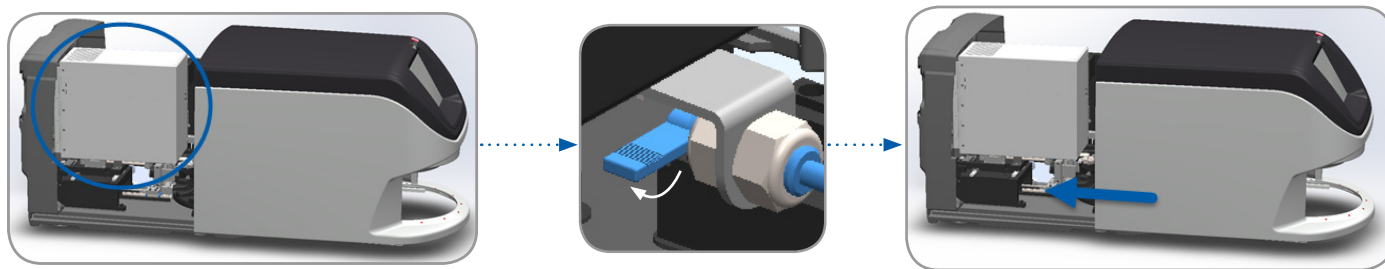
## Open and Close the Scanner Cover

You need to open the cover to perform certain maintenance and troubleshooting tasks. For detailed instructions on how to open and close the scanner, see the user's guide for the scanner.

### Open the Cover



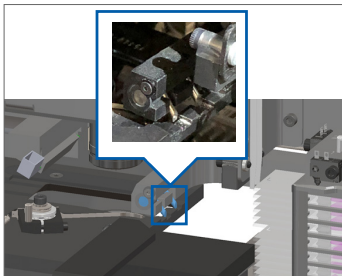
### Close the Cover



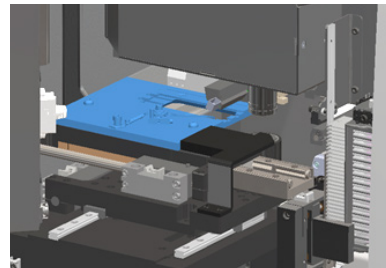
## Return Pusher to Safe Position

Follow these steps when the troubleshooting procedure asks you to return the pusher to the safe position.

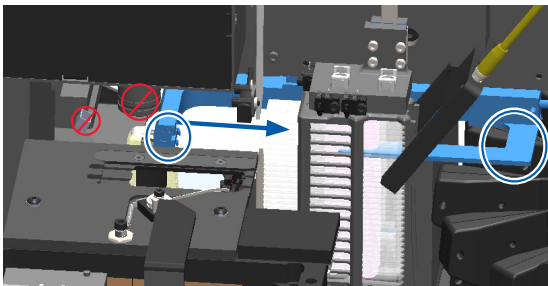
1. Align the pusher teeth with the slide stage grooves:



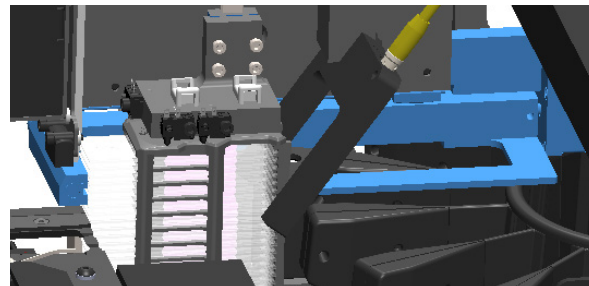
2. Slide the stage to the rear of the scanner:



3. Hold the pusher in one of the areas circled in blue, avoiding the LED and objective.



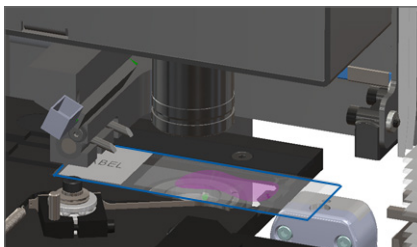
4. Slide the pusher to the front of the scanner as shown.



## Safe Restart After an Error

Some procedures ask you to restart the scanner. Restarting the scanner initializes the controller and puts the stage and autoloader in their home positions. Before restarting the scanner, you need to ensure there is no slide on the stage.

1. Open the cover and access the interior (see page 26).
2. Check if there is a slide on the stage or partially on the stage.
3. Carefully remove the slide from the stage without touching the surrounding components.




**CAUTION:** Restarting the scanner with a slide on the stage may damage the slide.

4. Return the pusher to the retracted (safe) position, as shown in *“Return Pusher to Safe Position”* on page 27.
5. Close the VPU and scanner cover (see page 26).
6. Tap **Maintenance** on the touchscreen interface, then tap **Restart Scanner**.

## Errors and Solutions

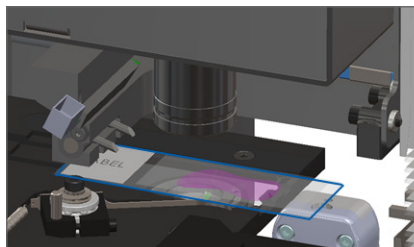


**CAUTION:** If you need to remove a rack before all slides in the rack are scanned, first take note of the rack and slide status. After removal, the rack's scan status is no longer available. If an error message is covering the rack and slide status, minimize the error message by tapping the  in the upper-right corner of the message box.

### Error Code 1000

#### Internal Error

1. Open the cover and access the interior (see page 26).
2. Take photos of any obstructions for Leica Biosystems Technical Services.
3. Check if there is a slide on the stage or partially on the stage.
4. Carefully remove the slide from the stage without touching the surrounding components.



**CAUTION:** Restarting the scanner with a slide on the stage may damage the slide.

5. If the pusher is extended, return the pusher to the safe position as described in *"Return Pusher to Safe Position"* on page 27.
6. Close the VPU and scanner cover (see page 26).
7. Tap **Restart Scanner**, and wait for the scanner to complete the restart process.

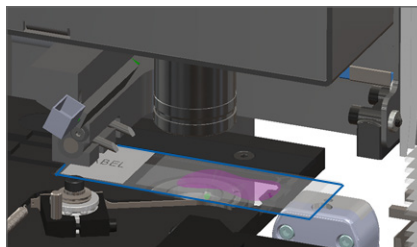
## Error Code 1001

### Scanner Cannot Initialize

1. Open the cover and access the interior (see page 26).

2. Check if there is a slide on the stage or partially on the stage.

3. Carefully remove the slide from the stage without touching the surrounding components.



**CAUTION:** Restarting the scanner with a slide on the stage may damage the slide.

4. If the pusher is extended, return the pusher to the safe position as described in *"Return Pusher to Safe Position"* on page 27.

5. Close the VPU and scanner cover (see page 26).

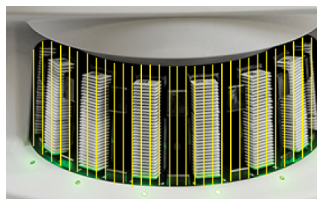
6. Shut down the scanner using the steps in, page 24.

7. Turn on the scanner, and wait for the initialization process to complete.

## Error Code 1002

### Carousel cannot rotate.

1. Check the rack loading area and pinch points for any unexpected object:

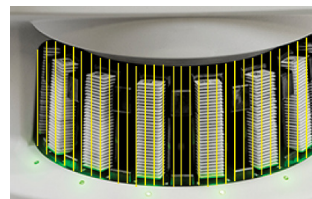


2. Ensure Leica logo faces up and out of the racks, and that racks are inserted fully in the carousel.
3. Ensure all slides are fully inserted into the racks.
4. Check for other obstructions in the rack loading area.
5. If there are no obstructions and carousel still does not rotate, follow the steps in, *"Safe Restart After an Error"* on page 28.

## Error Code 1003

### Carousel cannot rotate. Carousel pinch point obstructed.

1. Check the rack loading area and pinch points for any unexpected object:



2. If there are no obstructions and carousel still does not rotate, follow the steps in, *"Safe Restart After an Error"* on page 28.

## Error Code 1005

### Cannot process rack

1. Ensure the rack is inserted correctly. (See page 14.)
2. Remove the rack and check:
  - You are using a supported rack.
  - The rack is not damaged.
3. Verify the error only occurs on one rack. If the error occurs on multiple racks, contact Leica Biosystems Technical Services.
4. If the rack is supported and undamaged, reinsert it into the carousel for scanning.
5. If the scanner still cannot process the rack, contact Leica Biosystems Technical Services.

## Error Code 1006

### Cannot process one or more slides in rack

1. Tap the rack that has the error, and tap **Rack View** to identify which slides have the error.
2. Tap **Slide View** to view the macro image of the slide, and check the following:
3. Go to “*Slide Error Messages for Error Code 1006*” on page 33 and follow the steps for the specific slide error.



## Slide Error Messages for Error Code 1006

After identifying which slide has the error, follow the appropriate steps below.



*You can temporarily hide some error messages by tapping the **x** in the top-right corner.*

Error Message	What to do
<b>Tilted Slide</b>	<ol style="list-style-type: none"> <li>1. Remove the rack from the carousel.</li> <li>2. Locate and remove the slide that is tilted between multiple rack slots.</li> <li>3. Insert the slide in a new rack for scanning, ensuring it sits level horizontally in one slot.</li> <li>4. Insert the rack to an empty rack slot for scanning.</li> </ol>
<b>No Barcode</b>	<ol style="list-style-type: none"> <li>1. Check that the slides and rack are inserted correctly.</li> <li>2. Ensure barcodes meet specifications and the minimum quality requirements described in the scanner user guide.</li> </ol>
<b>No Tissue</b>	<ol style="list-style-type: none"> <li>1. Verify there is tissue on the slide.</li> <li>2. Take note of the slide number.</li> <li>3. Rotate and remove the rack to access the slide.</li> <li>4. Remove the slide from the rack, and then clean the slide.</li> <li>5. Re-insert the slide into a new rack and scan it again.</li> <li>6. If the issue persists, check for slide preparation errors.</li> </ol>

Error Message	What to do
<b>No Macro Focus</b>	<ol style="list-style-type: none"> <li>1. Check the slides and rack are inserted correctly. See page 13.</li> <li>2. Check that the slide tray is clean.</li> <li>3. Check the stain quality.</li> <li>4. Check that the slide and coverslip meet the requirements described in the <i>Aperio GT 450 Specifications</i>.</li> <li>5. Check for common slide preparation errors. See “<i>Slide Preparation Checklists</i>” on page 12.</li> </ol>
<b>Image Quality QC</b>	<ol style="list-style-type: none"> <li>1. Review the scanned slide image in Aperio ImageScope.</li> <li>2. Check for common slide preparation issues. See “<i>Slide Preparation Checklists</i>” on page 12.</li> <li>3. Scan the slide again. When the scan is finished, do not remove the rack from the scanner.</li> <li>4. Review the newly scanned slide image in Aperio ImageScope.</li> <li>5. If the issue persists, display the slide in Slide View, and tap <b>Scan Entire Slide</b>. (To scan the full slide area for a rack of slides, see page 22.)</li> <li>6. Check if other slides are in focus.</li> <li>7. If all slides are out of focus, clean the objective. (See the “Maintenance” chapter in the scanner user guide.)</li> </ol>

Error Message	What to do	
<b>Image Transfer Error - Pending Retry</b>	<b>Error message appears on some slides:</b>	<b>Error message appears on all slides:</b>
	<p>The system often resolves the issue without intervention.</p> <ol style="list-style-type: none"><li>1. If all slides in the rack are finished scanning, remove the rack.</li><li>2. Check for the image in eSlide Manager.</li><li>3. If necessary, rescan the slides that are missing from eSlide Manager.</li></ol>	<p>The Lab Administrator should:</p> <ol style="list-style-type: none"><li>1. Check connectivity from the scanner to the DICOM server, and the DICOM server to your site's image storage location.</li><li>2. Check if your site's image storage location is full.</li><li>3. If the issue persists, consult with your organization's IT professionals prior to calling Leica Biosystems Technical Services.</li></ol>

Error Message	What to do	
<b>Aborted</b>	<b>Error message appears on some slides:</b>	<b>Error message appears on all slides:</b>
	<ol style="list-style-type: none"><li>1. Check for damage or common slide preparation issues. (See page 12.)</li><li>2. Clean the slide.</li><li>3. Insert the slide into a different rack and scan it again.</li></ol>	<ol style="list-style-type: none"><li>1. Remove any completed slide racks from the carousel.</li><li>2. Open the cover and access the interior. (See page 26.)</li><li>3. If there is a slide on the stage, remove it. (See page 28, step 2.)</li><li>4. Close the scanner cover.</li><li>5. Shut down the scanner (see page 24.)</li><li>6. Turn the scanner back on using the On/Off switch.</li><li>7. Allow the scanner to scan any remaining racks.</li></ol>

## Error Code 1007

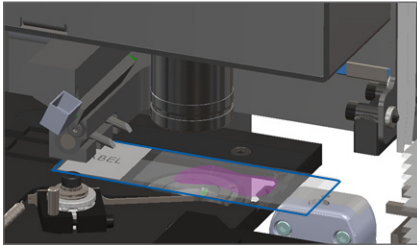
### **Internal storage full. Cannot send images to DICOM converter**

The Lab Administrator should perform these steps.

1. Ensure the LAN cables are connected at the scanner LAN port and at the SAM server.
2. Run network diagnostics.
3. Ensure the DICOM server is running. Restart the DICOM server if necessary.
4. If issue persists, contact Leica Biosystems Technical Services.

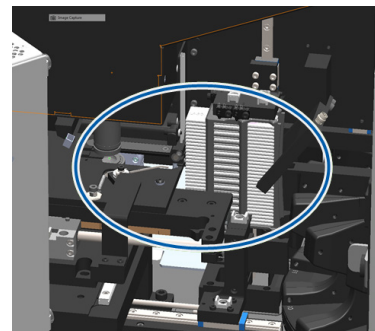
## Error Code 2000

### Slide handling error at slide stage, rack, or pusher

1. Open the scanner cover to access the interior. See page 26.
  2. Take photos of the obstruction for Leica Biosystems Technical Services.
  3. Check if there is a slide on the stage or partially on the stage.
  4. Carefully remove the slide from the stage without touching the surrounding components.
- 
5. Check for obstruction near the slide stage, rack, and pusher.
  6. If possible, carefully remove the slide that is causing the obstruction, and continue to step 8.
  7. If you cannot remove the obstruction or if the issue persists, call Leica Biosystems Technical Services.



**CAUTION:** Restarting the scanner with a slide on the stage may damage the slide.





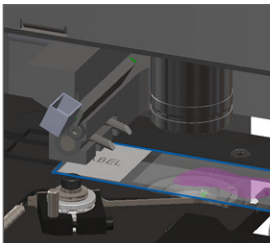
**WARNING:** Do not attempt to recover broken slides. Call Leica Biosystems Technical Services.

**AVERTISSEMENT:** Ne pas tenter de récupérer les lames brisées. Appeler les Services Techniques de Leica Biosystems.

8. Check the slide for preparation issues, such as over-hanging coverslips and label issues.
  - a. If there are no slide preparation issues, re-insert the slide in an available rack for scanning.
  - b. If there are slide preparation issues, correct the slide issues before scanning.
9. If the pusher is extended, return the pusher to the safe position as described in *"Return Pusher to Safe Position"* on page 27.
10. Close the scanner cover. (See page 26.)
11. Tap **Restart Scanner**.

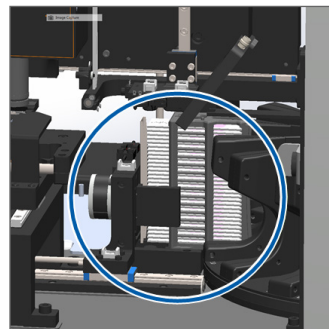
## Error Code 2001

### Slide handling error at rack gripper, lift, or carousel

1. Open the scanner cover to access the interior. See page 26.
  2. Take photos of the obstruction for Leica Biosystems Technical Services.
  3. Check if there is a slide on the stage or partially on the stage.
  4. Carefully remove the slide from the stage without touching the surrounding components.
- 
5. Check for an obstruction near the rack gripper, lift, and carousel.
  6. Close the scanner cover. See page 26.
  7. Call Leica Biosystems Technical Services.



**CAUTION:** Restarting the scanner with a slide on the stage may damage the slide.

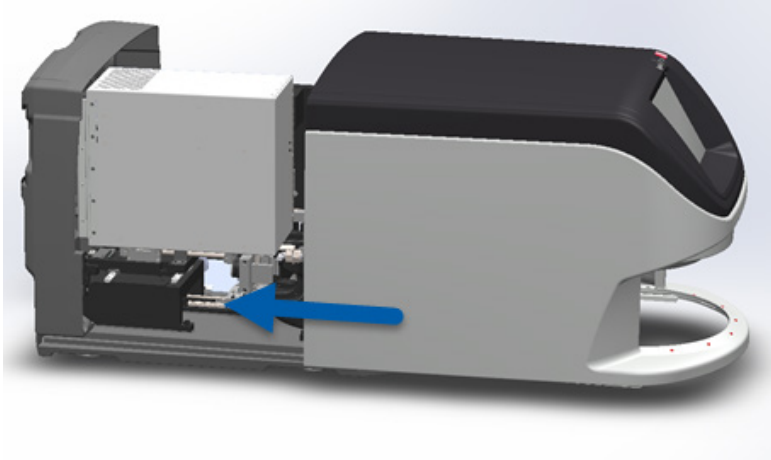




## Error Code 9000

### **Scanner cover is open.**

1. Slide the cover to the closed position, making sure the cover aligns with rear latches and clicks closed:



## Broken Slides Inside the Scanner



**WARNING: Do not attempt to recover broken slides. Call Leica Biosystems Technical Services.**

**AVERTISSEMENT: Ne pas tenter de récupérer les lames brisées. Appeler les Services Techniques de Leica Biosystems.**

Take photos of the location of the damage. Leica Biosystems Technical Services may request the photos when providing assistance.

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