

# Aperio GT 450

## User's Guide



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

# Aperio GT 450 User's Guide

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## Customer Resources

- ▶ For the latest information on Leica Biosystems Aperio products and services, please visit [www.LeicaBiosystems.com/Aperio](http://www.LeicaBiosystems.com/Aperio).

## Disclaimers

- ▶ This manual is not a substitute for the detailed operator training provided by Leica Biosystems Imaging or for other advanced instruction. Leica Biosystems Imaging Field Representatives should be contacted immediately for assistance in the event of any instrument malfunction. Installation of hardware should only be performed by a certified Leica Biosystems Imaging Service Engineer.

## Contact Information – Leica Biosystems Imaging, Inc.

Headquarters	Customer Support	General Information
 Leica Biosystems Imaging, Inc. 1360 Park Center Drive Vista, CA 92081 USA  Tel: +1 (866) 478-4111 (toll free) Direct International Tel: +1 (760) 539-1100	US/Canada Tel: +1 (844) 534-2262 (toll free) Direct International Tel: +1 (760) 539-1150  US/Canada/Worldwide Email: <a href="mailto:TechServices@LeicaBiosystems.com">TechServices@LeicaBiosystems.com</a>	US/Canada Tel: +1 (866) 478-4111 (toll free) Direct International Tel: +1 (760) 539-1100  Email: <a href="mailto:ePathology@LeicaBiosystems.com">ePathology@LeicaBiosystems.com</a>

# Customer Service Contacts

Please contact the office for your country for technical assistance.

**Australia:**

96 Ricketts Road  
Mount Waverly, VIC 3149  
AUSTRALIA  
Tel: 1800 625 286 (toll free)  
Between 8:30 AM-5 PM, Monday-Friday, AEST  
Email: lbs-anz-service@leicabiosystems.com

**Austria:**

Leica Biosystems Nussloch GmbH  
Technical Assistance Center  
Heidelberger Strasse 17  
Nussloch 69226  
GERMANY  
Tel: 0080052700527 (toll free)  
In-country Tel: +43 1 486 80 50 50  
Email: support.at@leicabiosystems.com

**België/Belgique:**

Tel: 0080052700527 (toll free)  
In-country Tel: +32 2 790 98 50  
Email: support.be@leicabiosystems.com

**Canada:**

Tel: +1 844 534 2262 (toll free)  
Direct International Tel: +1 760 539 1150  
Email: TechServices@leicabiosystems.com

**China:**

17F, SML Center No. 610 Xu Jia Hui Road, Huangpu District  
Shanghai, PRC PC:200025  
CHINA  
Tel: +86 4008208932  
Fax: +86 21 6384 1389  
Email: service.cn@leica-microsystems.com  
Remote Care email: tac.cn@leica-microsystems.com

**Danmark:**

Tel: 0080052700527 (toll free)  
In-country Tel: +45 44 54 01 01  
Email: support.dk@leicabiosystems.com

**Deutschland:**

Leica Biosystems Nussloch GmbH  
Technical Assistance Center  
Heidelberger Strasse 17  
Nussloch 69226  
GERMANY  
Tel: 0080052700527 (toll free)  
In-country Tel: +49 6441 29 4555  
Email: support.de@leicabiosystems.com

**Eire:**

Tel: 0080052700527 (toll free)  
In-country Tel: +44 1908 577 650  
Email: support.ie@leicabiosystems.com

**España:**

Tel: 0080052700527 (toll free)  
In-country Tel: +34 902 119 094  
Email: support.spain@leicabiosystems.com

**France:**

Tel: 0080052700527 (toll free)  
In-country Tel: +33 811 000 664  
Email: support.fr@leicabiosystems.com

**Italia:**

Tel: 0080052700527 (toll free)  
In-country Tel: +39 0257 486 509  
Email: support.italy@leicabiosystems.com

**Japan:**

1-29-9 Takadannobaba, Sinjuku-ku  
Tokyo 169-0075  
JAPAN

**Nederland:**

Tel: 0080052700527 (toll free)  
In-country Tel: +31 70 413 21 00  
Email: support.nl@leicabiosystems.com

**New Zealand:**

96 Ricketts Road  
Mount Waverly, VIC 3149  
AUSTRALIA  
Tel: 0800 400 589 (toll free)  
Between 8:30 AM-5 PM, Monday-Friday, AEST  
Email: lbs-anz-service@leicabiosystems.com

**Portugal:**

Tel: 0080052700527 (toll free)  
In-country Tel: +35 1 21 388 9112  
Email: support.pt@leicabiosystems.com

**The Russian Federation**

BioLine LLC  
Pinsky lane 3 letter A  
Saint Petersburg 197101  
THE RUSSIAN FEDERATION  
Tel: 8-800-555-49-40 (toll free)  
In-country Tel: +7 812 320 49 49  
Email: main@bioline.ru

**Sweden:**

Tel: 0080052700527 (toll free)  
In-country Tel: +46 8 625 45 45  
Email: support.se@leicabiosystems.com

**Switzerland:**

Tel: 0080052700527 (toll free)  
In-country Tel: +41 71 726 3434  
Email: support.ch@leicabiosystems.com

**United Kingdom:**

Tel: 0080052700527 (toll free)  
In-country Tel: +44 1908 577 650  
Email: support.uk@leicabiosystems.com

**USA:**

Tel: +1 844 534 2262 (toll free)  
Direct International Tel: +1 760 539 1150  
Email: TechServices@leicabiosystems.com

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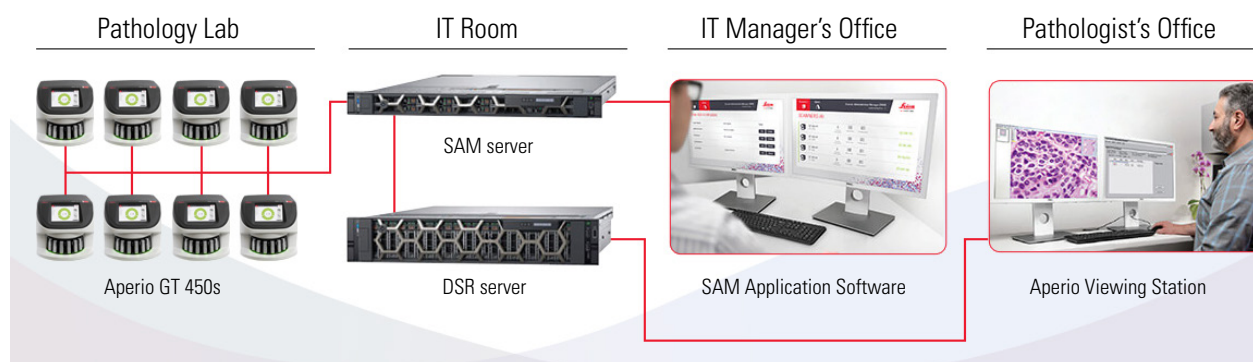
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# 1 Introduction

The Aperio GT 450 is a high performance, brightfield whole slide scanner that includes continuous loading with 450 slide-capacity across 15 racks, priority rack scanning, automated image quality check and a scan speed of ~32 seconds at 40x scanning magnification for a 15 mm x 15 mm area.

This system is intended for use by trained histotechnicians, IT professionals, and pathologists.



Use of the Aperio GT 450 scanner requires the following components.

Component	Description
<b>Scanner Administration Manager (SAM) Server</b>	The SAM server connects to multiple Aperio GT 450 scanners and runs the SAM Application Software.
<b>SAM Application Software</b>	The Scanner Administration Manager (SAM) client application software enables IT implementation, PIN configuration, and service access of multiple scanners from a single desktop client location for IT professionals.
<b>Aperio Viewing Station</b>	The viewing station includes two calibrated monitors and a workstation with Aperio ImageScope version 12.4 or higher.

See the *Aperio GT 450 Specifications* for more information on these components.

Ensure you follow appropriate good laboratory practices and the policies and procedures required by your institution for slide preparation, processing, storage, and disposal. Use this equipment only for this purpose and in the manner described in this guide.



## Intended Use



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

## Resources

Resource	Description
<b>Aperio GT 450 User's Guide</b>	Provides reference information and instructions for scanning, troubleshooting, and maintenance.
<b>Aperio GT 450 Quick Reference</b>	Contains quick instructions for scanning, basic troubleshooting, and maintenance. We recommend keeping this printed guide with your scanner.  An electronic version of the quick reference guide is available from the Help area on the scanner's touchscreen interface.
<b>Aperio GT 450 IT Manager and Lab Administrator Guide</b>	Contains information and instructions regarding IT administration of the scanner, including network administration and configuration.
<b>Aperio GT 450 Specifications</b>	Provides detailed specifications for the scanner.
<b>Instructional videos</b>	Provides video instruction on performing various tasks. You can view the videos from the Help area on the scanner's touchscreen interface.
<b>Customer Support</b>	If you have an issue with the scanner you cannot resolve, contact Leica Biosystems Technical Services. See page 2 for contact information.
<b>Training</b>	Leica Biosystems Imaging offers classroom and virtual training courses. Contact Leica Biosystems Imaging Customer Support for information about training options.

## Symbols and Warnings

The following symbols are used throughout the documentation to alert you to potential danger in operating the scanner.

Symbol	Description
	The exclamation point within an equilateral triangle is intended to alert you to the presence of important operating and maintenance (servicing) instructions.  <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>
	CLASS 1 LASER EN 60825-1:2007 P<100uw, $\lambda = 630-670\text{nm}$

## Electromagnetic Warnings

If the scanner is used in any manner not specified in this documentation, the protection provided by the equipment may be impaired.

**WARNING:** This equipment generates, uses and can radiate radio frequency energy. If not installed and used in accordance with the instructions in this manual it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device (pursuant to Subpart B of Part 15 FCC Rules), which are designed to provide reasonable protection against such interference when operated in a commercial environment.

*Si l'appareil est utilisé d'une autre manière que celle spécifiée dans cette documentation, la protection assurée par l'appareil risque d'être altérée.*

**AVERTISSEMENT :** Cet appareil génère, utilise et peut émettre une énergie de radiofréquences. S'il n'est pas installé et utilisé conformément aux instructions de ce guide, il peut brouiller les communications radio. Cet appareil a été testé et déclaré conforme aux limites des appareils numériques de Classe A (selon la sous-partie B de la section 15 des règlements de la FCC), qui sont destinés assurer une protection raisonnable contre un brouillage préjudiciable lorsque l'appareil est utilisé dans un milieu commercial.

## Instrument Warnings



**WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THE SCANNER TO RAIN OR MOISTURE.**

**MISUSE OF ELECTRICAL EQUIPMENT CAN CAUSE ELECTROCUTION, BURNS, FIRES, AND OTHER HAZARDS.**

**AVERTISSEMENT : POUR RÉDUIRE LES RISQUES D'INCENDIE OU DE CHOC ÉLECTRIQUE, NE PAS EXPOSER CET APPAREIL À LA PLUIE OU L'HUMIDITÉ.**

**UN MAUVAIS USAGE D'UN APPAREIL ÉLECTRIQUE PEUT PROVOQUER L'ÉLECTROCUTION, DES BRÛLURES ET D'AUTRES DANGERS.**


## Component and Part Replacement Warnings

There are no user-replaceable parts or components in the Aperio GT 450 scanner. Replacement of parts or components within the Aperio GT 450 scanner must be performed by qualified Leica Biosystems Technical Services personnel.

## Compliance Specifications

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device has been evaluated against and conforms to the following standards:

Feature	Details
Safety	 <p>IEC 61010-1: 2010 + AMD1:2016  EN 61010-1: 2010  CSA/CAN-C22.2 No. 61010-1:2012 + U1:2015-07 + U2:2016-04  UL 61010-1: 2012 + R:2015-07 + R:2016-04</p> <p>IEC 61010-2-081: 2015.  CSA/CAN-C22.2 No. 61010-2-081:2015.  EN 61010-2-081:2015.  Supplemented by UL 61010-2-081:2015.</p>
EMC	<p>EN 61326 (Emissions)  VCCI CISPR 32  KN 32  FCC/IC</p>

## Installation



**WARNING:** Two people are required for lifting the scanner.

**AVERTISSEMENT:** Il faut deux personnes pour soulever l'appareil.

Installation and setup of the scanner should only be performed by a trained Leica Biosystems Imaging Service representative.

*L'installation et le réglage du numériseur doivent être effectués uniquement par un représentant qualifié de service sur site d'Leica Biosystems Imaging.*

## Scanner Safety Instructions

This section contains important safety information for the Aperio GT 450 scanner.

When using your scanner, always take basic safety precautions, including all of those listed below.

**Read All Instructions – All safety and operating instructions must be read before operating the product.**

**Retain All Instructions – All safety and operating instructions must be retained for future reference.**

***Lisez toutes les instructions - Vous devez lire toutes les consignes de sécurité et d'utilisation avant d'utiliser l'appareil.***

**Conservez toutes les instructions - Vous devez conserver toutes les instructions à des fins de consultation ultérieure.**

1. **Heed All Warnings** – All warnings on the scanner and those listed in the operating instructions must be adhered to.

**Tenez compte des avertissements** – Vous devez respecter tous les avertissements à propos du numériseur ainsi que de ceux indiqués dans les instructions d'utilisation.

2. **Follow All Instructions** – All operating and scanner usage instructions must be followed.

**Suivez toutes les instructions** – Vous devez suivre toutes les instructions d'utilisation du numériseur.

3. **Heat** – The scanner must be situated away from any heat sources such as radiators, heat registers, stoves, or other products that produce heat.

**Chaleur** – L'appareil doit être placé loin de toutes sources de chaleur telles que les radiateurs, les bouches de chaleur, les cuisinières ou autres appareils produisant de la chaleur.

4. **Ventilation** – Slots and openings in the scanner are provided for ventilation. They ensure reliable operation of the product, keeping it from overheating. These openings must not be blocked nor covered during operation. Keep air openings free of lint, hair, fluff, etc. This product should not be placed into a rack unless proper ventilation is provided through following the manufacturer's recommended installation procedures.

**Ventilation** – L'appareil est doté de fentes et d'ouvertures de ventilation. Elles assurent le fonctionnement fiable de l'appareil, en l'empêchant de surchauffer. Ces ouvertures ne doivent pas être bloquées, ni couvertes pendant l'utilisation. Gardez les ouvertures libres de charpie, de cheveux, de peluches, etc. Cet appareil ne doit pas être placé dans un bâti à moins qu'une ventilation adéquate ne soit fournie en suivant le mode d'installation recommandé par le fabricant.

5. **Biosafety Procedures** – Please refer to your institution's biosafety policies and procedures regarding the proper handling of tissue and other potentially hazardous materials in connection with the use of this device.

**Procédure de biosécurité** – Veuillez vous référer aux politiques et aux procédures de biosécurité de votre établissement relativement à la manipulation adéquate de tissus et autres matières potentiellement dangereuses en lien avec l'utilisation de cet appareil.

6. **Water and Moisture** – Do not use the scanner near water—for example, near a water bath, wash bowl, kitchen sink, or laundry tub; in a wet basement; or near an open pool of water or the like. If the scanner becomes wet, unplug it before touching it.

**Eau et humidité** – N'utilisez pas l'appareil près de l'eau, par exemple, un bain-marie, une cuvette, un évier, une cuve de lessivage, dans un sous-sol humide ou près d'un bassin ouvert. Si l'appareil est mouillé, débranchez-le avant de le toucher.

7. **Attachments** – Do not use any attachments not recommended by the product manufacturer as they may cause hazards.

**Accessoires** – N'utilisez pas d'accessoires non recommandés par le fabricant de l'appareil, car ils peuvent causer un risque.

8. **Power Sources** – The scanner must be operated from the type of power source indicated on the marking label and in the installation instructions. If you are not sure of the type of power supplied to your facility, consult your local power company. Check that the voltage setting matches the electrical supply voltage.

**Alimentation** – L'appareil ne doit être utilisé qu'avec la source d'alimentation spécifiée sur l'étiquette signalétique et les instructions d'installation. En cas de doute sur le type de courant fourni à votre établissement, consultez votre compagnie d'électricité locale. Vérifiez si le réglage de la tension correspond à la tension d'alimentation électrique.

9. **Grounding and Polarization** – The scanner AC/DC adapter is equipped with a polarized AC plug with integral safety ground pin. Do not defeat the safety ground in any manner.

**Mise à la terre et polarisation** – L'adaptateur c.a. du numériseur est muni d'une fiche c.a. polarisée à contact intégré de mise à la terre de sécurité. En aucun cas, ne retirez la mise à la terre de sécurité.

10. **Power Cord Protection** – Power supply cords must be routed so that they are not likely to be walked on nor pinched by items placed upon or against them. Pay particular attention to the cords at AC wall plugs and convenience receptacles and at the point where the cord enters the AC/DC adapter.

**Protection du cordon d'alimentation** – Les cordons d'alimentation doivent être placés de manière à ce qu'il y ait peu de risque qu'une personne marche dessus ou qu'ils soient coincés par un meuble ou un autre objet. Veillez particulièrement à protéger le cordon près des prises murales c.a., des prises utilitaires et de sa sortie de l'appareil.

11. **Lightning** – For added protection for this scanner during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the AC wall outlet. This will prevent damage to the product due to lightning and power line surges.

**Foudre** – Pour protéger davantage l'appareil, débranchez le cordon du numériseur de la prise murale c.a. pendant un orage ou s'il est laissé sans surveillance ou qu'il n'est pas utilisé pendant une longue période. Cette mesure empêchera que la foudre ou qu'une surtension cause des dommages à l'appareil.

12. **Power Overloading** – Do not overload AC wall outlets, extension cords, or integral convenience outlets as this can result in a fire or electric shock hazard.

**Surcharge** – Ne surchargez pas les prises murales c.a., les rallonges ou les prises utilitaires intégrées car ceci risquerait de provoquer un incendie ou une électrocution.

13. **Operating Environment** – Observe these basic safety requirements:

**Milieu de fonctionnement** – Respectez ces consignes de sécurité de base:

- ▶ Do not operate the scanner out of doors. *N'utilisez pas l'appareil à l'extérieur.*
- ▶ Do not use where aerosol sprays are being used or where oxygen is being administered. *Ne l'utilisez pas à proximité d'aérosols ou d'endroits où de l'oxygène est administré.*
- ▶ Do not let the scanner or its cables or accessories come into contact with surfaces which are too hot to touch. *Ne laissez pas l'appareil ou ses câbles et ses accessoires entre en contact avec des surfaces qui sont trop chaudes au toucher.*
- ▶ Do not place anything on top of the scanner. *Ne placez rien sur l'appareil.*

14. **Object and Liquid Entry** – Never push objects of any kind into the scanner through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the scanner.

**Pénétration d'objets et de liquides** – N'introduisez jamais aucun objets par les orifices du numériseur. Ils pourraient toucher des points sous tension dangereux et court-circuiter des pièces et provoquer ainsi un incendie ou une

*électrocution. Veillez à ne jamais renverser de liquide dans l'appareil.*

15. **Accessories** – Do not place the scanner on an unstable cart, stand, tripod, bracket, or table. The scanner may fall, causing serious injury and damage to the product. Any mounting of the scanner needs to follow manufacturer's installation instructions. Do not place anything on top of the scanner.

**Accessoires** – *Ne placez pas l'appareil sur un chariot, un socle, un trépied, un support ou une table qui n'est pas stable. L'appareil pourrait tomber et provoquer une blessure grave ou être endommagé. Si l'appareil est fixé à un support, assurez-vous que les instructions d'installation du fabricant sont respectées.*

16. **Moving** – Use care if you must slide the scanner around the workbench. If you need to pick up the scanner to move it off the workbench, contact Leica Biosystems Technical Services. Removal of the scanner may void the applicable product warranty—contact Leica Biosystems Imaging for advice.

**Déplacement** – *L'appareil doit être déplacé avec prudence. Un arrêt brusque, une force excessive ou une surface inégale peuvent faire tomber l'appareil. Le déplacement d'un appareil peut annuler la garantie – communiquez avec Leica Biosystems Imaging pour obtenir des conseils.*

17. **Servicing** – Refer all servicing to qualified service personnel.

**Entretien** – *Faites appel à un technicien qualifié pour tout entretien.*

18. **Damage Requiring Service** – Unplug the scanner from the wall AC outlet and refer servicing to qualified service personnel under the following conditions:

**Dommages nécessitant un entretien** – *Débranchez l'appareil de la prise murale c.a. et faites appel à un technicien qualifié dans les cas suivants:*

- ▶ When the AC cord or AC/DC adapter is damaged. *Le cordon c.a. ou la fiche est endommagé.*
- ▶ If liquid has been spilled or objects have fallen into the scanner. *Du liquide a été renversé sur l'appareil ou des objets sont tombés dans l'appareil.*
- ▶ If the scanner has been exposed to rain or water. *L'appareil a été exposé à la pluie ou à l'humidité.*
- ▶ If the scanner does not operate normally (when you are following operating instructions). *L'appareil ne fonctionne pas normalement (lorsque vous suivez les instructions d'utilisation).*
- ▶ If the scanner has been dropped or damaged in any way. *L'appareil est tombé ou est endommagé de quelque façon que ce soit.*
- ▶ When the scanner exhibits a distinct change in performance. This indicates a need for service. *L'appareil présente des changements visibles de performances. Cela indique la nécessité d'un entretien.*

19. **Replacement Parts** – When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer. Unauthorized substitutions may result in fire, electric shock, or other hazards.

**Pièces de rechange** – *Si des pièces doivent être remplacées, assurez-vous que le technicien utilise bien les pièces de rechange prescrites par le fabricant. L'utilisation des pièces non autorisées peut entraîner un risque d'incendie ou de choc électrique, ou d'autres dangers.*

20. **Operational Check** – Upon completion of any repairs to this scanner, ask the service technician to perform operation checks to determine that the product is in proper operating condition.

**Vérification du fonctionnement** – *Après toute réparation d'un appareil, demandez au technicien d'effectuer les vérifications nécessaires pour s'assurer que l'appareil est en bon état de fonctionnement.*

- 21. Cleaning** – Apply the recommended cleaning solution to a clean cloth to clean the equipment. Do not apply cleaning solutions directly to the equipment.

**Nettoyage** – *N'utilisez pas de nettoyeurs liquides ou aérosols. Utilisez seulement un chiffon humide pour le nettoyage.*

# 2 Aperio GT 450 Overview

This chapter provides an overview of the Aperio GT 450 Scanner.

## Scanner Overview

This section describes the parts of your scanner used in daily operation.



The following section describes the main scanner elements:

Element:	Use:	More details:
<b>Touchscreen Interface</b>	View rack statuses, set rack options, and view other information.	See <i>"Touchscreen Interface Overview"</i> on page 18.
<b>Carousel</b>	The carousel contains 15 rack slots. After you load racks in the carousel, the carousel rotates the racks to the scanning area and the rack loading area.	See <i>"Carousel Rotation"</i> on page 26.



Element:	Use:	More details:
<b>Rack loading area</b>	Provides access to the carousel to load and unload slide racks. This area is also referred to as the “front-six,” because the rack loading area gives you access to six rack slots at a time.	See <i>“Load Racks in the Carousel”</i> on page 28.
<b>Safety light curtain</b>	The infrared safety light curtain detects objects in the rack loading area. The carousel only rotates when the safety light curtain area is clear.	See <i>“Carousel Rotation”</i> on page 26.
<b>Status lights</b>	The status lights are located below the rack slots in the rack loading area. They indicate the status of the front-six racks and the scanner. The colors of the status lights match the colors of the rack status Legend on the touchscreen interface.	See <i>“Check Scan Status”</i> on page 33. See <i>“Red Blinking Lights on Carousel”</i> on page 54.
<b>Fan filter</b>	The fan filter is located on the back of the scanner. Clean the fan filter at least every six months. You can insert the fan filter from the left side, the right side, or the top (requires a different fan filter holder).	See <i>“Clean the Fan Filter”</i> on page 49.

## Turn the Scanner On and Off

The On/Off switch is located on the right side of the scanner near the back.

- ▶ On position = **I**; Off position = **O**.



When you are turning the scanner off and on, follow these procedures according to the situation:

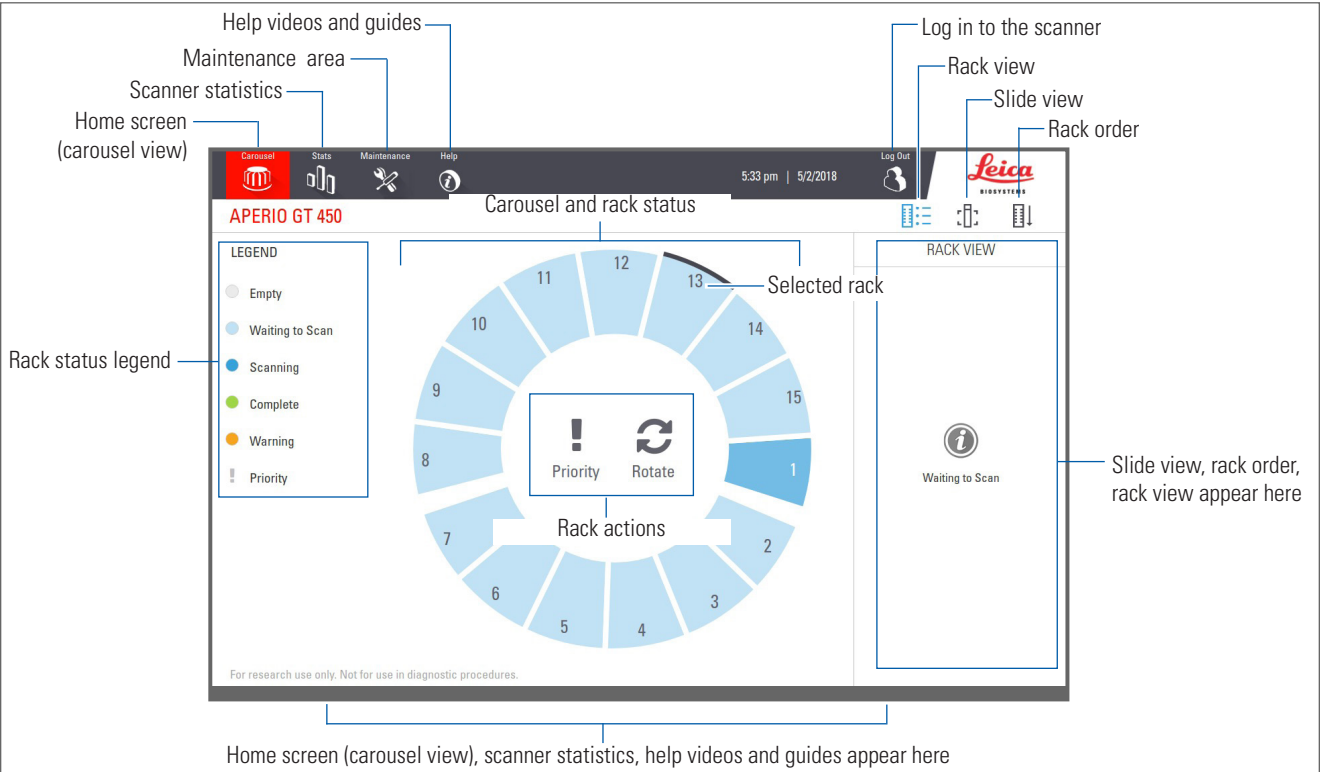
- ▶ *“Shut Down the Scanner”* on page 41.
- ▶ *“Restart the Scanner After Interior Maintenance”* on page 52.
- ▶ *“Perform a Safe Restart After an Error”* on page 55.

# Touchscreen Interface Overview

The touchscreen interface is where you view the scan status and interact with the scanner. Tap an area on the touchscreen interface to view information or perform an action.











## Home Screen

The Home screen (Carousel view) is where you view rack and slide status. The buttons along the top enable you to access other areas, such as Help and Maintenance.



The following section describes the Home screen elements.

Element:	Use:	More details see:
<b>Rack status legend</b>	<p>The <b>Legend</b> defines colors and icons that indicate rack status. Status colors appear on the rack slot positions on the touchscreen interface, and on the status lights in front of the carousel.</p> <p><i>Note: the Legend is for information only and is not interactive.</i></p>	<p><i>"Check Scan Status" on page 33.</i></p>

Element:	Use:	More details see:
<b>Scanner statistics</b>	Tap <b>Stats</b> to view scan statistics, such as the number of slides or racks scanned within a certain time period. 	<i>"Scan Statistics" on page 39.</i>
<b>Maintenance</b>	Tap <b>Maintenance</b> if you need to restart the scanner, or view the serial number and the hardware and firmware versions of your scanner. 	<i>"Serial Number and Firmware Version" on page 41.</i> <i>"Shut Down the Scanner" on page 41.</i> <i>"Restart the Scanner" on page 43.</i>
<b>Help</b>	Tap <b>Help</b> to view training and maintenance videos, or access an online version of the quick reference guide. 	<i>"Help Videos and Guides" on page 20.</i>
<b>Carousel and rack status</b>	Use the carousel and rack position on the touchscreen interface to: <ul style="list-style-type: none"> <li>• View the rack status, indicated by the color of the rack position.</li> <li>• Tap a rack position to select the rack.</li> <li>• Apply an action to the selected rack, such as Priority or Rotate (described next).</li> </ul>	<i>"Carousel Rotation" on page 26.</i> <i>"Check Scan Status" on page 33.</i>
<b>Rack actions</b> <i>Note: Rack actions appear when you select a rack.</i>	Select a rack and tap <b>Priority</b> to move the rack to the top of the scan queue. 	<i>"Priority Scanning" on page 30.</i>
	Select a rack and tap <b>Rotate</b> to rotate the rack to the rack loading area. 	<i>"Rotate a Rack to the Rack Loading Area" on page 31.</i>
<b>Login, Logout</b>	Tap <b>Login</b> to open a keypad and enter your pass code to access the scanner. 	<i>"Log In and Log Out of the Scanner" on page 26.</i>
	Tap <b>Logout</b> to lock access to the scanner touchscreen interface. 	
<b>Rack View</b>	Select a rack and tap <b>Rack View</b> to view the scan status for each slide in the rack. 	<i>"View Slide Status for a Rack" on page 35.</i>
<b>Slide View</b>	Select a rack and tap <b>Slide View</b> to view macro images for each slide. 	<i>"View Macro Images of Scanned Slides" on page 36.</i>
<b>Rack Order</b>	Tap <b>Rack Order</b> to view scan order and status of the racks. 	<i>"View Rack Scan Order" on page 36.</i>

## Help Videos and Guides

You can access training videos and the *Aperio GT 450 Quick Reference Guide* directly from the touchscreen interface.

1. Tap **Help**, and then tap a video or guide to view.



## Key Features

This section describes some key features of your Aperio GT 450.

### Continuous Load Workflow

You can continuously load new racks and unload completed racks without interruption.

### Scan Magnification

Custom optics for native 40x scanning magnification.

### Automatic Image Quality Check

The Auto-Image QC automatically checks scan quality. If the scan status is green for “complete,” the scan and Image QC were successful. If there is a problem with the scan quality on a slide, the system alerts you.

### Image Types Supported

The Aperio GT 450 creates DICOM compatible images and SVS files.

## Slide Types Supported

The scanner supports 1 x 3 inch glass slides (per ISO 8037/1).

## Coverslips

Fully-cured coverslips are required. The Aperio GT 450 supports common industry coverslips used for 1 x 3 inch slides.

## Slide Racks Supported

Optimized and recommended for use with Leica HistoCore Spectra workstation racks (stainer and coverslipper), which include the Leica Universal Rack 30-slide capacity (part number 23RACKGT450). Sakura Prisma Stainer and Coverslipper Rack 20-slide capacity racks also accepted.

## Slide Capacity

The maximum slide capacity depends on the racks used:

- ▶ 20-slide racks – load up to 300 glass slides.
- ▶ 30-slide racks – load up to 450 glass slides.

## Barcodes Supported

The Aperio GT 450 supports the following barcodes:

- NW7
- QR Code
- Data Matrix
- Interleaved 2 of 5
- Code 39
- Code 128
- PDF417
- MicroPDF41

## Optional Aperio Viewing Station

We recommend using the Aperio Viewing Station for slide image viewing. The Aperio Viewing Station is optional and is not included in the Aperio GT 450 product. For more information, contact your Leica Biosystems representative.

If you do not purchase the viewing station, we recommend using a medical-grade monitor for optimal image viewing.

For detailed viewing station and monitor specifications and requirements, see the *Aperio GT 450 Specifications*.

## Aperio eSlide Viewers

You can use the following viewers to view eSlides created on the Aperio GT 450 scanner:

- ▶ **Aperio ImageScope (version 12.4 or higher)** – this viewer is installed on your viewing workstation. For the latest version of Aperio ImageScope, contact your Lab Manager or download the installation file from the Leica Biosystems website. You must have administrator privileges on your viewing station to install Aperio ImageScope.
- ▶ **Aperio WebViewer** – this viewer is integrated with Aperio eSlide Manager. It is also available for LIS integration.

# 3

## Slide Preparation



*When preparing slides for scanning, you must use the procedures required by the vendors of the stains and reagents you are using.*

**Well prepared slides are crucial to a successful scan.** After reading this section, if you have questions about whether your slide preparation techniques will provide good scan quality, contact Leica Biosystems Technical Services.

Always consult the material safety data sheets for the stains and reagents you are using, as well as your institution's biosafety policies and procedures regarding safely handling biological materials.

It is the responsibility of the lab to verify the quality of the tissue preparation, the physical characteristics of the slide, and the staining quality.

### Tissue Preparation

For optimal scanner performance, slides must be well-prepared.

### Staining

Reproducibility of the slide staining is important for consistent and accurate diagnosis.

- ▶ Make sure that the variations of the staining process are controlled and eliminated to the greatest extent possible.
- ▶ Use appropriate morphological studies and controls as specified in the reagent manufacturer's instructions.
- ▶ Avoid excessive stain residue, as this may affect scanner performance.

### Slide Preparation

Many scanning issues are avoided by checking slide quality. Ensure the following:

- ▶ **Slides are very clean and in good condition.** Wipe them with a clean cotton cloth (don't use chemical cleaners). Make sure the slides have no dirt, no fingerprints, no markings, no writing, no extra mounting media, no broken slides, no chips, no scratches, etc.
- ▶ **Slides are fully cured** (not "wet").
- ▶ **All slides have coverslips.** Coverslips are required when using the Aperio GT 450 scanner.
- ▶ **There is no mounting adhesive around the edges of a slide.** This can cause it to stick or catch in the scanner stage area.



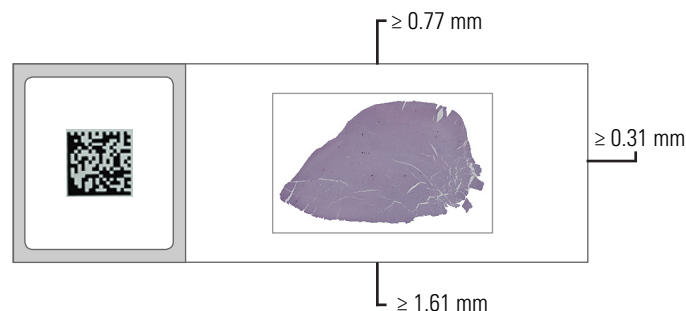
**CAUTION:** Do not attempt to scan damaged slides, as doing so may damage the scanner.

## Tissue Placement

Place the tissue in the middle of the slide, a distance from the edges of the slide, the label, and any other markings. Ensure the following:

- ▶ The coverslip covers all the tissue.
- ▶ The label does not cover any tissue.

The example below shows minimum distances from the side and bottom edges of a 26mm x 76mm slide.



For more details on slide specifications, see “*Slide Types Supported*” on page 21. For

## Fixing Slide Preparation Errors

Some physical problems of a slide can be resolved by cleaning the slide with a lint-free cloth or trimming the sides with a razor blade. Permanent problems with a slide may require the preparation of a new slide.

## Coverslips

Coverslips are required when using the Aperio GT 450. They must be fully-cured or have completed the on-board drying process for an automated coverslipper, such as the Leica Biosystems HistoCore SPECTRA Coverslipper.

The Aperio GT 450 supports common industry glass or plastic coverslips used for 1-inch x 3-inch (2.54 cm x 7.62 cm) slides. See the *Aperio GT 450 Specifications* for coverslip specifications. (Glass coverslips are recommended.)

The quality of the scan is affected by the condition of the coverslip.

- ▶ Keep the mounting media that attaches the coverslip to the slide to a minimum. Excess mounting media makes it hard for the tissue finder to distinguish between actual tissue and the mounting media.
- ▶ Make sure there are no air pockets under the coverslip.
- ▶ For best results, do not mark or write on the coverslip.
- ▶ The coverslip must not hang over the side of the slide.
- ▶ Make sure there is only one coverslip attached to the slide.

- ▶ Wipe the coverslip clean of dust and fingerprints before loading the slide in the scanner.

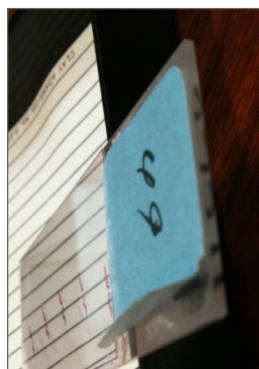
## Labels

The Aperio GT 450 supports common industry labels used for 1 x 3 inch slides. Improperly applied slide labels can cause slides to jam.

Ensure the following:

- ▶ Do not apply multiple labels to the same slide—this can cause the slide to exceed the specification for slide thickness. See the *Aperio GT 450 Specifications* for slide specifications.
- ▶ Labels do not extend past the edges of the slide and that they do not cover any tissue.
- ▶ Labels are not underneath coverslips.
- ▶ Labels are firmly attached.
- ▶ Do not apply labels to the bottom surface of the slide.
- ▶ Always load slides into the rack with the label facing out and up, as “*Load Slides in the Rack*” on page 27.

The examples below show a slide with multiple labels that cause the slide to exceed the allowable maximum thickness, and a slide with the label peeling away:



## Barcodes

For a list of supported barcodes, see “*Barcodes Supported*” on page 21. For best performance, we recommend using barcode labels that have a white background and black ink.

Improperly applied slide barcodes can cause slides to jam. Ensure the following:

- ▶ Barcode labels meet the same application requirements as slide labels. See “*Labels*” on page 24.
- ▶ Apply barcode labels to the slide label region.
- ▶ Ensure a minimum of 0.5 mm between each side of the barcode and the edge of the label.
- ▶ Apply only one barcode label per slide.
- ▶ Use only supported barcode labels. (See “*Barcodes Supported*” on page 21.)
- ▶ Use only high-quality printed barcode labels.



# 4 Scan Slides

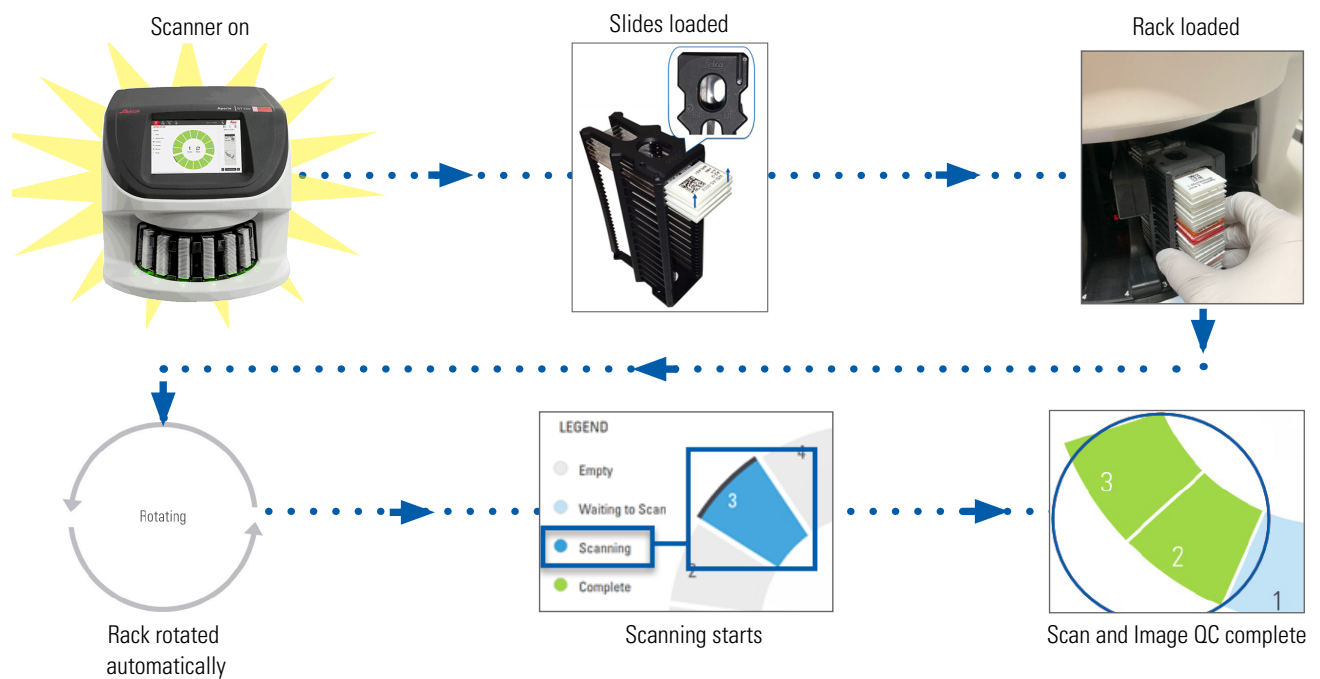
This chapter shows you how to scan slides.

## Scanning Concepts

This section provides basic concepts on the scanning workflow and the carousel rotation features. We recommend reviewing this section before using the scanner.

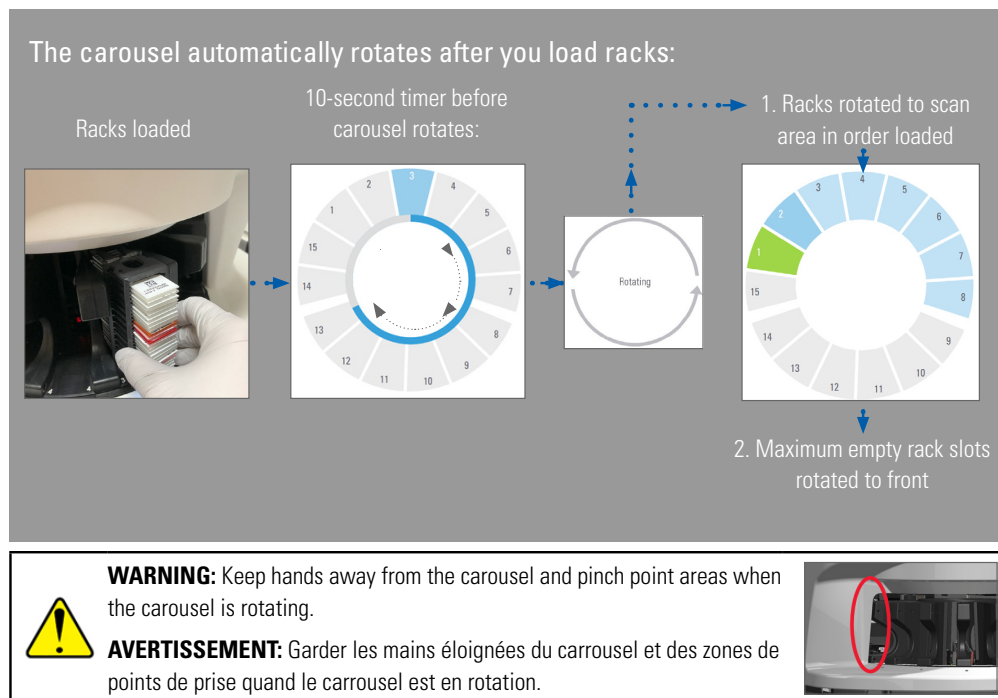
## Scan Workflow

The Apero GT 450 is a continuous load scanner. You can continually load new racks and unload completed racks, as shown below:



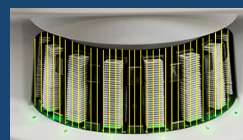
## Carousel Rotation

Review the following information to understand the carousel rotation and safety features.



### 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

## Log In and Log Out of the Scanner

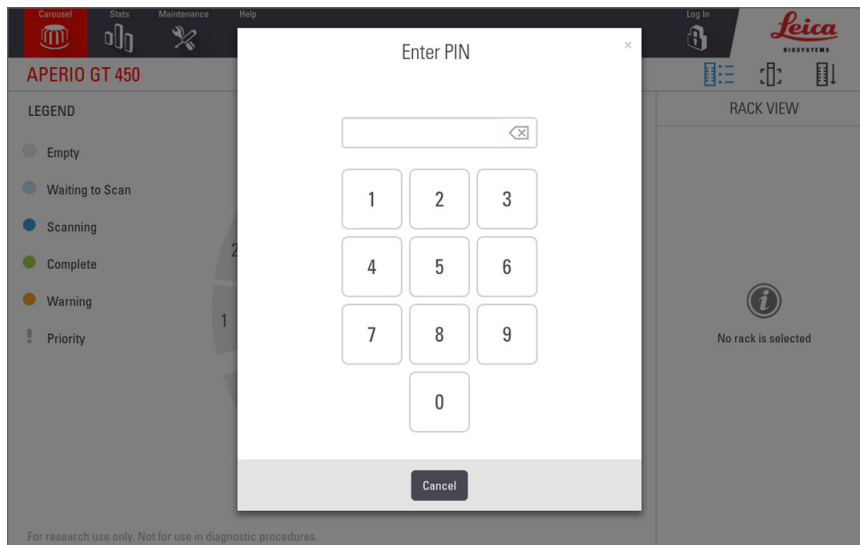
Your Lab Administrator sets up the scanner pass codes and timeout period for your lab using the Aperio GT 450 SAM client application software. You need to log into the scanner to interact with the touchscreen interface. You do not need to log in to load and unload racks for scanning.

As a security measure, the scanner logs you out after a period of time and requires you to enter the passcode.

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



- When the keypad screen appears, enter your 5-digit passcode.



### To log out:

Logging out locks the touchscreen interface until a valid passcode is entered.

- From the touchscreen interface, tap **Logout**.



## Load Slides in the Rack

For a successful scan, ensure you use the correct orientation of the slides and the rack.

To load slides in the rack:

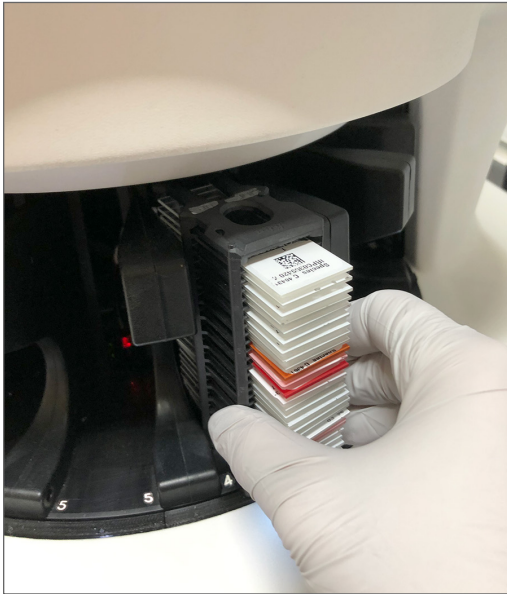
- Position the rack so the Leica logo and "SIDE UP" faces up.
- Insert each slide as shown with the label facing out and up.
- Push each slide into the rack until the slide touches the back of the rack, ensuring each slide is fully inserted into the rack.



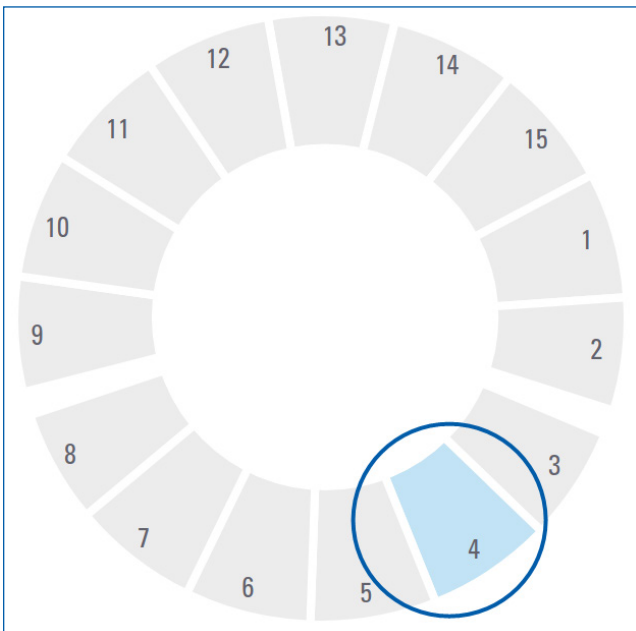
## Load Racks in the Carousel

Slides are scanned in the order you load them.

1. Place the loaded rack into an open slot in the carousel.
2. Push the rack forward until it stops and you hear a click.



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. When you've finished loading the first set of racks:

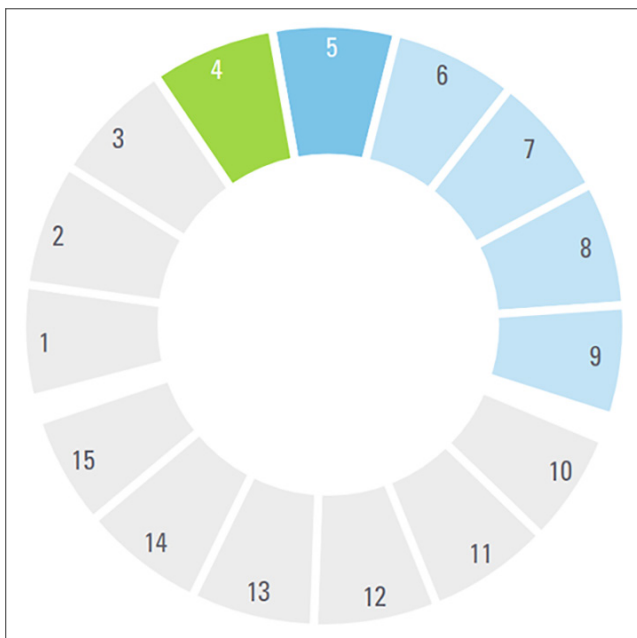
- ▶ The first rack is rotated to the scan area.
- ▶ Any empty rack slots are rotated to the loading area.



**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.**

5. When a rack is scanned successfully, the rack status turns green.



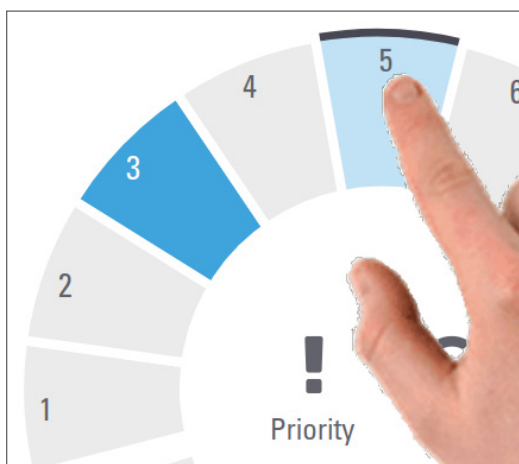
6. You can unload any completed racks and continue loading new racks.

If the completed rack is in the back of the carousel, you can rotate it to the rack loading area. See *“Rotate a Rack to the Rack Loading Area”* on page 31.

## Priority Scanning

Use Priority to move a rack 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.

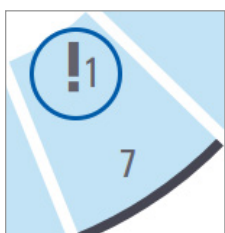


The Priority option appears when you select the rack position.

2. Tap **Priority**.



The Priority icon and scan queue number appear on the rack position:



The rack with the first level priority is moved to the top of the scan queue, and begins processing when the active rack is complete. To view the rack scan order, see *“View Rack Scan Order” on page 36*.

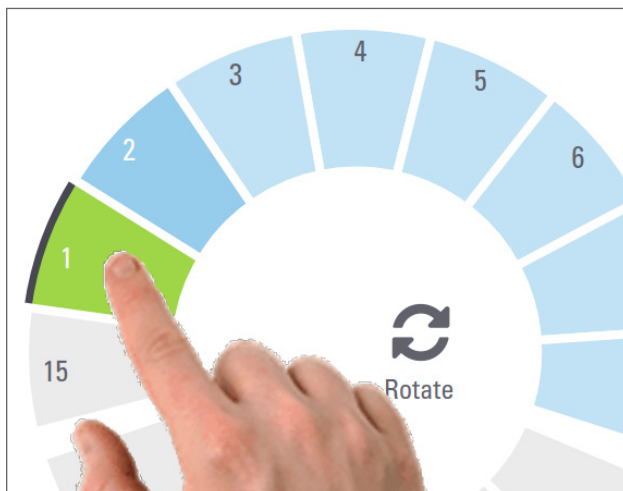
**i** To cancel a priority, you have to remove the rack.

## Rotate a Rack to the Rack Loading Area

The main reason for using the rotate feature is to rotate a completed rack to the loading area. If you try to rotate the rack that is currently being scanned, the system asks you for confirmation before continuing.

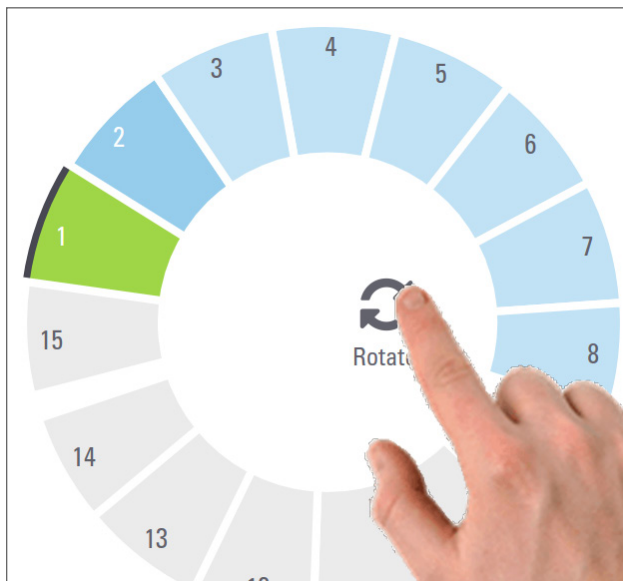
To rotate a rack to the rack loading area:

1. Tap the rack position.



The Rotate option appears when you select the rack position.

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



3. After the rack is rotated to the front, you can remove the rack. (The status light in the loading area blinks to indicate the location of the rotated rack.)

## Unload Racks from the Carousel

To unload racks from the carousel:

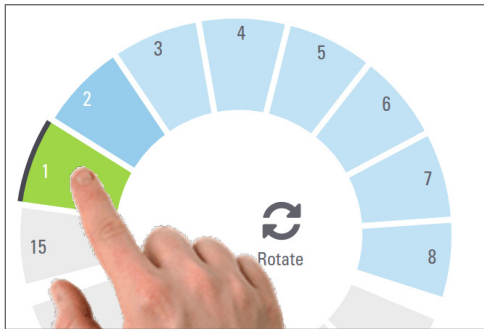
1. Make sure all the slides in the rack were successfully scanned (the rack status is green). If the rack status is orange, see *"Rack Warnings"* on page 37.
2. If the rack is in the loading area, carefully remove the rack from the rack slot.



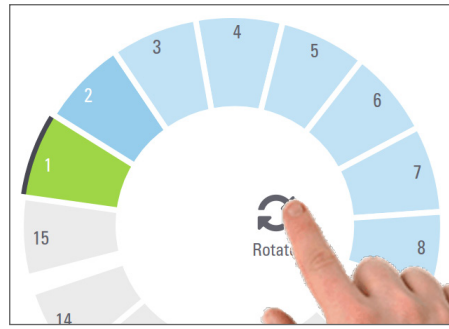


3. If the rack is not in the loading area, you can rotate it to the front:

a. Tap the rack position.



b. Tap **Rotate**.



**i** If you try to rotate the rack that is currently being scanned, the system asks you for confirmation.

4. After the rack is rotated to the loading area, you can remove the rack.

## Check Scan Status

This section describes the different ways to check scan status.

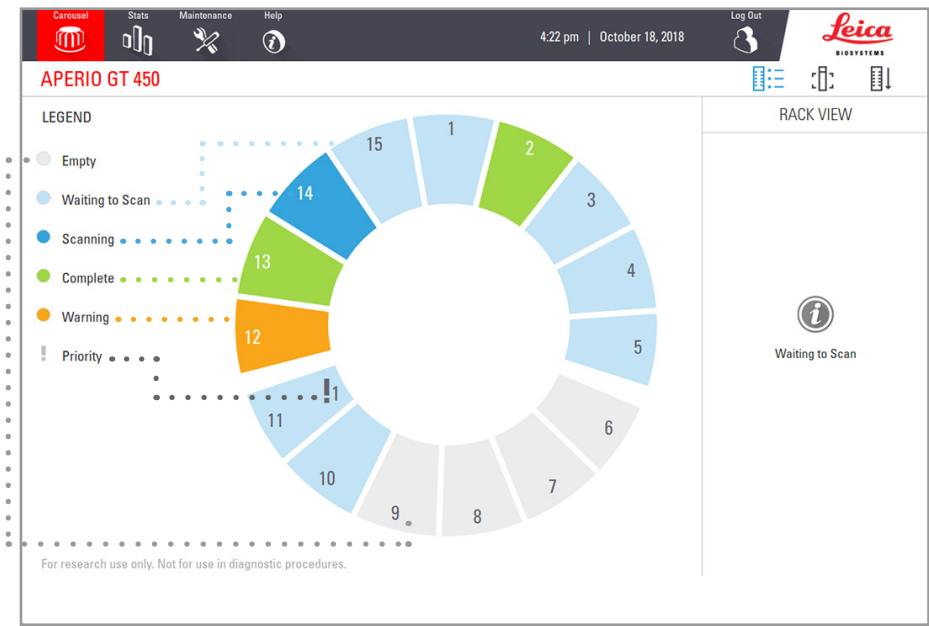


**CAUTION:** If you must remove a rack before all slides in the rack are scanned, note the rack and slide status. After removal, the rack's scan status is no longer available.

## Check Rack Status

To check the scan status of a rack:

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



- 2. The rack statuses are:

Empty	Rack is empty and available for use.
Complete	All slides in the rack scanned successfully and passed image QC. Scanned images are saved to the specific location.
Scanning	The rack is currently being scanned.
Waiting to Scan	The rack is loaded successfully and is waiting to scan.
Warning	There is an issue with the rack, or one or more slides in the rack. If you get a rack warning, see page 37.
Priority	The rack is set for priority scanning. (See “Priority Scanning” on page 30.)

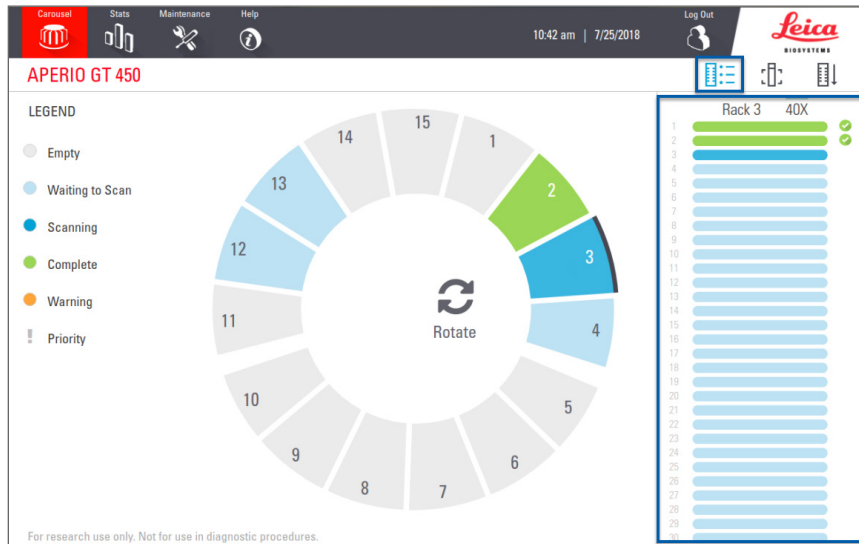
### Rack Error on Current Scan

If there is an error on at least one side in the rack that is currently scanning, the rack position pulses blue and orange. See “Rack Warnings” on page 37.

## View Slide Status for a Rack

To view the status for slides in a rack:

1. Tap the rack position on the touchscreen interface.
2. Tap the **Rack View** icon.



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 created. (See page 37.)
	The slide scanned successfully, passed image QC, and was transferred to the specific image location.
	The slide has a scan warning. (See page 37.)

## View Macro Images of Scanned Slides

To view a macro image of a scanned slide:

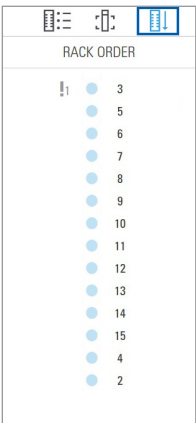
1. Tap the rack position on the touchscreen interface.
2. Tap the **Slide View** icon to view individual images for the selected rack.



- Tap  and  to view other slides in the rack.
- If any tissue is outside the scan area, 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 *"Slide Errors and Solutions"* on page 70.

## View Rack Scan Order

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



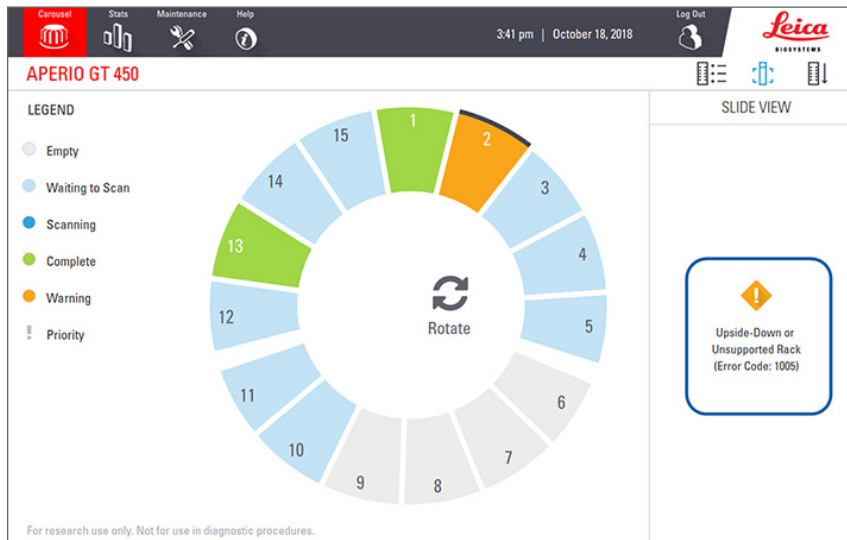
- Racks in the list appear in the scan order.
- The scan status is indicated for each rack.
- In the example, rack 3 is set as priority.

## Rack Warnings

A rack has a warning if the status color is orange or if the rack position is pulsating blue and orange.

To check the rack for errors:

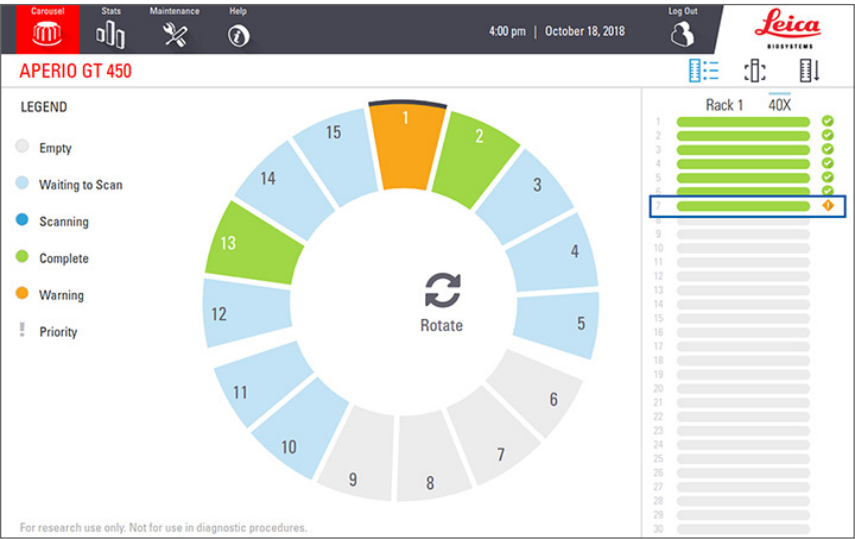
1. Tap the rack position you want to check.
2. If there is a problem with the rack, a message appears similar to the example below.



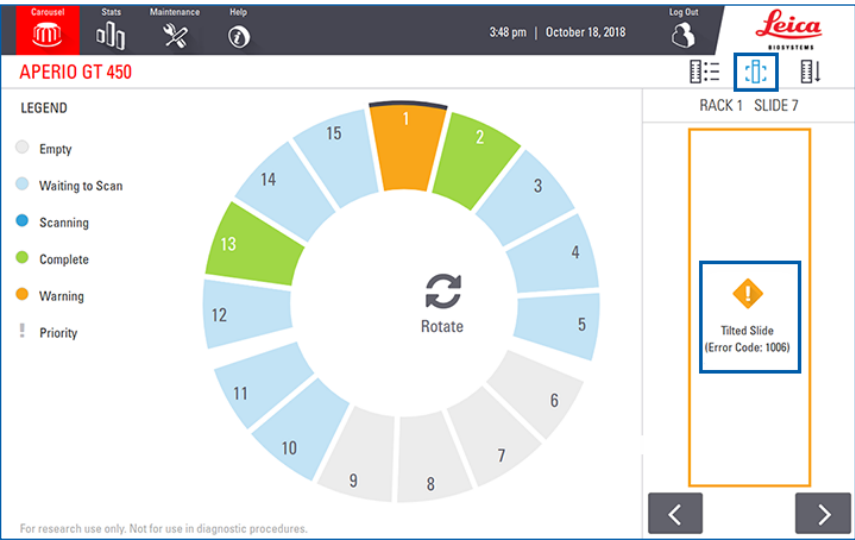
3. Take note of the error code and message. For information and steps to resolve the rack error, go to *"Rack Warnings and Solutions"* on page 68.
4. If there is a problem with one or more slides in the rack, a warning icon appears next to the slide in Rack View:

	The scanner created an image, but there is an error.
	An error prevented the scanner from creating an image.

In the example below, slide 7 in rack 1 has a warning.



5. Tap the **Slide View** icon to view the macro image for the slide that has a warning.



6. Take note of the error code and message. For information and steps to resolve the error, go to “*Slide Errors and Solutions*” on page 70.

## Scan Statistics

The Aperio GT 450 provides scan statistics, such as the number of slides or racks scanned per day, per week, etc. Tap **Stats** to view statistics for the **Last 7 Days**, **Last 12 Months**, or **Lifetime by Year**.



# 5

## Maintenance

This chapter contains a maintenance schedule and procedures for maintaining your Aperio GT 450 scanner. Call Leica Biosystems Technical Services if you cannot perform a maintenance routine or if you discover a problem with your scanner.

### Maintenance Schedule

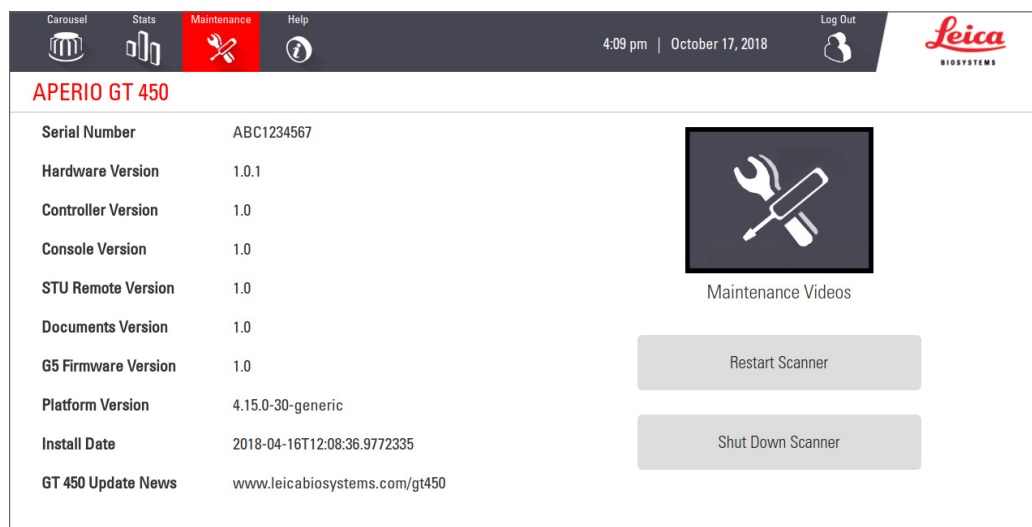
To keep your Aperio GT 450 scanner in optimal working condition, follow these maintenance routines.

Frequency	Maintenance Task	Procedure
<b>Daily (Recommended)</b>	Restart the scanner.	<i>"Restart the Scanner" on page 43.</i>
<b>Every Six Months</b>	1. Clean the objective and Koehler	<i>"Clean the Objective and Koehler" on page 44</i>
	2. Clean the stage slide tray	<i>"Clean the Stage Slide Tray" on page 47</i>
	3. Clean the carousel	<i>"Clean the Carousel" on page 48</i>
	4. Clean the slide racks	<i>"Clean the Slide Racks" on page 51</i>
	5. Clean the fan filter	<i>"Clean the Fan Filter" on page 49</i>
	6. Clean the touchscreen	<i>"Clean the Touchscreen" on page 52</i>
	7. Clean the scanner cover	<i>"Clean the Scanner Cover" on page 51</i>
<b>Once a year</b>	Schedule annual maintenance visit by Leica Biosystems Technical Services.	Call Leica Biosystems Technical Services. Customer Support contact information is provided on page 2.



## Serial Number and Firmware Version

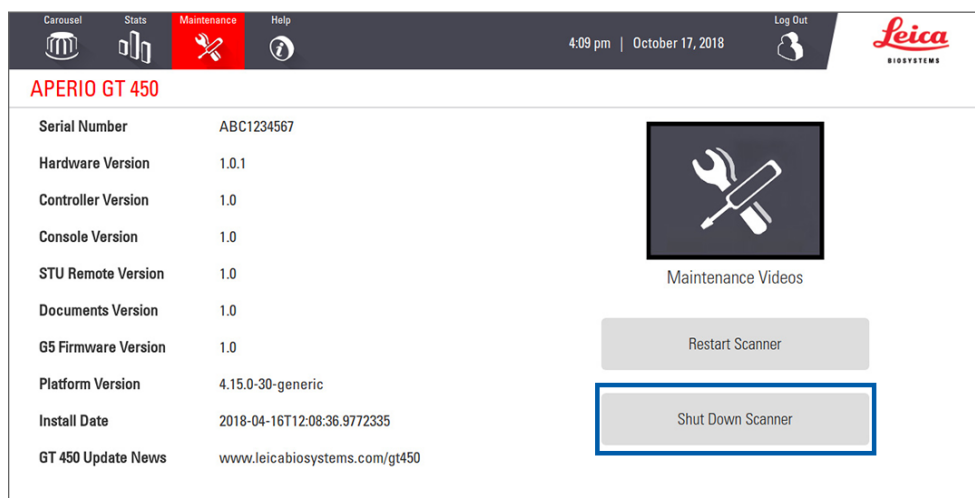
You need the serial number and current software version if you call Leica Biosystems Technical Support. Tap **Maintenance** on the touchscreen interface to view the serial number, firmware version, and other system information.



## Shut Down the Scanner

Use this procedure when you need to turn off the scanner.

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



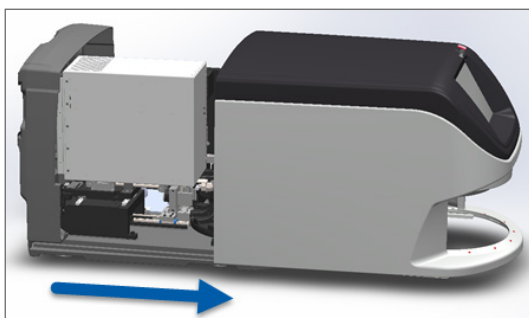
2. Tap **Shut Down Scanner**.
3. After the touchscreen goes dark, turn the scanner off using the On/Off switch.

## Open the Scanner Cover and Access the Interior Components

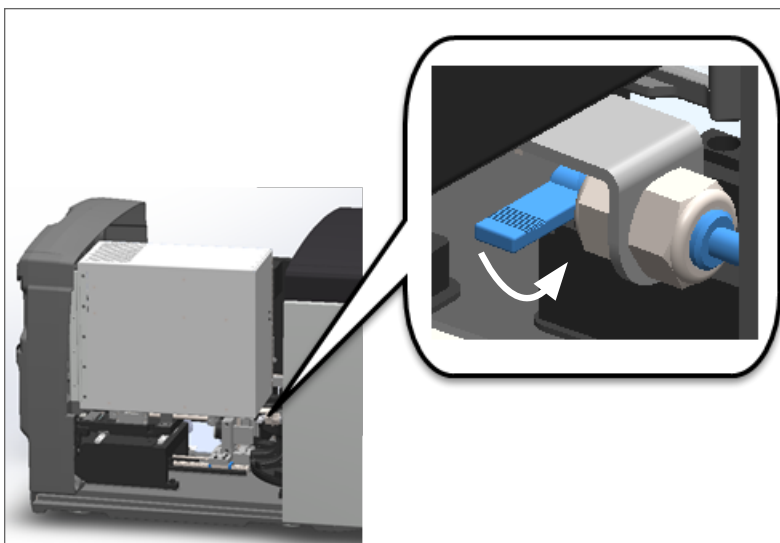
Complete these steps to access the inside of the scanner for maintenance or troubleshooting.

**i** *If you are performing maintenance on the scanner, you should first remove any racks from the carousel.*

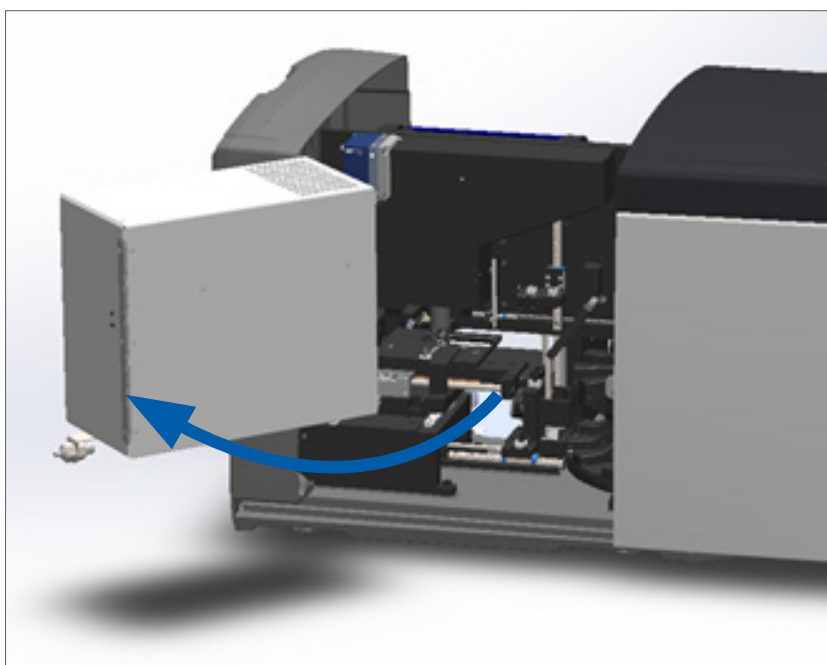
1. Shut down the scanner using the steps in “Shut Down the Scanner” on page 41.
2. Grasp the cover using the handhold indentations as shown in the following examples:



3. Slide the cover out until it reaches the point shown above.
4. Rotate the VPU latch 180 degrees to the open position, as shown below.



5. Carefully pivot the VPU outward as shown:



6. You can now access the interior components of the scanner for maintenance or troubleshooting purposes.

## Recommended Daily Maintenance

This section provides the recommended daily maintenance procedures.

### Restart the Scanner

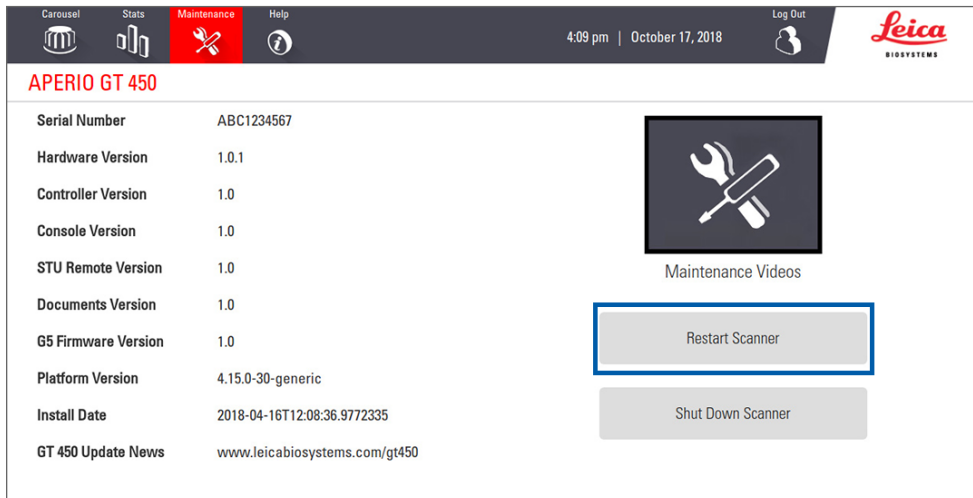
- ▶ **Frequency: daily**, and as needed to resolve a scanner issue.

Restarting the scanner initializes the controller and puts the camera, stage, and autoloader in their home positions.



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

1. Before restarting the scanner, ensure the following:
  - ▶ All racks are unloaded from the carousel.
  - ▶ There are no slides scanning.
  - ▶ The system does not have any errors displayed.
2. From the touchscreen interface, tap **Maintenance** and tap **Restart Scanner**.



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

## Six Month Maintenance

This section provides the six-month maintenance procedures. The purpose of the six month maintenance is to clean the scanner components.

### Clean the Objective and Koehler

- ▶ **Frequency: at least every six months.**



**CAUTION:** When cleaning the scanner's objective:

- **Do not remove the objective.**
- **Only use the recommended cleaning cloth and solution on the objective.** Otherwise, this may damage the objective and impact image quality.
- **Do not drag anything (including lens paper) across the lens surface using a lot of pressure.** This may damage the lens.

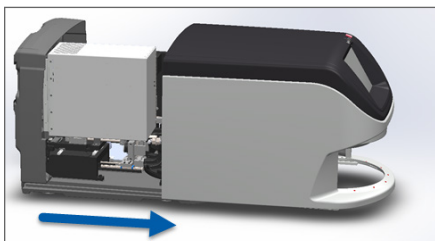
### Materials Needed

- ▶ Texwipe TX404 Absorbond Synthetic Wipers (lens cleaning wipes made of lint-free microfiber).
- ▶ Laboratory gloves.

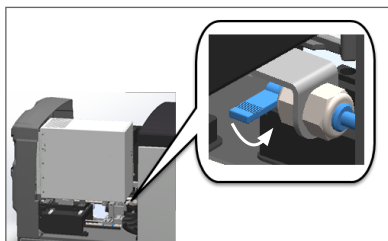
**To clean the objective and Koehler:**

1. Ensure the scanner is turned off. (For instructions, see *“Turn the Scanner On and Off”* on page 17.)
2. Open the cover and access the interior:

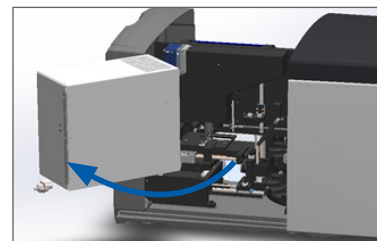
a. Open scanner cover.



b. Rotate VPU latch.

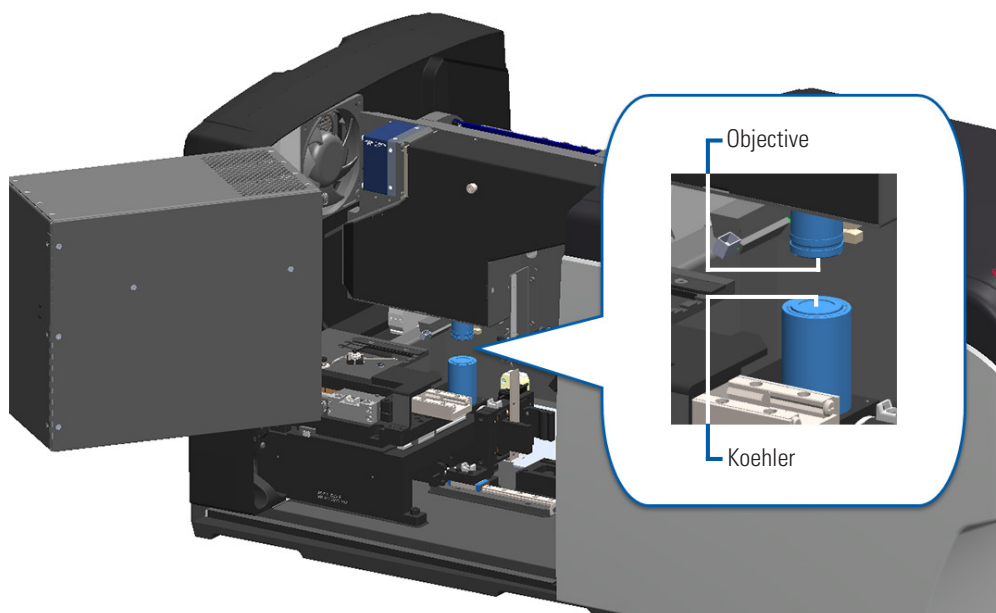


c. Pivot out VPU



For detailed steps, see *“Open the Scanner Cover and Access the Interior Components”* on page 42.

3. The objective and Koehler shown below in blue:

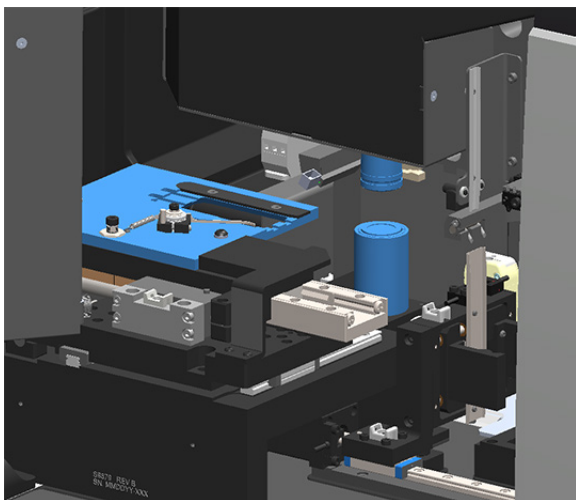


4. Manually position the slide stage so that you have clear access to the objective, as shown below.



**CAUTION:** The objective may move when you're cleaning it.

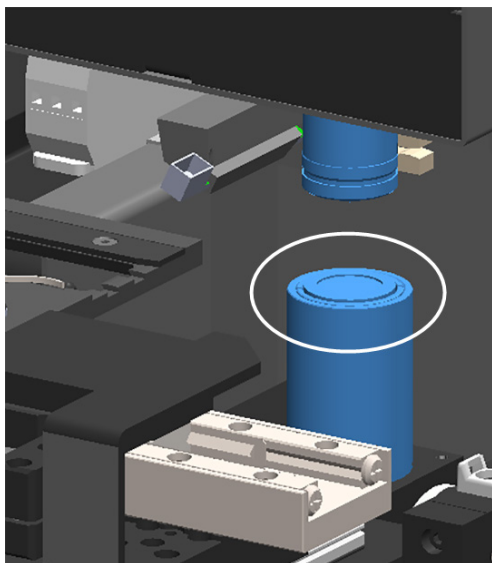
---



5. Wear gloves when cleaning the objective.
6. Clean the objective using small circular motions with the recommended lint-free microfiber cloth.



7. With a clean lint-free microfiber cloth, use the same technique described in step 6 to clean the Koehler. The Koehler is located below the objective, as shown circled in white below.



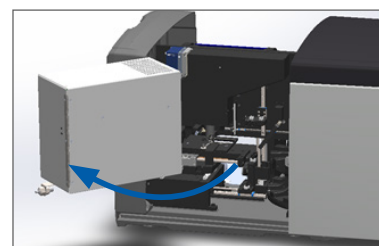
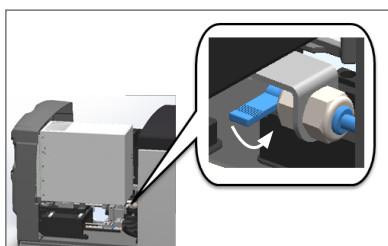
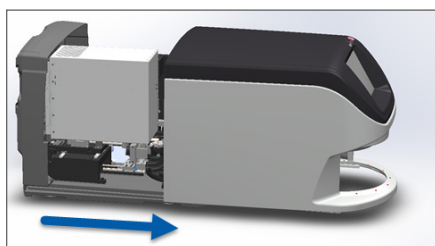
8. If you are performing the entire six-month maintenance routine, continue to the next procedure.
9. If you are ready to close the scanner cover and restart the scanner, follow the steps in *“Restart the Scanner After Interior Maintenance”* on page 52.

## Clean the Stage Slide Tray

- **Frequency: at least every six months.**

### To clean the stage slide tray:

1. If the scanner is on, shut down the scanner by following the steps in *“Shut Down the Scanner”* on page 41.
2. Open the cover and access the interior.
  - a. Open scanner cover.
  - b. Rotate VPU latch.
  - c. Pivot out VPU



For detailed steps, see *“Open the Scanner Cover and Access the Interior Components”* on page 42.



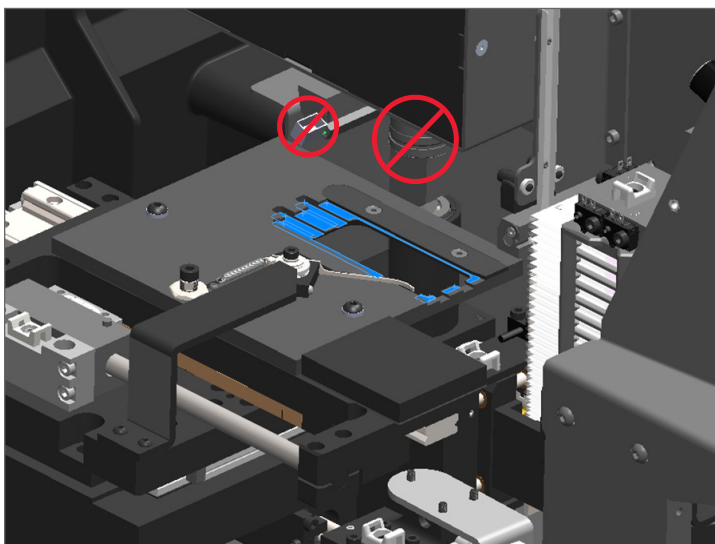
**CAUTION:** The stage slide tray is not removable. Do not attempt to remove it.

3. Gently wipe the slide tray (shown in blue) from back to front with a lint-free cloth.



**CAUTION:** Be careful not to bump the LED or the objective (highlighted in red).

---



4. Wipe the slide tray again from back to front using a microfiber cloth.
5. If necessary, use a gentle solvent such as denatured alcohol to remove any remaining residue.
6. If you are performing the entire six-month maintenance routine, continue to the next procedure.
7. If you are ready to close the scanner cover and restart the scanner, follow the steps in *"Restart the Scanner After Interior Maintenance"* on page 52.

## Clean the Carousel

- **Frequency: at least every six months.**

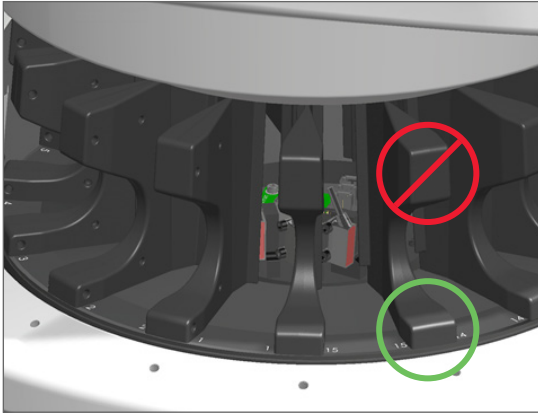
### To clean the carousel:

1. If the scanner is on, shut down the scanner by following the steps in, *"Shut Down the Scanner"* on page 41.
2. Remove all slide racks from the carousel.
3. Use a cotton swab soaked in a cleaning solvent, such as denatured alcohol, to thoroughly clean the carousel. Be sure to clean inside the slide rack slots.





**CAUTION:** When manually rotating the carousel to access the rack slots, grasp the area circled in green. Do not grasp the area circled in red.



4. Manually rotate the carousel to access the rear slide rack slots.
5. Repeat the cleaning steps until you have cleaned every slide rack slot.
6. If you are performing the entire six-month maintenance routine, continue to the next procedure.
7. If you are ready to close the scanner cover and restart the scanner, follow the steps in *“Restart the Scanner After Interior Maintenance”* on page 52.

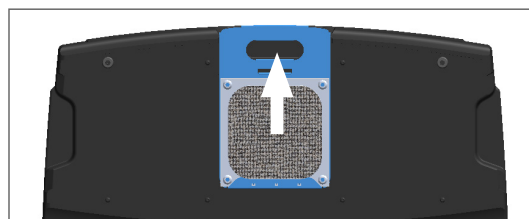
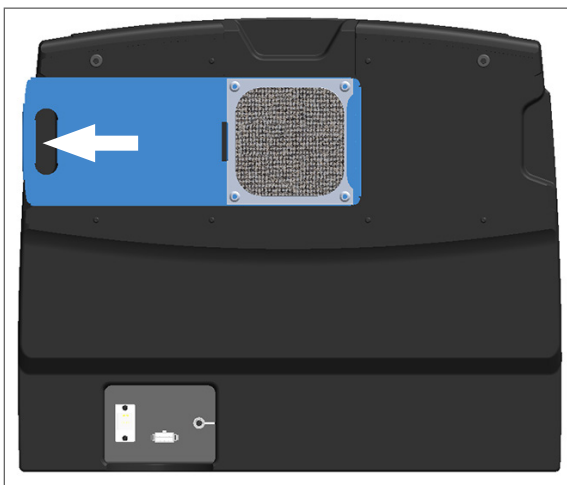
## Clean the Fan Filter

The fan filter is located on the back of the scanner. You may need to pivot the scanner to access the fan filter.

► **Frequency: at least every six months.**

### To clean the fan filter:

1. If the scanner is on, shut down the scanner by following the steps in, *“Shut Down the Scanner”* on page 41.
2. Remove the fan filter by gripping the handle (shown in blue), and sliding it left, right, or up depending on your scanner’s configuration.



3. With the front of the filter up toward the faucet (as shown below), rinse the filter under warm water.



4. Shake off any excess water.
5. Dry the filter thoroughly with a clean cloth or a dryer.



**CAUTION:** Ensure the fan filter is completely dry before inserting it in the scanner.

---

6. When the filter is completely dry, slide it back into position.



7. If you are performing the entire six-month maintenance routine, continue to the next procedure.
8. If you are ready to close the scanner cover and restart the scanner, follow the steps in *"Restart the Scanner After Interior Maintenance"* on page 52.

## Clean the Slide Racks

- ▶ **Frequency: at least every six months.**

### To clean the slide racks:

1. Check the racks for any damage or accumulated glass dust and mounting media.
2. If a rack is damaged, replace it immediately.
3. Use compressed air or a cleaning solvent to clean all grooves in the rack, ensuring the racks are clean and smooth. (We recommend Xylene cleaning solvent.)
4. If you are performing the entire six-month maintenance routine, continue to the next procedure.
5. If you are ready to close the scanner cover and restart the scanner, follow the steps in *"Restart the Scanner After Interior Maintenance"* on page 52.

## Clean the Scanner Cover

- ▶ **Frequency: at least every six months.**

### To clean the scanner cover:

1. Wipe the outer cover of the scanner with a damp cloth.
2. Immediately dry the cover using a dry cloth.

## Clean the Touchscreen

- **Frequency: at least every six months.**

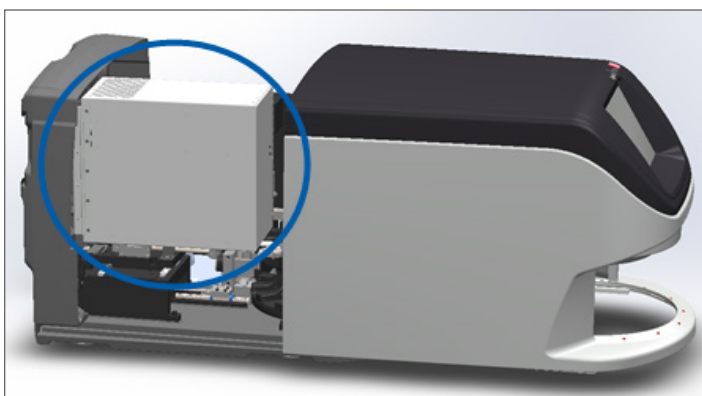
### To clean the touchscreen:

1. Spray standard monitor cleaner directly on a clean non-scratch cloth. (Avoid spraying the touchscreen directly to ensure that no liquid gets inside the scanner.)
2. Thoroughly wipe down the touchscreen with the cloth.
3. If you are ready to close the scanner cover and restart the scanner, follow the steps in *"Restart the Scanner After Interior Maintenance"* on page 52.

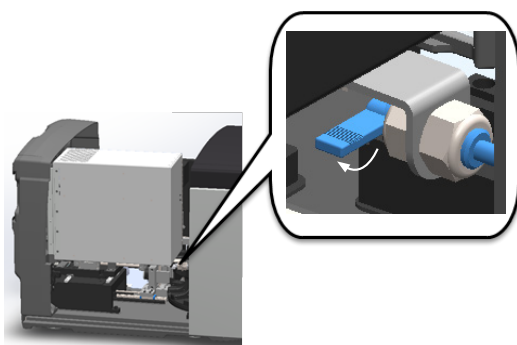
## Restart the Scanner After Interior Maintenance

Follow these steps to restart the scanner after you have accessed the scanner interior.

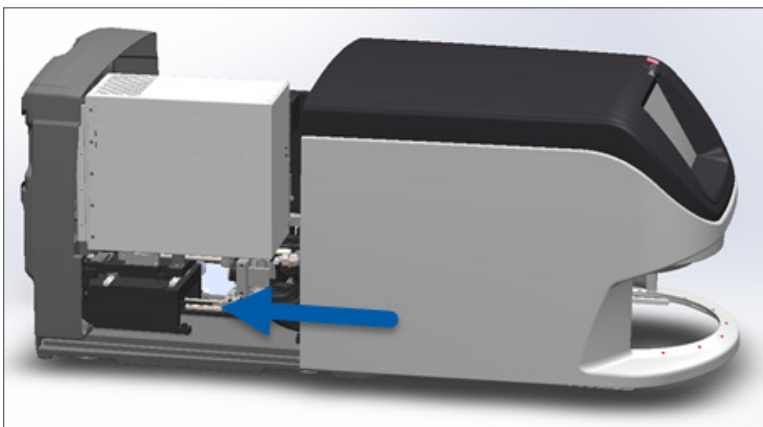
1. Pivot the VPU into the closed position.



2. Secure the VPU in place by rotating the VPU latch toward you 180 degrees.



3. Slide the scanner cover back into position so that it is aligned with the rear latches and clicks closed.



4. Turn on the scanner.

## Transporting or Moving the Aperio GT 450

If you need to relocate the scanner, contact Leica Biosystems Technical Services.

## Long Term Storage

If you are not going to use the scanner for a considerable amount of time, shut it down and unplug it. To shut down the scanner, follow the steps in, *"Shut Down the Scanner"* on page 41.

If you want to store the scanner, contact Leica Biosystems Imaging Technical Services for assistance.

# 6 Troubleshooting

This chapter contains information and instructions to help you resolve troubleshooting issues with your scanner. For issues with the Scanner Administration Manager, see the *Aperio GT 450 IT Manager and Lab Administrator Guide*.

## Personal Protective Equipment

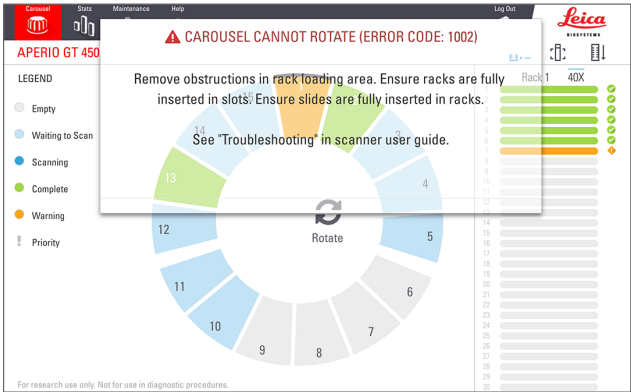
If you need to access the interior of the scanner while troubleshooting an issue, follow the policies and procedures of your institution, including the use personal protective equipment (PPE).

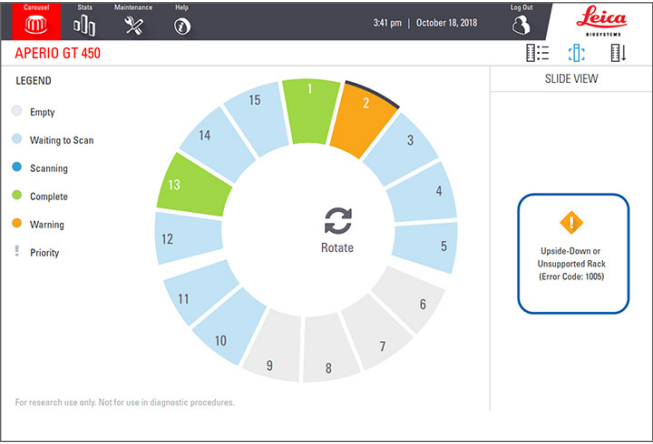
## Red Blinking Lights on Carousel

If the lights in front of the carousel are blinking red, the scanner needs attention. If there is an issue with a rack in the rack loading area, the light below that rack position blinks red. See the next section for more details on resolving scanner issues.

## How to Use the Troubleshooting Steps

The following table describes how to find the appropriate troubleshooting section:

Type of issue:	Scanner status:	Steps to resolve the issue:
<p>An error message box similar to this example appears on the touchscreen interface:</p> 	<p>The scanner cannot continue scanning until you resolve the issue.</p>	<p><i>“Error Codes and Solutions” on page 57.</i></p>

Type of issue:	Scanner status:	Steps to resolve the issue:
<p>A rack warning and error message similar to this example appears on the touchscreen interface:</p> 	<p>There is a problem with the rack or one or more slides in the rack.</p> <p>The scanner can continue scanning other racks or slides.</p>	<p><i>"Rack Warnings and Solutions" on page 68</i></p>
<p>No message or warning appears on the touchscreen interface, but there is a problem with the scanner. For example, the scanner does not power up when you turn it on.</p>	<p>Varies with the situation.</p>	<p><i>"Symptoms and Solutions" on page 74</i></p>

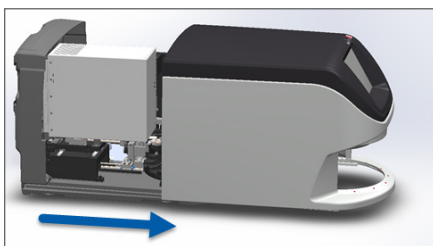
## Perform a Safe Restart After an Error

Some procedures in this chapter 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.

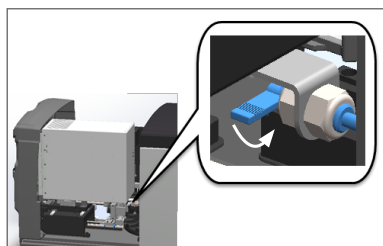
Follow these steps to safely restart the scanner after an error:

**1.** Open the cover and access the interior:

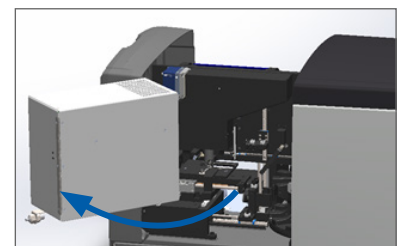
a. Open scanner cover.



b. Rotate the VPU latch.

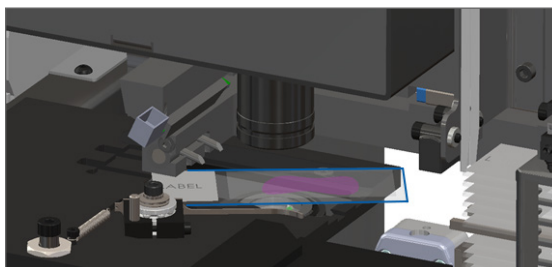
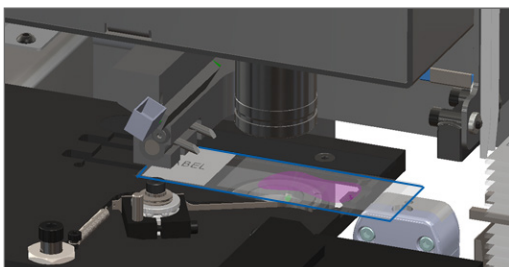


c. Pivot out VPU



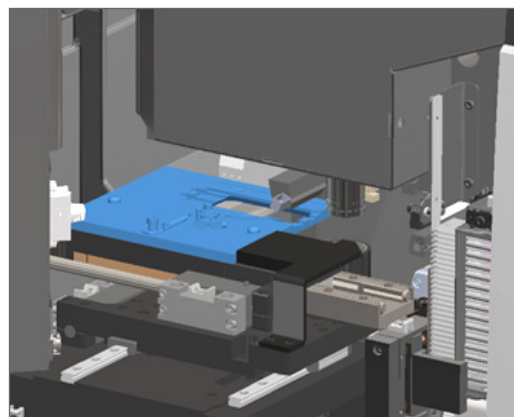
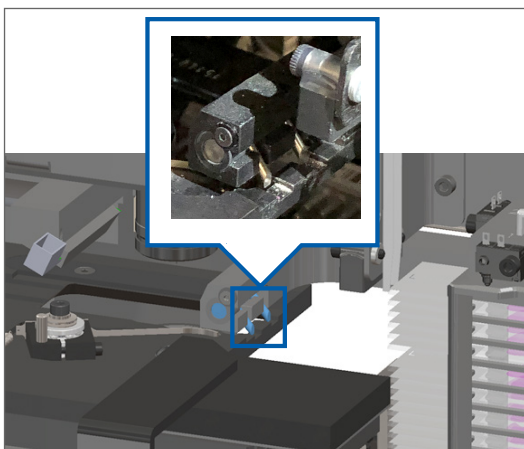
For detailed steps, see *"Open the Scanner Cover and Access the Interior Components"* on page 42.

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

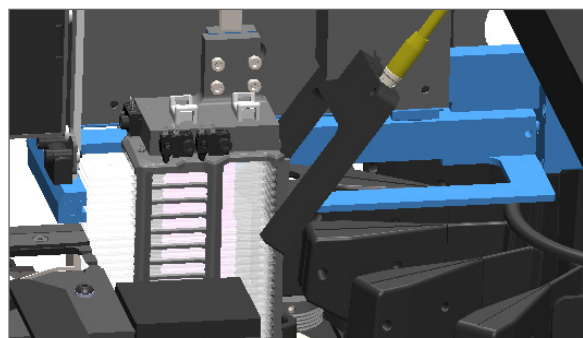
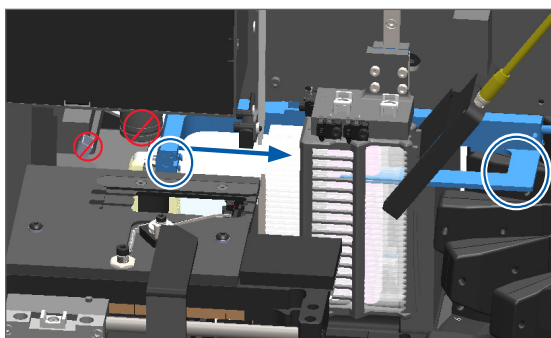


**CAUTION:** Restarting the scanner with a slide on the stage may damage the slide.

3. If there is a slide on the stage, carefully remove it from the stage without touching the surrounding components.
4. Return the pusher to the retracted (safe) position.
  - a. Align the pusher teeth with the slide stage grooves:
  - b. Slide the stage to the rear of the scanner, as shown:



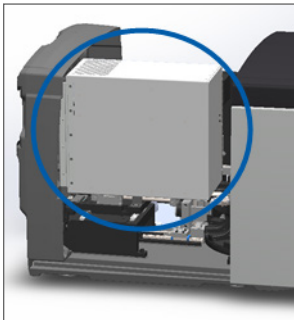
- c. Slide the pusher to the front of the scanner, as shown in the rightmost image below. Hold the pusher in one of the areas circled below. Avoid touching the LED and objective.



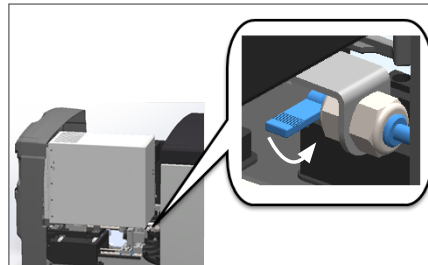


5. Close the scanner cover:

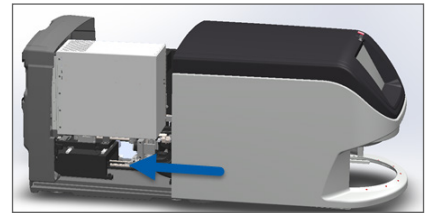
a. Pivot the VPU into place.



b. Rotate the VPU latch.



c. Slide the cover until it clicks closed.



For detailed steps, see *“Restart the Scanner After Interior Maintenance”* on page 52.

6. Tap **Maintenance** on the touchscreen interface, then tap **Restart Scanner**. Wait for the scanner to complete the restart process.

## Error Codes and Solutions

If an error box appears on the touchscreen, you must resolve the issue before the scanner can continue scanning. This section contains error codes and messages with troubleshooting steps.

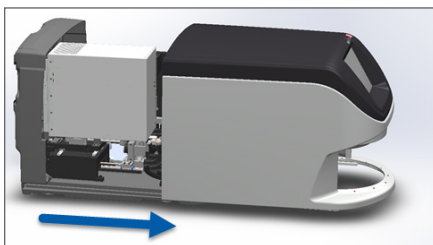
### 1000: Internal Error

- **Cause:** An unexpected event occurred in the system that prevents it from continuing operation.

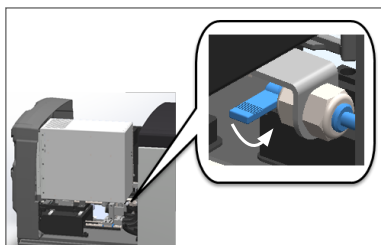
Follow these steps:

1. Open the cover and access the interior:

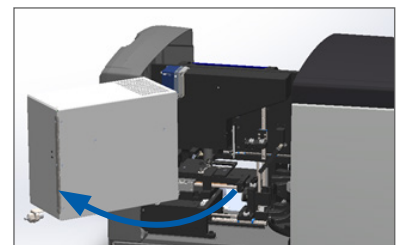
a. Open scanner cover.



b. Rotate the VPU latch.



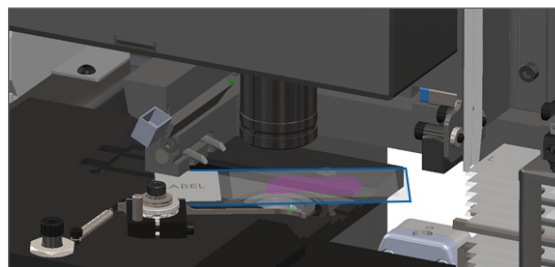
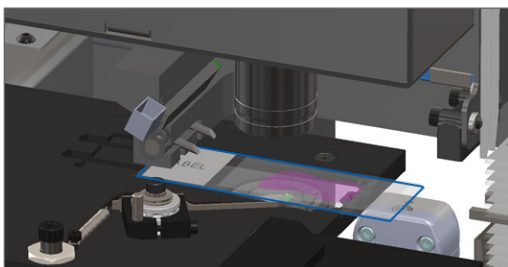
c. Pivot out VPU



For detailed steps, see *“Open the Scanner Cover and Access the Interior Components”* on page 42.

2. Take photos of any obstructions. Leica Biosystems Technical Services may request the photos if you need additional assistance after completing the steps below.

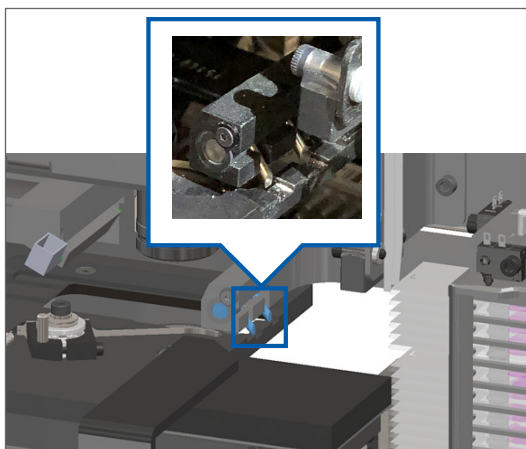
3. Check if there is a slide on the stage or partially on the stage.



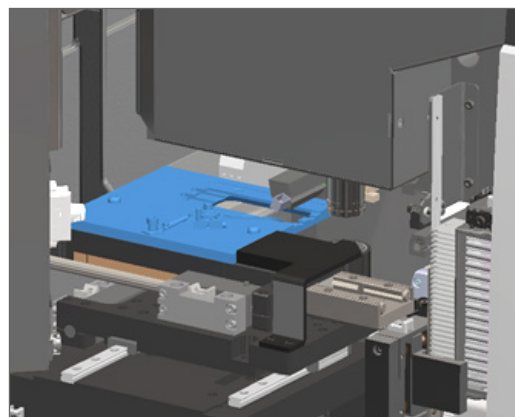
**CAUTION: Restarting the scanner with a slide on the stage may damage the slide.**

4. If there is a slide on the stage, carefully remove it from the stage without touching the surrounding components.
5. If the pusher is extended, return the pusher to the safe position.

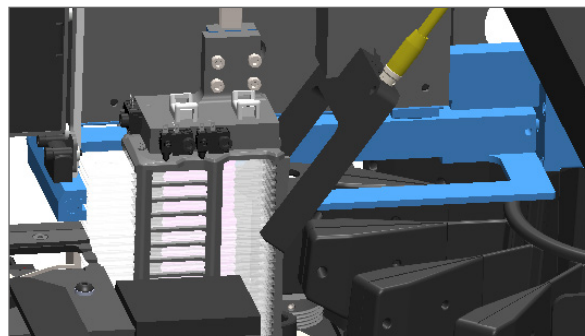
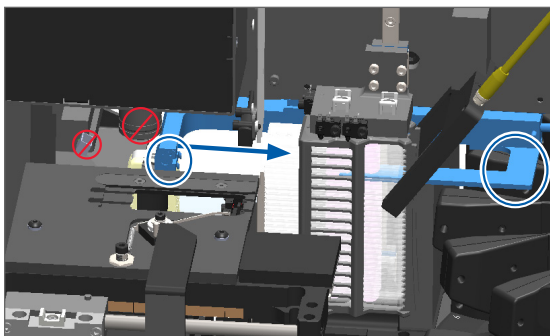
- a. Align the pusher teeth with the slide stage grooves:



- b. Slide the stage to the rear of the scanner, as shown:

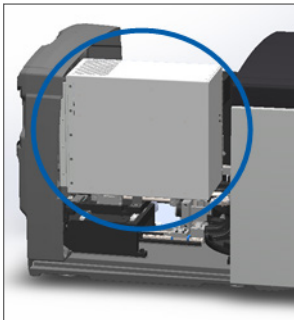


- c. Slide the pusher to the front of the scanner, as shown in the rightmost image below. Hold the pusher in one of the areas circled below. Avoid touching the LED and objective.

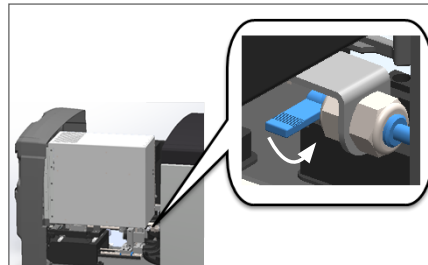


6. Close the scanner cover:

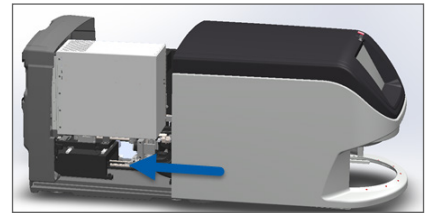
a. Pivot the VPU into place.



b. Rotate the VPU latch.



c. Slide the cover until it clicks closed.



For detailed steps, see *"Restart the Scanner After Interior Maintenance"* on page 52.

7. Tap **Restart Scanner** on the touch screen interface, and wait for the scanner to complete the restart process.
8. If the issue persists, call Leica Biosystems Technical Services.

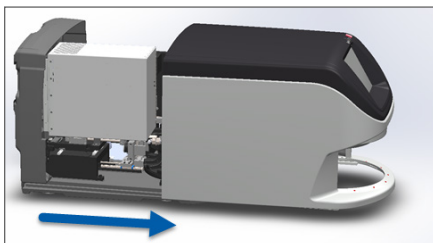
## 1001: Scanner Cannot Initialize

- **Cause:** The scanner cannot complete the initialization process.

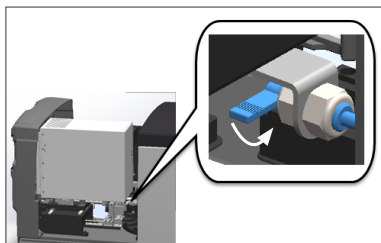
Follow these steps:

1. Open the cover and access the interior:

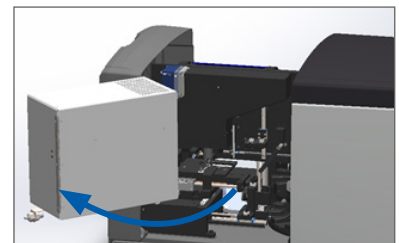
a. Open scanner cover.



b. Rotate the VPU latch.

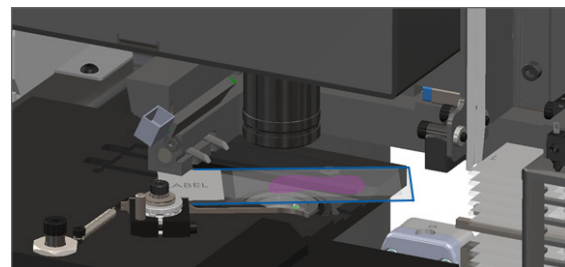
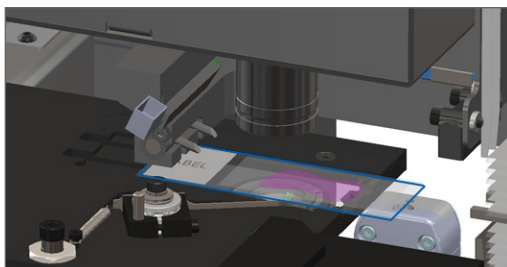


c. Pivot out VPU



For detailed steps, see *"Open the Scanner Cover and Access the Interior Components"* on page 42.

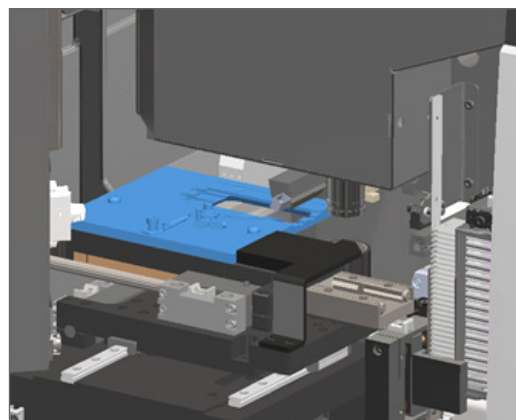
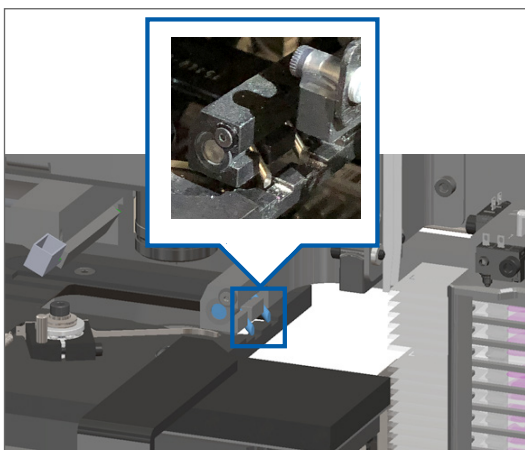
2. Check if there is a slide on the stage or partially on the stage.



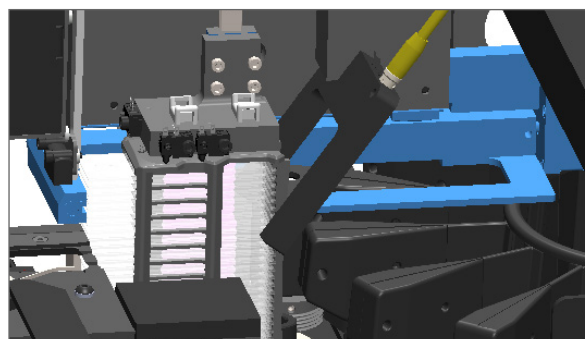
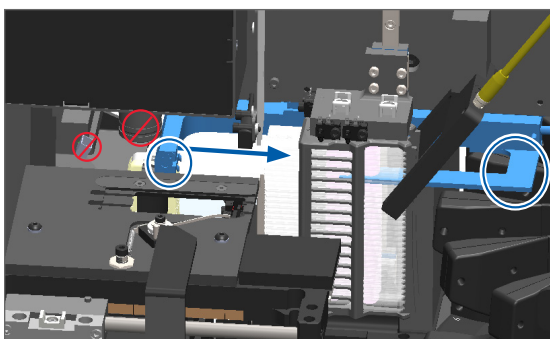


**CAUTION: Restarting the scanner with a slide on the stage may damage the slide.**

3. If there is a slide on the stage, carefully remove it from the stage without touching the surrounding components.
4. If the pusher is extended, return the pusher to the safe position.
  - a. Align the pusher teeth with the slide stage grooves:
  - b. Slide the stage to the rear of the scanner, as shown:

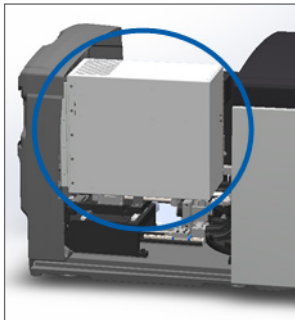


- c. Slide the pusher to the front of the scanner, as shown in the rightmost image below. Hold the pusher in one of the areas circled below. Avoid touching the LED and objective.

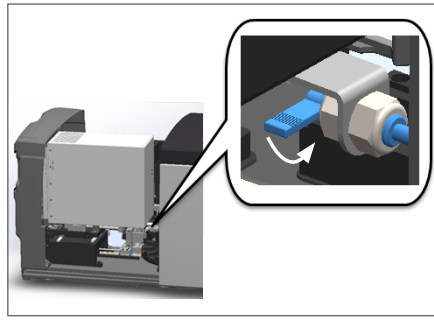


5. Close the scanner cover:

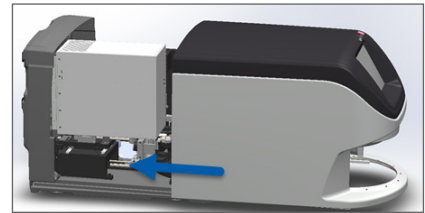
a. Pivot the VPU into place.



b. Rotate the VPU latch.



c. Slide the cover until it clicks closed.



For detailed steps, see *"Restart the Scanner After Interior Maintenance"* on page 52.

6. Shut down the scanner using the steps in, *"Shut Down the Scanner"* on page 41.

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

8. If the issue persists, call Leica Biosystems Technical Services.

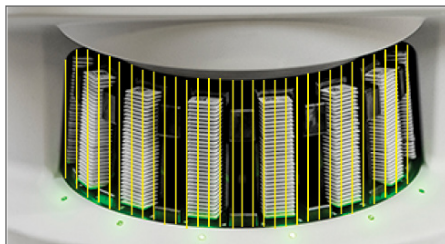
## 1002: Carousel cannot rotate

► **Cause:** Something is blocking the light curtain.

Follow these steps in order until the issue is resolved and the error message closes:

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

Rack loading area with light curtain highlighted:



Pinch points on either edge of rack loading area:





2. Ensure the racks in the rack loading area are inserted correctly:

Leica logo facing out and up:

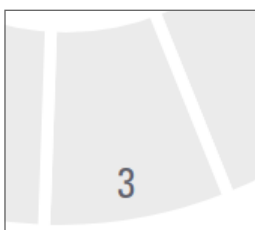


Rack inserted fully into the rack slot:

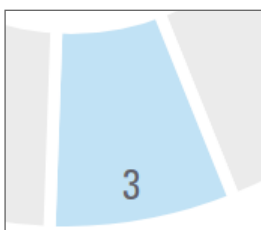


3. When you insert the rack, ensure the rack position and the rack status light turns light blue (waiting to scan):

Empty rack slot:



Rack inserted and waiting to scan:



4. Ensure all the slides are fully inserted so that they touch the back of the rack.



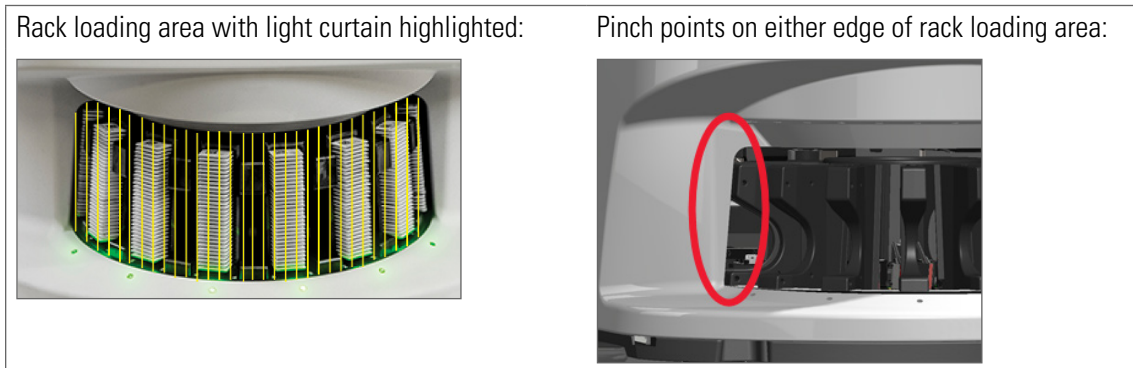
5. If there are no obstructions and the carousel still does not rotate, restart the scanner. See *"Perform a Safe Restart After an Error"* on page 55.
6. If the issue persists, contact Leica Biosystems Technical Services.

### 1003: Carousel cannot rotate. Carousel pinch point obstructed.

- ▶ **Cause:** There is an obstruction at a pinch point.

Follow these steps in order until the issue is resolved and the error message closes:

1. Check the rack loading area and pinch points for any unexpected object that may break the light curtain.



2. If there are no obstructions and the carousel still does not rotate, restart the scanner by following the steps in, *"Perform a Safe Restart After an Error"* on page 55.
3. If the issue persists, contact Leica Biosystems Technical Services.

### 1007: Internal storage full. Cannot send images to DICOM converter.

- ▶ **Cause:** If the internal storage is full, the system cannot send the images to the 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.

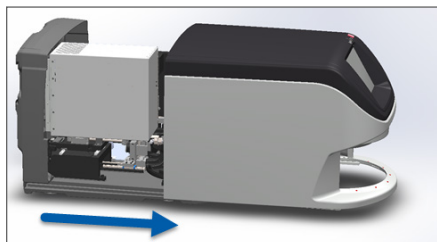
### 2000: Slide handling error at slide stage, rack, or pusher.

- ▶ **Cause:** There is an obstruction at the slide stage, rack, or pusher.

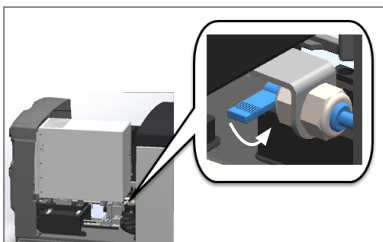
Follow these steps in order until the issue is resolved:

1. Open the cover and access the interior:

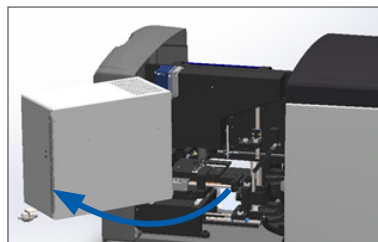
a. Open scanner cover.



b. Rotate the VPU latch.



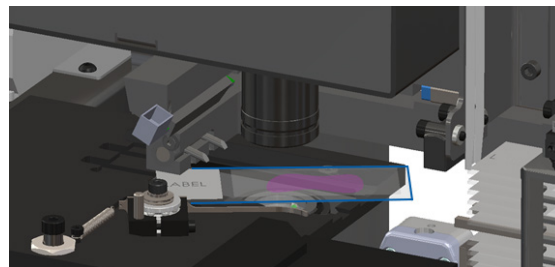
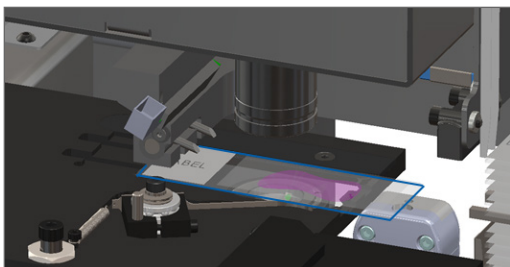
c. Pivot out VPU



For detailed steps, see *"Open the Scanner Cover and Access the Interior Components"* on page 42.

2. Take photos of the obstruction. Leica Biosystems Technical Services may request the photos if you need additional assistance after completing the steps below.

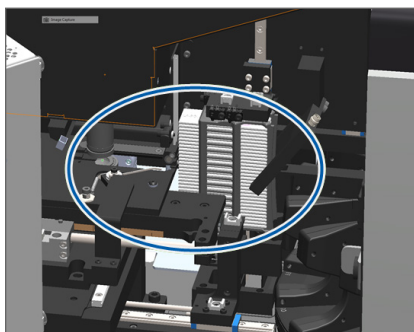
3. Check if there is a slide on the stage or partially on the stage.



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

4. If there is a slide on the stage, carefully remove it from the stage without touching the surrounding components.

5. Check the slide stage, rack, and pusher area for an obstruction.





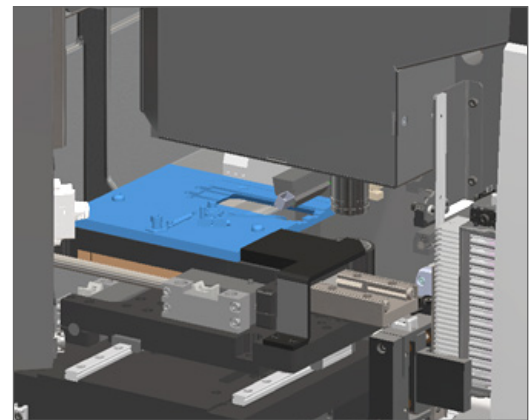
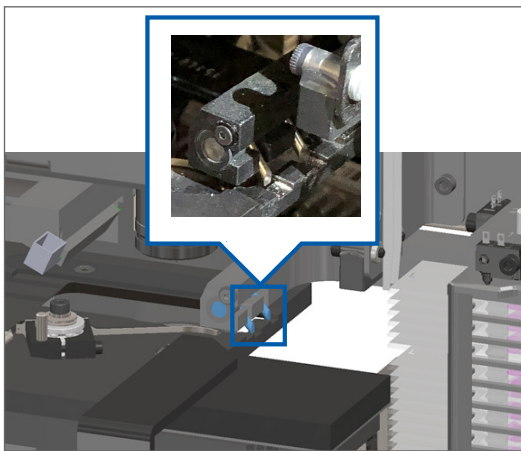
6. If possible, carefully remove the slide that is causing the obstruction.



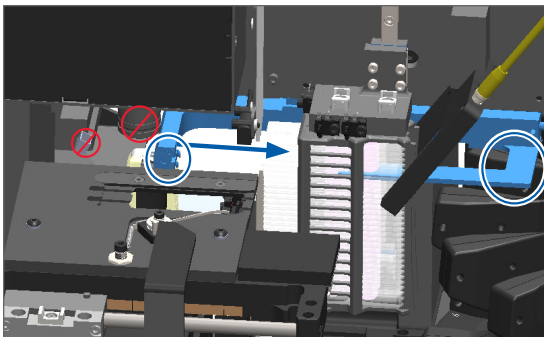
**WARNING: Do not attempt to recover broken slides. Call Leica Biosystems Technical Services.**

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

7. Check the slide for preparation issues, such as over-hanging coverslips and label issues.
  - ▶ If there are no obvious preparation issues, re-insert the slide in an available rack after you restart the scanner.
  - ▶ If there are slide preparation issues, correct the slide issues before rescanning.
8. If the pusher is extended, return the pusher to the safe position.
  - a. Align the pusher teeth with the slide stage grooves:
  - b. Slide the stage to the rear of the scanner, as shown:

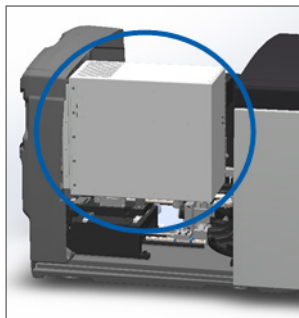


- c. Slide the pusher to the front of the scanner, as shown in the rightmost image below. Hold the pusher in one of the areas circled below. Avoid touching the LED and objective.

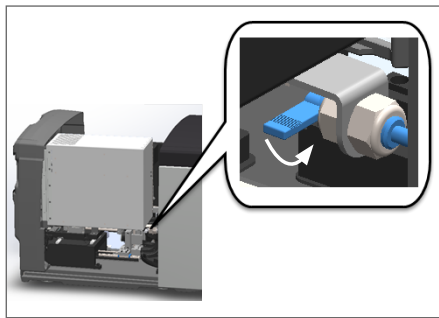


9. Close the scanner cover:

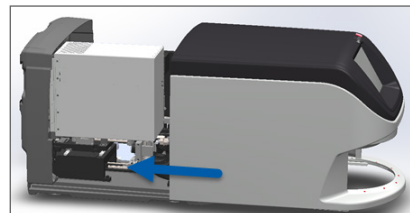
a. Pivot the VPU into place.



b. Rotate the VPU latch.



c. Slide the cover until it clicks closed.



For detailed steps, see *"Restart the Scanner After Interior Maintenance"* on page 52.

10. Tap **Restart Scanner** on the touch screen interface, and wait for the scanner to complete the restart process.

11. If the issue persists, contact Leica Biosystems Technical Services.

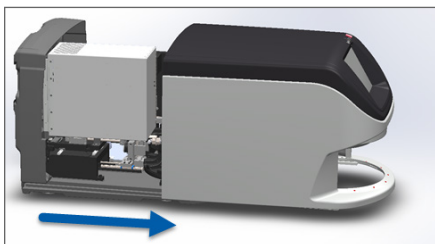
## 2001: Slide handling error at rack gripper, lift, or carousel.

► **Cause:** There is an obstruction near the rack gripper, lift, or carousel.

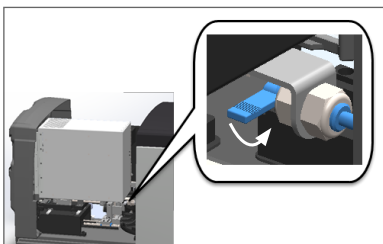
Follow these steps until the issue is resolved:

1. Open the cover and access the interior:

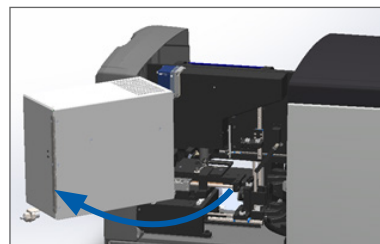
a. Open scanner cover.



b. Rotate the VPU latch.



c. Pivot out VPU



For detailed steps, see *"Open the Scanner Cover and Access the Interior Components"* on page 42.

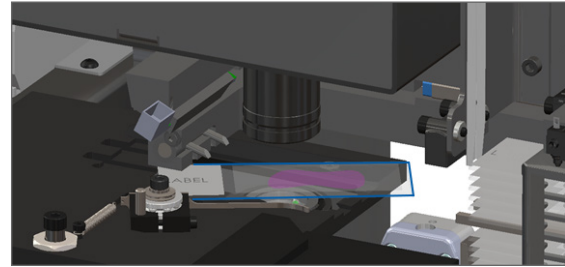
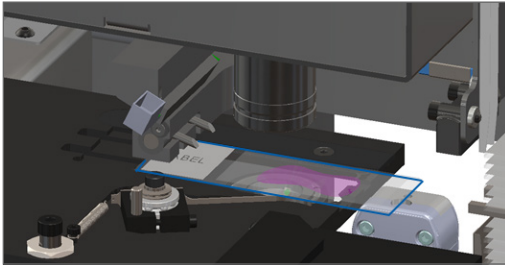
2. Take photos of the obstruction.



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

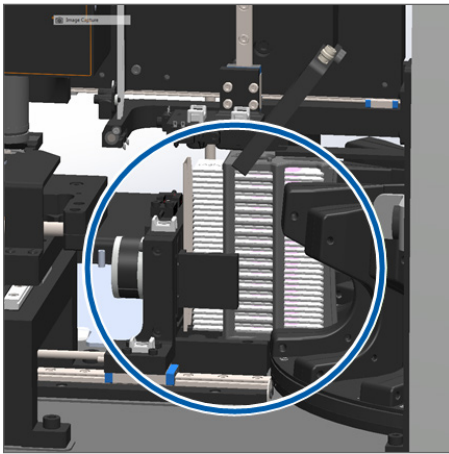
**AVERTISSEMENT: Ne pas tenter de récupérer les lames brisées. Appeler les Services Techniques de Leica Biosystems.**

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



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

4. If there is a slide on the stage, carefully remove it from the stage without touching the surrounding components.
5. Check the rack gripper, lift, and carousel area for an obstruction.

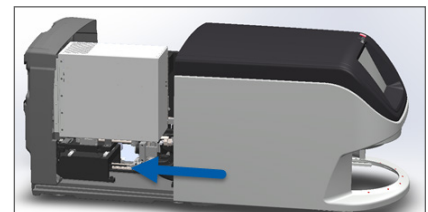
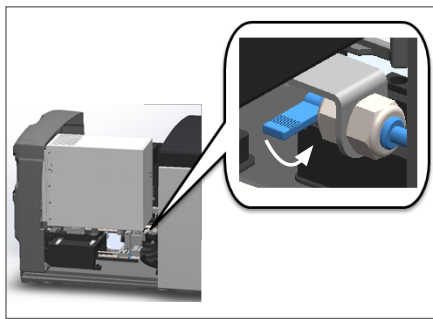
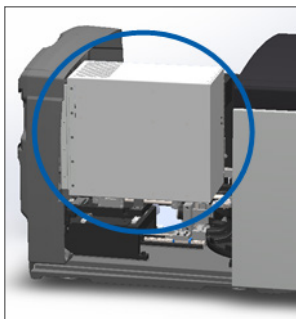


6. Close the scanner cover:

a. Pivot the VPU into place.

b. Rotate the VPU latch.

c. Slide the cover until it clicks closed.



For detailed steps, see *"Restart the Scanner After Interior Maintenance"* on page 52.

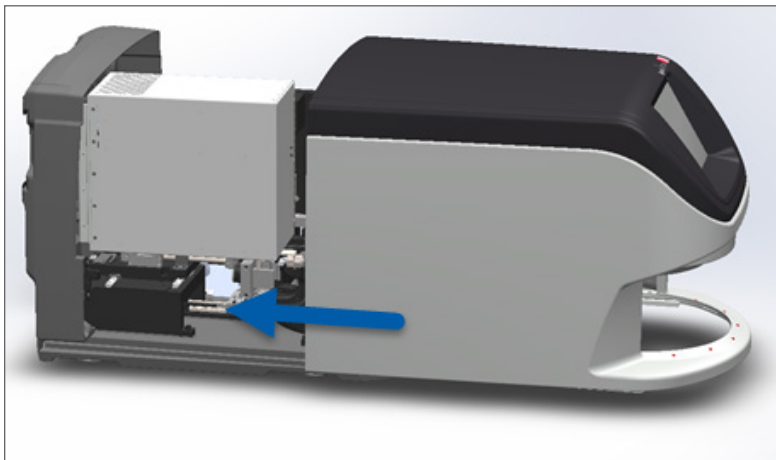
7. Contact Leica Biosystems Technical Services.

## 9000: Scanner cover is open

- ▶ The scanner cover is not closed completely.

Follow these steps until the issue is resolved:

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



## Rack Warnings and Solutions

Rack warnings indicate a problem with the rack or one or more slides in the rack. The scanner can continue scanning when there is a rack warning.



**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 you remove a rack, the rack's scan status is no longer available on the Home screen.**

## 1005: Cannot process rack.

- ▶ **Cause:** There is an issue with a rack that prevents scanning.

Follow these steps in order until the issue is resolved:

1. Rotate the rack to the rack loading area. (See *“Rotate a Rack to the Rack Loading Area”* on page 31.)
2. Ensure the rack is inserted correctly:



3. Remove the rack and check the following:
  - You are using a supported rack. (See *“Slide Racks Supported”* on page 21.)
  - The rack is not damaged or modified.
4. Verify the error only occurs on one rack.
  - If the error only occurs on one rack, go to step 4.
  - If the error occurs on multiple racks, contact Leica Biosystems Technical Services.
5. If you verified the rack is a supported and undamaged rack, reinsert it into the carousel for scanning.
6. If the scanner still cannot process the rack, attempt to restart the scanner by following the steps in *“Perform a Safe Restart After an Error”* on page 55.
7. If the issue persists, remove the rack and contact Leica Biosystems Technical Services.

## 1006: Cannot process one or more slides in rack.

- **Cause:** There is an issue with one or more slides in the rack.

Follow these steps in order until the issue is resolved:

1. Tap the rack position 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 the section that matches the slide error:
  - *“Tilted Slide(s)”* on page 70
  - *“No Barcode”* on page 70
  - *“No Tissue”* on page 71

- ▶ *"No Macro Focus" on page 71*
  - ▶ *"Image Quality" on page 72*
  - ▶ *"Image Transfer Error – Pending Retry" on page 72*
  - ▶ *"Aborted" on page 73*
4. If the issue persists after following the relevant procedure, keep the slide available for inspection and contact Leica Biosystems Technical Services.

## Slide Errors and Solutions

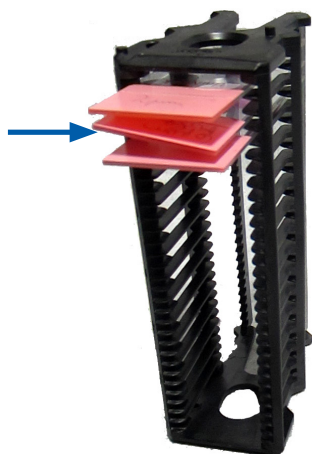
If there is an issue scanning a slide, one of the following error messages appears in Slide View. Follow the steps in order until the issue is resolved. If you follow the steps and the issue persists, contact Leica Biosystems Technical Services.

### Tilted Slide(s)

- ▶ **Cause:** The slide is tilted between two or more slots in the rack and cannot be scanned.

Follow these steps in order:

1. Remove the rack from the carousel, and locate the tilted slide:



2. Insert the slide in a new rack for scanning, ensuring it sits level horizontally in one slot.
3. Insert the rack to an empty rack slot for scanning.

### No Barcode

- ▶ **Cause:** The scanner does not detect a barcode on the slide.

Follow these steps in order until the issue is resolved:

1. Check the slides and rack are inserted correctly:
  - ▶ Slide label facing out and up.
  - ▶ Leica logo facing out and up.

- ▶ See also, “*Load Slides in the Rack*” on page 27.
- 2. Ensure barcodes meet specifications. See “*Barcodes Supported*” on page 21.
- 3. Ensure barcodes meet minimum quality requirements. See “*Barcodes*” on page 24.
- 4. If the issue persists, call Leica Biosystems Technical Services.

## No Tissue

- ▶ **Cause:** The scanner does not detect tissue on the slide.

Follow these steps in order until the issue is resolved:

1. On the touchscreen interface, tap the rack position that has the error.
2. Tap the **Slide View** icon to view the macro image of the slide.



3. Verify there is tissue on the slide.
4. Take note of the slide number.
5. Rotate and remove the rack to access the slide.
6. Remove the slide from the rack, and then clean the slide.
7. Re-insert the slide into a new rack and scan it again.
8. If the issue persists, check for slide preparation errors. See “*Slide Preparation*” on page 22.
9. If the issue persists after completing the previous steps, call Leica Biosystems Technical Services.

## No Macro Focus

- ▶ **Cause:** The scanner’s camera cannot focus on the tissue.

Follow these steps in order until the issue is resolved:

1. Check for slide loading issues:
  - ▶ Slide orientation is correct with the specimen-side facing up. (See “*Load Slides in the Rack*” on page 27.)
  - ▶ Slide tray is clean.
2. Check the stain quality.
3. Check that the slide and coverslip thickness are meet the requirements. See the *Aperio GT 450 Specifications*.
4. Check for common slide preparation issues:
  - ▶ Coverslip is not missing or overhanging.
  - ▶ Labels are not overhanging or on wrong side.
  - ▶ There is only one label applied to the slide.
  - ▶ Slide is clean.

5. If every slide has the same error, or if the issue persists after following the previous steps, call Leica Biosystems Technical Services.

## Image Quality

- ▶ **Cause:** The scanner's Auto-Image QC feature detected an image quality issue.

Follow these steps in order until the issue is resolved:

1. Review the scanned slide image in Aperio ImageScope.
2. Check for common slide preparation issues:
  - ▶ Coverslip is not missing or overhanging.
  - ▶ Labels are not overhanging or on wrong side.
  - ▶ There is only one label applied to the slide.
  - ▶ Slide is clean.
3. Scan the slide again. When the scan is finished, do not remove the rack from the scanner.
4. Review the newly scanned slide image in Aperio ImageScope.
5. If the issue persists, display the slide in Slide View, and tap **Scan Entire Slide**.
6. Check if other slides are in focus.
7. If all slides are out of focus, clean the objective. (See the *"Clean the Objective and Koehler"* on page 44.)
8. If the issue persists after following the previous steps, call Leica Biosystems Technical Services.

## Image Transfer Error – Pending Retry

- ▶ **Cause:** The scanner cannot transfer the scanned image to the image storage location.

Follow the appropriate steps below:

Error appears on some slides:	Error appears on all slides:
The system often resolves the issue without intervention.	The Lab Administrator should:
<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 only the slides that are missing from eSlide Manager.</li> </ol>	<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>



## Aborted

- ▶ **Cause:** The scanner cannot scan the slide.

Follow these steps in order until the issue is resolved.

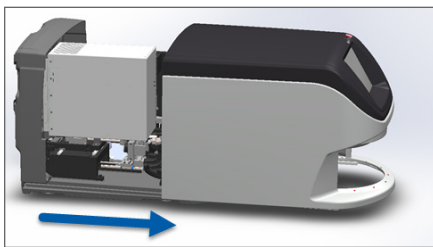
1. If the "Aborted" message appears on all slides, go to *"Aborted Message Appears on All Slides" on page 73*. If the message appears on one or some slides, continue to the next step.
2. Check for damage or common slide preparation issues:
  - ▶ Coverslip is not missing or overhanging.
  - ▶ Labels are not overhanging or on wrong side.
  - ▶ There is only one label applied to the slide.
  - ▶ There is only one coverslip applied to the slide.
  - ▶ Slide is clean.
3. Clean the slide.
4. Insert the slide into a different rack and scan it again.
5. If the issue persists after following the previous steps, call Leica Biosystems Technical Services.

## Aborted Message Appears on All Slides

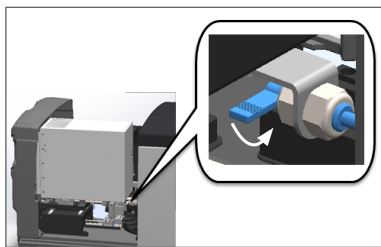
Follow these steps in order until the issue is resolved:

1. Remove any completed slide racks from the carousel.
2. Open the cover and access the interior:

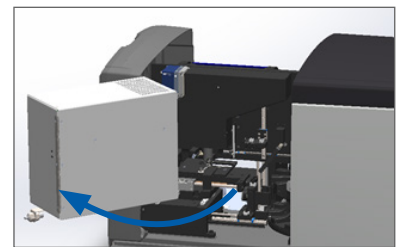
a. Open scanner cover.



b. Rotate the VPU latch.

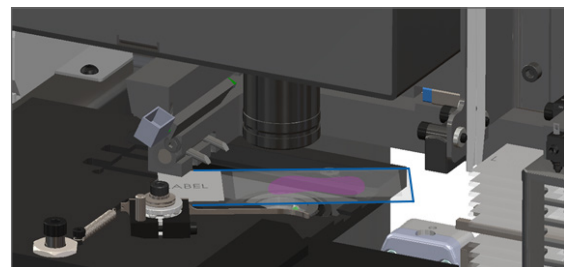
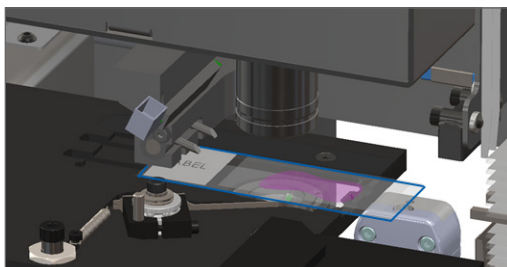


c. Pivot out VPU



For detailed steps, see *"Open the Scanner Cover and Access the Interior Components" on page 42*.

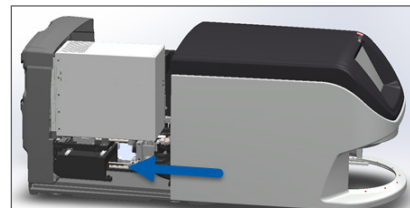
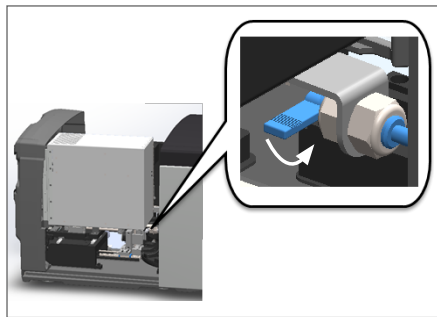
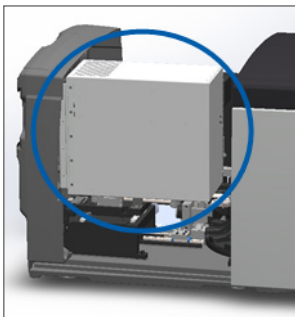
3. Check if there is a slide on the stage or partially on the stage.





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

4. If there is a slide on the stage, carefully remove it from the stage without touching the surrounding components.
5. Close the scanner cover:
  - a. Pivot the VPU into place.
  - b. Rotate the VPU latch.
  - c. Slide the cover until it clicks closed.



For detailed steps, see *“Restart the Scanner After Interior Maintenance”* on page 52.

6. Shut down the scanner by tapping **Maintenance**, then tapping **Shut Down Scanner**.
7. When touchscreen is dark, turn the scanner off using the On/Off switch.
8. Turn the scanner back on using the On/Off switch.
9. Allow the scanner to scan any remaining racks.
10. If the issue persists, call Leica Biosystems Technical Services.

## Symptoms and Solutions

This section contains troubleshooting information organized by symptom for scanner issues that do not have an error message or code.

### Scanner Does Not Power On

1. Ensure the scanner is turned on.
2. If you are using an optional uninterruptible power supply (UPS), ensure it is turned on.
3. Check the connections to wall outlet, and the Ethernet cable that attaches to the back of the scanner.
4. Ensure there is power available where the scanner is plugged in.
5. Verify there is a network connection to the device.
6. Ensure the main scanner cover is fully closed.
7. If the issue persists, call Leica Biosystems Technical Services.

## Touchscreen Does Not Respond to Touch

1. Shut down the scanner by following the steps in, *"Shut Down the Scanner" on page 41*.
2. Turn the scanner on.
3. If the issue persists, contact Leica Biosystems Technical Services with details.

## Touchscreen is Black

1. Shut down the scanner by following the steps in, *"Shut Down the Scanner" on page 41*.
2. Turn the scanner on.
3. If the issue persists, contact Leica Biosystems Technical Services with details.

## Slides are broken 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.**

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

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




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# Symbols

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

	Consult instructions for use
	Manufacturer
	Date of manufacture (year - month - day)
	European Union Authorized Representative
	In vitro diagnostic device
	Serial number
	Catalog number
	Relative humidity range
	Biological risks
	Storage temperature range
 	Electronic and electrical equipment waste disposal
	The exclamation point within an equilateral triangle is intended to alert you to the presence of important operating and maintenance (servicing) instructions. <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>
	Class I Laser

