

APERIO GT 180 DX

DIGITAL PATHOLOGY SLIDE SCANNER

USER'S GUIDE



Aperio GT 180 DX User's Guide

MAN-0558 | Revision B | October 2025

This manual applies to the Aperio GT 180 DX scanner and Aperio SAM DX Software version 1.5.

Original Instructions.


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Customer Resources


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

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Notices

Important message

Service personnel and distributors who have access to protected patients' information must treat all such information as confidential in accordance with professional ethics, accreditation standards, and legal requirements.

Revision Record

Rev.	Issued	Sections Affected	Detail
B	November 2025	Chapter 4: Scan slides	Clarified instructions.
A	October 2025	All	Initial release

Cautions and Notes

- **Serious Incidents Reporting** – Any serious incident that has occurred in relation to the Aperio GT 180 DX scanner shall be reported to the manufacturer and the competent authority of the member state in which the user and/or the patient is established.
- **Specifications and Performance** – For device specifications and performance characteristics, see the document *Aperio GT 180 DX Specifications*.
- **Installation** – Aperio GT 180 DX scanner must be installed by a trained Leica Biosystems Technical Services representative.
- **Repair** – Repairs may be done only by a trained Leica Biosystems Technical Services representative. After repairs are done, ask the Leica Biosystems technician to perform operation checks to determine the product is in good operating condition.
- **Accessories** – For information on using Aperio GT 180 DX scanner with third-party accessories such as a Laboratory Information System (LIS) not provided by Leica Biosystems, contact your Leica Biosystems Technical Services representative.
- **Quality Control** – For information on image quality checks, see [Image quality control for histotechnicians and pathologists \(on page 62\)](#).

- **Maintenance and Troubleshooting** – For information on maintenance and troubleshooting, see the [Maintenance](#) and [Troubleshooting](#) chapters in this guide.

Cybersecurity – Be aware that workstations are susceptible to malware, viruses, data corruption, and privacy breaches. Work with your IT administrators to protect workstations by following your institution’s password and security policies.

To protect workstations and servers from malware intrusion, use caution when inserting USB drives and other removable devices. Consider disabling USB ports that are not in use. If you plug in a USB drive or other removable device, you should scan the devices with an anti-malware utility. For Aperio recommendations on protecting your workstations and servers, see the *Aperio SAM DX IT Manager and Lab Administrator Guide*.

If a suspected Aperio GT 180 DX scanner cybersecurity vulnerability or incident is detected, contact Leica Biosystems Technical Services for assistance.

As a system security measure, Leica Biosystems products capture and log external attempts to access system data. For more information, contact your Leica Biosystems representative.

- **Training** – This manual is not a substitute for the detailed operator training provided by Leica Biosystems or for other advanced instruction.
- **Safety** – This device is intended for indoor use only. Safety protection may be impaired if this device is used in a manner not specified by the manufacturer.








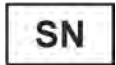






Intended Purpose





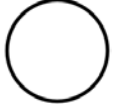


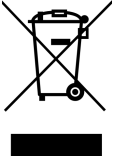
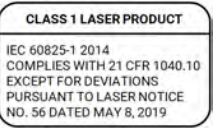


The Aperio GT 180 DX is a device for creation of digital images of scanned surgical pathology glass slides prepared from formalin-fixed paraffin embedded (FFPE) tissue that would otherwise be appropriate for manual visualization by conventional light microscopy. Aperio GT 180 DX is intended for in vitro diagnostic use with compatible viewing software and display that has been validated for use with this scanner as an aid to the pathologist in the qualitative review and interpretation of digital images.



The Aperio GT 180 DX is not intended for use with frozen section, cytology, or non-FFPE hematopathology specimens. It is the responsibility of a qualified pathologist to employ appropriate procedures and safeguards to assure the validity of the interpretation of images obtained using the Aperio GT 180 DX.

Symbols

The following symbols appear on your product label or in this user guide:

Symbol	Regulation/Standard	Description
	ISO 15223-1 - 5.4.3	Consult Instructions for Use
	ISO 15223-1 - 5.1.1	Manufacturer
	ISO 15223-1 - 5.1.3	Date of manufacture
	ISO 15223-1 - 5.1.2	European Union Authorized Representative
	IvDO; SR 812.219 Section 2 Article 44	Switzerland Representative
	ISO 15223-1 - 5.1.8	Importer
	AS/NZS 4417.1	Device is in compliance with with the Australian Communications Media Authority (ACMA) requirements (safety and EMC) for Australia and New Zealand.
	ISO 15223-1 - 5.1.7	Serial number
	ISO 15223-1 – 5.5.1	In Vitro Diagnostic medical device
	ISO 15223-1 – 5.1.6	Catalog number
	ISO 15223-1 – 5.7.10	Unique Device Identifier
	EU 2017/746 Article 18	Device carries the CE (Conformité Européenne) Mark and fulfils the requirements of EU Regulation 2017/746.
	Medical Devices Regulations 2002	Device is in compliance with UK Conformity Assessment requirements.
	ISO 15223-1 - 5.4.4	Caution

Symbol	Regulation/Standard	Description
	ISO 7010 – W001	General warning
	IEC 61010-1	TÜV Product Services have certified that the listed products comply with both U.S. and Canadian safety requirements.
	IEC 60417 - 5031	This device is suitable for direct current only.
	IEC 60417 - 5007	On. To indicate connection to the mains, at least for mains switches or their positions, and those cases where safety is involved.
	IEC 60417 - 5008	Off. To indicate disconnection from the mains, at least for mains switches, and all those cases where safety is involved.
	ISO 15523-1 5.7.3	Temperature limitation
	ISO 15223-1 5.3.8	Humidity limitation
	2012/19/EU	Device is regulated under 2012/19/EU (WEEE Directive) for Electrical and Electronic Equipment Waste and must be discarded under special conditions.
	IEC 60825-1	Device is a Class 1 Laser Product that is in compliance with international standards and US requirements.
	CA Proposition 65	This product can expose you to chemicals known to the State of California to cause Cancer and Reproductive Harm. For more information go to https://www.P65Warnings.ca.gov .
	ISO 7000-0659 (2004.1)	Biological risks To indicate a reference to substances that may be hazardous to men, animals, plants, or the environment based on biological activity (for example, holding a virus).

Symbol	Regulation/Standard	Description
	IEC 60825-1:2014	Warning label/Hazard label: Laser
	ISO 60417-5017 (2006.9)	Earth (ground) terminal To identify an earth (ground) terminal in cases where neither the symbol 5018 nor 5019 is explicitly required.

1

Introduction

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The Aperio GT 180 DX scanner is a high performance, brightfield whole slide scanner that includes continuous loading with 180-slide capacity across 6 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.

The Aperio GT 180 DX scanner is intended for use by trained clinical pathology histotechnicians, while the Aperio SAM DX software is intended for use by IT professionals and laboratory administrators.

The Aperio GT 180 DX scanner is intended for use in medium- to high-volume clinical pathology laboratories that support the pathology services of a hospital, reference laboratory or other clinical facility.

It is the responsibility of a qualified pathologist to employ appropriate procedures and safeguards to assure the validity of the interpretation of images obtained using the Aperio GT 180 DX scanner. Pathologists should exercise professional judgment in each clinical situation and examine the glass slides by conventional microscopy if there is doubt about the ability to accurately render an interpretation using this device alone.

Use of the Aperio GT 180 DX scanner requires the following components.

Component	Description
Aperio SAM (Scanner Administration Manager) DX (Aperio SAM DX) Server	The Aperio SAM DX Client Application Software resides on a server, which is referred to in this document as the Aperio SAM DX server. The Aperio SAM DX server connects to multiple Aperio GT 180 DX scanners.
Aperio SAM DX Client Application Software	The Aperio SAM DX client application software enables IT implementation, PIN configuration, and service access of multiple scanners from a single desktop client location for IT professionals.
Workstation, monitor, and keyboard	A workstation, monitor, and keyboard must be connected to your local area network with access to the Aperio SAM DX server to administer the Aperio GT 180 DX scanners.

See the *Aperio GT 180 DX 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.

Resources

Resource	Description
Aperio GT 180 DX User's Guide	Provides reference information and instructions for scanning, troubleshooting, and maintenance.
Aperio GT 180 DX Quick Reference Guide	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.
Aperio SAM DX IT Manager and Lab Administrator's Guide	Contains information and instructions regarding IT administration of the scanner, including network administration and configuration.
Aperio GT 180 DX Specifications	Provides detailed specifications for the scanner.
Instructional videos	Provides video instruction on performing various tasks. You can view the videos from the Help area on the scanner's touchscreen interface.
Customer Support	If you have an issue with the scanner you cannot resolve, contact Leica Biosystems Technical Services.
Training	Leica Biosystems offers classroom and virtual training courses. Contact Leica Biosystems Customer Support for information about training options.

Warnings

This section contains important safety and operation warnings. For more details, see also [Scanner safety instructions \(on page 18\)](#).

Electromagnetic warnings

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



CAUTION: Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the scanner, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

This device complies with the emissions and immunity requirements as specified in the EN/1EC 61326 series of Product Family Standards for a "basic electromagnetic environment". Such equipment is supplied directly at low voltage from public mains network. This equipment is not intended for residential use.

This device generates, uses, and can radiate unintentional radio-frequency (RF) energy. If this device is not installed and operated correctly, this RF energy can cause interference with other equipment. It is the responsibility of the end user to be sure that a compatible electromagnetic environment for the device can be maintained so that the device operates as intended.

In addition, other equipment can radiate RF energy to which this device is sensitive. If one suspects interference between this device and other equipment, Leica Biosystems recommends the following actions to correct the interference:

- Evaluate the electromagnetic environment before installation and operation of this device.
- Do not operate this device close to sources of electromagnetic radiation (for example: unshielded intentional RF sources), as these can interfere with proper operation. Examples of unshielded intentional radiators are handheld radio transmitters, cordless phones, and cellular phones.
- Do not place this device near medical electrical equipment that can be susceptible to malfunctions caused by close proximity to electromagnetic fields.
- This device has been designed and tested to CISPR 11 Class A emission limits. In a domestic environment, this device can cause radio interference, in which case, you need to take measures to mitigate the interference.

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.



WARNING: If the scanner appears to be damaged, do not attempt to disassemble or operate it. The scanner contains a very low-power diode laser, which could cause harm if the device malfunctioned and the laser were viewed through some manner of magnified lens for an extended period of time. The scanner contains a class 1 laser device compliant with IEC 60825-1:2014 and possessing a total radiated power of less than 100 μ W at a visible wavelength equal to 630–670 nm.

Component and part replacement warnings

There are no user-replaceable parts or components in the Aperio GT 180 DX scanner. Replacement of parts or components within the Aperio GT 180 DX scanner must be performed by qualified Leica Biosystems Technical Services personnel using Leica Biosystems specified parts.



CAUTION: Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.

Aperio GT 180 DX scanner compliance specifications

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- this device may not cause harmful interference, and;
- 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 60601-1-2:2014 IEC 61010-1:2010 IEC 61010-1: 2010/AMD1:2016 IEC 61010-2-101: 2018 CAN/CSA C22.2 No. 61010-1:2012/A1:2018 CAN/CSA C22.2 No. 61010-2-101:2019 UL 61010-1:2012/R2019-07 UL 61010-2-101:2019 EN 61010-1:2010/A1:2019 EN 61010-2-101:2017</p>
EMC	<p>EMC Directive (Directive 2014/30/EU) EN 61326-1:2013 CISPR 11: 2015 FCC Part 15 Subpart B ICES-003 Issue 6: 2016</p>

Installation



WARNING: Two people are required for lifting the scanner.

Installation and setup of the scanner should only be performed by a trained Leica Biosystems Service representative. After installation, the Leica Biosystems Service representative will check the scanner for proper operation.



WARNING: Incorrect installation could result in serious injury to the operator or ergonomic strain. For work surface and operating specifications, see the *Aperio GT 180 DX Specifications*.

When you first receive the Aperio GT 180 DX scanner and accessories, inspect the pallet and attached boxes for any damage. If the package has visible damage from shipment, contact Leica Biosystems Customer Service for assistance.

Disposal of the Aperio GT 180 DX scanner

The Aperio GT 180 DX scanner is regulated as Electrical and Electronic Equipment Waste (WEEE) under 2012/19/EU and must be discarded under special conditions. Contact Leica Biosystems Imaging, Inc. for assistance or questions regarding device disposal.

Device lifetime


The lifetime of the Aperio GT 180 DX scanner is ten years.

Scanner safety instructions

This section contains important safety information for the Aperio GT 180 DX 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.
- **Heed All Warnings** – All warnings on the scanner and those listed in the operating instructions must be adhered to.
- **Follow All Instructions** – All operating and scanner usage instructions must be followed.
 - 1 **Heat** – The scanner must be situated away from any heat sources such as radiators, heat registers, stoves, or other products that produce heat.
 - 2 **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.
 - 3 **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.
 - 4 **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.
 - 5 **Environment** – This device is intended for indoor use only.

- 6 **Attachments** – Do not use any attachments not recommended by the product manufacturer as they may cause hazards.
 - 7 **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.
 - 8 **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.
 - 9 **Cable Protection** – Secure all external cables to avoid operator injury.
 - 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. The appliance coupler on the external AC/DC power supply is considered the mains disconnect device.
 - 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.
 - 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.
 - 13 **Operating Environment** – Observe these basic safety requirements:
 - Do not operate the scanner out of doors.
 - Do not use where aerosol sprays are being used or where oxygen is being administered.
 - Do not let the scanner or its cables or accessories come into contact with surfaces which are too hot to touch.
 - Do not place anything on top of the scanner.
 - 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.
 - 15 **Accessories** – Do not place the scanner on an unstable cart, stand, tripod, bracket, or table or 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.
- 

WARNING: Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation.
- 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. Moving the scanner may void the applicable product warranty—contact Leica Biosystems for advice.
 - 17 **Servicing** – Refer all servicing to qualified service personnel.

- 18 **Damage Requiring Service** – Unplug the scanner from the wall AC outlet and refer servicing to qualified service personnel under the following conditions:
- When the AC cord or AC/DC adapter is damaged.
 - If liquid has been spilled or objects have fallen into the scanner.
 - If the scanner has been exposed to rain or water.
 - If the scanner does not operate normally (when you are following operating instructions).
 - If the scanner has been dropped or damaged in any way.
 - When the scanner exhibits a distinct change in performance. This indicates a need for service.

- 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 and may affect product compliance.

The objective in the Aperio GT 180 DX scanner has been specifically designed for this device. Do not replace it with another type of objective.



WARNING: Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation. Unauthorized substitutions may result in fire, electric shock, or other hazards and may affect product compliance.

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

2

Aperio GT 180 DX scanner overview

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This chapter provides an overview of the Aperio GT 180 DX scanner.

Theory of operation

The Aperio GT 180 DX scanner contains an automated slide loader subsystem which is designed to process standard 1" x 3" (2.54 cm x 7.62 cm) microscope slides.

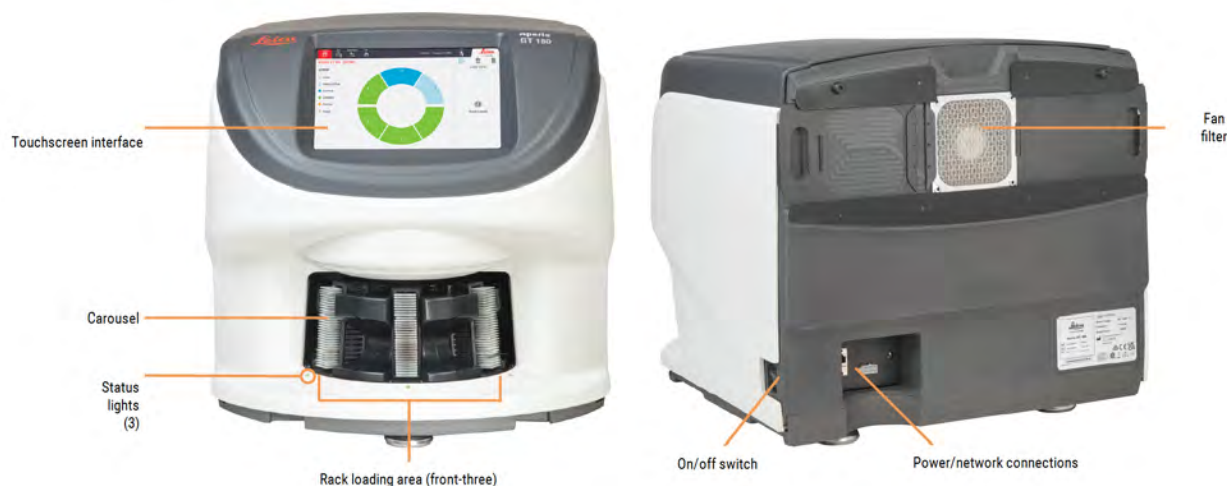
The scanner automatically loads the slides from the slide racks that the technician loaded into the scanner carousel. The slides are moved onto the scanning stage based on the automated processing and queuing of the racks.

Once the slide is on the stage, the imaging process begins with capturing the macro image, automatically detecting tissue, automatic placement of initial focus points (and reference stripe location), capturing the label image (including any barcode), and the image acquisition is initiated.

The tissue finding and scanning processes are automated without any need for the user to manipulate the slides being processed. If there is a need based on the quality review of the scanned image or tissue finder results, the device has the capability to reinitiate the scan with a different user selected mode (entire slide scan). The device images the slide using transmitted light from the Koehler Light Source through the specimen to the optical path (including the objective, tube lens, apertures, and mirrors). At this point the light travels to the line scan camera where the imaging data is captured and processed. The Aperio GT 180 DX scanner acquires images in stripes, as the motion subsystem moves the slide across the Koehler and optical path. These stripes of data are processed in the control VPU and sent to a database for use in later pathology workflow steps. Once the slide has finished scanning, it is automatically removed from the stage, returned to the slide rack, and the next slide is loaded.

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
Touchscreen Interface	View rack statuses, set rack options, and view other information.	See Touchscreen interface overview (on page 24) .
Carousel	The carousel contains 6 rack slots. After you load racks in the carousel, the carousel rotates the racks to the scanning area and the rack loading area.	See Carousel rotation (on page 40) .
Rack loading area	Provides access to the carousel to load and unload slide racks. This area is also referred to as the “front-three,” because the rack loading area gives you access to three rack slots at a time.	See Load racks in the carousel (on page 42) .
Safety light curtain	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 Carousel rotation (on page 40) .
Status lights	The status lights are located below the rack slots in the rack loading area. They indicate the status of the front-three racks and the scanner. The colors of the status lights match the colors of the rack status Legend on the touchscreen interface.	See Check scan status (on page 55) . See Red blinking lights on carousel (on page 96) .
Fan filter	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 Clean the fan filter (on page 89) .

Turn the scanner on and off

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

- On position = |
- Off position = ○



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

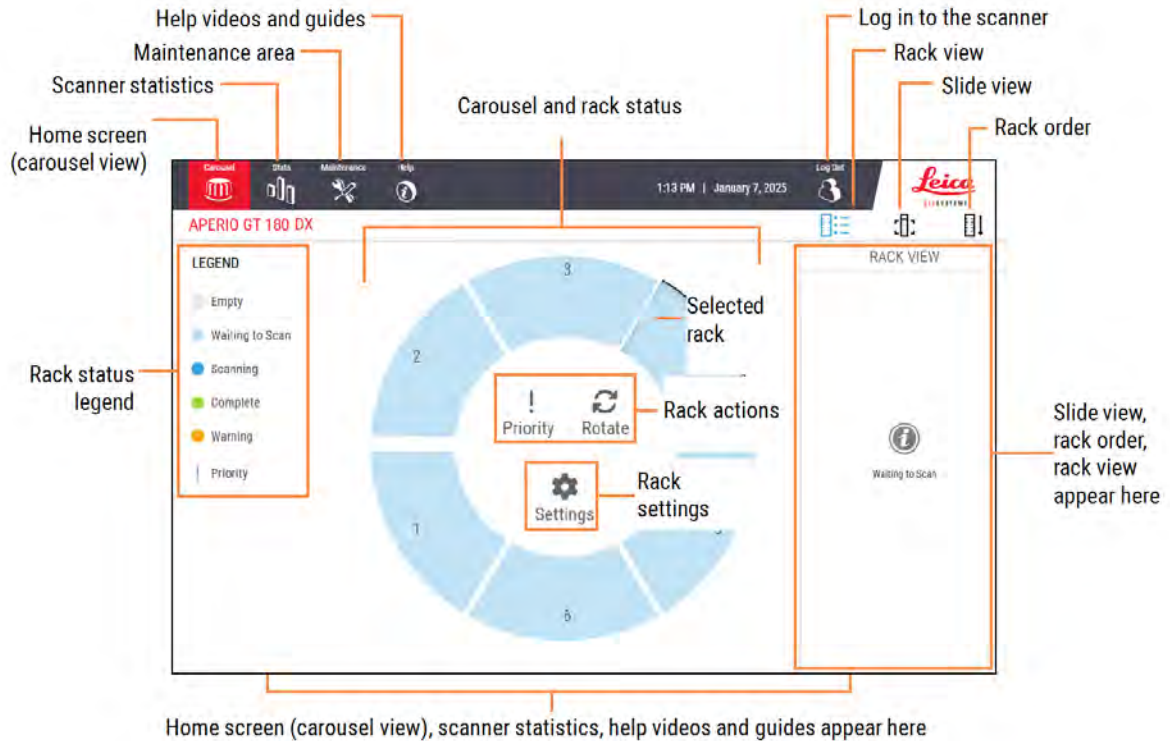
- Shut down the scanner (on page 74).
- Restart the scanner after interior maintenance (on page 92).
- Perform a safe restart after an error (on page 97).

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.

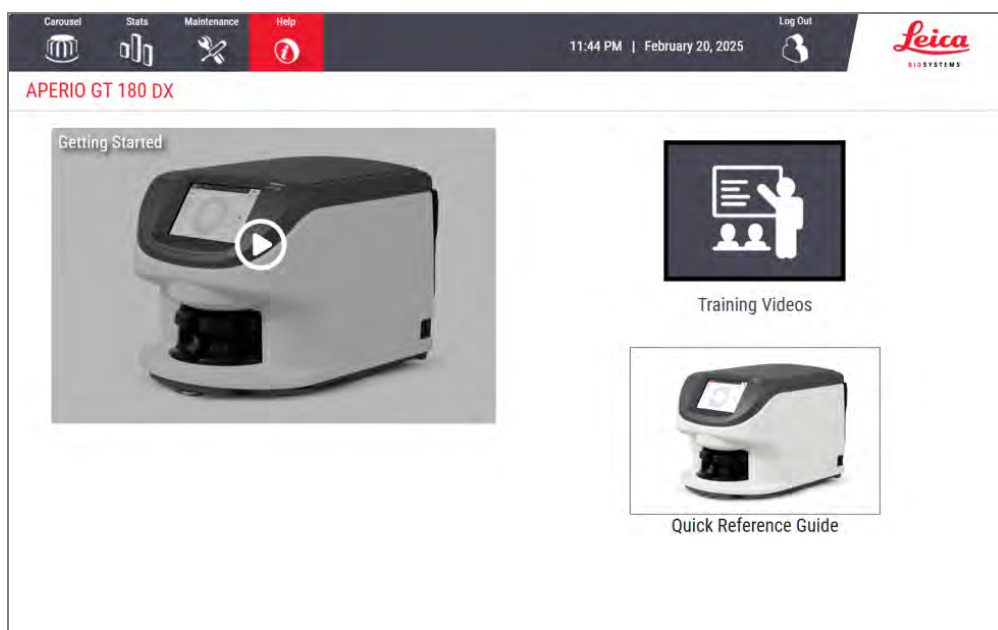
Element	Icon	Use	More details
Rack status legend	not applicable	The Legend defines colors and icons that indicate rack status. Status colors appear on the rack slot positions on the touchscreen interface, and on the status lights in front of the carousel. Note: the Legend is for information only and is not interactive.	Check scan status (on page 55)
Scanner statistics		Tap Stats to view scan statistics, such as the number of slides or racks scanned within a certain time period.	Scan statistics (on page 64)
Maintenance		Tap Maintenance if you need to restart the scanner, or view the serial number and the hardware and firmware versions of your scanner.	Serial number and firmware version (on page 73) Shut down the scanner (on page 74) Restart the scanner (on page 77)
Help		Tap Help to view training and maintenance videos, or access an online version of the quick reference guide.	Help videos and guides (on page 26)
Carousel and rack status	not applicable	Use the carousel and rack position on the touchscreen interface to: <ul style="list-style-type: none"> View the rack status, indicated by the color of the rack position. Tap a rack position to select the rack. Apply an action to the selected rack, such as Priority or Rotate (described next). 	Carousel rotation (on page 40) Check scan status (on page 55)
Rack actions Note: Rack actions appear when you select a rack.		Select a rack and tap Priority to move the rack to the top of the scan queue.	Priority scanning (on page 43)
		Select a rack and tap Rotate to rotate the rack to the rack loading area.	Rotate a rack to the rack loading area (on page 53)
Rack settings Note: Rack settings appear when you select a rack.		Select a rack and tap Settings to select and apply a rack setting.	Scan entire slide for whole rack (on page 61) Change the scan magnification for a rack of slides (on page 45)

Element	Icon	Use	More details
			<p>Scan a rack of slides using z-stack scanning (on page 47)</p> <p>Scan a rack of slides using Extended Focus (on page 50)</p>
Login, Logout		Tap Login to open a keypad and enter your pass code to access the scanner.	Log in and log out of the scanner (on page 40)
		Tap Logout to lock access to the scanner touchscreen interface.	
Rack View		Select a rack and tap Rack View to view the scan status for each slide in the rack.	View slide status for a rack (on page 57)
Slide View		Select a rack and tap Slide View to view macro images for each slide.	View macro images of scanned slides (on page 58)
Rack Order		Tap Rack Order to view scan order and status of the racks.	View rack scan order (on page 58)

Help videos and guides

You can access training videos and the *Aperio GT 180 DX Quick Reference Guide* directly from the touchscreen interface. We recommend that you watch the training videos before operating the scanner for the first time.

- 1 From the Home screen, press **Help**, and then tap a video or guide to view.



Key features

This section describes some key features of your Aperio GT 180 DX scanner.

Continuous load workflow

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

Scan magnification

Custom optics for native 40x scanning magnification, with the option to scan slides at 20x or 40x magnification, depending on the needs of your organization or specific project.

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.

Manual Scanning

The optional Manual Scan feature enables you to manually adjust the scan settings using the macro image from an automatic scan and re-scan a single slide without removing the slide from the scanner.

Z-Stack scanning

The Z-Stack scanning feature enables you to scan a glass slide at different focal planes along the vertical z-axis, and stack the images on top of each other to produce a 3D composite multiplane image.

Extended Focus

The optional Extended Focus feature enables you to scan a single composite image file with optimized focus. The Extended Focus scanning process uses z-stack layers to achieve optimal focus on the entire depth of tissue. The optimally-focused areas across the z-stack layers are identified and then fused into a single image.

Image types supported

The Aperio GT 180 DX scanner creates SVS files or DICOM images. The .svs image format is the default.

Slide types supported

The scanner supports 1-inch x 3-inch (2.54-cm x 7.62-cm) glass slides (per ISO 8037/1).

Coverslips

Fully-cured coverslips are required. The Aperio GT 180 DX scanner 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 are also accepted.

Slide capacity

The maximum slide capacity depends on the racks used:

- 20-slide racks – load up to 120 glass slides.
- 30-slide racks – load up to 180 glass slides.

Barcodes supported

The Aperio GT 180 DX scanner supports the following barcodes:

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

3

Slide preparation

In this section:

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Slide preparation overview

This section contains tips on best practices for slide preparation for your Aperio GT 180 DX scanner. To ensure the best possible quality and continued peak operation, it is crucial to ensure slides and scanner components are clean and free of obstructions.

The scanner is designed to safeguard the handling of slides throughout the entire scanning process. The product features numerous sensors and mechanisms to detect the proper handling of slides. Should any of these safeguards detect an unexpected outcome, the device will safely halt ensuring the slide is protected from damage throughout the process.



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 for advice.

Always consult the material safety data sheets for the stains and re-agents 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.



CAUTION: Ensure that the slides and racks you use meet the Aperio GT 180 DX scanner specifications. For details, see the *Aperio GT 180 DX Specifications*. Do not modify racks or attach labels to them.

Slide preparation checklist

Slides

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

Coverslips

- Fully cured coverslip in place. Must use coverslip.
- Minimal mounting media used.
- No air pockets under coverslip.
- Coverslip is not hanging over the side of the slide.
- Only one coverslip per slide.

Slide labels

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

Barcodes

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

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 guidelines

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 180 DX 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.



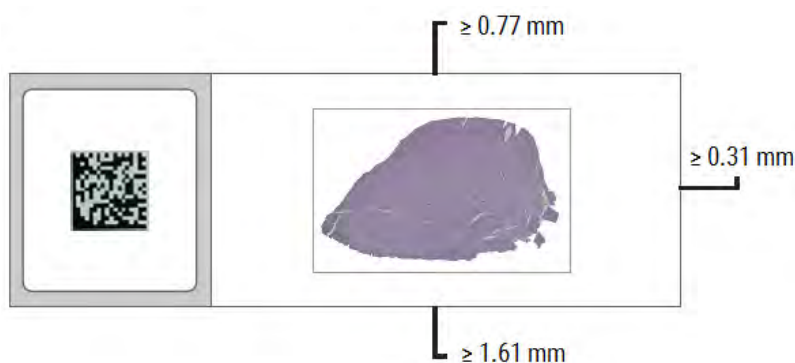
CAUTION: Do not attempt to scan damaged or broken slides, as doing so may damage the scanner.

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 (1" x 3") slide.



For more details on slide specifications, see [Slide types supported \(on page 27\)](#).

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 180 DX scanner. 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 180 DX scanner 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 180 DX 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.

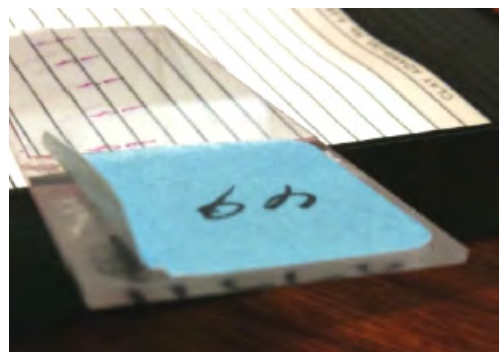
Labels

The Aperio GT 180 DX scanner supports common industry labels used for 1 x 3 inch (2.54 cm x 7.62 cm) 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 180 DX Specifications* for slide specifications.
- Labels do not extend past the edges of the slide and 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 shown in [Load slides in the rack \(on page 41\)](#).

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 \(on page 28\)](#). For best performance, we recommend using barcode labels that have a white background and black ink.


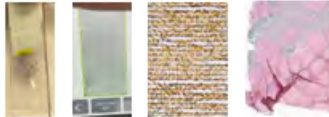

Improperly applied slide barcodes can cause slides to jam. Ensure the following:

- Barcode labels meet the same application requirements as slide labels. See [Labels \(on page 33\)](#).
- 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 \(on page 28\)](#).
- Use only high-quality printed barcode labels.

Slide quality control

Look for these issues in prepared slides.

Issue	What to look for	Sample Issues
Labels	Overhanging (size of label), peeling, multiple (covering tissue, barcodes), placement (label region), print quality and supported barcode type	
Coverslips	Overhanging (skewed), lifting, multiple, bubbles, excessive mounting media (edges of slide, bottom), wet	

Issue	What to look for	Sample Issues
Cleanliness	Paraffin (slide transportation, sorting, handling), pen marks, fingerprints, dust/debris	
Tissue	Thickness, size and proximity to other tissue, placement (away from edges), folds, chatter	
Staining	Intensity (too dark or too light), overstaining, contamination	

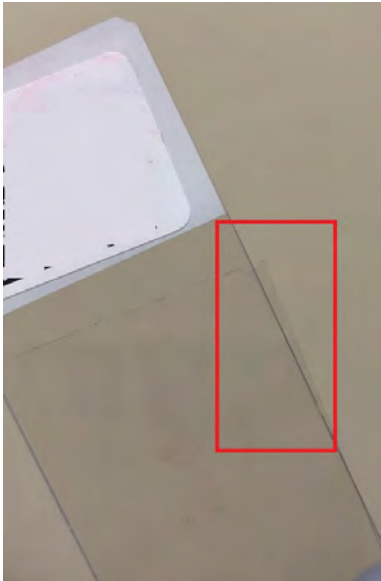
General guidelines for slide preparation

To ensure the best possible quality and continued peak operation, it is crucial to ensure slides and scanner components are clean and free of obstructions. Examples of such obstructions are a) Debris on slides (on top and under slide), b) Overhanging labels and coverslip, c) Excessive mounting media.

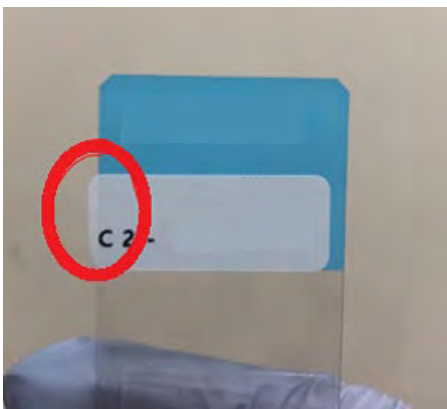
The scanner generates high magnification images with large field of view (FOV) at a high speed. To ensure good Image Quality, the slide needs to maintain its height on the stage while scanning and tissue/slide is flat within the FOV. If either of these fail, the sample will be out of focus or have uneven focus.

Here are a few examples of poor sample preparation that may cause slide handling errors in a scanner.

- 1 An overhanging or skewed coverslip may lead to slide loading and unloading errors as the slide is loaded to or from the scanning stage. It may also cause the slide to not sit firmly or flat in the slide tray and could lead to a physical shift during the scan process.



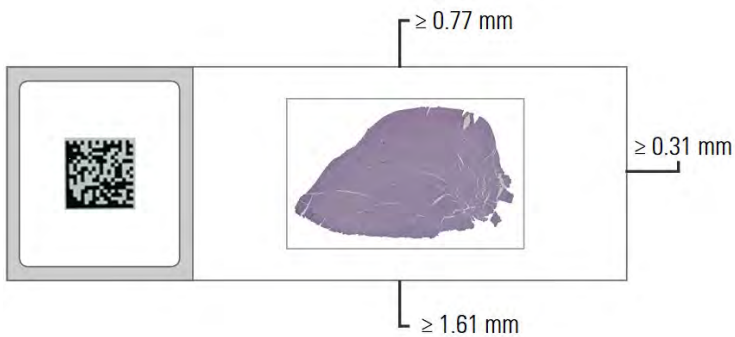
- 2 An overhanging label may lead to slide loading or unloading errors. Residue from the overhanging label may also transfer to the pusher assembly leading to slide loading/unloading errors for subsequent slides until the residue is cleaned.



- 3 Excessive mounting media around slide edges may lead to debris build up within the slide racks slots. This may cause slides to become affixed within the slide rack. Mounting media around the slide edges may also lead to slide load or unload errors.



- 4 When numerous slides with excessive mounting media are scanned over time, there may be mounting media buildups on the tray opening leading to a higher chance of slide loading or unloading errors. Debris on the bottom of the slide may create a catch point during the slide load or unload process leading to slide handling errors. Label on the backside of a slide may also create a catch point during the slide load or unload process leading to slide handling errors. 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 and the label does not cover any tissue. The example below shows minimum distances from the side and bottom edges of a 26 mm x 76 mm slide.



4

Scan slides

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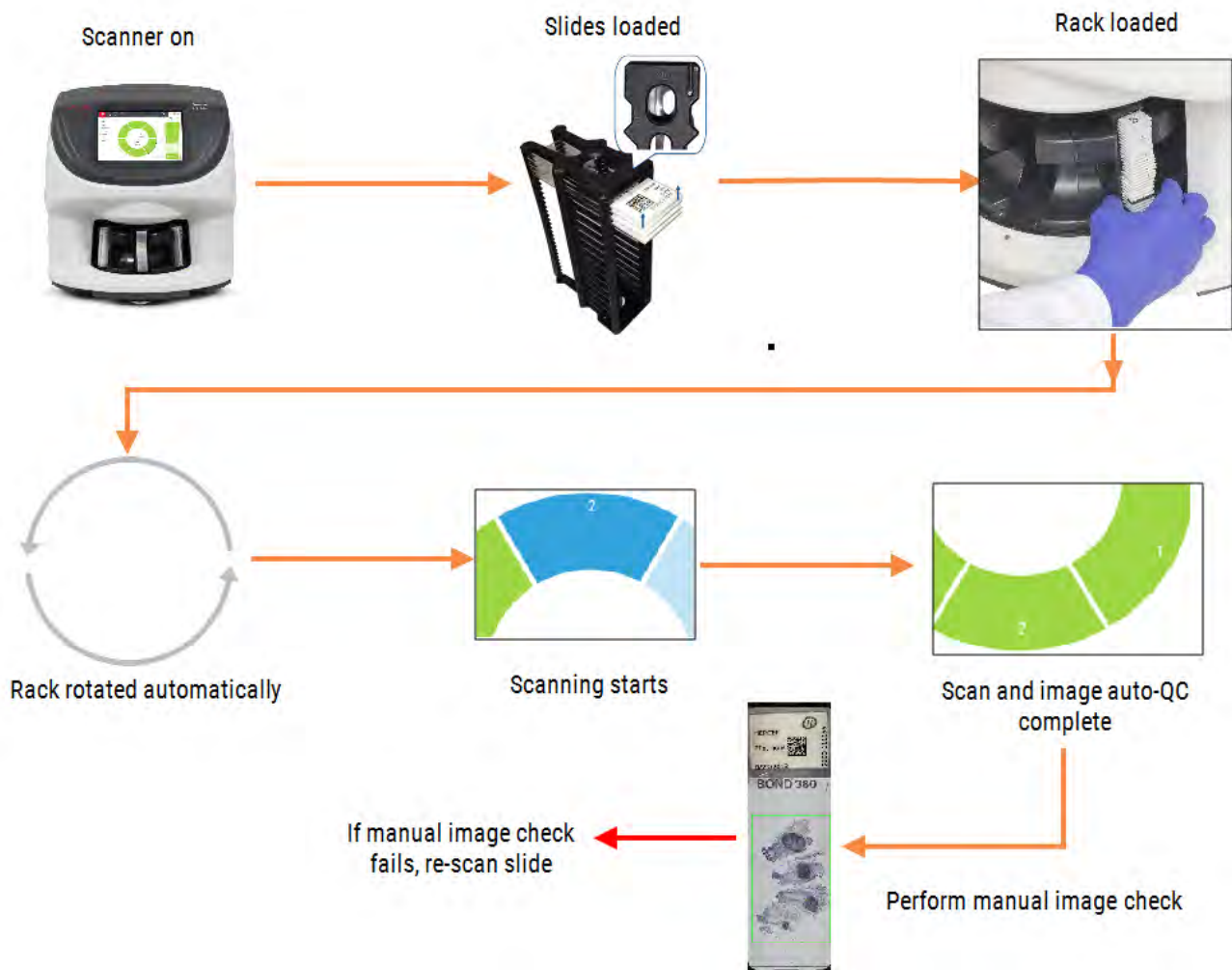
This chapter shows you how to scan slides.

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.

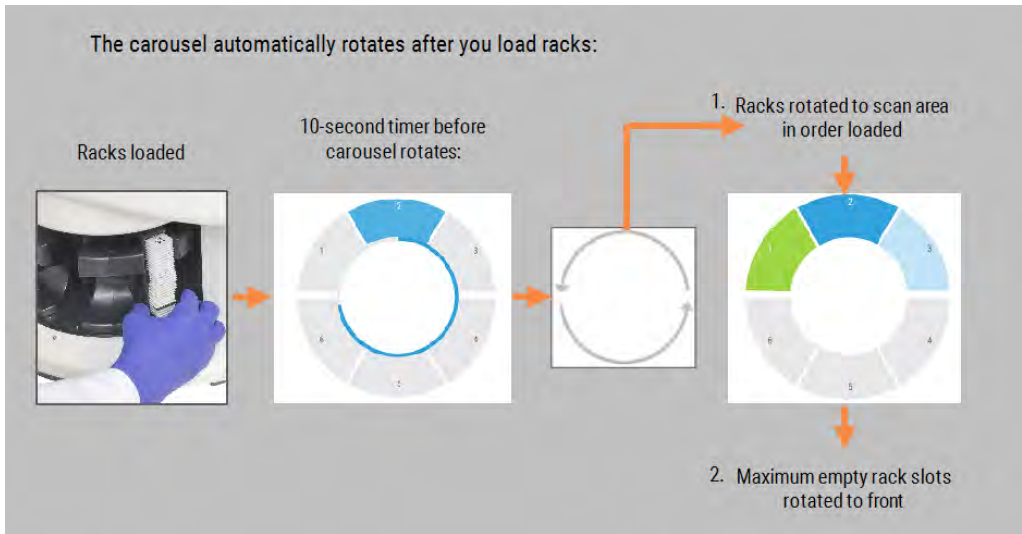
Scan workflow

The Aperio GT 180 DX scanner is a continuous load scanner. You can continually load new racks and unload completed racks, as shown below:



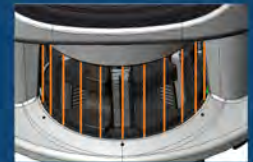
Carousel rotation

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



Safety light curtain

An infrared safety light curtain detects



If an object breaks

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



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



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 SAM DX 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**.



- 2 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.

- 1 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:

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



CAUTION: Use caution when loading slides into a rack to prevent improper slide orientation or damaged slides. Never use damaged slides in the scanner.



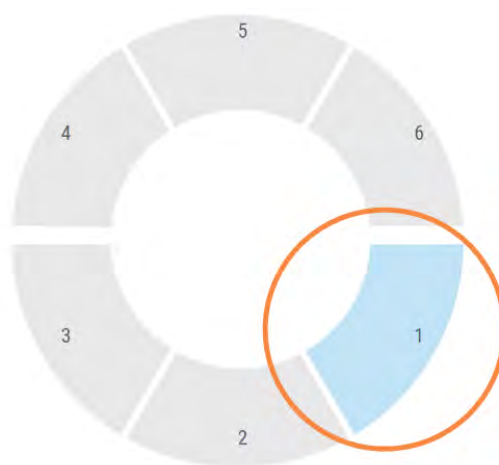
Load racks in the carousel

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 three 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: To prevent injury, keep hands away from the carousel and pinch point areas when the carousel is rotating. Never manually rotate the carousel unless you are performing maintenance and power is off to the scanner as discussed in [Chapter 5: Maintenance](#).

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



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

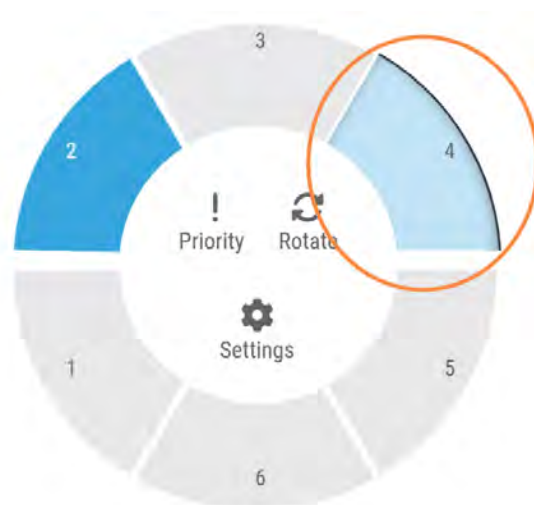
If the completed rack is in the back of the carousel, you can rotate it to the rack loading area. See [Rotate a rack to the rack loading area \(on page 53\)](#).

Priority scanning

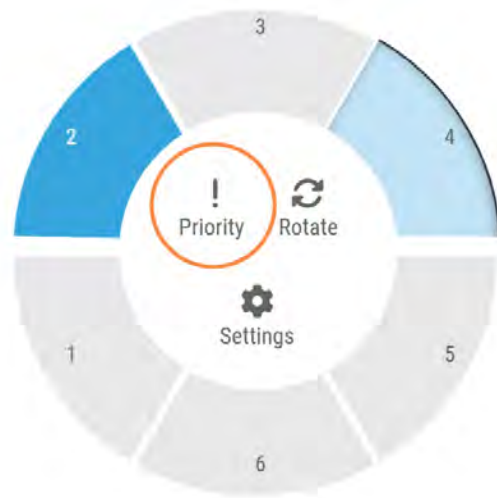
Use Priority to move a rack to the front of the scan queue. You can apply the Priority option on up to three racks at a time.

1. Tap the rack position.

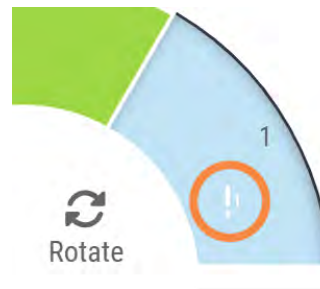
The Priority option appears when you select the rack position.



2. Tap **Priority**.



The priority icon and scan queue number appear on the rack position.



20x magnification scanning

You have the option to scan slides at 20x or 40x magnification, depending on the needs of your organization or specific project. This section contains instructions for performing rack-level scans at 20x or 40x magnification.

Your Aperio GT 180 DX scanner is initially set to scan all racks using 40x magnification. If you want this scanner to scan using 20x magnification by default, your administrator must turn on the DEFAULT TO 20X SCANNING option in Aperio SAM DX. For more information, see the *Aperio SAM DX IT Manager and Lab Administrator Guide*.

When scanning slides, you can override the default scan magnification using the rack settings on the scanner console.


Change the scan magnification for a rack of slides

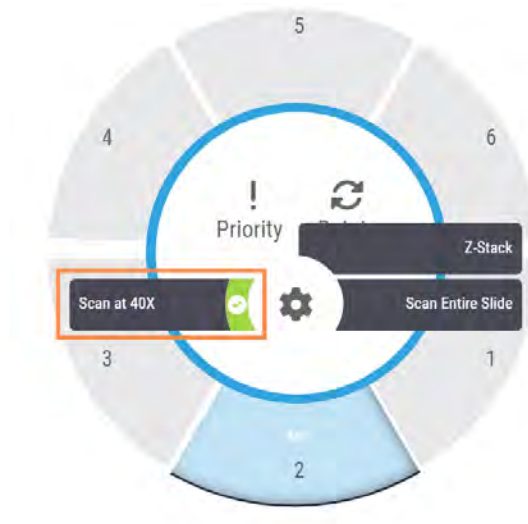
For each Aperio GT 180 DX scanner, your Lab Administrator has the option of changing the default scan magnification from 40x to 20x within the Aperio SAM DX software. This section shows how to override the default during scanning, and manually change the scan magnification for a rack of slides.

This procedure describes how to scan a rack of slides at 40x magnification, when the default scan magnification is set to 20x. (If the default scan magnification is set to 40x, use the same process to scan a rack of slides at 20x magnification.)

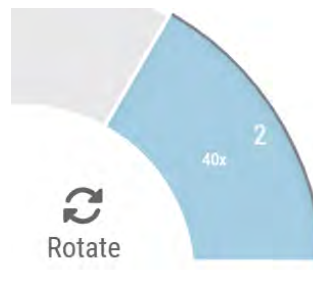
To scan a rack of slides at 40x when the scan magnification is set to 20x, follow these steps:

- 1 Load the rack with only the slides that you want to scan at 40x.
- 2 Tap the rack position that contains the slides you just loaded.

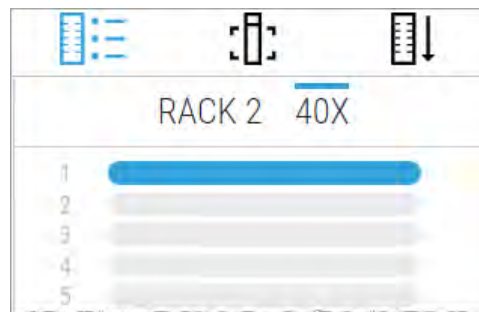
3 Tap **Settings** , and then tap **Scan at 40X**.



The **Scan at 40x** option is selected, and **40x** appears on the rack position.



During scanning, the Rack View indicates the scanner is scanning this rack at 40x magnification.



Z-Stack scanning

With the Z-Stack scanning feature, the scanner can create an image of multiple layers of the slide tissue scanned at different focal depths, creating a 3D composite multiplane image that you can visually navigate through much as a microscope user can navigate through different tissue focal depths by using the microscope objective fine and coarse adjustments. This ability to create a 3D image is called “z-stack” scanning.

Pathologists can review slide samples at varied “heights” using a software focus adjustment, comparable to the fine-focus knob of a conventional light microscope. The Z-Stack scanning feature is specifically useful in cytology and dermatopathology.

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

Scan a rack of slides using z-stack scanning

For each scanner in Aperio SAM DX, your Lab Administrator sets the default number of layers and the distance between layers (in microns) that are used for z-stack and extended focus scanning. You can adjust these settings on the scanner console for each rack of slides you scan.



Note the following when using Z-Stack scanning:


- Read through the entire procedure to familiarize yourself with the steps below before loading your rack in the scanner. When performing the procedure below, you must perform steps 2 and 3 in immediately after loading the rack in step 1 to ensure the scanner does not start scanning using the standard (non-z-stack) scanning process. If slides designated for z-stack scanning are scanned using the standard scanning process, the scanned images can appear out-of-focus. This may result in a misinterpretation of the whole slide image.
- The Auto Narrow Stripe feature is not used to scan z-stack images. If the Auto Narrow Stripe scanning feature is turned on in Aperio SAM DX, the system disables this feature during z-stack scanning.
- When using Z-stack scanning, the scan time and file size can increase, based on specified number of layers and the distance between layers.

To scan a rack of slides using z-stack scanning, follow these steps:

- 1 Load the rack with only slides that you want to scan as z-stack images. You should load slides of similar tissue types in the same rack. This is because you choose the number of layers to use depending on the type of tissue you are scanning.

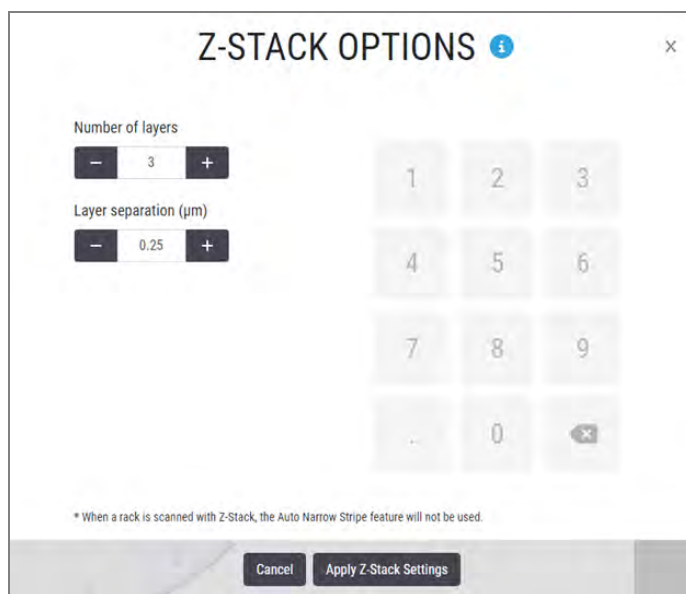


Perform steps 2 and 3 below immediately after loading the rack in step 1 to ensure the scanner does not start scanning using the standard (non-z-stack) scanning process.

- 2 Tap the rack position that contains the slides you just loaded.
- 3 Tap **Settings** , and then tap **Z-Stack**. (If your scanner has the optional Extended Focus feature installed, the setting will include "Z-Stack and Extended Focus".)

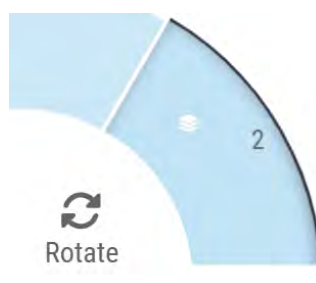


The Z-STACK OPTIONS screen appears with the default Number of layers and Layer separation (microns) that your Lab Administrator previously set in Aperio SAM DX. (If your scanner has the optional Extended Focus feature installed, then the Extended Focus options also appear on this screen.)

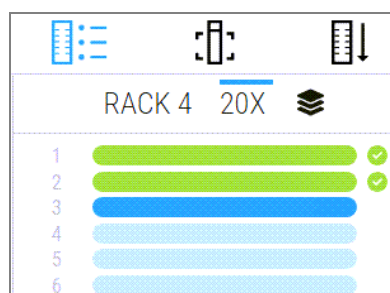


- 4 Follow these steps to adjust the z-stack scan settings for the rack you are scanning:
 - a To adjust the **Number of layers**, tap the **Minus** and **Plus** buttons until you reach the desired number of layers. You can also use the number pad to enter the desired values directly. Tap inside the **Number of layers** field to activate the keypad. (Note that the number of layers must be an odd number.)
 - b To adjust the **Layer separation**, tap the **Minus** and **Plus** buttons until you reach the desired number (in microns). As described in the step above, you can also use the number pad to enter the desired values directly.
- 5 Tap **Apply Z-Stack Settings** to start scanning the specified rack of slides.

After you tap **Apply Z-Stack Settings**, the Z-Stack icon  appears on the rack position.



During scanning, the Z-Stack icon  appears in Rack View to indicate the scanner is scanning this rack using the z-stack process.



View z-stack images

To view the 3-dimensional z-stack images, you must use a digital slide viewer that supports z-stack viewing, such as Aperio WebViewer DX (versions 1.2 and later), Aperio ImageScope, or a viewer of your choice that supports z-stack viewing.

Extended Focus scanning

The optional Extended Focus feature enables you to scan a slide to generate a single composite image with optimized focus and a greater depth of field than an image of a scanned single layer or any single layer in a set of z-stack images.

The Extended Focus process uses scanned z-stack layers to achieve optimal focus on the entire depth of the tissue. The Extended Focus process identifies the optimally focused areas across the z-stack layers and fuses those layers into a single, composite image. This feature is particularly useful in applications where it is preferable to view all cells in focus in a single-layer image.

An extended focus image has a smaller file size than the set of z-stack images from which it is generated. This smaller file size helps increase file transfer speed during collaborative activities, and also requires less storage space.

The single composite image file can be compatible in external image analysis software algorithms when a set of z-stack layers might not be.

Similar to the z-stacking feature, you set Extended Focus for an entire rack of slides.

To use the Extended Focus feature, you must have the Extended Focus option installed on your scanner.

Scan a rack of slides using Extended Focus

For each scanner in Aperio SAM DX, your Lab Administrator sets the default number of layers and the distance between layers (in microns) that are used for z-stack and extended focus scanning. You can adjust these settings on the scanner console for each rack of slides you scan using the Extended Focus feature.



WARNING: Read through the entire procedure below to familiarize yourself with the steps before loading your rack in the scanner. When performing the procedure below, you must perform steps 2 and 3 immediately after loading the rack in step 1 to ensure the scanner does not start scanning using the standard (non-z-stack) scanning process. If slides designated for extended focus scanning are scanned using the standard scanning process, the scanned images can appear out-of-focus. This may result in a misinterpretation of the whole slide image.


To scan a rack of slides using the Extended Focus feature, follow these steps:

- 1 Load the rack with only slides that you want to scan as extended focus (EF) images. You should load slides of similar tissue types in the same rack. This is because the number of layers and the distance between the layers you choose for Extended Focus are applied to all the slides in the rack. The settings you use depend on the type of tissue you are scanning.



Perform steps 2 and 3 below immediately after completing loading the rack in step 1 to ensure the scanner does not start scanning using the standard (non-z-stack) scanning process.

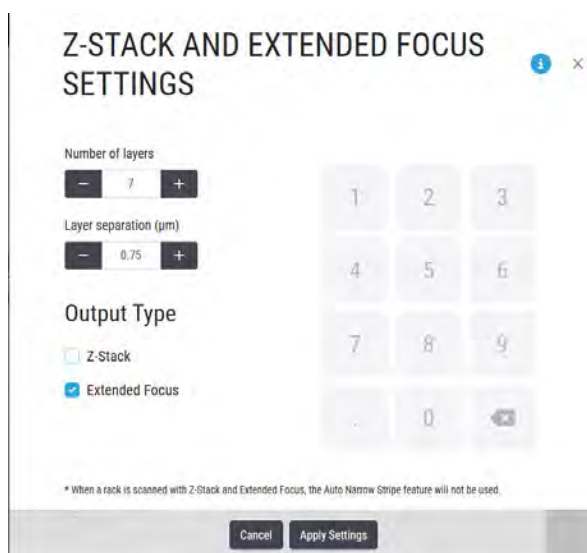
- 2 Tap the rack position that contains the rack of slides you just loaded.

- 3 Tap **Settings** , and then tap **Z-Stack and Extended Focus**.

Extended Focus appears as an option only if the Extended Focus feature is installed on your scanner.



- 4 The Z-STACK AND EXTENDED FOCUS SETTINGS screen appears with the default Number of layers and Layer separation (in microns) that your Lab Administrator previously set in Aperio SAM DX.

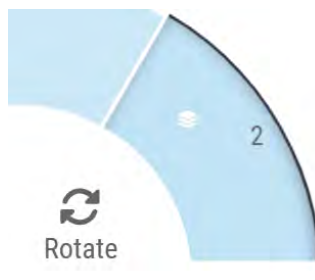



- 5 Follow these steps to adjust the Z-STACK AND EXTENDED FOCUS SETTINGS for the rack of slides you are scanning:
- To adjust the **Number of layers**, tap the **Minus** and **Plus** buttons until you reach the desired number of layers. You can also use the number pad to enter the desired values directly. Tap inside the **Number of layers** field to activate the keypad. (Note that the number of layers must be an odd number.)
 - To adjust the **Layer separation**, tap the **Minus** and **Plus** buttons until you reach the desired number (in microns). As described in the step above, you can also use the number pad to enter the desired values directly.

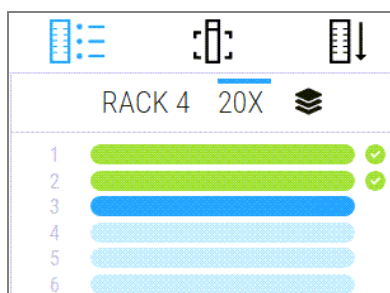
- 6 Under **Output Type**, select **Extended Focus** if it is not already selected. (Your Lab Administrator may have already set this option as a default in Aperio SAM DX.) Note that Extended Focus image file names are appended with "_EF."

To generate both a z-stack image and an extended focus image, you can also select **Z-Stack**.

- 7 Tap **Apply Settings** to start scanning the specified rack of slides.
- 8 After you tap **Apply Settings**, the **Z-stack** icon appears on the rack position.



During scanning, the Z-stack icon  appears in Rack View to indicate the scanner is scanning this rack using the z-stack process.

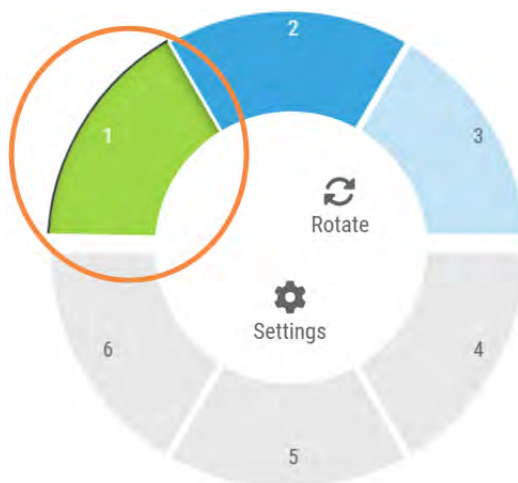


Rotate a rack to the rack loading area

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.

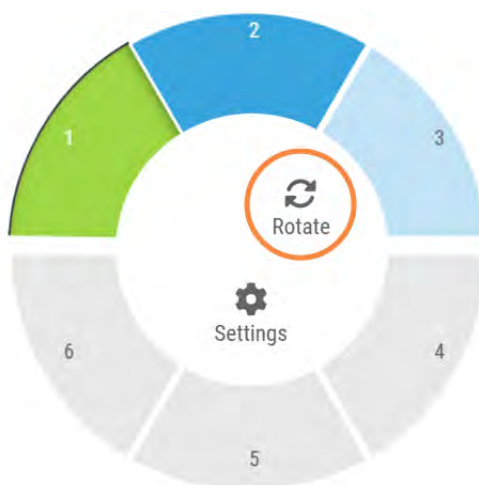
To rotate a rack to the rack loading area:

- 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



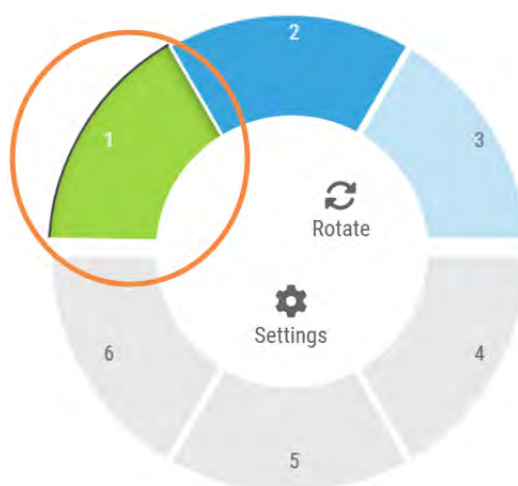
CAUTION: Use caution when unloading racks from the carousel and when unloading slides from a rack to prevent damaged slides or operator injury. Never use damaged slides in the scanner.

To unload racks from the carousel:

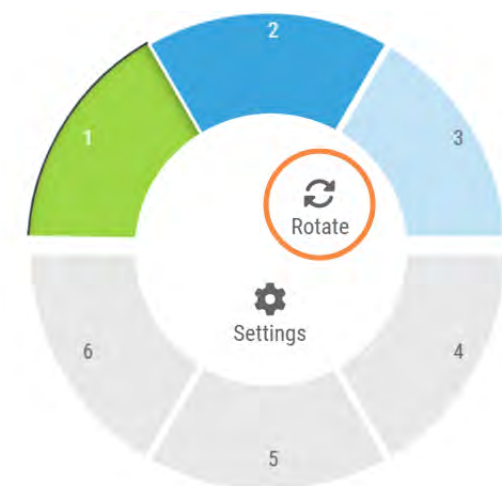
- 1 Make sure all the slides in the rack were successfully scanned (the rack status is green). If the rack status is orange, see [Rack warnings \(on page 59\)](#).
- 2 If the rack is in the loading area, carefully remove the rack from the rack slot.



- 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**.



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.



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 Rack warnings (on page 59) .
	Priority	The rack is set for priority scanning. See Priority scanning (on page 43) .

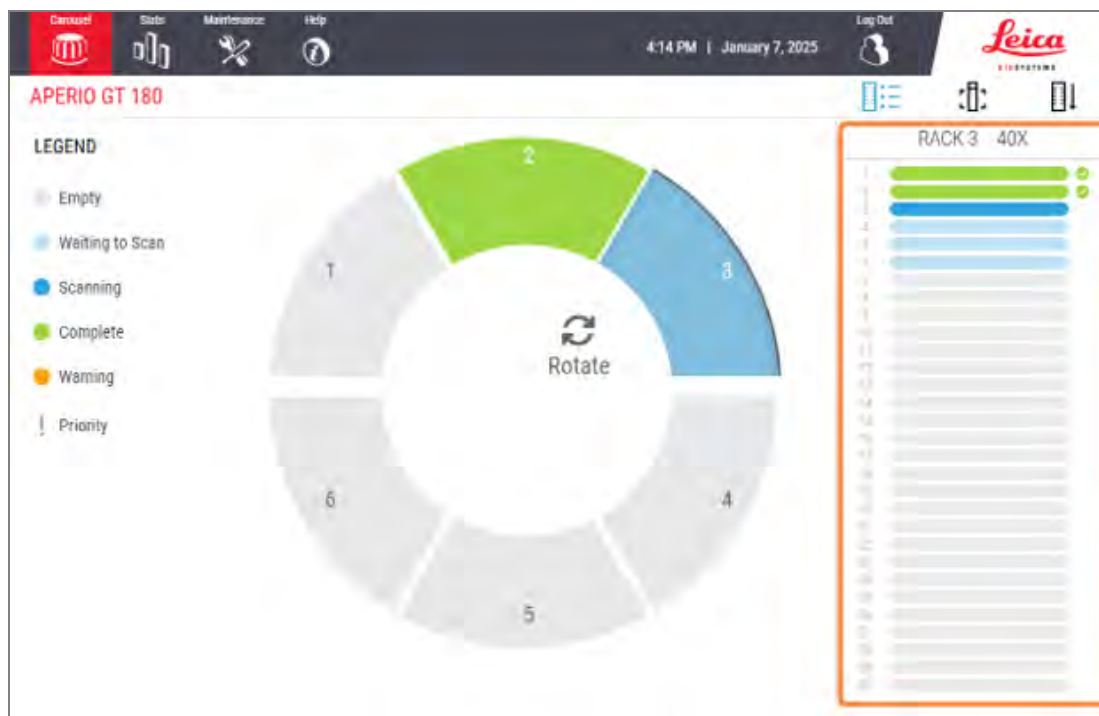
Rack error on current scan

If there is an error on at least one slide in the rack that is currently scanning, the rack position pulses blue and orange. See [Rack warnings \(on page 59\)](#).








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.






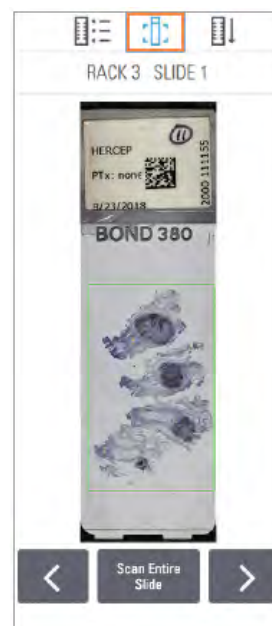
Slide status colors correspond to the Legend:

	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 Rack warnings (on page 59) .
	The slide scanned successfully, passed image QC, and was transferred to the specific image location.
	The slide has a scan warning. See Rack warnings (on page 59) .


View macro images of scanned slides

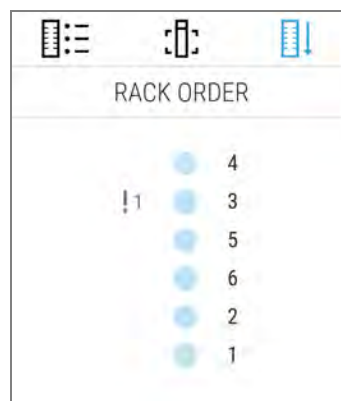
To view a macro image of a scanned slide:

- 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 \(on page 120\)](#).



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.

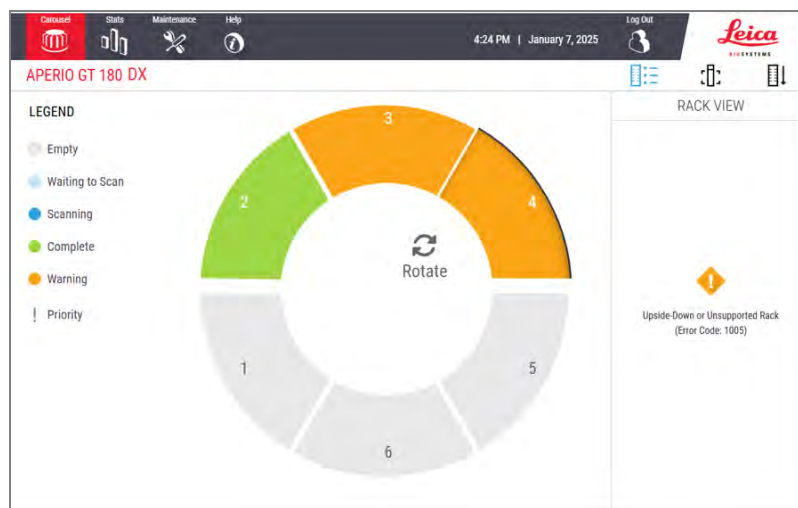


Rack warnings

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 \(on page 119\)](#).

- 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:

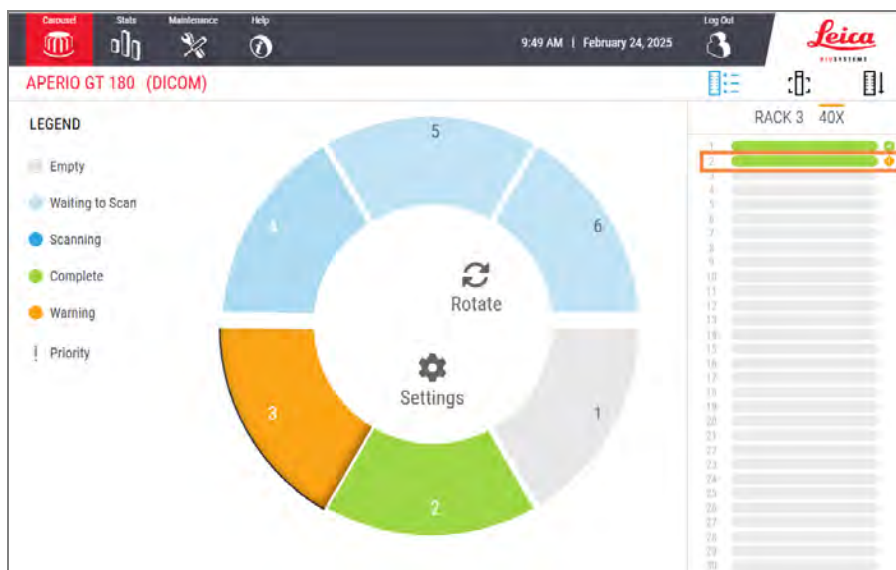
 The scanner created an image, but there is an error.

 An error prevented the scanner from creating an image.

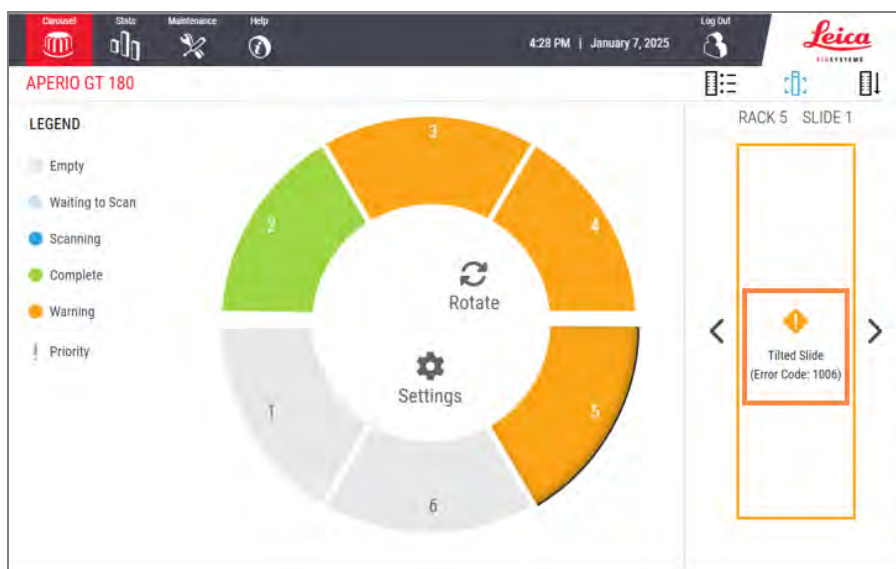
An error occurred when transferring an image to the designated storage location

A barcode is missing or invalid. (This issue only occurs if the Aperio SAM DX is configured to require barcodes.)

In the example below, slide 7 in the selected rack 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 \(on page 120\)](#).

Scan entire slide for whole rack

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

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



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



Image quality control for histotechnicians and pathologists

After scanning slides, it is important to review the digital slides to make sure the images are of good quality. Ultimately, it is up to the pathologist to look at digital slides to verify they are of sufficient quality to perform their task. In addition, scanner operators should verify digital slide quality after scanning.



The pathologist must verify that the label displayed on the digital slide is correct for that slide image based on the patient case being viewed. If it is not correct, the pathologist should request the slide to be rescanned.

The quality criteria that are important for primary diagnosis and should be verified by scanner operators are:

- that the entire tissue sample has been scanned, and;
- that the tissue is in focus.

Aperio scanners provide a macro image, a low resolution image of the entire slide, that also provides a green outline of the scanned image. Check that image for the quality criteria mentioned above. (For more details, see the next section, [Check that the scanned image covers all slide tissue.](#))

Re-scan any slides that failed to scan or failed the image quality review.

For additional image quality assessment instructions, refer to the user guide for your viewer.

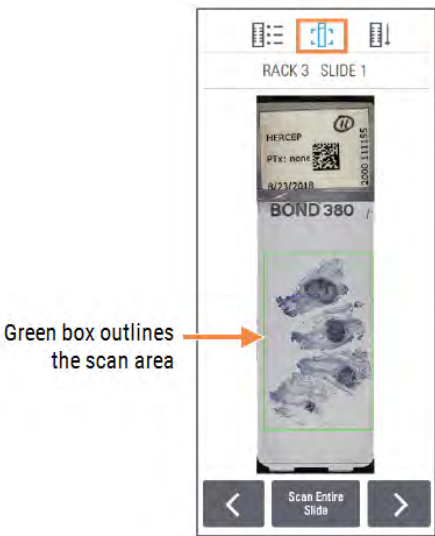


Check that the scanned image covers all slide tissue

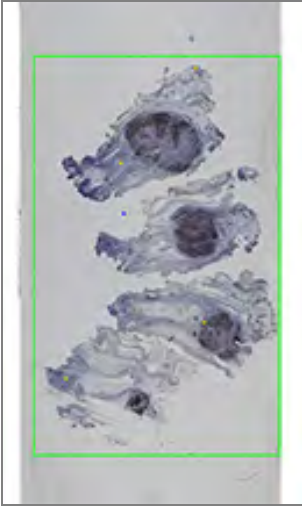
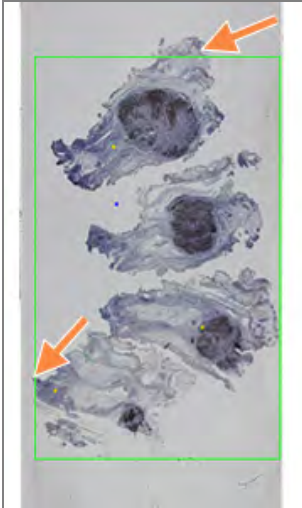
The steps below describe how to check that the scanned image covers all of the slide tissue.

- 1 Tap the rack position on the touchscreen interface that contains the slide images you want to review.
- 2 In the right pane of the touchscreen interface, tap the **Slide View** icon to view the individual scanned images for the selected rack. (Tap and to navigate through the slides in the rack. You can view slide images only after the scanner has completed scanning the slide.)

3 The green box on the macro image indicates the scan area, as shown below.



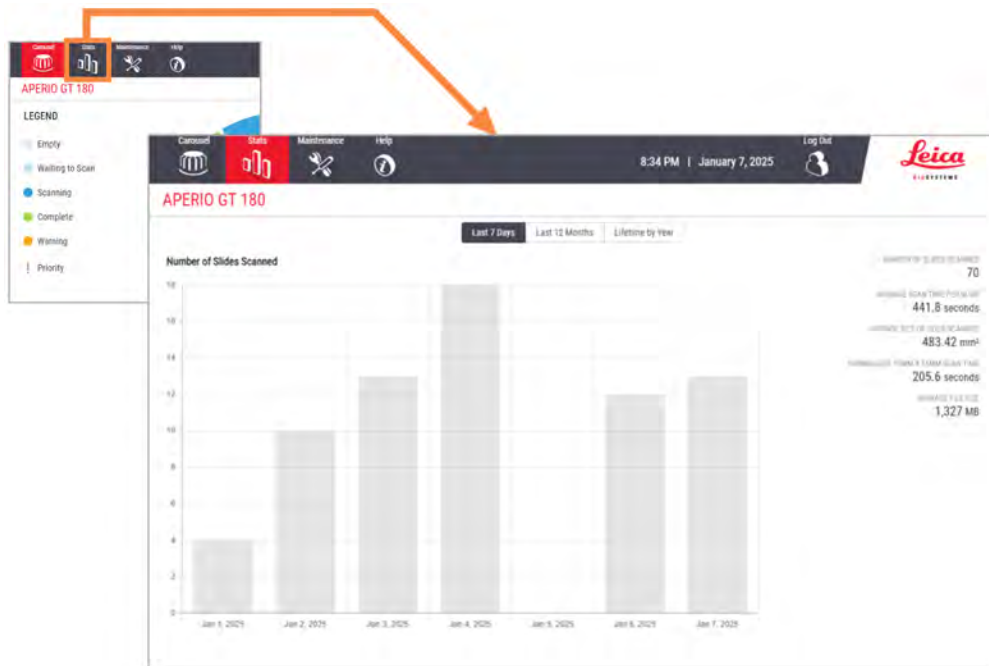
4 Visually check the macro image to ensure all of the tissue is inside the scan area. Tissue that extends outside of the scan area is not included in the scanned image.

Tissue is within the scan area	Tissue is outside the scan area
In the example below, all of the tissue is inside the scan area. This means all of the tissue is included in the scanned image.	In the example below, tissue extends outside the scan area. This means some tissue is not included in the scanned image.
	

5 If any tissue is outside the scan area, you can tap **Scan Entire Slide** to rescan the whole slide. If your scanner has the optional Manual Scan feature, tap **Manual Scan** to adjust the scan area. For more details, see [Manual Scanning \(on page 65\)](#)

Scan statistics

The Aperio GT 180 DX scanner 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**.



Manual Scanning

If a scanned image has certain image quality issues, sometimes the best resolution is to re-scan the slide using a manual process. The optional Manual Scan feature enables you to manually adjust the scan settings using the macro image from the automated scan, and then re-scan a single slide without removing the slide from the scanner.

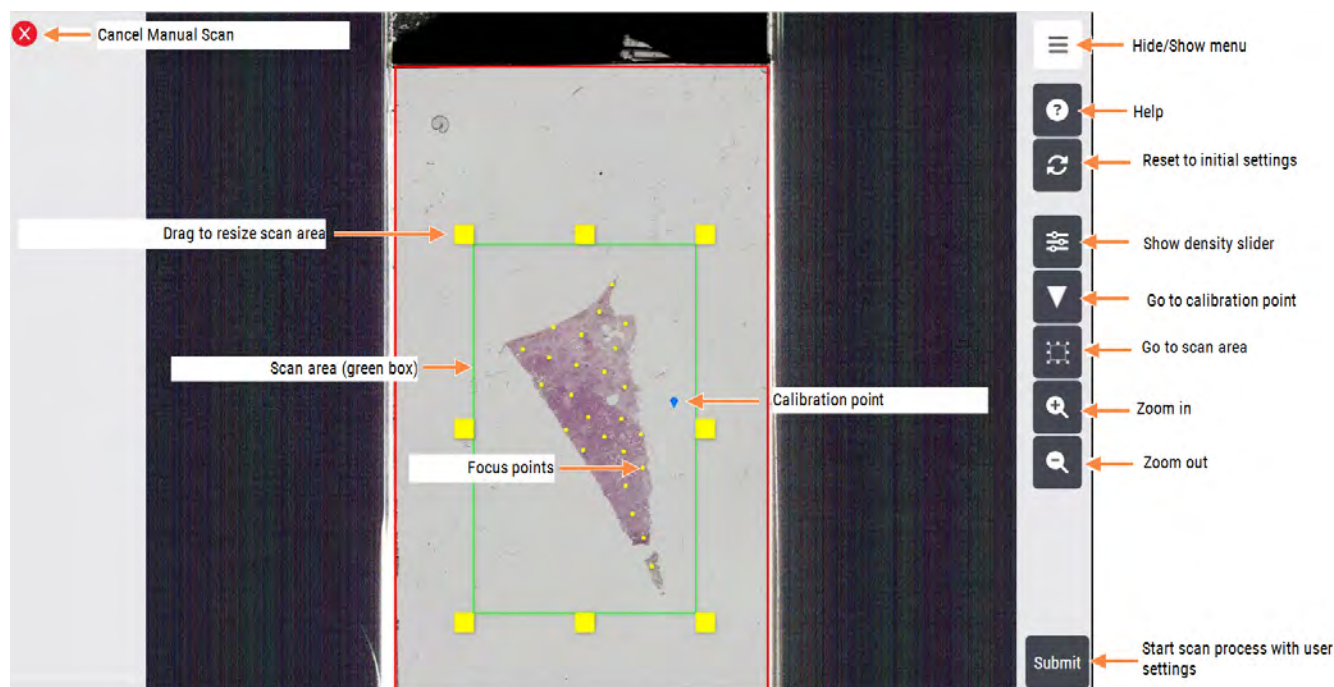
Manual Scan overview

You access the Manual Scan settings from the Slide View, which shows the macro image from the automated scan. The Manual Scan feature enables you to:

- Adjust the bounding box that defines the scan area.
- Add or remove focus points.
- Verify that the calibration point is positioned correctly, and re-position it if needed.
- Zoom into the macro image of the slide to access potential problem areas.

Manual Scan user interface

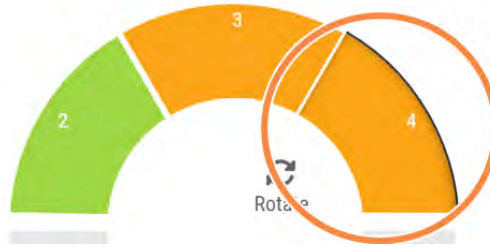
The example below shows the features of the Manual Scan user interface.



Use Manual Scan to resolve an image quality issue

If the scanner indicates a slide image has a quality issue, follow these steps to manually re-scan the slide:

- 1 On the touchscreen, tap the rack position that has the error.



- 2 Tap the **Rack View** icon to view the list of slides in the rack.



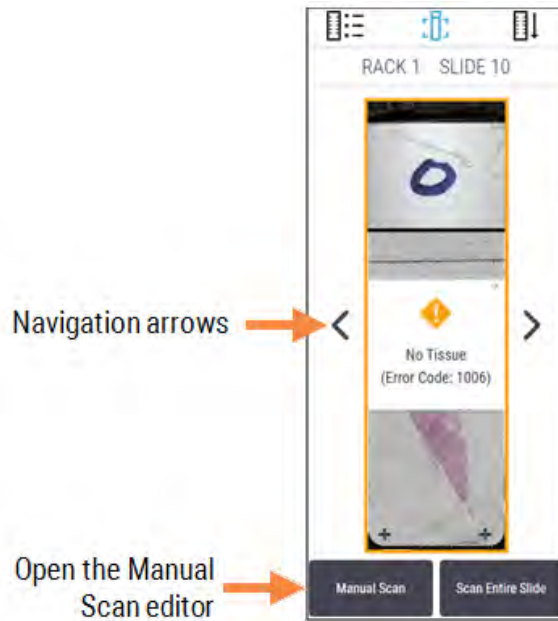
Any slides with scan issues are colored orange, as shown below.

RACK 1 40X	
1	Green bar with checkmark
2	Grey bar
3	Green bar with checkmark
4	Green bar with checkmark
5	Grey bar
6	Grey bar
7	Grey bar
8	Grey bar
9	Grey bar
10	Orange bar with diamond icon
11	Grey bar
12	Green bar with checkmark
13	Grey bar
14	Green bar with checkmark

- 3 Tap the **Slide View** icon.

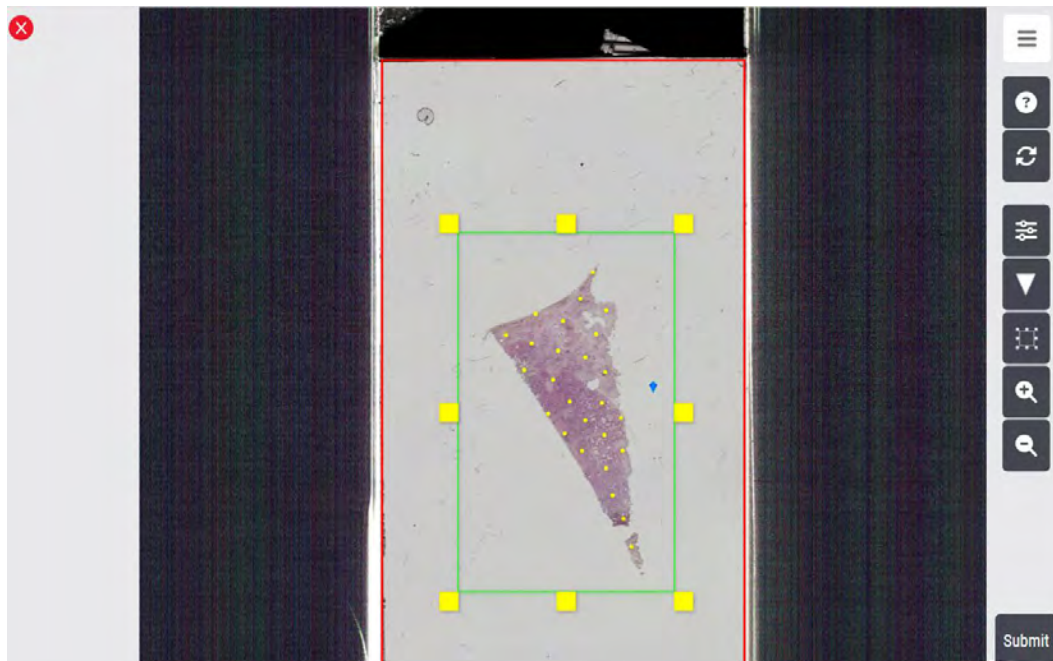


The macro image for the first slide in the rack appears.



- 4 Tap the left or right navigation arrow (shown above) to display the problem slide, and then tap **Manual Scan**.

The Manual Scan settings for the image open in the scanner console.



- 5 Adjust the Manual Scan settings as needed, using the instructions in the following table. Refer to [Manual Scan user interface \(on page 65\)](#) as needed.

To do this:	Follow these steps:
Adjust the scan area	<div style="display: inline-block; vertical-align: top; margin-right: 10px;"> </div> <p>WARNING: When adjusting the scan area, ensure all tissue is included inside the green bounding box. Tissue that is outside of the green bounding box will not appear on the scanned image. Missing tissue may result in a misinterpretation of the whole slide image.</p> <p>Drag any corner of the green bounding box to move or re-size the box to the desired position. Only the tissue inside the scan area is included in the scanned image.</p> <p>When you adjust the scan area, the system recalculates the number of focus points.</p>
Add or remove focus points	<div style="display: inline-block; vertical-align: top; margin-right: 10px;"> </div> <p>WARNING: Use care when manually adjusting the number and position of focus points, as the focus points affect the clarity of the scanned image. If there are insufficient focus points or if they are improperly placed, the scanned image can appear out-of-focus. This may result in a misinterpretation of the whole slide image.</p> <p>The yellow dots in the scan area are focus points. The scanner calculates the number of focus points to present for use depending on the specified scan area.</p> <p>Add or remove focus points in the following ways:</p> <ul style="list-style-type: none"> • Tap to open the Focus Point Density slider. Drag the Focus Point Density slider left for fewer focus points, and right for more focus points. <div style="text-align: center; margin: 10px 0;"> </div> <ul style="list-style-type: none"> • Tap a focus point to delete it. (There must be a minimum of three focus points for a slide.) • Double-tap an area to add a focus point. • Drag to move a focus point to a new position.

To do this:	Follow these steps:
Locate and verify the placement of the calibration point	<div style="text-align: center;"> </div> <p>WARNING: Ensure the calibration point (the blue diamond) is placed on a clear area of the slide that does not contain tissue and that is under the coverslip. If necessary, click the Focus View on Calibration Point button to bring the calibration point into view. If the calibration point is placed over tissue or slide artifacts, striping can appear on the scanned image. This may result in a misinterpretation of the whole slide image.</p> <p>To verify the calibration point:</p> <ol style="list-style-type: none"> 1 Click the Focus View on Calibration Point button to bring the calibration point (the blue diamond) into view. 2 Ensure the calibration point is on a clear area of the slide that does not contain tissue and that is under the coverslip. (Note that the calibration point can be located outside the bounding box of the scan area.) 3 If necessary, drag it to a new position.
Zoom in or out for a different view of the macro image	Pinch-to-zoom or tap the Zoom In and Zoom Out buttons to adjust the view of the image.
Zoom to the scan area	Tap the Focus View on Scan Area button to bring the scan area into view. Tap the button again to return to the full view.
Reset to the default scan settings	<div style="text-align: center;"> </div> <p>WARNING: Ensure the Manual Scan settings are configured according to your requirements before continuing with the scan. Tapping the Reset to Default Settings button erases your scan settings and returns the settings to their default state. This may result in a misinterpretation of the whole slide image.</p> <p>Tap the Reset to Default Settings button to erase your changes and return to the default settings, as determined by the scanner's tissue finder.</p>

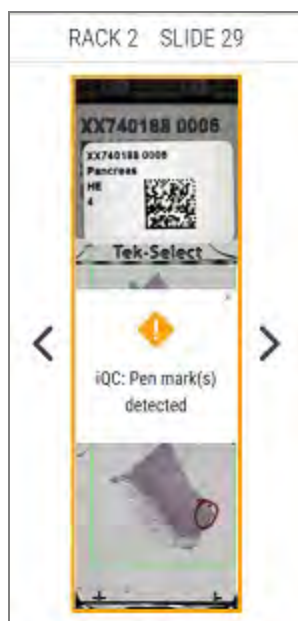
- 6 When you are satisfied with your settings, tap **Submit**. The rack is added to the scan queue, with the manual scan settings applied to designated slide.



You can prioritize the rack in the scan queue by following the instructions in [Priority scanning \(on page 43\)](#)

Aperio iQC DX Software Notifications

The Aperio iQC DX Software is a standalone software application intended to assist in identifying artifacts in whole slide images (WSIs) produced by the Aperio GT 180 DX scanner. If the Aperio iQC DX Software identifies any specified artifacts on the scanned image, the rack status indicates an error and a message appears within the Slide View on the scanner's console, as shown in the example below.



Your IT Administrator sets up the communication between your Aperio GT 180 DX scanner and the Aperio iQC DX Software. For more details, see the *Aperio SAM DX IT Manager and Lab Administrator Guide* and the *Aperio iQC DX Software IT Administrator's Guide*.

For instructions on using the Aperio iQC DX Software, see the *Aperio iQC DX Software User's Guide*.

5

Maintenance

This chapter contains a maintenance schedule and procedures for maintaining your Aperio GT 180 DX scanner.

Call Leica Biosystems Technical Services if you cannot perform a maintenance routine or if you discover a problem with your scanner.

Before performing maintenance, we recommend you watch the maintenance videos available on the touchscreen. See [Help videos and guides \(on page 26\)](#).



CAUTION: It is important that you perform the maintenance procedures listed below on a regular schedule. Not doing so could result in scanner misalignment which could impair image quality.

In this section:

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Recommended daily maintenance	77
Six month maintenance	82
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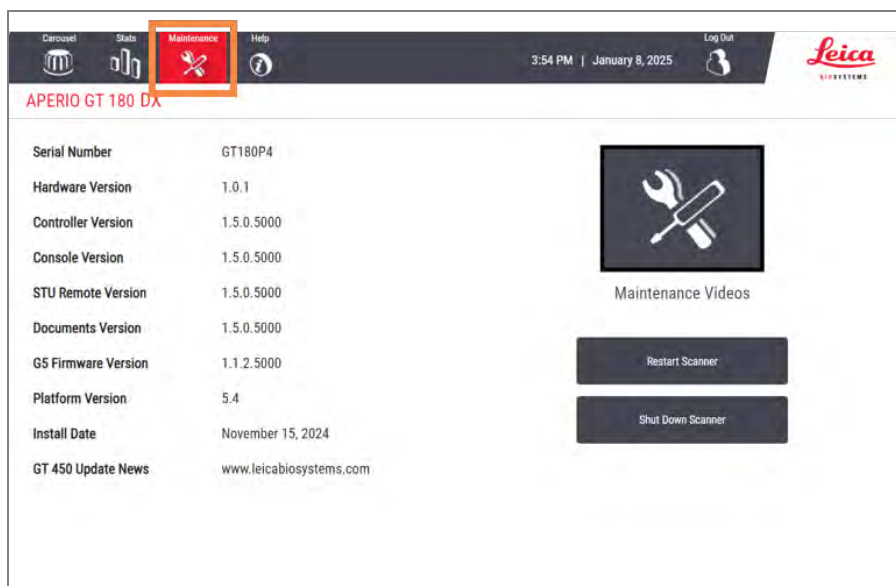
Maintenance schedule

To keep your Aperio GT 180 DX scanner in optimal working condition, follow these maintenance routines.

Frequency	Maintenance Task	Procedure
Daily (Recommended)	Restart the scanner.	Restart the scanner (on page 77)
	Inspect the Stage Slide Tray	Inspect the stage slide tray (on page 78)
	Inspect the Pusher/Puller	Inspect the pusher/puller (on page 80)
Every Six Months	1 Clean the objective and Koehler	Clean the objective and Koehler (on page 82)
	2 Clean the stage slide tray	Clean the stage slide tray (on page 86)
	3 Clean the carousel	Clean the carousel (on page 87)
	4 Clean the slide racks	Clean the slide racks (on page 90)
	5 Clean the fan filter	Clean the fan filter (on page 89)
	6 Clean the touchscreen	Clean the touchscreen (on page 91)
	7 Clean the scanner cover	Clean the scanner cover (on page 90)
Once a year	Schedule annual maintenance visit by Leica Biosystems Technical Services.	Call Leica Biosystems Technical Services.

Serial number and firmware version

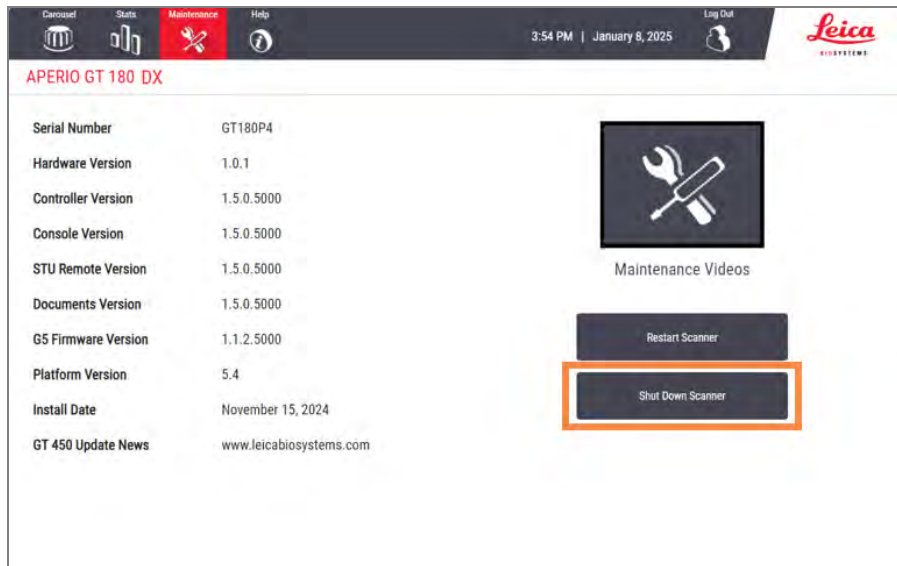
You need the serial number and current software version if you call Leica Biosystems Technical Support. Tap **Maintenance** on the touchscreen interface to view the serial number, firmware version, and other system information.



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.



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 \(on page 74\)](#).
- 2 Grasp the cover using the handhold indentations:

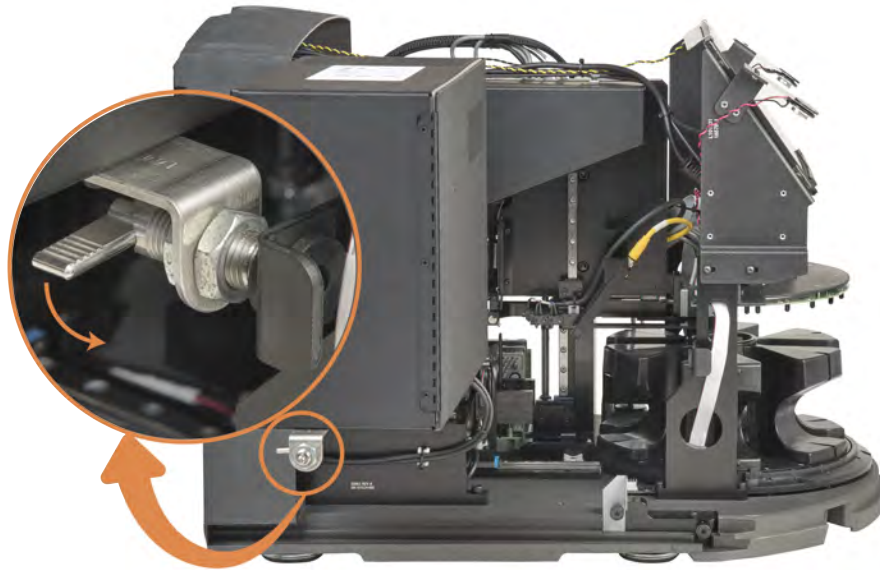


- 3 Slide the cover out and lift it off. Remove the cover fully and set it aside.



CAUTION: The scanner cover is fragile and prone to damage if mishandled. Store it only in a location away from foot traffic while it is not installed.

- 4 Rotate the VPU latch 180 degrees, 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.
- 7 When you are ready to close the VPU and slide the cover back into place, following the instructions in [Restart the scanner after interior maintenance \(on page 92\)](#).

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.

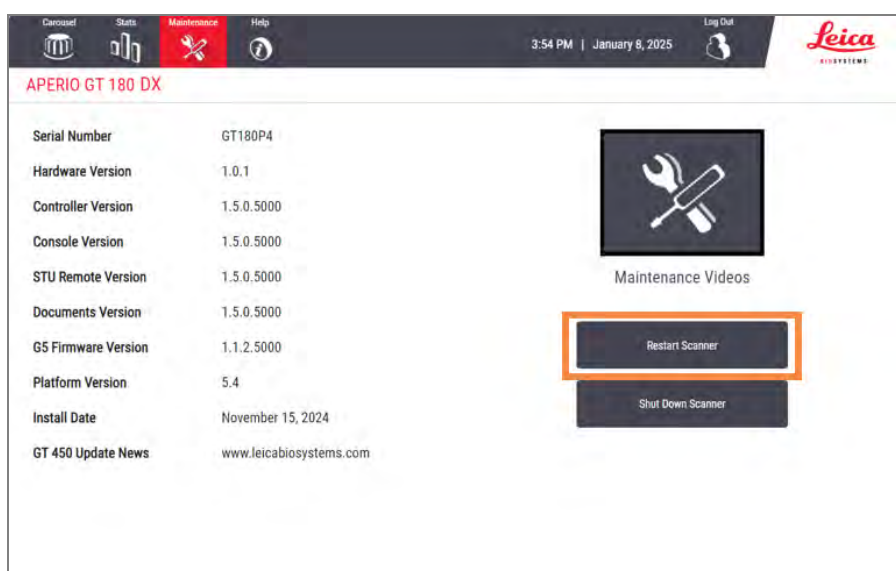


CAUTION: Restarting the scanner with a slide on the stage may damage the slide.

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.

From the touchscreen interface, tap **Maintenance** and tap **Restart Scanner**.



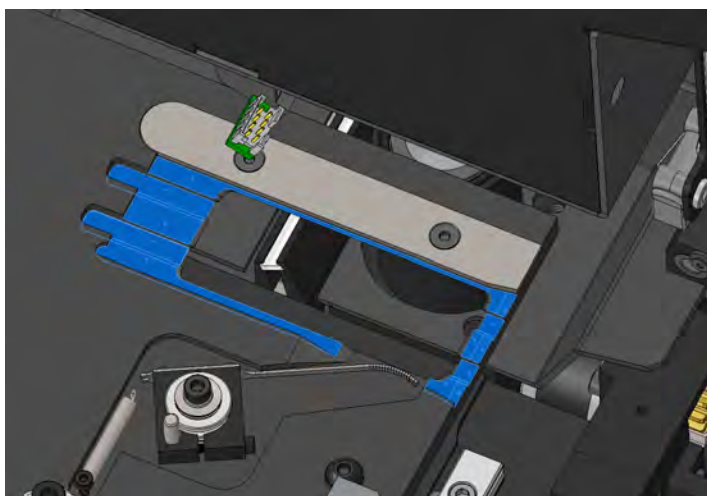
You can use the scanner again after initialization is complete and the Home screen appears.

Inspect the stage slide tray

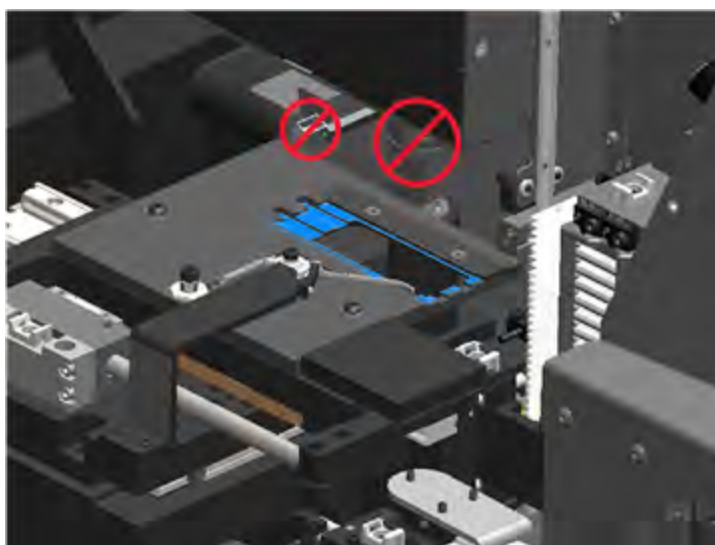
- **Frequency: daily**, and as needed to resolve a scanner issue.

Perform a visual inspection daily. Clean the slide tray if you observe debris.

- 1 Ensure there are no slides scanning and the touchscreen interface does not display any errors.
- 2 Open the scanner interior. For instructions, see [Open the scanner cover and access the interior components \(on page 75\)](#).
- 3 Visually inspect the stage slide tray (shown in blue). If you see debris on the slide tray, clean it using a plastic scraper or edge of a blank glass slide, removing any mounting, debris, or high points.



The stage slide tray is not removable. When cleaning it in place, do not bump the LED or objective (highlighted in red):



- 4 Gently wipe the slide tray from back to front with a lint-free cloth.



CAUTION: Do not use solvents such as xylene and toluene to clean the stage slide tray, as these solvents can damage the stage, lens coatings, wiring, and other internal components. Using such chemical solvents may also cause issues with the stage coating, resulting in loading or focusing errors during the scanning process.

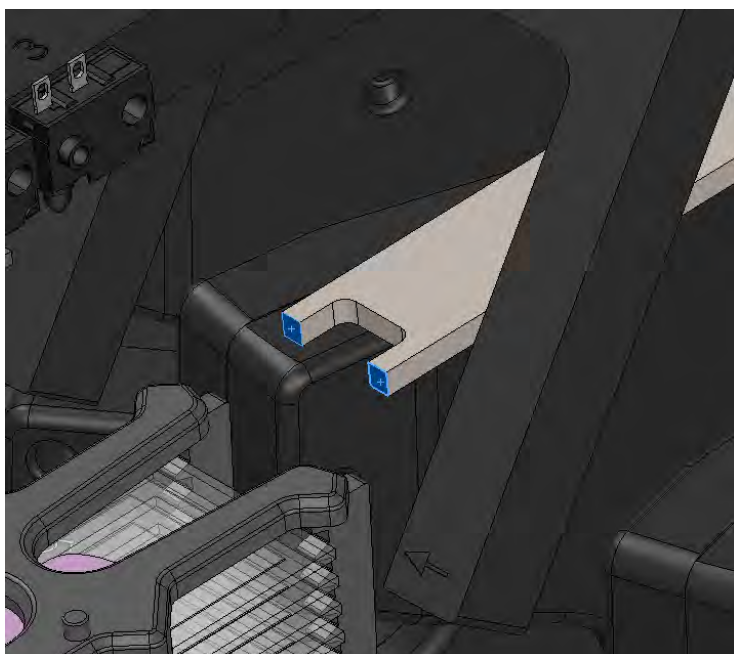
- 5 Wipe the slide tray again from back to front using a microfiber cloth. If necessary, use a gentle solvent such as denatured alcohol to remove any remaining residue. (To order a cleaning kit for this purpose, contact your Leica Biosystems representative.)

Inspect the pusher/puller

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

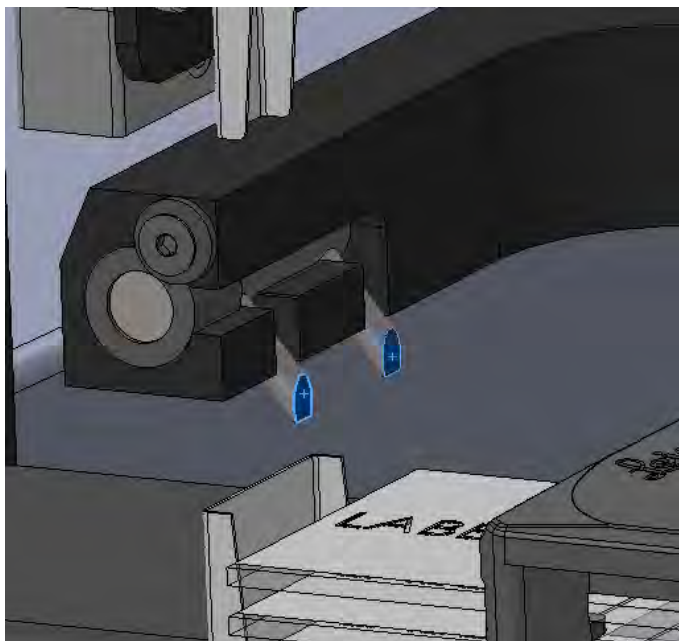
Visually inspect the pusher and puller assemblies. If you see debris on surfaces that contact the slide, clean the pusher and puller.

- 1 Ensure there are no slides scanning and the touchscreen interface does not display any errors.
- 2 Open the scanner interior. For instructions, see [Open the scanner cover and access the interior components \(on page 75\)](#).
- 3 Inspect the pusher contact surfaces (shown in blue):



- 4 If the pusher contact points contain debris, wipe them using a plastic scraper or edge of a blank glass slide, removing any mounting, debris, or high points.
- 5 Use a lint-free cloth or alcohol wipes to clean the surfaces.

- 6 Inspect the puller contact surfaces (shown in blue):



- 7 If the puller contact surfaces contain debris, wipe them using a plastic scraper or edge of a blank glass slide, removing any mounting, debris, or high points.
- 8 Use a lint-free cloth or alcohol wipes to clean surfaces.

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

As stated in the previous "CAUTION," use only the cleaning product specified below to clean the objective and Koehler. Using other products, including fiber-reinforced paper towels or other paper products, may leave debris deposits that can affect image quality.

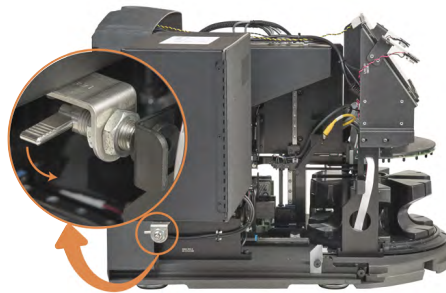
- Texwipe TX404 Absorbond Synthetic Wipers (lens cleaning wipes made of lint-free microfiber)
- Laboratory gloves

To clean the objective and Koehler:

- 1 Ensure the scanner is turned off. (For instructions, see [Turn the scanner on and off \(on page 23\)](#).)
- 2 Open the cover and access the interior:
 - a Open the scanner cover. Remove the cover and set it aside.



- b Rotate the VPU latch.

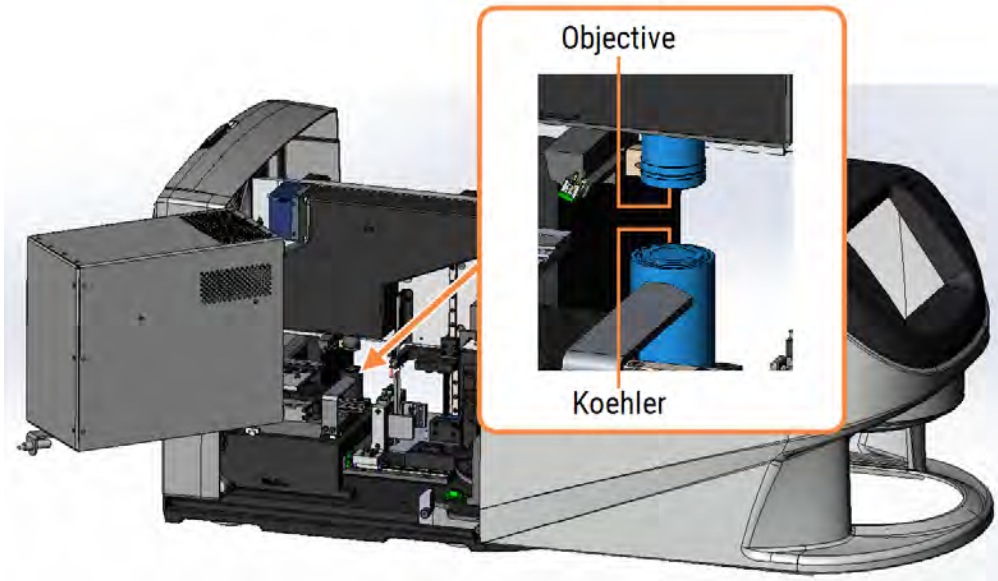


- c Pivot out the VPU.



For detailed steps, see [Open the scanner cover and access the interior components \(on page 75\)](#).

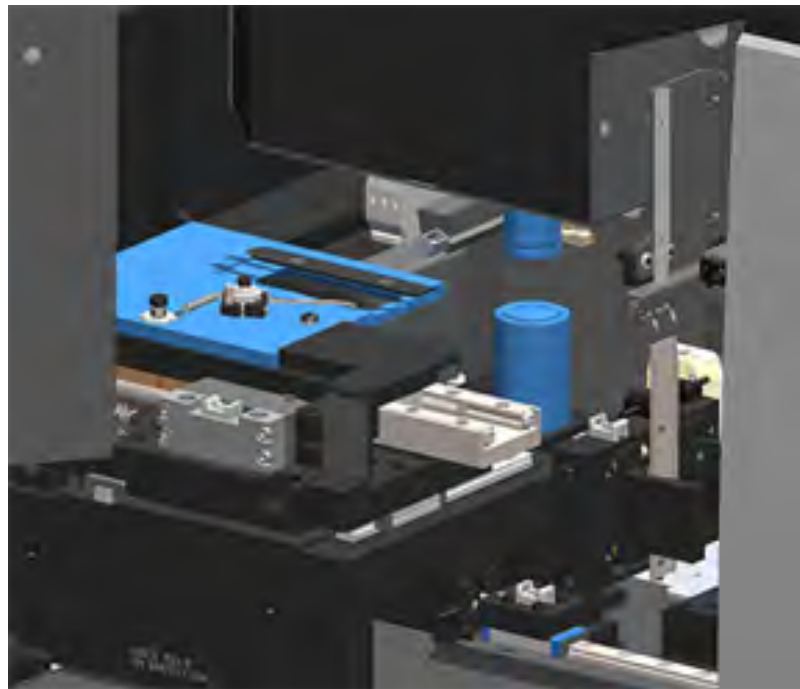
- 3 The objective and Koehler are shown below in blue:



- 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.

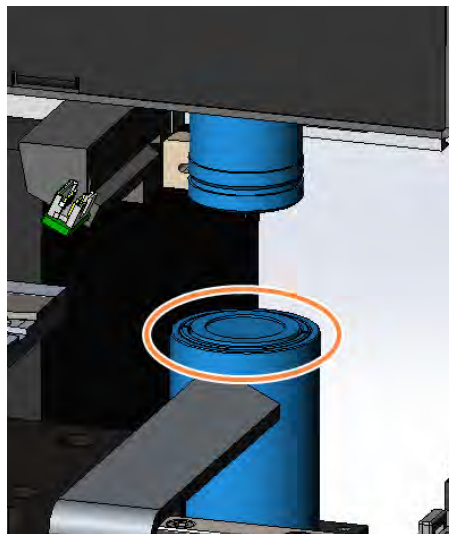


- 5 Wear gloves when cleaning the objective.

- 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 orange 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 \(on page 92\)](#).

Clean the stage slide tray

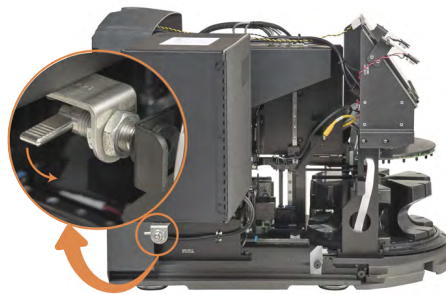
- **Frequency: at least every six months**

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 \(on page 74\)](#).
- 2 Open the cover and access the interior.
 - a Open the scanner cover. Remove the cover and set it aside.



- b Rotate the VPU latch.



- c Pivot out the VPU.



For detailed steps, see [Open the scanner cover and access the interior components \(on page 75\)](#).

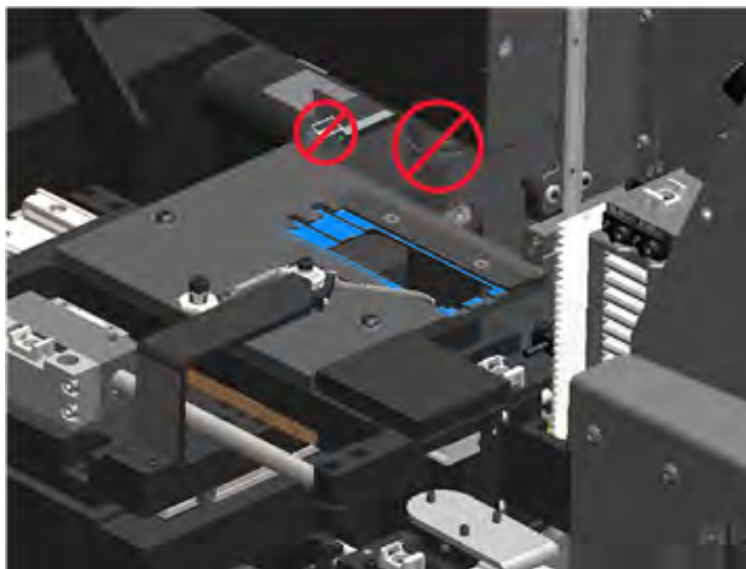


CAUTION: The stage slide tray is not removable. Do not attempt to remove it.

- 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 \(on page 92\)](#).

Clean the carousel

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

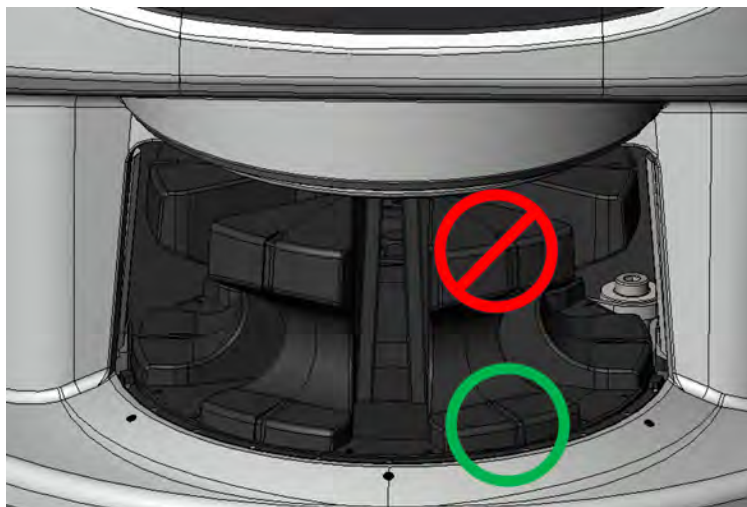
To clean the carousel:

- 1 If the scanner is on, shut down the scanner by following the steps in [Shut down the scanner \(on page 74\)](#).
- 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 \(on page 92\)](#).

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 \(on page 74\)](#).
- 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 \(on page 92\)](#).

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 \(on page 92\)](#).

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 \(on page 92\)](#).

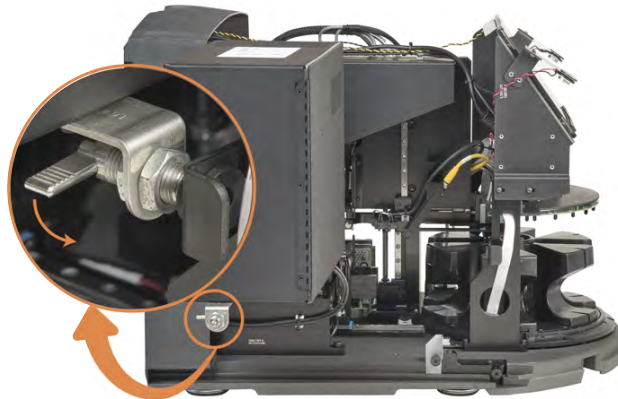
Restart the scanner after interior maintenance

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 180 degrees.



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



CAUTION: Take care when installing the cover. Do not press or push the lower-front area, as shown below with the red "X." This can damage the scanner's assembly. Place your hand flat against the areas shown with the green check mark, and then gently push to slide the cover back into place.



- Turn on the scanner.

Transporting or moving the Aperio GT 180 DX scanner

If you need to relocate the scanner, contact Leica Biosystems Technical Services. Be aware that moving the scanner yourself may void the hardware warranty.

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 \(on page 74\)](#).

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

For information on disposing of the scanner, see [Disposal of the Aperio GT 180 DX scanner \(on page 18\)](#).

Scanner Maintenance Log

Scanner Model Number:

Scanner Serial Number:

Year Installed:

Year of Log:

Activity	Technician	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
Daily Maintenance															
Restart scanner															
*Clean pusher/puller															
*Clean slide tray															
Monthly Maintenance															
Clean objective and Koehler															
Clean carousel															
Clean slide racks															
Clean fan filter															
Clean touchscreen															
Clean scanner cover															
Yearly Maintenance															
Schedule annual maintenance visit															

*Perform visual inspection daily; clean if you observe debris.

6

Troubleshooting

This chapter contains information and instructions to help you resolve troubleshooting issues with your scanner. For issues with the Aperio SAM DX, see the *Aperio SAM DX IT Manager and Lab Administrator's Guide*.



WARNING: Do not attempt to perform troubleshooting procedures not shown in this chapter. For additional troubleshooting assistance, contact Leica Biosystems Technical Services.

In this section:

Personal protective equipment	96
Red blinking lights on carousel	96
How to use the troubleshooting steps	96
Perform a safe restart after an error	97
Error codes and solutions	101
Rack warnings and solutions	119
Symptoms and solutions	128

Personal protective equipment

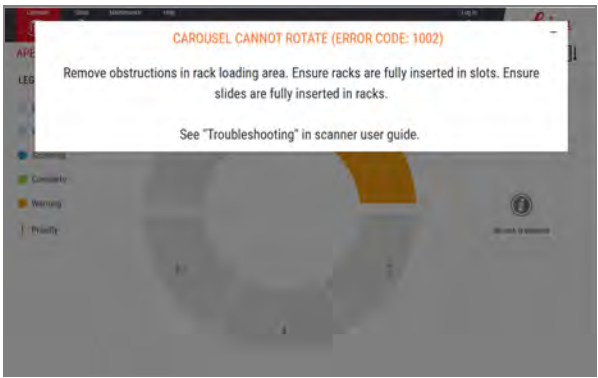

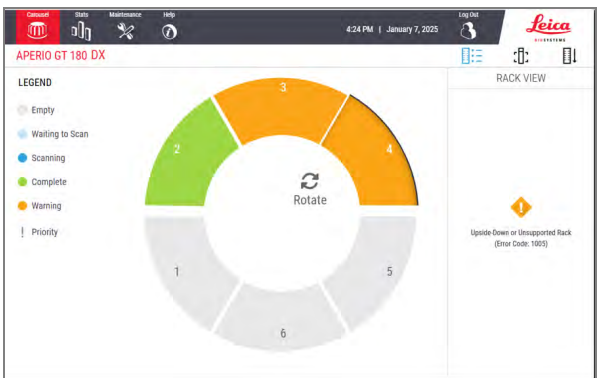
If you need to access the interior of the scanner while troubleshooting an issue, follow the policies and procedures of your institution, including the use of personal protective equipment (PPE).

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>Until the error is resolved:</p> <ul style="list-style-type: none"> You cannot interact with the carousel. The scanner cannot continue scanning. 	<ol style="list-style-type: none"> You can tap the  to minimize the message box. This enables you to view the rack status and access the Help resources. See Error codes and solutions (on page 101) for steps to resolve the specific error.
<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>See Rack warnings and solutions (on page 119) for steps to resolve the specific error.</p>

Type of issue	Scanner status	Steps to resolve the issue
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.	Varies with the situation.	See Symptoms and solutions (on page 128) .

Perform a safe restart after an error

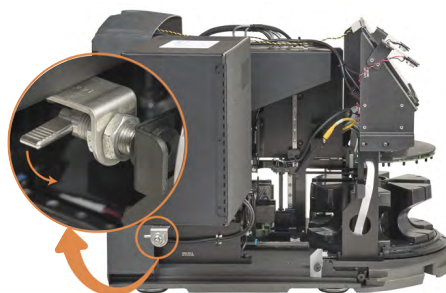
Some procedures in this chapter ask you to restart the scanner. Restarting the scanner initializes the controller and puts the stage and autoloader in their home positions. Before restarting the scanner, you need to ensure there is no slide on the stage.

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

- 1 Open the cover and access the interior:
 - a Open the scanner cover. Remove the cover and set it aside.



- b Rotate the VPU latch.



- c Pivot out the VPU.



For detailed steps, see [Open the scanner cover and access the interior components \(on page 75\)](#).

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

Figure 6-1: Slide on the stage

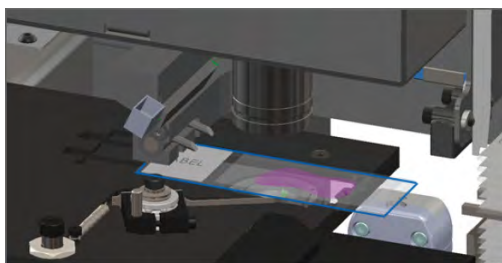


Figure 6-2: Slide partially on the stage

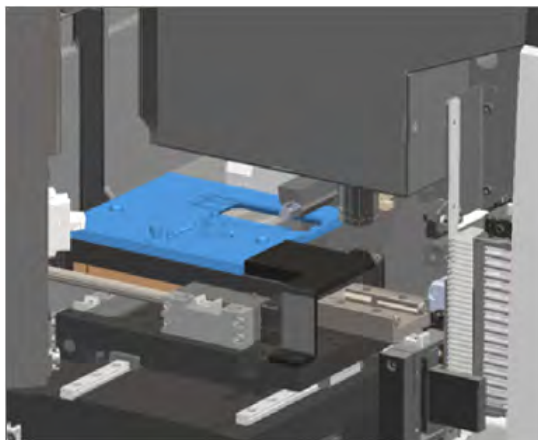


CAUTION: Restarting the scanner with a slide on the stage may damage the slide.

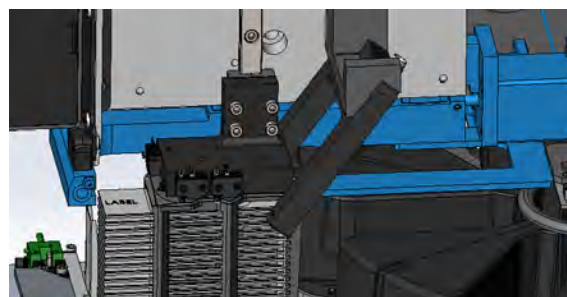
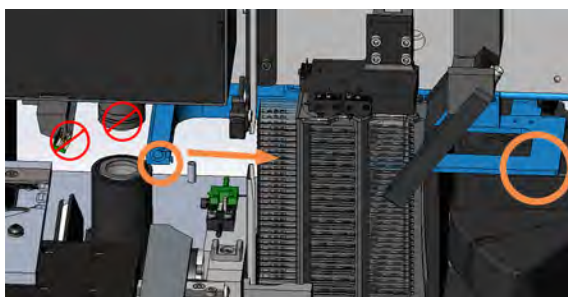
- 3 If there is a slide on the stage, carefully remove it from the stage without touching the surrounding components.
- 4 If the pusher is extended, return the pusher to the safe (retracted) position.
 - a Align the pusher teeth with the slide stage grooves.



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

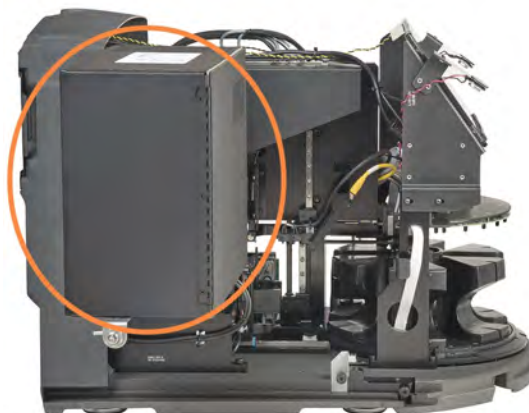


- c Slide the pusher to the front of the scanner, as shown in the rightmost image below. Hold the pusher in one of the areas circled below. Avoid touching the LED and objective.

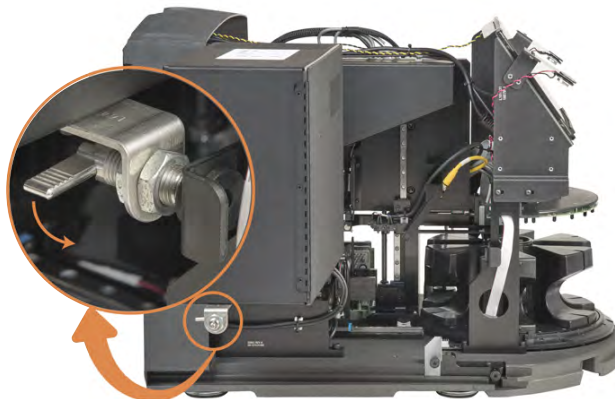


- 5 Close the scanner cover.

- 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 \(on page 92\)](#).

- 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

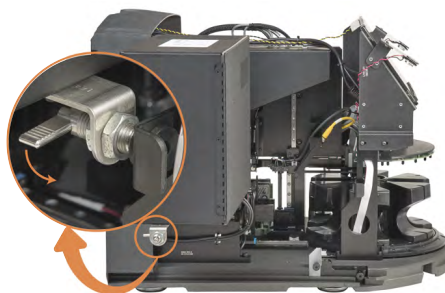
- **Cause:** An unexpected event occurred in the system that prevents it from continuing operation.

Follow these steps:

- 1 Open the cover and access the interior:
 - a Open the scanner cover. Remove the cover and set it aside.



- b Rotate the VPU latch.



- c Pivot out the VPU.



For detailed steps, see [Open the scanner cover and access the interior components \(on page 75\)](#).

- 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.

Figure 6-3: Slide on the stage

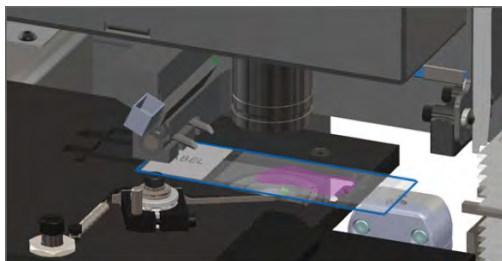
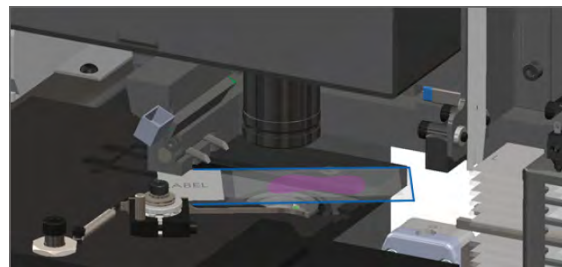


Figure 6-4: Slide partially on the stage

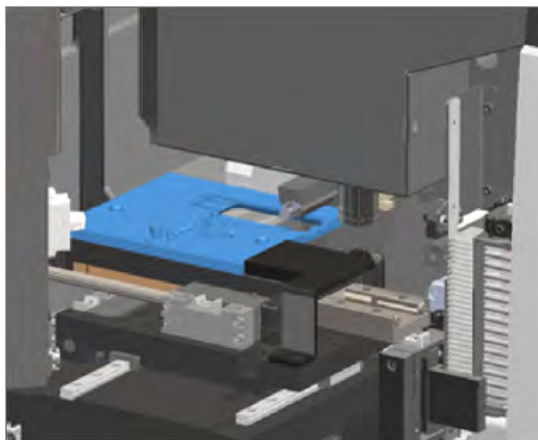


CAUTION: Restarting the scanner with a slide on the stage may damage the slide.

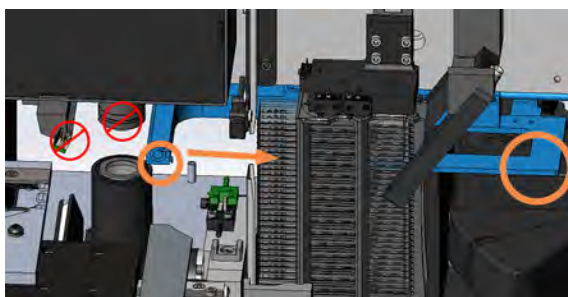
- 4 If there is a slide on the stage, carefully remove it from the stage without touching the surrounding components.
- 5 If the pusher is extended, return the pusher to the safe (retracted) position.
 - a Align the pusher teeth with the slide stage grooves.



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

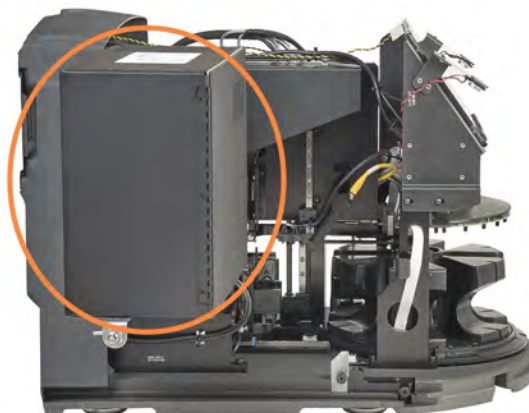


- c Slide the pusher to the front of the scanner, as shown in the rightmost image below. Hold the pusher in one of the areas circled below. Avoid touching the LED and objective.



- 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 \(on page 92\)](#).

- 7 Tap **Restart Scanner** on the touchscreen 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

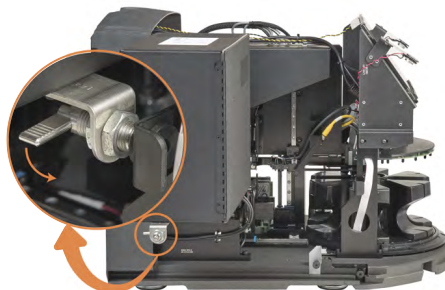
- **Cause:** The scanner cannot complete the initialization process.

Follow these steps:

- 1 Open the cover and access the interior:
 - a Open the scanner cover. Remove the cover and set it aside.



- b Rotate the VPU latch.



- c Pivot out the VPU.



For step details, see [Open the scanner cover and access the interior components \(on page 75\)](#).

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

Figure 6-5: Slide on the stage

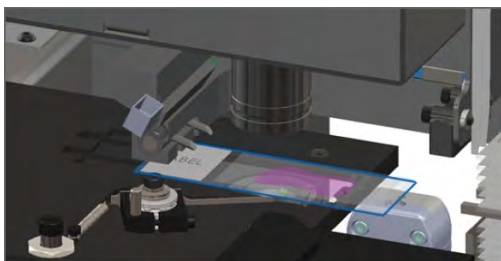
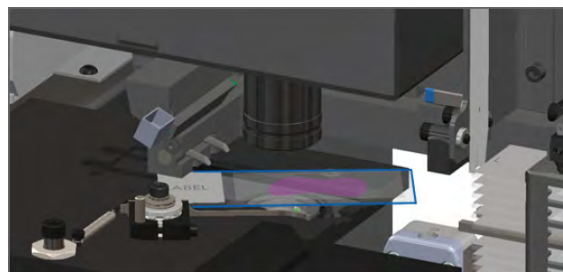


Figure 6-6: Slide partially on the stage

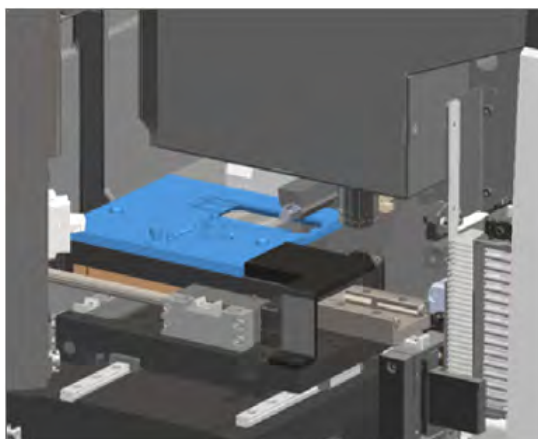


CAUTION: Restarting the scanner with a slide on the stage may damage the slide.

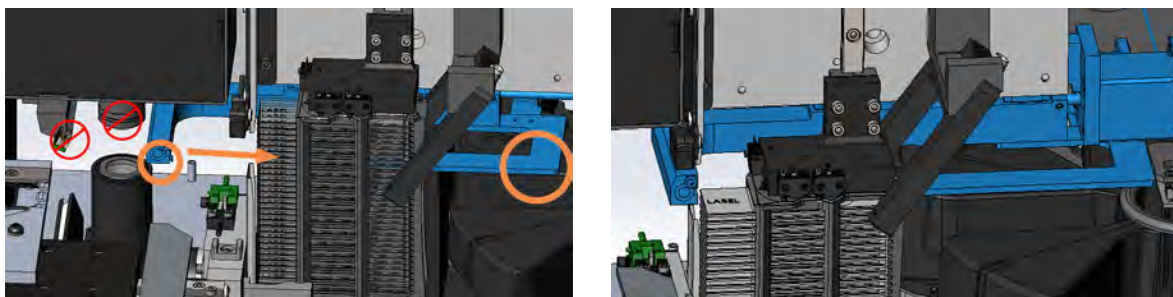
- 3 If there is a slide on the stage, carefully remove it from the stage without touching the surrounding components.
- 4 If the pusher is extended, return the pusher to the safe (retracted) position.
 - a Align the pusher teeth with the slide stage grooves.



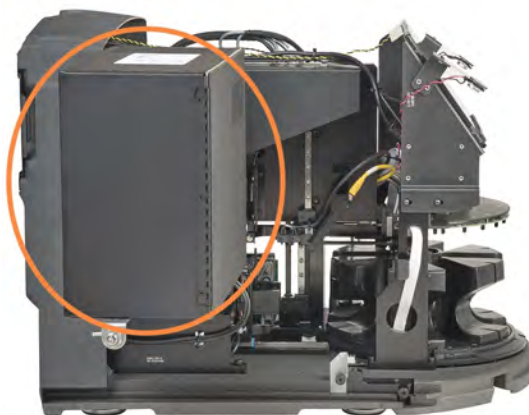
- b Slide the stage to the rear of the scanner, as shown.



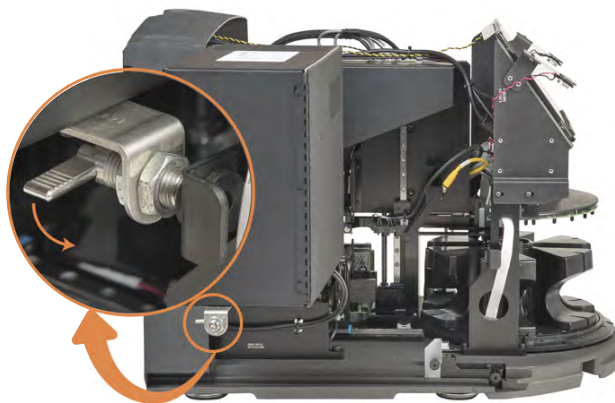
- c Slide the pusher to the front of the scanner, as shown in the rightmost image below. Hold the pusher in one of the areas circled below. Avoid touching the LED and objective.



- 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 step details, see [Restart the scanner after interior maintenance \(on page 92\)](#).

- 6 Shut down the scanner using the steps in [Shut down the scanner \(on page 74\)](#).
- 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.

Figure 6-7: Rack loading area with light curtain highlighted

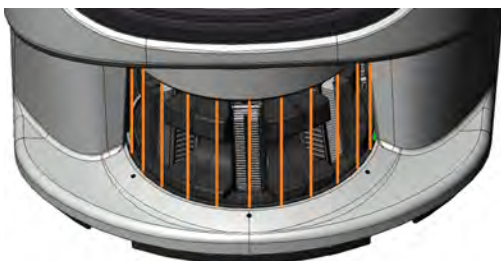
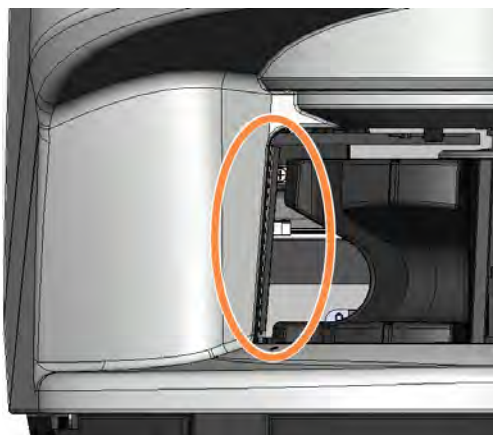


Figure 6-8: Pinch points on either edge of rack loading area



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

Figure 6-9: Leica logo facing out and up



Figure 6-10: 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):

Figure 6-11: Empty rack slot

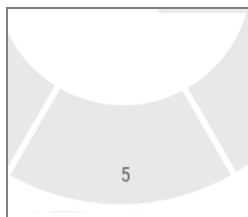
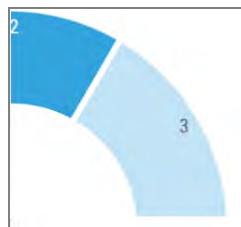


Figure 6-12: Rack inserted and waiting to scan



- 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 \(on page 97\)](#).
- 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.

Figure 6-13: Rack loading area with light curtain highlighted

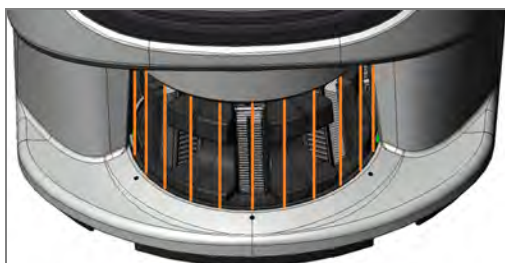
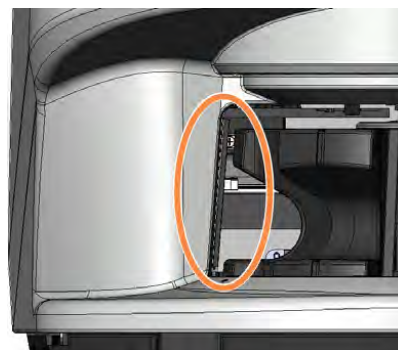


Figure 6-14: Pinch points on either edge of rack loading area



- 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 \(on page 97\)](#).
- 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 Aperio SAM DX server.
- 2 Do not restart the scanner. If you restart the scanner, the scanned data is lost, and users have to rescan their slides.
- 3 Check the connectivity from the scanner to the DICOM server, and from the DICOM server to your site's image storage location.
- 4 Ensure the DICOM server is running. Restart the DICOM server if necessary.
- 5 Check if your site's image storage location is full.
- 6 Check if there is a permissions or account problem with the account running the DICOM server.
- 7 If the issue persists, consult with your organization's IT professionals prior to calling Leica Biosystems Technical Services.

When the issue is resolved, if you have not restarted the scanner, the scanner starts transferring the slide images to the DICOM server.

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

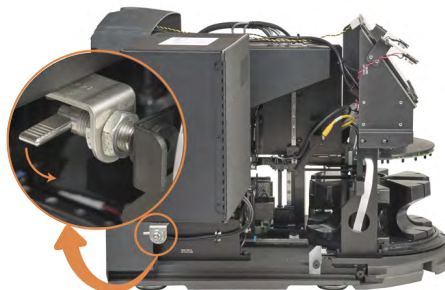
- **Cause:** There is an obstruction at the slide stage, rack, or pusher.

Follow these steps in order until the issue is resolved:

- 1 Open the cover and access the interior:
 - a Open the scanner cover. Remove the cover and set it aside.



- b Rotate the VPU latch.



- c Pivot out the VPU.



For detailed steps, see [Open the scanner cover and access the interior components \(on page 75\)](#).

- 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.

Figure 6-15: Slide on the stage

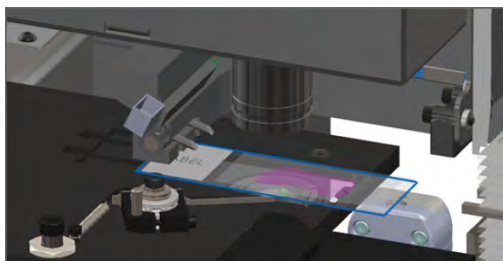
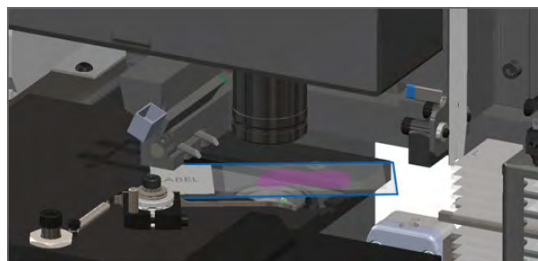


Figure 6-16: Slide partially on the stage



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.



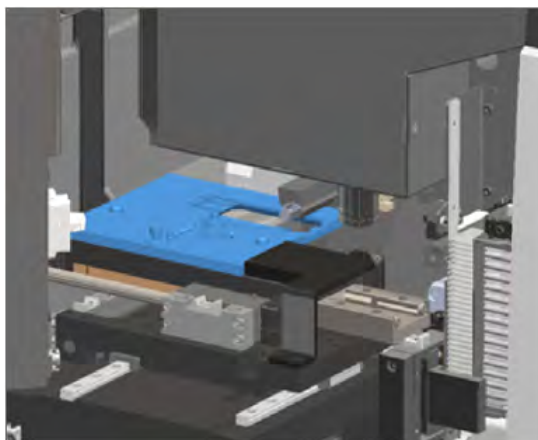
WARNING: Do not attempt to recover broken slides. Call Leica Biosystems Technical Services.

- 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.

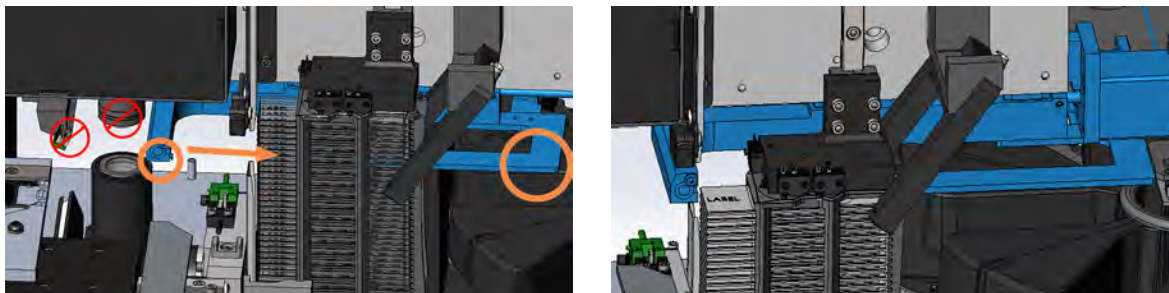
- 8 If the pusher is extended, return the pusher to the safe (retracted) position.
 - a Align the pusher teeth with the slide stage grooves.



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



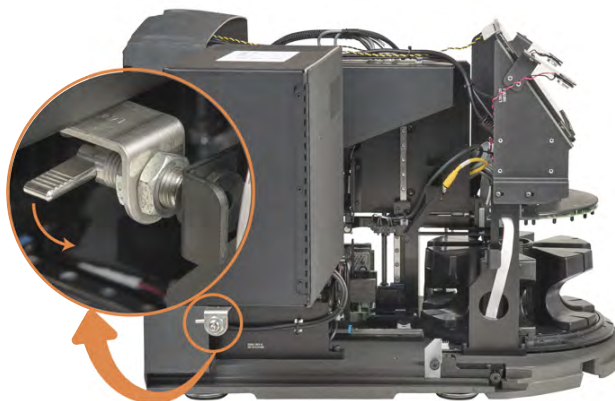
- c Slide the pusher to the front of the scanner, as shown in the rightmost image below. Hold the pusher in one of the areas circled below. Avoid touching the LED and objective.



- 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 \(on page 92\)](#).

- 10 Tap **Restart Scanner** on the touchscreen 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.

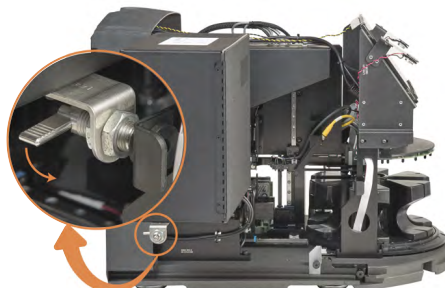
- **Cause:** There is an obstruction near the rack gripper, lift, or carousel.

Follow these steps until the issue is resolved:

- 1 Open the cover and access the interior:
 - a Open the scanner cover. Remove the cover and set it aside.



- b Rotate the VPU latch.



- c Pivot out the VPU.



For detailed steps, see [Open the scanner cover and access the interior components \(on page 75\)](#).

- 2 Take photos of the obstruction.



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

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

Figure 6-17: Slide on the stage

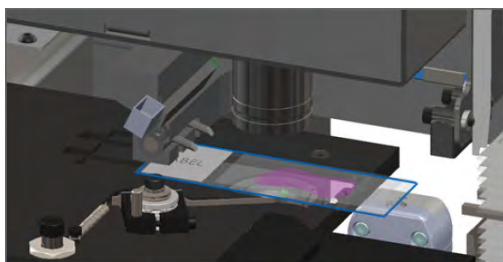
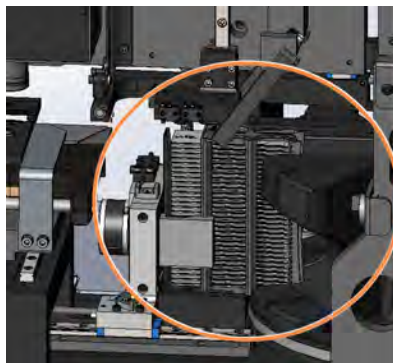


Figure 6-18: Slide partially on the stage

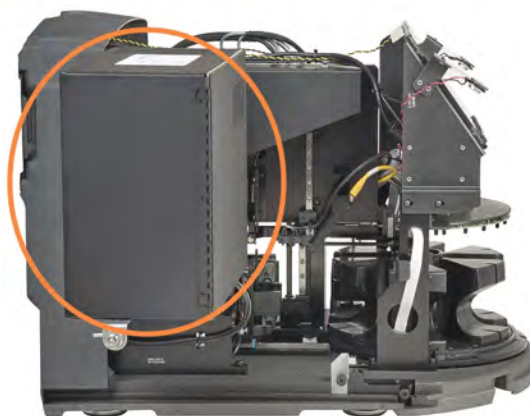


CAUTION: Restarting the scanner with a slide on the stage may damage the slide.

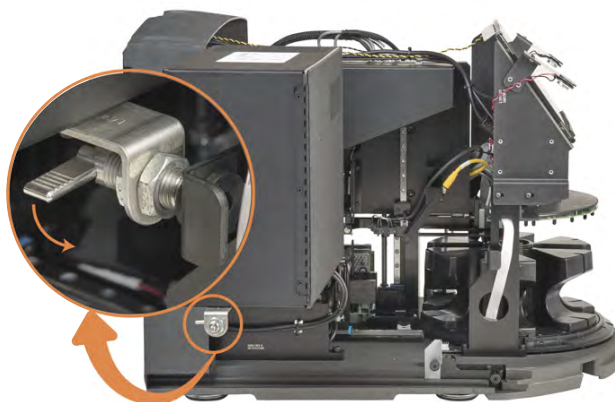
- 4 If there is a slide on the stage, carefully remove it from the stage without touching the surrounding components.
- 5 Check the rack gripper, lift, and carousel area for an obstruction.



- 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 \(on page 92\)](#).

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 \(on page 53\)](#).
- 2 Ensure the rack is inserted correctly:

Figure 6-19: Leica logo facing out and up



Figure 6-20: Rack inserted fully into the carousel



- 3 Remove the rack and check the following:
 - You are using a supported rack. See [Slide racks supported \(on page 28\)](#).
 - 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 5.
 - 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 \(on page 97\)](#).
- 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 On the touchscreen, 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 for an error message.
- 3 Go to the section that matches the slide error:
 - [Tilted slide\(s\) \(on page 121\)](#)
 - [No barcode \(on page 121\)](#)
 - [No tissue \(on page 122\)](#)
 - [No macro focus \(on page 122\)](#)
 - [Image quality \(on page 123\)](#)
 - [Image transfer error – pending retry \(on page 124\)](#)
 - [Aborted \(on page 124\)](#)
- 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.



You can temporarily hide some error messages by tapping the x in the top-right corner. This enables you to view the macro image.

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 into an empty rack slot for scanning.

No barcode

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

The scanner produces an image even if there are no barcodes detected. If your site does not require the use of barcodes, you can ignore this error.



Your Lab Administrator determines whether the scanner requires the presence of a barcode to complete a scan. Your Lab Administrator or Leica Biosystems representative sets this configuration in Aperio SAM DX.

If your site requires the use of barcodes, 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 [Load slides in the rack \(on page 41\)](#).
- 2 Ensure barcodes meet specifications. See [Barcodes supported \(on page 28\)](#).
- 3 Ensure barcodes meet minimum quality requirements. See [Barcodes \(on page 34\)](#).
- 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 Tap the error message to temporarily hide it.
- 4 If available on your scanner, scan the slide again using the optional Manual Scan process. (For details, see [Use Manual Scan to resolve an image quality issue \(on page 66\)](#).) If you do not have the Manual Scan feature available, skip to the next step.
 - a Consider placing additional focus points on the tissue area using the Manual Scan feature.
 - b When the scan is finished, do not remove the rack from the scanner.
- 5 If the issue persists, continue with the following steps.
- 6 Verify there is tissue on the slide.
- 7 Take note of the slide number.
- 8 Rotate and remove the rack to access the slide.
- 9 Remove the slide from the rack, and then clean the slide.
- 10 Re-insert the slide into a new rack and scan it again.
- 11 If the issue persists, check for slide preparation errors. See [Chapter 3: Slide preparation](#).
- 12 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 \(on page 41\)](#).
 - Slide tray is clean.
- 2 Check the stain quality.
- 3 Check that the slide and coverslip thickness meet the requirements. See the *Aperio GT 180 DX Specifications*.

- 4 Check for common slide preparation issues and verify:
 - 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 your viewing software.
- 2 Check for common slide preparation issues and verify:
 - 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 Display the slide in Slide View, and do one of the following depending on the configuration of your scanner:
 - If the optional Manual Scan feature is available on your scanner, tap **Manual Scan**. For detailed instructions, see [Use Manual Scan to resolve an image quality issue \(on page 66\)](#). When the scan is finished, do not remove the rack from the scanner.
 - If your scanner does not have the Manual Scan feature available, tap **Scan Entire Slide** to re-scan the entire slide. (To scan the whole area for a rack of slides, see [Scan entire slide for whole rack \(on page 61\)](#).)
- 4 When the scan is finished, do not remove the rack from the scanner.
- 5 Review the newly scanned slide image in your viewing software. If the issue persists, continue with the following steps.
- 6 Check if other slides are in focus.
- 7 If all slides are out of focus, clean the objective. See [Clean the objective and Koehler \(on page 82\)](#).
- 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
<p>The system often resolves the issue without intervention.</p> <ol style="list-style-type: none"> 1 If all slides in the rack are finished scanning, remove the rack. 2 Check for the image in Aperio eSlide Manager. 3 If necessary, rescan only the slides that are missing from Aperio eSlide Manager. 	<p>The Lab Administrator should:</p> <ol style="list-style-type: none"> 1 Ensure the LAN cables are connected to the scanner LAN port and to the Aperio SAM DX server. 2 Do not restart the scanner. If you restart the scanner, the scanned data is lost, and users have to rescan their slides. 3 Check the connectivity from the scanner to the DICOM server, and from the DICOM server to your site's image storage location 4 Ensure the DICOM server is running. Restart the DICOM server if necessary. 5 Check if your site's image storage location is full. 6 Check if there is a permissions or account problem with the account running the DICOM server. 7 If the issue persists, consult with your organization's IT professionals prior to calling Leica Biosystems Technical Services. <p>When the issue is resolved, if you have not restarted the scanner, the scanner starts transferring the slide images to the DICOM server.</p>

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 \(on page 125\)](#). If the message appears on one or some slides, continue to the next step.
- 2 Check for damage or common slide preparation issues and verify:
 - 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.

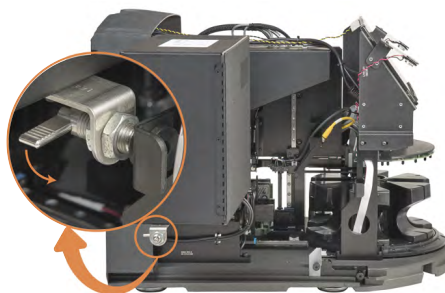
Aborted message appears on all slides

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 the scanner cover. Remove the cover and set it aside.



- b Rotate the VPU latch.



- c Pivot out the VPU.



For step details, see [Open the scanner cover and access the interior components \(on page 75\)](#).

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

Figure 6-21: Slide on the stage

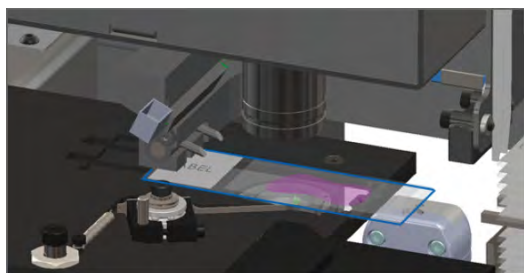
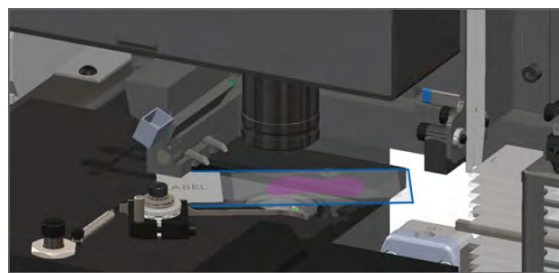


Figure 6-22: Slide partially on the stage



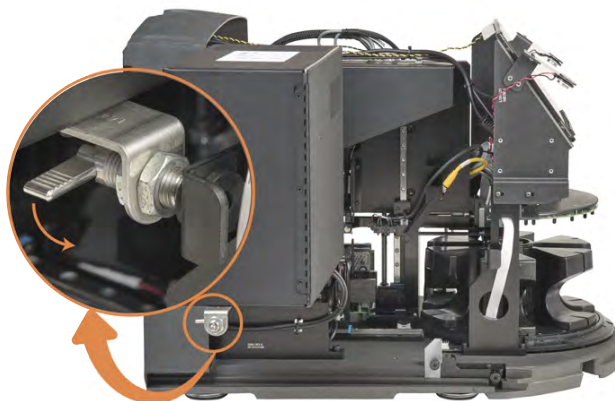
CAUTION: Restarting the scanner with a slide on the stage may damage the slide.

- 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 \(on page 92\)](#).

- 6 Shut down the scanner by tapping **Maintenance**, then tapping **Shut Down Scanner**.
- 7 When the 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.

Artifact detection messages from the optional Aperio iQC DX Software

If you are using the optional Aperio iQC DX Software, messages preceded by "iQC" appear in the scanner console's Slide View if the Aperio iQC DX Software detects one or more artifacts on the scanned image. Some examples of messages include "iQC: Missing Tissue," "iQC: Air Bubbles," etc.

See the *Aperio iQC DX Software User's Guide* for full details.

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 the 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 \(on page 74\)](#).
- 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 \(on page 74\)](#).
- 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.

Leica Biosystems Technical Services may request photos when providing assistance.

Network connection lost

The Aperio GT 180 DX scanner must be connected to the Aperio SAM DX through your Local Area Network to function. If that connection is lost, you see:

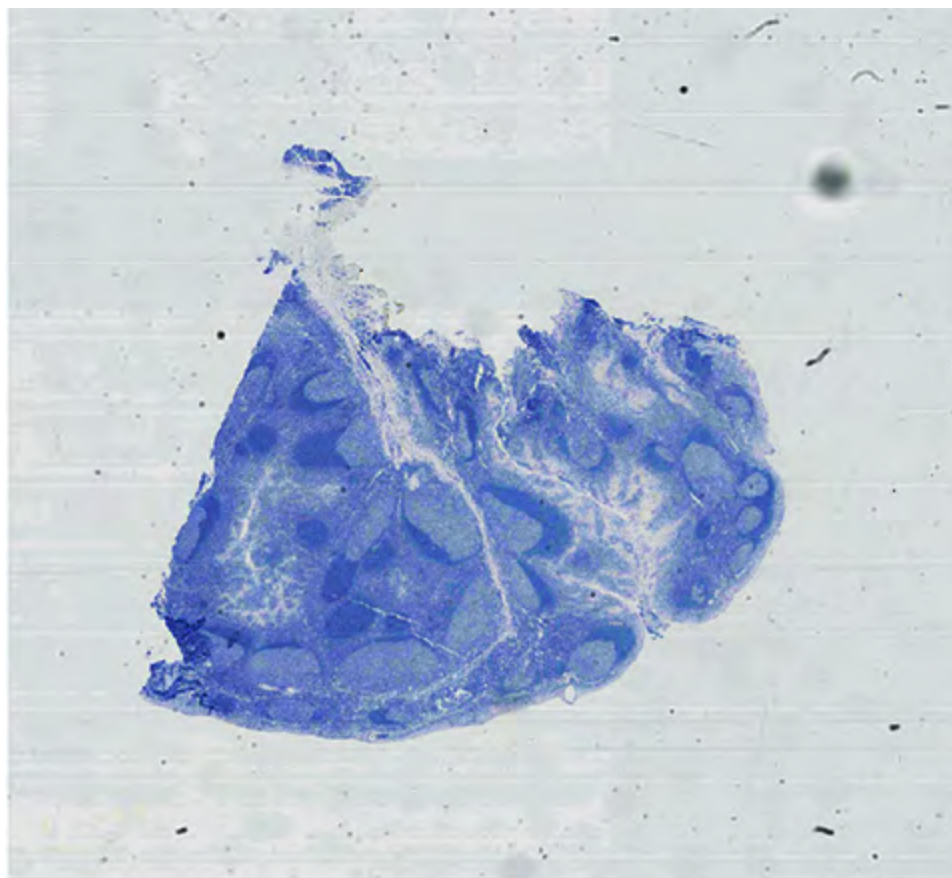


Contact your IT Administrator for assistance. The IT Administrator should do the following:

- 1 Ensure the LAN cables are connected to the scanner LAN port and to the Aperio SAM DX server.
- 2 In the area provided on the scanner's touchscreen interface, enter the IP address of the Aperio SAM DX server.
- 3 Verify the network connections are up and working for the Scanner and Aperio SAM DX server. (Consult your organization's IT professionals if needed.)
- 4 On the server, go to the Services Manager and restart all services. It may take a few minutes for all the services to restart.
- 5 Try to connect from the scanner again by manually entering the IP address again.
- 6 If the issue persists, consult with your organization's IT professionals prior to calling Leica Biosystems Technical Services.

White striping appears on scanned images

If your scanned images frequently appear with white striping, this may be caused by certain artifacts introduced by improper tissue processing, such as microscopic contamination, micro water droplets, micro air bubbles, preventing the scanner from obtaining a clear calibration pre-scan. The example below shows an image with the white striping effect:



The optional Default Calibration Point feature addresses this issue.

When the Default Calibration Point is enabled, the scanner checks the quality of the pre-scan during the scan workflow, and if necessary, replaces it with a higher quality default pre-scan that was created specifically for your particular scanner.

Your Lab Administrator configures the Default Calibration Point feature in the Aperio SAM DX. See the *Aperio SAM DX IT Manager and Lab Administrator's Guide* for details.

If your scanner is configured with the Default Calibration Point feature, and your scanned images still have the white striping effect, contact Leica Biosystems Technical Services. The Default Calibration Point settings may need adjustments.

A

Performance information

In this section:

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Analytical performance

This section gives a summary of the Aperio GT 180 DX scanner analytical performance studies.

Trueness

Test	Acceptance Criteria	Test Purpose
Tissue Finder	<ul style="list-style-type: none"> • System encompasses all stained portions of the tissue block at defined success rates for FFPE H&E-Stained slides – 98% success rate • System encompasses all stained portions of the tissue block at defined success rates for FFPE IHC Stained slides – 90% success rate • System scans \leq 30% excessive area at a success rate of 90% for FFPE H&E-stained slides • System scans \leq 30% excessive area at a success rate of 90% for FFPE IHC stained slides 	Demonstrates that all tissue specimen on the glass slide is included in the digital image file.
Focus Error	<p>System has a focus error within the allowable calculated limits for both auto-focusing and scanning methods:</p> <ul style="list-style-type: none"> • Focus low: -1.83 • Focus high: 1.21 microns 	Demonstrates that the focus quality of the Aperio GT 180 DX scanner is acceptable even in the presence of uneven tissue.
Color	System provides color management using an ICC profile per established industry guidelines.	Measures the color differences between the input color stimuli and the output digital image file.
Stitching Error	System has > 85% analysis stripes for all the slides across all 3 Aperio GT 180 DX scanner devices and has actual stitching errors less than stitching error specification.	Analyzes potential stitching error sources, capture image/stripe data, executes the stitching algorithm, and measures the alignment of the stitching algorithm to the established ground truth image data (perfect stitching). This comparison is performed by comparing the stripe overlap statistics with the actual data generated by the stitching algorithm.

Precision (repeatability and reproducibility)

Test	Acceptance Criteria	Test Purpose
Image Repeatability	Image repeatability is $\geq 90\%$.	Assesses image quality repeatability, which is a key component to ensuring first time scan success rate.
Image Quality Reproducibility	Inter-device reproducibility is $\geq 90\%$ (90 of 100 slides must result in a "Pass").	Assesses image quality reproducibility, which is the key component to ensuring first time scan success rate.
Focus Reproducibility	Systems have an overall intra-system agreement of $>85\%$.	Assesses that the intra-system focus quality of the Aperio GT 180 DX scanner is acceptable even in the presence of uneven tissue.
Stitching Reproducibility	Systems have an overall intra-system agreement of $>85\%$.	Analyzes potential stitching error sources, capture image/stripe data, executes the stitching algorithm, and measures the alignment of the stitching algorithm to the established ground truth image data (perfect stitching) and compares intrasystem agreement.

Accuracy (resulting from trueness and precision)

Test	Acceptance Criteria	Test Purpose
Spatial Resolution	System has a Modulation Transfer function with $MTF_{1/4} \text{ Nyquist} > .70$.	Evaluates the composite optical performance of all components in the image acquisition phase.

Clinical performance

Clinical performance is based on the concordance between the Aperio GT 180 DX scanner and traditional light microscopy.

Clinical performance of the Aperio GT 180 DX scanner is based on available scientific literature as, to date, no clinical performance studies, data from routine diagnostic testing or other clinical performance data is available for the Aperio GT 180 DX scanner. A systematic literature search was performed to identify relevant literature which supports the clinical performance of the Aperio GT 180 DX scanner.

The clinical performance, measured in terms of concordance of pathology findings between the Aperio GT 180 DX scanner and traditional light microscopy has been demonstrated by Hanna et al. 2020, who demonstrated that the Aperio GT 180 DX scanner had a major diagnostic concordance of 100% and a minor diagnostic concordance of 98.8%.

Overall, based on the clinical performance evidence available, the Aperio GT 180 DX scanner is able to perform as per its intended purpose in a clinical setting.

Results from the clinical performance studies reported in the literature are shown below.

Performance Outcome	Comparator	Results	Reference
Concordance	Glass slide microscopy	Major diagnostic concordance 100% (254/254) Minor diagnostic concordance 98.8% (251/254)	Hanna et al. 2020 ¹

¹ Hanna MG, Parwani A, Sirintrapun SJ: Whole Slide Imaging: Technology and Applications. Adv Anat Pathol, 27: 251-259, 2020 10.1097/pap.000000000000273

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