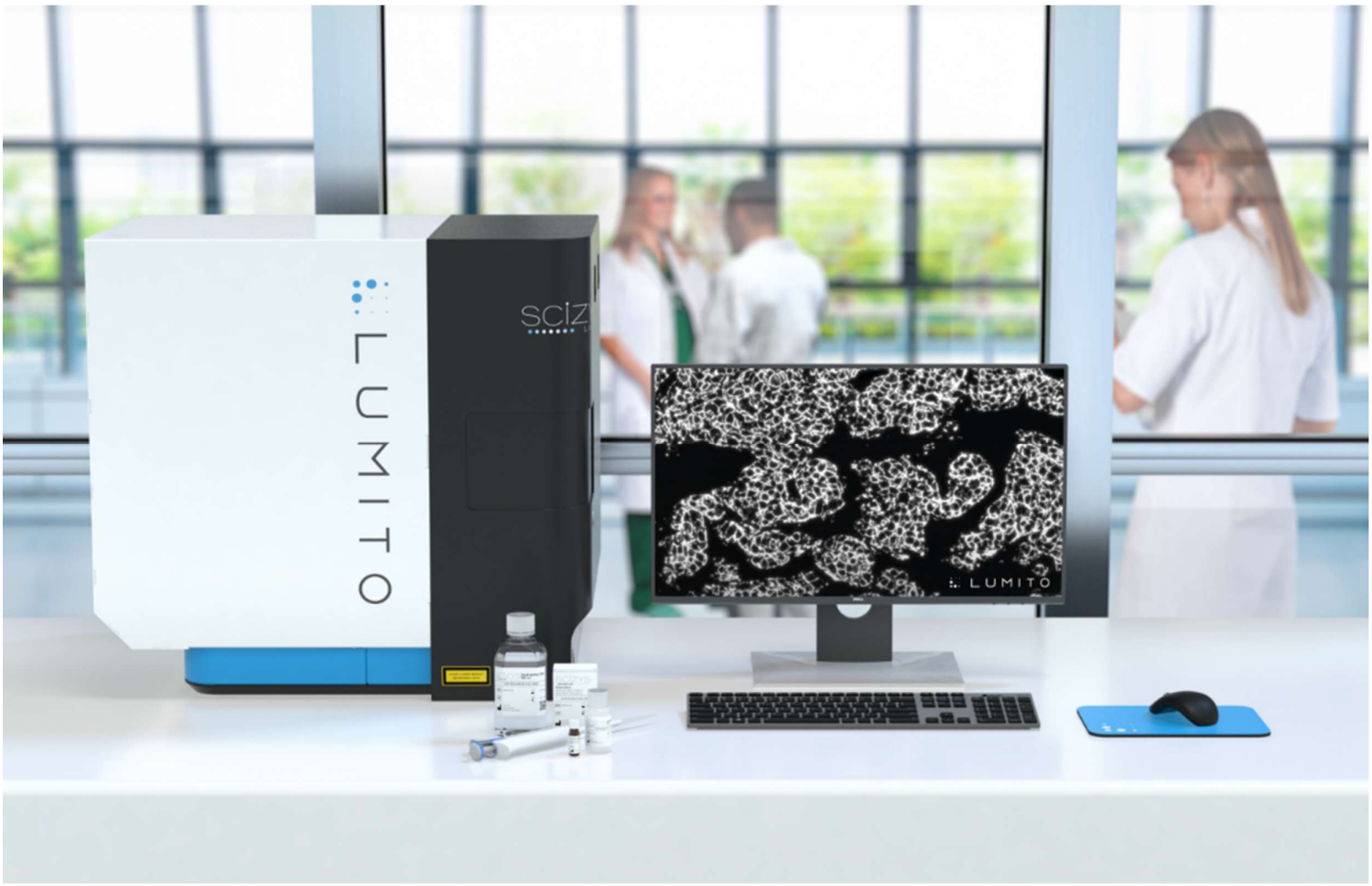
LUMITO

USER MANUAL

SCIZYS S1



Part number: 412902
Revision F
Release date: 2024-08-30

This document is produced and printed by:
Lumito AB
Mårtenstorget 5
SE-223 51 Lund
Sweden
Phone: +46 10 204 00 15
Website: https://www.lumito.se
E-mail: support@lumito.se

Nomenclature

Abbreviation and Terms	Definition
EMC	Electromagnetic Compatibility
NIR	Near Infrared
ROI	Region of Interest
UCNP	Upconversion Nanoparticles
WEEE	Waste of Electrical and Electronic Equipment

Table 0-1 List of common abbreviations, terms and acronyms used in this user manual.

Table of contents

1. Introduction

1.1 Purpose of this User Manual

The purpose of this manual is to describe the functionality and equip the user with the necessary knowledge to understand the intended use of SCIZYS S1. Always read the manual carefully before using the product. Keep it for future reference.

1.2 Intended Use

SCIZYS S1 is a scanner intended for digital imaging of biological samples, preparations, and specimens (primarily histological sections) on standard glass slides in transmitted light and upconversion fluorescence light. The scanner shall be used in an indoor laboratory environment by laboratory personnel. SCIZYS S1 is for research use only - not, directly, or indirectly, for *in vitro* diagnostic procedures.

1.3 Misuse

To ensure the intended use of SCIZYS S1, the user shall follow this user manual and the instruction for use for both SCIZYS S1 and SCIZYS reagent kit respectively. Lumito does not guarantee correct results if substitutes for SCIZYS reagents or SCIZYS S1-associated components are used. SCIZYS S1 is for research use only - not, directly, or indirectly, for *in vitro* diagnostic procedures.

Never disassemble nor modify SCIZYS S1 as it is harmful due to risk of fire, electric shock, and permanent damage to SCIZYS S1. Disassembling or modifying SCIZYS S1 will void the product warranty.

1.4 Prerequisites and Knowledge Level of User

SCIZYS S1 must be installed by an authorised service technician prior to use. The laboratory personnel need no additional training for operating SCIZYS S1 beyond this user manual.

1.5 Safety Precautions

Pay close attention to safety precautions and warnings in this user manual. In addition, always practice good safety when working in a laboratory environment to avoid personal injury or damage to SCIZYS S1.

1.6 Manufacturer

This product is manufactured by:

Lumito AB
Mårtenstorget 5
SE-223 51 Lund
Sweden
Tel. +46 10 204 00 15
Web. https://www.lumito.se
E-mail: support@lumito.se

1.7 Compliance Specifications

SCIZYS S1 complies with the regulatory standards in *Table 1-1.*

European Directives	Standard	Name of standard
MD 2006/42/EC	EN ISO 13849-1:2023 EN ISO 13849-2:2012	Safety of machinery - Safety-related parts of control systems
LVD 2014/35/EU	EN 61010-1:2010 + A1:2019	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
	EN IEC 61010-2-081:2020	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes
	EN 60825-1:2014/A11:2021 /AC:2022 IEC 60825-1:2014	Safety of laser products - Part 1: Equipment classification and requirements

EMC 2014/30/EU	EN IEC 61326-1:2021	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
	EN 61326-3-1:2017	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) - General industrial applications
RoHS 2011/65/EU WEEE 2012/19/EU	EN IEC 63000:2016	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Table 1-1 List of standards that SCIZYS S1 complies with.

1.8 Required Peripherals and Hardware

The following hardware is required, but not included, and is needed to fully operate SCIZYS S1:

- 1080p (1920 × 1080 pixels) or 4K (3840 × 2160 pixels) display with 16:9 aspect ratio and HDMI input.
- Mouse or equivalent pointing device.
- Keyboard.

NOTE! The SCIZYS software is developed and optimized to be used on a 1080p or 4K display with 16:9 aspect ratio.

NOTE! Do not use USB cables longer than 3 metres.

⚠**DANGER!** Detachable power cords must not be replaced by inadequately rated power cords. See sections *3.2.2 Power Input Panel* and *12 Technical Data* for more information about SCIZYS S1 power specifications.

1.9 Targeted software version

This version of the manual is targeted to SCIZYS software version 2.0. The current running software version on the instrument can be found under the “About” menu option (*Figure 1-1*).

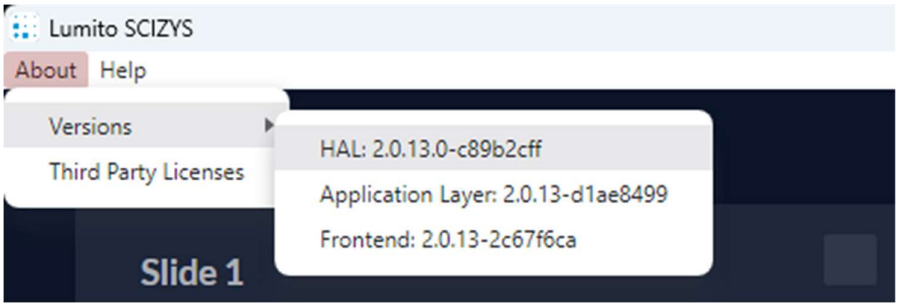


Figure 1-1 Version information for the currently running SCIZYS software

A link to the pdf-version of the manual targeting the currently running SCIZYS software is found under the “Help” menu option (*Figure 1-2*).

Figure 1-2 Link to pdf-version of the manual for the currently running SCIZYS software

2. Safety

SCIZYS S1 meets the requirements of the European Directives listed in *Table 1-1*. Thus, it bears the CE marking on its product label (see *2.3 Safety Labels, Signs and Symbols*).

⚠**DANGER!** If SCIZYS S1 is used in a manner not specified by this manual, the protection provided by the system may be impaired.

2.1 Risk Levels and Symbols

Table 2-1 describes the symbols that are used in this manual and their meaning.

 **DANGER!**	This symbol indicates a major hazard to the user that may cause serious injuries.
 **WARNING!**	This symbol indicates a potential hazard to the user.
 **CAUTION!**	This symbol indicates a potential hazard to the product.
 **NOTE!**	Special attention is to be paid to the details contained in this instruction.

Table 2-1 Symbols used in this manual and what they mean.

2.2 Remaining Risks

SCIZYS S1 is a Class 1 laser product with an embedded Class 4 laser. No harmful radiation can be accessed during normal use or fault conditions. To further ensure user and product safety, SCIZYS S1 is fitted with a shielding enclosure and interlock switches.

⚠**DANGER!** Do not remove parts of the enclosure mounted with screws.

⚠**DANGER!** Do not tamper with interlock switches on the Loading Door.

⚠**DANGER!** The user shall under no circumstances remove any of the outer enclosure panels due to risk of electric shock. Always adhere to the safety labels on SCIZYS S1.

⚠**WARNING!** Do not use flammable and combustible organic solvents, including sealing agents such as nail polish, in combination with SCIZYS S1 due to potential damage to SCIZYS S1 and fire hazard.

2.3 Safety Labels, Signs and Symbols

Table 2-2 presents the descriptions of safety labels, signs and symbols featured on SCIZYS S1 and its peripherals.

No.	Label	Description	Location
1		Product label containing product identification, manufacturing information, power specifications and other product-related data.	Rear side of SCIZYS S1, right side of the Rear I/O Panel.
2		Fuses used in the product shall be according to what is specified on the fuse label located near the mains input. The fuses shall only be exchanged by authorised service technician.	Rear side of SCIZYS S1, beneath the Power Supply Port.

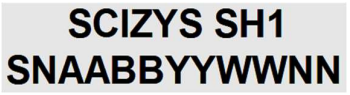
No.	Label	Description	Location
3		Potentially biohazardous substances are used near this label. Always follow relevant laboratory practices on safe handling and usage of biohazardous substances.	The top face of the SCIZYS slide holder. The inner wall of the Loading Compartment.
4		This symbol indicates that the user shall refer to the manual for specific information or instructions for operation.	Two labels. Front of SCIZYS S1, under the Front USB Ports. Rear side of SCIZYS S1, next to the Rear I/O Panel.
5		This label states the slide holder (SCIZYS SH1) serial number.	Underside of the slide holder.
6		This label indicates how slides shall be placed in the slide holder.	On the top face of SCIZYS slide holder.

Table 2-2 Safety labels, their descriptions and where they are located on SCIZYS S1.

2.4 Warning System

Any issues that affect the scanning operation or SCIZYS S1 in general will be displayed in SCIZYS software in the form of alerts and error messages.

2.5 Accident or Breakdown

In line with the presented risks and safe laboratory practices, it is strongly recommended that a Class B CO_2 fire extinguisher is always present in the vicinity of SCIZYS S1.

2.6 Protective Measures

SCIZYS S1 is equipped with several protective measures that have been designed to prevent accidents and protect both SCIZYS S1 and the user from unintended damage and injury respectively. Some of these measures are (but not limited to):

- Overvoltage protection (OVP) to prevent internal damage during sudden surges in voltage.
- Overcurrent protection (OCP) to prevent internal damage during sudden surges in current.
- The internal laser is automatically switched off when the Loading Door is opened.
- Scanning operation will not commence unless the Loading Door is closed.
- The Loading Door automatically closes after 10 minutes to prevent prolonged exposure to dust and other unwanted particles.
- The Loading Door will reopen if it does not reach its final position when closing within a certain time. For example, if an object is left in the door opening and obstructing the Loading Door movement, the Loading Door will reopen after the time out.

2.7 Lifting Assembly Kit

The Lifting Assembly Kit (see *11.1 Lifting Assembly Kit*) shall be kept by the user for future use after installation.

⚠**WARNING!** The Lifting Assembly Kit must only be used by an authorised service technician to move SCIZYS S1.

3. Function

3.1 Functional Description

SCIZYS S1 is a whole slide imaging scanner, equipped with a near-infrared (NIR) laser for upconversion nanoparticle (UCNP) excitation. For visualisation of UCNPs as reporters for molecules in biological samples, the SCIZYS reagent kit shall be used. The UCNPs convert two or more NIR photons into one photon with a shorter wavelength. This so-called anti-Stokes effect drastically reduces the optical background by completely avoiding autofluorescence. The emission light is detected via a highly sensitive camera. SCIZYS S1 can also be used for brightfield imaging.

Four standard, single slides can be mounted in the slide holder. The user interacts with the SCIZYS software to specify the automated scanning task, performed by SCIZYS S1. Images generated by SCIZYS S1 are saved in OME-TIFF file format.

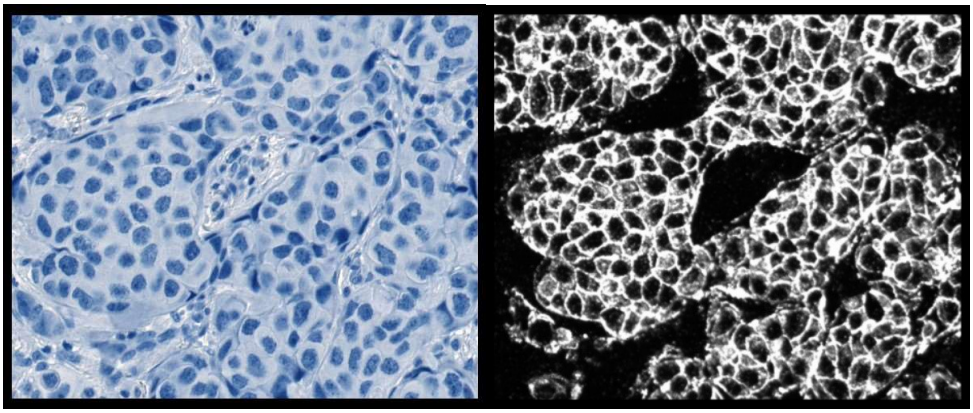


Figure 3-1 Imaging of breast tissue sample in transmitted light and upconversion fluorescence light.

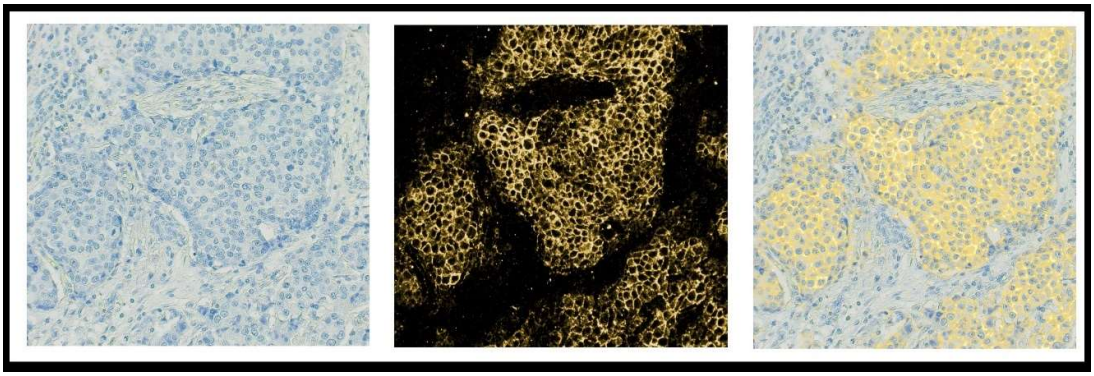


Figure 3-2 Imaging of breast tissue sample in transmitted light, upconversion fluorescence light and shown as overlay.

3.2 Main Parts of SCIZYS S1

Figure 3-3 Front of SCIZYS S1.

Figure 3-4 Side view of SCIZYS S1.

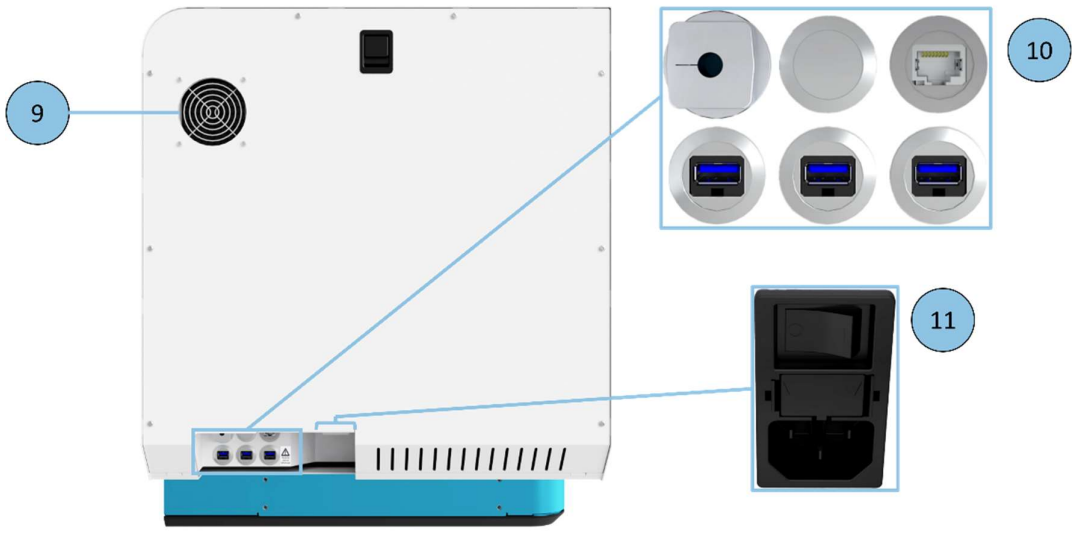


Figure 3-5 Rear side of SCIZYS S1.

Number	Name	Function
1	Loading Compartment	The Loading Compartment houses the Stage, which is where the slide holder (SCIZYS SH1) with samples is placed.
2	Loading Door	Keeps the Loading Compartment protected from dust and dirt.
3	Loading Door Button	Opens and closes the Loading Door.
4	Power Button	Turns SCIZYS S1 on or off.
5	Service Hatch	Provides access to internal system for authorised service technicians. ⚠**DANGER!** Do not open the Service Hatch! The Service Hatch is only to be opened by an authorised service technician.
6	Front USB Ports	See *3.2.3 Front USB Ports* for more information.
7	Loading Compartment LED light	Illuminates the Loading Compartment.
8	Stage	Moves the slide holder to the internal imaging system when the Loading Door is closed.
9	Intake Fan and Vents	For cooling of internal components. ⚠**CAUTION!** Do not block the Intake Fan or any of the Vents.
10	Rear I/O Panel	The Rear I/O Panel features interfaces for networking, USB and display output. See *3.2.1 Rear I/O Panel*.
11	Power Input Panel	The Power Input Panel features SCIZYS S1's main power-related interfaces. See *3.2.2 Power Input Panel* for more information.

Table 3-1 Description of SCIZYS S1 main parts and subsystems.

3.2.1 Rear I/O Panel

The Rear I/O Panel features interfaces for networking, USB and display output. See *Table 3-2* for a complete specification of the interfaces and their intended use.

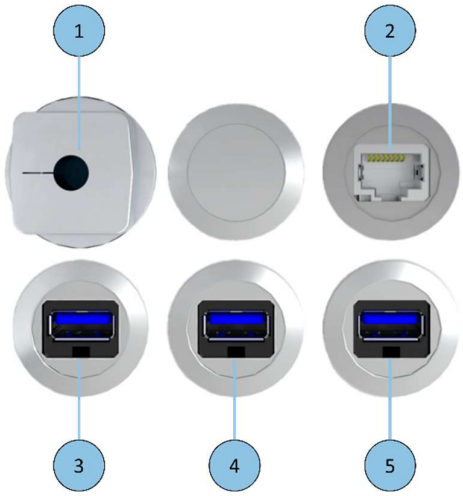


Figure 3-6 Rear I/O Panel.

Number	Interface	Specification	Intended Use
1	HDMI (hardwired)	HDMI 2.0	Transmit video signals to an external display to view the interface of SCIZYS software and interact with SCIZYS S1. See *1.8 Required Peripherals and Hardware* for display specifications.
2	Ethernet	8P8C modular connection, 10/100/1000 Mbit/s	Connect to a network to transfer scanned images, access the Internet etc. Not a requirement for SCIZYS S1's primary function.
3	USB	USB 2.0, 480 Mbit/s 5 V, 500 mA	Connecting peripherals to SCIZYS S1, such as a mouse, keyboard, external storage device etc.
4	USB	USB 2.0, 480 Mbit/s 5 V, 500 mA	
5	USB	USB 2.0, 480 Mbit/s 5 V, 500 mA	

Table 3-2 Specifications of the Rear I/O Panel.

3.2.2 Power Input Panel

The Power Input Panel features SCIZYS S1's main power-related interfaces. See *Table 3-3* for a complete specification of the interfaces and their intended use.

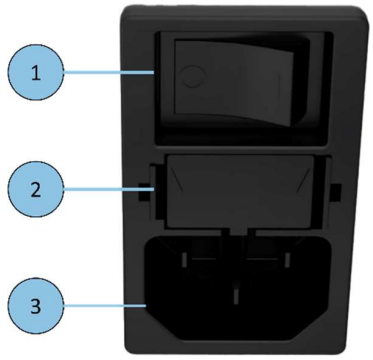


Figure 3-7 Power Input Panel.

Number	Name	Intended Use
1	Power Switch	Switching SCIZYS S1's power supply on and off.
2	Fuse Compartment	Contains the fuse which will automatically turn off the power supply in the case of overcurrent. The fuse must be replaced by an authorised service technician.
3	Power Supply Port (grounded - IEC 60320 C13/14)	Port for connecting SCIZYS S1's AC Power Cord.

Table 3-3 Specifications of the Power Input Panel.

⚠**DANGER!** Only connect SCIZYS S1 to a grounded power outlet.

⚠**DANGER!** Do not replace the fuse by yourself. Contact an authorised service technician if the fuse is burnt out.

3.2.3 Front USB Ports

The Front USB Ports (*Figure 3-8*) are ideal for external storage devices such as USB flash drives, which can be used to transfer scanned images.

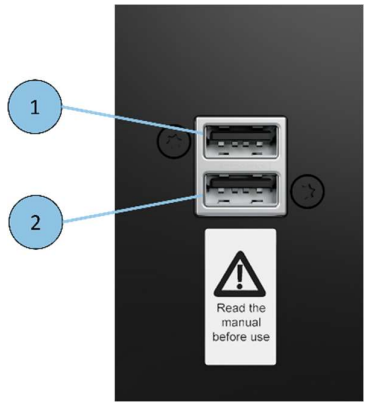


Figure 3-8 Front USB Ports.

Number	Interface	Specification	Intended Use
1	USB	USB 2.0, 480 Mbit/s 5 V, 500 mA	Connecting external storage devices and peripherals to SCIZYS S1.
2	USB	USB 2.0, 480 Mbit/s 5 V, 500 mA	

Table 3-4 Specifications of the Front USB Ports.

3.3 Slide Holder

The slide holder (SCIZYS SH1) holds up to four slides and is placed on the Stage.

Figure 3-9 Slide holder with no slides.

Figure 3-10 Slide holder with four slides.

NOTE! The SCIZYS S1 slide holder is only to be replaced by official Lumito AB spare parts. See *1111 Spare Parts and Accessories* for more information.

3.4 Slide and Coverslip Compatibility

The slide holder is compatible with slides of sizes 26x76 $^{+0}_{-1}$ mm according to ISO 8037-1:1986 (*Figure 3-11*).

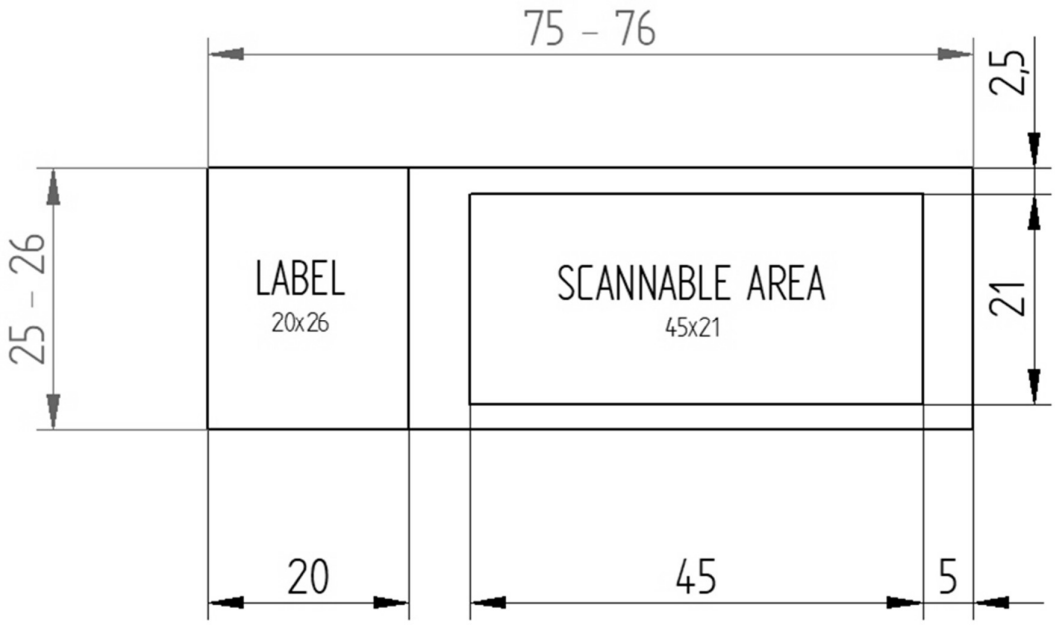


Figure 3-11 Dimensions of a slide compatible with the SCIZYS S1 slide holder. Supported label dimensions and scannable area highlighted.

The slide holder can hold up to four slides using its slide position springs. *Figure 3-12* illustrates the standard position numbering of slides on the SCIZYS S1 slide holder.

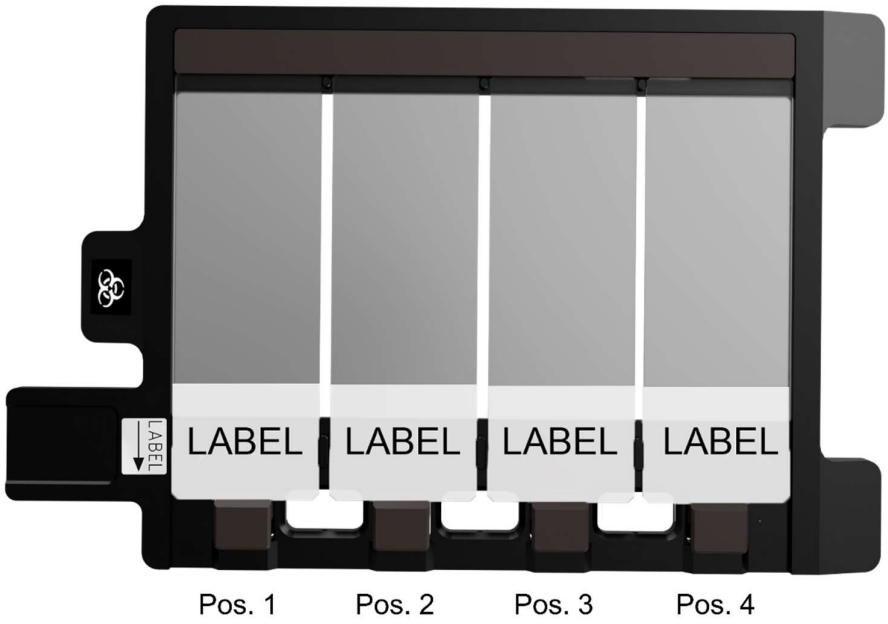


Figure 3-12 Overview of the standard positions of the slide holder.

SCIZYS S1 is designed for coverslips with a thickness of 0.17 mm. Coverslips #1.5 or #1.5H are recommended for use with SCIZYS S1.

3.5 Barcode Compatibility

The Label area of the slide (*Figure 3-11*) is designed to accommodate 1D or 2D barcode labels (*Figure 3-13*). Barcodes are read during scanning and used to generate filenames for the image files that are saved on the internal storage of SCIZYS S1. *Table 3-5* shows the list of supported 1D and 2D barcodes.

Barcode Category	**Compatible Types**
1D (linear)	CODE-39, CODE- 128, CODE-2-of-5 Interleaved (ITF) and Codabar.
2D (matrix)	QR Code and Data Matrix

Table 3-5 Supported barcode types.

Figure 3-13 Examples of supported of 1D and 2D barcodes respectively.

NOTE! The default file name of each scanned slide is set by their respective barcode label. If no 1D or 2D barcode label is present, a generic file name will be generated which can also be manually edited. See *6.6 Standard File Names of Scanned Slides* for more information about filenames.

4. Installation

Unpacking, installation and first start-up are carried out by an authorised service technician.

5. Moving SCIZYS S1

Contact an authorised service technician to physically move SCIZYS S1 to another location. Lifting Assembly Kit shall be made available to the authorised service technician before SCIZYS S1 can be moved.

6. Operation

6.1 Preparing the Slides Before Use

UCNP labelled samples shall be prepared following the instructions for use included in the SCIZYS reagent kit.

⚠**WARNING!** Do not use flammable and combustible organic solvents, including sealing agents such as nail polish, in combination with SCIZYS S1 due to potential damage to SCIZYS S1 and fire hazard.

6.2 Turning on SCIZYS S1 and Starting SCIZYS Software

1. Flip the Power Switch (*Figure 3-7*) to its ON state, indicated by the "I".

2. Press the Power Button (*Figure 3-1*) and wait for the system to boot up.

3. Log in to Windows. SCIZYS software will automatically initialise when logged in (*Figure 6-1*).

⚠**WARNING!** Do not place your hand in the Loading Compartment or otherwise operate SCIZYS S1 during the initialisation or self-check.

4. Wait until SCIZYS software has started and the prompt to insert new slides is displayed on the screen (*Figure 6-2*).

ℹ**NOTE!** SCIZYS software will initiate a self-check when SCIZYS S1 is powered on. This process may take up to 10 minutes and ensures that the imaging system is properly calibrated and maintained. The Loading Door will automatically open and close during the initialisation and self-check.

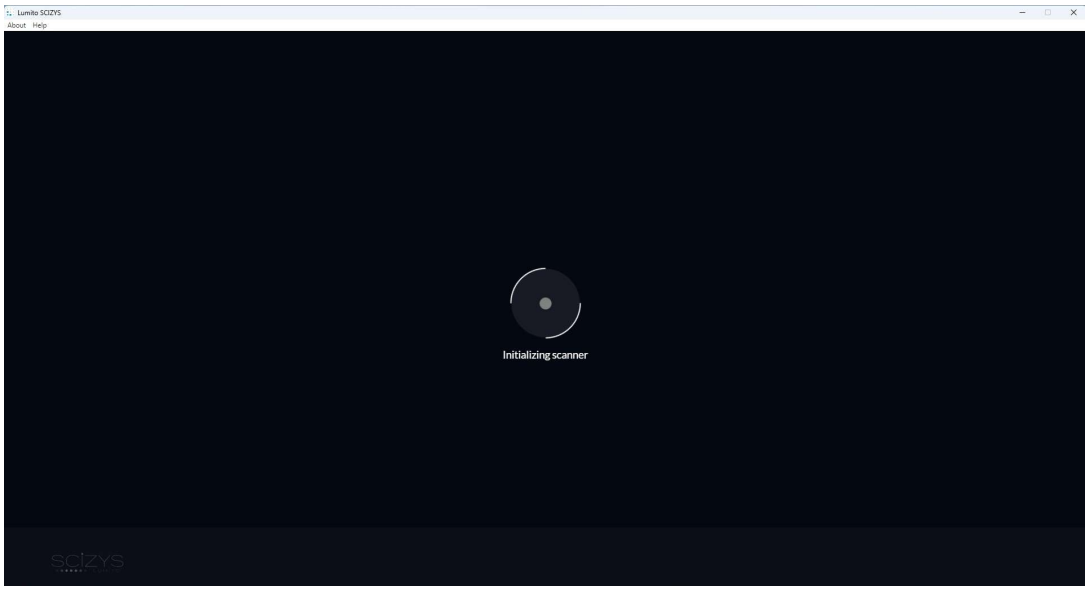


Figure 6-1 Initialisation of SCIZYS S1.

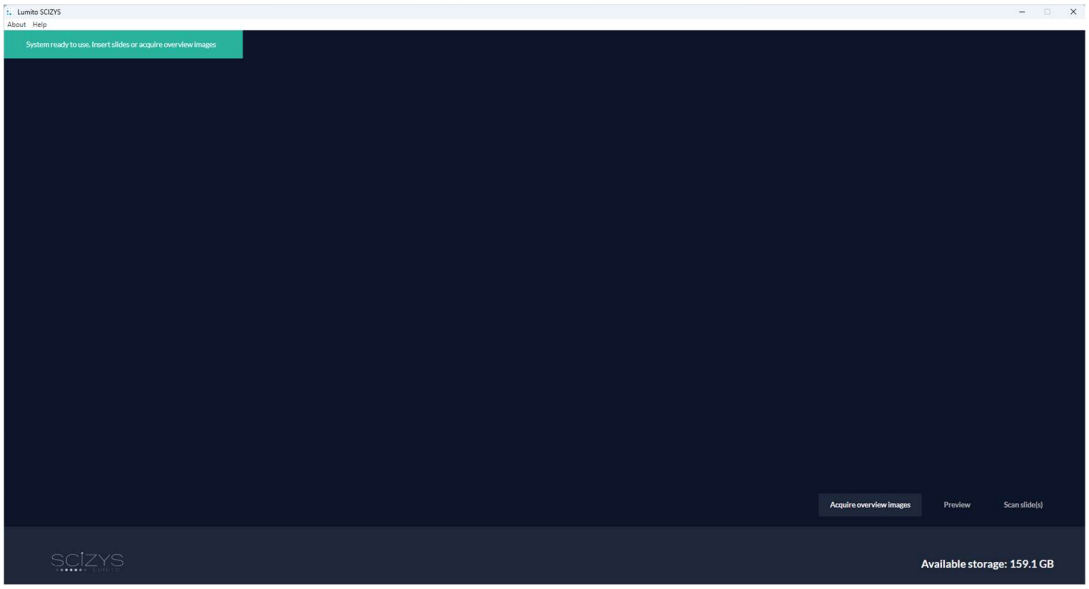


Figure 6-2 SCIZYS software with the prompt to insert new slides displayed on the screen.

5. If needed, click **Acquire overview images** (*Figure 6-3*) to image the slides that are in SCIZYS S1 without taking out the slide holder.

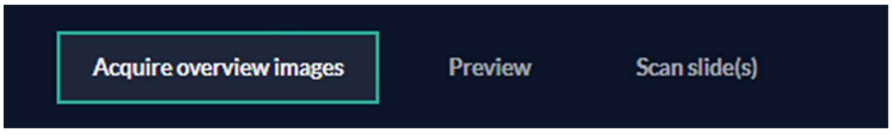


Figure 6-3 Acquire overview images.

6.3 Loading of Slides

1. Press the Loading Door Button (*Figure 6-4*) on SCIZYS S1 to open the Loading Door.

Figure 6-4 Closeup of the Loading Door Button.

⚠**WARNING!** Only use the Loading Door Button to open the Loading Door. Do not force it open by hand due to risk of pinch point injuries and damage to SCIZYS S1.

⚠**CAUTION!** Do not place any objects under the Loading Door while it is closing due to the risk of damage to SCIZYS S1.

2. Gently lift the slide holder using the tab and then pull it outwards as indicated in *Figure 6-5*.

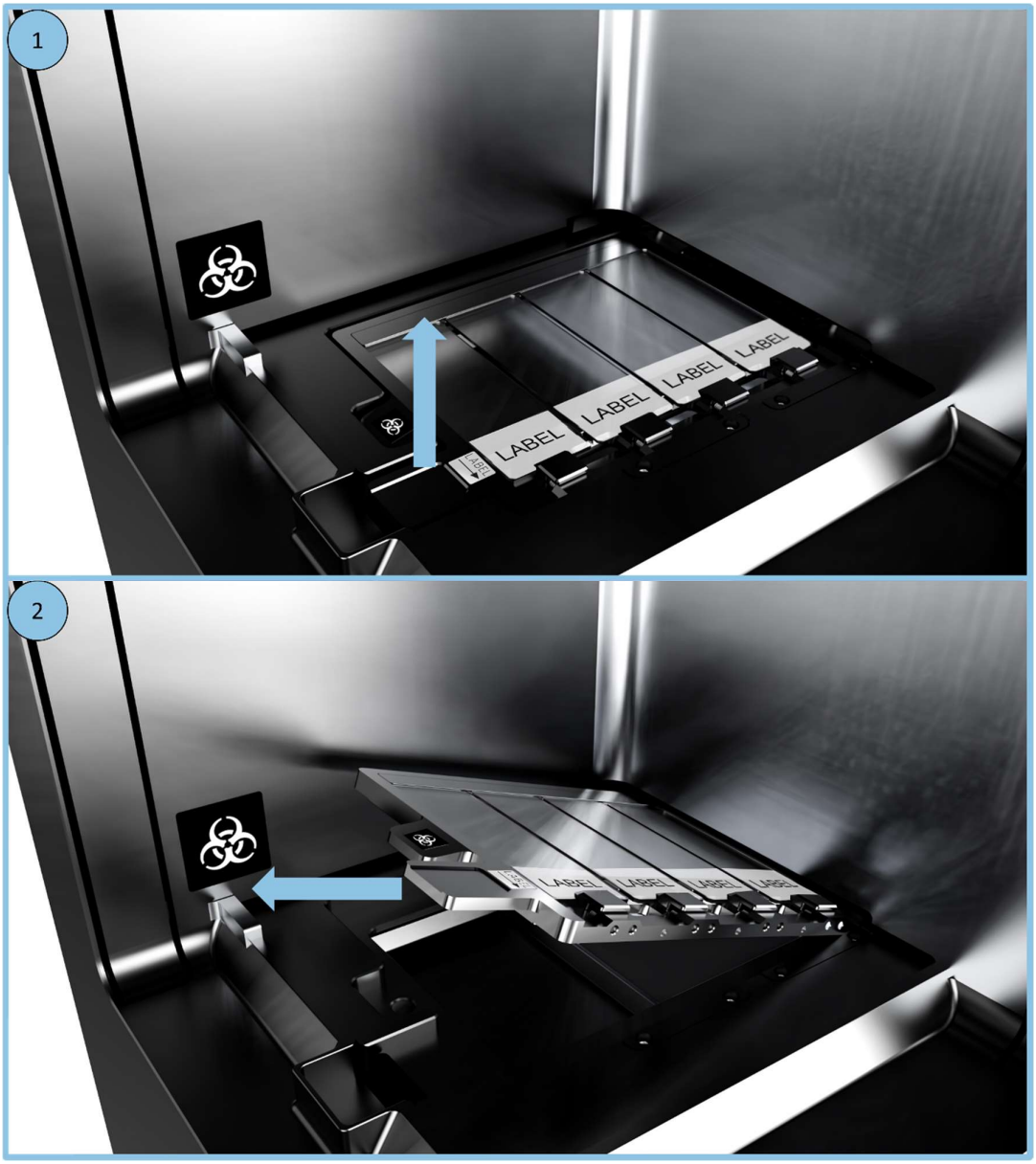


Figure 6-5 Removal the slide holder from the Loading Compartment.

3. Place the slide holder on a flat and clean surface such as a table.

⚠**CAUTION!** Check that there is no dust or other unwanted particles on the slides or the slide holder due to risk of elevated heating and damage to SCIZYS S1. If needed, clean the highlighted surfaces on the slide holder using a lint-free microfibre cloth (*Figure 6-6*).

Figure 6-6 Surfaces to clean on the slide holder highlighted in blue.

⚠**CAUTION!** Wipe off the slides using a lint free wipe (*e.g.* Kimwipes™). The slides must be free from dust, fibres, or other contaminants.

4. Place the slides into the slide holder. Note that the coverslip shall be facing up. The slide label shall be on the same side as the slide position springs, as shown in *Figure 6-7*.

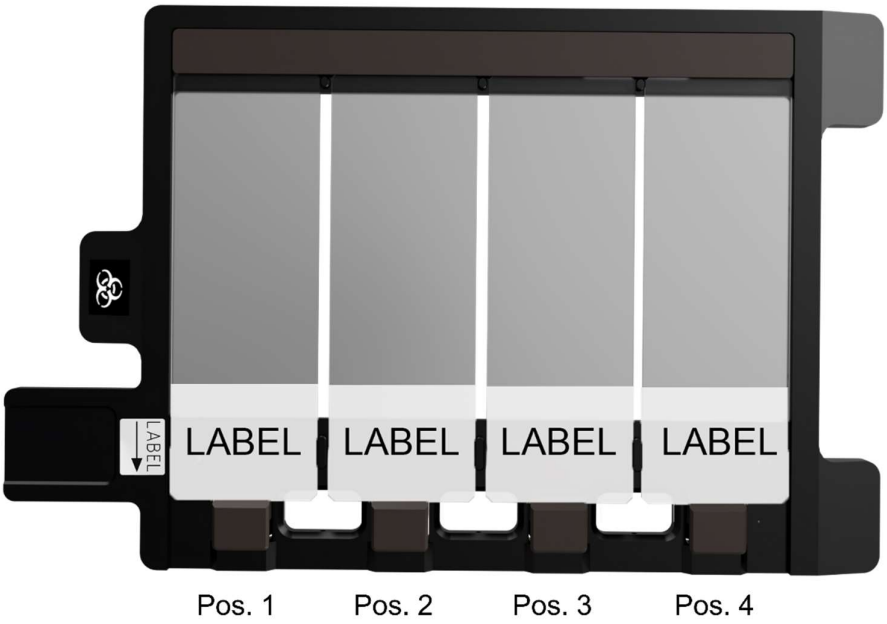


Figure 6-7 The SCIZYS S1 slide holder with four slides.

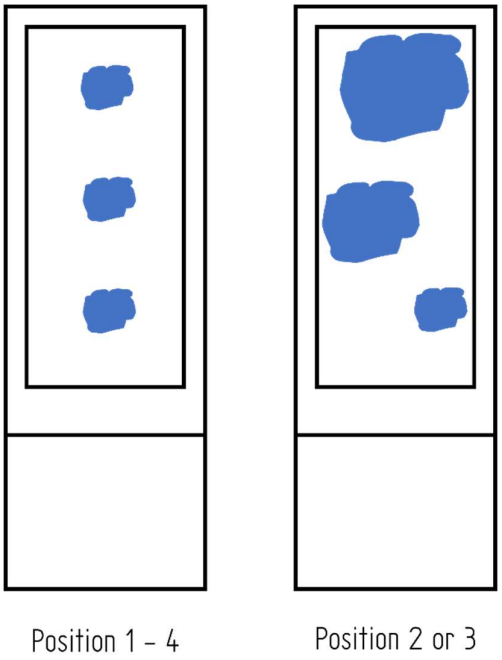


Figure 6-8 Examples of small and large samples with recommended positions in the slide holder.

⚠**CAUTION!** Check that the slides are correctly mounted in the slide holder and are not tilted. Tilted slides may lead to unsatisfactory results and slide breakage.

NOTE! For uniform illumination over the entire sample, place slides with samples closer to the edges of the scanning area at positions 2 and/or 3 of the slide holder (*Figure 6-8*). Brightfield illumination is somewhat limited near the edges of position 1 and 4.

5. If the Loading Door has automatically closed, press the Loading Door Button (*Figure 6-4*) to reopen the Loading Door.

⚠**CAUTION!** Check that there is no dust or other unwanted particles on the underside of the slide holder or the Stage. If needed, clean the highlighted surfaces on the slide holder and the Stage using a lint-free microfibre cloth (*Figure 6-9*).

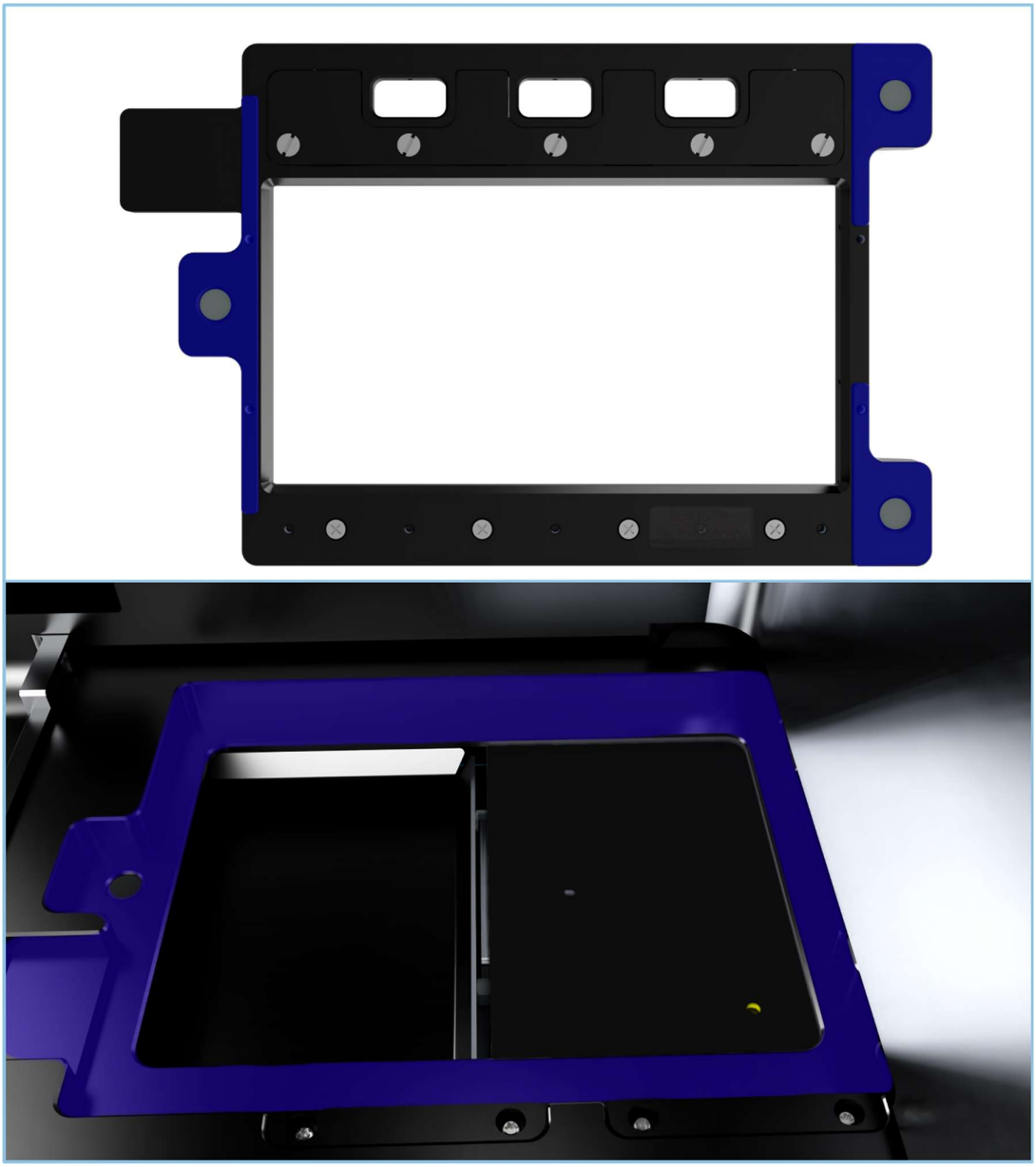


Figure 6-9 Zones to clean on the slide holder (top) and the Stage (bottom), highlighted in blue.

6. Firmly grip the slide holder by the highlighted area (*Figure 6-10*), then gently fit the slide holder onto the Stage (*Figure 6-11*). The magnets on slide holder will guide it into place. Note the alignment of the slide holder according to *Figure 6-11*.

Figure 6-10 Highlighted area (blue) to hold the slide holder when placing it in the Loading Compartment.

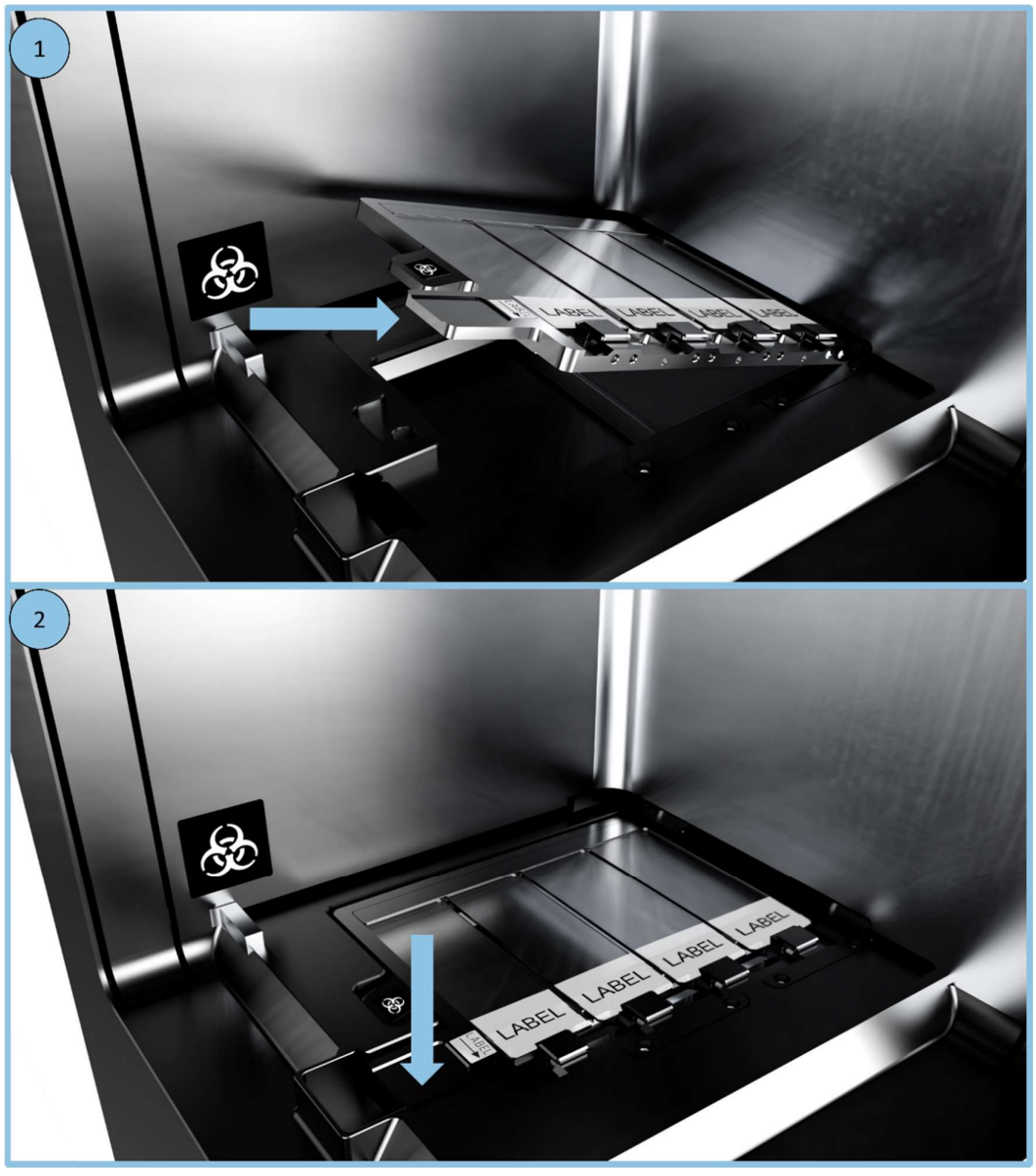


Figure 6-11 Insertion of the slide holder into Loading Compartment and placement on Stage.

7. Press the Loading Door Button (*Figure 6-4*) to close the Loading Door. The button and the Loading Compartment LED light will blink for a few seconds before the Loading Door closes.

6.4 Cautions Regarding the Loading Door

- The Loading Door will automatically close after 10 minutes.

- To alert the user of the risk of pinching, the Loading Compartment LED light will start blinking when the Loading Door is about to close.

⚠**WARNING!** Do not insert your hand into the Loading Compartment when the Loading Compartment LED light is blinking to avoid the risk of pinching.

NOTE! Overview images of the slides are automatically captured in SCIZYS software when the Loading Door closes (*Figure 6-12*).

NOTE! The acquisition of overview images can be aborted by pressing the Loading Door Button.

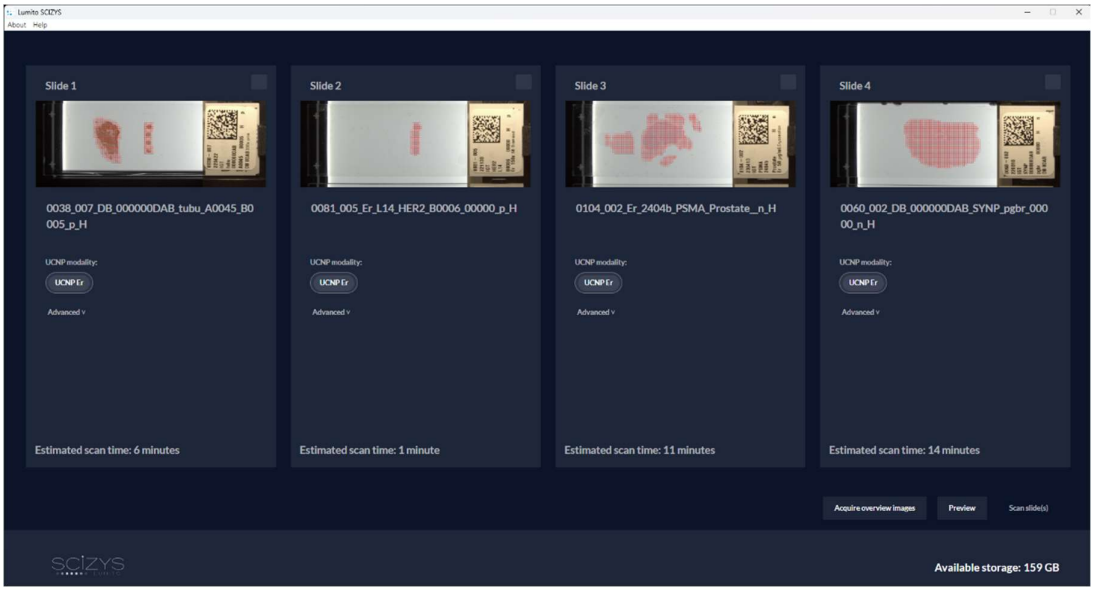


Figure 6-12 Overview images.

6.5 Adjusting Scan Settings

6.5.1 Choosing Modality

1. Click the **UCNP Er** button to select UCNP modality (*Figure 6-14*). Brightfield modality is always included (*Figure 6-13*).

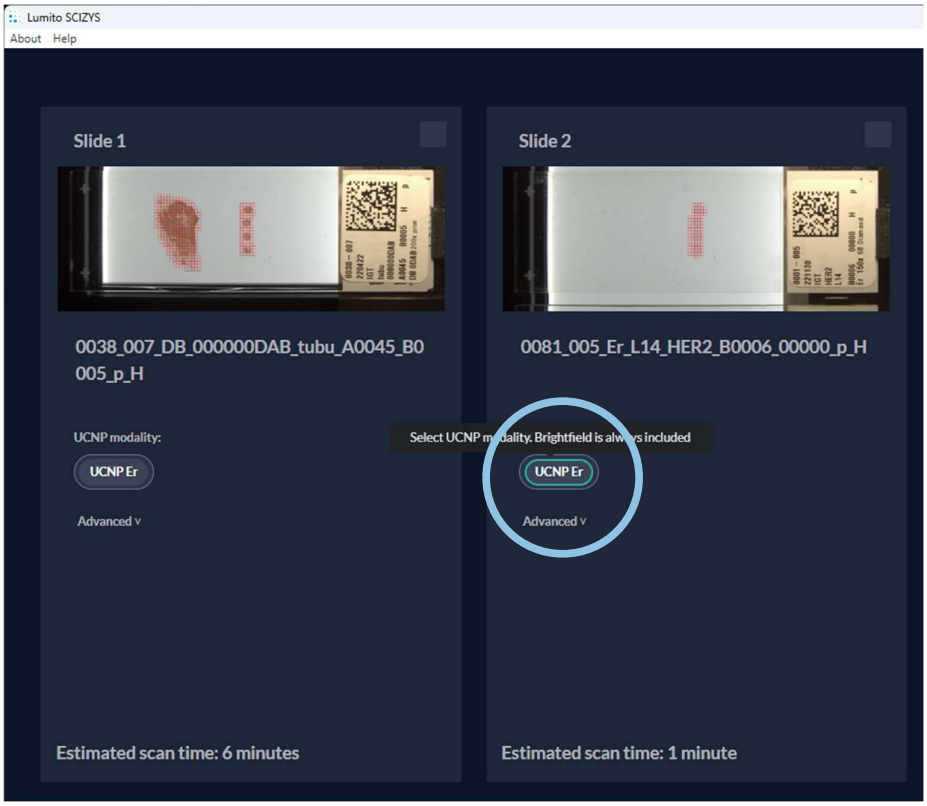


Figure 6-13 Modality "Brightfield and UCNP" (UCNP Er) not chosen.

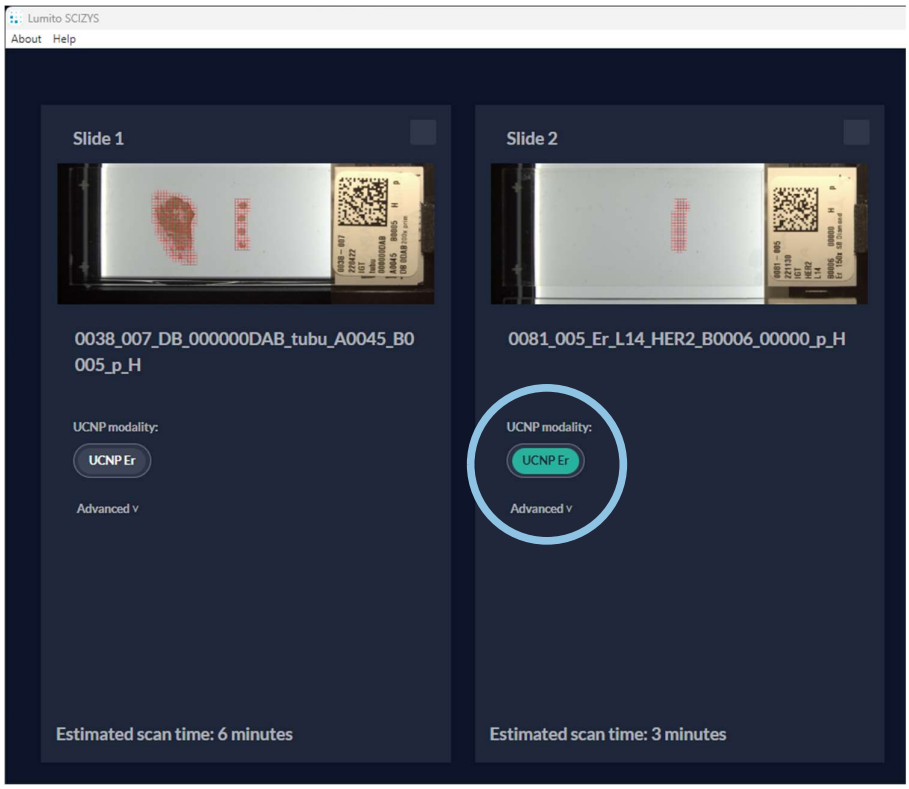


Figure 6-14 Modality "Brightfield and UCNP" (UCNP Er) chosen, indicated by the UCNP Er button turning green.

6.5.2 Advanced UCNP Settings (Only Applicable to UCNP Modality)

1. To set a custom UCNP exposure time, click **Advanced** and type a desired value (ms) in the UCNP Er field (*Figure 6-15*).

Figure 6-15 UCNP Er exposure time setting. 150 ms is the default exposure time.

NOTE! The adjustable exposure time range is 1 – 500 milliseconds.

6.6 Standard File Names of Scanned Slides

This section describes the structure of the default file names of scanned slides that are generated depending on the settings in SCIZYS software. The following conditions apply for standard file naming:

- If the slide label contains a compatible 1D or 2D barcode, the image filename will be set by the barcode. See *3.5 Barcode compatibility* for more information about compatible barcode types.
- If the modality was set to only Brightfield, the file names will end with "_BRIGHTFIELD".
- If the modality was set to Brightfield and UCNP, the file names will end with "_BRIGHTFIELD" and "_UCNPER", respectively, where ER stands for erbium.
- If the slide label does not contain any compatible 1D or 2D barcodes, the files will be named on the format:
  NO_BARCODE_IN_SLOT_X_TIMESTAMP-yyyy-mm-dd_HH-MM

In which:

- SLOT x is the position in the slide holder into which the slide is inserted (*Figure 3-12*).
- TIMESTAMP represents the current date (YYYY-MM-DD) and time (HH-MM).

6.7 Changing Default File Names

The scanned slides' default filenames can be renamed in SCIZYS software according to the user's preferences:

1. Click on the **file name** (Sample Name) and edit as desired (*Figure 6-16*).

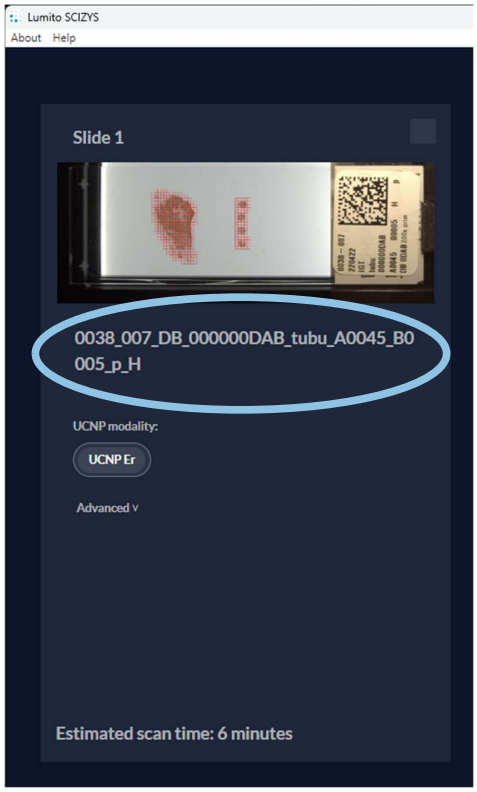


Figure 6-16 Sample Name highlighted.

2. Click **OK** to apply the changes (*Figure 6-17*).

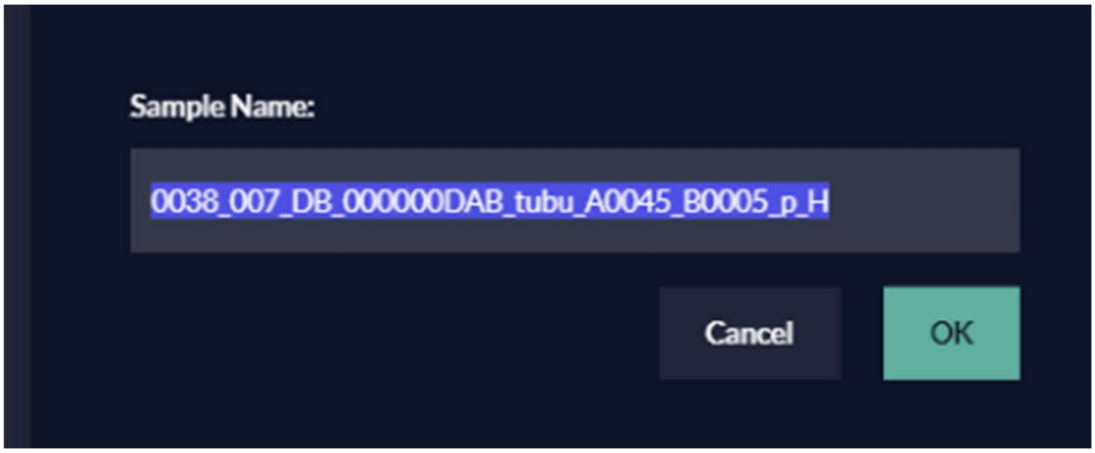


Figure 6-17 Sample Name main window.

NOTE! The file name supports the following characters:

- Numbers (0-9)
- Upper- and lowercase letters (a-z, A-Z)
- Underscore (_)
- Hyphen (-)

6.8 Adjusting Region of Interest (ROI)

A suggested Region of interest (ROI) will be added by the software, but the suggested ROI can be manually updated:

1. Click the **Overview Image** to show the ROI window of the desired slide (*Figure 6-18*).

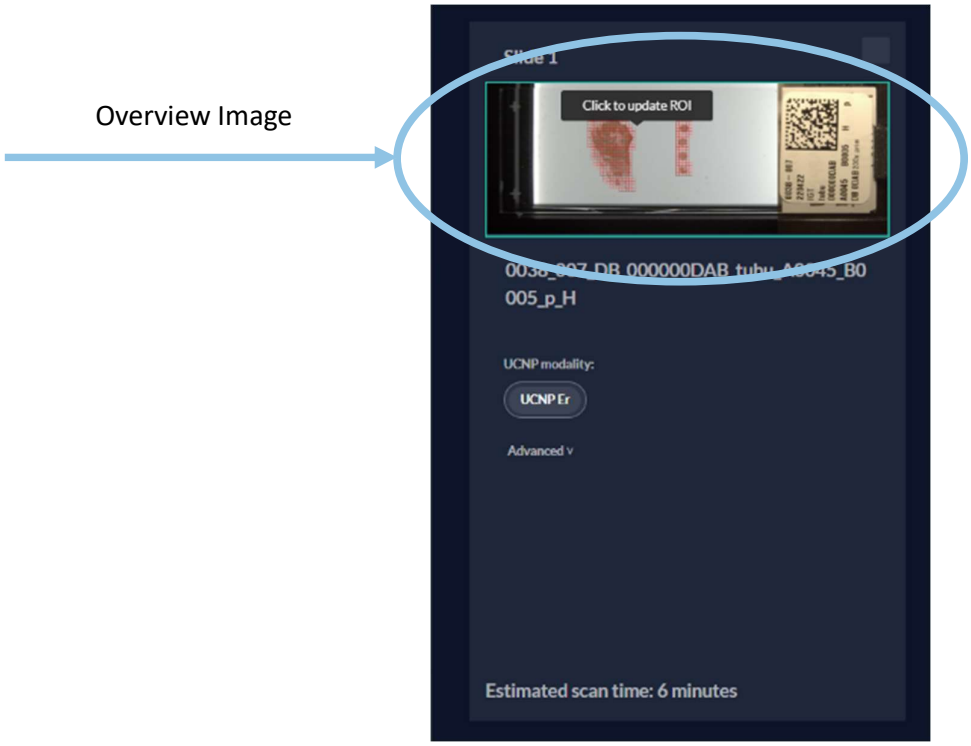


Figure 6-18 Overview highlighted which, when clicked, opens the ROI window.

2. The ROI window has controls to aid in setting the ROI, see *6.8.1 ROI Window Sliders and Functions* for a complete description of the sliders and functions.

a. To add to the ROI, place the cursor on the desired part of the image and click the left mouse button. To remove from the ROI, click the right mouse button.

b. Adjust the desired:
   - Size of the ROI brush tool.
   - Transparency of the ROI overlay.
   - Brightness and contrast of the image.
   - Zoom level of the image using shift and the mouse scroll wheel.

c. Click **Next** or **Done** when the ROI has been set as desired.

NOTE! The size of the ROI brush tool can also be adjusted using the scroll wheel.

NOTE! Set the ROI so that it is within the area of the specimen. Including empty areas in the ROI will result in longer scan times. See *6.8.2 Guidelines for Optimal ROI Settings* for more information on how to set optimal ROI.

3. Verify that the ROI is set as desired. The slide is highlighted by a white frame and a green checkmark, indicating that the slide will be added to the next scan (*Figure 6-19*). To further adjust the ROI, repeat steps 1-2.

   The estimated scan time is given under each respective slide and is adjusted as the ROI is changed.

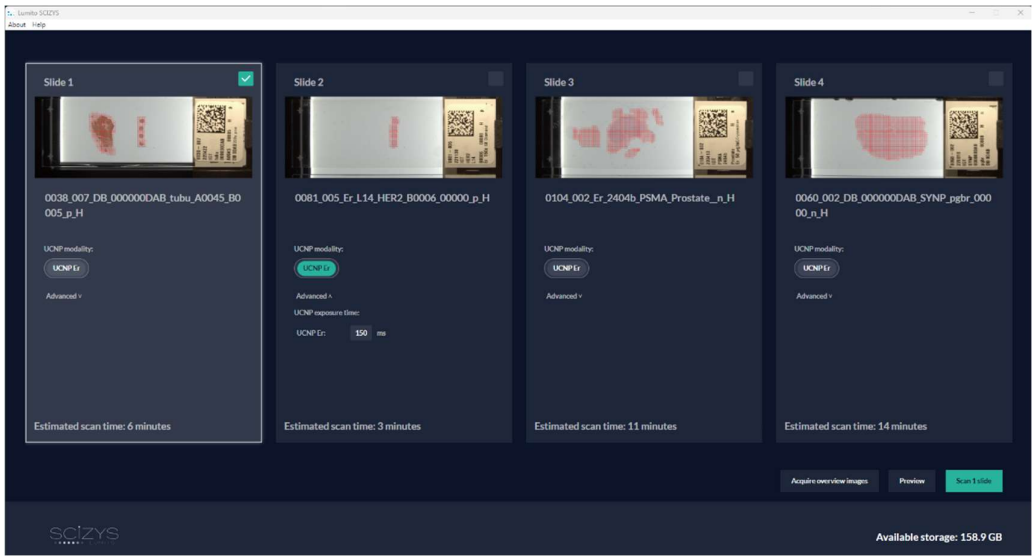


Figure 6-19 Slides with ROIs.

NOTE! If needed, slides with a set ROI can be selected or deselected by checking or unchecking their checkbox. Only checked slides are added to the scanning queue.

4. Repeat steps 1-3 for every slide in the batch as needed until they are ready for scanning and highlighted by a white frame and a green check-mark, as shown in *Figure 6-20*.

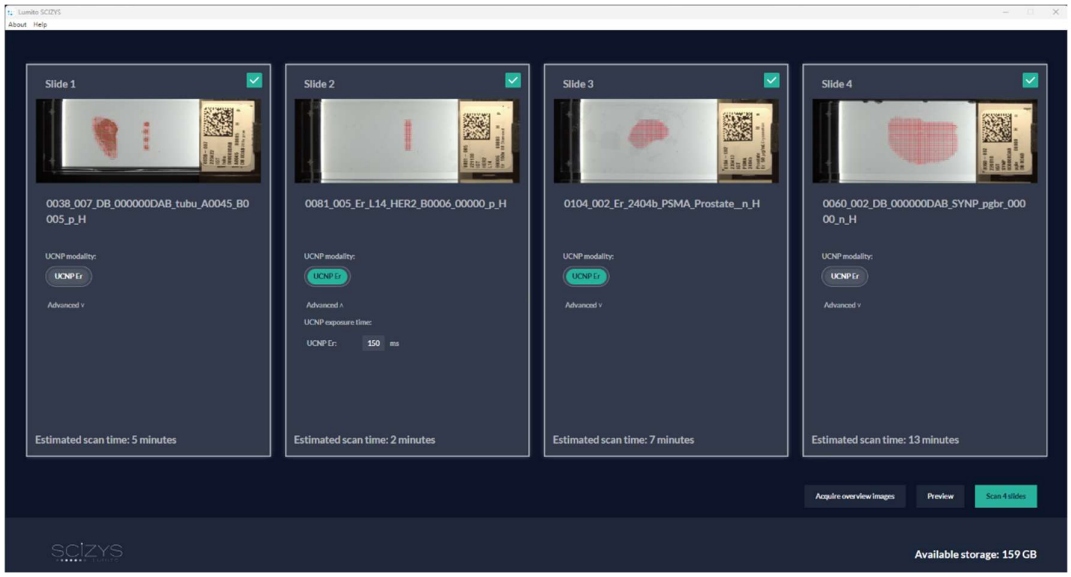


Figure 6-20 Four slides added to the scanning queue.

6.8.1 ROI Window Sliders and Functions

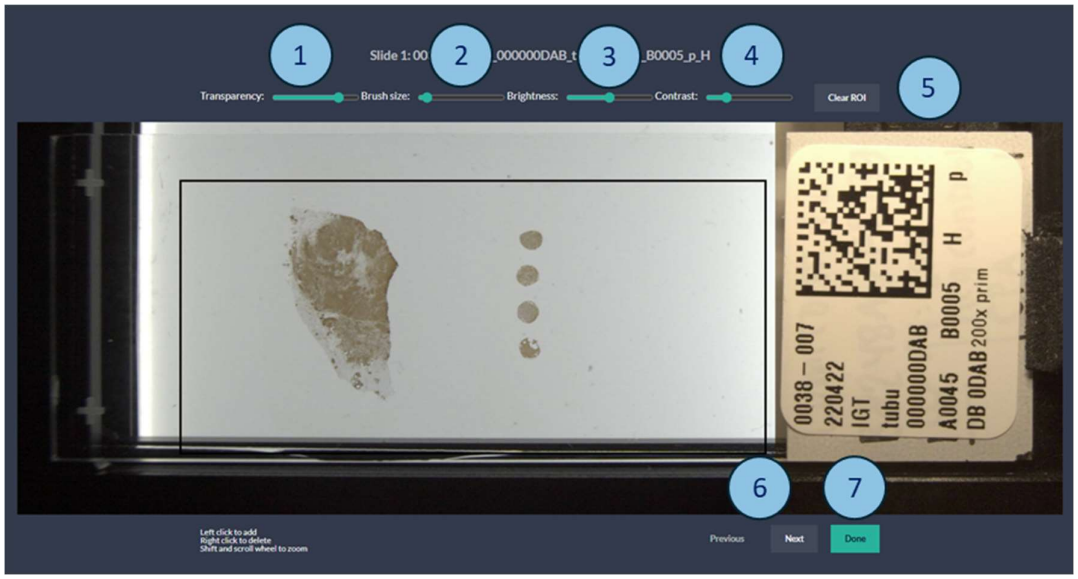


Figure 6-21 ROI window with sliders.

Control	Description
1	Adjusts the transparency of the ROI overlay.
2	Resizes the ROI brush tool (size of square).
3	Adjusts the brightness of the overview image.
4	Adjusts the contrast of the overview image.
5	Clears the chosen ROI.
6	Confirms the ROI placement and moves to next/previous slide
7	Confirms the ROI placement and closes the ROI window.

Table 6-1 Sliders and functions in the ROI window.

6.8.2 Guidelines for Optimal ROI Settings

To ensure optimal scan results and scan times, set the ROI on the sample with minimal empty areas. See *Figure 6-22* and *Figure 6-23* for examples of optimal and less-than-optimal ROI placements respectively.

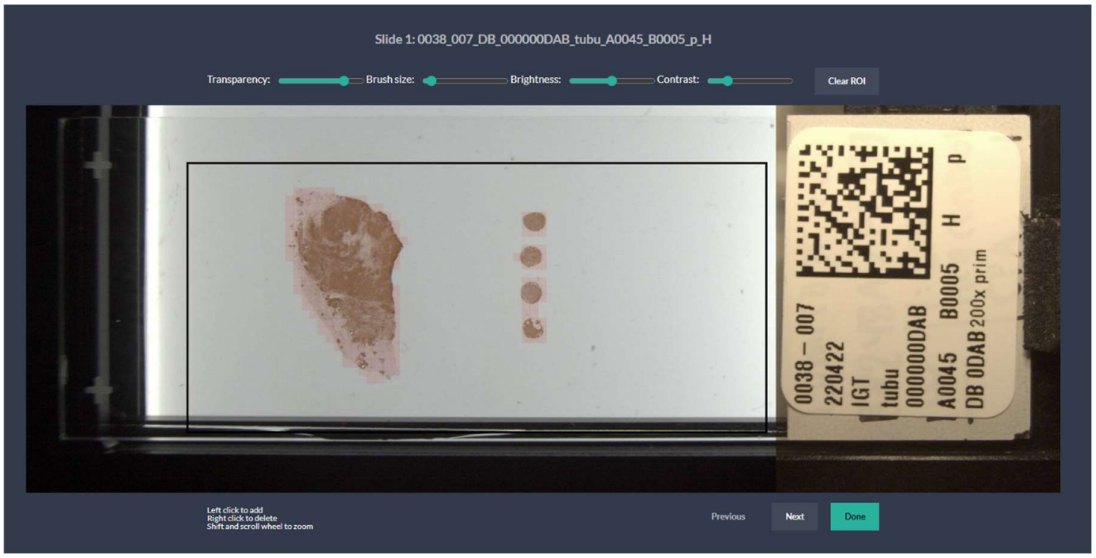


Figure 6-22 Example of optimal ROI placement, set within the area of the specimen.

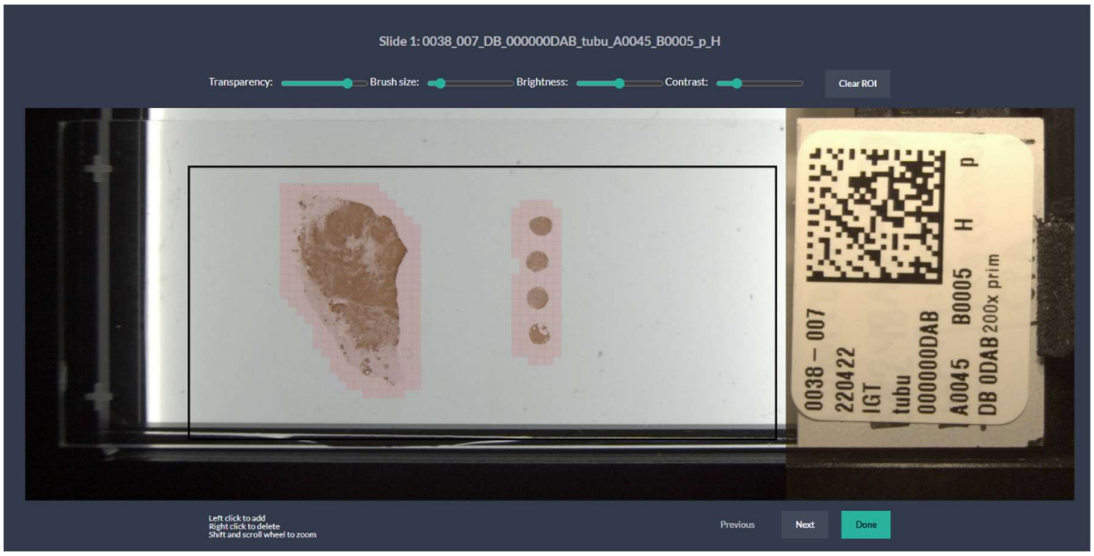


Figure 6-23 Example of less optimal ROI placement, including superfluous empty areas.

6.9 Scanning

1. To start the scan of the slides in the batch, click the **Scan slides** button (*Figure 6-24*).

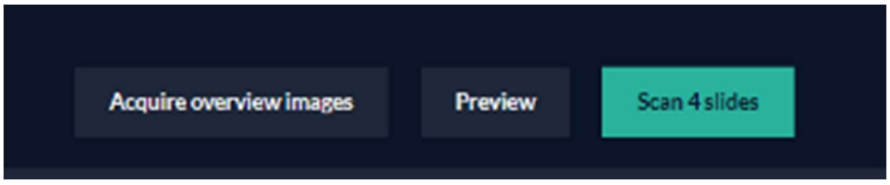


Figure 6-24 Scan button ("Scan 4 slides") starts the scanning process. In this case, four slides have been selected for scanning. The number changes depending on the number of slides selected.

2. Wait for the scan to finish. The progress of each slide will be displayed on the screen along with information about the estimated scan time (*Figure 6-25*). During scanning a preview of the latest scanned tile is shown.

NOTE! The previews shown during scanning are not colour or background corrected and will thus not fully reflect the quality of the finished whole slide image.

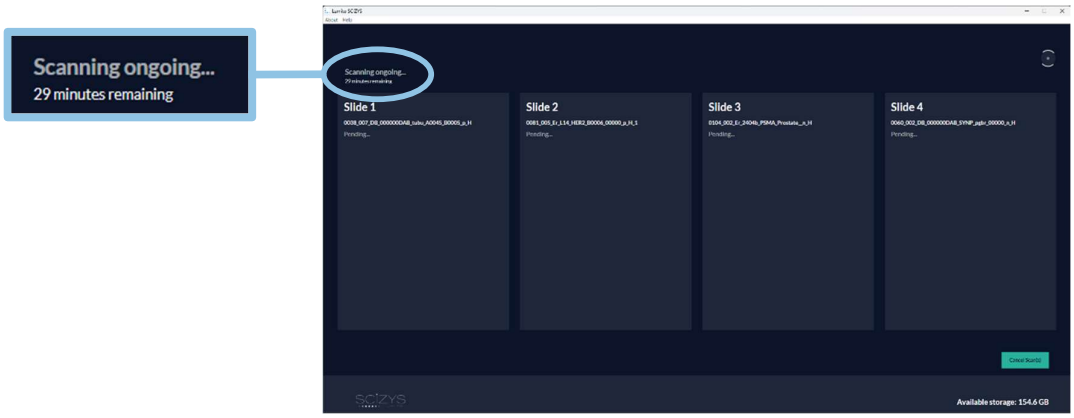


Figure 6-25 Scanning in progress, estimated scanning time shown at the top-left of the screen.

3. A filled green progress bar with a white checkmark and the status “Done”, indicates that the scanning is complete for an individual slide (*Figure 6-26*). The files of the completed slides are immediately available in the save location.

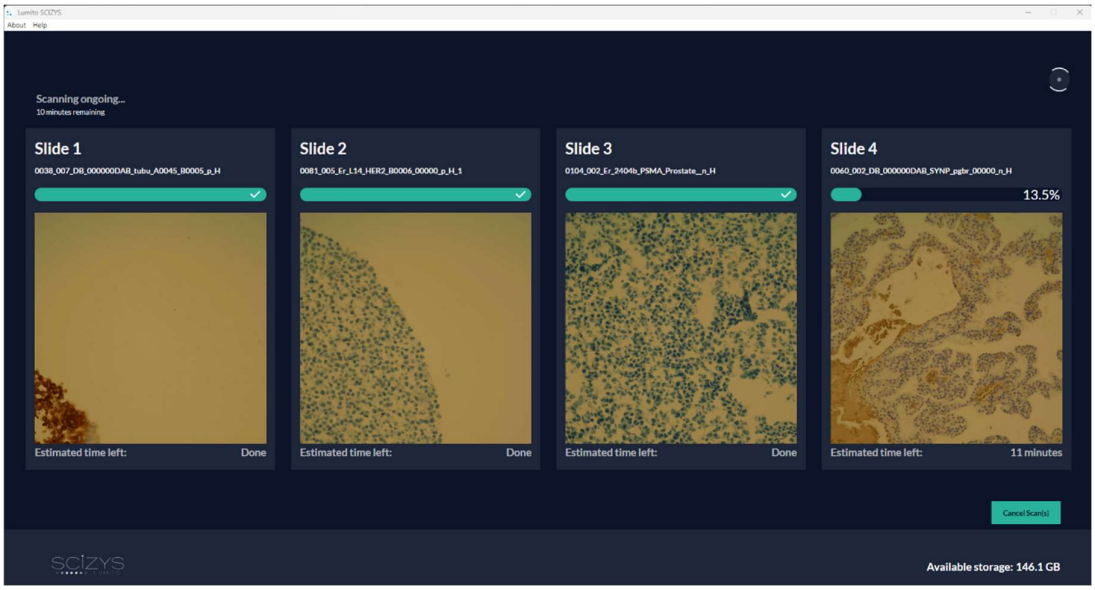


Figure 6-26 Completed scans indicated by filled progress bars and “Done” as status. In this case, three out of four slides have finished.

NOTE! Based on the ROI selected by the user, the estimated scan time will be different for each slide. The estimated time of completion for each individual slide is displayed in their respective progress window.

4. Verify that the scanning of all slides in the queue has finished successfully, indicated by the green filled progress bars with white checkmarks and the message “Scan complete” (*Figure 6-27*).

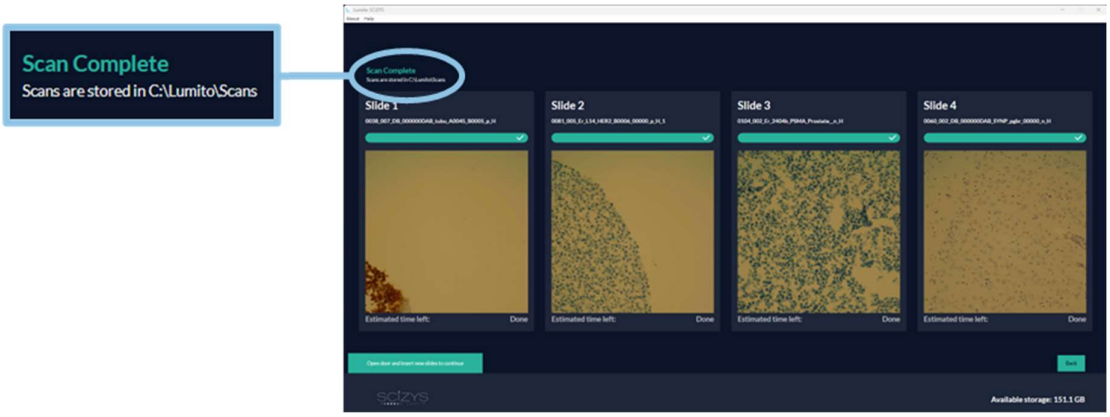


Figure 6-27 Finished scan operation of four slides.

6.10 Viewing the Scanned Images

The scanned images are saved locally on SCIZYS S1 in the *.ome-tiff* format and can be viewed with a compatible *.ome-tiff* viewer. The save location is C:\Lumito\scans.

NOTE! SCIZYS S1 does not come with a preinstalled viewer. It is recommended to transfer the files and view them in another system with a compatible *.ome-tiff* viewer.

6.11 Unloading the Slides After Scanning

1. Press the Loading Door Button on SCIZYS S1 (*Figure 6-4*). The button may blink for a few seconds before opening the Loading Door.

WARNING! Only use the Loading Door Button to open the Loading Door. Do not force it open by hand due to the risk of pinching and damage to the Loading Door.

2. Gently lift the slide holder using the tab and then pull it outwards as indicated by *Figure 6-5*.

3. Place the slide holder on a flat and clean surface such as a table.

4. Remove the slides from the slide holder by pushing the slide position springs (*Figure 6-28*).

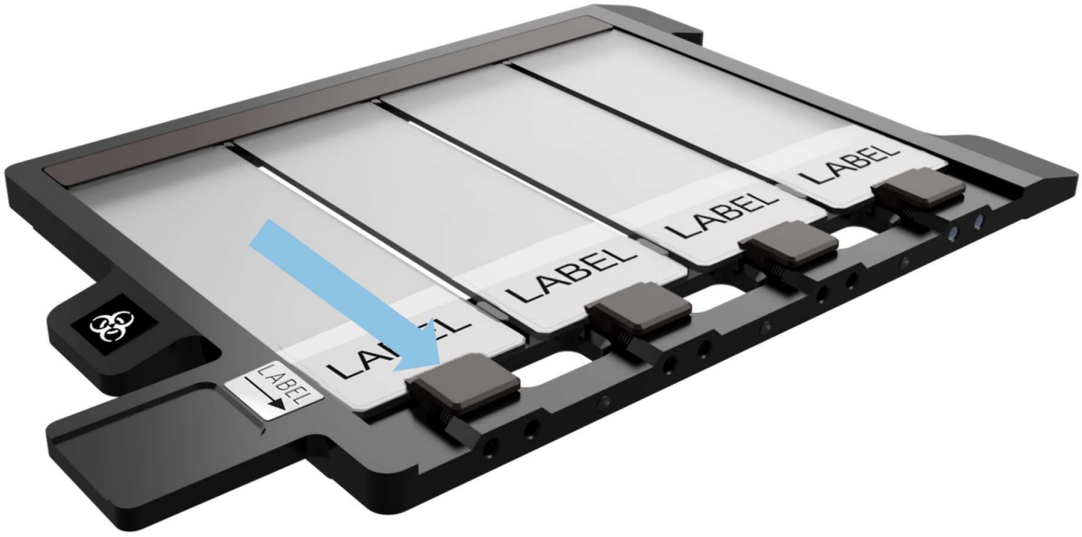


Figure 6-28 Removal of slides from the slide holder by pushing the slide position springs.

5. To put the slide holder back into SCIZYS S1, repeat steps 5-7 as described in *6.3 Loading of Slides*.

6.12 Aborting an Ongoing Scan

1. During an ongoing scan, click **Cancel Scan(s)** and confirm by clicking **Yes** (*Figure 6-29*).

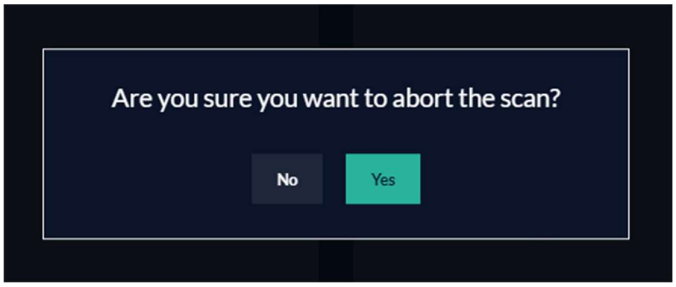


Figure 6-29 Confirmation of aborting scan.

2. After the scanning has stopped, the progress window will show the status of the scan. Slides that were successfully scanned are marked with green filled progress bars with white checkmarks. Images that were not saved are marked with red progress bars or red crosses (*Figure 6-30*). Click **Back** to go back to the overview window (*Figure 6-20*) or open the Loading Door to insert new slides.

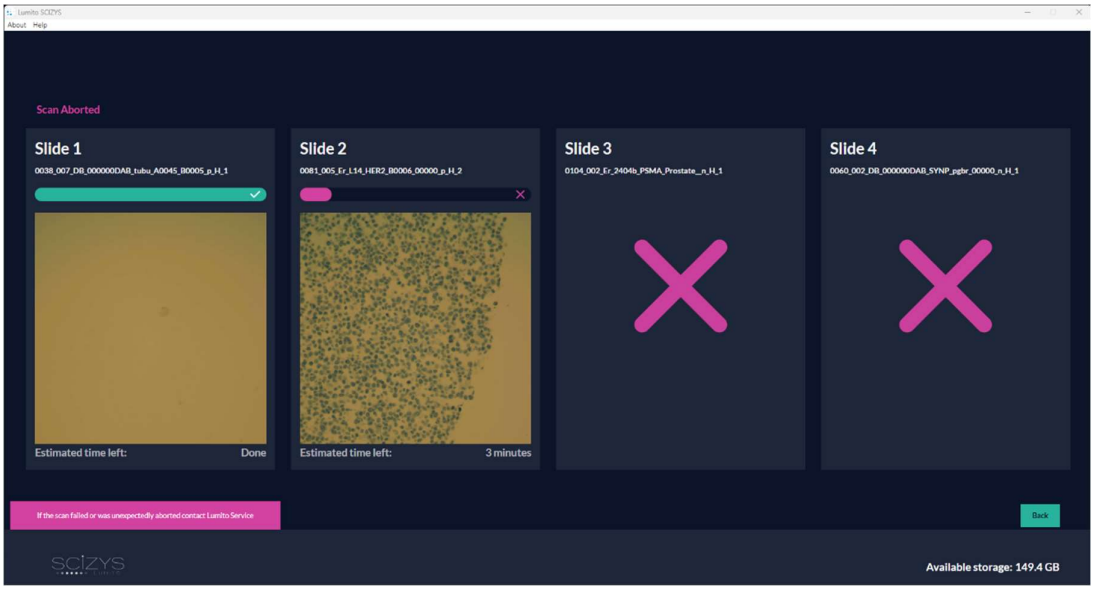


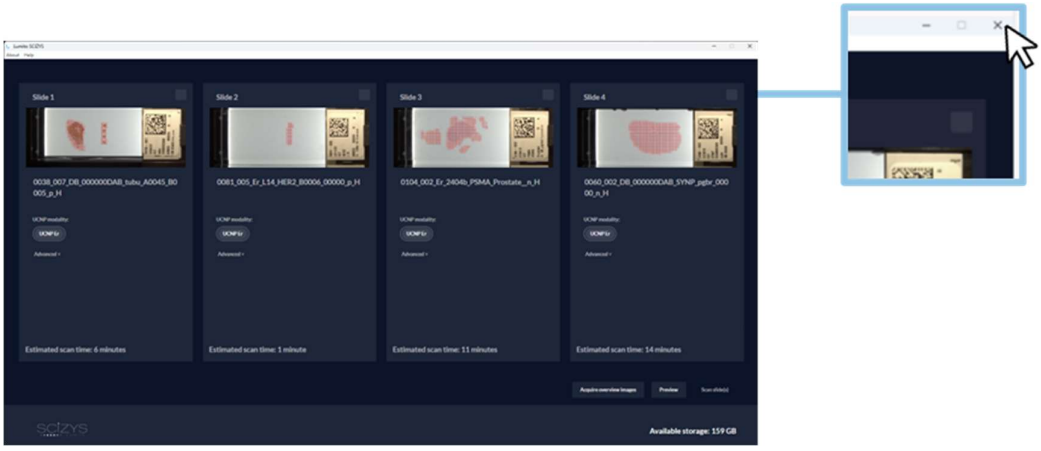
Figure 6-30 Status of scanned images after aborting scan.

NOTE! An ongoing scan can also be aborted by pressing the Power Button or the Loading Door Button.

NOTE! Only the slides that were completed before aborting the scan will be saved in C:\Lumito\scans.

6.13 Closing SCIZYS Software

1. Click the **X** in the top right corner of the SCIZYS software window (



2. Figure 6-31).

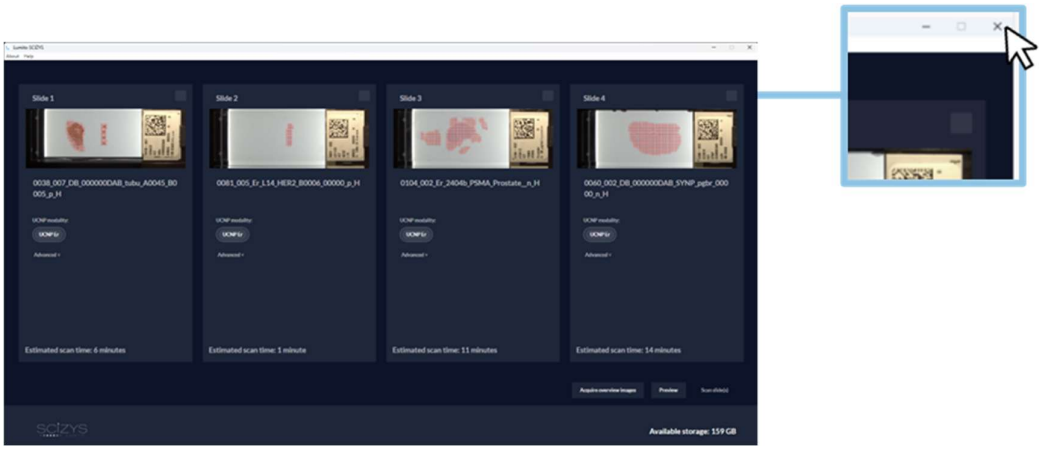


Figure 6-31 SCIZYS software window.

3. Click **Yes** in the window that pops up (*Figure 6-32*)

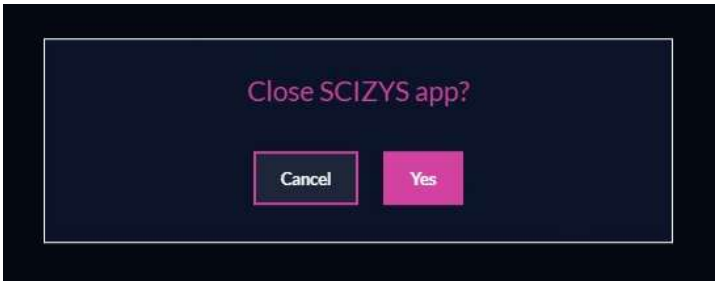


Figure 6-32 Confirmation to close SCIZYS software.

NOTE! The self-check will only run if SCIZYS software is running.

6.14 Turning off SCIZYS S1

1. Close SCIZYS software.
2. Click the **Windows button** then **Power icon** and **Power off** (*Figure 6-33*).

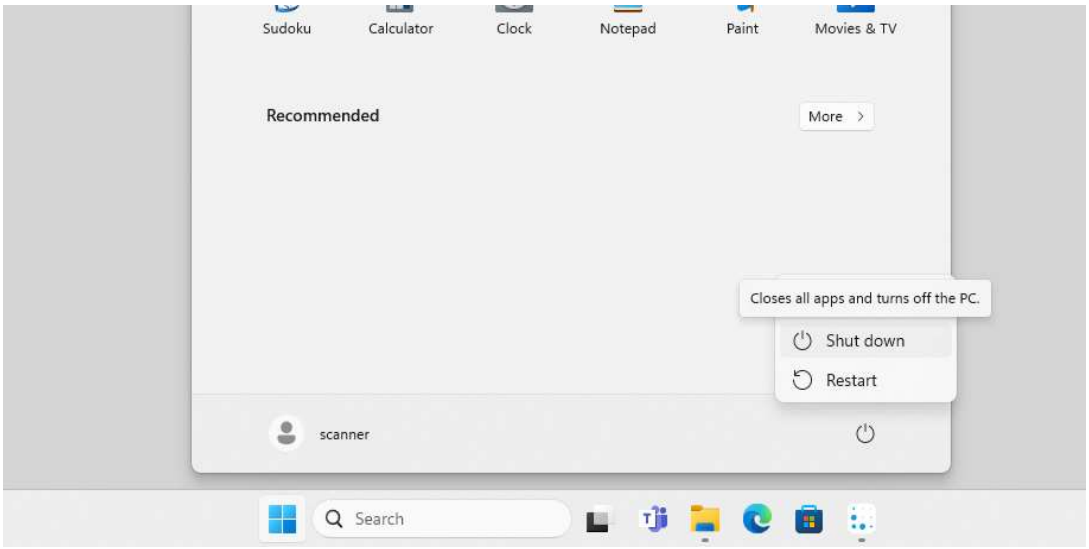


Figure 6-33 Turning off SCIZYS S1.

3. Wait until SCIZYS S1 has fully shut down.

NOTE! While SCIZYS software is running, SCIZYS S1 can also be turned off by pressing the Power Button.

7. Preview Mode

This section covers the use of the preview mode of SCIZYS S1. To enable fast screening of samples, SCZYS S1 has a preview functionality mimicking a traditional optical microscope but with an added UCNP modality.

7.1 Starting the Preview Mode

1. To start the preview mode, click the **Preview** button (*Figure 7-1*).

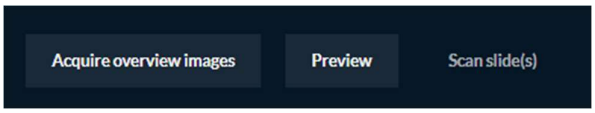


Figure 7-1 SCIZYS software window.

7.2 Operating the Preview Mode

1. Use the drop-down menu at the top left to select which slot to investigate (*Figure 7-2*).
2. In the large overview image use the left mouse button to click the position to image.
3. The scanner will image the selected position, first focusing and then acquiring a brightfield image.
4. The resulting image will be shown to the right.
5. Clicking at a new position in the overview image will result in a new image.
6. A new image can also be acquired by moving the red marker in the overview image using the x/y buttons in the **Stage box** and then pressing the **Acquire image** button.

NOTE! Subsequent images use the same focus plane as the first image. To refocus the image, press the **Auto-focus** Button, or manually adjust focus with the arrows in the **Focus** box.

NOTE! All images are shown in raw format, without background or colour correction, and will thus not fully reflect the quality of the final whole slide image.

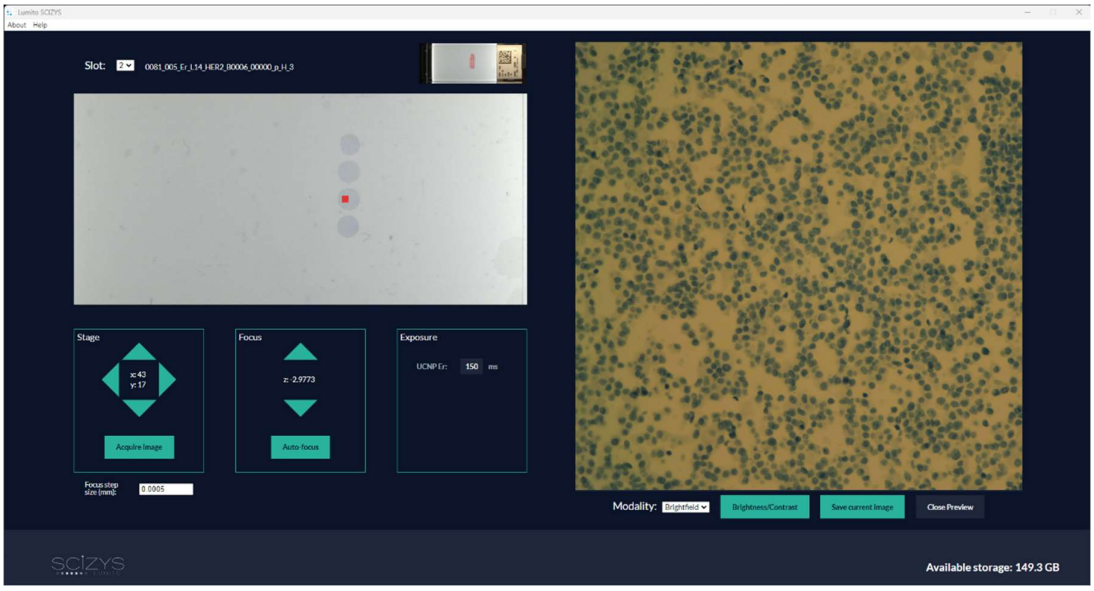


Figure 7-2 The Preview mode of SCIZYS S1.

7.3 Acquiring UCNP Images

1. Use the drop-down menu under the microscope image to select the UCNP modality.
2. The scanner will acquire a UCNP image at the current position.
3. To set the exposure time for the UCNP image, adjust the value in the **Exposure** box, and then press the **Acquire image** button to acquire a new image.

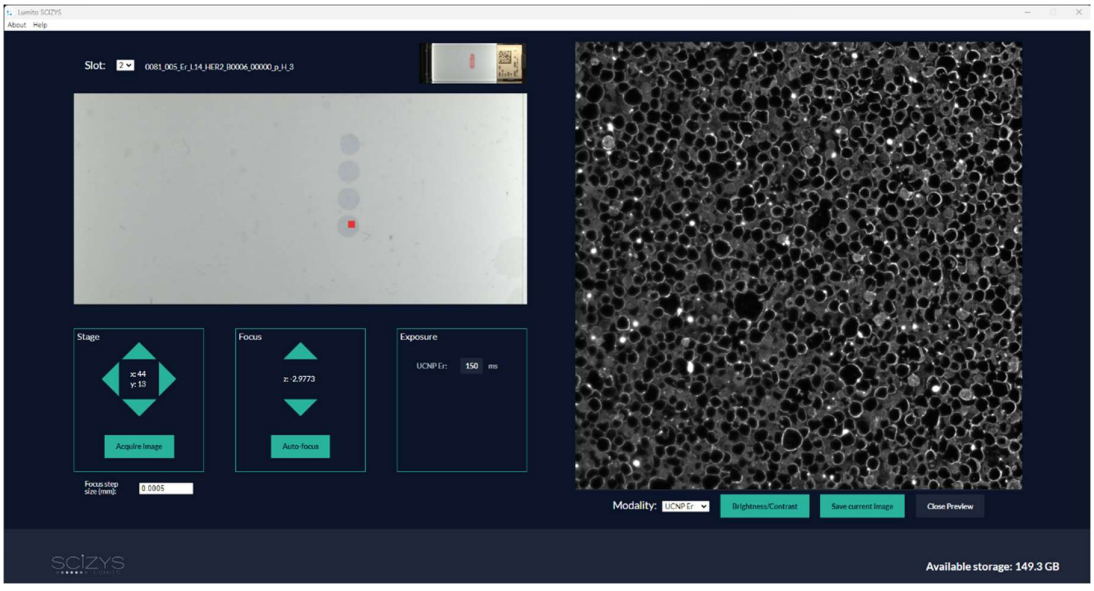


Figure 7-3 The Preview mode of SCIZYS S1 showing a UCNP image

NOTE! If the UCNP image is very dark or bright, the brightness and contrast can be adjusted using the **Brightness/Contrast** button.

7.4 Saving Images

1. Click the **Save current image** button.
2. Enter a filename.
3. The currently shown image will be saved in tiff-format at C:\Lumito\Preview_images

NOTE! The image will be saved without any brightness/contrast adjustments.

7.5 Closing the Preview Mode

1. To close the preview mode, click the **Close Preview** button.
2. The scanner will return to show the overview images in preparation for a scan.

8. Troubleshooting

This section covers basic troubleshooting steps for common issues. Contact an authorised service technician for more complex issues.

8.1 Self-Check Fails and/or Returns Error Message

1. Turn off SCIZYS by clicking the **Windows Button** then **Power** and **Shut Down** (*Figure 6-33*). Wait until SCIZYS S1 is fully shut down.

2. Press the Power Button and wait for the system to boot.

3. Log in to Windows. SCIZYS software will automatically start and initialise when logged in.

4. Wait until the dialog window with the prompt to insert new slides is displayed on the screen (*Figure 6-2*).

5. If the self-check still fails or returns an error message, contact an authorised service technician for further assistance.

8.2 Dusty or Grimy Image

If the overview image or the scanned image appear dusty or grimy, consider cleaning both the Loading Compartment and coverslips of the slides by following the steps covered in *6.3 Loading of Slides*.

If the results do not improve, contact an authorised service technician for further assistance.

8.3 SCIZYS S1 Does Not Power On

1. Make sure that SCIZYS S1 is powered off. Flip the Power Switch to the OFF position (*Figure 3-7*) and ensure that the AC Power Cord is firmly connected to the Power Supply Port.

2. Unplug the AC Power Cord from the grounded power outlet. Wait for 30 seconds.

3. Plug the AC Power Cord back into the grounded power outlet.

4. Flip the Power Switch to the ON position (*Figure 3-7*).

5. Press the Power Button (*Figure 3-3*).

6. If SCIZYS S1 still does not power on, contact an authorised service technician for further assistance.

8.4 Loading Door Button Continuously Blinking (Flashing Blue)

1. Turn off SCIZYS by clicking the **Windows Button** then **Power** and **Shut Down** (*Figure 6-33*). Wait until SCIZYS S1 fully shuts down.

2. Press the Power Button and wait for the system to boot.

3. Log in to Windows. SCIZYS software will automatically start and initialise when logged in.

4. If the Loading Door Button is still blinking, contact an authorised service technician for further assistance.

8.5 Power Button Continuously Blinking (Flashing Red)

1. Turn off SCIZYS by clicking on the **Windows Button** then **Power** and **Shut Down** (*Figure 6-33*). Wait until SCIZYS S1 fully shuts down.

2. Press the Power Button and wait for the system to boot.

3. Log in to Windows. SCIZYS software will automatically start and initialise when logged in.

4. If the Power Button is still blinking, contact an authorised service technician for further assistance.

8.6 File Transfer to External Storage Device Fails

If transfer of scanned images to external storage device fails, check the following:

- The external storage device is large enough to fit the scanned images being transferred.
- The external storage device formatted with a file system that allows a file size limit greater than the file size of the scanned image(s).

For more information about formatting and file systems, please consult the instructions provided by the manufacturer of the external storage device.

9. Cleaning and Maintenance

It is strongly advised to only clean the core parts of SCIZYS S1 when needed, according to the following instructions. No preventative cleaning is otherwise necessary.

⚠**DANGER!** Any service outside of the points described below is only to be performed by an authorised service technician.

9.1 Cleaning SCIZYS S1

Use a lint-free microfibre cloth to clean dust off the outer enclosure of SCIZYS S1. If needed, lightly dampen the lint-free microfibre cloth with clean water only.

NOTE! Do not use any cleaning solvents, solutions, or other liquids as they may damage sensitive electronics inside SCIZYS S1 and discolour the outer enclosure.

9.2 Annual Service

To ensure safe operation of SCIZYS S1, it is strongly recommended that periodic service and maintenance is performed by an authorised service technician.

10. Disposal of SCYZIS S1

SCIZYS S1 must be disposed of in accordance with the WEEE Directive 2012/19/EU. To prevent potential harm to the environment, please separate SCIZYS S1 from other types of waste and recycle it responsibly to promote sustainable reuse of material resources. If unsure how to properly dispose of SCIZYS S1, please contact either Lumito AB or your local government office for details.

NOTE! If SCIZYS S1 has been contaminated by biohazardous samples, decontamination is required prior to disposal or transportation. Determining if the unit is contaminated is the responsibility of the responsible laboratory organization. Thus, proper decontamination protocols applicable to the biohazardous substance in question must be followed to fully cleanse the unit. Decontamination may include cleaning, disinfection, sanitisation etc. Always follow the relevant protocols as required for the biohazardous substance such as biosafety manuals and local lab practices for a safe decontamination process.

11. Spare Parts and Accessories

The spare parts and accessories that can be purchased separately are listed in *Table 11-1*.

NOTE! Spare parts highlighted in the "Lumito Only" column in *Table 11-1* are only to be acquired from Lumito AB and must not be replaced with third-party spare parts.

Part Number	Item Name	Description	Lumito Only
412606	SCIZYS SH1	Slide holder	X
719566	SCREW MC6S M6x70 A4	Screws for lifting brackets	
412356	LIFTING BRACKET UPPER[1]	Upper half of the lifting bracket that holds the lifting bar	X
413223	LIFTING BAR[1]	Lifting bar to lift the instrument	X
412355	LIFTING BRACKET LOWER[1]	Lower half of the lifting bracket that holds the lifting bar	X
719746	HEX KEY L-SHAPE 5mm	Tool to fasten and loosen the screws holding the lifting brackets and lifting bar	
412697	LIFT COVER[1]	Covers to place where the lifting brackets are. After installation these will be on the instrument instead of the lifting brackets.	X
600174	AC POWER CORD CEE7/7 IEC C13 2m Bl	Power cable for the instrument	

1. Part of the Lifting Assembly Kit, visualized in *Figure 11-1* and *Table 11-2*.

Table 11-1 Specifications of spare parts.

11.1 Lifting Assembly Kit

The Lifting Assembly Kit is visualized in *Figure 11-1* and *Table 11-2*.

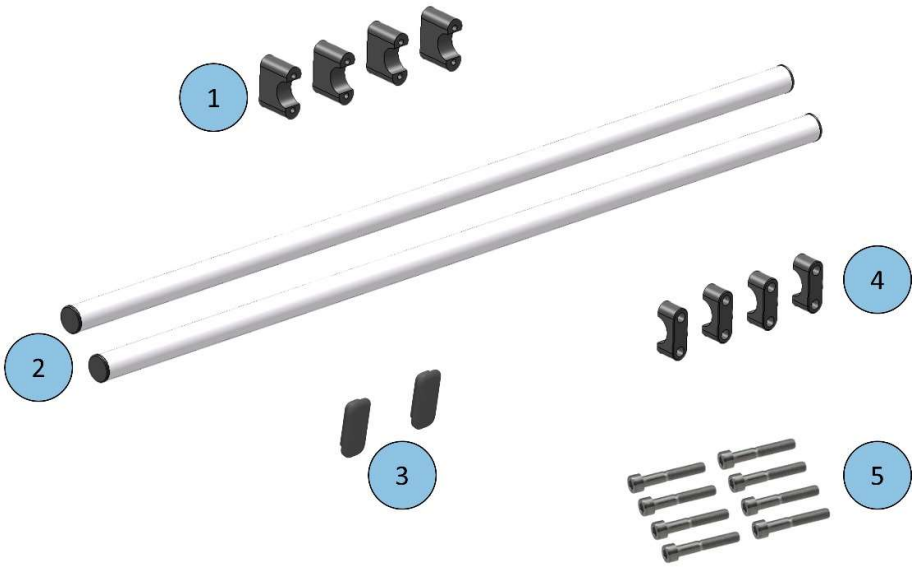


Figure 11-1 Lifting Assembly Kit.

Name	**Number**
LIFTING BRACKET LOWER	1
LIFTING BAR	2
LIFT COVER	3
LIFTING BRACKET UPPER	4
SCREW MC6S M6x70 A4	5

Table 11-2 Contents of Lifting Assembly Kit.

12. Technical Data

Dimensions	
Width	610 mm
Height	704 mm
Depth	752 mm
Weight	
Net weight	125 kg
Scanning Specifications	
Slide dimensions	26x76 $^{+0}_{-1}$ mm (ISO 8037-1:1986)
Slide capacity	4 slides
Slide handling	Tray-based mounting
Scanning resolution	<0.5 µm/pixel
Focus method	Autofocus
Modality	Brightfield and UCNP
Scanner Computer Specifications	
Storage space	2 TB
Operating system	Windows 11 Pro
I/O	1x HDMI 2.0 cable output 5x USB 2.0 (5 V, 500 mA) 1x Ethernet
Laser Radiation	
Wavelength	975 ± 10 nm
Maximum accessible emission	< 10 µW[1]
Operating Conditions	
Altitude	Up to 2000 m
Ambient temperature	15 – 35 °C
Pollution degree	PD2
Relative humidity	30 – 60 %
Power	
Peak power consumption	350 W
Input frequency	50/60 Hz
Input voltage	100-240 V
Voltage fluctuation	Min. 90 V Max. 264 V
Maximum current	4 A
Fuse type	2xT5AH/250V
Other Specifications	
Noise level (scanning)	<55 dBA at 1 m distance

[1] Measured in continuous operation. The laser is normally operated in pulsed mode.

Table 12-1 Technical data of SCIZYS S1.