

# CELENA<sup>®</sup> S

DIGITAL IMAGING SYSTEM



## USER MANUAL

**DISCLAIMER**

The contents of this document are subject to change without notice.

The CELENA® S Digital Imaging System is an electrical laboratory instrument for scientific research use only.

It is not a medical, therapeutic, or in vitro diagnostics device.

Do not disassemble the device on any occasion as this will invalidate your warranty.

**TRADEMARKS**

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# Getting Started

## Product contents

### Product contents

Your CELENA® S is shipped with the following components:

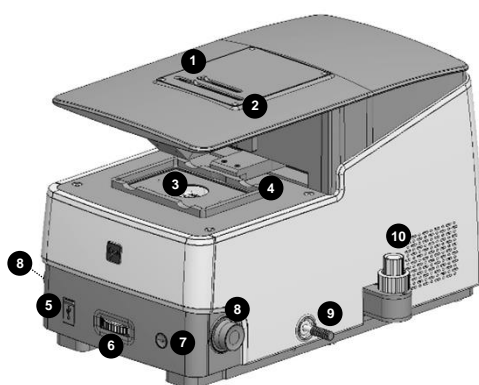
- Filter cubes (as ordered)
- Objectives (as ordered)
- Insert plate
- Vessel holder frame
- Universal Holder
- 25 mm x 75 mm slide holder, two positions
- Power cord with AC adapter
- HDMI cable
- Wireless mouse
- USB drive, 64 GB (includes the user manual and installation guide)
- Tool kit

Inspect the product package upon delivery to ensure that all components have been included. If anything is missing, contact your local sales representative. Damage that may occur during shipping and handling is not covered by warranty and must be filed with the carrier.

## Product description

### CELENA® S Digital Imaging System

The CELENA® S Digital Imaging System is a digital microscope that pairs high-performance optics and a user-friendly software interface to create a smooth and seamless user experience. Anyone can obtain sharp and beautifully vivid images in seconds with the CELENA® S.



- ① Iris diaphragm slider
- ② Phase annuli slider
- ③ Insert plate
- ④ Vessel holder frame
- ⑤ USB ports (2)
- ⑥ Objective turret wheel
- ⑦ Power button
- ⑧ Focus knobs
- ⑨ Filter cube selection tail
- ⑩ Stage control knobs

## Setting up

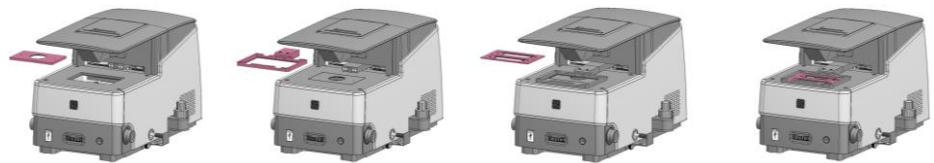
### Unpacking

Lift the CELENA® S out of its box by grasping its base firmly with both hands at diagonally opposite ends. Place it on a clean, level, and sturdy surface.

- Do not hold or lift it by its top cover (where ① and ② are located on the CELENA® S).
- Avoid vibrations from other devices.
- Leave sufficient space around the instrument for proper ventilation and to prevent overheating.
- Do not expose the instrument to intense ultraviolet light.

### Stage assembly

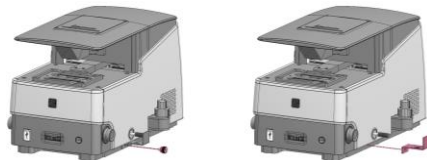
1. Place the insert plate onto the stage with the flat side up and the grooved side down.
2. Move the vessel holder frame arm to the front of the stage using the stage control knobs.
3. Attach the vessel holder frame to the vessel holder frame arm. The frame will snap into place because of the magnets in the vessel holder frame arm.
4. Move the vessel holder frame to the center of the stage using the stage control knobs.
5. Place the desired vessel holder into the vessel holder frame.



### Selection tail guard

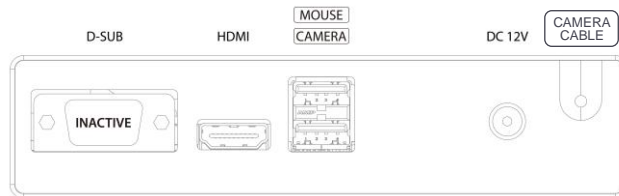
The selection tail guard keeps the filter cube selection tail from moving during shipping.

1. Unscrew the screw from the selection tail guard.
2. Pull the selection tail guard away from the instrument. Store in a safe place for future use.



## Connections

1. Remove the bubble wrap protecting the camera's USB cable\*. Insert into the bottom USB port at the back of the CELENA® S. Make sure the connection is secure.
2. Plug the wireless mouse dongle into the top USB port at the back of the CELENA® S.
3. Connect an HDMI-compatible monitor to the CELENA® S via the HDMI cable.
4. Insert the connector of the AC adapter into the power inlet of the instrument. Connect the power cord to the AC adapter. Connect the power cord to an electrical outlet.
  - Make sure the power cords are appropriate for your region.
  - Always use power cords and AC adapters provided by Logos Biosystems.



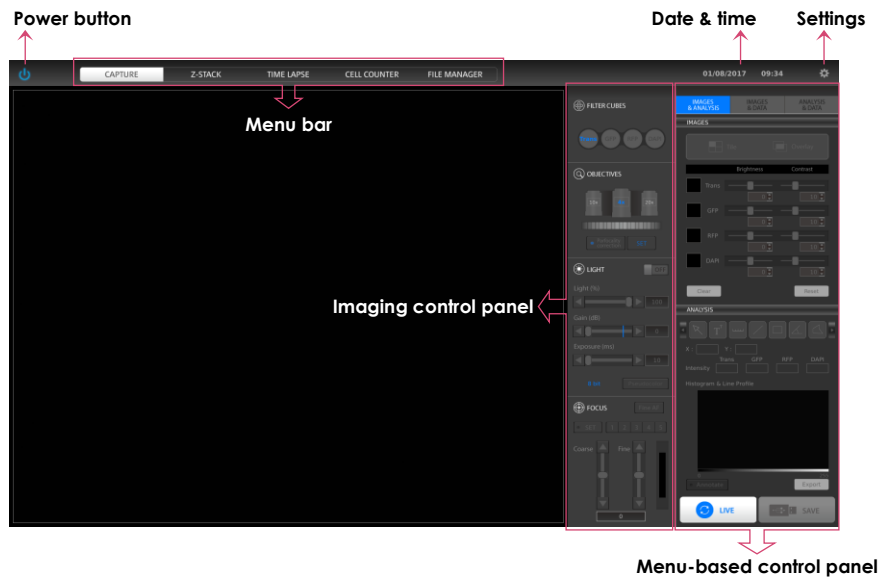
\*For the EU version of the CELENA® S, the camera cable is internalized and the inactive D-SUB port has been removed.

## Turn ON the CELENA® S

To turn on the instrument, push the power button.

Turn the monitor on.

The initial display will be in CAPTURE mode. The CELENA® S is ready to use.



## Shut down the CELENA® S

To shut down the instrument, click the power button located at the top left corner of the screen. The Z-stage is docked for safety when the CELENA® S shuts down.

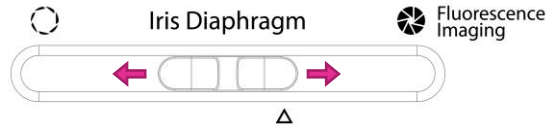
In the case of an emergency or system error, push the power button on the front of the instrument to power off the CELENA® S.

# Basic Operation

## Imaging basics

### Iris diaphragm

Move the diaphragm slider to adjust the amount of transmitted light to reach the sample. Opening or closing the iris diaphragm regulates the resolution and contrast of an image.



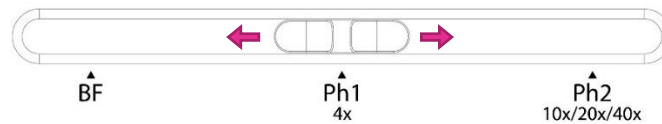
For transmitted light imaging, slide the diaphragm slider to the left. This opens the diaphragm to allow in the maximum amount of light and increase resolution.

For optimal fluorescence imaging, slide the diaphragm slider to the right. This closes the diaphragm to allow in the minimum amount of light and increase contrast.

For automated cell counting, slide the diaphragm slider to the  $\Delta$  mark (2 cm from the right). This allows the optimal amount of light for dye exclusion based cell counting.

### Phase annuli

The phase annuli slider can be adjusted for brightfield or phase contrast imaging with the three annuli for transmitted light imaging.



For brightfield imaging, move the phase annuli slider to **BF**.

For phase contrast imaging at 4X, move the phase annuli slider to **Ph1 4x**.

For phase contrast imaging at 10X, 20X, or 40X, move the phase annuli slider to **Ph2 10x/20x/40x**.

## Imaging control panel

**FILTER CUBES panel:** The filter cubes panel shows the three interchangeable filter cubes for fluorescence imaging and one white filter cube for transmitted light imaging. The selected filter cube is highlighted in blue. Each filter cube can be renamed and its pseudocolor selected in the Settings.

To select a filter cube, move the filter cube selection tail in or out.

**OBJECTIVES panel:** The objectives panel shows the selected objective and its adjacent objectives. The selected objective is highlighted in blue. The position, magnification, numerical aperture, manufacturer and a description of each objective may be modified in the Settings.

To select an objective, turn the objective turret wheel.

Due to the significant differences in objective lengths, take care when turning the objective turret:

1. Lower the turret by using a preset focus position, the coarse focus slider, or the coarse focus knob.
  - ✓ **Caution!** Lower the objective turret sufficiently or the objectives will hit the insert plate and may be damaged.
2. Turn the turret to the desired objective.
3. Raise the turret using a preset focus position, the coarse focus slider, or coarse focus knob.

Parfocality correction compensates for deviations along the focal plane between different objectives. This feature helps maintain focus when switching to a different objective. The CELENA® S is precalibrated for the objectives installed at the time of order.

To turn parfocality correction on or off, click **Parfocality correction**.

Calibrate all objectives when you add or change objectives.

To calibrate:

1. Click **LIVE**.
2. Turn off **Parfocality correction**.
3. Place a slide onto the stage.
4. Select an objective.
5. Focus as sharply as possible on the sample and click **SET**.
6. Repeat with the next objectives.

- ✓ **Important!** Parfocality correction can only be used with objectives corrected for the same vessel bottom thickness (i.e. long working distance objectives cannot be calibrated with coverslip-corrected objectives).

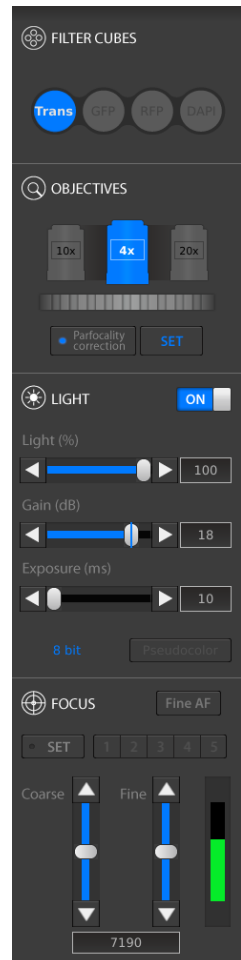
**LIGHT panel:** Use the light panel to control the intensity (%), gain (db), and exposure (ms) of the selected filter cube. The current pixel depth is displayed in the panel and may be changed in the Settings.

To turn the light source on or off, click the **ON/OFF** switch.

Light (%) is the intensity of the LED. Gain is the camera's amplification of the signal. The gain is analog up to 18 dB, meaning that signal will increase independently of the noise. Values above 18 dB are digital, meaning that both signal and noise will increase. Exposure is the amount of time that the camera shutter is open to allow light into the sensor.

To adjust values, drag the bars, click the arrowheads, or turn the mouse wheel while hovering over the sliders.

To colorize images, click **Pseudocolor**. Pseudocolor can be applied before or after capturing the image.





**FOCUS panel:** Use the focus panel to focus and to preset focus positions. The preset focusing speed and distance moved can be adjusted in the Settings.

To focus, manually manipulate the focus knobs or use the sliders in the focus control panel. Drag the bars, click the arrowheads, or turn the mouse wheel while hovering over the sliders.

Click **Fine AF** to finely tune focus. The Fine AF Z-scan range can be adjusted in the Settings.

The focus memory feature allows the user to preset focus positions:

1. Move the focal plane to the desired position (move the objective turret) and click the **SET** button. The **SET** button is highlighted in blue when selected.
2. Select the number that you want the position stored on. A keyboard will appear on the screen. Label the position as desired (e.g. 10X e coli).  
**✓ Important!** Do not touch the focus knobs during the process.
3. Repeat the process for the various positions you want stored. Numbers with stored positions will be highlighted in blue.
4. Hover over the set numbers to see their labels. Select a number to move the objective to the preset position.

Preset focus positions may be erased in the Settings.

## Capture images in CAPTURE mode

1. Place the sample into the appropriate vessel holder.
2. Adjust the diaphragm slider as needed.
3. Adjust the phase annuli slider as needed.
4. Select **CAPTURE** in the menu bar.
5. Select an objective.
6. Select an LED filter cube.
7. Click **LIVE**.
8. Adjust the light intensity, gain, and exposure as needed.
9. Adjust the focus as needed.
10. Readjust the light intensity, gain, and exposure as needed. Activate the Pseudocolor function as needed.
11. Capture the image by clicking **CAPTURE**.
12. Repeat steps 6-10 as needed.

# Image Editing and Analysis

## CAPTURE control panel

### Images panel

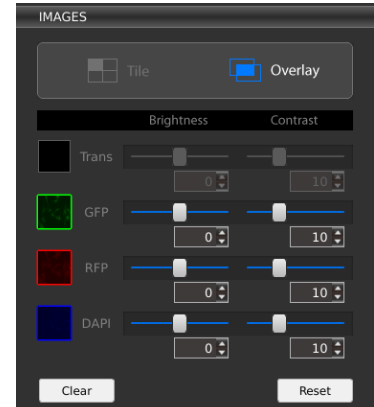
Use the IMAGES panel to adjust the brightness and contrast in each channel.

To see the all the channels separately, click **Tile**. For a merged image of all the channels, click **Overlay**. In the Overlay view, click the thumbnail next to each channel to hide or show it in the merged image.

Adjust the brightness and contrast of each channel using the respective sliders or the text boxes.

To undo image adjustments, click **Reset**.

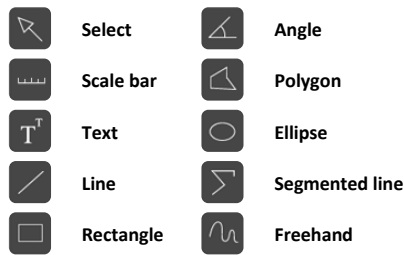
To delete all captured images, click **Clear**.



### Analysis panel

Use the ANALYSIS panel to add annotations and analyze captured images using the available tools.

#### Annotation tools

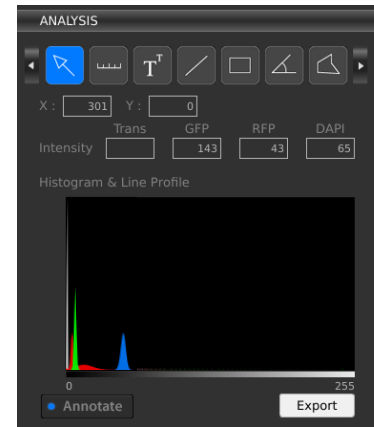


The select tool can be used to select and manipulate annotations. Right click on an annotation to change properties such as color and size as well as to copy, paste, and delete the annotation. Double click to deselect the annotation.

The ANALYSIS panel shows the X, Y position of the cursor and the light intensity of that position.

The histogram & line profile is a graphical representation of tonal values. To save individual histograms and line profiles as a CSV file, click the **Export** button underneath the graph.

To show or hide all of the annotations made, click the **Annotate** button.



### Data panel

The DATA panel shows you values for measurements made with the annotation tools in the ANALYSIS panel.

To view all measured values, use the scroll bars.

To clear all measured values, click **Clear**.

To export measurement data as a CSV file, click **Export**.

	Tool	Length	Area/Angle	Mill
1	Ellipse	7.0 $\mu\text{m}$	14.1 $\mu\text{m}^2$	
2	Rectangle	90.9 $\mu\text{m}$	1863.2 $\mu\text{m}^2$	
3	Segment Line	436.7 $\mu\text{m}$	-	
4	Angle	-	50.8 deg	
5	Freehand	277.2 $\mu\text{m}$	-	

## Save images

To save the image(s), click **SAVE**.

In the save window, choose:

- File/folder name
- File path
- File type: TIFF, JPEG, BMP, or PNG
- To save as a folder
- Image color: Monochrome or pseudocolor
- Image type: single channels, overlay, annotated

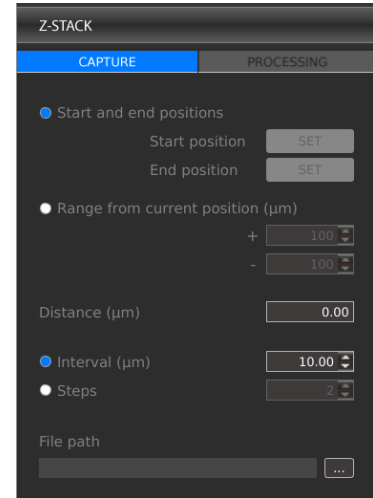
When Quick Save mode has been enabled, the **CAPTURE** button becomes the **CAPTURE & QUICK SAVE** button and images are saved immediately at the moment of capture to the designated file path. Quick Save mode can be enabled in the Settings.

# Z-stack Imaging

## Z-STACK mode

### Capture images in Z-STACK mode

1. Click **LIVE** in the CAPTURE tab of the Z-STACK control panel.
2. Set the iris diaphragm, phase annuli, objective, filter cube, light, and focus as needed.
3. Select to set the start and end positions or to designate a range from the current position.
  - a. **Start and end positions:**  
Move the focal plane to the desired start position and click **SET**. Move the focal plane to the desired end position and click **SET**. The distance ( $\mu\text{m}$ ) is automatically calculated.
  - b. **Range from current position ( $\mu\text{m}$ ):**  
Move the focal plane to the desired position. Adjust how far above (+) and below (-) the position to set the imaging range.
4. Select to capture images at specific intervals ( $\mu\text{m}$ ) or to capture a specific amount of images (steps) and enter the desired value.
5. Designate the file path for captured images and enter the desired file prefix. A file name extension will be automatically added as images are captured and saved.
6. Click **RUN**.



### View/delete images

To scroll through the captured images, click the icons above the image index or use the position indicator slider in the Z-STACK control panel.

To delete images from the stack, select an image and click the **Delete** button found below the image index. This will permanently delete the file.

## Process images

Select the PROCESSING tab in the Z-STACK control panel to add annotations to, create a slideshow video of, or merge the focus of Z-stack images.

To add annotations:

1. Load previously captured images by clicking **LOAD IMAGES** or use just captured images.
2. Add a scale bar or the Z-position of the image as needed. Right click on an annotation to change properties such as color and size.
3. To save annotated images, click **SAVE IMAGES**.

To create a slideshow video file:

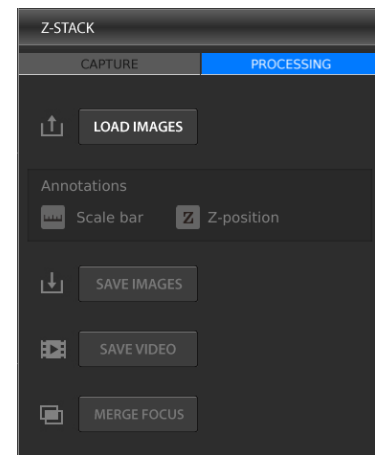
1. Click **SAVE VIDEO**.
2. Enter the file name and select the file path.
3. Select the frame rate, resolution, and quality of the video.
4. Click **OK**.

✓ **Important!** Any annotations onscreen will carry over to the video. You do not need to save annotated images to create a video file with annotations – what you see onscreen will be applied to the video.

To merge images with varying focal planes into one:

1. Click **MERGE FOCUS**.
2. Select the edge detection parameter. Edge detection parameter is the pixel area scanned to detect in-focus regions when merging images of different focal planes together. The larger the edge detection parameter, the longer it will take to merge the image.
3. Select to create an image in monochrome or in pseudocolor.
4. Click **OK**. The image file is saved where the original images are located.

✓ **Important!** If you have added a scale bar, this will automatically carry over to the merged image. The Z-position will not. You do not need to save annotated images to create a merged image with annotations.



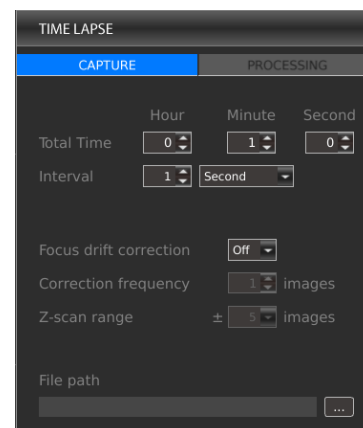
# Time Lapse Imaging

## TIME LAPSE mode

### Capturing time lapse images

1. Click **LIVE** in the CAPTURE tab of the TIME LAPSE control panel.
2. Set the diaphragm, phase annuli, objective, filter cube, light, and focus as needed.
3. Set the total imaging time and the interval at which images should be captured. The minimum interval is 1 second without focus drift correction or 1 minute with focus drift correction. Up to 10,000 images can be captured per sequence. Up to 3,000 images can be captured when the interval is set to continuous and the number of images captured is directly affected by exposure time.

✓ **Important!** Exposure time cannot exceed interval time. Make sure the interval exceeds exposure time.



4. Select whether to correct for focus drift during time lapse imaging. Focus drift is a normal phenomenon in live cell imaging. You can select how often to correct the focus (correction frequency) and how many images above and below the current focal plane to scan to find the optimal focus (Z-scan range) depending on the expected focal drift between images and the objective used.

Objectives	Depth of focus	Scan interval distance	Z-scan range	
			+/- 5 images	+/- 10 images
TC PlanAchrom 4X Ph TC PlanFluor 4X	39.53 μm	19.76 μm	217.38 μm	415.01 μm
TC PlanAchrom 10X Ph TC PlanFluor 10X	7.32 μm	3.66 μm	40.26 μm	76.87 μm
TC PlanAchrom 20X Ph TC PlanFluor 20X	3.89 μm	1.95 μm	21.40 μm	40.85 μm
TC PlanAchrom 40X Ph TC PlanFluor 40X	1.68 μm	0.84 μm	9.23 μm	17.63 μm
Plan Apochromat Fluor 20X	1.58 μm	0.79 μm	8.69 μm	16.6 μm
Plan Apochromat Fluor Oil 40X	0.97 μm	0.49 μm	5.35 μm	10.21 μm
Plan Apochromat Fluor Oil 100X	0.32 μm	0.16 μm	2.09 μm	4.00 μm

The scan interval distance between images is 50% of the depth of focus of the objective used and directly affects the Z-scan range. For example, if you expect the focus to drift 30 μm between images and you are using TC PlanFluor 20X objective, you know that the Z-scan range of that objective for +/- 5 images is 21.40 μm, which would be inefficient to correct the drift. You would need to set the Z-scan range to be +/- 10 images (40.85 μm) to account for the expected drift.

5. Designate the file path for captured images and enter the desired file prefix. A file name extension will be automatically added as images are captured and saved.
6. Click **RUN**.
  - ✓ **Important!** If using the onstage incubation system, place the sample in the system and allow the system to reach the set temperature, gas content, and humidity. Then wait 20 minutes before starting time lapse imaging.

### View/save images

Scroll through the captured images at the bottom of the screen or play a composite slide show of the images. Select the slide show time interval and press the play button.

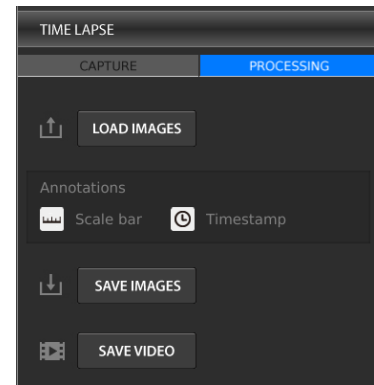
To delete images from the sequence, select an image and click the **Delete** button found below the image thumbnails. This will permanently delete the file.

## Process images

Select the PROCESSING tab in the TIME LAPSE control panel to add annotations to or create a slideshow video of time lapse images.

To add annotations:

1. Load previously captured images by clicking **LOAD IMAGES** or use just captured images.
2. Add a scale bar or timestamp as needed. Right click on an annotation to change properties such as color and size.
3. To save annotated images, click **SAVE IMAGES**.



To create a slideshow video file of time lapse images:

1. Click **SAVE VIDEO**.
2. Enter the file name and select the file path.
3. Select the frame rate, resolution, and quality of the video.
4. Click **OK**.

✓ **Important!** Any annotations onscreen will carry over to the video. You do not need to save annotated images to create a video file with annotations – what you see onscreen will be applied to the video.

# Cell Counting

CELL COUNTER mode provides the option to count cells automatically or manually. Both reusable and disposable slides from Logos Biosystems can be used for cell counting.

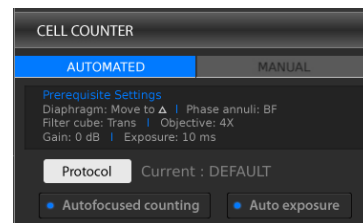
## AUTOMATED CELL COUNTER

### Automated cell counter control panel

Select the AUTOMATED tab in the CELL COUNTER control panel.

For automated cell counting, set the CELENA® S with the following settings:

- Iris diaphragm: Move to Δ (2 cm from the right)
- Phase annuli: BF
- Filter cube: Trans
- Objective: 4X
- Gain: 0 dB
- Exposure: 10 ms



Click **Protocol** to set specific parameters for automated cell counting. The current set protocol is shown to the right of the button.

Select **Autofocused counting** for the instrument to fine focus on the cells during counting.

Select **Auto exposure** for the instrument to adjust light settings automatically during counting.

### Protocol parameters and settings

Parameter	Range	DEFAULT protocol
Dilution Factor	1-100	2
Live Cell Sensitivity	1-9	4
Roundness (%)	0-100	10
Min. Cell Size (μm)	1-59	5
Max. Cell Size (μm)	2-60	60

- **Dilution Factor:** The dilution factor is used to calculate cell concentrations. Assuming a 1:1 ratio of stain to cell suspension, the DEFAULT dilution factor is preset to 2. Adjust this value according to the dilution of the cell sample.
- **Live Cell Sensitivity:** Live cells with intact cell membranes exclude dyes like trypan blue and Erythrosin B. The dyes form halos around live cells and stain the cytoplasm of dead cells or cells with compromised membranes. With a higher live cell sensitivity, the instrument can detect smaller cells by registering smaller halos.
- **Roundness:** Cells are not all completely spherical. Adjusting the roundness to detect cells of various shapes. Higher values lead to the counting of rounder cells and excludes objects with less roundness. Lower values are suitable for counting cells with irregular shapes.
- **Cell Size:** Users can customize cell size parameters to detect specific cells efficiently. Values can be adjusted in 1 μm increments for sizes between 3-60 μm.

The DEFAULT protocol cannot be modified or deleted.

To create a new protocol, select New Protocol. Click **Edit** to modify the selected protocol. This will activate the arrows for each parameter, turning them a solid grey. Use the arrows to adjust the values of each parameter as desired. Click **Save as** and use the onscreen keyboard to name the protocol. The newly created protocol will appear in the list of protocols.

To delete a selected protocol, click **Delete** to delete the selected protocol.

To load a specific protocol, select the desired protocol and press **Save & Load**.

- ✓ **Important!** Merely selecting a protocol does not mean that it has been put into effect. To apply the selected protocol, make sure to click **Save & Load**.



## Counting cells in automated cell counting mode

1. Click **LIVE**.
2. Set the iris diaphragm, phase annuli, objective, filter cube, gain, and exposure as indicated in the **Prerequisite Settings**.
3. Load a protocol.
4. Prepare a stained cell sample according to standard procedures.
5. Load 10-12  $\mu\text{L}$  of the cell sample into a new LUNA™ Cell Counting Slide or a clean LUNA™ Reusable Slide. Place into an appropriate vessel holder.
  - ✓ **Important!** The automated cell counter algorithm is compatible with LUNA™ Cell Counting Slides, PhotonSlides™ or LUNA™ Reusable Slides from Logos Biosystems.
6. Focus in on the cell sample. Even with **Autofocused Counting** selected, the cells should be visible to ensure accurate focusing and counting. Adjust the light settings as needed or select **Autoexposure**.
7. Click **COUNT**.
8. The results will appear in the CELL COUNTER control panel.

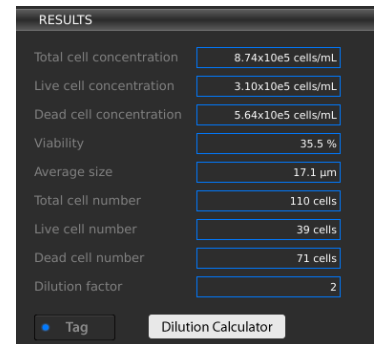
## View/save results

### Results

Cell count results will appear in the CELL COUNTER control panel.

Live cells will be labeled with green circles and dead cells with red circles. Click **Tag** to remove the labels.

To calculate dilutions, click **Dilution Calculator**. Set the current concentration as the total, live, dead, or a custom cell concentration by clicking the box below the Current Concentration value. Enter values for the desired final concentration and volume. Click **Load**.



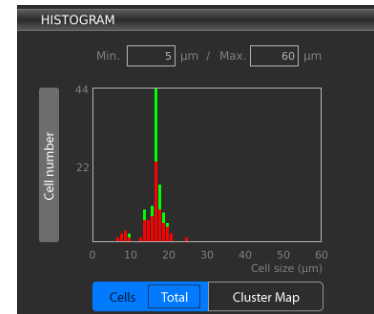
### Histogram

Below the numerical data, a cell size distribution histogram will appear.

Click **cell concentration** in the y-axis to switch it to **cell number**.

Use the button below to toggle between the total, live, and dead concentrations.

Click **cluster map** to show the percentage of single cells, doublets, and triplets.



### Save

To save the raw image, tagged, image, and data in csv format, click **SAVE**.

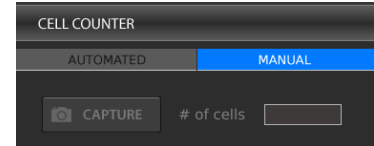
# MANUAL CELL COUNTER

## Manual cell counting

Select the MANUAL tab in the CELL COUNTER control panel.

1. Click **LIVE**.
2. Set the diaphragm, phase annuli, objective, filter cube, light, and focus as needed.
3. Place a sample into the appropriate vessel holder.
4. Click **CAPTURE**.
5. To tag, left-click on the image. As you tag each item, the system keeps a running tally of the counts. To delete tags, right-click on the image.

To save the raw and/or tagged image, click **SAVE**.



## Saving Images

### FILE MANAGER

#### File Manager

Captured images can be saved in monochrome or with pseudocolor as TIF, JPG, BMP, or PNG (12-bit dynamic range) on the instrument or an external drive.

Saved images can be further organized by selecting the FILE MANAGER option in the menu bar. Images can be previewed onboard but video and csv files cannot. Click the tile icon next to the command buttons at the top to view images as thumbnails.

Use the command buttons at the top to create new folders or copy, paste, delete, or cut files. Alternatively, right-click on icons to bring up commands.

To eject an external drive, select the drive you want to remove and click **Eject USB** at the bottom of the screen.

Back up and/or transfer files from the onboard SSD periodically. Logos Biosystems does not warrant the data stored in the SSD and will not be held liable for damages associated with data restoration.

# Settings

## Settings

Click the Settings button in the menu bar. The current version of software and the instrument's serial number is recorded here.

### Software update

Download the most recent version of software from the Logos Biosystems website ([www.logosbio.com](http://www.logosbio.com)) into the root directory of a USB drive. Insert the USB drive to a USB port in the instrument. Click **S/W Update**. Do not turn the instrument off during the update.

### Error report

(Maintenance use only) To create an error report, connect a USB drive to a USB port in the instrument. Click **Error Report**. Do not turn the instrument off during the process.

### Settings control panel

#### **FILTER CUBES**

After installing LED filter cubes, enter the name of and desired pseudocolor for each LED filter cube in its respective location.

#### **OBJECTIVES**

After installing objectives, enter the magnification, numerical aperture, brand, and a note for each objective in its respective location.

#### **FOCUS**

Choose to correlate the left and right focus knobs with coarse or fine focusing. Adjust the focusing speed and distance moved with each manipulation. The Fine AF scan range can also be changed. Click **CLEAR** to erase set focus memory positions. Click **RESET** to return to factory settings.

#### **CAMERA MODE**

Choose to capture images with a pixel depth of 8 or 16 bit (12 bit dynamic range). There are options to highlight saturated pixels in red or to enable hot pixel correction.

#### **TIME/DATE**

Adjust the instrument's date and time.

#### **MISCELLANEOUS**

Choose to show or hide the welcome message at startup. The welcome message contains a reminder that the Z-stage is docked for safety when the system is shut down. The end user licence agreement may also be viewed here.

#### **CAPTURE**

Modify the default annotation line color or width. The default font size and color can also be adjusted. Click **Enable Quick Save mode** to save images without having to determine save options each time. Designate the default file path for quick saved images.

#### **Z-STACK**

Modify the preset lag time of the Z-stage during Z-stack imaging.

# Maintenance

## Routine care

Clean surfaces with a soft cloth dampened with distilled water or 70% ethanol. Immediately wipe dry with a clean cloth. Do not pour or spray liquids directly onto the instrument. To avoid electrical shock or damage, do not wet electrical wires or connections. If liquid is spilled on the instrument, turn off the power and wipe dry immediately.

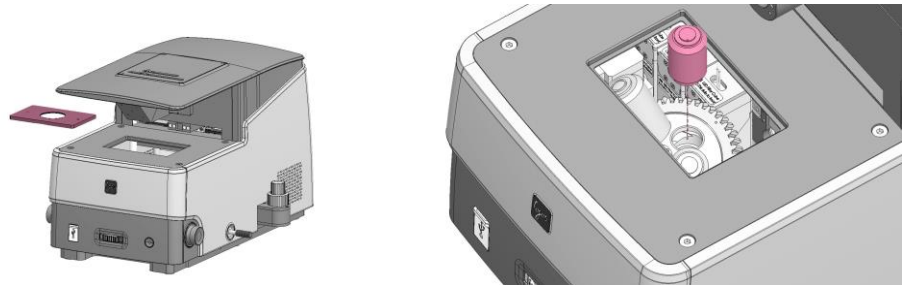
Use only optical-grade cleaning materials to clean optical components.

Do not exchange components between instruments unless they have been provided or authorized by Logos Biosystems.

## Installation and removal of components

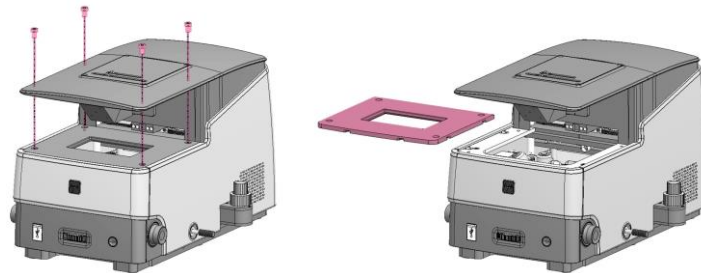
### Objectives

1. Turn the instrument off and remove the insert plate from the stage.
2. Grasp the objective at its base and unscrew it from the turret.
3. Replace it with the desired objective and screw it in securely.
4. Reinstall the insert plate.
5. Turn on the instrument and change the objective lens information in the Settings. Calibrate parfocality if needed.

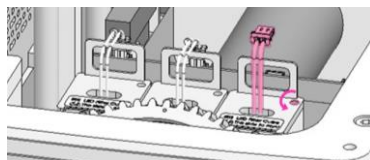


### LED Filter Cubes

1. Turn the instrument off and remove the insert plate from the stage.
2. Unscrew the screws from the four corners of the stage with a hex wrench from the tool kit. Remove the stage.



3. Unplug the connector of the LED filter cube. Loosen the screw in the cube with the flat-head screwdriver from the tool kit. Pull out the LED filter cube.



4. Insert the desired LED filter cube, fasten its screw, and plug in its connector.
5. Reinstall the stage and insert plate.
6. Turn the instrument on and change the LED filter cube information in the Settings.

# Troubleshooting

## Image quality

### Misaligned overlay image

Recapture images in each channel. Do not touch the stage or focusing knobs while capturing.

### Dim transmitted light image

Check that the iris diaphragm and phase annuli are in the appropriate positions.

### Dim transmitted light image with TC PlanFluor objectives

Set the phase annuli slider to the BF position. TC PlanFluor objectives do not have phase rings.

### Uneven focus

Place the sample flat on the stage. Make sure the sample thickness is uniform.

### Trouble focusing on a coverslipped sample with TC PlanAchrom or TC PlanFluor objectives

Place the slide with the coverslip facing up.

### Trouble focusing on a coverslipped sample with Plan Apochromat objective

Place the slide with the coverslip facing down.

### Black screen after clicking LIVE

1. Click the **ON** button in the LIGHT panel.
2. Ensure that the objective turret has clicked into position.
3. Ensure that the phase annuli slider is in the proper position.
4. Center the sample over the objective.

## Software

### Image unresponsive to changes in focus or stage position

Click the **ON** button in the LIGHT panel.

### Inactive ON/OFF switch in LIGHT panel

Verify that the filter cube selection tail and the objective turret have clicked into position.

### Inactive SAVE button

Capture the image first. The **SAVE** button is only active after an image has been captured.

## Mechanical

### No place for sample on vessel holder frame

Use the appropriate vessel holder.

## Data saving/transfer

### Too many files on SSD

Image acquisition and analysis may become slower when there are too many files saved on the SSD. Delete or move files to an external drive.

### Incompatible USB

Some USB drives are undetectable or incompatible. Use the USB supplied with the instrument or make sure that your USB is compatible with the instrument. The USB must be Ver 2.0.

## Software update

### Incompatible USB

Some USB drives are undetectable or incompatible. Use the USB supplied with the instrument or make sure that your USB is compatible with the instrument. The USB must be Ver 2.0.

### More than one software version on the USB

Delete previous versions of software from the USB before downloading new software.

### Incorrectly saved or damaged software

1. Use the USB supplied with the instrument or make sure that your USB is compatible with the instrument.
2. Download the file again into the root directory of the USB drive.
3. Insert the USB drive properly.
4. Click the S/W Update button again. If the problem persists, contact your local sales representative.

# Safety Information

## Instrument safety

### General safety

Operate the instrument in the conditions described in the Operating Conditions.

Install the instrument on a level and sturdy surface. Avoid vibrations from other devices. The instrument can withstand light shock and vibration. However, excessive shock and/or vibration may damage the instrument. Leave sufficient space around the instrument for air circulation and cooling. Take care that the instrument does not overheat during long and continuous operation.

Do not touch the instrument or its components with wet hands.

Use components provided or authorized by Logos Biosystems. If the proper combination of components is not used, product safety cannot be guaranteed.

Use only the provided power cord and AC adapter. If the proper components are not used, electrical safety of the product cannot be guaranteed.

Ensure that the input voltage is compatible with the power supply voltage of the product.

Connect the grounding terminal of the instrument and electrical outlet properly. If the instrument is not grounded, electrical safety of the product cannot be guaranteed.

Turn on the instrument only after connecting the power cord and AC adapter to both the power source and the instrument. Turn off the instrument before disconnecting the power cord and/or moving the instrument.

Do not expose the instrument to intense ultraviolet light.

This instrument uses Class 3B ultraviolet LEDs that are in accordance with IEC/EN 60825-1. Always turn the instrument off before changing LED filter cubes.

Turn off the power using the power button within the software. Use the power button at the front of the instrument to turn off the power in the case of an emergency or a system error.

Disconnect the power cord in the case of abnormalities.

Protect USB drives from being infected with viruses and malware.

### Operating conditions

<b>Operating Power</b>	100 - 240 VAC, 1.5 A
<b>Electrical Input</b>	12 VDC, 5.0 A
<b>Frequency</b>	50/60 Hz
<b>Installation Site</b>	Indoor use only
<b>Operating Temperature</b>	10 - 35°C
<b>Maximum Relative Humidity</b>	20 - 80%
<b>Altitude</b>	≤ 2,000 m
<b>Pollution Degree</b>	2

### Instrument disassembly

Do not disassemble the instrument in any event as this will invalidate your warranty. If the instrument is damaged or malfunctioning, contact your local sales representative.

## Personal safety

### Safety guidelines

Read all user manuals thoroughly before using the instrument.



Keep all user manuals in a safe and accessible place for future reference.

Wear appropriate personal protective equipment (PPE) when handling reagents and samples to avoid exposure.


When using toxic agents, radioactive materials, or pathogenic microorganisms belonging to WHO Risk Groups 2-4, follow national laws and regulations for biosafety level requirements.

## Instrument symbols


### Electrical symbols

Symbol	Description
	Power symbol
	Protective earth (ground) terminal

### Safety symbol


Symbol	Description
	WARNING! UV radiation hazard. Avoid looking directly at UV light.

### Environmental symbol


Symbol	Description
	Waste Electrical and Electronic Equipment (WEEE). Do not dispose of this product as unsorted municipal waste. Follow local waste ordinances for proper disposal provisions to reduce the environmental impact of WEEE.

## Safety standards

### European standards

Symbol	Description
	The CE mark indicates that this instrument conforms to all applicable European Community provisions for which this marking is required. Users must be aware of and follow the conditions described in this manual for operating the instrument. The protection provided by the instrument may be impaired if the instrument is used in a manner not specified by Logos Biosystems.

### Korean standards

Symbol	Description
	The KC certification mark indicates that this instrument conforms with Korea's product safety requirements for electrical and electronic equipment and components for which this marking is required.

### United States standards

Type	Description
<b>FCC Part 18</b>	This device complies with Part 18 of the FCC Rules.

# Product Specifications

## CELENA® S Digital Imaging System

### Physical characteristics

#### Instrument type

Benchtop digital epifluorescence and transmitted light imaging system

#### LCD display

Full HD color LCD monitor, 1920 x 1080 pixels (not included)

#### Dimensions

44 cm x 30 cm x 27 cm (17.3 in x 11.6 in x 10.6 in)

#### Weight

20 kg (44 lb)

### Technical specifications

#### Imaging methods

Epifluorescence and transmitted light (brightfield and phase contrast)

#### Illumination

LED filter cubes with adjustable intensity (>50,000 hr life per filter cube)

#### Fluorescence channels

3 fluorescence channels and 1 transmitted light channel

#### Objective turret

5 positions

#### Objectives

High quality long working distance (LWD) and coverslip-corrected; 1.25X-100X

#### Condenser

47 mm LWD condenser; 3-positions with brightfield and phase contrast annuli

#### Stage

Mechanical X/Y stage, motorized Z stage; accommodates an onstage incubator

#### Computer

Built-in dual core CPU, 128 GB SSD internal storage

#### Camera

1.3 MP monochrome CMOS with 1280 x 1024 pixels

#### Images

8 or 16-bit TIFF, JPG, BMP, or PNG

## Onstage Incubation System

### Physical characteristics

#### Compatible vessels

35 mm dishes, microslides

#### Dimensions

Heated plate with lid: 15.5 cm x 23.6 cm x 3.0 cm

Temperature controller: 23 cm x 17 cm x 9 cm

Gas mixer: 23 cm x 17 cm x 9 cm

#### Weight

Heated plate with lid: 0.4 kg (0.9 lb)

Temperature controller: 3.4 kg (7.5 lb)

Gas mixer: 2.1 kg (4.6 lb)

### Technical specifications

#### Temperature range

Ambient temperature to 55°C

#### CO<sub>2</sub> range

0.1-20%

#### O<sub>2</sub> range

0-21%

#### Humidity range

22-99%



# Ordering Information

## Instruments

Cat #	Product	Quantity
CS20001	CELENA® S Digital Imaging System	1 set
CS20002	CELENA® S Digital Imaging System Starter Kit - TC PlanAchrom 4X Ph - DAPI - TC PlanFluor 10X - EGFP - TC PlanFluor 20X - RFP - TC PlanFluor 40X	1 set

## Onstage incubation systems

Cat #	Product	Quantity
I10401	Universal Heating System	1 set
I10402	Gas Incubation System for CO <sub>2</sub>	1 set
I10403	Gas Incubation System for CO <sub>2</sub> /O <sub>2</sub>	1 set
I10410	Heating Insert for Micro Slides	1 unit
I10411	Heating Insert for a 35 mm Dish	1 unit

## Objectives

Cat #	Product	Quantity
I10001	TC PlanAchrom 4X Ph	1 unit
I10002	TC PlanAchrom 10X Ph	1 unit
I10003	TC PlanAchrom 20X Ph	1 unit
I10004	TC PlanAchrom 40X Ph	1 unit
I10005	TC PlanFluor 4X	1 unit
I10006	TC PlanFluor 10X	1 unit
I10007	TC PlanFluor 20X	1 unit
I10008	TC PlanFluor 40X	1 unit
I10013	Plan Apochromat Fluor 1.25X	1 unit
I10014	Plan Apochromat Fluor 4X	1 unit
I10009	Plan Apochromat Fluor 10X	1 unit
I10010	Plan Apochromat Fluor 20X	1 unit
I10011	Plan Apochromat Fluor 40X	1 unit
I10015	Plan Apochromat Fluor Oil 40X	1 unit
I10012	Plan Apochromat Fluor Oil 100X	1 unit

## LED filter cubes

Cat #	Product	Quantity
I10101	DAPI	1 unit
I10102	EGFP	1 unit
I10103	RFP	1 unit
I10104	mCherry	1 unit
I10105	ECFP	1 unit
I10106	EYFP	1 unit
I10107	DSRed	1 unit
I10108	Cy5	1 unit
I10109	Cy7	1 unit
I10110	Cy3/TRITC Long Pass	1 unit
I10111	GFP Long Pass	1 unit
I10112	Cy5 Long Pass	1 unit
I10113	Custom Filters	1 unit

## Vessel holders

Cat #	Product	Quantity
I10201	Universal Holder	1 unit
I10202	25 mm x 75 mm Slide Holder, Two Positions	1 unit
I10203	35 mm Cell Culture Dish Holder, Four Positions	1 unit
I10204	60 mm Cell Culture Dish Holder, Two Positions	1 unit
I10205	100 mm Cell Culture Dish Holder, One Position	1 unit
I10206	25 cm <sup>2</sup> Nunc T-25 Flask Holder, Two Positions	1 unit
I10207	75 cm <sup>2</sup> Nunc T-75 Flask Holder, One Position	1 unit
I10208	25 cm <sup>2</sup> BD/Greiner T-25 Flask Holder, Two Positions	1 unit
I10209	75 cm <sup>2</sup> BD/Greiner T-75 Flask Holder, One Position	1 unit
I10210	Glass Hemocytometer Holder, One Position	1 unit

## Counting slides

Cat #	Product	Quantity
L12001	LUNA™ Cell Counting Slides, 50 Slides	1 box
L12002	LUNA™ Cell Counting Slides, 500 Slides	10 boxes
L12003	LUNA™ Cell Counting Slides, 1000 Slides	20 boxes
L12005	PhotonSlide™, 50 Slides	1 box
L12006	PhotonSlide™, 500 Slides	10 boxes
L12007	PhotonSlide™, 1000 Slides	20 boxes
L12008	LUNA™ Reusable Slide	1 unit

# Purchaser Notification

## Limited use label license

### Research use only

The purchaser of this product should use this product only for research for the sole benefit of the purchaser. By use of this product, the purchaser agrees to be bound by the terms of this limited use statement whether the purchaser is a for-profit or a not-for-profit entity.

If the purchaser is not willing to accept the conditions of this limited use statement and this product is unused, the Company will accept return of the product with a full refund.

The purchaser cannot resell or otherwise transfer (a) this product (b) its components or (c) materials made using this product or its components to a third party for Commercial Purposes.

Commercial Purposes mean any and all uses of this product and its components by a party for monetary or other consideration, including but not limited to, (a) product manufacture, (b) providing a service, information, or data, (c) therapeutic, diagnostic, or prophylactic purposes, or (d) resale of this product or its components whether or not such product and its components are resold for use in research.

Logos Biosystems, Inc. ("Company") will not claim any consideration against the purchaser of infringement of patents owned or controlled by the Company which cover the product based on the manufacture, use or sale of a therapeutic, clinical diagnostic, vaccine, or prophylactic product developed in research by the purchaser in which this product or its components was employed, provided that neither this product nor any of its components was used in the manufacture of such product.

For any use other than this limited use label license of research use only, please contact the Company or email [info@logosbio.com](mailto:info@logosbio.com) for more information.

## LTC licensed products

### LED filter cubes

LED Filter Cubes are LTC Licensed Products provided under an intellectual property license from Life Technologies Corporation. The transfer of this product is conditioned on the buyer using the purchased product solely in research conducted by the buyer, and the buyer must not (1) use this product or its components for (a) diagnostic, therapeutic or prophylactic purposes; or (b) manufacturing, and/or (2) sell or transfer this product or its components for resale, whether or not resold for use in research. For information on purchasing a license to this product for purposes other than as described above, contact Life Technologies Corporation, 5791 Van Allen Way, Carlsbad, CA 92008 USA or [outlicensing@lifetech.com](mailto:outlicensing@lifetech.com)

## Instrument warranty

### Warranty

Logos Biosystems, Inc. ("Company") warrants to the original purchaser ("Purchaser") that the instrument ("Instrument"), if properly used and installed, will be free from defects in materials and workmanship and will conform to the product specifications for a period of one (1) year ("Warranty Period") from the date of purchase. If the Instrument under this limited warranty fails during the Warranty Period, the Company, at its sole responsibility, will: within and up to 30 calendar days of purchase, refund the purchase price of the Instrument to the Purchaser if the Instrument is in original conditions; or, after 30 calendar days of purchase, only replace or repair the Instrument for up to the Warranty Period without issuing a credit.

In no event shall the Company accept any returned instrument (including its components) that might have been used or contaminated in some labs, including but not limited to, HIV or other infectious disease or blood-handling labs. This limited warranty does not cover refund, replacement, and repair incurred by accident, abuse, misuse, neglect, unauthorized repair, or modification of the Instrument. This limited warranty will be invalid if the Instrument is disassembled or repaired by the Purchaser.

In case that the Company decides to repair the Instrument, not to replace, this limited warranty includes replacement parts and labor for the Instrument. This limited warranty does not include shipment of the Instrument to and from service location or travel cost of service engineer, the costs of which shall be borne by the Purchaser. Every effort has been made to ensure that all the information contained in this document is correct at its publication. However, the Company makes no warranty of any kind regarding the contents of any publications or documentation as unintended or unexpected errors including occasional typographies or other kinds are inevitable. In addition, the Company reserves the right to make any changes necessary without notice as part of ongoing product development. If you discover an error in any of our publications, please report it to your local supplier or the Company. The Company shall have no responsibility or liability for any special, incidental, indirect or consequential loss or damage resulting from the use or malfunction of the Instrument.

This limited warranty is sole and exclusive. The Company makes no other representations or warranties of any kind, either express or implied, including for merchantability or fitness for a particular purpose with regards to this Instrument. To obtain service during the Warranty Period, contact your local supplier or the Company's Technical Support team.

### Out of warranty service

Please contact your local supplier or the Company's technical support team in order to obtain out-of-warranty service. If necessary, repair service will be charged for replacement parts and labor hours incurred to repair the Instrument. In addition, the Purchaser is responsible for the cost of shipping the Instrument to and from the service facility and, if necessary, the travel cost of a service engineer after 30 calendar days of purchase, only replace or repair the Instrument for up to the Warranty Period without issuing a credit.



**Logos Biosystems**

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