

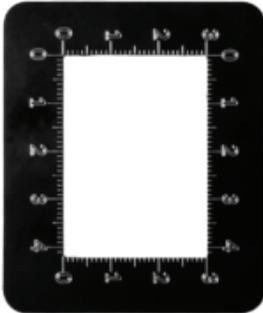
1 – Introduction

The BxCamera comes with the following items:

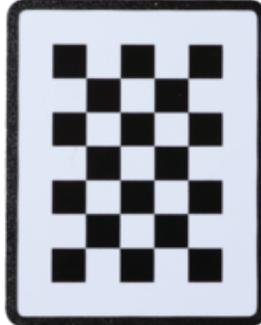
- Camera
- Power Supply Head
- USB-C to USB-C Cable
- Ethernet Cord
- USB to Ethernet Adapter
- Focus Tool
- Measurement Calibration Plate
- Color Calibration Plate
- Cassette Frame



Cassette Plate



Measurement Calibration Plate



Color Calibration Card and Card Holder

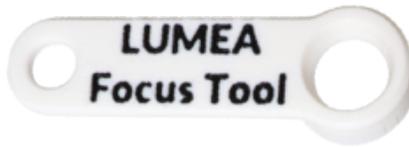


Ethernet Cord



Focus Tool

LUMEA
Focus Tool



Power Supply Head



USB C to C Cable



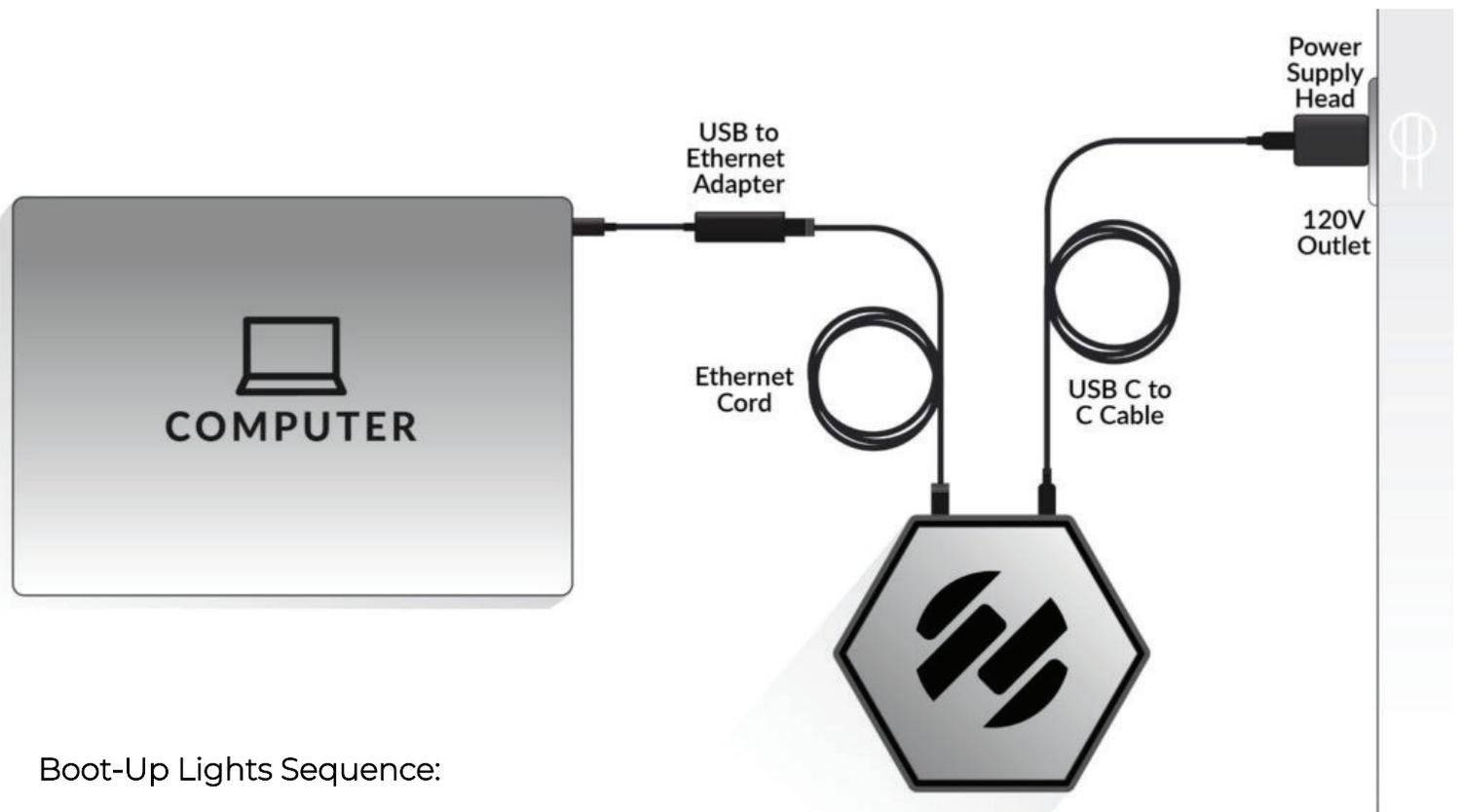
USB3.0 to Gigabit Ethernet Adapter

USB to Ethernet Adapter

2 – Camera Setup Procedures

Connections:

- - Plug the USB-C to C cable into the power supply head, then into an outlet.
 - Connect the other end to the back of the camera.
 - Connect the ethernet cable directly to your computer, or use a USB-to-ethernet adapter if needed.
 - If your computer lacks a USB port, you may need an additional adapter (not included)



Boot-Up Lights Sequence:

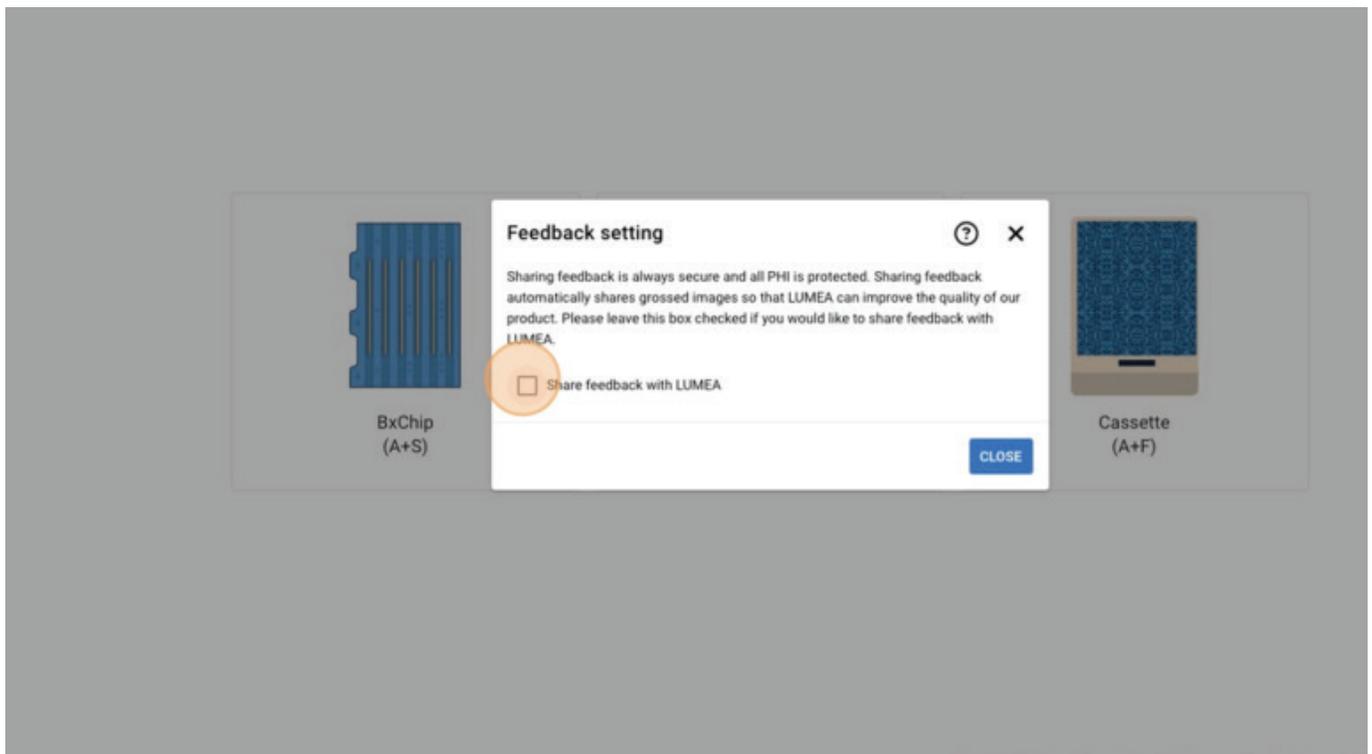
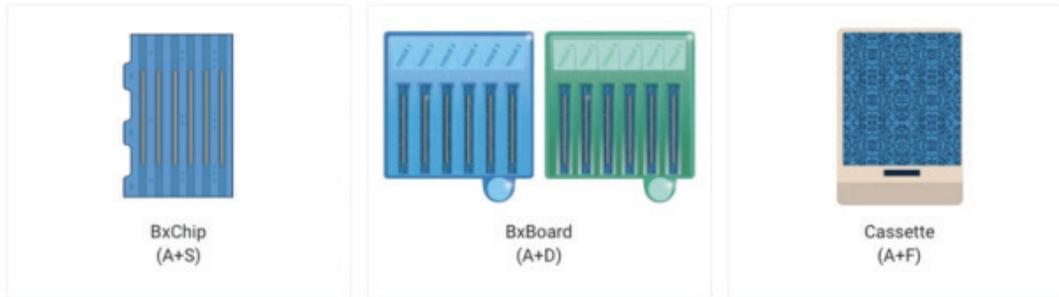
- - Single green light.
 - Dark blue chasing stripe in a circle.
 - Light blue flashing lights alternating sides.
 - Final aqua-colored flash indicating readiness.

3 – Accessing the Measurement Application

- Navigate to **camera.lumeadigital.com** in your browser.
- Access settings in the bottom right corner.

4 – Feedback Configuration

- Checking the feedback settings box allows grossed images to be shared with LUMEA to help improve product quality. Image sharing is secure, and PHI remains protected.



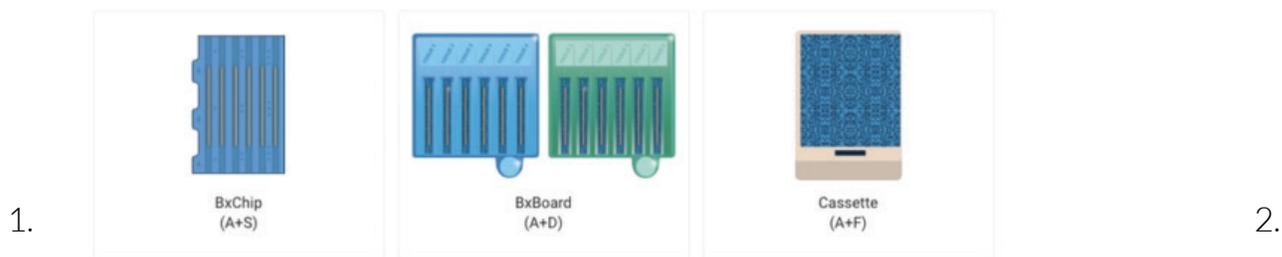
5 – Measurement Template Management

These templates allow grossing measurement data to auto-populate when an image is captured. Each specimen handling device (BxBoard, BxChip, or Cassette) type comes with simple pre-set templates that can be modified or replaced with a new one.

Since the camera doesn't recognize specimen types, we recommend keeping templates generic, with a default that suits most specimens in your lab. However, the camera can integrate with your LIS, allowing gross measurement data to transfer directly. For LIS integration, contact your Lumea representative.

- **Creating/Editing Templates:**

1. Select "Measurement Templates"
2. Create a new template by selecting "Create New" in the upper right hand corner
3. Choose a device type (BxChip, BxBoard, or Cassette)
4. Give the template a name
5. Adjust units (CM/MM) as desired
6. Enter text and tags in free text box
7. Click "Create Template"



templates

CREATE NEW

ID CASSETTE

Edit

length Lane [Lane Number] has total length = [Total Length]

Edit

< BACK

Hardware type *

Measurement Template Name *

Units

CM MM

Tags

- Total Length +
- Total Width +
- Total Area +
- Minimum Length +
- Minimum Width +
- Minimum Area +
- Maximum Length +
- Maximum Width +
- Maximum Area +
- Number of Pieces +
- Individual Piece Lengths +
- Individual Piece Areas +

Measurement text for gross description *

3.

4.

< BACK

Hardware type *
BxChip

Measurement Template Name *

Units
 CM MM

Tags

Total Length	+
Total Area	+
Minimum Length	+
Minimum Area	+
Maximum Length	+
Maximum Area	+
Number of Pieces	+
Lane #	+

Measurement text for gross description *

5.

< BACK

Hardware type *
BxChip

Measurement Template Name *
DEMO TEMPLATE

Units
 CM MM

Tags

Total Length	+
Total Area	+
Minimum Length	+
Minimum Area	+
Maximum Length	+
Maximum Area	+
Number of Pieces	+
Lane #	+

6.

Hardware type *
BxChip

Measurement Template Name *
DEMO TEMPLATE

Units
CM MM

Measurement text for gross description *

Tags

- Total Length +
- Total Area +
- Minimum Length +
- Minimum Area +
- Maximum Length +
- Maximum Area +
- Number of Pieces +
- Lane # +

7.

Measurement text for gross description *

BxChip with 6 lanes with [Number of Pieces][Lane Number][Total Length] THIS IS A DEMO

+
+
+
+
+
+
+

CANCEL CREATE TEMPLATE

- **Editing/Deleting Templates:** To edit an existing template select the edit icon next to the template, make your changes, and then save. To delete, select **Delete Template** and confirm deletion in the warning box.

templates

CREATE NEW

D CASSETTE

Edit

ingth Lane [Lane Number] has total length = [Total Length]



LTE BxChip with 6 lanes with [Number of Pieces][Lane Number][Total Length] THIS IS A DEMO



Measurement text for gross description *

BxChip with 6 lanes with [Number of Pieces][Lane Number][Total Length]

+
+
+
+
+
+
+
+

DELETE TEMPLATE

SAVE CHANGES

- **Default Templates:** Set a default template for each device type by selecting the circle next to it. This remains the default until manually changed.

< BACK

Measurement templates

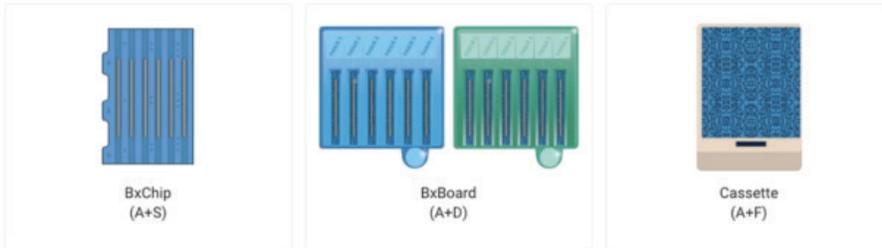
BXCHIP BXBOARD CASSETTE

Measurement template

<input type="radio"/>	001 - Cassette	[Number of Pieces] pieces with [Total Length] L, [Total Width] W and [Total Area] A
<input type="radio"/>	Default GI	Received in formalin labeled with the patient's name and DOB consists of [Number of Pieces] tissue fragment(s) measuring [Ind The specimen is submitted entirely in 1 cassette.
<input checked="" type="radio"/>	Default Skin	Sample received in formalin jar with patients name and DOB containing 1 skin specimen cut into [Number of Pieces] measuring [Lengths] and [Piece Length Range] for a total length of [Total Length].
<input type="radio"/>	Example Template	Received in formalin are two fragments of skin measuring [Total Length] and [Total Width], completely submitted in [Number of
<input type="radio"/>	Multiple Piece Biopsy	Received in a formalin jar labeled with patients name and DOB. [Number of Pieces] of pink-tan tissue measuring [Individual Piec

6 – Hotkeys

Hotkeys are keyboard shortcuts for quick actions. They are displayed in parentheses next to each action. To use a hotkey, press the two required keys on your keyboard simultaneously. You can hide hotkey labels by unchecking the box, but they will still function.



7 – Gross Image Acquisition

To begin taking gross images, place a specimen on the black plate. If photographing a BxChip or specimen on a cassette, we recommend using the cassette frame for stabilization and additional measurement reference. Select the item to capture an image. The camera will take the photo and display a gross measurement and image page.

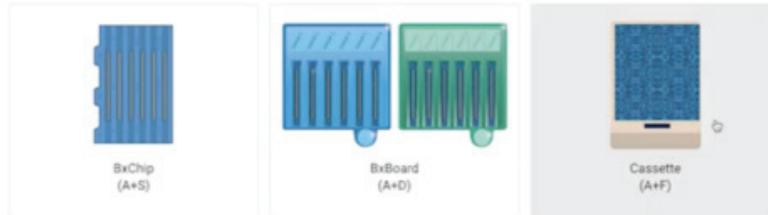
- **Specimen Placement:** **If photographing a BxChip or specimen on a cassette, we recommend using the cassette frame for stabilization and additional measurement reference.*
 - Place the specimen on the black plate.



- **Image Capture:**

- Select the desired specimen handling device to capture an image.
- A gross measurements and image page will appear.

- o The default template will auto-fill the information



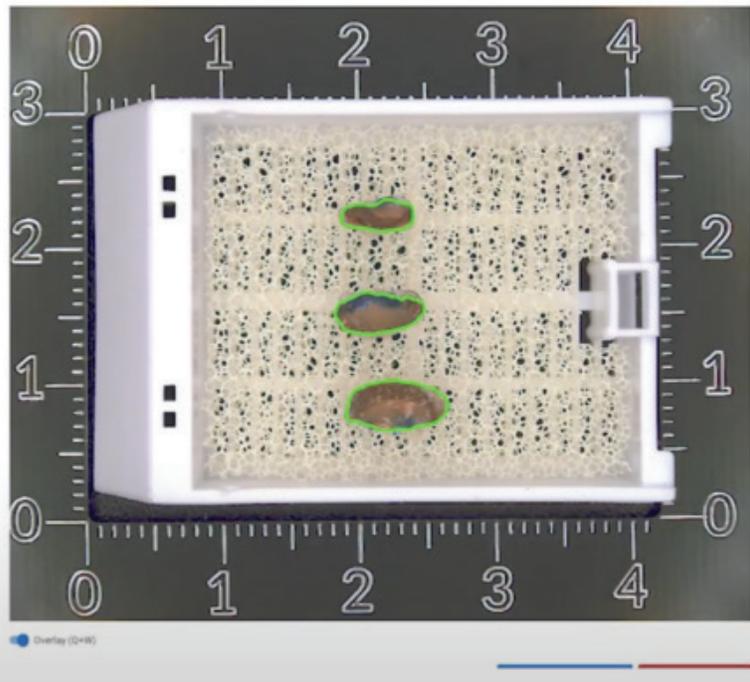
FEEDBACK SETTINGS MEASUREMENT TEMPLATES GUIDES Show hotkeys

← BACK

Cassette Measurement

Select template
Example Template

Measurement test for gross description
Received in formalin are two fragments of skin measuring 1.9 cm and 0.9 cm, completely submitted in 3 pieces.



Template Selection:

- o To modify the information simply click into the textbox and make the desired changes
- o To select a different template, use the dropdown.

< BACK

Cassette Measurement

Select template

Example Template

Measurement text for gross description

Received in formalin are two fragments of skin measuring 1.9 cm and 0.9 cm, completely submitted in 3 pieces.



COPY TEXT (A+S)

CAPTURE NEXT CASSETTE (Z+X)

< BACK

Cassette Measurement

Select template

Example Template

001 - Cassette

Default GI

Default Skin

Example Template

Multiple Piece Biopsy



COPY TEXT (A+S)

CAPTURE NEXT CASSETTE (Z+X)

- **Using Page Functions:**

- Copy measurements individually or as a list.
- Download or copy the image (with/without overlay).
- Print the page.
- Retake the image.

< BACK

BxChip Measurement

Select template

BxChip Lane Length

-  1st/Red
Lane 1.0 has total length = 22.6 mm 
-  2nd/Orange
Lane 2.0 has total length = 1.0 mm 
-  3rd/Yellow
Lane 3.0 has total length = 17.9 mm 
-  4th/Green
Lane 4.0 has total length = 8.1 mm 
-  5th/Blue
Lane 5.0 has total length = 15.9 mm 
-  6th/Black
Lane 6.0 has total length = 12.4 mm 

 COPY AS LIST (A+S)

CAPTURE NEXT BXCHIP (Z+X)

-  1st/Red
Lane 1.0 has total length = 22.6 mm 
-  2nd/Orange
Lane 2.0 has total length = 1.0 mm 
-  3rd/Yellow
Lane 3.0 has total length = 17.9 mm 
-  4th/Green
Lane 4.0 has total length = 8.1 mm 
-  5th/Blue
Lane 5.0 has total length = 15.9 mm 
-  6th/Black
Lane 6.0 has total length = 12.4 mm 

 COPY AS LIST (A+S)

CAPTURE NEXT BXCHIP (Z+X)

 PRINT PAGE(CTRL+P)

RETAKE IMAGE(R+T)

 DOWNLOAD IMAGE(A+C)

 DOWNLOAD IMAGE W/ OVERLAY(A+B)

 COPY IMAGE(A+X)

 COPY IMAGE W/ OVERLAY(A+V)

 SHARE IMAGE WITH LUMEA

IMPORTANT: Once you select to capture the next image, the current page's information will be deleted. Copy and paste any necessary data into your LIS before proceeding.

- **Sharing Images:** If not automatically enabled, use “Share Image With Lumea” to share individual images.

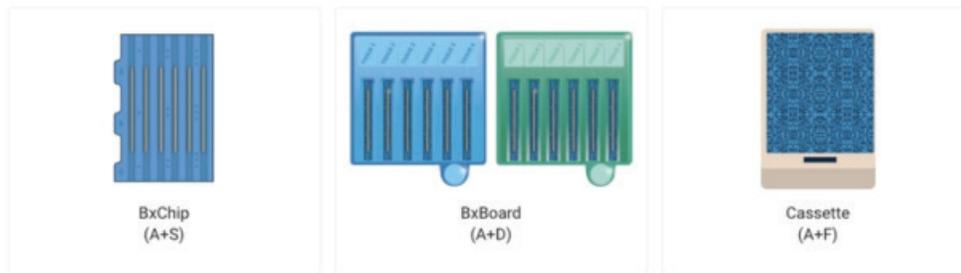


8 – Troubleshooting and Camera Parameter Adjustments

****Before troubleshooting and/or adjusting camera settings, please reach out to your Lumea representative to ensure adjustments are necessary.****

Accessing Admin Settings

- Click “Admin” to enter administrative settings.
- Settings under “Other” are for Lumea personnel only.



LUMEA Admin

YOU PROBABLY SHOULD NOT BE ON THIS PAGE. Click on the lumea logo in the top left to return.
 This page is used to configure the camera during its initial manufacturing.
 Changing the settings from this page could cause the camera to operate inconsistently or break.
 The only reason to be here is if a lumea support team member is giving you specific instructions.
 Click on the lumea logo in the top left to return.

Take Pictures

[full](#) [board](#) [cassette](#)

Run ML

[bxboard](#) [bxchip](#) [generic cassette](#)

Adjust Camera Settings

[full configuration](#) [exposure](#) [cassette crop](#) [bxboard crop](#)

Calibrate

[focus](#) [measurement](#) [color](#)

Other

[version/update](#) [manage pico](#) [thermals](#)

9 – Exposure Optimization

Exposure controls the brightness of the gross images.

Adjust Exposure When:

- Images are too dark or too bright, affecting tissue detail clarity.

- Lighting conditions change, requiring consistency.
- Tissue isn't detected accurately—this may be due to over or underexposure or moisture on or around the tissue causing reflections from the camera flash.

If bright spots from camera or environmental lighting affect tissue detection, lowering the exposure can reduce this errant detection. If the tissue appears too dark, increase the exposure for better detection.

Steps:

1. Discard current color calibration (Settings > Calibrate > Color > Discard Calibration).
2. Access Admin page > Select "Exposure".
3. Click "Preview" to see the current exposure setting.
4. Use +10%, +5%, +1% to increase or -10%, -5%, -1% to decrease exposure.
5. After increasing or decreasing exposure, click preview again. There should be a noticeable, even if it's minor, difference.
6. Click save when satisfied.
7. Validate by running "Run ML" and capturing a preview. Select "Admin" to return to the admin page.

The only reason to be here is to have a Lumea support team member to giving you specific instructions.

Click on the lumea logo in the top left to return.

Take Pictures

full board cassette

Run ML

bxboard bxchip generic cassette

1. **Adjust Camera Settings**

full configuration exposure cassette crop bxboard crop

Calibrate

focus measurement color

Other

version/update manage pico thermals

LUMEA Admin

```
{
  "crop": "full"
}
```

for the operations on this page you will need to place the appropriate target in the camera

check color calibrate color discard calibration

2.

```
{
  "crop": "full"
}
```

color lookup table has been discarded

check color

calibrate color

discard calibration

```
{
  "success": true
}
```

The only reason to be here is if a lumea support team member is giving you specific instructions.

Click on the lumea logo in the top left to return.

Take Pictures

- full
- board
- cassette

Run ML

- bxboard
- bxchip
- generic cassette

Adjust Camera Settings

- full configuration
- exposure
- cassette crop
- bxboard crop

Calibrate

- focus
- measurement
- color

Other

- version/update
- manage pico
- thermals

3.

```
{
  "correct_color": false,
  "configuration_override": {
    "exposure_nano_seconds": 654311,
    "gain": 1,
    "digital_gain": 1
  }
}
```

+10%

+5%

+1%

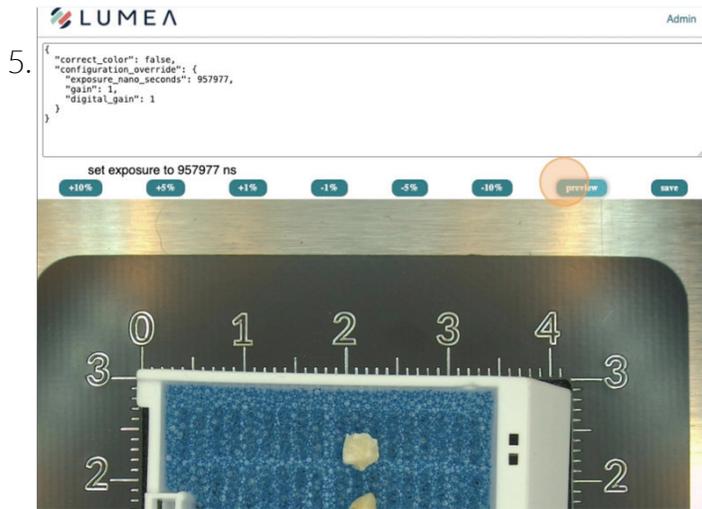
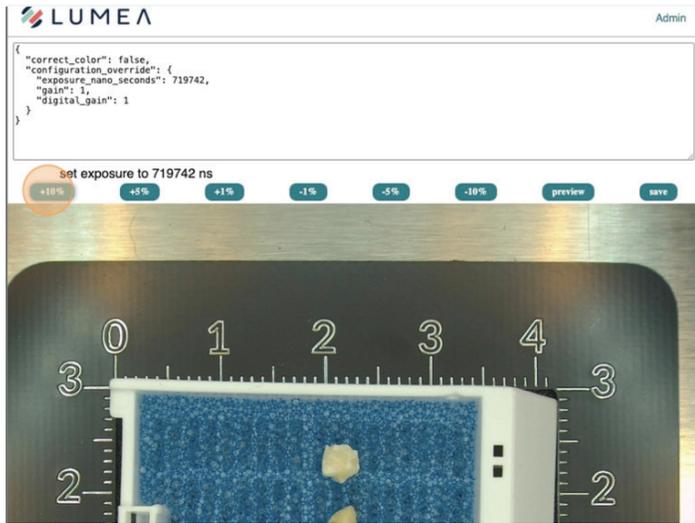
-1%

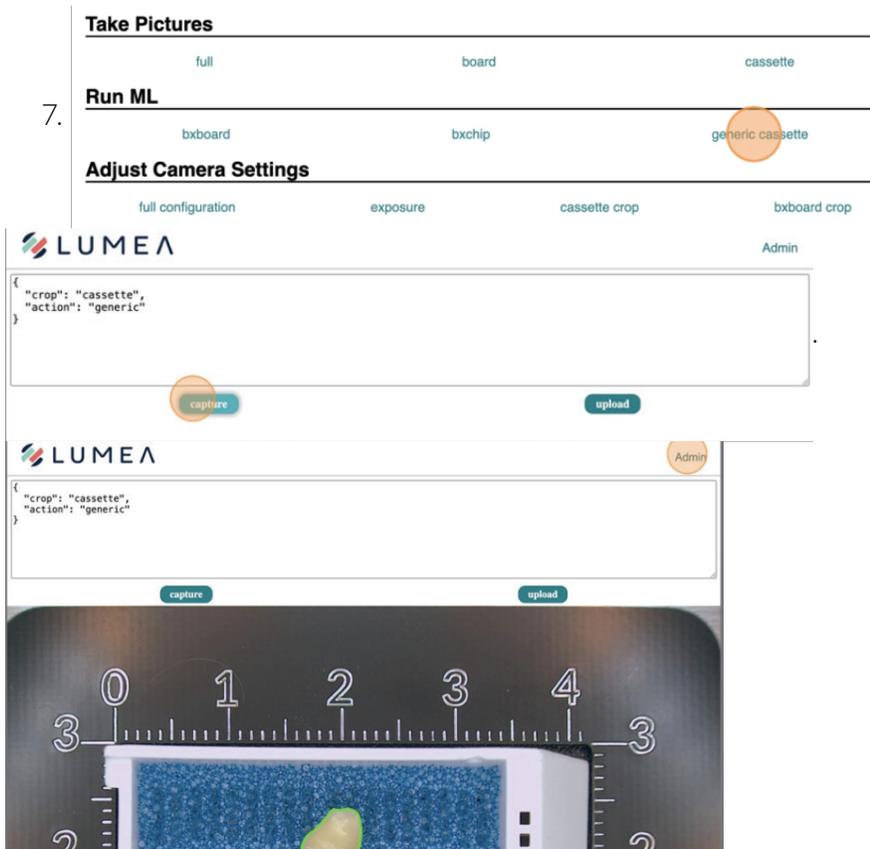
-5%

-10%

preview

save





10 – Color Calibration Procedures

color

Color calibration ensures that tissue images accurately match real-world colors, which is essential for pathologists and AI-based tissue detection. *It is essential to perform a calibration after adjusting exposure.*

A color calibration may be needed:

- When AI detection accuracy decreases
- If there is a noticeable change in image quality or coloration.
- When instructed to by a Lumea representative.

Steps:

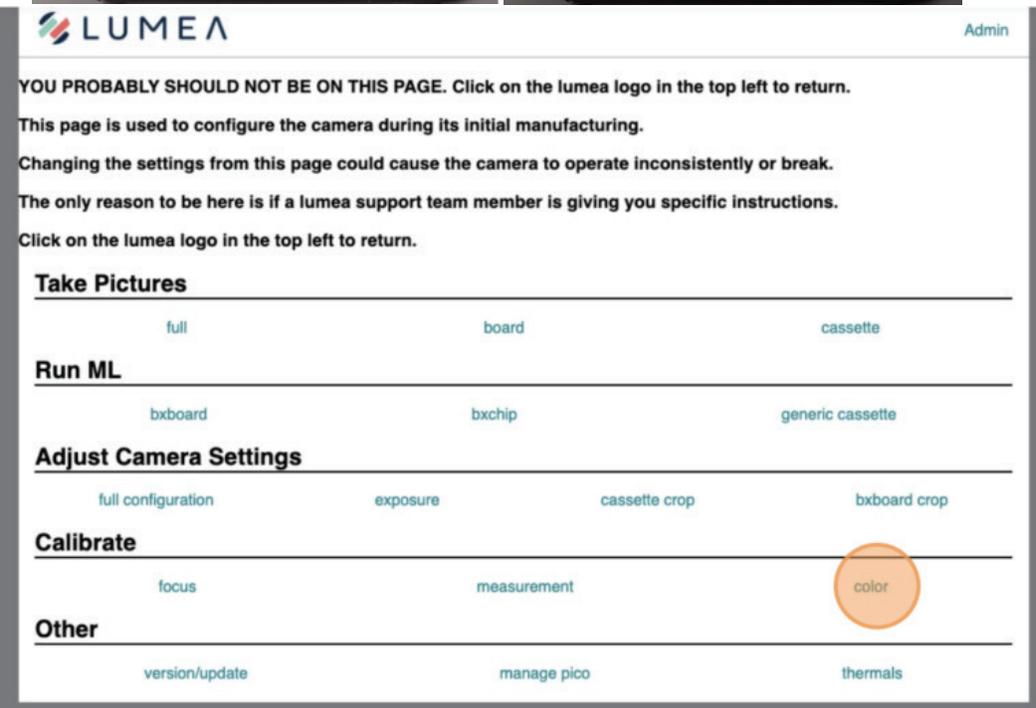
1. Place the color calibration plate on the camera.
2. Navigate to Settings > Calibrate > Color.
3. Click “Check Color”.

4. Check to make sure the color plate is in frame, then click “Calibrate Color”.

Calibration can take up to 1 minute.

5. There should be a noticeable difference between the two images, the latter one being brighter.

6. Remove the color calibration plate from the camera. The new calibration will automatically be saved.



3.

LUMEA Admin

```
{
  "crop": "full"
}
```

for the operations on this page you will need to place the appropriate target in the camera

check color calibrate color discard calibration

4.

LUMEA Admin

```
{
  "crop": "full"
}
```

check complete, average delta_e : 9.167020786162299

check color calibrate color discard calibration

24ColorCard Camera-Profession

5.

24ColorCard Camera-Profession

24ColorCard Camera-Profession

11 – Focus Calibration Procedures

Proper focus ensures sharp, high-quality images for accurate diagnostics and optimal AI performance. If images appear blurry or AI detection is inconsistent, you may need to adjust the focus.

When to Adjust Focus:

- Blurry images.
- AI inconsistencies.

Steps:

1. Insert the focus tool into the top of the camera until it clicks. **Be sure not to touch the lens of the camera.**
2. Navigate to Settings > Calibrate > Focus.
3. Click “Preview”.
4. Click “Toggle Stream” to enable a live image feed.
5. Rotate the focus tool in small increments in either direction until the image is sharp. *If rotating in one direction makes the image worse, reverse direction.*
6. Once satisfied, click “Toggle Stream” to disable feed and remove the focus tool.



1.

2.

The only reason to be here is if a Lumea support team member is giving you specific instructions.

Click on the lumea logo in the top left to return.

Take Pictures

full board cassette

Run ML

bxboard bxchip generic cassette

Adjust Camera Settings

full configuration exposure cassette crop bxboard crop

Calibrate

focus measurement color

Other

version/update manage pico thermals

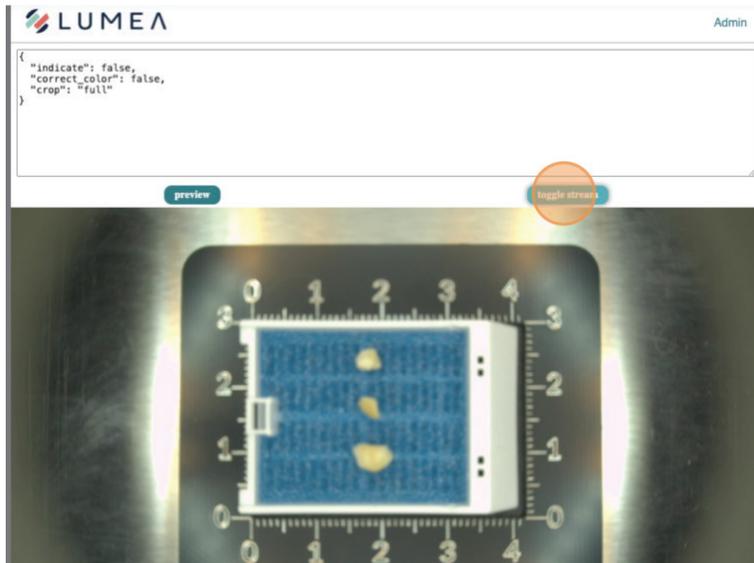
3.

LUMEA Admin

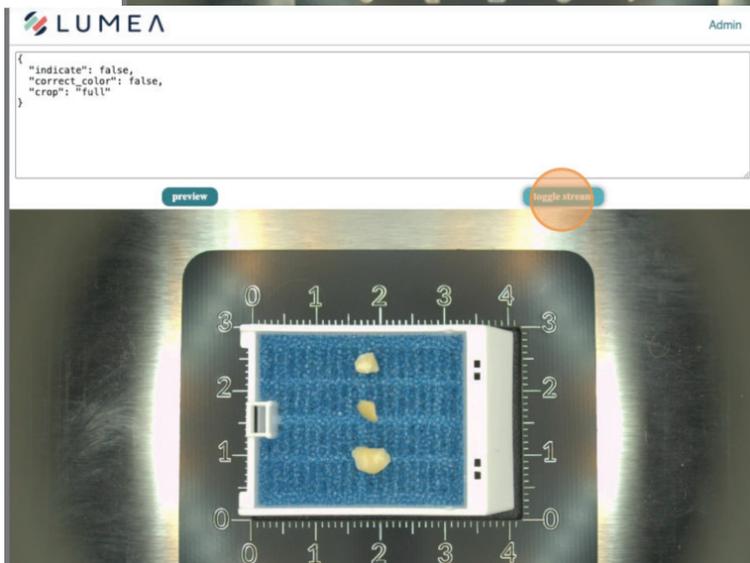
```
{
  "indicate": false,
  "correct_color": false,
  "crop": "full"
}
```

preview toggle stream

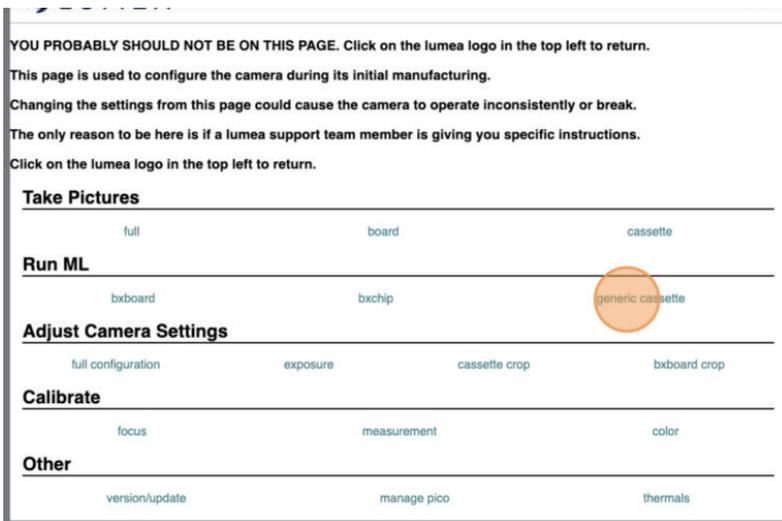
4.



5.



Tip: If you are unsure if the adjustments are making the desired change, you can use the focus tool while taking single images. Navigate to Settings > Take Picture > "bxboard", "bxchip", or "generic cassette" > Capture. This will crop the image and can make it more clear if you are getting in focus images.



12 – Measurement Calibration Procedures

If AI annotations and measurements seem off, determine whether it's an annotation or measurement issue.

- If the annotation inaccurately outlines tissue (missing areas or including non-tissue), adjust exposure, as measurement calibration won't fix this.
- If the annotation correctly outlines the tissue but the size appears incorrect, it's a measurement issue, which can be corrected by calibrating measurement.

When to Calibrate:

- If annotation outlines are correct but measurements seem wrong.

Steps:

1. Place the measurement calibration plate on the camera
2. Navigate to Settings > Calibrate > Measurement. An image will populate showing if any measurements are off – this is indicated by red lines and text.
3. Click “Calibrate Measurement”. A new image will be generated with little red tick marks indicating measurements are calibrated.
4. Click “Save” and remove the measurement calibration plate.



1.

2.

The only reason to be here is if a Lumea support team member is giving you specific instructions.

Click on the lumea logo in the top left to return.

Take Pictures

full

board

cassette

Run ML

bxboard

bxchip

generic cassette

Adjust Camera Settings

full configuration

exposure

cassette crop

bxboard crop

Calibrate

focus

measurement

color

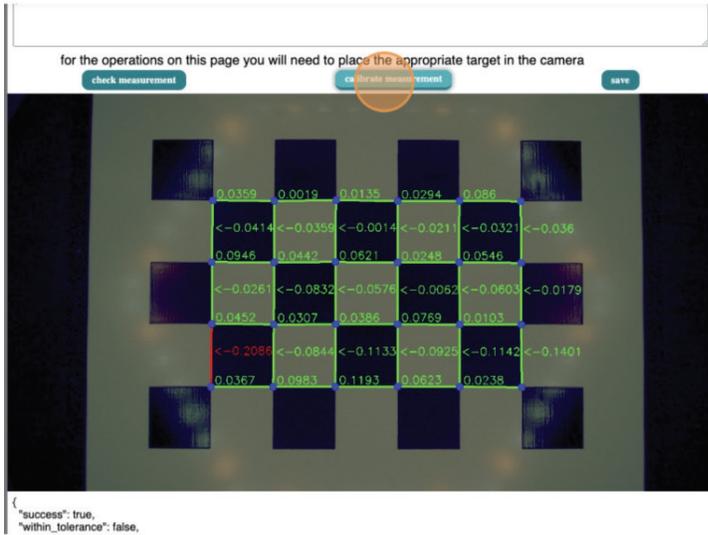
Other

version/update

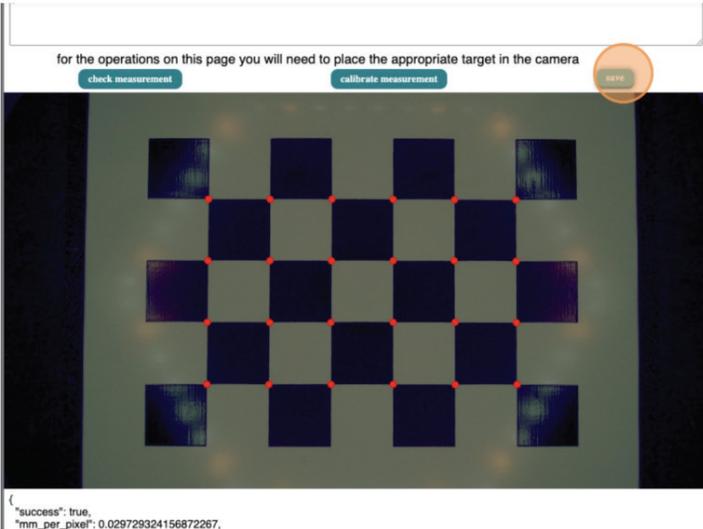
manage pico

thermals

3.



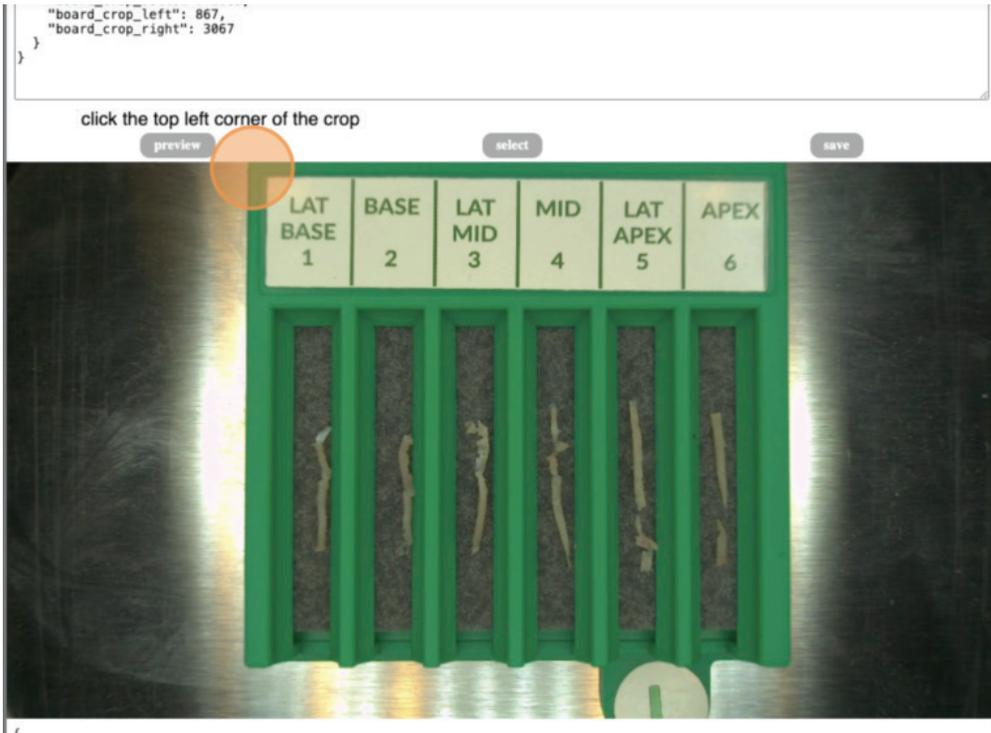
4.



13 – Cassette Cropping Procedures & 14 – BxBoard Cropping Procedures

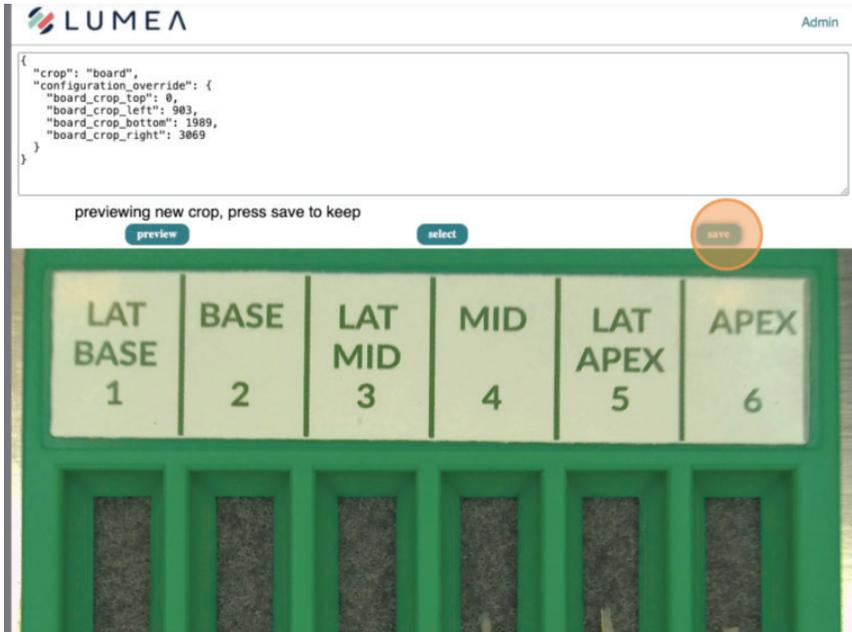
Steps:

1. Navigate to Settings > Adjust Camera Settings > “BxBoard Crop” or “Cassette Crop”.
2. Click “Preview”.
3. Click “Select”.
4. Click the desired starting point of the frame in the top left corner and drag the mouse until the desired frame is highlighted and then click again in the bottom right corner where you want the frame to end.
5. If satisfied, click “Save”.



4.





15 – Finalization Steps

Once troubleshooting or adjustments are complete, return to continue using the BxCamera.

camera.lumeadigital.com to

For questions or further assistance, please contact your Lumea representative.