



EPIC II MICROSCOPE USER MANUAL (v 11.1)

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1. Introduction

Our vision for the EPIC II Operating Microscope is to offer the best portable, high-quality microscope for cataract mission work around the world. Besides optical quality, we design for portability, durability, ergonomics, electrical redundancy, and modularity. We want to offer our customers a microscope that can travel with them anywhere while withstanding the most demanding field conditions.

Central to the dependability of this microscope is its lighting system, rated for 100,000 hours of use. The system will run up to 8 hours continuously on a full charge of the high-capacity battery, and the light can be easily replaced using simple tools.

The EPIC II Microscope is the redesign of the EPIC I Microscope whose development began in 2014. EPIC microscopes are currently serving or have been used in many countries around the world including these and more:

Burundi, Rwanda, Togo, Sierra Leone, Ivory Coast, Uganda, Kenya, Liberia, Sudan, Ghana, Ethiopia, Tanzania, Myanmar, Mexico, Dominican Republic, Jamaica, Haiti, Honduras, Guatemala, Panama, Guayana, Ecuador, Peru, Bolivia, New Zealand, Papua New Guinea, Mongolia, Guam, United States, Canada

We keep the latest updates of our manual online. To view the latest version of our manual, please scan the QR code here.



2. SPECIFICATIONS

2.1 Disclaimer

By using the EPIC II Microscope, you agree to follow the instructions and warnings in this manual to protect yourself and patients from accidental injury. You agree that eyeMobil Innovations is not liable for any accidental injury, death, or negative surgical outcomes associated with the use of this microscope and its accessories.

2.2 What's in the Box

Your EPIC II Microscope system includes the following:

- Pelican case with custom foam Case
- Water bladder pan Case Lid
- Water bladder Case Lid
- 3 legs with lockable casters Layer 1
- 3 stainless steel pins to retain legs Layer 1
- Lithium-ion battery Layer 1
- LED power cable Layer 1
- Main large pole with attached leg pegs Layer 2
- Inner second pole inside large pole Layer 2
- Short top pole Layer 2
- Square extension arm with 2 attached pegs Layer 2
- Flex arm with 2 small black rotating handles Layer 3
- Microscope head attached to top mount, with dust cover Layer 3
- Binoculars Layer 3
- Battery charger Layer 4
- 5mm hex key for flex arm adjustment Layer 4
- Video components (optional) Layer 4

2.3 System Specifications

General Specifications:

Storage temperature	35°F (2°C) to 100°F (38°C)
Storage humidity	Below 60%
Operating temperature	40 to 90 F, 4 to 32 C
Operating humidity	Less than 70%
Microscope stand materials	Primarily aluminum, Delrin® plastic and stainless steel.
Stand-alone weight of the microscope and stand	Approximately 27 lbs.
Weight of the microscope packed in suitcase	50 lbs. maximum

Power Specifications: (**NOTE:** Your battery specifications may differ. Refer to unit label.)

Battery Type	Lithium-ion
Battery Capacity	23000 mAh
Battery Input (charging)	DC 15–24 V / 2 A
Battery Output	DC 9, 12, 16, 19, or 20 V / 4.5 A (max)
Battery Dimensions	7.2" × 4.9" × 0.8" (184 × mm × 124 mm × 20 mm)
Direct Microscope Input	DC 9–32 V / 2 A

Optical Features:

Binocular	45° fixed or 0°–180° inclinable
Eye pieces	10x
Interpupillary distance	2.16"–2.95" (55 mm–75 mm)
Manual magnification changer	0.4x, 0.6x, 1.0x, 1.6x, and 2.5x Overall 4x, 6x, 10x, 16x, and 25x with 10x eyepieces
Objective lens focal length	200 mm
Fine Focus	Manual or motorized with wireless foot pedal

2.4 Safety Features and Warnings

Your EPIC II Microscope has the following safety features:

Microscope Head Mount:

When attached in the top mount configuration, your microscope head is naturally resistant to accidental removal from the flex arm.

When attached in any hang down configuration, there is an additional safety pin which must be retracted to remove the microscope from the flex arm.

WARNING: Beware of knocking or lifting the microscope head upwards in the top mount configuration, which could possibly dislodge the microscope head from its mount. Always keep some tension on the top flex arm knob.

Stand Casters:

The microscope stand is fitted with lockable casters which increase stability and minimize the potential for unwanted motion during surgery.

WARNING: Never perform surgery with the stand casters unlocked.

Stand Height Adjustment:

A tapered groove is incorporated in the height adjustment mechanism of the bottom pole which prevents the middle pole from falling quickly in case of accidentally loosening the bottom pole knob. This will not prevent the microscope from falling if the bottom pole knob is completely loosened or removed.

WARNING: Never loosen height adjustment knobs with the microscope above a patient.

Stand Joints:

Each stand joint (poles, extension arm, flex arm) has a tightening knob or handle. These should always be tightened or partially tightened during use.

WARNING: Never use the microscope with any stand joints completely loose but adjust them prior to use.

Weight System:

The microscope is outfitted with a weight system to stabilize the portable stand. The default configuration is a fillable water bladder. Alternatives include metal plates, and alternate H-mount base, and a wall mount (see Accessories).

This stand may not be as stable as standard, heavy surgical microscopes that physicians may be accustomed to.

WARNING: Never use the microscope without a filled water bladder (or appropriate alternative). Make sure the physician has tested the stability and is familiar with the stand balance before use.

3. SETUP INSTRUCTIONS

The microscope is packed such that it can be put together in the basic order that parts are removed from the custom Pelican case. (For a visual packing guide, refer to Section 7.) The complete setup takes around 5 minutes, besides filling the water bladder.

3.1 Setup Overview:

1. Attach 3 legs to main pole using pins.
2. Place water bladder pan onto legs.
3. Place water bladder onto water bladder pan:
 - Fill water bladder with 5-6 gallons of water (at least ~3/4 full). Remove main pole knob, place water bladder on water bladder pan, and replace main pole knob.
 - Alternatively, fill water bladder on the stand using a hose or funnel.
 - For usage over 1 week, add 1 ounce of bleach to water to prevent bacterial / fungal growth.
4. Insert Top Pole into Second Pole.
5. Attach Extension Arm to Top Pole.
6. Attach Flex Arm to Extension Arm.
7. Attach Microscope Head and Binocular to Flex Arm.
8. Place Battery on Flex Arm Velcro and connect to microscope back.

3.2 Visual Setup Guide

See next page.

1. Attach 3 legs to main pole using pins:



2. Place water bladder pan onto legs:



3. Place water bladder onto pan:



4. Place top pole on top of second pole:



5. Place extension arm onto top pole:



6. Attach flex arm to extension arm:



7. Attach microscope head and binocular:



8. Attach and connect battery:



4. CARE OF YOUR MICROSCOPE

Your EPIC II Microscope is built to last for a lifetime if cared for properly. Please pay special attention to these details and the guidelines in this chapter to keep your microscope in the best possible working condition.

4.1 Maintenance Tools and Supplies

Item	Use
#2 Phillips screwdriver	Used on back cover of the microscope
Nitrile gloves (powder-free)	Handling lenses
Air blower	Lens cleaning (dust removal)
Lens paper or wipes	Lens cleaning
Lens cleaner (60 : 40 ethanol / acetone)	Lens cleaning (not needed with pre-packaged wipes)
5% Vinegar	Lens cleaning (fungus removal)
Hemostat	Lens cleaning (for holding lens paper)
Multi-purpose lubricating oil	Lubricate objective lens mount if stiff (see maintainer's manual)
Bleach (5% sodium hypochlorite)	Prevent bacterial or fungal growth in water bladder
Cotton cleaning cloth (lint-free)	General cleaning
Paper towels	Soak up any excess oil or grease
Cotton buds	Removing dirt, oil, and debris from parts

4.2 General Recommendations

Setup Recommendations:

1. Use the same trained technician(s) or physician(s) for setup and teardown to minimize packing errors.
2. Heed the labels and refer to the visual packing guide for optimal packing.

Lens Cleaning:

1. **Important:** Remove dust from lens surface using an air puffer or similar before contacting with lens paper or wipe.
2. Use powder-free nitrile gloves to prevent skin oils from contacting lens.
3. Use lens paper and proper lens cleaning solution or pre-packaged lens wipes to clean lenses. A clean microfiber cloth with lens cleaner is an acceptable alternative.
4. Always apply the lens cleaner to the paper / cloth and not directly to the lens.

Environmental Recommendations:

1. Maintain in environment with the least vibration possible.
2. Keep the dust cover over the microscope when not in use to avoid exposure to dust.
3. Avoid using the microscope in dusty conditions.
4. Avoid sudden changes in temperature (e.g., going from air-conditioning to hot outside ambient temperature).
5. Maintain humidity less than 60% where possible to minimize risk of fungus.

Transport of Microscope:

1. Always transport microscope in original case, labeling and treating it as fragile.
2. If traveling by commercial airline, remove the lithium-ion battery from the top of the case and place this battery in your carryon.
3. Remove the tablet and camera from the 4th layer if traveling by commercial airplane for safety reasons and secure these in your carryon.

Storage:

1. **Important:** Store water bladder outside of case unless completely dry.
2. Store the microscope in a climate controlled, air-conditioned environment: 35°F–100°F (2°C–38°C). Do not store battery in extreme temperatures.
3. Place binocular and microscope head inside a plastic bag with desiccant packets.

4.3 Flex Arm Tension Adjustment

Flex arm tension is factory adjusted for your microscope configuration (with or without video). Removing or adding video may require readjustment of your flex arm tension.

To add tension to the flex arm:

4. Use the included 5mm hex key (stored in layer 4).
5. Remove microscope head (including binocular) and detach flex arm from stand.
6. Locate the tension adjuster at the bottom end of the flex arm.
 - Turn **clockwise** to **decrease** tension (e.g., to remove video system).
 - Turn **counterclockwise** to **increase** tension (e.g., to add video system).



7. Replace flex arm and microscope head to test flex arm motion.
8. Repeat Steps 2–4 until tension is satisfactory.

4.4 Water Bladder Management



Our unique water bladder system provides weight and stability for EPIC series microscopes, without increasing travel weight.

Fill the water bladder with 5–6 gallons of water (at least $\frac{3}{4}$ full) in a sink away from the microscope head. Place the filled water bladder onto the stand as in Step 3 of the Visual Setup Guide above. For easier placement, remove the lower stand knobs beforehand.

Alternately, fill the water bladder on the stand using a hose and funnel. Take care to keep the microscope head dry.

Important: Add 1 ounce of bleach to the water bladder to prevent fungal growth. This is especially important if the water bladder will be left filled for several days.

Important: Once used, the water bladder takes some time to dry out. We do not recommend transporting the microscope with the water bladder unless it has completely dried.

5. LIGHTING SYSTEM AND POWER

5.1 Overview

The EPIC II microscope can run for approximately 8 hours of continuous use with the included 23,000 mAh battery (no video). The lighting system draws approximately 1.4 A at maximum brightness.

We recommend charging the battery while not in use (e.g., overnight). Charging while operating is also possible. We also recommend purchasing a backup battery.

5.2 Power Management

In the spirit of versatility, we designed the EPIC II microscope to run off most standard battery chargers and power adapters. Power configurations are as follows:

1. Lithium-ion battery (included).
2. Battery charger (included) connected directly to microscope.
3. Car battery with a car battery adapter (optional).
4. Any standard computer or appliance power adapter, provided it:
 - supplies 9 V–32 V power, and
 - connects with a 5.5 mm × 2.1 mm or 5.5 mm × 2.5 mm barrel plug.

The provided battery charger is compatible with 110–220 V power.



5.3 Quick-Change LED Replacement

The Quick-Change LED system simplifies bulb replacement:



1. Disconnect the microscope power.
2. Use a small Phillips head screwdriver to remove the Quick-Change LED.
3. Insert the replacement and fasten Phillips screw.
4. Reconnect the microscope power and test.

(please note that the back is not removed to change the Quick-Change LED however if you wish to change the chip driver, you must remove the back to do this.)

If bulb replacement does not resolve your issue, please contact us.

VISUAL GUIDE: Quick-Change LED Replacement

1. Disconnect microscope power:



2. Remove Quick-Change LED:



3. Insert replacement LED:



4. Reconnect microscope power and test:



5.4 LED Replacement (Original system)

Important: Whenever opening the microscope back, do so in a clean, dust-free environment.

To change the LED bulbs, use the optional LED replacement kit. This kit includes two connected LED bulbs, one LED driver, and one hex key to remove the current LED bulbs.



1. Disconnect the microscope power.
2. Use a small Phillips head screwdriver to remove the microscope back.
3. Disconnect the white 4-pin connector to detach the back.
4. Disconnect the small, white 2-pin connector where both bulbs are attached to the battery chip (voltage regulator).
5. Loosen the set screws on the top of the LED tube using the M3 hex key, then remove the LED bulb set.
6. Insert the new LED bulb set and re-tighten the set screws.
7. Reconnect the 2- and 4-pin connectors, power the microscope, and test the new LED bulb set. If the problem persists, replace the LED chip driver as well.
8. Secure the microscope back with the Phillips screws.

If your lighting system is still not working after following these steps, please contact us.

VISUAL GUIDE: LED Replacement (Original system)

1. Disconnect microscope power:



2. Remove microscope back:



3. Disconnect 4-pin connector:



4. Disconnect 2-pin connector:



5. Remove LED bulb set:



6. Connect new LED bulb set:



7. Reconnect and test:



8. Resecure microscope back:



6. EPIC VIDEO SYSTEM

6.1 Overview

The EPIC video system allows recording and monitoring of surgical cases with resolution up to 4K. Your system may be one of several configurations, with either an external or integrated beamsplitter, and either a wired or wireless monitor.

6.2 Integrated Video System

In 2021, eyeMobil introduced the integrated video system, further simplifying setup. The beamsplitter is always in place, and the camera never needs to be detached.

Setup

1. Check that camera is snugly secured and correctly oriented.
2. Connect short camera power cable from microscope back to camera.
3. Attach the monitor holder and swivel mount to extension arm.
4. Secure tablet in monitor holder, locking in place. Connect power cable if needed.
5. Turn on tablet and camera, then pair using the preinstalled GoPro app.

If needed, refer to instruction video on tablet, or watch online here:

<https://www.eyemobil.com/tutorials>

- After first pairing, camera will connect automatically when tablet app starts.
 - **Wired monitor:** Connect monitor power cable and HDMI cable as indicated on labels, then power on camera and monitor.
6. Focus the camera:
 - Adjust eyepieces first.
 - Focus the microscope on small writing at high mag.
 - Focus camera using focus ring on microscope back.
 - Use monitor / tablet for easier viewing.
 7. XY adjustment (optional)
 - If the image is misplaced on the camera, the left right (X) position and up down (Y) position can be adjusted with a 1.5 mm Allen key.
 - The X adjustment is found as a small hole on the upper back to the upper right of the USB power
 - The Y adjustment hole is located on the top of the upper back

VISUAL GUIDE: Integrated Video System Setup

1. Secure camera:



2. Connect camera cable:



3. Attach monitor holder:



4. Secure tablet in monitor holder:



5. Pair camera with tablet:



6. Adjust focus:



6.3 External Video System

Setup Overview:

1. Remove binocular, attach beamsplitter with video adapter, and reconnect binocular.
2. Remove the video adapter ring and its plastic cap.
3. Remove the camera body cap.
4. Thread video adapter ring onto camera.
5. Attach camera to video adapter, locking in correct orientation.
6. Connect camera power cable from microscope back to camera.
7. Attach the monitor holder and swivel mount to extension arm.
8. Secure tablet in monitor holder, locking in place. Connect power cable if needed.
9. Turn on tablet and camera, then pair using the preinstalled GoPro app.
 - a. If needed, refer to instruction video on tablet, or watch online here: <https://www.eyemobil.com/videos>.
 - b. After first pairing, camera will connect automatically when tablet app starts.
 - c. **Wired monitor:** Connect monitor power cable and HDMI cable as indicated on cable labels, then power on camera and monitor.
10. Focus the camera using video adapter focus ring.
 - a. Adjust eyepieces first.
 - b. Focus the microscope on small writing with high mag, then focus camera.
 - c. Use monitor / tablet for easier viewing.
 - d. If unable to achieve focus, ensure the spacer ring is in place on camera.

VISUAL GUIDE: External Video System Setup

1. Attach beamsplitter:



2. Remove video adapter ring:



3. Remove camera body cap:



4. Thread adapter ring onto camera:



5. Attach camera to video adapter:



6. Connect camera power cable:



7. Attach monitor holder:



8. Secure tablet in monitor holder:



9. Pair camera with tablet:



10. Adjust focus:



6.4 General Video Recommendations

We offer the following tips and recommendations for best video experience:

1. Remove GoPro cable door for ease of use.
2. Utilize GoPro voice commands or tablet app for easier control. Please note that sometimes voice control is too sensitive and an unintended word can turn off the video or camera by accident. If this happens, you can turn off the voice control mode.
3. To change the microSD card, open the battery door to access the small card slot inside this compartment. Refer to this resource for approved cards:

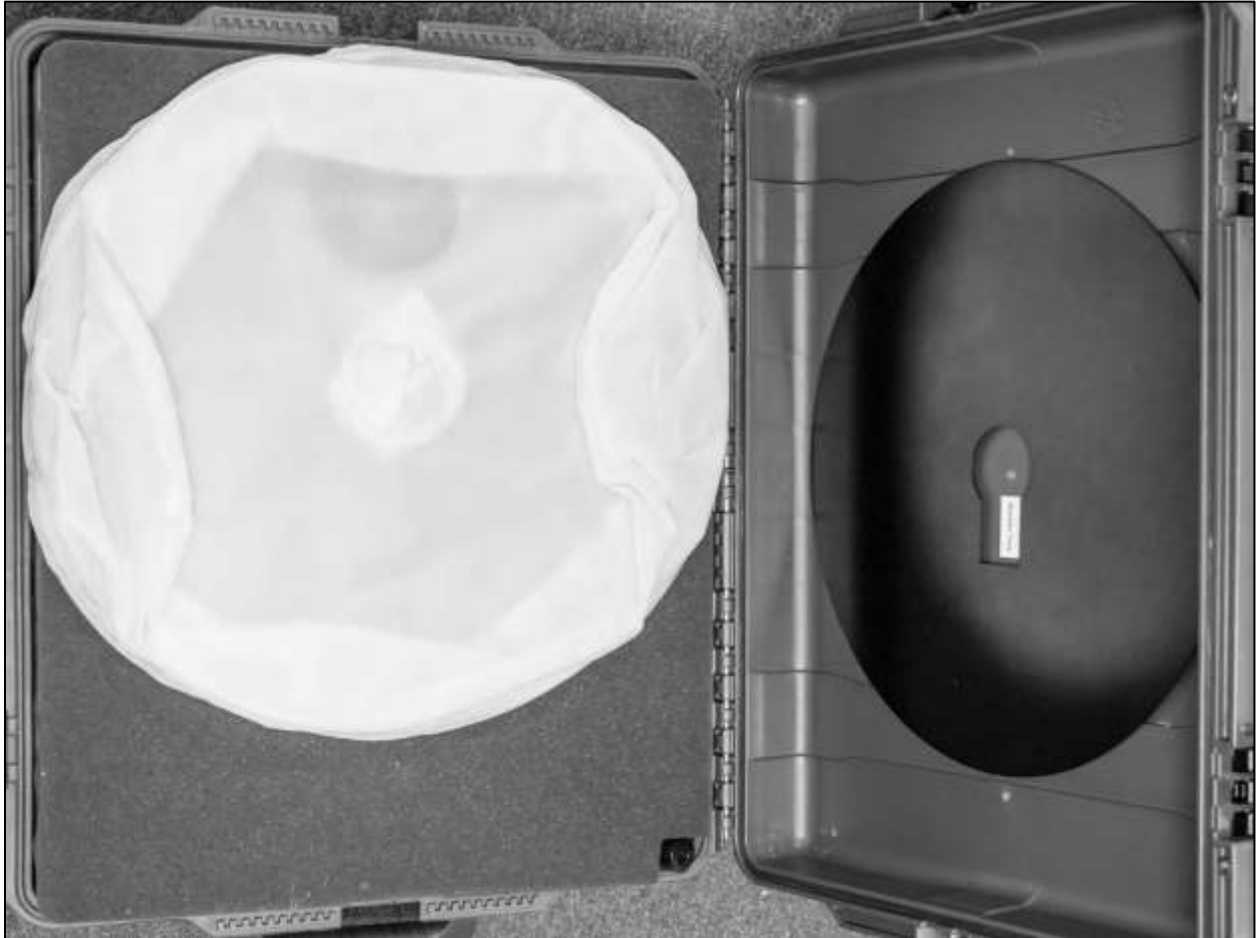
<https://gopro.com/help/articles/block/microSD-Card-Considerations>

4. Use 1080p resolution and 30 fps for best balance between file size and video quality.
5. Use the wide or medium settings for best picture size.
6. Consider using multiple microSD cards and backing up regularly.
7. Turn off screensaver on the GoPro.
8. If wireless connection lag is a problem, use an HDMI cable instead.

7. VISUAL PACKING GUIDE

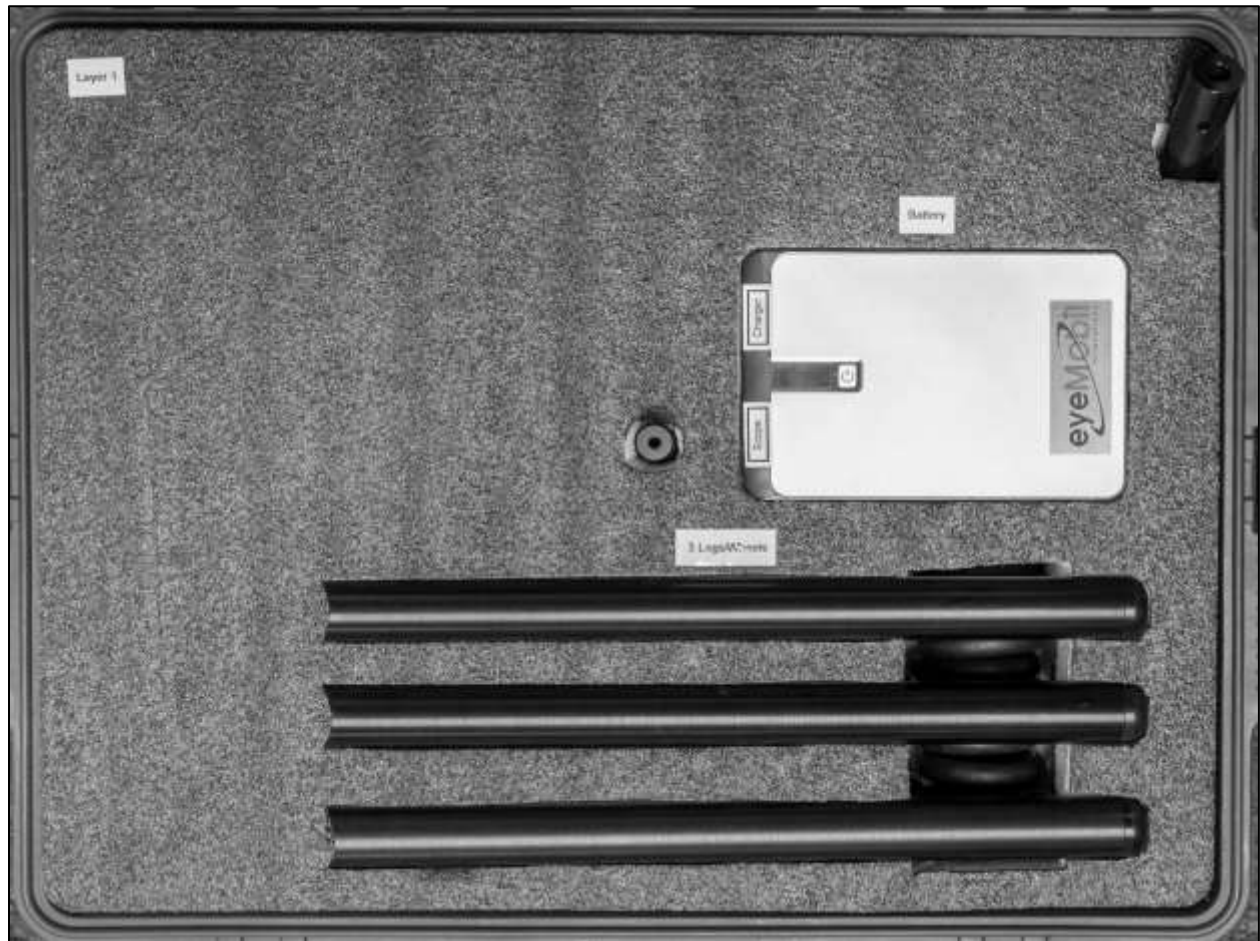
The Pelican case has been custom cut to fit your microscope. The following visual guide illustrates the correct packing arrangement for storing your microscope, starting with the top layer:

Case Lid:



- Water bladder
- Water bladder pan

Layer 1:



- Battery
- Microscope power cable
- Stand legs (3)

Layer 2:



- Stand base
- Extension arm
- Top pole (optional)

Layer 3:



- Microscope head
- Flex arm
- Monitor holder (optional)

Layer 4:



- Battery Charger
- Knob covers
- 5 mm hex key
- Video monitor and cables (optional)
- Video camera and memory card (optional)

8. Troubleshooting

Please identify the problem below:

No Light

- Verify the microscope is switched on.
- Check microscope power cable connection at battery and microscope.
- Check that brightness knob is at maximum.
- Check that battery is not empty. Ensure USB output is providing power (e.g., connect to a cell phone).
- Test light with charger directly attached to microscope (no battery).
- If problem persists, follow LED replacement instructions in Section 5.

Poor Focus

- Check if eyepieces are fully inserted into binocular.
- Check that eyepieces are adjusted to 0 diopters.
- Check if binocular is seated correctly on microscope head.
- Clean objective lens if needed.

Cannot See through One or Both Eye Pieces

- Remove binocular and look through it towards a distant object.
- Look down the barrel of the microscope with the binoculars removed and see if there is any visible obstruction.

Video Defocused (External System)

- Attempt to focus using the focus ring on video adapter.
- Verify that the black spacer ring is in place between the camera and C-Mount.

Thank you for choosing eyeMobil! We appreciate your business and look forward to serving you as you serve others. For any inquiries, complaints, or feedback, please do not hesitate to contact us.

If you wish to view our most current manuals, please go to www.eyemobil.com/manuals or scan the QR code below:



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