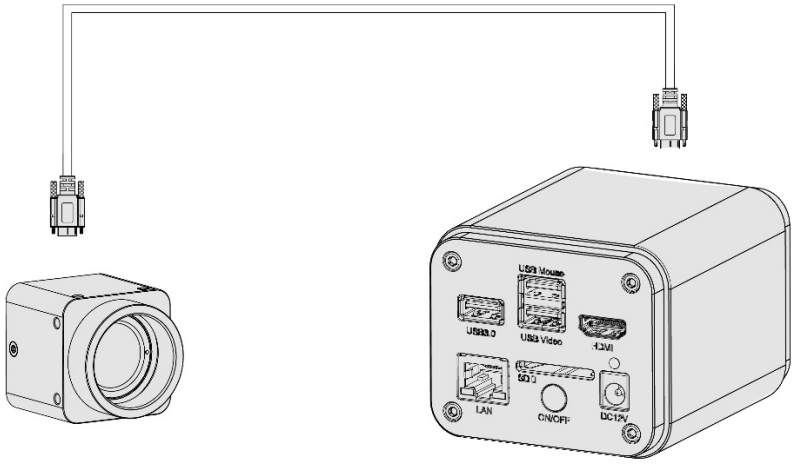
LABOMED
ideas for vision

Atlas+
User Manual

4K Surgical Imaging Camera



To ensure correct use of this instrument and to avoid injury during operation,
read this manual completely before use.

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1 INTRODUCTION

The Atlas+ is a long-distance 4K imaging platform engineered for surgical microscopy, laboratory instrumentation, and high-resolution industrial inspection. The system is delivered as a two-piece assembly: a compact **image-capture head** that mounts to the microscope or trinocular tube, and a separate **processing unit** (the master device) that handles encoding, output, and storage. The two components are joined by a screw-locked Micro-USB 3.0 tether up to ten meters in length, allowing the capture head to be embedded in tight enclosures while the master device remains accessible at the operator's console.

The architecture is intentionally modular. By isolating the optical front-end from the processing electronics, the Atlas+ may be integrated into OEM equipment with minimal mechanical accommodation, while still presenting a familiar set of host-side outputs — HDMI 2.0, USB 3.0, Gigabit Ethernet, and 5 GHz Wi-Fi — to downstream monitors and workstations.

The following points highlight the principal capabilities of the Atlas+ Series:

- Sony 4K back-illuminated CMOS image sensor, optimized for low-light and high dynamic range performance.
- Simultaneous video output over **HDMI**, **network**, and **USB**, with 4K and 1080p resolutions selected automatically based on the attached monitor.
- 4K at 60 fps over HDMI 2.0 in a low-latency mode, with an average end-to-end delay of approximately 40 ms.
- On-device capture of still images and video to SD card or USB flash drive, with local preview, playback, and side-by-side comparison.
- Support for RAW image acquisition for downstream analysis and color science workflows.
- Automatic image upload to a designated server over the local network.
- Optional USB voice-control module enabling hands-free triggering of snap, record, freeze, and other capture commands.
- Embedded image browser providing image-to-image comparison, image-to-live-video comparison, multi-image extended depth of field (EDF), and multi-image stitching.
- Advanced ISP pipeline featuring local tone mapping and three-dimensional noise reduction.
- Real-time EDF and WDR processing for live viewing.
- Real-time stitching for in-session panorama composition.
- Factory-tuned ISP profiles for biological and stereo microscopes.
- Embedded Atlas+ 4K firmware with automated edge detection and on-image measurement.
- Companion PixelPro / PixelPro Lite software for Windows, macOS, and Linux workstations.
- Free iOS and Android applications for tablets and smartphones.

This manual covers safety, installation, day-to-day operation, calibration of measurement tools, network configuration, and the full setting catalog exposed through the embedded Atlas+ 4K interface.

2 SAFETY INFORMATION

The Atlas+ is a precision optical instrument intended for use by trained clinical, laboratory, and industrial personnel. Read this section in full before placing the system in service. If the instrument is used in any manner not specified in this manual, the protection afforded by the equipment may be impaired and the warranty voided.

1 Intended Use & Installation

1. The Atlas+ is intended for the live viewing, capture, and measurement of microscopic images. It is not, by itself, a diagnostic device.
2. Install the system on a stable, level surface free of mechanical vibration and away from direct sunlight, high temperatures, high humidity, and excessive dust. See Chapter 16, *Specifications*, for environmental tolerances.
3. Allow at least 10 cm of clearance around the master device to permit convective air flow. Do not place the master device on soft surfaces (carpet, foam, etc.) that may obstruct ventilation slots.
4. Use only the power adapter supplied by LABOMED. Substitution of an unapproved adapter may damage the camera and void product safety warranties.
5. Route the power cable away from the camera body and away from sources of heat. Do not pinch or kink the Micro-USB 3.0 tether between the master device and the image-capture head.
6. Confirm that the receptacle into which the adapter is plugged is properly grounded. LABOMED cannot warrant electrical safety on an ungrounded supply.
7. Never permit metallic objects, fluids, or foreign particles to enter the camera housing through ventilation slots or unused ports. Doing so may cause electric shock and irreversible damage to the camera.
8. Disconnect the power adapter from the wall outlet whenever the camera is not in use, before cleaning, and before performing any servicing.

2 Safety Symbols

The following symbols may appear on the instrument or its accessories. Operators should familiarize themselves with each before placing the system in service.

Symbol	Meaning
⚠	Caution. Refer to the operating manual before use. Improper use may result in injury to the user and/or damage to the equipment.
⚠	Warning — risk of electric shock. Do not open the master device or capture head; there are no user-serviceable parts inside.
I	Main power switch in the **ON** position.
○	Main power switch in the **OFF** position.
⊗	Do not disassemble. Sealed assemblies must be returned to LABOMED service for any internal repair.

2 SAFETY INFORMATION (CONT.)

⚠ **Caution.** If the camera is used in any manner not specified by this manual, the safety of the user may be compromised and the warranty may be voided. The equipment may also sustain damage. Always operate the Atlas+ as outlined in this instruction manual.

3 Getting Started

1. The Atlas+ is a precision instrument containing delicate optical and electronic assemblies. Handle the capture head and tether with care; avoid mechanical shock during installation.
2. The capture head must be mounted to the microscope using the appropriate C-mount adapter (see Chapter 6, *Optional Accessories*). Cross-threading or over-tightening will damage the optical interface.
3. Carry the assembled system by the master device housing only; never lift or transport the system by the connecting tether.
4. Allow the system to acclimate to ambient temperature before powering on if the unit has been moved between substantially different climates. Condensation on optical surfaces may transiently degrade image quality.

4 Cleaning & Maintenance

The Atlas+ requires very little routine maintenance. Keep optical surfaces clean, keep ventilation slots clear, and store the system under its dust cover when it is not in use.

Optical Surfaces

1. Remove loose particulate from the front element of the capture head using filtered compressed air or a manual blower bulb. Do not use household compressed-air cans with internal propellant; the propellant residue can stain optical coatings.
2. For fingerprints or oily films, lightly moisten a lens tissue with an 85 % petroleum-ether / 15 % isopropanol cleaning solution and wipe the lens using a single **spiral motion** from the center outward. Never wipe in a zigzag pattern; this spreads contaminants across the coating.
3. Allow solvent to flash off fully before reassembly. Solvents such as petroleum ether and isopropyl alcohol are flammable; use them only in a well-ventilated area and away from open flame, sparks, or operating electrical equipment.


zigzag motion (X)


spiral motion (✓)

Cleaning Painted Surfaces

Avoid organic solvents (thinners, xylene, ether, acetone, alcohol, etc.) on painted housings. Painted surfaces may be cleaned with a microfiber cloth lightly moistened with water; loose dust may be removed with a soft, dedicated dust brush.

Use a spiral cleaning motion from the center of any optical element outward. A zigzag motion will smear contaminants across the surface and may damage anti-reflective coatings.

5 Storage & Long-Term Handling

1. When the Atlas+ is not in use, fit the protective lens cap over the capture head and cover the master device with the supplied dust cover.
2. Store the system in a dry, climate-controlled space within the ranges given in Chapter 16. Avoid extended exposure to humidity above 60 %, which may promote fungal growth on optical coatings.
3. If the system will not be used for an extended period, remove the SD card and USB flash drive to prevent contact corrosion at the card edge.
4. Disconnect the power adapter from the wall outlet during storage and route both ends of the tether into a coiled, strain-free position.

6 Disposal

The Atlas+ contains a CMOS image sensor and associated electronics that must be recycled in accordance with applicable local regulations on waste electrical and electronic equipment (WEEE). Do not dispose of the system as unsorted municipal waste. Contact LABOMED service for region-specific take-back guidance.

7 Service

The Atlas+ contains no user-serviceable components. Opening either the master device or the image-capture head will void the warranty and may expose the user to electrical hazards. All service must be performed by LABOMED-authorized personnel. Contact your local LABOMED dealer or visit **www.laboamerica.com** for service information.

Note. Firmware updates for the embedded Atlas+ 4K interface are distributed through the LABOMED dealer network. Confirm that your unit's firmware revision matches the version referenced in this manual before reporting an anomaly; current and prior revisions are listed on the LABOMED product support page.

3 SYSTEM OVERVIEW

The Atlas+ system is built around two physically separated assemblies linked by a single shielded tether. This separation lets the optical head sit close to the specimen while keeping the processing unit, controls, and host connections at a convenient working position.

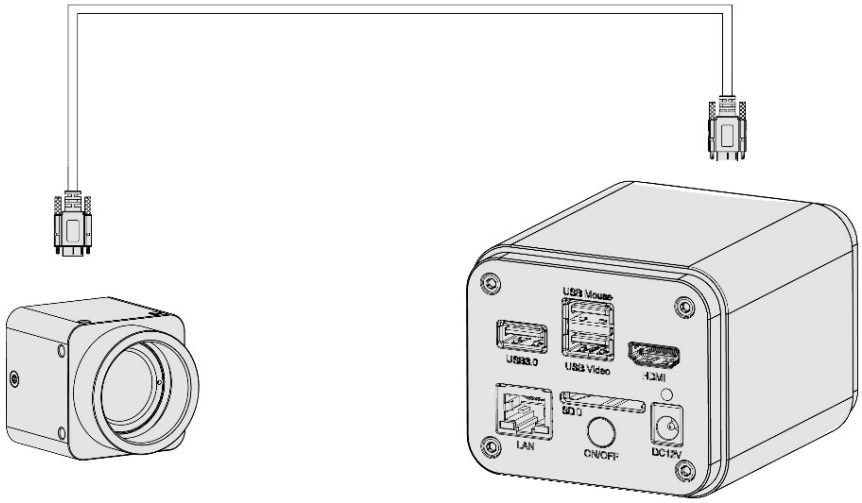


Fig. 1 — Atlas+ image-capture head (left) and master device (right), joined by the supplied 10 m Micro-USB 3.0 tether with screw lock.

1 Image-Capture Head

The capture head houses the Sony 4K image sensor, the C-mount optical interface, and the high-speed serializer that transmits raw video to the master device. The head is intentionally compact (an approximately 50 mm cube) so that it can be embedded in instrument enclosures, surgical arms, or OEM imaging stations. There are no user controls on the capture head — all configuration is performed at the master device.

2 Master Device

The master device performs ISP processing, video encoding, on-board capture, and host-side I/O. All operator-facing connections — HDMI, USB 3.0, LAN, USB host (mouse / flash / Wi-Fi), SD card, and DC power — terminate at the rear panel of this unit. The embedded Atlas+ 4K interface runs on the master device and is rendered through the HDMI output.

3 Tether

The supplied tether is a custom Micro-USB 3.0 to Micro-USB 3.0 cable with locking thumbscrews at each end. The tether carries power, control, and full-bandwidth raw video. It is rated for continuous operation at 10 m and is not interchangeable with off-the-shelf Micro-USB 3.0 cables. Do not substitute.

4 PORTS & INTERFACES

All external connections terminate at the rear panel of the master device. The figure below identifies each port; the table on the right summarizes its function.



Fig. 2 — Rear panel of master device.

USB Mouse	Connect the supplied USB mouse for navigation of the embedded Atlas+ 4K interface, or a USB voice-control module for hands-free triggering of snap, record, and freeze.
USB 3.0	Multi-purpose host port. Accepts a USB flash drive for image and video storage, a USB microphone for audio capture, a 5 GHz Wi-Fi adapter for wireless transmission, or the USB voice-control module.
USB Video	Connects directly to a computer or compatible host for USB 3.0 video transfer to PixelPro, PixelPro Lite, or any UVC-compatible application.
HDMI	HDMI 2.0 video output. 4K UHD or 1080p, automatically selected based on the EDID of the attached monitor.
LAN	Gigabit Ethernet for direct network operation or for connection to a router / switch in a multi-camera deployment.
SD	SDIO 3.0 card slot. Recommended cards: Class 10 or higher, 16 GB or larger.
ON / OFF	Master power switch.
LED	Status indicator. Solid green: ready. Blinking: capture in progress.
DC 12V	Power input. Use the supplied 12 V / 1 A regulated adapter only.

Video output interfaces. The Atlas+ provides four concurrent video paths. Their formats and frame-rate ceilings differ; the relevant performance limits are summarized below.

Interface	Capability
HDMI 2.0	60 fps at 4K (3840 × 2160) or 1080p (1920 × 1080); auto-switch based on monitor EDID.
LAN	H.264 encoded video; resolution switching between 4K / 1080p / 720p; DHCP or static IP; unicast or multicast.
Wi-Fi	Via 5 GHz USB Wi-Fi adapter in AP or STA mode.
USB 3.0 Video	H.264 / MJPEG to a host computer through the USB Video port.

5 STANDARD COMPONENTS

- After removing the Atlas+ from its shipping carton, verify that all items listed below are present. Please note that the actual contents of your kit may vary slightly depending on the regional configuration and any optional accessories ordered with the system.

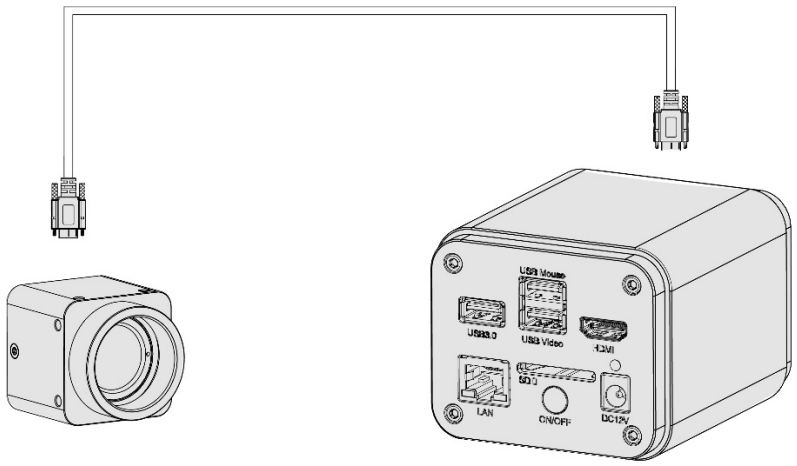


Fig. 3 — Atlas+ master device, capture head, and connecting tether.



Master Device



Capture Head



Micro-USB 3.0 Tether (10 m)



USB Mouse



HDMI Cable



USB 3.0 A-to-A Cable



12 V DC Power Adapter



Software USB Flash Drive

Power adapter specification. Input: 100–240 V AC, 50 / 60 Hz. Output: 12 V DC, 1 A. Certifications: UL, CE, FCC. Both U.S. (POWER-U-12V1A) and European (POWER-E-12V1A) variants are available; the appropriate adapter is shipped for the destination region.

6 OPTIONAL ACCESSORIES

The following items are not included with the standard Atlas+ kit but are available from LABOMED. The capture-head adapter rings should be selected to match the eyepiece tube diameter of your microscope.



SD Card (16 GB+, Class 10)



USB Flash Drive



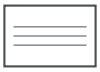
5 GHz USB Wi-Fi Adapter



Ethernet Cable



Eyepiece-Tube Adapter Rings



Calibration Slide Kit



Voice-Control Module



PixelPro Software (Windows / macOS / Linux)

C-mount adapter selection. Match the ring to your microscope's eyepiece tube diameter: 23.2 mm (108001 / 108002 / 108003), 30 mm (use 108015 ring + a 23.2 mm adapter), or 30.5 mm (use 108016 ring + a 23.2 mm adapter). Choose one adapter per microscope.

Companion Software (free)

- **PixelPro** — Windows XP / 7 / 8 / 10 / 11 (32 / 64 bit).
- **PixelPro Lite** — macOS 10.10 and later, Linux distributions with kernel 2.6.27 and later.
- **PixelPro App** — iOS 11+ and Android 5.1+ for tablet and mobile use.

7 INITIAL SETUP

Each Atlas+ kit is shipped fully assembled at the factory and requires only the connection of the supplied cables and adapters before first use. Plan to allow approximately fifteen minutes for an initial bench-top configuration.

1 Site Selection

Choose a stable surface free of mechanical vibration, away from direct sunlight and high-intensity ceiling lighting. Confirm that the local AC supply matches the rated input of the supplied adapter (100–240 V AC, 50 / 60 Hz). Maintain at least 10 cm of clearance around the master device for convection cooling.

2 Mounting the Capture Head

1. Identify the eyepiece-tube diameter of the microscope (23.2 mm, 30 mm, or 30.5 mm). Select the matching adapter ring.
2. Thread the chosen C-mount adapter onto the front of the capture head. Hand-tighten only; never use tools.
3. Lower the capture head into the trinocular port and secure it with the trinocular thumbscrew. Confirm the alignment mark on the adapter is positioned toward the operator.

3 Connection Sequence

1. Connect one end of the supplied Micro-USB 3.0 tether to the capture head and tighten the screw lock. Connect the opposite end to the master device and tighten its lock.
2. Connect the HDMI cable from the master device to the chosen monitor.
3. Insert the supplied USB mouse into the **USB Mouse** port of the master device.
4. Optionally insert an SD card or USB flash drive into the appropriate slot. The Atlas+ defaults to SD card storage when both are present; this priority may be changed under *Settings > Storage*.
5. Connect the DC power adapter to the master device, then to the wall outlet.
6. Switch the master device **ON**. The HDMI monitor displays live video within approximately ten seconds.

Note. Always insert and remove the SD card and USB flash drive with the master device powered **OFF**. Hot-swap is not supported and may corrupt the file system on the storage medium.

8 OPERATING MODES

The Atlas+ supports five distinct operating configurations. The first — *standalone HDMI* — requires only the camera, a monitor, and the supplied USB mouse. The remaining four extend the camera into networked and host-driven workflows for capture, archiving, and shared review.

8.1 Standalone HDMI — Embedded Atlas+ 4K

In this configuration the camera operates as a self-contained imaging station. No computer or network connection is required. The embedded Atlas+ 4K interface is rendered through the HDMI output and operated with the supplied USB mouse.

Connection steps

1. Join the capture head to the master device with the Micro-USB 3.0 tether.
2. Connect the HDMI cable from the master device to the monitor.
3. Insert the supplied USB mouse into the *USB Mouse* port.
4. Insert an SD card or USB flash drive for image and video storage.
5. Connect the power adapter and switch the master device **ON**.

Live video appears on the monitor. Move the mouse cursor to the left, right, top, or bottom edge of the video window to reveal the corresponding control panel or toolbar.

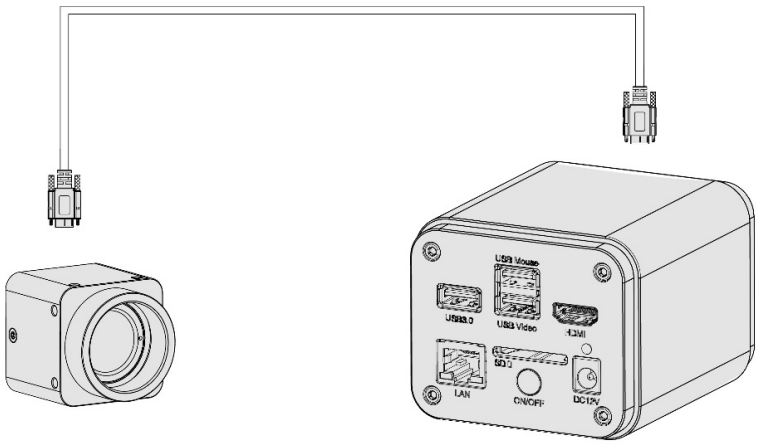


Fig. 4 — Atlas+ master device and capture head joined for standalone operation. An HDMI monitor and USB mouse complete the workstation.

8.2 USB 3.0 Connection to a Host Computer

The master device may be operated as a USB 3.0 camera through the *USB Video* port. Install **PixelPro** on Windows hosts or **PixelPro Lite** on macOS / Linux hosts, then connect the supplied USB-A cable from the master device to a USB 3.0 port on the computer. The upper-left corner of the HDMI overlay displays “USB 3.0 Mode” or “USB 2.0 Mode” once the link is established.

8.3 Wireless — Wi-Fi Access-Point (AP) Mode

In Wi-Fi AP mode the Atlas+ creates its own wireless network. Workstations and mobile devices connect to this network directly and receive live video through PixelPro, PixelPro Lite, or the free PixelPro app for iOS and Android.



Fig. 5 — In Wi-Fi AP mode, the master device hosts the wireless network. Hosts join the network directly.

Configuration

1. Start the camera in standalone HDMI mode (Sec. 8.1).
2. Move the cursor to the bottom of the video window to reveal the Synthesis Camera Control Toolbar. Click *Settings*, open the *Network* > *Wi-Fi* page, and select **AP** in the *Wi-Fi Mode* control. AP is the factory default.
3. Insert the optional 5 GHz USB Wi-Fi adapter into the *USB 3.0* port. The HDMI overlay displays “AP Mode” in the upper-left corner.
4. On the workstation or mobile device, connect to the SSID listed on the *Network* > *Wi-Fi* page (default password 12345678; change it at the earliest opportunity).
5. Launch PixelPro, PixelPro Lite, or the PixelPro app. The active Atlas+ appears automatically in the camera list (desktop) or thumbnail panel (mobile).

Compatibility. Use a workstation running Windows XP / 7 / 8 / 10 / 11, macOS 10.10 or later, or a Linux distribution with kernel 2.6.27 or later. Mobile devices require iOS 11+ or Android 5.1+.

8.4 Wired Network — Direct LAN Connection

For a peer-to-peer wired connection, configure static IP addresses on both the Atlas+ and the host computer. The two addresses must reside in the same subnet and share the same subnet mask and default gateway. See Fig. 6 on the following page for the topology.

Configuration for direct LAN

1. Start the camera in standalone HDMI mode and open *Settings > Network > LAN*.
2. Uncheck **DHCP**. Enter a static IP address, subnet mask, and default gateway. A Class C private range such as 192.168.x.x is recommended.
3. On the host computer, open the operating system's IPv4 network properties for the connected adapter. Assign a static address in the same subnet, with the same subnet mask and gateway, but a different host octet.
4. Connect the supplied Ethernet cable between the Atlas+ *LAN* port and the host's network port. The HDMI overlay displays the assigned IP address.
5. Launch PixelPro or PixelPro Lite on the host. The Atlas+ appears in the camera list. Double-click its entry to begin live preview.

8.5 Multi-Camera Deployment via Router

Multiple Atlas+ cameras may be aggregated through a single router or managed switch. Cameras connect either by Ethernet cable (*LAN* port) or wirelessly (*Wi-Fi STA* mode with the 5 GHz USB adapter). Workstations connect to the same router and address each camera by IP.

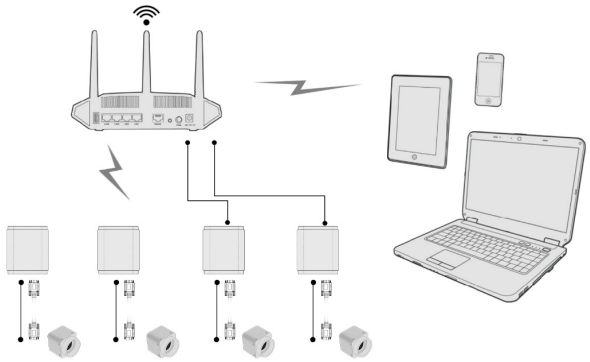


Fig. 6 — Multiple Atlas+ cameras connected to a single router by Ethernet or Wi-Fi STA mode.

Configuration for STA mode

1. Open *Settings > Network > Wi-Fi* and select **STA** in the *Wi-Fi Mode* control.
2. Choose the target SSID from the dropdown (or enter it manually) and supply the password.
3. Insert the USB Wi-Fi adapter into the *USB 3.0* port. The HDMI overlay displays "STA Mode" and the IP address assigned by the router.

DHCP and multicast options — Under *Settings > Network > LAN*, enable **DHCP** so the router can assign IP addresses automatically. If multiple workstations need to view the same camera simultaneously, and the router supports IP multicast, select **Multicast**. Otherwise leave the camera in **Unicast**. Confirm that broadcast traffic is permitted on the network segment.

Router selection. For best wireless throughput, use a router that supports 5 GHz Wi-Fi 5 (802.11ac) or later. 2.4 GHz Wi-Fi will operate but at substantially reduced video bandwidth.

The diagram below summarizes a complete multi-camera deployment. Cameras may connect to the router by Ethernet or wirelessly; workstations, tablets, and phones may share that router to access any camera by its assigned IP.



Fig. 7 — Mixed wired and wireless deployment. Two cameras are connected by Ethernet; two are connected by Wi-Fi STA. All hosts read from the same router.

8.6 Selecting a Camera in PixelPro / PixelPro Lite

Once the camera is reachable on the network, launch PixelPro or PixelPro Lite. Active Atlas+ cameras are recognized automatically and listed in the **Camera List** panel. Double-click the camera's entry to begin live preview. In the PixelPro mobile app, tap the camera thumbnail in the **Camera List** page to open the live view.

Per-host network requirements

- **CPU:** Intel Core 2 at 2.8 GHz or faster (equivalent or better).
- **Memory:** 4 GB or more.
- **Ethernet:** Gigabit RJ-45 port (for wired Atlas+ connections).
- **Display:** 19-inch or larger.
- **Software:** Install from the supplied USB flash drive or download link.

Image Auto-Upload

The Atlas+ may push every captured image to a designated server over the network. Install **Atlas+ 4K Server** on the destination workstation; enable *Listen* in the server application; then, on the camera, open *Settings > Network > Tool*, enable **Image Auto Upload**, enter the server's IP and port, and press *Connect*. The HDMI overlay reads "Connected to Server" once the link is established. Each subsequent *Snap* is uploaded automatically.

Note. When Image Auto Upload is enabled, the on-camera *Snap* function is disabled to prevent capture conflicts. Disable Auto Upload before resuming on-device captures.

9 USER INTERFACE OVERVIEW

The embedded Atlas+ 4K interface is rendered through the HDMI output of the master device and operated with the supplied USB mouse. Its layout follows a single principle: *controls hide until they are needed.* The video occupies the full frame at all times, with overlays revealed by moving the mouse to the corresponding edge of the screen.



Fig. 8 — The embedded Atlas+ 4K interface. Camera Control Panel at left; Measurement Toolbar at top; Synthesis Camera Control Toolbar at bottom.

Three overlay regions

- **Left or right edge:** The Camera Control Panel. ISP, exposure, gain, white balance, color, anti-flicker, and scene presets.
- **Top edge:** The Measurement Toolbar. Calibration, geometric primitives, automatic edge detection, scale bars, and annotations.
- **Bottom edge:** The Synthesis Camera Control Toolbar. Zoom, mirror / flip, freeze, EDF, stitch, browse, settings, and version info.

Behavioral notes

1. Moving the mouse to any of the four edges of the video window reveals the corresponding panel. The panel auto-hides when the cursor moves back into the video.
2. Clicking the float / fix toggle on the Measurement Toolbar pins it in place. While the toolbar is pinned, the Camera Control Panel does not auto-reveal — it remains hidden until the toolbar is unpinned.
3. While a measurement object is selected, an Object Location & Attributes Control Bar appears beside the object. Use this bar to nudge the object's position, change its color, or delete it.
4. To exit the measurement mode entirely, click the exit icon at the right end of the Measurement Toolbar.

9 USER INTERFACE OVERVIEW (CONT.)

9.1 Synthesis Camera Control Toolbar

The Synthesis Camera Control Toolbar at the bottom of the video window gathers the most frequently used view controls and the entry points to *Browse* and *Settings*.

Function	Description
Zoom In / Out	Magnify or reduce the live video display. Up to 10×.
Horizontal Flip	Mirror the image left-to-right.
Vertical Flip	Invert the image top-to-bottom.
Color / Gray	Toggle the display between color and monochrome.
Freeze	Pause the live video on the current frame. Click again to resume.
EDF	Real-time extended depth-of-field fusion.
Stitch	Real-time panorama stitching across consecutive frames.
Cross Line	Overlay a centered crosshair for alignment.
Overlay	Display a saved overlay (grid, logo, or annotation layer) over live video.
PIP	Picture-in-picture. Display a magnified inset of a region of interest.
Browse	Open the file browser for the SD card or USB flash drive.
Settings	Open the global configuration dialog (Network, Measurement, ISP, etc.).
Version	Display the installed Atlas+ 4K firmware revision.

9.2 Status Overlay

The upper-left corner of the HDMI output displays the current operating mode (**HDMI**, **USB 3.0 Mode**, **AP Mode**, **STA Mode**, or the assigned IP address), the active resolution, and a small indicator showing whether an SD card and USB flash drive are mounted. This overlay may be hidden under *Settings > Miscellaneous*.

10 CAMERA CONTROL PANEL

The Camera Control Panel exposes every parameter that affects image formation: capture commands, exposure, gain, white balance, color, ISP refinements, and scene presets. It appears at the left or right edge of the video window when the cursor approaches; pin it in place with the show / auto-hide toggle at its corner. The location (left, right, or both) is set under *Settings > Miscellaneous*.

Control	Function
Snap	Capture a still image to the SD card or USB flash drive in the format set under *Settings > Image Format*.
Record	Begin video recording to the SD card or USB flash drive. Click again to stop.
Auto Exposure	When checked, exposure time and gain are adjusted automatically against the chosen exposure-compensation setpoint.
Exposure Compensation	Active in Auto Exposure. Biases the auto-exposure target brighter or darker.
Exposure Time	Manual exposure (Auto Exposure unchecked). Slide left to shorten, right to lengthen exposure.
Gain	Analog gain. Increasing gain raises brightness at the cost of noise.
White Balance — *Red / Green / Blue*	Per-channel gain. Manual white balance.
Auto	Recalibrate white balance from the current full-frame image each time the button is clicked.
Manual	Use the R / G / B sliders to set white balance directly.
ROI	Drag a red rectangle to a neutral region of the image; white balance is computed against that region only.
One Push	Perform a single global auto-white-balance pass over the entire frame.
Sharpness	Edge sharpening strength.
Denoise	3D denoise level applied by the ISP.
Saturation	Chroma intensity.
Gamma	Tone curve exponent. Higher values lift midtones.
Contrast	Tonal contrast.
Brightness	Overall brightness offset.
Hue	Hue rotation.

10 CAMERA CONTROL PANEL (CONT.)

10.1 Anti-Flicker

DC	Select when illumination is direct-current (LED or filtered halogen). No flicker compensation is applied.
AC (50 Hz)	Compensate for flicker on a 50 Hz mains supply (most regions outside North America).
AC (60 Hz)	Compensate for flicker on a 60 Hz mains supply (North America, parts of Asia).

10.2 Scene Presets

The **Scene** selector loads a tuned ISP profile for a particular class of microscope. Two factory presets are provided:

- **Biological** — calibrated for transmitted-light brightfield slides typical of histology, cytology, and microbiology.
- **Stereo** — calibrated for incident-light stereo microscopes used in industrial inspection and dentistry.

Click **Default** at the bottom of the Camera Control Panel to restore every parameter on the panel to the factory baseline.

10.3 Practical Workflow

1. Select the appropriate *Scene* preset before adjusting individual parameters.
2. Set *AC (50 Hz)* or *AC (60 Hz)* to match local mains. Flicker is rarely visible to the eye but appears as horizontal banding in captured stills.
3. Engage *One Push* white balance over an empty field of view or a neutral slide region. Rebalance whenever the light source changes.
4. Adjust *Exposure Time* and *Gain* manually for live measurement work where stable exposure is critical. For routine viewing, leave *Auto Exposure* enabled.
5. Tune *Denoise* and *Sharpness* last. Aggressive denoise softens fine detail; aggressive sharpening introduces ringing.

> *Treat the Camera Control Panel as a calibration surface: set a scene-appropriate baseline, lock white balance, then tune sparingly. The factory ISP profiles are designed to be close to optimal out of the box.*

11 MEASUREMENT TOOLS

The Measurement Toolbar at the top of the video window provides on-image calibration, geometric primitives, automated edge detection, and annotation. Measurements may be saved as a separate layer alongside the original image (recoverable for further editing) or burned directly into the captured pixel data (immutable record).

11.1 Calibration

Before measuring dimensions, the system must learn the relationship between sensor pixels and physical units. This is accomplished with a stage micrometer:

1. Place a stage micrometer on the microscope stage and bring it into sharp focus under the desired objective.
2. Click the **Calibration** icon on the Measurement Toolbar.
3. Click two points on the micrometer scale separated by a known distance. Enter that distance and its physical unit (typically µm).
4. Assign a descriptive name to the calibration (for example, *10X*, *40X*, or the operator's preferred label) and save.

Repeat the procedure for every magnification in routine use. Saved calibrations are managed under *Settings > Magnification* and selected at measurement time from the magnification dropdown.

11.2 Geometric Primitives

The toolbar offers the following measurement objects. Auto-edge detection is available on the geometric primitives where it is meaningful.

- Point / point counter
- Arbitrary line
- Three-point line
- Horizontal line
- Vertical line
- Three-point vertical line
- Parallel lines
- Angle (3-point) and 4-point angle
- Rectangle
- Three-point rectangle
- Ellipse
- Five-point ellipse
- Circle
- Three-point circle
- Annulus
- Three-point annulus
- Two circles & center-to-center distance
- Arc
- Polygon / curve
- Scale bar / arrow / text

11.3 Automated Detection

The Atlas+ provides automatic detection for four common geometries: *two-point parallel*, *circle*, *annulus*, and *rectangle*. Click the auto-detect entry on the toolbar, then click within the feature of interest; the system fits the geometry to local edges. Adjust the detection range and accuracy under *Settings > Measurement*.

11.4 Working with Objects

Click a measurement object to select it. The Object Location & Attributes Control Bar appears with five controls: *Move Left*, *Move Right*, *Move Up*, *Move Down*, and *Color*. Use these for pixel-accurate positioning. The object can also be dragged with the mouse; the control bar gives the finer adjustment.

Right-click an object for additional operations: change line width, change endpoint style, change font size, lock the object, or delete.

11.5 Saving Modes

Layered Mode	Measurement primitives are stored as a separate layer in the target file. The image and the measurements remain editable on a PC. *This mode is reversible.*
Burn-In Mode	Measurement primitives are rasterized into the image pixels. The result is a permanent, tamper-evident record suitable for archival. *This mode is not reversible.*

Switch between modes under *Settings > Image Format > Measurement Object Saving Method*.

11.6 Exporting Measurements

Click the CSV export icon on the toolbar to write a comma-separated file of every measurement currently on the image. The file is saved to the same storage device as the image and may be opened directly in spreadsheet or analytics software for downstream statistics.

Note. Calibration is magnification-specific. Always verify that the magnification selected at the top of the Measurement Toolbar matches the objective currently in the optical path. An incorrect magnification selection will scale every measurement on the frame.

12 SYSTEM SETTINGS

The Settings dialog is opened from the Synthesis Camera Control Toolbar at the bottom of the video window. Each setting page is summarized below. Settings persist across power cycles and may be exported to (or imported from) an SD card under *Settings > Miscellaneous*.

12.1 Network — General

Name	Camera name as seen on the network. Use a unique name in multi-camera deployments.

12.2 Network — LAN

DHCP	When enabled, the router or DHCP server assigns the camera's IP automatically. Recommended for multi-camera operation behind a managed router.
Unicast / Multicast	Select *Multicast* only on networks that support it; multicast saves bandwidth when many hosts watch one camera. Otherwise use *Unicast*.
IP Address	The camera's 32-bit IPv4 address. Use a Class C private range (e.g., 192.168.x.x) in lab and clinical networks.
Subnet Mask	The subnet boundary. Both camera and host must use the same mask.
Default Gateway	The router address through which the camera reaches hosts on other subnets. Set only if cross-subnet access is required.

12.3 Network — Wi-Fi

Wi-Fi Mode	Choose *AP* (camera hosts the network) or *STA* (camera joins an existing network).
Channel	AP only. The 5 GHz channel on which the camera transmits.
SSID	STA only. The name of the network to join.
Password	AP: password clients use to join the camera's network. STA: the target network's password.

12.4 Network — Tool (Image Auto Upload)

Configure automatic upload of captured stills to a running instance of **Atlas+ 4K Server** on a host computer. Enter the server's IP and port, ensure the server is in *Listen* state, and click *Connect*. The overlay reads "Connected to Server" on success. Default port: **8888**.

12.5 Measurement

Set global measurement precision (decimal places), enable or disable automatic edge detection, define the auto-detection range, set the font size of measurement labels (Large, Medium, Small), choose the cursor style, and set calibration line width, color, and endpoint style. Individual primitives expose their own subordinate properties when expanded.

12.6 Magnification

Maintain the list of named magnifications produced by the Measurement Toolbar's calibration command. Each entry stores a name (10X, 40X, 100X, etc.) and a resolution in pixels per meter. Reorder, rename, or delete entries; *Clear All* removes every calibration and is irreversible.

12.7 Image Format

JPEG	Lossy compression. Smallest file, suitable for routine documentation. Measurement primitives are always burned in.
TIFF	Lossless. Larger file, suitable for archival and downstream processing.
RAW	Uncompressed sensor data (little-endian, 16-bit, top bits zero-padded). Suitable for color-science work and machine-learning datasets.
Saving Method	Burn-In (immutable) or Layered (editable). See Sec. 11.5.

12.8 Video

Resolution	1280 × 720, 1920 × 1080, or 3840 × 2160.
Encoder	H.264 or H.265. H.265 yields smaller files at equal visual quality but requires a compatible host decoder for playback.
Quality	Low, Medium, or High. Sets the rate-control target of the encoder.
Playback Skip	The fast-forward / rewind interval used in the on-camera video player.

12.9 Storage & Files

Select the preferred destination for captured stills and video: **SD Card** or **USB Flash Drive**. The current file-system format of the destination (FAT32, exFAT, NTFS) is displayed. The file-naming mode may be *Auto* (PixelPro appends a sequence number to a fixed prefix) or *Manual* (a dialog prompts for a name on each capture). FAT32 limits a single video file to 4 GB; use exFAT or NTFS for longer recordings.

12.10 Time

Set year, month, day, hour, minute, and second. The time stamp is written into the EXIF metadata of captured stills and the metadata stream of recorded video. An optional on-board RTC preserves time across power cycles.

12.11 ISP

Auto Exposure	Set the upper limit on the integration time the auto-exposure algorithm is allowed to use.
Metering Mode	Center-weighted average, evaluative, partial, or spot. Affects how the auto-exposure algorithm weights the frame.
WB ROI Color	Set the color of the white-balance ROI rectangle and whether it is mirrored to the Camera Control Panel.
Clarity Factor	Display a real-time numeric estimate of image sharpness in the corner of the video window — useful for focusing.
Color Tone	Custom, Standard, Warm, or Cool color rendering.
Dark Enhance	Local tone-mapping strength in shadow regions.
Work Mode	*Low Delay* — 40 ms average latency, up to 60 fps. *WDR* — 2-frame composite for higher dynamic range, up to 30 fps.

12.12 EDF (Extended Depth of Field)

Automatic Alignment	Compensate for inter-frame translation and scale during fusion. Slows the fusion pass but improves robustness on free-hand focus stacks.
Sensitivity	Threshold for depth-of-field detection. Higher sensitivity improves detection accuracy but may reduce fused image quality.
Window Size	Size of the live preview window during real-time EDF.

12.13 Stitch

Detection Precision	Higher precision improves stitch alignment but extends processing time.
Stitching Stride	Larger strides accelerate the stitch at the cost of accuracy.
Background Color	Color filling the gaps in the stitched panorama where the constituent frames did not overlap.

12.14 Voice Control

With an optional USB voice-control module installed, enable hands-free triggering of Snap, Record, and Freeze. Each command exposes one or more configurable key words (e.g., “snap”, “freeze”, “unfreeze”, “begin record”, “end record”). When the module is not detected, the voice-control panel hides automatically.

12.15 Language

The Atlas+ 4K interface is available in thirteen languages. Selection takes effect immediately and persists across power cycles.

- English
- Simplified Chinese
- Traditional Chinese
- Korean
- Thai
- French
- German
- Spanish
- Japanese
- Italian
- Russian
- Dutch
- Portuguese

12.16 Miscellaneous

Ruler	Display a calibrated ruler along the edges of the video window. Choose ruler color.
Measurement	Toggle availability of the Measurement Toolbar at the top of the video window.
Overlay	Permit saving of graphic overlay information in fusion-mode captures.
Grids	Permit saving of grid information in fusion-mode captures.
Monitor Working Mode	Display the current monitor working mode in the video window overlay.
Mouse	Mouse cursor size (Small, Medium, Large). Enable *Left Snap / Right Record* to bind the mouse buttons to capture actions.
Control Panel Location	Display the Camera Control Panel on the left, right, or both edges of the HDMI output.
Parameters Export	Save the full system configuration to a file on the SD card or USB flash drive.
Parameters Import	Restore a previously exported configuration. Useful for cloning settings across a fleet of cameras.
Factory Reset	Restore every setting to its factory default. Captured images are not affected.

The Atlas+ stores captured stills and video to the SD card or USB flash drive selected under *Settings > Storage*. The embedded browser, opened from the Synthesis Camera Control Toolbar, gives full access to those files without a host computer.

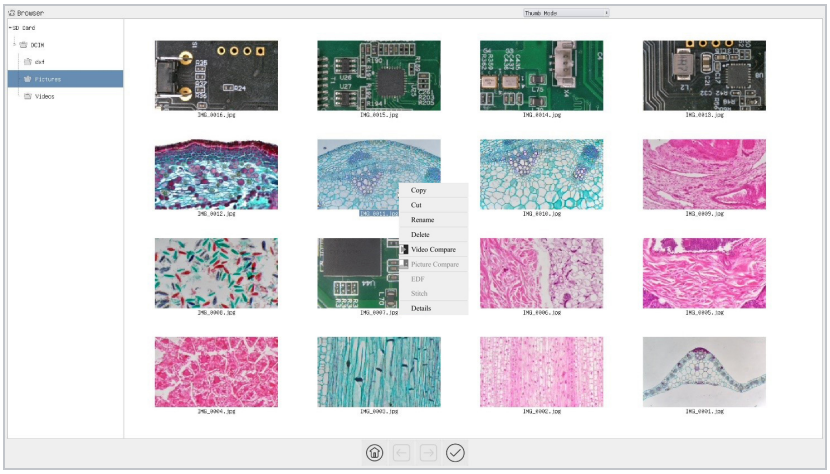


Fig. 9 — The embedded image browser in Thumbnail mode, with a context menu open over a single thumbnail.

13.1 Browse Modes

The browser opens in **Thumbnail** mode by default. Toggle to **List** mode using the selector at the top right. Right-click an empty area to create a new folder.

13.2 Single-File Operations

Right-click any image or video to reveal a context menu containing *Copy*, *Cut*, *Rename*, *Delete*, *Video Compare*, and *Details*. Double-click an image to open it for review. Double-click a video to play it.

13.3 Multi-File Operations

- **Picture Compare** — Select two (or up to four) thumbnails. Right-click and choose *Picture Compare* to view them side-by-side or in a 2 × 2 grid.
- **Video Compare** — Select two thumbnails and choose *Video Compare* to scrub them in lockstep.
- **EDF (Multi-Image)** — Select 2 to 5 stills focused at different depths of the same scene. Right-click and choose *EDF*. The system fuses them into a single all-in-focus image.
- **Stitch** — Select 2 to 32 stills covering adjacent fields. The browser stitches them in ascending order of file-name numerical suffix.

13.4 In-Browser Image Processing

Open a still and right-click within it to access in-browser corrections: *Gray Scale*, *Invert*, *Highlights*, *Binary*, *Sharpness*, *Saturation*, *Gamma*, *Brightness*, *Filter Color*, *Extract Color*, *Auto Level*, *Auto Contrast*, *Histogram*, *Histogram Equalization*, and *Flip*. Use *Reset* in the side panel to discard all changes, or *Save* / *Save As* to commit them.

14 SAMPLE IMAGES

The following stills were captured directly on the Atlas+ at native 4K with the factory-default ISP profile, without retouching. They demonstrate the camera's color rendering and tonal range across representative subjects.

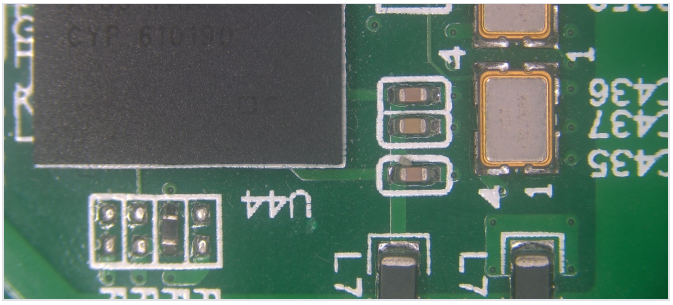


Fig. 10 — FPC region of a populated PCB.

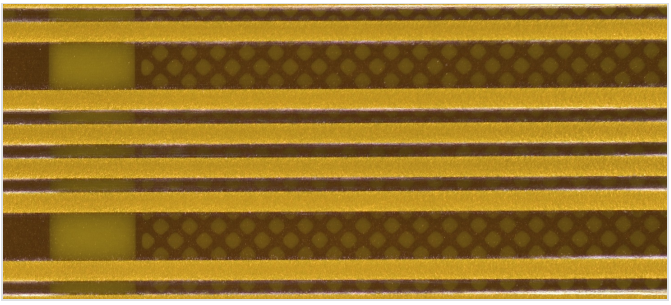


Fig. 11 — Conductive traces on a flexible printed circuit.



Fig. 12 — Anterior dental prosthetic crowns under stereo microscopy.

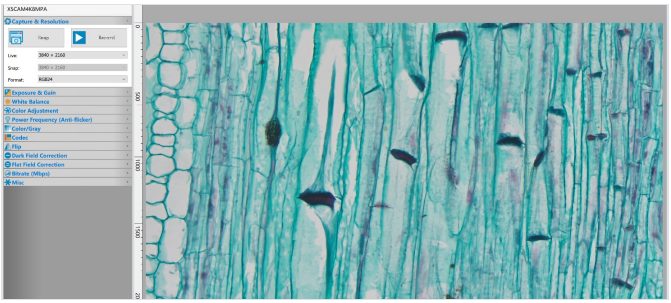


Fig. 13 — Stained botanical cross-section, PixelPro 4K capture.

15 TROUBLESHOOTING GUIDE

Under certain conditions, the performance of the Atlas+ may be impaired by factors other than equipment defects. If a problem is observed, review the list below and apply the indicated remedy. If the problem persists, contact LABOMED or your local LABOMED dealer.

Observation	Cause	Remedy
No video on HDMI monitor.	Monitor input not set to HDMI; HDMI cable seated incorrectly; monitor does not support the negotiated resolution.	Verify monitor input source. Reseat HDMI cable. Force 1080p in *Settings > Video* if monitor does not negotiate 4K.
Camera shows in PixelPro but live preview is black.	Network bandwidth insufficient; multicast is selected on a network that does not support it.	Switch to Unicast under *Settings > Network > LAN*. Verify Gigabit cabling end-to-end.
Image is dim or appears underexposed.	Microscope illumination too low; exposure-time ceiling restrictive.	Increase microscope brightness first. Raise the auto-exposure ceiling under *Settings > ISP > Auto Exposure*.
Visible horizontal banding under live light.	Anti-flicker setting does not match mains frequency.	Switch to *AC (50 Hz)* or *AC (60 Hz)* on the Camera Control Panel to match local supply.
Color cast across the image.	White balance drift after a change of illuminant.	Click *One Push* on a neutral area, or use *ROI* over a white field.
Image is soft or out of focus.	Microscope not parfocal at the chosen objective; capture head not seated squarely; condenser misaligned.	Refocus through the eyepieces; confirm parfocal alignment between eyepieces and camera. Verify camera adapter is fully seated.
Captured measurements are not in expected units.	Wrong magnification selected on the Measurement Toolbar.	Verify the active objective and select the matching saved magnification.
SD card or USB drive not detected.	Hot-swap during operation; unsupported file system.	Power-cycle the camera with the medium inserted. Reformat to FAT32, exFAT, or NTFS on a host computer.
“Connected to Server” never appears.	Atlas+ 4K Server not in *Listen*; firewall blocking port 8888; IP address typo.	Confirm server is listening. Open TCP port 8888 in the workstation firewall. Verify IP and port on both sides.
Voice control commands ignored.	Voice module not inserted; key words not configured; background noise exceeds threshold.	Confirm voice module is plugged into a *USB 3.0* or *USB Mouse* port. Set or update key words under *Settings > Voice Control*.
System will not turn on.	Power adapter unplugged; wall outlet unpowered; faulty adapter.	Verify outlet with a second device. Inspect the DC plug. If symptoms persist, contact LABOMED service.

16 SPECIFICATIONS

1. Sensor	Model	Sony 4K sensor, 1/2″
	Type	Sony 4K back-illuminated CMOS
	Pixel Size	2.0 µm (Model A) | 2.9 µm (Model B)
	Green Sensitivity	3541 mV @ 1/30 s (Model A) | 5970 mV @ 1/30 s (Model B)
	Dark Signal	0.15 mV @ 1/30 s (Model A) | 0.13 mV @ 1/30 s (Model B)
	Exposure Range	0.019 ms to 1000 ms (Model A) 0.048 ms to 1000 ms (Model B)
2. Video Output	HDMI 2.0	60 fps @ 4K UHD (3840 × 2160) or 1080p; auto-switch by EDID
	LAN	30 fps @ 4K, 60 fps @ 1080p, 60 fps @ 720p (H.264 / H.265)
	USB 3.0	30 fps @ 4K, 45 fps @ 2688 × 1512, 60 fps @ 1080p
	Wi-Fi (5 GHz USB adapter)	30 fps @ 4K, 60 fps @ 1080p, 60 fps @ 720p
3. Capture & Storage	Image Formats	JPEG, TIFF, RAW (16-bit, little-endian)
	Video Codec	H.264 / H.265, MP4 container, up to 60 fps @ 4K
	Storage Media	SD card (SDIO 3.0, Class 10, 16 GB+) and USB flash drive (USB 3.0 preferred)
4. ISP	Pipeline	Local tone mapping; 3D denoise; per-channel WB; sharpness; gamma; saturation; metering modes; ROI / Auto / Manual / One-Push WB
	Work Modes	Low Delay (~40 ms, up to 60 fps) and WDR (2-frame composite, up to 30 fps)
5. Software	Embedded	Atlas+ 4K with measurement and image processing
	PC / Mobile	PixelPro (Windows), PixelPro Lite (macOS / Linux), PixelPro App (iOS 11+, Android 5.1+)
6. Languages	English, Simplified Chinese, Traditional Chinese, Korean, Thai, French, German, Spanish, Japanese, Italian, Russian, Dutch, Portuguese	
7. Environmental	Operating Temperature	-10 °C to 50 °C
	Storage Temperature	-20 °C to 60 °C
	Operating Humidity	30 % to 80 % RH
	Storage Humidity	10 % to 60 % RH
8. Electrical	Power	DC 12 V / 1 A. Adapter: 100–240 V AC, 50 / 60 Hz. UL / CE / FCC certified.
9. Tether	Type	Custom Micro-USB 3.0 to Micro-USB 3.0, locking thumbscrews each end, 10 m rated.

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