ULTIMATE POWERBOX V3 (UPBV3)



PRODUCT MANUAL

Version *1.3*
01-Aug-2024

VERSION HISTORY

Version #	Implemented By	Revision Date	Reason
1.0	*Evans Souglakos*	*10/Jan/2024*	*Initial Document*
1.1	*Angelos Kechagias*	*01/Feb/2024*	*Minor glitches and 3d drawings*
1.2	*Evans Souglakos*	*10/May/2024*	*Enhance ASCOM Alpaca section*
1.3	*Evans Souglakos*	*01/Aug/2024*	*VESA Mount description and hole threads.*

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INTRODUCTION

1.1 PURPOSE

Thank you for purchasing the Pegasus Astro Ultimate Powerbox v3.

This device is a versatile and indispensable accessory for astronomy enthusiasts and astro-photographers alike. If you're weary of the complexities of multiple power packs and tangled cables, the Ultimate Powerbox v3 is the solution you've been seeking. Our concept revolves around a compact enclosure that delivers ample amperage while maintaining impeccable cable organization.

Bid farewell to cable clutter interfering with mount and instrument movements. With only a single main power cord and a USB data cord connected to the UPBv3, all other device cables are neatly organized and managed by the Ultimate Powerbox, ensuring a seamless and efficient power supply.

1.2 IN THE BOX

The box contains the Ultimate Powerbox v3 unit and a range of cables.



- Ultimate Powerbox v3
- 4 x Power DC 2.1mm to 2.1mm male cable (length 2x1m, 2x0.5m)
- 1 x USB3 Cable Type B (1.8m)

1.3 DEVICE CARE

The device electronics are housed inside an aluminium blue anodized enclosure. The enclosure is made from aircraft aluminum alloy type 6061 which provides very good corrosion resistance.

- While the controller is safeguarded against moisture, it is essential to emphasize that it is not waterproof and should always be maintained in a clean and dry environment.
- Prolonged exposure to excessive moisture can pose a significant risk to the electronics and connectors, potentially causing damage. It is imperative to exercise caution in this regard.
- Avoid any contact between solvents or chemicals and the device, as these substances can have adverse effects on its functionality.
- When the controller is not in use for extended periods, it is advisable to store it indoors within a dry room to prevent any potential moisture-related issues.
- Take precautionary measures and refrain from touching the internal components during operation, as they may become hot. Ensuring safety and optimal performance is paramount.

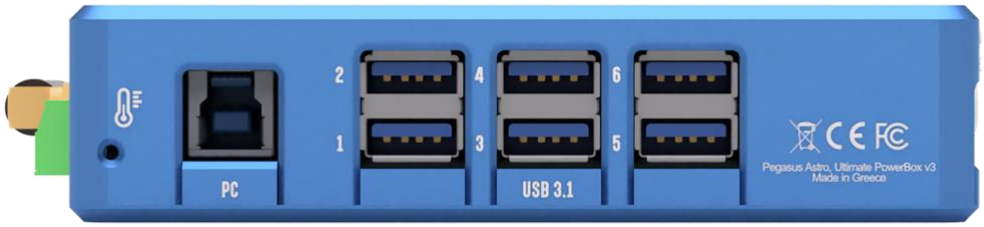
DEVICE DESCRIPTION

1.4 DESIGN OVERVIEW

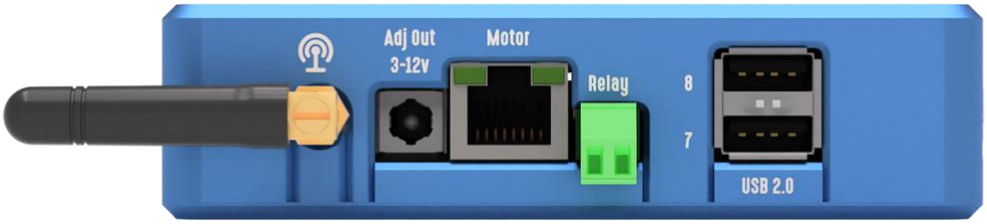
From left to right



- 12V Power Outputs [x6].
- Always 12V ON Outputs [x2].
- XT60 DC IN Power Input.
- LED Operation Indication (Red colour)



- Temperature and Humidity internal sensor hole.
- USB3 Type B socket – PC.
- USB3 Ports [1-6] (All backward compatible with USB2).



- Wi-Fi Antenna SMA socket + external detachable antenna.
- Adjustable Buck Output [3-12V] (2.1mm) – Up to 3 Amps.
- Stepper Motor Output.
- Relay Switch Output.
- USB2 Ports [7-8].



- Adjustable Boost Output [12-24V] (2.1mm) - Up to 4 Amps.
- EXT Port [External Environmental Sensor / XMC / EZY Focus].
- RCA Dew Outputs [A, B, C].

1.5 FEATURE LIST

- Up to 12V / 20Amps of provided electric current (240W).
- 6 x 12V smart and individual switchable outputs. Outputs 3,4,5,6 can be also configured as constant voltage [12V] or pulse width modulated driven.
- 2 x 12V / Always ON outputs.
- 3 x Dew heaters outputs – RCA Sockets.
  (Each one is automatically adjustable with AutoDew feature).
- 1 x Adjustable [Buck] power output 3-12V - Regulated output of 3Amps.
- 1 x Adjustable [Boost] power output 12-24V – Regulated output of 4 Amps.
- 1 x Power relay switch 250V/10A.
- 6 x USB3.1 (backwards compatible with USB2) and 2 x USB2 available ports (8 USB ports in total). Individual switchable via software.
- Stepper motor controller (Silent and low vibrating stepper controller. Can drive nearly any stepper motor in the astro -market up to 2Amps per coil).
- External detachable Wi-Fi Antenna.
- Built-in ambient temperature and humidity sensor. Can also accept external sensor and auto-prefer external sensor.
- Power metrics (Input voltage, current, current per smart power output).
- VESA compatible size enclosure.
- Wi-Fi (2.4GHz) or USB operation.

SETUP AND OPERATION

I. Initial Connection:

USB3 Cable: Insert the USB3 cable into the designated port on the UPBv3 and connect the other end to your computer.
Power Supply: Connect the power supply, which may be either a battery or our power pack, to the "12V DC IN" socket. We strongly recommend using our certified power supply capable of delivering DC 12V and 10 Amps. (**PEG-PSU-XT60**) or higher current (**PEG-PSU-XT60H**) which can provide up to 20Amps.

II. Device Boot-up:

Upon connecting the power supply, the device will commence its boot sequence. Observe the LED indicator, which will quickly blink 3 times and then will stay on to a steady, solid red illumination. This confirms the successful loading of firmware and signifies that the device is now in full operational mode.

III. Default Device Configuration:

By default, the UPBv3 is pre-configured by factory to have:

a) All power ports are set to ON.
b) All USB3 and USB2 ports are set to ON.
c) Dew Heater outputs [A, B, C] are set to OFF.
d) Relay Switch is set to OFF.
e) Adjustable Buck [Step-down] Output is set to ON and configured to 3V.
f) Adjustable Boost [Step-up] Output is set to ON and configured to 12V.

IV. Software Installation:

To establish seamless communication with the device, please visit our official website at pegasusastro.com. Download the Unity software package, which includes all requisite ASCOM drivers, to facilitate connectivity with the Ultimate Powerbox v3

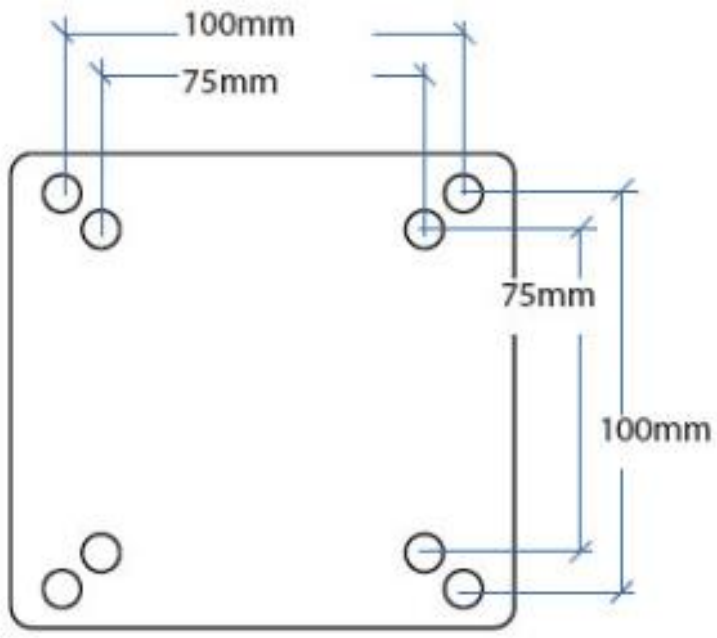
Click here to download Unity Platform: https://pegasusastro.com/download/

VESA COMPATIBILITY

The UPBv3 enclosure is VESA mount compatible, featuring strategically placed screw holes that enable seamless stacking of devices like the Intel NUC alongside the Ultimate Powerbox v3.



Device supports the **75mm x 75mm** & **100mm x 100mm** (2.95in. x 2.95in. or 3.94in. x 3.94in.) M4 threaded pattern of VESA.



POWER INPUT

The accepted voltage range for this device is limited to a precise window, falling within the parameters of **11 to 14.5 Volts**. Operating outside of this prescribed voltage range **may result in malfunction or damage to the device**, emphasizing the critical importance of adhering to this specified voltage range for safe and optimal performance.

To ensure the utmost reliability and longevity of the device, we strongly recommend utilizing our proprietary power supply unit (PSU), the **PEG-PSU-XT60** [10Amps] or **PEG-PSU-XT60H** (higher current 20Amps). This specialized PSU is designed to deliver up to 10 or 20 amperes of current, precisely tailored to meet the demands of the device within its specified voltage range of 11 to 14.5 volts. By using our PEG-PSU-XT60(H), you not only guarantee consistent and stable power delivery but also safeguard the device against potential voltage fluctuations, contributing to its overall performance and durability.

For optimal performance, we highly recommend utilizing a 12-14V LiFePo battery as your mobile power source. To ensure sufficient power delivery, it's essential to select a power supply capable of providing a minimum of 8 amps of current. In scenarios where your observatory demands peak power, such as during equipment operation or data collection, you may require up to 10 Amps of current to meet these heightened power requirements. This power solution will not only enhance the efficiency of your observatory but also prolong the lifespan of your equipment by ensuring consistent and reliable power delivery.

- **Under no circumstance exceed DC 15.0V input as you will cause severe damage to the electronic board**

Safety is a paramount feature of this unit's design, as it incorporates robust reverse polarity protection. In the event of an accidental reversal of the power source polarity, **the unit will automatically cut off power**, preventing potential damage. To power on the controller, simply insert the XT60 DC plug into the corresponding DC power cable socket. Upon doing so, the controller will initiate its start-up sequence, and within moments, the status LED indicator will turn to a solid red glow, signaling that the unit is operational and ready for use.

It's essential to note that in addition to reverse polarity protection, the unit is equipped with a voltage safeguard feature. Any voltage exceeding the upper limit of 14.5 volts will trigger an automatic power cut-off to all outputs. This protection mechanism is in place to prevent any potential overvoltage situations, ensuring the safety of the device and the connected equipment. Thus, users should exercise caution and adhere to the specified voltage range to maintain uninterrupted and secure operation.



Please note that Cig. Lighter Adapter to DC Power XT60 is an optional cable that can be purchased separately.
(CIGLIGHT-ADAPTERXT60)

USB INPUT [PC]

The unit features a USB3 Type B port, designed to seamlessly fit the included 1.8-meter USB3 Type B cable for effortless PC connectivity, ensuring a hassle-free setup right out of the box.

It is strongly recommended to limit the **maximum USB3 cable length to 3 meters**. Adhering to this guideline ensures optimal data transmission rates and minimizes the potential for signal degradation over longer distances, thereby promoting stable and reliable USB3 connectivity for your devices and peripherals.

While USB3 extenders may function on a case-by-case basis, it is important to note that we cannot provide a guarantee of compatibility or performance with third-party devices. The efficacy of such extenders can vary depending on numerous factors, and users should exercise caution and conduct their own testing when integrating third-party USB3 extenders with our products.

USB PORTS

The device has a powered USB3.1 Hub and a USB2 Hub that enhances connectivity with 6 x USB3.1 SuperSpeed Ports and 2 x USB2 High-Speed Ports. In total the device spawns **8 x USB ports**.

- *Notably, all USB3 ports maintain backward compatibility with the USB2 protocol.*

This versatile hub extends support to various data transfer speeds, encompassing Hi-Speed (HS), Full Speed (FS), and Low Speed (LS). SuperSpeed hub operate seamlessly in tandem with the USB 2.0 controller, ensuring that lightning-fast 5 Gbps SuperSpeed data transfers remain unaffected by any concurrent USB 2.0 traffic, guaranteeing efficient and uninterrupted data flow. (Both USB hubs support MTT - Multi Transaction Translator- operation).

It's essential to take note that each of the USB ports is capable of delivering a robust 2.5 amps of current, ensuring ample power for your connected devices. However, it's crucial to bear in mind that the total current draw from all USB ports combined should not surpass 8 amps. Exceeding this limit, the device will reboot as a protection measurement. This prudent consideration ensures the safe and efficient functioning of the USB ports and the connected peripherals.

- Each USB Port is switchable (ON/OFF) [data and power pins]
- Each port delivers 5Volts and up to 2.5Amps.
- It is protected from current overload. Automatically shuts down and informs the operating system.

- *Each USB port fully supports RaspberryPI 3, 4 or 5. Please note that your RPI (even v5) will operate fine supplying power from each USB port.*

POWER OUTPUTS [1-6]

The device is equipped with 6 x 12V outlets, offering ample power for your various equipment needs.
The device employs automotive grade, robust, smart MOSFET transistors to deliver reliable electrical current to your valuable equipment.

Each of the [1-6] output port is a smart port with following features:

- Socket is 2.1/5.5mm / Center Positive.
- Delivers up to 6 Amps.
- Can be switched ON or OFF.
- Software allows to time-schedule ON or OFF.
- Software can set its boot state.
- Measures current in Amps.
- Has overload protection can will automatically turn off in case of overload.
- Voltage output unregulated [output voltage is exactly the same as input voltage that you provide to device).

- Additionally, you have the flexibility to **repurpose # 3, 4, 5, 6 outlets**, converting them from continuous 12V power sources to PWM Duty cycle % output. Power output can be tuned from 0%-100% with 1% step.

POWER OUTPUTS [ALWAYS ON]

The UPBv3 features 2 dedicated Always-ON 12V unregulated outputs, increasing the total 12V outputs to an impressive 10. When combined with the 2 adjustable outputs, configured to 12V, you can harness a grand total of 10 outlets, providing unparalleled power distribution.

- Socket is 2.1/5.5mm / Center Positive.
- Delivers up to 8 Amps (each)

ADJUSTABLE (BUCK) OUTPUT [3V - 12V]

The UPBv3 has one adjustable voltage **step-down (buck)** output, adaptable within the range of **3V to 12V** and delivering up to 3 Amps of power.

- Can be switched ON or OFF.
- Can be adjusted from software from **3V to 12V** with 1V step.
- Delivers up to 3 Amps (can support peaks up to 4A).
- Setting is stored permanently into internal memory.
- Socket is 2.1/5.5mm / Center Positive.
- Software can set its boot state.
- Software allows to time-schedule ON or OFF.

  - *This port fully supports RaspberryPI 3, 4 or 5. Please note that your RPI (even v5) will operate fine supplying power from this port.* ***Make sure to configure the port to output 5 Volts.***
  - *This port fully supports our battery couplers.* ***Make sure to configure the port to output 8 Volts.***

ADJUSTABLE (BOOST) OUTPUT [12V - 24V]

The UPBv3 has one adjustable voltage **step-up (boost)** output, adaptable within the range of **12V to 24V** and delivering up to 4 Amps of power. [at 19V / 76W]

- Can be switched ON or OFF.
- Can be adjusted from software from **12V to 24V** with a 1V step.
- Delivers up to 4 Amps (at 19V].
- Setting is stored forever into internal memory.
- Socket is 2.1/5.5mm / Center Positive.
- Software can set its boot state.
- Software allows to time-schedule ON or OFF.

  - *This port fully supports Intel NUC PCs.* ***Make sure to configure port to output 19 Volts.***
  - *This port can support 10Micron mounts.* ***Make sure to configure port to output 24 Volts.***

RELAY SWITCH

Device is equipped with an SPST-NO relay, providing the capability to effortlessly control and manage third-party equipment with ease.

- Can be switched ON or OFF (of course).
- Relay and socket support up to 220V / 8A (AC).
- Software can set its boot state.
- Software allows to time-schedule ON or OFF.

Rated Loads:

- 10 A at 250 VAC
- 10 A at 125 VAC
- 5 A at 30 VDC

IMPORTANT: It is crucial to note that the cables and socket should support the voltage & current of the relay!

DEW OUTPUTS

These 3 dew outputs offer fine-grained control over heater intensity, allowing you to tailor your equipment's performance to your exact needs. What's more, the device features an intelligent auto-dew function that can automatically adjust heater intensity by monitoring the onboard temperature and humidity sensor, ensuring optimal conditions for your setup.

Each output is capable of delivering 3 Amps of current, providing ample power for your dew heating requirements. This versatile system empowers you to maintain clear and dew-free conditions, enhancing your observatory or photography experience.

The outputs offer PWM (Pulse Width Modulation) operation at a frequency of 3 KHz (can be adjusted), granting you precise control over the duty cycle to fine-tune the heating intensity according to your specific needs. This PWM capability enhances your ability to maintain optimal conditions for your equipment, ensuring that dew and moisture do not interfere with your observations or photography.

- Outputs Duty Cycle % (PWM 3KHz frequency) unregulated voltage. (same as input).
- RCA Socket.
- Delivers up to 3Amps.
- Has a cut-off protection above 3Amps.
- Software can set the power % and auto-set during device boot.
- Software allows to time-schedule 0%, 50% or 100% of power.

MOTOR OUTPUT

Stepper motors offer excellent speed control, precise positioning, and repeatability of movement. UPBv3 has a built-in stepper motor controller that can drive unipolar and bipolar stepper motors with great accuracy.

The motor controller offers micro-stepping drive from the full driver down to 32 micro steps. [full, half, ¼, 1/8 ,1/16, 1/32]. **The factory default drive is half step and 200 max speed.**

In short, the motor controller supports:

- Unipolar and bipolar stepper motors.
- Silent motor operation, vibration-free.
- Micro stepping drive [full, half, ¼, 1/8 ,1/16, 1/32].
- Motor power turns off when idle.
- Last position is stored automatically to the memory when the motor is idle and restored on device boot.
- Drives motor with 12Volts.
- Up to 2Amps per motor coil.
- Adjust max current of motor output.
- RJ45 Port has an indication green led that motor controller is operational.

A wide range of motors are compatible with the stepper controller as displayed in the table below. Each motor requires a special cable as the pinout is different for each type.

At Pegasus Astro, we understand that each manufacturer has its unique pinout configuration for motors, and we're here to ensure your experience is hassle-free. To guarantee the correct cable for your specific motor, it's crucial to reach out to us with any inquiries or uncertainties you may have regarding your motor type.

Our support team is readily available to assist you, addressing any questions and providing you with the precise cable needed to seamlessly integrate your motor with our controller. Your satisfaction and confidence in our products are our top priorities.

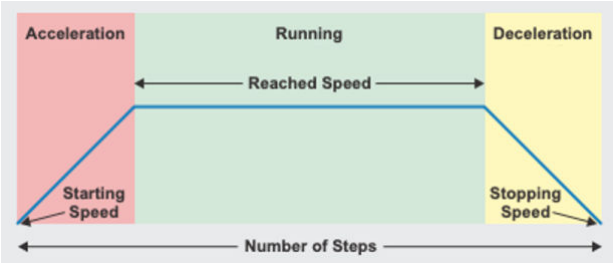
Below, you'll find a comprehensive list of motor cable types available for purchase.

Motor Type	**Compatible Cable Type**
Pegasus Motor Focus Kit (v1/v2)	Requires RJ45 to RJ45 common straight network cable
Robofocus	Order: PEG-CMOT-RJ45DB9
Moonlite	Order: PEG-CMOT-RJ45DB9
Lakeside	Order: PEG-CMOT-RJ45DB9
Starlight HSM 20,30,35	Order: PEG-CMOT-HSM
Starlight MSM 20,30,35	Order: PEG-CMOT-MSM
Starlight DirectSync motors	Order: PEG-CMOT-HSM
Starizona Microtouch	Order: PEG-CMOT-MSM
Optec DirectSync or QuickSync motors	Order: PEG-CMOT-HSM
Rigel nStep motor	Order: PEG-CMOT-MSM
Starlight POSI Drive Motor	Order: PEG-CMOT-HSM
Lacerta Motor	Order: PEG-CMOT-LCRT

The performance of the stepper motor is greatly affected by the driving method. UPBv3 uses **Half Step** drive by factory setting.

When starting a stepper motor, acceleration and deceleration should happen through pulses to the motor that start slowly and gradually quicken in a process called ramping. Most stepper motors require gradual ramping to full speed.

For this specific reason an acceleration and deceleration profile is applied to the motor movement. (Please check image below of how this works). This profile ensures that motor will ramp up power consumption and will not jump when it starts under focuser load or overshoot steps when it is time to stop.



- Backlash compensation can be implemented from imaging software.
- An ASCOM6 and Alpaca focuser driver is available for the stepper controller.

RJ45 connector is located on the right side of the UPBv3. The pinout can be seen in the following table:

MOTOR OUTPUT CONNECTOR (RJ45 / 8P8C)	
PIN 1	N/C
PIN 2	N/C
PIN 3	**COIL 1+**
PIN 4	**COIL 1-**
PIN 5	**COIL 2+**
PIN 6	**COIL 2-**
PIN 7	N/C
PIN 8	N/C

RESET WATCHDOG

In the realm of operational integrity, an invaluable safeguard is in place: a hardware watchdog mechanism that diligently resets the device should the controller fail to respond within a mere three (3) seconds. This feature, though seldom required, provides a notable reassurance, especially in the context of remote observatory management, where absolute operational reliability is imperative. In this rare occurrence of a microcontroller freeze, it guarantees that your remote observatory functions seamlessly, assuring the highest level of operational assurance.

AUTO-DEW CONTROL

The UPBv3 includes our advanced feature that enables automatic adjustment of heater power levels based on data from the environmental sensor, specifically the Dew Point reading. With the simple selection of the "Auto" option for each Dew Port you can entrust the UPBv3 to autonomously determine the optimal activation and precise tuning of your dew heaters. This sophisticated capability streamlines the dew control process, enhancing your observatory or photography experience with efficiency and precision.

It's worth noting that you have the flexibility to control this feature directly from the software interface [Unity or web], allowing you to effortlessly enable or disable this automatic heater power adjustment capability as per your specific requirements and preferences.

STANDALONE OPERATION

The UPBv3 is engineered for convenient standalone operation right out of the box. With a simple cable connection setup your preferred settings are ready for immediate use each time you power up the device. Additionally, it's important to note that all ports are configured to deliver power and data by factory settings, ensuring a hassle-free and user-friendly experience from the moment you begin using the device.

BUILT-IN POWER SENSORS

The device is equipped with an integrated input voltmeter, designed to continuously monitor and track the incoming voltage. Additionally, it features a precise current meter that monitors and records the overall power consumption, ensuring a comprehensive and real-time assessment of your electrical parameters.

It's important to note that in the event of an unexpected voltage surge or overvoltage condition, the UPBv3 incorporates a safety mechanism that promptly cuts off power to the output sockets. This proactive measure is implemented to safeguard your valuable equipment from potential damage or harm caused by voltage irregularities.

BUILT-IN ENVIRONMENTAL SENSOR

The device comes equipped with a built-in sensor that elevates its functionality to a new level. These sensor includes temperature, humidity and dew point monitoring, ensuring that you can keep a close eye on environmental conditions during your observation sessions.

This sensor integrated into the UPBv3 offers advanced automation capabilities by continuously monitoring environmental conditions. The sensor plays a crucial role in maintaining your optics dew-free, particularly in scenarios where the formation of dew can impact your astronomy sessions.

The sensor actively calculates the dew point, and based on its real-time readings, it automatically adjusts the power levels of the dew heater. This dynamic control ensures that the dew heater operates efficiently, preventing the accumulation of moisture on your optics. By seamlessly adapting to changing conditions, the sensor not only safeguards equipment but also minimizes energy consumption, making it a valuable asset for precise and energy-efficient control.

- *The internal sensor is strategically located in a separate compartment to mitigate heat generated by UPBv3 power electronics. Employing a specialized algorithm, it effectively compensates for any potential temperature and humidity fluctuations caused by internal heat. For optimal precision, the use of an external sensor is recommended, as it remains unaffected by internal thermal factors, ensuring the most accurate environmental data acquisition. [please read below]*

EXTERNAL ENVIRONMENTAL SENSOR

An optional external environmental sensor is supported and can be plugged into the EXT port.

Compatible sensors are:

- PEG-SENS-UPBv2
- PEG-EZYFOCUS (hand-controller has a built-in temperature and humidity sensor)

When the external sensor is connected, the internal sensor is automatically deactivated, ensuring precise environmental data capture and enhancing overall versatility.



PEG-SENS-UPBv2

Please read the following:

- Place the external sensor away of a direct moisture hit (water droplets).
- Place the external sensor away of direct sunlight hit.
- Dust and high humidity over the time can create “mud particles” and interfere with the sensor’s internal circuit leading to higher humidity levels.
- In order to prevent all the above it is **highly recommended** to place the sensor between the telescope and dovetail.

EXT PORT

Expansion Port [on the left side – RJ12 socket] allows the connectivity of the below products.

- **EZY Focus Hand Controller** can be plugged into this port.
- **External Motor Controller** [XMC] can be plugged into this port.
- **External Temperature/Humidity Sensor** [PEG-SENS-UPBv2] can be plugged into this port.

LED INDICATION

Located on the right front side of the unit, a prominent red LED serves as a visual indicator, conveying the operational status of the device through distinct light patterns. This LED's functionality can be conveniently controlled via the software interface, granting you the flexibility to activate or deactivate it as needed to suit your preferences and operational requirements.

Permanently Light	Device is up and running.
Light Off	Device firmware is not loaded / not operational.

WI-FI CLIENT

UPBv3 seamlessly operates as a client, connecting to a 2.4GHz Wi-Fi network. Notably, it stands out by functioning concurrently **as both a Wi-Fi hotspot and a Wi-Fi client.**

To link up with a Wi-Fi network, navigate to the Unity platform, access the Wi-Fi tab, and initiate a scan to discover networks in your area. Simply select the desired network, input the Wi-Fi password and your preferences are stored.

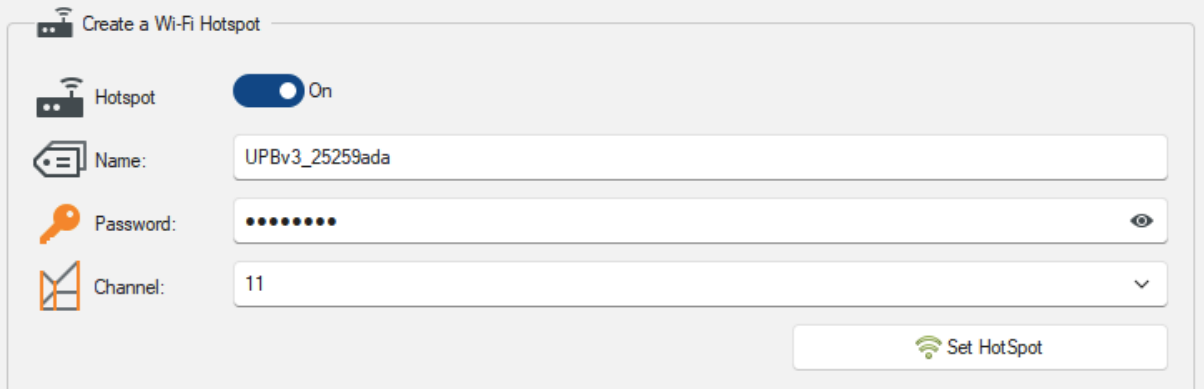
With each reboot, the device effortlessly connects to the configured wireless network. The device retrieves your selection on every boot and automatically connects to the configured wireless network.

WI-FI HOTSPOT

UPBv3 v3 has a Wi-Fi Access point (hotspot) at 2.4 GHz. The hotspot is enabled by default. The SSID name is compiled from the prefix `UPBv3_` and the unique 8-character device ID e.g. `25259ada`.

You can easily control the hotspot settings from the Unity Platform.

- Open Unity Platform, click on the discovered Ultimate Powerbox v3, and locate the Wi-Fi settings tab.
- There you will see the below screen which allows you to control the Wi-Fi hotspot.
- You can easily change the SSID name, enable, or disable the Wi-Fi hotspot, or switch to another channel number.



- You will have to change the hotspot channel if your area is fully crowded with Wi-Fi networks. **Channels 1, 6, and 11 [default] are the best channels for 2.4 GHz Wi-Fi.** These are the only channels in the 2.4 GHz frequency band that don't overlap with each other. You'll only want to consider using a different channel if each of these channels is overcrowded in your coverage area.

1.6 CONSIDERATIONS ABOUT WI-FI CHANNELS TO IMPROVE NETWORK CONNECTION

- Wi-Fi is a line-of-sight radio technology, which means that it operates not by surrounding your device with a wireless signal, but by connecting directly to it, through whatever walls, subflooring, or other electronic devices are in its way. Each solid object between the antenna of your wireless access point (router/modem) and your computer will diminish the signal. Repositioning things by inches can make a world of difference.
- Sources of interference are not always obvious. Many times, you may be receiving interference from hidden wireless networks or even some electronics. Interference from electronics is more prevalent with the 2.4 GHz radio spectrum. If you are using a low channel width on a free channel and are still seeing wireless disconnects (even while near your wireless access point), then the issue could be something else occupying that spectrum. Try experimenting with other channels.
- In a crowded wireless landscape, wireless performance will often degrade and improve on its own, as other people use their Wi-Fi networks. Experimenting with channel settings can help here as well, since some of your competition may rarely use their Wi-Fi, while others are continually transferring data from many devices. If you live in an apartment complex, for example, and your neighbor has their router against a shared wall, sharing a wireless channel will not become a noticeable problem until they get home, connect with their smartphones, and start streaming to their television. However, at that point, your Wi-Fi may become completely unusable until you change the wireless channel.

WEB DASHBOARD

Upon connecting to the UPBv3 hotspot or any Wi-Fi network, you can conveniently access it from any web browser by simply typing "**`upbv3.local`**" in the address bar. The device announces itself as *upbv3.local* in your local network.

For security reasons, the web dashboard has a simple authentication process and requires a username and aa password upon login. The dashboard password is always the Wi-Fi hotspot password.

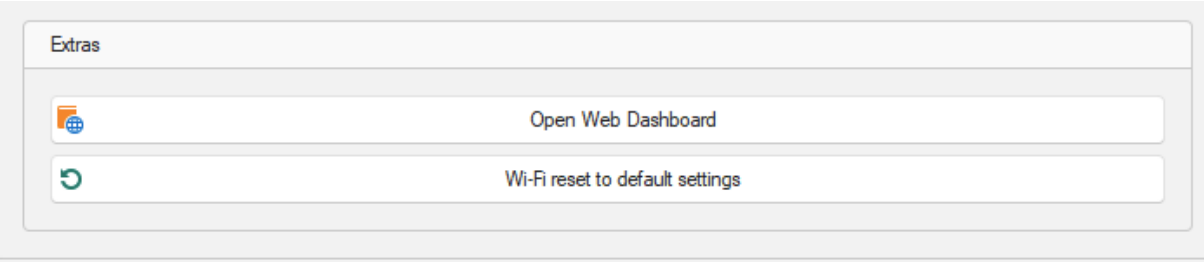
Default credentials are:

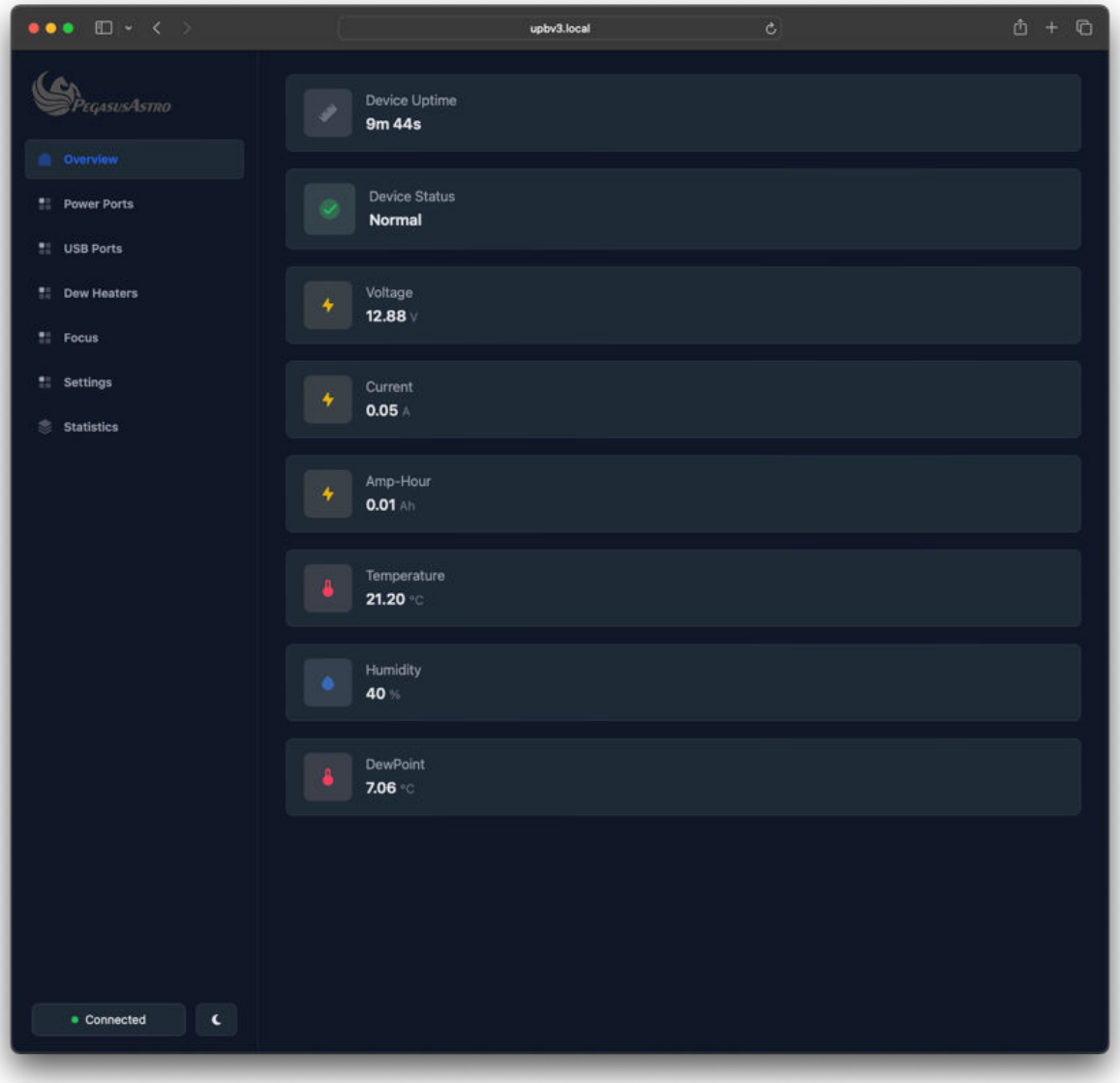
Username	`admin`
Password (always same as hotspot password)	`12345678`

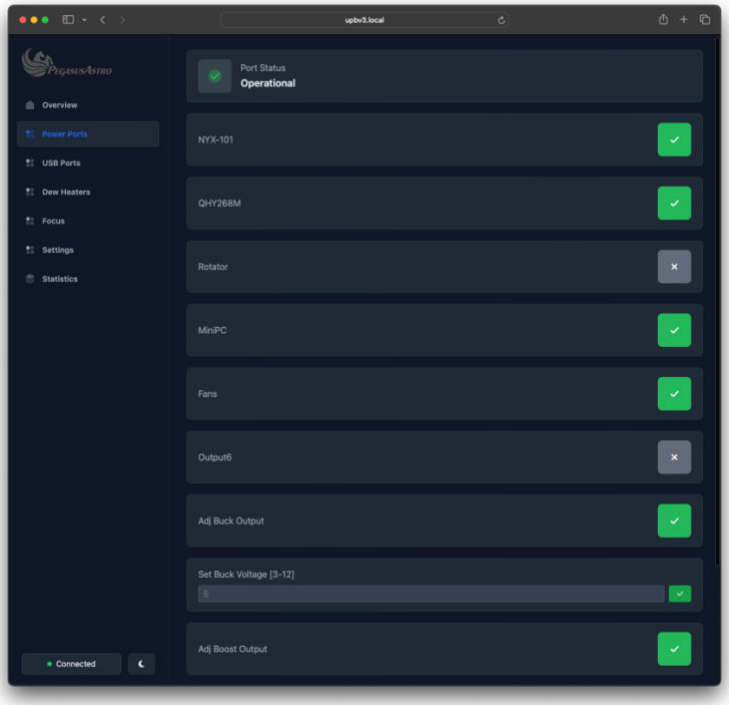
This feature is operating system-independent and functions seamlessly alongside USB control.

The web dashboard offers full control of the device power ports, USB ports, dew heaters, focus motor control along with statistics and information about UPBv3.

You can also open the web dashboard directly from Unity Platform if you click button “Open Web Dashboard”.







RECOMMENDATIONS

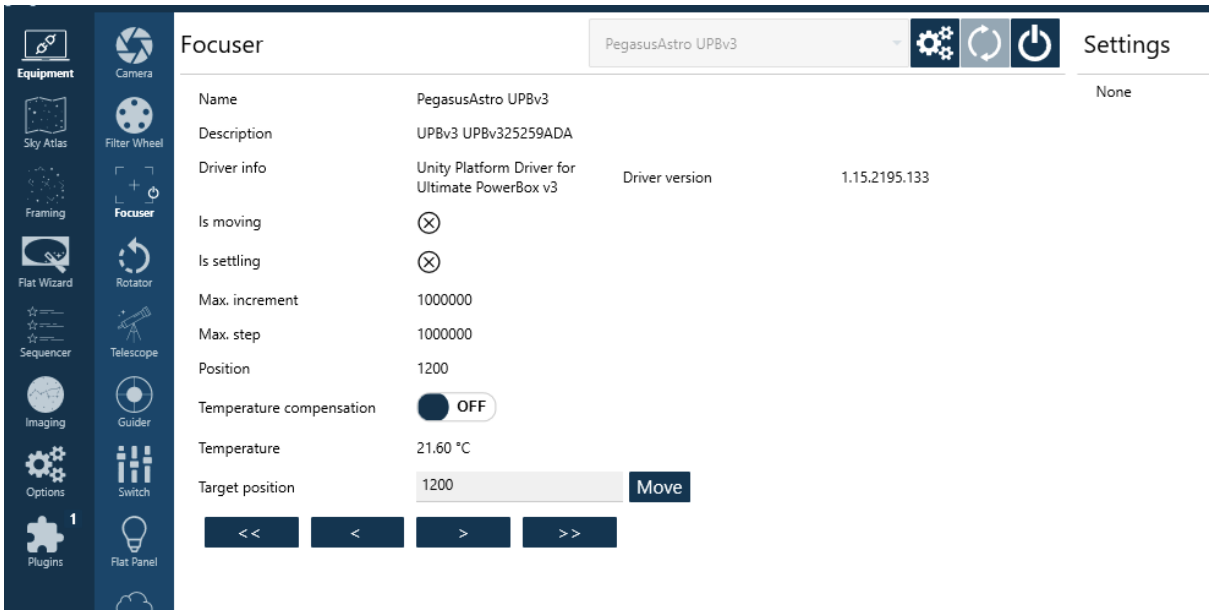
- We highly recommend the selection and use of high-quality, shorter-length USB cables to ensure optimal connectivity and data transfer reliability.
- Similarly, exercise caution when choosing power cables, favoring shorter and thicker variants to mitigate voltage drops. Extended, thin power cables may adversely affect the image quality of your camera (CCD or CMOS) or the tracking performance of your mount.
- Ensure the utilization of a robust DC input socket paired with a substantial power cable, featuring a diameter of 1.5mm for each pole. Vigilantly inspect for any gaps that could potentially lead to power interruptions.
- Avoid the practice of looping USB or power cables, as this can introduce communication issues and disrupt the seamless operation of your equipment.
- To prevent potential interference issues, it is advisable to avoid tightly bundling power and data cables together. USB 3.0 (USB 3.1 Gen 1) cables, in particular, can be susceptible to interference from nearby power cables. To maintain optimal signal integrity and minimize the risk of data transfer problems, it's recommended to keep power and data cables separated and routed in a way that minimizes their proximity to each other. This practice helps ensure the reliable performance of USB 3.0 devices and mitigates the risk of electrical noise or interference that can impact data transmission.
- If you find it necessary to employ a "step-up voltage converter" in the DC input, be mindful that a minimum of 6 amps is required to power all connected devices. While not recommended, if you choose to use such converters, consider acquiring a reliable battery source or explore our certified 12V/10A power supply options for enhanced performance and peace of mind.
- USB 3.0 (and its successor, USB 3.2) can generate electromagnetic interference that may impact the performance of nearby Wi-Fi devices operating in the 2.4GHz frequency band. This interference occurs because USB 3.0 cables and connectors emit radio frequency interference (RFI) as a byproduct of their high-speed data transfer. To mitigate these interference issues and maintain good Wi-Fi quality:
  a. Use Shielded Cables: Consider using shielded USB 3.0 cables and connectors. Shielding can help contain RFI and reduce its impact on nearby devices.

b. Increase Separation: Physically separate the USB 3.0 and Wi-Fi devices, or use longer cables to increase the distance between them. This can reduce the proximity of the sources of interference.
c. Use 5GHz Wi-Fi: If possible, use a 5GHz Wi-Fi band for devices that require a stable and interference-free connection. The 5GHz band is less susceptible to interference from USB 3.0.

ASCOM 6

Classic ASCOM 6 (32 and 64-bit supported) drivers are bundled along with the Unity Platform.

The driver is named as "`PegasusAstro UPBv3`" and an example can be found in the below screenshot of N.I.N.A. imaging software.



ASCOM ALPACA

ASCOM Alpaca outshines classic ASCOM drivers with its platform independence, modern web standards, streamlined installation, remote control capabilities, extensibility, and open-source options. This ensures superior compatibility and user-friendly performance, making it the preferred choice for advanced astronomy applications.

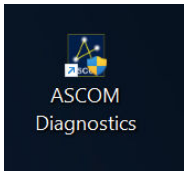
UPBv3 comes equipped with an integrated web server that seamlessly communicates with Alpaca clients natively. This integration enhances the user experience by providing easy access to device through ASCOM Alpaca but also monitoring from any device with a web browser such as a smartphone.

To use ASCOM Alpaca make sure that the UPBv3 is connected to your Wi-Fi network or you use its hotspot feature and you are connected to it.

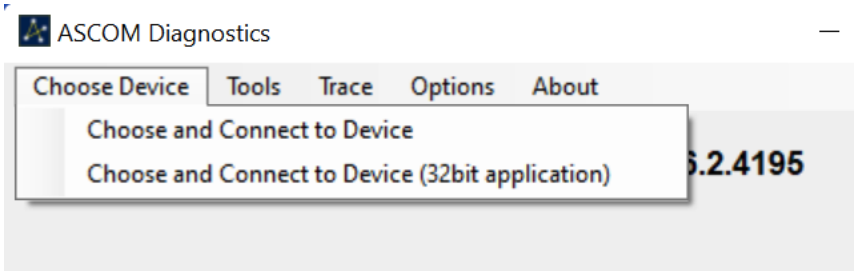
This is a one-off action and it is required to discover UPBv3 and automatically create the appropriate ASCOM Alpaca driver.

To do that:

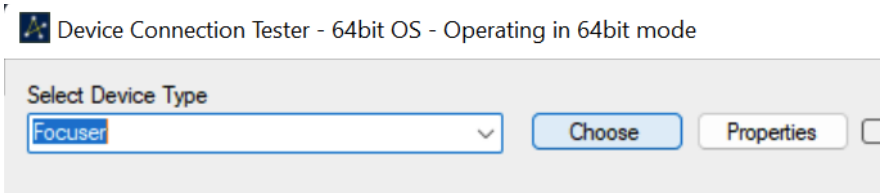
Open ASCOM Diagnostics (you should have this software once you install ASCOM)



Choose: Device -> Choose and Connect to Device

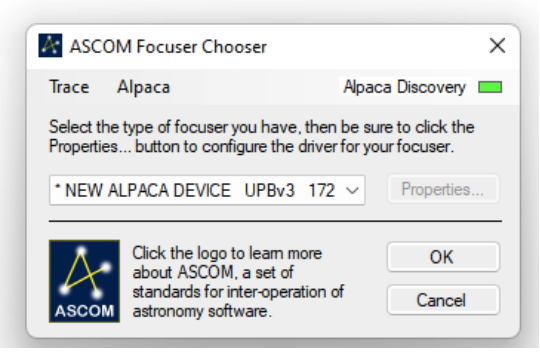


Select Focuser in the drop-down line of device types and press Choose button.

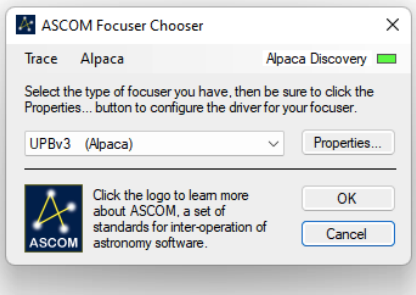


ASCOM Alpaca Discovery will flash on the top right and will be converted to a green rectangular meaning that a new alpaca device has been discovered.

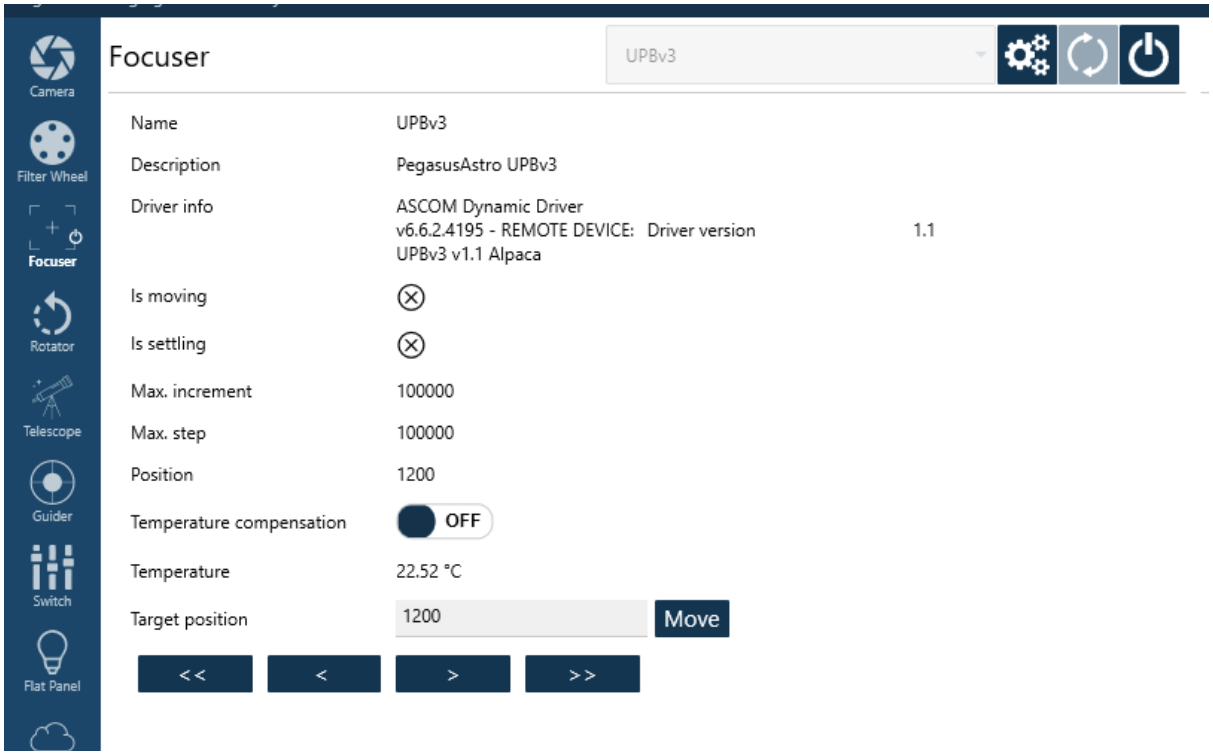
Select from the drop-down list the "`NEW ALPACA DEVICE UPBv3`" and press OK to create the Alpaca Dynamic Driver



After that, the generated driver will be automatically renamed to `UPBv3 (Alpaca)`.



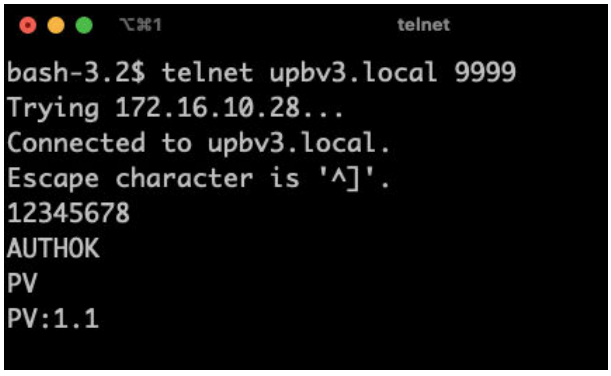
You are ready to go. You can use the UPBv3 Focuser driver on your selected imaging software. The below screenshot is an example from NINA using the **Alpaca UPBv3 Focuser driver**.



COMMAND SOCKET VIA TCP PORT

Ultimate Powerbox v3 listens to TCP port number 9999 and accepts the same command set like USB serial port. The only difference is that you need to provide **the access point [hotspot] password** before any interaction with the device.

In the below example, we send the default password "`12345678`" and receive an `AUTHOK` reply.
After that, we can communicate and control the device. In case the password is incorrect, the UPBv3 will terminate the connection.



You can change this easy password if you change the access point password. It uses the same password.

For the complete command set please check the UPBv3 product page at the Pegasus Astro website.

UPGRADABLE FIRMWARE

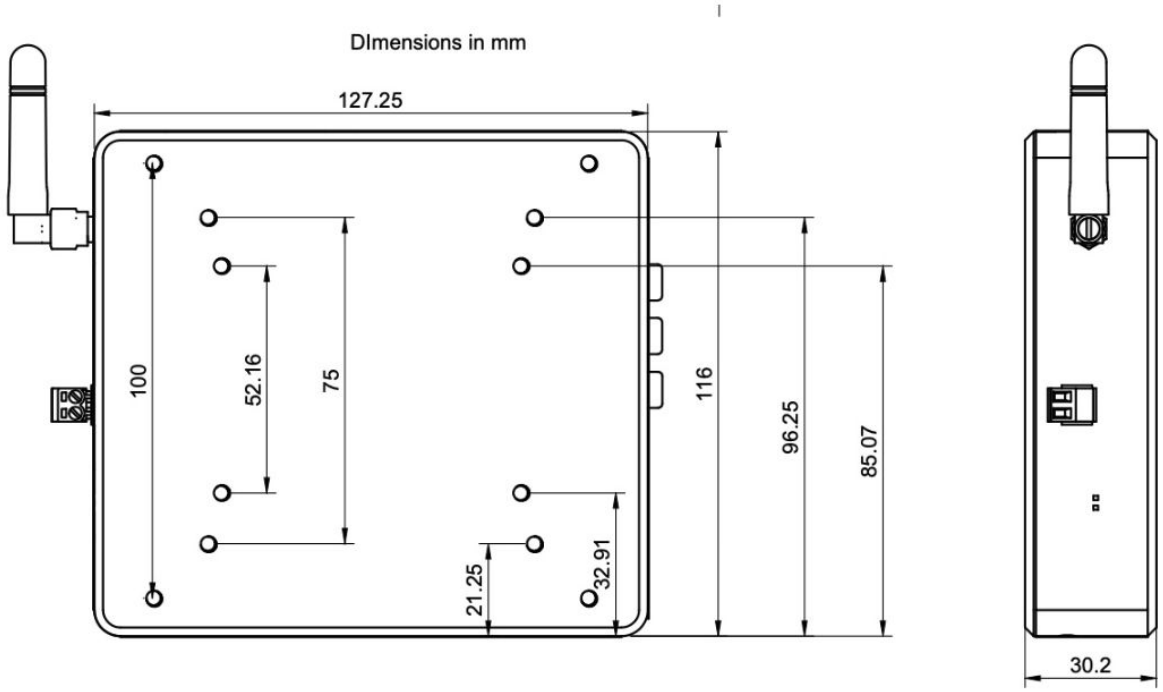
The device offers firmware upgradeability via USB cable and Wi-Fi, a valuable feature that not only ensures the flexibility to accommodate future enhancements but also allows for the seamless rectification of any potential bugs or issues.

The USB upgrades are managed by the Unity Platform. If a new firmware version becomes available, you will receive a prompt to upgrade the device firmware.

Alternatively, you can connect to the Wi-Fi hotspot SSID and navigate to http://upbv3.local/update in your web browser. From there, you can effortlessly upload the firmware .bin file using the provided interface.

DIMENSIONS

127.3mm x 116mm x 30mm, Weight: 400 grams (14.1 ounces).



MOUNTING ACCESSORIES

Attach the Ultimate Powerbox 3 effortlessly onto our optional A-Plate mounting accessory (**PEG-APLATE**) using the provided 4 x M4 screws.



Upgrade your telescope setup with our **Universal Single Clamp (PEG-USCLAMP)!** Just use the 4 x M4 screws (distance of 55 mm x 55 mm) provided to attach it directly onto the Ultimate Powerbox v3. Once secured, you can easily mount it onto your telescope assembly with the dual Vixen and Losmandy 3” clamp.



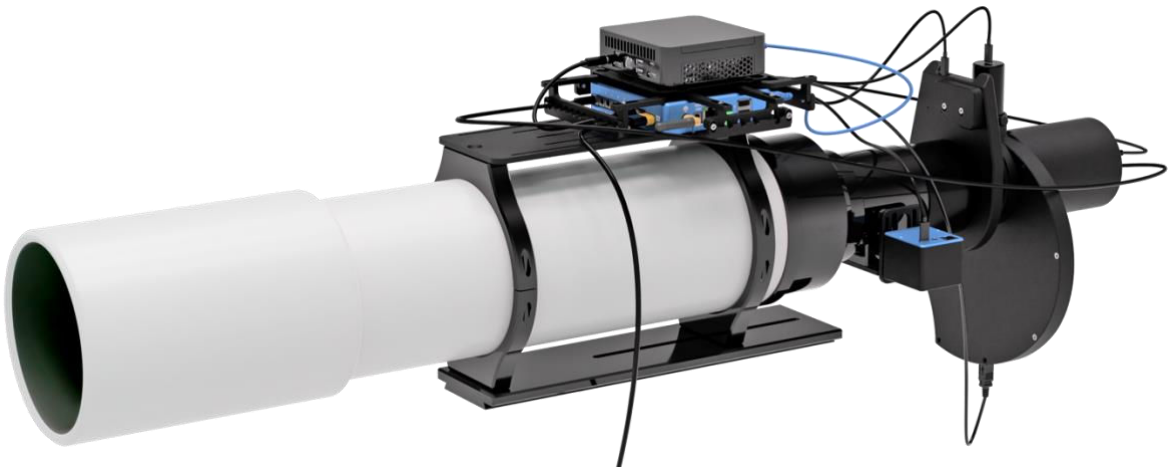
Introducing the **Pegasus Astro Spider Clamp (PEG-SPIDERCLAMP)**, your solution for **securing and safeguarding power and data cables against snags and connector damage.**

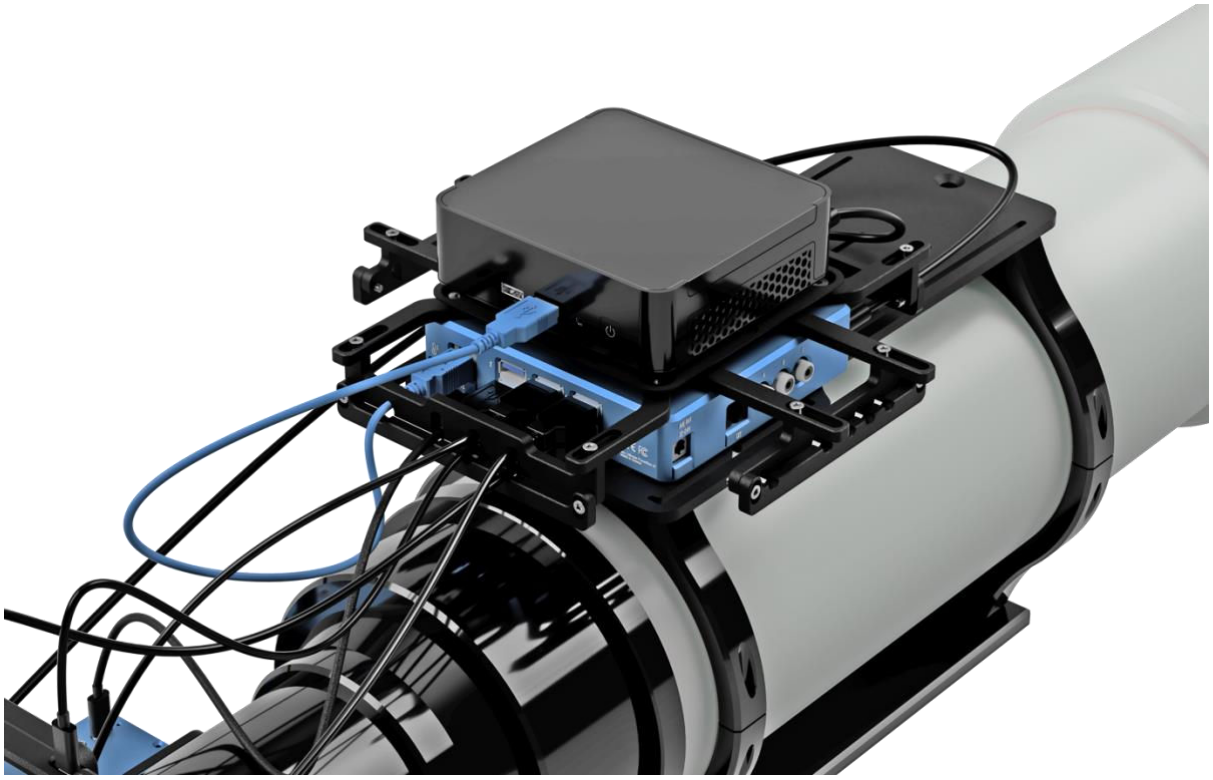


Specifically designed for the Ultimate Powerbox v3, this clamp ensures cable protection. Plus, it offers the convenience of directly plugging and securing small-factor PCs like the Intel NUC, MELE, or **any VESA-compatible device** (75x75mm and 100x100mm) onto the UPBv3.



Examples mounting the UPBv3 onto a refractor telescope by using both PEG-A-PLATE and the PEG-SPIDERCLAMP.





TECHNICAL SPECIFICATION

Supply Voltage:	12V-14V DC (Reverse Polarity Protected)
Power Input Connector	XT60 Female
Connectivity	USB3 – Type B USB Connector
6 x 12V Outputs	Maximum Current 6.0A each. 2.1mm Center Positive Sense/ Ampmeter in each port Software: ON/OFF
3 Channel x 12V PWM Outputs	Maximum Current 3A each, RCA Connector, Pulse Width Modulated (Suitable for Dew Heaters / Fans / Flatpanel) Software: Duty Cycle % / OFF
2 x Variable Outputs	Step down [buck]: adjustable via software. 3-12V / 3Amps. Step up [boost]: adjustable via software. 12-24V / 4Amps @19V.
2 x Always ON 12V Output	12V passthrough / Always ON / 8 Amps
Internal Env Sensor	0-100% humidity readings with 2-5% accuracy -40 to 80°C temperature readings ±0.5°C accuracy
Ampmeter	Measures 0 – 20A
Voltmeter	Measures 5 – 15V
Superspeed (USB3.1) 8 port powered Hub	Industrial Grade: Temperature range -40°C to +80°C 6 x SuperSpeed (USB3.1) ports (backwards compatible with USB2) 2 x High Speed (USB2) ports USB Ports can be switched ON/OFF on demand via software (data + power) Each USB port can deliver up to 2.5Amps
Stepper Motor Controller	Unipolar and Bipolar Stepper motors (2.0 Amps per phase) – RJ45 socket.
Dimensions	127mm x 116mm x 29mm
Weight	400 grams (14.1 ounces)

ENVIRONMENT

The device's electronic components and materials have undergone a selection process to ensure its performance across a wide range of environmental conditions. With an operational capability spanning from -40°C to +80°C, coupled with the ability to withstand humidity levels of up to 99%, this device has been engineered to excel even in the most challenging of climates.

WARRANTY

The device is covered by a comprehensive 2-year warranty. Within the warranty period, we offer free repair services to address any issues that may arise. Following the expiration of the warranty period, we continue to provide repair support and service, which will be subject to a fee. It is important to note that this warranty does not extend to damage resulting from abuse, misuse, accidental falls, or other incidents occurring after the purchase of the product. The customer is responsible for shipping the product to our designated return address for either repair or replacement. For more information please read: https://pegasusastro.com/returns

SUPPORT

For any issues, questions or feedback and recommendations please contact us via email: support@pegasusastro.com.