APERTURA

# Armored USB Hub with Power Supply

## User's Manual


By Matthew M Paul and Edward Bevan
2024

# What's Included

1- Armored USB Hub
2- USB-A to USB-B3.0 Cable, 2m
3- 5 amp 12.5v AC Power Supply
4- Power Supply Threaded Extension Cable
5- Power Supply AC Cable
6- Synta Finder Base
7- 2x M4x.7 Finder Base Attachment Screws
8- 3mm Hex Key


# Technical Specifications

| | |
|---|---|
| Device Connectivity | 6 USB-A 3.0 Ports |
| Device USB Port Power Output | 5V DC at up to 2.6A per Port |
| Device USB Port Protections | Short Circuit Protection, Over-Current Protection |
| Computer Connectivity | 1 USB-B 3.0 Port |
| Computer OS Support | Plug-and-Play with Windows, Linux, and Mac |
| Power Input Connection | 5.5x2.1mm Center Positive DC Port |
| Power Input Specification | 12V DC |
| Power Input Protections | DC Overvoltage Protection, Under Voltage Protection, Reverse Polarity Protection |
| Temperature Operating Range | -20° to 70° C (-4° to 158° F) |
| Weight | 226.80 g (8oz) |
| Dimensions | 70 x 85 x 30 mm (2.75 x 3.35 x 1.18 in) |

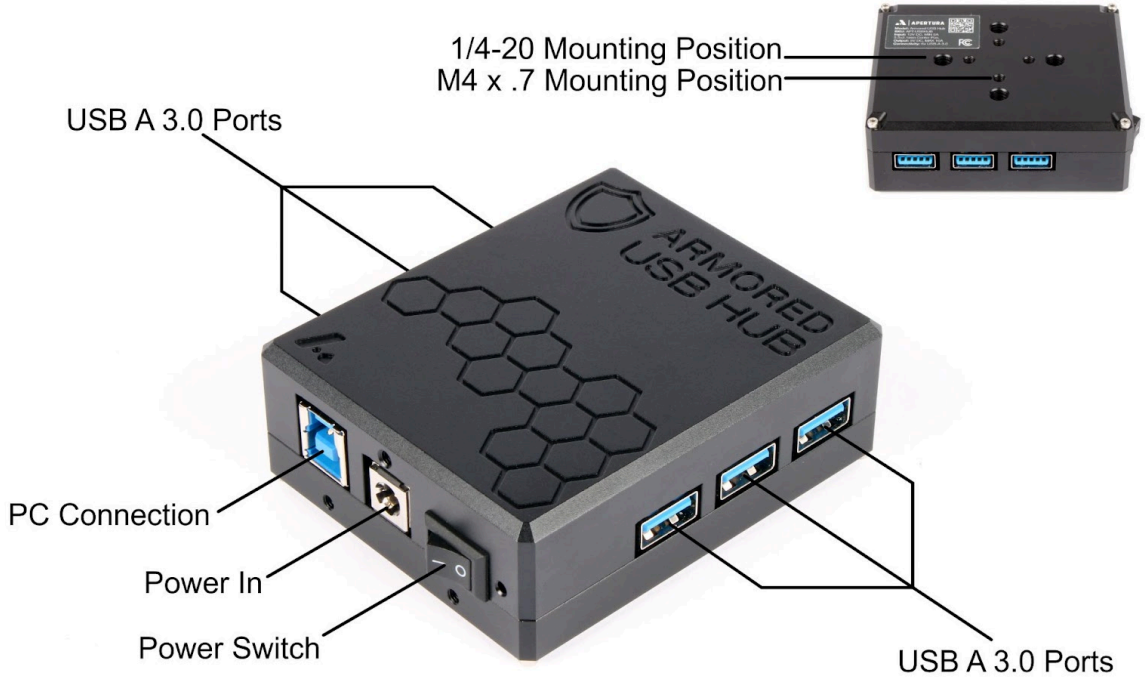
# Introduction

The Apertura Armored USB Hub is a heavily protected, six (6) port USB hub designed by astronomers for astronomers. This unique device was conceptualized and designed from the ground up by our development team who wanted every aspect of this USB hub to benefit amateur astronomers and astrophotographers.

The Armored USB Hub offers many high-quality features. Perhaps the most important is the full spread of integrated, automated, and non-intrusive smart protections. The USB hub has integrated overcurrent protection, short circuit protection, over voltage protection, under voltage protection, and reverse polarity protection. This resilient device has been engineered to fully function from below zero to above 150-degrees Fahrenheit. It comes with a hard and durable CNC machined 6061 aluminum exterior case and a dependable mechanical on/off switch with a low output and dark site friendly red LED power indicator light.

The plug-and-play functionality incorporated into the Apertura Armored USB Hub allows for a hassle free experience with no additional software to control and interface the USB hub. To top it all off, everything needed to use the hub is included in the package. This includes a high-quality 2m long USB3.0 cable, Apertura AC5 5 amp AC power supply, and Synta-style finder base mounting foot so that the USB Hub can easily attach to any telescope.

# Parts of the Armored USB Hub



# Using the Armored USB Hub

The Apertura Armored USB Hub is Plug-and-Play with Windows, Linux, and Mac operating systems, making getting started with and using the hub is fairly straightforward.

First connect the hub to power via the 5.5x2.1 mm Power Input. The hub is designed to run off 12V at a maximum of 5A, for a total of 60W. A different amperage supply can be used so long as it is adequate for the intended connected devices. The amperage rating needed for the 12V power supply can be approximated by calculating total amperage draw of all connected 5V USB devices and multiplying this by 0.42.

Once power has been supplied, connect the USB hub to the computer with a USB-B 3.0 cable. To get the most reliable connection, It is recommended the included cable be used. Now just flip the power switch to the On position, and the hub is ready for use. Simply connect and use USB devices the same as if they were directly connected!

# Attaching the Findershoe Bracket

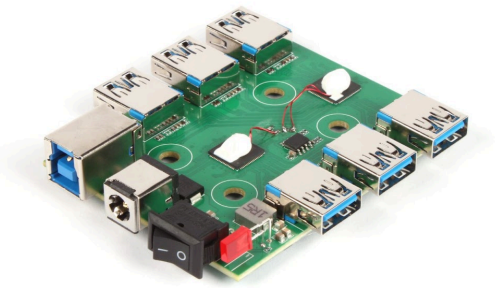
The included Synta-style findershoe bracket can be used to install the Armored USB Hub in most common findershoes included with telescopes or available separately (APT-FSSSHOEV2 or APT-SCTSHOE).

To use, first flip the hub over to show the threaded hole pattern. Two (2) sets of M4 threaded holes are available to allow for flexibility in the hub's orientation when installed. Place the findershoe bracket over the desired set of holes, and use the included hex key and two (2) M4 x 0.7 mm, 8mm long screws to secure the bracket to the hub. The bracket can be attached in either 90-degree orientation.

The USB hub also has four (4) ¼-20 mounting points in addition to the found M4 mounting holes for custom mounting solutions. The ¼-20 holes can be used to mount through dovetail bar mounting slots. We recommend sourcing the most appropriate length fastener from your local hardware store as each application will be different.

# Quality Control

As amateur astronomers, we know that your astrophotography and astronomy gear is expensive and sensitive equipment. That's why we here at Apertura have implemented a strict and extremely detailed quality control procedure that every Apertura Armored USB Hub PCB circuit board must pass before it can be assembled in its CNC machined 6061 black oxide finished aluminum housing. The units are tested here in the USA with final assembly happening in the very same facility.

Each board goes through an extensive test procedure using a digital programmable electronic load, digital adjustable power supply, digital voltage ohm meter, and test PC to monitor data transfer rates during intentional and forced malfunctions. The PCB boards are checked for proper under current, over current, over voltage, reverse polarity protection. If a PCB board does not make the cut, it does not move to the next stage of assembly. There is no room for sub-par or marginal test results when it comes to protecting your expensive and sensitive astronomy gear.

# Protections of the Armored USB Hub

The device incorporates an armada of short term protections designed to help protect your equipment in the event of a catastrophic failure as well as in situations of smaller failures. These

protections act to drastically increase the survivability of your astronomy equipment. These protections are not intended to replace normal periodic monitoring of your astrophotography system.

## Temperature Protections

The Armored USB Hub is rated for temperatures of -4-degrees Fahrenheit to 158-degrees Fahrenheit and has been extensively tested and confirmed to work normally, transferring at nominal data rates when at both temperature extremes.

## Over-Current Protection


Each of the six (6) USB-A device connection ports have over-current protection built in that will trigger if a port exceeds its 2.6A rating. When this protection is triggered, the port with the fault will be turned off automatically. The device will continue to briefly power and check the load for a temporary overload until the load has surpassed 3A where it will turn off completely. Only the offending port will be shut down, all other ports and the hub itself will continue to function normally. The device will continue to monitor the faulty port and once the fault has been corrected the port will begin to function normally again.

## Short Circuit Protection


Each of the six (6) USB-A device connection ports have short circuit protection built in that will trigger if a short circuit is detected on an individual port. When this protection is triggered the port with the fault will be turned off, though the device will continue to monitor this port. Only the offending port will be shut down; all other ports and the hub itself will continue to function normally. The device will continuously monitor the faulty port and once the fault has been corrected the port will begin to function normally again.

## Over-Voltage Protection


The Armored USB Hub has over-voltage protection on the input that helps protect connected devices from voltage outside of the specification being supplied on the power input. The hub has been tested with input voltages up to 19V without a significant increase in output voltage from the USB ports.

**Please note that while the over-voltage protection is designed to protect against possible voltage spikes and short term accidental uses of an incorrectly spec'd power supply, it is not a replacement for a power supply with the proper 12V DC voltage specification.**

## Under Voltage Protection

The device will power down if the input voltage drops to around 4V, protecting your USB devices from a major under voltage condition. Once the voltage is restored to around 5V or higher, the device will automatically power back on.


## Reverse Polarity Protection

In the unlikely event that the power input is accidentally switched, positive to negative and negative to positive, the device will not power on and will remain off in a safe condition.

# Warranty

This product is backed by the Apertura 1 year Electronics Warranty. We guarantee this product to be free from manufacturing defects for one year from the time of delivery. This warranty does not cover accidental damage, misuse, or other things not expressly covered under manufacturer defects. This item is not covered under the Apertura Absolute Warranty.