ALTO Telescope Cover Motor

USER MANUAL

VERSION 1.4

Update 01-07-2025



ALTO is manufactured by PrimaLuceLab SpA (Italy). For any matters relating to the use, service and warranty, please refer to the addresses given in the relevant documents.

English

WARNING

If improperly handled, ALTO may be damaged. Please follow the instructions below:

- Do not disassemble the unit
- Do not drop, subject to excessive impact, open, or subject to electric shock any part of ALTO.
- Do not rotate ALTO's arm manually since this could damage the internal motor
- Do not short the electronic elements
- Do not expose to temperatures below -20°C and above +60°C
- Do not burn or incinerate any component.
- Do not expose to rain or other atmospheric effect related to water
- Do not bend, modify or force any part of ALTO

QUALITY CONTROL

After being manufactured in our laboratories, each ALTO unit is tested by PrimaLuceLab technical experts to verify all mechanical and electronic components. If you find any malfunction, please contact us immediately (+ 39-0434-1696106 or support@primalucelab.com). Do not try to disassemble, repair or modify the ALTO yourself, without our written approval, in order maintain the manufacturer's warranty.

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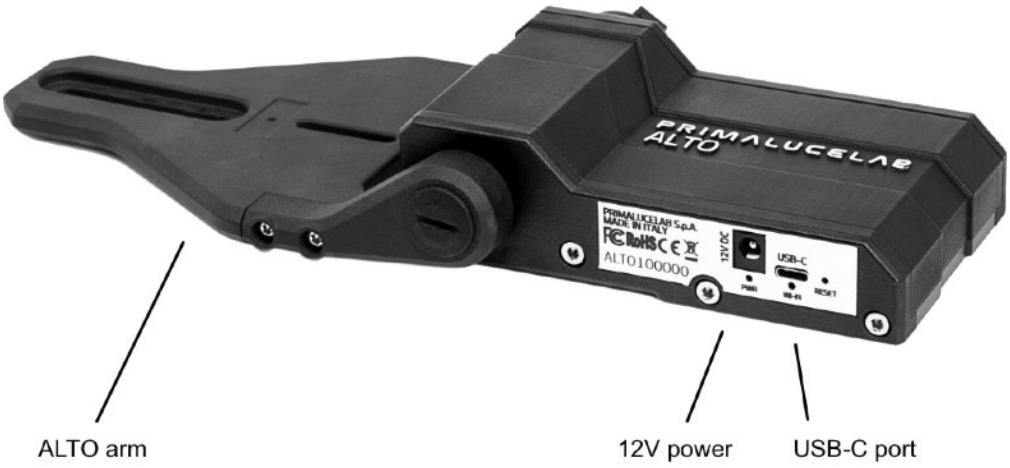
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Component Identification





Package contents

- ALTO telescope cover motor
- M6 screw with washers and o-ring to attach GIOTTO
- Cable Locking Clip with M6 screw
- USB-C to USB-B cable*
- 12V power cable with 5.5 x 2.5mm plug on both ends
- ALTO quick start guide

* USB-C to USB-A cable that is needed to connect ALTO to EAGLE or standard Windows computer is not included in ALTO's box since one is provided with GIOTTO.

NOTE

In order to use ALTO, you need to download the PLAY software from the

DOWNLOAD

section of our website www.primalucelab.com

Save the package (downloaded in zip format) onto the EAGLE or Windows computer you will to use to control ALTO. Unzip it with the proper unzip software (You can simply right-click and select “Expand” or you can use software from https://www.winzip.com).

NOTE:

ALTO telescope cover motor is specifically designed to be used together with GIOTTO smart flat field generator, allowing you to use GIOTTO as a remotely controlled motorized cap for telescopes. ALTO is available in different models (ALTO-1, ALTO-2, ALTO-3 and ALTO-3L) based on the dimensions of GIOTTO. In this table you can find the compatibile ALTO model for the various GIOTTO models. For example, ALTO-1 is compatible with GIOTTO120, GIOTTO150, GIOTTO185 and GIOTTO220 but not with larger models (that require ALTO-2, ALTO-3 or ALTO-3L).

	ALTO-1	ALTO-2	ALTO-3	ALTO-3L
GIOTTO120	V	X	X	X
GIOTTO150	V	X	X	X
GIOTTO185	V	X	X	X
GIOTTO220	V	X	X	X
GIOTTO255	X	V	X	X
GIOTTO285	X	V	X	X
GIOTTO320	X	V	X	X
GIOTTO430	X	X	V	X
GIOTTO560	X	X	X	V
GIOTTO CUSTOM	X	X	X	to be verified

NOTE: when ALTO is mounted on a telescope, you may notice a hesitation or gap in the movement as the weight of the ALTO/GIOTTO passes through the apex of the movement. This is normal as the weight of the GIOTTO transitions from an upward to a downward movement (or opposite) and the backlash in the drive gear settles.

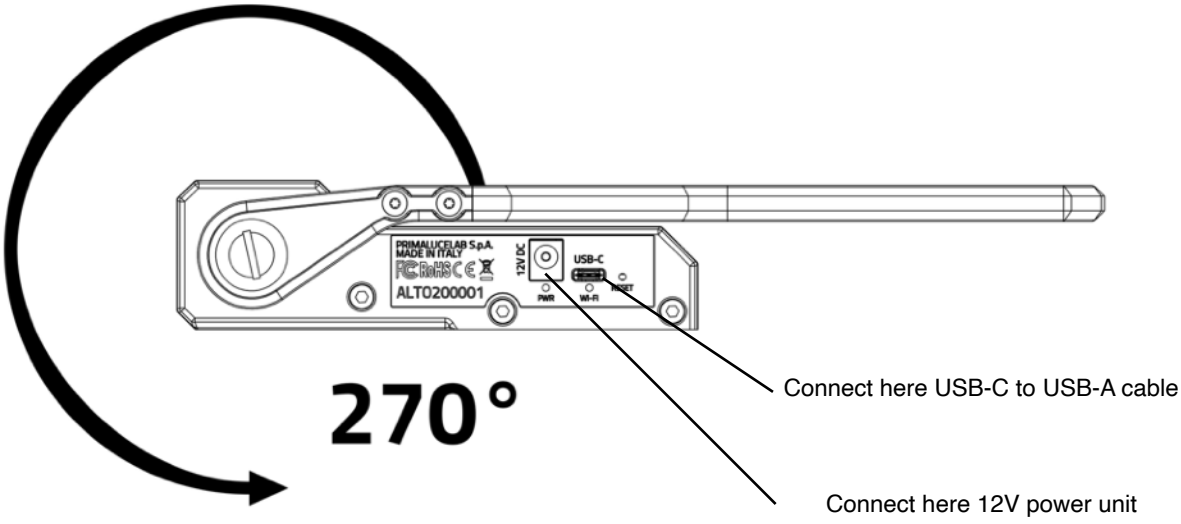
Note: since GIOTTO with ALTO can't seal the telescope front opening, we do not recommend using GIOTTO with ALTO to record dark calibration frames; we suggest recording a dark library instead.

First use: preparing ALTO for installation

When you open the ALTO's box, you can see that ALTO (for safety of shipment) has the arm completely attached to the ALTO body. The first step to do is to rotate the ALTO's arm by around 270° and this has to be done by powering ALTO and by using PLAY software installed in the computer or by using the Virtual HandPad through a WiFi connectivity. **NOTE: do not rotate ALTO's arm manually since this could damage the internal motor.**

In order to prepare ALTO for installation on your telescope, remove ALTO from the box and connect 12V power to ALTO (you can use a 12V 1A power unit with 5.5/2.5 positive tip plug or the 12V power cable with cigarette plug provided with GIOTTO) and connect the USB-C to USB-A cable (that is not included in the ALTO's box, you can use the one provided with GIOTTO) from ALTO to EAGLE or standard Windows computer.

PLEASE NOTE: do not connect USB and power cable to the other side of ALTO, where you can see the USB-B port since these are passthrough ports (and not power in): passthrough ports are used to power and connect GIOTTO through ALTO and not to power and control ALTO directly.

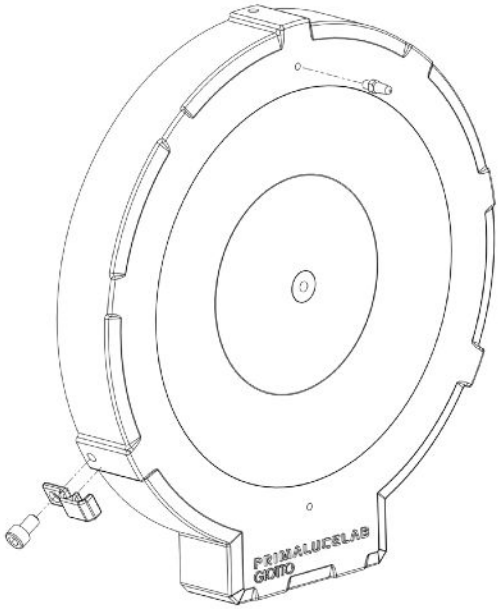


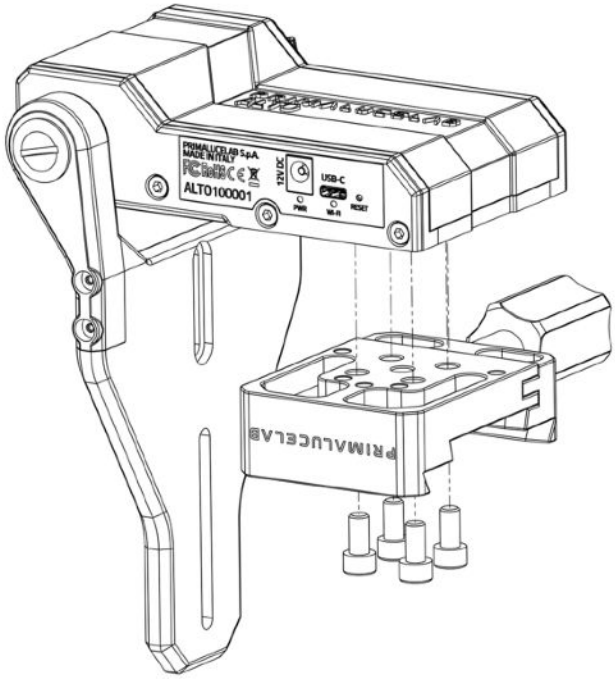
Then start PLAY and follow the instructions included in the next section: "First use - Controlling and Calibrating ALTO with PLAY software" in order to rotate ALTO's arm 270 degrees. This will allow you to proceed with the next paragraph and connect GIOTTO to ALTO.

PLEASE NOTE: you can also rotate the ALTO arm by using the Virtual HandPad instead of PLAY. In this case please refer to the section "First use: controlling ALTO with Virtual HandPad" to read how to do.

First use: connecting GIOTTO and attaching ALTO to front of your telescope

To install ALTO on your telescope and connect it to GIOTTO, first remove the plastic thumbscrews from GIOTTO (the ones used to to attach GIOTTO to front of your telescope - these will not be needed when you used with ALTO). Connect the Cable Locking Clip by attaching it to the GIOTTO with the M6 screw, as shown in the image. This clip is used to lock in place the USB and 12V power cables that connect ALTO to GIOTTO.



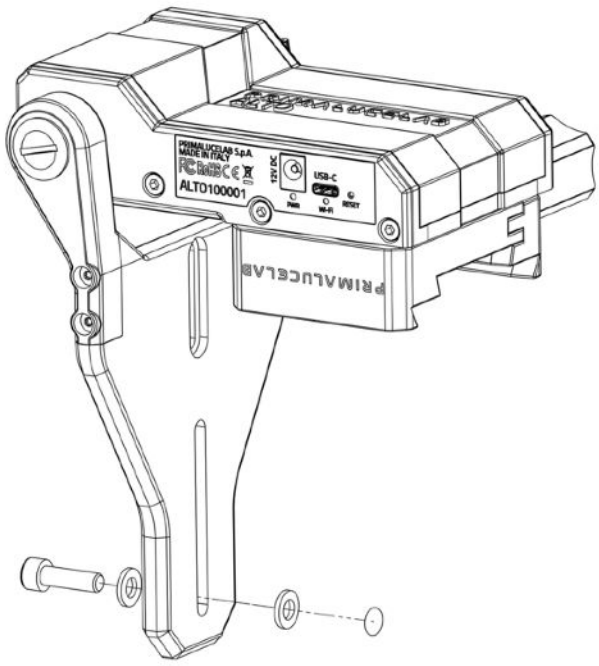


ALTO is designed to connect to telescopes dovetail bars by adding the optional PLLMORVLP PLUS dovetail clamp. Vixen or Losmandy style dovetail bars already present in many telescopes (like SCT, Aplanatic SCT, RCT, etc). If your telescope has a short bar (for example on a refractor or Newtonian) you can easily add a longer dovetail bar to let you clamp ALTO just above or below the front end of your tube.

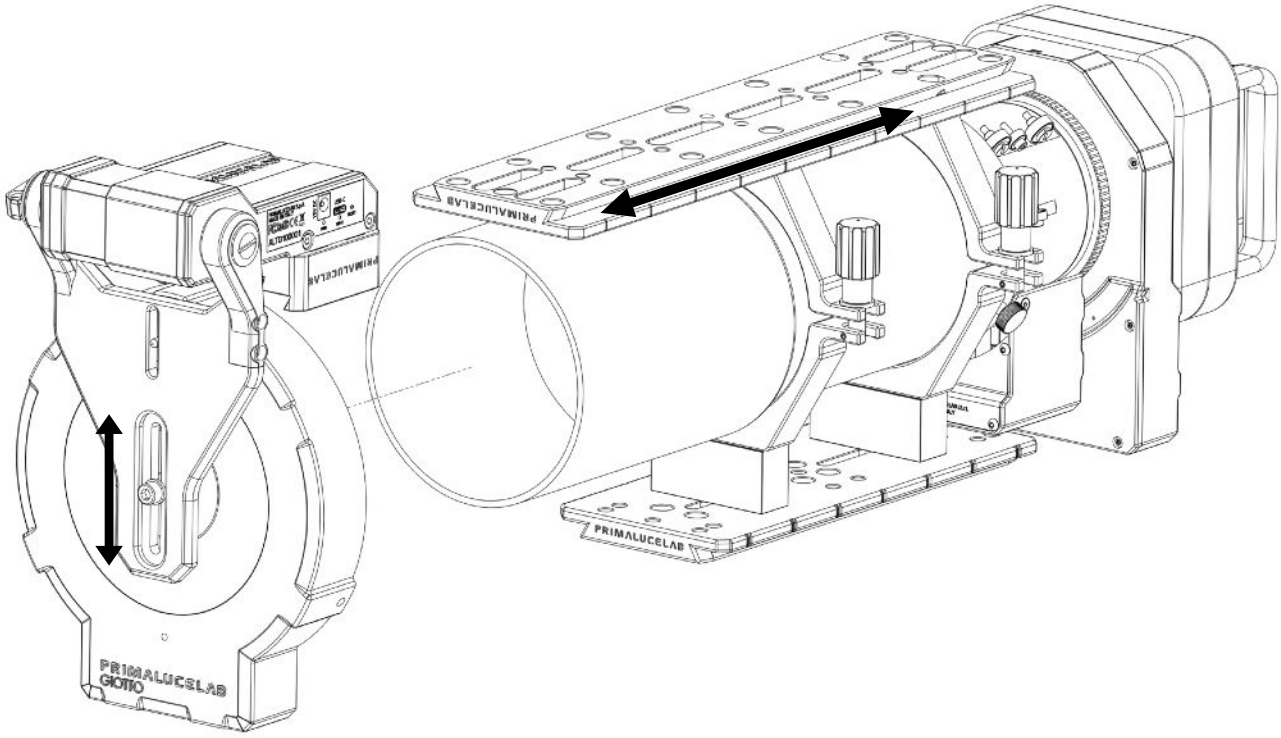
In the bottom part of ALTO body you can find different M6 threaded holes that allow you to attach the optional PLLMORVLP PLUS dovetail clamp to ALTO. Attach the optional PLLMORVLP PLUS clamp to the bottom side of the ARCO with the M6 screws that are included in the PLUS clamp box.

If you don't want to add the optional PLUS clamp but you want to attach the ALTO directly to your telescope, we suggest you to attach it to a metallic element (that will be important to dissipate the heat created by ALTO motor during use) and you will also have to identify the best locking position in order to safely and securely allow the GIOTTO rotation.

In order to attach GIOTTO to ALTO, take the M6 screws with washers and o-ring (that are included in the ALTO box) and insert them in the ALTO arm as you can see in the picture.



Now you can connect ALTO with the optional PLUS clamp to a Vixen-style or Losmandy-style dovetail bar and this will set GIOTTO in front of your telescope.



The GIOTTO illuminated flat panel has to be larger that the external diameter of the front ring of the OTA tube or dew shield and, since GIOTTO illuminated flat panel has to be centered on the telescope optical axis, you can:

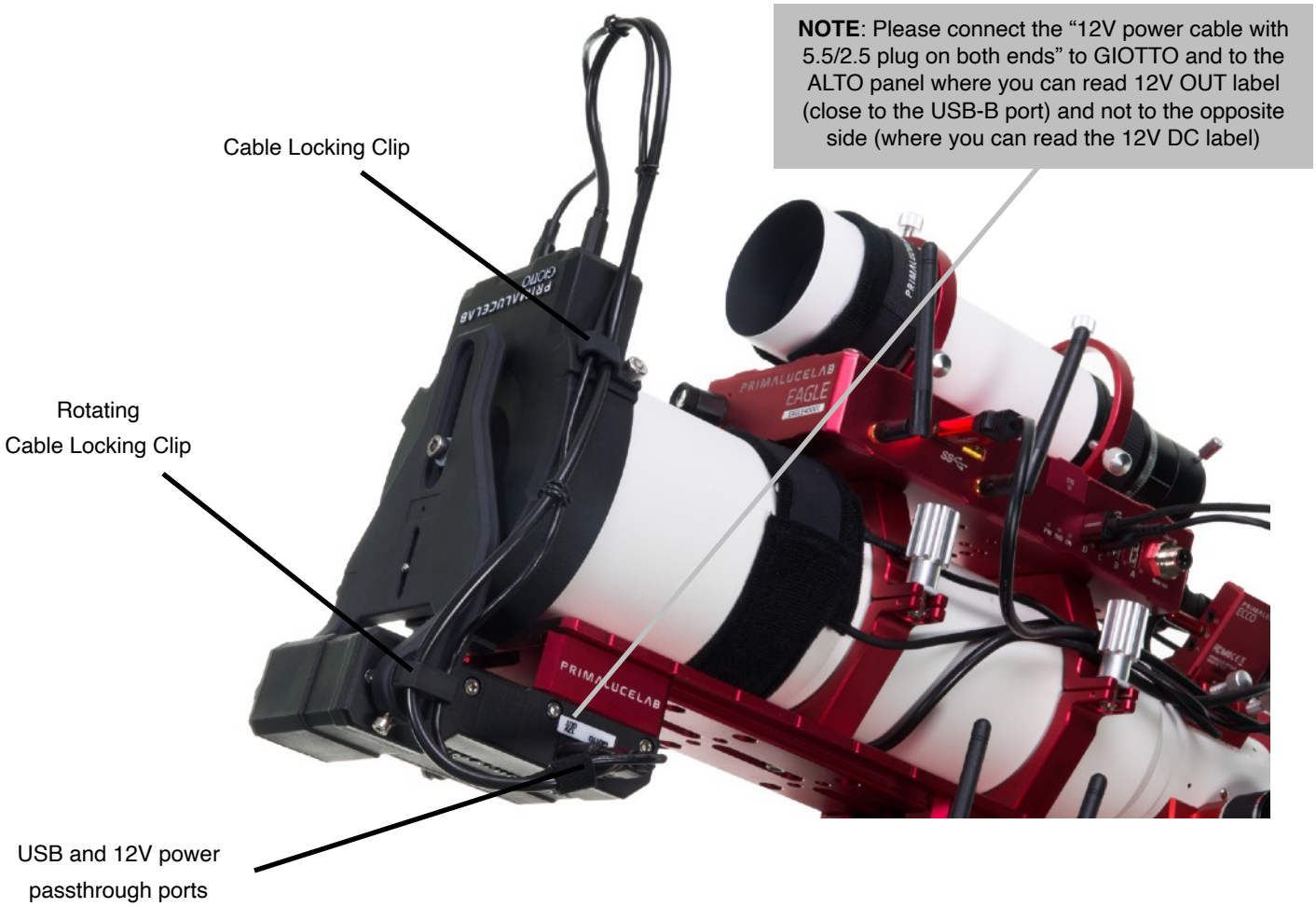
1) use the PLUS clamp to lock ALTO along the Vixen-style or Losmandy-style dovetail bar in order to attach GIOTTO just in front of your telescope OTA or dew shield.
2) use the buttonhole in the ALTO's arm to secure GIOTTO in the best (vertical) position, by making sure GIOTTO panel is centered in respect to the OTA.

First use: Installing USB and 12V power cables

ALTO telescope cover motor offers USB and 12V power passthrough plugs to improve cables management when you use it together with GIOTTO smart flat field generator. In fact on one side of the ALTO you will find a 12V and USB port (type-C) to connect to your computer and to provide power. On the opposite side you find the USB-B port to connect to USB-C port of GIOTTO and 12V power out port to connect to 12V power port of GIOTTO. This way, in order to use both ALTO and GIOTTO, you do not have to connect multiple USB and power cables to each device. The two devices will be recognized by the control computer as separate devices in device manager and you will be able to control them individually from your software. In order to connect USB and power cables for ALTO and GIOTTO, please follow this procedure:

1) Connect the “12V power cable with 5.5/2.5 plug on both ends” between 12V OUT power passthrough plug of the ALTO (that is close to the USB-B port on the opposite side of the USB-C port) to GIOTTO’s 12V power port. This will provide 12V power to GIOTTO through ALTO, without the need to connect it to an external 12V power unit. You can attach this cable along GIOTTO body by using the Cable Locking Clip and then lock on the rotating Cable Locking Clip that is present on the ALTO body.
2) Connect the “USB-C to USB-B cable” between USB-B port of the ALTO to USB-C port of the GIOTTO. This will allow the computer to control GIOTTO through ALTO, without the need to connect GIOTTO with another USB cable. You can attach this cable along GIOTTO body by using the Cable Locking Clip and then lock on the rotating Cable Locking Clip that is present on the ALTO body.

NOTE: Please connect the “12V power cable with 5.5/2.5 plug on both ends” to GIOTTO and to the ALTO panel where you can read 12V OUT label (close to the USB-B port) and not to the opposite side (where you can read the 12V DC label)



3) Connect a 12v power cable (not included with ALTO) from the 12V DC power in port of the ALTO panel (close to the USB-C port) to your 12V power source or to the EAGLE. This will provide 12V power to both ALTO and GIOTTO.

4) Connect a USB-C cable (not included with ALTO - please use the one provided with GIOTTO) from the USB-C port of the ALTO panel to one of the USB-A ports of your EAGLE or standard Windows computer. This will allow your EAGLE or standard Windows computer to recognize two different COM devices and control both of them.

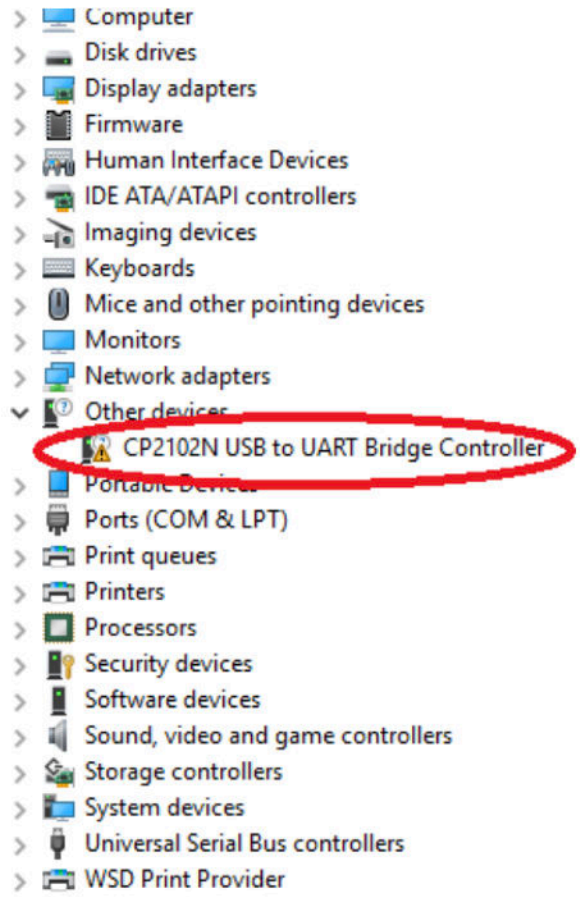


After you fixed the USB and 12V power cables with the Cable Locking Clips, if you want to remove the cables you have to use a small tool (like a screwdriver) in order to remove the clip. In this case please take care not to break the clip with the screwdriver since the clip is made up of plastic and it may break if you apply too much force.



First use: Install ALTO in EAGLE or Windows 10/11 computer

ALTO can be controlled using an EAGLE or a standard Windows 10 or 11 computer. To do this, you first need to ensure that the system driver is correctly installed when you connect ALTO to your computer. Follow these steps to check and install the driver if necessary:



Connect the USB-C cable from ALTO to a USB port on your EAGLE or Windows computer. The PWR LED will turn on and, after a few seconds, the Wi-Fi LED will also light up—this means ALTO is online and ready for wireless communication too.

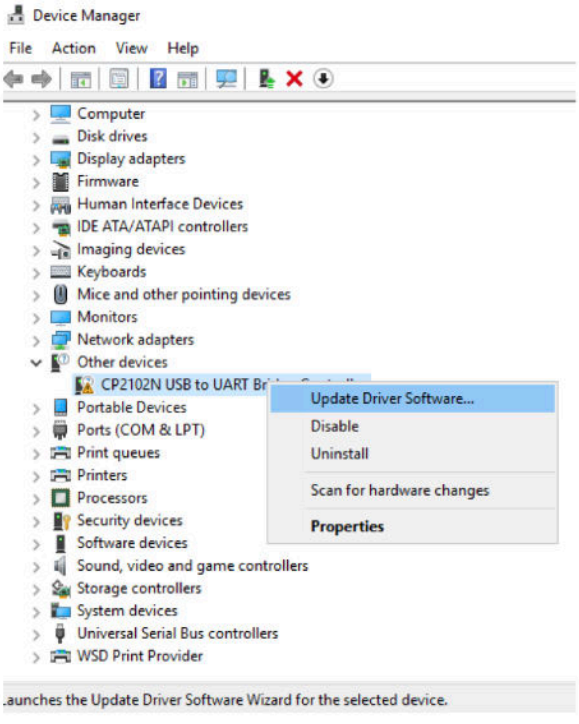
Once connected, ALTO should be automatically detected by Windows, which should install the appropriate driver. To verify this, open the Control Panel, go to Device Manager, and check under “Ports (COM & LPT)”. You should see ALTO listed as “Silicon Labs CP210x USB to UART Bridge”. To confirm, you can disconnect and reconnect the USB cable and observe how Windows lists the device.

If the device is not listed or it shows a yellow exclamation mark, it means Windows was unable to automatically install the driver. In that case, please follow the procedure below:

1) Download the appropriate software package from the DOWNLOAD section of our website: www.primalucelab.com

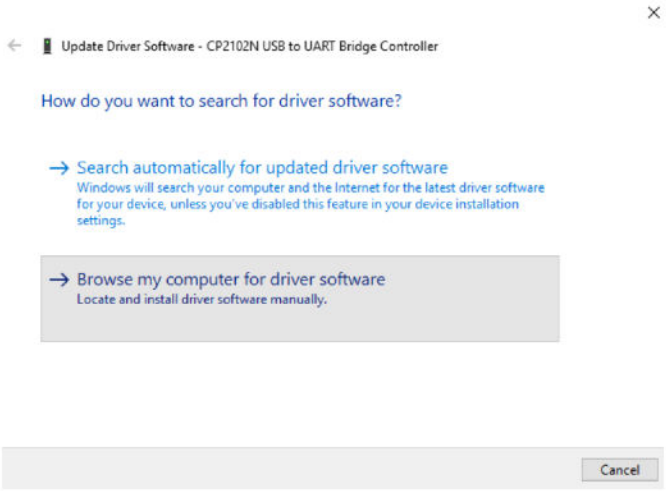
2) Unzip the downloaded file on the same EAGLE or Windows computer where you’re installing ALTO.

3) Open "Device Manager”.

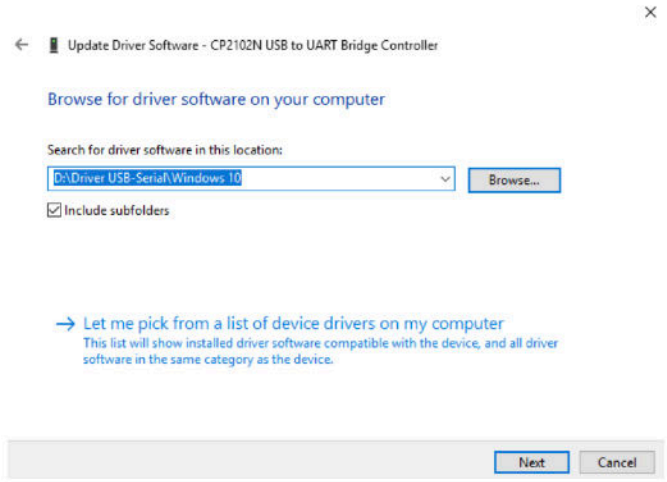


4) Locate "CP2102N USB to UART Bridge Controller" under "Other devices"

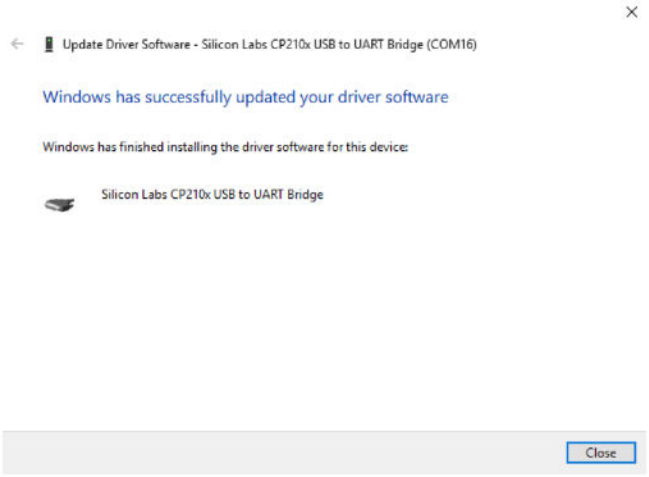
5) Right-click on it and select “Update driver”.



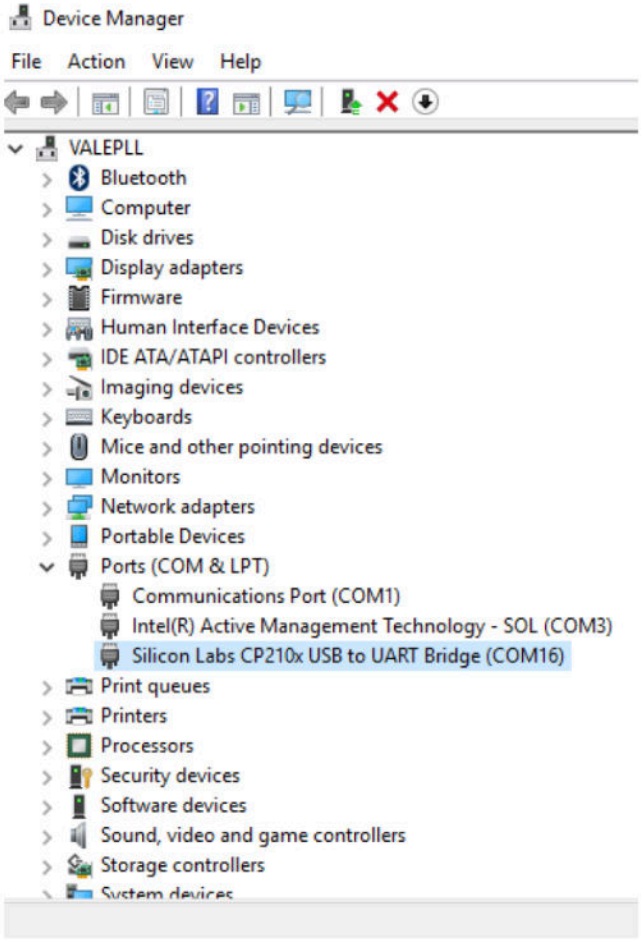
6) Choose the option “Browse my computer for driver software”.



7) Navigate to the folder where you extracted the software package.



8) Click “Next” and follow the prompts to complete the installation.



Once the installation is complete, Windows will display a confirmation message. ALTO will now appear under Ports (COM & LPT) with a COM port number—this is the port your computer will use to communicate with your ALTO (in this example, COM16). From now on, you won't need to repeat this process. Windows will remember your driver selection and automatically load it every time you boot your EAGLE or Windows computer and connect ALTO via USB.

NOTE

If the driver is not correctly installed in your Windows operative system, ALTO will not be able to connect to your EAGLE or Windows computer. Please verify that the COM driver is correctly installed before proceeding to the next step.

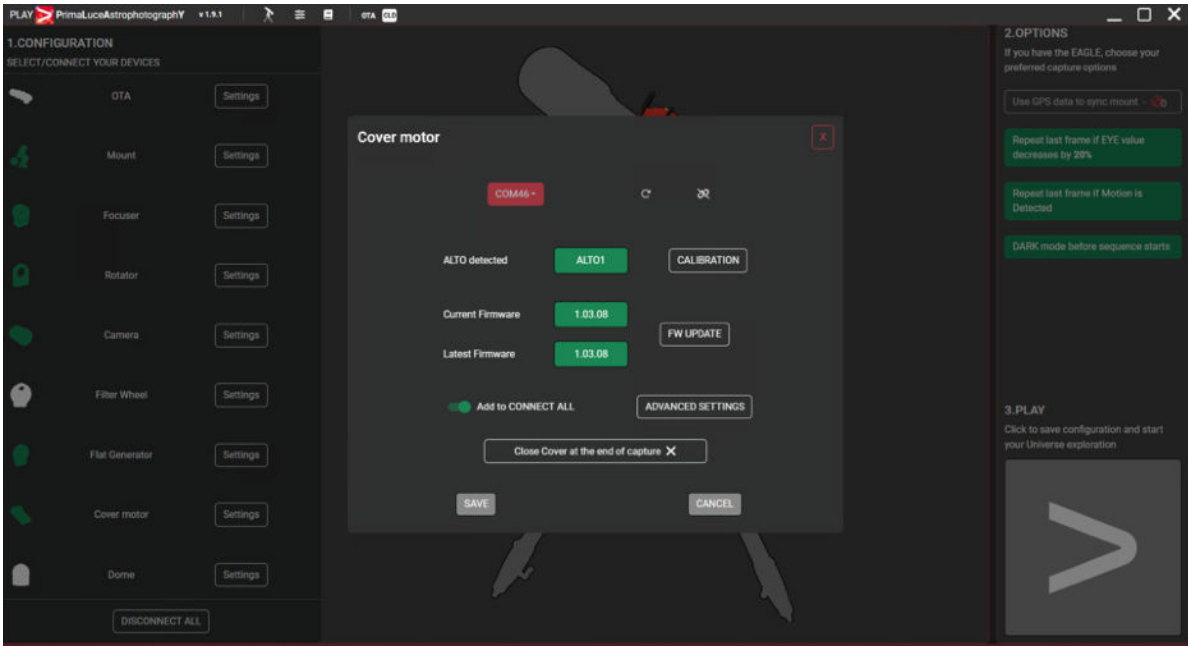
First use: Controlling and Calibrating ALTO with PLAY software

ALTO telescope cover motor includes remote control capabilities with specially designed electronics that allow you to connect it to a computer's USB port and open/close telescope cap. In order to start using ALTO, please follow this procedure:

1) Launch the Windows Device Manager to find a new entry in the COM port list. Please take note of the COM port number your EAGLE or standard Windows computer creates when you connect ALTO (with or without GIOTTO) to USB port since this will be needed to control it from PLAY software (tip: in order to better identify ALTO, you can connect and disconnect the USB cable; you will see the device appear and disappear. The Device Manager list will update automatically).

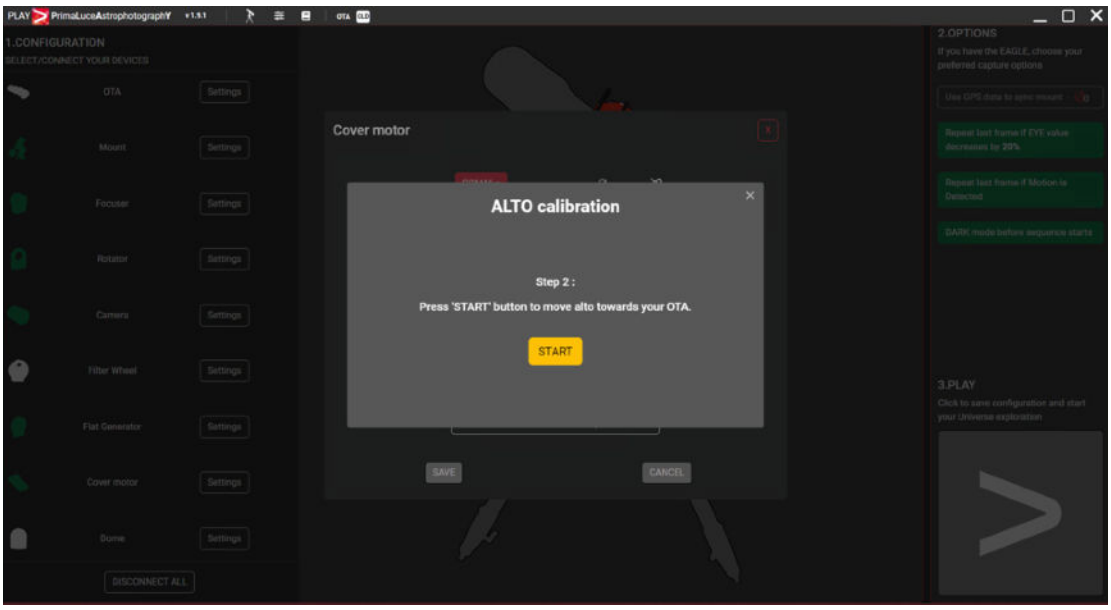
2) Install PLAY software on your EAGLE or standard Windows computer you want to use to control ALTO. In the folder where you downloaded and unzipped PLAY installation files, please double click on the PLAY-Setup.exe file to start the installation procedure. Please note that ALTO requires at least version 1.5 of PLAY astrophotography software.

3) Launch PLAY astrophotography software and connect to ALTO by selecting "Cover motor" in the left column of the Configurator window. In the window that opens, please select the COM port related to ALTO in Device Manager (noted in the previous step) and click on the connect (chain) icon to connect ALTO.



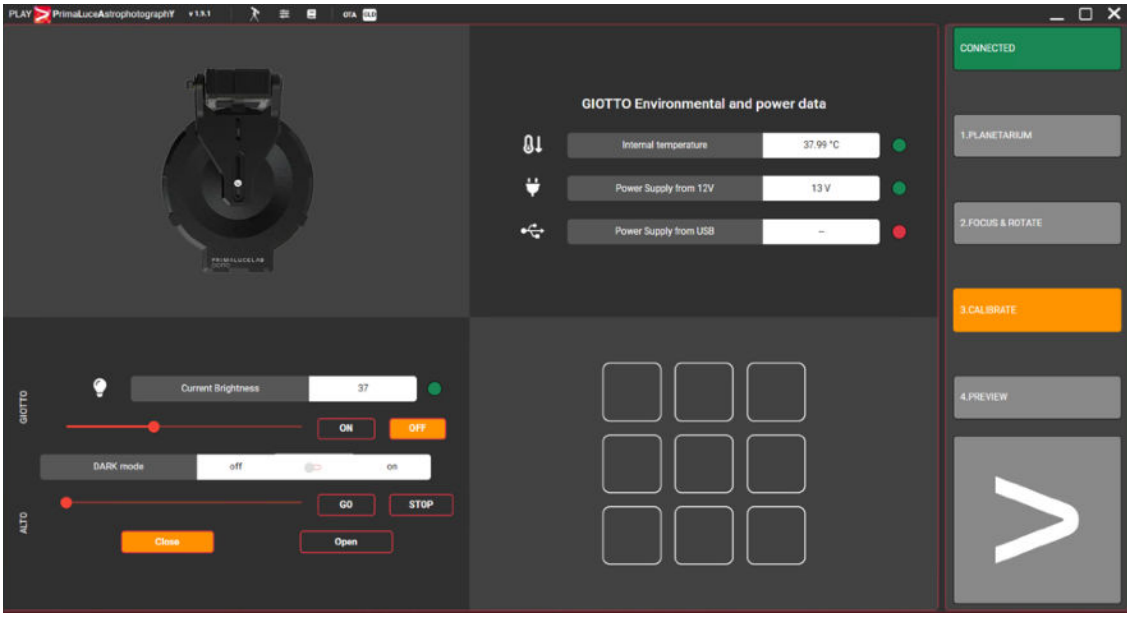
4) If you selected the correct COM port, you will see the buttons becoming green. Here you will see the current firmware version of ALTO and the latest available firmware. If you want to save the COM port setting and quickly connect to ALTO the next time you will launch PLAY, select the "add to CONNECT ALL" switch.

5) Press the CALIBRATION button to begin calibration. This is needed in order to determine the "open" and "closed" position of the ALTO telescope cover motor, depending on how you attached ALTO to your telescope. The calibration process requires you to first move ALTO/GIOTTO to the closed position - in front of your telescope, as if it were be the cap. Then move ALTO into the opposite direction to your preferred fully "open" position. Please follow the onscreen instructions in order to complete the calibration process.



6) Then press SAVE button and press the large PLAY button to the bottom-right part of the screen to access the CAPTURE section and control your ALTO telescope cover motor.

7) In order to move ALTO, select CALIBRATION tab and, in the bottom-left part of the window, you will find a slider that allows you change motor position, as well as buttons for “open” and “close”. In the same area, you can also enable “*DARK mode*” - allowing you turn off ALTO’s red LED status lights (please note that with DARK mode enabled, you won’t be able to visibly verify ALTO’s status without accessing it via the provided software).

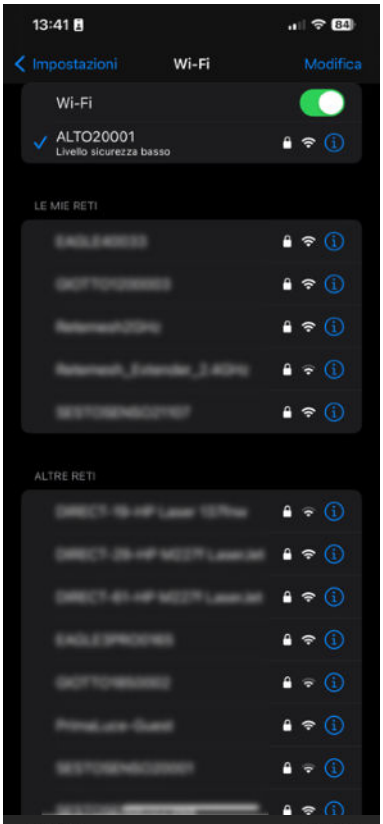


8) The Environmental Data and Virtual HandPad part of PLAY interface within CALIBRATION tab are related to GIOTTO (and not to ALTO) so you can use them only if you also connected GIOTTO to your EAGLE or standard Windows computer.

9) When you connect ALTO to PLAY, you can also open or close your motorized cap by using the “open/close” button found in the upper part of the PLAY window. This can be used to quickly open or close your telescope.

First use: controlling ALTO with Virtual HandPad

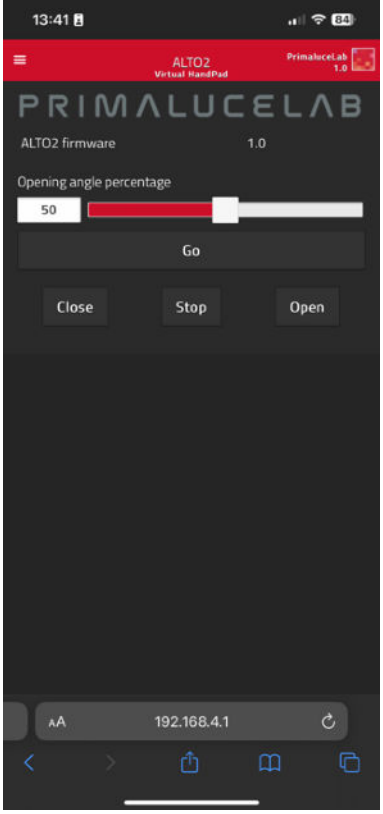
ALTO can be controlled without the need of an EAGLE or Windows computer, by controlling it directly via ALTO's built-in WiFi connection, using the integrated Virtual HandPad. In order to use ALTO through WiFi, please follow this guide (example created on a smartphone using iOS but the process is similar for Android devices).



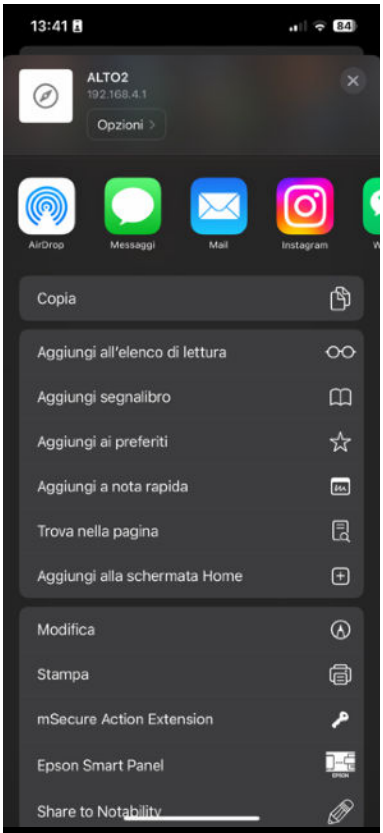
After powering up ALTO, enable WiFi on your mobile device and navigate to the wifi settings.

You should now see the network hosted by your ALTO, the network name corresponds to your device serial number. Select the ALTO#### wifi network. Now, using the keyboard (virtual or physical) of your device insert "primalucelab" as the default password (or password you chose if you modified the default password) and then press the "Login" button. The next time you want to access your ALTO, you will no longer have to enter the password: your device will automatically connect when you select the network created by ALTO, unless you change the login password. Wait a few seconds for confirmation that your device is properly connected to the WiFi network.

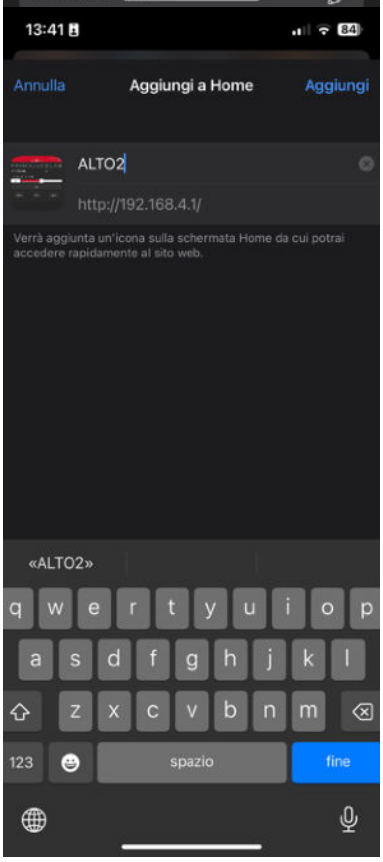
If you see a "Connected - No Internet" notification on the selected ALTO network, this is alerting you that you are connected to ALTO, but that there is no internet connectivity - this is expected since ALTO is not an internet connected device.



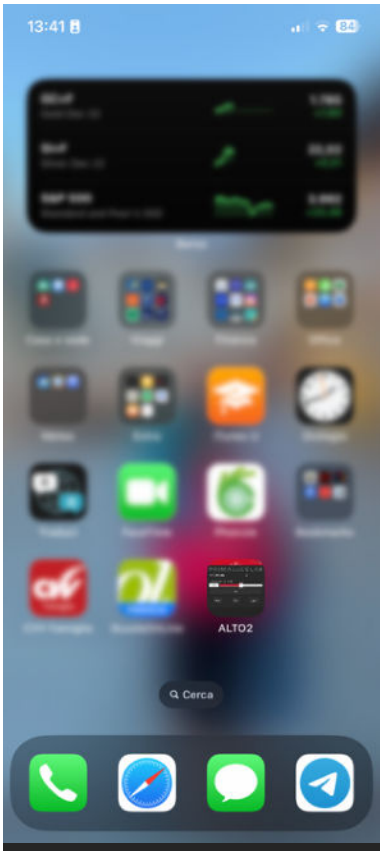
Now open a browser on your mobile device (for example Chrome or Safari), and enter the IP address "192.168.4.1" into the URL field (where you usually enter urls like www.primalucelab.com) type and press <return>. The ALTO Virtual HandPad should load on your screen.



To create an app icon to connect to ALTO directly on the home screen of your mobile device, simply press the "share" button and then select "Add to Home".

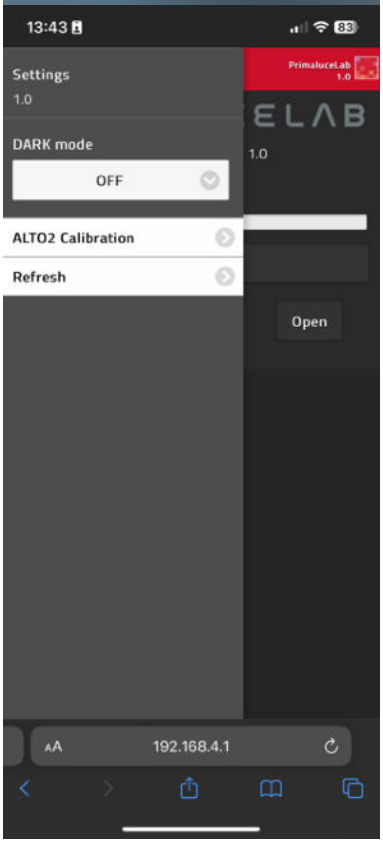


You can personalize the name. Press Add button to confirm.

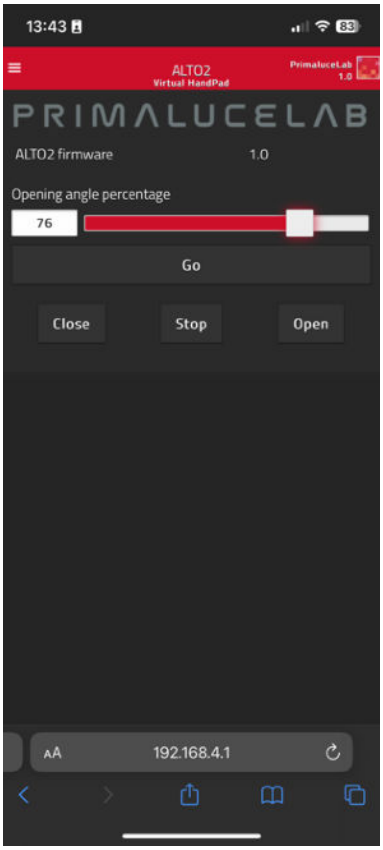


The ALTO web app icon will be created and you will have a shortcut to your device.

Press the ALTO button to start the Virtual HandPad allowing you to control and use ALTO without the need to be connected to an EAGLE or to a Windows computer.



Press the menu button on the top-left part of the Virtual HandPad to reveal the left menu.



In the portion of the Virtual HandPad below the menu bar you find the controls for ALTO.

In order to use ALTO, select a opening angle percentage with the slider and press GO. This will move the telescope cover motor to the desired value.

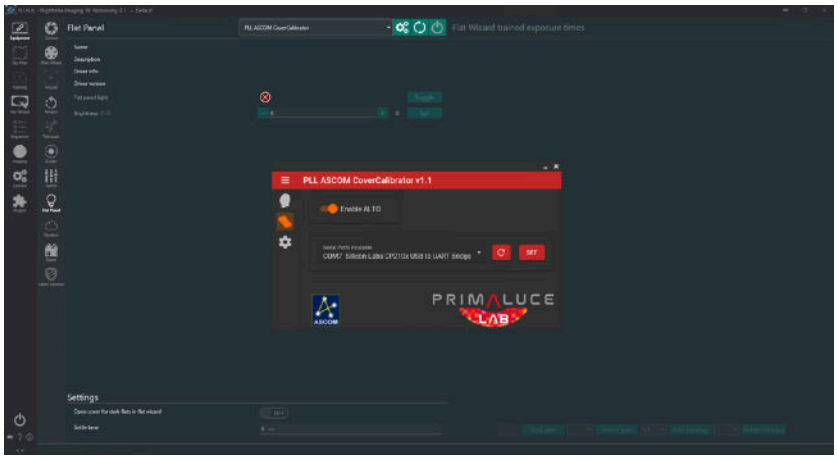
Controlling ALTO with ASCOM drivers and third party software

ALTO telescope cover motor can also be controlled within third party software applications such as Sequence Generator Pro or NINA via ASCOM using the included “PLL ASCOM CoverCalibrator” driver (ASCOM platform version 7 or later required). The ASCOM platform is available for free download at their website - https://ascom-standards.org

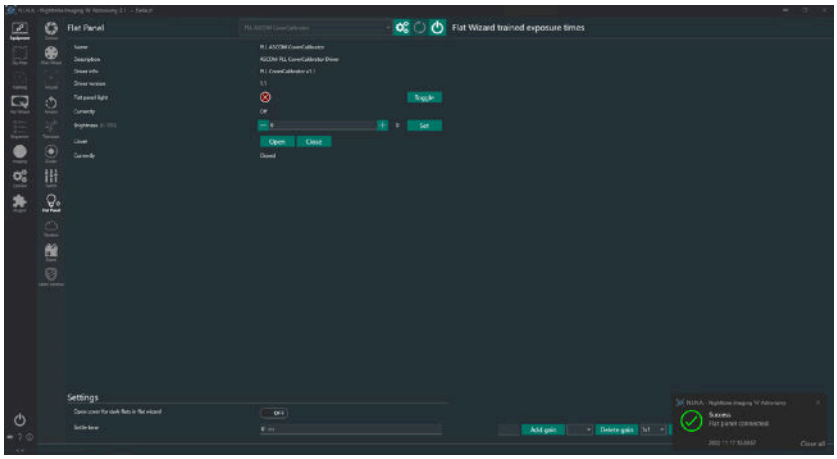
To install “PLL ASCOM CoverCalibrator” driver onto an EAGLE or comparable Windows computer, double click on the PLL ASCOM CoverCalibrator.exe file (ALTO is compatible with PLL CoverCalibrator at least v1.1) included with the ALTO software package downloaded from the DOWNLOAD section of the www.primalucelab.com website. A new window will appear, select “I accept the agreement” and press Next button to proceed. In the next window, press the Install button to proceed with installation. When the installation is completed, press the Finish button.

You can now control ALTO by using third party software that supports telescope cover motors through ASCOM. This guide will show how to connect, using NINA as an example. Other software is similar, please refer to third party software user manual to read how to connect to devices through ASCOM.

1) Launch NINA (at least v2.1) and under “Flat Panel” select “PLL ASCOM CoverCalibrator”.
2) Click on the Settings icon, you will see the ASCOM driver window. Here select the ALTO tab, click on “Enable ALTO” button and select the COM port related to ALTO. Finally press SET button.

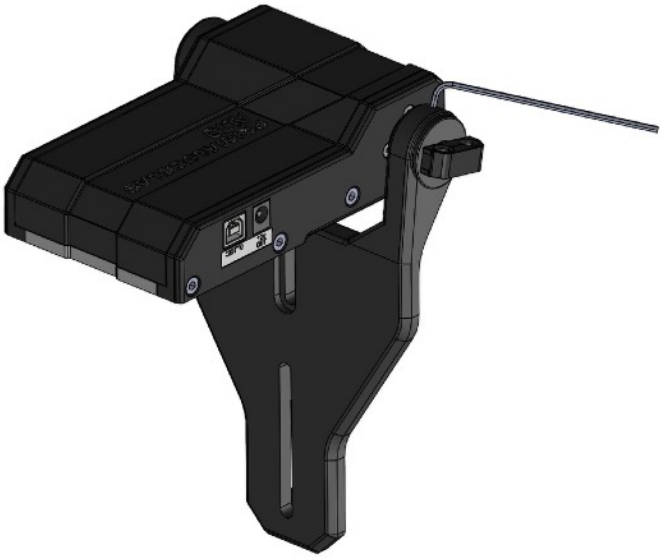


3) Click on the Connect button to activate connection to ALTO. A notification will show the connection confirmation. Now you are able to open or close the ALTO telescope cover motor by using NINA.



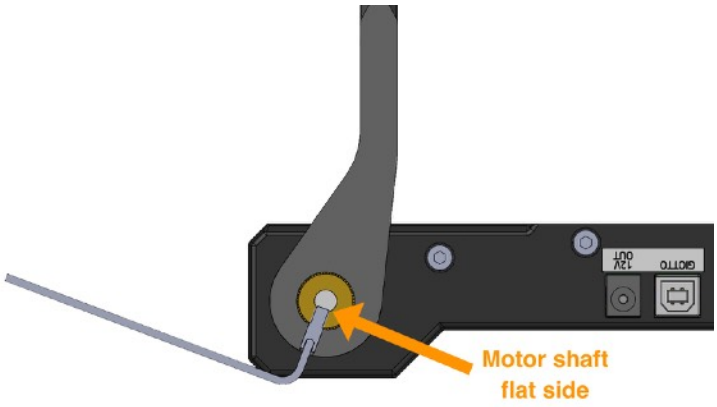
How to minimise backlash in ALTO's arm rotation

As previously described, when ALTO arm rotates you may notice a small hesitation or gap in the movement as the weight of the ALTO/GIOTTO passes through the apex of the movement. This is normal as the weight of the GIOTTO transitions from an upward to a downward movement (or opposite) and the backlash in the drive gear settles. But this backlash has to be small so, if you notice a large backlash (that can be generated if you manually force ALTO's arm rotation), you can follow this guide in order to minimise backlash.



By using a 2mm Allen key slightly loosen the grub screw that locks the ALTO's arm to the motor shaft, as you can see in the picture below.

Now rotate the ALTO arm so that the position of the grub screw aligns with the flat side of the motor shaft. Keep in mind that the motor shaft is not visible, so you will need to find the position of the flat side by making small adjustments until you find the best position to tighten the grub screw.



Now tighten the grub screw and test if backlash of ALTO's arm rotation is now reduced.

INFORMATION TO USERS



According to art. 26 of Decreto Legislativo 14 marzo 2014, n. 49 "Attuazione della Direttiva 2012/19/UE sui rifiuti di apparecchiature elettriche ed elettroniche", the symbol of the barrel placed on the equipment or its packaging indicates that the product at the end of its useful life must be collected separately from other waste.

The user will therefore have to give the end-of-life equipment to the appropriate separate collection centers for electronic and electrotechnical waste or to return it to the reseller upon the purchase of a new type of equivalent equipment, one by one.

Properly differentiated collection for the subsequent start of dismantled equipment for recycling, treatment and environmentally compatible disposal helps to avoid possible adverse effects on the environment and health and favors the reuse and / or recycling of the materials contained in the equipment.

The abusive disposal of the product by the user implies the application of the administrative sanctions as per D.Lgs. 152/2006.

Compliance with the RAEE legislation (D.Lgs. 49/2014)
PrimaLuceLab is registered to AEE Register with number IT17030000009790
PrimaLuceLab adheres to Sistema Collettivo ERP Italia for the compliance to RAEE legislation.

European Recycling Platform

FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and the receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

FCC RF Exposure Statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm (8 inches) between the radiator and your body.

Wireless Module Compliance
This device contains an ESP32 Wi-Fi module, which has been certified by the manufacturer to comply with FCC regulations. Any modifications or changes to this device not expressly approved by PrimaLuceLab could void the user’s authority to operate the equipment.

WARRANTY

1) The PrimaLuceLab product warranty is effective from the date of purchase and is valid only if it is accompanied with receipt or proof of purchase.

2) The warranty covers the product against defects in workmanship and includes the cost of the replacement parts and labor.

3) The warranty does not cover any damage caused to the product or failures that occur due to improper installation , improper use and/or deterioration due to normal wear.

4) THE GUARANTEE DOES NOT APPLY IN THE FOLLOWING CASES:
   - Repair by anyone not authorized by PrimaLuceLab .
   - Invasive interventions or tampering with internal and/or external parts.
   - Missing receipt or proof of purchase.

TERMS OF SERVICE
Technical assistance is performed exclusively by PrimaLuceLab or its authorized resellers. All returns must be received with our permission (to be submitted in writing via email to support@primalucelab.com).

YOU MUST ADD a detailed description of the defect along with a copy of your or receipt or proof of purchase in the return shipment. For products without the invoice (or receipt) of purchase, repair and shipping costs will be paid by the customer.