

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

# Operating instructions

## omegon<sup>pro</sup>



## ***Omegon<sup>®</sup> Pro HM31Pro EQ/AZ Strainwave Gear Mount***

Version 03.2026, Art.-Nr. 86211

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# Omegon<sup>®</sup> Pro HM31Pro EQ/AZ

*Congratulations on the purchase of the new Omegon<sup>®</sup> Pro HM31Pro EQ/AZ Strainwave Gear Mount. This mount will give you hours of fun. It is the ideal companion for astrophotography and visual observations with telescopes or big binoculars. From simple operation via hand controller to full imaging setup with computer control this mount does it all.*

The many features of this mount mean that this manual is longer than usual. The most efficient way is to start with the mechanical setup of the telescope that you want to use with this mount. The mount supports the use in equatorial mode (recommended for astrophotography), azimuthal mode and a special azimuthal mode that requires optional accessories that allows you to use big binoculars with this mount. We recommend that you go to the assembly section of your intended use variant first, assemble the telescope and set the mount up mechanically. Then go to the section about the ONSTEP telescope controller. During the initial setup of the Onstep you will encounter some unclear graphics and mount behaviour. The reason for this is not malfunction, but the fact that the mount does not know which direction button does what until it is setup and aligned. You can find a list of the graphics that you might encounter in the troubleshooting section at the end of this manual. We recommend to make a short rough one-star alignment first. Then followed by a more precise alignment with 2 or 3 stars later to improve pointing accuracy.

The Omegon<sup>®</sup> Pro HM31Pro EQ/AZ Strainwave Gear Mount is a powerful tool. You should take the time to familiarize yourself with the mount and its controls during the day, so that no precious time is wasted under the clear sky. You can do a rough alignment by verifying the alignment star after a look on your astronomy app or planisphere and then check the many options your mount is offering you.

The manual is based on the factory default specifications. Therefore, some specifications or appearance of your mount may be different. This manual is subject to change without prior notice. The manual can still be used as a guide when there are differences in appearance or structure but no substantial differences in function or the use methods. In order to ensure proper use of the mount, please read this user manual carefully before starting to use it under the night sky.

The HM31Pro EQ/AZ Strain Wave Mount uses 17+17 strain wave reducers. It is a lightweight mount but with a high payload capacity and high-precision. The HM31Pro EQ/AZ supports three modes: EQ mode, Alt/Az side mode and Alt/Az top mode for large binoculars.

Mode	Astrophotography	Visual telescope	Visual-Binoculars
EQ Mode	All objects	Yes	—
Alt/Az Side	Planets,Sun,Moon	Yes	—
Alt/Az Top	Planets,Sun,Moon	Yes	Yes

The different modes cater to the needs of both astrophotographers and visual observers. Its compact and lightweight design makes transportation to your photography or viewing location effortless.

The innovative altitude adjustment mechanism provides an exceptionally smooth experience for polar alignment. The quick-installation system simplifies setup, allowing you to begin observing or capturing images faster.

Thoughtful cable management ensures tidy wiring and prevents tangling.

The ergonomic design enhances user comfort.

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Crafted with precision and premium materials, the mount combines durability and elegance.



Please install and use the mount in strict accordance with the steps and precautions reminded in this manual, operators shall be responsible for any damage to the equipment or personal injury caused by improper operation.



Ensure the mount's time, coordinates, and home position are properly set before use. Incorrect settings can cause GOTO errors or equipment collisions.



After installation, carefully check for any interference. Collisions can damage components, causing malfunctions or accuracy issues. Unplug immediately if interference or emergencies occur.



Please be careful when you carry, assemble or disassemble the mount and other heavy components and other equipments used on the mount. Or it may cause damage to the equipments or even personal injury.



Please ensure the entire setup is placed on a stable, flat surface and confirm the tripod has enough capacity and support area to prevent tipping, which could cause equipment damage or personal injury.



If there are children around when using, please pay attention to protecting their safety



Do not wipe the surface with corrosive liquid. Avoid water immersion and exposure to rain.



Unauthorized disassembly is strictly prohibited. Any self-disassembly will result in the warranty being voided.

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# Standard Packing Content



EM31 Pro Body



Hand Controller



Dovetail VIXEN & LOSMANDY



Tripod adapter



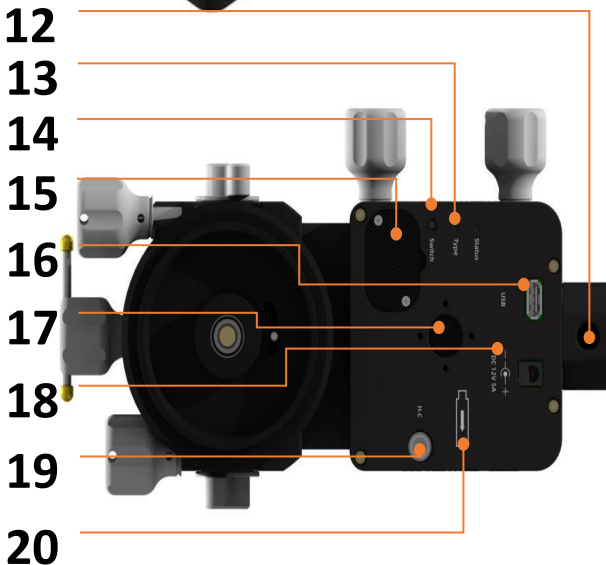
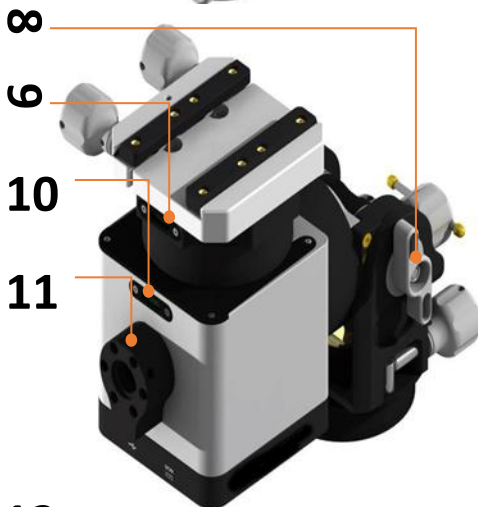
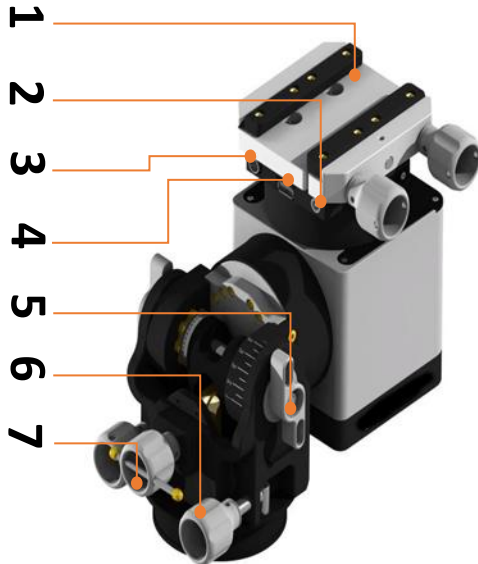
0.5m + 2.0m USB 2.0 cables



Shockproof Soft Bag

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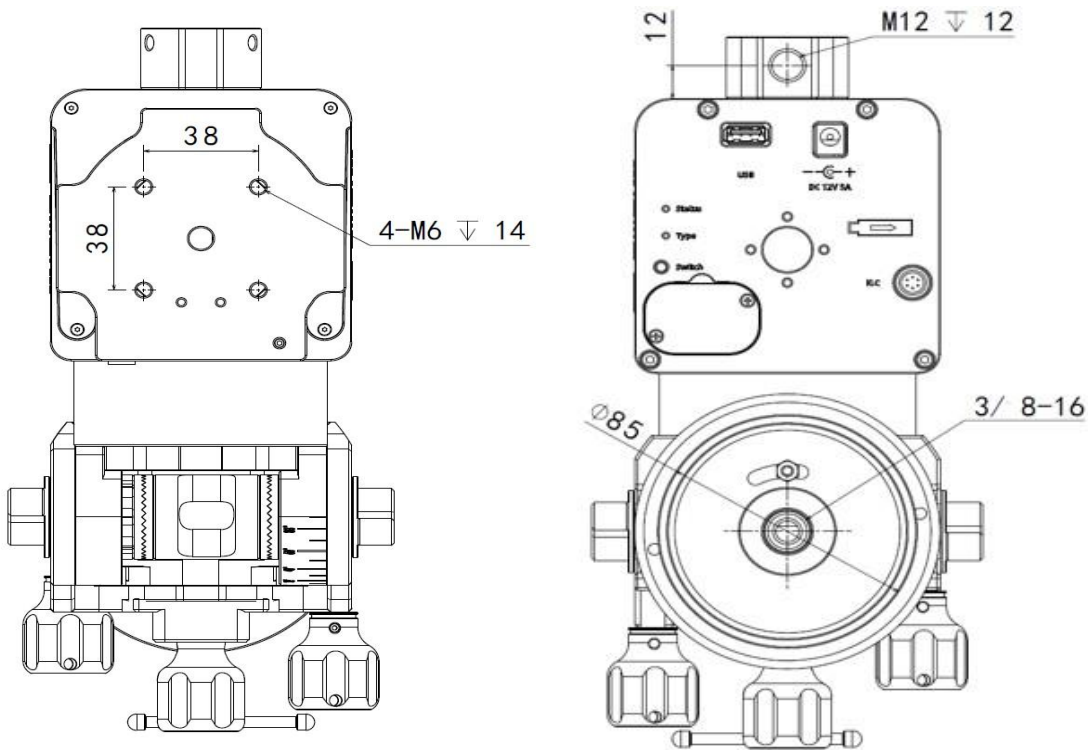
## Components



1. Dovetail
2. DEC 12v DC 5.5\*2.1
3. DEC Hand controller port
4. DEC USB port type A
5. Main altitude locking knob
6. Azimuth adjustment knob
7. Altitude fine adjustment
8. Auxiliary altitude locking
9. Bubble level for DEC- axis
10. Bubble level for RA- axis
11. Multifunctional front
12. Counterweight bar interface
13. Mode indicator light
14. Mode switching button
15. Battery cover plate
16. USB port type A
17. Ball head interface
18. 12 v DC 5.5\*2.1 power port
19. Hand controller port
20. Telescope directional mark

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# Product Overview



The standard dovetail of HM31Pro EQ/AZ can be replaced, and the installation dimensions of the dovetail are as follows:

**HM31Pro EQ/AZ supports counterweight bar with a diameter less than 20mm, and with length less than 300mm, the counterweight should be no more than 5kg**

**The screw thread length of the counterweight bar shall not exceed 12mm**

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## Optional Accessories:

⚠ This accessory needs to be purchased separately

87649 Omegon Pier Extension EMH200

87652 Pro Harmonic Mount Bino Adaptor set

60250 40mm Carbon Tripod

### 87649 EMH200 Fast-assembling pier extension

Material: Aluminum(AL6061),

Stainless steel

Size: H200mm dia 110mm

Weight: 1.4kg



### 87652 Top-mounted Binocular supporting bracket



Material: Aluminium (AL6061), Stainless steel, Titanium alloy (counterweight bar)

Size: L350mm Weight: 1.8kg

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# Installation and Use

## Installation of the mount with pier extension and tripod

HM31Pro EQ/AZ can be mounted on center-column-free tripods with a bore diameter of 85 mm, such as RT90C, Gitzo5



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# Quick Overview – EQ Mode

EQ Mode

North Celestial Pole



Install equipment



Set time and



Set home



Polar alignment



Select target and Goto



Using Target



Enjoy the night



Ensure the site coordinates, time, and home position are set correctly to avoid GOTO errors or equipment collisions.



For OnStep, South latitude & East longitude (-), North latitude & West longitude (+);

UTC: East of the prime meridian (-), West (+)



EM31Pro retains coordinates and time; no reset is needed if unchanged.

**The mount remembers its last power-off position as the “home position”. Be sure to either return the mount to the correct home position before shutting it down or manually reset the home position after each power - on.**

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## Home position of EQ mode

The EQ mode home position is shown in the diagram below. This is the position the mount should be in before power-off or should be reset manually after each power-on.



North Celestial Pole NCP



HM31Pro can confirm the EQ mode home position using the bubble levels on the RA and DEC axes.

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# Quick Overview - Altazimuth Mode (side & top)

Install equipment



Set time and coordinates



Horizontal adjustment



Mode confirmation



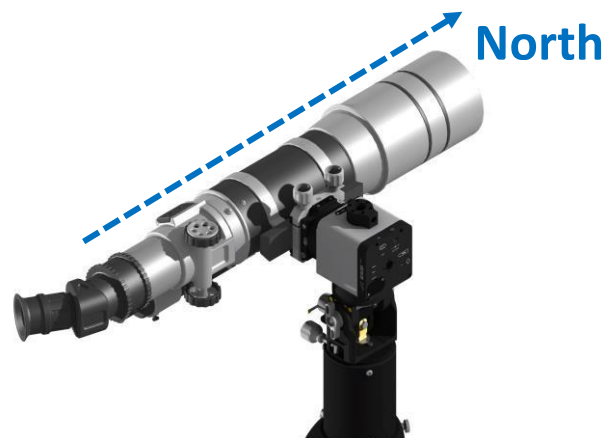
Set home position



Select target and Goto  
Using Target Calibration



Enjoy the night sky



Ensure the site coordinates, time, and home position are set correctly to avoid GOTO errors or equipment collisions.

For OnStep, South latitude & East longitude (-); North latitude & West longitude (+); UTC: East of the prime meridian (-), West (+),

HM31Pro EQ/AZ retains coordinates and time; no reset is needed if unchanged. **The mount remembers its last power-off position as the “home position”.** Be sure to either return the mount to the correct home position before shutting it down, or manually reset the home position after each power<sup>18</sup>-on.

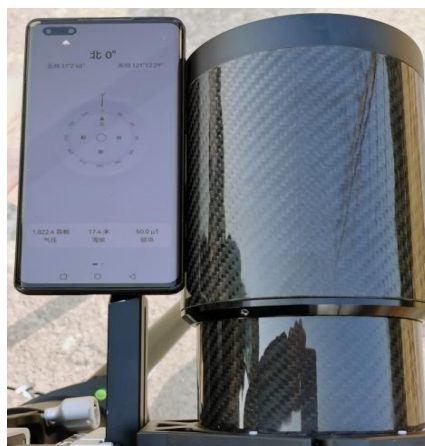
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## Home position of Altazimuth Mode (Side & Top)

The home position of the Altazimuth mode is shown in the diagram below. The telescope is level and points north.



The home position can be confirmed through a mobile compass and bubble levels.



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## Quick Assembly

 Size and style of the 3/8- 16 locking screw should be proper.



Locking knob



Diameter 85mm



**Ensure that non-official tripods are compatible with the mount and securely attached, with no wobbling or movement, to avoid precision issues or potential equipment falls.**

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The strain wave mount is compact, and when using a longer telescope, there is a risk of collision between the telescope and the tripod, especially near the zenith or the meridian. In this case, a pier extension is needed to avoid collisions.



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## Installation steps with the pier extension



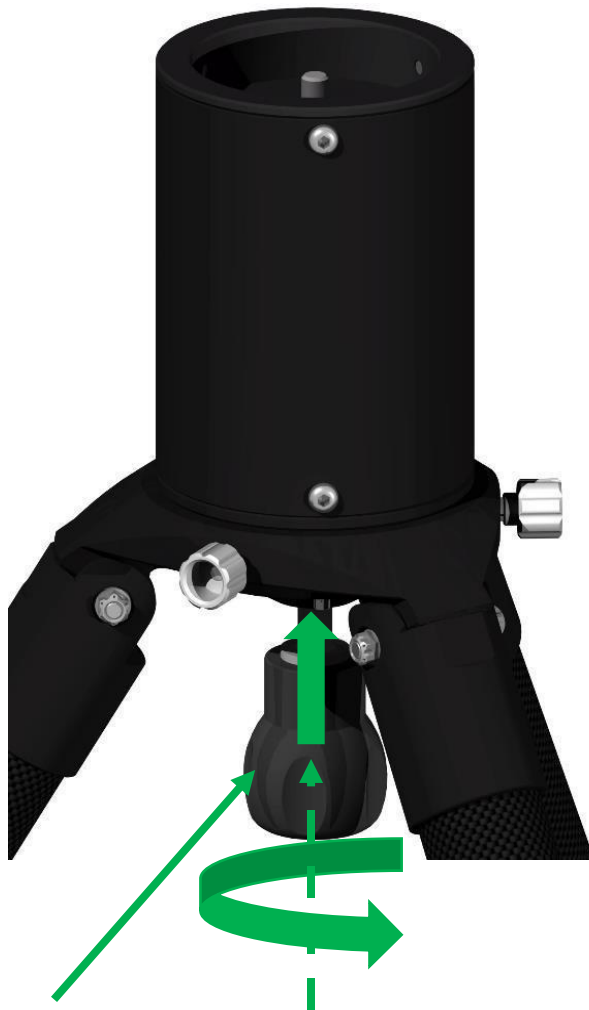
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Gently Push up the main tripod locking knob and rotate it clockwise until the knob and pier extension cannot rotate relative to each other

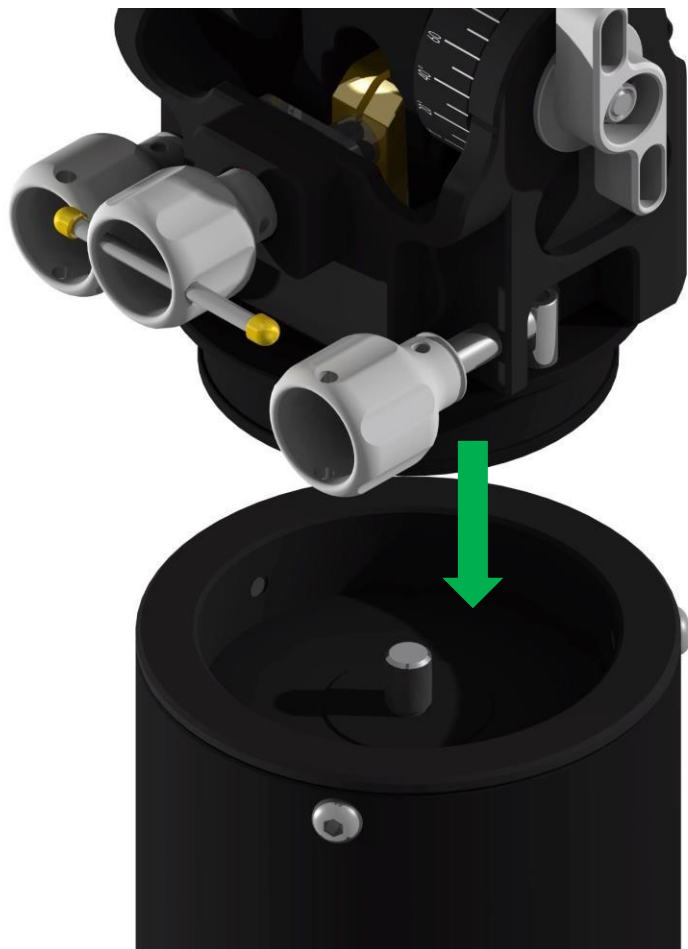


Note that if this step is not performed correctly, the mount body and pier extension may not be separated properly when disassembling the equipment.



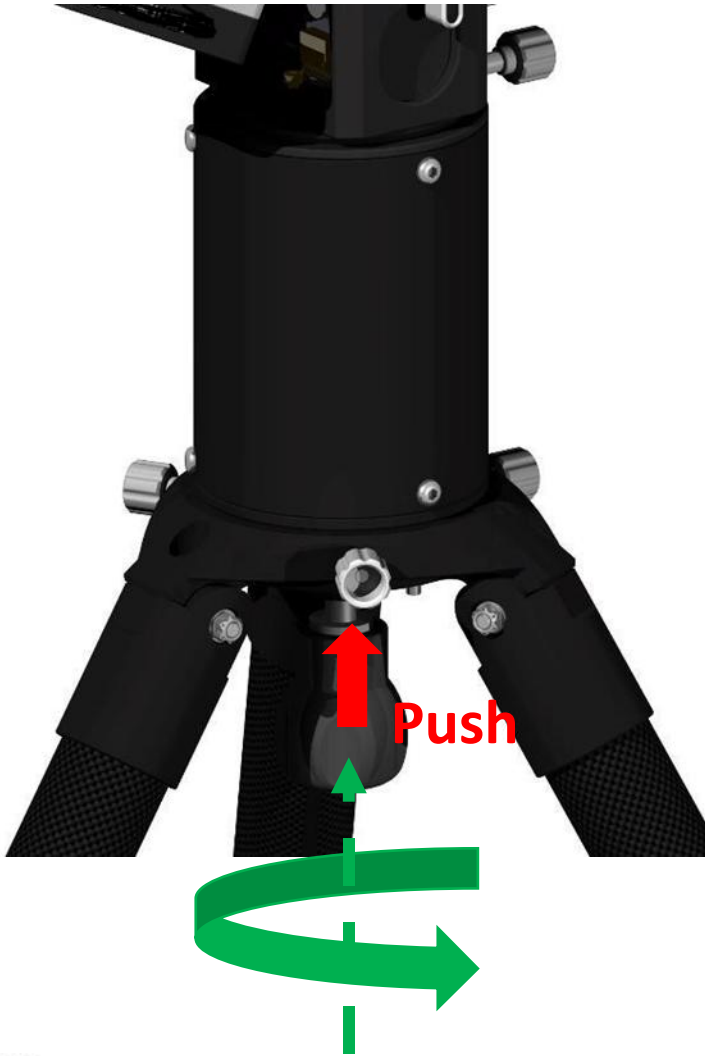
Main locking knob

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Place the mount body with the adapter into the pier extension

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Push upward and continue rotating the main tripod locking knob clockwise until it is tightly secured. At this point, the installation of the mount body, pier extension, and tripod is complete



To lock the mount body, first push the main locking knob upward with slight force, then rotate the knob clockwise to secure it.

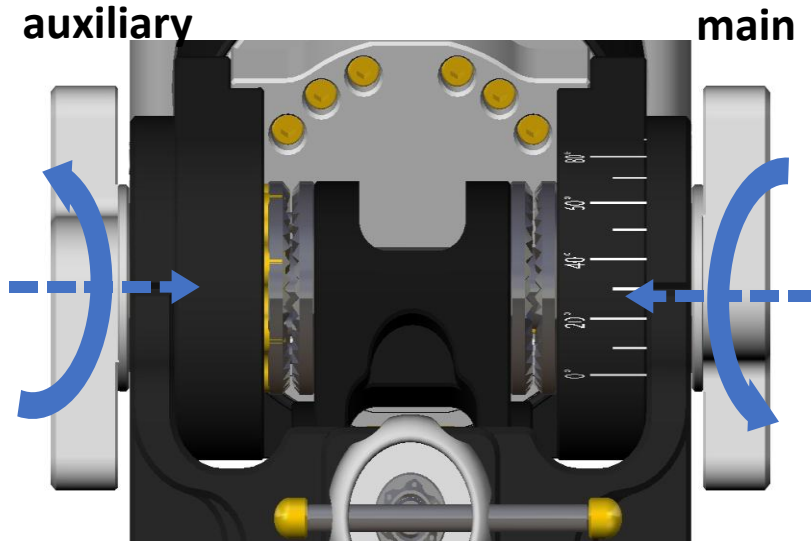


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# Quick Setup – EQ Mode

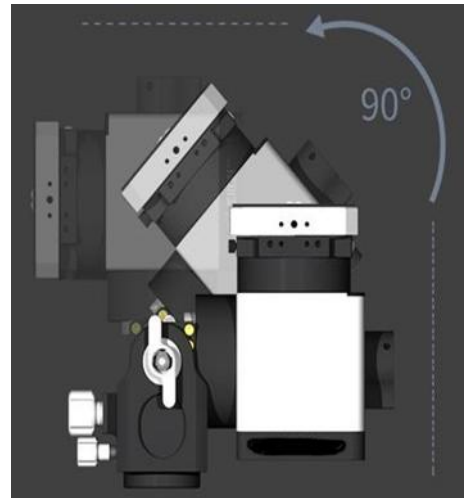
**Step 1.** Rotate counterclockwise to release the auxiliary altitude locking knob.

**Rotate one to one and a half turns until it loosens, avoid over-rotation**



**Step 2.** Rotate the main altitude locking knob counterclockwise until the two pairs of flat gears are completely separated. At this point, the altitude angles can be freely adjusted

**When the main altitude locking knob is loosened, the mount loses its support. During the coarse adjustment process, ensure that the mount is always supported by hand until the main altitude locking knob is securely tightened again.**

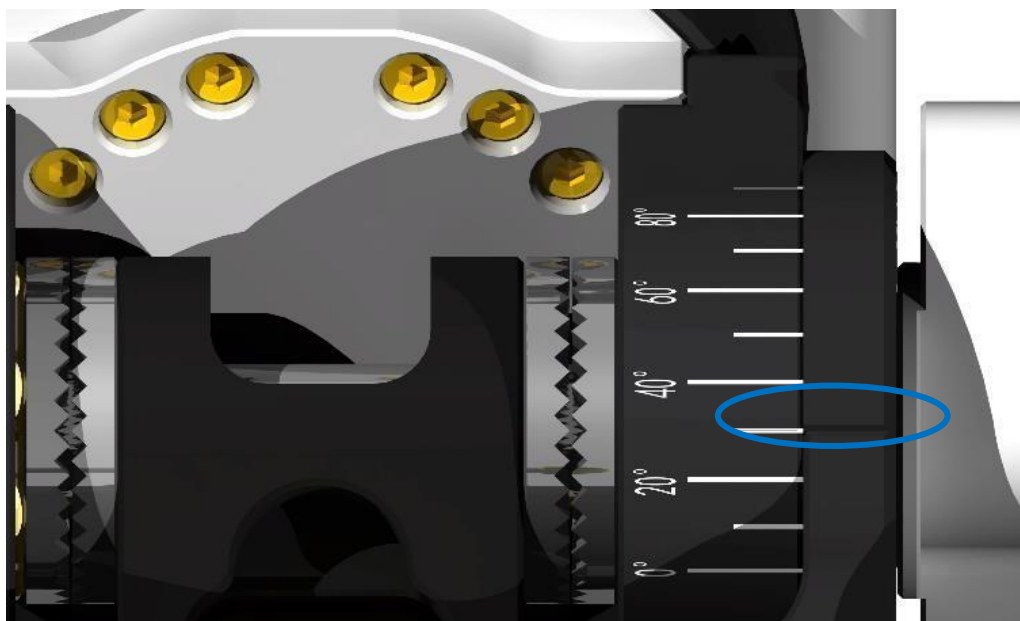


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## Adjustment of altitude and azimuth angles in EQ-Mode



Altitude coarse adjustment: approximately match the local latitude. (For example, if the local latitude is  $31^{\circ}13'20''$ , set and lock the altitude near  $30^{\circ}$ )



Refer to the altitude scale and adjust the altitude angle

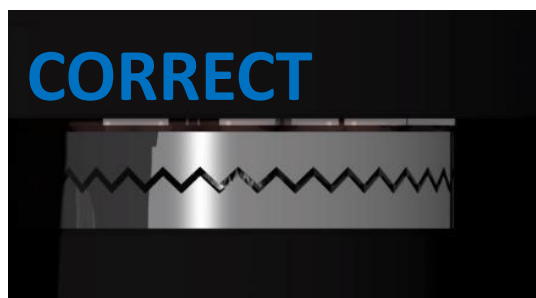


**When the main altitude locking knob is loosened, the mount loses its support. During the coarse adjustment process, ensure that the mount is always supported by hand until the main altitude locking knob is securely tightened again.**

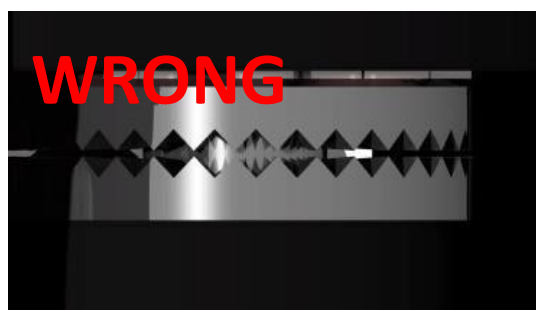


Rotate the main altitude locking knob clockwise at the approximate latitude position until the flat gear engages. Then, rotate the auxiliary altitude locking knob clockwise to complete coarse adjustment of the altitude angle.

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**Note that the flat gear must engage correctly, as shown in the left diagram. Incorrect engagement may cause the equipment to slip**



**When the main altitude locking knob is loosened, the mount loses its support. During the coarse adjustment process, ensure that the mount is always supported by hand until the main altitude locking knob is securely tightened again.**

**Altitude angle coarse adjustment completed**



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## Precise alignment of polar axis

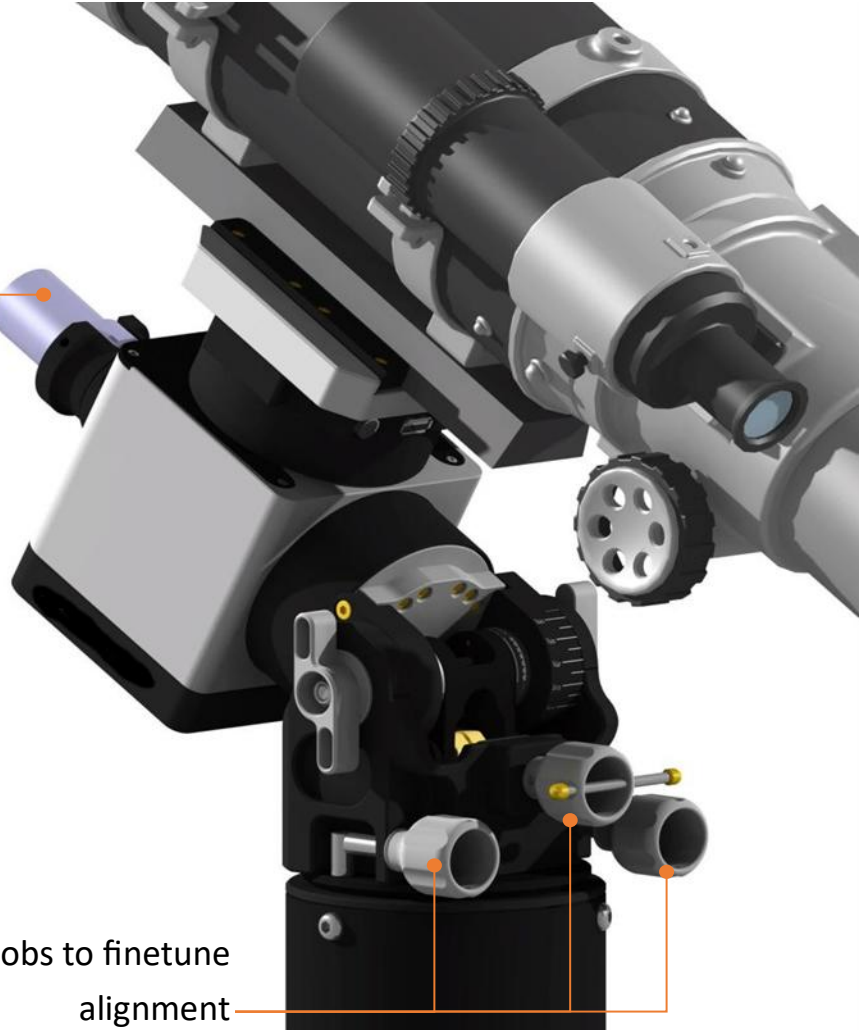
1. For astrophotography, polar calibration can be completed through plate solving
2. EM31 Pro supports the installation of Pole master or iPolar to complete polar calibration

Adapter for  
electronic polar  
alignment scope



Use the knobs to finetune  
alignment

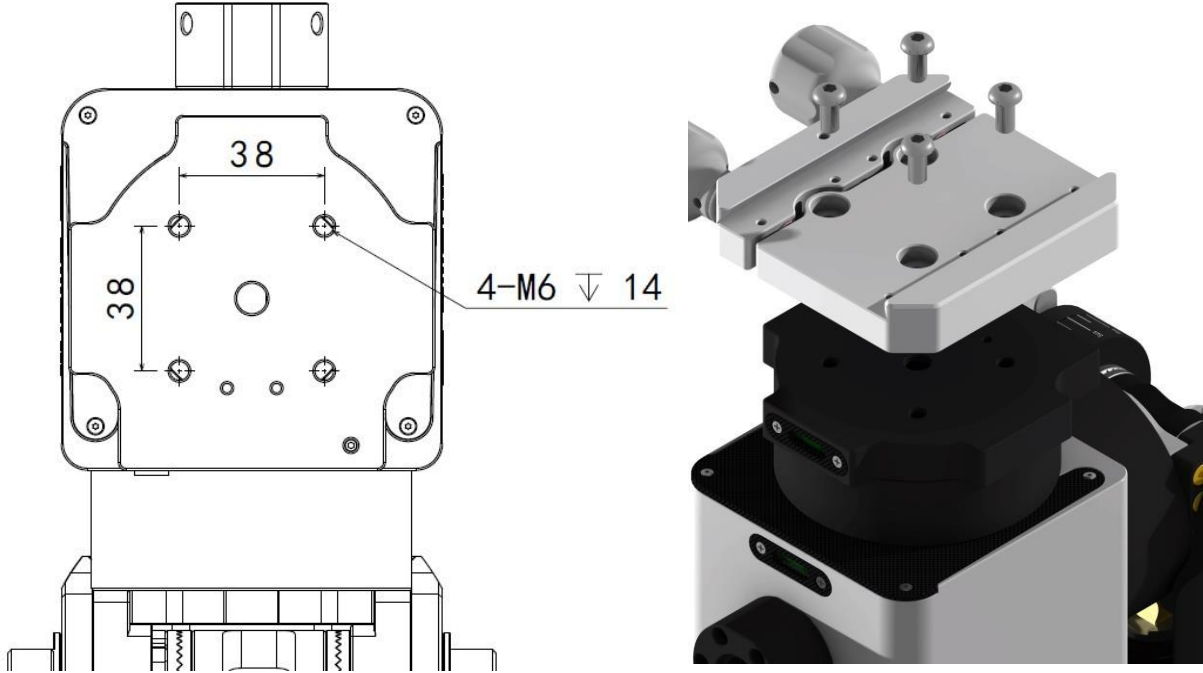
Once all equipment is installed, precise polar alignment can be achieved by rotating the azimuth adjustment knobs and altitude fine adjustment knob



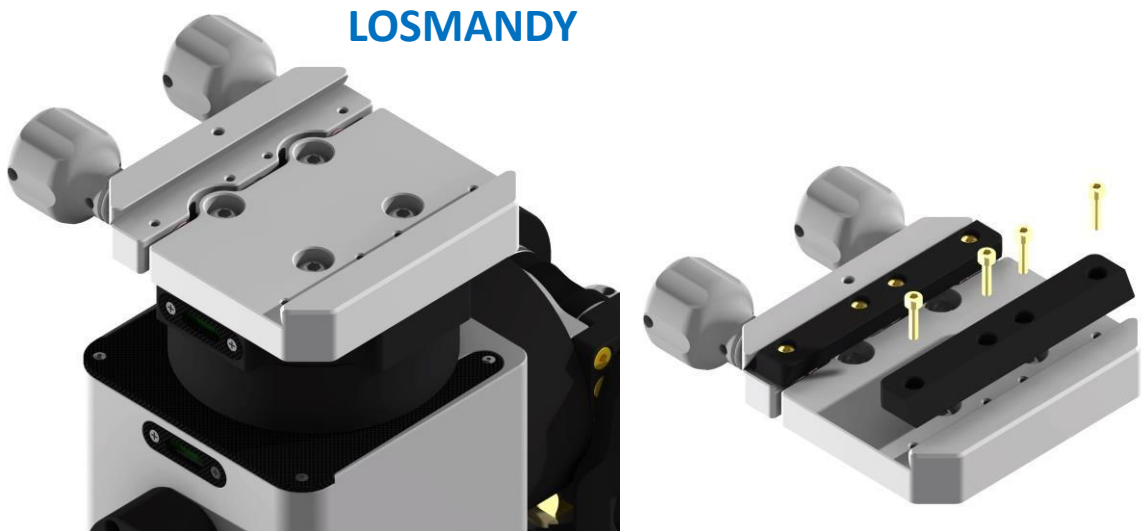
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## Installation of the dovetail

The interface on the HM31Pro EQ/AZ DEC top plate is compatible with most dovetails, allowing users to replace the dovetail as needed.



The HM31Pro EQ/AZ comes with standard LOSMANDY 60° and Vixen 75° dovetail compatibility. Arca specifications can be achieved by installing the dovetail Arca strips (optional)

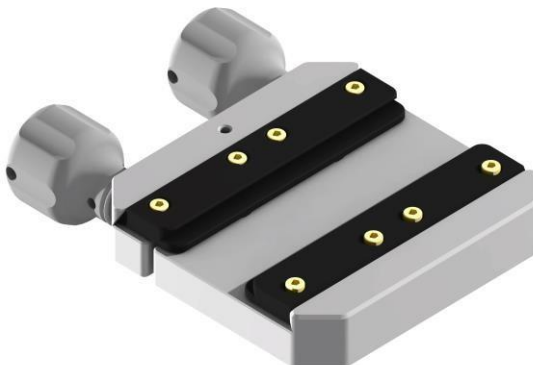


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## VIXEN



## ARCA(optional)



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# Quick Setup – AltAz Mode

The installation method for the HM31Pro EQ/AZ pier extension and tripod in altazimuth mode is identical to that in equatorial mode. Adjust the altitude angle to 90 degrees using the same procedure as in equatorial mode.



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Confirm that the installation direction of the telescope is consistent with the direction marked on the bottom of the body. **Installing the telescope in reverse can result in GOTO errors and may even lead to collisions that could damage the equipment.**



## Horizontal calibration

Accurate GOTO and stable tracking in altazimuth mode require the azimuth rotation axis to be perpendicular to the ground. The HM31Pro EQ/AZ allows users to confirm this alignment using the horizontal bubble on the RA axis. The mount can be roughly levelled with the bubble level of the tripod, such as in the 60250 Omegon Pro 40mm Carbon fiber tripod.

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All equipment must be installed before starting to level the mount.

### **Precise levelling**

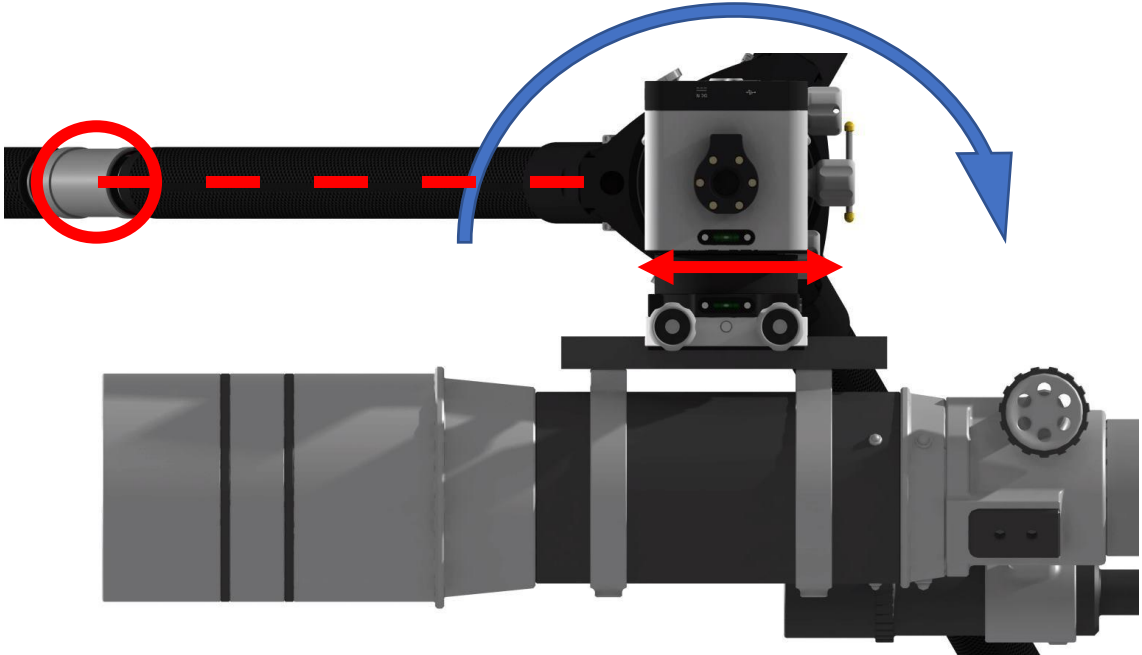


Power on the mount and manually rotate the RA axis. Adjust two of the legs horizontal until the horizontal bubble is centered in the level for all positions of the RA axis.

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Manually rotate the RA axis until the horizontal bubble aligns with the red dashed line in the diagram. Adjust the tripod leg until the horizontal bubble is centered, indicating that the horizontal adjustment is complete.

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## AltAZ Top (Binocular) Mode

Large binoculars can be mounted on the top of the HM31 Pro by installing a supporting bracket on top



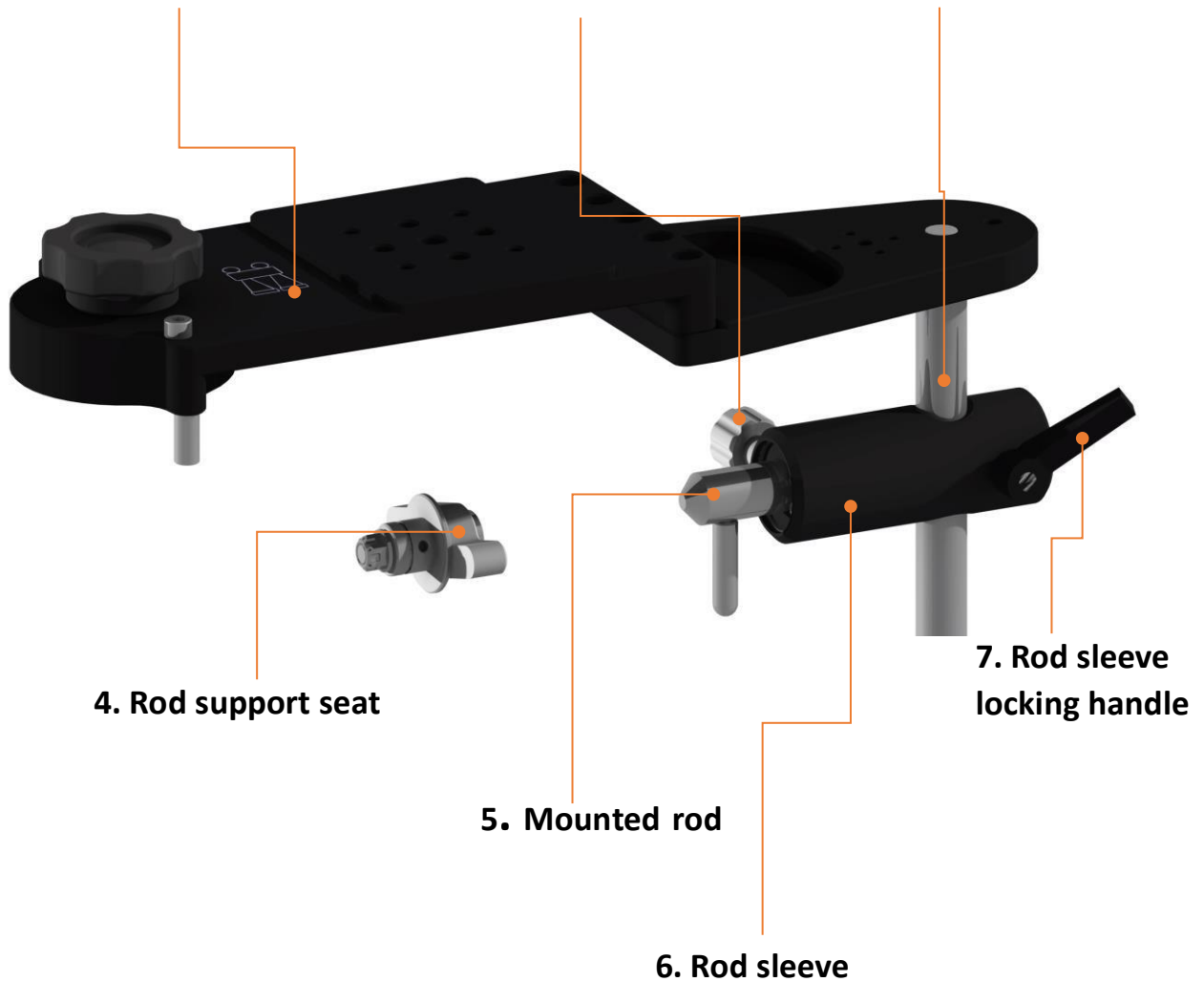
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## Top mode supporting bracket structure

1. Bracket Body

2. Rod locking knob

3. Side support rod



4. Rod support seat

5. Mounted rod

6. Rod sleeve

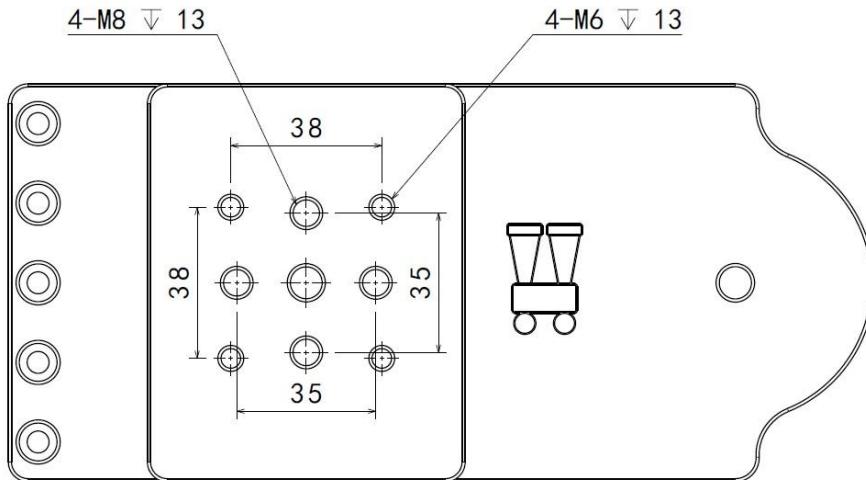
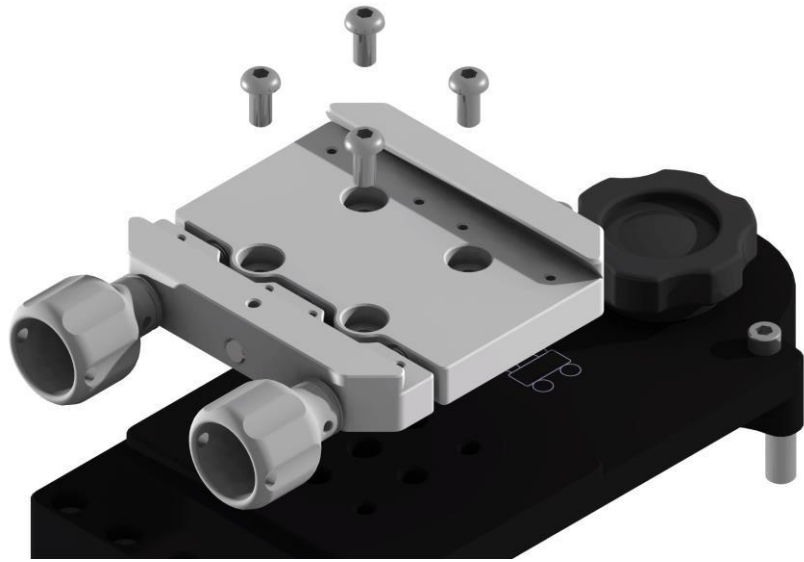
7. Rod sleeve locking handle

The supporting bracket interface is compatible with most dovetails.

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Pay attention to the installation direction of the dovetail knobs, as shown in the diagram.

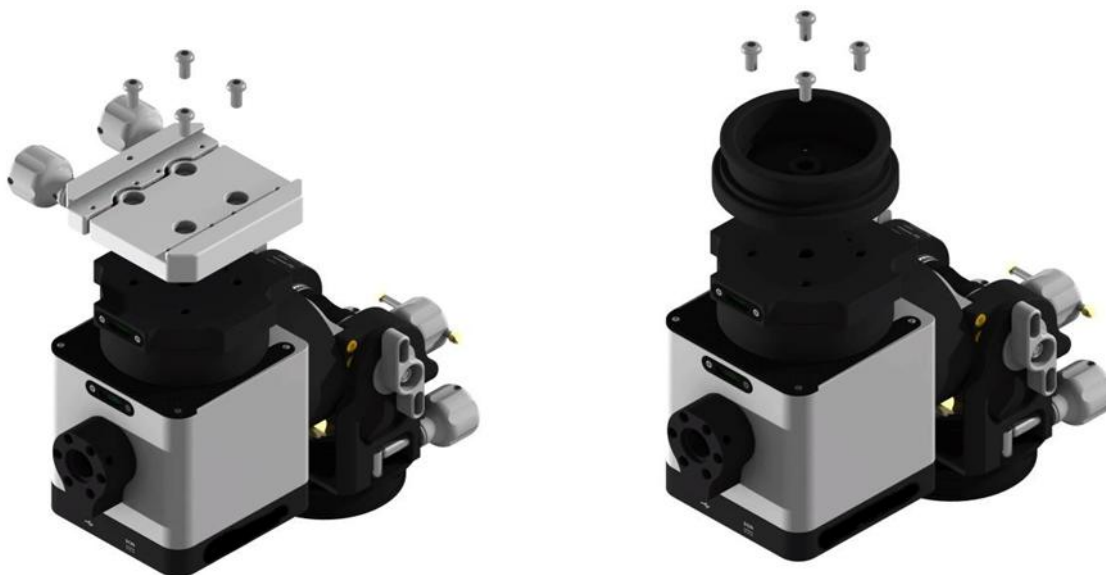


The top mode supporting bracket does not come with a dovetail, you can use the dovetail on the HM31Pro EQ/AZ body or choose your own.

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Replace the dovetail on the mount body with a supporting bracket connecting adapter and adjust the altitude angle to 0 degrees



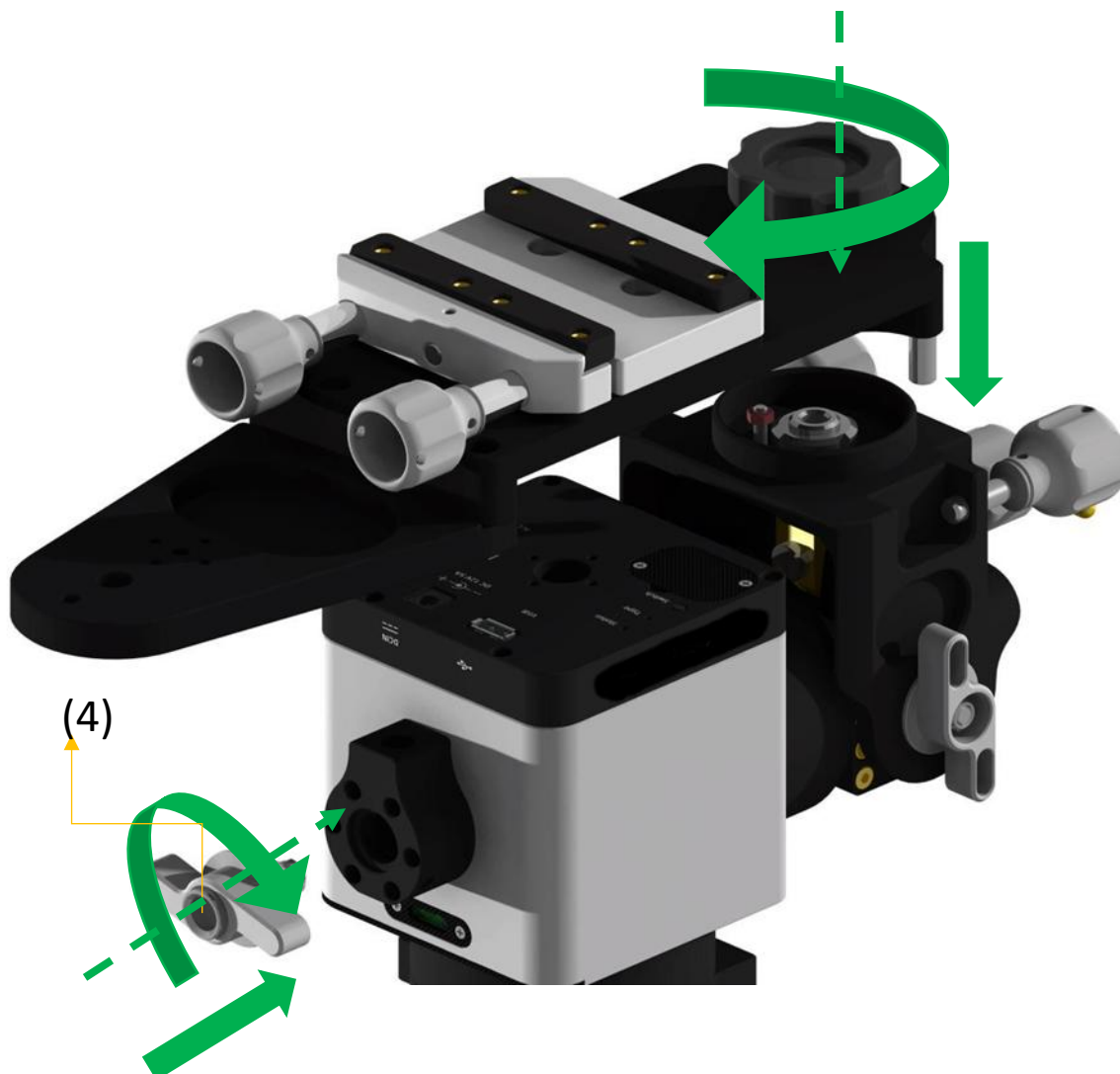
Invert the mount body and install it with the pier extension and tripod, following the same steps as in Equatorial mode.

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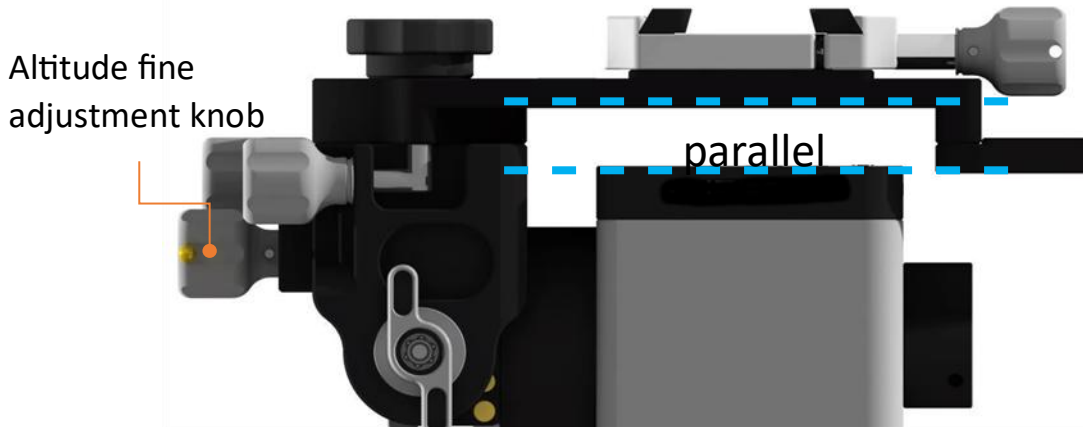
Insert the supporting bracket into the mount body base and rotate the knob clockwise until it is locked. Then, rotate the Rob support seat (4) clockwise until it reaches the bottom but do not lock it tightly

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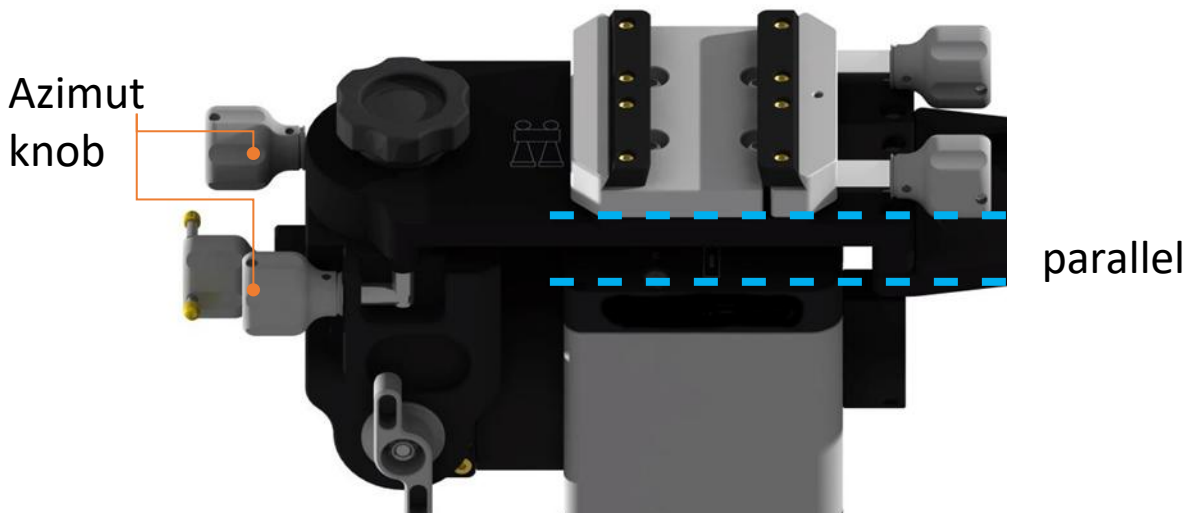


Adjust the altitude fine adjustment knob until the lower edge of the top-mount bracket is parallel to the edge of the mount body's base.

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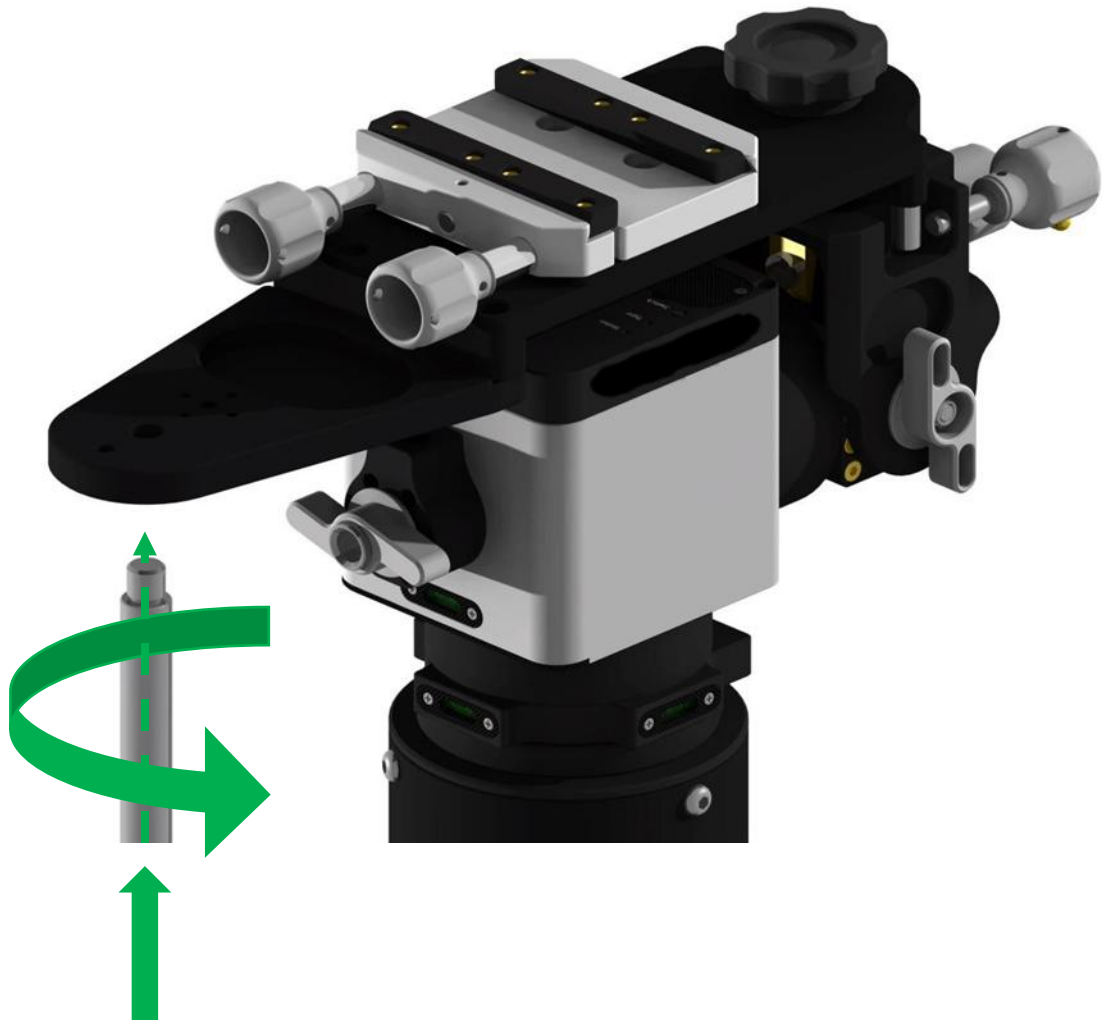


Adjust the azimuth knob until the side edge of the top-mount bracket is parallel to the edge of the mount body's base.



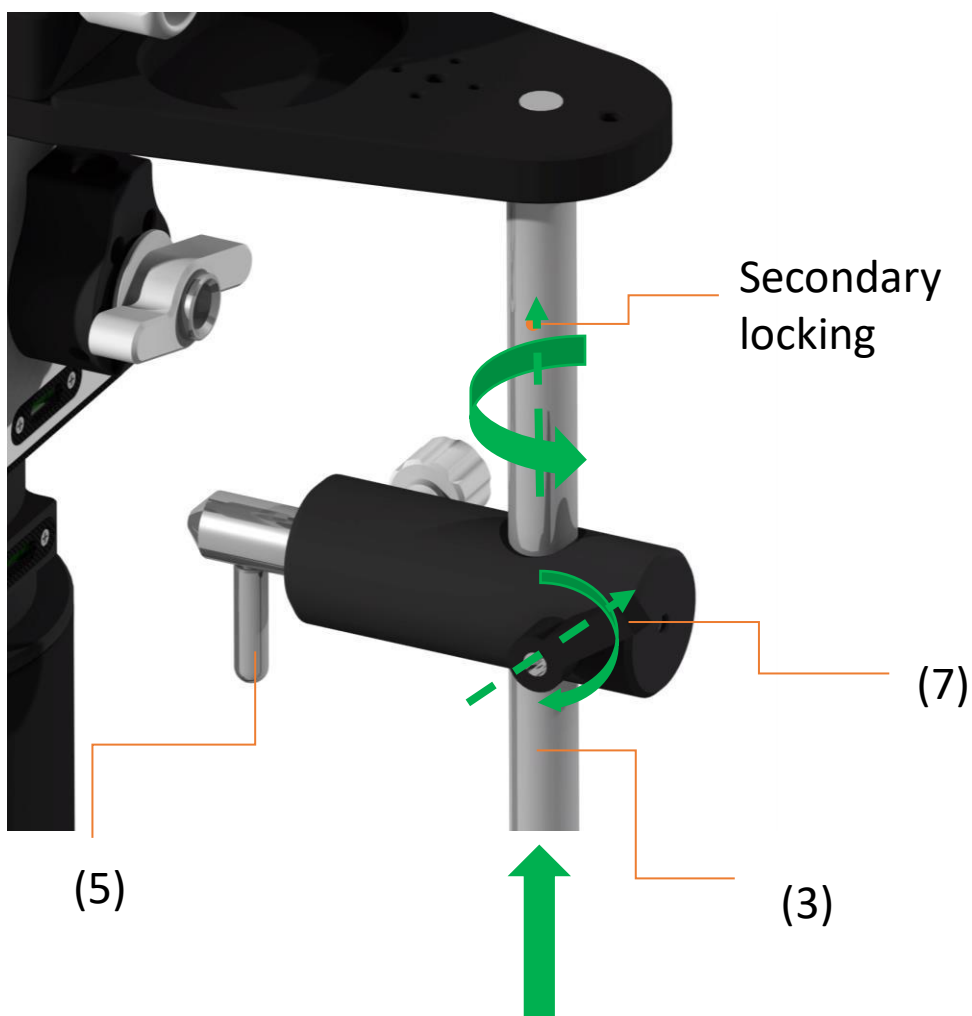
Parallel alignment of the edges can be determined by adjusting the viewing angle.

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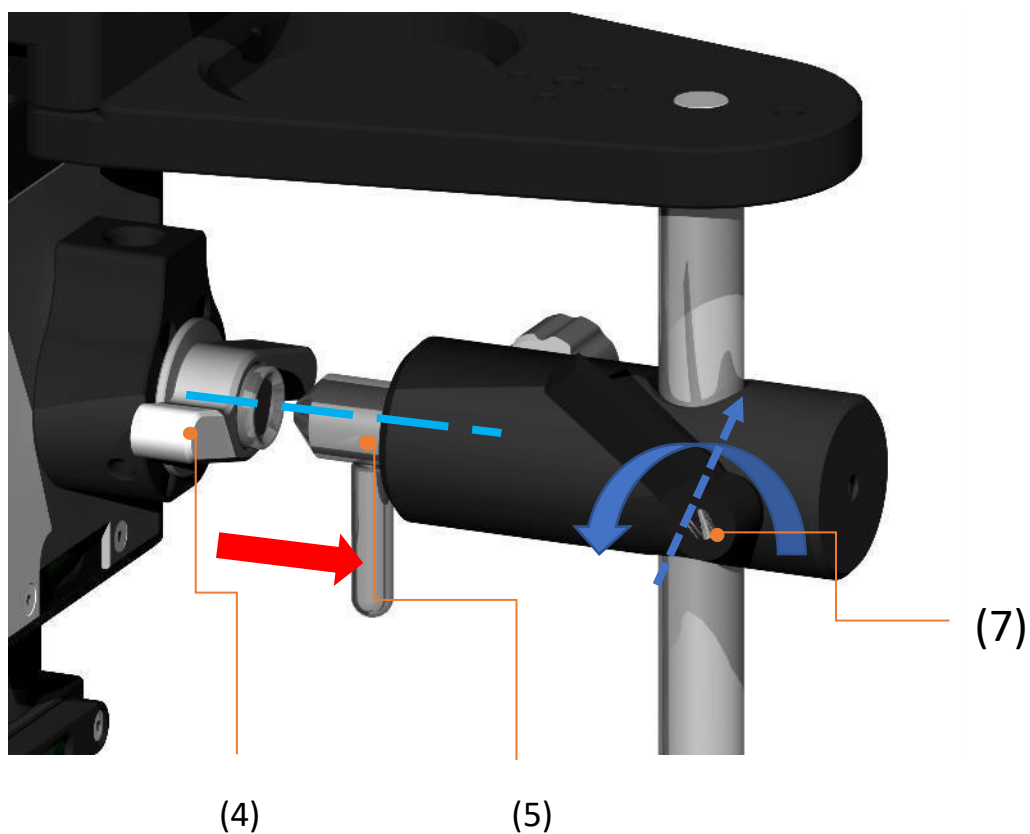
Turn the Mounted rod(5) into the Side support rod(3) and rotate the Rod sleeve locking handle(7) clockwise to lock it. After locking, hold the Mounted rod(5) tightly and rotate it clockwise to lock the Side support rod(3) again

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Loosen the Rod sleeve locking handle (7) counterclockwise and press the Mounted rod (5), while aligning the Mounted rod (5) with the Rod support seat (4) and releasing the Mounted rod (5)

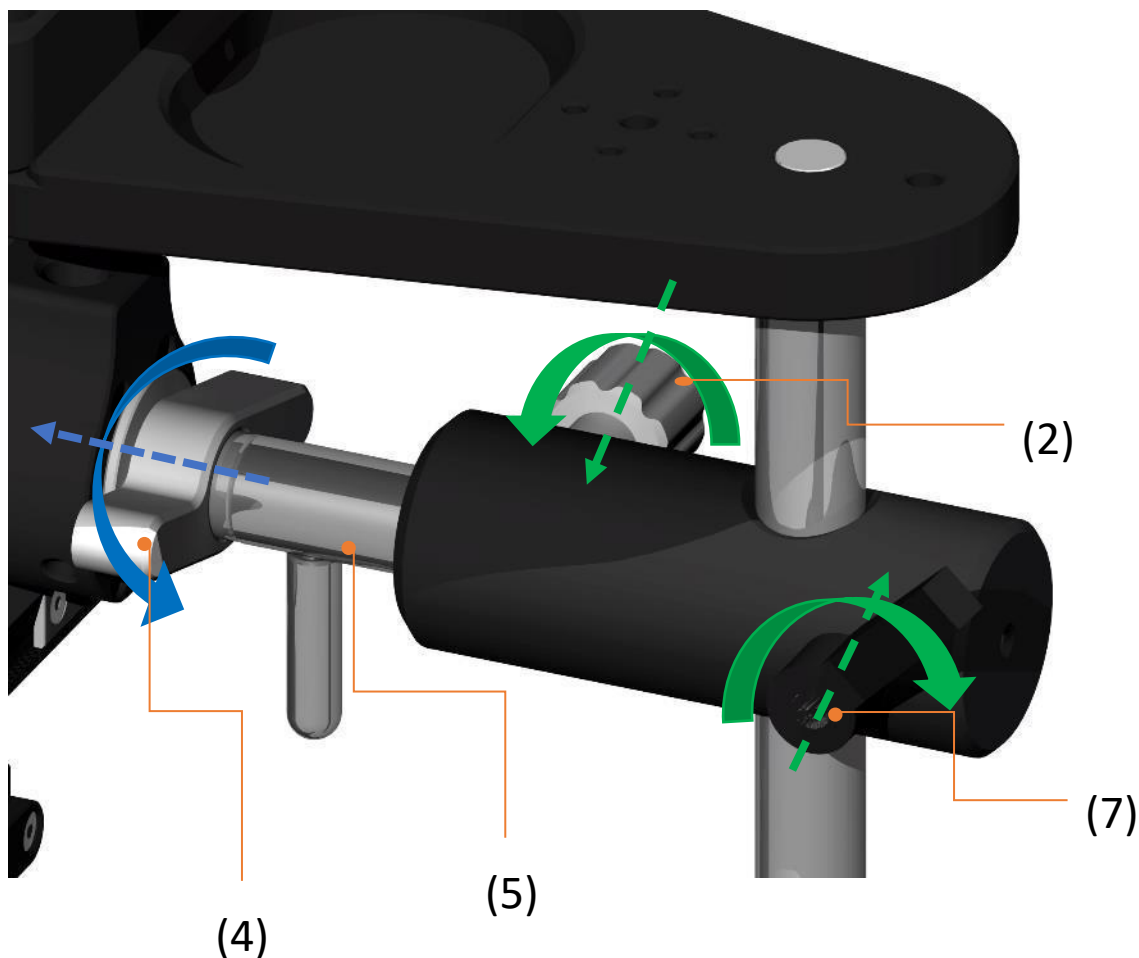
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Rotate the Rod sleeve locking handle(7) and Rod locking knob(2) clockwise

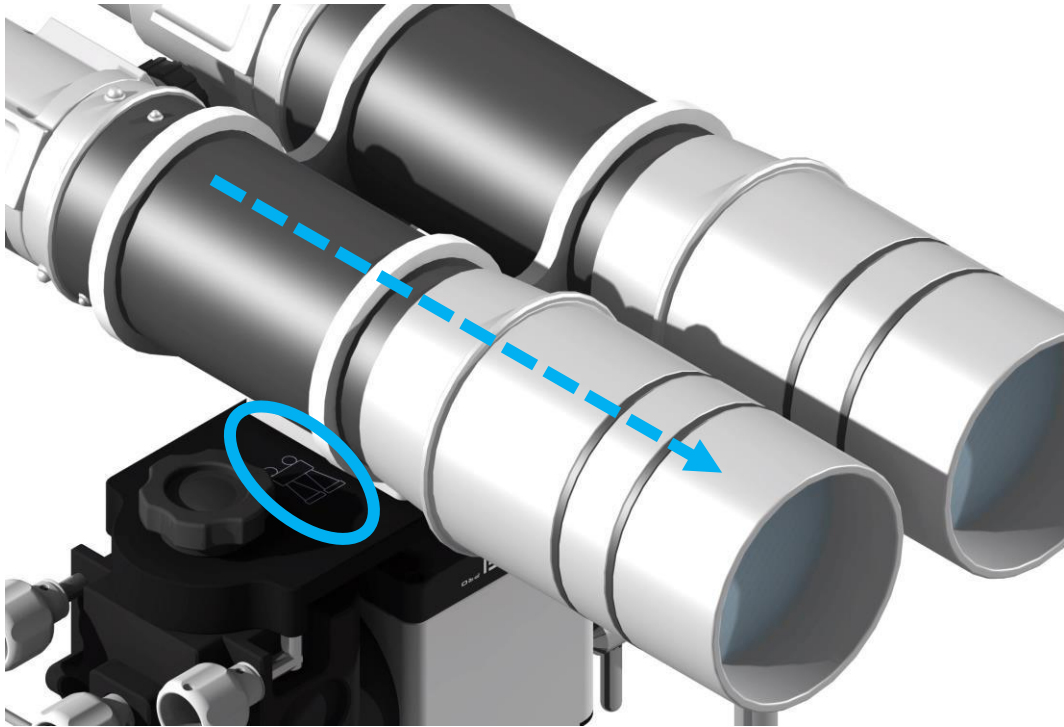
Rotate Rod support seat(4) counterclockwise half a turn to one turn to fully lock the Mounted rod(5) and complete the installation of the top mode supporting bracket

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Install the telescope into the upper dovetail, ensuring that the installation direction of the telescope is consistent with the direction marked on the top mode supporting bracket, **Installing the telescope in reverse can result in GOTO errors and may even lead to collisions that could damage the equipment.**

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## **Level adjustment**

The top mode is Altazimuth mode, it is necessary to adjust the horizontal state.

Accurate horizontal state can be obtained through horizontal bubbles on the

DEC axis

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DEC axis level  
bubble



Complete the horizontal adjustment by adjusting the legs of the tripod, using the same method as in the sidemounted Alt-Az mode.

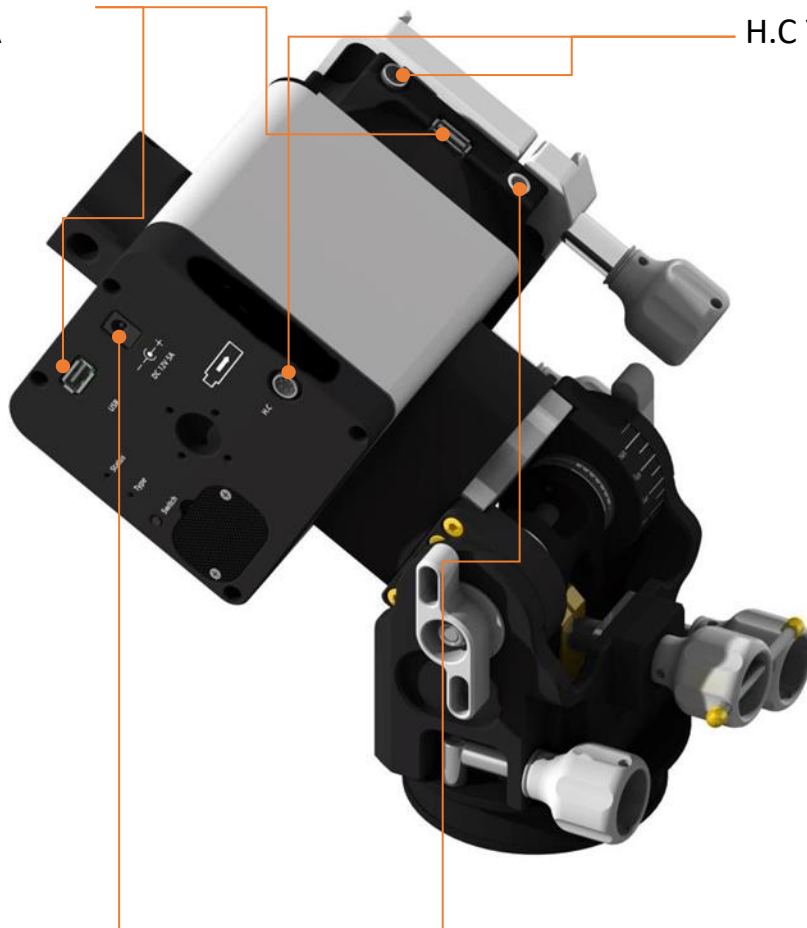
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## Cable Connections

HM31 Pro has two sets of cable ports, located on the base of the mount and on the DEC rotation axis, both with identical functions.

USB 2.0  
Type A

H.C YC8 6



DC 5.5-2.1  
12V



**Do not connect two power sources simultaneously.**

**Do not connect two hand controllers simultaneously. Do not connect two astronomical control devices simultaneously (such as any PC, astronomy box, or Mini PC).**

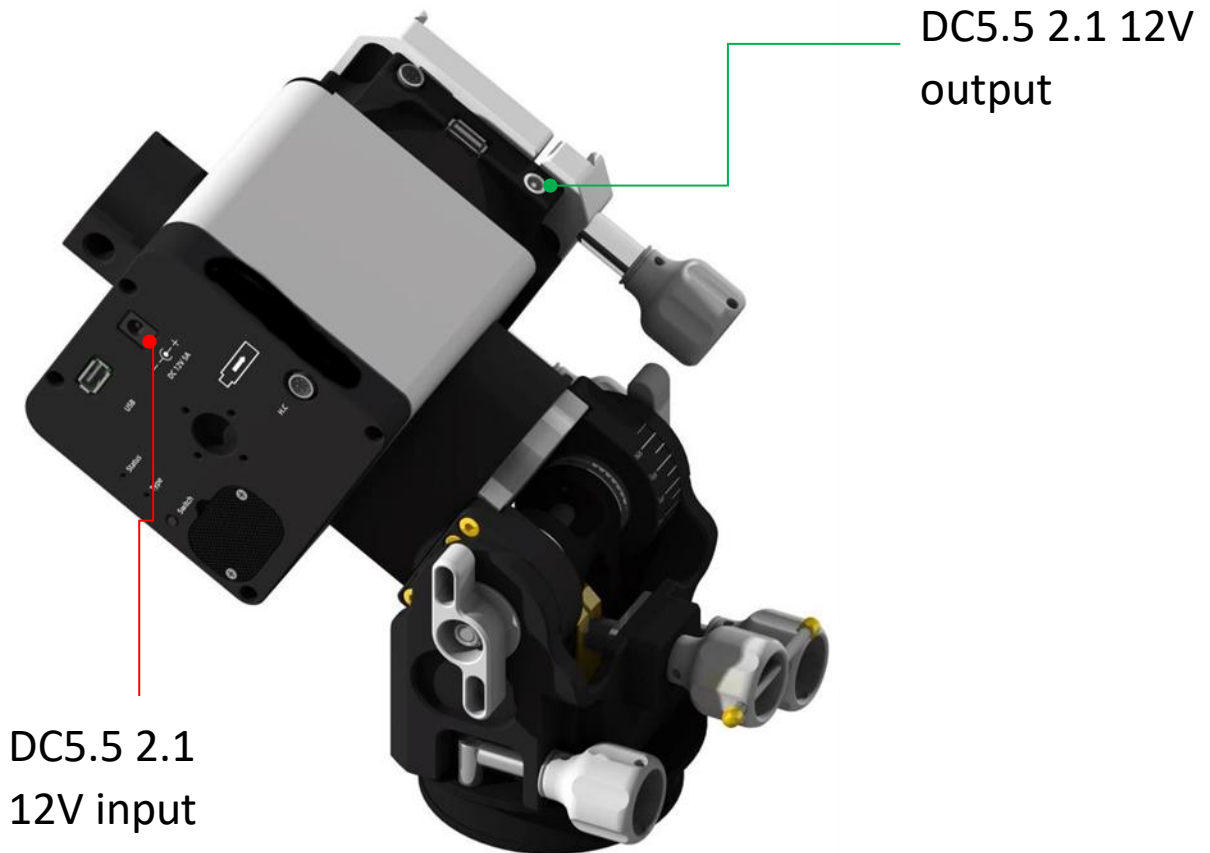
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## Power connection method

HM31Pro EQ/AZ features two DC 12V ports. Either port can serve as a power input, while the other can be used as a power output to supply power to other astronomical devices.



For astrophotography, it is recommended to use the port on the base of the mount as the power input and the DEC axis port as the output.



**Do not connect two power sources simultaneously. The load on the output port must not exceed 12V 5A.**



**When powering only the mount, it is recommended to use a DC 12V 2A power supply or higher. When powering other devices as well, use a DC 12V 5A power supply or higher.**

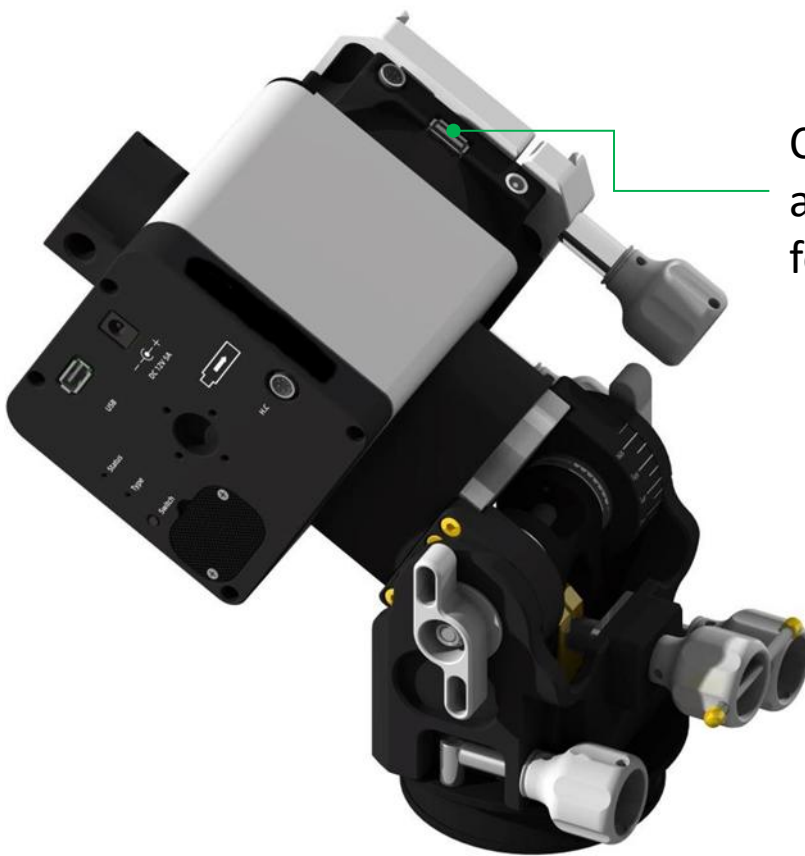
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## USB cable connection

EM31 Pro has two USB ports, each capable of connecting the mount to a control device (such as a PC, astronomy box, Mini PC).



For astrophotography, it is recommended to connect the astronomy box or PC to the DEC axis port. This allows the USB and power output cables to rotate in sync with the telescope, effectively preventing cable tangling.



Connection of an astronomy box or PC for astrophotography



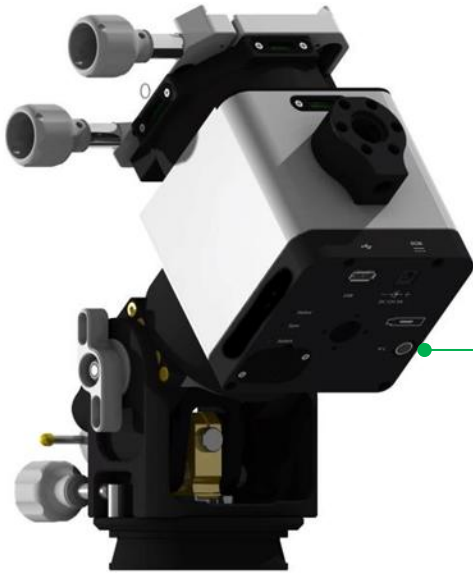
**Prohibit connecting devices other than PCs, Astro Boxes, and Mini PC...**

**Do not connect the mount through any USB hub.**

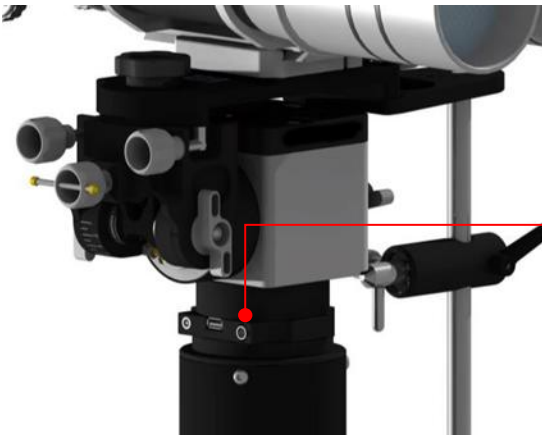
## Handbox connection

EM31 Pro has two Handbox controller ports, each capable of connecting the handbox controller

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Handbox connected to the bottom of the mount in EQ and Alt/Az side modes.



Handbox connected to DEC axis cable management in Alt/Az top mode

**⊘ Do not connect two Handbox controllers simultaneously! Do not plug and unplug the Handbox controller while the mount is powered on!**

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## Mode selection

The active HM31 Pro mode is indicated by the “Type” light:

**Blue is Altazimuth side-mounted mode,**

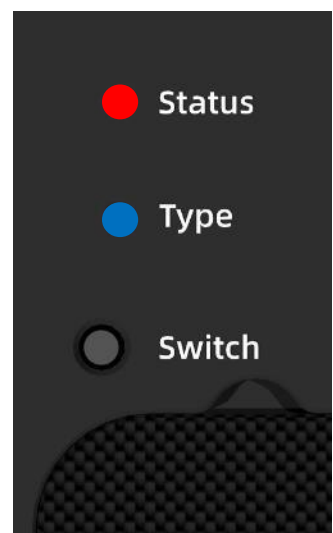
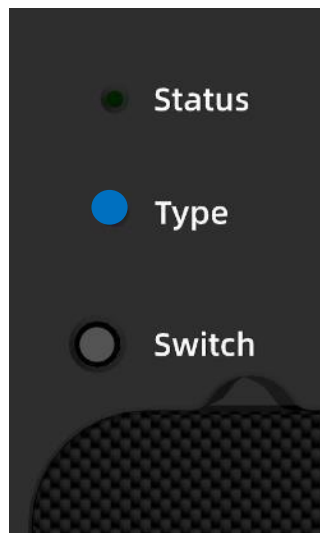
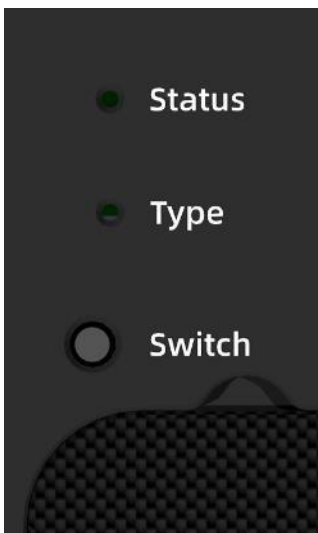
**Red is Altazimuth top-mounted mode,**

**Light out for Equatorial mode**

Wait for 5 seconds when the mount is powered on, and enter mode switching after the Status light flashes off

By clicking the Switch button, the Type light will begin to change, blue-redoff, and the Type light will be switched once per key press, which can be switched cyclically.

After confirming the required mode, wait for 10 seconds, the Status light will remain on after flashing, and the mode switch is complete



When

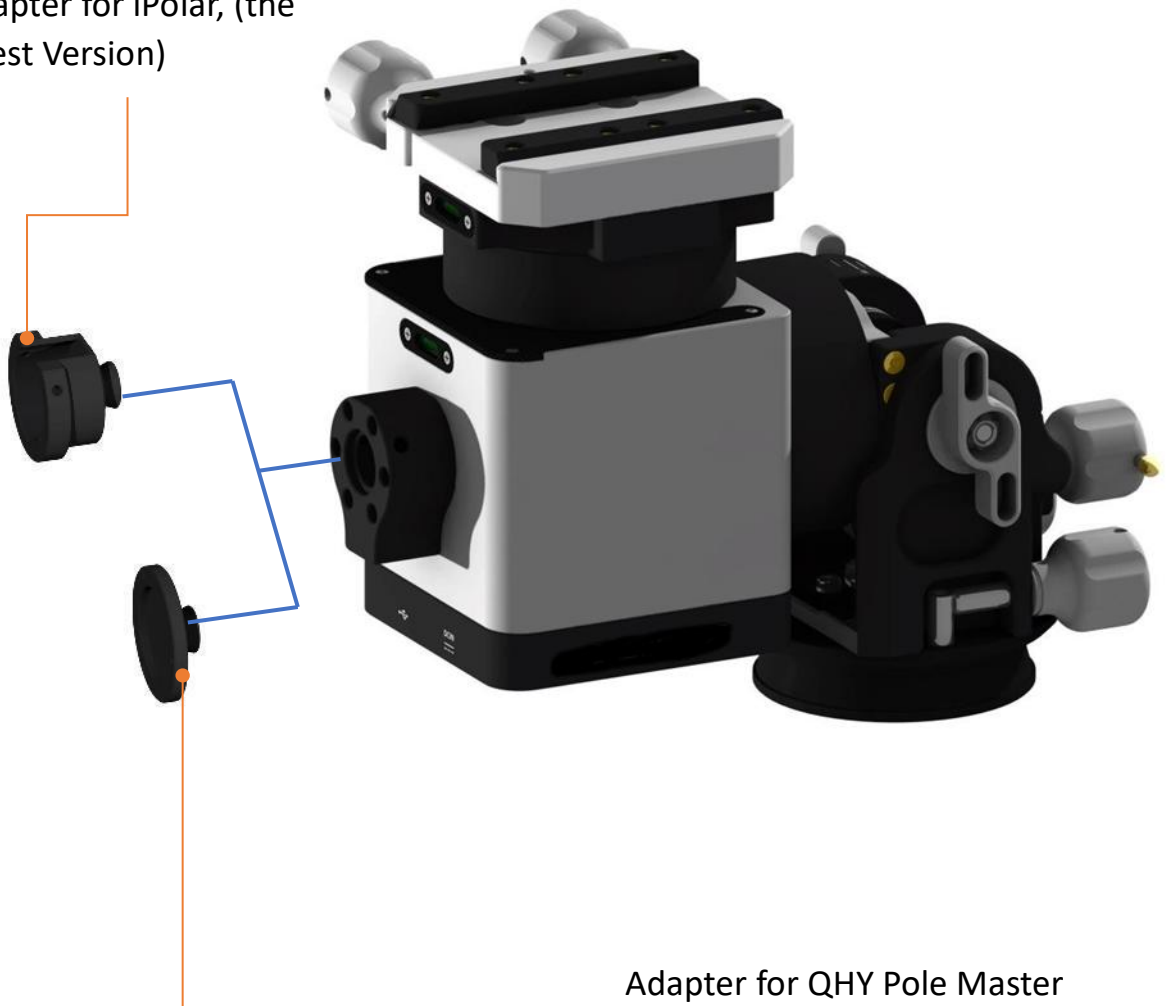
the mount is in operation, the Status light will remain on and will start flashing once tracking is activated.

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## Accessory Installation – Electronical polar alignment scope

Adapter for electronic polar alignment scope. The electronic polar scope can be connected to HM31Pro EQ/AZ via an adapter (optional accessory).

Adapter for iPolar, (the latest Version)



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## Accessory Installation - Ball head adapter

EM31 Pro can mount a DSLR through the ball head adapter (optional), allowing for wide-field astrophotography while capturing astronomical images.



3/8 16 bolts

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## Battery Installation - Install and replace the battery

### Battery replacement



Battery model CR1220



The battery stores the time and location coordinates. It is recommended to replace it every 12 to 18 months.



Do not replace the battery while powered on

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## OnStep Guide – App control



Android users can set and control the mount through OnStep APP or webpage. **IOS system cannot use APP, webpage is working**



### Connect to the web via WiFi:

Search for WIFI hotspot OnStep connection through PC or mobile phone, password: password

Enter "192.168.0.1:9999" or "192.168.0.1" into the browser

**OnStep** WiFi Server 2.1i (OnStep 4.24a)

Status Control Library PEC Settings Config WiFi

**Site:**  
7/30/22 04:44:59 UT (web browser)  
1/01/00 00:04:27 UT (06:44:19 LST)  
Long. = +00°00, Lat. = +00°00

**Coordinates:**  
Current:  $\alpha=18:44:24$ ,  $\delta=+89^{\circ}26:29$   
Target :  $\alpha=00:00:00$ ,  $\delta=+00^{\circ}00:00$   
Pier Side=**None** (meridian flips **On**)

**Polar Alignment:**  
← 0" ▲ 0" (Mount relative to NCP)

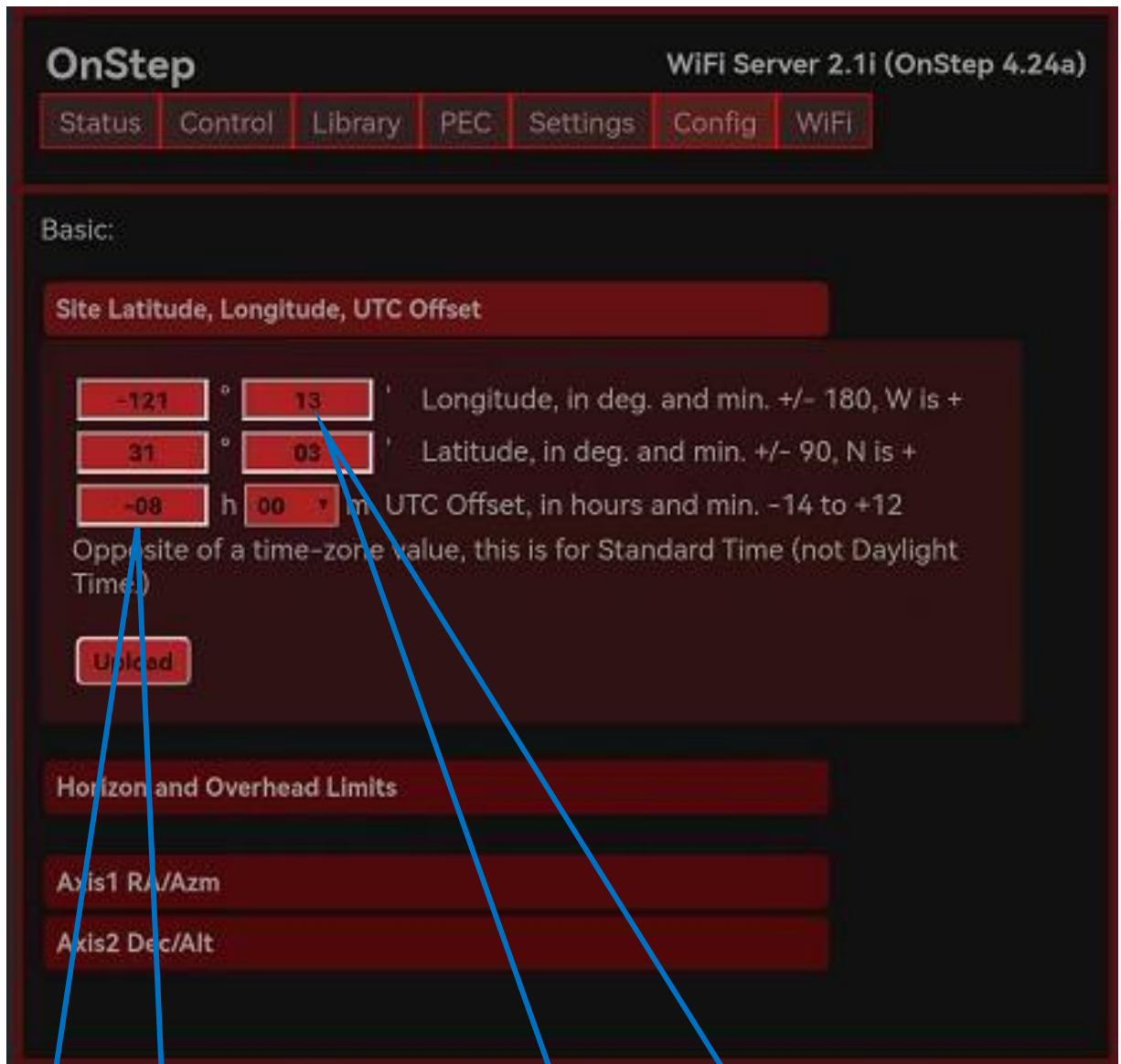
**Operations:**  
Parking: **Not Parked (At Home)**  
Tracking: **Off**  
Tracking Rate: **0.000Hz**  
Maximum slew speed: **1.5°/s**

**State:**  
Last General (Background) Error: **None**  
Workload: **5%**  
Wireless signal strength: **31dBm (100%)**




For the first use or when using the mount at a new location, set the mount's latitude and longitude coordinates and local time (can be synced via NINA or Asiair)

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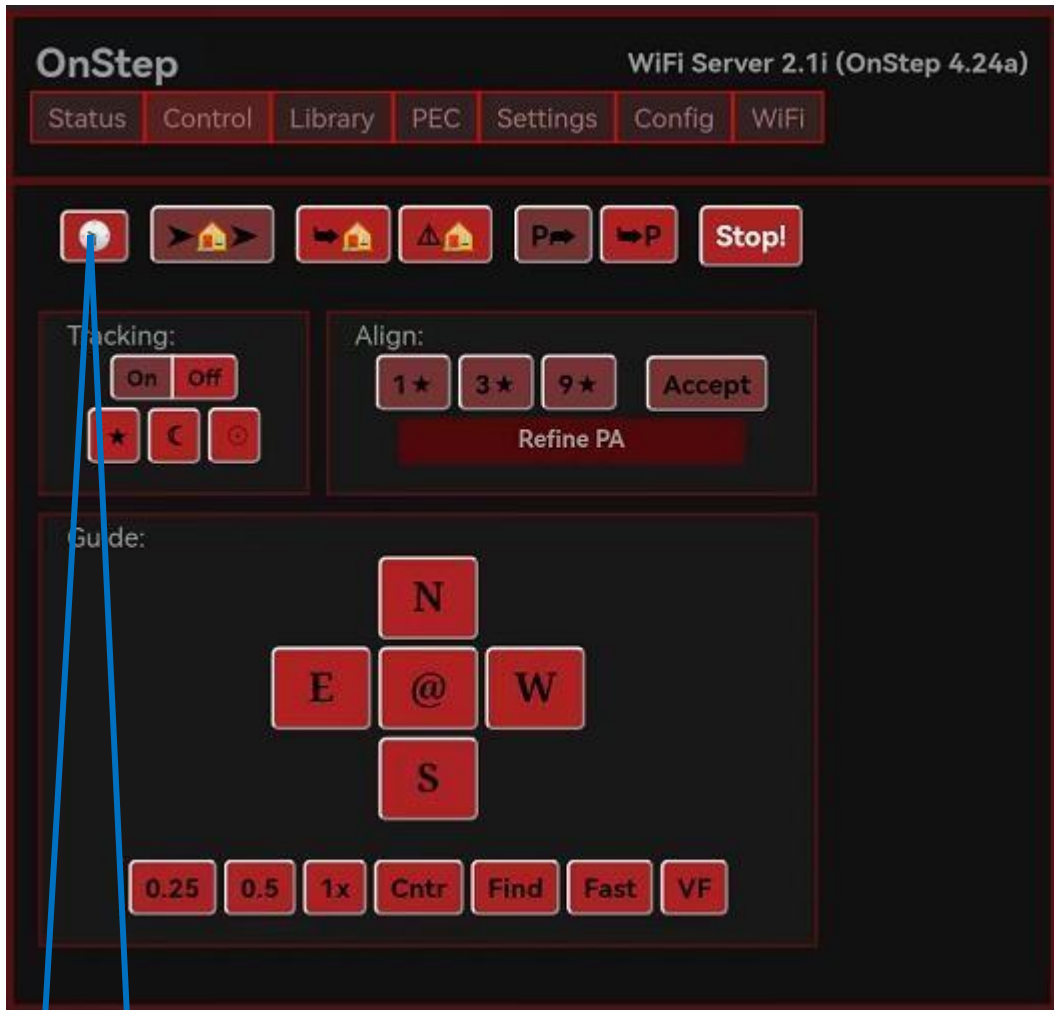
Set time offset

Latitude and longitude coordinates

 In the OnStep system, east longitude is (-), west longitude is (+), north latitude is (+), and south latitude is (-). For UTC, east of the prime meridian is (-), and west is (+).

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## Set Time



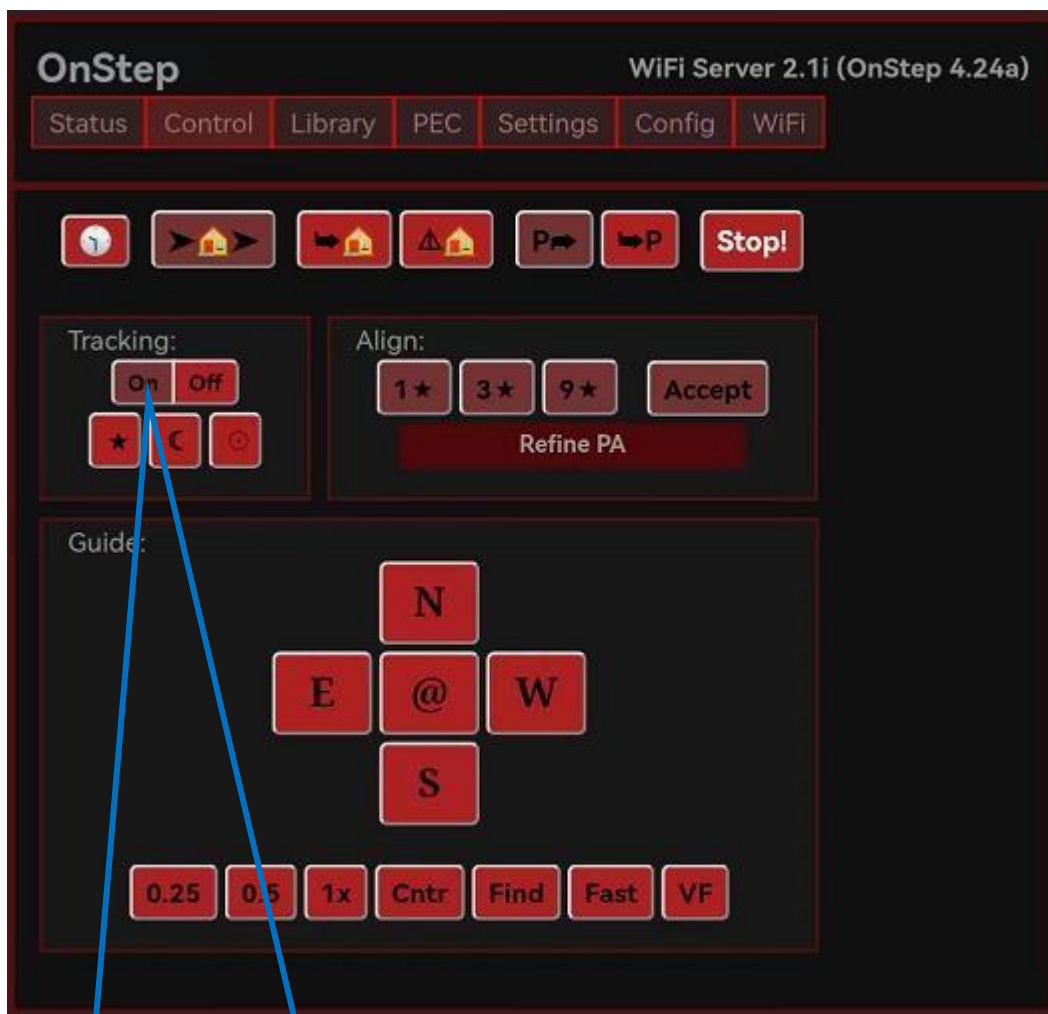
set time

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## OnStep Quick Start Guide – App

### OnStep Guide - App

#### Start Tracking



Turn on Tracking, and the rotation of the mount can be controlled by operating the direction keys.



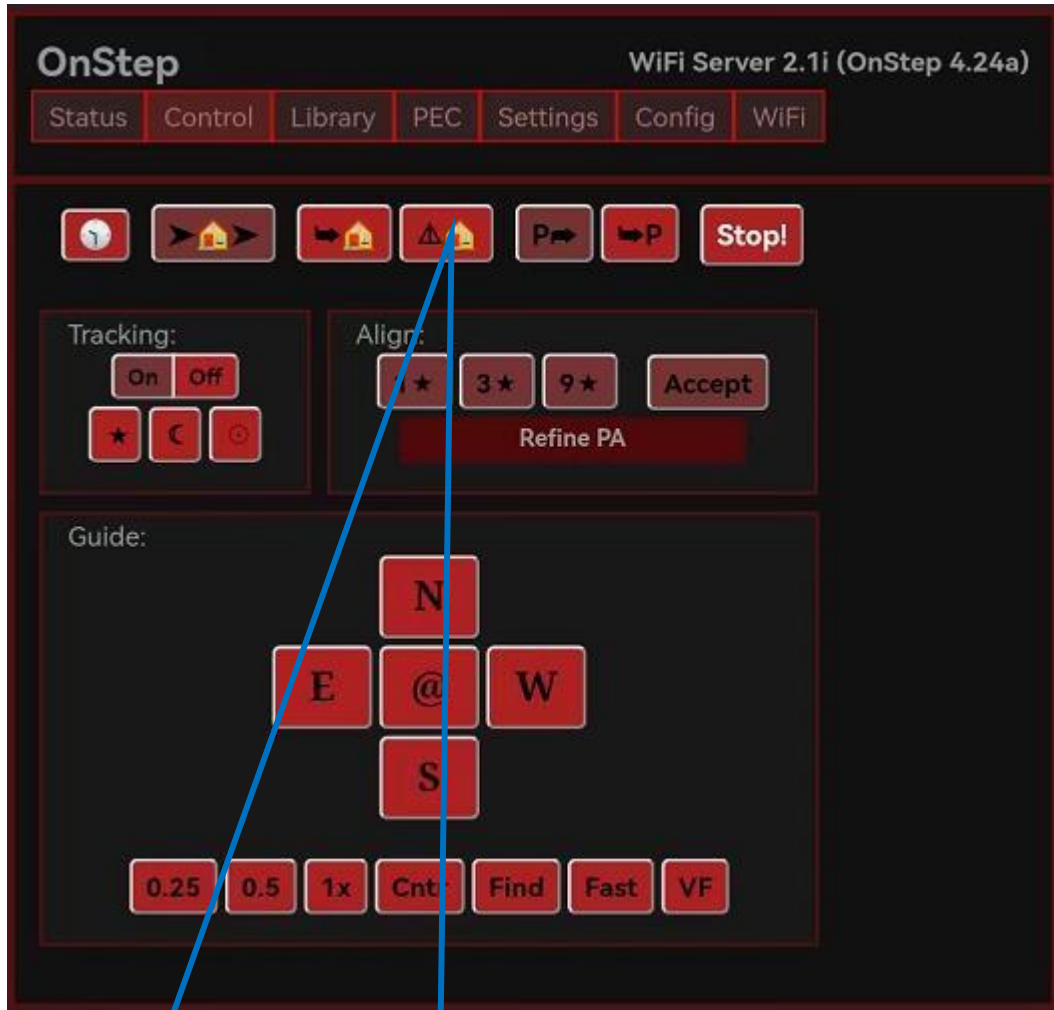
**In the OnStep system options, grey indicates ON status**

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## OnStep App Quick Start Guide – Home position



**The home position differs in the three modes of HM31Pro EQ/AZ, so it should be set before using the mount**



**After enabling tracking, manually rotate the mount to the home position, and click the “At Home” button to save the home position of the mount.**

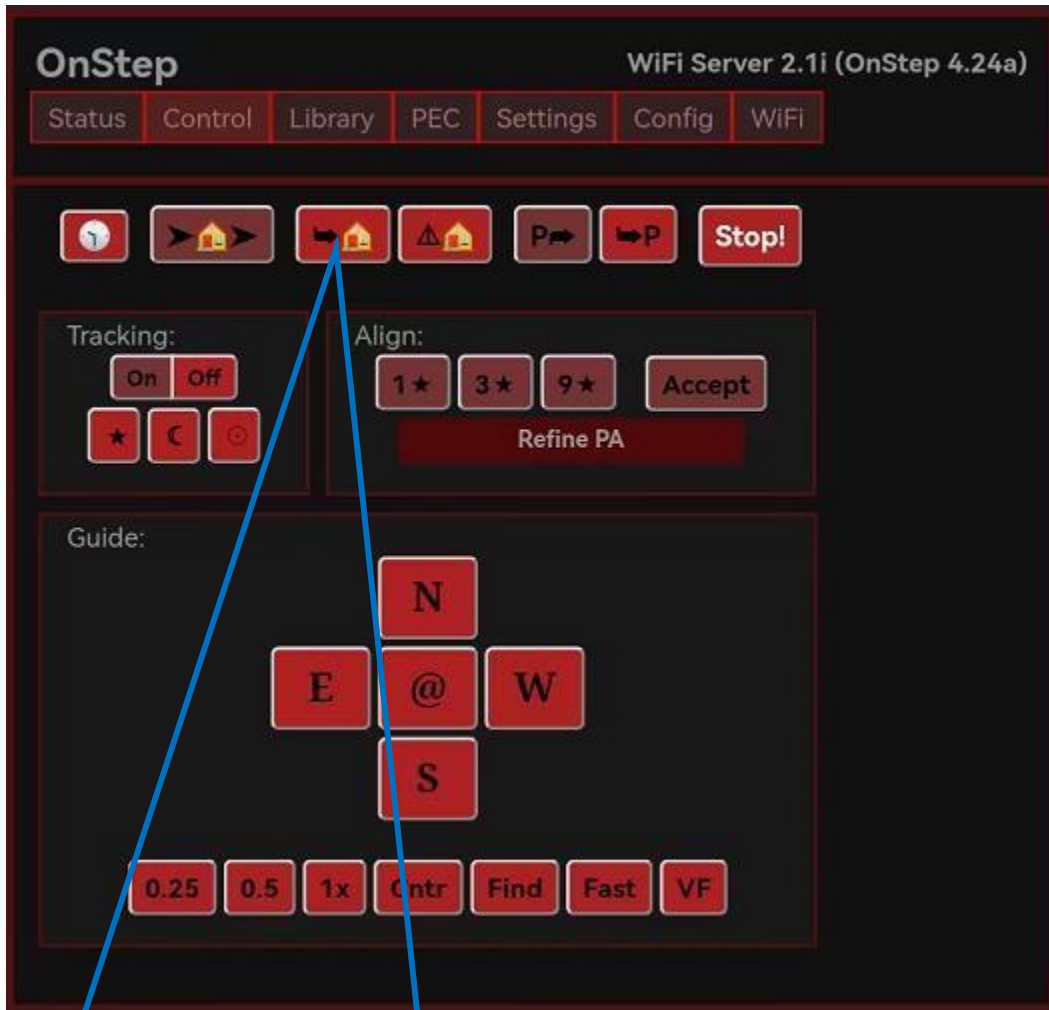


**Note: After setting the home position, the mount will return to the “Untracking” state. Click “Tracking ON” again to enable tracking**


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**The home position is different in the three modes of HM31Pro EQ/AZ, so it should be set before using the mount**

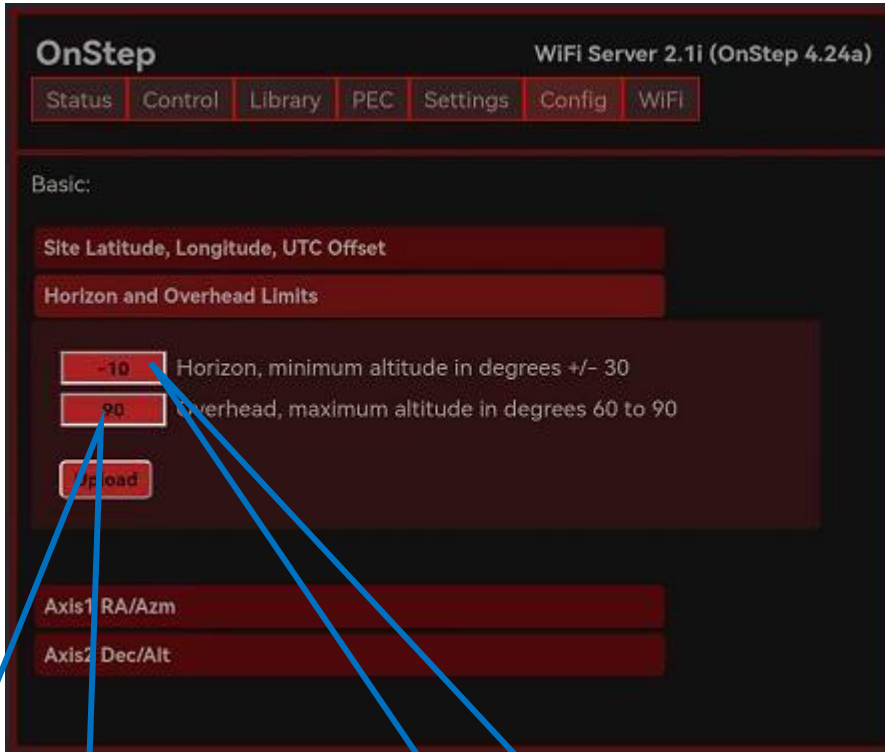


Click the “Go Home” button to return the mount to the home position.

 After powering off and on, the mount defaults to the power -on position as the home position. For accuracy, always reset the home position before each use. Alternatively, you can click the 'Go Home' button to return the mount to the home position before powering off, or, if using control software, configure the plan to execute the 'Go Home' command automatically after each session to avoid the need for a manual reset next time.

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## Limit position setting



Equatorial mode, DEC axis rotation limit

Altitude angle limit in Altazimuth mode



**Note :** When the manual operation of the mount rotation exceeds the set limit, the mount will stop rotating, press the key again, the mount will only move a small angle.

Once the GOTO target exceeds the limit, GOTO will stop. The limit position is related to the time, latitude and longitude coordinates and home position setting of the mount.

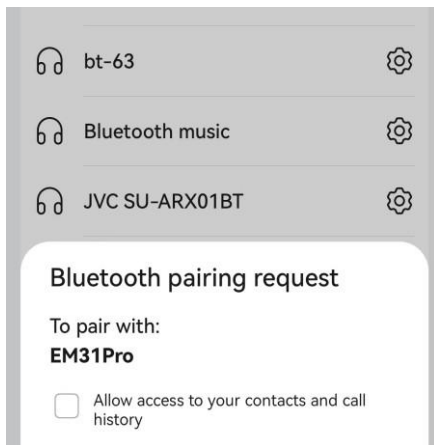
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## Connect to the Android app via Bluetooth.

(App only supports Android system, Apple system needs to be set through the webpage )

### ① Matching Bluetooth



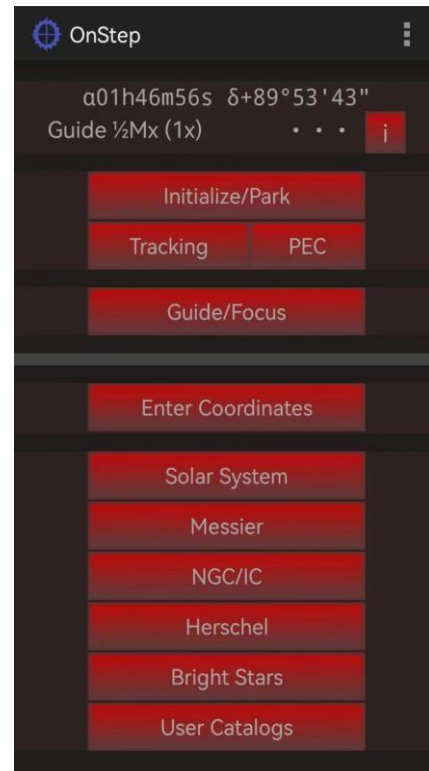
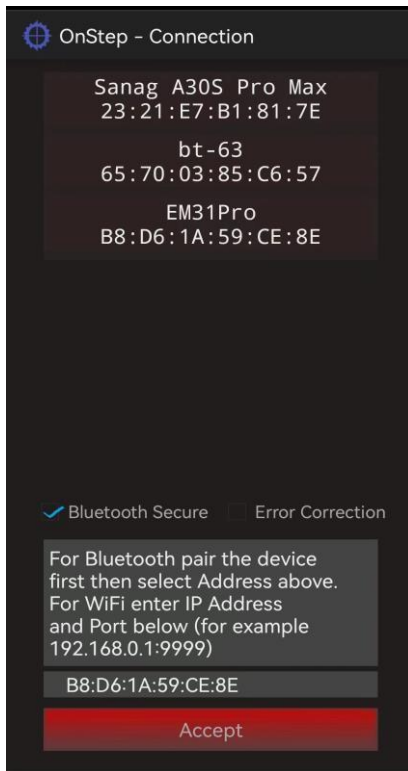
### ③ Choose Bluetooth

### ② Select Connection in the APP



### ④ Complete connection

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.



**The first connection may be very slow. Please allow some time for the process to complete.**

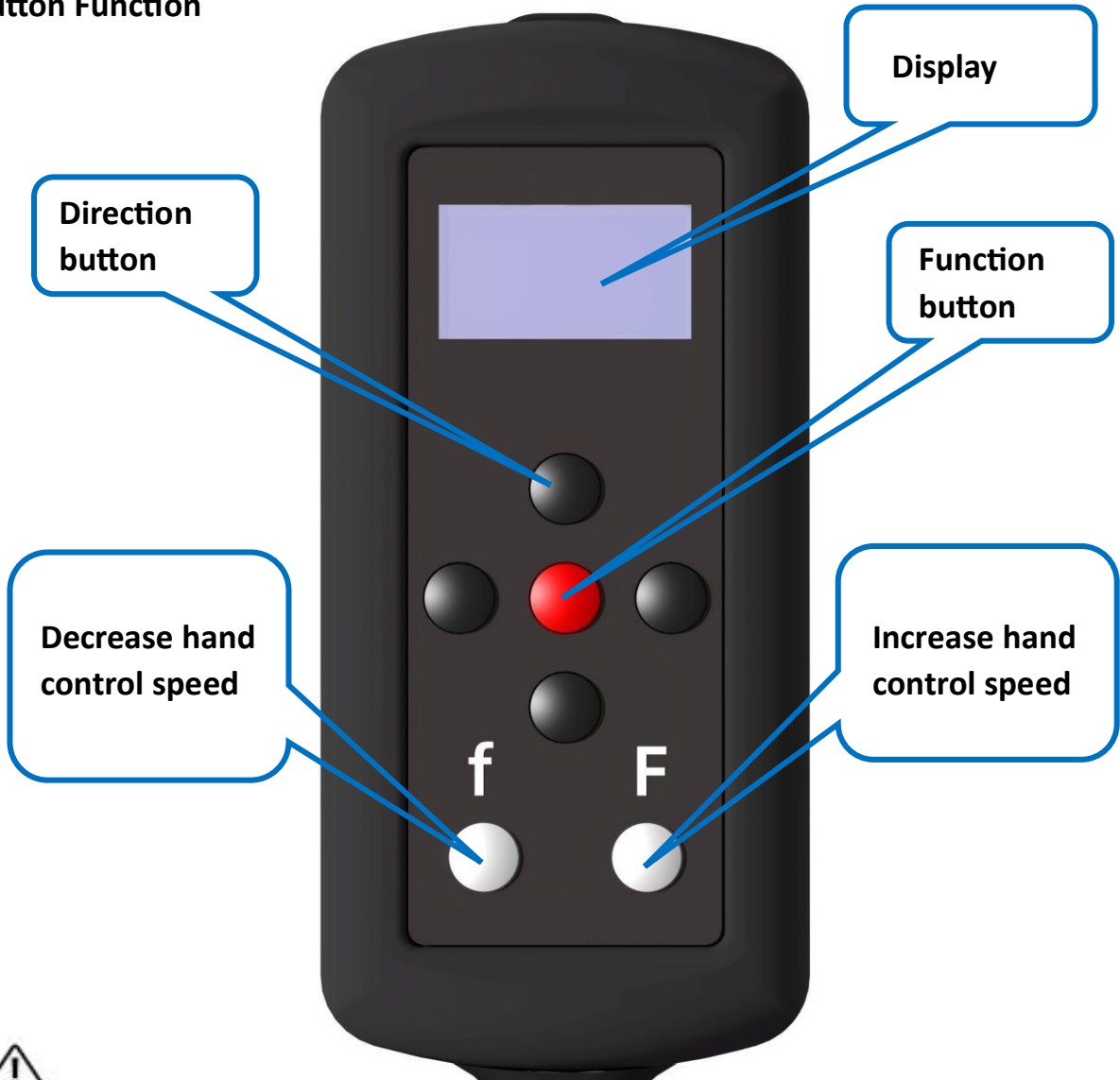
WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## HM31 Pro Hand Controller



**Keep the hand controller connected to the mount even when not in use or inquire about firmware options to disable its function.**

### Button Function



**For safety, the hand controller defaults to a low speed (20X) upon startup. Press 'F' to increase the speed.**

**WARNING!** Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## HM 31 Pro Hand Controller

### Button Function

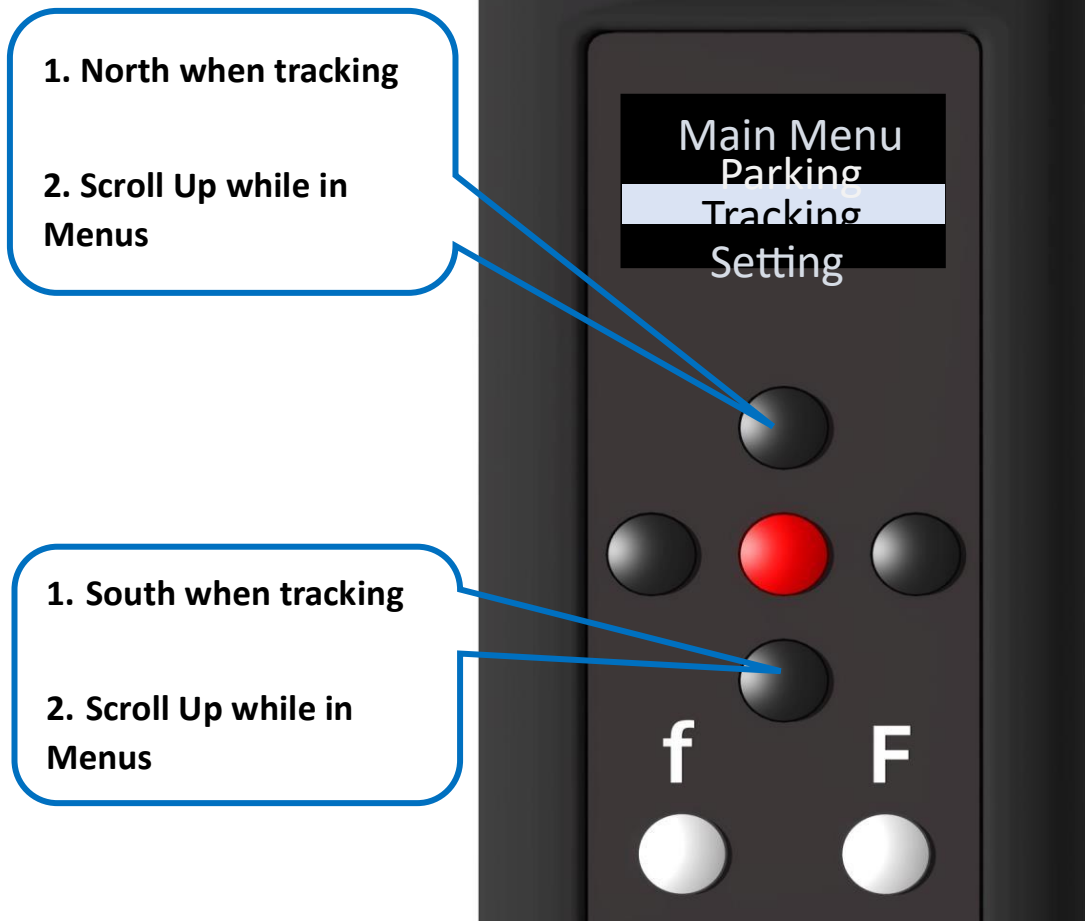


- 1. Short Press = switching display information**
- 2. Long Press = entering Main Menu**
- 3. Double Click = Feature Menu**

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## HM 31 Pro Hand Controller

### Button Function



### N and S Button Note

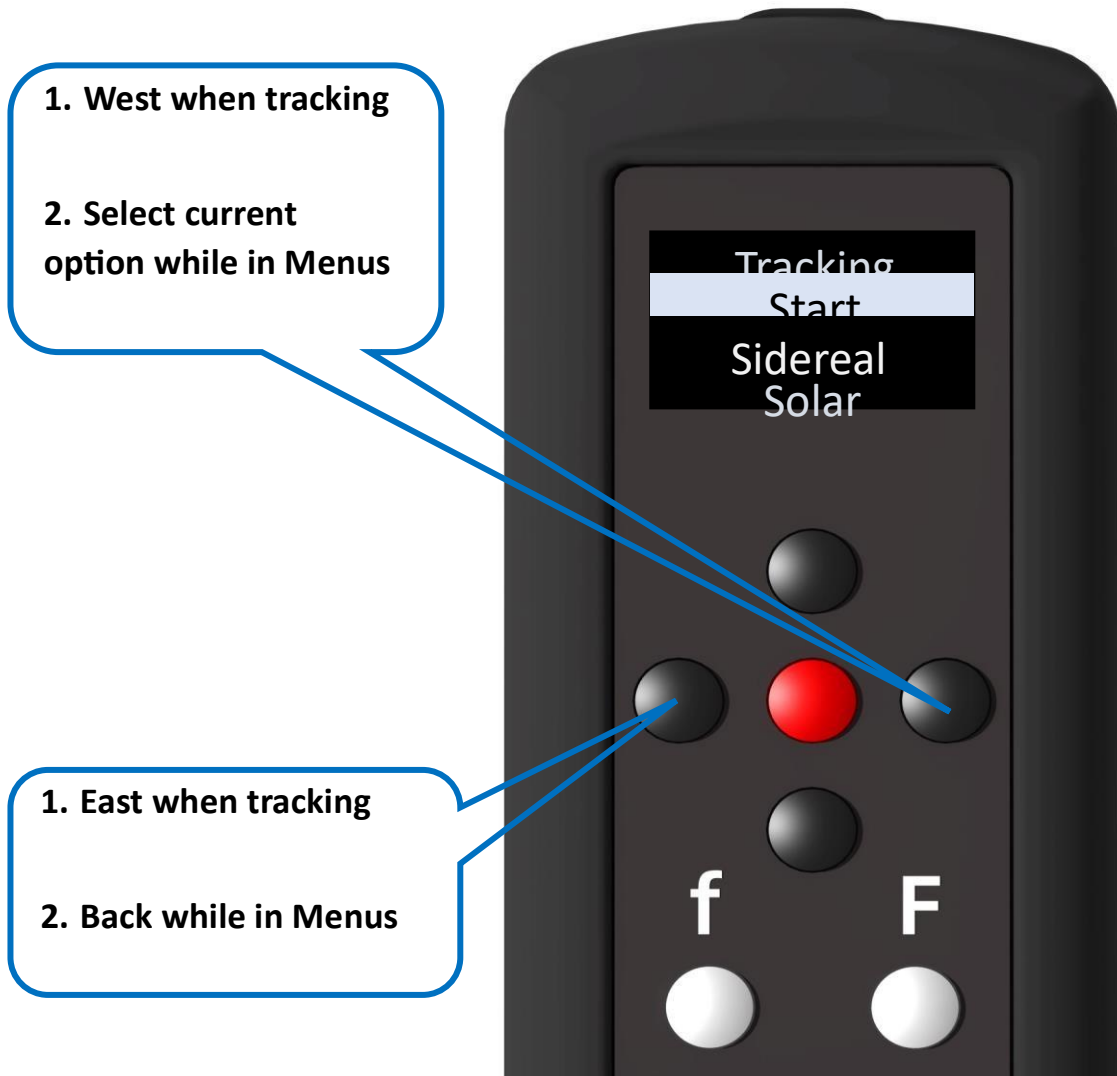
Near the celestial pole, the N and S buttons may behave unexpectedly. This is normal. The system always tries to move North when you press the N button. If it can't, it will move South until you release the button.

**Tip:** This behavior is expected near the pole and will make more sense with practice. In the Southern Hemisphere, this will be reversed.

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## HM31 Pro Hand Controller

### Button Function



Refer to the OnStep website for detailed menus and usage instructions.

<https://onstep.groups.io/g/main/wiki/28605>

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## Common status icons for the Hand Controller



Alignment Star #1



Alignment Star #2 (#3 thru #8 not shown)



Alignment Star #9 (last possible)



Telescope is at home position. Tracking is OFF



Unknown error. Tracking has stopped



Telescope position exceeds user defined Meridian limit. Tracking has stopped



Telescope position exceeds user defined RA limits "Under Pole". Tracking has stopped



Telescope position exceeds user defined Azimuth limits. Tracking has stopped



Telescope position exceeds user defined Declination limit. Tracking has stopped



Telescope limit sensed. Tracking has stopped



Telescope position exceeds user defined Horizon or Overhead limit. Tracking has stopped



Motor fault. Tracking has stopped



East side of pier. Declination is between 90 and -90



West side of pier. Declination is between 180 and 90 or -90 and -180



PEC, paused

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.



PEC, recording



PEC, playing



Telescope is slewing



Lunar Tracking rate is selected



Solar Tracking rate is selected



King Tracking rate is selected



Sidereal Tracking rate is selected



Sidereal Tracking, refraction compensated (RA-axis only)



Sidereal Tracking, refraction compensated (Dual-axis)



Sidereal Tracking, refraction and pointing model compensated (Full)



Sidereal Tracking, refraction and pointing model compensated (Full, Dual-axis)



Tracking is OFF



Telescope is guiding



Park failure



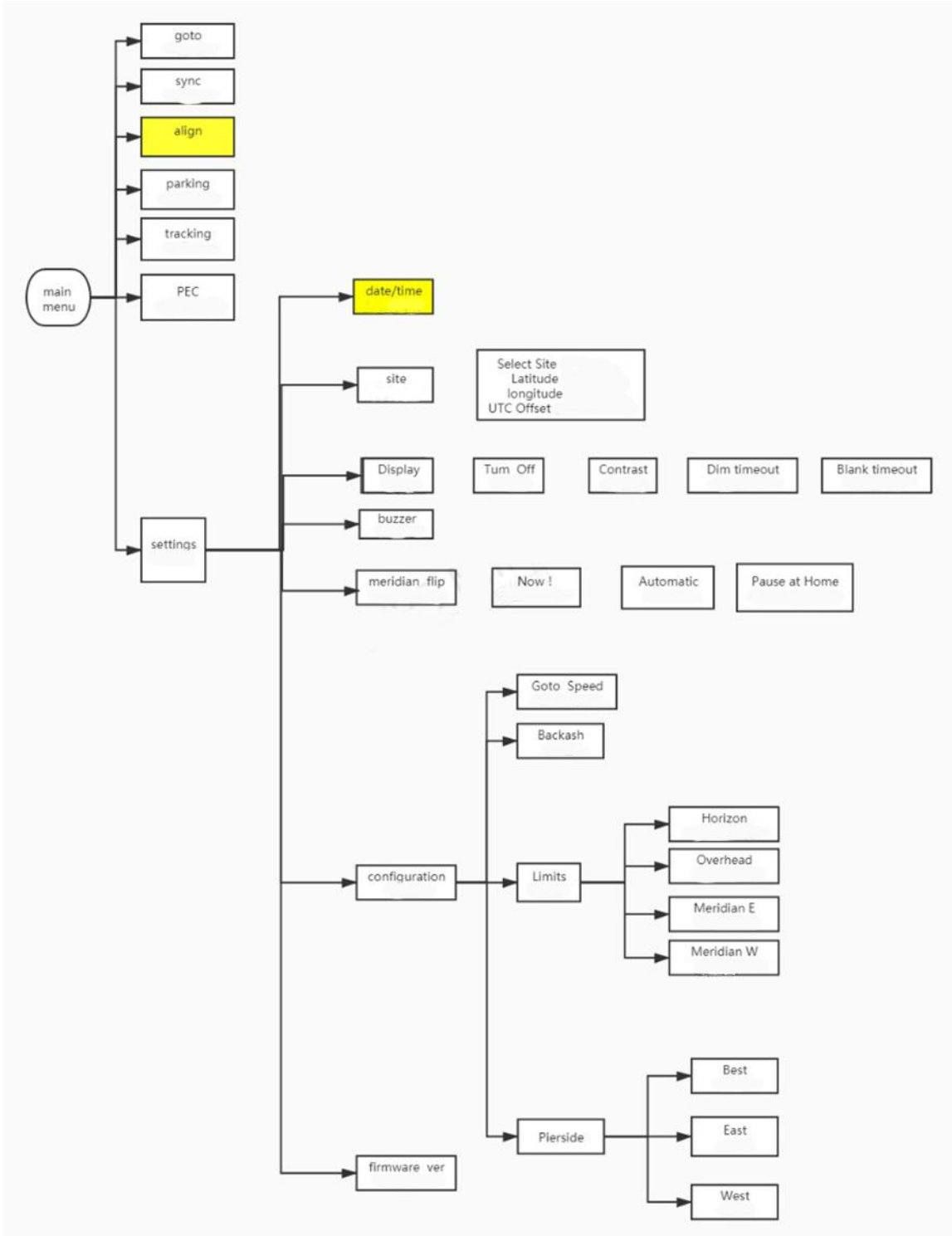
Telescope is slewing to park position



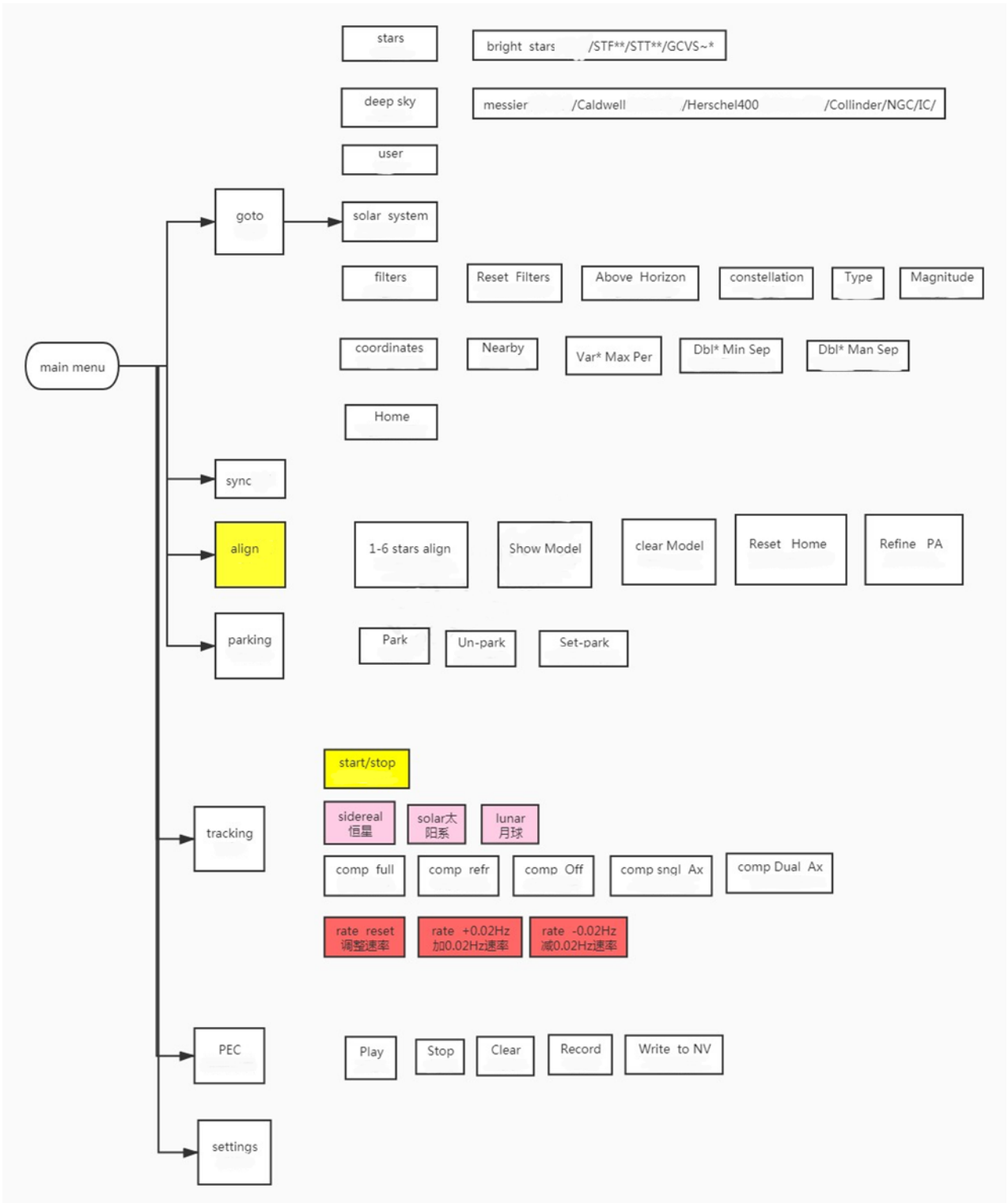
Telescope is parked

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## Hand Controller menu structure diagram



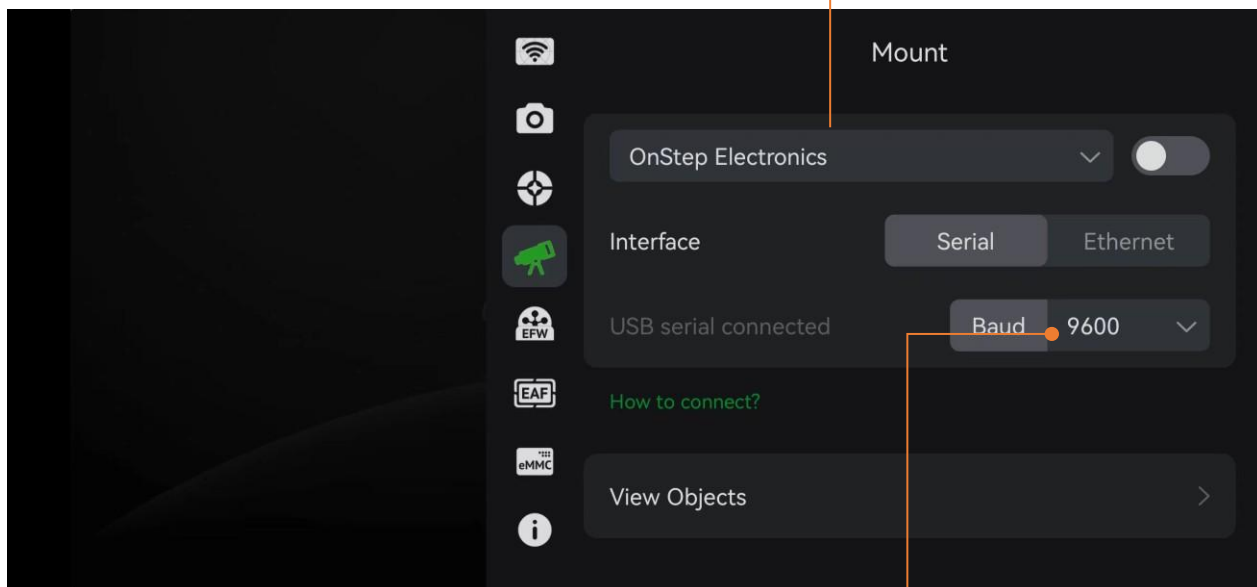
WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.



WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## OnStep and ASI AIR connection

Mount select: "OnStep Electronics"



Serial port baud rate 9600

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## OnStep and PC connection

### Step ① Installing the mount serial port driver cp2102



**Confirm that the mount serial port connection is normal in Windows Device Manager**

设备管理器

文件(F) 操作(A) 查看(V) 帮助(H)



### Step ② Install ASCOM platform

<https://www.ascom-standards.org/>



### Step ③ Install OnStep ASCOM driver <https://emcanastro.com/downloads/>

Select the correct serial port (check the correct port number in Device Manager) and connect the mount

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

OnStep Telescope Setup
✕

3.7

Port: COM5
 IP Address: 192.168.0.1:9999

Retry Timeout (3000ms):

Currently connected to: OnStep 4.25a
 Enable Serial Port DTR Control  Use Error Correction Proto

**Site Information**

 Latitude (N is +):   
 Longitude (W is +):   
 Elevation (m):   
 UTC Offset (opposite of a):

**Date/Time**

 Date:   
 Standard Time:   
 Time (UTC):   
 Time (LST):   
 Set Date/Time on Connect:

**Optics**

 Aperture (m):   
 Aperture Area (m<sup>2</sup>):   
 Focal Length (m):

NOTE: OnStep never uses Daylight Savings Time internally, so all time related values are based on Standard Time.

**Backlash**

 RA/Azm:  (arc-sec)  
 Dec/Alt:  (arc-sec)

**Limits**

 Horizon:  (deg)  
 Overhead:  (deg)  
 Meridian E:  (deg)  
 Meridian W:  (deg)

**Max. Goto Rate**

31.25 us  
 (6 deg/sec)

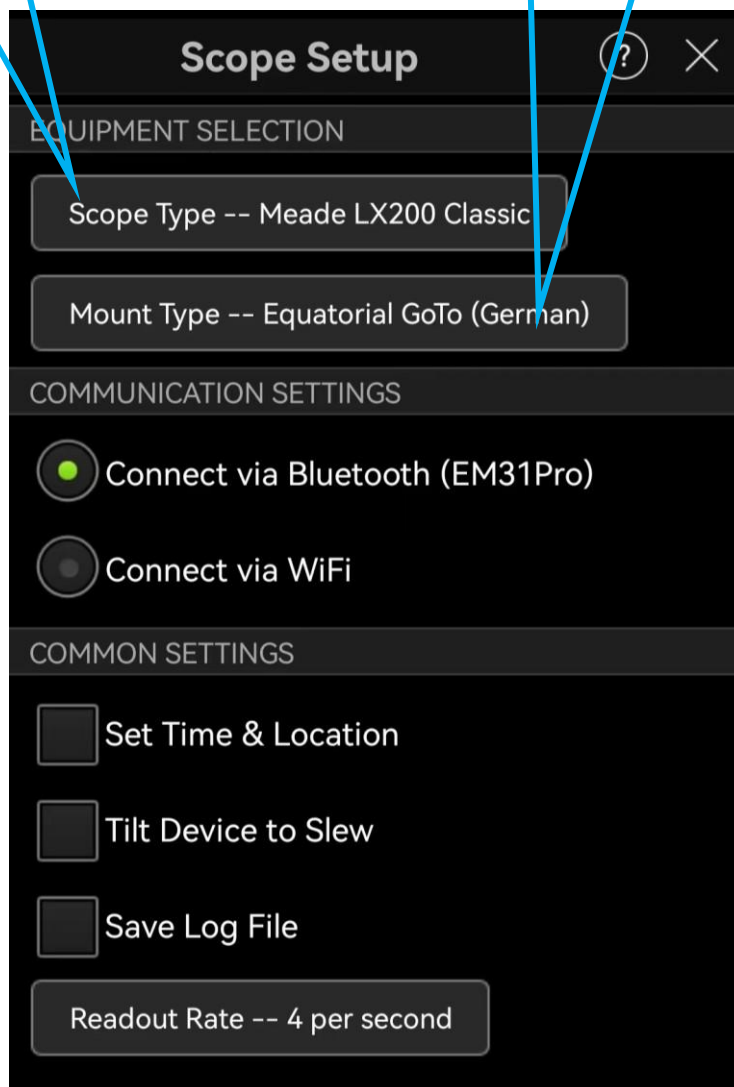
Trace on
OK
Cancel

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## SkySafari Connection

Scope Type:  
Meade LX200  
Classic

Mount Type: Choose  
Equatorial or Alt-Az  
depending on EM31Pro  
mode.



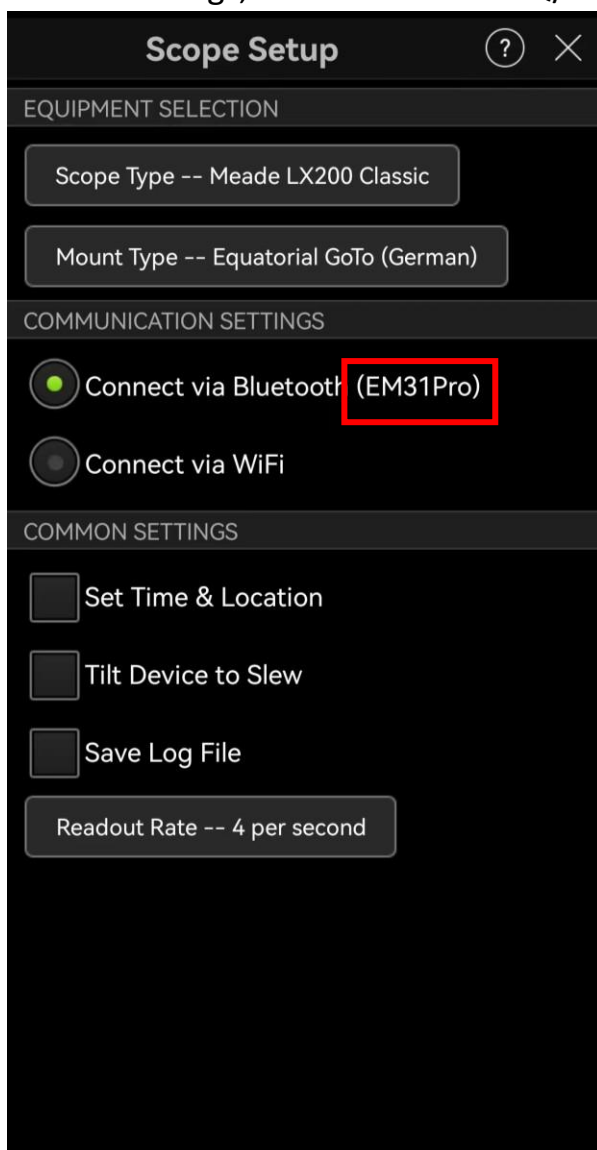
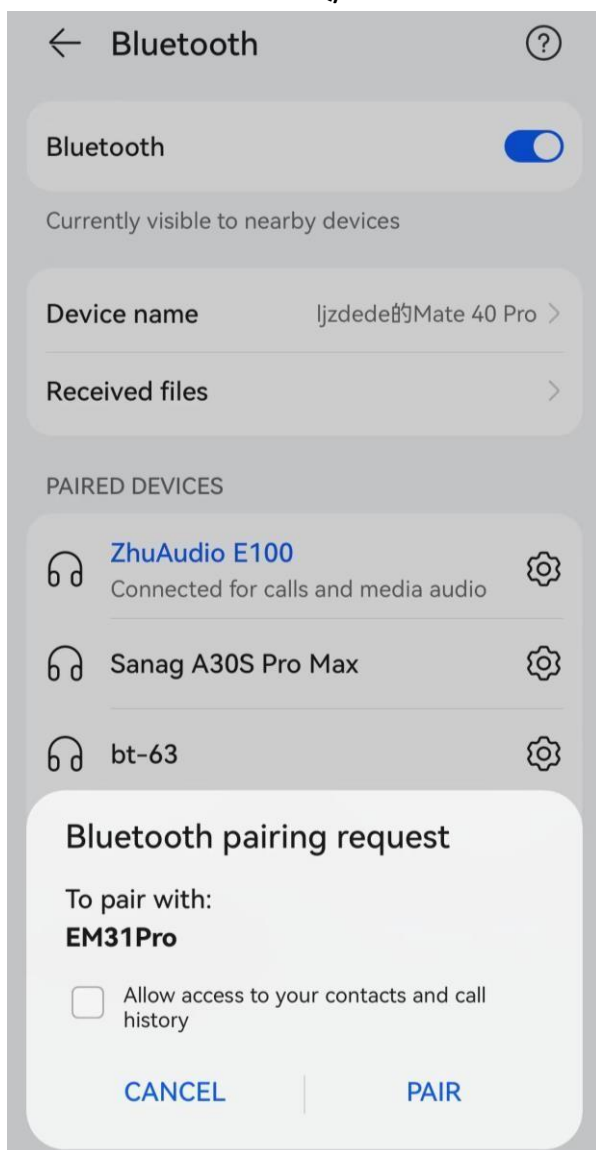
**Note:**

**Selecting to synchronize time and location information will slow down the mount connection startup, adding approximately 30 seconds, please wait patiently.**

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## SkySafari Connection 1. Via Bluetooth (**Android only**)

Pair with HM31Pro EQ/AZ via Bluetooth. Bluetooth settings, select HM31Pro EQ/AZ.



### Note:

**Using Bluetooth to connect to HM31Pro EQ/AZ will take around 40–60 seconds to initiate the mount connection.**

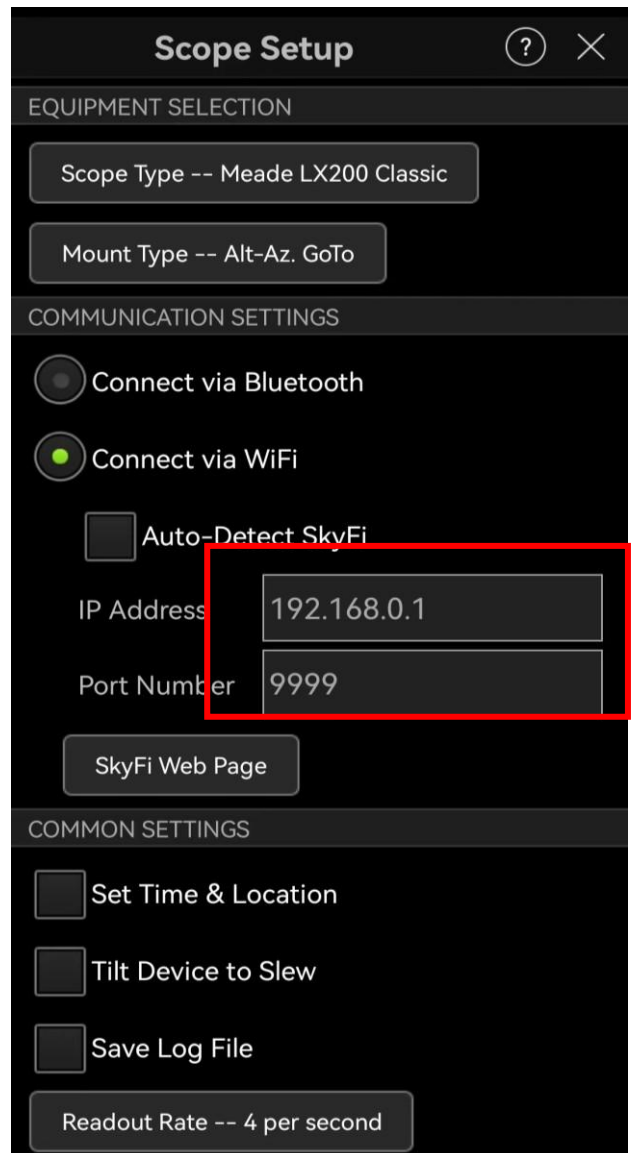
WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## SkySafari Connection 2. Via Wi-Fi (Android + Apple)

Connect to the mount's Wi-Fi hotspot.

Enter the following details:

IP: 192.168.0.1 Port: 9999 or 9998.




WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## Firmware Update

(Demonstrated using Windows 10)

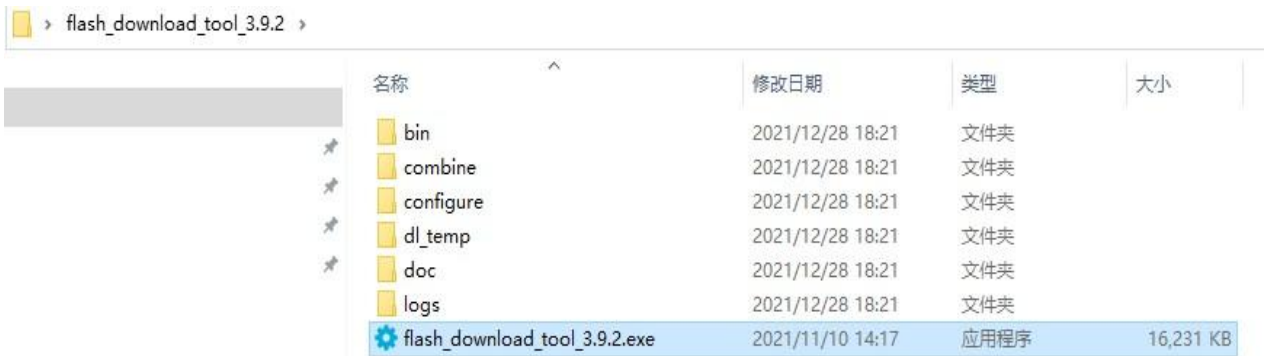
### ① Connect the device to the PC

- If updating the Mount: Connect the mount to the PC via USB. If the PC's USB port provides insufficient power, please connect a 12V power supply to the mount.
- If updating the Hand controller: Simply connect the hand controller to the PC via USB. No need to connect the mount.

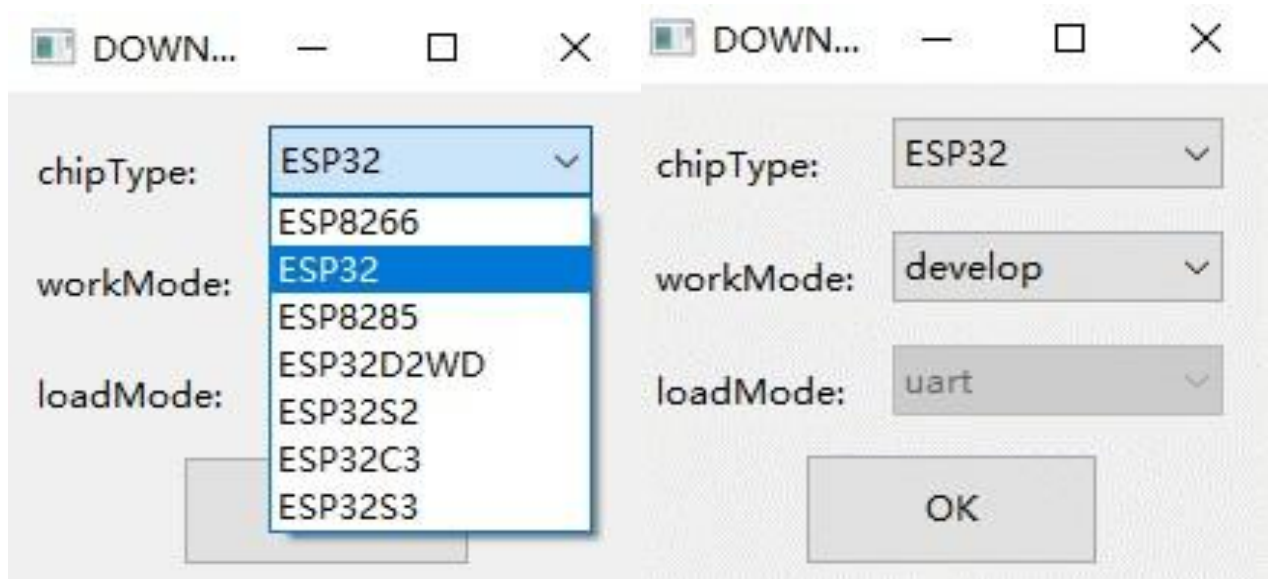
 **Note:** The mount and hand controller use separate firmware files and do not require simultaneous updates.

### ② Open the firmware flashing software

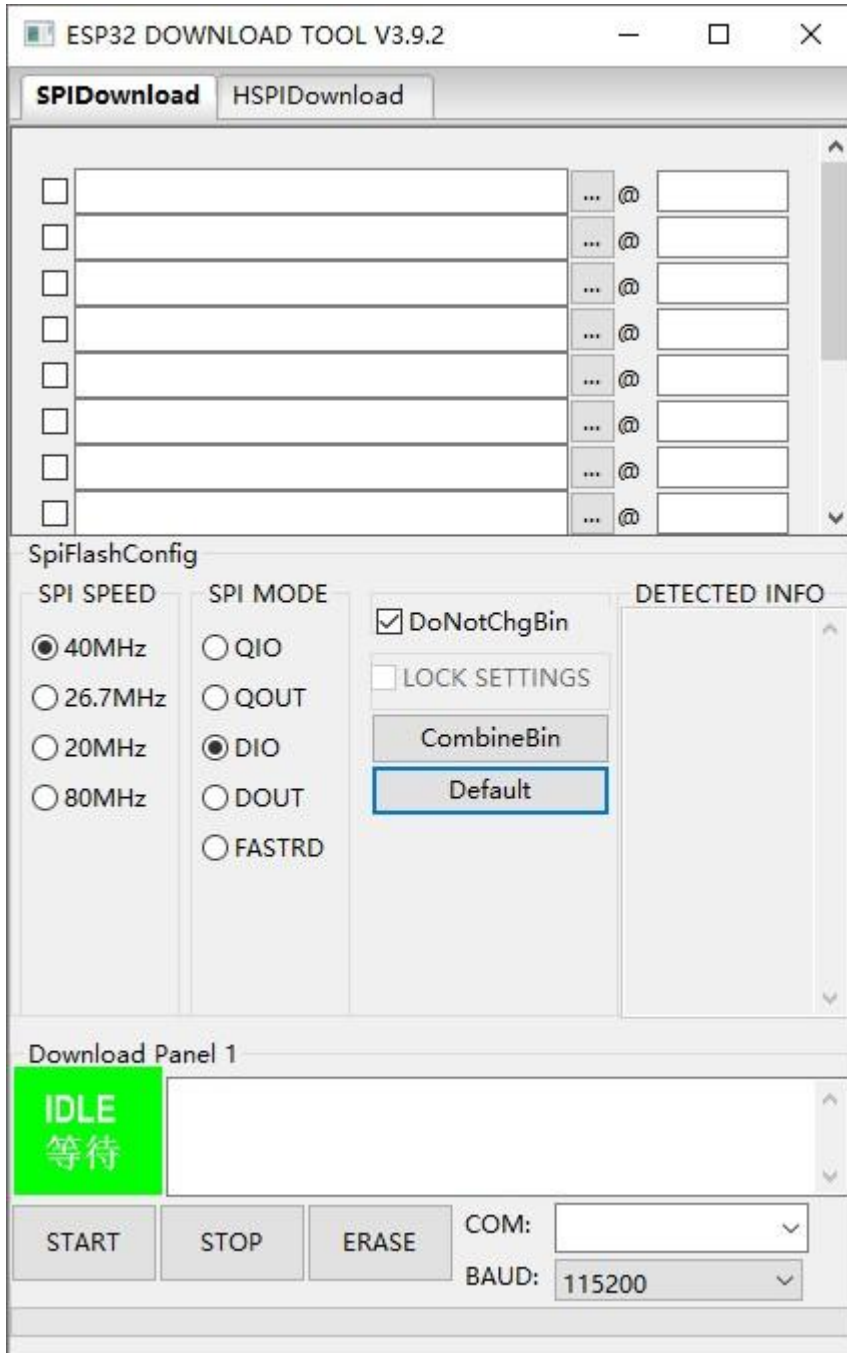
Firmware flashing software interface.



### ③ Select “ESP32” and “develop” and confirm

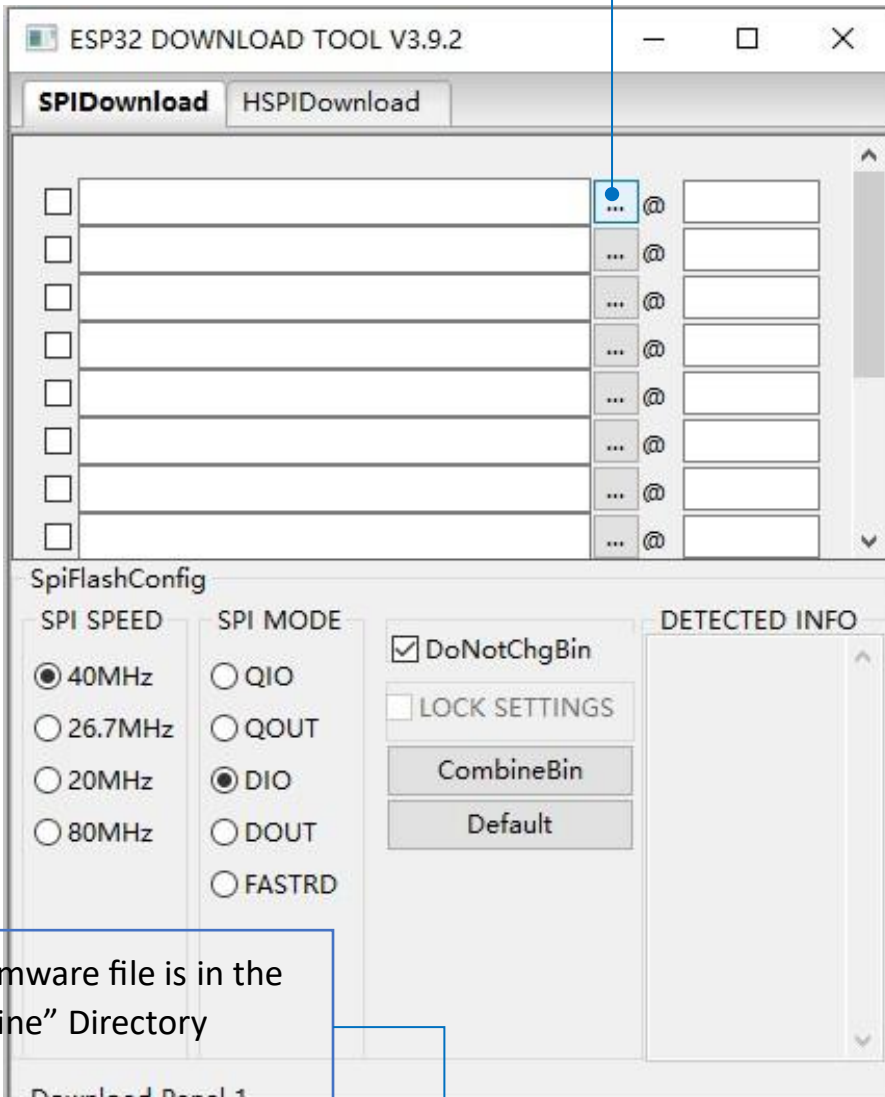


WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.



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#### ④ Open Firmware File



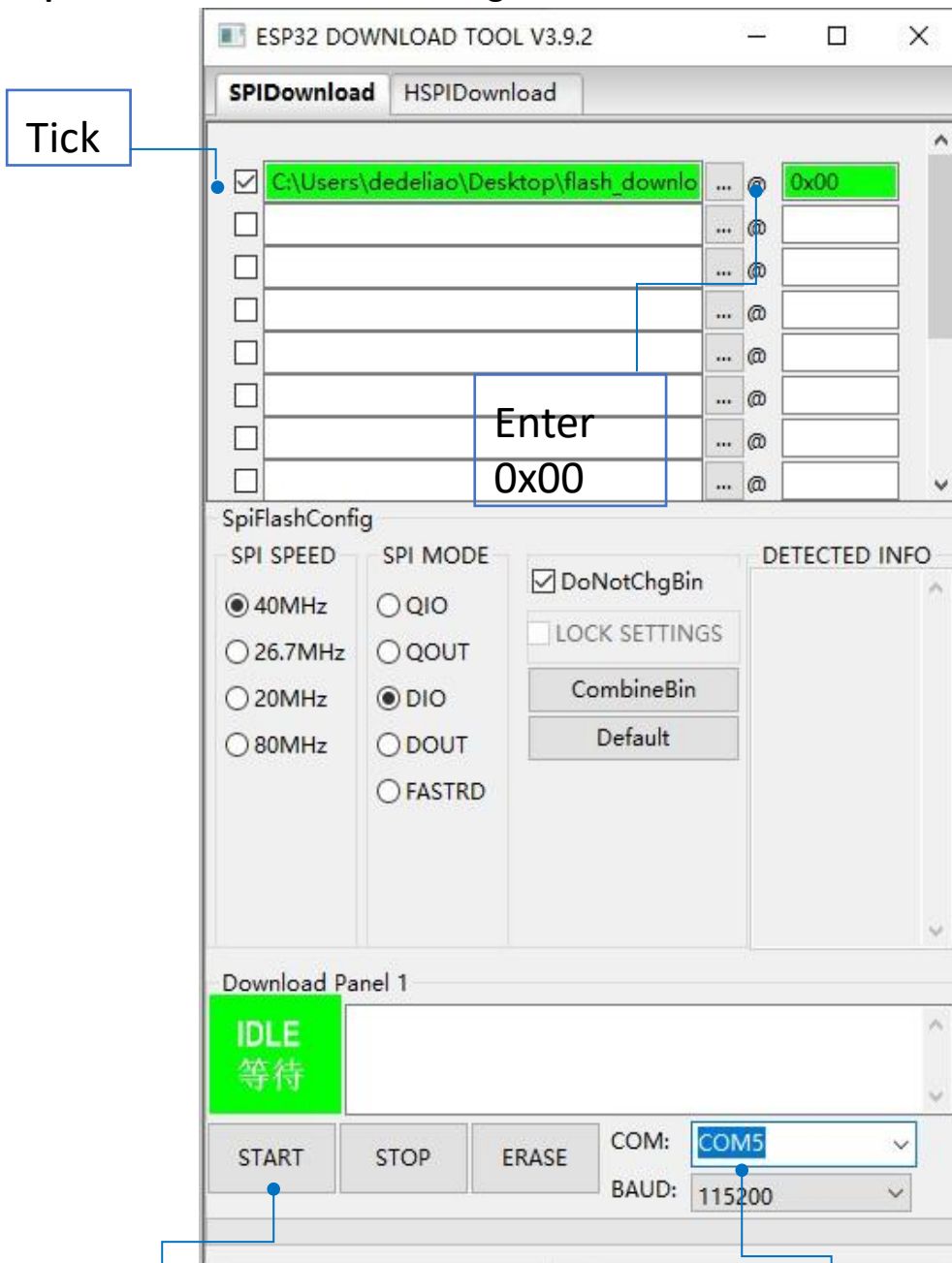
The firmware file is in the "combine" Directory

电脑 > 桌面 > flash\_download\_tool\_3.9.2 > combine

名称	修改日期	类型	大小
EM31onstep211228.bin	2021/12/27 20:56	BIN 文件	1,035 KB

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

⑤ Set parameters as shown in the figure below

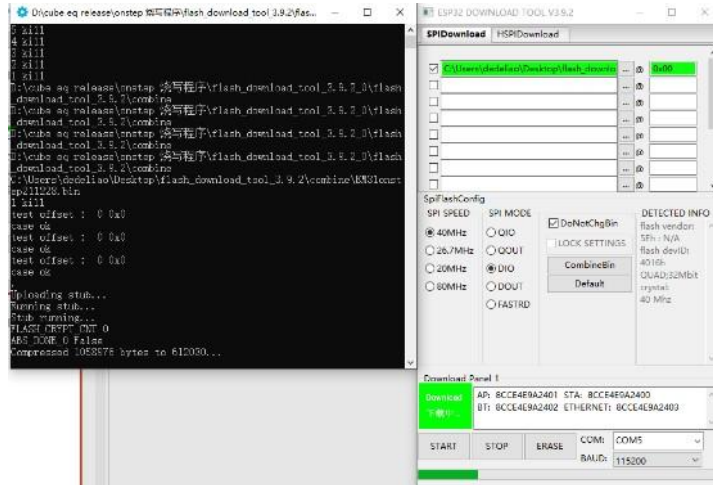


⑥ After setup, click "START" to flash the firmware.

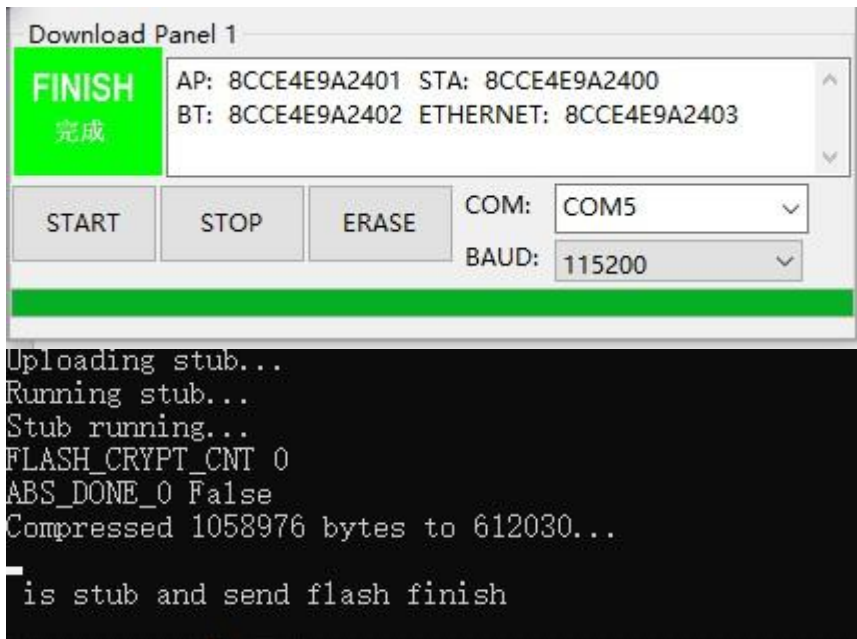
Select serial port

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## Firmware flashing begins.



Flashing complete, status bar shows "is stub and send flash finish".



⑦ After the firmware update, disconnect all connections (including the 12V power supply and USB cable) for 6 seconds, then reconnect the power to resume normal operation.

💡 **Note:** After the firmware update, some existing settings, such as GOTO speed, may be changed. Please check and reset them as needed before using the mount.

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## Warranty Statement

Thank you for purchasing the HM31Pro EQ/AZ Strain Wave Mount. To ensure you have the best experience with our product, we provide a two-year warranty service for the HM31Pro EQ/AZ. Below are the specific warranty terms and conditions:

### Warranty Period

This product is covered by a two-year warranty starting from the date of purchase.

### Warranty Coverage

During the warranty period, if the product exhibits any material or workmanship defects under normal use, we will provide free repair or replacement services. This includes, but is not limited to:

- Motor failure
- Control board failure
- Mechanical structure damage

### Warranty Exclusions

The warranty does not cover the following situations:

1. **Human-induced damage:** Including but not limited to damage caused by dropping, impact, submersion, excessive use, etc.
2. **Unauthorized repair or modification:** If the product has been repaired or modified by an unauthorized service provider, the warranty will be void.
3. **Accidents or natural disasters:** Including but not limited to fire, earthquake, flood, lightning, etc.
4. **Normal wear and tear:** Such as normal wear and tear, scratches on the exterior, etc.

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## Warranty Service Procedure

**1.Contact Customer Service:** If your product requires repair, please first contact the after-sales service of the purchase channel or directly contact our customer service center.

Provide a detailed description of the fault.

**2.Fault Diagnosis:** We will conduct a preliminary diagnosis of the reported fault via email. If further inspection is needed, we will guide you to send the product to the designated repair center.

**3.Repair or Replacement:** Once the product is confirmed to be within the warranty conditions, we will provide free repair services. If the product cannot be repaired, we will replace it with the same model or an equivalent product of the same value.

**4.Return Shipping:** The repaired or replaced product will be shipped back to you via courier.

## Important Notes

☒ Before sending the product, please ensure it is properly packaged to avoid further damage during transit. ☒ When shipping, include a description of the fault.

If you have any questions or need further assistance, please feel free to contact our customer service team. We are dedicated to serving you.

Customer Service Email: [info@nimax.de](mailto:info@nimax.de) Thank you for your understanding and support.

WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

## Appendix A - Symbols and Error Messages



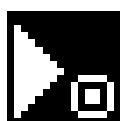
Telescope is at home position. Tracking is OFF



Tracking sidereal is ON



Tracking moon is ON



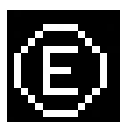
Tracking sun is ON



Tracking is OFF



Telescope is slewing



East side of pier. Declination is between 90 and -90



West side of pier. Declination is between 180 and 90 or -90 and -180



Telescope is slewing to park position



Telescope is parked. Press shift and then east button to unpark

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Park failure



Buttons are locked to avoid unintentional press



Show guiding correction, for pulse Guiding and ST4 corrections



Telescope position exceeds user defined Horizon limit. Tracking has stopped



Telescope position exceeds user defined Meridian limit. Tracking has stopped



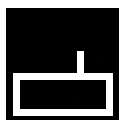
Telescope position exceeds user defined Declination limit. Tracking has stopped



Motor fault. Tracking has stopped



WiFi is ON. If it is configured in station mode it shows a successful connection to the WiFi router



WiFi is ON but has no connection to the WiFi router. Reasons are e.g. out of range



GNSS receiver synced with satellites, you can now update your location and/or Time with GNSS signal, when the Telescope is at home/park. The GNSS


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feature is turned off when the telescope is not at home and not at park hence the icon will disappear if you leave the Park home position

### Catalogue icons:

 Globular star cluster

 Galaxy

 Open star cluster

 Planetary nebula

 Nebula

### Symbol Description



forbidden



Important points



Operation instruction



Blue stands for counter-clockwise rotation



Green stands for clockwise rotation

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Observe in the direction indicated by the dashed arrow.

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## Appendix B – Technical Specifications

1. **Weight of the main body** : approx. 4kg (without Dovetail & adapter)
2. **Payload** :  $\leq 15\text{kg}$  (without counterweight)  $\leq 20\text{kg}$  (with counterweight)  
**Note:** payload calculated in the condition that the telescope's center of gravity is 20cm from RA axis
3. **Latitude adjustment** :  $0^\circ \sim 90^\circ$  (fine adjustment  $\pm 10^\circ$ )
4. **Azimuth adjustment** :  $-8^\circ \sim +8^\circ$
5. **RA** : 17 type 100:1 SWG+ Synchronous Belt  
(300:1 reduction ratio )
6. **DEC:** 17 type 100:1 SWG+ Synchronous Belt  
(300:1 reduction ratio )
7. **Motor:** 42 Closed-loop stepper motor (RA with Brake)
8. **Goto speed** : max  $6^\circ/\text{s}$
9. **Power port** : DC5.5-2.1 12V 5A (Cable Management Support)
10. **Power consumption** : tracking 0.4A, Goto 0.7A
11. **Communication interface** : usb2.0, Wi-Fi, Bluetooth
12. **Support:** Asiatic, ASCOM ( NINA、PHD2)、INDI、SkySafari
13. **Dovetail** : Vixen  $75^\circ$  & LOSMANDY  $60^\circ$  ; Arca(Optional)
14. **Home position** : by bubble levels
15. **Mode** : Equatorial mode; Altazimuth mode (side & top)
16. **Hand controller** : Wired hand controller



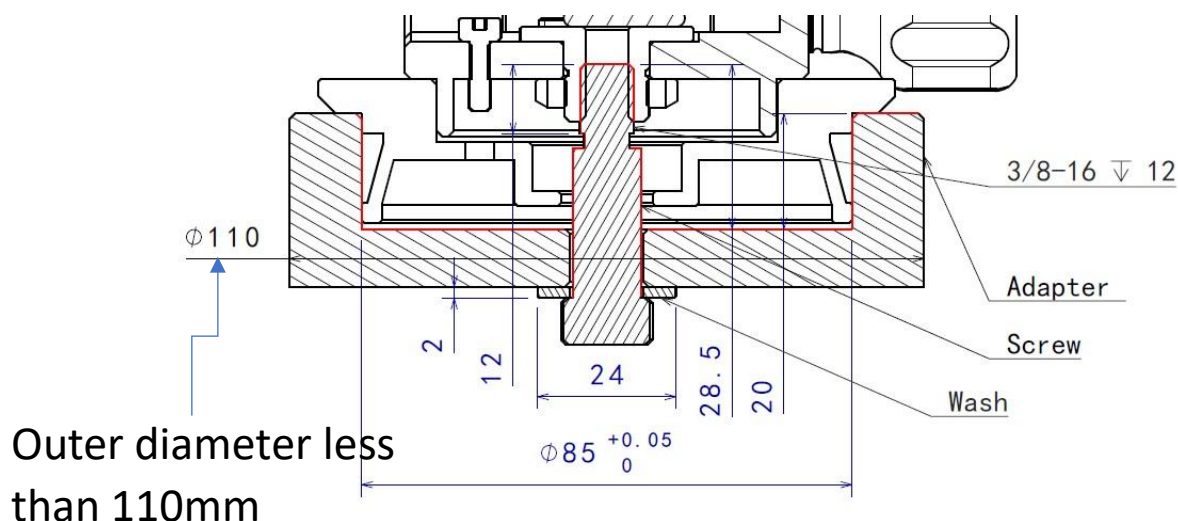
The payload capacity is not exactly equal to the total weight of the equipment being mounted. The effective weight that the mount can support depends closely on the center of gravity of the entire setup. Equipment with a higher center of gravity will reduce the mount's loadbearing capacity accordingly. Before installing heavy equipment with a high center of gravity, please refer to the HM31Pro EQ/AZ load formula to ensure it does not exceed the weight limit.

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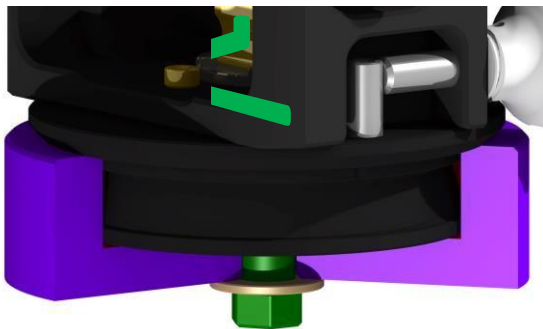
## Appendix C – Using the mount with a pier or non-compatible tripod

The standard setup does not include accessories for mounting the HM31Pro EQ/AZ on non-compatible tripods or piers. Users who wish to install the mount on a different tripod will need to design and fabricate a custom adapter and appropriate mounting bolts.

The dimensions should follow the chart below:



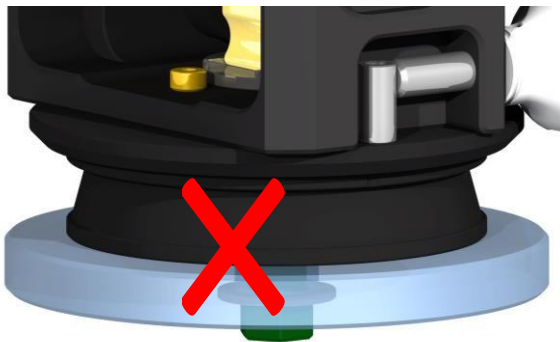
WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.







Correct adapter structure



Incorrect adapter structure, it is prohibited to connect to the mount through only one plane



WARNING! Never use a telescope to look at the Sun! Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or viewfinder as it is moving. Children should always have adult supervision while observing.

		<b>EU Konformitätserklärung</b> <b>EU declaration of conformity</b>	
Deutsch	English		
Wir, die Firma	We, the company	NIMAX GmbH	
erklären in alleiniger Verantwortung, dass das Produkt mit Artikelnummer	declare under our sole responsibility that the following product with ID	86211	
und Produktbezeichnung	and product name	Omegon Pro HM31Pro EQ/AZ	
Produktbild	Image		
Name und Adresse des Herstellers oder seines autorisierten Vertreters	Name and address of the manufacturer or his authorised representative	NIMAX GmbH Otto-Lilienthal-Str. 9 D-86899 Landsberg am Lech Germany	
Geräteart	type of product	Montierung / Mount	
Handelsmarke	trademark	Omegon Pro	
Modell	model	HM31Pro EQ/AZ	
weitere Angaben	further details		
<b>die grundlegenden Anforderungen folgender EU-Richtlinien erfüllt:</b>	<b>complies with the standards of following EU regulations:</b>		
RoHS	RoHS	<a href="#">2011/65/EU</a>	
Elektromagnetische Verträglichkeit	Electromagnetic compatibility	<a href="#">2014/30/EU</a>	
Funkanlagen	Radio equipment	<a href="#">2014/53/EU</a>	
Batterien	Batteries	<a href="#">(EU) 2023/1542</a>	
Bevollmächtigter zur Zusammenstellung der technischen Unterlagen:	Authorized person for technical documentation:	Tassilo Bohm	
Ort	Place of issue	Landsberg am Lech (DE)	
Datum	Date	18.05.2026	
Unterschrift	Signature	 Patrick Bosch (COO)	