EM31PRO
STRAIN WAVE MOUNT
USER MANUAL v2.1

EMCAN
www.emcanastro.com

Reading Tips

Reading Interpretation

Thank you for choosing EM31Pro Strain Wave Mount.

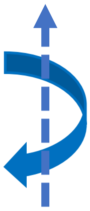
The manual is based on the factory default specifications. Therefore, some specifications or appearance of your mount may be different. This manual is subject to change without prior notice.

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.

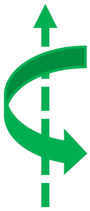
In order to ensure proper use of the mount, please read this user manual carefully before starting to use

Symbol Description

⊘ forbidden ⚠ Important points 💡 Operation instruction



Blue stands for counterclockwise rotation



Green stands for clockwise rotation

Observe in the direction indicated by the dashed arrow.

Reading Tips

Security precautions

⚠ 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

⚠ The operating temperature of this mount ranges from -15℃ to 40℃. Please use the mount reasonably under proper environmental conditions

⚠ 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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Product Overview

Brief Introduction

The EM31Pro Stain Wave Mount uses **17+17 strain wave reducers**. It is a **lightweight** mount but with a **high payload** capacity and **high-precision**. The EM31Pro supports **three modes**: EQ mode, Alt/Az side mode and Alt/Az top mode.

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

At EMCAN, we are dedicated to delivering a seamless experience, exceeding the expectations of astronomy enthusiasts.

Product Overview

Specification

1. Weight of the main body： approx. 4kg (without Dovetail & adapter)
2. Payload： ≤15kg (without counterweight)
≤20kg (with counterweight)

Note: payload calculated in the condition that the telescope's center of gravity is 20cm from RA axis

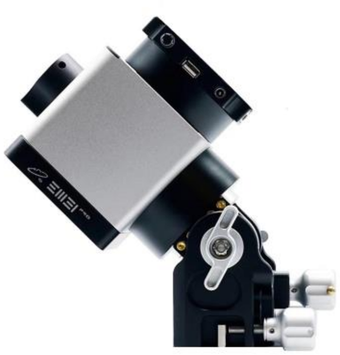
3. Latitude adjustment： 0°~90°（fine adjustment +/-10°）
4. Azimuth adjustment： -8°~+8°
5. RA： 17 type 100:1 SWG+ Synchronous Belt
(300:1 reduction ratio)
6.DEC: 17 type 100:1 SWG+ Synchronous Belt
(300:1 reduction ratio)
7.Motor: 42 Closed-loop stepper motor (RA with Brake)
8.Goto speed： max 6°/s
9.Power 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: Asiair、ASCOM (NINA、PHD2)、 INDI、SkySafari
13.Dovetail： Vixen 75° & LOSMANDY 60°； 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 load-bearing capacity accordingly.

Before installing heavy equipment with a high center of gravity, please refer to the EM31Pro load formula to ensure it does not exceed the weight limit.

Product Overview

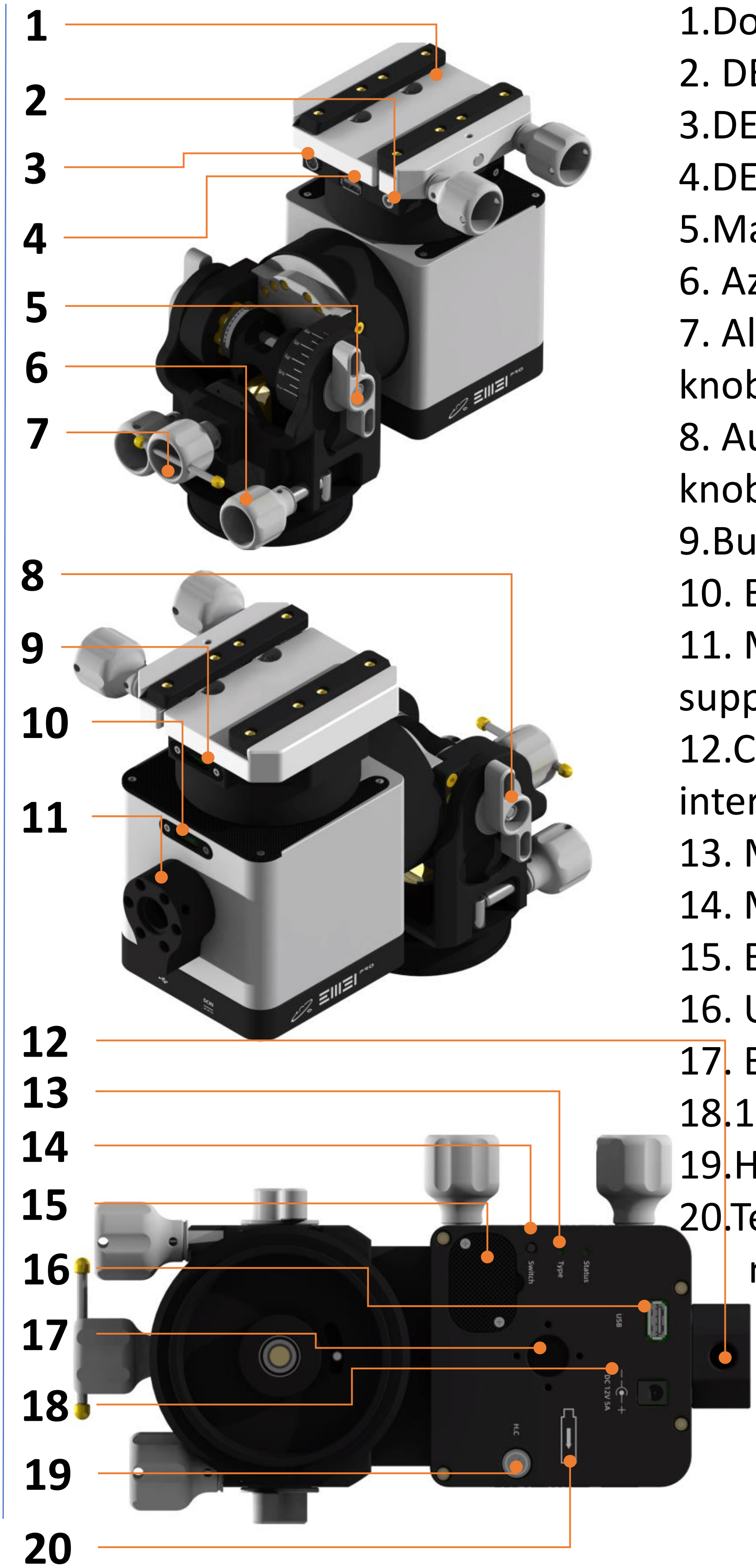
Standard Packing



1	EM31 Pro Body	X1
2	Hand Controller	X1
3	Dovetail （VIXEN & LOSMANDY）	X1
4	Adapter	X1
5	0.5m USB2.0 Cable	X1
6	2m USB2.0 Cable	X1
7	Shockproof Soft Bag	X1

Product Overview

Components


1
2
3
4
5
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7
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9
10
11
12
13
14
15
16
17
18
19
20
Switch
Type
Status
USB
DC 12V 5A
HC

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 knob
8. Auxiliary altitude locking knob
9.Bubble level for DEC axis
10. Bubble level for RA axis
11. Multifunctional front support
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
18.12v DC 5.5*2.1 power port
19.Hand controller port
20.Telescope directional mark

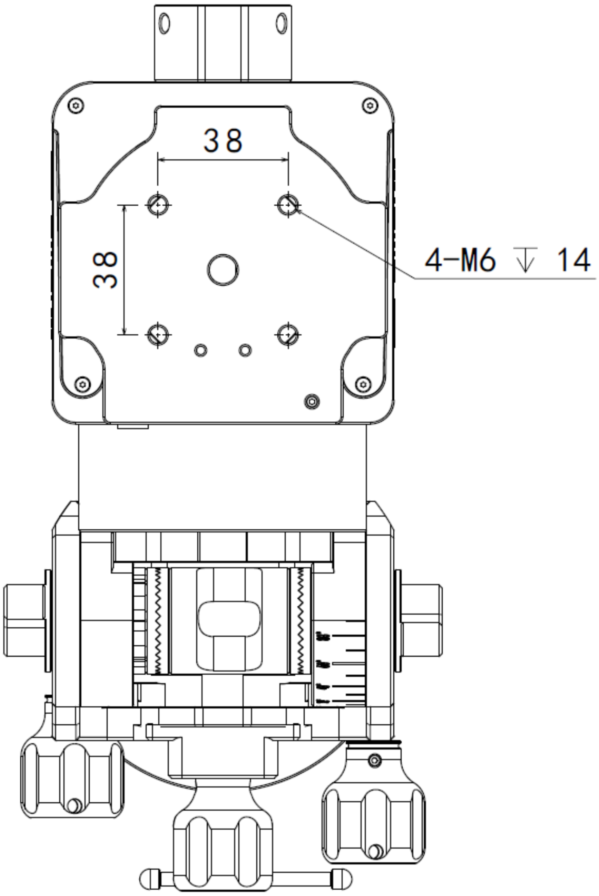
Product Overview

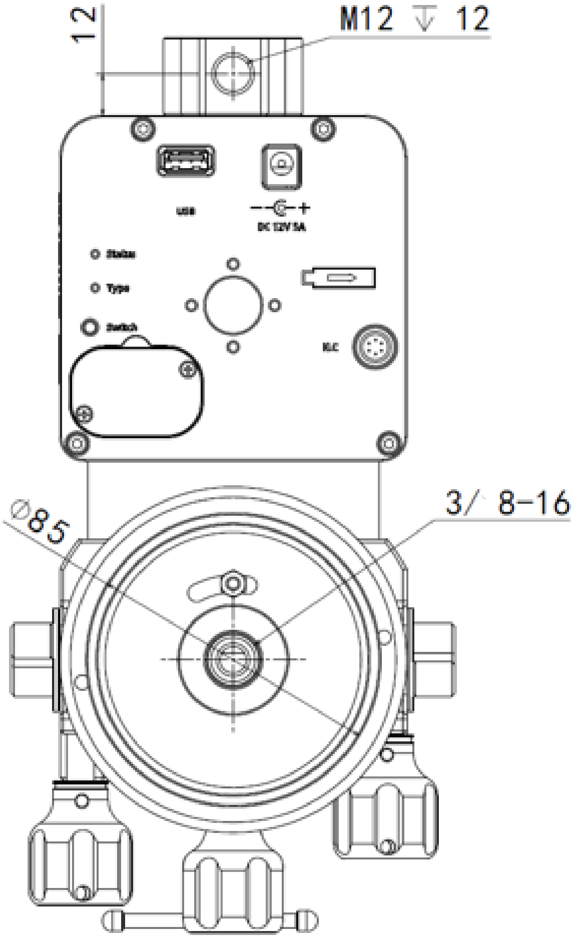
Interface Size

The standard dovetail of EM31Pro can be replaced, and the installation dimensions of the dovetail are as follows:

⚠

EM31Pro supports counterweight bar with a diameter less than 20mm, and with length less than 300mm, the counterweight should be no more than 5kg




12
M12 ↧ 12
USB
DC 12V 5A
Status
Type
Switch
ILC
Ø85
3/ 8-16

⚠

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

Product Overview

Optional Accessories：

EM TC44S Tripod

RP200 Extension Rod

AD120 Horizontal Adjuster

TC44A
(TC44S+AD120)

TC44L
(TC44S+RP200)

TC44U
(TC44S+AD120+RP200)

Parameters：	
Tripod interface： 85mm	Locking method： 3/8+three screws locked
Carbon fiber tube diameter：44mm	Carbon fiber tube thickness：2mm
Storage length：	EM-TC44S 620mm
	EM-TC44A 720mm
	EM-TC44L 850mm
	EM-TC44U 950mm

Size：	
Unfolded height:	EM-TC44S 530mm
	EM-TC44A 620mm
	EM-TC44L 720mm
	EM-TC44U 810mm
Weight：	EM-TC44S approx. 2.5kg
	EM-TC44A approx. 3.4kg
	EM-TC44L approx. 3.3kg
	EM-TC44U approx. 4.2kg

⚠ This accessory needs to be purchased separately

Product Overview

Optional Accessories：

EMH150 Fast-assembling pier extension

Material: Aluminum(AL6061),
Stainless steel
Size: H150mm dia110mm
Weight: 1.2kg

⚠ This accessory needs to be purchased separately

Product Overview

Optional Accessories：

EMH200 Fast-assembling pier extension

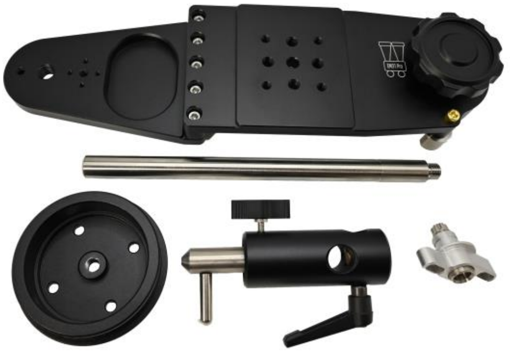
Material: Aluminum(AL6061),
Stainless steel
Size: H200mm dia110mm
Weight: 1.4kg

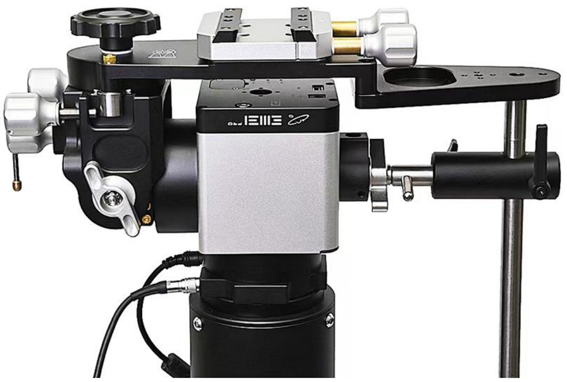
⚠ This accessory needs to be purchased separately

Product Overview

Optional Accessories：

Top-mounted mode supporting bracket





Material:
Aluminum(AL6061),Stainless steel,
Titanium alloy(counterweight bar)
Size: L350mm
Weight: 1.8kg

Suitable for Binoculars

⚠ This accessory needs to be purchased separately

Product Overview

Optional Accessories：

Ball head mount
adapter

Arca board strips

⚠ This accessory needs to be purchased separately

Product Overview

Optional Accessories：

Adapter for QHY
Pole master

Adaptor for iPolar
(Only applicable to
specific version)

⚠ This accessory needs to be purchased separately

Standard Use Procedure

Use Procedure

EQ Mode

Install equipment

↓

※ Set time and coordinates

↓

※※ Set home position

↓

Polar alignment

↓

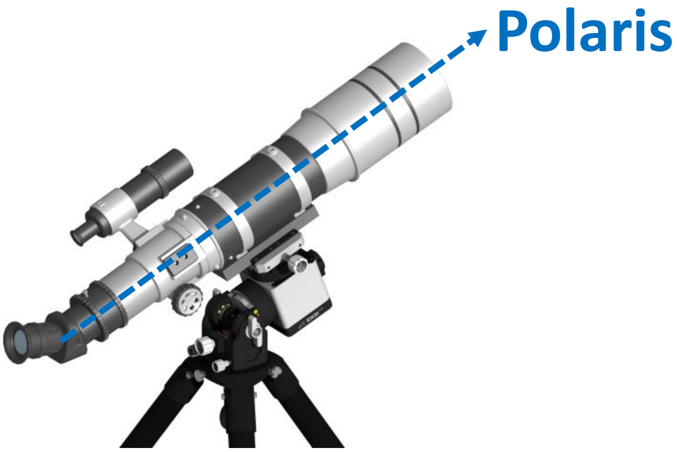
Select target and Goto

↓

Using Target Calibration

↓

Come into use



⚠ **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.

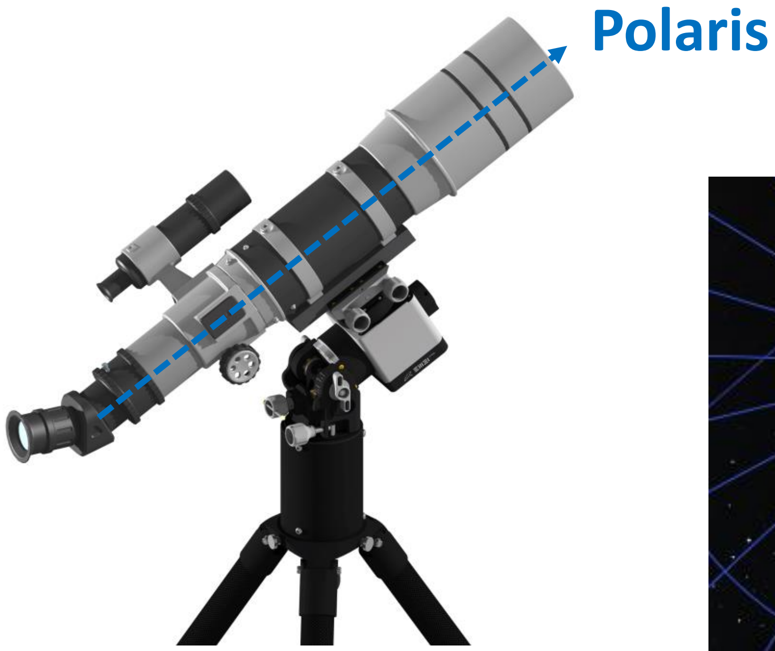
The default power-on position is the home position. So, the home position must be reset before each use, or the mount should be returned to the home position before powering off.

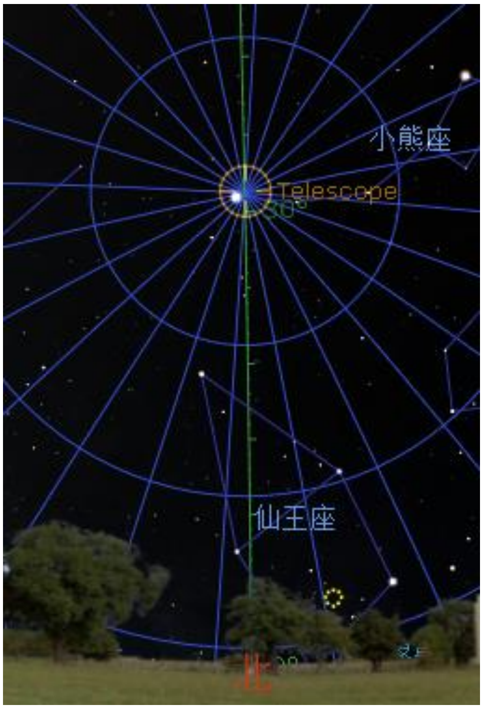
Standard Use Procedure

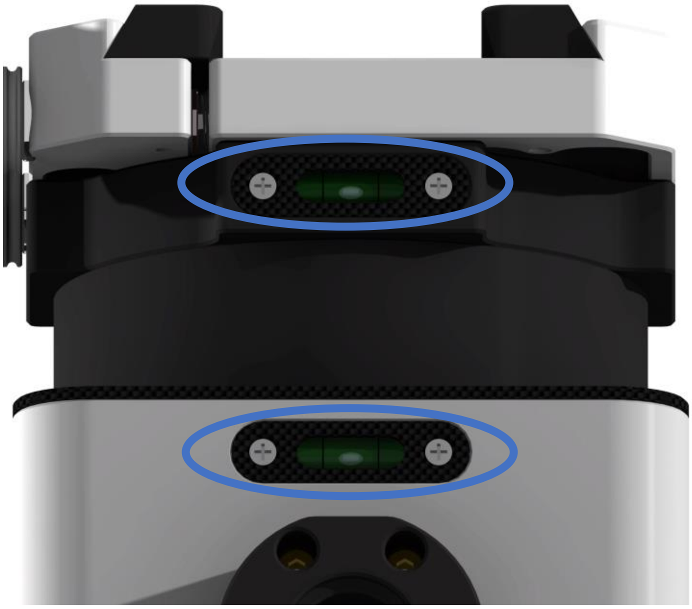
Use Procedure

Home position of EQ mode

The home position of the EQ mode is shown in the diagram below, and the telescope points to the Polaris.







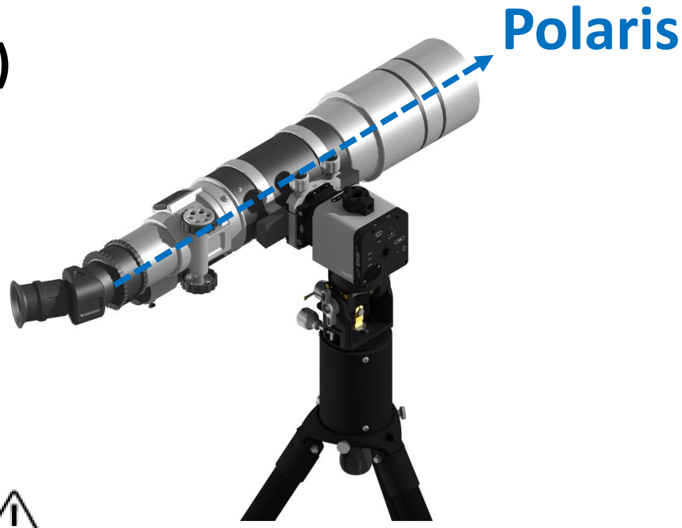
EM31Pro can confirm the EQ mode zero position using the bubble levels on the RA and DEC axes.

Standard Use Procedure

Use Procedure

Altazimuth Mode (side & top)

- Install equipment
- ※ Set time and coordinates
- ※ Horizontal adjustment
- ※ Mode confirmation
- **※※ Set home position**
- Select target and Goto
- Using Target Calibration
- Start observation



⚠ **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.

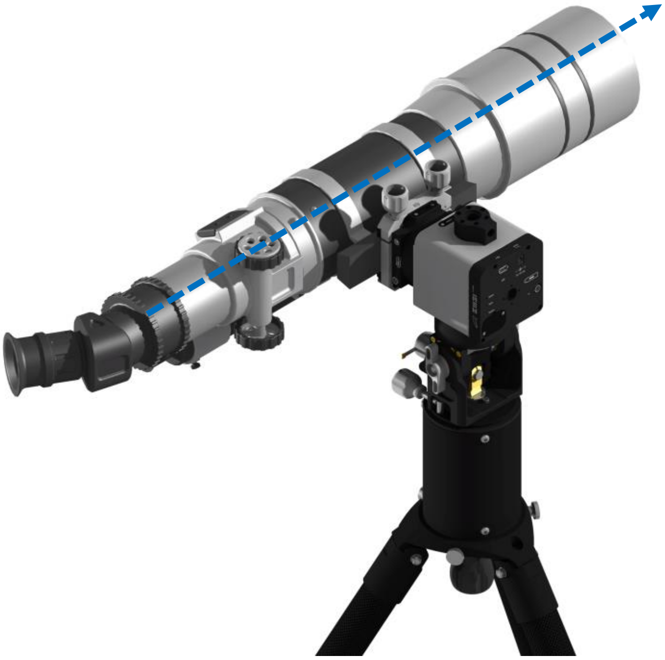
The default power-on position is the home position. So, the home position must be reset before each use, or the mount should be returned to the home position before powering off.

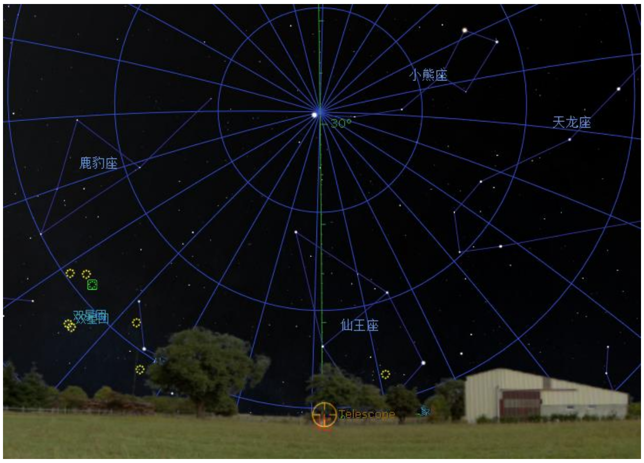
Standard Use Procedure

Use Procedure

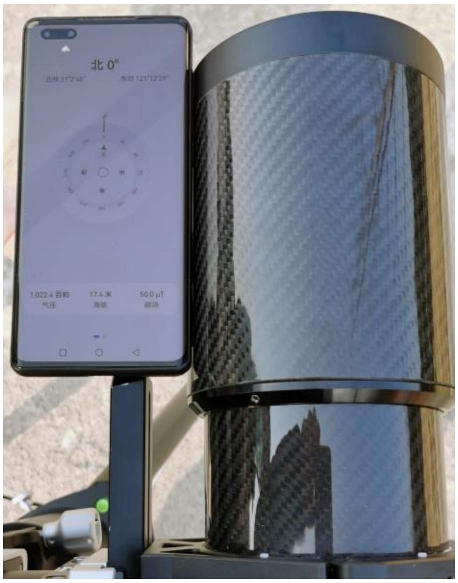
Home position of Altazimuth Mode (Side & Top)

The home position of the Altazimuth mode is shown in the diagram below, and the telescope points to the Polaris.




小熊座
天龙座
30°
鹿豹座
仙王座
Telescope

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

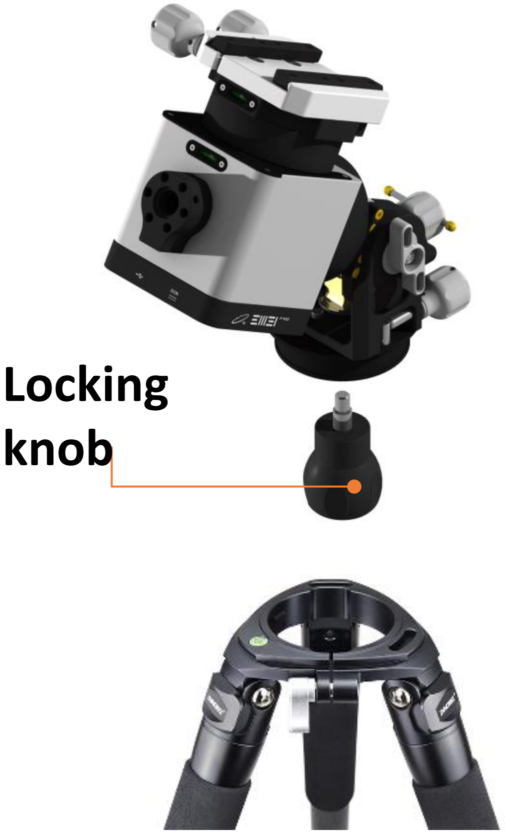


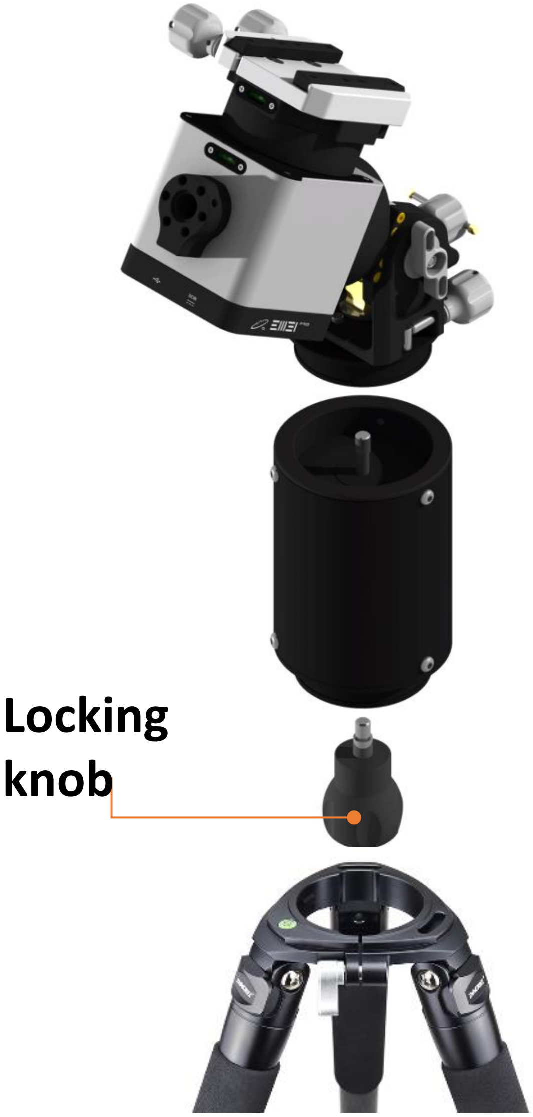
Installation and Use

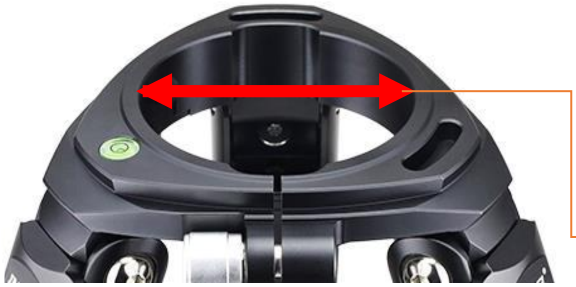
Installation of the mount with pier extension and tripod

EM 31 Pro can be mounted on center-column-free tripods with a bore diameter of 85 mm, such as RT90C, Gitzo5

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







⚠

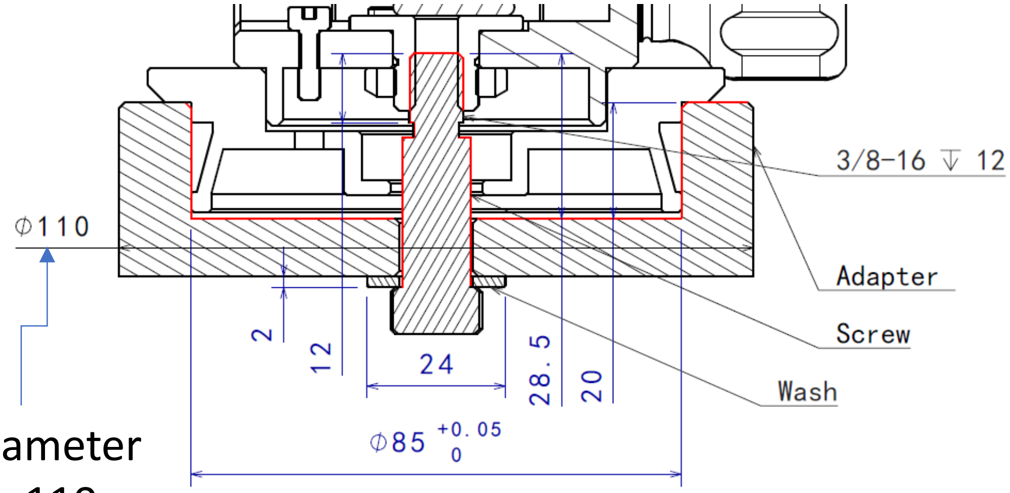
Ensure that non-official tripods are compatible with the mount and securely attached, with no wobbling or movement, to avoid precision issues or potential equipment falls.

Installation and Use

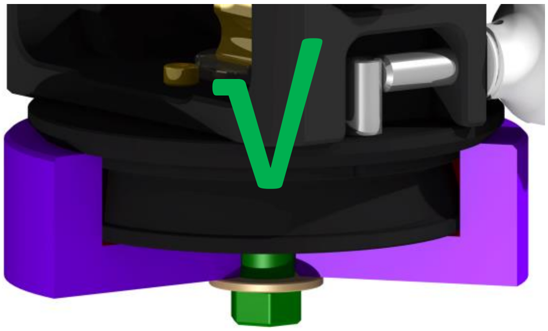
Installation of the mount with pier extension and tripod

The standard setup does not include accessories for mounting the EM31Pro on non-compatible tripods. 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：

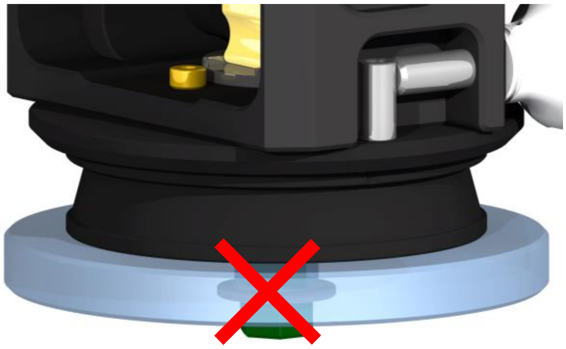


Outer diameter less than 110mm



Correct adapter structure

⊘

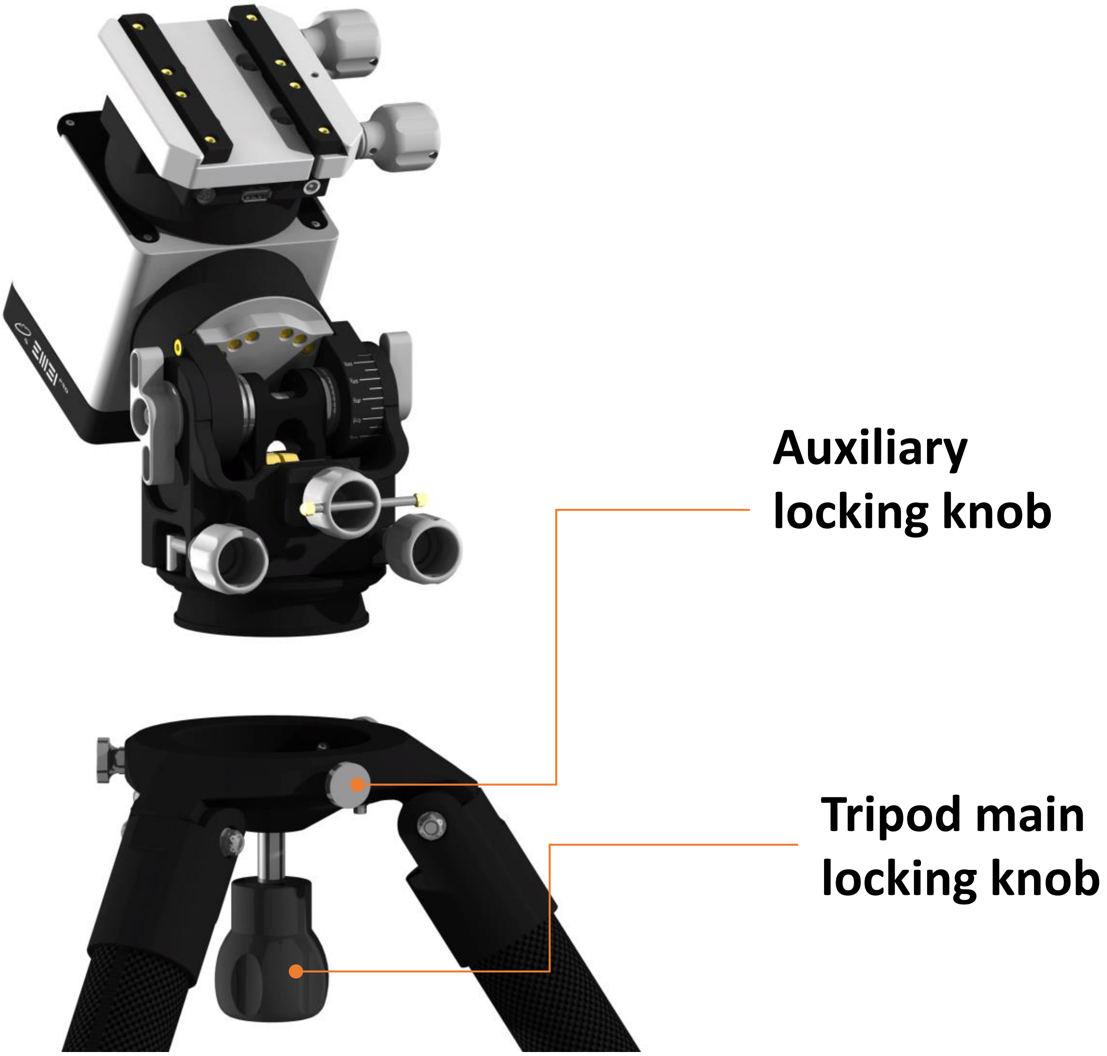


Incorrect adapter structure, it is prohibited to connect to the mount through only one plane

Installation and Use

Installation the mount with pier extension and tripod

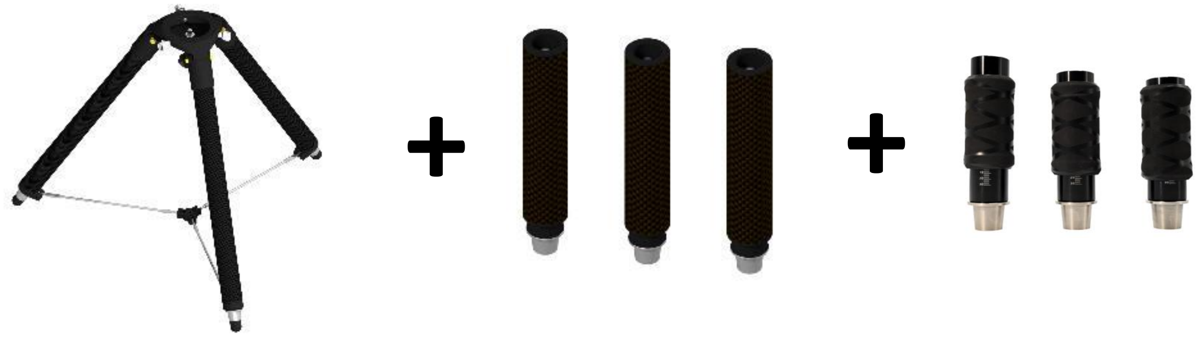
When using the EMTC44 tripod, the mount body can be directly attached to the tripod via the officially supplied adapter and secured with the tripod's three knobs for a more reliable connection.


Auxiliary locking knob
Tripod main locking knob

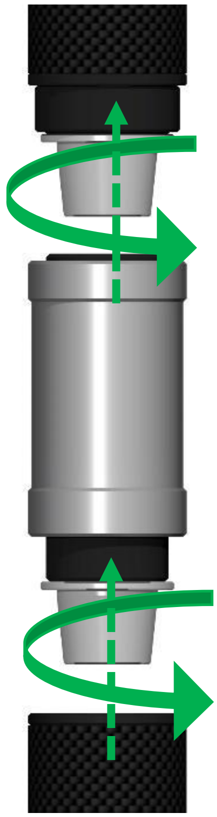
Installation and Use

Installation of the mount with pier extension and tripod

The EMTC44S is a high-load tripod specifically designed for astronomical applications. Its rigidity is enhanced by a non-retractable structure crafted from 44mm/2mm carbon fiber tubes. Additionally, the tripod's height and support area can be extended using the heightening section.



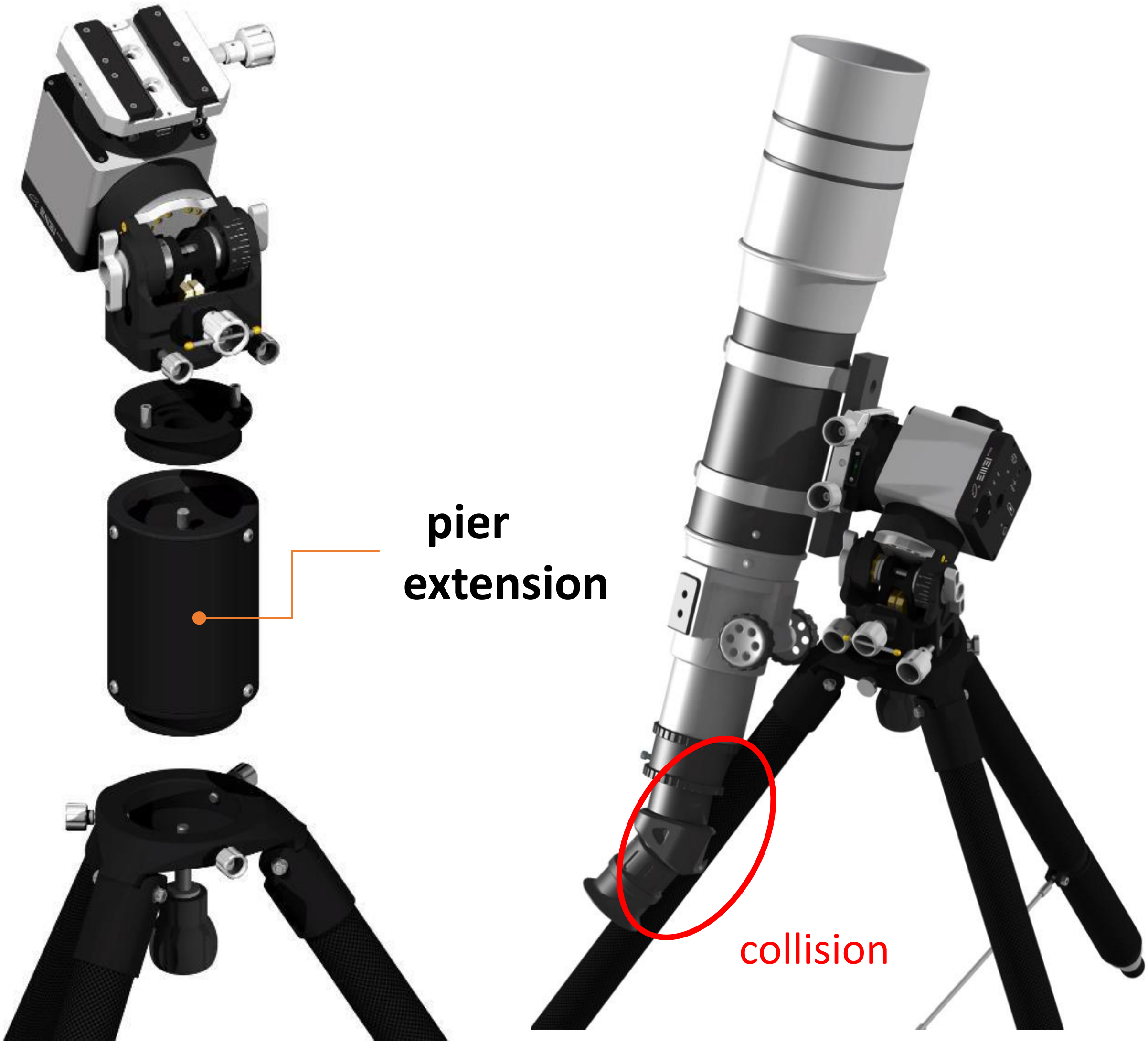
Rotate clockwise to install the extension rod and horizontal adjuster



Installation and Use

Installation of the mount with pier extension and tripod

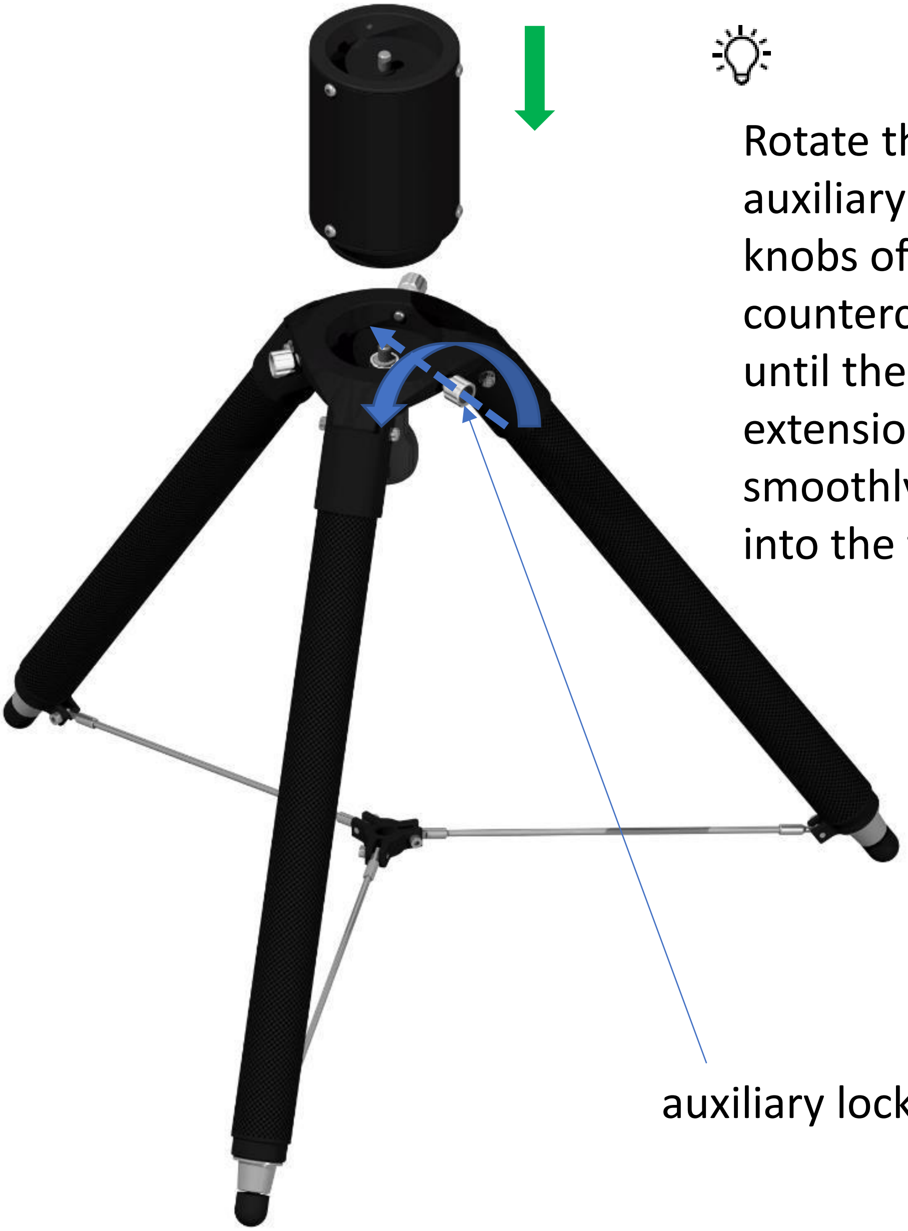
The strain wave mount is compact, and when using a longer telescope, there is a risk of collision between the telescope and the tripod, especially near the zenith or the meridian. In this case, a pier extension is needed to avoid collisions.



Installation and Use

Installation of the mount with pier extension and tripod

Installation steps with the pier extension



💡

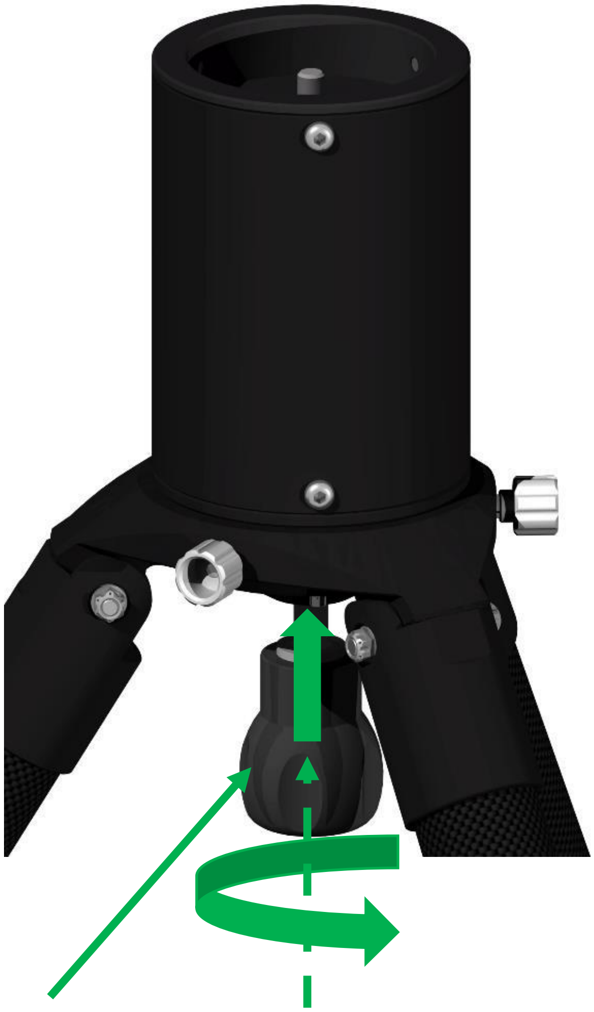
Rotate the three auxiliary locking knobs of the tripod counterclockwise until the pier extension can be smoothly installed into the tripod tray

auxiliary locking knob

Installation and Use

Installation of the mount with pier extension and tripod

Installation steps with the pier extension



Main locking knob

💡

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

⚠

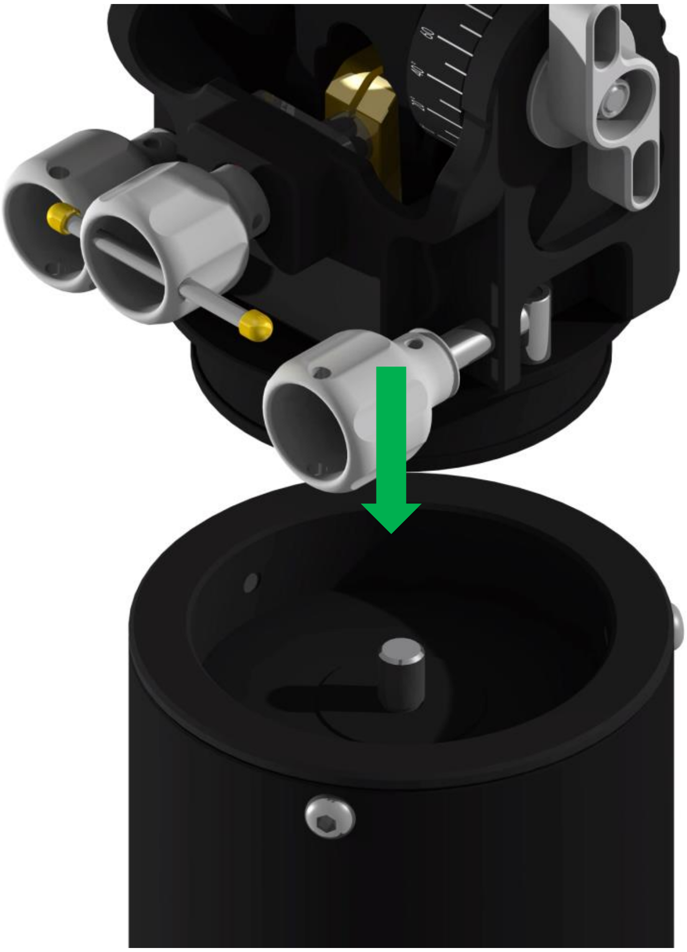
Note that if this step is not performed correctly, the mount body and pier extension may not be separated properly when disassembling the equipment.

Installation and Use

Installation of the mount with pier extension and tripod

Installation steps with the pier extension

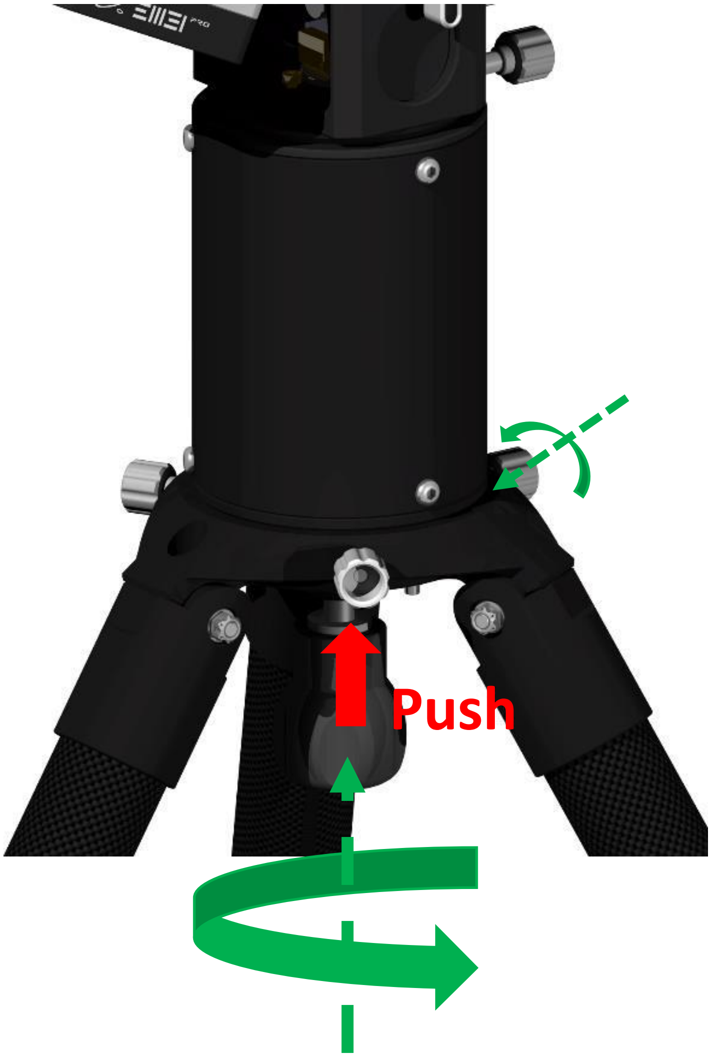
Place the mount body with the adapter into the pier extension



Installation and Use

Installation of the mount with pier extension and tripod

Installation steps with the pier extension



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

Push upward and continue rotating the main tripod locking knob clockwise until it is tightly secured.

Next, rotate the three auxiliary tripod locking knobs clockwise until they are firmly locked.

At this point, the installation of the mount body, pier extension, and tripod is complete

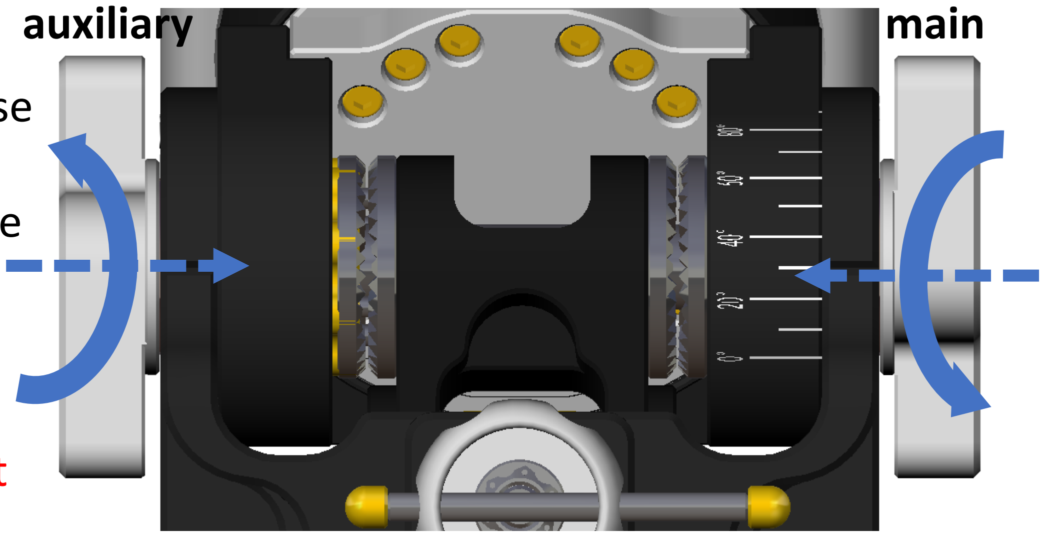
Installation and Use

Adjustment of altitude and azimuth angles of the equatorial mode

Altitude coarse adjustment

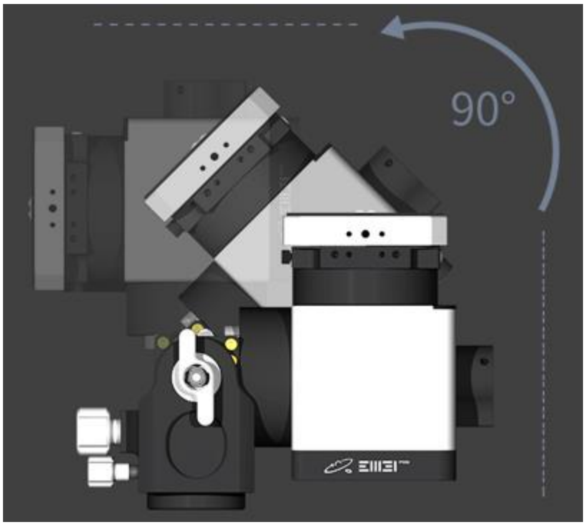
Step1.Rotate counterclockwise to release the auxiliary altitude locking knob

Rotate half to one turn until it loosens, avoid over-rotation



Step2.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

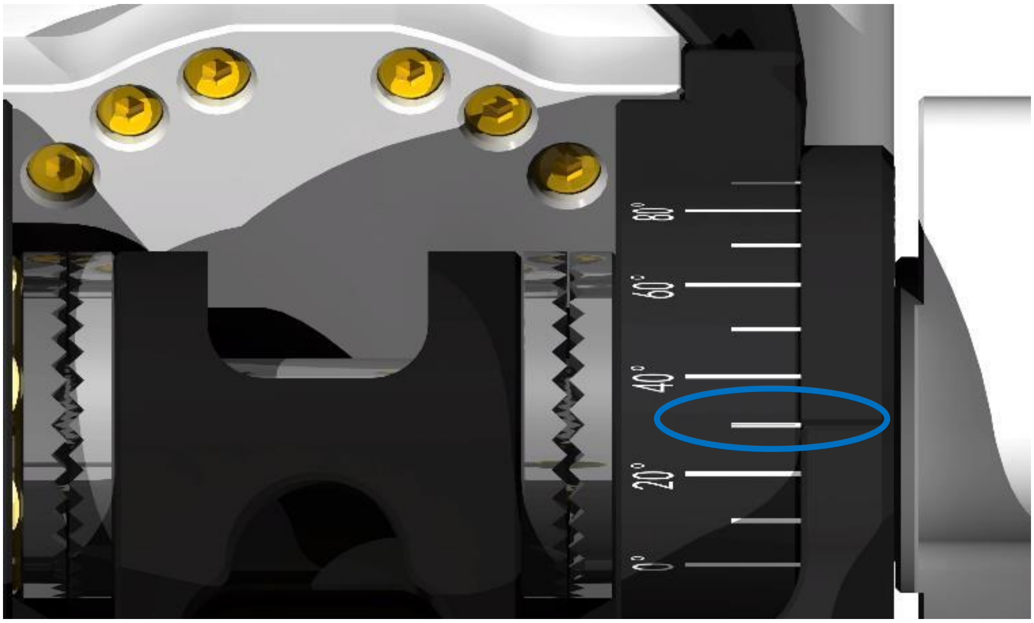
When the main altitude locking knob is loosened, the mount loses its support. During the coarse adjustment process, ensure that the mount is always supported by hand until the main altitude locking knob is securely tightened again.



Installation and Use

Adjustment of altitude and azimuth angles of the equatorial mode

Altitude coarse adjustment



💡 Refer to the altitude scale and adjust the altitude angle to approximately match the local latitude. (For example, if the local latitude is 31°13'20", set and lock the altitude near 30°

⚠

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.

⚠

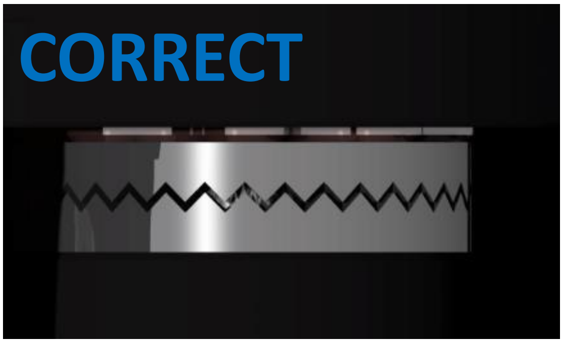
Roughly adjust the altitude angle at 10 ° intervals, such as 0 ° 10 °, 20 °, 30 °... 90 °

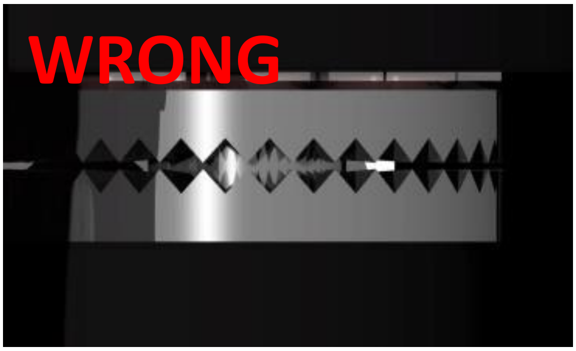
Installation and Use

Adjustment of altitude and azimuth angles of the equatorial mode

Altitude coarse adjustment

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





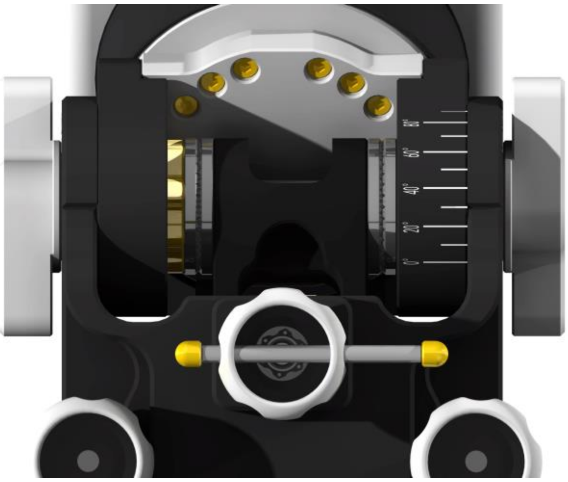
⚠

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

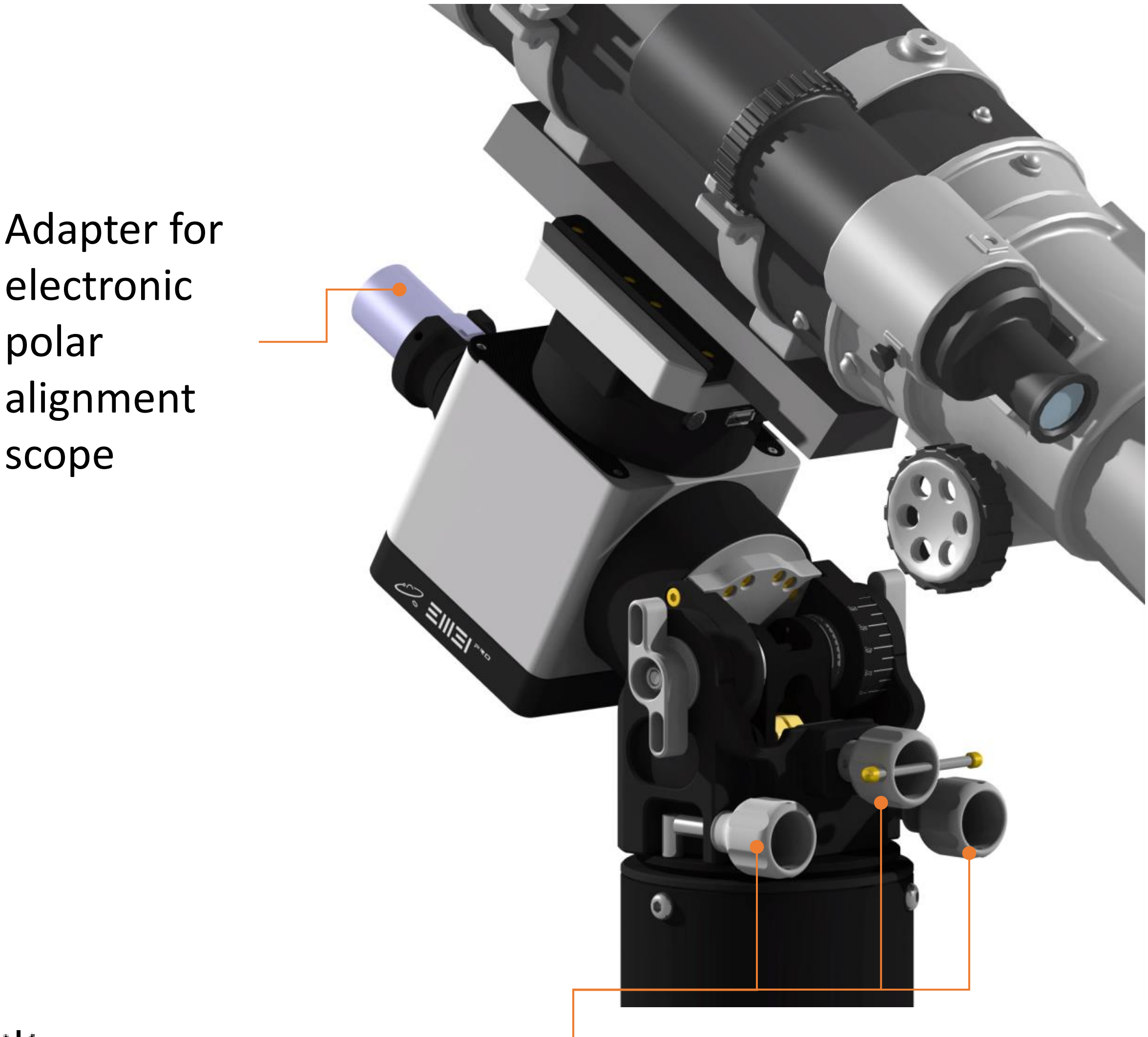


Installation and Use

Adjustment of altitude and azimuth angles of the equatorial mode

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



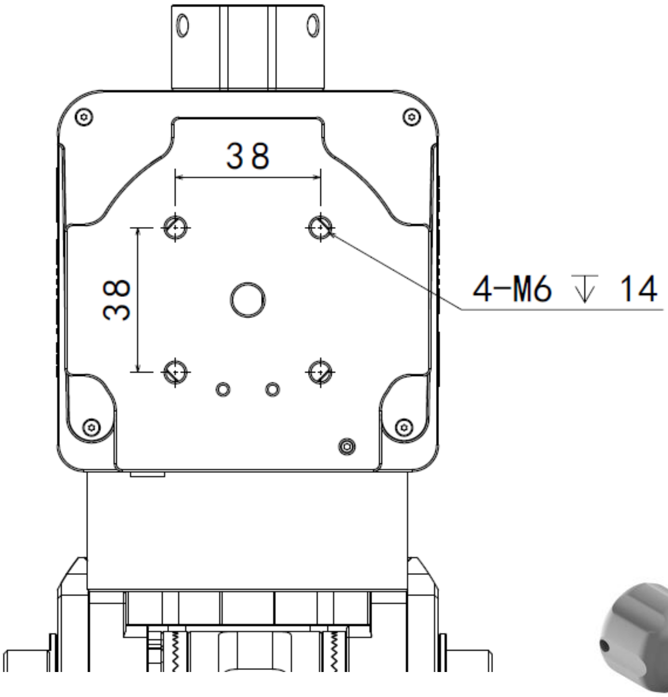
Once all equipment is installed, precise polar alignment can be achieved by rotating the azimuth adjustment knobs and altitude fine adjustment knob

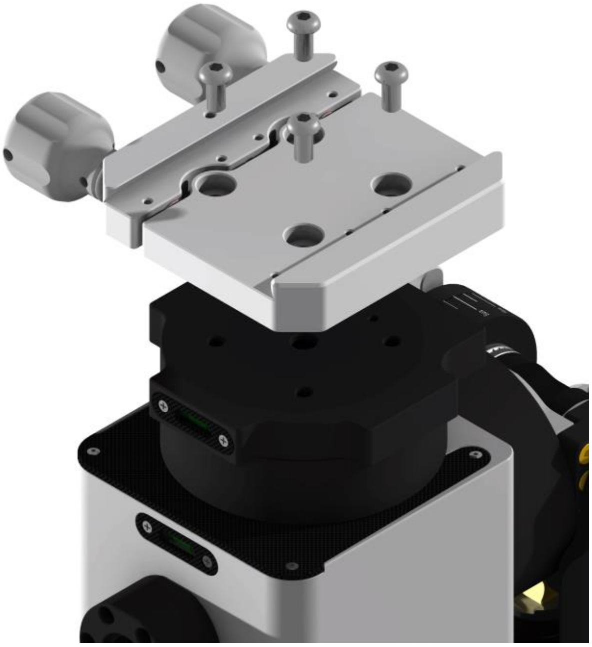
Accessory Installation

Installation of dovetail

Dovetail

The interface on the EM31Pro DEC top plate is compatible with most dovetails, allowing users to replace the dovetail as needed.





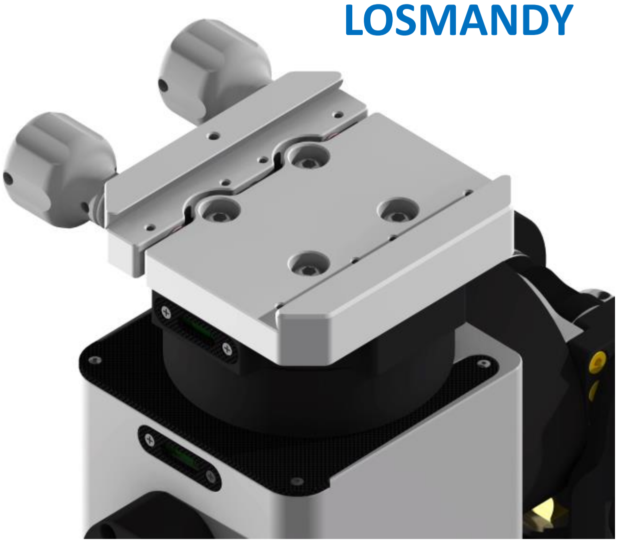
Accessory Installation

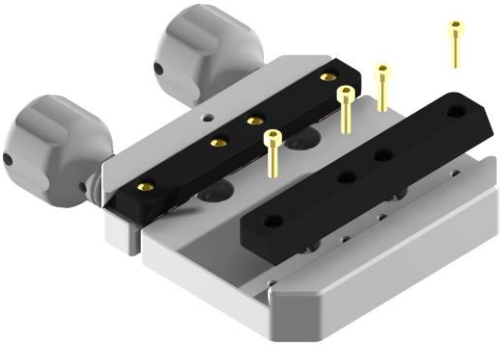
Installation of dovetail

Dovetail

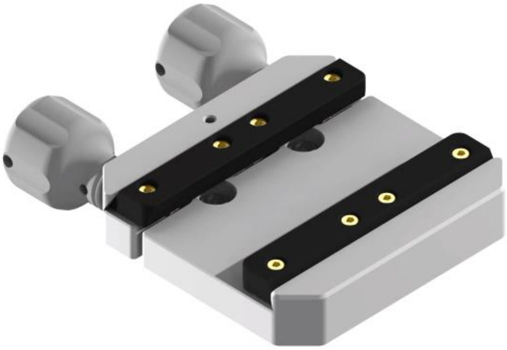
The EM31Pro comes with standard LOSMANDY 60° and Vixen 75° dovetail compatibility. Arca specifications can be achieved by installing the dovetail Acra strips (optional)

LOSMANDY

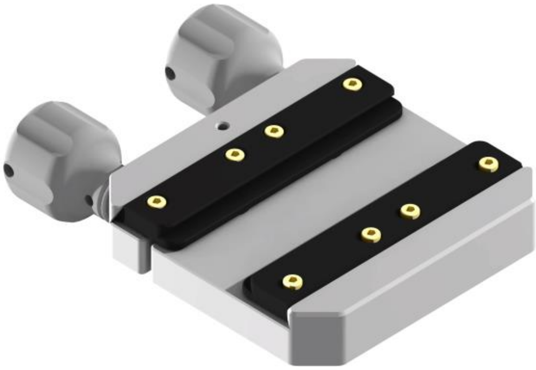




VIXEN



ARCA(optional)



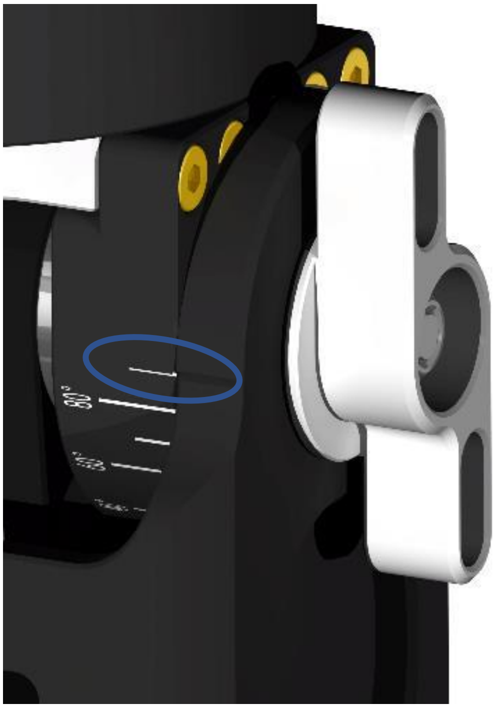
Installation and Use

Altazimuth Mode

Structure Switching

The installation method for the EM31Pro 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.

💡

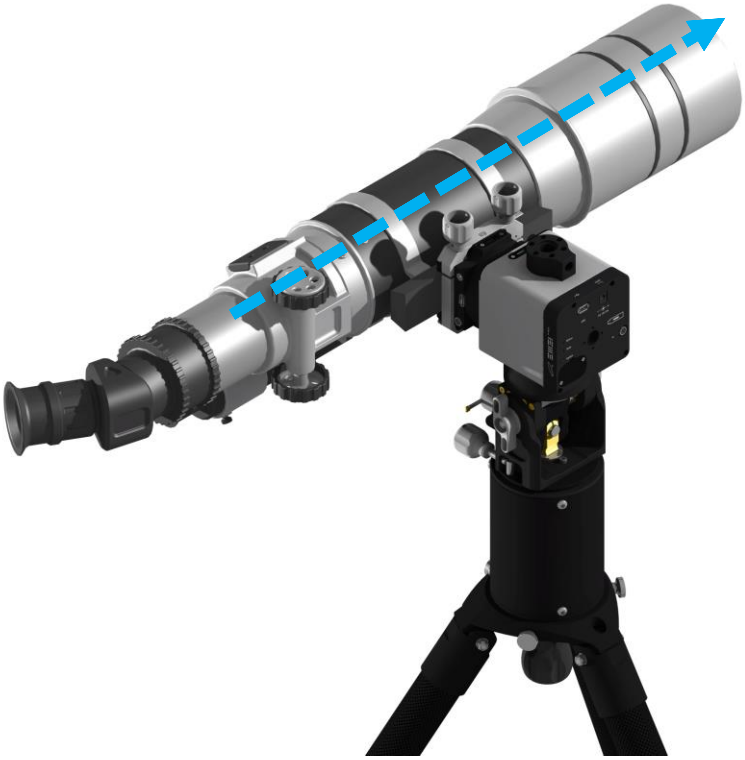


Installation and Use

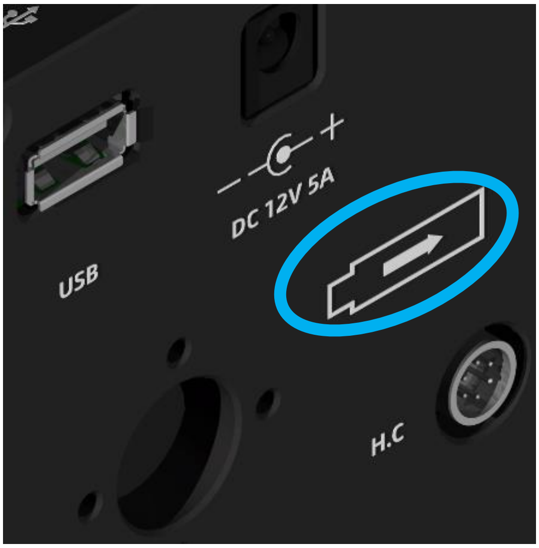
Altazimuth mode

Installation of telescope

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.**



⚠

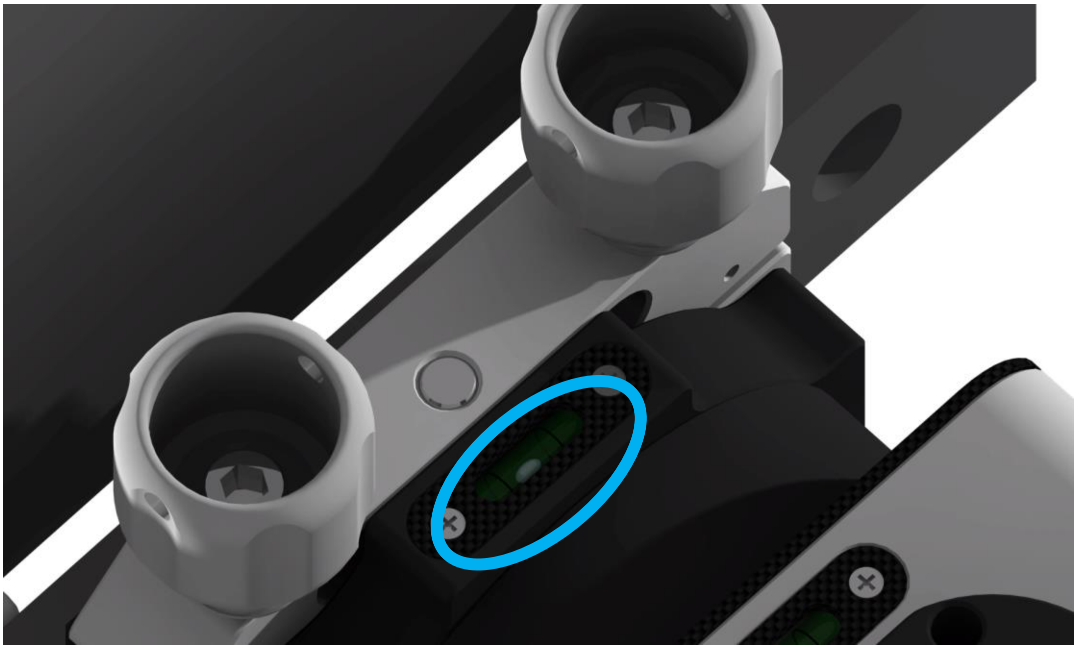


Installation and Use

Altazimuth Mode

Horizontal calibration

Accurate GOTO and stable tracking in altazimuth mode require the azimuth rotation axis to be perpendicular to the ground. The EM31Pro allows users to confirm this alignment using the horizontal bubble on the RA axis.

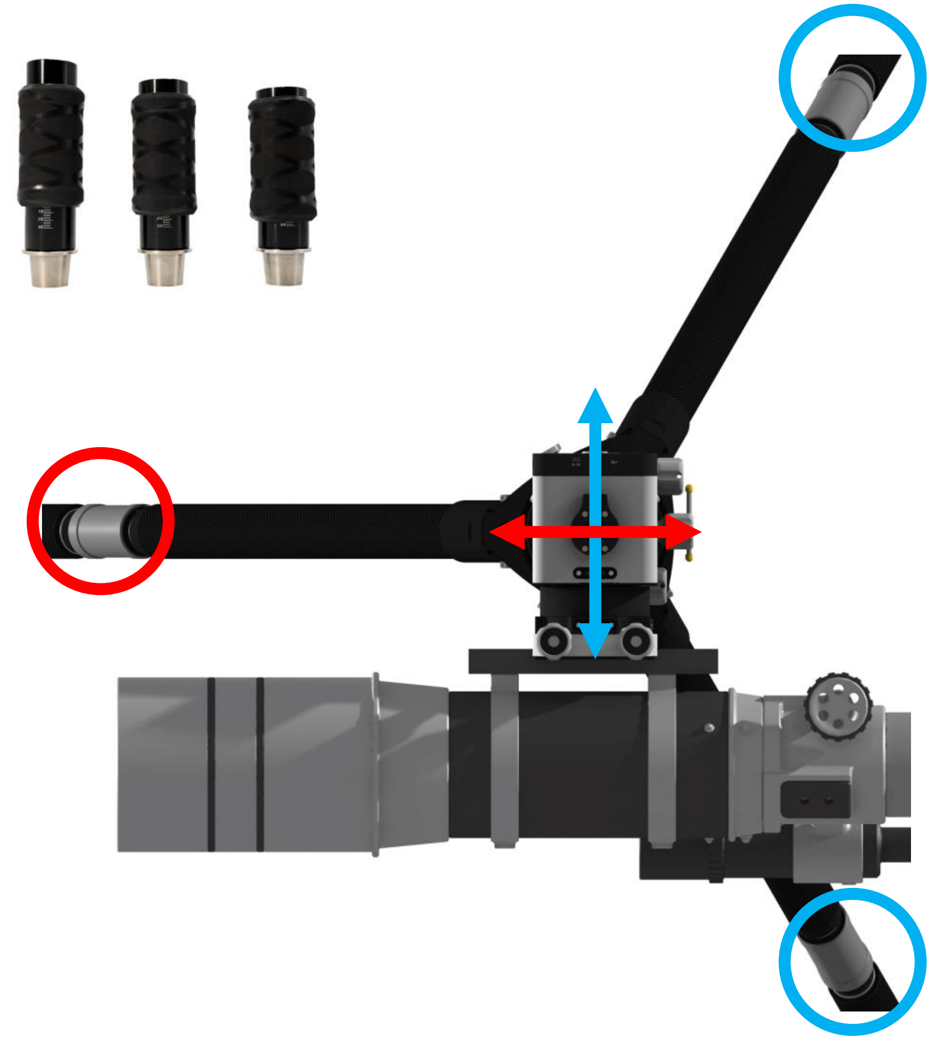


Installation and Use

Altazimuth Mode

Horizontal calibration

When using the AD120 horizontal adjuster, the level state can be achieved by adjusting the horizontal adjusters



⚠ All equipment need to be installed before starting to adjust the level state

Installation and Use

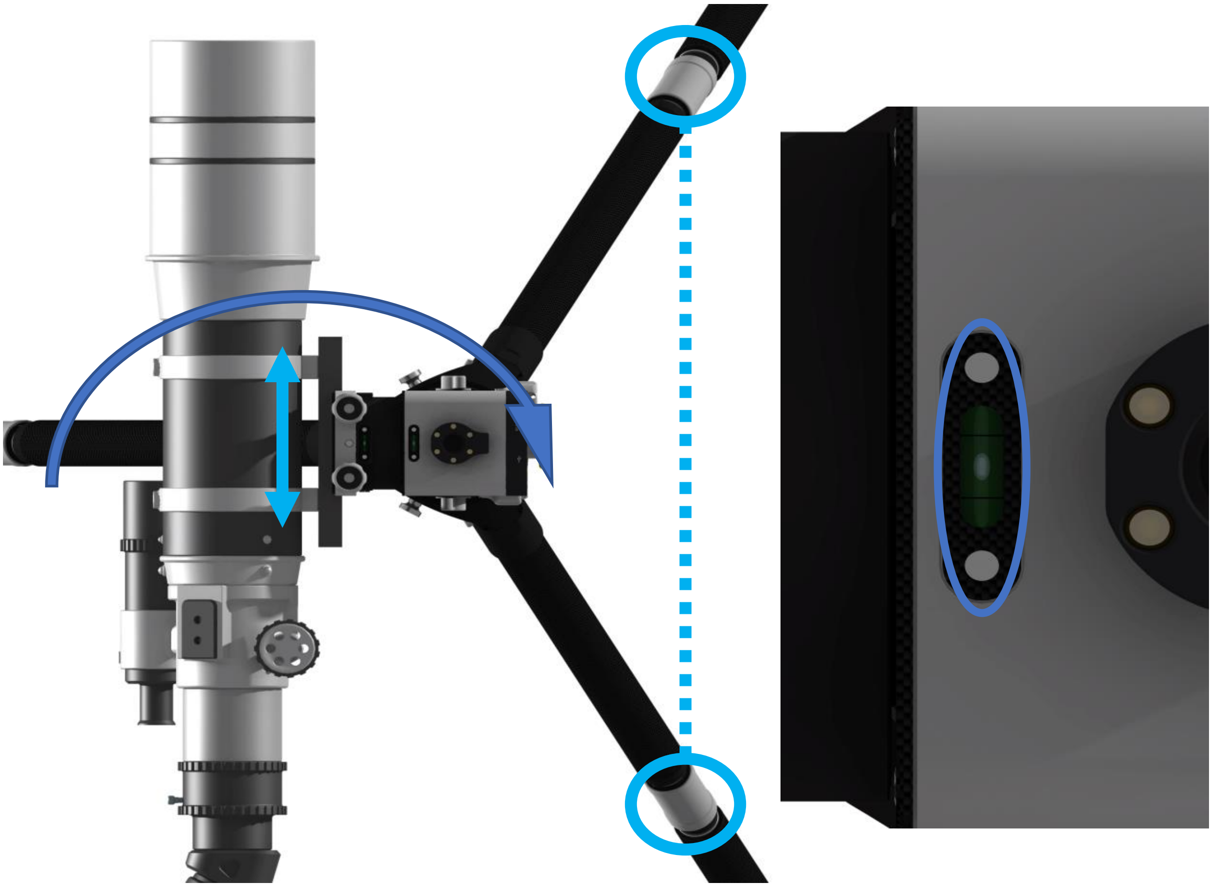
Altazimuth Mode

Horizontal calibration

Obtain accurate horizontal state

Power on the mount and manually rotate the RA axis until the horizontal bubble is parallel to the blue horizontal adjuster line shown in the diagram.

Adjust the two horizontal adjusters inside the blue circles until the horizontal bubble is centered



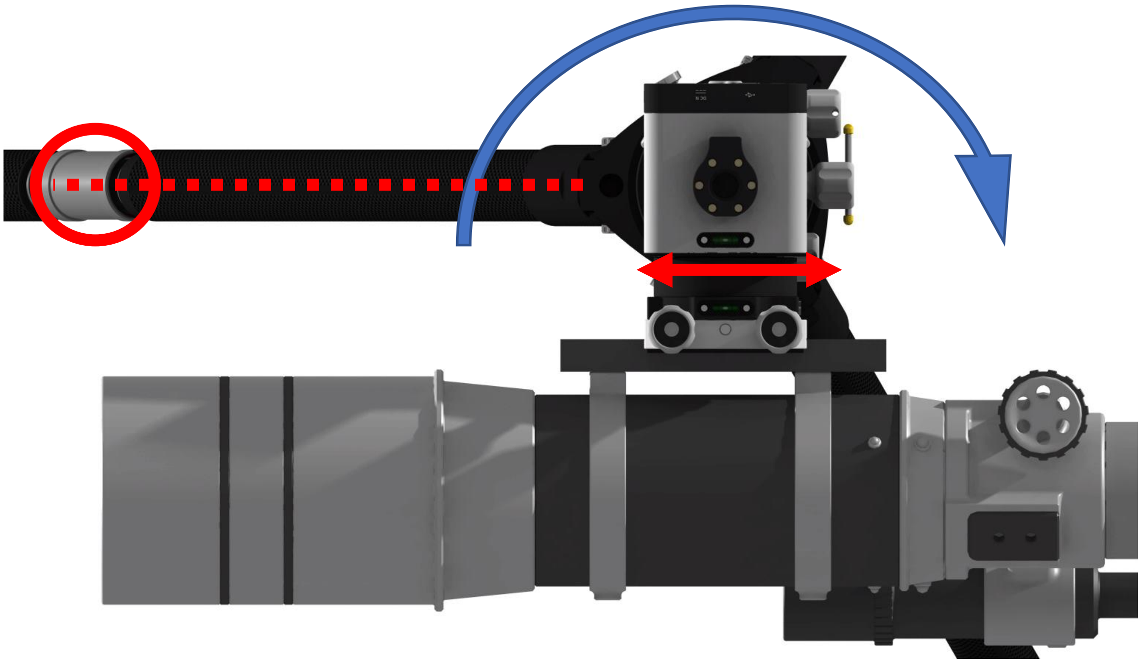
Installation and Use

Altazimuth Mode

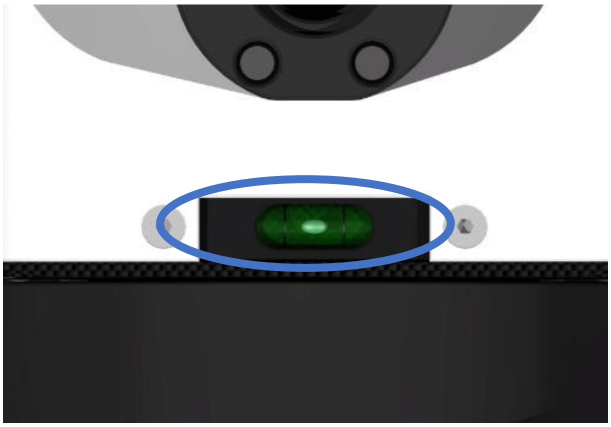
Horizontal calibration

Obtain accurate horizontal state

Manually rotate the RA axis until the horizontal bubble aligns with the red dashed line in the diagram.



Adjust the horizontal adjuster inside the red circle until the horizontal bubble is centered, indicating that the horizontal adjustment is complete.

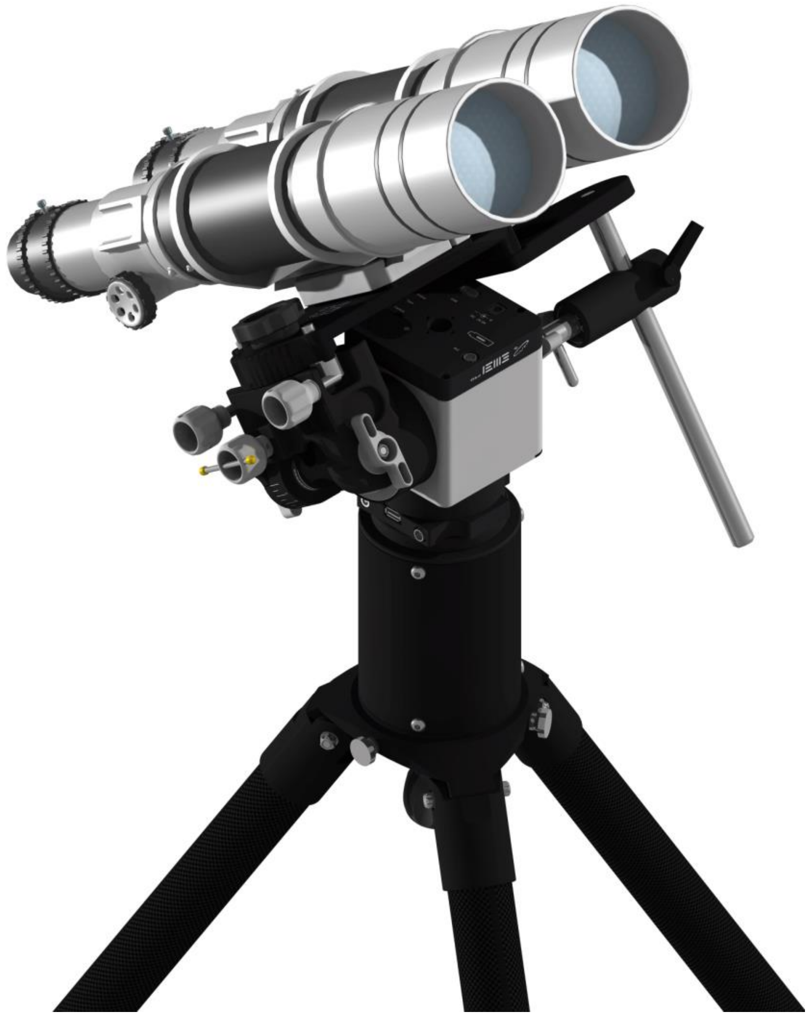


Installation and Use

Altazimuth Mode-Top mounting

Structure Switching

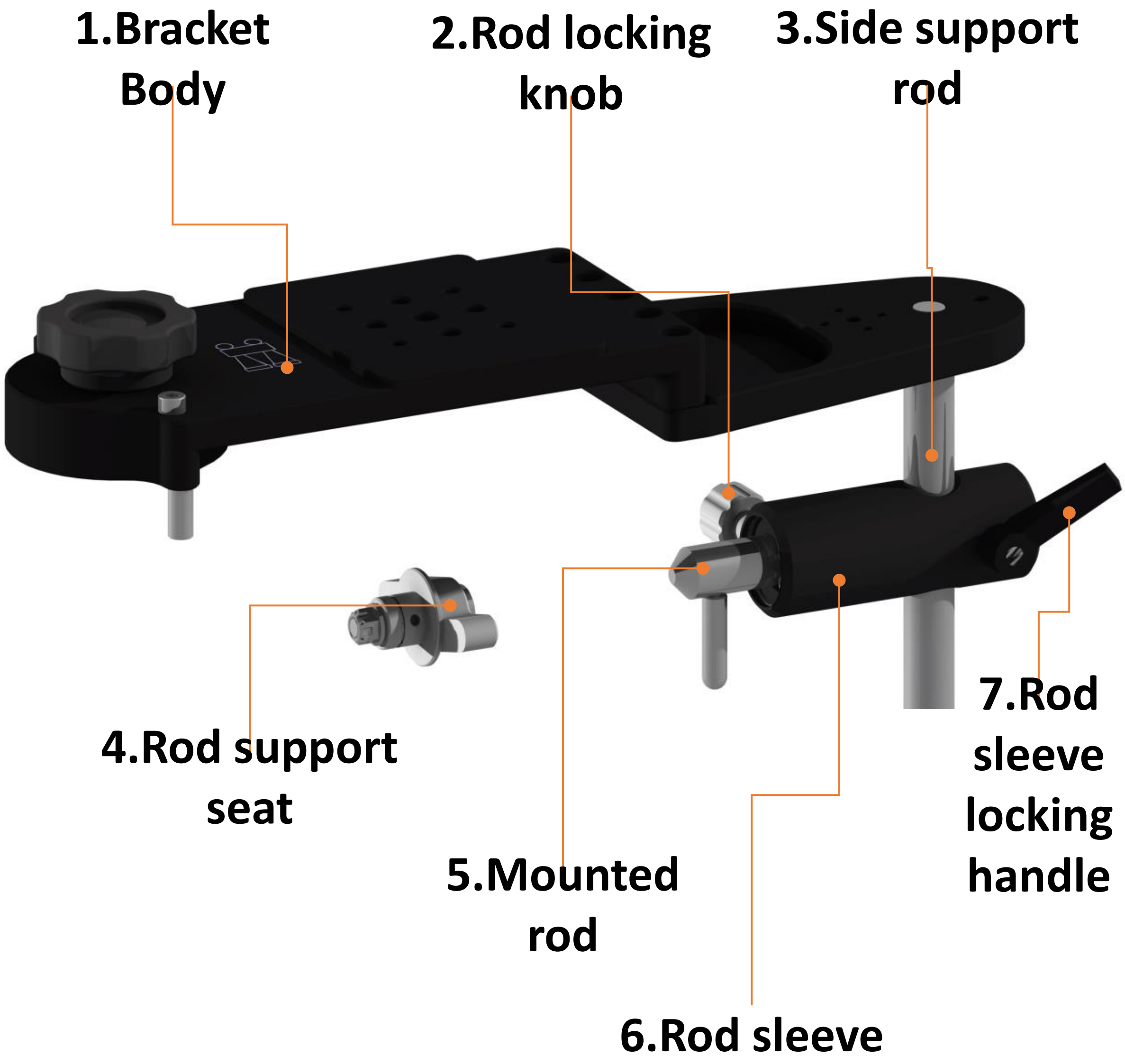
EM31 Pro can achieve the altazimuth top mode by installing a supporting bracket on top



Installation and Use

Altazimuth Mode-Top mounting

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

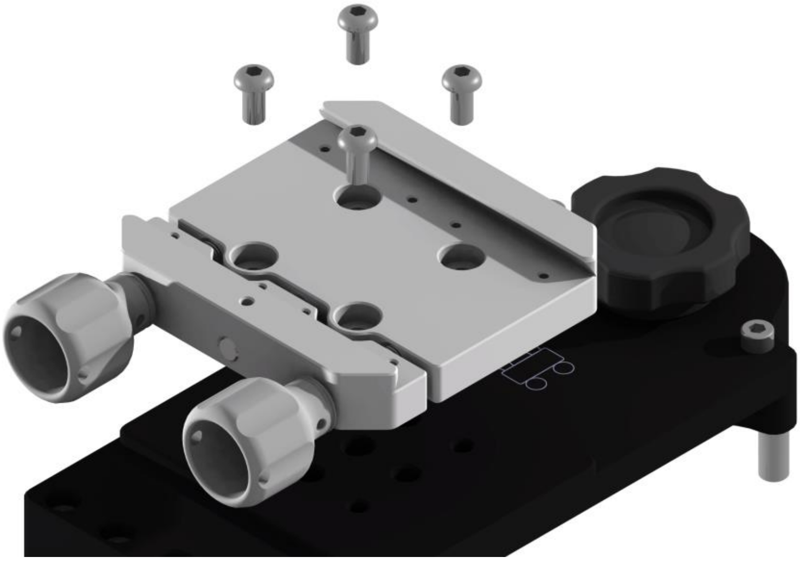
Installation and Use

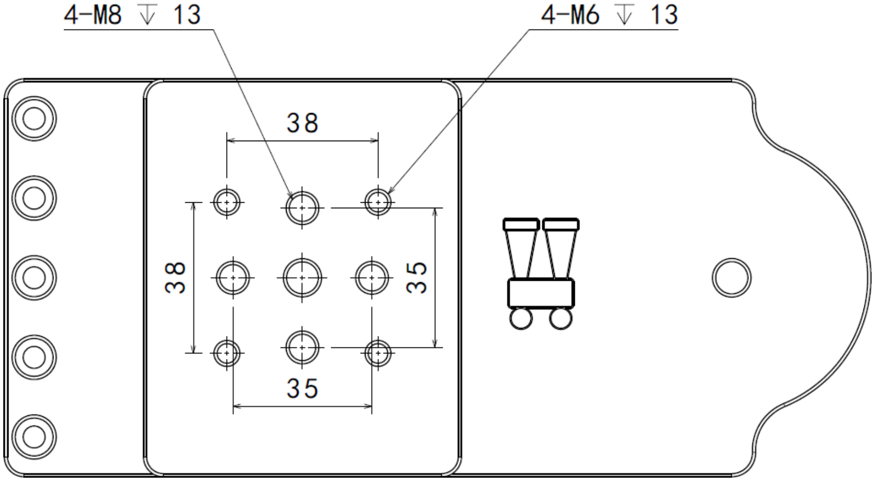
Altazimuth Mode-Top mounting

Structure Switching

The supporting bracket interface is compatible with most dovetails.

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





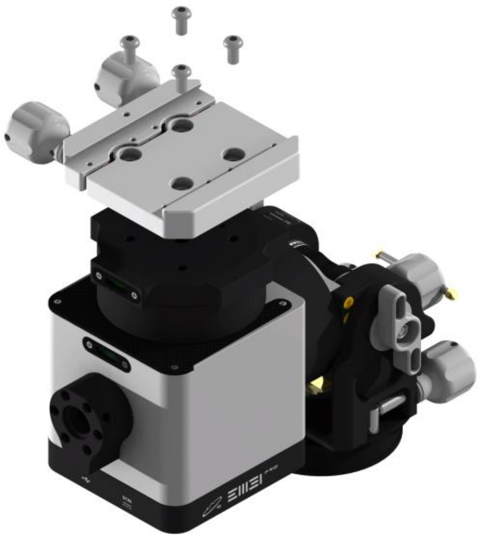
⚠ The top mode supporting bracket does not come with a dovetail, you can use the dovetail on the EM31Pro body or choose your own.

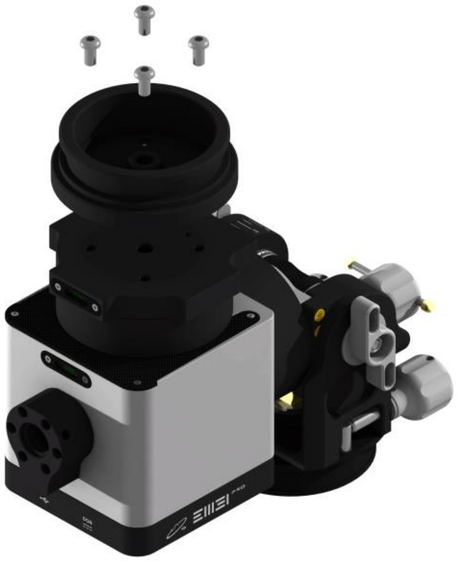
Installation and Use

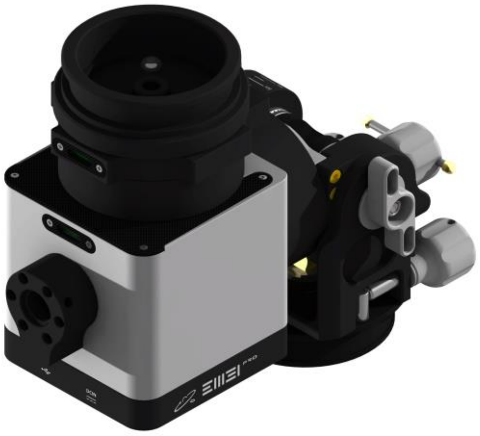
Altazimuth Mode-Top mounting

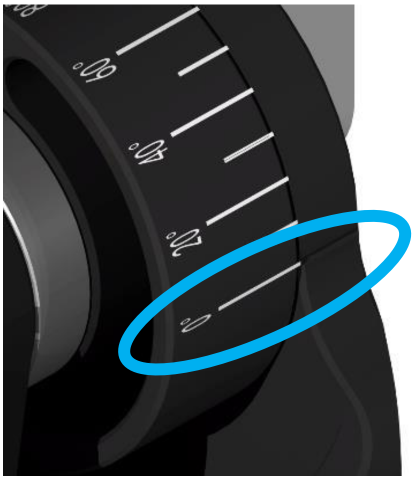
Structure Switching

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









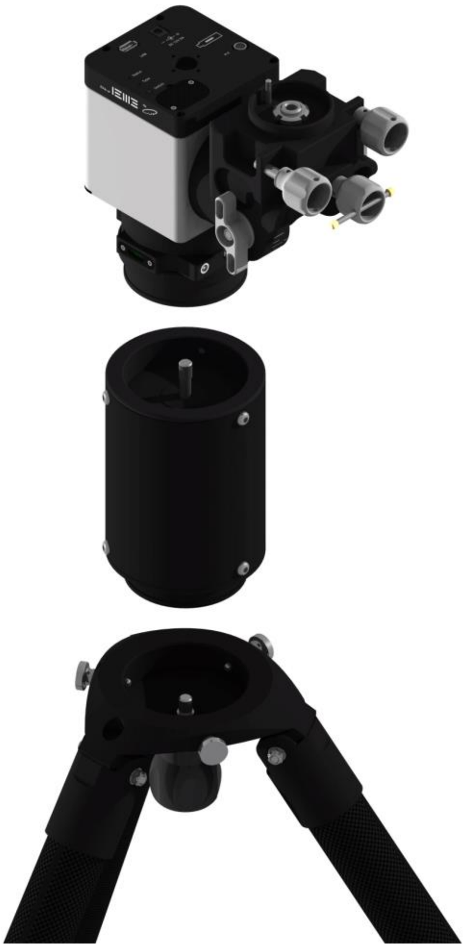
Installation and Use

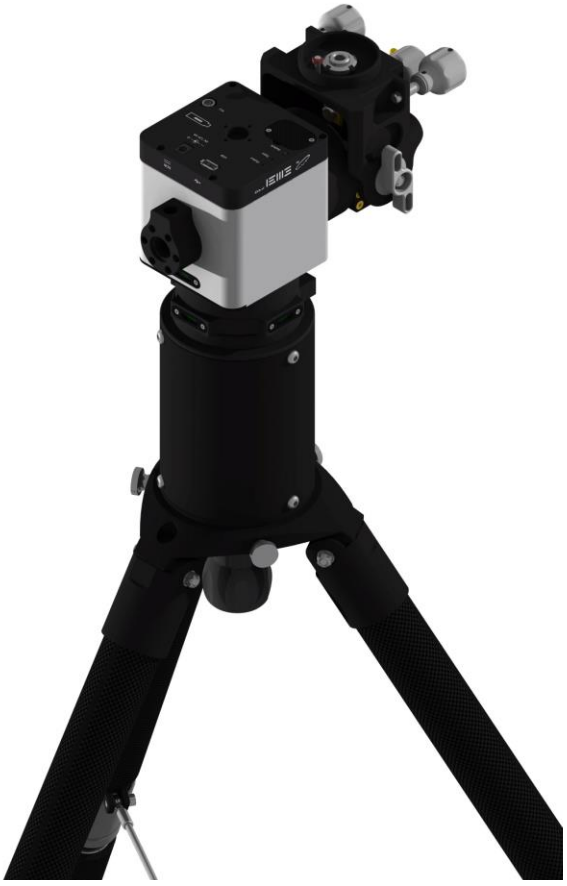
Altazimuth Mode-Top mounting

Structure Switching

💡

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



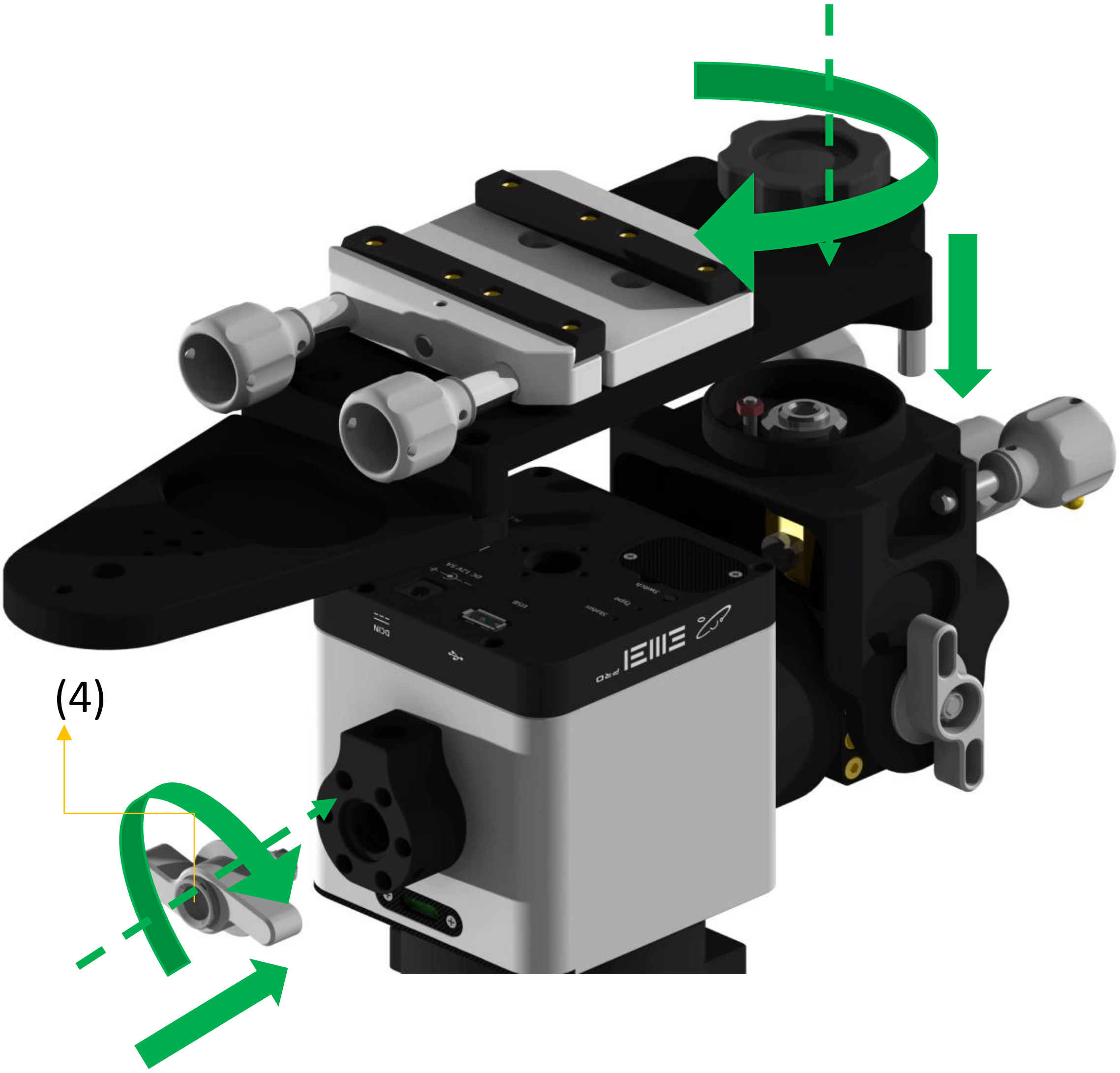


Installation and Use

Altazimuth Mode-Top Mounting

Structure Switching

💡 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

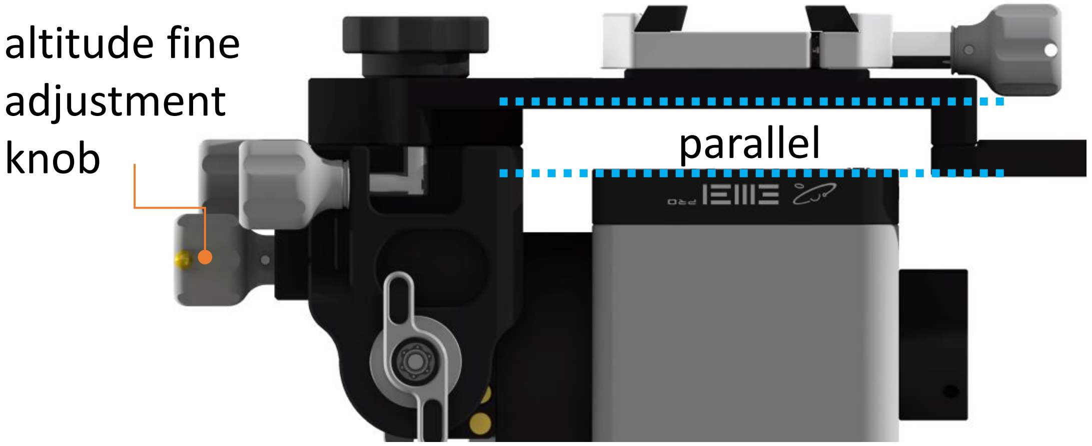


Installation and Use

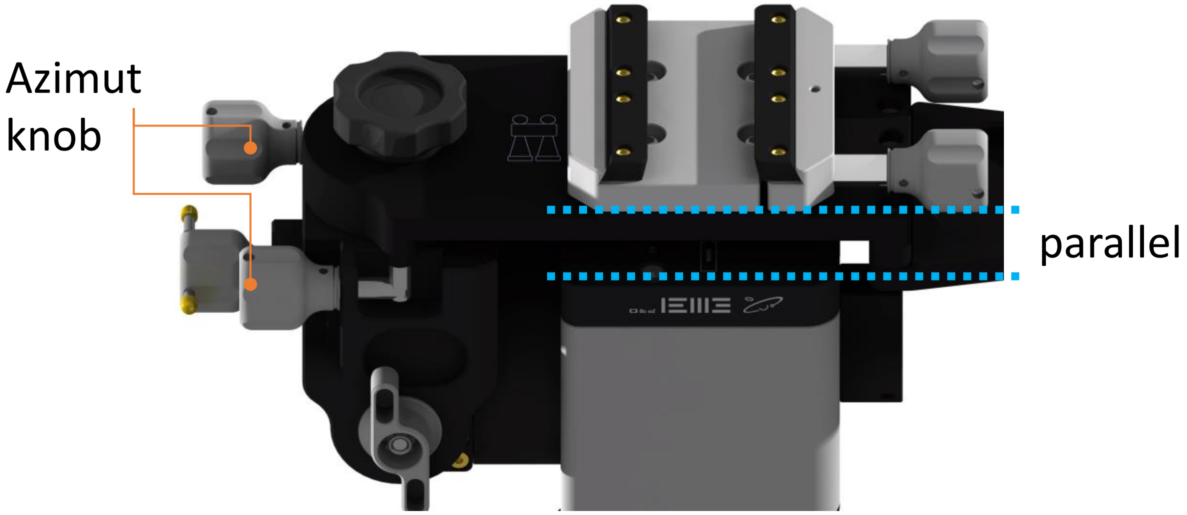
Altazimuth Mode-Top Mounting

Structure Switching

💡 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.


altitude fine adjustment knob
parallel

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


Azimut knob
parallel

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

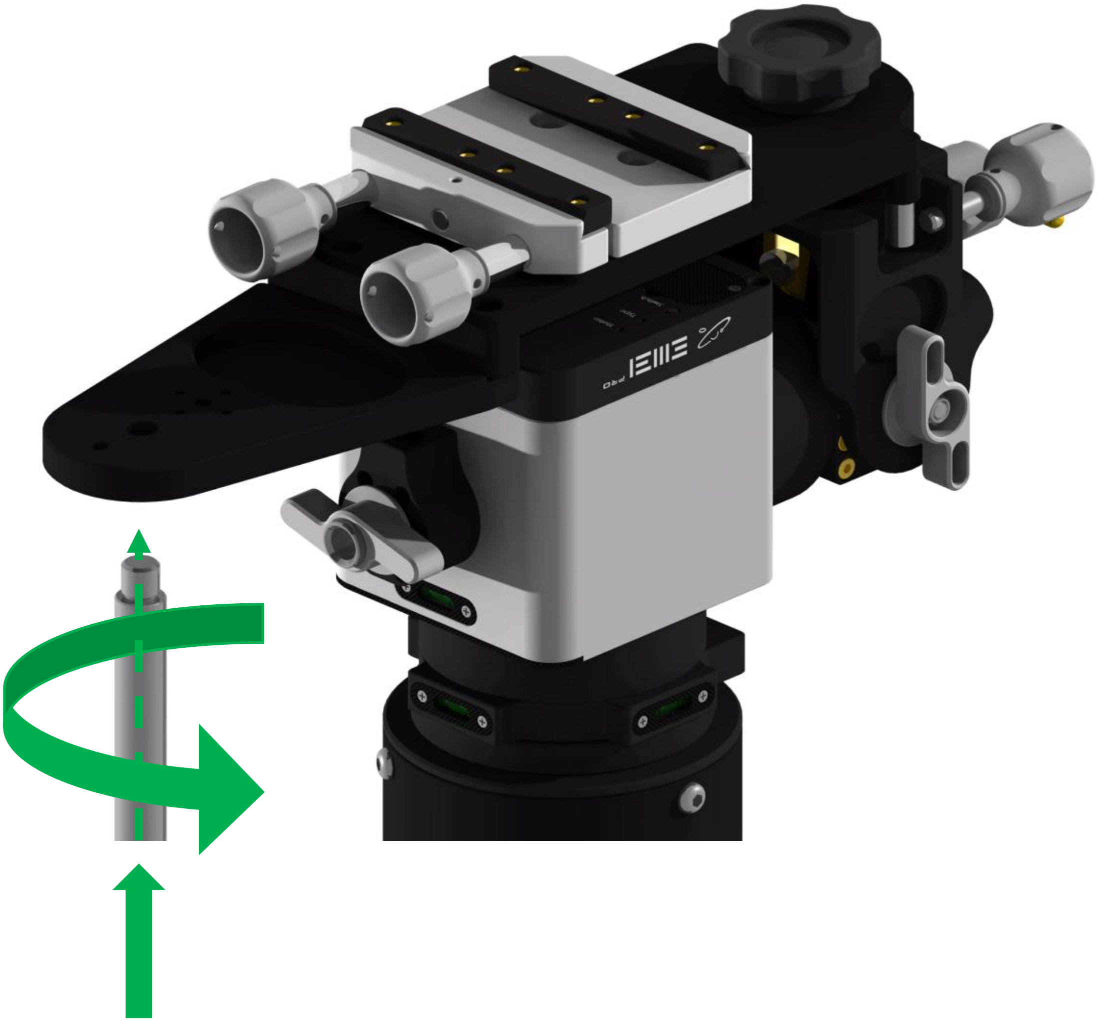
Installation and Use

Altazimuth Mode-Top mounting

Structure Switching

💡

Clockwise into the Side support rod

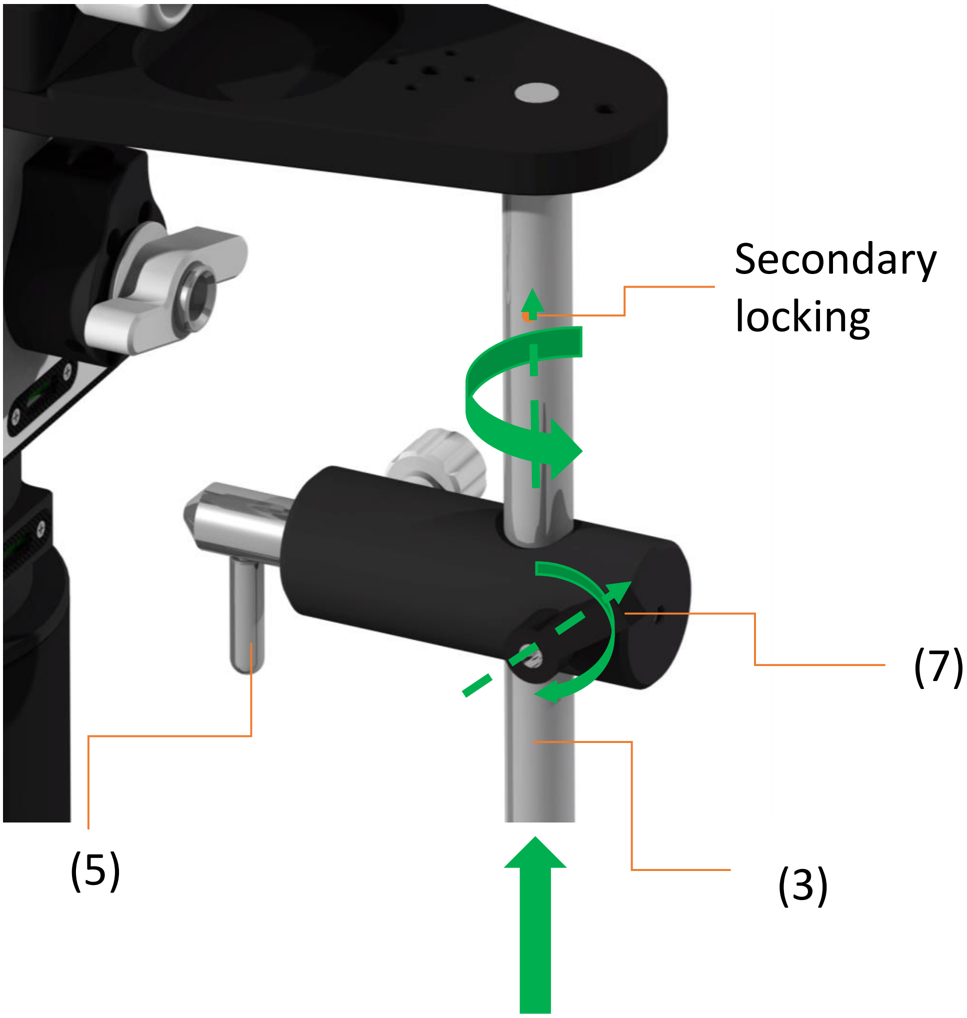


Installation and Use

Altazimuth Mode-Top mounting

Structure Switching

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



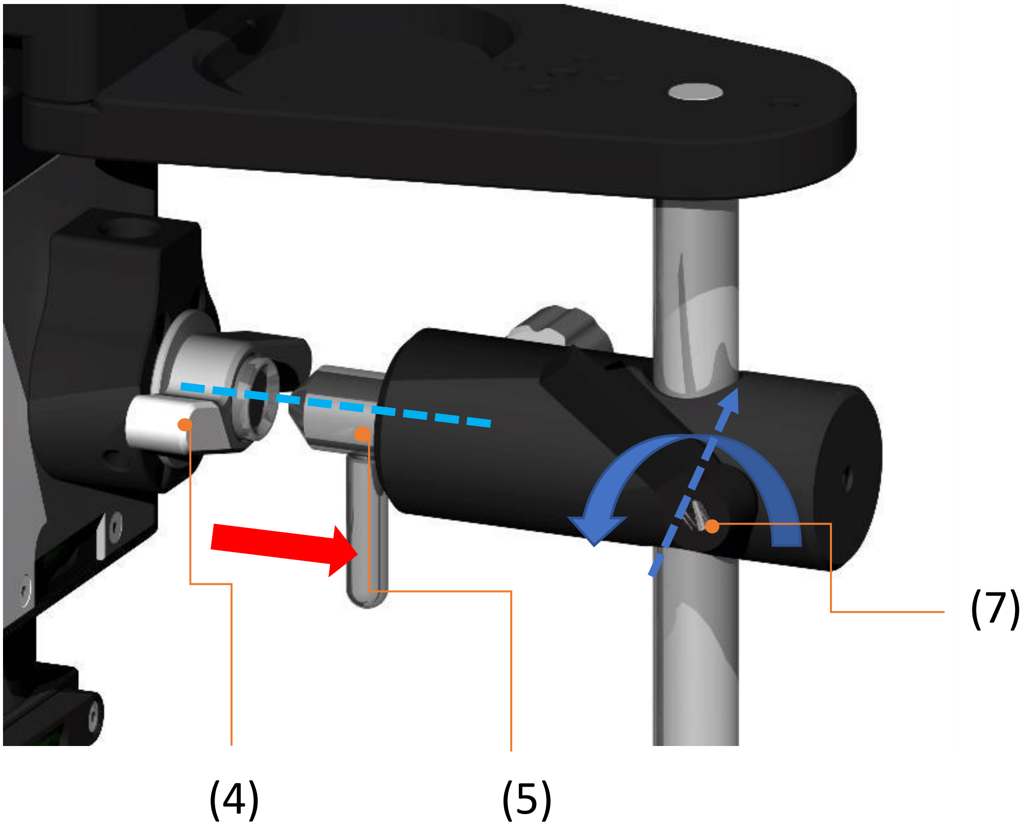
Installation and Use

Altazimuth Mode-Top mounting

Structure Switching

💡

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)



Installation and Use

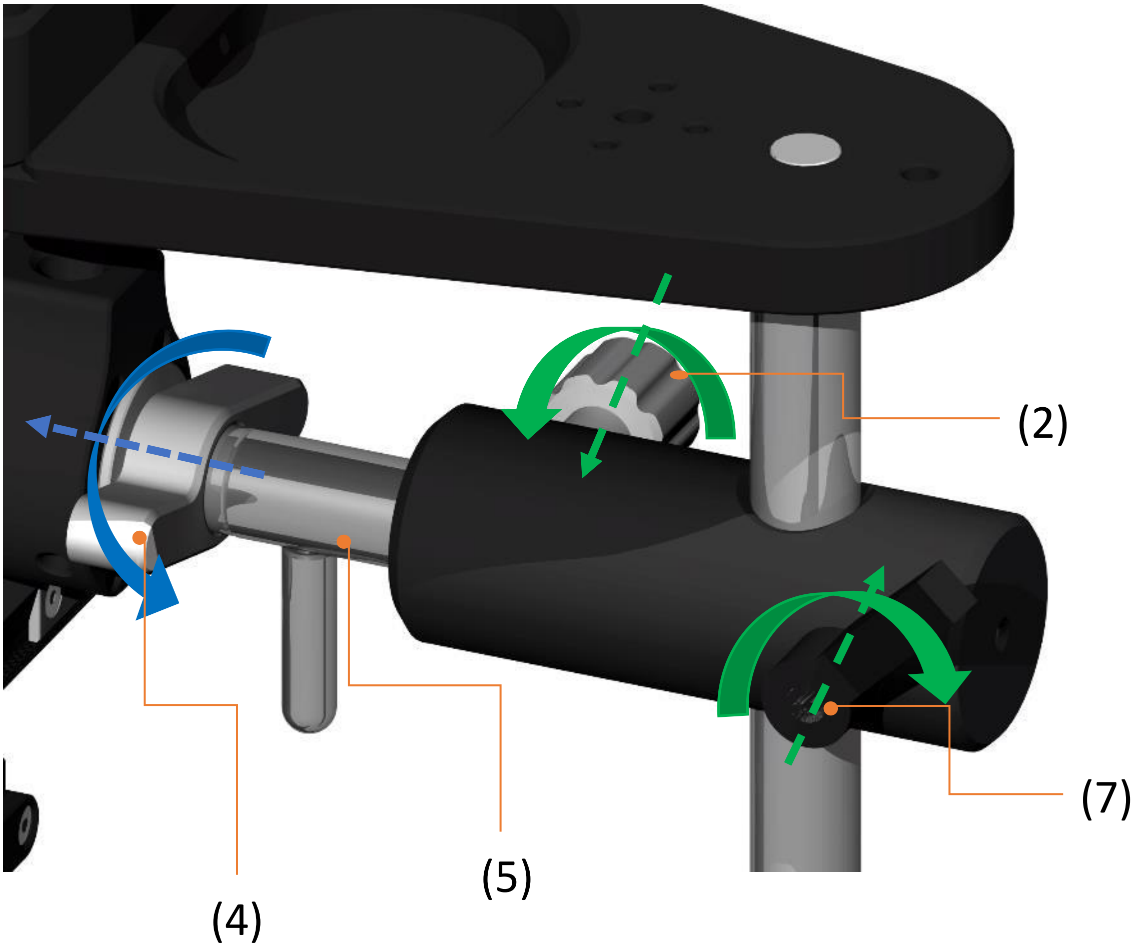
Altazimuth Mode-Top mounting

Structure Switching

💡

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



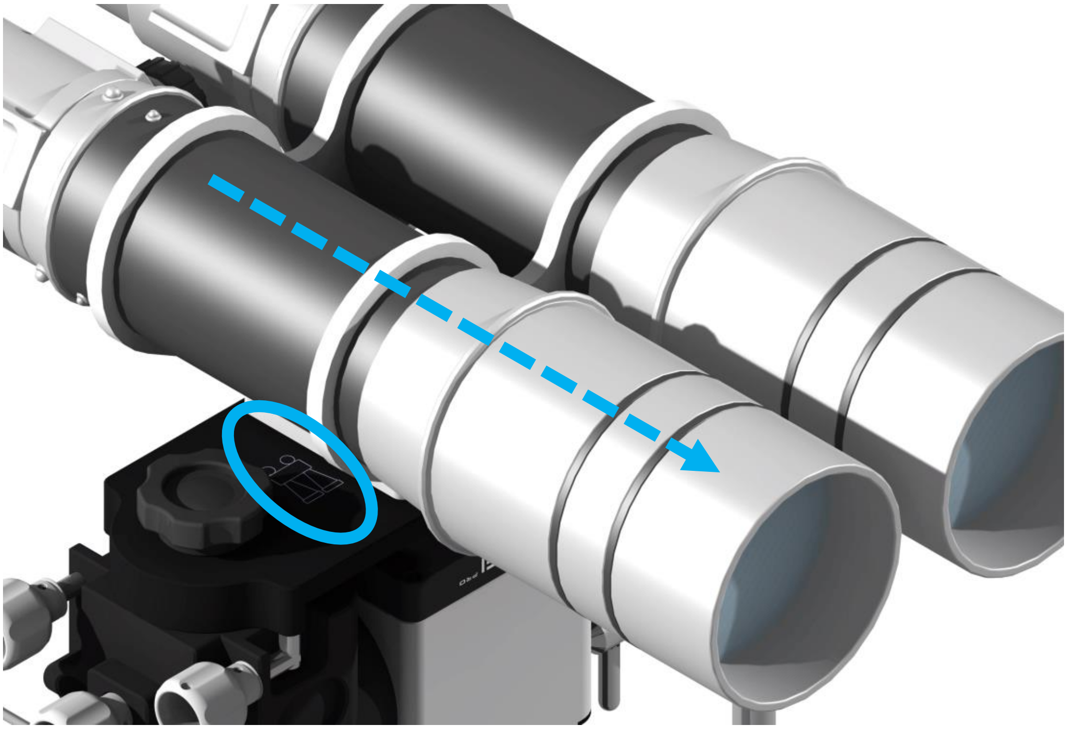
Installation and Use

Altazimuth Mode-Top mounting

Telescope installation

💡

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.**

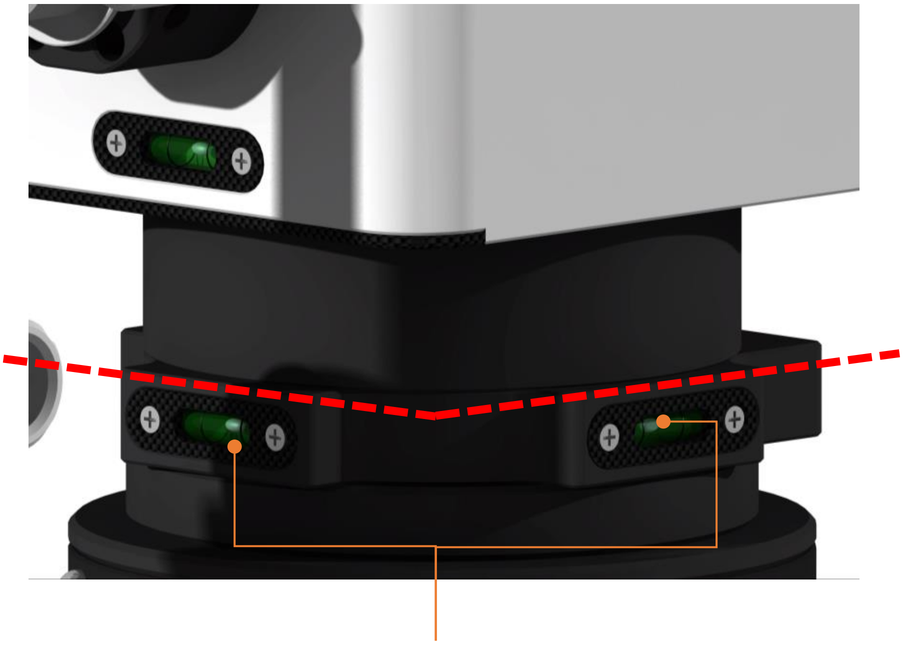


Installation and Use

Altazimuth Mode-Top mounting

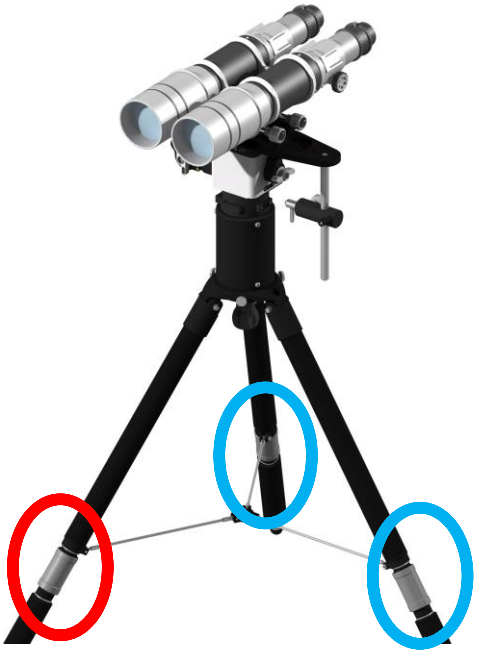
Level adjustment

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



DEC axis level bubble

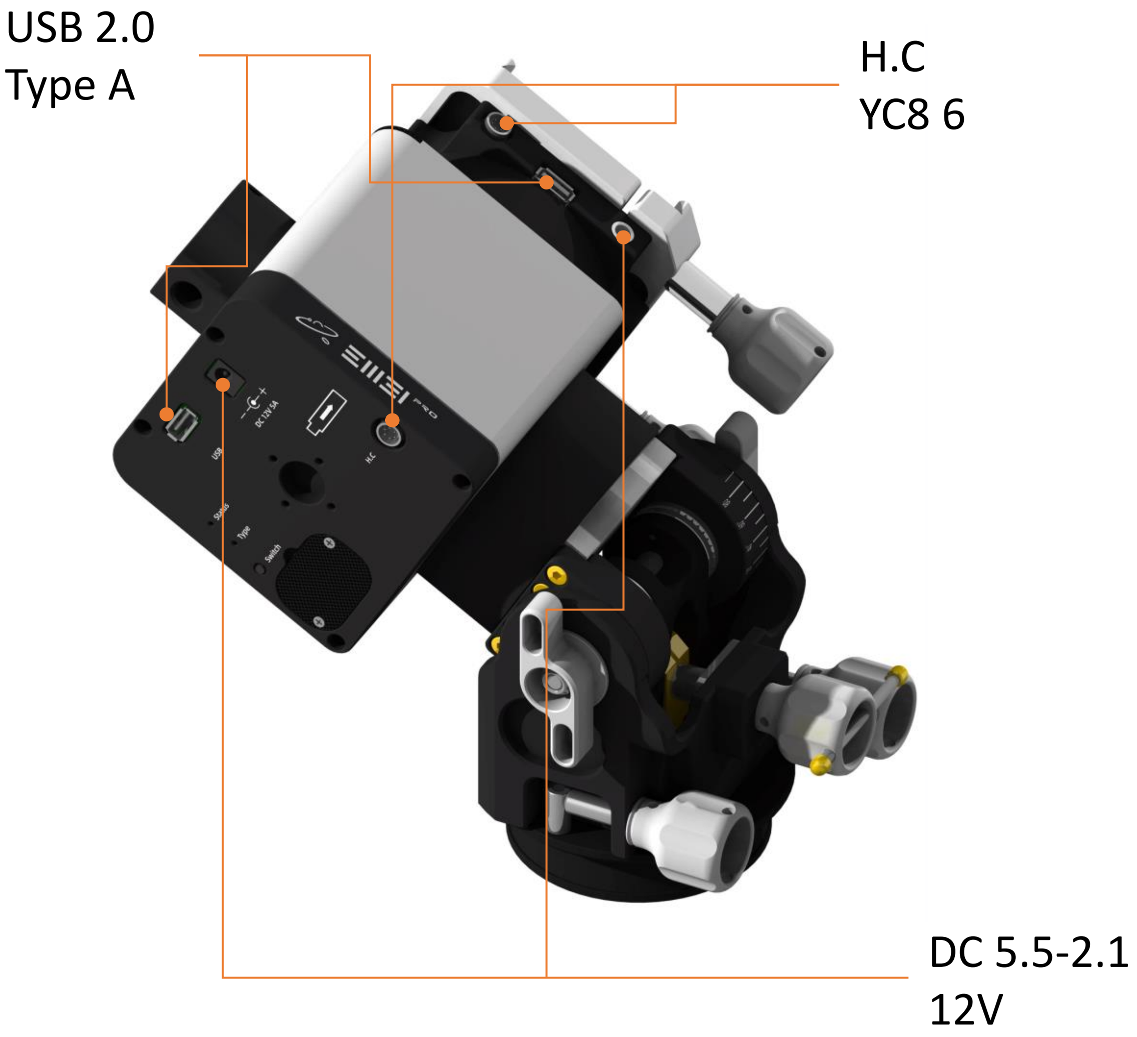
💡 Complete the horizontal adjustment by adjusting the horizontal adjuster installed on the tripod, using the same method as in the side-mounted Alt-Az mode.



Installation and Use

Cable Connection

EM31 Pro has two sets of cable ports, located on the base of the mount and on the DEC rotation axis, both with identical functions.



⊘

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).

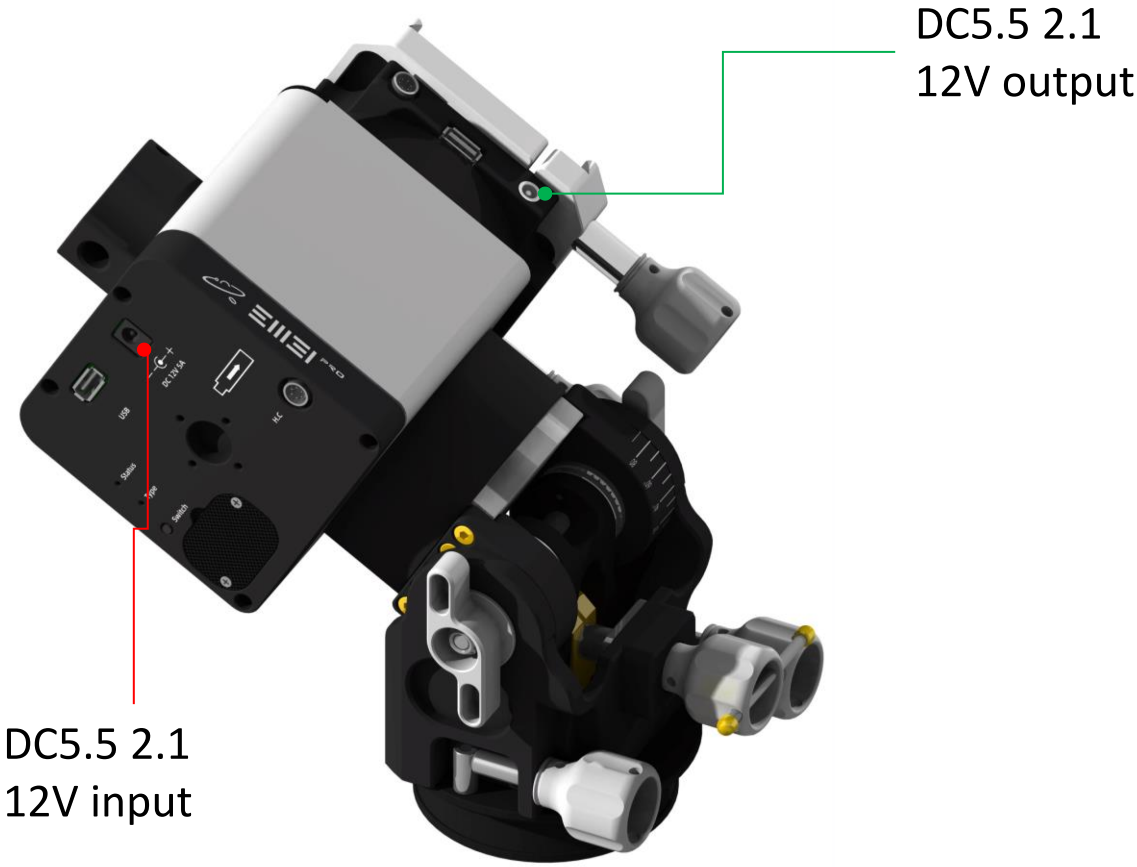
Installation and Use

Cable Connection

Power connection method

EM31Pro 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.

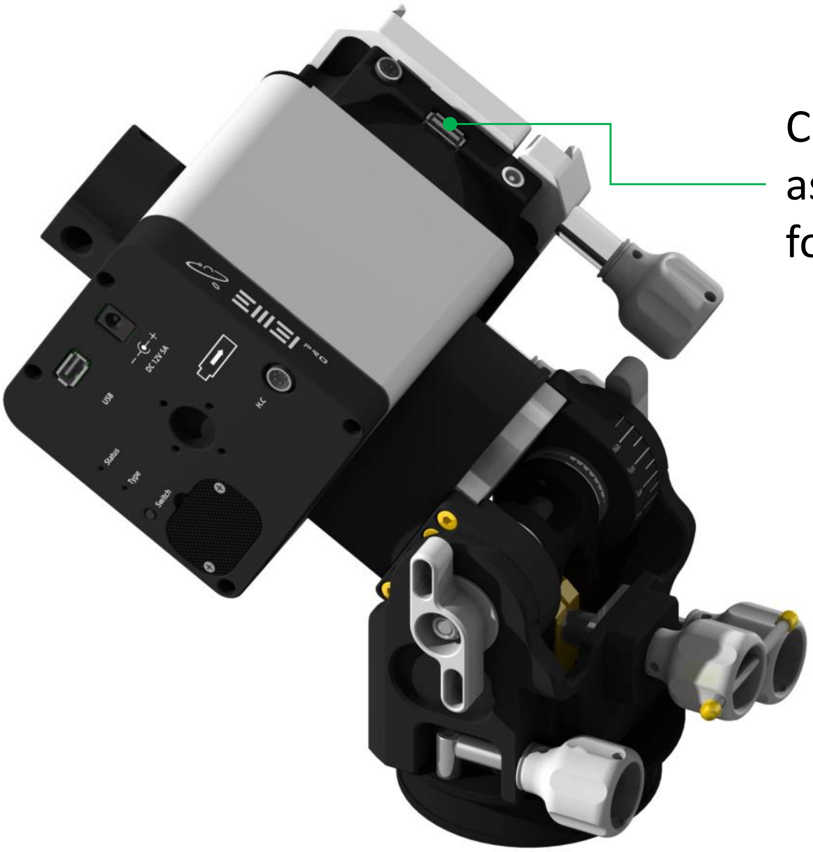
Installation and Use

Cable Connection

USB cable connection method

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...

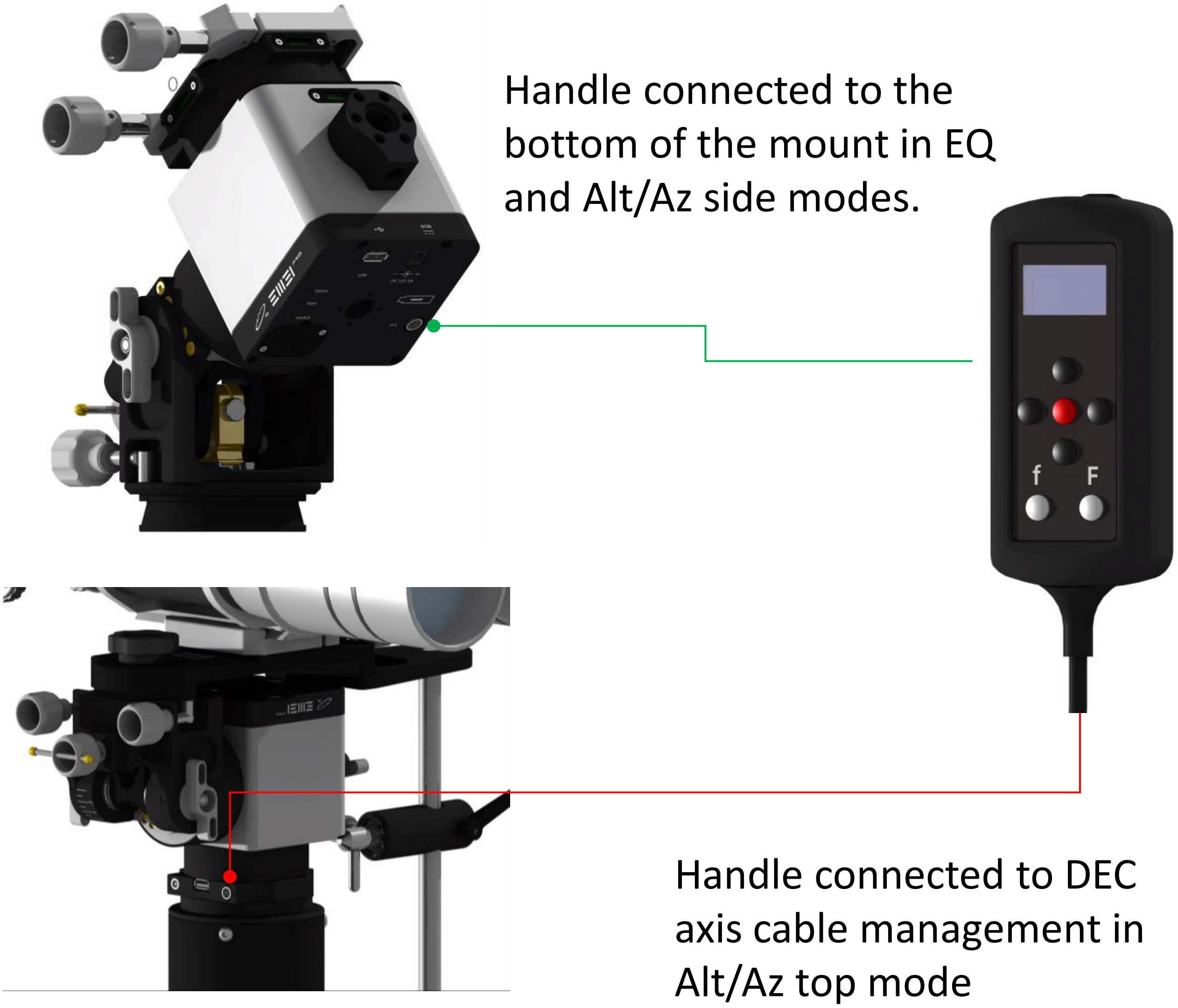
Do not connect the mount through any USB hub.

Installation and Use

Cable Connection

Handle connection

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



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

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

---

⊘ **Prohibit connecting two handle controllers simultaneously**
Do not plug and unplug the handle controller while the mount is powered on

Installation and Use

Mode Selection

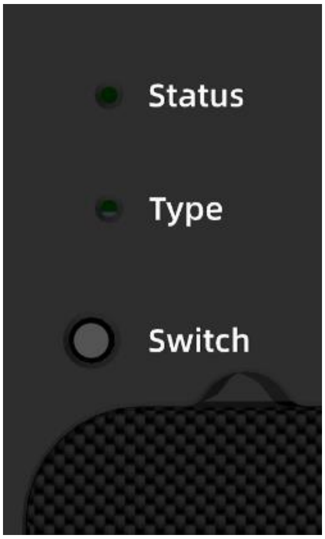
Mode selection

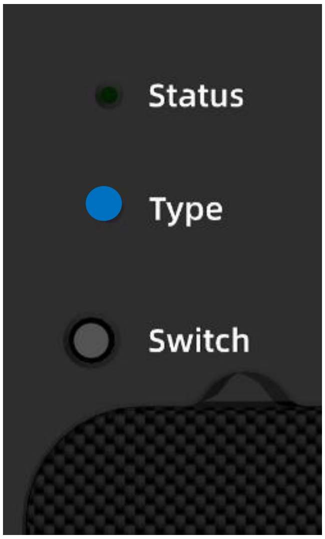
EM31 Pro mode selection indicated by the “Type” light，**Blue is Altazimuth side-mounted mode**， **Red is Altazimuth top-mounted mode, Light out for Equatorial mode**

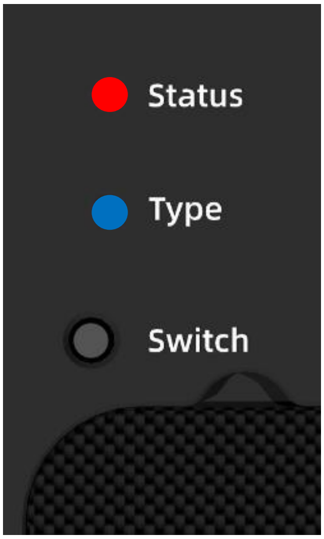
Wait for 5 seconds when the mount is powered on, and enter mode switching after the Status light flashes off

By clicking the Switch button, the Type light will begin to change, blue-red-off, 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





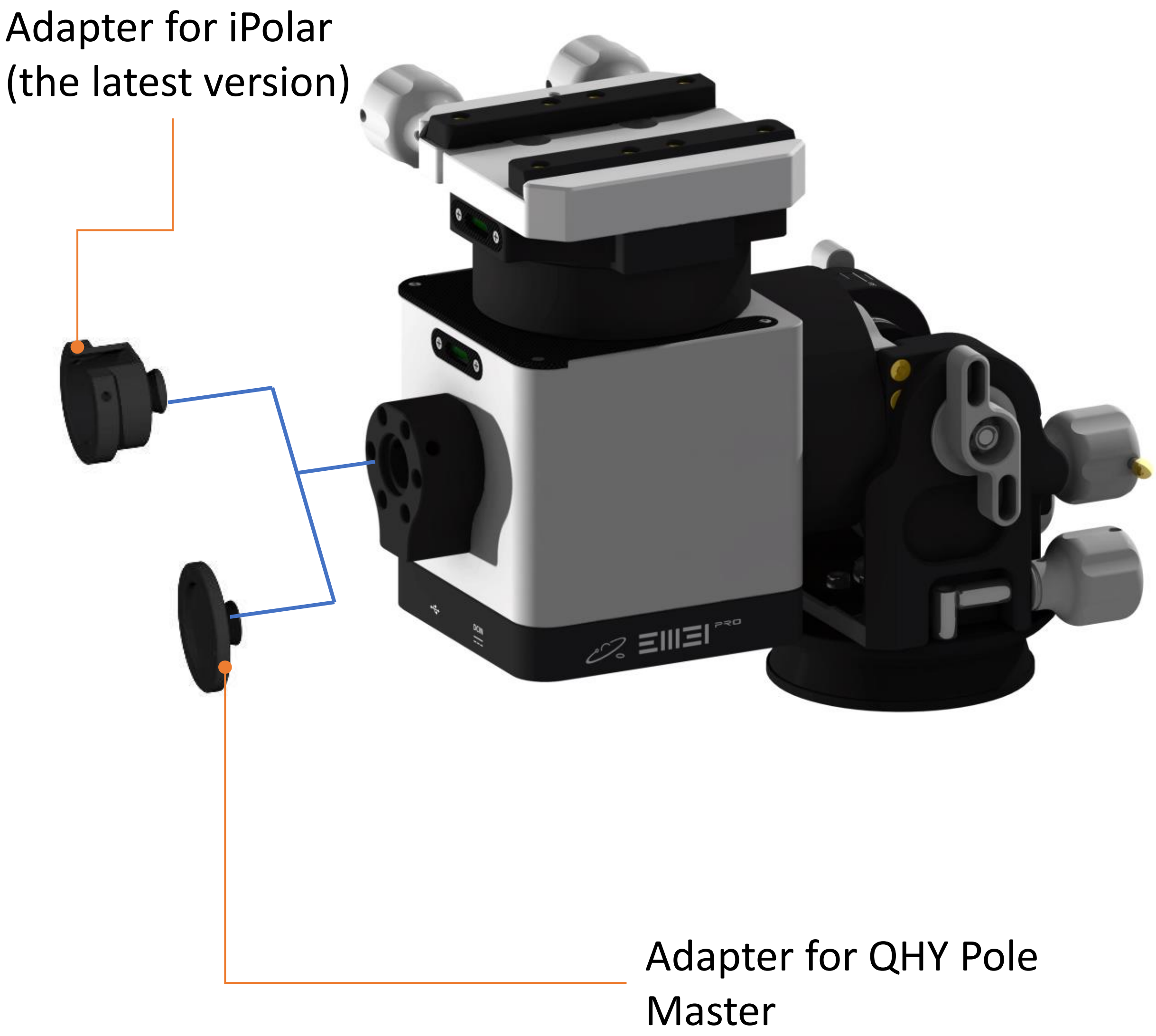


⚠ When the mount is in operation, the Status light will remain on and will start flashing once tracking is activated.

Accessory Installation

Adapter for electronic polar alignment scope

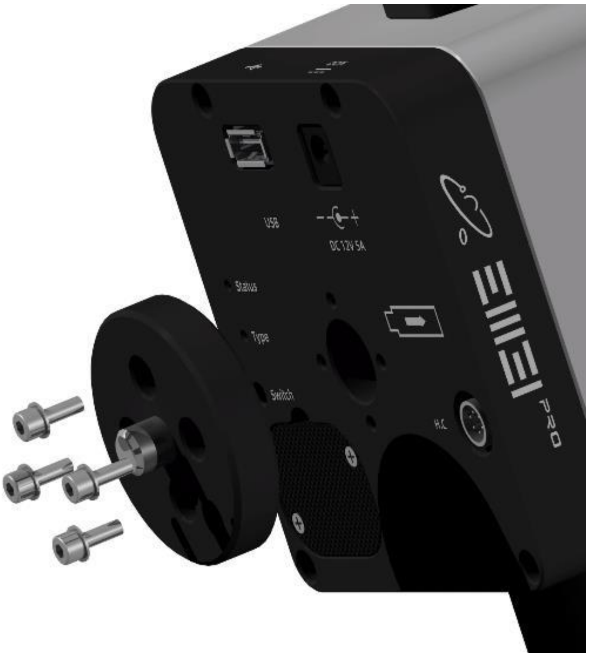
The electronic polar scope can be connected to EM31Pro via an adapter (optional accessory).

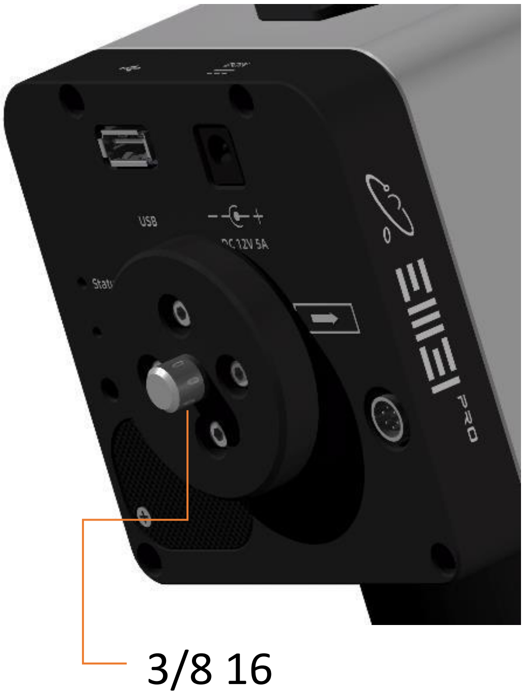

Adapter for iPolar
(the latest version)
Adapter for QHY Pole Master

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.

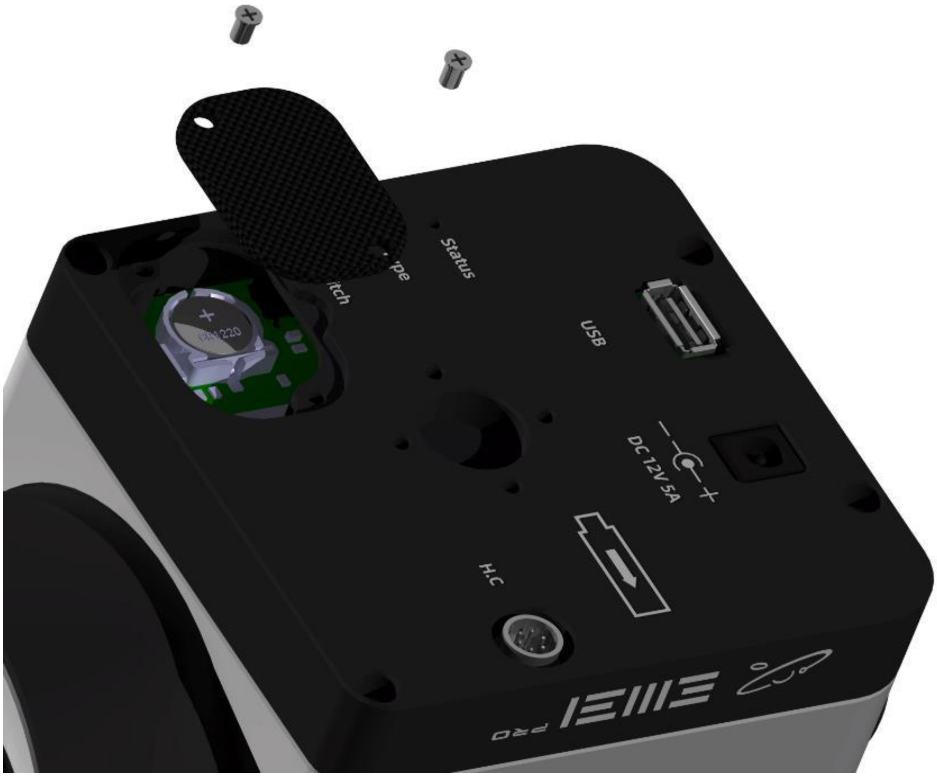

USB
DC 12V 5A
Status
Type
Switch
H.C
PRO


USB
DC 12V 5A
PRO
3/8 16
bolts

Battery Installation

Install and replace the battery

Battery replacement


Status
pe
itch
USB
CR1220
DC 12V 5A
H.C
PRO

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

OnStep Quick Start Guide

OnStep Guide

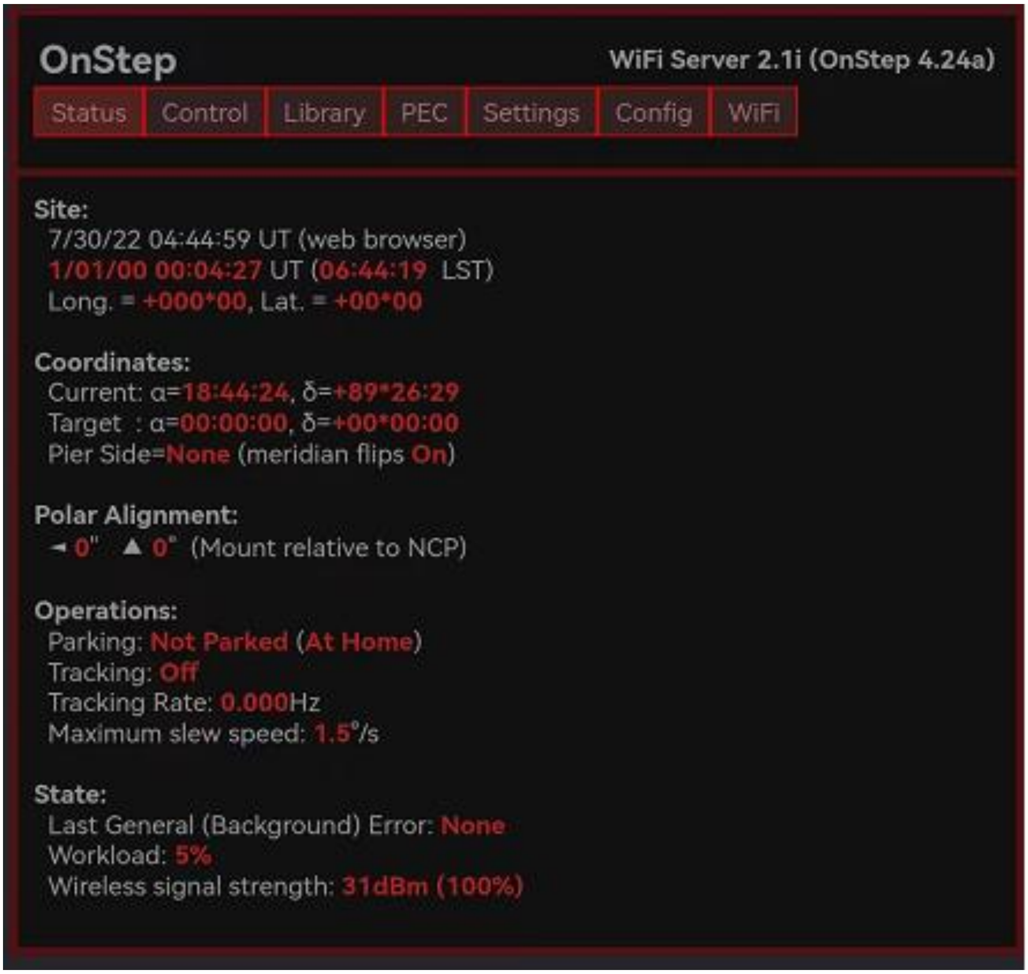
Android users can set and control the mount through OnStep APP or webpage

⚠ **IOS system cannot use APP, webpage is workable**

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. = +000*00, Lat. = +00*00

Coordinates:
Current: α=18:44:24, δ=+89*26:29
Target : α=00:00:00, δ=+00*00:00
Pier Side=None (meridian flips On)

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

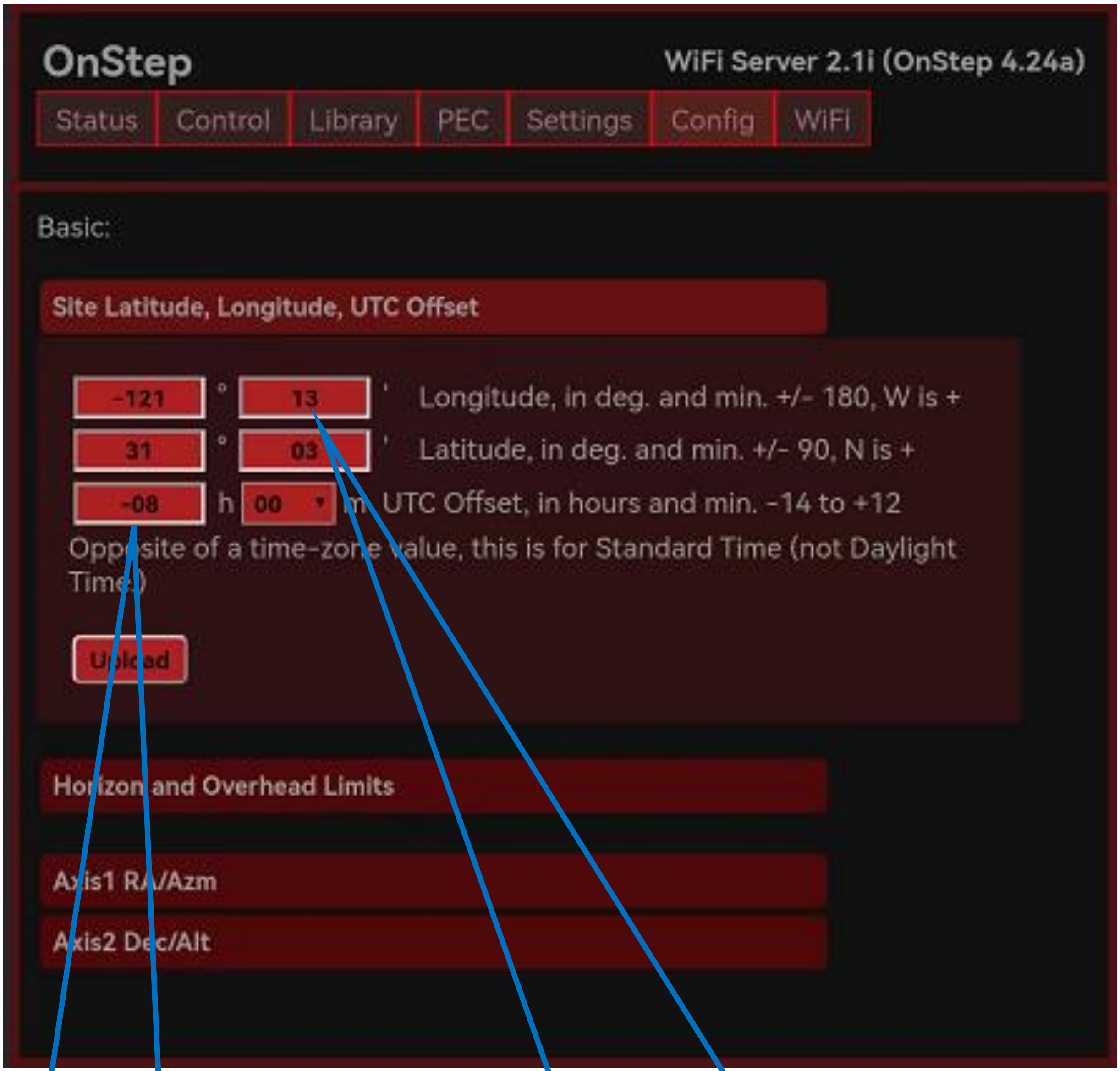
Operations:
Parking: Not Parked (At Home)
Tracking: Off
Tracking Rate: 0.000Hz
Maximum slew speed: 1.5°/s

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

OnStep Quick Start Guide

OnStep Guide

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)


OnStep
Status
Control
Library
PEC
Settings
Config
WiFi
Upload
Horizon and Overhead Limits
Axis1 RA/Azm
Axis2 Dec/Alt

WiFi Server 2.1i (OnStep 4.24a)

Basic:

Site Latitude, Longitude, UTC Offset

-121 ° 13 ' Longitude, in deg. and min. +/- 180, W is +

31 ° 03 ' Latitude, in deg. and min. +/- 90, N is +

-08 h 00 m UTC Offset, in hours and min. -14 to +12

Opposite of a time-zone value, this is for Standard Time (not Daylight Time)

Set time offset

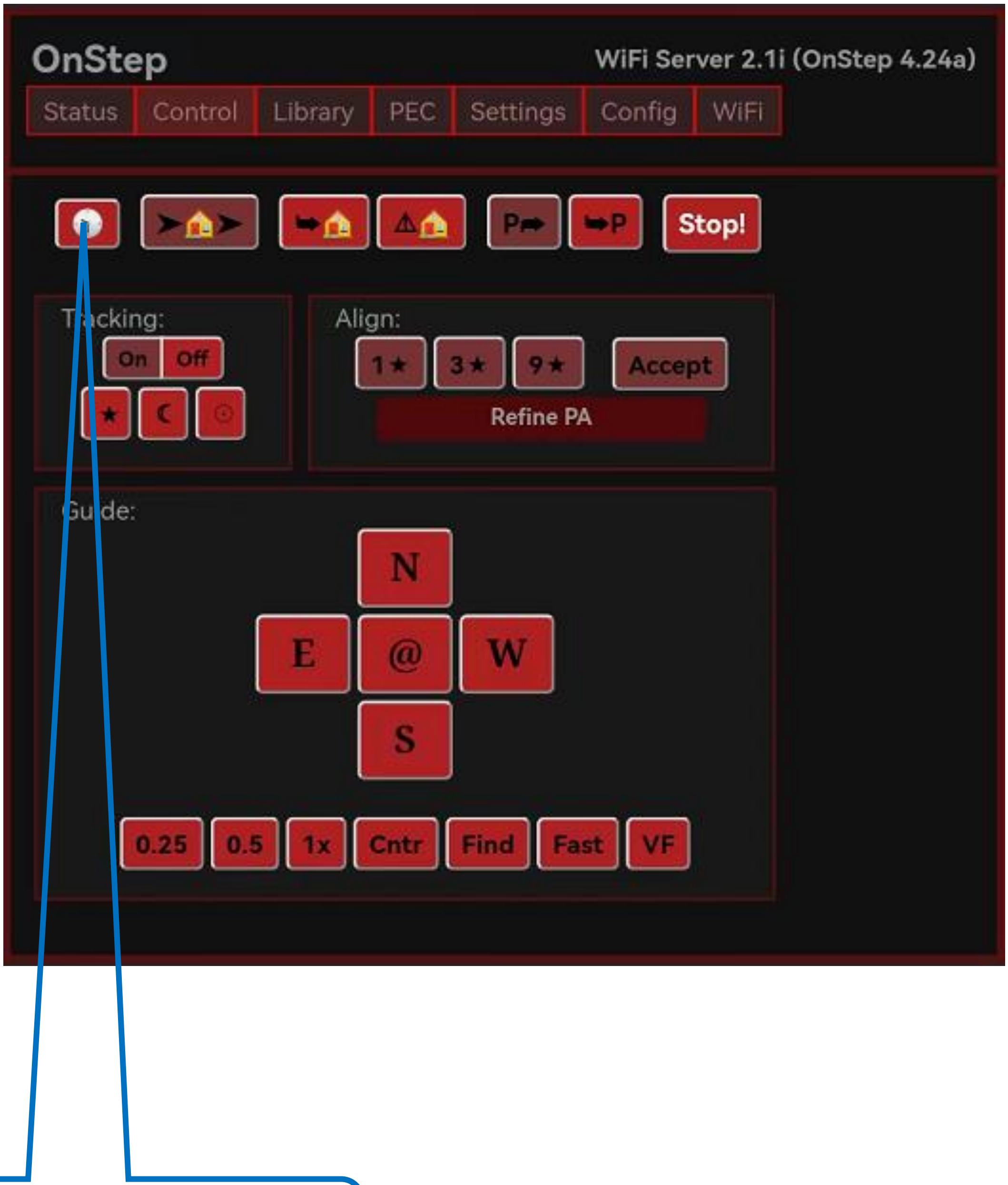
Latitude and longitude coordinates

⚠ 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 (+).

OnStep Quick Start Guide

OnStep Guide

Set Time

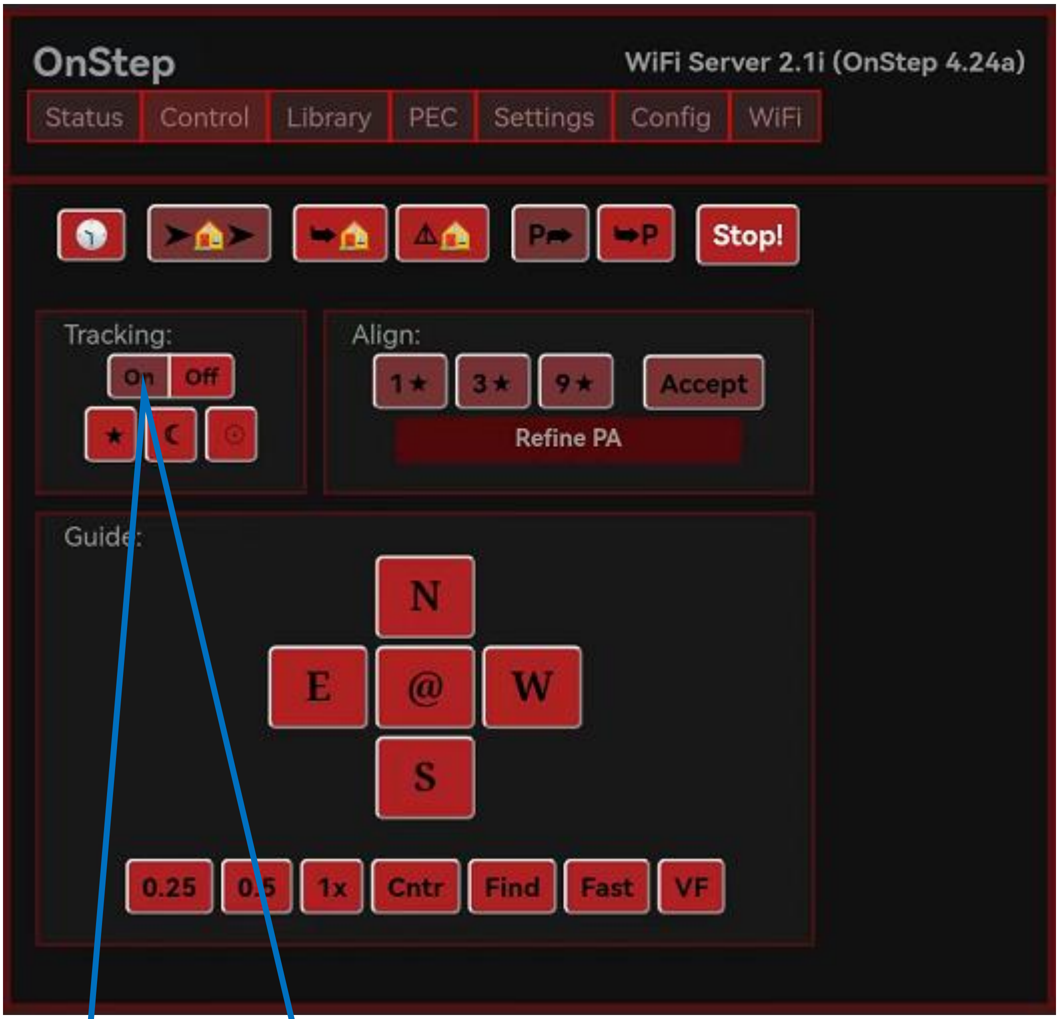

OnStep
WiFi Server 2.1i (OnStep 4.24a)
Status
Control
Library
PEC
Settings
Config
WiFi
P➡
➡P
Stop!
Tracking:
On
Off
★
☾
☉
Align:
1★
3★
9★
Accept
Refine PA
Guide:
N
E
@
W
S
0.25
0.5
1x
Cntr
Find
Fast
VF

set time

OnStep Quick Start Guide

OnStep Guide

Start Tracking


OnStep
WiFi Server 2.1i (OnStep 4.24a)
Status
Control
Library
PEC
Settings
Config
WiFi
Stop!
Tracking:
On
Off
Align:
1★
3★
9★
Accept
Refine PA
Guide:
N
E
@
W
S
0.25
0.5
1x
Cntr
Find
Fast
VF

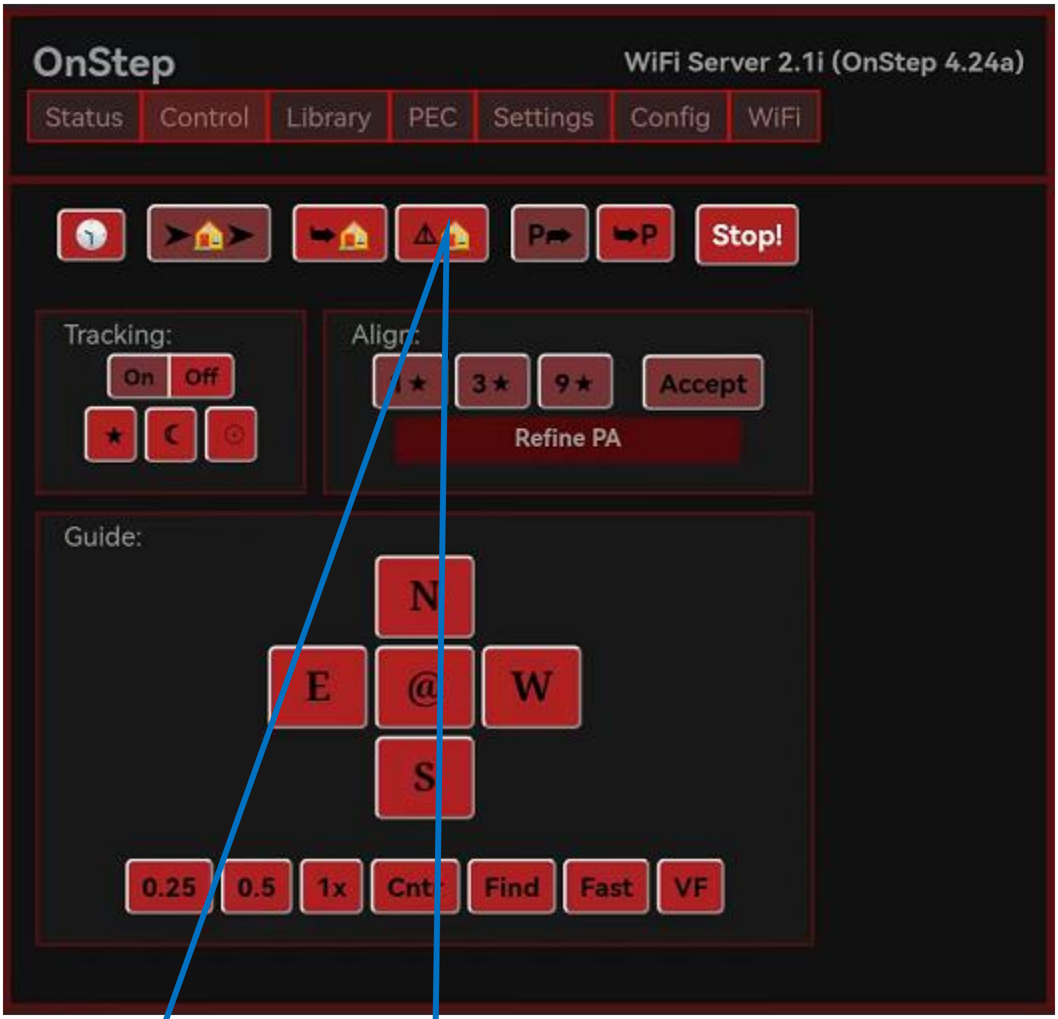
Turn on Tracking, and the rotation of the mount can be controlled by operating the direction keys.

⚠ **OnStep system option, gray indicates ON status**

OnStep Quick Start Guide

OnStep Guide

⚠ **The home position differs in the three modes of EM31Pro, so it should be set before using the mount**


OnStep
WiFi Server 2.1i (OnStep 4.24a)
Status
Control
Library
PEC
Settings
Config
WiFi
Stop!
Tracking:
On
Off
Align:
1★
3★
9★
Accept
Refine PA
Guide:
N
E
@
W
S
0.25
0.5
1x
Cnt
Find
Fast
VF

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.

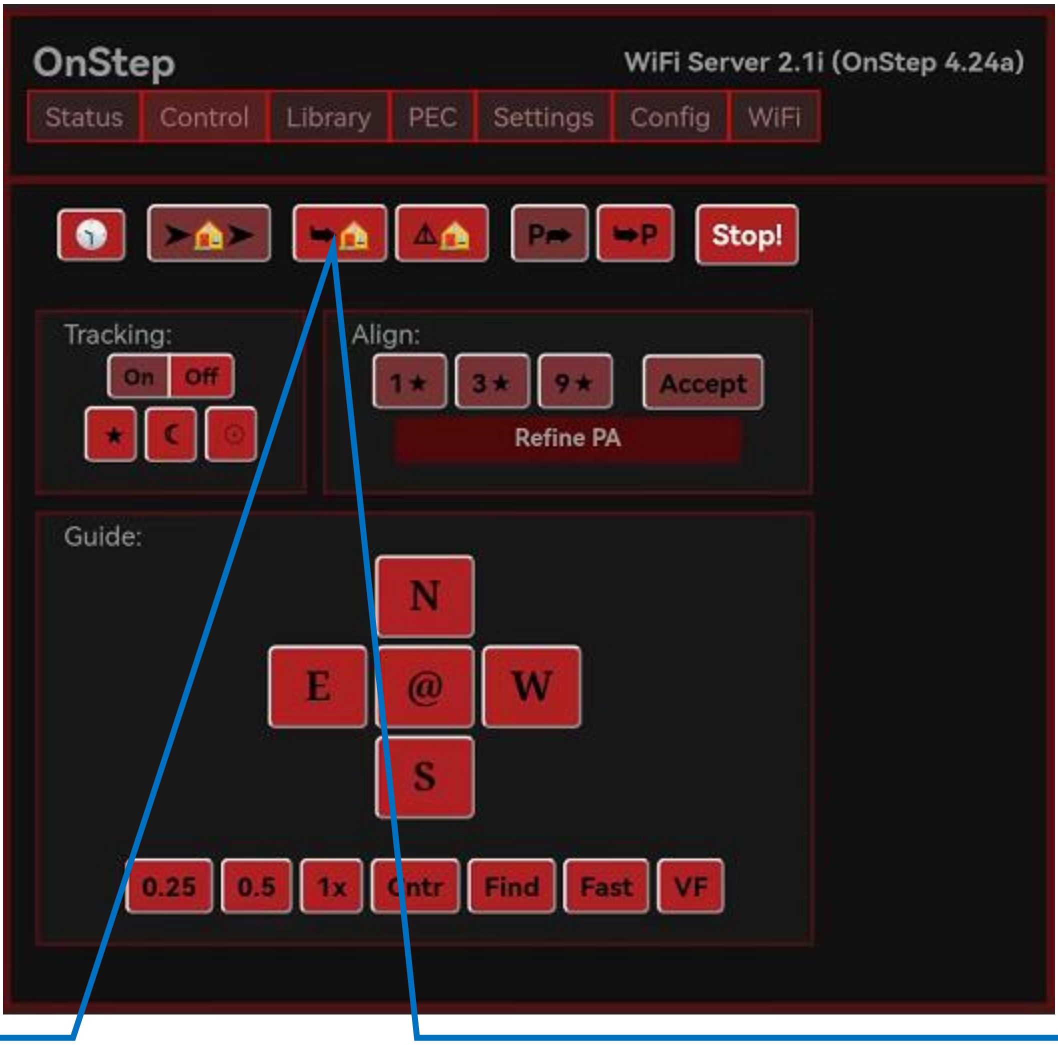
⚠

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

OnStep Quick Start Guide

OnStep Guide

⚠ **The home position is different in the three modes of EM31pro, so it should be set before using the mount**


OnStep
WiFi Server 2.1i (OnStep 4.24a)
Status
Control
Library
PEC
Settings
Config
WiFi
Stop!
Tracking:
On
Off
Align:
1★
3★
9★
Accept
Refine PA
Guide:
N
E
@
W
S
0.25
0.5
1x
Cntr
Find
Fast
VF

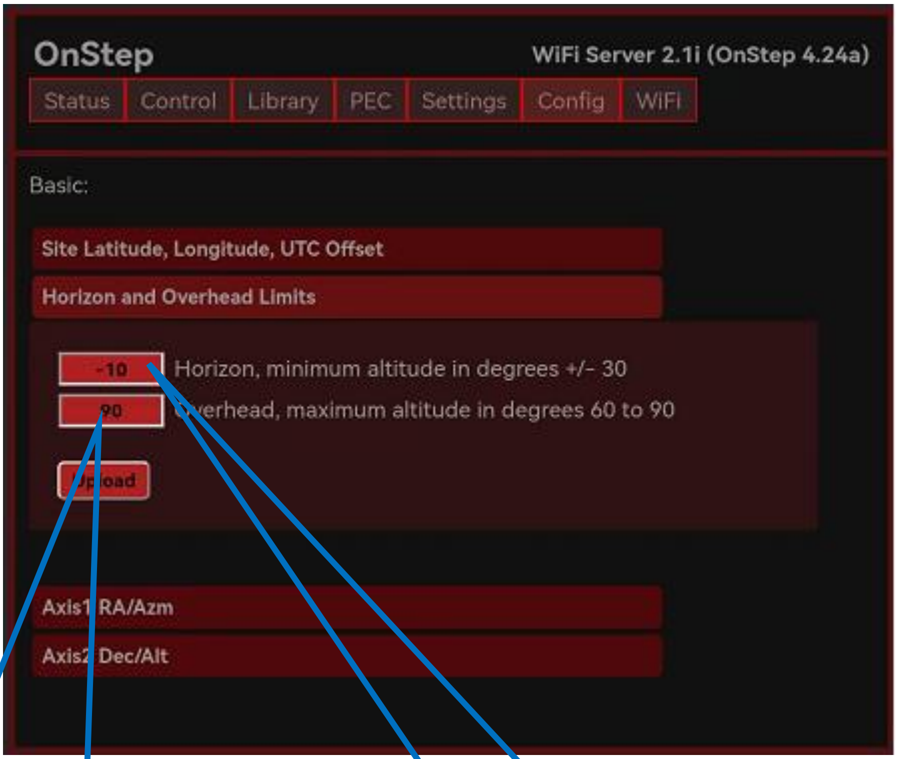
Click the "Go Home" button to return the mount to the home position.

⚠ **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.**

OnStep Quick Start Guide

OnStep Guide

Limit position setting



OnStep
WiFi Server 2.1i (OnStep 4.24a)
Status
Control
Library
PEC
Settings
Config
WiFi

Basic:

Site Latitude, Longitude, UTC Offset

Horizon and Overhead Limits

-10 Horizon, minimum altitude in degrees +/- 30

90 Overhead, maximum altitude in degrees 60 to 90

Upload
Axis1 RA/Azm
Axis2 Dec/Alt

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.

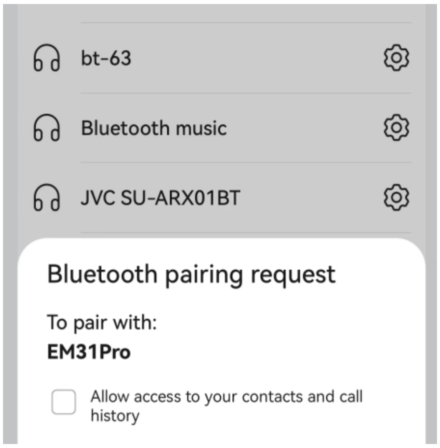
OnStep Quick Start Guide

OnStep Guide

Connect to the Android app via Bluetooth.

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

①Matching Bluetooth



bt-63

Bluetooth music

JVC SU-ARX01BT

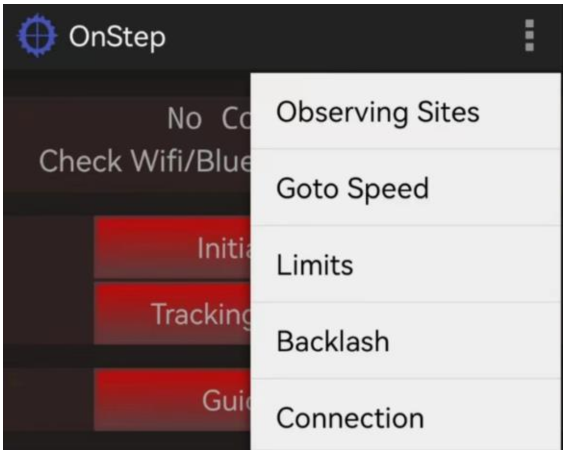
Bluetooth pairing request

To pair with:

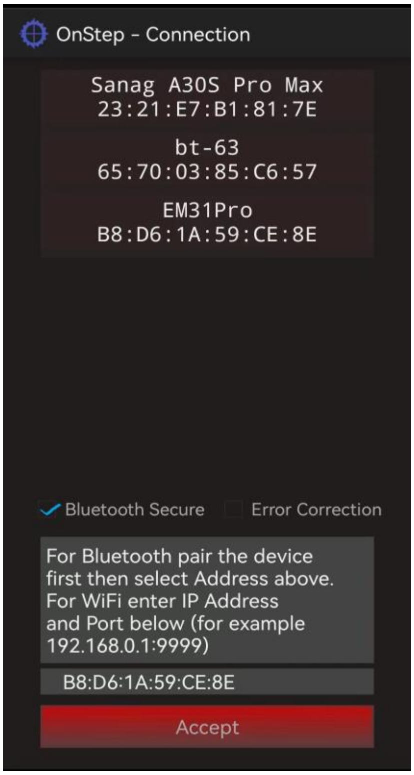
EM31Pro

☐ Allow access to your contacts and call history

②Select Connection in the APP


OnStep
No Co
Check Wifi/Blue
Initia
Tracking
Gui
Observing Sites
Goto Speed
Limits
Backlash
Connection

③Choose Bluetooth



OnStep - Connection

Sanag A30S Pro Max
23:21:E7:B1:81:7E

bt-63
65:70:03:85:C6:57

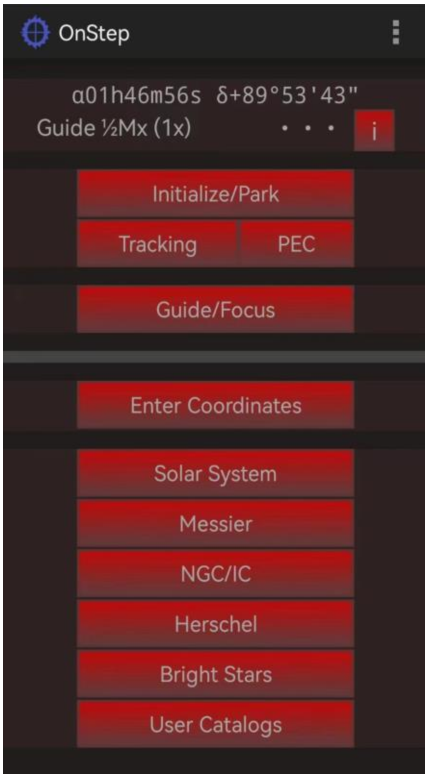
EM31Pro
B8:D6:1A:59:CE:8E

✓ Bluetooth Secure ☐ Error Correction

For Bluetooth pair the device first then select Address above. For WiFi enter IP Address and Port below (for example 192.168.0.1:9999)

B8:D6:1A:59:CE:8E

④Complete connection



OnStep

α01h46m56s δ+89°53'43"
Guide ½Mx (1x)

i
Initialize/Park
Tracking
PEC
Guide/Focus
Enter Coordinates
Solar System
Messier
NGC/IC
Herschel
Bright Stars
User Catalogs

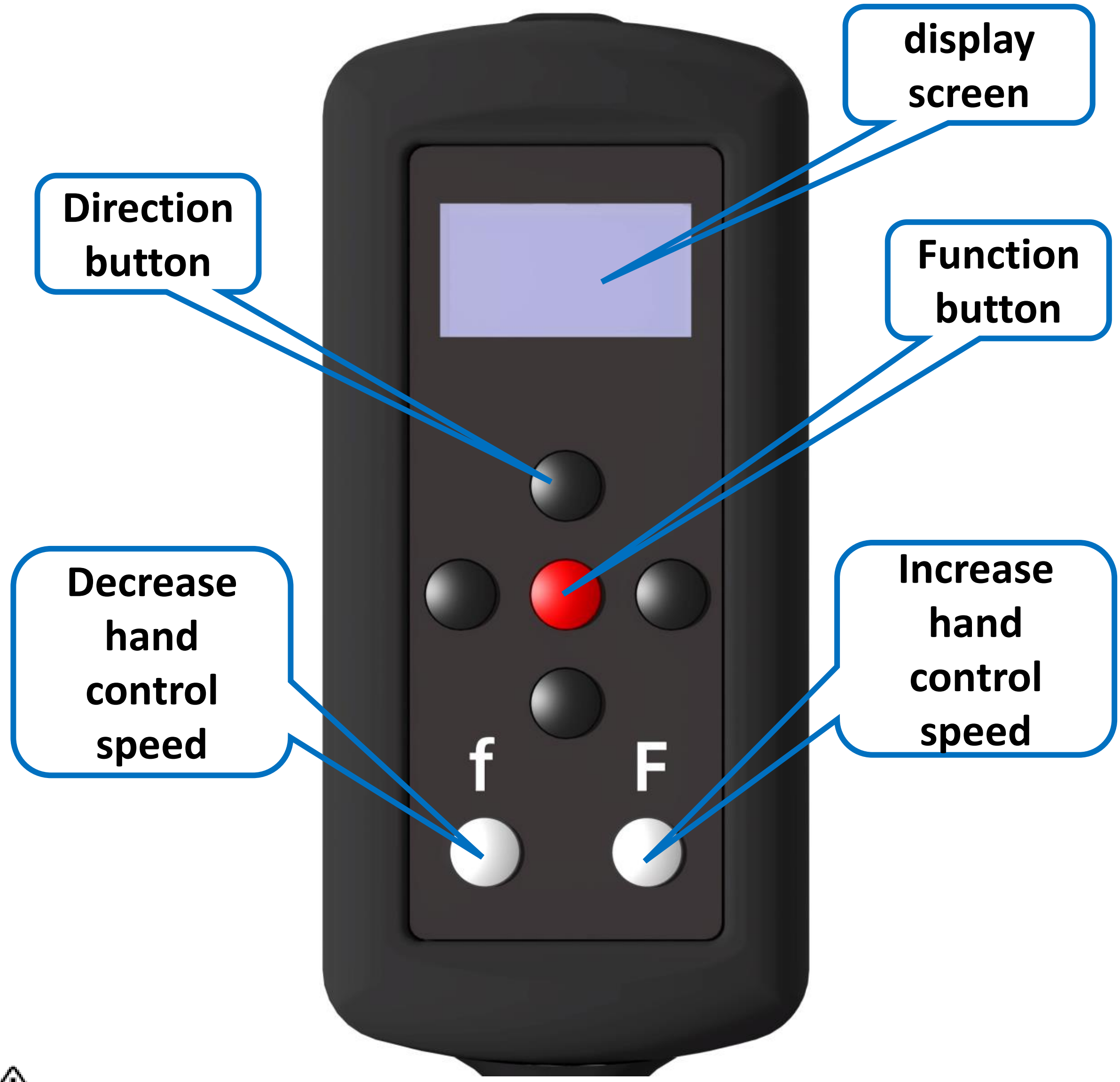
The first connection may be very slow. Please allow some time for the process to complete.

OnStep Quick Start Guide

EM31 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


display screen
Direction button
Function button
Decrease hand control speed
Increase hand control speed
f
F

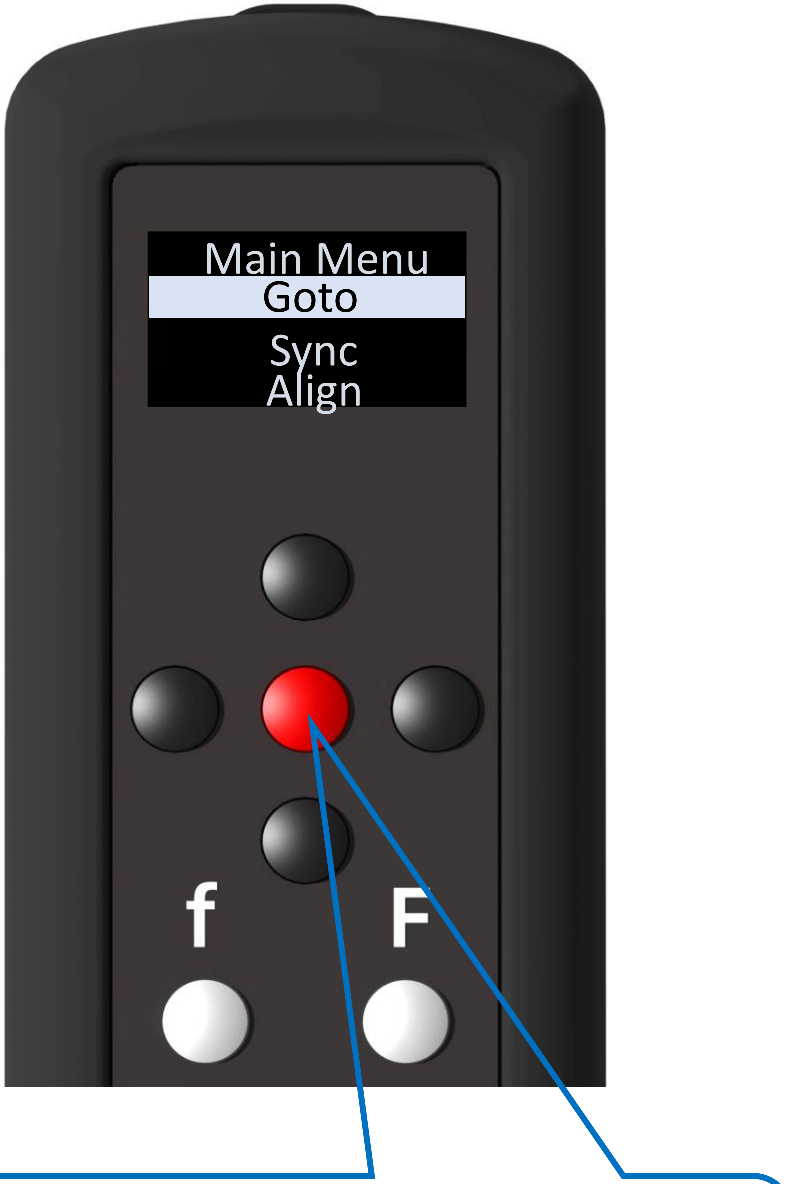
⚠

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

OnStep Quick Start Guide

EM31 Pro Hand Controller

Button Function


Main Menu
Goto
Sync
Align
f
F

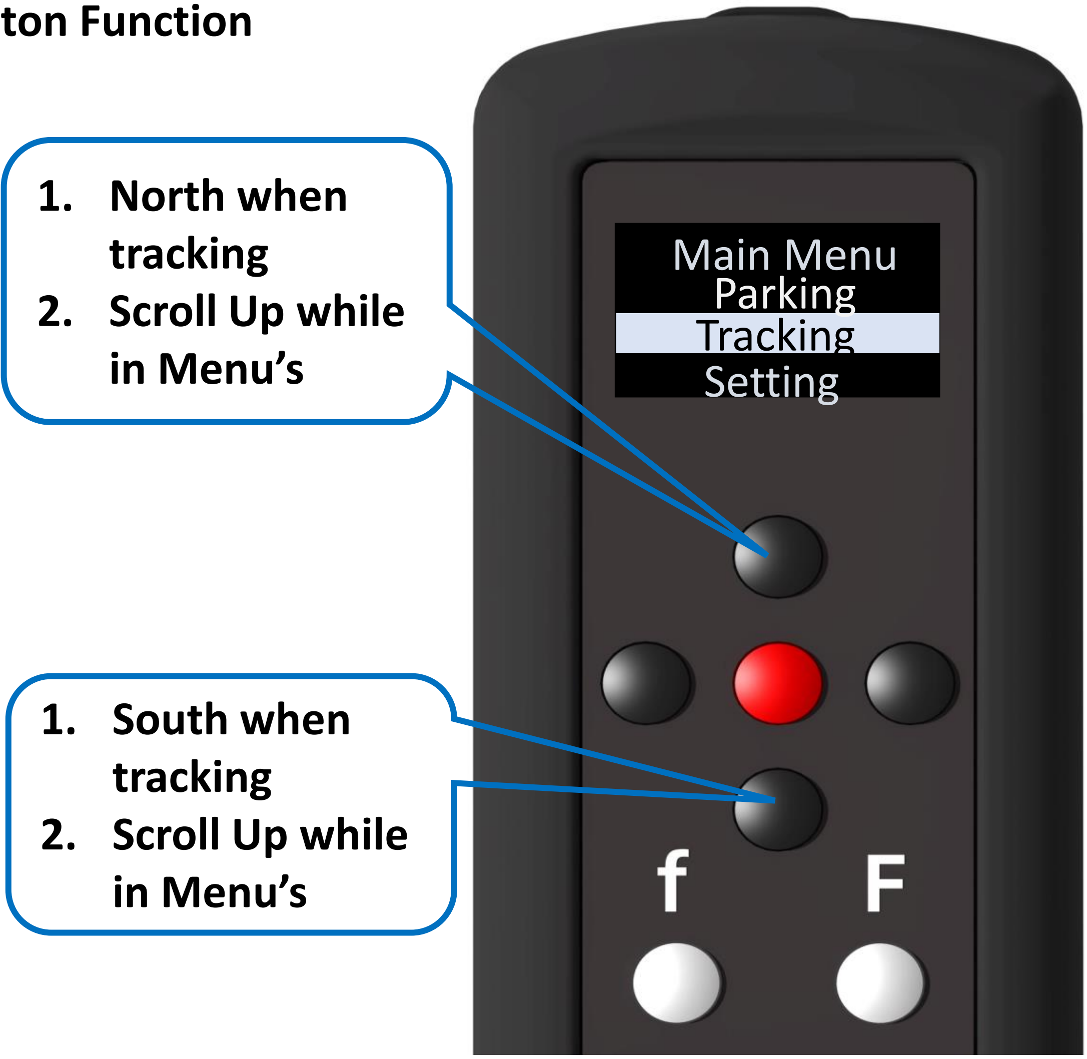
1.**Short Press = switching display information**
2. Long Press = entering Main Menu
3. Double Click = Feature Menu

OnStep Quick Start Guide

OnStep Guide

EM31 Pro Hand Controller

Button Function



1. **North when tracking**
2. **Scroll Up while in Menu’s**

1. **South when tracking**
2. **Scroll Up while in Menu’s**

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.

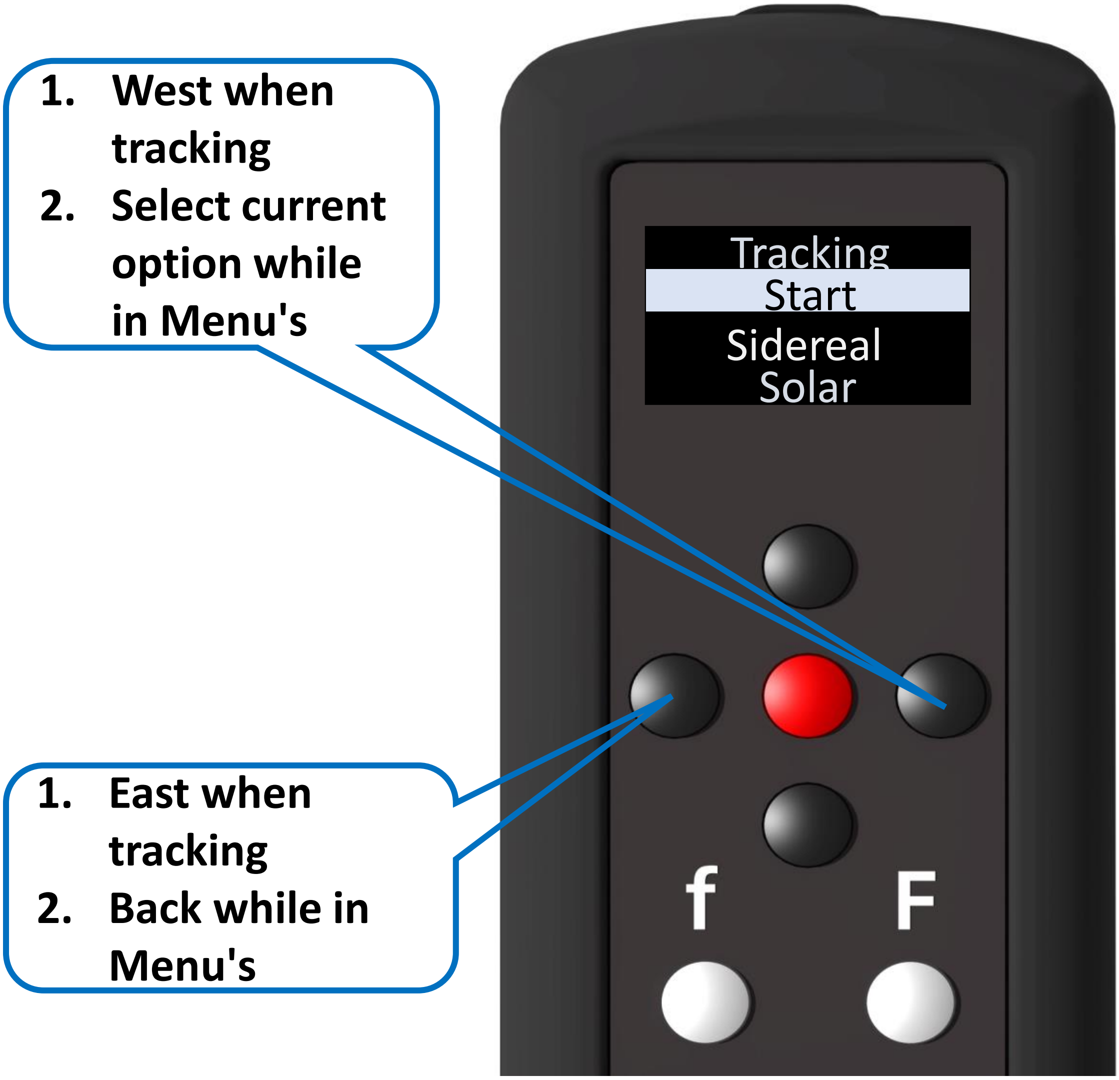
Tip: This behavior is expected near the pole and will make more sense with practice. In the Southern Hemisphere, this will be reversed.

OnStep Quick Start Guide

OnStep Guide

EM31 Pro Hand Controller

Button Function



Tracking
Start
Sidereal
Solar
f
F

1. West when tracking
2. Select current option while in Menu's

1. East when tracking
2. Back while in Menu's

OnStep Quick Start Guide

OnStep Guide

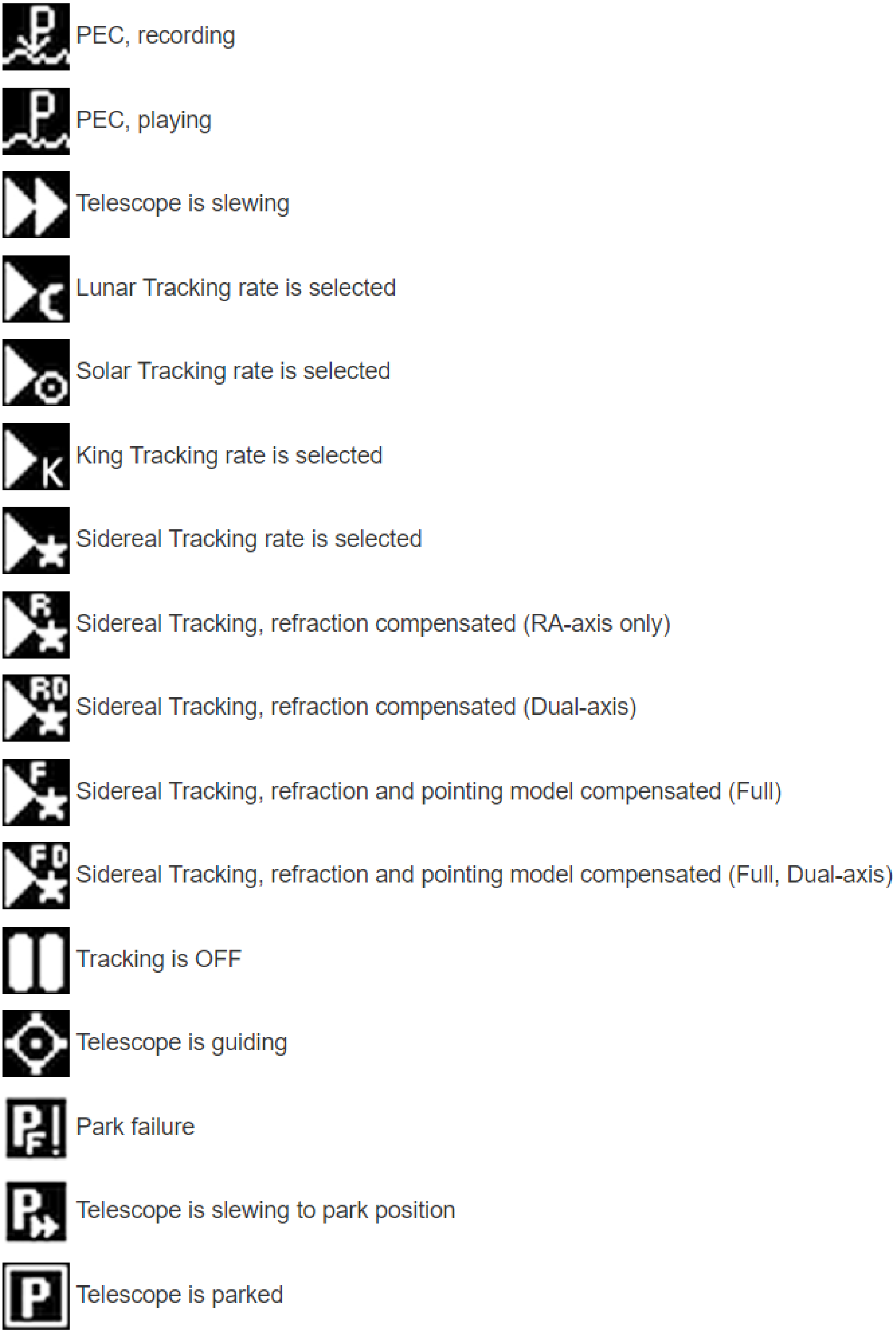
Common status icons for the Hand Controller

1↖	Alignment Star #1
2↖	Alignment Star #2 (#3 thru #8 not shown)
9↖	Alignment Star #9 (last possible)
H	Telescope is at home position. Tracking is OFF
Err ? !	Unknown error. Tracking has stopped
Err Me !	Telescope position exceeds user defined Meridian limit. Tracking has stopped
Err Up !	Telescope position exceeds user defined RA limits "Under Pole". Tracking has stopped
Err Az !	Telescope position exceeds user defined Azimuth limits. Tracking has stopped
Err De !	Telescope position exceeds user defined Declination limit. Tracking has stopped
Err →| !	Telescope limit sensed. Tracking has stopped
Err ↖↘ !	Telescope position exceeds user defined Horizon or Overhead limit. Tracking has stopped
Err MF !	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
P	PEC, paused

OnStep Quick Start Guide

OnStep Guide

Common status icons for the Hand Controller



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

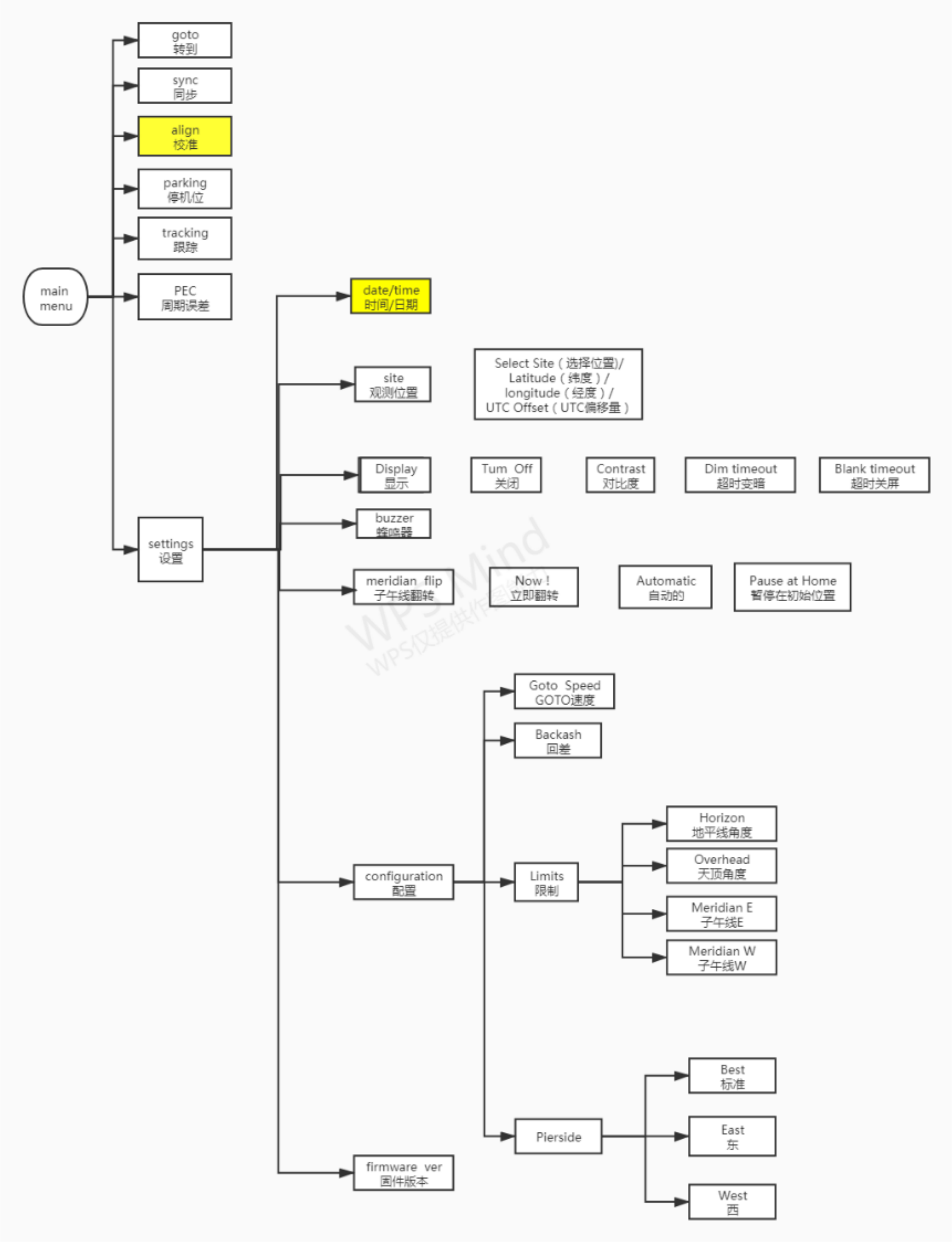
Telescope is slewing to park position

Telescope is parked

OnStep Quick Start Guide

OnStep Guide

Hand Controller menu structure diagram

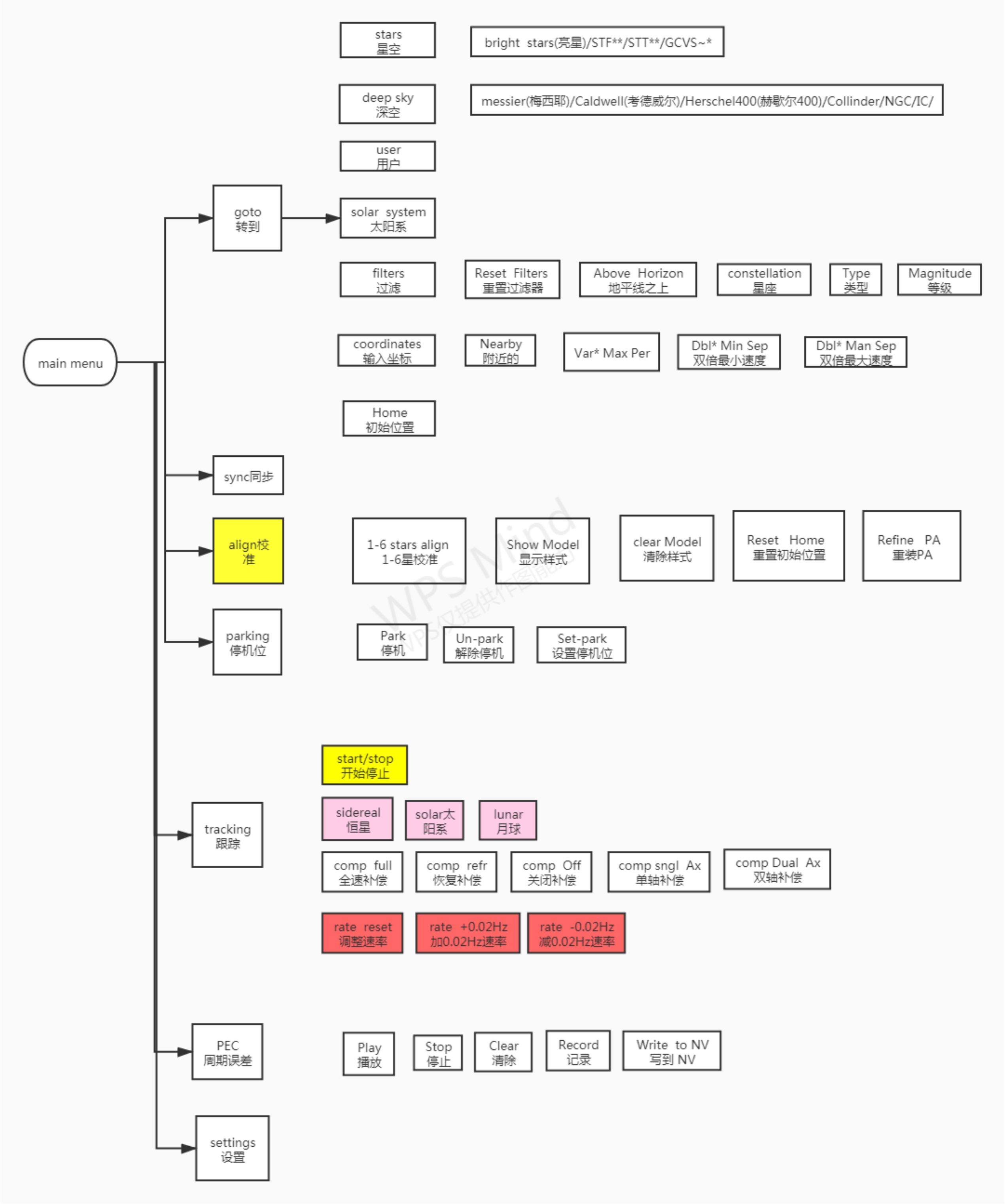

main menu
goto 转到
sync 同步
align 校准
parking 停机位
tracking 跟踪
PEC 周期误差
settings 设置
date/time 时间/日期
site 观测位置
Select Site（选择位置)/ Latitude（纬度）/ longitude（经度）/ UTC Offset（UTC偏移量）
Display 显示
Tum Off 关闭
Contrast 对比度
Dim timeout 超时变暗
Blank timeout 超时关屏
buzzer 蜂鸣器
meridian flip 子午线翻转
Now ! 立即翻转
Automatic 自动的
Pause at Home 暂停在初始位置
configuration 配置
Goto Speed GOTO速度
Backash 回差
Limits 限制
Horizon 地平线角度
Overhead 天顶角度
Meridian E 子午线E
Meridian W 子午线W
Pierside
Best 标准
East 东
West 西
firmware ver 固件版本

WPS Mind
WPS仅提供作图服务

OnStep Quick Start Guide

OnStep Guide

Hand Controller menu structure diagram

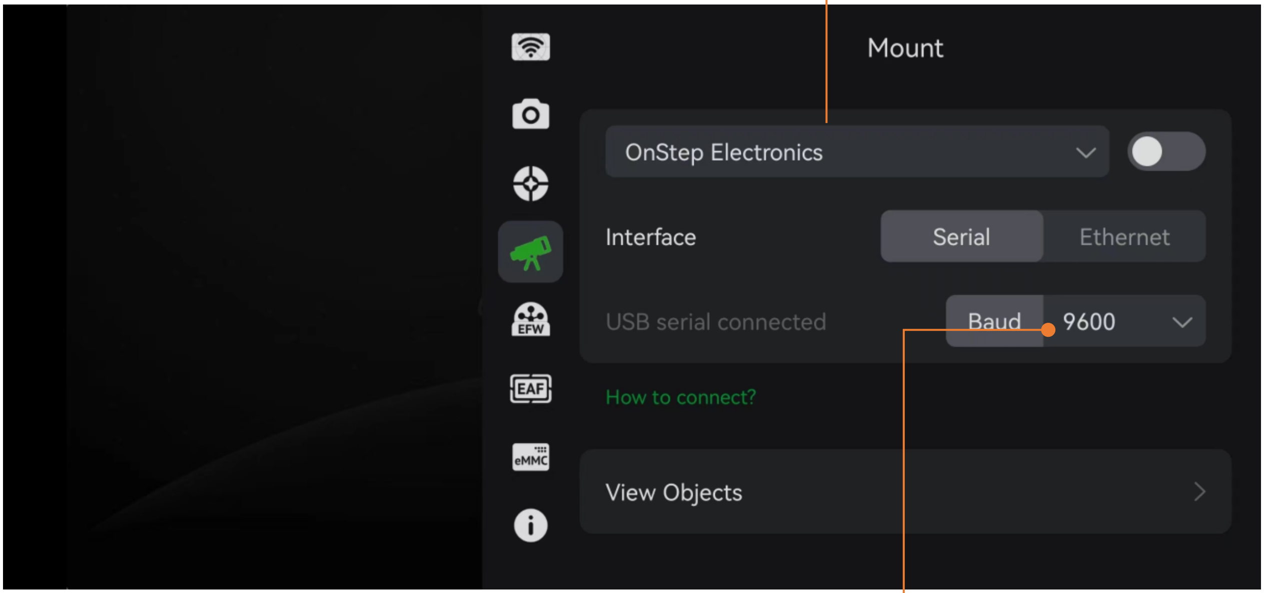

stars
星空
bright stars(亮星)/STF**/STT**/GCVS~*
deep sky
深空
messier(梅西耶)/Caldwell(考德威尔)/Herschel400(赫歇尔400)/Collinder/NGC/IC/
user
用户
goto
转到
solar system
太阳系
filters
过滤
Reset Filters
重置过滤器
Above Horizon
地平线之上
constellation
星座
Type
类型
Magnitude
等级
main menu
coordinates
输入坐标
Nearby
附近的
Var* Max Per
Dbl* Min Sep
双倍最小速度
Dbl* Man Sep
双倍最大速度
Home
初始位置
sync同步
align校准
1-6 stars align
1-6星校准
Show Model
显示样式
clear Model
清除样式
Reset Home
重置初始位置
Refine PA
重装PA
parking
停机位
Park
停机
Un-park
解除停机
Set-park
设置停机位
start/stop
开始停止
tracking
跟踪
sidereal
恒星
solar太阳系
lunar
月球
comp full
全速补偿
comp refr
恢复补偿
comp Off
关闭补偿
comp sngl Ax
单轴补偿
comp Dual Ax
双轴补偿
rate reset
调整速率
rate +0.02Hz
加0.02Hz速率
rate -0.02Hz
减0.02Hz速率
PEC
周期误差
Play
播放
Stop
停止
Clear
清除
Record
记录
Write to NV
写到 NV
settings
设置

OnStep Quick Start Guide

OnStep Guide

OnStep and ASIAIR connection

Mount selects “OnStep Electronics”



Mount

OnStep Electronics

Interface: Serial

USB serial connected

Baud: 9600

Ethernet
How to connect?
View Objects

Serial port baud rate 9600

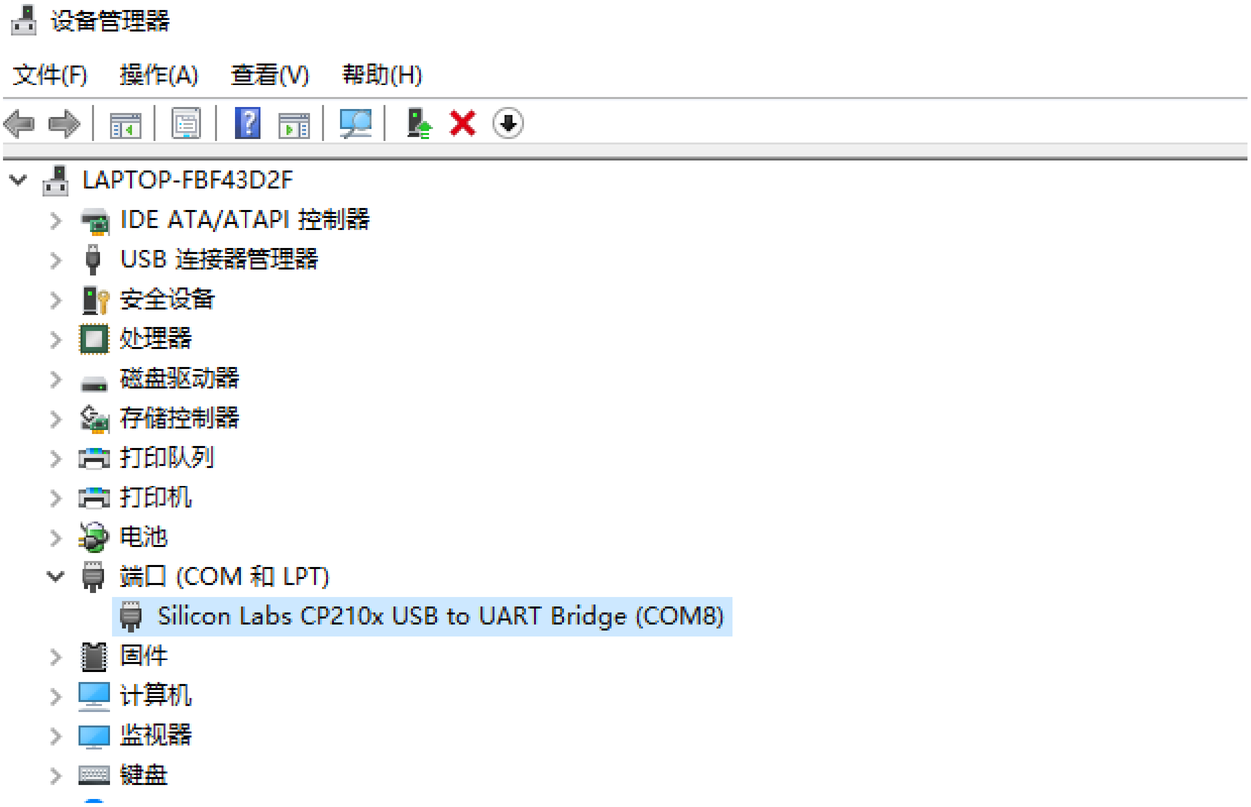
OnStep Quick Start Guide

OnStep Guide

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)
LAPTOP-FBF43D2F
IDE ATA/ATAPI 控制器
USB 连接器管理器
安全设备
处理器
磁盘驱动器
存储控制器
打印队列
打印机
电池
端口 (COM 和 LPT)
Silicon Labs CP210x USB to UART Bridge (COM8)
固件
计算机
监视器
键盘

Step ② Install ASCOM platform

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

Step ③ Install OnStep ASCOM driver

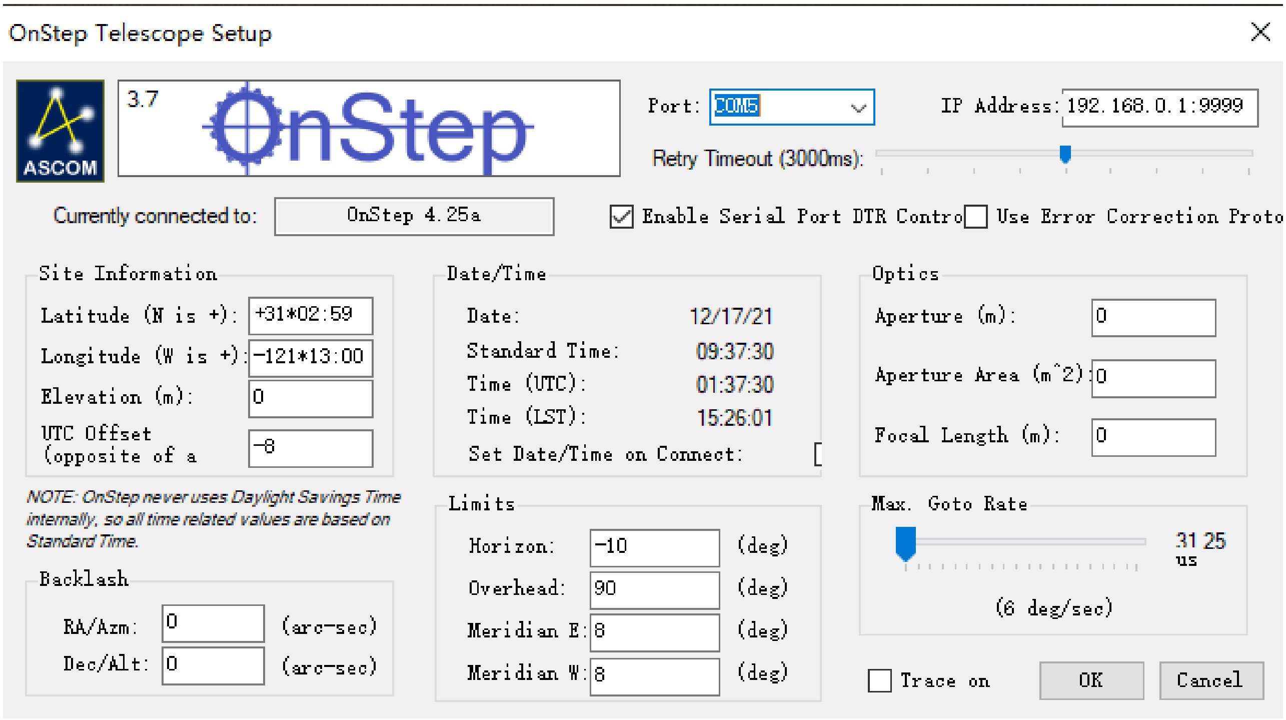
https://emcanastro.com/downloads/

OnStep Quick Start Guide

OnStep Guide

OnStep and PC connection

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



3.7

Port: COM5

IP Address: 192.168.0.1:9999

Retry Timeout (3000ms):

Currently connected to: OnStep 4.25a

☑ Enable Serial Port DTR Contro ☐ Use Error Correction Proto

Site Information

Latitude (N is +): +31*02:59

Longitude (W is +): -121*13:00

Elevation (m): 0

UTC Offset (opposite of a: -8

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

Backlash

RA/Azm: 0 (arc-sec)

Dec/Alt: 0 (arc-sec)

Date/Time

Date: 12/17/21

Standard Time: 09:37:30

Time (UTC): 01:37:30

Time (LST): 15:26:01

Set Date/Time on Connect:

Limits

Horizon: -10 (deg)

Overhead: 90 (deg)

Meridian E: 8 (deg)

Meridian W: 8 (deg)

Optics

Aperture (m): 0

Aperture Area (m^2): 0

Focal Length (m): 0

Max. Goto Rate

31 25 us

(6 deg/sec)

☐ Trace on

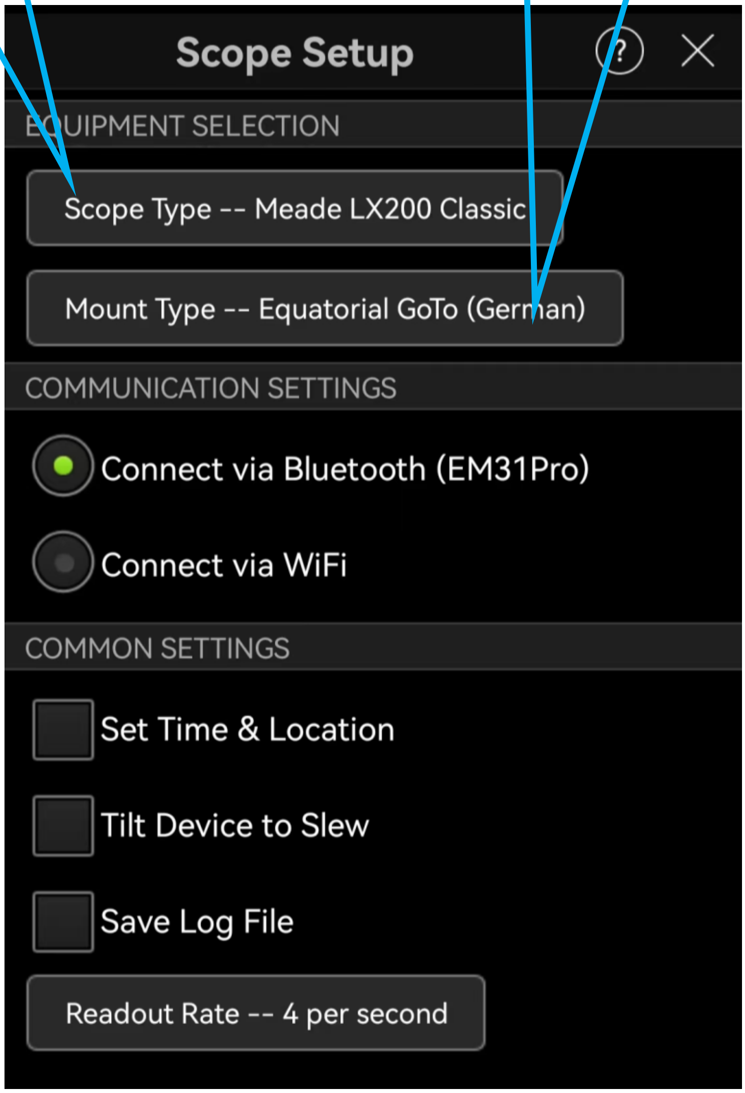
OnStep Quick Start Guide

OnStep Guide

SkySafari Connection

Scope Type: Meade LX200 Classic

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



Scope Setup

EQUIPMENT SELECTION

Scope Type -- Meade LX200 Classic

Mount Type -- Equatorial GoTo (German)

COMMUNICATION SETTINGS

● Connect via Bluetooth (EM31Pro)

○ Connect via WiFi

COMMON SETTINGS

☐ Set Time & Location

☐ Tilt Device to Slew

☐ Save Log File

Readout Rate -- 4 per second

⚠ **Note:**

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

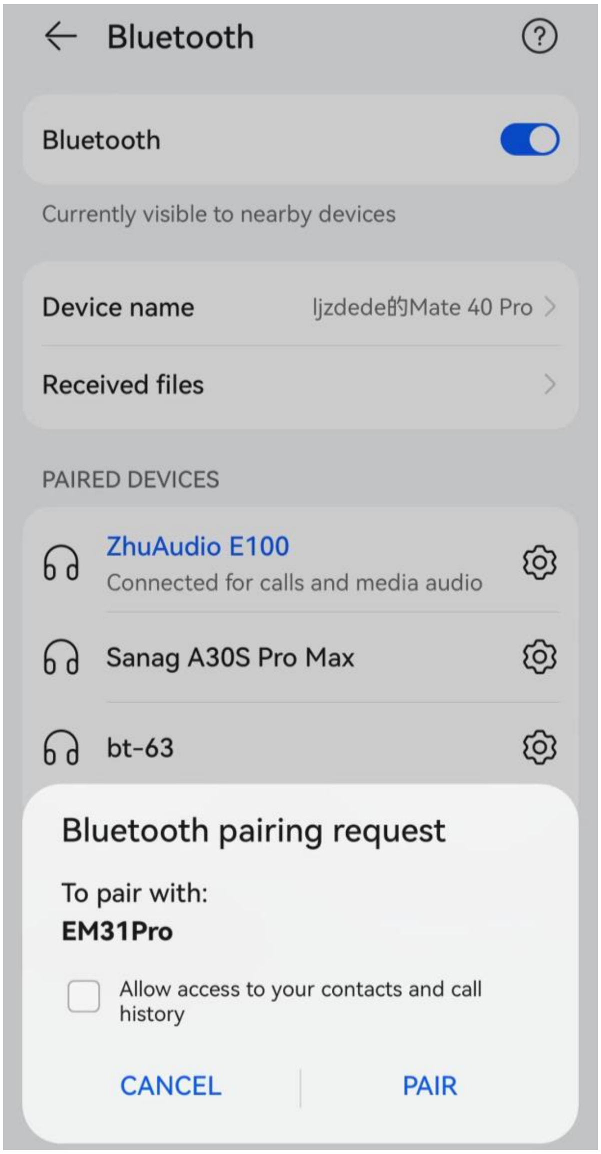
OnStep Quick Start Guide

OnStep Guide

SkySafari Connection

1. Via Bluetooth (Android only)

Pair with EM31Pro via Bluetooth.



Bluetooth

Bluetooth

Currently visible to nearby devices

Device name ljzdede的Mate 40 Pro

Received files

PAIRED DEVICES

ZhuAudio E100
Connected for calls and media audio

Sanag A30S Pro Max

bt-63

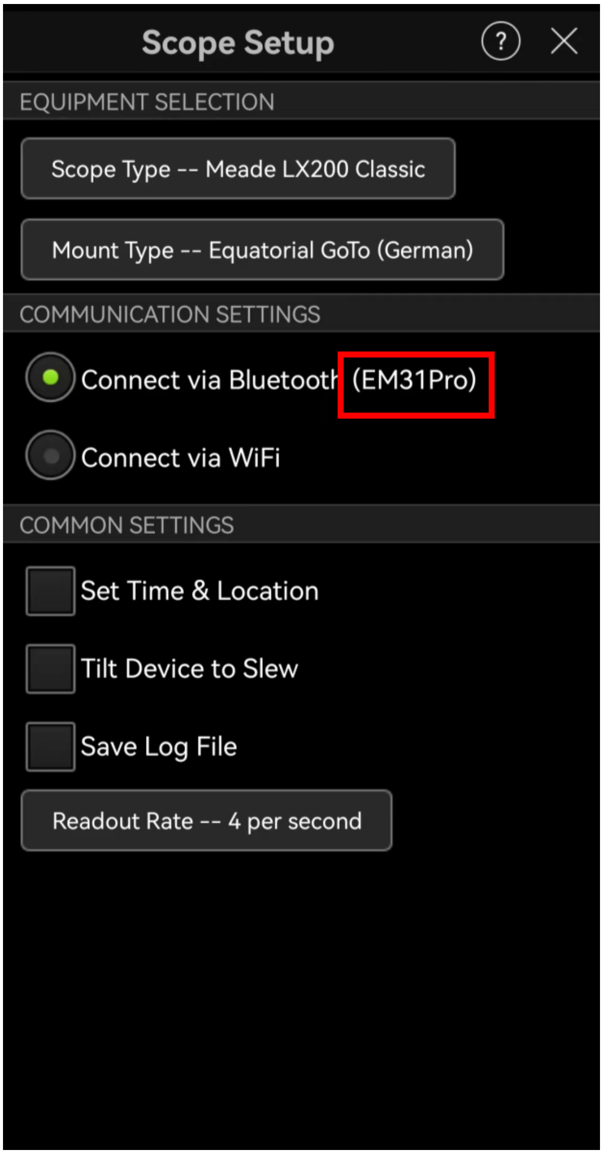
Bluetooth pairing request

To pair with:
EM31Pro

☐ Allow access to your contacts and call history

CANCEL PAIR

Bluetooth settings, select EM31Pro.



Scope Setup

EQUIPMENT SELECTION

Scope Type -- Meade LX200 Classic

Mount Type -- Equatorial GoTo (German)

COMMUNICATION SETTINGS

● Connect via Bluetooth (EM31Pro)

○ Connect via WiFi

COMMON SETTINGS

☐ Set Time & Location

☐ Tilt Device to Slew

☐ Save Log File

Readout Rate -- 4 per second

⚠ **Note:**

Using Bluetooth to connect to EM31Pro will take around 40–60 seconds to initiate the mount connection.

OnStep Quick Start Guide

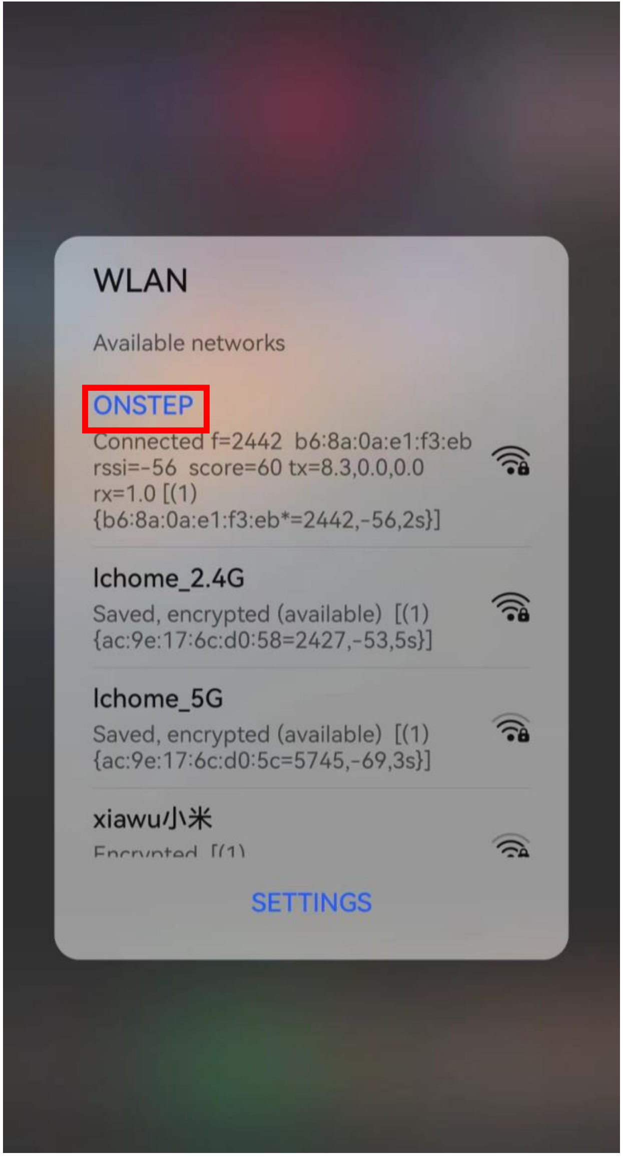
OnStep Guide

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.



WLAN

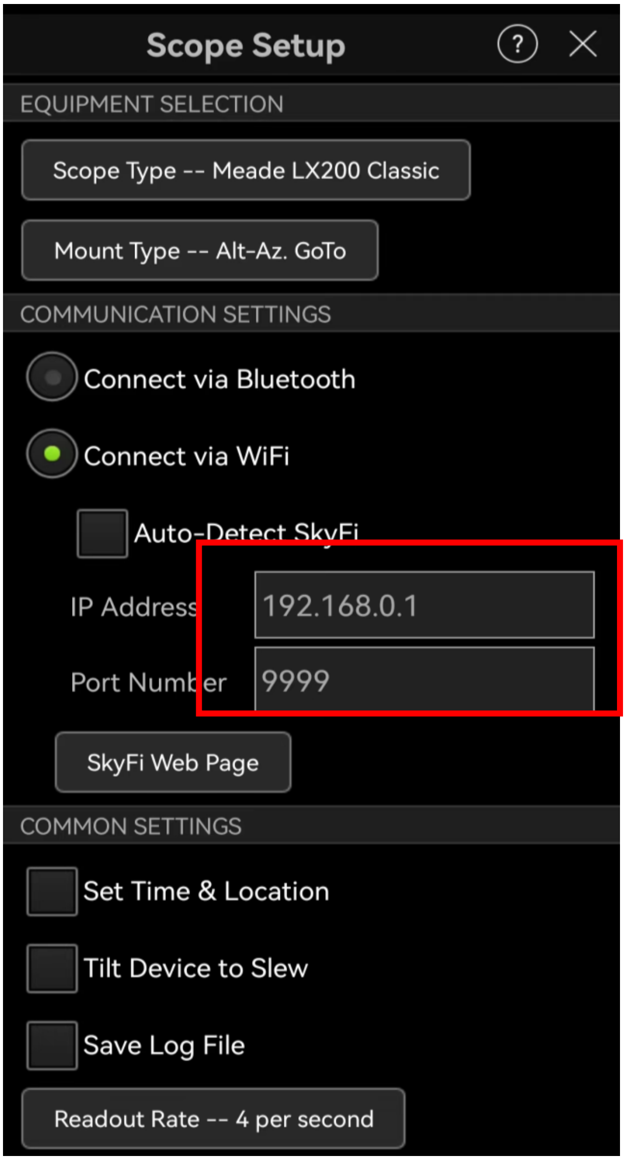
Available networks

ONSTEP
Connected f=2442 b6:8a:0a:e1:f3:eb rssi=-56 score=60 tx=8.3,0,0,0,0 rx=1.0 [(1) {b6:8a:0a:e1:f3:eb*=2442,-56,2s}]

lchome_2.4G
Saved, encrypted (available) [(1) {ac:9e:17:6c:d0:58=2427,-53,5s}]

lchome_5G
Saved, encrypted (available) [(1) {ac:9e:17:6c:d0:5c=5745,-69,3s}]

xiawu小米
Encrypted [(1)



EQUIPMENT SELECTION

Scope Type -- Meade LX200 Classic

Mount Type -- Alt-Az. GoTo

COMMUNICATION SETTINGS

○ Connect via Bluetooth

● Connect via WiFi

☐ Auto-Detect SkyFi

IP Address: 192.168.0.1

Port Number: 9999

COMMON SETTINGS

☐ Set Time & Location

☐ Tilt Device to Slew

☐ Save Log File

Readout Rate -- 4 per second

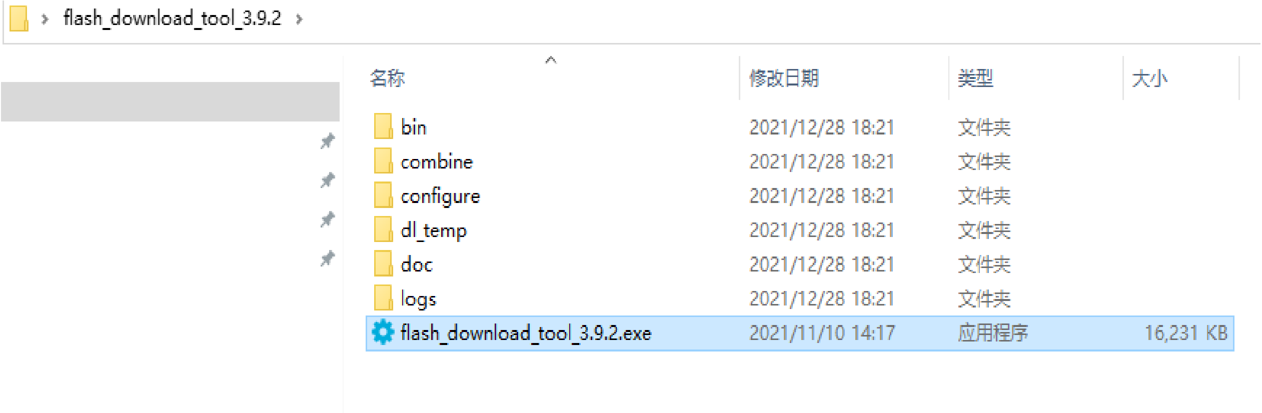
Firmware Update

Firmware Update

(Demonstrated using Windows 10)

① **Use a USB cable to connect the mount to the PC.** If the computer's USB port provides insufficient power, please connect a 12V power supply to power the mount.
(For a hand controller update, only the hand controller needs to be connected to the PC.)

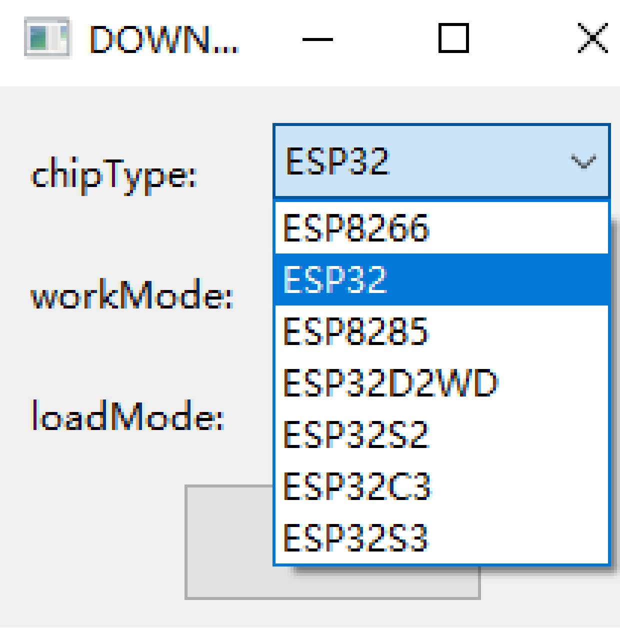
② **Open the firmware flashing software.**



› flash_download_tool_3.9.2 ›

名称	修改日期	类型	大小
bin	2021/12/28 18:21	文件夹	
combine	2021/12/28 18:21	文件夹	
configure	2021/12/28 18:21	文件夹	
dl_temp	2021/12/28 18:21	文件夹	
doc	2021/12/28 18:21	文件夹	
logs	2021/12/28 18:21	文件夹	
flash_download_tool_3.9.2.exe	2021/11/10 14:17	应用程序	16,231 KB

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

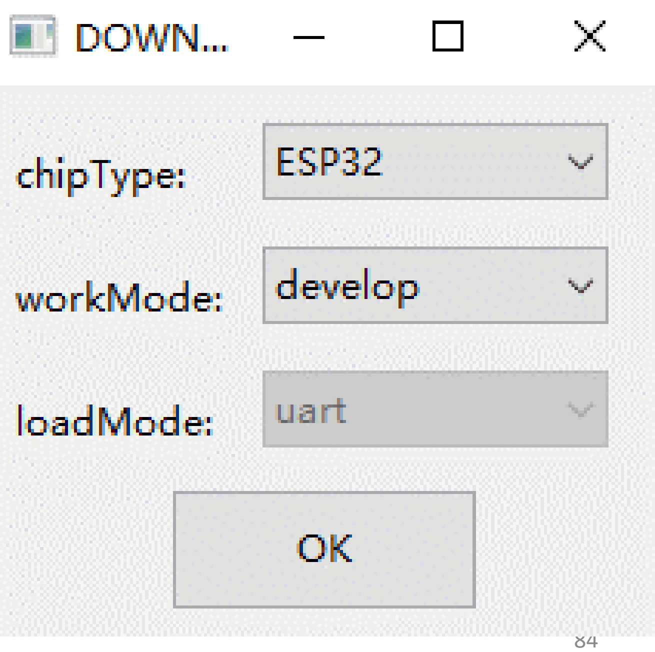


DOWN...

chipType: ESP32

workMode:

loadMode:



DOWN...

chipType: ESP32

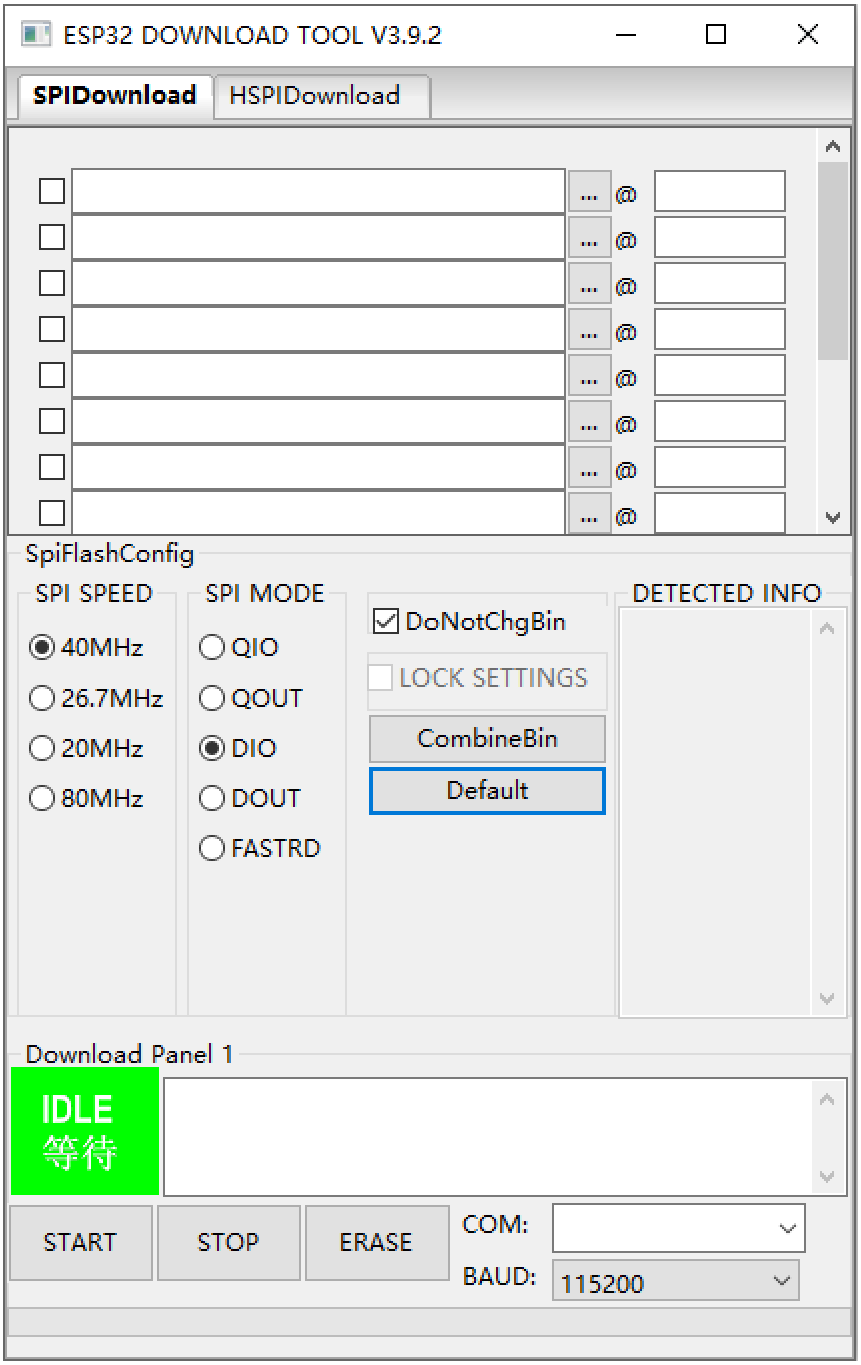
workMode: develop

loadMode: uart

Firmware Update

Firmware Update

Firmware flashing software interface.



ESP32 DOWNLOAD TOOL V3.9.2
SPIDownload
HSPIDownload
SpiFlashConfig
DETECTED INFO
LOCK SETTINGS
CombineBin
Default
Download Panel 1
IDLE
等待
START
STOP
ERASE
COM:

SPI SPEED: ● 40MHz ○ 26.7MHz ○ 20MHz ○ 80MHz

SPI MODE: ○ QIO ○ QOUT ● DIO ○ DOUT ○ FASTRD

☑ DoNotChgBin

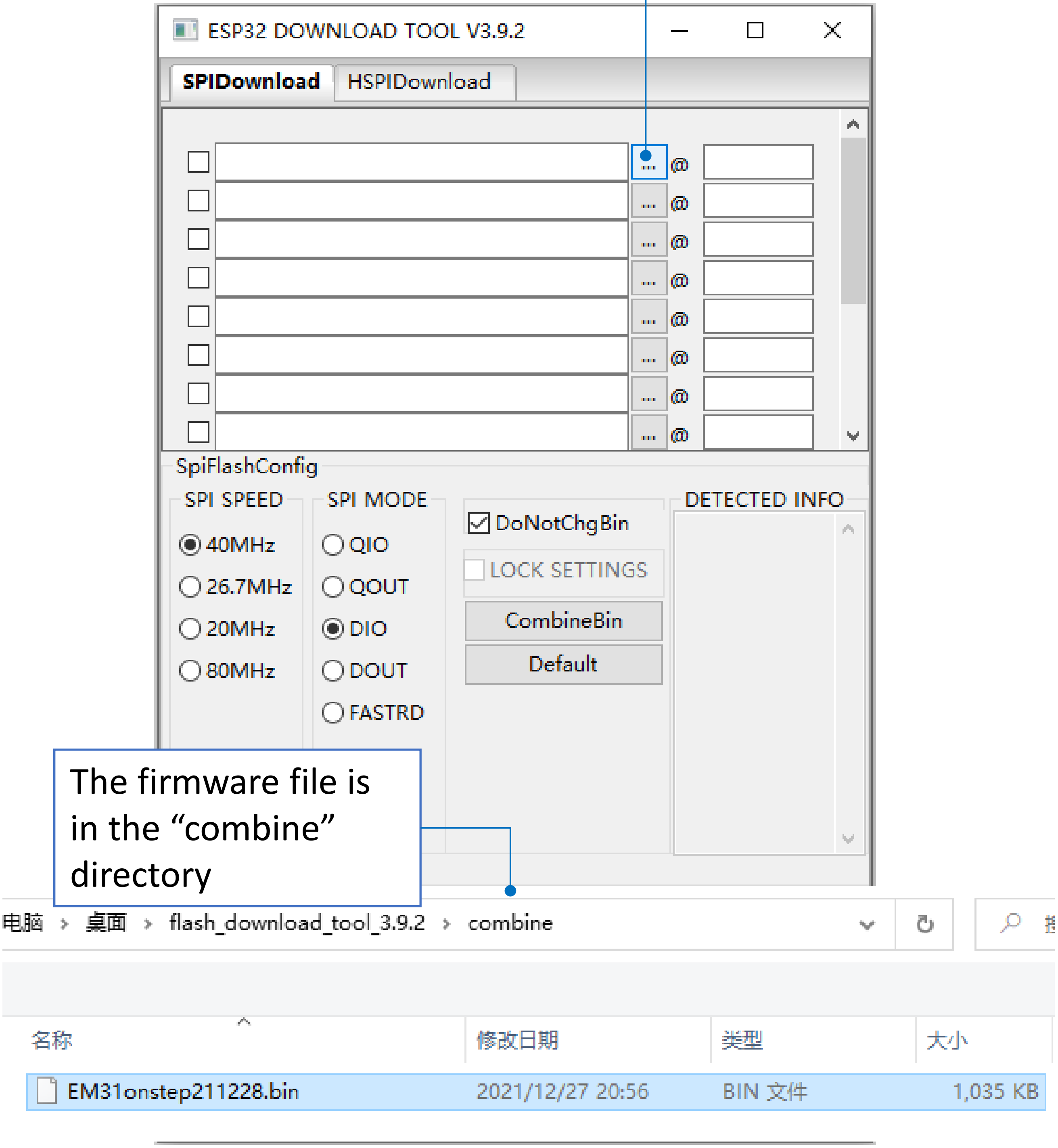
☐ LOCK SETTINGS

BAUD: 115200

Firmware Update

Firmware Update

④ **Open Firmware File**


ESP32 DOWNLOAD TOOL V3.9.2
SPIDownload
HSPIDownload
...
@
SpiFlashConfig
CombineBin
Default
DETECTED INFO

SPI SPEED: ● 40MHz ○ 26.7MHz ○ 20MHz ○ 80MHz

SPI MODE: ○ QIO ○ QOUT ● DIO ○ DOUT ○ FASTRD

☑ DoNotChgBin

☐ LOCK SETTINGS

The firmware file is in the “combine” directory

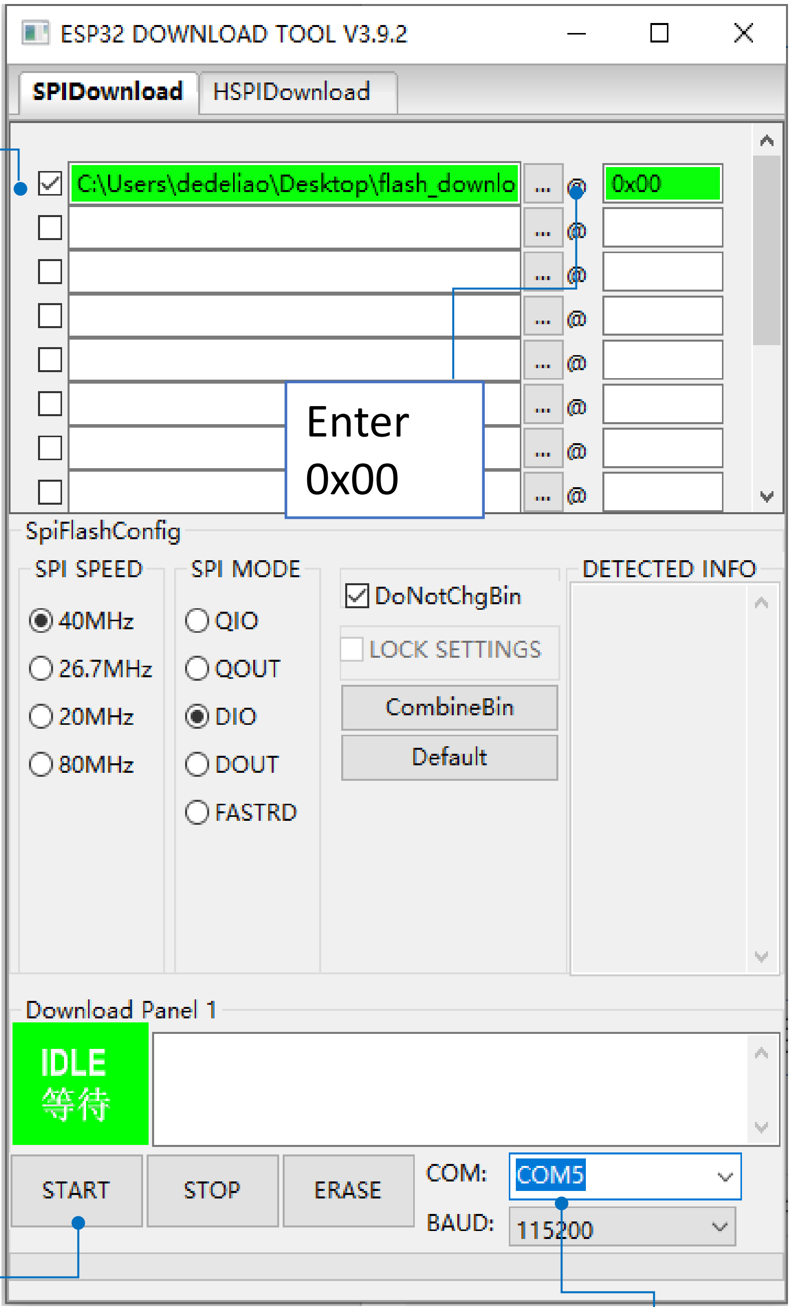
电脑 › 桌面 › flash_download_tool_3.9.2 › combine

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

Firmware Update

Firmware Update

⑤ Set parameters as shown in the figure below



ESP32 DOWNLOAD TOOL V3.9.2

SPIDownload
HSPIDownload

☑ C:\Users\dedeliao\Desktop\flash_downlo @ 0x00

SpiFlashConfig

SPI SPEED: ● 40MHz ○ 26.7MHz ○ 20MHz ○ 80MHz

SPI MODE: ○ QIO ○ QOUT ● DIO ○ DOUT ○ FASTRD

☑ DoNotChgBin

☐ LOCK SETTINGS

CombineBin
Default
DETECTED INFO
Download Panel 1
IDLE
等待
START
STOP
ERASE

COM: COM5

BAUD: 115200

Tick

Enter 0x00

⑥

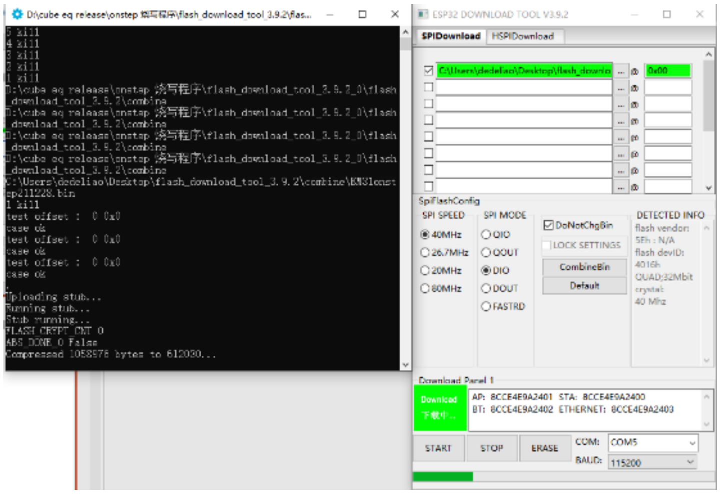
After setup, click "START" to flash the firmware.

Select serial port

Firmware Update

Firmware Update

Firmware flashing begins.


D:\cube eq release\onstep 烧写程序\flash_download_tool_3.9.2\flas...
ESP32 DOWNLOAD TOOL V3.9.2
SPIDownload
HSPIDownload
SpiFlashConfig
LOCK SETTINGS
CombineBin
Default
Download Panel 1
START
STOP
ERASE

```
5 kill
4 kill
3 kill
2 kill
1 kill
D:\cube eq release\onstep 烧写程序\flash_download_tool_3.9.2_0\flash
_download_tool_3.9.2\combine
D:\cube eq release\onstep 烧写程序\flash_download_tool_3.9.2_0\flash
_download_tool_3.9.2\combine
D:\cube eq release\onstep 烧写程序\flash_download_tool_3.9.2_0\flash
_download_tool_3.9.2\combine
D:\cube eq release\onstep 烧写程序\flash_download_tool_3.9.2_0\flash
_download_tool_3.9.2\combine
C:\Users\dedeliao\Desktop\flash_download_tool_3.9.2\combine\EM31onst
ep211228.bin
1 kill
test offset :  0 0x0
case ok
test offset :  0 0x0
case ok
test offset :  0 0x0
case ok
.
Uploading stub...
Running stub...
Stub running...
FLASH_CRYPT_CNT 0
ABS_DONE_0 False
Compressed 1058976 bytes to 612030...
```

☑ C:\Users\dedeliao\Desktop\flash_downlo @ 0x00

SPI SPEED: ● 40MHz ○ 26.7MHz ○ 20MHz ○ 80MHz

SPI MODE: ○ QIO ○ QOUT ● DIO ○ DOUT ○ FASTRD

☑ DoNotChgBin

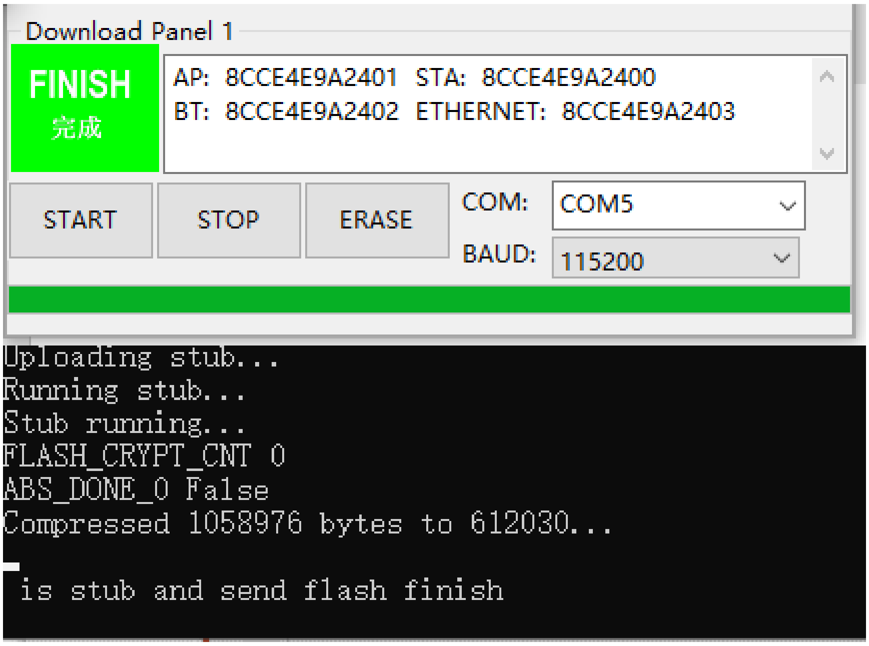
DETECTED INFO
flash vendor:
5Eh : N/A
flash devID:
4016h
QUAD;32Mbit
crystal:
40 Mhz

Download 下载中...

AP: 8CCE4E9A2401 STA: 8CCE4E9A2400
BT: 8CCE4E9A2402 ETHERNET: 8CCE4E9A2403

COM: COM5
BAUD: 115200

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


Download Panel 1
START
STOP
ERASE

FINISH 完成

AP: 8CCE4E9A2401 STA: 8CCE4E9A2400
BT: 8CCE4E9A2402 ETHERNET: 8CCE4E9A2403

COM: COM5
BAUD: 115200

```
Uploading stub...
Running stub...
Stub running...
FLASH_CRYPT_CNT 0
ABS_DONE_0 False
Compressed 1058976 bytes to 612030...

 is stub and send flash finish
```

⑦After 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.

Warranty Statement

Warranty

Thank you for purchasing the EM31Pro Strain Wave Mount. To ensure you have the best experience with our product, we provide a two-year warranty service for the EM31Pro. 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.

Warranty Statement

Warranty

4. Normal wear and tear: Such as normal wear and tear, scratches on the exterior, etc.

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: support@easeastro.com

Thank you for your understanding and support.

Appendix

EM31Pro Tutorial Videos

To help you get started and operate the EM31Pro effectively, we have prepared a series of instructional videos. You can find detailed guides via the links below:

EM31Pro Installation

Learn how to properly install the EM31Pro and ensure stable operation.
https://www.youtube.com/watch?v=KfCiDCdeQ50

EM31Pro Altitude Adjustment

A guide to adjusting the altitude for different observation needs.
https://youtu.be/oWRaSYimG0c

EM31Pro EQ Mode Home Position Setup

Quickly learn how to set up the home position in EQ mode.
https://www.youtube.com/watch?v=81gaRCINgCw&t=51s

EM31Pro Mode Switching

Step-by-step instructions on switching between different modes, including EQ and Alt-Az modes.
https://youtu.be/K9rK1uqSFIQ

Appendix

EM31Pro Tutorial Videos

To help you get started and operate the EM31Pro effectively, we have prepared a series of instructional videos. You can find detailed guides via the links below:

EM31Pro Side-Mounted Alt-Az Mode and Home Position Setup
Learn how to configure the side-mounted Alt-Az mode and set the home position.
https://youtu.be/uJGSUqnAcHc

EM31Pro Top-Mounted Alt-Az Mode
Demonstrates how to set up the top-mounted Alt-Az mode.
https://youtu.be/I4pH3T3Topw

EM31Pro Tripod (TC44)
An overview of the tripod, step-by-step assembly guide, and various configuration options for different needs.
https://www.youtube.com/watch?v=xt3OhjC8vtE

⚠

Before operating, please ensure you have read the full manual carefully and follow the steps shown in the tutorial videos for optimal performance and safety.
For further assistance or technical support, feel free to reach out to us anytime.