ASIAIR Plus

User Manual V1.3

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Preface

Thank you for purchasing the ASIAIR Plus.

ASIAIR Plus is a Wi-Fi enabled astronomy controller designed for deep sky astrophotography. When used with the ASIAIR app, it integrates your mount, camera, focuser, filter wheel, and other supported equipment into a single control system. It manages equipment connection, polar alignment, guiding, sequencing, and image acquisition in one workflow.

ASIAIR Plus is the third generation of the ASIAIR platform. It incorporates hardware and software improvements developed by ZWO since the first ASIAIR was released in July 2018.

Before using ASIAIR Plus for imaging, please read this manual carefully. While the system is designed to simplify astrophotography, it may take several sessions to become fully comfortable with its operation. This manual provides step by step guidance, detailed explanations of features, and practical tips to help you operate the system efficiently.

This document explains proper setup and operation through written instructions and illustrations. It also outlines important safety information and usage precautions. Read all instructions thoroughly before operating the device and follow them carefully during use. Damage to equipment or personal injury resulting from improper operation is the responsibility of the user.

Reading Instructions

Quick Keyword Search

PDF electronic documents support keyword searches using the search function. For example, in Adobe Reader, Windows users can press Ctrl+F, and Mac users can press Command+F to search for keywords.

Navigate by Clicking the Table of Contents

Users can understand the document's structure through the table of contents; clicking a title will navigate directly to the corresponding page.

Print Document

This document supports high-quality printing.

Usage Recommendations

ZWO provides tutorial videos and documentation for ASIAIR Plus users, and strictly follows the guidance of the Manual during actual use. The content of the Manual may be subject to change. For the latest instructions on using this product, please refer to

Online manuals are available at https://www.zwoastro.com/cn/support/manuals.

1. Quick Guide

2. User Manual including Disclaimer and Safety Summary

It is recommended that users first watch the instructional videos and then review the Quick Guide to become familiar with the basic operation process.

For complete product information, including the full disclaimer and safety summary, please refer to the User Manual.

Access Instructional Videos

Users can scan the QR Code with their mobile devices to access and view the

instructional videos, ensuring correct and safe usage of this product.

https://qrcode.zwoastro.com/asiair-video

Download the ZWO ASIAIR App

Scan the QR Code to obtain the download link. The iOS version can be found and downloaded in the App Store. The Android version is available on the Google Play Store, Z WO official website, Huawei AppGallery, and Xiaomi App Store by searching for ASIAIR.

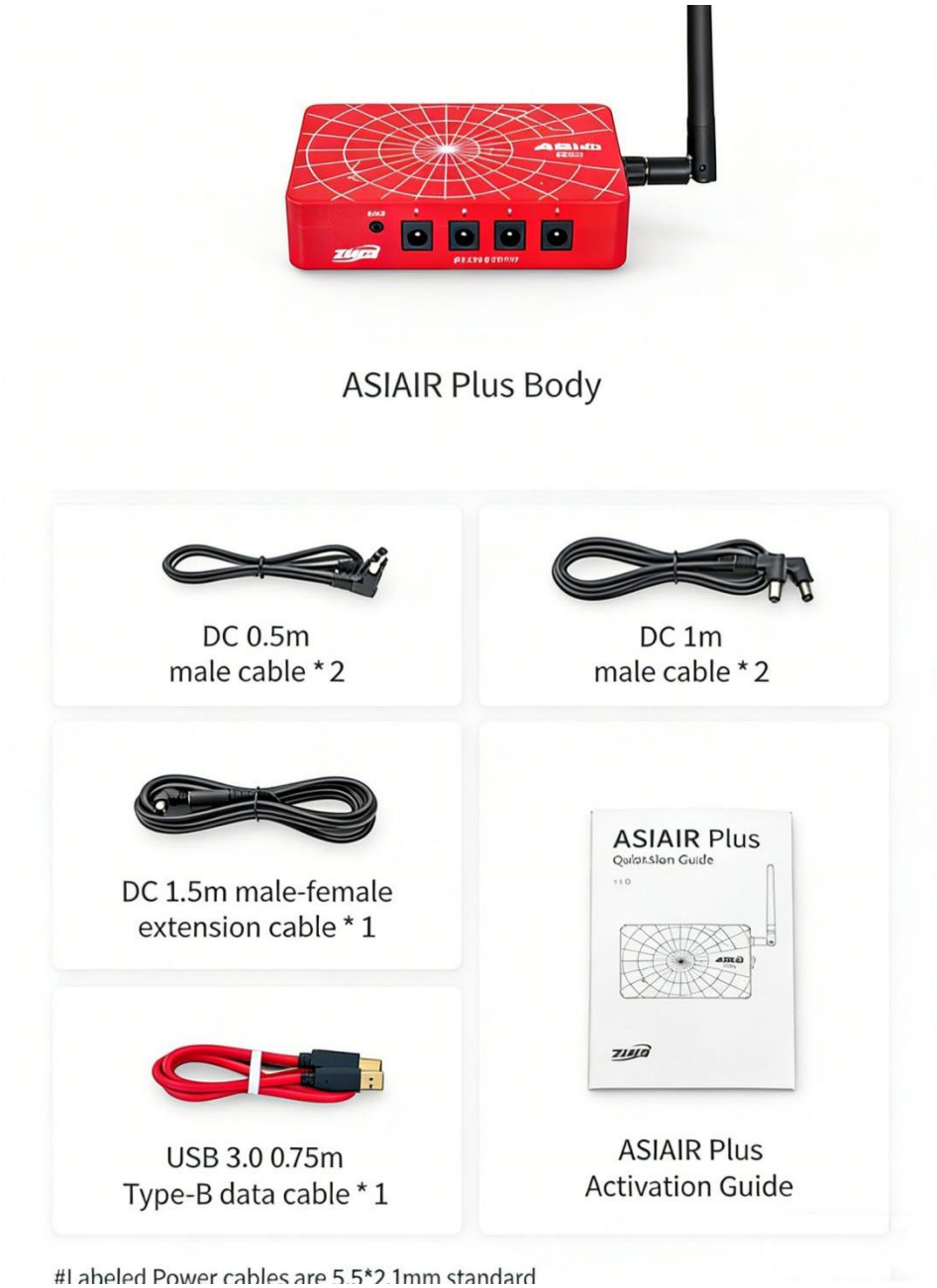
The ASIAIR App supports Android 8.0 and above, and iOS 12 and above.

Minimum and Recommended Specifications

ASIAIR is supported on devices running iOS and Android operating systems. To ensure the best user experience, we recommend running the ASIAIR App on devices exceeding the recommended specifications.

	Android	iOS	MacOS	HarmonyOS
Minimum Specifications	Android 8 and above, device RAM > 4GB	iOS 12 and above	Mac devices equipped with Apple Silicon	HarmonyOS 2.0 and above
Recommended Specifications	Android 12 and above, device RAM > 6GB	iOS 15 and above	Mac devices equipped with Apple Silicon	HarmonyOS 4.0 and above

Packing List



1. Product Overview

This chapter describes the main features of the ASIAIR Plus, identifies its external components, and explains the function of the status indicator lights.

1.1. Introduction

ASIAIR Plus is an intelligent Wi-Fi device featuring a lightweight power management module, ample USB Interfaces, and various dovetail plate mounting methods. Together with the comprehensive functions of the ASIAIR App, it offers full support for Astronomical Deep-Sky Photography, from device integration to image acquisition. ASIAIR Plus is the third-generation product, continuously improved and newly designed by ZWO since the release of the first-generation ASIAIR in July 2018.

1.2. Feature Highlights

The ASIAIR Plus housing is constructed from aerospace-grade aluminum, manufactured by CNC machining, and finished with anodic oxidation, which not only effectively protects the enclosure but also provides a comfortable tactile experience. With overall dimensions of 102.5 × 70 × 26.5 mm, it is compact and portable, handheld-sized, and easier to store.

The elegantly symmetrical slots on the body, combined with the front laser-etched star maps of Polaris, Ursa Minor, and Ursa Major, further highlight its dynamic and refined design. The M4 and 1/ 4-inch openings on the bottom and sides, in conjunction with the Dovetail Plate, make installation and removal effortless.

Equipped with a lightweight power management module, the device facilitates integrated wiring that is neat and orderly, providing stable and reliable power supply. In addition to ample USB interfaces, a DSLR camera shutter port is provided, supporting exposures of 30s or longer.

During operation, clear and distinct LED status indicators, along with key operational alert sounds, ensure everything remains under control.

1.3. Preparation Kit

The dovetail plates on the sides are factory installed. Because of transportation and handling, the mounting screws may loosen. Check and secure them properly before operation.

When tightening the dovetail plate fixing screws, avoid applying excessive force to prevent thread damage.

Product Certification Information:

“Contains TX FCC ID: 2A7R3-ASIAIRPLUS”

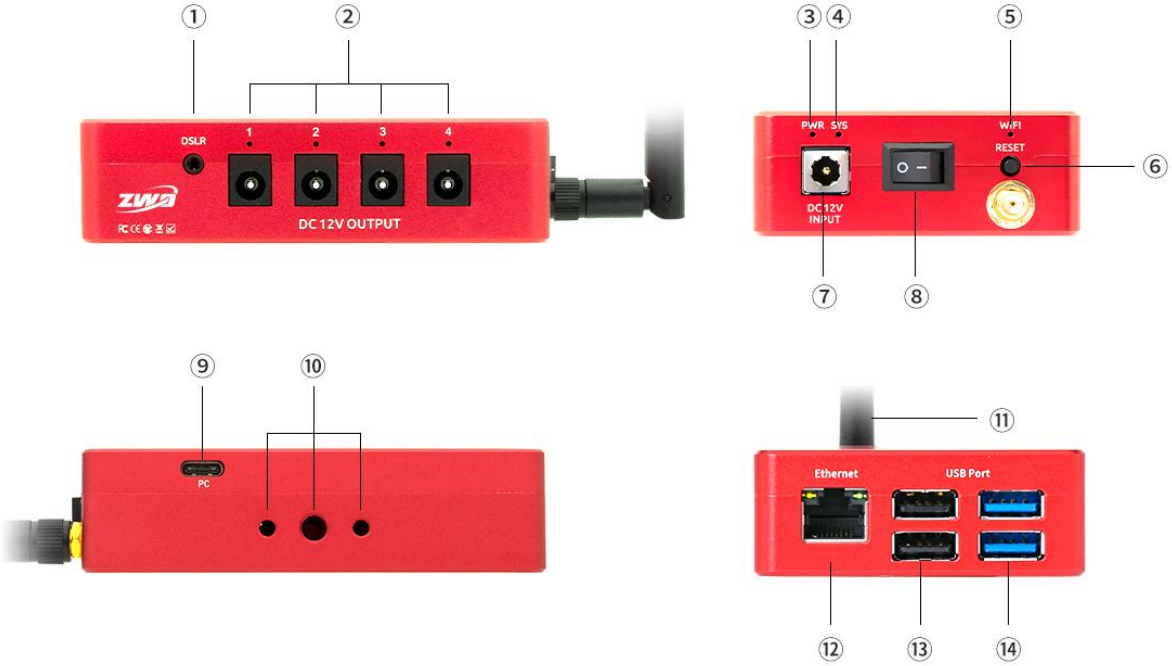
“Contains IC: 28392-ASIAIRPLUS”

“This device complies with Part 15 of FCC Rules. Operation is Subject to following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received including interference that cause undesired operation.”

1. 4. ASIAIR Component Name



Label	Name	Specification	Quantity	Remarks
1	DSLR	DSLR shutter release interface (2.5 mm)	1	
2	DC 12V Output Interface	DC 5.5 x 2.1 mm power output	4	
3	PWR	Power indicator	1	
4	SYS	Disk read/write status indicator	1	
5	Wi-Fi	Wi-Fi Status Indicator Light		
6	RESET	RESET Button	1	
7	DC 12V INPUT	DC 12V Power	1	Used to supply

		Input		power to the device
8	Power Switch	Supply power to the device	1	
9	PC	Type e-C Port	1	Can be connected to a computer to view and edit shooting-related files
10	Mounting Holes and Dovetail Plate	Installation of Mounting Holes and Dovetail Plate	1	The dovetail plate is used to mount the main telescope tube
11	Antenna	External Enhanced Dual-Band Antenna	1	
12	Ethernet Port	RJ45 Gigabit Ethernet Port	1	
13	USB2.0	USB 2.0 Port	2	Used for communication with the Guide Camera and Equatorial Mount
14	USB3.0	USB 3.0 Port	2	Used to connect the Primary Camera and other external devices

1.5. Status Indicator Light

LED	Function	Status	Description
PWR	Power Indicator Light	Steady On	Power Supply Normal
		Blinking/Off	Voltage Too Low
Wi-Fi	Wi-Fi Status Light	Steady On	Normal
		Off	Wi-Fi Not Started
		Blinking	Resetting
SYS	Disk Read/Write Status Light	Off	ASIAIR Plus is powered off or no system read/write activity
		Steady On	Normal startup: S YS indicator stays solid for 15-20 seconds, then flashes; if it remains solid, the disk has failed.
		Irregular flashing	ASIAIR Plus functioning normally

Wi-Fi indicator abnormal. Press and hold the RESET button until the indicator

flashes, then release. The hotspot, password, and bridge settings will be reset; reset completes in 5 seconds.

1.6. Specifications

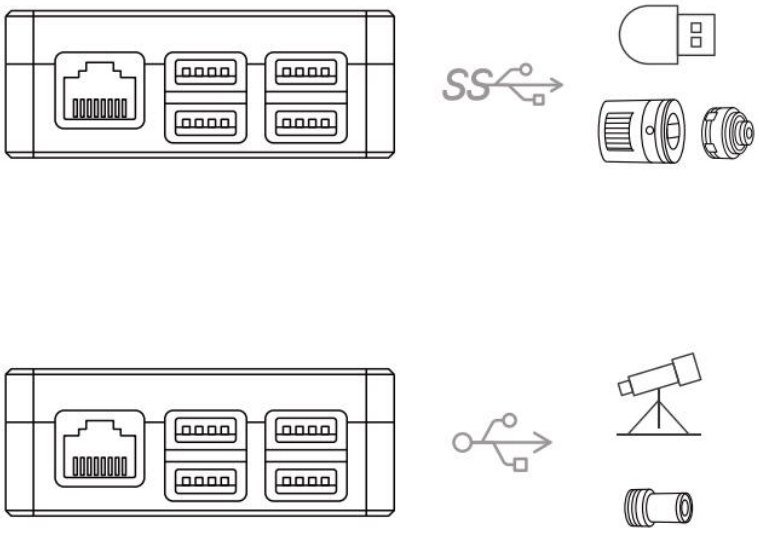
Product Name	ASIAIR Plus
Dimensions (L*W*H) (cm)	10.25 x 7 x 2.65
Weight (g)	210
Operating Temperature (℃)	-10~40
Storage Temperature (℃)	-30~60
RAM	4GB DDR4
Storage	32GB or 256 GB eMMC*
Wired Network	Gigabit Ethernet
Wireless Network	802.11 b/g/n/ac（2.4Gh/5 GHz）, effective transmission distance 20 m
Input Power	12V@2A-10A input
Output Power	12V@5A Max output, 4 output ports

* The ASIAIR Plus 256G version supports Bluetooth connection with Harmonic Drive Equatorial Mounts AM7, AM5N and AM3.

2. Connection and Setup

This chapter primarily demonstrates the device's data cable and power cable connections and setup based on the ASIAIR Plus.

2. 1. Data Cable Connection



1. Connect the Primary Camera and USB flash drive to the USB 3.0 port.

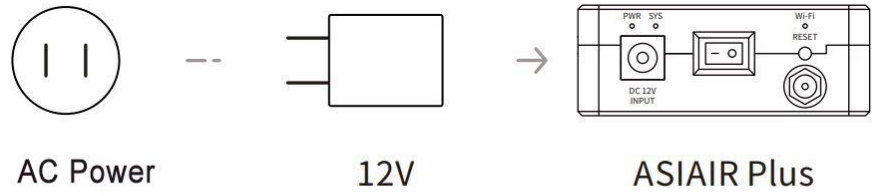
2. Connect the Guide Camera and Equatorial Mount to the USB 2.0 port.

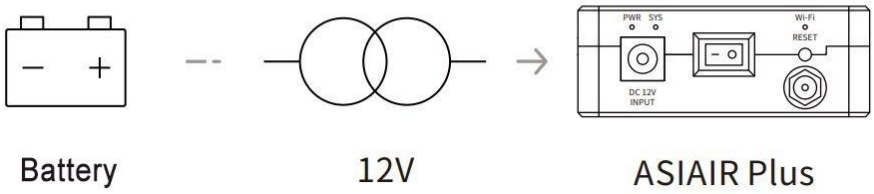
3. Connect the EAF and EFW to the Primary Camera USB HUB port.

All cooled cameras require a DC 12V@3A–5A power supply for proper operation.

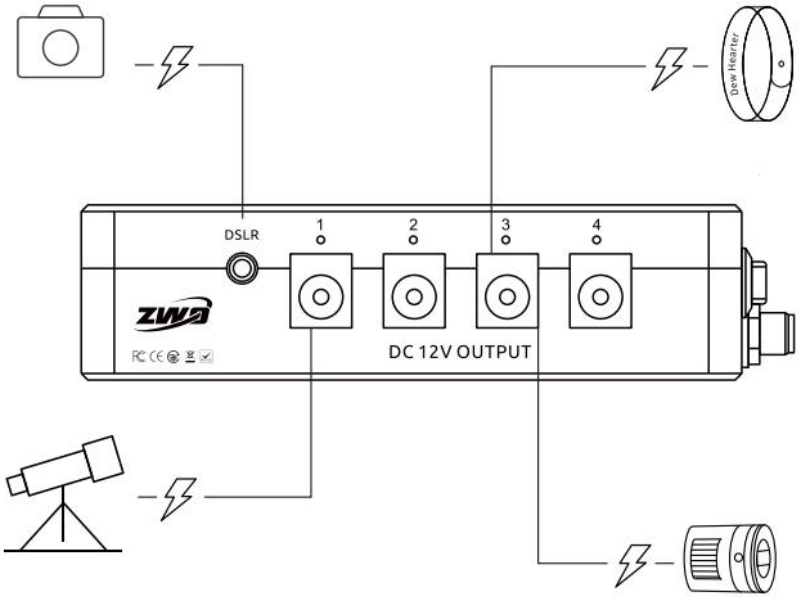
2.2. Power Cable Connection

1





2



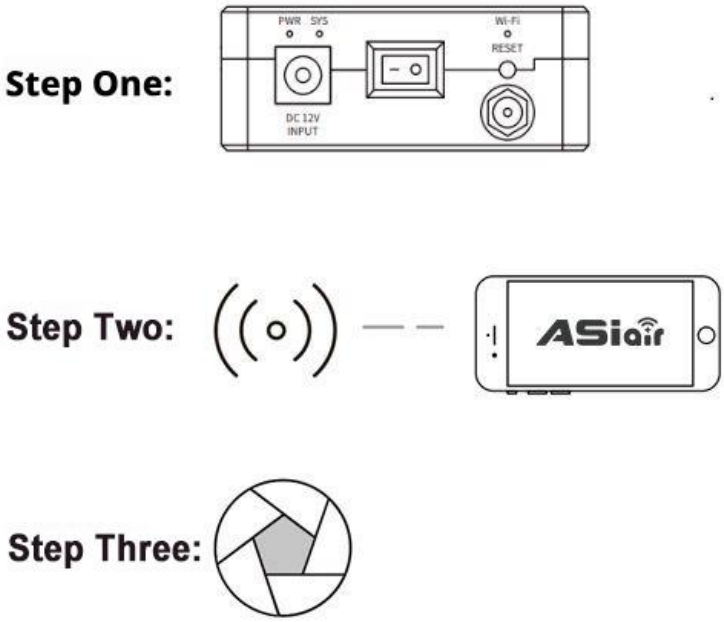
1. The ASIAIR Plus requires only a 12V@2A power supply to operate normally. Considering the power requirements for other devices through its four DC output ports, it is recommended to use a 12V@5A power supply.

2. Connect the power cable from the ASIAIR Plus power output port to the Primary Camera, EAF, EFW, dew heater strip, Equatorial Mount, and other powered devices.

Pay close attention to the varying lengths of the power cables to prevent entanglement during Equatorial Mount rotation.

Please strictly supply power to devices according to their specified voltage, current, and power ratings; otherwise, the devices may be damaged or fail to operate normally.

2.3. Network Connection



Step 1: Press the power switch toggle to on, and wait for 15 seconds.

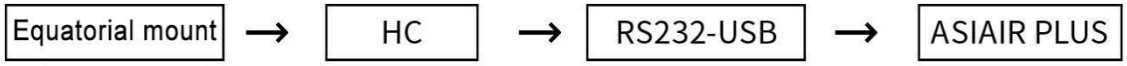
Step 2: Connect to the hotspot named “ ASIAIR_xxxxxx ” using the initial password 12345678, then launch the ASIAIR App.

Step 3: Begin your imaging journey!

The built-in Wi-Fi hotspot of the ASIAIR Plus can theoretically cover a range of 20 meters in an unobstructed environment.

2.4. Equatorial Mount Connection - Serial Cable Method

1. RS-232 conversion via hand controller



Most equatorial mounts have a separate control system, commonly referred to as the 'hand controller.' Common models include: ARGO VAVIS, GTOCP series, StarGo, NexStar series, SynScan V3/V4 series, Pulsar2 GoTo, Go2Nova series, Gemini series, AutoStar series, AudioStar series, PMC-8 (requires manual switching to serial mode), as well as the Electronic FS-2, frequently used by enthusiasts.

All connection methods utilize RS232 to USB cable adapters; alternatively, integrated FTDI cables may be chosen to simplify the wiring.

The SynScan V5 version requires a USB Type B to Type A printer data cable. If the connection fails to open in the App, please confirm that the 'Baud rate' setting is correct.

2. Direct connection to the equatorial mount's HC Interface

With ongoing optimization by equatorial mount manufacturers, some mounts now integrate the control system within the mount body itself and expose a direct interface. This further simplifies wiring, allowing connection between the equatorial mount and ASIAIR Plus using a single USB Type B – Type A printer data cable.

Whether this feature is supported must be verified by the user through the equatorial mount’s specific documentation.

3. EQMod, utilizing the EQDir cable

For EQ series equatorial mounts, besides connecting via the hand controller, there is a simpler and more stable method by directly connecting the equatorial mount's HC Interface （or AUX Interface） to the ASIAIR Plus USB Interface using an EQDir cable. In the App, select [EQMod Mount] or [EQMod with SkySafari] accordingly.

Currently known equatorial mounts are:

EQ3-2

NEQ3

HEQ3

SkyView Pro EQ

EQ4

EQ5

HEQ5

EQ6

EQ6 Pro

NEQ6

EQ6-R PRO

AZ-EQ5GT

AZ-EQ6GT

EQ8

EQM-35 Pro

AZ-GTi*

M-Uno Fast Reverse Single Fork Arm EQ

Linear Fast Reverse EQ

Vixen GPDX / Vixen SP fitted with Sysncan Upgrade kit (EQ5)

CEM26, GEM28, CEM40, GEM45, HEQ5 PRO, AVX, CGEM II, CGX, Black Hole Equatorial Mount 2nd Generation, RST-135, RST-135E, EM31, Crux 170HD, Crux 140HD, Mark III

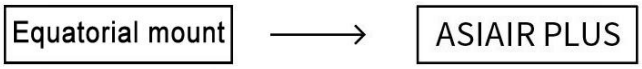
AM5

HEM27

The default baud rate for EMQod mode is 9600, except for AZEQ5 and EQ6-R PRO, which use 115200. AZ-GTi uses a network connection method with a baud rate of 11880 and employs the UDP protocol.

2.5. Equatorial mount connection- Network method

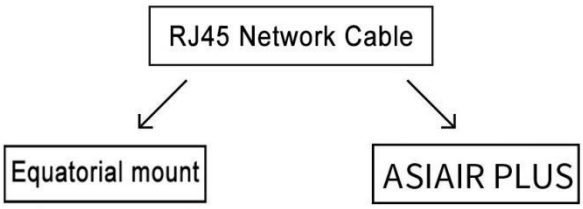
1. Wi-Fi connection



With the growing popularity of wireless technology, some manufacturers have integrated Wi-Fi modules within equatorial mounts or provide external Wi-Fi accessories, such as the built-in SynScan Wi-Fi module in the AZ-GTi, the StarFi Wi-Fi Adapter, SkyPortal Wi-Fi Module, StarGo Wi-Fi mode, and PMC-8 Wi-Fi mode.

This type of Wi-Fi connection operates on a generally similar principle; however, since there is currently no unified standard for Wi-Fi connections, please refer to the relevant documentation on the ZWO official website’s Help page for detailed instructions regarding the ASIAIR Plus connection.

2. Wired Network Connection



This method is primarily intended for Vixen’s StarBook series control systems, including StarBook, StarBook One, StarBook-S, StarBook Ten, etc. The specific steps are as follows:

1. Power on the StarBook control system.

2. Connect the ASIAIR Plus and the StarBook control system directly using an RJ45 standard Ethernet cable (with crystal connectors wired according to either the A or B standard).

3. Open the ASIAIR App and keep the “Wired Ethernet” setting on “Automatic” to obtain the IP address.

4. Switch to the “Equatorial Mount Settings” page, select the corresponding StarBook control system option, and enter the StarBook control system's IP address in the IP input box (obtainable from “Menu - About LAN”).

For example: 169.254.0.1. The default port is 80.

If the ASIAIR App indicates a connection failure, please verify whether the IP address has been acquired in StarBook under About LAN.

2. 6. DSLR/Mirrorless Camera Connection

ASIAIR PLUS supports the following DSLR/mirrorless camera list:

Canon

Camera Model	Status
Canon EOS 1000D	Tested
Canon EOS 100D	Tested
Canon EOS 1100D	Tested
Canon EOS 1200D	Tested
Canon EOS 1300D	Tested
Canon EOS 1500D	Tested
Canon EOS 1D Mark III	ⓘ
Canon EOS 1D Mark IV	ⓘ
Canon EOS 1D X	Tested
Canon EOS 1D X Mark II	Tested
Canon EOS 2000D	Tested
Canon EOS 200D	Tested
Canon EOS 250D	Tested
Canon EOS 4000D	Tested
Canon EOS 40D	Tested
Canon EOS 450D	Tested
Canon EOS 500D	Tested
Canon EOS 50D	Tested
Canon EOS 550D	Tested
Canon EOS 5D Mark II	Tested
Canon EOS 5D Mark III	Tested
Canon EOS 5D Mark IV	Tested
Canon EOS 600D	Tested
Canon EOS 60D	Tested
Canon EOS 650D	Tested

Camera Model	Status
Canon EOS 6D	Tested
Canon EOS 6D Mark II	ⓘ
Canon EOS 700D	Tested
Canon EOS 70D	Tested
Canon EOS 750D	Tested
Canon EOS 760D	Tested
Canon EOS 77D	Tested
Canon EOS 7D	Tested
Canon EOS 7D Mark II	Tested
Canon EOS 800D	Tested
Canon EOS 80D	Tested
Canon EOS 90D	Tested
Canon EOS M6 Mark II	Tested
Canon EOS R	Tested
Canon EOS R5	Tested
Canon EOS R6	Tested
Canon EOS Ra	Tested
Canon EOS Rebel SL3 250D	ⓘ
Canon EOS Rebel T1i 500D	Tested
Canon EOS Rebel T7 2000D、1500D	Tested
Canon EOS Rebel T7i 800D / Kiss X9i	Tested
Canon EOS Rebel T8i Canon EOS 850D	ⓘ
Canon EOS M6	ⓘ
Canon EOS RP	Tested
Canon EOS 5DS	ⓘ
Canon EOS 5DS R	ⓘ

Nikon

Camera Model	Status
Nikon D780	Tested
Nikon DSC D3	Tested Ⓢ
Nikon DSC D300	Tested Ⓢ
Nikon DSC D300s	ⓘ Ⓢ
Nikon DSC D3200	Tested Ⓢ
Nikon DSC D3300	Tested Ⓢ
Nikon DSC D3400	ⓘ Ⓢ
Nikon DSC D3s	Tested Ⓢ
Nikon DSC D3x	Tested Ⓢ
Nikon DSC D4	ⓘ
Nikon DSC D5	ⓘ
Nikon DSC D500	ⓘ
Nikon DSC D5000	ⓘ Ⓢ
Nikon DSC D5100	Tested Ⓢ
Nikon DSC D5200	Tested
Nikon DSC D5300	Tested
Nikon DSC D5500	Tested
Nikon DSC D5600	Tested
Nikon DSC D600	Tested
Nikon DSC D610	Tested
Nikon DSC D700	Tested Ⓢ
Nikon DSC D7000	Tested Ⓢ
Nikon DSC D7100	Tested
Nikon DSC D7200	ⓘ
Nikon DSC D750	Tested
Nikon DSC D7500	Tested
Nikon DSC D800	Tested
Nikon DSC D800E	Tested
Nikon DSC D810	Tested
Nikon DSC D810A	Tested
Nikon DSC D850	Tested
Nikon DSC D90	ⓘ Ⓢ
Nikon DSC Df	ⓘ
Nikon Z5	Tested
Nikon Z50	Tested
Nikon Z6	Tested
Nikon Z6 II	Tested
Nikon Z7	Tested
Nikon Z7 II	ⓘ

SONY

Camera Model	Status
Sony A7	Tested
Sony A7 II	ⓘ
Sony A7 III	Tested
Sony A7 IV	ⓘ
Sony A7S	ⓘ
Sony A7S II	ⓘ
Sony A7S III	ⓘ
Sony A7C	Tested
Sony A7R	Tested
Sony A7R II	ⓘ
Sony A7R III	Tested
Sony A7R III A	ⓘ
Sony A7R IV	Tested
Sony A7R IV A	ⓘ
Sony A5000	ⓘ
Sony A6000	Tested
Sony A6400	ⓘ
Sony A6500	ⓘ
Sony A6600	ⓘ
Sony ZV-E10	Tested

Sony Camera Connection Notes:

- USB Settings: According to the specific options in the camera menu: USB Options – select PC Control or Network – enable PC Control function.
- After completing the camera setup, please restart the camera before connecting to ASIAIR.

Notice:

- When ASIAIR connects to the camera, please ensure only one SD memory card remains in the camera's card slot.

ⓘ Indicates not yet verified through actual testing.

Ⓢ Indicates a shutter release cable is required for use with ASIAIR Plus.

Ⓝ Indicates Real-time Stacking mode is not supported.

DSLR Cameras may only be used as the Primary Camera, therefore for Preview, Real-time Stacking, and Scheduled Imaging. When in use, connect the DSLR Camera directly to the ASIAIR device via a data cable. Prior to connecting to the App, perform the following settings:

Shooting Mode: M

Shutter Mode: Bulb

Image Format: RAW （RAW+JPEG is not selectable）

Image Quality: L （Maximum Size）

Additionally, for DSLR cameras with settings related to "Power Saving Mode", Wi-Fi, noise reduction, and mirror lock functions, these features must be disabled. When performing scheduled imaging, ensure that the camera's storage has sufficient remaining space (refer to the "Estimation Space" in the ASIAIR scheduled imaging settings interface; it must exceed this value) and that the battery is adequately charged.

The ASIAIR Plus supports external shutter release cables, overcoming the 30-second exposure limit of some DSLR cameras. Cameras marked in the table ⓘ have not yet undergone practical testing and will be continuously updated in future releases.

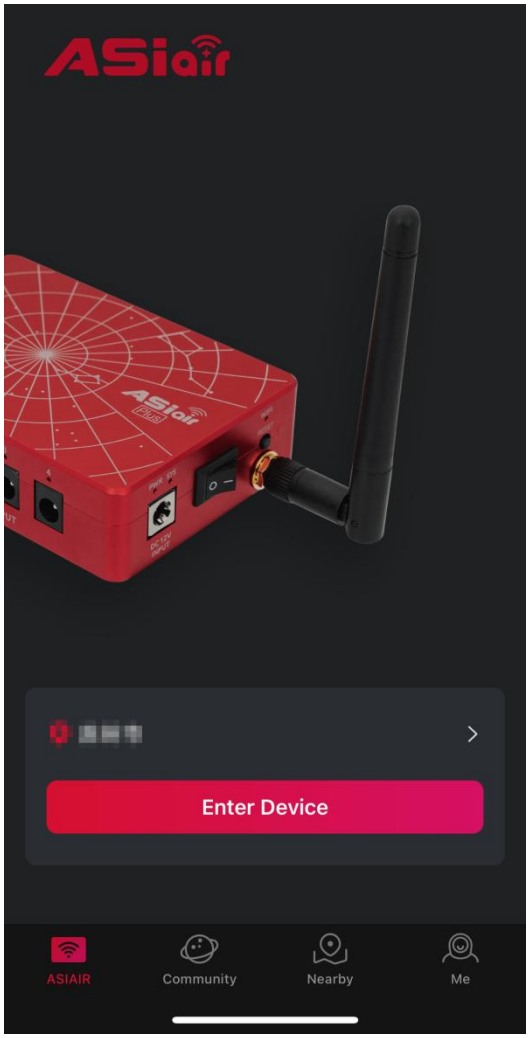
3. ASIAIR App

This chapter primarily introduces the main functions and user guide of the ASIAIR App.

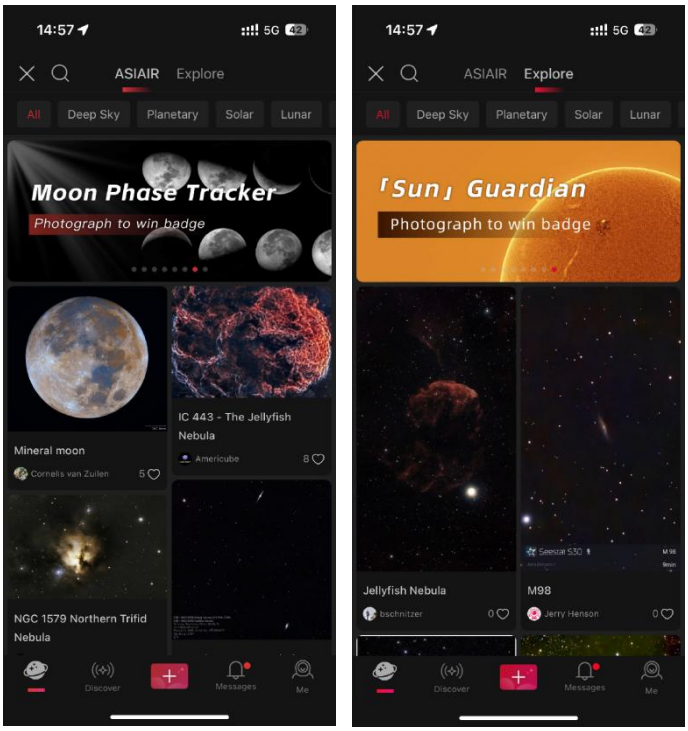
3. 1. Home

3. 1. 1. ASIAIR Page

Launch the ASIAIR App, and enter the “ASIAIR” page. Tap “Enter Device” to access the ASIAIR control page.



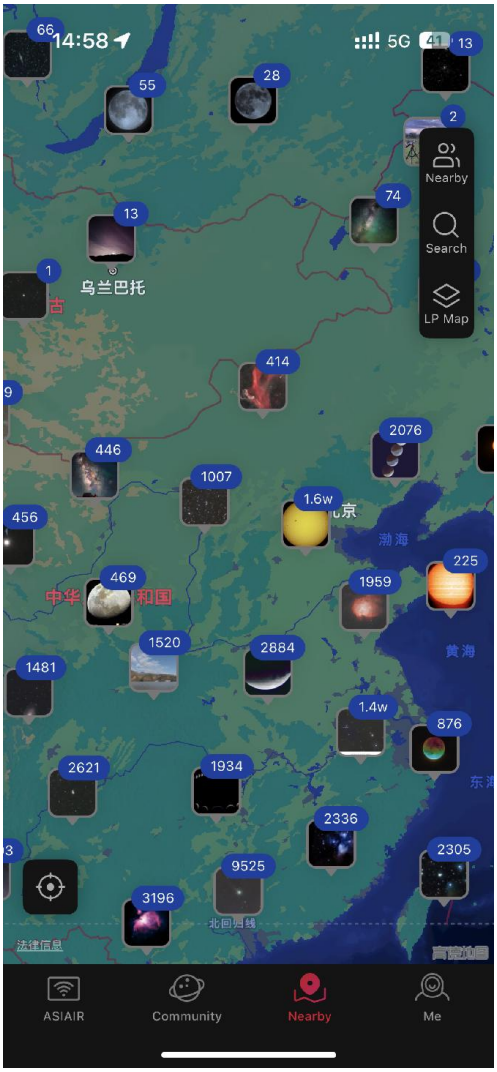
3. 1. 2. **Community Page**



“ASIAIR” Page: You can browse a wide variety of astrophotography images captured with ASIAIR.

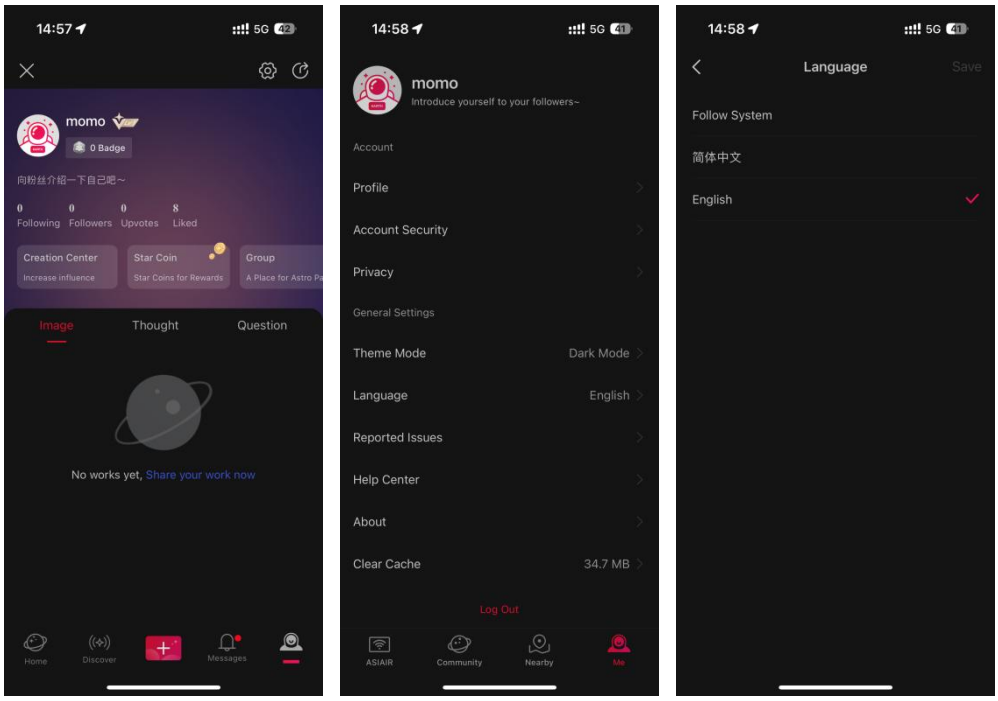
“Explore” Page: You can enjoy astrophotography works created by users around the world.

3. 1. 3. **Nearby Page**



“Nearby” Page: Assists in locating nearby star points, viewing local astronomy enthusiasts, and accessing regional light pollution maps.

3. 1. 4. **My Page**

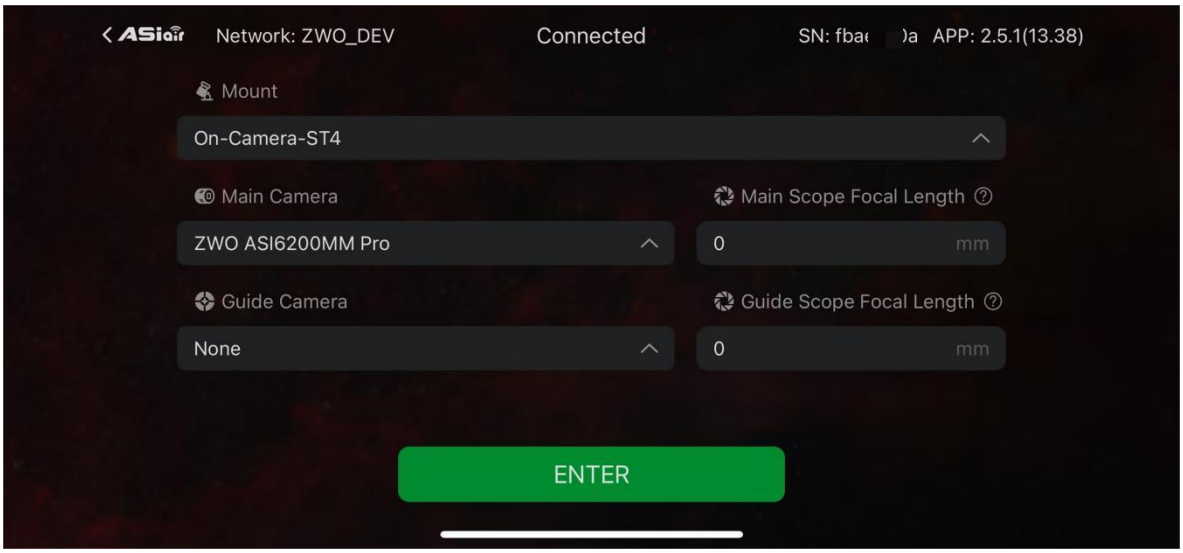


"Me" Page: Allows publishing and viewing your own astrophotography works.

Click  the icon to open the settings page, where you can view and configure various options. For example, the "Language" feature enables changing the App's display language.

3. 2. Basic Configuration

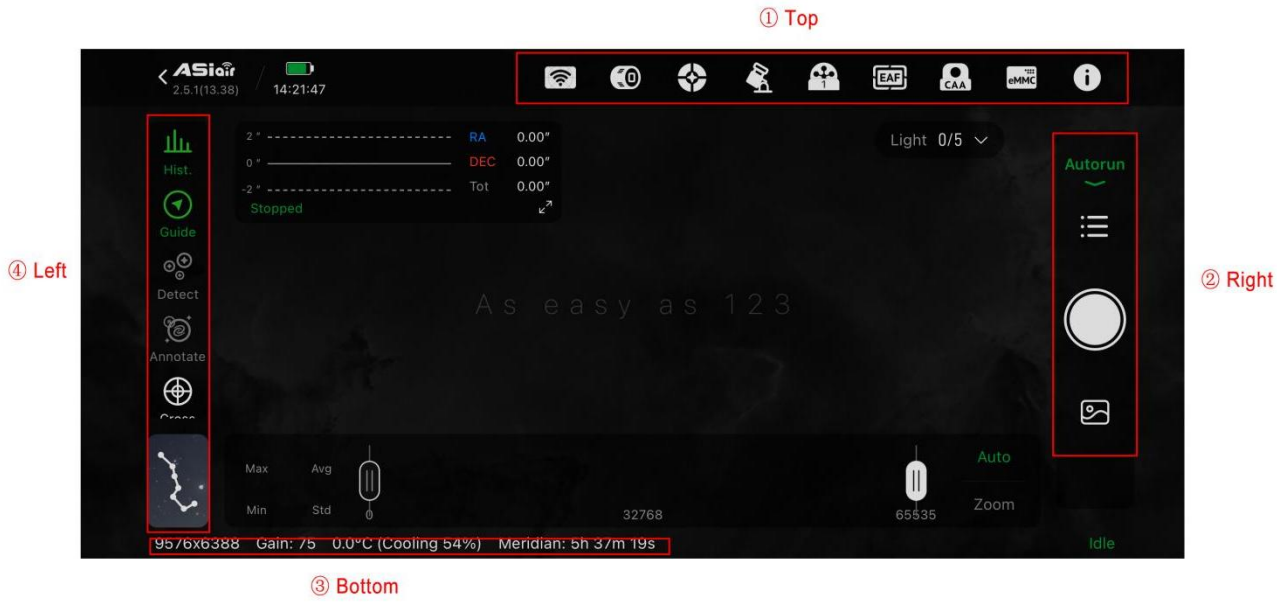
3. 2. 1. Device Information Page



Complete the "Network Connection" process as per section 2.3 (Network Connection) and select the device according to your connection type.

After configuration, click "Enter" on the page to access the App operation interface.

Please ensure the latitude and longitude information in "Location Information" corresponds to the current geographic coordinates of the ASIAIR device. If the automatically obtained data is inaccurate, you can set it manually by clicking.



① Top

Device detailed configuration entry area. Click any icon to slide out its corresponding settings page. From left to right: ASIAIR Settings, Primary Camera Settings, Guiding Settings, Equatorial Mount Settings, Filter Wheel Settings, Electronic Focuser Settings, Storage Space, and About. If the corresponding device is connected and powered on, the icon will be lit; otherwise, it will be grayed out.

② Right side

Main function switch corresponding to primary parameter settings and operation areas. Tap “Preview” to switch between Focus, Polar Alignment, Scheduled Imaging, Multiple Targets, Real-time Stacking, and Video modes.

③ Bottom

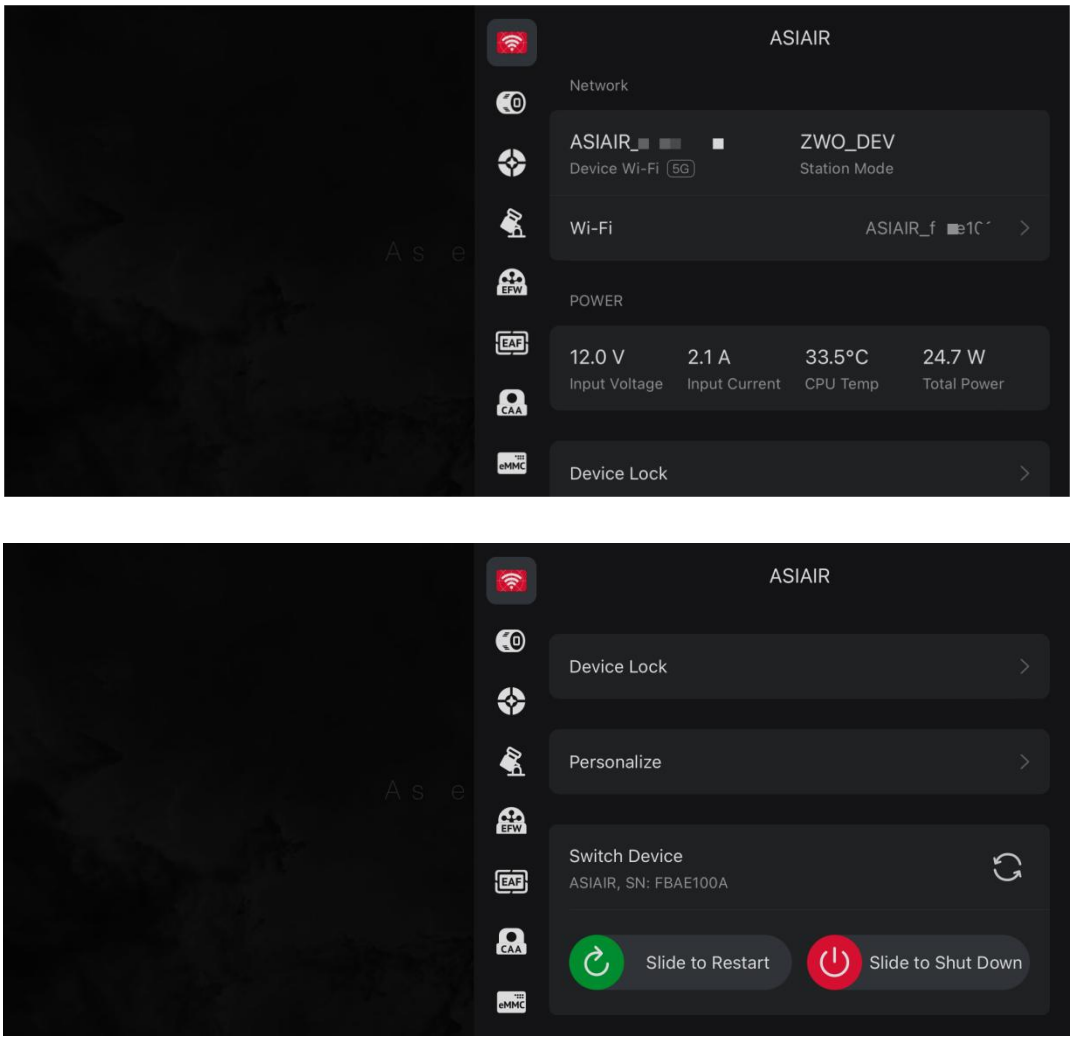
Displays the current working status of the ASIAIR Plus, including camera information such as resolution, gain, temperature, and cooling power.

④ Left side

Displays available tools in the current functional mode, including Histogram,

Focusing, Guiding, Analysis, Crosshair, Annotation, and Star Point Detection. Tap an icon to enable or disable the corresponding tool.

3. 2. 2. ASIAIR Settings



This page contains most of the basic settings related to ASIAIR.

Network: Customize the ASIAIR Plus Wi-Fi hotspot name and password, switch between 2.4GHz and 5GHz Wi-Fi hotspot bands, and configure Wi-Fi bridge mode.

Power Monitoring: Real-time display of input voltage, input current, CPU operating temperature, total power, and other information.

Personalization: Adjust system sound modes, temperature units, etc.

Switch Device: Display the ASIAIR box names and their serial numbers (SN).

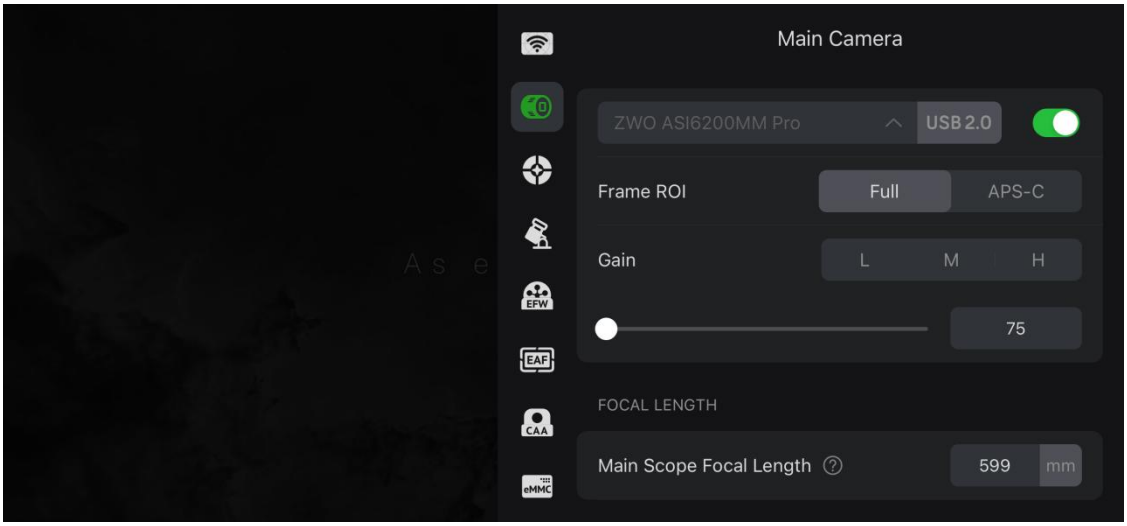
Switch Device: After configuring bridge mode, multiple devices can be switched within the home local area network.

Soft Restart/ Shutdown: For safety reasons, a soft shutdown operation is provided. You may select either the “Slide to Restart” or “Slide to Shutdown” function.

Wi-Fi Bridge Mode: After following the App instructions to configure, the ASIAIR device can be connected to the home LAN via bridging, enabling “Play Anywhere”and eliminating the distance limitations of AP hotspots; Furthermore, mobile devices can continue to access the home LAN and maintain internet connectivity, ensuring that “ Astrophotography and Social Interaction ” are both seamlessly maintained.

Soft Shutdown: Soft shutdown will simultaneously exit the App; please wait patiently for 5 to 10 seconds before disconnecting the device power.

3. 2. 3. Primary Camera Settings



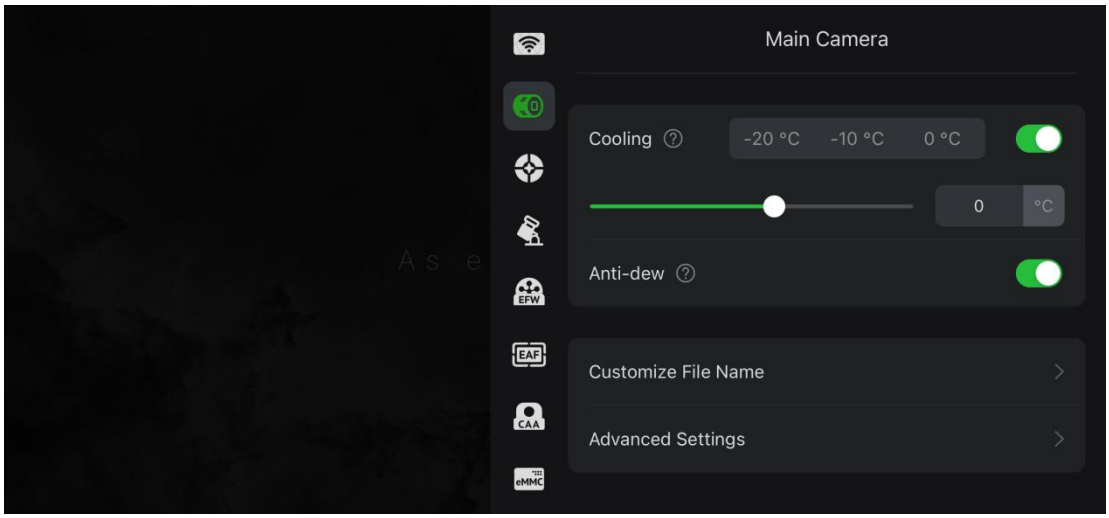
Select the Primary Camera and power it on. When switching cameras, please first turn the switch off, then turn it on again after switching.

Next, set the Gain and enter the focal length of the primary lens.

Gain: refers to the camera's signal amplification factor; generally, a medium gain setting is chosen. If the image from the camera appears too dim or lacks detail, increase the gain setting or adjust the gain slider manually to improve brightness and signal.

If you are using a cooled camera model, the cooling function is enabled by default when the app starts. You can set a target temperature as needed. Some camera models also include a built in window heater to reduce dew formation.

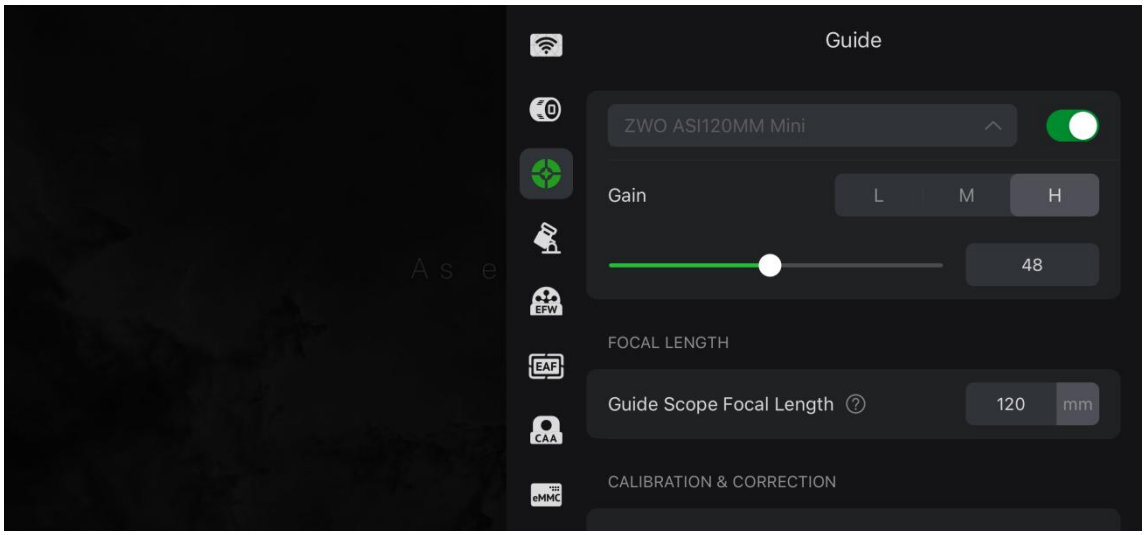
A DSLR Camera can also be used as the Primary Camera. For models that do not support long exposures, a Shutter release cable is required. For DSLR Camera models supported by ASIAIR, please refer to section “2.6. DSLR Camera Connection.”



Filename Configuration: Used to edit the saved filename for downloaded photos. The filename can be customized, with optional content including camera model, Gain, temperature, etc.

Advanced Settings: Advanced settings include auto white balance, Mono Bin, continuous Preview, automatic Cooling upon camera connection, and automatically activating the heater window during Cooling.

3. 2. 4. Guiding Settings



Select and activate the Guide Camera here. It is recommended to set the Gain to “High.” Please ensure the focal lengths for both the Primary Camera and the Guide Camera are accurately entered.

Gain: Gain controls the amplification of the camera signal. For guiding, the goal is to detect sufficiently bright stars within short exposure times, so a higher gain setting is generally recommended.

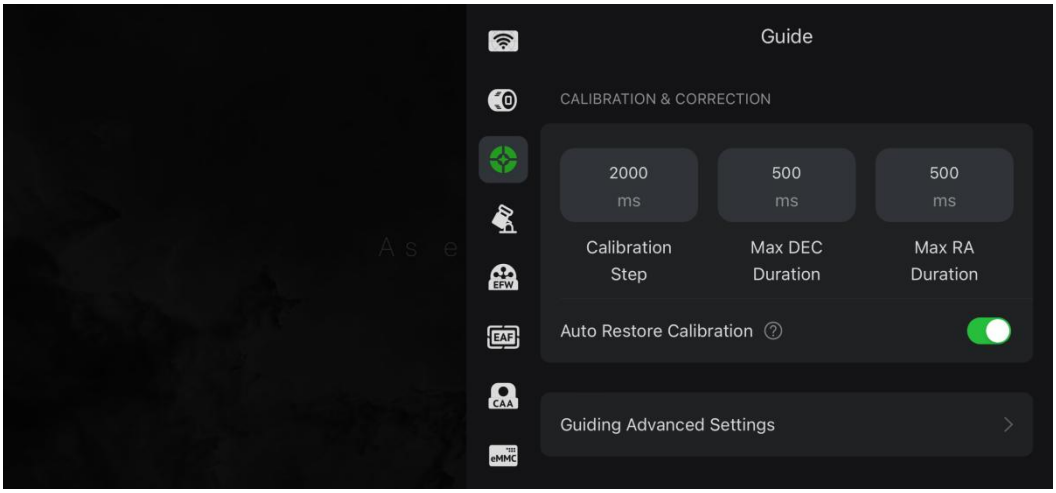
However, use gain cautiously. Excessive gain can over amplify the background signal, reducing contrast and causing stars to blend into the background. This can make accurate star detection more difficult and lead to guiding instability.

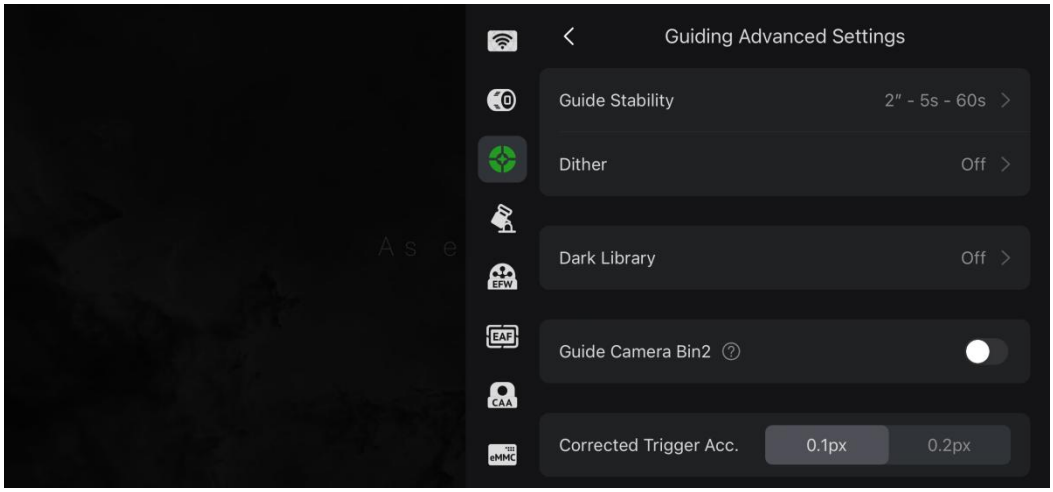
Aim for strong star visibility with clear contrast between the stars and the background.

Focal Length: refers to the focal length of the guide scope or off-axis guider (OAG) scope focal length, matched with the guide camera.

For example, if you install the guide camera on a ZWO 30F4 mini guide scope, enter 120 here (unit: millimeters, mm). If you are using a DUO series ASI camera or an OAG, enter the focal length of the **main** telescope, which corresponds to the primary camera's focal length. You may also click 'Fill in Primary Camera Focal Length' to fill this automatically.

Pro tip: Prior to your imaging session, set the guide camera to infinity focus. This adjustment can be completed in daylight using a distant object such as a building or horizon feature.





Calibration Settings:

Calibration Duration: This parameter pertains to guide calibration; it is recommended to maintain the default value of 2000 milliseconds.

Maximum Declination Correction Duration: It is recommended to retain the default value or set it to less than the guide camera exposure time.

Maximum Right Ascension Correction Duration: It is recommended to retain the default value or set it to less than the guide camera exposure time.

Use Last Calibration Data: If the astrophotography equipment has not been moved or disassembled since your last session, you may enable this option.

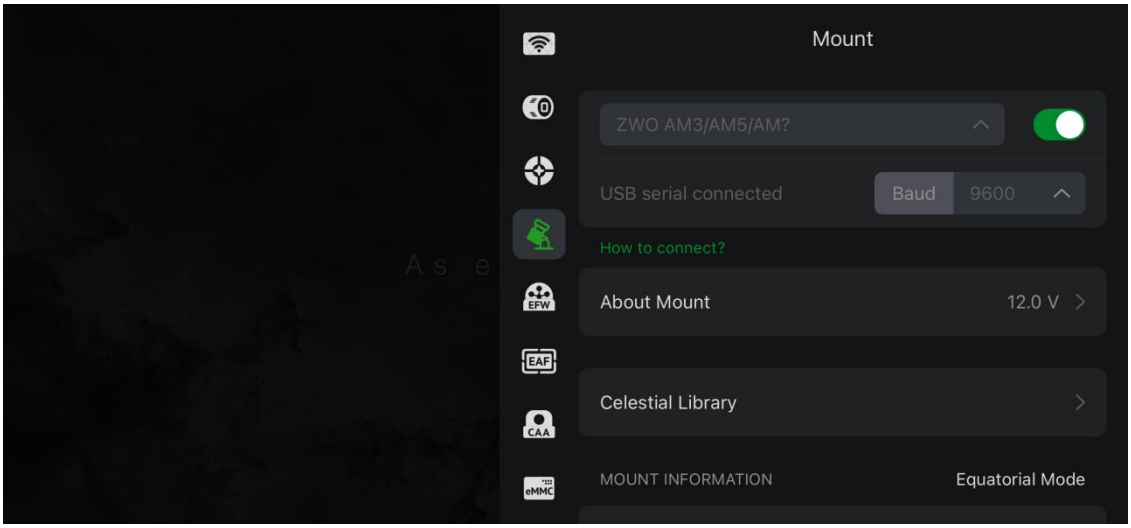
Guiding:

Guide Camera Bin2: Generally, this function is not used; it can be enabled when star points are indistinct.

The“Guiding Stabilization Settings” and “Dithering Settings” can typically be left at their default values. Dithering can be enabled as needed. If you are new to using ASIAIR, it is recommended to leave it disabled until you are familiar with basic operation.

Guide Dark Frame Library: This function performs dark frame calibration on guide camera images. Typically, current guide cameras have sufficient performance, so this function is generally unnecessary.

3. 2. 5. Equatorial Mount Settings

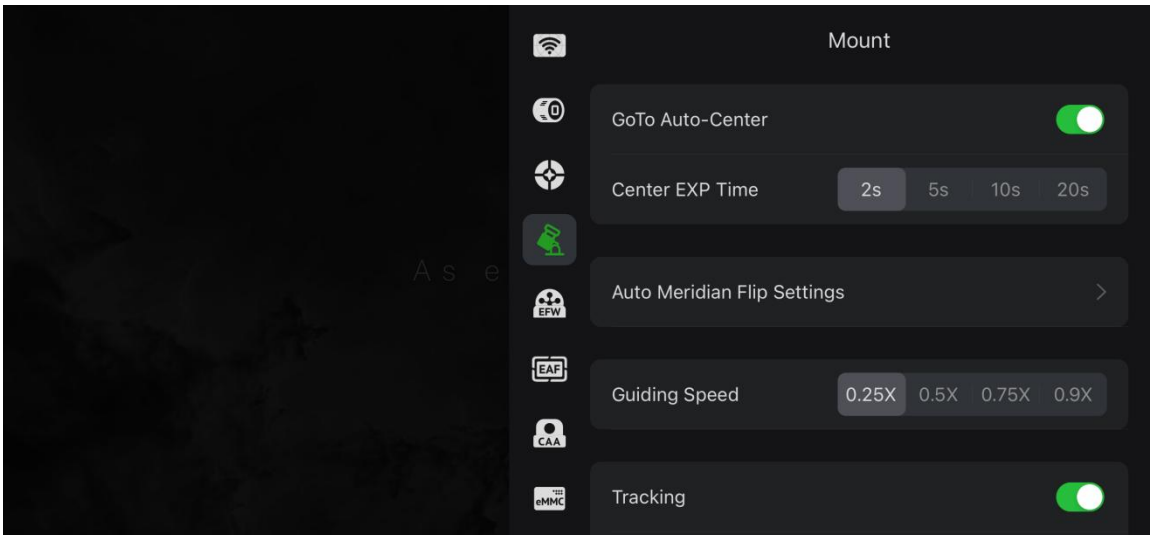


Select the corresponding equatorial mount model or connection method here, then tap the switch to connect. For detailed equatorial mount connection methods, please refer to sections 2.4 and 2.5 covering equatorial mount connections.

Equatorial mount information: Records the location and time data where the equatorial mount is situated, as well as the current pointed location of the mount (the default initial position is generally the mount zero position). We can directly determine our current Location Information from the smartphone's built-in positioning data by selecting "Location Information" under "Equatorial mount information" to provide the correct location for the equatorial mount.

If the equatorial mount's geographic location and time data are inaccurate, you can synchronize the smartphone's positioning information to the equatorial mount. Clicking"Sync to Equatorial mount"will then transfer the positioning information from the smartphone to the equatorial mount. Similarly, the time zone and time information in "Equatorial mount information" are also acquired from the smartphone.

If the Right Ascension and Declination display as 00°00'00", please try restarting the equatorial mount and reconnecting.



GoTo Auto Centering: It is recommended to enable GoTo auto centering.

Centering Exposure Time: The default value is 2 seconds.

Culmination Flip: You may use the default settings initially or adjust according to your preference.

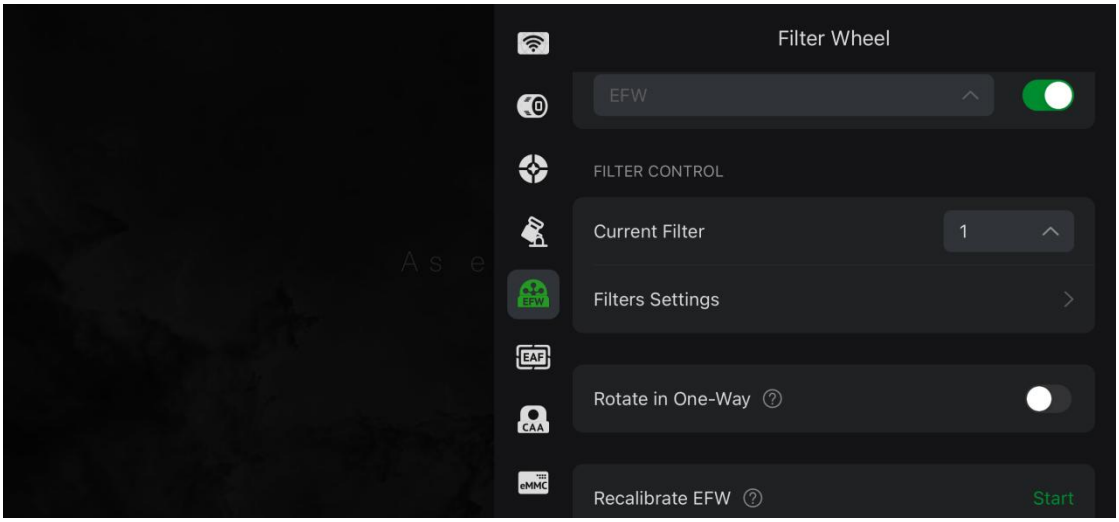
Guiding Rate: This setting is available on certain equatorial mounts. Guiding Rate refers to the multiplier of the equatorial mount's correction movement speed during guiding ; the default is 0.5X.

Tracking: It is recommended to keep tracking enabled when starting imaging.

Tracking Rate: Refers to the tracking rate of the celestial object during imaging; the default is sidereal.

Zero Position: Return the equatorial mount to its initial zero position. We recommend performing the zero position (Go to Home) operation each time before starting to use the equatorial mount and before powering off and packing the equipment after completing astronomical imaging.

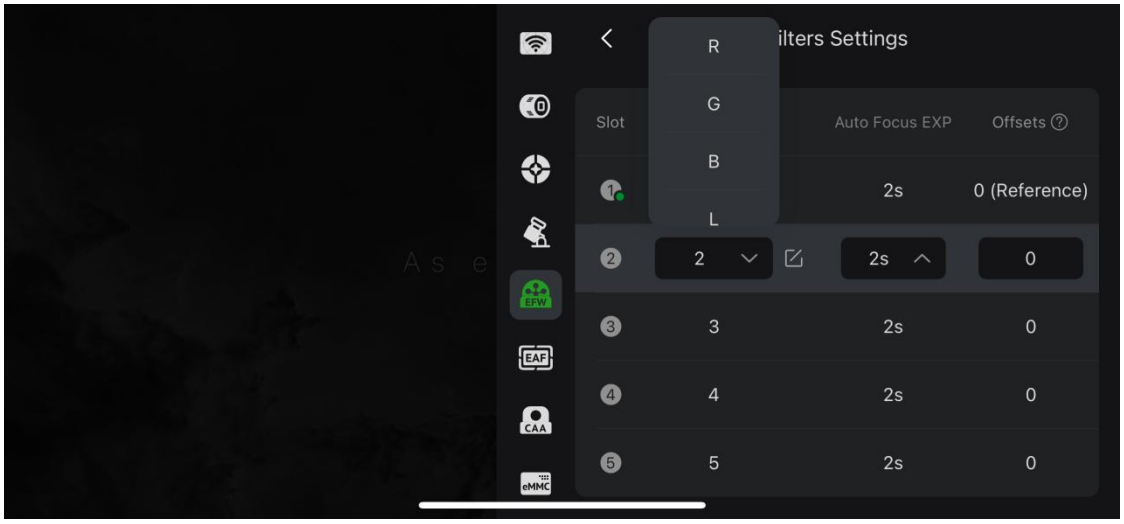
3. 2. 6. Filter Wheel Settings



After connecting the filter wheel, it can be configured.

Aperture Position Control:

Current Position: After manually selecting a number, the filter wheel will rotate to the corresponding aperture position.

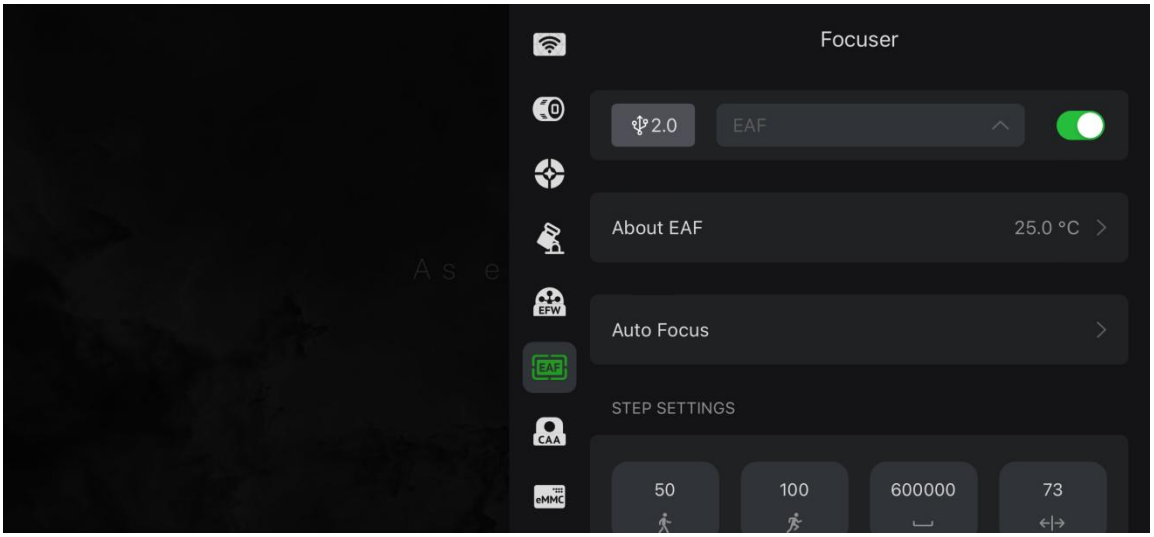


Filter: The filter name and autofocus exposure time can be set for each aperture position. Aperture position names can be selected based on the filter types used or customized with different names.

Unidirectional Rotation: Enable this function to restrict the filter wheel to rotate only clockwise for filter switching.

Recalibrate Filter Wheel: If the filter wheel aperture position is abnormal, click 'Start Calibration' to reset the aperture position.

3. 2. 7. Electronic Focuser Settings



Once the electronic focuser is connected, tap to establish connection and configure various parameters. For detailed settings, please refer to the ZWO EAF manual.

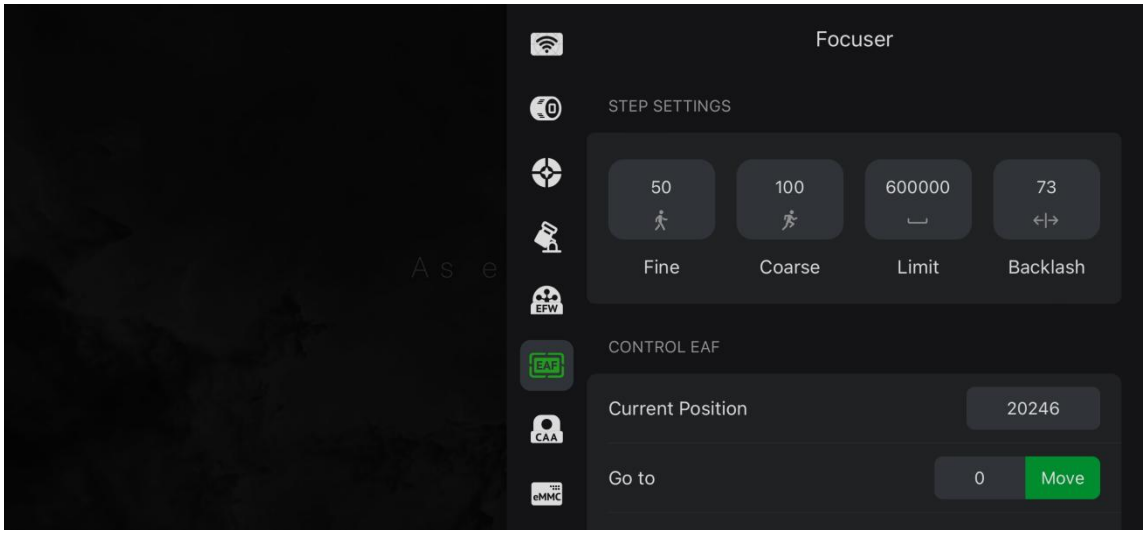
Current Position: Displays the current EAF focusing position. The current position can be redefined via the input field.

Move To: Moves the EAF focusing position to a specified value. Enter the target position in the input box on the right and click Move.

Reverse: Inverts the moving direction of the EAF.

Beep: Provides beep notifications upon completion or failure of movement. One beep indicates completion; two beeps indicate failure.

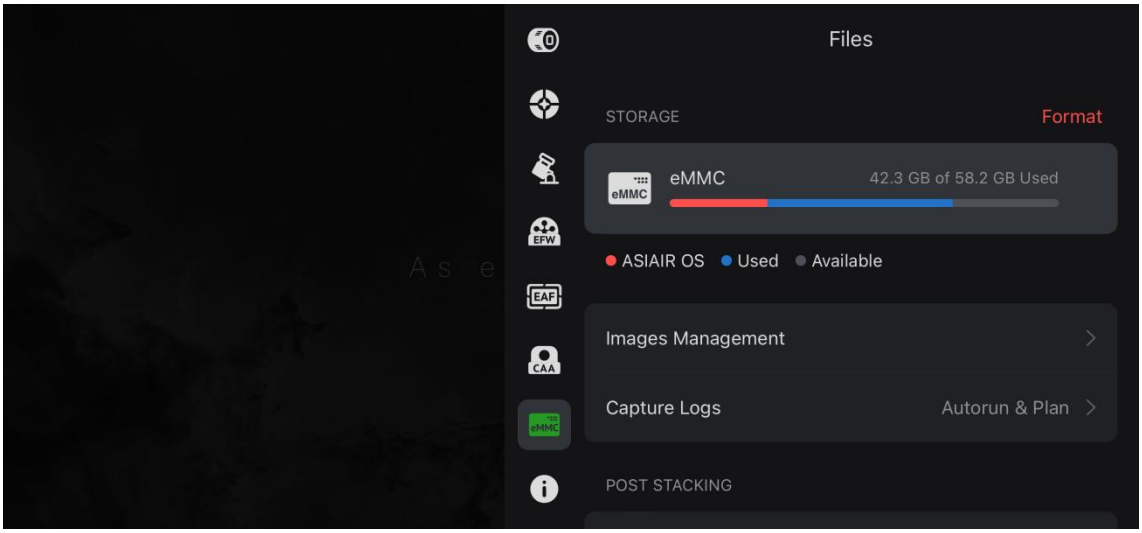
#Suggestion Enable the beep function.



Movement Step Settings: Configure the number of steps per movement for fine and coarse adjustments; the travel limit defines the maximum position accessible to the EAF.

Backlash Steps: The number of additional steps applied to compensate for backlash when the EAF reverses direction.

3. 2. 8. Storage Settings



Storage Device: Displays the storage capacity and usage of the ASIAIR Plus. The ASIAIR Plus features built-in eMMC storage and supports external USB storage

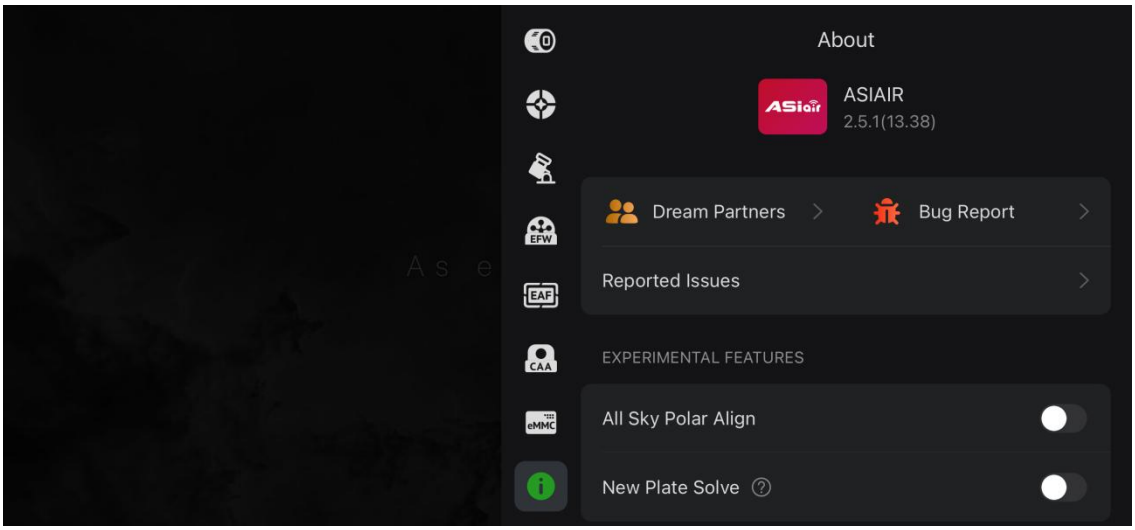
devices.

Image Management: Enables categorized image management, including preview, export, and deletion of stored images.

Imaging Log: You can view the imaging logs for Scheduled Imaging and Multiple Targets modes.

Post-Processing Stacking: Used to stack videos that have already been captured and processed to obtain a higher signal-to-noise ratio and clearer images.

3. 2. 9. About



ASIAIR Plus 2.1.2(10.93): “2.1.2” is the App version number, and “10.93” is the firmware version number.

Feedback: You can report any issues encountered during use here.

Reported Issues: You can view issues that have already been reported here.

Experimental Features: Includes certain features currently in the testing phase. Experimental features do not guarantee stability; please use with caution.

All-sky Polar Alignment: Supports polar alignment anywhere within the sky, unlike previously when polar alignment required the lens to point near the south/north celestial pole; this method no longer has that limitation.

New Solving Algorithm: An optimized solving algorithm for scenarios with a low number of star points and high sky quality, providing advantages in dark zones and when using narrowband filters.

Firmware Restoration: This feature allows your device to revert to a previous firmware version.

3. 3. Shooting Guidance

(Example with FF80 + ASI2600MM Pro + OAG + ASI220MM Mini + EAF)

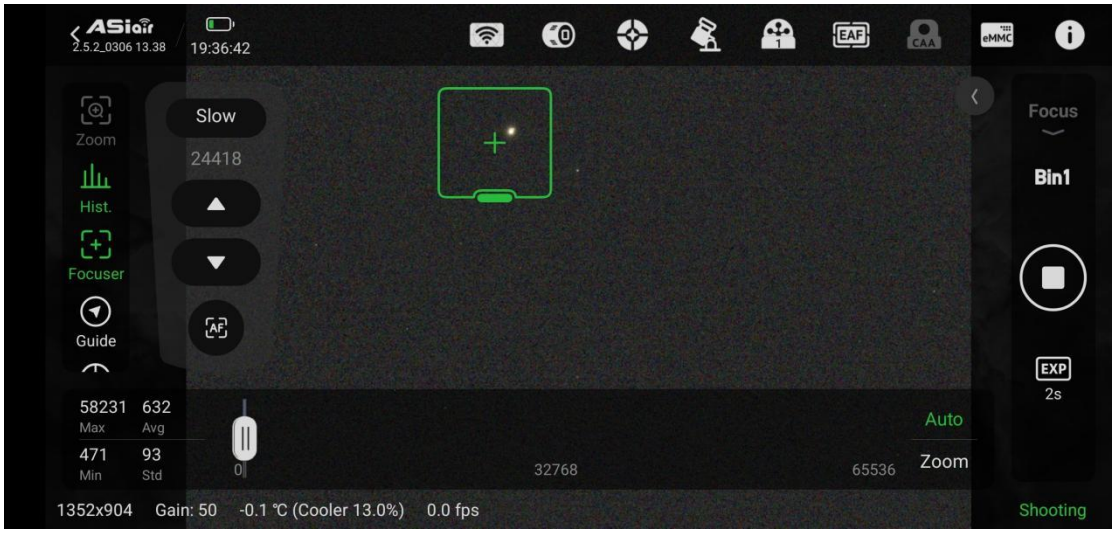
One of the primary goals of ASIAIR is to simplify the workflow of deep sky astrophotography. To better understand how it streamlines the process, let us first review a typical deep sky imaging session, assuming the equipment is already set up and post processing is not included.

1. Telescope Focusing (Primary Telescope, Guide Scope）
2. Polar Alignment
3. Select Target GoTo
4. Preview Capture and Compose
5. Start Guiding
6. Scheduled Imaging
7. Multiple Targets Imaging

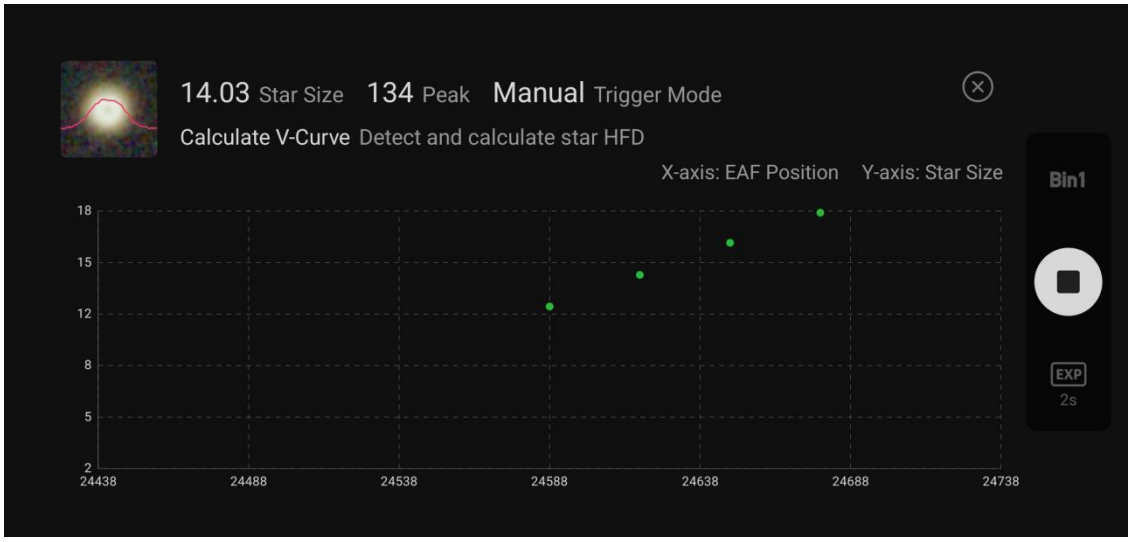
3. 3. 1. Focusing

① Open the ASIAIR App, select “Primary Camera Settings” in the upper device settings area, and connect the device while also connecting the EAF.

② Switch to “Focusing” mode in the right operation area, then tap  the “ Start ” button to view the real-time refreshed image; manually click the icon  and adjust the focuser until the star point becomes progressively clearer.



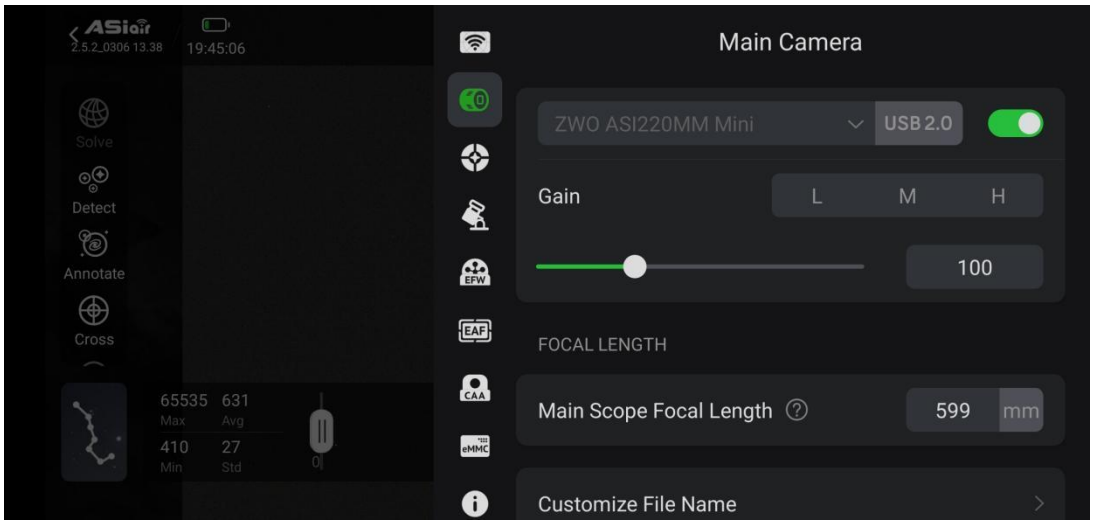
③ Drag the green box to select a bright star, then tap on the left side  . The “Focusing Magnification”button allows you to observe focus details and complete focusing according to the principle that“the smaller the HFD value under Bin 1, the better the focus”(focus can be gradually adjusted from the maximum Bin down to Bin 1). After completing coarse focusing, you may click  the“AF”button to enter automatic fine focusing.



④ OAG Guide Camera Focusing

Select “ Primary Camera Settings ” in the top device settings area, configure the

guide camera as the primary camera, and connect it.



⑤ Switch to the“Focusing”mode in the operation area on the right, then tap  the“Start”button to view the real-time refreshed image and manually adjust the guide camera focuser until the star points become progressively sharper.

The independent Guide Camera requires separate manual focusing or installation of the EAF for automatic focusing;

After Guide Camera focusing is completed, please switch the Primary Camera to the cooled camera.

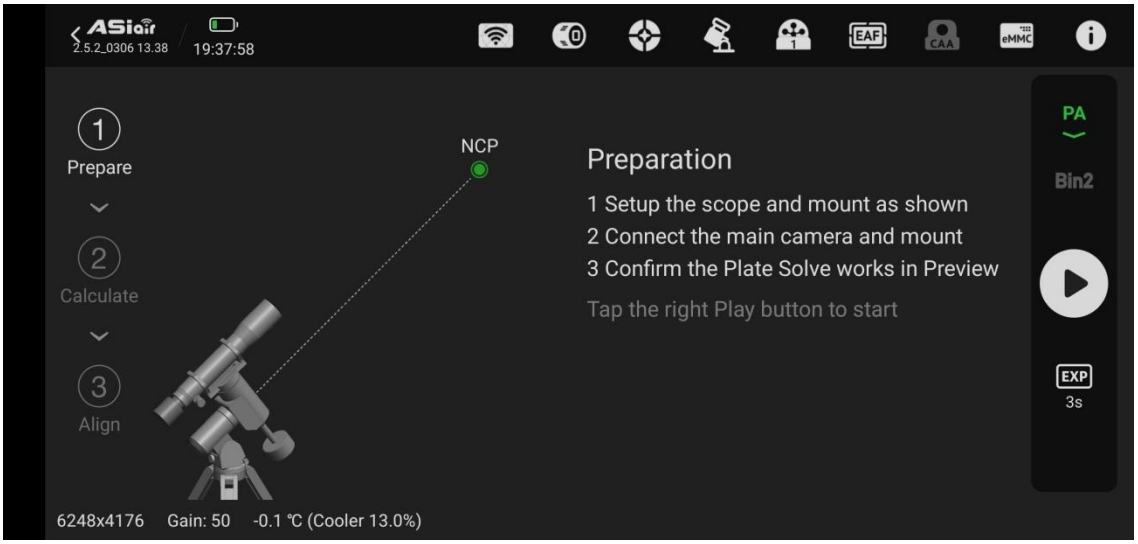
3. 3. 2. **Polar alignment**

Preparations:

① It is recommended that the telescope (with the equatorial mount at zero position) points toward the true north or south direction and roughly adjust the equatorial mount's altitude angle to match the local latitude;

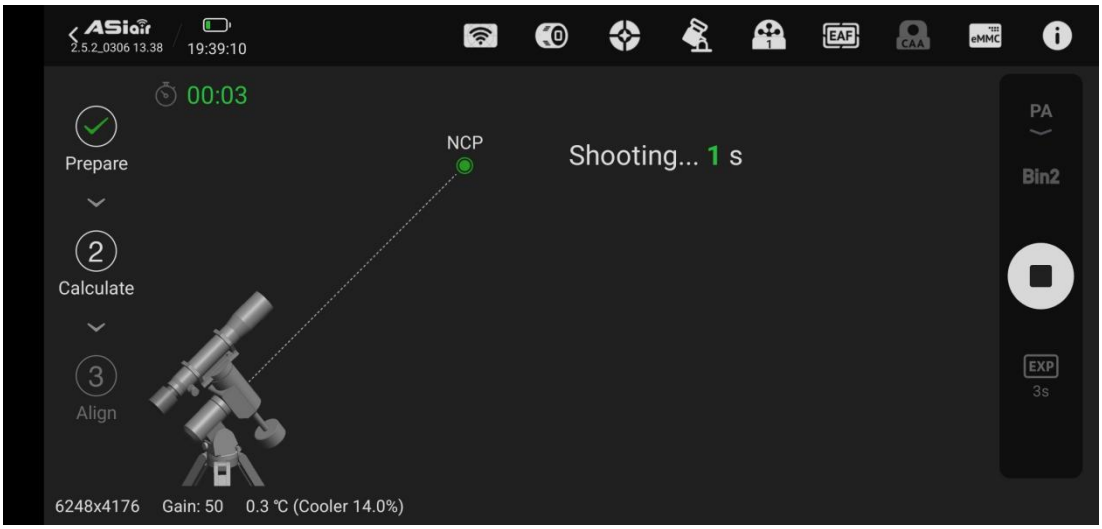
② Ensure the Primary Camera and equatorial mount are properly connected to the ASIAIR;

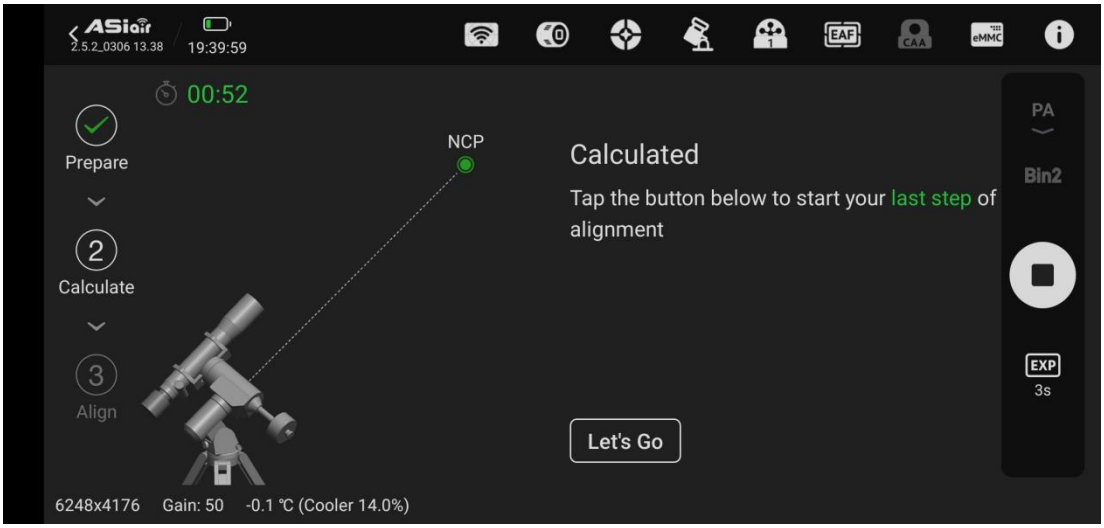
③ Ensure the telescope's pointing direction is unobstructed. Capture an image showing star points in “Preview” mode to verify that the “Plate Solving” function operates correctly. (Please refer to Section 3.3.9.2 for details.)



Polar deviation calculation:

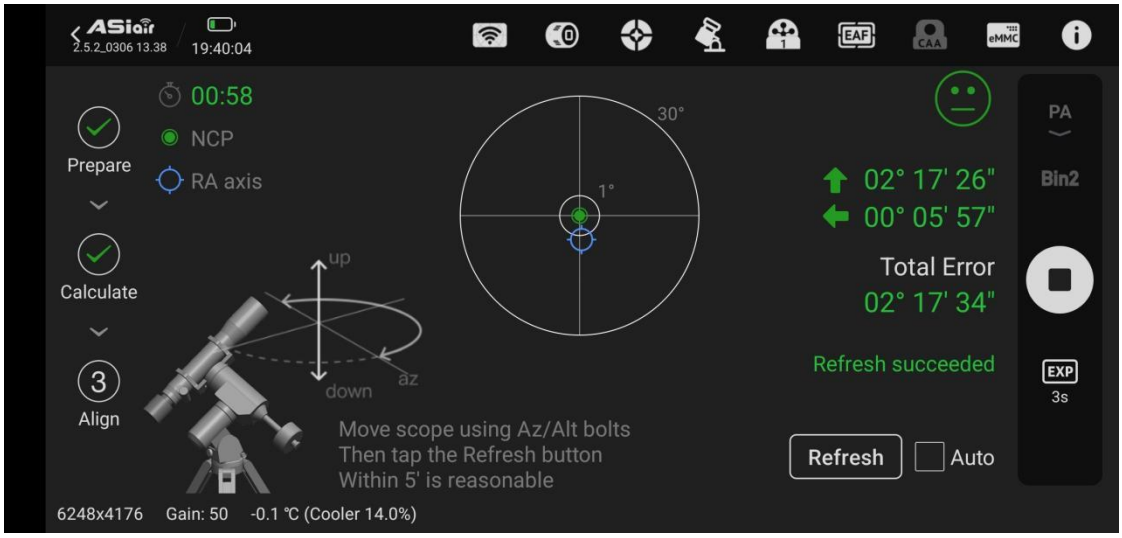
Tap the operation area on the right. Press the button to start the polar alignment procedure. The equatorial mount will capture and analyze images at its current position, then automatically rotate approximately 60 degrees to capture and analyze again. The polar deviation is calculated based on the analysis results from these two different positions.





Adjust the equatorial mount:

After successful polar deviation calculation, click“Start Calibration”to enter the equatorial mount calibration page. According to the calculated offset values, manually adjust the mount’s altitude angle and azimuth angle to align the right ascension axis of the equatorial mount parallel to the celestial pole axis.



Adjust the mount’s azimuth and altitude angles according to the green values on the right (before adjusting, first loosen the mount’s azimuth lock screw and altitude tensioner). Select the “√” box at the bottom right for Auto Refresh, which allows real-time updating of the equatorial mount’s deviation values during adjustment.

ZWO Equatorial Mount Azimuth and Altitude Angle Adjustment Method are as follows (The adjustment method may vary depending on the equatorial mount; please refer to the manual provided with your equatorial mount):

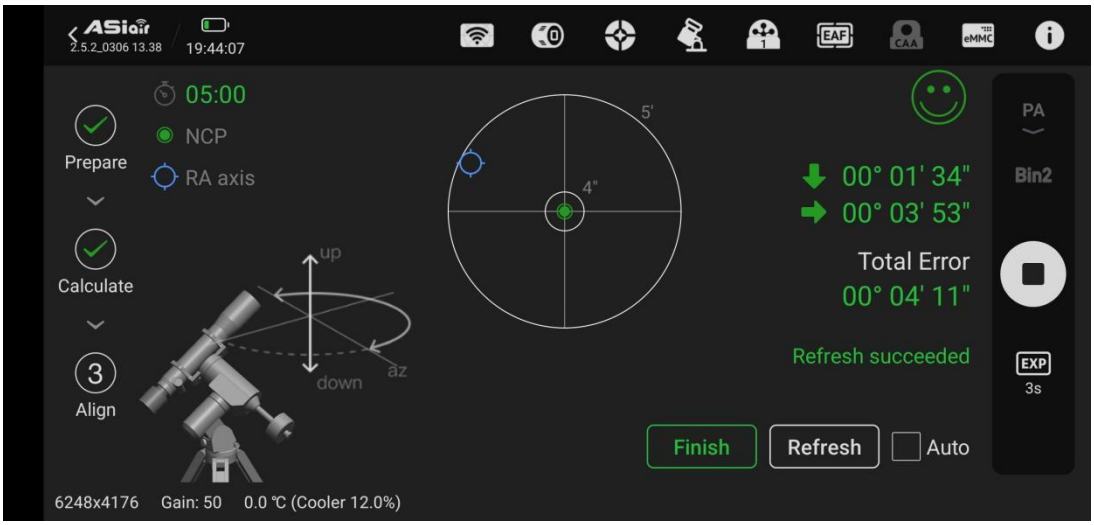
Arrow pointing left: Loosen the left azimuth fine-adjustment knob and tighten the right azimuth fine-adjustment knob;

Arrow pointing right: Loosen the right azimuth fine-adjustment knob and tighten the left azimuth fine-adjustment knob;

Arrow pointing up: Turn the altitude angle fine-adjustment knob clockwise;

Arrow pointing down: Rotate the altitude angle fine-tuning knob counterclockwise;

A total error within 5’ (arcminutes) is considered acceptable; the smaller, the better.

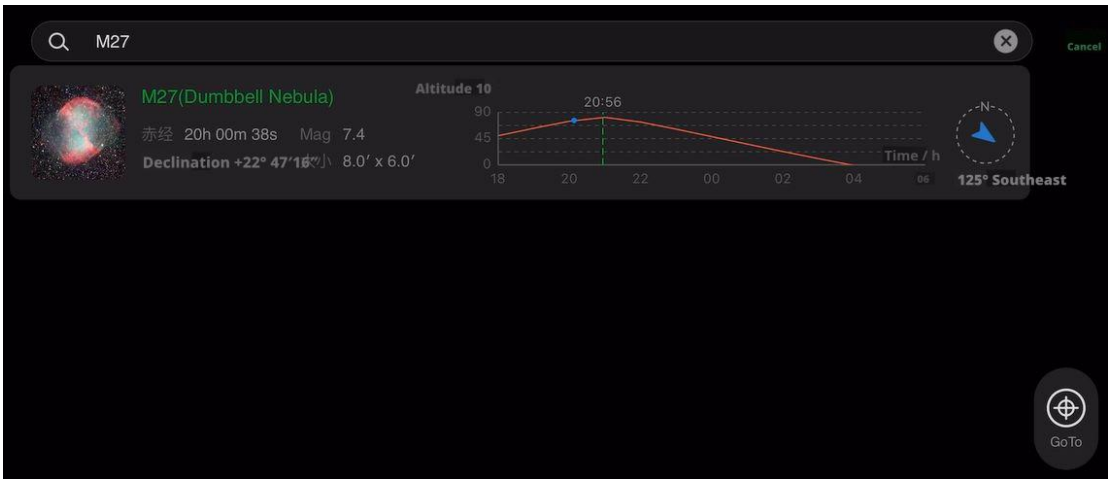


After adjustment, promptly lock the azimuth lock screw and altitude angle tensioner. Click Finish to obtain the ranking data.

After completing polar alignment, to prevent mechanical interference between the rear of the telescope and the tripod during GoTo operations, it is recommended to first set the equatorial mount to the zero position.

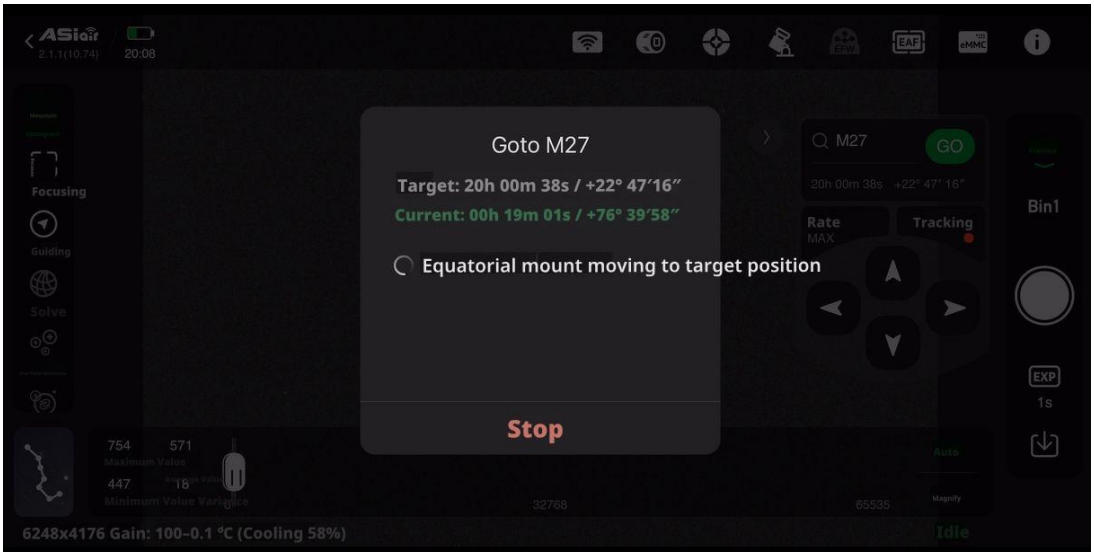
3. 3. 3. **GoTo**

① Upon completing polar alignment, switch to “Preview” mode, tap the search box on the equatorial mount control panel (MCP) to access the Celestial Object Library, and select a suitable imaging target with an appropriate altitude angle from the “Best Tonight” list.



② After selecting the target, you will return to the Preview interface. Tap the “GoTo” button on the equatorial mount control panel, and the equatorial mount will move to the

target position.



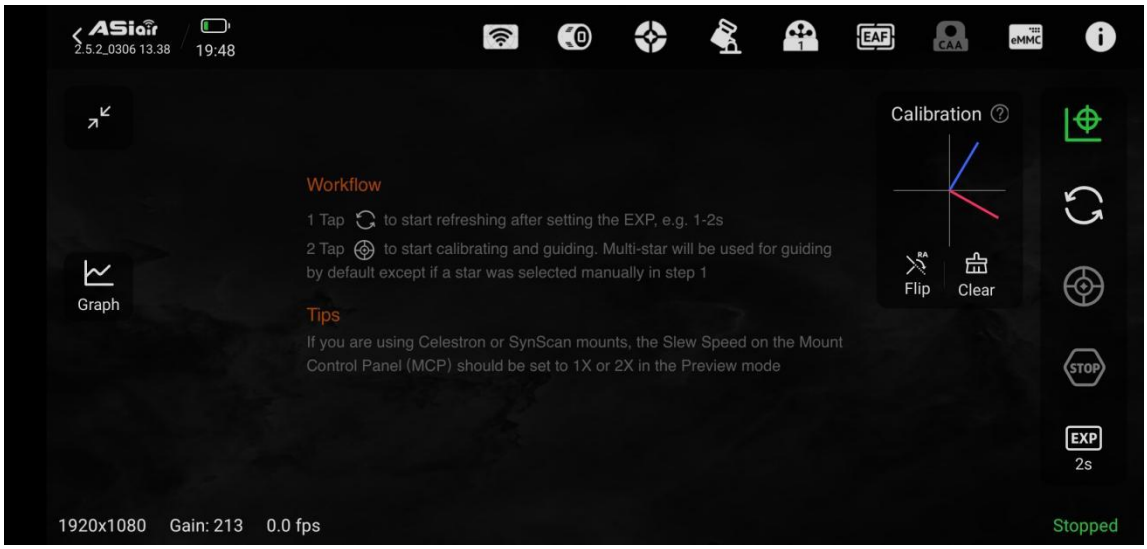
③ According to the default settings, GoTo will automatically complete the “Centering Composition.”

3. 3. 4. **Preview and Composition**

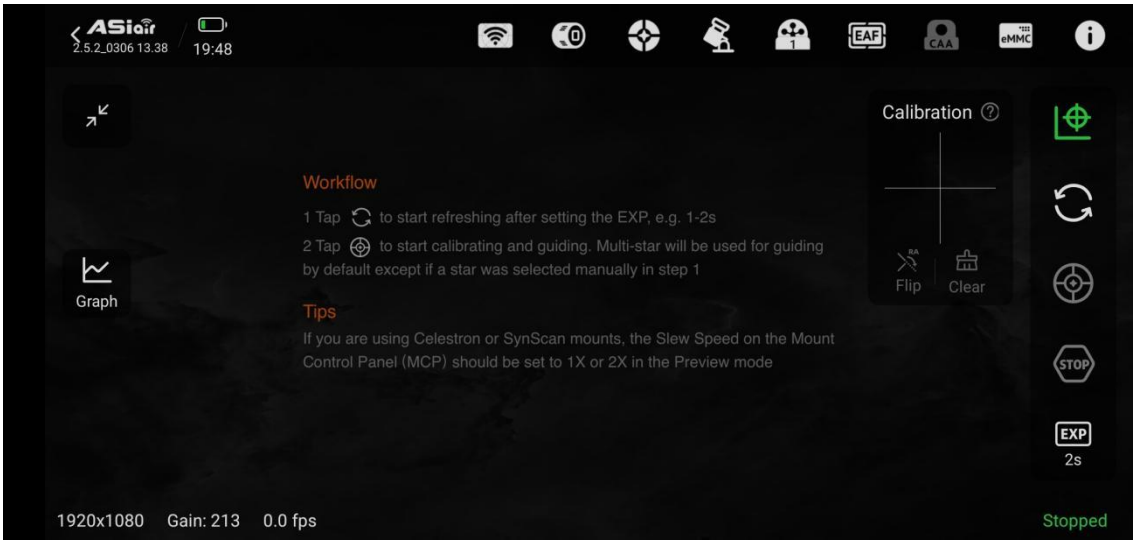
After the “Parsing Centering” following GoTo is completed, click the capture button in the right navigation bar to obtain a short-exposure preview image of the target. You can analyze this preview image to complete your composition.

3. 3. 5. **Start Guiding**

Tap the icon “Guide” will display a floating window with simplified guiding information (hereafter referred to as the “Guiding Floating Window”), which shows “Guiding Stopped.” Tap anywhere on the Guiding Floating Window to enter the guiding interface.



You can click the“Minimize”button at the top left corner of the page to return to the main interface.



Click the icon  and a list of corresponding exposure times (unit: seconds) will appear, ranging from 0.001 seconds to 5 seconds. Select an exposure time, recommended 1–2 s, then click  button. The guide camera will then refresh in real time according to your selected exposure time, continuously generating images.

Click the icon  Begin calibration. Before calibration, you may manually select a

star point for guiding (manual single-star guiding). Note: please do not select the brightest star; generally, select a star point of medium brightness in the image. You may also directly tap the button; ASIAIR will automatically select a suitable star point to begin the calibration process (automatic multi-star guiding). Guiding will start once calibration is complete.

 Toggle for graphical display of guiding calibration data. This graph shows the star point motion trajectory generated by the guiding pulses sent by ASIAIR during calibration. The blue and red lines represent the RA and Dec guiding rates and directions calculated as calibration results; they are typically approximately perpendicular.

We can click  to view the guiding operational status. We can observe the red and blue polylines being gradually drawn within the curve graph display area. As shown in the interface above, the lower-left corner displays “0.2 fps” indicating the update rate of the guiding display or the curve plot. On the left side of the curve, an “X: 50”button indicates that this curve can display up to 50 guiding results simultaneously, or accommodate polylines corresponding to 50 iterations. You may also click the 'X: 50' button to switch to 'X: 100' or 'X: 200'.

On the guiding interface, the left side contains the toggle button for the Guiding Curve, while the right side contains the guiding settings and activation button.

Blue represents the Right Ascension axis, red represents the Declination axis, and the combined tracking error RMS value for both axes is 17.48 arcseconds.

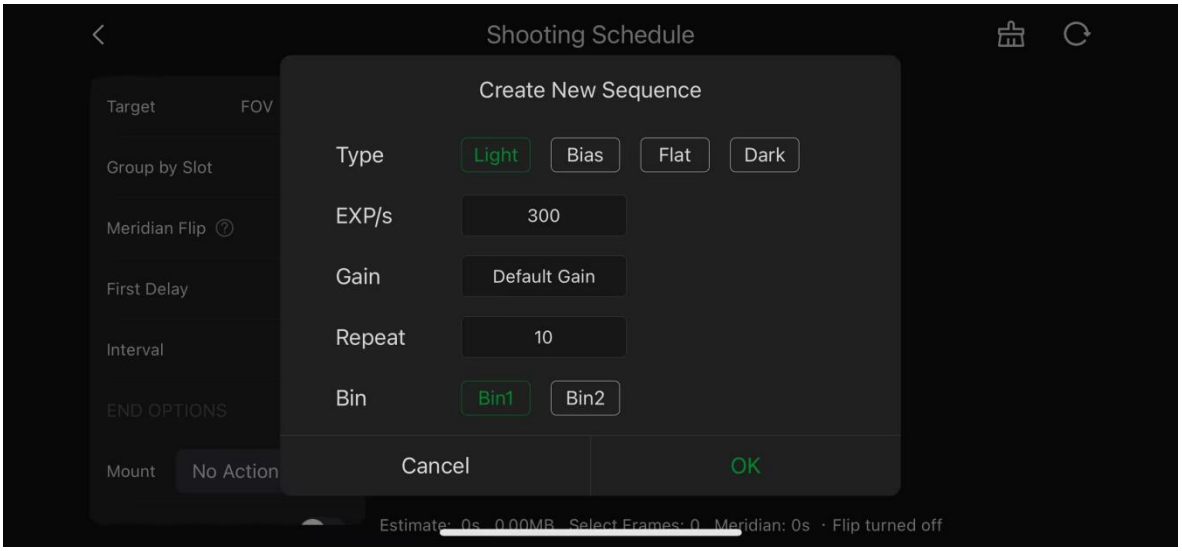
For the ZWO ASIMount, 'Right ascension correction', 'Declination correction', and 'Declination direction' can be set to their default values of '70%', '100%', and 'Auto', respectively. During actual guiding, you may also try slightly reducing the 'Right ascension correction' and 'Declination correction' values.

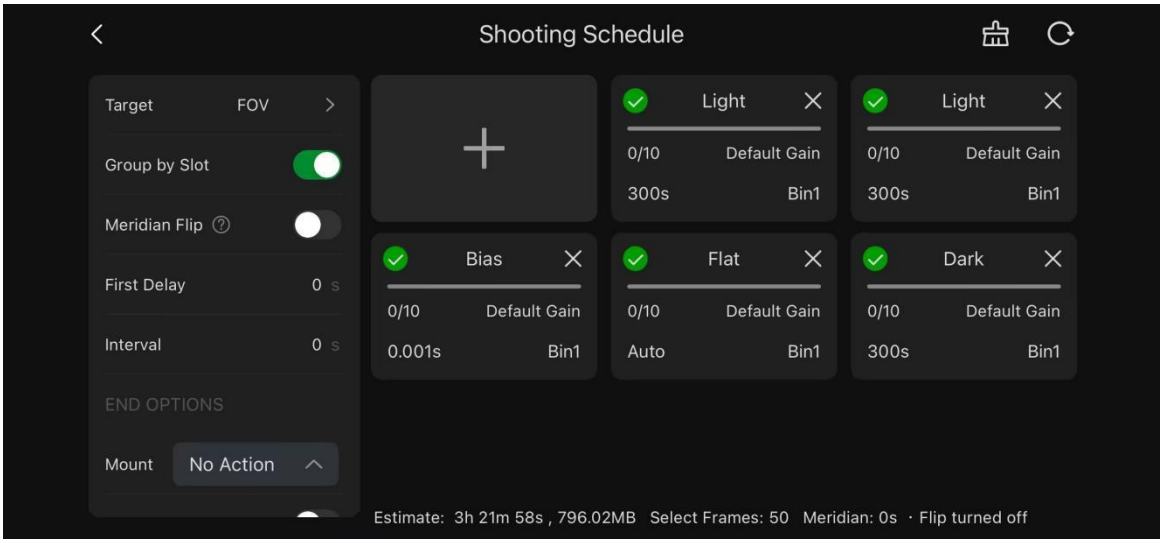
Yes, it is the Stop Guiding button.

The setting option above the Guiding Curve is generally kept at the default. When the Guiding Curve fluctuates significantly, you can lightly tap the area behind the Correction Line to display the correction signals on the image, assisting in troubleshooting guiding issues.

Immediately after calibration during the initial guiding phase, the Guiding Curve and error statistics may be inaccurate. Please patiently wait for 10–20 frames, then tap the 'Clear' button at the lower left corner of the curve graph and recheck.

3. 3. 6. **Scheduled imaging**





Many of the stunning deep-sky images you see are created through stacking and post-processing. The longer the cumulative exposure time on deep-sky targets, the clearer the resulting image. You need to capture multiple sets of photos and perform stacking using dedicated software.

Step One: Before executing the “ Scheduled Imaging ”, you need to perform guiding so that the equatorial mount can accurately track the target. Switch to “ Preview ” mode, take an exposure image with visible stars, and use the guiding tool to complete guiding.

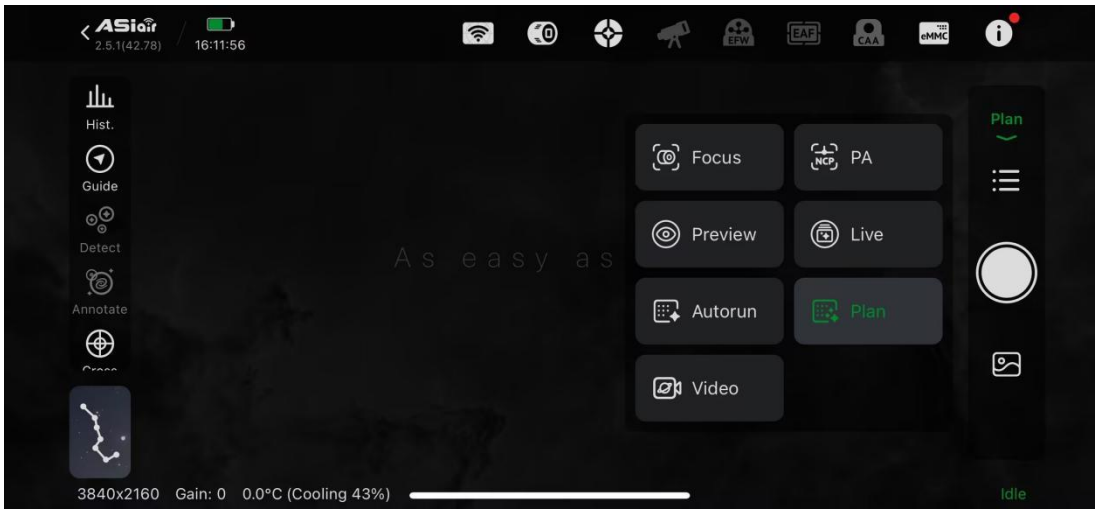
Step Two: Switch to “Preview” mode, select the desired imaging target on the equatorial mount panel, perform GoTo to the target, and take an exposure image to adjust focus and composition ;

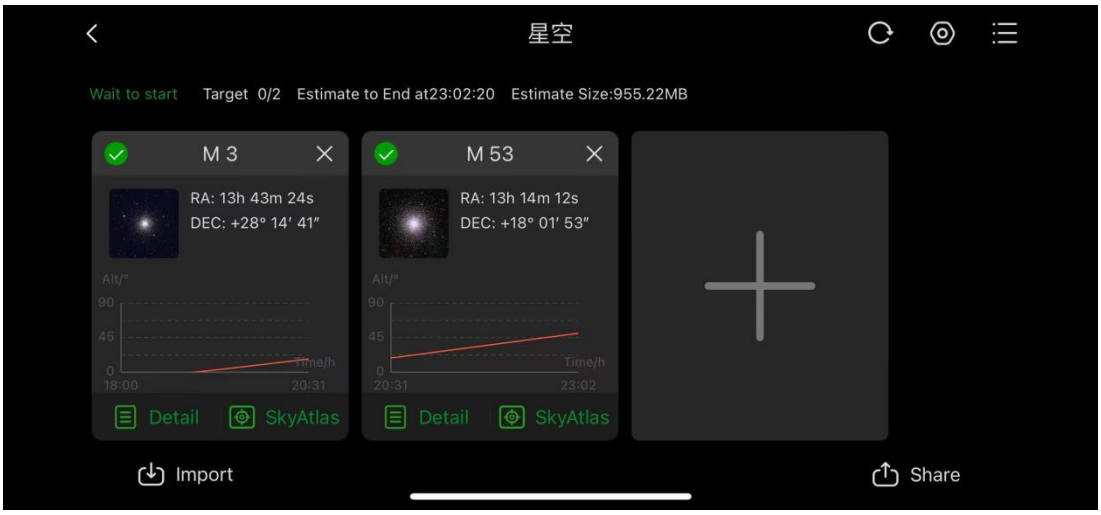
Step Three: Create the imaging plan. It is recommended that the plan includes Dark frames, Flat fields, Bias frames, and Bright Field frames. Once the plan is created, click the Start button to begin scheduled imaging. During scheduled imaging, ensure that the camera, guiding system, equatorial mount, and other devices remain properly connected.

During the scheduled imaging process, if you wish to modify the imaging plan, you must reset the current scheduled imaging progress.

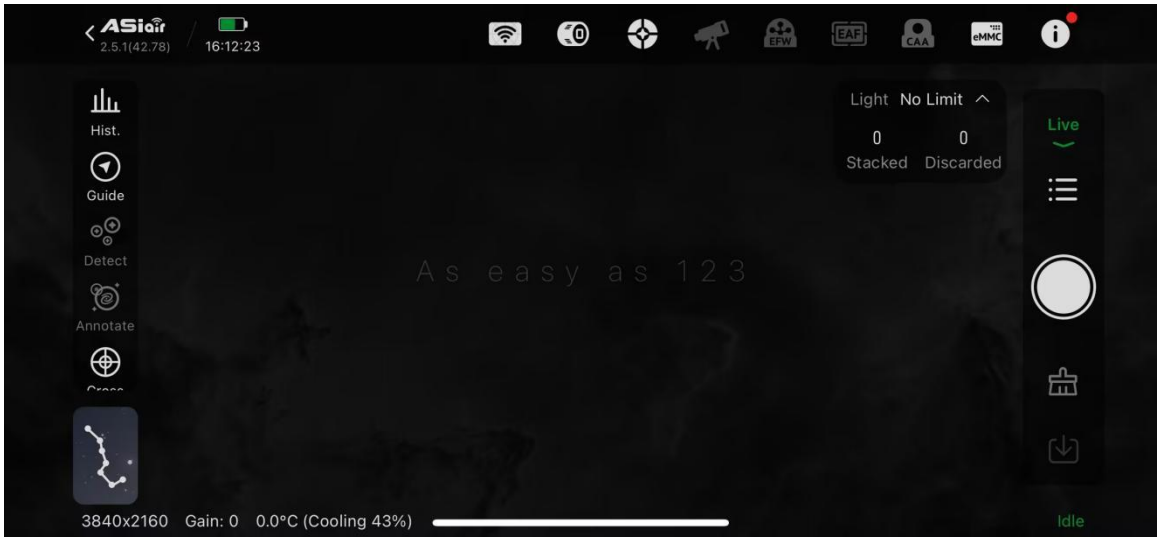
3. 3. 7. **Multiple Targets Imaging**

Click “Preview” to switch to “Plan” mode. Here, you can add and select multiple celestial objects for imaging. Return to “Preview”, and after clicking the “Start” button, ASIAIR will image the celestial objects sequentially.





3. 3. 8. **Real-time Stacking**



Real-time stacking of images can be performed within ASIAIR.

Step 1: Switch to 'Preview Mode.' On the equatorial mount panel, select the target you wish to image, GoTo the target, and take an exposure to adjust the image and composition.

Step 2: Switch the App to “Real-time Stacking” mode, and select the frames to stack in the settings. It is recommended to first stack Dark frames, Flat Fields, and Bias Frames; When stacking Bright Field frames, it is advisable to first stack Dark frames, Flat Fields, and Bias Frames to obtain higher quality images.

During stacking, it is recommended not to change the image size. If the image size is changed, previously stacked image data must be cleared before stacking again.

3. 3. 9. Others

3. 3. 9. 1. Equatorial Mount Control Panel

The ASIAIR App provides a highly convenient and powerful tool for mobile equatorial mount control, target selection, performing GoTo, and target framing. This tool is called the “Equatorial Mount Control Panel (MCP). Let’s overview the Control Panel from top to bottom:

Target search box: Tap to enter the “Celestial Object Library” interface. We have carefully selected more than 14,000 solar system and deep-sky celestial objects, and there is a “Best Tonight” list to facilitate easier selection of imaging targets.

Considering that users may wish to image targets not included in the Celestial Object Library, the option to add custom targets is provided.

GoTo button: After selecting a target celestial object in the Celestial Object Library, you will return to the MCP interface. At this point, tapping this button will cause ASIAIR to control the equatorial mount to move to the region of the sky where the target

is located and complete automatic centering framing.

Direction buttons and speed slider: These can be used together to select different movement speeds, thereby moving the equatorial mount's right ascension axis or declination axis to achieve your preferred framing or other requirements.

Tracking: Click 'Tracking'; green indicates that the equatorial mount tracking is enabled, while red indicates it is disabled.

The current celestial object library contains: deep-sky object catalogs (NGC/IC/M/SH2/C/LDN), solar system object catalogs, prominent star catalogs, double star catalogs, comet catalogs, and others. Updates will continue to be released.

The equatorial mount control panel is only applicable to GoTo equatorial mounts and is not available when using On-Camera-ST4 driving.

3.3.9.2. Auxiliary Tools

① Left Side of the Control Panel

Histogram 

The image histogram is a distribution graph of pixel brightness and pixel count within the current image. The horizontal axis represents pixel brightness values, the vertical axis represents pixel quantity, and it concurrently displays the maximum value, minimum value, average value, and standard deviation. By dragging the two triangular buttons on the histogram coordinate system, manual stretching of the histogram can be

performed. You can also click the zoom button to enlarge the statistical interval for fine-tuning. It is recommended to enable the histogram auto-adjustment button, as the software will automatically stretch the histogram.

Electronic focusing

After connecting the electronic focuser (ZWO EAF), you can use the electronic focuser control panel to perform coarse and fine adjustments to achieve telescope focus. Click to enter the electronic focuser control panel.

Guiding

Enable Guiding Floating Window

Solve

Analyze the current image to determine the true sky coordinates (equatorial celestial coordinate system) to which the current equatorial mount is pointing. This function is used for equatorial mount pointing calibration. After completing plate solving, click the“Sync to Equatorial Mount”option in the pop-up dialog.

Plate solving remains an essential feature for both “GoTo Auto Center” and “ Polar Alignment ”.

Star Point Detection

Calculates the average size of the star points detected in the current image.

Annotation 

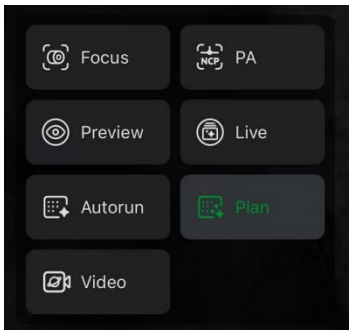
Annotate celestial objects within the captured images.

Crosshair 

The crosshair assists in better composing the imaging target.

② Right side of the control panel

Preview 



Click Preview to switch between : Focusing, Polar Alignment, Scheduled Imaging, Multiple Targets, Real-time Stacking, and Video modes.

Scheduled Imaging: Enables the creation of personalized imaging plans and allows imaging according to user preferences.

Multiple Targets: Multiple celestial objects can be selected for imaging. During the session, ASIAIR will perform imaging sequentially.

Real-time Stacking: In this mode, images are stacked concurrently during imaging, enabling real-time acquisition of higher-quality images.

Video Mode: This mode supports recording of imaging videos.

Bin 

During precise focusing, focus is achieved following the principle that a smaller HFD value at Bin 1 indicates better focus (adjusting gradually from the maximum Bin to Bin 1).

Bin1: indicates a single pixel; Bin2: indicates 2 pixels combined into 1; Bin3: indicates 3 pixels combined into 1; Bin4: indicates 4 pixels combined into 1; Binning can enhance the signal-to-noise ratio of the image and improve image clarity.

Start 

Click “Start” to initiate the capture process.

Exposure 

Click “Exposure” to set the exposure time, ranging from 0.001 s to 1000 s.

4. Appendix

This chapter primarily covers image export, firmware upgrade, Disclaimer, and after-sales warranty.

4. 1. Image Export

After completing image capture, the images must be exported to a computer for post-processing. Since the ASIAIR Plus supports external USB drives, images stored on the eMMC can be “exported” to a USB drive, which can then be directly connected to a computer to access the images; It can also connect to a Type-C interface to directly access images in the eMMC.

4. 2. Firmware Upgrade

ASIAIR Plus will continuously add new features and optimizations through updates, comprising firmware and App updates, with firmware distributed together with new App versions. After downloading the latest version of the ASIAIR App, the next time you connect to the ASIAIR Plus device and open the App, you will be prompted to update; click confirm and patiently wait a few minutes for completion.

The firmware of ASIAIR Plus refers to the suite of programs running on ASIAIR OS.

If the firmware upgrade fails, you can exit the App and restart the device to retry.

4. 3. Wi-Fi Recovery

If the ASIAIR Plus Wi-Fi signal cannot be found, first try resetting the device; please refer to sections “1.4 ASIAIR Component Names” and “1.5 Status Indicators” for detailed instructions.

4. 4. Safety Summary

① Environment

Operate within an environment ranging from 0°C to 40°C under favorable weather conditions (no rain, snow, heavy fog, thunderstorms, strong winds, or extreme weather).

② Inspection

Ensure that the input power voltage is within 12V, the current exceeds 2A, and that the total system power consumption does not exceed 10A.

Ensure adequate ventilation around the ASIAIR Plus during operation.

Ensure that the cables connecting the ASIAIR Plus to other devices are free of entanglements, with special attention to communication and power supply cables to the equatorial mount.

③ Operation

If the ASIAIR Plus operates for an extended period under extreme high temperatures, its internal temperature may reach 70°C. Do not touch immediately after powering off.

Do not operate the device under prolonged undervoltage conditions.

4.5. Disclaimer

This product is not a toy. Do not allow children to access this product or its components and wiring. Please exercise caution when operating in the presence of children.

You should read the entire User Manual and familiarize yourself with the product's functions before operation. Improper operation of this product may result in damage to the product and property loss. For beginners in astrophotography, this product requires a period of familiarization and some basic astronomical knowledge before safe and proficient use.

For additional terms of service, please refer to the 'Service Agreement' within the App. ZWO shall not be liable for any losses incurred due to users failing to follow the User Manual when using this product.

Subject to compliance with laws and regulations, ZWO reserves the final right of interpretation of this document. ZWO reserves the right to update, revise, or discontinue this document without prior notice.

4. 6. After-Sales Service Information

We provide a two-year warranty service for our products. Within two years, if the device fails to operate normally, we will provide free after-sales repair service.

Beyond the two-year warranty period, we offer lifetime repair service, charging only for parts required for repair or replacement. Warranty terms do not apply to damages caused by misuse, abuse, accidental drops, or logistics-related incidents. Return shipping costs for repaired devices shall be borne by the buyer.

This manual may be updated without prior notice.

You can obtain the latest version of the User Manual from the official ZWO website.

https://www.zwoastro.com/cn/support/manuals

If you have any questions or suggestions regarding the manual, please contact us at the following email address: support@zwoptical.com