



ASIAIR Manual

Version 1.1

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1 Instruction

Congratulations and thank you for buying ZWO ASIAIR!

This manual will give you a brief introduction to your ASIAIR. Before using the ASIAIR, please take some time to read it thoroughly and if you have any other questions, feel free to contact us at info@zwoptical.com.

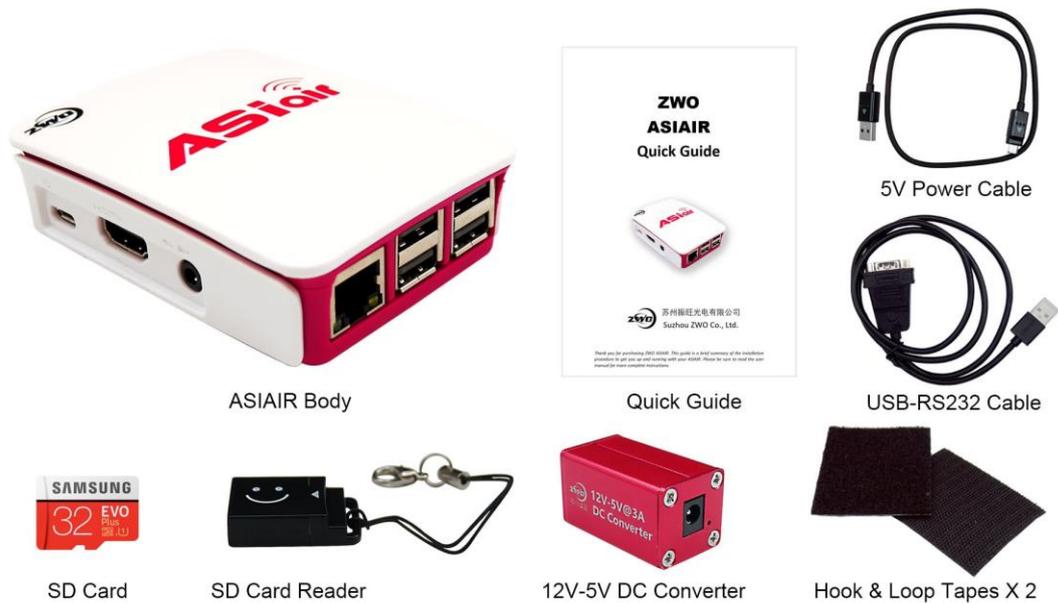
You may need to do a few practical exercises to get familiar with the use of ASIAIR. This manual gives you detailed reference information and descriptions of each function in each step of use. It allows you to get a simple and enjoyable experience.

The ASIAIR is designed for DSO imaging. Its outstanding performance coupled with simple and convenient controls will surely impress you!

ZWO Website: <https://astronomy-imaging-camera.com>

2 What is in the box Instruction

2.1 Schematic



2.2 List

No.	Name	unit	Qty	Note
1	ASIAIR body	pcs	1	
2	ZWO ASIAIR Quick Guide	pcs	1	
3	5V power cable	pcs	1	Peak value 3A
4	USB-RS232 serial cable	pcs	1	
5	SD Card	pcs	1	32GB, Samsung
6	SD Card Reader	pcs	1	
7	12V-5V DC Converter	pcs	1	
8	Hook & Loop Tapes	set	2	

3 ASIAIR Brief Introduction

The ASIAIR is a lightweight wireless astrophotography control unit that enables all the essential features of deep space imaging through the accompanying application, including (but not limited to and with more features under development): wireless control, equatorial control, focus, capture and preview, automatic guiding, plate solving, sequence etc.

ASIAIR currently supported devices include:

Cameras: Currently supports all ASI USB3.0 and ASI Mini-series cameras

Filter wheel: Currently only supports ZWO filter wheels, EFWmini, ZWO EFW (8 x 1.25"/31mm or 7 x 36mm)

Equatorial control: ASIAIR controls the mount through INDI. Compatible mounts include iOptron, Celestron, Losmandy, Sky-Watcher (SyncScan and EqMod), which were all tested with ASIAIR.

INDI supported mount list: <http://indilib.org/devices/telescopes.html>.

If you have any questions, please visit the [ASIAIR forum](#) for answers.



3.1 External View

ASIAIR has an SD card slot. We have pre-installed an SD card at the factory and the ASIAIR is ready to use. Simply connect your devices and power on. Additionally, there are several other interfaces besides the USB interface and power port.

HDMI and Headphone port: These are all used as debug interfaces, users do not use.

Ethernet port: The network cable can be used to access the route, so that users can access photos stored on ASIAIR through a limited network (also via wireless WiFi), eliminating the trouble of plugging and unplugging the SD card.



3.2 Download the ASIAIR App

Method 1: Scan the QR-code below and follow the prompts to download and install the ASIAIR app (hereafter referred to as App):



Method 2: If inconvenient to scan, you can directly download the following link in the mobile browser: zwo.biz/qrcode/ASIAIR.html.

3.3 First Use

Please pay attention to the following before using ASIAIR for the first time.

5G WiFi

ASIAIR defaults to 5G WiFi hotspot, so make sure your phone or tablet supports 5G WiFi, otherwise you won't be able to find the ASIAIR device on the network.

Power Supply

We recommend using a 12V power supply, please use the 12V-5V DC adapter and power cord that is included with the ASIAIR. If you need to use a 5V power supply, be sure the power supply can supply 2.5A@5V.

Backing up and restoring the SD card

The service (firmware) programs and pictures taken by ASIAIR are stored on the SD card. Due to the nature of the technology, it is inevitable that at some point the SD card will become corrupted or damaged so we strongly recommend that you back up the SD memory card when you use the ASIAIR for the first time.

Due to the variability of SD cards from different manufacturers, backup and restore is best performed using the same brand and size of SD card. We install a 32G Samsung SD card in your ASIAIR at the factory.

For a detailed backup method, see the Backup section in the section "[Backing up and restoring the SD card](#)".

4 Start DSO Imaging

4.1 External device connection

SD card

The ASIAIR has a 32GB SD boot card installed by default (25G left can be used for image storage)



External device connection

The ASIAIR is connected to the equatorial mount via a USB-RS232 and RS232 equatorial lines (some equatorial mounts do not require a USB-RS232 serial cable and can be connected directly, such as EQMOD or Celestron's equatorial hand controller).

The equatorial mount must be directly connected to the ASIAIR. Do not connect through the camera's hu1

The camera, filter wheel, etc. can be connected to the ASIAIR via USB cable, as shown below:



Before using the ASIAIR, it is necessary to align the polar axis on the equatorial mount. The accuracy of the polar axis calibration will affect the accuracy of the guiding and the GoTo. Most of the equatorial mount's sync function is equivalent to a one-star calibration, so in general, you don't need to perform one or more star calibrations in advance. Synta's equatorial mount is an exception if you connect the Synta's Equatorial Mount via SyncScan, be sure to accurately do polar axis calibration in advance and 3-star calibration, because its sync command can only be valid in a small range, so we recommend using EQMOD to control Synta's equatorial instead of the SyncScan hand controller. However, currently SkySafari does not support EQMOD.

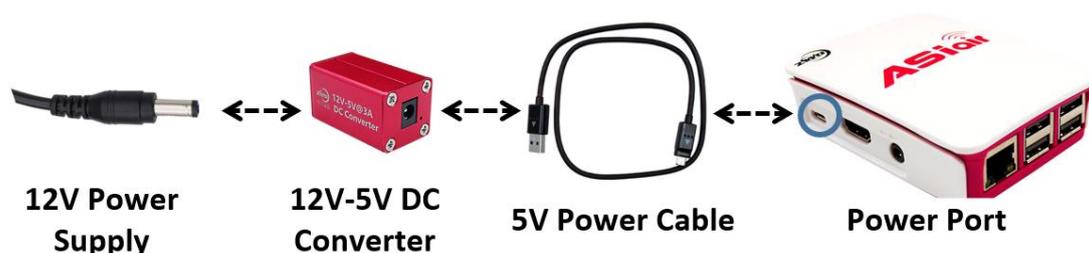
Attach the ASIAIR

We recommend that you attach the ASIAIR to your telescope or other devices with Hook & Loop Tape.



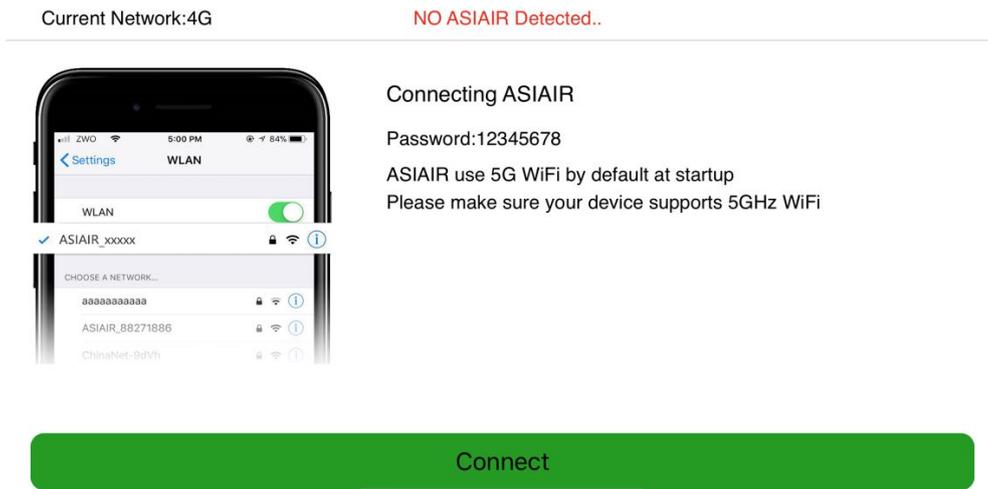
Power Supply

The ASIAIR supports 12V and 5V power supply, ASIAIR standby power consumption is approximately 2.5W.

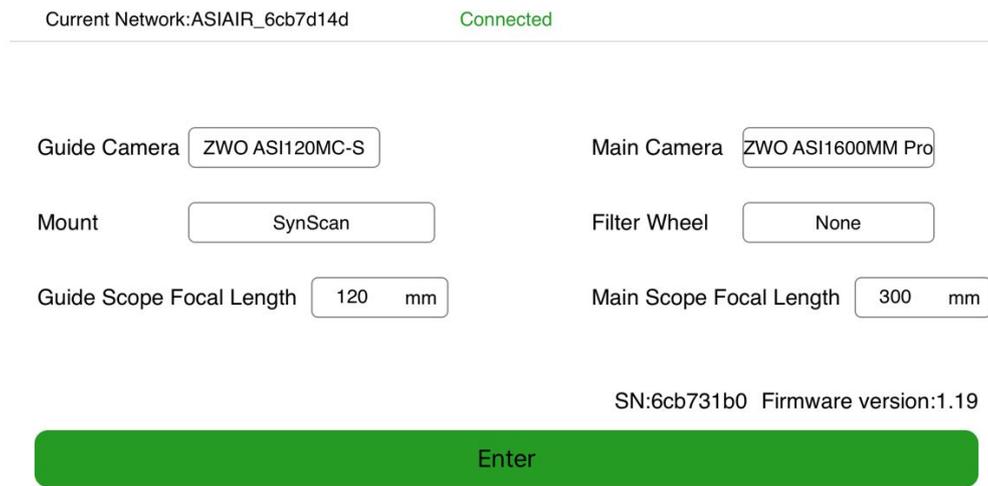


4.2 ASIAIR App connection and setup

After the ASIAIR is powered up, wait for about 15 seconds before connecting to the ASIAIR hotspot via the mobile app. The ASIAIR starts up as a 5G WiFi hotspot by default, so make sure your phone or tablet supports 5G WiFi, otherwise you won't be able to find the ASIAIR device on the network.



Enter the device selection/main interface to select the main camera, guiding camera, equatorial mount and filter wheel. Make sure that you enter the accurate focal length of your telescope and guide telescope.



Click the WiFi icon  in the device area of the main interface to access the ASIAIR WiFi settings interface, where you can get the connected ASIAIR related device information and WiFi configuration:

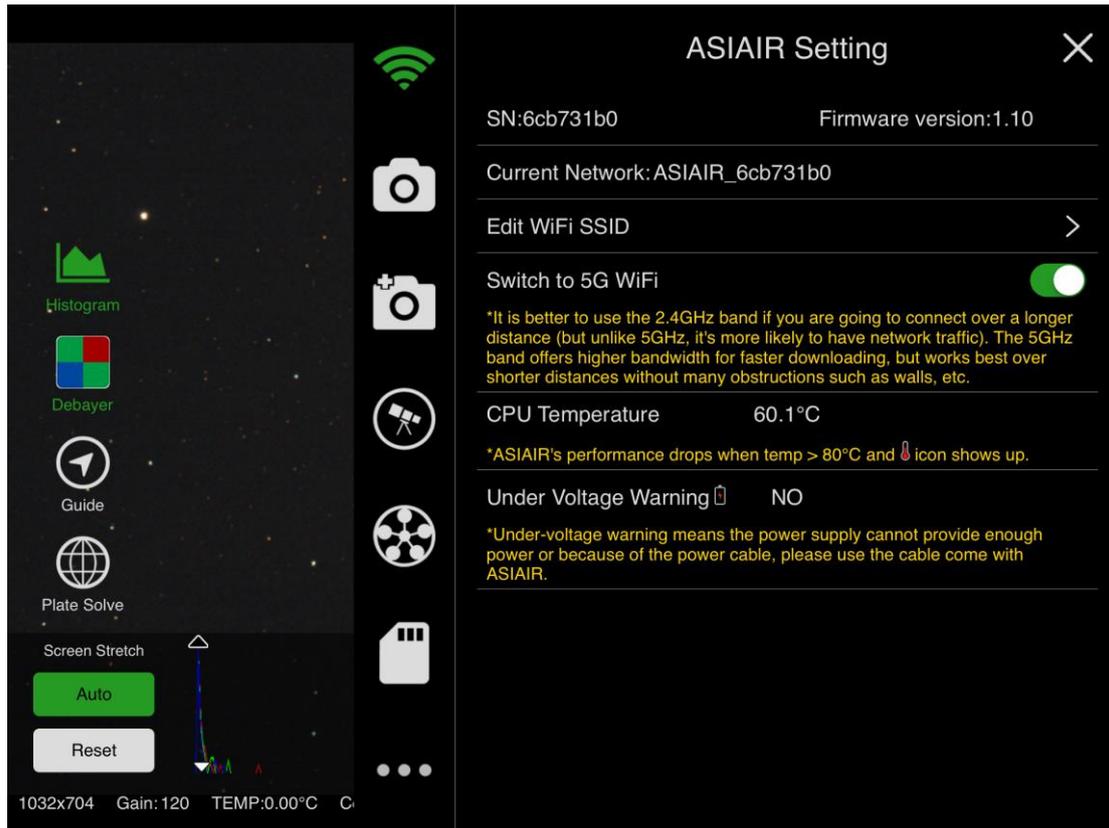
Serial Number: Each ASIAIR has a separate and unique serial number.

Modify the WiFi name: You may modify the ASIAIR hotspot name. Currently, you cannot modify the hotspot password.

WiFi 2.4G/5G switching: 5G is enabled by default. If you switch, you will need to reconnect to WiFi. We recommend using 5G for data transmission, because 5G transmission speed is quicker, there is no 2.4G signal congestion, and the interference is minor. The only drawback is the transmission distance is significantly reduced.

CPU temperature: ASIAIR is designed for outdoor night use. The normal working temperature should not exceed 80 degrees. If it exceeds 80 degrees, there will be a high temperature warning and CPU performance will drop. At this time, you need to try to open the case to cool the ASIAIR down. When it is below 80 degrees, please feel free to use it normally.

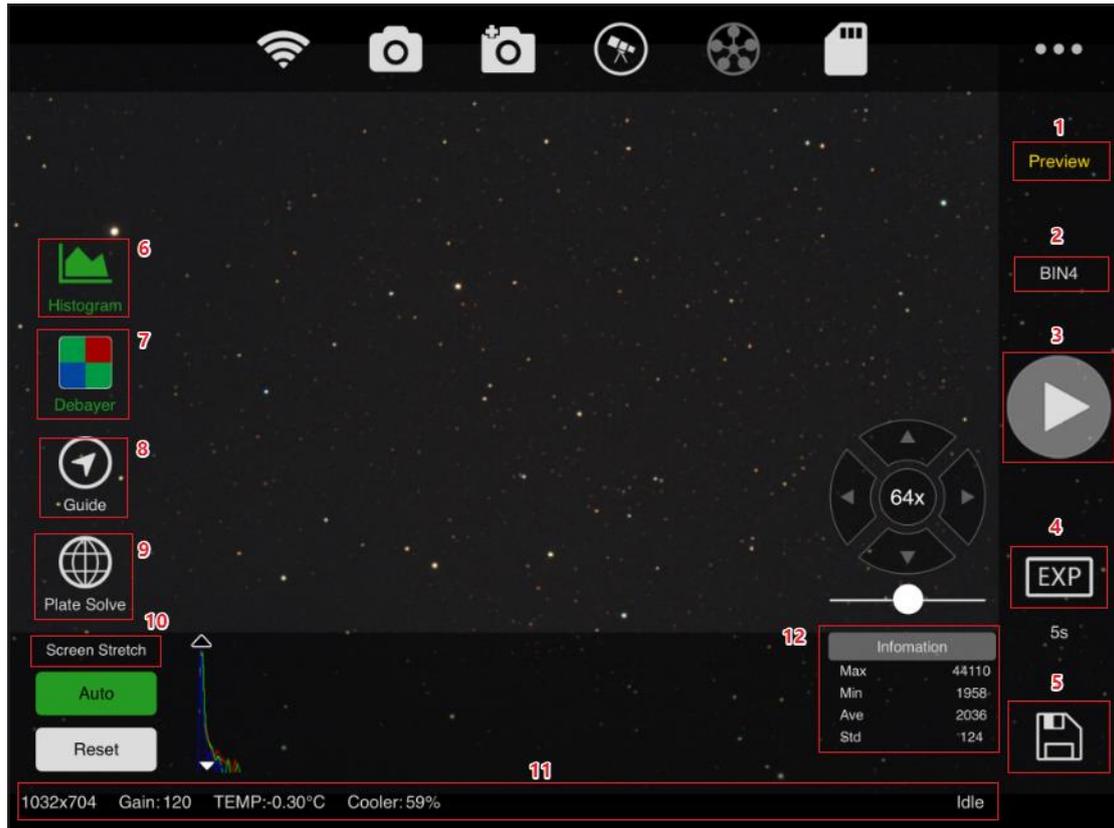
Under voltage Warning: An under-voltage warning will occur if there is an insufficient power supply or there is a problem with the power cable. The ASIAIR needs 0.5A@5V under normal conditions and 2.5A@5V for peak current. Please use the USB high current power supply cable supplied with ASIAIR. When connected to the power supply, the ordinary micro USB cable is too thin, causing a drop-in power and will cause the ASIAIR to work abnormally.



Click the X in the upper right corner or click the left area on the image to return to the preview interface.

4.3 Image preview function

The function list of preview interface is opened as follows: After setting the camera related exposure, gain and BIN parameters, click the start button (3) to start a single exposure. After the exposure has completed, the image will be transmitted and displayed, and the status will be displayed in the lower right corner (Idle, in the exposure, download).



Note: The pictures taken in the preview interface are just previews and will not be saved by default unless you click the Save button (5).

No.	Name	Function	Note
1	Function Switch	Switch between preview, focus, and Autorun	
2	BIN Setting	Pixel merge settings, all the cameras support is listed here	
3	Start/Pause Imaging	Start or stop the current exposure progress	
4	Exposure Setting	Can be set from 0.001s to 300s	
5	Save Image	Save the RAW image on the SD card, stretched image on the interface will be save	
6	Histogram	Show items 10 and 12 when turned on	
7	Debayer	Convert between raw format and color	Only color camera

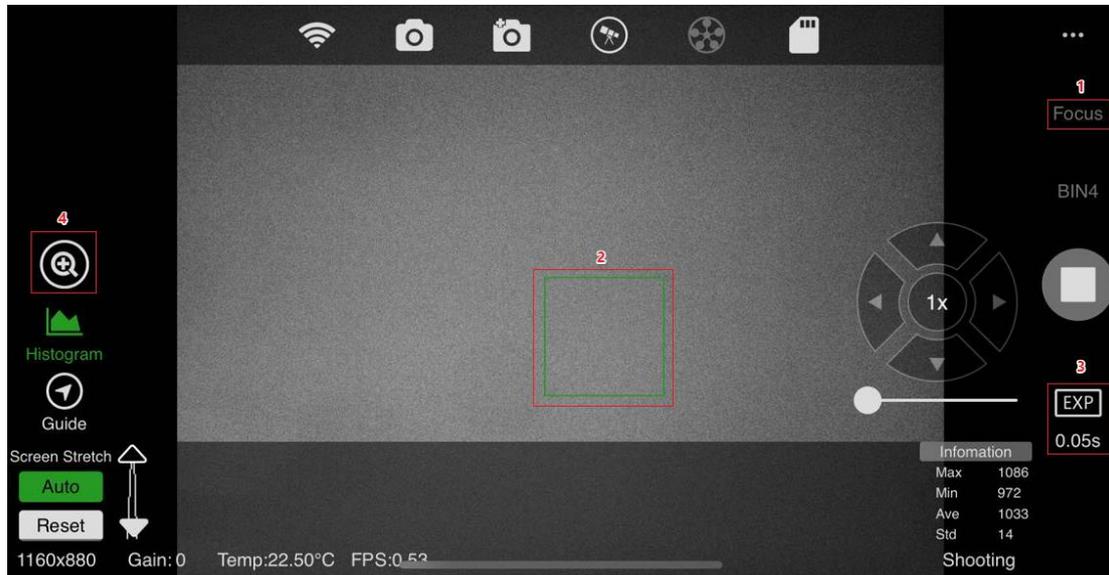
8	Guiding	Show guiding curve window	
9	Plate Solving	Plate solving the coordinates of the current image	
10	Histogram Stretch	Divided into automatic and manual stretching	Info Display
11	Camera specification	Sensor size, gain, temperature, cooling power, camera status	
12	Histogram Information	Contains Max, Min, Avg, Std values	

Congratulations! It is your first image taken with the ASIAIR! The picture may look blurry because it is out of focus.



4.4 Focus

For the first image, the telescope will not be focused properly. We recommend using the maximum BIN value and 1s exposure to focus the star.



The ASIAIR auxiliary focus function is divided into coarse adjustment and micro adjustment.

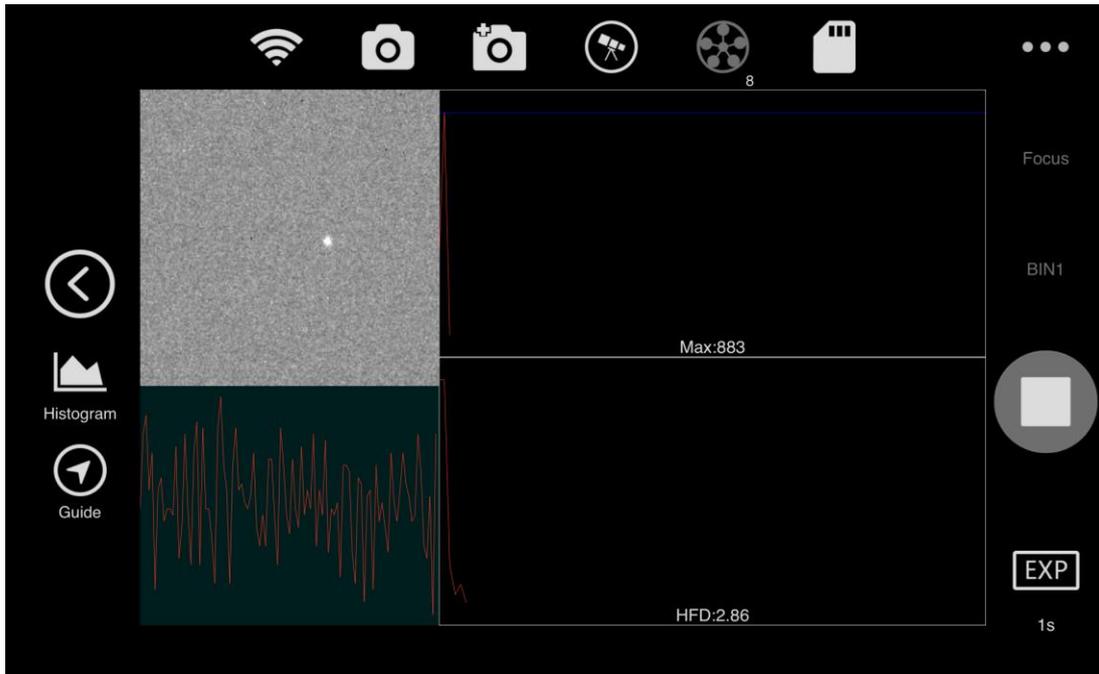
Switch to the focus adjustment interface (1), click the start button (3), and the image will start to continuously refresh. To make the refresh speed quick and easy to focus, we limit the area to 1280X960.

If you need a larger field of view, use BIN. The green frame area (2) is a fine-tuned zoom area.

You can drag this area to any star point and click the magnifying glass button (4) to enter the fine-tuning interface.

The micro adjustment interface shows a peak focus and HFD focus curve. The larger the peak value, the smaller the HFD value, which indicates the focus is more accurate. The ASIAIR will support automatic focus adjustments in the future. After getting focus, you can start looking for our first deep space

shooting target.

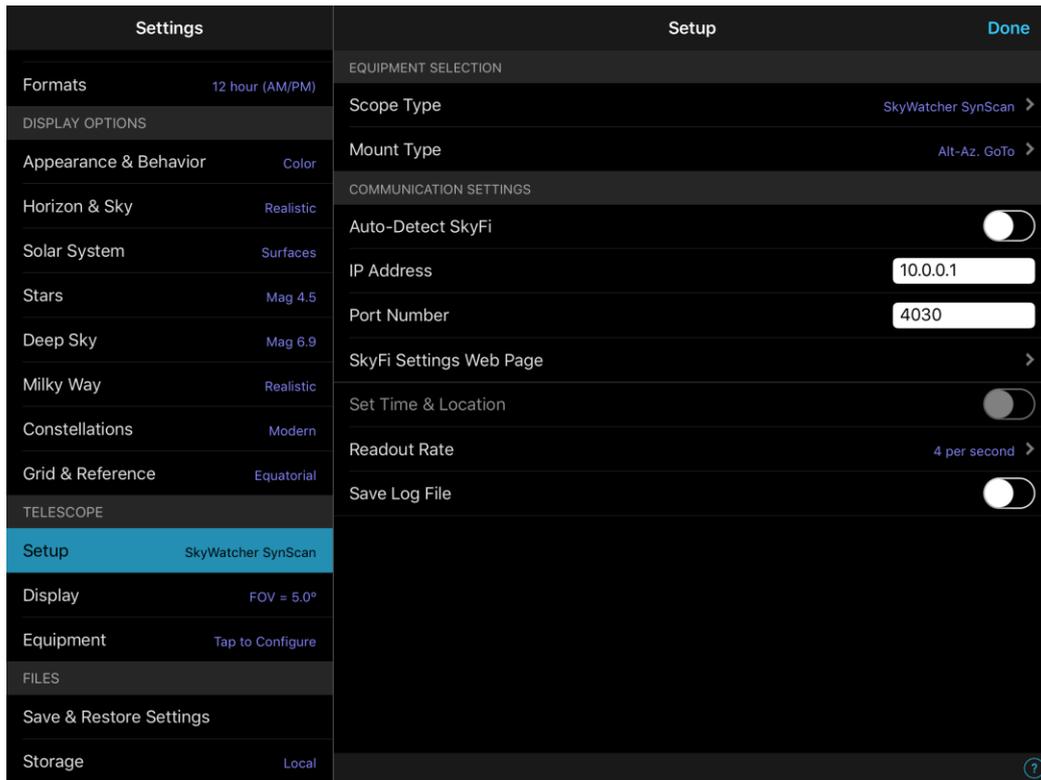


4.5 Finding the target

For beginners, finding the deep space target you want to capture is very difficult, but with the help of the Star Map software, everything is simple. We recommend using SkySafari's star map software to control the Equatorial GoTo to find the target. Note: The control of the Equatorial Mount is supported by the Plus/Pro version of SkySafari 5/6.

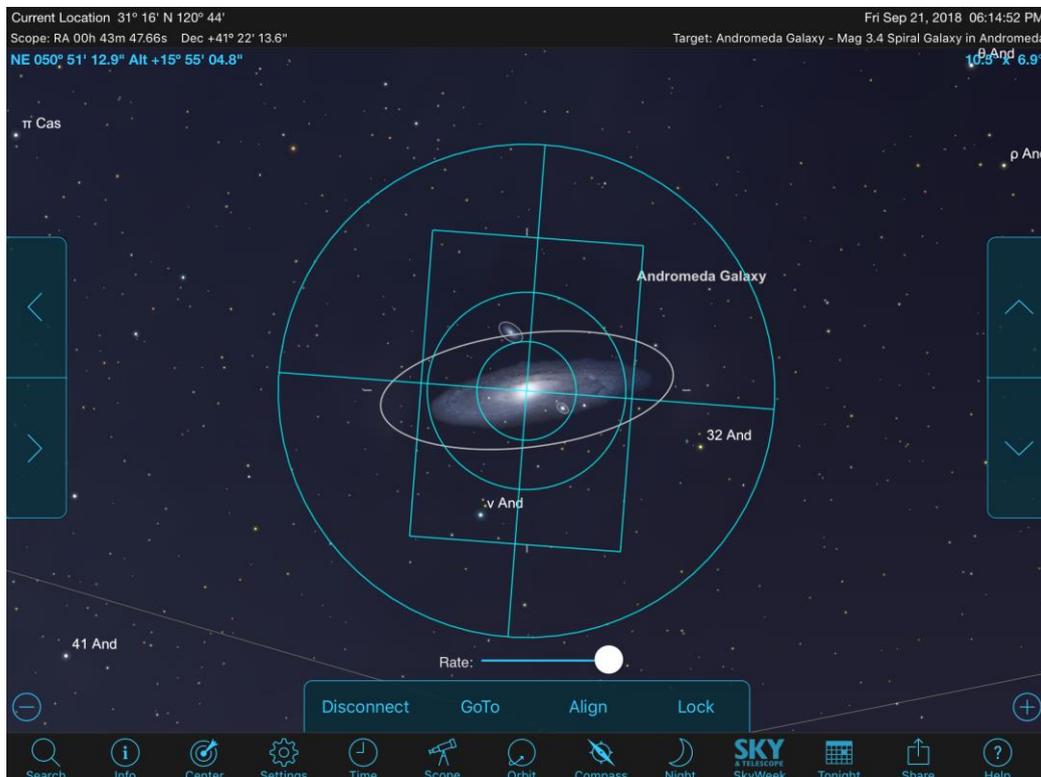
SkySafari connects to the ASIAIR via WiFi. The ASIAIR connects to the equatorial mount via serial cable or Ethernet. This allows SkySafari to fully control and operate the equatorial mount. ASIAIR is equivalent to a proxy server, IP is 10.0.0.1, port is 4030, under SkySafari. Select the corresponding equatorial model and type. (*Do not open Auto-Detect SkyFi. The IP and port defaults have been filled out.*) Click Done.

Note: Using the *SkySafari* App to control the equatorial mount does not require the opening of the equatorial mount in the ASIAIR App.



Click the connect button. After connecting to the mount, you can control the mount and GoTo.

Take M8 for example, choose the target and click GoTo.

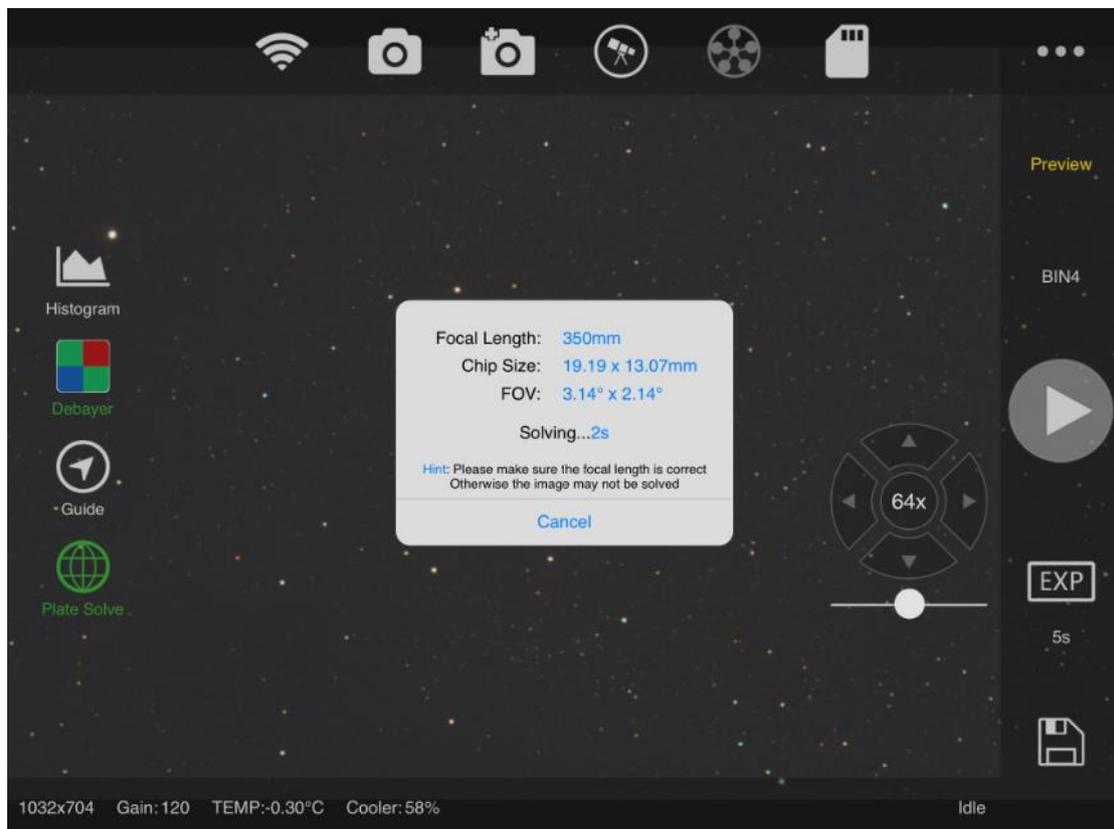


After the Equatorial finishes slewing to M8, switch to the ASI AIR Application to take a single preview image.

4.6 Plate Solving

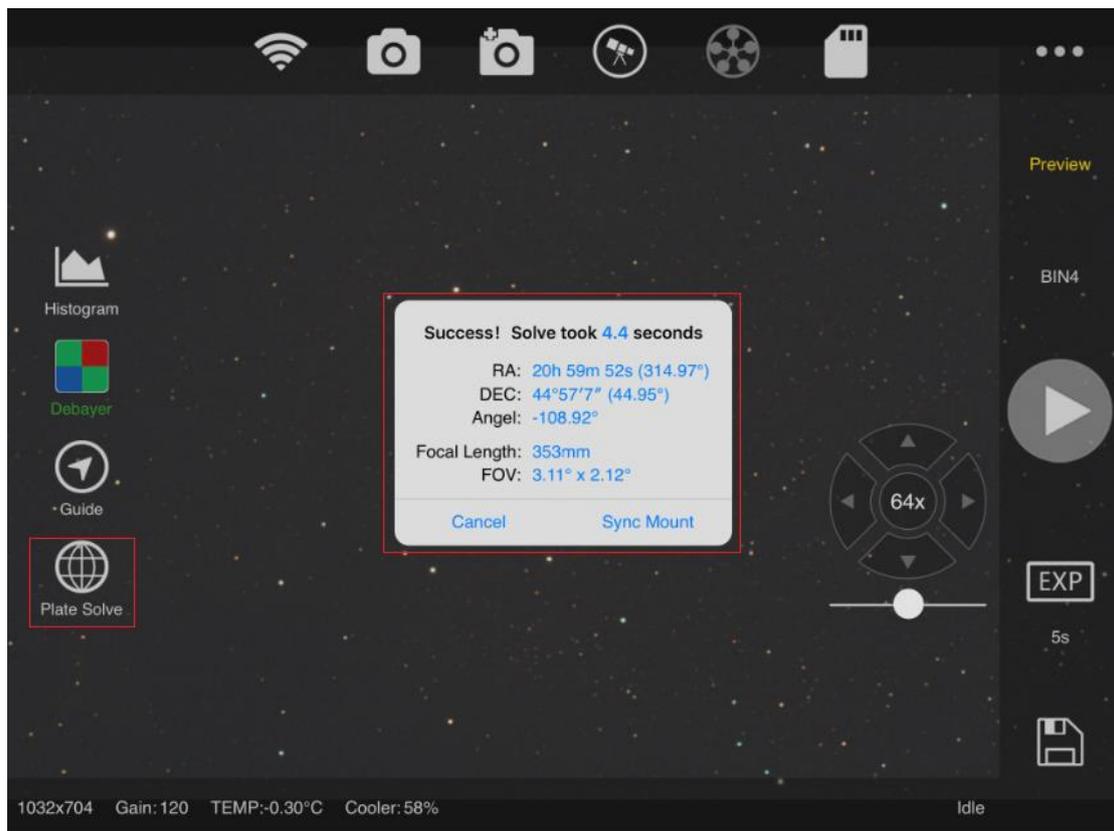
Because the equatorial mount itself and the polar axis have errors, usually the images we take after GoTo are not the targets we want to capture, especially with the wide range of GoTo. The function of the analysis is to obtain the correct coordinate position of the equatorial mount according to the image we have taken. After synchronizing to the equatorial mount, the correct position can be displayed in the SkySafari software. We can get the target correctly centered.

Click the plate solving button on the left, the current image will start to plate solve. At present, plate solving supports the image field of view from 0.4 degrees to 33 degrees. If this range is beyond the resolution, it cannot be resolved.



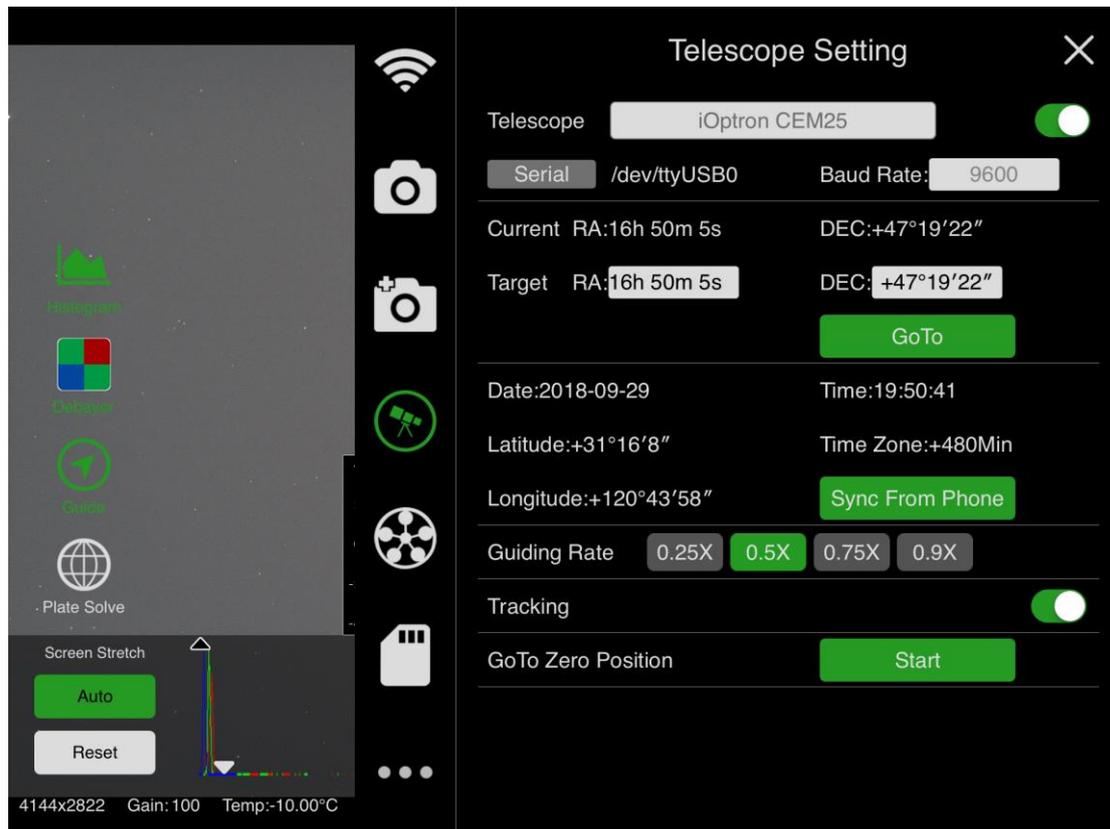
We recommend using 1s or 2s exposure, BIN4 (the highest BIN value supported by the camera), to capture the image to be plate solved, so the resolution is the fastest. It will take a few seconds to calculate the analysis results, if there is a cloud in the sky may affect the analysis speed and results. Too few of stars in narrow-band photography will also affect. Please try to extend the exposure time properly.

After the analysis is successful, you will get the coordinates of the current image in the sky and the real focal length of the main mirror. You can synchronize the coordinates to the equatorial mount. Ensure the equatorial mount is already open (refer to the next chapter) and re-enter SkySafari for GoTo. Enter the true focal length into the main camera settings interface, and the accurate focal length allows for faster resolution.



4.7 Setting up the equatorial mount

The sync function will be successful if the equatorial mount has been turned on and is properly connected. This chapter focuses on the equatorial setup. Click on the icon of the equatorial mount to enter the equatorial setup.



The ASIAIR controls the equatorial mount through the INDI protocol, so all equatorial mounts that support the INDI protocol are supported by ASIAIR. (<http://indilib.org/devices/telescopes.html>). Currently ASIAIR supports access via USB to serial cable or network. Equatorial mounts include: iOption, SkyWatcher (SyncScan & EqMod), Celestron, Losmandy, etc.

When SyncScan is connected, special care must be taken to accurately align the polar axis and a star alignment in advance, because its synchronization commands can only be implemented in a small range.

The current equatorial control supports the following features:

Serial/network switching of equatorial control mode: At present, the serial port will be automatically selected. After clicking the serial port, it will switch to the network, and input the IP address and port to identify the network control (please ensure that ASIAIR and controlled equatorial device are on the same network). You can adjust the Baud Rate of your mount.

Right ascension& declination information: The data of the right ascension obtained by the equatorial mount will automatically refresh every 5s if you stay at this interface (When guiding, it will not automatically refresh in order to prevent the intervention while guiding).

GoTo function, choose the target RA/DEC, goto the position directly.

Longitude, latitude, time, time zone information: Sync supported through mobile phone GPS information.

Guiding rate: The default setting is 0.5X. If the target star is not centered, you can try to increase the guiding speed.

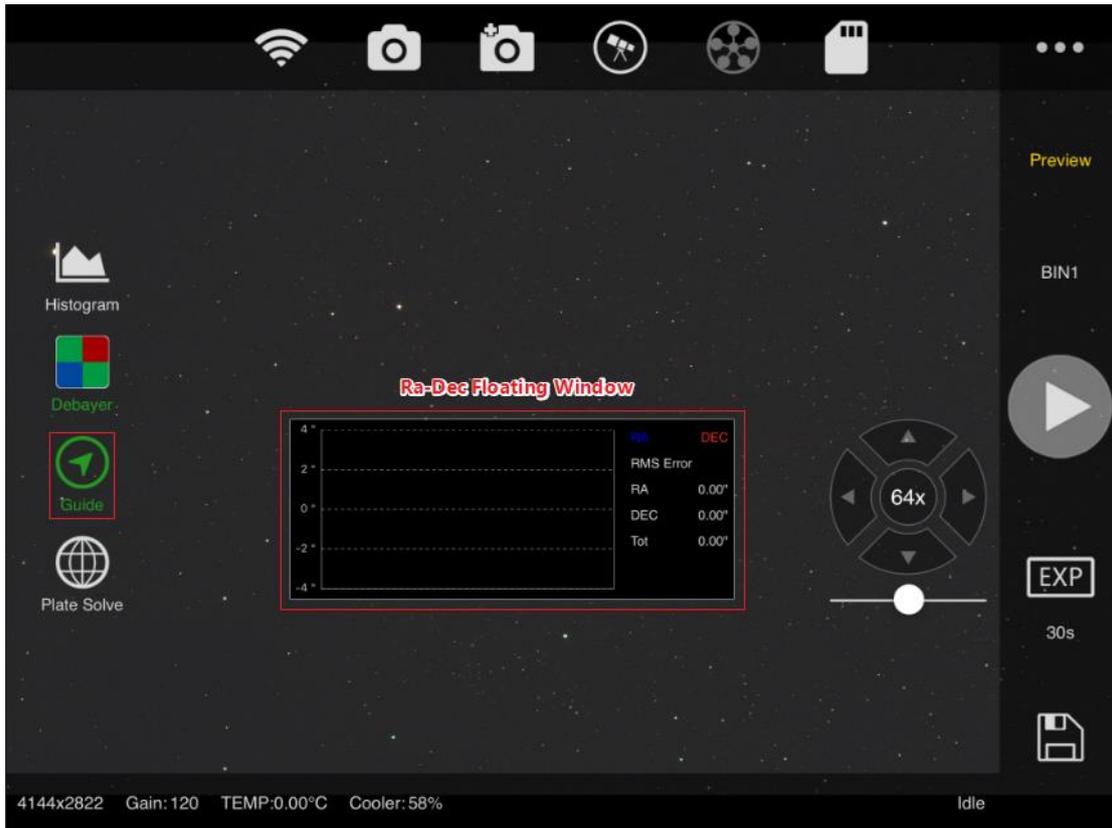
Tracking: Whether to enable tracking? When turned on, the equatorial mount will automatically enter the star speed tracking mode. Some equatorial mounts must be tracked to achieve equatorial coordinate synchronization, such as EQMOD.

4.8 Guiding

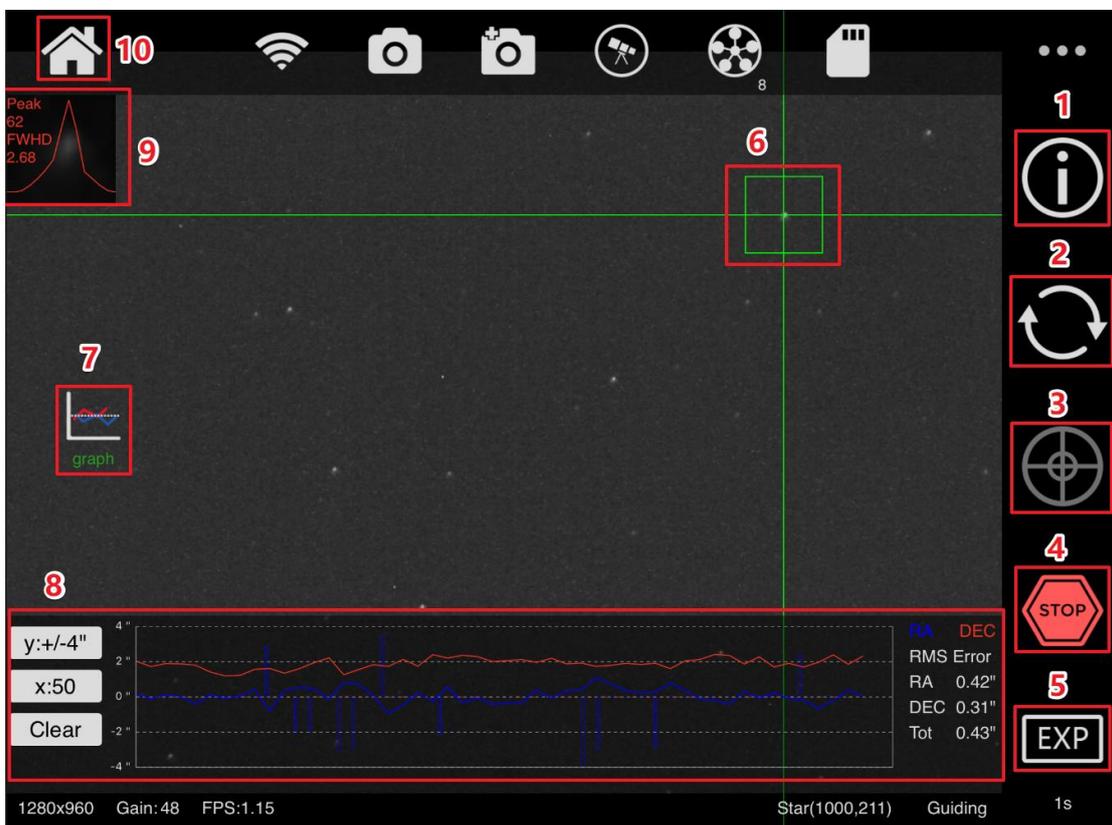
Now that we have synchronized the equatorial mount, the GoTo will be accurate. Next, start the guide camera capture.

Click the main interface guide star icon to pop up the guide star floating window. This window will display the current guiding curve, and you can drag it at will.

Click the floating window to enter the guiding interface.

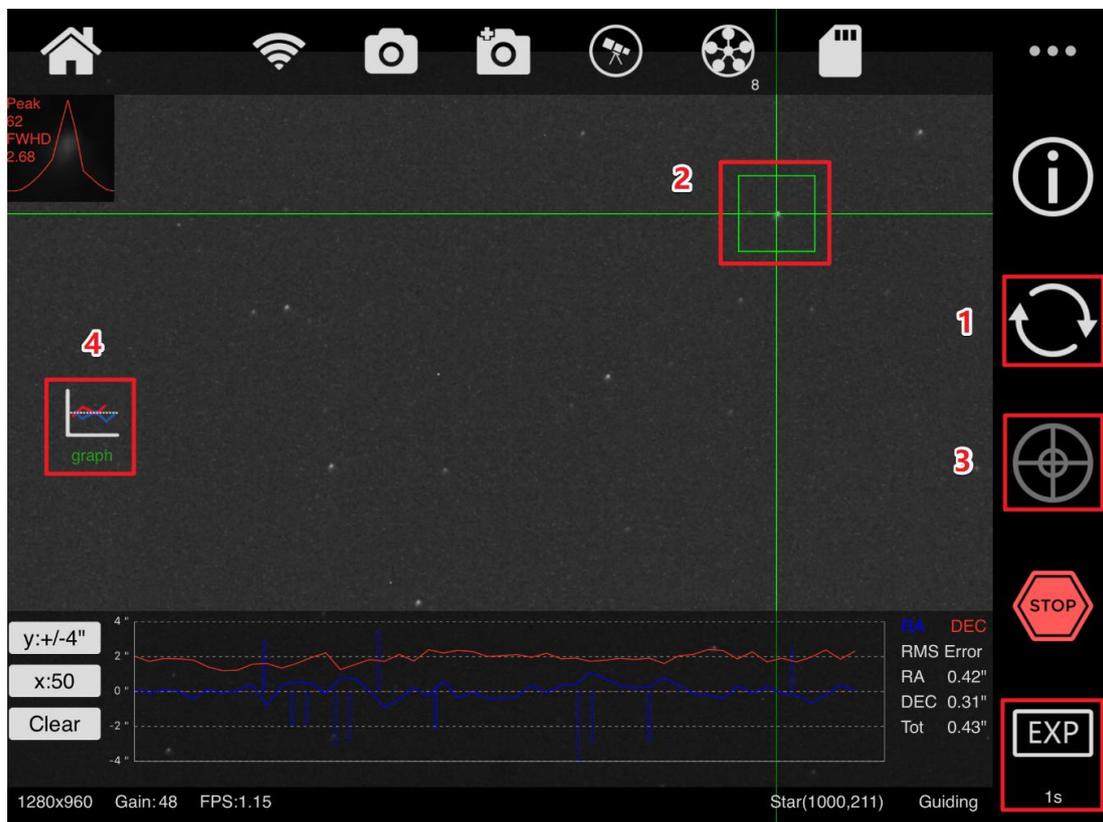


The guiding interface is shown below



The guiding interface is divided into 10 areas, which are:

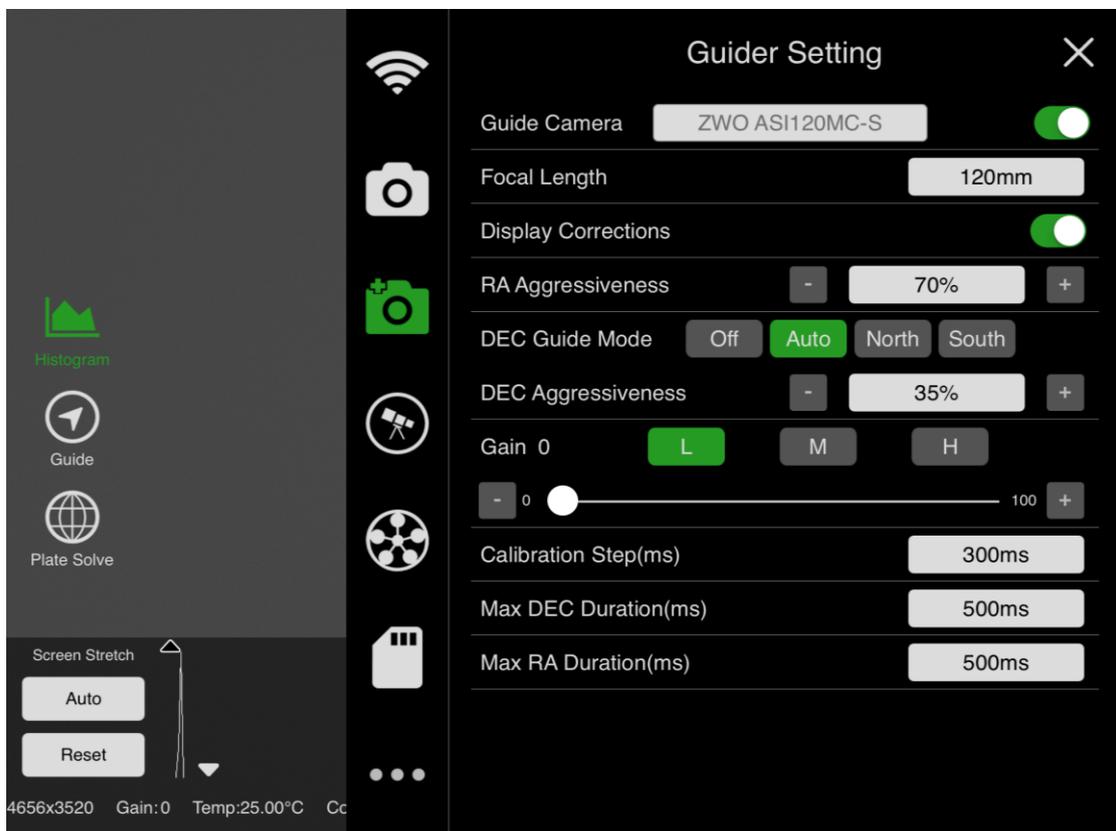
No.	Name	Function	Note
1	Calibration data	Recorded vector data for right ascension declination correction	After data is deleted, it needs to be recalibrated.
2	Image refresh	Preview image in real time	
3	Start guiding	Equatorial instrument begins guiding	calibration for the first time
4	Pause Guiding	Equatorial instrument stops guiding	
5	Exposure Setting	Set exposure time of the guiding camera	
6	Select star	automatically selected by default, or it can be selected manually.	
7	Graph switch	Turn the guide star graph on or off, function item 8	
8	Guding Curve	Display the curve of guiding	
9	FWHD info	Guiding star data	
10	Return	Back to main interface	



The normal operation steps of the guiding are as follows:

1. Set the exposure time (usually 1s or 2s) and gain (gain setting is in guide camera settings interface). Click the refresh button (1) to open the preview.
2. The guide camera will generally not focus, so you still need to adjust the guide camera focus.
3. Select a star point with the right brightness and click the calibration button (3).
4. The guide program begins to automatically calibrate, and shorter focal lengths may take longer to calibrate.
5. After the calibration is complete, the program will automatically start the guide star curve.

To get the optimal guide curve, we can do some advanced settings on the guide camera settings page. Click on the guide camera icon to enter the guide setting interface.



The guide settings include the following:

Telescope focal length: Inaccurate focal length will result in incorrect display of the guide star error.

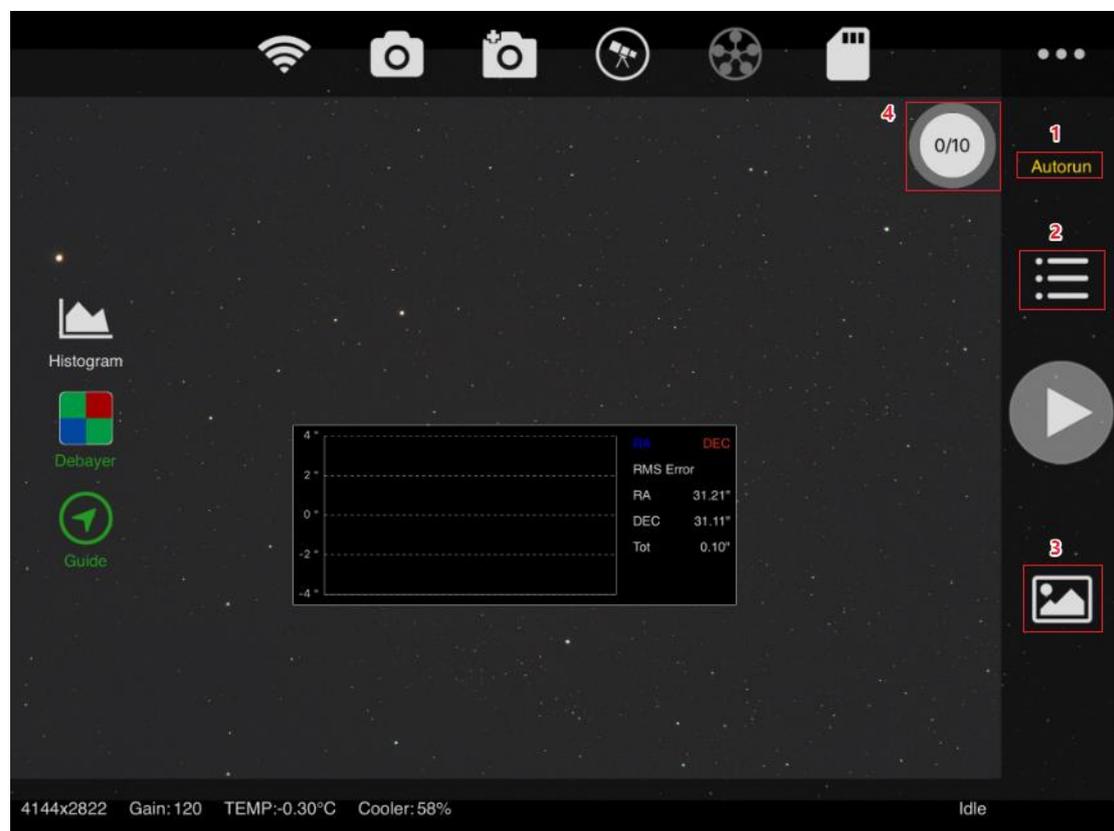
The direction of the declination guide star: Because the polar axis may not be accurate, it will only cause the declination to be biased in one direction, and the declination generally has a small idle motion. Therefore, this option is very effective, and the two-way is not necessarily better than the one-way.

Gain setting: We recommend using "medium gain" for the guiding camera

Calibration duration: The maximum duration of the RA and DEC single calibration actions. If the guide star is not in place, try increasing this value. If the guide curve is too oscillating, try reducing this value.

4.9 Autorun

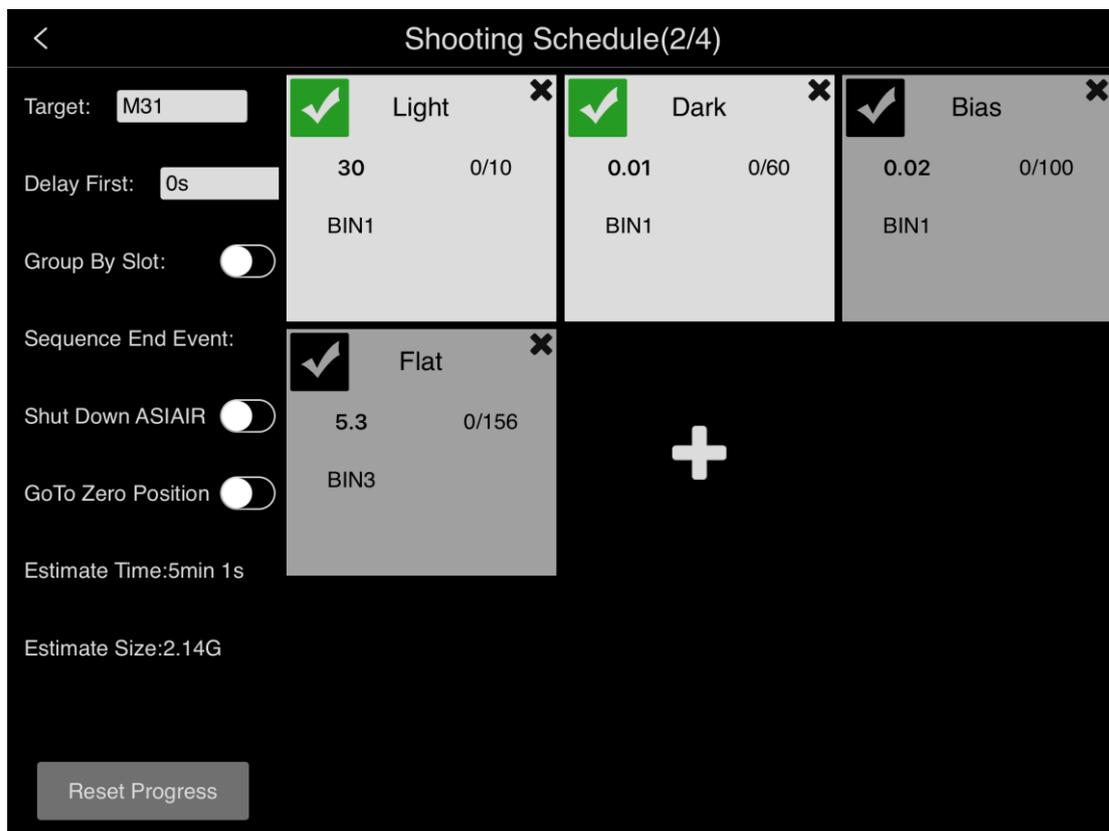
The ASIAIR will continue to capture and guide, even when you turn off your phone or tablet.



Select Autorun (1) to enter the Autorun shooting interface. Click (2) to enter the

capture plan page to add or delete the shooting sequence. Click the start button to start scheduled shooting.

Click the image button (3) to view the captured images. These image files are stored in the ASIAIR SD card, you can delete them in full, select batch delete, or delete singles. The status icon (4) shows the status of the scheduled execution.



In addition to adding or deleting the shooting sequence, Autorun interface has some parameter settings:

No.	Name	Function	Note
1	Target	Part of image file name	Convenient to identify
2	Delay First	Back to main interface for sequence	
3	Group by Slot	One completed, keep going for next sequence	
4	Shut Down ASIAIR	Turn off the ASIAIR or not after imaging	
5	GoTo Zero Position	The mount back to zero position or not after sequence	
6	Estimated time	Estimated time of whole imaging	Help you check the feasibility of setting up the sequence
7	Estimated size	The disk space required to store all images	

4.10 Transferring the images

After the shooting is complete, the captured pictures will be saved to the ASIAIR SD card. We provide three ways to copy the pictures to the computer (under Windows, Mac and Linux systems are slightly different):

1 Using the supplied SD card reader

During the operation of this method, pay attention to the front and back of the SD card. The detailed steps are:

A Unplug the SD card from ASIAIR, insert the card reader, and then insert the card reader into the computer USB interface;

B Open the resource manager (usually my computer) and enter the BOOT partition;

C Double-click to enter the Image folder and copy the image file you want to capture. Please do not delete any other files under the boot partition.

2 Using the ASIAIR WiFi wireless network (recommended)

This method requires a laptop or a desktop computer with a wireless network card. The detailed steps are:

A In the wireless connection of the computer, select your ASIAIR SSID to connect.

B Open the Explorer, type [\ASIAIR](#) in the address bar, and press Enter to access it.

C Select the Image folder in the open directory and copy the image file you want to capture (cannot be deleted).

3 Using a wired network

This method is suitable for desktop computers without a wireless network card.

The detailed steps are as follows:

A Connect the ASIAIR and your computer to the same LAN through the network cable.

B Open the Explorer, type [\ASIAIR](#) in the address bar, and press Enter to access it.

C Select the Image folder in the open directory and copy the image file you want to transfer.

5 Backing up and restoring the SD card

5.1 Windows

1 ASIAIR file system backup

A Download, install and run the latest version of [Win32 Disk Imager](#).

B Remove the SD card from ASIAIR, insert it into the card reader, and plug the card reader into the computer USB port.

C On the Win32 Disk Imager software interface, click the folder icon () , select the path to save image file. Please make sure the path is on your computer and it has at least 30GB of free disk space. Name the image file ***ASIAIR_backup_20180810.img***.

D Under the Device label, select the BOOT partition. Normally the driver letter is: [E:].

E Click the Read button () to start. This operation usually takes 15-20 mins.

Note: The partition of SD card under Windows 10 is slightly different, so you only need to back up the BOOT partition.

5.2 ASIAIR system restore

When ASIAIR cannot be started due to an SD card failure, you need to restore the img file which was backed up in the previous step to your new SD card. The steps are as follows:

A Download, install and run the latest version of Win32 Disk Imager (If you've already Installed it, please skip this step).

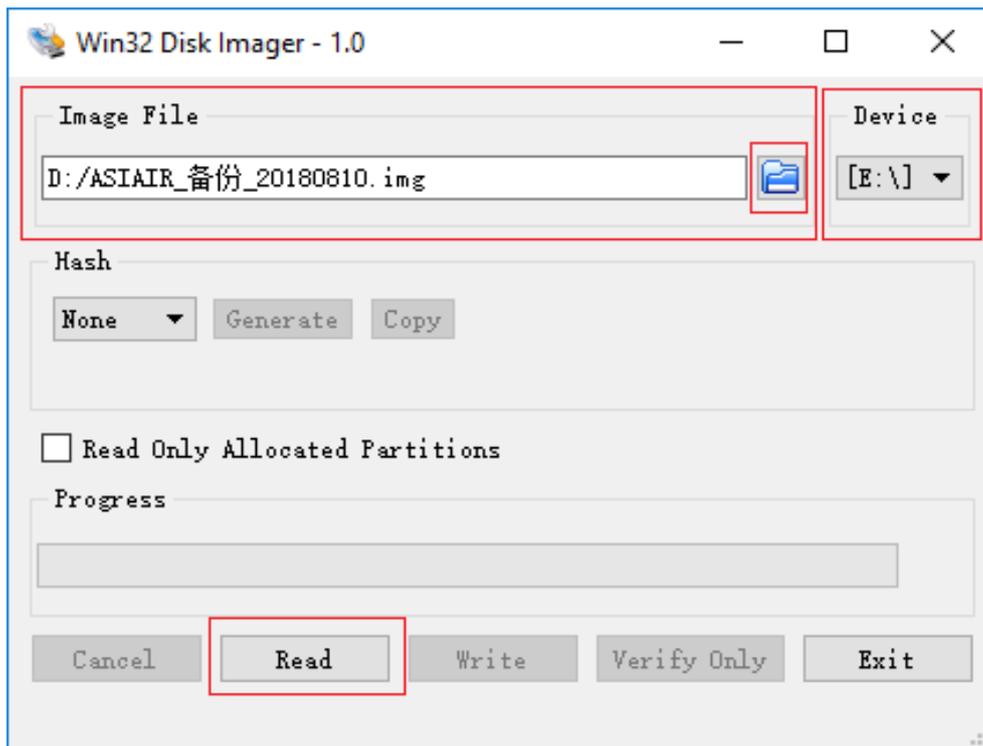
B Insert a new SD card (32G) into the card reader, then plug the card reader into the computer USB port.

C In the Win32 Disk Imager software interface, click the folder icon () to select the image file that has been backed up.

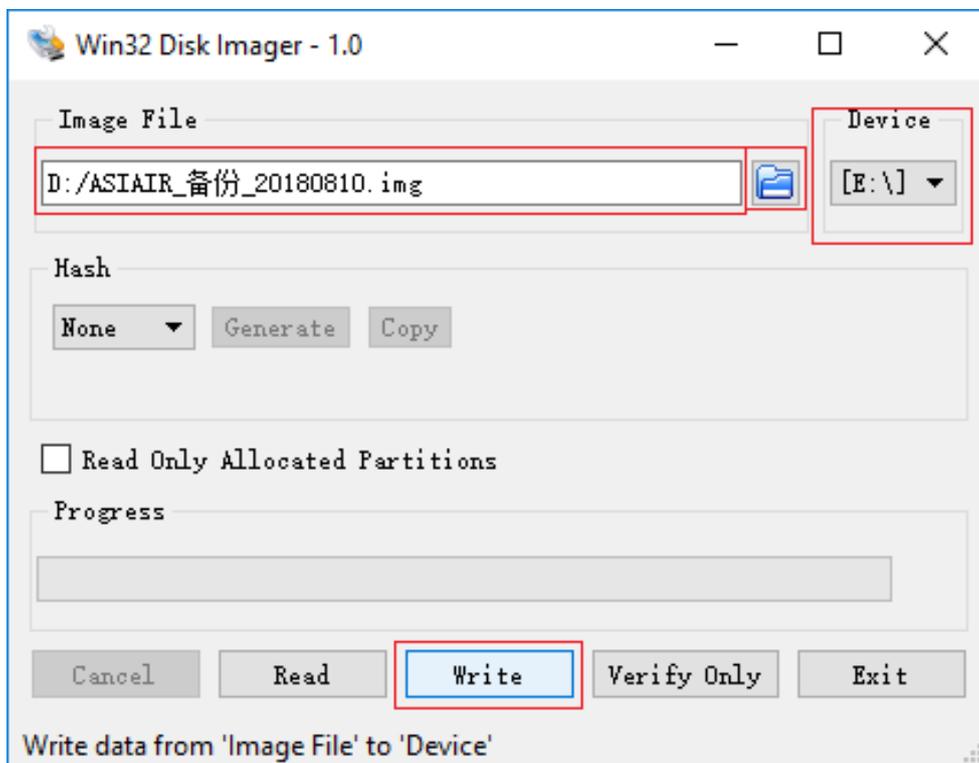
D Under the Device label of the Win32 Disk Imager software interface, select the SD card drive letter.

E Click the Write button () to start. This operation usually takes 30-40 mins.

Note: After the restore has finished, insert the SD card into ASIAIR and restart. You should be ready to image! Reference screenshots for WIN32 Disk Imager.



Backup of ASIAIR SD Card



Restore of ASIAIR SD Card

5.2 Mac

It is recommended to use Apple [Pi-Baker](#) for ASIAIR system backup and restore. The operating guide is included on this download page and is easy to complete.

5.3 Linux

Backup and restore under Linux system, you can use the "dd" command. You can also use the GUI tool [Etcher](#) when restoring.

6 Warranty and Return Policy

We provide 2-year warranty for our products.

We will offer the repair service for free or replace the item for free if the camera does not work properly within the warranty period. After the warranty period, we will continue to provide repair support and service on a charged basis.

This warranty does not apply to damage that occurred because of abuse or misuse, or damage caused by a fall, or any other accidental failures after purchase.

The customer must pay for shipping when shipping the camera back for repair or replacement.

If you get a faulty camera, please contact us as soon as possible through email: info@zwoptical.com. Please describe the problem in detail, and we will do our best to solve the problem. Most instances are perceived problems which are caused by a bad driver install or software configuration.

For customers who bought the camera from our dealer, the dealer is responsible for the customer service.