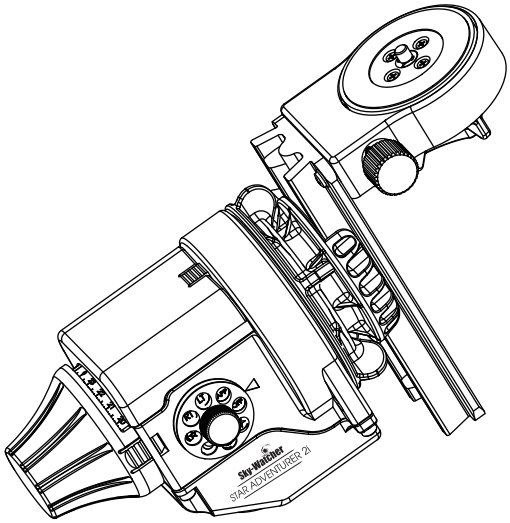
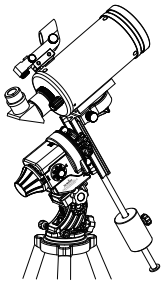
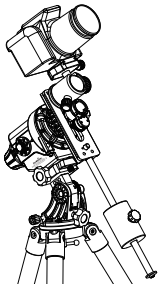
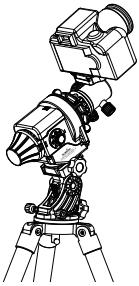
INSTRUCTION MANUAL

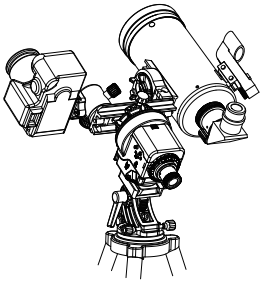
Star Adventurer 2i











200430V1

Thank you for purchasing this Sky-Watcher product

Sky-Watcher Star Adventurer 2i is user-friendly and provides various combinations to satisfy all your needs for astrophotography and time-lapse photography. It is a high precision, portable and stable celestial tracking platform for sidereal, solar, lunar tracking or other customized speeds with automatic DSLR shutter release control. It also support unguided dithering option for easily removing hot pixels, cold pixels and even satellite/ airplane trails and may also improve pattern noise problem during the stacking process. Moreover, its built-in **Wi-Fi** allows users to easily customize their favorite settings through free **Star Adventurer mini Console** App both for Android and iOS platforms. All the customized parameters will be stored in preprogrammed functions selected by friendly **Mode Dial** which allows you to use your favorite settings without initiating the **Wi-Fi** communication.

For your Safety

To prevent damage to your Sky-Watcher product or injury to yourself or to others, read the following safety precautions entirely before using this equipment. Keep these safety instructions available to all users of the product.

To prevent possible injury, pay special attention to all warnings before using this **Sky-Watcher** product.

WARNING:

- **Do not look at the Sun through the Polar Scope.** Viewing the Sun or other strong light sources through the Polar Scope could cause permanent visual impairment
- **Do not use in the presence of flammable gas.** Do not use electronic equipment in the presence of flammable gas, as this could result in explosion or fire
- **Keep out of reach of children.** Failure to do so could result in injury. Moreover, note that small parts constitute a choking hazard. Consult a physician immediately when a child swallows any part of this equipment
- **Do not disassemble.** Touching the product's internal parts could result in injury. In the event of malfunction, remove the batteries and take the product to a Sky-Watcher authorized service center

Notice

- Sky-Watcher reserves the right to change the specification of the hardware and software described in this manual at any time and without prior notice.
- Sky-Watcher cannot be held liable for any damage resulting from inappropriate use of this product.
- While every effort has been made to ensure that the information in this manual is accurate and complete, we greatly appreciate if you find any errors, to report them to Sky-Watcher.1

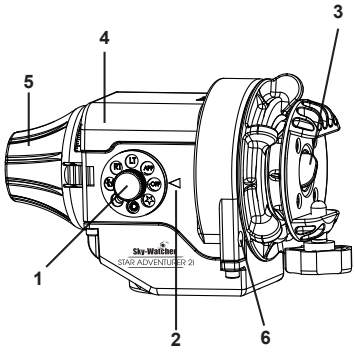
CONTENT

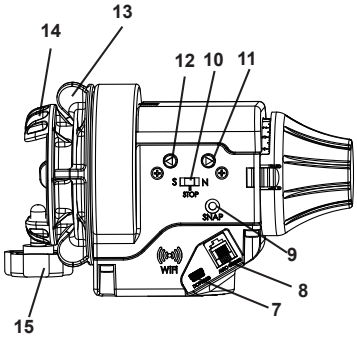
Features:

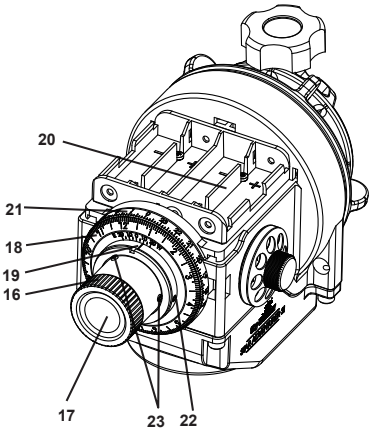
- High precision, portable and stable celestial tracking system
- Built-in Wi-Fi with free App for Android and iOS platforms
- Multi-language support
- Solar, lunar, sidereal and customized tracking speeds for astrophotography
- Supports unguided dithering option for easily removing hot/cold pixels
- Maximum payload up to 5 kg (11 lb)
- Supports star-scape photography
- Supports standard short exposure time-lapse photography
- Supports long exposure time-lapse photography
- User-friendly Mode Dial with preprogrammed functions
- Built-in Polar Scope with illuminator for precise polar alignment
- Provides DSLR shutter control for multiple brands
- Lifetime free firmware upgrade
- Supports single axis auto-guiding
- Built-in motor protection and status indication
- Uses AAx4 batteries
- Supports external USB power
- Low power consumption
- Fits standard 3/8 and 1/4 inch tripod/quick release brackets
- Expandable with a range of optional accessories

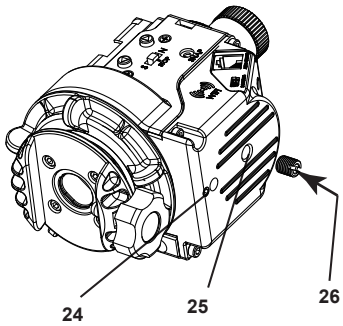
Introduction:

The Sky-Watcher Star Adventurer 2i Body





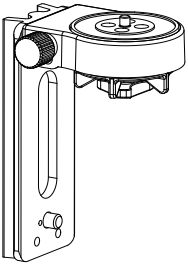




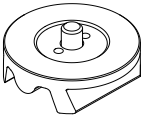
1:Mode Dial
2:Mode Index
3:Polar Scope Cap
4:Battery Case Cover
5:Polar Scope Cover
6:Quick Polaris Finder
7:Mini USB Port
8:RJ-12 6-pins Auto-guider Interface
9:DSLR Shutter Control Port
10:3-Position Slide Switch
11:Right Button and LED Indication
12:Left Button and LED Indication
13:Clutch Knob
14:Mounting Platform
15:Locking Knob
16:Knurled Ring of Polar Scope
17:Polar Scope
18:Date Graduation Circle
19:Time Meridian Indicator
20:AAx4 Battery Case
21:Time Graduation Circle
22:Time Meridian Indicator Calibration Screw
23:Polar Scope Calibration Screw
24:Worm Gear Meshing Adjustment Screw
25:Socket for 3/8" Thread Screw
26:1/4” to 3/8” Convert Screw Adapter

The Optional Accessories: (The default included accessories may vary. Please refer to local dealers for details).

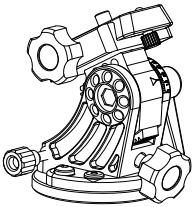
Polar Scope Illuminator - To provide lighting source for **Polar Scope.** Also compatible with **Sky-Watcher EQ3, EQ5** and **EQ8**.



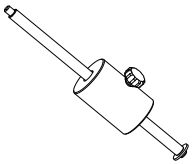
Fine-Tuning Mounting Assembly - To mount a telescope with ¼" thread screw on the **Star Adventurer 2i**. Allows pointing and fine-tuning pointing in two directions.



3/8" Ball Head Adapter - To mount a standard camera ball-head with 3/8" thread screw on the **Star Adventurer 2i.**

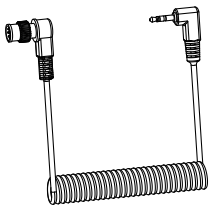


Equatorial Wedge - To adjust the latitude of the **Star Adventurer 2i** for polar alignment. Offers higher accuracy and stability than a standard photo tripod head.



Counterweight - To balance the telescope or camera loading with 1kg counterweight.

1/4" to 3/8" Convert Screw Adapter - To convert the default socket for 3/8" thread screw to the socket for 1/4" thread screw in order to mount the **Star Adventurer 2i** to a standard quick release plate of the tripod with 1/4" thread screw.

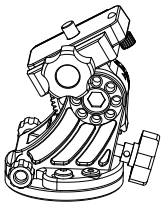


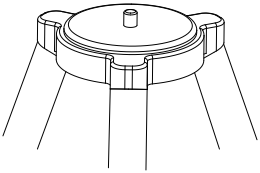
DSLR Shutter Control Cable - To connect the **DSLR Shutter Control Port** of **Star Adventurer 2i** to your DSLR's external shutter control port. This allows **Star Adventurer 2i** to directly control the DSLR's shutter release with preprogrammed shutter interval. You can order an optional cable for your camera from your local resellers. The Following list shows the cables that we offer as optional items.

Sky-Watcher Cable model	Camera interface	Compatible Remote controller interface	Compatible Camera
AP-R1C (CANON C1)	Canon remote control terminal (E3 type)	Canon RS-60E3	Canon EOS 100D, 300D/350D, 400D/450D, 500D/550D, 600D/650D, 700D, 60D/60Da, 70D
AP-R3C (CANON C3)	Canon remote control terminal (N3 type)	Canon RS-80N3, TC-80N3	Canon EOS 5D/6D/7D, 10D/20D/30D/40D/50D, 1V, 1D, 1Ds Mark III, 5D Mark III
AP-R1N (NIKON N1)	Nikon Ten-pin remote terminal	Nikon MC-22, MC-30, MC-36	Nikon D1/D2/D3/D4 D200/D300/D700/D800
AP-R2N (NIKON N2)	Nikon Remote cord connector	Nikon MC-DC1	Nikon D70S, D80
AP-R3N (NIKON N3)	Nikon Accessory terminal	Nikon MC-DC2	Nikon D90, D600, D3000/D3100/D3200/D3300, D5000/D5100/D5200/D5300, D7000/D7100
AP-R1S (SONY S1)	Sony REMOTE terminal	Sony RM-S1AM, RM-L1AM	Sony a100, a200, a300, a350, a450, a550, a560, a700, a850, a900
AP-R3L (OLYMPUS OP12)	Olympus Multi-connector	RM-UC1	Olympus E-P1/E-P2, E-PL2/E-PL3, E510/E520/ E550/E620, E400/ E410/E420, SP-570UZ/SP-590UZ

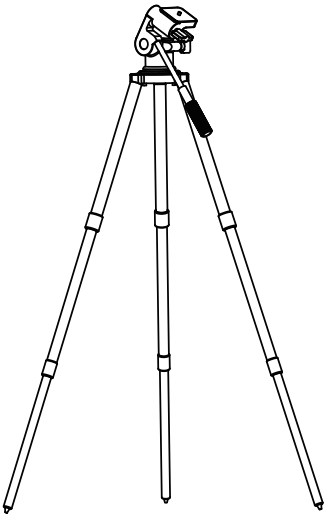
Preparation :

Setup Tripod:





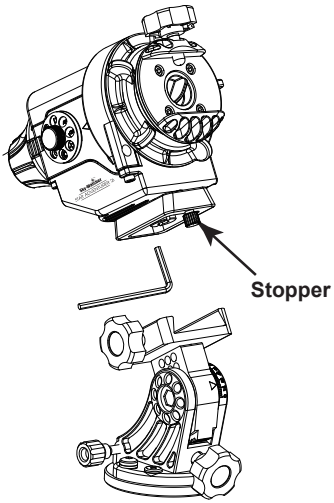
Without Tilt-head: take a standard photo tripod or video tripod with a 3/8” connection screw. Spread the legs and secure the tripod legs at the desired height to provide a stable support for your **Star Adventuer 2i.** Assemble **Equatorial Wedge** to the tripod as Fig 1.

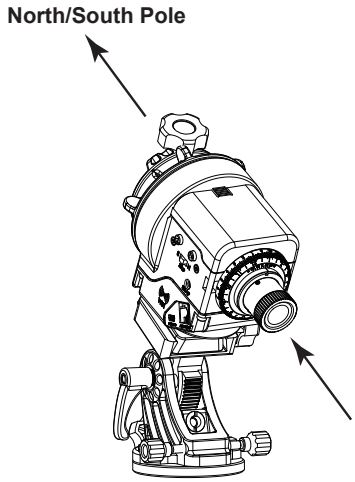


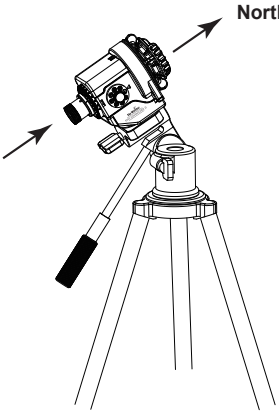
With Tilt-head/Ball-head: Take a standard photo tripod or video tripod with Tilt-head or Ball-head. Spread the legs and secure the tripod legs at the desired height to provide a stable support for your **Star Adventurer 2i** as Fig 2.

Mount Star Adventurer 2i:

With Equatorial Wedge: Make sure the **1/4" to 3/8" Convert Screw Adapter** is not in the 3/8" threaded socket at the bottom side of the **Star Adventurer 2i.** If it is, use a Slot Screwdriver to remove it. Mount the **Star Adventurer 2i** on the (optional) Equatorial Wedge (Fig 3). Make sure the Stopper is facing forward. Then point the **Polar Scope** to the direction of the North Pole (For Northern Hemisphere observing) or South Pole (For Southern Hemisphere observing) (Fig 4). Lastly, complete the Polar Alignment process (Please see **Polar Alignment** session for reference).







With Tilt-head/ Ball-head: Make sure the **1/4" to 3/8" Convert Screw Adapter** is in the 3/8" threaded socket at the bottom of the **Star Adventurer 2i**. If it is not, use an Slot Screwdriver to install it. Mount the **Star Adventurer 2i** to the quick release plate on the tripod. Then point the **Polar Scope** to the direction of the North Pole (For Northern Hemisphere observing) or South Pole (For Southern Hemisphere observing) (Fig 5). Then complete the polar alignment process (Please see **Polar Alignment** session for reference).

Please DO NOT move the tripod or change the angle of Equatorial Wedge or tilt-head in order to keep the polar alignment. IF you did, please redo the polar alignment process.

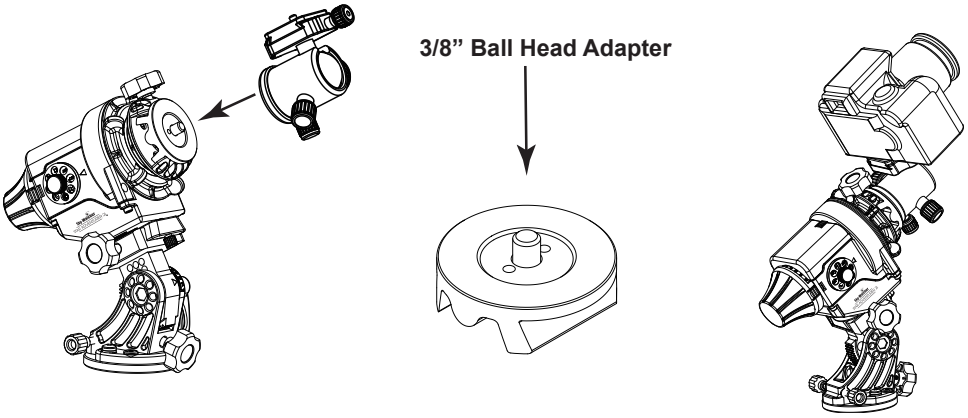
Mount The Imaging Equipment:

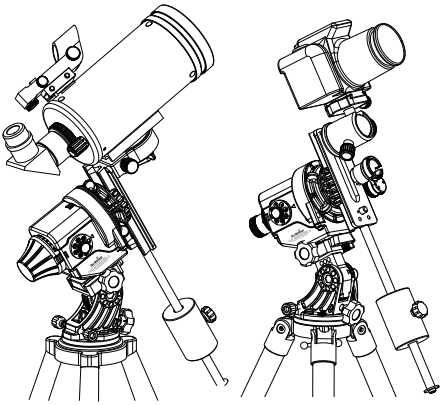
Now you can mount your imaging equipment according to your need, including the **Shutter Control Cable,** as the following figures show. You can contact **Sky-Watcher** authorized dealers to acquire the optional accessories as needed. During mounting, please DO NOT move the tripod or change the angle of the **Equatorial Wedge** or tilt-head in order to keep the polar alignment.

For Astrophotography:

Star Adventurer 2i +3/8" Ball Head Adapter + Ball head + Camera + Shutter Control Cable:

Note: Make sure the locking bolt of the **Mounting Platform** has locked on the indentation on the side of the **3/8" Ball Head Adapter** for better locking and support.



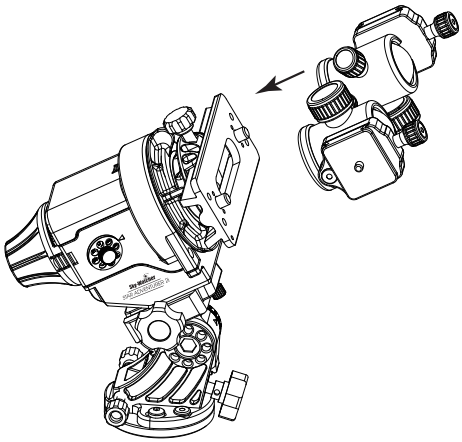


Star Adventurer 2i + Fine-Tuning Mounting Assembly + Polar Scope Illuminator + 1kg Counterweight + Telescope

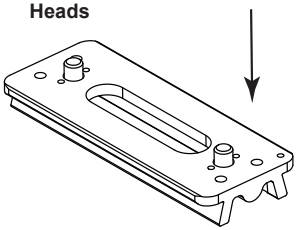
Or

Star Adventurer 2i + Fine-Tuning Mounting Assembly + Polar Scope Illuminator Camera + Ball Head + Shutter Control Cable + 1kg Counterweight

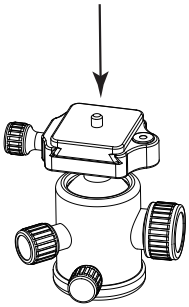
Star Adventurer 2i + Dovetail + Dual Ball Heads +Dual Cameras + Shutter Control Cable:

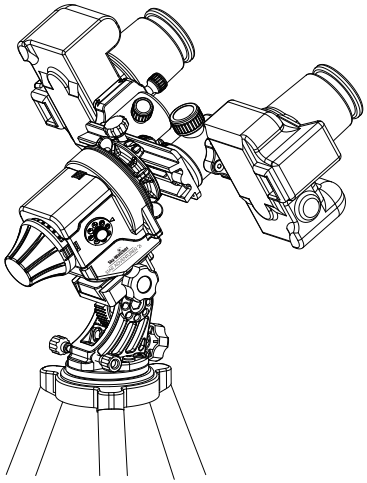


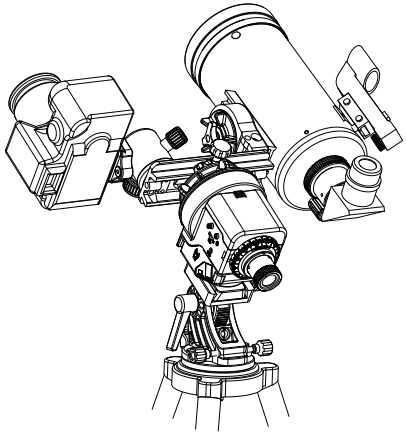
Take the Dovetail from the Fine-Tuning Mounting Assembly to mount two Ball Heads



Ball Head





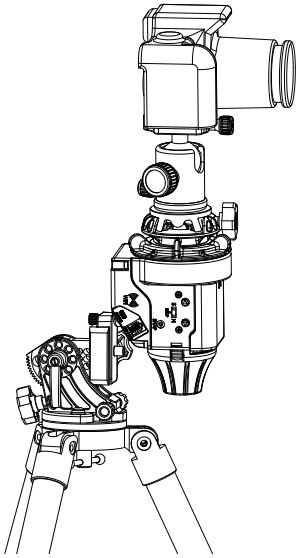


Star Adventurer 2i + Fine-Tuning Mounting Assembly + Ball-Head + Camera+ Telescope (+ Auto-guider):

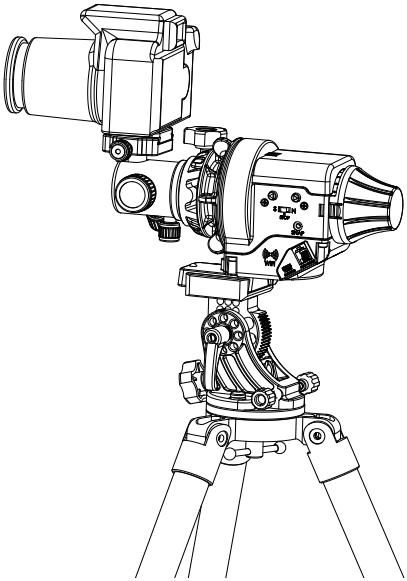
For Time-Lapse Photography:

(For reference only: you can assemble very different configurations to create more interesting time-lapse photography)

Horizontal Rotation Time-Lapse Photography:

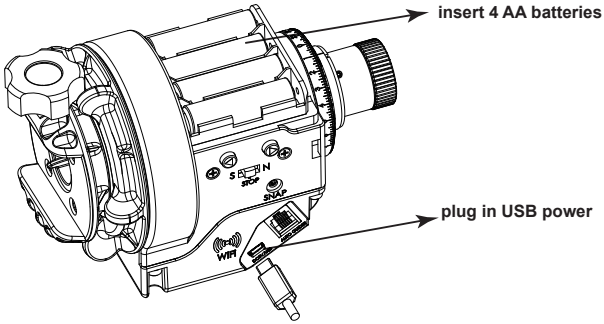


Vertical Rotation Time-Lapse Photography:



Provide Power Source:

Star Adventurer 2i allows two power source options. One is inserting 4 AA type batteries; the other is providing DC 5V through USB port (type mini-B).



Start Using Star Adventurer 2i

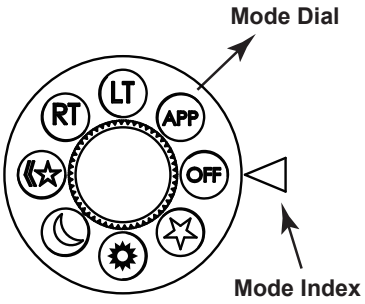
Overview:

Star Adventurer 2i is the next generation of **Star Adventurer.** It's a compact and versatile camera tracking platform that lets you make truly unique photographs and time-lapse videos. While keeping previous high-accuracy tracking and the friendly **Mode Dial** with preprogrammed functions, it also adds Wi-Fi capability to allow users easily configure their favorite photographic settings through free **Star Adventurer mini Console** App. Besides previous **Astrophotography** and **Regular-Exposure Time-lapse** modes, It also adds **Long-Exposure Time-lapse** and patented **Astro Time-lapse.** Moreover, It supports unguided dithering option in Astrophotography mode for easily removing hot/cold pixels, satellite/airplane trails and may also improve pattern noise problem during the stacking process.

Star Adventurer 2i has a fully App controlled mode (**APP**) and six preprogrammed function modes (★ , ✹ , ☾ , ☆⟫ , **RT** and **LT**). The **APP** mode let users fully control Wi-Fi settings and photographic settings including exposure time, frame period, number of pictures taken, tracking speed, dithering range and swing range through Wi-Fi and **Star Adventurer mini Console** App. All the successful executed settings in **APP** mode will be stored into corresponding preprogrammed function modes. Next time users can directly select any of the six preprogrammed function modes without initiating the Wi-Fi communication. **Star Adventurer 2i** will automatically execute the corresponding preprogrammed function with customized settings.

Following is the basic description. For more details, please read each section carefully to understand how to control **Star Adventurer 2i** using the free control app or the preprogrammed function modes.

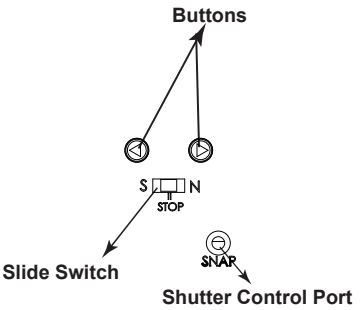
Mode Dial : For power control and mode selection. While powering off the **Star Adventurer 2i** , please wait until LEDs completely off



Mode Dial	Functional Description
OFF	Turn off Power
★	Astrophotography mode with celestial tracking
✹	Astrophotography mode with solar tracking
☾	Astrophotography mode with lunar tracking
☆⟫	Astro Time-lapse mode
RT	Regular-Exposure Time-lapse mode
LT	Long-Exposure Time-lapse mode
APP	Star Adventurer mini Console App mode

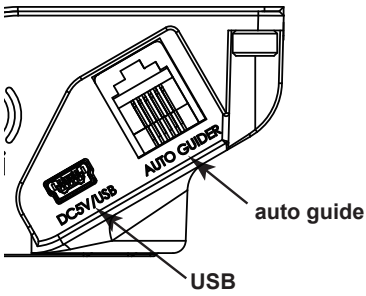
3-Position Slide Switch: For selection of rotation direction in six preprogrammed function modes (★ , ✵ , ☾ , ☆ , **RT** and **LT**). This function has no effect in **APP** mode.

Buttons: The Right / Left buttons are used for rotating in higher speed (about 12X celestial tracking speed) in six preprogrammed function modes (★ , ✵ , ☾ , ☆ , **RT** and **LT**) . **The slewing function has no effect in APP mode.** In **APP** mode, buttons are ONLY used to **enable Wi-Fi** if it is disabled .



Snap : This is a 2.5mm 3-segment stereo jack for connecting to a camera's shutter control port to control camera shutter interval.

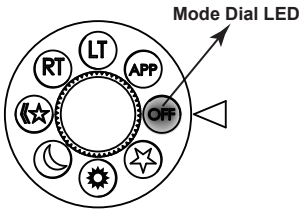
Auto-Guider: Star Adventurer 2i also contains auto-guiding interface to accept single axis (RA axis) auto-guiding signal to provide more accurate celestial tracking for better quality of astrophotography. The RJ-12 6-pin outlet is for connecting an auto-guider. It is compatible with any auto-guider with a ST-4 type interface. This function only works in Astrophotography Mode with Dithering disabled and the tracking speed is not faster than 2 times of sidereal speed. For other modes, the auto-guiding signal has no effect.



USB Port: Star Adventurer 2i contains a USB port (Type Mini-B) to support external USB power and to support control commands for firmware upgrade or App control. For firmware upgrade, please refer to "**Appendix Ⅴ :Firmware Upgrade procedure** " for details For APP control please refer to " **Using Star Adventurer mini Console in APP mode**" for details.

LED Status Indicators

Mode Dial LED:



Mode Dial LED Off: The Power is Off.

Mode Dial LED Solid On: Power is on and system is normal.

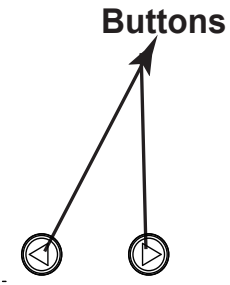
Mode Dial LED Slow Blink: Low Battery Level. The red LED blinks 2 times per second when the battery level is lower than 4.6V, or USB power is lower than 4.4V.

Mode Dial LEDs Fast Blink: The red LED blinks 3 times per second to indicate motor speed errors exceeding 5% and/or motor stalls that last over 5 seconds. Speed errors can be caused by overloading the mount and by low battery levels. To correct a speed error reduce the load or supply new batteries. Motor stalls are usually due to obstructions of the mount so that it cannot rotate. In the case of motor stalls, remove the cause of the block then restart your task.

Button LEDs:

For six preprogrammed function modes (★ , ☼ , ☾ , ☆⟫ , **RT** and **LT**):

Button LEDs Solid On: Motor status is normal



For APP mode:

Button LEDs Off: Wi-Fi is turned off.

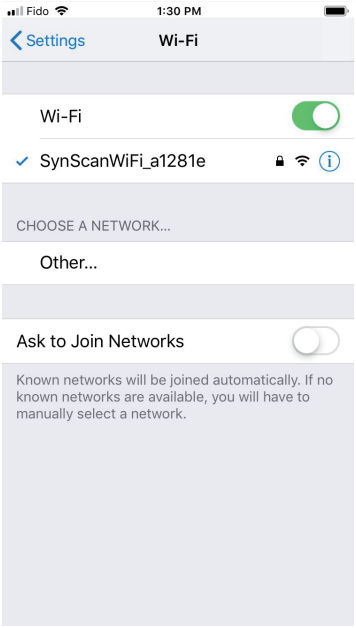
Button LEDs Blinking: Wi-Fi is activated and ready for connection.

Button LEDs Solid On: Wi-Fi is connected and **Star Adventurer mini Console** is connected and running

Both of Mode Dial LED and Button LEDs Repeatedly Blink 3 times: Indicate the Star Adventurer 2i is ready for firmware update or firmware update is in progress.

Now is time to learn more about Star Adventurer 2i in each of following sections.

Basic Operations in APP mode:



Installing the Star Adventurer mini console:
The **Star Adventurer mini Console** is available at the Android “Play Store” for your Android device and at the “App Store” for your iOS device. Go to your particular store, search for “**Star Adventurer mini Console**”, then download and install. The app performs the same way for both operating systems. Detailed use of the app is provided in the relevant sections.

Turn on Wi-Fi: Turn **Mode Dial** to **APP** mode to enable Wi-Fi and allow device to accept commands from App.

Connect to Wi-Fi: Once Wi-Fi is activated and ready for connection, go to the “**Settings > Wi-Fi**” for your phone, then search for and join the Wi-Fi access point “SynScanWiFi_xxxxxx”

Start the Star Adventurer mini Console: Once Wi-Fi is connected you can run the **Star Adventurer mini Console** to access its many features. See specific details in the relevant sections

Turn Off Wi-Fi : Turn **Mode Dial** to any mode other than **APP** mode will disable the Wi-Fi

Reconnecting the Wi-Fi: Built-in Wi-Fi may be disabled due to timeout or after task started according to users' setting. Timeout happens when the Wi-Fi traffic is absent for certain period. The default timeout is disabled but you can set it to other values using the **Star Adventurer mini Console**. The Wi-Fi may also be disabled after the task started when user enable the "**Wi-Fi Off on Run**". To resume Wi-Fi, press the **Right/Left Button** briefly until the **Button LEDs** starting flashing. Re-connect to Wi-Fi as described above.

Following we will start to explain the most popular function of Star Adventurer 2i, Astrophotography and explain how Star Adventurer 2i makes this challenge job become easier.

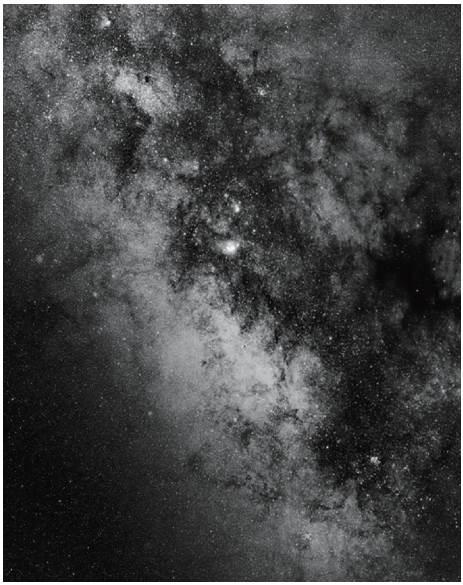
Astrophotography and Astro Time-Lapse

Astrophotography

Astrophotography refers to photography of the night time sky. It has become far more familiar to us due to the incredible images recorded by the Hubble Space Telescope and shared by NASA with the public over the past two decades. But astrophotography didn't start with the Hubble Space Telescope. In fact, it started more than 100 years ago and has been done in large part since that time by amateur astronomers.

With **Star Adventurer 2i**, astrophotography is now something you can do, too. You won't be able to produce photographs that have the same image scale as those taken by the Hubble, but you will be able to make beautiful portraits of constellations and large regions of the Milky Way galaxy showing star clouds, star clusters, and light and dark nebulae. You'll be able to record time-lapse videos of auroras, and the stages of a lunar eclipse.

First, however, there are two challenges to overcome that you don't encounter in typical, terrestrial types of photography. One is the need to use long exposures (e.g., greater than 30 seconds) to record dim night sky objects. The second is the need to have the camera follow the sky as the exposure is taking place.



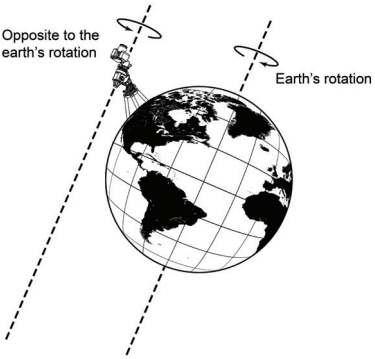
The Milky Way Galaxy revealed through a long exposure astro-photo with precision tracking

The Need For Long Exposures

Unfortunately, you can't just set your camera to AUTO, aim it at the night sky and take a picture. The night sky is far too dim for that to work, and any attempts you make will produce seriously underexposed results. But, you can overcome this challenge by selecting BULB mode on your camera and using Star Adventurer 2i's SNAP cable connection to create much longer exposures – like a minute or two – or ten! With a sufficiently long exposure, your camera will collect enough light to reveal hidden details that are much too faint for our eyes to see. But then, quite literally, you'll see the second problem!

The Need For Tracking

In your now, nicely exposed photo, the stars don't look like stars anymore. they look like little lines and arcs of variable lengths! The problem here is called trailing, and it becomes more noticeable as the focal length of your lens and/or your exposure time increases.



An equatorial mount rotates to prevent star trailing in your photo by precisely countering Earth's Rotation Milky Way Galaxy revealed through a long exposure astrophoto with precision tracking

You might think that trailing is due to the movement of the stars, but it's not. It's due to the movement of your camera as it records those distant stars over the course of that exposure. Your camera is moving because it is sitting on a tripod that is sitting on the Earth, and the Earth is rotating. This motion causes the stars, which appear to be fixed in space from our perspective, to appear to move relative to us, and more importantly, to our camera.

Star Adventurer 2i overcomes this challenge by moving your camera to precisely offset the effects of Earth's rotation while a sufficiently long exposure of the night sky is being made. **Star Adventurer 2i**'s tracking capability keeps a specific area of the sky impinging upon the same part of the camera sensor throughout the exposure. So a star will fall on the same set of pixels from the beginning through the end of the exposure. The result is a well-exposed photo of the night sky with pin point star images.

With Star Adventurer 2i, two of the biggest challenges in doing astrophotography are simplified and automated for you. **Star Adventurer 2i**'s camera control features enable you to take exposures in excess of 30s each. **Star Adventurer 2i**'s tracking ability keeps your camera on target to produce pin point star images. As your skill level in astrophotography progresses you can set **Star Adventurer 2i** up to take multiple images of your subject, then use advanced processing techniques like stacking to make truly remarkable celestial portraits.

Astro Time-Lapse

Astro Time-Lapse photography faces the same challenges as astrophotography in general. Namely, due to the dimness of the subject (the night sky), longer exposures are required to record sufficient detail, and tracking is needed to prevent star trailing during those exposures. But there are some differences as well.

For astrophotography, the region of sky that is being photographed moves over the course of the exposure sequence. We generally repeat the process to obtain a sequence of images, all of the same subject, and all framed identically. This means that our camera is pointing in a different direction at the end of the sequence compared to where it was pointing at the beginning. This occurs because our subject has moved and the camera has moved along with it.

In **Astro Time-Lapse** we take multiple images as well, and the camera moves with each exposure. But, unlike in astrophotography, **Star Adventurer 2i** returns the camera to the starting point after each exposure is completed.

Now, when the frames are sequenced into a video, you see the night sky moving about a fixed terrestrial reference point. By finding locations with beautiful foreground settings you can produce breathtaking videos of the sky moving over your location. [Visit our YouTube channel to see some examples].

Special Requirements For Astrophotography and Astro Time-Lapse

In order to track the movement of the night sky the camera has to be continuously moved to offset the rotation of the Earth in order to hold the subject perfectly steady on the sensor. The rotation of the camera needs to take place about an axis that is parallel to Earth's rotational axis, and therefore, the two axes must be aligned in order for tracking to work correctly.

Polar Alignment:

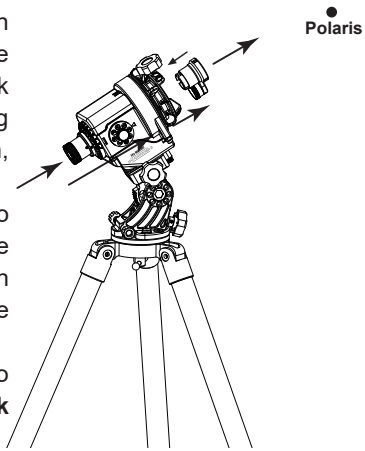
Polar Alignment refers to the procedure for aligning Star Adventurer 2i's rotational axis with the Earth's rotational axis. If we extend Earth's rotational axis out into space it intersects an imaginary point called the Celestial Pole. In the Northern hemisphere we refer to that point as the North Celestial Pole, or NCP for short. In the Southern hemisphere it is the South Celestial Pole or SCP. Because the celestial poles are imaginary points, there is nothing to see at their locations. This can make pointing at them a bit of a challenge! However, there are a couple of celestial land marks nearby the poles that help us along. In the north it is Polaris, the North Star. In the south it is the star Sigma Octanis

Polar Alignment in the Northern Hemisphere

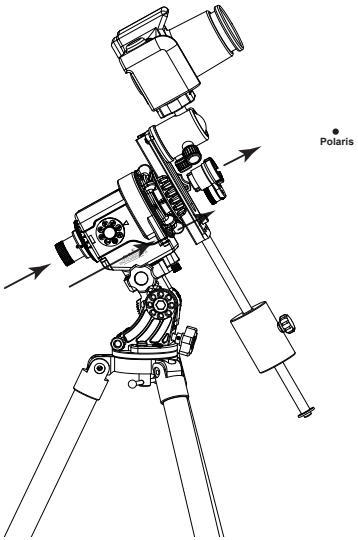
To polar align Star Adventurer 2i with the NCP follow this procedure. It is best to do this at dusk when you can just see Polaris, but before it is completely dark so that you can more easily see what you are doing. Also, it's always good practice to save the dark for taking your pictures, not for setting up your equipment.

While using a tilt/pan head or ball mount attached to your tripod:

1. Set up your tripod and be sure that it is secure.
2. Attach **Star Adventurer 2i** to the tilt/pan or ball head.
3. Move the tripod and make the **Mounting Platform** facing north. Then remove **Polar Scope Cap.**
4. Attach **Polar Scope Illuminator** to the **Polar Scope** on Mounting Platform side. This will help make the reticule pattern in the **Polar Scope** eyepiece more visible in dark conditions. Adjust the intensity of the illuminator by turning the dial. Make it bright enough to see the reticule pattern, but not so bright as to wash out your view of Polaris
5. Loose **Clutch Knob** and rotate **Mounting Platform** so that In view of **Polar Scope** the "0" label on the reticule pattern is at the12 o'clock position (i.e., at the top). When positioned correctly 3 will be seen at the right, 6 and the bottom and 9 to the left. Then fasten **Clutch Knob**.
6. Now, angle the tilt/head or ball mount up and rotate so that you can see Polaris in the field of view of the **Quick Polaris Finder** .
7. Now you should be able to see Polaris in field of view of **Polar Scope**. If not, angle the tilt/head or ball mount up and rotate until Polaris in the field of view. It can be anywhere in the field of view at this point. You will adjust to its exact location in a moment
8. Go to **Using the Polar Clock Utility for Polar Alignment in the Northern Hemisphere** to finish the Polar alignment procedure



While using the optional Equatorial Wedge attached to your tripod with Mounting Assembly:

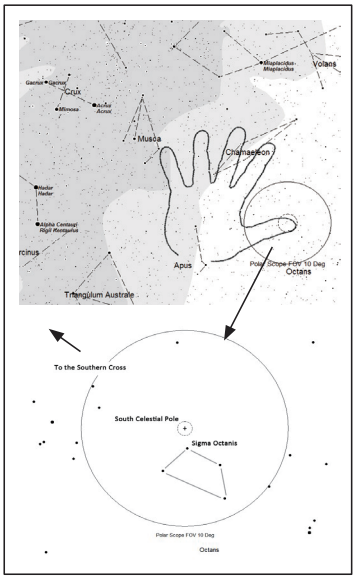


1. Set up your tripod and ensure it is stable.
2. Attach the **Equatorial Wedge** directly to your tripod via the 3/8-inch threaded mounting hole.
3. Once the wedge is securely attached align the tripod so that the **Altitude Adjustment Knob** is facing north.
4. Now, level your tripod using the built-in **Bubble Level**. A leveled **Equatorial Wedge** is not a requirement for astrophotography, but it makes subsequent adjustments easier to make.
5. Once leveled, rotate the **Altitude Adjustment Knob** until the **Altitude Indicator** points at your latitude on the **Altitude Scale**. (The altitude of Polaris above the horizon at your location matches your latitude). If you don't know your latitude you can look it up in the **Star Adventurer mini Console** under **Settings-> Location**.
6. Attach **Mounting Assembly**, Camera, Ball Head and **Counterweight**. Loose **Clutch Knob** then adjust the position of counterweight until it's balanced. Then Fasten the **Clutch Knob** and remove **Polar Scope Cap**.
7. Attach **Polar Scope Illuminator** to the dove tail of **Mounting Assembly**. Adjust the position to align it to the **Polar Scope**. This will help make the reticule pattern in the **Polar Scope** eyepiece more visible in dark conditions. Adjust the intensity of the illuminator by turning the dial. Make it bright enough to see the reticule pattern, but not so bright as to wash out your view of Polaris
8. Loose **Clutch Knob** and rotate **Mounting Platform** so that In view of **Polar Scope** the "0" label on the reticule pattern is at the12 o'clock position (i.e., at the top). When positioned correctly 3 will be seen at the right, 6 and the bottom and 9 to the left. Then fasten **Clutch Knob**.
9. Now, adjust **Altitude** and **Azimuth Adjustment Knobs** on the wedge so that you can see Polaris in the field of view of the **Quick Polaris Finder** .
10. Now you should be able to see Polaris in field of view of **Polar Scope**. If not, adjust **Altitude** and **Azimuth Adjustment Knobs** until Polaris in the field of view. It can be anywhere in the field of view at this point. You will adjust to its exact location in a moment.
11. Go to **Using the Polar Clock Utility for Polar Alignment in the Northern Hemisphere** to finish the Polar alignment procedure
12. After complete the polar alignment. Connect the SNAP camera control cable between **Star Adventurer 2i** and your camera. Point your camera at your subject, then proceed to set up **Star Adventurer 2i** via the Star Adventurer mini Console or 6 preprogrammed function modes.
13. You can monitor the accuracy of polar alignment during taking the astro-photos. Adjust it if needed.

Using the Polar Clock Utility for Polar Alignment in the Northern Hemisphere

Now tap on the **Polar Clock Utility** in the Main Menu of the **Star Adventurer mini Console**. Tap on Northern Hemisphere if it is not already selected. The app shows you a drawing that matches the view in the **Polar Scope**. Note the position of the small black dot. It represents Polaris and shows where Polaris should be located relative to the NCP at the time off your session. Angle the tilt/head or turn your **Altitude** and **Azimuth Adjustment Knobs** until Polaris as seen in the view finder of your Polar Scope matches the position of the black dot. You are now precisely polar aligned with the NCP (represented by the intersection at the centre of your field of view) and can increase the focal length of your lenses and/or exposure times of your photos with confidence.

Polar Alignment in the Southern Hemisphere:



Northern observers/photographers have a great advantage when it comes to performing a polar alignment. They have the naked-eye star Polaris situated just 2/3 of a degree from the North Celestial Pole. This makes a quick alignment of an equatorial device like **Star Adventurer 2i** very easy to accomplish. Just find Polaris and point **Star Adventurer 2i** so that you can see Polaris in the field of view of the **Polar Scope**.

Unfortunately there are no bright reference stars in the immediate vicinity of the SCP, so the procedure to obtain a polar alignment is a bit more involved. However, there is a small group of stars near the SCP that, while invisible to the naked eye, can be seen in your **Polar Scope**. Once you have this group in view, a precision polar alignment is just as easy to accomplish in the southern hemisphere as it is in the north, thanks to the **Polar Clock** function included in the **Star Adventurer mini Console**.

First remove the **Polar Scope Cap** and attach the **Polar Scope Illuminator** to the other end. This will help make the reticule pattern in the **Polar Scope** eyepiece more visible in dark conditions. Adjust the intensity of the illuminator by turning the dial. Make it bright enough to see the reticule pattern, but not so bright as to wash out your view of the faint stars near the SCP.

Performing a Coarse Polar Alignment in the Southern Hemisphere

The goal of the coarse polar alignment is to get your **Polar Scope** aimed near enough to the SCP that you will be able to see a small group of four stars within its field of view. We refer to these as the Sigma Octantis group, with Sigma Octantis being the slightly brighter of the four, and always the one that is nearest the SCP as the group rotates about the SCP over the course of 24 hours.

1. Setup the mount as described in **Polar Alignment in the Northern Hemisphere**.

2. Find Acrux, then following a line from it to alpha Muscae, locate the next brightest star, gamma Muscae. If you were to draw a line through Acrux and gamma Muscae, it would point very nearly to the SCP(see chart on previous page).

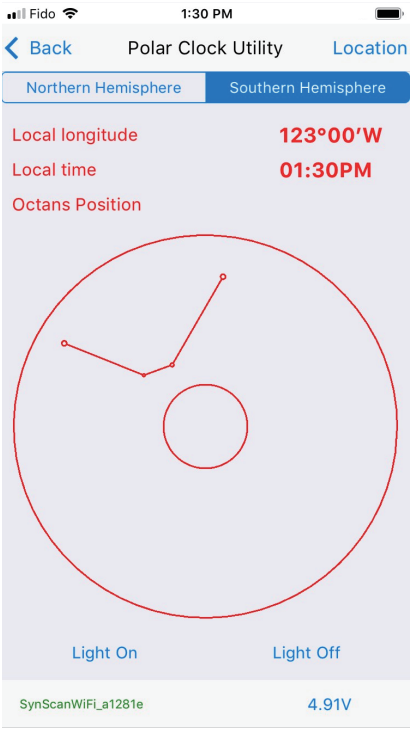
3. Raise your hand at arm length and spread your fingers so there is about an extra finger space between each one. Put the tip of your little finger near gamma Muscae and tilt your hand so that the tip of your thumb would be on a line that connects it to gamma Muscae and Acrux

4. Points your **Polar Scope** into the region where the tip of your thumb has been. If you points with reasonable accuracy, you should be able to see the Sigma Octanis group in the field of view of the Polar Scope. If not, keep making adjustment until you can using the altitude and azimuth adjusters on your wedge.

Using the Sigma Octantis Clock Utility

Once you can see the Sigma Octantis group in your Polar Scope field of view you are ready to fine-tune your polar alignment to the SCP.

1. Bring up the Star Adventurer mini Console and tap on the Polar Clock Utility.
2. Tap on Southern Hemisphere if it is not already selected. This will bring up a representation of the reticule in your Polar Scope.
3. Loose Clutch Knob and rotate Mounting Platform to rotate your Polar Scope to match the view in the Polar Clock Utility. That is, rotate it so that the representation of the Sigma Octantis group in your Polar Scope has the same orientation as shown in the Polar Clock Utility, then fasten the Clutch Knob.
4. Use the fine-tuning knobs on your wedge to adjust it until the stars of the Sigma Octantis group as seen in the Polar Scope match their representation as shown in the app.



Using Star Adventurer mini Console in APP mode

Now that you have **Star Adventurer 2i** set up with your camera gear attached it's time to learn how to use the **Star Adventurer mini Console**. This section assumes that you installed the app on your device. If you have not, please refer back to the section titled **Installing the Star Adventurer mini Console**.

The main screen of the control app divides **Star Adventurer 2i**'s functions into separate sections. To select a function just tap on it. There are separate sections for astrophotography and for different types of time-lapse photography. The app also provides for **Manual Control of Star Adventurer 2i**, assists you with **Polar Alignment** (see astrophotography section), and lets you alter **Settings,** such as making a Wi-Fi connection with **Star Adventurer 2i**.

For **Astrophotography, Star Adventurer 2i** helps you to conquer the biggest challenge for photography of the night time sky, which is, precisely offsetting the effects of Earth's rotation while a sufficiently long exposure of the night sky is being made.

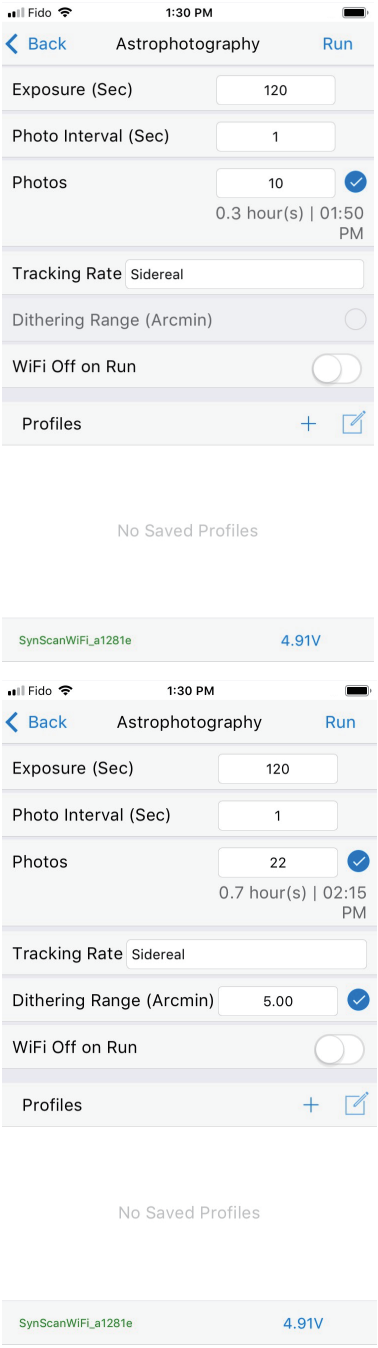
For **Astro Time-Lapse, Star Adventurer 2i** provides you a method to create a breathtaking videos of the sky moving over your location while the challenge in Astrophotography is also overcome.

For **Regular-Exposure Time-Lapse**, it is the simplest mode for **Star Adventurer 2i** and a good one for helping you understand how to set the control options. **Regular-Exposure Time-Lapse** mode is for capturing time-lapse videos under daylight or well-lit conditions where long exposure times are not necessary. In this mode, exposure settings are set on your camera. The Star **Adventurer mini Console** pans your camera and sends signals to trigger the shutter as it creates your time-lapse video.

For **Long-Exposure Time-Lapse, Star Adventurer 2i** controls the exposure time instead of your camera. This way you can use exposures that exceed 30 seconds, which are often needed in low light conditions, especially with small aperture settings on your lens. Whenever you use **Long-Exposure Time-Lapse** mode, set your shutter to BULB mode. If it is not set on BULB mode the camera shutter speed setting will be used instead.

You can make time-lapse videos using **Star Adventurer 2i** to control the shutter only (no panning), or to pan continuously while firing the shutter of your camera at intervals set by you. Use the first of these techniques to produce a time-lapse video from a fixed perspective and the second to create a time-lapse video in which the perspective changes as the video is recorded

Using the Star Adventurer mini Console For Astrophotography



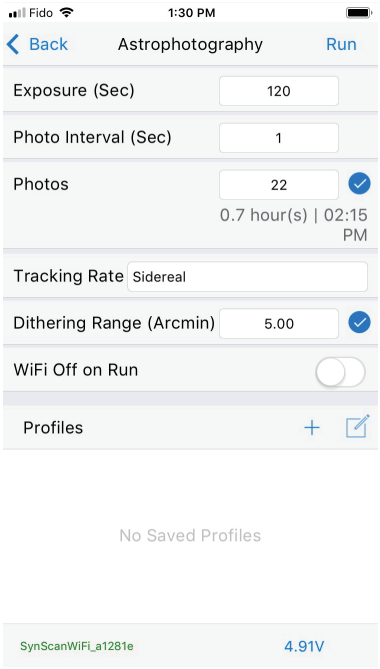
Exposure (Sec): Exposure should be set to a value that is sufficiently long to record detail in the night time sky, which is typically longer than 30 seconds. Be sure that your camera is attached to **Star Adventurer 2i** via the **SNAP** control cable, then set your exposure time in the **Exposure** field. Be sure to set your camera to BULB mode, otherwise your shutter will close according to whatever shutter speed is selected on your camera.

Photo Interval (Sec): Taking multiple long exposures generates a heat build-up in your camera. This heat can increase the amount of grain (noise) in your picture. You can reduce this effect by giving the camera some time to cool down between photos. A good place to start is to set **Photo Interval** to half of the value you set for **Exposure**. **Star Adventurer 2i** will continue to track the object during the **Photo Interval**, then resume with the next exposure once the **Photo Interval** has elapsed.

Photos: Enter the number of photos you wish to acquire of the subject. You can use advanced image processing methods to combine multiple images of an object into a single photo with much less graininess and far more detail than can typically be recorded in a single long exposure.

Tracking Rate: Celestial objects within our own solar system move at slightly different rates than the distant stars and nebulae that populate the rest of our galaxy. **Star Adventurer 2i** can be set to track “nearby” objects more accurately by setting this parameter. Choose **Sidereal** if you are taking a constellation or Milky Way portrait and **Lunar** if you are tracking the Moon (e.g., to record the stages of a Lunar Eclipse). **Solar** is reserved for advanced uses where specialized equipment is being used to photograph the Sun.

Dithering Range (Arcmin): Check the box to enable the dithering option and enter the dithering range you allow. **Star Adventurer 2i** will pseudo-randomly dither the astro-photos within the dithering range according to the photo numbers. Same celestial object won't be at the same position for all photos due to the dithering. Please notice that too large



dithering range may result in longer total task time, but too small dithering range may result in poor dithering effect after photo stacking. Please adjust dithering range according to your condition. Due to the nature of dithering, **Dithering only works when Star Adventurer 2i control the camera shutter and is not guided through Auto-Guiding Port.**

WiFi Off on Run: When enabled, **Star Adventurer 2i** will automatically turn off Wi-Fi at the start of a task to save power. Wi-Fi can be restored at any time in **APP** mode by pressing the **Right/Left Button** until **Button LEDs** start slowly blinking.

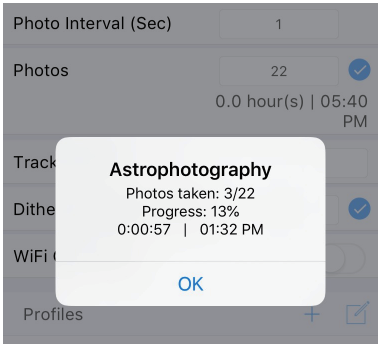
Profiles Save / Edit: To save a profile tap **Save**. To edit or delete a profile tap **Edit**. You can store your multiple profiles of your favorite settings for recall at future sessions.

Start the Task:

Once your tripod, **Star Adventurer 2i** and camera gear are set up and all of your task parameters are set, just press **Run** to initiate the task.

Cancel Current Task:

After your task started, you can cancel current task at any time by tapping on **STOP** at the top-right corner of the parameters screen. It brings up a confirmation screen. You can cancel the **Stop** request and resume the task or proceed to end the task at that point

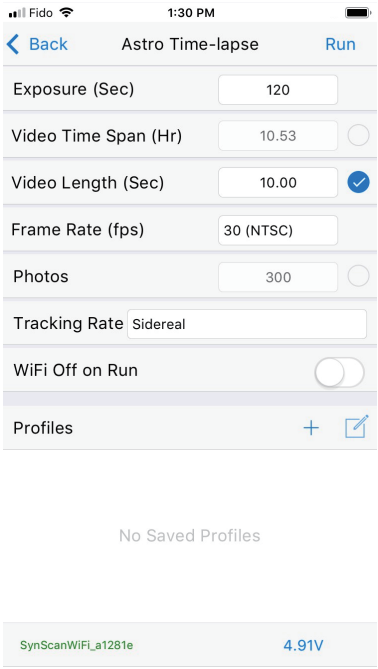


Astrophotography Progress Screen:

Anytime you have a process running you can view its progress by tapping on **Status** at the bottom of the parameters screen. This brings up information about number of photos taken, percentage of task complete, etc.

Using the Star Adventurer mini Console For Astro Time-Lapse

One of the most unique features of **Star Adventurer 2i** is its ability to create time-lapse videos of celestial vistas. This feature combines **Star Adventurer 2i**'s astrophotography functions with its time-lapse functions giving you a powerful tool to create stunning and unique time-lapse videos. Note that to obtain astronomical time-lapse videos you must polar align **Star Adventurer 2i** as described above. Below are the parameters you can set along with their explanations for producing astronomical time-lapse videos



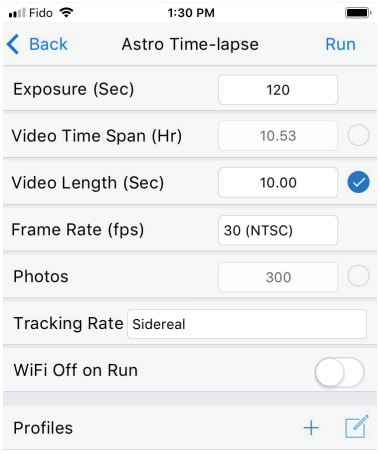
Exposure (Sec): Exposure should be set to a value that is sufficiently long to record detail in the night time sky, which is typically longer than 30 seconds. Be sure that your camera is attached to **Star Adventurer 2i** via the **SNAP** control cable, then set your exposure time in this field. Be sure to set your camera to BULB mode, otherwise your shutter will not stay open. It will close according to whatever shutter speed is selected on your camera.

Video Time Span (Hr): Video Time Span refers to the amount of real time that will elapse from the start to the end of the recording. **Video Time Span** is affected by **Exposure, Photos, Video Length** and **Frame Rate**, and will be calculated for you. However, you can also directly set a value for **Video Time Span**. For instance, if you want to follow the Moon for 5 hours to record the stages of a lunar eclipse, you could set **Video Time Span** to 5. Set the length of your desired time-lapse video in **Video Length** and the appropriate frames per second (fps) in **Frame Rate**. Other related parameters will then be calculated for you.

Video Length (Sec): Set this parameter to the desired length in seconds of your finished time-lapse video. You can set this parameter directly, or you can allow it to be calculated for you based on the values of other parameters.

Frame Rate: Select NTSC (30 fps) or PAL (25 fps) according to the video standards for your location. You can further adjust the playback speed of your video in your video editing software.

Photos: Enter the number of photos you wish to make up your video. It is usually easier to let this field be calculated based on settings for other parameters.

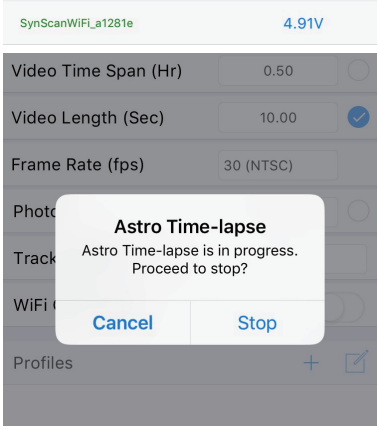


For instance, you have more creative control on your time-lapse video by setting the **Video Time Span** and the **Video Length** parameters, then letting the app calculate the number of **Photos** that will be required.

Tracking Rate: If you are making a time-lapse video of the Moon then select **Lunar**. Otherwise, select **Sidereal**.

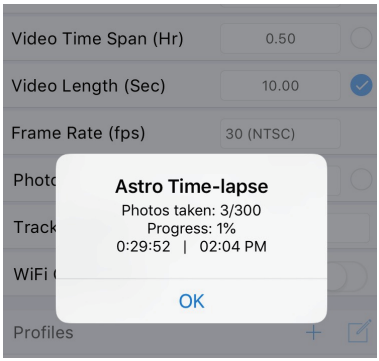
WiFi Off on Run: When enabled, **Star Adventurer 2i** will automatically turn off Wi-Fi at the start of the task to save power. Wi-Fi can be restored at any time in **APP** mode by pressing the **Right/Left Button** until **Button LEDs** start slowly blinking.

Profiles Save / Edit: To save a profile tap **Save**. To edit or delete a profile tap **Edit**. You can store multiple profiles of your favorite settings for recall at future sessions.



Start the Task:
Once your tripod, **Star Adventurer 2i** and camera gear are set up and all of your task parameters are set, just press **Run** to initiate the task.

Cancel Current Task:
After your task started, you can cancel current task at any time by tapping on **STOP** at the top-right corner of the parameters screen. It brings up a confirmation screen. You can cancel the **Stop** request and resume the task or proceed to end the task at that point.



Astro Time-Lapse Progress Screen:
Anytime you have a process running you can view its progress by tapping on **Status** at the bottom of the parameters screen. This brings up information about number of photos taken, percentage of task complete, etc.

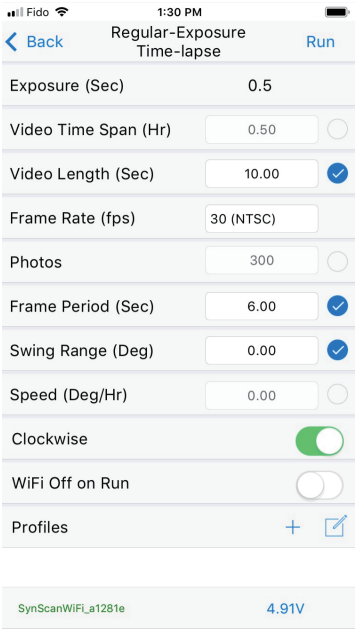
Using the Star Adventurer mini Console For Time-Lapse Photography

The major difference between **Regular-Exposure Time- Lapse** mode and **Long-Exposure Time-Lapse** mode is that, in the latter case, rotation stops during the exposure. This enables the sensor to capture more of the available light resulting in a better image.

The parameters for **Regular-Exposure Time-Lapse** and **Long-Exposure Time-Lapse** are exactly the same except for the **Exposure** parameter. In the **Regular-Exposure Time-Lapse** screen you cannot change the value for **Exposure**. It is fixed at 0.5 seconds, which is a requirement in order for **Star Adventurer 2i** to provide an adequate signal to control the shutter of your camera. Note: This 0.5 second period is automatically taken into consideration when the App calculates the **Video Time Span** parameter.

In the **Long-Exposure Time-Lapse** mode the **Exposure** parameter controls the TV (exposure time) setting of your camera and can be set to suit your needs. For night scenes where a small aperture and low ISO value is used, individual exposures may range from a second or two to several minutes. Take some test shots to establish the best settings and exposure for your needs, then enter that value into the **Exposure** parameter field. Again, you must set your shutter to BULB mode, otherwise the TV setting on your camera will take precedence over the value in the **Exposure** field.

Please note that because several of the parameters are interrelated some may be unavailable at certain times. For instance, when **Frame Rate** and **Video Length** are set you cannot manually choose the number of **Photos** as it is calculated for you based on the other two parameters. However, if you deselect **Video Length** and set **Photos** directly, the app will calculate a new value for **Video Length**.

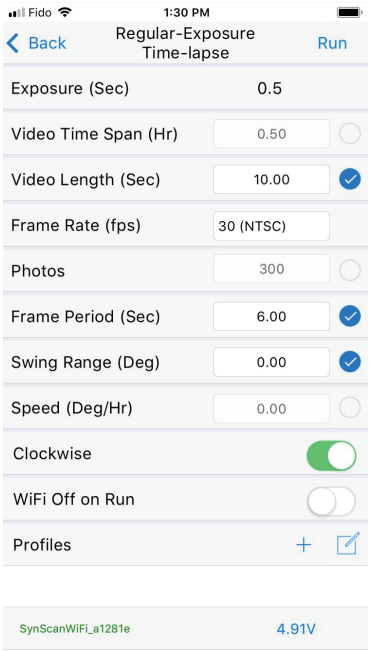


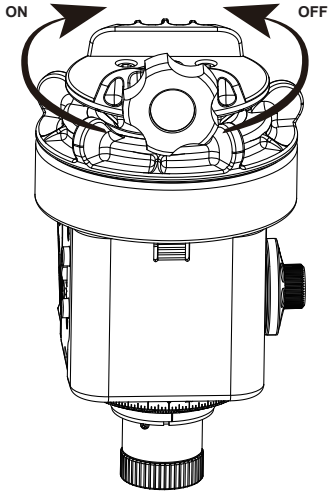
Exposure (Sec): Fixed at 0.5 seconds for **Regular-Exposure Time-Lapse**. For **Long-Exposure Time-Lapse** set this value to suit your exposure requirements. Be sure to set your camera shutter to BULB mode.

Video Time Span (Hr): Set this parameter to the total **Video Time Span** time for your video. For example, if you want your video to cover a span of three hours, set **Video Time Span** to 3. Note that **Video Time Span** does not refer to the length of your video, it refers to the time span over which it is created. You set the desired length of your video in the **Video Length** parameter.

Video Length (Sec): Set **Video Length** equal to the desired length of your video in seconds. For a one-minute long video, set **Video Length** to 60.

Frame Rate (fps): Select NTSC (30 fps) or PAL (25 fps) according to the video standards for your location. You can further adjust the playback speed of your video in your video editing software.





Star Adventurer 2i will rotate left to right if Clockwise is set to ON, or right to left if Clockwise is set to OFF

Photos: This parameter is automatically set by setting **Video Length** and **Frame Rate** using the formula: **Photos = Video Length** x **Frame Rate**

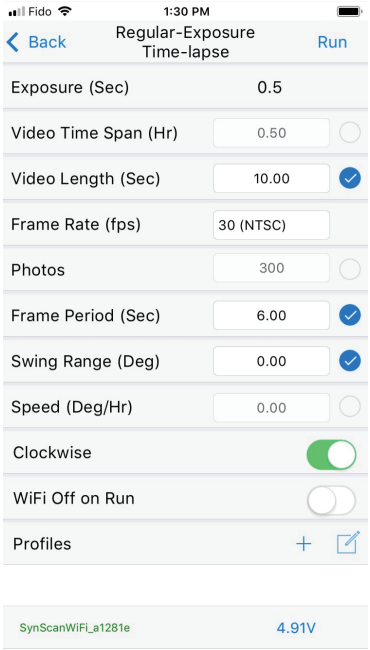
Frame Period (Sec): You can set the **Frame Period** to select a desired interval between photos taken rather than have it calculated for you based on other parameters. Note that if you set **Photo Interval** and **Video Length** the app will re-calculate **Video Time Span**. Anytime you are changing a parameter it is a good idea to check its effects on the other ones

Swing Range (Deg): Use **Swing Range** to create an interesting swing or pendulum effect for your time-lapse video. When used, **Star Adventurer 2i** will pan to the limit of the **Swing Range** that you set, then pan back to your starting point as many times as specified in the **Swing Count** parameter. For instance, say you have two interesting subjects that you want to feature in your video. Set **Swing Range** to the angle between them and **Swing Count** to 1, then point your camera at the first subject. As the time-lapse video is being recorded, **Star Adventurer 2i** will pan from the first subject to the second subject then stop. By setting **Swing Count** to 2, it will pan to your second object, then back to your first object, then stop. By using **Swing Range** values greater than 1 you can have **Star Adventurer 2i** pan back and forth multiple times during the video. Set **Swing Range** to 0 for no panning and to an even number to always end up where you started.

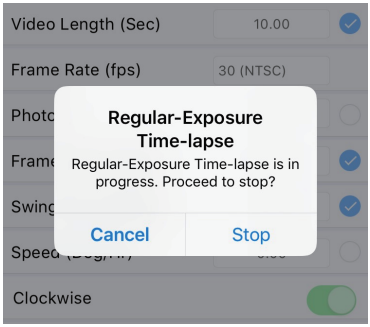
Speed (Deg/Hr): Speed determines how quickly **Star Adventurer 2i** will pan. In most cases, you do not need to set this parameter unless you want to control the panning speed but are not concerned with the actual video time span. If you do not want **Star Adventurer 2i** to pan in your time-lapse video then set **Speed** to 0.

Clockwise: ON will cause **Star Adventurer 2i** to rotate left to right (viewing down with the **Mounting Platform** on top). **OFF** will cause **Star Adventurer 2i** to rotate right to left.

WiFi Off on Run: When enabled, **Star Adventurer 2i** will automatically turn off Wi-Fi at the start of a task to save power. Wi-Fi can be restored at any time in **APP** mode by pressing the **Right/Left Button** until **Button LEDs** start slowly blinking.



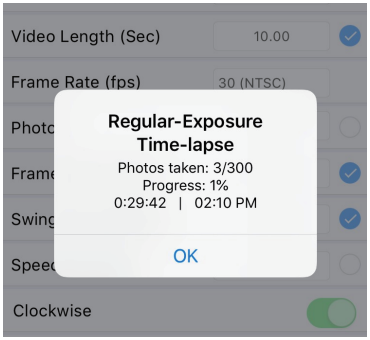
Profiles Save / Edit: To save a profile tap **Save**. To edit or delete a profile tap **Edit**. You can store multiple profiles of your favorite settings for recall at future sessions



Start the Task:
Once your tripod, **Star Adventurer 2i** and camera gear are set up and all of your task parameters are set, just press **Run** to initiate the task.

Cancel Current Task:

After your task started, you can cancel current task at any time by tapping on **STOP** at the top-right corner of the parameters screen. It brings up a confirmation screen. You can cancel the **Stop** request and resume the task or proceed to end the task at that point

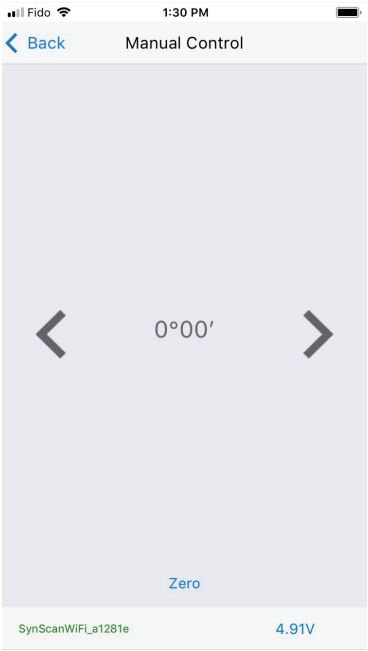


Time-Lapse Progress Screen:

Anytime you have a process running you can view its progress by tapping on **Status** at the bottom of the parameters screen. This brings up information about number of photos taken, percentage of task complete, etc.

The **Long-Exposure Time-Lapse's** stop confirmation screen and progress screen show the same information and works in the same manner.

Manual Control with the Star Adventurer mini Conso

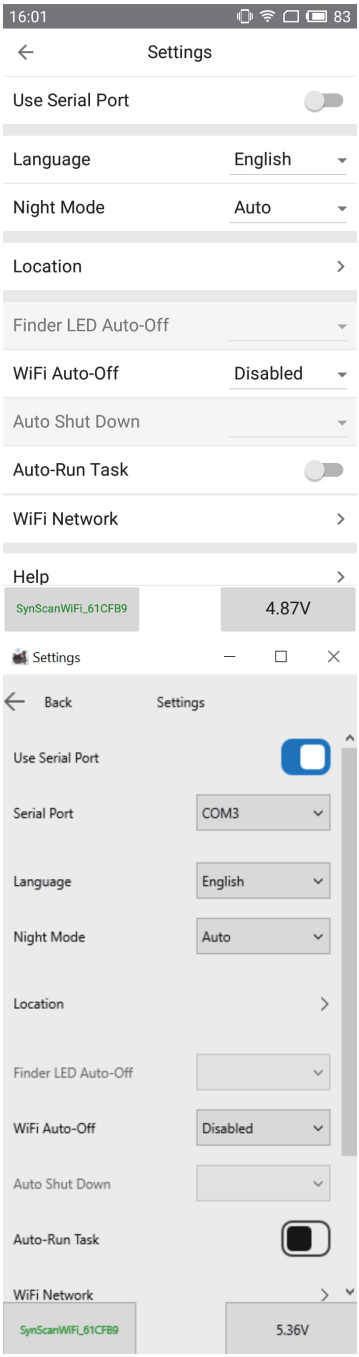


Go to the **Main Menu** and tap on **Manual Control**. This will bring up the manual control arrows on either side of an angle given in degrees and minutes. Tap or touch and hold the arrow symbols to nudge or continuously move **Star Adventurer 2i** to the left or right, respectively. Release the arrow symbol to stop **Star Adventurer 2i**'s movement. The angle you have rotated through will show up between the arrows.

Manual Control gives you the ability to nudge your camera, but without touching it directly – a handy feature when you need to tweak your composition to get that perfect shot without bumping your gear out of alignment.

You can also use it to determine the **Swing Range** for your time-lapse video compositions. For instance, say you have two points of interest and want your video to swing from one to the other. Aim your camera at the first point, then Zero the counter. Now, tap and hold the arrow keys until your camera is pointing at your second point of interest. Record the angle that is showing between the arrows and enter it as your **Swing Range** parameter when you are ready to create you time-lapse video.

Settings with the Star Adventurer mini Console



Tap on **Settings** on the home screen to set a variety of device functions as detailed below.

Use Serial Port: ONLY AVAILABLE in Android and PC. If enabled, **Star Adventurer mini Console** will use serial port to control mount instead of Wi-Fi. Your Android phone need to support USB OTG in order to use this feature. You can also use PC version of **Star Adventurer mini Console** to use this feature. Please select the correct COM port for "Serial Port"

Language: Choose the default language for the **Star Adventurer mini Console**.

Night Mode: Tap and choose **On** or **Auto** to get a black background with red text. This mode is designed to help preserve your dark adaptation. Note: if there are any visual astronomers in your vicinity you should set the app to **On** as a courtesy to them.

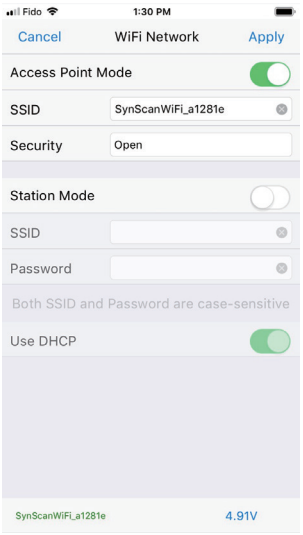
Location: Tap to get a sub menu that gives you the option to use the location sensor in your device to set your current longitude and latitude. If disabled you can enter the coordinates manually. Location determines the hemisphere you are in and sets the correct rotation direction for **Astrophotography** and **Astro Time-Lapse** functions. It is also used to display the position of Polaris and Octans on the Polar Scope reticule.

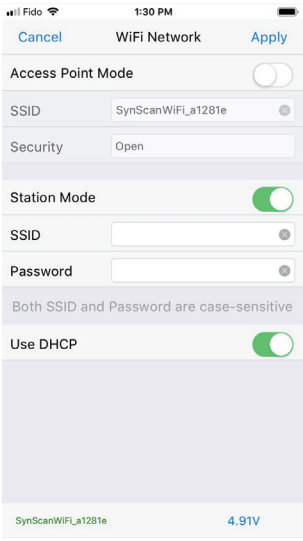
WiFi Auto-Off: Tap to choose a delay to automatically turn off Wi-Fi to preserve power. Wi-Fi will turn off when no Wi-Fi activity is detected during the Auto-Off interval. You can turn it back on by pressing Star Adventurer 2i's **Right/Left Button**. Note: Wi-Fi is not needed once parameters for a given task have been set.

Auto-Run Task: If enabled, **Star Adventurer 2i** will automatically re-start the previous photography process when next time the **Mode Dial** is turned into **APP** mode.

WiFi Network

Tap on **WiFi Network** to bring up the Wi-Fi options as detailed below. You can choose either **Access Point** (AP) Mode or **Station** (STA) Mode. Use **AP** mode for a basic connection to **Star Adventurer 2i**. Use **STA** mode if you wish to control **Star Adventurer 2i** while simultaneously being connected to a wireless network (e.g., for internet access) or want to control **Star Adventurer 2i** remotely via the internet. Be sure that you have the correct **STA SSID** and **Password** information. If you enter the incorrect information you may need to reset **Star Adventurer 2i** to its factory settings using the procedure outlined in **Appendix IV : How to Restore Factory Settings**.





Access Point (AP) Mode: This is the default mode. In **AP** mode **Star Adventurer 2i** acts as a wireless access point so that you can connect to it via the **Star Adventurer mini Console**.

AP Mode SSID: The **SSID** will automatically show up based on the **SSID** you entered to make your initial Wi-Fi connection. Select it to connect your device to **Star Adventurer 2i**. Before attempting to connect be sure that **Star Adventurer 2i** is at **APP** mode and the **Button LEDs** are slowly blinking which indicates that **Star Adventurer 2i** is ready to make a Wi-Fi connection.

AP Mode Security: Select **Open** if no encryption is to be used. Otherwise, tap on the settings field and choose an encryption type from the list, then enter the correct password in **Password**.

Station Mode (STA): Choose this mode if you wish to have internet access while using **Star Adventurer 2i**, control **Star Adventurer 2i** via the internet, or to save battery power. When you select **STA** mode **Star Adventurer 2i** will join an existing Wi-Fi network. To use **STA** Mode, select it, then set the **SSID** and Password for the network you are joining. When all of your selections are made click on **Apply**. **Star Adventurer 2i** will restart and join the network. The new settings will be stored in **Star Adventurer 2i**'s memory and will remain there until the settings are changed.

STA SSID: Select the network you wish to join and enter the SSID for that network.

STA Password: Enter the password for the network you have selected to join.

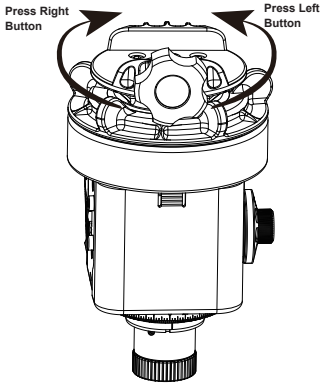
STA Use DHCP: Turn this off ONLY if you want to set the IP address manually

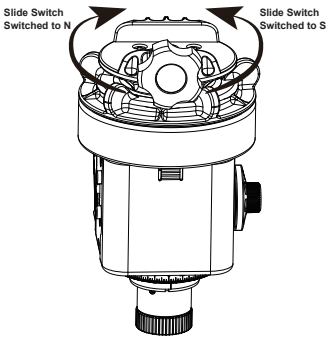
Six Preprogrammed Function Modes (★ , ☼ , ☾ , ☆⟫ , RT and LT):

To provide more convenient operational experience, **Star Adventurer 2i** provides an easy way to execute 6 most popular photographic functions including **Astrophotography mode with celestial tracking**, **Astrophotography mode with solar tracking , Astrophotography mode with lunar tracking, Astro Time-lapse** mode, **Regular-Exposure Time-Lapse** mode and **Long-Exposure Time-Lapse** mode. All you have to do is turning the **Mode Dial** to corresponding mode, then **Star Adventurer 2i** will automatically execute the preprogrammed function with your favorite settings. The default factory settings will be used if user haven't customized their own settings. **Please refer to "Appendix Ⅳ : How to Restore Factory Settings**" for details.

Please note that all the successful executed parameters in APP mode will be automatically stored into corresponding preprogrammed function mode. For example, when you turn the **Mode Dial** to APP and configure the **Exposure** as 180 seconds , **Photo Interval** as 2 seconds , **Photos** as 60 pictures, **Tracking Rate** as sidereal, **Dithering Range** as disabled and **WiFi Off on Run** as disabled. After you click on **Run**, all these settings will be stored into preprogrammed **Astrophotography** mode with **celestial tracking**. Next time when you turn Mode Dial to ★ , All the previous configured settings will take effect instead of factory setting.

Whenever the button are pushed or Slide Switch are changed, the preprogrammed task will be terminated and restart after button released or Slide Switch changed.





Rotation direction in six preprogrammed task modes:

Buttons: Whenever you push the buttons, **Star Adventurer 2i** will rotate at speed of 12 times of sidereal rate. Please refer to picture on the left for rotation direction.

3-position Slide Switch:

Buttons: Whenever you push the buttons, **Star Adventurer 2i** will rotate at speed of 12 times of sidereal rate. Please refer to picture on the left for rotation direction.

Switched to STOP: The motor will stop rotation, however the camera shutter control still works. This is useful when taking astrophotography with landscape. You can switch to **STOP** to take a clear landscape photo first, then switch to N/S to take photos with sharp celestial objects. Then stacking them to get a fantastic astro-photo with landscape.

Switched to N: For **Astrophotography** mode in Northern Hemisphere. For rotating direction in time-lapse please refer to the picture on the left

Switched to S: For **Astrophotography** mode in Southern Hemisphere. For rotating direction in time-lapse please refer to the picture on the left

Appendix I : Calibrate The Polar Scope

Before using the **Polar Scope** for polar alignment, the **Polar Scope** itself must be calibrated to ensure the pattern in the **Polar Scope** is aligned to the mount's R.A. axis. The following steps will outline how to calibrate the **Polar Scope**. **Calibrating during daytime is strongly recommended :**

1. Choose a fixed object (the Polaris at night, or a faraway object in daytime); orient **Star Adventurer** to put the crosshair of the **Polar Scope** exactly on the chosen object.

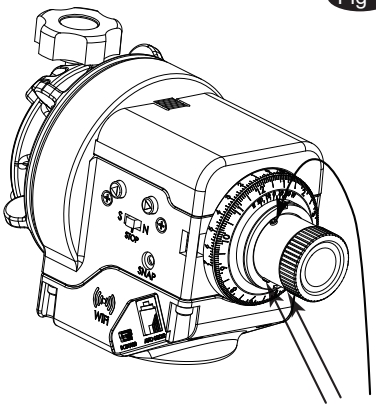
2. Rotate the mount in R.A. axis for half a turn.

3. If the object remains exactly behind the crosshair in the **Polar Scope** after the rotation, then it means the **Polar Scope** is aligned to the R.A. axis and no calibration is needed.

4. If, during rotation, you see the object wandering off, calibration is needed. You should rotate the **Star Adventurer 2i** to find the point where the object is at the longest distance from the crosshair center, and then you should move the crosshair halfway towards the object (Fig 2), using the 3 tiny adjustment screws on the side of the **Polar Scope** (Fig 1). A 1.5mm Allen wrench is needed.

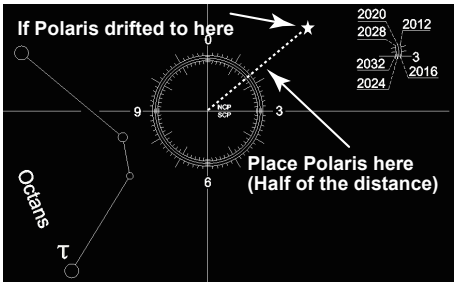
IMPORTANT WARNING: Adjusting with the very small Allen screws is delicate. Read the note below.

Fig 1



Adjust these screws

Fig 2



5. Repeat steps 1 to 4 a few times until the object remains at the center of the reticle when rotating the mount in R.A. axis.

6. Turn the **Date Graduation Circle** to align Oct 31 to the 0 of the **Time Graduation Circle**. Then hold the **Date Graduation Circle** and turn the eyepiece/Mounting Platform to align the **Time Meridian Indicator** to the 0 of the **Time Meridian Circle** (Fig 3). Then, when looking through the eyepiece, you should see the pattern aligned as shown in Fig 4. If the pattern is oriented differently, then scales need readjustment. To readjust, turn the **Date Graduation Circle** to align Oct 31 to the 0 of the **Time Graduation Circle**. Then hold it and turn the eyepiece/mounting platform to orient the pattern in the position shown in Fig 4. Loosen the **Time Meridian Indicator Calibration Screw** and move the meridian indicator to align it to the 0 of the **Time Meridian Circle** without turning the **Date Graduation Circle** and **Eyepiece/Mounting Platform**. Tighten the Time Meridian Indicator calibration screw. See through the eyepiece. Now the pattern should still be in the right position.

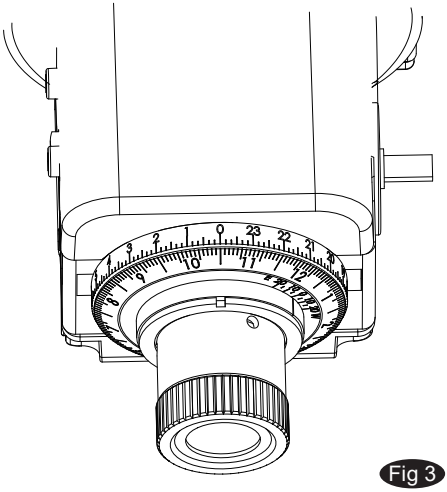


Fig 3

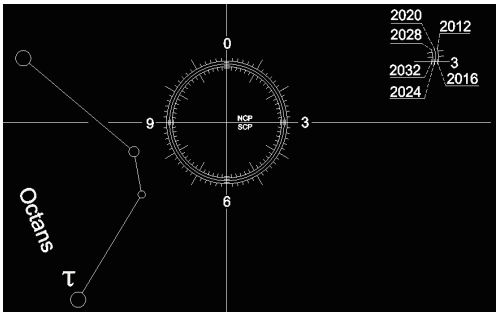


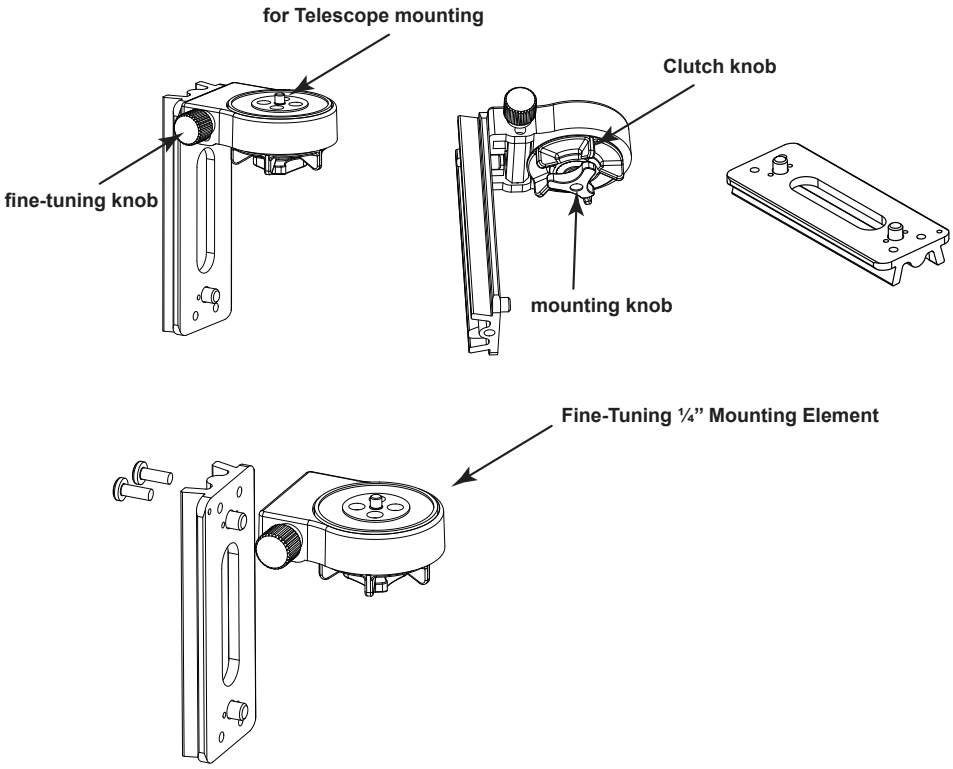
Fig 4

Note:

- When adjusting the Allen screws, loosen one screw only ¼ of a turn, and then tighten the other two gently.
- Do not over tighten the Allen screws; it might damage the pattern plate in the **Polar Scope**.
- Do not loosen one screw completely or loosen more than one screw at a time; otherwise, the pattern plate in the **Polar Scope** will be disengaged and further adjustment is impossible.
- If the pattern plate does disengage, remove the **Polar Scope**'s eyepiece by turning the **Knurled Ring** counterclockwise and then engage the pattern plate again.

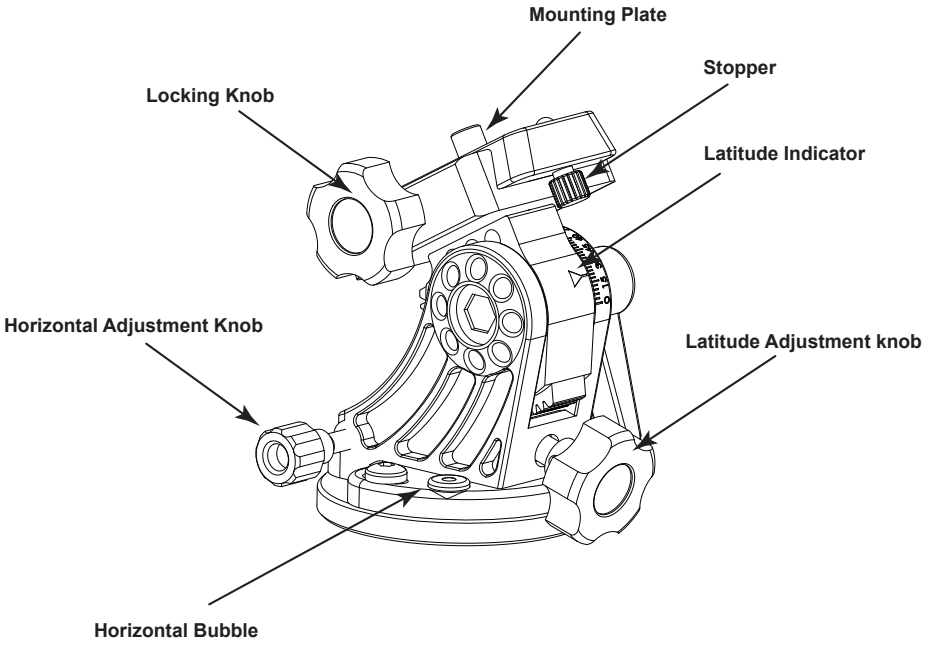
- It is recommended to do this calibration at daytime, aiming at a point object (such as a distant rooftop) because the delicate operation with the tiny allen screws is even more delicate in the dark.

Appendix Ⅱ : Fine-Tuning Mounting Assembly



The **Fine-Tuning Mounting Assembly** connects a telescope to **Star Adventurer 2i** and allows rotation in the other direction (at 90°, DEC direction). You can adjust the tightness of the rotation with the clutch knob. You also can fine-tune the camera or telescope orientation slightly in DEC direction by using the fine-tuning knob. You can also remove the Fine-Tuning ¼" Mounting Element from the dovetail and then mount two ball heads on the dovetail to carry two cameras or one camera and another instrument. You can also use the Fine-Tuning ¼" Mounting Element at one side and use ball head at the other side. You can implement various combinations to fit your needs.

Appendix Ⅲ : Equatorial Wedge



The **Equatorial Wedge** is a device to adjust the latitude for polar alignment. Rotate the **Latitude Adjustment Knob** can adjust the latitude of the **Star Adventurer 2i** indicated by the Latitude Indicator. The range is from 0° to 90°. The **Horizontal Adjustment Knob** can adjust the Wedge to rotate to right or left horizontally. The Horizontal bubble is for checking if the base plate of the wedge is horizontal. The accuracy is 1°. When you install the **Mounting Plate** on the **Star Adventurer 2i**, Make sure the **Stopper** is facing forward as figure shown above to avoid equipment slippage, before you fasten the Locking Knob.

Appendix Ⅳ : How to Restore Factory Settings

From time to time you may need to reset **Star Adventurer 2i** to its factory settings. For instance, if you accidentally enter any incorrect Wi-Fi settings or If you have forgotten the password, then you may need to restore **Star Adventurer 2i** to factory settings.

Follow the procedures listed below to restore the factory settings:
1. Turn the **Mode Dial** to **APP** mode
2. Press and hold both **Right/Left Button** simultaneously for about 5 seconds until button LEDs start to blink fast.
3. Release both **Right/Left Button** and wait until button LED start to blink slowly.
4. Now all the factory setting has been restored. Please reestablish Wi-Fi communication for normal operation. For details of default factory settings, please see following tables.

Factory Settings for Wi-Fi

Operation Mode	Access Point Mode
SSID	SynScanWiFi_XXXXXX
Security	Open

Factory Settings for System Configuration

WiFi Auto-off	Disabled
Auto-Run Task	Disabled

Factory Settings for preprogrammed Astro-photography modes

	★ celestial tracking	☼ solar tracking	☾ lunar tracking
Exposure(sec)	120	0.5	0.5
Photo interval (sec)	5	1.5	1.5
Photos	Continuous	Continuous	Continuous
Tracking Rate	Sidereal	Solar	Lunar
Dithering Range	Disabled	Disabled	Disabled
WiFi Off on Run	Disabled	Disabled	Disabled

Factory Settings for preprogrammed Astro Time-Lapse

Exposure(sec)	30
Photos	300
Tracking Rate	Sidereal
WiFi Off on Run	Disabled

Factory Settings for preprogrammed Landscape Time-Lapse

	Regular-Exposure	Long-Exposure
Exposure(sec)	0.5	8
Frame Period (sec)	2	12
Photos	300	600
Swing Range (Deg)	unchecked	180
Swing Count	N/A	1
Speed (Deg/Hr)	180	unchecked
Clockwise	Slide-switch selection	Slide-switch selection
WiFi Off on Run	Disabled	Disabled

Appendix Ⅴ：Firmware Upgrade Procedure

1. Download “ **Motor Controller Firmware Loader** " V1.73 or higher and the newest firmware from www.skywatcher.com
2. Connect **Star Adventurer 2i** to the computer with the mini USB cable. If this is the first time the device is connected to this computer, please wait for a few minutes for the computer to load the driver.
3. Rotate the **Mode Dial** to leave the **OFF** mode to turn on the power.
4. Double click on **Motor Controller Firmware Loader** and load the previously downloaded firmware.
5. Select " **auto-detect COM port** " and deselect " **Using SynScan Hand Controller's PC Direct Mode**". Click on the "**update**" button. Please do **NOT** turn off power while updating the firmware. After about 25 seconds, the Software will display ” **Update Complete. Turn off power** ". Then the firmware upgrade is completed.
6. If you did not select " **auto-detect COM port** ", or you have multiple **Star Adventurer 2i** connected to the same computer, please manually select the correct serial COM port. Then click on the "**update**" button. Please do **NOT** turn off power while upgrading is in progress. After about 25 seconds, the Software will display "**Update Complete. Turn off power**“. Then the firmware upgrade is completed.
7. Rotate the **Mode Dial** to "**OFF**" and wait for LEDs completely off.
8. Now you can turn on the power and use **Star Adventurer 2i** normally.
9. If you encounter power loss during the firmware update, you can just repeat Step 3 through 7 after restoring the power

Appendix VI : Specification

Sky-Watcher Star Adventurer 2i	
Type	Ultra compact equatorial tracking platform
Tracking speed	Preprogrammed: Celestial, solar and lunar tracking rate APP controlled: Customized
Max payload	5 kg (11 lb)
Wheel Gear	86mm dia. 144 teeth aluminum alloy
Worm Gear	13mm dia. High tension brass
Motor drive	DC Servo
Built-in Wi-Fi	Yes
Built-in accessory	Polar scope
Polar scope	About 7° field of view
Working voltage	4 x AA battery: DC 3.6V~ 6.5V External power supply: DC 5V
Operation temperature	0 ° ~ 40 °C
Dimensions	173.5mm x 113.3mm x 96 mm
Weight	1 kg
Base connect	3/8" threaded socket (or 1/4" with conversion adapter supplied)

Notice

Sky-Watcher reserves the right to change the specifications of the hardware and software described in this manual at any time and without prior notice.

Sky-Watcher cannot be held liable for any damage resulting from the inappropriate use of this product. While every effort has been made to ensure that the information in this manual is accurate and complete, any errors you might find should be reported to Sky-Watcher

CAUTION!

EVER USE YOUR TELESCOPE TO LOOK DIRECTLY AT THE SUN. PERMANENT EYE DAMAGE WILL RESULT. USE A PROPER SOLAR FILTER FIRMLY MOUNTED ON THE FRONT OF THE TELESCOPE FOR VIEWING THE SUN. WHEN OBSERVING THE SUN, PLACE A DUST CAP OVER YOUR FINDERSCOPE OR REMOVE IT TO PROTECT YOU FROM ACCIDENTAL EXPOSURE. NEVER USE AN EYEPIECE-TYPE SOLAR FILTER AND NEVER USE YOUR TELESCOPE TO PROJECT SUNUGHT ONTO ANOTHER SURFACE, THE INTERNAL HEAT BUILD-UP WILL DAMAGE THE TELESCOPE OPTICAL ELEMENTS.