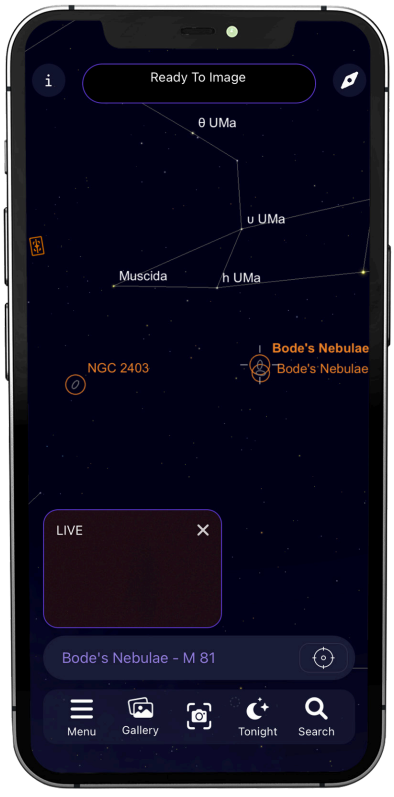
CELESTRON

origin®

INTELLIGENT HOME OBSERVATORY

INSTRUCTION MANUAL

#12100 ENGLISH



Congratulations on purchasing Celestron Origin, and welcome to a new world of adventure.

Celestron Origin stands at the forefront of a new era in amateur astronomy, blending stargazing and astrophotography into a single, user-friendly experience. Your intelligent, all-in-one home observatory takes the complexity out of using a telescope and transforms your backyard into a gateway to the cosmos. Packed with cutting-edge technology, Celestron Origin captures the beauty of celestial objects and brings them to life on your phone or tablet.

This manual contains a lot of information, but Origin is simple to use. We recommend reading through at least the first few sections to get oriented before using Origin at night. Then, as you use Origin and become more familiar with its basic operation, you can read on to learn about its advanced features.

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1. Getting Started

Please refer to the included Quick Setup Guide for initial setup instructions.

We recommend that you keep all the packaging provided with your Origin. If you need to ship Origin to another location, or if it ever needs to be shipped to Celestron for service, the original packaging will come in handy.

CELESTRON origin APP POWERED BY SkySafari™

Don't forget to download the Celestron Origin Powered by SkySafari™ App from the Apple App Store or Google Play.

Minimum device requirements:
- Android OS 12 or greater
- iOS 16 or greater (iPhone 8 and up)

Available on the App Store

ANDROID APP ON Google play

Origin's power source is its internal rechargeable battery. Fully charge the battery using the included AC adapter before you use Origin for the first time. The AC adapter has four different plugs for various international standards. Choose the appropriate plug for your region and install it on the adapter. Then, plug the AC adapter into a wall socket and the other end into the power jack at the bottom of the Origin mount (Figure 1).

Figure 1: The included AC Adapter plugs into Origin's 12V DC power jack.

When you're ready to observe, take Origin outside and place it in the area of your observing site with the fewest obstructions. If your observing site contains railings or fences, extend Origin's tripod legs to avoid them. (Remove the mount and optical tube before extending the tripod legs.) Use the integrated bubble level at the top of the tripod to ensure it is reasonably level (within 5° of true level).

Turn on Origin with the power switch on the mount. Wait about a minute for Origin to boot up. When Origin is ready to connect, the red LED status ring on the rear cell will change from pulsing to spinning counterclockwise. Open the Origin app on your device. The first time you open the app, the Quick Start Guide will appear. Please read through the Quick Start Guide carefully. You can swipe to go back and forth between the screens.

When you first open the Origin app, it will ask for several permissions:

Photo Library – Origin needs access to your Photo Library to store your completed images. We recommend allowing full access.

Location Services – Origin needs access to your location to align itself to the night sky. We recommend allowing access while using the app.

Local Network – Origin needs access to your local network to connect Origin to your home network. Please select allow.

Connecting to Origin

Direct Connect Mode

Initially, you must connect to Origin's internal WiFi network using "Direct Connect" mode. The app should automatically find Origin's WiFi network and ask you to connect in a pop-up window. The network will be named "Origin-XXX," where XXX is a combination of letters and digits. Once connected, initialization will automatically begin.

NOTE: If you attempt to connect to Origin's WiFi network outside the app, the app will ask you for a network password. The default password is "12345555" but you can change it under Menu>Settings.

When operating Origin in Direct Connect mode, you must remain within 30 feet of the unit. If there are no available external WiFi networks at your observing site, you must operate Origin in Direct Connect mode only. When using Origin at home or where trusted local networks are available, we recommend connecting through your network in "Network Connect" mode. This will potentially provide you with a larger operating range, allowing you to move more than 30 feet away from Origin as you use it.

If desired, you can force Origin to always create a Direct Connect network by enabling the Force Direct Connect setting in Menu>Settings>WiFi Settings.

Direct Connect Mode

Network Connect Mode

You can follow the steps in the Quick Start Guide to set up Network Connect mode. Alternatively, you can configure it from Menu>Settings>WiFi Settings. To start, first connect to Origin in Direct Connect mode. You should see the network you want to connect to under "WIFI NETWORKS VISIBLE TO SCOPE" near the bottom of the screen. Select the network you would like to join, and a pop-up window will appear, prompting you to enter the network's password. Once you enter the password, you should see the network under "CONFIGURED WIFI NETWORKS." Origin will then restart (this takes about 30 seconds) and reconnect to the app through this network.

The next time you connect to Origin, it will scan the environment for any network you have configured previously. Origin will begin to initialize immediately if it successfully connects to a configured visible network. If Origin does not successfully connect to any configured networks, it will create a Direct Connect network.

Network Connect Mode

Troubleshooting

The WiFi logo in the upper left corner can help you connect (Figure 2). If Origin doesn't automatically connect to your smart device, press the WiFi logo and select "Connect." Alternatively, you can choose "WiFi Settings," and the app will take you to the Menu>Settings>WiFi Settings screen, where you have additional connection options, including the Run Network Quick Setup Quick Start option, which loads the Quick Setup Guide screens.

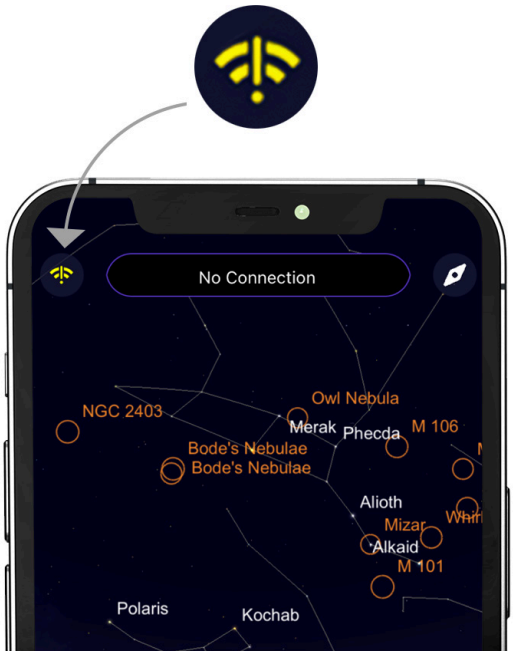


Figure 2: The WiFi logo in the upper left corner of the Planetarium View can help you get connected.

Initialization

Once Origin connects via Direct or Network Connect mode, initialization begins automatically. Origin will point itself up, then focus itself. Then, it will move around and align itself with the night sky.

During initialization, you can follow along with the Picture-in-Picture within the Planetarium View or Camera View. You'll see the stars focusing as Origin focuses, and stars streak by as Origin slews across the sky. Once initialization is complete, Origin will report "Ready to Image."

Of course, if you connect to Origin during the day, it will fail initialization, as it needs to see stars to focus and determine where it is pointing. Origin will only initialize successfully when the sky is sufficiently dark.

If you wish to cancel initialization, press the "Cancel Initialization" bar at the top of the screen. Remember that Origin will not work at night until initialization with the sky is complete.

After initialization, the next step is to select an object to image.

GETTING ORIENTED

Planetarium View

The main screen or home screen is called the "Planetarium View." This screen has the interactive planetarium sky chart (Figure 3) and access to all of Origin's functions.

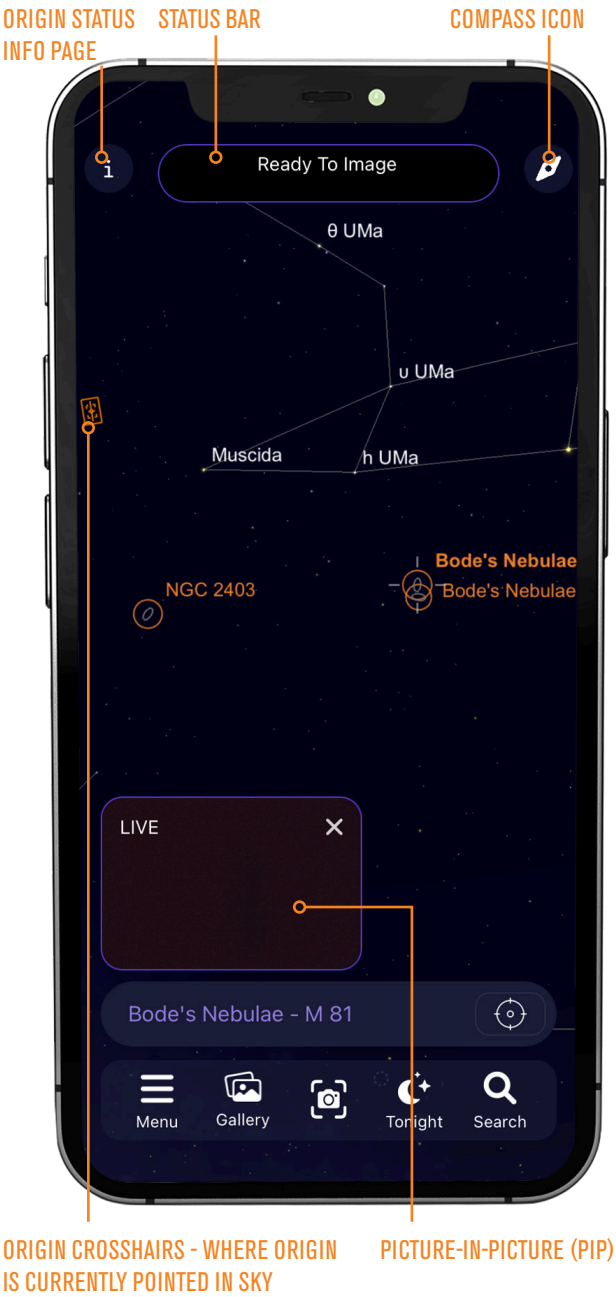


FIG 3: The Planetarium View is the "home screen" where you can select objects to view and access Origin's features. You can see the Camera View in the Picture-In-Picture.

Planetarium Functionality

You can move around the sky within the app's Planetarium View by swiping. To zoom in or out, you can "pinch" the screen.

You can also move around the sky in Compass mode by tapping the compass icon in the upper right corner. Compass mode uses your smartphone's accelerometer and gyro to match the view onscreen to the sky overhead. You can now hold your smartphone up to the sky, and the planetarium will match the night sky behind it. It's a great way to move around the Planetarium View outside, as it helps you learn the positions of objects from your observing location. To exit Compass mode, simply tap onscreen.

Selecting an Object

As you move around the Planetarium View, you'll see objects highlighted with orange circles. These are the best objects to target. To select an object, tap it onscreen. Once selected, the object will show selection crosshatches around it, and its name will appear in the Object Info bar (Figure 4).

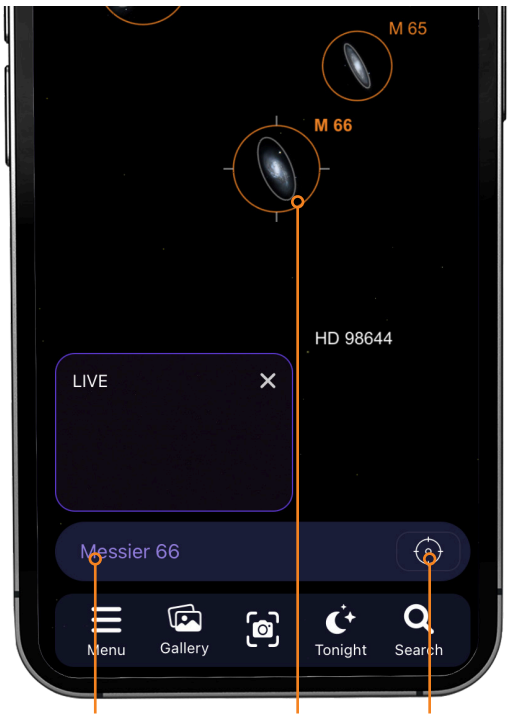


FIG 4: The Object Info bar indicates the currently selected object. Tapping it displays additional options.

You don't have to select only the highlighted objects; you can choose any object within the Planetarium View. You can select stars or any of the object icons that appear. Zoom in, and you'll see fainter objects.

To point Origin to the selected object, tap the crosshairs icon next to the Object Info bar, and Origin will slew to the object. You can also press the Object Info bar and select "Center Object." To access the object information screens, press the Object Info bar and select "Object Info" from the options provided.

A handy way to find objects to observe is by tapping the Tonight icon at the bottom of the Planetarium View. Selecting this will display a list of all the best objects currently visible from your location. Choose an object from the list to see its Object Info screen (Figure 5). From there, you can press the Locate icon at the bottom to find the object in the Planetarium View. You can also press the Center icon, and Origin will automatically slew to the object in the sky.

Another way to find objects is via the Search icon. You can enter an object's name or designation in the search bar or select one of the object folders and choose from the list. Once you select an object, you'll see its Object Info screen. From there, you can Locate or Center the object as described above.

Picture-in-Picture (PIP)

In the lower-left corner of the Planetarium View, you'll see the "Picture-in-Picture" (PIP), which displays a live feed from Origin's camera. You can reposition the PIP within the Planetarium view by dragging it. Press the "X" in the upper right corner of the PIP to hide the PIP in the lower left corner. Tap the right chevron that subsequently appears to unhide the PIP. You'll see the full Camera View if you tap anywhere on the PIP screen. The PIP and Camera View display the same view, but the Camera View fills the entire screen.

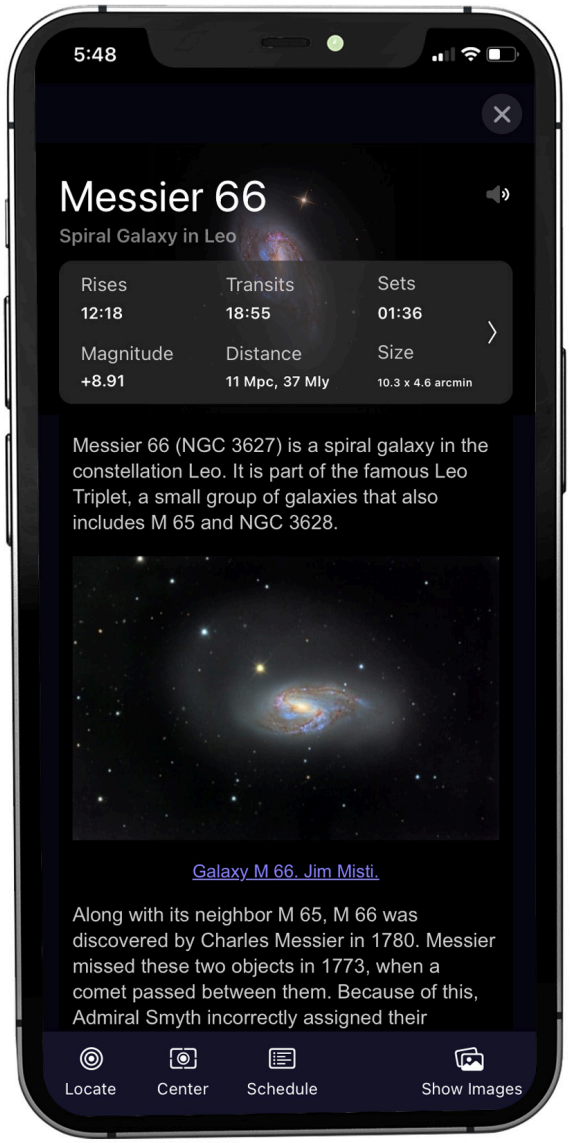


FIG. 5: The Object Info screen gives information about the selected object. Swipe right to access all the screens. The Locate and Center options are at the bottom of the screen.

Camera View

Besides the Planetarium View, the other main screen is the Camera View (Figure 6), which you can access by tapping the camera icon or the PIP screen.

The Camera View shows you a live feed from Origin's camera. It's also where you initiate imaging sessions (by pressing the Start Imaging button) and where you can adjust the camera settings (by pressing the up chevron).

In Camera View, Origin shows you what it sees during initialization. When Origin is focusing, you can see the stars coming in and out of focus in the live video. When Origin slews around the sky, you'll see the stars streak by!

Once Origin is pointing at an object you would like to image, enter the Camera View and press the "Start Imaging" button at the bottom of the screen. Origin will then begin capturing 10-second exposures and automatically stack and post-process the images using its built-in artificial intelligence (AI) algorithms.

The first 10-second exposure will show a lot of detail, but more detail emerges as Origin captures more 10-second exposures and adds them to "the stack." After a few exposures, improved noise reduction will kick in. When you're ready to stop imaging, press "End Imaging" at the bottom of the screen. Origin will download, process, and display the final stacked master. Then, it will automatically save that image to the Image Gallery and your device's camera roll.

Near the top of the Camera View, you'll see the name of the object currently selected. Above that is the Status Bar, which communicates what Origin is doing. During imaging, the Status Bar will indicate the total number of stacked images and the total integration time. It will also indicate when the app is downloading and processing an image from Origin and will even let you know the current bandwidth speed. Below the object name, you'll find the Progress Bar. This will fill as the current sub-exposure is captured and reset when the next sub-exposure begins.

At the bottom of the Camera View, next to the Start Imaging button, you'll see the Reframe and Filter buttons.
You can use the Reframe button to fine-tune your composition before imaging by recentering the view on any spot in the frame. Press the Reframe button, and a crosshair will appear on the image. "Drag" the image until the crosshairs coincide with where you want to recenter the frame. Then press "Center Here," and the telescope will reposition so the selected spot lies in the center of the frame.

You'll only use the Filter button when you have placed optional filters into Origin's integrated filter drawer. We'll discuss this button in this manual's "Filters" section.

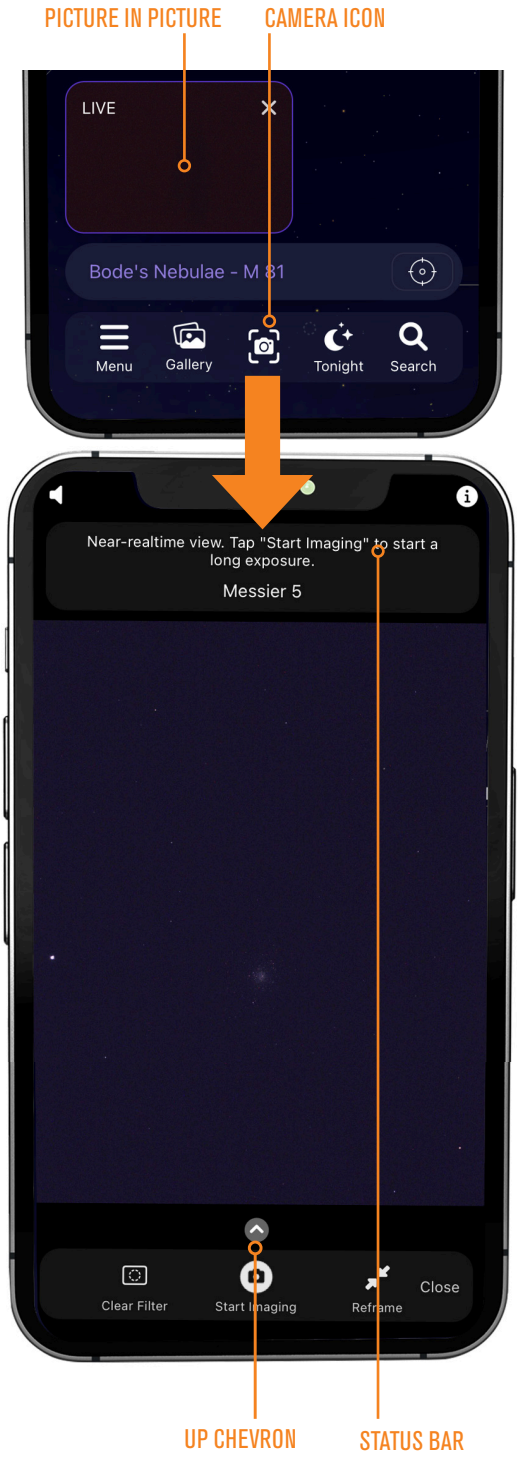


FIG 6: The Camera View is where you observe objects being imaged. It's also where you can access the manual camera controls by tapping the up chevron.

Object Info View

As you are imaging, you can peruse information about the object by pressing the Info button in the upper right corner of the Camera View (Figure 7). This takes you to the Object Info page for the selected object. You can also listen to audio presentations for over 200 of the most popular celestial objects by pressing the speaker icon in the upper left corner of the Camera View.

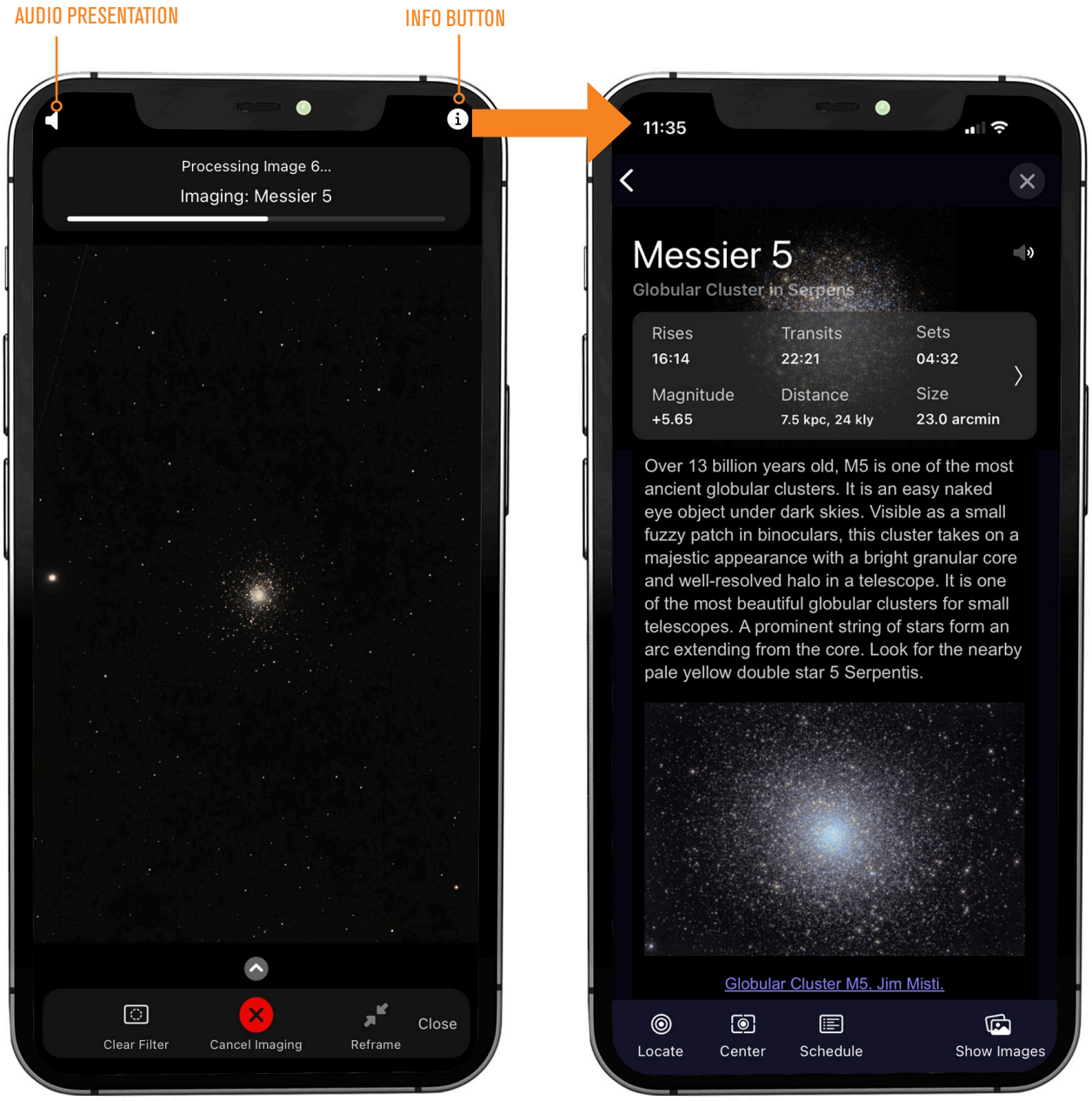


Fig. 7: During imaging, you can read information about your chosen object or listen to an audio presentation by using the icons in the upper left and upper right corners.

2. Your First Night Out with Origin

Here are the steps to follow for basic operation:

1. Download the Celestron Origin app from the Apple App Store (iOS) or Google Play (Android).

2. Place Origin outside, where it has a clear view of the sky.

3. Turn on Origin.

4. Open the app.

5. Directly connect to Origin's WiFi network.

6. If Origin is within range of your home WiFi network, set up Origin to connect through your home network.
   a. The next time you launch the app, it will automatically check the home network to see if it can find Origin. You won't need to set up a connection through your home network again.

7. Once connected, Origin will autofocus and orient itself to the night sky (i.e., initialization). This process takes about 90 seconds.

8. Select an object to view from the Planetarium View by tapping one of the highlighted objects onscreen.

9. Slew Origin to the selected object by pressing the crosshairs icon to the right in the Object Info bar at the bottom of the screen (refer to Figure 4).

10. Switch to Camera View by pressing the Camera icon at the bottom of the screen.

11. Press the Start Imaging button in the bottom center of the screen (refer to Figure 6). The first image will appear onscreen in about 10 seconds.

12. Continue observing the image as it gets brighter and more "burned in" onscreen.
   a. You can peruse object info and audio presentations using the info and speaker icons at the top corners of the screen.

13. When you are done observing/imaging, press End Imaging. Origin will download, process, and save the final image to the gallery and your device's camera roll.

14. Switch back to the Planetarium View by closing the Camera View. Then select another object to observe and image.

15. When you finish observing for the night, power off Origin and bring it inside.
   a. After switching the power off, Origin takes about 7 seconds to complete its "safe shutdown" routine.

Low Bandwidth Warning

If the bandwidth between your mobile device and Origin becomes less than 0.2 MB/sec, the Low Bandwidth warning will appear, and you may notice that images take longer to download. If this happens when directly connected to Origin, we recommend moving your device closer to Origin (i.e., within 10 feet). If you receive a Low Bandwidth warning while connected to Origin through a home network, you may need to move Origin and/or your smartphone closer to your WiFi router, reboot your router and reconnect, purchase a WiFi extender, or upgrade your WiFi router. Consult Appendix A in this manual for more information. Remember, you can always use Direct Connect mode if you have issues with your home network.

3. Status LEDs and Origin Status

Origin has LEDs to provide “status-at-a-glance” functionality outside of the app, which allows you to check Origin by looking at its lighting pattern. The status LEDs help you understand what Origin is doing and assist with troubleshooting.

Status LED Ring

You’ll find the Status LED Ring on the back of Origin’s rear cell (Figure 8). The ring has eight individual segments and provides “status-at-a-glance” functionality. The status LED ring can also indicate if there is a problem.

Fig. 8: The LED ring on Origin’s rear cell provides status-at-a-glance.

Pattern	Meaning
Counterclockwise swirl	Origin has established its own network and is waiting for the mobile app to connect.
Clockwise swirl	Origin has connected to your local WiFi network and is waiting for the mobile app to connect.
Solid ring	Origin has established a connection with the mobile app and is awaiting commands.
LED #3 and #7 (left and right) are alternating	Origin is busy with a long task (e.g., focusing).
Fill in a clockwise direction	An exposure is in progress.
All LEDs - repeating stepwise increase in brightness	Origin is booting up.
All LEDs - repeating stepwise decrease in brightness	Origin is shutting down.
Pendulum - swinging back and forth	Origin is reconfiguring the WiFi network.
One LED Blinking (top LED)	A firmware update is in progress.
One LED Blinking (closest to the dovetail bar)	There is a hardware malfunction.
Slow fill from bottom to top	The hardware is not calibrated.

You can find animations of some of the LED ring patterns at https://software.celestron.com/Origin/led-patterns.html

Mount LEDs

There are two LEDs on the Origin mount—one faces outward behind the battery icon on the side of the mount, and the other faces inward and conveniently illuminates the center of the mount itself (Figure 9). Only the LED behind the battery icon has status patterns. The tray light is always on or off, depending on how you have configured it under Menu>Settings>Advanced in the app.

The battery icon LED on the mount indicates the power status:

Pattern	Meaning
Repeating stepwise increase in brightness	Battery charging
Steady On	Discharging (or fully charged if plugged in)
Slow Blinking	Discharging and battery is low or critically low
Fast Blinking	Battery fault
Repeating stepwise decrease in brightness	Origin is completing its shutdown sequence and will shut down in seven seconds.

It is normal for the battery to display the fast-blinking “battery fault” pattern for a few seconds immediately after you plug it into external power via the mount’s 12V power jack. You may also see the battery fault warning if the battery is too warm or cold to charge.

Fig. 9: There are two LEDs on the Origin mount. The battery icon LED indicates power status.

Origin Status Page

Once you connect to Origin with your device, you can access the Origin Status page by pressing the info icon in the upper left corner of the Planetarium View. The Origin Status page (Figure 10) gives information about Origin's current operating status and can help you monitor performance.

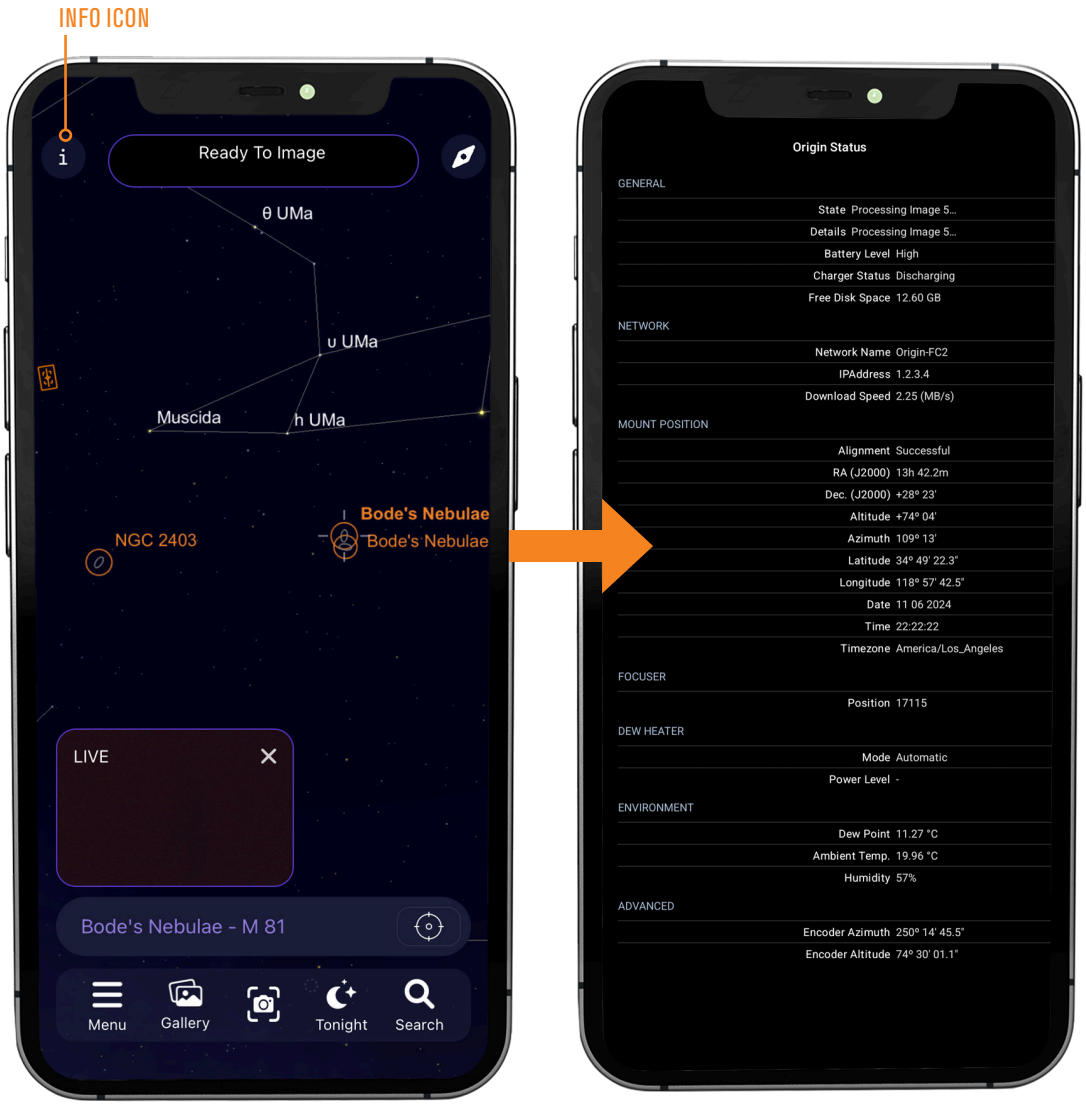


Fig. 10: You can access the Origin Status page from the Info icon in the upper left corner of the Planetarium View.

4. Manual camera settings

Once you are comfortable with Origin's basic operation, you can try using manual camera settings instead of automatic ones. You can customize the duration of the sub-exposures and the ISO (i.e., gain) setting.

To access the manual camera settings, press the up chevron above the Start Imaging button in the Camera View (Figure 11). Press the Auto button on the far left to toggle from Auto to Manual camera settings.

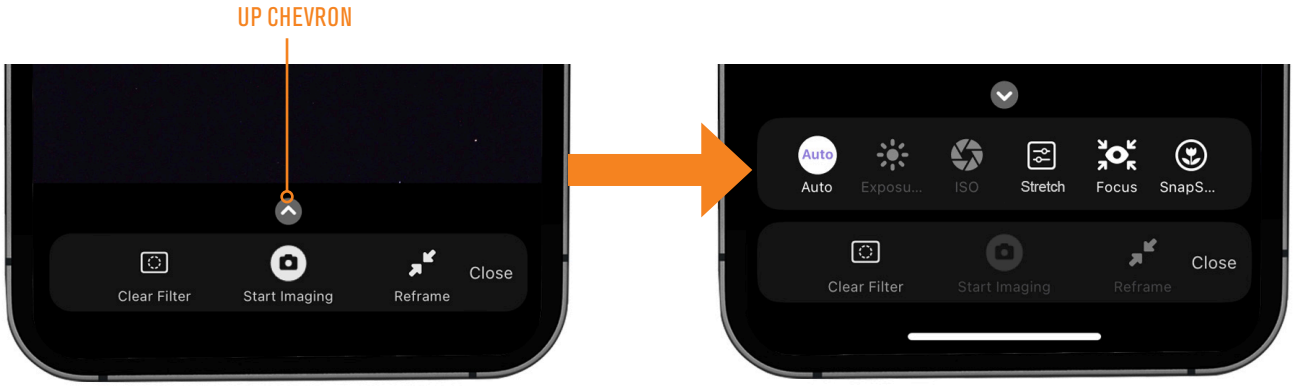


Fig. 11: Access the manual camera settings from the Camera View by pressing the up chevron.

Sub-exposure Duration

To manually set the sub-exposure duration, press the "Exposure" button. To set the number, tap it, and a number keyboard will appear. You can also use the "+" and "-" buttons to increment the number. To change the unit of time, tap it. We recommend using seconds for normal operation at night.

- For exposures under one second, use SnapShot mode (explained later in this manual).

- The maximum sub-exposure time is 30 seconds due to field rotation from the altazimuth tracking mount, which is normal. If the object is close to the zenith, you will need to use shorter sub-exposures.

ISO (Gain)

To manually set the ISO, tap the ISO button and select ISO 200, 500, 1000 (default), 2000, 5000, or 10000. Use ISO 1000 most of the time. You can try a higher ISO if you are imaging from very dark skies or using a narrowband imaging filter. Otherwise, the gain will be too high for the Origin to recognize star patterns, which will cause Origin to fail. If this occurs, Origin will display a warning message and you should use a lower ISO value. You can try ISO 500 for bright targets, like stars or clusters, to minimize noise by sacrificing some signal strength. ISO 200 can be useful for daytime and lunar imaging in SnapShot mode.

Stretch

Tapping the "Stretch" button reveals two sliders: "Stretch" and "Background." Use these sliders while imaging. When you make an adjustment, you'll see the effect onscreen when the subsequent sub-exposure is processed.

The "Strength" slider adjusts the image stretch strength. In astronomical image processing, stretching helps bring out faint details in an image. However, applying too much stretch can introduce artifacts or other strange-looking results. Origin's default stretch

strength setting works well for most objects, but for faint, diffuse targets under dark skies—like certain nebulae or galaxies—you may get better results by increasing the stretch strength to reveal more subtle features. Experiment with a few different levels during imaging to see what works best for your target and observing conditions. The stretch strength will also apply to the final stacked master produced within the app. However, it will not apply to the individual raw files saved on Origin (if you have chosen to save raws under Menu>Settings>Advanced).

The “Background” slider adjusts the average black level for the background sky after stretching. Lower values make the background darker; higher values brighten it. If your target object is small in the field of view, such as a small galaxy, the default background value works well. However, if the your target is large in the field of view, such as a wide-field nebula, you can set this value a little higher since there is almost no true completely dark background sky. In this case, raising the background value brings out the faint nebulosity around the object.

We recommend adjusting the strength slider first, then adjusting the background if needed for objects that fill the field of view.

Focus

You can either autofocus or manually focus your Origin. To autofocus, press “AutoFocus” on the far right (Figure 12). In most cases, the AutoFocus button is all you will need. Remember that Origin will autofocus as a regular part of its initialization routine, so you should not need to rerun it under most circumstances.

To manually focus, use the -100/-10/+10/+100 controls to move the focuser in and out until stars come into sharp focus. You can see the relative position of the focuser under “Focuser Position.” Each complete turn of the focuser knob equates to 1000 counts.

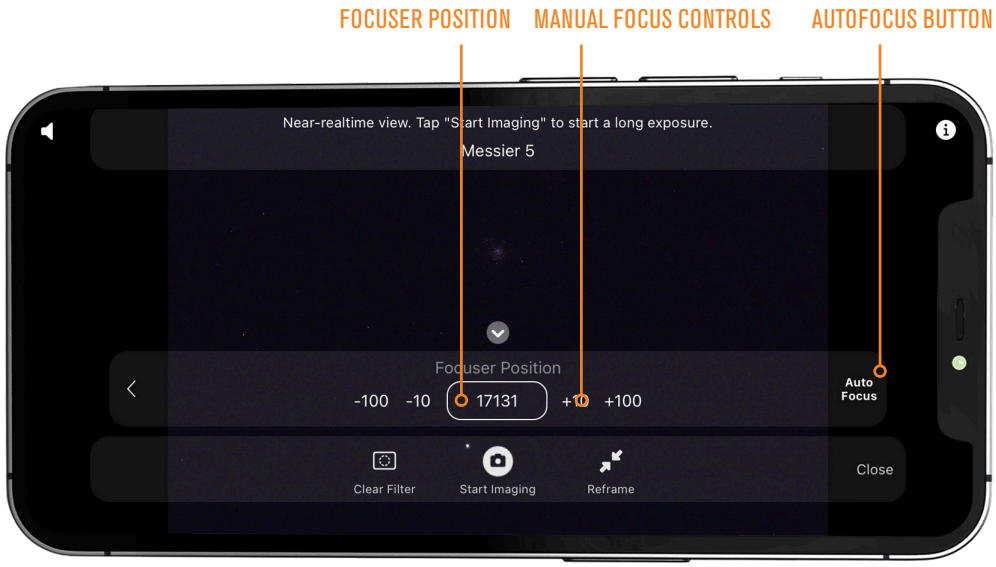


Fig. 12: Use the focus icon to access autofocus and manual focus controls. The Focuser Position can also provide useful information.

SnapShot

In SnapShot mode, stacking is disabled. Origin will take a single snapshot and save it to your device’s camera roll. SnapShot mode is ideal for sub-exposures under one second and is the correct mode for terrestrial imaging or imaging the Moon and planets. The toggle to turn SnapShot mode on and off is in the manual camera settings. Please refer to Section 9 of this manual for more information.

5. Use of Optional Filters

A great feature of Origin is its built-in filter drawer, which allows you to use astronomical imaging filters in the standard 1.25” or 2” formats. The most useful filter is likely the optional Nebula Filter for Origin offered by Celestron, but you can experiment with other filters, too.

Fig. 13: Remove the lens shade by pressing down on the two tabs with one hand while pushing upward under the Origin logo.

Using the Optional Nebula Filter for Origin

Installing the Nebula Filter for Origin is easy. First, in the app, press the “Clear Filter” button to the left of the “Start Imaging” button in the Camera View (refer to Figure 6). The app will prompt you to install the Nebula Filter in Origin. First, remove the lens shade from the front of the Origin optical tube by pressing down on the two tabs on the exterior of the lens shade with one hand while pushing upward under the Origin logo located 180° away from the tabs (Figure 13). Removing the lens shade will expose the Origin camera. The filter drawer lies between the camera and the front optics, held in place by magnets (Figure 14).

NOTE: The filter drawer has two pieces of tape to prevent it from dislodging during shipment. Before removing the filter drawer for the first time, remove the tape. If you ever ship the Origin optical tube, re-tape the filter drawer. You won’t need to re-tape for regular transport, as the drawer’s magnets are strong enough to secure it in place.

Grasp the drawer’s handle with your fingers and pull outwards to release the filter drawer from its securing magnets (Figure 15). You’ll see the clear filter already installed in the filter drawer.

The clear filter is essential to maintain the Origin’s optical properties when using filters. Without the clear filter, adding another piece of flat glass (like the Nebula Filter) to the optical system without removing a piece of glass (like the

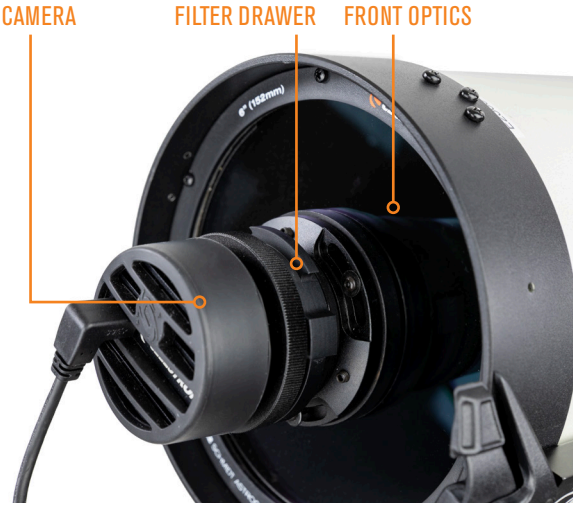


Fig. 14 The filter drawer is located between the camera and the front optics.

Fig. 15: Grasp the drawer’s handle with your fingers and pull outwards to release it from its magnets.

clear filter) would affect the system's performance at f/2.2. So, a filter should always be installed in the drawer, either the included clear filter, the optional Nebula Filter, or some other astronomical imaging filter you wish to use.

To change the filter, unthread the clear filter from the drawer, and thread in the Nebula Filter. Make sure to put the clear filter in a safe place! Reinstall the filter drawer into Origin, orienting it as shown in Figure 15. When the magnets connect to the drawer, you'll feel it "click" into place. Finally, reinstall the lens shade onto Origin.

Now, go back to the app and indicate that you have changed filters in the pop-up window. The app will ask if you want to re-autofocus, which you should do. Now, you are ready to image with the Nebula Filter. The app will also update the default settings, using 15-second sub-exposures at ISO 1000 for the best performance with the filter. Remember, you can always change the camera settings manually.

When you are done using the Nebula Filter, either at the end of the night or if you want to resume imaging broadband objects, reinstall the clear filter. Before doing this, press the Nebula Filter button in the lower left corner of the Camera View. The app will direct you to reinstall the clear filter. Then press OK. After reinstalling the filter and pressing OK, you'll be asked if you would like to autofocus again. Choose this option. After autofocusing is complete, you're ready to resume imaging.

If you disconnect from Origin with the Nebula Filter installed, Origin will automatically ask you if the Nebula Filter is still installed when you reconnect.

Using Other Filters

You can use any appropriate third-party astroimaging filters in 1.25" or 2" format with your Origin. The maximum shoulder height for the filter to fit in the drawer is 8mm, which should accommodate most filters.

To install third-party 1.25" filters, follow the same instructions for the Nebula Filter for Origin. For 2" filters, in addition to removing the clear filter, you also need to remove the 1.25" filter adapter ring, which is the part that the 1.25" filters thread into (Figure 16). Grasp the knurled edge of the ring with your fingers and rotate it counterclockwise. Once you remove the ring, you'll see the 2" filter threads.

When using other filters, we recommend pressing the clear filter button, which will instruct you to remove the clear filter, and then install the "Nebula Filter," which, in this case, can be any filter you choose. The app will ask if you want to re-autofocus, which you should do. Now, you are ready to image with your filter. The app will update the default settings using 15-second sub-exposures at ISO 1000. Remember, you can always change the camera settings manually.

If your filter's glass is much thicker than 2.0mm, it may put the focus point out of range of the autofocusing routine. A pop-up will appear. Use the manual focus controls to get stars reasonably in focus, then try pressing the AutoFocus button again.

Also, depending on the filter, AI image processing may not provide the best results; you may want to process the raw images manually. You can turn off some (or all) AI image processing under Menu>Settings>Advanced.

Fig: 16: Remove the drawer's 1.25" filter adapter ring to expose the 2" filter threads.

6. Image Gallery

After you complete an image, Origin stores it in the app's Image Gallery and your device's camera roll. You can access the Image Gallery anytime by tapping the Gallery button at the bottom left of the Planetarium View (Figure 3).

IMPORTANT NOTE: If you manually delete an image from your device's camera roll, it will also be deleted in the Origin app's gallery.

When you open the gallery, the screen will look like Figure 17. There are three sections at the top of the gallery:

"All Photos" displays all images taken with the Origin, sorted in chronological order.

"Favorites" displays only the images you've selected as favorites.

"Recent" displays only the images you've captured during the past day.

You can also search the gallery by object name for your desired image.

When you select an image, you'll see a screen similar to the one you saw when you originally downloaded and processed the image (Figure 18). From here, you have several options:

"Favorite" allows you to mark images as favorites for easy access in the gallery from the "Favorites" section.

"Share" allows you to send images to friends, family, and/or social media.

"Delete" permanently removes the image from the gallery AND your camera roll.

"Edit" allows you to make some manual post-processing adjustments.

"Info" gives you detailed information about the image's parameters

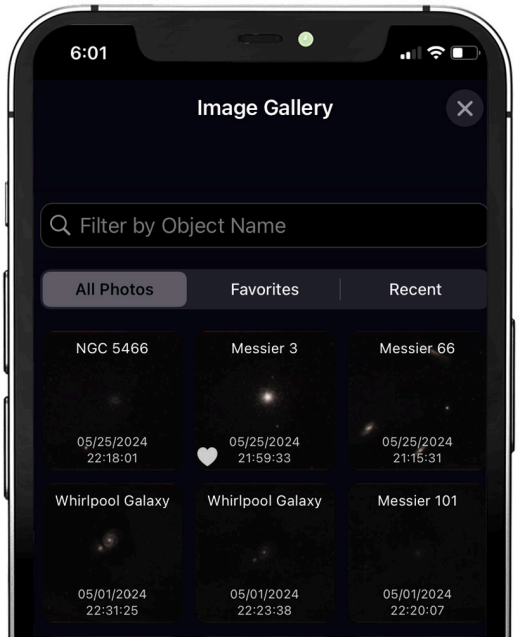


Fig: 17: The Image Gallery is where you can view and share all the images you've captured with Origin.

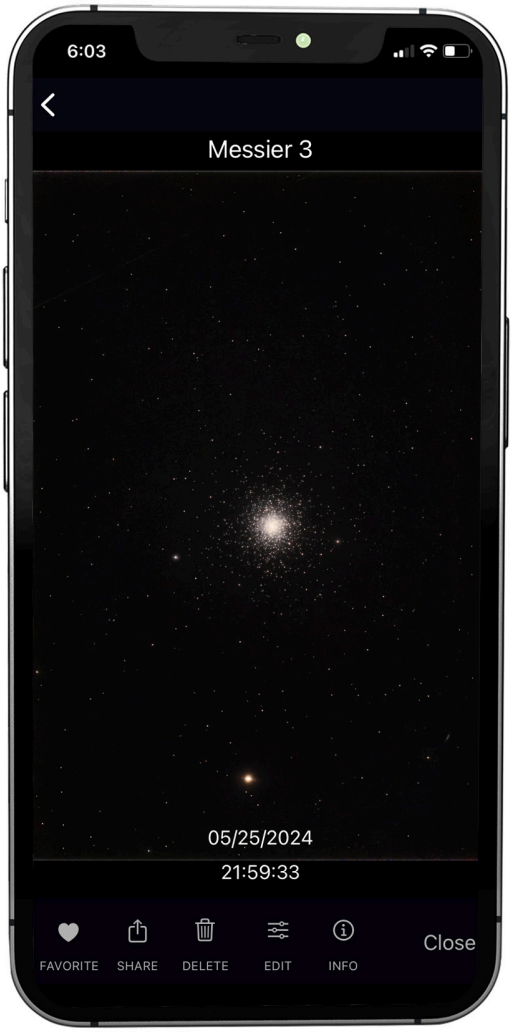


Fig: 18: From the Image Gallery, you can select an image to edit or share.

Sharing Images

Sharing images requires a connection to the internet. If your device is connected to Origin via Network Connect mode, you should be able to connect to the internet. If you are in Direct Connect mode, you won't be able to share images unless you have cell service.

After tapping the Share button, you'll see a screen that looks like Figure 19. The buttons at the bottom of the screen allow you to customize the image further before you share:

"Exposure" displays the total exposure time in the lower left corner.

"Name" displays your name in the lower left corner.

"Date" displays the time, date, and location where the image was captured in the lower left corner.

NOTE: The location may not be exact. The app displays the nearest location in its database.

"Object" displays the object's name in the lower left corner.

"Logo" displays the Origin logo in the bottom right corner.

"Crop" allows you to crop the image before sharing. This is especially useful for smaller objects that only take up a small section of the larger frame.

As you make changes, you'll see them in the preview image. When you're ready to share the image, press the Share icon in the top right corner. You'll see several ways to share, depending on the other apps you have installed. You can even share directly to social media!

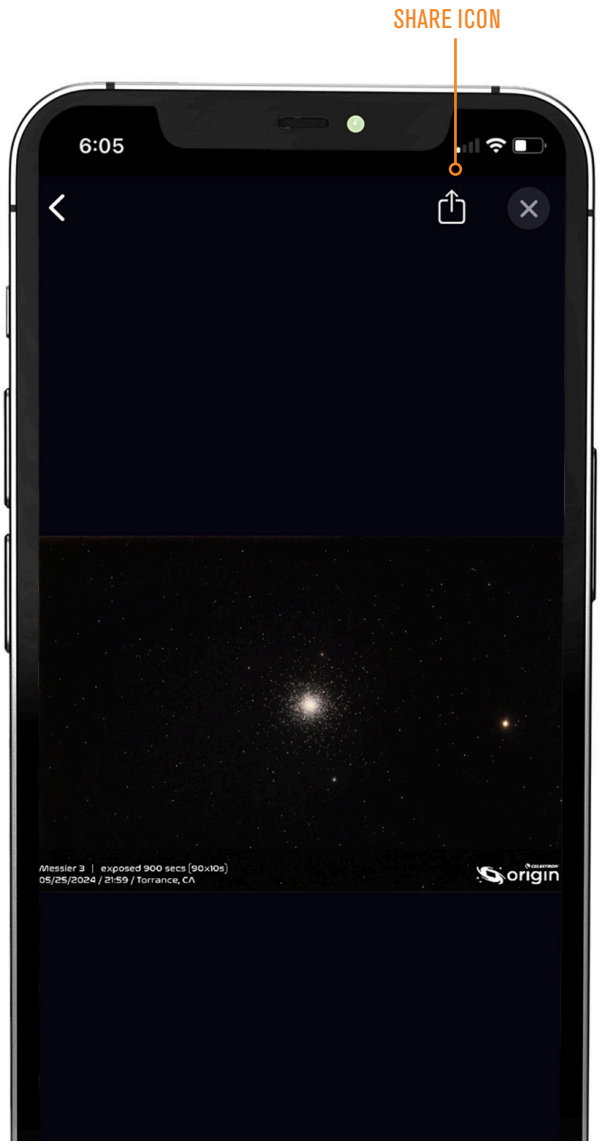


Fig: 19: After pressing Share for an image in the gallery, you'll see additional options. Press the Share icon when the image is ready to share.

Note about Image Resolution and File Formats

For Android devices, shared images will be high-resolution in PNG. For iOS devices, however, the shared images are compressed JPG files. This is because the saved images on iOS devices default to the HEIC format, allowing photos to have smaller file sizes while retaining a higher image quality. To obtain high-resolution images from your iOS devices, consult Apple online resources.

Recovering Final Stacked Masters

If you have deleted an image from the Image Gallery or if the final stacked master image otherwise fails to download automatically after ending imaging, you can download the image from Origin again. To do this, press the Menu icon, then "Settings", then "Manage Files", then select the relevant image folder and choose "Download Stacked Master."

7. Scheduled Imaging

One of Origin's most interesting functions is its ability to perform scheduled imaging sessions whether you are actively observing or not. You can set up a list of objects, disconnect your device, and let Origin automatically image the objects on your list. When you come back later and reconnect, you'll be able to download the images. You even have the option to power off Origin automatically after the schedule completes!

You can create "Tonight's Imaging Schedule," run the list, go to bed, wake up, power on Origin, and download your images. It's that easy! Or you can take a real-time automatic sky tour by creating a list of objects and sitting back as Origin automatically images the list and displays the results.

It all starts with Tonight's Imaging Schedule. There are a couple of ways to add objects to your schedule:

For objects selected in the Planetarium View, press the Object Info bar, then select "Add to Tonight's Imaging Schedule" from the pop-up menu.

From the Object Info pages, tap the Schedule icon at the bottom of the screen.

Once you've added all your desired objects to Tonight's Imaging Schedule, go to Menu>Tonight's Imaging Schedule. You'll see the objects you have added to the list. To remove an object in iOS, swipe left on it, then press the Delete button that appears. For Android, press the Edit button in the upper left corner, select the object you want to remove from the list, and press the Delete icon.

There are two additional options located at the top of the screen. "Power Down Scope On Completion" instructs Origin to automatically power itself off after completing the list. This is ideal for scheduling imaging sessions before you go to bed.

NOTE: Be sure weather and safety conditions allow Origin to be left outside all night!

"AutoFocus After Each Object" instructs Origin to automatically focus after it moves to a new object in the list and before imaging starts. This can be useful if you are imaging many objects across the sky over an extended time, as it ensures excellent focus throughout the imaging run.

To run Tonight's Schedule, simply press "RUN SCHEDULE NOW." Origin will begin by moving to the first object in the list. Once the schedule is underway, you can close the app (and go to bed!) or watch the Camera View as Origin images the objects on the list. If you want to interrupt the schedule and skip to the next object, press "Skip to Next Object" towards the bottom of the Camera View. To cancel the schedule, press the Cancel Schedule button at the bottom of the Camera View.

Origin automatically parks in a designated "home position" once Tonight's Imaging Schedule ends. This feature is ideal for users who start a schedule and go to bed while Origin finishes on its own. By morning, the telescope will be securely parked in this safe position, eliminating any risk of it being aimed toward the Sun.

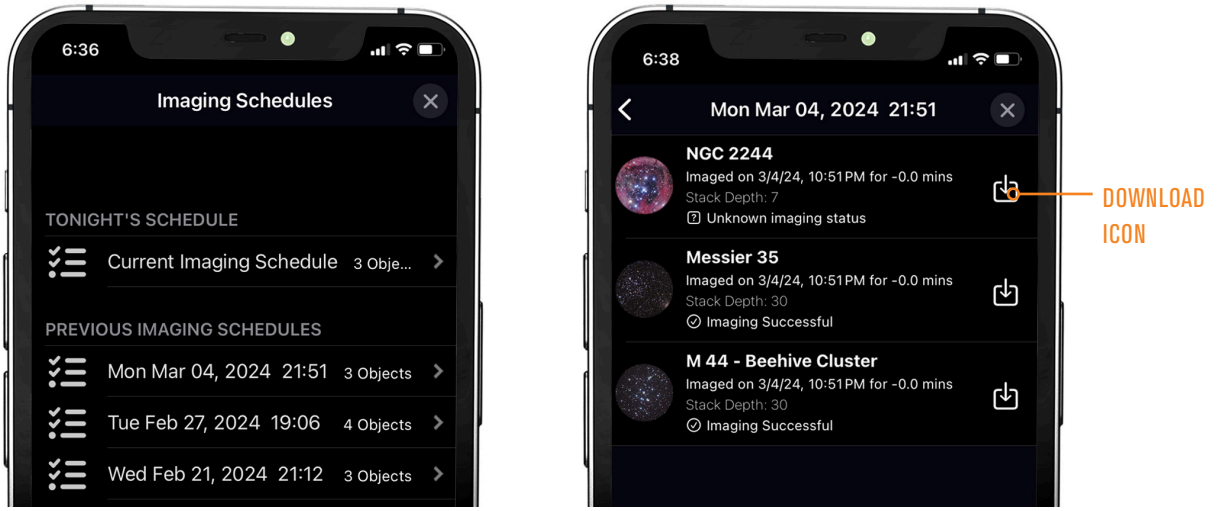


Fig: 20: Find the schedule you ran under PREVIOUS IMAGING SCHEDULES. Once selected, you'll see download icons for objects previously imaged.

To retrieve the images after Tonight's Schedule is complete, go to Menu>Imaging Schedules. Under PREVIOUS IMAGING SCHEDULES, you should see the date and time of the schedule you just ran. Select that schedule, and you should see download icons next to the objects in the schedule that were successfully imaged (Figure 20). Press the download icon, and the image will download into the gallery and your device's camera roll.

NOTE: If you are connected to Origin while running the schedule, the app may download the final stacked masters automatically. If this occurs, you won't see a download icon next to the object in the schedule. Instead, you'll see a right chevron, which takes you to the final stacked master image.

You can usually use the automatic and default settings while running Tonight's Imaging Schedule. The automatic/default settings are as follows:

Image Duration
- 1 minute for stars
- 5 minutes for open star clusters
- 10 minutes for globular star clusters and planetary nebulae
- 20 minutes for galaxies and diffuse nebulae

Camera Settings
- 10-second sub-exposures (15s if Nebula Filter installed)
- ISO 1000

You can also manually change the imaging settings for each object in the schedule from the Tonight's Schedule screen. Tap on an object in the list, and you'll be able to adjust settings (Figure 21):

Image Start Time
- Allows you to set the Minimum Start Time for each object.

Image Duration
- Allows you to set the total exposure time for each object.

Camera Settings
- Allows you to change sub-exposure duration: 10, 15, or 30 seconds.

- Allows you to change the ISO: 200, 500, 1000, 2000, 5000, or 10000.

NOTE: For objects near the zenith, don't use 30 second sub-exposures due to altazimuth field rotation.

NOTE: If you are under light-polluted skies and not using the Nebula Filter for Origin, don't use ISO 10000. The background may become too bright for Origin to see stars and plate-solve.

To delete old schedules under PREVIOUS IMAGING SCHEDULES, swipe left in iOS. For Android, press the Edit button in the upper left corner, select the schedule you want to delete, then press the Delete icon.

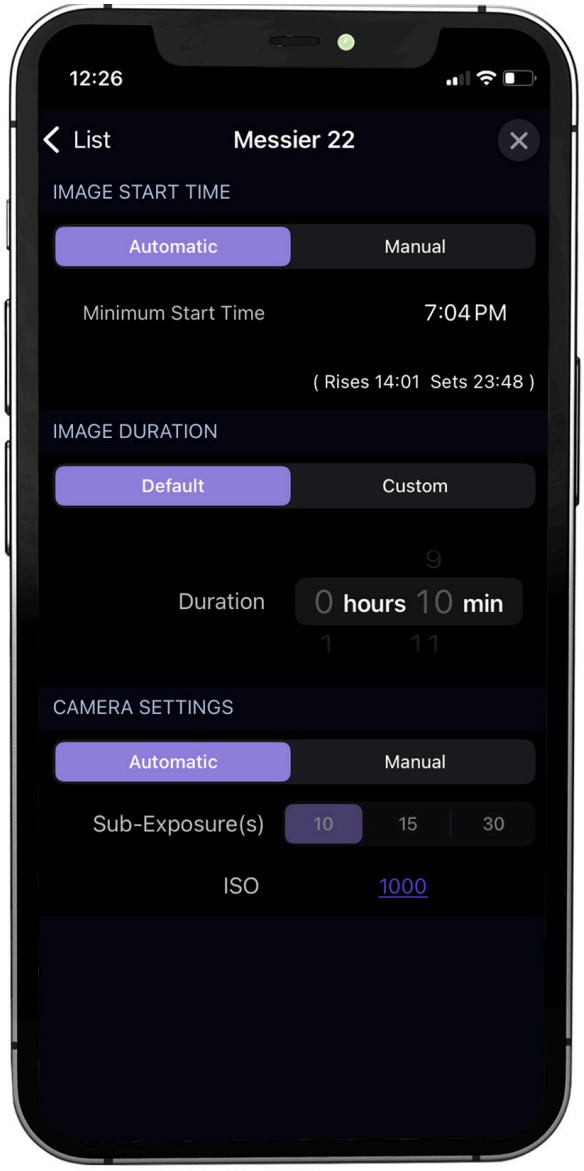


Fig: 21: You can manually adjust settings for each object in the schedule by tapping on it.

8. OneSky

Origin can connect to Simulation Curriculum's OneSky database. Here, you can see which astronomical objects other people are observing with Origin (and other apps from Simulation Curriculum) and how many observers are currently studying each object. This can help you select the best objects to observe and lets you know that others are observing at the same time you are!

To enter OneSky, select Menu>OneSky. When you connect to OneSky, you'll see objects highlighted and a number below each. The highlighted objects are the ones others are observing, and the number denotes the current number of observers for that object. Tap the OneSky icon in the upper left corner for more options (Figure 22).

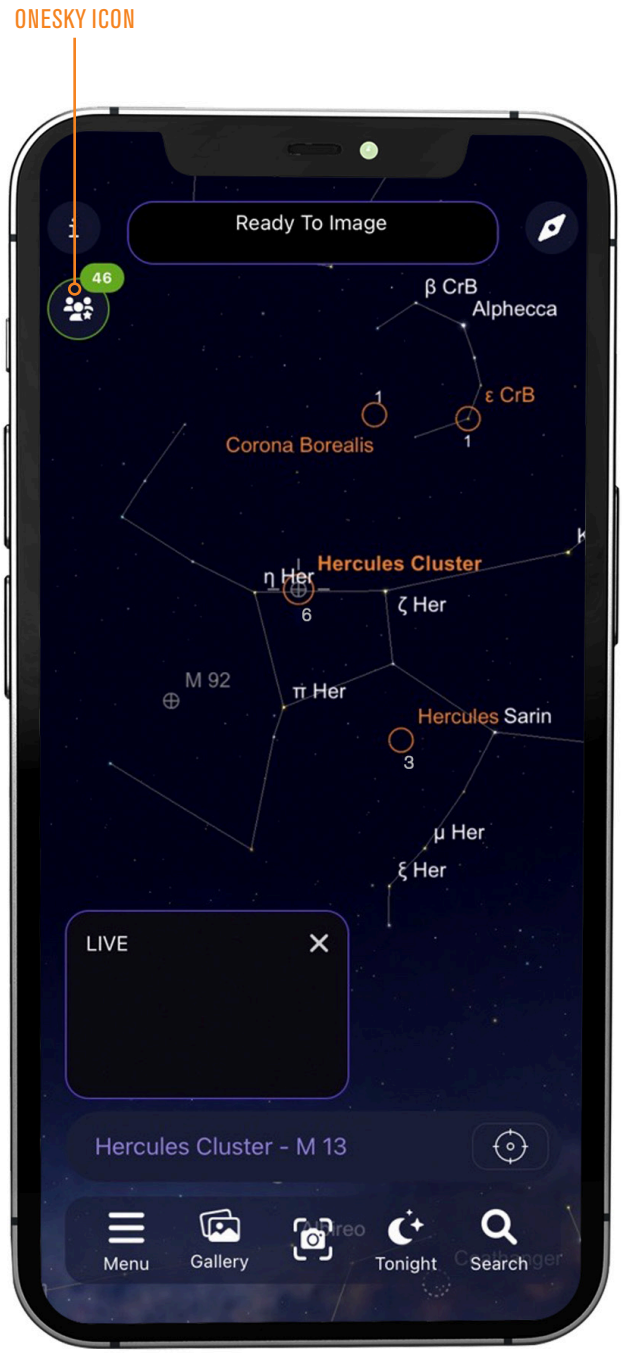


Fig: 22: After entering OneSky, press the OneSky icon for more options.

9. Using Origin for Terrestrial Observing

Of course, Origin delivers dazzling images of objects in the night sky. But did you know it can also capture images of terrestrial (i.e., land-based) objects? During the day, you can use your Origin like a spotting scope to observe vistas, wildlife, or far-away objects. At night, Origin provides "night-vision-like" performance by delivering a large amount of light to its sensitive sensor in a fraction of a second. You'll be able to look around in near-darkness and see things clearly.

To use Origin for terrestrial viewing, you don't need to initialize. In fact, Origin cannot initialize during the day since it needs to be able to see stars to orient itself. To enter Terrestrial mode, power on Origin and connect to it with the app. Then press "Cancel Initialization." (Otherwise, Origin will soon fail initialization anyway.)

SnapShot Mode

For terrestrial targets, you'll use Origin in SnapShot mode. Image stacking is turned off, and when you press the "Start Imaging" button, Origin will capture a single image and send it to your camera roll. SnapShot mode is also the best way to capture images of the Moon and planets.

To launch SnapShot mode, go to the Camera View, press the "up chevron" to access the manual camera controls, then press the "SnapShot" icon that appears. (refer to Figure 11) This will reveal the SnapShot mode slider. Tap the slider to turn it on. You'll notice that the telescope manual slew controls appear, and "SnapShot Mode" is indicated in the Status Bar (Figure 23).

Use the manual slew controls to move Origin until it is pointed at the desired target. The slew controls move Origin in the direction indicated by the arrows. The up arrow moves Origin up, the down arrow moves Origin down, the right arrow moves Origin to the right, and the left arrow moves Origin to the left. When you are holding your device in landscape mode (i.e., horizontally), the arrows will match the apparent direction of the image you see. When you are holding your device in portrait mode (i.e., vertically), the field of view appears rotated 90° clockwise, so the direction arrows do not correspond to the apparent motion direction of the image. For this reason, we recommend using your device in landscape mode during terrestrial imaging.

Fig: 23: When in SnapShot mode, you'll have access to the manual telescope slew controls in the Camera View. These work best with your device in landscape mode.

To focus during the day, tap the Focus button in the manual camera controls. From here, you can either autofocus or manually focus. For autofocus, simply press AutoFocus. Origin can take 30 seconds or more to go through its focus range to find the best focus. If you use the manual focus adjustments, you'll see the current focuser position in the box in the center:

- -1000 turns the focuser = one full turn counterclockwise
- -100 turns the focuser = 1/10th of a turn counterclockwise
- +100 turns the focuser = 1/10th of a turn clockwise
- +1000 turns the focuser = one full turn clockwise

During the day, you can usually use auto camera settings in SnapShot mode. If you're imaging terrestrially at night with low light levels, use manual camera settings to prevent your images from looking too dim. You should also use manual camera settings when capturing the Moon and planets like Jupiter and Saturn.

It is easy to adjust camera settings manually in SnapShot mode, as the Live View image you see onscreen will reflect the ISO and exposures you manually set. Press the up chevron above the "Start Imaging" button and press the Auto button to toggle to Manual camera settings. Then, you can use the ISO and Exposure buttons to change the ISO and Exposure manually. Once the image looks good onscreen, press the "Start Imaging" button to capture a snapshot and save it to your camera roll.

If you are setting manual exposure times during the day, you'll need to use exposures much less than one second to prevent the sensor from becoming saturated (i.e., screen appears all white). Tap the unit of time in the manual exposure settings to change it.

NOTE: When using Origin during the day, never point it at the Sun or slew it across the Sun. Doing so can damage its sensor. Solar imaging requires a full-aperture solar filter (not currently available from Celestron).

10. Multiple Users

With a traditional telescope, only one person can look through the eyepiece at a time. With Origin, there are several ways to have multiple people observe at once.

The easiest and simplest way is to have others observe on your device with you. We highly recommend using a tablet for this application to provide a bigger observing screen.

A variation on this is to “cast” the image on your device onto a big-screen TV. This requires additional external equipment,depending on your device:

- For iOS devices, you’ll need an AirPlay-compatible smart TV or external device, such as AppleTV or specific 4K Roku devices.

- For Android devices, you’ll need a Google Chromecast-compatible smart TV or external device, such as the Chromecast, Fire TV, or Roku.

Alternatively, multiple people can observe Origin’s images on their devices simultaneously. To do this, each user will need to download the Origin app. Then, everyone can connect to Origin and view the image from the Camera View. Each person can save the final image on their own device! Anyone connected with the app can control Origin, so you’ll need to coordinate with your friends and family. Origin works best with one user controlling the telescope while the others watch from the Camera View.

You may receive a Low Bandwidth Warning message if too many people connect to Origin at once. To improve performance, we recommend turning on “Bin Live Images” under Menu>Settings>Advanced. This combines pixels so that they act as a single larger pixel. This reduces image resolution, but the effect should not be noticeable when viewing on a device. Binning does not affect the resolution of the final stacked master that downloads after pressing “End Imaging,” just the “live” images displayed during imaging in the Camera View. Network Connect mode generally provides more bandwidth than Direct Connect mode, but it depends on the quality of your home network router. If you can use Network Connect mode with multiple users, we recommend trying that first.

11. Other Menu Options

In this section, we'll review all the options under the menu icon in the Planetarium View.

Night Vision

- This will turn the screen red to preserve your night vision.

OneSky

- Refer to Section 8 of this manual.

Imaging Schedules

- This is where you can download images from previously run Tonight's Imaging Schedules. Refer to Section 7 of this manual for more details.

Tonight's Schedule

- This is the main interface for performing scheduled imaging. Refer to Section 7 of this manual for more details.

Show Scope Controls (and Manual Coordinate Entry)

- Selecting this option displays the manual telescope slew controls in the Planetarium View. You can use the up/down/left/right direction buttons to move Origin manually or change the slew rate by tapping the rate button (Figure 24).

- Selecting this option also allows you to enter coordinates manually. Tap the "two boxes" icon that appears just under the Compass icon, and the coordinate entry interface will appear (Figure 25). Enter the RA and Dec coordinates, then press "GoTo" to slew Origin to the desired coordinates.

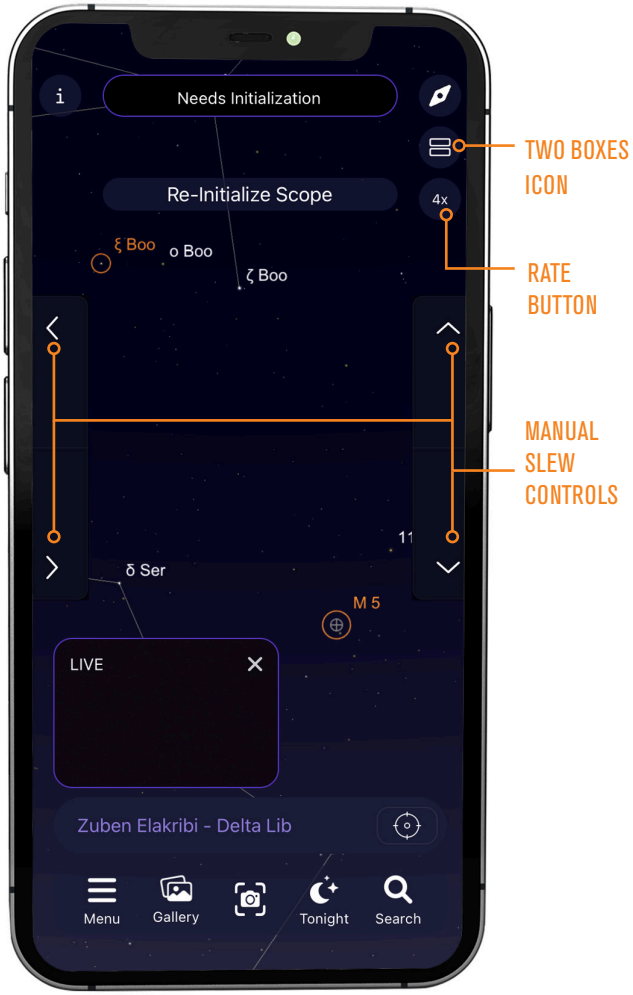


FIG 24: Show Scope Controls gives you manual slew controls in the Planetarium View. Use the Rate button to change the slew rate.

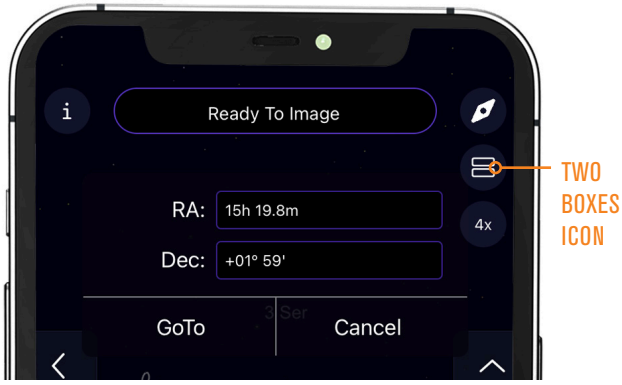


FIG 25: When Show Scope Controls is selected, pressing the two boxes icon gets you to the manual coordinate interface.

Recenter Telescope

Selecting this option recenters the Planetarium View on the location Origin is currently pointing to.

Settings

Tapping here brings up the Settings page, which presents additional options:

— **Wifi Settings** – Manage and view Origin's WiFi connection details (Figure 26).

- ***Network Status*** – Displays the Network Name and IP Address for the current WiFi connection.
- ***Network Setup Quick Start*** - Runs the initial "Quick Start" guide to set up WiFi connection.
- ***Use 5GHz Access Point*** – This is on by default. We generally recommend using Origin in 5GHz. If you want to switch to 2.4GHz operation, turn this switch off. You may need to use 2.4GHz operation with some older routers in Network Connect mode. In this case, Origin will automatically switch to 2.4 GHz.
- ***Force Direct Connect*** – If you are connected to Origin through your home network and wish to revert to Direct Connect mode, turn the Force Direct Connection slider on.
- ***Set Direct Connect WiFi Password*** – This is where you can change the password for Origin's Direct Connect WiFi network from the default 12345555. **NOTE:** You will only need this password if you try to connect to Origin's WiFi outside the app (i.e., from your device's WiFi page. You won't need the password if you connect from within the app
- ***Restart Scope WiFi*** – This restarts Origin's WiFi connection. While WiFi is restarting, you won't be able to connect to Origin.
- ***Force Manual IP Adresss*** – If you're in Network Connect mode (i.e., using Origin through a router) and your router connects to Origin on a fixed IP address, you can manually enter Origin's IP address to establish a connection. To do so, enable this setting and then enter Origin's fixed IP address. This can be handy if your router is having trouble finding Origin.
- ***Configured WiFi Networks*** – Selecting this option displays the external WiFi networks you previously set up to work with Origin.

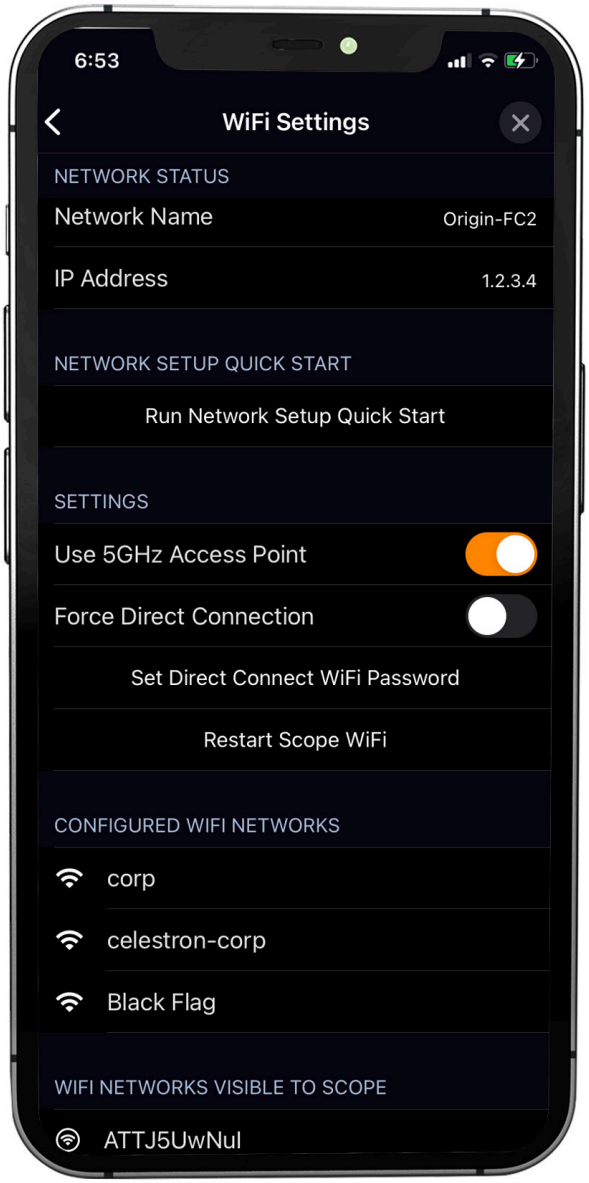


FIG 26: Manage and view Origin's WiFi connection from the Menu>Settings> WiFi Settings page.

- ***WiFi Networks Visible To Scope*** – Selecting this option displays all the external WiFi networks currently visible to Origin. Tap one of the visible networks to begin configuring that network to connect to Origin in Network Connect mode.

— **Version & Updates** – Refer to Section 14 of this manual.

— **Advanced** – Refer to Section 13 of this manual.

— **Manage Remote Files** – Refer to Section 12 of this manual.

— **Account Information** – This is where you can set the screen name that displays when you have the "Name" customization enabled on your shared images.

— **Privacy** – This displays Origin's privacy policy. You can opt out of sharing observing information with OneSky here.

— **Revert to Default Settings** – Tapping here reverts all the display options to the app's default settings.

— **Display Options –** This section provides extensive customization options for the Planetarium View.

— **Notifications** – This section lets you receive or opt out of Origin's notifications about upcoming astronomical events.

—**Storage** – The images you capture with Origin are stored on your device like the ones you capture with your device's built-in camera. However, some image metadata is also backed up (anonymously) on our servers. If you choose to use this storage option, the metadata on our servers can help us retrieve your images should your device be lost or stolen. This storage is free, but you can opt-out on this screen if you do not want to use it.

— **Time & Location**

A) *Date & Time* – Displays the Origin app's current date and time. This should match the date and time on your device.

B) *Location* – Displays the Origin app's current location data. This should match your current observing location. If the location you see here is incorrect, use the options at the bottom of the screen to reset it.

12. Accessing Raw Files for Manual Image Processing

As you use Origin and learn about astronomical imaging, you may want to try processing your raw images manually instead of using Origin's AI image processing. While some find imaging processing challenging and tedious, others enjoy using their creative and technical skills to create a final image they can call their own.

By default, Origin does not save raw image files to avoid filling up Origin's memory if you do not plan on manually processing your images. If you wish to save your raw image files for manual processing, you first need to enable "Save Raw Images" under Menu>Settings>Advanced. The raw image files are saved in the FITS, the preferred format for astronomical image processing.

To obtain the raw images, insert a USB thumb drive into one of the USB ports in Origin's rear cell (Figure 27). The only filesystems currently supported for file transfer are exFAT and FAT32. If you plug in a thumb drive with some other filesystem, such as NTFS (the Windows filesystem) or HFS+ (the Mac filesystem), the file transfer won't work.

FIG 27: Insert a USB thumb drive into the USB port on Origin's tube to transfer the raw image files.

The app has a built-in File Manager (Figure 28) to help you access Origin's raw image files. You can find it under Menu>Settings>Manage Remote Files. When you navigate to the File Manager, you'll see two self-explanatory options:

Copy All to USB - Copies all the raw image files on Origin's internal memory onto the thumb drive.

Delete All Image Directories - Deletes all the raw image files on Origin.

Below these two options, you'll see a list of folders named for the objects you have imaged with Origin. The name for each

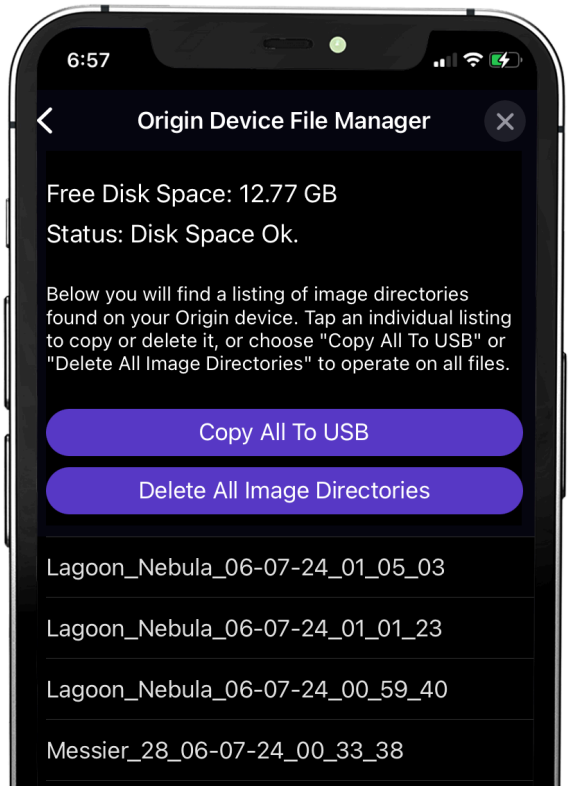


FIG 28: Access Origin's raw image folders from the File Manager.

folder starts with the object name and then the date imaged, so it should be easy to find the folder you are looking for. Tap a folder, and you'll see additional options:

Delete Image Directory - Deletes the selected folder from Origin.

Download Stacked Master - Downloads the final stacked master image and saves it to both the Origin app's Image Gallery and your device's camera roll. Use this command if the image failed to download automatically or if it was previously deleted.

Copy Folder to USB - Copies the unprocessed final stacked master (i.e., calibrated and stacked but not post-processed), the raw image files, and a copy of the flat, dark, and bias frames Origin used during image capture to your USB thumb drive. This option only works if "Save Raw Images" was enabled during imaging. If it was not enabled, only the unprocessed final stacked master is saved. You can always obtain an unprocessed final stacked master by using this command.

Deleting Raw Files Before Memory Fills

If you have enabled the “Save Raw Images” option under Menu>Settings>Advanced, there will come a time when you come close to filling up Origin’s internal memory (50+ GB). When this occurs, Origin will notify you with a warning message and a warning icon in the upper left corner.

At this point, transfer any files you wish to keep onto a thumb drive, and then delete at least some of the folders. The fastest method is to use “Copy All To USB” to save all the raw image folders onto a thumb drive and then use “Delete All Image Directories” to erase the internal memory. If you do not heed the warning and fill up Origin’s memory, you may encounter major functionality issues. It is important that you remove folders as soon as you see the notification.

Downloading Raw Files Directly to a Computer

Starting with Origin core software v.1.2.5059 and later, you can also download raw images directly to a computer using an FTP client. For details, see Appendix F.

13. Other Advanced Functionality

In this section, we'll review some of Origin's more advanced functionality. You can find these features under Menu>Settings>Advanced. You shouldn't need to adjust any of these options for basic, everyday use.

Mount

Altitude Slew Limit

This option allows you to set a minimum altitude limit on Origin's slewing range. If local obstructions block your horizon, you can enable slew limits to ensure Origin doesn't slew to an object behind an obstruction. You'll receive a warning message if you select an object below the altitude slew limit. Altitude Slew Limit also affects which highlighted objects are displayed in the Planetarium View and automatic start times for objects in Tonight's Imaging Schedule. Keep this in mind when setting the Altitude Slew Limit.

Power Off

This option allows you to turn Origin off remotely in the app rather than using the physical power switch.

Reinitialize Telescope Now

Selecting this option forces Origin to reinitialize.

Using an Equatorial Wedge

Choose this setting if you're using Origin with the optional Evolution Wedge for equatorial tracking (instead of standard altazimuth tracking). For more details, see Appendix D.

When this setting is enabled, the app will prompt you to run the automated polar alignment routine after intialization. You can also start polar alignment manually at any time by selecting "Polar Align Telescope Now."

Lighting

This slider allows you to adjust the brightness of Origin's onboard lights from 100% (full brightness) to 0% (off). You can adjust:

- The LED ring on Origin's rear cell
- The LEDs on Origin's fork arm, including the battery icon light and the tray light (i.e., the light that illuminates the azimuth axis clutch area).

Fans

This option lets you turn Origin's fan and the CPU fan on or off. We recommend that you always leave the fans on. Your Origin uses low-vibration fans that do not affect imaging during use.

AutoFocus

Selecting this option displays settings for automatic focusing.

On Temperature Change

Turn this on to force Origin to refocus after it detects changes in ambient temperature via its environmental sensor. Use the "Change After" slider to set the degree of temperature change that initiates refocusing.

After GoTo Any Object

Turn this on to force Origin to refocus after slewing to an object.

Dew Heater

The dew heater prevents dew from forming on the exterior of the Schmidt corrector lens. You can choose between automatic or manual operation.

Automatic Operation

In this mode, you can adjust the dew heater's "aggressiveness" from 1 (lowest) to 10 (highest), with 5 being the default. This indicates how active the smart dew controller is when preventing dew. A higher aggression setting will use more power but will provide the highest level of dew prevention during changing environmental conditions. Use a lower aggression setting for warmer, drier, or windier observing sites. Conversely, use a higher aggression setting for cooler and more humid observing sites.

Manual Operation

In this mode, you set the dew heater's power from 0-100%, forgoing "smart" dew prevention via the environmental sensor. Adjust the power level upwards to prevent dew from forming in cooler and more humid conditions.

Recalibrate Environmental Sensor

Tap "Recalibrate Environment Sensor" under Environment. This heats the sensor to evaporate any accumulated moisture, which helps provide the most accurate sensor readings. The sensor takes about 10 minutes to heat up and cool

back down. We recommend recalibrating the environmental sensor periodically, especially if Origin has not been used in a while and was stored in humid conditions. Doing so will help maximize the dew heater's power efficiency.

NOTE: Under heavy dew conditions, Origin uses more power to heat the corrector lens to keep it clear. As a result, Origin's battery runtime will be reduced.

Camera and Imaging

Show Live Images in Sky

Turning this on will display the field of view you are currently imaging in the Planetarium View instead of the default graphic.

AI Post Process

Toggling this option turns AI image processing on and off. For most use cases, leave this on. If you turn off AI Post Process, Origin will not process displayed images within the app. Images will generally appear dim and lack detail because they are unprocessed.

Save Raw Images

Turning this on saves the raw images on Origin so you can access them later. Refer to Section 12 of this manual for more information. This option is off by default to not unnecessarily fill up Origin's internal memory if you don't plan to access the raw image files later.

Image Stacking Replay

Turning this option on creates a short video of the sub-exposures being stacked for an imaged object. If you have enabled this feature, you'll see a replay icon at the bottom of the image in the Gallery view after you press End Imaging. Press the replay icon to play the video.

Replay only works for the last object you imaged. You can share the video to save it elsewhere. Otherwise, Origin will overwrite the replay video for the next object you image. Image Stacking Replay is not available for images obtained from Scheduled Imaging.

Auto-Crop Images

This function auto-crops the edges of the image that are affected by altazimuth mount field rotation before displaying the image. Auto-Crop Images is enabled by default. If you choose to turn it off, you'll find that AI post-processing handles many field rotation artifacts quite well.

AI Image Processing Controls

Here, you can enable or disable different parts of Origin's AI image processing.

- **AI Deconvolution** – This option applies deconvolution to the final stacked master only, not the "live" images in the Camera View. You'll find AI Deconvolution tightens up the appearance of stars and helps to reveal fine object detail.
- **AI Gradient Removal** – This option removes gradients across the field of view.
- **Denoise Live Images** – This option applies denoise to all images as they are stacked.
- **Denoise Final Image** – This option applies denoise only to the final stacked master.
- **Denoising –** Here, you can choose from low, medium, or high denoise. Medium is selected by default.

Flat Frames

A flat frame ensures even illumination across the sensor. The factory flat was taken with the camera in the orientation shown in Figure 29. To take a new flat frame for Origin image calibration, press "Recapture Flat Frames." This usually requires an optional third-party flat frame generator or EL panel.

FIG 29: The flat frame taken at the factory and pre-loaded onto Origin was captured with the camera in the orientation shown. If you rotate the camera from this orientation, we recommend capturing a new flat frame for best results.

Technical Note: The flat frame is created by averaging 30 individual exposures. Origin automatically adjusts the exposure time for each frame based on available light, increasing or decreasing it until the average pixel brightness (measured in ADU or Analog-to-Digital Units) reaches about two-thirds of the maximum possible ADU.

FIG 30: If you wish to rotate the camera orientation, first loosen the camera lock ring.

An important note about rotating the camera: If you rotate the camera for better framing of an object, you should take a new flat frame for best results. This usually requires an optional third-party flat frame generator or EL panel.

- To rotate the camera, loosen the lock ring behind the camera (Figure 30), rotate the camera to the desired orientation, and retighten the lock ring.

If you are using the GIOTTO Origin Flat Frame Generator from PrimaLuceLab, there are controls for it within the app. Refer to Appendix G for more information.

Dark Frames

Here, you can take new dark frames for Origin. Generally, you won't need to capture new dark frames; you can use the ones captured at the factory. To take a new dark frame, first place the lens cap on Origin. You may also want to consider covering Origin with a blanket if there is a lot of ambient light present. Set the Dark Frame ISO and Dark Frame Exposure to match what you will use for imaging (usually ISO 1000 Exp 10s. Number Of Dark Frames indicates how many dark frames are averaged into the final dark frame. We recommend using 10. You can use less than this to make the process faster, but the final dark frame may not be as effective in reducing noise. After you have set the Dark Frame ISO, Dark Frame Exposure, and Number Of Dark Frames, press "Capture Dark Frames" to begin the process. A new bias frame is also generated when new dark frames are captured.

"Recapture Complete Set of Dark Frames" creates an entirely new set of dark and bias frames (up to 30 seconds exposure time). The process takes approximately 20 minutes. This is typically unnecessary, as it simply regenerates the same set of darks captured at the factory. However, if Celestron offers optional Origin camera upgrades in the future, this function may become useful.

Logs

This is where you can download logs for troubleshooting purposes.

Core Software Channel

Here, you can change the channel that receives core software updates. This is set to "stable" by default. Do not switch to "beta" unless you have been instructed to do so by Celestron Tech Support. The beta core software is always in development and will likely cause unexpected issues to arise.

Refer to Section 14 for more information about updating software.

14. Updating Software

There are two types of software updates for Origin: app updates and updates to the Origin's internal computer ("core" updates). App updates are handled automatically through the Apple App Store (iOS) and Google Play (Android). Update these as you would any other apps on your smartphone or tablet.

You must connect in Network Connect mode to update Origin's core. If there is a core update available when your device has an internet connection, you'll receive a message that a new update is available. Core updates are handled through the app under Menu>Settings>Version & Updates. Connect to Origin in Network Connect mode and select "Download and Install." The app will download the core update and install it into Origin.

In some cases, you may need to power cycle Origin after a core update if the app doesn't automatically reconnect.

If, for some reason, you cannot Network Connect Origin to receive a core update through the app, you can still update the core using a USB thumb drive. Please refer to Appendix C for more information.

15. Transporting and Storing

Transporting

Transporting Origin from one location to another is easy. If you are just taking Origin a short distance outside, like from your garage to your backyard, then you may be able to carry the entire setup assembled. It weighs about 42 pounds. You can use the handles on the fork arm and mount to lift Origin (Figure 31).

FIG 31: Use the handles on the fork arm and mount to lift Origin.

If the assembled setup is too heavy, or if you must move it somewhere further away, we recommend disassembling Origin into its three components: optical tube, mount, and tripod. Each component weighs between 10 and 17 pounds, so they should be easy for most people to carry. Refer to the Quick Setup Guide supplied with Origin for details on disassembly and reassembly.

If you need to transport Origin via car to an observing location, you should break the system down into its three components. We strongly recommend the optional Padded Bag for Origin (Figure 32) for the optical tube assembly, as it is the component you should protect most from impacts. We also offer optional padded bags for the tripod and mount. Place all the components in your car so they can't move around or bump into each other when driving.

WARNING: When handling the Origin optical tube, do not grasp, lift, or carry it by the dew shield! The dew shield is removable and will detach if too much force is applied to it. Always grasp the rear cell and the body of the tube instead.

FIG 32: Padded Telescope Bag for Celestron Origin

If you ever need to ship Origin to another location:

- Use the original packaging.
- Secure the filter drawer with tape to prevent it from dislodging from its magnets if the box takes a significant impact.
- Use the front foam piece that goes into the lens shade and covers the camera to protect the camera and Schmidt corrector from large impacts.

Storing

Store Origin indoors in a dry place. A garage is ideal; it will keep the system near the ambient outdoor temperature, so the optics won't take as long to acclimate. Keep the dust cover on the front of Origin when not in use to prevent dust and particles from accumulating on the optics.

If the telescope is wet from dew, dry the exterior of the telescope tube, mount, and tripod with a towel before storage. While a small amount of water on the exterior won't harm the telescope, storing it wet in the long term could cause corrosion and water damage. If the exterior surface of the Schmidt corrector lens has moisture on it, wait until it dries/evaporates before installing the dust cover.

16. Care and Maintenance

Cleaning the Optics

Dust, debris, and fingerprints on the optics will usually have little effect on the images you capture with Origin. However, if the external surface of the Schmidt corrector lens becomes excessively dirty, you should clean it. Remove dust with a blower bulb or an optical cleaning brush. Then, use an optical cleaning solution and lens cleaning tissue to remove any remaining debris or stains. Apply the solution to the tissue and then apply the tissue to the lens. Use low-pressure strokes; do not rub in circles. When cleaning the corrector, strokes should go from the center to the outer edge. Use a new tissue for each stroke so as not to spread any oils or debris. Keep the dust cover on Origin when it is not in use to minimize the need for cleaning.

Only the Celestron Repair Department should clean your Origin's internal optical surfaces. If your Origin needs internal cleaning, please call Celestron for a return authorization number and price quote.

Optical Alignment

Origin's optics are factory-aligned and should not normally need adjustment. However, if needed, you can adjust the lens group's tilt to collimate the optical system. To do this, you'll need a 2mm hex key. If you have two of them, it will make things easier. The primary mirror and corrector are permanently aligned at the factory and cannot be adjusted.

To adjust the tilt of the lens group:

1. Turn Origin on and let it initialize on the night sky as usual.

2. Point Origin at a bright star. Make sure the star is centered in the field of view.

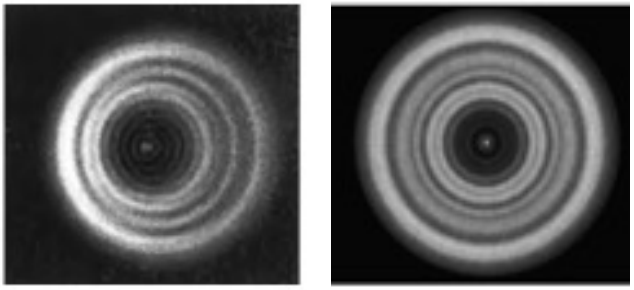
3. Use the manual focus controls to defocus the star by about 500-1000 counts.

4. Inspect the defocused star diffraction pattern. When collimated, the pattern should look like a concentric donut. If the pattern is concentric, no adjustment is necessary. If the "donut hole" is not centered within the pattern, some adjustment is needed (Figure 33).

5. There are two sets of three collimation screws. The setscrews act as push screws, while the button head screws act as pull screws (Figure 34). The screw sets work together as a push-pull tilt adjustment. Using the hex keys, adjust the collimation by slightly loosening two of the push screws and tightening the pull screw located between them. Alternatively, you can loosen two of the pull screws and tighten one of the push screws between them to tilt the lens group in the opposite direction. Always loosen two of the push or pull screws first, then tighten the screw between them. **TIP**: If the defocused star pattern is thin on one side, adjust the collimation screws so the star moves towards the thin side.

6. After adjusting, recenter the star in the field of view and reinspect the defocused star diffraction pattern.

7. Continue adjusting until the defocused star image is concentric, as shown in Figure 33.

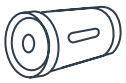


NEEDS ADJUSTMENT GOOD COLLIMATION

FIG 33: If the optics need alignment, the "hole" will not be centered in the defocused star image.

FIG 34: Adjust the tilt of the lens group (and camera) with the collimation screws.

17. Specifications



OPTICS	
OPTICAL DESIGN	Rowe-Ackermann Schmidt Astrograph (RASA)
APERTURE	152mm
FOCAL LENGTH	335mm
EFFECTIVE FOCAL RATIO	f/2.2
OPTICAL COATINGS	StarBright XLT coatings throughout
FILTER DRAWER	Integrated, accepts 1.25" or 2" astroimaging filters

IMAGING SENSOR	
CMOS IMAGE SENSOR	Sony IMX678-AAQR1, color, back-illuminated
SENSOR SIZE	8.9mm diagonal
PIXEL SIZE	2.0µm x 2.0µm
NUMBER OF EFFECTIVE PIXELS	8.4M (3856 x 2180)
FIELD OF VIEW	1.32° x 0.75°
CAMERA OPTICAL WINDOW	IR-cut coatings, transmits 400-740nm

INTEGRATED ELECTRONICS	
ONBOARD COMPUTER	Raspberry Pi 4 Model B
MOUNT	Computerized GoTo altazimuth mount
DEW PREVENTION	Fully automated heating element integrated into front lens, removable dew shield/lens shade
FOCUS MOTOR	Autofocus or manual control
COOLING FANS	One (1) fan for optics, one (1) fan for electronics, both pull air through vents with wire mesh
LED STATUS RING	Indicates status "at-a-glance"
RECOMMENDED TEMPERATURE RANGE	23 to 104 degrees Fahrenheit (-5 to 40 degrees Celsius)

PORTS	
USB-A	Two (2) on optical tube for accessing raw image files for external processing, one (1) on mount for mobile device charging only
ETHERNET	One (1) on optical tube
AUXILIARY PORTS	Two (2) on optical tube, four (4) on mount

POWER	
BATTERY	Integrated LiFePO4, 97.9 Wh, capable of 6+ hours of use
POWER INPUT	12V DC adapter for charging internal battery or running on external AC power

USER INTERAFACE	
CELESTRON ORIGIN POWERED BY SKYSAFARI™ APP	Runs on compatible iOS or Android smartphones and tablets
SYSTEM REQUIREMENTS	iOS 16 or higher, Android 12 or higher

DIMENSIONS	
OPTICAL TUBE	24" x 7" diameter
MOUNT	18" x 12" x 10"
TRIPOD (COLLAPSED)	13" x 12" x 32"
ASSEMBLED SYSTEM	24" L x 26" W x 48" H

WEIGHT	
OPTICAL TUBE	10.6 lb
MOUNT	17.0 lb
TRIPOD	14.0 lb
TOTAL SYSTEM	41.6 lb

Appendix A: Troubleshooting

The information in this manual is accurate as of September 2025. For more helpful tips and up-to-the-minute information, visit celestron.com/origin and navigate to the FAQ tab.

If you are having problems with Origin, consult this appendix for possible solutions.

Direct Connect Password

- Normally, you can directly connect to Origin's WiFi network through the app. No password is required. You can also directly connect to Origin's WiFi network outside the app through your device's WiFi settings page. The first time you attempt to connect to Origin's WiFi network outside the app, you'll be asked for a password. The default password is 12345555
- Once connected, you can change the password in the app in Menu>Settings> WiFi settings.
- You can reset the Direct Connect password with a USB key action. Refer to Appendix C for more details.

App Settings

When you first open the Origin app, it will ask for several permissions:

Photo Library

Origin needs access to your Photo Library to store your completed images. We recommend allowing full access.

Location Services

Origin needs access to your location to align itself to the night sky. We recommend allowing access while using the app.

Local Network

Origin needs access to your local network to connect Origin to your home network. Please select allow.

- If you are having trouble connecting to Origin, check your device's settings to ensure access to Location, Photos, and Local Network is enabled.
- For iOS devices, go to Settings, then find Origin in your list of installed apps. Select Origin, and you'll see the permissions (i.e., "Allow Origin to Access").

Connecting to Origin Through Home Network

When switching from Direct Connect mode to Network Connect mode using a home router, you may encounter issues that are unrelated to Origin's functionality.

Origin Cannot Connect to Home Network - Wrong Password Entered

If, after selecting your home network from "Visible WiFi Networks" and entering your home network password, Origin cannot connect to the router, you'll see Origin's status LED ring display a "rocking back-and-forth" pattern instead of rotating clockwise. This usually means you entered the home network password incorrectly.

Tap the WiFi icon in the upper left corner of the Planetarium View, then select "Connect." Origin will eventually drop back into Direct Connect mode (i.e., status LED ring rotating counterclockwise). Once reconnected directly to Origin, go to Menu>Settings>WiFi Setttings, select the home network from "Configured WIFi Networks" and choose "Remove Configuration." Then, select the home network again under "Visible WiFi Networks" and reenter the network password correctly.

Origin and Device Connect to Home Network but Cannot Connect to Each Other

With some routers, you may be able to connect your device to the home network and Origin to the home network, but cannot get the device to connect with Origin. You'll see Origin's status LED ring rotating clockwise, indicating it is connected to the home network, and you'll be able to connect to the internet with your device. In this case, check your router's security settings to make sure it will allow networking of multiple devices.

To recover from this, you'll need to reconnect to Origin in Direct Connect mode. This can be a bit tricky, as Origin will be connected to the router and won't be able to receive commands from your device. If needed, you can turn off your home network temporarily so Origin won't detect and automatically connect to it; Origin will drop back into Direct Connect mode automatically. Another way to do this is to

move Origin far enough away from your router so that it does not detect it. Another way is to use the Resetting WiFi USB Key Action. To do this, you'll need a USB thumbdrive. Refer to Appendix C for more information.

Low Bandwidth

In Direct Connect mode

- Move your device closer to Origin or vice-versa.

- If Origin is outside and you are inside, place the device where there is minimal interference between the device and Origin.
  - For example, if there is a thick wall between the device and Origin, try placing the device closer to a window.
  - If Origin is outside and you are inside, we highly recommend trying Network Connect mode.

- Using a WiFi antenna
  - Origin is compatible with a third-party USB WiFi antenna, the TP-Link Archer T2U Plus AC600 High Gain Wireless Dual Band USB Adapter. If you would like to use the antenna, first turn Origin off. Then, connect the antenna to the USB 2.0 port in Origin's rear cell (Figure 35).

FIG 35: You can install an optional third-party WiFi antenna into the USB 2.0 port in Origin's rear cell.

In Network Connect mode

- WiFi Routers
  - When operating in Network Connect mode, where Origin is connected through your home network, performance highly depends on your home network's WiFi router. If you consistently get low bandwidth in Network Connect mode, consider upgrading or reconfiguring your WiFi router.
  - The WiFi router's location relative to Origin can also impact performance. If you are getting low bandwidths in Network Connect mode and your WiFi router is a good one, consider moving your router closer to where you observe with Origin (or vice-versa).
- WiFi Extenders
  - If your Origin will usually be located far away from your router, consider purchasing a WiFi extender. You can place this somewhere in your home closer to Origin. It will help increase your router's bandwidth and range.

Tripod Leveling

- Origin's tripod should be within about 5° of level for the best tracking and pointing accuracy. Use the bubble level on the top of the tripod to confirm. If the tripod is over 5° out of level, it will not properly initialize.

Date/Time/Location

Check the date/time/location by pressing the information button

- If Origin has problems initializing, check Date & Time and Location under Menu>Settings to confirm the data is correct.

Nebula Filter Activated While Clear Filter Installed

- Initialization may fail if the app indicates that you have the Clear Filter installed but another filter (or no filter) is installed. Conversely, initialization may fail if the app indicates you have a Nebula Filter installed but you have the Clear Filter (or no filter) installed.

- In either of these instances, simply press the filter button to change its state to match your installed filter. Then, try initializing again.

- If no filter is installed, Origin's optical performance will be slightly degraded, as the fast F/2.2 optics were designed to be used with a 2.0mm thick filter of flat glass. So, if you are not using an optional filter, ensure that the Clear Filter that came with your Origin is always installed.

Wind

- Strong winds can influence Origin's performance, especially with regard to tracking over time. If you note that your stars are somewhat streaked or that imaging fails, you may need to shield Origin from the wind or move it to a better-protected, less windy area.
- If you are in an area of strong winds, use manual camera settings to try shorter sub-exposures. Using shorter sub-exposures may also allow using higher ISO settings.

Consistently Streaky Stars or Objects Not Centered

- If you see streaky stars during imaging or if objects are consistently off-center in the field of view, Origin's mount model is probably inaccurate or corrupted.
- In this unlikely scenario, try power cycling Origin and reinitializing. This will usually clear the problem.

Performance Near Zenith

- Because Origin uses an altazimuth mount (and not an equatorial mount), imaging near the zenith becomes difficult due to field rotation. A warning message will appear when imaging within 5° of the zenith.
- If imaging fails near the zenith due to field rotation, use manual camera settings to set a shorter sub-exposure time.
- It's possible to image at the zenith without field rotation when you add the optional equatorial wedge. Refer to Appendix D for more information.

Grid Artifacts When Zooming Into Camera View While Imaging

- If you zoom into your device's screen during imaging, you may notice some "grid artifacts." These artifacts result from the compression of the "live" image you see onscreen.
- The final stacked master is not compressed in this way, so your final stacked master (i.e., the image Origin saves to the Image Gallery after you press End Imaging) will not show these grid artifacts.

Hot Pixels or Other Image Artifacts

If you notice some "hot pixels" or other image artifacts, we recommend using "Recapture Dark Frames" in Menu>Settings>Advanced (refer to Chapter 13 for more information). The dark frames stored on Origin were taken at the factory, and may not perfectly match your current observing conditions (i.e. temperature). Taking the dark frame in the same conditions you are imaging will better eliminate any residual hot pixels or artifacts.

NOTE: Be sure to install the dust cover on Origin before recapturing dark frames. You may also want to consider covering Origin with a blanket if there is a lot of ambient light present.

Camera Cable Connections

- An internal USB cable connects Origin's camera to its onboard computer. If you are no longer receiving images from the camera, check the cable connections on both ends of this cable. One end connects to the USB-C port on the camera. The other end connects to one of Origin's USB ports (Figure 36).

FIG 36: One end of the camera cable plugs into the camera. The other end plugs into one of Origin's USB ports.

Power Stays On When Power Switch Is Turned Off

- After turning off the switch, the mount may remain on for up to 7 seconds while it waits for Origin's electronics to shut down.

- In some rare instances, you may find that Origin stays on indefinitely, even when the power switch is put into the off position. If this occurs, press the Reset button on the fork arm (Figure 37). You'll need a paper clip or another instrument with a fine tip. Once you press the Reset button, Origin will turn off. The next time you turn Origin on via the power switch, it should work normally.

FIG 37: In rare instances, you may need to depress this recessed button to turn Origin off

Power Stays Off When Power Switch Is Turned On

- If this occurs, the battery may be completely dead, or it may have shut down for other reasons to protect itself. To reset the battery, briefly plug in the AC adapter.

Diminished Battery Life in Cold Weather

Using Origin in temperatures below 50° F (10° C) will shorten the runtime of the internal rechargeable battery. While a full charge typically powers Origin for six hours, colder conditions will reduce this duration.

In temperatures near or below freezing (32° F/0° C), keep an eye on the app for "low" or "critically low" battery warnings. If you see one, you should switch to external AC power using the included AC adapter.

Halos Around Bright Stars When Using the Nebula Filter

When using the optional Nebula Filter to capture a nebula that contains a very bright star, you may notice a prominent halo around that star. Dimmer stars will still appear as sharp points of light.

This halo effect occurs because the filter blocks much of the incoming light, and some of that rejected light reflects back into the optical path and toward the sensor. This creates an out-of-focus star image superimposed on the focused one—the visible halo. In some cases, the camera cable may also cast a shadow within the halo.

Origin's fast optics and sensitive sensor make these halos more noticeable, especially during long exposures where bright stars significantly outshine the surrounding nebulosity.

To minimize halos in bright-star targets like the Pleiades Cluster or Horsehead Nebula, use the clear filter instead of the Nebula Filter, and shoot from dark skies. Faint halos may still appear, but they will be far less pronounced.

AutoFocus Failure

The autofocus command may fail if the current focus is too far out of range. This can happen, for example, when switching to a filter that is significantly thicker or thinner than the clear filter (which is 2.0mm thick).

If autofocus fails, use the manual focus controls in Camera View to get closer to focus, then try running autofocus again.

Appendix B: Tips

In this appendix, we'll review tips to help you get the best results with Origin.

Charge your device

- While you use Origin, your device (i.e. phone or tablet) will continually process images, which can deplete the battery over time. You may find that your smartphone battery runs down faster than Origin's internal battery. Therefore, before using Origin, we recommend fully charging your device.

- You can use the USB charge port on the Origin mount (Figure 38) to charge your device as you use it.

NOTE: Only use the USB charge port on the mount to charge your device. Do not use the USB ports on the tube for charging.

FIG 38: You can use the USB charging port on the Origin mount to charge your device in the field.

Use a smartphone or tablet with a modern display and processor

- Your overall experience, including the speed of image processing and image quality, depends on the device you pair with Origin. Choose a smartphone or tablet with an excellent display and fast processor for best results.

Choose the correct settings for your device's sleep mode

- While you use the Origin app, your device's operating system may go into "sleep mode" after some inactivity to preserve the device's battery power. If this happens, the app will lose connection with Origin. The app will automatically reconnect to Origin when you reactivate the app. To prevent Origin from disconnecting due to sleep mode, turn off sleep mode or set a very long duration before it initiates. Consult your device's manual or manufacturer's website for specific instructions.

- On Android devices, there's a setting in the app to help prevent the screen from going to sleep. Go to Menu>Settings>Appearance & Behavior, then enable "Prevent Sleep."

Adjust the tube balance

- Origin's Quick Setup Guide shows you how to balance the optical tube on the mount. However, you may slightly improve Origin's tracking performance by mounting the tube somewhat off-balance. When Origin's tube is slightly off-balance, gravity ensures the altitude axis gears stay well-engaged. The worm gears on both axes of motion are spring-loaded to provide good contact regardless. However, the additional gravitational force on the altitude axis when slightly off-balance may help in some circumstances.

Select the correct object for the best imaging results

- For the best AI image processing results, ensure the object you selected is the object you intend to image. If you want to change the framing, use the Reframe functionality. Do not choose a nearby star and issue a GoTo command to center on that. Origin will think you intend to image the star and may adjust AI parameters as a result.

    - The Western Veil Nebula is a good example. The bright star 52 Cygni is near its center. Do not choose 52 Cyngi and GoTo it to image the Western Veil. Instead, choose the Western Veil, GoTo it, and then use the Reframe functionality to place 52 Cygni at the center of the image, if you wish.

Switch from 5 GHz WiFi to 2.4 GHz WiFi if necessary

- When in Direct Connect mode, Origin's WiFi operates at 5 GHz by default. In most cases, 5GHz provides the greatest bandwidth and stability. However, you may find that operating at 2.4 GHz WiFi is best for your WiFi environment in Direct Connect mode. To switch from 5 GHz WiFi (default) to 2.4 GHz WiFi, use the toggle in Menu>Settings>WiFi Settings. After you change the setting, power cycle Origin.
- When in Network Connect mode, Origin automatically switches between 2.4 GHz and 5 GHz operation to match your router. If your home router has both 2.4 GHz and 5 GHz channels, we generally recommend connecting through the 5 GHz channel for best results.

Using External Power Sources

Origin's internal rechargeable battery will last about 6 hours when fully charged. If you plan to use Origin for longer sessions, you have two options:

- Plug into an AC power source with the included AC adapter.
- Connect an external battery. We highly recommend Celestron PowerTank Lithium batteries. The ones shown below are fully compatible with Origin. The chart below shows the approximate runtime each battery can provide.

Battery	Battery Energy	Approx. Origin Runtime
PowerTank Lithium	84.4 Wh	5.6 hours
PowerTank Lithium Pro	158.7 Wh	10.5 hours

A Note on Cord Wrap Prevention

When you are using an external power source, Origin automatically prevents the power cable from wrapping around the telescope as it slews across the sky. Here's how it works:

- If you plug a power cable in before turning Origin on, the mount's position at startup becomes its "neutral" position. The telescope will rotate no more than 180° in azimuth from that point.
- If you plug a power cable in after turning Origin on, the mount's position when you connect the power cable becomes its "neutral" position. The telescope will rotate no more than 180° in azimuth from that point.

Remotely Powering On and Off

If you're operating Origin remotely, you can control its power using an external power source that can be switched on and off remotely. To enable this setup, follow these steps:

Initial Setup (Required Once, On-Site):

1. Plug Origin into the remote-controllable power source.
2. Power on the external power source.
3. Turn on Origin using its physical power switch. This must be done locally the first time.

To Power Off Remotely:

1. In the app, go to Menu > Settings > Advanced and select "Power Off."
2. Remotely turn off the external power source.

To Power On Remotely (After Initial Setup):

1. Remotely turn on the external power source.
2. Origin will power on automatically.

Sky Flat Frame

If you don't have a flat field generator or EL panel, you can try capturing a flat frame using the evening sky shortly after sunset, before darkness sets in. These are known as "sky flats."

Capturing good sky flats can be challenging due to potential gradients introduced by Origin's fast f/2 optics, so conditions must be just right.

To capture a sky flat:

1. Wait 20-30 minutes after sunset.
2. Power on Origin. Initialization will fail since stars are not yet visible—this is expected.
3. Manually point Origin to an altitude of approximately 60°-75°, roughly opposite the Sun. Look for a patch of clear, uniform blue sky with no clouds.
4. In the app, go to Menu > Settings > Advanced, and select "Recapture Flat Frames."

Appendix C: USB Key Actions

In this appendix, we'll explain how to use a flash drive (thumb drive) to reset Origin's WiFi settings, reset all settings, or update the core software. You won't usually need to perform these procedures, but they can be helpful in some situations.

USB Drive Requirements

Format your flash drive using exFAT or FAT32. Other filesystems like NTFS (used by Windows) or HFS+ (used by macOS) may not work.

Resetting WiFi

When you perform this reset, the Direct Connect password will revert to the default and all known networks will be cleared. This could be useful if you have changed the Direct Connect password and forgotten it. It can also get Origin back into Direct Connect mode if it becomes stuck in Network Connect mode. (This could happen if you connect Origin to your router's network but then are unable to connect your device to Origin through the network due to network security settings.)

1. On a USB thumb drive, create a file named "OriginResetWifi.txt"

2. Turn off the Origin unit and insert the thumb drive.

3. Turn on the Origin unit. In a few moments, Origin will create an access point. You can now use the app to connect via Direct Connect with the default password. Once reconnected, remove the thumb drive from Origin.

Reset All Settings

When you perform this reset, you clear all your customized settings while retaining astrophotography data. For instance, the dew heater's aggressiveness and the WiFi settings will be reset. You may want to perform this reset during troubleshooting.

1. On a USB thumb drive, create a file named "OriginResetSettings.txt"

2. Turn off the Origin unit and insert the thumb drive.

3. Turn on the Origin unit. All settings will be reset.

Updating Core Software

When you're connected to Origin in Network Connect mode (i.e., your smartphone or tablet is connected to Origin through a router with internet access), you can install core software updates through the Origin app. See Section 14 ("Updating Software") for complete instructions.

If you cannot achieve Network Connect mode with Origin and can only connect to Origin in Direct Connect mode, you can "side load" the core software update using a flash drive (thumb drive). Follow these steps:

1. Download the "Origin Core Sideload" from the Software and Downloads section of the Origin product webpage at Celestron.com.

2. Unzip the downloaded file.

3. Copy the .txt file and .swu files onto the flash drive. We recommend deleting any other files already on the flash drive.

4. With Origin powered off, insert the USB thumbdrive into one of the USB ports in Origin's rear cell. Refer to Figure 27.

5. Ensure the optical tube and mount are connected with the AUX cable as they normally would be. Then, power on Origin.

6. The core update will begin automatically. Installation takes a few minutes. When you see Origin's LED ring spinning clockwise or counterclockwise, the update is complete, and Origin is ready to use.

7. Confirm the update was successful in the Origin app. Navigate to Menu > Settings > Versions & Updates. The "Current Version" should match the version number on the .swu file you installed.

8. Remove the flash drive from Origin.

Appendix D: Using Origin on an Optional Equatorial Wedge

Starting with Origin core software version 1.2.5099 and app version 1.0.8, Origin can be used with the Celestron Wedge for NexStar Evolution. This optional accessory allows the mount to track the sky equatorially, offering several benefits:

- Eliminates field rotation caused by altazimuth tracking. Normally, field rotation isn't noticeable because the app automatically crops the frame edges where it occurs (unless Auto-Crop Images is turned off under Menu > Settings > Advanced). With equatorial tracking, no cropping is needed.
- Enables imaging at or near the zenith.
- Allows manual sub-exposures longer than 30 seconds.

If you'd like to use Origin with the wedge, follow the installation instructions included with it. We strongly recommend reading the full wedge manual to understand the adjustments needed for proper polar alignment.

Initial Polar Alignment

Once the wedge is installed, perform a rough polar alignment: **NOTE:** If you are located in the Southern Hemisphere, substitute South whenever this procedure mentions North.

1. Point the fork arm roughly North.

Rotate the entire setup until the fork arm faces within about 5° of North (Fig. D1).

- If Polaris (the North Star) is visible from your location, use it as a reference.
- If Polaris isn't visible, use a compass app on your smartphone to find North.

2. Set your observing latitude.

Use the wedge's latitude adjustment knob to align the indicator with your local latitude on the scale (Fig. D2). Before adjusting, remember to loosen the latitude lock knobs on the sides of the wedge.

3. Enable EQ Wedge Mode.

Power on Origin and connect to it in the app. Go to Menu > Settings > Advanced and enable "Using Equatorial Wedge." Origin will reinitialize in EQ Wedge Mode.

FIG D1: The base of the wedge and the fork arm should be pointing North. If you are in the Southern Hemisphere, the fork arm should be pointing South.

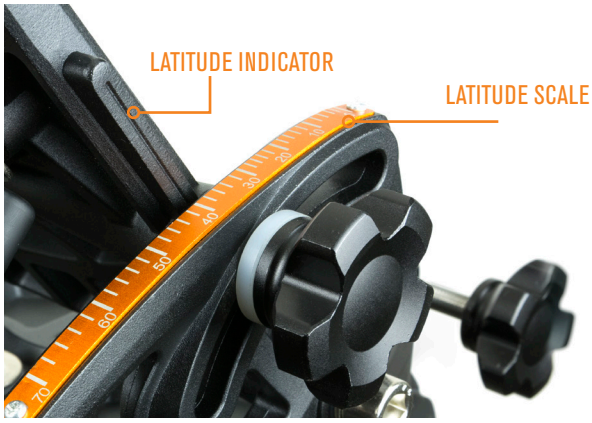


FIG D2: Turn the latitude adjustment knob on the wedge until the latitude indicator lines up with your current location's latitude on the scale.

4. Begin polar alignment.

After initialization, the app will prompt you to begin the polar alignment routine. While not strictly required, we strongly recommend completing it for improved tracking accuracy. If you choose to proceed, the app will take you to the Polar Alignment alignment screen (refer to Figure D3).

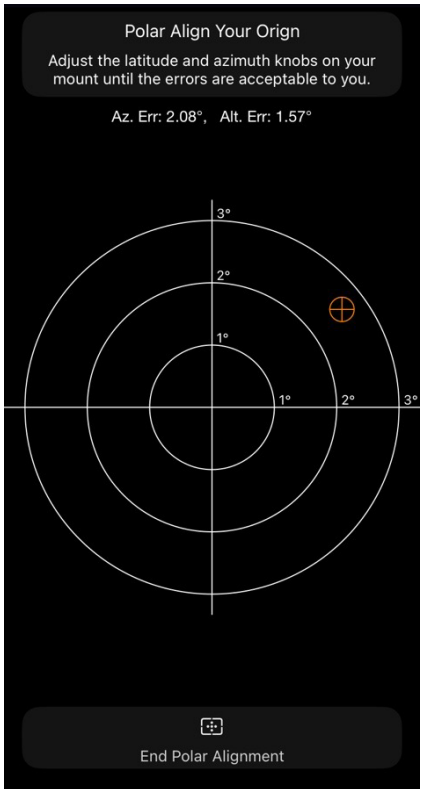


FIG D3: The Polar Alignment screen. This graph provides a visual guide for adjusting the wedge. Azimuth error is shown on the horizontal axis, and altitude error on the vertical axis. When alignment is complete, the crosshair indicator should be near the center of the graph.

5. Adjust the wedge.

Use the wedge's azimuth adjustment knobs and latitude adjustment knob (Fig. D4) to reduce the alignment error. Aim to bring both azimuth and altitude errors below 0.1°. There's no need to fine-tune beyond this—doing so won't noticeably improve performance.

6. Finish alignment and reinitialize.

When you're satisfied with the alignment, tap "End Polar Alignment." Origin will reinitialize. It will again ask you if you'd like to polar align. Since you already did, skip it. You're now ready to begin imaging in EQ mode.

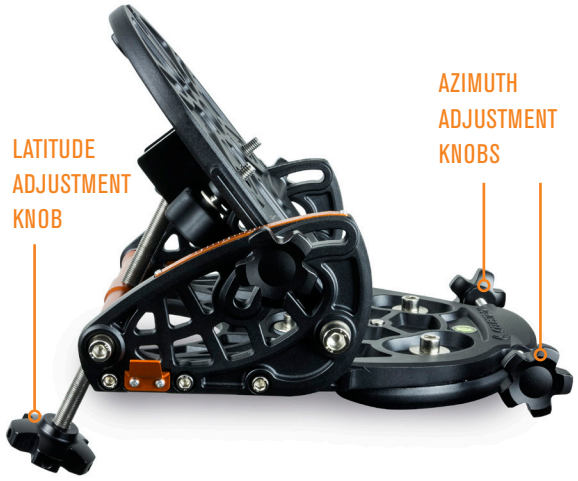


FIG D4: Make adjustments to the wedge using the azimuth and latitude adjustment knobs.

NOTES:

- Before adjusting azimuth, loosen the three hex-head bolts on the wedge's azimuth plate just enough to allow smooth movement. For latitude adjustments, slightly loosen the latitude lock knobs on the sides of the wedge. After polar alignment, you can retighten all knobs and bolts securely. For more detail, refer to the Evolution Wedge instruction manual.

- In EQ Wedge Mode, you can set sub-exposures longer than 30 seconds using the manual camera settings in the Camera View screen. However, due to Origin's fast f/2.2 optics, the sensor may saturate (turn all white) in under a minute at most locations unless you're using the Nebula Filter. In many cases, sub-exposures longer than 15 seconds offer little additional benefit.

- If you plan to use sub-exposures longer than 30 seconds, we recommend capturing new dark frames using the "Capture Dark Frames" command (found under Menu > Settings > Advanced). You can manually enter your desired Dark Frame ISO, Dark Frame Exposure, and Number of Dark Frames values.

- When using Origin on an EQ wedge with the included AC Adapter or another 12V DC external power source, check that the power plug cannot become pinched between

Origin's base and the wedge during use. At latitudes above 35°, consider purchasing a right-angle adapter for Origin's power jack to avoid this issue (Fig. D5).

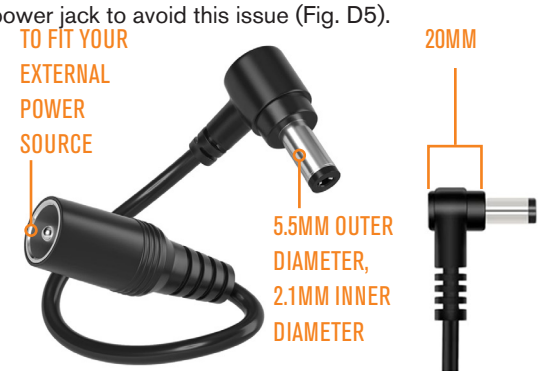


FIG D5: If using external power in EQ Wedge mode, consider purchasing a right-angle adapter for Origin's power jack to prevent the power source's plug from getting pinched between Origin's base and the wedge. This can most often occur at latitudes above 35°. The height of the adapter should be no more than 20mm, and the adapter's plug should have a 5.5mm O.D. / 2.1mm I.D. barrel connector.

Appendix E: Using Origin with StarSense Autoguider

Starting with Origin core software version 1.2.5099 and app version 1.0.8, you can add the optional StarSense Autoguider (SSAG) accessory to Origin to improve its tracking accuracy when using the optional equatorial wedge.

If you're using automatic camera settings (e.g., sub-exposures of 10-15 seconds), SSAG offers little benefit. Origin already tracks very well over short timeframes and automatically discards any frames with tracking errors.

If you're using manual sub-exposures of 30 seconds or longer, SSAG becomes more useful by reducing the number of rejected frames.

For exposures of 60 seconds or longer, both the SSAG and the equatorial wedge are required.

Mounting SSAG to Origin

Use the "Other Telescopes" hardware included with SSAG to attach the large bracket base to Origin's rear cell (Fig. E1). Then mount the SSAG to the bracket and secure it with the thumbscrews.

NOTES: If you already own SSAG (Celestron SKU #94008), you will need a bracket base with longer mounting slots to fit Origin as well as the proper mounting hardware. If so, contact Celestron Technical Support.

When mounting the bracket base to Origin, it should be relatively parallel to the optical tube. Precise alignment isn't necessary—you can simply eyeball it.

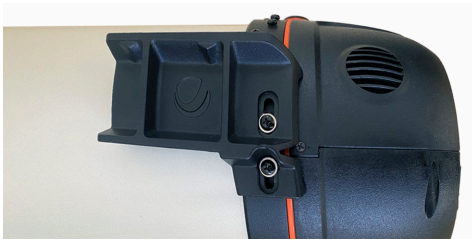


FIG E1: Use the "Other Telescopes" hardware included with the StarSense Autoguider to mount the large bracket base onto Origin as shown.

Connecting SSAG

1. With Origin powered off, use the included AUX cable to connect SSAG's AUX port to one of Origin's AUX ports. For the shortest cable path, we recommend using the AUX port on the Origin optical tube, though any AUX port on the mount will also work.
2. Power on Origin. SSAG will begin guiding automatically during imaging sessions.

Checking SSAG's Status During Imaging

1. From the planetarium view in the app, tap the icon in the upper-left corner to open the Origin Status page. When SSAG is connected, you'll notice that this icon has changed from an "i" info icon to a crosshair icon.

2. Under the AUTOGUIDER section (Fig. E2), you'll see data updated every second:
- RA and Dec tracking error corrections in arcseconds
- Number of stars used for guiding
- Seeing quality rating, from 1 (worst) to 100 (best)

NOTE: You can also view SSAG status via its own LED ring. Refer to the StarSense Autoguider instruction manual for details.

ORIGIN STATUS ICON

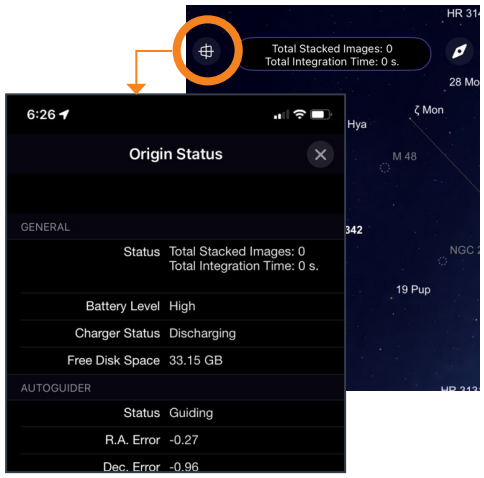
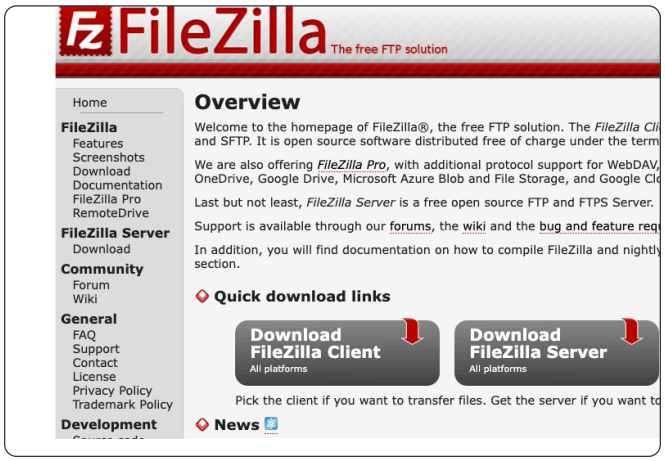


FIG E2: In the planetarium view, tap the icon in the upper-left corner to view the Origin Status screen. From here, you can see the StarSense Autoguider status and data.

NOTE: If you subsequently use SSAG with another Celestron mount, you should perfrom a Factory Reset on the SSAG using the NexStar+ hand control. You can access the function by navigating to MENU>SSAG>Factory Reset.

Appendix F: Downloading Raw Image Files via WiFi

You can download the raw image files you capture with Origin for manual processing. This guide shows you how to transfer those files straight to your computer over WiFi using a third-party program

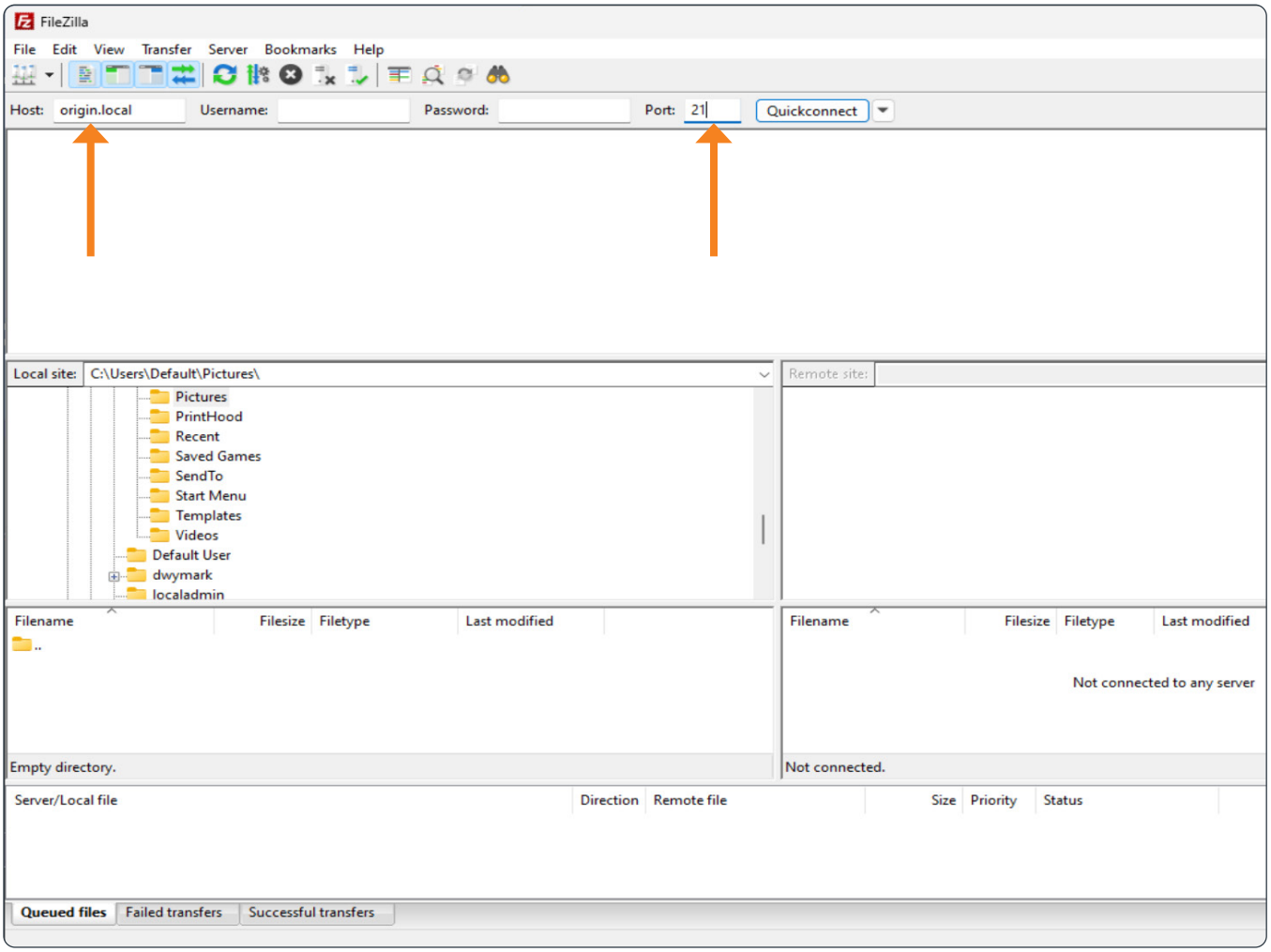


1. Installing FileZilla

Download FileZilla from the official FileZilla website. Run the installer for your operating system and follow the on-screen instructions to complete the installation.

2. Connecting to Celestron Origin

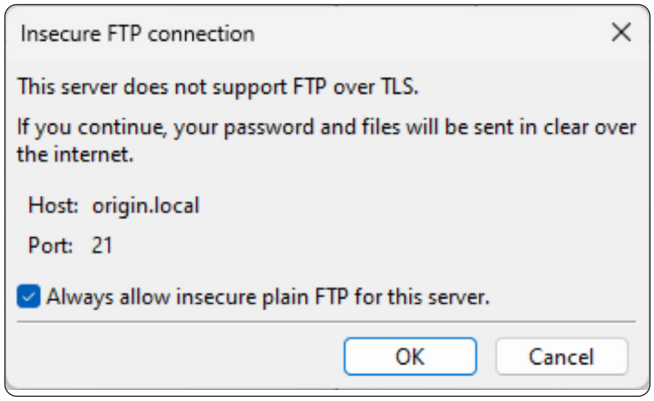
Open FileZilla. You should see a window like the one below—this is what FileZilla looks like before you connect. In the connection bar at the top, enter Host **origin.local** and **Port 21.**



Click **Quickconnect** to start the connection. You might see a warning about an insecure FTP connection—don't worry. Since this connection is local (just between your computer and Origin), it's safe to proceed. Click **OK.**

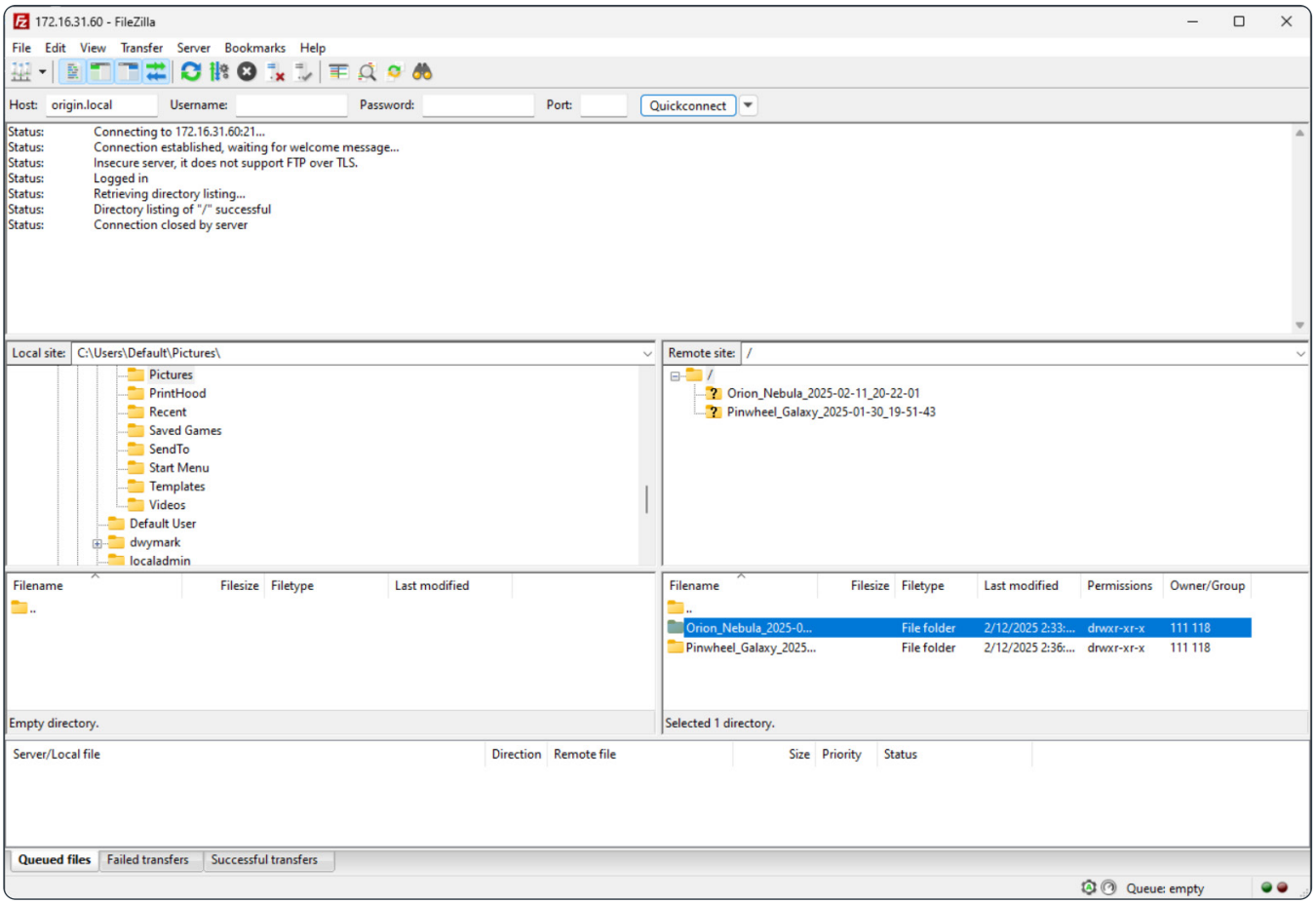
If you are unable to connect, check that both your computer and Origin are connected to the same home network. If you're connected directly to Origin, make sure your computer is on Origin's WiFi network.

Also, note that WiFi file downloads require Origin core software version **1.2.5059** or later. If you're running an earlier version, you'll need to update Origin before continuing.



3. Navigating and Managing Your Files

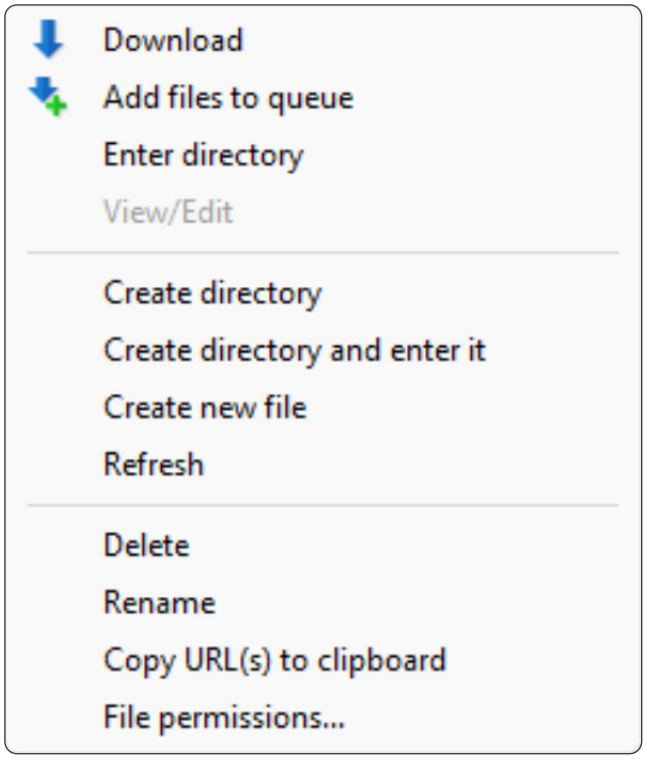
Once connected, FileZilla's right-hand panel will show your astrophotography folders. Each folder is named after the object you captured and the date.



Click on a folder to highlight it. Then, right-click to open a menu where you can download all the raw image files and calibration frames for a given object. You can also delete files to free up space, if desired. But be careful—deleted files can't be recovered.

Alternatively, you can select multiple folders by Shift-clicking on them, or press **Ctrl+A** to highlight all of them at once. Once you've selected all the folders you want, simply drag them from FileZilla to a folder on your computer to start the transfer. Each folder also includes the bias, dark, and other calibration frames associated with that object.

TIP: Downloading many raw files over your home WiFi network? You can speed things up by connecting Origin directly to your router with an Ethernet cable. Just plug one end into Origin's Ethernet port and the other into your router.



Appendix G: Using with the PrimaLuceLab GIOTTO Origin Flat Field Generator

During automatic image processing, Origin uses flat frames to ensure even illumination across the entire camera sensor. For optimal results, we recommend capturing new flat frames whenever you:

- Rotate the camera's orientation relative to the optical tube
- Replace or upgrade Origin's camera

To make this process quick and easy, the team at PrimaLuceLab developed the GIOTTO Origin Flat Frame Generator. It fits directly onto Origin in place of the dust cap and is fully integrated with the Origin app. You can turn GIOTTO on or off and adjust its brightness without disconnecting from Origin's WiFi network.

We highly recommend using GIOTTO to streamline your flat frame capture process and ensure the best possible image quality.

Capturing Flat Frames with GIOTTO

To begin, power GIOTTO using an external 12V DC power source as described in the GIOTTO instruction manual. Do not rely on Origin's USB port for power, as it does not provide sufficient current. Once power is applied, GIOTTO's LED ring will illuminate.

Next, connect GIOTTO to one of the USB ports on Origin's tube using the USB A-to-C cable supplied with GIOTTO (**Figure G1**).

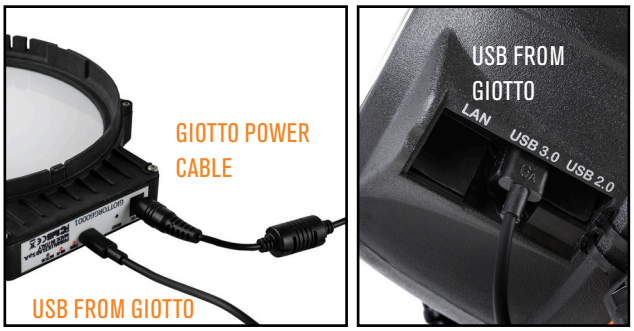


FIG G1

With GIOTTO powered and connected, follow these steps to capture new flat frames:

1. Connect to Origin using the Origin app on your smartphone or tablet. If initialization begins automatically, tap "Cancel Initialization" from the planetarium view.
2. Go to Menu>Settings>Advanced and switch on "GIOTTO Flat Generator" (**Figure G2**). GIOTTO should turn on.

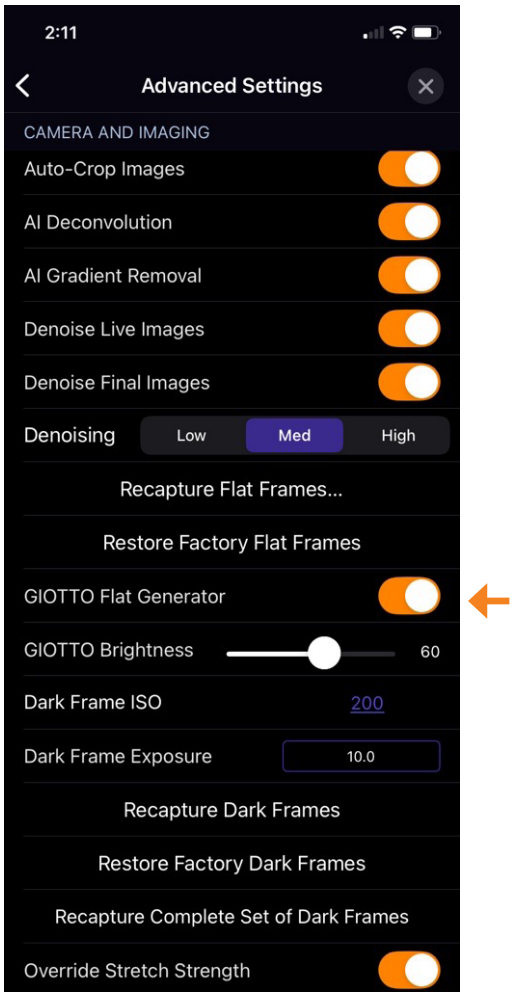


FIG G2

3. Use the "GIOTTO Brightness" slider to set the brightness to around 60.

NOTE: The exact brightness setting is not critical; Origin will adjust the exposure time as needed during flat frame capture.

4. Remove the dust cap from Origin and attach GIOTTO in its place. Line up the slots on GIOTTO with the tabs on the front edge of Origin's dew shield (**Figure G3**). Once aligned, press GIOTTO onto the dew shield and rotate it slightly clockwise to lock it into place.

FIG G3

5. In the app, go back to Menu>Settings>Advanced and tap "Recapture Flat Frames." Origin will automatically capture a new flat frame. This only takes a few minutes.

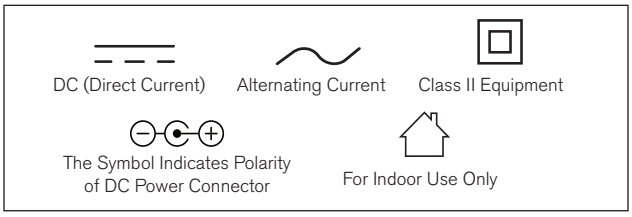
6. When the capture is complete, remove GIOTTO from Origin and disconnect the USB cable.

A new flat frame has now been captured, and you can resume imaging as usual. The PrimaLuceLab GIOTTO Origin Flat Frame Generator is a handy tool to help you get the best images from your Origin.

As of this writing, this manual contains the most up-to-date information we have on Origin. But as we gather feedback from customers and work internally to add new features, we continue to maintain a Frequently Asked Questions page on our website with up-to-the-minute answers and tips as they become available. Scan the QR code below or navigate to the FAQ tab at celestron.com/origin to browse the full FAQ.

AC ADAPTER INFORMATION:

- **Manufacturer:** ShenZhen XinJunMeng Energy Technology Co. Ltd
- **Model:** 18778
- **Input:**100-240V~, 50/60Hz, Max. 0.8A; Output:12V , 2A
- **Operating Temperature for the AC Adapter:** 25°C



Max. Operating Temperature: 25°C

BATTERY WARNING

- Never use the appliance and its battery in extreme conditions (high or low extreme temperatures, high altitude…) during use, storage or transportation.
- Batteries shall not be exposed to excessive heat such as sunshine, fire or the like.
- Never damage the appliance and its battery.
- Never short circuit the battery

Wi-Fi Network Frequency Bands

- **2.4 GHz band**: 2400–2483.5 MHz
- **5 GHz band:** 5150–5850 MHz

Supports **802.11 b/g/n (2.4 GHz**) and **802.11 a/n/ac (5 GHz)** with dual-band capability.

Maximum RF (Radio Frequency) Power

- **2.4 GHz band:**
  - Up to **20 dBm** (≈ 100 mW) EIRP depending on region/ regulatory domain.
- **5 GHz band**:
  - Typically, **18–20 dBm** (≈ 63–100 mW) EIRP depending on channel and region.

The exact transmit power is **limited by regional regulations** (FCC in the U.S., ETSI in the EU, etc.), so the firmware dynamically adjusts the max TX power depending on what country code is set.

Points de collecte sur www.quefairedemesdechets.fr
Privilégiez la réparation ou le don de votre appareil !

Separate waste collection. Check your local municipal guidelines.

Raccolta differenziata. Verifica le disposizioni del tuo Comune.

FCC NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Product design and specifications are subject to change without prior notification.

This product is designed and intended for use by those 14 years of age and older.

Origin uses Open Source Software. A document with licenses and notices for all the open source software used to build Origin OS is available on the device. Connect to the device using Wi-Fi, then visit http://origin.local/licenses for more information.

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