



iOptron[®] AZ Mount Pro[™] Altazimuth Mount Instruction Manual

Product #8900, #8903 and #8920



This product is a precision instrument. Please read the included QSG before assembling the mount. Please read the entire Instruction Manual before operating the mount.

If you have any questions please contact us at support@ioptron.com



WARNING!

***NEVER USE A TELESCOPE TO LOOK AT THE SUN WITHOUT A PROPER FILTER!
Looking at or near the Sun will cause instant and irreversible damage to your eye.
Children should always have adult supervision while observing.***

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1. AZ Mount Pro™ Altazimuth Mount Overview

Introducing the AZ Mount Pro™ altazimuth mount featuring "**level and go**" intuitive GOTO setup.

We call it "level and go", the term used to describe iOptron new AZ Mount Pro's simple set up routine. Using its built-in precision level indicator, the operator simply levels the mount and turns on the power; this capable computerized alt-azimuth telescope mount takes it from there. Utilizing the on board 32 channel GPS receiver and built-in position and angular detection sensors; the AZ mount Pro calculates its global position as well as the telescope orientation. Automatically the mount slews the instrument to an easily identifiable bright object in the night sky. The user need only confirm a bright object is in the center of the view, to activate tracking and GOTO functionality.

Features:

- 33lb primary payload and 10lb secondary payload capacity, with a mount weighing only 13lbs
- Whisper quiet low-power consumption stepper motors
- Go2Nova® 8407 hand controller featuring 212K+ object library with an 8 line illuminated LCD screen
- Zero backlash driver system
- On board rechargeable lithium ion battery for up to 10 hours of use
- Built-in WIFI adapter for full ASCOM, iOptron Commander™ and Sky Safari wireless control
- Serial port for computer control and firmware upgrades
- Retractable counter weight shaft
- Position memorization at power interruption
- Die-cast aluminum body
- 3-Point easy level adjustment on tripod
- 6 inch dual dovetail saddle (Losmandy/Vixen styles)
- Stands a mere 10 inches tall (mount head only)
- Built-in 32-channel GPS receiver
- Automatic position and angular detection sensors
- Aluminum carrying case

2. AZ Mount Pro™ Mount Assembly

2.1. Parts List¹

The mount head (#8920) is shipped in an aluminum carrying case, which includes:

- iOptron AZ Mount Pro telescope mount
- 6P6C RJ11 (6 pin connector, straight wired) coiled controller cables X1
- AC adapter for mount battery charging (100V~240V AC input, 12.6V/2000mA DC output)
- 4P4C RJ9 (4 pin connector) to DB9 RS232 serial cable for firmware upgrade and computer control.

If you are ordering a AZMP mount system (#8903), there will be another package with:

- LiteRoc 1.75 inch heavy duty stainless steel tripod
- 4.5kg counterweight X1(#3006-10)
- Level adjustment screw X3 (#8340)

OPTIONAL PARTS

- #8953 Secondary Vixen-style dovetail saddle
- #3006-10 4.5kg counterweight
- #3006-05 2kg counterweigh
- #8034 Tri-Pier
- #8034-RC Tri-Pier with rolling case
- #8032 MiniPier
- #8340-Pier Level adjustment screw with center post (for using with Pier and Tri-Pier)
- #8345 USB to RS232 Converter with FTDI chipset

ONLINE RESOURCES (click on the "Support" menu at www.iOptron.com)

- Quick Start Guide
- This instruction manual
- Hand controller and mount firmware upgrades (check online for latest version)
- ASCOM and Commander
- Reviews and feedback from other customers
- Accessories

¹ US market only. Actual contents may vary.

2.2. Identification of Parts



- | | |
|----------------------------------|-----------------------------|
| 1. AZ Mount Pro Head | 12. RS232 Socket |
| 2. Altitude Lock | 13. Battery Status LED |
| 3. Counterweight Shaft Lock | 14. Power Switch |
| 4. Counterweight Shaft | 15. Battery Charging Socket |
| 5. Bubble Level | 16. Level Adjustment Screw |
| 6. Dovetail Saddle | 17. Tripod Leg |
| 7. Dovetail Saddle Lock Screw | 18. Tripod Knob |
| 8. Hand Controller Hanger | 19. Tripod Bolt |
| 9. Hand Controller | 20. Tripod Support Spreader |
| 10. Altitude Lock Lever | 21. Tripod Lock |
| 11. Hand Controller Socket (HBX) | |

Figure 1. AZMP mount assembly

2.3. Go2Nova® 8407 Hand Controller



Figure 2. Go2Nova® 8407 hand controller

The Go2Nova® 8407 hand controller (HC) shown in Figure 2 is the standard controllers that used for the AZMP mount. It has an integrated temperature controller that ensures it can be operated as low as -20°C (-4°F). It has a large LCD screen, function, direction and number keys on the front; a red LED reading light on the back; and a HBX port (6-pin) and a RS232 serial port (4-pin) at the bottom.

2.3.1. Key Description

- MENU Key: Press “MENU” to enter the Main Menu.
- BACK Key: Move back to the previous screen, or end/cancel current operation, such as slewing.
- ENTER Key: Confirm an input, go to the next menu, select a choice, or slew the telescope to a selected object.
- Arrow (\blacktriangle \blacktriangledown \blacktriangleleft \blacktriangleright) Keys: The arrow keys are used to control the movement of DEC and R.A. axes. Press and hold \blacktriangle (DEC+), \blacktriangledown (DEC-) buttons to move a telescope along the DEC direction, \blacktriangleleft (R.A.+), \blacktriangleright (R.A.-) to move a telescope along the RA direction. They are also used to browse the menu or move the cursor while in the menu. Press and holding an arrow key for a fast scrolling.
- Number Keys: Input numerical values. Also used to adjust speeds. The speed selections are 1: 1X; 2: 2X; 3: 8X; 4: 16X; 5: 64X; 6: 128X; 7: 256X; 8: 512X; 9: MAX($\sim 10^{\circ}/\text{sec}$, 2400X)
- Light Key(\odot): Turns on/off the red LED reading light on the back of the controller.
- Help (?) Key: Identify and display bright stars or objects where the telescope points to.
- STOP/0 Key: Stop the mount during GOTO. Also toggling between start and stop tracking.
- HBX (Handbox) port: connect the HC to the AZMP mount using a 6P6C RJ11 cable.

- Serial port (*i.e.*, RS232 port): connect the HC to a Computer for HC firmware upgrade via a RS232-RJ9 cable.

2.3.2. The LCD Screen

The 8407 HC has a large 8-line, 21-character per line LCD screen, which displays all the information as shown in Figure 3. The user interface is simple and easy to operate.

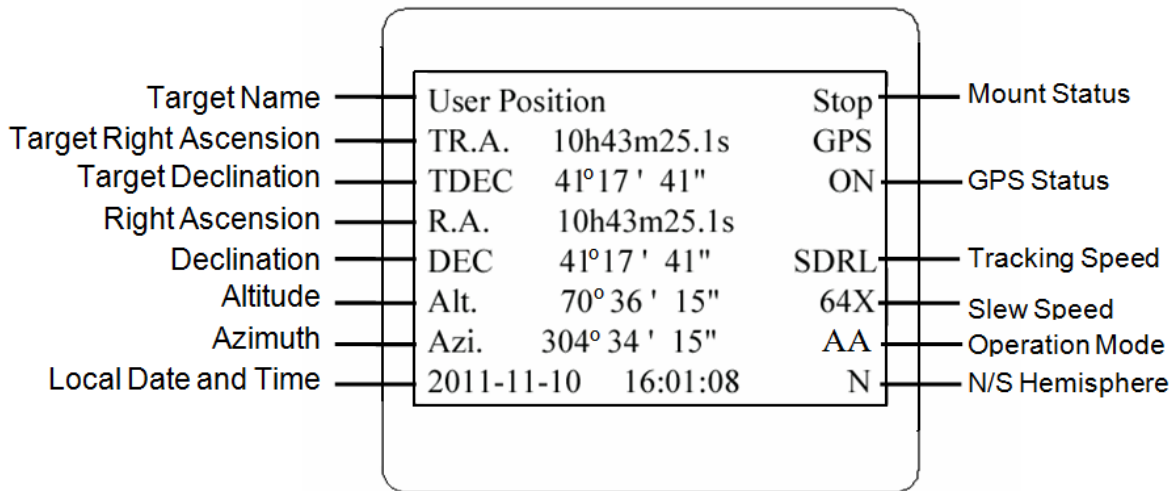


Figure 3. 8407+ HC LCD Information Screen

1. Target Name/Mount Position: displays the name of the target that telescope is currently pointed to or the current mount position.
 - Zero Position: The reference position for the mount. It will be displayed when moved to Zero Position using "**Goto Zero Position**";
 - User Position: The mount is point to a user defined position, which could be a particular celestial object or simply a position determined by pressing an arrow key;
 - An object name, such as "Mercury" or "Andromeda Galaxy": Name of the star or celestial object that the mount is currently slewing to or tracking.
2. Target R.A.: Right Ascension (R.A.) of the target object.
3. Target Declination: Declination (DEC) of the target object.
4. Right Ascension: Current R.A. of the telescope.
5. Declination: Current DEC of the telescope.
6. Altitude: Altitude of the telescope (degrees vertical from the local horizon - zenith is 90°).
7. Azimuth: Azimuth of the telescope (north is 0°, east 90°, south 180°, and west 270°).
8. Local Date and Time: display local time in a format of YYYY-MM-DD HH:MM:SS.
9. Mount Status: Display current operation status of the mount.
 - Stop: mount is not moving;
 - Slew: mount is moving with an arrow key is pressed or a GOTO command, such as "**Select and Slew**" or "**Goto Zero Position**";
 - Tracking: mount is at a tracking status.
10. GPS status: When the power is turned on, the initial GPS status will be "GPS ON", which means that the mount is connected to its GPS receiver and is seeking a satellite signal. When the GPS receiver finds the satellites and receives the GPS signal, the status will change to "GPS OK".
11. Tracking speed: Display current tracking rates of the mount

- SDRL: mount is tracking at a sidereal speed;
- Solar: mount is tracking at a solar speed;
- Lunar: mount is tracking at a lunar speed;
- King: mount is tracking at a King speed;
- CSTM: mount is tracking at a customer defined speed.

12. Slew speed: It has 9 speeds: 1X, 2X, 8X, 16X, 64X, 128X, 256X, 512X, MAX (2400X, ~10°/sec).

13. Operation Mode: AA is for alt-azimuth mode.

2.4. Install and Check the Hand controller Battery

The hand controller uses a CR2032 button battery to keep the Real Time Clock running. The HC is shipped without battery installed due to shipping restrictions. Open the HC back cover. With battery + sign facing up, slide the battery under two small metal hooks on the positive side first. Then push the battery down to make a good contact.

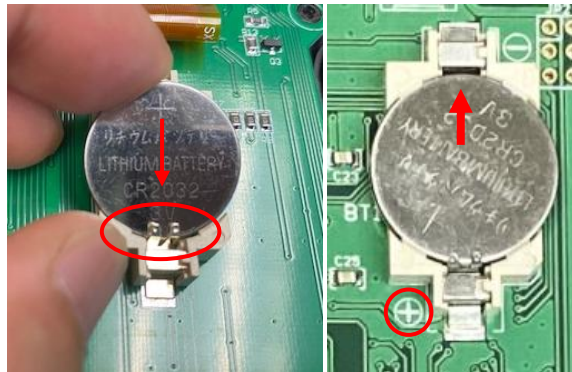


Figure 4. Install a CR2032 battery

If the hand controller can't display the correct date and time, most likely the battery power is low and needs be replaced.

3. AZ Mount Pro™ Mount Assembly

3.1. Un-package the Mount

Remove the AZ Mount Pro™ (AZMP) mount from the aluminum carrying case. Make sure that the Altitude Lock is fully tightened. **Charge the mount** using the included AC battery charging to fully charge the mount, until the LED indicator on the AC adapter changed to green.



Warning: Make sure use the included battery charger to charge the mount. **DO NOT** plug in any standard AC/DC adapter. **NEVER charge the battery when it is below 0°C.**

A **slowly flashing** battery status LED indicates the battery is low, which you still have about 30 minutes of operation time. You may keep using the mount by plugging in the battery charger. **NEVER** use the mount this way when it is below 0°C. iOptron is **NOT** responsible for any damages and consequences caused by misuse.

If you are running out of the battery during an observation session, you may also plug in a 12V DC power source for temporary use if the temperature is above 0°C.

Full charge the battery every 6 month if the mount is not used.

3.2. Tripod Setup

Evenly extend tripod legs to a desired length. Then lock legs using the locking knobs on sides. Set the tripod upward. If set a tripod on an uneven surface, make sure the tripod head is leveled.



Figure 5 Set up tripod

Install three star-shaped adjustment screws onto the tripod head. Raise the screws up about 5mm.

3.3. Attach Mount

Carefully position telescope mount onto the tripod by aligning the three holes on the bottom of the mount base to the three level adjustment screws on the top of the tripod.



Figure 6 Attach mount

Thread the tripod bolt into the bottom of the mount while holding the mount with your hand. Slightly tighten the tripod bolt by turning the tripod bolt lock knob.

3.4. Level Mount

Adjust level adjustment screws to level the mount using the bubble level on the base. You may use a torpedo level on the opposite side of the bubble level to assist the leveling.



Figure 7 Level mount

3.5. Lock Mount

Tighten the bolt lock knob to secure the mount. Slide tripod support spreader onto the bottom of bolt. Position the three edges to fit against the three tripod legs. Then hand tighten tripod lock knob to secure the tripod support spread in place.



Figure 8 Lock mount

3.6. Attach Telescope

Attach a telescope to dual dovetail saddle. Make sure that the telescope objective end is pointing to the direction as the arrow mark on the dovetail pointed to. The dovetail saddle can be rotated freely when the altitude lock knob is released. Fully tighten the altitude lock knob afterwards. **Tighten two dovetail saddle lock screws to secure the telescope.**



Figure 9 Install the telescope along the arrow direction on dovetail saddle

NOTE: Push the CW shaft out first if a counterweight is needed.

3.7. Install Counterweight

Make sure the altitude lock knob is tightened. Back out CW shaft lock screw slightly. Push the CW shaft out of the mount from the center of the dovetail saddle. Retighten the CW shaft lock screw.



Figure 10 Push the counterweight shaft out from the mount

Slide the counterweight onto the CW shaft, **with large opening hole facing inward**, if the CW has a stepped CW shaft hole. Insert the brass pin into the hole on the CW. Secure the CW by tightening the CW lock knob. (The groove on the CW shaft is designed for secondary dovetail saddle use.)

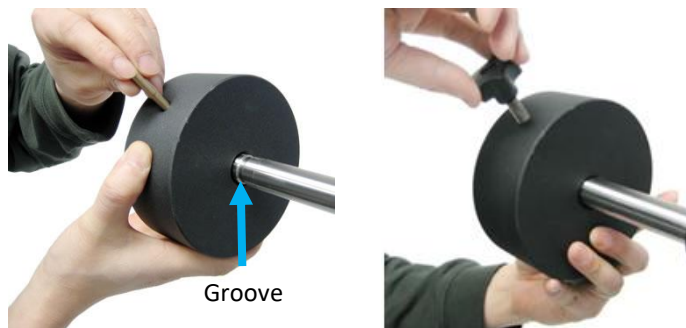


Figure 11 Install CW and CW lock



Warning: Counterweight is heavy. Please handle with care to avoid injury.

3.8. Balance Payload

After attaching scope and accessories, the mount needs to be balanced. To balance in altitude direction, release the altitude lock knob, rotate the scope to horizontal position. Move the telescope back and forth to find the balance point and lock the altitude lock knob.



CAUTION: The telescope may swing freely when the altitude lock knob is released.

Extend the CW shaft and add CWs onto it. Adjust the CW shaft position or number of CWs based on the telescope weight and size. A simple and safe method to estimate the CW and its position is by calculating the torques (*weight times the distance to the center*) of the payload and CW, and making them equal or close.

If you have a small and light scope (a few pounds), you may operate the mount without attach a CW. However, a CW is always helpful to balance the OTA in order to have smooth and accurate GOTO and tracking.



Figure 12 Heavy/large scope with two CWs



NOTE: Please re-check leveling before operation the mount.

3.9. Connect Cable

Connect the Go2Nova® 8407 Hand Controller to the HBX port on the mount panel using the supplied coiled control cable. Put the hand controller onto the hand controller hanger.

3.10. Install Second Telescope

An optional secondary saddle (#8953) is available for dual balanced OTAs. To install a secondary dovetail saddle, loose the CW shaft lock and push the CW shaft out to a desired length. Lock the CW shaft lock. Slide the secondary CW onto the CW shaft and tighten the secondary dovetail saddle lock.

After you mount a secondary OTA onto the secondary dovetail holder, make sure you align it with the primary OTA. This alignment is easier to be done during the daytime. Point the primary telescope to a target at a remote building or flagpole and center the target in the eyepiece. Loosen the secondary dovetail saddle lock. Rotate the secondary OTA around the counterweight shaft. Center the object in the eyepiece of the secondary OTA. If the secondary OTA is tilted, it can be adjusted by adjusting two tilting adjustment screws as shown in Figure 13 (M6 x 12mm Allen set screws). The maximum payload on secondary side is 5kg (11lbs).

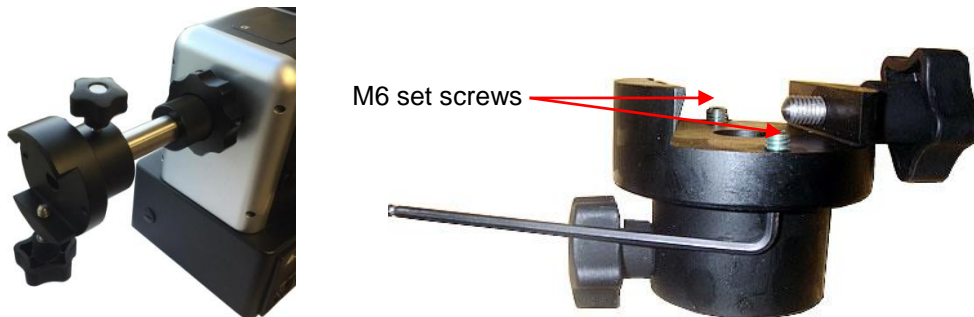


Figure 13. Secondary dovetail saddle and set screws

A combination of a light OTA and a CW can be used to balance a heavier primary OTA.

4. AZ Mount Pro™ Mount Operation

4.1. Power the Mount and GO

Assemble your mount. **Make sure the mount is leveled.**

Just flip the power switch ON and wait! The mount will first perform an Assistant Alignment Wizard which will determine the Zero Position, *i.e.* the South and Zenith. Then the mount will pick up GPS signal. Lastly the mount will GOTO a bright star for a Star Calibration. Follow the instruction on the hand controller screen to center the bright star. If the star displayed is blocked by a tree or building, just press the **BACK** button to go to next one.

Now you can use “**Select and Slew**” to go to any objects!

Note: The date and time displayed on the hand controller may differ from your local time. Just ignore it. You can change it later.

4.2. GOTO a Celestial Object

Press **MENU** on the hand controller and select “**Select and Slew**”. Select a category, such as “**Named Star**”, and then select a star of interest, and press **ENTER**. The telescope will slew to the object and automatically start tracking. If the target is not centered in your eyepiece, use “**Sync to Target**” to improve the performance. Press **MENU** => “**Sync to Target**” and enter the star you are observing. Use the arrow keys (▶, ◀, ▼, and ▲) to center it, press a number key to change the star moving speed.

4.3. Solar Observation

Press **MENU** => “**Sync to Target**” on the hand controller, then follow the instruction on the hand controller screen to select a catalog, here is “**Solar System**”, and then select “**Sun**” and use the arrow keys to center it and press **ENTER**.

Change the tracking rate to Solar by press **MENU** => “**Settings**” => “**Set Tracking Rate**” => “**Solar**”

4.4. Enter Initial Information

After turn on the mount power, the mount will ask if you want to run the “**assist alignment wizard**,” as shown in LEFT screen in Figure 14. Press **ENTER** or do nothing to start the wizard. Or press **BACK** to cancel.

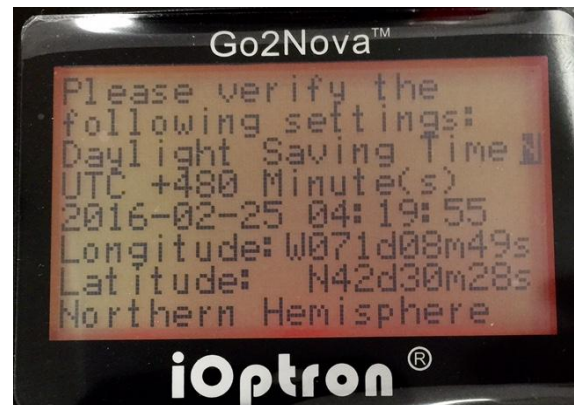
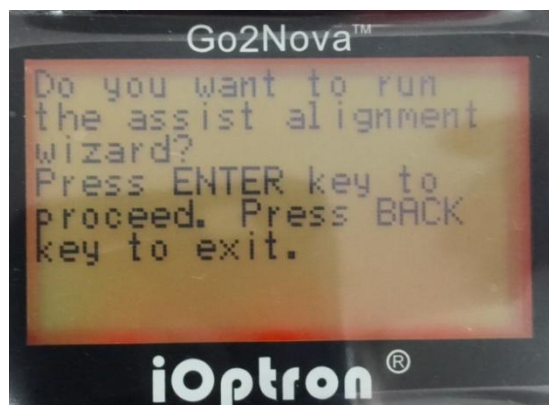


Figure 14 Initial hand controller screen

The mount will start to **perform self calibration** by rotating in both altitude and azimuth directions to find the Zero Position, *i.e.*, the mount's "**S**" (bubble level) facing south and the telescope tube pointing up at the zenith.

When it stops, the hand controller will display your current time and site info (RIGHT screen of Figure 14).

If all the information is correct, you may press **ENTER** to confirm and skip waiting for GPS signal. Or if the mount could not pick up the GPS signal (the mount won't advance to next step to start slewing), you can manually change it by setting Daylight Saving Time (DST) to Y(es) or N(o); adjusting the date and time; inputting your location coordinates; entering the time zone offset to the UTC.



Warning: If you enter your data, make sure they are complete and correct. Or just let the mount computer and GPS do the job for you.

4.5. Set Up the Mount Manually

In the event that the mount does not perform well for assistant align wizard and/or star calibration, or you would like to set up the mount quickly as a MiniTower mount, you may do the following:

1. Assemble the tripod and install the mount onto the tripod;
2. Level the mount;
3. Attach OTA, accessories and CW(s), balance the mount;
4. Turn on the mount. Press BACK button to skip the **Alignment Wizard** when the HC asks;
5. Press number 9 button to change the slew speed to MAX;
6. Slew the mount in azimuth to double check the leveling;
7. Slew the bubble level side facing south. Slew the telescope to point to Zenith;
8. Press **MENU=> "Zero Position"=> "Set Zero Position"=>ENTER** to set the current position as zero Position;
9. Press **MENU="Settings"=>"Set Time and Site"** to set the Daylight Saving Time (Y/N), UTC, as well as current time and location info. The press **ENTER**.
10. Do a **Star Alignment**, or "**Select and Slew**" followed by "**Sync to Target**" to align the mount.
11. Now happy GOTO!

4.6. Manual Operation of the Mount

The mount can now be used to observe astronomical objects using the HC. Use the arrow keys to point the telescope to the desired part of the sky. Use the number keys to change the slewing speed. Press the **STOP/0** button to start tracking.

4.7. Position Memorization

The AZMP mount can memorize its current position if the power is interrupted, either during tracking or slewing. You only need to use "**Select and Slew**" to go to the same object after power is restored if the mount is not physically moved. No alignment is needed.

4.8. Star Identifying Function

The 8407+ hand controller has a star identification function. After setting the correct local time and location and completing polar alignment, slew the telescope to a bright star manually or using the GOTO function. Press the ? key to identify the star that the telescope is pointing to, as well as nearby bright stars if there is any.

4.9. Turn Off the Mount

When you have finished your observation, simply turn the mount power off and disassemble the mount and tripod.

5. Complete Functions of Go2Nova[®] Hand Controller

5.1. Slew to an Object

Press **MENU** => "**Select and Slew.**" Select an object that you would like to observe and press the **ENTER** key.

The Go2Nova[®] 8407 hand controller (HC V2 with 150429 Catalog) for an AZMP mount has a database of over 212,000 objects. Use the ► or ◀ button to move the cursor. Use the number buttons to enter the number, or the ▼ or ▲ button to change a number. Hold a button to fast scroll through the list. The "☉" symbol indicates that the object is above the horizon, and the "☾" symbol means it is below the horizon. In some catalogs the stars below the horizon will not be displayed on the hand controller.

5.1.1. Solar System

There are 9 objects in the Solar System catalog.

5.1.2. Deep Sky Objects

This menu includes objects outside our Solar System such as galaxies, star clusters, quasars, and nebulae.

- Named Objects: consists of 92 popular deep sky objects with their common names. A list of named deep sky objects is included in Appendix E.
- Messier Catalog: consists of all 110 Messier objects.
- NGC Catalog: consists of 7,840 objects
- IC Catalog: consists of 5,386 objects.
- PGC Catalog: consists of 73,197 objects.
- Caldwell Catalog: consists of 109 objects.
- Abell Catalog: consists of 4,076 objects.
- Herschel Catalog: consists of 400 objects.

5.1.3. Stars

- Named Stars: consists of 259 stars with their common names. They are listed alphabetically; a list is included in Appendix E.
- Double/Multi Stars: consists of 208 binary stars; a list is attached in Appendix E.
- Hipparcos (HIP) Catalog: consists of 120,404 records.

5.1.4. Comets

This list contains 15 comets.

5.1.5. Asteroids

This list contains 116 asteroids.

5.1.6. Constellations

This catalog consists of 88 modern constellations with their names. They are listed alphabetically; a list is attached in Appendix E.

5.1.7. Custom Objects

This allows the storage of up to 60 user-defined objects, including comets.

5.1.8. Custom R.A. DEC

Here you can go to a target by entering its R.A. and DEC coordinates.

5.2. Sync to Target

This operation will match the telescope's current coordinates to Target Right Ascension and Declination. After slewing to an object, press **MENU** => "**Sync to Target**" => **ENTER**. Follow the screen to perform the sync. Using this function will re-calibrate the computer to the selected object. Multiple syncs can be performed if needed. This operation is most useful to find a faint star or nebula near a bright star.

You can change the slew rate to make the centering procedure easier. Simply press a number (1 through 9) key to change the speed. The default moving rate is 64x.

5.3. Alignment

This function is used to align the telescope mount. Please keep in mind that LEVELING is the most critical part of goto and tracking accuracy.

5.3.1. One Star Alignment

Press **MENU** => "**Alignment**" => "**One Star Align**". A list of alignment stars that are above the horizon is computed based on your local time and location. With the mount in the Zero Position, use the ▲ and ▼ buttons to select a star and press **ENTER**. Center the target in your eyepiece using the arrow keys. Press **ENTER** when finished. If your mount is well leveled, one star alignment should be sufficient for good GoTo accuracy. To increase the pointing accuracy over the sky, you may choose to do a two star and three star alignment.

5.3.2. Two Star Alignment

Two Star Align can improve the mount's average goto pointing accuracy. Two star alignment requires a wider view of the sky, since the two align stars need to be far apart. Press **MENU** => "**Alignment**" => "**Two Star Align**." A list of alignment stars that are above the horizon is computed based on your local time and location. With the mount at the Zero Position, use the ▲ and ▼ buttons to select the first alignment star and press **ENTER**. Center the target in your eyepiece using the arrow keys after the mount slews to it. Press **ENTER** when finished. The hand controller will prompt you to choose a second star. After selecting and centering the second star, the two-star alignment is finished.

5.3.3. Three Star Alignment

The three-star alignment will further improve the average pointing accuracy based on 3-point sky model.

Press **MENU** => "**Alignment**" => "**Three Star Align**." A list of alignment stars that are above the horizon is computed based on your local time and location. With the mount at the Zero Position, use the ▲ and ▼ buttons to select the first alignment star and press **ENTER**. Center the target in your eyepiece using the arrow keys. Press **ENTER** when finished. The hand controller will prompt you to choose a second star. Select third star after the mount aligned to the second star.

5.3.4. Solar System Alignment

This function uses a planet or the moon as an alignment object. Press **MENU** => "**Alignment**" => "**Solar System Align**" for a list of available alignment objects.

5.3.5. Clear Alignment Data

The alignment data will be kept for your next observation session. This function will clear all alignment data created during one star, two star or three star alignment process.

5.4. Settings

5.4.1. Set Time and Site

The AZ Mount Pro mount is equipped with a GPS receiver which will receive the time, longitude and latitude information for your current location from satellites after a link is established. However, there are still some parameters which need to be entered to reflect your location, such as time zone information and whether daylight saving time is currently in effect. This information will be stored in the hand controller memory along with longitude and latitude coordinates until they need to be updated.

NOTE: you don't need to do anything if the mount is in an automatic mode, even the time zone is wrong.

A clear sky and open space outside is needed for the GPS to establish a link with the satellites. The GPS is installed on the top of the main board under main control board cover. If the GPS module has difficulty receiving the satellite signal, you may rotate the R.A. axis to one side to exposure the GPS module.

To set up the controller, press **MENU =>“Settings”**

```
Select and Slew
Sync. to Target
Alignment
Settings
Edit User Objects
Firmware Information
Zero Position
```

Press **ENTER** and select **“Set Time and Site”**

```
Set Time and Site
Set Beep
Set Display
Set Tracking Rate
HBX Heating ON/OFF
Wi-Fi Option
Language
```

Press **ENTER**. A time and site information screen will be displayed:

```
Daylight Saving Time    Y
UTC +480 Minute(s)
2016-03-09 10:19:18

Longitude:W071d08m50s
Latitude:  N42d30m32s

Northern Hemisphere
```

Set Local Time

The time will be updated automatically when the GPS receiver has established its link with the GPS satellites. In the event that the GPS module is unable to establish a link to the satellites, local time

can be entered manually. Use the ◀ or ▶ key to move the cursor █ and use the number keys to change the numbers. Use the ▲ or ▼ button to toggle between “Y” and “N” for Daylight Saving Time, or “+” and “-” for UTC (Coordinated Universal Time) setting. Hold the arrow key to fast forward or rewind the cursor.

In order to make the Hand Controller reflect your correct local time, **time zone information has to be entered**. Press the ◀ or ▶ key, move the cursor to the third line “UTC -300 Minute(s)” to set the time zone information (add or subtract 60 minutes per time zone). For example:

- Boston is “UTC -300 minutes”
- Los Angeles is “UTC -480 minutes”
- Rome is “UTC +60 minutes”
- Beijing is “UTC +480 minutes”
- Sydney is “UTC +600 minutes”

All the time zones in North America are “UTC -”, as shown in the following table, so ensure the display shows “UTC -” instead of “UTC +” if in North or South America.

Time Zone	Hawaii	Alaska	Pacific	Mountain	Central	Eastern
Hour behind UT	-10	-9	-8	-7	-6	-5
Enter UTC	-600	-540	-480	-420	-360	-300

To adjust minutes, move the cursor to each digit and use the number keys to input the number directly. Use ▲ or ▼ key to toggle between “+” and “-”. After the time zone information is entered, press ENTER and go back to the previous screen. **Note that fractional time zones can be entered.**

Do not manually add or subtract an hour from displayed time to reflect Daylight Saving Time (DST). Only select “Y” after DST begins.

For other parts of the world you can find your “time zone” information from the internet.

Set Observation Site Coordinate

The third and fourth lines display the longitude and latitude coordinates respectively. The longitude and latitude coordinates will be automatically updated when the GPS picks up a satellite signal. “W/E” means Western/Eastern Hemisphere; “N/S” means Northern/Southern Hemisphere; “d” means degree; “m” means minute; and “s” means second.

If, for any reason, your GPS does not pick up the satellite signal, you can manually enter your longitude and latitude coordinates. Press the ◀ or ▶ key to move the cursor, use the ▲ or ▼ key to toggle between “W” and “E”, and “N” and “S”, and use the number keys to change the numbers. It is always a good idea to do your homework and get longitude and latitude coordinates before traveling to a new observation site.

The site coordinates information can be found from your smart phone, GPS receiver or via the internet. Site information in decimal format can be converted into d:m:s format by multiplying the decimal numbers by 60. For example, N47.53 can be changed to N47°31'48": $47.53^\circ = 47^\circ + 0.53^\circ$, $0.53^\circ = 0.53 \times 60' = 31.8'$, $0.8' = 0.8 \times 60'' = 48''$. Therefore, $47.53^\circ = 47^\circ 31' 48''$ or 47d31m48s.

Select N/S Hemisphere

This option is active only if the latitude of observation site is below 10°. If polar axis is aligned to the North Celestial Pole, then set the mount to Northern Hemisphere. If the polar axis is pointing to the South Celestial Pole, set the mount to Southern Hemisphere. Use the ▲ or ▼ key to toggle between “Northern Hemisphere” and “Southern Hemisphere”.

The time and site information will be stored inside the hand controller’s memory chip. If you are not traveling to another observation site, they do not need to be changed.

Check Hand Controller Battery



The hand controller has a real time clock (RTC) which should display the correct time every time the mount is turned on. If the time is incorrect, please check the battery inside the hand controller and replace it if needed.

5.4.2. Set Beep

The Hand Controller allows a user to turn off the beep partially, or even go to a silent mode. To change this setting press **MENU** => "**Settings**" => "**Set Beep**",

```
Set Time and Site
Set Beep
Set Display
Set Tracking Rate
HBX Heating ON/OFF
Wi-Fi Option
Language
```

Select one of three available modes:

"**Always On**" – a beep will be heard on each button operation or mount movement;

"**On but Keyboard**" – a beep will be heard only when the mount is slewing to the object or there is a warning message;

"**Always Off**" – all sounds will be turned off, including the SUN warning message.

5.4.3. Set Display

Press **MENU** => "**Settings**" => "**Set Display**",

```
Set Time and Site
Set Beep
Set Display
Set Tracking Rate
HBX Heating ON/OFF
Wi-Fi Option
Language
```

Use the arrow keys to adjust LCD display contrast, LCD backlight intensity, and keypad's backlight intensity.

5.4.4. Set Tracking Rate

You can set up the mount tracking rate by selecting "**Set Tracking Rate**".

```
Set Time and Site
Set Beep
Set Display
Set Tracking Rate
HBX Heating ON/OFF
Wi-Fi Option
Language
```

Then the user can select "**Sidereal Rate**", "**Lunar Rate**", "**Solar Rate**", "**King Rate**", and "**User Defined Speed**". The "User defined speed" can be adjusted from 0.9900X to 1.0100X of sidereal.

When use “Select and Slew” to Moon or Sun, “Lunar Rate” or “Solar Rate” will be used automatically. “Sidereal Rate” will be used for other object tracking.

The “King Rate”, developed by Edward S. King, corrects the tracking rate of a telescope to account for atmospheric refraction. This is more useful for unguided tracking.

5.4.5. Set Altitude Limit

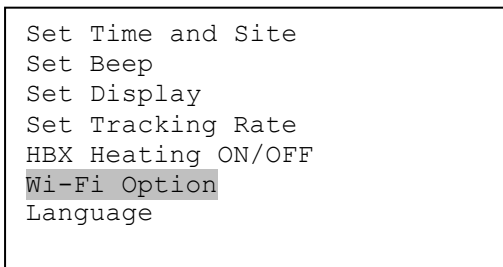
Set the tracking limit in altitude, a useful function for tracking an object all the way to below the horizon when set it at a minus number (degree). The default setting is 0. The mount will stop tracking when the telescope is point to horizon. **Use this function at your own risk.**

5.4.6. Set Heating OFF/ON

Turn on/off the controller LCD back heater. When “Heating” is set to **ON**, the heater will automatically be turned on when the ambient temperature reaches 0°C (32°F) and shut off at 10°C.

5.4.7. Wi-Fi Option

AZ Mount Pro mount has a built-in Wi-Fi adapter that allows a user to wirelessly control the mount via SmartPhone/Tablet/Computer.



- Wi-Fi Status: indicates if the Wi-Fi is turned on and password protected. Password can be set after internet login
- IP Address & Socket: the parameters needed for setting up a manual WI-Fi access, such as SkySafari
- SSID: Wi-Fi broadcast ID, which can be changed.
- Wi-Fi ON/OFF: turn ON/OFF Wi-Fi connection
- Restart: restart the Wi-Fi adapter
- Restore to Factory: restore the Wi-Fi factory setting

5.4.8. Language

Select one of supported menu languages.

5.5. Edit User Objects

Besides various star lists available in the hand controller, you can add, edit or delete your own user-defined objects. This is especially useful for newly found comets. You can also add your favorite observation object into the user object list for easy sky surfing. Up to 60 comets and other user objects can be stored.

5.5.1. Customer Comets

Press **MENU** => “**Edit User Objects**” to set user objects.


```

Custom Comets
Other Objects

```

Select “**Custom Comets**” to add/browse/delete the user-defined comet list. Find the orbit parameters of a comet in the SkyMap format. For example, the C/2012 ISON has an orbit parameter:

No.	Name	Year	M	Day	q	e	ω	Ω	I	H	G
C/2012	S1 ISON	2013	11	28.7960	0.0125050	1.0000030	345.5088	295.7379	61.8570	6.0	4.0

Select “**Add a New Comet**” to add a new one:

```

Add a New Comet
Browse Comets
Delete a Comet
Delete All Comets

```

The hand controller will display the parameter entry screen:

```

Enter Comet Parameter
Date: 0000-00-00.0000
q: 0.000000
e: 0.000000
 $\omega$ : 000.0000
 $\Omega$ : 000.0000
i: 000.0000

```

Enter the parameters using the arrow buttons and number keys. Press **ENTER** and a confirmation screen will be displayed. Press **ENTER** again to store the object under the assigned user object number, or press **BACK** button to cancel.

5.5.2. Enter Other Objects or Observation List

Press **MENU** => “**Edit User Objects**” to set user objects.

```

Custom Comets
Other Objects

```

Select “**Other Objects**” to enter you own object:

```

Add a New Object
Browse Objects
Delete One Object
Delete All Objects

```

Select “**Add a New Object**”. A screen will be displayed asking you to **Enter R.A. and DEC coordinates**:

```

Enter R.A. and DEC

R.A.: 00h00m00s
DEC: +00d00m00s

```

You may enter the R.A. and DEC coordinates of the object you want to store, and press **ENTER** to confirm.

A more useful application of this function is to store your favorite viewing objects before heading to the field. When the “**Enter R.A. and DEC**” screen appears, press the **MENU** button. It brings up the catalogs that you can select the object from. Follow the screen instructions to add your favorite objects. Press **BACK** button to go back one level.

Press the **BACK** button to go back to the object entry submenu. You may review the records or delete those that are no longer wanted. Press the **BACK** button to finish the operation. Now you can slew to your favorite stars from “**Custom Objects**” catalog using “**Select and Slew.**”

5.6. Firmware Information

This option will display the mount type, firmware version information for the hand controller (HC), Main board (Main), Azimuth motor board (Azi), and Altitude motor board (Alt).

5.7. Zero Position

5.7.1. Goto Zero Position

This moves your telescope to its Zero Position. The mount memorizes its Zero Position. The power on position is not necessary the zero position.

5.7.2. Set Zero Position

This set the Zero Position for the firmware.

The Zero Position reference will be an undefined value after firmware upgrade or HC battery replacement. You can use this function to set the zero position reference.

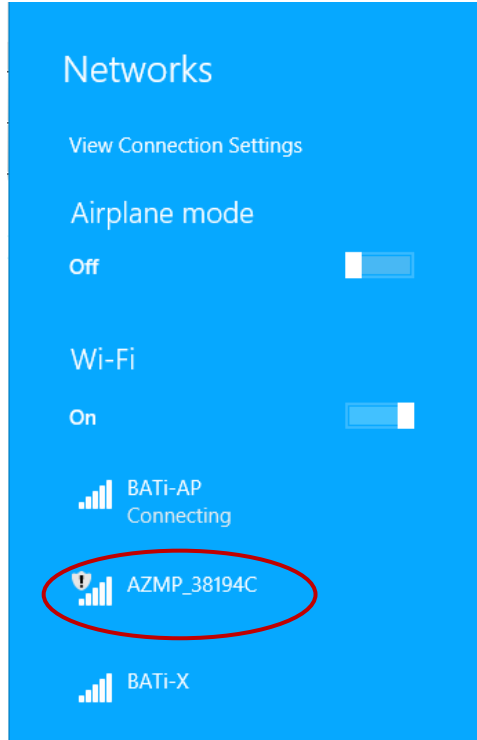
Press the **ENTER** after moving the mount to Zero Position with the hand controller.

6. Wi-Fi Operation

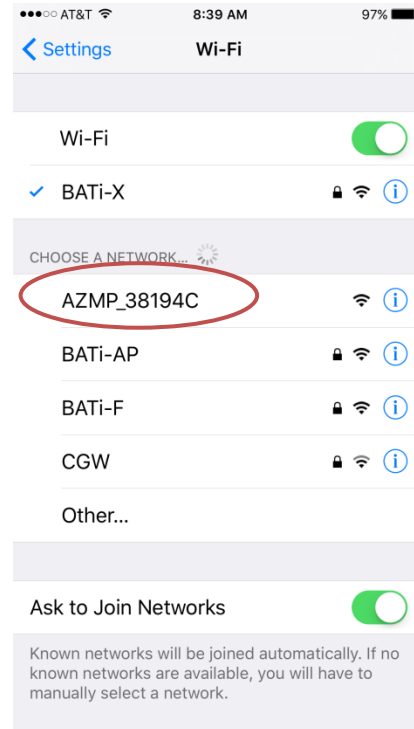
6.1. Wi-Fi Connection

6.1.1. For a Windows/Mac Operation System

Open the Wi-Fi connection panel on your device, Find a Wi-Fi SSID called “AZMP_XXXXXX”, as shown in Figure 15(a), then connect.



(a)



(b)

Figure 15. Wi-Fi connection panel (a) PC and Mac, (b) iOS

6.1.2. Tablet/SmartPhone with iOS

Connect the iOS Tablet/SmartPhone to the AZMP_XXXXXX wireless network, as shown in Figure 15(b).

6.1.3. Tablet/SmartPhone with Other OS

Open the Wi-Fi connection panel on your device, Find a Wi-Fi SSID called “AZMP_XXXXXX”, then connect.

6.2. Connect the Mount

6.2.1. Windows

After connecting a computer to AZMP Wi-Fi network, launch the iOptron Commander. Select **iOptron StarFi/Built-in Wi-Fi** to connect the mount to your computer via Wi-Fi/Ethernet connection (Figure 16). Check the **Mount Panel**, as shown in Figure 16, to open iOptron Commander Mount Panel (Figure 17).

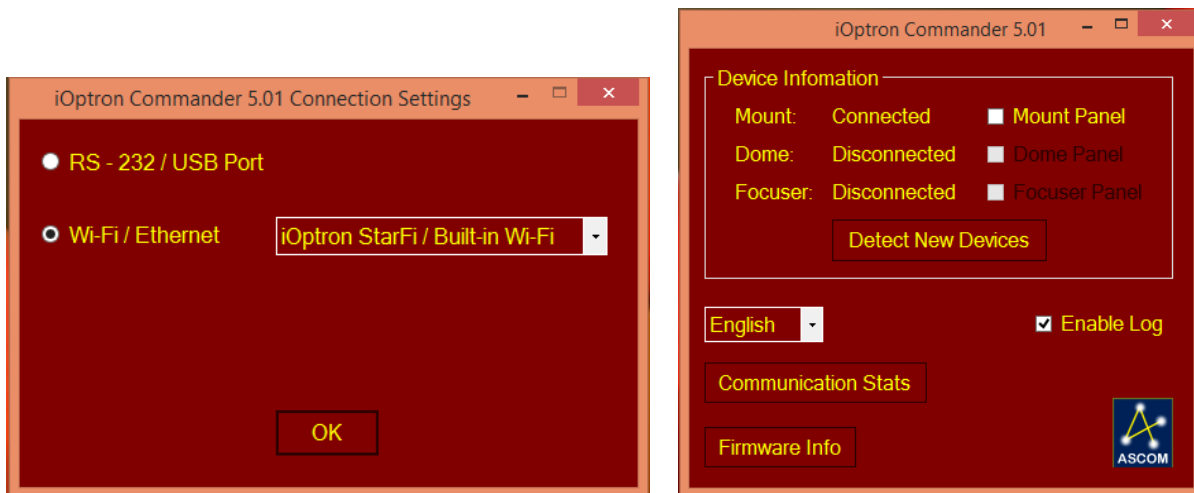


Figure 16 iOptron Commander Connection

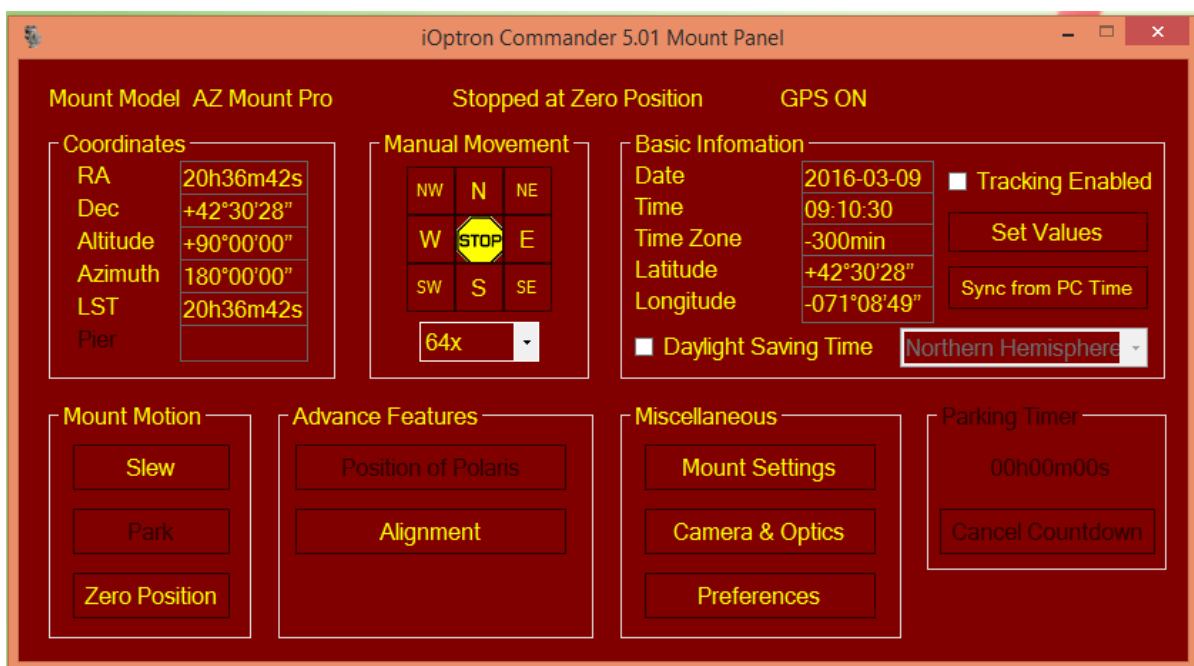


Figure 17 iOptron Commander Mount Panel

Now you can use iOptron Commander to direct control the AZMP mount, or use your favorite ASCOM compatible software to control the mount.

6.2.2. Mac OS

You need planetarium software that runs on Mac OS and has an embedded AZMP mount drive, such as Sky Safari. Check the software for support information.

If the software support INDI driver, please choose INDI iEQ.

6.2.3. Tablet/SmartPhone with Sky Safari

The App needs be configured first.

- Click on **Settings**.
- Click on **Setup**.
- Select **Scope Type** as **iOptron CEM/iEQPro/AZ Mount Pro** and **Mount Type** should be **Alt-Az. GoTo**.

- Turn off **Auto-Detect SkyFi**. Change the **IP Address** to **10.10.100.254** and **Port Number** to **8899**. Click **Done**.

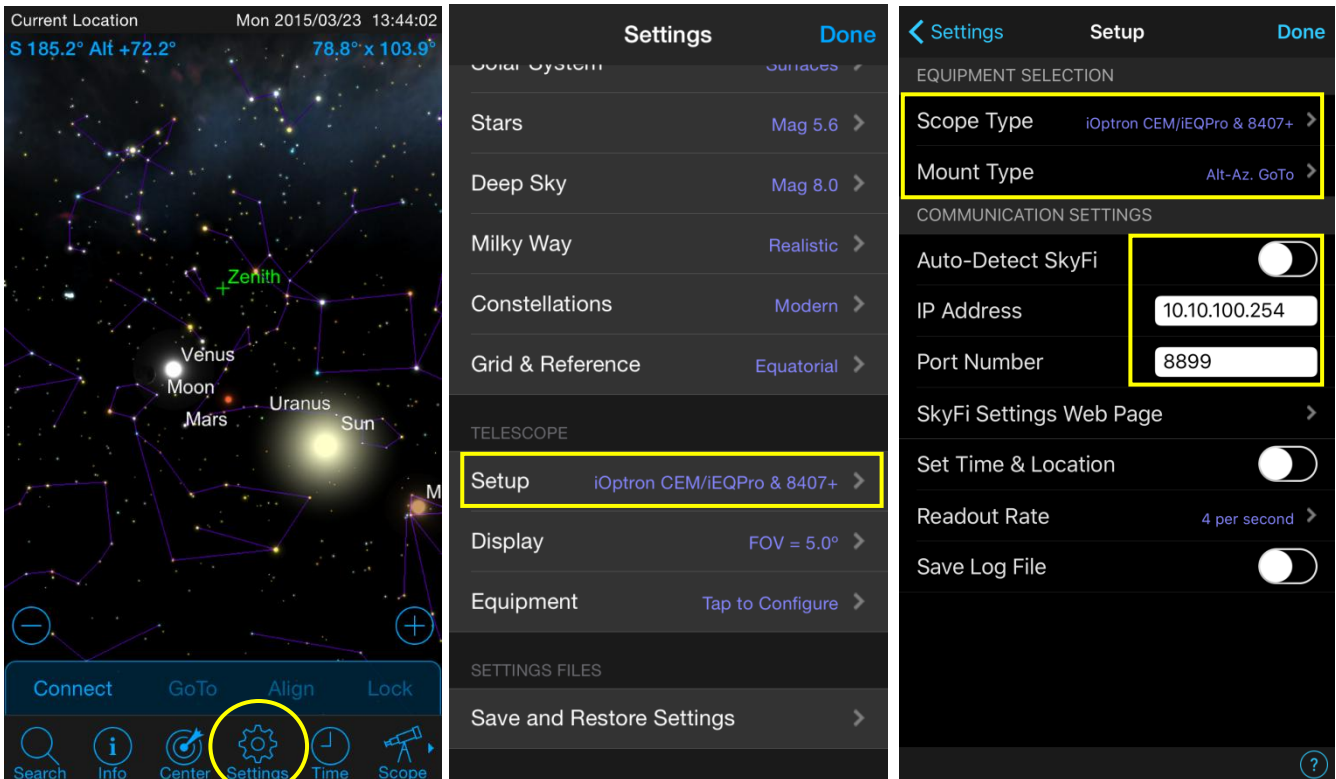


Figure 18 Using Sky Safari on a SmartPhone/Tablet

This procedure only needs to be performed once unless you have changed your AZMP Wi-Fi settings.

Then click on the **Scope** icon and tap on **Connect** to connect the mount. Now you can perform GOTO and Slew from your SmartPhone/Tablet.

6.3. Wi-Fi Configuration

The AZMP Wi-Fi is shipped with no password protection. You can change the SSID and enable password protection so only you can make the connection.

To change the Wi-Fi settings:

- Connect the computer/tablet/SmartPhone to AZMP Wi-Fi;
- Open the internet browser and type in <http://10.10.100.254>;
- A login window will open. Enter “**admin**” as both **User Name** and **Password**;
- Go to AP Settings;
- Now you can change the SSID name from AZMP_XXXXXX to Your Name, enable WPA2 encryption, etc.;
- You may also go to account to change login name and password;
- Restart the mount.

Note:

1. Please keep the Wi-Fi at AP (access point) mode, unless you know how to setup the ST mode.
2. If ever you forgot your password, use the hand controller “**Restore to Factory**” to reset the WI-FI adapter to factory default settings.

7. Maintenance and Servicing

7.1. Maintenance

Do not overload the mount. Do not drop the mount as this will damage the mount and / or permanently degrade GOTO performance and tracking accuracy. Use a wet cloth to clean the mount and hand controller. Do not use solvent.

If your mount is not to be used for an extended period, dismount the OTAs and counterweight(s). Remove the battery.

7.2. iOptron Customer Service

If you have any question concerning your mount contact iOptron Customer Service Department. Customer Service hours are 9:00 AM to 5:00 PM, Eastern Time, Monday through Friday. In the unlikely event that the mount requires factory servicing or repairing, write or call iOptron Customer Service Department first to receive an Return Merchandise Authorization Number (RMA#) before returning the mount to the factory. Please provide details as to the nature of the problem as well as your name, address, e-mail address, purchase information and daytime telephone number. We have found that most problems can be resolved by e-mails or telephone calls. So please contact iOptron first to avoid returning the mount for repair.

It is strongly suggested that to send technical questions to support@ioptron.com. Call in the U.S. 1.781.569.0200.

7.3. Product End of Life Disposal Instructions



This electronic product is subject to disposal and recycling regulations that vary by country and region. It is your responsibility to recycle your electronic equipment per your local environmental laws and regulations to ensure that it will be recycled in a manner that protects human health and the environment. To find out where you can drop off your waste equipment for recycling, please contact your local waste recycle/disposal service or the product representative.

7.4. Battery Replacement and Disposal Instructions

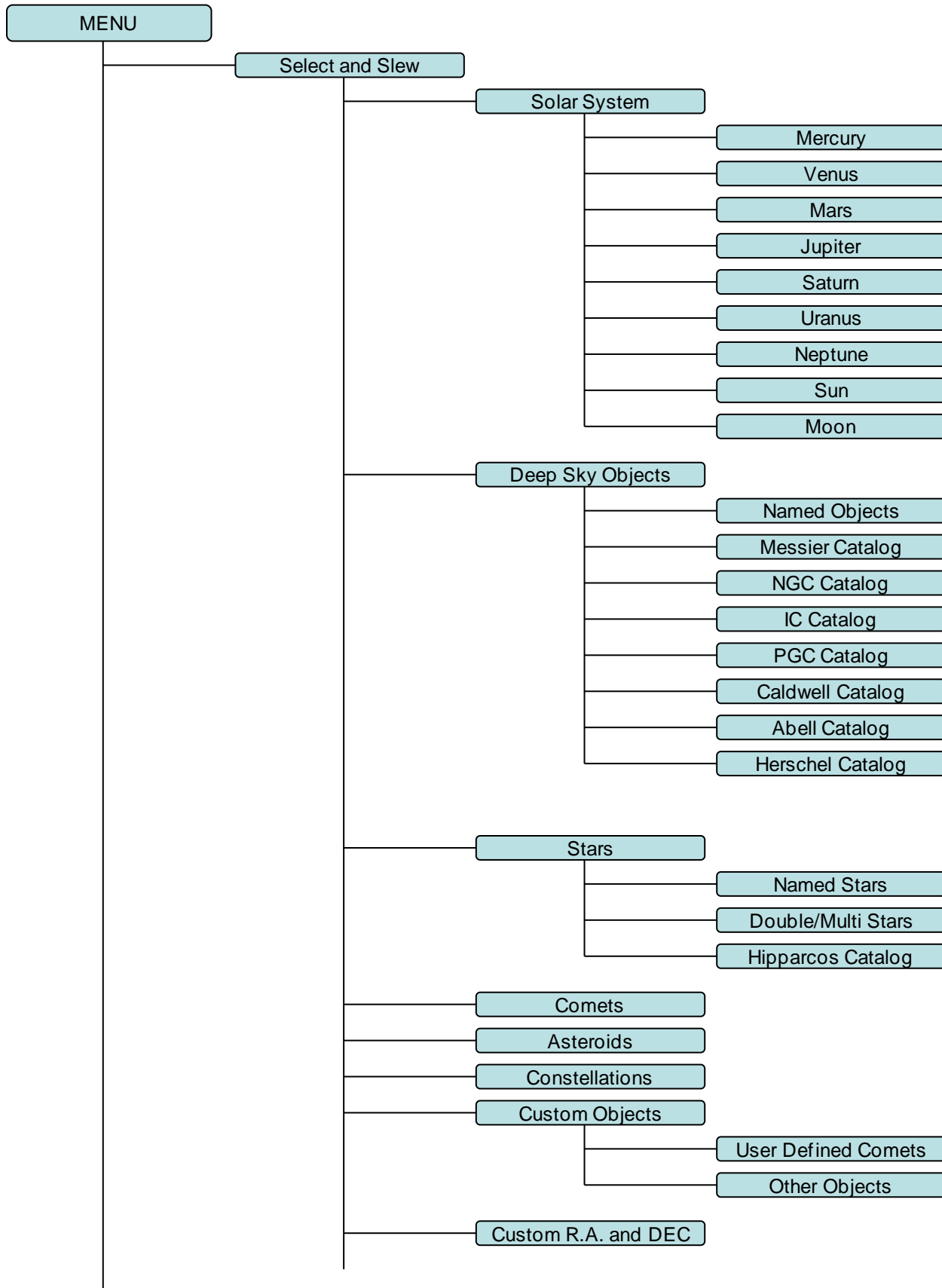


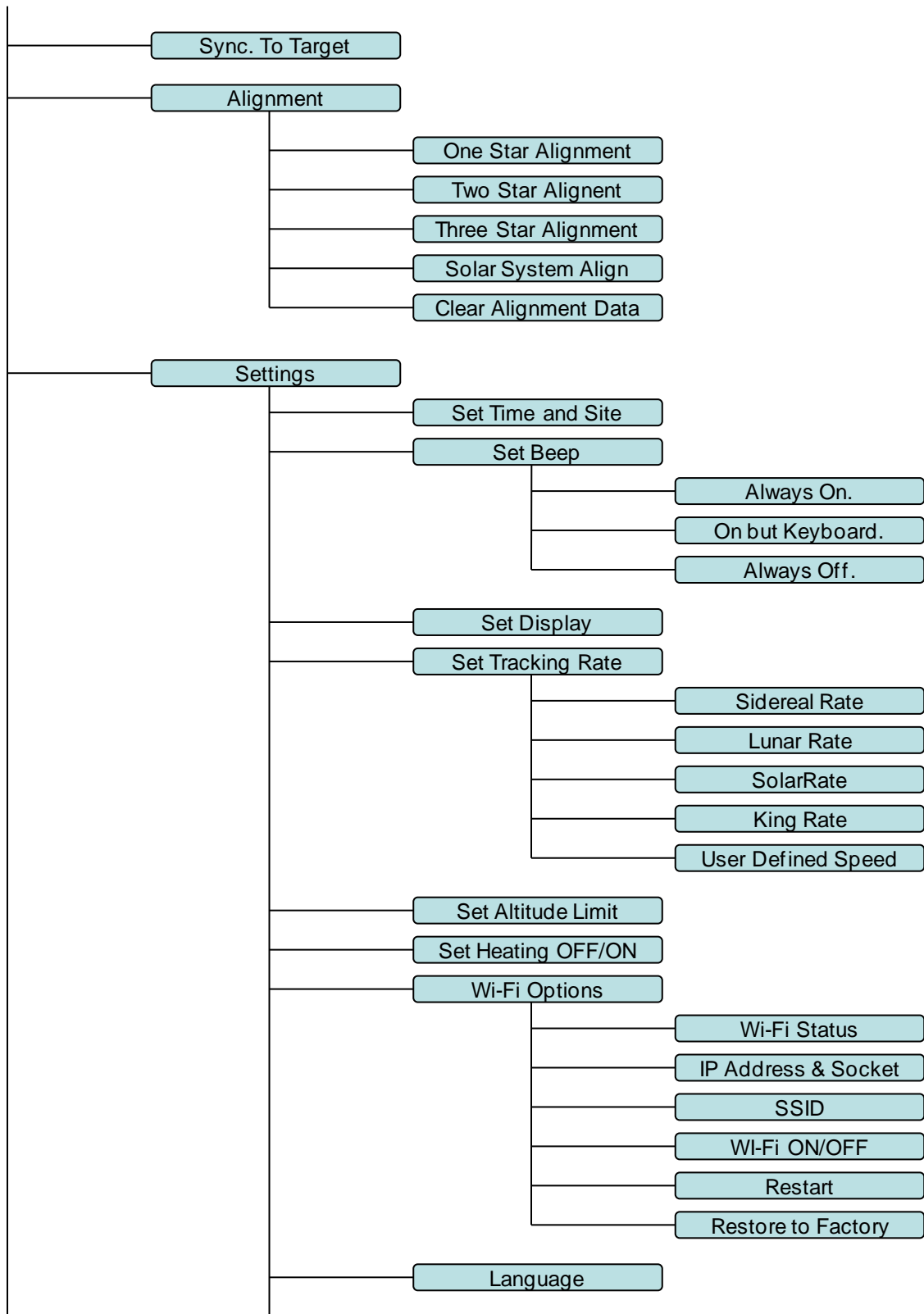
Battery Disposal: Batteries contain chemicals that, if released, may affect the environment and human health. Batteries should be collected separately for recycling, and recycled at a local hazardous material disposal location adhering to your country and local government regulations. To find out where you can drop off your waste battery for recycling, please contact your local waste disposal service or the product representative.

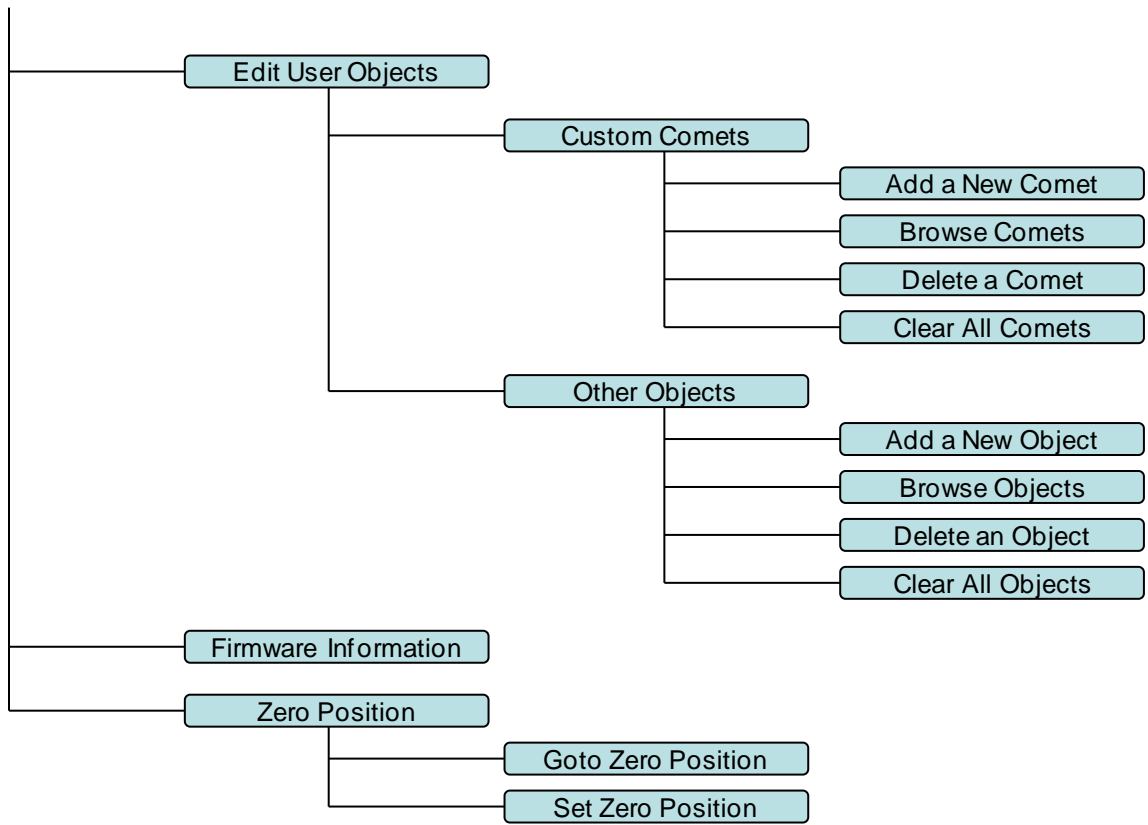
Appendix A. Technical Specifications

Mount	Altazimuth Mount
Body material	Die-cast aluminum
System	GOTONOVA®
Primary payload	33 lb
Secondary payload	10 lb
Mount weight	13 lb (including CW shaft and battery)
Gear	Aluminum worm wheel/Brass worm gear
Motor	128X microstep stepper motor
Resolution	0.1 arc seconds
Transmission	Synchronous belt
Tracking	Automatic
Tracking rate	sidereal, solar, lunar, King and user defined
Hand Controller	Go2Nova® 8407 with 212,000+ object database
Slew speed	1x,2x,8x,16x,64x,128x,256x,512x,MAX(~10 ° /sec, 1400X)
GPS	Built-in 32-channel GPS
Sensors	Position and angular detection
Level indicator	Precision bubble
Dovetail saddle	6" VIXEN/LOSMANDY-D dual saddle Optional secondary Vixen saddle
Battery	Built-in rechargeable Li-ion battery (11.1V, 4.4AH)
Battery running time	Up to 10 hour at 20°C when new
Battery charger	100-240V AC input /12.6V DC 2000mA output (Included)
Wireless control	Yes, full control via built-in WIFI adapter
Firmware upgrade	Yes, via serial (RS232) port on mount and hand controller
Computer control	Yes. PC (ASCOS) and Mac/Tablet/SmartPhone
Counterweight	10 lb (optional for #8920)
Tripod/Pier/Tri-Pier	Optional for #8920
Operation temperature	-10°C ~ 40°C
Warranty	Two year limited for mount 90 day limited for battery

Appendix B. AZ Mount Pro Go2Nova[®] 8407 HC MENU







Appendix C. Firmware Upgrade

The firmware in the 8407 Hand Controller and control board can be upgraded by the customer. Please check iOptron's website, <http://www.iOptron.com>, under **Support > Firmware/Software** for details.

Appendix D. Computer Control an AZMP Mount

The AZ Mount Pro mount can be controlled by a SmartPhone, a tablet or a computer. It is supported by two types of computer connections:

- Connect to a computer via RS232 serial port. An optional RS232 to USB adapter (iOptron part #8435) is needed if your computer does not have a serial port, like most of the laptops on the market today. Follow the adapter instructions to install the adapter driver. The mount can be controlled via ASCOM protocol (Windows OS), or directly by some software, such as Sky Safari (Mac OS)
- Connect wirelessly via built-in Wi-Fi connection. The mount can be controlled via ASCOM protocol (Windows OS), SmartPhone/tablet and Mac OS wirelessly (with supported software, such as Sky Safari).

To control the mount via ASCOM protocol, you need:

1. Download and install the latest ASCOM Platform, currently 6.5 SP1, from <http://www.ascom-standards.org/>. Make sure your PC meets the software requirement.
2. Download and install the latest iOptron ASCOM drive for AZMP from iOptron website.
3. Planetarium software that supports ASCOM protocol. Follow software instructions to select the iOptron Telescope.

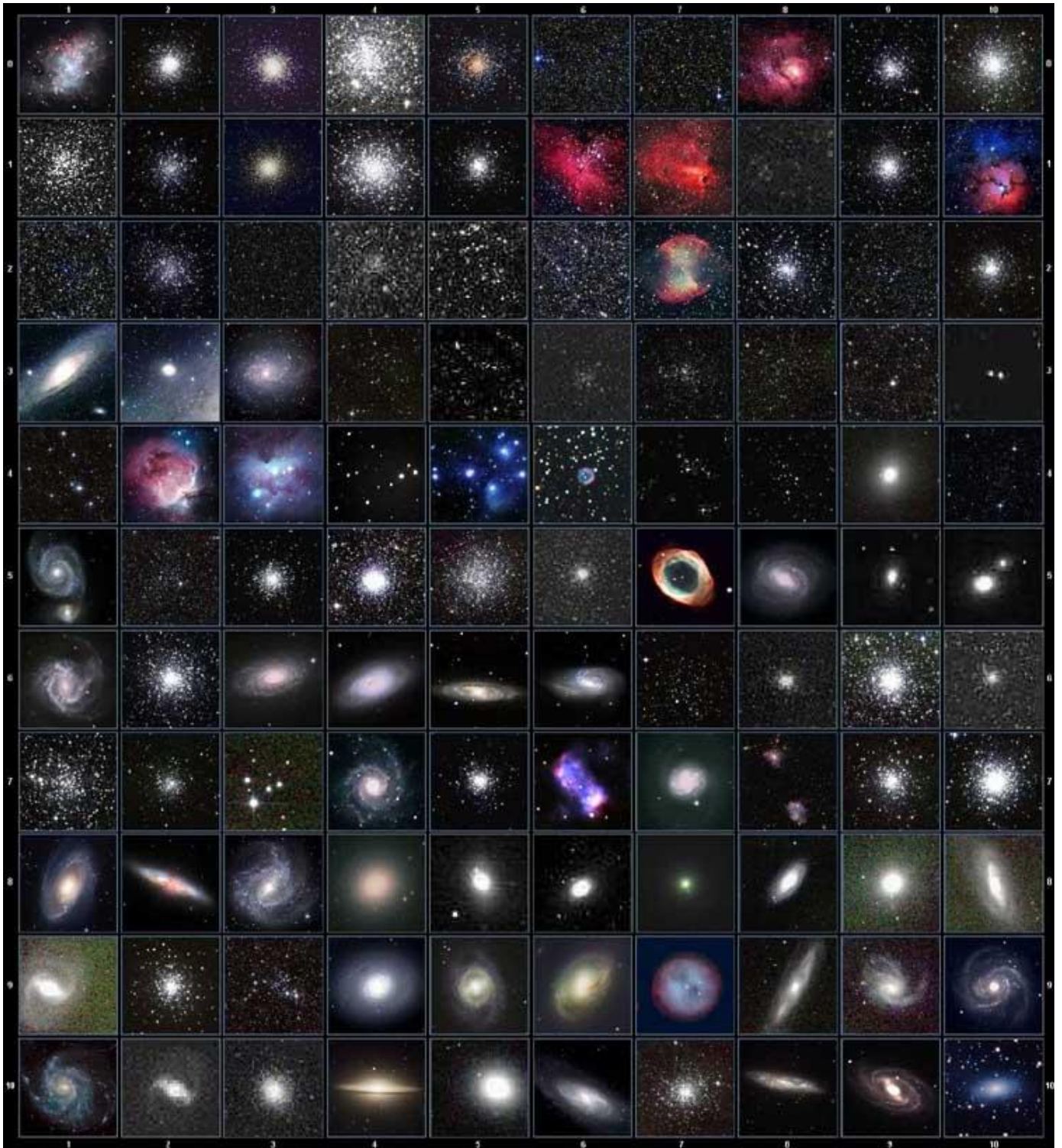
Please refer to iOptron website, www.iOptron.com, under **Support > iOptron ASCOM Driver** for more detail.

Appendix E. Go2Nova[®] 8407 Hand Controller Star List

Deep Sky Object

1	47 Tucanae	47	Integral Sign Galaxy
2	Andromeda Galaxy	48	Iris Nebula
3	Antennae Galaxies	49	Jellyfish Nebula
4	Barnard's Galaxy	50	Jewel Box Cluster
5	Bear-Paw Galaxy	51	Lagoon Nebula
6	Beehive Cluster	52	Lambda Centauri Nebula
7	Black Eye Galaxy	53	Large Magellanic Cloud
8	Blinking Planetary	54	Leo Triplet
9	Blue Flash Nebula	55	Little Dumbbell Nebula
10	Blue Planetary	56	Little Gem Nebula
11	Blue Snowball Nebula	57	Little Ghost Nebula
12	Bode's Galaxy	58	Mice Galaxies
13	Box Nebula	59	Monkey Head Nebula
14	Bubble Nebula	60	North America Nebula
15	Bug Nebula	61	Northern Jewel Box
16	Butterfly Cluster	62	Omega Nebula
17	Butterfly Galaxies	63	Orion Nebula
18	California Nebula	64	Owl Nebula
19	Carina Nebula	65	Pacman Nebula
20	Cat's Eye Nebula	66	Pelican Nebula
21	Cave Nebula	67	Phantom Streak Nebula
22	Christmas Tree Cluster	68	Pinwheel Galaxy
23	Cigar Galaxy	69	Pleiades
24	Cocoon Nebula	70	Ring Nebula
25	Coma Pinwheel	71	Rosette Nebula
26	Copeland Septet	72	Saturn Nebula
27	Crab Nebula	73	Sextans B
28	Crescent Nebula	74	Small Magellanic Cloud
29	Draco Dwarf Galaxy	75	Sombrero Galaxy
30	Dumbbell Nebula	76	Soul Nebula
31	Eagle Nebula	77	Southern Pinwheel Galaxy
32	Eight-Burst Nebula	78	Spindle Galaxy(3115)
33	Elephant Trunk Nebula	79	Spindle Galaxy(5866)
34	Eskimo Nebula	80	Stephan's Quintet
35	Eyes Galaxies	81	Sunflower Galaxy
36	Flame Nebula	82	Tarantula Nebula
37	Flaming Star Nebula	83	The Witch Head Nebula
38	Ghost of Jupiter	84	The Wizard Nebula
39	Heart Nebula	85	Thor's Helmet
40	Helix Nebula	86	Triangulum Galaxy
41	Hercules Globular Cluster	87	Trifid Nebula
42	Hind's Variable Nebula	88	Ursa Minor Dwarf Galaxy
43	Hockey Stick Galaxies	89	Veil Nebula
44	Horsehead Nebula	90	Whale Galaxy
45	Hubble's Variable Nebula	91	Whirlpool Galaxy
46	Hyades Cluster	92	Wild Duck Cluster

Messier Catalog



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Named Star List

001 Acamar	050 Alrescha	099 Deneb el Okab	148 Lesath
002 Achernar	051 Alshain	100 Deneb Kaitos	149 Mahasim
003 Achird	052 Altair	101 Denebakrab	150 Maia
004 Acrab	053 Altais	102 Denebola	151 Marfik
005 Acrux A	054 Alterf	103 Dschubba	152 Marfikent
006 Acrux B	055 Aludra	104 Dubhe	153 Markab
007 Acubens	056 Alula Australis	105 Edasich	154 Markeb
008 Adhafera	057 Alula Borealis	106 Electra	155 Matar
009 Adhara	058 Alya	107 Elnath	156 Mebsuta
010 Al Dhanab	059 Ancha	108 Eltanin	157 Megrez
011 Al Dhibain Prior	060 Ankaa	109 Enif	158 Meissa
012 Al Kab	061 Antares	110 Epsilon Persei	159 Mekbuda
013 Al Mizan	062 Apollyon	111 Errai	160 Menkalinan
014 Al Nair	063 Arcturus	112 Fomalhaut	161 Menkar
015 Al Niyat	064 Arkab	113 Furud	162 Menkent
016 Albaldah	065 Arneb	114 Gacrux	163 Menkib
017 Albali	066 Ascella	115 Gamma Lupi	164 Merak
018 Albireo	067 Asellus Australis	116 Gatria	165 Merope
019 Alchiba	068 Asellus Borealis	117 Giausar	166 Mesartim
020 Alcor	069 Aspidiske	118 Gienah	167 Miaplacidus
021 Alcyone	070 Atik	119 Gienah Cygni	168 Mimosa
022 Aldebaran	071 Atlas	120 Girtab	169 Mintaka
023 Alderamin	072 Atria	121 Gliese 1	170 Mira
024 Alfirk	073 Avior	122 Gomeisa	171 Mirach
025 Algenib	074 Azha	123 Graffias	172 Mirfak
026 Algenubi	075 Barnard's Star	124 Groombridge 1830	173 Mirzam
027 Algieba	076 Baten Kaitos	125 Grumium	174 Mizar
028 Algiedi Secunda	077 Beid	126 Hadar	175 Mu Leporis
029 Algol	078 Bellatrix	127 Hamal	176 Mu Velorum
030 Algorab	079 Beta Gruis	128 Hatsya	177 Muphrid
031 Alhakim	080 Beta Hydri	129 Head of Hydrus	178 Muscida
032 Alhena	081 Betelgeuse	130 Homam	179 Naos
033 Alioth	082 Betria	131 Iritjinga	180 Nasak Yamani
034 Alkaid	083 Biham	132 Iritjinga	181 Nashira
035 Alkalurops	084 Birdun	133 Izar	182 Navi
036 Alkes	085 Canopus	134 Kapteyn's Star	183 Nekkar
037 Almaaz	086 Capella	135 Kaus Australis	184 Nihal
038 Almach	087 Caph	136 Kaus Borealis	185 Nunki
039 Alnair	088 Castor A	137 Kaus Media	186 Nusakan
040 Alnasl	089 Castor B	138 Keid	187 Peacock
041 Alnilam	090 Cebalrai	139 Kekouan	188 Phact
042 Alnitak	091 Chara	140 Kitalpha	189 Phecda
043 Alniyat	092 Chertan	141 Kochab	190 Pherkad
044 Alpha Lupi	093 Choo	142 Koo She	191 Pi Puppis
045 Alpha Muscae	094 Cor Caroli	143 Kornephoros	192 Pi Scorpii
046 Alpha Tucanae	095 Cursa	144 Kraz	193 Polaris
047 Alphard	096 Dabih	145 Kurhah	194 Pollux
048 Alphecca	097 Deneb	146 Lacaille 9352	195 Porrima
049 Alpheratz	098 Deneb Algedi	147 Lalande 21185	196 Procyon

197 Propus	213 Sadachbia	229 Suhail	245 Vindematrix
198 Proxima Centauri	214 Sadalbari	230 Sulafat	246 Wasat
199 Rasalas	215 Sadalmelik	231 Syrma	247 Wazn
200 Rasalgethi	216 Sadalsuud	232 Talitha	238 Wei
201 Rasalhague	217 Sadr	233 Tania Australis	249 Wezen
202 Rastaban	218 Saiph	234 Tania Borealis	250 Yed Posterior
203 Regor	219 Sargas	235 Tarazed	251 Yed Prior
204 Regulus	220 Scheat	236 Tau Puppis	253Zaniah
205 Rigel	221 Schedar	237 Taygeta	253 Zaurak
206 Rigel Kentaurus B	222 Seginus	238 Tejat Posterior	254 Zavijava
207 Rigil Kentaurus A	223 Shaula	239 Theta Carinae	255 Zeta Persei
208 Ruchbah	224 Sheliak	240 Thuban	256 Zeta Tauri
209 Rukbat	225 Sheratan	241 Turais	257 Zosma
210 Rukh	226 Sirius	242 Unukalhai	258 Zubenelgenubi
211 Rutilicus	227 Skat	243 Vasat-ul-cemre	259 Zubeneshchamali
212 Sabik	228 Spica	244 Vega	

Modern Constellations

No.	Constellation	Abbreviation
1	Andromeda	And
2	Antlia	Ant
3	Apus	Aps
4	Aquarius	Aqr
5	Aquila	Aql
6	Ara	Ara
7	Aries	Ari
8	Auriga	Aur
9	Boötes	Boo
10	Caelum	Cae
11	Camelopardalis	Cam
12	Cancer	Cnc
13	Canes Venatici	CVn
14	Canis Major	CMa
15	Canis Minor	CMi
16	Capricornus	Cap
17	Carina	Car
18	Cassiopeia	Cas
19	Centaurus	Cen
20	Cepheus	Cep
21	Cetus	Cet
22	Chamaeleon	Cha
23	Circinus	Cir
24	Columba	Col
25	Coma Berenices	Com
26	Corona Australis	CrA
27	Corona Borealis	CrB
28	Corvus	Crv
29	Crater	Crt
30	Crux	Cru
31	Cygnus	Cyg
32	Delphinus	Del
33	Dorado	Dor
34	Draco	Dra
35	Equuleus	Equ
36	Eridanus	Eri
37	Fornax	For
38	Gemini	Gem
39	Grus	Gru
40	Hercules	Her
41	Horologium	Hor
42	Hydra	Hya
43	Hydrus	Hyi
44	Indus	Ind

No.	Constellation	Abbreviation
45	Lacerta	Lac
46	Leo	Leo
47	Leo Minor	LMi
48	Lepus	Lep
49	Libra	Lib
50	Lupus	Lup
51	Lynx	Lyn
52	Lyra	Lyr
53	Mensa	Men
54	Microscopium	Mic
55	Monoceros	Mon
56	Musca	Mus
57	Norma	Nor
58	Octans	Oct
59	Ophiuchus	Oph
60	Orion	Ori
61	Pavo	Pav
62	Pegasus	Peg
63	Perseus	Per
64	Phoenix	Phe
65	Pictor	Pic
66	Pisces	Psc
67	Piscis Austrinus	PsA
68	Puppis	Pup
69	Pyxis	Pyx
70	Reticulum	Ret
71	Sagitta	Sge
72	Sagittarius	Sgr
73	Scorpius	Sco
74	Sculptor	Scl
75	Scutum	Sct
76	Serpens	Ser
77	Sextans	Sex
78	Taurus	Tau
79	Telescopium	Tel
80	Triangulum	Tri
81	Triangulum Australe	TrA
82	Tucana	Tuc
83	Ursa Major	UMa
84	Ursa Minor	UMi
85	Vela	Vel
86	Virgo	Vir
87	Volans	Vol
88	Vulpecula	Vul

Double/Multi Stars

No.	HC Item		Constellation	Name	HIP	WDS	SAO
1	Rigel	Alpha Centauri	Centaurus		71683	14396-6050	252838
2	Rigel	Beta Orionis	Orion		24436	05145-0812	131907
3	Gacrux	Gamma Crucis	Crux		61084	12312-5707	240019
4	Sargas	Theta Scorpii	Scorpius		86228	17373-4300	228201
5	Castor A	Alpha Geminorum	Gemini		36850	07346+3153	60198
6	Mizar	Zeta Ursae Majoris	Ursa Major		65378	13239+5456	28737
7	Almach	Gamma Andromedae	Andromeda		9640	02039+4220	37735
8	Algieba	Gamma Leonis	Leo		50583	10200+1950	81298
9	Aludra	Eta Canis Majoris	Canis Major		35904	07241-2918	173651
10	Iritjinga (Cen)	Gamma Centauri	Centaurus	Muhlifain	61932	12415-4858	223603
11	Zubeneigenubi	Alpha Librae	Libra		72603	14509-1603	158836
12	Alcyone	Eta Tauri	Taurus		17702	03475+2406	76199
13	Cor Caroli	Alpha Canum Venaticorum	Canes Venatici		63125	12560+3819	63257
14	Acamar	Theta Eridani	Eridanus		13847	02583-4018	216113
15	Adhafera	Zeta Leonis	Leo		50335	10167+2325	81265
16	Rasalgethi	Alpha Herculis	Hercules		84345	17146+1423	102680
17	Meissa	Lambda Orionis	Orion		26207	05351+0956	112921
18	Graffias	Beta1 Scorpii	Scorpius		78820	16054-1948	159682
19	Alya	Theta Serpentis	Serpens		92946	18562+0412	124068
20	HIP 48002	Upsilon Carinae	Carina	Vathorz Prior		09471-6504	250695
21	HIP 95947	Beta1 Cygni	Cygnus	Albireo		19307+2758	87301
22	HIP 20894	Theta2 Tauri	Taurus			04287+1552	93957
23	HIP 74395	Zeta Lupi	Lupus			15123-5206	242304
24	HIP 27072	Gamma Leporis	Lupus			05445-2227	170759
25	HIP 26549	Sigma Orionis	Orion			05387-0236	132406
26	HIP 85667	HD 158614	Ophiuchus			17304-0104	141702
27	HIP 74376	Kappa1 Lupi	Lupus			15119-4844	225525
28	HIP 34481	Gamma2 Volantis	Carina			07087-7030	256374
29	HIP 53253	Upsilon Carinae	Carina			10535-5851	238574
30	HIP 99675	Omicron1 Cygni	Cygnus	31 Cyg		20136+4644	49337
31	HIP 63003	Mu1 Crucis	Crux			12546-5711	240366
32	HIP 43103	Iota Cancri	Cancer	48 Cnc		08467+2846	80416
33	HIP 110991	Delta Cephei	Cepheus	27 Cep		22292+5825	34508
34	HIP 20635	Kappa1 Tauri	Taurus	65 Tau		04254+2218	76601
35	HIP 88601	70 Ophiuchi	Orion			18055+0230	123107
36	HIP 2484	Beta1 Tucanae	Horologium			00315-6257	248201
37	HIP 91971	Zeta1 Lyrae	Cygnus	6 Lyr		18448+3736	67321
38	HIP 79374	Nu Scorpii	Scorpius	Jabbah		16120-1928	159764
39	HIP 102532	Gamma2 Delphini	Pegasus	12 Del		20467+1607	106476
40	HIP 52154	Xi Velorum	Vela			10393-5536	238309
41	HIP 37229	HD 61555	Canis Major			07388-2648	174198
42	HIP 30419	Epsilon Monocerotis	Orion	8 Mon		06238+0436	113810
43	HIP 108917	Xi Cephei	Cepheus	Al kurhah		22038+6438	19827
44	HIP 53417	54 Leonis	Leo			10556+2445	81584
45	HIP 65271	J Centauri	Centaurus			13226-6059	252284
46	HIP 67669	3 Centauri	Centaurus			13518-3300	204916
47	HIP 105319	Theta Indi	Indus			21199-5327	246965
48	HIP 80582	Epsilon Normae	Norma			16272-4733	226773
49	HIP 8832	Gamma Arietis	Aries			01535+1918	92680
50	HIP 69483	Kappa Boötis	Boötes	Asellus Tertius		14135+5147	29045
51	HIP 92946	Theta Serpentis	Serpens			18562+0412	124068
52	HIP 86614	Psi1 Draconis	Draco	31 Draconis		17419+7209	8890

No.	HC Item		Constellation	Name	HIP	WDS	SAO
53	HIP 95771	Alpha Vulpeculae	Vulpecula	Anser		19287+2440	87261
54	HIP 30867	Beta Monocerotis	Monoceros			06288-0702	133316
55	HIP 35363	NV Puppis	Puppis			07183-3644	197824
56	HIP 94761	Gliese 752	Aquila	Wolf 1055, Ross 652		19169+0510	
57	HIP 21683	Sigma2 Tauri	Taurus			04393+1555	94054
58	HIP 8497	Chi Ceti	Cetus	53 Cet		01496-1041	148036
59	HIP 26199	HD 36960	Orion			05350-0600	132301
60	HIP 104521	Gamma Equulei	Equuleus	5 Equ		21103+1008	126593
61	HIP 116389	Iota Phoenicis	Phoenix			23351-4237	231675
62	HIP 17797	HD 24071	Eridanus			03486-3737	194550
63	HIP 21036	83 Tauri	Taurus			04306+1343	93979
64	HIP 107310	Mu1 Cygni	Cygnus	78 Cyg		21441+2845	89940
65	HIP 72659	Xi Boötis	Boötes	37 Boo		14514+1906	101250
66	HIP 21029	HD 28527	Taurus			04306+1612	93975
67	HIP 42726	HY Velorum	Vela			08424-5307	236205
68	HIP 18255	32 Eridani	Eridanus			03543-0257	130806
69	HIP 9153	Lambda Arietis	Aries			01580+2336	75051
70	HIP 88267	95 Herculis	Hercules			18015+2136	85648
71	HIP 85829	Nu2 Draconis	Draco	25 Dra		17322+5511	30450
72	HIP 43937	V376 Carinae	Carina	b1 Carinae		08570-5914	236436
73	HIP 71762	Pi2 Boötis	Boötes	29 Boo		14407+1625	101139
74	HIP 80047	Delta1 Apodis	Apus			16203-7842	257380
75	HIP 58484	Epsilon Chamaeleontis	Chamaeleon			11596-7813	256894
76	HIP 25142	23 Orionis	Orion			05228+0333	112697
77	HIP 54204	Chi1 Hydrae	Hydra			11053-2718	179514
78	HIP 76669	Zeta Coronae Borealis	Corona Borealis	7 CrB		15394+3638	64833
79	HIP 99770	b3 Cygni	Cygnus	29 Cyg		20145+3648	69678
80	HIP 101027	Rho Capricorni	Capricornus	11 Cap		20289-1749	163614
81	HIP 74911	Nu Lupi	Lupus			15185-4753	225638
82	HIP 35210	HD 56577	Canis Major			07166-2319	173349
83	HIP 26235	Theta2 Orionis	Orion	43 Ori		05354-0525	132321
84	HIP 40321	OS Puppis	Puppis			08140-3619	198969
85	HIP 70327	HD 126129	Boötes			14234+0827	120426
86	HIP 26221	Theta1 Orionis	Orion	Trapezium		05353-0523	132314
87	HIP 80473	Rho Ophiuchi	Ophiuchus	5 Oph		16256-2327	184381
88	HIP 78105	Xi1 Lupi	Lupus			15569-3358	207144
89	HIP 79043	Kappa Herculis	Hercules	7 Her		16081+1703	101951
90	HIP 61418	24 Comae Berenices	Coma Berenices			12351+1823	100160
91	HIP 91919	Epsilon Lyrae	Lyra	4 Lyr		18443+3940	67309
92	HIP 41639	HD 72127	Vela			08295-4443	219996
93	HIP 104214	61 Cygni	Cygnus			21069+3845	70919
94	HIP 23734	11 Camelopardalis	Camelopardalis			05061+5858	25001
95	HIP 60189	Zeta Corvi	Corvus	5 Crv		12206-2213	180700
96	HIP 66821	Q Centauri	Centaurus			13417-5434	241076
97	HIP 14043	HD 18537	Perseus			03009+5221	23763
98	HIP 5737	Zeta Piscium	Pisces	86 Psc		01137+0735	109739
99	HIP 84626	Omicron Ophiuchi	Ophiuchus	39 Oph		17180-2417	185238
100	HIP 60904	17 Comae Berenices	Coma Berenices			12289+2555	82330
101	HIP 58684	67 Ursae Majoris	Ursa Major			12021+4303	44002
102	HIP 5131	Psi1 Piscium	Pisces	74 Psc		01057+2128	74482
103	HIP 115126	94 Aquarii	Aquarius			23191-1328	165625
104	HIP 62572	HD 112028	Camelopardalis			12492+8325	2102

No.	HC Item		Constellation	Name	HIP	WDS	SAO
105	HIP 40167	Zeta1 Cancr	Cancer	Tegmen		08122+1739	97645
106	HIP 40817	Kappa Volantis	Volans			08198-7131	256497
107	HIP 81292	17 Draconis	Draco			16362+5255	30013
108	HIP 80197	Nu1 Coronae Borealis	Corona Borealis			16224+3348	65257
109	HIP 88060	HD 163756	Sagittarius			17591-3015	209553
110	HIP 42637	Eta Chamaeleontis	Chamaeleon			08413-7858	256543
111	HIP 21039	81 Tauri	Taurus			04306+1542	93978
112	HIP 100965	75 Draconis	Draco			20282+8125	3408
113	HIP 25768	HD 36553	Pictor			05302-4705	217368
114	HIP 93717	15 Aquilae	Aquila			19050-0402	142996
115	HIP 79980	HD 148836	Scorpius			16195-3054	207558
116	HIP 12086	15 Trianguli	Triangulum			02358+3441	55687
117	HIP 90968	Kappa2 Coronae Austr	Corona Australis			18334-3844	210295
118	HIP 22531	Iota Pictoris	Pictor			04509-5328	233709
119	HIP 34065	HD 53705	Puppis			07040-4337	218421
120	HIP 79607	Sigma Coronae Boreali	Corona Borealis			16147+3352	65165
121	HIP 109786	41 Aquarii	Aquarius			22143-2104	190986
122	HIP 56280	17 Crateris	Hydra			11323-2916	179968
123	HIP 51561	HD 91355	Vela			10320-4504	222126
124	HIP 107930	HD 208095	Cepheus			21520+5548	33819
125	HIP 97966	57 Aquilae	Aquila			19546-0814	143898
126	HIP 117218	107 Aquarii	Aquarius.			23460-1841	165867
127	HIP 82676	HD 152234	Scorpius			16540-4148	227377
128	HIP 111546	8 Lacertae	Lacerta			22359+3938	72509
129	HIP 29151	HD 42111	Orion			06090+0230	113507
130	HIP 107253	79 Cygni	Cygnus			21434+3817	71643
131	HIP 88136	41 Draconis	Draco			18002+8000	8996
132	HIP 81702	HD 150136	Ara			16413-4846	227049
133	HIP 97423	HD 186984	Sagittarius			19480-1342	162998
134	HIP 30444	HD 45145	Columba			06240-3642	196774
135	HIP 66400	HD 118349	Hydra			13368-2630	181790
136	HIP 17579	21 Tauri	Taurus	Asterope		03459+2433	76159
137	HIP 35785	19 Lyncis	Lynx			07229+5517	26312
138	HIP 81641	37 Herculis	Hercules			16406+0413	121776
139	HIP 7751	p Eridani	Eridanus			01398-5612	232490
140	HIP 21148	1 Camelopardalis	Camelopardalis			04320+5355	24672
141	HIP 9021	56 Andromedae	Andromeda			01562+3715	55107
142	HIP 97816	HD 187420	Telescopium			19526-5458	246311
143	HIP 88818	100 Herculis	Hercules			18078+2606	85753
144	HIP 36817	HD 60584	Puppis			07343-2328	174019
145	HIP 25695	HD 35943	Taurus			05293+2509	77200
146	HIP 98819	15 Sagittae	Sagitta			20041+1704	105635
147	HIP 61910	VV Corvi	Corvus			12413-1301	157447
148	HIP 111643	Sigma2 Gruis	Grus			22370-4035	231217
149	HIP 80399	HD 147722	Scorpius			16247-2942	184368
150	HIP 83478	HD 154228	Hercules			17037+1336	102564
151	HIP 101123	Omicron Capricorni	Capricornus			20299-1835	163626
152	HIP 28271	59 Orionis	Orion			05584+0150	113315
153	HIP 64246	17 Canum Venaticorum	Canes Venatici			13101+3830	63380
154	HIP 96895	16 Cygni	Cygnus			19418+5032	31898
155	HIP 35564	HD 57852	Carina			07204-5219	235110
156	HIP 37843	2 Puppis	Puppis			07455-1441	153363

No.	HC Item		Constellation	Name	HIP	WDS	SAO
157	HIP 28790	HD 41742	Puppis			06047-4505	217706
158	HIP 4675	HD 5788	Andromeda			01001+4443	36832
159	HIP 31676	8 Lyncis	Lynx			06377+6129	13897
160	HIP 10176	59 Andromedae	Andromeda			02109+3902	55330
161	HIP 25950	HD 36408	Taurus			05322+1703	94630
162	HIP 117931	AL Sculptoris	Sculptor			23553-3155	214860
163	HIP 81914	HD 150591	Scorpius			16439-4107	227123
164	HIP 21242	m Persei	Perseus			04334+4304	39604
165	HIP 86831	61 Ophiuchi	Ophiuchus			17446+0235	122690
166	HIP 115272	HD 220003	Grus			23208-5018	247838
167	HIP 46657	Zeta1 Antliae	Antlia			09308-3153	200444
168	HIP 41404	Phi2 Cancri	Cancer			08268+2656	80188
169	HIP 29388	41 Aurigae	Auriga			06116+4843	40925
170	HIP 49321	HD 87344	Hydra			10040-1806	155704
171	HIP 84054	63 Herculis	Hercules			17111+2414	84896
172	HIP 39035	HD 66005	Puppis			07592-4959	219249
173	HIP 25303	Theta Pictoris	Pictor			05248-5219	233965
174	HIP 52520	HD 93344	Carina			10443-7052	256750
175	HIP 95398	2 Sagittae	Sagitta			19244+1656	104797
176	UCAC4 277-135548						
177	HIP 32609	HD 48766	Lynx			06482+5542	25963
178	HIP 101765	48 Cygni	Cygnus			20375+3134	70287
179	HIP 24825	YZ Leporis	Lepus			05193-1831	150335
180	HIP 31158	21 Geminorum	Gemini			06323+1747	95795
181	HIP 3885	65 Piscium	Pisces			00499+2743	74295
182	HIP 93371	HD 176270	Australis			19011-3704	210816
183	HIP 36345	HD 59499	Puppis			07289-3151	198038
184	HIP 108364	HD 208947	Cepheus			21572+6609	19760
185	HIP 50939	HD 90125	Sextans			10242+0222	118278
186	HIP 76603	HD 139461	Libra			15387-0847	140672
187	HIP 32269	HD 49219	Carina			06442-5442	234683
188	HIP 42516	39 Cancri	Cancer			08401+2000	80333
189	HIP 62807	32 Comae Berenices	Coma Berenices			12522+1704	100309
190	UCAC4 226-128246						
191	HIP 94913	24 Aquilae	Aquila			19188+0020	124492
192	HIP 94336	HD 179958	Cygnus			19121+4951	48193
193	HIP 107299	HD 206429	Indus			21440-5720	247151
194	HIP 59984	HD 106976	Virgo			12182-0357	138704
195	HIP 16411	HD 21743	Taurus			03313+2734	75970
196	HIP 23287	HD 32040	Orion			05006+0337	112305
197	HIP 105637	HD 203857	Cygnus			21238+3721	71280
198	HIP 108925	HD 209744	Cepheus			22039+5949	34016
199	HIP 103814	HD 200011	Microscopium			21022-4300	230492
200	HIP 58112	65 Ursae Majoris	Ursa Major			11551+4629	43945
201	HIP 109354	V402 Lacertae	Lacerta			22093+4451	51698
202	HIP 43822	17 Hydrae	Hydra			08555-0758	136409
203	HIP 21986	55 Eridani	Eridanus			04436-0848	131442
204	HIP 17470	HD 23245	Taurus			03446+2754	76122
205	HIP 35960	V368 Puppis	Puppis			07248-3717	197974
206	HIP 42936	HD75086	Carina			08451-5843	236241
207	HIP 19272	SZ Camelopardalis	Camelopardalis			04078+6220	13031
208	HIP 76143	HD 138488	Libra			15332-2429	183565

IOPTRON WARRANTY

1. iOptron battery has 90 day limited warranty
2. iOptron mount has two (2) year limited warranty

A. iOptron warrants your telescope, mount, or controller to be free from defects in materials and workmanship for two years. iOptron will repair or replace such product or part which, upon inspection by iOptron, is found to be defective in materials or workmanship. As a condition to the obligation of iOptron to repair or replace such product, the product must be returned to iOptron together with proof-of-purchase satisfactory to iOptron.

B. The Proper Return Merchant Authorization Number must be obtained from iOptron in advance of return. Call iOptron at 1.781.569.0200 to receive the RMA number to be displayed on the outside of your shipping container.

All returns must be accompanied by a written statement stating the name, address, and daytime telephone number of the owner, together with a brief description of any claimed defects. Parts or product for which replacement is made shall become the property of iOptron.

The customer shall be responsible for all costs of transportation and insurance, both to and from the factory of iOptron, and shall be required to prepay such costs.

iOptron shall use reasonable efforts to repair or replace any telescope, mount, or controller covered by this warranty within thirty days of receipt. In the event repair or replacement shall require more than thirty days, iOptron shall notify the customer accordingly. iOptron reserves the right to replace any product which has been discontinued from its product line with a new product of comparable value and function.

This warranty shall be void and of no force of effect in the event a covered product has been modified in design or function, or subjected to abuse, misuse, mishandling or unauthorized repair. Further, product malfunction or deterioration due to normal wear is not covered by this warranty.

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Some states do not allow the exclusion or limitation of incidental or consequential damages or limitation on how long an implied warranty lasts, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

iOptron reserves the right to modify or discontinue, without prior notice to you, any model or style telescope.

If warranty problems arise, or if you need assistance in using your telescope, mount, or controller contact:

iOptron Corporation
Customer Service Department
6E Gill Street
Woburn, MA 01801
www.ioptron.com
support@ioptron.com
Tel. (781)569-0200
Fax. (781)935-2860
Monday-Friday 9AM-5PM EST

NOTE: This warranty is valid to U.S.A. and Canadian customers who have purchased this product from an authorized iOptron dealer in the U.S.A. or Canada or directly from iOptron. Warranty outside the U.S.A. and Canada is valid only to customers who purchased from an iOptron Distributor or Authorized iOptron Dealer in the specific country. Please contact them for any warranty.