SPECTRUM
OPTICAL INSTRUMENTS

PolarPlus (EQ6) Series

Equatorial Reflector Telescope



INSTRUCTION MANUAL

Version. 2.1

Scan for Video Instruction

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The PolarPlus (EQ6) Series telescope is an exceptional telescope kit designed for amateur astronomers and hobbyists who want to explore the night sky with ease. With its advanced optics and sturdy construction, this telescope is ideal for observing the moon, planets, star clusters, bright deep sky objects like the Orion Nebula and Andromeda Galaxy at night.

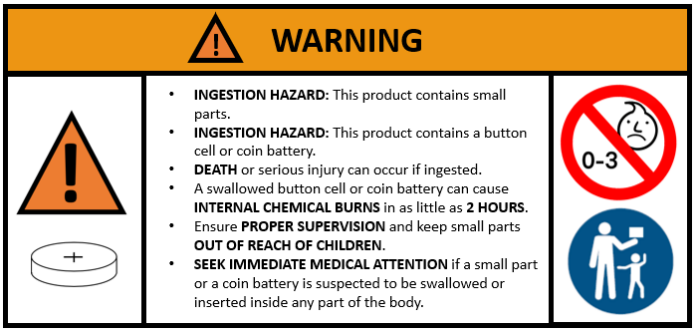
This telescope carries a **three year limited warranty**. For details see our website at spectrumoi.com

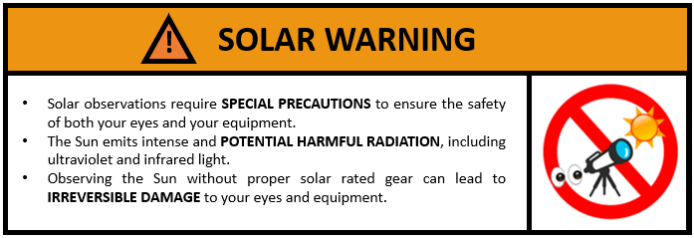
Some of the outstanding features of the PolarPlus telescope includes:

- Fully coated glass optical elements for crisp clear images.
- Newly designed Aluminum casted Equatorial mount.
- Slow motion control cables for both axes for precision tracking.
- Preassembled aluminum full size 2” tripod ensures a stable platform.
- Quick and easy no-tool set up.

Please take time to read through this manual before exploring the night sky. This manual helps you get familiar with your telescope, so we recommend to keep this manual around until you have fully mastered the telescope’s operation. This manual gives detailed information regarding each step as well as needed reference material and helpful hints to make your observing experience simple and pleasurable.

Your telescope is designed to give you years of fun and rewarding observations. However, there are a few things to consider before using your telescope that will ensure your safety and protect your equipment.





Parts List

This section covers the parts included for your EQ6 Series Telescopes.



FIG.1 EQ6 All Items

1. Optical Tube Assembly (OTA) (OTA may differ)
2. EQ6 Mount
3. Counter-weight Shaft
4. 2 Slow motion cables
5. Accessory tray
6. Bluetooth remote shutter
7. Smartphone adapter
8. Red-dot Viewfinder
9. 1.25" 2X Barlow Lens
10. 1.25" 20mm eyepiece
11. 1.25" 10mm eyepiece
12. 1.25" 4mm eyepiece
13. Counter Weight
14. Tripod

Major Parts List

This section covers the name of the major parts of your EQ6 Mount and Tripod.

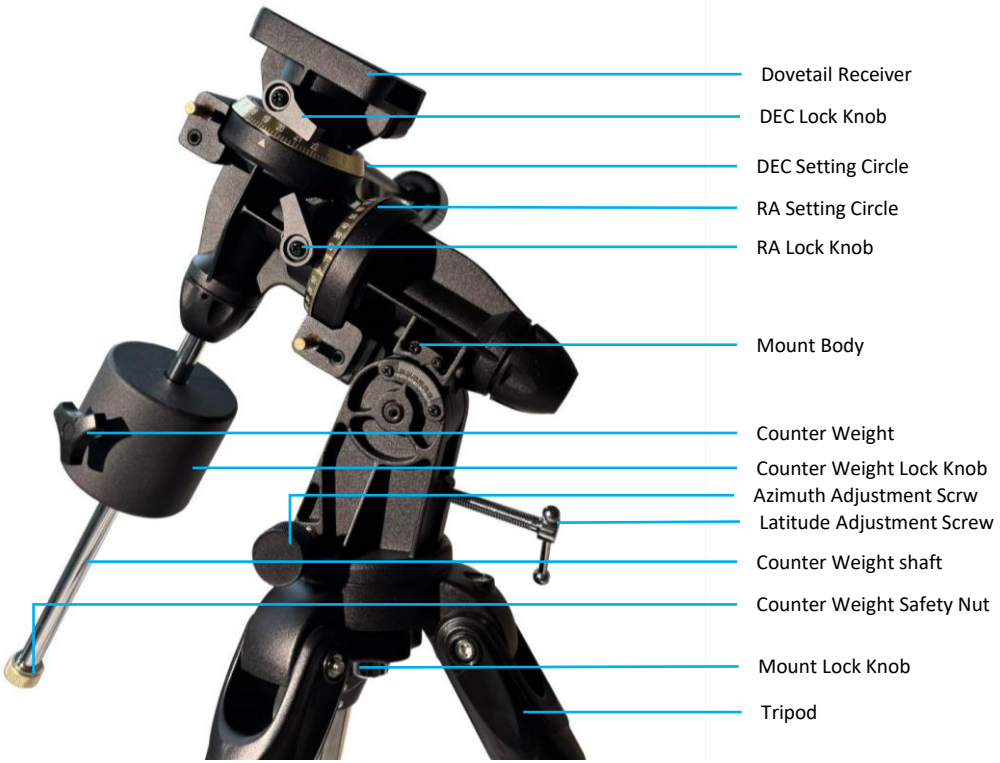


FIG.2: EQ6 Mount and Tripod

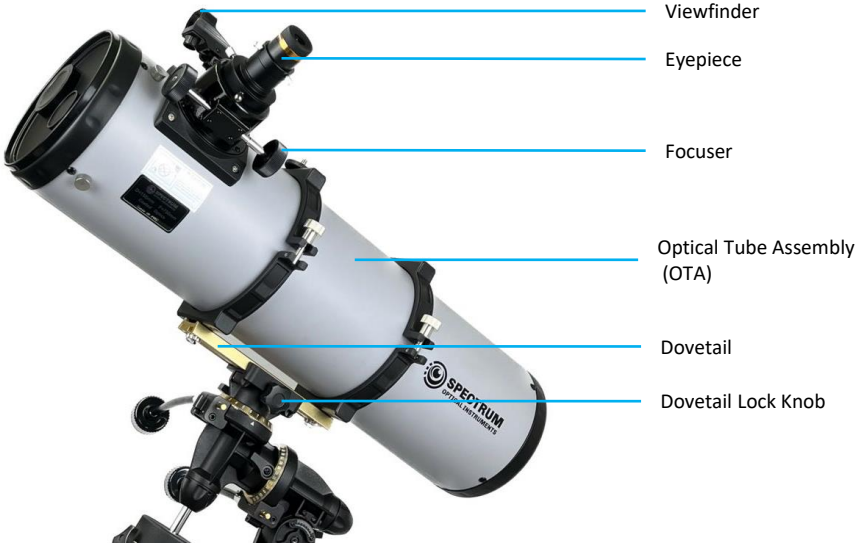


FIG.3: EQ6 Reflector

Tripod and Mount



FIG.4



FIG.5

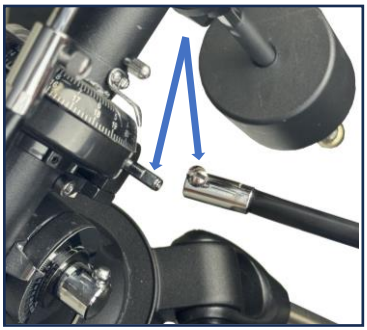


FIG.6



FIG.7

1. The tripod comes detached and setting up is easy. It's recommended to set up the telescope indoor first to get familiar with the set up process.

2. Spread the tripod out fully (see Fig.4) and place the tripod on a relatively flat ground or table.

3. Release the tripod leg lock (see Fig.4) and fully extend the legs. You can adjust the tripod height by raising the tripod legs. At the lowest level the height of the dovetail receiver is about 29" (74cm) and about 46" (1170cm) at its highest level.

4. Remove the mount from the packaging and set the protruding base of the mount into the indentation on the top of the tripod.

5. Secure the mount onto the tripod by tightening the Mount locking knob shown in Fig. 5 to a firm feel.

6. Attach the accessory tray onto the center spreader bar. Secure it by rotating the accessory tray until all three of the flaps are clamped down by the spreader bars. Temporarily place the un-used accessory here.

7. Attach the two slow motion control cables onto the mount. Make sure the locking screw is against the flat part of the shaft, see Fig. 6. after installing the

8. Install the counterweight shaft onto the mount. Make sure that the shaft is threaded in entirely and securely.

9. Remove the counterweight safety nut from the counterweight shaft. Slide the counterweight onto the counterweight shaft and tighten the lock knob to a firm feel. Re-install the safety nut. See Fig,7.

Optical Tube Assembly

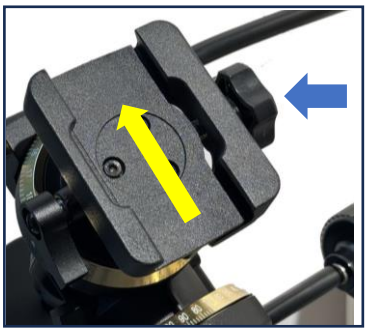


FIG.8

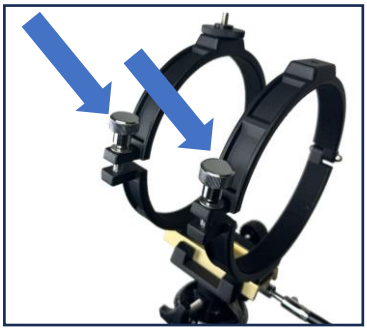


FIG.9



FIG.10



FIG.11

1. Remove the protective paper covering the optical tube assembly.

2. Loosen the large and small OTA lock knob on the top of the mount by turning it counterclockwise. (see Fig.8)

3. Locate the Vixen Dovetail on the OTA, usually in our signature gold color and locate the dovetail receiver on the mount (see Fig.8).

4. For the Reflector, loosen the crater rings by loosening the two nuts. Remove the OTA from the crater ring. See Fig. 9.

5. Slide the crater ring onto the dovetail receiver and lock it down by first tightening the large OTA lock knob then the small OTA lock knob. See Fig. 10. Slide the OTA back onto the crater ring and tighten the lock nut to secure the OTA.

6. In case of needing to remove the OTA from the mount, please loosen the small OTA lock knob first, then the large OTA lock knob.

7. It's recommended to place the OTA at a location where the OTA lock knob is located in the middle of the Vixen Dovetail for maximum security (see Fig.11). It's not recommended to place the OTA too far forward or back risking dropping the OTA.

8. You may need to slide the OTA back and forth to balance the OTA on the Altitude axis as more accessories are added onto the OTA later on.

Accessories

1. Remove the plastic plug at the back of the OTA and make sure the two thumbscrews do not protrude into the opening of the back of the OTA before installation.

2. For the 114mm and 130mm OTA, remove the two viewfinder locking nuts and install the viewfinder onto the OTA. Tighten the lock nuts back to secure the viewfinder. See Fig. 12.



FIG.12

3. For the 150mm OTA, slide the red dot viewfinder into the finder bracket and lock it down by tightening the lock screw. See Fig. 13.



FIG.13

4. Loosen the thumbscrew on the opening end of the diagonal until it is not protruding into the opening. Insert one of the three included eyepieces into the diagonal and secure it by retightening the thumbscrew to a firm feel. See Fig.14.

5. Use different eyepieces for different magnifications. It's recommended to start off with the eyepiece with the least power (i.e. the largest focal length eyepiece)



FIG.14

6. In case of requiring even higher magnifications, install the included 2X Barlow Lens between the eyepiece and diagonal to double the magnification. See Fig.15



FIG.15

Moving The Telescope

The EQ6 mount is designed to move in two directions based on the celestial coordinate system, the Right Ascension (RA), and the Declination axis (DEC). The RA axis moves in the East/West direction while the DEC axis moves in the North/South direction. By moving the telescope around these two axes, you would be able to point at any celestial object. See Fig. 16.

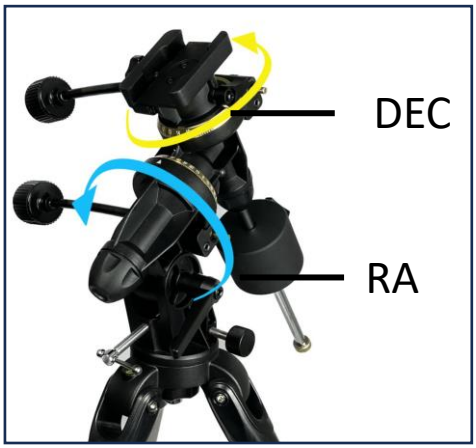


FIG.16

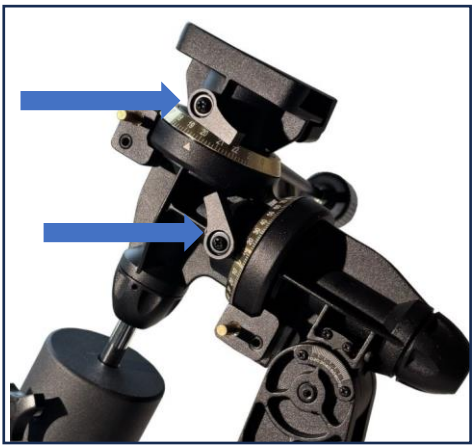


FIG.17

1. Loosen the RA and DEC lock knob located on the side of the mount by rotating them counter-clockwise. See Fig. 17. This allows you the manually move the telescope freely around the two axes.

2. Move the telescope until it is roughly pointing at the object you'd like to observe. Retighten the RA and Dec lock knob clockwise to secure the mount in place.

3. Rotate the slow motion cable of each axis to center the object in your eyepiece.

4. At this point, the telescope is almost visual-viewing ready. But before then, you would need to align the OTA and the viewfinder so that you can easily locate an object that you wish to observe. This process will be covered in the next section. After your OTA is aligned with the viewfinder, your telescope is view-viewing ready.

Aligning Viewfinder

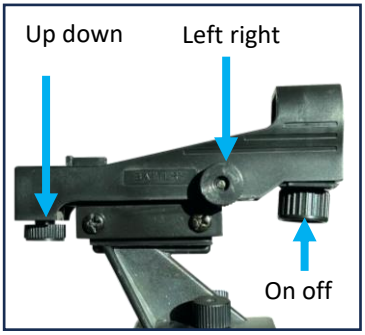


FIG.18

1. After installing the viewfinder onto the OTA, the viewfinder and OTA are not yet aligned. You may not see the same object through the eyepiece and the viewfinder. Aligning the OTA with the viewfinder is a necessary step before using the telescope.

2. Point your telescope at a stationary object at distance. A STOP sign, a light pole are some objects that often used for alignment purposes. Use the eyepiece with the lowest power and look through the eyepiece. Center the object in the eyepiece and focus image.

3. Turn on the red dot viewfinder by turning the knob in the front of the viewfinder (shown in Fig.18).

4. By turning the knob on the right side of the viewfinder, the red dot can be moved left and right. By turning the knob of the back of the viewfinder, the red dot can be moved up and down. (see Fig.18)

5. Move the red dot so that the red dot overlaps the object you have centered in the eyepiece. (see Fig. 19 and Fig.20)

6. You may need to repeat the same object at night to furthermore align the OTA and viewfinder by pointing the telescope at a bright star or the Moon.



FIG.19 view through eyepiece



FIG.20 View Through Viewfinder

Balancing The Telescope

It is a necessary step to balance your telescope to avoid over-stressing the mount and the gears. This section covers the steps to balance both RA and DEC axis. Before balancing the telescope, make sure you have all the accessories installed. Make sure all the locking knobs are firmly tightened to prevent any parts from falling off.

1. To balance the RA axis, loosen the RA lock knob to allow the RA to move freely.

2. Rotate the telescope in the RA direction until the counterweight shaft is parallel to the ground.

3. If your telescope is unbalanced at this point, you would see that your telescope would spin under gravity.

4. Loosen the counterweight lock knob and slightly move the counterweight inward/outward (see Fig. 21) until the RA axis does not spin under gravity. Tighten the counterweight lock knob to finish the RA balancing.

5. To balance the DEC axis, keep the OTA on the side of the mount and loosen the DEC lock knob.

6. If your DEC axis is unbalanced, you'd see that the OTA would spin under gravity. If the OTA rotates up, it means it is back-heavy; if the telescope rotates down, it means it is front-heavy.

7. Hold onto the OTA with one hand and slowly loose the two OTA locking screws. Do not loosen the two screws all the way, just loosen them enough so that the OTA can slide back and forth.

8. Move the OTA back and forth (see Fig. 22) until it does not rotate by itself anymore, then retighten the two locking screws.



FIG.21 Balancing RA



FIG.22 Balancing DEC

Polar Alignment

Your EQ6 mount has the ability to easily track any celestial objects by rotating around the RA axis, this can be achieved by either turning the RA slow motion cable or by using an optional motor drive. In order for the mount to track any celestial objects accurately, you'd need to first polar align your mount. Here is the procedure to complete a proper polar alignment.

1. Adjust the height of the tripod legs so that the top of the tripod is level. You may use your phone for this or simple eyeballing is efficient enough.

2. Determine the latitude of your observation location. Simply search the latitude of your location on your smartphone or tablet. For instance, the latitude of Los Angelos is roughly 33 degree.

3. Loosen the Latitude lock slightly to allow movement of the Latitude axis. Rotate the Latitude adjustment screw until the Latitude indicator is pointing at the proper Latitude.

4. Once the Latitude is set correctly, tighten the Latitude lock screw to lock it down.

5. With this done, now you need to rotate your mount so that the RA axis points North. Set up the telescope so that the OTA is directly above the mount and pointing forward.

6. Next step is to point your telescope at True North. We recommend using your phone APP to locate the True North. Please note that most smartphones allows you to switch between Magnetic North and True North.

7. Slightly loosen the Mount locking knob so that it can rotate around while still be attached to the tripod.

8. Put your phone against the mount (see Fig. 24) and rotate the mount until it is pointing True North. Retighten the mount locking knob to lock it down.

9. Now, the mount is properly polar aligned and can track any celestial object by just rotating the RA axis.



FIG.23 Latitude



FIG.24 RA Pointing North

Smartphone & Bluetooth



FIG.25

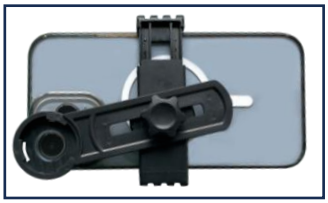


FIG.26

1. Pull open the phone clamp and clamp the phone securely. (See Fig. 25)
2. Loosen the big knob and rotate the phone clamp around until the camera is aligned with the hole on the phone clamp. (See Fig. 26)
3. Remove the eye relief from the eyepiece to reveal the teeth. (See Fig. 27) Please note that the Smartphone adapter included only works with the 10mm and 20mm eyepiece that come with the telescope.
4. Align the adapter and the eyepiece, then rotate the eyepiece to lock the two together. (See Fig. 28)

5. Insert the eyepiece and adapter back into the diagonal. Loosen the knob on the back of the phone adapter to move the phone around.
6. Turn on the camera APP and rotate the phone until a perfect circular view appears on the screen. Then re-tighten the knob to lock the phone's position.
7. Focus the telescope and take a picture through the telescope.
8. Open the Bluetooth setting APP on your phone and connect to the device named "GB Shutter." (See Fig. 29)
9. If the device name did not appear on your phone, long press the button on the remote shutter until the device name appears.
10. Now, the remote shutter is connected with the phone, press the button on the remote to take a picture.



FIG.27



FIG.28

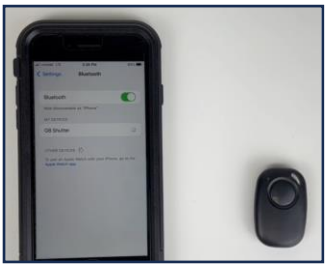


FIG.29

Telescope Maintenance

The main lens of the telescope is the most important part of the telescope, and all Spectrum Optical Instruments telescopes have high transmission glass optics for best performance. Each glass optic is fully coated, It is very important to protect the coating and prevent any potential damages which can cause significant decrease of performance. Here are a few maintenance tips you can perform to ensure your telescope perform at its best for a long time.

- When the telescope is not in use, we recommend putting the dust cover back onto the OTA to prevent any dust and/or moister build-up on the main optics. It is also recommended to cover the back of the OTA with the included plastic plug to prevent foreign objects entering the OTA body.
- In case of dust/moisture build-up on the outside of the main optics, you can remove it with a camel hair brush or pressurized air.
    - When using a camel hair brush, make sure there is no foreign object on the brush before using. Lightly move brush across the optic to remove the dust/moisture;
    - When using a can a pressurized air, spray the air onto the optics at an angel so that the dust can be blown away from the optic.
- In case of moisture build-up occur on the inside of the OTA, remove the plastic cover of the back of the OTA, and point the telescope downward to allow to moisture to evaporate.
- In case of finger print/grease on the optics, it is necessary to remove it with the correct cloth motion.
    - Use any commercial optic cleaning solution with a optics cleaning cloth/or white tissue with the least amount of debris;
    - Apply the cleaning solution onto the cloth/tissue. **DO NOT** apply the cleaning solution directly onto the optics;
    - Apply the cloth/tissue to the optics with low pressure;
    - Move the cloth/tissue from the center of the optics to the outer portion. **DO NOT RUB the optics!**
    - Repeat until optics is fully cleaned.

Celestial Observing

PLEASE DO NOT LOOK AT THE SUN WITHOUT PROPER SOLAR FILTER.

Moon Observing



FIG.30

When looking through the telescope at the Moon, you may find that the Moon is exceptionally bright when it is at full moon. This is because the Moon is reflecting the light from the Sun. Even though the Moon can be very bright, the light it reflects is not harmful to your eyes.

When observing the Moon's surface details, it is better to install the optional Moon filter. The Moon filter is a yellow/green filter to help bring the contrast of the craters. If you are viewing through your phone with the phone adapter, we recommend lowering the exposure which will bring you a similar effect of having a moon filter.

Planets Observing

Planets observing is also fascinating. However, please note that Planets observing is limited by the seeing condition of your observation site including light pollution and atmospheric condition. So observing planets in the city and/or while the planets are low in the horizon may not be the best options.

You may see the ring of Saturn; the lunar phase of Venus; the Great Red spot of Jupiter; surface detail of Mars, etc.

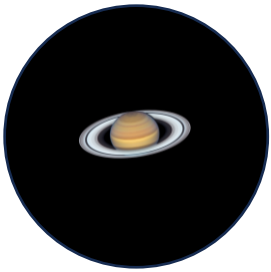


FIG.31

How to calculate Magnification

Calculating the magnification of a telescope is a very straightforward and easy process that involves dividing the telescope's focal length by the eyepieces' focal length.

The Focal length is the distance from the primary lens or the mirror to the point where the incoming light converges. To determine magnification, simply divide the telescope's focal length by the eyepieces' focal length. Here is the equation for the calculation.

For instance, if your telescope has a focal length of 400mm and you're using an eyepiece with a focal length of 10mm, the magnification of this set up can be calculated as shown:

$$Magnification = \frac{Telescope\ Focal\ Length}{Eyepiece\ Focal\ Length} = \frac{400mm}{10mm} = 40X$$

Please keep in mind that while magnification influences the apparent size of observed objects, it is also important to consider factors like atmospheric conditions and telescope's optics for a comprehensive view.

Changing Battery

Bluetooth Shutter

In case of replacing the battery for the Bluetooth shutter, remove the screw on the back of the shutter to allow access to the battery compartment, and replace the old battery with a new CR2032 battery.

- Please ensure that the battery or the screw is **OUT OF REACH OF CHILDREN**.



FIG.32



FIG.33

Red Dot Viewfinder

The included red dot viewfinder utilizes 1x CR2032 button battery and the battery can be swapped out with just a few steps.

- Locate the battery compartment located in the center of the viewfinder.
- The left side of the battery compartment states “PUSH,” and the right side states “BATTERY.”
- Push the battery compartment out from the left side where it states “PUSH.” (See Fig. 34)
- Once the battery compartment is out of the viewfinder, you can remove the old battery. (See Fig. 35)
- Insert the new battery and insert the battery compartment back into the viewfinder.



FIG.34



FIG.35







Model	ST-EQ60-114500	ST-EQ60-130900	ST-EQ20-150750
Optical Design	Reflector	Reflector	Reflector
Optical Element	Fully Coated	Fully Coated	Fully Coated
Mount type	Heavy Duty Aluminum Equatorial mount w/ Slow Motion Control Cables		
Tripod	Full size Aluminum adjustable 2” tripod		
Aperture	114 mm (4.5”)	130 mm (5.12”)	150 mm (5.9”)
Focal Length	500 mm	900 mm	750 mm
Focal Ratio	f/4.4	f/6.9	f/5
Eyepiece 1	4mm – 1.25”	4mm – 1.25”	4mm – 1.25”
Eyepiece 2	10mm – 1.25”	10mm – 1.25”	10mm – 1.25”
Eyepiece 3	20mm – 1.25”	20mm – 1.25”	20mm – 1.25”
Barlow Lens	2X Barlow	2X Barlow	2X Barlow
Magnification	25X – 250X	45X -450X	37X – 375X
View Finder	Red Dot Viewfinder (Battery included)	Red Dot Viewfinder (Battery included)	Red Dot Viewfinder (Battery included)

Note: Specifications are subject to change without notice or obligation

THREE YEAR WARRANTY

Thank you for choosing Spectrum Optical Instruments as your trusted source for telescopes, microscopes and other optical products. We stand behind the quality of our products and offer a **THREE-YEAR limited warranty** from the date of purchase within the US. If a defect is identified on a new product, Spectrum Optical Instruments will repair or replace a product with proof of original purchase. Please note that this warranty only applies to the original purchaser and it is not transferable. Any product that is purchased from anyone or organization other than Spectrum Optical Instruments or authorized dealer is not covered in this warranty.

Additionally, this warranty does NOT cover damage caused by misuse, mishandling, unauthorized repairs, or normal wear and tear. Spectrum Optical Instruments specifically disclaims special, indirect, or consequential damages or lost profit which may result from a breach of this warranty. Any implied warranties which cannot be disclaimed are hereby limited to a term of three years from the date of original retail purchase.

Spectrum Optical Instruments shall use reasonable efforts to repair or replace any product covered by this warranty within thirty days of receipt. In an event where repairing or replacement would require more than thirty days, Spectrum Optical Instruments shall notify the customer in advanced. Spectrum Optical Instruments reserves the right to replace any obsolete product with a new product of comparable price and performance.

Spectrum Optical Instruments reserves the right to change product specifications or to discontinue products without notice. This warranty gives specific rights. You may have other rights which vary from state to state. For warranty inquires, please contact: customer@spectrumoi.com

RETURN POLICY

As a condition to the obligation to repair or replace your product, the product needs to be returned to Spectrum Optical Instruments with proof of original purchase from Spectrum Optical Instruments or an authorized dealer.

A claim is required to be filed before return of a product. A claim template can be obtained from Spectrum Optical Instruments by email. Please contact customer service at customer@spectrumoi.com in such an event. Each return product must include a written statement detailing the nature of the claimed defect. As well as the original purchaser's name, address, and contact information.

Buyers are responsible for return shipping and handling cost for warranty services after 30 days of original purchase. Our warranty covers parts and labor only.

Spectrum Optical Instruments reserves the rights to replace an obsolete product with a new product of comparable price and performance. In event of a defected product shall be replaced by a new product, the defected product become the property of Spectrum Optical Instruments. Spectrum Optical Instruments does not issue refunds but only repair or replacement.

CUSTOMER SERVICE

Our Focus: Customer Satisfaction

Our dedication to your satisfaction is at the core of everything we do. We understand the importance of having the optical instrument to enhance your pursuits, whether you're exploring the cosmos or diving into the microscopic world.

US-based team, Lightening-fast Response

When you reach out to us, you're not just getting assistance; you're connecting with a team of professional experts right here in California. We're proud to based in the USA, and we stand by our commitment to provide you with answer and support within 24 hours. Your questions and concerns are our top priority.

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