Askar

N210

详细版使用说明书
Detailed User’s Manual

www.sharpstar-optics.com

警告
WARNING

请勿通过本望远镜直接观测太阳，这样做可能导致瞬间失明，请购买专用太阳观测滤镜或滤膜，来获得最安全的观测指导。

DO NOT LOOK AT SUN THROUGH TELESCOPE.
IT WILL CAUSE IRREVERSIBLE DAMAGE TO YOUR EYES.

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English

Instructions for use

The N210 undergoes precise collimation and is locked in place before leaving the factory. Under normal circumstances, it is ready for use right out of the box without any additional adjustment. However, due to various uncontrollable factors such as cleaning, external impact, or other influences, the device may experience slight optical misalignment. If this occurs, please refer to this collimation guide for self-adjustment.

This collimation guide applies only to N210 units whose primary mirror cell, secondary mirror cell, and focuser have not been disassembled.

If you have disassembled any of the above components, please visit the Sharpstar Optics official website - N210 product page - Product Downloads, and refer to the N210 Detailed User Manual for collimation.

If you have only disassembled the primary mirror cell or adjusted the primary mirror height adjustment knobs, you simply need to re fine tune the primary mirror outdoors. For specific procedures, refer to step (2) on page 32 of this manual.

Askar N210 is a cost-effective Newtonian reflector with a 210mm aperture and a focal ratio of F3.6. When used with the included 2-inch 0.95× coma corrector, the system focal ratio is further optimized to F3.4.

The Askar N210 supports APS-C format imaging and delivers excellent star performance.

The primary mirror of the Askar N210 features a high-precision parabolic design. Both the primary and secondary mirrors are made of high-borosilicate glass, which has an extremely low coefficient of thermal expansion and excellent stability. The

mirror surfaces are coated with enhanced aluminum, providing high reflectivity and crisp, clear image quality.

On the bottom of the primary mirror, there are three height adjustment knobs and three height locking knobs, used respectively for adjusting the primary mirror angle and for securing the mirror position after adjustment to prevent any shift.

The secondary mirror of the Askar N210 has a minor axis of 71mm and a major axis of 100mm, providing ample illumination coverage for APS-C sensors to ensure uniform brightness across the frame. The secondary mirror bracket is manufactured using an integrated precision process, ensuring rigidity while reducing weight. Three tilt adjustment screws are fitted on the bracket base, enabling fine angle calibration of the secondary mirror.

The Askar N210 comes standard with a 2-inch 0.95× coma corrector, which features a triplet air-spaced design and effectively corrects coma aberrations. The corrector is equipped with a threaded locking design for a more secure connection.

The focuser of the Askar N210 is a dual-speed rack-and-pinion type with 25mm of focus travel, and it supports the installation of an electronic focuser. The focuser body can be rotated entirely, effectively preventing interference when attaching accessories such as an electronic focuser. The focuser base features angle adjustment screws and angle locking screws to ensure precise alignment between the focuser axis and the primary mirror optical axis.

The tube rings of the Askar N210 are equipped with hand-tightened locking screws, allowing for tool-free installation and removal for quick and convenient operation. The top handle includes a multi-function finder base slot, which facilitates carrying and provides additional mounting positions for other astronomy accessories.

The dovetail plate of the Askar N210 is a standard Vixen-style 400mm dovetail, compatible with most commercially available mounts and bases.

The tube of the Askar N210 is made of high-quality carbon fiber. The inner wall of the tube is lined with professional black felt to effectively suppress stray light.A finder base is pre-configured on the side of the tube, allowing you to mount a finder scope or other accessories as needed.

N210 Specifications:

Aperture size: 210mm

Focal length: 756mm (without Corrector)
714mm (with Corrector)

Focal ratio: f/3.6 (without Corrector)
f/3.4 (with Corrector)

Primary mirror type: Parabolic mirror

Format specifications: APS-C

Tube material: Carbon fiber

Corrector type: Triplet design

Secondary mirror short axis diameter: 71mm

Lens tube outer diameter: 264mm

Lens tube total length: 640mm

OTA weight: 7.9kg

Gross weight(including handle, tube ring, dovetail plate, and corrector): 9.8kg

Corrector weight: 0.22kg

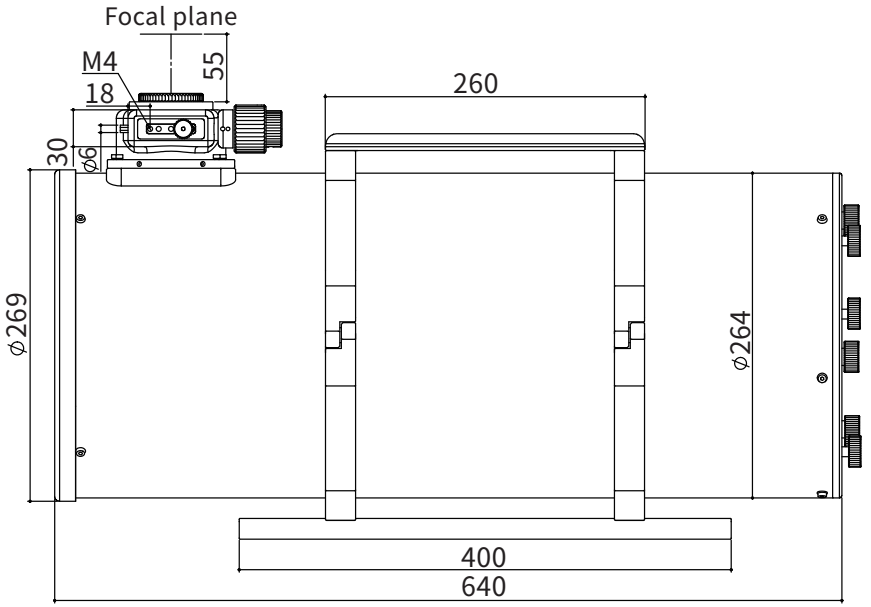
Resolution: 0.55 arcseconds

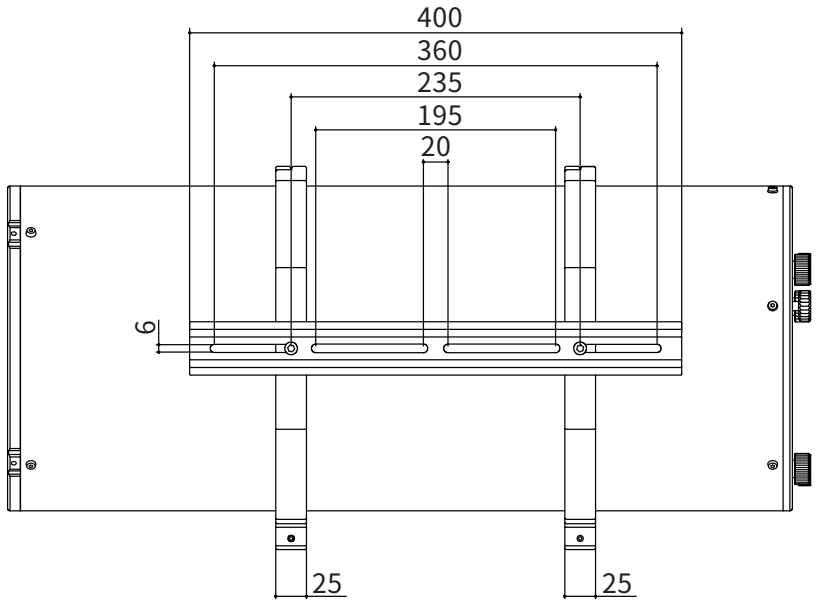
Back focus: 55mm (from the M48 thread)

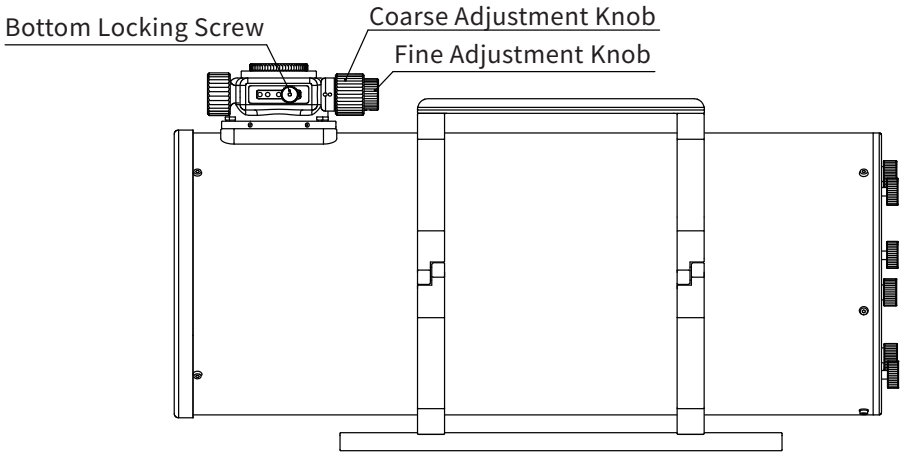
Rear-end thread type: M48*0.75

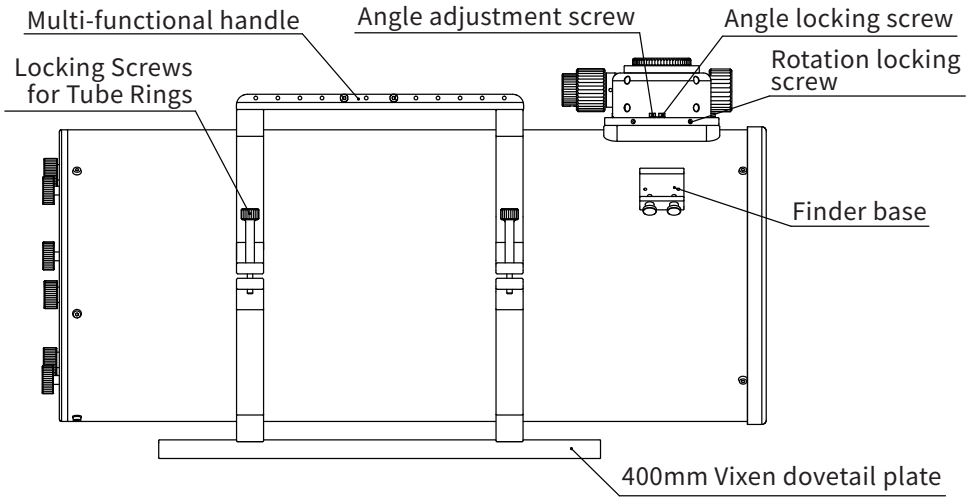
Standard package items: a N210 OTA, M58 to M48 adapter, a T10 Torx Wrench, 2mm hex key, 2.5mm hex key, 3mm hex key, 4mm hex key, 0.1mm shim *2, 0.2mm shim *2, 0.3mm shim *2, a Warranty Card, a Manual

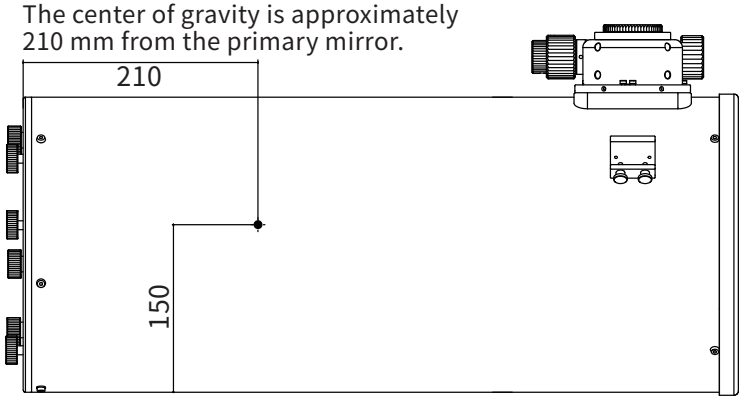
Product Size Diagram



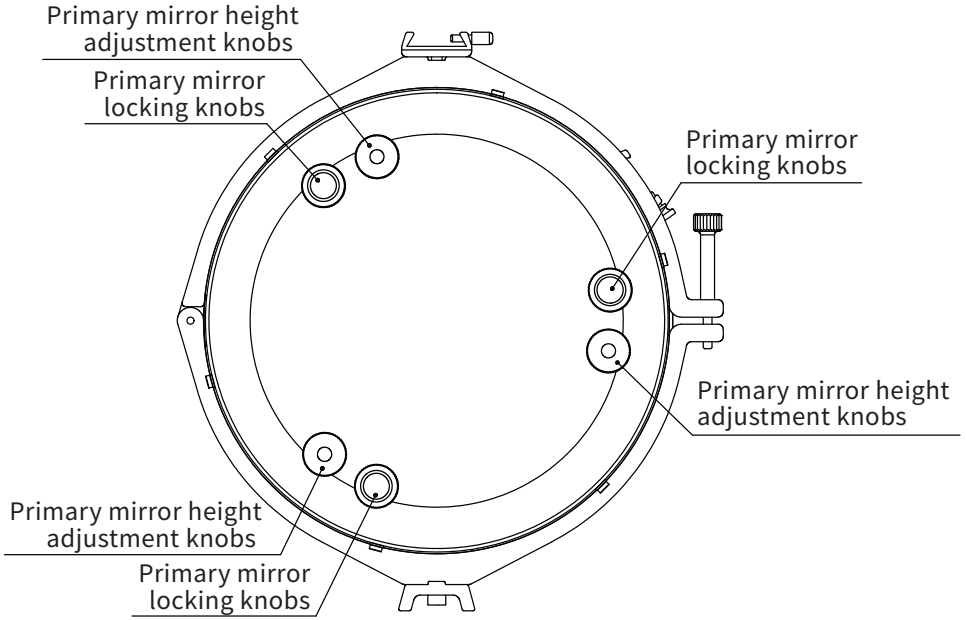




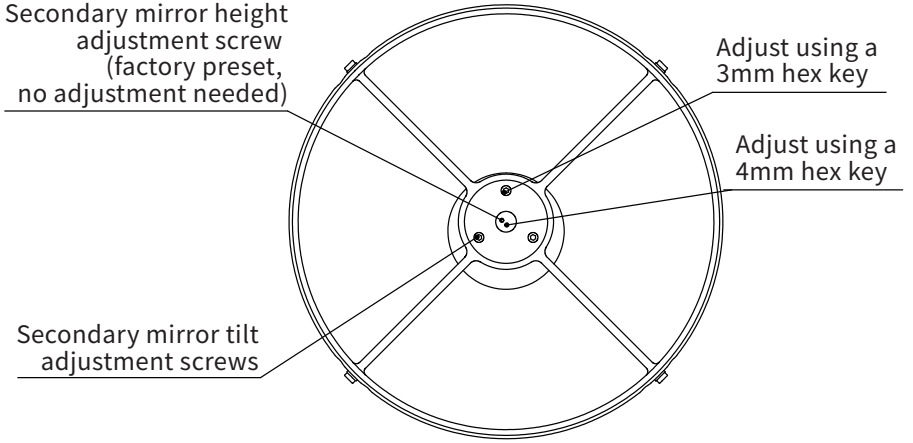




The primary mirror adjustment screw instruction



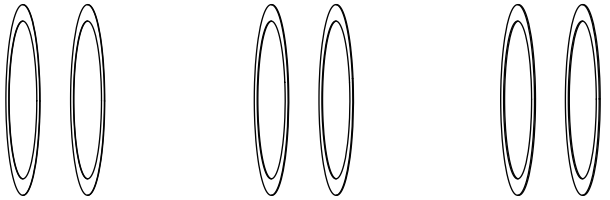
The secondary mirror adjustment screw instruction



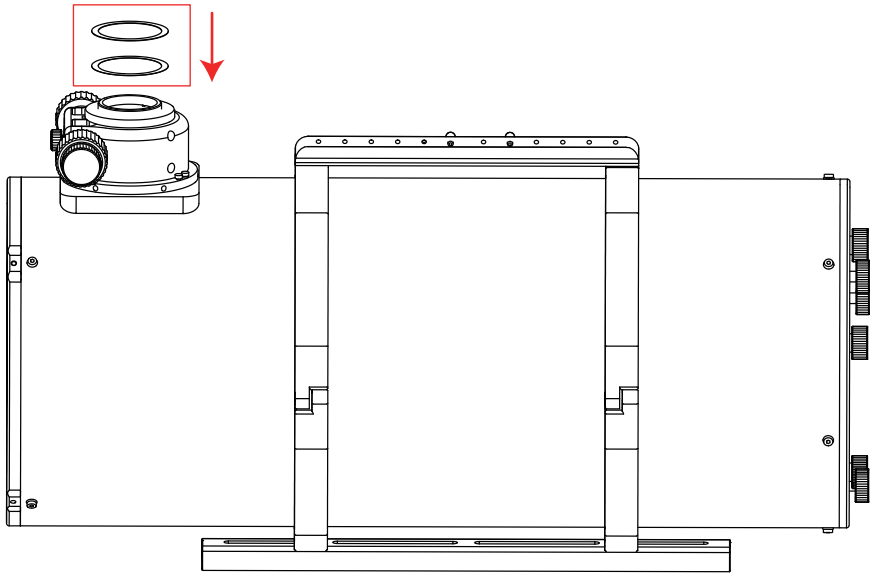
Shim Usage Instructions

The Askar N210 comes standard with three different sizes of stainless steel shims.Before attaching your imaging train, you can choose the required shims and install them on the M48 thread of the corrector (see the diagram below).By combining different shim, you can fine-tune the back focus distance to match your setup.

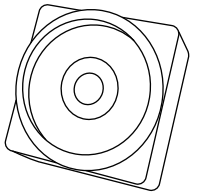
Shims are individually packed in separate transparent bags.



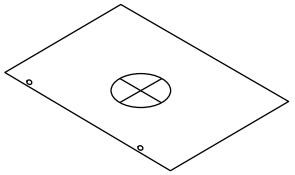
0.1mm shim *2 0.2mm shim *2 0.3mm shim *2



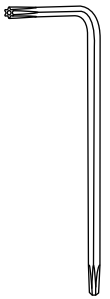
Tools Required



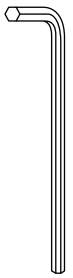
OCAL collimator (optional)



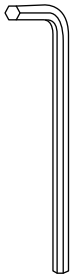
Focuser calibration aid (A4)[1]



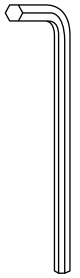
T10 Torx wrench



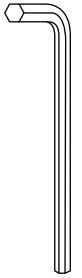
2mm hex key



2.5mm hex key



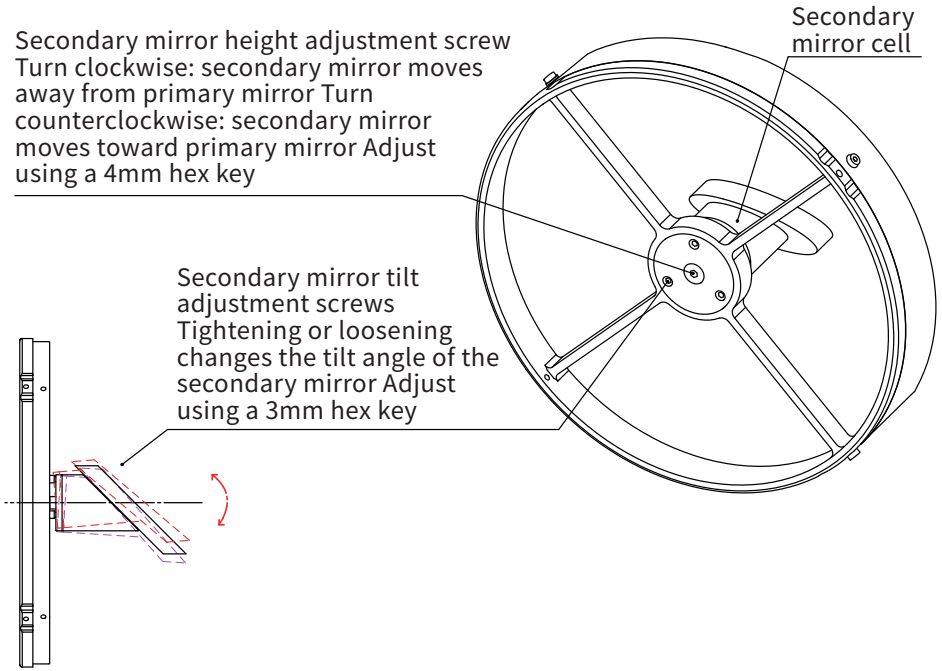
3mm hex key

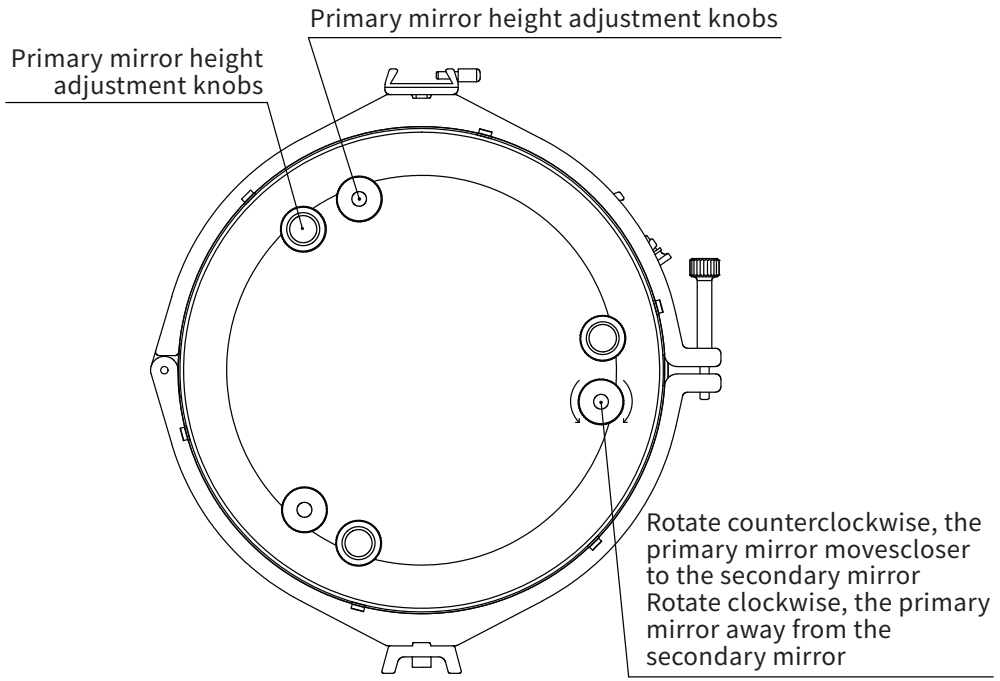


4mm hex key

[1] If you need the focuser calibration aid (A4), please visit the Sharpstar Optics official N210 product page - Product Down loads - "N210 Focuser Calibration Aid Electronic File" - down load and print at 1:1 scale, then cut out

Structure Introduction



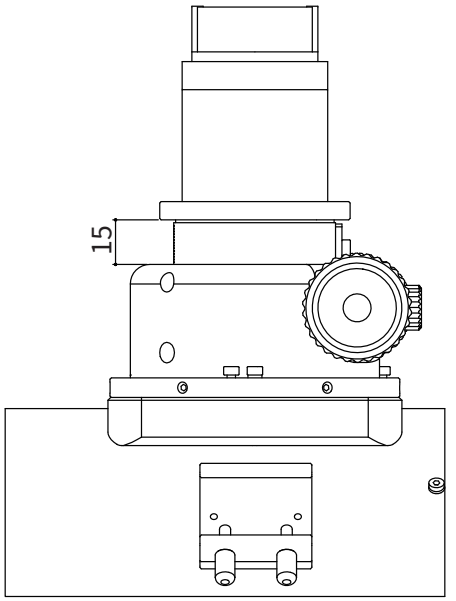


Collimation Steps

① Preparation

(1) After confirming that all parts are securely fastened and there is no looseness, mount the N210 vertically on the equatorial mount.

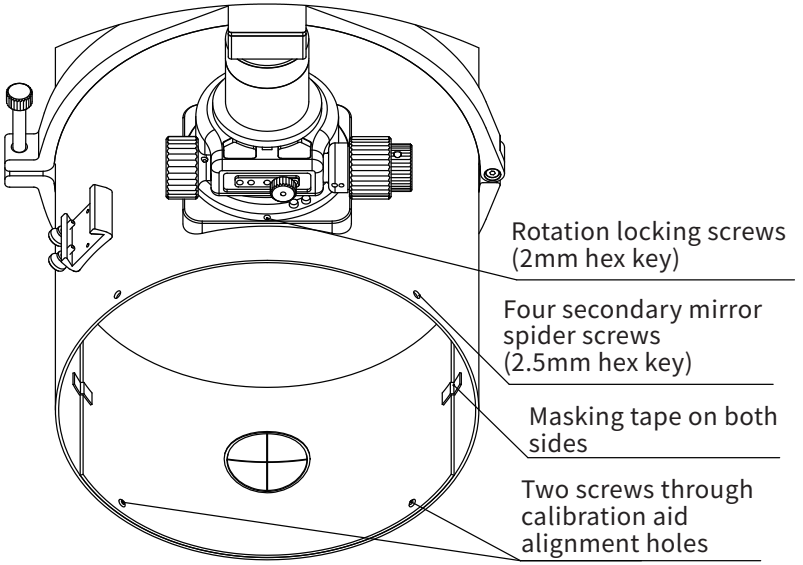
(2) Extend the focuser by about 15mm. Connect the OCAL collimator to the M48 thread at the rear of the telescope's coma corrector. Turn on the OCAL collimator and observe its display. Adjust the extension distance until the primary mirror projection is fully visible within the outline of the secondary mirror. Then proceed to the next steps.



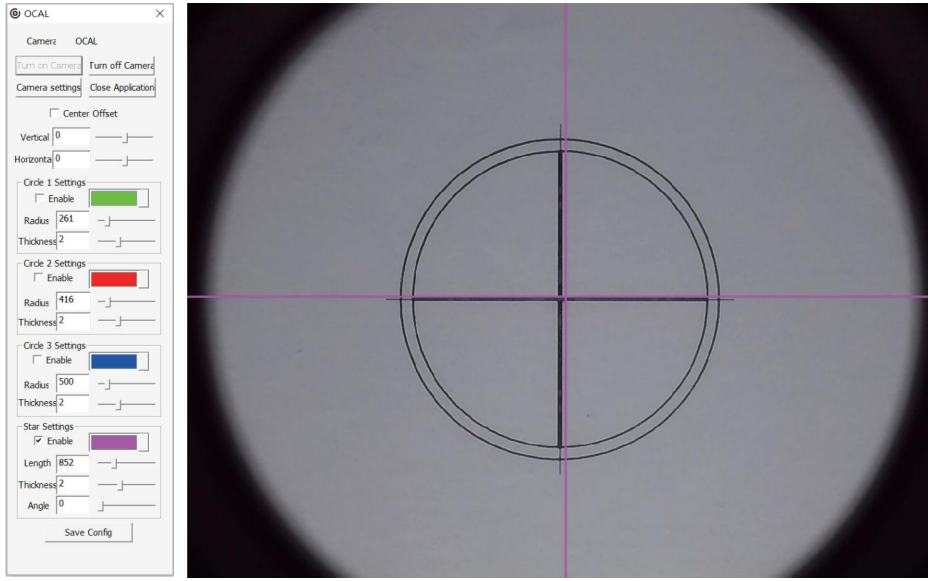
② Focuser Calibration

(1) Use a 2.5mm hex key to remove the four screws securing the secondary mirror spider. After removal, place the focuser calibration aid in the center of the carbon fiber tube. You may use two screws through the alignment holes of the calibration aid for initial positioning, then secure both sides of the calibration aid with masking tape to ensure it is firmly installed (see Figure 1).

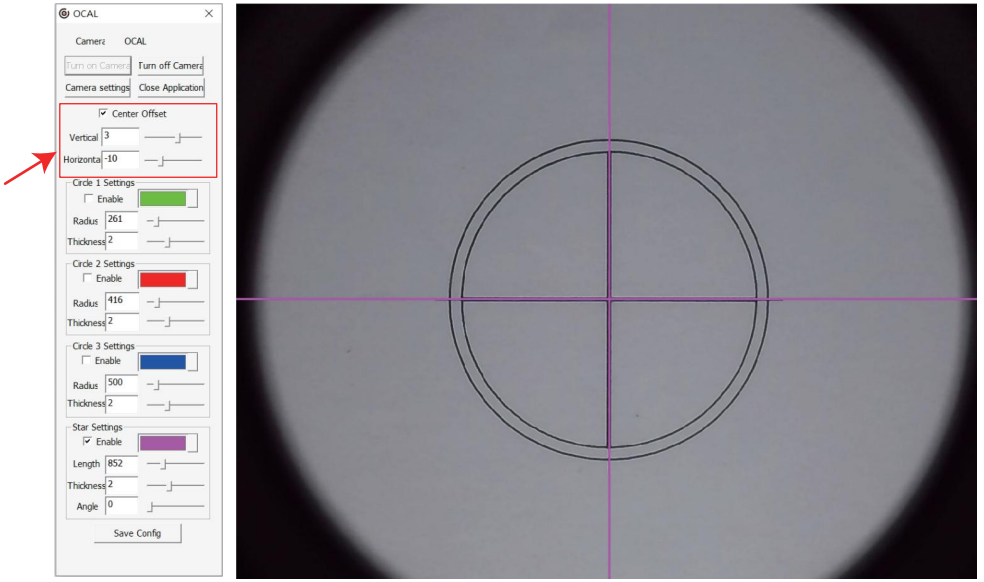
(Figure 1)



(2) Use a 2mm hex key to loosen the side rotation locking screw. Open the crosshair settings in the OCAL software. Use the "Center Offset" function, drag the slider to move the crosshair, align its center with the center of the calibration aid, and record the first center offset data. (e.g., 3, -10)

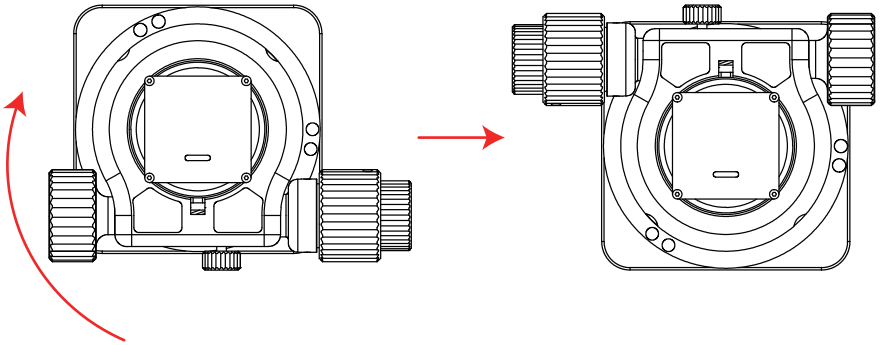


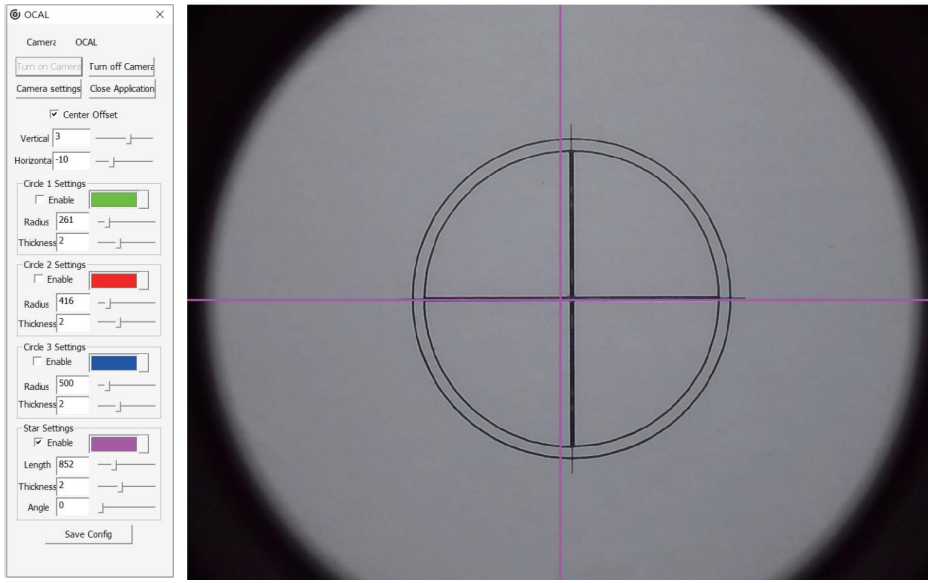
(OCAL collimator connected)



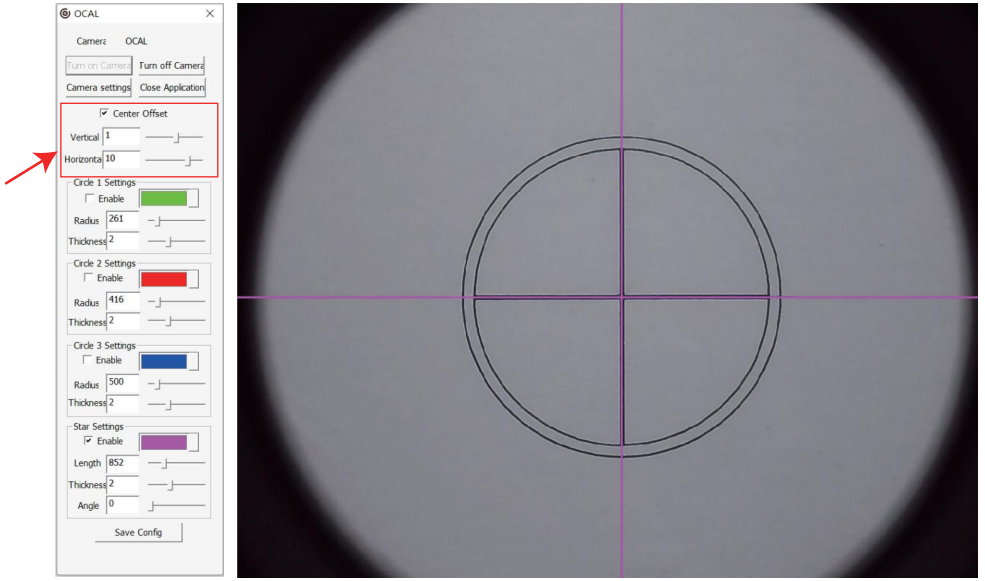
(First center offset)

(3) Manually rotate the focuser 180°. After the image stabilizes, again use the "Center Offset" function to move the crosshair to the center of the calibration aid, and record the second center offset data. (e.g., 1, 10)





(Focuser rotated 180°)



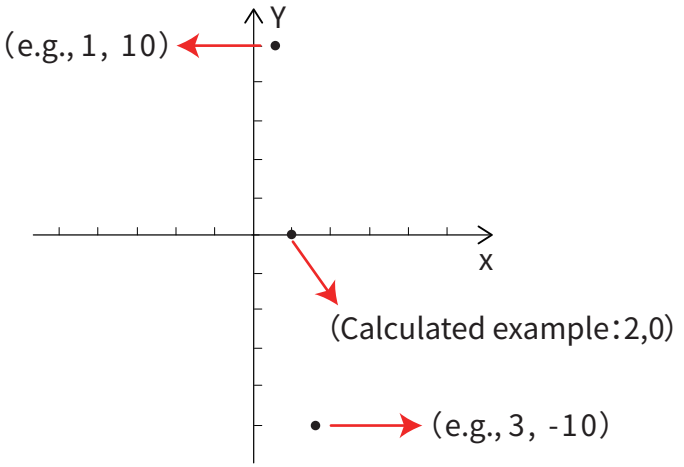
(Second center offset)

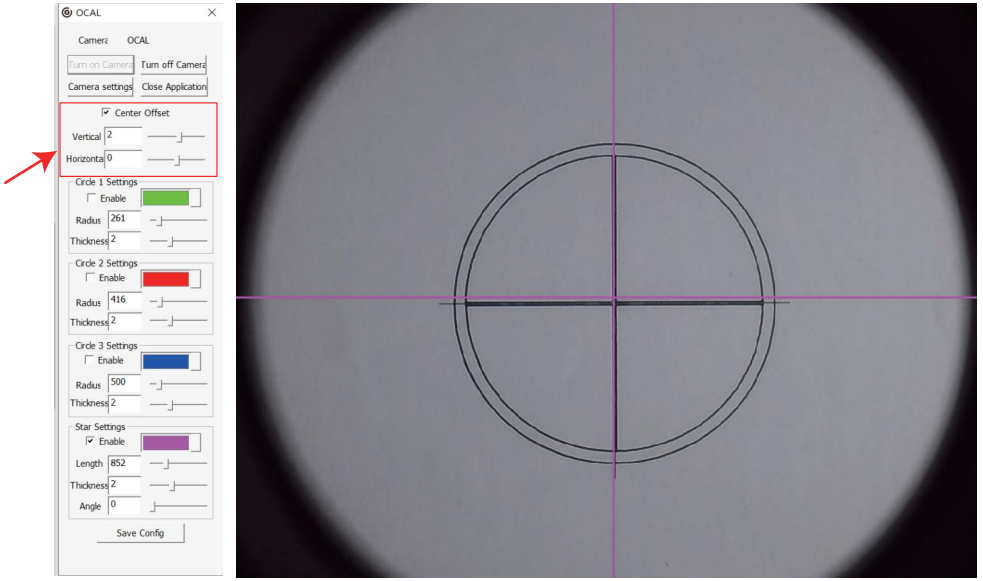
(4) Calculate the average of the two recorded data points to obtain the actual center coordinates that need correction. Adjust the "Center Offset" coordinates to this calculated value. (e.g., 2, 0)

Refer to Figure 2 for the adjustment principle.

Calculation formula: ($X=\frac{X1+X2}{2}$, $Y=\frac{Y1+Y2}{2}$)

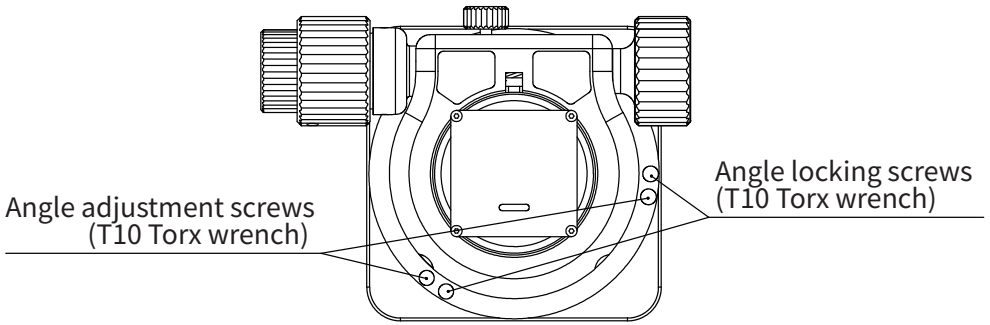
(Figure 2)

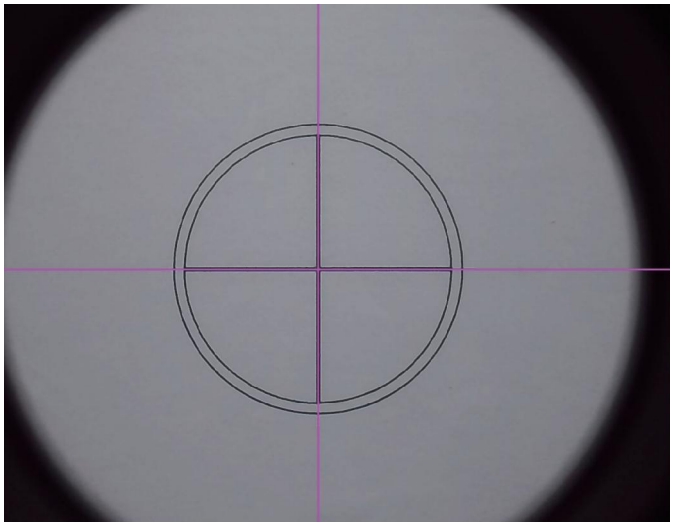




(Average of the two center offsets)

(5) Use a T10 Torx wrench to loosen the three angle locking screws, then adjust the three angle adjustment screws until the software crosshair is centered on the crosshair of the calibration aid. Rotate the focuser 360° and observe whether the software crosshair remains concentric with the crosshair of the calibration aid. If it remains concentric, tighten the angle locking screws and also tighten the side rotation locking screw. If not concentric, repeat steps (1)–(5) above.





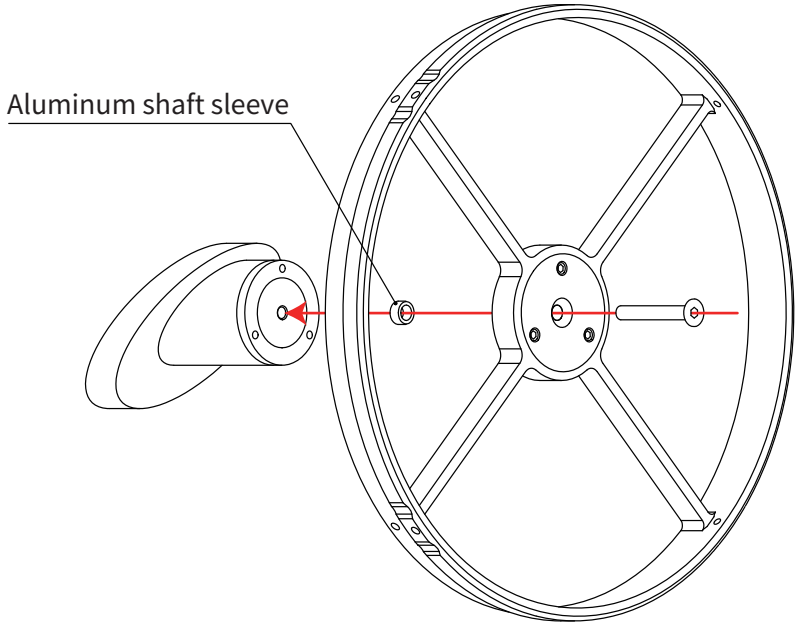
(Adjust angle adjustment screws until image matches reference)

(6) After the corrector calibration is complete, remove the focuser calibration aid. Reinstall the secondary mirror spider in its original position. Use a 2.5mm hex key to insert the four screws with nylon washers, then smoothly tighten them into the mounting holes, ensuring the spider is secure with no looseness or misalignment.

③ Secondary Mirror Collimation

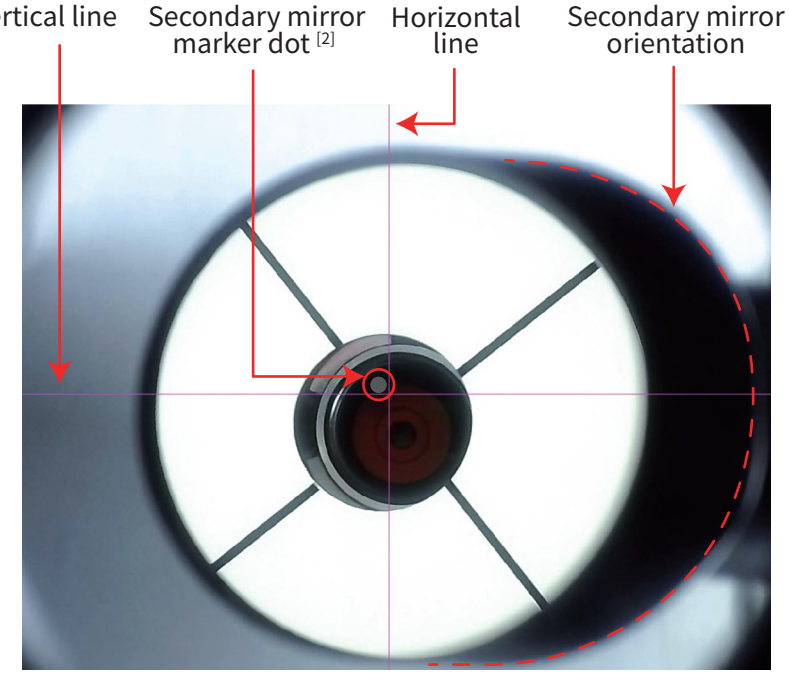
(1) Secondary mirror height positioning

Using a 4mm hex key, tighten the secondary mirror height adjustment screw through the aluminum shaft sleeve. Focus the OCAL software on the surface of the secondary mirror until the marker dot on the secondary mirror is clearly visible. After the image stabilizes, observe whether the marker dot lies on the horizontal line of the software crosshair. If not, continue to fine tune the secondary mirror height adjustment screw until the marker dot is on the horizontal line (see reference image below).



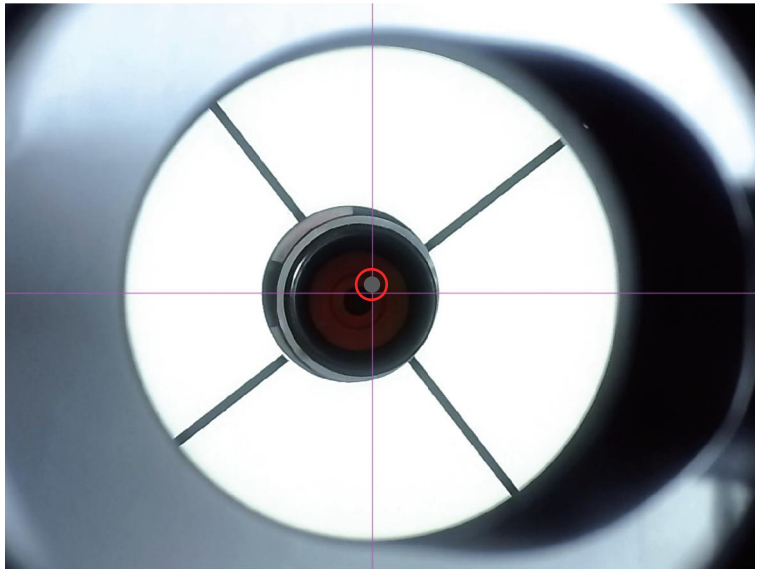
Tips:

- You may place a piece of white paper inside the carbon fiber tube to aid observation, positioned similarly to the focuser calibration aid.
- If the marker dot is not clear, add additional light, such as from a flashlight.
- The software crosshair is referenced to the secondary mirror orientation. The line parallel to the secondary mirror orientation is the horizontal line; the perpendicular direction is the vertical line.



(Before adjustment)

[2] The secondary mirror marker dot shown in this manual is for illustration only. In actual operation, the marker dot is black.

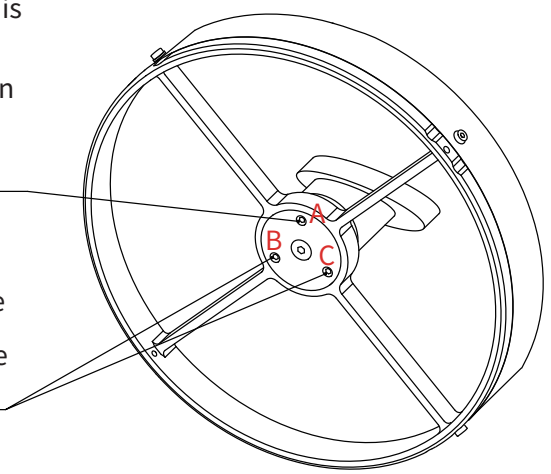


(After adjustment)

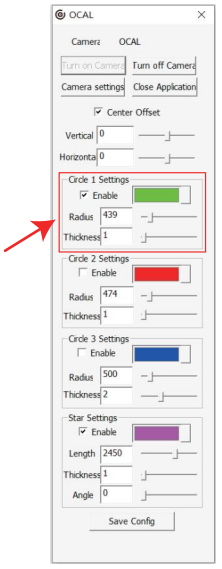
(2) Secondary mirror tilt positioning

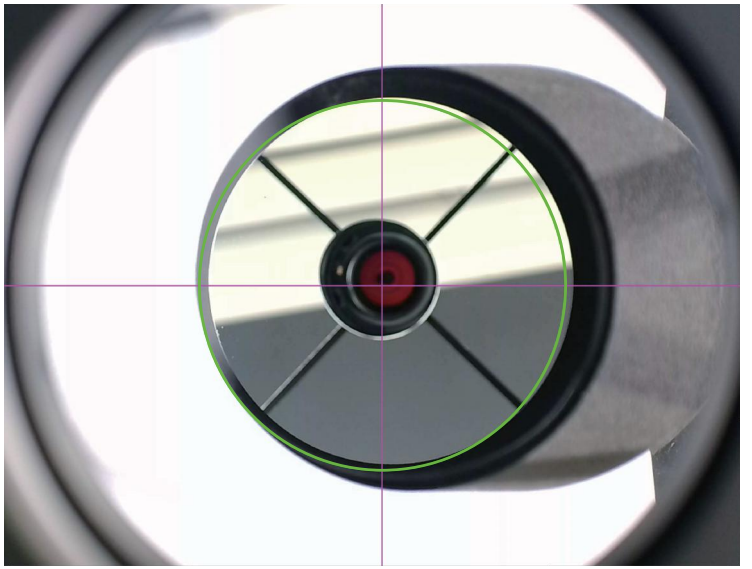
A: This tilt adjustment screw is located at the center of each end of the spider mount and is used to control the position of the vertical line projected by the primary mirror in the secondary mirror.

B、C: The other two tilt adjustment screws are used to control the position of the primary mirror' s projection relative to the horizontal line in the secondary mirror.



Once the height of the secondary mirror has been determined, calibrate its tilt by turning the focuser handwheel until the projection of the primary mirror in the secondary mirror is fully visible (without obstruction). Open the OCAL software and display the green auxiliary circle 1, then rotate the secondary mirror mount so that the projection of the primary mirror in the secondary mirror is roughly centered within the green auxiliary circle 1.

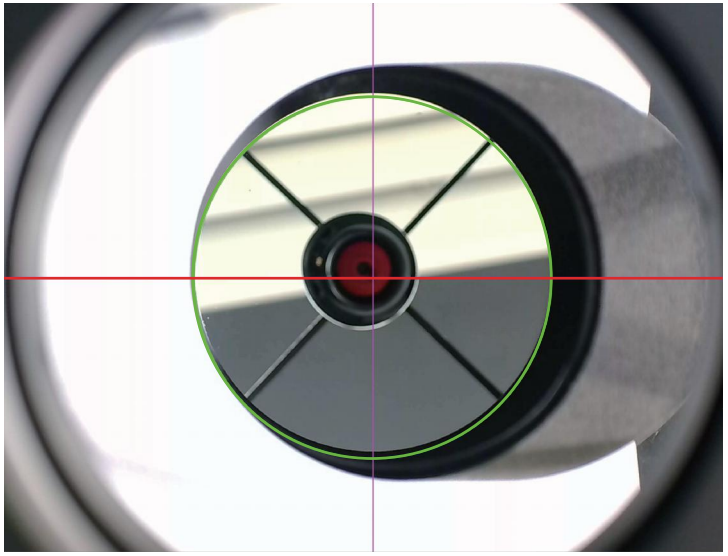




(Roughly centered)

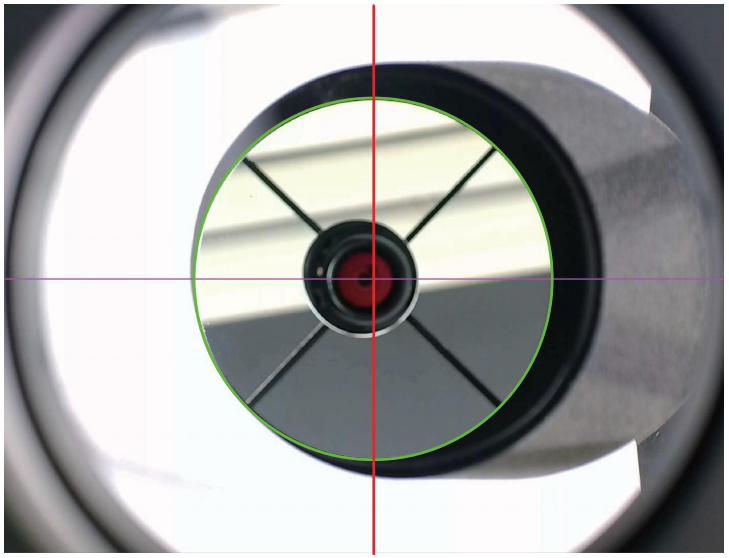
Vertical Adjustment: Gently turn the secondary mirror tilt adjustment screw A (use only for fine adjustments; do not tighten the screw all the way) to precisely center the primary mirror' s projection along the vertical line.

(Precisely centered vertically)

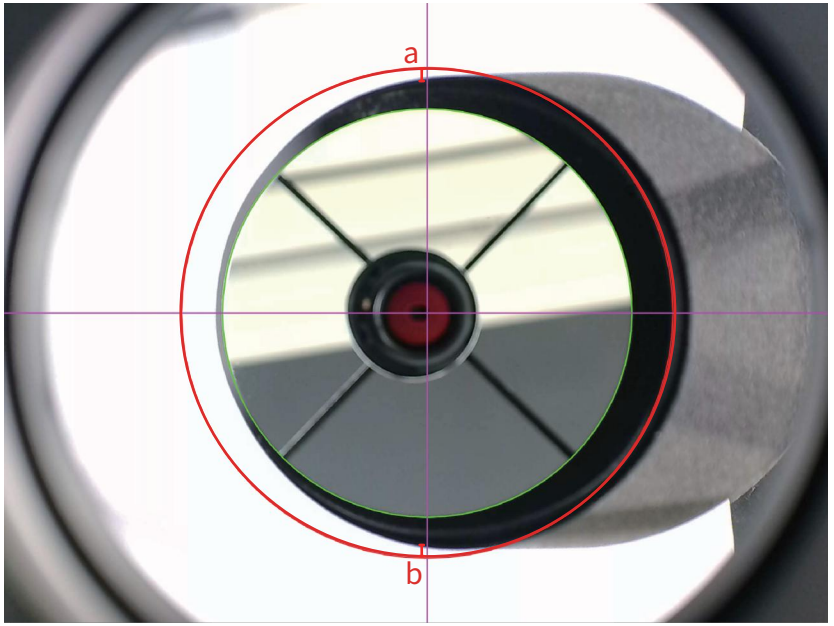


Horizontal Adjustment: While ensuring that the projection of the primary mirror remains concentric with the green auxiliary circle, rotate the secondary mirror mount again to precisely center the projection of the primary mirror along the horizontal axis.

(Precisely centered horizontally)



Launch the OCAL software and display the red guide circle 2. Fine-tune the secondary mirror tilt adjustment screws B and C (make only slight adjustments; do not overtighten the screws) so that the gaps between the upper and lower edges of the secondary mirror and both sides of the red guide circle are roughly equal (as shown in the figure below, where the distances between segments a and b are roughly the same);



(Adjustment complete)

If, after adjusting the rotation angle of the secondary mirror, the projection of the primary mirror on the secondary mirror shifts, repeat the above steps until the projection of the primary mirror on the secondary mirror is concentric with the auxiliary circle, and the gaps on either side of the secondary mirror' s upper and lower edges are roughly equal to the width of the auxiliary circle;

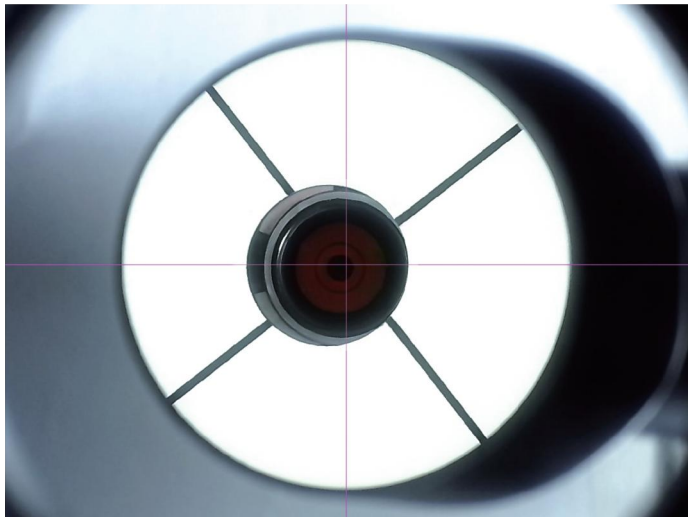
*Keep all secondary mirror tilt adjustment screws slightly tightened but not fully locked; tighten and secure them all at once after the subsequent adjustments are complete.

③ Primary Mirror Collimation

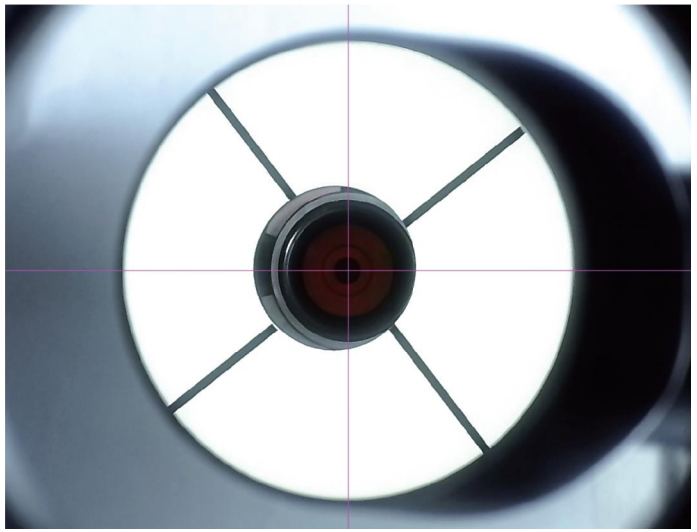
（1）Coarse adjustment of primary mirror

Adjust the OCAL software focus to focus on the OCAL eyepoint. Loosen the primary mirror locking knobs, then adjust the three primary mirror angle adjustment knobs while observing the software display. When the OCAL eyepoint is centered on the software crosshair, gently snug the three primary mirror locking knobs against the mirror cell.

(Before adjustment)



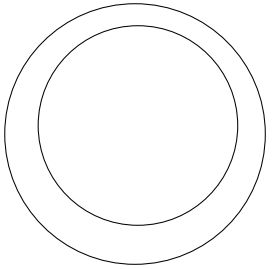
(After adjustment)



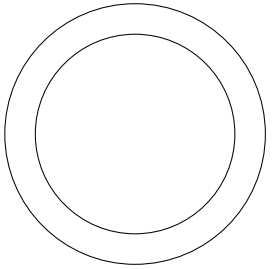
（2）Fine adjustment of primary mirror

Choose a clear night with good seeing and no moonlight interference (not a full moon night). Securely connect your camera or other imaging equipment to the rear of the N210 telescope's coma corrector.

Rotate the focus knob to defocus a star until it appears as a bright halo in the frame. Check whether the spacing of the defocused star halo is uniform (as shown in the image). If not uniform, loosen the three primary mirror locking knobs and fine tune the three primary mirror angle adjustment knobs until the star halo becomes concentric. Then tighten the three primary mirror locking knobs to complete the primary mirror fine adjustment.



(Before adjustment)



(After adjustment)

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