

## RH200 AT and MARK II AT COLLIMATION MANGIN, FRONT LENS AND TIP TILT

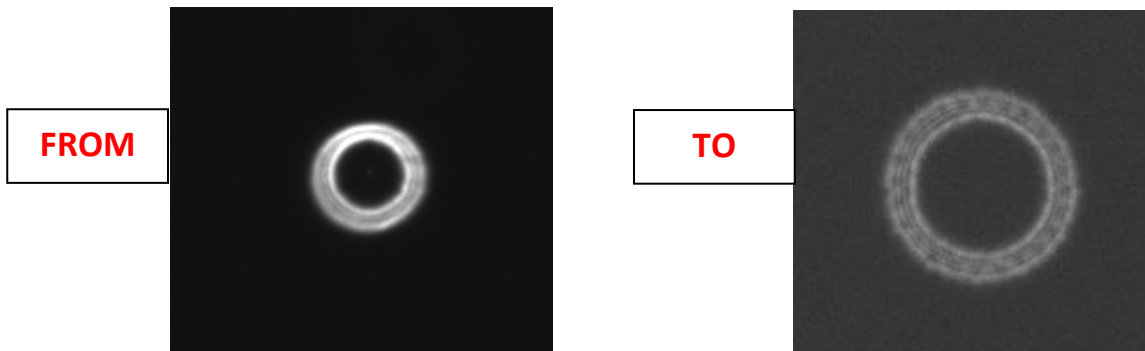
Thanks for purchasing our RH200, simply the best astrograph on the market!  
As with any professional instrument, it needs a proper adjustment to be used.  
In this manual you will learn how to adjust the:

- Primary mirror (Mangin)
- Front lens
- Tip tilt

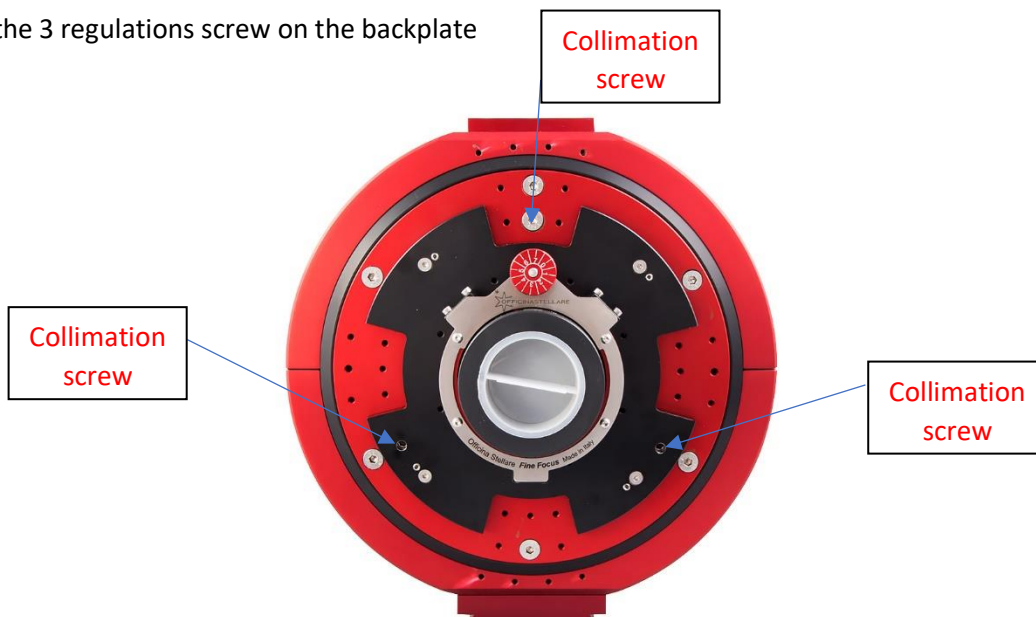
**VERY IMPORTANT:** normally, only primary mirror collimation is required. If you are not satisfied with your result, please contact *Officina Stellare* or your Dealer to get further assistance before making any further adjustments. An improper adjustment of the front lens or tip tilt will cause a dramatic telescope's performance degradation vs. bad collimation.

### PRIMARY MIRROR (MANGIN) COLLIMATION

The first step is to collimate the telescope, as you would do with any other scope using a mirror to collect and focus light. The RH200 is equipped with 3 screws on the backplate to adjust collimation. This is analogous to an SCT, Newtonian, or RC in that you use the 3 regulation screws to center the secondary mirror shadow. Stars must be extra focal and always in the center. You should always make very small adjustments of a 4<sup>th</sup> a turn or less.



Using the 3 regulations screw on the backplate

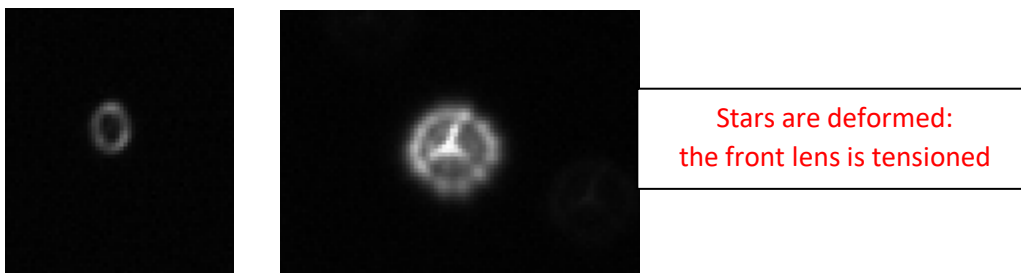


Now you have the telescope collimated, it's time to take some images to check the rest of the system. You need to take one image at focus and another just a little bit out of focus.

### FRONT LENS ADJUSTMENT

Now look at the out of focus image. If the stars appear deformed then there is too much stress on front lens from mechanics. This could be caused from a prior poor adjustment and/or a big temperature change after adjustment. While you can collimate the telescope using the collimation screws on the back (as noted above), the front lens can also be adjusted with a very different effect. The front lens will control the stars shape roundness and can remove or introduce aberrations (most common one is astigmatism).

For example, if the stars look like the two below, that means you have the front lens under too much tension which is introducing astigmatism and needs to be fixed.



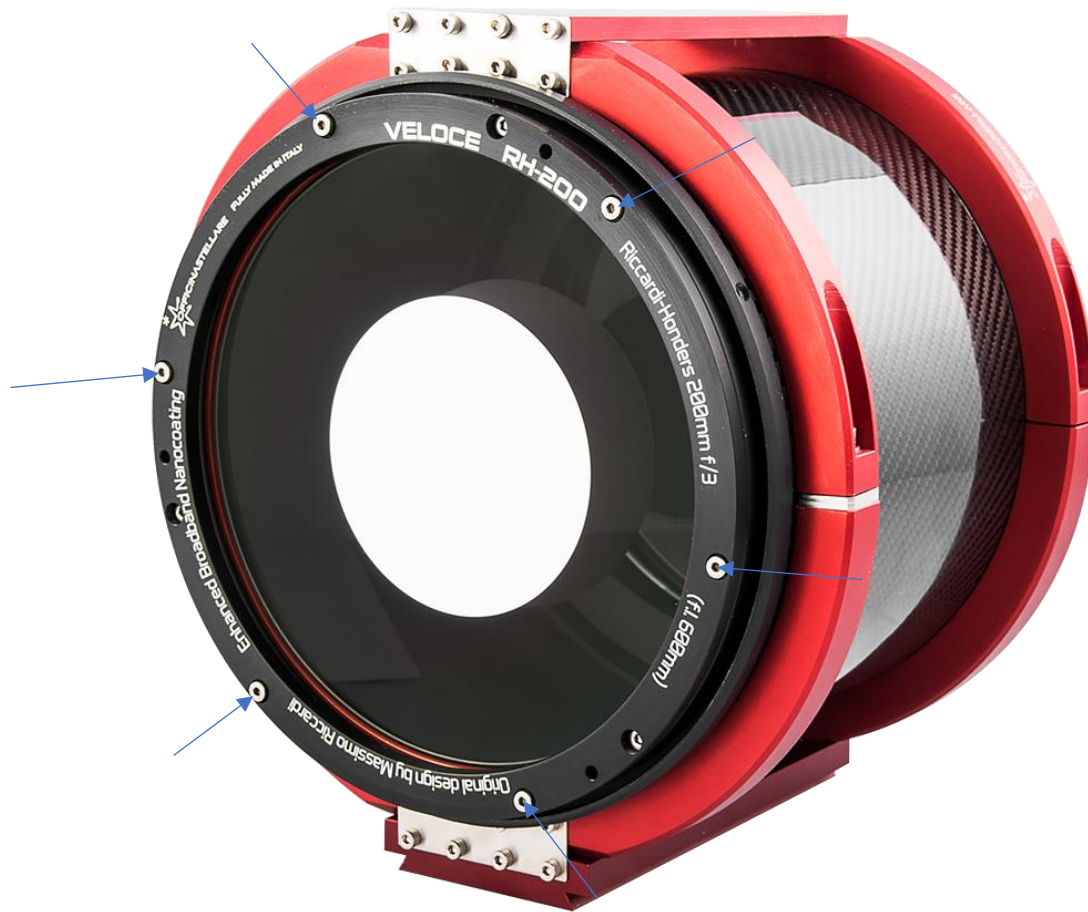
If you get round stars like the ones below then you shouldn't touch the front lens.



**NOTE:** to check the front lens, images must be taken in intra-focal position and always in the center, meanwhile collimation is done with extra-focal stars.

To adjust the front lens, take the allen screws provided and follow instructions in next page.

- 1) Unscrew about  $\frac{1}{4}$  or  $\frac{1}{2}$  a turn the following screws indicated from the blue arrow:



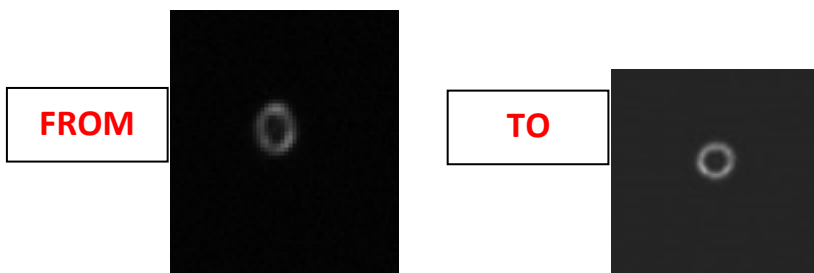
These screws will reduce tension on the front lens from the front ring (the one with writings).

- 2) Take another image of the same star. If the shape is more round, but still not perfect, you can try another  $\frac{1}{2}$  turn. Never unscrew more than 1 turn in total. **If you loosen the front ring too much, the front lens will be free to fall down.** To check if the front ring is too loose, gently tap on it with a finger. If you hear the front ring tapping on the front lens that means there is no contact between them and the screws need to be tightened a bit more.
- 3) If after loosening the screws the stars shape is still deformed then it's time to collimate the front lens. To collimate the lens, follow the steps as displayed on the next page:



Under the pull screws (blue arrow) there are cup springs to keep collimation. If these screws are/or become too tight, you need to unscrew them. Start by unscrewing all pull screws 1 turn. This will reduce compression on the front lens cell from the cup springs. Then take another image to see if the star's shape has changed.

You need to bring the star



**NOTE:** If 1 turn is not enough to reach to the goal, you can do a second turn on the pull screws.

Now gently tighten the push screws to lock the front lens. After collimating the front lens, you need to go move focus to extra-focal and collimate the primary mirror again as shown in the first part of this manual.. Every time you touch the front lens you MUST re-collimate the primary mirror.

**Let's recap:**

- With the collimation screws on the back you can collimate the primary (mangin) mirror as you do in most telescopes
- You MAY need to use the collimation screws on the front lens to change the star's roundness to remove aberrations like astigmatism

We always carefully collimate the telescope before shipping. However different variables (like large temperature change or mishandling) could require a deeper adjustment instead of the classical collimation.

If you have any questions about collimating your RH200, always contact Officina Stellare or your Dealer to get the proper assistance: this is a professional instrument and very sensitive!

**TIP TILT REGULATION** (AT or classic version)

Take a look at the image below: you can note the imaging train is completely tilted on the focal plane and this is causing a massive star deformation. As a result, you see a part of the field you will not see when the imaging train is proper tilted on the focal plane.

Completely deformed stars, as

Focal plane seems to be centered here. In the ideal situation each corner is flat. Tip tilt adjustment is required.





Your RH200AT is equipped with a mechanical zero position under the tip tilt plate. You can loosen or tighten the pull screws to reach the good tip tilt regulation. If you want to start over, simply tighten the pull screws, until the mechanical zero under the backplate touches the telescope's backplate. At this point the screw will no longer tighten.



Work with only on one screw at a time. Then take an image, check the corners, and adjust other screws or stop. Use the push screw to gently lock the pull screw.

### TIP TILT REGULATION (Mark II version)

1. Take an image and check stars in the corners. If not round, go to step 2
2. Be sure your imaging train is screwed properly on your telescope and that no adapter is causing tilt or flexure
3. Set up both gold cursor to the zero position if not already in that position

4. Start moving one cursor in and/or out, always use the same screw's turn for each movement (like ½ turn)
5. After each movement, take an image to check stars in the corners
6. If only one cursor is not giving the desired result, try to act also on the other cursor. Remember you also can move both cursors, together, in the same direction
7. If you are very near to the optimum result, but you can't move one or both cursors because you are out of space, you can try to turn – only a fraction – the thumb screw, then repeat the steps above. Turning the thumb screw will change the tip tilt hardness and, directly, it's inclination. For this reason, it should be touched only when is not possible to reach a good regulation with the two cursors. Please remember, if you completely loosen the thumb screw, or loosen it too

Thumb screw: acts on tip tilt global stiffness. Normally you don't have to touch it

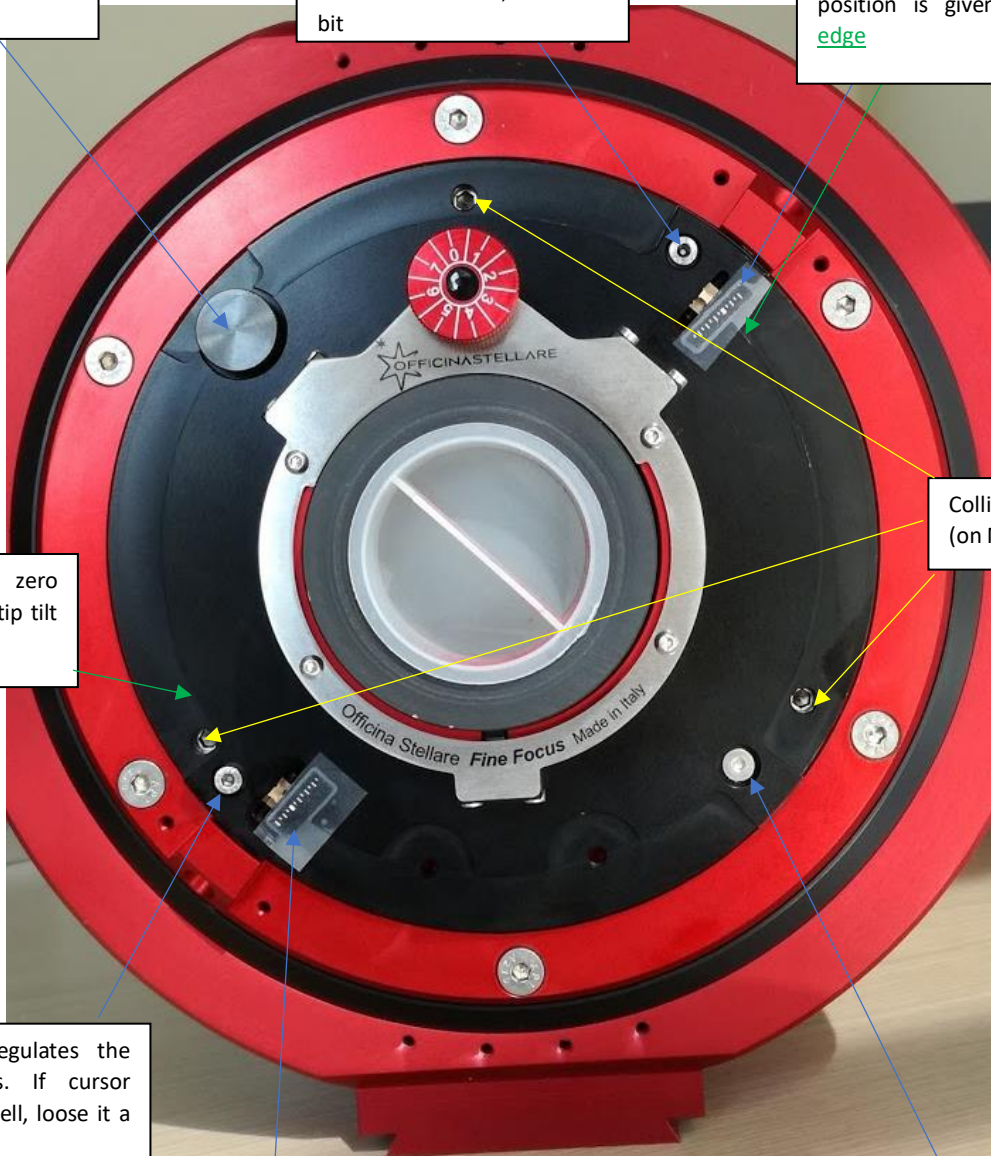
much, you stiffness to

Allen screw, regulates the cursor stiffness. If cursor doesn't move well, loose it a bit

remove tip tilt

#1 engraved scale where available. Biggest mark is zero position. If not available, zero position is given from [the edge](#)

system.



[edge](#) is the zero position for tip tilt cursors

Collimation screw (on Mangin mirror)

Allen screw, regulates the cursor stiffness. If cursor doesn't move well, loose it a bit

Engraved scale #2, same as for #1.

Pivot locking screw. Do not loosen it.

Now it's time to start having fun! If you have questions please contact Officina Stellare or your dealer and we all will be glad to assist you with your new OS telescope!