INSTRUCTION MANUAL

Quattro 200 ST & CF Newtonian Astrograph





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Be amazed.

QT200-F-140618V1-EN

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CONTENT

Part I : Introduction

Sky-Watcher Quattro-200 ST: Sky at Night magazine group test winner scoring 89% 2

Part II: Getting Started

Parts description 3
Assembling the finder scope 3
Frequently Asked Questions about the packaging 4
Doesn't an astrograph deserve a better box than just a simple cardboard box? 4
No eyepiece is provided with my telescope. Is it normal? 4
Why is no coma corrector proposed as standard? 4
What does Sky-Watcher propose for the Quattro series as accessories? 4
Aligning the finder scope 5

Part III: Basic Operations

Using an eyepiece 6
Using the 42x0.75mm ring (T2 ring) 6
Using an accessory with specific connections 6
Focusing 7

Part IV: Advanced Operations

Offset and collimation 8
Focuser parallelism 9
Balancing the tube with a heavy image train 9

Part V : Specifications

Telescope specifications 11

Part I: Introduction

Sky-Watcher Quattro-200 ST: Sky at Night magazine group test winner scoring 89%

The superb Skywatcher Quattro-200 ST telescope OTA has beaten all the opposition to win best in class in the November 2011 Sky at Night magazine.



The most acclaimed feature of the Quattro 200 astrograph is the knife-edge baffle system. The Quattro's tube is lined with a set of nine internal baffle rings. Their main purpose is to cut down on stray light entering the telescope tube, greatly helping to improve image contrast.

The Quattro is fitted with a Crayford-style focuser with tension adjustment, focus-lock and a 10:1 dual-speed fine focusing, and also comes with a 2-inch fitting that has a T-thread on its external side. This allows a sturdy connection to be made between scope and camera with the right adaptor ring.

The primary and secondary mirrors are made of Low Expansion Borosilicate Glass, for near zero thermal expansion.

The impressive 0.5 mm Ultra-Thin secondary mirror vanes ensure minimal thermal accumulation and reaches thermal equilibrium in no time.

The secondary mirror support is mounted offset, for perfect optical collimation.

Optimized for astrophotography, with its baffle system and parabolic primary optics with a very fast f/4 focal ratio, the Quattro 200 is designed for exceptional wide-field, deep-space imaging performance. Even faint galaxies and nebulas exhibit stunning detail with limited exposure time when photographed with a CCD imager or DSLR camera.

The Quattro 200 is proposed with two options for the tube: Standard Tube (ST series) and Carbon Fiber (CF series) for astrophotographers dealing with long to very long exposure times. The Carbon Fiber series can remain in focus for a longer period of time and long exposure images will stay clear and in focus.

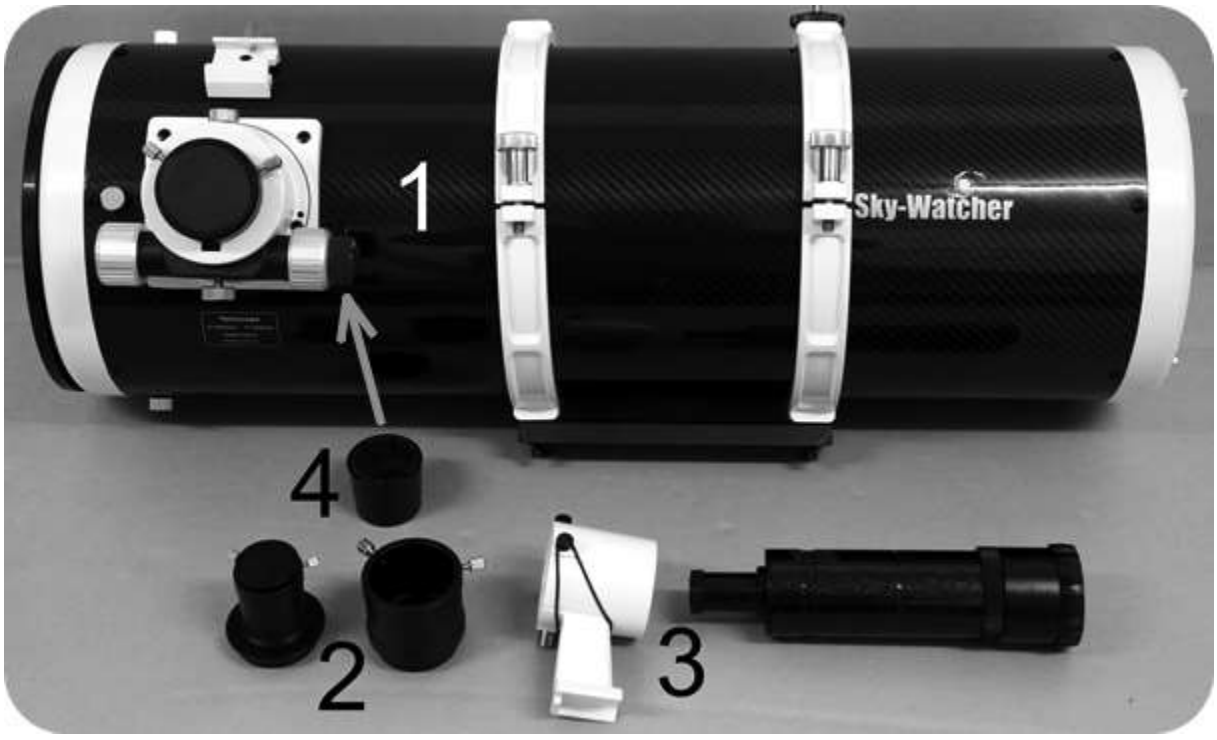


- NEVER USE YOUR TELESCOPE TO LOOK DIRECTLY AT THE SUN. PERMANENT EYE DAMAGE WILL RESULT.
- NEVER USE AN EYEPIECE-TYPE SOLAR FILTER.
- NEVER USE YOUR TELESCOPE TO PROJECT SUNLIGHT ONTO ANOTHER SURFACE; THE INTERNAL HEAT BUILD-UP WILL DAMAGE THE TELESCOPE OPTICAL ELEMENTS.
- USE A PROPER SOLAR FILTER FIRMLY MOUNTED ON THE FRONT OF THE TELESCOPE FOR VIEWING THE SUN.
- WHEN OBSERVING THE SUN, PLACE A DUST CAP OVER YOUR FINDERSCOPE OR REMOVE IT TO PROTECT YOU FROM ACCIDENTAL EXPOSURE.
- NEVER LET A TELESCOPE POINTING THE SUN UNATTENDED.

Part II: Getting Started

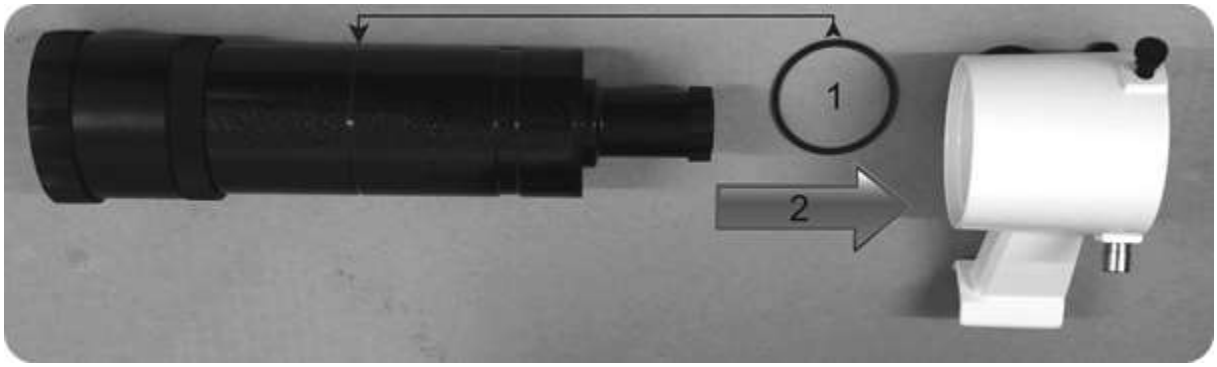
Parts description

When unpacking the box, you will find the following parts enclosed:



1. The main tube
2. 1 1/4 inch screwed on 42mm T2 adapter (left part (see Fig.2 page 6)) and 2 inch eyepiece adapter (right part), to insert into the focuser's drawtube.
3. Finder bracket and 8x50 finder scope, with centering O-ring attached to the bracket.
4. Protective cap for the 1:10 speed reduction's knob.

Assembling the finder scope



1. Carefully remove the rubber O-ring from the finder scope bracket. Position the O-ring into the groove on the finder scope tube.
2. Loosen the two adjusting screws on the bracket. Position the finder scope into its bracket by sliding it backwards until the rubber O-ring seats. The chrome button on the finder bracket contains a spring. When inserting the finder scope in the bracket, pull the chrome button.

Slide the finder scope bracket into the mounting slot on the telescope and tighten the screw to hold the bracket in place

Frequently Asked Questions about the packaging:

Doesn't an astrograph deserve a better box than just a simple cardboard box?

Yes, indeed. But when we asked seasoned astrophotographers what type of box should be the best for a Newtonian astrograph, the answer was always the same: "*Only a box I choose specifically for my equipment will do the job*".

Because every astrophotographer we met has his own choice of camera, filter set, accessory plate or even car trunk dimension we decide to let the customer free to choose what will be the best fit instead of asking added money for a nice box which a vast majority will find unpractical or even totally useless.

No eyepiece is provided with my telescope. Is it normal?

As the Quattro series are fast Newtonian astrograph we were unsure what can be the best eyepiece to provide. Seasoned astrophotographers use different eyepieces for different purposes: a standard low magnification eyepiece to check if the object is inside the field of view, a high magnification eyepiece to observe Moon details and planets, and many more usages were evoked.

Many astrophotographers already have eyepieces at hand so we decide to let any standard eyepiece out of the box and to not ask money for an accessory most customers already have at hand.

Why is no coma corrector proposed as standard?

A high quality coma corrector (see next paragraph) is an essential accessory for widefield astrophotograpy. But the Quattro series can also offer nice visual images without coma corrector.

Again we decide to let the coma corrector out of the box and let the customer decide what will be the best fit.

What does Sky-Watcher propose for the Quattro series as accessories?

If you are looking for a great eyepiece to use with your telescope or other compatible accessories, like the F4 Coma Corrector (4 lenses, enlarged T2 thread), we advise you to ask your reseller or visit the Sky-Watcher sites at www.skywatcher.com or ca.skywatcher.com for further inquiries.



Aligning the finder scope

The 8x50 finder scope is a small fixed magnification scope mounted on the optical tube. When it is correctly aligned with the telescope, objects can be quickly located and brought to the center of the field.

The alignment should be done at first use and over time if the alignment is no more accurate.



Alignment is best done outdoors in day light when it's easier to locate objects

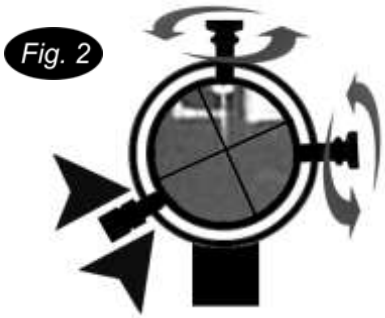


If it is necessary to refocus your finder scope, look at an object that is at least 500 meters (or yards) away. Loosen the knurled ring by unscrewing it back towards the bracket. The front lens holder can now be turned in and out of focus. When focus is reached, lock it in position with the knurled ring **(**Fig. 1**).**



NEVER LOOK DIRECTLY AT THE SUN WITH THE FINDER SCOPE. IT COULD IMPAIR DEFINITIVELY YOUR VISION.

When the finder scope is in focus, choose a distant object that is at least 500 meters (or yards) away and point the main telescope at the object. Center the object in the eyepiece of the telescope by aiming precisely at the distant object.



Now, check in the finder scope to see if that distant object is exactly positioned behind the crosshairs of the finder scope's eyepiece. If not, adjust the alignment of the finder scope with the two black adjusting screws on the bracket of the finder scope **(**Fig. 2**)**.

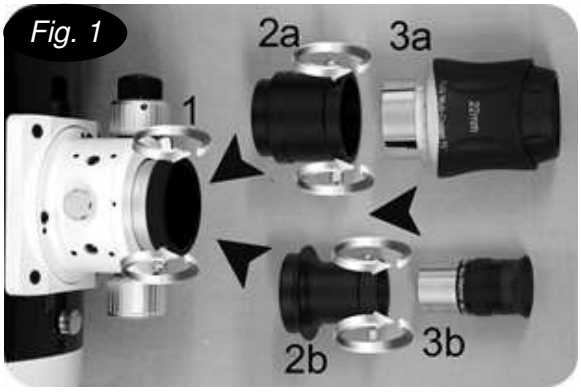
Do not over tighten the screws when aligning the finder scope.



The image in the finder scope is upside-down. This is normal and has no incidence on observations.

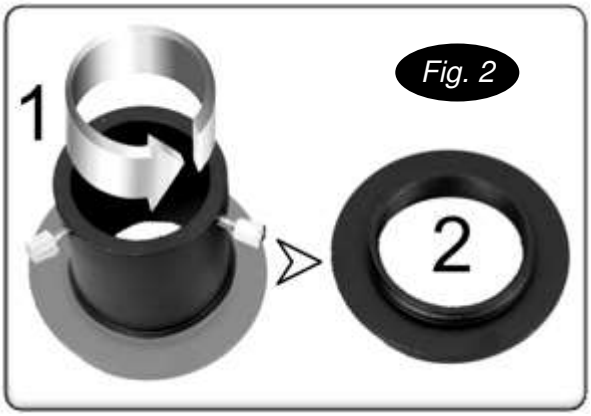
Part III: Basic Operations

Using an eyepiece



1. Loosen the two thumbscrews on the focuser's drawtube **[Fig 1.1].**
2. Insert the $1^{1/4}$ inches or 2 inches adapter inside the focuser' drawtube. Tighten the two screws at the end of the focuser's drawtube **[Fig 1.1]**, and unscrew the two thumbscrews on the adapter **[Fig 1.2a]** or **[Fig 1.2b].**
3. Insert the eyepiece into the adapter **[Fig 1.3a]** or **[Fig 1.3b]** and tighten the adapter's thumbscrews **[Fig 1.2a]** or **[Fig 1.2b]**

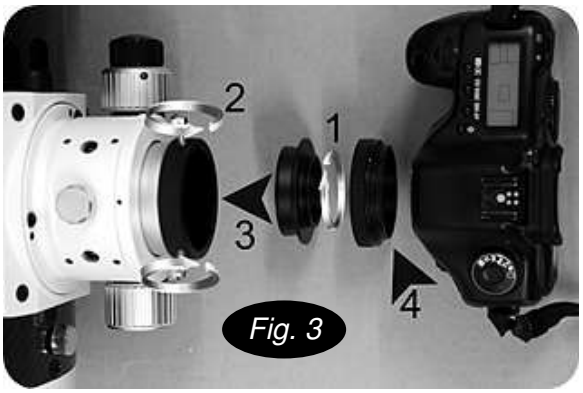
Using the 42x0.75mm ring (T2 ring)



The $1^{1/4}$ inches adapter is composed of two parts: an $1^{1/4}$ inches tube **[Fig 2.1]** screwed on a T2 (42x0.75mm) plate **[Fig 2.2].**

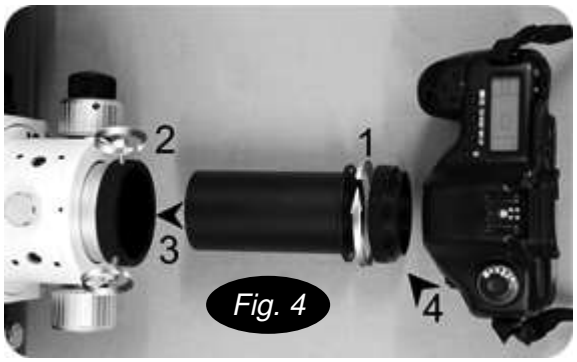
To access the T2 '(42x0.75mm) plate **[Fig 2.2]** simply unscrew the $1^{1/4}$ inches tube **[Fig 2.1]** form the $1^{1/4}$ inches adapter.

Reassembling the $1^{1/4}$ inches adapter can easily be done by following the preceding steps in reverse order.



1. Assemble the T2 plate with your T2 accessory adapter **[Fig 3.1]**.
2. Loosen the two thumbscrews on the focuser's drawtube **[Fig 3.2].**
3. Insert the T2 plate with your T2 accessory adapter inside the focuser's drawtube **[Fig 3.3]**. Tighten the two screws at the end of the focuser's drawtube **[Fig 3.2]**.
4. Assemble your accessory onto the T2 accessory adapter **[Fig 3.4]**.

Using an accessory with specific connections



[Fig. 4].Some accessories don't need a standard adapter to be connected to the telescope, like the Sky-Watcher F4 Coma Corrector.

In this case please follow indications given with the accessory for proper and secure connection.

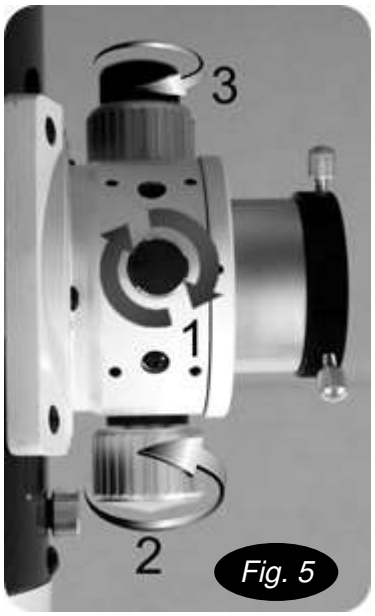


Fig. 5

Focusing

1. Make sure the locking screw **[**Fig 5.1**]** is loose.
2. Slowly turn the focus knobs **[**Fig 5.2**]** one way or the other, until the image in the eyepiece is nearly sharp.
3. To finely focus the image turn the 1:10 knob one way or the other until the image is perfectly sharp **[**Fig 5.3**]**.
4. Tighten the locking screw **[**Fig 5.1**]** if a heavy load is attached.

The image usually has to be finely refocused over time, due to small variations caused by temperature changes. This often happens when the telescope has not yet reached outside temperature.

Refocusing is almost always necessary when you change an eyepiece or accessory.



Part IV: Advanced Operations

Offset and collimation

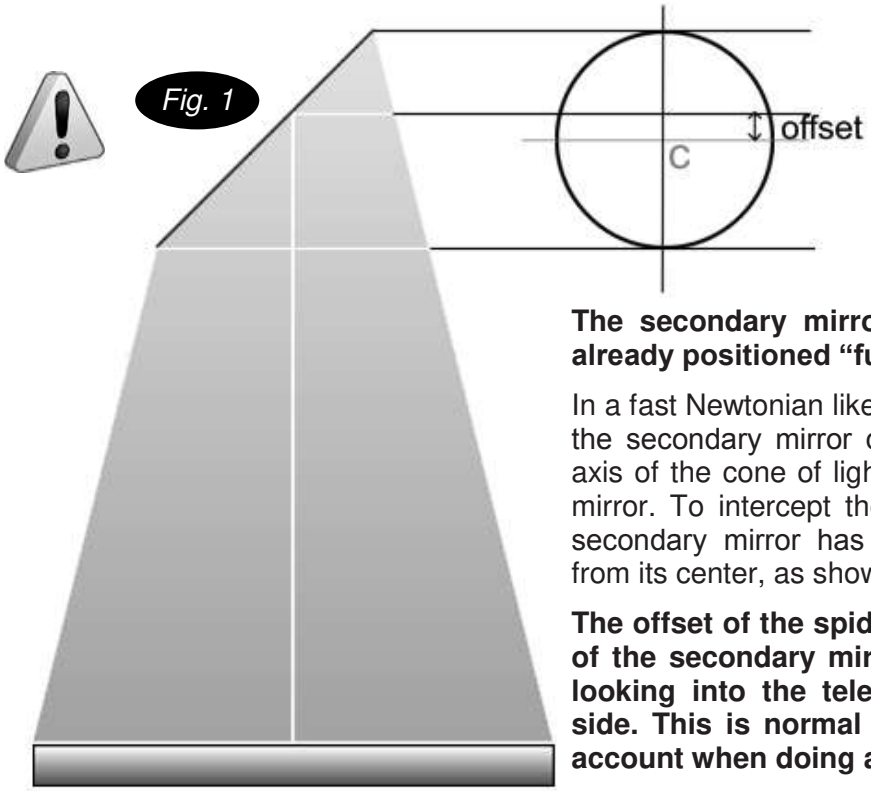


Fig. 1

The secondary mirror of the Quatto 200 is already positioned "full offset".

In a fast Newtonian like the Quattro, the center of the secondary mirror doesn't correspond to the axis of the cone of light reflected by the primary mirror. To intercept the light cone properly, the secondary mirror has to be positioned "offset" from its center, as shown in **[**Fig. 1**]**.

The offset of the spider vanes with the center of the secondary mirror will be visible when looking into the telescope by the focuser's side. This is normal and should be taken in account when doing a collimation.

Mirrors inside the telescope have been carefully aligned to each other in the factory. When using the telescope, this alignment should be checked to ensure optimal image quality.

When looking at a bright star, the star image given by your telescope should be symmetrical, a central dot with diffraction rings centered on this white dot (see Fig 2). Be patient to consider the average shape of the star image while the image is slowly moving due to air turbulence (see Fig 3).

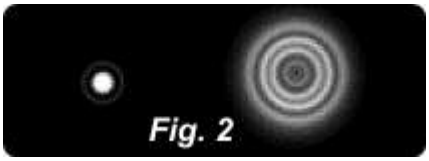


Fig. 2

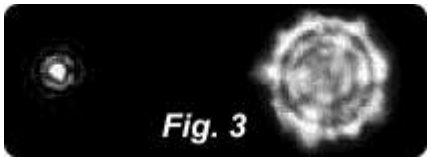


Fig. 3



Fig. 4



Fig. 5

If the star image appears to be unsymmetrical (see Fig 4) a recollimation is needed. Therefore, the blocking screws of the primary mirror on the back of the telescope should be loosened **[**Fig. 5.1**]** and the big adjustment knobs will then allow realigning the primary mirror to obtain a symmetric star image again **[**Fig. 5.2**]**. These adjustments should be small. After adjusting, by tightening the blocking screws, you can lock the primary mirror in its aligned position.

When misalignment is heavy, an alignment of the secondary mirror should be done also. In that case, it is recommended to use an optional laser collimator. This laser collimator greatly helps in determining the misalignment of each mirror.

Focuser parallelism



Fig. 6

Since the Quattro Newtonian telescope is very well suited for wide field photography, the focuser of this telescope is equipped with adjustment screws for alignment of the focuser to the optical axis of the telescope. Misalignment can be detected in the edge of wide field pictures when the stars in the 4 edges look different. The stars in the edges may show some coma if the optional coma corrector is not correcting all of the coma aberration in the image edge of a very big size CCD, but this aberration should be symmetric (all pointing to the center of the image). If not, realigning the focuser with the push pull screws (**[**Fig. 6 A and B**]**) may be needed.

FINE TUNING THE FOCUSER PARALLELISM IS A DELICATE OPERATION. PLEASE CAREFULLY CHECK FOR OTHER CAUSES BEFORE ATTEMPTING THIS PROCEDURE.

Balancing the tube with a heavy image train



In Newtonian reflectors the secondary mirror intercepts the light and points it out the side of the tube at right angles to the tube through the eyepiece.

This configuration allows positioning the eyepiece in a comfortable viewing angle, mainly parallel to the ground or elevated some degrees when the target is low on horizon.

When using an accessory in the focuser, like an eyepiece, the tube is not in perfect balance due to the added weight of the eyepiece on one side of the tube. It has no real importance when the accessory is light, the mount can easily support such imbalance.


Fig. 7

When using a heavy imaging train, containing a heavy CCD camera, a radial guider, a filter wheel and maybe an adaptive optic system the imbalance can become a real problem.

A neat solution to this imbalance problem is to put all the imaging train vertically, oriented to the ground, as shown in **[**Fig. 7**]**.

IN THIS CONFIGURATION GRAVITY IS YOUR ENEMY! BE CAREFUL TO PROPERLY SECURE YOUR ACCESSORIES TO THE FOCUSER!

Part IV: Advanced Operations



When the imaging train is this position you need to adjust the focuser's tension by using the large thumbscrew below the focuser, as shown in **[**Fig. 8**]**. A correct tension allows to smoothly focusing but doesn't let the imaging train move due to gravity.

When in focus and centered don't forget to block the focuser drawtube with the thumbscrew placed on top, as shown in **[**Fig. 9**]**.

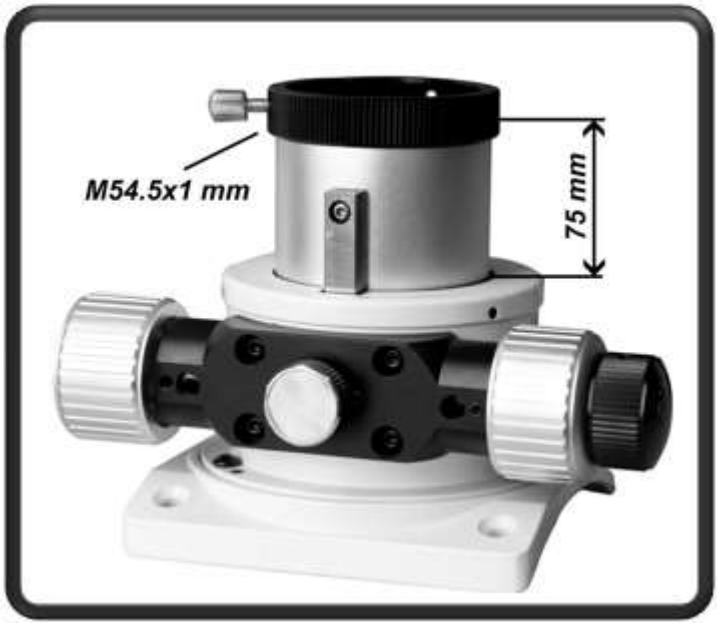




Part V: Specifications

Telescope specifications

Optical Design	Newtonian Reflector
Aperture (mm)	205 mm (8 in)
Focal Length	800 mm (32 in)
Focal Ratio	4
Primary Mirror	Parabolic, Low Expansion Borosilicate Glass
Secondary Mirror	Flat, Low Expansion Borosilicate Glass
Central Obstruction	70mm, 34%
Tube Rings	With EQ5 dovetail plate
Highest Useful Magnification	400 x
Lowest Useful Magnification	29 x
Limiting Stellar Magnitude	13.4
Resolution (Rayleigh)	0.68 arc seconds
Resolution (Dawes)	0.59 arc seconds
Light Gathering Power (Compared to Human Eye)	858 x
Fully Illuminated Field	44 mm (1.7 in)
Optical Tube Length	730 mm (28.74 in)
Optical Tube Weight ST Tube	9.5 kg (21 lbs)
Optical Tube Weight CF Tube	8.3 kg (17.7 lbs)



The focuser's drawtube has a maximum extension of 75mm from the base. For specific applications, requiring more than the standard 55mm back focus, it is possible to machine a custom ring (thread M54.5x1mm) to replace the 2 inch accessory support and use it as a base to affix specific accessories.

Please do note that the 75mm drawtube course doesn't mean there is 75mm of free back focus. Please do test there is enough back focus for your configuration before requesting a custom made adaptation ring



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