

Orion® EON 80mm ED Apochromatic Doublet Refractor

#10287



Congratulations on your purchase of the Orion EON 80 ED Apochromatic Refractor optical tube. Your 80mm f/7 ED has been designed with high quality optics and excellent mechanical construction. The ED glass in the objective lens means you'll enjoy images with far less color distortion than those seen in a standard refractor, and the smooth and robust dual speed Rack and Pinion focuser will make getting sharp images a breeze. These instructions will help you set up and use your telescope tube.



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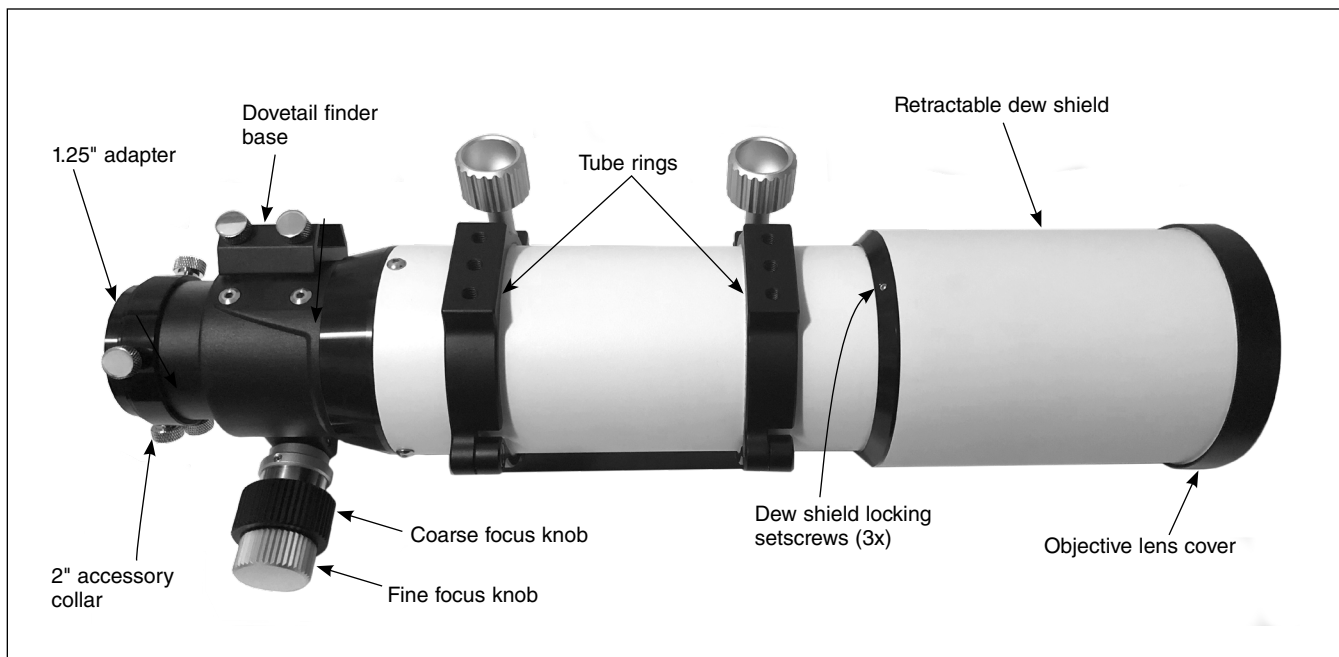


Figure 1. The EON 80 ED Apochromatic Refractor optical tube assembly

Getting Started

The EON 80mm ED comes fully assembled from the factory. The telescope's optics have been installed and collimated, so you should not have to make any adjustments to them.

Please keep the original shipping box! In the unlikely event you should need to ship the telescope back to Orion for warranty repair service, you should use the original packaging. The box also makes a very good container for storing the telescope when it is not in use.

Attaching the EON 80mm ED to a Tripod or Mount

The EON 80mm ED can be attached to a tripod or mount by the use of the narrow Vixen style dovetail rail. This dovetail fits any mount capable of connecting a Vixen style dovetail, including the Orion AstroView, SkyView Pro, Sirius, and Atlas mounts. In addition, in the middle of the dovetail plate is a threaded $\frac{1}{4}$ "-20 hole designed for any standard photo tripod, so the EON can be connected to any camera tripod capable of holding the weight of the optical tube.

Machined felt-lined rings are included with your EON, and come fully assembled and connecting in the box. In addition, on the top of those tube rings are a series of 6mm (1mm per thread) mounting holes, designed to connect any auxiliary rail or other accessory to the top of your telescope.

WARNING: Do NOT look at the Sun without a professionally made solar filter on the telescope; serious eye damage may result if you look at the Sun with any unfiltered optical instrument. Do not leave the telescope unsupervised around children. Always cover the lenses when leaving the telescope in direct sunlight.

Use of Optional Eyepieces, Diagonal, and Finder Scope

The EON 80mm ED does not come with a finder scope, diagonal or eyepieces in order to grant the user the greatest versatility in customizing the instrument to suit their tastes. However, certain rules for using accessories still apply.

Any Orion finder scope with a dovetail bracket can be used with the EON 80mm ED. Simply unthread the thumbscrews on the dovetail mount (**Figure 1**) and insert the assembled finder scope and dovetail bracket. Retighten the thumbscrews. Finder scopes that do not use a dovetail bracket will need to be attached by other means.

The EON 80mm ED can use almost any 1.25" diagonal or eyepiece. Please note that the telescope will not come to focus without the use of a diagonal or extension tube. To install a diagonal, loosen the thumbscrew on the 1.25" adapter (**Figure 1**). Insert the diagonal or extension tube and secure it with the thumbscrew. Then insert the eyepiece into the diagonal or extension tube and secure it with the thumbscrew(s).

Use of 2" Eyepieces and Diagonals

A feature of the EON 80mm ED is its ability to also use 2" barrel-diameter eyepieces and diagonals. At low magnifications, 2" eyepieces can give a wider field of view than standard 1.25" eyepieces. This is especially desirable for observing deep-sky objects, as many of them appear quite large, but faint. As with 1.25" eyepieces, the EON 80mm ED will not reach focus with the 2" eyepieces unless a 2" diagonal or extension tube is used.

To use 2" eyepieces, simply loosen the three large thumbscrews on the 2" adapter (**Figure 1**). Once these thumbscrews are loosened, the entire back end of the focuser, including any 1.25" diagonal and eyepiece that may be attached, comes

off, exposing the 2" diameter focuser drawtube. Now, insert your 2" diagonal into the drawtube and secure with the three thumbscrews loosened previously. Insert a 2" eyepiece into the diagonal, secure it in place with the thumbscrew on the diagonal, and you're ready to observe. The EON 80 focuser features brass compression rings to securely hold your eyepieces and diagonal in place without marring the 1.25" or 2" nosepiece walls.

2" Rack and Pinion Focuser

The EON 80mm ED comes equipped with a solid 2" dual speed Rack and Pinion (R&P) focuser. The R&P design allows for smooth, precise focusing without any slippage that typical Crayford focuser designs can experience. And backlash has been minimized by using a large Rack gear cut on a diagonal bias to fully mesh the Pinion gear at all times. The focuser includes a 10:1 reduction gear for super precise focusing. The black knobs are the course focus, and the gold knob is the fine focus. For every one full turn of the course knob, the fine knob will turn 10 times.

A focus lock thumb knob is located on the Pinion housing between the two focus knobs (**Figure 2**). Leave this knob fully unlocked during normal operation, and only lock it when you do not want the focus to change at all. Under normal operation the focus should not move on its own, even with this lock knob fully disengaged. But if you load the focuser with very heavy gear, you might find the factory tension is not strong enough to hold against gravity and the wheels may begin to turn on their own when aiming at high altitudes. If this happens, slightly tighten the focus tension setscrew (**Figure 2**) a small amount, and retest for holding strength. This setscrew should only be tightened enough to hold the weight of your equipment.

Retractable Dew Shield

The front dew shield (**Figure 1**) is retractable to allow for easy transport and storage, and pulls out to full length to provide protection from dew and stray light from sources such as nearby streetlights or buildings. The dew shield should hold securely in position on its own, but if you find it slipping during use, there are three allen head set screws around the perimeter of the bottom ring of the dew shield (**Figure 2**). Use a 2mm Allen wrench to gently tighten down these three setscrews, and the dew shield will stay securely in place. It's best to slightly loosen them again when you wish to retract the dew shield.

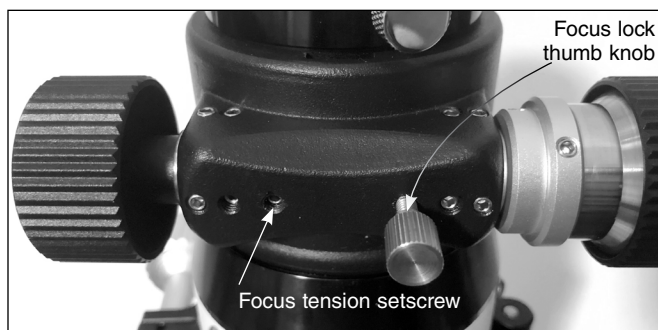


Figure 2. The Rack and Pinion Focuser adjustments

Calculating Magnification (Power)

It is desirable to have a range of eyepieces of different focal lengths, to allow viewing over a range of magnifications. To calculate the magnification, or power, of a telescope, simply divide the focal length of the telescope by the focal length of the eyepiece:

$$\text{Telescope F.L.} \div \text{Eyepiece F.L.} = \text{Magnification}$$

For example, the EON 80mm ED, which has a focal length of 560mm, used in combination with a 25mm eyepiece, yields a power of

$$560 \div 25 = 22.4x.$$

Every telescope has a useful limit of power of about 50x per inch of aperture. Claims of higher power by some telescope manufacturers are a misleading advertising gimmick and should be dismissed. Keep in mind that at higher powers, an image will always be dimmer and less sharp (this is a fundamental law of optics). The steadiness of the air (the "seeing") will limit how much magnification an image can tolerate.

Always start viewing with your lowest-power (longest focal length) eyepiece in the telescope. After you have located and looked at the object with it, you can try switching to a higher-power eyepiece to ferret out more detail, if atmospheric conditions permit. If the image you see is not crisp and steady, reduce the magnification by switching to a longer-focal-length eyepiece. As a general rule, a small but well-resolved image will show more detail and provide a more enjoyable view than a dim and fuzzy, overmagnified image.

Note About Chromatic Aberration

Chromatic aberration literally means color distortion. Whenever light passes through one material to another, light of different wavelengths (color) is bent by different amounts. This is a problem that plagues refractor-type telescopes, since light passes through both air and glass to form an image. Most astronomical objects emit a spectrum comprised of many different wavelengths of light, so each wavelength will be bent by a slightly different amount when passing through a lens. This results in each color of light reaching precise focus at a slightly different point, which will provide unacceptable images.

The EON 80mm ED is designed to minimize chromatic aberration. The objective lens is actually comprised of two individual lenses, called elements, one of which is made of special ED (Extra-low Dispersion) glass, a special type of glass that has superior refractive properties when compared to normal types of glass. The use of this ED glass coupled with the proper mating lens minimizes the amount of chromatic aberration, resulting in a much more pleasing view when compared to telescopes that do not use ED glass.

Photography with the EON 80mm ED

With optional camera adapters, the EON 80mm ED becomes a 560mm f/7 telephoto lens for DSLR and dedicated astro cameras. For long-distance terrestrial or astronomical photography with a DSLR, you need a T-ring for your particular camera model along with a 2" prime focus camera adapter or dedicated field flattener or reducer. Please note: If you use a field flattener such as the Orion #8893, or the focal reducer

(#8894), you will most likely not need any extension tubes to reach focus. But if you choose to use the telescope without a flattener or reducer, it's likely that you will also need a 2" extension tube to reach focus with a DSLR or dedicated astro camera.

If you wish to use a 3rd party robotic focus motor for automated focus, use the threaded hole for the focus lock thumbscrew (**Figure 2**) to secure the motor bracket. The lock knob is not normally used when a robotic focuser is attached and can be removed. Please make sure to find a screw that is only long enough to engage the threads and tighten down the bracket – it needs to be short enough to NOT begin to lock down the focus mechanism internally. Use washers if necessary to hold the screw higher and away from locking down the focuser. The focus lock knob threaded hole is M4 x 0.7mm

Care & Maintenance

Give your telescope reasonable care and it will last a lifetime. When not in use, keep its dust cover on as well as the dust cap on the eyepiece opening. Store it indoors or in a dry garage.

Do not leave the telescope outside except when using it. The optical tube is aluminum and has a smooth painted surface that should resist scratches and smudges. If a scratch does appear on the tube, it will not harm the telescope. Smudges on the tube can be wiped off with standard mild household cleaners.

Any quality optical lens tissue and cleaning fluid specifically designed for multi-coated optics can be used to clean the telescope's objective lens as well as the lenses of the eyepieces and finder scope. Never use regular glass cleaner or cleaning fluid designed for eyeglasses. Before cleaning with fluid and tissue, however, blow any loose particles off the lens with a blower bulb or compressed air, or lightly brush the lens with a soft camel hair brush. Apply some cleaning fluid to a tissue, never directly on the optics. Wipe the lens gently in a circular motion, then remove any excess fluid with a fresh lens tissue. Oily fingerprints and smudges may be removed using this method. Use caution; rubbing too hard may scratch the lens! Clean only a small area at a time, using a fresh lens tissue on each area. Never reuse tissues.

Specifications

Optical tube:	Seamless aluminum
Objective lens diameter:	80mm (3.1")
Objective lens:	Apochromatic doublet, rear element made of Fk-61 ED glass, air-spaced
Objective lens coating:	Fully multi-coated (all air-to-glass surfaces multi-layer coated)
Lens cell:	Machined aluminum
Focal length:	560mm
Focal ratio:	7.0
Focuser:	Rack and Pinion, 10:1 dual speed, compression locking, 2" w/ 1.25" adapter
Back focus:	153mm
Mounting bar:	Vixen dovetail rail with slots and included ¼"-20 tripod threaded hole
Tube rings:	Two hinged, felt lined rings, multiple M6-1.0 holes included
Weight:	5 lbs. 13 oz.
Length:	17.25"

One-Year Limited Warranty

This Orion product is warranted against defects in materials or workmanship for a period of one year from the date of purchase. This warranty is for the benefit of the original retail purchaser only. During this warranty period Orion Telescopes & Binoculars will repair or replace, at Orion's option, any warranted instrument that proves to be defective, provided it is returned postage paid. Proof of purchase (such as a copy of the original receipt) is required. This warranty is only valid in the country of purchase. This warranty does not apply if, in Orion's judgment, the instrument has been abused, mishandled, or modified, nor does it apply to normal wear and tear. This warranty gives you specific legal rights. It is not intended to remove or restrict your other legal rights under applicable local consumer law; your state or national statutory consumer rights governing the sale of consumer goods remain fully applicable.

For further warranty information, please visit www.OrionTelescopes.com/warranty.



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