



90 mm Triplet Refractor User's Manual



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2023

Overview

The Apertura 90 mm Triplet Refractor uses an Air Spaced FPL53 ED Triplet Objective. It is of excellent quality and produces sharp, bright, high contrast images for both visual and photographic use. The telescope comes in a well-made aluminum hard case. The padded interior of the case is shaped to gently support and protect the telescope in storage and transport. In the case, there is a special cutout to hold the included field flattener. The dual speed rack and pinion focuser has an integrated rotator which is useful for imaging as well as quick positional adjustments during visual observations. The telescope also comes with an Apertura 32mm guide scope to be used when imaging, and it is color matched to the 90mm Triplet.

SKU Number	APT-90APO
Model Number	90APO
Telescope Series	Apertura Premium Refractors
Focal Ratio	f/6
Optical Design	Refractor
Telescope Aperture	90mm (3.54")
Number of Optical Elements	3 (Triplet)
Focal Length	540 mm
Optical Glass Type	FPL-53
Focuser Style	Dual Speed Rack & Pinion
Focuser Size	2.5" (2" Visual Accessories)
Telescope OTA Weight	9.8lb

Using The Telescope

Mounting

The Apertura 90mm APO Triplet comes from the factory with a 7" D series dovetail plate which can be attached to most telescope mounts on the market. For those mounts that require the smaller V series dovetail bar, we recommend using the optional Apertura VUP7. This optional accessory can be installed in the same position as the factory DUP7 dovetail bar, using a 5mm hex key (not included).

Visual Use

Diagonal Mirror

This telescope is well suited to visual use and comes from the factory with a 2" twist lock ocular holder. This supports 2" diagonal mirrors and accessories. The telescope also comes with a self centering dual compression ring type, 2" to 1.25" adapter, which is threaded to accept 2" filters. This allows you to use a 1.25" diagonal, should you wish to. We recommend the Apertura 2" Twist Lock Carbon Dielectric Mirror Diagonal (APT-D2CF), as an option accessory.

Focusing

With a 2" Diagonal Mirror and 2" Eyepiece, focus should be found around the 35mm mark on the focuser's drawtube. With a 1.25" diagonal mirror, like the Apertura 1.25" Carbon Dielectric Mirror Diagonal (APT-D1CF), again an optional accessory. Focus should be located around the 55mm mark on the focuser's drawtube.

Photographic Use

Deep Sky

Field Flattener

Refracting telescopes inherently have a curved focal plane. This is the virtual surface on which the telescope's image is formed. You can think of the curved focal plane as looking something like a salad bowl. As we know, a camera's sensor is a flat chip. When we image with a curved focal plane on a flat chip, the edges of our image look out of focus and blurred. To correct this we use an optical device known as a Field Flattener. This does exactly as it sounds, and flattens the curvature of the field to resemble something more like a dinner plate. A well designed field flattener allows for nearly pinpoint stars out to the very extreme corners of a full frame camera sensor. The Apertura 90APO Triplet's field flattener is well designed, indeed!

The rearmost fitting of the field flattener has a provision to accept 2" mounted filters. To install a filter here, simply thread this adapter off of the flattener, thread the filter into the housing, and reinstall the adapter back onto the telescope's field flattener.



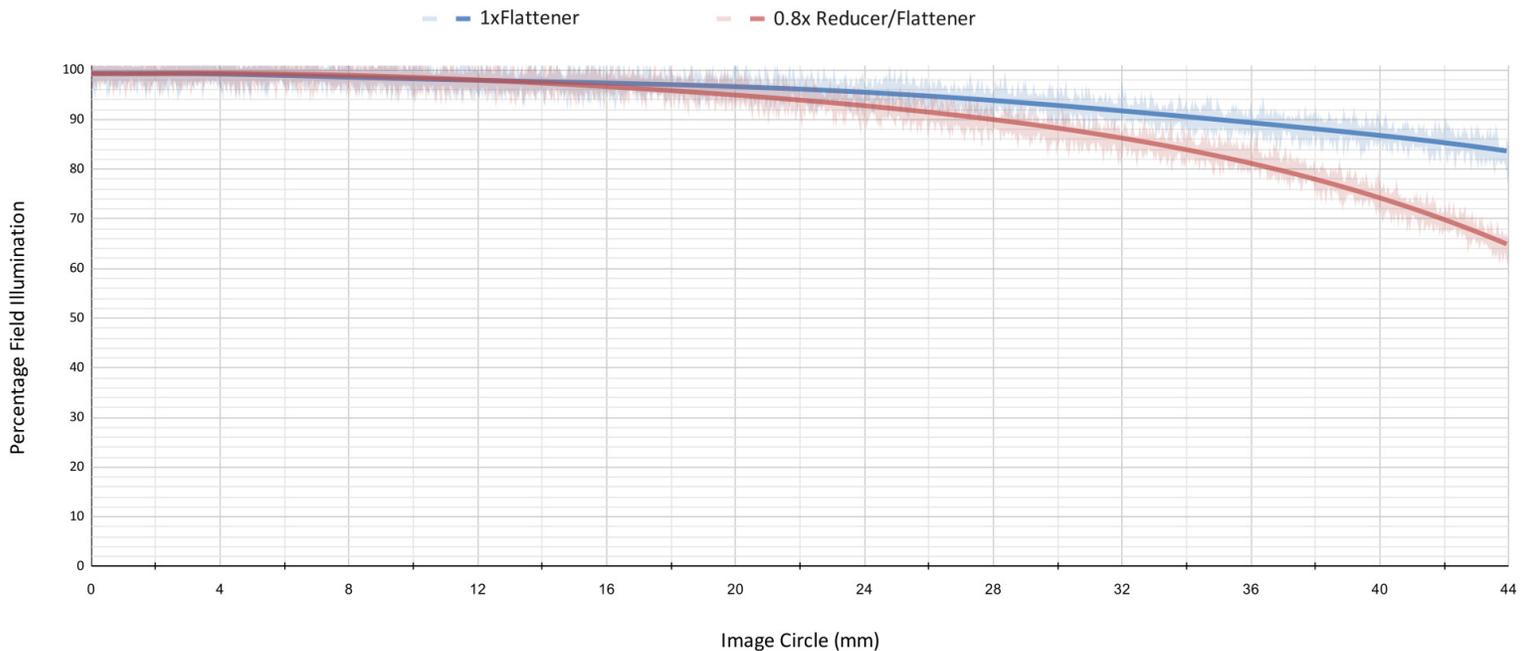
Field Illumination

Field illumination is the percentage of light that reaches the camera sensor across the whole image. Almost every optical system has some light loss and vignetting that we correct for using flat frame calibration images. With that being said, minimizing this vignetting and increasing field illumination is an important part of an imaging telescope. Below you can see a graph showing the field illumination across a full frame camera sensor using the included field flattener, as well as the optional 0.8x reducer flattener (APT-R-FLAT).

This telescope illuminates a full frame sensor. The 1x reducer has incredible field illumination levels (blue line in graphic). The optional 0.8x reducer offers superb illumination as well; on par with the most premium of telescopes (red line in graphic).

Apertura 90 mm Triplet Refractor

Measured Field Illumination Percentage



Field Correction

The 90mm APO Triplet, when combined with the included 1x flattener, is extremely well corrected for a full-frame camera sensor. Even at the very extremes of an image, the stars will look small and pinpoint. This telescope and 1x flattener is a magnificent combination. When using the optional 0.8x reducer, the system is best corrected for an APS-C sensor but is still well corrected for a full frame. Deep sky astrophotography using large sensors requires that there is no tilt within your camera's system, and that the spacing between camera and flattener is ideal and correct. This is generally a non-issue but some cameras might require careful adjustment. This is true with any telescope imaging system and is not something that is exclusive to the Apertura 90mm Triplet APO.

Attaching a Field Flattener

To attach your telescope's included 1x field flattener or optional 0.8x reducer, you'll need to loosen three of the small hex screws around the 2" ocular holder that is used for visual observations. Once the three screws are loose, turn the entire adapter clockwise to unthread it from the rotator. The telescope comes with the 2mm hex key necessary to remove this part of the telescope. See the following image for reference.

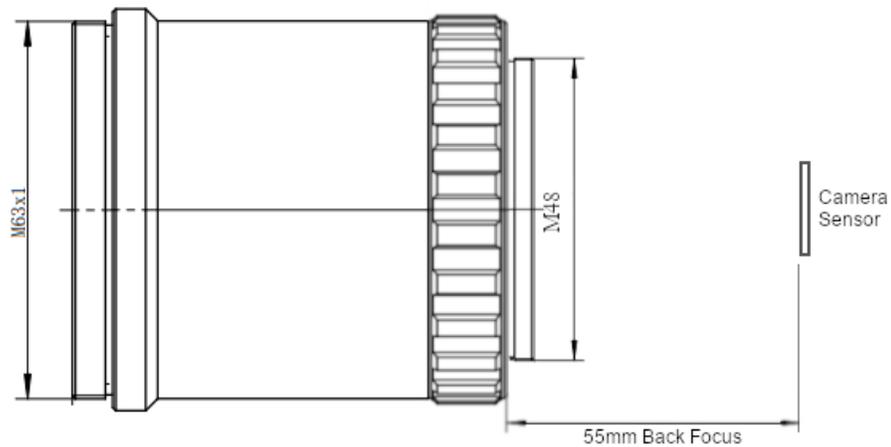


Back Focal Distance

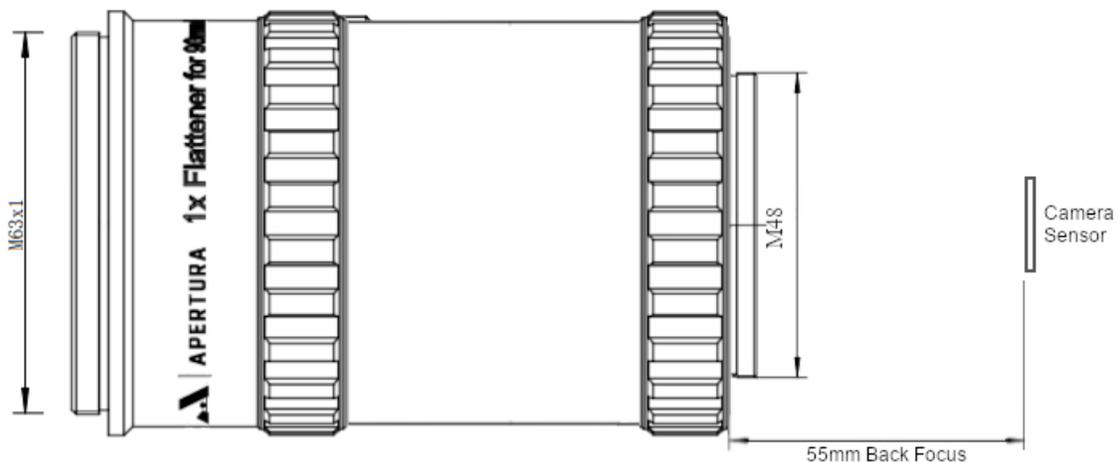
Sub-aperture correctors, like field flatteners and focal reducers, have a specific working distance built into their design. In the astronomy hobby, we call this back focus. The most standard distance is 55mm. Most DSLR cameras with a T-ring occupy 55mm back focus, and most cooled dedicated astronomy cameras are set up for 55mm of back focus. This makes attaching your camera to the M48 threads on Apertura 90APO Flattener or optional 0.8x Reducer, a breeze.



Optional .8x Reducer Flattener for 90 mm Triplet APO Refractor



1x Flattener for 90 mm Triplet APO Refractor

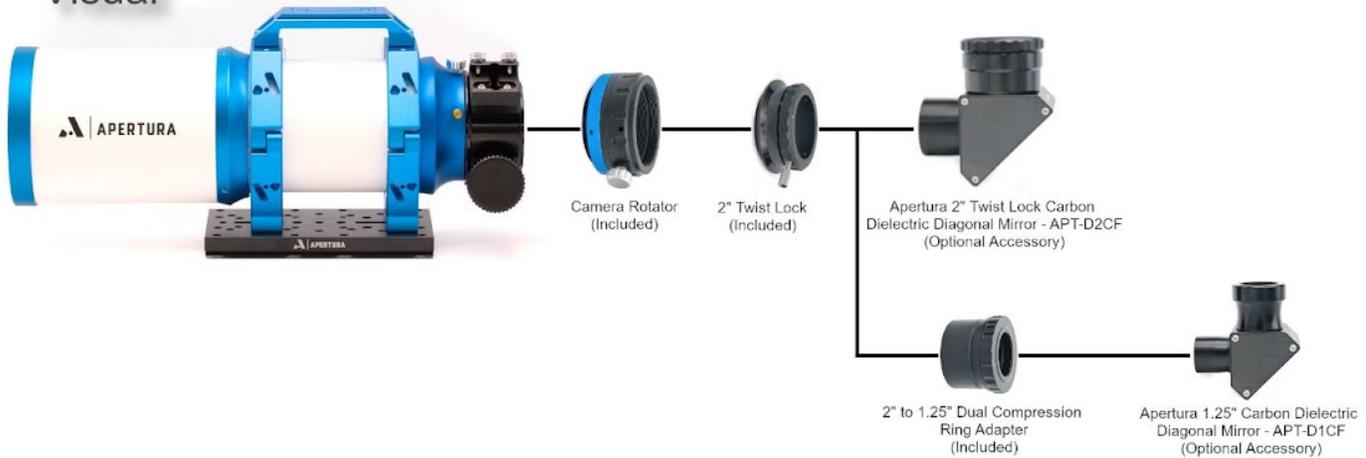




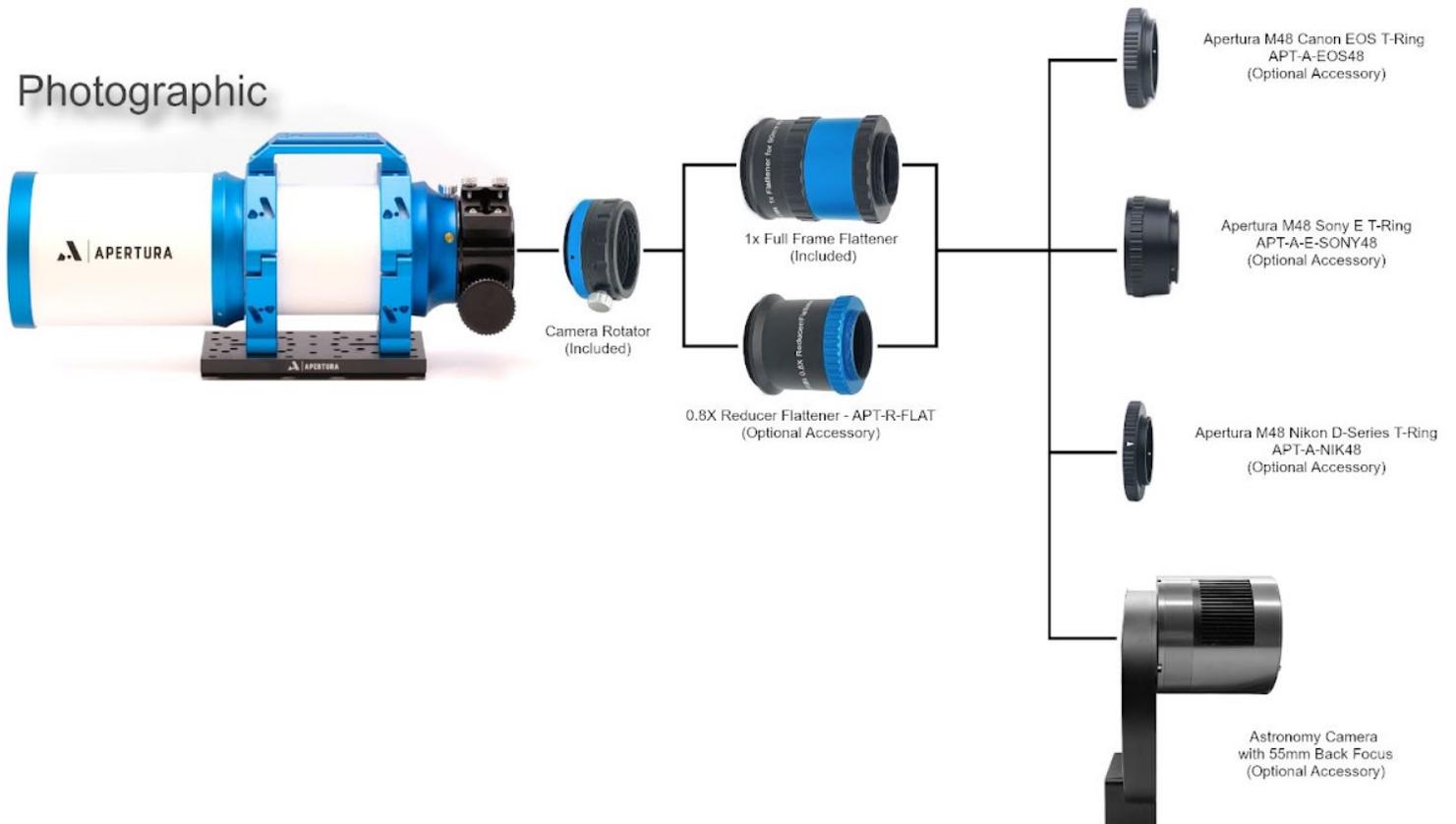
APERTURA

Apertura 90 mm Triplet Refractor - System Diagram

Visual



Photographic



Warranty

The *Apertura Absolute Warranty* provides two years of coverage against product defects. After the initial two-year warranty expires, this product qualifies for Apertura's Three-Year Accident Replacement Program. In addition, the Apertura Absolute Warranty is transferable! It is important to keep your original receipt and the product's original boxes and packaging, should you need to make a claim.