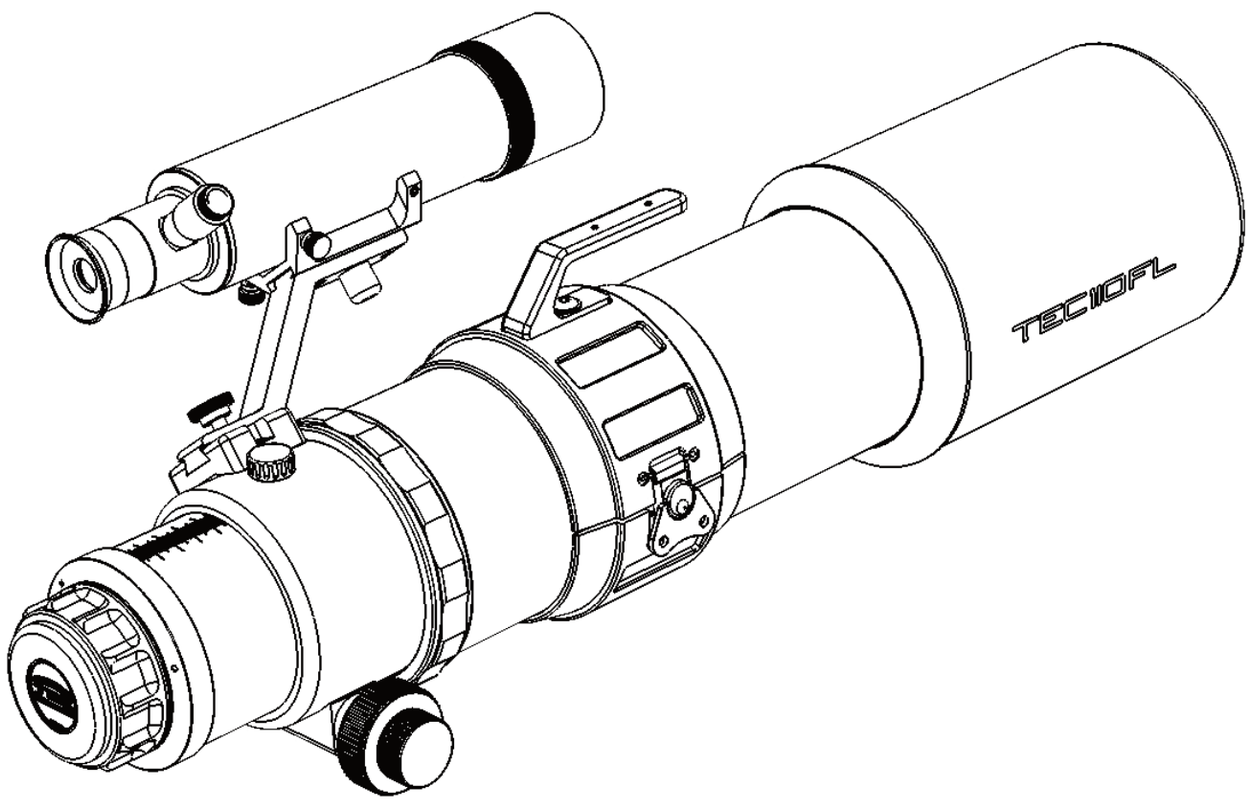
TEC APO110 FL

ECLIPSE



OWNER'S MANUAL
2012

IMPORTANT - PLEASE READ THIS MANUAL BEFORE USING YOUR TELESCOPE

SAFETY PRECAUTION

Do not look at the sun through the telescope!
Viewing the sun through the telescope without special equipment (Solar Filter, Herschel Wedge) will cause permanent visual impairment and damage to telescope components.
Do not disassemble!
Disassembly of the telescope could result in personal injury and telescope malfunction.
Do not use hairdryer to remove dew condensation from the front lens!

CONTACT INFORMATION

If you have any questions or need assistance - please contact us:

Phone	303 273 9322 • Fax: 303 273 0204
E-mail	tec@telescopengineering.com
Web site	www.telescopengineering.com
User's group	http://groups.yahoo.com/group/tec-scopes
Address	Telescope Engineering Co. • 15730 West 6th Ave. Golden CO, 80401. USA

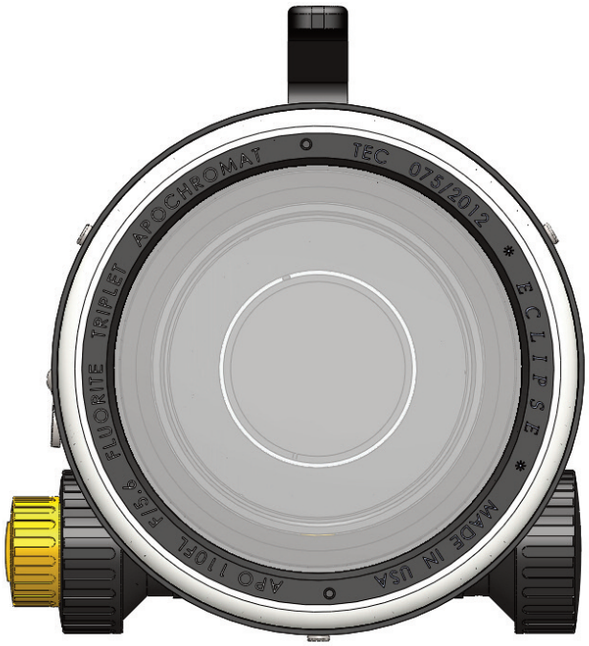
TEC APO 110 TECHNICAL SPECIFICATIONS

Clear aperture	4.33" / 110 mm
Focal length	616 mm
Focal ratio	5.6
Image scale	5.6 arc min
Resolution (theor.)	1.0 arc sec
Focuser TEC- I	3.20" / 82mm ID
Eyepiece holder	2" Collet type
Focusing range	3.60" / 92 mm
One turn focus travel:	
Coarse	18.3 mm
Fine (small knob)	1.8 mm
Back focus distance	6.70" / 170 mm
Focuser load capacity	12 lb / 5.5kg
Tube assembly dia.	4.44" / 112.8 mm
Baffle diameter	5.51" / 140 mm
OTA length (shortest)	18.95" / 482 mm
OTA weight	10 lb / 4.5 kg including ring
Weight with case	18 lb / 8.2 kg incl. keys
Price 2012	$4500
Includes :	Optical tube assembly, front cover, plug, ring

Please note: the Aluminum case was included only for the 1st run(2010).
An optional soft case is available from stock. It is compact and high quality case.

OPTIONAL EQUIPMENT (see www.telescopengineering.com for up to date prices)

Finderscope bracket with base	$120
TEC 9” narrowed dovetail plate	$70
Plate clearance adapter	$15
RD sight bar with screws	$12
Focuser end with 2.75” thread for Astro-Physics accessories	$40
8X50 finderscope with illuminated eyepiece	$190
Heavy (>10lb) camera set-up ring	$50
Canon EOS bayonet adapter	$60
Eyepiece Turret	$500
Field Flattener (three-lens design)	$750



Soft case $150

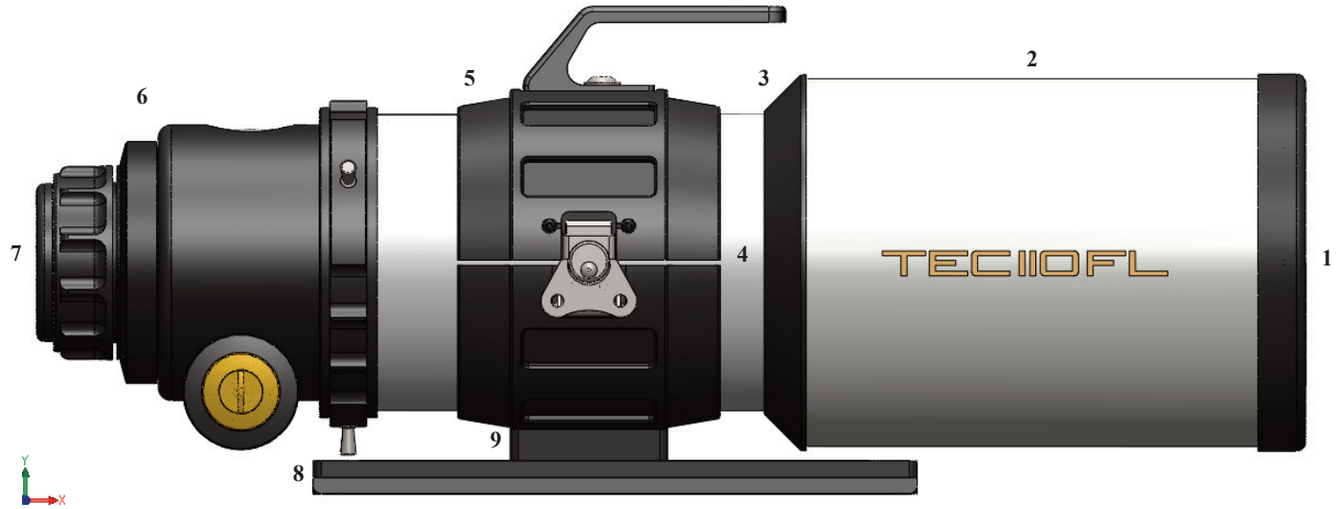
OVERVIEW

The APO110 Fluorite is TEC’s smallest model, it was designed with customer input in mind and many aspects of it’s design were discussed on tec-scopes yahoo group since April 2009: http://tech.groups.yahoo.com/group/tec-scopes

As a result we have designed a very compact, relatively fast F/5.6 telescope that could be used for both visual observations and wide field imaging.

Scope also has number of features that in given combination are rarely found in one scope:
• Compact, lightweight tube assembly with retractable baffle and shell type ring with handle for GG action (“grab and go”)
• Case for telescope has “carry-on” dimensions for most airlines (since these dimensions could change, please double check weight/dimensional limitation prior to your flight).
•Telescope objective being “oiled triplet” by design transmits more light than any other objective in it’s class, thanks to the use of CaF2 as a middle lens and modern BBAR coatings on outer surfaces.
• Precision rotatable focuser with coarse and fine focusing, with 2”eyepiece holder.
• The focuser features a specially designed collet made of metal wich is insensitive to temperature and holds loads with high precision when concentricity of focuser tube and axis of the eyepiece or camera attained automatically by definition.
• All components of the telescope, including: mechanical parts, optics, coatings, etc. are made in our shop in Golden, Colorado.

GETTING TO KNOW YOUR TELESCOPE

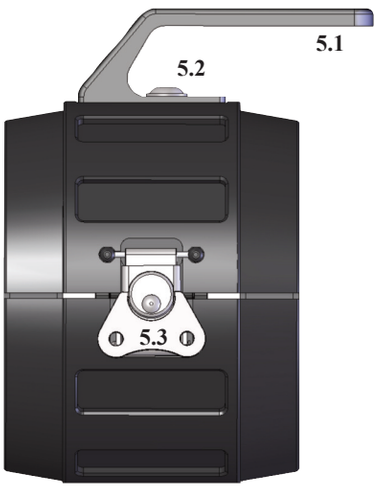


PARTS AND THEIR FUNCTIONS ARE IDENTIFIED AND DESCRIBED BELOW:

1 - Front Cover. Made of anodized black aluminum. It has TEC logo in the center.
2 - Retractable Sliding Baffle. This feature makes the OTA shorter for handling and transportation. Open end of the baffle is rounded to improve aerodynamics of the front end of telescope.
3 - Baffle flange. It holds the baffle with four 2-56 Button Head Screws
4 - Tube assembly (OTA). The tube interior is coated with special light absorbent coating and has two sharp edge diaphragms, which block internal reflections.
5 - Clamshell ring with handle (see separate description).
6 - Focuser (see separate description).
7 - Plug. It is a small part to keep the focuser end closed when not in use. It also has TEC logo.
8 - TEC 9" narrow dovetail plate (fits Losmandy style saddle plates).
9 - Plate clearance adapter - gives clearance for the sliding baffle to detracted position.

CLAMSHELL RING

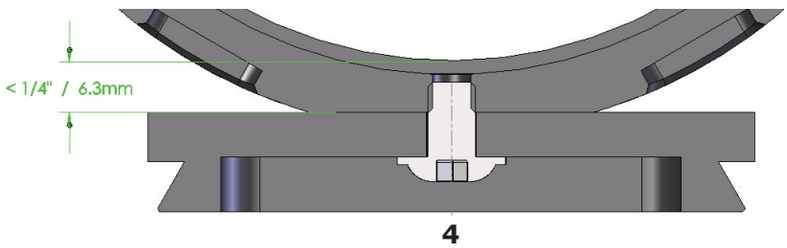
Clamshell contains upper and lower semi-round parts, handle (5.1), latch (5.3), hinge (5.4).



Handle can be removed by unscrewing the flanged screw (5.2) with 5/32" hex key.
To remove OTA from the clamshell ring, lift the latch wing up, make half counter clockwise turn, disengage latch upper end from the small pin and open clamshell.

The hole pattern of the bottom has two 1/4-20 (5.5) (5.6) and one 3/8-16 threaded hole (5.7) these are standard threads for photo tripods. 1/4" holes are 48mm apart.

PLEASE NOTE, that maximum screw length allowed to go into the clamshell bottom must be 1/4" or shorter to avoid touching the OTA.



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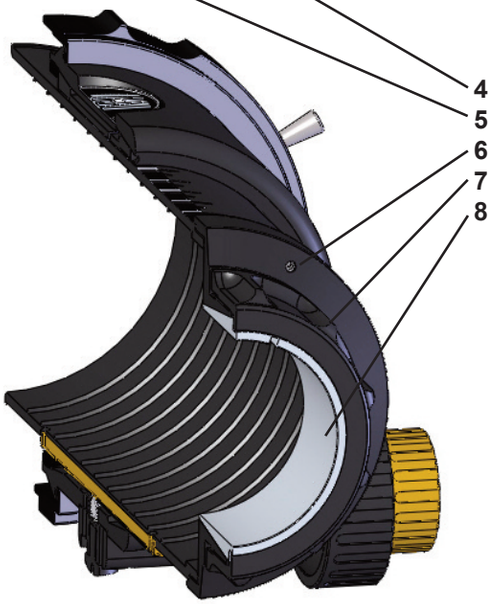
TEC 110FL FOCUSER

The APO110FL dimensions asked for a focuser that would fit OTA in good proportion and be large enough to avoid vignetting for wide field imaging.

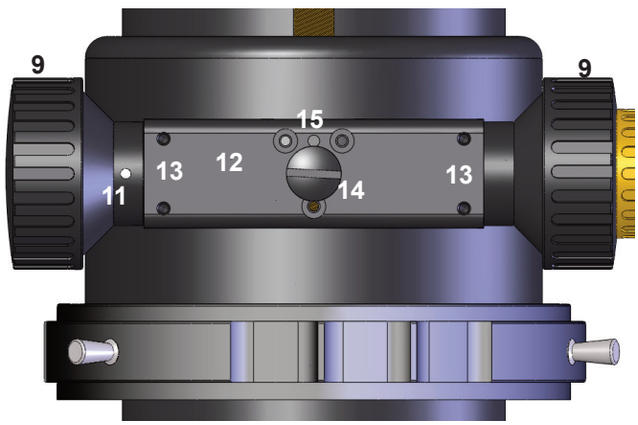
The focuser has been designed and made in our shop - it is entirely a TEC focuser. While similar in appearance to other focusers on the market, it has a few special features that were required for today's imaging:

• It is all metal 2" collet type holder; being all metal it does not change holding force under colder temperatures and would not be damaged from sun heat exposure either.
• Holding capacity (axial load) of TEC collet itself is over 5 times the telescope weight - thanks to special design of the collet. Compared to traditional thumb screw holders the collet type holder keeps item's axis strictly concentric to focuser axis by definition.
• Focuser draw tube is held in the focuser housing all the way around that also makes the axis of draw tube strictly concentric to the optical axis of the telescope. Holding draw tube in such a way makes focuser more robust, it has virtually no play under radial load, 7lb weight shifts fully extended draw tube for less than 20mk.
• The F5.6 ratio required finer focusing compared to our typical F7 telescopes since permitted defocusing is two times less. The planetary mechanism ratio is 1:10 and one turn of the fine focusing knob moves focuser tube 1.8mm.
• The TEC focuser is "dry" - no oiling is required on the draw tube - this will keep focuser draw tube free from dirt.



FOCUSER PARTS

1. Focuser locking collar with 3 pegs
2. TEC logo
3. Focuser housing
4. Focuser draw tube
5. Draw tube end cap
6. End cap locking screws (3X)
7. Collet locking nut
8. Collet sleeve
9. Coarse focus knobs (CFK)
10. Fine focus knob (FFK)
10.1 Fine Focus Lock knob (FFLK)
11. Right knob set screw
12. Pinion shaft housing
13. Pinion shaft housing threaded holes (4X)
14. Pinion housing plastic screw
15. Pinion housing screws (3X).



FOCUSER PARTS DESCRIPTION

Focuser locking collar (1) connected to the OTA flange (not shown) and holds focuser on the end of telescope. Loosening it will allow you to rotate the focuser to any position.

NOTE: The focuser can be completely removed by unscrewing the locking collar completely and then pulling the focuser from the OTA flange. This should only be done in rare special circumstances. Please contact TEC before removing focuser for any reason.

Focuser draw tube (4) has laser engraved mm scale, inside it is painted with flat black paint and has number of knife-edge baffles to reduce internal reflections at low angles.
Draw tube end cap (5) with Collet locking nut ((7) and Collet sleeve (8) are assembled as one unit. This unit can be removed by loosening three 6-32 set screws (6) and unscrewing it completely. The Field Flattener for wide field imaging could then be screwed onto the focuser draw tube end.

The Collet sleeve is made of Aluminum, its surface is tumbled and left un-anodized to avoid scratching the barrel of eyepiece or other equipment, also coefficient of friction of unanodized aluminum is higher than for anodized aluminum.

NOTE: keep the Collet locking nut tightened at all times to avoid droping /damaging your equipment!

Coarse focusing knobs (9), here and further CFK and Fine focusing knob (10), FFK have special shape slots cuts around of cylindrical surface for better tactile feeling during focusing.
Left focusing knob can be removed by loosening set screw (11), a Robofocus or other brand of electrical motors can be installed instead, use 4-40 threaded holes (13) for motor bracket installation.
Please note: the pinion shaft diameter is 1/4”.

The movement and feel of the CFK (9) and FFK (10) is preset by TEC before shipping; however, the "Feel" may be adjusted to your liking. By increasing the friction between the CFKand FFK the load carrying and holding ca pacity will also be increased.
To increase the friction felt and increase the load carrying capacity, first, using your left hand, grip the FFK, then with your right hand, loosen the Fine Focus Lock Knob, FFLK (10.1) by turning it counterclockwise. Next, while holding the CFK, turn the FFK by approximately 10 degrees clockwise (about 1/2 the angle between two slotted cuts on the course focus knob). Finish by resetting the FFLK by gripping the FFK and turn in the FFLK clockwise and tighten it.
Please note, the steps to loosen up the "feel" is the same as above with the exception of turning the FFK 5-10 degrees counterclockwise. Please note, while giving a looser feel, this will reduce the load capacity and holding capacity of the focuser, particularly pointing at the zenith. Moreover, the holding capacity of the focuser can be increased up to full lock-up if needed.

Pinion shaft housing (12) attached to the focuser housing (3) with 4-40 socket head cup screws (15).
Position of the pinion housing with pinion shaft relatively to the rack (installed on the focuser draw tube), is precisely adjusted by TEC during assembly. Please avoid unscrewing these screws.
Pinion housing plastic screw (14) covers 1/4”-20 threaded hole, the purpose of this hole will be described ahead.

The Focuser housing (3) also has two 8-32 threaded holes for finder base installation (these holes are on the left from TEC logo) not shown on given sketch. If finder base is to be installed on the focuser housing, make sure the screws being used are of correct length to avoid scratching/damaging internal parts of the focuser housing.

Please contact TEC if you have question about the length of the finder base screws.

WARNING:

Do not ever try to disassemble the focuser for any reason, it can not be done without proper tools and without knowing its internal structure. Attempt to disassemble focuser may end with focuser parts damage and loosing warrantee. Contact TEC if you have any issues or question about the focuser.

ACCESSORIES

TEC FINDERSCOPE BRACKET

The Finderscope Bracket showb on the left was designed to hold 50mm or 60mm optical finders. TEC finder bracket re quires only two thumb screws for alignment! It looks and works more elegant comparing to traditional finder brackets. A theaded insert must be installed into the finder body to use it with TEC finder bracket (that is done by TEC at no charge).

USING RED DOT SIGHT

A Red Dot sight of most brands could be used as an alternative finder for APO110FL.

A small RD sight bar is required to be installed on the Clamshell Ring Handle as shown on the right.

CLEANING AND HANDLING YOUR TELESCOPE

The tube assembly and front baffle are powder coated; to clean them use water with soap or mineral spirits (paint thinner); do not use Acetone or any other strong chemicals. Please contact us if you need the lens to be cleaned.

Handling the telescope around and it's transportation to the observing site requires careful handling. We recommend to keep the telescope in the case when it is not in use.

If you find any problems, or have any comments - please call us for assistance. Telescope Engineering Company is commited to serving it's customers after sale for unlimited time. See the info on the second page of this manual.

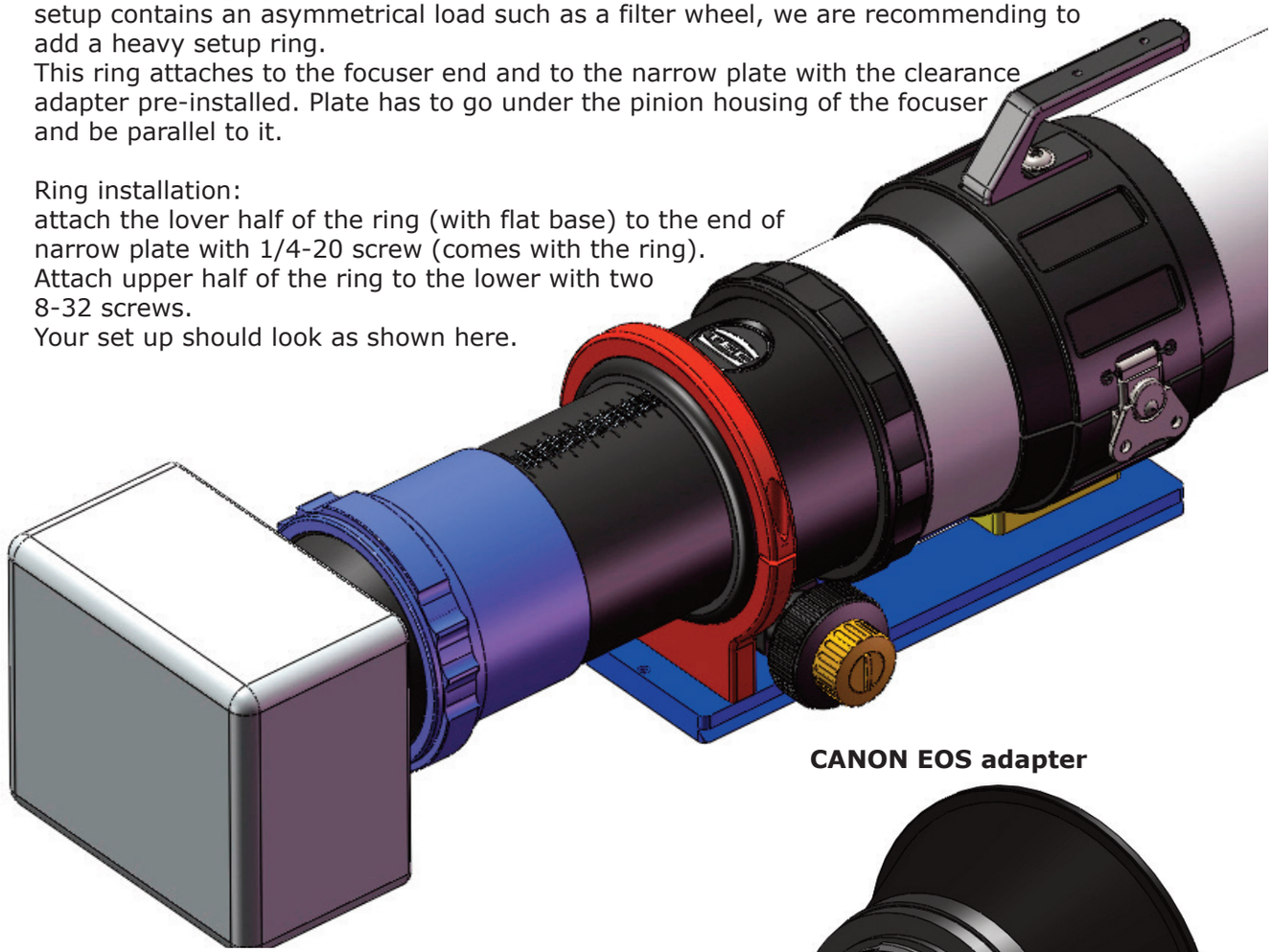
Remember - your feedback makes our telescopes better.

Yuri Petrunin, TEC President

IMAGING SETUP

When your imaging equipment weights more than telescope >10lb, or weights even less, but when setup contains an asymmetrical load such as a filter wheel, we are recommending to add a heavy setup ring.
This ring attaches to the focuser end and to the narrow plate with the clearance adapter pre-installed. Plate has to go under the pinion housing of the focuser and be parallel to it.

Ring installation:
attach the lover half of the ring (with flat base) to the end of narrow plate with 1/4-20 screw (comes with the ring).
Attach upper half of the ring to the lower with two 8-32 screws.
Your set up should look as shown here.



CANON EOS adapter

Field Flattener Back Focus position (85mm)