INSTRUCTION MANUAL

ESPRIT 150 ED Super APO



Sky-Watcher®
Be amazed.

ES150-F-141120V2-EN

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Introduction

The spirit of perfection, by Sky-Watcher

Designed with the discerning astronomer in mind, Sky-Watcher top-of-the-line Esprit refractors deliver the kind of imaging performance one would expect from telescopes costing much more. With their three-element air spaced objective lens design, false color is completely eliminated, yielding exceptional contrast and sharpness.

The 3" CNC machined 1:11 rotatable dual speed linear power focuser provides a smooth, rock-solid focusing with zero image shifts. The Esprit ED 150mm refractor comes with a 9 x 50 right angle finder scope, 2-inch Star diagonal, D-style dovetail, retractable dew cap and padded case. Everything you need to get out under the stars.

The 2-element thread-on 48mm field flattener guarantees excellent field flatness across the entire 44 mm imaging plane. Its oversized lenses ensure a larger and clearer aperture and also extremely minimized halation.

Quick overview:



- 150 mm apochromatic, 3-element refractor
- 1050 mm (f/7)
- Metallic high-transmission lens coatings
- 3" CNC machined 1:11 dual-speed focuser
- Zero color fringing even on bright objects
- 44 mm image circle
- Knife-edge Baffled Optical System
- 2" Diagonal with dielectric coatings
- 9x50 erect-image 90° finder scope
- Tube rings with dovetail D (Losmandy style) bar
- Aluminum foam lined case
- Full frame corrected focal plane
- Thread-on field flattener



- 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.

Getting started

Parts description



1. Retractable dew cap
2. Tube rings
3. D (Losmandy) dovetail bar
4. 9x50 erect-image 90° finder scope
5. 3" 1:11 dual-speed focuser
6. 2" dielectric diagonal
7. 2" eyepiece f= 28mm

Unpacking the telescope

Your telescope is inside the sturdy aluminum padded case*, designed to securely carry the telescope and the tube rings. The case contains and protects the telescope and its accessories. Once open you will find, alongside the telescope with dew cap retracted:



1. The 9x50 erect-image finder scope with tube rings and mount.
2. The 2" (50.8mm) diagonal.
3. The 2-element thread-on field flattener (used for photography only), guarantees excellent field flatness across the entire 44 mm imaging plane, allowing picturing the sky with large sensors.
4. Field flattener extender tube for DSLR camera, used to place the camera exactly on the corrected focal plane.

> The field flattener extender tube for DSLR may be in one solid piece or two pieces screwed together, depending on the dealer's country. Please refer to page 7 for further information.

5. 2" eyepiece, f= 28mm.
6. Thread-on field flattener adaptor, used to install the field flattener on the focuser's drawtube.

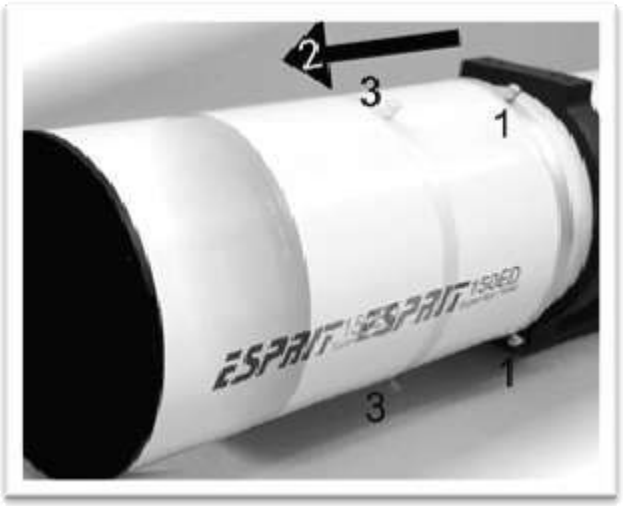
Some parts may be optional, depending on the dealer's country.
Please check with him if any doubt.

* Sky-Watcher offers this product with the best available quality in accordance with the legislation of the local market. This can lead to small differences over time and depending on the area of sale in the world. These differences do not influence the overall quality which is of the high standard guaranteed by Sky-Watcher worldwide.

Preparing the telescope for an observation



A. Upon delivery, and when not used, the telescope and its accessories are inside the aluminum padded case (*note: the case may be different from the picture, depending on your dealer's country*). Unpack the telescope and assemble it to your mount using the included D (Losmandy style) dovetail bar. Please refer to your mount manual to properly install the telescope.



B. To extend the dew cap unscrew the two screws on the aluminum ring **(1)**, then gentle pull the dew cap forward **(2)**. When in position, tighten the two screws to ensure the dew cap stays in position **(3)**.



C. The 9x50 erect-image 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 into the field of telescope (see also "*Aligning the finder scope*" chapter, on next page)

To install the finder scope on the telescope insert the positive dovetail of the finder scope support inside the negative dovetail mounted on the focuser, as shown in picture.

Cooling the telescope

Telescopes require time to cool down to outside air temperature. This may take longer if there is a big difference between the temperature of the telescope and the outside air. This minimizes heat wave distortion inside telescope tube (tube currents). Your telescope would require at least 30 minutes cooling off to outside conditions. Tip: use this time for planning your session and mount accessories.

Aligning the finder scope

The 9x50 erect-image 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, sight on an object that is at least 500 meters (or yards) away. Loosen the locking ring by unscrewing it back towards the bracket. The front lens holder can now be turned in and out to focus. When focus is reached, lock it in position with the locking ring



Choose a distant object that is at least 500 meters (or yards) away and point the main telescope at the object. Adjust the telescope so that the object is in the center of the view in your eyepiece.



If you are using the star diagonal the image will be left/right inverted, like images in a mirror.



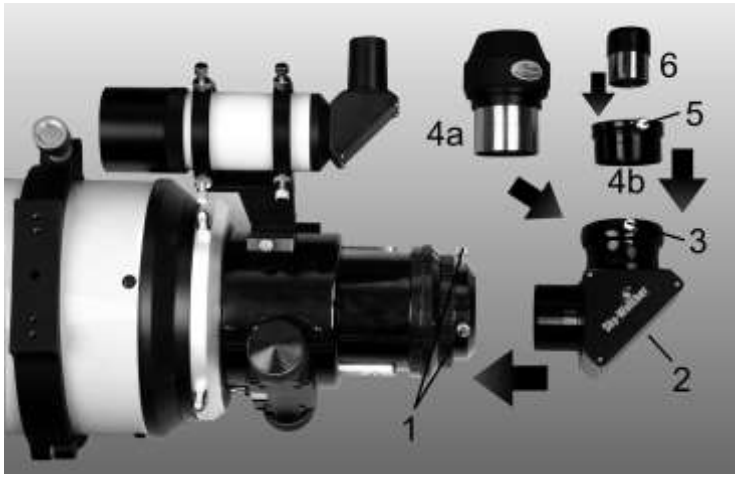
Having an erected image, the view you have in the finder scope has the same orientation as the landscape.

Check the finder scope to see if the object, centered in the main telescope view, is centered on the crosshairs. If not unscrew the three blocking rings on the rear ring, then adjust the three small screws to center the finder scope.

Do not over tighten the screws when aligning the finder scope. When the finder scope is correctly oriented, screw the three blocking rings in position.

Using the telescope for visual observation

Inserting the eyepiece



- Loosen the two thumbscrews **(1)** on the end of the focuser tube.
- Insert the 2" diagonal **(2)** into the focus tube and re-tighten the thumbscrews **(1)** to hold the diagonal in place.
- Loosen the diagonal's screw **(3)**.
- For 2" eyepieces **(4a)**, insert it into the diagonal and secure it by re-tightening the thumbscrew **(3)**.
- For 1.25" eyepieces first insert the 2" to 1.25" adapter **(4b)** into the diagonal and secure by re-tightening the screw **(3)**. Loosen the adapter's screw **(5)** and insert the 1.25" eyepiece **(6)** inside the adapter ring, then secure it by re-tightening the screw **(5)**.

Focusing



- Make sure the locking lever below the focuser **(1)** is unlocked (position as shown in picture).
- Slowly turn the focus knobs **(2)** one way or the other, until the image in the eyepiece is nearly sharp.
- To finely focus the image turn the 1:11 knob one way or the other until the image is perfectly sharp **(3)**.
- Lock the screw below the focuser **(1)** if a heavy load is attached (pull the lever at 90°).

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.



When looking through a diagonal, the image is inverted left to right, as an image in a mirror. This is normal and has no incidence for astronomical observations.

If you plan to do terrestrial observation often, like bird watching, optional image-erecting devices such as the Amici prism or the erected 90° diagonal may be the right tool.

Your reseller will be glad to advise you about the best optional part that can be used with your telescope.

Using the telescope for prime focus imaging



Before installing the field flattener onto the drawtube of the focuser, the 2" ring adaptor **(2)** needs to be unscrewed and removed.

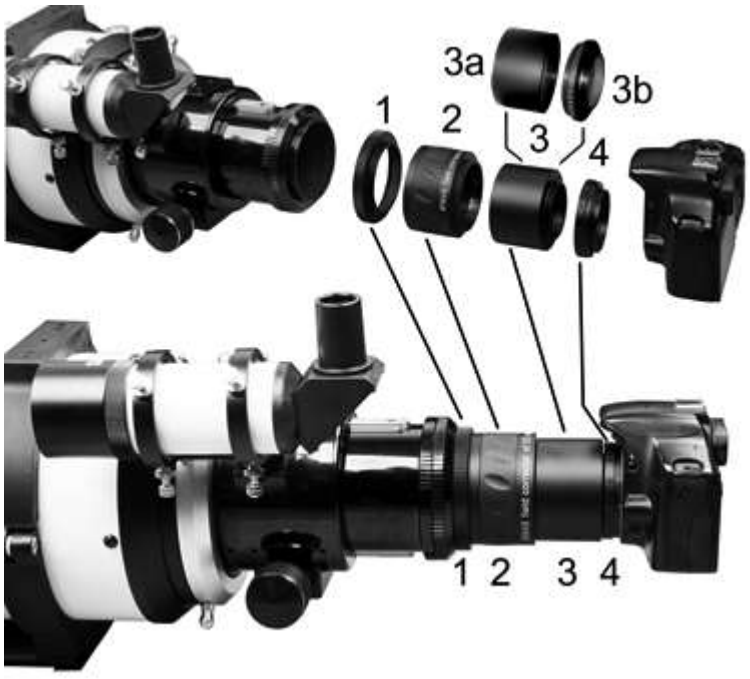
In order to easily unscrew the ring, hold with one hand the ring **(1)** at the end of the drawtube and then unscrew the 2" ring adaptor **(2)** with the other hand.

The Sky-Watcher ESPRIT 150 Field flattener has been specifically designed for your telescope. It guarantees excellent field flatness across the entire 44 mm imaging plane and ensures full illumination with extremely minimized halation and zero color fringing even on bright objects.

No "universal" field flattener available on the market will deliver the premium results achieved with the Sky-Watcher ESPRIT 150 Field flattener.

The Sky-Watcher ESPRIT 150 Field flattener **is not compatible with other telescopes**, even refractors with the same aperture and same focal length.

Installing the field flattener and a DSLR (Digital Single-Lens Reflex) camera



1. Screw the drawtube adaptor **(1)** at the end of the focus tube.
2. Screw the field flattener **(2)** onto the drawtube adaptor **(1)**.
3. Screw the extender tube **(3)** onto the field flattener **(2)**.

If your extender tube has two parts screwed together (3a+3b), please check the two parts are secured tight before inserting them in the optical train.

4. Screw the enlarged 48mm T-Ring **(4)** onto the extender tube **(3)**.
5. Install your DSLR camera on the 48mm enlarged T-Ring **(4)** – **see note below.**

The enlarged 48mm T-Ring **may not be included with your telescope** and should match your DSLR camera's manufacturer and model. Please check with your reseller to get the correct 48mm Enlarged T-Ring for your DSLR camera.



In order to get the premium results the field flattener for ESPRIT 150 can deliver the distance between the last lenses to the sensor should be exactly 100mm. This distance is called the field flattener "back focus".

The rings are designed to provide 100mm of back focus with any DSLR camera. Modifications to this layout, i.e. by adding a radial guider, will lead to blurry stars images in the field edges.

Installing a 48mm filter inside the focal extender

A 48mm (2") filter can be mounted inside the DSLR extender tube if needed. By example using a light pollution reducer filter may allow pictures of the night sky even in suburban areas.

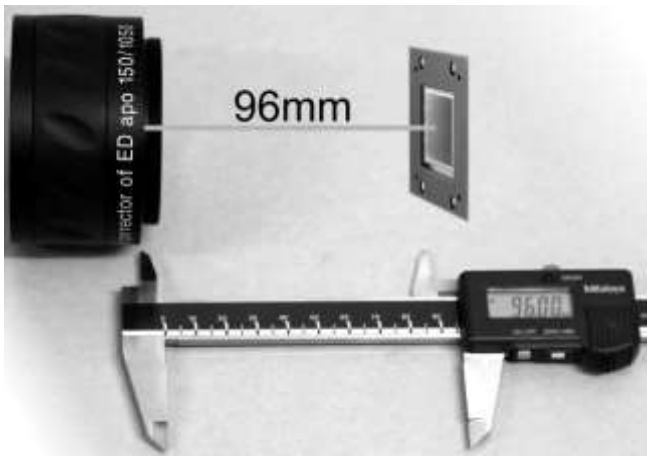
Single part Extender	
	Inside the focal extender a 48mm thread receive any 48mm (2") filter. Insert the filter and screw it on the thread. Do not over tight the filter. Use a tissue when screwing the filter to avoid fingerprints.

2 parts Extender	
	Please unscrew the two parts of the Extender. Insert the filter inside the 48mm inner thread of the second part. Do not over tight the filter. Reassemble the 2 parts.

Installing the field flattener and a CCD (Charge-Coupled Device) camera

CCD cameras differ from one model to another by the threads used and the body-to-sensor distance. Accessories also have different possible threads and depths, thus the combination of a CCD camera and its accessories can have any total length and any coupling thread. A custom coupling ring is needed in order to assemble the CCD camera and its accessories (called the "optical train") to the telescope's field flattener. The custom ring should be machined† to have:

1) A female M62x1 thread, to screw and secure the ring to the field flattener exit.
2) A thread compatible with the first component of the optical train.
3) A length to ensure that the distance **from the last lenses** of the field flattener **to the CCD sensor** is exactly 100mm.



As it can be difficult to evaluate the position of the field flattener lenses inside the frame, the distance can be more conveniently measured from the lenses mount edge, as shown in the picture on the left.

From there to the sensor, the correct distance should be exactly 96mm.

Most CCD cameras have also the distance from their body thread to CCD sensor noted in the manual, thus evaluating the length of the custom ring you need can be precisely evaluated.

† Refer to your local dealer about custom ring supply.

Installing the field flattener and a CCD camera - continued



1. Screw the drawtube adaptor **(1)** at the end of the focus tube.
2. Screw the field flattener **(2)** onto the drawtube adaptor **(1)**.
3. Screw the custom ring **(3)** onto the field flattener (**2**).

> The custom ring needs to be sturdy enough to secure the optical train to the field flattener.

4. Screw your optical train to the custom ring **(3)**.

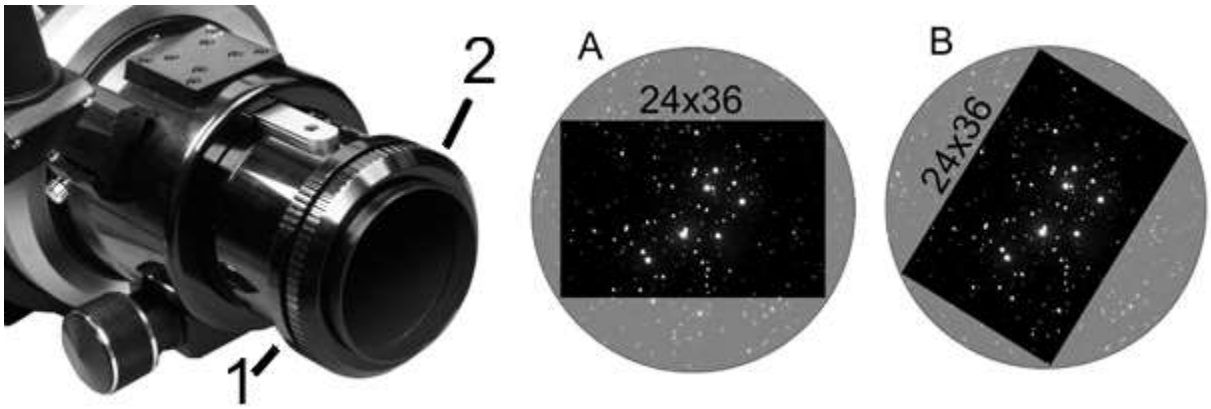
Focusing



- Make sure the locking lever below the focuser **(1)** is unlocked (position as shown in picture).
- Slowly turn the focus knobs **(2)** one way or the other, until the image in the eyepiece is nearly sharp.
- To finely focus the image turn the 1:11 knob one way or the other until the image is perfectly sharp **(3)**.
- Lock the screw below the focuser **(1)** if a heavy load is attached (pull the lever at 90°).

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.

Framing the picture



When the object you want to picture is in the middle of the circular 44mm field, most often its orientation on the rectangular camera sensor is not what you expected (figure A). You can easily reframe the picture on the camera sensor by unscrewing the blocking ring **(1)** at the end of the focuser drawtube, then turning the adapter ring **(2)** with all the optical train until the framing suits your needs (figure B). When done screw the ring **(1)** to lock position, and you are ready to picture the sky.

Useful tips for all observations



Removing the finder scope

During an observation, when the desired target is acquired, it is possible to remove the finder scope from its support. When needed the finder scope can be inserted again.

This can be useful when the observer's head is in a position where the finder scope becomes an obstacle to observation.



Using the indexed scale

The indexed scale on the focuser drawtube gives an accurate indication on the focus position for various accessories.

Once the position for one accessory is known it is very easy to approximate the focus position.

Due to the precision needed to reach perfect focus a fine tuning is advised.



Rotating the focuser

The whole focuser body can be rotated. It is useful when the focuser knobs aren't in a convenient position.

1. Remove all accessories from the focuser.
2. Fully retract the drawtube inside the focuser body.
3. Unscrew the "boat wheel" like large aluminum ring.
4. Rotate the focuser body.
5. Tight back the "boat wheel" like large aluminum ring.

Specifications

Telescope specifications

Optical Design	Refractor (air-spaced triplet APO)
Field Flattener	Thread-on (2 lenses)
Aperture (mm)	150 mm (5.9 in)
Focal Length	1050 mm (41 in)
Focal Ratio	7
Finderscope	9x50, erect-image, right-angle
Diagonal	2" dielectric coatings
Tube Rings	With 3" (D Style) dovetail plate
Highest Useful Magnification	354 x
Lowest Useful Magnification	21 x
Limiting Stellar Magnitude	13.4
Resolution (Rayleigh)	0.93 arc seconds
Resolution (Dawes)	0.77 arc seconds
Light Gathering Power (Compared to Human Eye)	459 x
Optical Coatings	Fully multi-coated
Fully Illuminated Field With Field Flattener	44 mm (1.7 in)
Optical Tube Length (Retracted Dew Cap)	92 cm (36 in)
Optical Tube Weight	15 kg (32 lbs)
Telescope Visual Backfocus[*]	>170mm (6.7 in)
Field Flattener Backfocus[**]	96mm (3.8 in)

Threads specifications

The 2 parts Extender threads



Full DSLR train with single part Extender or with two parts Extender screwed together.



Rings/ Threads	Focuser Tube	Drawtube Adatpor	Field Flattener	DSLRl Ext. Tube	Enlarged T-Ring
In Ø	n/a	M74x1 F.	M65x1 F.	M62x1 F.	M48x0.75 F.
In screw depth	n/a	7 mm	7.5 mm	8.5 mm	variable
Out Ø	M74 x1 M	M65x1 M.	M62x1 M.	M48x0.75 M	Camera
Out screw depth	6 mm	6 mm	6 mm	6 mm	n/a

[*] The visual back focus of the telescope is the distance from the end of the focuser tube (with 2'' adapter installed) to the focal plane. This means, all accessories needing 170mm back focus or less can be installed.

[**] The back focus of the field flattener is the distance from the back of the field flattener (flat surface at the exit) to the focal plane. To obtain flat wide field images, the sensor should be positioned at exactly (+-1mm) this distance. See also detailed explanations on bottom of page 8.

Different releases: The Helinear Focuser

Some of the ESPRIT 150 series are delivered with a different focuser: the *Helinear focuser*.

Focusing with the Helinear focuser



- Unlock the locking screw below the focuser **(1)**.
- Slowly turn the focus knobs **(2)** one way or the other, until the image on the eyepiece or the camera sensor is nearly sharp.
- To finely focus the image turn the 1:11 knob one way or the other until the image is perfectly sharp **(3)**.
- Lock the screw below the focuser **(1)**.

The image usually has to be finely refocused over time, due to small variations caused by temperature changes.

Before doing prime focus imaging

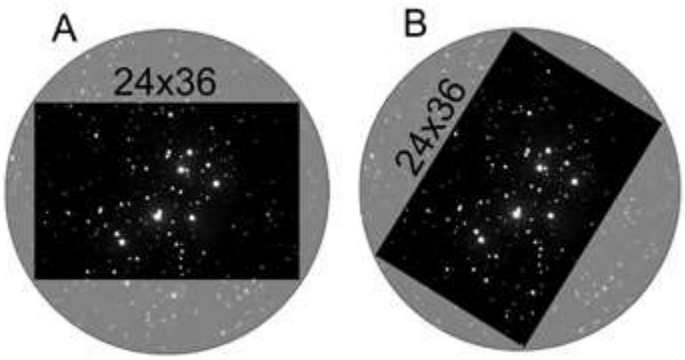


Before installing the field flattener onto the drawtube of the Helinear focuser, the 2" ring adaptor **(2)** needs to be unscrewed and removed.

In order to easily unscrew the ring, the blocking thumbscrew **(1)** at the end of the drawtube needs to be tight to lock the rotating end cap.

Framing a picture with the Helinear focuser





When the object you want to picture is in the middle of the circular 44mm field, most often its orientation on the rectangular camera sensor is not what you expected (figure A). You can easily reframe the picture on the camera sensor by unlocking the thumbscrew at the end of the focuser drawtube and turning all the optical train until the framing suits your needs (figure B). When done relock the thumbscrew, and you are ready to picture the sky.



We want to ensure that your experience with a Sky-Watcher product is the best it can be. To make that happen we have a comprehensive technical and customer support available, alongside with the list of distributors and dealers worldwide, on our worldwide internet site:

http://www.skywatcher.com

Sky-Watcher offers this product with the best available quality in accordance with the legislation of the local market, and reserves the right to modify or discontinue, without prior notice to you, any model or style telescope.