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ESPRIT 100ED:
A Fast, Affordable Astrograph

Sky-Watcher touts its Esprit line as high-end astrograph refractors at a fraction of the usual cost. Does the new 100ED match the hype?

Sky-Watcher Esprit 100ED

U.S. price: $2,499

Available from www.skywatcherusa.com and through dealers worldwide

ALL PHOTOS COURTESY OF THE AUTHOR

IF YOU HAD TO LIVE with just one telescope, what would it be? For me, I'd pick a 4-inch apochromatic refractor. If designed right, an "apo" can serve for both visual observing and deep-sky imaging, yet it's highly portable. We have no shortage of such telescopes on the market.

The latest entry is a new model in the Esprit line of refractors from Sky-Watcher. The Esprit 100ED is advertised as offering image quality equal to refractors selling for twice the price. Indeed, it retails for $2,499, whereas most competitors with similar specs run $4,000 to $6,000. Too good to be true? *S&T* tested a unit on loan from Sky-Watcher Canada to find out.

Looking Through the Esprit

Like other refractors in the series, the Sky-Watcher Esprit 100ED employs a triplet objective with one element made from premium FPL53 extra-low dispersion glass for the pinnacle of color correction. The challenge is the 100ED's fast f/5.5 focal ratio. Compared to slower f/7 and f/8 models, fast apos are tougher to make free of false color and other aberrations.

The Sky-Watcher Esprit 100ED is a fast apochromatic refractor designed for imaging as well as visual use. It promises first-class performance for an affordable price. The tube collapses to a compact 46.5 centimeters (18.3 inches) but has a generous dewcap that extends to yield a total tube length of 64.3 cm.

But my testing shows that Sky-Watcher succeeded. Although the Esprit line, and the 100ED in particular, are sold as *astrographs* — telescopes optimized for photography — the beauty of refractors is that making them great for imaging rarely compromises them for just visual use. By comparison, optimizing reflectors for imaging usually requires oversizing the secondary mirror, which degrades visual contrast and resolution.

The 100ED proved to be a superb visual instrument. Viewed at high power, stars looked "textbook perfect," with little evidence of spherical aberration disturbing their Airy disk patterns, and there was no hint of astigmatism distorting them into ellipses or other odd shapes from malformed or pinched optics.

Using Vega, racking to inside of focus revealed a trace of blue tint on the perimeter of the diffraction pattern, while outside of focus the pattern showed the palest rim of magenta. But when in focus, Vega was colorless with no halo of blue or violet. This is color correction on a par with other premium fast apos I have tested over the years.

Using a 41-mm Tele Vue Panoptic eyepiece to achieve the widest possible field with this telescope, stars looked sharp across the field, distorting only slightly at the very edges. Switching to a high-power 3-mm Radian eyepiece, I tried a popular test for resolution, the "Double Double" star Epsilon Lyrae. Each of its two tight pairs was cleanly split, with tiny Airy disks surrounded by a single diffraction ring and clear dark sky between the component stars. Visual observers will find little to criticize about the Esprit 100ED.

Photographing Through the Esprit

As it is sold in North America, the Esprit 100ED is supplied with a two-element field flattener. This device is not a focal reducer and does not change the f/ratio. The flattener replaces the visual back and has a step-down ring with a standard male T-thread for attaching CCD cameras. Also included is a T-ring adapter for Canon EOS cameras that threads onto this step-down ring. Owners of other camera brands will need to supply their own T-rings. Details on the adapter ring system are found in the telescope's manual, downloadable as a PDF from the Canadian Sky-Watcher site at **tiny.cc/ngdvhx**.

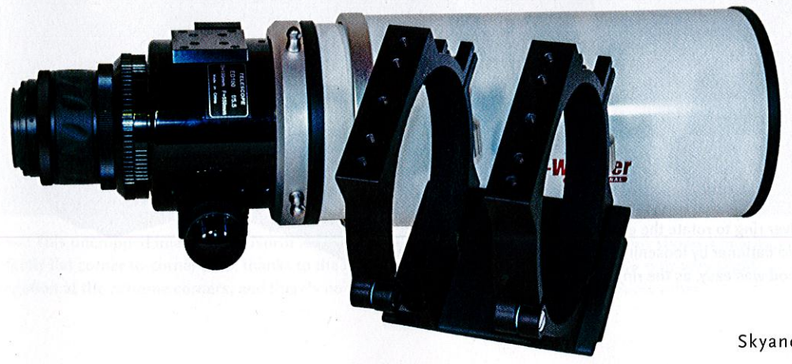
The included 9×50 finderscope is an erect-image, right-angle design. You can focus it by loosening the retaining ring at the front end and then turning the objective.

A word of caution: attaching a camera to the focuser involves three adapter rings plus the field flattener. Lose any one ring and you're out of business!

Images taken with the field flattener and a full-frame Canon 5D Mark II showed round stars across the field, with only very slight distortions in the extreme corners. This performance is as good as with any other telescope/flattener combination I've used.

The outer area of the frame was darkened slightly by vignetting, but no more so than with any fast apo in my

The f/5.5 objective elements are flawlessly multicoated, and the tube has one knife-edge baffle halfway down the tube to eliminate off-axis glare. The focal length as tested was 550 mm (21.7 inches) — just as advertised.



The included tube rings are each drilled with five ¼-20 bolt holes on both their tops and bottoms, making it easy to attach additional plates, rings, or other accessories.

experience. The vignetting was uniform and would be easy to correct with flat-field calibration frames or, as I prefer with raw DSLR files, using *Adobe Camera Raw*'s lens-correction settings.

Handling the Esprit

The tube weighs 7.6 kg (16.8 pounds) with its field flattener, tube rings, and dovetail plate — pretty hefty for a 4-inch telescope. Depending on what weight of camera and guidescope gear you would want to add, I'd suggest at least a medium-duty mount for any astrophotography performed with the Esprit 100ED. In the Sky-Watcher line, the EQ6 or AZ-EQ6 mounts would do the job.

The generously long dewcap is secured with two locking screws, so it won't slide back down the tube with a bang when aimed straight up. The supplied 9×50 finderscope offers decent optical quality, though stars were distorted in the outer half of the field. Its eyepiece provides generous eye relief, which enabled me to view its entire field of view while wearing glasses.

The focuser accepts either a 2-inch visual back for the included star diagonal, or a field flattener with its 48-mm step-down ring and T-ring for a Canon DSLR.

The solid 3-inch focuser combines a helical-cut rack-and-pinion gear on the bottom and a Crayford slider on the top. The top surface (not shown) features a graduated scale for pre-setting the focuser. The little silver lever is the lock.

The finderscope has sturdy rings and six nylon-tipped collimation bolts, which provide solid alignment. The finder's bracket attaches with a standard dovetail shoe secured to the main tube with a single setscrew. I was concerned this might lead to some wobble, but it proved solid and secure. This is important because some imagers will replace the 9×50 finder with a small guidescope in the same rings — and any looseness will be a problem.

Focusing the Esprit

Besides the objective, the telescope's focuser is the most important element in any astrograph. The Esprit line uses what Sky-Watcher calls a "linear power" focuser, a hybrid rack-and-pinion and Crayford design. I found no wobble or image shift with heavy 2-inch eyepieces or a DSLR camera, though I did not weigh it down with massive CCD imagers, filter wheels, and robotic focusers. My impression is that the Esprit line is designed with the DSLR shooter in mind.

The distance from the back of the focuser to the focal plane is 185 mm. But for the flattest field, the critical distance to maintain is the 63-mm spacing from the back surface of the field flattener to the focal plane — optimal for the back focus required by DSLRs and their T-rings. CCD cameras might require a custom-made spacer ring.

The 90 mm of focus travel provided more than enough range to accommodate all of the dozen or so 1¼- and 2-inch eyepieces I tried. But my William Optics binoviewer would not reach focus even with its Barlow lens installed and when used with a 1¼-inch diagonal.

The focuser has an 11:1 dual-speed mechanism, which proved very smooth and precise. There was enough tension so that even the heaviest eyepiece did not cause the focuser to slip when it was unlocked and aimed straight up. Yet it was easy to make fine adjustments. The lock lever did just that — it prevented further movement without introducing any image or focus shift.

My only issue with the Esprit 100ED's design is how it handles camera rotation. You want to easily rotate a camera up to 180° to frame the field, switch from landscape to portrait orientation, or put the camera right-side up after doing a meridian flip with a German equatorial mount. Rotation should be quick and easy, yet it should also lock back down again with no image or focus shift.

This setup offers two rotation points: a large "ship wheel" ring can be loosened, enabling the entire focuser to turn; or the camera and field flattener can turn by loosening two counter-rotating lock rings at the camera end of the focuser. With the former, it was just as easy to unscrew the entire focuser from the tube. But with the latter method, I often found it difficult to loosen the knurled rings.

Both methods risk shifting the focus — not to mention bumping the telescope off target as you wrestle with the locked-up rings. Far preferable is a rotation mechanism using large, glove-friendly setscrews, the method used on Sky-Watcher's larger Esprit 120. The 100-mm model should use the same design.

As best I could determine, this shortfall was the only significant price to pay for getting an astrograph that can indeed compete with the best, but at a substantially lower price. The Esprit 100ED's fast f/5.5 focal ratio is about two-thirds of an f/stop faster than the many f/7-class 4-inch apos on the market, and this gives you shorter exposures.

Overall, I recommend the Esprit 100ED as a superb telescope for all-purpose observing and wide-field imaging. It's a refractor I could happily live with if I had to survive with just one telescope. ✦

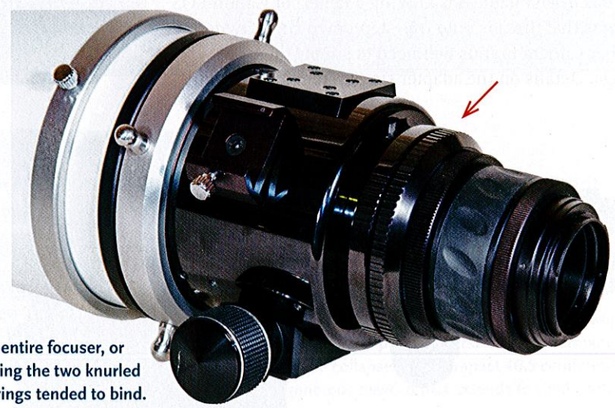
Contributing editor ***Alan Dyer*** *recently retired from 40 years of producing planetarium shows. Follow his continuing astronomical exploits and photo blog at* ***www.amazingsky.net.***

WHAT WE LIKE:

- Superb optical quality for visual use
- Flat field for photography use
- Excellent focuser and fittings
- Sturdy carrying case

WHAT WE DON'T LIKE:

- Awkward camera rotation
- Uses multiple adapter rings



You can loosen the spoked silver ring to rotate the entire focuser, or rotate just the camera and field flattener by loosening the two knurled rings (arrowed). Neither method was easy, as the rings tended to bind.

Above: **This uncropped image of the North America Nebula (left) and Pelican Nebula (right) shows a nearly perfectly flat corner-to-corner field, thanks to the included flattener lens.** ***Inset:*** **Stars show only very slight elongation at the extreme corners, and there's no variation from one side of the frame to the other.**