



Vixen created its 4-inch VSD100F3.8 astrograph with imagers in mind. VIXEN OPTICS

Astronomy tests Vixen's wide-field refractor

The VSD100F3.8 imaging scope is fast, has a flat field, and adds no false color to your photo. **by Tony Hallas**

My first contact with the Vixen VSD100F3.8 astrograph was at the 2013 Advanced Imaging Conference. It wasn't like any other telescope I had seen. The focuser alone was an eye-catcher: a huge, nonrotating helical focuser as wide as the telescope itself. It was built like this to hold massive amounts of weight.

The president of the U.S. distributor for Vixen products, Brian Deis, asked if I'd be interested in trying out a production model the company scheduled for release in early 2014. I immediately pictured this 4-inch telescope, designed to cover the area of an old medium-format camera (6 by 4.5 centimeters), attached to my CCD camera. What would the results be like?



Vixen includes a high-quality engraved vernier scale to allow pinpoint focusing. TONY HALLAS

Quality assessment

In March, the Vixen VSD100F3.8 arrived. While waiting for it, I had ordered a custom interface for my CCD camera. When I connected this adapter, the camera fit directly and firmly to the back of the telescope. I attached this assembly, in tandem with a 70mm guide scope, on my mount in a side-by-side configuration.

First light was from my observatory in Foresthill, California, and immediately the quality of the focuser struck me. It was tight, smooth, and capable of making the tiny corrections needed for f/3.8 optics. At such a fast f/ratio, the tolerance for focus is something like one-fifth the diameter of a human hair! But I could see easily when the focus was razor sharp.

Once I was satisfied with focus, I took a 10-minute unguided test exposure. I didn't guide because this scope's focal length is only 380mm. And I didn't need to. The stars looked excellent from the corners to the center of the image, an even more amazing feat given the size of the CCD chip (40mm square).

The VSD100F3.8 that Vixen shipped me arrived in perfect collimation. If, for some reason, your images display an unfocused corner due to lack of flatness somewhere in your system, the company has made changing the coupling angle easy. Just adjust the set screws at the back of the telescope.

The telescope achieves a high level of performance because the objective contains

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PRODUCT INFORMATION

Vixen VSD100F3.8

Type: 4-inch apochromatic refractor
Optical design: Five-element front lens
Focal length: 380 millimeters
Focal ratio: f/3.8
Length: 19.6 inches (497mm)
Weight: 9.9 pounds (4.5 kilograms)
Price: \$6,299
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five elements, including one each of ultra-high-quality (and high-cost) super-low dispersion and extra-low dispersion glass. The company produces all five elements by a precision annealing process to ensure uniform refractivity. Each then receives high-end coatings, which permit 99.9 percent light transmission and help achieve a superb level of color correction. This design forms an imaging circle 70mm in diameter.

Further impressive points

When I finally put the VSD100F3.8 under the stars to capture enough data for a full-fledged astroimage, I found it to be quite tolerant of temperature shifts. During a three-hour imaging run with modestly falling temperatures, I saw no change in the focus. (Note that the telescope had reached equilibrium before I began imaging. I didn't just pull it out of a warm room!)

At f/3.8, exposures were wonderfully short. I took 10-minute ones that captured the equivalent of 45-minute shots at f/8. This adds up. In three hours, I gathered the same amount of exposure that would have taken 13.5 hours at f/8. That means I worked one night instead of three.



Using a custom adapter, the author connected his SBIG STX-16803 CCD camera to Vixen's VSD100F3.8 optical tube assembly with no problems. TONY HALLAS



Using a Santa Barbara Instrument Group STX-16803 CCD camera, the author captured this wide-field image of the Orion and Horsehead nebulae. He stacked seven 15-minute with five 3-minute exposures. TONY HALLAS

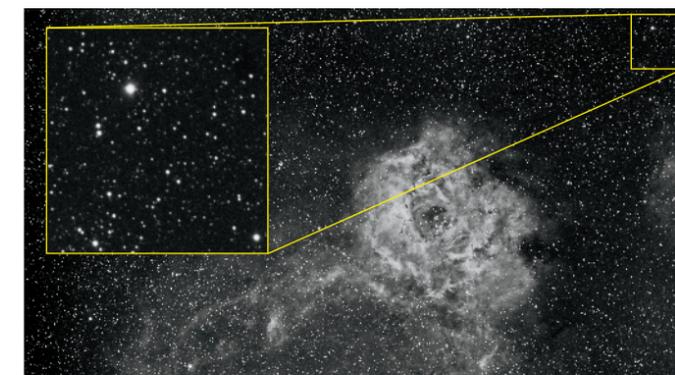
So many scenarios can benefit from this. The weather might be perfect for only one night. Taking short exposures minimizes tracking errors. It also lets you take more exposures so outlier rejection can work at its best. (My February 2011 column at www.Astronomy.com/hallas, "The fine art of dithering," is about outlier rejection.)

I did discover one small issue with the VSD100F3.8. Although it is extremely well color-corrected, showing no blue flaring around stars, the price you pay for blinding f/3.8 speed with a refractor is a tiny focus shift when going toward the red. Meaning, if you focus specifically for your luminance, green, and blue exposures, the red ones will be a tiny fraction out of focus.

This amount is so small that what I did was to first focus the blue, then the red, noting both positions on the focuser. I then used the setting between them. If you are taking Hydrogen-alpha data, which lies in the far-red, you'll definitely need a refocus. Hmm, two focuses to assure great data. Actually, that's not a high price to pay at all.

One awesome scope

The overall workmanship of Vixen's VSD100F3.8 astrograph is superb. It has all the qualities of the ultimate wide-field telescope: blazing-fast f/3.8 optics that produce a totally flat field across a large CCD chip, superb color correction, and terrific light transmission. I highly recommend it. ☺



The author made this image to show the perfect stars he recorded in the extreme corner of his 16803 CCD chip. TONY HALLAS