TMB Optical TMB-80

Thomas M. Back Signature Series

Congratulations on your purchase of our 80mm f/6.3 TMB-80 apochromatic FPL-53 ED triplet refractor. Its truly outstanding optical and mechanical quality will provide you with many years of highly portable observing and imaging enjoyment.

MOUNTING POSSIBILITIES

Your new TMB-80 is usable with many different types of telescope mounts. A suitably sturdy altazimuth mount, such as the Vixen Porta mount, is a good choice for general visual use. The venerable German equatorial mount is also a popular choice, as it can be used for both visual and imaging purposes.

The TMB-80 has a removable L-shaped combined tripod adapter and dovetail mounting shoe. The dovetail is sized and shaped (with slanted sides) to fit the dovetail slot on the head of many equatorial and altazimuth mounts. It will mount without modification directly onto Celestron Advanced Series; Meade LXD-75; and Vixen Great Polaris, Porta, and Sphinx mounts, among others.

In addition, the mounting shoe has two 1/4"-20 thread mounting holes that allow it to be installed on any suitably sturdy camera tripod that has a standard 1/4"-20 thread mounting bolt.

The front hole balances the scope for 1.25" diagonal and eyepiece use with the lens shade extended. The rear hole balances it when a camera or 2" diagonal and eyepieces are mounted. The mounting shoe can also be unbolted, rotated 180° on the scope body, and reinstalled. This will move the balance point further back on the scope body to help balance the TMB-80 if very heavy 2" accessories are used. Cork pads on the underside of the mounting shoe help keep the scope from swiveling when mounted on a tripod.

FOCUSER

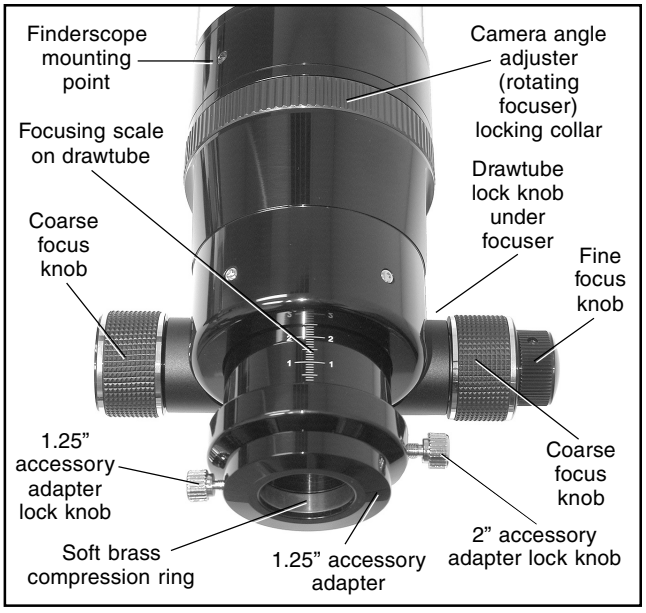
Your TMB-80's backlash-free 2" dual-speed Crayford focuser terminates in a 2" compression ring eyepiece holder. This allows visual use with 2" accessories and imaging with large format CCD cameras. The non-marring soft brass compression ring won't scratch your star diagonal barrel as an ordinary thumbscrew can.

There is also a 2" to 1.25" compression ring adapter for visual use with 1.25" accessories and for imaging with standard format CCD, webcam, and 35mm photo adapters. The barrel of this adapter is threaded to accept standard 2" filters and has a slight taper at the top that engages the compression ring of the 2" adapter. This prevents the 1.25" adapter from slipping out of the focuser should the 2" focuser's thumbscrew accidentally loosen during use.

The precision-made focuser has dual-speed focusing. There are two coarse focusing knobs. The right knob also has a smaller concentric knob with a 11:1 ratio reduction gear for microfine focusing. This provides exceptionally precise image control during high power visual observing or critical film or CCD imaging. The focus knobs have ribbed gripping surfaces so they are easy to operate, even while wearing gloves or mittens in cold weather.

The focuser drawtube has a long 80mm (3.1") travel. It has a scale marked on the top in 1mm increments so you can note individual focuser positions for easy return to the correct focus when switching between visual use and photography. A knob under the focuser lets you lock in your photographic focus.

A built-in camera angle adjuster (focuser rotation system) lets you rotate the focuser a full 360°. This lets you rotate an attached camera to line up in either a landscape or portrait orientation (or any orientation in between) without losing focus. It also lets you put your star diagonal and eyepiece into the most comfortable observing position as you move from one area of the sky to another. Turn the red ribbed ring at the front of the focuser to the left to loosen the focuser, rotate the focuser to the desired orientation, then turn the red ring back to the right to temporarily lock in the focuser's new orientation.



FINDERSCOPE MOUNTING

Your TMB-80 is supplied with an attachment point for a quick-release finder bracket on the upper left front side of the focuser. It has a screwdriver-slotted insert that can be unscrewed to provide a mounting point for any of a number of red dot type non-magnifying finders. Contact your telescope dealer for an appropriate finder if you do not already have one that is suitable.

COOL DOWN TIMES

For any optical system to give its best wavefront (for the sharpest and highest contrast images), the optics must be at or very near the temperature of the surrounding air. The "cool down" time needed to reach ambient temperature varies considerably, as the temperature of the scope must change from a typical 72° Fahrenheit indoor temperature to an outdoor temperature that can range from a high of over 100° down to 10° below zero or less. In small doublet refractors, the cool down (or heat up) time is quick, usually less than 30 minutes. In subfreezing temperatures, it may take a small refractor twice that time or more to reach its best performance. This is particularly true with triplet refractors, where the thermal load of the center lens is isolated from the surrounding air by the lenses on either side of it. This slows the transfer of the center lens heat load to the outside air.

If you'd like to shorten the wait to reach thermal equilibrium, placing the telescope in an unheated garage for an hour or two before observing can speed up the cool down process considerably. Another technique to shorten cool down time is to retract the insulating dew shield to allow direct exposure of the cell and lens to the night air so they can reach thermal equilibrium faster. Once the lens has cooled, extend the dew shield again. This provides a faster cool down time, and generally will still keep the lens from dewing up. Only on the highest dew point nights will the objective lens form dew on its front optical surface.

The best way to avoid dew forming on the lens after you bring the telescope into the house is to take your closed scope case outside when you observe, so it can also reach ambient temperature. When you are finished observing, cap the telescope with its dust caps and place it into the carrying case. Bring it into the house and let it slowly warm back up to room temperature, then remove the dust caps to allow any trace of dew to evaporate. Once the objective is free from dew, replace the dust caps and store the scope away.

CLEANING

The best policy is not to let the lens get dirty and/or dusty in the first place. The regular use of the dust caps is highly recommended. However, no amount of preventative measures will keep your objective from eventually collecting dust and airborne pollutants on the first optical surface. We recommend that you do not clean the objective too often, no matter how frequently the urge to do so may hit you. A few specks of dust on the lens will not be visible in your images, as they are not in the focal plane and don't block enough light to measure, let alone be seen.

Depending on how often you use your scope, and the amount of pollutants in your air, you may have to clean your scope as often as twice a year, but generally no more than that – and preferably no more than once a year. If the front lens surface becomes dusty, smeared, or shows fingerprints or any other surface build-up, and you find it absolutely necessary to clean the lens, use the following cleaning technique.

First, gently blow away any surface dust or particles with a clean air blower (a child's ear syringe or a photographer's camel's hair brush with attached blower bulb, for example). The use of canned or compressed air should be avoided, if possible, as the propellant in the can may spit out and leave difficult-to-remove deposits on your lens. Also, the expanding compressed air drops in temperature as it leaves the can. The cold air coming out of the tiny tube that most compressed air cans use to direct the air flow has been known to chill a lens to the point of spalling chips off the lens if pointed at the same spot on the glass for too long.

If you want, or need, to use compressed air to remove stubborn particles, use a high quality compressed air duster (of the R-134 propellant type). ChemTronics sells a high-quality unit. Do not tip or shake the can. Blow any loose particles off the lens surface using short blasts at an angle to the glass, without getting too close to the lens surface or aiming directly at it.

Next, moisten a ball of USP grade pure cotton with a few drops of a photographic-quality optical cleaning solution designed for multicoated camera and binocular lenses. You can use Formula MC (available from many telescope dealers) or your own mixture of distilled water and a drop or two of mild soap. A well-worn 100% cotton handkerchief also works well and Zeiss and Kodak both make suitable cleaning fluids. Blot the entire surface with the dampened cotton ball or cloth to pick up any stubborn particles and to clean the surface. Exchange the cotton ball and/or turn the cloth frequently so you always have a clean portion of the cotton ball or cloth in contact with the lens.

Use a very small amount of liquid – not so much that the fluid could be wicked between the lenses by capillary action. Do not drip the cleaning fluid directly on the lens. Do not, at any stage, apply hard pressure. Using a fresh piece of cotton or a lint-free white facial tissue, carefully clean the surface of the lens by wiping across in a radial direction. Repeat the process with denatured alcohol, using a blower brush to clean off any dust that may fall on the lens as you are cleaning it.

If you want to take the ultimate step in cleaning, a final rinse with high-grade acetone will clean the surface to new condition. You may notice a few faint streaks from the dried solvent. They will not affect performance, but they can be removed with light pressure and a Q-Tip slightly moistened with a small amount of alcohol or acetone. Finally, a clean air blower bulb can be used to remove any remaining dust.

Avoid overcleaning your scope. The multicoatings on the lens are quite hard and durable. However, frequent overzealous cleaning can scratch the coatings if all the dust particles (which are often tiny flecks of windborne rock) are not removed before you start pushing a damp tissue around the lens surface. Clean your optics only when absolutely necessary. If you take proper care of your scope, cleaning should rarely be needed.

THE STAR TEST

We strive to make the best apochromatic optical systems available. You may find your lens may not test "perfect" during an extended and stringently-graded "star test," particularly if the scope has not fully reached thermal equilibrium before the test. This is not an indication of a poor optic, but is rather due to the test star's complex wavefront of light being changed constantly by our living atmosphere as seeing conditions vary from moment to moment. No optic is perfect, and each will show some error under a detailed and extended star test. The sensitivity of the star test under *perfect* conditions is 1/20th wave P-V on the wavefront for third order aberrations, and 1/60th wave for sharp (fifth order) aberrations. It is highly unlikely that even the most ardent observer can see errors of this small a magnitude on an extended object, even under very good seeing conditions (which is when the atmosphere typically presents a 1/4th wave P-V wavefront to the instrument).

The refractor also presents another factor: the change in spherical aberration with a change in wavelength. This "sphero-chromatism" is found in all refractors. As a lens is tested in the longer (red) wavelengths, the lens becomes "under-corrected." Tested in the shorter wavelengths (blue), the lens becomes "over-corrected." These overlapping corrections at different wavelengths change the star test pattern from perfection.

However, TMB objectives are corrected at the peak visual wavelength centered around 560nm in the green-yellow portion of the visual spectrum. The eye sees over 80% of the visual detail at this wavelength. It is the correction at this visual peak that makes the difference between a merely good objective and a superb one. Our lenses are figured for the best possible wavefront at green-yellow wavelengths, for the sharpest images and highest contrast.

While star tests are interesting and useful, most observers spend their nights enjoying extended and detailed objects, not just examining sharply focused points of light. We feel that the proof of optical excellence is in the observing, not just in the testing.

A FINAL WORD

Thank you for your purchase of our TMB-80. We believe this apochromatic refractor will outperform any other telescope type, inch for inch, and is the most trouble-free telescope that you can buy. Its versatility for visual, photographic, and CCD work is unmatched. With a little care, this fine apochromatic refractor will last you a lifetime. Use it to enjoy the wonders of the night sky!

Tom Back

BRIEF SPECIFICATIONS

Aperture	80mm (3.1")
Focal Length	504mm
Focal Ratio	f/6.3
Objective Type	triplet apochromatic, FPL-53 ED element
Optical coatings	fully multicoated
Resolving Power (Dawes' Limit)	1.45 arc seconds
Visual Limiting Magnitude	12.0
Light Grasp Versus the Eye	131x
Focuser	dual-speed Crayford with 11:1 ratio fine focus; 2" and 1.25" compression ring eyepiece holders; and 360° rotating camera angle adjuster
Focuser Travel	3.1" (80mm)
Tube Diameter	90mm (3.5") o. d.
Tube Length (lens shade retracted)	15.25" (387mm)
Tube Length (lens shade extended)	17.75" (450mm)
Optical Tube Weight	6.5 lbs. (2.95 kg)
Case Dimensions	22.5" x 12.75" x 8"

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