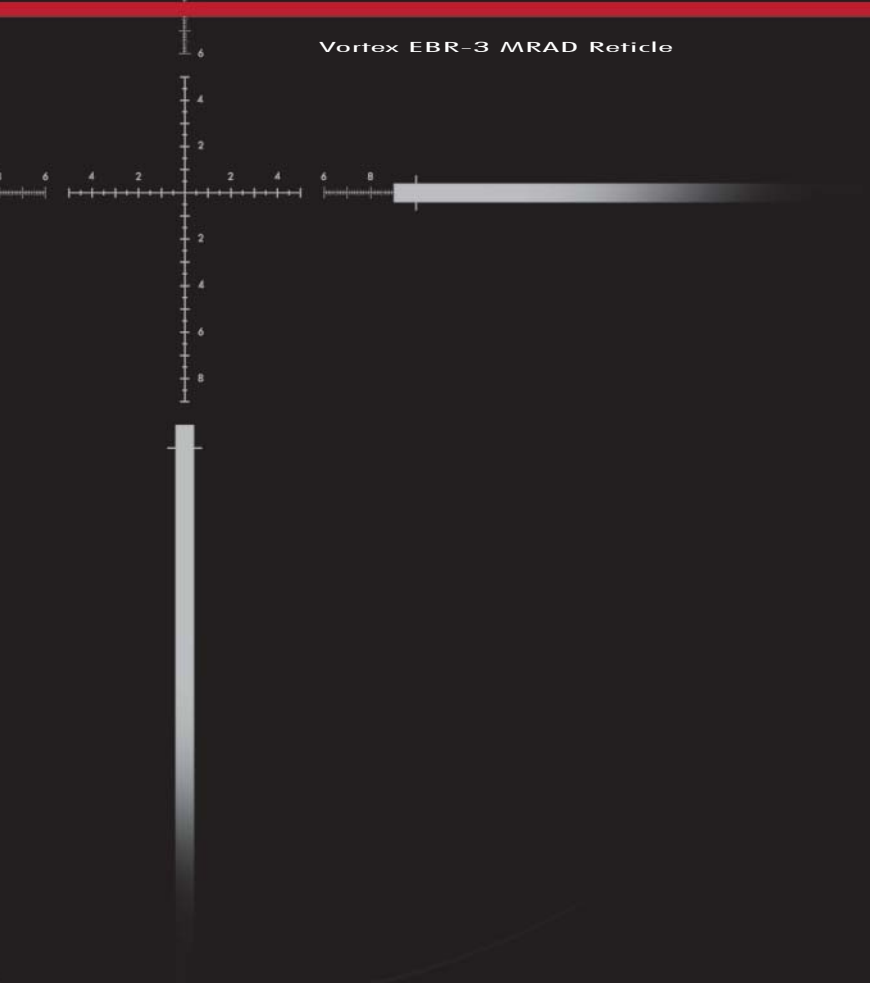
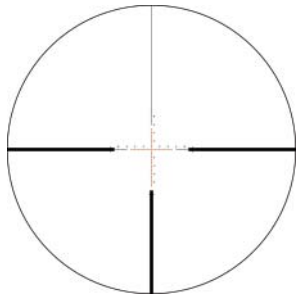
RAZOR HD RIFLESCOPE

Vortex EBR-3 MRAD Reticle



RAZOR HD RIFLESCOPE

Your new Vortex riflescope is equipped with the patented Vortex EBR-3 mrad reticle.



Designed to maximize long distance shooting and ranging abilities, the EBR-3 mrad reticle can be used to effectively determine ranges, holdovers, windage corrections and moving target leads. Ultra precision laser etching on the glass reticle ensures that mrad specifications can be kept to the tightest tolerances possible. The fine center crosshair subtensions on the EBR-3 mrad reticle were carefully chosen to provide the optimum balance between precision aiming and low light visibility.

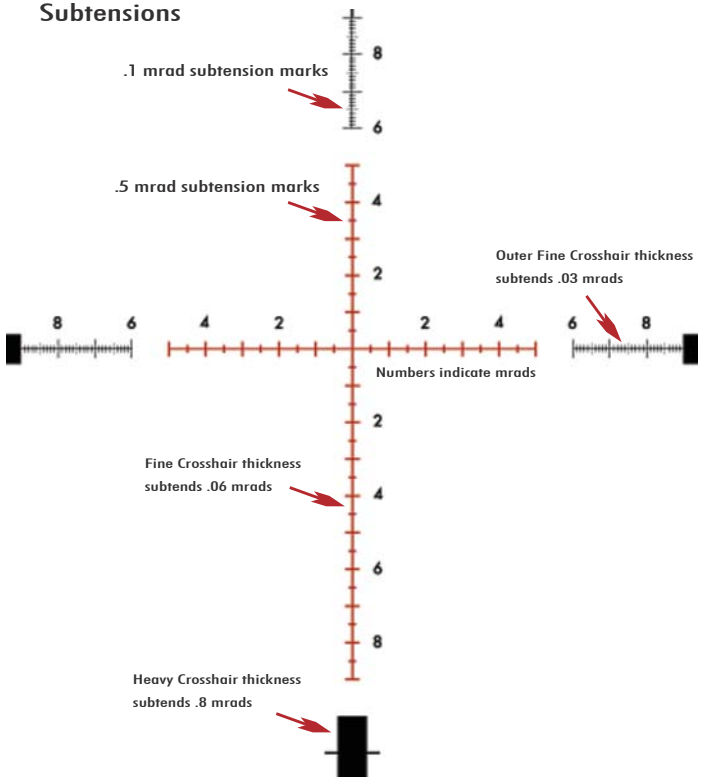
MRAD Subtensions

The EBR-3 mrad reticle is based on the milliradian (or mrad for short), a form of angular measurement. This measurement is similar in concept to a degree although much finer. A degree is 1/360th of a circle; a milliradian is 1/6283th of a circle.

Most shooters are familiar with the minute-of-angle (MOA) system commonly used in hunting riflescopes. MOA measurements are based on degrees and minutes: 360 degrees in a circle, 60 minutes in a degree for a total of 21,600 minutes. When comparing MOAs and mrads, 3.44 MOAs is equal to 1 mrad. These angular measurements are used for ranging and to correct for bullet trajectory drop in riflescopes.

Both mrad and MOA measurements are effective for ranging and bullet trajectory drop compensation in reticle designs. However, the mrad method used in the EBR-3 mrad has some important advantages over an MOA method. The primary benefit is that once learned, it is much simpler and faster to use. The mrad system will also be very easy for shooters familiar with the metric system and for those shooters with previous training in using mil dot reticles.

Subtensions



When used in a first focal plane Vortex Razor HD riflescope, the EBR-3 reticle mrad subtensions listed in this manual are valid at all magnification levels. This means the shooter can use the magnification level most appropriate for the situation and still have effective holdover and windage reference marks.

Ranging

The EBR-3 mrad reticle is very effective for ranging using simple formulas.

Mrad Ranging Formulas

$$\frac{\text{Target Size (Yards)} \times 1000}{\text{mrads Read}} = \text{Range (Yards)}$$

$$\frac{\text{Target Size (Meters)} \times 1000}{\text{mrads Read}} = \text{Range (Meters)}$$

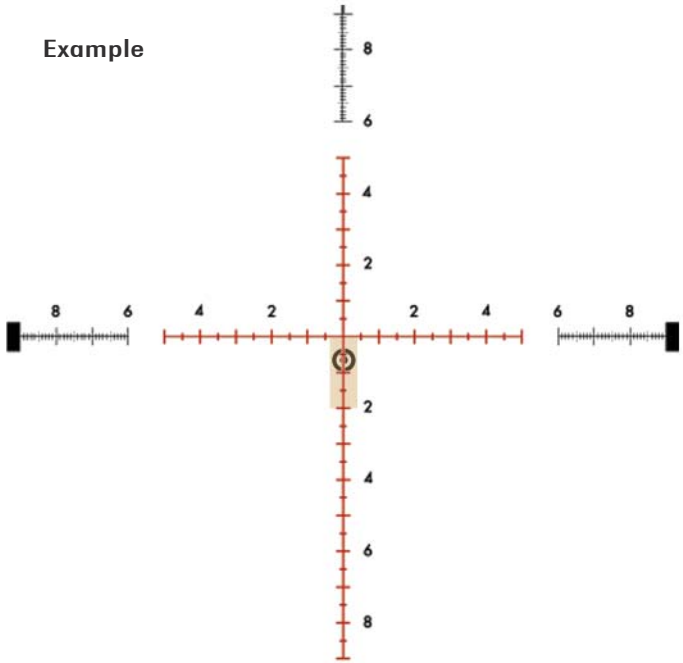
$$\frac{\text{Target Size (Inches)} \times 27.8}{\text{mrads Read}} = \text{Range (yards)}$$

To use these formulas, it will be necessary to know the measured size of the target or a nearby object. Using either the vertical or horizontal mrad scale, place the reticle on the target of known measurement and read the number of mrads spanned. Maximum accuracy in ranging will be obtained by calculating exact mrad measurements—mrads should be estimated in 1/10s if possible.

To help calculate 1/10s of mrads, the EBR-3 mrad reticle uses .5 mrad graduations on the inner portion of the crosshair and .1 mrad graduations on the fine outer scale. The inner crosshair line thickness subtends .06 mrads and the coarse outer crosshairs subtend .8 mrads. Fine outer scale lines subtend .03 mrads.

Accurate measuring will depend on a very steady hold. The rifle should be solidly braced using a rest, bipod or sling when measuring. Once you have an accurate mrad reading, use the any of the ranging formulas to calculate distance.

Example



Ranging a target stand that is one meter tall at 2 mrads to get 500 meters.

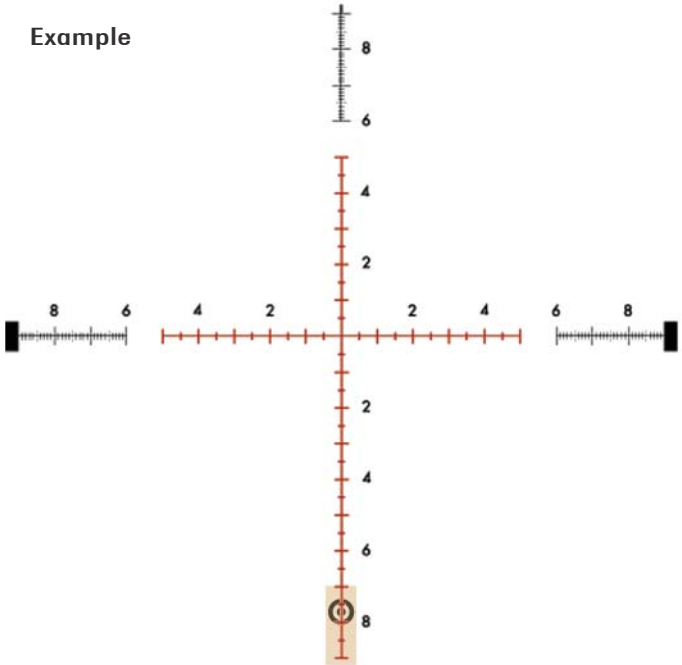
$$\frac{1 \times 1000}{2 \text{ mrads}} = 500 \text{ Meters}$$

Elevation Holdovers

Once the distance has been calculated using the EBR-3 or a laser rangefinder, the EBR-3 can be used for rapid holdover correction for the bullet drop of the weapon system being used. To get the most benefit out of the riflescope equipped with the EBR-3 reticle, Vortex Optics ***highly*** recommends shooters learn their bullet drop numbers and windage/lead corrections in mrads rather than inches or MOAs. Remember that 1 mrad equals 3.44 MOA or 3.6 inches per 100 yards.

Since the EBR-3 reticle is marked in mrads, it is an easy job to quickly select the correct drop reference line once the shooter knows the bullet drops and windage/lead corrections in mrads. If the shooter prefers to dial the ***come ups*** for bullet drop using the elevation knob, knowing bullet drops in mrads will allow for much faster adjustments because the mrads can be quickly read on the elevation knob.

Example



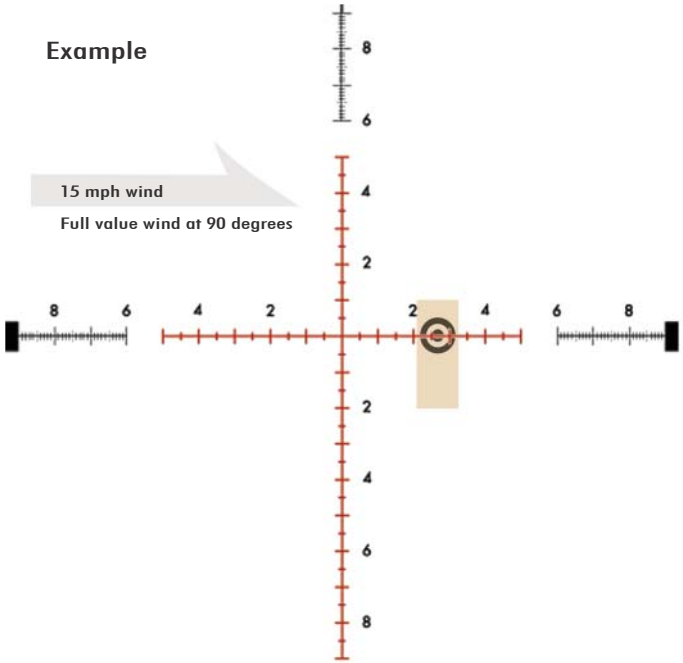
7.7 mrad reticle holdover correction for 800-yard shot. No wind.

Windage and Moving Targets

The EBR-3 reticle is highly effective when used for wind and moving target leads. Using the reticle for effective windage and moving leads will require a thorough knowledge of your weapon system's ballistic performance under varying conditions and experience in reading wind strengths and target speeds. As in bullet drops, it is imperative the shooter learn their particular weapon's windage/moving target corrections in mrads rather than inches or MOAs. Always hold the reticle into the wind when correcting for wind drift.

Basic windage correction on center crosshair

When dialing elevation ***come ups***, the center horizontal crosshair will be used for windage or moving target leads. Mrad marks on the horizontal crosshair are graduated in .5 mrad increments, with .2 mrad marks in outermost sections.

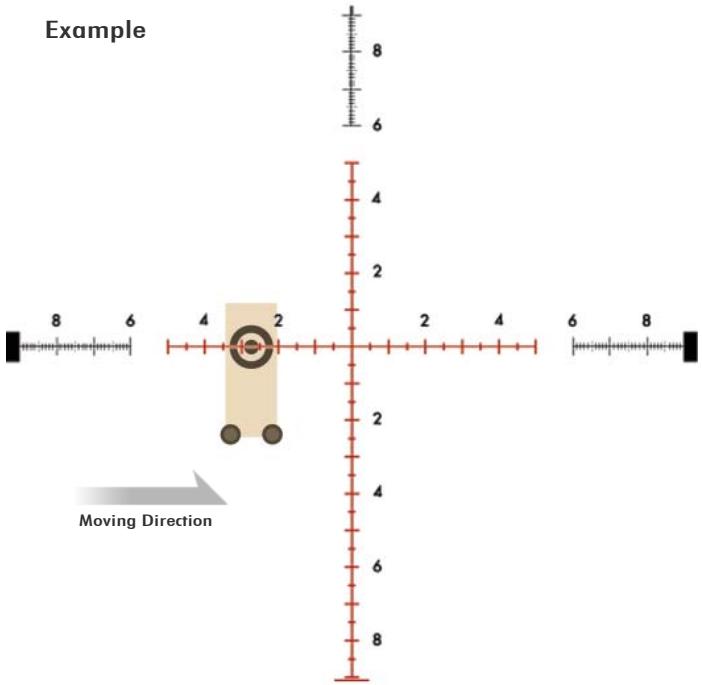


2.6 mrad reticle correction for 15 mph wind at 700 yards. Elevation already dialed into turret.

Basic moving lead correction

When estimating moving target leads, the mrad marks on the center horizontal crosshair can be used. Estimating moving leads will require knowing yardage distance, wind speed, moving target speed and total bullet flight times including rifle lock time. Bullet flight times can be roughly calculated based on fps velocities or a ballistic calculator.

Note: *Correctly estimating moving leads is very difficult and requires considerable practice and knowledge beyond the scope of this manual.*



2.74 mrad reticle correction for a target moving 3 mph at a distance of 800 yards. No wind. Total bullet time of flight from moment of trigger pull is 1.5 seconds during which a target travels 6.6 feet. Elevation already dialed into turret.

Vortex Service and Repair Policy

Unconditional Lifetime Warranty

Vortex Optics wants you to shoot and use your Razor HD riflescope under any conditions with complete confidence—that's why our warranty is straightforward and simple:

Unconditional Lifetime Warranty

- Fully transferable
- No warranty card needed
- No receipt needed

Rest assured, if this riflescope should ever require repair, all you need to do is contact Vortex for absolutely free service. Call 800-426-0048 or e-mail service@vortexoptics.com.

Vortex Optics
2120 West Greenview Drive
Middleton, Wisconsin 53562
USA

Patent Pending
Dual Use for Shooting Tactical / Hunting

VORTEX
THE FORCE OF OPTICS
vortexoptics.com