

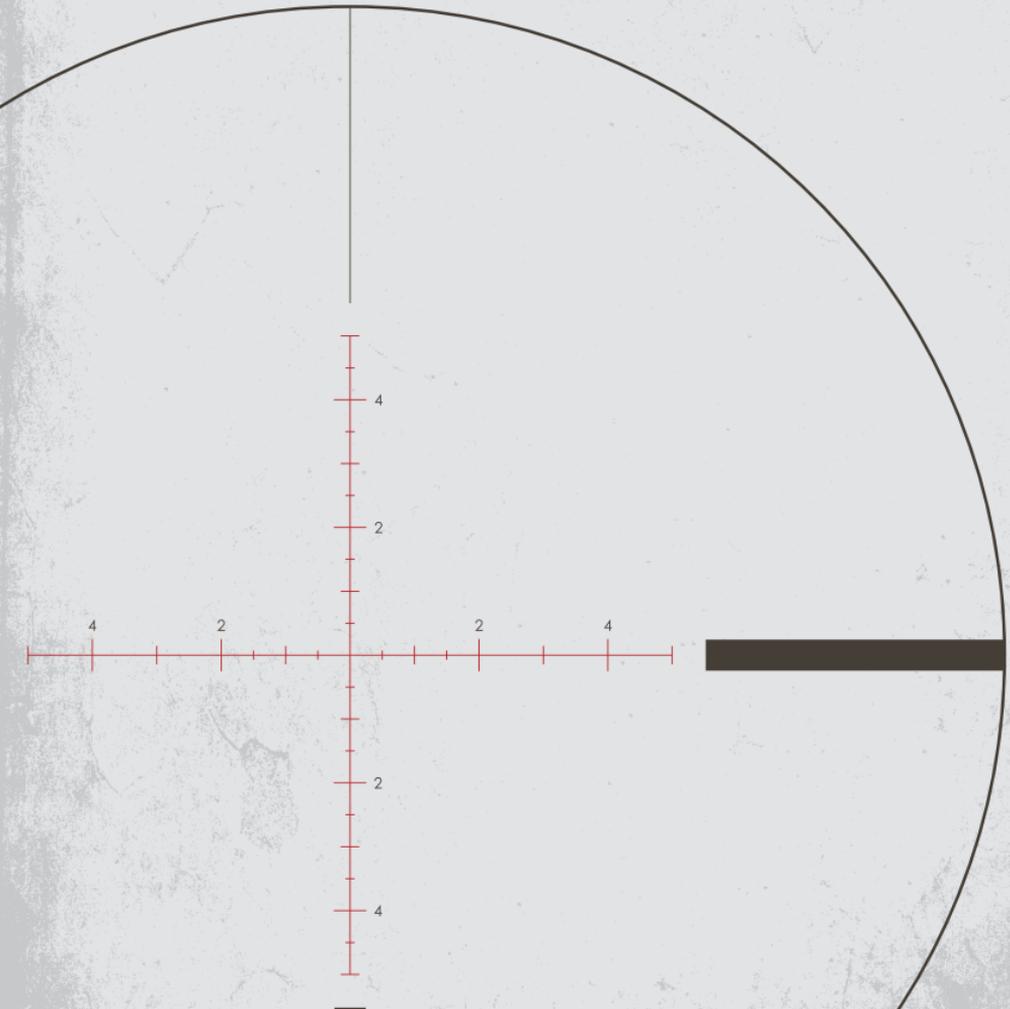
VORTEX
THE FORCE OF OPTICS®

VIPER® PST™ RIFLESCOPE



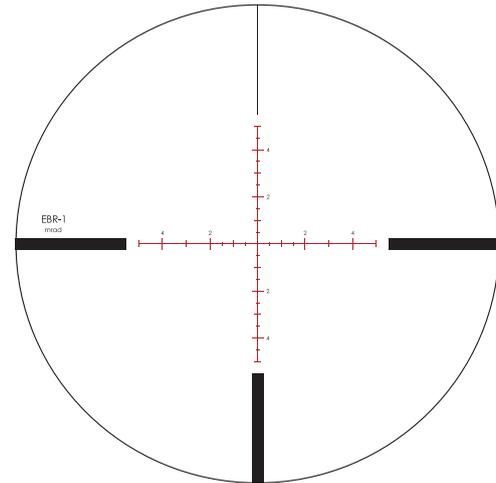
Second Focal Plane | Uncapped Turrets

4-16x50 EBR-1 RETICLE (MRAD)



The Vortex® EBR-1 MRAD Reticle

Designed to maximize long distance shooting and ranging abilities, the EBR-1 MRAD reticle for the Viper® PST™ 4-16x50 riflescope 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-1 MRAD reticle were carefully chosen to provide the optimum balance between precision aiming and low light visibility.



Note: Reticle images shown in this manual are for representation only—images vary between scope models depending on magnification and reticle plane.

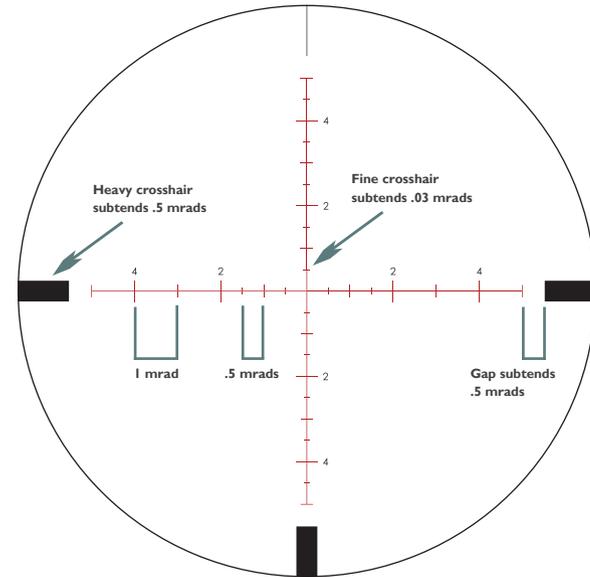
MRAD Subtensions

The EBR-1 MRAD reticle is based on the milliradian, or mrad for short. Mrad unit of arc measurements are based on the radian. A radian is the angle subtended at the center of a circle by an arc that is equal in length to the radius of the circle. There are 6.283 radians in a circle and 1000 milliradians in a radian for a total of 6,283 milliradians (mrads) in a circle. An mrad will subtend 3.6 inches at a distance of 100 yards. Most riflescopes with mrad adjustments use .1 mrad clicks which subtend .36 inches at 100 yards.

In the Viper PST second focal plane riflescopes, the listed MRAD subtensions of the EBR-1 reticle are only valid at the highest magnifications of the scope. However, by understanding the relationship of magnification and subtensions, you can still calculate ranging, holdovers, and wind drift at partial magnifications. Here are some examples:

- If the magnification is set at 1/2 the full magnification, subtension values will be two times the spec listed in the manual.
- If the magnification is set at 1/3 the full magnification, subtension values will be three times the spec listed in the manual.
- If the magnification is set at 1/4 the full magnification, subtension values will be four times the spec listed in the manual.

EBR-1 Mrad Reticle Subtensions



Subtension Changes with Magnification

4-16x50 Reticle Subtensions

(Valid at 16x)

RIFLESCOPE MAGNIFICATION	ACTUAL SUBTENSION OF 1 MRAD RETICLE SPACE
16x	1 mrad
8x	2 mrad
5.3x	3 mrad
4x	4 mrad

Ranging

Mrad reticles such as the EBR-1 are very effective for ranging using simple formulas:

Mrad Ranging Formulas

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

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

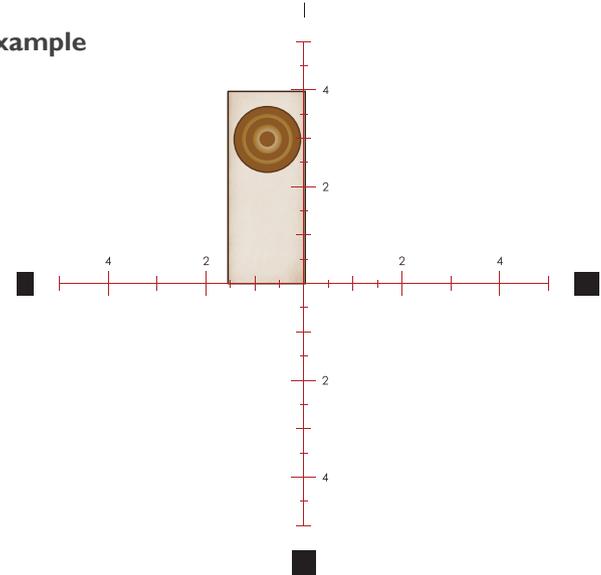
$$\frac{\text{Target Size (Inches)} \times 27.8}{\text{MRADs Read}} = \text{Range (Yards)}$$

To use these formulas, you will need 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.

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

Maximum accuracy in ranging will be obtained by calculating exact mrad measurements—mrads should be estimated in tenths if possible.

Example



Ranging a 6-foot target (2 yards) at 4 mrads yields 500 yards.

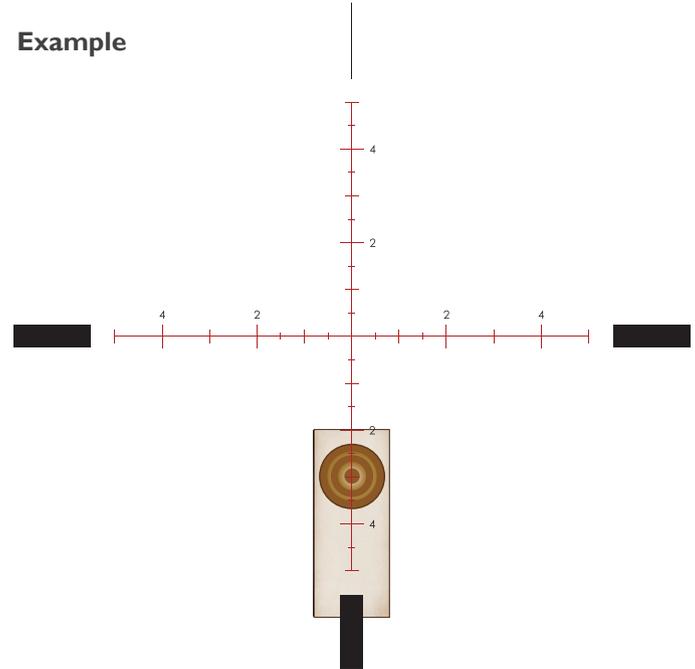
$$\frac{2 \times 1000}{4 \text{ mrads}} = 500 \text{ Yards}$$

Elevation Holdovers

Once the distance has been calculated using the EBR-1 MRAD reticle or a laser rangefinder, the EBR-1 can be used for rapid holdover correction for bullet drop of the cartridge being used. To get the most benefit out of the EBR-1 equipped rifle scope, Vortex Optics **highly** recommends shooters learn their bullet drop numbers 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-1 reticle is scaled in mrads, it is an easy job to quickly select the correct drop reference line once the shooter knows their bullet drops and windage/lead corrections in mrads. If the shooter prefers to dial **come ups** for bullet drop using the elevation knob, knowing bullet drops in mrads will allow for much faster adjustments as the mrads can be quickly read on the elevation knob.

Example



3 mrad correction for 500-yard shot. No wind.

Windage and Moving Targets

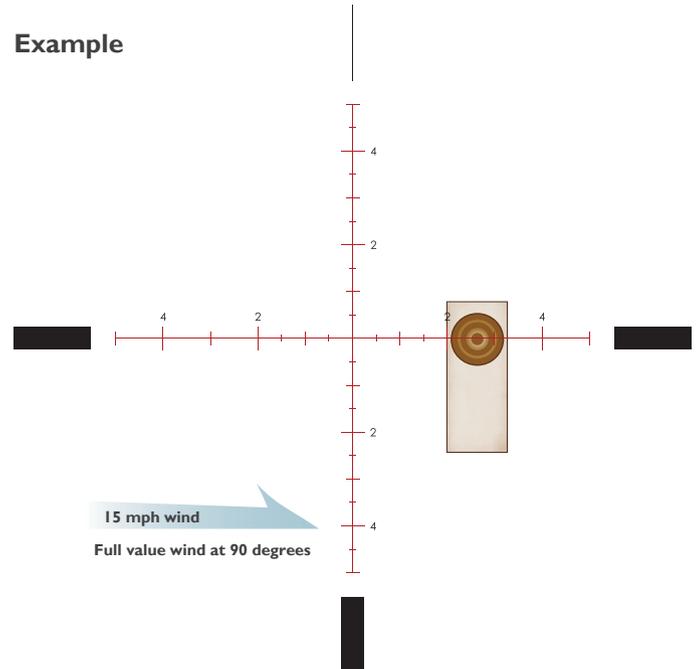
The EBR-1 reticle is highly effective when used for wind and moving target leads.

Using the reticle for windage and moving leads will require 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 the particular weapon's windage/moving target corrections in mrads rather than inches or MOAs.

Basic windage correction on center crosshair

When dialing elevation *come ups*, the center horizontal crosshair will be used for windage or moving lead corrections.

Example

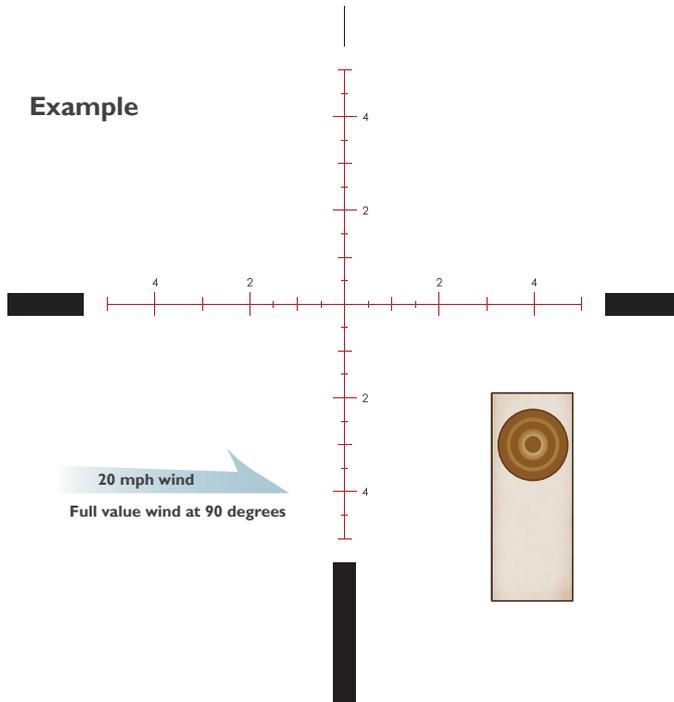


2.6 mrad correction for 15 mph wind at 700 yards.
Elevation already dialed into turret.

Basic windage correction using drop line on reticle

When using the reticle for elevation correction rather than dialing, the mrad marks on the center horizontal crosshair can still be used to help visually reference windage corrections.

Example



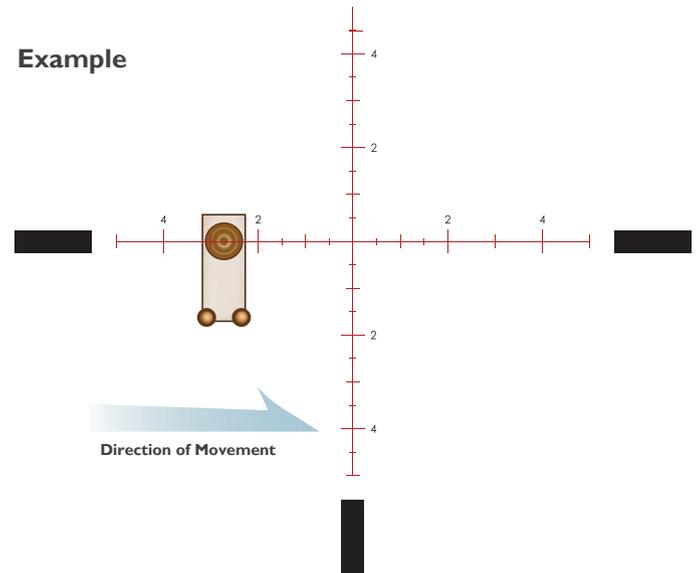
Using 3 mrad drop line at 500 yards, 4 mrad correction for 20 mph wind.

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.

Example



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

THE VIP WARRANTY

We build optics based on our commitment to your absolute satisfaction. That's why Vortex products are unconditionally guaranteed and we make this Very Important Promise to you—a Very Important Person.

Rest assured that in the event your Viper PST becomes damaged or defective, Vortex Optics will repair or replace the riflescope at no charge to you. Call Vortex Optics at 800-426-0048 for prompt, professional, and friendly service.



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Visit www.vortexoptics.com for more information. Canadian customers may visit www.vortexcanada.net for customer service information.

Note: The VIP warranty does not cover theft, loss, or deliberate damage to the product.

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