



ALL ABOUT OPTICS



THE BASICS OF OPTICS

FINDING THE RIGHT OPTICS
TO BRING NATURE AND GAME UP CLOSE.

In hunting, success often hinges on the smallest of details. A flicking tail in the underbrush or the glint of an ivory-tipped antler in a distant mountainside can mark the difference between success and eating tag soup.

Optics are essential for unlocking those hidden details that make for great days afield. From understanding the basics of magnification to lenses and glass that can make you see clearer than a hawk spotting breakfast from a mile up — this guide aims to help you make sure you’re packin’ the best optic for the job.

For specific information, see below:

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OPTICAL QUALITY

Quality optics use dense optical glass that is painstakingly designed, shaped, and polished to eliminate flaws. When a product features more sophisticated optical design techniques and glass, the results are better images. The quality of the optical glass will make a difference in how bright, sharp, and colorful a view will be.

CONSTRUCTION

You may pay more for products using higher quality materials, more sophisticated designs, and stricter tolerances, but this leads to greater reliability in the field.

Waterproof and fogproof optics are sealed with O-rings to inhibit moisture, dust, and debris. The inside of the optics is then purged of atmospheric air and filled with an inert gas (such as nitrogen or argon) with no moisture content. This prevents internal fogging from high humidity, altitude, and temperature changes.

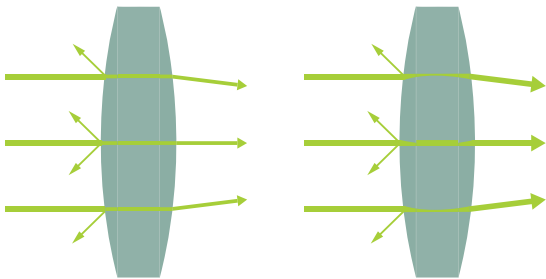
ANTI-REFLECTIVE LENS COATINGS

Anti-reflective coatings increase the amount of light that passes through the optical system so more light gets to your eye.

The application of more coatings results in an increase of light transmission, resolution, contrast, and color fidelity.

Without lens coatings, almost 50 percent of the light could be lost as it passes through the multiple air-to-glass surfaces of an optic.

In general, higher end optics use more lens elements and coatings to correct aberrations and distortions which give a better overall experience while glassing.



UNCOATED LENSES

COATED LENSES

SPECIFICATIONS

It's important to know what features you need based on your optic's application. What follows is an explanation of basic features and specifications to help you select optics that will perform to the level you need when in the field.

FIELD OF VIEW & MAGNIFICATION

FIELD OF VIEW

When looking through an optic, you'll see the field of view as the area between the left and right edges of the image. The field of view can be measured either in linear feet or in angular degrees. (One degree equals 52.5 feet at 1,000 yards.)

Riflescopes: Measured in feet @ 100 yards

Binoculars: Measured in feet @ 1,000 yards

Spotting Scopes: Measured in feet @ 1,000 yards

Laser Rangefinders: Measured in feet @ 1,000 yards

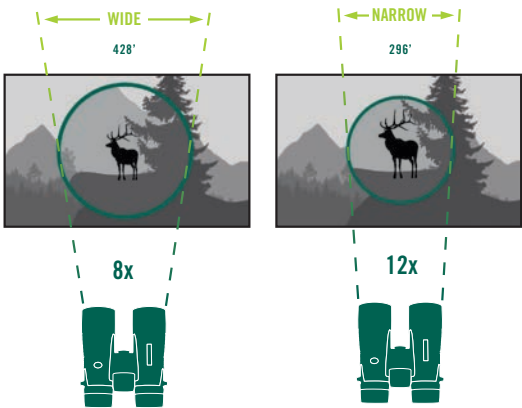
MAGNIFICATION

Choosing the higher magnification option has benefits, but it may not always be the best choice.

KEY TAKEAWAY

Generally, as magnification increases, you'll see a shallower depth of field, a diminished field of view, a darker image, and you'll have greater chance of image shake.

As magnification increases, field of view decreases.

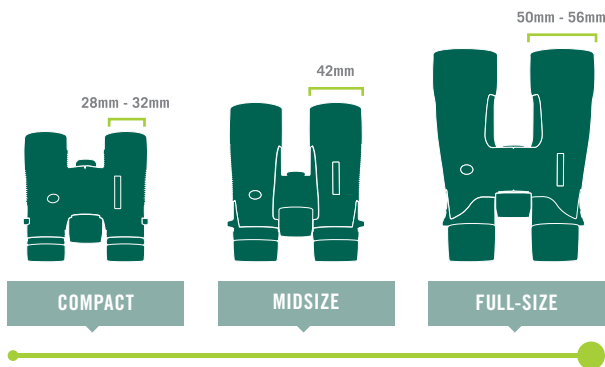




OBJECTIVE LENS SIZE

All else equal, a larger objective size delivers a brighter image, especially under low-light conditions, but it will be heavier and bulkier than a smaller lens. Consider the distance and habitat you'll be glassing when choosing what size is best for you.

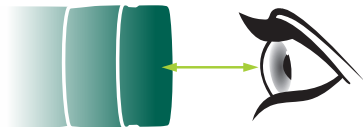
As magnification increases, the same amount of light is spread over a larger area, which can make the image appear dimmer. To compensate for the light loss at higher magnifications, a larger objective lens is often used. This is why high-powered binoculars typically have large objective lenses. Alternatively, an optic with lower magnification can use a smaller objective lens and still have similar low-light performance.



EYE RELIEF

Eye relief refers to the fixed distance away from the ocular lens, which the user's eye can see the full field of view. Proper eye relief is important for comfortable viewing. This measurement varies between product models and sizes.

Proper eye relief is required for a full field of view.



ADJUST FOR EYE RELIEF

Adjust the distance from your eye to the eyepiece of your optic until you see a single image and the black edges disappear when looking through the barrel(s).

By twisting a binocular's or spotting scope's eyecup(s) up or down, you can achieve custom eye relief to work with your eyes or glasses.



SUFFICIENT DISTANCE
Full Field of View



TOO FAR AWAY
Tunneling Effect



TOO CLOSE
Shadowing Effect

Riflescopes & Prism Scopes: In general, a minimum distance of three inches or more provides safe eye relief from recoil.

Binoculars & Spotting Scopes: Proper eye relief is important to people who wear eyeglasses or sunglasses while looking through optics. However, anyone planning to view for long stretches of time will also benefit from optics with longer eye relief.

Red Dots & Holographic Sights: Unlimited eye relief.

CLOSE FOCUS

Close focus is the distance between your optic and the nearest object that can be focused on.

Close focus is more important for some applications than others. For example, many binoculars will focus down to 10 feet or less — a feature that's especially important for watching butterflies, insects, and birds.

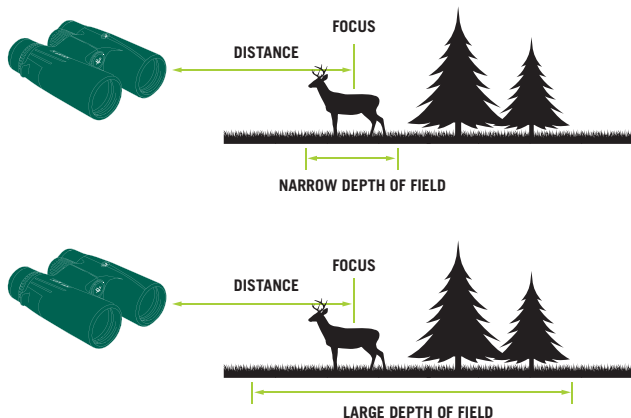




DEPTH OF FIELD

The distance between the closest and furthest objects in your field of view that appear in focus.

In general, optics with a short close focus will have a shallower depth of field.



EXIT PUPIL

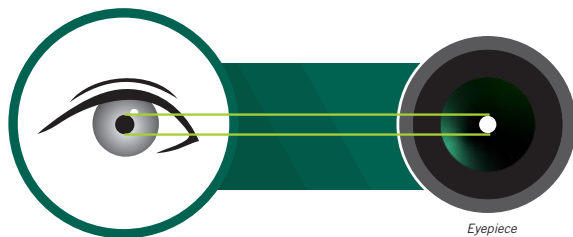
The exit pupil diameter is the width of the beam of light at the eye relief position, usually measured in millimeters (mm). A person's pupil can dilate from roughly 2mm to 8mm, depending on the person's eyes and the lighting situation.

HOW IS THE EXIT PUPIL CALCULATED?

Objective Lens (mm) ÷ Magnification Power = Exit Pupil (mm)

Ex. 10x42 Binocular: 42mm ÷ 10x = 4.2mm

All else equal, a larger exit pupil allows in more light to your eye, which translates into better low-light performance.

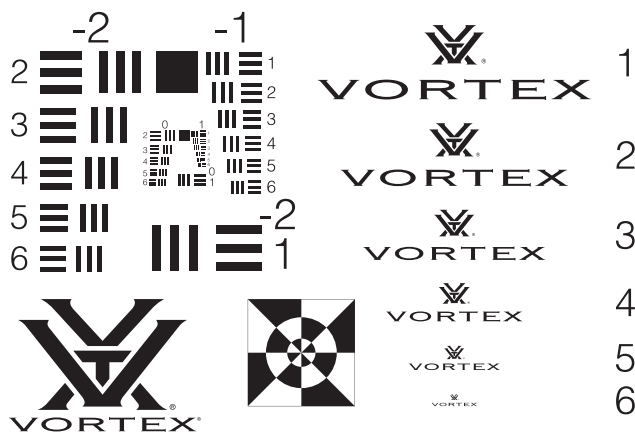


Look for the exit pupil by holding the optics a short distance from your face — seen here as a clear circle in the center of the eyepiece.

RESOLUTION

Resolution refers to an optic's ability to distinguish details. A resolution chart contains groups of lines set in a series with progressively smaller spacing — a design used to ascertain the limiting number of lines per millimeter that optics can resolve.

Use a resolution chart to determine how well a rifle scope, binocular, or spotting scope can resolve fine details.



KEY OPTIC DEFINITIONS

Elevate your optical expertise with these essential terms.

Alignment of Collimation: All elements (lenses or prisms) are in line along the optical axis. The misalignment of elements results in diminished performance and can cause eye strain and fatigue.

Astigmatism: Because the lenses in an optic usually have a curved shape, the light rays passing through the lens will not all converge on the same focal plane. If this physical reality isn't remedied in the overall optical design, images will either be in focus in the center area or at the edge, but not in both areas at the same time. Astigmatism cannot be eliminated completely, but it can be kept to a minimum.

Chromatic Aberrations: Diminished resolution and color fidelity display as green or purple fringing. Different colors move at different wavelengths and will have different focal lengths when passing through glass. Different glass types help reduce this inherent problem.

Contrast: This refers to differences in brightness between the light and dark areas of an image. Because we see much of the color spectrum, contrast also refers to differences in the dimensions of hue, saturation, brightness, or lightness. Optics with superior contrast transmit colors that appear very dense and well-saturated.

Edge Distortion: This is the inability of an optical system to deliver an image that is a true-to-scale reproduction of an object. There are two types of distortion: barrel and pincushion.

Barrel Distortion: Image bows outward and looks bulged.

Pincushion Distortion: Image bends inward.

Light Transmission: This is the percentage of light that passes through an optic to reach the user's eyes. Light transmission will be higher through more expensive optics than through modestly priced optics due to better optical designs, glass quality, and improved optical coatings.



RIFLESCOPES

Modern riflescopes deliver a world of options as diverse as the firearms they top. From tack-driving bolt-actions to carbines in close-quarters, your rifle's application determines the ideal riflescope. Start by demystifying the essentials to set your sights on the perfect choice.

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RIFLESCOPE DESIGN

Riflescopes have several adjustable features. When broken down to the basics, many are commonly shared and relatively simple. Once you understand basic terms and their functions, you'll be able to select the right riflescope with pinpoint accuracy.



KNOW THE NUMBERS

MAGNIFICATION

Refers to the degree to which the riflescope can enlarge the appearance of a target.



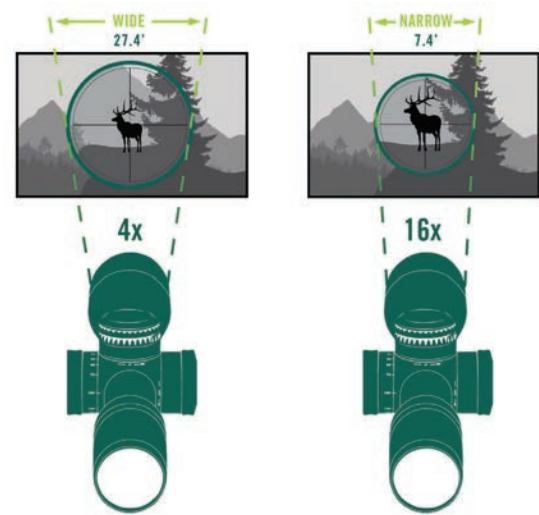
Lowest Magnification: The lowest end of your magnification range is 4x. Larger field of view allows for easier target acquisition.

Highest Magnification: The highest end of your magnification range is 16x. More detail but at the sacrifice of the field of view.

FIELD OF VIEW

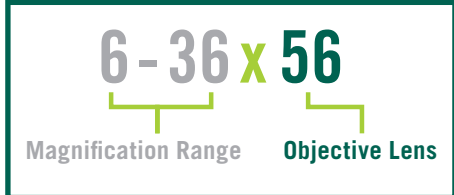
Field of view is the width of the area you can see commonly measured in feet at 100 yards. With riflescopes you have two measurements, one at low magnification and one at high magnification.

As magnification increases, field of view decreases.



OBJECTIVE LENS DIAMETER

All else equal, a larger objective size gives a brighter image but increases the size and weight of the riflescope.



SMALLER OBJECTIVE

- Compact form
- Quicker target acquisition

LARGER OBJECTIVE

- Better clarity at distance
- Brighter images in low light



TUBE SIZE

Riflescope main tubes come in several diameters, including 1", 30mm, and 34mm. Larger tubes can provide increased travel ranges for windage and elevation adjustments. Being aware of tube size is also very important when selecting rings. A common misconception about tube size is that a larger tube provides a brighter image. This is not usually the case.

RETICLE FOCUS

The reticle focus is typically a one-time adjustment used to focus the reticle for maximum sharpness. This adjustment is slightly different for every shooter. A clearly focused reticle is a critical component for accurate shooting. When setting up a riflescope, this should be the first adjustment you make and should only need to be changed from user to user, or if your eyesight changes over time.

Adjusting the reticle focus to your eye:

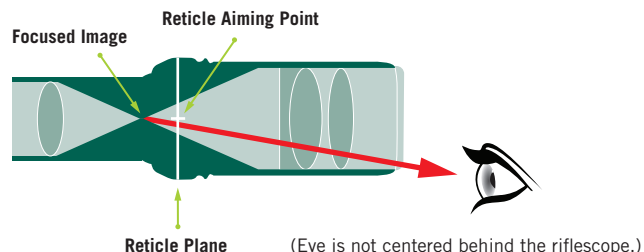
1. Turn the Magnification Adjustment Ring to the highest power and the Parallax Adjustment Knob to infinity (if adjustable). Looking through the optic, turn the Ocular Focus Ring until the reticle is slightly blurry.
2. While looking at a white wall or a clear blue sky, taking short glances through the optic, turn the Ocular Focus Ring until the reticle is clear and crisp as soon as you look through the optic. This may take several attempts.



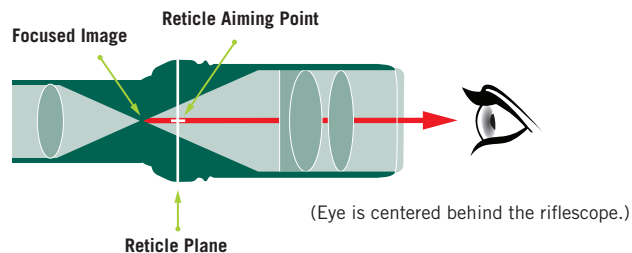
Note: You do not want your eye to focus to the reticle, rather you want the reticle in focus to your eye instantly when looking through the optic. Looking away and letting your eyes refocus is important in getting the Ocular Focus set correctly.

PARALLAX

Parallax results when the target image is not on the same optical plane as the reticle within the riflescope. This can cause an apparent movement of the reticle in relation to the target if the shooter's eye is off-axis behind the optic. This is because the line of sight from the eye to the focused target image does not align with the reticle aiming point.

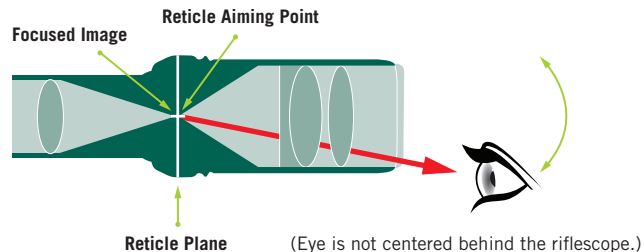


When the target image is not focused on the reticle plane and your eye is centered directly behind the riflescope, no parallax occurs. This is because the line of sight from the eye to the focused target image coincides with the reticle aiming point.



Correctly focus the target image so it falls on the same optical plane as the reticle within the riflescope.

When the target image is focused on the reticle plane, parallax cannot occur, even if your eye is not centered behind the riflescope. This is because the line of sight from the eye to the focused target image always coincides with the reticle aiming point no matter where you position your eye.



ADJUSTABLE PARALLAX

Some riflescope models feature a Parallax Adjustment Knob that allows you to tune the target image for maximum sharpness and remove any parallax. This adjustment may be on the objective lens or near the turrets on the riflescope's sides.

Dial the Parallax Adjustment Knob until the target image is as sharp as possible. The yard/meter numbers on the knob should be used as general reference points only. Check for parallax error by moving your head up, down, left, and right without influencing the gun. The Parallax Adjustment Knob position is correct if there is no apparent shift between the reticle and the target image. If you notice any shift, adjust the Parallax Adjustment Knob slightly until all shift is eliminated.



Note: If the reticle and the image are not both simultaneously in focus, readjust your Ocular Focus.

MAGNIFICATION ADJUSTMENT

The Magnification Adjustment Ring is used to change the riflescope's "power." To adjust your optic's magnification, rotate the Magnification Adjustment Ring clockwise, or counterclockwise, to increase or decrease the magnification to your desired level.

Lower Magnifications: Provide brighter images and wider field of view which can be helpful in low light, close-range shooting, and with moving targets.

Higher Magnifications: Have narrower field of view and dimmer images but are better at shooting smaller targets at longer ranges.



TURRETS

ELEVATION AND WINDAGE TURRETS

Use turrets to adjust the bullet's point of impact. Turrets come in several styles to account for individual user preferences and are generally marked in either MOA or MRAD scales.



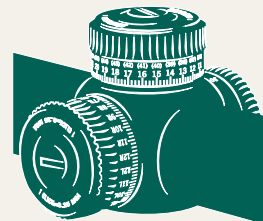
Capped Turrets

- Ideal for close-range hunters and shooters who hold for wind/elevation corrections
- Provides protection from accidental adjustments



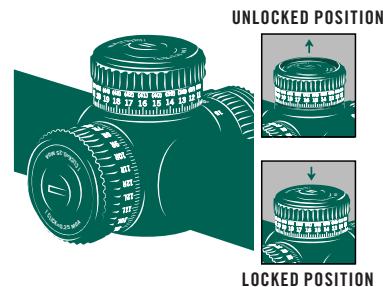
Exposed Turrets

- Ideal for mid- to long-range hunters and shooters who need to make quick adjustments
- Easy adjustment and more flexibility



Locking Turrets

- Ideal for dynamic mid- to long-range hunters and shooters
- Eliminates accidental movement of turrets

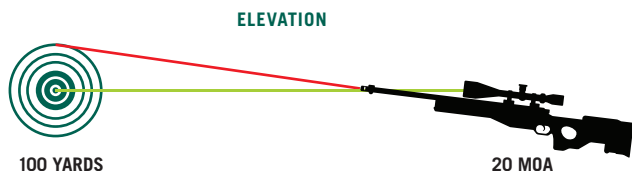




TOTAL TRAVEL

More travel built into a riflescope allows for a greater range of adjustments allowing you to dial a more precise correction on further shots.

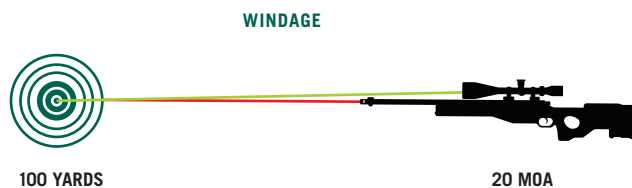
Max Elevation Adjustment: How much you can adjust the point of impact of the riflescope up or down.



Note: It is common practice to use a 20 MOA rail on a rifle that you plan to shoot further than 600 yards. A 20 MOA rail angles the riflescope down towards the barrel, forcing the user to zero 20 MOA lower in their total travel. This allows the user to gain an additional 20 MOA of travel when dialing at further distances.

Max Windage Adjustment: How much you can adjust the point of impact of the riflescope left or right.

More windage or elevation adjustment is useful for shooters that dial at long range.

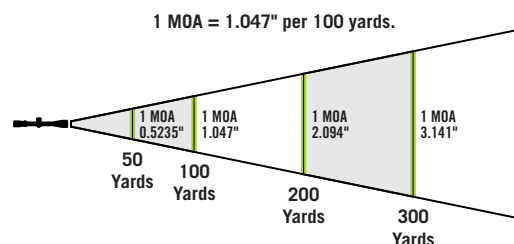


ARC MEASUREMENTS

Riflescopes will use one of two arc measurements: Milliradians (MRAD) or Minute of Angle (MOA). The arc measurements apply to both the turret adjustments and the reticle subtensions (or hashmarks).

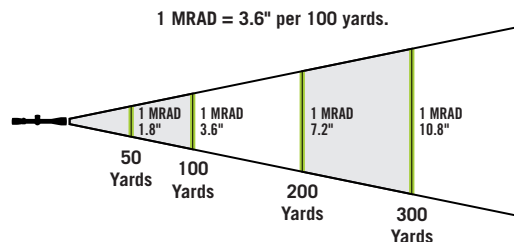
Minute of Angle (MOA) Adjustment

Minute of Angle is an angular unit of measurement commonly found in riflescopes. It is used to measure bullet drop, wind holdovers, and for measuring targets. Both the reticle and turrets will be laid out in specific MOA values. 1 MOA equates to 1.047" at 100 yards, 2.09" at 200 yards, 3.14" at 300 yards, etc. Being an angular unit of measurement, the value of 1 MOA will increase/decrease the distance you are shooting. For this reason, think about all of your adjustments in MOA, rather than a linear unit such as inches. If your turret, reticle, and drop chart are all laid out in MOA, adjusting your riflescope for bullet drop of windage corrections is extremely easy.



Milliradian (MRAD) Adjustment

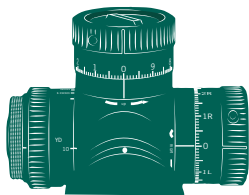
Milliradian is an angular unit of measurement commonly found in riflescopes. It is used to measure bullet drop, wind holdovers, and for measuring targets. Both the reticle and turrets will be laid out in specific MRAD values. 1 MRAD equates to 3.6" at 100 yards, 7.2" at 200 yards, 10.8" at 300 yards, etc. Being an angular unit of measurement, the values of 1 MRAD will increase/decrease proportionally as you increase/decrease the distance you are shooting. For this reason, think about all of your adjustments in MRAD, rather than a linear unit such as inches.



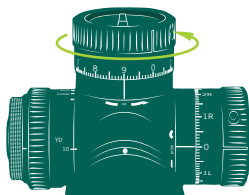


ZERO SYSTEM ADJUSTMENT

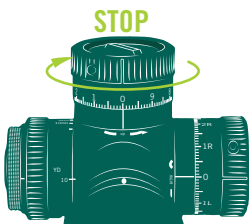
Once you zero your riflescope at a set range, a zero system allows you to lock in that setting and easily return to zero after dialing for various distances.



ZERO DISTANCE SET WITH TURRET



TURRET ROTATED FOR
ELEVATION ADJUSTMENT



IMMEDIATE AND EFFORTLESS
RETURN TO ZERO

A zero system is recommended for shooters who must constantly make rapid, precise adjustments for varying distances.

UNDERSTANDING RETICLES

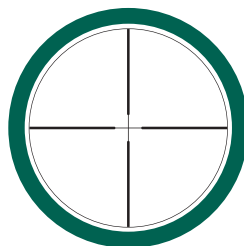
From a simple crosshair to first focal plane, hashmark-based, reticles with wind dot references — every reticle shines under the right conditions when paired with an appropriate firearm.

HOW TO CHOOSE YOUR RETICLE

The reticle in a riflescope is a series of fine lines in the eyepiece that provide point of aim, as well as measurement and other information.

There are reticle options for every shooting situation.

BASIC: V-PLEX

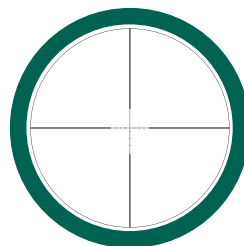


Minimal information for clean sight picture.

Application:

- Hunting
- Casual shooting

BASIC: BDC

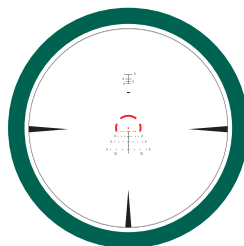


Drop compensation for shooting at longer distances.

Application:

- Hunting
- Casual shooting

TACTICAL

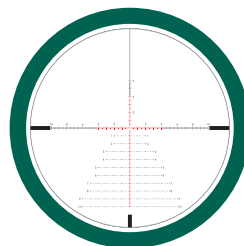


Open circle elements draw the eye to center of the reticle for rapid target acquisition.

Application:

- Tactical shooting
- Target shooting

TECHNICAL



Elevation and windage information built into the reticle to maximize long-range accuracy and performance.

Application:

- Tactical shooting
- Target shooting

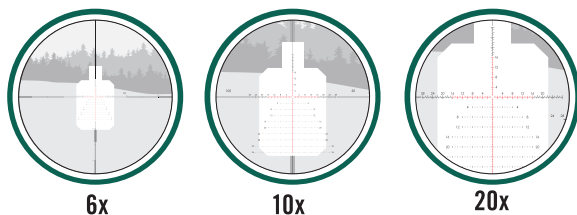
FIRST AND SECOND FOCAL PLANE RETICLES

Modern riflescope reticles are placed in either the first or second focal plane, the main difference being how the reticle changes when magnification is adjusted.

First Focal Plane

The reticle grows and shrinks as magnification is adjusted increased and decreased.

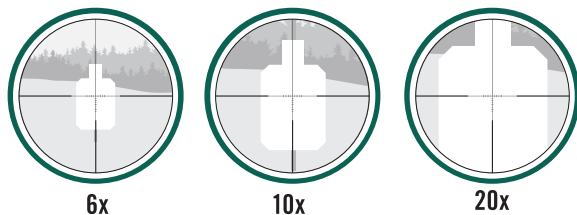
- Ideal for competitive and long-range shooting
- Accurate windage and elevation holdovers at any magnification
- Reticle can be more difficult to see and use at lowest magnification



Second Focal Plane

The reticle stays the same size regardless of magnification setting.

- Ideal for close-range hunting and shooting
- Windage and elevation holdovers are only accurate at a specific magnification setting, typically the highest magnification



RETICLE ILLUMINATION ADJUSTMENT

Some riflescopes are equipped with an illuminated reticle. Reticle illumination adjustment “lights up” all or a portion of the reticle allowing it to be more easily seen against a dark background. The intensity level can usually be adjusted and is commonly placed on the ocular or left side of the riflescope, though it can be in other positions. Illumination is normally powered by a small battery.



RED DOTS, HOLOGRAPHIC SIGHTS, & PRISM SCOPES

Task-focused for hunting, competition, tactical scenarios, or personal protection, these optics deliver quick target acquisition and accuracy across various shooting environments. Find the one that best aligns with your unique shooting challenge.

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RED DOT, HOLOGRAPHIC SIGHT, & PRISM SCOPE DESIGN

Learn about the main differences and benefits of each optic type to help you choose the right one for your needs.

RED DOTS

Named for their illuminated red dot reticle, these optics excel for fast, accurate shooting in close quarters. The main advantage is their simplicity and quick target acquisition. Advanced LED technology ensures minimal power usage while providing a clear aiming point.

Green dot options are available in select models.



HOLOGRAPHIC SIGHTS

Holographic sights use laser technology to project a hologram of a reticle onto a viewing window, ideal for quick-response shooting. They ensure superior reticle visibility in various light conditions and offer more complex reticles that provide detailed aiming information, facilitating seamless transitions between close- and longer-range targeting. The design facilitates both-eyes-open shooting, enhancing situational awareness and field of view.



PRISM SCOPES

Prism scopes use a glass prism to focus the image, allowing for compact designs with built-in magnification. Ideal for close- to mid-range shooting, they deliver sharper images, can support complex reticles, and better suit shooters with astigmatism. They also provide reliable aiming with or without battery power.





RED DOTS & RETICLES

Red dots are ideal for fast target acquisition, while reticles offer additional information for precise shots.

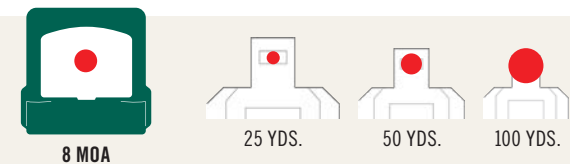
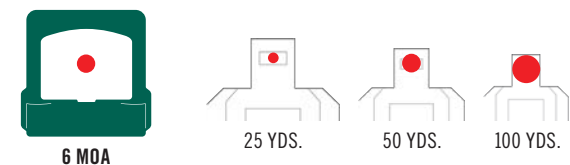
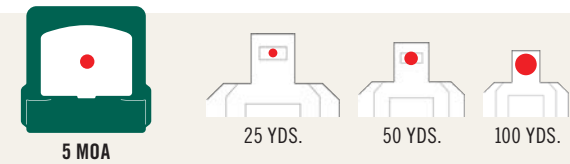
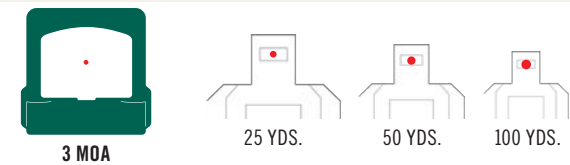
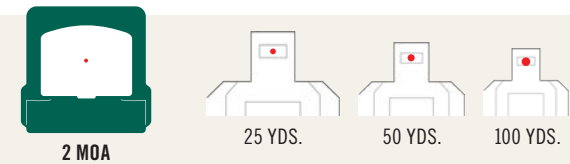
RED DOTS

- Simple dot aiming system in various sizes
- Cleaner sight picture for faster target acquisition
- Variable brightness settings for shooting in any lighting scenario



DOT SIZE

This number indicates the size of the actual projected dot measured in MOA (see definition on the next page).



A smaller red dot covers less of the target, ideal for mid- to longer-range shooting. A larger red dot covers more of the target, but can be advantageous for close-range and moving targets.

MOA

This is an acronym for “Minute of Angle” and is a ranging term used to describe the size of an object at a known distance. 1 MOA is approximately 1" at 100 yards. For example, a red dot with a 3 MOA will appear approximately 3" in size on a target at 100 yards.

RETICLES

- Offer more information for different applications
- Features found on different types of reticles include:



OPEN CIRCLES
Naturally draws eyes to the center of the reticle.



CQB TRIANGLE
Quick point of aim for extremely close targets.



PRECISE CENTER DOT
Smaller point of aim for better target visibility at distance.



BDC HOLDS
Faster reference points for holdovers at known distances.

EYE RELIEF

Here's how to choose the right sight — with the best eye relief — for your specific application.

RED DOTS AND HOLOGRAPHICS

- Unlimited eye relief
- Greater peripheral vision
- Faster target acquisition
- Better in low-light conditions
- Ideal for tactical and close-range shooting and hunting

PRISM SCOPES

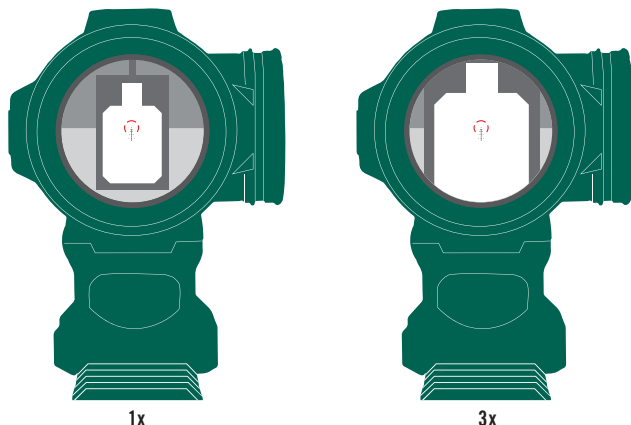
- Shorter eye relief
- Magnifying capability
- Better for users with eye conditions
- Brighter and wider field of view
- Ideal for close- to mid-range shooting





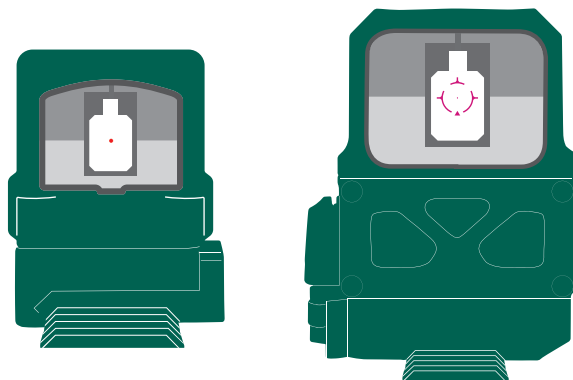
MAGNIFICATION

1x magnification is great for fast target acquisition while mid magnifications are preferred for shooting further distances.



PRISM SCOPES

- Prism scopes have a fixed magnification
- This mid magnification combined with the BDC reticles provide consistent holdover subtensions when shooting further distances
- Prism scopes cannot be paired with magnifiers



RED DOTS AND HOLOGRAPHICS

- Red dots and holographic sights are intended for fast short-range shooting. Because of this, red dots and holographic sights are set at a fixed 1x magnification
- Their effective range can be increased by adding a magnifier

MOUNTING TYPES & FOOTPRINTS

Modern handguns utilize three main methods for mounting.



MILLED SLIDE

- Allows direct mount of red dots with the same footprint or use of factory adapter plate
- Low mounting height makes co-witnessing factory iron sights easier
- Creates lowest profile ideal for concealed carry use



DOVETAIL ADAPTER PLATE

- Replaces pistols rear iron sight with an adapter plate specific to your red dot footprint
- Added height to the mount requires taller iron sights to co-witness



ACCESSORY RAIL MOUNT

- Adds height, width, and weight to the overall firearm
- Requires an additional mount to attach optic to rail
- Superior stability compared to other mounting solutions

BINOCULARS

Using the right binocular for the terrain and your unique hunting style is the first step to greater success. From bowhunting dense hardwoods to open-country rifle hunting, get ready to narrow down choices and lock in the best binocular for every hunting venture.

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BINOCULAR DESIGN

The main binocular designs are Roof prism and Porro prism. These designs come in a variety of weights and sizes.

ROOF PRISM

Named for the roof-like appearance of the prisms, the roof prism binocular has objective lenses and eyepieces positioned in a straight line, and is appreciated for a streamlined, durable chassis. Phase correction coatings on the prism glass keep the light in correct color phases, enhancing the resolution, contrast, and color fidelity.



The Abbe-Koenig prism is named after Ernst Abbe and Albert Koenig and is one type of roof prism. This style has a larger prism system that has a longer optical path length. The prism is two glass prisms cemented together that form a symmetric "V" shape. This prism design provides a sharper image resolution, cuts chromatic aberration, and has an improved edge-to-edge clarity over the standard roof-prism style binoculars. To fit the larger prisms the overall body must be larger.



PORRO PRISM

Many people will recognize the traditional binocular shape of a Porro prism by its offset barrels. Named after the Italian optical designer Ignazio Porro, this type of binocular has objective lenses spaced wider apart than the eyepieces. This design offers a rich depth of field, wide field of view, and delivers good quality at a reasonable cost.



Reverse Porro Prism is a compact version of the full-size Porro prism binocular with the eyepieces spaced wider apart than the objective lenses. These binoculars are the ultimate in on-the-go glassing, allowing for quality optics in a durable, lightweight package.





KNOW THE NUMBERS

MAGNIFICATION



8x to 10x are preferred in dense foliage or heavily wooded terrain.

12x, 15x, or 18x are commonly used in more vast, open landscapes.

12x magnification and larger are recommended for use with a tripod for a stable image and comfortable viewing.

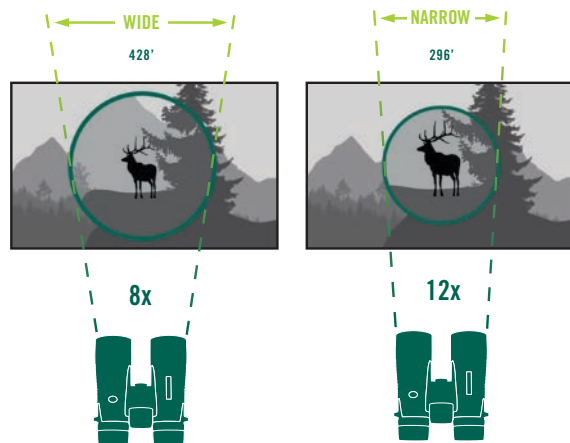
FIELD OF VIEW

Field of view is the width of the area you can see and can be described two ways:

Linear Field of View: Width of the area you can see, measured in feet observed at 1,000 yards.

Angular Field of View: The true angle seen through the optic, measured in degrees.

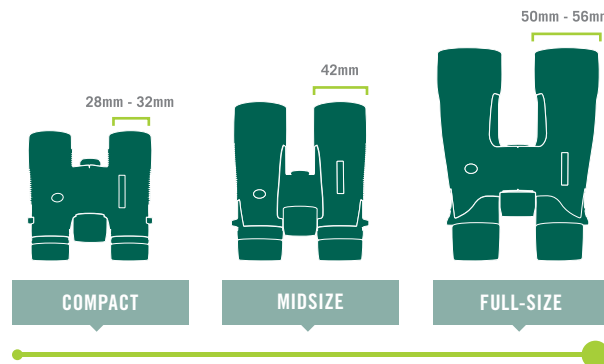
As magnification increases, field of view decreases.



OBJECTIVE LENS DIAMETER



All else equal, a larger objective size delivers a brighter image but increases size and weight.



SMALLER OBJECTIVE

- Ideal for treestand hunting or stalking
- Stows easier in a pocket or backpack
- Quicker target acquisition
- Best for hand-held use

LARGER OBJECTIVE

- Ideal for long glassing sessions
- Better low-light performance
- Brighter images/clarity
- Best used with a tripod



BASIC ADJUSTMENTS

ADJUST THE EYECUPS

The Eyecups on a binocular twist up and down so any viewer can see the full field of view and enjoy comfortable viewing — with or without eyeglasses.

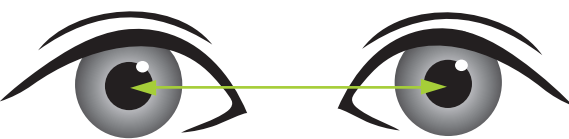
When not using eyeglasses or sunglasses, keep the Eyecups fully extended. For the best viewing when viewing through eyeglasses, twist Eyecups down.



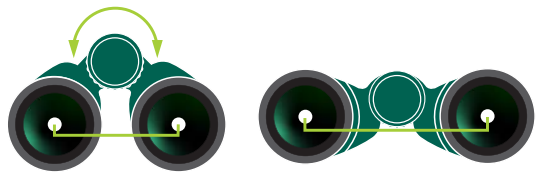
ADJUST THE INTERPUPILLARY DISTANCE

Understanding IPD will ensure you select binoculars that will fit your face properly.

Interpupillary Distance (IPD) is the distance in millimeters between the center of your pupils.



Adjust the barrels of the binocular until you see a single image and the black edges disappear when looking through both barrels of the binocular.



FOCUS THE BINOCULAR

For the best view, follow this two-step process to properly adjust the Center Focus and Diopter. Choose an object about 20 yards away and stay in the same spot until you've adjusted the binocular for your eyes.

1. Adjust the Center Focus. Start by closing your right eye or covering the right objective lens with your hand. Focus your left eye on the object and adjust the Center Focus wheel until the image is in focus. Leave the Center Focus in this position as you adjust the Diopter.

Adjust the Center Focus



2. Adjust the Diopter. Next, close your left eye or cover the left objective lens with your hand. Look through your right eye and adjust the Diopter ring (generally found on the right eyepiece) until the object is in focus. Make note of this Diopter setting in case you need to set it again. From this point on, you'll only need to use the Center Focus wheel.

Adjust the Diopter focus



Note: Some models feature a locking Diopter. If the Diopter locks, lift the Diopter ring (or follow manufacturer instructions) to unlock. Then, adjust the Diopter until the object is in focus as described above and lock the Diopter ring.

LASER RANGEFINDERS

Whether you're bowhunting in deep forests, competing in long-range shooting, or planning a stalk across open prairie, laser rangefinders deliver precision distance measurement to improve your accuracy and success. Select the model that aligns with your specific outdoor pursuit.

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LASER RANGEFINDER DESIGN

Named for their use of laser technology to measure distances accurately, these devices are indispensable for precise shooting and hunting. They excel in both open terrains and dense forests for ranging game, targets, and landscape features when planning a stalk. Key advantages include instantaneous feedback and high accuracy. Advanced optics and signal processing provide reliable measurements even in challenging conditions.



RANGE, RANGE MODES, AND TARGET MODES

RANGE

The more reflective the target, the stronger a signal it returns to the rangefinder, meaning it can be ranged out to the farthest distance.



MINIMUM RANGE

Ex: 6 yds.

- Closest distance the rangefinder can return an accurate range-to-target
- Important when hunting from a treestand



DEER RANGE

Ex: Up to 2,000 yds.

- Distance the rangefinder can range non-reflective animals in ideal conditions
- Critical for accurate shot placement when hunting



TREE RANGE

Ex: 2,300 yds.

- Distance the rangefinder can range less reflective objects
- Important when planning your stalk



MAX REFLECTIVE RANGE

Ex: 3,000 yds.

- Distance the rangefinder can range highly reflective targets in ideal conditions
- Important for long-range target shooting scenarios



RANGE MODES

Range Modes help you adjust for inclines and declines that affect your distance to the target.



LINE OF SIGHT (LOS)

- Distance to the target without angle compensation
- Important when using a ballistic calculator



HORIZONTAL COMPONENT DISTANCE (HCD)

- Distance to the target with angle compensation
- Important when shooting from elevated positions (E.g. treestand, mountain terrain, etc.)

TARGET MODES

The appropriate Target Mode will help you range more effectively.



NORMAL MODE

- Delivers strongest range reading
- Recommended in most situations
- Use to quickly range target distance with minimal background or foreground disturbance



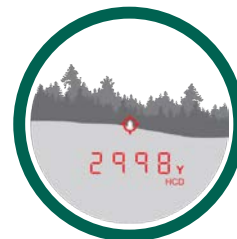
FIRST MODE

- Displays the closest distance when ranging
- Use when ranging smaller targets in front of larger, more reflective ones



LAST MODE

- Capable of ranging through non-reflective foreground cover, such as grass or brush
- Recommended in wooded landscapes
- Use when ranging target with foreground disturbance



EXTENDED LASER RANGE MODE

- Delivers strongest reading when used on a tripod
- Recommended when ranging targets at extreme distances



KNOW THE NUMBERS

MAGNIFICATION



Higher magnification allows more detail but at the sacrifice of field of view. Larger field of view allows for easier target acquisition.

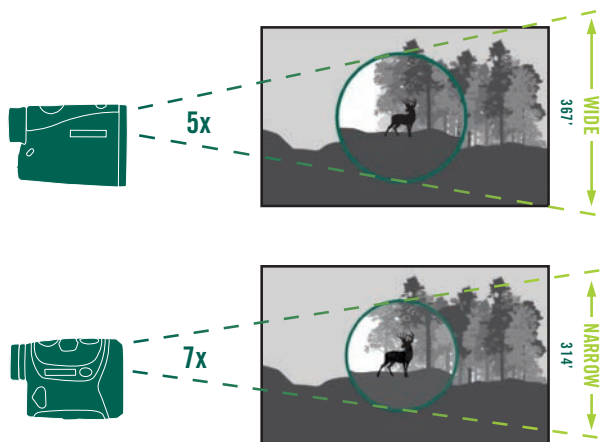
FIELD OF VIEW

Field of view is the width of the area you can see and can be described two ways:

Linear Field of View: Width of the area you can see, measured in feet observed at 1,000 yards.

Angular Field of View: The true angle seen through the optic, measured in degrees.

As magnification increases, field of view decreases.



SPOTTING SCOPES

Whether looking for bullet holes on paper targets at the range or evaluating the trophy potential of distant animals in the field, modern spotting scopes have you covered. But before you zoom in, let's focus on the essentials that'll guide you to the perfect optic.

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SPOTTING SCOPE DESIGN

Spotting scopes provide higher magnification than most binoculars and are designed for viewing wildlife and landscapes at longer distances. In many cases, manufacturers make a spotting scope design available with both an angled and a straight body style. Though one design is not better than the other, each offers distinct advantages.

Angled spotting scopes are great on a tripod while straight are ideal for glassing from a vehicle. Regardless of configuration, spotting scopes are recommended to be used on a tripod for a stable image and comfortable viewing.



ANGLED

- Easily used from the side, out of the way of your other equipment
- Easily shared between users
- More comfortable to use from a seated position
- More comfortable when glassing at a steep upward angle



STRAIGHT

- Slides into and out of a pack more easily and takes up less space
- More intuitive to locate targets
- More comfortable when glassing at steep downward angles
- Easier to use from a vehicle



KNOW THE NUMBERS

MAGNIFICATION



Lowest Magnification: The lowest end of your magnification range is 20x. Larger field of view allows for easier target acquisition.

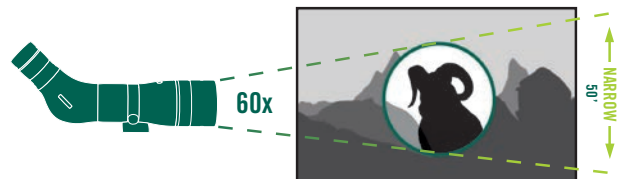
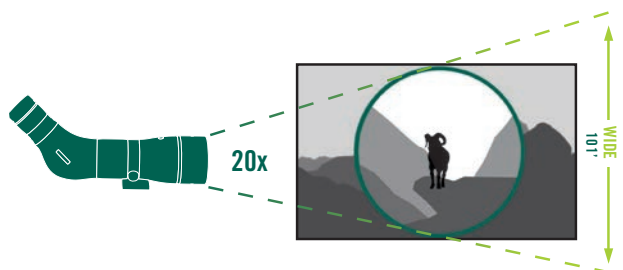
Highest Magnification: The highest end of your magnification range is 60x. More detail but at the sacrifice of the field of view.

Spotting scopes are recommended to be used on a tripod for a stable image and comfortable viewing.

FIELD OF VIEW

Field of view is the width of the area you can see, commonly measured in feet at 1,000 yards. With spotting scopes you have two measurements, one at low magnification range and one at high magnification.

As magnification increases, field of view decreases.

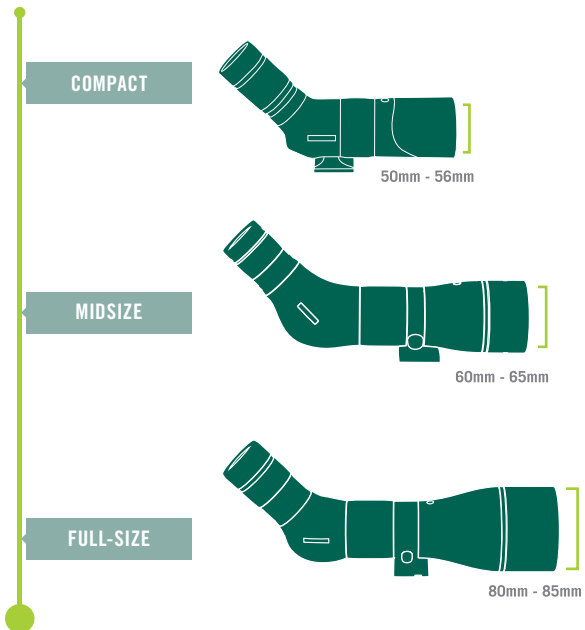




OBJECTIVE LENS DIAMETER



All else equal, a larger objective size delivers a brighter image but increases size and weight.



SMALLER OBJECTIVE

- Ideal for backcountry hunts
- Lighter and stows easier in a backpack
- Easier to use in tight spaces/dense cover

LARGER OBJECTIVE

- Ideal for long-range hunting and shooting
- Better low-light performance
- Brighter images/better light transmission

BASIC ADJUSTMENTS

ADJUST THE MAGNIFICATION

Change your spotting scope's magnification by simply turning the Magnification Adjustment Ring in a clockwise or counterclockwise direction.



ADJUST THE FOCUS

After setting the magnification, some refocusing is usually required. To adjust the focus, rotate the focus dial until the image is in focus.



ADJUST THE EYECUP

The Adjustable Eyecup twists up and down so you can observe the full field of view. The Adjustable Eyecup will help with comfortable viewing for differences in facial structure and for use with or without glasses.



ADJUST THE VIEWING ANGLE

Some spotting scopes provide a rotating tripod collar that allows you to rotate the spotting scope body for greater viewing flexibility.



Mounting Collar Thumb Screw



ADJUST THE SUNSHADE

Some spotting scopes provide a Built-in Sunshade that extends to block out interfering stray light. The Sunshade also shields the objective lens from damage and against precipitation.





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