

OWNER'S MANUAL
ASTRONOMICAL BINOCULARS
ZHUMELL TACHYON 25X100 ASTRONOMY BINOCULARS



zhumell
your world within reach



Zhumell customers know that there are plenty of ways to experience the world. They also understand that, however you choose to explore it, the best experience is one that fully immerses you in the world's most striking details.

That's where our optics products come in. We strive to put high-performance products in the hands of our customers so that they can experience the world up close, with their own eyes.

With Zhumell, you get field-tested, precision-crafted optics at the best possible value. So even if you're just starting out as an amateur birder or astronomer, you don't have to settle for entry-level products. Zhumell customers enjoy life's pursuits, hobbies, and adventures in rich, colorful detail- the kind of detail that only high-performance optics can produce.

At Zhumell, we design our binoculars, telescopes, and spotting scopes for discerning, price-conscious users who are uncompromising on quality. If you're looking for accessibly priced optics that will bring your world within reach, you're looking for Zhumell.

Enjoy the view.



ENJOYING YOUR ZHUMELL ASTRONOMICAL BINOCULARS

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CARING FOR YOUR ZHUMELL ASTRONOMICAL BINOCULARS

Zhumell binoculars are precision optical instruments designed for ease of use and versatility in their application. Your Zhumell binoculars are built with the highest-quality optics and top-notch construction to provide years of reliable functionality, but will require proper care.

If, after reading this manual, you still have questions about your Zhumell binoculars, please visit <http://www.zhumell.com> for more helpful tips and contact information. Our customer service representatives are available to address any problems you encounter with your binoculars. Please let us know about your experiences; we would like to hear your feedback.

Enjoy your Zhumell.

CARING FOR YOUR ZHUMELL ASTRONOMICAL BINOCULARS

WARNINGS

- Never look at the sun through your binoculars. Doing so can cause permanent damage to your eyes, including blindness.
- Always be sure your binoculars are properly held, secured, or stored.
- While viewing objects at distance, be sure to be aware of what's going on around you to prevent harm to yourself or to your binoculars.

CARE

- When cleaning binocular lenses, use included lens cloth or other soft, lint-free cloth.
- Use lens cleaner or diluted isopropyl alcohol to remove dirt and smudges - other chemicals may damage your equipment. Always apply solution to a lens cloth first, never directly to the lens.
- Store binoculars in a moisture-free area. Be sure to dry your equipment before packing it up.
- Always use lens caps when binoculars are not in use.
- Always store your binoculars in a protective case to avoid accidental damage.

USING YOUR ZHUMELL ASTRONOMICAL BINOCULARS

To get the most from your Zhumell astronomical binoculars, be sure to understand and properly use these features. Doing so will lead to the most satisfying experience possible from your new optical equipment.

TRIPOD MOUNTING

Zhumell astronomical binoculars are far too large to hold comfortably in your hands while viewing. For most applications, use the included tripod adapter as follows:

1. Slide the tripod adapter until the tripod base fits between the binocular barrels
2. Securely tighten the tripod adapter
3. Screw a standard .25-inch #20 tripod base screw into the threaded socket on the adapter
4. Adjust as needed

INTERPUPILLARY DISTANCE

Interpupillary distance is the distance between the eyepieces of a binocular. Easy adjustment will ensure that your binoculars are giving you the view you want. To adjust interpupillary distance, follow these simple steps:

1. Hold binoculars in the normal viewing position
2. Grasp each barrel firmly
3. Gently move the barrels closer together or farther apart until you see a single circular field
4. When your view appears as a single circle, the interpupillary distance is correct. Note the settings for easy adjustment in the future.

USING YOUR ZHUMELL ASTRONOMICAL BINOCULARS

EYEPiece FOCUS

Your Zhumell binoculars have individual eyepiece focus, which allows for greater control over your view. Each eyepiece is focused using the diopter ring directly behind the lens. To bring your binoculars into focus, follow these steps:

1. Choose a distant or astronomical object on which to focus.
2. Close your left eye or cover the left objective lens and turn the right diopter until the object is in perfect focus.
3. Close your right eye or cover the right objective lens and turn the left diopter until the object is in perfect focus.
4. When viewing with both eyes, the object should now be crystal-clear. If it is not, make individual adjustments as needed.

TERRESTRIAL AND ASTRONOMICAL VIEWING

Your Zhumell binoculars are equipped for both large-magnification terrestrial viewing and astronomical viewing purposes. Although they are light enough to hold in your hand, we recommend these binoculars be mounted to a tripod for best results. At high magnification, even the smallest movement of the binoculars results in a large jolt to the view.

To use your binoculars for land-based viewing, mount to a tripod and point the binoculars at the object you'd like to see. Adjust the focus knobs to bring the object into clear view.

To use your binoculars for astronomical viewing, read the following guide to achieve viewing success.

SELECTING A VIEWING SITE

The ideal site for using your binoculars for astronomical viewing is in the middle of nowhere. Most users don't have access to the darkest of skies, however, so select a site that is both far from light pollution and practical for travel. Avoid street lights, yard lighting, rooftops, and chimneys, and never observe through an open window indoors. Be sure your site is out-of-town or very dark and has clear view of a large portion of the sky.

ASTRONOMICAL OBSERVATION TIPS

SEEING AND TRANSPARENCY

Atmospheric conditions are of the utmost importance when considering viewing conditions for your astronomical binoculars. These conditions are commonly referred to as “seeing.” When seeing is good, star twinkling is minimal and objects appear steady in your lenses. Seeing is best overhead, worst at the horizon, and generally better after midnight. You can’t see the stars without looking through the atmosphere, so the clearer the air and the higher your altitude, the better seeing conditions you will encounter.

A reliably quick way to judge seeing conditions is to look at bright stars about 40° above the horizon. If the stars appear to twinkle, there is significant atmospheric distortion and viewing at high magnification will not be ideal. If these stars are steadily bright, chances of successful viewing at high magnification are much better.

Judging the transparency of the air is also important in determining viewing conditions. The best air is free of moisture, dust, and smoke, which tend to scatter light, reducing a viewed object’s brightness.

How many stars can you see with your naked eye? If you are unable to see stars of magnitude 3.5 or dimmer, transparency in your area is poor. A good indicator star for this test is Megrez (mag. 3.4) - the star in the Big Dipper connecting the handle to the dipper. If Megrez is not visible, elements in the air will negatively affect your view.

ASTRONOMICAL OBSERVATION TIPS

DARK-ADAPTING YOUR EYES

When you go out into the dark, your eyes need time to adjust. You will initially be able to see only a fraction of the stars and objects your eyes are capable of. Remain in the dark (don't look at any lights or cell phones) for at least 30 minutes, and your eyes should be around 80% of their full dark-adapted sensitivity. Every time bright light comes into your eye, the dark-adapting process will start over.

When eyes are fully dark-adapted, you will probably still need to see what you're doing. Use a red-light flashlight to maneuver around the area. A regular flashlight covered in red cellophane will work, but red LED lights are best.

TRACKING CELESTIAL OBJECTS

The Earth is always rotating about its polar axis, completing one full rotation every 24 hours. This is what defines our "day", and we see it in the apparent movement of sun and stars throughout each rotation. In the same way that the sun rises and sets each day, the stars in the sky rise and set each night. The motion translates to a rate of approximately $.25^\circ$ per minute, or 15 arc-seconds per second. This is commonly referred to as the sidereal rate.

As you observe any celestial object, remember that it is in motion. You will need to continuously update your binocular position throughout a viewing session, most easily done using your tripod adjustments. As an object begins to leave your field of view, adjust your position in the correct direction and bring the view back to center.

ASTRONOMICAL OBSERVATION TIPS

Remember, your binoculars achieve a high level of magnification, which shrinks your field of view accordingly. Objects will appear to move faster at high magnification, and frequent positional adjustments will need to be made.

COOL VIEWS WITH YOUR ZHUMELL ASTRONOMICAL BINOCULARS

THE MOON

The Earth's moon is one of the easiest and most rewarding targets at which to point your binoculars. Its rocky, cratered surface is close enough to be rendered in some detail, and allows for satisfying exploration. The best time for lunar viewing is during its partial phases, when shadows fall on the craters and canyon walls to give them definition. Even though the full moon may look like a tempting target, the light is too bright and the definition too low for optimal viewing.

THE PLANETS

The planets are beautiful and popular targets for astronomers, but they can be more difficult to keep track of than the stars or moon. Planetary position charts can readily be found online or in any astronomical publication. Sun and Moon aside, the brightest objects in the night sky are Venus, Mars, Jupiter, and Saturn. The apparent size of planets can be quite small, but high-power binoculars provide an adequately enjoyable view.

COOL VIEWS WITH YOUR ZHUMELL ASTRONOMICAL BINOCULARS

JUPITER

Jupiter is our solar system's largest planet. Through your binocs, you can easily see the planet and observe the changing positions of its four largest moons: Io, Callisto, Europa, and Ganymede. With the right conditions, you may be able to see cloud bands wrapped around the planet and the famous Great Red Spot.

SATURN

This infamously ringed planet can be a fantastic sight through your binoculars. The tilt-angle of the rings varies over a period of many years, so they may be seen edge-on (like a thin line) or broadside (like giant "ears" on each side of the planet). You will need a good steady atmosphere to achieve a worthwhile view of Saturn. If you look closely enough, you can see the Cassini division - a thin, dark gap in the rings. You can also often make out one or more of Saturn's moons, including the largest - Titan.

VENUS

At its brightest, Venus is the most luminous of all the planets - so bright that it is occasionally visible in full daylight. Venus appears as only a thin crescent at its brightest, and it is never found far from morning or evening horizon. No surface detail can be seen on Venus as it is surrounded by dense cloud cover.

MARS

Mars makes a close approach to our planet once every two years, which is the best time to observe it. With your binoculars, you'll be able to see a salmon-colored disk marked with dark patches and possibly a whitish polar ice cap. Surface detail on Mars is only observable during prime conditions with a high-power magnification.

COOL VIEWS WITH YOUR ZHUMELL ASTRONOMICAL BINOCULARS

THE STARS

Through your binoculars, stars will appear much as they do to the naked eye - as tiny points of light against a dark sky. Even powerful binoculars cannot magnify stars to appear as anything more than these pinpoints. You can, however, enjoy the different colors of their glow and locate many beautiful double- and multiple-stars.

Two popular targets are the "Double-Double" in the constellation Lyra and the two-color double star Albireo in Cygnus.

DEEP-SKY OBJECTS

With dark skies, ideal viewing conditions, and powerful astronomical binoculars, you can observe a number of amazing objects outside our solar system - commonly referred to as "deep-sky objects".

These include star clusters, galaxies, gaseous nebulas, and more.

With primary conditions, your binoculars are well equipped to gather the light necessary to view these objects, but you will need to find a viewing site well away from light pollution and give your eyes plenty of time to fully dark-adapt. As you continue to view, your eyes will become trained, and more and more subtle details from these objects will become apparent. Don't expect to see color, however, as human eyes are not sensitive enough to distinguish color from faint light.

STARHOPPING

Starhopping is the most common and simplest way to reliably track down objects in the night sky. It uses relative positioning, beginning at a star with a known location and progressing to other stars closer and closer to the destination object. It's been used for hundreds of years, and - with practice - will never let you down when finding an object. Starhopping can be very difficult at first, so be patient and keep trying!

COOL VIEWS WITH YOUR ZHUMELL ASTRONOMICAL BINOCULARS

You will need a small number of additional resources to successfully employ starhopping as your night-sky positioning technique. A star chart or atlas that shows stars to at least magnitude 5 is required. Choose one that shows the positions of many deep-sky objects to give yourself a wealth of options. If you don't already know the positions of the constellations in the night sky, you will need a planisphere as well.

Begin by choosing brighter deep-sky objects as your destination. The brightness of an object is measured by its visual magnitude; the brighter an object, the lower its magnitude. Choose an object with a visual magnitude of 9 or lower. Most beginners start with the Messier objects, some of the brightest and most beautiful deep-sky objects, first catalogued about 200 years ago by French astronomer Charles Messier.

Using your star chart, determine in which constellation your object lies and locate that constellation in the night sky. Turn your binoculars to face this general direction. Find the brightest star in this constellation and center your view on it. Consult your star chart again, and determine the next brightest star between your currently focused star and your object destination. Move your binoculars slightly to focus and center this next star. Continue on this course, using each star as a guidepost for the next, until you reach the area in the sky in which the object of your hunt should be seen. Center the object and bring it into focus. You've just found a deep-sky object. If the object is still not in view, retrace your starhopping steps and start again. Remember, expertise in this hobby will require both patience and practice.

Good luck out there!

ASTRONOMY TERMINOLOGY

DECLINATION (DEC.) - The astronomical equivalent of latitude. Declination describes the angle of a celestial object above or below the celestial equator. The sky over the northern hemisphere has a positive declination. The sky over the Southern hemisphere has a negative declination. For example, Polaris (the North Star) which lies nearly directly over the North Pole, has a declination value of 90° .

RIGHT ASCENSION (R.A.) -

The astronomical equivalent of longitude. Right ascension measures the degree of distance of a star to the east of where the ecliptic crosses the celestial equator. R.A. is measured in hours, minutes, and seconds as opposed to degrees. It is different than the term "meridian", which is used in referring to lines of longitude. Right ascension is referred to in "hour circles". There are 24 hour circles of right ascension which run from the north to south celestial poles.

CELESTIAL EQUATOR - The celestial equator is the line of declination which lies directly above the Earth's equator. The celestial equator lies halfway between the north and south celestial poles and serves as the 0° point in measuring declination.

ECLIPTIC - The ecliptic is the apparent path of the sun through the sky over the course of the year. Since we view the sun from different angles throughout the year, it appears to move in relation to other stars. The vernal (spring) and autumnal (fall) equinoxes lie at the points where the ecliptic intersects the celestial equator. The vernal equinox is where right ascension is at 0h (hours). The autumnal equinox can be found at 12h R.A.

ZENITH - The zenith is the point in the celestial sphere directly above your head. The zenith varies depending upon your location. In general, the declination point of your zenith is equal to the latitude at which you are standing on Earth.

EPHEMERIS - The ephemeris of a planet or the sun or the moon is a table giving the coordinates of the object at regular intervals of time. The coordinates will be listed using declination and right ascension. Other information such as distance and magnitude may be listed in ephemerides (plural of ephemeris).

ALTITUDE - The altitude of a celestial object is the angular distance of that object above the horizon. The maximum possible altitude is the altitude of an object at the zenith, 90° . The altitude of an object on the horizon is 0° . Altitude is measured from your point of observation and does not directly correlate to points on the celestial sphere.

AZIMUTH - Azimuth is the angular distance around the horizon measured eastward in degrees from the North Horizon Point. Thus, the North Horizon Point lies at an azimuth of 0° , while the East Horizon Point lies at 90° , and the South Horizon Point at 180° . Azimuth is measured from the point of observation and does not directly correspond to points on the celestial sphere.

ANGULAR DISTANCE - Angular distance is the size of the angle through which a telescope tube or binocular aiming at one object must be turned in order to aim at another object. If you must rotate the equipment from the zenith to the horizon, the angular distance between the two points would be 90° .

WARRANTY

Zhumell products are designed to provide you with the highest quality and best value available, which is why we're proud to offer a world-class warranty on all of our products. All Zhumell binoculars are covered by a 25-year no-fault warranty.

To obtain warranty service, the damaged equipment must be returned to Zhumell. Our Customer Care associates will be happy to assist you in completing this return to get your Zhumell in working order as quickly as possible. There is a \$15 surcharge associated with warranty returns to cover return shipping and handling.

For more information, contact information, and to download the Zhumell Warranty Return Form, please visit <http://www.zhumell.com>.