

Celtic Vision - Photo Imaging Store

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Guide to Binoculars

The following information is aimed at giving you a basic understanding of how binoculars work, the different specifications available and what they mean, plus some points to help you make a more informed decision about which model to choose.

Specification Example: 8x42. The first figure '8' denotes the magnifying power and allows the user to see an object 1/8th the distance away. The second figure '42' represents the diameter of the objective lens (the large end) in mm through which light enters the binocular. The symbols or letters that often follow provide important information as to which binocular may best suit your requirements.

The letters Z or B usually denote conventional porro prism binocular body styles, which gather light from lenses further apart than one's pupils giving a stereoscopic effect that counters the foreshortening of perspective caused by magnification. The letter D stands for roof prism binoculars, which although more compact than porro prism models, tend to be more expensive and for the same price often under perform their larger counterparts.

Centre focusing 'CF' is generally more popular than individual eyepiece focusing 'IF' especially when readjustment is required at less than infinity settings. Most 'IF' binoculars are 7x magnification which give a large depth of field thus negating the need for focusing adjustment at distances over 100m.

The suffix B when used on roof prism binoculars including Opticron BGA models mean the eyepieces have a long eye relief giving full field of view for spectacle wearers. GA stands for rubber armouring and W or WA denotes binoculars that give wide-field or wide-angle vision.

What magnification? For hand held use, practical trials suggest choosing a binocular with a magnification no greater than 8x or 10x, the reasons for which are as follows. The magnification effectively spreads the available light over the image being viewed. The higher the magnification, the larger the image being covered and hence the lower the relative brightness of the image. Higher magnification binoculars also give a reduced depth of field (distance in clear focus at one time) and field of view. Lastly, the higher the magnification the more natural hand-shake or tremor affects the stability of the image. If you want binoculars over 10x magnification it is advisable to try them first and consider using a support such as a tripod to attain a stable image, especially when viewing for long periods.

The objective (OG) lens and light transmission For any given specification of binocular the amount of light passing through the instrument (known as light transmission) varies according to the optical design, optical quality and lens coatings used. However, a few general rules can help you in your choice. The amount of light entering the binocular is directly related to the surface area of the OG lens. A 50mm OG will admit 2.5x the light of a 30mm OG. The amount of light reaching the eye when positioned at the eyepoint of the binocular is known as the exit pupil diameter or EPD. Its size can be found by dividing the OG diameter by the magnification, e.g. the EPD of an 8x32 = 4mm, the EPD of an 8x56 = 7mm. As a general rule the iris in the eye dilates between 2 and 3 mm (bright sunlight) and 7 and 8 mm (twilight) and therefore a choice should be made on the type of use the binocular is being put to. For general use an 8x40 with EPD of 5mm is recommended.

Field of view The field of view of a binocular is expressed as either the width of panoramic view in metres from a distance of 1000m or in degrees. For example: 1 degree = 17.45m approx. A binocular is usually stated to be a wide-angle instrument if the angular field in degrees when multiplied by the magnification gives a figure equal or larger to 65. The field of view of a binocular is dependent on the overall design and for any given design directly related to the magnification. As you read through the information and compare models in the same range, you may find that on occasions the 10x magnification model gives a similar, equivalent or larger field of view as the 8x magnification model. This is because different eyepiece designs are used within a range.

Setting up the binocular To adjust to the spacing of your eyes known as inter pupillary distance (IPD), simply rotate the two sides of the binocular around the centre hinge until a single rounded picture is obtained when looking through both eyepieces. Some roof prism binoculars have two hinges and a single rounded picture is obtained by rotating both hinges simultaneously around the centre focusing plate. As mentioned, most binoculars are focused by turning the centre focusing wheel. If however there is a difference in strength between the eyes, the dioptre scale (usually located on the right hand eyepiece) can be adjusted in order to compensate. To set the binoculars for your eyes, focus with your left eye on an object using the focusing wheel. When the object is in sharp focus, close your left eye and open your right adjusting the dioptre ring until the image being viewed becomes sharp. Opening both eyes should then reveal the sharpest picture at all distances.

Wearing glasses Many binoculars provide the full field of view when wearing glasses by either folding down rubber eyecups or by turning/pushing retractable eyecup assemblies to the 'down' position. As a general rule the longer the eyerelief - the distance between the surface of the eyepiece and the point where the pupil is positioned for full field of view - the better the instrument for spectacle wearers.

Due to the differences between individuals, it is advisable to try different models as binoculars with too short an eyerelief will not only result in a reduced field of view but can cause eyestrain when using glasses.

Finally, you might find the right binoculars with the right specification and then decide against them because of their weight. It has been said many times and with some truth that small, lightweight binoculars which can be taken anywhere are used much more than larger, heavier ones which tend to be left at home.

Guide provided courtesy of Opticron