

# Space Explorer 90/900 EQ Refracting telescope

Art. No. 9621801









## **Possible observation objects**



Dumbbell Nebula in the constellation "Little Vixen" (lat. Vulpecula) (M 27)

### **General Information**

#### About this instruction manual

Please read the safety instructions in this manual carefully. Use this product only as described in the manual to avoid damage to the device or injury. Keep the operating instructions in a safe place so that you can always keep up to date on all the operating functions.



#### DANGER!

You will find this symbol before every section of text that deals with the risk of minor to severe injuries resulting from improper use.



#### ATTENTION!

You will find this symbol in front of every section of text which deals with the risk of damage to property or the environment.

#### Designated use

This device is for personal use only. It was developed for a magnified representation of observations of nature.

#### General warnings

#### **RISK OF BLINDNESS!**

Never look directly at, or near to the sun with this device. There is a RISK **OF BLINDNESS!** 



#### **DANGER OF SUFFOCATION!**

· Children must only use the device under adult supervision. Keep packaging materials (plastic bags, rubber bands, etc.) away from children! There is a DANGER OF CHOKING!

#### FIRE HAZARD!

Do not expose this device - especially the lenses - to direct sunlight! Focusing of sunlight could cause fires.

#### ATTENTION!

Do not disassemble the device! In the event of a defect, please contact your dealer. They will contact the Service Centre and can arrange the return of this device for repair if necessary.

Do not expose the device to high temperatures.



#### **Protect privacy!**

The binoculars are only intended for private use. Respect the privacy of your fellow human beings - do not look into private flats with this device, for example!

### All parts (Fig 1-3)

- 0 Telescope tube
- 0 I FD viewfinder
- Ø Adjustment screws
- 4 Tube opening
- 6 Objective
- 6 Eyepiece socket
- 0 Focus wheel (focus adjustment)
- 8 Tube clamp
- 9 Mounting
- 0 Accessory tray with screws (3x) and wing nuts (3x) Ø
- Locking screws (tripod)
- Ø Dust cap B
- Tripod Leg
- Ø Flexible shaft for declination adjustment
- ß Flexible shaft for right ascension adjustment
- 6 Fastening struts
- Ø Counterweight + rod
- B Evepiece
- Ð **Upright Prism** 20
- **Barlow Lens**

\*camera specific T2 ring additionally required, not included in the delivery

#### Parts (Fig15): Mounting

- Tube clamp Α
- В Focusing the focus wheel
- С Scale of the declination axis
- D Declination axis fixing screw
- Fine adjustment of the declination axis Ε
- F Latitude setting scale
- G Fixing and adjusting screw of the latitude setting
- Counterweight with locking screw н
- I Fixing screw of the right ascension axis
- Right ascension axis scale J K
- Fine-adjustment of the right ascension axis

ATTENTION!

- Fixing screw for horizontal alignment L
- Bracket for optional tracking motor Μ
- Ν Clutch for disengaging the engine

TIP:

0 Transmission gear for tracking motor



The right ascension axis (Fig 16 green line) is also called the hour axis.

The declination axis (Fig 16 blue line) is also called the elevation axis.

#### Part I - The Structure

#### 1. General information about the structure and the choice of location

Before you begin the assembly, you must choose a suitable location for your telescope. It helps, if you set up this instrument in a location where a clear view of the skies , a stable footing and sufficient space around you are given.

First, remove all the parts from the packaging. Using the diagram, check whether all the parts are included.



Only tighten the screws with care "hand-tight" to avoid "overtightening" the screws. This can cause damage to the screws and threads

#### 2. Set up the tripod

The tripod legs are pre-assembled and already connected to the tripod head (Fig 5, X) and the tripod spider (Fig 1, 16).

Remove the tripod from its packaging and place it vertically with the tripod feet facing down. Now take two of the tripod legs and carefully pull these tripod legs apart to the fully open position. The entire weight of the tripod rests on one leg. Then set up the tripod straight.

Now pull out each tripod leg individually to the desired length (Fig 4) and now turn one each of the clamping screws (Fig 4, 11) 3 pieces hand-tight. Do not overtighten the screws! The clamping screws are used to lock the inner tripod leg segments at the desired height.



A small spirit level on the accessory tray can help you set up your tripod level.

#### 3. Insert mount

Next, attach the mount (Fig 1, 9) to the tripod head (Fig 5, X). To do this, insert the mount in to the top of the tripod head and hand-tighten the thumbscrew from below.

The mount (Fig 1, 9) is assembled by sliding the weight on to the weight rod (Fig 7, X) and screwing it firmly in to the thread of the mount from below.

The mount is completed by placing the tube clamp (Fig 1+3, 8) on the mount and securing it with the screw (Fig 8, X).

Maksutov optics do not have a tube clamp. The rail is placed directly on to the mount.

#### 4. Mount shelf

The accessory tray (10) is mounted to the mounting struts with the beveled sides facing down. To do this, the screws (Fig 6, X) are pushed through the holes in the tray and the brackets from above and screwed on with the wing nuts (Fig 6, Y) from below.

#### 5. Mounting the tube

To mount the telescopic tube (Fig 1, 1), first loosen the screws of the tube clamps (Fig 9, X) on the holder and open the clamps.

Place the tube in the middle of the holder and close the clamps. Hand-tighten the clamp screws again so that the tube is securely fastened to the holder.

#### 6. Insert eyepiece and upright prism



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Two eyepieces (Fig 2, 18) and an upright prism (Fig 2, 19) are supplied with your telescope as basic equipment.

With the eyepieces you determine the respective magnification of your telescope.

Before inserting the eyepieces and the upright prism, remove the dust cap from the eyepiece tube.

(Fig 1, 6) Loosen the clamping screw (Fig 12, X) on the eyepiece tube and insert the upright prism first. Then retighten the clamping screw (Fig 12, X). Then fix the 20mm eyepiece in the upright prism in the same way by opening and closing the clamping screw (Fig 13a, X).

Make sure that the eyepiece sight points vertically upwards. This facilitates easy viewing. Otherwise, loosen the clamping screw (Fig 12, X) on the eyepiece tube and turn the upright prism to this position.

#### 7. Mounting and adjusting the LED viewfinder

Fully insert the base of the LED viewfinder (Fig 1a, 2) into the corresponding base on the optics tube (Fig 10, X).

**IMPORTANT:** Make sure that the mirror surface of the LED viewfinder points towards the tube opening when attaching it.

#### 7.1. Battery replacement

Note: The battery of the LED viewfinder is protected against discharge by a plastic foil when delivered. This must be removed before switching on for the first time!

Remove the button cell held in the battery holder (Fig 1a, W) with a contact clip. Insert a new battery (button cell type CR2032, 3V) into the holder.

#### 8. Adjusting the LED viewfinder

The LED viewfinder must be adjusted before use. This means that the "viewing direction" of the LED viewfinder and the optical tube must be matched:

Insert the eyepiece with the longest focal length in to the zenith mirror (13). Aim the telescope at a prominent object at a distance of approx. 300 m (e.g. house gable, church spire, etc.) until it appears in the centre of the field of view (Fig14, A).

Turn on the LED viewfinder. To do this, move the slider (Fig 1a, Z) to position '1' (weak red dot) or '2' (brighter red dot).

Look through the LED viewfinder and adjust it by turning the horizontal (Fig 1a, X) and vertical (Fig 1a, Y) adjustment screws so that you see the red dot in the center of the image (Fig14, C). The LED viewfinder and telescope are now matched.

#### Important: The image in the telescope will be upside down unless you use appropriate accessories to invert the image (e.g. zenith prism).

#### 9. Use protective caps

To protect the inside of your telescope from dust and dirt, the tube opening is protected by a dust cap (Fig 11, X). There is also a dust cap on the eyepiece tube (Fig 1, 6).

#### 10. Use flexible shafts

The flexible shafts facilitate the exact fine adjustment of the declination and right ascension axis. They are pushed onto the holders provided for the two axles (Fig13, Y) and fixed with the small clamping screws (Fig 13, X).

**Note:** The long flexible shaft (Fig 1, 14) is mounted parallel to the telescopic tube. The fastening is done with a clamping screw at the provided notch of the axle. The short flexible shaft (Fig 1, 15) is fitted laterally. The fastening is done with a clamping screw at the provided notch of the axle.

The telescope is now ready for use.

#### PART II - The handling

#### 1. Function and use of the mount

The following information is extremely important for the positioning and tracking accuracy of your telescope during a night observing. Your telescope has a so-called "parallactic mount" (also equatorial mount). This is characterized by two axes that can be rotated perpendicular to each other (Fig15, a+b)

The so-called right ascension axis (also RA or hour axis) (Fig 15, b) must be aligned parallel to the polar axis of the earth (Fig 25, c). For the correct setting of the pole height, see Part II - 4. Handling - Adjusting the telescope).

The declination axis (also DEC or elevation axis) (Fig15, a) is used to set the altitude of a celestial object in relation to the celestial equator (Fig 25, d). To do this, take the declination coordinates of a celestial object from a star chart or discover the objects yourself.

With the manual operation of the right ascension axis via the flexible shaft (Fig 1, 15) you continuously compensate the earth rotation in the opposite direction. This way, your selected (= positioned) object always remains in the field of view of the eyepiece.

#### 2. Choosing the right site

A dark location is very important for many observations, since disturbing lights (lamps, lanterns) can considerably impair the sharpness of detail of the telescope image.

When you go outdoors at night from a bright room, your eyes have to get used to the darkness. After about 20 minutes you can start your astro observation.

Do not observe from closed rooms and place your telescope with the accessories in its location approx. 30 min. before starting observation to ensure temperature equalization in the tube.

Furthermore, you should make sure that this telescope is placed on a level, stable surface.

#### *3. Balancing the telescope*

Your telescope must be balanced before observing. That is, the declination axis and the right ascension axis are adjusted for smooth and accurate operation.

The right ascension axis is balanced by loosening the fixing screw (Fig15, I) and tilting the weight rod to a horizontal position. Now move the counterweight (Fig15, H) on the rod until the tube and the counterweight remain in this horizontal position. Retighten the fixing screw (Fig15, I) of the right ascension axis. The declination axis is balanced by loosening the fixing screw (Fig15, D) of the declination axis. Then loosen the screws of the tube holder (Fig15, A) and move the tube until it also remains in a horizontal position. Do not forget to re-tighten the screws of the tube holder axis.

#### 4. Adjusting the telescope

Adjust the latitude axis (Fig15, F) (pole height) by loosening the fixing screw (Fig 17, X) and adjust the Pohl height accordingly with the adjusting screw (Fig 17, Y).

The number on which you set the axis depends on the latitude of your location (e.g. Munich 48°, Hamburg 53°).

Do not forget to tighten the fixing screw again. Then adjust the declination axis (Fig15, C) to 90° by loosening and tightening the fixing screw (Fig15, D). The telescope tube is now aligned parallel to the Earth's axis. This is called polar alignment.



You will always find the latitude of your exact observation location on the right or left edge of a map in an atlas. You can also obtain information from your local council, land registry office or on the Internet: e.g. at www.heavens-above.com. There you can select your country under "Anonymous user > Select"; the data will then be displayed.

#### 5. Polar alignment of the telescope

TIP:

Point the telescope with the tube opening forward towards the north. To do this, loosen the locking screw (Fig 18). Now you can rotate the telescope tube and align it exactly to the north. If necessary, use a compass to help you. Afterwards, the locking screw is fixed again.

Check that your telescope is set up as shown in Fig 27. The counterweight (Fig 27, X) points to the ground and thus forms a vertical axis together with the tube.

In this position you can see the polar region with the polar star through the viewfinder. Polaris is the brightest object in this region. (Fig 26)

This should then also be visible in the centre of the field of view of the eyepiece (f=20 mm). Polar alignment has been achieved. This setup requires some patience, but rewards you with a good positioning option when searching with celestial coordinates. In this polar alignment, the graduated circles (scales) of the declination axis (Fig 28) should be at "9" (= 90°) and the right ascension axis (Fig 29) at "0" (= 0 hours). If necessary, carefully rotate both scales to the appropriate values (aligned with the arrows in each case).

Thus set, you can use the finding of celestial objects with the help of the graduated circles (scales) (see also 3.1. Possible objects of observation).

#### 6. Fine alignment by means of LED viewfinder

Your telescope is now roughly aligned and adjusted.

To achieve a comfortable observation position, carefully loosen the screws of the tube holder (Fig 9, X) so that you can rotate the telescope tube. Move the eyepiece and LED viewfinder to a position from which you can observe comfortably.

The fine alignment is done by using the finder scope. Look through the viewfinder and try to align the polar star (Fig 26) with the illuminated point (Fig 14). The shaft (Fig15, K) of the hour axis (Fig15, b), as well as the shaft (Fig15, E) of the declination axis (Fig15, a) will help you with the exact setting.

#### 7. First observations

Remove the caps from the openings for observation.

After you have adjusted the polar star in the LED viewfinder, you will be able to see the polar star in the telescope when you now look through the eyepiece.

If necessary, you can now align the star more precisely with the aid of the flexible shafts and adjust the focus using the focus wheel (7).

Furthermore, you can now set a higher magnification by changing the eyepiece (smaller focal length). Please note that the magnification of the stars is hardly or not at all perceptible.



**TIP:** Eyepieces are lens systems that face the eye. With the eyepiece, the image formed at the focal point of the telescope lens is recorded, i.e. made visible, and magnified again. You need eyepieces with different focal lengths to achieve different magnifications. Start each observation with a low magnification eyepiece (= higher focal length of 25mm).

#### 8. Star search

At first, you will certainly find it difficult to orientate yourself in the starry sky, as stars and constellations are always in motion and change their position in the sky depending on the season, date and time.

The exception is the polar star. Through it runs the extended imaginary polar axis of the earth. It is a fixed star and the starting point of all star charts. On the drawing you can see some well-known constellations and star arrangements that are visible all year round. However, the arrangement of the stars depends on the date and time.

If you point your telescope at one of these stars, you will notice that it disappears from the field of view of your eyepiece after a short time. To compensate for this effect, operate the flexible shaft (Fig15, K) of the right ascension axis and your telescope will follow the apparent trajectory of this star.

#### 9. Setting circles

Stars and other heavenly bodies are positioned in the heavens by coordinates. A star's place in the universe is determined by its right ascension and declination. Declination (Fig 22, C) is the distance of a star from the celestial equator (Fig 25, d), measured in angular degrees. For stars north of the celestial equator, the degree becomes positive. If the star is south of the equator, the degree is marked with a minus sign.

Right ascension (Fig 22, J) is a distance of a star from the vernal equinox measured on the celestial equator. The vernal equinox is the point of intersection of the celestial equator with the apparent orbit of the sun (the so called Ecliptic) (Fig 25, e). Ecliptic) (Fig 25, e). This happens in spring at the equinox (end of March). The value is counted in time from 0 to 24 o'clock, contrary to the daily celestial revolution.

You can find more detailed information in star charts or the relevant specialist literature.

#### 10. Accessories

Several accessories (Fig 2) are supplied with your telescope as standard.

Important: When fitting accessories, ensure that the small clamping screws (Fig 12, X) for fixing are always hand-tightened.

#### 10.1. Eyepieces

By changing the eyepieces, you determine the respective magnification of your telescope.

#### Calculation of the magnification:

Focal length (telescope) ÷ Focal length (eyepiece) = Magnification

### Examples:

Telescope- Focal length	Eyepiece Focal length	Magnification	Magnification with 3x Barlow lens
900 mm	20 mm	45X	135X
900 mm	12 mm	75X	225X
900 mm	4 mm	225X	675X

#### 10.2. Diagonal mirror

When looking through the eyepiece, an upside-down image appears for technical reasons. The zenith mirror causes an image inversion and is therefore especially suitable for earth observation. But it is also very helpful for easier orientation in the starry sky.

#### 10.3. Barlow Lenses

With a 3x Barlow lens, you can achieve an additional increase in magnification of 3x.

If necessary, the Barlow lens (Fig 23, 20) is inserted between the upright prism (Fig 23, 19) and the eyepiece (Fig 23, 18).

**Note:** Not every mathematically possible enlargement (sh. Table to 10.1) is also absolutely sensible. Some objects - especially in the night sky - can only be seen blurred at higher magnifications. This is not a defect, but a technical or physical one.

#### 11. Dismantling

After a hopefully interesting and successful observation it is recommended to store the entire telescope in a dry and well ventilated room. Some telescope models allow you to separate the mount and tripod by simply unscrewing them. In this case, your settings on the mount are retained. Do not forget to put the dust-protection-caps on to the OTA opening and on to the eyepiece connection. Also, you should stow all the eyepieces and optical accessories into their corresponding containers.

#### 12. Cleaning & Storage

Clean the lenses (eyepieces and/or objective lenses) only with a soft and lint-free cloth (e.g. microfibre cloth). To avoid scratching the lenses, use only gentle pressure with the cleaning cloth.

To remove more stubborn dirt, moisten the cleaning cloth with an eyeglasscleaning solution and wipe the lenses gently.

Protect the device from dust and moisture! After use, particularly in high humidity, let the device acclimatise at room temperature for a short period of time, so that the residual moisture can dissipate.

#### PART III - Annex

#### 1. Possible observation objects

Below we have selected and explained some very interesting celestial bodies and star clusters. In the accompanying illustrations at the end of the manual you can see how you will see the objects through your telescope with the supplied eyepieces - in good viewing conditions:

#### Moon (Fig 30)

The moon is the only natural satellite of the earth Orbit: approx. 384,400 km from the earth Diametre: 3.476 km Distance: 384.401 km

The moon has been known since prehistoric times. It is the second brightest object in the sky after the sun. As the moon orbits the earth once a month, the angle between the earth, the moon and the sun is constantly changing; you can see this in the cycles of the moon's phases. The time between two consecutive new moon phases is about 29.5 days (709 hours).

#### Constellation ORION / M42 (Fig 31)

Right Ascension (R.A): 05:32.9 (hours : minutes) Declination (DEC): 05:25 (degrees : minutes) Distance: 1.500 million light years

At a distance of about 1600 light-years, the Orion Nebula (M42) is the brightest diffuse nebula in the sky - visible to the naked eye, and a rewarding object for telescopes of all sizes, from the smallest binoculars to the largest Earth-based observatories and the Hubble Space Telescope.

It is the main part of a much larger cloud of hydrogen gas and dust, extending at more than 10 degrees over well over half of the constellation of Orion. The extent of this enormous cloud is several hundred light years.

#### Constellation LEIER / M57 (Fig 32)

Right ascension:18:51.7 (hours : minutes)Declination (DEC):32:58 (degrees : minutes)Distance:4.100 million light years

The famous Ring Nebula M57 in the constellation Lyra is often considered to be the prototype of a planetary nebula; it is one of the splendours of the northern hemisphere summer sky. Recent studies have shown that it is most likely a ring (torus) of brightly glowing matter surrounding the central star (visible only with larger telescopes), rather than a spherical or ellipsoidal gas structure. If the Ring Nebula were viewed from the side plane, it would resemble the Dumbell Nebula M27. We are looking right at the pole of the nebula for this object.

#### Constellation Vixen / M27 (Fig 33)

Right Ascension (R.A): 19:59.6 (hours : minutes) Declination (DEC): 22:43 (degrees : minutes) Distance: 1.250 million light years

The Dumbbell Nebula M27 or Dumbbell Nebula in the Vixen was the first planetary nebula ever discovered. On July 12, 1764, Charles Messier discovered this new and fascinating class of objects. We see this object almost exactly from its equatorial plane. If the Dumbell Nebula were seen from one of the poles, it would probably have the shape of a ring and resemble the sight we know from the Ring Nebula M57. This object can already be seen well in reasonably good weather conditions at low magnifications.

#### 2. Troubleshooting

Mistakes:	Solution:	
No image	Remove dust cap from tube opening	
	Select eyepiece with lower magnification (= high- er focal length)	
Blurred picture	Focusing with the focus wheel	
No focusing possible	Wait for temperature equalisation (approx. 30 minutes)	
Bad picture	Never watch through a pane of glass	
Observation object in the viewfinder, but not visible through the eyepiece	Adjust the viewfinder (see Part I - 8.)	
Difficult tracking of the axes via shafts	Balance telescope and counterweight (sh. Part II - 3.)	
Despite upright prism only "crooked" image	Align upright prism vertically in the eyepiece tube	

### Disposal



Observe the current legal regulations when disposing of the device! Information on proper disposal can be obtained from municipal waste disposal service providers or the Environmental Agency.

Do not dispose of electronic devices in the household waste! According to the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment and its transposition into national law, used electrical equipment must be collected separately and recycled in an environmentally sound manner.

Batteries and rechargeable batteries must not be disposed of with household waste. You are legally obliged to return used batteries and accumulators and can return the batteries after use either at our sales outlet or in the immediate

vicinity (e.g. in the trade or in municipal collection points) free of charge.

Batteries and accumulators are marked with a crossed-out dustbin and the chemical symbol of the pollutant, "Cd" stands for cadmium, "Hg" stands for mercury and "Pb" stands for lead.

#### Warranty & Service

The regular warranty period is 5 years and begins on the day of purchase. For complete warranty terms and services, please visit www.bresser.de/warranty\_terms.

In the event of a warranty claim, please first contact the service team responsible for your country, preferably by e-mail or using the contact form on the website. Here you can be helped quickly in most cases. The corresponding contact information can be found under "Service" in this manual.

#### **IMPORTANT!**

Do not send in devices - even in the event of damage - without first consulting the service department. Unfortunately, unsolicited devices cannot be accepted and processed.

## Service

## DE AT CH BE

Bei Fragen zum Produkt und eventuellen Reklamationen nehmen Sie bitte zunächst mit dem Service-Center Kontakt auf, vorzugsweise per E-Mail.

E-Mail: service@bresser.de Telefon\*: +4928728074210

### **BRESSER GmbH**

Kundenservice Gutenbergstr. 2 46414 Rhede Deutschland

\*Lokale Rufnummer in Deutschland (Die Höhe der Gebühren je Telefonat ist abhängig vom Tarif Ihres Telefonanbieters); Anrufe aus dem Ausland sind mit höheren Kosten verbunden.

## GB IE

Please contact the service centre first for any questions regarding the product or claims, preferably by e-mail.

E-Mail: service@bresseruk.com Telephone\*: +441342837098

## BRESSER UK Ltd.

Suite 3G, Eden House Enterprise Way Edenbridge, Kent TN8 6HF United Kingdom

\*Number charged at local rates in the UK (the amount you will be charged per phone call will depend on the tariff of your phone provider); calls from abroad will involve higher costs.

## FR BE

Si vous avez des questions concernant ce produit ou en cas de réclamations, veuillez prendre contact avec notre centre de services (de préférence via e-mail).

E-Mail: sav@bresser.fr Téléphone\*: 00 800 6343 7000

### **BRESSER France SARL**

Pôle d'Activités de Nicopolis 314 Avenue des Chênes Verts 83170 Brignoles France

\*Prix d'un appel local depuis la France ou Belgique

## NL BE

Als u met betrekking tot het product vragen of eventuele klachten heeft kunt u contact opnemen met het service centrum (bij voorkeur per e-mail).

E-Mail: info@bresserbenelux.nl Telefoon\*: +31528232476

### **BRESSER Benelux**

Smirnoffstraat 8 7903 AX Hoogeveen The Netherlands

\*Het telefoonnummer wordt in het Nederland tegen lokaal tarief in rekening gebracht. Het bedrag dat u per gesprek in rekening gebracht zal worden, is afhankelijk van het tarief van uw telefoon provider; gesprekken vanuit het buitenland zullen hogere kosten met zich meebrengen.

## ES IT PT

Si desea formular alguna pregunta sobre el producto o alguna eventual reclamación, le rogamos que se ponga en contacto con el centro de servicio técnico (de preferencia por e-mail).

E-Mail: servicio.iberia@bresser-iberia.es Teléfono\*: +34 91 67972 69

## **BRESSER Iberia SLU**

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\*Número local de España (el importe de cada llamada telefónica dependen de las tarifas de los distribuidores); Las llamadas des del extranjero están ligadas a costes suplementarios..

Notes					

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