



First Light MAK 100/1400 EQ

Maksutov telescope

Art. No. 9621802



Instruction manual

WARNING!



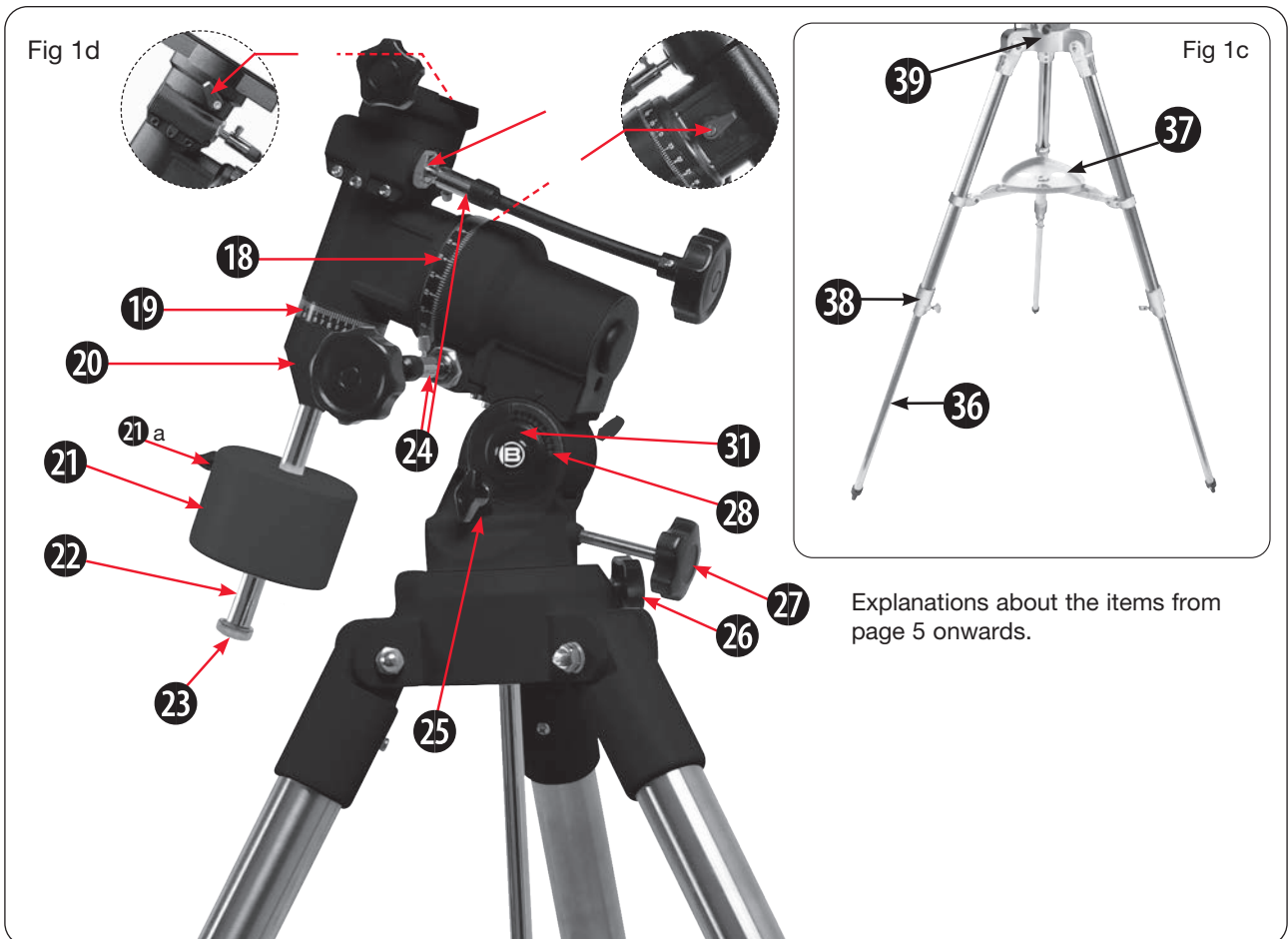
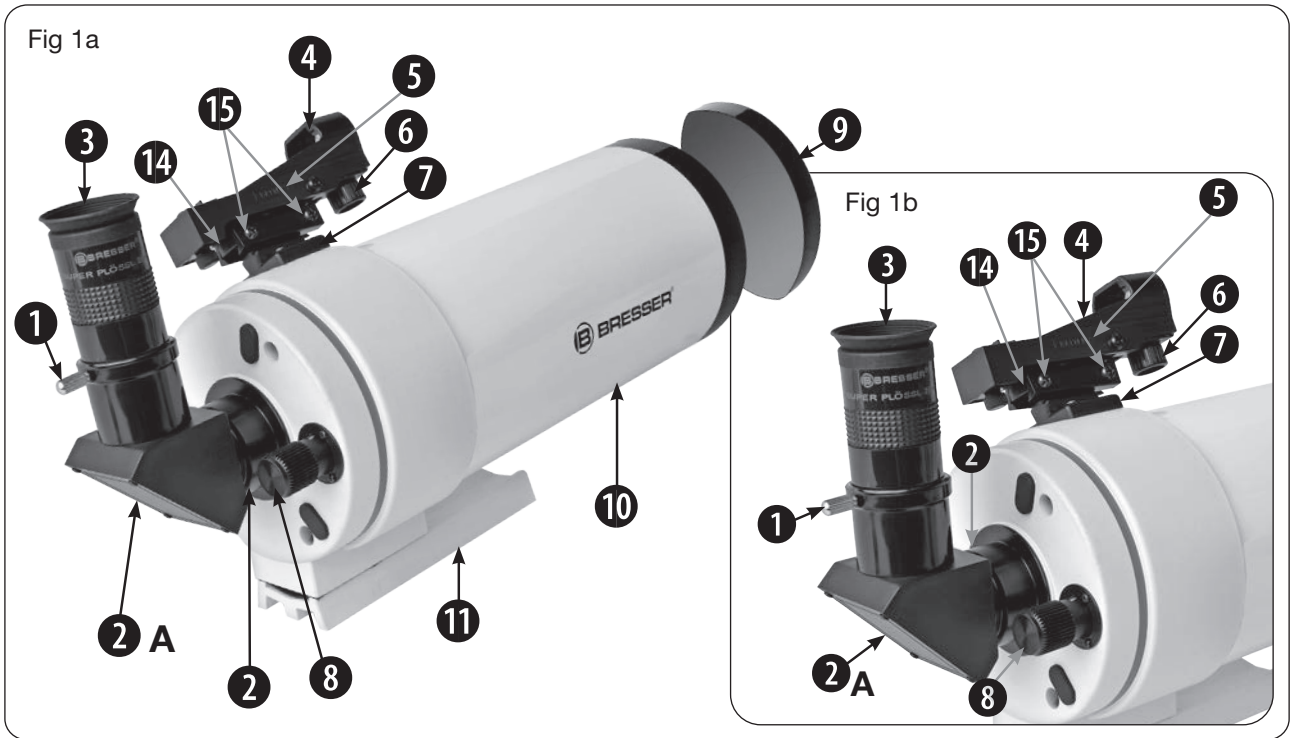
Never use a telescope for an unprotected view of the sun! As soon as you look directly at the sun, or even at its immediate surroundings, you risk immediate and irreparable damage to your eye. This damage of the eye happens mostly painlessly and therefore without any warning to the observer, so that it is perhaps already too late as soon as eye damage has set in. Therefore, never point the telescope or its viewfinder at or next to the sun. Never look through the telescope or its viewfinder when it is moving. During observation, children must always remain under adult supervision.

DOWNLOADS:

- Astronomy Software
 - Moon Map
 - Instruction Manual
- Accompanying reading material "Astro Basics"



<http://www.bresser.de/download/9621802>



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About this Instruction Manual

- Read the operating instructions and the general warnings carefully before assembly and before initial commissioning.
- All BRESSER telescopes and accessories are under constant technical development. For this reason, we reserve the right to make minor changes to the product specifications in order to improve the product. This also means that illustrations may not correspond in whole or in part to the parts included in the scope of delivery. However, the general operation is the same and the assembly as well as the use of the purchased product can still be carried out as described.
- No part of this manual may be reproduced, transmitted, transcribed or translated into any language in any form without the written permission of Bresser GmbH. Errors and omissions reserved.
- Please keep this manual handy for future reference.

General warnings

DANGER 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.

RISK of MATERIAL DAMAGE!

Do not disassemble the device! In the event of a defect, please contact the after sales support number listed below.

Do not expose the device to high temperatures.

Protect privacy!

The binoculars are intended only for private use. Respect the privacy of your fellow human beings - do not look into the immediate living space of others (e.g. garden, apartment, etc.) with this device!

Introductory words about this telescope and its use

This telescope from BRESSER is a versatile and high-resolution optical instrument. It shows nature in even greater, detailed detail. First and foremost, it is designed to study the starry night sky. For example, it can be used to view Saturn with its distinctive rings at a distance of 1.3 billion kilometres. But also other planets or the moon, nebulae, star clusters and even far away galaxies beyond the borders of our solar system can be seen with this so called "stargazer". Maksutov-Cassegrain telescope.

The handling of the special mirror optics as well as the equatorial professional mount require a little training time in advance, in order to exhaust all the possibilities of the telescope. We therefore recommend that you study the operating instructions and the accompanying literature carefully. It's worth it! With the included accessories, however, simple observations can already be made once the first steps have been correctly set up and carried out.

Description of the components according to Figure 1a to 1d

1 For information on selecting the correct eyepiece, see the chapter "**Using accessories**".

- 1 Ocular clamp screws: Fix the eyepiece in to the plug-in sleeve (also point 3). A sensitive tightening of the clamping screw is sufficient.
- 2 Eyepiece holder: Accepts the eyepiece or a zenith mirror (see 2a).

2a Diagonal mirror 90° mirror system in front of the eyepiece, which allows a more comfortable observation position. Insert the zenith mirror directly into the eyepiece holder, as well as the eyepiece and now tighten the knurled screws. (see Chap. "Structure", pt. 13).

- 3 Eyepiece: Insert the supplied eyepiece into the holder provided or the zenith mirror (see point 2/2a) and fix it in place with the knurled screws. The eyepiece magnifies the image captured by the telescope.

4 For information on aligning the viewfinder, see the chapter "**Aligning the Viewfinder**" section.

- 4 LED viewfinder: Projects a red dot on to a mirrored surface, which helps to align the observation object with the image centre of the telescope eyepiece.
- 5 Battery compartment of the LED viewfinder: Contains a button cell battery (CR2032) which supplies power to the LED viewfinder (red dot).
- 6 On/off rotary switch: Turn the rotary switch to turn the LED viewfinder on or off.

TIP: After your observation session, turn off the LED viewfinder. This saves the batteries!

7 For information on mounting the viewfinder, see the "**Assembly**" section (items 9 and 9a).

- 7 Viewfinder shoe/base: Holds the LED viewfinder in place.
- 8 Focus knob: It causes a fine movement of the focusing drive and enables the precise focusing of an object. The telescope can be focused in a range from about 150m to infinity. Rotate the focus knob to focus on objects.
- 9 Dust cover: Prevents dust and coarse dirt from penetrating optical surfaces or the tube and maintains the optical quality of the instrument.

NOTE: The dust cover should be replaced after each observation. However, first make sure that all the dew that has accumulated during observation has completely evaporated before replacing the dust cover.

10 Information on the assembly of the tube and the associated components in the chapter "**Assembly**" (from point 7)

- 10 Optical Tube: The most important optical component. The tube contains the main optics and thus collects the light from distant objects and brings it together to form a focal point so that it can be observed through the eyepiece.
- 11 OTA prism rail: To be attached to the mount (see chap. "Structure", pt.7).
- 13 N/A
- 14 Viewfinder prism rail: Attaches to the viewfinder shoe (see Chap. "Structure", pt. 9).

17 ATTENTION!

Hold the optical tube when loosening the DEC clamp! The weight of the tube could cause it to suddenly swing! You could injure yourself or damage the tube.

27 For more information on setting the width scale, refer to the chapter "Assembly instructions", point 2. 6.

DEFINITION:

In this manual, the terms "Right Ascension" (RA), "Declination" (DEC), "Elevation" and "Azimuth" (AZ) are mentioned several times. These terms are explained in more detail in the accompanying booklet (download via link on p. 2).

- 15 Viewfinder fixing screws: Tighten the screws to fix the prism rail of the viewfinder in the viewfinder shoe (14).
- 16 N/A
- 17 Declination/DEC Clamp: It influences the manual movement of the telescope. Turn the DEC clamp counterclockwise to release the telescope clamp. You can then rotate the telescope freely around the declination axis. By turning the DEC clamp clockwise (hand-tighten only), you prevent the telescope from being moved manually.
- 18 Right ascension axis (RA) pitch circle: More information in the accompanying booklet (download via link on p. 2).
- 19 Declination axis pitch circle (DEC): More information in the accompanying booklet (download via link on p. 2).
- 20 Counterweight rod receptacle: The counterweight rod is screwed into this and then the counterweights are pushed on and clamped. You can find more information in the "Structure" section
- 21 Counterweight with counterweight clamping screw (21a): Balances the weight of the optical tube. Tighten the counterweight clamping screw to prevent it from slipping off the counterweight rod.
- 22 Counterweight Bar Unit: Slide the counterweight onto the counterweight rod (see 21).
- 23 Counterweight locking screw: Prevents the counterweight from accidentally slipping off the counterweight rod.
- 24# Flexible rotary shafts for the RA axis and DEC axis.
- 25 Clamping screw for the pole height. By loosening this screw, the pole height of the telescope can be adjusted with the long spindle screw 27.
- 26 Azimuth fine adjustment screws: With these screws you can adjust the horizontal rotation of the mount while centering the Polar star in the eyepiece or use the adjusted finder for this purpose first.
- 27 Pole height adjustment screws: Used to set the latitude of the observation position. By loosening the pole height clamping screw (25), the pole height of the telescope can now be adjusted.
- 28 Polar altitude scale: This allows you to read the latitude of your observing site, which you make by operating the polar altitude adjustment screw. (see chap. "Structure", pt. 6).
- 29 N/A
- 30 N/A
- 31 Pole height axis for setting the pole height of the so-called right ascension axis: More information in the accompanying booklet (download via link on p. 2)
- 32 N/A
- 33 RA Clamp: Controls the manual movement of the telescope. By turning the RA locking screw counterclockwise, you free the telescope and allow it to rotate freely around the RA axis. Turn the screws clockwise (hand tight), close the clamp again and prevent the telescope from moving manually. However, you can now use the rotary shaft (24 below) for the fine drive of the RA axis.
- 34 DEC drive shaft
- 35 Mounting connection screw. This connects the tripod head and the mount base. Hand-tighten the screws to ensure that the mount is secure.
- 36 Height adjustable tripod rod: Carry the telescope mount. The mount is placed on the tripod head (see chap. "Structure", pt. 4).
- 37 Spreader plate with integrated accessory holder: provides spreading of the tripod legs under slight tension against the spreader plate ends and increases the stability of the tripod. Eyepieces or other accessories can be conveniently stored when not in use, but remain within reach.
- 38 Height adjustment screws for tripod legs: Loosen the screws to extend the lower tripod leg segments. Once you have reached the appropriate tripod height for you, tighten the screws again.
- 39 Tripod head: The mount is inserted into the tripod head and screwed to it.

ASTRO TIPS

Surf the Internet



The Internet offers one of the most exciting resources for astronomy. There is a wealth of websites on the Internet with new images, discoveries and the latest astronomical information. For example, when Comet Hale-Bopp was approaching our Sun in 1998, astronomers from all over the world displayed their latest photos on a daily basis. You can find websites on the Internet for almost any topic that is somehow related to astronomy. Try the following search terms: NASA, Hubble, HST, Astronomy, Messier, Satellites, Nebulae, Black Hole, Variable Stars, etc. If you are interested in the latest product related and technical information from Bresser, check out their website. There you will find links to other astronomical websites. You can find our website at the following address: <http://www.bresser.de>

Here are some links to third party provider sites. No liability can be assumed for the content of these pages:

- Internet forum "Astronomie.de": [astronomie.com/](http://www.astronomie.com/)
- The magazine "Astronomie - DAS MAGAZIN": www.astronomie-magazin.com
- The journal Astronomy: www.astronomy.com
- Internet forum "Astrotreff": www.astrotreff.de
- Astronomical clubs and planetariums: <https://www.sternklar.de/gad/>
- Astronomy "The Picture of the Day": antwrp.gsfc.nasa.gov/apod/
- Publication Stargazing Associations: www.sternzeit-online.de
- Interstellarum magazine: www.interstellarum.com/
- Sky & Telescope magazine: www.skyandtelescope.org
- The magazine "Stars and Space": https://www.spektrum.de/lp/suw_magazin
- "Heaven's Above: Information for satellite observation": www.heavens-above.com/
- Hubble Space Telescopes Image Releases: www.spacetelescope.org
- European Southern Observatory: www.eso.org

This list is only a small selection and does not claim to be complete. The address details were current at the time of going to press and are the responsibility of the providers. Listed names are in alphabetical order.

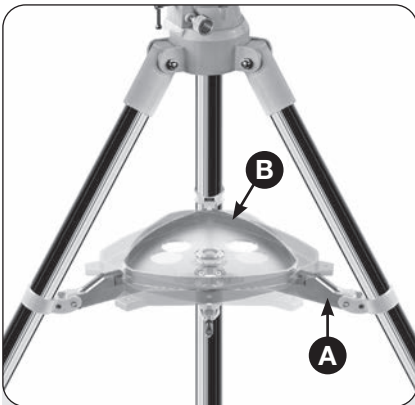


Fig 2 The tripod with accessory tray

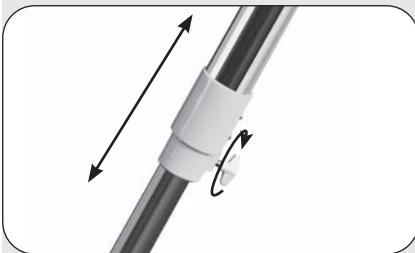


Fig 3 Tripod leg clamp



Fig 4 Tripod head



Fig 5 Mounting the mount on the tripod



Fig 6 Central screw

Assembly

Listing of parts - Unpacking

It does not take long to prepare the telescope for the first observation. When you open the package for the first time, please check the following individually packaged parts:

Telescope:

- Equatorial mount
- Height-adjustable field tripod with clamping and fixing screws
- Optics tube with dust cap, eyepiece holder and prism rail
- 2 eyepieces (Plössl 25/10 mm)
- Diagonal mirror
- Counterweight and counterweight rod.
- LED viewfinder with viewfinder mount

Instructions for assembling the telescope

The packages contain the tube and its individual parts, the tripod with the mount and the accessories.

1. Remove the individual parts from the packaging and also familiarise yourself with them at the same time. Use also the pictures 1a to 1c (page 2-3) to find your way when assembling your telescope. When you take the tripod out of the packaging, keep it parallel to the ground, otherwise the inner legs of the tripod will slip out as they are not yet screwed down.
2. Assembly - Tripod-legs: The tripod legs are pre-assembled and already connected to the tripod head and the tripod spider (A, Fig 2). 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 straight the tripod. Now pull out each tripod leg individually to the desired length (Fig 3) and tighten each of the clamping screws (3 pcs.) by hand. Do not overtighten the screws! The clamping screws are used to lock the inner tripod leg segments at the desired height.
3. Assembly - Mount the shelf: The accessory tray (B, Fig 2) is placed in the centre of the tripod spider with the flat side facing downwards and mounted by turning it clockwise through 60°. The three lugs of the storage plate must align with the retaining brackets of the tripod spider and lock into place.
4. Assembly - Attach the mount: Place the mount on the tripod head (Fig 5). Insert the central screw from below into the tripod head and screw it to the mount (Fig 6).
5. Assembly - Fastening the counterweight to the counterweight rod (Fig 7): Screw the base of the counterweight rod (20, Fig 1d) to the threaded end of the rod, and screw it onto the counterweight rod (22, Fig 1d) the thread at the bottom of the declination axis. Then counter the rod with the base. If you look through the large hole in the counterweight, you will see the bolt that blocks the hole. When you move the counterweight slightly, the bolt disappears in its hole and releases the hole. If it does not, carefully unscrew the clamping screw on the counterweight until the bolt moves. Remove the locking screw (23, Fig 1d) from the rod. Then, while holding the counterweight firmly, push it to about the middle of the counterweight rod (22, Fig 1d). Tighten the counterweight locking screw securely and replace the locking screw.

NOTE:

Should the counterweight ever start to slip, the locking screw prevents it from slipping completely off the rod. Always leave the locking screw in place as long as there is a counterweight on the rod.

6. Set latitude: It is easier to adjust the width before you mount the weights and put the tube on the mount. Locate the latitude scale (28, Fig 1d). Note that there is a triangular pointer above the scale on the mount. The pointer



Fig 7 Attachment of the counterweight to the counterweight rod.

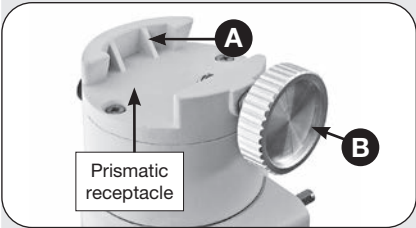


Fig 8 Unscrew the locking screw on the prism holder.



Fig 8a: Insert the optical tube with the prism rail into the prism holder and fix it in place.

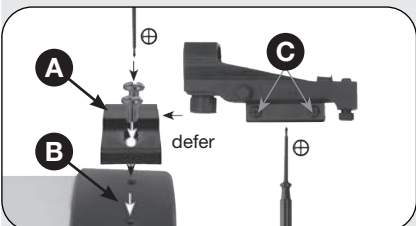


Fig 9 Mount the viewfinder bracket and attach the LED viewfinder.

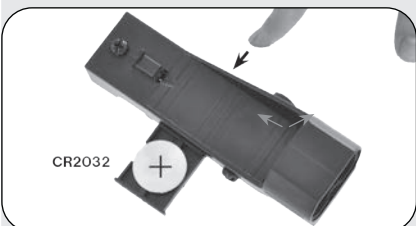


Fig 10 Battery change for the LED viewfinder

is not fixed. It moves as soon as the mount moves. Determine the latitude of your observation location. You can find information on this in our accompanying booklet (download via link on p. 2) or take a look at the atlas. Loosen the pole height clamp (Fig 1d, 25) and turn the pole height adjustment screw (Fig 1d, 27) until the pointer indicates the desired width. The adjustment screws work by an adjustment and counter mechanism (i.e. before you tighten one, loosen the other). Once the pointer shows the width you want, tighten both screws until they make contact with the mount.

7. Attaching the optics tube to the mount (bracket): Unscrew the locking screw (B, Fig 8) on the prism holder until you can comfortably insert the prism rail (11, Fig 1a) of the optics tube into the dovetail base of the rail (A, Fig 8)(Fig 8a). Then retighten the locking screw (B, Fig 8) firmly.
8. Positioning of the tube: Hold the optic tube firmly. If not done directly during insertion, now move the tube (10, Fig 1a) within the prism holder until its position corresponds to the holder on the title page. Then retighten the locking screw (B, Fig 8). For more information, see the chapter "**Balancing the Telescope**".
9. Attaching the LED viewfinder: Mount the viewfinder shoe (A, Fig 9) on to the optics tube (B, Fig 9). Loosen the side clamping screws (C, Fig 9) on the LED viewfinder and slide the viewfinder onto the bracket. Carefully retighten the clamping screws so that the viewfinder is mounted on the bracket without slipping. The LED viewfinder must be aligned with the telescope after installation and before first use. Please read the chapter "**Aligning the LED viewfinder**".
10. Battery in LED viewfinder (Fig 10): The pre-installed battery in the LED viewfinder is protected against discharge by a plastic plate. Remove the plastic plate before the first use. To change the battery, first push the battery compartment out of the side. Remove the dead battery and insert a new one into the compartment.

IMPORTANT!

Only use a button cell of the type CR2032. When inserting, note the correct position of the battery poles (+/-).

11. Insert the eyepiece (Fig 11) for straight viewing mode: Remove the dust cap from the eyepiece holder. Place the dust cap in a safe place and replace it when you have finished observing to prevent dirt from entering the telescope. Loosen the knurled screw and insert the supplied eyepiece (C, Fig 11) into the eyepiece holder (A, Fig 11). Then hand-tighten the screw again so that the eyepiece is firmly seated.
12. Insert the zenith mirror (Fig 11): Recommended at zenith height for a more comfortable neck-friendly view. The zenith mirror (B, Fig 11) is inserted into the eyepiece holder (A, Fig 11). Then insert the eyepiece (C, Fig 11) into the receptacle of the zenith mirror. After inserting the zenith mirror and eyepiece, retighten the corresponding fixing screws well so that all parts are securely fixed in position.
13. Adjusting the tripod height: Adjust the tripod by loosening the locking screws (Fig 12) on the tripod. Then pull the inner tripod legs to the desired length. Then tighten the screws again. Adjust the tripod to a height that makes observing as comfortable as possible.

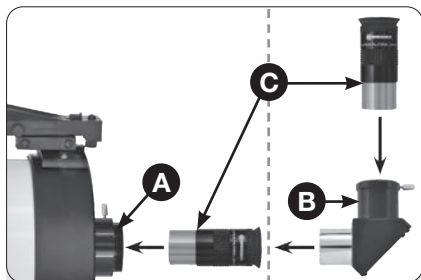


Fig 11 Mounting options for the optical accessories on the focusing unit.

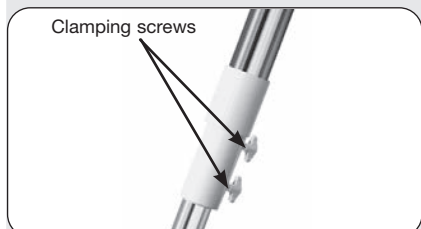


Fig 12 Adjust the height of the tripod legs and tighten the clamping screws.

Getting Started

Balancing the telescope

To ensure that the telescope is secure and stable on the tripod and moves smoothly and evenly, it must be balanced. To balance the telescope, open the RA clamp (33, Fig 1d). When the axis is now free, the telescope rotates around the RA axis. Later on, you will also open the DEC clamp (17, Fig 1d). When this is then open, the telescope will also rotate around the DEC axis. The movement of the telescope occurs around these two axes, individually or simultaneously. Try to familiarise yourself with these clamps and observe how the telescope moves around each axis. To find the best possible balance for your telescope, follow the method described below:

1. Hold the tube tightly so that it does not swing around freely by accident. Loosen the RA clamp (33, Fig 1d). The tube now moves freely around the RA axis. Now let the telescope rotate until the counterweight rod is parallel to the ground.
2. Open the counterweight clamping screw and slide the counterweight (21, Fig 1d) back and forth on the counterweight rod until the telescope is in a position in which it does not move in either direction when released and is thus in balance. Then tighten the counterweight screw again so that the counterweight remains in its current position and cannot slip.
3. Then hold the tube again so that it cannot move freely. Then close the RA clamp (33, Fig 1d) and open the DEC clamp (17, Fig 1d) again. The telescope is now able to move freely around the DEC axis. Loosen the tube clamp screws (13, Fig 1a) so that the main tube can easily slide back and forth in the tube clamps. Now move the tube back and forth in the tube clamps until it stays in one position without moving in any particular direction. Then close the DEC clamp (17, Fig 1d) and retighten the pipe clamp clamping screws. The telescope is now properly balanced in both axes. The next step is to align the finder scope.

Aligning the 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:

1. Remove the dust caps from your telescope.
2. If not already done, attach the eyepiece holder (2, Fig 1b) to the screw thread of the tube end. Then insert the zenith mirror (2a, Fig 1b) and the eyepiece (3, Fig 1b) into the eyepiece holder. Please read points 11 to 13 in the chapter "Structure".
3. Now look through the LED viewfinder and find an object that is at least 1000m away. Ideally, the red dot of the LED viewfinder should already be visible as centrally as possible above the observed object when aiming at it.
4. Open the RA clamp (33, Fig 1d) and the DEC clamp (17, Fig 1d) so that the telescope moves freely in both axes. Now point the main telescope at a large, clearly visible fixed land object (e.g. a church spire, a high-voltage pylon or another prominent fixed point) located at a distance of at least 1000m and bring it to the centre of the eyepiece of the main telescope. Focus the image by turning the focusing knob (8, Fig 1b). Then tighten the RA and DEC clamps again.
5. Now look "straight" through the LED viewfinder and check whether the targeted object can also be seen here in the centre. If so, then the viewfinder is already adjusted!

If this is not the case, turn the viewfinder adjustment screws (A+B, Fig 13) carefully one after the other until the red dot is exactly in line with the object you are aiming at (e.g. a tree top).

Check this occasionally with a comparative look through the eyepiece of the telescope.

Now you are ready to make your first observation.

ATTENTION! DANGER!

NEVER look at or near the sun! Observing the sun will inevitably lead to

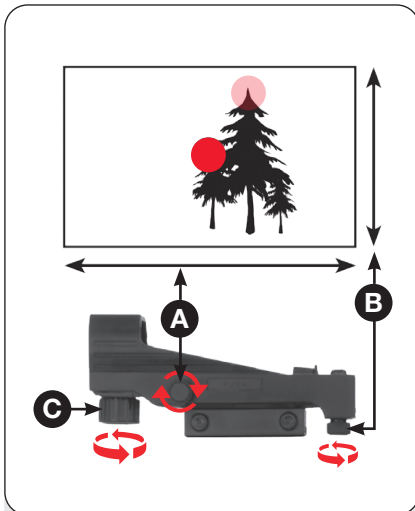


Fig 13 Adjustment of the observation object in the LED viewfinder by means of adjustment screws (horizontal: A, vertical: B). On/Off rotary switch (C)

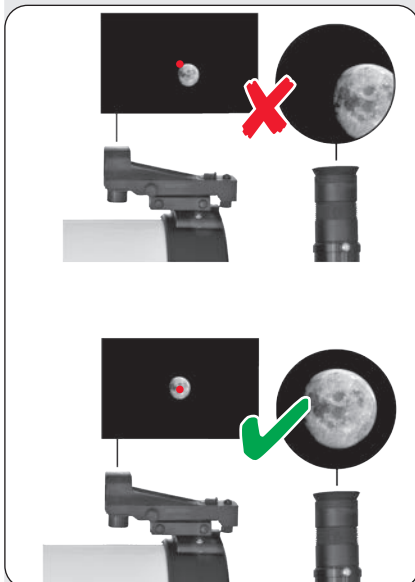


Fig 14 Alignment of the LED viewfinder to a celestial object (here the centre of the moon).

immediate and irreparable eye damage - even if it lasts only the tiniest fraction of a second. In addition, your telescope itself will also be damaged.

Alternatively, you can adjust the viewfinder using a celestial object (Fig 14) such as a bright star or the moon.

Proceed as described in steps 3 and 4.

Now that the viewfinder is adjusted, any object that is centred there will also be centred in the eyepiece of the telescope. Congratulations! With this alignment, objects that were first seen in the wide field of view of the finder scope will also be seen in the eyepiece of the main telescope.

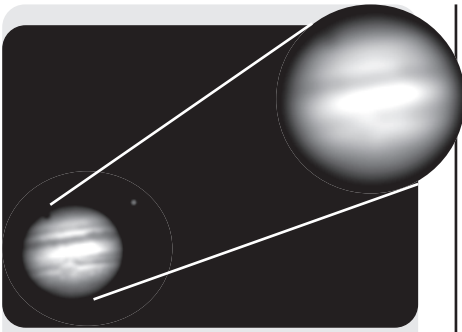


Fig 15a: The planet Jupiter. An example of correct (left) and too much magnification (right)

Visibility conditions vary greatly from night to night and depend largely on the observation site. Air turbulence also occurs during apparently clear nights and distorts the image of objects. If an object appears blurry and poorly defined, go back to a lower magnification eyepiece. This will give you a sharper, better defined image (Fig 15a).

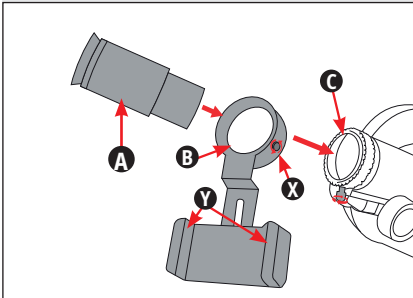


Fig 17 Attaching the smartphone adaptor to the eyepiece socket.

Use accessories

Eyepieces

The main function of a telescope eyepiece is to magnify the image produced by the main optics of the telescope. Each eyepiece has a specific focal length, which is specified in millimetres (mm). The smaller the focal length, the greater the magnification. Thus, an eyepiece with a focal length of 10mm produces a higher magnification than an eyepiece with 25mm.

Long focal length eyepieces provide a wide field of view, bright high contrast images and reduce eye fatigue during long periods of observation. If you are looking for an object with a telescope, you should always start with a lower magnification eyepiece (e.g. 25mm). Then, when the object is found and is in the center of your eyepiece, you can use a higher magnification eyepiece and enlarge the image as much as the prevailing weather conditions will allow.

The magnification of a telescope is determined by the focal length of the telescope itself and the focal length of the eyepiece used. To calculate the power of the eyepiece, divide the focal length of the telescope by the focal length of the eyepiece. Here is an example using a 25 mm eyepiece. (see "Technical data" from page 20).

Telescope focal length / focal length of the eyepiece = magnification of the eyepiece

Telescope focal length

Focal length of the eyepiece = 25 mm

$$\text{Magnification} = \frac{\text{Telescope focal length}}{\text{Eyepiece focal length}} = \frac{1400 \text{ mm}}{25 \text{ mm}} = 56$$

The magnification is therefore 56x.

Smartphone adaptor

With this adaptor, a smartphone can be mounted to the telescope to capture bright, flat objects (e.g. the moon) or - depending on the sensor sensitivity of the smartphone - also planets.

For mounting, insert the eyepiece (A, Fig 17) through the retaining ring (B, Fig 17) of the smartphone adaptor and fix it with the knurled screw (X, Fig 17). Insert the eyepiece with the attached smartphone adaptor into the eyepiece socket (C, Fig 17) and clamp it there as well.

Clamp the smartphone between the two holding jaws (Y, Fig 17) of the smartphone adaptor so that the camera lens is directly and centrally above the eyepiece lens.

ASTRO TIPS

Is it even possible to choose a magnification that is "too high"?

Yes, you can! The most common mistake made by beginners is to over-magnify the image produced by the telescope. A very high magnification is selected, which the telescope cannot provide due to construction, weather or light conditions. Therefore, always keep in mind that a sharp but low magnification image (Fig 15a, bottom left) is much nicer to look at than a high magnification but completely blurry image (Fig 15a, right), which you will definitely not enjoy. Magnifications above 200x should only be selected when the air is absolutely calm and clear. Most observers should have three or four extra eyepieces on hand to take advantage of the full range of magnifications possible with the telescope.



Observation

IMPORTANT NOTE:

Objects viewed through the viewfinder appear upside down and upside down.

Objects observed through the eyepiece of the main tube, which sits on the telescope via a zenith prism, appear upright but also laterally inverted.

This effect does not interfere with the observation of astronomical objects. Incidentally, these effects occur with all astronomical telescopes.



WARNING!

Never use a telescope for an unprotected view of the sun! As soon as you look directly at the sun, or even at its immediate surroundings, you risk immediate and irreparable damage to your eye. This damage to the eye usually occurs painlessly and therefore without any warning to the observer that perhaps everything is already too late and that eye damage has occurred. Therefore, never point the telescope or its viewfinder at or next to the sun. Never look through the telescope or its viewfinder when it is moving. During an observation, children must remain under adult supervision at all times.

Observation with manual operation

After the telescope is assembled and balanced as described, you are ready for manual observation. Pick an easy-to-observe object on Earth such as a street sign or traffic light and familiarise yourself with the telescope's functions. To achieve the best possible result, please observe the following instructions:

- To locate an object, first loosen the RA clamp (33, Fig 1d) and the DEC clamp (17, Fig1d). The telescope can now move freely around its axes. First loosen the clamps individually and familiarise yourself with the individual movements. Then loosen both clamps at the same time. It is important that you familiarise yourself with all the movements of your telescope, as handling a parallactic mount can take some getting used to, especially at night in complete darkness.
- Now use the finder scope to locate the object of your choice. When you have the desired object in your sights, close the RA and DEC clamps again.
- The eyepiece of a telescope magnifies the image captured by the telescope's primary mirror. Each eyepiece has a focal length, expressed in millimeters (mm). The smaller the focal length, the higher the magnification. For example: an eyepiece with a focal length of 9mm has a higher magnification than an eyepiece with a focal length of 26mm. Eyepieces with a lower magnification offer a larger field of view, provide brighter and higher contrast images and are more comfortable for the eye during longer observations. At the beginning of an observation, you should always start with a weaker eyepiece, such as the supplied Plössl 25 mm. Then, when the desired object is centred and focused, you can switch to a stronger eyepiece to magnify the object as high as the observing conditions will allow.
- Once centred, an object can be brought into focus using the focusing knobs on the focusing unit (8 Fig 1b). However, keep in mind that the desired object will slowly move out of view due to the rotation of the earth on its own axis. This impression is even reinforced at high magnification.

Moon Observations

Point the telescope (picture: (Keep in mind, however, that the moon is not visible every night) Now practice using the different eyepieces to observe different details on the moon. There are many different details to look at on the moon, such as craters, mountain ranges, and grooves. The best time to observe the moon is during its crescent or sickle phase. At this time, the sunlight hits the moon at a very shallow angle, giving its appearance a vivid depth. At full moon there are no shadows to be seen at all, which makes the surface of the moon look very bright, flat and uninteresting. Therefore, when viewing the moon, you may want to consider using a neutral density moon filter. Among other things, this not only dampens the glaring light of the moon, but also increases the contrast at the same time.

Tracking of an object

While the earth turns under the night sky, the stars seem to wander from east to west. The speed with which the stars perform this movement is called "sidereal velocity".

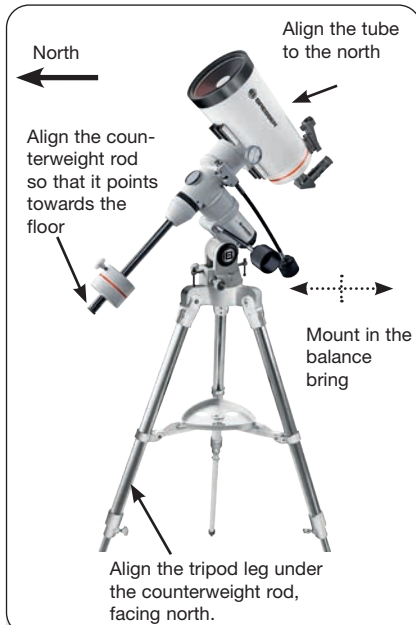


Fig 18a: The parallactic home position, side view



Fig 18b: The parallactic home position seen from the north.

The parallactic home position

1. Balance the mount; if necessary, adjust the height of the tripod legs.
2. Loosen the RA clamp (33, Figure 1d). Swivel the tube until the counterweight rod points directly to the ground (see also Fig. 16a and 16b).
3. If you have not already done so, align the entire telescope assembly so that the tripod leg, under the counterweight rod, faces (approximately) north. Then open the DEC clamp (33, Fig 1d) so that the optical tube (10, Fig 1a) can be swivelled. Now turn the tube until it points to the north and ideally to the North Star (Polaris). Then close the clamps again. More information on finding the North Star in the accompanying booklet (download via link on p. 2).
4. If you have not already done so, determine the latitude of your observation location. Use the latitude adjustment screws (27, Fig 1d) to adjust the telescope mount so that the pointer points exactly to the correct latitude of your observing site on the latitude scale (28, Fig 1d). More information on latitude determination in the accompanying booklet (download via link on p. 2).
5. If steps 1 through 4 have been performed reasonably accurately, your telescope is now sufficiently well aligned with Polaris, the North Star, and you can begin making observations.

Once the mount has been aligned with the polar star as described above, it is not necessary to adjust the latitude setting again, unless you move your observation to a completely different geographical location (different latitude setting required).

IMPORTANT NOTE:

For almost all astronomical observing requirements, approximate estimates of latitude are quite acceptable. So don't let excessive attention to the exact position of the polar star take away the joy of your telescope.

ASTRO TIPS

Further studies / accompanying reading

This instruction manual provides only the most important information on using the telescope. In order to make full use of the manifold possibilities of the instrument, you should definitely delve deeper into the subject of "astronomy". For this purpose, we have compiled some helpful information in an accompanying booklet, which you can download free of charge via the following weblink: <http://www.bresser.de/download/astrowissen>

Furthermore, we have listed below topics that are also worth taking a closer look at. Below you will find a list of books, magazines and organizations that may be of use to you.

Topics

1. How to measure the distance of a star? What exactly is a light year?
2. How were the craters of the moon formed? How old are the earth, moon and sun?
3. What are stars made of? Why do the stars have different colours?
4. Was ist eine „Nova“ oder „Supernova“?
5. What is meant by comets, asteroids, meteors and meteor showers?
6. Was ist ein „Planetarischer Nebel“? What is a "globular cluster"?
7. What does the term "big bang" mean? What is behind the "universe"?

Books

1. Adventure Astronomy by David H. Levy
2. The Great Cosmos Sky Atlas by Axel Mellinger
3. Cosmos Celestial Year by Hans-Ulrich Keller
4. Telescope guide in 4 steps, Oculum Verlag

Magazines

1. Astronomy - THE MAGAZINE
2. Stars and space

Organizations

1. Association of Stargazers e.V. (VdS)
2. astronomie.de , astrotreff.de

This list is only a selection and does not claim to be complete.

General maintenance instructions

This telescope is considered a precision optical instrument that will give you many years of enjoyment. As long as you give your telescope the care and attention due a precision instrument, you will very rarely need factory service or other appropriate maintenance.

IMPORTANT NOTE:

Always strictly adhere to the instructions given here in case of possible maintenance. Since this is a sensitive opto-mechanical instrument, even the smallest steps performed incorrectly can cause irreparable damage to the device! The manufacturer accepts no liability for damage resulting from improper handling or maintenance!

The following points should be noted:

- A Avoid cleaning the telescope optics too frequently. A little dust on the front of your telescope's lens, or on the mirror surface, causes virtually no reduction in imaging quality, and so a little dust should not cause you to constantly clean the optical surfaces.
- b. Only if absolutely necessary, the jam on optical surfaces can be removed with gentle movements of a fine photo brush. You can also blow the dust away with a small bellows. However, do not use any photographic lens cleaners under any circumstances!
- c. Organic soiling (fingerprints, etc.) on optical surfaces is best removed with a cleaning fluid consisting of three parts distilled water and one part isopropyl alcohol. You may add a small drop of biodegradable dish-washing liquid per half litre of cleaning liquid. Also, use only soft, white cosmetic wipes, make short, careful wiping motions, and change wipes as often as possible.

Attention:

Do not use fragrance impregnated, dyed or lotion soaked cloths as they will damage your optics.

- D Never, for any reason, remove the optics from their mount; not even to clean them or for any other reason. You would probably not be able to reinsert them at the exact position and risk a serious degradation of the optical performance of your telescope. In such cases, Bresser accepts no liability whatsoever for any damage incurred.
- e If your telescope is used outside during a humid night, dew may settle on the surface of the telescope. Normally, such wetness does not cause any damage, but it is strongly recommended to dry the telescope with a suitable cloth each time before storing it. However, never wipe the optical surfaces dry! Instead, leave the telescope in a warm room for a while so that the damp optical surfaces can dry by themselves. Wait until the telescope is completely dry before repacking it.
- f. Never leave your telescope in a locked car on hot summer days. Excessive temperatures can affect the internal lubrication.

Technical data



SpaceExplorer MAK 100/1400 EQ

Item number	9621802
Optical design	Maksutov
Free opening	4" = 100 mm
Focal length	1400 mm
Focal ratio / photographic aperture	f/14.0
Maximum resolution	1.3 arcseconds
Mounting	equatorial/parallactic
RA and DEC drive/movement	manual, via flexible shafts
Max. useful magnification	200x
Tripod	height adjustable field tripod

Guarantee

The regular warranty period is 5 years and begins on the day of purchase. You can consult the full guarantee terms as well as information on extending the guarantee period and details of our services at www.bresser.de/warranty_terms.

In case of warranty or other service requests, please contact the customer service responsible for your country beforehand, preferably by e-mail.

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*: +49 28 72 80 74 210

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Telephone*: +44 1342 837 098

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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

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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*: +31 528 23 24 76

BRESSER Benelux

Smirnoffstraat 8
7903 AX Hoogeveen
The Netherlands

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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
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