BRESSER

Art. No. 4951750

GoTo Kit
for EQ5 mounts

EN **INSTRUCTION MANUAL**

WARNING!
Never use a telescope to look at the Sun without adequate protection! If you look directly at the Sun, or even only in its immediate vicinity, you immediately risk serious and permanent damage to your eyes. This damage to the eye usually occurs without pain and therefore without any warning to the observer that everything may already be too late and that eye damage has occurred. Therefore, never point the telescope or its finder at or near the Sun. Never look through the telescope or its finder while it is moving. During observation, children must be supervised by adults at all times.

CAUTION - Risk of injury!
When moving the telescope, always step back a little and do not bring any objects or body parts close to the telescope! Risk of crushing! Only look through the telescope again once the positioning procedure has been completed fully!

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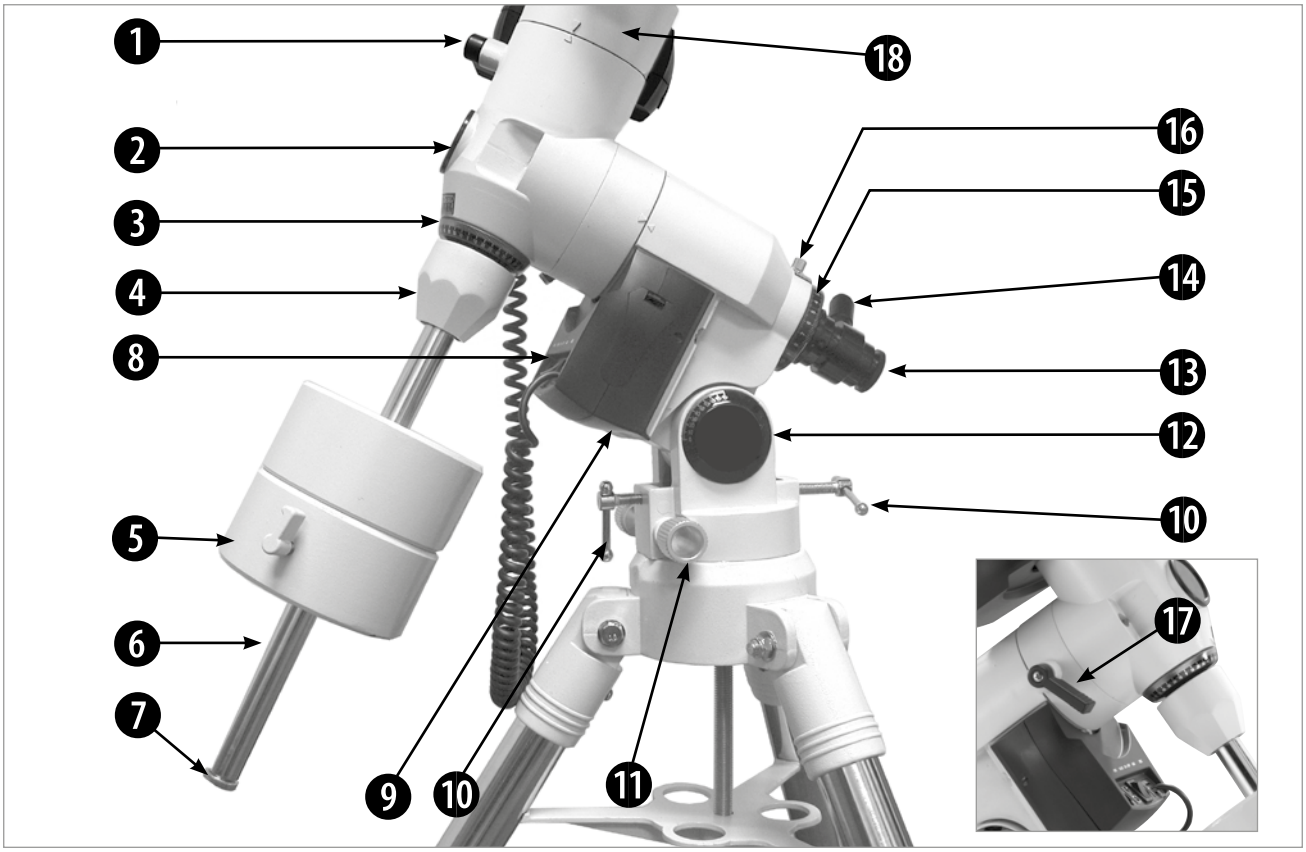

Fig. 1a:*The mount; the detail shows the opposite side.*

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7. Numeric keys: **0–9**
8. key
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10. key
11. Connection socket for the coiled cable
12. Red light lamp
13. USB-C connection socket
14. Battery compartment with battery compartment cover and retaining screw (rear)

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Parts overview mount

❶ **Declination lock:**When this lock is loosened counterclockwise, the optical tube can be pivoted freely. During motorised operation, the lock must be tightened hand-tight. After alignment, the locking lever must no longer be loosened, otherwise the alignment will be lost!

❷ **Polar scope cap:**Remove before using the polar scope.

❸ **Dec setting circle**

❹ **Counterweight bar base:**Screw straight into the mount.

❺ **Counterweight with locking screw:**Balances the weight of the optical tube and thus enables precise tracking. Tighten the locking screw hand-tight to prevent slipping (depending on type: 1–3 counterweights).

❻ **Counterweight bar:**The counterweights are slid onto this bar.

❼ **Safety screw:**Must always be installed! It prevents the counterweights from accidentally slipping off.

❽ **Computer connection board (see Fig. 1b):**

- **Hand controller/HBX) connection**: Insert the coiled cable of the hand controller (**9, Fig. 2**) here.
- **12V= connection:**For connecting an optional power supply unit (Item No. 4930000 or 0455121)
- **LED:**Illuminates when the telescope is switched on.
- **ON/OFF switch:**Main switch used to switch the entire telescope on and off.
- **ST-4 autoguider connection:**An ST-4 compatible autoguider can be connected here.
- **Dec connection:**The coiled cable of the Dec drive is connected here.

❾ **R.A. drive:**This provides positioning and tracking in the hour axis. The R.A. lock**(17, Fig. 1a)**must be tightened.

❿ **Altitude adjustment screws(10, Fig. 1a):**The latitude of your observing location is set here. The screws work in a push-pull configuration—when one is tightened, the other must be loosened accordingly.

⓫ **Azimuth fine adjustment:**The azimuth is set here when polar-aligning the mount; the function is analogous to the altitude adjustment screws.

⓬ **Altitude scale:**It serves as an aid for coarse adjustment of the latitude using the altitude adjustment screws.

⓭ **Polar scope:**This allows precise polar alignment of the mount.

⓮ **Polar scope illumination:***Turn the knob to switch the LED in the reticle of the polar scope on or off. Make sure to switch the illumination off again when you no longer need the polar scope.*

⓯ **R.A. setting circle**

⓰ **R.A. setting circle locking screw:**Tighten lightly to secure the setting circle.

⓱ **R.A. lock:** *Controls the manual movement of the telescope. By turning the RA locking screw counterclockwise, you release the telescope and allow free rotation about the RA axis. Turn the screw clockwise hand-tight to close the lock again and prevent manual movement of the telescope. You can then only use the RA motor function of the controller.*

⓲ **Dec drive:***Controlled via the hand controller. Moves the optical tube along the DEC axis. The DEC lock***(1, Fig. 1a)***must be tightened hand-tight for the DEC motor to operate.*

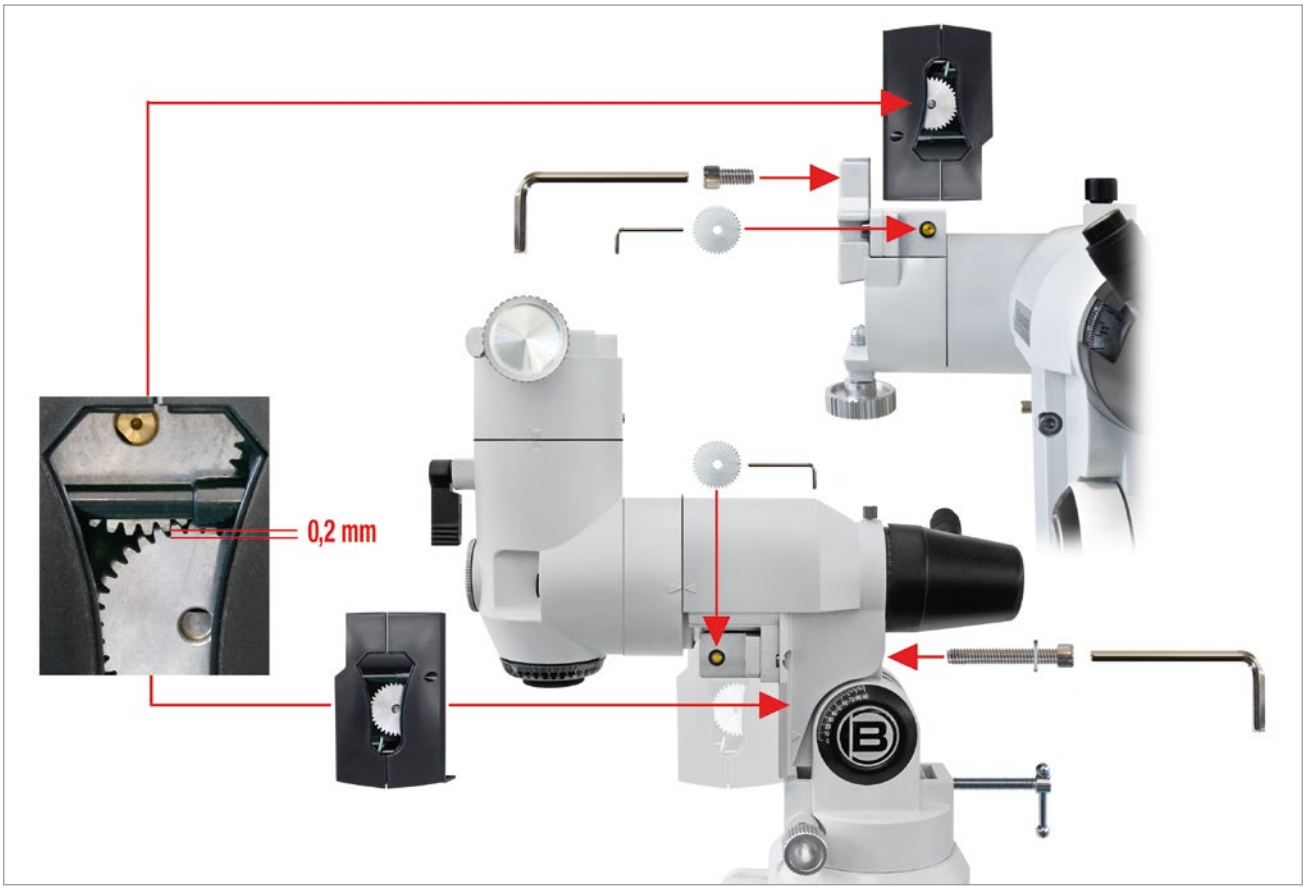
Telescope assemblies

The drive motors

Fig. 1b:*The RA motor connection board*

Fig. 1c:*The DEC motor connection board*

Installing the motors



Warranty

The warranty period is 2 years and begins on the day of purchase. Please keep the receipt as proof of purchase. During the warranty period, defective devices are accepted by your specialist dealer on site and, if necessary, sent in. You will then receive a new or repaired device free of charge. After the warranty period has expired, you also have the option of returning a defective device for repair.

However, repairs incurred after the warranty period are subject to a charge.

Important:

Please ensure that the device is returned carefully packed in the original packaging in order to avoid transport damage! Please enclose the receipt (or a copy). Your statutory rights are not restricted by this warranty.

Your specialist retailer:

Name:

Postcode / City:

Street:

Telephone:

Date of purchase:

Signature:

Telescope settings

Balancing the telescope

For the telescope to stand securely and stably on the tripod and to move smoothly and evenly, it must be balanced. To balance the telescope, release the RA lock**(17, Fig. 1a)**. If the axis is now free, the telescope will rotate about the RA axis. Later you will also release the DEC lock**(1, Fig. 1a)**. If this is then released, the telescope will also rotate about the DEC axis. The telescope moves about these two axes, individually or simultaneously. Try to become familiar with these locks and observe how the telescope moves about the individual axes. To find the best possible balance for your telescope, follow the method described below:

*1. Hold the tube firmly so that it does not accidentally swing freely. Release the RA lock**(17, Fig. 1a)**. The tube now moves freely about the RA axis. Now allow the telescope to rotate until the counterweight shaft is parallel to the ground.*

NOTE

If it is not possible to balance the mount, a second or even third counterweight is required. These are available as optional accessories. Please note, however, that a higher overall weight has a negative effect on stability.

*2. Release the counterweight locking screw**(5, Fig. 1a)**and slide the counterweight back and forth on the counterweight shaft until the telescope is in a position where, when released, it does not move in either direction. Then tighten the counterweight screw again so that the counterweight remains in its current position and cannot slip.*

*3. Then hold the tube firmly once more so that it cannot move freely. Then close the RA lock**(17, Fig. 1a)**and release the DEC lock**(1, Fig. 1a)**again. The telescope is now able to rotate freely about the DEC axis. RA/SN models: Loosen the tube ring locking screws (***13, Fig. 1a***) so that the main tube can slide slightly forwards and backwards in the tube rings. Now move the tube back and forth in the tube rings until it remains in one position without moving in a particular direction. SC models: Slightly loosen the locking screws of the mount**(17 or 1, Fig. 1a)**. Slide the tube in the dovetail mount of the mount back or forth until the tube is balanced. Then re-tighten the locking screws.*

The telescope is now correctly balanced on both axes. Next, the finder scope must be aligned.

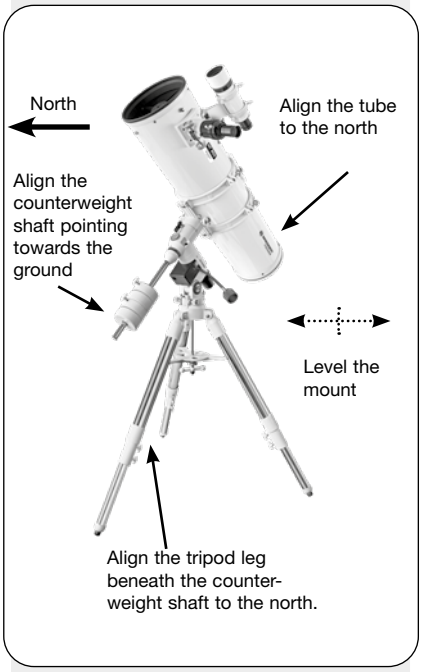


Fig. 3a: The equatorial home position, side view

Fig. 3b: The equatorial home position – here on a Newtonian – viewed from the north.

Tracking an object

As the Earth rotates beneath the night sky, the stars appear to move from east to west. The speed at which the stars perform this movement is called “sidereal speed”. You can now set up your telescope so that it moves at sidereal speed. In this way, it automatically tracks objects and stars in the night sky. This tracking function is available with the drive set available as an accessory.

The equatorial home position

1. Level the mount; if necessary, adjust the height of the tripod legs.

2.Release the RA lock (17, Fig. 1a). Swivel the tube until the counterweight shaft points straight towards the ground (see also Fig. 3a and 3b).

3. If not already done, align the entire telescope setup so that the tripod leg beneath the counterweight shaft points (approximately) north. Then release the DEC lock (1, Fig. 1a) so that the optical tube 10 (Fig. 3a) can be swivelled. Now rotate the tube until it points towards the north. Re-tighten the locks.

4. If not already done, determine the latitude of your observing location. Use the latitude adjustment screws (10, Fig. 1a) to set the telescope mount so that the pointer indicates exactly the correct latitude of your observing location on the latitude scale (12, Fig. 1a).

5. If steps 1 to 4 have been carried out with reasonable accuracy, your telescope is now sufficiently well aligned to Polaris, the Pole Star, and you can begin observing.

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

IMPORTANT NOTE:

To achieve the most precise GoTo functionality possible, the RA axis should, however, be aligned as accurately as possible to the celestial pole using the polar scope (13, Fig. 1a). See also the chapter “Improving polar alignment”.

NOTE:
When switching on for the first time, the hand controller prompts you to enter the country and location (observing location). Please select your country manually and then the nearest city; the entries are saved automatically. A subsequent change is possible in the setup menu under "Location".

Observing with manual operation

After the telescope has been assembled and balanced as described, you are ready for manual observing. Choose an easy-to-observe object on Earth, e. g. a road sign or traffic light, and familiarise yourself with the functions of the telescope. To achieve the best possible result, please observe the following instructions:

• To locate an object, first loosen the RA lock ***(17, Fig. 1a)*** *and the DEC lock* ***(1, Fig. 1a)****. The telescope can now rotate freely about its axes. First loosen the locks individually and familiarise yourself with the individual movements. Then loosen both locks at the same time. It is important that you become familiar with all movements of your telescope, as handling an equatorial mount takes some getting used to.*

• Now use the finder scope to locate the object of your choice. Once you have the desired object in the crosshairs, re-tighten the RA and DEC locks.

•Once centred, an object can be brought into focus using the focuser.

Using the direction keys

The direction keys allow you to move the telescope up, down, left or right. Activate the direction keys using the following procedure:

1. After the power supply has been inserted correctly and the hand controller cable has been plugged into the HBX socket of the control panel (Fig. 1b), the BRESSER logo first appears on the LED display (1, Fig. 2).

2. After switching on, you will be prompted to enter the observing location in addition to the date, time and daylight saving time.

3. After completing the entries, the main screen appears on the display.

You can now use the arrow keys to move the telescope. You can move the telescope at different speeds.

Slew speeds

The hand controller offers a total of eight slew speeds, which are directly proportional to the sidereal speed. They are designed so that special functions can optionally be performed. Press a numeric key to change the slew speed; it then appears at the bottom left of the LCD display of the hand controller.

The nine available speeds are as follows:

Numeric key 1 = 1x = 1x sidereal (0.25 arcminutes per second or 0.004°/sec)
Numeric key 2 = 2x = 2x sidereal (0.5 arcminutes per second or 0.008°/sec)
Numeric key 3 = 8x = 8x sidereal (2 arcminutes per second or 0.033°/sec
Numeric key 4 = 16x = 16x sidereal (4 arcminutes per second or 0.067°/sec)
Numeric key 5 = 64x = 64x sidereal (16 arcminutes per second or 0.27°/sec)
Numeric key 6 = 128x = 30 arcminutes per second or 0.5°/sec
Numeric key 7 = 256° = 60 arcminutes per second or 1.0°/sec
Numeric key 8 = 512° = 120 arcminutes per second or 2°/sec
Numeric key 9 = Max. = 120 arcminutes per second or 2°/sec

Speeds 1, 2 or 3: Ideal for fine adjustment of an object into the field of view of a higher-magnification eyepiece – for example a 12 mm or 9 mm eyepiece.

Speeds 4, 5 or 6: For positioning an object in the centre of the field of view of a low- to medium-magnification eyepiece – for example the standard Super Plössl 26 mm.

Speeds 7, 8 or 9: Best suited for coarse positioning of an object. This allows the telescope to move quickly from one place in the sky to another.

Tip:
If there are several selection options, the active one is usually displayed first and marked with an arrow (>).

Definition:
Initialise*This is the process in which the controller collects the basic data required for correct operation (date, time, etc.).*

This information is required to perform correct positioning of objects and additional functions.

Using the GO TO functions

Before you can use the functions of the**GO TO**menu, you must first:

- *Learn how to navigate through the menu programme using the keys*
- *Initialisation*
- *Move the telescope to the equatorial home position, if not already done.*
- *Select*ALIGNMENT: *One-star in the "Alignment" menu*

The controller menus

The menus are organised in various levels for fast and convenient navigation.

- *If you want to go down to deeper menu levels, press the**[OK]**key.*
- *If you want to go back towards the top menu level, pressthe⮌key.*
- *If you want to scroll up or down through the options available at each level, press the arrow keys▲ ▼.*
- *For entering letters and numbers, press the direction keys.*

You also move your telescope with the direction keys when no other input is required.

Travel the Universe at the touch of a button

The mount is controlled by usingthe hand controller. Almost all telescope functions can be performed by pressing only a few keys. The most important featuresof the controllerinclude:

- Slew the telescope automatically to any of the 30,000 stored-objects, or manually enter the astronomical coordinates of any cosmic object.
- Take a "tour" that allows you to observe the best celestial objects for every night of the year.
- Control thetelescopefrom your PC via aUSB-C interface.

Hand controller

Hand controller

Legend

1. LCD display
2. key
3. key
4. key
5. **OK** key
6. Arrow keys: ▲▼►◄
7. Numeric keys: **0-9**
8. key
9. **[Stop/0]** key
10. key
11. Connector socket for the coiled cable
12. Red light lamp
13. USB-C connection socket
14. Battery compartment with battery compartment cover and retaining screw (rear)

Fig. 2:*The hand controller*

Hand controller features

1. **The large LCD display (1, Fig. 2)**– It functions as an interface between the hand controller and the telescope.

A wide variety of values/information or individual menu options of the menu structure are displayed to enable operation.

2. **key (2, Fig. 2)**– This can be used to call up the most recently approached objects again via quick access. Use the arrow keys (5) to select an observing object and press [OK]. The telescope controller then positions the selected object in the field of view. It may happen that the object does not appear in the centre of the field of view after positioning. In this case, centre the object using the arrow keys.

3. **key (3, Fig. 2)**– Switches the red light (12, Fig. 2) on and off in two brightness levels by pressing repeatedly.

4. **key (4, Fig. 2)**– Returns to the previous menu or to the previous menu level. If pressed repeatedly, you will eventually reach the top level or the main screen of the hand controller.

5. **[OK] key (5, Fig. 2)**– Provides access to the main menu and acts as a confirmation key in further menu navigation or for the basic data.

6. **Arrow keys (6, Fig. 2)**– Rotate the telescope, using nine different speeds, in a specified direction (up, down, left and right). The preselection of the speed is explained in the section “Slew speeds” on page 9. The following functions are additionally enabled by the arrow keys:

• *Data entry – Press the arrow keys to select within the displayed keyboard. Using the keys ◄ or ► you can also move the flashing cursor in the LCD display to the left or to the right.*

• *RA/Dec alignment – With thekeys ◄ or ► you can swivel the telescope in the hour axis. With the keys ▲ or ▼ you move the telescope in declination.*

• *Within a preselected menu, these keys allow access to various options in the database. The options of this menu are displayed – one after another – in the second line. If you press the keys ▲ or ▼, you move through the various options.*

7. **Numeric keys (7, Fig. 2)**– These allow you to enter the digits 0 – 9 and change

the slew speed (further information under “Slew speeds”).

8. **key (8, Fig. 2)**– Provides access to the help function. Once your questions have been sufficiently answered by the help function, press the Back key and return to the original display. Continue the previously selected procedure.

9. **[Stop/0] key (9, Fig. 2)**– This interrupts any motorised movement of the telescope.Pressing again resumes the last executed function.

10. **key (10, Fig. 2)**– Enables searching for object designations in the various catalogues in the Navigation submenu. To do this, select a catalogue, e.g. the Messier catalogue, and then press the Search key. You can now enter the number of the desired Messier object.

NOTE:
In the event of a tracking malfunction, press the Stop key twice!

11. **Connector socket for the coiled cable (11, Fig. 2)**– Plug one end of the coiled cable of the hand controller into this socket (9, Fig. 2). The socket is located on the underside of the hand controller.

12. **Red light lamp (12, Fig. 2)**– With this permanently installed red light lamp, you can illuminate star charts and accessories without losing your eyes’ dark adaptation.

13. **USB-C connection socket (13, Fig. 2) –**Plug the USB-C cable in here to establish a connection with a computer, e.g. for control via an ASCOM driver.

14. **Battery compartment with battery compartment cover and retaining screw (14, Fig. 2) (on the rear of the hand controller)**– The battery compartment contains a backup battery of type CR2023. The battery compartment is secured with a twist lock as well as an additional Phillips screw to prevent children from accidentally removing and swallowing the battery.

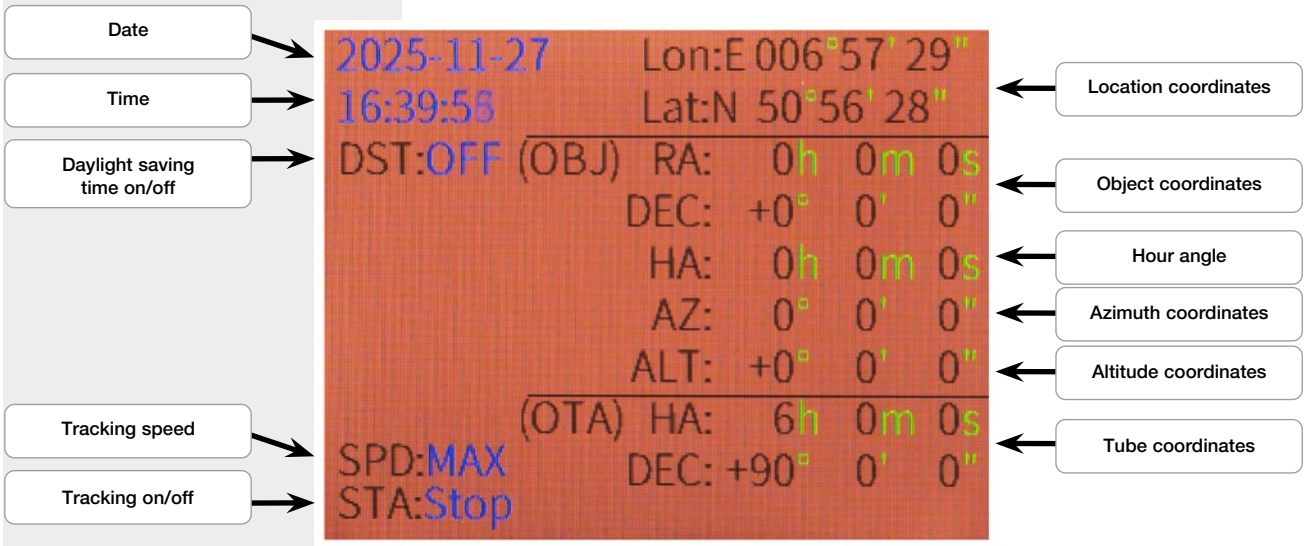


Fig. 2a: The hand controller display

Main menu of the telescope controller

Main menu overview:

- **Alignment**
- One-star Align telescope to one star
- Two-star Align telescope to two stars
- Three-star Align telescope to three stars
- Synchronisation Increases alignment accuracy
- Polaris position Shows the position of Polaris
- Sigma Octantis position Shows the position of Sigma Octantis
- Polar axis deviation Shows the deviation of the polar axis
- RA backlash correction RA backlash correction calibration
- DEC backlash correction DEC backlash correction calibration

- **Navigation**
- Solar system Solar system object catalogue
- Constellations Constellation catalogue
- Bright stars Catalogue with known stars
- Messier objects Catalogue with bright deep-sky objects
- NGC objects Extensive catalogue with a wide variety
- IC objectsCatalogue with faint objects
- Sh2 objects Catalogue with faint objects
- Catalogue with bright stars
- SAO objects Extensive star catalogue
- User objects Enables saving your own objects
- Enter coordinates Define your own point in the sky

- **Accessories**
- Current events Currently visible objects
- Rise & set Rise and set time of an object
- Moon phase The current moon phase
- Timer Timer functionality
- Alarm Set alarm
- Eyepiece FOV Eyepiece field of view
- Eyepiece magnification Eyepiece magnification
- Park telescope Slew to the park position

- **Settings**
- Date/Time Set date and time
- Location Set current location
- Summer/Winter Switch daylight saving time on or off
- Tracking speed Set tracking speed
- Star Speed
- Solar Speed
- Moon Speed
- Display illumination Switch display illumination on or off
- Audible signals on/off Switch audible signals on or off
- Language Select language
- Display mode Set display illumination
- Telescope model Information about connected mount
- Reset Reset to factory settings

Initialising the controller

This chapter describes how the hand controller is initialised. Run through this procedure either when using the hand controller for the first time, or after you have previously carried out the RESET function (see the section "**Reset**" onpage20).

1. Make sure that the DEC and RA locks (1 and 17, Fig. 1a) are tightened according to the instructions.

2. Make sure that the controller and the power supply are correctly connected to your telescope.

3. Set the power switch to "ON". The display field is activated, and the Bresser logo appears briefly. A short audible signal then sounds. The controller now needs a moment to boot up the system.

4. You will then be prompted to enter the date and time. The date is entered in the format "Year-Month-Day / e.g.: 2025-12-31". The time is entered in the format "Hour-Minute-Second / e.g.: 20-15-00". Use the numeric keys (7, Fig. 2) and confirm your entries with the [OK] key (5, Fig. 2).

5. You will now be prompted to enter daylight saving time. Select the setting "on" if the telescope is used during daylight saving time. Select the setting "off" if the telescope is used outside daylight saving time.

6. The next display asks you for the country and the city of your observing location. You have two different options for entry.

1. You can select a city near you from the internal database (select "Location selection"). In the database, the countries are listed in alphabetical order. Use the keys ▲ or ▼ to scroll through the list of countries and cities. As soon as the desired city appears on the display, press the [OK] key.

2. With manual entry (select "Individual location"), you can define your location data manually. Enter the name ("Name"), the longitude ("Lon"), the latitude ("Lat") and the time zone ("Zone"), and confirm your entries with the[OK] key

Example:

Name: Berlin ; Lon: E013° 25` ; Lat: N52° 30` ; Zone: E01

The telescope control now displays the main screen and is now ready for alignment with the night sky.

One-star alignment

After you have completed the initialisation, you can align the mount using the hand controller. The quickest and easiest way to use the controller's positioning is the one-star alignment. Alignment can only be carried out at night.

1. Move the telescope to the equatorial home position (Fig. 3b) and lock the clamps on both axes.
2. Press the [OK] key once to access the main menu and select the "Alignment" menu item. Then press the [OK] key.
3. Different alignment methods are now displayed for selection. Select "One-star" and then press the [OK] key.
4. A selection of alignment stars is now displayed. Use the keys ▲ or ▼ to select the desired alignment star and confirm your selection with the [OK] key. The telescope will now move from the start position towards the vicinity of the selected alignment star.
5. It may happen that the star does not appear in the telescope's field of view after positioning. In this case, use the arrow keys to bring the star into the field of view and centre it. As a rule, the alignment star is clearly visible and is the brightest star in the region of the sky at which the telescope is pointing. If you have adjusted the finder scope, it will generally be the brightest star in the finder's field of view. Once the star is centred in the eyepiece field of view, pressthe [OK] key. Successful alignment of the telescope is then confirmed by an audible signal.

After completion of the one-star alignment procedure, the motor drive runs for tracking. The telescope is now set up for an observing night. All objects should

retain their position in the eyepiece, even though the Earth continues to rotate beneath the starry sky.

NOTE:
Once the telescope has been aligned, only move it using the GoTo control or the direction keys. Do not open the telescope locks (1 and 17, Fig. 1a) now, and also avoid adjusting the base of the telescope manually. Otherwise, the telescope alignment will be lost.

Two- and three-star alignment

The procedure is identical; however, you repeat steps 4 and 5 two or three times respectively for additional alignment stars.

Synchronisation

This can improve pointing accuracy. After synchronisation, the telescope matches the position of this object with the database. Celestial objects in the immediate vicinity are then approached more accurately.

1. In the main menu, select “Alignment” and then the menu item “Synchronisation”, and press [OK].
2. You will now be asked whether synchronisation should be started. Select “Yes” and press [OK].
3. In the main menu, select “Navigation”, e.g. the menu item “Messier objects”. Use the arrow keys to select a visible object and confirm the selection with [OK].
5. Press [OK] again and the telescope will move to the selected object. You may need to use the direction keys to place the object precisely in the centre of the field of view of the eyepiece. Once this has been done, press [OK]. The display now shows the message “SYNC: ON”.
6. In the main menu, select “Alignment” again, then the menu item “Synchronisation”, and press [OK].
7. Select “No” and press [OK]. Synchronisation is now complete and the position values on the LCD are recalculated and updated accordingly.

NOTE:
Based on location, time and date, the hand controller calculates the best alignment stars. The stars may change from night to night and from hour to hour. As an observer, you only need to centre the stars in the field of view when prompted to do so.

RA and DEC backlash correction

For improved accuracy, you can train the gear backlash or “backlash correction of the axis”. This must be carried out separately for both axes and is generally not necessary. Press the OK key to enter the menu and select “Alignment”. Then select “RA backlash correction” or “DEC backlash correction” accordingly.

1. Select the menu item “RA backlash correction” and press [OK].
2. Insert a crosshair eyepiece into the telescope’s focuser drawtube.
3. Use the telescope to point at a high-contrast object (e.g. a church spire) and centre it as precisely as possible on the crosshair. Press [OK].
4. Briefly press the right direction key and wait until a confirmation tone sounds.
5. Press and hold the left direction key until the previously set object is exactly back in the original position on the crosshair. Press [OK].
6. The measured value for the RA motor backlash is now displayed in arcseconds.

The “DEC backlash correction” function works in the same way, except that the “Up and Down” keys must be used for this.

NOTE:
To further improve the positioning accuracy of the telescope control, align the telescope mount as precisely as possible to the celestial pole using the polar scope before alignment is carried out. Further instructions can be found in the relevant

Navigating to observing objects

“Go To” Saturn

This exercise shows you how to select a celestial object, namely Saturn, for observation from the basic hand controller data.

1. After aligning the telescope, the main screen appears on the LCD of the hand controller. Press [OK]. You are in the main menu. Use the direction keys to select “Navigation” and press [OK].
2. You are in the “Navigation” submenu and various selection options for stored observing objects that can be approached using the telescope controller are displayed.
3. Select “Solar system” and press [OK]. “Mercury” appears on the LCD. Use the keys ▲ or ▼ to scroll through the database until “Saturn” appears on the display. Press [OK]. The planet Saturn is now approached automatically by

NOTE:
In step 5, always approach the object from one direction only. It is not recommended to make corrections in the opposite direction in order to re-approach the object. If necessary, the procedure must be cancelled and restarted.

the telescope controller. You may need to use the direction keys to place Saturn precisely in the centre of the field of view of the eyepiece.

The controller now continues to move the telescope automatically. This “tracks” Saturn (or any other object you have just selected), i.e. Saturn now remains continuously centred in the eyepiece.

User objects

How toenter the coordinates of an object under the “User object” option in the Navigation menu and approach the object:

1. Ensure that you have initialised the controller and aligned the telescope.
2. After aligning the telescope, press the [OK] key to access the main menu.
3. Select the “Navigation” menu option and press [OK].
4. Select the “User object” menu option and press [OK].
5. Use the direction keys to select a memory location ((Target star 1 – Target star 9)) and press [OK].
6. You can now enter the object coordinates in the format hours/minutes/seconds for the right ascension axis (Ra) and in degrees/minutes/seconds for the declination axis (DEC). Note the positive or negative sign of the degree value. Save the entries with the [OK] key. The entered coordinates are now approached.

The object is tracked automatically by the controller. It may happen that the object does not appear in the centre of the telescope’s field of view (eyepiece) after positioning. In this case, centre the object in the field of view using the arrow keys.

NOTE:
Please note that the coordinates of Saturn (and those of the other planets) change continuously over the course of a year. If the selected observing object (e.g. Saturn) is not visible below the horizon at the set observing time and location, this will be shown on the LCD with the message “Target under Horizon / Objekt unter dem Horizont”. In this case, press the [OK] key once and select another object from the database.

Entering object coordinates

How to enter the coordinates of an object directly under the “Enter coordinates” option in the Navigation menu and approach the object:

1. Ensure that you have initialised the controller and aligned the telescope.
2. After aligning the telescope, press the [OK] key to access the main menu.
3. Select the “Navigation” menu option and press [OK].
4. Select the “Enter coordinates” menu option and press [OK].
5. You can now enter the desired object coordinates in the format hours/minutes/seconds for the right ascension axis (Ra) and in degrees/minutes/seconds for the declination axis (DEC). Note the positive or negative sign of the degree value.
6. Press [OK]. The telescope now moves to the previously stored object coordinates. The object is tracked automatically by the controller. It may happen that the object does not appear in the centre of the telescope’s field of view (eyepiece) after positioning. In this case, centre the object in the field of view using the arrow keys.

NOTE:
If tracking has been stopped by accidentally pressing the [OK] key, tracking can be switched on again by pressing the “STOP” key twice.

Accessories menu

Here you can find out more about the additional functions of the telescope controller.

Current events

Planets currently visible from your location, with currently calculated rise and set times and the time of culmination (highest position in the south = best visibility), can be displayed here. Press the ⮌ key to return to the main menu.

Note: Ensure that the telescope controller has been successfully initialised beforehand.

Rise and set times

If you would like to know the rise and set times and the time of culmination (highest position in the south = best visibility) of any object with known coordinates

for your location, you can have this calculated under this menu item. Press the ⮌ key to return to the main menu.

Note: Ensure that the telescope controller has been successfully initialised beforehand.

Moon phase

The moon phases of the currently set month are shown graphically here. The numbers indicate the day associated with the graphic. Use the arrow keys to change the year and month. The moon phases are then recalculated and displayed immediately. Press the ⮌ key to return to the main menu.

NOTE:
Make sure that the telescope control has been successfully initialised beforehand to ensure correct functionality of all additional functions.

Time (Timer)

The timer function emits an audible signal after any set time in seconds. This allows, for example, exposure times in astrophotography to be adhered to precisely to the second. Enter the desired time in seconds. Use the arrow keys to select the symbol ▶ (Play/Start) and confirm with [OK]. This starts the timer. The time now counts down and can be paused or stopped using the displayed symbols ⏸ (Pause) or ■ (Stop). Here too, select the desired symbol with the arrow keys and confirm with [OK]. Press the ⮌ key to return to the main menu.

Alarm

The alarm function emits an audible signal at any set time. This allows, for example, celestial events to be planned so that they are not missed. Enter the desired date and time in 24-hour format and move the slider using the left and right arrow keys to “ON” once the alarm is to be activated. Press the ⮌ key to return to the main menu. If you want to deactivate the alarm early, select the “Alarm” menu item again and set the slider to “OFF”.

Eyepiece FOV (field of view)

The Eyepiece FOV (Field of view / field of view) function can calculate the field of view of a specific eyepiece. After entering the focal length of the telescope used (objective lens focal length), the focal length of the eyepiece (eyepiece focal length) and the apparent field of view of the eyepiece (eyepiece viewing angle), select “Calculate” and press OK. The size of the field of view in degrees is then displayed in the lower line of the LCD.

Eyepiece magnification

NOTE:
You can select the key symbols shown on the display using the arrow keys and start the corresponding function with the [OK] key.

The Eyepiece magnification function can calculate the magnification of a specific eyepiece. After entering the focal length of the telescope used (objective lens focal length) and the focal length of the eyepiece (eyepiece focal length), select “Calculate” and press OK. The calculated magnification is then displayed in the lower line of the LCD. Press the Back key to return to the main menu.

Park telescope

Select this function to move the telescope to the park position (start position). Switch off the telescope controller after the park position has been reached.

Settings

Here you can find further details about the setting options of this telescope controller.

Date and time

The date is entered in the format “Year-Month-Day / e.g.: 2013-31-12”. The time is entered in the format “Hour-Minute-Second / e.g.: 20-15-00”. Use the numeric keys and confirm your entries with the[OK]key.

Daylight saving time / standard time

Select the setting “on” if the telescope is used during daylight saving time. Select the setting “off” if the telescope is used outside daylight saving time. Note: Make sure this information is correct, otherwise deviations may occur during calculations and objects may not be approached accurately.

Note:

Make sure this information is correct, otherwise deviations may occur during calculations and objects may not be approached accurately.

Location

Here you can set your observing location. You have two different options for entry:

1. You can select a city near you from the internal database (select “Location selection”). In the database, the countries are listed in alphabetical order. Use the “Up and Down” direction keys to scroll through the list of countries and the “Left and Right” keys to scroll through the cities. As soon as the desired city appears on the display, press the [OK] key.
2. With manual entry (select “Individual location”), you can define your location data manually. Enter the name (“Name”), the longitude (“Lon”), the latitude (“Lat”) and the time zone (“Zone”), and confirm your entries with the[OK]key.

Example:

Name: Berlin

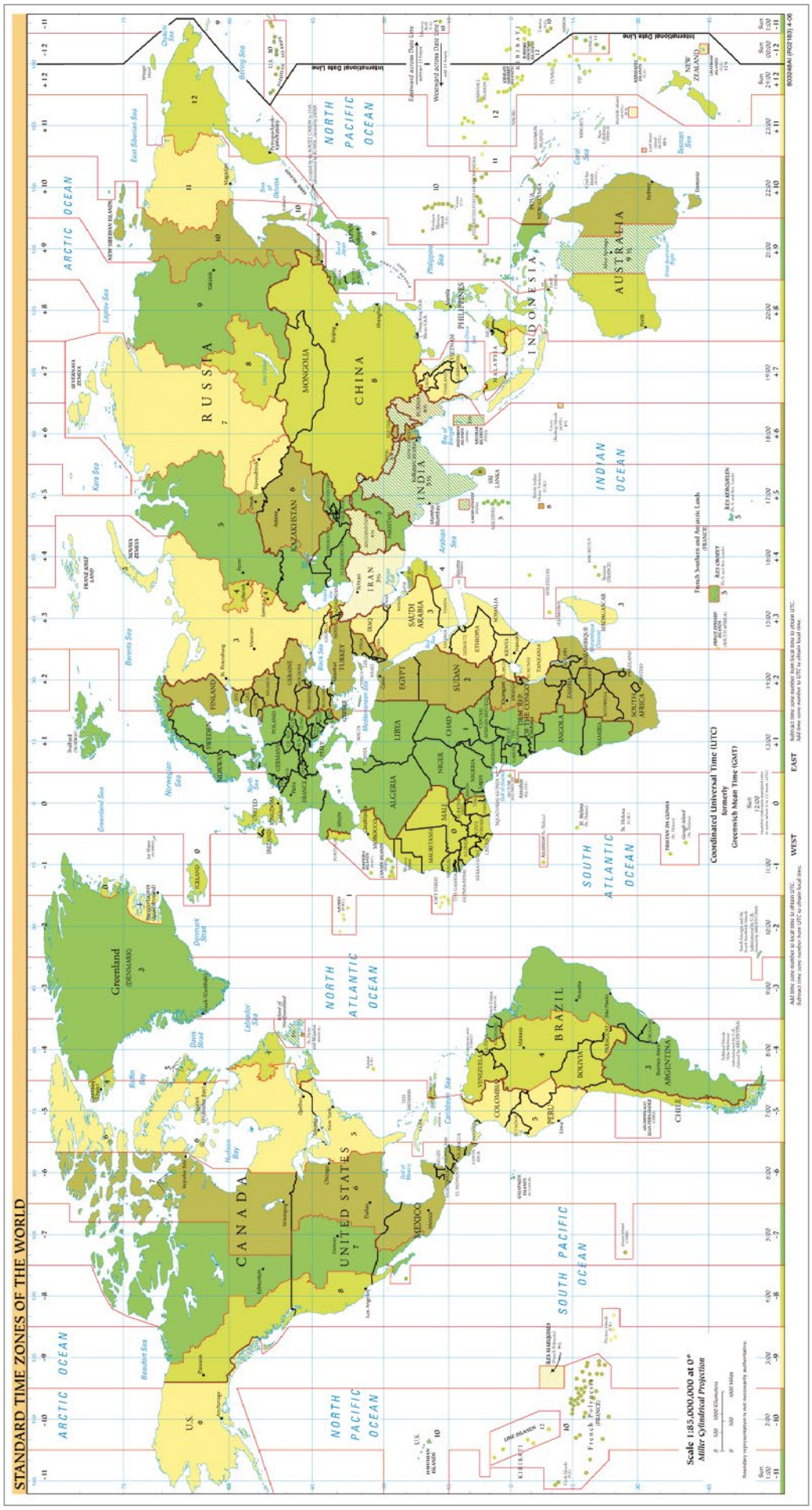
Lon: E013° 25` ; Lat: N52° 30` ; Zone: E01

Time zone east of Greenwich: E01-E12

Time zone west of Greenwich: W01-W12

Greenwich time zone (GMT):

E00 or W00


STANDARD TIME ZONES OF THE WORLD
Scale 1:85,000,000 at 0°
Miller Cylindrical Projection
Coordinated Universal Time (UTC)
formerly
Greenwich Mean Time (GMT)
WEST
EAST
International Date Line
RUSSIA
CHINA
INDIA
AUSTRALIA
INDONESIA
CANADA
UNITED STATES
BRAZIL
Greenland
(DENMARK)
MEXICO
ARGENTINA
CHILE
ALGERIA
LIBYA
EGYPT
SUDAN
SAUDI ARABIA
IRAN
KAZAKHSTAN
MONGOLIA
NEW ZEALAND
ARCTIC OCEAN
NORTH PACIFIC OCEAN
NORTH ATLANTIC OCEAN
SOUTH PACIFIC OCEAN
SOUTH ATLANTIC OCEAN
INDIAN OCEAN

Display mode

Here you can choose between day mode, night mode and automatic mode, and confirm with OK.

Tracking speed

This allows you to adjust the speed of automatic tracking. Select the desired option and press[OK]. The following options can be set:

Star Speed: sidereal speed / star speed

(Standard factory setting)

Solar Speed: Sun speed

Moon Speed: Moon speed

Guiding Speed: Adjustment of the response speed for auto-guiding via the ST-4 interface (astrophotography). The setting 1.000 results in an aggressive response of the drive motors. Settings with lower values result in a more sluggish response. This setting must be adjusted individually for each telescope mount in order to achieve the most even and/or accurate tracking possible. Required accessories for this, such as ST-4 compatible guiding cameras, are available from specialist retailers.

Display illumination

Here you can adjust the brightness of the display using the left and right arrow keys.

Key backlight

Here you can adjust the brightness of the keys using the left and right arrow keys.

Audible signals On / Off

Here you can enable or disable the audible signals.

Language

Select your preferred language. The following options are available: English , German , French , Italian , Spanish, Chinese (simplified), Chinese (traditional), Japanese, Korean

Telescope model

Here the connected mount is displayed, as well as the telescope software version used and the hand controller software version.

Reset

This resets the telescope control to the factory settings. This is required, for example, if all personal settings are to be undone or if system errors occur. Afterwards, you must re-initialise the telescope control and re-enter all user data.

Connection to a PC via ASCOM

By connecting to a PC, you can control the mount using third-party programs such as Cartes du Ciel, Stellarium, APT or NINA. To do this, install the ASCOM. JocGotoV2 Setup.zip, which you can find as a download under “Instructions” for this item. After successful installation, connect the hand controller to your mount and switch it on. Then connect the hand controller and the PC via a USB-C cable. You can now select the mount “JOC JocGotoV2 Telescope” in the various programs and control it.

Meridian flip

When a telescope with an equatorial mount tracks an object that is moving towards the west (due to the Earth’s rotation), it eventually reaches the point at which it crosses the meridian (an imaginary line running from north to south

through the zenith) into the western half of the sky. At this point, the telescope would reach its mechanical limits or even collide (e.g. with the tripod) if it simply continued to follow the motion. Therefore, the mount must turn the telescope over, i.e. swivel it to the other side of the mount head so that it can continue tracking the object – this is the meridian flip.

Once this point is reached, the mount rotates automatically. Please monitor this step, as cables may become taut. If necessary, the object must be re-centred after the flip.

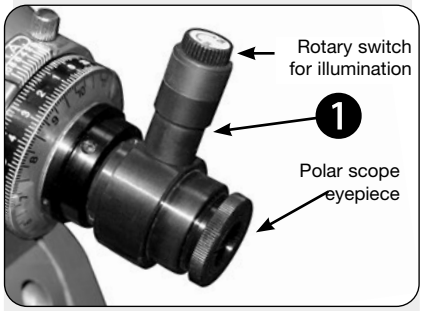


Fig. 4: Polar scope construction

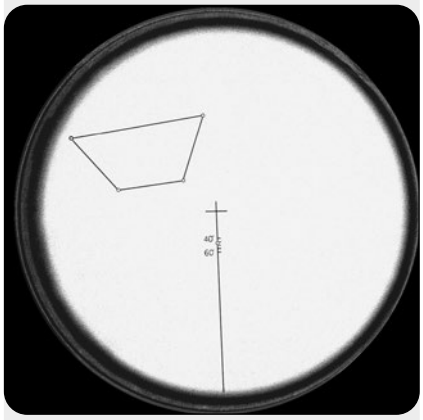


Fig. 5: View through the polar scope. (The four stars show a star group near the south celestial pole)

Improving polar alignment

The polar scope

Normally, a simple polar alignment is sufficient for most observers, and the use of the polar scope is not necessary for them. However, for the observer who has higher requirements, such as e s o m e t h i n g s i m i l a r g. astrophotography, the polar scope offers the possibility of aligning the telescope mount even more precisely to the north celestial pole. This also benefits pointing accuracy. The Exos 2 can be equipped with red LED illumination (optional).

Adjusting the polar scope (EXOS 2)

A. Calibration of the date circle on the polar scope (this procedure is best carried out during the day)

1. Look through the polar scope at a bright surface (e. g. a house wall or the sky, but never at, or near, the Sun!) and identify the trapezoid as well as the line with the small circle and the labelling (Fig. 5). If you cannot see the figures clearly, turn the polar scope eyepiece slightly to focus.

2.The date circle is calibrated in such a way that it is rotated relative to the polar scope so that the long line of the scale plate points exactly to 1 May on the month division. It is best to hold the date circle with your thumb and forefinger around its circumference and rotate the polar scope in the appropriate direction. Repeatedly look through the polar scope eyepiece and try to achieve the best possible match of the long line with 1 May. If you find it difficult to see the line in the eyepiece and the date circle at the same time, you can also screw the polar scope into the mount and rotate it so that the long line points straight up (in this case please note that the opening in the mount must allow an unobstructed view through the polar scope; see B.1. in the section further below). You can then rotate the date circle as described above at your leisure. The date circle is relatively stiff to turn, as it is held by a locking ring. The locking ring behind the date circle can be loosened with a screwdriver; however, the date circle should never be so loose that it can rotate unintentionally. The date circle should also not be so tight that it can later only be turned in operation with extreme effort. It should remain just movable, without being loose.

3. When the long line points to 1 May, the calibration of the date circle is complete. On the date circle there is another, smaller scale labelled “E 20 10 0 10 20 W”. Take a white paint marker or. and make a small mark on the polar scope that lies immediately in front of the “0” mark of the small scale (you can e. g. also do this with a narrow adhesive tape and a marking on it). Your marking and the “0” of the small scale now coincide exactly. Then screw the polar scope back into the mount.

B. Adjustment of the optical axis of the polar scope to the RA axis of the mount (EXOS 2)

1. Bring your telescope into the equatorial home position (see page 8). Release the DEC lock and rotate the main telescope by 90°. Then re-tighten the DEC lock. In this position, the DEC axis provides a clear view through the polar scope.

2. Set a clearly visible terrestrial object (e. g. a church spire) on the crosshair in the centre of the polar scope.

3. Determine whether the object moves away from the crosshair when rotating the mount in RA.

4. If this is the case, adjust the polar scope in its holder so that the terrestrial object remains on the crosshair when rotating the mount. To do this, loosen one of the three side Allen screws located below the date circle. Then tighten the other two Allen screws until the polar scope is firmly seated again. Then check the movement of the terrestrial object again when rotating the mount. Continue with the three Allen screws until the terrestrial object no longer moves when rotating the mount.

Precise alignment of the telescope to the north celestial pole with the aid of the polar scope: (EXOS 2)

Fig. 6: Detailed view of the polar scope with rotary switch (ON/OFF)

Polar scope illumination (1) available as an optional accessory for Exos 2.

1. Bring your telescope into the equatorial home position (see page 8). Release the DEC lock (17, Fig. 1a) and rotate the main telescope by 90°. Then re-tighten the DEC lock. In this position, the DEC axis provides a clear view through the polar scope.

2. Release the RA lock (17, Fig. 1a).

3. Remove the cap from the polar scope.

4. If not already done, remove the insulating tab from the battery inside the polar scope illumination.

5. Turn the rotary switch on the polar scope illumination clockwise to switch the illumination on, and look through the polar scope eyepiece. Focus the polar scope eyepiece by turning it until the scale plate appears sharp to you.

6. In the following step 7, use the altitude adjustment screws and the azimuth fine adjustment screws (10, Fig. 1a) of the mount to perform the required fine adjustments.

A. Observers in the northern hemisphere of the Earth

N-7a) Determine the approximate geographical longitude of your observing location, e. g. for Munich = 12° (check in the Autostar if necessary, if you have already entered it there; an accuracy to 1° is entirely sufficient here). Now determine the geographical longitude of the time meridian of the time reference you are using. For Central European Time (CET/MEZ) this is 15° (daylight saving time must not be used here!). Now calculate the difference between the two longitudes; in the example Munich = 3°.

N-7b) On the small scale of the polar scope “E 20 10 0 10 20 W”, set exactly this calculated difference – for this, the date circle is rotated relative to the polar scope (as in step A.3. above). If your observing location lies east of the time meridian, the marking must be set towards “E”, otherwise towards “W”. This setting only needs to be changed later if you go to an observing site that has a significantly different longitude difference to the time meridian (deviations of around 1° are absolutely negligible). See also Fig. 6 – 3° difference to W for the example, as Munich lies west of the 15° time meridian.

N-7c) Loosen the RA setting circle locking screw, rotate the RA setting circle by hand to “0” and re-clamp the setting circle (the screw engages in a noticeable notch at “0”). In normal operation, however, this screw should always remain loosened!

N-7d) Release the RA lock and swivel the telescope about the RA axis until the approximate current date on the polar scope scale coincides with the approximate local time (!) on the RA setting circle (the polar scope disc has 12 months with 15 subdivisions each – each subdivision corresponds to about 2 days). In the picture on the left, this would be e. g. on 15/1 at 22:00 CET. It is essential that the same time system (UT, CET, etc.) is used here that was also used as the basis for calculating the longitude difference in step N-7a)!

N-7e) Now move the mount using the fine adjustments in azimuth and altitude until the small circle on the long line of the crosshair (between the 40‘ and 60‘ markings) coincides exactly with the Pole Star.

B. Observers in the southern hemisphere of the Earth:

S-7a) Identify the trapezoid-shaped figure in the field of view. These are the four stars Sigma, Tau, Chi and Ypsilon in the constellation Octans. First rotate the telescope only in the RA axis until the orientation of the four star positionson the scale plate of the polar scope approximately matches the orientation of the four stars in the sky.

S-7b) The two trapezoids will probably still be laterally offset. Now use the fine movements according to point 6 to adjust the azimuth and altitude of the mount until the two trapezoids coincide exactly. If necessary, rotate the mount a little further in RA as well to achieve an exact match.

NOTE:
Not all settings are always possible with the polar scope, as the tripod restricts the freedom of movement of the main telescope.

8. Tighten the RA lock (17, Fig. 1a) again and return the telescope to its equatorial home position.

NOTE:
Do not forget to switch the illumination off again after use.

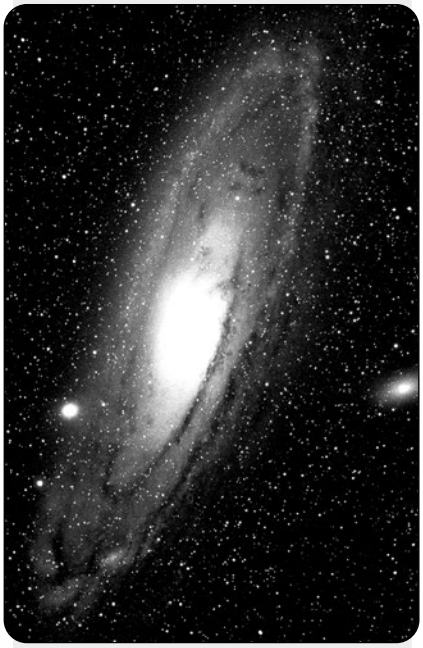


Fig. 7: The Andromeda Galaxy, the largest in our vicinity.

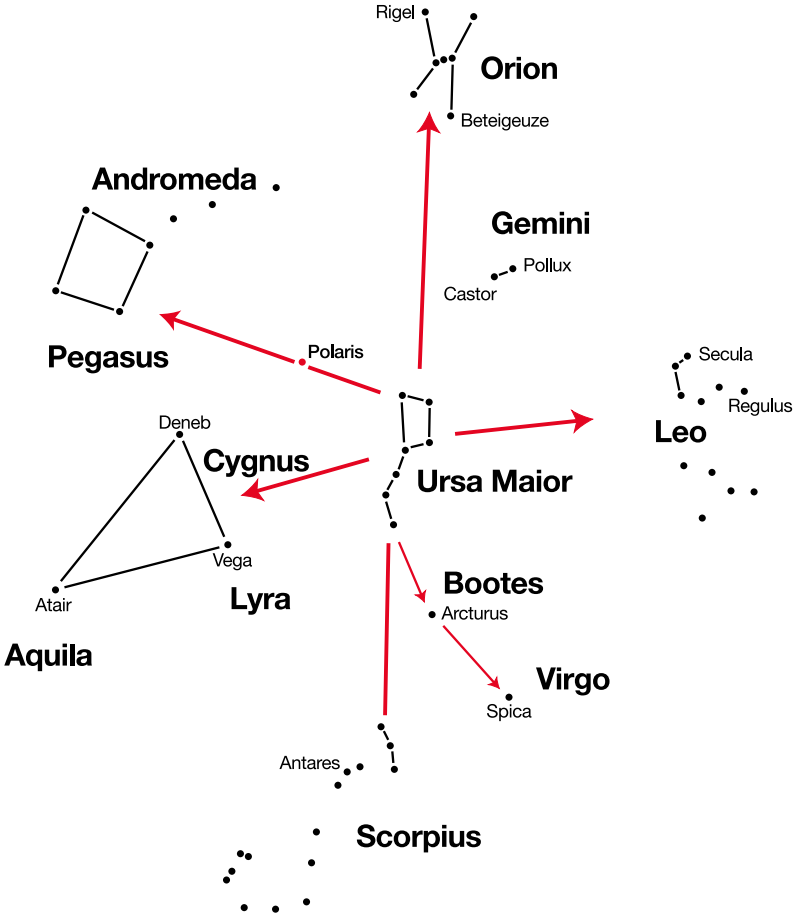
How do I find the Pole Star

Starting from the two "pointer stars" – the two rear stars of the Plough – draw a fivefold extension to the Pole Star. Extend this line well beyond the Pole Star, and you will reach the Great Square, which Pegasus and Andromeda share.

The Summer Triangle is a conspicuous region of the sky to the left of the handle of the Plough. This triangle consists of three very bright stars: Vega, Deneb and Altair.

If you draw an imaginary line straight towards the handle of the Plough, you will arrive at the summer constellation Scorpius. Scorpius curves in the sky like a scorpion's tail to the left; it also looks a little like the letter "J".

American amateurs coined the phrase "Arc to Arcturus and spike to Spica"; in German, roughly: "Bogen zum Arkturus und Spitze zur Spika". They refer to a region of the sky that lies in the direct extension of the arc described by the handle of the Plough. Follow the arc to Arcturus, the brightest star of the northern hemisphere, and then "spike" down to Spica, the 16th brightest star in the sky.



Tip:

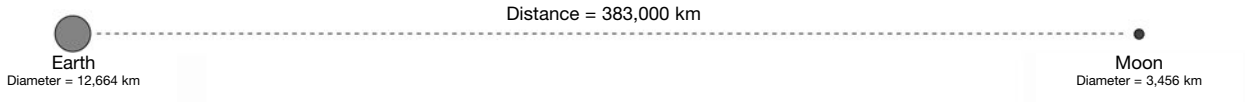
Star charts

Star atlases and rotating star charts are extremely useful and helpful utensils when it comes to planning an observing night.

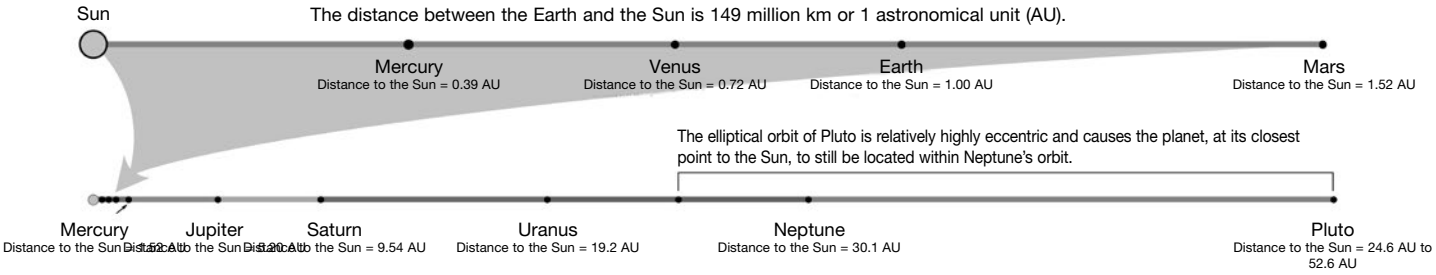
There is a wide range of star atlases in book form, in magazines, on the Internet and on CD-ROM.

“You and the Universe”

The distance between the Earth and the Moon

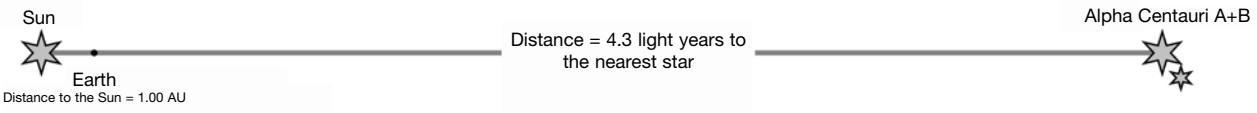


The distance between the planets



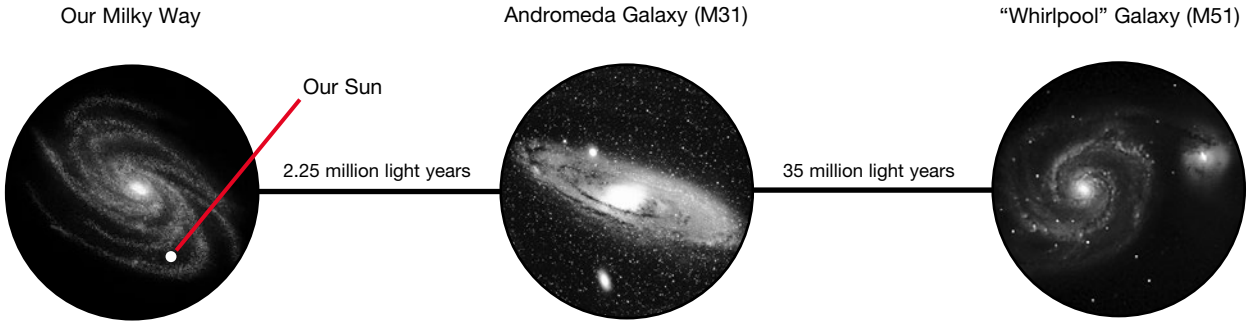
The distance between the stars

The distance from the Sun to the nearest star is about 4.3 light years or approximately 40 trillion km. This distance is so enormous that, in a model in which the Earth were 25 mm away from the Sun, the distance to the nearest star would be more than 6.5 km!



Our home galaxy, the Milky Way, together with our Sun contains approximately 100 billion stars. It is a spiral star system that probably has a diameter of more than 100,000 light years.

The distance between the galaxies



Possible observing objects

Below we have selected and explained some very interesting celestial objects for you.

Moon

The Moon is the only natural satellite of the Earth
Diameter: 3,476 km
Distance: 384,400km away from the Earth

After the Sun, the Moon is the second brightest object in the sky.
As the Moon orbits the Earth once a month, the angle between the Earth, the Moon and the Sun is constantly changing; this can be seen in the cycles of the lunar phases. The time between two successive new moon phases is about 29.5 days (709 hours).

Constellation ORION / M42

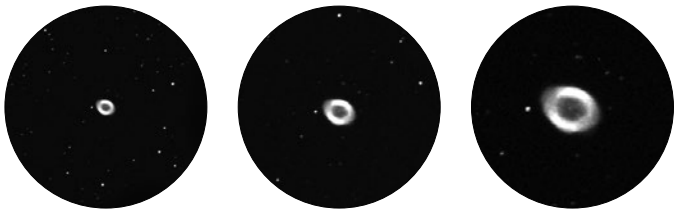
Right ascension: 05^h 35^m(hours : minutes)
Declination: -05°25‘(degrees : minutes)
Distance: 1,344light years away from the Earth

At a distance of about1,344light 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 ground-based observatories and the Hubble Space Telescope.

It is the main part of a much larger cloud of hydrogen gas and dust, which extends over more than 10 degrees across more than half of the constellationOrion.The extent of this enormous cloud amounts to several hundred light years.

Constellation LYRA / M57

Right ascension: 18^h 53^m(hours : minutes)
Declination: +33° 02‘ (degrees : minutes)
Distance:2,412light years away from the Earth



The famous Ring Nebula M57 in the constellation Lyra is often regarded as the prototype of a planetary nebula; it is one of the showpieces of the summer sky of the northern hemisphere. More recent studies have shown that it is most likely a ring (torus) of brightly glowing matter surrounding the central star (visible only with largertelescopes), and not a spherical or ellipsoidal gas structure. If the Ring Nebula were viewed from the side plane, it would resemble the Dumbbell Nebula M27. With this object, we are looking directly at the pole of the nebula.

Constellation VULPECULA / M27

Right ascension: 19^h 59^m(hours : minutes)
Declination: +22° 43‘(degrees : minutes)
Distance: 1,360light years away from the Earth

The Dumbbell Nebula M27, or Hantel Nebula, in Vulpecula was the first planetary nebula ever to be discovered.On 12 July 1764, Charles Messier discovered this new and fascinating class of objects. We see this object almost exactly from its equatorial plane. If one were to view the Dumbbell Nebula from one of its poles, it would probably have the shape of a ring and resemble the appearance we know from the Ring Nebula M57.

This object can already be seen well at low magnifications under reasonably good observing conditions.

Technical data

Article designation: Bresser Goto Set

Article number: 49-51750

Compatible mounts: Bresser EXOS II and EQ-5 compatible series

Required worm gear ratio: 144:1

Number of stored objects: < 100,000

Max. drive speed: 2° / second

Auto-guider connection: Yes / ST-4 compatible

LCD display: 36 x 63 mm; 8 lines with 21 characters each

Drives: DC servo motors with rotation encoders

Operating voltage: 12 V direct current

Power supply connection: DC hollow plug 5.5 / 2.5 mm

Polarity of the 12 V power socket: centre pin positive / outer sleeve negative

Battery compartment: Yes / 8 x D-cell / LR20 (batteries not included)

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

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*: +44 1342 837 098

BRESSER UK Ltd.
Suite 3G, Eden House
Enterprise Way
Edenbridge, Kent TN8 6HF
Great Britain

*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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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*: +31 528 23 24 76

BRESSER Benelux B.V.
Donau 5-12
7908 HA Hoogeveen
Nederland

*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 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

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28925 Alcorcón Madrid
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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..

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