Starscope telescopes on azimuthal mount

Instruction manual

These instructions are valid for the telescope models shown in the illustration

Starscope 707

Starscope 767

First information

Thank you for choosing a quality product from Teleskop-Service. With the purchase of this telescope you are now entering the fascinating world of hobby astronomy. With our beginner's set you can make your first experiences in the sky and take a look into the past of the universe.

In order to enjoy this optical instrument for a long time, we ask you to read these instructions carefully. The setup is sometimes not easy for beginners. Therefore we want to help you with this description to unpack your new telescope and to assemble it professionally.

Only then you will have a lot of fun observing celestial objects. Further helpful steps for finding celestial objects or also for the care of your telescope can be found at the end of this manual.

If you have any special questions, our staff will be happy to assist you. Just write an e-mail or call us and we will be glad to help you.

WARNING!

Never look at the sun with a telescope or any other optical device. Permanent and irreversible damage would be done to your eyes, which could lead to blindness.

For solar observation, there are special solar filters that are mounted in front of the front lens of the telescope. Please also consider the small finder scope, which must also be covered or equipped with a solar filter.

Do not use eyepiece solar filters, as they may crack and cause you to lose your eyesight.

Also, please do not use the telescope for solar projection. The heat generated inside may destroy the telescope/eyepiece.

Never leave the telescope unattended, especially when children are around. They could endanger themselves and others through lack of knowledge.

Only use the telescope for the type of observation described in these instructions.

Contents

Note: The pictures in this manual show the Starscope 767

Unpacking and checking the contents of the package

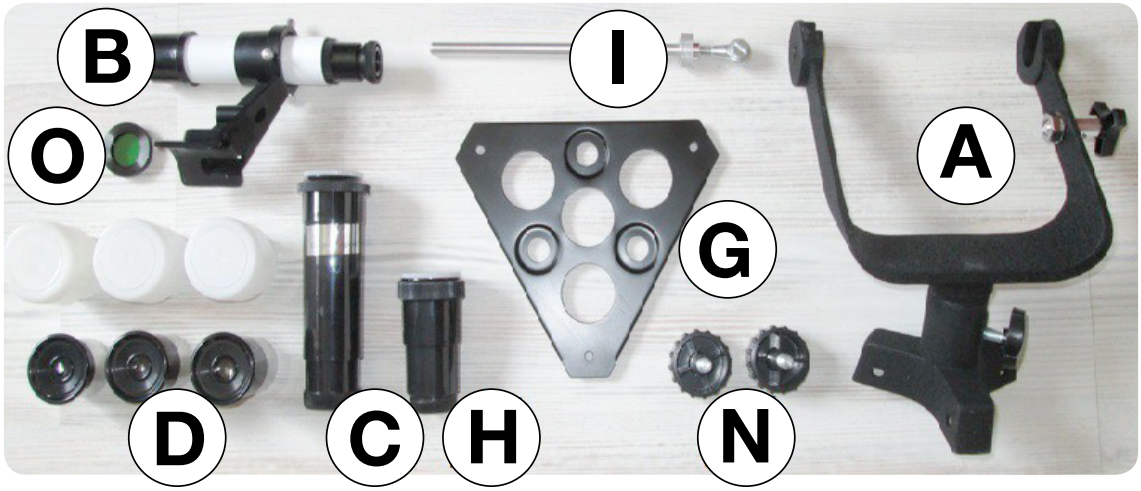
The outer packaging contains another box and these instructions. This contains the individually packed parts for the telescope complete set.

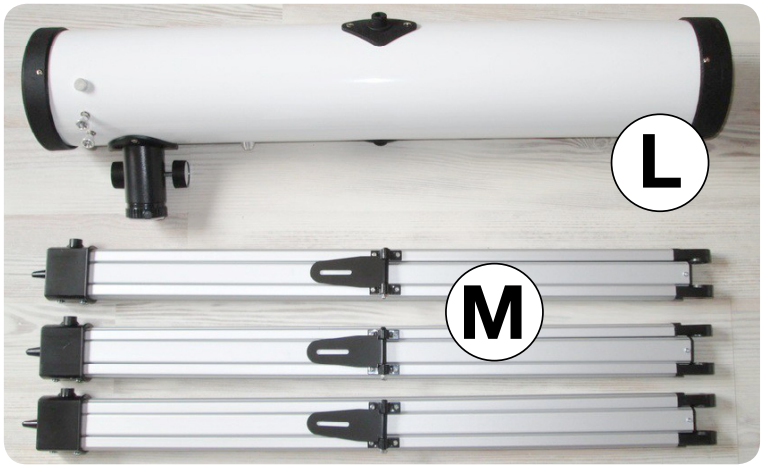
Please unpack the individual parts conscientiously and place everything carefully on the floor.

Before starting the assembly, please check all parts for their undamaged condition. Please also check whether all parts are present.

If you are setting up a telescope for the first time, please follow our assembly instructions carefully, as incorrect assembly can result in poor imaging of the optics or even damage to them.

If, contrary to expectations, you should ever notice damage to one of the parts when unpacking or checking, please contact us immediately before you finish assembling the complete set.





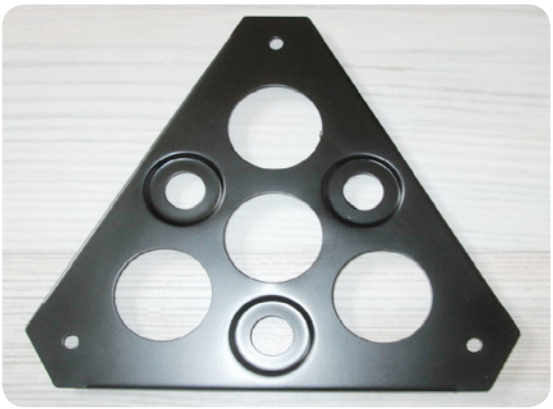
A - Mount
B - Finder scope
C - Erect lens
D - Eyepieces
E - ---
F - Locking screws for tripod legs
G - Support plate
H - Barlow lens
I - Fine adjustment
J - Screws/wing nuts for tripod legs
K - Screws/wing nuts for support plate
L - Optical tube
M - Tripod legs
N - Screws
O - Moon filter

Assembly of the mount • preparation

Take the parts needed for this and place them ready for mounting.

You will need the following parts for the mount:

- AZ mount head
- Tripod legs
- Screws for tripod leg clamping
- Screws with wing nuts for the tripod leg mounting
- Storage plate for eyepieces and accessories
- Screws with wing nuts for the storage plate

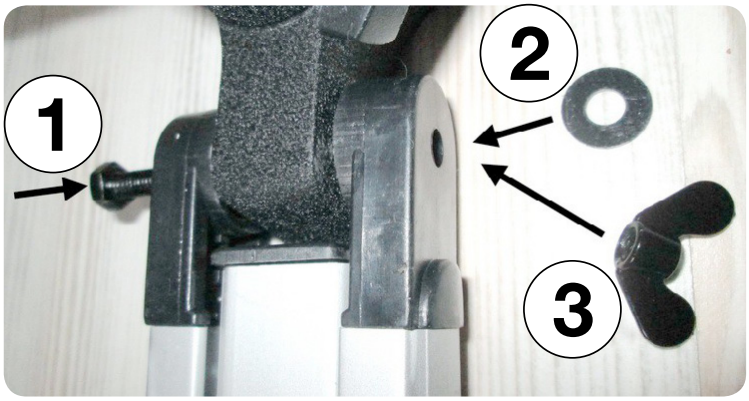


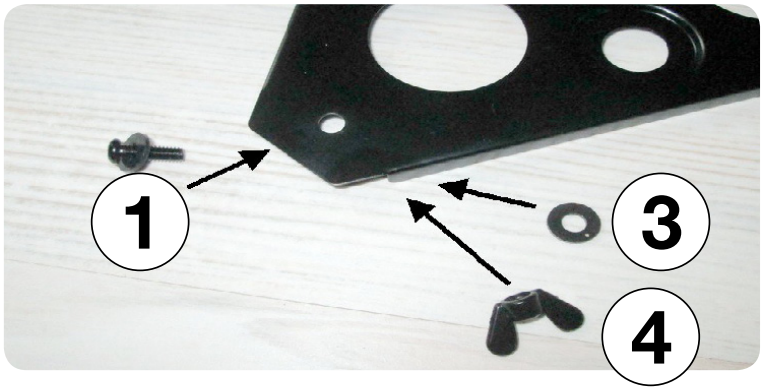
Assembling the mount

First screw the three screws ‚F' into the threads of the tripod legs, but do not tighten the screws too much, only „hand-tight". You can later use these three screws to change the „working height" of the tripod or to adjust the tripod to an uneven floor.

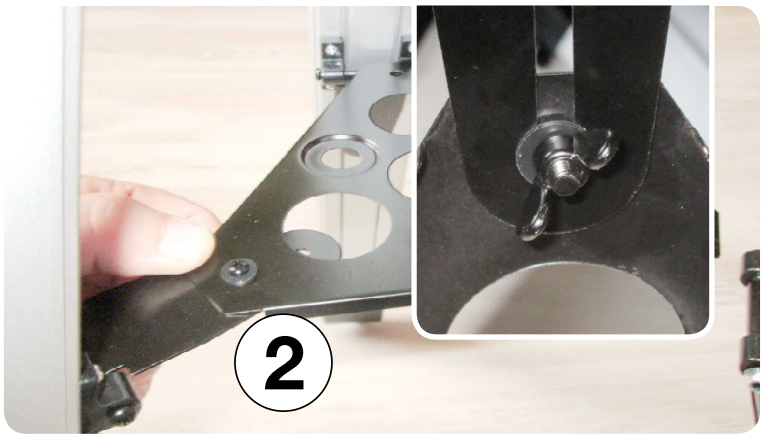
When mounting the tripod legs, make sure that the three retaining plates for the storage plate face inwards.

Then attach the tripod legs to the mount head using the three screws ‚J'. You should not tighten these screws too much yet.





Now fasten the storage plate to the retaining plates of the ripod legs using the three screws (K). To do this, insert the screws with a washer from above into the holes provided for this purpose in the storage plate ...

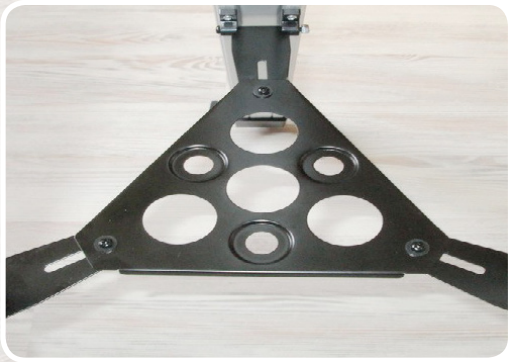


... and screw a wing nut together with a washer onto the screw from below. Do not tighten the nut yet.

Then spread the three tripod legs evenly and only then tighten the three screws (J) on the mounting head „hand-tight“ (page 7).

Now attach the storage plate to the other two holding plates.

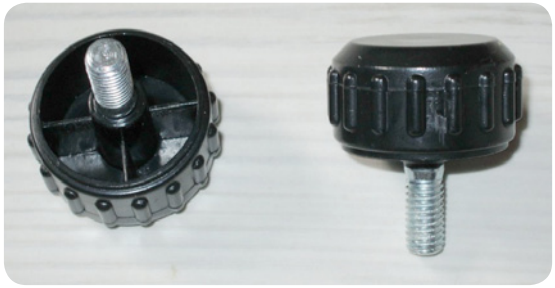
Your AZ mount should now be secure and stable and is ready to receive the telescope.

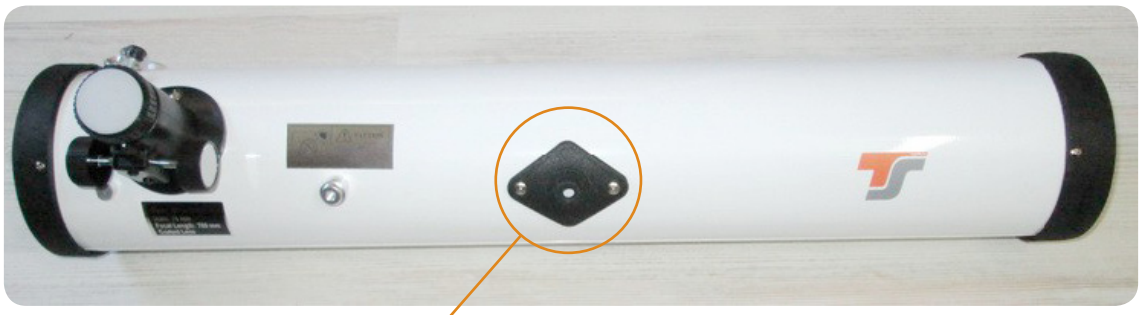


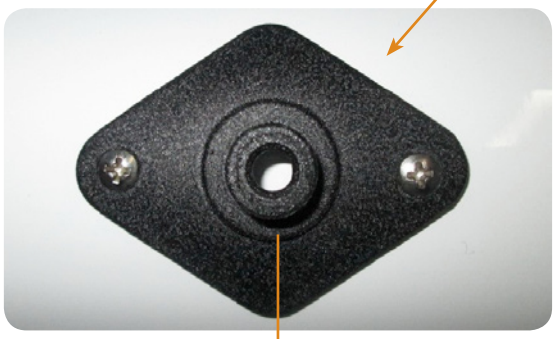
Mounting the telescope on the mount

To mount the telescope on the mount you need the following parts:

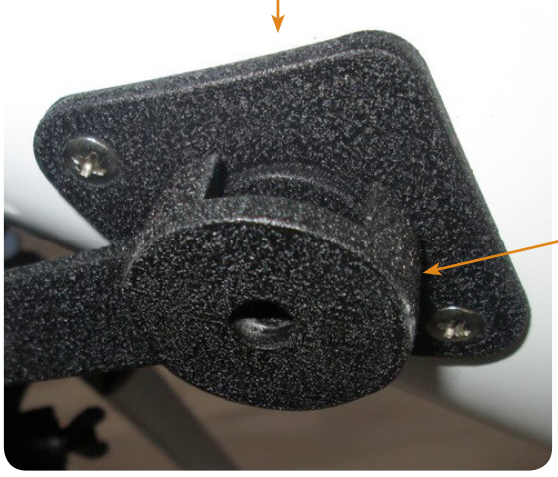
- 2 x screw (N) for tube mounting
- 1 x fine drive with screw (I)
- Telescope tube (L)

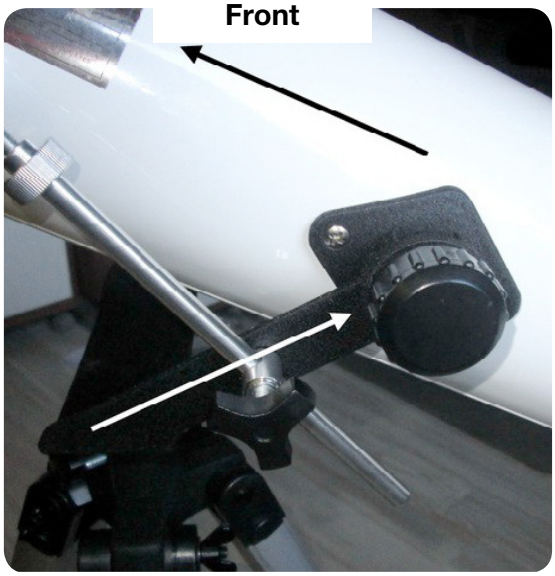






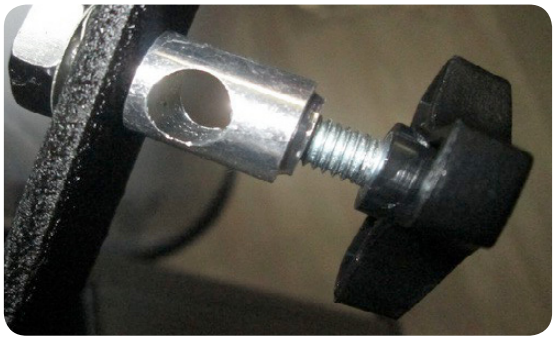
Now carefully take the telescope and place it with the two holders in the two openings at the top of the mounting fork.



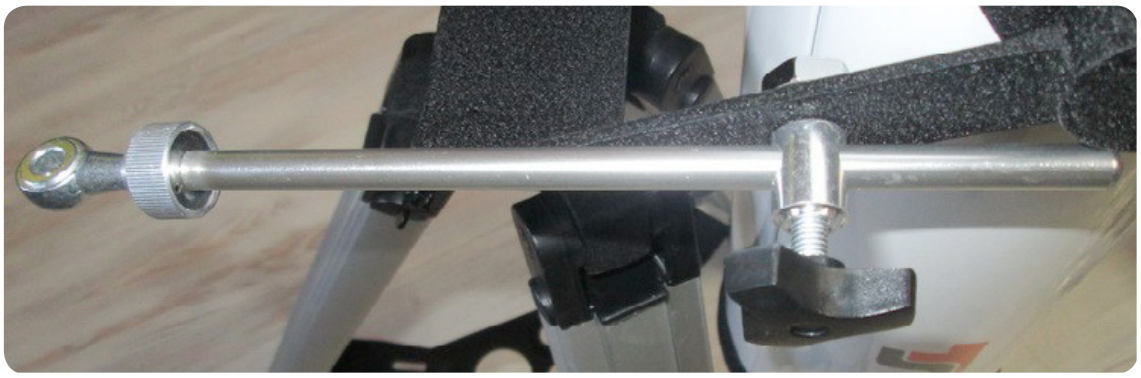


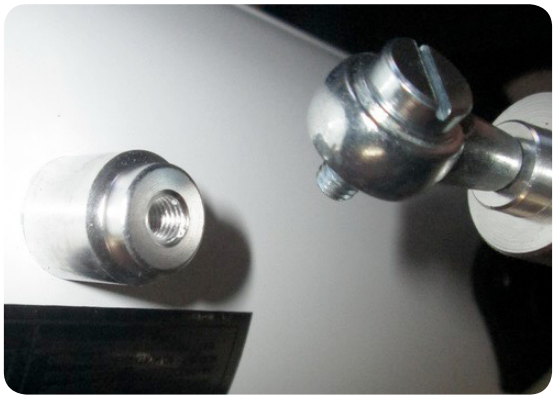
When inserting the telescope, it is important that the front end of the telescope (aperture) points in the opposite direction of the tilt of the mount fork.

Secure the telescope to the mount with the two screws ‚N'. Tighten the screws only „hand tight" so that the telescope can still be moved in the mount.



Next, screw the holder for the fine adjustment onto the mount.





Insert the fine adjustment rod into the holder on the mount.

Attach the fine adjustment knob to the threaded bolt of the telescope using the screwdriver provided.

Tighten the screw firmly, the fine adjustment knob still remains movable.

Now clamp the fine adjustment knob to the mount with the star knob screw.

Attaching and using the viewfinder telescope

The entry-level package comes with either an optical viewfinder or a so-called illuminated dot finder. Both variants are attached to the telescope.

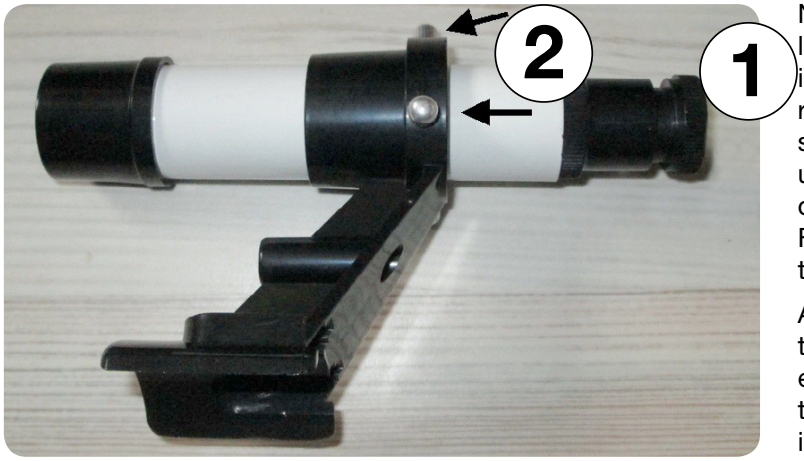
First, remove the two knurled nuts so that only the screws protrude from the tube.

Now take the viewfinder and place it on the screws so that you can screw the knurled nuts back onto it.

After you have screwed both knurled nuts back onto the screws, the viewfinder is mounted. When mounting the viewfinder, make sure that the aperture of the viewfinder telescope points in the same direction as the aperture of the telescope.

Now you have to align (adjust) the viewfinder to the telescope. To do this, first insert the eyepiece with the largest focal length into the focuser.

Now look for a distant, earthly object (church tower, high voltage pylon, chimney, etc.) and look through the eyepiece. Now align the telescope so that your selected object appears in the center of the eyepiece. For more detailed information on how to move the telescope on the mount, see page 16.



Now look into the finder telescope from behind (shown in the adjacent image on the right). Using the adjustment screws (2), adjust the finder until you see the same object as in the eyepiece. Focusing is done by rotating the eyepiece.

Adjust the viewfinder so that the selected object is exactly in the center behind the crosshairs or behind the illuminated dot.

Now you have aligned your finder with the telescope. Your telescope is now ready for its first use.

Using accessories on the eyepiece side

To view the image captured by the telescope, you need the eyepieces. The telescope collects and focuses the light and creates an image that you view with an eyepiece. The focal length of the eyepiece determines the magnification factor. The lower the magnification, the larger the visible area (field of view).The higher the magnification, the smaller the field of view and the brightness of the image decreases. Therefore, there is a „useful magnification“ for each telescope. The possible magnification also depends on the so-called „seeing“ (air turbulence) as well as the transparency of the atmosphere (haze etc.).

The highest magnification can only be achieved on particularly clear nights with very calm, clear air. In addition to the eyepiece, there are magnification lenses (barlow lenses) which double the magnification value of the eyepiece, for example. A 2x Barlow lens thus turns a 12.5 mm eyepiece into a 6.25 mm eyepiece. The focal length is halved and the magnification is doubled!

It is not always advisable to use a Barlow lens, especially with high magnification eyepieces (e.g. 4 mm), because there is not enough collected light for this magnification in small telescopes. The image becomes very dark.

If you also want to observe nature with your new telescope, you will quickly notice that the image is mirrored vertically and/or horizontally, unlike the image of binoculars.

This is not a problem when observing the sky at night, but an upright and laterally correct image is an advantage when observing nature. To achieve such an image, there are - depending on the type of telescope - so-called erect lenses or amici prisms. The upright lenses usually provide magnification at the same time. These optical elements are always inserted between the focuser and the eyepiece. If your complete package does not include these parts, you can order them in our online store.

f.l.: Eyepieces • Barlow lens • Erect lens

Useful magnifications and calculation formulas

The magnification in a telescope is calculated by dividing the focal length of the telescope by the focal length of the eyepiece.

Example:

Telescope focal length 700 mm

Eyepiece focal length 12.5 mm

700/12.5 = 56x magnification

This means that the smaller the eyepiece focal length, the higher the magnification.

With a 2x Barlow lens, the magnification doubles, in the example to 112x.

Examples for a telescope with 700 mm

Focal length (eyepiece focal length/magnification/magnification with 2x Barlow lens):

20 mm 35 x 70 x

12.5 mm 56 x 112 x

4 mm 175 x 350 x

Highest and lowest useful magnification

Theoretically, almost any magnification is possible with a telescope if you use the right eyepieces. As you can see in the table above, in the example with the 4 mm eyepiece and a 2x Barlow lens even a magnification of 350x can be achieved. With even smaller eyepiece focal lengths and stronger Barlow lenses (e.g. 3x, 5x) this could be increased almost arbitrarily. However, the useful magnification range is limited by the laws of optics.

For the highest useful magnification, the rule of thumb is that you should choose a maximum magnification of twice the diameter of the optics.

For example, if the telescope has an diameter of 76 mm, the highest magnification should the highest magnification should not be more than 76 x 2 = 152x. If you go beyond this range, the image will become dark and the sharpness will decrease, so you will see less detail despite the higher magnification.

Magnification is also often limited by what is called „seeing“ (air turbulence in the Earth’s atmosphere).

Depending on the night of observation, the air may be calmer or less calm. The highest useful magnification can only be achieved when the air is as calm as possible.

The lowest useful magnification is limited by the so-called exit pupil (EP). The exit pupil is the diameter of the light beam that is directed from the eyepiece into your eye.

Here’s how to calculate the exit pupil:

Aperture of the telescope / Magnification

= diameter of theexit pupil

If the exit pupil is larger than the pupil of your eye, light is lost and the image becomes darker. It is believed that the human pupil dilates to a maximum diameter of 5-7 mm in complete darkness. Therefore, avoid magnifications that result in an exit pupil that is too large.

Examples (aperture of the telescope and lowest reaonable magnification):

60 mm	8,5–12x
70 mm	10–14x
76 mm	11–15x

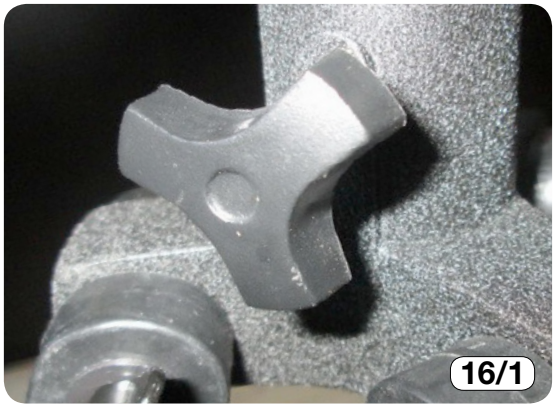
Observing with the telescope

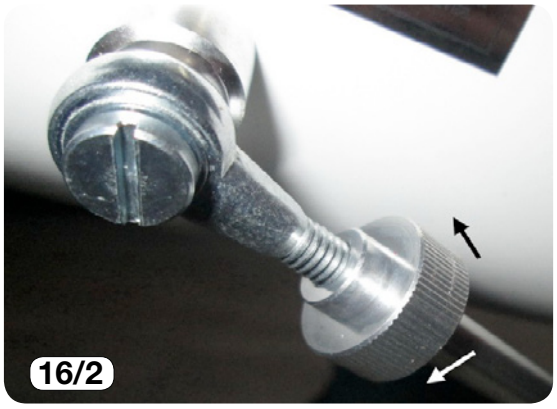
1. Always set up the telescope outdoors. It is best to place the telescope outdoors about 30 minutes before observing so that the optics can adjust to the ambient temperature. Observing from inside a building through a window (whether open or closed) is not recommended, since the image quality deteriorates significantly as a result of the air exchange.

2. choose a location for observation that is as dark as possible. This is especially important if you want to observe faint objects such as star clusters, gas nebulae, or even galaxies. Spend some time in the dark before observing to give your eyes a chance to adjust to the dark. Avoid looking directly into bright light, as this will undo the dark adaptation. Use a red light lamp that is not too bright for orientation at night.

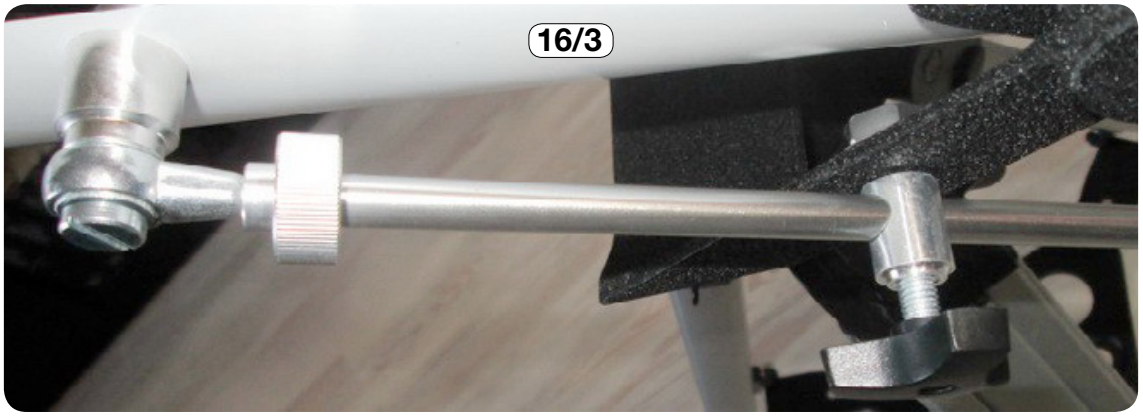
3. Remove the dust caps from the telescope before observing. On some telescopes (e.g. 76/700 mm Newtonian telescope) the cap is in two parts. Remove the entire cap, not just the inner part.

4. Always use the eyepiece with the lowest magnification at first. Once you have centered the observation object in the telescope, you can slowly increase the magnification.





5. To slew the telescope horizontally, simply loosen the clamping screw at the bottom of the mount head (Fig. 16/1). To slew the telescope vertically, you can either loosen the star knob screw on the fine adjustment drive (Fig. 16/3) or adjust the knurled nut on the fine adjustment drive (Fig. 16/2).



6. moisture (dew) may condense on the optics during observation. If this happens, DO NOT clean the optics with a cloth, as this will damage the optical surfaces. Instead, you should warm the optics slightly, e.g. with a hair dryer or with optionally available exchange heaters. A slight warming is sufficient! The optical elements must not become hot under any circumstances!

7. If you bring the telescope back into a closed room after observing, dew can form on the surface due to the difference in temperature and humidity. Short-term dew condensation is not a problem. However, the telescope should not be stored in a damp condition. Leave it open (without the dust cover) for about 1 hour until the optics have adjusted to the room temperature again and the moisture has disappeared. Only then should you place the dust covers on the telescope aperture and the focuser.

Optional accessories

TS Optics 8-piece eyepiece and accessory set in high-quality metal case
Useful and important accessories for nearly every telescope

TS Zoom Eyepiece
7mm to 21mm Focal Length
Change the magnification according to your needs - steplessly!

LED Red & White Light Lamp with Dimmer
Astro red light and white light
ready to use with battery

TS Cleaner Kit -complete package#
Universal cleaning kit for almost all optical surfaces

All items are available in our online store: www.teleskop-express.de

Maintenance and cleaning

If the telescope needs to be cleaned, this should always be done with extreme care and the proper cleaning materials.

Some important rules:

• Clean the telescope as infrequently as possible. After frequent cleaning, the imaging quality of the telescope will increasingly suffer. Some dust or similar minor dirt on the optics does not negatively affect the imaging quality. Only when the optics are really heavily soiled should they be cleaned. It is recommended not to clean a telescope more often than once a year.

• The only exception to this rule: fingerprints and pollen from flowers can damage the coating of the mirror or lens. In this case, the optics should be cleaned.

• Store the telescope only with the dust covers attached. This is the best way to prevent dust from accumulating on the optics.

• It is best to remove dust on the optics without touching it using a bellows (available in our online store).

• To remove fingerprints, pollen or dust that cannot be removed with a bellows, you may ONLY use special cleaning agents, such as so-called „Lenspens“ (for eyepieces) or special microfiber cloths (for telescope optics). However, since this type of cleaning cannot be done without contact, it should be done as infrequently as possible.

• If you do not feel confident to clean the optics, you can contact our customer service.

Observation examples

A lot of interesting celestial objects are waiting to be viewed by you. A detailed listing would go beyond the scope of this guide. There is very good literature on this subject in our online store and, of course, a lot of free information on the Internet and astronomy forums. Nevertheless, here are a few examples, which are ideal especially for the beginner.

The Moon

The moon is the easiest and especially for beginners an extremely productive observation object. It is easy to find and shows a lot of details even for the untrained eye. Especially interesting is the observation of the light-dark boundary, the so called „terminator“.

There the sun casts long shadows, so that craters and mountains look especially vivid. At full moon no shadows can be seen, the moon then looks flat and overlit.

The planets

If you have some observing experience with the moon, the planets are the next interesting target. You can see especially much at Jupiter and Saturn. Saturn‘s rings, for example, or even Jupiter‘s four brightest moons can be seen without much experience.

With a little more practice you will be able to see many additional details, e.g. the cloud bands on Jupiter.

Venus (also known as the morning or evening star) already shows its phase shape even in small telescopes, similar to our moon.

Mercury, Mars and Uranus are also within reach of your telescope, but they show much less detail than the planets Jupiter and Saturn mentioned above. You should observe the planets during a so-called „opposition“, since they are closest to Earth then.

Note: Not all planets are visible in the sky at all times. A celestial calendar tells you which planets are visible and when and where they can be discovered.

Objects outside our solar system

There are also numerous objects which are within the range of your telescope.For the beginning the perhaps most interesting „Deep Sky Objects“.

- the „Ring Nebula“ M57 in Lyra
- the globular cluster M13 in Hercules
- the Andromeda Nebula M31, a huge galaxy at a distance of about 2.5 million light years (use as low magnification as possible).
- Open star clusters like the *Pleiades* in Taurus, *h and xi* in Perseus or *M11* in the constellation Scutum.

Frequently asked questions

1. How far can I see with my telescope?

That depends largely on how dark the sky is. From the city you can comfortably see the brightest planets (a few hundred million kilometers). Beyond the solar system, because of the huge distances, we no longer calculate in kilometers, but in light years. One light year is nearly 10 trillion kilometers! With the naked eye you can see stars which are some light years to some hundred light years away.

2. I see nothing when I look through my telescope, what am I doing wrong?

Observing through a telescope takes practice. Initially, you will notice detail only in the brightest objects. However, with each observation you will be able to see more detail and objects that were previously „invisible“ will suddenly become visible.

If you do not see anything at all, please check the following:

- Is the dust cover completely removed?
- Is the magnification too high?
- Is the object in the field of view?

If in doubt, point the telescope at an object that is easier to see to make sure there is no technical problem.

3. the image becomes very dark when I choose a high magnification. Why?

The higher the magnification, the darker the image will be for geometric reasons. If you find the image too dark, simply choose an eyepiece with lower magnification (= longer focal length).

4. The celestial objects move when I observe them through my telescope and disappear from the field of view. Why?

In truth, it is not the celestial objects that move, but it is our Earth itself that rotates on its own axis. Therefore, in 24 hours all celestial objects „wander“ once completely around the earth. With the naked eye this movement is not visible, but with a telescope you enlarge the image so much that the movement becomes clearly visible. To follow the celestial objects, you must therefore move the telescope along on the mount at regular intervals.

Technical Data

Optics:	Achromatic doublet
Aperture:	70 mm (Starscope 707)/76 mm (Starscope 767)
Focal length:	700 mm
Resolution:	1,64” (Starscope 707)/1,53” (Starscope 767)
Limiting magnitude:	11,2 mag (Starscope 707)/11 mag (Starscope 767)
Focuser:	1,25” gear drive
Mount:	Azimuthal mount with height fine adjustment
Tripod:	Height adjustable aluminum tripod (up to 120 cm)