



BAADER **SOLAR** FILTER

*for telescopes, spotting scopes,
binoculars, camera- and tele-lenses*



ASTF
AstroSolar Telescope Filter

ASSF
AstroSolar Spotter Filter

ASBF
AstroSolar Binocular Filter

BDSF
Baader Digital Solar Filter



ENGLISH

INSTRUCTION MANUAL



Please note: If you have purchased a B^DSF Filter (OD 3.8) for photographic use only, please read the following:

- Application notes for B^DSF Filters, equipped with AstroSolar[®] Photo Film 3.8:
www.astrosolar.com/en/products/whitelight/bdsf-baader-digital-solar-filter-od-3-8-for-high-end-telescopes
- Differences in the types of AstroSolar[®] Film:
www.astrosolar.com/en/information/about-astrosolar-solar-film/differences-in-astrosolar-solar-films

B^DSF Filters must not be used for visual observation, permanent eye-damage may occur.

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INSTRUCTION MANUAL

Thank you for purchasing this Baader Planetarium product. For the proper use of your Baader Solar Filter, please read this instruction manual thoroughly before starting to work with the Solar Filter. Keep this User's Guide available for future reference and visit the Baader Planetarium website: www.astrosolar.com for up-to-date information about the product.

Please read and follow the instructions in this manual carefully, otherwise your eyes could suffer irreversible damage.



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ASTF / BDSF (AstroSolar® Telescope Filter)

ASTF / BDSF Scope of Supply

As you unpack your Baader Solar Filter, check the list below and make sure that all items shown below are included. If anything is missing contact your original retailer.



Standard Accessories:

1. Solar Filter Holder including AstroSolar® Safety Film 5.0 (for ASTF) or AstroSolar® Photo Film 3.8 (for BDSF), printed index scale, warning text
2. 6x centering bolts in 38mm length: 3 bolts with 10mm diameter / 3 bolts with 20mm diameter)
3. 3x Black sliding washers
4. 3x Sliding fastener
5. 3x M4 Phillips head screw
6. 6x rubber plugs (3x for covering the holes which are not used / 3x spare part)
7. 3x Safety straps

ASSF (AstroSolar® Spotting Scope Filter)

ASSF Scope of Supply

As you unpack your Baader Solar Filter, check the list below and make sure that all items shown above are included. If anything is missing contact your original retailer.



Standard Accessories:

1. Solar Filter Holder including AstroSolar® Film, printed index scale, warning text
2. ASSF 50-115: 3x centering bolts in 24mm length with 13mm diameter
ASSF 130-150: 3x centering bolts in 38mm length with 10mm diameter
3. 3x Black sliding washers
4. 3x Sliding fastener
5. 3x M4 Phillips head screw
6. 3x Safety straps

ASBF (AstroSolar® Binocular Filter)

ASBF Scope of Supply

As you unpack your Baader Solar Filter, check the list below and make sure that all items shown above are included. If anything is missing contact your original retailer.



Standard Accessories:

1. Solar Filter Holder including AstroSolar® Film, printed index scale, warning text
2. 3x centering bolts in 24mm length with 13mm diameter
3. 3x Black sliding washers
4. 3x Sliding fastener
5. 3x M4 Phillips head screw
6. 3x Safety straps

1. Introduction

After 25 years of offering AstroSolar® film sheets as DIY-product, this system of **Baader Solar Filters** is designed to retain the true optical quality of the diffraction limited AstroSolar® Safety Film 5.0 / AstroSolar® Photo Film 3.8.



Baader Solar Filters provide a professional and secure solution to observe (OD 5.0) and image (OD 5.0 or 3.8) the Sun using AstroSolar® Safety Film. Many ready-made filters do stretch the filter material like a drumhead in order to make it look like a piece of glass - this absolutely does destroy the image quality, rendering the film useless for high magnification work. AstroSolar® must be mounted entirely stress free in order to perform like a high precision planeoptical window. It sounds like a contradiction with traditional perception of quality, but AstroSolar® must show slight ripples! Only when the film is being put under stress by an improper cell mount it performs just like any single side coated glass-filter made of untreated float glass.

2. Safety Instructions

Safety Warning – how to protect your eyes. Please read and follow the instructions carefully, otherwise your eyes could suffer irreversible damage.

Do not use Baader Solar Filters if you do not feel well informed about the hazards involved in improper use and handling.

- Never look into the Sun without adequate filtering in front of your optical instrument. AstroSolar® Safety Film 5.0 provides this necessary safety when mounted into a Baader Solar Filter. Carefully read the instructions to correctly adjust your Baader Solar Filter in front of your telescope, Spotting Scope, Binocular or Camera Lens.
- Never use BDSF Filters (OD 3.8) for visual observation.
- Always attach the safety straps onto the three centering bolts of the filter and affix the counterparts at the optical tube to prevent the filter from falling off.
- Interrupt solar observation within three minute intervals to relieve your eyes.
- If you already know that you suffer from excessive eye sensitivity or eye related diseases, consult your ophthalmologist prior to using this product.
- Solar products are not intended for those under 14 years of age.
- Never leave your Solar Telescope outside unattended to prevent children or uninformed visitors from looking at the Sun without proper guidance.
- Store the filter adequately in a closed box to prevent it from ageing or accidental damage and from collecting dust.
- Do not attempt to clean the filter by rubbing it. The filter should not need cleaning if you store it correctly. You may only very lightly brush over it with Optical Wonder cleaning cloth (Baader SKU #2905000).
- Do not touch the silver filter film with bare hands (natural acidic components of the skin may damage the film)
- Carefully inspect your filter for damages such as scratches before each observing session. Please also note our comments on filter quality in Appendix B of this manual.
- For additional general notes regarding the safe use of AstroSolar® film please visit: www.astrosolar.com/en/information/safety-instruction

Important note: The eye safety norm EN ISO 12312-2:2015 for naked eye solar viewers does not apply to front aperture filters, covering long-range optics. AstroSolar® Safety Film 5.0 is not authorized to be used for naked eye solar observation or production of solar viewers. For direct solar viewing without telescope, binocular or camera optics, inquire for our EN ISO 12312-2:2015 certified eclipse shades equipped with AstroSolar® Silver/Gold Film.

3. Assembly Instructions

Solar Safety First! – prevent your solar filter from falling off your telescope. For your own safety – attach safety straps



Utmost care is necessary when positioning your solar filter in front of your objective lens or telescope. It is therefore mandatory to use the three safety straps supplied in this package.

Please consider that a strong gust of wind, a loosely fastened centering bolt - as well as someone not familiar with the severity of damage that may be caused to the observers eyesight, could cause even a well fastened solar filter to detach from your objective lens or telescope and have the immense amount of solar energy fall into the observers eye.

This set of three safety straps provides an easy to use and repeatable protection to prevent the solar filter from falling off your solar observation device under any circumstances.

Please read the instructions on how to mount the safety straps thoroughly and carefully. Do not miss to make use of this important safety feature.

3.1 Preparation

Prepare all parts on a table. Check the Scope of Supply (ASTF and BDSF: page 5 / ASSF: page 6 / ASBF: page 7) of your individual filter to make sure nothing is missing.

3.2 Safety Straps



Prepare the supplied bolts on a table and attach the Safety Straps to the bolt by pressing the hole in the strap onto the upper side of the bolt until it rests in the depressed area in the bolt.

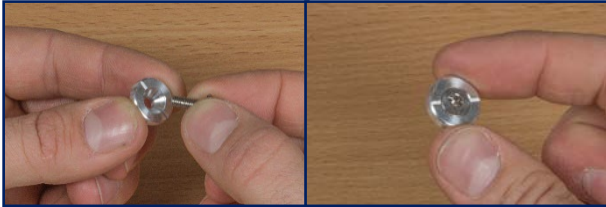
Make sure that the side of the strap which has the double-sticky tape on it faces the table while applying it to the bolt.

(For ASTF / BDSF you can choose which bolt diameter you want to use. Please check clamping range diagram at Appendix B)



3.3 Sliding fastener bolts

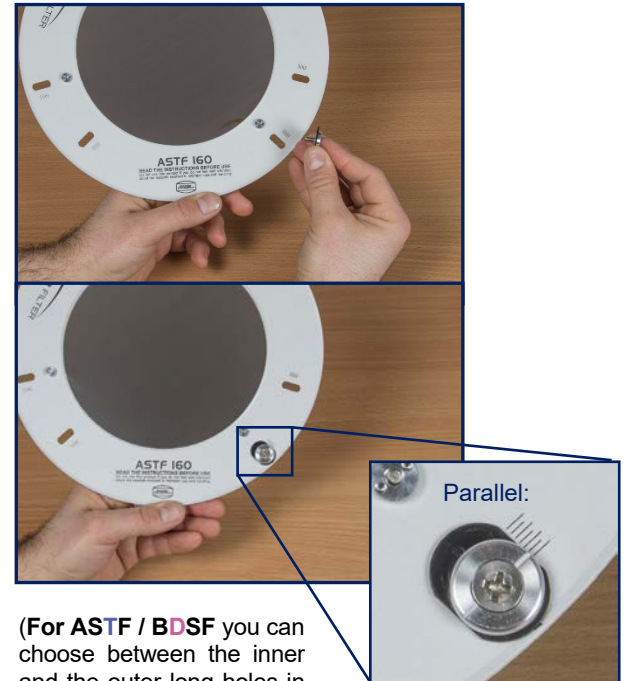
3.3.1 Insert M4 Phillips head screw into sliding fastener.



3.3.2 Place black sliding washers in parallel to the milled surfaces on the lower part of the sliding fastener



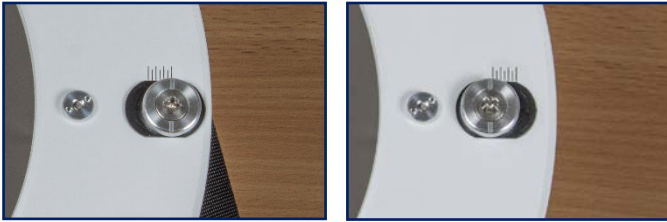
3.3.3 Place combination of the three parts to one of the long holes and make sure that the machined indicator points parallel toward the index scale. It should not rotate anymore if the milled surfaces of the slitting fastener are in the correct position according the long holes of the white front ring.



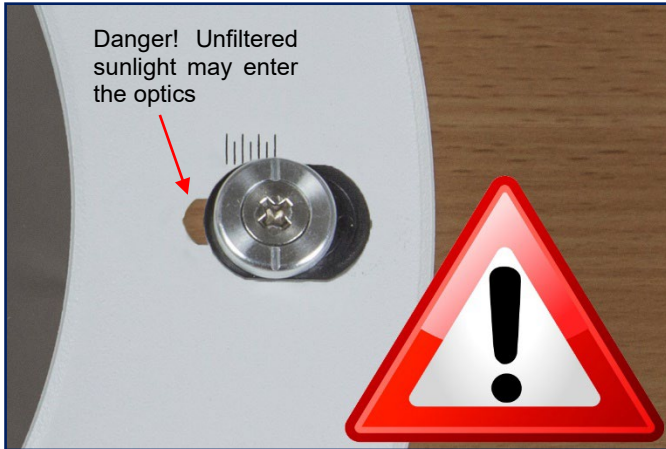
(For **ASTF / BDSF** you can choose between the inner and the outer long holes in order to reach different clamping areas. Please check clamping range diagram at Appendix B)

3.3.4 Make sure that the long hole is covered by the black plastic washer at all times to not have unfiltered sunlight entering the optics!

Correct:



Wrong:



3.3.5 Hold the combination gently with one finger and turn the whole filter ring around.



3.3.6 Keep your fingertip on the head of the M4 Phillips screw to avoid it from rotating while fastening the bolt.

3.3.7 Screw the centering bolt onto the screw from the rear with the safety strap already attached.
For **ASTF / BDSF** only: Select the correct bolt for your application from the two bolts of different thickness (10mm/20mm).



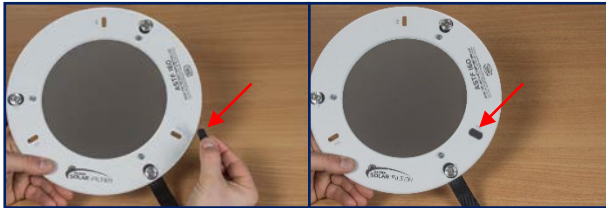
Side view of fully assembled centering bolt with safety strap:



In order to firmly lock the combination, you may use a Phillips head screwdriver to gently counter the Phillips head screw while holding the bolt with two fingers.



3.3.8 Only applies to ASTF / BDSF: Cover the open hole on top with the supplied rubber plug.



Repeat 3.2 to 3.3.8 for the two other bolts.

Your Baader Solar Filter is now ready for use.

4. Attaching the Filter onto your optics

How to attach your Baader Solar Filter onto your Telescope, Spotting Scope, Binocular or Camera Lens:

4.1 Hold the filter in front of the tube and gently push the three bolts onto the outer rim of your optics. The safety straps are hanging loosely from the bolts.



4.2 Peel off the carrier film to reveal the sticky bottom of the Velcro tape. Gently stretch out the safety strap (without forcing it) and attach the sticky side to your optical tube at maximum length. Firmly push it to the tube, so that it can not accidentally come off.



- 4.3 Now you can lift off the safety strap if you want to remove the filter, but the Velcro counterpart always stays at the tube for quick and easy fastening of the filter onto your optics.



- 4.4 Repeat 4.1 to 4.3 for the other two safety straps.

Enjoy observing or imaging the Sun with your Baader Solar Filter!

5. Maintenance

5.1 Durability of AstroSolar® Film

Patented AstroSolar® Film is metalized with a coating technique similar to metal coatings applied onto telescope mirrors - but on both sides of the film! Even a bad rub or removed spot on one side of AstroSolar® would still only let 50% of the light go through the film because the counter side coating stays intact. This proprietary metallization process is noticeably more resistant than common industrial metallization processes. The art is to uniformly metalize the second side without deteriorating the first side at all. Other makers always had to use two layers of film in order to provide two metalized coating layers of equal optical density.

Cell mounted AstroSolar® Film does not age nor oxidize during storage when protected properly. We have cell mounted AstroSolar® filters in use since 25 years – still providing excellent image quality because the complete filter assembly is stored safely in a sealed and dry box after each observing session.

Even the very durable metalized surfaces of AstroSolar® (especially the one facing the sky) may become scratched or age due to accidental touches and by collecting dirt or pollen when being left on the telescope uncovered over longer periods of time. Especially pollen grains do contain a large degree of ethereal oils which work like a weak acid, dissolving the metal coating over time like they do with multicoatings on lens surfaces. Pollen grains as well as likewise acidic finger prints may need to be removed most carefully with the help of mild Baader Optical Wonder Fluid. A certain amount of dust is no bother and better

be left alone rather than be removed by repeated cleaning processes.

However - heavy wind movement as well as dirt or pollen as well as their removal procedure itself may lead to the formation of small pinholes in the metallization. Please see Appendix A (A.2) for further information on Pinholes.

Still the cell mounted filter **MUST** be inspected most carefully before each and every solar session. Someone might have severely dented the filter surface during earlier removal from the telescope or might have severely rubbed the film in an attempt to "clean" it. In each case where the surface quality raises suspicion during visual inspection by holding it against the Sun - of having large imperfections or scratch marks of more than 0.5 mm width, or dented portions with incision marks which might even lead to breaking the film - **in every such case, the film must be discharged and replaced.**



FAQ - Frequently Asked Questions

For more information please visit www.astrosolar.com/en/faqs

5.2 Exchanging AstroSolar® Film

- 5.2.1 Each sheet of film is being cemented in our factory onto a white (ASTF / BDSF) or black (ASSF/ASBF) plastic ring, by using a special variant of temperature resistant and age proof double sticky tape. For filter exchange this ring must be accessed.
- 5.2.2 Unmount the injection molded black plastic ring from the white metal front ring by removing each of the M3 Phillips head screws with the help of a small watchmakers screwdriver.
- 5.2.3 The various rings will come apart and provide access to the ring-side where the filter material is affixed.
- 5.2.4 Gently lift the film from the holding ring by cutting into the middle of the filter and pulling the remaining material from inside to outside all around the ring. Doing this with the right amount of slowness and care will even keep the original sticky tape intact to be right away used for affixing a new sheet of film.
- 5.2.5. In case that some of the sticky tape has been lifted off the plastic ring together with the film removal, then all the sticky tape needs to be removed and replaced all around with your own tape solution
- 5.2.6 Check out the link below and follow the instructions from paragraph 3 to 7 on how to apply the new film onto the holding ring:
www.astrosolar.com/en/information/how-to/how-to-make-your-own-objective-solar-filter-for-your-camera-or-telescope/

AstroSolar® Safety (5.0) / Photo (3.8) Film is available from most specialized dealers and also here: www.astrosolar.com

SKU's	Item Description
# 2459286	AstroSolar® Safety Film 5.0 / ECO-size (140x155mm)
# 2459281	AstroSolar® Safety Film 5.0 / Din-A4 (20x29cm)
# 2459282	AstroSolar® Safety Film 5.0 / 100x50cm
ONLY for photographic use:	
# 2459278	AstroSolar® Photo Film 3.8 / Din-A4 (20x29cm)

Please visit www.astrosolar.com for further information.

5.3 Handling and Storage

We suggest storing the filter in the supplied cardboard box in a safe and dry place. If you wish to store your Baader Solar Filter fully mounted we recommend use of a closed plastic container (Tupperware-style) to seal the film completely against dust and moisture. Thus you can positively protect your filter from aging.

You may want to even put some bags of dehumidifying compound into the box or use a refurbishable variant which is available from Baader Planetarium (Baader SKU #1905160).

Appendix A: Product features

All Baader Solar Filters feature:

- Original Baader AstroSolar® Safety Film 5.0 (**Only for BDSF filter:** Original Baader AstroSolar® Photo Film 3.8), cell mounted and quality inspected by skilled members of our staff.
- Clear white IR-rejecting front ring with reinforcing raised edges along the outer and inner circumference, designed to protect the solar filter material from contact with any sharp metal edge.
- 3 injection molded centering-bolts with threaded brass inserts to center the filter-cell in front of the tube opening. These bolts come in three different diameters, depending on the filter category (ASTF/BDSF/ASSF/ASBF). Each bolt features injection molded rubber grip-faces, shaped to easily slide onto any telescope tube - but to come off very hard.
- No-tool-mounting and adjustment of the centering bolts to fit a wide variety of mechanical tube diameters. Bolts made to contact the outside or optional (if appropriate) the inside of the optical instrument tube.
- Non-rotating sliding fasteners made from aluminum that hold the centering bolts. These metal sliders are equipped with a machined indicator to point towards the adjustment index.
- Additional Phillips screws are integrated into the sliding fasteners, so that the centering bolts can be firmly fastened with a screw driver if preferred by the user.
- Index scale provided beside each adjustment slot - adjacent to each sliding fastener, for fast and repeatable adjustment of the filter cell onto different telescope tubes.



*BDSF: PHOTO Film

- Black sliding washers supplied to securely cover the full length of the adjustment slots in the aluminum frame - for blocking sunlight from passing through the filter cell beside the filter area.
- Only for ASTF/BDSF Filters: Rubber plugs supplied as cover for closing unused adjustment slots in the aluminum frame.
- Three safety straps included, to secure the position of the filter cell with Velcro-adhesive pads. A safety feature to absolutely ensure a secure fit in front of the telescope under any circumstances (gust of wind asf).
- Warning text printed onto the front side of each filter cell: Read the Instructions before use.
- Cardboard gift box fit for safely shipping the filter.



Baader Solar Filters are available in 3 categories with a total of 21 filter sizes:

A.1 ASTF / BDSF (AstroSolar® Telescope Filter)

This family of solar filters is made in the most elaborate way. AstroSolar® must not be put under stress, neither during mounting the film, nor during any temperature change. For this reason the ASTF-Filter features a temperature compensated cell. The film itself is repeatedly cemented onto an injection molded ring, whereas the substrate of that ring has the same thermal expansion coefficient like the AstroSolar® Filter material itself. This free floating film-carrier ring is held onto the aluminum frame with the help of another holding ring made of fiber reinforced plastic - for a maximum of security against breaking of the cell. This temperature compensated cell enables the AstroSolar® filter material to retain its excellent optical quality at any temperature - be it -30°C or $+50^{\circ}\text{C}$.

ASTF 80 to 280 packages all come with two sets of centering bolts in 38 mm length (3 bolts with 10 mm diameter and 3 bolts with 20mm diameter) to cover a wide range of tube diameters.



Most ASTF filter sizes are additionally available in the version "BDSF" (Baader Digital Solar Filter) with AstroSolar® Photo Film 3.8.

A.2 ASSF (AstroSolar® Spotting Scope Filter)

This family of filters offers a stable and rigid solution for all spotting scopes, tele-lenses and amateur telescopes, with magnifications up to 120x. The AstroSolar® filter material is likewise mounted onto a plastic ring whereas the plastic ring itself works as stabilizing element for the filter cell. This still plastic ring is mounted onto the aluminum front frame. The thermal expansion coefficient of the plastic and the film are similar.

ASSF 50 to 115 packages come with three centering bolts of 13mm diameter and 24mm length.

ASSF 130 and 150 packages come with three centering bolts of 10mm diameter and 38mm length.



A.3 ASBF (AstroSolar® Binocular Filter)

This category is essentially similar to the ASSF in terms of mechanics. The only difference is that one side is cut off in order to make them usable on any binocular - even when the bridge is nearly closed. (depending on the binocular type).

ASBF 50 to 100 packages come with three centering bolts of 13mm diameter and 24 mm height.



Appendix B: Quality information

The following texts and images in B.1 and B.2 depict typical views of cell mounted AstroSolar® Film which may appear to be imperfect but which show films that are perfectly within tolerance and which are working without any deterioration to the image quality.

After mounting and assembly, each Baader Solar Filter has passed a stringent quality control procedure at our company in Mammendorf / Germany.

Boxes are sealed with a clear Baader logo mark. Any seeming imperfections like ripples, dents, or even very small pinholes are within the manufacturing tolerance and will not deteriorate the image quality and most of all will not endanger the users eyesight.

If AstroSolar® Film does collect imperfections over time (note the explanation under B.2) we suggest discharging the Film. Also check chapter B.1 and B.2 below, or visit our website www.astrosolar.com for further information.

The real danger to your filter and eyes (and camera-chip) are severe scratches or rubbed off zones done to the filter material inadvertently during handling, were a large amount of the metallization has been scraped off without you noticing it. Also dents and creases impressed into the film due to accidental touching and tearing the filter surface may cause the filter to break during observation under heavy wind load. The filter surface must look "unharmful" in every respect before each solar observation session. A filter whose surface looks scratched, dented or otherwise violated must be discharged and/or the film must be exchanged (see section 5.2).

B.1 Folds, Ripples, Creases

Any of the film patterns shown below are remains of the entirely stress free production processes that AstroSolar® has to undergo. Trying to avoid such surface textures inevitably leads to gross astigmatism and noticeable loss of image sharpness. In fact these patterns do not influence the quality of the image at all. Do not let yourself be misled by looking for the cosmetics instead of the optical outcome.



B.2 Pinholes

Before each use carefully inspect your filter for mechanical damages, broad scratches, streaks, extensive wipe marks and other quality degrading influences:

ASTF / ASSF / ASBF (AstroSolar® Safety Film 5.0):

by holding it very briefly at arms length towards the Sun.

BDSF (AstroSolar® Photo Film 3.8):

By holding it at arms length towards a bright LED or Halogen lamp

Pinholes smaller than 0.5 mm in size do not constitute a safety problem since each such pinhole works as a minute "camera obscura" - producing a real image of the solar disk - although of extremely low resolution - given the ever so tiny "aperture". Several such "solar ghost images" then do overlap to brighten the background of the real solar image created by the telescope optics.

Over time many such pinholes would noticeably deteriorate the contrast visible in the solar surface details. For this reason it is recommended to blacken larger pinholes (see instructions below). In the effect that ever more, even tinier pinholes (of just 0.1 mm in diameter and smaller) will noticeably brighten the image then it might be a good time to exchange the film in the cell with the help of the same procedures as described in great detail on www.astrosolar.com for DIY-production of filter cells.

Tiny pinpoint sized bright spots can be blackened on the inside of the Solar Filter (the side facing the telescope) by applying a tiny black spot, using a black felt marker or soot filled black paint. Apply with small retouching brush. Considering the total optical surface area, such small black spots do not have any adverse effect on optical quality. Rather you will notice an increase in contrast within finest solar surface details.

ASTF – Baader Solar Filter for high-end Telescopes (including temperature compensated filter cell)

Appendix C: Clamping Range

visit www.astrosolar.com for further technical details

Filter Name	ideally suited for aperture range ~		Clamping Range	
	contacting inner tube diameter with 10mm bolt	contacting inner tube diameter with 20mm bolt	contacting outer tube diameter with 10mm bolt	contacting outer tube diameter with 20mm bolt
ASTF 80	70 – 90	130 – 160	140 – 170	110 – 140
ASTF 100	90 – 110	150 ⁽¹⁾ – 180 ⁽²⁾	160 – 190	130 ⁽³⁾ – 160 ⁽⁴⁾
ASTF 120	110 – 130	170 – 200	180 – 210	150 – 180
ASTF 140	130 – 150	190 – 220	200 – 230	170 – 200
ASTF 160	150 – 170	210 – 240	220 – 250	190 – 220
ASTF 180	170 – 190	230 – 260	240 – 270	210 – 240
ASTF 200	190 – 210	250 – 280	260 – 290	230 – 260
ASTF 240	230 – 250	290 – 320	300 – 330	270 – 300
ASTF 280	270 – 290	330 – 360	340 – 370	310 – 340

ASSF – Baader Solar Filter for Spotting Scopes, Telescopes and Camera-Lenses

Filter Name	ideally suited for aperture range ~		Clamping Range	
	inner tube Ø with 13mm bolt	outer tube Ø with 13mm bolt	inner tube Ø with 10mm bolt	outer tube Ø with 10mm bolt
ASSF 50	40 – 60	81 – 96	55 – 70	70 – 85
ASSF 65	55 – 75	96 – 111	70 – 85	85 – 100
ASSF 80	70 – 90	111 – 126	85 – 100	105 – 120
ASSF 100	90 – 110	131 – 146	105 – 120	120 – 135
ASSF 115	105 – 125	146 – 161	120 – 135	148 – 178
ASSF 130	120 – 140	168 – 188	148 – 178	168 – 198
ASSF 150	140 – 160	188 – 218	168 – 218	

ASBF – Baader Solar Filter for Binoculars and Camera-Lenses

Filter Name	ideally suited for aperture range ~		Clamping Range	
	inner tube Ø with 13mm bolt	outer tube Ø with 13mm bolt	inner tube Ø with 13mm bolt	outer tube Ø with 13mm bolt
ASBF 50	40 – 60	ASBF filters cannot be clamped to binoculars from the inside because the lenses are too close to the edge.	55 – 70	75 – 90
ASBF 60	50 – 70		65 – 80	85 – 100
ASBF 70	60 – 80		75 – 90	105 – 120
ASBF 100	90 – 110		105 – 120	

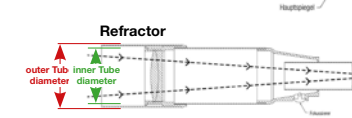
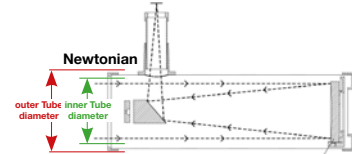
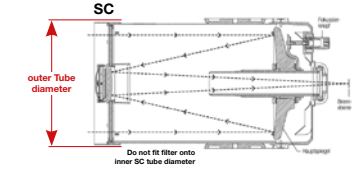
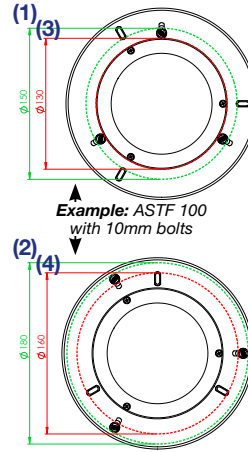
Mentioned dimensions are in mm. Align all filters with the optical aperture by adjusting the filter with the centering bolts to fit the inner or outer tube diameter.

Appendix D: Recommended accessories

Available from your specialized dealer or directly from:

www.astrosolar.com or www.baader-planetarium.com

SKU's	Item Description
# 1905160	Silica Gel with color indicator, 125ccm
# 2905000	Optical Wonder Cleaning Cloth
# 2905007	Optical Wonder Cleaning Fluid
# 2459286	AstroSolar® Safety Film 5.0 / ECO-size (140x155mm)
# 2459281	AstroSolar® Safety Film 5.0 / Din-A4 (20x29cm)
# 2459282	AstroSolar® Safety Film 5.0 / 100x50cm



Read all about AstroSolar® Film at:

AstroSolar.com



Do you need more filters for other optics?

Always find the correct Baader Solar Filter with our
Baader Solar Filter Finder Tool:

FILTER FINDER TOOL

**BAADER
SOLAR FILTER**



www.astroSolar.com/baader-solar-filter



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