

INSTRUCTION MANUAL



Orion® Deluxe Safety Film Solar Filters

Orion Deluxe Safety Film Solar filters are designed specifically for safe, white-light observation of the Sun through a telescope. Made from high-quality Baader AstroSolar™ Film*, they provide sharp, resolved views of sunspots, penumbral detail, solar granulation, and lighter colored faculae. They are also great for viewing solar eclipses and planetary transits. You'll see the Sun in a neutral white color, without any artificial orange or blue tinting as with some other types of filters.

This filter material (ND5 density) transmits less than 0.001% of sunlight through the telescope. That might not sound like much, but it's just enough to see the Sun in its full glory while keeping your eyes safe from its harmful, intense radiation. Baader AstroSolar™ safety film has been approved for eye safety by the National Bureau of Standards in Germany, the PTB. Unlike any other Solar Filter on the market, AstroSolar™ is CE-tested according to EG-Norm 89/686 and EN 169/92 (notified body 0196). All processes connected to this product have been thoroughly tested. Coatings are inspected constantly for consistency to ensure your eye safety!

Do not use a filter that shows any through-hole bigger than 0.5 mm or tear! If you suspect a defect, please contact us for return instructions. All solar filters are covered by a limited liability warranty from defects in material and workmanship.

WARNING!

DO NOT LOOK AT THE SUN through any optical instrument without a professionally made solar filter such as this one covering the front of the instrument, or permanent eye damage could result!

- Do not use this filter if it shows any sign of physical damage!
- Make sure filter FITS SNUGLY on the instrument.
- Be sure also to cover any finder scope attached to the main instrument.
- Children should use only with adult supervision.
- Keep instrument covered if left outdoors in daylight, unattended.

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Telescope Compatibility

Each Deluxe Safety Film Solar filter is mounted in an aluminum cell that slide-fits over the front opening of your telescope. Each filter can fit telescope tube diameters up to 1/4" smaller than the specified inside diameter (ID) with use of the included adhesive foam tabs. There are four 1/16" thick tabs and four 1/8" thick tabs so you can customize a friction fit to your telescope. *A tight friction-fit is required for safe solar viewing through a telescope.*

The filter is also equipped with three equidistant nylon thumbscrews in the aluminum cell. They are there for extra security to ensure a safe, snug fit of the solar filter to the front of your telescope. The thumbscrews are intended to complement the press-fit foam lining inside the aluminum cell. Thumbscrews should **ONLY** be used to keep the filter securely in place once a friction fit has been achieved.

Pinholes and Filter Safety

Despite the thin, flexible nature of the Orion Deluxe Safety Film Solar filter material, it is actually a high-strength polymer that stands up to considerable abuse. The coating on the polymer cannot easily be rubbed off. It is applied on both sides of the film. Since it is nearly impossible for any manufacturer to produce a filter coating that is completely pinhole-free, a few pinholes may be found. Even if you find a pinhole on one side of the filter, however, it is likely that the other side is still coated, providing sufficient protection. However, if you find a pinhole bigger than 0.5mm diameter that goes completely through the filter, do not use it. Call Orion technical support for advice on returning or replacing the filter.

Check the filter's optical surfaces for any possible damage before each use. The view through your telescope should be comfortable and not appear excessively bright. Stop looking immediately if the view is excessively bright.

Note that rippling or warping in the film material is normal with Safety Film Solar filters and does not have any effect on the image you will see or on the filter's safety.

Using the Solar Filter

Make sure the filter fits securely onto the front opening of the telescope. If it feels loose or comes off easily, **DO NOT** use it! Call Orion customer service to see about getting a replacement.

Keep the front of any finder scope covered with its opaque objective cap or a couple layers of aluminum foil, if it is not equipped with its own solar filter. Better yet, remove the finder altogether when observing the Sun. An uncovered finder scope is dangerous to look through. Even if you do not look through it, however, unfiltered sunlight could melt internal parts of a finder scope.

To aim the telescope with solar filter installed at the Sun without aid of a finder scope equipped with a solar filter, you can use the shadow cast by the telescope as a guide. Point your telescope in the general direction of the Sun, and watch the shadow cast by the telescope tube on the ground. Move the tube gradually back and forth, up and down until the shadow is the smallest it will get. The Sun should then be visible in the eyepiece field of view.

Allow the telescope and filter to equalize to the outside temperature for at least 15 minutes. Direct sunlight may warm the tube assembly enough to cause internal heat currents that can degrade image quality, especially on dark-colored telescopes. You might want to cover the tube assembly with a light-colored cloth to help avoid this.

If possible, do not view over pavement or buildings, which radiate heat. Those rising "heat waves" will reduce the sharpness of the images you see through the telescope. Viewing over grass will help avoid surface heat currents.

Removing the Solar Filter

Point the telescope away from the Sun before removing the solar filter! Removing the filter while the telescope is aimed at the Sun is dangerous if anyone is looking into the eyepiece, and can damage the telescope if left pointed at the Sun for too long.

Solar Photography

WARNING about Truss Tube Dobsonians:
When using a truss tube Dobsonian telescope for solar observing, always use a light shroud and a properly sized solar filter. When you install the light shroud make certain there are no gaps between the shroud and the telescope where direct sunlight can reach the telescope mirror. When a truss tube telescope (equipped with a solar filter but no shroud) is pointing near the Sun, direct sunlight can hit the mirror and focus on the solar filter or other portions of the telescope. This can lead to eye injury or heat damage to the telescope. Using a light shroud protects your telescope from peripheral sunlight. Always install protective caps on all optical instruments if left out during daylight hours.

Orion Telescopes & Binoculars

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Orion Safety Film Solar filters can be used for viewing and for photography. By attaching a camera body to a telescope, in effect using the scope as a telephoto lens, you can take striking photographs of the Sun. Only attempt this if the telescope is equipped with the proper solar filter.

Depending on the aperture and focal length of your telescope and "seeing" conditions, you will need to experiment to find the best exposure time for your equipment. Do not be discouraged if your first attempts at solar imaging are less than "stellar." The Sun is very difficult to image because of poorer "seeing" conditions caused by unavoidable heat currents associated with daytime viewing. The highest possible resolution for any land-based telescope, regardless of location, is about 1 arc second. Ideal seeing for any location will be available less than 5% of the time. It may be some consolation to consider that your results could equal those at professional observatories, as larger apertures and location have little, if any, advantage. During bad seeing conditions, it may help to "stop down" apertures over 5" with an off-axis mask.

Cleaning AstroSolar Film

We recommend storing the solar filter in the flat box it came in for protection, or in a "Tupperware" type of plastic container of the proper size.

Occasionally, the filter may require cleaning after extended exposure to the elements. If the dust is loose, you may be able to blow it off with compressed air or a blower bulb of the type that photographers use. Since the coating is harder than regular aluminum coatings applied on mirror surfaces, it can be cleaned with a solution of dishwasher detergent and distilled water. Use sterilized cotton wool (as used for eye application), available in pharmacies. Normal cotton balls as used for cosmetic purposes should NOT be used!

Use careful, gentle strokes. For each stroke, a new portion of cotton is to be used, soaked with the cleaning solution. This helps to avoid scratches in the filter's coatings due to dust grains picked up by the cotton.

**Baader AstroSolar is a trademark of Baader Planetarium GmbH.*

One-Year Limited Warranty

This Orion product is warranted against defects in materials or workmanship for a period of one year from the date of purchase. This warranty is for the benefit of the original retail purchaser only. During this warranty period Orion Telescopes & Binoculars will repair or replace, at Orion's option, any warranted instrument that proves to be defective, provided it is returned postage paid. Proof of purchase (such as a copy of the original receipt) is required. This warranty is only valid in the country of purchase.

This warranty does not apply if, in Orion's judgment, the instrument has been abused, mishandled, or modified, nor does it apply to normal wear and tear. This warranty gives you specific legal rights. It is not intended to remove or restrict your other legal rights under applicable local consumer law; your state or national statutory consumer rights governing the sale of consumer goods remain fully applicable.

For further warranty information, please visit www.OrionTelescopes.com/warranty.