

# Sol'Ex assembly instructions

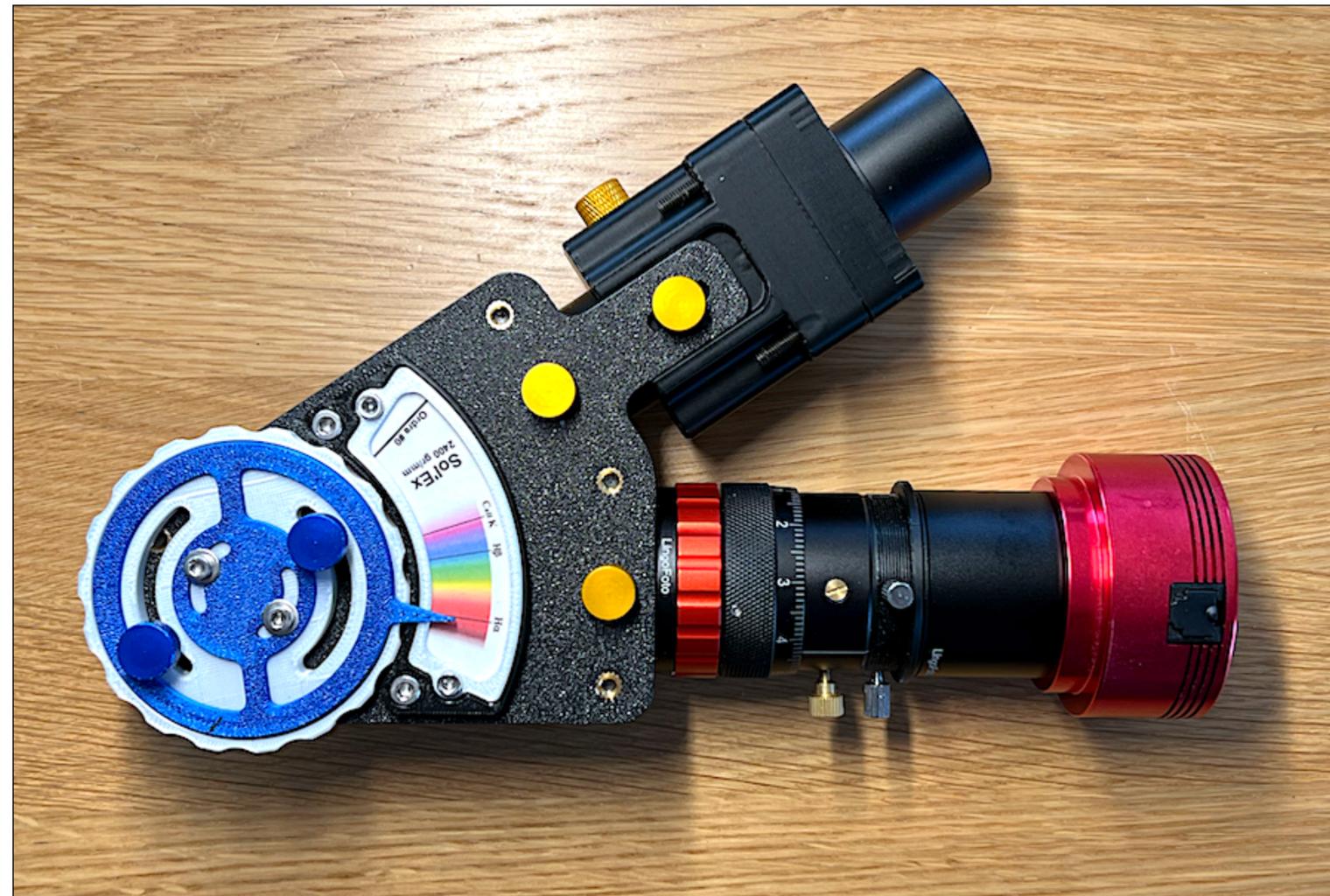
## The Solar Explorer

This document is based on the Azur3DPrint V2 mechanical kit

<https://www.azur3dprint.fr/>

Optical elements from Shelyak (compatible with mechanical versions 1 and 2)

<https://www.shelyak.com>



**SOL'EX**

<http://www.astrosurf.com/solex/>

Release 1.2 - November 14, 2023

Copyright (c) 2020-2023 Christian Buil

**A****B****C****STEP #1**

A - Unpacking! This is the Sol'Ex mechanical kit from Azur3DPrint as you receive it (<https://www.azur3dprint.fr/>). It is pre-assembled. All screws and bolts are supplied (ISO).

Only those parts of the kit that are relevant to this manual are shown.

B - The optical kit from Shelyak Instruments (this kit is compatible with both the "original" V1 and V2 mechanical versions). It includes two objectives, a diffraction grating and a slit (<https://www.shelyak.com>).

C - Additional accessories required to operate the Sol'Ex: a helical focusing system (here the ZWO model), a T2/1 1/4" interface, a CMOS acquisition camera (here a black and white ASI178MM model, rather recommended - equivalents are available from other manufacturers).

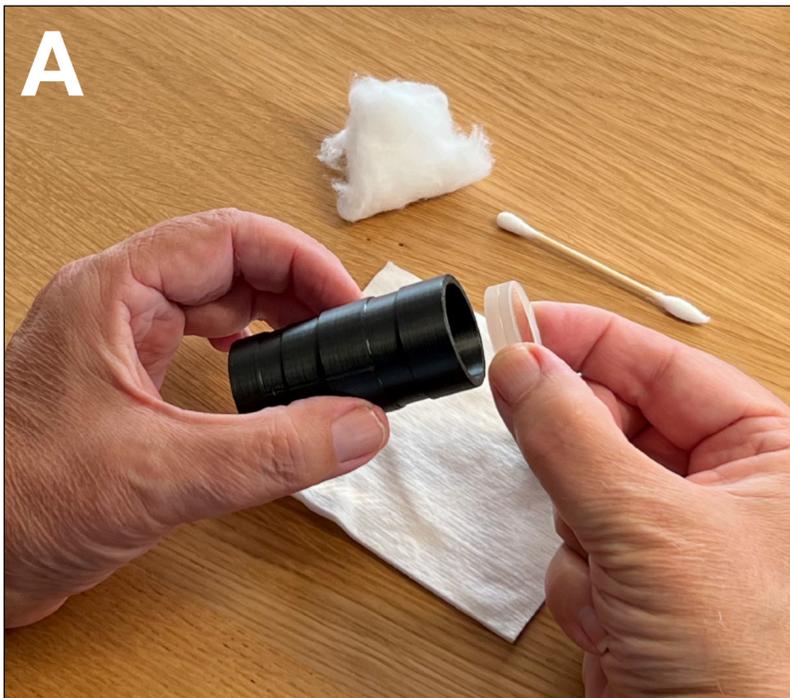
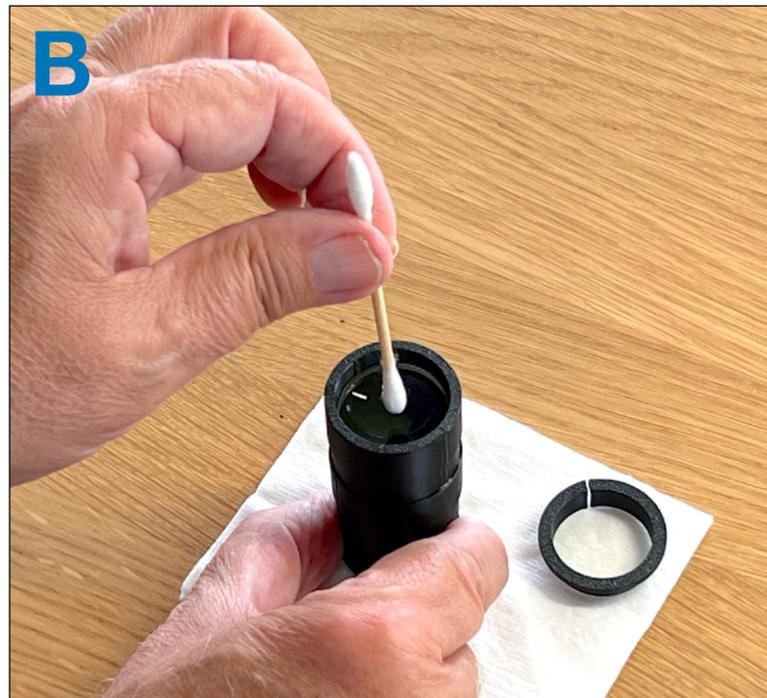
A



## STEP #2

A - Dismantling the collimator + entrance slit system.

You'll find a split washer to hold the objective, the objective tube, the collimator block and the telescope interface (T2 standard).

**A****B****C****D****STEP #3**

A - Mounting the collimator lens in its tube. The collimator lens is the thicker of the two lenses supplied with the optical kit.

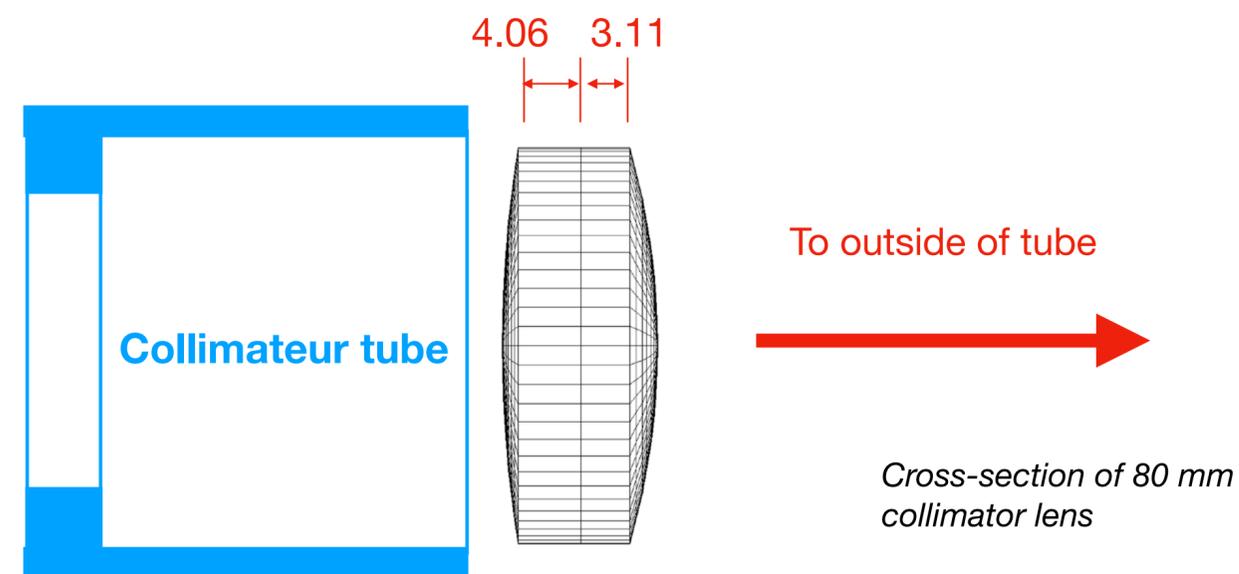
Always hold the lens by its edges to prevent fingers coming into contact with the useful surface (you can wear thin gloves). The surfaces are relatively sturdy, so if necessary, you can clean them with absorbent cotton, dampened at the start, then dry at the end. Change the cotton often, that's the secret (avoid cleaning paper at all costs). Use only water or Purosol.

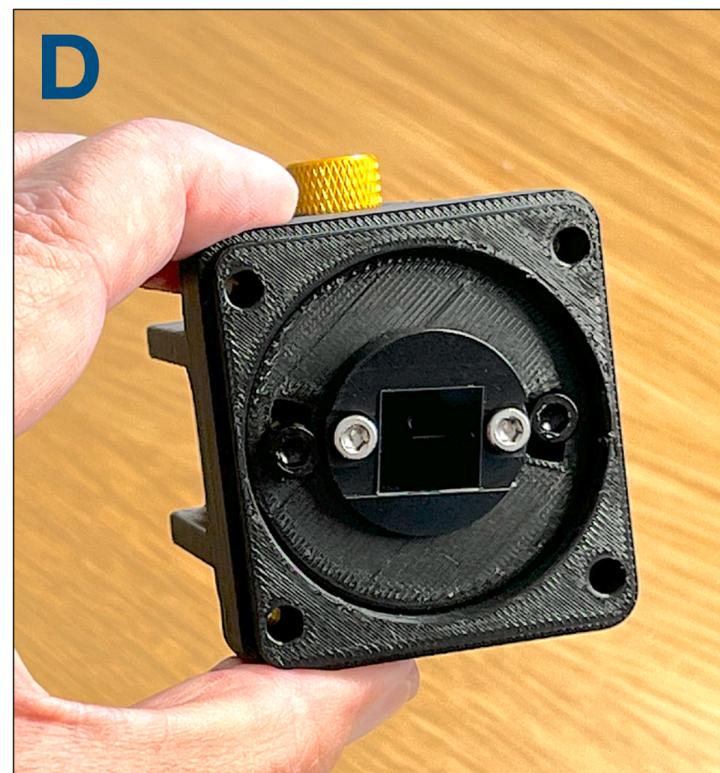
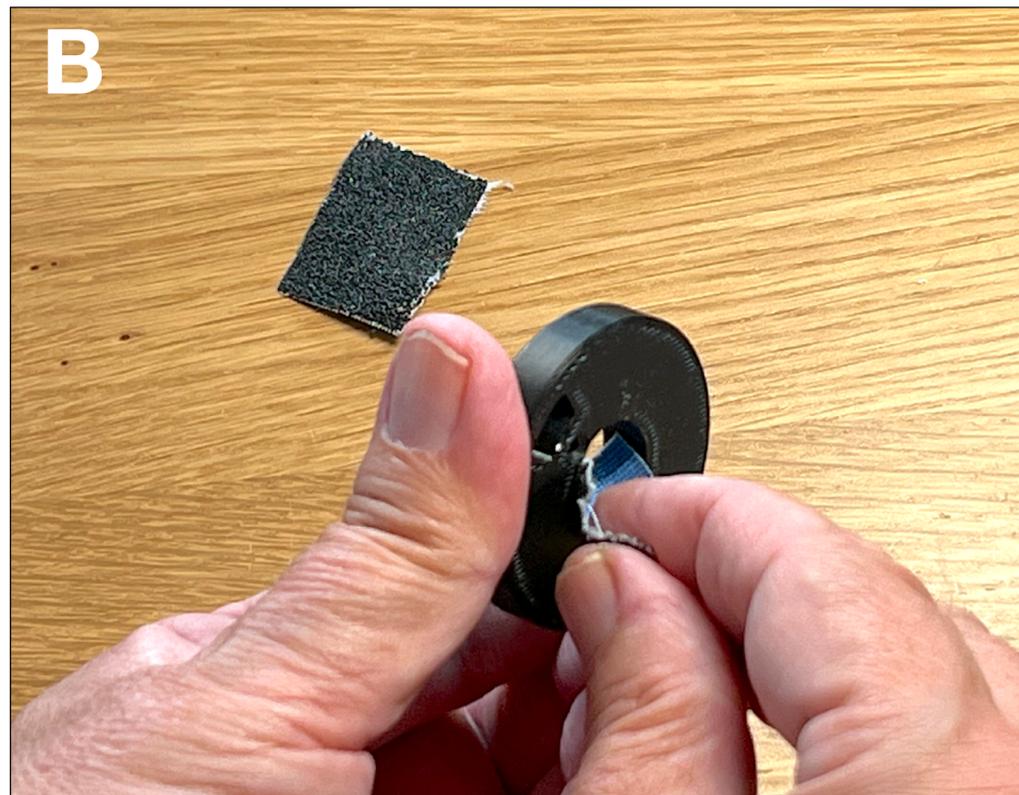
Don't make a mistake in the lens mounting direction: the most convex side is on the outside of the tube. See the drawing below, it's important.

B - Apply pressure with a cotton swab to ensure that the lens rests firmly on the mechanical shoulder and is mounted straight.

C - Fix the black split ring to hold the collimator lens in the tube. The lens must not move when the tube is shaken.

D - The collimator lens mounting operation is now complete. Leave this assembly aside for the moment.





#### STEP #4

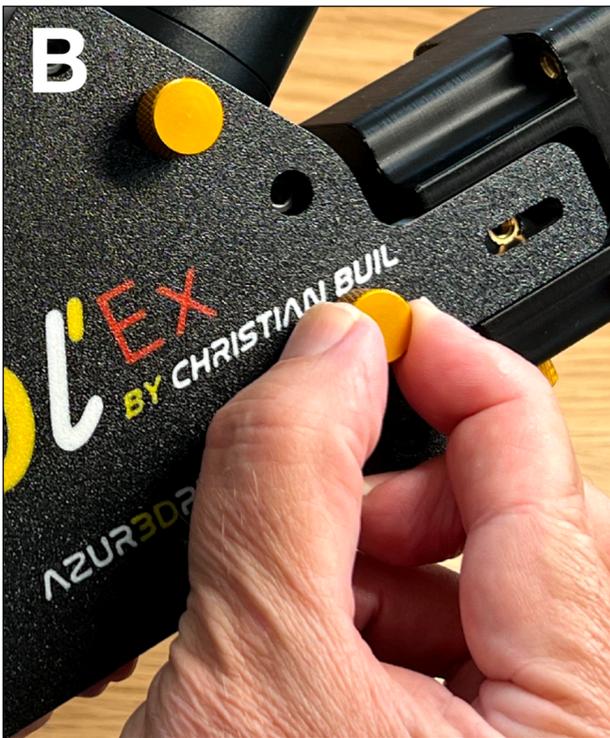
A - Mounting the slit. The slit is a thin glass plate glued into a metal part. Note the  $30^\circ$  angle of its plane to the optical axis.

B - Occasionally, the end of the slit does not fit into the slot provided in the 3D-printed washer. More often than not, it's the tapping of the M3 clamping screws that causes material to overflow into the hole. These burrs can easily be removed by rubbing with emery cloth. The metal part must fit effortlessly, and be able to rotate. Just be patient as you deburr.

C - The slit is now mounted on its support part (washer), via two M3 screws.

D - When fitting the washer into the collimator block, try to align the fixing screws as closely as possible. Do not do what is shown in the photograph, which is a counter-example.

E - Slit integration is complete. Note how the inclined plane of the slit is positioned in relation to the top screw. Try to respect this orientation.



## STEP #5

A - Fit the collimator system assembly into its housing. Note the general orientation.

B - Push the collimator tube all the way in so that the end rests on the shoulder in the housing. This is very important. It's while holding the tube that you tighten the two screws holding it in place.

Tighten sufficiently to ensure that the tube is held in place without any play. If necessary, remove a nylon washer from the screws. But be careful, you're tightening on plastic and it's very effective, so don't use too much force, otherwise the collimator cube will be deformed by the tip of the screws. The aim is to make a simple mark on the tube.

Distribute the tightening force with the two screws on either side of the housing.

C - At this point, moderately tighten the collimator cube locking screws. We'll come back to this when we come to the optical adjustment. Here, we're only talking about a safety hold.



## STEP #6

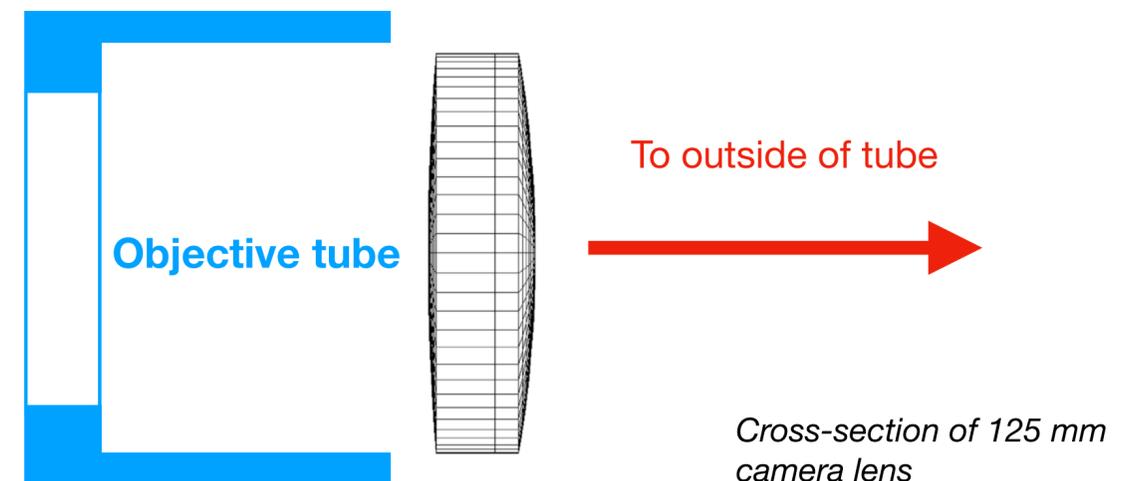
A - Remove the camera lens tube sub-assembly.

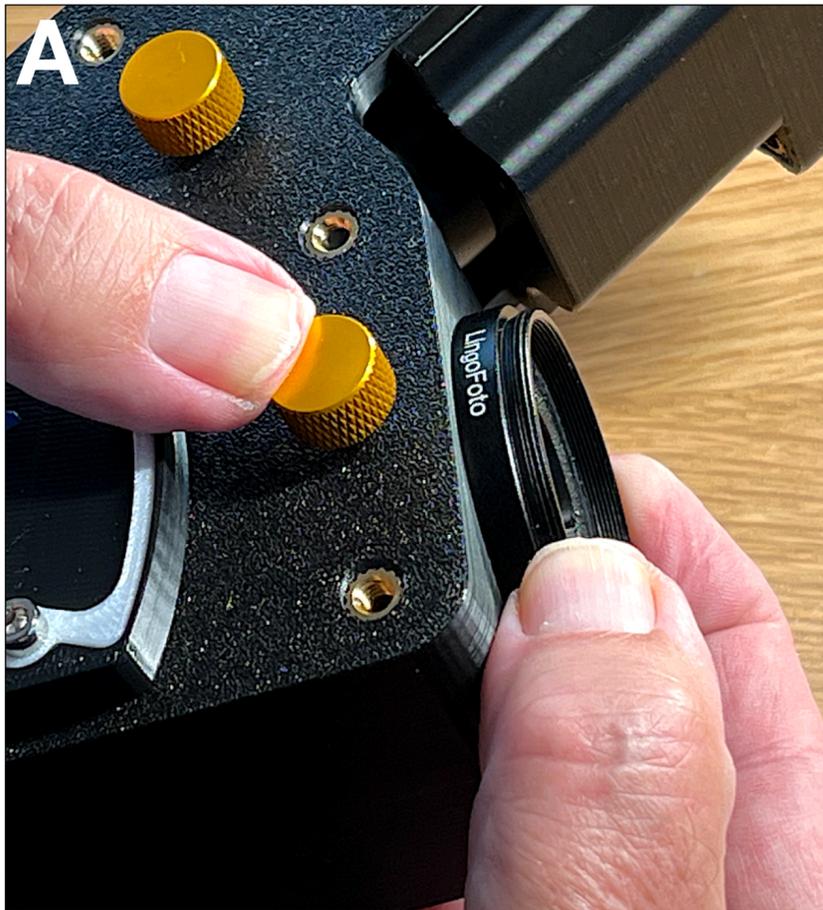
B - Insert the long ring into the tube first.

C - Fit the lens. Be careful to respect the mounting direction: the most convex side of the lens faces outwards (convex side). See drawing below. The lens should fit smoothly (there is a little play).

D - Check that the lens is fully seated in its housing by pressing down with a cotton swab. Avoid touching the optical surfaces with your fingers (you can, however, clean them by rubbing with moistened, then dry, absorbent cotton).

E - Slide on the white retaining ring and press. When shaking the tube, you should not hear the lens move.





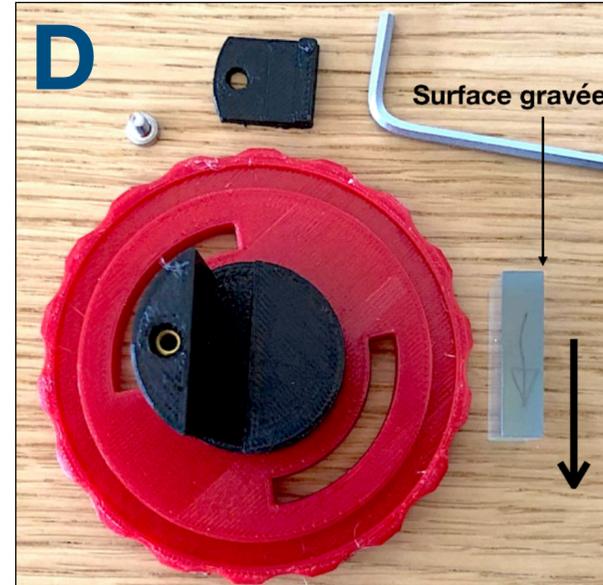
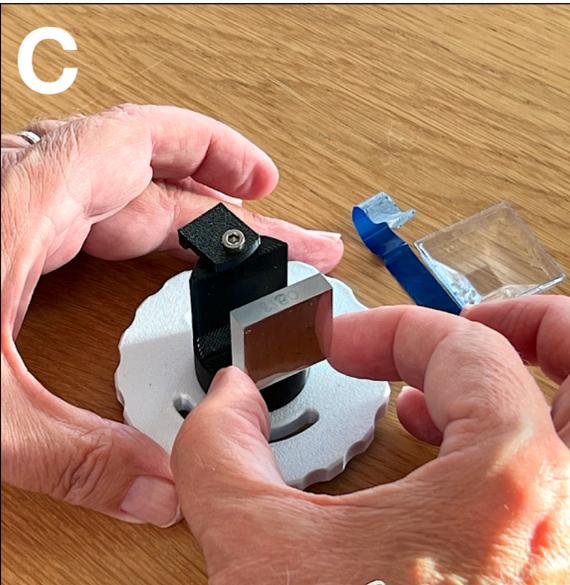
## STEP #7

A - Insert the lens barrel into the housing. As with the collimator tube, push it all the way into the housing and, at the same time, tighten the two locking screws moderately on either side of the housing. Simply make a mark in the plastic of the tube.

B - Screw on the helical focusing system (here the ZWO model).

C - Screw a 31.75mm / T2 adaptor to the 30 mm diameter T2 extension tube supplied with the kit. Slide this assembly into the focusing system's runner, remembering to interpose the thin 2.5 mm ring. Without this ring, some cameras may not focus the spectrum image properly.

D - Screw your camera to the other end of the T2 extension tube using the M42/0.75 thread. Don't worry about the orientation of the camera at this stage, we'll do that during the optical adjustment.



## STEP #8

A - Remove the grating washer (it's the Sol'Ex wheel!).

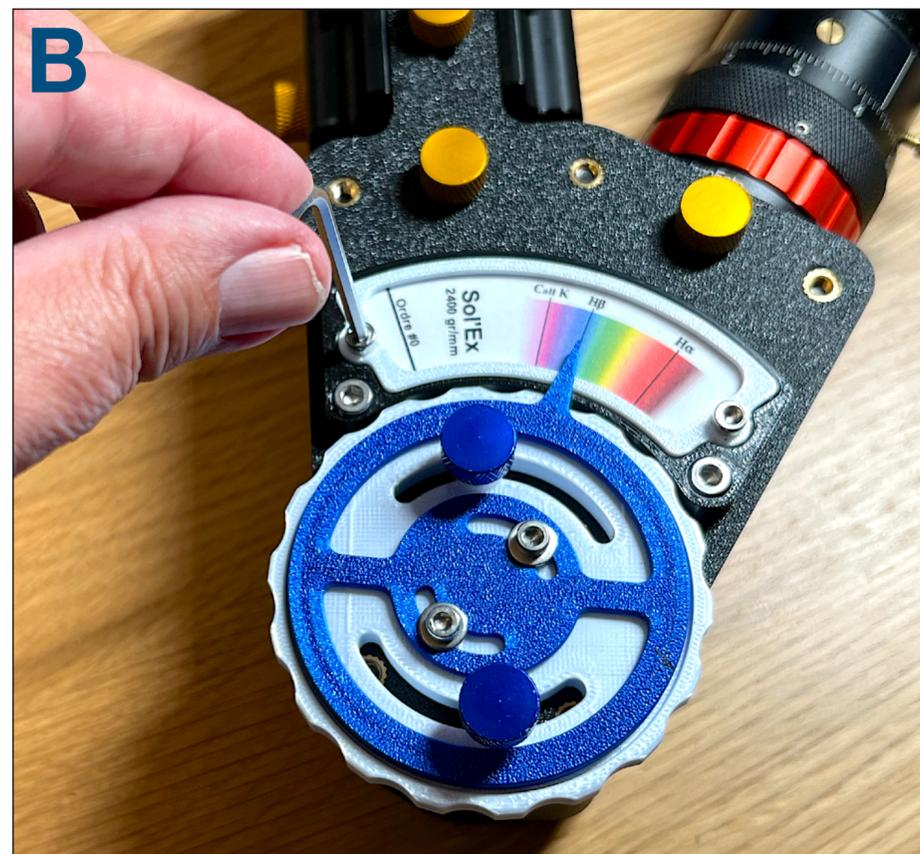
B - Examine the plastic box protecting the engraved surface of the grating. It's held in place by adhesive tape, which you can carefully remove (the fragile side is on the opposite side to the one you're looking at).

C - Always grasp the grating by its sides (drop it onto the unengraved side, turning it over in the palm of your hand to dislodge the grating). The engraved side is shiny and iridescent in color at certain angles. **NEVER** touch the engraved side, even with gloves. **NEVER** rub, even with a soft brush. Do not attempt to clean, **NEVER**. If you see dust, leave it alone - it's not serious. Don't stress, despite these warnings, this step is easier than you think.

D - Respect the mounting orientation, using the arrow drawn on one edge of the grating as a guide. Note that it doesn't matter whether the arrow is above or below. What's important is to respect the direction of this arrow in relation to the installation plan, as shown in the image. Of course, the engraved face is on the outside (on the right-hand side in the photograph).

E - Center the network grating in its support. Tighten the grating's mounting bracket moderately.

F - Check that the plane of the rear face of the grating is flush with the support when viewed from the side. Touch up if necessary. It doesn't matter if the clamp isn't straight.



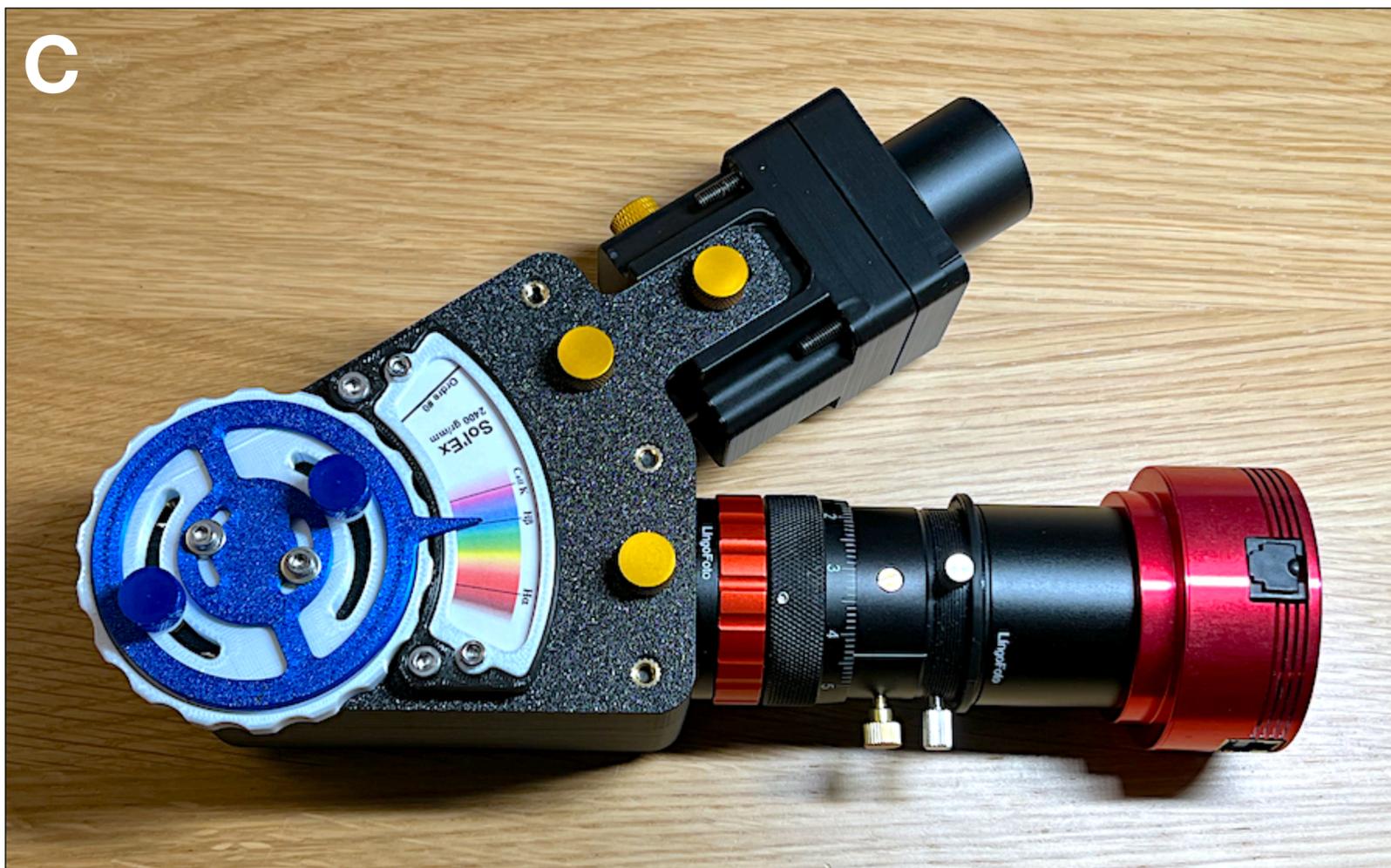
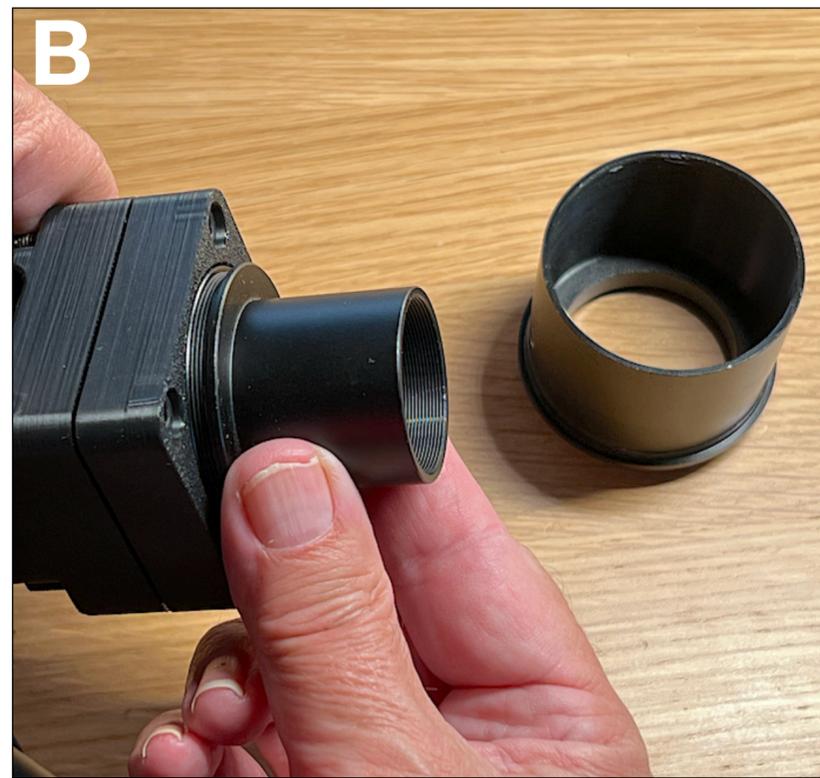
## STEP #9

A - The grating lever must be removed from its housing to perform the following operation. Dispose this assembly in a protected place, with the engraved side of the grating facing downwards. With Sol'Ex (and Star'Ex), disassembly of the Sol'Ex wheel is a routine operation.

Use a scissors to cut out the plasticized paper wavelength ruler supplied in the kit. You can use the half-moon piece as a guide.

B - Reassemble the assembly in the housing provided, secured with a frame and two M3 screws.

C - Do not leave the grating exposed to the open air; fit it into the housing, tightening moderately with the two screws provided. Don't worry about precise orientation at this stage, but make sure that the engraved face points approximately towards the objective tube.



## STEP #10

A - Fix the telescope interface with the 4 long M4 screws.

B - Fit an adapter to the telescope via the standard M42x0.75 thread. You can choose, for example, between a 1.25" or a 2" fixation (the latter will have a better hold, but Sol'Ex is very light, so the classic 1 1/4" mm works just fine).

C - Congratulations on your Sol'Ex!

All that's left to do is make a few optical adjustments, and you're ready to observe the Sun.