# ADC-UV

**The Atmospheric Dispersion Corrector - Theory**

The light from the stars, planets, and other deep sky objects, travels from space through the Earth's atmosphere (fig 1).In doing so it is "refracted," or scattered (deflected at an angle, depending on its wavelength). This effect, similar to a prism, causes a significant colour shift known as Chromatic Aberration. This is very detrimental to both viewing and imaging these objects.

The Atmospheric Dispersion Corrector, or ADC (fig 2), is an opto-mechanical accessory which corrects this by using the chromatic superposition of two counter rotating prisms. Simplified operation is described by the small diagram below.

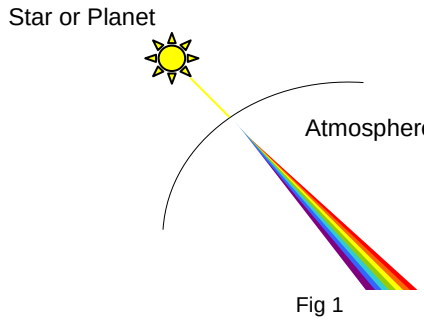


Fig 1

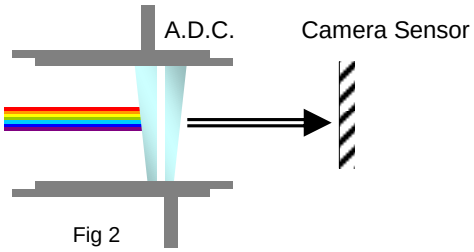


Fig 2

Light from a Star or Planet is dispersed by the atmosphere (fig 1). The ADC works in the opposite way to counteract this effect (fig 2)

**Technical Overview of Pierro Astro ADC-UV**

**Mechanics**

| | |
|---|---|
| Threads | T2 male / female |
| Length | 30mm (excluding threads) |
| Body | Aluminium, black anodized and knurled |
| Internals | Rings and internal accessories blackened to prevent unwanted reflections |
| Optical Aperture | 24 mm |
| Adjustment | Machined stainless steel rod with PETP covers for easy adjustment. Lockable |

**Optics**

| | |
|---|---|
| Prisms | 2 |
| Deviation Angle(°) | 2.0 ° |
| Surface Accuracy(λ) | 1/10 |
| Coating | Fully Multi Coated 300-700nm |
| Prism Edge | Surface Blackened |
| Prism Material | Fused Silica Substrate |

**Using the ADC**

Movement of the levers moves the prisms. When the levers meet, the device has virtually no effect. According to the factory adjustment of the prisms, it is possible that the minimum effect is obtained with the levers slightly open

When the levers are opposed (180 °) the correction is at maximum.

The levers are located in tracks which enable an opening of 240 ° with an overlap of 60 °. This allows an adjustment of 180 ° with 60 ° rotation possible. This allows you to rotate the prisms so they are aligned level with the horizon without having to rotate the ADC or focuser.

The ADC achieves maximum efficiency with optical systems when the focal ratio is F10 or greater. For planetary photography it is better to use a higher focal ratio.

The focal ratio of your telescope is calculated as follows

Focal Length / Objective Diameter = Focal Ratio

Therefore a telescope with an 800mm focal length and 100mm diameter objective would be

800 / 100 = F8

If a Barlow is added, multiply the focal length by the Barlow's power first as follows;

800 x 2.7 (Barlow magnification) = 2160mm / 100 = F21.6

**Operation**

Place the ADC in front of the camera or eyepiece. Loosen the knobs and place them one above the other. Orient the levers so they are parallel to the horizon (fig 1 and fig 2). Move the levers in opposite directions until you get a good correction of atmospheric dispersion (fig 3). Repeat your settings using small adjustments to obtain the best possible correction of the object. Screw the levers in slightly to maintain the orientation of the prisms. DO NOT over tighten the levers. During extended observing or imaging periods it may be necessary to re adjust the ADC. Objects suffer more dispersion at low angles and less at high. Therefore as the object rises less compensation will be needed.

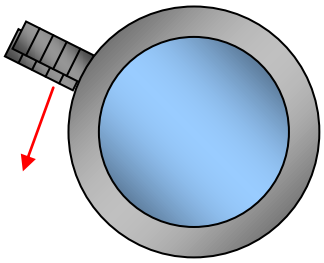


fig 1

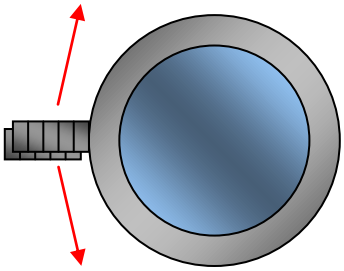


fig 2

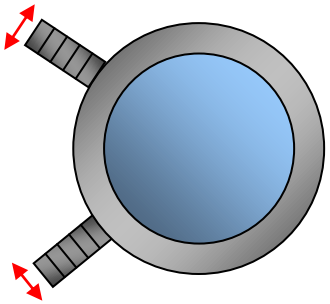
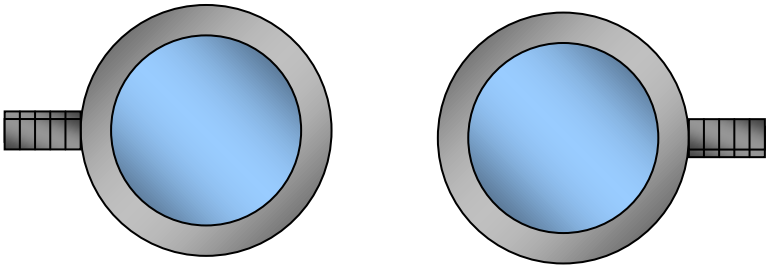
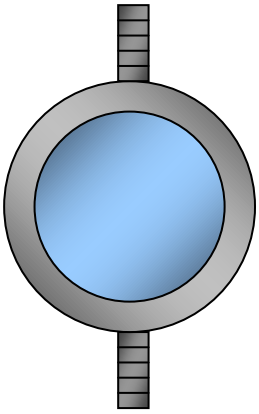


fig 3

The relative position of the levers shows the "power" of the correction:



No Effect



Maximum Effect

If you find that dispersion increases, instead of decreasing when you "open" the prisms, move both levers 180 ° to the other side of the ADC. Initial adjustment of the levers will cause the image to move to the left or right.

The orientation of the prism relative to the horizon is important and depends on the orientation of the telescope tube, its eyepiece and accessories present (reference-angled, tilting mirror, etc). Please take time to consider how the levers must appear when together to be parallel to the horizon.

Setting of the ADC using an eyepiece prior to using a camera may require slight adjustment for use with the camera as the correction power also depends on the distance between the ADC and the focal plane. The difference in adjustment can only be found with trial and error and gaining experience over time. We would recommend that your system is setup for imaging and that you use the same eyepiece each time. The ADC has a series of calibration marks for reference. Overtime it should be possible to discover the exact difference between the correct setting for a specific eyepiece compared to a specific camera

To assist in setting up the ADC a purple filter Wratten No. 47 can be used with the ADC, which should then be removed for imaging. We recommend in this case the use of a filter wheel or a filter holder drawer, allowing easy insertion and removal of optical filters in the chain without changing the ADC setting.

This filter only passes light in the deep violet and near infra red part of the spectrum. When used with the ADC on a star of given altitude the effects of dispersion will be more easily seen as only the opposite ends of the spectrum are seen. Correct adjustment of the ADC should combine these two images into a single image.

By using this method on a Star at different altitudes, it should be possible to calibrate the ADC so that the levers may be positioned correctly for an object at a given altitude. Please note that the amount of adjustment required is dependent on the complete visual or imaging system, being the Telescope, Barlow and Back Focus to Focal Plane. You cannot take a correct adjustment from one system and assume it will be correct in another.

**Usage Notes**

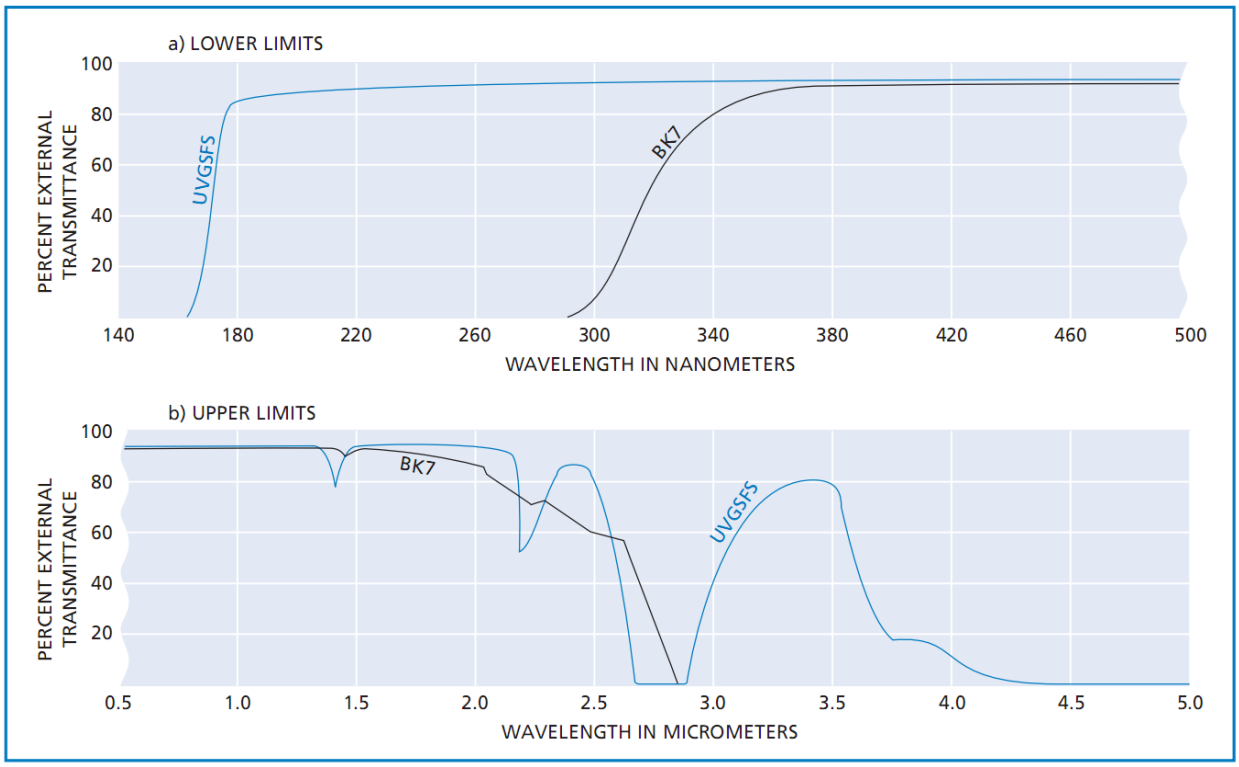
The supporting rings of the prisms allow easy rotation in both heat and cold. However, they will be looser in cold temperatures due to contraction. Slight tightening of the levers will allow for the correct adjustment of free play in the prisms to facilitate smooth rotation.

The Prisms are anti-glare coated. All optical surfaces are of very high quality but they can be damaged by the use of chemicals. We recommend that you protect the optics from possible contamination and only use an air duster to remove dust rather than physically touching the prisms.

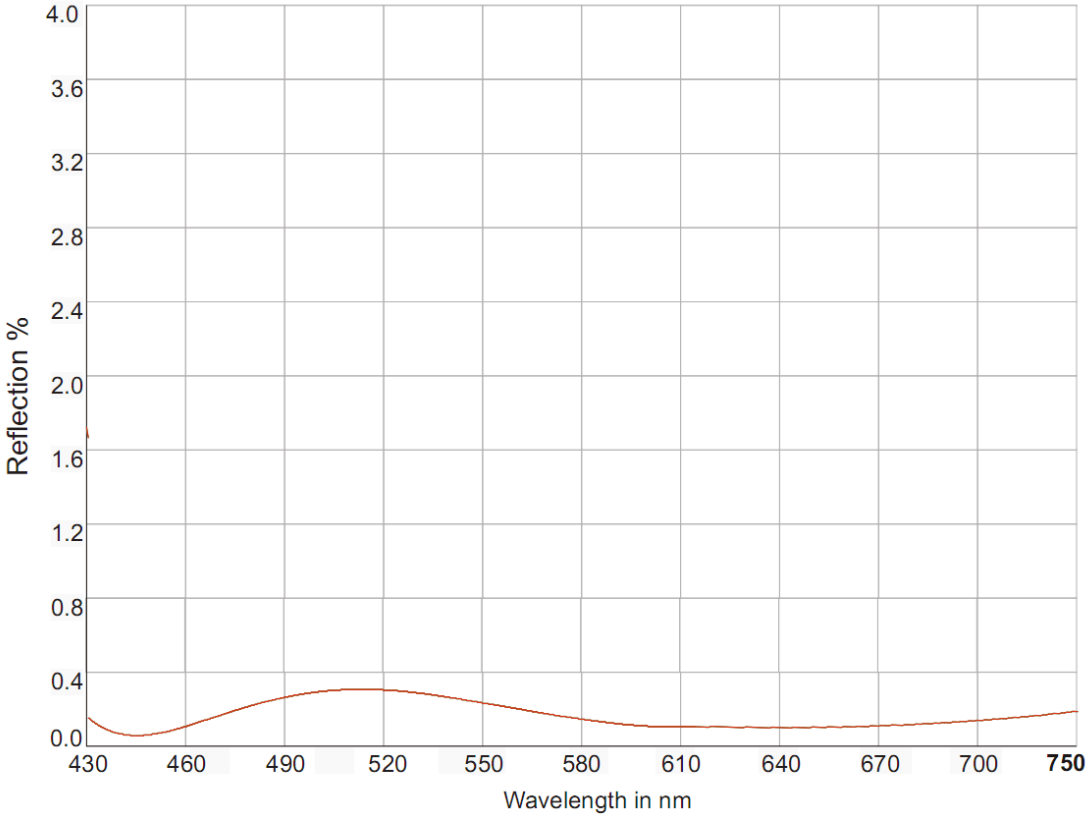
The optics are inspected before shipment to ensure perfect optical surfaces without scratching. Scratches and damage to the optic after cleaning are not covered by the warranty.

**Pierro Astro ADC Performance**

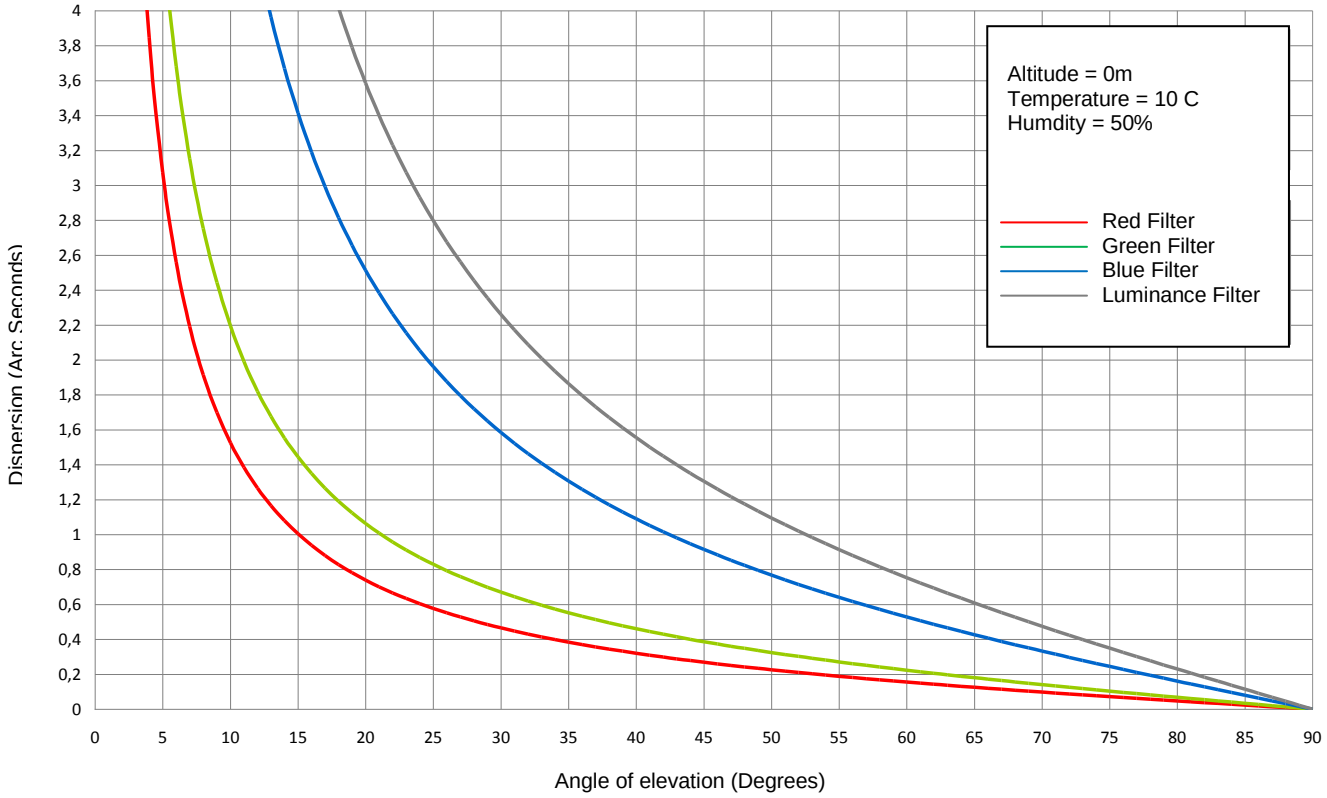
Light transmission rate of BK7 compared to fused silica (UVGSFS) as used in our prism (10mm thickness)



The graph below shows the reflection characteristics of the anti-reflective coating applied to the prisms compared to wavelength (standard ADC version). ADC-UV version is similar but larger in the UV band (300-700nm).




The graph below shows the amount of atmospheric dispersion versus altitude for different wavelengths. Plots were made from the middle transmission point using Astronomik L-RGB filters




With this graph it can be seen how different wavelengths are affected differently at different angles of elevation.