ATIK USB Filter Wheel EFW2

A Review for First Light Optics by Steve Richards

Introduction

I discussed the case for using a filter wheel in my recent review of the Starlight Xpress USB filter wheel so I won't cover the same ground again here. However, to summarise, the use of a software controlled filter wheel means that changing filters during an imaging session can be carried out automatically leading to unattended operation.

The subject of this review is the software controlled Atik USB Filter Wheel. Well known for their competitively priced range of CCD cameras, this is Atik's second stab at producing an electronic filter wheel. The first one, the EFW1, was a little basic in design and suffered from a variable tilt in its carousel which caused concern to some imagers as there was no guarantee that each filter would be presented parallel to the imaging sensor each time. Having owned an EFW1, I was looking forward to testing the EFW2 as it purported to be much better designed and engineered than its predecessor.

The unit submitted for review came with the 9 x 32.5mm (1.25") filter carousel option but other carousel options include 5 x 50.8mm (2"), 7 x 36mm unmounted and 5 x 50mm unmounted filters.

Specification of the review sample

Filter Type:	1.25" threaded	
Filter Capacity:	9	
Weight:	Filter wheel	585gm
	Off Axis Guider	122gm
Dimensions:	185mm x 160mm x 29mm (with Baader 'T' adapter)	
	185mm x 160mm x 22.3mm (with Atik 'T' adapter)	
Interface:	USB 2.0	
Power:	12v, cigar plug	
Price:	USB Filter Wheel	£475.00
	Off Axis Guider	£198.00
Supplier:	First Light Optics	

What's in the box?

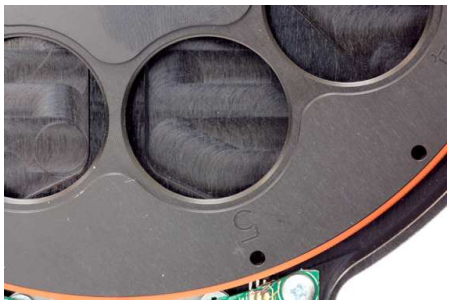
The EFW2 arrived in a no frills Jiffy bag inside an outer cardboard box but as we shall see, this understated presentation did not match the contents. Included in the package is a 1.8 metre USB lead, matching length 12v cigar lead, CD with Artemis Capture software and an ASCOM driver, a 54mm to 2" nosepiece adapter, a 2mm and extra long 1.5mm Allen Key and a colour printed instruction sheet.

Description

The 21.8mm deep filter wheel comprises a CNC machined casing 19mm deep with 2mm thick sides reinforced in 8 positions around the perimeter to accept the 8 x M3 stainless steel Allen bolts that along with a matching centre bolt retain the 3mm thick front faceplate. Both the front and rear external faces are beautifully finished with a machine turned design to the flat surfaces and all the corners are pleasantly curved to give a smooth feeling with no sharp edges. The quality of the black anodising is excellent and the whole unit really is visually 'a thing of beauty'. Somewhat at odds with the rest of the design and amazing attention to detail is the motor unit which projects out of the

rear of the housing. It was surprising that the motor wasn't covered in a simple casing to protect it and its exposed axle end.

Internally the rear face of the housing is exquisitely machined to give a lattice to maintain rigidity whilst minimising weight. A 10mm pillar is machined into this backplate to support a 17mm needle bearing onto which the carousel is installed. However, the support doesn't end here as the carousel is clamped top and bottom by two radial needle bearings kept under tension by a wave spring when the facing plate is attached to the CNC housing. The 4mm thick carousel is again beautifully machined with finger recesses to help with the insertion of the filters, the position of each being neatly marked by an engraved number. At the top of each filter position, there is a smooth bored hole that is used by the optical counter to identify the position of the wheel in conjunction with an extra index hole between filter positions 4 and 5. A rubberised 'tyre' is installed around the periphery of the wheel and this is driven by a ridged shaft on the motor. The sprung motor assembly and printed circuit control board are located at the foot of the housing from where the power and USB mini 'B' sockets exit. On the outside of the wheel near the USB socket there is a small grub screw that can be used to adjust the motor tension.

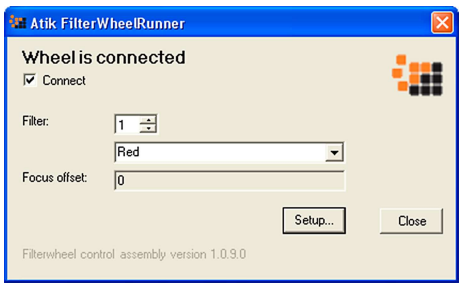


Gaining access to the carousel itself is very easy if a little time consuming as it requires the use of the supplied 2mm Allen Key to remove the 9 tiny retaining bolts. The 8 peripheral bolts are unscrewed first then the final centre bolt is removed allowing the bevel edged faceplate to be lifted up. The wave spring, machined spacer and top radial needle bearing are then removed, the motor unit pulled away from the rubber tyre and the carousel is lifted out. Installing the 1.25" filters was simple with the engraved numbers indicating the correct position of each filter.

Once reassembled, the carousel was very stable and no apparent tilt was apparent or indeed possible making for a very finely engineered solution thanks to the nicely engineered needle bearings.

On the rear face of the housing, a male 'T' threaded insert is neatly installed in a machined recess with two hidden retaining grub screws. This mounting adds nothing to the backfocus of the system yet allows the CCD camera to be set at any angle of rotation with regard to the filter wheel by slackening off the two grub screws and repositioning the adapter with the camera attached.

On the front face plate there is a 54mm threaded opening into which the supplied 2" nosepiece adapter can be screwed. Alternatively, an optional 54mm to female 'T' adapter is available for attachment using an all 'T' threaded solution.



Atik's well respected Artemis software, an ASCOM driver, a console program called 'Filter Wheel Runner' and various PDF files are included on the supplied CD. If you use an Atik CCD camera then the Artemis software would present an elegant integrated sequencing solution. Disappointingly, the AstroArt and MaximDL plugins and PDF files have nothing to do with the filter wheel itself, rather they are related to the use of Atik CCD cameras. On the plus side, the ASCOM driver performed perfectly on the various XP and Windows 7 equipped laptops and desktop PCs that the wheel was tested on. MaximDL connected to the filter wheel instantly using the supplied ASCOM driver and no connection or control problems were detected during the extensive testing period.

To give a feel for how quickly the filter wheel would change filters, I timed how long it took to go from filter position 1 to position 9 as this represented the longest travel and it took 6.8 seconds. Repeatability of filter placement was excellent at every position which is important for ensuring that on larger sensors, the filters are centred over the sensor to avoid any obstruction. Accurate placing of each filter also ensures ease of obtaining accurate FLATS for dust bunny removal.

Conclusion

The Atik EFW2 USB Filter Wheel performed absolutely flawlessly during the review period, was simple to operate and a delight to handle and use. The excellent engineering and amazing attention to detail in every component of the unit was a sizeable step up in quality from any other filter wheel that I have used so far. The option of up to 9 x 1.25" filters installed at the same time is an obvious attraction for owners of small to medium sized sensors, allowing for L/R/G/B/Ha/OIII/SII/Hb and an IDAS LP filter to be available for instant use without any carousel swapping – terrific!

Although this is certainly not a low cost option, I believe the price is fully justified on engineering grounds alone and I wouldn't hesitate to recommend it. In fact, I have ordered one for my own use.

Atik Off Axis Guider Add-on

A matching Atik off axis guider (OAG) was also supplied for testing as this is likely to be a popular option. This too was well engineered and designed to be very light despite its 76mm diameter, 24mm depth and 11mm thick walls. Again, excellent attention to detail was apparent in the engineering with deep trenches machined in the walls to keep the weight down. A 2" nosepiece was supplied, duplicating the one supplied with the filter wheel. If you wanted to use a focal reducer or field flattener, a 'T' adapter would almost certainly be required as well and I used a Baader 54mm to 'T' adapter during my testing. Atik have taken heed of this and now supply an optional adapter for this purpose. Two Allen keys are supplied for installation and prism adjustment.

The OAG attaches directly to the front faceplate of the filter wheel using three stainless steel M3 x 6mm Allen head bolts. The guide camera attaches to a small turret on the top of the OAG and this includes a very neat and effective helical focuser for fine focus and a set of 3 'T' extension tubes (4, 7 and 15mm) for coarse focus adjustments. A 6.25mm hole is bored through the centre of the turret to transfer off axis light picked off by the prism to the guide camera which seems a little restrictive as the prism itself is 10mm wide by 7mm deep so full use is not being made of the light available.

Adjustment of the prism position in the light cone is by slackening off two small grub screws and pushing the prism with a finger to a new position which is a little crude but the method works well enough. This is certainly not something you would want to do in the field although in fairness, this would normally be a 'do once and leave forever' procedure unless you wanted to adjust the prism to get a different choice of guide stars.

The additional back focus imparted by the filter wheel and OAG is 49mm with the 2" nosepiece and 54mm with the Baader 'T' adapter (but see below). A typical Atik CCD camera like the 314L+ has a sensor to mounting face of 13.1mm which gives a total sensor to final mounting face distance of 67.1mm. Most focal reducers, field flatteners for refractors and coma correctors for Newtonian

reflectors require a sensor to mounting face measurement of 56mm ± 1mm so they will be a long way out of their optimum design spacing and even with the new svelte Atik 54mm to 'T' adapter the sensor to mounting face spacing is still 60.4mm. One focal reducer/field flattener, the William Optics Focal Reducer IV (FR IV), has an adjustable optical element that can allow for this discrepancy but there is a problem as I discovered when I coupled the FR IV to the OAG. The neat 59mm diameter helical focuser disc fouls the side of the FR IV. The only way to install the FR IV is to pull the helical focuser upwards against the tension of the built in spring and clamp it in this position with the locking nut. The FR IV will now fit but with no base for the helical focuser disc to bear against, it can no longer be used to make fine focus adjustments! As the FR IV is an obvious choice for many imagers wishing to ensure a flat field of view, I have brought this to the attention of the manufacturer.

With this in mind, I tested the Filter Wheel/OAG combination with my William Optics FLT98 refractor using the 2" nosepiece supplied in the kit and with my SXVF-H9 CCD camera as this has the same medium sized sensor as the Atik 314L+. There is less of a requirement for a field flattener with a sensor of this size than with, say an APS-C sized sensor so this represents a good match and would be a typical CCD to use with this set-up.

Achieving focus with both the guide camera and imaging camera at the same time can be quite a trial but I always carry out this procedure during the day by focusing on the roof tiles of a distant neighbour's house and it couldn't have been simpler with the Atik OAG. My guide camera is a Starlight Xpress SXV slave guider and although this is designed to fit a 1.25" eyepiece holder, it also has a standard female 'C' mount thread. I used my own 'C' to 'T' adapter to install the guider directly to the helical focuser on the OAG. Using the supplied 7mm 'T' extension tube at the rear of the filter wheel to mount the imaging camera allowed almost exact focus on both cameras and a slight tweak of the excellent helical focuser was all that was needed to complete the job. This was very impressive indeed.

Despite my reservations regarding the small-sized portal in the guide turret, there was plenty of guide star choice for the SXV sensor. With a larger imaging sensor than my SXVF-H9, it may prove necessary to adjust the position of the prism out more towards the perimeter to avoid interrupting the light cone.

Conclusion

Provided you don't need to use a focal reducer, field flattener or coma corrector then this combination of USB filter wheel and OAG will serve you very well indeed and the excellent engineering (bordering on exquisite in places) provides a solid yet light platform for mounting your mono CCD camera.

Steve Richards is the author of '*Making Every Photon Count*' and writes for The Sunday Times, BBC Sky at Night Magazine and BBC Focus Magazine.