



**DIFFRACTION**  
ASTRONOMY + SCIENTIFIC IMAGING

# ***SBIG<sup>®</sup> USB to Filter Wheel Adapter***



## User's Manual

Version 1.01 - May 22, 2024

*Visit us at:*

<http://diffractionlimited.com>

*and*

<http://forum.diffractionlimited.com/>

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# Table of Contents

## Contents

Table of Contents .....	3
SBIG USB to Filter Wheel Adapter.....	4
1 - Installation.....	5
1.1 Supplied Components .....	5
1.1 Installing the Hardware.....	6
1.2 Installing the Software .....	9
2 – Accessories and Replacement Parts .....	17
Appendix A: Technical and Warranty Support .....	18
Software Downloads.....	18
Technical Support.....	18
Authorized Repair Center .....	18
Diffraction Limited Main Address .....	18

### **IMPORTANT!**

Please read this guide thoroughly before installing and operating your new SBIG USB to Filter Wheel adapter. It is important to fully understand and follow all installation, operation, and maintenance procedures as stated to ensure proper functionality. Do not disassemble or modify the device. Do not connect the AC power supply until the filter wheel has been connected to the adapter. Failure to follow these procedures may affect your warranty, damage equipment, or present a hazard!

## **SBIG USB to Filter Wheel Adapter**

If you want to use a single SBIG filter wheel or a stacked pair of SBIG Advanced Filter Wheels (AFW series) with third-party equipment, the SBIG USB-to-Filter Wheel Adapter is the solution.

Diffraction Limited offers a variety of versatile and reliable SBIG filter wheels in several sizes. Normally an SBIG filter wheel is used with an SBIG camera that provides both power and control signals to the filter wheel. If you don't have an SBIG camera, then this Adapter will act as a substitute controller. This is an ASCOM-compatible solution for a Windows computer to control the filter wheel(s).

Customers using third-party cameras or detectors will need to make a mechanical adapter to attach their detector to the SBIG filter wheel. Diffraction Limited does not supply these adapters. Third parties such as [PreciseParts.com](http://PreciseParts.com) can assist with this.

The SBIG USB to Filter Wheel Adapter ("Adapter") is a small box that connects the computer and a power pack to the filter wheel(s).



The Adapter can run a single filter wheel. If you have two SBIG Advanced Filter Wheels (AFW-series) and the Dual AFW Filter Wheel Adapter kit, then you can run a pair of stacked SBIG filter wheels as a single virtual filter wheel with combined filter positions.

As of this writing, only one (1) USB-FW adapter can be used in the system. This means that you can use it with one camera attached to a single or dual filter wheel setup. You cannot use a second unit with a second camera used for guiding.

# 1 - Installation

## 1.1 Supplied Components

### ***SBIG USB to Filter Wheel Adapter***

Your USB-to-Filter Wheel Adapter comes with the necessary accessories to connect it to an SBIG filter wheel. A filter wheel is not included. Observe proper handling procedures for sensitive electronic equipment and unpack the contents carefully in a clean, dry, static-free area. Inspect the contents to ensure all components are present and in good order. The kit includes:

- SBIG USB to Filter Wheel Adapter (P-USB-FW)
- Power supply:
  - +12V DC 2A power adapter (60013A)
  - Power cable with USA, European, or Australian plug (specified on ordering)
- Extension Cable (68005) for the +12VDC connection
- USB 2.0 cable – 4.5m (15 foot) Type A Male to Mini B (68006)

### ***Compatible Filter Wheels***

The following SBIG filter wheels are known to work with the Adapter:

- SBIG Advanced Filter Wheel (AFW-series)
- Supports dual wheel operation for the SBIG AFW series wheels when used with the Dual AFW Filter Wheel Adapter
- SBIG FW8S-STXL eight-position filter wheel
- SBIG FW8S-STT eight-position filter wheel
- SBIG FW8-8300 eight-position filter wheel
- SBIG FW7-STX seven-position filter wheel

The following SBIG filter wheels have compatible connectors but have not been tested with the adapter, so correct operation is not guaranteed:

- SBIG FW5-8300 five-position filter wheel
- SBIG FW5-STX five-position filter wheel

Older SBIG wheels from the ST-series have not been tested with the USB-FW adapter and are not compatible and should not be connected.

## 1.1 Installing the Hardware

Perform the following procedure to prepare your SBIG USB-to-Filter Wheel Adapter for use.

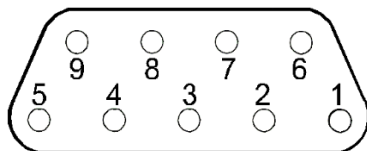
**➔ CAUTION:**

Do not connect power to the USB-to-Filter Wheel adapter until instructed to do so. Do not “hot plug” the cable to the filter wheel or the DC power connection into the unit. Always disconnect power before connecting or disconnecting any cables.

1. Ensure no power is getting to the USB-FW adapter. Make sure the DC power supply is not connected to the AC wall outlet.
2. Ensure the USB cable is not connected to the USB-to-FW Adapter.
3. See the following photo showing the connector locations.



The 9-pin D-subminiature connector (sometimes called a DE9 or DB9) on the right side in the above photo is the connection to the SBIG filter wheel. It takes the place of the SBIG I2C AUX (Inter-Integrated Circuit Auxiliary) communication connection found on an SBIG camera. It provides power and control signals to the attached Filter Wheel.



➔ **CAUTION:**

This is not an EIA RS-232 serial port. Do not connect any serial devices such as a telescope mount, modem, or other device to this port, as damage will occur.

4. Connect the filter wheel's 9-pin D-shell cable to the USB-FW AUX connector. On a single SBIG filter wheel, this is usually a short white cable that dangles out of a corner of the filter wheel.

If you have a Dual Filter Wheel setup with stacked filter wheels, connect the 3-connector cable to the USB-FW after connecting it to the 2 filter wheels. For example, see this workbench photo showing a pair of AFW-10-50SQ filter wheels connected to a USB-FW Adapter in the middle:



➔ **CAUTION:**

If you are using an SBIG FW7-STX or similar (eg FW5-STX), do not connect a cable between the FW7-STX connector panel RS-232 jack. Use the white cable instead. Do not connect power directly to the FW7-STX filter wheel.

5. When using dual AFW wheels, please note that the internal **Address Switch** must be configured for each wheel. Please see the AFW Filter Wheel Manual for more information.
6. Connect the 68005 DC extension cable to the +12VDC input on the USB-FW. There may be a threaded locking collar ring on the power

connector, so screw this down finger-tight. It will help retain the connector.

7. Connect the other end of the DC extension cable to the supplied AC power supply cable. Do not connect power to the AC adapter – leave it unplugged from the wall outlet.
8. Connect the supplied USB Mini B cable to the USB-FW adapter. Leave the other end disconnected – don't attach it to the computer until completing the software installation.
9. Move on to Software Installation.

Do not turn the power supply on yet or connect the USB cable.



## 1.2 Installing the Software

Diffraction Limited provides the installation software via electronic download or on a USB memory stick. Contact us if you require this software.

The SBIG USB to FW Adapter allows you to operate your SBIG Filter Wheel using ASCOM drivers on a Windows computer. Hardware device drivers and ASCOM drivers are provided for the Windows 10 and 11 operating systems.

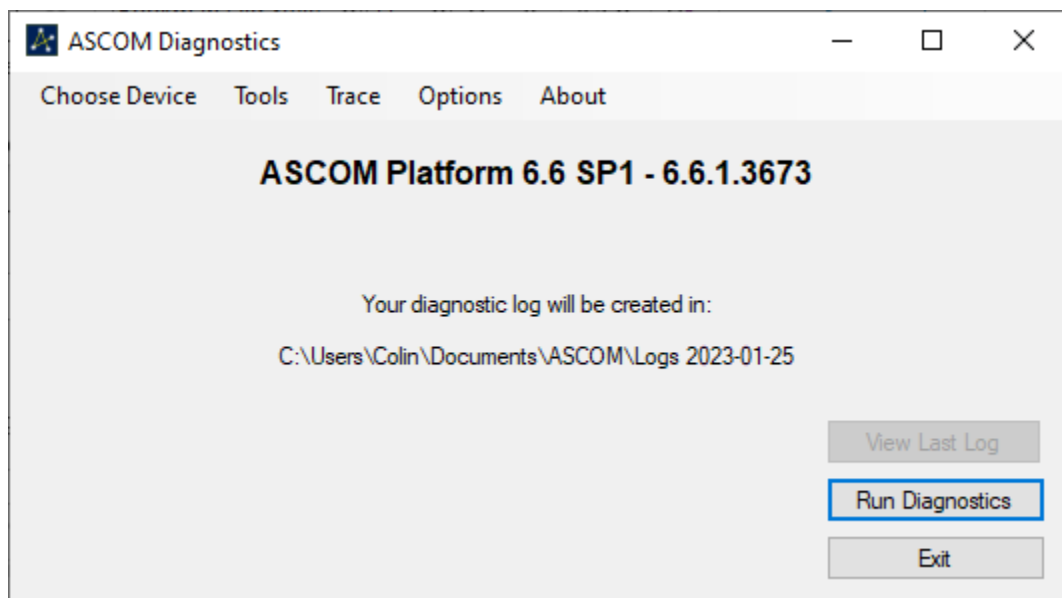
### **System requirements**

The following hardware and software is required:

- Microsoft Windows (applicable versions: 10 or 11)
- ASCOM Platform 6.6 Service Pack 1 or newer, available from the ASCOM Standards website here: <https://www.ascom-standards.org/>
- Disk space: estimated under 10 MB for program installation

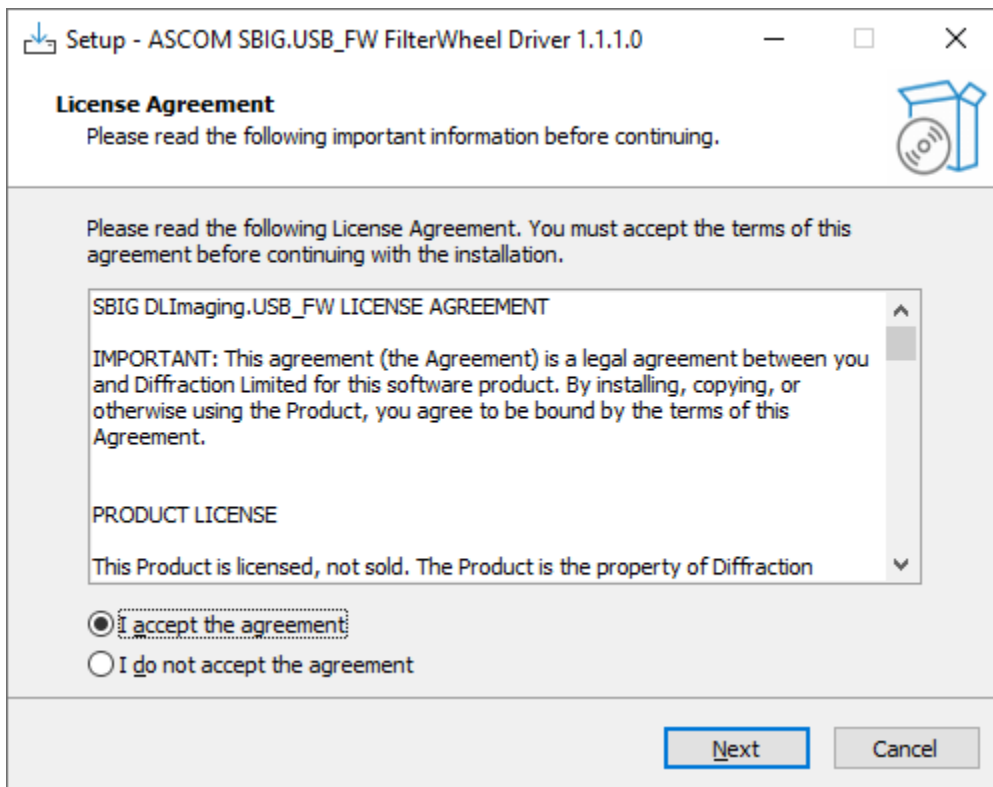
### **Windows installation**

1. Before starting, make sure to disconnect power from the USB-to-FW adapter.
2. Ensure the ASCOM Platform 6.6 SP 1 is installed. You can run ASCOM Diagnostics to confirm the version and that all is installed correctly.



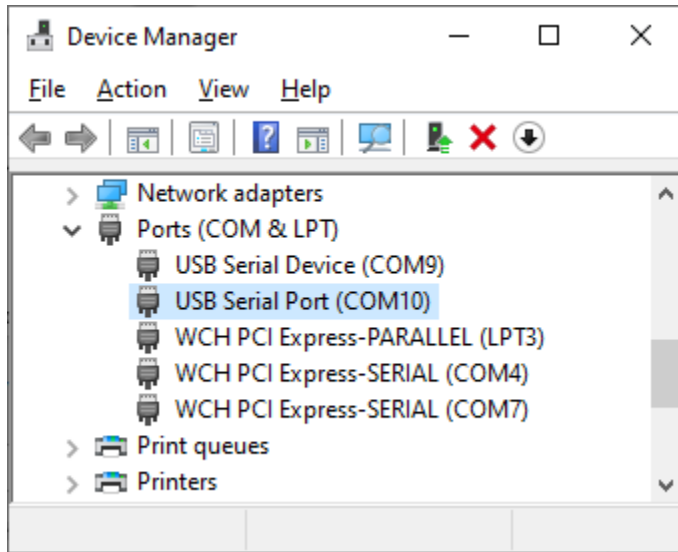
3. Obtain the SBIG.USB\_FW Setup.exe program. If this is supplied to you as a ZIP file, use Windows explorer to uncompress the file.

4. Run the SBIG.USB\_FW Setup.exe installation program and follow the instructions. Accept the license agreement and continue through each step until it is finished.



5. Complete the software installation steps to finish.
6. Plug in the AC power supply. You may hear the filter wheel start up and search for the home position.
7. Connect the other end of the USB cable to a port on your computer.
8. Windows should now automatically install the device drivers.

9. Verify that a new COM: port is listed in the Windows Device Manager as a new USB Serial Port. You should see something like this:



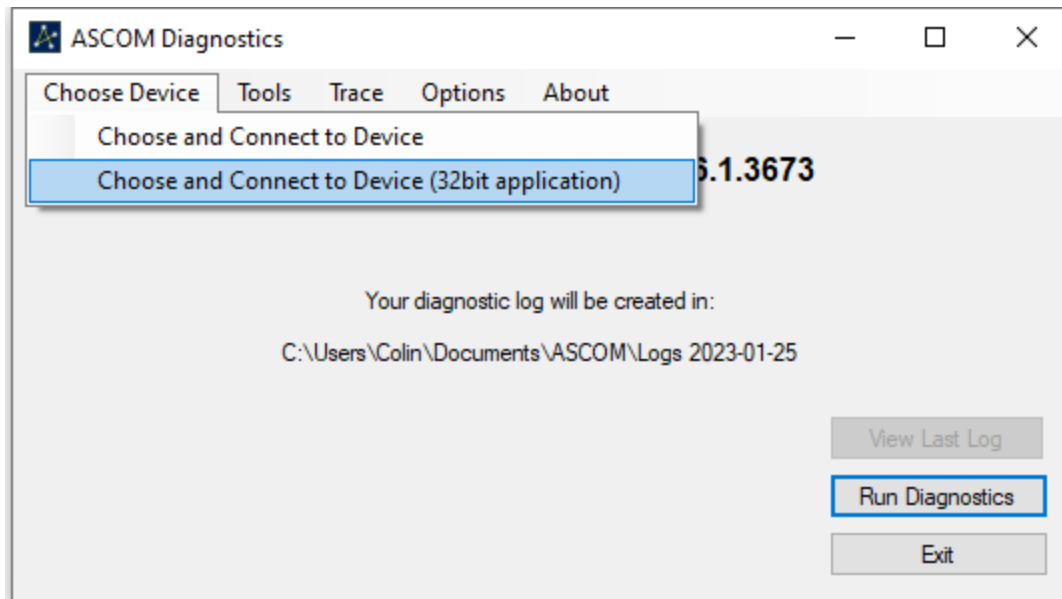
Note the COM port number. (In the example, COM10: )

10. The hardware and driver software is now installed. You must configure the filter wheel as an ASCOM Filter Wheel. See the next section on ASCOM Configuration.

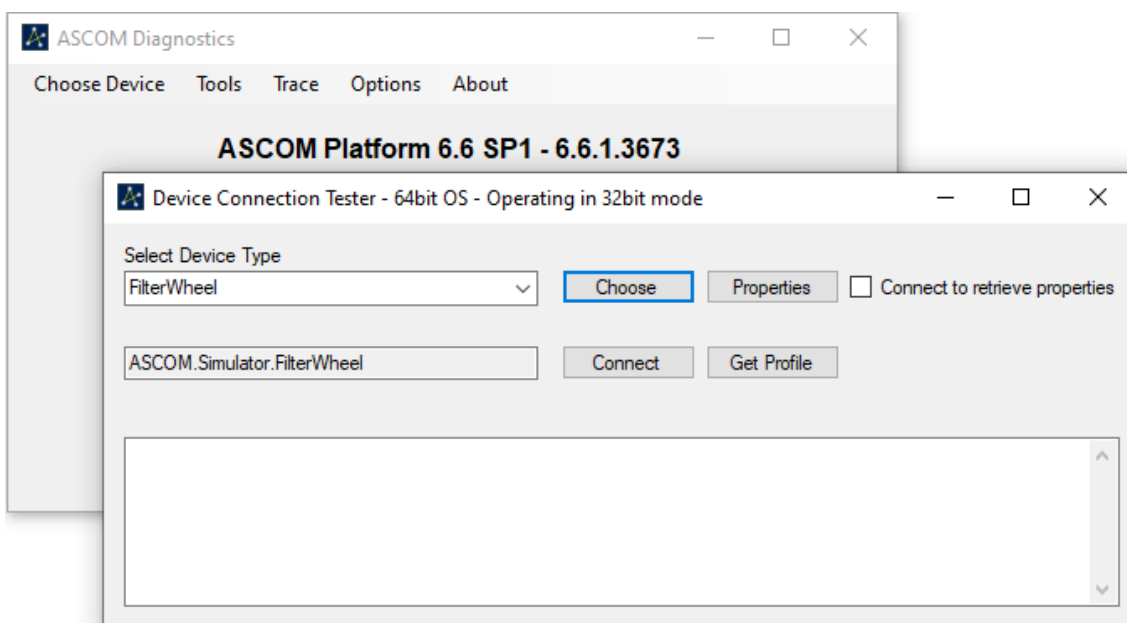
## **ASCOM Configuration**

The ASCOM Platform is a standard way to allow astronomy programs to connect to most common astronomy hardware. At this point, you will need to configure the ASCOM driver software and set up your filter wheel. We'll use the ASCOM Diagnostics Connection Tester as a simple way to do this. You can then repeat this using your favourite ASCOM-compatible astronomy software such as MaxIm DL Pro.

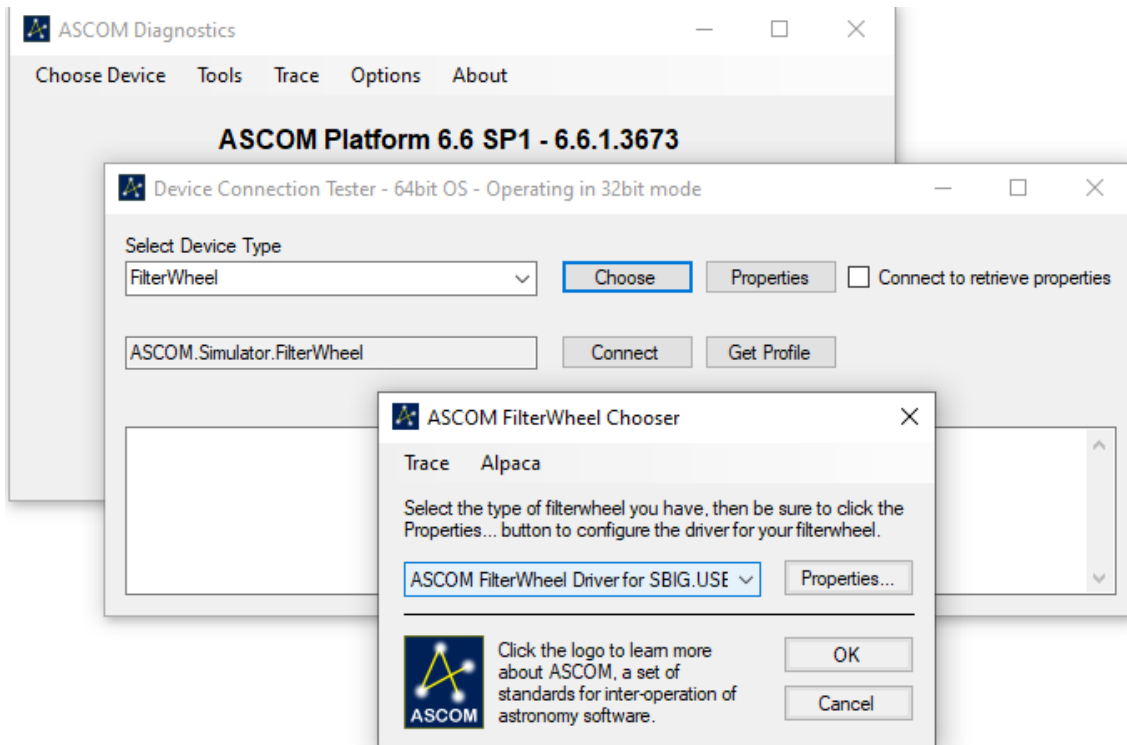
1. Launch the ASCOM Platform Diagnostics.
2. Select the Choose Device option, and pick Connect and Test (32bit device):



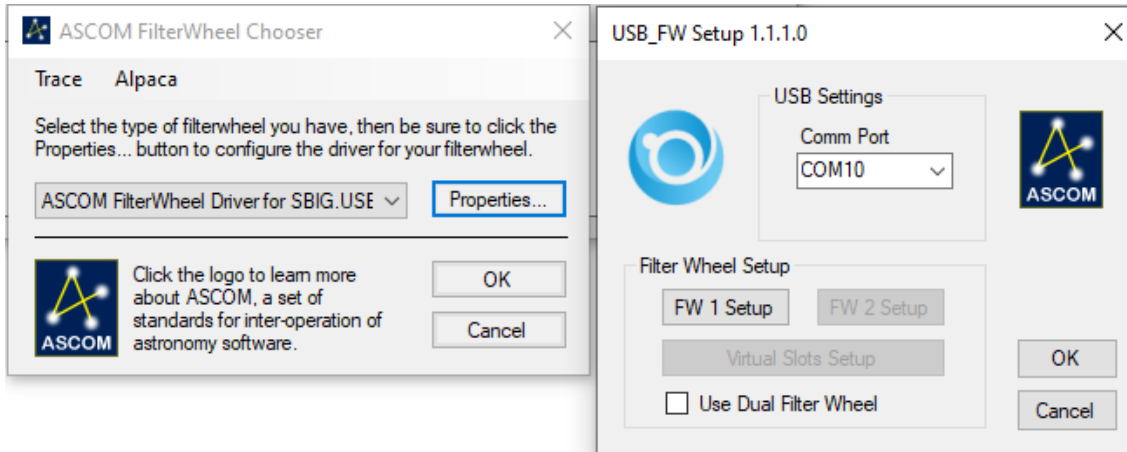
3. Next, select Device Type = Filter Wheel.



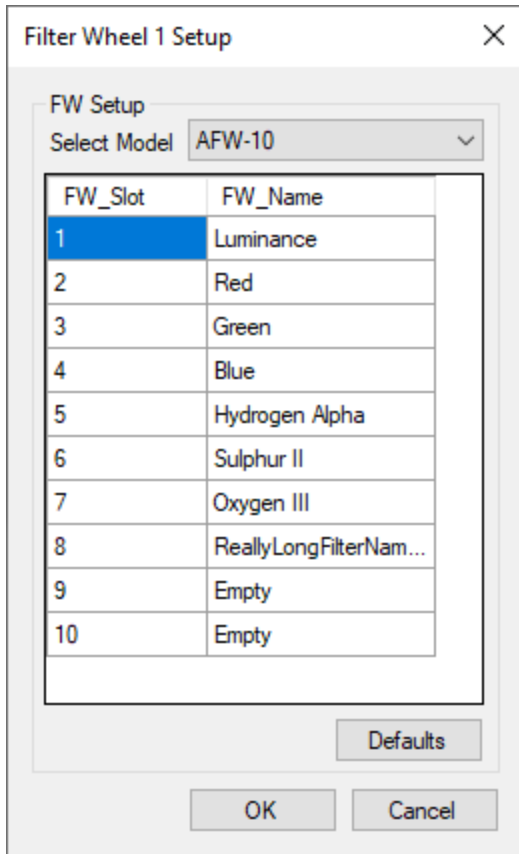
4. Click the Choose button, and the ASCOM Filter Wheel chooser will come up. Select the “ASCOM Filter Wheel Driver for SBIG.USB”.



5. Now click the [Properties...] button to select the COM port that your USB-FW adapter is attached to. In our example, COM10.



6. If you are using a single Filter Wheel, make sure [ ] Use Dual Filter Wheel is not checked. Turn this on to for Dual Filter Wheel operation with a pair of stacked AFW-series filter wheels.
7. Click [FW 1 Setup] to set up the first filter wheel. You will see something like this:



8. Select the correct filter wheel using “Select Model”. In the example above, this is an AFW-10 filter wheel with 10 positions.
9. Edit the names of the filters and click [OK] when done.
10. If you only have one filter wheel, skip ahead to step 12. For a dual wheel setup, repeat this for the second wheel using [FW 2 Setup].
11. For dual stacked wheels, you need to set up the [Virtual Slots]. Virtual slots combine a filter from the first wheel with a filter from the second wheel, and give it a virtual filter number and new name.

There are many combinations you could use:

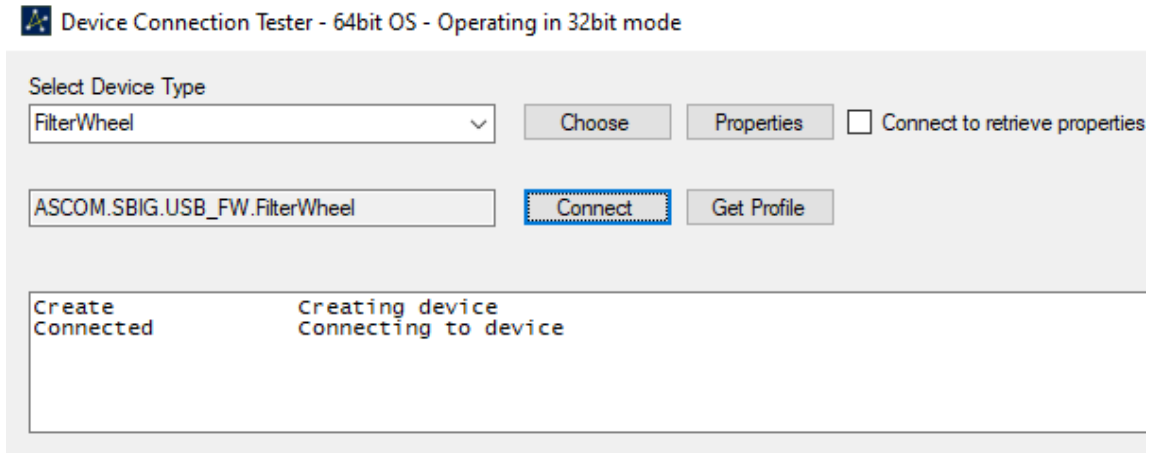
- a) **Plenty of filters:** if you have 18 filters and two 10-position wheels, put 9 filters in each wheel, and leave 2 empty slots.
- b) **Stacked filters** for bright star photometry: Put your photometric (UBVRI or Sloan) filters in one wheel, and a set of Neutral Density filters in a second wheel. Then create a virtual filter slot that combines one from each wheel.

Here are some examples on how you can use this. Pretend you have these filters in the first wheel: (L,R,G,B colour, Sloan r' and z' ) and in the second wheel, three neutral density filters (NDO, ND1, ND2). Here are some combinations you could create:

Virtual Slot (Combined Position)	Filter Wheel 1 Position Selected	Filter Wheel 2 Position Selected
1 = EmptyBoth	1 = Empty	1 = Empty
2 = L	2 = Luminance	1 = Empty
3 = R	3 = Red	1 = Empty
4 = G	4 = Green	1 = Empty
5 = B	5 = Blue	1 = Empty
6 = r_	6 = Sloan_r	1 = Empty
7 = r_ND0	6 = Sloan_r	3 = NeutralDensity0
8 = r_ND1	6 = Sloan_r	4 = NeutralDensity1
9 = z_	7 = Sloan_z	1 = Empty
10 = z_ND1	7 = Sloan z	4 = NeutralDensity1
11 = Moon	1 = Empty	5 = NeutralDensity2

Various combinations are possible. You can create whatever arbitrary name for the virtual filter, and this is what is normally shown in your application.

12. Let's test that the filter wheel is configured successfully. In the ASCOM Diagnostics, click OK until you are back at this screen and click [Connect]:



13. You will get a success message if all goes well. Then you can quit out of the ASCOM diagnostics.
14. If you get an error message like “Timed out waiting for received data” that means the USB-FW Adapter cannot talk to the filter wheel. Disconnect AC power before troubleshooting and contact us via the Official Technical Support Forum.
15. Launch your favorite astronomy application, for example, Maxim DL Pro. In the filter wheel setup, select ASCOM, and then advanced settings should allow you to see the ASCOM Filter Wheel chooser, where you can select the ASCOM Filter Wheel Driver for SBIG USB. Consult the instructions for that application or ask us on our official tech support forum.
16. Congratulations.



## **2 – Accessories and Replacement Parts**

Optional parts are available for use with the USB to Filter Wheel Adapter. This includes:

- AFW-series filter wheels
- Dual Filter Wheel Adapter Kit for AFW wheels
- Replacement Cables
- Replacement Power supplies and cords

Accessories are available from your authorized SBIG dealer and at:

<https://www.diffractionlimited.com>

# ***Appendix A: Technical and Warranty Support***

## **Software Downloads**

Downloads are included on the Diffraction Limited website product pages:

<http://diffractionlimited.com/>

Navigate to your product and click the *Downloads* tab. Software utilities, drivers, user documentation, and a Software Development Kit are available here. Contact us if you do not see what you need.

## **Technical Support**

Technical Support: <http://forum.diffractionlimited.com/>

Technical Support Phone: +1-613-225-2732

## **Authorized Repair Center**

**NOTE:** You must contact our authorized service & repair center for an RMA number prior to returning your equipment.

Phone: +1-613-225-2732

## **Diffraction Limited Main Address**

*For repair purposes & enquiries:*

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