FLI
Finger Lakes Instrumentation

Engineering Excellence
Because Your Image Depends On It

CenterLine Filter Wheel

User's Guide

WELCOME

Thank you for purchasing an FLI CenterLine Filter Wheel. We know that the accessory will bring you years of enjoyment and excellent imaging results.

This User's Guide is intended as a reference tool for you to use with the FLI CenterLine Filter Wheels. Please read it and follow the procedures to ensure trouble-free installation of your hardware and software. For information on other FLI Filter Wheels, please visit our website at:

www.flicamera.com

If you have any questions about your purchase, please contact us.

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FLI Yahoo Group is an active forum for members wishing to discuss FLI imaging systems, share imaging experiences, techniques, and results, and discuss imaging solutions and problem solving. The forum is accessible online at:

http://tech.groups.yahoo.com/group/FLI_Imaging_Systems.

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PRODUCT SAFETY

⚠ This FLI CenterLine Filter Wheel is shipped with a 12 VDC power supply. Do not use any other power supply with this System or use the power supply in a way other than described in this Guide as it may cause damage to the CenterLine Filter Wheel that will not be covered under the warranty.

⚠ If you are concerned about lightning strikes in the area in which you use your CenterLine Filter Wheel, you may want to take safety precautions as electrical surges can damage electrical equipment. We recommend that when your CenterLine Filter Wheel is not in use that you unplug the CenterLine Filter Wheel from power and unplug the USB cable from the CenterLine Filter Wheel.

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CENTERLINE FILTER WHEEL OVERVIEW

The CenterLine Filter Wheel features a centrally located aperture that presents a symmetrical mass distribution and eliminates the offset weight problems associated with virtually every other Color Filter Wheel on the market. It is also ideal for prime focus installations where a zero or symmetric shading of the primary mirror is critical. The CL1-10 presents an easier load to handle compared to a traditional Color Filter Wheel and it will not change a telescope's balance as it tracks across the sky. The CenterLine also allows for filter combinations unavailable with traditional style Color Filter Wheels. The CL1-10 holds up to ten 50 mm square filters in two independently operated wheels. It is powered by two internally mounted stepper motors and an innovative drive mechanism allowing for easy wheel removal and filter access. The internal wheels are supported by radial ball bearings that provide a smooth, quiet, and repeatable operation.

The bottom lip of the filter pocket acts as an aperture screen reducing the effect of filter edge reflections. The filter pocket lips on both wheels are facing outward, further improving the internal reflection performance.

Light leakage inside the wheel is addressed through solid wheel construction complemented by square optical port aperture screens on both sides of the housing.

Mechanical attachment of the CenterLine Filter Wheel is realized through the robust Zero-Tilt Adapter™ mechanism, which is incorporated into both the housing and cover side of the Filter Wheel and operated using easily accessible set screws. The structural rigidity and overall weight of the housing, cover, and wheels have been thoroughly optimized.

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CENTERLINE FILTER WHEEL SPECIFICATIONS

Overall Thickness	1.1"
Weight	4.3 lbs.
Recommended Filter Size	50 mm Square
Filter Thickness Range	1 mm -5 mm
Homing Device Type	Magnet / Hall Effect
Motor / Drive Type	Pulley / Belt
Software Controlled	Yes
Frame Side Connection	3.43" Zero-Tilt Adapter™
Cover Side Connection	3.43" Zero-Tilt Adapter™

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INSTALLING THE FLI FILTER SOFTWARE

Obtain the most up to date software to install and test your CenterLine Filter Wheel from our website:

http://www.flicamera.com/software

Select the FLI Software Installation Kit. Follow the installation instructions given in on-screen prompts that will guide you through the whole procedure. The FLI Software Installation Kit includes drivers for FLI products as well as utilities that can be used to control the hardware.

> Note: Run the FLI Software Installation Kit before you set up and power the CenterLine Filter Wheel to ensure the system recognizes and correctly initializes the CenterLine Filter Wheel when you connect it.

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Connecting the CenterLine to a Computer

12V DC Adapter to Power Outlet

USB to Computer
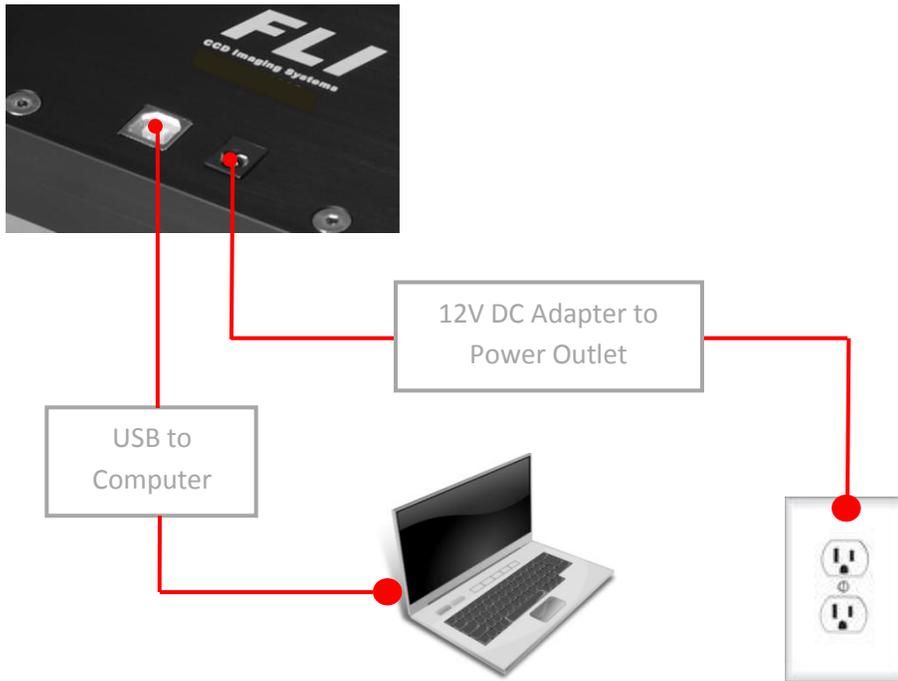
Connecting the CenterLine to a ProLine Hub

12V DC to ProLine Hub

USB to ProLine Hub

ACCESSORY POWER   POWER   AUX I/O   HUB   USB

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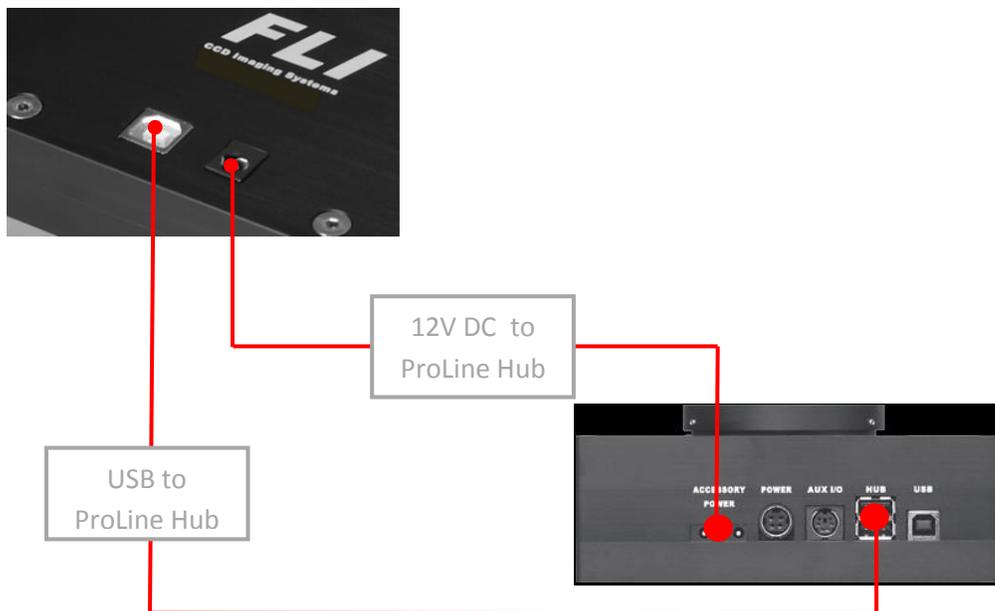
CONNECTION ACCESSORIES

Note: A Short Cable Kit (Part# 20055A) is available for connecting the CenterLine Filter Wheel to a ProLine Hub more efficiently. Please contact FLI via phone or email for more info.

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SETTING-UP AND POWERING A CENTERLINE FILTER WHEEL

Assemble all components in one area before beginning this set up procedure. Complete the software installation previously detailed before running the CenterLine Filter Wheel for the first time. Refer to the next topic for installing filters into the CenterLine Filter Wheel.

1. Plug the power supply cable into the CenterLine Filter Wheel.
2. Attach the USB cable between the CenterLine Filter Wheel and your computer.
3. Plug the power supply cable into a wall socket or switched AC power strip.
4. Run FLI Filter to operate the CenterLine Filter Wheel and make control selections.

The following notes are provided to assist you with the FLI Filter Software:

➢ The FLI Filter software will automatically recognize the type of Color Filter Wheel that is attached to your computer and display the correct number of filter positions. If the computer does not correctly identify this information, refer to the Troubleshooting topic later in this Guide for instructions.

➢ Upon successful driver, software, and filter installation, you should initiate a Homing procedure. To do this, click Home on the FLI Filter dialog. The filter combination in the aperture position is displayed at the bottom of the dialog. Will show (0,0) after the Homing sequence completes.

➢ You can move the CenterLine Filter Wheel to a particular preset filter pocket/cup position combination. To do so, click the button corresponding to the preset on the FLI Filter dialog. The CenterLine Filter Wheel will align the selected filter combination position in the aperture.

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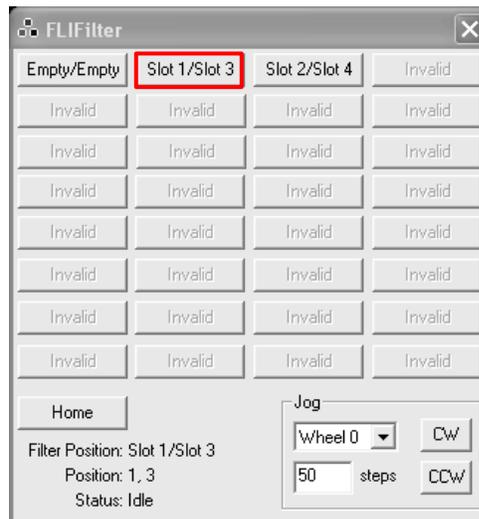
➢ The **Jog** section allows you to rotate the wheel by a fraction of the adjacent filter distance.

➢ Use the CW and CCW buttons to rotate the clockwise and counter-clockwise by the number of steps entered in the text box.

➢ **Filter Position** displays the filter positions of the currently selected preset using the user designated names.

➢ **Position** displays the current slot for Wheel 0 and Wheel 1

➢ **Status** displays the current action of the Filter Wheel

➢ Both wheels rotate counter-clockwise when moving to filter position (when viewed from the top). The standard filter sequence for Wheel 0 (left) is 0-4-3-2-1, the sequence for Wheel 1 (right) is 0-1-2-3-4.

➢ To rename a slot, right-click on the FLI Filter dialog box and select "Configure Filter Positions". Select the Wheel and Slot number you wish to rename and enter the desired name, then click "Apply" to confirm the change.

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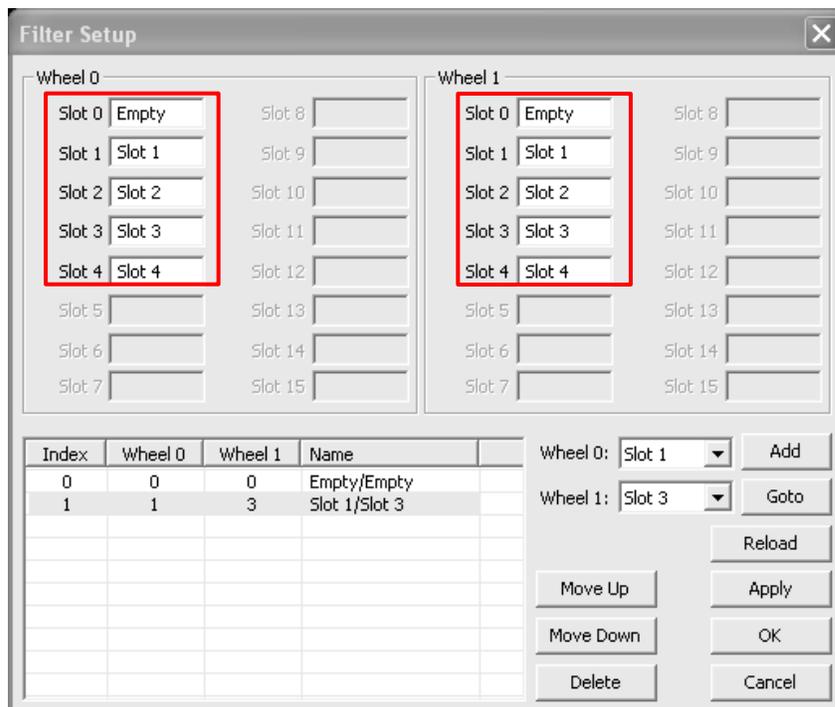
➢ To configure the filter combination presets, right-click on the FLI Filter dialog box and select "Configure Filter Positions". Choose the slot for both Wheel 0 and Wheel 1 for the new preset, then click "Add". You will notice that the combination you have chosen is now listed in the table to the left, along with a listing of the associated slot numbers/names.

Note: All custom filter position configurations will be stored with the CenterLine Filter Wheel, and will be retained even if the Filter Wheel is connected to a different computer.
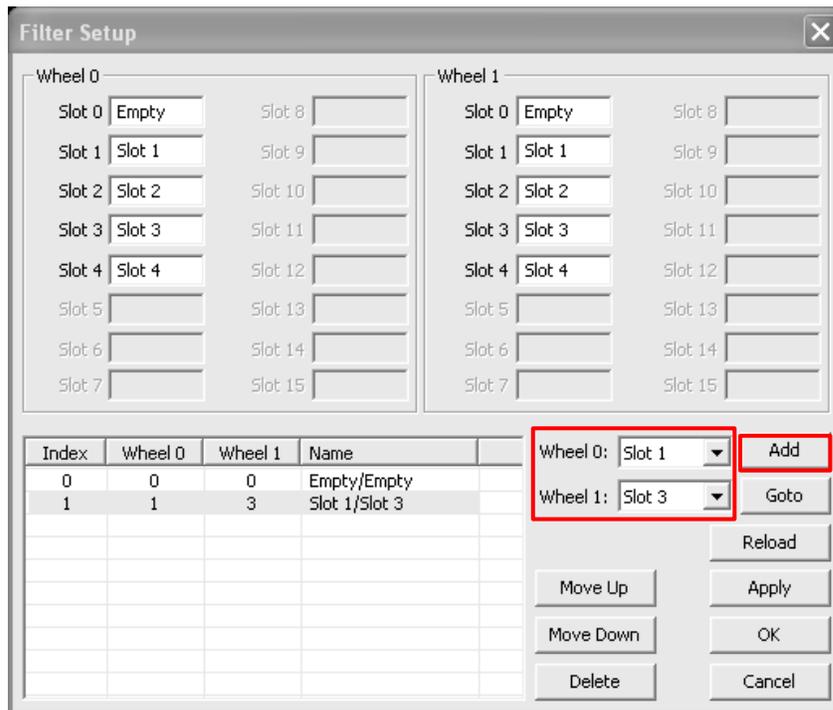

➢ If you wish to delete a configured combination, simply select the configuration and press "Delete".

➢ By selecting "Goto", the Filter Wheel will move to the location that is displayed in the Wheel 0 and Wheel 1 drop down selection boxes.

➢ The "Reload**"** button will reset all unapplied changes that have been made.

Note: Be sure to select "Apply" to save any changes, failure to do so will result in the loss of any alterations made.

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INSTALLING FILTERS

1. Disconnect power cable and USB cable from the CenterLine.
2. Remove the CenterLine cover by removing the 8 perimeter screws and 2 wheel pivot screws with a screwdriver.
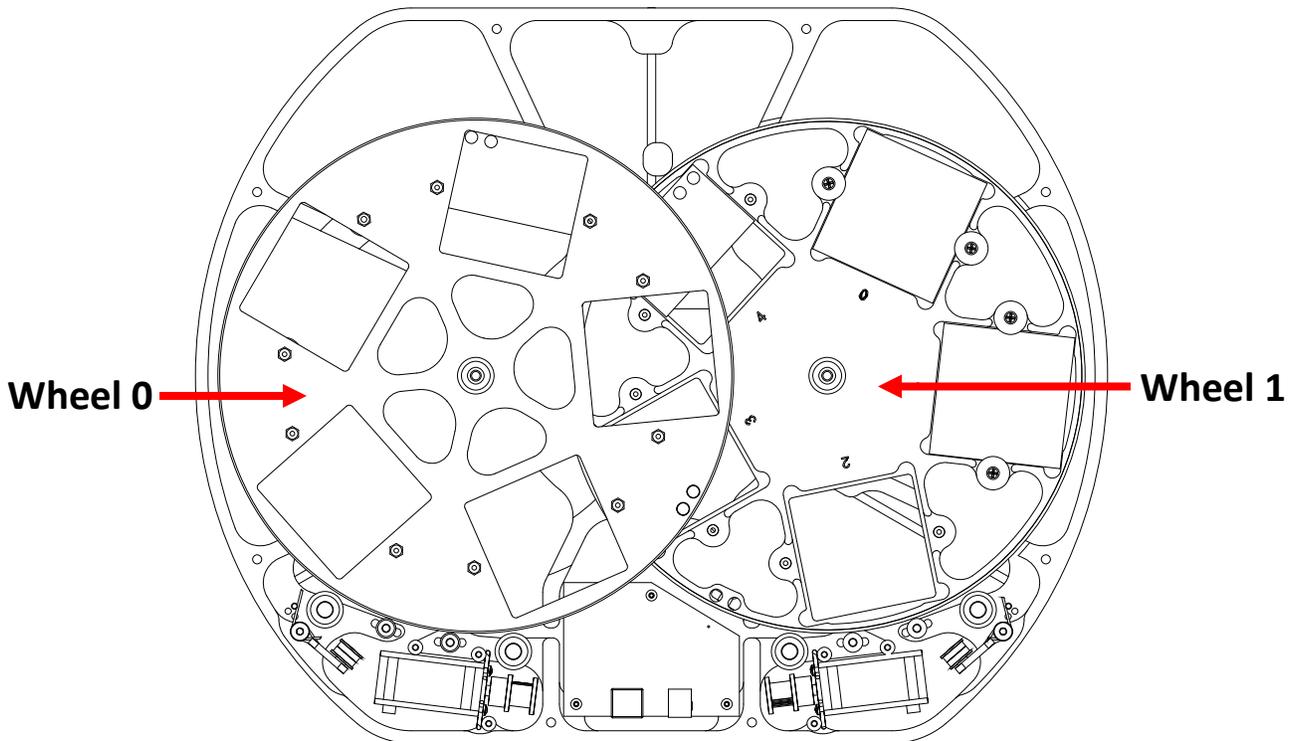
Wheel 0 →   ← **Wheel 1**

CenterLine with cover removed

3. Wheel 0 has to be removed to install its filters. Wheel 1 should not be removed. Remove wheel 0 by removing its pivot screw from the underside of the housing with a screwdriver and lifting the wheel out of the housing.
4. With a Phillips #1 screw driver, remove the Multi-Step Filter Retainers on both sides of the filter pocket to be populated.
5. Place a square filter into the filter pocket.
6. Place two Multi-Step Filter Retainers over the filter with the correct step corresponding to the thickness of the installed filter. The filter thickness options supported by the Multi-Step Filter Retainer are 1 mm, 2 mm, 3 mm, 4 mm, and 5 mm. With a Phillips #1 screw driver tighten the two screws to secure the filter in position. Do not over tighten the screws.
7. Repeat steps 4 through 6 to install filters in remaining pockets.

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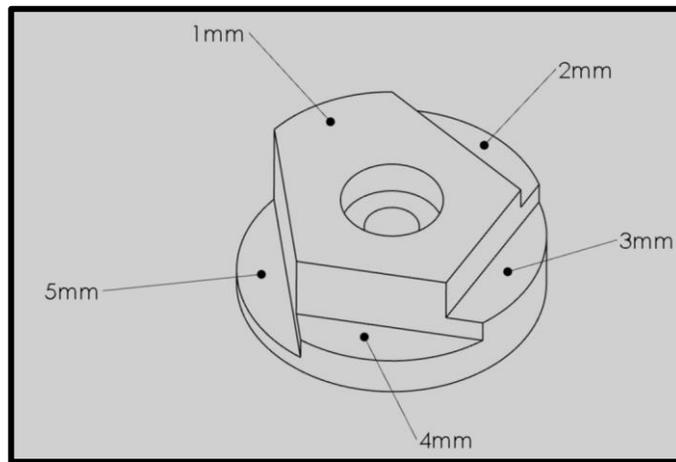
MULTI-STEP RETAINER
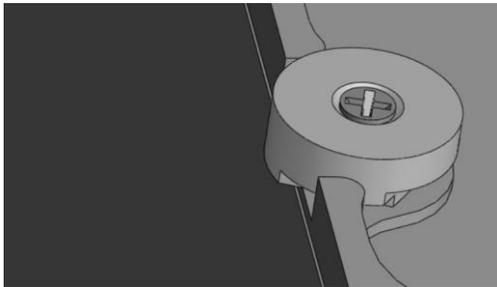
Multi-Step Retainer Orientation

for Securing a Filter with

1 mm Thickness
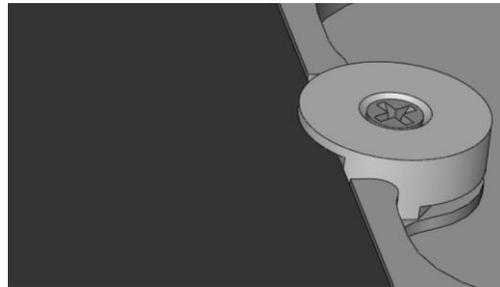
Multi-Step Retainer Orientation

for Securing a Filter with

5 mm Thickness

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8. To reinstall wheel 0, first pull the belt over the idler as shown:
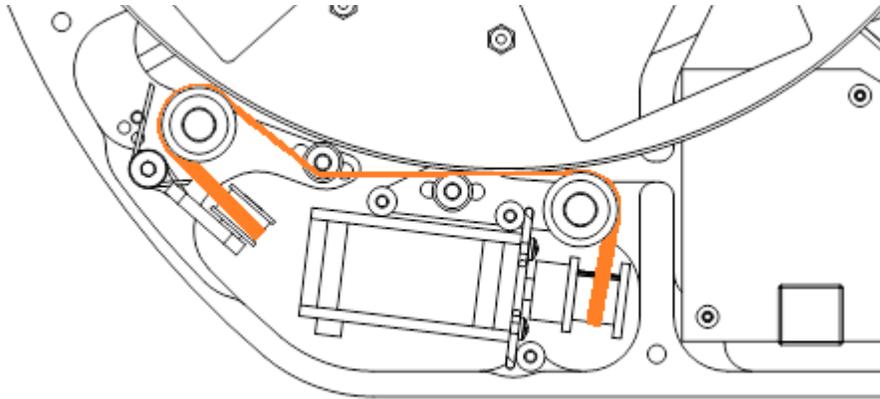
With the side of the wheel with engraved filter numbers facing down, insert the wheel pivot into the pivot hole in the housing and lower the wheel until it starts to engage the belt. Pull the belt off of the idler. The belt will snap to the wheel and engage it fully. Slowly spin the wheel and lightly press it down until it is fully seated in the pivot hole. Install and tighten the pivot screw on the underside of the housing with a screwdriver.

9. Place the cover back onto the housing then install and tighten the 8 perimeter screws and 2 wheel pivot screws with a screwdriver.

10. Plug the CenterLine Filter Wheel's USB cable into the computer and supply power to the CenterLine Filter Wheel.

11. Initiate a Homing procedure.

CONNECTING ADAPTERS TO THE CENTERLINE FILTER WHEEL

FLI CenterLine Filter Wheels employ the Zero-Tilt Adapter™ mechanism to attach to other components in the imaging train. The mechanism is easy to use and provides an extremely rigid connection. The locking mechanism is actuated with three set screws accessible at the perimeter of the housing in a manner similar to a more traditional V-groove connection. Both sides of the CenterLine Filter Wheel feature the same mechanical interface and accept the same adapters. The symmetry of the design of the CenterLine Filter Wheels eliminates the orientation preference of the housing with respect to the optical train for optimal performance.

Follow the steps below to attach adapters to the CenterLine Filter Wheels.

1. Insert the V-groove side of the adapter in to the CenterLine aperture. If necessary, loosen the three set screws around the perimeter of the housing to ease the insertion of the adapter into the aperture. Ensure that the adapter flange is flush with the CenterLine housing before proceeding to the next step.

2. Tighten the three set screws around the perimeter of the housing with the supplied 5/64" Allen key in the order shown below:
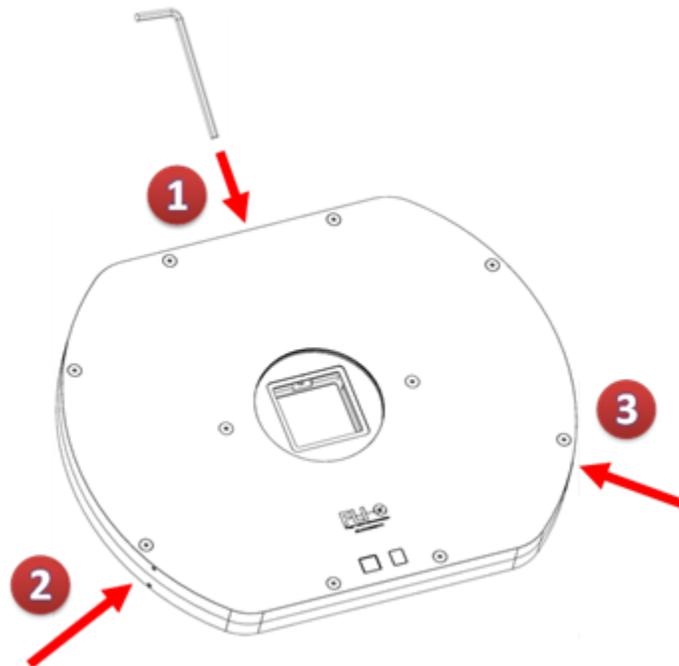
Visit the Color Filter Wheels section of our website **http://www.flicamera.com/** to view an animation demonstrating the operation of the Zero-Tilt Adapter™.

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APPENDIX A – TROUBLESHOOTING

Issue	Remedy
The computer does not correctly identify the attached CenterLine.	Check that the CenterLine's power supply and USB cable are properly connected. If so, follow the steps below. 1. On the FLI Filter dialog box right click on the top of the dialog box and select "Communications Settings". 2. On the new dialog box click "Scan". The system will display "**flifil0**" or "**flifil1**" in the port window. 3. Click OK. The system will highlight the correct number of positions for your filter wheel. 4. If a problem persists, unplug the CenterLine power and USB cable, then uninstall and reinstall FLI Filter.
A filter is not centered in the CenterLine aperture	In the FLI Filter dialog box, click Home. The CenterLine moves to place the filter in position 0 in the aperture.
The filter pocket cup I want to see is not displayed in the aperture.	On the FLI Filter dialog box, click any button that identifies a filter pocket/ cup position to move that filter pocket/cup into the aperture position.

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