

GENERAL INFORMATION

The adapter system stated in this document is intended for the following model: (small to medium) sized cooled CMOS camera, QHYOAG series, QHYCFW filter wheel series, A series integrated CCD camera。 The legacy CCD cameras (QHY23 and before) require custom adapters. Scientific grade camera usually involved custom adapter solution, which is not included in this document.

Prior to your selection, there are few basic concepts:

1. **Back focus distance:** To simplified, this is the centered-focus distance of a lens or group of lenses. In camera system, this is distance of which the focused image from the center of a lens or group of lenses projected onto a film or sensor. In another word, this is the distance between the back of lens to the camera sensor. This specification can usually be found on the lens or telescope. This is the most important specification for camera to acquire a sharp image through an optical instrument.
2. **How to reach the optimum back focus distance:** In general, the back focused distance is a fixed specification. The flange distance in conventional camera system is equivalent to back focus distance; for example, the modern CANON DSLR EF lens system has a back focus of 44mm. Unlike the DSLR lens flange, the back-focus distance of a telescope is not fixed and covers a range of distance. This is due to the differences of optical structure and focusing system. Alternatively, if a flat field generator (flattener) is used in an Astro-Imaging chain, the back-focus system of the flattener is used for determining the correct back focus distance.

To summarize, the correct telescope back focus distance (BF, and this is the distance behind focuser, flattener and or other optical correctors) should be calculated per follow:

$$\text{Maximum Telescope BF} \leq \text{Camera BF} + \text{Filterwheel BF} + \text{OAG BF} + \text{adapter BF}$$

The following table includes the back-focused system consumed by respective the QHYCCD camera.

Name	Model	Back focus Consumed
Small sized cooled Camera	QHY183、178、224、290、174 163、294*、550	10mm (Not incl. adapter# 020085)
Medium sized cooled camera	QHY128、168、247、367、268、600	18mm (Not incl. adapter#020002)

* The QHY294 used a bigger housing body only and the adapter remain the same of small sized camera.

Name	Model	Back focus consumed
OAG	S/M/L	10mm
QHYCFW3	S	15.5mm/20mm
	M	17mm/20.5mm
	L	21.5mm
	XL	21.5mm

3. The thread


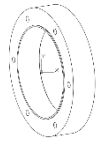
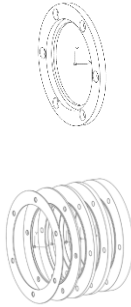
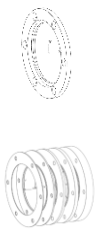
- M represent external thread, for example, M42 represents external thread of a radius of 42mm.
- F represent internal thread, for example, M54 represents internal thread of a radius of 54mm.

4. Back focus consumption: In this document all listed back focus consumption is de facto consumption measurement rather than the measurement of the adapter.
5. Customized screws: Screws are required to mount the adapter otherwise the adapter is mount with threads. In certain cases, tailored screws are required to fit the specific thickness of the system.

The table below listed all the adapters available in QHYCCD. Follows the table, there are few sample solutions:

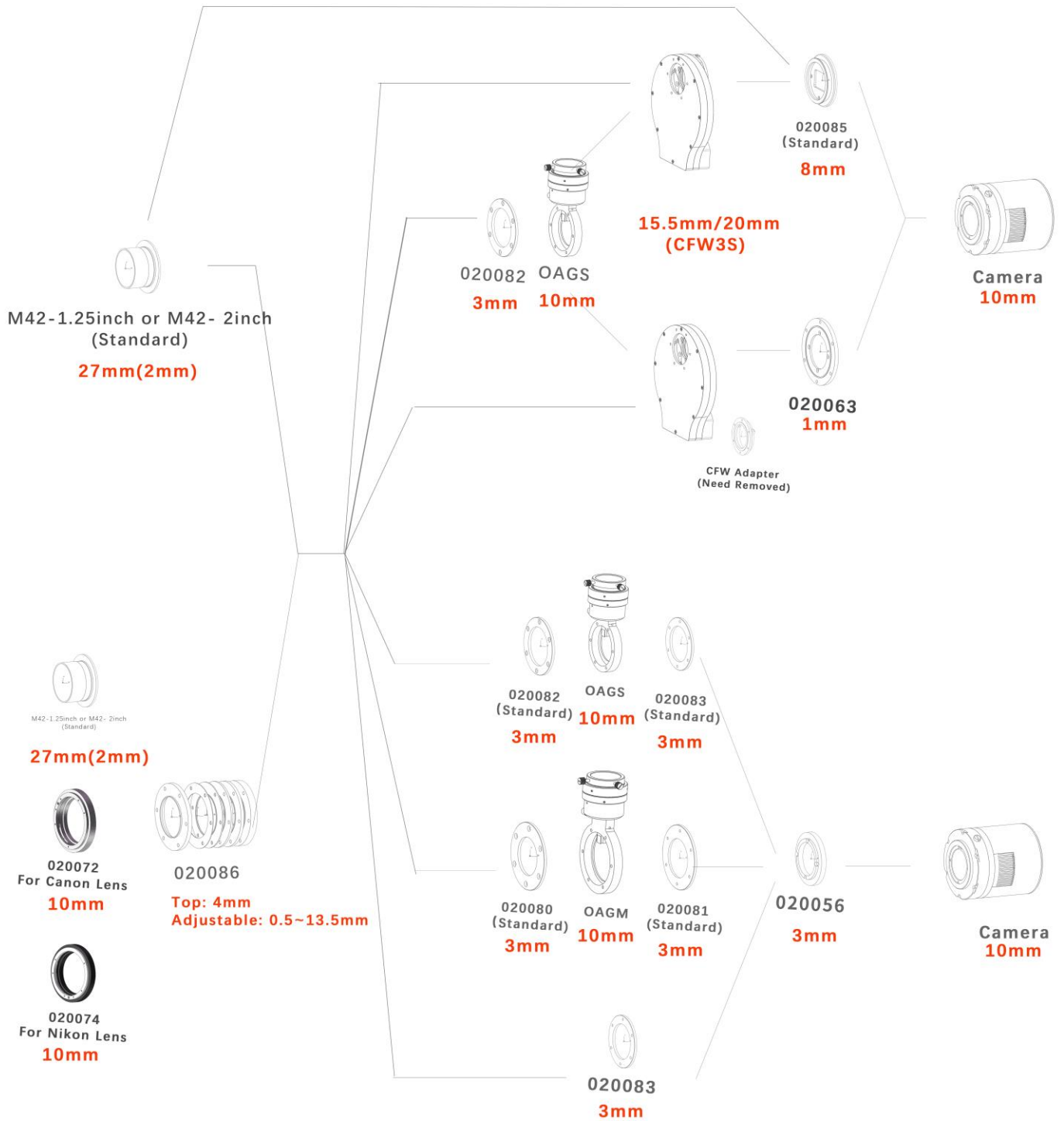
Model	Illustration	Back focus consumption	application	Where to acquire
020002		6mm	Tilt adjustment	Incl. in all medium camera package
020010		27mm(2mm)	M42 to 1.25" adapter	Incl. in all small camera 183/178/224/290/174 package
020011		32.5mm(2.5mm)	M42 to 2" adapter	Incl. in small sized MFT frame or bigger size sensor camera 163/294/550 package
020028		32.5mm(2.5mm)	M54 to 2" adapter	Incl. in all medium sized camera
020055		2.5mm	Medium sized camera connector for mounted 2-inch filter	Purchased separately
020056		3mm	Small sized camera to M42 adapter	Purchased separately
020063		1mm	Small sized camera to M54 adapter (screw mount)	Purchased separately
020071		10mm	Medium sized camera (M54) to Canon EF mount	Purchased separately

020072		10mm	Small sized camera (M42) to Canon EF mount	Purchased separately
020073		10mm	Medium sized camera (M54) to NIKON F mount	Purchased separately
020074		10mm	Small sized camera (M42) to NIKON F mount	Purchased separately
020076 020077		13.5mm	Medium adapter for mounted IR filter	Purchased separately
020078 020079 020080 020081		3mm 3mm 3mm 3mm	OAGM Installation parts (54mm\42mm)	Incl. in OAGM package
020082 020083		3mm 3mm	OAGS installation parts (42mm)	Incl in OAGS package
020084		—	Camera quick mounting plate	Purchased separately

020085		8mm	Standard external mount in small sized camera	Incl. in small sized camera package
020088		14mm	Medium sized camera back focus adjustment	Purchased separately
020089		External mount 4mm Fine adjustment mount $0.5+1+2+3+7=13.5$ mm	Medium sized camera back focus fine adjustment	Purchased separately
020090		External mount 4mm Fine adjustment mount $0.5+1+2+3+7=13.5$ mm	Small sized camera back focus fine adjustment	Purchased separately

GENEARL ILLUSTRATION FOR CONNECTING SMALL SIZED CAMERA TO THE IMAGING

Adapter Solutions for QHY Small-size Cameras 小号相机接环解决方案

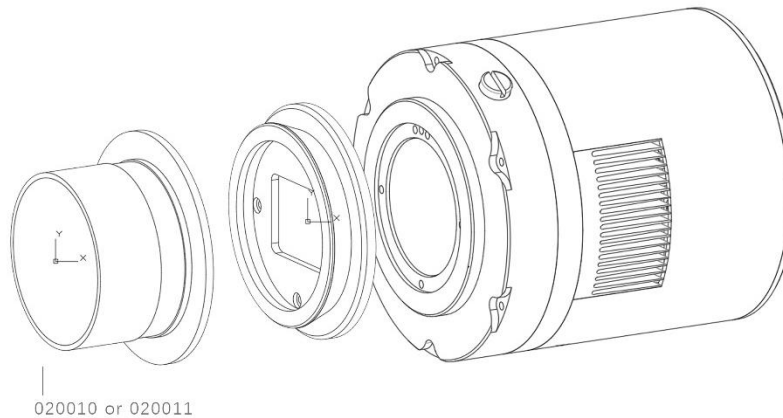


Started from the camera, follows every solution to the end of the flow chart represents a complete connection behind telescope. Back focus consumptions were in red. Please select carefully to match the optimal back focus distance of your system.

SCENARIO I : SMALL SIZED CAMERA + TELESCOPE W/O CORRECTORS

This is the most basic solution and use the camera as is or as an EAA sensor. In this case the camera was used as an eyepiece of either 1.25" or 2". Most telescope has a tolerant range of back focus distance; a simple connection is sufficient.

Model	Back focus consumed	Where to acquire	Whether tailored screws are needed
020010 M42 to 1.25"	27mm(2mm)	Incl. in all small camera 183/178/224/290/174 package	NO
or 020011 M42 to 2"	32.5mm(2.5mm)	Incl. in small sized MFT frame or bigger size sensor camera 163/294/550 package	



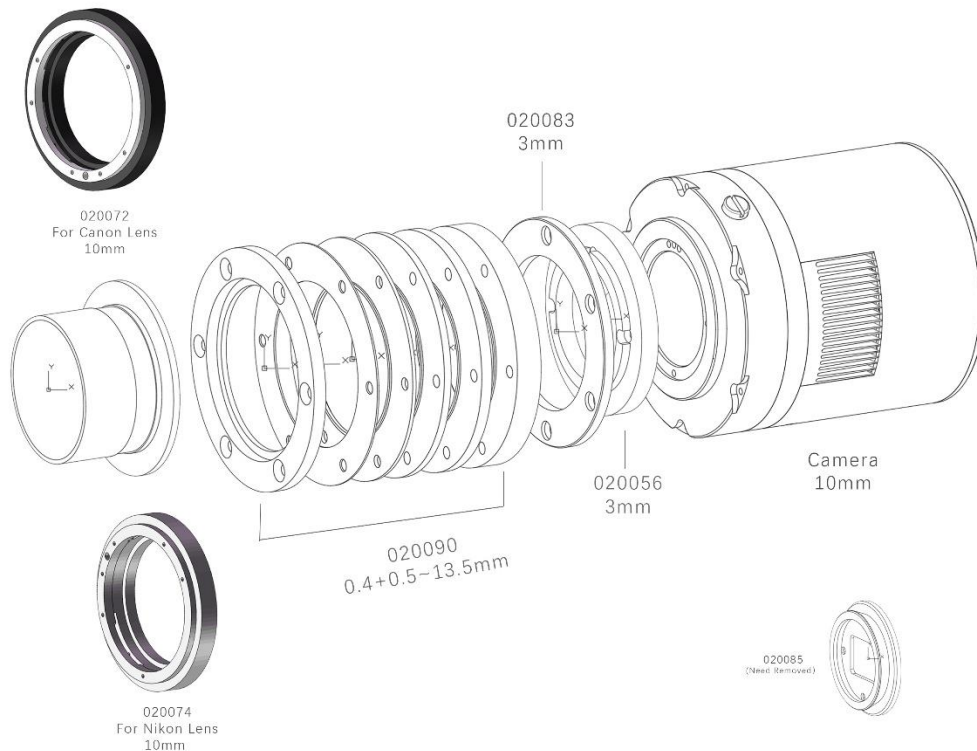
SCENARIO II : SMALL SIZED CAMERA + CAMERA LENS/TELESCOPE WITH FLATTENER

As aforementioned, the back focus of DSLR lens is fixed. Therefore, the optimal back focus distance (OBF) in such setup must be met strictly. This is applicable to telescope flattener, which can be considered as a lens. The only difference is the mounting method, bayonet mount for camera lens and regular threaded mount for flattener.

To reach the OBF in such system, the fine adjustment adapters can be used: the 20090 (small size)/020089 (medium sized) are comprised of 5 different pieces of adapter of 0.5/1/2/3/7mm respectively. They can be combined into various thickness to meet specific demands. Tailored screw may require for the adapter(s).

While using the fine adjustment adapters in small sized camera, the external adapter (020085) needs to be replaced by threaded external adapters (020056 and 020083). The 020083 is included in the standard package of small off axis guider (OAGS)

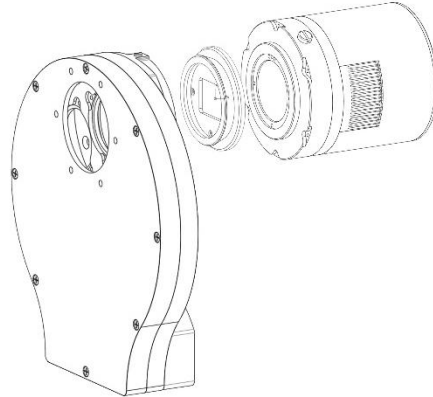
Model	Back focus consumed	Where to acquire	Whether tailored screws are needed
020056	3mm	Purchased separately	Likely
020083	3mm	Purchased separately	
020090	External adapter 4mm; Fine adjustment adapters 13.5mm (0.5+1+2+3+7)	Purchased separately	
020072/ 020074	10mm	Purchased separately (72 for CANON EF MOUNT, 74 FOR NIKON F MOUNT)	



SCENARIO III : SMALL SIZED CAMERA + COLOR FILTER WHEEL

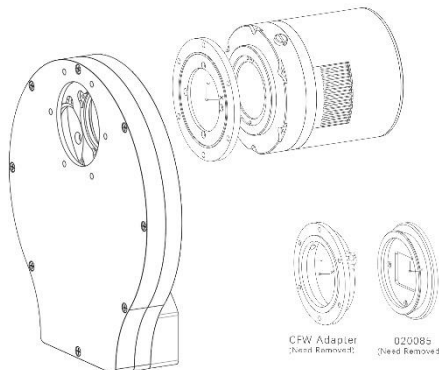
The small sized camera can be fitted with either smaller sized or medium sized color filter wheel (CFW). Please choose one that is suitable for your system. CFW 2 and CFW 3 share the same connection method, in the following demo, only CFW3 is shown.

The CFW can be threaded directly onto the camera without any extra adapters as shown per follow. Attention: the CFW adapter does not add back focus length because the design is to let the top of cam (020085) plug into CFW, the total length is 8mm still.



Alternatively, adapter 020063 can replace the original adapter in the original imaging chain. There are 2 major advantage of such replacement. Firstly, it consumed less back focus. Secondly screws are used in fixing the CFW in place, by which may reduce tiltness in the imaging chain. Such method requires minor works by opening the CFW and removing the original adapter. Detail illustration can be found in the appendix.

Model	Back focus consumed	Where to acquire	Whether tailored screws are needed
020063	1mm	Purchased separately	No

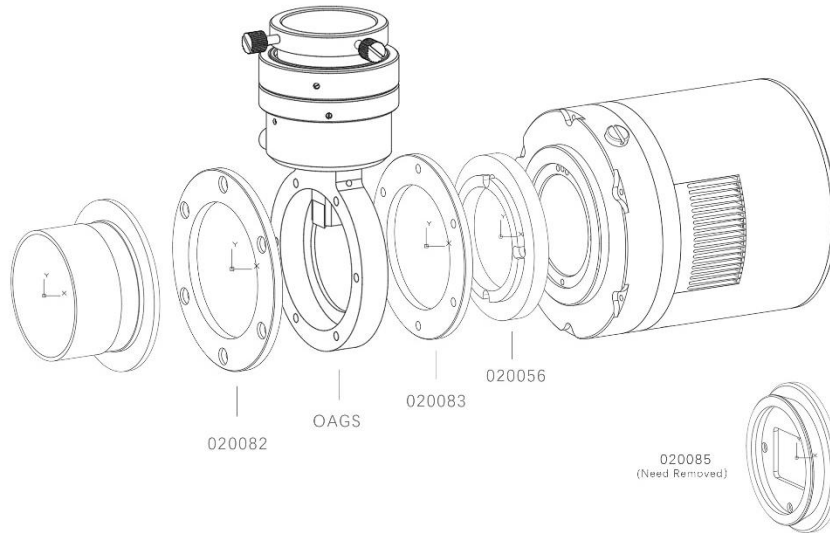


One side of the filter wheel has matching threads for the camera respectively (M42 for small CFW, M54 for medium CFW).

SCENARIO IV: SMALL SIZED CAMERA + OAG

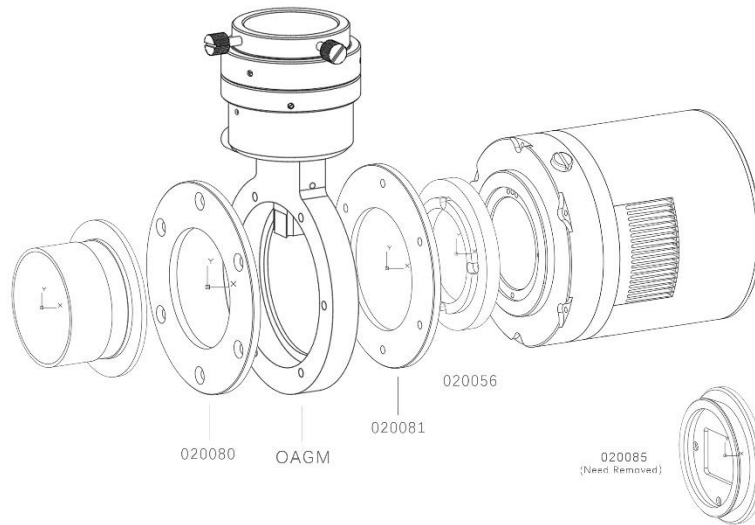
The following illustration is the recommended connection method for small sized camera + OAGs:

Model	Back focus consumption	Where to acquire	Whether tailored screws are needed
020082 020083	3mm 3mm	Incl in OAGS package	No (screws are incl. in the OAG package)
020056	3mm	Purchased separately	



We highly recommend matching size for OAG and camera. However, users may want to fully utilize idled equipment. The following illustration is the recommended connection method for small sized camera + OAGM.

Model	Back focus consumption	Where to acquire	Whether tailored screws are needed
020081 020080	3mm 3mm	Incl in OAGM package	No (screws are incl. in the OAG package)
020056	3mm	Purchased separately	



Please refer to scenario I and II to add the OAG into the imaging chain for either telescope or camera lens. Also, please ensure the 020082/020080 adapter install at the outer side of the OAG. They have the matching thread size of the camera (M42 and M54 respectively).

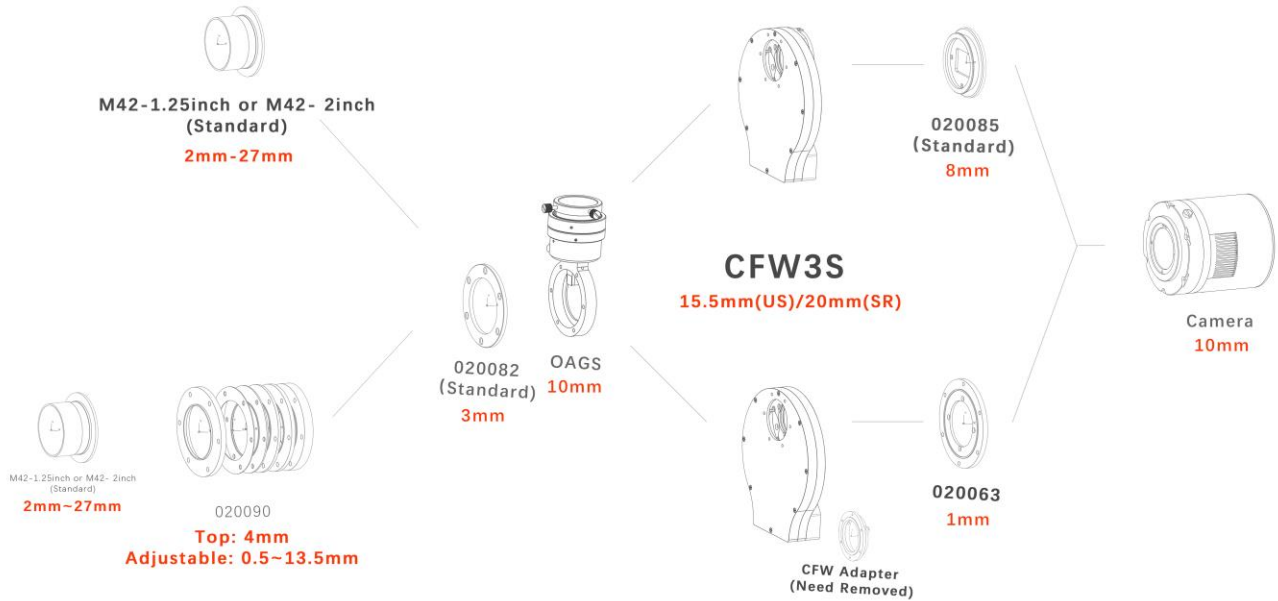
SCENARIO V SMALL SIZED CAMERA + CFW + OAG

OAGS connected with screws and external adapter is used (DO NOT INSTALL THE INTERNAL ADAPTER 020083).

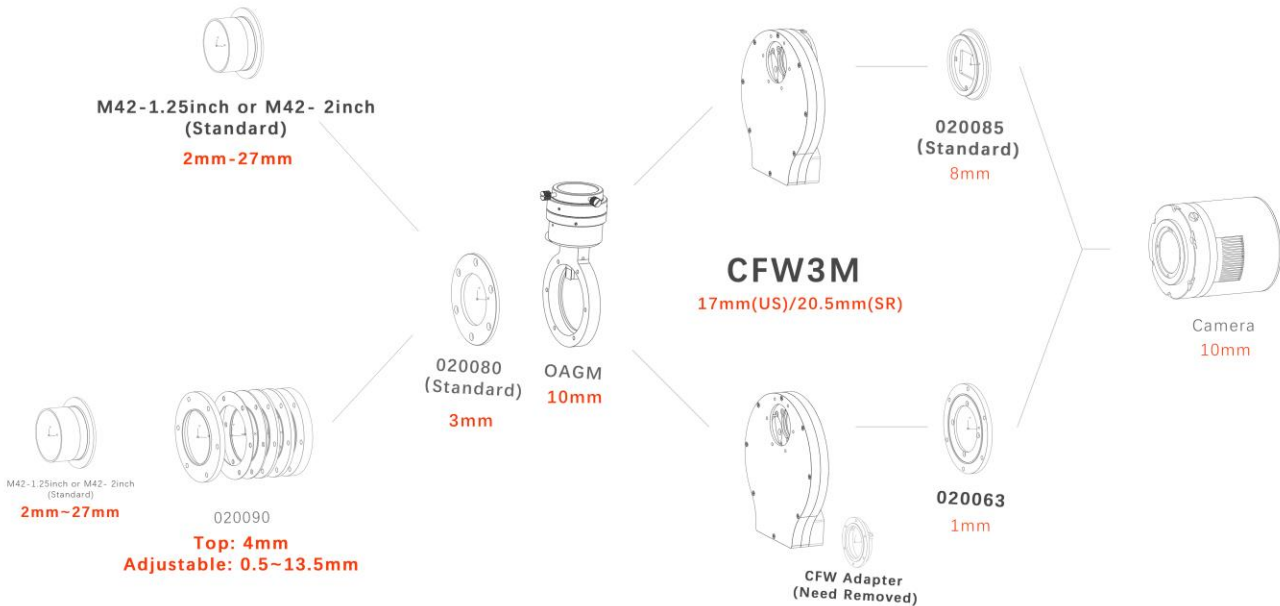
ATTENTION: this combo CANNOT match DSLR Lens, because the length is too long for Canon/Nikon back focus. Without OAG will be okay.

Small sized cams can connect CFWS+OAGS or CFWM+OAGM. The adapter used is a little different.

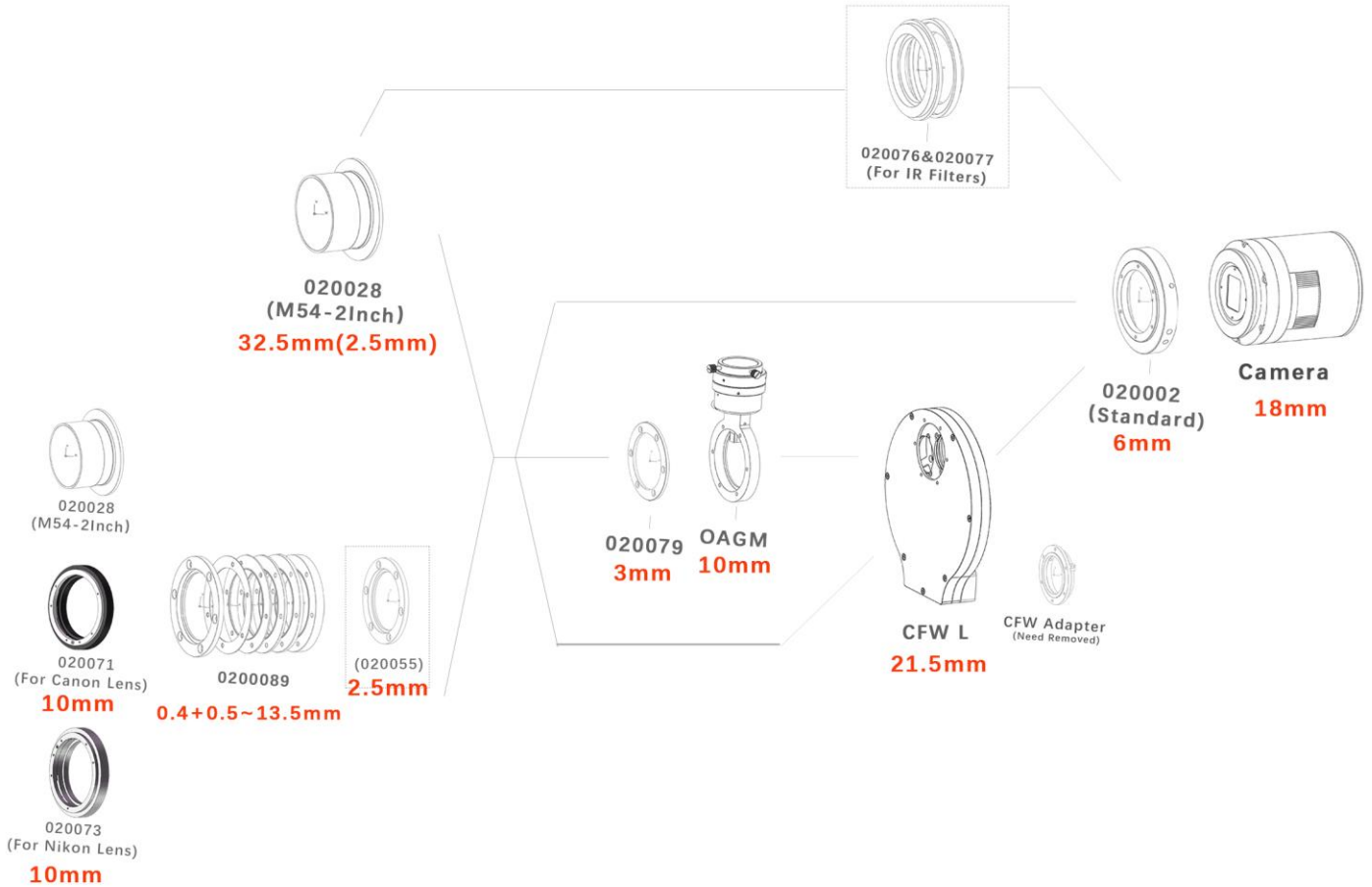
SMALL SIZED CAMERA + CFW S+ OAG



SMALL SIZED CAMERA + CFW M+ OAG



GENERAL ILLUSTRATION FOR CONNECTING MEDIUM SIZED CAMERA TO THE IMAGING

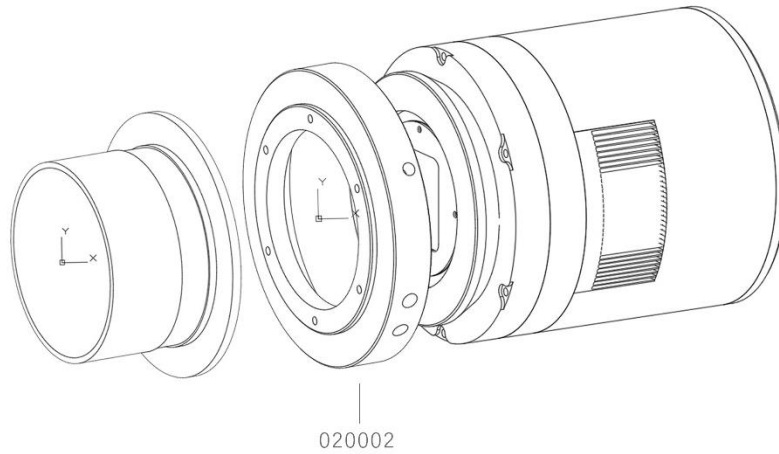


Started from the camera, follows every solution to the end of the flow chart represents a complete connection behind telescope. Back focus consumptions were in red. Please select carefully to match the optimal back focus distance of your system.

Comparing to the small sized camera solutions, medium camera solutions are far less complicated. The explanations are simplified, and similar connection can be referred back to the small camera solution as aforementioned.

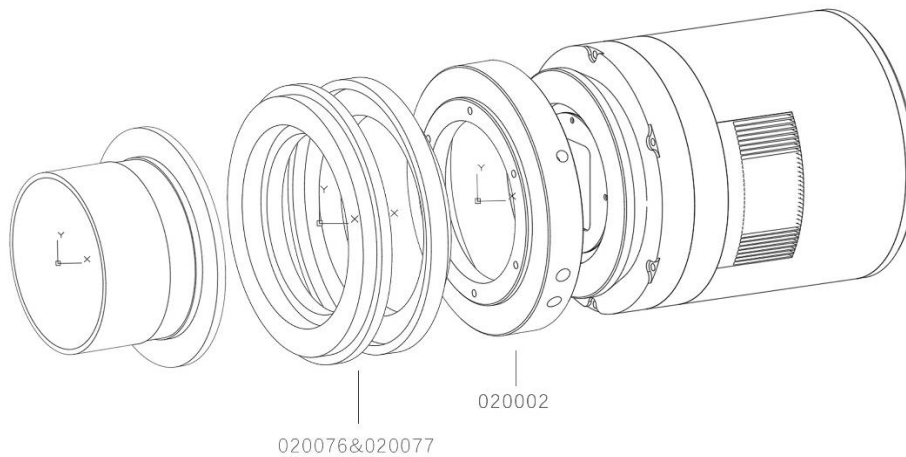
SCENARIO I MEDIUM SIZED CAMERA + TELESCOPE W/O CORRECTORS

Model	Back focus consumption	Where to acquire	Whether tailored screws are needed
020002	6mm	Incl. in all medium sized camera package	No
020028	32.5mm(2.5mm)	Incl. in all medium sized camera package	



To install UV/IR cut filters adapter 020076 and 020077 are required.

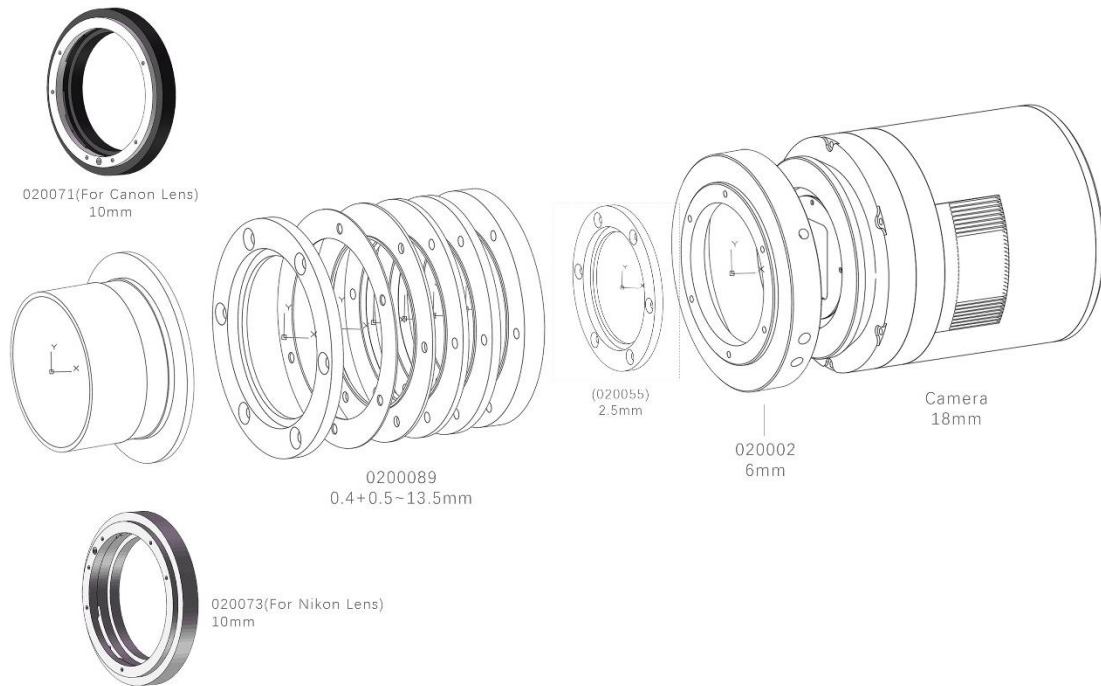
Model	Back focus consumption	Where to acquire	Whether tailored screws are needed
020076 & 020077	13.5mm	Purchased separately	No



SCENARIO II MEDIUM SIZED CAMERA + CAMERA LENS/TELESCOPE WITH FLATTENER

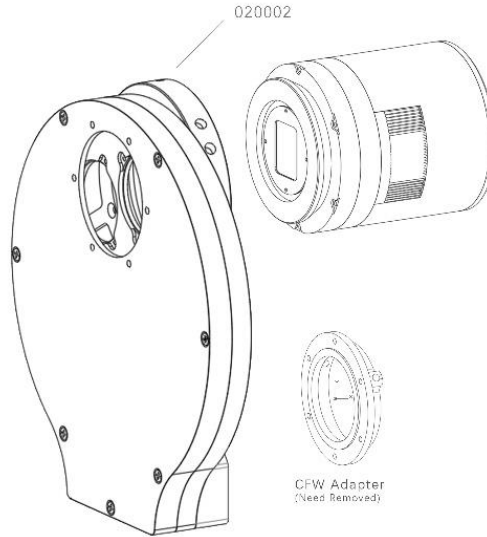
Model	Back focus consumption	Where to acquire	Whether tailored screws are needed
020002	6mm	Incl. in all medium sized camera package	Likely
020089	External adapter 4mm; Fine adjustment adapters 13.5mm (0.5+1+2+3+7)	Purchased separately	
020088	14mm	Purchased separately	
020055	2.5mm	Purchased separately	
020073 OR 020074	10mm	Purchased separately (72 for CANON EF MOUNT, 74 FOR NIKON F MOUNT)	

If OBFD is not reached by adding the 13.5mm of the 020087, 020088 is recommended; In this case, 020055 is required for installing UV/IR cut filter.



SCENARIO III MEDIUM SIZED CAMERA + CFW

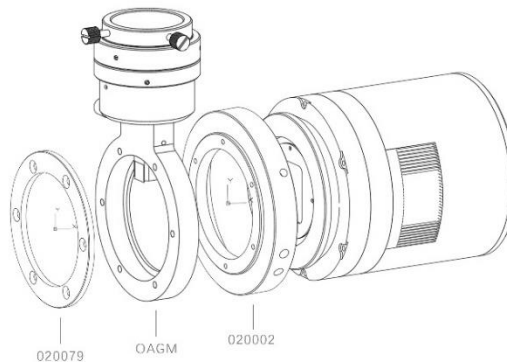
So far QHY600M is the only camera required large sized filter wheel (CFWL). QHY600 is the only monochrome model camera in the medium sized camera category. Like small sized filter wheel (CFWS), the internal adapter of CFWL needs to be removed and replaced with 020002 for screw mounting method. If the QHY600 and CFWL is purchased in a package, the installation works will be performed in our manufacturing facility.



SCENARIO IV MEDIUM SIZED CAMERA + OAG

Medium sized camera can only be matched with medium sized OAG.

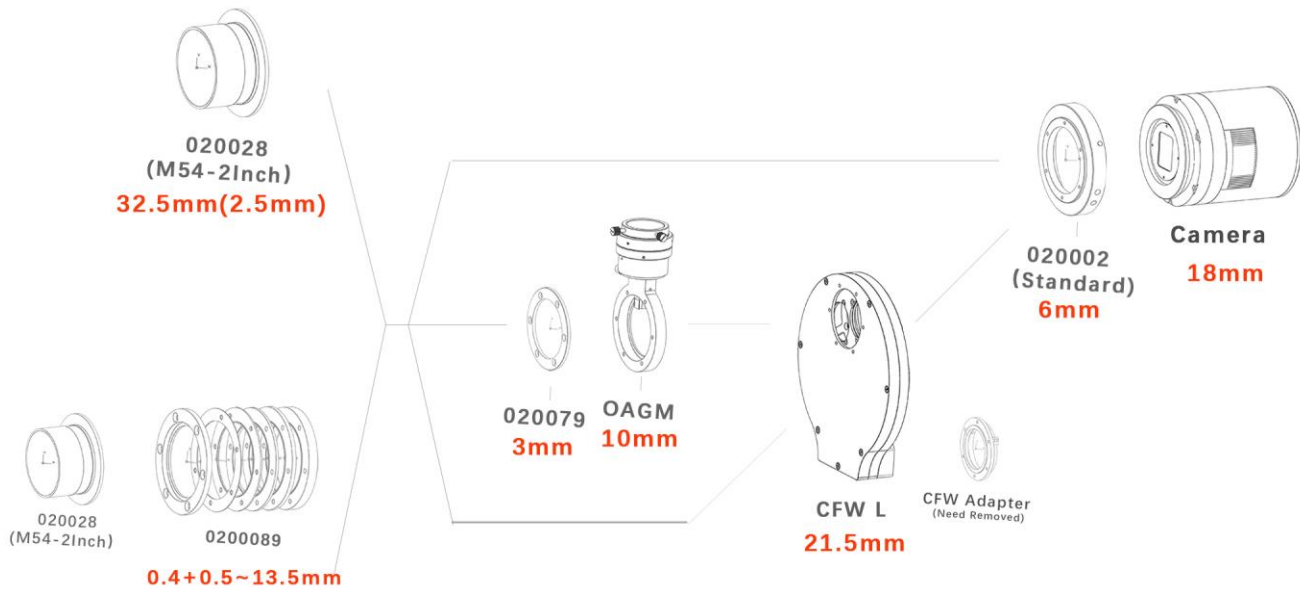
Model	Back focus consumption	Where to acquire	Whether tailored screws are needed
020079	3mm	Incl in the OAGM package	No (the screws are included in the package)



SCENARIO V MEDIUM SIZED CAMERA + CFW + OAG

As aforementioned, QHY600M fits in such category, since it's the only camera needs CFWL.

ATTENTION: this combo CANNOT match DSLR Lens, because the length is too long for Canon/Nikon back focus. Without OAG will be okay.



APENDIX REMOVING AND REPLACING THE INTERNAL ADAPTER OF CFW

When connect the camera with the CFW via 020056, 020063 OR 020002, the standard 2" adapter needs to be removed and connect the camera with screws. The following illustration shows the replacing method:

REMOVAL OF THE 2" ADAPTER

INSTALLATION OF 020056, 020063 or 020002

