QHYCCD

Super high resolution cooled astronomical camera

QHY27/28/29M

User's Manual Rev. 1.0

This document is an online document. You may save it or print it by downloading its PDF version attached below. QHYCCD reserves the right to change this user manual without prior notice.

Notice

This manual is for QHY27M/28M/29M. Since they have the same structure and the only difference is their CCD, we use QHY29M as an example in this manual.

Package Contents

Please confirm that the package contains the following items:

USB2.0 cable	1
Self-locking power cable	1
Serial port cable	1
Drying tube	1
desiccant	1
Driver download card	1
Inspection report	1
Angle adjustment adapter ring	1
QHY29M camera	1

Optional accessories

12V power adapter

Note that if the user wants to buy 12V power adapter by themselves, its output current is at least 3.5A, and the polarity must be center positive.

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01 Software Installation

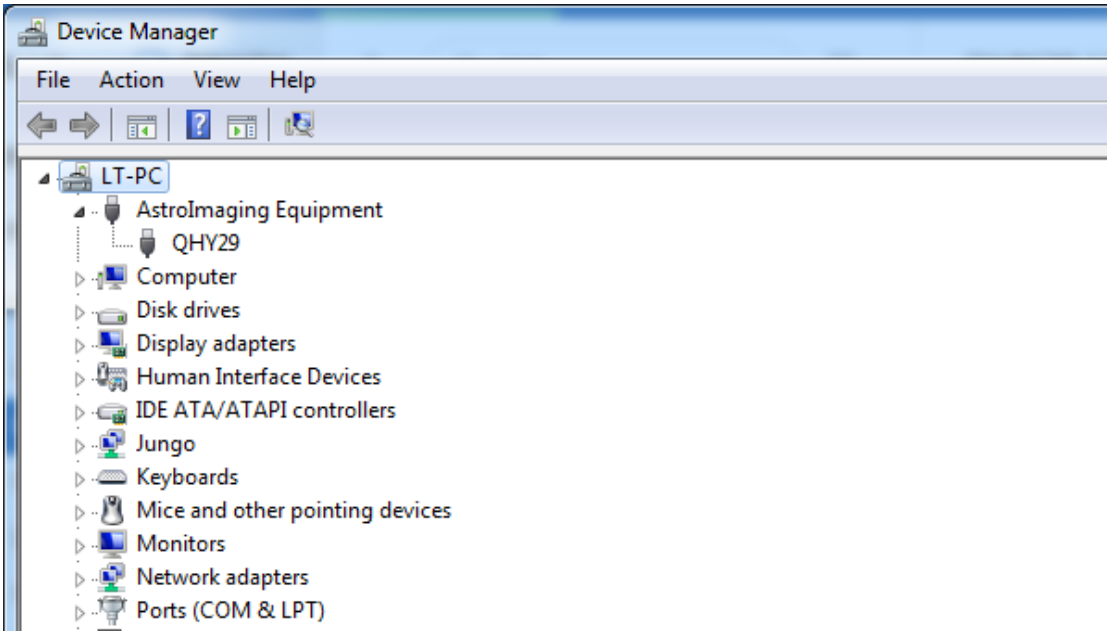
1. Download and install *ASCOM platform*

2. Download and install the *Camera Driver*

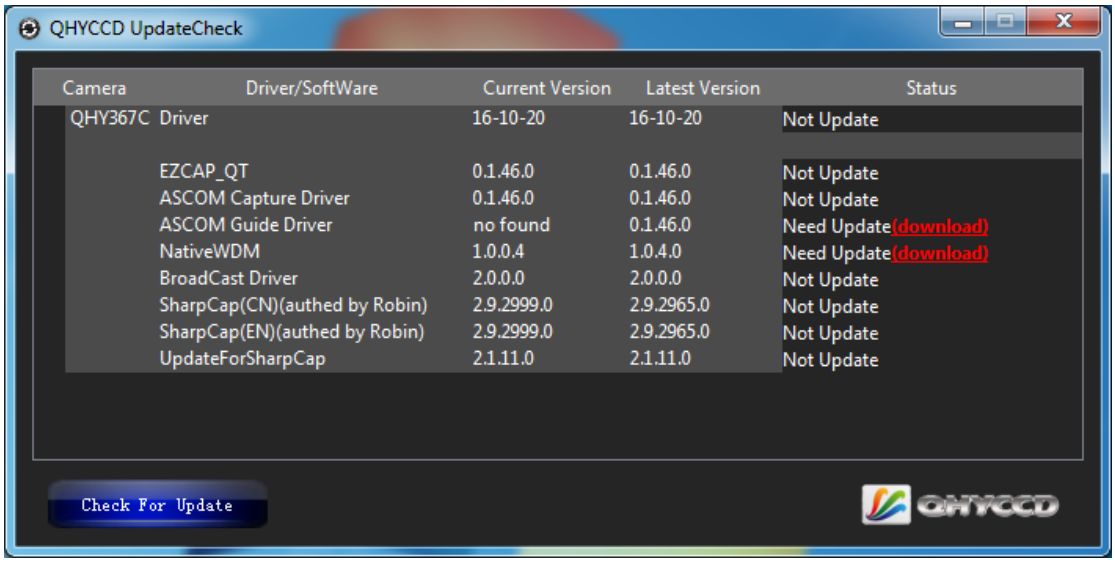
3. Download and install the *ASCOM Capture Driver*

4. QHY29 camera uses EZCAP_QT as the default capture software. Please download and install *EZCAP_QT*.

5. Connect QHY29M to your PC with USB2.0 cable. Connect your QHY29M to 12V power supply (**Make sure 12V power supply is always connected when you use QHY29M**). For the first time the system will find a new device and search the driver. You can keep skipping the online searching by clicking "Skip obtaining driver software from Windows Update" and the computer will find the drivers. After installation is complete successfully, you can find the device in the device manager as shown in the picture below.



6. QHYCCD has developed a software named *UpdateCheck* that can check if the drivers installed on your computer are the latest versions as well as update the drivers if needed. If the status of some driver is “Need Update”, you can directly download its update package in this software freeing you from the inconvenience of looking for and downloading it from our website. Take QHY367C for example, you can see the drivers we need are the latest versions and don’t need to be updated as shown in the following picture.



Note that after you downloading and installing the new drivers by using this software, be sure to pull the USB cable out and then plug it in to enable the new drivers.

02 Use QHY29M with Filter Wheel

QHY29M is a monochromatic camera and it is frequently used with color filter wheel. Connecting it with QHY color filter wheel is simple and quick. QHY29M supports connections with QHYCFW2-L.

You can refer to a tutorial to set up your QHYCFW-L.

After you've installed color filters for your QHYCFW2-L properly, you can begin to connect it with QHY29M as shown in the picture below.

First, you need to stick QHY29M into QHYCFW2-L as shown in the picture above. Then you should screw those three bolts in. At the first time you screw bolts, you may find it a little bit difficult to screw in, in this case, please make sure that the bolts are pointing towards the center and apply a little bit more of force. Finally, you should connect your QHY29M with QHYCFW2-L by using DIN4/RJ11 cable, which is included in the box.

The last thing you need to do before using QHY29M with QHYCFW2-L is to open the link below to download and install the driver (ASCOM FiltersPlug-in) for QHYCFW2-L.
Now, you should be all set. Read the following parts to know how to use QHY29M with color filter wheel in MAXIMDL, and Sequence Generator Pro.

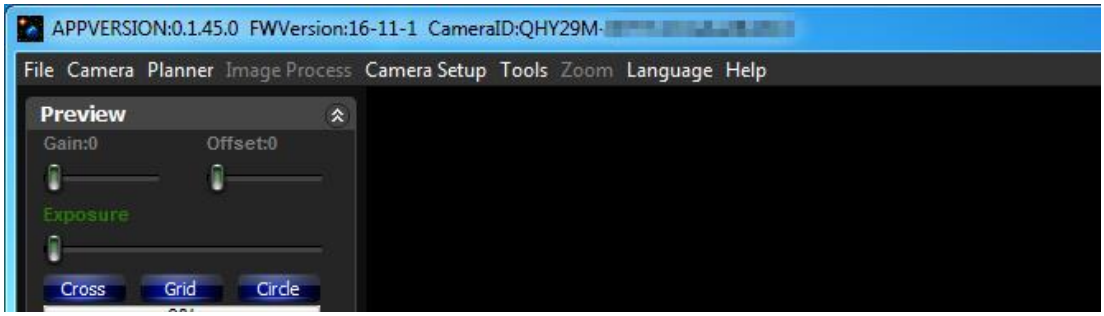
03 Use QHY29M in EZCAP_QT

EZCAP_QT is the software developed by QHYCCD. This software has the basic capture function for QHYCCD deep sky cameras. You can use this QHY29M camera with filter wheel in this software.

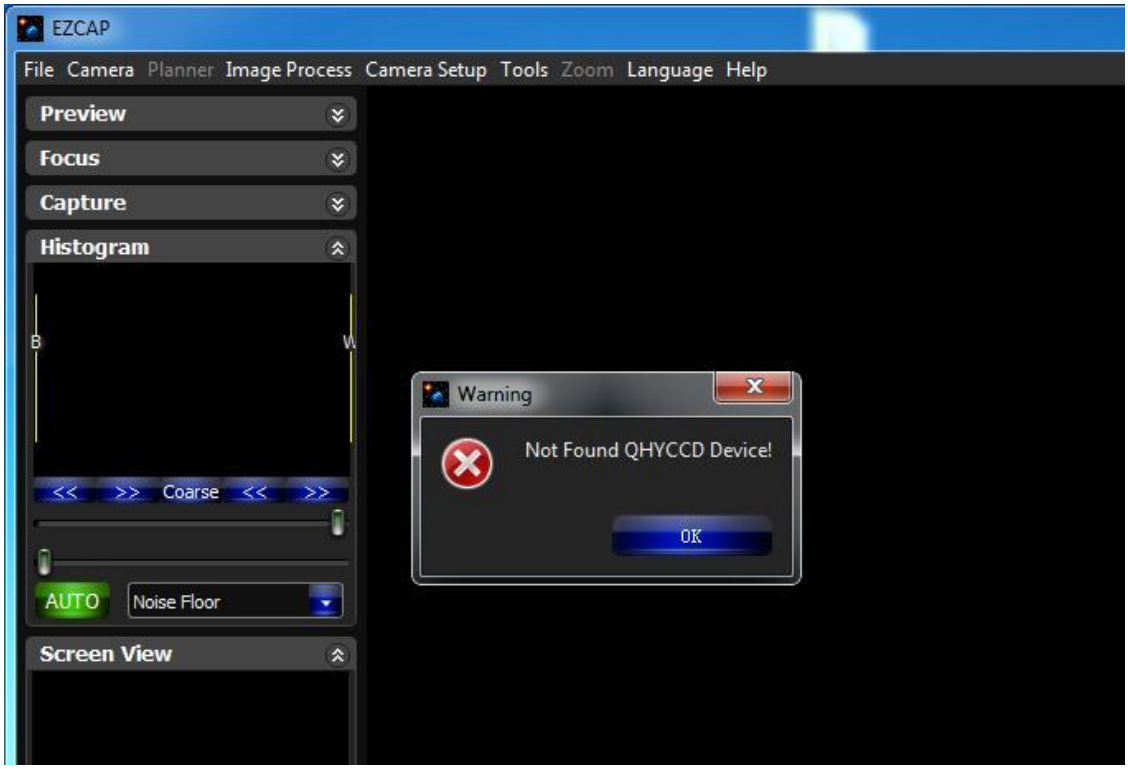
1. Install *EZCAP_QT*

2. Connect your QHY29M to 12V power supply. Connect your QHY29M to color filter wheel with DIN4/RJ11 cable. Connect your QHY29M to your computer with USB2.0 cable.

3. Run EZCAP_QT. Select "Connect" in Menu->Camera. If the camera is successfully connected. The title of EZCAP_QT will display the camera firmware version and the camera ID as shown below.



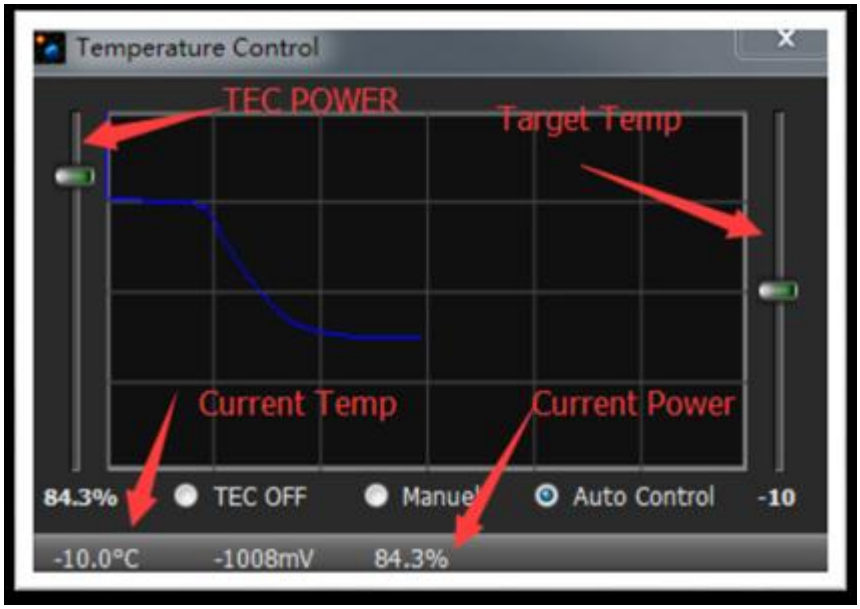
Before you click "connect", you have to make sure you can see QHY29 in the device manager on Windows. Sometimes if you click "connect", you may see the warning shown in the picture below.



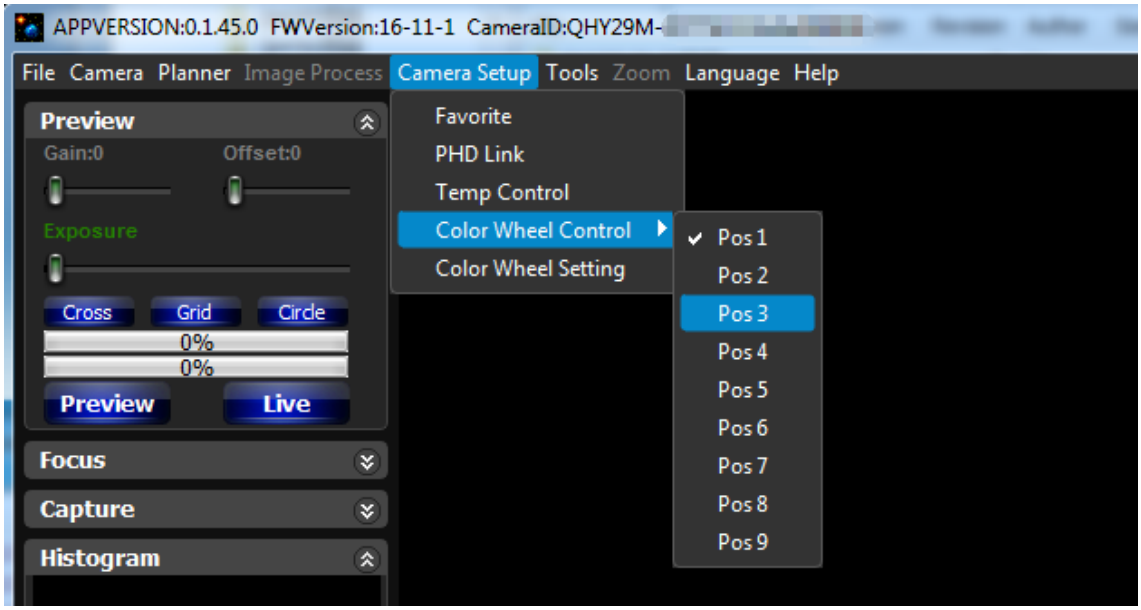
That doesn't necessarily mean that the camera and your computer are not connected. In this case,

you can just wait for a minute and click 'connect' again, then you can see it will be connected successfully. This is because it usually takes a while to load its firmware into your computer.

4. In Menu->Camera Setup, Click "Temp Control" and set the CMOS sensor temperature. You can enable the "Auto Control" and set the target temperature. For example here we set the temperature to -10C. The CMOS temperature will come to -10C very fast (in about 2-3minute). If you want to close the TEC, you can select "TEC OFF". If you just want to set the TEC power but not the temperature. You can select "Manual" and then set the percent of the TEC power.

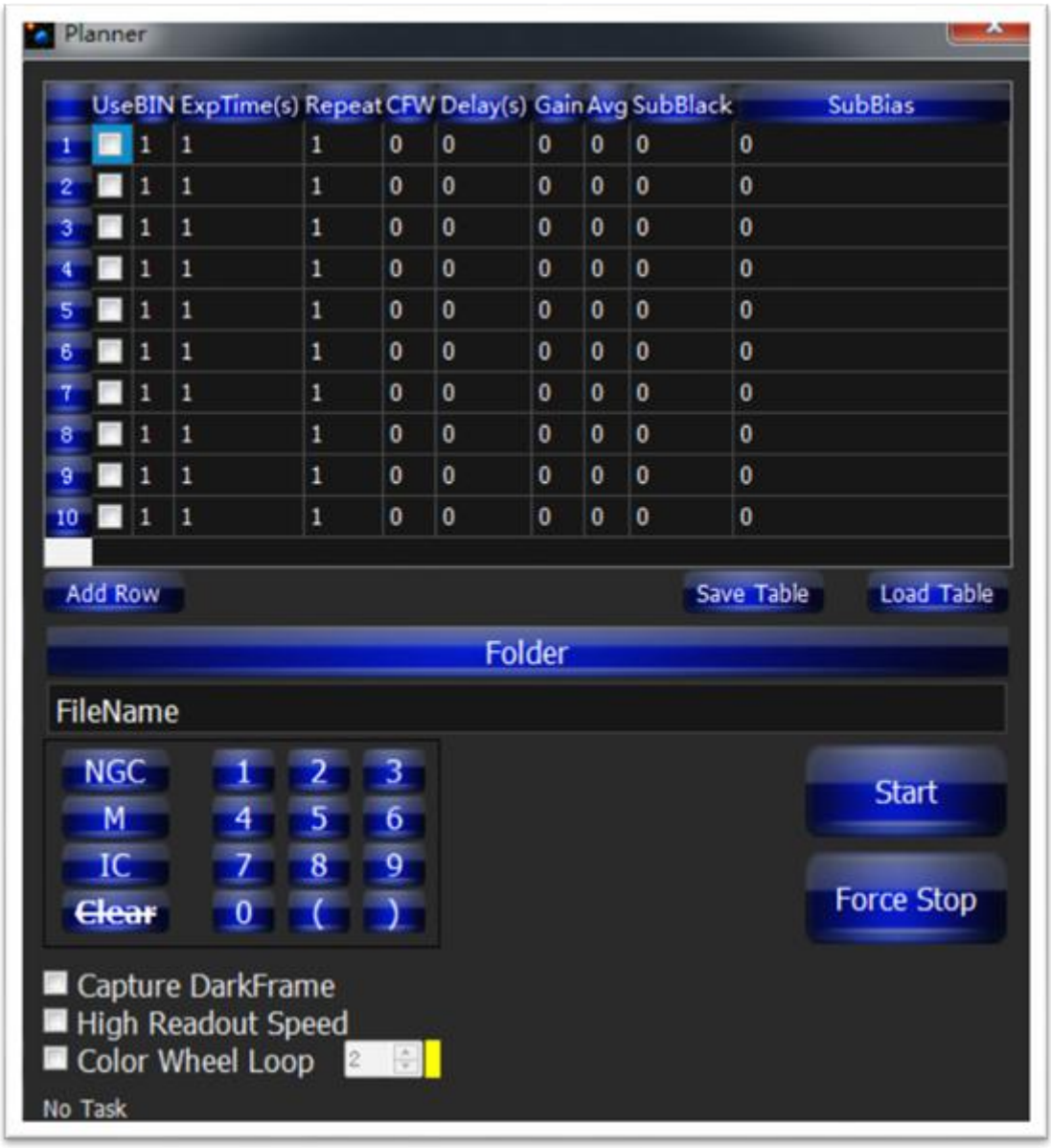


5. You can select which filter you are going to use by changing the position of filter wheel as shown in the following picture.



6. You can use the preview tab to do preview. And use the focus tools to do focus. Then use the capture tab to capture image.

7. In EZCAP_QT there is a planner for image tasking. You can capture a series images by using the table below.



04 Use QHY29M on ASCOM platform

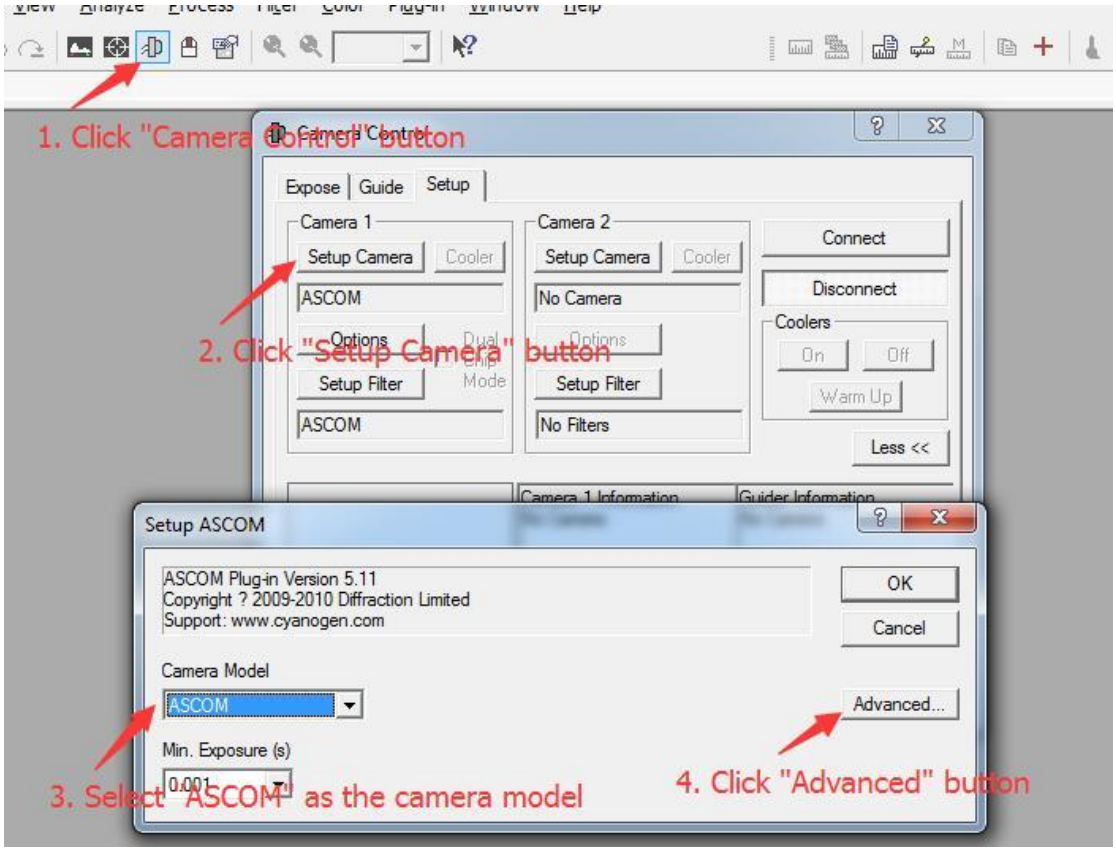
You can connect many software that support ASCOM. Currently QHY29M only supports normal ASCOM connection and does not support the ASCOM VIDEO connection. Please note that QHY29M always transfers maximum bit depth by ASCOM to make the best DSO imaging performance. The image format is 16bit width and patch zero on low bit.

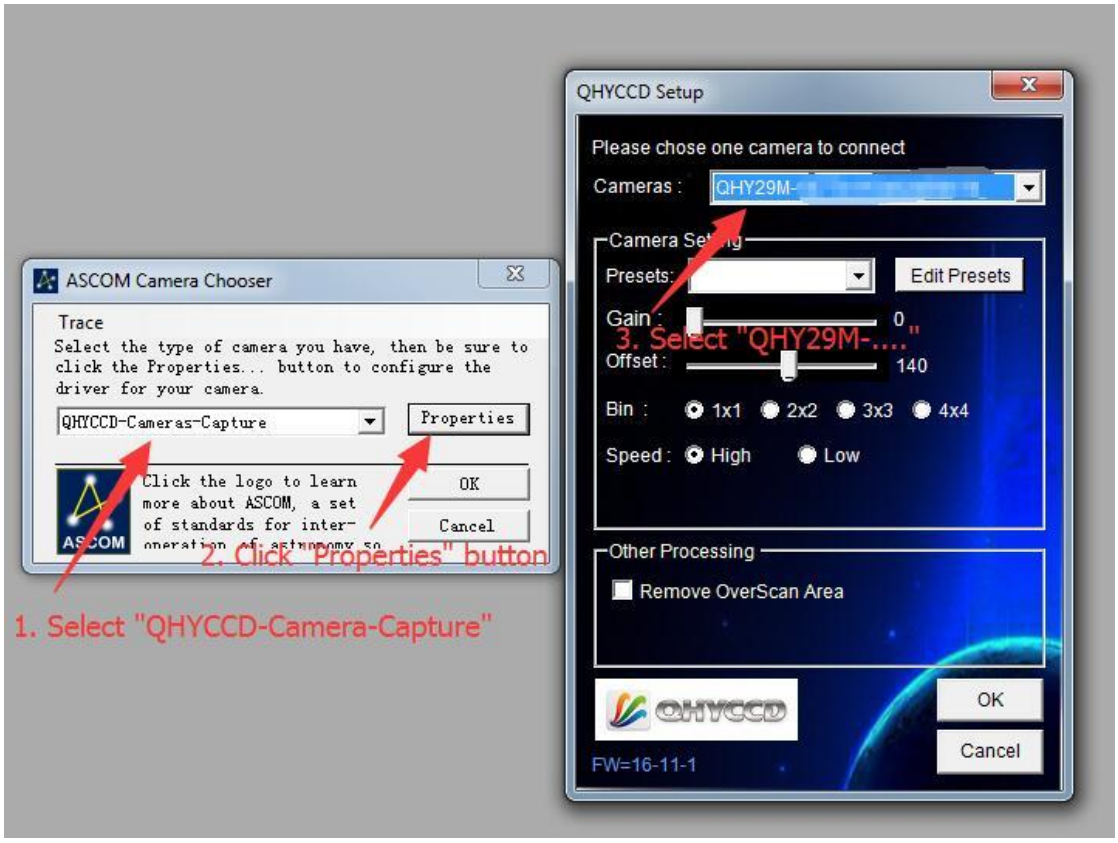
MaxIM DL

1. First you have to make sure that both ASCOM Platform and ASCOM driver have been installed. If not, please install it first.

2. Start MAXIMDL

3. Follow the instructions shown below to finish the setup.

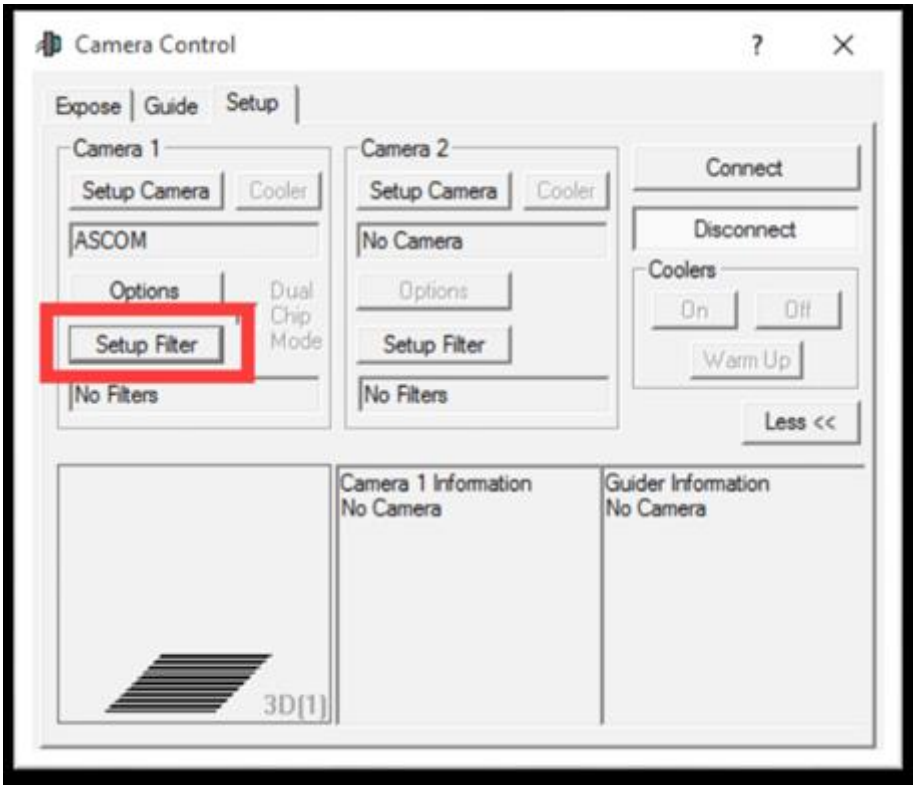


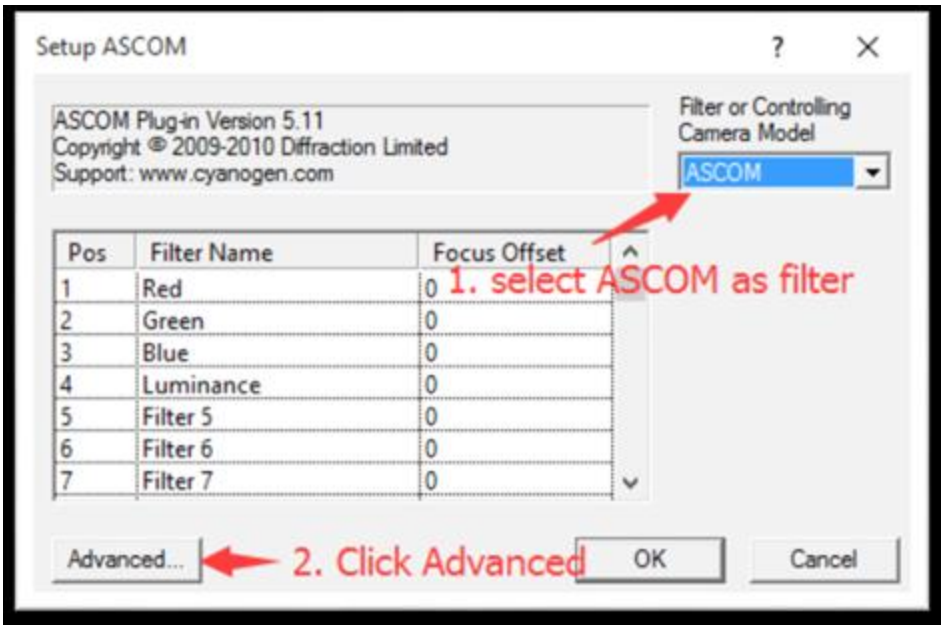


Normally, you can set the gain=1 and offset=10 to start. Keep clicking "Okay" to return to Camera Control window.

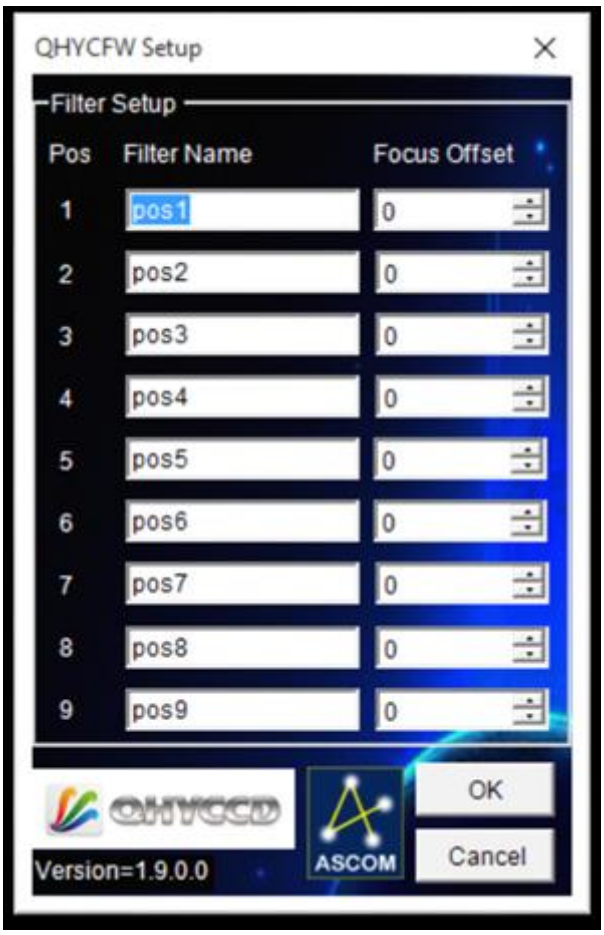
The following instructions are going to show you how to configure filter wheel(QHYCFW2-L) in MAXIMDL.

Click "Setup Filter" in the Camera Control window.

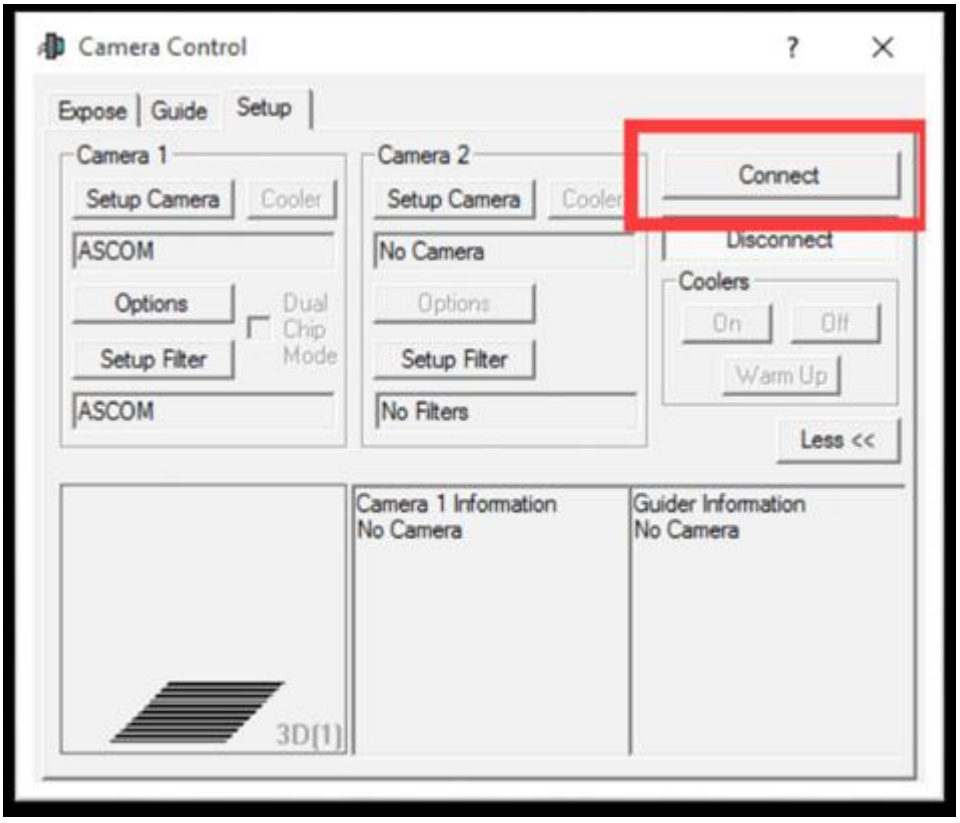

Camera Control
Expose
Guide
Setup
Camera 1
Setup Camera
Cooler
ASCOM
Options
Dual Chip Mode
Setup Filter
No Filters
Camera 2
Setup Camera
Cooler
No Camera
Options
Setup Filter
No Filters
Connect
Disconnect
Coolers
On
Off
Warm Up
Less <<
Camera 1 Information
No Camera
Guider Information
No Camera
3D[1]

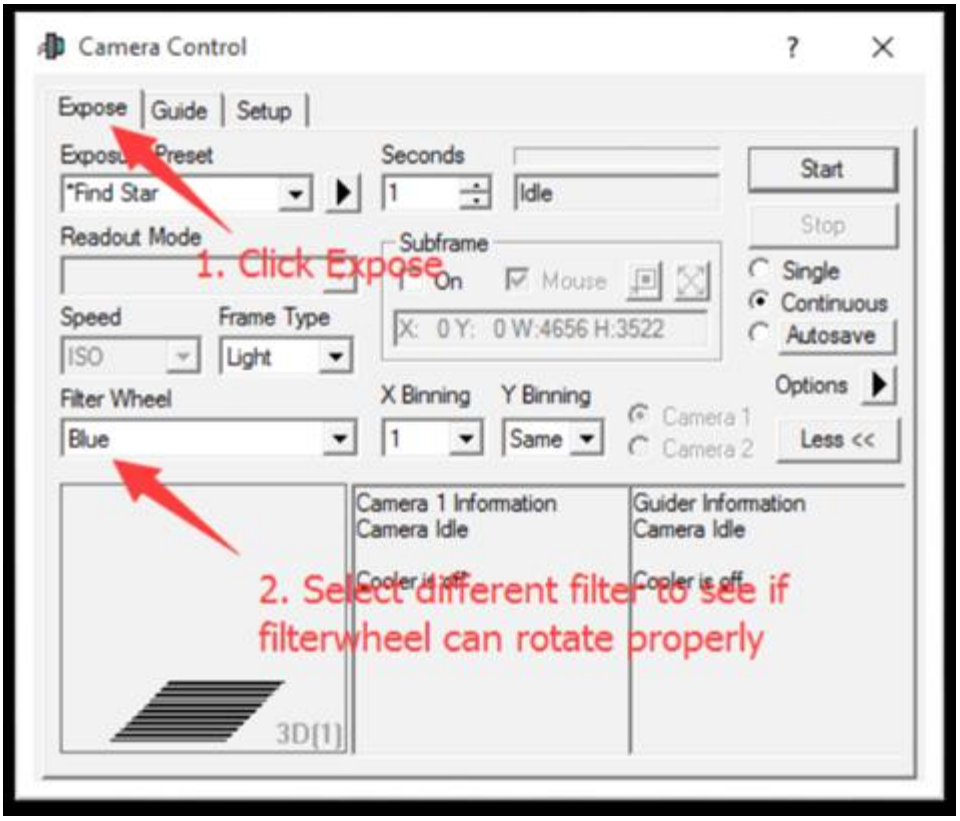

Setup ASCOM
ASCOM Plug-in Version 5.11
Copyright © 2009-2010 Diffraction Limited
Support: www.cyanogen.com
Filter or Controlling Camera Model
ASCOM
Pos
Filter Name
Focus Offset
1 Red 0
2 Green 0
3 Blue 0
4 Luminance 0
5 Filter 5 0
6 Filter 6 0
7 Filter 7 0
1. select ASCOM as filter
Advanced...
2. Click Advanced
OK
Cancel

In the window shown below, you can set up your filter wheel



Keep clicking "OK" to return to the Camera Control window. Click "Connect"


Camera Control
Expose
Guide
Setup
Camera 1
Setup Camera
Cooler
ASCOM
Options
Dual Chip Mode
Setup Filter
ASCOM
Camera 2
Setup Camera
Cooler
No Camera
Options
Setup Filter
No Filters
Connect
Disconnect
Coolers
On
Off
Warm Up
Less <<
Camera 1 Information
No Camera
Guider Information
No Camera
3D[1]

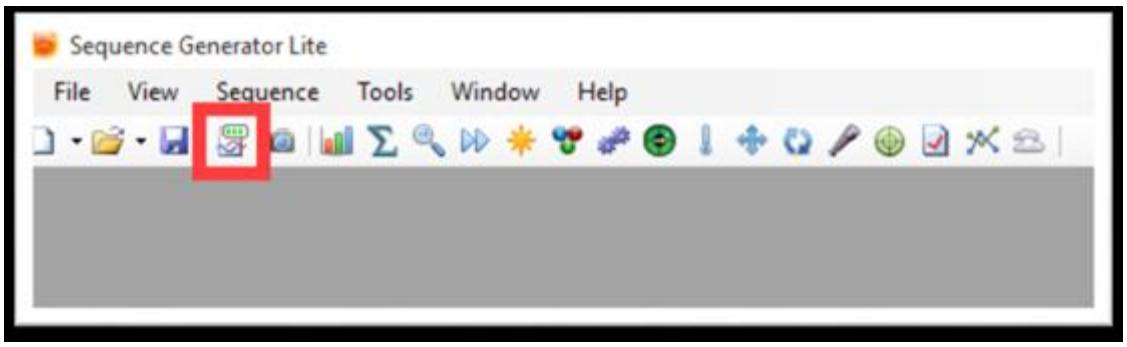

Camera Control
Expose
Guide
Setup
Exposure Preset
*Find Star
Seconds
1
Idle
Start
Stop
Readout Mode
Subframe
On
Mouse
X: 0 Y: 0 W:4656 H:3522
Single
Continuous
Autosave
Speed
ISO
Frame Type
Light
Filter Wheel
Blue
X Binning
1
Y Binning
Same
Camera 1
Camera 2
Options
Less <<
1. Click Expose
2. Select different filter to see if filterwheel can rotate properly
Camera 1 Information
Camera Idle
Guider Information
Camera Idle
3D[1]

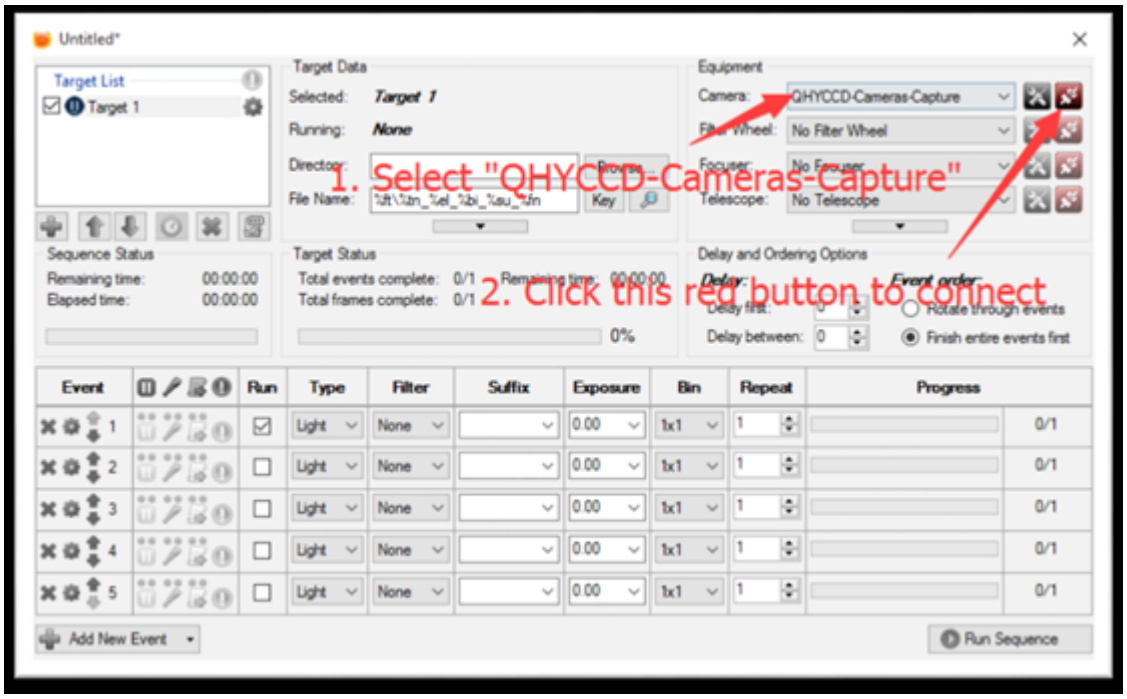
Sequence Generator Pro

Sequence Generator Pro is an extremely powerful image capture suite. It can perform many complex tasks in order to meet your imaging needs. After you connect your gears and configure Sequence Generator Pro properly, you can go to sleep and see images in the morning.

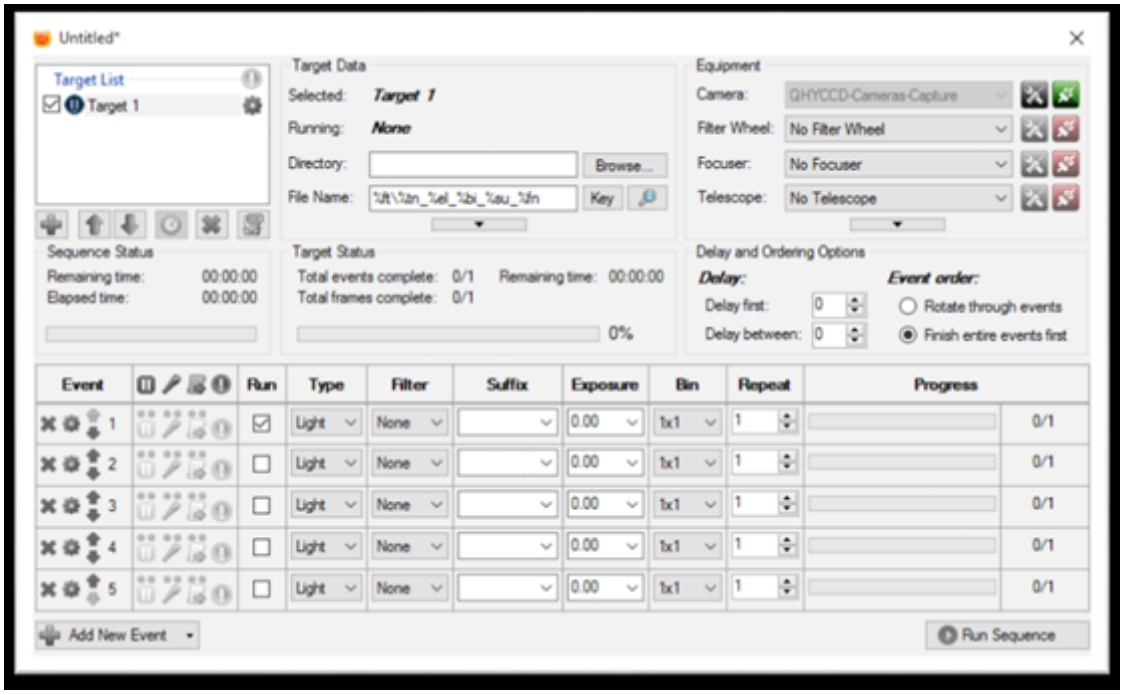
To use QHY29M in Sequence Generator Pro, you can follow the instructions listed below.

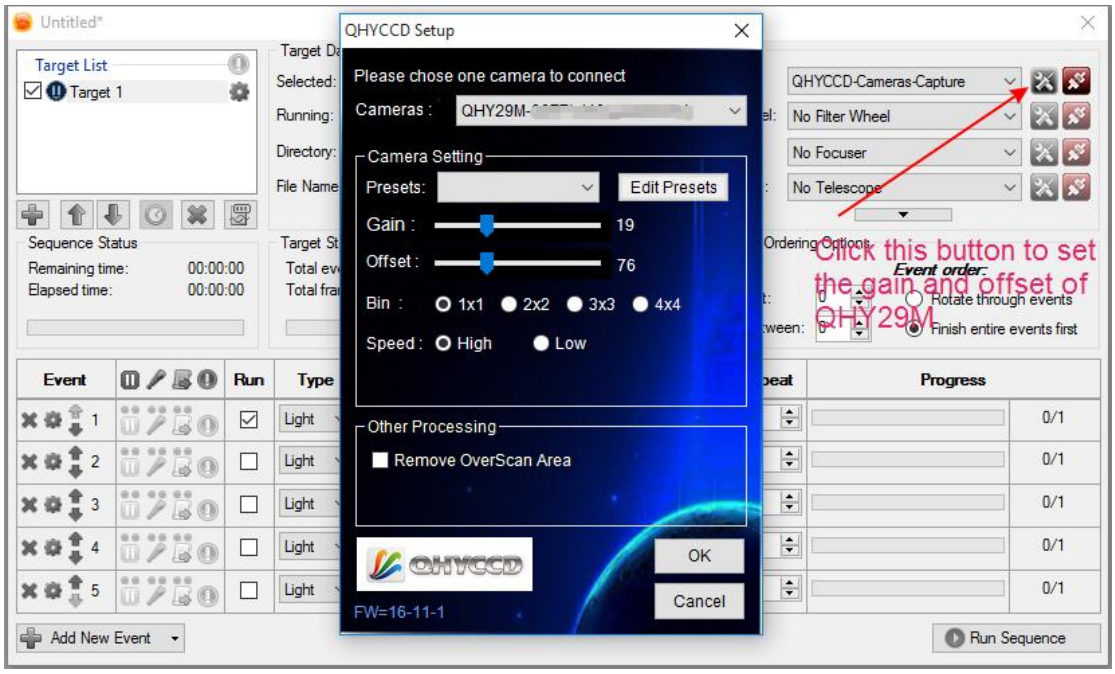
Open sequencer by clicking the button in the red rectangle as shown in the picture below.



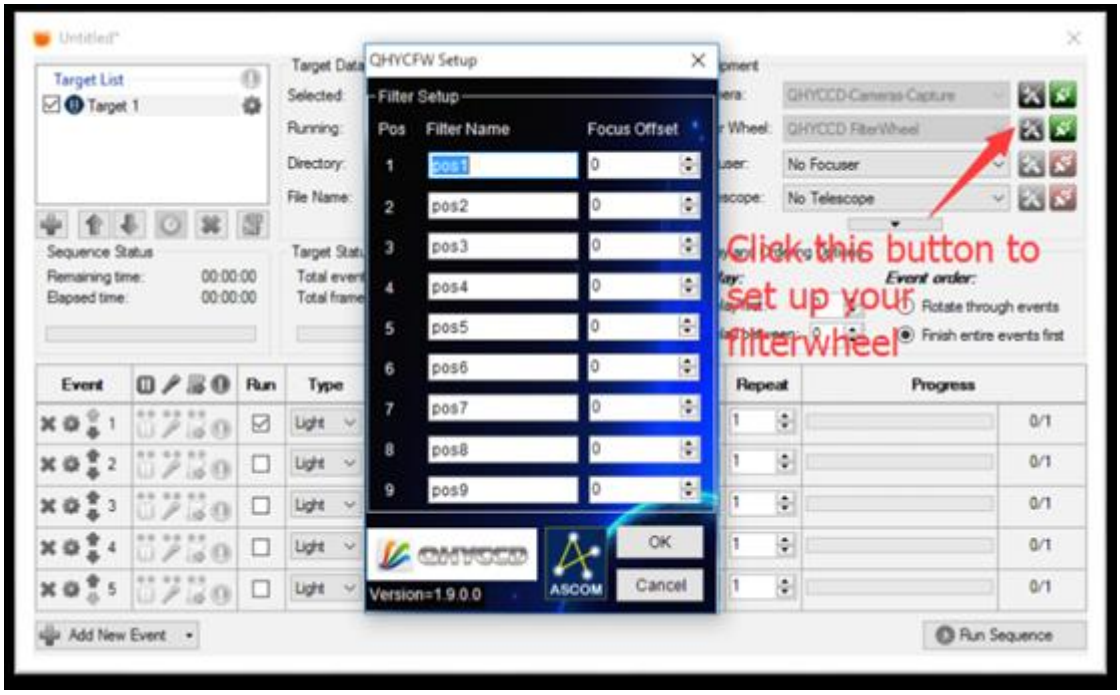


If you've connected QHY29M to your PC before click that red button. The red button will turn to green as shown in the picture below.

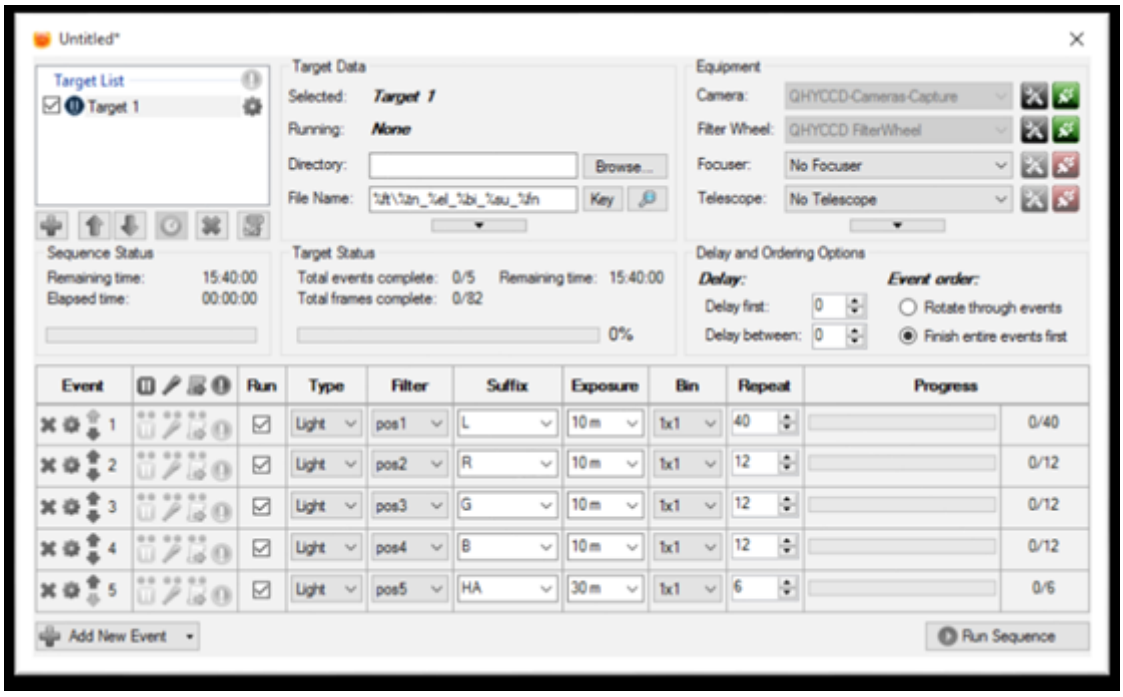




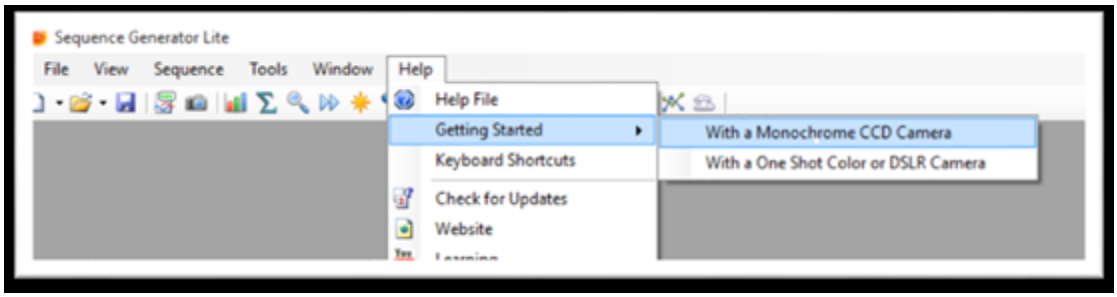
The next step is going to connect your filter wheel (QHYCFW2-L). Before you select QHYCCD Filter wheel as the filter and click the red connect button, you should also make sure you've connected QHY29M to filter wheel (QHYCFW2-L) with DIN4/RJ11 cable, you've plugged in the 12V power supply cable, you've installed the Filter wheel drivers, and the initialization of filter wheel has been finished.



For example, you can change the filter names to Lum, Red, Green, Blue, and Ha as you installed them this way. Then you make schedule events to take turns to use these filters as shown in the following picture.



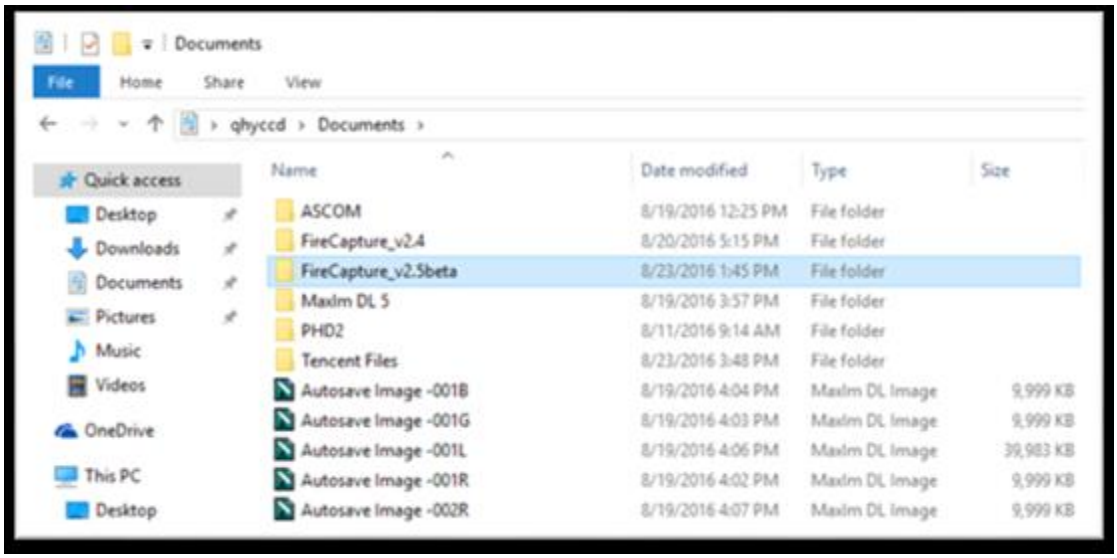
For detailed and helpful tutorial of this software, please go to its website to check its help content.


Sequence Generator Lite
File
View
Sequence
Tools
Window
Help
Help File
Getting Started
Keyboard Shortcuts
Check for Updates
Website
With a Monochrome CCD Camera
With a One Shot Color or DSLR Camera

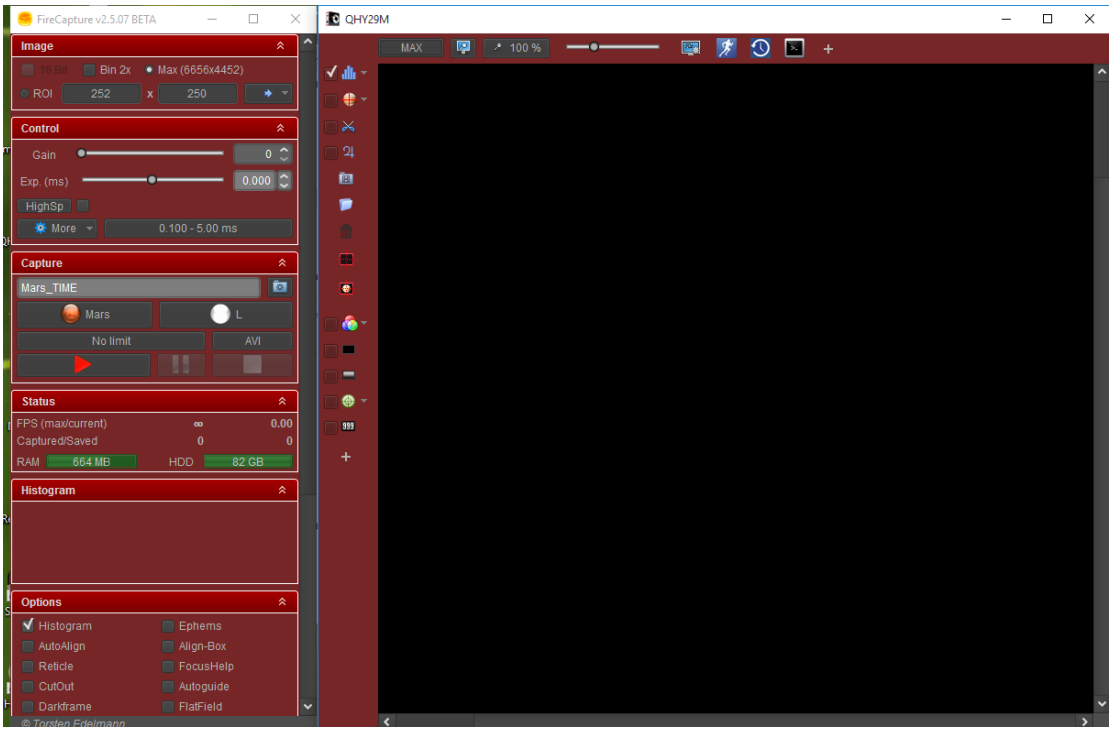
05 Use QHY29M in FireCapture

The latest FireCapture supports QHY29M already. Please go to FireCapture website to download its v2.5 BETA (32-bit) version.

By default, it will be installed in the "Documents" folder. After it was installed successfully, navigate to "Document folder", and you will find its installation folder as shown below.

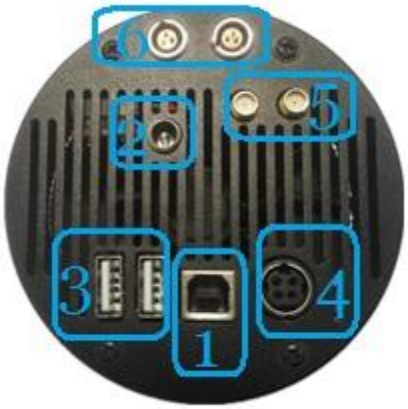


Enter that folder and run "FireCapture.exe", then select QHYCCD camera. And after the loading, you will see the image on FireCapture like shown below.



For detailed and helpful tutorial of this software, please go to its website to check the tutorial section at http://www.firecapture.de/

06 Peripheral Ports on QHY29

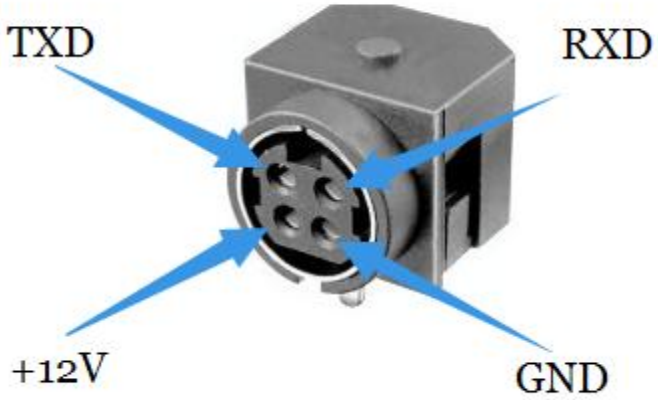


1. USB2.0 type-B port

2. 12V power port with screw thread for fixation purpose

3. USB2.0 type-A ports
With these two USB ports, you can use QHY29M as an USB hub. After connecting your other devices to QHY29M, you can control the entire system with one single USB2.0 cord connecting your QHY29M to your computer.

4. Filter wheel control port



Pin number arrangement

Note: The TXD and RXD is standard RS232 level (+-10V). Not the TTL standard.

5. trigger ports for industrial usage

6. Serial ports (LEMO connector)

These two ports are especially useful when the equipment you are using support serial port such as equatorial mount.

7 FAQ

1. How to avoid the camera hanging?

If you camera always hangs. It may be caused by many reasons. You can check the following things.
1.1 If there is power leak for your mounts and computers? The power leak may cause the leak current transfer from computer to the camera via the GND. This may affect the USB transfer and causes the data packet lost and cause it hang. You need to make sure the computer and the mount is well grounded.
1.2 If the USB port's voltage not enough? Some computer's USB port +5V is not enough. It may cause the camera always hangs. In this condition you can use a powered USB3.0 HUB to connect camera and get the good +5V power for camera.
1.3 If the USB cable connection is good enough? Sometimes the contact issue in the USB cable to camera or USB cable to computer will cause the signal loss and cause camera to hang. Especially when you move the cables. In this condition. You can try to add a little silicon oil into the USB socket/plug .This can increase the contact a lot better.
1.4 Avoid the statics. Sometimes the static electricity on human body will cause the camera to hang. You can touch the computer metal case for first before touch the camera to let the static electricity on your body release.
1.5 Some computer's front USB port is not so good for high speed transfer (The reason is it connected to mainboard by a cable and which has no good signal integrity). If you found the camera always hang on front USB port. You can try the USB port on backside of the computer (which is connected to chipset directly on the mainboard).

2. How to clean the CMOS sensor and the optic windows of the camera?

If you found there is dust on the CCD sensor. You can screw off the front part of the QHY29M. The QHY29M's CCD sensor has the AR coating so you need to be careful to clean it. You can use the clean kit for DSLR sensor to do it.
The optic window is the IR cut coating or AR coating. So you need to be careful when cleaning it. You can also use the DSLR clean tools or the lens paper. Don't use strong force to clean it. The coating is not so hard and it is easy to get scratch when you use strong force on it.

3. How to protect the cooler in QHY29M?

The cooler in QHY29M can lower the CCD temperature to a value that's almost 40 degrees centigrade below the ambient temperature. So you need to be careful to avoid thermal shock, which refers to when the cooler's temperature rises or fall dramatically, the cooler is subjected to strong internal stress due to contraction principle. Drastic thermal shock can shorten cooler's service life or permanently break it.
So when you begin to adjust the CCD temperature, you should avoid setting "Cooler Power" to its maximum value, and you should gradually turn up the "Cooler Power" value. When you turn off

the power, if the "Cooler Power" value is very big, you should gradually turn it down before turn off the power.

8 Camera Maintenance

Drying the CCD Chamber

The CCD sensor is located in a CCD chamber. This chamber is airproof and connect to the socket of the silicone gel tube on one side of the QHY29M front case. If there is moisture and cause the CCD sensor glass get dew. You can connect the silicone gel tube on the socket to dry it.

Please put the effective silicone gel into the silicone gel tube. Make sure there is a small amount of cotton inside to prevent the silicone gel get into the CCD chamber.

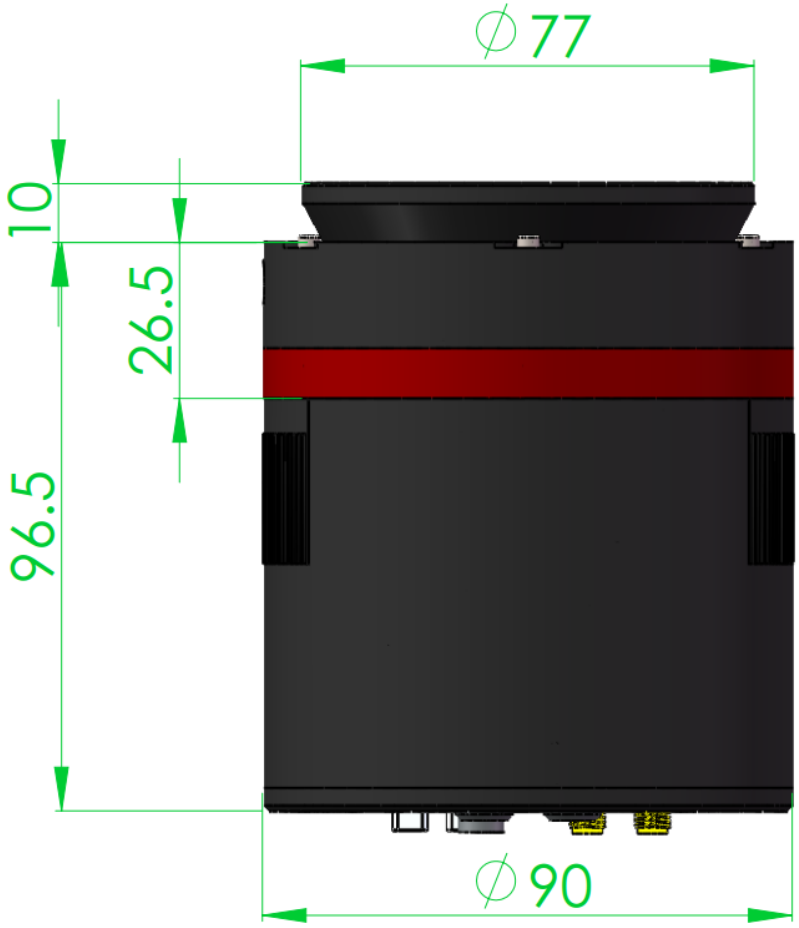
Avoid CCD chamber optic window get dew

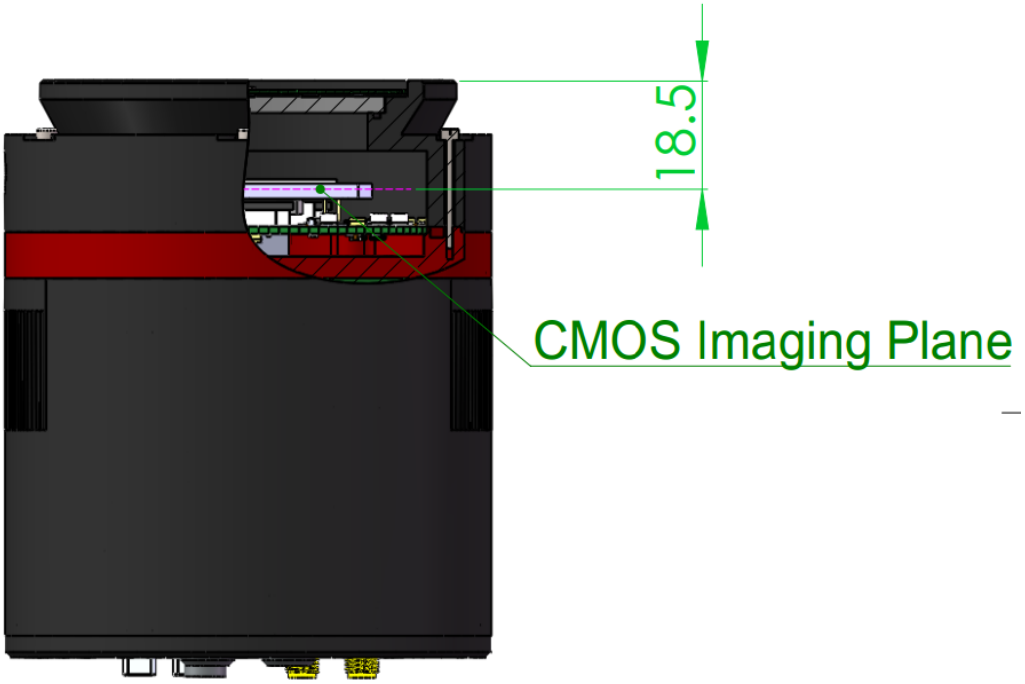
If the environment humidity is very high, the optic window of the CCD chamber may get dew. The QHY29M has the build-in heat board on this optic window to heat the optic window to avoid it. In most conditions it can take effect.
If the optic window still get dew please try the following method.
1. Avoid the CCD Camera face down to ground. The cold air is heavy than warm air, if you put the camera facing down to the ground, the cold air is easy to get the optic window and cause it very cold and get dew
2. Increase the temperature of the CCD sensor. You can increase the CCD sensor temperature a little to prevent the optic window get dew.
3. Check if the heat board working. If the heat board not working, the optic window is easy to get dew. Normally the heat board can get about 65-70C in +25C environment. If it is not so warm, it maybe the problem of the heat board damaged. Need to contact QHYCCD to replace one heat board.

9 Specifications

	QHY27	QHY28	QHY29
CCD sensor	KAI16050 (Grade2)	KAI16070 (Grade2)	KAI29050 (Grade2)
Pixel Size	5.5um*5.5um	7.4um*7.4um	5.5um*5.5um
Total Pixels	4964*3332	4932*3300	6644*4452
Effective Pixels	4920*3288	4888*3256	6600*4408
Active Pixels	4896*3264	4864*3232	6576*4383
Effective Pixels	16mega pixels	16mega pixels	29mega pixels
Active Image Size	26.93*17.95mm	36.0*23.9mm	36.17*24.11
Full Well	20ke-	44ke-	20ke-
Typical Size	APS	Full Size	Full Size

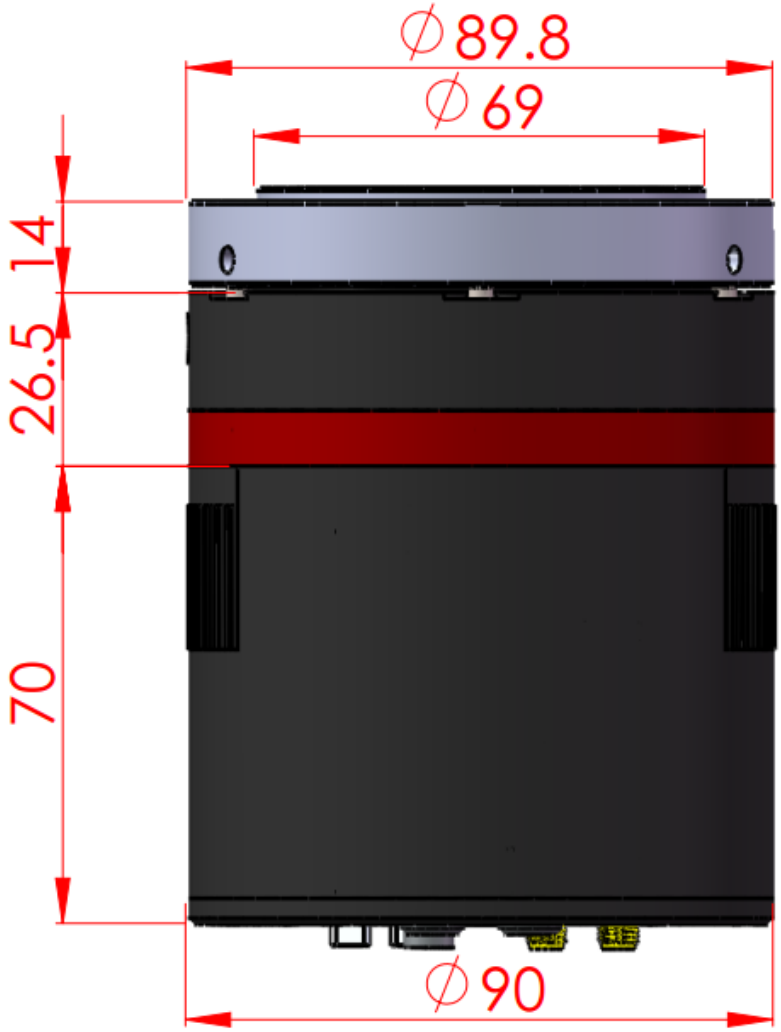
10 Mechanical Dimensions

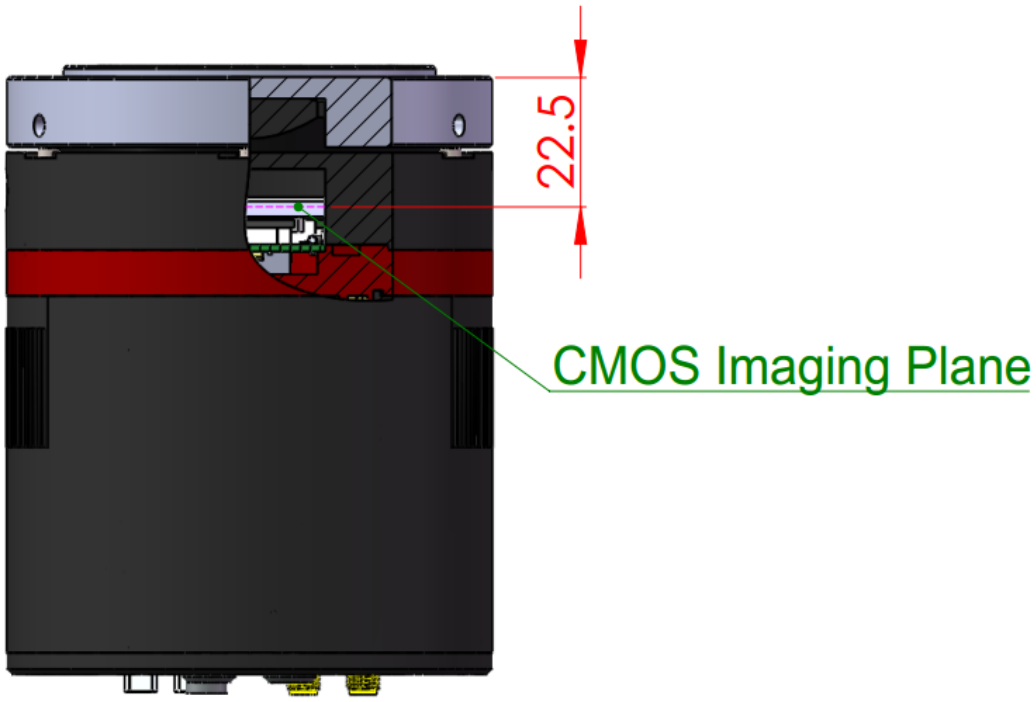




drawing of QHY29M

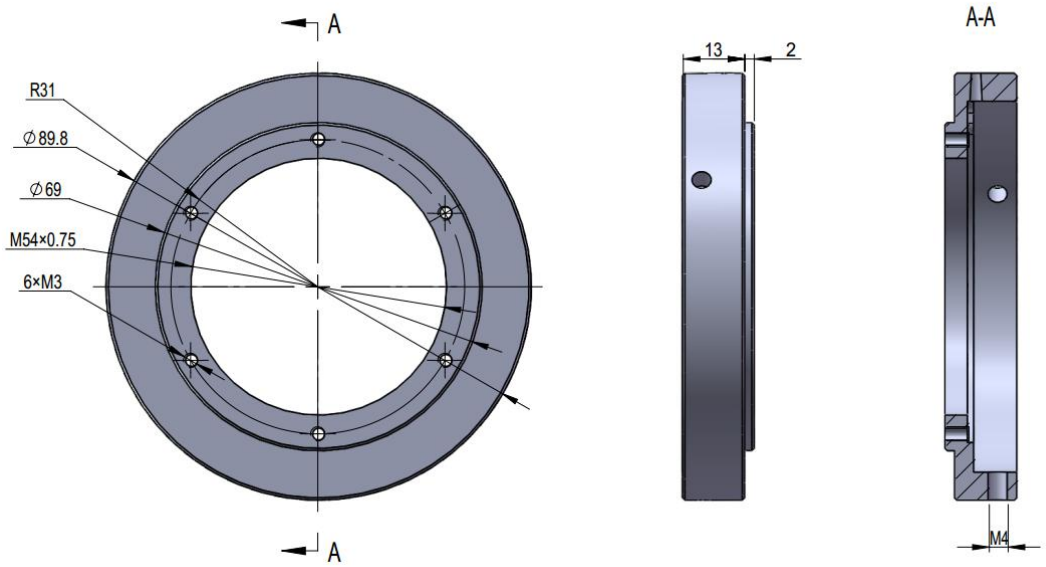
The back focal length of QHY29M is about 18.5 mm.


∅89.8
∅69
14
26.5
70
∅90



drawing of QHY29M with angle adjustment adapter ring

The back focal length of QHY29M with angle adjustment adapter ring is about 22.5 mm. You can lengthen it or adjust the angle by adding washer or something under the ring.



drawing of angle adjustment adapter ring

11 Revision history

Date of change	Revision	Content of change
November 29th, 2016	1.0	First edition