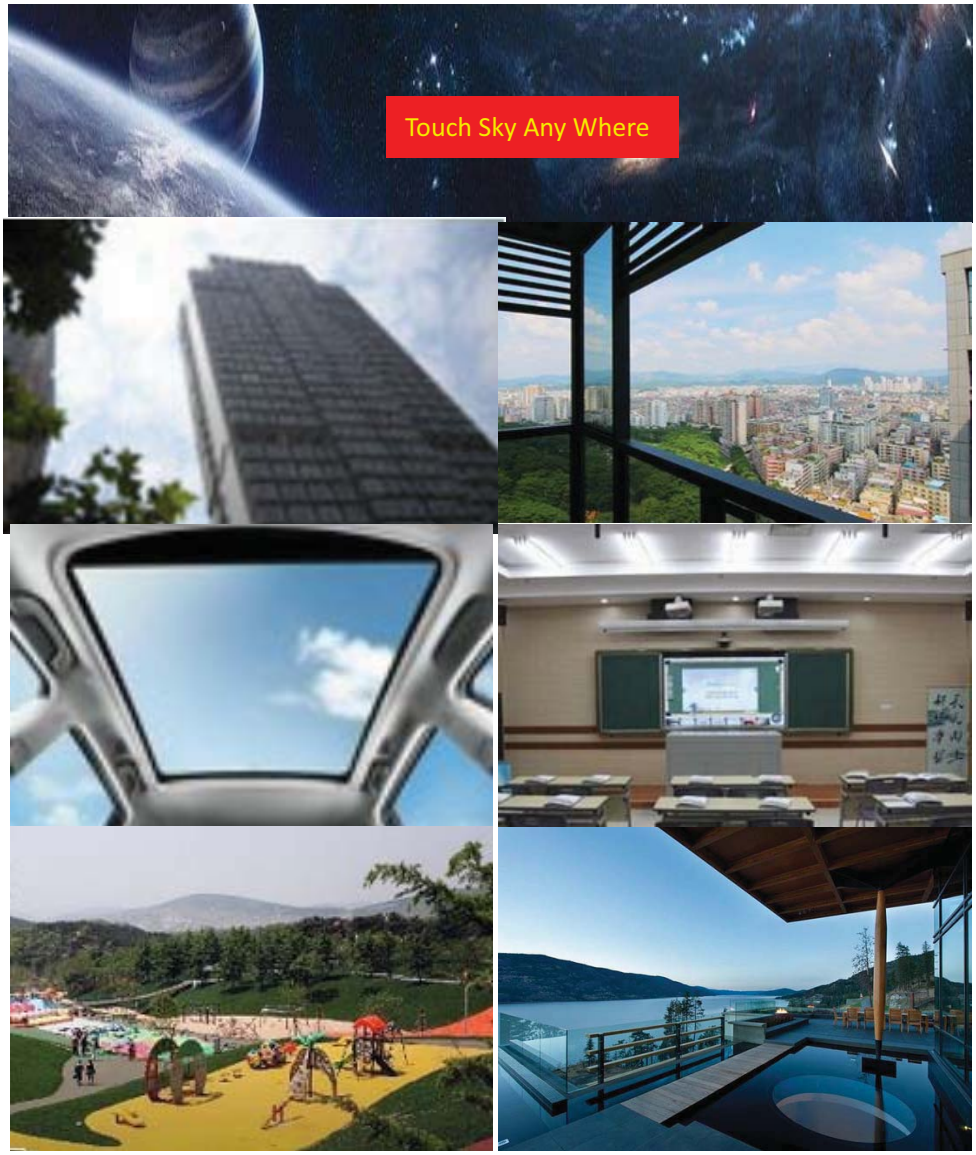
QHY16200A User Manual V1.0

QHY16200A is the QHYCCD "A" series cooled astronomy camera. The camera comes with the following items. Please check if each items is here.

- Camera Body
- 12V Cigar Lighter Cable
- 1.8 meter BELKIN USB Cable
- 1.0 meter 12V power cable with lock
- Cable for Ground
- Silicon gel tube and Silicon gel
- USB HUB BYPASS Board (Red board)
- Water proof plastic box
- 2inch To M54/0.75 T-ring
- Screw drivers for M2 and M3 Hexagon screw
- QHYOAG-M
- Some Screws for filters

The camera comes with a factory testing report also.
The camera has no 12V AC adapter by default. Some dealers may add an adapter into it. Some are not.



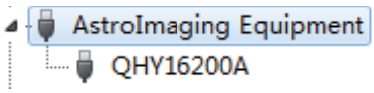
This camera can be widely used

Camera "First Light" .

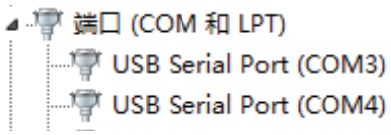
When you get the camera . You can try the first light of the camera. Please following this step:

1. Download the QHY16200A system driver, ascom driver and EZCAP_QT software from QHY16200A web page http://www.qhyccd.com/IC16200A.html
2. If you have not installed ASCOM Platform before, you need install it. You can download the lastest ASCOM platform from http://www.ascom-standards.org/index.htm
3. Run the system driver install package. It will install QHY16200A system driver, an ethernet driver and a FTDI RS232 driver (This is a combo driver package for both QHY16200A and IC16200A. The Ethernet driver is no use since the QHY16200A has no this port. but it is useful for IC16200A)
4. Connect your 12V adapter with the 1.0 meter 12V power cable with lock. You may be wonder to know if you can connect the 12V adapter's DC plugin directly to camera without using the 1.0meter 12V cable with lock. The answer is no. The DC socket on QHY16200A requires a DC socket paired with it. Other DC plugin maybe not working on it. There is two 12V socket on camera. You can connect any one. These two DC socket is connect in paralle in the camera.
5. Push the Power button to "ON" Position. You will see the fan is running.
6. Loose the USB lock. And connect the USB cable
7. If everything are well, you will hear the shutter sound and the color wheel start rotating. The OLED screen become blue.
8. You can confirm all system drivers are ok by opening the hardware manager:

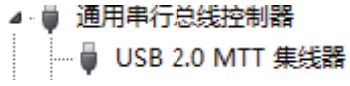
QHY16200A system driver



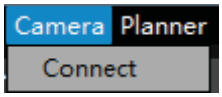
Two Serial Port on camera (Port number may be various)



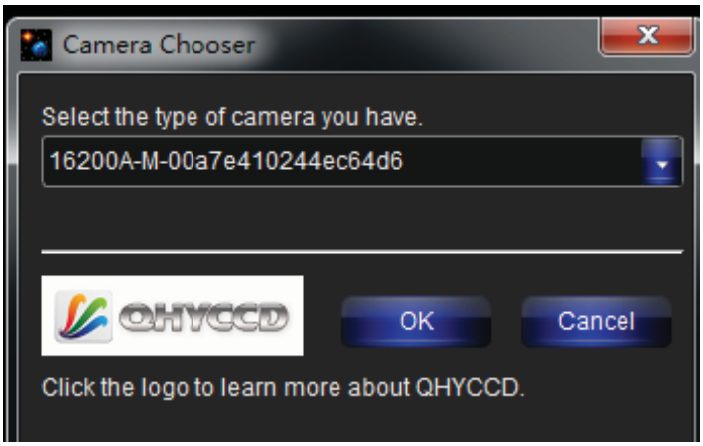
on Camera USB HUB



Now you can install the EZCAP_QT software . And run it.

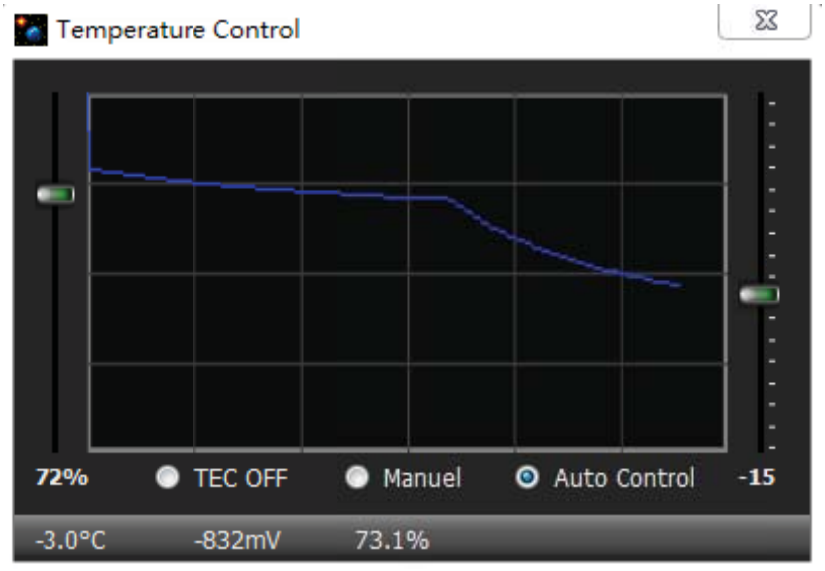
1. Select Menu->Camera->Connect 

2. The camera will be shown in the select list. Click Button OK. Then the left tool box will be expand.



3.Click Preview Button. Camera will capture one preview frame. During the exposure the OLED will off to prevent the light leaking. (In current firmware version, the OLED will not show the text, just a whole blue color)

4.You can click menu->Camera setup->temp control. Select the Auto Control and set a target temperature. Here we set it to -15C. Please pay attention the max cooling capability of QHY16200A is about 40C below ambinet. It means in 25C environmentyou can get max -15C on sensor and in 20C environment you can get -20C. You must consider some spare range for it .



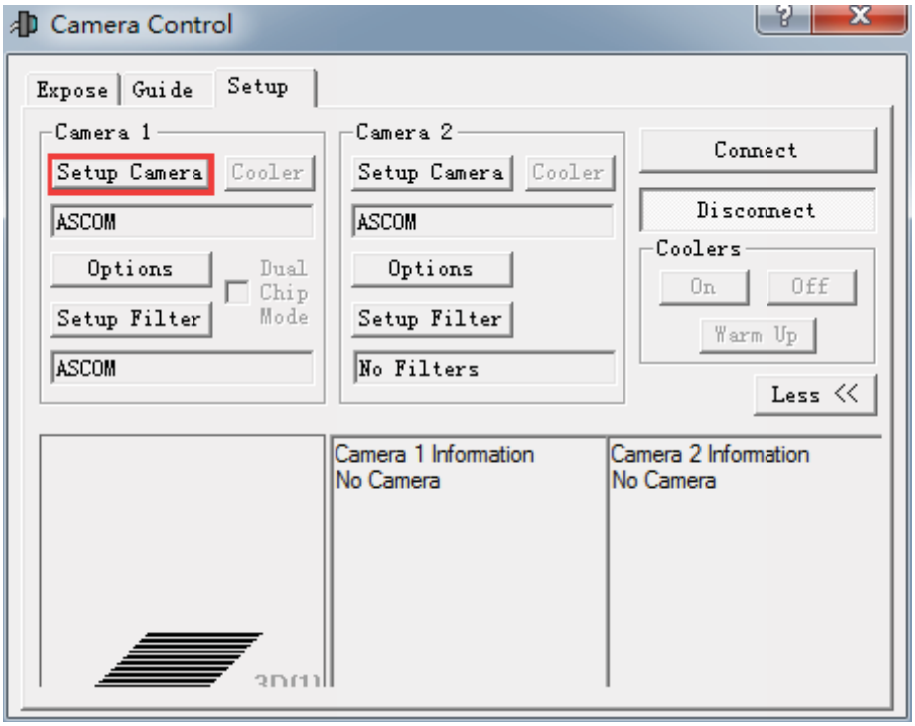
5. You can wait the temperature falling down. Since QHY16200A sensor is not small. The temperature changed is not so fast. You need to be patient to wait more time for it.

6. You can click menu->Camera setup->Color Wheel Control to set the CFW position. Check if the CFW working well.

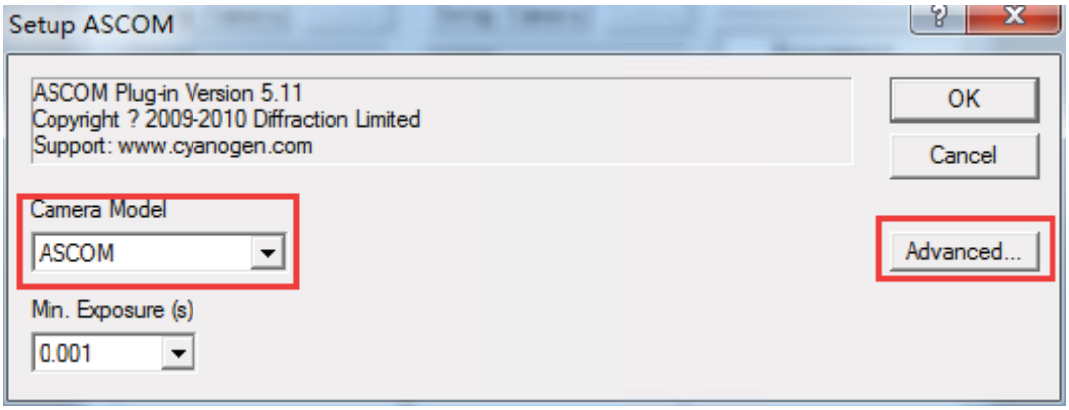
Note1: The 12V power is necessary for the camera. If you do not power it , the camera will not work and the USB device can not be found.

Using ASCOM and MAXIMDL

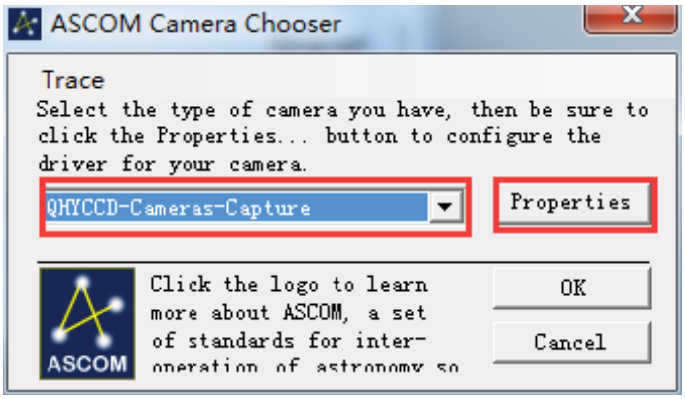
1. In Camera Control. Click "Setup Camera" Button



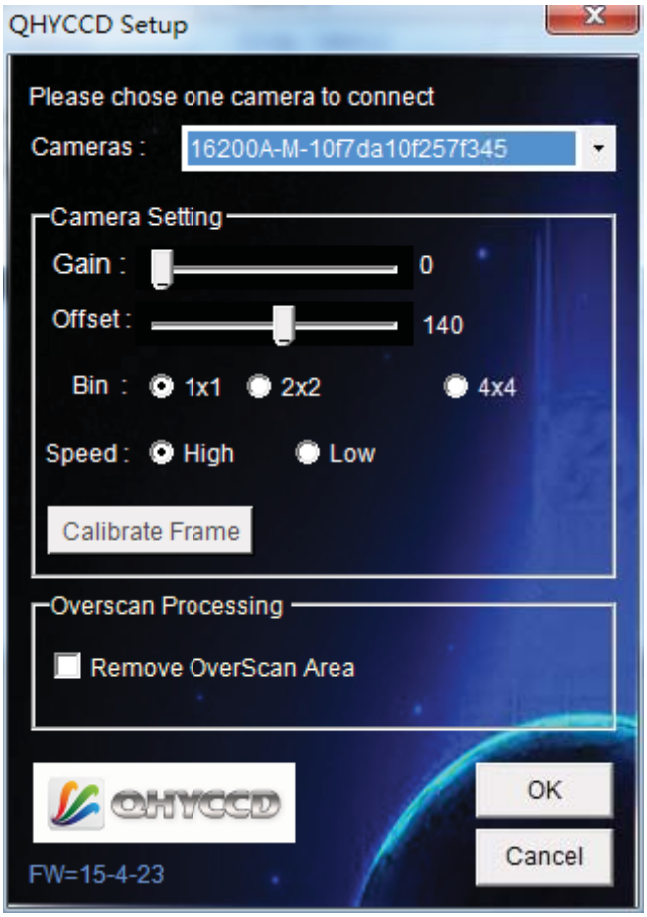
2. Select "ASCOM" in the Camera Model List and click "Advanced"



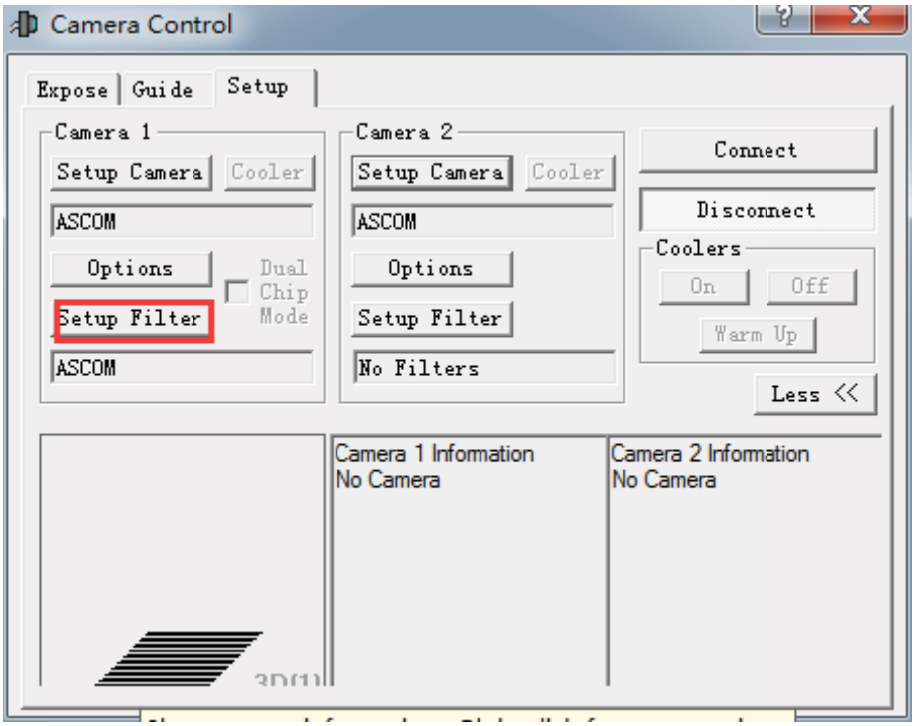
3.Select "QHYCCD-Camera-Capture) in the ascom camera list and click Properties button to setup.



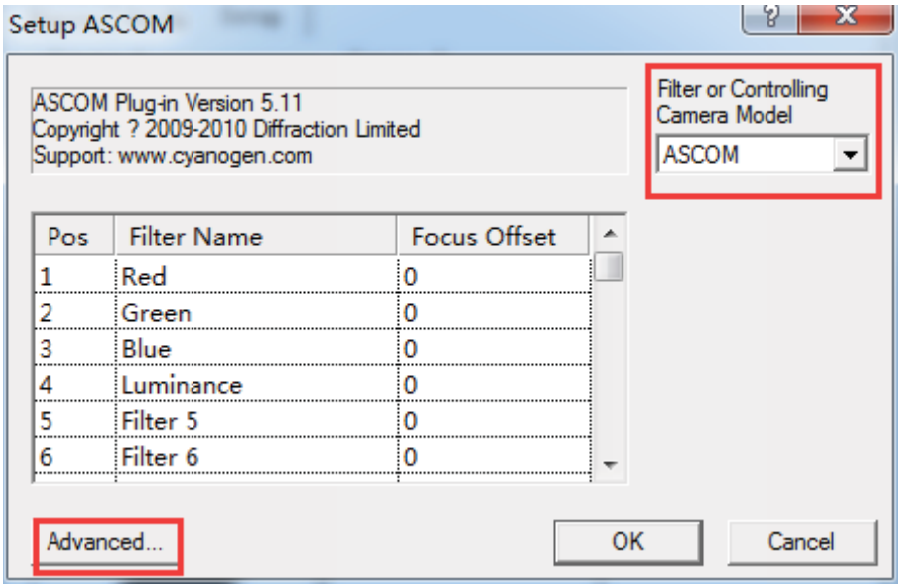
In Camera list select 16200A



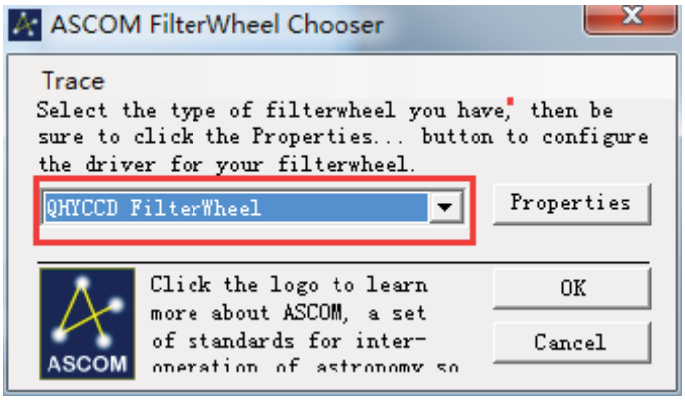
5. In Camera Control-Camera1 click "Setup Filter" Button



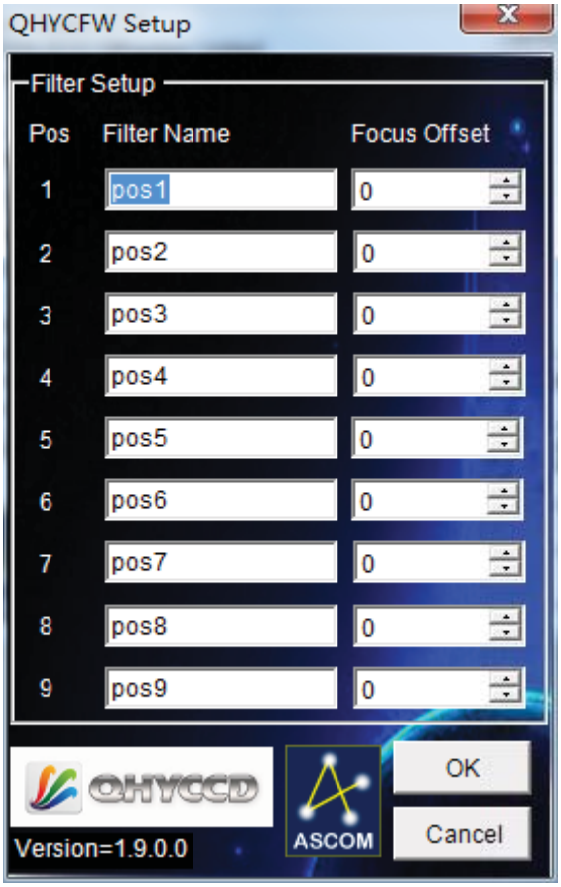
Choose "ASCOM" in the "Filter or controlling camera model" list



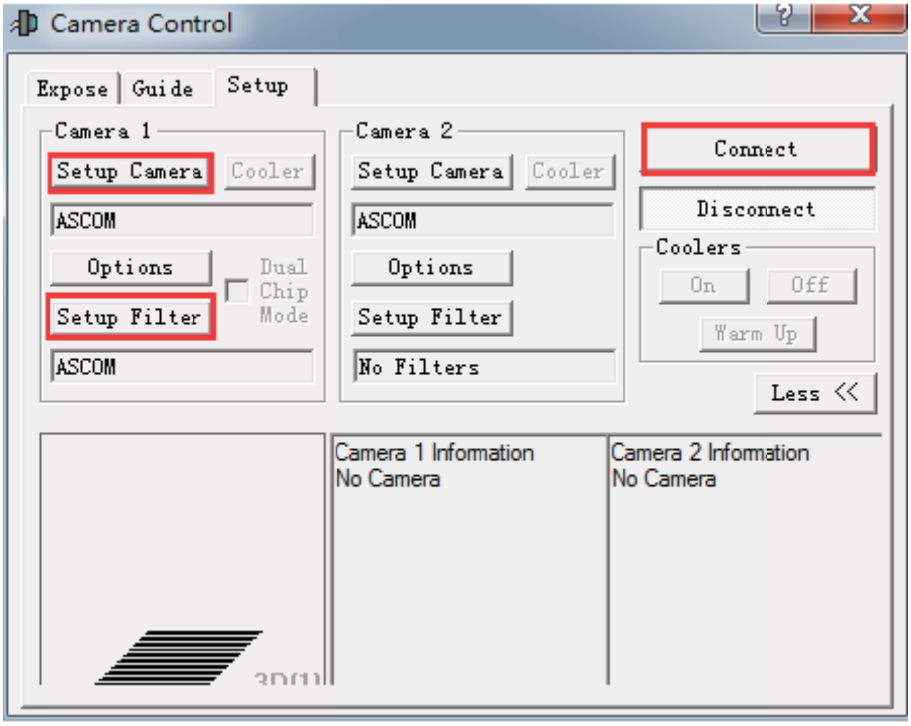
Click "Advanced" Button and select QHYCCD FilterWheel and click "Properties" to setup.



Setup the filter wheel parameters

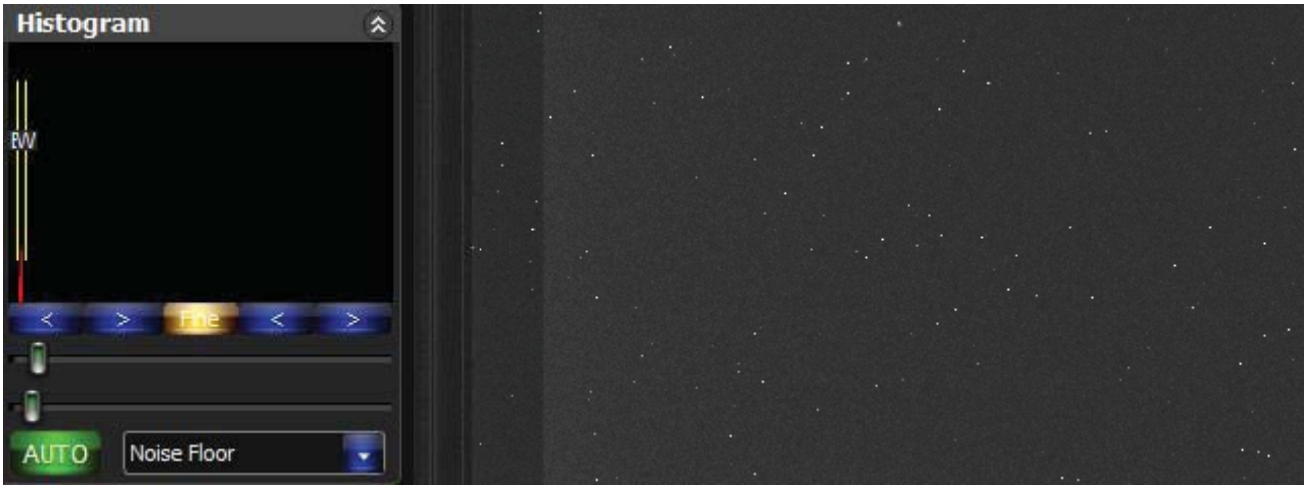


Click "Connect" to connect both camera and filterwheel.

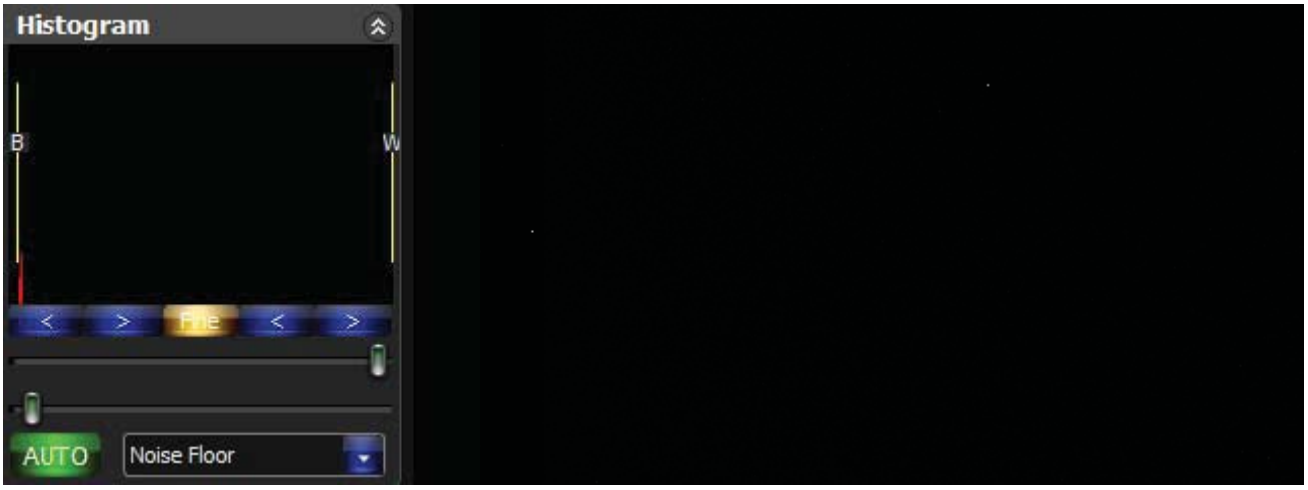


Typical QHY16200A Dark/Flat/Calibrated Images with Grade2 sensor

This is a typical Dark Frame at 300sec exposure, -15C, gain=0. Part of the image. 1:1 zoom



Stretch to background level



Stretch to Max Range

A typical 10sec 4*4binning Dark Frame with all the region of the image. The vertical blank banding on the right of the image is the overscan area. The overscan area is important for overscan calibration.We recommend you reserve this area. You can also see two strip which is a little brighter than the image area.Which is the "Optic Black" Area.

The difference of "Optic Black" Area and "Overscan" Area is that the "Optic Black" area has a metal shield on it and it does not sensitive to light, But thermal current still exist. . The "Overscan" area is a virtual area and it represent the bias .

About defect columns

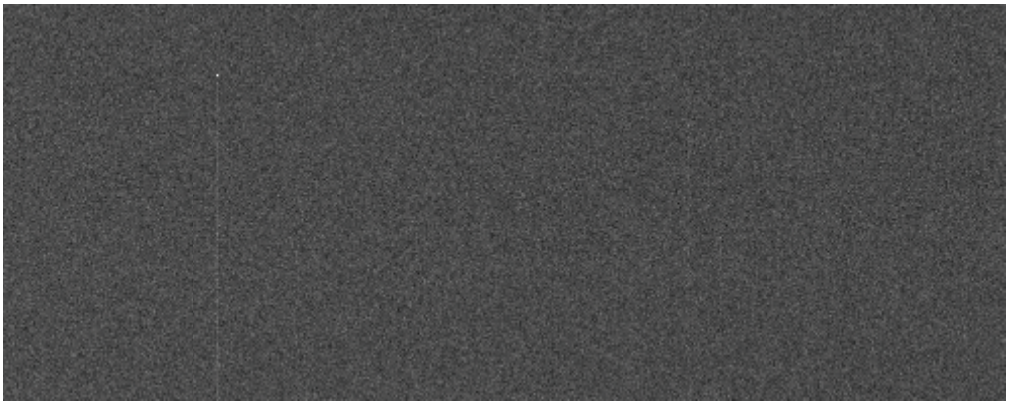
You may see one or more vertical columns. The first pixel of the vertical column is a bright dot. Normally speaking such column is not a defect column. This is due to one pixel with high thermal current. Because the KAF frame transfer sensor is tranferring the electron on pixel. All the pixels after this high thermal pixel on the same column is getting thermal current when transfered through this pixel.

This pixel can be removed by dark frame calibration. So that you need not do more things than it.

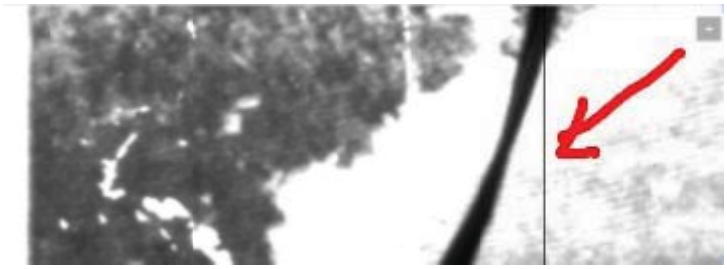
You may see one or more black columns which is not full sensitivity to the light or it is dim to light. This is the defect column and it can not be removed by dark frame calibration. The KAF16200 sensor has two grade. grade1 and grade2. From the specification of the datasheet, the grade 2

allows some defect columns. For more information on this please check KAF16200 datasheet. You can use the "defect tools" in some image process software to remove such defect columns.

A Typical "defect" columns caused by a hot pixel. Which is tightly and it is not a really defect column. It will be gone after dark frame calibration.



A Typical defect column with low CTE or zero CTE. This is a defect column. You have to use the some defect tools to remove it.



Use the build-in Color filter wheel

Install filters

QHY16200A has build-in five position 2inch/50mm color wheel. Please following the steps to install them.

1. Open the camera front case. There is four M3 screws and eight M2 hexagon screws for the front case. You can use the screw driver supplied with the camera to open it. Among the eight M2 screw there is one shorter than all the others. Please remeber the position of this screw.

2. You will see the filter disk after remove the front case. The current disk design is suitable for both 50mm unmounted filters and the 2inch mounted filter. You can use the screw set come with the QHY16200A to fix the filter on the disk. Please pay attention the maximum height of the filter (excludes the 2inch thread) is 7.0mm. Please make sure the filter plus the screw does not touch the front case and also does not touch the optic position detector board.

3. After installed the filters. You can power the camrea and connect USB to verify the colorwheel running well. Then put the front case back.

Control filter wheel in software

In EZCAP. You can control the filter wheel rotate by select menu->camera setup->colorwheel control
Select a number and the colorwheel will run to this position. If the number is the current position of the colorwheel the camera will ignore of it.

In ASCOM.

Please refer to chapter " Using ASCOM and MAXIMDL" above.

Use OAG-M

QHYOAG-M and a M54 adapter come with the QHY16200A. By six M3 screws you can install them .

The prism of the OAG may have a protect film on front surface. Please remove it before using.

You can use QHY5L-II-M as the guider. Please pay attention that you may remove the front part of QHY5L-II-M to get the back focus short enough for this combination of OAG-M and QHY16200M. If you are using other guider. We are not gurantte the back focus is suitable for them due to the very short back focus of the QHY16200A.

The thinkness of QHYOAG-M is 10mm and the M53 adatper is 3mm. So the totally back focus addon is 13mm. The QHY16200A back focus is 33.5mm. So the total back focus with QHYOAG-M is 46.5mm.

Use the On-Camera Serial Port

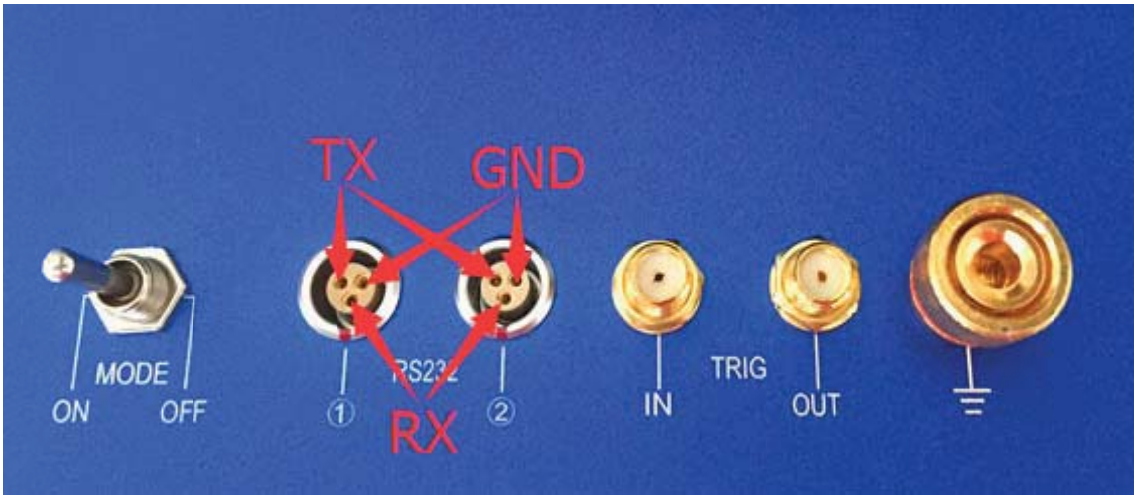
QHY16200A has two on-Camera Serical Port. It connect to the internal USB hub via FTDI USB to Serial Port convertor. The Serical Port has standard RS232 level (+-10V) . You can connect to the RS232 to the mount or focuser. Please note it is not TTL (+5V) voltage level so you can not use it for EQMOD directly. EQMOD is TTL level. You can use the level convertor if you want use this port to EQMOD.

After you installed the system driver of camera, the serical port driver is installed together. Please check the COM port number and set it in the application software .

The serial port cable is the optional Accessorie for QHY16200A. QHYCCD is making some types of the serical port with different socket type. Please contact QHYCCD for more informations.

The PIN definition of the 3PIN socket

Please check the relation position to the "red" dot of this socket.



Other Port and Socket

In QHY16200A there is two USB HOST Port. Which is connect in the on-camera hub. You can use this port to connect the guider or anyother USB device. The USB port can output 500mA current each.

On top of the camera this is a "CCD Clean" Port. Normally this port is in-factory using propose. Normally you do need to open it.

On the side of the camera there is a "Silicon gel socket". It can be used to dry the CCD chamber. See the topic of "Drying CCD Chamber" for it.

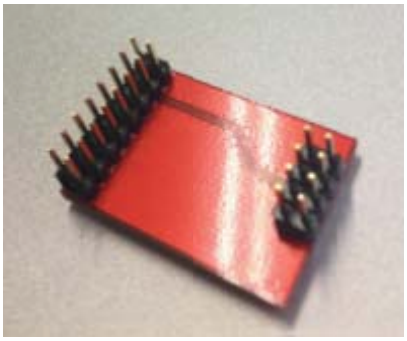
QHY16200A has the "Trig-In" and "Trig-Out" Socket. Trig-in is the trigger input socket and allow you send a pulse to the camera and the camera will begin to exposure. The Trig-Out socket can output a signal to indicate the exposuring period of the camera. This two port is isolated by optocoupler relay. If you need to use this two port please contact QHYCCD for details.

USB Bypass Board

QHY "A" series camera includes a build-in USBHUB and it can expand two USB Host and two RS232 via a USB->Serial Port convertor. In some condition it may not work , for example, the QHY16200A is under another USBHUB and sometimes it has conflict that cause the problems. You can replace the HUB board with this Bypass Board by openning the case of the camera.

Here is a step by step guide of how to replace this board.
http://note.youdao.com/groupshare/?token=D1C38D9FEEDD41D2A8C7D33F9EB74294&gid=7234866

After you installed the bypass board. The camera's two USB host port and two RS232 port will be no function.



GND Socket

Keep the camera grounded with other device is very important for get the system stable and safe. The QHY16200A has a GND socket for this propose. This socket is connect to internal "GND" of the camera. The "GND" is just the "-" of the 12V input. There is cable comes with the camera and you can insert this cable in the GND socket and connect another side of the cable to other device's GND that you want to keep them grounded. For example, the mount's metal case, the computer's metal case etc. If you does not understand this please consult the electric engineer.

 **Don't connect this cable to AC power board directly, it will bring the risk of electric shock .**

The on-camera OLED display

The on-camera OLED display is used to display some informations. This OLED is driven directly by the applicaton software. In different software it may display different informations. In current applications this OLED is not actived.

FAQs

1.What's the back focus of this QHY16200A
The backfocus is 33.5mm. When connect with QHYOAG-M and M54 adapter it is 33.5mm+13mm=46.5mm

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Camera Maintenance

Drying the CCD Chamber

The CCD sensor is located in a CCD chamber. This chamber is airpoor and connect to the socket of the silicon gel tube on one side of the QHY16200A case. If there is moisture and cause the CCD sensor glass get dew. You can connect the silicon gel tube on the socket to dry it.

Please put the effective silicon gel into the silicon gel tube. Make sure this is a cotton inside to prevent the silicon gel get into the CCD chamber.

Avoid CCD chamber optic window get dew

If the envrioment humidity very high, the optic window of the ccd chamber may get dew. The QHY16200A has the build-in heat board on this optic window to heat the optic window to avoid it. In most conditions it can take effection.

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 enviroment . If it is not so warm, it maybe the problem of the heat board damaged. Need to contact QHYCCD to replace one heat board.

Clean the CCD Sensor

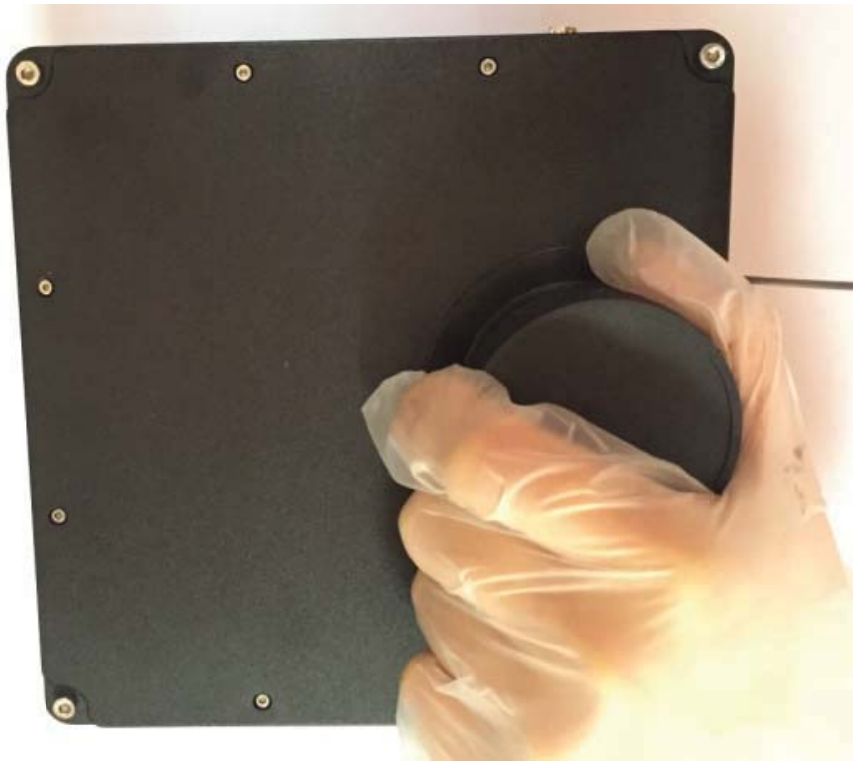
Normally you can use the flat frame to calibrate the dust shadow on the image. QHYCCD does not recommand you open the ccd chamber to clean it. It may bring more dust if you can not control the enviroment dust. It also may bring the scratch when cleanning CCD sensor or cause some cable damaged during assembly the camera.

QHYCCD has the factory clean service. It is USD100 per time and it does not includes the ship cost.

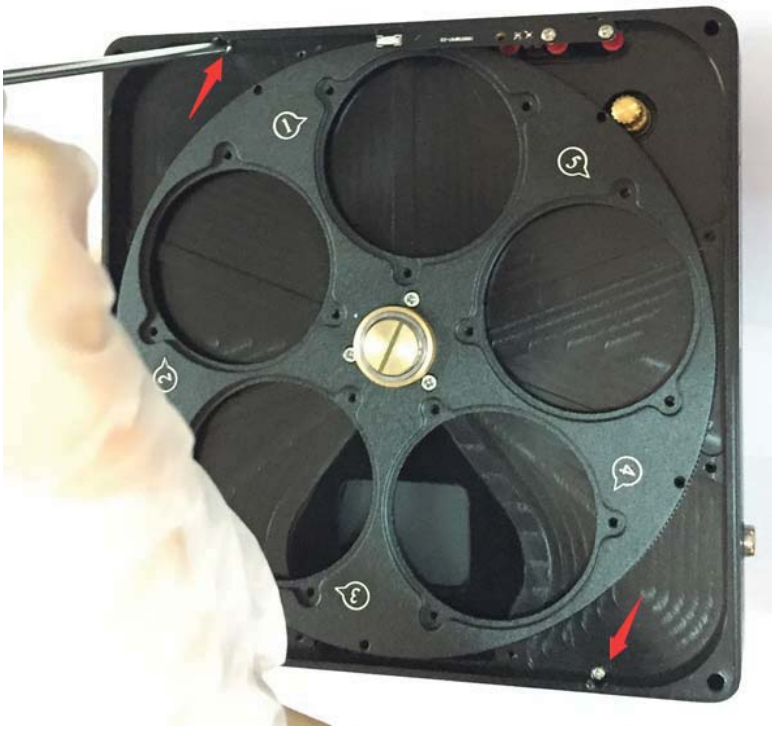
If you really want to clean it . Please following this step.

You need prepare the tools by yourself to open the camera.

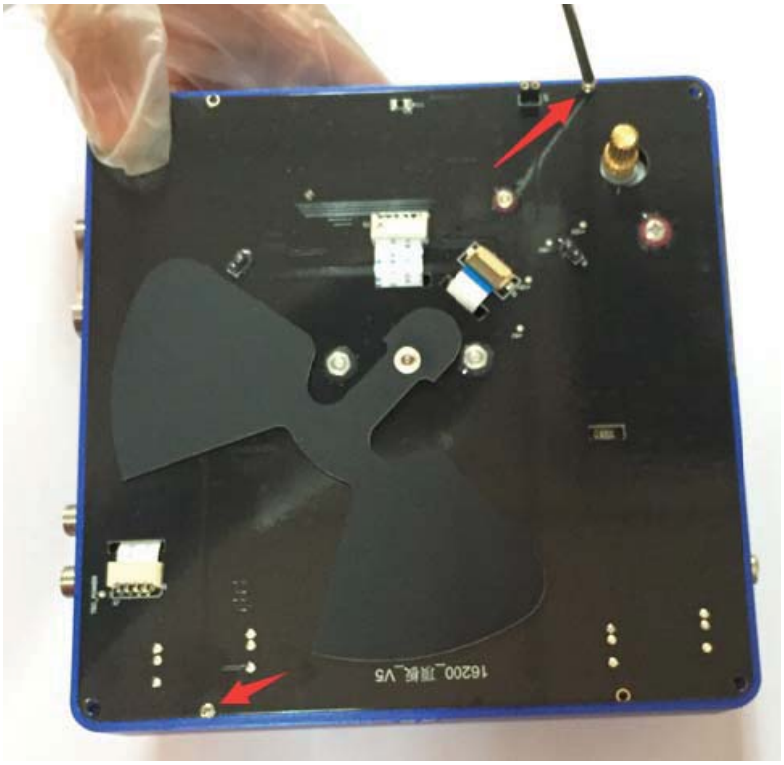
Remove all the screws on front of the camera case and remove the front case



You will see two screws to fix the filterwheel case (the middle layer of the camera). unscrew them.

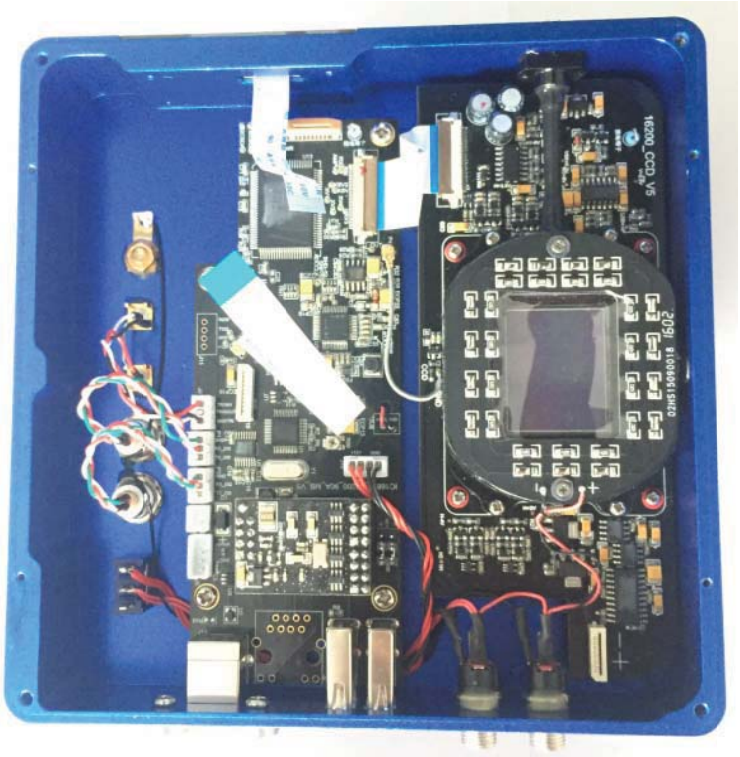


You will see the power PCB board. Remove the two screw of the power PCB board

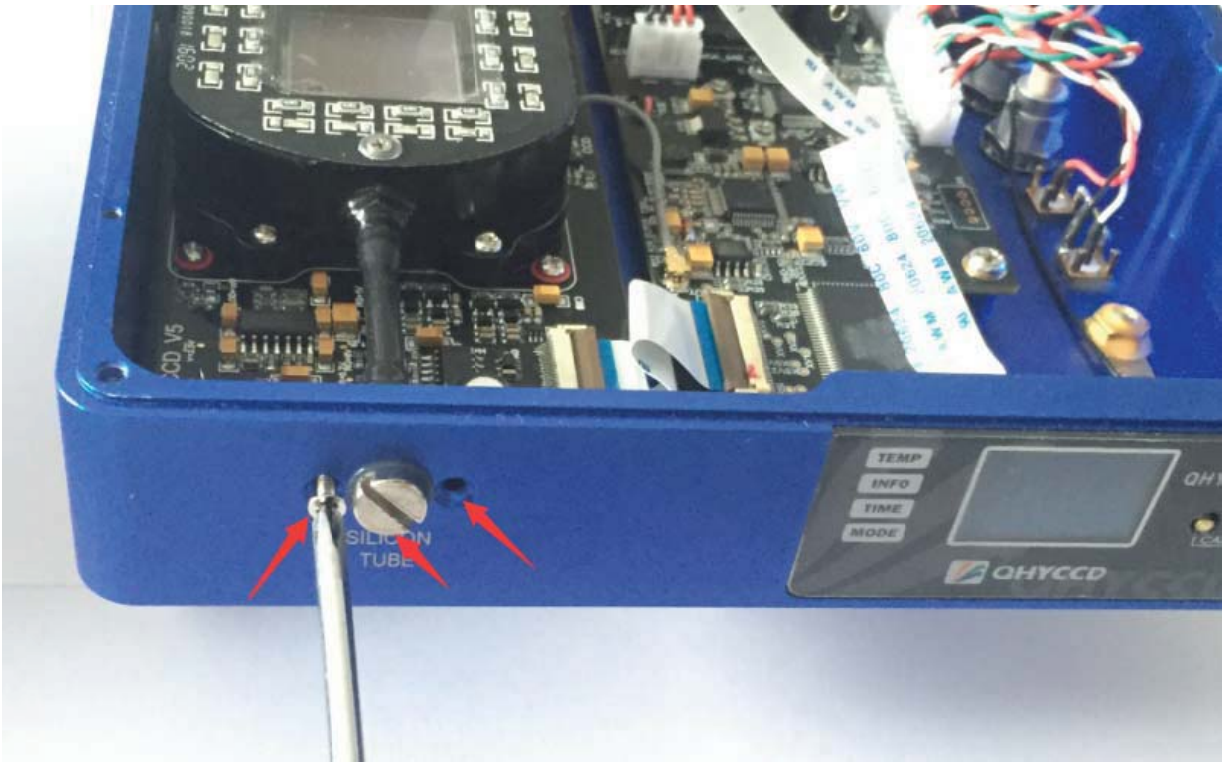


Remove the three cable carefully.

Please use a film to protect the ccd chamber optic window.



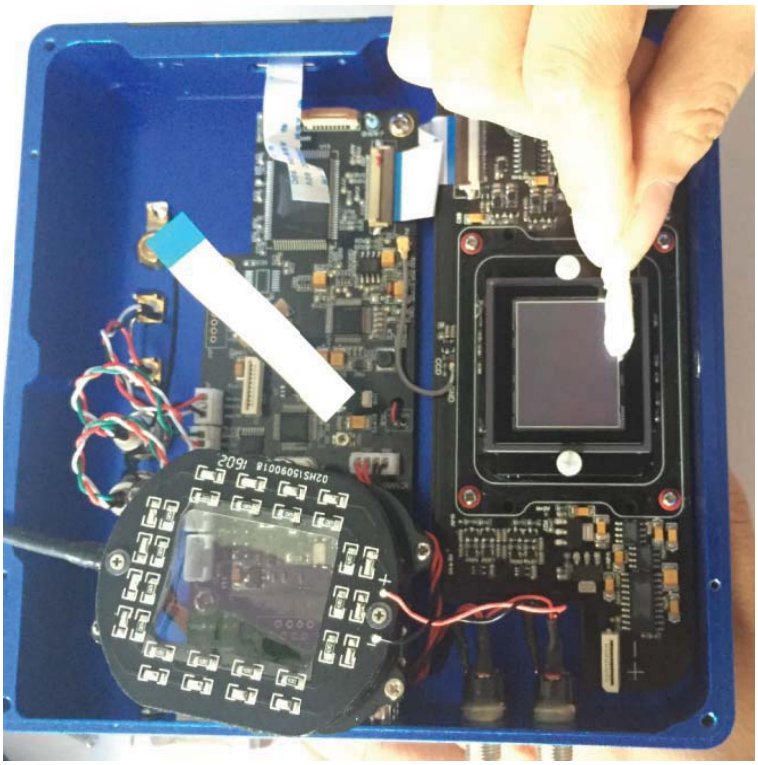
The CCD chamber is connecting with the silicon gel tube socket by a rubber piple. Remove the two screw for the silicon gel socket .



Remove the four screw for the ccd chamber. There is totally eight screws for the ccd chamber. Only remove the four screws pointed by the red arraow in this picture.

Now the ccd chamber is removed . The CCD sensor can be clean here.

The CCD sensor has the AR coating. Please clean it carefully by using the lens paper or another professional tools (like the DLSR sensor clean tools)



FCC ID: 2AJFC-16200A

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment。

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.