



ASI120 Manual

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1. Instruction

Congratulations and thank you for buying one of our ASI Cameras ! This manual will give you a brief introduction to your ASI camera. Please read it thoroughly. If you have any other questions, please feel free to contact us. info@zwoptical.com

ASI120 camera is an excellent choice for those who has just started to make astronomy photographing with affordable price. Its excellent performance and multifunctional usage will impress you a lot!

For software installation instructions and other technical information please refer to “Support” on our official website.

<https://astronomy-imaging-camera.com/>

2. Camera Models and Sensor Type

There are 4 types of ASI120 models:

Models	Mono or Color	Interface	Sensor
ASI120MM	Mono	USB2.0	AR0130CS
ASI120MC	Color	USB2.0	AR0130CS
ASI120MM-S	Mono	USB3.0	AR0130CS
ASI120MC-S	Color	USB3.0	AR0130CS

Why do I choose ASI120?

It is mostly used for planetary imaging. It can also be used for deep sky imaging up to a certain level. This new version comes with an ST4 Auto guider Port, so you may now use it both for imaging and guiding.

Monochrome camera sensors are capable of higher details and sensitivity than color sensors, but you need additional accessories such as filters. The post-processing is more complicated too. So color camera is often recommended for beginner of astrophotographer.

ZWO ASI120-S CMOS Camera follows ASI120. ASI120-S has 3.0 USB port instead of 2.0 port, with faster speed!

3. What's in the box?

ASI120MM and ASI120MC



- 1-ZWO ASI120MM or ASI120MC Camera Body
- 2-2 m long ST4 guider cable
- 3-1.25" Cover
- 4-M42-1.25" T-Mount
- 5-2 m long USB3.0 cable
- 6-Driver & Extra Software CD (Mac, PC&Linux Compatible)

ASI120MM-S and ASI120MC-S



- 1–ZWO ASI120MM-S or ASI120MC-S Camera Body
- 2–2 m long ST4 guider cable
- 3–1.25" Cover
- 4–M42-1.25" T-Mount
- 5–2 m long USB3.0 cable
- 6–Driver & Extra Software CD (Mac, PC&Linux Compatible)

4. Camera technical specifications

Sensor	1/3" CMOS AR0130CS
Resolution	1.2Mega Pixels 1280×960
Pixel Size	3.75μm
Max FPS at full resolution	35FPS(12bit ADC)
Shutter	Rolling shutter
Exposure Range	64μs-1000s
Read Noise	4.0e~6.6e
QE peak	75%
ADC	12 bit
Interface	USB2.0(ASI120MM/MC) USB3.0(ASI120MM-S/MC-S)
Adapters	2" / 1.25" / M42X0.75
Back focus distance	12.5mm
Dimensions	62mm
Weight	100g
Supported OS	Windows, Linux & Mac OSX
Power consumption	100ma@5V (ASI120MM/MC) 150ma@5V (ASI120MM-S/MC-S)
Working Temperature	-5°C~45°C
Storage Temperature	-20°C~60°
Working Relative Humidity	20%~80%
Storage Relative Humidity	20%~95%

Notes:

Our USB2.0 camera is not compatible very well with OSX & Linux. USB3.0 cameras are recommended for Mac & Linux users and fully compatible with USB2.0 host, for more info, please refer to "Support-manual and software" on our official website.

<https://astronomy-imaging-camera.com/>

5. QE Graph & Read Noise

QE and Read noise are the most important parts to measure the performance of a camera.

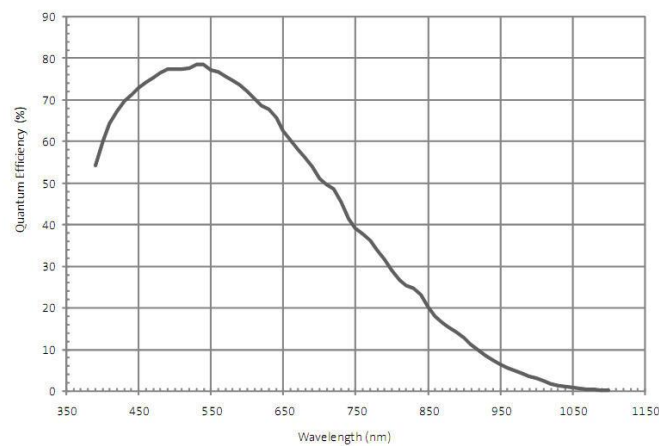
Higher QE and Lower read noise are needed to improve the SNR of an image.

ASI120 is a very fast and sensitive USB2.0 camera. Up to 35FPS under 1280x960 full resolution! With a peak QE of 75%, beyond ICX618 and with no FPN (Fixed pattern Noise)! Long time exposure supported up to 1000s.

Mono 120 sensor

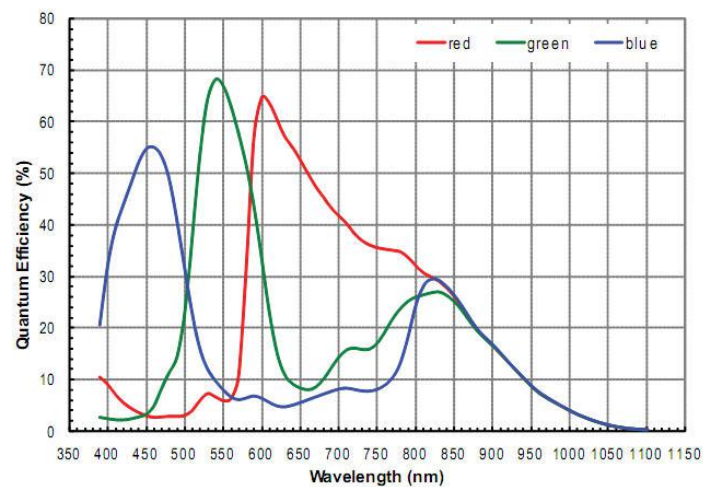
Spectral Characteristics

Figure 23: Quantum Efficiency – Monochrome Sensor



Color 120 sensor

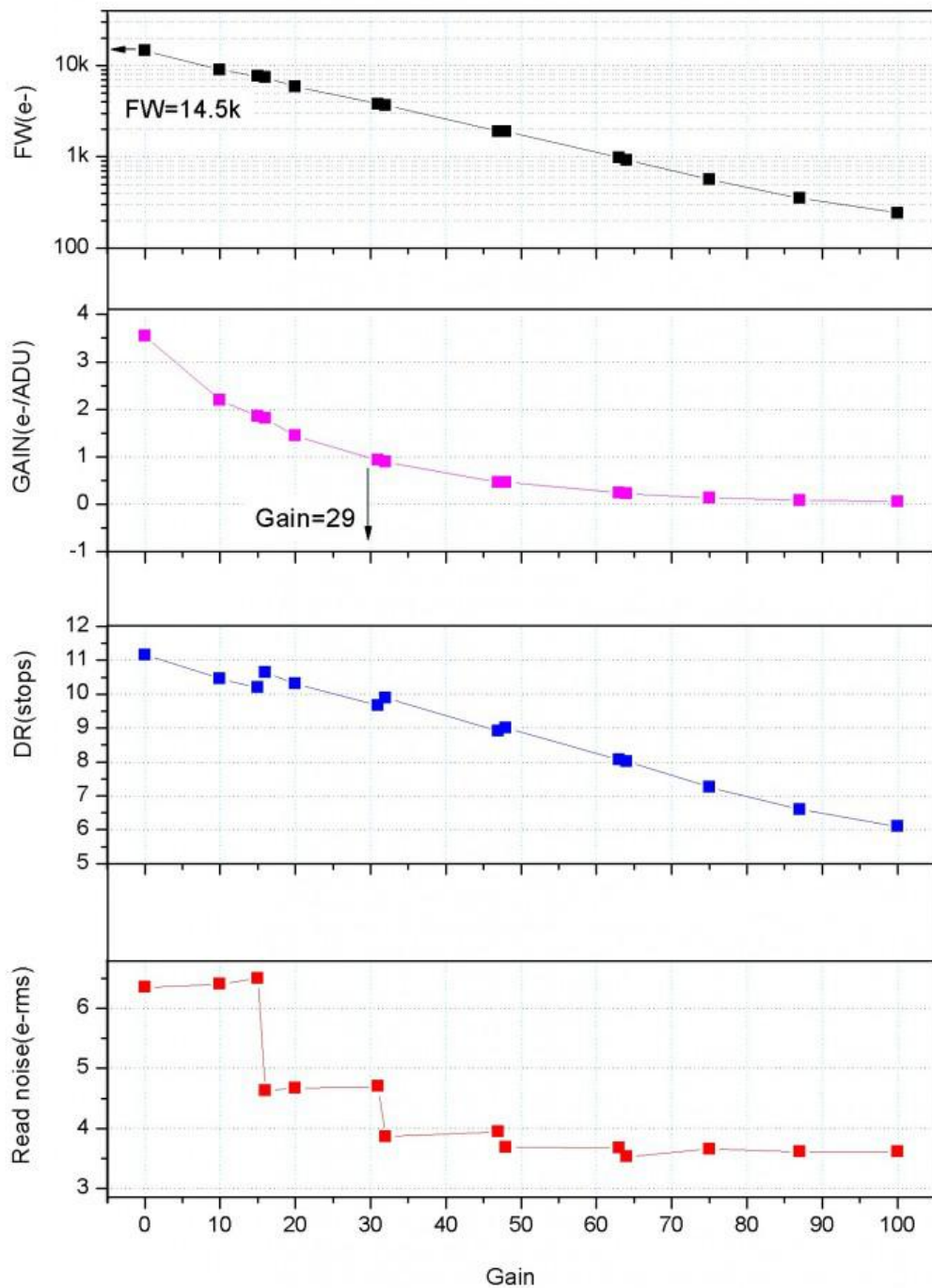
Figure 24: Quantum Efficiency – Color Sensor



Read noise includes pixel diode noise, circuit noise and ADC quantization error noise, and the lower the better.

Depending on your target, you can set the gain lower for higher dynamic range (longer exposure) or set the gain higher for lower noise (such as short exposure or lucky imaging).

Read noise, full well, gain and dynamic range for ASI120



6. Getting to know your camera

6.1 External View

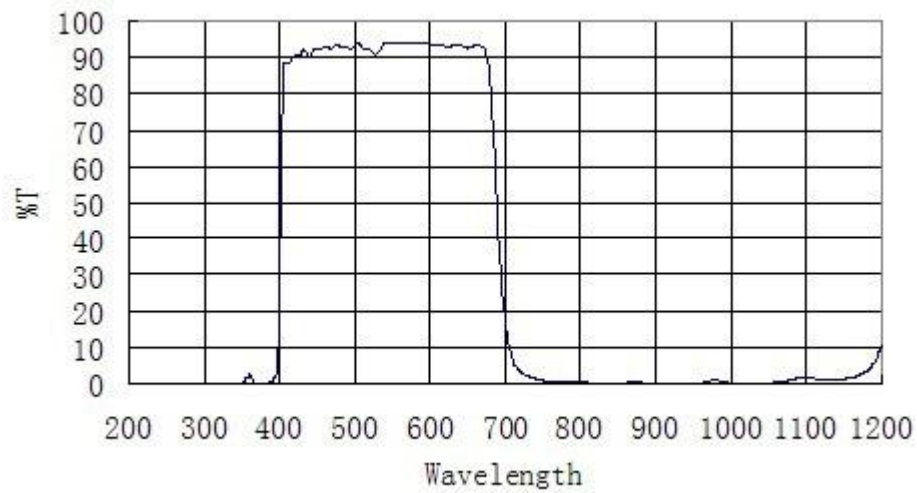


6.2 Protect Window

There is a D21 IR-CUT protect window in the ZWO ASI120MC and ASI120MC-S camera to prevent the sensor from humidity and dust.

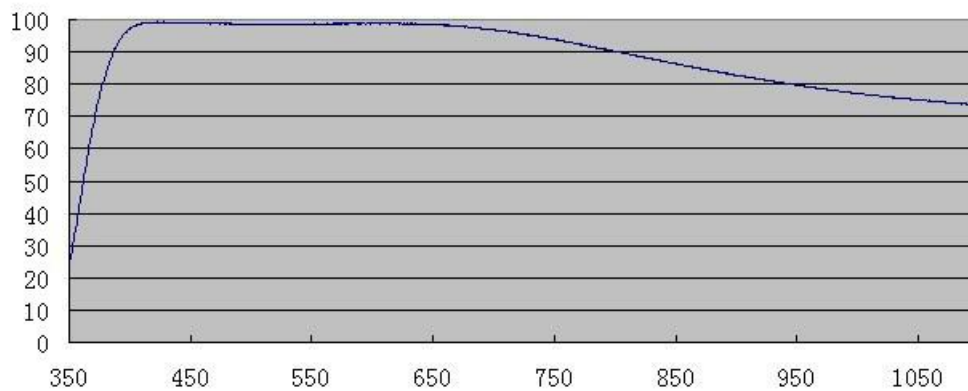
Diameter is 21mm and 1.1mm thick.

Transmission chart of the UV IR-CUT filter



ASI120MM and ASI120MM-S come with the D21 AR protect window.

Transmission chart of the AR filter



6.3 Analog to Digital Converter (ADC)

The ASI20 camera records in 12bit ADC. This camera also supports ROI (region of interest) shooting, and this smaller ROI has faster fps.

Here is the maximum speed of 120MM/120MC running at 12bit ADC .

Resolution	120MM/120MC (12bit)
1280X960	35FPS
1280X720	46FPS
1280X600	55FPS
1280X400	80FPS
960X960	46FPS
1024X768	54FPS
1024X600	69FPS
1024X400	101FPS
800X800	66FPS
800X640	74FPS
800X512	102FPS
800X400	108FPS
800X320	158FPS
640X560	98FPS
640X480	113FPS
512X440	123FPS
512X400	135FPS
480X320	165FPS
320X240	215FPS

Here is the maximum speed of ASI120MM-S/120MC-S running at 12bit ADC .

Resolution	120MM-S/120MC-S (12bit)
1280X960	60FPS
1280X720	98FPS
1280X600	116FPS
1280X400	168FPS
960X960	74FPS
1024X768	90FPS
1024X400	160FPS
800X800	85FPS
800X640	106FPS
800X48	141FPS
640X480	133FPS
512X440	145FPS
512X400	158FPS
480X320	196FPS
320X240	254FPS

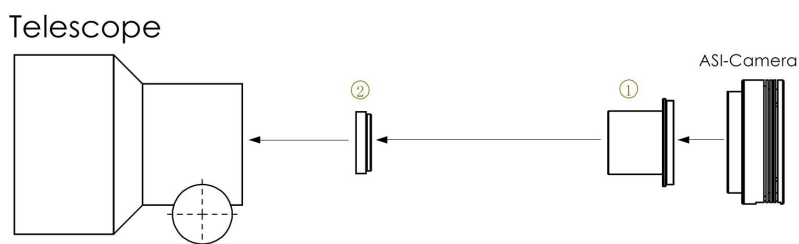
6.4 Binning

The ASI120 camera supports software bin2 mode. You should use 10bit ADC. We recommend customer to use software binning if you don't care speed.

7. How to use your camera

You can refer to the connecting drawing blow:

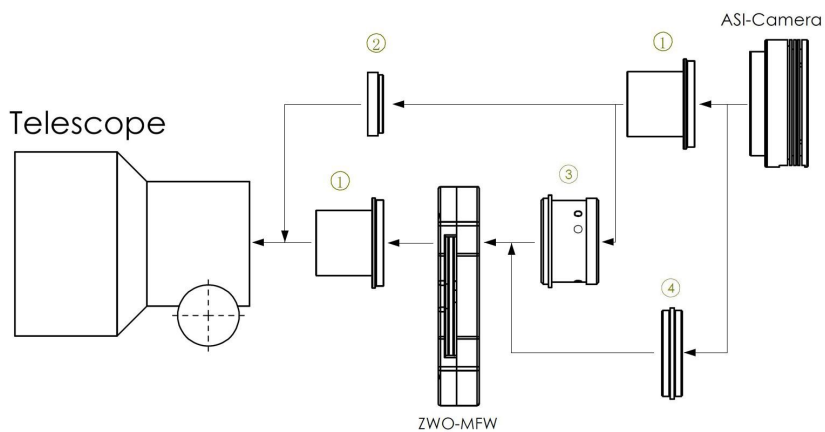
Color camera connecting drawing:



1. 1.25" T-Mount

2. 1.25" filter(optional)

Mono camera connecting drawing:



1. 1.25" T-Mount

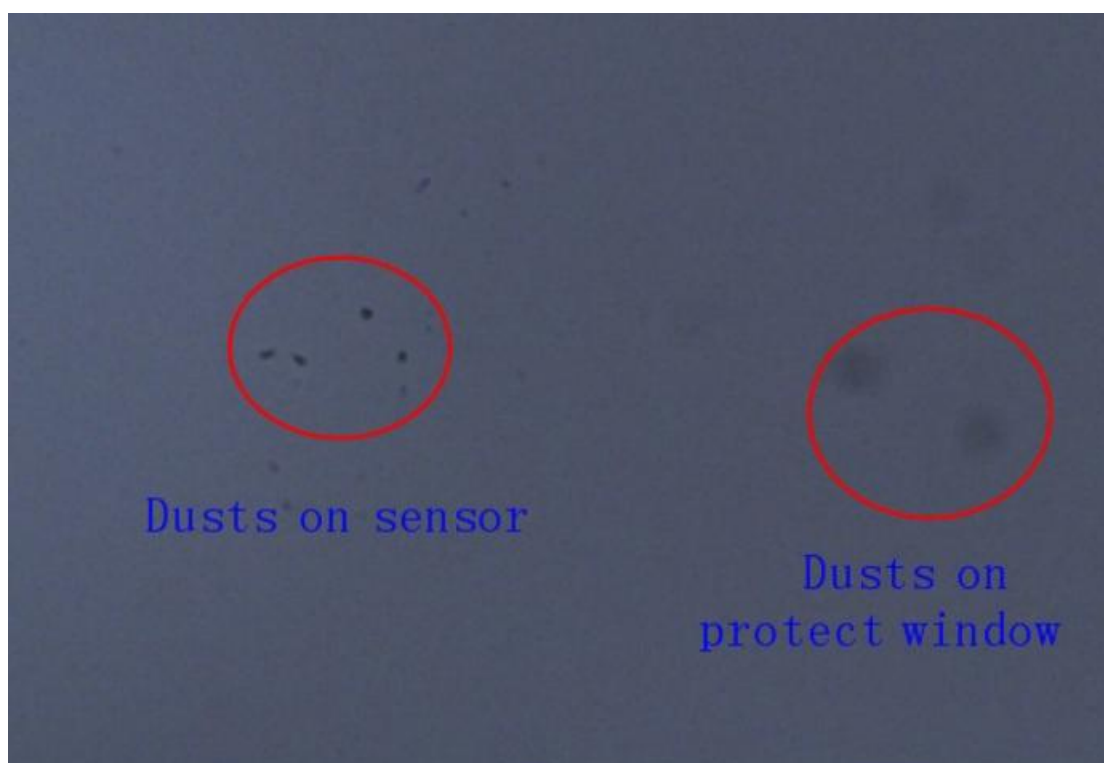
2. 1.25" filter(optional)

3. M42-1.25" adapter

4. M42-M42 (Male screw thread)

8. Cleaning

The camera comes with an AR or IR-CUT protect window, which can protect the sensor from dust and humidity. Should you need to clean the sensor, it's better to do so during the daytime. To see the dust, you just need to setup your telescope and point it to a bright place. A Barlow is required to see these dusts clear. Then attach the camera and adjust the exposure to make sure not over exposed. You can see an image like below if it's dirty.



The big dim spot on the image (at right) are the shadows of dust on the protect window.

The very small but very dark spot in the image (at left) are the shadows of the dusts on the sensor.

The suggested way to clean them is try to blow them away with a manual air pump. To clean the dust on the sensor you will need to open the camera body. Simply screw off the cover by hand in a counter-clockwise direction.

Keep in mind that the sensor is an optical device and all precautions must be taken to prevent dust or scratches on the input window. If there is dirt that doesn't come off with the air pump, here are the steps to clean it.

Equipment

- Ethanol.
- Cleaning medium (wipes, optical paper, cotton buds).
- Filtered blow-off gun (preferably with static charge neutralizing capability).

- Area protected from electrostatic discharges and equipped with ground straps.

Preparations

- Wear vinyl gloves or finger cots without talcum powder.
- Make use of anti-ESD equipment: Ground straps, ionizers etc.

Recommendations

- Never clean with a dry cleaning medium.
- Soak the cleaning medium with alcohol and do not pour it directly on the window.
- Clean the window only if necessary.

Operating Procedure

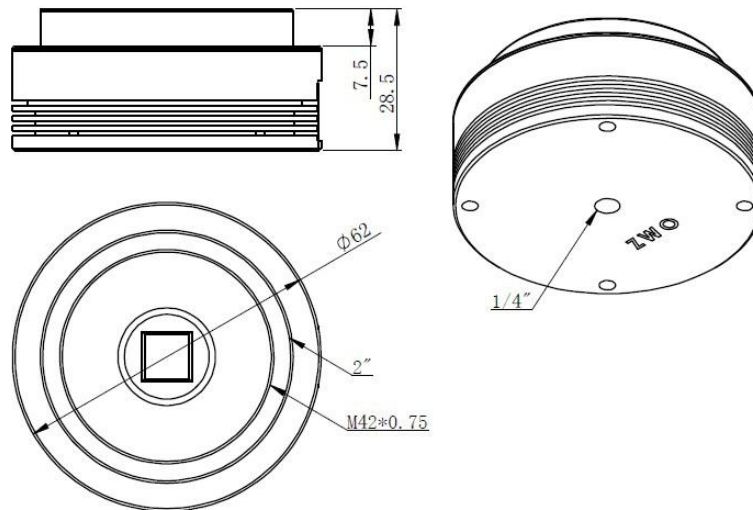
- Clean the glass window with an air-jet (using the blow-off gun).
- If stains or dust remain;
 - Soak the cleaning medium with alcohol and wipe the glass window in a single movement

From one side to another.

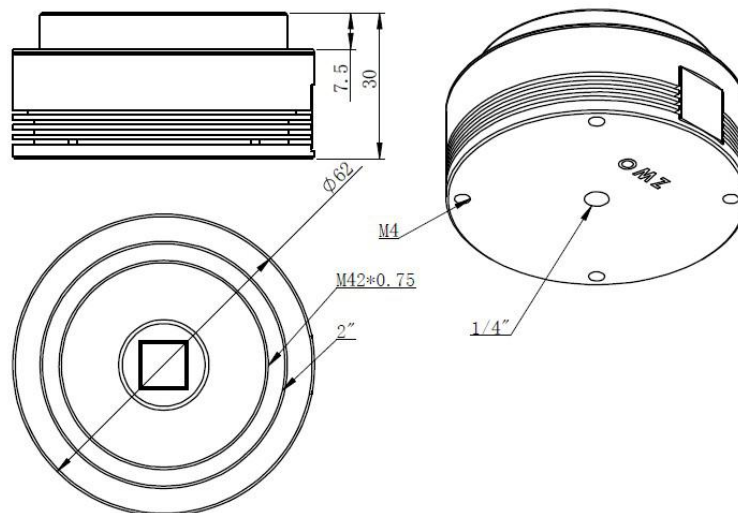
- Always use a clean part of the cleaning medium for each new attempt.
- Adapt the speed of the wiping action to let alcohol evaporate without leaving traces.
- Optionally, use the blow-off gun to clean the window once more.

9. Mechanical drawing

ASI120MM/ASI120MC



ASI120MM-S/ASI120MC-S



10. Servicing

For software upgrades please refer to “Support-manual and software” on our official website.

<https://astronomy-imaging-camera.com/>

Repairs and servicing are available by emailing info@zwoptical.com

For customers who bought the camera from your local dealer, dealer is responsible for the customer service.

11. Warranty

We provide 2-year warranty for our products. We offer repair service or replacement for free if the camera doesn't work within warranty period.

After the warranty period, we continue to provide repair support and service on a charged basis.

This warranty does not apply to damage that occurred as a result of abuse or misuse, or caused by a fall or any other transportation failures after purchase.

Customer must pay for shipping when shipping the camera back for repair or replacement.