Player One

Professional Cooled Camera Manual

V1.3

Player One

Professional Cooled Camera Features

Cooled camera series is our most advanced product line

Rear/Front Sensor Tilt Plate

To obtain a flatter image field

When do solar imaging with prominence telescope, the Newton ring is annoying. Smoother solar image without Newton ring could be taken by adjusting the sensor tilt plate. Besides, when you use a planetary camera for DSO lucky imaging, if you found the stars in corner are not perfect, you can adjust the sensor tilt plate to obtain a flatter image field. get a much smaller field curvature of the telescope.

Deep cooling

High quality 2-stage TEC cooling system

Cooling system is the core of cooled camera, we did an innovation on it, can give deeper cooling than a lot of competitors.

DDR buffer

512MB DDR3 Buffer

It helps stabilize and secure data transmission, it effectively avoids frame dropping and greatly reduces readout noise. Buffer size is according to the total pixels of camera, we has 3 different buffer size for cooled camera line!

BFL Solution

Complete imaging train solution

Player One provide a lot of accessories for cooled cameras, such like filter wheel, filter drawer, OAG, adapters, can make sure the imaging system working on right BFL (back focal length).

Player One

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»01 Camera line introduction

Over view of cooled camera line

One Map to understand cooled camera line

Cooled Camera Line

Aluminium Camera

Zeus Series
FF format
IMX455
Mono/Color

Poseidon Series
APS-C format
IMX571
Mono/Color

Artemis Series
4/3” format
IMX492 Mono/
IMX294 Color

Compatible Accessories:
Filter Drawer MAX, FHD-OAG MAX
Phoenix Wheel 7x36mm/7x2”/7x50mm/5x2”

Carbon Fiber Camera

Ares Series
1” format
IMX533
Mono/Color

Uranus Series
1/1.2” format
IMX585
Mono/Color

Apollo Series
1.1” format
IMX 428/432
Mono

Compatible Accessories:
Filter Drawer MINI, FHD-OAG MINI
Phoenix Wheel 8x1.25”

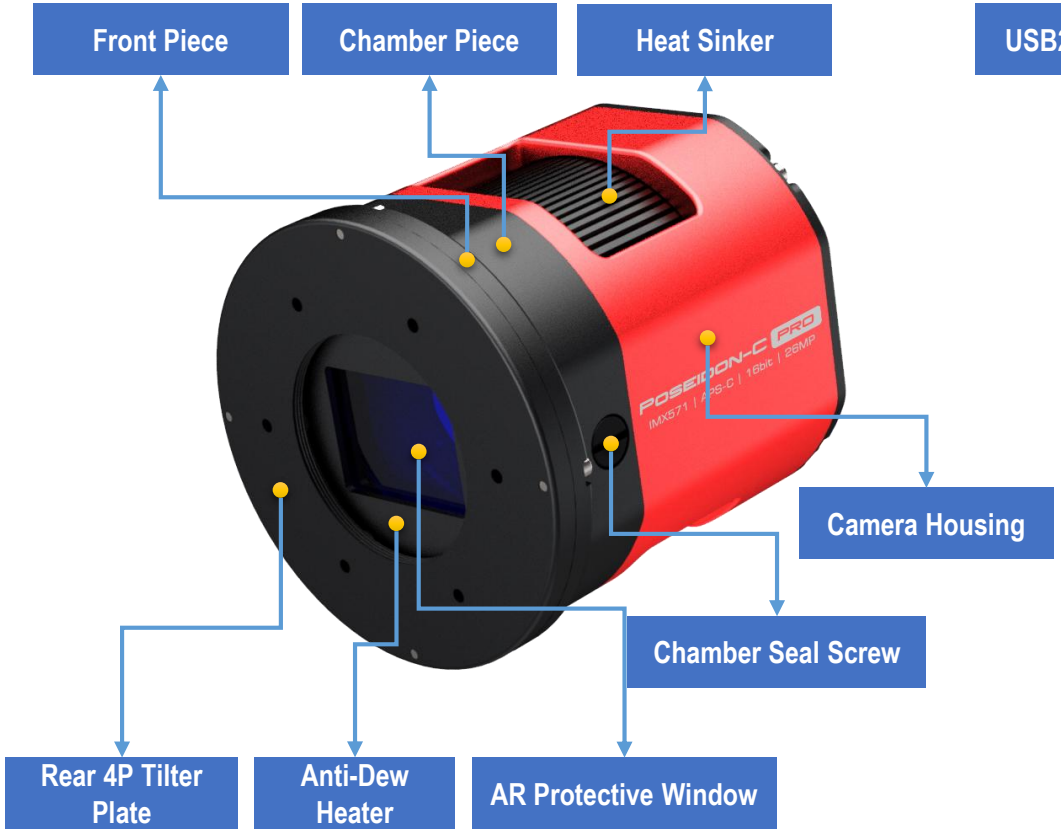
Cooled Camera Specification

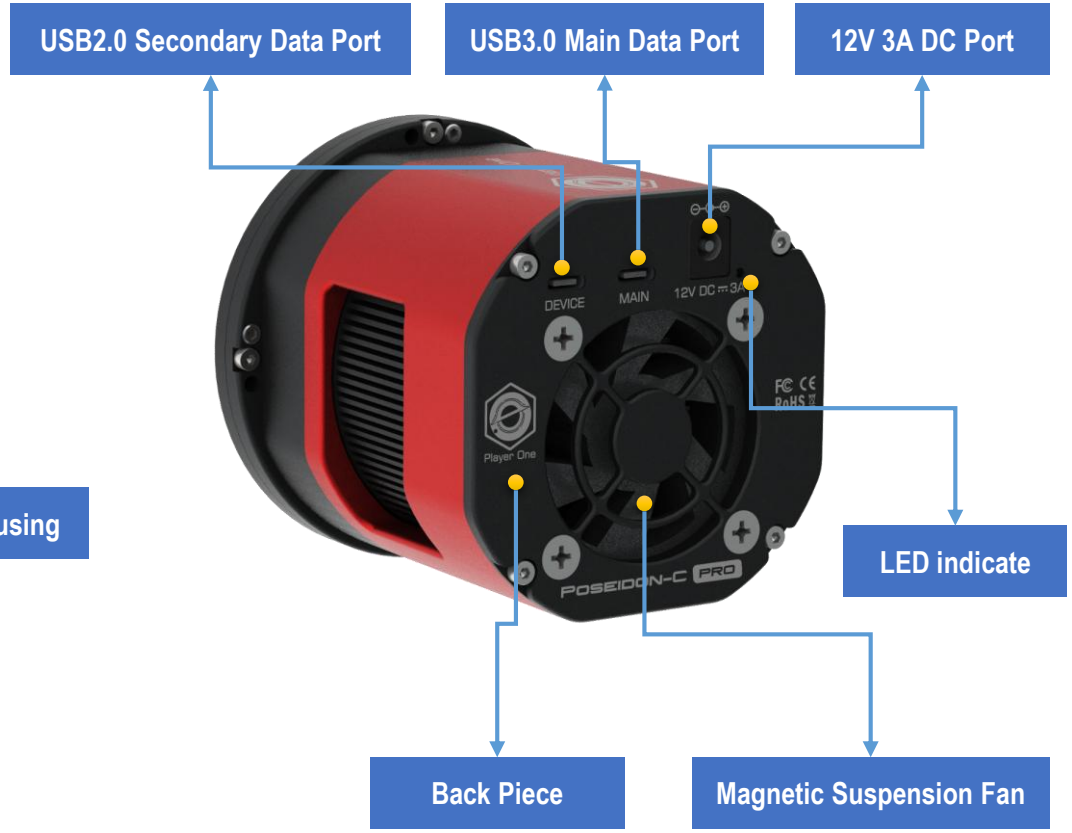
Model	Sensor	Format	Resolution	Total Pixel	Pixel Size	Noise	QE	FW	Delta-T	ADC	FPS	Exposure Range	Window	Bayer Pattern	Shutter	Weight	BFL
ZEUS 455M PRO	IMX455 mono	36×24mm (FF)	9576×6388	61MP	3.76μm	4.2-1.27e	≈91%	71.6ke	-35℃±2℃	16bit	6.5FPS	32μs-2000s	AR	-	Rolling	650g	17.5mm
ZEUS 455C PRO	IMX455 color	36×24mm (FF)	9576×6388	61MP	3.76μm	4.2-1.27e	≈80%	71.6ke	-35℃±2℃	16bit	6.5FPS	32μs-2000s	AR	RGGB	Rolling	650g	17.5mm
Poseidon-M PRO	IMX571 mono	23.5×15.7mm (APS-C)	6252×4176	26MP	3.76μm	3.9-1.0e	≈91%	71.7ke	-40℃±2℃	16bit	15FPS	32μs-2000s	AR	-	Rolling	650g	17.5mm
Poseidon-C PRO	IMX571 color	23.5×15.7mm (APS-C)	6252×4176	26MP	3.76μm	3.9-1.0e	≈80%	71.7ke	-40℃±2℃	16bit	15FPS	32μs-2000s	AR	RGGB	Rolling	650g	17.5mm
Artemis-M PRO	IMX492 mono	19.2×13mm (4/3")	8288×5648	47MP	2.3μm	7.7-1.46e	≈90%	18.6ke	-40℃±2℃	12bit	8FPS	32μs-2000s	AR	-	Rolling	650g	17.5mm
Artemis-C PRO	IMX294 color	19.2×13mm (4/3")	4144×2824	11.7MP	4.63μm	7.8-1.2e	≈75%	65.8ke	-40℃±2℃	14bit	33FPS	32μs-2000s	AR	RGGB	Rolling	650g	17.5mm
Ares-M PRO	IMX533 mono	11.31×11.31mm (1")	3008×3008	9MP	3.76μm	4.46-1e	≈91%	73ke	-35 ℃-40℃	14bit	43FPS	32μs-2000s	AR	-	Rolling	420g	17.5mm
Ares-C PRO	IMX533 color	11.31×11.31mm (1")	3008×3008	9MP	3.76μm	4.46-1e	≈80%	73ke	-35℃-40℃	14bit	43FPS	32μs-2000s	AR	RGGB	Rolling	420g	17.5mm
Uranus-M PRO	IMX585 mono	11.2×6.3mm (1/1.2")	3856×2180	8.3MP	2.9μm	6.5-0.7e	≈91%	47ke	-35℃-40℃	12bit	47FPS	32μs-2000s	AR	-	Rolling	420g	17.5mm
Uranus-C PRO	IMX585 color	11.2×6.3mm (1/1.2")	3856×2180	8.3MP	2.9μm	6.5-0.7e	≈91%	47ke	-35℃ -40℃	12bit	47FPS	32μs-2000s	AR	RGGB	Rolling	420g	17.5mm
Apollo-428M MAX PRO	IMX428 mono	14.5×9.9mm (1.1")	3216×2208	7.1MP	4.5μm	5.5~1.4e	≈79%	25.3ke	-35℃ -40℃	12bit	51FPS	32μs-2000s	AR	-	Global	420g	17.5mm
Apollo-M MAX PRO	IMX432 mono	14.5×9.9mm (1.1")	1608×1104	1.7MP	9μm	22.9~2.6e	≈79%	100ke	-35℃ -40℃	12bit	126FPS	32μs-2000s	AR	-	Global	420g	17.5mm

» 02 Camera external view

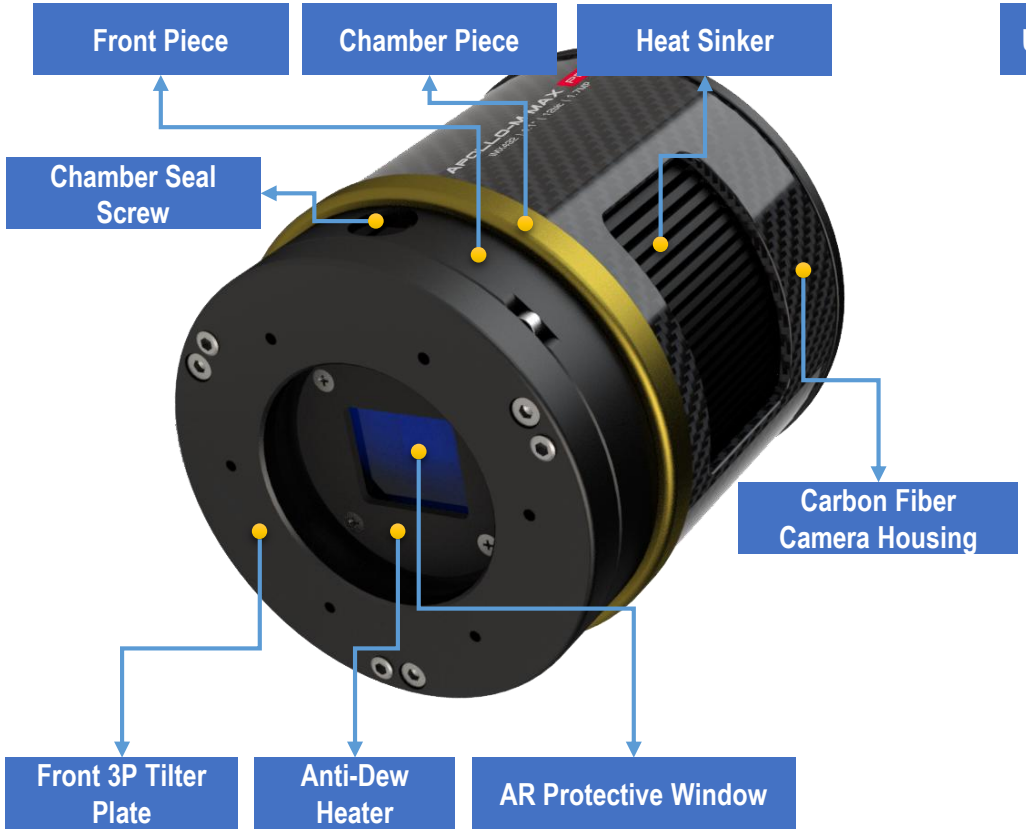
Familiar with cooled camera

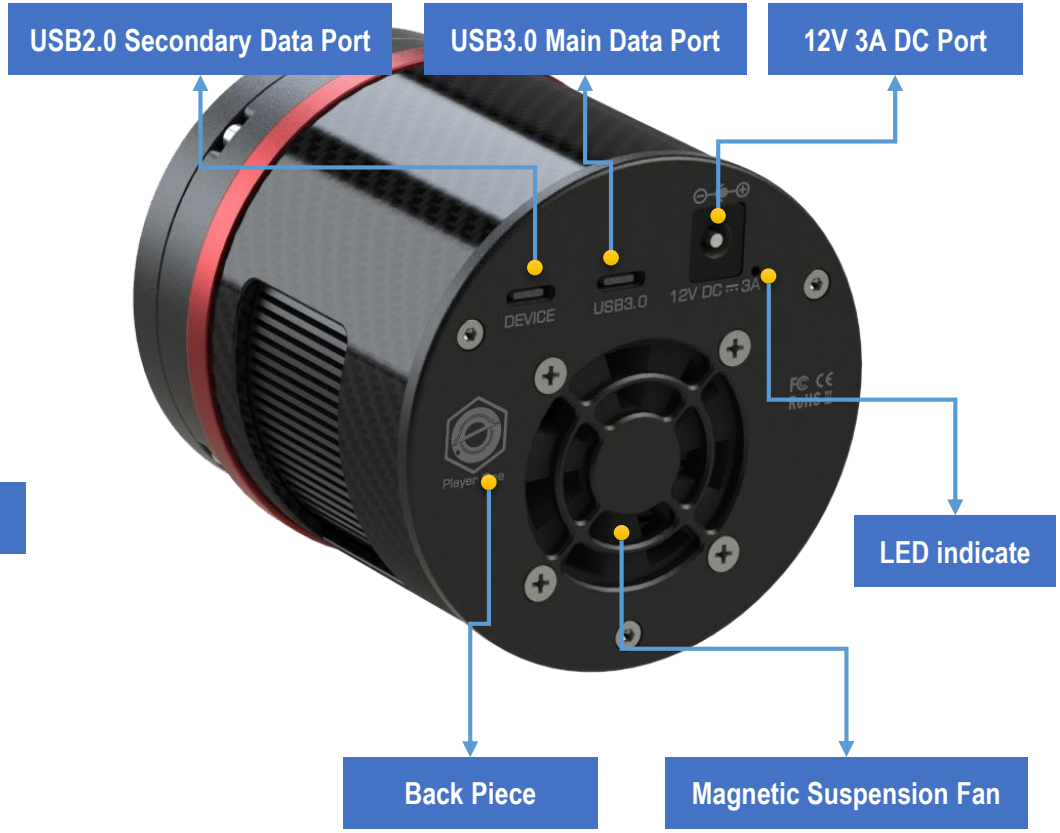
2. Camera external view





2. Camera external view

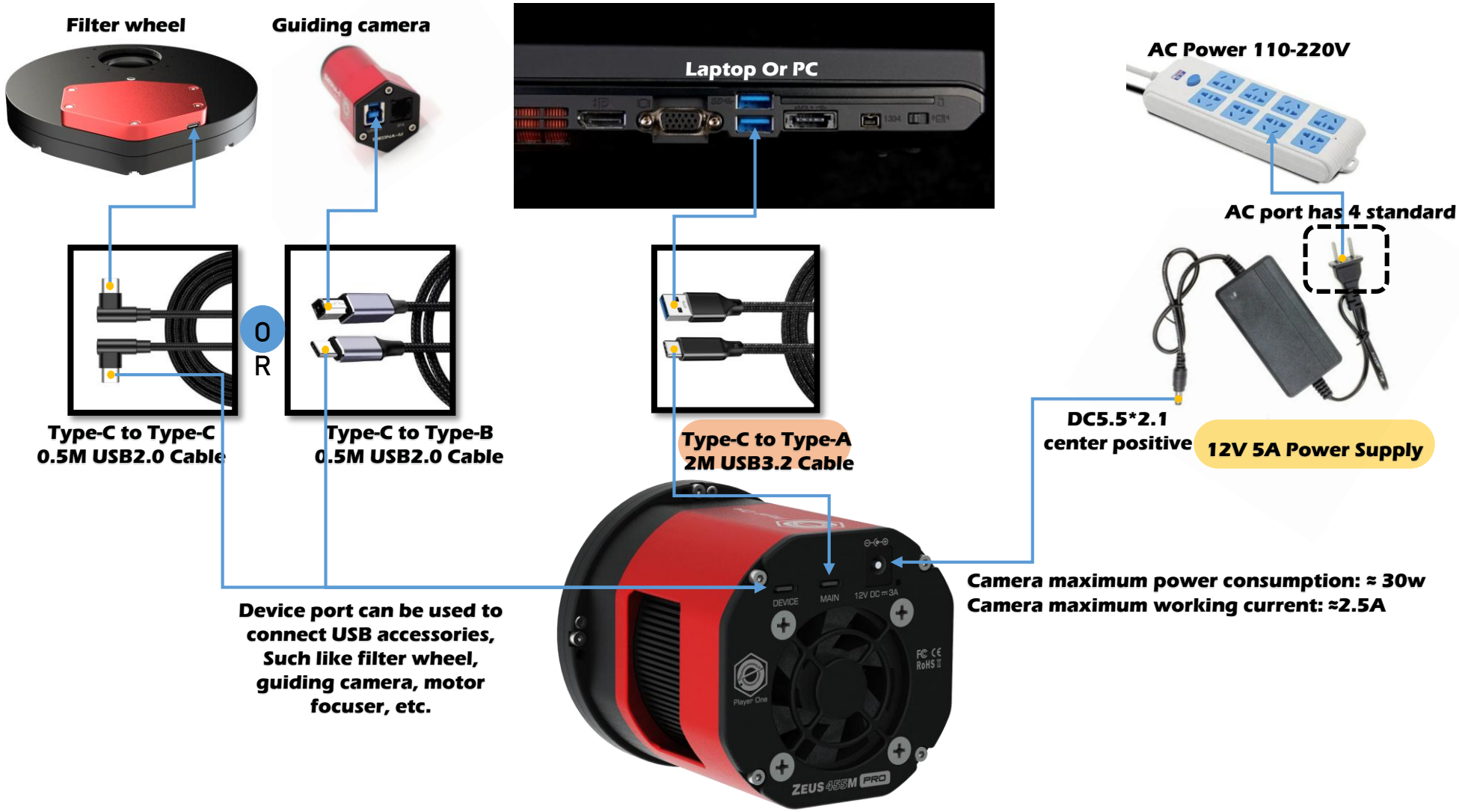




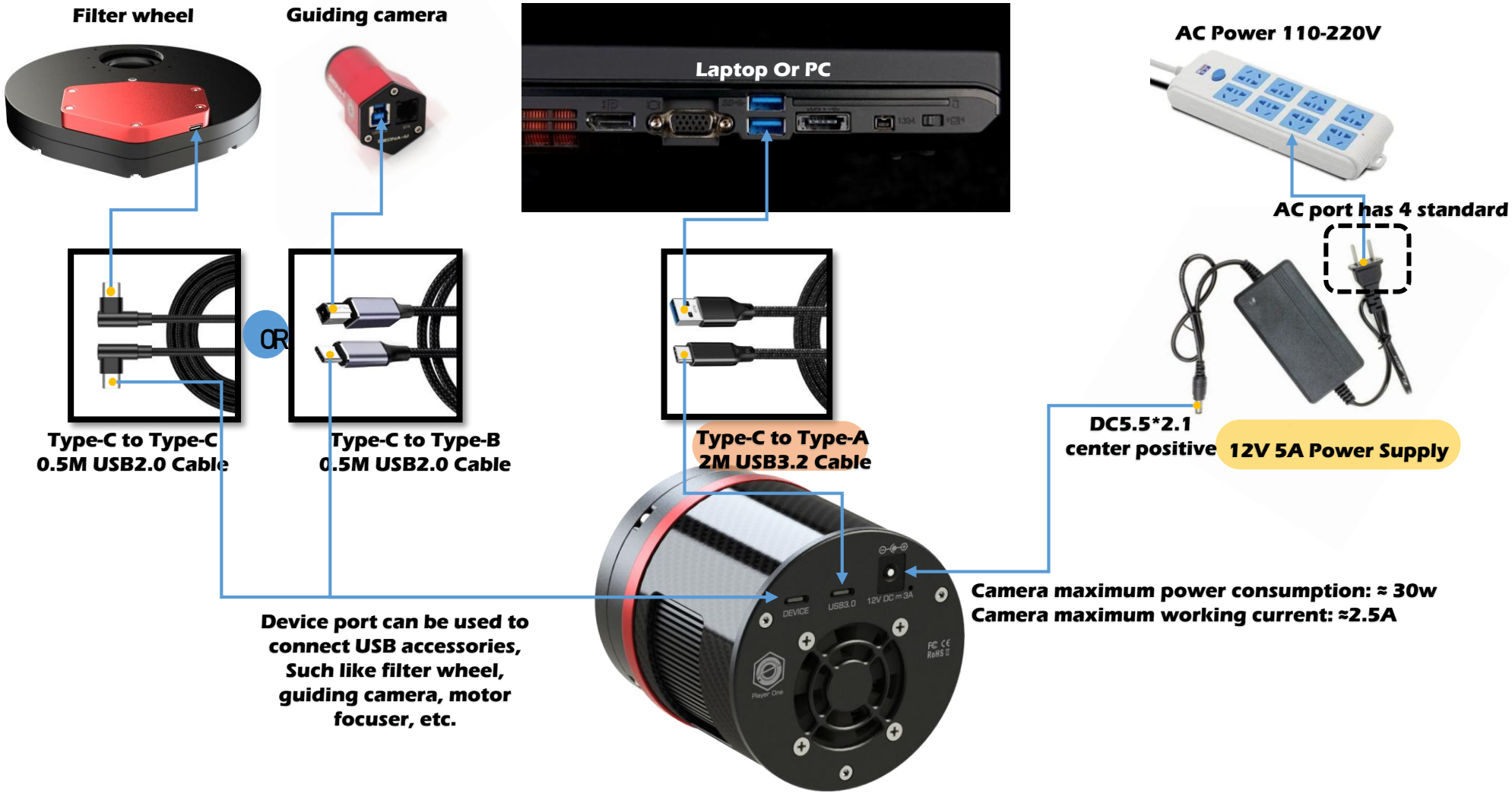
» 03 Cable connections

Familiar with all cables

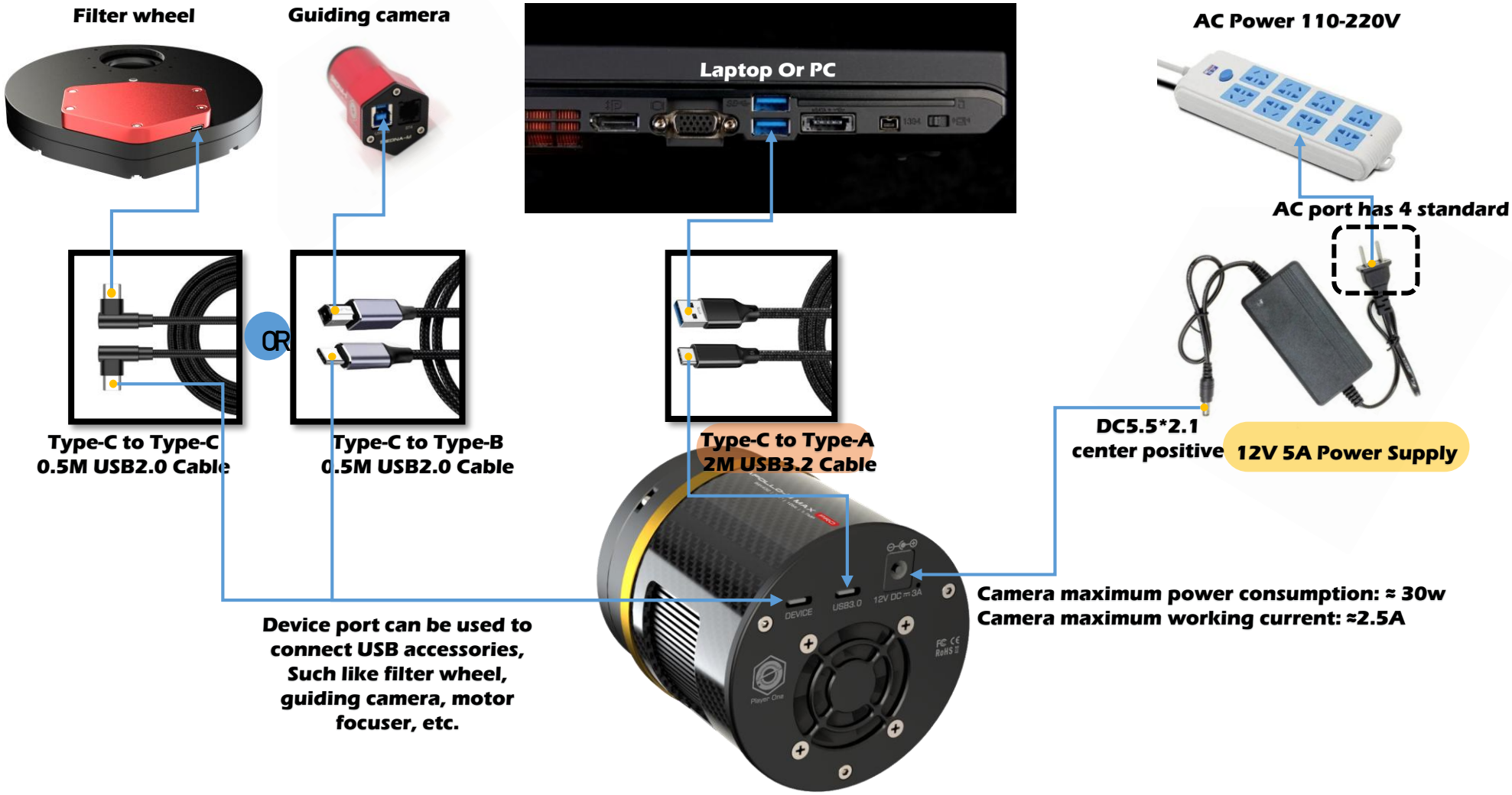
3. Cable connections



3. Cable connections



3. Cable connections



Optional accessory:

Power supply is necessary if you want to open cooling system of cooled camera. It has different adapter so we can't put it into camera standard package list.
Purchase link:

»04 Driver and software installation

First time to run your camera

4.Driver and Software installation

Player One

1. Open Player One website to download:

https://player-one-astronomy.com/service/software/

For planetary imaging, Sharpcap 4 and upper is supported.

For DSO imaging, ASCOM 6.5 is supported.

Windows 7/8/10/11 is supported.

Linux and Mac OS is supported.

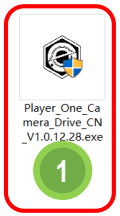
Home » Service » Software

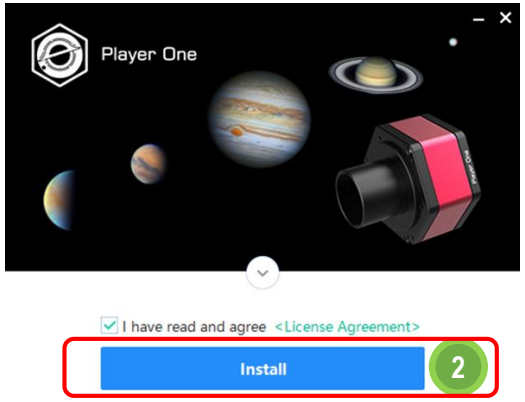
Native Driver				
Camera Driver	Windows users must install the native driver to use the camera.	V1.1.2.4	Released: 2021/02/04	Download
Camera SDK	SDK is provided for developers to do secondary development based on Player One cameras	V1.1.2.25	Released: 2021/02/25	Download

2. Driver installation （Don't connect the camera before installation）

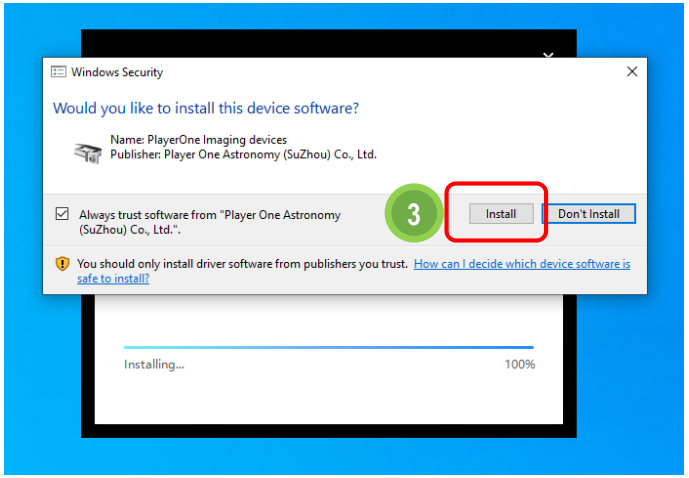
1) Double-click the driver installation package to enter the installation page

2) Click "Install" and wait for completion

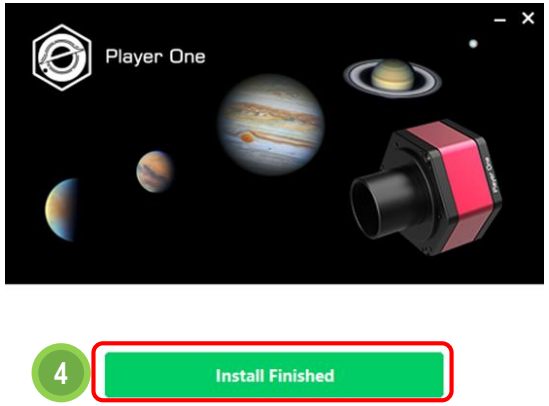




3)In first installation, your computer will show up Windows Security window, please click "Install".

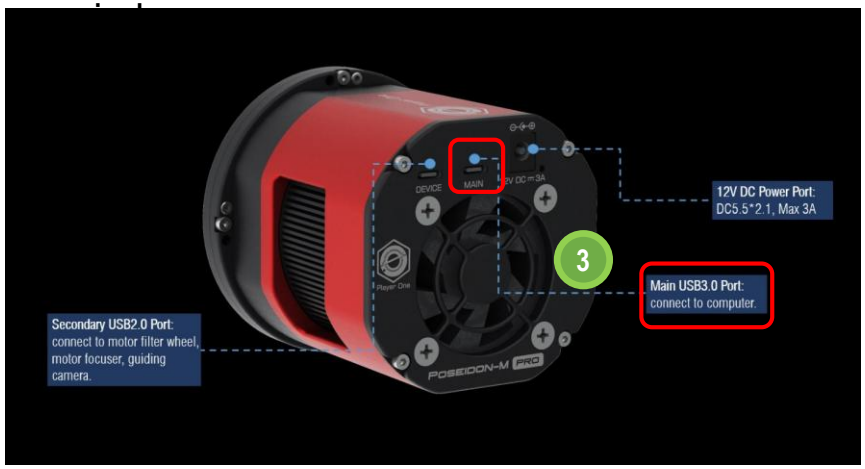


4)Click "Install Finished" to finish installation.

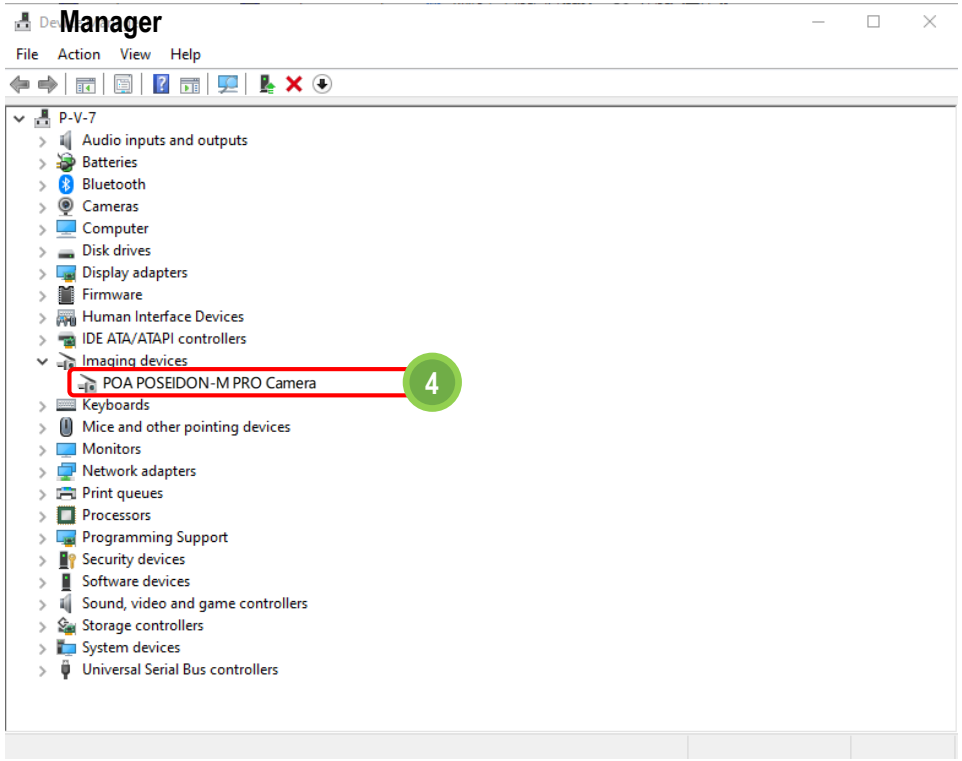


4.Driver and Software installation

5) After installation, connect the camera to the computer USB3.0 port through USB cable, and the camera will be automatically



6) View the camera status in Device Manager



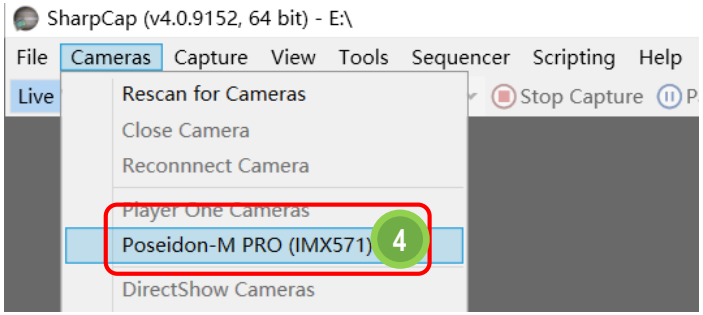
3. Install capture software

1) After the installation of the driver, you will need to install a capture software such as SharpCap.

2) Select the installation path (the default path is generally recommended).

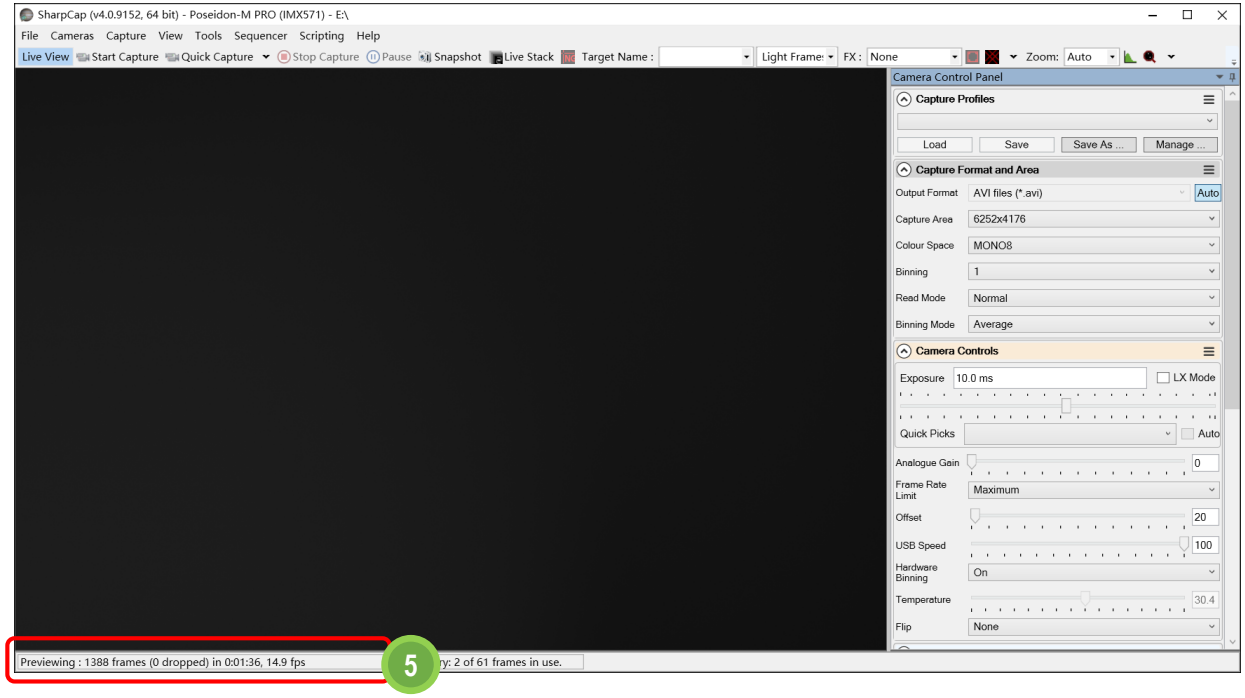
3) After the installation is completed, open the software.

4) Open Camera: under the Cameras menu, go to Player One Cameras and select the available camera models.



5) Check FPS

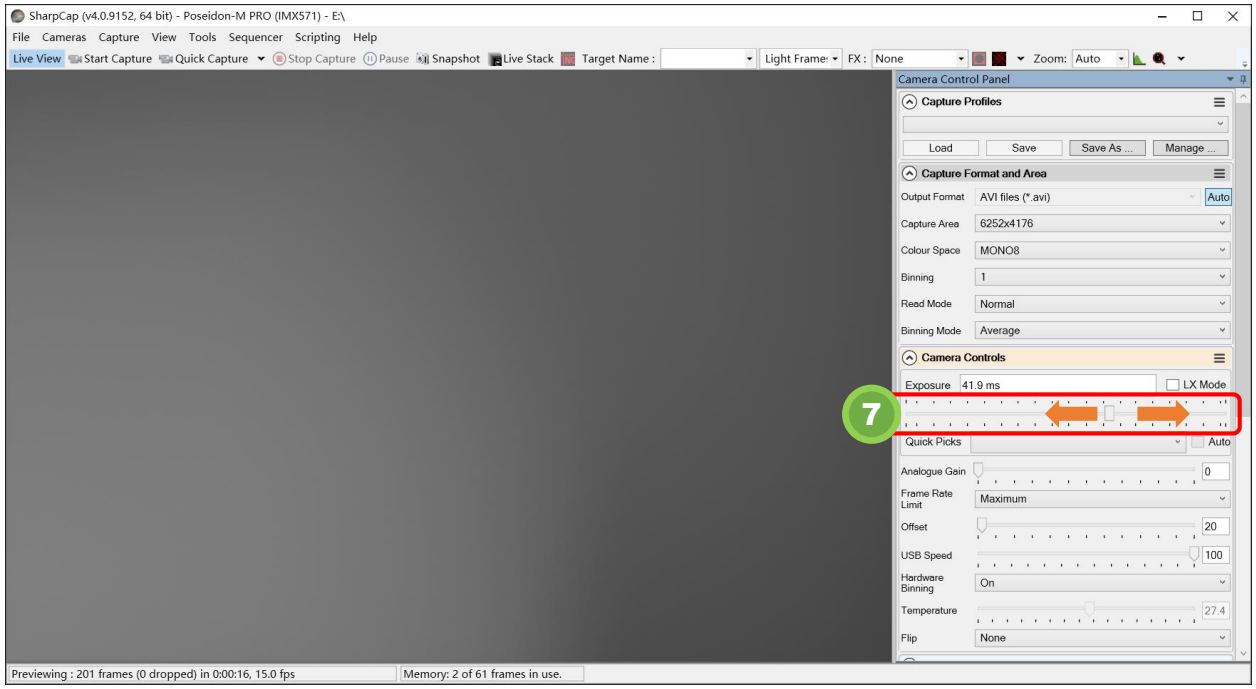
FPS is a very important parameter, if FPS show a normal value such like the fps in camera specification, means the camera can transmit data to your computer normally.



4.Driver and Software installation

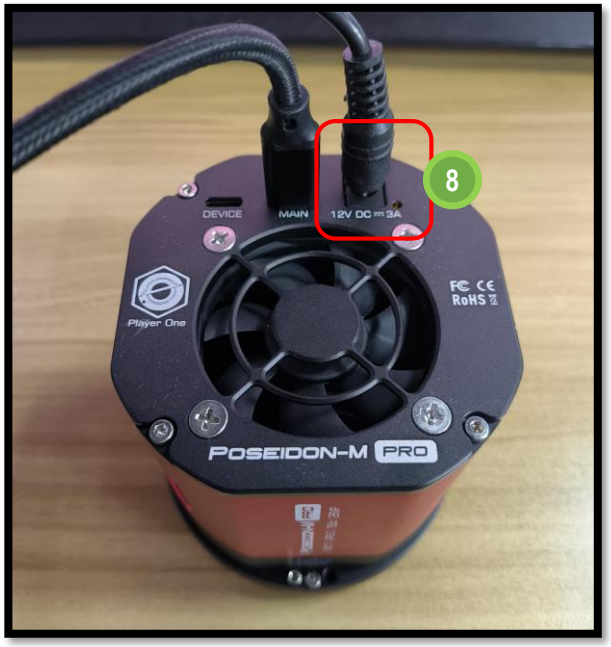
6) Remove the camera cover

7) Check the preview. Adjust the exposure, you will see the change of brightness from the preview. That means the camera is working normally.

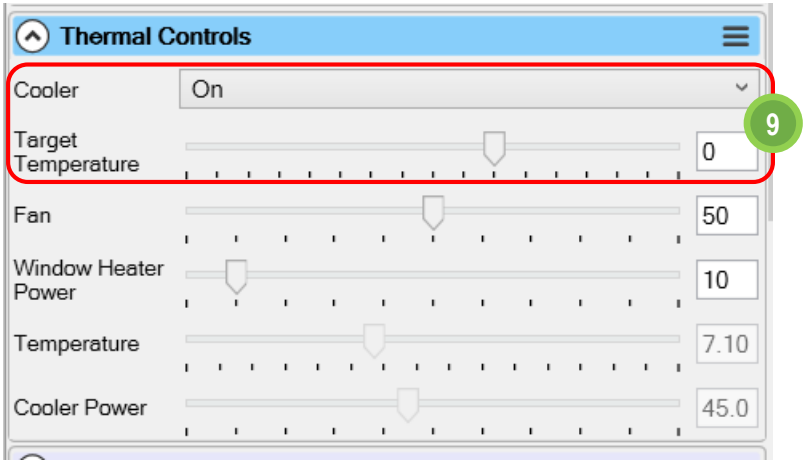


4.Driver and Software installation

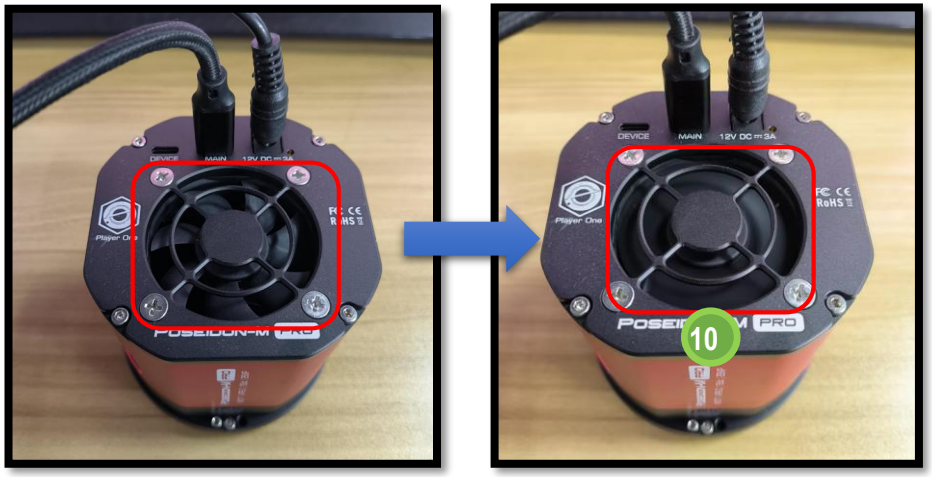
8) Plugin the 12V power supply



9) Cooler set “On” , and set target temperature to 0 degree.



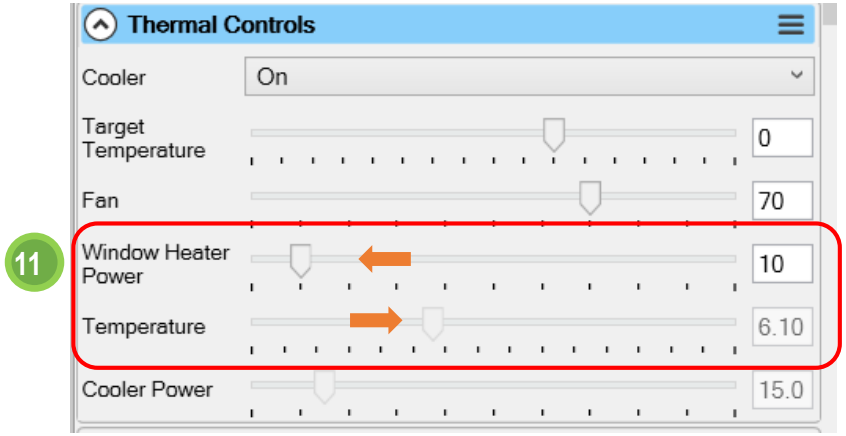
10) Check the Fan is running or not.



Not running

Running

11) Check the Temperature drop down from ambient temperature and Cooler Power rising up from 0.



If all functions are normal as the manual said, it means the camera works very well!

» 05

Imaging train

How to setup entire imaging train

5. Imaging Train

In deep sky imaging, telescope and camera is not enough, we also need some necessary accessories, like filter drawer, filter wheel, OAG and etc.

And some telescope required flattener or Coma corrector, when use those optical accessories, we must considering back focal length (BFL). Most flattener or Coma corrector was designed 55mm BFL.
Our accessories system already considered almost all combinations.

Color Cooled Camera + Filter Drawer + DSLR Lens

Mono Cooled Camera + Filter Wheel +

Reference on the right show up 4 different common imaging train.

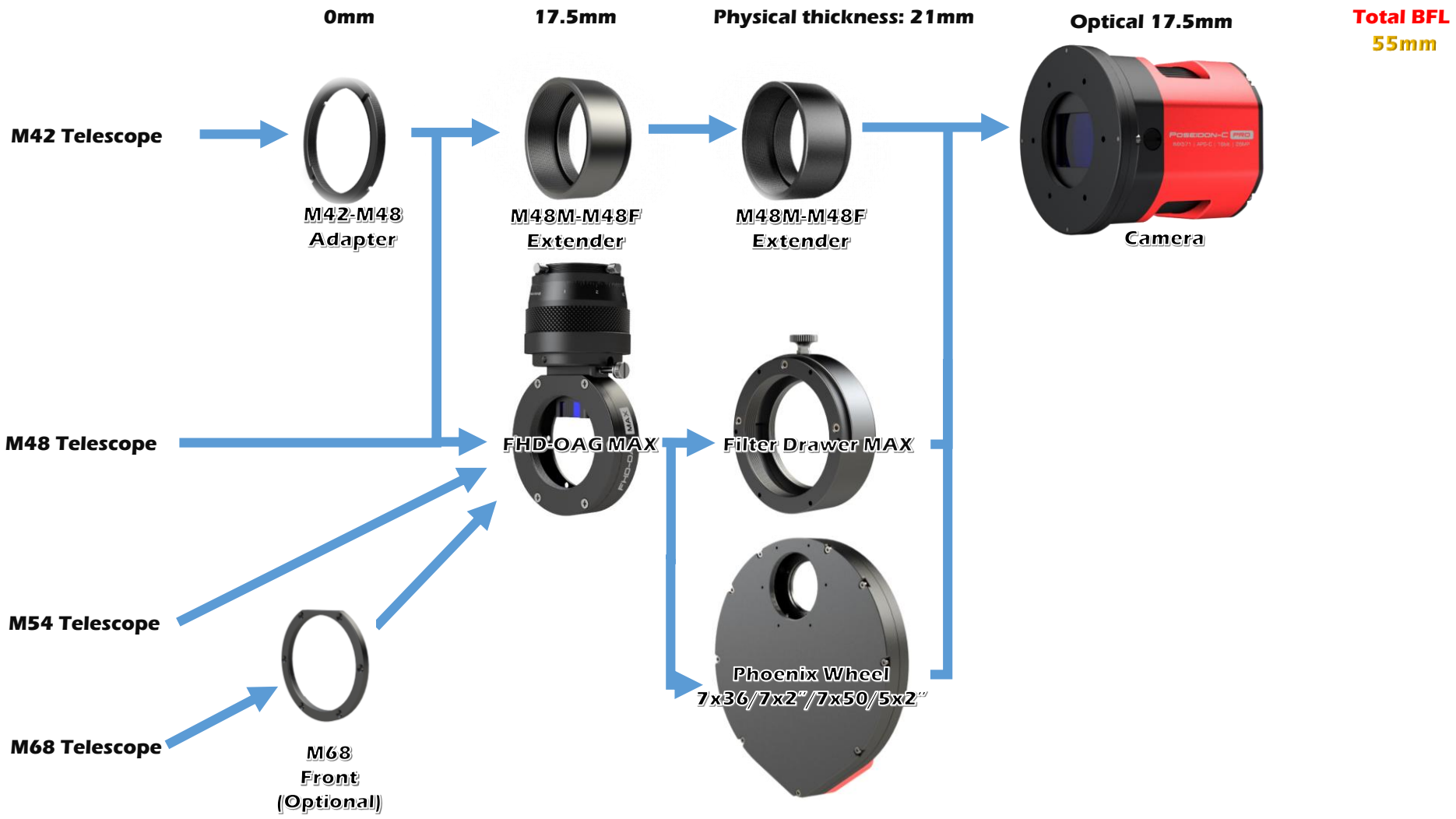
Drawing in next page, is our entire BFL solution for two kind of cooled cameras.

Color Cooled Camera + Filter Drawer + OAG + Telescope

Mono Cooled Camera + Filter Wheel + OAG

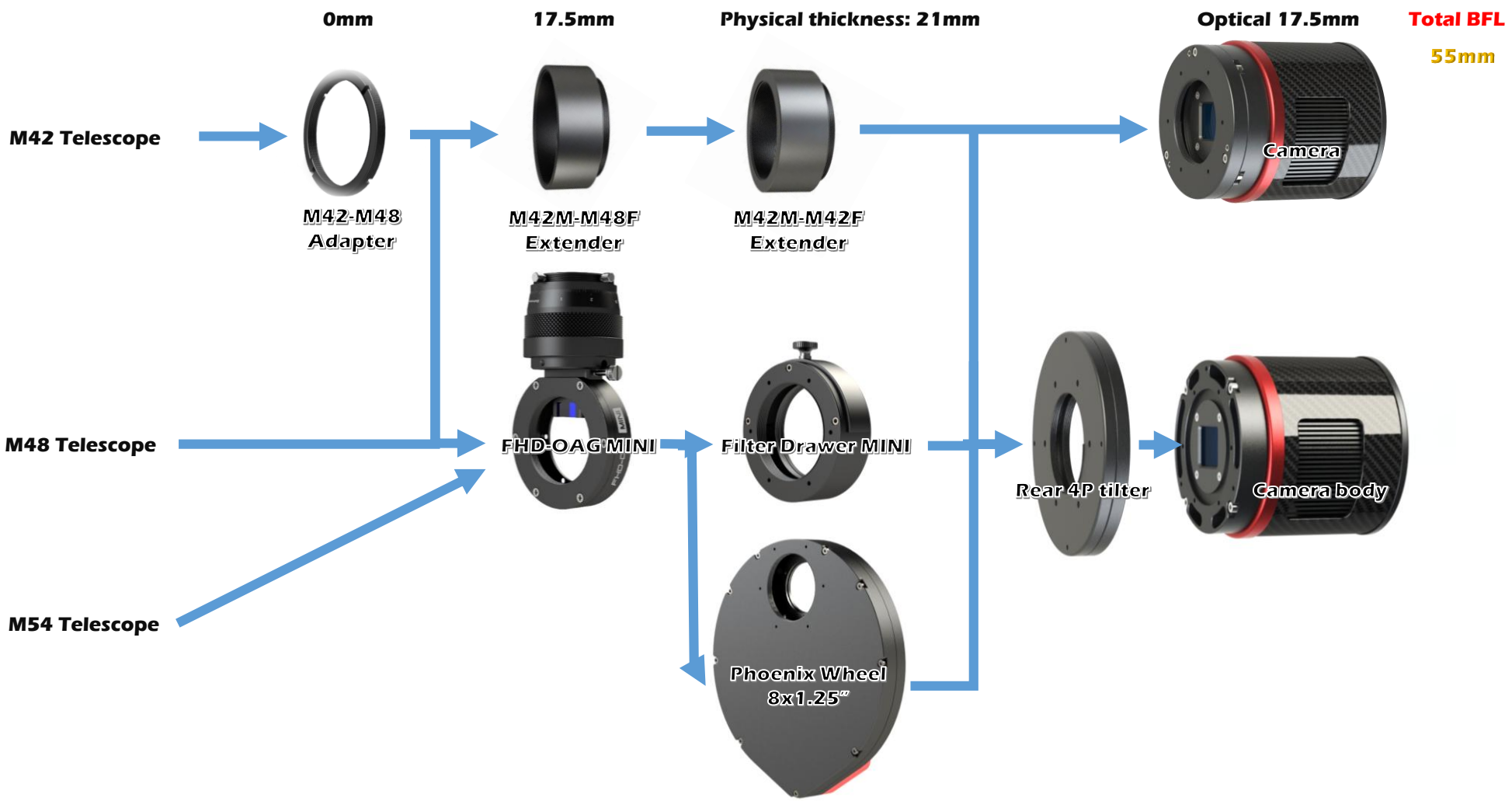
Player One

Poseidon/Artemis PRO camera adapter system



Player One

Ares PRO/Uranus PRO/Apollo PRO Camera adapter system



Player One

Accessory Compatible list

Model	Sensor	Format	Support Filter Wheel	Support Filter Drawer	Support OAG	Recommend filter size
ZEUS 455M PRO	IMX455 mono	36×24mm (Full-Frame)	Phoenix Wheel 7x2”/7x50mm/5x2”	Filter Drawer MAX	FHD-OAG MAX	2”/50mm
ZEUS 455C PRO	IMX455 color	36×24mm (Full-Frame)	Phoenix Wheel 7x2”/7x50mm/5x2”	Filter Drawer MAX	FHD-OAG MAX	2”/50mm
Poseidon-M PRO	IMX571 mono	23.5×15.7mm (APS-C)	Phoenix Wheel 7x36mm/7x2”/7x50mm/5x2”	Filter Drawer MAX	FHD-OAG MAX	36mm/2”
Poseidon-C PRO	IMX571 color	23.5×15.7mm (APS-C)	Phoenix Wheel 7x36mm/7x2”/7x50mm/5x2”	Filter Drawer MAX	FHD-OAG MAX	36mm/2”
Artemis-M PRO	IMX492 mono	19.2×13mm (4/3")	Phoenix Wheel 7x36mm/7x2”/7x50mm/5x2”	Filter Drawer MAX	FHD-OAG MAX	36mm
Artemis-C PRO	IMX294 color	19.2×13mm (4/3")	Phoenix Wheel 7x36mm/7x2”/7x50mm/5x2”	Filter Drawer MAX	FHD-OAG MAX	36mm
Ares-M PRO	IMX533 mono	11.31×11.31mm (1")	Phoenix Wheel 8x1.25”/7x36mm/7x2”/7x50mm/5x2”	Filter Drawer MINI	FHD-OAG MINI/MAX	1.25”
Ares-C PRO	IMX533 color	11.31×11.31mm (1")	Phoenix Wheel 8x1.25”/7x36mm/7x2”/7x50mm/5x2”	Filter Drawer MINI	FHD-OAG MINI/MAX	1.25”
Uranus-M PRO	IMX585 mono	11.2×6.3mm (1/1.2")	Phoenix Wheel 8x1.25”/7x36mm/7x2”/7x50mm/5x2”	Filter Drawer MINI	FHD-OAG MINI/MAX	1.25”
Uranus-C PRO	IMX585 color	11.2×6.3mm (1/1.2")	Phoenix Wheel 8x1.25”/7x36mm/7x2”/7x50mm/5x2”	Filter Drawer MINI	FHD-OAG MINI/MAX	1.25”
Apollo-428M MAX PRO	IMX428 mono	14.5×9.9mm (1.1")	Phoenix Wheel 8x1.25”/7x36mm/7x2”/7x50mm/5x2”	Filter Drawer MINI	FHD-OAG MINI/MAX	1.25”
Apollo-M MAX PRO	IMX432 mono	14.5×9.9mm (1.1")	Phoenix Wheel 8x1.25”/7x36mm/7x2”/7x50mm/5x2”	Filter Drawer MINI	FHD-OAG MINI/MAX	1.25”

- Carbon fiber cooled cameras (Ares, Uranus and Apollo series) can compatible with Phoenix Wheel 7x36mm/7x2”/7x50mm/5x2” from 2024.
- when you choose 7x36mm/7x2”/7x50mm/5x2” filter wheels for carbon fiber cooled cameras, remember to purchase FHD-OAG MAX instand of FHD-OAG MIN.

» 06 ASCOM and Native Settings in DSO imaging

How to set Gain/offset and other settings in ASCOM and Native mode

6. Camera ASCOM driver installation

Many DSO imaging software (such as SGP and Maxim dl) require ASCOM platform and camera ASCOM driver to control the camera for DSO imaging.

The ASCOM driver of Player One camera is developed based on ASCOM 6.5, so you need to download the latest ASCOM6.5 platform and camera ASCOM driver from the official website to control the camera normally.

https://player-one-astronomy.com/service/software/

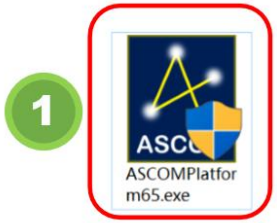
6-1. Download ASCOM platform and camera driver

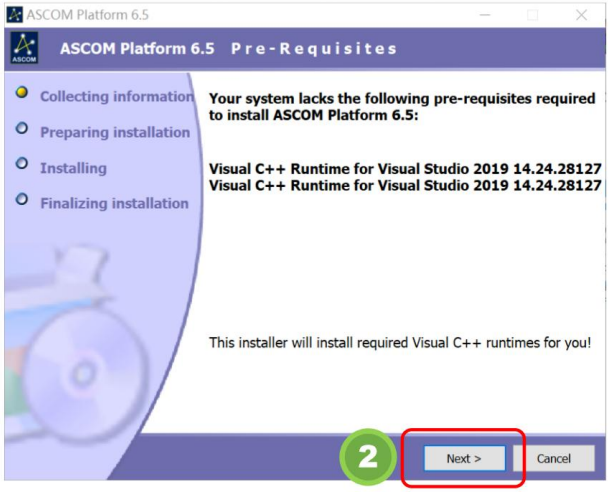
Click the download button to download the driver.
And wait for the download to complete.

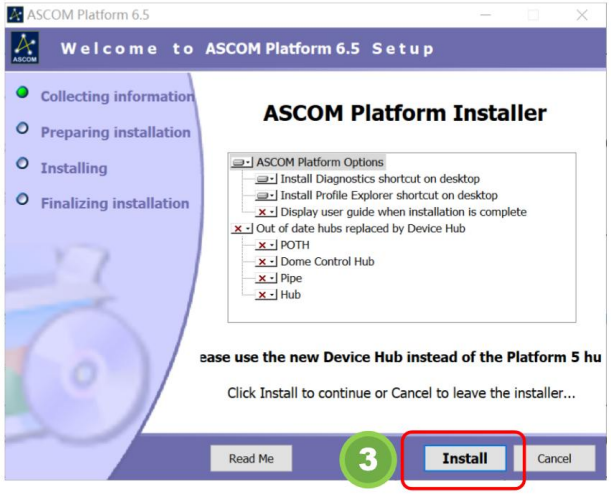
ASCOM Driver				
ASCOM platform	The ASCOM platform is an astronomical standard protocol set running on the windows system. Many astronomy software need to be installed after the ASCOM platform can be used. You can log on to the ASCOM platform official website for more information.	V6.5	Released: 2020/5/20	Official Download 1 ASCOM6.5 Download
Camera ASCOM Driver (base on ASCOM6.5)	Software using ASCOM interface，need to be installed to control the camera. **ASCOM6.5 platform is required.**	V6.5.1.0225	Released: 2021	2 Download

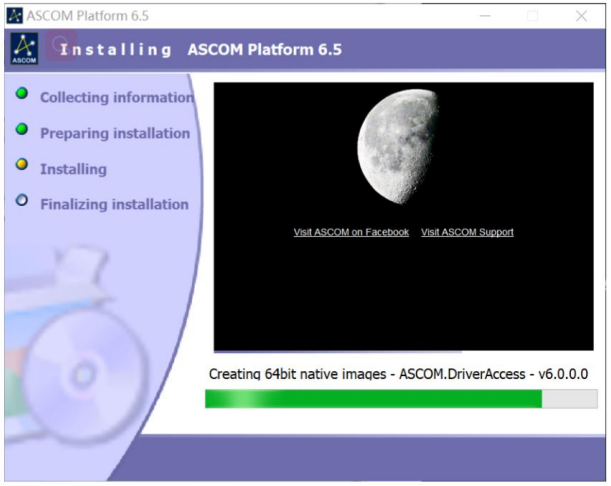
6-2. install ASCOM platform

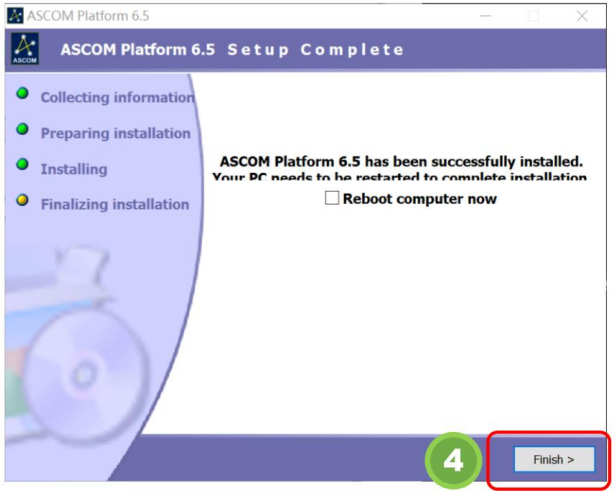
1) Double-click the driver installation package to enter the installation page
2) Automatically detect necessary files and click "Next" to continue.
3) Click "Install" to Install the platform
4) Installation completed





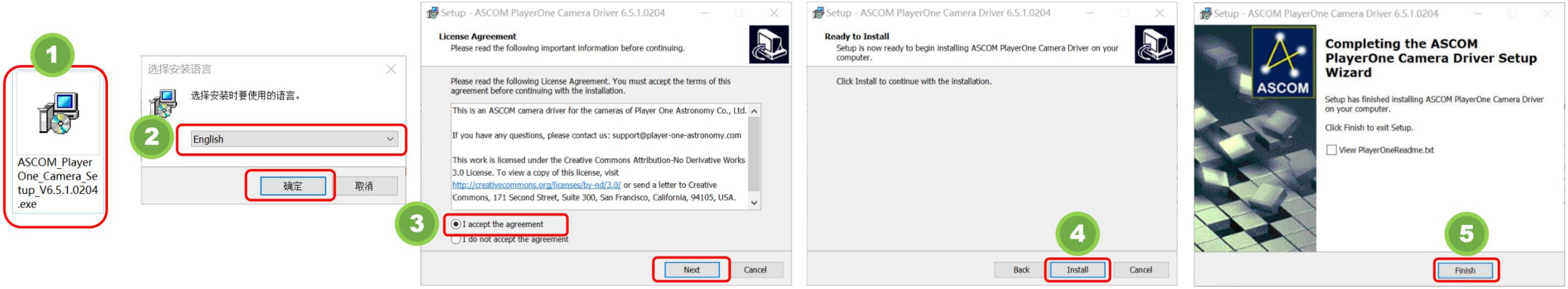






6-3. install camera ASCOM driver

1) Double-click the driver installation package to enter the installation page.
2) Select the language, it is recommended to choose Chinese, and then click "OK" button.
3) Select "I Accept the Agreement" and click the "Next" button.
4) Click the "Install" button to Install and wait for completion.
5) Click "Finish" to complete the installation.



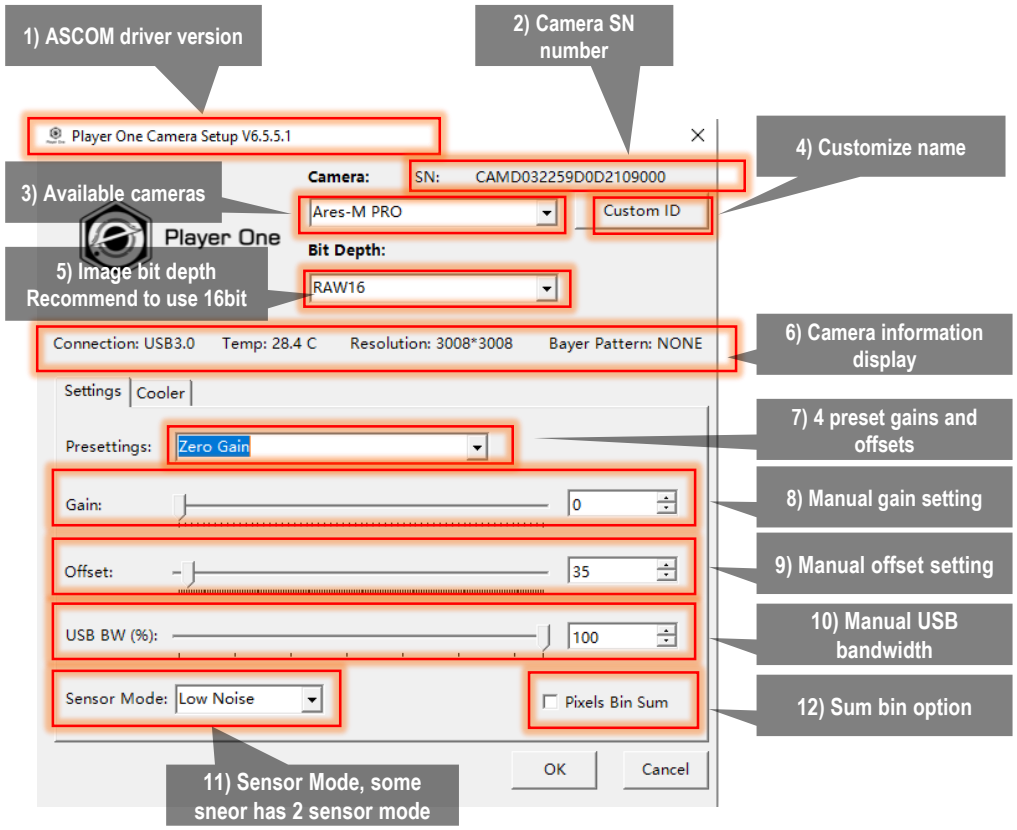
6-4. Download and install capture and guiding software

There are many software that support ASCOM platform, you can choose the software you are familiar with to shoot and guide the star, all the commonly used software download links are as follows:

https://player-one-astronomy.com/service/software/

6-5. ASCOM setup window

1. ASCOM window introduction



1) ASCOM driver version: Shows the current version you used, recommend to use newest version.

2) Camera SN number: Camera SN is the identity of the camera, it is unique. It is important for warranty and after-sale service.

3) Available cameras: Cameras which already connected to your PC.

4) Customize name: Users can set names of your camera, especially when 2 same model connected.

5) Image bit depth: RAW8/RAW16, Recommend to use RAW16 for imaging.

6) Camera information display: Basic info of the camera.

a. Sometimes when you found image download speed is too slow, check if connection is USB3.0 here.

b. Check the current temperature of sensor.

c. Check Resolution of the camera

d. Check Bayer Pattern of the camera, only color camera has Bayer pattern info.

7) 4 preset gains and offsets: We provide 4 default gain and offset preset settings.

8) Manual gain setting: Control the gain value manually.(For experienced photographers)

9) Manual offset setting: Control the offset value manually. (For experienced photographers)

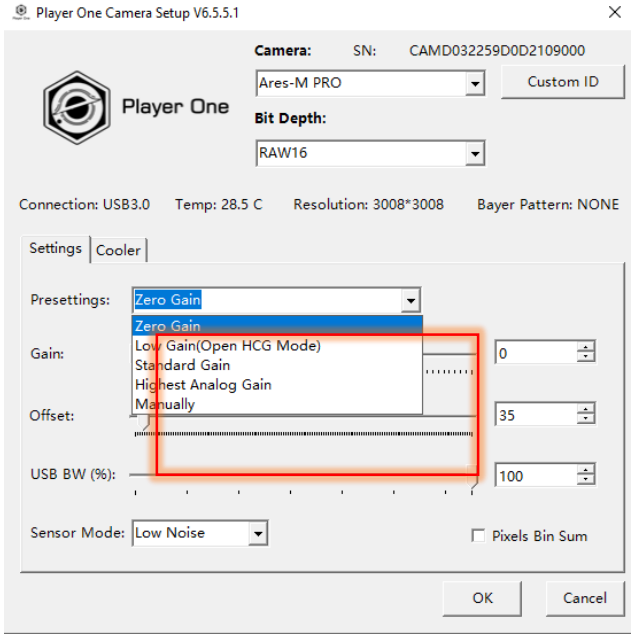
10) Manual USB bandwidth: Bandwidth can control the download speed of image, if has image download failure, reduce the bandwidth to 40%.

11) Sensor Mode: Cameras which using IMX533/IMX571 sensor has 2 sensor mode. Normal mode has faster FPS, Low Noise mode has lower readout noise.

12) Sum bin option: Sum bin means when do binning, brightness value of pixels will sum up, it will make the image brighter. Most used in plate solve.

2. Detailed explanation of Gain preset values

1) Zero Gain: Maximum dynamic range can be obtained, suitable for long exposures.
2) Low Gain (Open HCG Mode) : it is the lowest trigger gain to start the HCG mode of camera, and can obtain high dynamic and low readout noise.
3) Standard Gain: 1e /ADU can be obtained and minimize quantization error.
4) Highest Analog Gain: obtain the lowest readout noise, suitable for short exposures.
5) Manually: Manual setting of gain and offset.
*Notice: Preset values including offset and gain, no need to set offset manually.



3. Cooler control panel

1) Cooler info: Show up current info of cooling system.

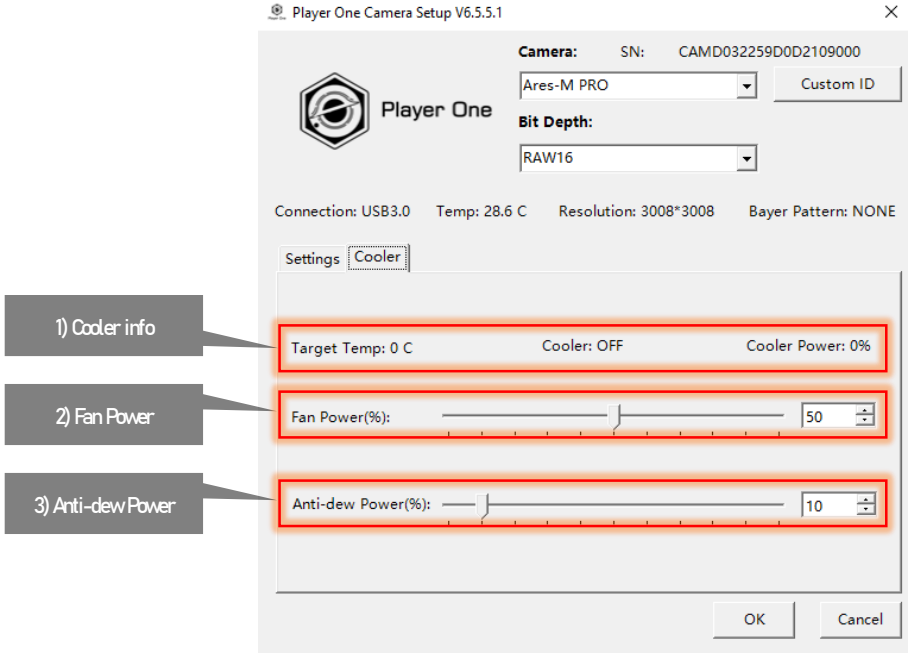
a) Target Temp: Target temperature you set in capture software, it only could be set in capture software.

b) Cooler: ON means cooler is active, TEC unit and Fan is running. OFF means cooler is inactive, TEC and Fan is not running.

c) Cooler Power: Show up the power of cooling system.

2) Fan Power: Carbon fiber camera default power is 50%, Aluminum camera default power is 70%. If need maximum delta-T, set 100% power.

3) Anti-Dew Power: All our cooled cameras has Anti-Dew heater, anti-dew can protect window against dew problem. Default power is 10%, minimum power is 1%, maximum power is 100%.



4. Preset value and option table

Model	sensor	Zero Gain		HCG Gain		Standard Gain		High Gain		Low noise Mode
		Gain	Offset	Gain	Offset	Gain	Offset	Gain	Offset	
Zeus 455M PRO	IMX455 mono	0	20	125	25	8	20	550	1200	Support
Zeus 455C PRO	IMX455 color	0	20	125	25	8	20	550	1200	Support
Poseidon-M PRO	IMX571 mono	0	20	125	25	8	20	550	1200	Support
Poseidon-C PRO	IMX571 color	0	20	125	25	8	20	550	1200	Support
Artemis-M PRO	IMX492 mono	0	5	120	5	229	5	400	70	NO
Artemis-C PRO	IMX294 color	0	5	120	5	120	5	400	70	NO
Ares-M PRO	IMX533 mono	0	35	125	50	130	50	600	1000	Support
Ares-C PRO	IMX533 color	0	35	125	50	130	50	600	1000	Support
Uranus-M PRO	IMX585 mono	0	3	210	6	210	6	498	120	NO
Uranus-C PRO	IMX585 color	0	3	210	6	210	6	498	120	NO
Apollo-M MAX PRO	IMX432 mono	0	12	145	13	280	45	385	130	NO
Apollo 428M MAX PRO	IMX428 mono	0	12	70	15	158	35	310	150	NO

6-6 Setup in NINA

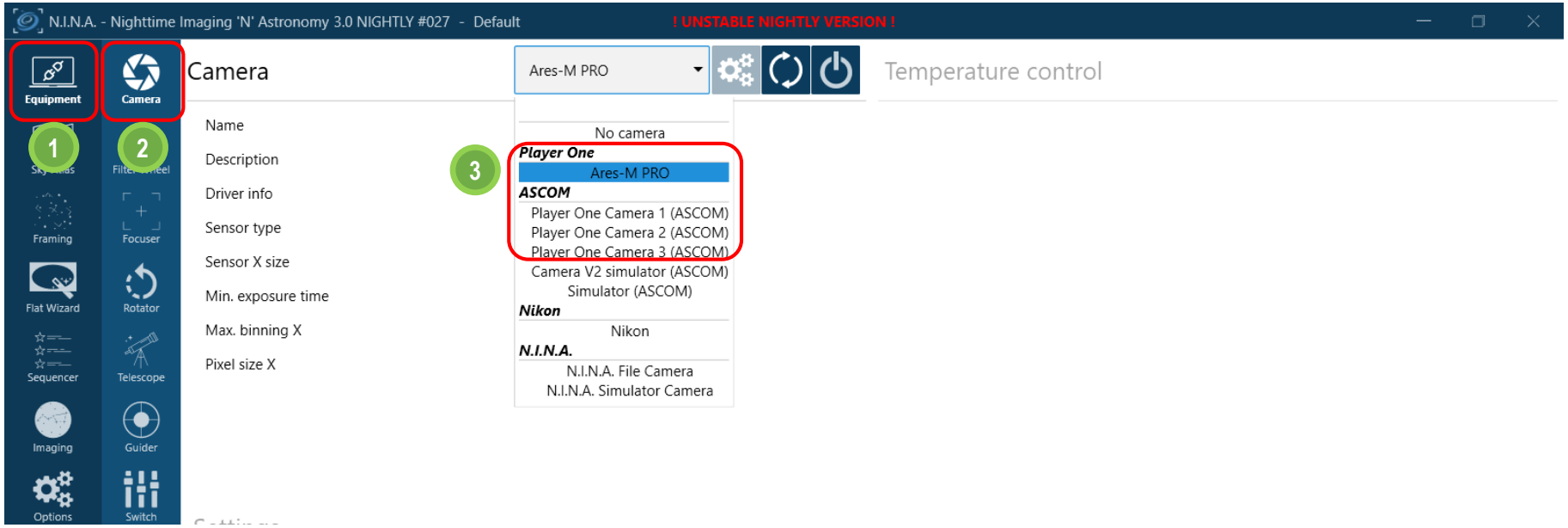
1) Open the Equipment Bar

2) Open the Camera bar

3) Select Camera from combo box.

a) Select camera below “Player One”, means control the camera via native driver.

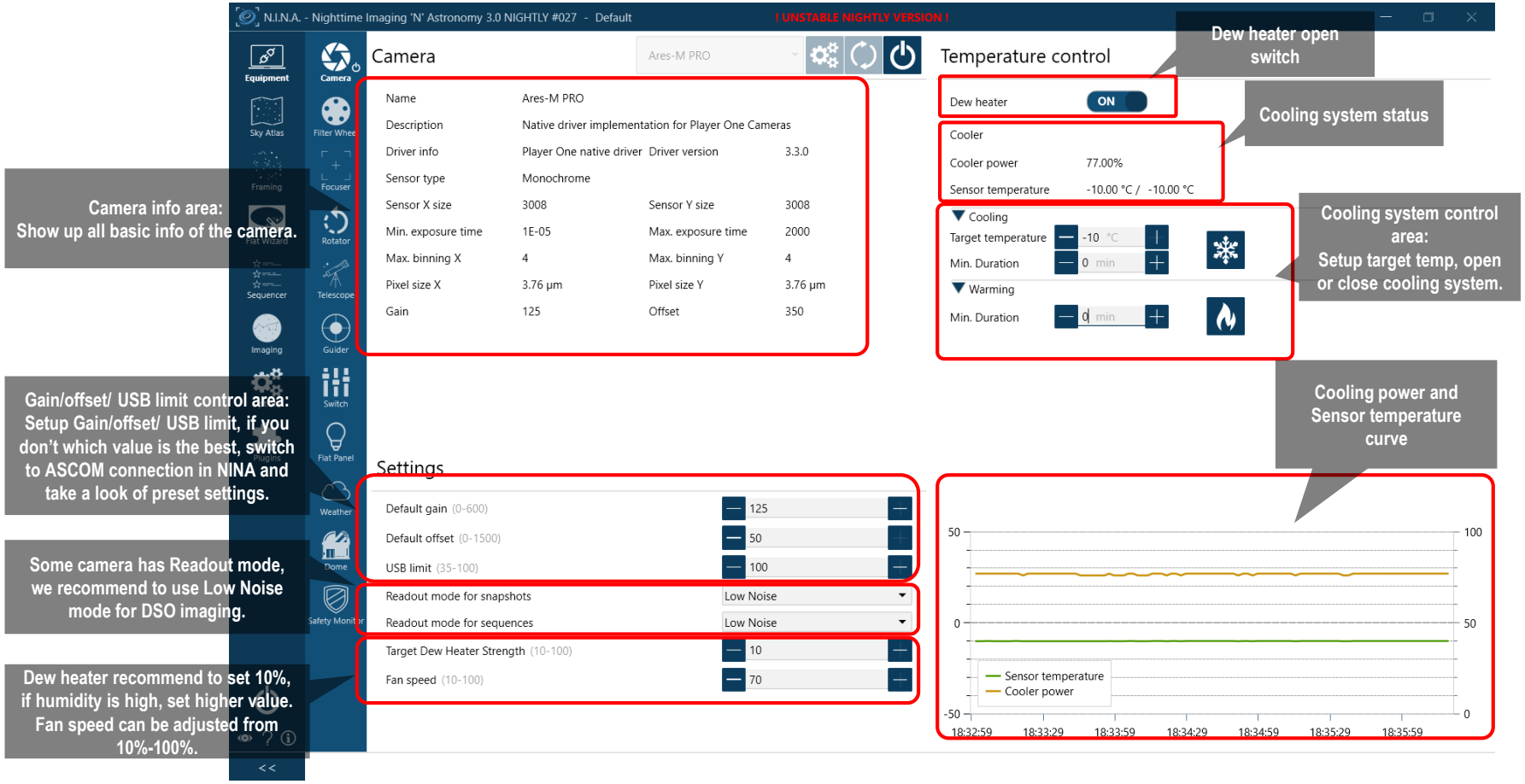
b) Select camera below “ASCOM”, means control camera via ASCOM driver. We provide 3 ASCOM camera option, users could setup at most 3 cameras for imaging and guiding.



6-6-1 Native mode in NINA

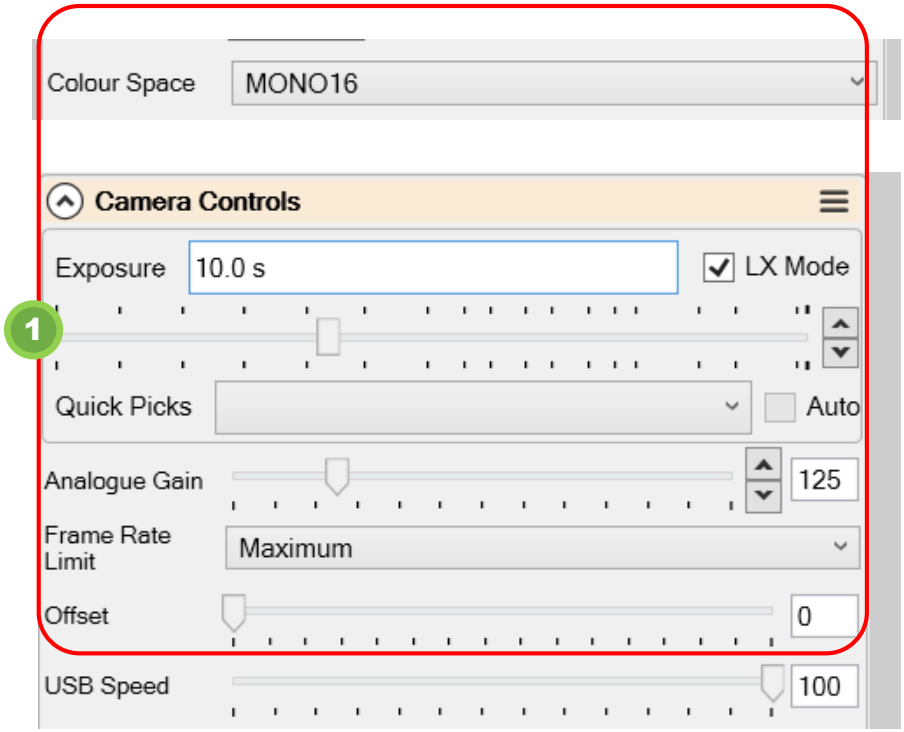
1) Choose the Camera you want to connected as main camera.

2) Press ⏻ to connect the camera. Then you will see following picture, all functions are active.

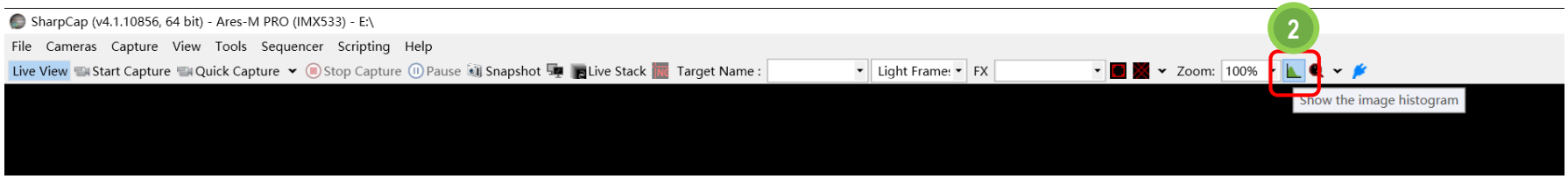


6.6.2 How adjust offset to suitable value?

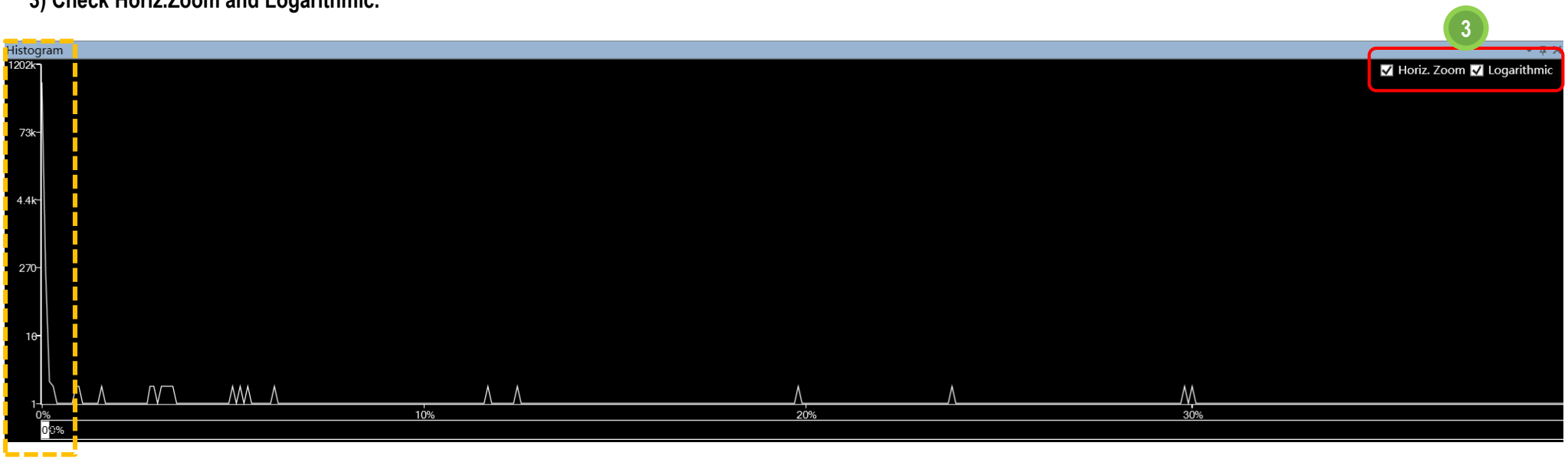
The effect of offset is to add a constant value to the brightness value of all pixels in the image, ensuring that all pixel brightness values are greater than 0.
In different software, offset value might not same, because they may use different algorithm to calculate.
There is a simple way to find out best offset value, take Sharpcap as an example:
1) We use Ares-M PRO (IMX533) camera (camera was covered, we need to take dark frame). After connected, choose RAW16 mode and we set gain=125 and offset=0 in Sharpcap, take 10s exposure to capture dark frame.



2) Click to show up histogram 3)Set 10s exposure

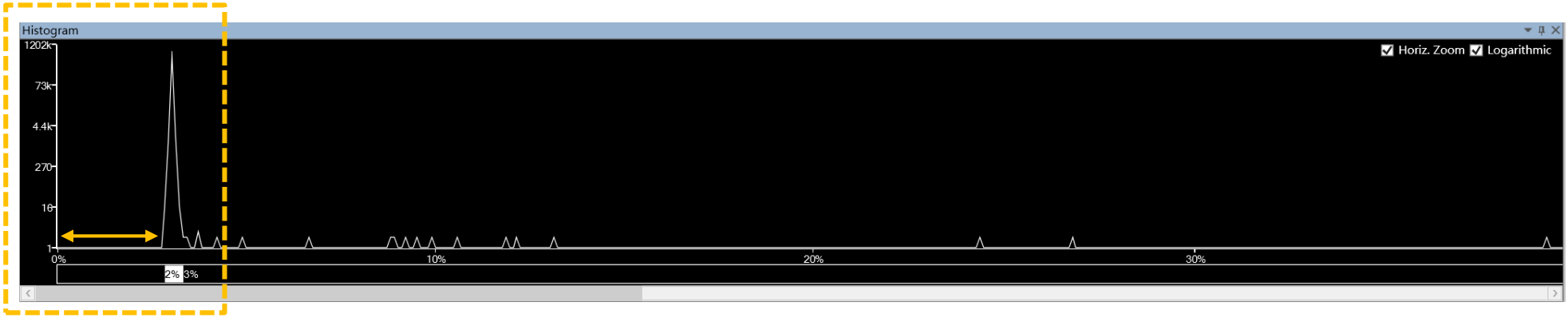


3) Check Horiz.Zoom and Logarithmic.

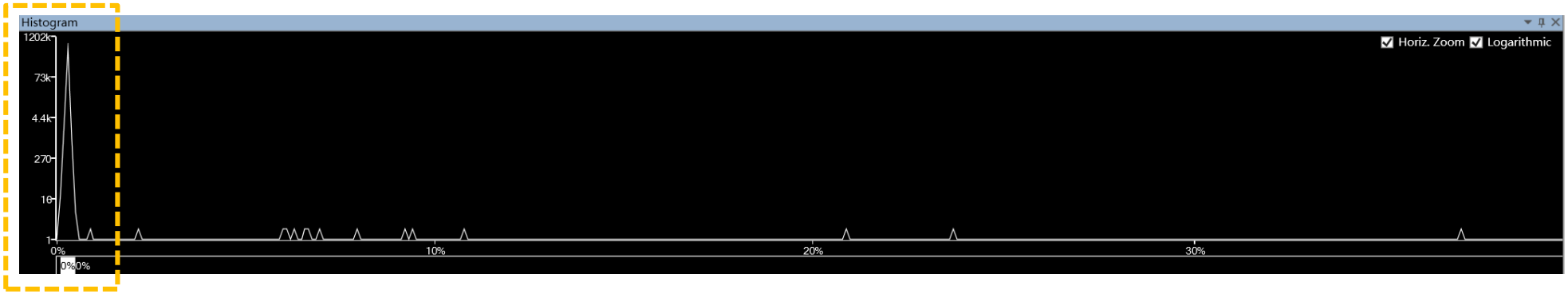


We can see the left part of curve cut off, which means offset was too low.

4) Set offset value to 500, and take a shot again. We can see the whole curve can be seen, which means offset is high enough. But it left too much space on the left.



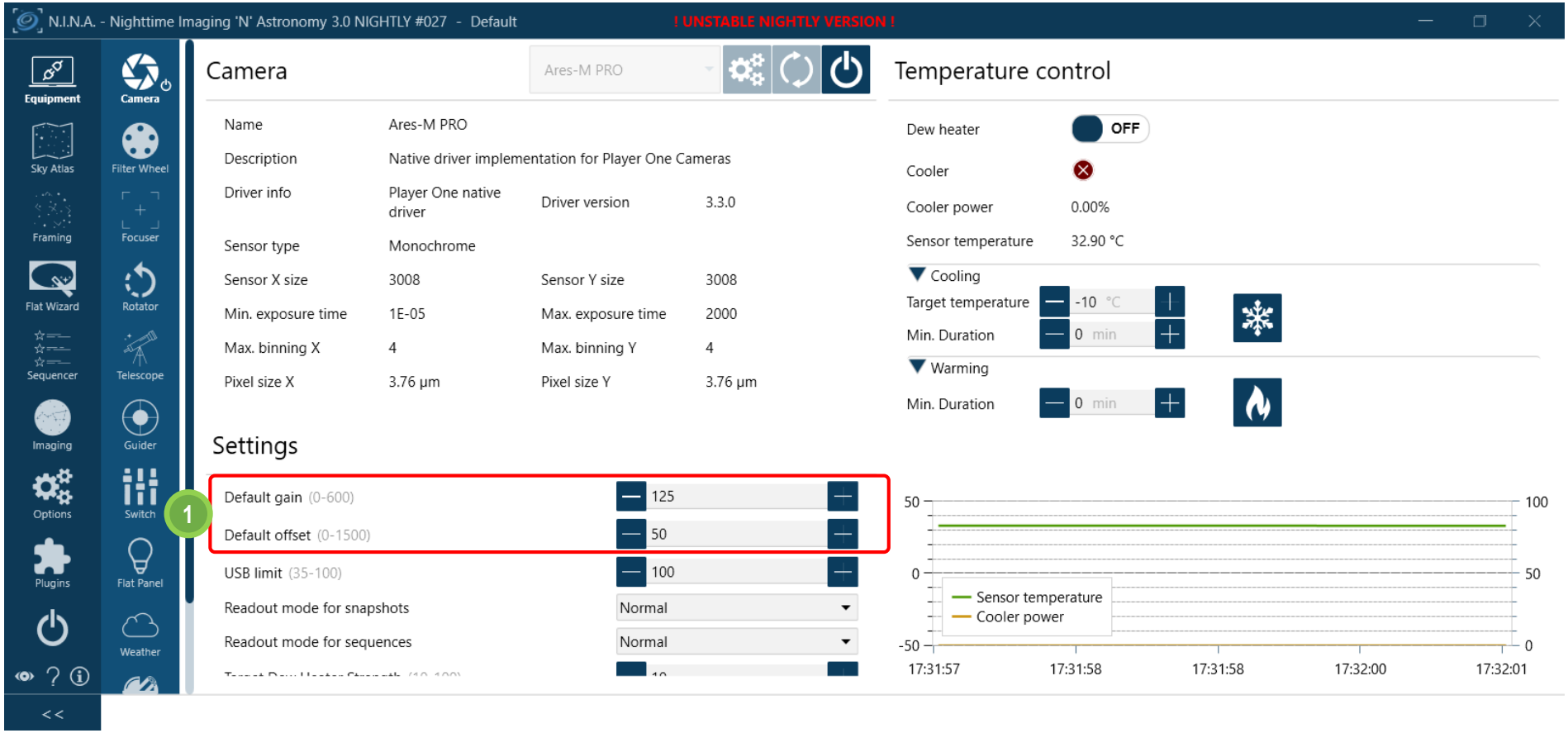
5) So we reduce the offset value, and take 10s dark frame again. After a few times attempts, we found 50 is the best value.



6.6.3 Offset in NINA

In NINA, offset looks different, histogram is not as same as Sharpcap.

1) We use Ares-M PRO (IMX533) camera (camera was covered, we need to take dark frame). After connected, camera run under RAW16 mode and we set gain=125 and offset=50 in NINA, take 10s exposure to capture dark frame.



6. Camera ASCOM Settings for DSO imaging

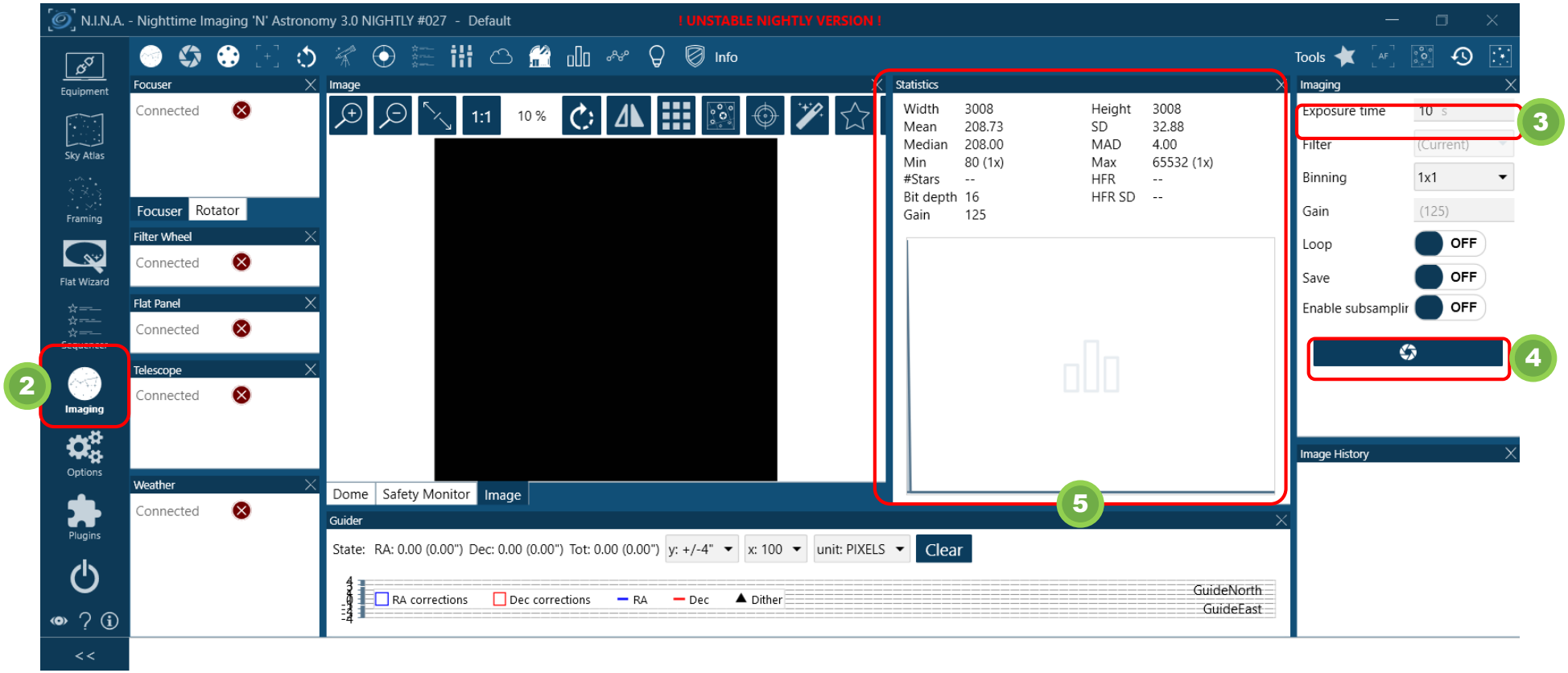
Player One

2) Choose “Imaging” panel.

3)Set 10s exposure.

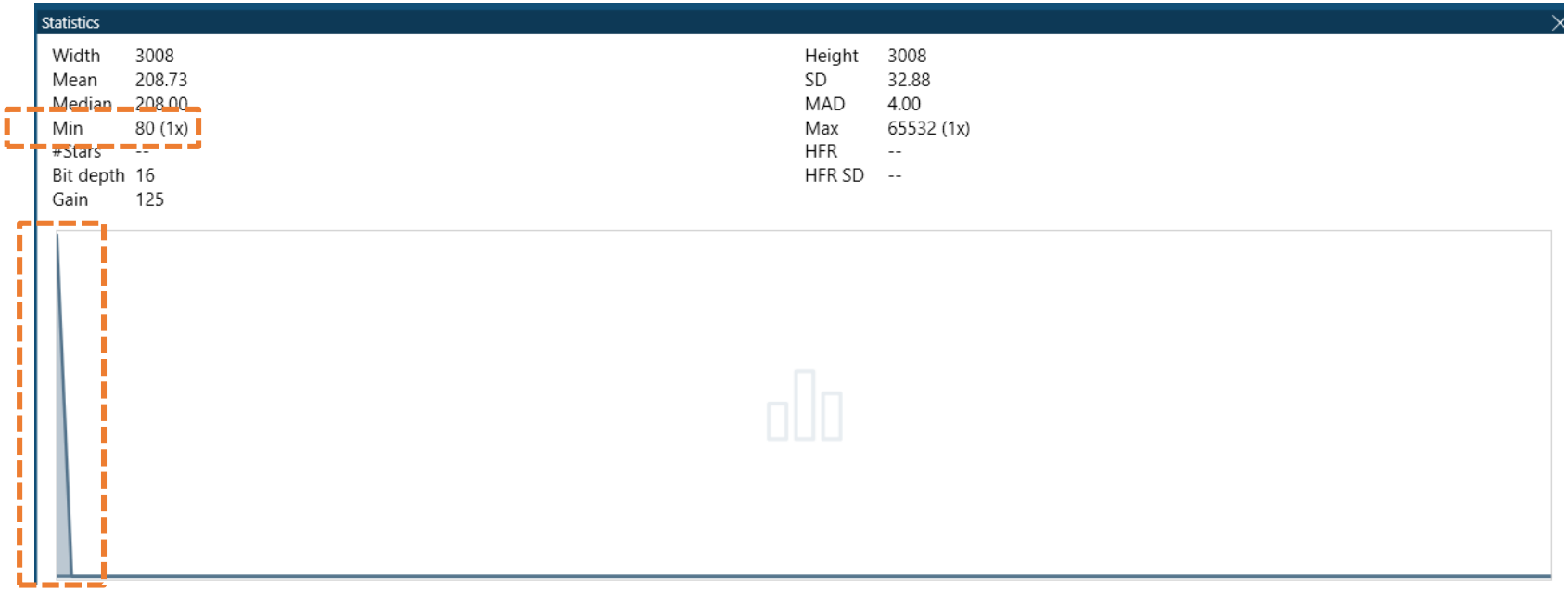
4) Take a single shot.

5) Check histogram in “Statistics”.

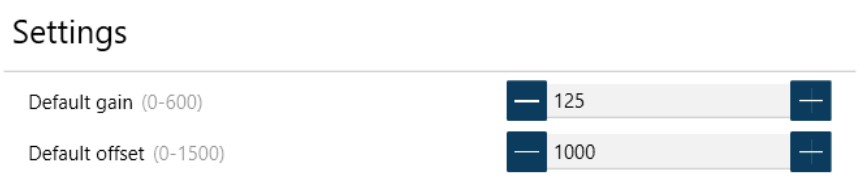


6. Camera ASCOM Settings for DSO imaging

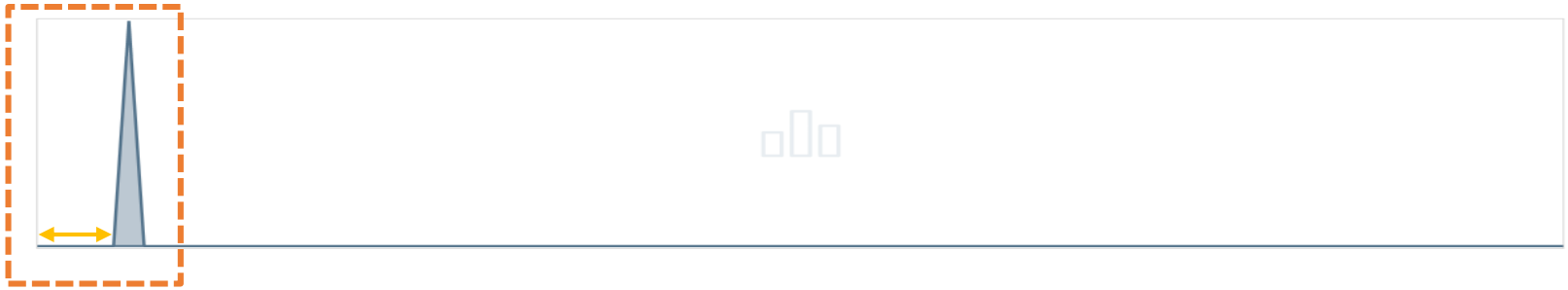
Offset = 50 should be the best value in Sharpcap, however it looks cut off in histogram in NINA. But when we check the Min value of pixel, it is 80, which means all pixel value is bigger than 0. After check the histogram of image in different software, we believe Min value =80 is correct, but the preview of histogram is not precisely (maybe it isn't start from 0 point).



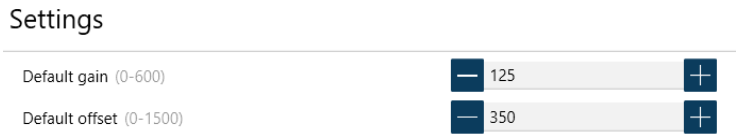
6) If we want entire curve show up in histogram, we try to set offset to 1000, and take a 10s dark frame again.



We can see the whole curve can be seen, which means offset is high enough. But it left too much space on the left.

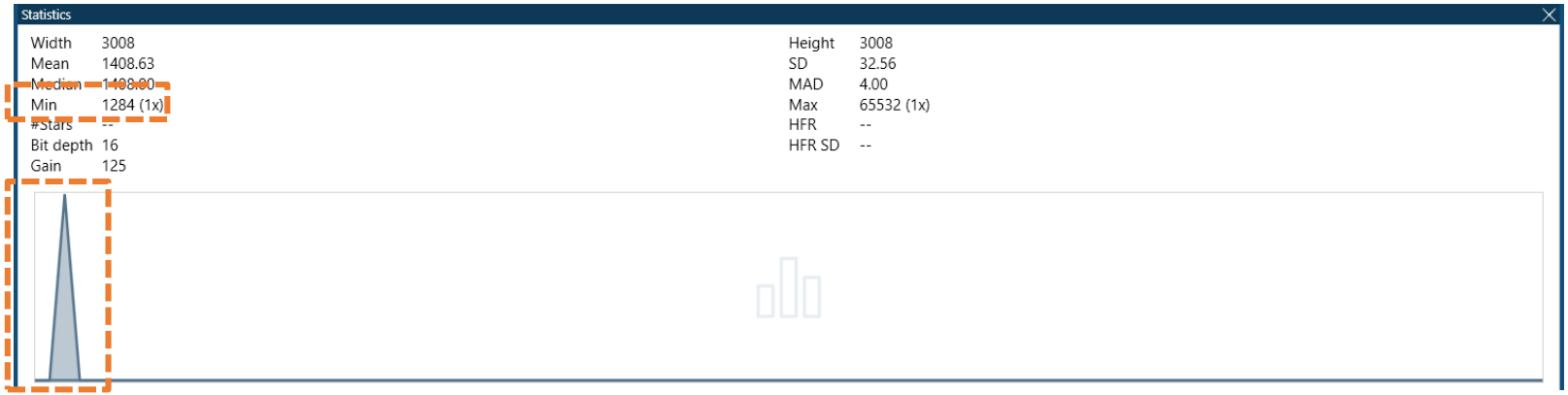


6) So we reduce the offset value, and take 10s dark frame again. After a few times attempts, we found 350 is the best value.



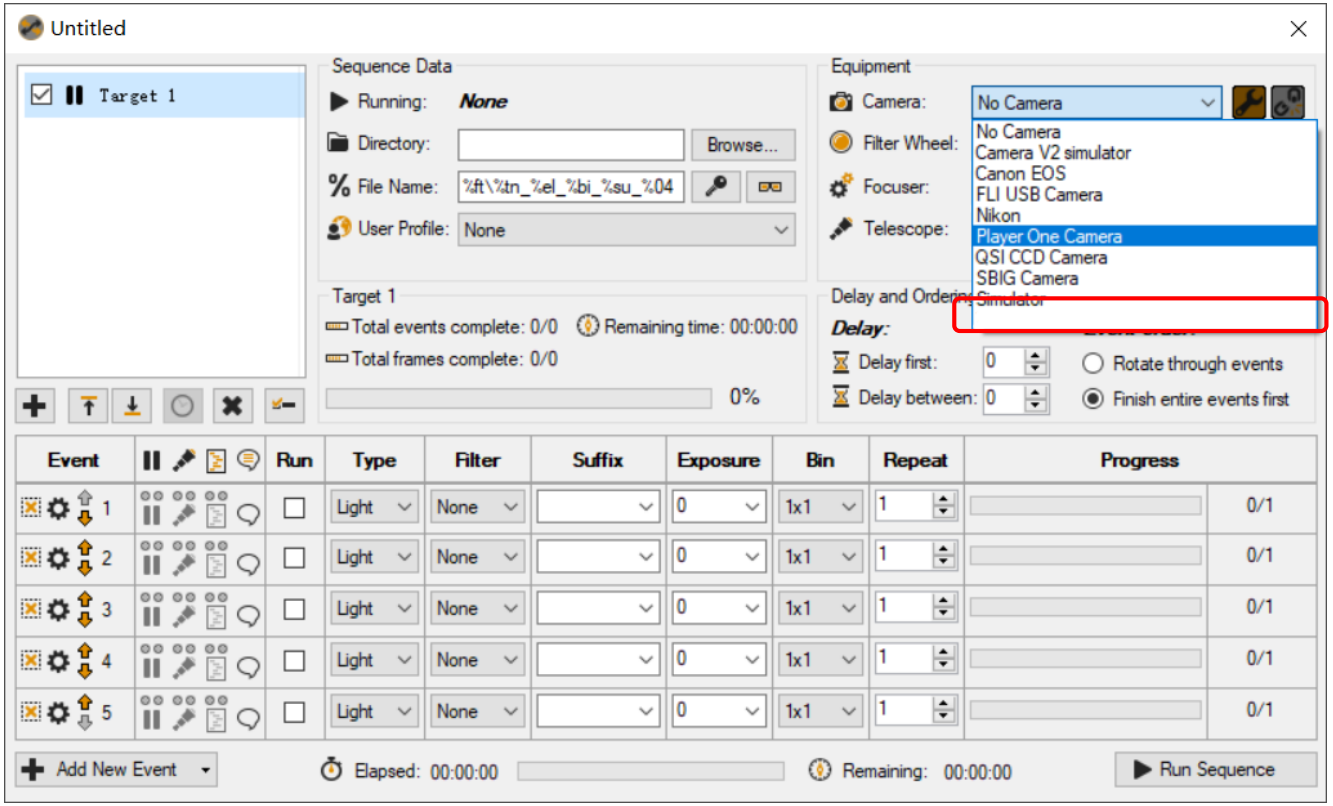
This time curve can be seen and close to the left. So offset = 350 is best value when gain = 125. This is looks like the good offset in histogram, but actually cause the Min value up to 1284 ADU.

This offset value also could be used but might lose some dynamic range.



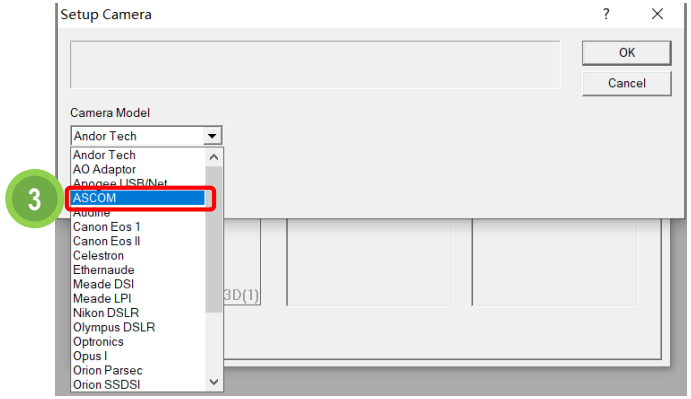
6-7 Setup in SGP

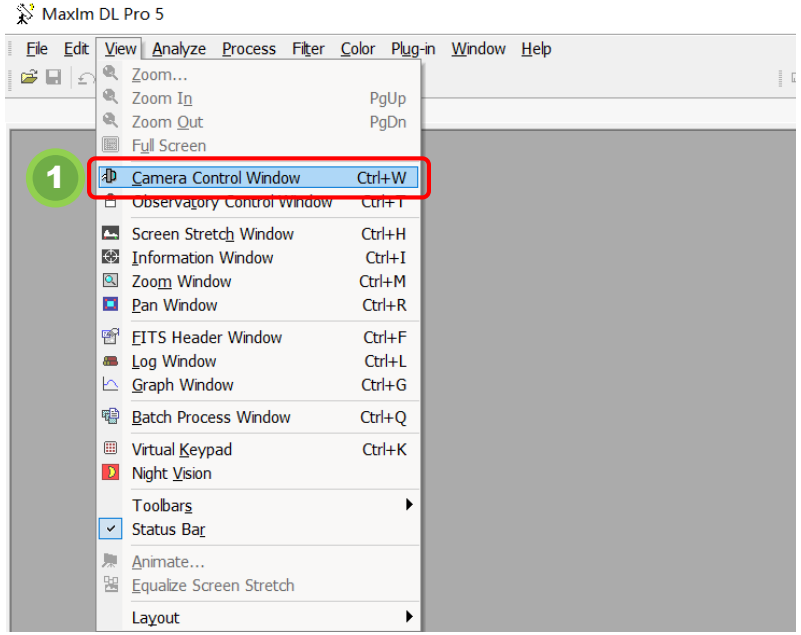
Open the SGP Schedule Planner and go to the Camera section. Select Player One Camera from the dropdown list.

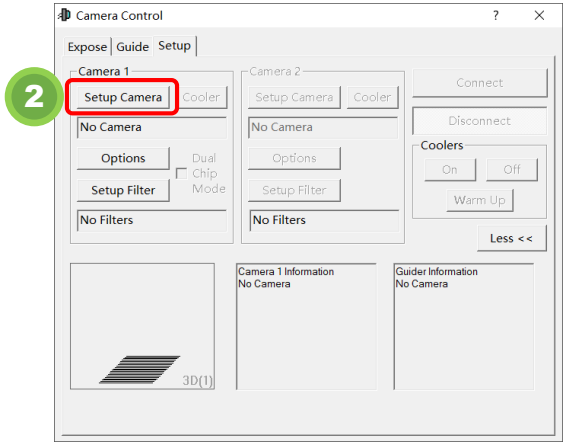


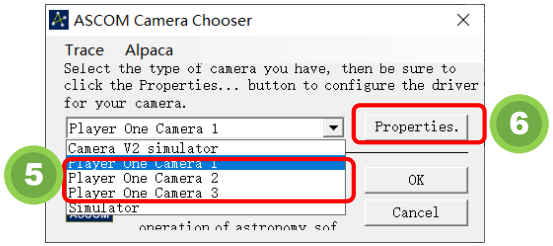
6-8 Setup in MDL

1) Open the Camera Control Window.
2) Select Camera1 or Camera2 as required and click Setup Camera.
3) Select the ASCOM option in Camera Model.
4) Click Advanced, .Pop up the ASCOM Camera Chooser.
5) Select Player One Camera from the dropdown list. We provide 3 ASCOM camera option, users could setup at most 3 cameras for imaging and guiding.
6) Click Properties to set ASCOM camera parameters



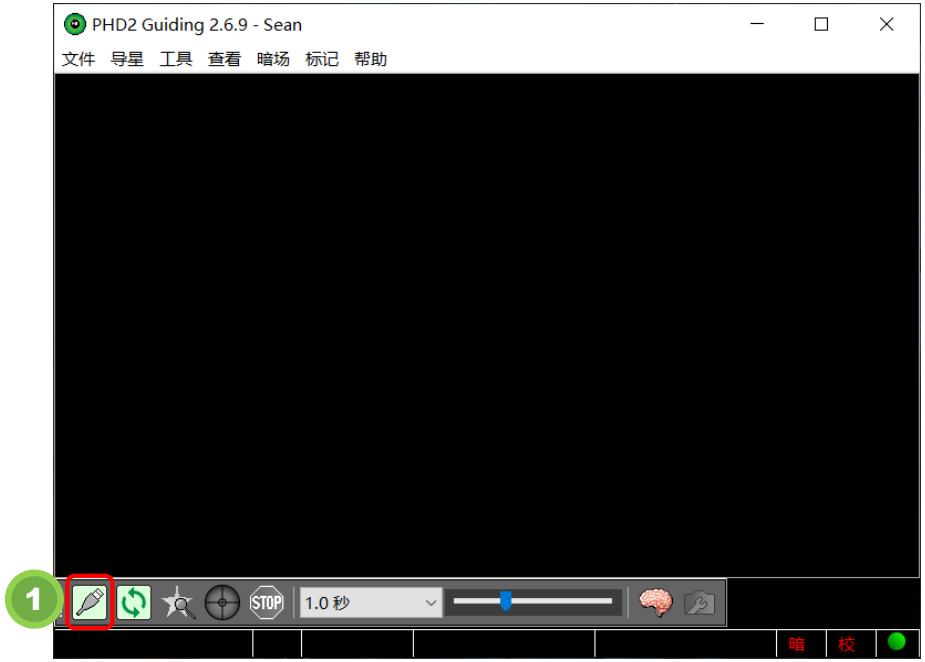






6-9 Setup in PHD2

1) Click the button to open the page of connected device.
2) Select "Player One Camera(ASCOM)" from the Camera dropdown list.
3) Click the button to set ASCOM parameters of the camera.
4) Click the "Connect" button to turn on the camera.



» 07 How to adjust tilter plate

Get perfect star roundness

How to adjust tilter plate

Player One

Front 3P sensor tilter plate

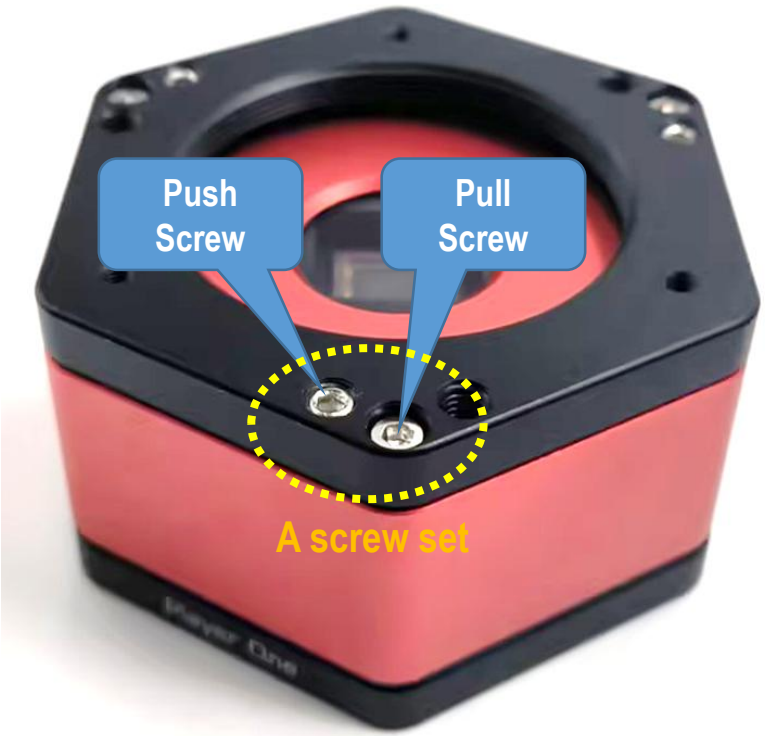
Rear 4P sensor tilter plate

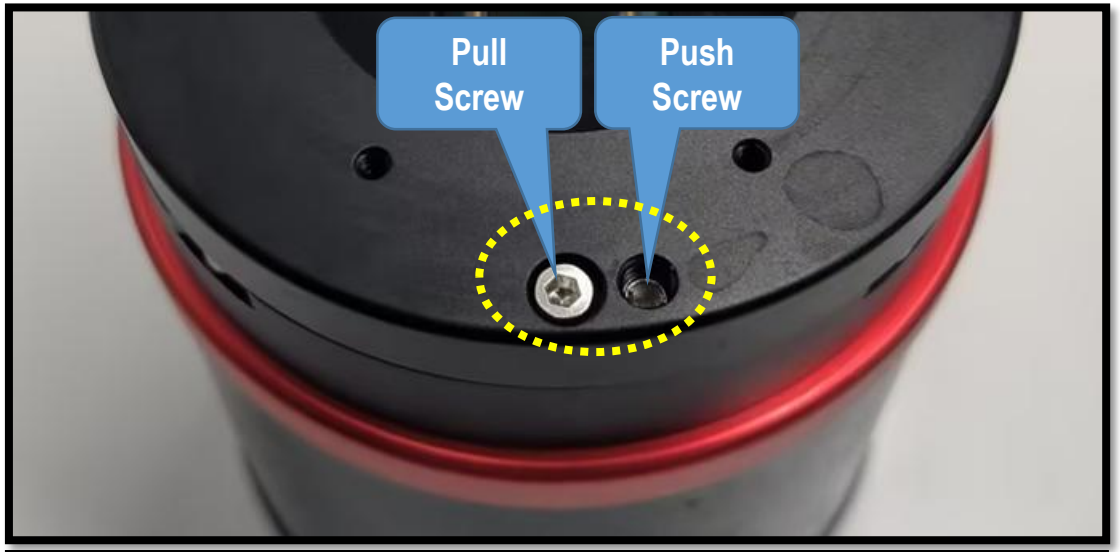
How to adjust tilter plate

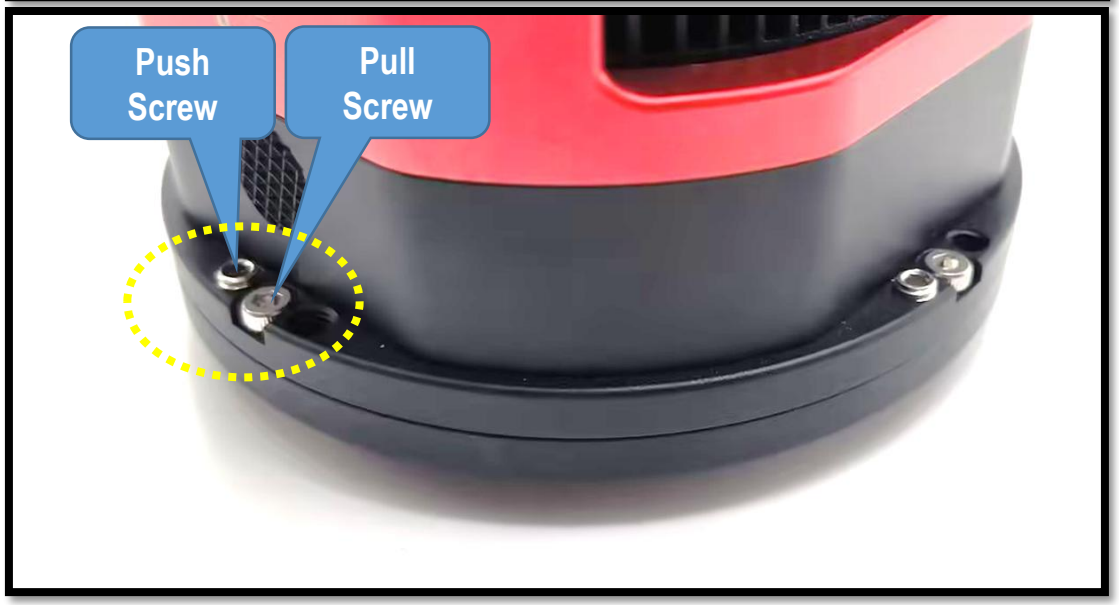
Player One

Basic adjust principle

A screw set has 1 pull screw and 1 push screw







Basic adjust principle

Imagine if there is only one pull-push screw set, 2 step will make the sensor tilter plate to be tilt

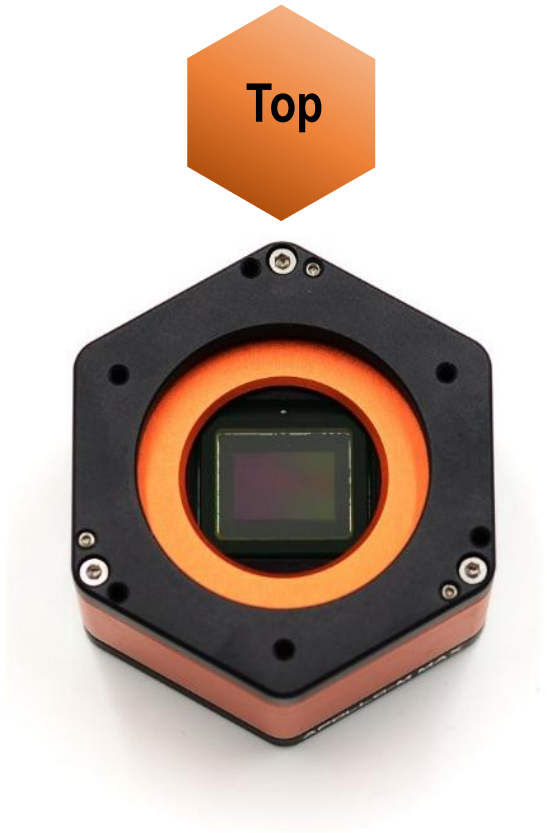
In reality, there will be 3 or 4 sets of pull-push screw.

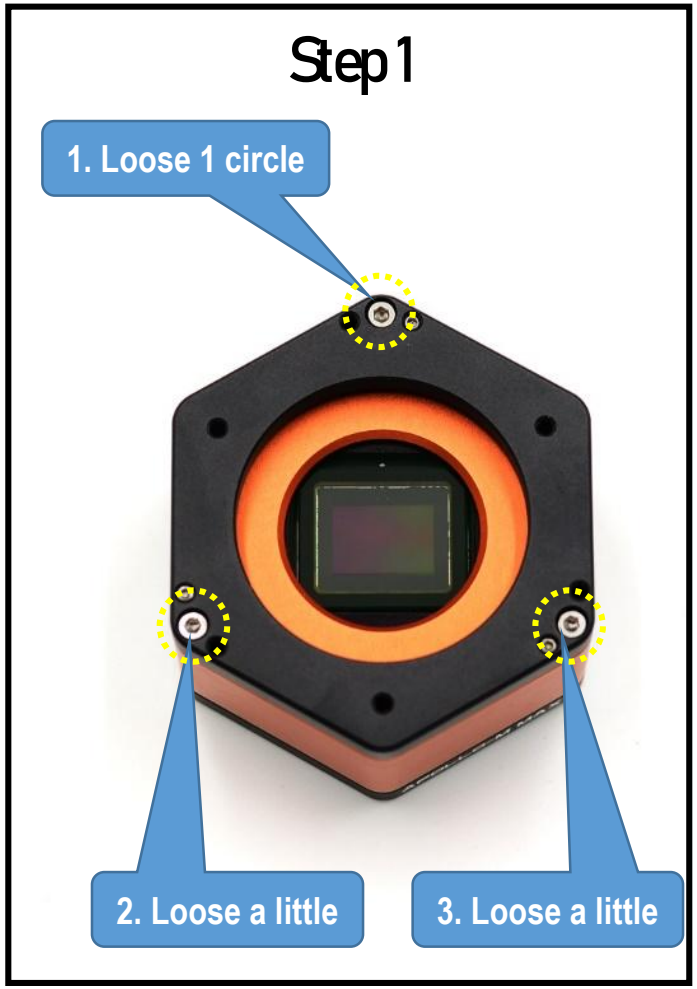
Every set will interfere others, so we need to adjust them following a sequence.

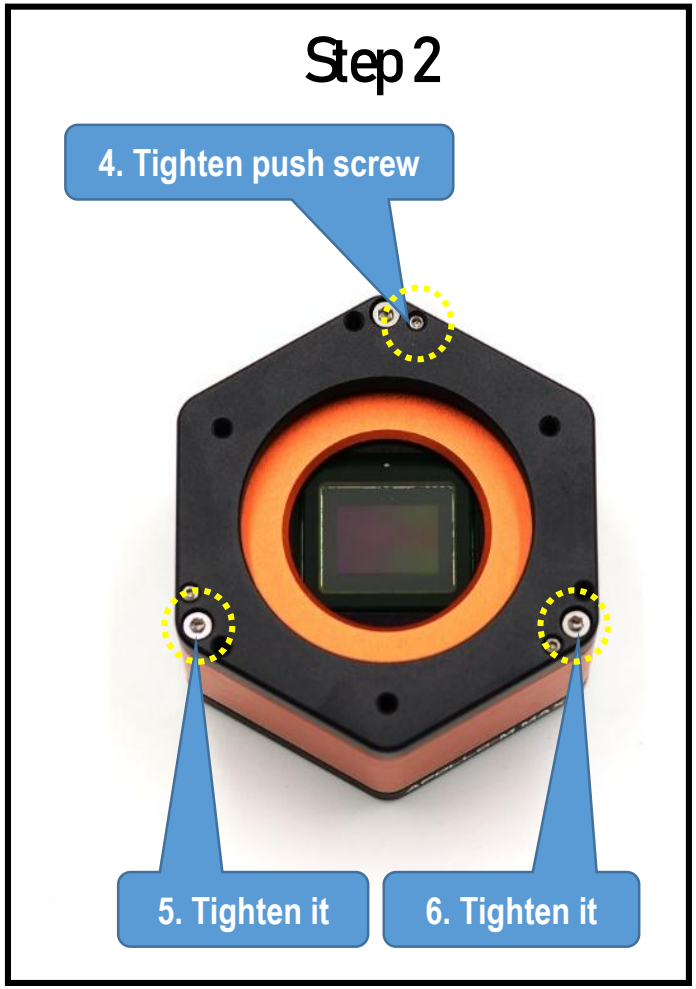
How to adjust tilter plate

Player One

Tilt top for 0.5mm

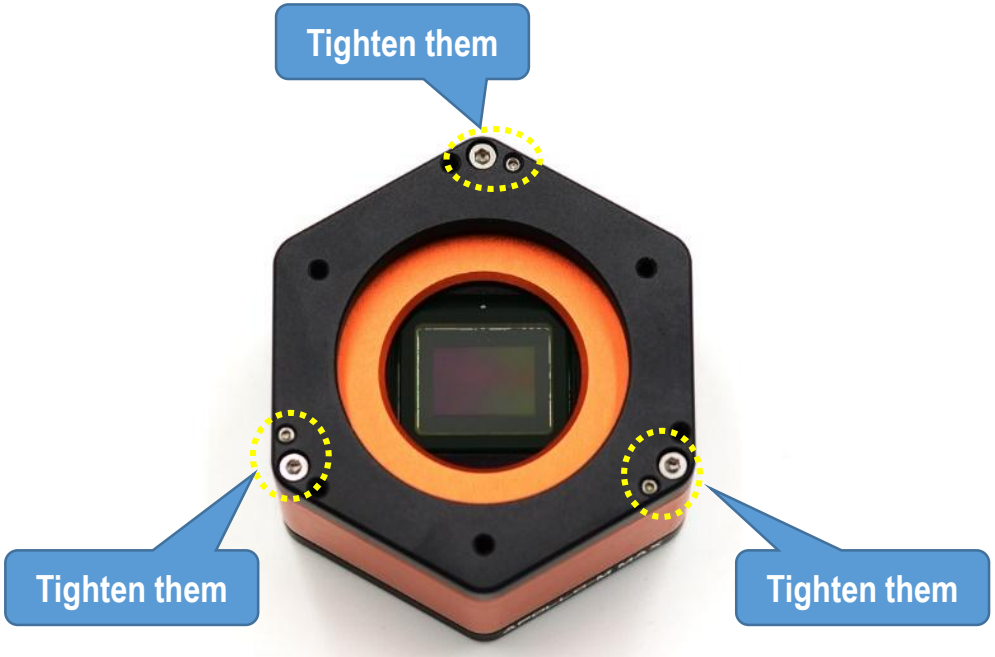






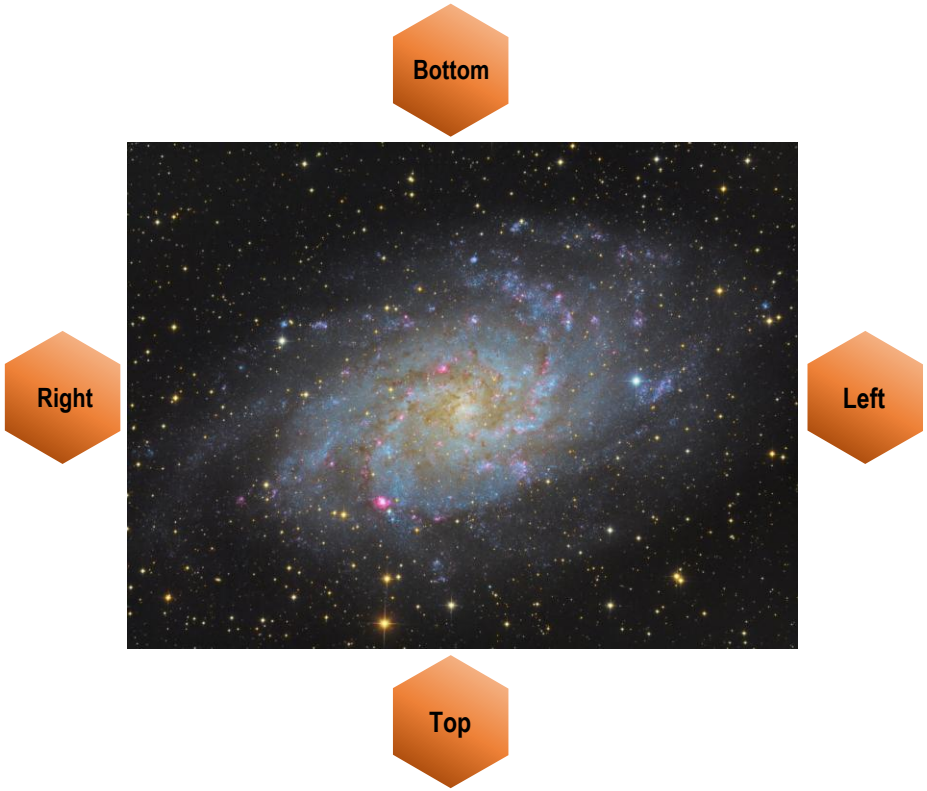
If you need to tilt top corner more, Repeat step1 and step2, until got suitable tilt angel to remove newton ring completely.

Step 3: Check and tighten all screws to lock the position

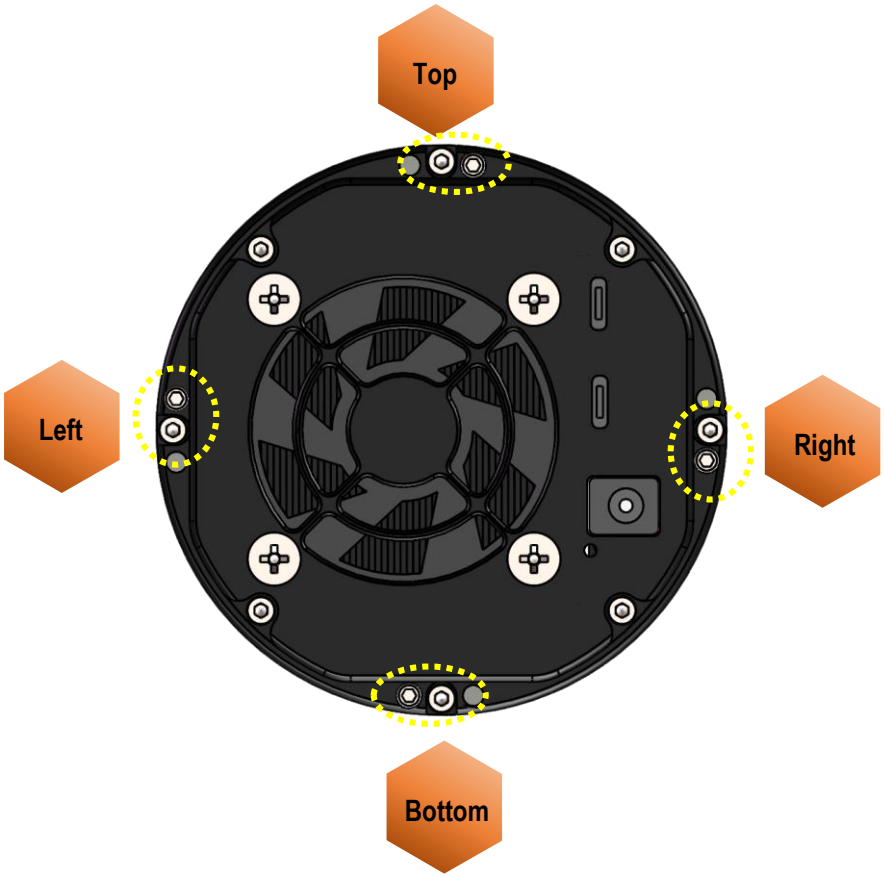


How to adjust tilter plate

Image preview on screen



4 sets of Push/Pull screws

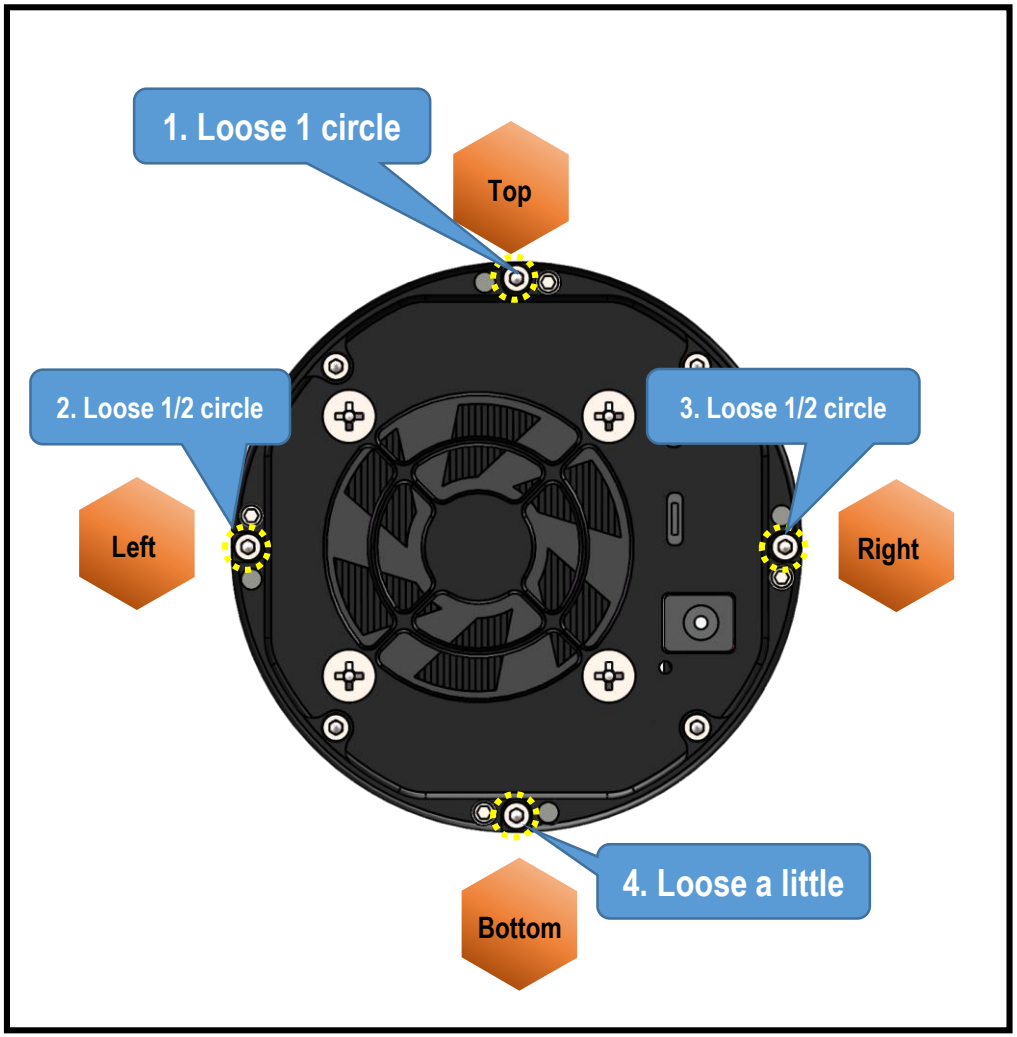


If want to tilt top for 0.5mm

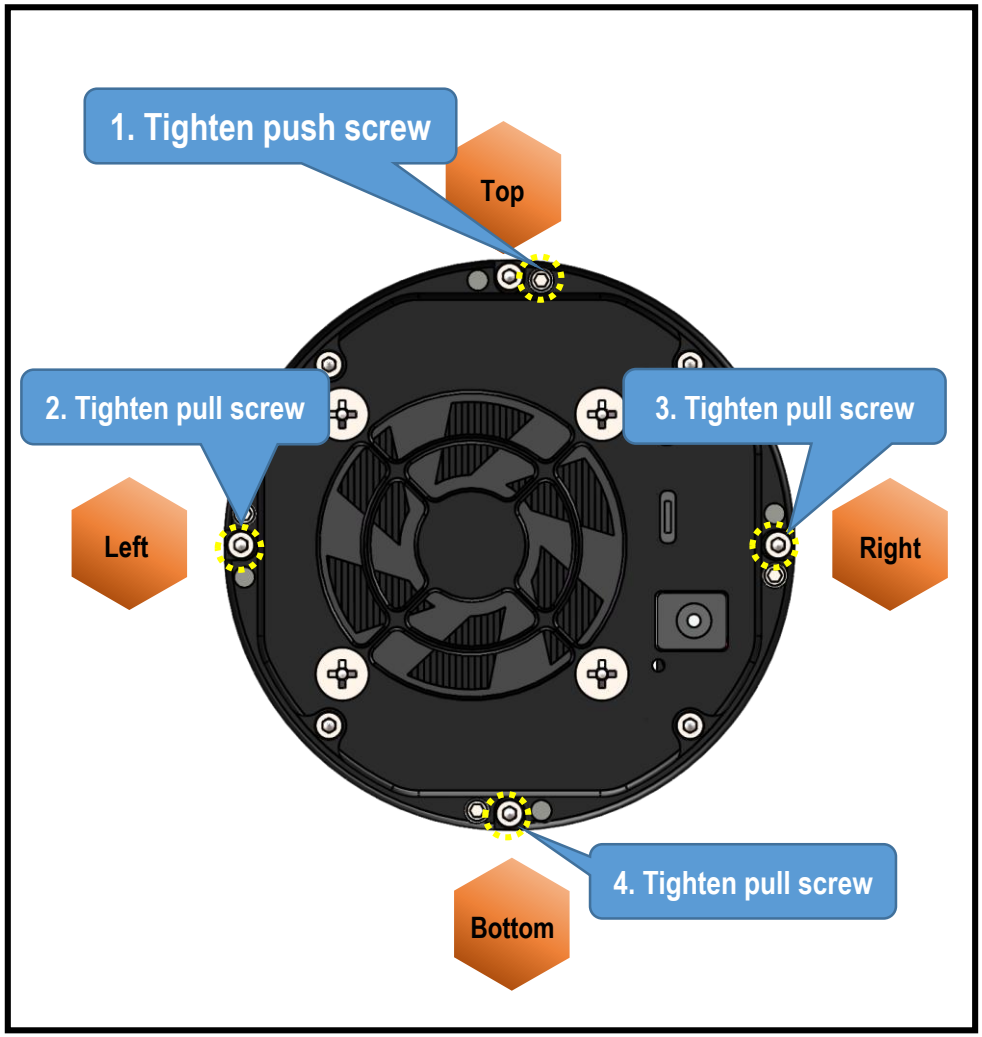
How to adjust tilter plate

Player One

Step 1: Loose pull screws

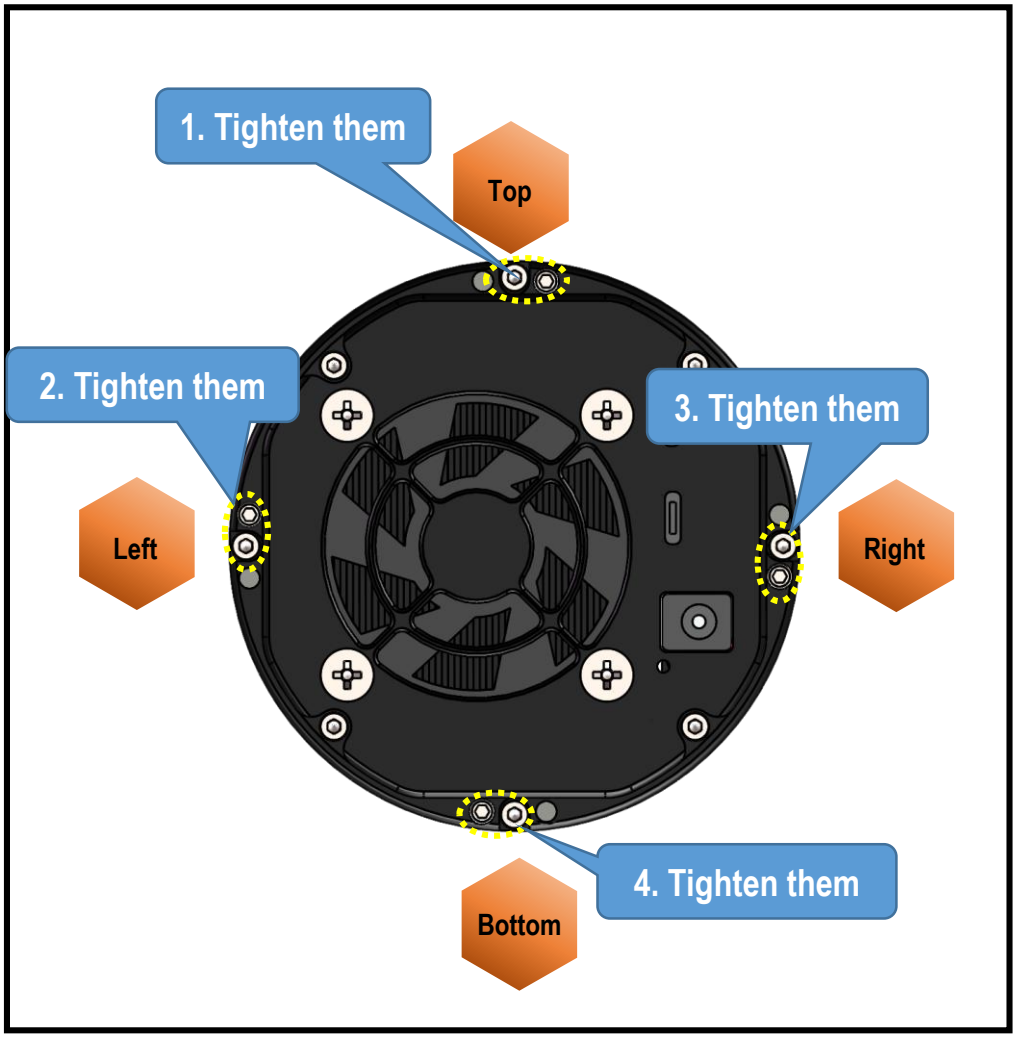


Step 2: Tighten some screws



If you need to tilt top corner more, repeat step1 and step2, until got suitable tilt angel.

Step 3: Tighten all screws



If want to tilt another direction, just repeat those steps.

Tighten all screws to finish tilt adjustment of top direction.

» 08 Servicing and Warranty

After-sale service guide

Warranty Policy

2-year free warranty (time start from delivered) for Player One products. If the product has any issue, please send the image or video and description to support@player-one-astronomy.com for further check to confirm.

•Purchase from Player One official online store, we will provide warranty service directly.

•Purchase form dealer, we will provide warranty service through dealer.

Repair in warranty, customer only pay the shipping fee of shipping back the product to us or dealer, and no other extra fees.

Replacement Policy

You can request our Replacement Service:

√ Within 30 calendar days of receiving the product if the product does not match the original description of the product in one or more significant respects.

√ Within 30 calendar days of receiving the product if the product suffers performance failure.

Please contact our After-Sales team by email to support@player-one-astronomy.com within 30 calendar days of receiving the products. Player One shall be responsible for the two-way replacement freight for any products sent in for replacement due to performance faults.

Warranty and Replacement Policy Exceptions:

× Warranty service time or replacement service time expired.

× Legal proof-of-purchase, receipts, or invoices are not provided, or are reasonably believed to have been forged or tampered with.

× A product sent to Player One for replacement does not include all original accessories, attachments and packaging, or contains items damaged by user error.

× A product is found to have no defects after all appropriate tests are conducted by Player One.

× Any fault or damage of the product is caused by unauthorized use or modification of the product, including exposure to moisture, entry of foreign bodies (water, oil, sand, etc.) or improper installation or operation.

× Product labels or serial numbers show signs of tampering or alteration.

× Damage is caused by uncontrollable external factors, including falling down, fires, floods, or lightning strikes, etc.

× Proof of damage during transit issued by the carrier cannot be provided.

× Other circumstances stated in this policy.

In those situations, repair the product might has extra cost, we will estimate cost and email customer to know the information before send product back.

» 09 FAQs

Thanks

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