ZWO is a world-renowned company focused on innovative product development in the field of astrophotography. ZWO dedicated to production of CMOS cameras, smart astro-imaging devices and astrophotography accessories. The company was founded by Sam Wen in 2011, with the headquarters in Suzhou, China. ZWO supplies cameras to more than 60 countries all over the world.

Innovate continuously, ZWO made one milestone after another in astronomy field. More than 40 energetic employees with rich experience and knowledge serve our customers worldwide. We all come together for one dream.

*Make astrophotography easy and fun*
2011
Nov
**ZWO Founded**
The ZWO Company was established by Founder and CEO Sam Wen.

Dec
**World's first planetary CMOS camera**
The ZWO **ASI130MM** was the first CMOS camera designed for planetary imaging.

2012
Sep
**Milestone! The first planetary CMOS camera beat CCD**
The ZWO **ASI120** camera allowed the CMOS camera to completely dominate the planetary camera market.

2014
Jun
**World's first USB3.0 Camera for astrophotography**
The ZWO **ASI120-S** camera, featuring a USB3.0 connection, image download times are lightning fast.

2015
Feb
**The biggest & fastest planetary CMOS camera in the world**
This new camera makes SONY's Pregius Global Shutter CMOS technology available for amateurs without breaking the bank. The ZWO **ASI174** has the largest sensor for planetary and solar/lunar imaging. And it can incredibly capture a maximum of 164 FPS at full resolution!

Jul
**Excellent Series for planetary imaging**
The ZWO **ASI1224**, **ASI290**, **ASI178**, **ASI185** were introduced to astronomy market at the very beginning by ZWO. The excellent performance in planetary imaging is well known throughout the world.

2016
May
**Another Milestone, the ZWO ASI1600 changed the world**
The ZWO **ASI1600** broke the CCD camera's leading position in DSO imaging.

Nov
**The first APS-C format CMOS cooled camera in the world**
The ZWO **ASI071** was the biggest CMOS camera in astrophotography.

2017
Sep
**New Product line: Mini guide camera**
The ZWO **ASI120 Mini**, **ASI290 Mini**, **ASI174 Mini** guide cameras, small and stable, they are dedicated and designed for guiding.

Oct
**The first CMOS cooled camera with 4/3" BSI sensor**
The ZWO **ASI294** was integrated with SONY's latest IMX294 back-illuminated sensor with very high sensitivity and low read noise.

Dec
**20 Megapixels camera series released**
The ZWO **ASI183** cameras have 20 Megapixels and impressive 84% QE.

2018
July
**Game changer: ASIAIR**
The ZWO **ASIAIR** is a smart WiFi device for astrophotography. The ASIAIR completely changed the way people used to do astrophotography, easy & fun.

**Future**
Still under developing...
ZWO Astrophotography Solutions

Our Products

For DSO imaging

1. Mini Guide Telescope
2. Guide Camera
3. ASIAIR
4. DSO Cooled Camera
5. Electronic Filter Wheel
6. Electronic Automatic Focuser
7. Off-Axis Guider

For Planetary imaging

8. Planetary Camera
9. Atmospheric Dispersion Corrector
### Camera Naming Rule

**Camera Type**
- Rule 1: Number of total pixels, e.g., ASI1600/ASI120/ASI130 etc.
- Rule 2: Sensor type, e.g., ASI290/ASI1094 etc.

**Camera brand of ZWO**
- Pro: Cooled camera, DDR3 buffer
- Cool: Cooled camera, no buffer
- GT: All in one cooler camera, DDR3 buffer
- No suffix means uncooler camera, no buffer

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**ASI 1600 M M PRO**

- M: CMOS sensor
- C: CCD sensor, never used
- M: Monochrome sensor
- C: Color sensor

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### ASI Camera Sensor Size

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>APS-C</th>
<th>4/3&quot;</th>
<th>4/3&quot;</th>
<th>4/3&quot;</th>
<th>1&quot;</th>
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<td>4944</td>
<td>3284</td>
<td>3250</td>
<td>2822</td>
<td>3672</td>
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<tr>
<td>4656</td>
<td>17.7x13.4mm, 3.8 μm</td>
<td>19.1x13.0mm, 4.63 μm</td>
<td>13.0x9.5mm, 24 μm</td>
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</tr>
<tr>
<td>4144</td>
<td>11.3x7.1mm, 7.4μm</td>
<td>11.3x7.1mm, 7.3μm, 1096</td>
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<td></td>
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<tr>
<td>5496</td>
<td>11.3x7.1mm, 7.4μm</td>
<td>11.3x7.1mm, 7.3μm, 1096</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**DSO Cooled Cameras**
- ASI071MC PRO
- ASI1600MM PRO
- ASI294MC PRO
- ASI183MM/MC PRO

**Planetary Cameras**
- ASI174MM
- ASI178MM/MC
- ASI224MC
- ASI120MM/MC

**Guide Cameras**
- ASI174MM Mini
- ASI290MM Mini
- ASI120MM Mini
The best enter-level camera

**ASI120MC/MM-S**
The ASI120 is ZWO’s legendary CMOS camera. It once broke the CCD camera’s leading position in the field of planetary imaging with high sensitivity and high frame rate. This allowed the CMOS camera begin to dominate the planetary camera market.

The most popular planetary camera

**ASI224MC**
The ASI224MC color camera has a super low read noise of 0.8e. No filter wheel or LRGB filters are required, which saves on cost and simplicity. Still the ASI224MC delivers excellent astro-imaging performance and provides amazing results in planetary imaging.

The best color planetary camera

**ASI385MC**
The ASI385MC is a big brother of ASI224MC, which shares the same pixel size and ultra-low read noise but bigger chip size of 1/1.9”, so it is also suitable for DSO lucky imaging.

The best mono planetary camera

**ASI290MM/MC**
The ASI290 uses the Sony IMX290 1/3” CMOS back-illuminated sensor, with a 1936 x 1096 array of 2.9um pixels. This sensor has an extremely low read noise of 1.0e and can capture a maximum of 170 FPS at full resolution. It also has monochrome version, making it excellent for lunar, solar, and planetary imaging.
High resolution imaging

ASI178MM/MC

The ZWO ASI178 camera uses the Sony IMX178 back-illuminated, 6.4M pixel image sensor. The 1/1.8" sensor has an array of 3096 x 2080 pixels which are 2.4um square. With a 14bit ADC, high sensitivity, the sampling accuracy can be greatly improved.

Lunar Solar imaging

ASI174MM

The ASI174MM is recognized as the best camera for solar imaging. It features a 1/1.2" large sensor, a high frame rate of 164 fps, and uses global shutter. It is also a great camera for imaging high-speed moving objects such as ISS.

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Format</th>
<th>Resolution</th>
<th>Pixel Size (µm)</th>
<th>QE</th>
<th>Read Noise</th>
<th>Shutter</th>
<th>FPS</th>
<th>ADC</th>
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<td>1/3&quot;</td>
<td>1280*960</td>
<td>3.75</td>
<td>75%</td>
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<td>Rolling</td>
<td>60</td>
<td>12bit</td>
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<td>ASI124</td>
<td>Color</td>
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<td>1304*976</td>
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<td>12bit</td>
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<td>ASI1290</td>
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<td>1936*1096</td>
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<td>80%</td>
<td>1.0-3.2e</td>
<td>Rolling</td>
<td>170</td>
<td>12bit</td>
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<tr>
<td>ASI178</td>
<td>Mono/Color</td>
<td>1/1.8&quot;</td>
<td>3096*2080</td>
<td>2.4</td>
<td>79%</td>
<td>1.4-2.2e</td>
<td>Rolling</td>
<td>60</td>
<td>14bit</td>
</tr>
<tr>
<td>ASI385</td>
<td>Color</td>
<td>1/1.9&quot;</td>
<td>1936*1096</td>
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<td>TBD</td>
<td>0.7-2.8e</td>
<td>Rolling</td>
<td>120</td>
<td>12bit</td>
</tr>
<tr>
<td>ASI174</td>
<td>Mono</td>
<td>1/1.2&quot;</td>
<td>1936*1216</td>
<td>5.86</td>
<td>77%</td>
<td>3.5-6.0e</td>
<td>Global</td>
<td>164</td>
<td>12bit</td>
</tr>
</tbody>
</table>

- USB3.0 high speed
- ST4 Port
- High sensitivity
The Cocoon nebula  Marcel Drechsler
Imaging telescope: RASA 11"
Imaging camera: ZWO ASi1600MM-Cool
Integration: 33.5 hours
**The Lowest dark current DSO camera**

**ASI071MC PRO**

The ASI071MC PRO has a new sealing structure and a built-in tilt adapter. As the amp-glow free camera with super-low dark current noise, it is very suitable for long time exposure DSO imaging. The APS-C format is the largest frame that most flatteners and coma correctors on the market can support.

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**The most popular mono DSO camera**

**ASI1600MM PRO**

The legendary ASI1600 is a milestone in astrophotography history. It was the first CMOS camera that can beat CCD. It has very low dark current and 1.2e extremely low read noise. Don't underestimate the 4/3\" format, as long as you match the appropriate telescope focal length, you can take excellent photos.
The most popular color DSO camera

**ASI294MC PRO**

The ZWO ASI294 MC Pro is a remarkably capable one-shot-color CMOS camera for deep sky astrophotography with 4/3” Sony IMX294 back-illuminated sensor. Thanks to its built-in 14bit ADC and 63ke full well, it can provide great images with very short time exposure.

---

High resolution Imaging

**ASI183MM/MC PRO**

The new 1” format back-illuminated sensor make 183 cameras have 84% extreme-high sensitivity, high frame rate. It has 20 mega pixels. It can be regarded as the best choice for small or medium sized short focal length telescopes. Wonderful choice for both DSO imaging and planetary imaging with some serious power and versatility!

---

- DDR3 256MB Buffer
- USB3.0 high speed
- USB2.0 HUB
- 2-stage TEC Cooling

---

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Cooling</th>
<th>Format</th>
<th>Resolution</th>
<th>Pixel Size (μm)</th>
<th>Read Noise</th>
<th>QE</th>
<th>Full Well</th>
<th>ADC</th>
<th>Back Focus</th>
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<tr>
<td>ASI183</td>
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<td>Cooled/Uncooled</td>
<td>1”</td>
<td>5496*3672</td>
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<td>1.6-7.0e</td>
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<td>15000e</td>
<td>12bit</td>
<td>6.5mm/17.5mm</td>
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<tr>
<td>ASI294</td>
<td>Color</td>
<td>Cooled/Uncooled</td>
<td>4/3”</td>
<td>4144*2822</td>
<td>4.63</td>
<td>1.2-7.3e</td>
<td>TBD</td>
<td>63700e</td>
<td>14bit</td>
<td>6.5mm/17.5mm</td>
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<td>ASI1600</td>
<td>Mono</td>
<td>Cooled/Uncooled</td>
<td>4/3”</td>
<td>4656*3520</td>
<td>3.8</td>
<td>1.2-3.6e</td>
<td>60%</td>
<td>20000e</td>
<td>12bit</td>
<td>6.5mm/17.5mm</td>
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<td>50%</td>
<td>46000e</td>
<td>14bit</td>
<td>17.5mm</td>
</tr>
</tbody>
</table>
The Choice Of Sensor

In the case where the telescope's focal length is determined, the sensor size determines the field of view. Using a larger sensor size means you can capture a wider field of view, without exceeding the effective imaging circle of the telescope.

Monochrome Or Color?

Mono Camera + Filter Wheel + Filters → LRGB → Color

Color Camera

Monochrome cameras have higher quantum efficiency and wider band capabilities. Color cameras are simpler to use and you can get color images directly.

Pixel size?

under sampling  suitable sampling  over sampling

The pixel size and focal length determine the sampling accuracy, and you need to choose a camera that best matches your telescope to get the best sampling accuracy.

Sampling Rate (arcsec/pixel) = \frac{206 \times \text{Pixel Size}}{\text{Focal Length}}

Non-cooled Or Cooled?

Non-cooled cameras with high sensitivity are excellent for short exposure imaging such as: planetary, lunar and solar imaging. Cooled cameras are dedicated for long time exposure imaging such as DSO Imaging.
The Electronic Filter Wheel will be a good addition to the monochrome cameras. It can be used with a variety of astronomical filters such as LRGB filters, IR-PASS filters, and UV-PASS filters.

**EFW**  
Electronic Filter Wheel  
400g (14oz)

**EFW mini**  
Mini Electronic Filter Wheel  
300g (10.6oz)

**ZWO Filter Series**

<table>
<thead>
<tr>
<th>Filter</th>
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<th>36mm</th>
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<td>✓</td>
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<td>SHO</td>
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<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>UV IR-cut</td>
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<td>x</td>
<td>x</td>
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</tr>
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<td>CH4</td>
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<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>IR850</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
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</table>
Guide Cameras and Accessories

**Widely Used**

**ASI120MM Mini**
The ZWO ASI 120 Mini is a top-notch monochrome guide camera with affordable price, well suited to both planetary imaging and acting as a guider to amplify the usefulness of other astronomy instruments. This camera has a 4.8mm x 3.6mm sensor with small pixels 3.75 micron pixels. It is also more compact than other ASI120-series cameras.

**Precise Guiding**

**ASI290MM Mini**
The ASI290 Mini contains 2.9μm pixels for a higher arcsec per pixel than either the 224 or 120 series cameras. This means the ASI290 Mini can detect even more negligible star movement in the same guide scope. This camera can enhance guiding precision over the 120 mm by about 30%.

**Big FOV**

**ASI174MM Mini**
Designed for big FOV guiding, the ASI174 Mini serves as a useful OAG for locating a guide star. When using an OAG in conjunction with an RC or SCT, the most difficult part is searching for a guide star. The ASI174 Mini features a large 1/1.2" sensor for a 4x bigger FOV than 120 mm.

- Small and lightweight
- USB2.0 Type-C Port
- ST4 Port
- 1.25" Diameter as eyepiece

**Mini Guide Scope**

- Lens Diameter: 30 mm
- Focal Length: 120 mm
- Weight: 250 g
- Back Focus: 0~20 mm

**Off-Axis Guider**

**ZWO Atmospheric Dispersion Corrector**
While observing or imaging low altitude objects, the ZWO ADC is very useful.
## OEM Solutions

### OEM Camera Board Sets

### OEM Camera

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensor</th>
<th>Mono</th>
<th>Color</th>
<th>USB3.0</th>
<th>USB2.0</th>
<th>Trigger</th>
<th>Global Shutter</th>
<th>Resolution</th>
<th>Format</th>
<th>Pixel Size (μm)</th>
<th>QE</th>
<th>ADC</th>
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<td>×</td>
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<td>×</td>
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<td>✓</td>
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<td>✓</td>
<td>×</td>
<td>1936 x 1036</td>
<td>1/3&quot;</td>
<td>2.9</td>
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</tr>
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<td>✓</td>
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<td>✓</td>
<td>×</td>
<td>1936 x 1096</td>
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<td>3.75</td>
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<td>✓</td>
<td>1936 x 1216</td>
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<td>✓</td>
<td>✓</td>
<td>1936 x 1216</td>
<td>1/1.2&quot;</td>
<td>5.86</td>
<td>80%</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>×</td>
<td>5496 x 3672</td>
<td>1&quot;</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>1608 x 1104</td>
<td>1.1&quot;</td>
<td>9</td>
<td>TBD</td>
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<tr>
<td>IMX294</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>4144 x 2822</td>
<td>4/3&quot;</td>
<td>4.63</td>
<td>TBD</td>
<td>14</td>
</tr>
<tr>
<td>IMX299</td>
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<td>✓</td>
<td>×</td>
<td>4144 x 2822</td>
<td>4/3&quot;</td>
<td>4.63</td>
<td>TBD</td>
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<td>✓</td>
<td>×</td>
<td>4944 x 3284</td>
<td>APSC</td>
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<td>✓</td>
<td>✓</td>
<td>×</td>
<td>6032 x 4032</td>
<td>Full Frame</td>
<td>5.97</td>
<td>53%</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
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<td>Full Frame</td>
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<td><strong>Panasonic</strong></td>
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<td>✓</td>
<td>✓</td>
<td>×</td>
<td>4656 x 3520</td>
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<td><strong>Gpixel</strong></td>
<td>GMAX0806</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>7912 x 5436</td>
<td>APSC</td>
<td>2.8</td>
<td>62%</td>
<td>12</td>
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</tbody>
</table>
**EAF**  
Electronic Automatic Focuser

Introducing the new EAF, the latest innovation from the engineers at ZWO. This electronic focuser enables precise, dynamic focus control for planetary and deep-sky imaging.

**5KG capacity**  
**ASCOM & ASIAIR Supported**

The ZWO EAF works with all capture software supported by the ASCOM platform. The focuser also completes the ASIAIR WiFi imaging and control system. Now control your entire imaging runs from a smart phone or tablet, even from indoors.

The design on the body is inspired by the changing Airy diffraction pattern through a range of focus. The EAF is constructed from an all-metal housing in an attractive red color that matches our cameras.

<table>
<thead>
<tr>
<th><strong>Body size:</strong></th>
<th>60mm x 50mm x 40mm</th>
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</thead>
<tbody>
<tr>
<td><strong>Power port:</strong></td>
<td>12V DC 5.5mm x 2.1mm, center positive</td>
</tr>
<tr>
<td><strong>Data port:</strong></td>
<td>USB2.0 port</td>
</tr>
<tr>
<td><strong>Weight:</strong></td>
<td>277g</td>
</tr>
<tr>
<td><strong>Capacity:</strong></td>
<td>5kg</td>
</tr>
</tbody>
</table>

**Standard version**
- EAF body
- flexible coupling
- motor bracket
- USB2.0 cable

**Advanced version**
- EAF body
- flexible coupling
- motor bracket
- USB2.0 cable
- hand controller
- temperature sensor
Astrophotography has never been easier!

ASIAIR
CHANGE YOUR WAY OF ASTROPHOTOGRAPHY!

ASIAIR is a smart WiFi device that allows you to control all ASI USB 3.0 cameras, ASI Mini cameras, DSLRs and equatorial mount to do plate solving and imaging with your phone or tablet/iPad when connected to ASIAIR via WiFi.

Support New Equipments!

EAFocuser
Nikon&Canon

iOS
Android
as easy as 123!

Without ASIAIR

**Comparison**

With ASIAIR

---

**Setup**

1. A lot of cables between equipments and laptop
   - Less cables and Say Goodbye To Laptop!

**Occasion**

2. Have to stick to your equipment and fight with mosquitoes and cold
   - Stay wherever you want

**Operation**

3. Too many software operated on PC
   - All in one app
Device Settings
- ASI AIR, Main Camera, Guide, Telescope, Filter wheel, SD card etc.

App Info

Main Functions
- Preview, Focus, Autorun, B/N, exposure, Save Preview image.

Guiding Floating Window
- Tap to enter guiding interface.

Common Functions
- Histogram, Plate Solve, Guide etc.

Real-time information

Mount Control Pad
- Most useful and important information of all devices and functions.

Mount control

Plate solving

Autorun Customize
- Make your shooting schedule freely!

Target Choose
- Create your own shooting plan!

Little box, big universe!
Contact Us

Local dealers in your country
https://astronomy-imaging-camera.com/dealers

🏠 Suzhou, China
📞 +86 0512 6592302

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vanessa.zhang@zwoptical.com

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vanessa.zhang@zwoptical.com

Product Technical Support
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🌐 ZWO Astronomy Cameras