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* Thank you for purchasing a CentralDS product.
Introduction

Astro 5D Mark IV is a cooled camera that modified 5D Mark IV of Canon. We took out the image sensor from the inside of camera body and attached a TEC cooling module on to it and made it to a high performance Astronomical cooled camera. The image sensor can be cooled maximum -18°C (± 2°C) below ambient by the installed TEC cooling module.

Informations of product

* Cool down the temperature of CMOS sensor 18 Celsius degree (±2°C) from that of ambient air.
* Absolutely high-Quality image in B-shutter use compared with usual unmodified DSLR
* Realtime Monitoring of the cooling temperature by digital thermometer
* Drop-in filter system
* AF Lens Adapter for canon lens (option)
* Use of high efficiency Thermo electric cooler module
* Power: 12V, 1.7A DC
* Low Pass Filter Removed.
* Optimal design by 3D CAD modelling
* Precision manufacturing by CNC machine
* Perfect tuning of optical axis of CMOS sensor by 3 point alignment
* Permanent Anti-dew system applied.
* Hoya MC Clear Filter Installed
* Internal Silent cooling fan installed
* Live-view Focus function alive.
* Removed function: Low Pass Filter, Mechanical shutter, Sensor Cleaning
* Net weight: 1,390g
Camera usages

You will get used to this camera and understand the camera better while reading this manual and taking test images. Please read 'Handling caution' and 'Safety of the user and the camera' thoroughly to prevent any accidents or damages to the camera.

Package contents

Please check following devices and accessories are all included in the package. If anything is missing, please contact CentralDS or the dealer that you purchased from.

1. Astro 5D Mark IV body
2. FRM72 / Base Adapter (M72 x 0.75mm pitch Male Thread)
3. CM2C / Drop-In Filter system + Canon EF Mount (CM2N / Drop-In Filter system + Nikon F Mount)
4. DTH48 / 48mm(2”) Filter Holder
5. DFH52 / 52mm Filter Holder
6. FR1 / Field Rotator (M72 x 0.75mm pitch Male Thread)
7. ECR48 / Adapter for Wide T thread (M42 x 0.75mm Pitch Female Thread)
8. ECR54 / Adapter for Takahashi Telescope (M54 x 0.75mm Pitch Male Thread)
9. DTH-1 / Digital Thermometer
10. CT18 / Thermometer Cable
11. PS1204 / DC power supply for TEC cooler
12. PSEC1 / DC extension power cable (5.5mm/2.1mm Barrel)
13. PSC1 / Cigar Jack 12V Power Cable
14. PSCA1 / AC100-240V To DC12V5A Adapter Power Supply
Camera operation and responsibility

You can record the images to the storage (Memory Card) of this camera. CentralDS will not be responsible for any inconvenience or loss due to failure of storing images to the Memory Card or defective images stored in the card.

You can use this camera for personal use anywhere in the world.

Handling precaution

- This camera is a high precision device. Please do not drop and avoid any physical impact against camera.
- This camera is not waterproof. If you drop the camera in water, wipe off any water droplets from the camera with a dry cloth and contact CentralDS (support@centralds.net)
- Do not leave the camera under the direct sunlight. High temperature can damage the camera.
- Do not disassemble the camera.
- Do not touch Parallelism Alignment Screws (3 pieces of M4 headless screws) on the beneath of FRM72.
- If the Parallelism Alignment Screws were adjusted by personnel not authorized by CentralDS, the warranty will be voided.
- Please use a dust blower to remove dusts on the filter.
- Do not disassemble the filter. If the airtight sealing is damaged, dew can form inside the camera.
- If the camera is disassembled by personnel not authorized by CentralDS, the warranty will be voided.
- Do not leave the camera attached to a telescope with the cooling system off for long time. Dew can form on the surface of the camera and this can damage the camera.
- If condensation forms on the camera, do not use the camera.
- If the camera is suddenly brought in from the cold into a warm room, condensation may form on the camera and internal parts. To prevent condensation, first put the camera in a sealed plastic bag and let it adjust to the warmer temperature before taking it out of the bag.
- Store the camera in a sealed container with desiccants (i.e. Silica gel) or cool, dry, well ventilated location.
- Image sensor dust – CentralDS tests each camera with test exposures to check the image sensor is dust free before shipping. However about 2 – 4 % of the customer reported dusts on the image sensor. If you see marks on your image due to the dusts on the image sensor, please contact CentralDS for servicing. Do not disassemble the camera to clean the dusts.
- Caution with the cooling system activated – the TEC cooling system for the image sensor is designed to emit substantial amounts of heat to outside. This does not cause any problem on the camera operation but a minor burn can be caused if skin is contacted with the cooling system for extended period time.
- Don’t set cooling temperature under -45C. If you cool down the CMOS temperature to -45C under, Micro lenses of Image sensor (=CMOS) will be destroyed.
Taking Pictures

- You can operate the camera with the following instruction.

Using with Telescope

1. Attach firmly the camera to Telescope using FR1 + ECR48 or ECR54.
2. Insert a Filter in Drop-In Filter Holder. (** very important to maintain Back Focus Distance)
3. Connect TEC power cables (PS1204) and temperature sensor cable(CT18).
4. Connect DC 12V to PS1204.
6. Check the working of canon body and cooling module.
7. Check the cooling temperature. Within 7~10minutes the temperature of CMOS will drop to maximum cooled temperature.
8. Using (Live view) mode of camera find the subject and adjust the focus.
9. Take the shots.
Using with AF Adapter + Canon Lens

1. Detach Drop-In Filter system form FRM72 of camera body.
2. Insert a Filter in 48mm thread of FRM72. (** very important to maintain Back Focus Distance)
3. Attach AF Adapter to FRM72 of camera body.
4. Align X Y axis angles of AF mount using 3point M4 set screw of FRM72.
5. Attach canon Lens to AF adapter.
6. Connect TEC power cables ( PS1204) and temperature sensor cable(C18).
7. Conect DC 12V to PS1204.
9. Check the working of canon body and cooling module.
10. Check the cooling temperature. Within 7~10minutes the temperature of CMOS will drop to maximum cooled temperature.
11. Using (Live view) mode of camera find the subject and adjust the focus.
12. Take the shots.

* Cooling Module of Astro 5D Mark IV has no ON/OFF switch. When you connect the DC power to camera, cooling module become ON at the same time.

* Astro 5D Mark IV has no Temperature controller. When cooling get reach to stable condition the CMOS temperature will be it’s maximum cooling state.

*PS1204 is a DC step down adapter for TEC module and it’s adjusted for maximum cooling performance of heatsink and cooling fan. Please do not use DC power supply of other companies.

*Back Focus Distance of Astro 5D Mark IV is 44mm(CM2C) /46.5mm(CM2N), These are same to Canon EF-mount or Nikon F-mount, and adjusted at the condition of 2mm thickness glass filter installed at the drop-in filter holder. If you take the shots with the camera lens, in case of no filter in drop-in filter holder, infinity focusing error will be occurred. We recommend to install a filter (2~3mm thickness) into drop-in filter holder always.

(Recommended filters: Hoya MC Clear, Baader UV/IR cut, IDAS LPS P2 etc )

*In case of Baader 2” filters, you can use only Low Profile Filter Cell(LPFC) products.

*TEC cooling module is more efficient when the ambient temperature is high but the efficiency is lower when the temperature is low in the winter. This is due to the electricity consumption per temperature characteristics of the Peltier elements which is one of the most important parts in the TEC cooling module. As a result, the cooled image sensor temperature may not reach to max cooling temperature of (product information) in the winter season.

*The camera temperature showing in BackyardEOS or other Astro imaging programs is not the actual sensor temperature but the temperature at the temperature sensor installed on the PCB circuit board placed behind the image sensor.
**The temperature value displayed at DTH-1 is from the temperature on cold finger and it’s near to real CMOS temperature and the temperature that Astro imaging programs is displaying (from Canon exif data) is about 3-7°C higher than this value.**

* If the camera is exposed to the air outside with the cooling module off for extended period of time, the camera can be internally damaged due to problems such as short circuits caused by condensation.

* If you have to leave the camera outside for extended period of time, cover the camera with the dew shield cover as soon as turning off the cooler.

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**Characteristics of the modification**

- Astro 5D Mark IV is modified versions of Canon’s general purpose DSLR cameras. Some of original features of Canon camera were removed and new features such as TEC cooling and Drop-In filter holder System are added for high quality astrophotography. Followings are the differences made by the modification.

1. Low Pass Filter of original CMOS sensor was removed.

2. In Astro 5D Mark IV Hoya Clear filter installed, and image blurring can occur due to chromatic aberration on the infrared lights recorded on the sensor so the image sharpness can suffer. This is more pronounced in the images taken with refraction optics than reflection optics. We recommend you to install in Drop-In filter holder UV/IR cut filter, light pollution filter and deep sky filter at the same time while imaging.

3. With Astro 5D Mark IV, you can take IR images by mounting a visible light blocking / infrared transmitting filter such as a Hoya R72 filter.
4. Various 2” imaging filters or 52mm filters can be mounted in the Drop-In filter holder.

5. Drop-In Filter system (CM2C/CM2N) does not have the communication contact points so the auto focus, lens information recording and pulse signal transfer for motor operation which are based on the communication between the camera body and the lens are disabled even when a Camera lens is used.

6. In case of Drop-In Filter system (CM2C/CM2N) you always have to focus lenses manually. Some lenses need power from the body for manual focusing and you cannot focus these lenses even manually when they are mounted on Astro 5D Mark IV.

7. View Finder was disabled.

8. Shutter speed control of Astro 5D Mark IV is not valid in sub-second exposure, only valid in Bulb Shutter mode.

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**Safety of the User and the Camera**

Follow these safeguards and use the equipment properly to prevent injury and equipment damage.

1. Do not leave the power adapter and the power cord near an object emitting heat. This can cause fire due to deformation and damage of the insulator.

2. Do not use the camera near inflammable gas.

3. If the internal parts of the camera are exposed after the camera is dropped or the camera housing is damaged, do not connect the power to the camera due to danger of an electric shock.

4. Do not disassemble the camera. It can cause an electric shock.

5. Keep the camera from the reach of small children.

6. Do not use the equipment in dusty or humid places. This is to prevent fire and electrical shock.

7. Do not use the camera with medical equipments. The electromagnetic interference can cause malfunction of the medical equipments.

8. To prevent fire and electrical shock, follow the safeguards below:
   - Always insert the power plug all the way in.
   - Do not handle a power plug with wet hands.
   - Do not excessively bend the cord.
   - Do not put a heavy object on the power adapter and cord.
   - Do not connect too many power plugs to the same power outlet.
   - Do not use a cord whose insulation has been damaged.
   - If the surrounding near the power outlet is dusty or humid, the power outlet can be short circuited. Clean and dry the surrounding before using the equipment.
   - Do not use the camera inside a car under the hot sun, under the direct sun light or near a heat source. The camera can be damaged or causes skin burns.
   - Do not use paint thinner, benzene, acetone or other organic solvents to clean the equipment. Doing so may cause fire or a health hazard.
Product Warranty

CentralDS provides 1 year product warranty for customers who purchase brand new Astro 5D Mark IV.
In case of [User supplied camera modification service], CentralDS offers 60 days product warranty.
Astro 5D Mark IV system Chart

Astro 5D Mark IV System Chart

Option Items

Tilt Adapter TA54
(TA48)<br>Wid-T mount

AF Adapter CA1 (for EF Lens)

CANON Lens

TELESCOPE

NIKON Lens

CANON Lens

ECR48 415.4mm 0.75P

ECR54 625.4mm 0.75P

58.0mm Back Focus Distance

Drop-In Filter Holder

FRH48

FRH52

Body

DTH1 Digital Thermometer

CT18 Thermometer Cable

FRM72 Field Rotator

PS1204 12V to 6V Converter

PSCA1 Cigar Jack of CAR 12V DC

PSEC1 DC extension cable

5.5mm/2.1mm Male Plug

5.5mm/2.1mm Female Plug