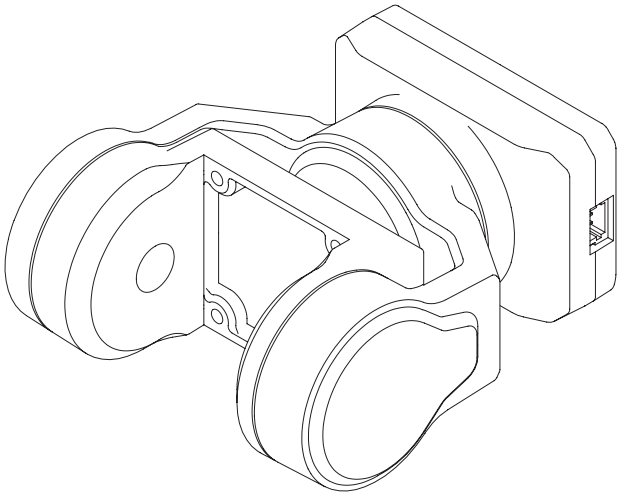
V1.5

2026.07

C-20D

Horizontal 2-Axis Gimbal

User Manual



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Using this Manual – Legend

 Important

 Tips

 Explanation

Revision History

Date	Document Version
2024.05.30	V1.0

Date	Document Version
2024.11.19	V1.1

Date	Document Version
2024.12.19	V1.2

Date	Document Version
2025.06.04	V1.4

Date	Document Version
2026.07.21	V1.5

Caution

Always stay alert when using C-20D 2-axis Gimbal and its accessories to control an unmanned aerial vehicle (UAV) or other carriers. Careless may result in serious harm to yourself and others.

1. Make sure that the external power supply for the gimbal is a lithium battery (2S~6S) with an input voltage between 7.4V~26.4V. Otherwise, the gimbal may work abnormally or be damaged.
2. DO NOT short circuit the power output and GND. Otherwise, the equipment may be damaged and may not work properly.
3. Follow the instructions in the user manual when installing the gimbal. Incorrect installation may cause the gimbal to not work properly.
4. Make sure that all connectors are secure and all parts are work properly.
5. Make sure you fully understand and abide by local laws and regulations before using this product.
6. This product is not intended for children.

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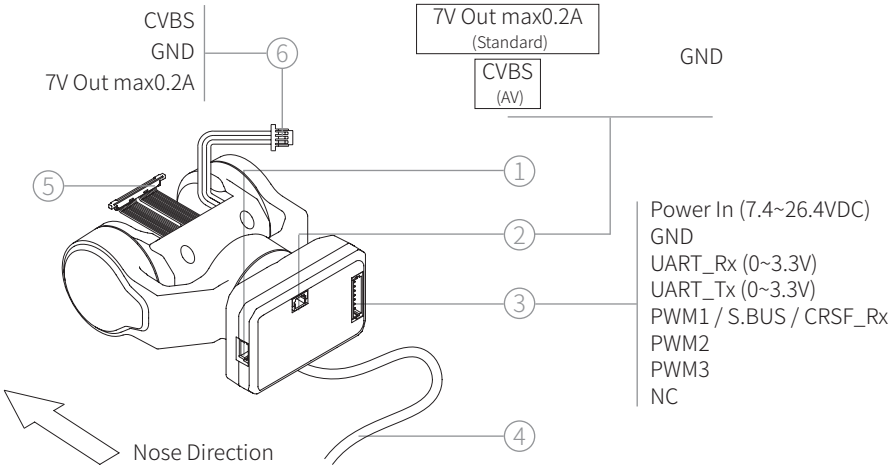
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Diagram

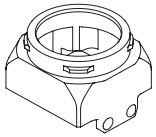
Gimbal

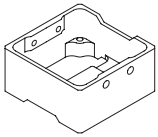


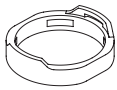
⚠ The gimbal must share a common ground with the control signal transmitter.

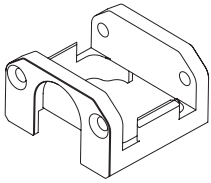
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5. Coaxial Cable Camera End (Standard)
6. Analog Camera Cable (MX1.25-3P, AV)

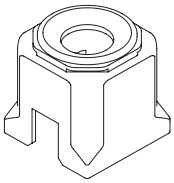
Accessories

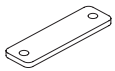

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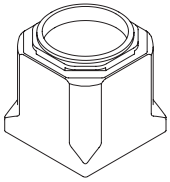

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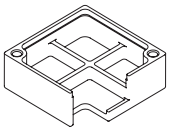

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1. O4 Pro Lens Front Housing (O4 Pro)
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Installation

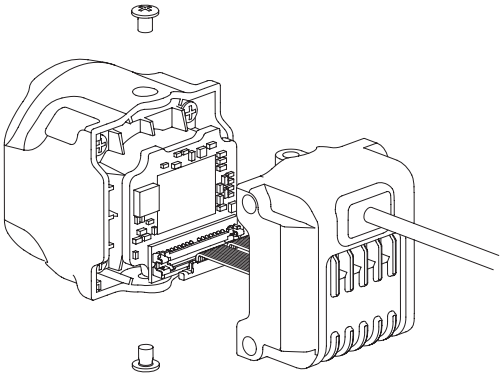
O4 Pro

1. Remove the housing fixing screws of the camera (one on each side) and separate the front and rear housings of the camera.

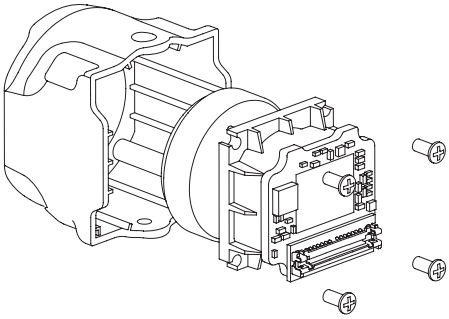
⚠ Do not separate the housings too far or may damage the camera.

2. Use the crowbar in the package to disconnect the coaxial cable from the camera and remove the rear housing.

⚠ The coaxial cable and its connectors are vulnerable. Please be careful when disconnecting and connecting the cable.

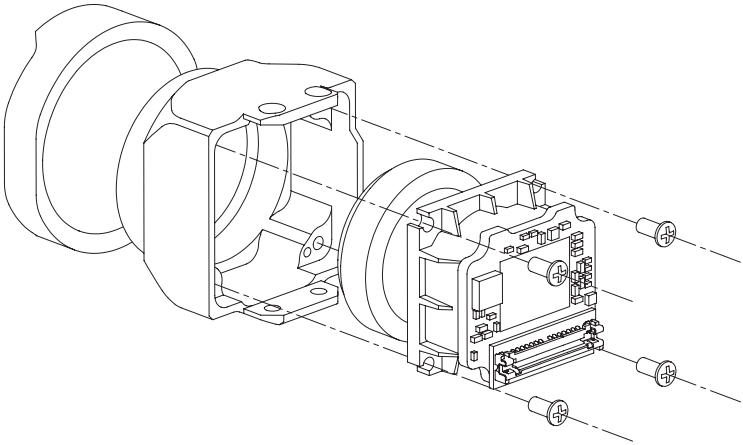


3. Remove the four lens fixing screws inside the front housing and take the lens out.

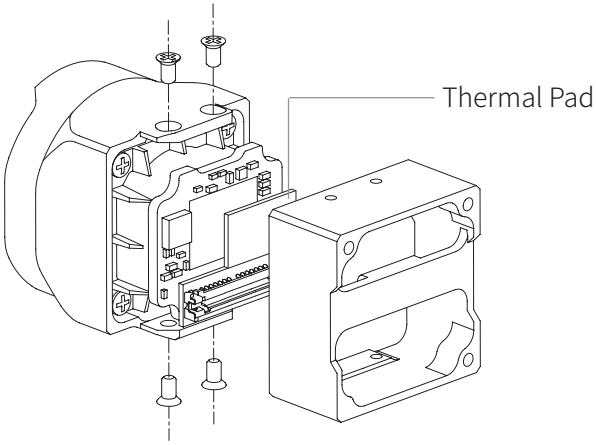


4. Install the lens protection ring on the front of the lens mount.
5. Fix the lens into the lens front housing with four M1.4 x L3mm screws.

⚠ The mounting direction of the lens in the lens mount is unique. Please note the correspondence between the lens locating posts and the locating holes inside the lens mount.

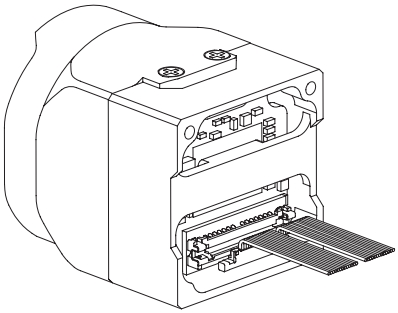


6. Connect the front and rear housing with four M1.4 x L2.5mm countersunk screws.



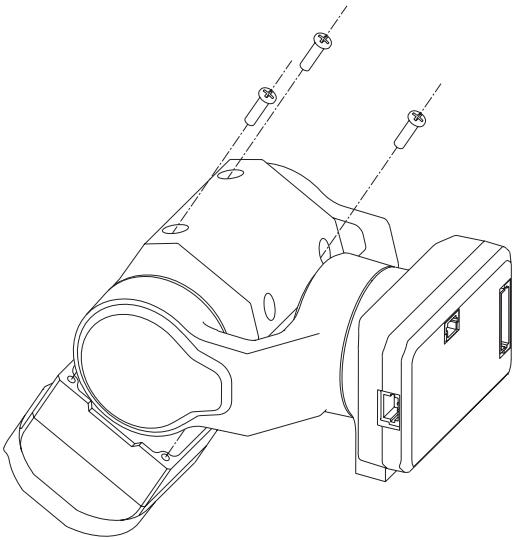
7. Connect the gimbal pre-built coaxial cable on the lens.

⚠ The space is a narrow on this step. Please be careful not to pull the cable.



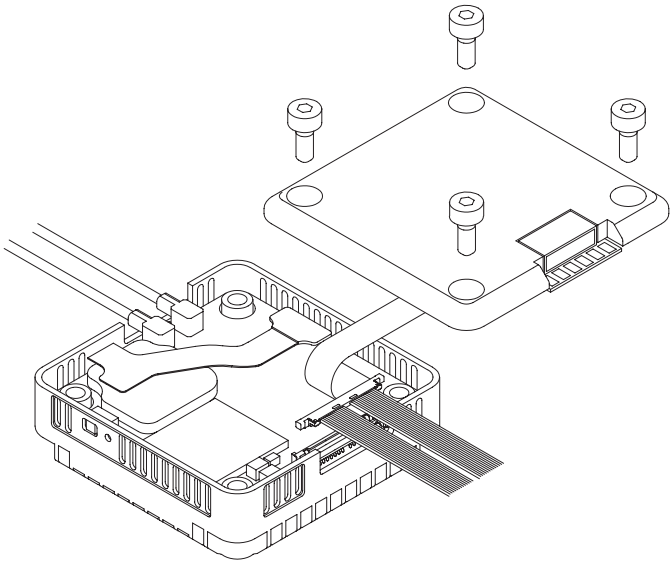
8. Fix the camera on the gimbal with three M1.4 x L5mm screws.

⚠ Determine the mounting direction of the camera on the gimbal by usage scenario (gimbal upward / downward mounting). Avoid squeezing the cable when installing the camera. If the pitch motor of the gimbal spins unsmoothly or rebounds, it is generally caused by a tense coaxial cable. Please organize the cable and try again.



9. Separate the top and bottom housing of the air unit, then use the crowbar to disconnect the coaxial cable from the air unit and remove it.

⚠ Do not separate the housings too far or may damage the air unit.

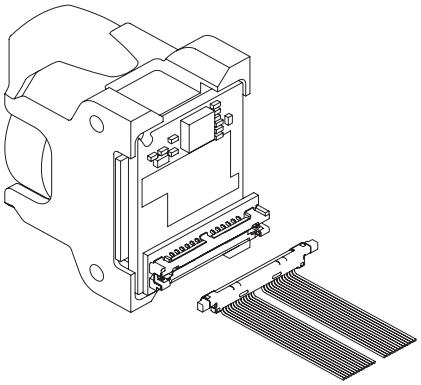


10. Connect the coaxial cable from the gimbal to the air unit and assemble the air unit.

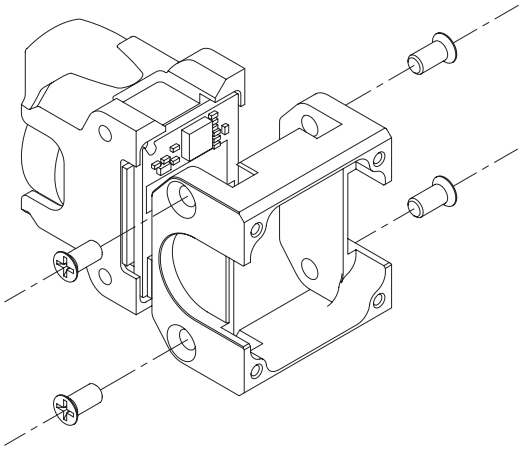
O4 Wide

1. Use the crowbar in the package to disconnect the coaxial cable from the camera and remove the rear housing.

⚠ The coaxial cable and its connectors are vulnerable. Please be careful when disconnecting and connecting the cable. There is glue on the connector for fixation. A heat gun can be used to heat the glue at 150 °C and remove it with tweezers after it is softened.

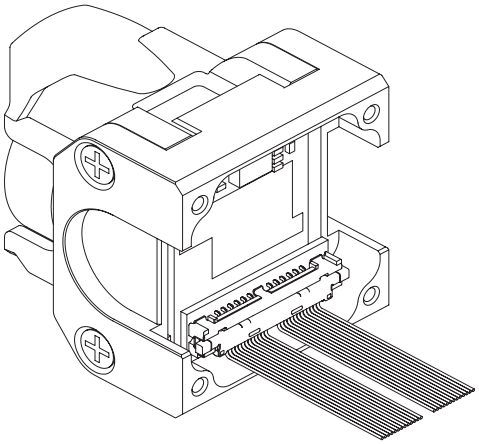


2. Secure the lens to the lens housing with four M2 x L4mm countersunk screws.



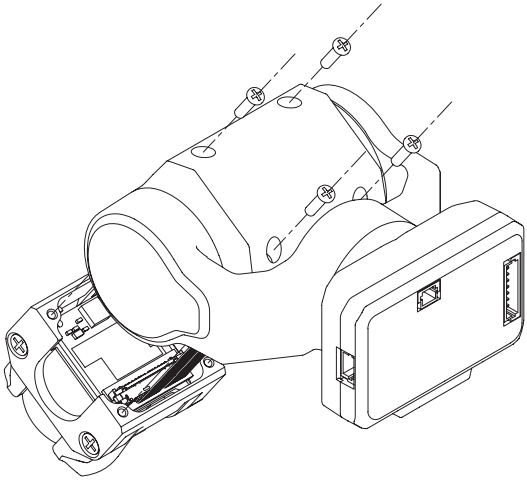
3. Connect the gimbal pre-built coaxial cable on the lens.

⚠ The space is a narrow on this step. Please be careful not to pull the cable.



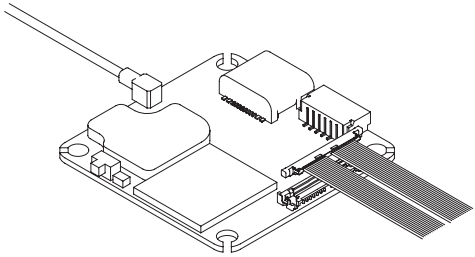
4. Fix the camera on the gimbal with four M1.4 x L5mm screws.

⚠ Determine the mounting direction of the camera on the gimbal by usage scenario (gimbal upward / downward mounting). Avoid squeezing the cable when installing the camera. If the pitch motor of the gimbal spins unsmoothly or rebounds, it is generally caused by a tense coaxial cable. Please organize the cable and try again.



5. Use the crowbar in the package to disconnect the coaxial cable from the air unit and remove the rear housing.

⚠ The coaxial cable and its connectors are vulnerable. Please be careful when disconnecting and connecting the cable. There is glue on the connector for fixation. A heat gun can be used to heat the glue at 150°C and remove it with tweezers after it is softened.

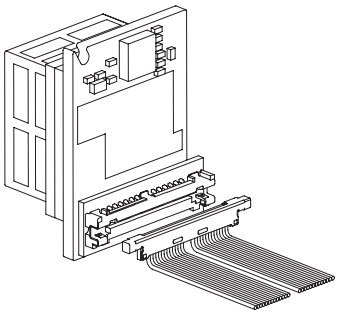


6. Connect the coaxial cable from the gimbal to the air unit.

04

1. Use the crowbar in the package to disconnect the coaxial cable from the camera and remove the rear housing.

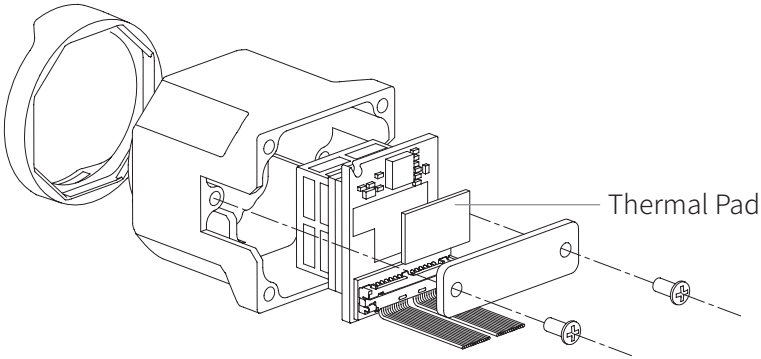
⚠ The coaxial cable and its connectors are vulnerable. Please be careful when disconnecting and connecting the cable. There is glue on the connector for fixation. A heat gun can be used to heat the glue at 150°C and remove it with tweezers after it is softened.



2. Install the lens protection ring on the front of the lens mount.
3. Connect the gimbal pre-built coaxial cable on the lens.

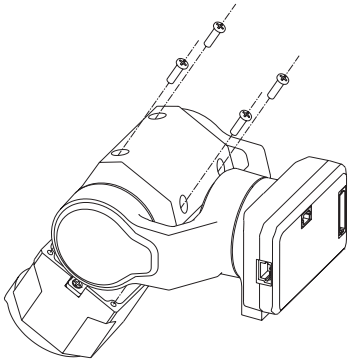
⚠ The space is a narrow on this step. Please be careful not to pull the cable.

4. Thread two M1.4 x L3mm screws through the pressing plate and fix the lens into the lens mount.



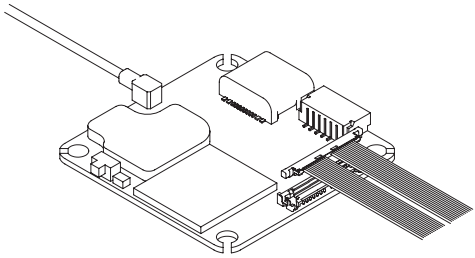
5. Fix the camera on the gimbal with four M1.4 x L5mm screws.

⚠ Determine the mounting direction of the camera on the gimbal by usage scenario (gimbal upward / downward mounting). Avoid squeezing the cable when installing the camera. If the pitch motor of the gimbal spins unsmoothly or rebounds, it is generally caused by a tense coaxial cable. Please organize the cable and try again.



6. Use the crowbar in the package to disconnect the coaxial cable from the air unit and remove the rear housing.

⚠ The coaxial cable and its connectors are vulnerable. Please be careful when disconnecting and connecting the cable. There is glue on the connector for fixation. A heat gun can be used to heat the glue at 150°C and remove it with tweezers after it is softened.



7. Connect the coaxial cable from the gimbal to the air unit.

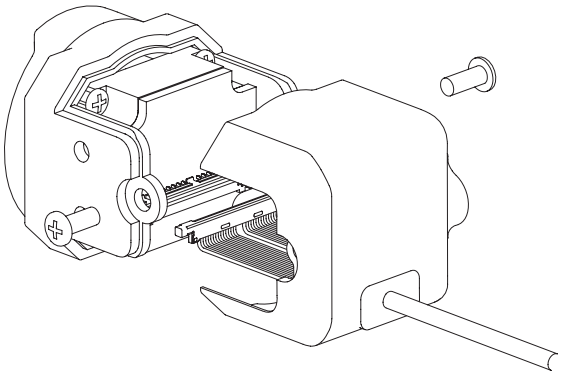
03

1. Remove the housing fixing screws of the camera (one on each side) and separate the front and rear housings of the camera.

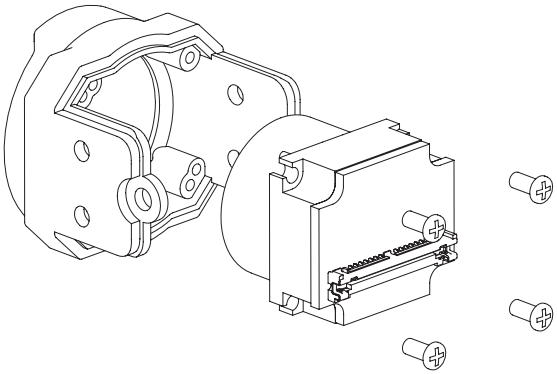
⚠ Do not separate the housings too far or may damage the camera.

2. Use the crowbar in the package to disconnect the coaxial cable from the camera and remove the rear housing.

⚠ The coaxial cable and its connectors are vulnerable. Please be careful when disconnecting and connecting the cable.



3. Remove the four lens fixing screws inside the front housing and take the lens out.

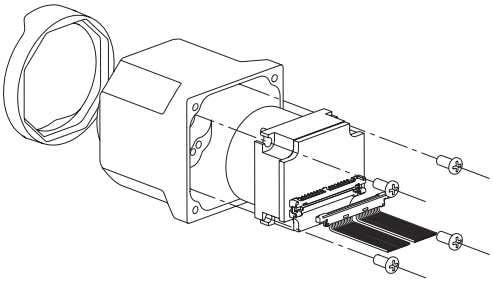


4. Install the lens protection ring on the front of the lens mount.
5. Fix the lens into the lens mount with four M1.4 x L3mm screws.

⚠ The mounting direction of the lens in the lens mount is unique. Please note the correspondence between the lens locating posts and the locating holes inside the lens mount.

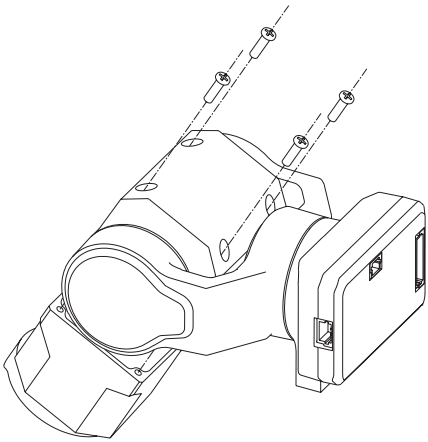
6. Connect the gimbal pre-built coaxial cable on the lens.

⚠ The space is a narrow on this step. Please be careful not to pull the cable.

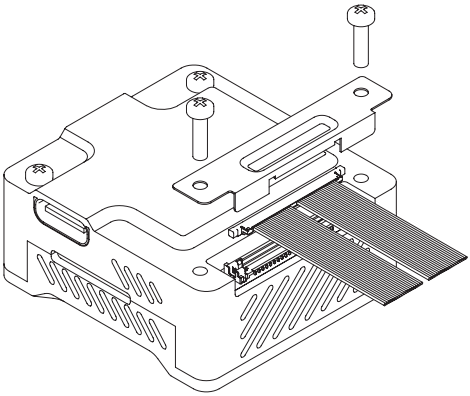


7. Fix the camera on the gimbal with four M1.4 x L5mm screws.

⚠ Determine the mounting direction of the camera on the gimbal by usage scenario (gimbal upward / downward mounting). Avoid squeezing the cable when installing the camera. If the pitch motor of the gimbal spins unsmoothly or rebounds, it is generally caused by a tense coaxial cable. Please organize the cable and try again.



8. Remove the cover of the coaxial cable on the bottom of the air unit, then use the crowbar to disconnect the cable from the air unit and remove it.



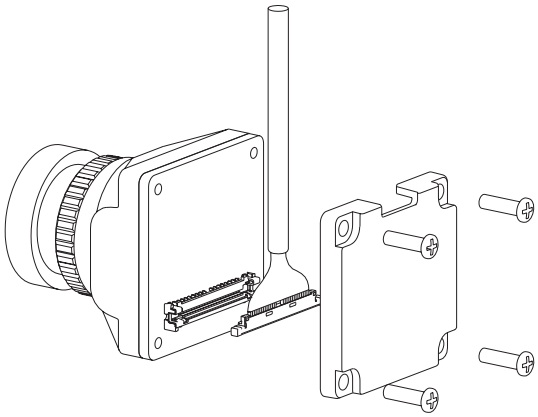
9. Connect the coaxial cable from the gimbal to the air unit and reinstall the cover back.

Standard Version

Take Walksnail Moonlight kit as an example:

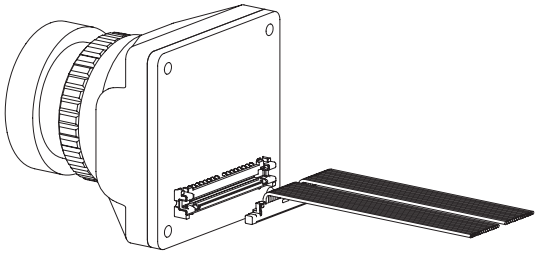
1. Loosen the four screws on the back of the camera and remove the rear housing.
2. Use the crowbar in the package to disconnect the coaxial cable from the camera and remove the cable.

⚠ The coaxial cable and its connectors are vulnerable. Please be careful when disconnecting and connecting the cable.



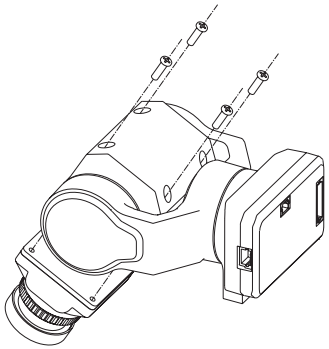
3. Connect the gimbal pre-built coaxial cable on the lens.

⚠ Please be careful not to pull the cable.

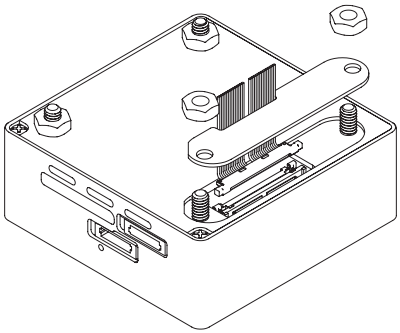


4. Fix the camera on the gimbal with four M1.4 x L5mm screws.

⚠ Determine the mounting direction of the camera on the gimbal by usage scenario (gimbal upward / downward mounting). Avoid squeezing the cable when installing the camera. If the pitch motor of the gimbal spins unsmoothly or rebounds, it is generally caused by a tense coaxial cable. Please organize the cable and try again.



5. Remove the cover of the coaxial cable on the top of the air unit, then use the crowbar to disconnect the cable from the camera and remove it.



6. Connect the coaxial cable from the gimbal to the air unit and reinstall the cover back.

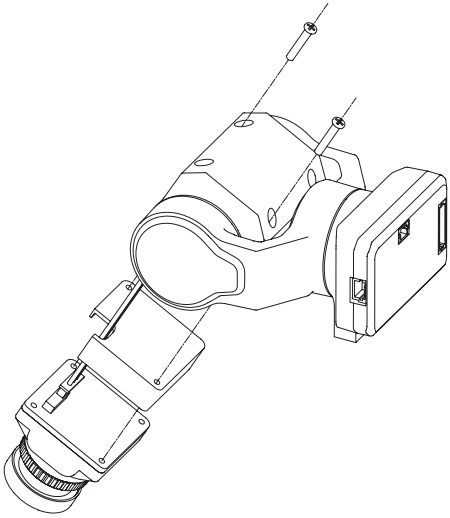
AV

1. Connect the gimbal pre-built analog camera cable on the camera.

⚠ Please be careful not to pull the cable.

2. Fix the camera and the camera mount on the gimbal with two M1.4 x L10mm screws.

⚠ Determine the mounting direction of the camera on the gimbal by usage scenario (gimbal upward / downward mounting). Avoid squeezing the cable when installing the camera. If the pitch motor of the gimbal spins unsmoothly or rebounds, it is generally caused by a tense cable. Please organize the cable and try again.



Controlling the C-20D

The C-20D supports Headtracker direct / private protocol control, S.BUS / CRSF control, PWM control and MAVLink control, with the priority of the four control methods above decreasing in order.

Headtracker Direct Control

Connect the UART_Rx or PWM1 in power-communication port to the UART_Tx port of Headtracker via the data link. The Headtracker can directly control the gimbal without going through the RC link. In this case, the gimbal's S.BUS / CRSF control, PWM control, and MAVLink control will be disabled. For details, refer to Headtracker User Manual and Headtracker Datalink System User Manual.

Private Protocol Control

Please refer to *Gimbal Private Protocol*.

S.BUS / CRSF Control

Connect the PWM1 in power-communication port to the S.BUS or CRSF_Tx of the receiver, which needs 5 channels to control gimbal mode, gimbal sensitivity, roll, pitch and yaw respectively. Channel mapping can be done in the *GimbalConfig* software.

PWM Control

The PWM1~PWM4 are channels to control gimbal mode, gimbal sensitivity, gimbal pitch and gimbal yaw respectively.

MAVLink Control

Connect the UART_Rx and UART_Tx in power-communication port to the Tx and Rx in a certain serial port of the autopilot respectively, which needs 5 channels to control gimbal mode, gimbal sensitivity, roll, pitch and yaw respectively. Channel mapping can be done in the *GimbalConfig* software.

Only ArduPilot firmware and PX4 firmware are supported currently. The MAVLink configuration are detailed in Appendix 2.

Gimbal Modes

There are six operating modes of the C-20D as below:

- FPV – Angle Control (FPVM-ANGL)
  The input control value to the gimbal corresponds to its rotation angle. When the input control value is 0, the gimbal's pitch and roll axes follow the carrier's movements with eliminating slight shaking.

- PitchLock – Angle Control (PLCK-ANGL)
  The input control value to the gimbal corresponds to its rotation angle. When the input control value is 0, the gimba's pitch axis remains horizontal and its roll axis follows the carrier's movements with eliminating slight shaking.

- Horizon – Angle Control (HORI-ANGL)
  The input control value to the gimbal corresponds to its rotation angle. When the input control value is 0, the gimbal's pitch and roll axes remain horizontal.

- Horizon – Rate Control (HORI-RATE)
  The input control value to the gimbal corresponds to its rotation angular speed. When the input control value is 0, the gimbal's pitch and roll axes keep current attitude.

When controlling the gimbal via Headtracker, angle control modes must be used.

For users employing the gimbal for non-head-tracking aerial filming, it is recommended to use rate control modes to achieve an optimal handling responsiveness.

- Return-to-Center (GOTO-ZERO)
  In this mode, the camera lens maintains horizontal forward orientation while its yaw axis follows the carrier's movements with eliminating slight shaking. The gimbal becomes non-controllable in this state.

- OrthoView (LOOK-DOWN)
  In this mode, the camera lens maintains vertically downward orientation while its yaw axis follows the carrier's movements with eliminating slight shaking. The gimbal becomes non-controllable in this state.

Gimbal Sensitivity

The higher the sensitivity is, the quicker the response of the gimbal to follow the motion of the carrier, but the less it eliminates the carrier's wobble.

The gimbal sensitivity is vaild only in FPV mode.

Carrier Data Fusion

The gimbal must obtain valid carrier attitude angles and acceleration (with valid carrier GNSS positioning) through the gimbal's proprietary protocol, or obtain valid carrier data (with valid carrier GNSS positioning) via the MAVLink protocol, in order to achieve higher angular accuracy.

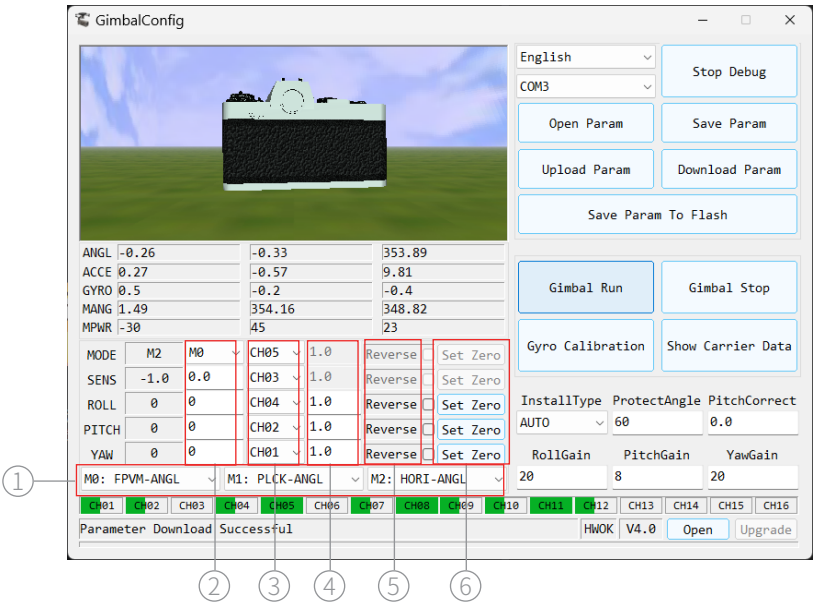
Carrier data fusion is available in all control modes.

Carrier attitude angles: Carrier's Euler angles in the carrier coordinate system. (Refer to *Gimbal Private Protocol*)
Carrier accelerations: Carrier's accelerations in the world system (NEU).

Configuring, Calibrating & Firmware Upgrading

Configure the gimbal and upgrade firmware of the gimbal with the *GimbalConfig* software.

Ensure the driver of the Config Module is installed on the computer before configuring, calibrating or upgrading.



1.Regular Modes 2. Gimbal Presets 3. Channel Mapping

4. Control Ratio 5. Reverse 6. Neutral Point

Connect the Gimbal

1. Connect the gimbal upgrading port and the computer with the J1.0 Config Module. Power up the gimbal.
2. Run the *GimbalConfig* software. Select the COM port corresponding to the Config Module. Click "Start Debug" and confirm the software and the gimbal being connected.

The Config Module is sold separately. For some brands of dual Type-C cables, there may be cases where the computer cannot recognize the Config Module. Please try replacing it with a Type-A to Type-C cable.

Parameter Configuration Basic Operation

After the gimbal is connected to the GimbalConfig software, the software will automatically download the parameter from the gimbal, or you can click "Download Param" to perform the download operation.

Click "Save Param" to save the current displayed parameter as a local file. Click "Open Param" to read a locally saved parameter file.

After selecting a new option in the drop-down box, the parameter will be automatically uploaded to the gimbal and take effect. After entering a new parameter in the parameter frame, press Enter key or click "Upload Param" to upload the parameter.

After the parameter is uploaded, click "Save Param To Flash" to finalize it into the gimbal.

If not click "Save Param To Flash" after uploading parameters, the uploaded parameters will be lost when the gimbal loses power.

Regular Modes

Users can select three work modes from the gimbal's various options to serve as their regular modes (M0 / M1 / M2).

Gimbal Presets (Headtracker direct, S.BUS/CRSF & PWM control)

The gimbal works in accordance with the preset values when there is no signal input or no mapped channel assigned. After the signal input is restored, the gimbal exits the preset state. The gimbal presets are invalid in MAVLink control.

Preset gimbal mode: Users can choose one work mode from the regular modes (M0 / M1 / M2) as the preset mode.

Preset gimbal sensitivity: setting range -1.0~1.0, with a resolution of 0.1.

Preset roll, pitch and yaw angle: setting range -180° ~180° , with a resolution of 1° .

- The actual effective preset angles are based on the maximum rotation range of the gimbal.
- If you want to always use the preset values for some channels, map the corresponding channels to NULL.
- If the preset gimbal mode is set to rate control mode, the preset roll, pitch, and yaw angles cannot be modified and shall be 0.

Channel Mapping (S.BUS/CRSF & MAVLink control)

Select the channels corresponding to gimbal mode, gimbal sensitivity, roll, pitch and yaw respectively.

Control Ratio (S.BUS/CRSF & MAVLink control)

Set the proportional coefficients for the rotation angle/angular velocity of the gimbal's roll, pitch, and yaw axes with respect to the input control quantity respectively. A larger coefficient results in more sensitive gimbal response.

Reverse (S.BUS/CRSF & MAVLink control)

Set the direction (normal/reverse) for the roll, pitch, and yaw axes of the gimbal respectively.

Neutral Point (S.BUS/CRSF & MAVLink control)

Upon clicking this button, the gimbal reads the current input control value on this channel and uses it as the neutral point for control.

Mounting Type

The mounting type of the gimbal is AUTO by default, and the gimbal will automatically switch to DOWN/UP mode according to its attitude at power-on. The mounting type can also be manually set as DOWN or UP mode.

For tail-sitter VTOL aircrafts, it should place the fuselage in a level flight attitude and power up, or manually set the mounting type of the gimbal.

After the mounting type is set manually, make sure that the actual mounting type is consistent with the setting, otherwise the gimbal will enter the protection state.

Tilt Protection (Pitch-lock & Horizon mode)

When the tilt of the mounting plane of the gimbal exceeds the protect angle, the gimbal will enter the protection state, at this time the gimbal will be neutralized and uncontrollable. When the tilt of the mounting plane is smaller than the protect angle, the gimbal will automatically exit the protection state. Tilt protection is effective in Pitch-lock mode and Horizon mode, not in FPV mode.

The protection angle can be modified according to the actual use. The setting range is 0° ~90° with a resolution of 1° . ⩽ 15° means disabling the tilt protection.

After disabling the tilt protection, the gimbal may work abnormally when the attitude angle of the carrier is large.

Parameter Tuning

For cameras with larger moment of inertia, mounting them on the gimbal may result in gimbal shaking. In such cases, increasing the gain value can enhance stabilization effects.

It is strongly recommended to use the default gain parameters if unnecessary.

Pitch Calibration

In FPV mode, the gimbal's pitch center may exhibit a slight deviation. This parameter allows fine-tuning of the pitch zero point specifically for FPV mode. The adjustable range is -10° ~+10° with a resolution of 0.1° .

Calibrating & Firmware Upgrading

If the attitude of the gimbal tilts or drifting slowing when no control signal input, it is necessary to calibrate the gimbal.

1. To calibrate the gimbal. Keep the gimbal static. Click "Gyro Calibration" and wait for the calibration to complete.
2. To upgrade the firmware. Click "Open Firmware". Select the firmware file. Click "Start Upgrade" and wait for the upgrade to complete.

Appendix 1 Supported Cameras

Standard Version	Walksnail Moonlight Kit
	Walksnail Avatar HD Kit V2 (Dual Antannas Version)
	Walksnail Avatar HD Pro Kit (Dual Antannas Version)
	Walksnail Avatar HD Pro Kit
	Walksnail Avatar HD Kit V2
	CADDXFPV Polar Starlight Vista Kit
	CADDXFPV Nebula Pro Vista Kit
	RunCam Link Phoenix HD Kit
	RunCam Link Wasp Kit
	RunCam Link Night Eagle Kit

Appendix 2 MAVLink Configuration

ArduPilot

SERIAL1	
SERIAL1_BAUD	115
SERIAL1_OPTIONS	1024
SERIAL1_PROTOCOL	2
SR1	
SR1_ADSB	0 Hz
SR1_EXIT_STAT	0 Hz
SR1_EXTRA1	0 Hz
SR1_EXTRA2	0 Hz
SR1_EXTRA3	0 Hz
SR1_PARAMS	0 Hz
SR1_POSITION	0 Hz
SR1_RAW_CTRL	0 Hz
SR1_RAW_SENS	0 Hz
SR1_RC_CHAN	0 Hz

Serial port number can be changed according to the actual situation.

PX4

MAVLink	
MAV_1_CONFIG	TELEM2
MAV_1_MODE	Custom / Gimbal
MAV_1_RATE	115200 B/s
Serial	
SER_TEL2_BAUD	115200 8N1

The MAV_1_MODE is recommended as Custom.