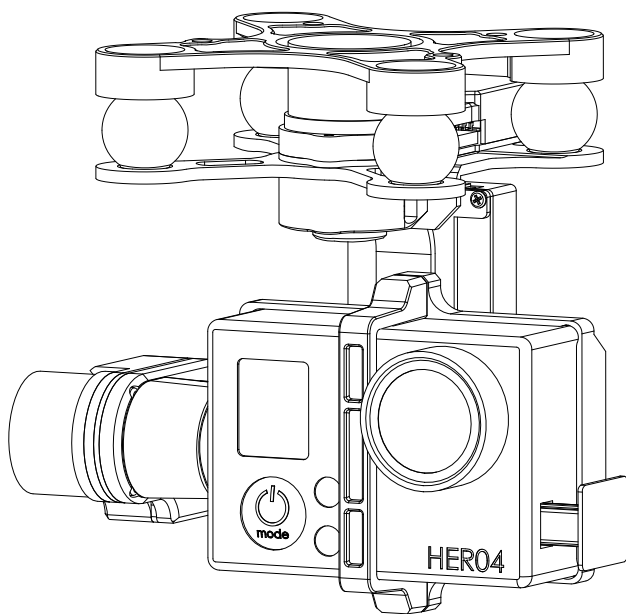# ZENMUSE H4-3D

User Manual

V1.0   2015.1

Warning & Disclaimer

The Zenmuse H4-3D gimbal is calibrated before delivery. No adjustment or modification to the gimbal is required or recommended.

Ensure the camera is mounted to the gimbal before powering on your aircraft.

The H4-3D gimbal is finely calibrated according to the specified camera model and lens (GoPro Hero4 Black) before delivery. You do not need to perform extra calibration. Do not attempt to modify the gimbal or mount extra components/devices (such as a filter, lens hood, etc.) to the camera. Be sure to use a DJI approved battery, otherwise the performance of the gimbal may be affected.

The H4-3D gimbal is compatible with following DJI flight control systems: NAZA-M, NAZA-M V2, WooKong-M, Phantom 2 and A2. To optimize the gimbal's performance, download the relevant Assistant for your flight controller and upgrade the firmware.

Make sure to operate your aerial system in the safest manner possible. We strongly recommend that you remove all propellers, use a power supply from the R/C system or flight pack battery, and keep children away when calibrating and configuring the gimbal. Observe the procedures contained in this manual to mount and connect gimbal to your aircraft. Users of this product should respect the AMA's National Model Aircraft Safety Code.

DJI has no control over use, setup, final assembly, modification (including use of non-specified DJI parts i.e. motors, ESCs, propellers, etc.) or misuse, and no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability. DJI assumes no liability for damage(s), injuries or legal responsibilities incurred directly or indirectly from the use of this product.

DJI and Zenmuse are registered trademarks of DJI. Names of product, brand, etc., appearing in this manual are trademarks or registered trademarks of their respective owner companies. This product and manual are copyrighted by DJI with all rights reserved. No part of this product or manual shall be reproduced in any form without the prior written consent or authorization of DJI.

Legend

⚠ Important   ☼ Hints and Tips

Contents

Profile

The Zenmuse H4-3D gimbal offers excellent stabilization features for aerial hobbyists and professional aerial photographers. Powered by a built-in IMU (Inertial Measurement Unit) and a special servo module, this gimbal is built to hold a GoPro camera and enables stable, quality aerial photography.
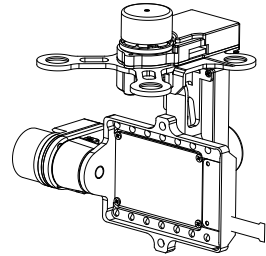
⚠ The H4-3D gimbal is designed for GoPro Hero4 Black camera. Using other type of camera may cause the gimbal to function abnormally.
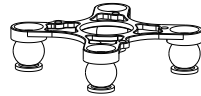
In The Box

Gimbal × 1

Built-in servos and a stand-alone IMU provide yaw, roll, and tilt stabilization. Pre-installed vibration absorbers greatly reduce vibrations.

Damping Unit × 1

The upper plate of the damping unit is used to connect the gimbal to your aircraft. An integrated bottom damping plate minimizes installation time.

Accessories Pack – Spare Vibration Absorbers × 4

Spare vibration absorbers for the damping unit. Use one set at a time.

Accessories Pack – Anti-drop Kit × 4

Spare anti-drop kits that are used to secure the upper and bottom plates of the damping unit.

Accessories Pack – Camera Securing Bracket × 1

Camera mounting bracket.

Accessories Pack – Spare Screws × 1

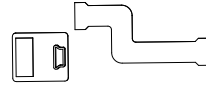M2.5x6.3: Used to mount your camera to the gimbal.
M2.5x5: Used to secure the gimbal to the damping unit.
M3x8, M3x6.5: Used to secure the gimbal to the aircraft.

Accessories Pack – USB Video Output Module × 1

Connects to the USB port of your camera, for transmitting video.

## Accessories Pack – Anti-interference Board × 1

Serves as the connecting board between the G8 port on the gimbal and an 8-pin cable. This board is only available with the H4-3D gimbal that does not come with a GCU unit (namely, the H4-3D specifically designed for a Phantom 2).
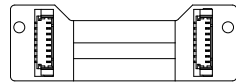
You can mount the H4-3D gimbal onto other DJI aircraft by using the below accessories. You may purchase the accessories according to your aircraft type.

Gimbal Controller Unit (GCU) × 1

Connect the Gimbal Controller Unit to your flight control system using CAN-Bus. Power the GCU and gimbal through a 3S~6S power cable.
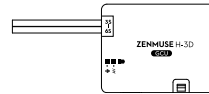
Gimbal Video Signal Cable × 1

For connecting the gimbal controller unit to your wireless video transmission module. Transmits the video signal.
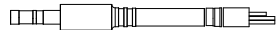
CAN-Bus Cable × 1

Use CAN-Bus to connect the GCU to your flight control system.

8-Pin Cable × 1

For connecting your Phantom 2 to the G8 port of the GCU.

Phantom 2 (old version) Adapter

For installing the H4-3D gimbal onto older versions of the Phantom 2.

F450 & Phantom 1 Adapter

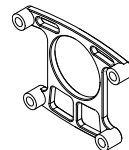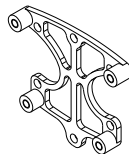For installing the H4-3D gimbal onto a F450 or Phantom 1.

F550 Adapter

For installing the H4-3D gimbal onto a F550. Must be used with the above F450 adapter.
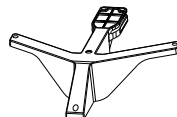
Installation

Gimbal Description

⚠️ • Ensure the gimbal servos are unobstructed, otherwise they may be damaged during operation.
   • If the gimbal becomes obstructed during operation, power off and clear all obstructions immediately.
   • Always mount the camera before powering on the gimbal.
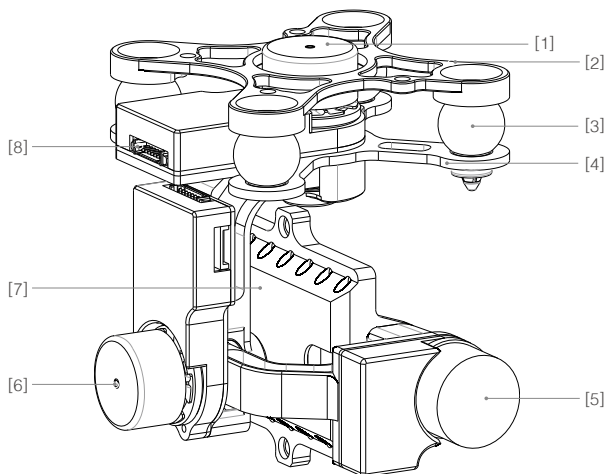
[1] Yaw servo driver module
[2] Upper plate of the damping unit
[3] Vibration absorbers
[4] Bottom plate of the damping unit
[5] Tilt servo driver module
[6] Roll servo driver module
[7] Camera mount
[8] 8-pin connector port (to GCU/Phantom 2)

Installing H4-3D onto an Aircraft

Installing H4-3D onto a Phantom 2 (new version)

There are two versions of the Phantom 2. The latest Phantom 2 can hold the H4-3D gimbal directly, while the older version of the Phantom 2 requires an adapter to hold the H4-3D. The difference between the two versions can be seen on the bottom of Phantom.
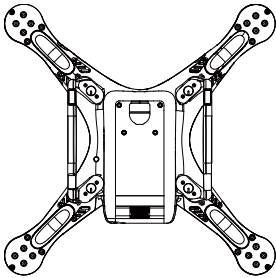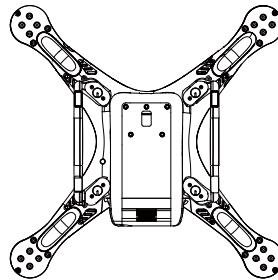
Phantom 2 (new version)   Phantom 2 (oid version)

Follow the instructions below to install the H4-3D gimbal onto a Phantom 2 (new version).

1. Insert the securing pins into the holes on the upper plate of the damping unit as shown below. Then, attach the upper plate of damping unit to the Phantom 2 with four M3x5 screws.
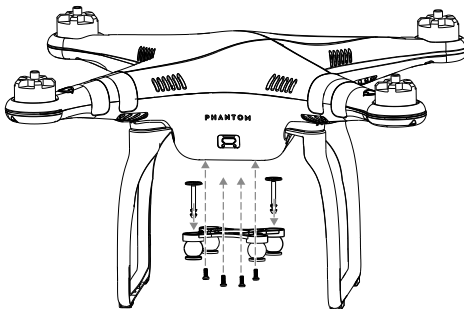
2. Attach the bottom plate of the damping unit to the upper plate. To do this, insert the securing pins on the tip of the vibration absorbers into the mounting holes on the bottom plate.
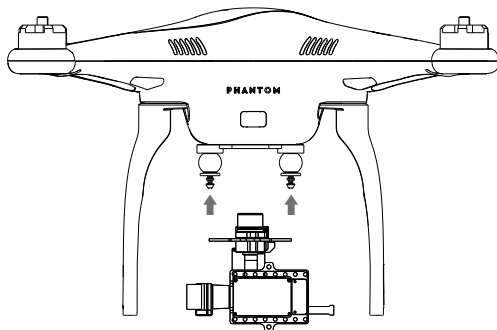
3. Cover the securing pins with washers to lock the damping unit in place. Only push the washers past the first nut.
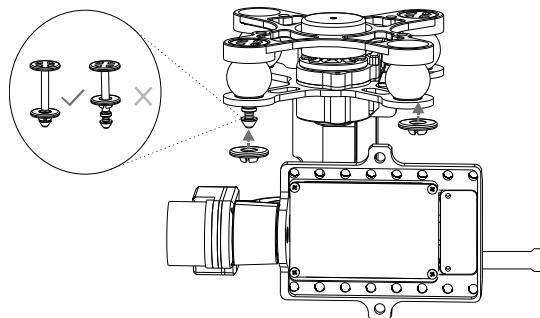
4. Plug the 8-pin cable from the Phantom 2 into the Phantom 2 port on the anti-interference enhancement board. Then use the supplied 8-pin cable to connect the H4-3D port on the anti-interference enhancement board to the 8-pin port on the gimbal.
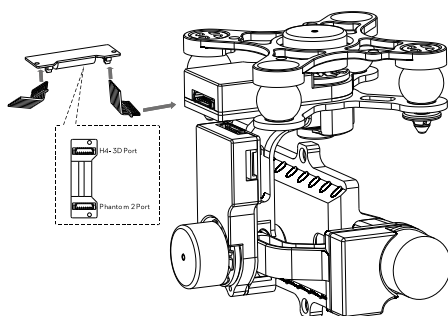
Installing the H4-3D onto Other DJI Aircraft

You can install the H4-3D onto other DJI aircraft by using the corresponding adapter. Refer to the relevant instructional video or user manual for more details.

1. Use the Phantom 2 (old version) adapter to install the H4-3D onto previous versions of the Phantom 2.

Phantom 2 (old version)   Phantom 2 (old version) adapter   H4-3D

Installation
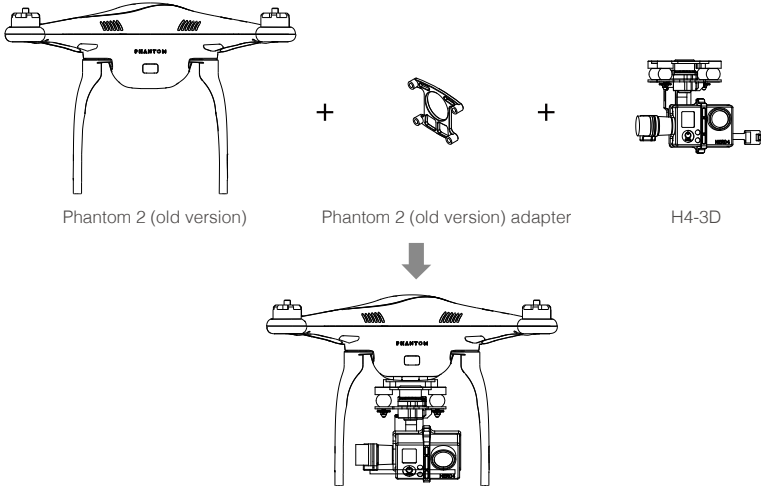
2. Use the Phantom 1 adapter to install the H4-3D onto the Phantom 1.

Phantom 1   Phantom 1 adapter   H4-3D   GCU
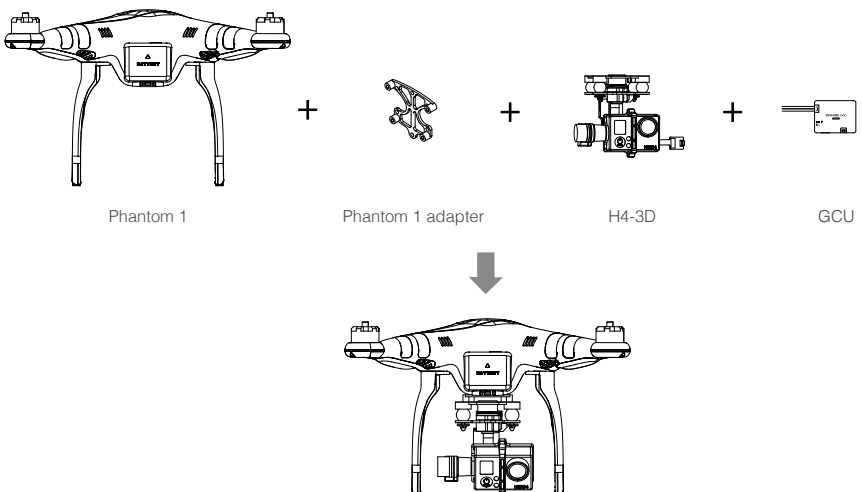
3. Use the F450 adapter to install the H4-3D onto the DJI F450.

DJI F450   F450 adapter   H4-3D   GCU
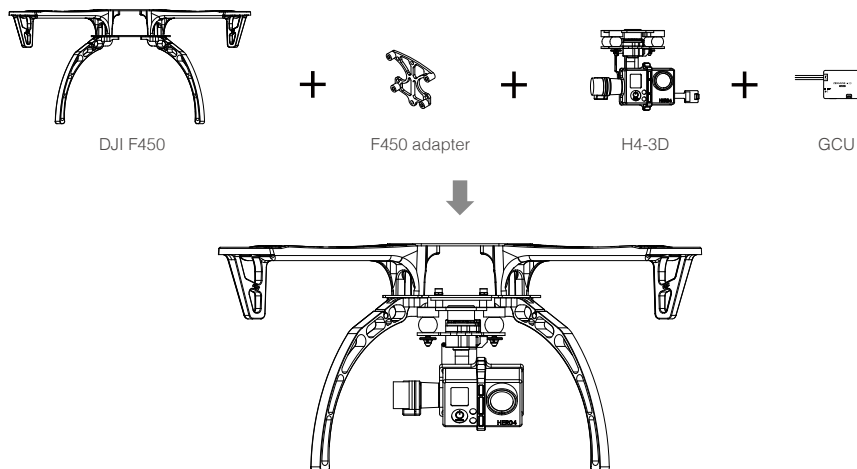
4. Use the F450 adapter and F550 adapter to install H4-3D to DJI F550.

DJI F550   F450 adapter   F550 adapter   H4-3D   GCU
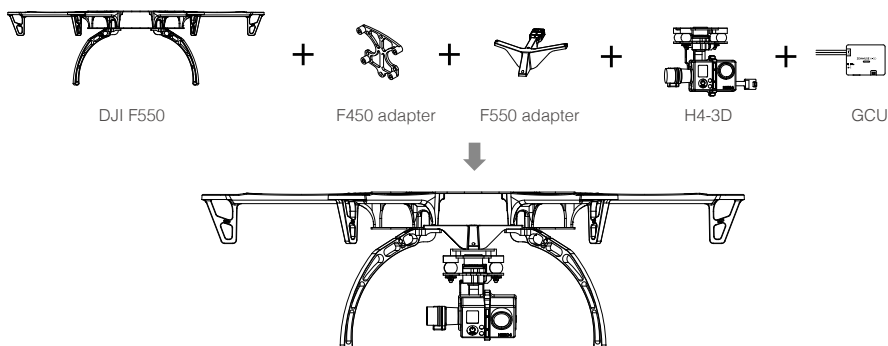
⚠ • Aircraft, camera, and accessories are not included with the gimbal.
- Camera must be aligned to face the nose of the aircraft, and the gimbal should be parallel with the aircraft itself.
- The gimbal is calibrated before delivery. Do not attempt to adjust or calibrate it yourself.
- Do not remove any screws in the gimbal, which may result in reduced performance or failure.
- Do not unplug any cable attached to the gimbal ports or change the mechanical structure of the gimbal.
- The 8-pin port on the H4-3D should only to be used to connect the gimbal to your aircraft. Do not connect other devices (such as a 5.8G video downlink transmitter) to this port, otherwise the gimbal may be damaged.

Camera Installation

Follow the instructions below to mount your GoPro Hero4 Black camera.

⚠️ • Visit http://www.dji.com/product/zenmuse-h4-3d/video and watch the installation video tutorial before mounting your GoPro camera to the H4-3D gimbal.
• The gimbal cables are delicate items, handle with extreme care. Always check all connections before each flight and ensure they are secure.

1. Connect the video output board to the gimbal using the connection cable. Ensure the connection orientation is correct.
2. Mount the camera onto the gimbal and secure the camera with the camera bracket and screws.
3. Firmly insert the video output board into the mini-USB port on the camera to complete the installation.

Installation
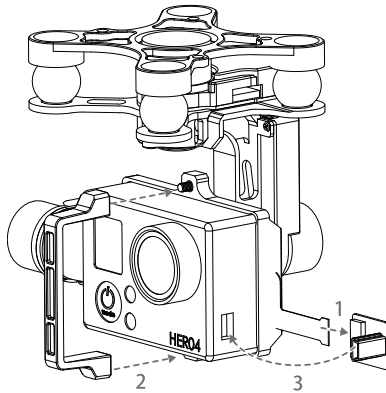
Final Checks

Ensure the installed damping unit is parallel with the aircraft.
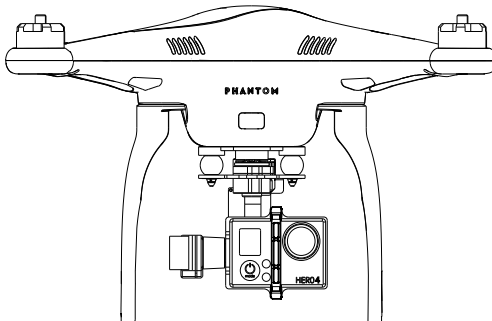
GCU Connection

⚠ • Skip this chapter if you have the Phantom 2 version of the H4-3D gimbal, as it does not come with a GCU.
• The GCU must be connected to the flight control system before it is powered on.
• Be sure to mount the camera onto the gimbal before powering on the aircraft and the gimbal. Otherwise the servos may be damaged due to an incorrect center of gravity.
• Re-calibrate the remote control whenever the NAZA-M firmware is upgraded.
• Ensure all connections are correct, otherwise damage to the gimbal or the flight control system may occur.

GCU Port Description	
3S~6S	Connect to a battery for GCU or gimbal power.
G8	Connect to the G8 pin port on the gimbal for signal transmission.
⟷•	Connect to a PC to upgrade the firmware using PC Assistant.
⬅⫴⬆	Connect to a flight control system.
▪▪▶	Connect to a wireless video downlink module.

Connecting the GCU and Flight Control System

The GCU can be either vertically or horizontally installed on the Phantom 2. Follow the procedure below to complete the connection between the GCU and the flight control system.

1. Upgrade the flight controller's firmware and PC Assistant to the latest version, as shown in the table below:

Flight Controller	A2	WKM	NAZA−M V2	NAZA−M
PC Assistant	V1.20 (or higher)	V2.00 (or higher)	V2.12 (or higher)	V2.12 (or higher)
Firmware Version	V2.10 (or higher)	V5.22 (or higher)	V3.12 (or higher)	V3.12 (or higher)

2. Complete the connection to the flight control system as shown on the table below. NAZA-M users need a PMU V2 module (a NAZA-M V2 accessory) to make the CAN port connection.

| Flight Controller	A2	WKM	NAZA−M V2 or NAZA−M
Main Controller and PMU connection	Connect the PMU's X1 port to the X1 port of the Main Controller.	Connect the PMU's X1 port to the X1 port of the Main Controller.	Connect the PMU V2's X3 port to the X3 port of the Main Controller.
PMU Power Cable connection	Connect the power cable to a connecter, or solder the power cable to the central board as required.		
(GPS/Compass Module and Flight Control System Connection	Connect the GPS/Compass module to the CAN 2 port on the A2.	Connect the GPS/Compass module to a spare CAN-Bus port on the PMU.	Connect the GPS/Compass module to the GPS port of the PMU V2.

Refer to GCU and Flight Control System Connection for more information about the connection. For details on the flight control system connections, refer to the corresponding flight control system user manuals.

3. Connect the GCU to the flight control system. Then connect the 8-Pin cable of the gimbal to the G8 port on the GCU.

Flight Controller	A2	WKM	NAZA-M V2	NAZA-M
GCU and Flight Control System Connection	Connect to the CAN 2 port on the A2.	Connect the GCU to a spare CAN-Bus port on the WKM system.	Connect the GCU to the CAN-Bus port on the PMU V2 module.	
GCU Power Cable Connection	Connect the power cable to a connecter or solder the power cable to the central board as needed.			
Gimbal Tilt Control Channel	H4-3D	X3	X1	

4. Connection is complete. Power on the aircraft to launch.
5. To fully utilize the gimbal, you will also need to configure its tilt function. Each flight control system assigns a specified channel (X3 channel for WKM, X1 for NAZA-M, and H4-3D for A2) for tilt control. To activate the tilt function, set up the channel in the PC Assistant and ensure the connection between the receiver and the main controller is correct. Refer to the gimbal PC Assistant for details.

GCU and Flight Control System Connection
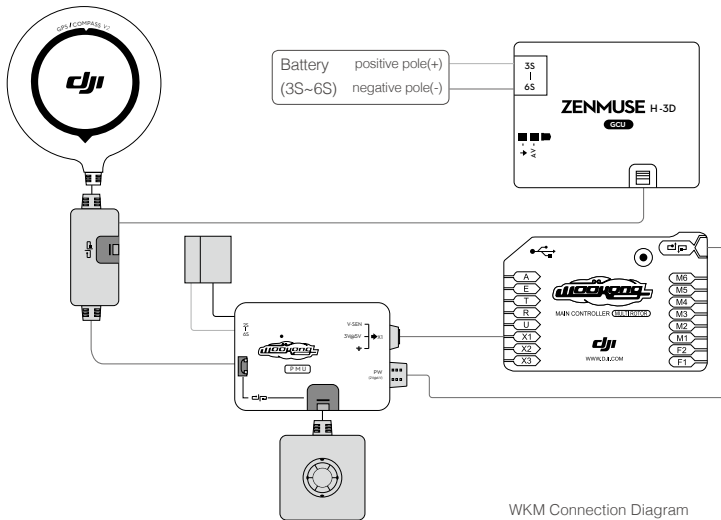
WKM Connection Diagram

⚠ • The PMU and GCU can both connect to the same LiPo 3S-6S battery.
   • The GCU can be connected to any CAN ports on the PMU or to the CAN port on the GPS. (Any spare CAN port on the WKM system.)
   • Control the tilt motion via the X3 channel. Properly configure the corresponding channel on your remote controller.

13
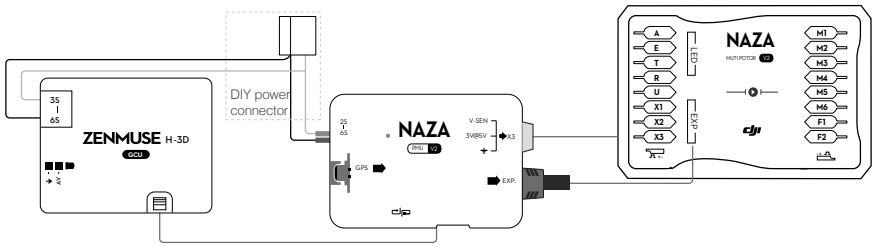
NAZA-M V2 Connection Diagram
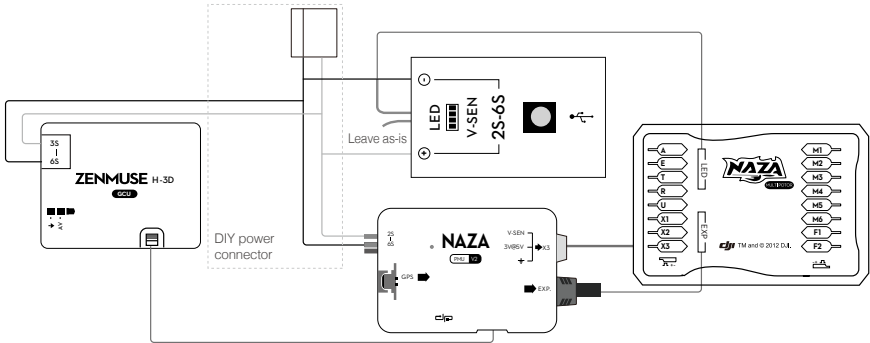
NAZA-M Connection Diagram

⚠ • The PMU and GCU can both connect to the same battery.
  • Control the tilt motion via the X1 channel. Properly configure the corresponding channel on the remote controller.

Video Connection

The camera's video signal is transferred to your wireless video transmission module from the GCU by using the gimbal video signal cable. Follow the figure below to complete the connection.

Wireless Video Transmission Module
Air System

External Power
Leave as-is
Gimbal Video Signal Cable

Power
Yellow
Video Signal
GND

3S | 6S

ZENMUSE H-3D
GCU

Video Signal(Yellow:AV)

GND(Black: ⏚)
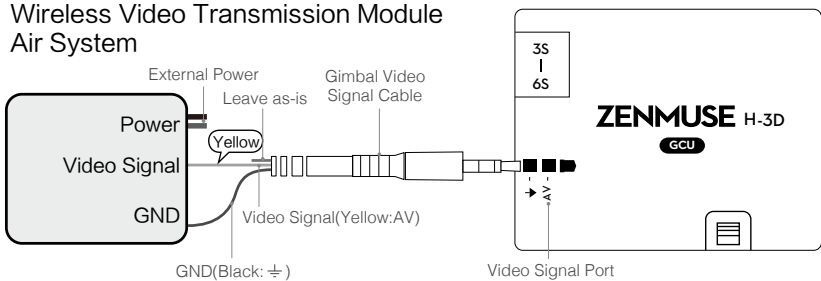
Video Signal Port

1. Solder the Video Signal/GND cables to your wireless video transmission module (air system).
2. Plug the gimbal video signal cable into the GCU video signal port.

⚠ • Ensure the wireless video transmission unit is connected to the GCU before powering on the aircraft.
   • Use of a standard gimbal video signal cable is recommended. Make sure you solder the gimbal video signal cable to the wireless video transmission module firmly. Insulate all the cables to prevent short circuiting.
   • The GCU does not provide power to the wireless transmission module. Refer to the wireless video transmission module manual for details on the power supply connection.

☼ • The diagram below shows how video signal flows from the camera to the gimbal.
   • Should errors occur, examine each step to locate the source of the problem.

GCU Connection

Camera		AV Signal	Gimbal		AV Signal	GCU		AV Signal
Video Port			Camera Interface			G8		Gimbal Video Signal Cable
					8-Pin cable			

Monitor		AV Signal	Wireless Video Transmission Module		Wireless Signal	Wireless Video Transmission Module	
AV Input			Ground System		5.8G/2.4G/1.2G	Air System	

Supplied by user
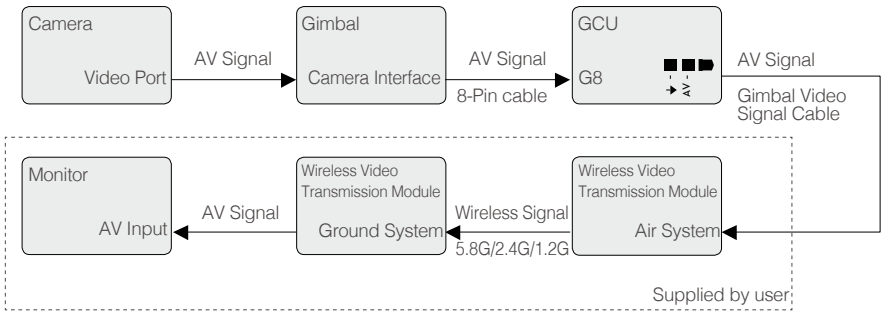
Configuration

Driver and PC Assistant Installation

⚠️ The contents of this chapter do not apply to the Phantom 2 version of the gimbal. Refer to the Phantom 2 PC Assistant information in your Phantom 2 User Manual instead.

1. Ensure the drivers for the flight control system are properly installed.
2. Download the PC Assistant from the official DJI website.
3. Launch the PC Assistant installer and follow each step to complete the installation.
4. Run the PC Assistant.

PC Assistant Interface

With the PC Assistant running on your PC, connect the GCU to your PC by using a Micro-USB cable. Then power on the GCU.
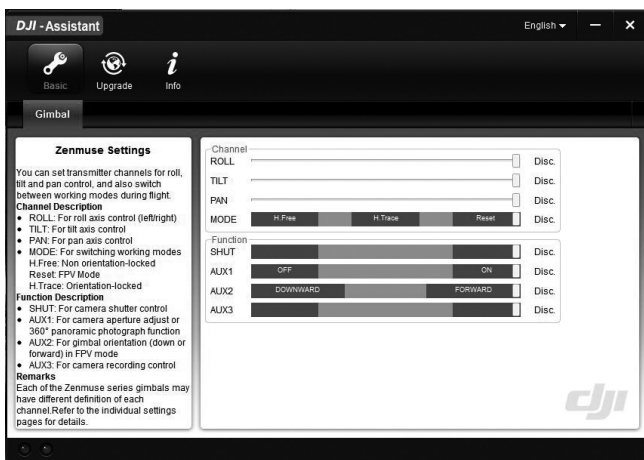
Channel Setting

You can adjust the available range of camera tilt in the PC Assistant by adjusting the slider.

Tilt Upwards

Tilt Downwards

Firmware & Software Upgrade

Firmware Upgrade

Follow the procedures below to upgrade the H4-3D's firmware. Failure to follow these instructions carefully may damage the gimbal.

1. Ensure your computer has access to the internet.
2. Close all other applications (including anti-virus programs or firewalls) before upgrading the firmware.
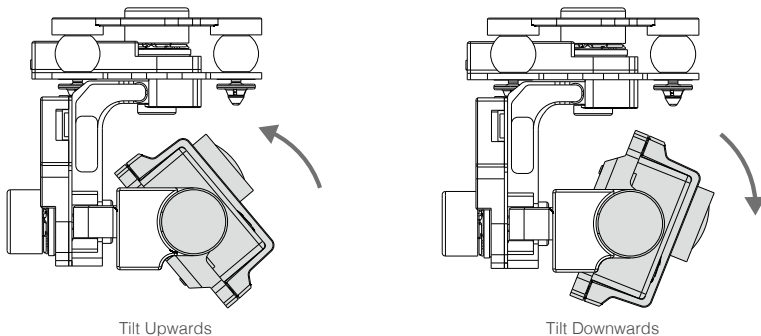3. Make sure the power supply is securely connected. DO NOT unplug the power supply before the upgrade is complete.
4. Connect the GCU to your PC through a Micro-USB cable. DO NOT disconnect the cable until the firmware upgrade is complete.
5. Launch the PC Assistant and wait until the connection is established.
6. Select "Upgrade" → Main Control, IMU and CMU.
7. The DJI server will check the current firmware version.
8. If a newer firmware is detected, the PC Assistant will download and upgrade the firmware automatically.
9. Wait until the upgrade completes.
10. Click "OK" and power cycle (turn off, then turn on again) the system to finish the upgrade process.

Configuration

⚠ • CMU stands for "Camera Multi Unit", which is the management module for the camera.
- To eliminate interference from the main controller, DJI recommends you disconnect the CAN-Bus cable between the GCU and main controller before you upgrade the firmware.
- Double check your set parameters once you have finished upgrading the firmware.
- Repeat the above steps if the DJI server is experiencing heavy traffic or the firmware upgrade fails.

Software Upgrade

Click Info → Software Info. If the latest version is newer than your current version, please upgrade your software.

Obtain your gimbal's serial number (SN) by clicking the "Info" → "SN". The serial number is a 32 digit authorization code that is used to activate the gimbal. This number is set at the time of manufacture, before shipment. You may be prompted to fill in a new SN if you purchase a new feature. If you fill an invalid SN more than 30 times, the gimbal will be locked and you will have to contact our customer support to unlock the gimbal.

Test Flight

Pre-flight Checklist

For safety reasons, check all of the following items before each flight:
1. The gimbal is firmly installed onto the aircraft, and the camera is mounted correctly. Make sure the camera is aligned facing the nose of the aircraft.
2. All cables are firmly and correctly connected.
3. The gimbal video signal cable is firmly soldered in place.
4. The wireless video transmission module is connected to the GCU before powering on the system.
5. The remote control is properly configured.
6. The camera is correctly connected to the gimbal.
7. The GCU and flight control system are correctly connected.
8. The flight control firmware is updated to the latest version.

Gimbal Test
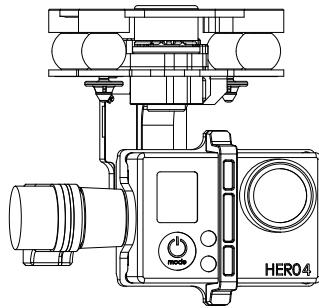
1. Ensure all batteries are fully charged.
2. Turn on the remote control.
3. Power on your camera, then power on the gimbal and wait until gimbal's self-test completes.
4. The camera lens should be pointing in the same direction as the aircraft nose. All three axes of gimbal should be in the positions depicted in the diagram above.
5. Toggle the tilt control switch on your transmitter and make sure it is working properly. Check that the gimbal moves in the correct direction when the switch is toggled. If not, check your settings.
6. When the test is complete, power off the gimbal first, then the camera.

⚠ • If the gimbal is not working properly, refer to *Troubleshooting (P19)* for solutions.
  • Place the aircraft on a flat surface during the test. If you choose to hold the aircraft while testing, do not tilt the aircraft more than 35°.
  • Do not land an aircraft with a powered-on gimbal on uneven terrain (such as a grass lawn or rocky surface). In such conditions there may be objects that will block the motion of the gimbal and force it into hibernation mode.
  • Hibernation mode offers protection for the gimbal. When a camera is not mounted on the gimbal, it will default to hibernation mode. During hibernation, the gimbal does not respond to any commands from the transmitter. The gimbal resumes normal operation once a camera is mounted.
  • The gimbal enters hibernation mode when it detects external objects blocking its range of motion. Once such objects are no longer detected, the gimbal will resume normal operation.
  • Use of a separate battery pack to test the gimbal is suggested before powering on the flight controller, gimbal, OSD, FPV gears, etc.
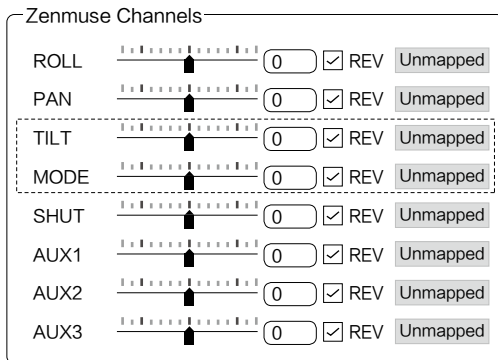
Appendix

Troubleshooting

Problem	Cause	Solution
Gimbal keeps drifting after initialization.	1. The transmitter trims value is beyond the acceptable limit. 2. The GCU is disconnected from the flight control system. 3. The gimbal is not mounted correctly.	1. Adjust the transmitter trims value. 2. Connect the GCU and flight control system. 3. Ensure the gimbal is mounted so it is parallel with the aircraft, and the camera is pointing towards the nose.
The gimbal axes are not level.	Factory calibration error.	Contact your local dealer or DJI customer service for assistance.
Unable to determine gimbal orientation.	BVR (beyond visual range) flight.	Use a wireless video transmission module.

Settings When Using the A2 Flight Control System

Users should configure the H4-3D's pitch control in the A2 assistant when using the A2 Flight Control System. Map the H4-3D to two channels on the transmitter as shown in the following diagram. DJI recommends the use of a knob switch or a stick with spring back function for tilt control, and a 2-position switch for MODE.

Zenmuse Channels

ROLL	0 ☑ REV	Unmapped
PAN	0 ☑ REV	Unmapped
TILT	0 ☑ REV	Unmapped
MODE	0 ☑ REV	Unmapped
SHUT	0 ☑ REV	Unmapped
AUX1	0 ☑ REV	Unmapped
AUX2	0 ☑ REV	Unmapped
AUX3	0 ☑ REV	Unmapped

Specifications

General	
Built-in Functions	• Zenmuse technology • 3-axis stabilized gimbal • High precision brushless servo control • Built-in IMU module • Lightweight • Phantom 2, A2, WKM, NAZA-M, NAZA-M V2, supported • GoPro Hero4 Black supported

Peripheral	
Supported Camera	GoPro Hero4 Black
GCU Input Power	3 S~6 S LiPo (12 V~26 V)
PC Assistant System Requirement	Windows XP SP3; Windows 7; Windows 8

Mechanical & Electrical Characteristics	
Working Current	Static current: 400 mA (@12 V) Dynamic current: 600 mA (@12 V)
Gimbal Input Power	3 S~6 S (12 V ~26 V)
Operating Temperature	-10°C ~ 50°C
Gimbal Weight	168 g (camera excluded)
Gimbal Dimensions (With Damping Unit)	103 mm × 92 mm × 80 mm
GCU Weight	22 g
GCU Dimensions	42 mm ×32 mm ×9.3 mm

Working Performance	
Angular Vibration Range	Pitch/Roll:±0.02°, Yaw: ±0.03°
Maximum Controlled Rotation Speed	Tilt axis: ±130°/s
Controlled Rotation Range	Tilt axis control: -130 ~ +45°

Regulatory Approvals	
FCC (USA)	Yes
CE (EU)	Yes
ROHS(EU)	Yes

The content is subject to change.

Download the latest version from

http://www.dji.com/product/zenmuse-h4-3d/download