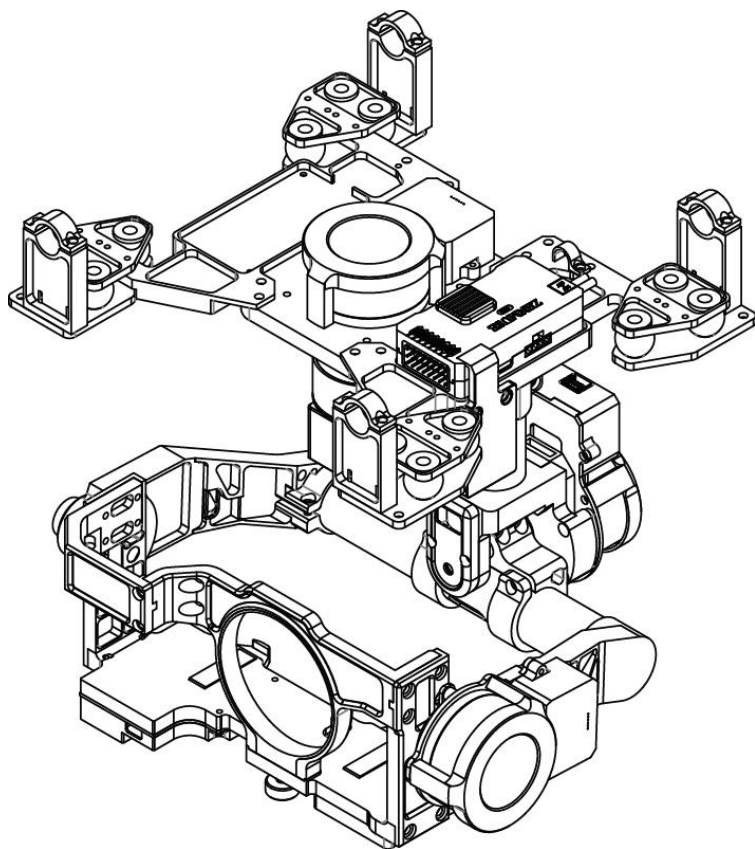# Zenmuse Z15-GH3
User Manual

V1.04
2014.12

Warning & Disclaimer

No adjusting or amending is allowed to Z15.

Z15 is specialized for Camera and Lens before it leaves the factory. Please mount your camera to Z15 when get it. No adjusting or amending is allowed to Z15. Do not modify or add any other component/device (such as filter, lens hood, etc.) to the camera; make sure to use the original battery; otherwise it may ends up with worse performance or even internal malfunction.

Z15 can only work with Flight control system specified by DJI Innovations (Ace One/ Ace WayPoint/ WooKong M/A2, make sure to upgrade the flight control system to the latest firmware version), so as to ensure the highest stability and precision. Please download the corresponding assistant software and upgrade the flight control system MC firmware, otherwise may lead the Z15 work abnormally.

Make sure the Flight control system operates in the safest manner when the main power battery is connected. We strongly recommend customers to remove all propellers, use power supply from R/C system or flight pack battery, and keep children away during gimbal calibration and parameter setup. Please strictly follow these steps to mount and connect gimbal on your aircraft, as well as to install the assistant software on your computer. Please respect the AMA´s National Model Aircraft Safety Code.

As DJI Innovations has no control over use, setup, final assembly, modification (including use of non-specified DJI parts i.e. motors, ESCs, propellers, etc.) or misuse, 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) or injuries incurred directly or indirectly from the use of this product.

DJI and Zenmuse are registered trademarks of DJI Innovations 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 Innovations 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 Innovations. No patent liability is assumed with respect to the use of the product or information contained herein.

Specified Camera and Lens Type list for Z15-GH3.

Camera Type	Panasonic GH3
Lens Type	OLYMPUS M.ZUIKO DIGITAL ED 12mm f2.0

Product Profile

Z15 is an excellent gimbal designed for AP. The gimbal has built-in slip ring in the mechanical structure, preventing wire rod from winding up. It also has built-in independent IMU module, special servos drive module, HDMI- AV module, etc. Excellent job can be done by Z15 in any working mode, including Orientation-locked control, Non orientation-locked control and FPV Mode (Reset).

Z15 Working Mode			
	Orientation-locked Mode	**Non orientation-locked Mode**	**FPV Mode (Reset)**
Gimbal Pointing	Gimbal pointing moves with aircraft nose direction	Gimbal pointing stays unchanged when aircraft nose moves.	Gimbal pointing stays the same as aircraft nose direction when power up
Gimbal and Aircraft Nose Relative Angle	Gimbal pointing keeps the same relative angle with aircraft nose direction	The relative angle between gimbal pointing and aircraft nose direction is changeable	The relative angle between gimbal pointing and aircraft nose is 0°
TX Control	Controllable	Controllable	Uncontrollable
Attitude stability	YES	YES	YES
Vibration Reduction	YES	YES	YES
Stick Meaning	ROLL is locked level in 0~2/3 command stick and rotate in 2/3 ~endpoint; command stick stands for rotation angle limited to $\pm$ 40° in PAN; command stick stands for the TILT rotation velocity of the gimbal.	Command stick stands for gimbal rotation velocity，Stick center position is 0°/s，its endpoint is the maximum velocity.	——
Command Linearity	YES	YES	——

Note1: Gimbal pointing means the PAN rotation angle of the gimbal.

Note2: Attitude stability means that gimbal´s ROLL/TILT will not follows the aircraft´s ROLL/PITCH.
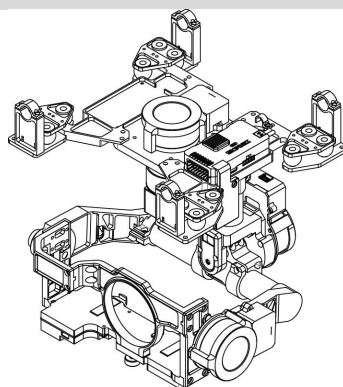
Note3: Gimbal rotating maximum velocity is corresponding to TX 100%end-point.

In the Box

Gimbal ×1

In the mechanical structure, the gimbal has built-in slip rings, preventing wire rod from winding up, which also enables free rotations for the 3 axes rotating rods.

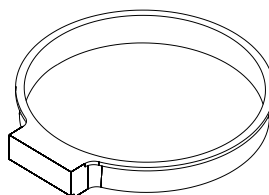The gimbal has built-in Z15 gimbal special servos drive module, independent IMU module and HDMI – AV module.

Gimbal Controller Unit (GCU)×1

Connect the gimbal controller to the flight control system by CAN- Bus. The GCU will control the gimbal's pan, roll and tilt rotation.
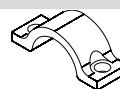
Lens Retaining Ring×1
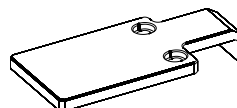
For fixing the camera lens.

Mounting Bracket ×4

For gimbal and landing gear connection.

Mounting Board for Receiver ×1

For fixing the GCU, and providing the mounting position for the receiver or other device.
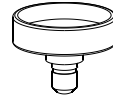
Cable Clamp ×1

For tidying the cables on gimbal.

Camera Mount Screw×1

For camera mount.

Lens Retaining Ring Screw×1
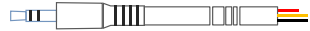
For fixing the lens retaining ring to the gimbal.

Screw×8
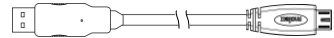
For mounting gimbal to aircraft (M2.5*8 Head-cup screw).

Gimbal Video Power Cable×1

For GCU and Wireless Video Transmission Unit connecting, transmitting AV signal.

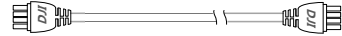## Micro-USB Cable×1

For adjusting parameter and upgrading firmware via PC.

CAN-Bus Cable×1

Use CAN-Bus to power and communicate with the flight control system

Spare Package×1

Damping units, Spare Screw, and Mounting Bracket.

Contents

Gimbal Description

Tips:

- Servo driver module is with two motor command input ports and one encoder private port.

- HDMI-AV module converts HDMI video signal to AV video signal with a cable connecting to camera HDMI port; also transforms TX signal into shutter control signal with a shutter control module.

- The camera shutter control cable is pluggable, user can unplug it if nonuse the shutter control function.

Pan ±360°

Servo Driver Module 1

Damping Unit

Motor Input Port To G6 port of GCU

8-Pin Port To G8 port of GCU

Receiver Mount Board

Tilt ±360°

Servo Driver Module 3

IMU Module

Camera Mount Position

Camera Mount Holes

Camera LED Indicator

Roll ±40°

Servo Driver Module 2

Camera Shutter Control Cable

HDMI-AV Module
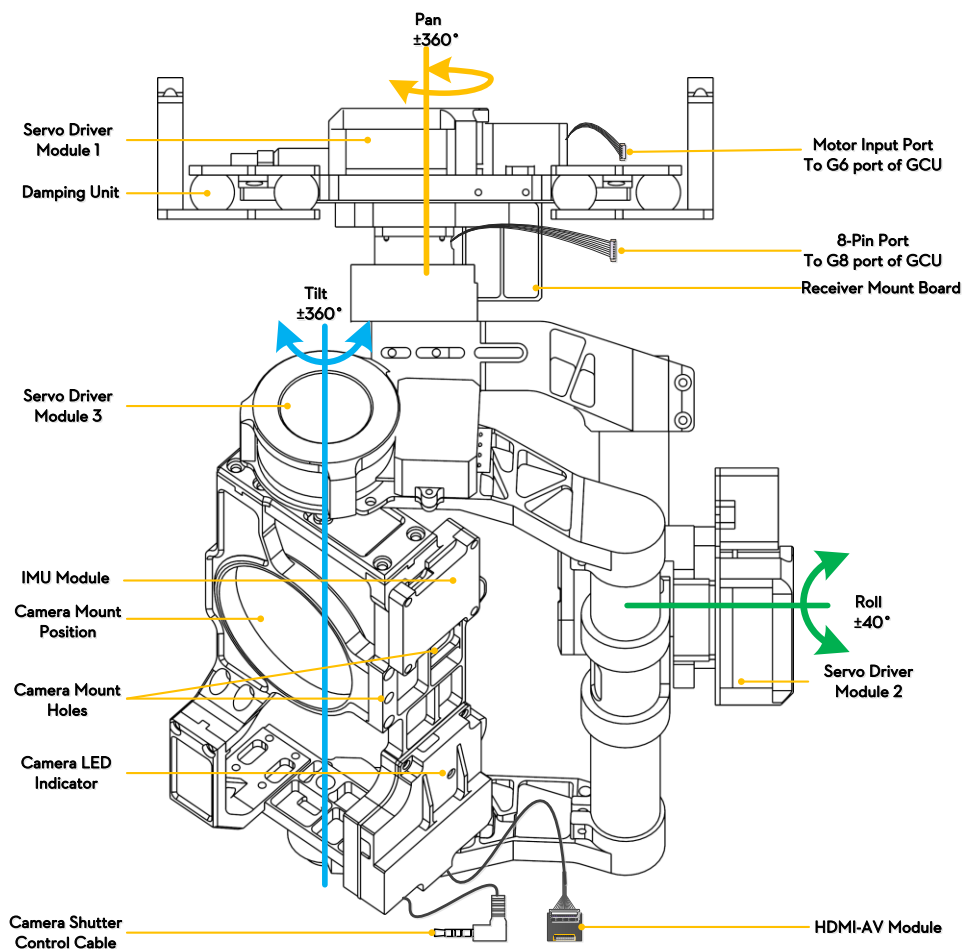
Camera Setup

Configure your camera by the following settings to meet the requirements of Z15. Please read the related content according to your camera.

Panasonic GH3
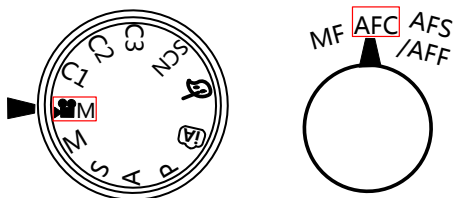
- Please set the Mode as *Creative video* (🎥M).

- MF/AFC/AFS/AFF Select: Select *AFC*.

- Select the Shutter-priority AE mode in the Menu and adjust the shutter speed to 200.

- Please enable the AF when using the Auto Focus function.

Tips:

In the Menu settings, the mandatory values are in red italic font while recommended values in blue. Flashing image output may occur if not follow the recommended settings.

Mount

Mount Lens

Camera

Retaining Ring
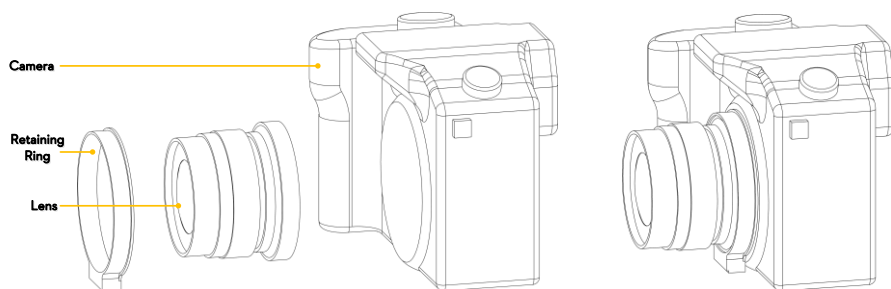
Lens

step1: Mount the lens onto the camera first, and then put the retaining ring through lens until it is fixed.

Mount Camera into Gimbal

Camera
Mounting Screw

Lens Retaining Ring Screw
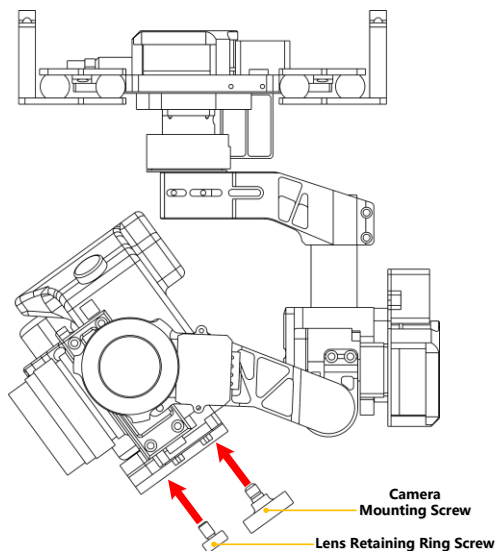
step2: Mount the camera into the gimbal.

step3: Adjust the camera and tighten the camera mounting screw, then tighten the lens retaining ring screw.

Mount Gimbal to Landing Gear

Following diagram shows mounting gimbal to DJI Innovations S800 EVO. You may mount the gimbal to a landing gear prepared by yourself referring to the following diagram.

S800 EVO Landing Gear

Lens direction

Aircraft nose direction

step4: Install the gimbal to a landing gear with mounting bracket; tighten up the screws (2.5*8 Head-cup screw×8) with appropriate screw glue.

Notes:

- Ensure to mount the side of servo driver module1 without ports to the aircraft nose direction.
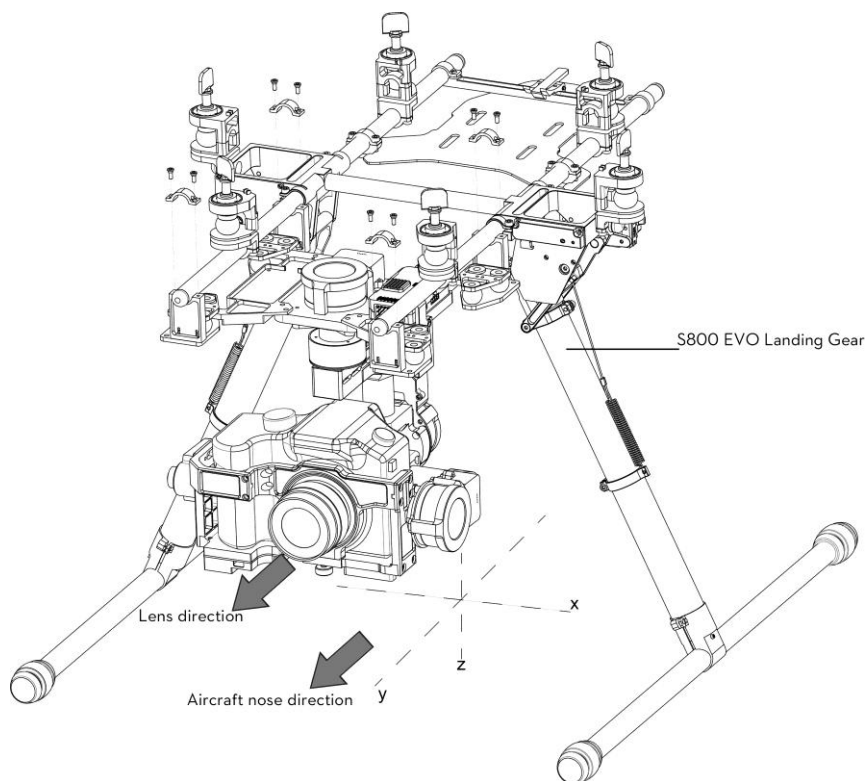- Make sure the top and bottom plates of damping unit stay parallel when mounting, preventing the damping units from stretched and distorted.
- Keep overall balance when mounting, in order to make the center of gravity on the Z axis line.
- The gimbal center of gravity has been set, whose position directly determine the gimbal performance. Please do not adjust the gimbal center of gravity by yourself.
- The gimbal is high-precision controlled. Do not remove any other screws in the gimbal, which may result in bad performance or even damage.
- Do not unplug any cable attaching to the gimbal ports, or even change the mechanical structure.
- Make sure the wiring is correct, otherwise may lead to gimbal abnormal work or even out of control.

Camera Wiring/Shutter Control

Camera Wiring

Connect the camera correctly, since the gimbal works with a HDMI-AV module for converting video signal format
and transforming TX signal into shutter control signal. Ensure the camera is setup first, and then carry out the
following procedures to connect the camera and gimbal.
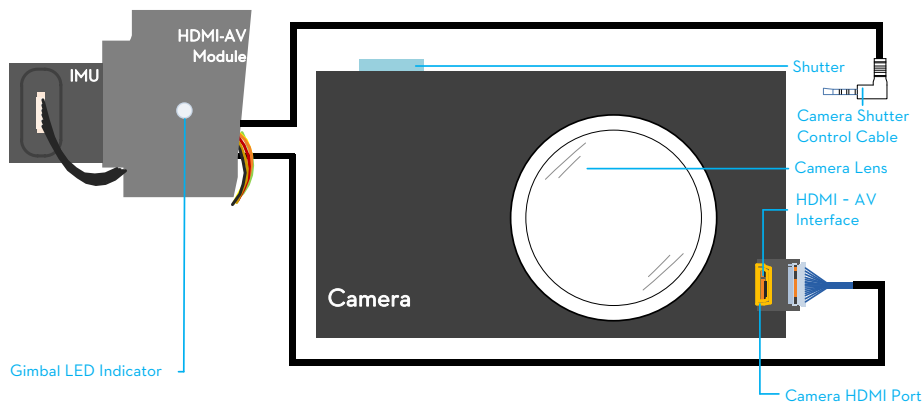
step1: Connect the gimbal HDMI-AV module to camera HDMI port with a HDMI-AV connection cable.

step2: Connect the camera shutter control cable to the camera.

Notes:

● When disconnect the cable between HDMI-AV module and camera, dismount the camera, and unplug the
HDMI-AV interface.

Shutter Control

The Z15 enables transforming TX command into shutter control signal, please set one 2-position switch/channel for remote shutter control.

Make sure the shutter control module is correctly mounted and wired.

Whichever 2-position switch on your transmitter selected, wire the right channel of receiver to SHUT port.

For example:

Position -1→ Position -2: First shooting

Position -2→Position -1: No shooting

Position -1→ Position -2: Second shooting
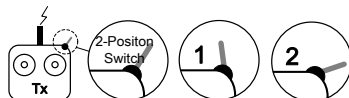
Notes:

● Set the camera of Z15-GH3 to "Creative video", the shutter can be used to record video. One toggle is for start/stop recording.

Tips:

● The following diagram shows how the shutter control works.

● If the shutter control works abnormally, please check each step.

Video Signal Transmission

A wireless video transmission module is required for the video signal accessing remotely.
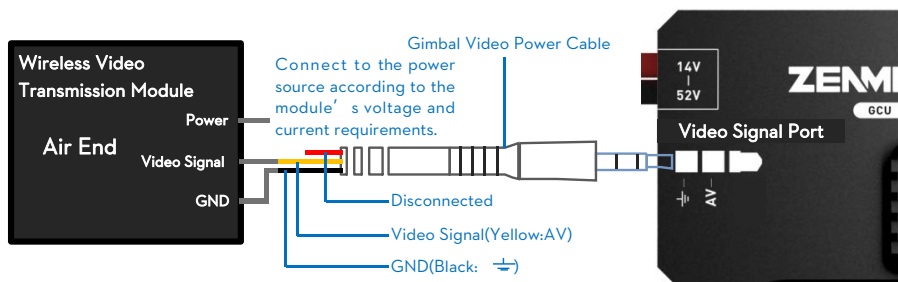
step1: Carefully solder the corresponding Video Signal/GND cables to a wireless video transmission module (Air End).

step2: Plug the gimbal video power cable lead into the GCU Video Signal Port.

Notes:

- Make sure to connect the **wireless** video transmission module to the GCU prior to powering on.

- The standard gimbal video power cable is recommended.

- Make sure you solder the gimbal video power cable to the wireless video transmission module correctly. As the cable carries power, ensure the cables are insulated or wrapped to prevent any type of short circuit.

    ▬▬ Disconnected
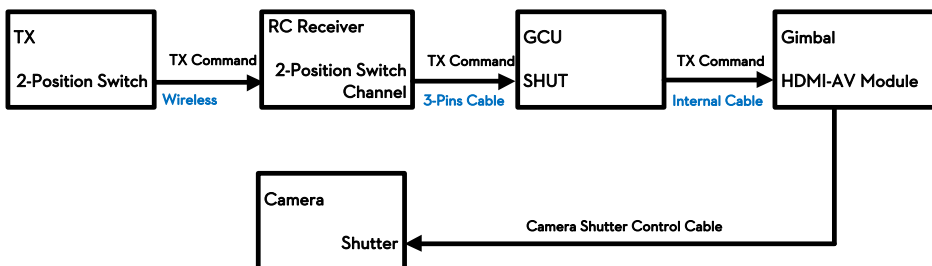
    ▬▬ Video Signal Cable(AV)

    ▬▬ GND Cable

Connect the wireless video transmission module to a power source as the GCU cannot supply power. Make sure the power is a safe voltage for you own devices according to the wireless video transmission module´s requirement.
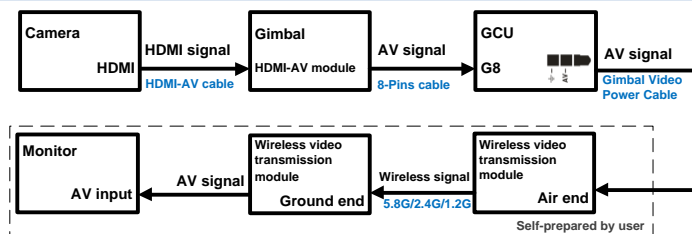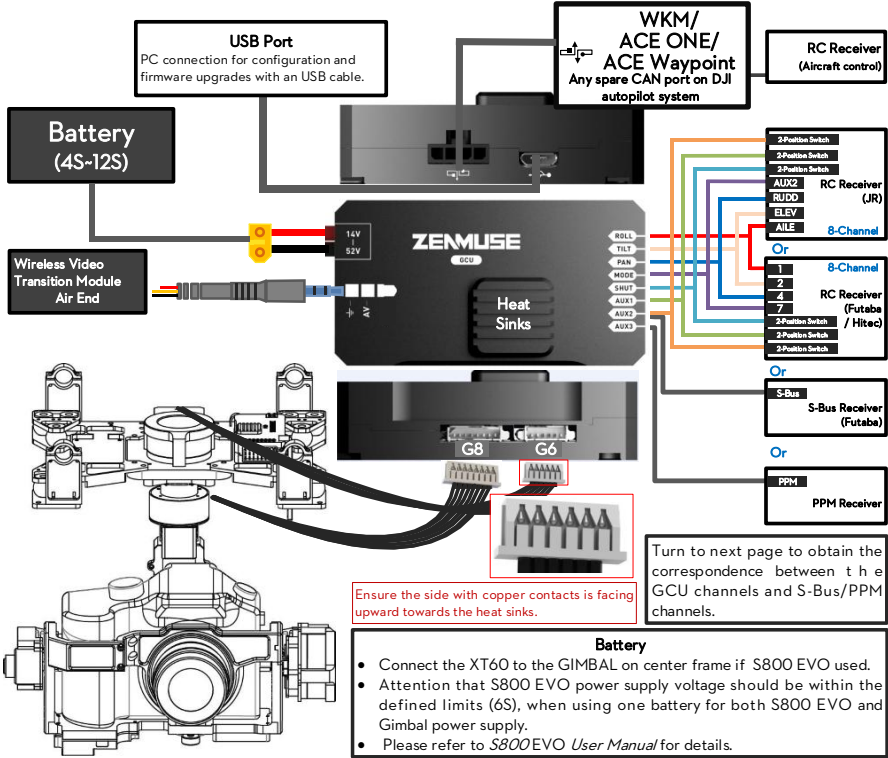
Tips:

- The following diagram shows how video signal transit when gimbal working.

- If the video signal access fails, please check each step.

GCU Wiring

USB Port
PC connection for configuration and firmware upgrades with an USB cable.

**WKM/
ACE ONE/
ACE Waypoint**
Any spare CAN port on DJI autopilot system

RC Receiver
(Aircraft control)

Battery
(4S~12S)

Wireless Video Transition Module Air End

ZENMUSE
GCU

14V / 52V

AV

Heat Sinks

ROLL
TILT
PAN
MODE
SHUT
AUX1
AUX2
AUX3

2-Position Switch
2-Position Switch
2-Position Switch
AUX2
RUDD
ELEV
AILE
RC Receiver (JR)
8-Channel

Or

8-Channel
1
2
4
7
2-Position Switch
2-Position Switch
2-Position Switch
RC Receiver (Futaba / Hitec)

Or

S-Bus
S-Bus Receiver (Futaba)

Or

PPM
PPM Receiver

G8   G6

Ensure the side with copper contacts is facing upward towards the heat sinks.

Turn to next page to obtain the correspondence between the GCU channels and S-Bus/PPM channels.

Battery
- Connect the XT60 to the GIMBAL on center frame if S800 EVO used.
- Attention that S800 EVO power supply voltage should be within the defined limits (6S), when using one battery for both S800 EVO and Gimbal power supply.
- Please refer to *S800 EVO User Manual* for details.

WKM/ACE ONE/ACE Waypoint

Please refer to WKM/ACE ONE/ ACE Waypoint User Manual for all connection and configuration details.

Gimbal Controller (GCU)
- Make sure the ports are accessible when installing the MC so as to facilitate wiring and software configuration.
- In 3-pin ports, pins near the nicks are signal pins.
- 6-pin cable for G6, 8-pin cable for G8.
- DO NOT cover the heat sinks, keep them unobstructed.
- The IMU module is NOT water-proof or oil-proof.

RC Receiver
- These are example connections. Prepare 2 TXs, one is for gimbal control, the other one for aircraft control, refer to **2-Pilots Solution** for more detail in **Appendix.**
- If one receiver is used for aircraft and gimbal control at the same time, refer to **1-Pilot Solution** for detail in **Appendix.**
- Setup Aileron, Elevator, Rudder channels on gimbal control TX. Command stick stands for gimbal rotation velocity，center position is for 0，endpoint for maximum velocity(both clockwise and counter clockwise directions). (End Point is 100%)
- Choose one 3-position switch/channel as Z15 working modes switch.(MODE)
- Choose one 2- position switch/channel As camera shutter control switch(SHUT), one for HDMI switch(AUX1), one for camera lens orientation switch in Reset Mode (AUX2).
- Please refer to WKM/ACE ONE/ACE Waypoint User Manual for aircraft control setting.
- Connect the receiver to GCU correctly.

The Z15-GH3 gimbal also supports DJI A2 flight control system. When using with A2 latest firmware version 2.5, all of the gimbal channels can be setup through the A2 receiver. Refer to A2 User Manual for details.

GCU Ports Indication

The following table shows the GCU channels and TX channels connection.

TX Channels		GCU	Indications
JR	Futaba/Hitec	Channels	
AILE	1	ROLL	For roll axis control (left/right). Velocity is zero if disconnection.
ELEV	2	TILT	For tilt axis control. Velocity is zero if disconnection.
RUDD	4	PAN	For pan axis control. Velocity is zero if disconnection.
AUX2	7	MODE	For Working Mode switch.
2-position switch channel		SHUT	For camera shutter control (both taking picture and recording video are available). Off when non-connection and disconnection.
2-position switch channel		AUX1	For HDMI-AV conversion switch. Conversion function is on while non-connection or disconnection.
2-position switch channel Or Futaba S-Bus channel		AUX2	When the AUX2 is connected to a 2-position switch channel, it is used as camera orientation (down or forward) switch in FPV Mode (Reset). The camera orientation is forward while non-connection or disconnection. If S-Bus receiver is used, it should be connected to AUX2 port.
PPM channel		AUX3	If PPM receiver is used, it should be connected to AUX3 port.

The following table shows the corresponding relationship between the GCU and the S-Bus/PPM channels.

S-Bus/PPM Channels	GCU Channel
1	ROLL
2	TILT
4	PAN
7	MODE
5	SHUT
8	AUX1
9	AUX2
6	AUX3

Working Modes/HDMI/AUX2 Switch Setup

Working Mode Switch Set

Whichever 3-position switch selected as working mode switch, wire the right channel of receiver to MODE port. At each switch position, use end-point fine tuning, set the channel AUX2(JR) /7(Futaba/Hitec) for the three Working modes.

Orientation-locked Mode	Back to center
FPV Mode (Reset)	MODE channel end-point 60%~90%
Non orientation-locked Mode	MODE channel end-point 60%~90%

Notices:

- The gimbal will work in **Orientation-locked Mode**, if not connect to MODE.

- Gimbal default works in **FPV Mode** after power on.

- The gimbal will maintain the Working Mode from last moment, if the cable between MODE and RC receiver is disconnecting while working.

Tips:

- For 3-position switch, you may assign:

  Position-1 to **Non orientation-locked**

  Position-2 to **FPV Mode (Reset)**

  Position-3 to **Orientation-locked**

  Position-1 and Position-3 can be reverse assigned.

- One 2-position switch can be assigned for any two of the working modes as you like.

HDMI Switch Set

The HDMI-AV module can be set on/off by TX. Please ensure the camera HDMI port is connected to the gimbal correctly. Whichever 2-position switch selected as HDMI switch, wire the right channel of receiver to AUX1 port.

You may assign: Position-1 to ON; Position-2 to OFF; or reverse the assignment.

Notes:

The camera HDIM will be on if AUX1 and RC receiver is disconnected.

AUX2 Switch Set

The Z15 supports to control the camera lens down or forward in Reset Mode. Please wire the right channel of receiver to AUX2 port. You may assign: Position-1 to DOWN; Position-2 to FORWARD; or reverse the assignment.
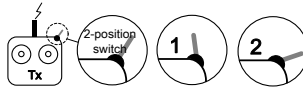
Notes:

- This function can only work in FPV Mode (Reset).
- When this function is on, if the working mode switch from other modes to FPV Mode (Reset), the gimbal will force the camera lens to face forward or down depending on AUX2 Switch.
- The camera orientation is forward while non-connection or disconnection.

Tips:

When the AUX2 is connected to **Futaba** S-Bus channel it is used as the S-Bus channel input.

Assistant Software Installation and Usage

step1: Make sure the driver is installed correctly, which has been installed before you use WKM , ACE ONE or ACE WAYPOINT.

step2: Please download the assistant software installer from DJI Innovations website.

step3: Double click the assistant software installer file and follow the steps to finish installation.

step4: Run the assistant software.

step5: Please upgrade the firmware or configure the parameters according to the assistant software indication if necessary.

Test

Check Before Flight

Notes:

- The gimbal is installed firmly to landing gear, and camera mounted correctly and stably.
- All cables are in correct connection, without anyone in backwards.
- The gimbal video power cable is in good soldered condition if wireless video transmission module used.
- Correct TX settings.
- Camera shutter control module is correctly mounted.
- Correct camera setups.
- Correct connection between GCU and RC receiver.
- Normal connection between GCU and flight control system.
- Upgrade Flight control System MC Firmware.

Tips:

- The gimbal LED flashing red quickly when the camera and gimbal connection fails.
- The gimbal LED stays solid green when the camera and gimbal is successful connection.
- Please turn to the *Trouble Shooting* in *Appendix* if abnormal situation occurs.
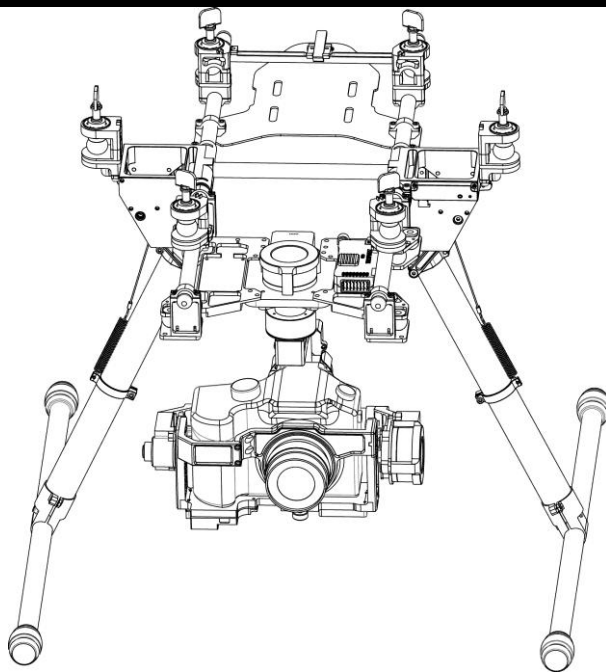
step1: Ensure the batteries are fully charged for transmitter, GCU and all the other devices on your aircraft.

step2: Make sure all connections and wirings are in good condition.

step3: Switch on the TX.

step4: Make sure to adjust the Roll axis of gimbal to be level.

step5: Power on the gimbal and wait for self-testing. The Roll axis will rotate first, and then the yaw and pitch axes will rotate quickly at the same time.

step6: After self-testing, the camera lens will point to aircraft nose direction, that is, the three axes of gimbal should be in the condition as the above diagram shows.

step7: The gimbal goes into initialization, at this time the three axes will rotate very slowly.

step8: The gimbal is at a standstill after initialization, and ready for usage.

step9: Toggle the Working Modes switch on your transmitter, and make sure it is working properly.

Switch the Working Modes to Non orientation-locked, FPV Mode (Reset), Orientation-locked respectively, and then try to push your sticks lightly in Roll, Tilt and Pan to feel if your gimbal moves to the corresponding direction. If not, go back to the Gimbal Working mode Switch Set to correct your settings.

Notes:

If the gimbal is abnormal (unlike the diagram shows) after initializing, please turn to the *Trouble Shooting* in *Appendix*.

Appendix

Matters Needing Attention

**For safety reasons, please pay serious attention to all of the following items:**

- Ensure nothing blocks the servo drive module′s total range of movement, to avoid motor damage.

- Before powering on, spin the gimbal by hand through the complete rotational axes to ensure nothing is blocking the mechanical movement of the gimbal.

- Be sure to mount the side of servo drive module1 with ports facing towards the aircraft′s tail.

- The gimbal′s center of gravity balance has been preset from the factory. The gimbal balance is directly correlated with the gimbal performance. Please do not adjust the gimbal′s center of gravity by yourself.

- The gimbal is a sophisticated, highly technological device. Do not remove any other screws in the gimbal which would result in poor performance or even damage.

- Do not unplug any cables attached to the gimbal ports or change the mechanical structure.

- Make sure all wiring is correct, otherwise it may lead to abnormal operation or the gimbal may start to operate out of control.

- Make sure to connect the wireless video transmission module to the GCU prior to powering on the system.

- The camera′s HDMI resolution should be set to 1080i, otherwise the HDMI-AV/HD module may not work normally.

- The factory gimbal video power cable is recommended.

- Make sure you solder the gimbal video power cable to the wireless video transmission module correctly. Ensure the cables are insulated and protected to prevent and type of short circuit.

- Pay close attention to the S800 EVO′s voltage and be sure it is within the defined limits (6S) when using one battery for both the S800 EVO and power supply for the gimbal.

- Prevent the gimbal from ever touching the contact points of a power cable; otherwise it may lead to a short circuit of the gimbal and cause complete failure.

- Make sure to adjust the roll axis of the gimbal to be level when the camera is attached before powering on.

1-Pilot Solution
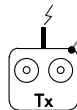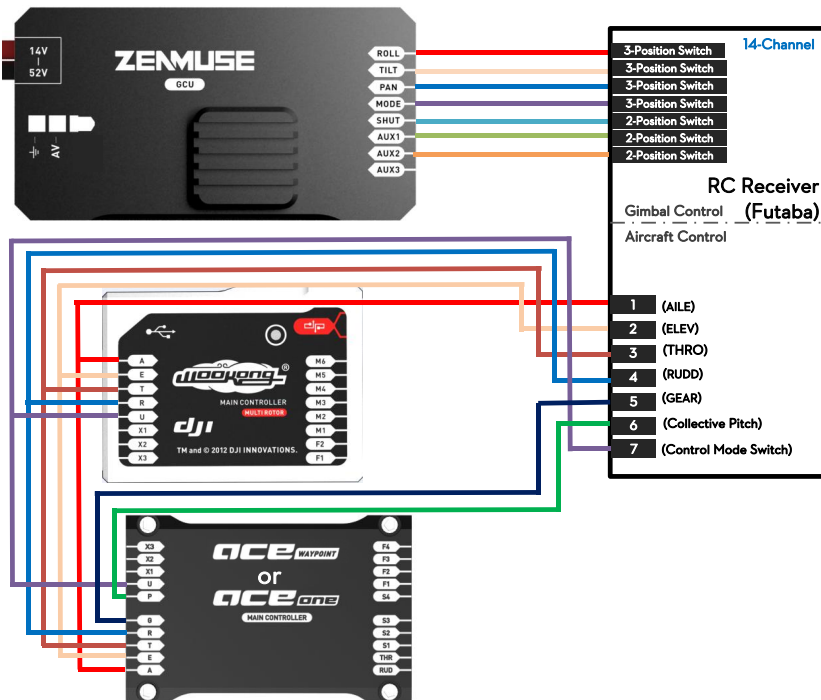
- This is the example connection. Prepare one 14-channel TX/RC receiver for aircraft and gimbal control.

- Setup the Aileron, Elevator, Throttle ,Rudder channels on TX for aircraft roll, elevator, throttle, rudder control, and TX AUX2 for aircraft control modes(Please refer to the *Flight Control System User Manual*).

- Choose three 3-position switches for ROLL, TILT, and PAN rotation control. Switch center position is 0 velocity and end positions are maximum velocity.

- Choose one 3-position switch/channel as Z15 Working Modes switch (MODE).

- Choose one 2-position switch/channel as camera shutter control switch (SHUT), and one as HDMI switch (AUX1).

- Connect the receiver to GCU and Flight control System MC correctly.

2-Pilot Solution

Gimbal Control

Aircraft Control

WKM

ACE ONE
ACE Waypoint
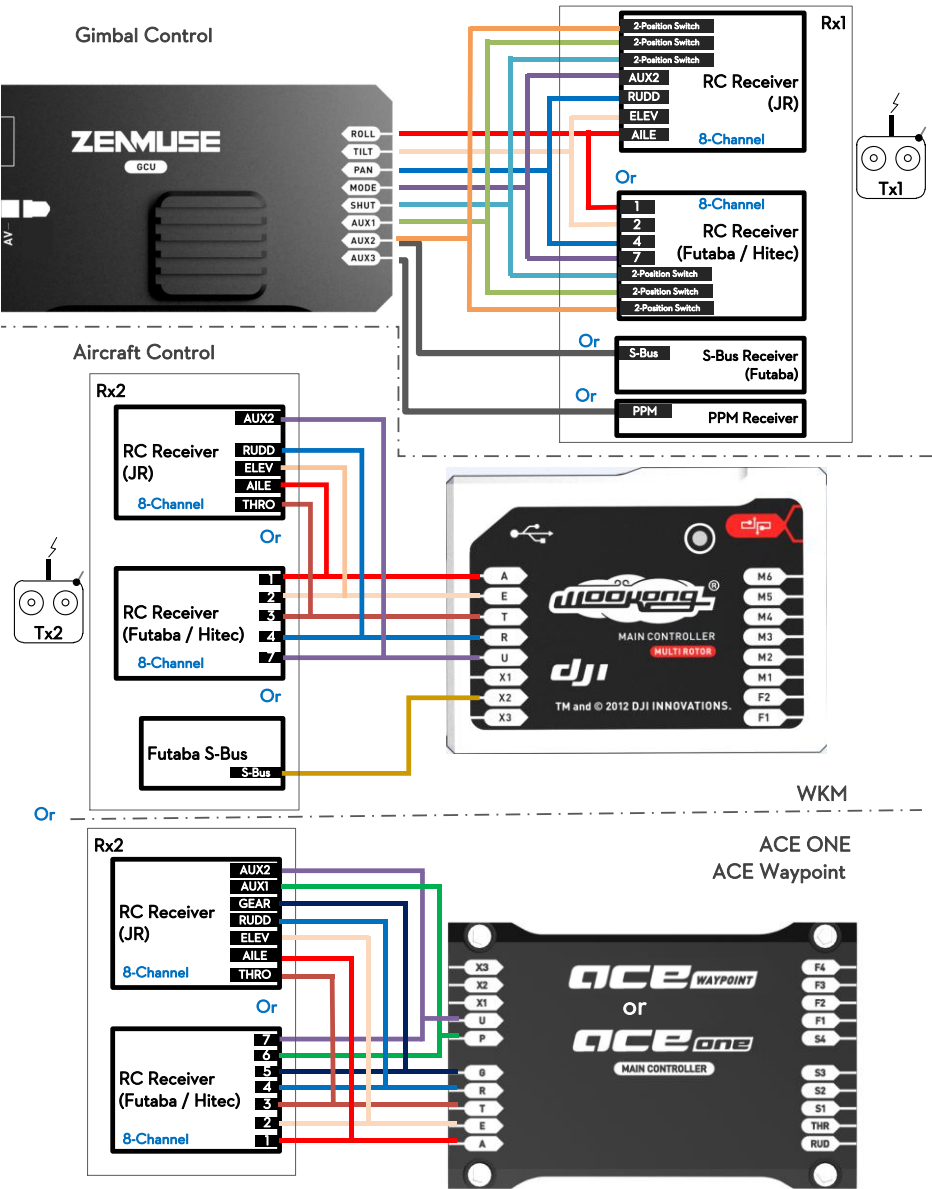
Prepare two TXs and two RXs.

The TX1 and RX1 are for gimbal control.

The TX2 and RX2 are for aircraft control.

Please refer to the *Gimbal Controller Wiring* for more details.

Port Description

GCU		
ROLL	For roll axis control	
TITL	For tilt axis control	
PAN	For pan axis control	
MODE	For Working Mode switch	
SHUT	For camera shutter control	
AUX1	For HDMI switch	
AUX2	For Gimbal orientation (down or forward) switch in FPV Mode	S-Bus Receiver
AUX3	PPM Receiver	
▄▄▄	To wireless video transmission unit, transmitting AV signal	
XT60	To battery (To GIMBAL if DJI Innovations S800 used)	
G6	To Gimbal, transmitting motor command	
G8	To Gimbal, transmitting video signal	
⊷	Micro-USB port: PC connection for configuration and firmware upgrades	
⊶	CAN-Bus port: Use CAN-Bus to connect GCU to the flight control system	

Gimbal	
HDMI-AV Port	To Camera HDMI port
Motor Command Input Port	To GCU G6
8-Pin Cable Port	To GCU G8

Gimbal LED Indicator

Description	LED Indicator
Camera and gimbal connected	▬▬▬▬▬▬▬ (green)
Camera and gimbal disconnected	●●●●●●●●●●●●●●●●●●●●●●●● (red)

Trouble Shooting

NO.	What	Why	How to
1	The gimbal keeps drifting after initialization	(1) The TX trims are too much (2) The GCU and autopilot system is disconnected (3) The Z15 mounting direction is disaccording to aircraft nose	(1) Adjust the TX trims (2)Connect the GCU and flight control system (3)Ensure the Z15 mounting direction is the same with aircraft nose
2	The gimbal is abnormal after initializing	Abnormal calibration after manufacture	Please contact the local dealer or DJI Innovations customer service
3	Cannot distinguish the gimbal pointing when using	BVR flight	Switch to the FPV Mode first, then to another Working Mode needed
4	The gimbal LED flashing red	(1) The gimbal and camera disconnected (2)Camera is off (3) Camera setup failure	(1)Make sure the cable connected (2)Please power on the camera (3)Set the HDMI resolution as 1080i
5	The gimbal green LED is on but without video display	(1) The wireless video transmission unit disconnected (2)Wrong power supply for wireless video transmission unit	(1) Check the wireless video transmission unit connection (2) Ensure the power supply for wireless video transmission unit is 12V

Specifications

General

Built-In Functions	• Three Working Modes
	✧ Orientation-locked control
	✧ Non orientation-locked control
	✧ FPV mode (Reset)
	• Built-in independent IMU module
	• DJI gimbal special servos drive module
	• HDMI- AV module

- Wireless video transmission supported
- Camera shutter control supported
- Wide range voltage input supported
- S-Bus/PPM Receiver supported

Peripheral

Supported Camera	Panasonic GH3
Supported Lens Currently	OLYMPUS M.ZUIKO DIGITAL ED 12mm f2.0
GCU Input Power	4S~12S LiPo (Recommend 6S if with S800)
Control Requirement	Four spare receiver channels at least
Assistant Software System Requirement	Windows XP SP3; Windows 7; Windows 8 (32 or 64 bit)

Mechanical& Electrical Characteristics

Working Current	• Static current: 200mA (@25V) • Dynamic current: 400mA (@25V) • Locked-rotor current: 4A (@25V)
Operating Temperature	-10°C ~ 50°C
Weight	1.22Kg
Dimensions	220mm × 220mm × 190mm
GCU Weight	63g
GCU Dimensions	64.2 mm ×34.1mm ×19.5mm

Working Performance

Load Weight (Reference Value)	680g(@Panasonic GH3 with OLYMPUS M.ZUIKO DIGITAL ED 12mm f2.0, Battery and SD Card)
Controlled Angle Accuracy	±0.01°
Maximum Controlled Rotation Speed	Pan axis: ±130°/s Tilt axis: ±130°/s Roll axis: ±30°/s
Controlled Rotation Range	Pan axis control: ±360° continuous rotation Tilt axis control: ±360° continuous rotation Roll axis control: ±40°