

# FY-41AP Autopilot & OSD System Installation & Operation Manual

Multi-rotor Version V2.22 And Above



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## Dear Customer :

Thank you for choosing FY-41AP as your autopilot system. Please read this manual carefully to ensure correct installation & operation. [FY-41AP has both fixed wing and Multi-rotor versions. You can choose your preferred version while upgrading your firmware. You are currently reading the Multi-rotors version manual.](#)

## User Agreement

The use of FY-41AP is prohibited for any illegal intentions and purposes. The user will be fully responsible for the use of this product and FY-Tech will not be held liable for it's misuse either in its original or altered state by the customer (including the direct, indirect, or third party losses caused by a faulty plane or plane crash).

Please read this manual carefully before using this product. If you have any questions, do freely contact us and we will attempt to provide you with a satisfactory clarification and/or resolution should it be required. The products' functions may be changed only by firmware upgrades which are available from our website from time-to-time. Please do check our website for available firmware upgrades. The company reserves the right to alter the contents of the product firmware.

This agreement takes immediate effect upon the purchase of the product.

### Attention:

- (1) The installation and use of this device require some skill and knowledge in flying remote controlled aircraft.
- (2) If you are a complete beginner & have never flown one before, we do not recommend you install this device on your own. Please find an experienced RC pilot who may provide you with the basic knowledge required to use this device successfully.
- (3) If you are already an experienced flyer, you will find the FY-41AP installation to be easy & logical. Follow this manual & you won't go wrong.
- (4) If you need further technical support, contact us at: [uavservice@feiyu-tech.com](mailto:uavservice@feiyu-tech.com)

# 1. FY-41AP Autopilot & OSD System Introduction

## FY-41AP Module

FY-41AP is an inertial attitude measurement instrument used for FPV flight on fixed-wing aircrafts and multi-rotors aircrafts. It has an integrated OSD video overlay system that presents critical flight information such as power management, airspeed, altitude, and flight direction via its electronic compass, allowing for a clear visual flight while ensuring key information is within sight.

[This manual is for multi-rotor installation & operation.](#)

Flight stabilization is achieved via an integrated 3 axis gyro, 3 axis accelerometer, 3 axis magnetometer and a barometric pressure sensor. This enables the module to accurately measure flight attitude, earth azimuth & relative altitude to achieve:

- Attitude Stabilized Mode
- Hovering Mode
- Auto Return To Launch Mode(RTH)

## GPS Module

GPS module– enables the FY-41AP to calculate the flight course & sense the exact location of the aircraft. GPS Data enables the aircraft to utilize Auto Return To Launch Mode (RTH) and Hovering Mode.

## OSD System

FY-41AP has integrated OSD hardware with optimizing display interface. Critical flight parameters are displayed like Altitude, Speed, Direction, flying voltage and Amp draw.

## Power Manager Module

FY-41AP can connect Power Manager Module which is integrated with Current Sensor module and Voltage-Regulating module. Current Sensor is used to check voltage, Amp draw. The integrated Voltage-Regulating module provides stable +12V to FPV video camera and video transmitter.

## 2. Function Introduction

### Altitude Stabilized Mode

41AP can auto stabilize the aircraft flight altitude in this mode. Keep the **pitch and roll stick** in center position for 0 °altitude. The pitch and roll stick has an endpoint of 45 ° and has linear control over the flight altitude, with a maximum angular velocity of 150 ° / s. The **yaw stick** in the center position will lock on to the current course. The yaw stick can linearly control the aircraft's rotation rate, with a maximum rotation rate of 135 ° per second. The **throttle stick** directly controls the aircraft's ability to climb and decline; the climbing and declining rate is directly related to the throttle.

### Hovering Mode

The GPS Module must be connected to the 41AP with at least 5 GPS satellites detected. In this Mode, yaw control method are the same as in Attitude Stabilized Mode. 41AP can auto control flight altitude. Climbing and descending rate is directly related to the throttle, when the throttle stick is in the center position, 41AP auto locks the altitude, with a maximum means climb rate of 3 m/s, and a minimum means decline rate of 1.5 m/s. The throttle stick linearly controls the aircraft climb and decline rate. Releasing the pitch and roll stick will lock the position when GPS signal is adequate. And non-releasing is stand for the aircraft movement speed in the corresponding axial direction(Maximum 6m/s),not aircraft attitude.

### Auto Return To Launch Mode (RTH)

The GPS Module must be connected to the 41AP with at least 5 GPS satellites detected. In this Mode, FY-41P is take over all the control, the RC aileron, elevator, throttle and rudder stick is no control function anymore. When you switch into RTH mode, FY-41AP (FY-41AP has 20m altitude protection limit, if the switch point altitude below 20m, FY-41AP will automatic climb to 50m) will first automatic adjust the aircraft heading to the home point and automatically fly the aircraft back to the take-off point, while maintaining altitude. Upon reaching the launch area, the unit will automatically landing and closed the engine.

### Camera Gimbal Stabilization

41AP multi-rotor firmware, when used to control Quadcopter and Hexcopter, can simultaneously control two axis Camera Gimbal Stabilization.

#### Attention:





- (1) You must use 400Hz high-speed servos for Camera Gimbal, if you use normal servos for a long time, will cause the Camera Gimbal servos overheat.
- (2) If you use FY-41AP to control Octocopter aircraft, S7 and S8 ports will not output






Camera Gimbal control signal any more.

### OSD Video Overlay Display Function

**First Person View (FPV):** FY-41AP has an integrated OSD video overlay system, so you do not need to connect an external video overlay module. The flight data overlays to video output and through the video transmission system to send back the signal, letting you enjoy the fun of FPV. And operating FPV is even easier with the functions of automatic balance, Hovering, and Auto Return To Launch.

## 3. FY-41AP Configuration

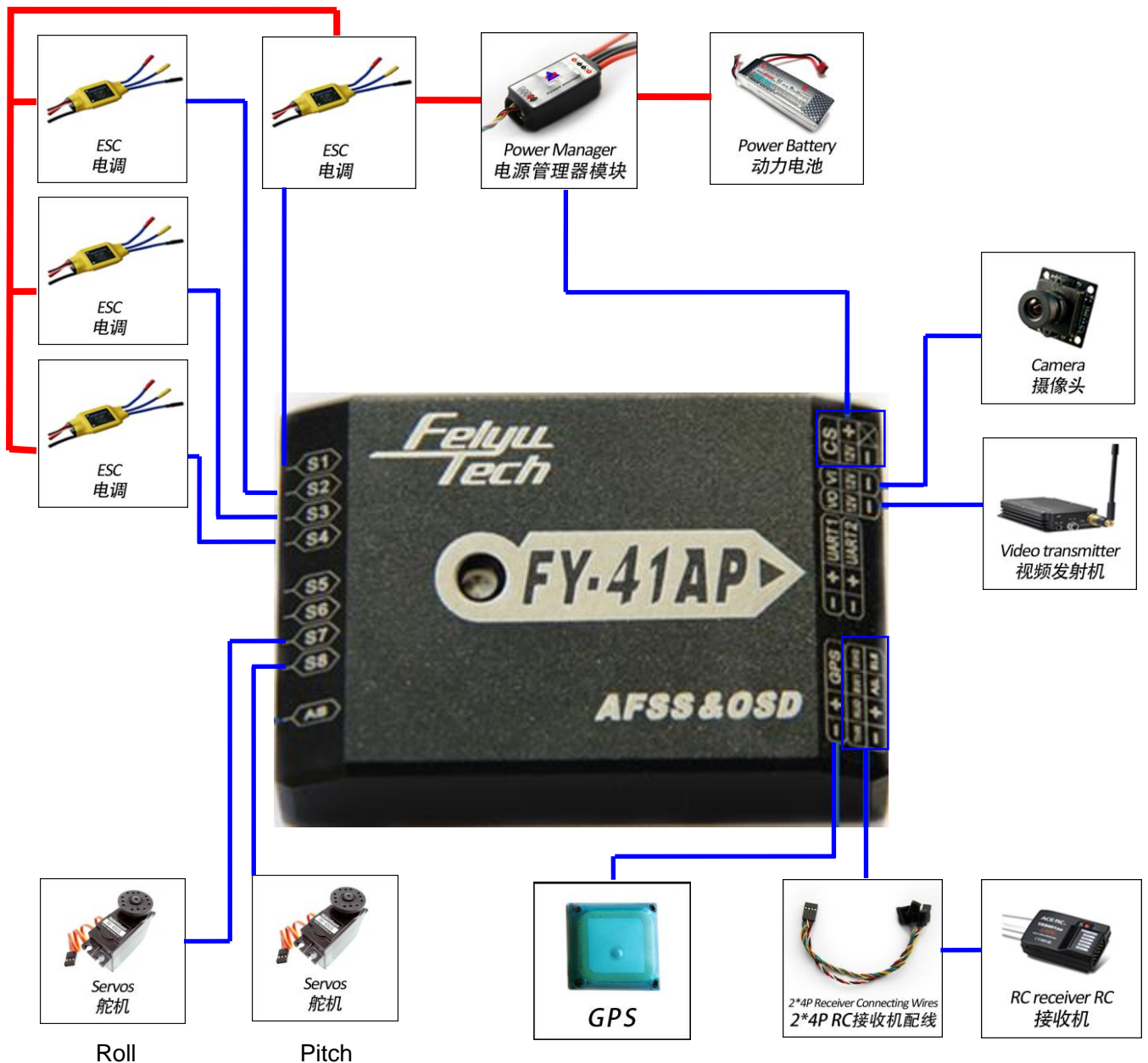
NO.	Module	Introduction
1	 <p>FY-41AP</p>	<p>FY-41AP module Size: 58mm*37mm*19mm Weight: 34g</p>
2	 <p>GPS</p>	<p>GPS receiver module Size: 32mm * 32mm * 13.5mm Weight: 24g</p>
3	 <p>Power Manager 电源管理器模块</p>	<p>Integrated with the Current Sensor and regulating voltage module to provide stable +12V to the FPV video camera and transmitter at the same time. Size: 50mm*24mm*18mm Weight: 35g</p>
4		<p>Use for supporting the GPS module length: 85mm Weight:9g</p>

<p>5</p>	 <p>USB Data Cable USB线</p>	<p>For FY-41AP firmware upgrade For connect data link to PC For connect remote adapter to PC</p>
<p>6</p>	 <p>2*4P Receiver Connecting Wires 2*4P RC接收机配线</p>	<p>2x4P RC receiver wiring For connecting the FY-41AP and RC receiver</p> <p><b>Black&amp;white—AIL      Orange—ELE</b> <b>Green—THR              Yellow—RUD</b> <b>Brown—CH5             Blue—CH6(Not use)</b></p>
<p>7</p>	 <p>Video Connecting Wires 视频连接线</p>	<p>For connecting the video camera or video transmitter</p>
<p>8</p>	 <p>Power Supply T-Head 电源T头</p>	<p>Can weld to power manager module for connecting the battery and ESC</p>
<p>9</p>	 <p>GPS Extension Cord GPS延长线</p>	<p>GPS extension wire</p>

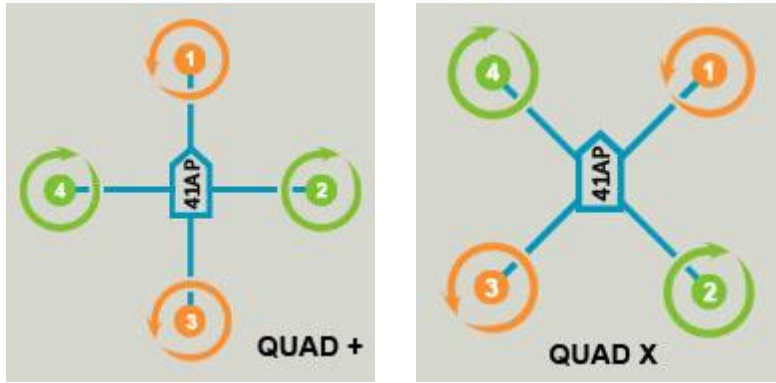
## 4. FY-41AP Connection Summary

The following pictures display the rotation direction and serial number of each motor. Each ESC should be connected to the FY-41AP S1 - S8 interface. Pay attention once you've chosen the control type, as the corresponding position motor rotate direction has to be completely the same as in the picture. (If the motor rotate direction is not correct then exchange any two of the three connection wires between ESC and motor to change the motor rotate direction.)

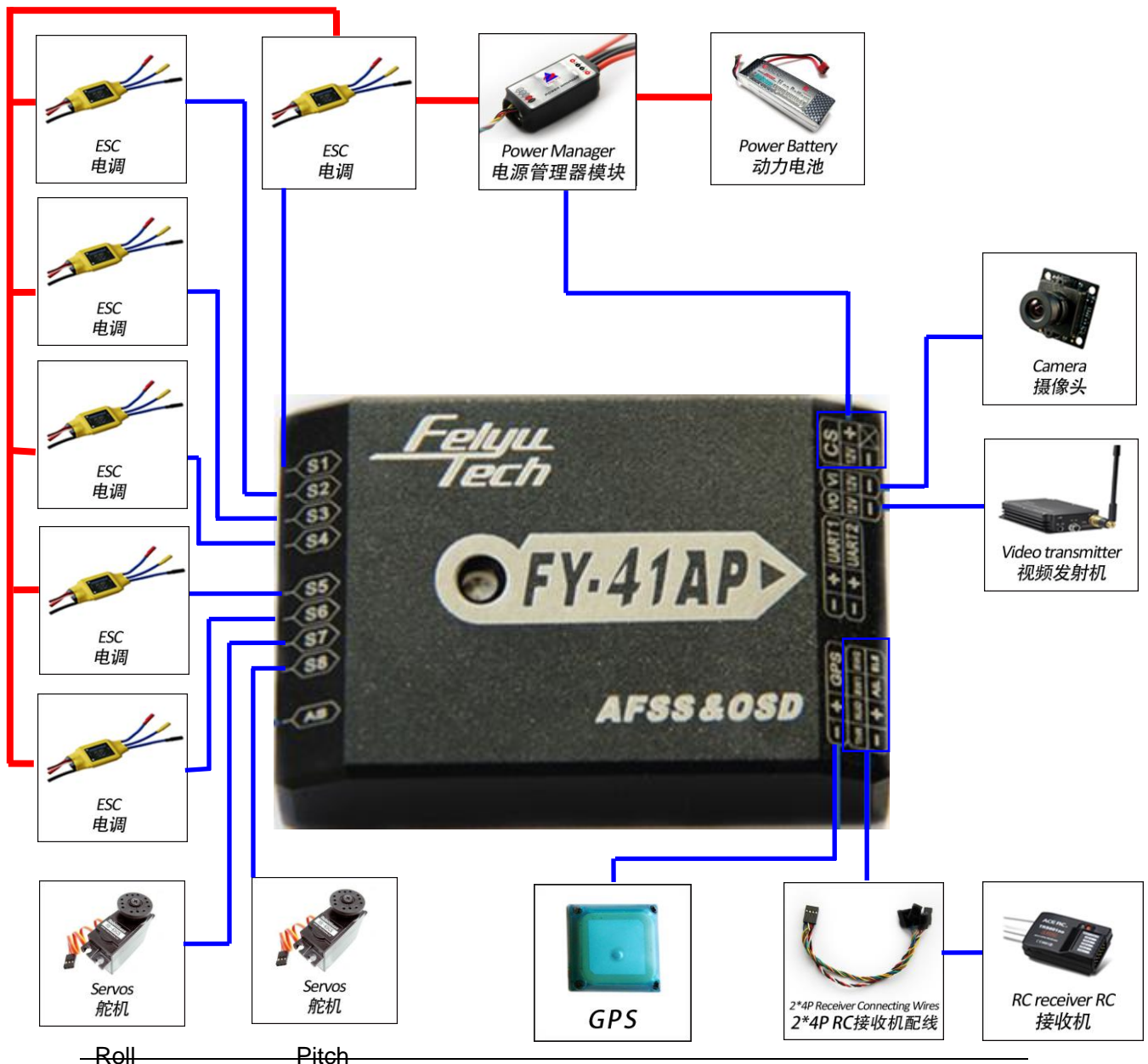
### 4.1 Quadcopter Connection Summary





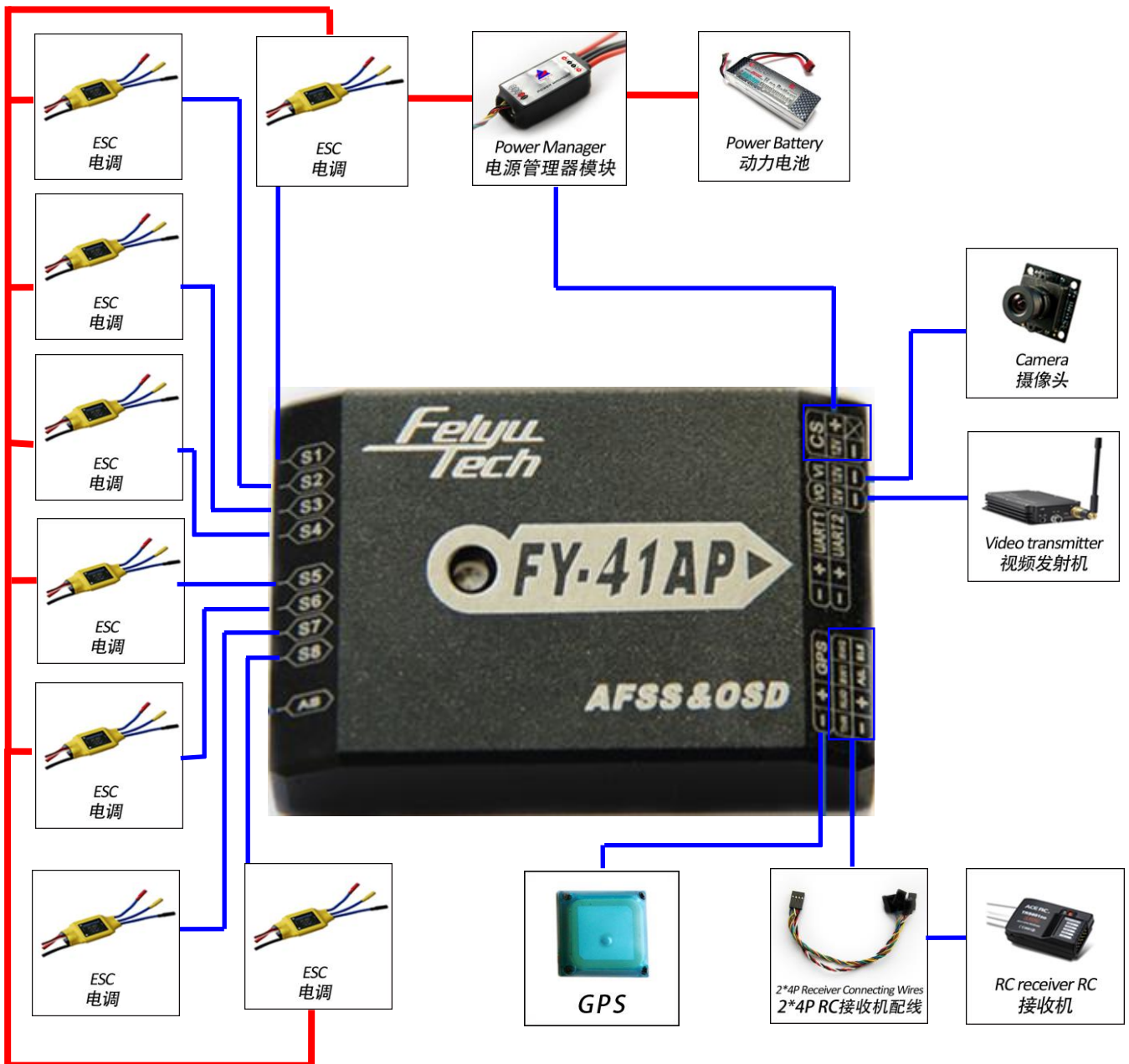


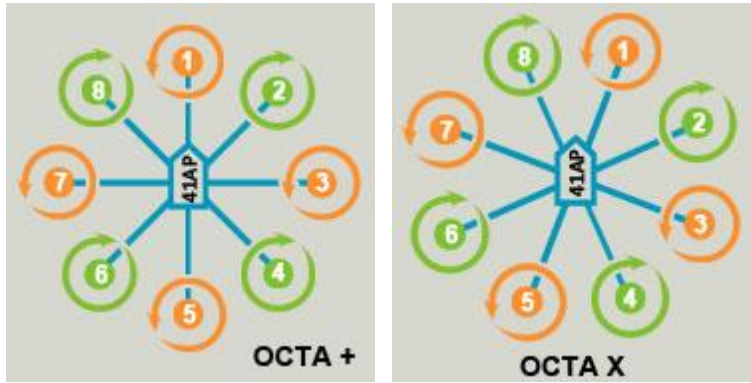
## 4.2 Hexacopter Connection Summary














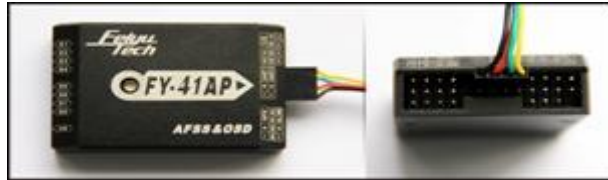

### 4.3 Octocopter Connection Summary





## 5. Connection Introduction

Connection Picture	Introduction
	<p>S1~S8 servo wiring connection Pay attention to the signal wiring sequence</p>
	<p>Power manager wiring</p>
	<p>GPS module wiring</p>
	<p>2x4P RC receiver wiring For FY-41AP  <b>Black&amp;white</b>——<b>AIL</b>  <b>orange</b>——<b>ELE</b>  <b>green</b>——<b>THR</b>  <b>yellow</b>——<b>RUD</b>  <b>brown</b>——<b>CH5</b>  <b>blue</b>——<b>CH6</b></p>

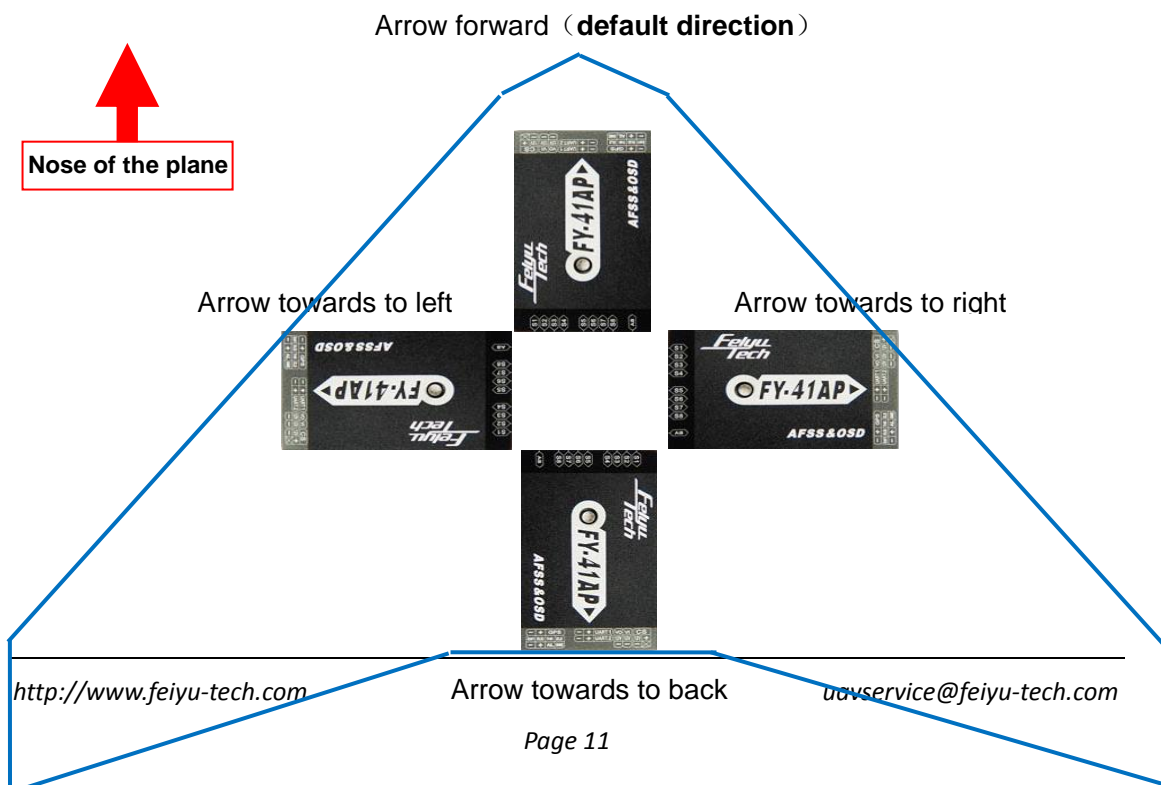
	<p>Airspeed meter wiring(Not use)</p>
	<p>Video camera wiring Yellow-video signal Red--+12V Black--GND</p>
	<p>Video transmitter wiring Yellow-video signal Red--+12V Black--GND</p>
	<p>Connect the USB data cable to UART1 port to firmware upgrade for FY-41AP control module</p>
	<p>Connect the USB data cable to UART2 port to firmware upgrade for OSD module</p>
	<p>Data link wire Connect the FY-602 data radio to UART1 port</p>
	<p>Vibration absorbing pads (dampers),use for FY-41AP vibration damping installation.</p>

## 6. Main Module Installation

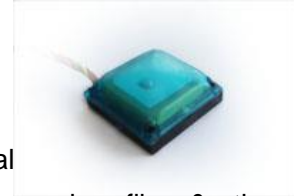
## 6.1 FY-41AP Module Installation



- While installing, please keep FY-41AP horizontal and as close as possible to the "Centre of gravity" (COG) of the aircraft. The module's orientation can be changed by FY-GCS (Ground Control Station) system: arrow to front (default), back, left or right. [Please reset the "install orientation" after you changed the install orientation.](#)
- Efficient anti-vibration components are very important and to be used when installing. You can use the included 'vibration absorbing dampers' or your DIY equipment. Please note: For Nitro planes, flying without using efficient 'anti vibration damper's', will lead to FY-41AP working abnormally.
- [The better the damping installation is, the better attitude control and GPS hovering functions are.](#)
- Each modules installation to a suitable position is conducive to further enhance the performance of Hovering mode. Regarding 41AP module installation position, the center of the aircraft should be as far away as possible from other objects that could cause interference. The aim is to reduce the disturbance to the internal IMU position sensors when the aircraft tilts or rotates. In addition, you also have to consider a very important factor: reducing the interference to the 41AP internal magnetic sensor due to positioning during installation. There will be interference to magnetic sensor, [from surrounding objects with a strong current, motor rotation, battery, etc.](#) [Keep potential interfering objects as far away as possible during installation.](#) Keeping these two factors in mind, please find a suitable position for installation. For example, you can put the FY-41AP module on a high place.



## 6.2 GPS Module Install



- GPS receiver module has integrated plate type GPS passive antenna with stronger reception ability shielding the false signal by ground reflection efficiently. DO NOT install next to metal or carbon fiber & other shielding material, which may block satellite signal reception. Install the GPS Module horizontal and away from electromagnetic sources such as ESC's, power wires, servo wires & video transmitters which can interfere with GPS signal.
- GPS module should be placed as far as possible to the center position, in order to reduce the interference to GPS data when it level rotating. Also you can put the GPS module to a high place using a stent. This practice can effectively reduce the interference to GPS signals caused by other devices, and improve the positioning performance of GPS module.



## 6.3 Power Manager Module Install



- Power manager module supports 2S ~ 6S lithium battery input; the integrated current sensor can measure APM draw and voltage; DC-DC module offers 5V to FY-41AP meanwhile 12V to the video camera and video transmitter. But servo power is supplied by ESC or S1~S8 through any port access.
- Only one BEC power source should be used. If all the ESCs have internal BEC, only choose one to supply power. Disconnect the red wire (positive) of the other ESCs, but reserve the GND and Signal wirings.



## 7. Remote Control Setting (SW1&SW2)

- ( 1 ) FY-41AP needs a remote control and receiver with at least 5 channels,
- ( 2 ) including 4 normal channels for AIL,ELE,THR,RUD, and SW1 to control flying mode.
- ( 3 ) You need to choose normal fixed wing plane mode while canceling all mix control modes, meanwhile setting CH5 to a three-switch.
- ( 4 ) FY-41AP needs a three-switch to control flying mode:SW1 for Attitude Stabilized Mode, Hovering Mode, Auto Return To Launch Mode(RTH).
- ( 5 ) After setting the Switch, you can double check by monitoring the indicator light on the module against selected flying mode. For details see the indicator light manual
- ( 6 ) SW1 default set :

SW1		
Attitude Stabilized Mode	●	▲ ▬ ▼
Hovering Mode	● ●	
Auto Return To Launch Mode(RTH)	● ● ●	



## 8. Gyroscope Reset

**If the following conditions occur, the FY-41AP initialization is recommended:**

1. The device has not been used for a long time.
2. There is a change in environmental temperature of over 30 degrees since last flight.
3. The **Red** LED flashes continuously even when the FY-41AP remains stationary and you never activate the motor.

### Note:

**For a better flight, we suggest you reset the gyro before each flight.**

There are two ways to realize the gyro reset. **(The FY-41AP must be kept stationary during the gyro reset procedure)**

#### 1. Through SW1:

On SW1, switch stabilized mode to fixed altitude mode 6 times, each time interval has to be less than 3 seconds as follows:

stabilized mode→fixed altitude mode →stabilized mode →fixed altitude mode →stabilized mode→fixed altitude mode →stabilized mode →fixed altitude mode →stabilized mode →fixed altitude mode →stabilized mode →fixed altitude mode.

#### 2. Through FY-41AP setting software "Init GYRO" button.

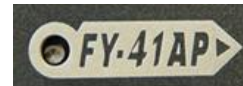
## 9. Calibrate The Compass

FY-41AP has a built-in magnetic field sensor which can measure the earth's orientation position, providing the basis of the hover function. If the magnetic field is disturbed, the hovering mode will draw a circle motion and be unable to hover.

FY-41AP internal procedure will correct magnetic field in real time, since the magnetic field will change if the motor starts, so the best way is that control aircraft spin over three circles after take-off. The internal procedure will calibrate the magnetic field automatically. This is very critical, and can affect the hover mode directly.

**Attention:** If you want to save the compass calibration value permanently, please take off and wait the aircraft automatic into the state before execute Combination Stick Commands (CSC) and do the gyro reset. The compass calibration value will be saved into FY-41AP through the gyro reset procedure.

## 10. FY-41AP Indicator Light Instruction



FY-41AP with three colors LED which can send out red, blue, green light. Also yellow, white, purple and other colors light through the combination.

Operators can know the FY-41AP's operating mode by judging the different colors which the LED sends out and the flash frequency. (Attention: If it sends out red light it either means FY-41AP needs a Gyro Reset or that it's moving.)

NO.	operating mode	LED	GPS location fixed (normal)	GPS location fixed (good)	GPS location fixed (very good)
1	stabilized mode	Single flash	Single flash	Double flash	Triple flash
2	Hovering Mode	Double flash	Single flash	Double flash	Triple flash
3	Auto Return To Launch Mode	Triple flash	Single flash	Double flash	Triple flash
4	Gyro needs Reset or is moving	Red light continuous flash			
5	During the gyro reset	Flash white light for almost one second			
6	too much vibration	red light stay on solid			



e.g.

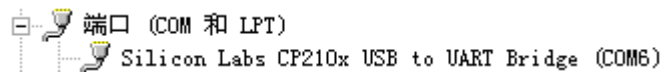
Blue	Stabilized mode, GPS not lock
Blue—Blue—Green	Hovering Mode, GPS lock, Bad Signal
Blue—Blue —Green—Green	Hovering Mode, GPS lock, Good Signal
Red—Red—Red ——Red	If it stays static it means it needs a Gyro Reset.

## 11. Install USB Driver

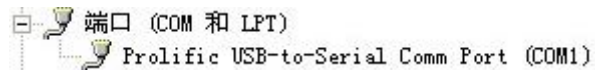
(1) Please visit the official website: [www.feiyu-tech.com](http://www.feiyu-tech.com). Download the newest USB driver at the download page

(2) After successfully install the USB driver, insert the USB-TTL interface cable into computer USB COM port(don't connect TTL port to any other device ) , the system will correctly identify the USB -TTL data cable, then you will find there is more than one port(COM and LPT).

If the USB data cable you have received is the new one(Silver), like the picture show, please download the “Feiyu Tech New USB Driver ”.The new port is “[Silicon Labs CP210x USB to UART Bridge](#)”.



If the USB data cable you have received is the old one(Black), like the picture show , please download the “ [USB Driver](#) ”.The new port is "[Prolific USB-to-Serial Com Port](#)"

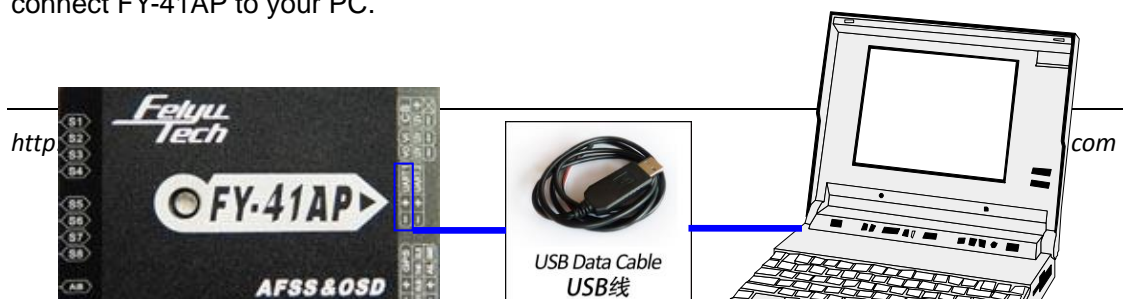


The “COM \* ” is the virtual serial number of the USB-TTL cable.

## 12. Via FY-41AP Setting Software Set FY-41AP

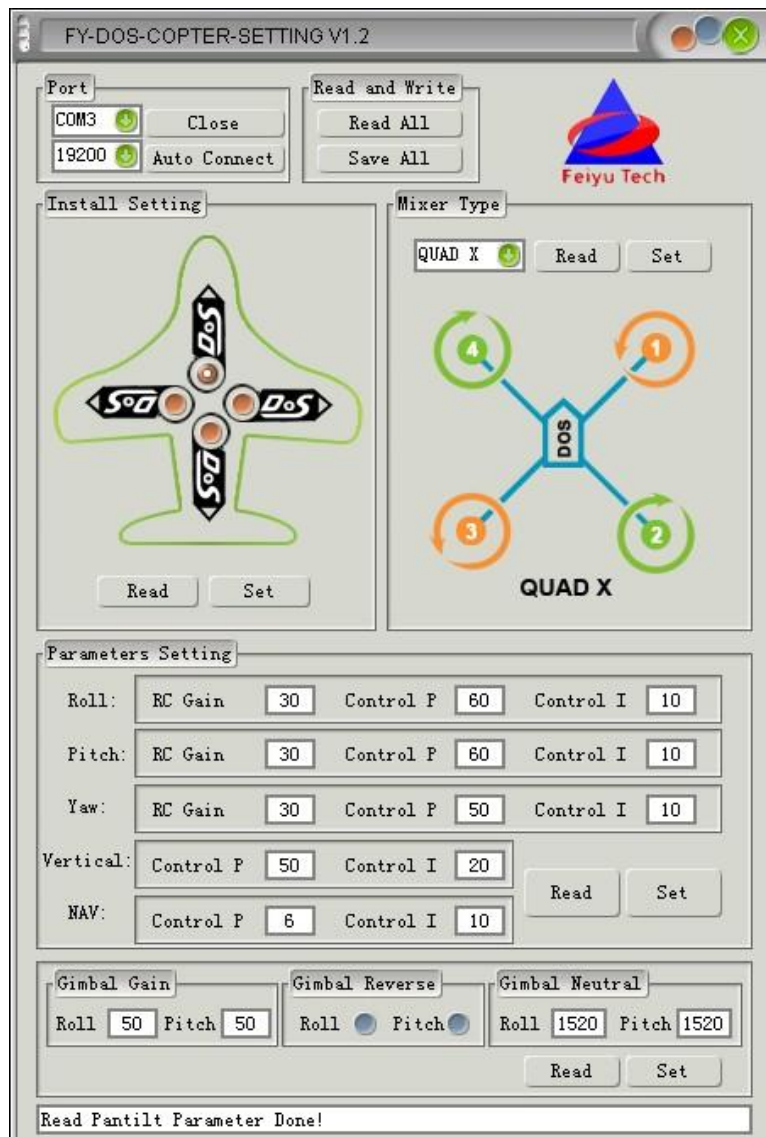
Download the USB-TTL device driver for FY-41AP from our official website: [www.feiyu-tech.com](http://www.feiyu-tech.com)

Please follow the directions according to the picture below. Use a USB data cable to connect FY-41AP to your PC.



Connect FY-41AP to your PC, from “my computer” –“device manager” –“Port” to find COM port, select the corresponding COM port. Baud rate has to be “19200”, click “connect” button. Or just click “Auto Connect” button, it will search automatically, but it takes time. Note: You can set other settings only after this has been done.

Software Interface Description: ([Parameter in the following picture is default parameter](#))



## 13. FY-41AP Setting And Debugging

After FY-41AP system has been installed and connected, you can adjust settings for the FY-41AP, follow the steps below.

### 13.1 Direction Setting

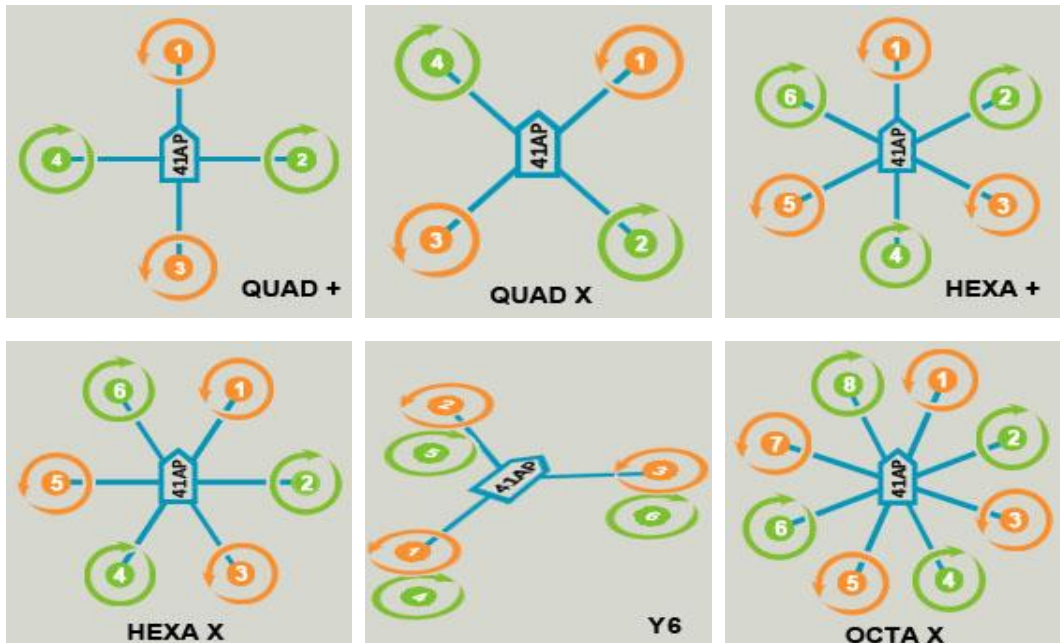
First of all, according to the direction of the FY-41AP install atio.



### 13.2 Motor Mixer

The following pictures display the rotation direction and serial number of each motor, each ESC should be connected to the DoS&41AP S1 - S8 interface. Pay attention that once you've chosen the control type, the corresponding position motor rotation direction has to be completely the same as in the picture. (If the motor rotation direction is not correct then exchange any two of the three connect wires between ESC and motor to change the motor rotation direction.)

**FY-41AP support the following types of multi-rotors:**



### 13.3 RC Setting

FY-41AP requires a minimum of 5-channel RC receiver.



(1) First, the remote control is set to fixed-wing aircraft of conventional layout mode, do not set any mixing. The rudder angle of the remote control is set to 100%, and fine-tunes gyrus.

(2) Need a three-position switch or rotary switch settings for CH5 used to connect SW1. Used to switch the flight mode.

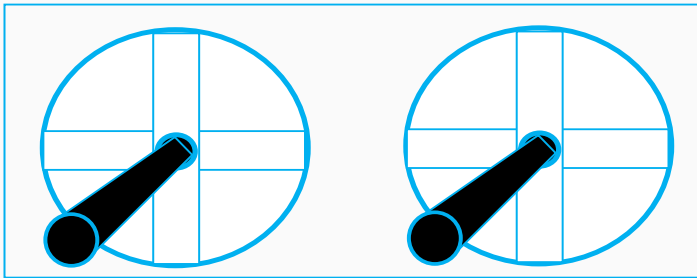
(3) After the connection is complete, call CH5 to check if the settings are in correct control mode, the status of the lights, or OSD display mode to confirm.

## 13.4 Start Motor And Check The Motor Rotation Direction

**Start Motor** : When using multi-rotor firmware, pushing throttle stick before takeoff will not start the motors. You have to execute Combination Stick Commands (CSC) in stabilized mode or Hovering mode (Can not in Auto Return To Launch Mode(RTH) ) in order to start motors. (Please do not install propeller yet.)

### Meet the following conditions:

- Put Throttle stick to the lowest position
- Put Aileron stick to any endpoint position
- Put Elevator stick to any endpoint position
- Put Rudder stick to any endpoint position



Please slowly push the throttle and according to the picture “**Motor Mixer**” shows to check the motor rotation direction is right or not.

### Attention:

- (1) Altitude Stabilized Mode and Hovering Mode both can execute Combination Stick Commands (CSC) to start the motor.
- (2) In Hovering mode, if you want to take off after execute Combination Stick Commands (CSC), also you need push the RC throttle stick to above half position. Altitude Stabilized Mode did not have this limit.
- (3) If you do not have any control action with 6 seconds after execute Combination Stick Commands (CSC), the FY-41AP will into the state before execute Combination Stick Commands. If you want to take off ,you need to execute Combination Stick Commands again.
  - 1) Altitude Stabilized Mode: If the RC throttle stick is not in the lowest position, FY-41AP will not into the state before execute Combination Stick Commands.
  - 2) Hovering mode: When your aircraft landed into the ground , And FY-41AP detected there is no

altitude change, it will closed the engine and into the state before execute Combination Stick Commands.

- (4) Auto Return To Launch Mode(RTH) is all controlled by FY-41AP,RC sticks human intervention is invalid.
- (5) Wind pressure in the volatile situation, due to the throttle closed protection restrictions, hovering mode and Auto Return To Launch Mode(RTH) may appear the situation which can not closed the throttle, then you just need to put the RC throttle stick to the lowest and switch into Altitude Stabilized Mode.

## 13.5 Install Propeller

In order to install the propeller, please follow the motor rotation direction according to the pictures found in the “**Motor Mixer**” section on page 20 of this manual.

## 13.6 Check The Control Direction Of RC Corresponding Channel

After installation is complete, please execute Combination Stick Commands (CSC) in stabilized mode or in Hovering mode (**Can not in Auto Return To Launch Mode(RTH) )** to start motors. Slowly push the throttle but do not take off. Check the control surfaces of the joystick remote control and make sure the aircraft direction is correct.

## 13.7 Attempt To Fly

To use the default control parameters, execute Combination Stick Commands (CSC) in stabilized mode and takeoff. Manually control the aircraft and attempt to hover at the height of about 1 meter. Get a feel for the attitude stability, and then manually change the attitude through your RC, and then loosen the RC sticks and observe the aircraft auto-recovery levels and retention capacity. If improper, then land the aircraft and perform further debugging.

## 13.8 Control Parameters Adjustment

Parameters Setting						
Roll:	RC Gain	<input type="text" value="30"/>	Control P	<input type="text" value="60"/>	Control I	<input type="text" value="10"/>
Pitch:	RC Gain	<input type="text" value="30"/>	Control P	<input type="text" value="60"/>	Control I	<input type="text" value="10"/>
Yaw:	RC Gain	<input type="text" value="30"/>	Control P	<input type="text" value="50"/>	Control I	<input type="text" value="10"/>
Vertical:	Control P	<input type="text" value="50"/>	Control I	<input type="text" value="20"/>		
NAV:	Control P	<input type="text" value="6"/>	Control I	<input type="text" value="10"/>		
					<input type="button" value="Read"/>	<input type="button" value="Set"/>

- **RC Sensitivity**

RC Sensitivity determines the reaction speed of attitude from the command (the bigger the value the quicker the reaction). Increase it for sharper and quicker leveling action after the command stick is released. Unstable shaky flying and a control feeling of stiffness and rigidity will result if the value is too high; and sluggish leveling action and slow braking if it's too small.

- **Control Gain**

Control gain used for stabilizing the flight attitude (correlated to the severity of the Pitch and Roll stick). If you release the Pitch or Roll stick after giving commands, the multi-rotor should be back to hovering state.

**Control P:** If the reaction of multi-rotor in this procedure is too soft (large delay), please increase the basic gain slowly (10%-15% each time) until vibration emerges after you release the stick. Then decrease the gain a little until vibration just disappears. Now the gain should be perfect.

**Control I:** This value generally does not need adjustment.

- **Course control gain adjustment**

The way of tuning the Yaw gain is the same as the way of adjusting the Tail Gyro. If you want fast stick reaction speed, increase the gain, otherwise decrease the gain. However, the spin of multi-rotor is produced by the counter torque force, and the magnitude of which is limited. Therefore, a large gain will not produce tail vibration like a helicopter, but instead have a severe reaction at the start or stop of motors, which will affect the stabilization of the other directions.

- **Vertical control Gain**

Vertical control Gain is used for hovering Mode.

**Control P:** You use two methods to judge if the Vertical gain is good enough: 1) If the multi-rotor can lock the altitude when the throttle stick is at center position; 2) If the change of altitude is small during the flight along a route. You can increase the gain slowly (10% each time) until the vibration emerges along the vertical direction or the reaction of throttle stick is too sensitive, then decrease 20% of the gain. Now it is a suitable Vertical gain.

**Control I:** This value generally does not need adjustment.

- **Navigation control Gain**

Navigation control Gain controls the parameters use for control hovering point.

**Control P:** please increase the basic gain slowly (2-3 each time) until the vibration emerges in the hovering point. Then decrease the gain a little until vibration just disappears. Now the gain is perfect.

**Control I:** This value generally does not need adjustment.

## 13.9 GPS Hovering Mode Test

First you should wait until the GPS positioning LED shows that the GPS positioning is in good condition (**Green light double flash each loop or triple flash each loop**). As a result, you can get a good hover effect.

First take off in Attitude Stabilized Mode. During the flight, please control your aircraft's heading to spin three circles. The magnetic field will automatically calibrate during this procedure.

Rise to a height of about 5 meters, it basically remains in the hover throttle, and then switch CH5 to hovering mode, **put the RC throttle stick into the middle position**, then release other RC sticks. Observe the altitude maintain situation and GPS hover effects; if improper, you should adjust the control parameters.

**Note:** The current firmware version does not support the take-off and landing in hovering mode. To prevent the altitude sudden change caused by the throttle, you have to put throttle stick back to balance flight position, when switch off hovering mode.

## 13.10 Auto Return To Launch Mode(RTH) Test

First you should wait until the GPS positioning LED shows that the GPS positioning is in a good condition (**Green light double flash each loop or triple flash each loop**) so you can get a good hover effects. **The GPS will record the first positioning success point as "Home Point"**.

Assuming the GPS hovering mode test is complete, we can now test the auto return to launch function. Please control the aircraft to fly away for a certain distance in hovering mode. Then switch CH5 to RTH mode.

If the aircraft return point less than 20 meters will automatically rise to 20 meters high and then return and auto landing.

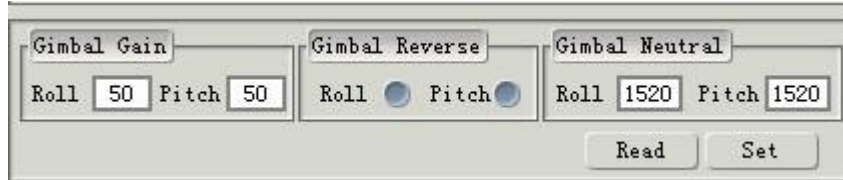
If the aircraft return point above 20 meters after return to home will auto landing.

## 13.11 The Altitude Control Of Hovering Mode

FY-41AP can automatically control flight altitude on hovering .Climbing and descending rate is directly related to the throttle, **when the throttle stick is in the center position, 41AP automatic locks the altitude**. Maximum means climb rate is 3 m/s, minimum means decline rate is 1.5 m/s. The throttle stick can linearly control the aircraft climb and decline rate.

## 13.12 Camera Gimbal Stabilization Adjust Instructions

**Attention:** Please do not adjust the Camera Gimbal Stabilization until you have finished the multi-rotor aircraft adjust.



Please according to following steps to adjust Camera Gimbal Stabilization :

### (1) Gimbal Reverse

- 1) Shaking the Camera Gimbal on roll direction , if 41AP doesn't give the corresponding reverse correction, please choose Roll reverse.
- 2) Shaking the Camera Gimbal on pitch direction , if 41AP doesn't give the corresponding reverse correction, please choose pitch reverse.

### (2) Gimbal Gain

The default Gimbal Gain:Roll 50,Pitch 50.

Under the condition of servo no rotation, you should control the camera gimbal with the RC stick. If the servo is shaking when the stick in the neutral position, that's indicates the sensitivity is too much. As a result, you should slowly decrease (10% -20% each time) corresponding direction Gimbal Gain, until the shaking situation disappears. If the camera gimbal goes back to Neutral, it is too soft. As a result, you should slowly increase (10% -20% each time) corresponding direction Gimbal Gain

### (3) Gimbal Neutral

The default Gimbal Neutral is 1520.

Power on and put the camera gimbal into level position, observe the servos position. If the servos is not in the Neutral value, please thoroughly adjust the corresponding servos Gimbal Neutral to put them into Neutral value position.

**Adjusting method:** According to corresponding servo reaction, appropriate increase or decrease corresponding servo Gimbal Neutral.

## 13.13 FAIL-SAFE Setting

In order to realize auto return to home when your aircraft out of control, requires your RC and RC receiver both have "Fail Safe" function.

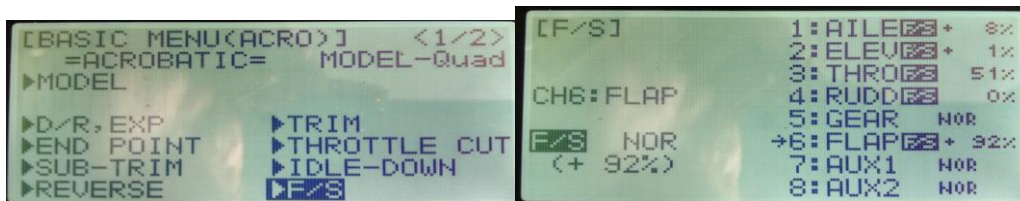


When the Failsafe remote control receiver doesn't receive a signal, it outputs a default setting for the rudder. Most remote control models have a controlled set runway protection system. Please refer to your remote control's manual to see if your remote has this function.

Auto return to home when your aircraft out of control require you connect the SW1 to RC receiver CH5 corresponding channel and adjust your RC to make RC receiver CH5 channel output a out of control signal to make SW1 into RTH mode. And adjust your RC to make RC receiver throttle channel output a out of control signal to make throttle into hovering position.

If in debugging balanced mode, the following example is that of a Futaba remote control T10CHG setting runaway protection. Go to the settings menu, then turn off the power to the aircraft to avoid setting the motor to start without control.

First enter the remote control setup menu to find the set of "F / S"; into the F / S menu, put the lever into the neutral position, carefully adjust the settings rudder to maintain the status adjusted, put the throttle lever to the cruise throttle position, and then put the CH5 cut to return mode . Then in all open channel F / S set the program, as successfully shown below (usually set by using the "PUSH" button)



After setting the aircraft is powered off, check if it has successfully entered the return mode. Pay attention to safety, to prevent the Failsafe motor rotation, met items cause damage.

After each setting, do not forget the "Save parameters"

## 14. Flight Essentials

To achieve satisfactory results, you need to pay attention to the following aspects

1. Good shock mounting is very important, which not only can make a more smooth flight, but also conducive to the inertial device for measurement of displacement.
2. Try to minimize the interference of the surrounding environment of the internal magnetic field sensor when you install the FY-41AP.
3. Adjust altitude balance parameters, try to use the larger parameters if the control parameters do not cause shock. The altitude control has a certain hardness and stability.
4. Before take-off, switch to the Altitude Stabilized Mode, check whether the gyro need initialization.

5. The GPS module should support installation away from interference. You should wait for the green light double flash each loop or triple flash each loop before take-off.

6. After take-off, control the aircraft rotation to make three circles, all while making sure the magnetometer is satisfactorily corrected.

### Other Considerations

(1) Please as far as possible to maintain the current altitude when switching Attitude Stabilized Mode to Hovering Mode. In Hovering Mode, DoS&41AP can automatically control flight altitude. Climbing and descending rate is directly related to the throttle, when the throttle stick is in the center position, DoS&41AP automatic locks the altitude, in maximum means climb rate is 3 m/s, in minimum means decline rate is 1.5 m/s. The throttle stick can linearly control the aircraft climb and decline rate.

#### There are two very important points:

1) To prevent sudden change to the altitude caused by the throttle, you have to put throttle stick back to balance flight position when switching off hovering mode.

2) After connecting the GPS module, please do not take off yet. You should wait until the GPS positioning LED shows the GPS positioning is in a good condition (Green light double flash each loop or triple flash each loop).

(2)

1) Please control your aircraft fly 0.8 meters above to the ground, which will give you a good control effect. And if you control your aircraft descend to the ground in hovering mode may cause the aircraft altitude volatility which caused by the ground air.

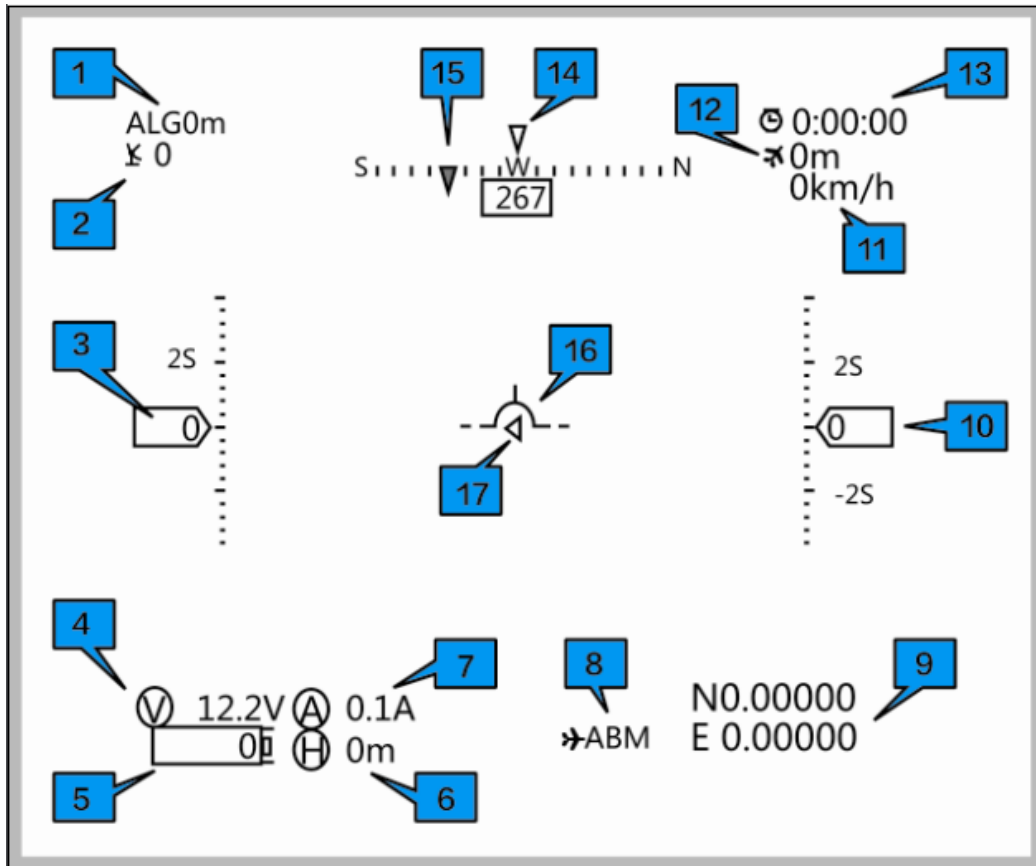
2) Without the GPS module, switching to Hovering Mode or Auto Return to Launch Mode will automatic bring you into Fixed Altitude Flight Mode.

(3) In hover mode, you can change the aircraft position by using the RC sticks. When you release the RC sticks, the aircraft will hover to a new position.

## 15. OSD Interface Instruction

The integrated OSD module supports PAL or NTSC form video input.

OSD display interface ( apply to the firmware for OSD v1.20 or above version ) :



No.	Instruction	No.	Instruction
1	GPS altitude(Unit: m)	10	Relative altitude (Unit: m)
2	The quantity of satellite used for positioning	11	GPS speed (Unit: km/h)
3	Airspeed/GPS speed (Unit: km/h)	12	Flight total mileage (Unit: km)
4	The battery voltage (Unit: V)	13	Total flight time (Format:h:m:s)
5	Battery power consumed (Unit: mA/h)	14	Current course of flight (Unit: deg)
6	Distance to Home Point (Unit: m)	15	The angle of turning to the Home Point (Unit: deg)
7	Power battery current (Unit: A)	16	Attitude table
8	Flight mode	17	Relative position of Home Point (Icon in the middle position when the aircraft is around Home Point.)
9	Current latitude & longitude of the plane (Format: dddmm.mmm)		

### Flight mode instruction

Name	Introduction
3D	Attitude Stabilized Mode
NAV	Hovering Mode
RTL	Auto Return To Launch Mode(RTH)

## 15.1 Via Remote Control And OSD Overlay Menu Set

### FY-41AP

**Attention:** Please be cautious when you into the OSD overlay menu to adjust the FY-41AP parameters. We strongly suggest you do not install propeller to do the

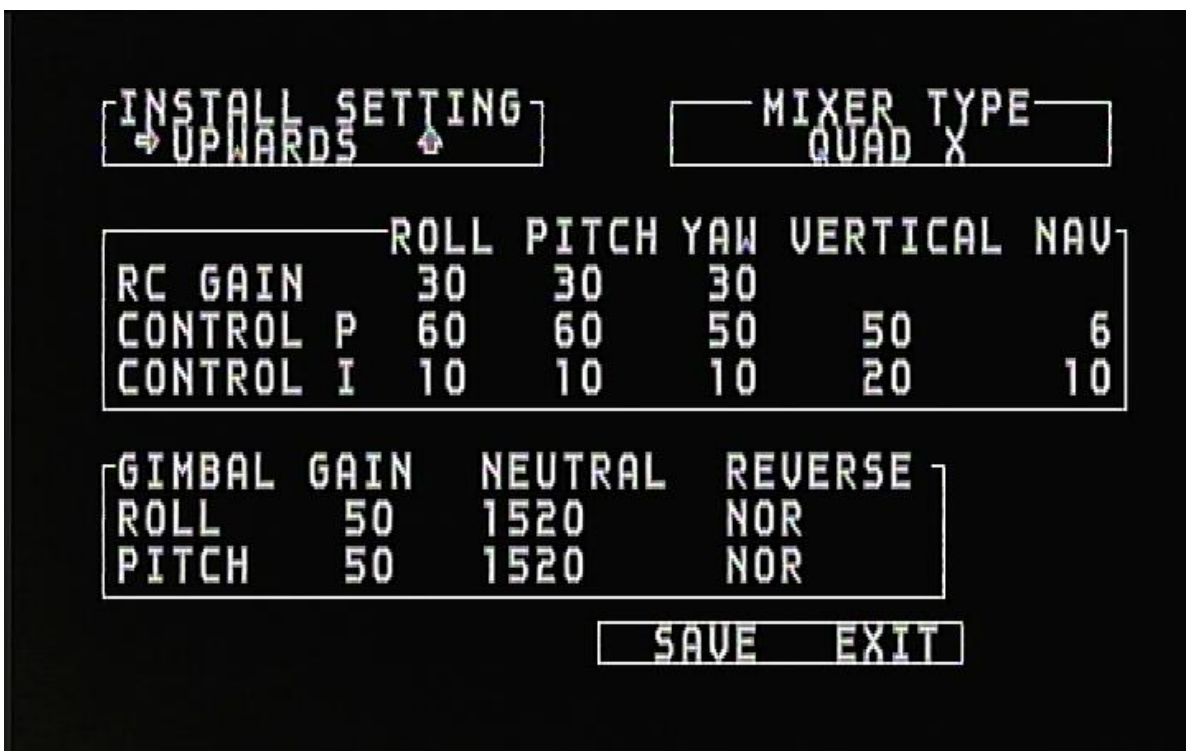
- 1) You can not execute Combination Stick Commands (CSC) to start the motor when you in the OSD overlay menu. If you want to start the motor please exit the OSD setting menu.
- 2) You can not enter the OSD setting menu after you execute Combination Stick Commands (CSC) to start the motor. If you want to enter the OSD setting menu please wait the FY-41AP into the state before execute Combination Stick Commands (CSC).

(1) Activate the OSD setup menu: switch " Hovering Mode " to the " Auto Return To Launch Mode(RTH)" 6 times in SW1, between two switching it has to be less than 3 seconds, the process is as follows: Hovering Mod→Auto Return To Launch Mode(RTH) →Hovering Mod →Auto Return To Launch Mode(RTH) →Hovering Mod →Auto Return To Launch Mode(RTH) →Hovering Mod →Auto Return To Launch Mode(RTH) →Hovering Mod →Auto Return To Launch Mode(RTH) →Hovering Mod →Auto Return To Launch Mode(RTH) →Hovering Mod →Auto Return To Launch Mode(RTH) →Hovering Mod →Auto Return To Launch Mode(RTH). This will activate OSD setup menu interface.

(2) Move Elevator stick to the project you want to set.

(3) Move aileron stick to the project you want to set.

(4) Please put elevator stick to SAVE, after your setting. Through the stick of ailerons carried out to save the action, when saving, "SAVE" will flicker for two seconds, the end of the flashing, been saved successful.



— END —

Note: We reserve the right to change this manual at any time! And the newest edition will be shown on our website [www.feiyu-tech.com](http://www.feiyu-tech.com).