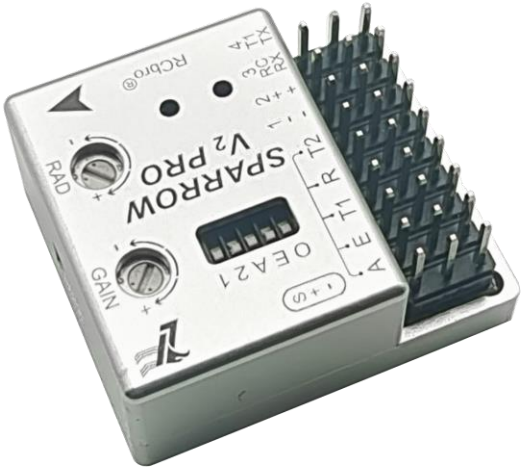
SPARROW V2 Pro

Manual v1.4



Disclaimers and Warnings

Please use this product within the scope permitted by local laws and regulations. LE FEI does not assume any legal liability resulting from any illegal use of this product.

This product is a remote-control aircraft model. Please strictly abide by the safety operating regulations of model aircraft products. LE FEI does not assume any performance, safety or legal liability caused by improper operation and use control.

Aircraft models are not toys. Please fly under the guidance of professional personnel and install and use them according to this product manual. LE FEI is not responsible for aircraft model accidents caused by improper installation, configuration, or operation by users.

Once you use this product, you are deemed to have understood, recognized and accepted the above terms and content. Please be responsible for your own behavior, safety and all consequences when using it.

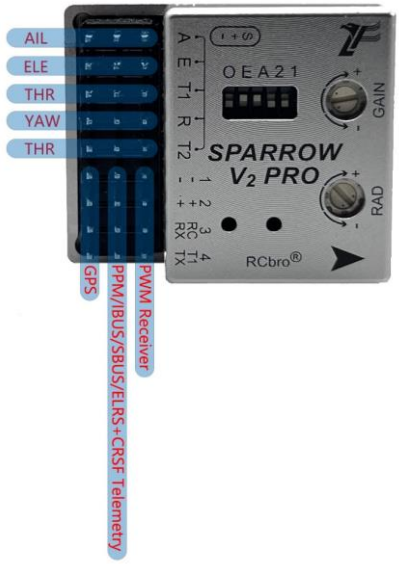
Content

Parameter

FC	Size	30*25*12.5mm
	Weight	13g
	Voltage	5V
GPS	Size	18*18*6mm
	Weight	5g
	Voltage	5V
Receiver	Type	PWM、PPM、SBUS、IBUS、ELRS(CRSF)
Others	Accessories	FC,GPS,Screwdriver,Wire
	HD VTX	DJI V2/DJI O3/AVATAR
	Custom OSD	Supported
	Telemetry	CRSF

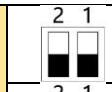
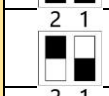
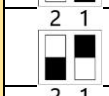
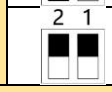
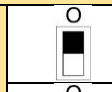
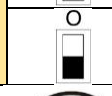
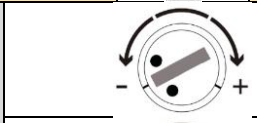
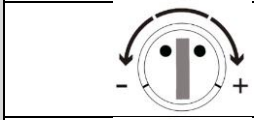
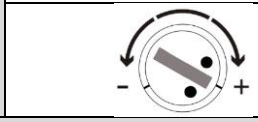
Setup & Wiring

- **PORT**



➢ Settings & Display

***The *white* area of the DIP switch in the picture indicates the actual position of the DIP switch.**

DIP switch	1	Aircraft model settings and OSD position adjustment		T-Tail
				V-Tail
	2			Delta Wing
				OSD position adjustment
	A	AIL feedback direction		
	E	ELE feedback direction		
	O	HD VTX selection		DJI V2
				DJI O3/AVATAR
Knob	RAD	FlightMode selection and radius adjustment		MANUAL
				FENCE(Radius 100~400m)
				ALTCTL
	GAIN	Gain setting		
LED	RED	GPS Status	Constant on	GPS fixed
			Blink	GPS not fixed
			Constant off	GPS not connected
	GREEN	FlightMode	Blink rapidly	RTH/FENCE/ALTHOLD
			Blink slowly	MANUAL/ALTCTL
			Constant on	STAB
	Special status indication		Red off,green blinks 3 times	No RC
			Green off,red blinks 3 times	Cali-ESC
			Red and green blink 3 times	Sensor Failure
VTX		-	GND	
		+	No output,only used to measure supply voltage	
		TX	Data output, connected to Air Uint-RX	

➢ Wiring

Servo (Output)	A	AIL
	E	ELE
	T1	THR
	R	RUD
	T2	THR
Receiver (Input)	CH1-4	Connect to AIL/ELE/THR/RUD of PWM receiver
	RC	PPM/SBUS/IBUS/ELRS/PWM receiver mode channel
	T1	CRSF telemetry, connect to the RX of the ELRS receiver
GPS	Just connect according to the corresponding wiring sequence	

***It is recommended to remove the propeller during installation and debugging, pay attention to safety!**

➢ RC & Receiver

◐ PPM SBUS IBUS ELRS/CRSF

Just connect the receiver signal(usually TX pin) to the RC pin on FC, and the FC will automatically recognize it;the default receiver channel sequence is A-E-T-R;The flightmode channel of PPM/SBUS/IBUS is CH5, and the flightmode channel of ELRS/CRSF is CH6.

◐ PWM

The CH1-4 port on FC is only for PWM input and the corresponding receiver channel sequence is A-E-T-R, when using PWM, select a 3-pos switch as the flightmode channel and connect it to the RC port on FC.

◐ Calibrate the RC

Before using the RC to unlock the FC, put the DIP switches 1 and 2 in the aircraft model setting state.Throttle at the lowest position, the other joystick on neutral position and reset the channel trim to zero, then quickly dial the flightmode switch several times until servos swing up and down to indicate that the calibration is complete.

◐ CRSF Telemetry

When the signal type is ELRS/CRSF, CRSF telemetry is automatically turned on, and the user only needs to connect the RX of the receiver to the T1 near RC pin of the FC; the telemetry information includes flightmode, latitude and longitude, attitude angle, speed, altitude, heading, number of satellites and other information.

◐ RSSI

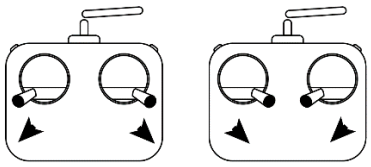
The FC uses the 12th channel of RC as the RSSI channel. Therefore, if you want to display the RSSI correctly when using O3 or other equipment, you need to set the 12th channel of the RC as the RSSI channel. When using ELRS,which will display LQI (Link Quality Indication).

◐ **Unlock the FC**

The throttle is at the lowest position before the FC is powered on. After the FC recognizes the receiver, push the throttle to the highest position and then pull it to the lowest position to complete the unlocking.

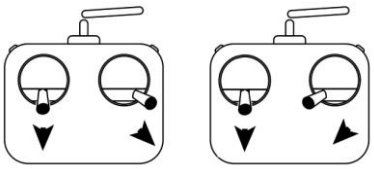
◐ **Calibrate level**

Before unlocking the FC, place the FC horizontally and still,choose a way to dial the sticks as shown in the picture, until two LEDs blink at the same time.After the calibration is completed, LEDs return to normal.



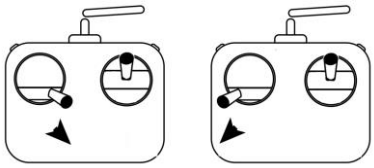
◐ **OSD position reset**

Before unlocking the FC, choose a way as shown in the picture to dial the sticks for a few seconds, and then observe the change in the OSD position.



◐ **OSD position reset**

The T2 channel function can be set to THR or RC6 (RC7 for ELRS/CRSF). Before unlocking the FC, choose a way as shown in the picture to dial the sticks for a few seconds(the throttle is at the lowest position, and the aileron and elevator return to the center). Servos swing up and down to indicate that the output function has been changed. The default function is THR(**early versions of the FC do not have this function. If the servos do not respond, it is an early version**).



◐ **Flight mode**

The flight mode channel defaults to using a 3-pos switch.

		
Pos 1	Pos 2	Pos 3
STAB	MANUAL/FENCE/ALTCTL	RTH
The flight mode represented by Pos 1 and 3 of different RC may be opposite. You can judge whether it is STAB or RTH according to the green LED.	Pos2 indicates which mode is determined by the position of the RAD knob, and then the green LED is used to assist in judging whether the mode setting is correct.	The flight mode represented by Pos 1 and 3 of different RC may be opposite. You can judge whether it is RTH or STAB according to the green LED.

➢ InstallDirection

Front	Face up, the arrow points to the head of the aircraft.
Back	Face down, the arrow points to the head of the aircraft.

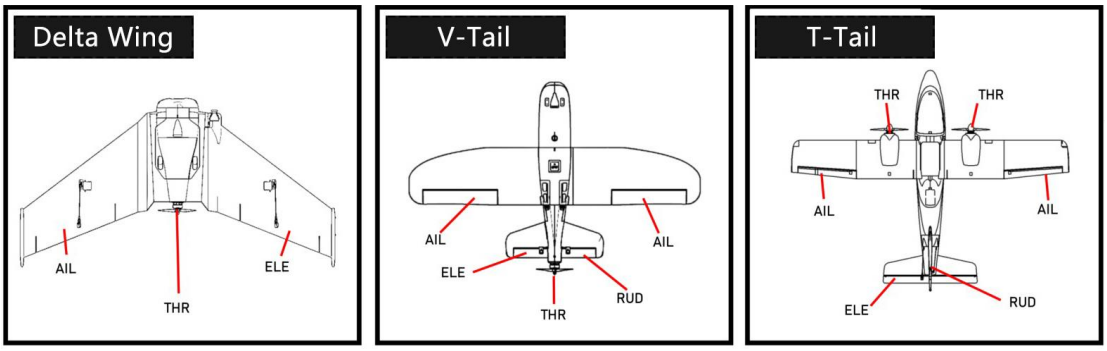
*** Automatically recognize the installation direction when calibrating level.**

***You need to recalibrate level after changing the installation.**

➢ Servos Connection

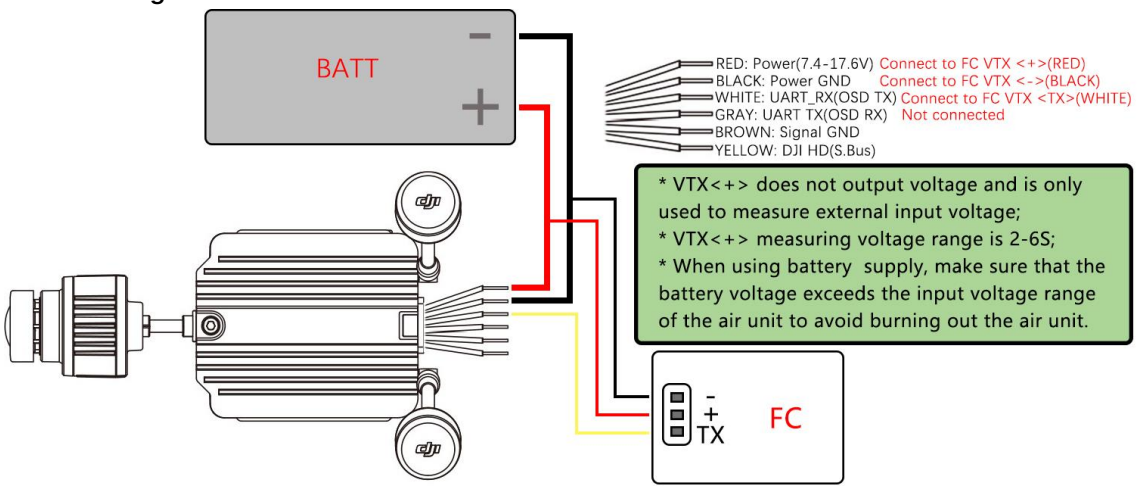
	T-Tail	V-Tail	Delta Wing
A	AIL1/AIL2	AIL1/AIL2	AIL1
E	ELE	RUD1	AIL2
T1/T2	ESC	ESC	ESC
R	RUD	RUD2	NO CONNECTION

***The FC supports the throttle differential function by default.**



➢ **Using DJI V2**

◐ **Wiring**



◐ **OSD**

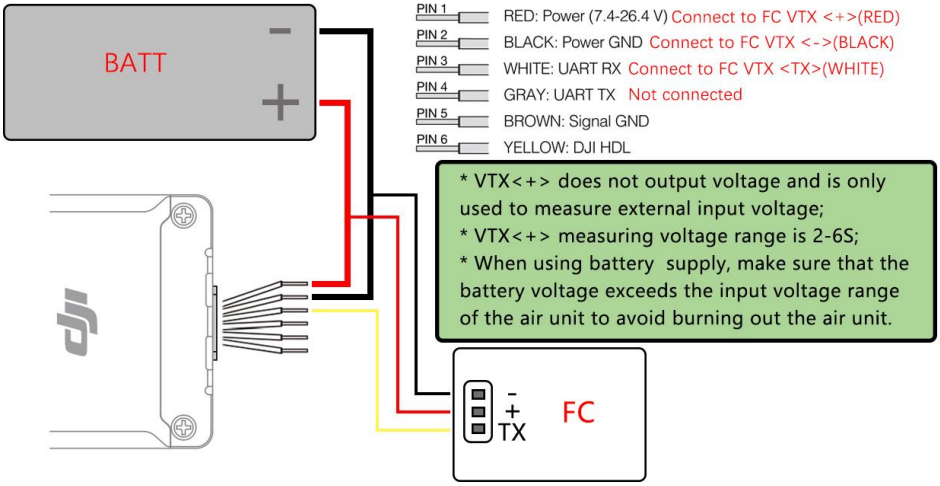
Goggles Settings:<Settings>-<Display>-<Custom OSD>-<on>

◐ OSD position adjustment

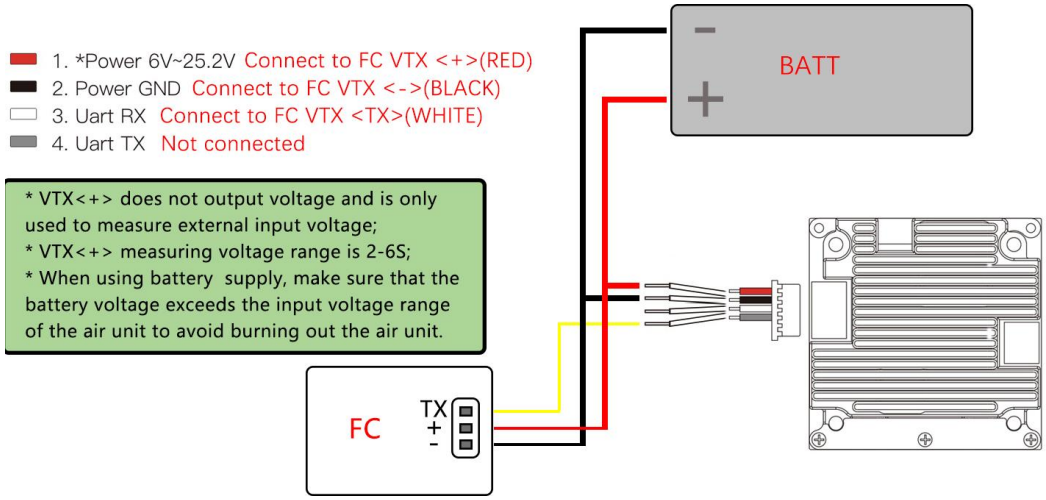
Quickly dial the flightmode channel to enter. The OSD flashes slowly to indicate that the OSD whose position needs to be adjusted can be selected through the pitch stick. Quickly dial the mode channel again, the OSD flashes quickly to indicate that the OSD position can be adjusted through the roll and pitch sticks. After the adjustment is completed, dial the mode channel quickly and the OSD will resume slow flashing, and you can adjust the next OSD again. After all adjustments are completed, press the roll stick left to exit.

➢ Using DJI O3/AVATAR

◐ O3 Wiring

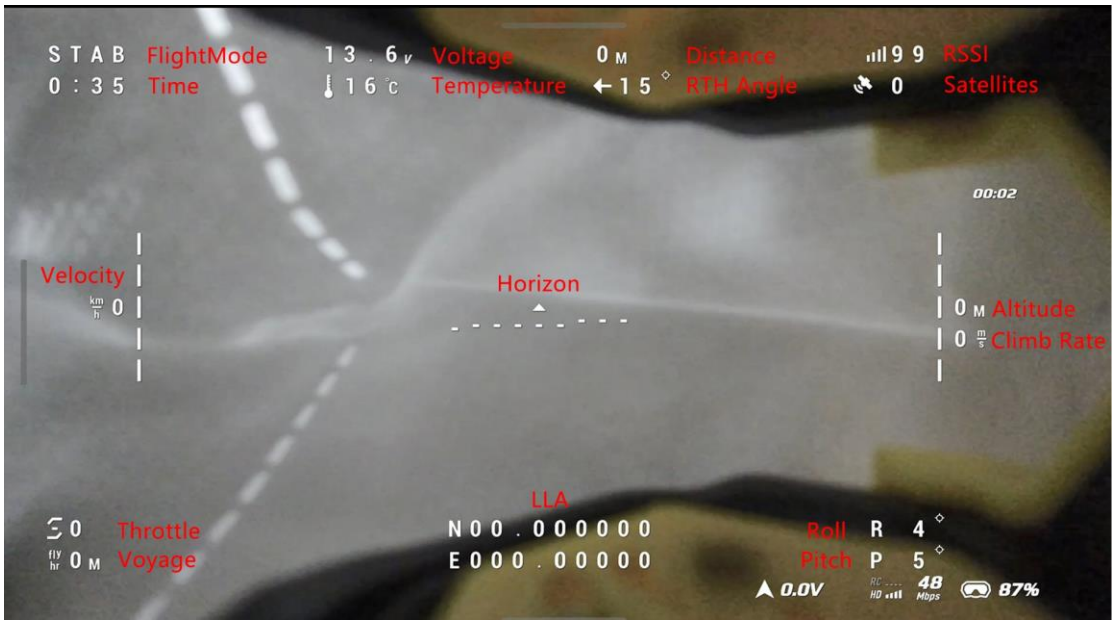


◐AVATAR Wiring



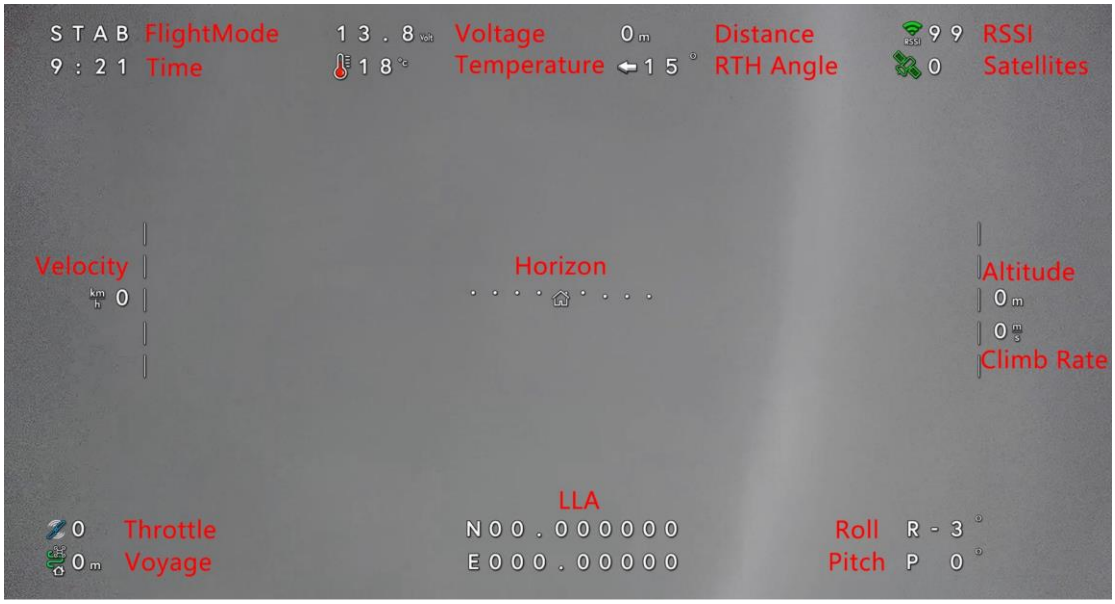
◐ O3 OSD

Goggles Settings:<Settings>-<Display>-<Canvas Mode>-<Wide>



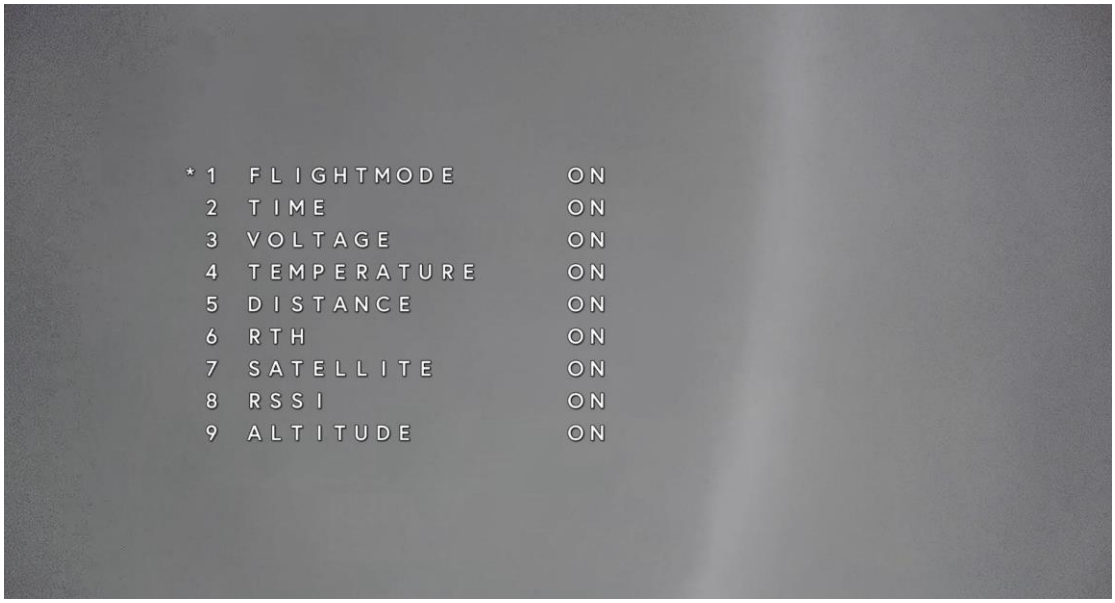
◐ AVATAR OSD

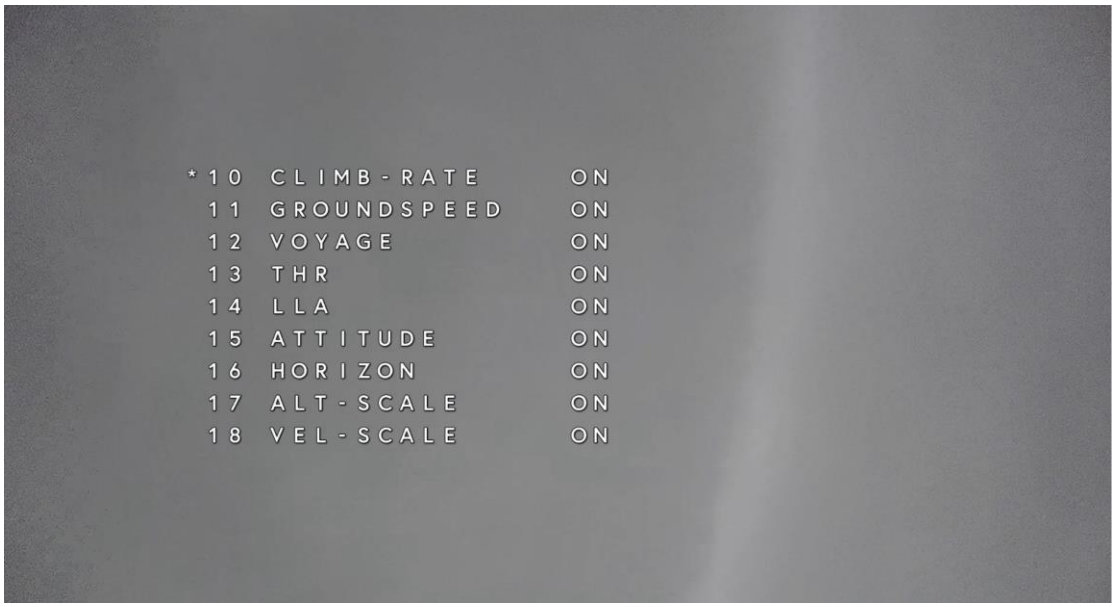
Goggles Settings:<Settings>-<Display>-<OSD>-<Auto>



***In order to use the official tool to superimpose the OSD after the video is exported,RSSI and Satellites displayed in the goggles are white. If you need to display them in color, you can follow the instructions in the *<Appendix>*.**

◐ OSD Menu(AVATAR)





◐ **OSD position adjustment**

Quickly dial the flightmode channel to enter the menu. When the OSD item is set to <ON>, quickly dial the mode channel to enter the OSD position adjustment page, and adjust the OSD position through the roll and pitch sticks. After the adjustment is completed, quickly dial the mode channel can exit.

Gain

GAIN

The knob adjusts the gain of ROLL and PITCH at the same time. On the premise of ensuring that the aircraft does not shake during flight, the gain can be increased appropriately to improve the sensitivity and stability.

Flight Mode

➢ How

MANUAL	The airplane is direct controled by RC.
STAB	Control the angle of airplane,and auto level when no RC input.
ALTHOLD	Hold altitude when no ELE input, Minimum 25m.
FENCE	Auto Retun Home when out of fence radius.
RTH	Auto Retun Home.
ALTCTL	Lock the flight direction and maintain the altitude.

*** FENCE/RTH/ALTCTL can only be used when the GPS is fixed, otherwise it will become ALTHOLD.**

➢ Assisted Takeoff

ALTHOLD/FENCE/ALTCTL: Push the throttle to enough power, after takeoff(throw it away), the aircraft will climb to 20m automatically.

RTH Mode: Push the throttle to enough power, shake the aircraft or run, then the motor starts slowly, and then take off after the power is enough(throw it away), the aircraft automatically climbs and circles over HOME.

➢ Throttle control

MAN/STAB/ ALTHOLD: Throttle is direct controlled by RC.

FENCE: Before triggering RTH, the throttle is controlled by RC, after triggering, it is determined by RTH.

RTH: Throttle is controlled by RC during assisted takeoff, after entering the circling state, the throttle is controlled by the FC, it automatically adjusts the throttle according to the cruise speed you set, you can manually push the throttle up (beyond the throttle calculated by the FC) to increase cruise speed, but you can't pull it down.

ALTCTL: Throttle is controlled by RC during assisted takeoff.After the automatic climb to 20m, the throttle is automatically controlled according to the cruise speed. When the throttle stick is at the neutral postion, the flight is maintained at the cruise speed. Push the throttle up to increase the cruise speed, and pull down the throttle to decrease the cruise speed; When the roll or pitch stick is in motion, the throttle is manually controlled.

➢ Throttle output

Before executing *<Unlock the FC>*, there is no throttle output! After unlocking, throttle output is determined by GPS status and flightmode.

NO GPS： After the FC is initialized and unlocked, the motor can be started in all flightmodes!

With GPS： After the FC is initialized and unlocked, if the GPS is not fixed, only MANUAL can start the motor. After fixed, the motor can be started manually except in RTH!

Setup & Preflight inspection

- **Install the FC**

  Refer to *<InstallDirection>*.

- **FC power supply**

  Both FC and GPS require users to provide 5V; FC<VTX>port does not output voltage, it is only used to measure voltage, and the air uint needs to be powered separately. Refer to *<PORT>*and *<Use HD VTX>*in the following text.

- **Equipment wiring**

  Refer to *<Wiring>.*

- **Set aircraft model**

  Refer to *<Settings & Display>*-*<Aircraft model settings and OSD position adjustment>*.

- **Calibrate the RC**

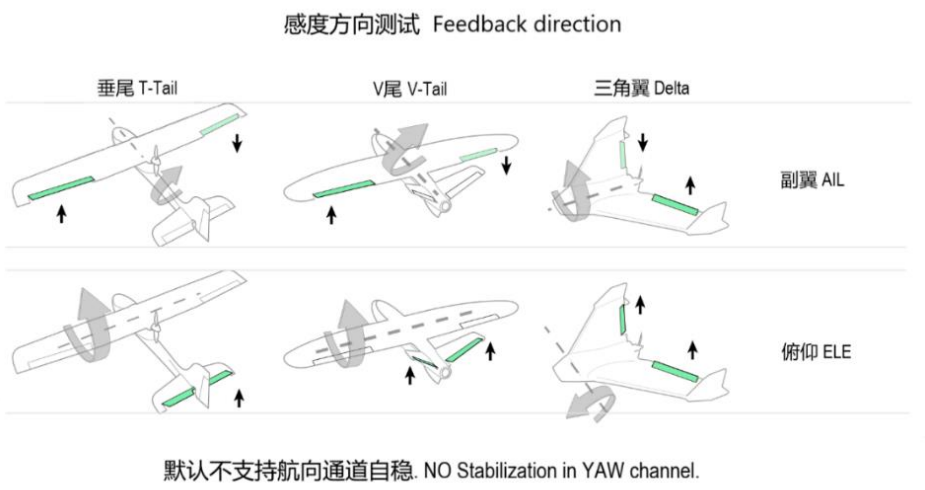
  Refer to *<Calibrate RC>*. If you use this FC for the first time or after replacing the RC, you must perform *<Calibrate RC>*.

- **Calibrate level**

  Refer to *<Calibrate level>.*

- **Feedback direction**

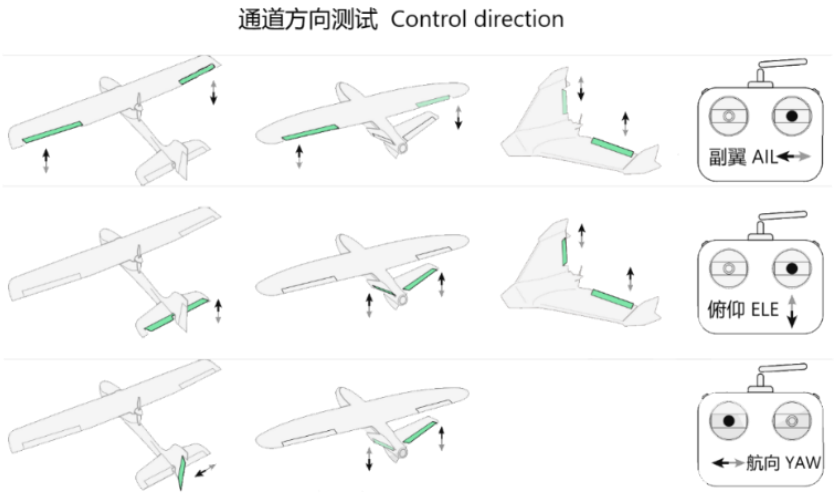
  Step 1: Check the feedback direction,if incorrect, go to the next step.



  Step 2: Turn the DIP switch that controls the feedback direction to the other side.

  Step 3: Check the feedback direction again.

- **RC control direction**



***If the control direction is not correct, you can set the channel output reverse in the RC.**

***After setting the feedback direction, the control direction can only be modified in the RC.**

- **Set gain**

Refer to *<Gain>.*

- **FailSafe**

When the RC that outputs PWM/PPM/IBUS/ELRS is failsafe, there are usually three states that can be set.They are: **cut** (no output), **pos hold** (hold the output at the last moment before failsafe), **custom** (the user sets the output when failsafe), of course, different RC will be different.

Cut mode: the FC can automatic recognition as failsafe,and switch to RTH;

Pos hold: this mode is not recommended.

Custom mode: the user sets the output data of each channel when the RC is failsafe, to ensure that the output of the flightmode channel(CH5/CH6) can make the FC switch to RTH when the RC is failsafe.

PPM/IBUS/CRSF: it is recommended to use cut mode or custom mode.

SBUS: the FC can automatic recognition as failsafe,and switch to RTH.

*** If the SBUS of your RC is not a standard protocol, it may cause the failure to recognize failsafe.**

*** GPS must be connected, otherwise the RTH cannot be used; after setting failsafe, you can turn off the RC for testing on the ground.**

- **Use HD VTX**

According to the type of your VTX,*<Settings & Display>*-*<HD VTX selection>*, then refer to *<Using DJI V2>* and *<Using DJI O3/AVATAR>.* If you need to adjust the OSD position,refer to *<Settings & Display>*-*<Aircraft model settings and OSD position adjustment>*, adjust the DIP switch to the appropriate position, after adjusting the OSD position, set the DIP switch correctly according to your model.

- **Unlock the FC**

Refer to *<Unlock the FC>.*

➢ **Throttle differential for dual motors**

Refer to *<Servos Connection>*. After completing *<Unlock the FC>*, it is recommended to push the throttle to more than 50%, dial the yaw joystick, and determine whether the throttle differential direction is correct. If not, just swap the positions of the two ESC wires.

➢ **Calibrate ESC**

Step1: Switch to **MANUAL** mode, push throttle to the highest position;
Step2: Power on;
Step3: Follow the ESC user manual, wait for the correct ESC beep, and then pull the throttle to the lowest position;
Step4: If there are two motors, the two ESCs need to be calibrated separately.

FAQ

Q. Important question! ! !
A. Failsafe is very important and must be set!

Q. How to operate after reconnecting from Failsafe?
A. When FC recognizes Failsafe and the GPS connection is normal, it automatically switches RTH; When the RC is reconnected, FC will be controlled again by the RC, and the user can take over in a timely manner!

Q. Why is there no power supply to the air uint after wiring, and the voltage cannot be displayed when using HD VTX or ELRS/CRSF telemetry?
A. The FC VTX port does not output voltage to the outside, but is only used to measure voltage; connect the <+> of the FC VTX port to the positive pole of the power supply device to display the voltage on screen; the maximum measurable voltage is 6S!

Q. The rudder surface response is too small in STAB or other modes.
A. If the aircraft does not shake during flight, you can increase the gain appropriately.

Q. Is it normal for the rudder surface to react when pushing throttle during testing?
A. This is a normal integration phenomenon, it does not affect the flight.

Q. Can I set the aircraft model on the RC?
A. The aircraft model must be set through FC and the aircraft model setting option in the RC is set to T-Tail.

Q. The RC cannot control servos in RTH.
A. This is a normal phenomenon. In RTH, the servo is automatically controlled by the FC!

Q. Is there any throttle output in RTH during flight?
A. It is recommended to fly normally for more than 6 seconds before switching to RTH. At this time, the throttle is automatically controlled by the FC. If you switch to RTH just after takeoff in other modes, it is recommended to manually push the throttle to a point with sufficient power.

Q. Throttle problem in RTH.
A. If assisted takeoff is not performed, there will be no response when pushing the throttle;

during assisted takeoff, after the aircraft is shaken or the run-up conditions are met, the throttle begins to slowly increase to the pos of the throttle stick (therefore, the throttle needs to be pushed to sufficient power at the beginning), after starting to hover, the throttle will be automatically controlled based on the cruising speed. At this time, the user can push the throttle up, but cannot pull it down. That is, the FC calculates the throttle value that meets the current cruising speed, and then compares it with the current actual throttle stick. The actual output value is the larger of the two.

Q.RTH or FENCE or ALTCTL mode becomes ALTHOLD.
A.RTH/FENCE/ALTHOLD can only be used when the GPS is fixed, otherwise it will become the ALTHOLD.

Q.RSSI is incorrect.
A. Refer to ***<RSSI>***.

Q. Why can't the SBUS automatically recognize the failsafe?
A. Because some receivers are not standard SBUS, the FC may not be able to automatically identify the failsafe. In this case, the user needs to manually set failsafe. Please refer to ***<FailSafe>***.

Q. ALTCTL cannot maintain the direction.
A. Check whether the ROLL and PITCH sticks are centered.

Q. The throttle suddenly changes when operating the sticks in the ALTCTL.
A. When the roll or pitch stick is in motion, the throttle is manually controlled; after the stick is returned to the center, the throttle output is automatically controlled by the FC according to the cruising speed. Therefore, if there is a large difference between the manual throttle and the actual throttle calculated by the FC when the stick is in motion, it will cause a sudden change in the throttle.

Q. Problems with feedback direction and RC control direction.
A. You must adjust the feedback direction firstly. After the feedback direction is correct, set the RC control direction. If the feedback direction is incorrect, you can change it through the DIP switch. If the RC control direction is incorrect, you need to set the channel direction in your RC. After the feedback direction is set correctly, the DIP switch position cannot be modified due to incorrect RC control direction.

Q. The aircraft control surface is not level even after calibration.
A. Switch to MANUAL and observe whether the aircraft control surface is level at this time. If not, manually adjust the aircraft control surface to level, and then ***<Calibrate level>***. If the aircraft control surface is normal in MANUAL, switch to STAB or other modes, even after calibrating the level, the aircraft control surface is not level,you can try to ***<Calibrate the RC>***.

Q.The GPS has not been fixed for a long time.
A. When installing GPS, try to stay away from cameras,VTX, etc.

Q. 5th channel of the RC cannot switch flightmode.
A. The flightmode channel of the ELRS receiver is 6th channel.

Q. How to determine the HOME position in RTH?

A. The position when the red LED of the FC turns constant on is the HOME, and the aircraft will circle around this point when RTH.

Q. There is no response when calibrating level, and the LEDs do not blinks at the same time.

A. Do not limit the RC channel output range.

Q. Even if the RC is calibrated, still need to push the throttle stick a lot higher to start the motor.

A. Refer to *<Calibrate ESC>*.

Q. Can the ALTHOLD not be lower than 20m?

A. When the throttle is not at the lowest position, the minimum altitude in ALTHOLD is 20m. If the throttle is at the lowest position, the ALTHOLD is invalid and the altitude is no longer maintained. At this time, the aircraft can be controlled to descend.

Q.Why is the horizon opposite to the actual angle?

A. The horizon is not the attitude line. Due to the different reference systems, the direction is opposite.

Appendix

Official Website: http://www.lefeirc.com/

E-mail: lefeirc@163.com

18852991827@163.com

Walksnail OSD Tool: https://github.com/avsaase/walksnail-osd-tool

The font library required for video rendering OSD and the color icon font library can be downloaded from the official website.