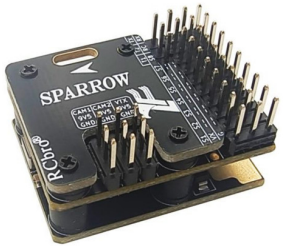


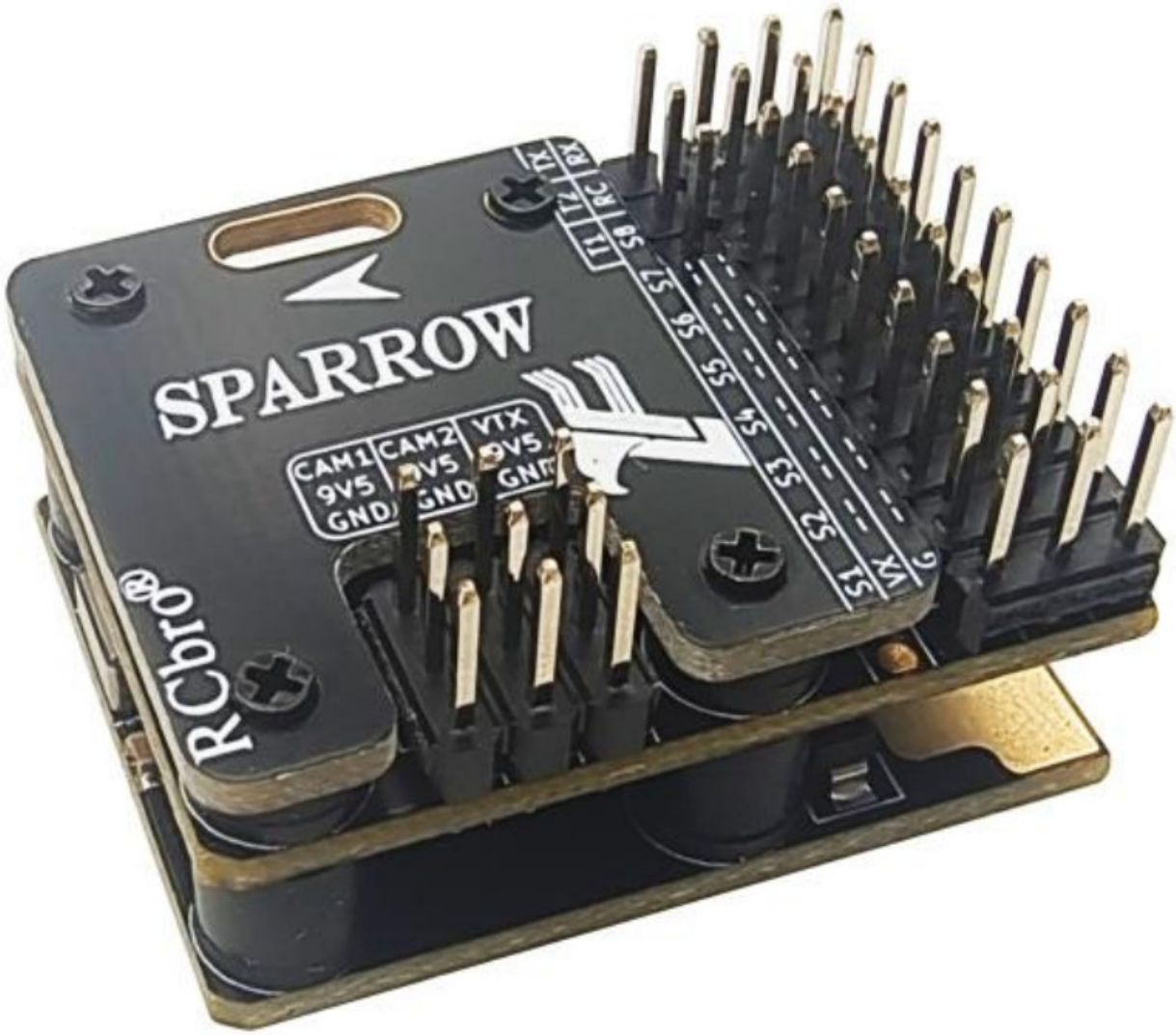
LeFeiRC SPARROW V3 Pro OSD Flight Controller Gyro Stabilization Return User Guide

LeFeiRC

RCbro®
SPARROW V3 Pro
Manual v1.2

Contents

SPARROW V3 Pro OSD Flight Controller Gyro Stabilization Return



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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.

Parameter

➢ **FC**

SIZE: 33*25*13mm

WEIGHT: 16.5g

➢ **POWER**

INPUT: 2-6S (MAX 80A)

OUTPUT(PMU): 5V/4A 9.5V/2A

FC: 5V(PMU)

VTX/CAM: 9.5V(PMU)

SERVO: onboard 5V(PMU) or external BEC

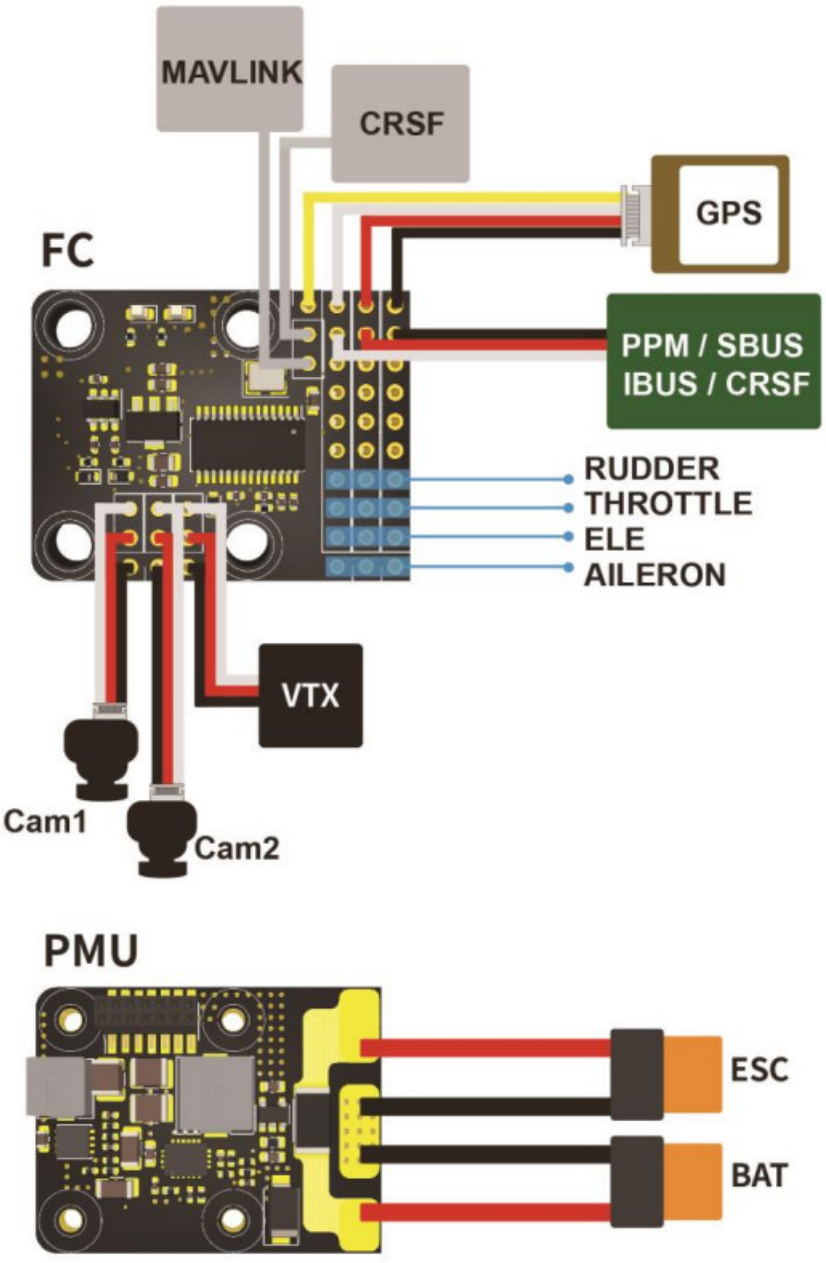
➢ **RC RECEIVER**

Protocol PPM SBUS IBUS ELRS/CRSF

Telem MAVLINK CRSF

Interface

➢ **PORT**



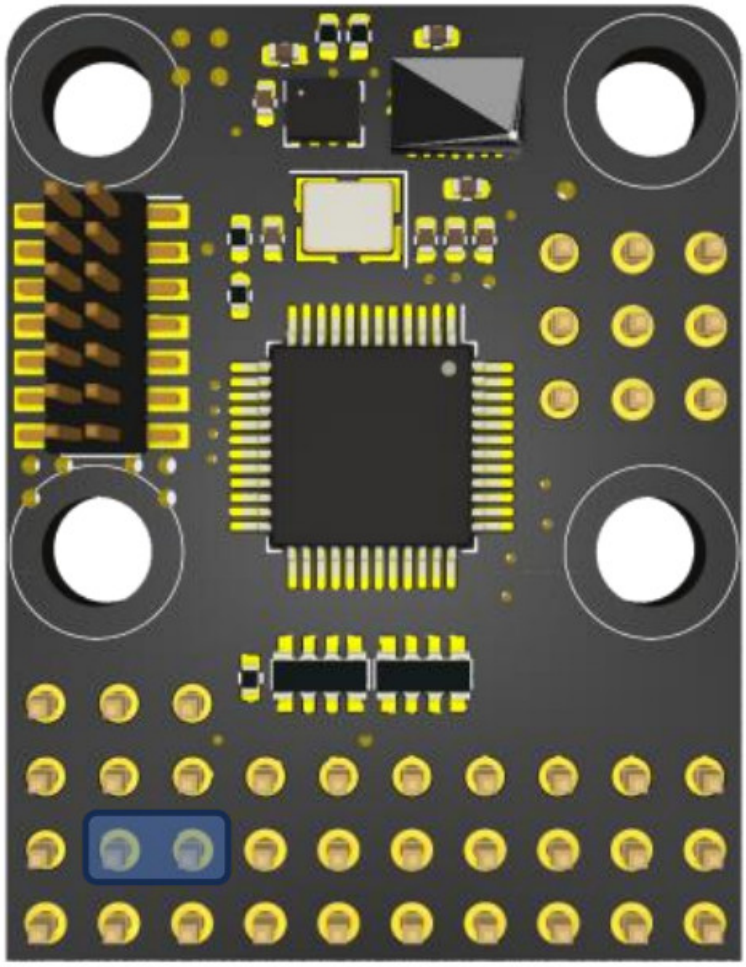
RC	PPM/SBUS/IBUS/CRSF
T1	MAVLINK
T2	CRSF
TX	GPS-RX
RX	GPS-TX
S1	AIL
S2	ELE
S3	THR
S4-S8	AUX Channel(S4 defaults to RUD)
CAM1-2	Dual camera
VTX	VTX
9V5	VTX/CAM power supply
BAT	Battery
ESC	ESC
VX	Servo power
G/GND	GND

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

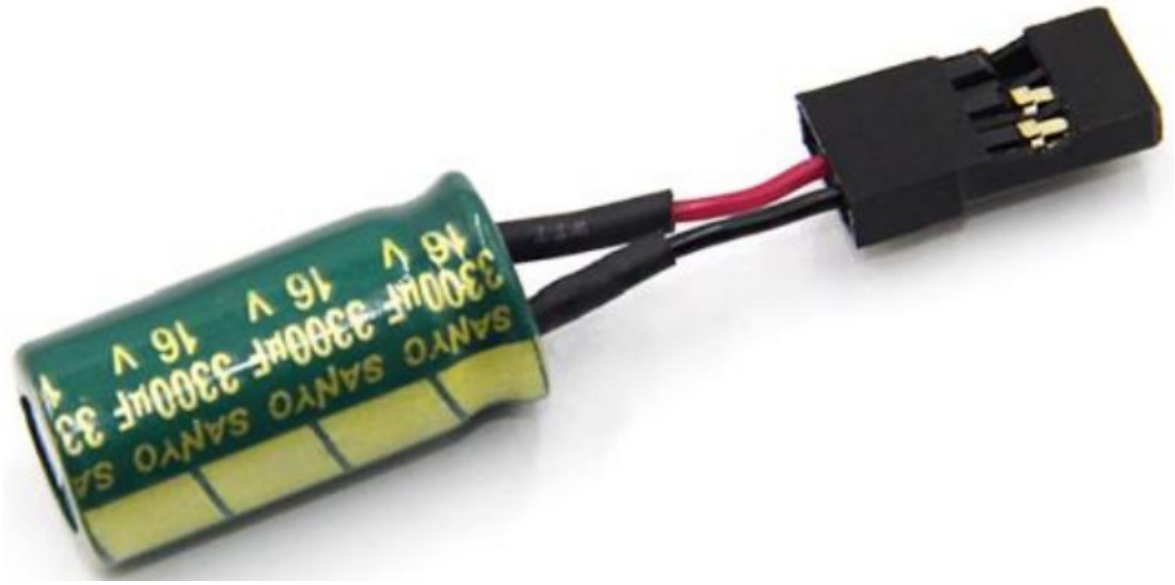
➢ **Servo power**

FC 5V BEC(PMU): Use solder to connect the two pins shown in the picture, and disconnect other BEC of the servo (such as the built-in BEC of the ESC).

External BEC: If you do not connect the two pins shown in the figure, the external BEC is used by default. The BEC can be connected to any channel among S1-S8.

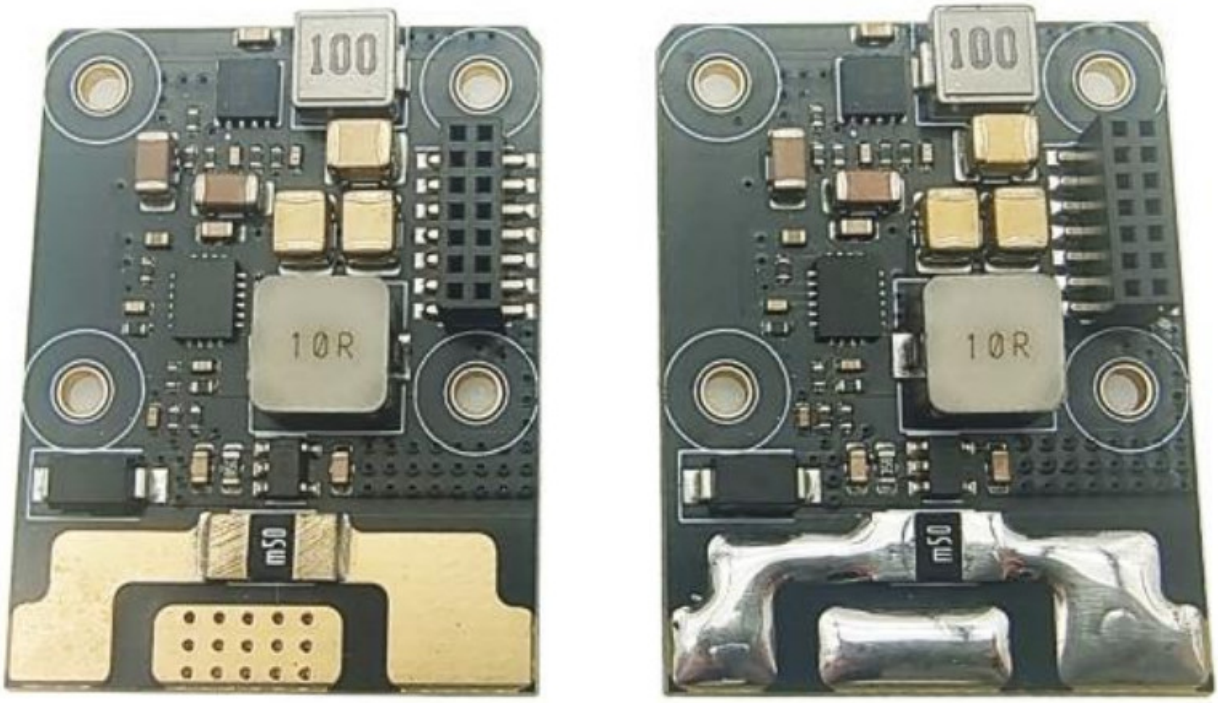


It’s recommended to use the supplied 3300uF/16V capacitor to get a more stable and secure working voltage for the PMU. The capacitor can be plugged onto any one of the free input or output sockets of the FC.



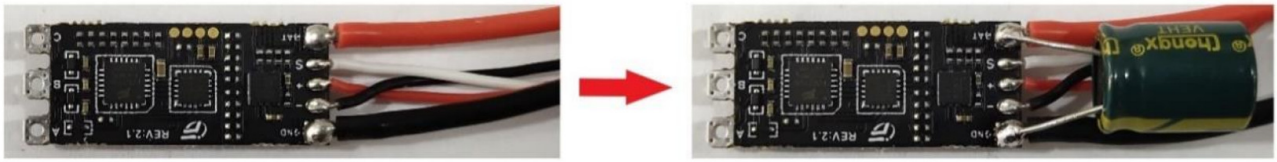
➢ **Large current**

When the current is large, it is recommended to tin the exposed pad during soldering, as shown in the picture below!



When the current is too large and the battery power supply capacity is insufficient, it may cause the OSD to flicker. At this time, it is recommended to connect a low ESR large capacitor in parallel with the FC, such as 470uf/30V(included in the accessories);Pay attention to the positive and negative poles of the capacitor when using it. The common way to judge is that the longer pin is the positive pole and the shorter pin is the negative pole, or you can judge by the positive pole (+) or negative pole (-) marked on the capacitor shell,

In some ESCs, the battery voltage and 5V-BEC output voltage fluctuate greatly under high current conditions, which will cause certain interference to the FC, such as OSD flickering or even the sensor being affected, resulting in an attitude error. A low ESR large
capacitor is connected in parallel with the output terminal of the ESC (the closer the ESC is, the better the effect). If space allows, a capacitor can be connected in parallel at the BAT and ESC terminals of the FC.



➢ **Remote control and receiver**

◐ **PPM SBUS IBUS ELRS/CRSF**

Just connect the signal to the RC channel, the FC will automatically recognize it;the default channel sequence is A-E-T-R, which can be modified to T-A-E-R;it supports dualchannel mode switching and is divided into MAIN-SUB mode channels.You can set 5 flight modes at the same time. The main mode channel defaults to CH5, before using the sub mode, you only need to set one of the main modes to <SUB>.

◐ **Calibrate the RC**

Enter the OSD menu <RC>-<RC CALI> , press and hold the stick for a few seconds (ROLL to the right) until < CFM?> appears. Quickly dial the main mode channel several times to complete the calibration. If <ERR> is displayed after calibration, it indicates that the calibration failed. Observe whether there is an offset in the channel data displayed on the OSD. If the calibration fails and the RC cannot be calibrated again, you can turn the roll and pitch stick to the MAX, and then restart the FC , it will automatically enter <RC CALI>.After the calibration is completed, press and hold the stick for a few seconds (ROLL to the left) to exit the calibration page.

◐ **RSSI**

RSSI channel can be selected, and the range of RSSI value is the same as that of other channels. When using ELRS, if the RC cannot set an independent RSSI channel, you can set <RSSI> in the OSD menu to <AUTO>, which will display LQI (Link Quality Indication).

◐ **CRSF Telemetry**

When the signal type is ELRS, CRSF telemetry is automatically turned on, and the user only needs to connect the RX of the receiver to the T2 port of the FC; the telemetry information includes flight mode, latitude and longitude, attitude angle, speed, altitude, heading, number of satellites and other information.

◐ **Tips**

When using the RC, there is no need to set the mixing mode, the user can select the appropriate model in the OSD setting menu; when entering the OSD setting menu, do not limit the travel of the sticks.

➢ **InstallDirection**

0D	Arrow points to the head
90D	Arrow points to the right
180D	Arrow points to the rear
270D	Arrow points to the left
R90D	Arrow points to the head, place the bottom of FC on the right side of the plane
L90D	Arrow points to the head, place the bottom of FC on the left side of the plane
BACK	Arrow points to the head, and the bottom of FC points up

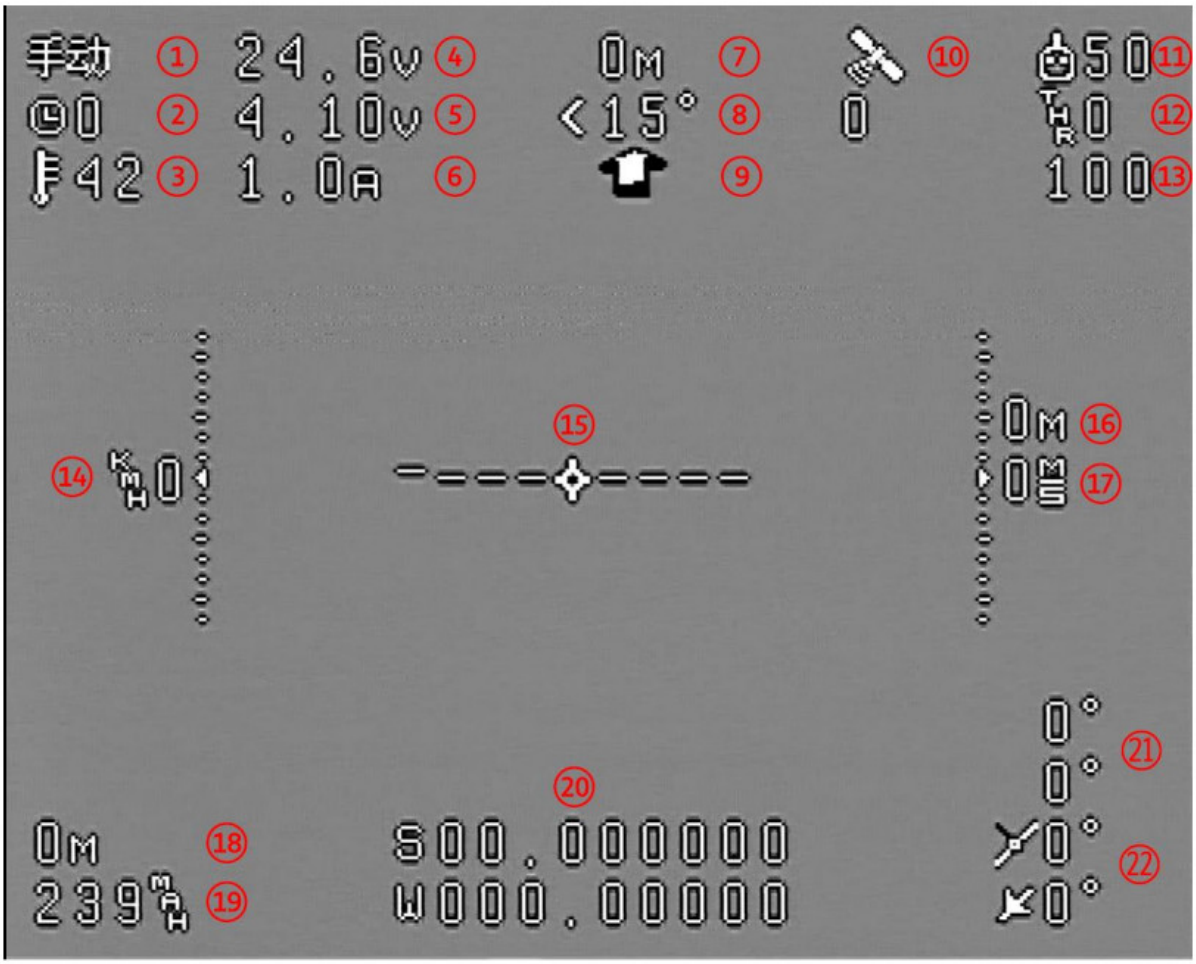
➢ **SERVOS CONNECTION**

	T-TAIL	V-TAIL	WING
S1	AIL1/AIL2	AIL1/AIL2	AIL1
S2	ELE	RUD1	AIL2
S3	ESC	ESC	ESC
S4	RUD	RUD2	NO CONNECTION

*S4 defaults to YAW(RUD) function, and can also be reused for other functions.
*When using dual motors, just select any channel from S4-S8 to reuse it as the THR function, and then connect the two ESC wires to S3 and the selected channel respectively. If you need to use the throttle differential function, refer to <Throttle differential>.

OSD & LED

➢ MAIN



1	Flight Mode	**12**	Throttle
2	Time	**13**	Acceleration health
3	Temperature	**14**	GroundSpeed
4	Volatge	**15**	Horizon Line
5	Cell Voltage	**16**	Altitude
6	Current	**17**	Climb Rate
7	Distance	**18**	Voyage
8	Return Home Angle	**19**	Power Consumption
9	Flight Direction	**20**	Latitude and Longitude
10	Satellite	**21**	Desired Attitude Angle
11	RSSI	**22**	Actual Attitude Angle

*The GPS icon will continue to flash when GPS is not connected or GPS is not fixed.
*'>' means to turn right, '<' means to turn left, and the number after it indicates the specific required turning angle.
*If the RC icon flashes, it means that the RC is failsafe or the receiver is disconnected. If the GPS has been fixed at this time, it will automatically switch to the RTH.

➢ **CONTROL OSD MENU**

Enter Menu	Quickly dial main mode channel
Exit	AIL LEFT
Enter	AIL RIGHT
UP/DOWN	ELE UP/DOWN

*When enter or exit the <RC CALI>, ROLL left or right needs to be held for a few seconds.

➢ **PARAMETERS**

RC	RC CALI	Calibrate the RC
	CHANNEL TYPE	A-E-T-R or T-A-E-R
	RSSI	**RSSI**
	MAIN CHANNEL	CH5/CH6
	SUB CHANNEL	CH5/CH6/CH7/CH8/CH9/CH10
	MAIN MODE1	STAB/MAN/ACRO/ALT/RTH/FENCE/HOVER/ALT*/SUB
	MAIN MODE2	
	MAIN MODE3	
	SUB MODE1	STAB/MAN/ACRO/ALT/RTH/FENCE/HOVER/ALT*
	SUB MODE2	
	SUB MODE3	
	TIMEOUT RTH	Enable RTH after timeout (except RTH and MAN)
	TIMEOUT SEC	Set the timeout (the time sticks remain motionless)
	CAM CHANNEL	Dual camera switching channel
	FRAME	T-TAIL V-TAIL WING
	INSTALLATION	InstallDirection
	ROLL GAIN	Set the gain, the YAW gain only works in ACRO .
	PITCH GAIN	
	YAW GAIIN	
	LEVEL CALI	LEVEL CALI
	VOLTAGE CALI	Set voltage/current offset
	CURRENT CALI	

BASE	CRUISE SPEED	Flight speed in RTH/HOVER/ALT*
	RTH ALT	If the distance is beyond 3 times the circling radius, the min flying altitude is <SAFE ALT>. If it is higher than this altitude, it will slowly descend; after approaching the HOME, the fly altitude is <RTH ALT>
	SAFE ALT	
	FENCE RADIUS	If the distance exceeds this radius, RTH will be triggered
	RTH RADIUS	Circle radius
	BASE THR	MIN THR in RTH/HOVER/ALT*
	ACRO GAIN	Stability gain in ACRO
	VEL GAIN	The faster the speed, the smaller the required gain, and the larger <VEL GAIN> should be.
	THR-DIFF	Throttle differential ratio controlled by YAW.
	MANUAL	Sticks control ratio in ACRO mode.
	MAX ROLL	MAX flight angle
	MAX PITCH	
	BAT-S-NUM	Number of battery cells
SERVO	S1 DIR	Servo direction
	S2 DIR	
	S4 DIR	
	S5 DIR	
	S6 DIR	
	S7 DIR	
	S8 DIR	
	S4 FUNC	Set S4-S8 multiplex function, if set to throttle, it will have differential function
	S5 FUNC	
	S6 FUNC	
	S7 FUNC	
	S8 FUNC	
	S1 MID	Set the servo neutral position
	S2 MID	
	S4 MID	
	S5 MID	
	S6 MID	
	S7 MID	

	S8 MID	
OSD	MODE	When the OSD item is set to <ON>, quickly dial the main 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 main mode channel can exit
	TIME	
	VOLTAGE	
	CURRENT	
	DISTANCE	
	RTH ANGLE	
	SATELLITE	
	RSSI	
	THR	
	ALT	
	CLIMB RATE	
	GROUNDSPEED	
	VOYAGE	
	MAH	
	LLA	
	ATTITUDE	
	HORIZON	
	FLY DIR	
	ALT SCALE	
	SPEED SCALE	
	SINGLE CELL	
	TEMPERATURE	
	ACCEL HEALTH	
	DESIRED-ATT	
	DESIRED-ALT	
	OSD	Enable OSD overall display
	HOS	Set OSD offset
	VOS	
	TELEMETRY	MAVLINK baud
	GPS RESET	GPS RESET
	GPS CFG	Whether to configure GPS after powering on. Not configuring can reduce the initialization time

SYSTEM	FC RESET	Restore default settings
	FLY SUMMARY	Flight data summary
	SUMMARY RESET	Reset flight data summary
	FC DATA	Sensor data display
	LANGUAGE	Chinese or English.

*When setting the servo function, RC6-12 means the RC 6-12th channel.
*< FENCE RADIUS> only works in fence mode, other modes do not have fence function.
*After changing the <TELEMETRY>, you need to restart the FC.

➢ **Flight Summarize**

After landing, OSD will show summarize about flight information.
Quickly dial the main mode channel to exit.

➢ **LED**

GREEN	Quick flash	RTH/ALTHOLD/FENCE/HOVER/ALT*
	Flash	MANUL/ACRO
	On	STAB
RED	Flash	GPS NoFix
	On	GPS Fixed
	Off	NO GPS

➢ **GPS**

The FC supports UBLOX protocol, but does not support NMEA. After power-on, the FC will automatically configure the GPS. If the FC cannot recognize the GPS latitude and longitude, you can reset the GPS through the setting item <GPS RESET>.

Flight Mode

➢ **How**

MAN	The airplane is direct controled by RC.
STAB	Control the angle of airplane,and auto level when no RC input.
ACRO	Gyro mode,lock the current angle when no RC input.
ALT	Hold current height when no ELE input.
FENCE	Auto Retun Home when out of fence radius.
RTH	Auto Retun Home.
HOVER	Hover over the current position.
ALT*	Lock the flight direction and maintain the altitude.

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

➢ **SUB Mode Setting**

The flight controller supports main-sub mode channel setting, and up to 5 flight modes can be set at the same time. The setting method is as follows:
Step 1: Select the appropriate main-sub mode channel. It is recommended to use a 3pos switch;
Step 2: Select any position in <MAIN MODE 1/2/3> and set it to <SUB>;
Step 3: Set <SUB MODE 1/2/3> to the mode you need;
Step 4: Switch the main-sub mode channel to observe whether the mode change is correct.

➢ **Assisted Takeoff**

ALT/FENCE/ALT*: 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**

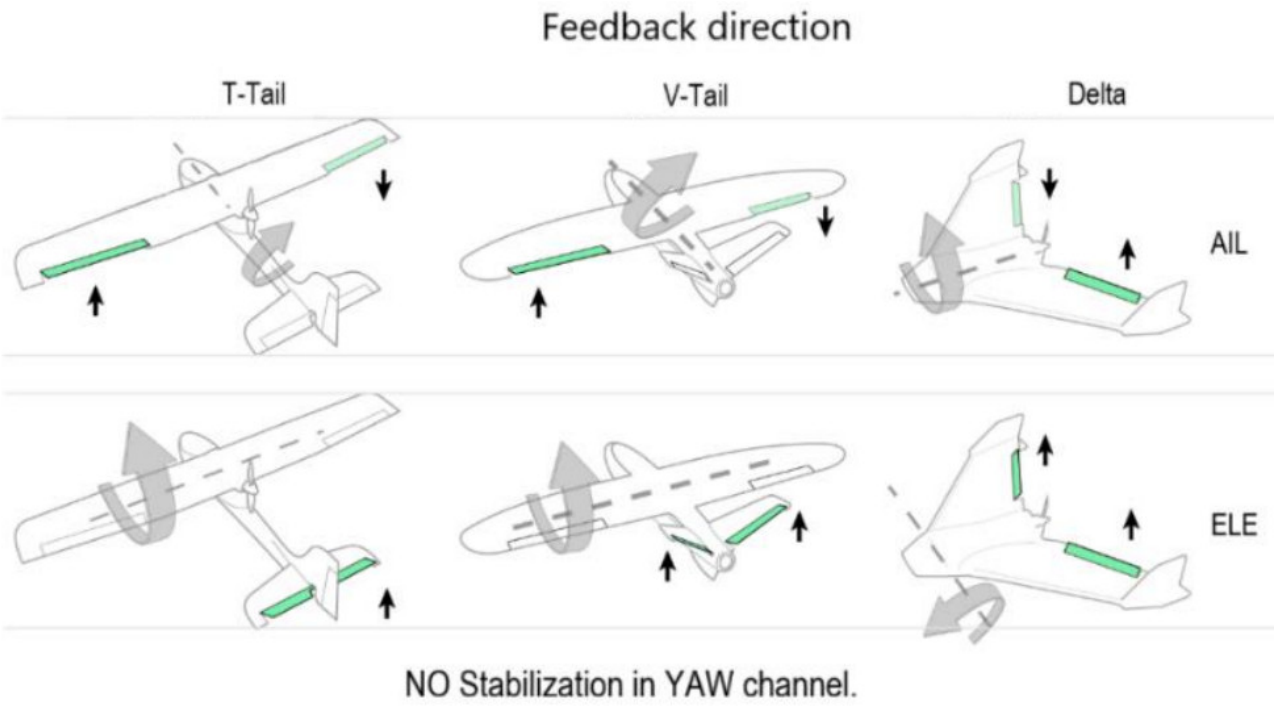
MAN/STAB/ACRO/ALT: Throttle is direct controlled by RC.
FENCE: Before triggering RTH, the throttle is controlled by RC, after triggering, it is determined by RTH.
RTH/HOVER: Throttle is controlled by RC during assisted takeoff, after entering the circling state, the throttle is controlled by the FC, 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.
ALT*: 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 differential**

Any port in S4-S8 is set to throttle, and the <THR-DIFF> is not zero, then you can control the differential rotation of the two motors by YAW channel. It is necessary to pay attention to whether the direction of the speed change of the two motors is correct, if it is not correct, just swap the two ESC signal wires.

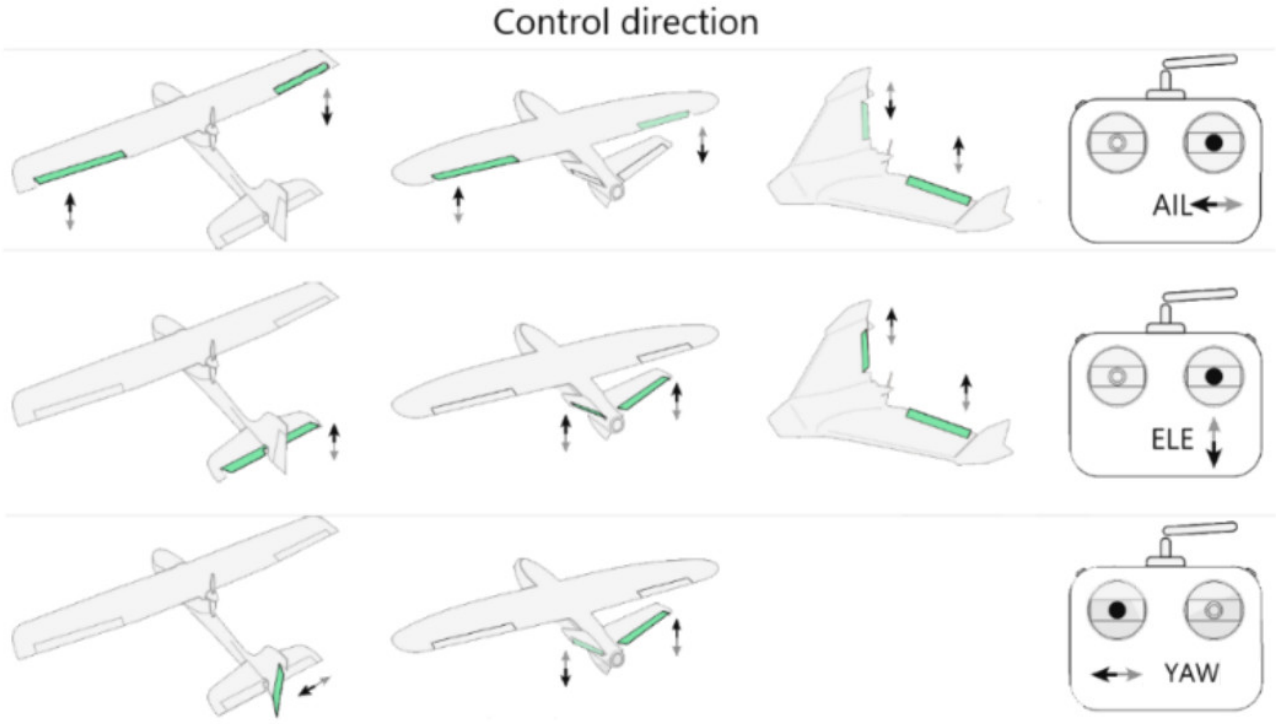
Preflight inspection

➢ **Feedback direction**



* If the feedback direction is not correct, you can invert the channel in OSD.
* The feedback direction must be set first, then the RC control direction.

➢ **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.

➢ **FailSafe**

When the RC that outputs PPM/IBUS/CRSF 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 mode channel(CH5/CH6) can make the FC switch to RTH when the RC is failsafe. Therefore, RTH must be included in the three modes set in the OSD.
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 you use custom mode, in order to simplify the operation, set the mode channel in the RC to output an arbitrary value, and then observe which mode the FC switches to after failsafe and then change the mode to RTH in the OSD. For example, after the RC is failsafe, the flight mode is automatically switched to A, then just set the position of A to RTH in the OSD.

➢ **FC Installation**

1. After the FC installation is completed, you need to set the correct installation direction in the OSD menu. For the selection of the installation direction, refer to <InstallDirection>;
2. When installing, try to ensure that the direction is accurate. For example, when pointing to the head of the plane, try to ensure that the FC is parallel to the direction of the head of the plane, and there is no obvious included angle, otherwise the flight attitude will be affected;
3. When installing the FC, try to place it at the center of gravity and avoid placing it too close to the motor to avoid vibration that affects the flight attitude.

➢ **LEVEL CALI**

Calibration method: Place the FC horizontally and still, then start calibration, and wait for the calibration to be completed; when placing the FC in the cabin for calibration, ensure that the FC is placed horizontally in the cabin, and at the same time place the aircraft horizontally and still, and then start calibration.
When calibration is needed: It is recommended to perform level calibration when using the FC for the first time; after changing the installation direction, it is necessary to perform level calibration again; it is recommended to

perform level calibration after it has not been used for a long time.
Calibration precautions: Try to keep it horizontal when calibrating, allowing a very small angle difference, which will not affect calibration and flight; you must remain still duringcalibration and do not shake the FC.

➢ **Armed**

NO GPS: after the FC is initialized, it will be automatically armed, and the motor can be started in all modes at this time.
With GPS: after GPS fixed, except for RTH and HOVER, the motor can be started at will, but before fixed, only MAN can start the motor.

➢ **Calibrate ESC**

Step1 Switch to MAN mode, push throttle channel to the max;
Step2 Power on, OSD prompt <THR> (longer waiting time than directly connected receiver).
Step3 After ESC Beep, push throttle channel to zero.
*If it is a dual motor, you can calibrate the two ESCs separately!

FAQ

Q. Important question! ! !

A. Failsafe is very important and must be set! It is recommended to record DVR when using for the first time!

Q. The rudder surface response is too small in STAB or other modes.

A. Under normal flight conditions, you can increase the gain appropriately and the control surface response will increase.

Q. The RC cannot control servos in RTH and HOVER.

A. This is a normal phenomenon. In RTH and HOVER, the servo is automatically controlled by the flight controller!

Q. Is there any throttle output in RTH and HOVER during flight?

A. It is recommended to fly normally for more than 6 seconds before switching to RTH or HOVER. At this time, the throttle is automatically controlled by the flight controller. If you switch to return mode 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 and HOVER.

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 flight controller 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.About cruise speed setting.

A. Do not set the cruise speed too low, as it may cause stalling. It is recommended to refer to the cruise

speed given by the manufacturer before setting it. If you feel that the cruise speed is set too low and the flight is dangerous, you can manually push the throttle up!

Q. Does the flight controller support devices such as FM30 and HM30?

A. Support. The flight controller can output theMAVLINK with two baud rates of 57600 and 115200. The user can connect the T1 port of the flight controller to the RX of the data transmission device, and then select the appropriate baud rate in the .

Q.Why does the motor keep beeping?

A.&

Q.RTH or FENCE or HOVER or ALT* mode becomes ALT.

A.RTH /FENCE /HOVER/ALT* can only be used when the GPS is fixed, otherwise it will become the ALT.

Q.RSSI is incorrect.

A. Check which channel the RSSI is set in the RC, and then modify the in the flight controller to the corresponding channel; RSSI with independent wiring is not supported; When using ELRS, if the RC cannot set an independent RSSI channel, you can set in the OSD menu to , which will display LQI (Link Quality Indication).

Q. Why can’t the SBUS automatically recognize the failsafe?

A. Because some receivers are not standard SBUS, the flight controller may not be able to automatically identify the failsafe. In this case, the user needs to manually set failsafe. Please refer to .

Q. ALT* 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 ALT*.

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 flight controller according to the cruising speed. Therefore, if there is a large difference between the manual throttle and the actual throttle calculated by the flight controller when the stick is in motion, it will cause a sudden change in the throttle.

Q. About the dual-channel camera.

A. When using only one camera, the CAM1 channel is enabled by default. If the camera is connected to CAM2, there will be no image output, but there will be OSD. When using dual cameras, you only need to set the , you can switch the screen through the corresponding channel; When using dual cameras, it is

recommended that both cameras be in PAL or NTSC format. This can avoid image or OSD flickering when switching. It is also recommended to use PAL format cameras. The OSD fonts are moderate and the display effect is good.

Q.What type of GPS can be used for flight controller?

A. The SPARROW V3 Pro support protocol is UBLOX and does not support the NMEA protocol. Therefore, please pay attention when choosing. The series that support UBLOX include the 6th, 7th, 8th, 9th and 10th generations.

Q. Regarding the current sensor problem.

A. The maximum current that the FC caneffectively measure is 80A, and the maximum current that the FC can withstand is 120A. After exceeding 80A, the current display value is no longer accurate. At the same time, in order to ensure the safety of the FC, it is not recommended for users to use it beyond the range; When using a large current within the measuring range for a long time (for example, more than 50A for a long time), the temperature rise caused by different current and heat dissipation environments must also be considered. Excessive temperature rise may cause the solder to melt and affect flight safety. If you need to fly with a large current for a long time, it is recommended to test on the ground first.

Accessories Description

Camera wire x 2: Compatible with CADDX and other camera wire sequences. Be sure to check whether the wire sequence needs to be modified before use.
VTX wire x 1: Compatible with PandaRC and other VTX wire sequences. Be sure to check whether the wire sequence needs to be modified before use.

LefeiRC www.lefeirc.com/

Documents / Resources

	LeFeiRC SPARROW V3 Pro OSD Flight Controller Gyro Stabilization Return [pdf] User Guide SPARROW V3 Pro OSD Flight Controller Gyro Stabilization Return, SPARROW V3 Pro, OSD Flight Controller Gyro Stabilization Return, Controller Gyro Stabilization Return, Gyro Stabilization Return, Stabilization Return

References

- LFRC – welcome to LeFei
- User Manual