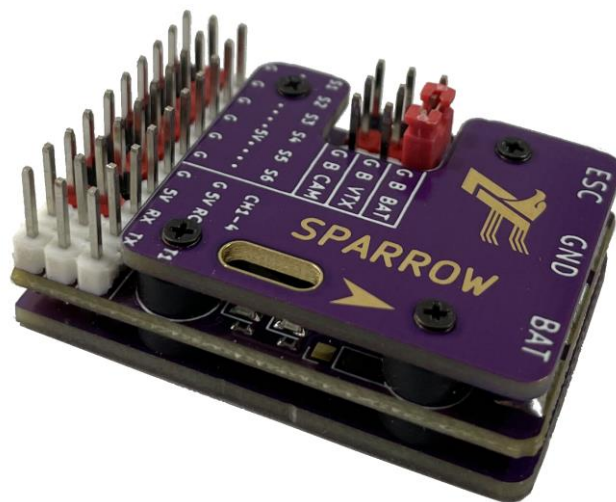# *SPARROW 3-OSD*

Manual v2.0

WARNING

Please strictly abide by relevant national laws and regulations and fly safely. Before using the FC, you must fully understand the safety details. The equipment and any electronic products on the aircraft cannot be completely reliable. The necessary inspections must be carefully performed before the flight.

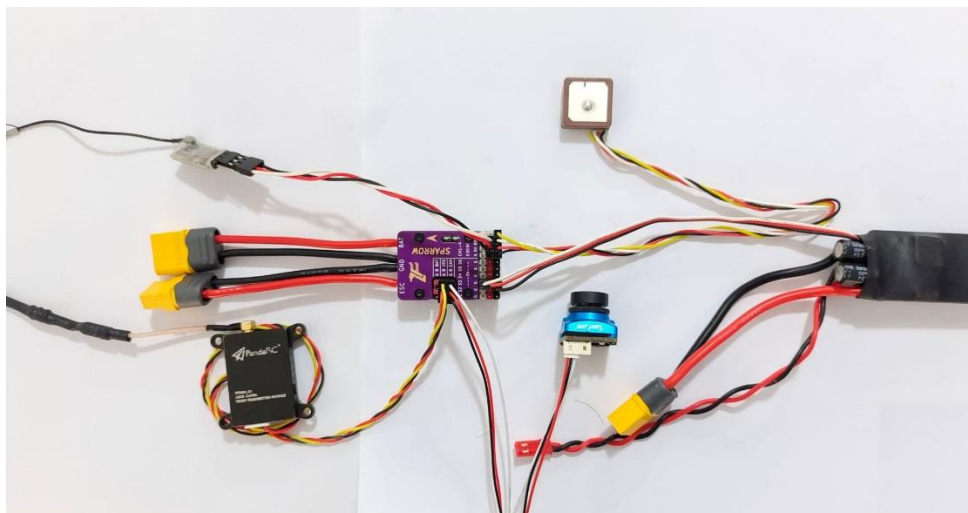## Content

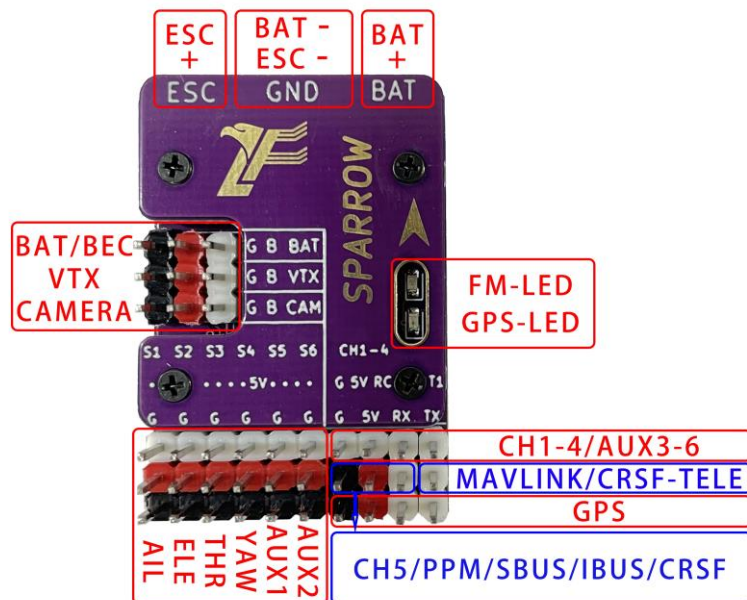## Parameter

➢ **FC**
  SIZE： 37*25*10mm
  WEIGHT： 15g
➢ **POWER**
  FC： 5V
  Battery： 2-6S(MAX 80A)
  VTX、Cammera： powered by battery or external BEC
➢ **RC RECEIVER**
 Protocol： PWM、PPM、SBUS、IBUS、CRSF
 Telem： MAVLINK、CRSF

Interface

➢ **PORT**

CH1-CH4	PWM receiver,CH1-4: A-E-T-R;AUX3-6
RC	PWM receiver,Flight mode channel
	PPM/SBUS/IBUS/CRSF
TX	GPS RX
RX	GPS TX
S1	AIL
S2	ELE
S3	THR
S4	RUD
S5	AUX1
S6	AUX2
CAM	Camera
VTX	VTX
B	VTX,CAM power supply
T1	MAVLINK/CRSF-telemetry

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

➢ **How to power the VTX and camera**
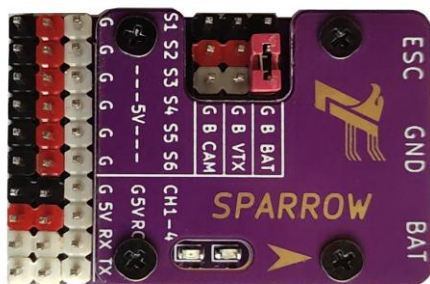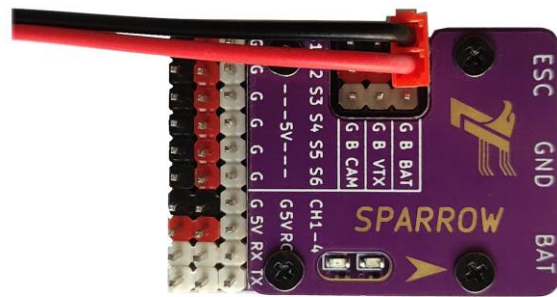
Battery powered   **External BEC powered**

If the battery voltage is higher than the VTX or camera working voltage, must use an external BEC power supply.

When the current is too large and the battery power supply capacity is insufficient, if the image transmission and camera are powered by battery, 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/50V, etc.
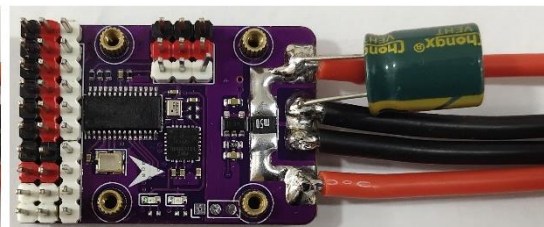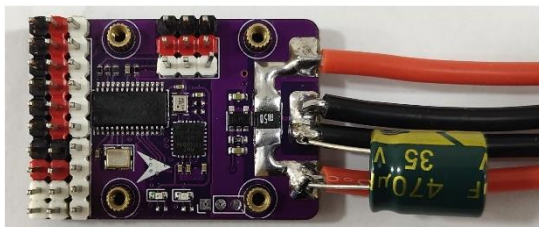
In some ESCs, the battery voltage and 5V-BEC output voltage fluctuate greatly under high current conditions, which will cause certain interference to the FC, such as OSD flickering or even the sensor being affected, resulting in an attitude error. A low ESR large capacitor is connected in parallel with 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.

> **Flight controller working voltage**
> FC is powerd by external 5v BEC.

> **High current working state**
> When the motor need to work with high current, it is recommended to plate tin on the exposed pad, as shown in the figure below!
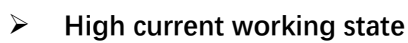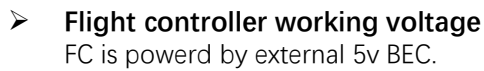
> **Remote control and receiver**
> ➊ PWM
>
> The flight controller supports 5 PWM inputs, including CH1-4 and RC. The specific settings are that CH1 is AIL, CH2 is ELE, CH3 is THR, CH4 is RUD(A-E-T-R), and RC is the mode channel. It is recommended to use a 3-SW for the mode channel.
>
> ➋ PPM SBUS IBUS CRSF
>
> Just connect the signal to the RC channel, the FC will automatically recognize it, the channel sequence is A-E-T-R, and the mode channel is CH5 by default. Some CRSF(ELRS) receivers have only two states for CH5, which makes it impossible to switch the three flight modes. At this time, you can change the mode channel to CH6 in the OSD setting item.
>
> ➌ Calibrate the RC
>
> Ensure that the throttle is at the lowest level before calibration, and other sticks have no offset .Select the _**<RC CALI>**_ item, when <CFM?> appears, quickly dial the mode channel(CH5/CH6) several times to complete the calibration. If <ERR> is displayed after calibration, it indicates that the calibration failed. 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>**_.
>
> ➍ RSSI
>
> RSSI channel can be selected, and the range of RSSI value is the same as that of other channels.

❶ 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   90D   180D

270D   L90D   R90D
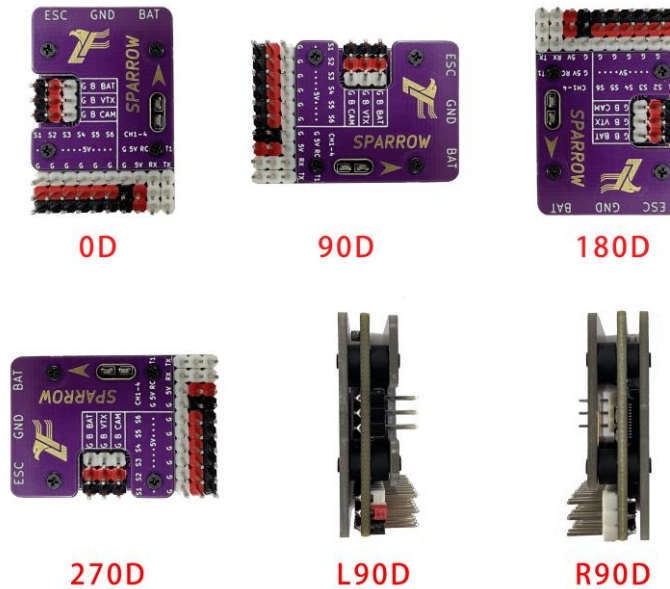
*Need to re-calibrate the level after changing the installation direction.;The installation direction should point to the aircraft head as shown in the picture.

OSD&LED

➢ **MAIN**

1	Flight Mode	10	GroundSpeed
2	Time	11	Attitude Line
3	Volatge	12	Altitude
4	Current	13	Climb Rate
5	Distance	14	Voyage
6	Return Home Angle	15	Power Consumption
7	Satellite	16	AIL Angle
8	RSSI	17	PITCH Angle
9	Throttle	18	Latitude and Longitude

*OSD menu item <GPS> can set whether to display the latitude and longitude information.

*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 CH5/CH6
Exit	AIL LEFT
Enter	AIL RIGHT
UP/DOWN	ELE UP/DOWN

➢ **PARAMETERS**

FRAME	T-TAIL、V-TAIL、WING
INSTALLATION	*InstallDirection*
ROLL/PITCH/YAW GAIN	Set the gain, the YAW gain only works in ACRO .
ROLL/PITCH/YAW DIRECTION	Set the output directions of servos.
RC CALI	*Calibrate the RC*
LEVEL CALI	*LEVEL CALI*
VOL/CURRENT CALI	Set voltage/current offset.
CRUISE SPEED	Flight speed in RTH.
RTH ALT SAFE ALT	In RTH, 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>.
FENCE RADIUS	If the distance exceeds this radius, RTH will be triggered.
RTH RADIUS	Circle radius.
MODE 1/2/3	The flight mode corresponding to each position of the mode channel(CH5/CH6).
ACRO GAIN	Stability gain in ACRO.
VEL GAIN	The faster the speed, the smaller the required gain, and the larger <VEL GAIN> should be.
AUX1-6[1]	Set AUX function(AXU3-6:CH1-4)
AUX1-6 DIRECTION	Set the output direction of the AUX.
GPS	Whether to display latitude and longitude.
TELE	MAVLINK:MAV1-57600, MAV2-115200,CRSF telemetry
RSSI	*RSSI*
MODE-CH	*Select mode channel*
HOS/VOS	Set OSD offset.
THR-DIFF[1]	Throttle differential ratio controlled by YAW.
MANUAL[1]	Sticks control ratio in ACRO mode.
PORT[1]	PWM:CH1-4 is PWM receiver channel. AUX:CH1-4 is AUX3-6.
GPS RESET[1]	*GPS RESET*
LANGUAGE	Chinese and English.

[1]Since the FC has undergone an upgrade, these setting items are added later. If your FC does not have it, don't worry, it will not affect your flight performance.

*When setting the AUX function, RC6-12 means the remote control 6-12 channel.

*< FENCE RADIUS> only works in fence mode, other modes do not have fence function.

*After changing the <TELE>, you need to restart the FC.

*After changing the <PORT>, you need to restart the FC. If it is set to AUX, the AUX3-6 setting items will be automatically added after restarting.

➢ **Flight Summarize**

After land, OSD will show summarize about flight info.

Quickly dial mode channel(CH5/CH6) to exit.

➢ **LED**

	Quick flash	RTH/ALTHOLD/FENCE
GREEN	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.

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

➢ **Assisted Takeoff**

ALT/FENCE: 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: 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.

➢ **Throttle differential**

When an AUX port 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

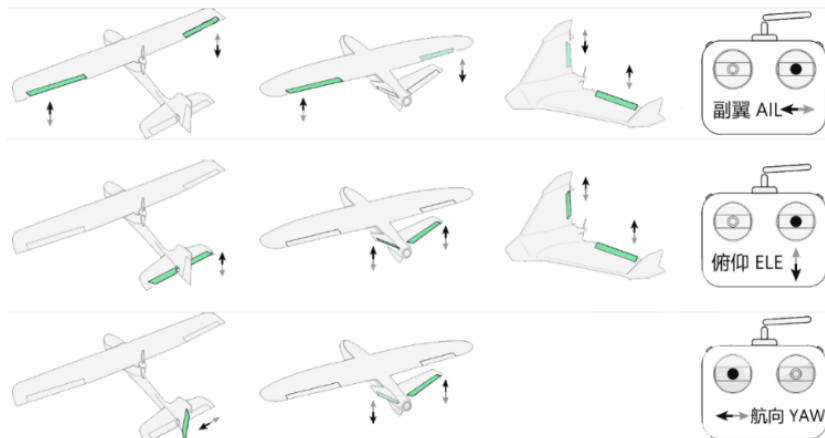➢ **Feedback direction**

感度方向测试 Feedback direction

垂尾 T-Tail   V尾 V-Tail   三角翼 Delta   副翼 AIL / 俯仰 ELE
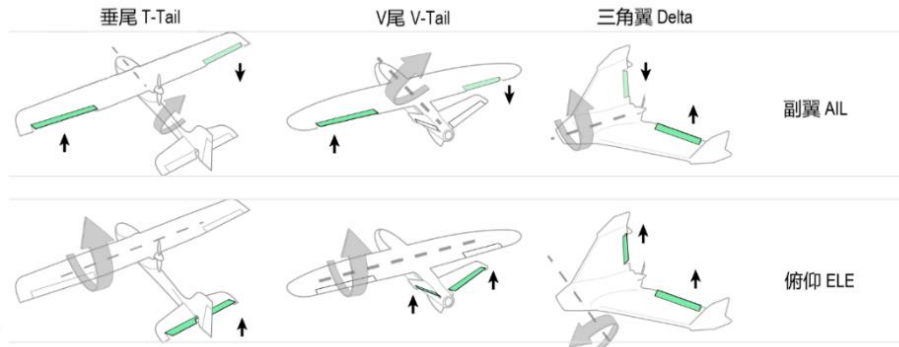
默认不支持航向通道自稳. NO Stabilization in YAW channel.

*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**

通道方向测试 Control direction

副翼 AIL / 俯仰 ELE / 航向 YAW

*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 PWM/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.
PWM/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 losing control, 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.**

➢ **LEVEL CALI**

     Before calibration, place the FC horizontally and keep it still; if it has not been calibrated for a long time or the installation direction has been changed, needs to be re-calibrated.

➢ **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, the motor can be started at will, but before fixed, only MAN can start the motor.

➢ **Calibrate ESC**

Step1：Switch to manual mode, push throttle channel to the max;

Step2：Power on(longer waiting time than directly connected receiver).

Step3：After ESC Beep, push throttle channel to zero.

FAQ

Q.Is the automatic action of the servos normal in RTH?

A.Yes. This is normal for RTH.

Q. Is there any output from the throttle channel when switching to RTH during flight?

A. It is recommended to switch to RTH after flying for more than 6 seconds. At this time, the throttle is automatically controlled by the FC.

Q.Why does the motor keep beeping?

A.*<Throttle control>*&*<Armed>*

Q.RTH or FENCE mode becomes ALT.

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

Q. Does the FC support telemetry of devices such as FM30 and HM30?

A. Yes. The FC can output the MAVLINK protocol with two baud rates of 57600 and 115200.