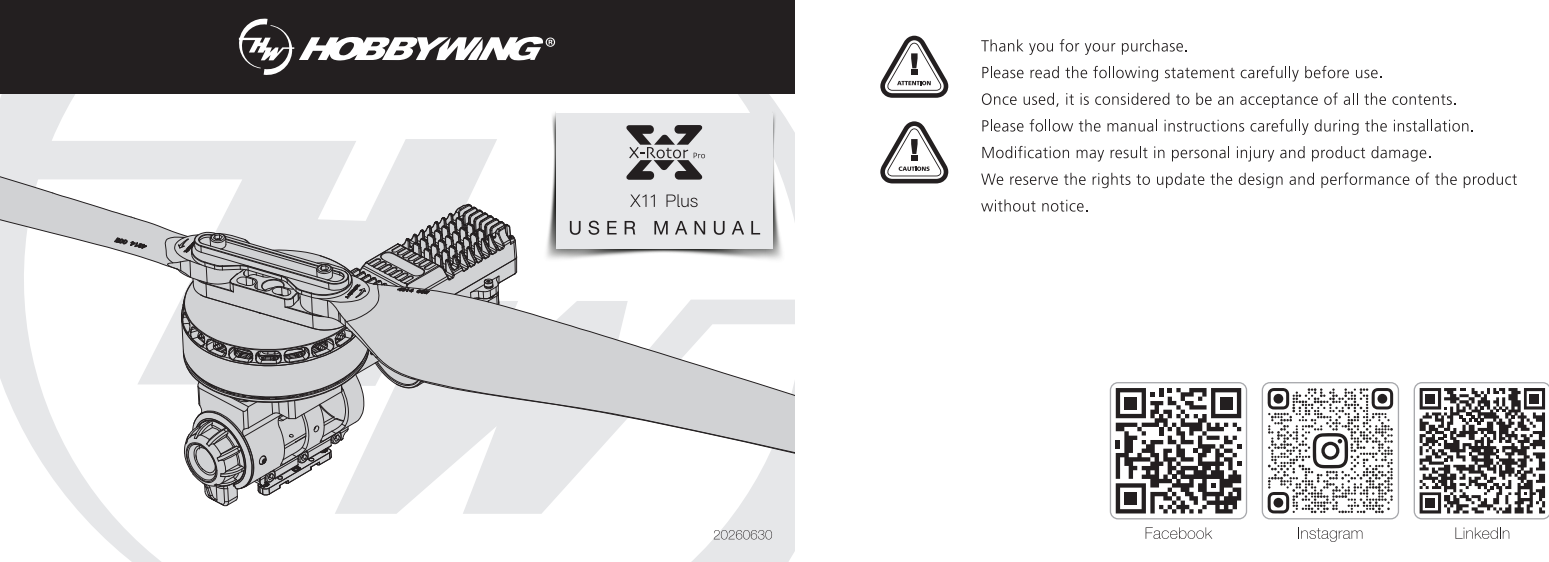




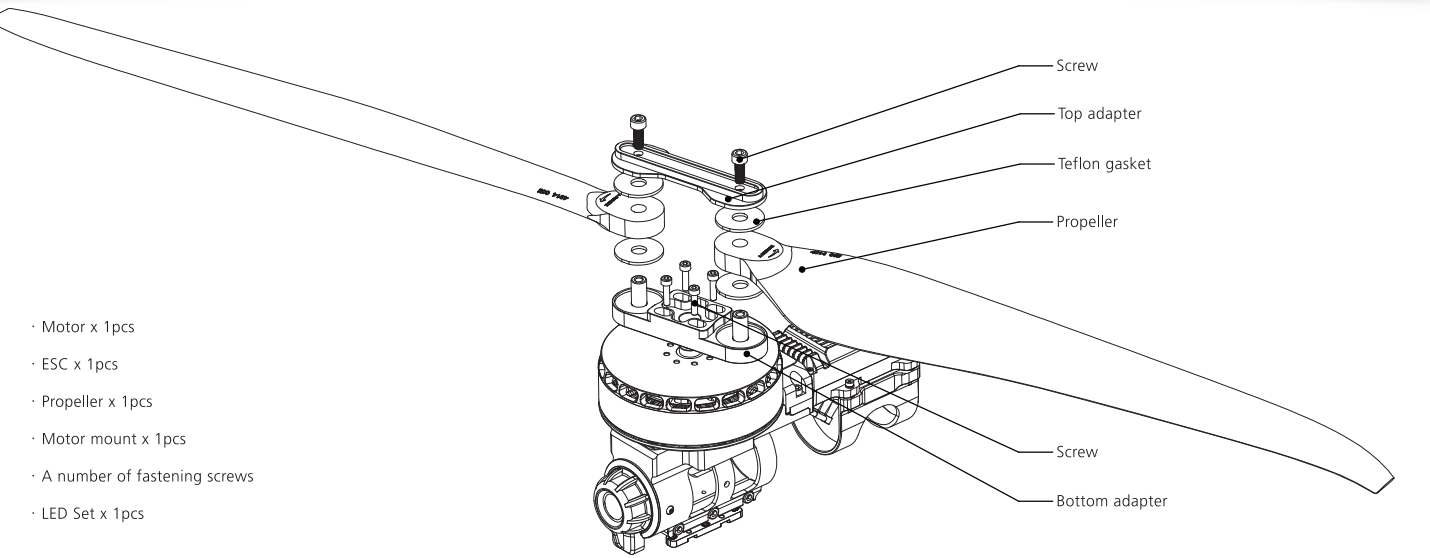
01 Introduction

The X11 PLUS brushless power system is designed for applications in agriculture, education and training, logistics, fire fighting, surveying, inspection and other fields, with a single-axis rated load of 15-18kg, and a single-axis maximum thrust of 37 kg. It is suitable for a 50mm carbon fiber tube arm; the overall waterproof level is IPX6, and it is not afraid of rain pesticides, salt spray, high temperature, sand and dust, impact resistance, mud and sand resistance; the ESC uses FOC vector control, based on PM5M system algorithm optimization; the system has digital throttle and analog throttle, which can make the flight more stable; the system has power-on automatic detection, power-on voltage abnormal protection, over-current protection, stall protection and other protection functions; use CAN communication, with real-time data transmission; built-in fault storage function, can record fault data.

02 Safety Precautions

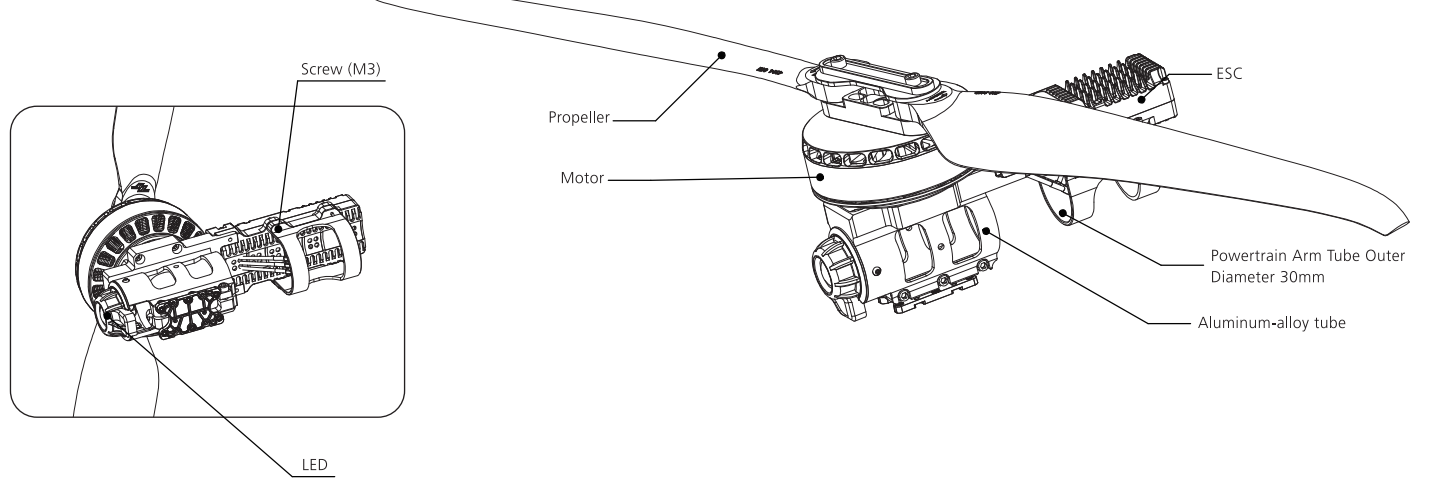
- When use it please keep away from crowd, high voltage cable and obstacles and conform to safety norm.
- Never approach to the high-speed rotating propeller & motor so as to avoid being injured by blade.
- Check if all the components are good before use. If there is any damaged component, please contact after-sale service for replacement.
- Check if the screw of connecting parts is loose or whether the motor is horizontal before flight.
- The X11-PLUS power system is connected to a circular tube arm with a diameter of 50mm.
- The color of the power system navigation light is optional. After removing the light housing, you can select the desired color by flipping the dial switch.
- The motor should be kept clean and can be washed with water after each fly has been completed.
- This function can be realized only when the flight controller has a CAN channel.
- There is no digital throttle for serial communication. Serial communication is optional for this power system.

03 Components of the Power System



04 Power system installation

- The whole power system has been assembled before leaves the factory. Unpack and take out the power kit to install on the rack of plant-protection plane as per the rotation direction of motor.
- The yellow, gray and green cables are the data output. Upgrade signal wire (ESC system is upgradable) and digital throttle using the Hobbywing CAN protocol. The yellow wire is ground wire, the gray wire is CAN-High (CH), and the green wire is CAN-Low (CL).
- The optional serial communication power system. Yellow, red and green cables are the data output and upgrade signal line (the ESC system is upgradable).
- The black and white is the PWM throttle wire, the black wire is ground wire, and the white wire is signal wire.
- The data signal line outputs in real time: the input and output throttle, motor speed, bus current, phase current, bus voltage, capacitor temperature, Mosfet temperature and other data.
- The throttle pulse width was fixed at 1050-1950μs.
- The CAN digital throttle needs to be adapted separately by the flight controller and the Hobbywing CAN protocol. Please obtain the agreement from Hobbywing sales, after-sales service, agents, flight control manufacturers, etc.



05 Specifications

Recommend Take-off Weight: 15-18kg/rotor (54V, Sea Level)	ESC	Propeller
Recommended Battery: 12-14S LiPo (Max 61V)	Continuous Current: 50A (Non-hermetic Ambient Temperature < 60°C)	Model: MFP 43x14
Powertrain Arm Tube Outer Diameter: 50mm	Maximum Current: 150A (Non-hermetic Ambient Temperature < 60°C)	Single propeller weight: 146g
Protection Grade: IPX6	Recommended Battery: 12-14S LiPo	Weight (INC. adapter): 455g
Maximum Torque: 37kg (54V, Sea Level)	Throttle Pulse Width: 1050-1950μs	
Operating Temperature: -20°C-50°C		
Total Weight: 2490g (INC. prop.)	Motor	
Support throttle Frequency: 50-500Hz	Stator Size: 111*18mm	
	KV: 85	
	Motor dimension: 120*49mm	

06 Parameters

Voltage(V)	Propeller	Throttle(%)	Thrust(g)	Current(A)	Power Input(W)	Speed(RPM)	Efficiency(g/W)	Torque(N · m)	Power Output(W)	Motor Temperature(°C)
54V (12S LiPo)	MFP 43x14	33%	7175	11.3	614.7	1485	11.7	3.37	523.3	/
		35%	7885	13.1	710.4	1557	11.1	3.70	603.0	
		37%	8965	15.9	862.1	1660	10.4	4.21	731.7	
		39%	9740	18.0	975.6	1730	10.0	4.58	829.2	
		42%	10875	21.2	1148.8	1827	9.5	5.12	978.9	
		45%	12680	26.6	1442.2	1972	8.8	5.97	1232.5	
		48%	14000	30.9	1670.7	2071	8.4	6.59	1428.8	
		51%	15300	35.2	1907.5	2165	8.0	7.19	1630.3	
		54%	17305	42.4	2295.7	2303	7.5	8.11	1956.6	
		57%	18715	47.8	2585.4	2396	7.2	8.76	2197.0	
		60%	19810	52.1	2819.9	2466	7.0	9.26	2390.1	
		63%	21560	59.3	3211.7	2574	6.7	10.06	2710.2	
		66%	23030	65.7	3557.4	2662	6.5	10.73	2990.1	
		69%	24795	73.8	3992.3	2763	6.2	11.54	3339.4	
		72%	26215	80.5	4358.1	2842	6.0	12.20	3630.7	
		75%	27825	88.5	4790.5	2928	5.8	12.95	3971.1	
		78%	29535	97.4	5270.8	3016	5.6	13.75	4343.3	
		81%	30945	105.1	5683.9	3087	5.4	14.41	4656.6	
		84%	31435	107.8	5830.9	3111	5.4	14.63	4766.6	
		87%	33235	118.2	6389.4	3198	5.2	15.45	5173.2	
		90%	34920	128.3	6938.7	3279	5.0	16.18	5554.3	
		100%	37670	146.1	7895.3	3414	4.8	17.24	6162.9	

07 Protective function

- **Start protection**
When the power is connected normally, the ESC will first start the self-test. If the self-test is successful, it will run normally after beeping. If the self-test fails, it will not start and the flashing light will act as warning sign.
- **Stall Protection**
When the ESC detects that the motor is locked, the ESC will completely turn off the output and will not restart the motor. At this time, it is necessary to power on again to clear the error and restart the ESC to restore power output.
- **Current protection**
When it detects that the instantaneous current abnormality reaches close to 320A, the ESC will restart immediately, and the output will be turned off if the number of detections reaches 6 consecutive times. After the motor stops, it will return to normal after power on again.
- **Throttle signal loss protection**
When the ESC detects that the throttle remote control signal is lost for more than 0.25 seconds, it will immediately turn off the output to avoid greater losses caused by the continued high-speed rotation of the propeller. After the signal is restored, the ESC will immediately restore the corresponding power output.
- **Temperature protection**
This power system has no temperature protection, and will only send out an alarm when the temperature of the ESC is higher than 110°C. The flashing lights will be 1 long and 3 short, and 1 long and 4 short. When the temperature exceeds 130 degrees, the ESC may be burnt. Upon seeing the prompt, please land immediately.

08 Warning tone description

Symptom	Tone	Possible causes	Possible solutions
Motor fails to start after power on	"Beep beep beep" rapid monotone	Throttle is not reset to zero	Push the throttle to the lowest point or recalibrate the throttle point
Motor fails to start after power on	"Beep, Beep, Beep" (2 second for each interval)	No throttle signal input on the receiver throttle channel	Check if transmitter and receiver is normal Check if wiring of throttle channel is normal
The power-on voltage is lower than 18V or higher than 82V	"Beep , Beep , Beep" (1 second for each interval)	Battery voltage is too low or too high	Replace with a suitable battery

09 Daily usage

1 Adjust LED light color

Use a tool to take out the M3×8 screws that fasten the lampshade, and set the switch according to the corresponding light color below (factory default green). After the setting is successful, assemble and fasten the lampshade in the original way.

Dial code on/off 1	Dial code on/off 2	Dial code on/off 3	LED color
ON	ON	ON	White
ON	OFF	ON	Blue
ON	ON	OFF	Purple
ON	OFF	OFF	Blue
OFF	ON	ON	Yellow
OFF	OFF	ON	Green
OFF	ON	OFF	Red
OFF	OFF	OFF	LED Off

2 Description of light color status

Flashing of LED	Meaning	Solution
Single short flash	Over-voltage	No over-voltage protection. When voltage more than 75V, motor will trigger open circuit protection.
2 short flash	Under-voltage	Replace the battery (Voltage higher 24V)
3 short flash	Over-current	• Check the motor for foreign objects and check the propeller, then power on again • Contact after-sales service
Single long flash	Throttle lost	• Check connection between signal line to the flight controller • Check whether the remote controller and flight controller are turned on • Check the resistance of the black and white wires, if there is a short circuit, contact the after-sales service
Single long flash + Single short flash	Throttle not reset to zero	This problem occurs during the rotation of the motor. Please check the aircraft battery and circuit. There is a short circuit on the circuit.
Single long flash + 2 Short flash	Mosfet overheated (Over 110°C)	Cool down the power system and power on again
Single long flash + 3 Short flashes	Capacitor overheated (Over 110°C)	Cool down the power system and power on again
Single long flash + 4 Short flashes	Stall protection	• Restart after the throttle is reset to zero • Please check if there is any foreign matter in the motor, remove the foreign matter before starting
2 long flashes	ESC open-circuit	• Please check whether the motor circuit is intact • Contact after sales service
2 long flashes + Single short flash	ESC short-circuit	• Please check whether the motor is in good condition • Contact after sales service
2 long flashes + 2 Short flash	Motor short-circuit	• Please check whether the motor is in good condition • Contact after sales service
2 long flashes + 3 Short flash	Phase A operational amplifier is abnormal	• Re-power on to return to normal • Contact after sales service
2 long flashes + 4 Short flash	Phase B operational amplifier is abnormal	• Re-power on to return to normal • Contact after sales service
3 long flashes	Phase C operational amplifier is abnormal	• Re-power on to return to normal • Contact after sales service

3 Replacing the propeller

- Use the appropriate tools to take out the two propeller fastening screws in and replace them with intact propellers. If you need to replace the propeller clips, continue to take out the fastening screws and replace the whole set of propeller clips and propellers.
- Installing the propeller clip blades
Firstly, install the bottom cover on the motor, followed by the propeller blades, propeller gaskets, upper cover (propeller clips) and the final screws in order; pay attention to the installation of the propeller screws, after clamping, the propeller should rotate freely, and make sure that the propeller clamp and the motor fastening screw are tightened and screw glue is used at the same time.

4 Firmware upgrade

There are two ways to upgrade the software: online upgrade via a computer or using flight control remote. The explanation using the flight control remote are as follows.
This function needs to use DataLink data box, special DataLink software for upgrade package, and USB data cable.
DataLink data box version requirements, LINK-01.2, 14-C or higher version, LINK-01.2, 09-U or higher version; DataLink software contact Hobbywing to obtain.
Note: Please ensure that the computer has already installed the Microsoft Visual C++ 2013 before or later using. An upgrade package contains only one program for each ESC. For other programs, please obtain a new upgrade package. For additional details, please refer to the DataLink user manual. The upgrade package can be obtained at the place of purchase; Hobbywing official website, dealers, Hobbywing sales, Hobbywing, and after-sales service. The FOC ESC is one-dimensional and can only be upgraded on a fixed version, not at will.
Note: It can only be upgraded from the existing program. Software and hardware cannot be upgraded together.

4.1 CAN ESC upgrade

- 1) **Connection**
Connect the computer and the DataLink data box with a USB cable;
ESC<-->DataLink data box "yellow red green"<-->"□ □ D", any channel from D1-D8 is acceptable, and it is recommended to use D1 channel first.
- 2) **Software acquisition**
It can be obtained at the place of purchase; Hobbywing official website, dealers, Hobbywing sales, and Hobbywing after-sales service.
Note: It can only be upgraded from the existing program, and software and hardware cannot be upgraded together.
- 3) **Operation**

Run the DataLink software.	→	The USB cable is connected to the data box, and the ESC is connected to the data box.	→	Click "DataLink" of the software. View data box firmware, firmware version LINK-01.2, 14-C or later.	→	Click "CAN->ESC(FAST)", ESC firmware upgrade page.	→
Select the "Scan" button first, and then power on the ESC.	→	After the channel on the page is ticked, select the "Stop" button.	→	After the hardware and firmware information appears on the page.	→	In "Available Version", select the desired firmware and click "Update".	→
Wait for the upgrade to complete, if the upgrade fails, please scan for the upgrade again.	→	After the upgrade is complete, please scan again to confirm that the program is upgraded successfully.	→	The equipment is powered off, there is no sequence of power outages, and the equipment will not be burned.			

4.2 Serial port ESC upgrade

- 1) **Connection**
Connect the computer and the DataLink data box with a USB cable;
ESC<-->DataLink data box "yellow gray green"<-->"□ □ CH1 CL1".
- 2) **Operation**

Run the DataLink software.	→	Connect the USB cable to the DataLink box, connect the ESC to the DataLink box, connect the PWM throttle cable to the signal generator.	→	Click "DataLink" of the software. Check the data box firmware and update the firmware version to LINK-01.2, 09-U or later.	→	Click "UART->ESC(FAST)", the ESC firmware upgrade page.	→
Select the "Scan" button first, and then power on the ESC.	→	After the channel on the page is ticked, select the "Stop" button.	→	After the hardware and firmware information appears on the page.	→	In "Available Version", select the desired firmware and click "Update".	→
Wait for the upgrade to complete, if the upgrade fails, please scan for the upgrade again.	→	After the upgrade is complete, please scan again to confirm that the program is upgraded successfully.	→	There is no sequence of power off, and the equipment will not be burned.			

5 ID set up

If there is no requirement, the default factory ID of the ESC is 1, the throttle channel is 1, and the bus speed is 500Hz.
This function is only available for CAN communication ESCs, and the serial port does not have this function. This function can communicate with the flight controller to realize digital throttle. This function requires the additional purchase of DataLink data box.
Before using this function, ensure that the computer system is installed with the Microsoft Visual C++ 2013 software in advance to operate.

- 1) **Connection**
ESC<-->DataLink data box "yellow gray green"<-->"□ □ CH1 CL1";
Connect the data box to the computer via USB.
Please remove the paddle to avoid danger upon changing the ID.
For the same aircraft, different ESC IDs and throttles cannot be the same. Otherwise, ESCs with the same ID will be recognized as one ESC upon using the CAN function.,
- 2) **Operation**

The ESC is connected to the data box, and the data box is connected to the computer.	→	Run the DataLink software.	→	Enter the software page, confirm the software version of DataLink in the type "DataLink", and ensure that the program version is above LINK-01.2, 15-C.	→		
Enter the CAN parameter adjustment page.	→	Wait for the bus speed automatic setting to complete.	→	Set ID and Throttle.	→	Click "Set ID and Throttle Channel" and wait for the data to be saved.	→
Check the prompt in the upper left corner to see if the setting is complete.	→	The equipment is powered off, there is no sequence of power outages, and the equipment will not be burned.					

6 Fault storage

The ESC has its own fault storage function to store the time during power-on, flight time, and fault time information. This function drastically improves the quality of life and makes it convenient for flight fault analysis. Please note that this function only records the data at the time of failure, and not all flight data.
This function requires the use of DataLink data box, serial port assistant, DataLink software, and USB data cable.
Note: DataLink software can be obtained from Hobbywing official website, dealers, Hobbywing sales, and Hobbywing after-sales.
DataLink data box version requirements, LINK-01.2, 15-C or later; serial port assistant requirements, USB to TTL; DataLink software requires a fault storage version, which can be obtained from the official website, WeChat official account or after-sales.
The DataLink box has three power supply methods; USB data cable, serial port assistant, and external power supply cable. You can choose one of the power supply methods, and there is no need to repeat power supply.
Note: For detailed steps, please refer to the DataLink user manual.

- 1) **Connection**
Serial assistant <--> DataLink data box "GND 5V TX RX" <--> "□ + RX2 TX2";
CAN communication ESC <--> DataLink data box "yellow gray green" <--> "□ □ CH1 CL1", multiple ESCs can be used in parallel.
Note: Upon using multiple ESCs in parallel, the ID and throttle number must be set differently in order for one ESC to be recognized.
Serial communication ESC<-->DataLink data box "yellow red green"<-->"□ □ D", any channel of D1-D8 is acceptable, and it is recommended to use D1 channel first.
- 2) **Software operation**

Run the DataLink software.	→	Connect the USB cable to the DataLink box, connect the ESC to the DataLink box, connect the PWM throttle cable to the signal generator.	→	The serial port uses the version ending with 4J, update the firmware version to LINK-01.2, 10A4 or later; the CAN ESC uses the version ending in C, update the firmware version to LINK-01.2, 15-C or later.	→	Remove the USB cable and connect the serial port assistant.	→
Click the "USB-serial port" button in the upper right corner to enter the serial port page.	→	Click "Fault Analysis" to enter the page.	→	Power on the ESC.	→	Select the serial port number, the default baud rate, click "Open Serial Port" to connect the ESC to the computer.	→
Select a channel, click "Read Fault Information" to view flight faults.	→	After checking the fault, save the data as needed; except for the special case of fault data, it will be kept in the ESC until the memory is full, and the oldest data will be overwritten sequentially.	→	The equipment is powered off, there is no sequence of power outages, and the equipment will not be burned.			

Note: This function requires the serial port assistant. Before using it, please ensure that the serial port assistant is in working conditions. If it cannot be used, please replace the serial port assistant and try again.

10 After-sale maintenance

In the event that the equipment of the power system is damaged, please contact Hobbywing after-sales customer service immediately. Under the premise of not affecting the performance, make sure that you can use the Hobbywing power system kit accessories for replacement after contacting the customer service. Users are prohibited from configuring accessories by themselves (such as screws, paddle clips, propellers) for replacement.