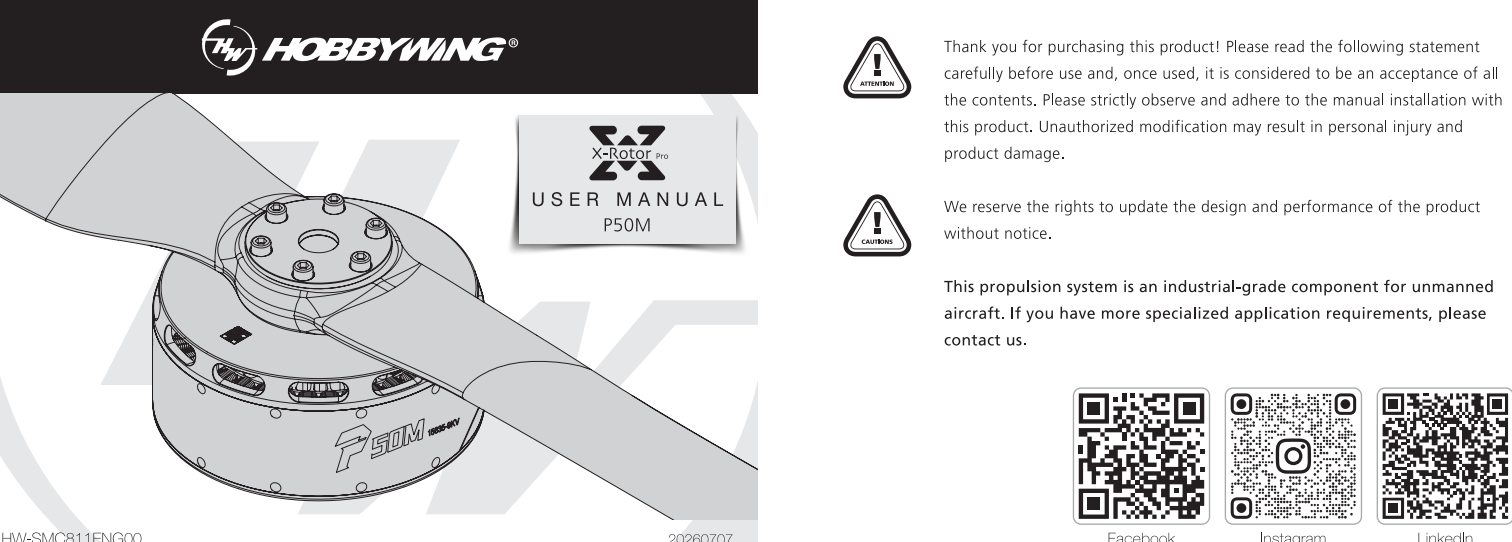




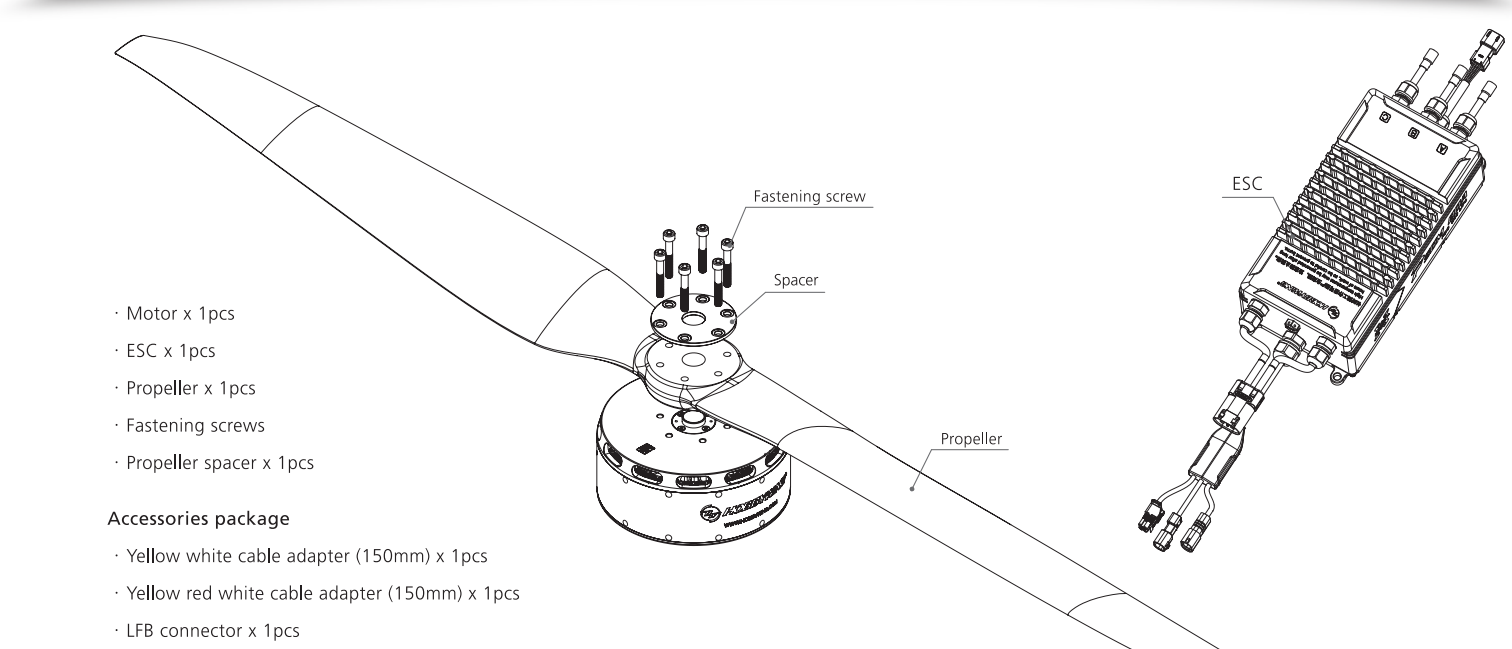
01 Introduction

The P50M is an industrial-grade brushless thrust system designed for multi-rotor aircraft, supporting a rated single-axis load of 50 kg with a maximum thrust of 106 kg/axis. It supports carbon fiber tubes with a 60 mm diameter for installation. Featuring IP35 protection and high-efficiency thermal dissipation, it delivers a one-step power solution for heavy-load multi-rotor drone applications across logistics, emergency rescue, construction lifting, and other critical domains. The FOC ESC employs CAN communication protocol and dual-redundant throttle control (digital/PWM), integrating power-on self-diagnostics, fault logging, over-current protection, and stall protection to ensure operational safety.

02 Precautions

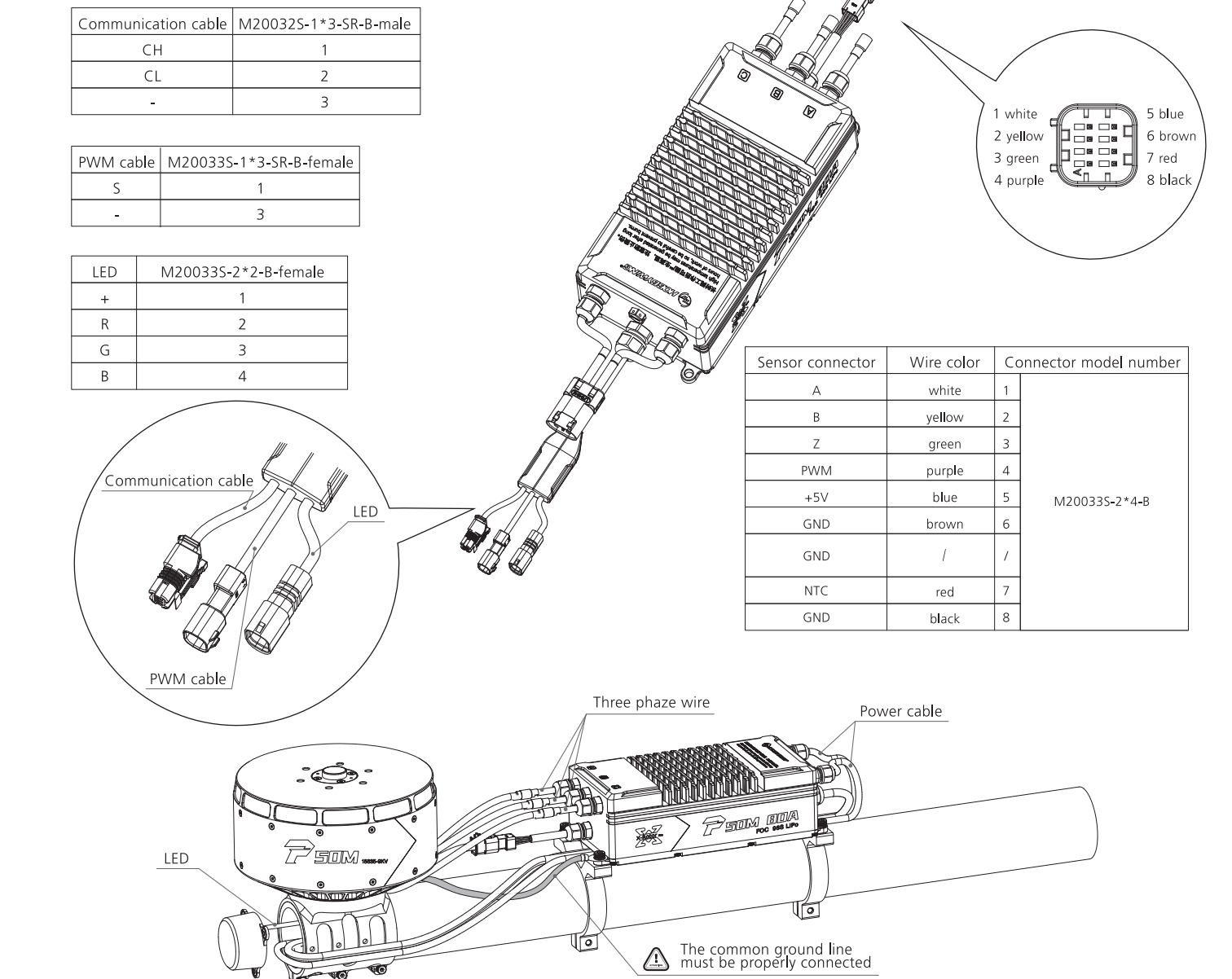
- Please stay away from crowds, high-voltage lines, obstacles, etc. when using, and be sure to follow safety regulations when using.
- The thrust system contains FOC driven ESC, which needs to strictly match the motor parameters. The program is unique. It is only suitable for one combination of propellers and is not compatible with multiple combinations at the same time. If you need to change it, please contact the manufacturer. Unreasonable combinations will trigger ESC protection and make it unusable.
- The ESC is equipped with CAN/485 function. This manual only introduces the CAN communication version. When using the CAN function, the ESC ID and the throttle channel of the same aircraft can not be the same, otherwise the multiple ESCs will be recognized as one ESC.
- Do not install propellers for ground testing to avoid unnecessary danger.
- Be sure to connect all parts carefully. If the connection is poor, you may not be able to control the aircraft normally, or other unpredictable situations such as equipment damage may occur.
- If you need to weld the input and output wire connectors of the ESC, please ensure that the welding is reliable and use welding equipment with sufficient power.
- Do not use this thrust system when the external ambient temperature exceeds 55°C. The high temperature will destroy the ESC and may cause damage to the motor and cause your drone to crash.
- This product adopts a fully isolated design between the protective earth (PE), high-power circuits, and low-power signal circuits, ensuring a low-impedance connection (common grounding) between the motor base and the ESC housing.
- When the sensor cable connector is connected, calibration is required to use sensorless drive mode. Without calibration, the motor will still operate in sensorless drive mode. The motor temperature measurement (NTC) function works normally with or without calibration.
- This product adopts a fully isolated design between protective earth (PE), power circuits, and low-voltage signal circuits, ensuring low-impedance connection (common grounding) between the motor base and ESC housing.
- When connecting the sensor-enabled cable, if sensor-assisted startup is used, calibration via the upper computer is required first. Without calibration, the motor will remain in sensorless startup mode. The motor temperature measurement (NTC) function works normally with or without calibration. The ESC program defaults to not requiring sensor-assisted startup; this logic is added solely to pursue stability during rapid motor startup and is not mandatory.
- The sensor cable and fixed-Props functionality cable share the same wiring. If either function is used, calibration is required for it to take effect.

03 Thrust system composition



04 Thrust system installation

- The product comes standard with a signal cable adapter for debugging purposes. Yellow, red and white cables are data output and upgrade signal cables (The firmware of the ESC can be upgraded), yellow cable is GND; red cable is CAN-High (hereinafter referred to as CH), white cable is CAN-Low (hereinafter referred to as CL); yellow and white cables are PWM throttle signal cables for the ESC, yellow line is GND, and white cable is throttle signal cable.
- The data signal cable outputs real-time data such as throttle, motor speed, bus current, bus voltage, capacitor temperature, IGBT temperature, etc.
- The phase wire connection correspondence between the motor and ESC is: A-Blue, B-Yellow, C-Orange. When connected this way, the actual motor rotation direction is CW (Clockwise). To change the rotation direction, it should be configured via software.
- The standard sensor cable connector includes the motor temperature measurement (NTC) function via Pin7 and Pin8, which provide real-time feedback on motor temperature. The remaining pins are for the sensor cable, which also serve as the fixed-Props control cable.
- ESC PWM throttle range is fixed to 1100-1940µs, no need to do calibration.



05 Specifications

Recommended uniaxial load: 50kg	ESC	Motor
Max.Torque: 116kg	Continuous current: 40A (Non-airtight ambient temperature < 60 °C)	Stator size: 156*35mm
Ambient temperature: -35°C~55°C	Lithium compatible: 280-450VDC	Outer diameter: Ø167.1*1100.5mm
Applicable carbon tube: 60mm (diameter)	Instantaneous current: 80A (3 seconds - good heat dissipation)	KV rating: 9KV / 11 KV
Total weight (excluding propellers): 6100~6300 g	Throttle solidified: 1100-1940µs	Propeller
Protection level: IP35	Communication & digital throttle: CAN / RS485	Model: MSC 64x20 / USC 54x23
Support throttle frequency: 50-500Hz	Firmware upgrade: supported	Weight (straight propeller) : 860g / 707g
Rated output power (Max continuous): 5984 W		
*Normal flight operating voltage range: 280 VDC to 450 VDC.		
Hovering thrust operating voltage range: 315 VDC to 450 VDC.		
Maximum thrust operating voltage range: 336 VDC to 450 VDC.		

06 Thrust system parameters

MSC 64x20-9KV Load performance parameters										
Voltage(V)	Propeller	Throttle(%)	Thrust(g)	Current(A)	Power Input(W)	Speed(RPM)	Efficiency(g/W)	Torque(N·m)	Power Output(W)	Temperature(°C)
400V	MSC 64x20	33%	23676	6.0	2410.8	1225	9.8	15.25	1956.6	90°C
		35%	26903	7.2	2888.2	1305	9.4	17.33	2368.4	
		37%	30242	8.4	3373.8	1383	9.0	19.48	2817.7	
		39%	33678	9.6	3959.7	1458	8.6	21.70	3313.6	
		42%	38862	12.1	4835.2	1560	8.1	25.14	4122.0	
		45%	44421	14.6	5835.4	1669	7.6	28.67	5010.1	
		48%	49445	17.3	6917.7	1767	7.2	32.27	5909.8	
		51%	55053	20.2	8073.6	1860	6.9	35.90	6962.1	
		54%	61046	23.2	9284.3	1946	6.6	39.54	8066.1	
		57%	66525	26.4	10570.6	2030	6.3	43.17	9184.7	
		60%	71855	29.7	11862.0	2112	6.0	46.74	10336.1	
		63%	77113	33.1	13246.1	2196	5.8	50.23	11497.3	
		66%	82140	36.5	14616.8	2282	5.6	53.61	12684.0	
		69%	86939	40.0	15993.9	2320	5.4	56.85	13810.8	
		72%	91481	43.4	17354.0	2376	5.3	59.93	14822.2	
400V	USC 54x23	33%	26740	46.7	15861.4	2451	6.1	62.82	15960.3	90°C
		35%	29968	49.9	19068.8	2478	5.0	65.50	16965.6	
		37%	33342	52.9	21703.9	2519	4.9	67.97	17927.1	
		39%	36867	55.9	22205.4	2555	4.8	70.21	18790.0	
		42%	40409	58.4	23353.7	2588	4.7	72.22	19571.6	
		45%	44049	60.8	24312.0	2615	4.6	74.02	20266.7	
		48%	46838	62.8	25714.1	2653	4.5	76.59	21275.6	
		51%	50112	64.3	26714.1	2653	4.5	76.59	21275.6	
		54%	53612	64.3	26714.1	2653	4.5	76.59	21275.6	
		57%	57342	64.3	26714.1	2653	4.5	76.59	21275.6	
		60%	61046	64.3	26714.1	2653	4.5	76.59	21275.6	
		63%	64838	64.3	26714.1	2653	4.5	76.59	21275.6	
		66%	68638	64.3	26714.1	2653	4.5	76.59	21275.6	
		69%	72438	64.3	26714.1	2653	4.5	76.59	21275.6	
		72%	76238	64.3	26714.1	2653	4.5	76.59	21275.6	
		75%	80038	64.3	26714.1	2653	4.5	76.59	21275.6	
400V	USC 54x23	33%	22233	6.4	2577.3	1487	8.6	12.93	2013.1	90°C
		35%	25510	7.7	3058.2	1580	8.3	14.84	2470.4	
		37%	28843	9.2	3654.7	1691	7.9	16.86	2965.1	
		39%	32504	10.8	4336.8	1790	7.5	18.99	3568.6	
		42%	36333	13.6	5420.3	1933	7.0	22.30	4513.3	
		45%	40293	16.5	6613.4	2069	6.6	25.72	5571.6	
		48%	44409	19.8	7901.9	2197	6.3	29.20	6716.5	
		51%	48612	23.2	9276.3	2318	6.0	32.70	7937.8	
		54%	52917	26.8	10731.0	2431	5.7	36.22	9193.9	
		57%	57342	30.7	12261.1	2538	5.5	39.73	10568.7	
		60%	61865	34.6	13859.7	2638	5.2	43.22	11938.9	
		63%	66525	38.6	15515.2	2732	5.0	46.67	13365.7	
		66%	71342	43.0	17209.8	2820	4.8	50.06	14782.0	
		69%	76357	47.3	18919.3	2901	4.7	53.35	16235.9	
		72%	81513	51.5	20613.1	2974	4.5	56.50	17684.8	
		75%	86792	55.6	22256.4	3040	4.4	59.47	18929.3	
400V	USC 54x23	33%	20057	55.6	22256.4	3040	4.4	59.47	18929.3	90°C
		35%	22233	64.3	26714.1	2653	4.5	76.59	21275.6	
		37%	24409	73.0	31163.1	2974	4.5	56.50	17684.8	
		39%	26585	81.7	35612.1	3295	4.2	60.45	21992.0	
		42%	28761	90.4	40061.1	3616	4.1	64.40	26299.2	
		45%	30937	99.1	44510.1	3937	4.0	68.35	30606.4	
		48%	33113	107.8	48959.1	4258	3.9	72.30	34913.6	
		51%	35289	116.5	53408.1	4579	3.8	76.25	39220.8	
		54%	37465	125.2	57857.1	4899	3.7	80.20	43528.0	
		57%	39641	133.9	62306.1	5220	3.6	84.15	47835.2	
		60%	41817	142.6	66755.1	5541	3.5	88.10	52142.4	
		63%	43993	151.3	71204.1	5861	3.4	92.05	56449.6	
		66%	46169	160.0	75653.1	6182	3.3	96.00	60756.8	
		69%	48345	168.7	80102.1	6503	3.2	100.00	65064.0	
		72%	50521	177.4	84551.1	6824	3.1	104.00	69371.2	
		75%	52697	186.1	89000.1	7145	3.0	108.00	73678.4	

The above data are measured by Hobbywing Lab at the ambient temperature of 25°C and sea level by changing the throttle input adjustment. The motor temperature is measured by running the throttle at the rated point for 10 minutes, for reference only.

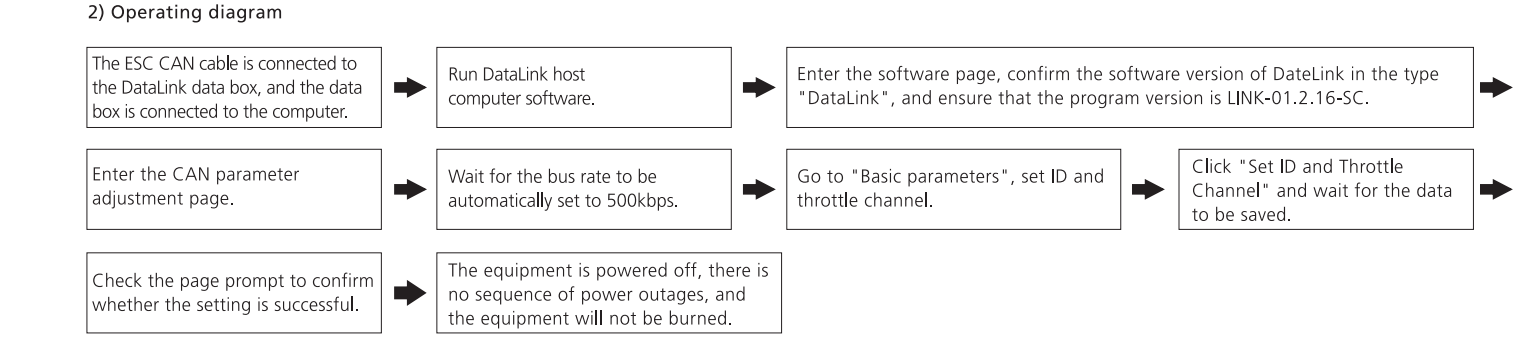
07 ESC protection function

- This ESC is specially designed for industrial drones, without low-voltage protection and over-heat protection.
- Stall protection
When the ESC detects that the motor is locked, the ESC will completely turn off the output and repeatedly try to restart the motor. Please land the aircraft as soon as possible if the motor is unable to be restarted. The power output can only be resumed after the power is turned off and restarted, and the fault is eliminated.
- Over current protection
When the instantaneous phase current abnormally reaches 250A, the ESC will turn off the output and keep trying to restart the motor. If the motor does not restart, it will return to normal after power on again.

- Over-heat warning
A fault message will be sent out through the data interface when the IGBT temperature is higher than 110°C or capacitor temperature is higher than 100°C. Please land the aircraft in time or reduce the throttle output when the ESC reports an over-heat fault, if the temperature continues to rise, electronic components may be damaged.
- Low voltage protection
This ESC has no low-voltage protection. Some electronic components of the ESC will work abnormally when the voltage falls below 315VDC. Please land the aircraft in time.
- Throttle signal loss protection
When the ESC detects that the throttle signal is lost, the output will be turned off immediately to avoid greater losses caused by the continued high-speed rotation of the propeller. After the signal is restored, the ESC will resume normal operation immediately.

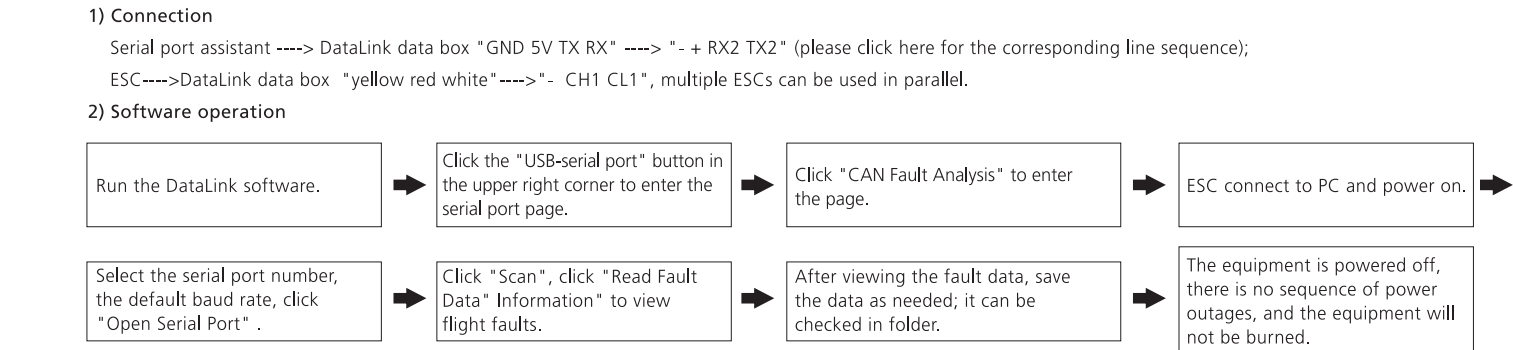
08 ID setting

- If there is no requirement, the default factory ID of the ESC is 1, the throttle channel is 1, and the bus speed is 500kpbs. This function requires the additional purchase of DataLink data box. Before using this function, ensure that the computer system has installed Microsoft Visual C++ 2013 software in advance, otherwise it cannot operate normally.
- 1) Connection
ESC---->DataLink data box "yellow red white"---->- CH1 CL1"; Connect the data box to the computer via USB. Connect the data box to the computer via USB. When changing the ID, please remove the propeller to avoid danger. Please set ESC ID one by one.
- For the same aircraft, different ESC IDs and throttles cannot be the same to avoid same ID recognizing as one ESC when using CAN function.



09 Fault data read

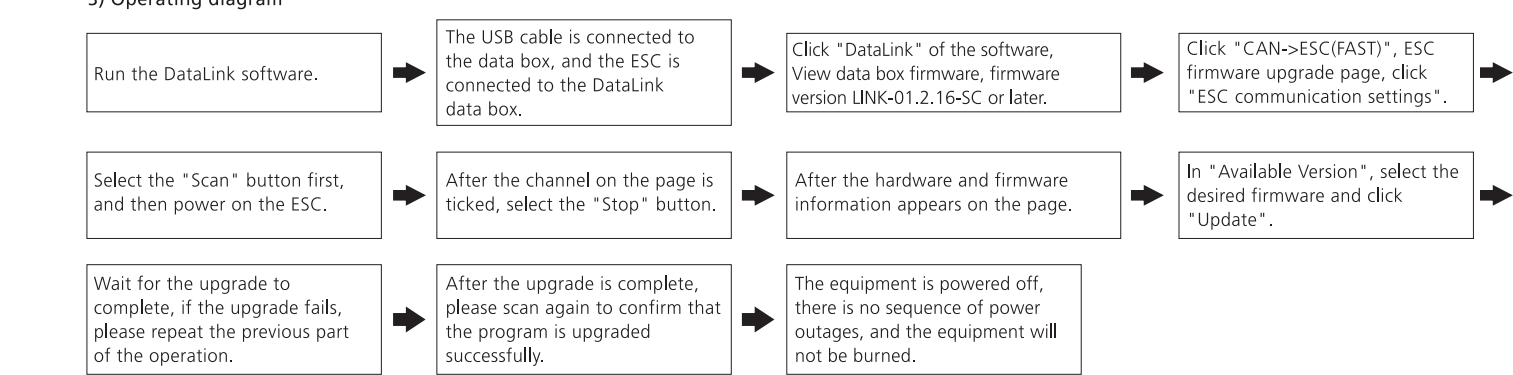
- The ESC has its own fault storage function to store the times upon powering-on, flight time, and fault times information. It is convenient for flight fault analysis. This function needs to use DataLink data box, serial port assistant, and DataLink host computer software.
- Note: DataLink software can be obtained from Hobbywing official website, dealers, Hobbywing sales, and Hobbywing after-sales.
- DataLink data box firmware version requirements: LINK-01.2.16-5C or later; serial port assistant requirements: USB to TTL protocol; DataLink host computer software requirements: fault storage version. It can be obtained on the official website, WeChat official account or after-sales service.
- The DataLink box has three power supply methods (+5V), USB data cable, serial port assistant, and external power supply cable. You can choose one of the power supply methods, and you don't need to repeat the power supply.
- Note: For detailed steps, please refer to the DataLink user manual.



10 Firmware upgrade

- Firmware upgrade is divided into two ways: computer online upgrade and flight controller remote upgrade. It supports online upgrade of multiple ESCs at the same time, and the upgrade port is CAN-ESC (Fast).
- The upgrade of the flight controller needs to cooperate with the flight control(not explained here).
- This function needs to use DataLink data box, special DataLink software for upgrade package, and USB data cable.
- DataLink data box version requirements, LINK-01.2.16-5C or later; DataLink software can be obtained from Hobbywing official website, distributors, Hobbywing sales, and Hobbywing after-sales.
- Note: Please ensure that the computer system has installed Microsoft Visual C++ 2013 software before using this function, otherwise it cannot be used. An upgrade package usually only contains one program for one type of ESC. For other ESCs, please re-obtain the upgrade package for the corresponding ESC model.

- 1) Connection
Connect the computer and the DataLink data box with the USB data cable; ESC---->DataLink data box "yellow red white"---->- CH1 CL1".
- 2) Firmware acquisition
It can be obtained at the place of purchase, Hobbywing official website, dealers, Hobbywing sales and Hobbywing after-sales offices. Note: It can only be upgraded from the existing program, and software and hardware cannot be upgraded together.
- 3) Operating diagram



11 Common Faults and Prompt Sound Description

Symptoms	Alarm tone	Possible causes	Solutions
Motor fails to start after power on	"Beep beep beep..." rapid monophonic	Throttle 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..." (1 second for each interval)	Receiver throttle channel has no throttle signal output	1. Check whether the transmitter and receiver operates normally 2. Check whether the throttle control channel wiring is normal
The power-on voltage is lower than 315VDC	"Beep, beep" (interval 1 second)	Battery voltage is too low	Replace with a suitable fully charged battery
The power-on voltage is higher than 450VDC	"Beep, beep" (interval 1 second)	Battery voltage too high	Replace with a suitable fully charged battery
The motor stops or restarts		The motor is not compatible with the ESC	Replace the motor, or replace the propeller
There is no sound during the self-test of the motor, but the motor can rotate		Driver exception	1. Replace ESC 2. Return to factory for repair
The motor cannot start normally, accompanied by "click-click" jitter		Motor phase loss	1. Check phase connection 2. Check motor 3. If there is no problem with the motor and connection, return the ESC to the factory for repair

12 The blinking of the light

Condition	normal	Full of throttle	Over voltage	Low voltage	Over current	Throttle loss	The input throttle signal is not at the 0% position	MOS overheat	Capacitor over heat	Motor block
Number of blinking of the light	The light is always on	Continuous short blinking	1 short	2 short	3 short	1 long	1 long and 1short	1 long and 2 short	1 long and 3 short	1 long and 4 short
Others										
Condition		The input throttle signal is not at the 0% position				Shorted circuit of signal line		Open circuit of motor		
Sound & blinking		Continus short loudly beep & LED continuous short blinking				Continuous short with blinking & LED off with LED off		Continus short blinking without beep		