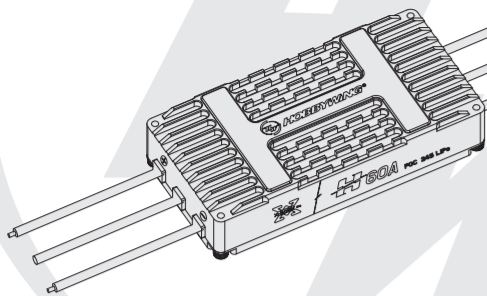




Thank you for purchasing this product! Please read the following statement carefully before use and, once used, it is considered to be an acceptance of all the contents. Please strictly observe and adhere to the manual installation with this product. Unauthorized modification may result in personal injury and product damage. We reserve the rights to update the design and performance of the product without notice.

**X-ROTOR PRO**  
H60A-24S-FOC-RTF  
USER MANUAL



20230417

## 01 Safety Precautions

- This is a FOC drive ESC and needs to strictly match the motor parameters. The unique program is only suitable for one motor + propeller configuration. It is not compatible with multiple configurations at any time. Please contact the manufacturer for use.
- The power system used with this ESC is not recommended to replace the propellers. The wrong configuration will trigger the ESC protection, making it unusable.
- Do not bring propellers for ground testing to avoid unnecessary danger.
- Before connecting the ESC to related components, please ensure that all contact terminals are well insulated to avoid short-circuit from causing damages to the ESC.
- Please be sure to connect all parts appropriately. If the connection is poor, you may not be able to control the aircraft normally, and may risk damages to the equipment.
- Before using the ESC, please carefully review both the ESC and motor manual to ensure that the power system is properly configured to avoid causing damage to the ESC due to wrong configuration.
- If you need to do soldering work on the input and output wire plugs of the ESC, please ensure that the soldering station is reliable. And use the full power of soldering iron.
- Do not set the ambient temperature of the electric switch to higher than 65°C. High temperature will cause damages to both the ESC and motor.
- The direction of the motor can be changed by swapping the order of the two-phase wires.
- This ESC is equipped with CAN function. When using the CAN function, the ESC ID and the throttle channel of the same aircraft cannot be the same. Otherwise, multiple ESCs will be recognized as the same.

## 02 Product features

- The program is specially optimized for the external rotor to improve throttle speed response, taking into account both response and reliability.
- This ESC adopts nano-coating technology, the protection level is IP55, and IP67 can be customized.
- Two modes of CAN digital throttle and PWM throttle are newly added to improve the working reliability of the power system.
- The microprocessor is powered by an independent voltage regulator IC, which has better anti-interference ability and reduces the possibility of runaway.
- Using shielded wire to improve anti-interference capability, and ensuring signal quality.
- FOC ESC, strict configuration of motor parameters, high efficiency, low noise, energy recovery, and good throttle linearity.
- Using CAN communication, the input and output throttle, motor speed, bus current, bus voltage, capacitor temperature, MOS temperature and other data can be controlled in real time. The communication protocol can be obtained by contacting the HW official.
- Compatible with throttle signals with a refresh rate of 50-500Hz, suitable for a variety of flight controls.
- The ESC has built-in fault storage, and the ESC can record flight faults such as overcurrent, stalled, throttle loss, overheat, etc., and can be read by connecting the ESC data cable through the DataLink data box (optional).
- You can use DataLink (optional) to upgrade the ESC program. For details, refer to the DataLink instruction manual or contact the manufacturer.
- Support flight control to upgrade ESC firmware (this function requires the cooperation of flight control).
- Throttle pulse width 1100-1940µs, solidified pulse width, not calibrated.
- The propellers setting function is customizable, this manual does not include the introduction of ESC custom function.

## 03 Product Specifications

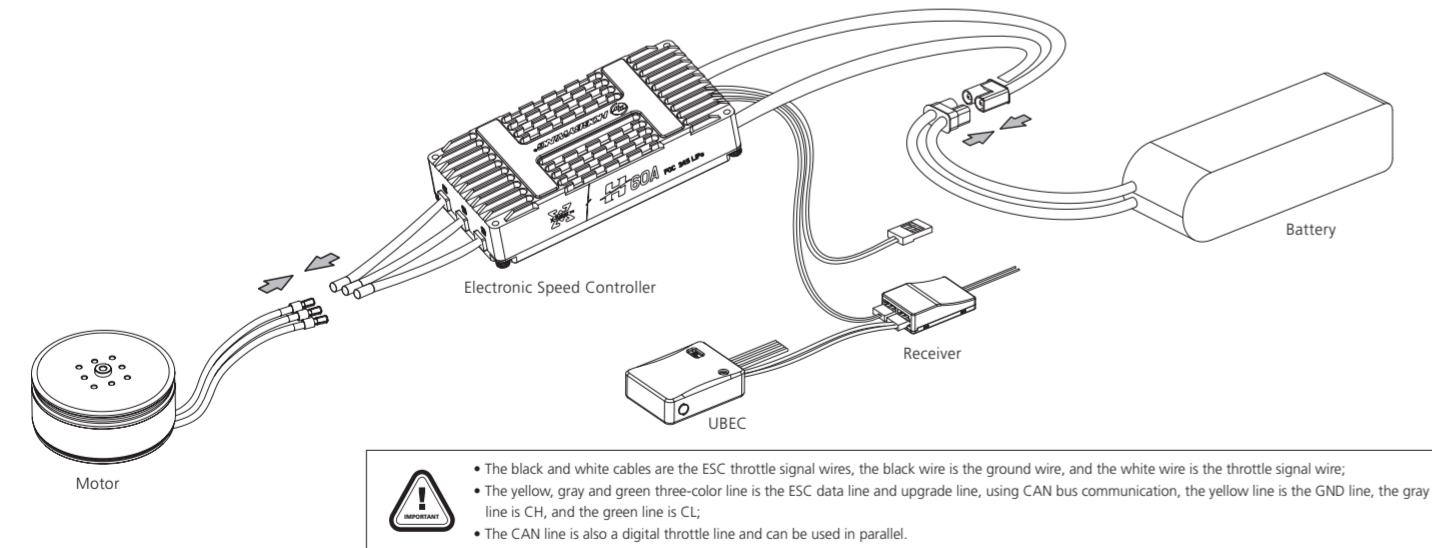
Model	Continuous current Cooling wind speed 7m/s	Specification	BEC	Number of lithium battery cells(3.7V)	parameter options	Weight (no wire)	Physical dimension (mm)
XRotor-Pro-H60A-24S-FOC-RTF-HW-H-V1	25A	60A	None	18-24S	Unable to change parameters	181g	113 x 56 x 25.9

## 04 User Guide

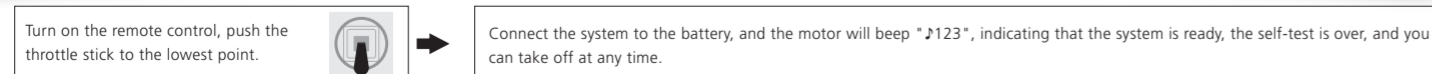
### 1 Precautions

- Warning!** The throttle of this ESC is fixed, and the throttle stroke cannot be calibrated.
- Warning!** The FOC ESC has a braking effect and reverse-series voltage, please do not use a power supply device that cannot absorb the reverse-series voltage for ESC testing or flight, otherwise the ESC and power supply will be damaged.
- Warning!** This ESC has PWM throttle mode, CAN digital throttle mode, set which throttle mode to use, and the default response corresponds to the throttle mode.

### 2 Wiring method



## 05 Normal start-up process



## 06 Description of the protection function

This ESC is specially designed for industrial drones, without low-voltage protection and over-temperature protection.

### 1) 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. If the motor still cannot be started, please land the plane as soon as possible. The power output can only be resumed after the power is turned off and restarted, and the fault is eliminated.

### 2) Current protection:

When the instantaneous phase current abnormality reaches close to 200A, or close to the short-circuit current, the ESC will completely turn off the output and repeatedly try to restart the motor. After the number of over-current reaches 6 times, the motor will not restart, and it will return to normal after power on again.

### 3) Overheat protection:

When the MOS temperature is higher than 110°C or the capacitor temperature is higher than 100°C, it will send an over-temperature fault message through the data interface. When the ESC reports an over-temperature fault, if the temperature continues to rise, electronic components may be damaged. Please land the c in time or reduce the throttle output.

### 4) Low current protection:

This ESC has no low-voltage protection. When the voltage is lower than 36V, some electronic components of the ESC will work abnormally. Please land the aircraft in time.

### 5) Throttle signal loss protection:

When the ESC detects that the throttle signal is lost, 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.

## 07 ID Setup

If there is no requirement, the default factory ID of the ESC is 1, the throttle channel is 1, and the bus speed is 500KHz. This function needs to purchase DataLink data box separately to use. 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

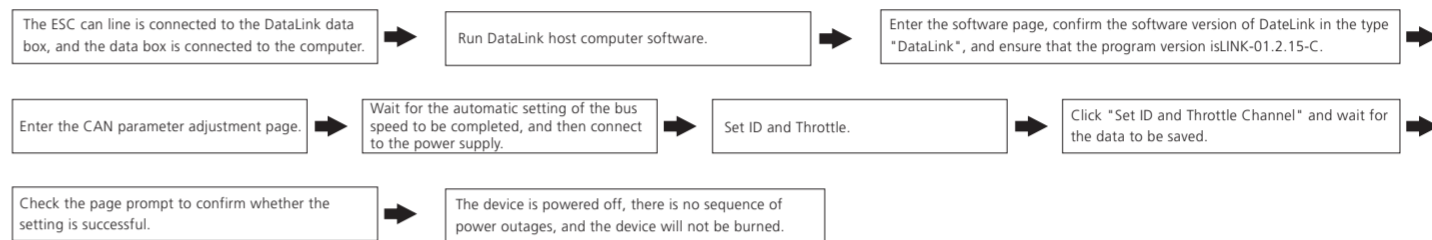
ESC-----DataLink data box \*yellow gray green\*-----> "—CH1 CL1";

Connect the data box to the computer via USB.

When changing the ID, please remove the paddle to avoid danger.

For the same aircraft, different ESC IDs and throttles cannot be the same, otherwise when using the CAN function, different ESCs with the same ID will be recognized as one ESC.

### 2) Operation



## 08 Read fault data

The ESC has its own fault storage function, which can store power-on times, flight time, and fault times information, which 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-01.2.15-C 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.

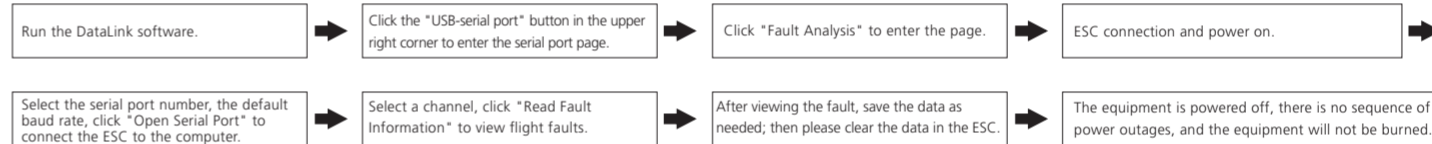
**Note:** For detailed steps, please refer to the DataLink user manual.

### 1) Connection

Serial port assistant -----> DataLink data box \*GND 5V TX RX\* -----> "— + RX2 TX2" (please click here for the corresponding line sequence);

ESC-----DataLink data box \*yellow gray green\*-----> "—CH2 CL2", multiple ESCs can be used in parallel.

### 2) Operation



## 09 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 control needs to cooperate with the flight control, which is 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-01.2.15-C 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;

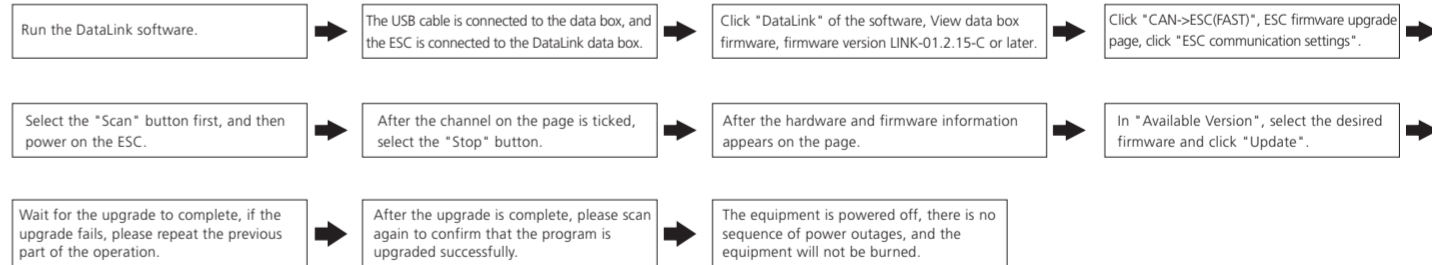
ESC-----DataLink data box \*yellow gray green\*-----> "—CH1 CL1".

### 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) Operation



## 10 Common failures and workaroud

### Warning tone description

SYMPTOM	STONE	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
Motor fails to start after power on	"Beep beep beep" rapid monotone	Throttlet 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" (1 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.
Voltage below 36V after power on	"Beep, Beep, Beep" (1 second for each interval)	Battery voltage is too low.	Replace with a full-charged battery.
Voltage velow 120V after power on	"Beep, Beep, Beep" (1 second for each interval)	Battery volatage is too high.	Replace with a suitable and fully-charge battery.
Motor stops or restarts during operation		Motor is not compatible with the ESC.	Replace motor, or propeller.
No sound during self-test, motor is operating	No sound during self-test, motor is operating	Abnormal drive.	1. Replace ESC; 2. Return to factory for repair.
Motor fails to start normally, accompanied by "jam" vibration	No sound during self-test, motor is not operating	Loss of motor phase.	1. Check phase connection; 2. Check motor; 3. Return to factory for repair.