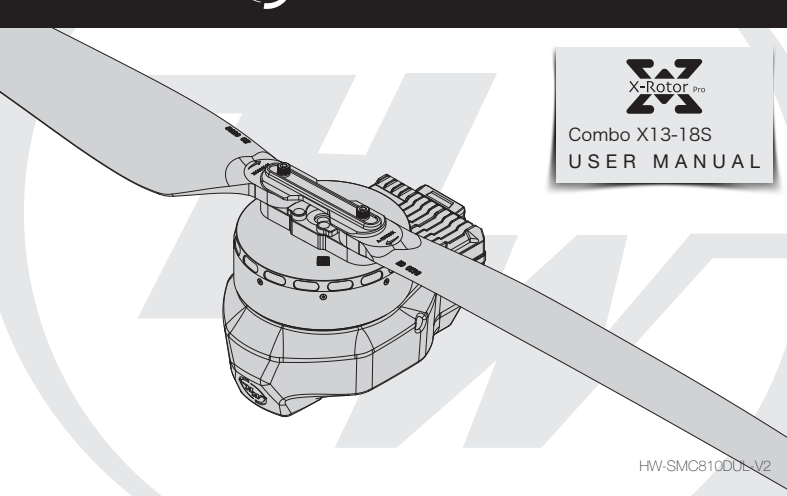




Thank you for your purchase. Please read the following statement carefully before use. Once used, it is considered to be an acceptance of all the contents. Please follow the manual instructions carefully during the installation. Modification may result in personal injury and product damage. We reserve the rights to update the design and performance of the product without notice.



HW-SMC81000-1/2

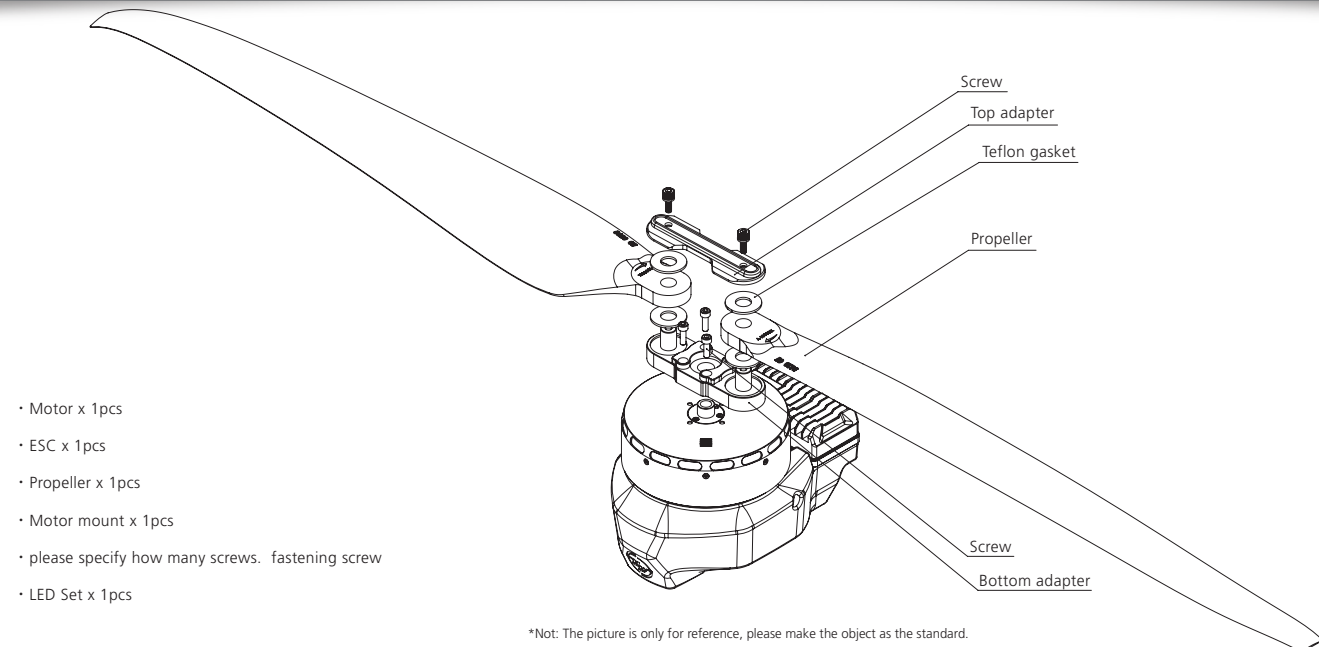
01 Introduction

The COMBO-XRotor-X13 brushless power system is a plant protection power system that adapts to a single-rotor load of 25-27kg/rotor. The maximum thrust of a single-rotor is 53kg; it is suitable for a 50mm carbon fiber tube arm; the overall waterproof level is IPX6, and it is resistant to rain, rain pesticides, salt spray, high temperature, dust, impact, mud and sand resistance; the ESC uses FOC vector control, based on PMSM 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, and records fault data.

02 Safety Precautions

- When use it please keep away from crowd, high voltage cable and obstacles and conform to safety regulations.
- Never approach to the high-speed rotating propeller & motor to avoid being injured by propeller.
- Check all the components conditions before use. If there is any damaged component, please contact after-sale service for replacement.
- Check if the mounting screws, and all connecting parts before flight.
- Always make sure the motor is horizontal before flight.
- The X13 power system is connected to a circular tube arm with a diameter of 50mm.
- The color of the power system navigation light can be selected. After removing the light housing, you can select the desired color by flipping the dial switch.
- The CAN function can only be used when the flight controller has a CAN Channel.
- This function can be realized only when the flight controller has a CAN channel.
- There is no digital throttle for UART communication. UART communication is optional for this power system.

03 Components of the Power System

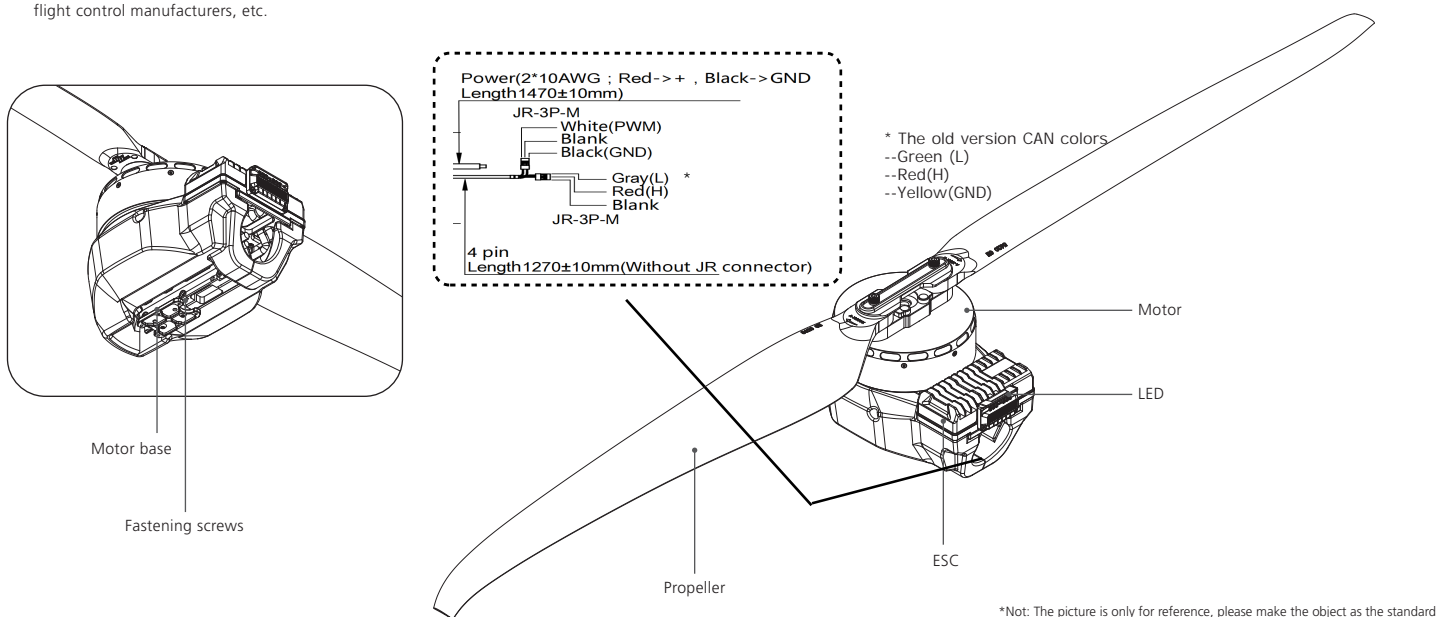


- Motor x 1pcs
- ESC x 1pcs
- Propeller x 1pcs
- Motor mount x 1pcs
- please specify how many screws, fastening screw
- LED Set x 1pcs

*Not: The picture is only for reference, please make the object as the standard.

04 Power system installation

- The whole power system has been assembled before leaves the factory. Unpack and take out the power system to install on the rack agricultural as per the rotation direction of motor.
- The gray and red (yellow, red and green) cables are the data output. Upgrade signal wire (ESC system is upgradable) and digital throttle using the Hobbywing CAN protocol. The blank (yellow wire) is ground wire, the red wire is CAN-High (CH), and the gray(green) wire is CAN-Low (CL).
- The optional UART communication power system. Yellow, red and green cables are the data output and update signal line (the ESC system can be updated).
- 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 protocol from Hobbywing sales, after-sales service, agents, flight control manufacturers, etc.



*Not: The picture is only for reference, please make the object as the standard.

05 Specifications

Recommend Take-off Weight: 25-27kg/rotor(54V, Sea Level)
Recommended Battery: 18S LiPo(Max 78.3V)
Maximum Thrust: 53kg(+70V, Sea Level)
Operating Temperature: -20°C-50°C
Mounting Arm Tube Outer Diameter: 50mm
Protection Grade: IPX6
Total Weight: 4087g (INC. prop)
Support throttle Frequency: 50-500Hz

ESC
Continuous Current: 80A (Non-hermetic Ambient Temperature <60°C)
Maximum Current: 200A (Non-hermetic Ambient Temperature <60°C)
Recommended Battery: 18S LiPo
Throttle Pulse Width: 1050-1950µs

Propeller
Diameter Pitch: 56*20 inch
Single propeller weight: 292g
Weight (INC. adapter): 805g

Motor
Stator Size: 138*25
Motor Size: 148*63.5mm
KV: 60

06 Parameters

| Voltage (V) | Propeller | Throttle (%) | Thrust (g) | Ampere (A) | Power (W) | Speed (RPM) | Efficiency (g/W) |
|-------------|-----------|--------------|------------|------------|-----------|-------------|------------------|
| 70 | HW5620 | 32% | 9254 | 10.5 | 721.7 | 991 | 12.8 |
| | | 33% | 9514 | 10.9 | 749.3 | 1004 | 12.7 |
| | | 36% | 11268 | 13.7 | 945.4 | 1091 | 11.9 |
| | | 39% | 13287 | 17.2 | 1190.0 | 1183 | 11.2 |
| | | 42% | 15487 | 21.4 | 1477.5 | 1275 | 10.5 |
| | | 45% | 17812 | 26.1 | 1802.7 | 1364 | 9.9 |
| | | 48% | 20221 | 31.3 | 2161.3 | 1450 | 9.4 |
| | | 51% | 22693 | 36.9 | 2550.9 | 1532 | 8.9 |
| | | 54% | 25218 | 43.0 | 2971.1 | 1611 | 8.5 |
| | | 57% | 27794 | 49.6 | 3423.3 | 1688 | 8.0 |
| | | 60% | 30426 | 56.6 | 3910.4 | 1762 | 7.8 |
| | | 63% | 33118 | 64.3 | 4436.6 | 1836 | 7.5 |
| | | 66% | 35874 | 72.5 | 5006.4 | 1908 | 7.2 |
| | | 69% | 38691 | 81.4 | 5623.4 | 1980 | 6.9 |
| | | 72% | 41557 | 91.1 | 6289.6 | 2050 | 6.6 |
| | | 75% | 44447 | 101.4 | 7002.5 | 2119 | 6.3 |
| | | 78% | 47319 | 112.3 | 7753.4 | 2186 | 6.1 |
| | | 81% | 50109 | 123.5 | 8524.6 | 2248 | 5.9 |
| 84% | 52731 | 134.5 | 9286.5 | 2305 | 5.7 | | |
| 87% | 55070 | 144.8 | 9995.8 | 2355 | 5.5 | | |
| 90% | 56981 | 153.4 | 10594.6 | 2396 | 5.4 | | |
| 100% | 57893 | 157.7 | 10886.6 | 2415 | 5.3 | | |

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 cycle 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 24V 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 M3x8 screws that fasten the led cover, and set the switches according to the corresponding light color below (factory default green). After the setting the switches, assemble and fasten the led cover.

| 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 | Replace the battery (Voltage below 81V) |
| 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 and replace them with new 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 blades
First, 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 thread locker is used at the same time.

4 Firmware upgrade

There are two ways to update the firmware: online update via a computer or using flight control pass through. The process using the flight controller pass through are as follows. This function uses DataLink data box, special DataLink software for upgrade package, and USB data cable. DataLink data box version requirements, LINK-01.2.15-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 will not support any other firmware, and can only be updated to the official firmware. Note: It can only be upgraded from the existing system. Software and hardware cannot be upgraded together.

4 CAN ESC upgrade

1) Connection
Connect the computer and the DataLink data box with a USB cable;
ESC---->DataLink data box * red gray (yellow red green)---->"-CH1 CL1"

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

```

    graph LR
    A[Run the DataLink software.] --> B[The USB cable is connected to the data box, and the ESC is connected to the data box.]
    B --> C[Click "DataLink" of the software, view data box firmware, firmware version LINK-01.2.15-C or later.]
    C --> D[Click "CAN->ESC(FAST)", ESC firmware upgrade page.]
    D --> E[Select the "Scan" button first, and then power on the ESC.]
    E --> F[After the channel on the page is ticked, select the "Stop" button.]
    F --> G[After the hardware and firmware information appears on the page.]
    G --> H[In "Available Version", select the desired firmware and click "Update".]
    H --> I[Wait for the upgrade to complete, if the upgrade fails, please scan for the upgrade again.]
    I --> J[After the upgrade is complete, please scan again to confirm that the program is upgraded successfully.]
    J --> K[The equipment is powered off, there is no sequence of power outages, 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 bate rate is 500KHz. This function is only available for CAN communication ESCs, and the UART does not have this function. This function can communicate with the flight controller to realize digital throttle. Before using this function, ensure that the computer system is installed with the Microsoft Visual C++ 2013 software in advance to operate. This function requires the additional purchase of DataLink data box.

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

2) Operation

```

    graph LR
    A[The ESC is connected to the data box, and the data box is connected to the computer.] --> B[Run the DataLink software.]
    B --> C[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.]
    C --> D[Enter the CAN parameter adjustment page.]
    D --> E[Wait for the bus speed automatic setting to complete.]
    E --> F[Set ID and Throttle.]
    F --> G[Click "Set ID and Throttle Channel" and wait for the data to be saved.]
    G --> H[Check the prompt in the upper left corner to see if the setting is complete.]
    H --> I[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 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, UART 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; UART 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, UART assistant, and external power supply cable. You can choose one of the power supply methods, and there is no need to use multiple power supply methods. Note: For detailed steps, please refer to the DataLink user manual.

1) Connection
UART assistant ----> DataLink data box "GND 5V TX RX" ----> "- + RX2 TX2";
CAN communication ESC ----> DataLink data box * red gray (yellow red 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.

2) Software operation

```

    graph LR
    A[Run the DataLink software.] --> B[Connect the USB cable to the data box, connect the ESC to the data box, check whether the firmware of DataLink itself matches the ESC.]
    B --> C[The CAN ESC uses the version ending in -C-, update the firmware version to LINK-01.2.15-C or later.]
    C --> D[Remove the USB cable, and connect the UART assistant.]
    D --> E[The ESC connect to the receiver (or PWM generator), the ESC connect to DataLink data box, the box connect to PC by UART assistant. And power on the ESC.]
    E --> F[Run UARTassistant.]
    F --> G[Select the COM and connect, select HEX for both receiving and sending settings, and default to other settings.]
    G --> H[Send three commands in sequence: "01 A8 15 00 00 08 A3 0E ", "01 A6 11 00 00 02 B0 AA ", "01 A6 12 00 00 01 0F 01 "]
    H --> I[Run the datalink software. And click "UART" in the upper right corner to enter the next page. Then select "Fault Analysis".]
    I --> J[After sending each command, a data reply will be received (multiple electrical readings can be read at once). And the serial port connection will be disconnected.]
    J --> K[Select a channel, click "Read Fault Information" to view flight faults.]
    K --> L[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.]
    L --> M[The equipment is powered off, there is no sequence of power outages, and the equipment will not be burned.]
    
```

Note: This function requires the UART assistant. Before using it, please ensure that the UART assistant is in working conditions. If it cannot be used, please replace the UART 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, propeller clips, propellers) for replacement.