HOBBYWING®

X-Rotor USER MANUAL
Multi-Rotor
Brushless Electronic Speed Controller
XRotor Micro 12A/20A 4IN1
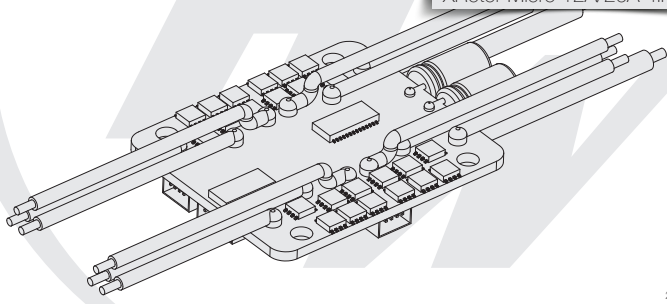
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01 Warnings

- Read through the manuals of all power devices and aircraft and ensure the power configuration is rational before using this unit, as incorrect configuration may cause the ESC to overload and be damaged.
- Ensure all wires and connections must be well insulated before connecting the ESC to related devices, as short circuit will damage your ESC. And ensure all devices are well connected, (please use a soldering iron with enough power to solder all input/output wires and connectors if necessary,) as poor connection may cause your aircraft to lose control or other unpredictable issues such as damage to the device.
- Do not use this unit in the extremely hot weather or continue to use it when it gets really hot (around 105℃/221℉). Because high temperature will cause the ESC to work abnormally or even damage it.
- Users must always disconnect the batteries after use as the current on the ESC is consuming continuously if it's connected to the batteries (even if the ESC is turned off). The battery will completely be discharged and may result in damage to the battery or ESC when it is connected for a long period of time. This will not be covered under warranty.

02 Features

- Well-designed core program with all parameters adjusted to the optimum saves all the trouble of parameter adjustment.
- Smaller size & lighter weight for smaller-size multirotors/drones.
- Multiple output ports for powering different accessories such as picture transmission module, camera and LED lights and etc.
- Amp/Volt monitoring port for flight contr oller monitoring Amp/Volt in real time (the FC needs to support time function , XRotor 12A 4IN1 Micro without this).
- One-Shot125 signal-receiving mode with a real-time signal frequency of up to 3800Hz supported.
- One-Shot42 signal-receiving mode supported.
- MultiShot signal-receiving mode supported.
- DEO (Driving Efficiency Optimization) technology significantly reduces the ESC temperature, improves the throttle response, and strengthens the stability and flexibility of multi-rotors. (**Note:** this ESC is quite suitable for QAVs.)
- Active braking (brought by DEO technology) for quicker deceleration when reducing the throttle amount.
- Motor direction is switchable between CW and CCW through the transmitter.
- Braking function allows the motors to quickly stop spinning when the throttle stick is moved to the bottom position.
- Compatible with various flight controllers and supports a PWM signal frequency of up to 621Hz in "Regular" signal-receiving mode.
- Intelligent motor lock-up protection for protecting the motor and the ESC.

03 Specifications

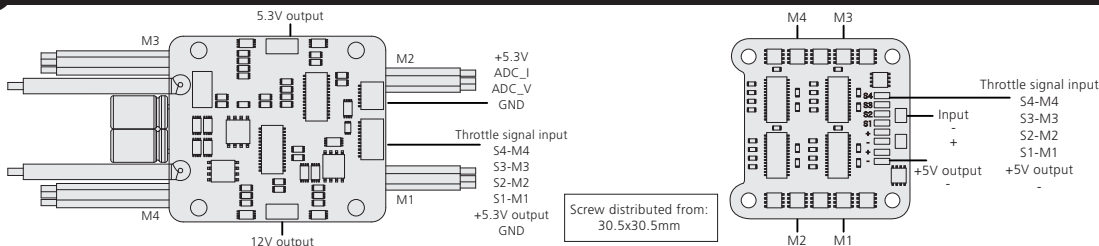| Model	Con. Current	Peak Current (10s)	BEC	LiPo	Weight	Size
XRotor Micro 20A 4IN1	20A	25A	5.3V & 12V, 3A	3-4S	24.5g	54 x 36 x 7mm
XRotor Micro 12A 4IN1	12A	18A	5V , 1A	1-4S	8g	38.1 x 37.9 x 5.3mm

Notes:
- This XRotor ESC supports the PWM signal frequencies of 50 to 621Hz in regular signal-receiving mode, the throttle high level ranges from 700 to 2200μs (1100~1900μs by default). And the ESC supports throttle calibration.
- This XRotor ESC supports the signal frequency of 50 to 3800Hz in One-Shot125 signal-receiving mode, the throttle high level ranges from 110 to 270μs (125~250μs by default). And the ESC supports throttle calibration.
- This XRotor ESC supports the One-Shot42 signal-receiving mode, the throttle high level ranges from 35 to 90μs (42~81μs by default). And the ESC supports throttle calibration.
- This XRotor ESC supports the MultiShot signal-receiving mode, the throttle high level ranges from 3 to 30μs (5~25μs by default). And the ESC supports throttle calibration.
- Users need to re-calibrate the throttle range after they change the (throttle) signal frequency.
- Amp/Volt monitoring port: APM standar d, the voltage is 1/10 of the battery voltage, the curr ent is 50mv/A, and the tolerance is 5%. (XRotor 12A 4IN1 without tihs)

04 User Guide

- After connected to the flight system, the ESC will automatically detect the input throttle signals every time after it is powered on and then execute the corresponding signal-receiving mode. Users cannot change the signal-receiving mode during the powering-up process and the flight. If necessary, they need to change the mode on the flight controller (under the condition that the flight controller supports the "One-Shot125" or "One-Shot42" or "MultiShot" signal-receiving mode) first, and then disconnect and re-connect the battery, then the ESC will complete the mode change.
- If users'flight controllers support throttle calibration, HOBBYWING recommend calibrating the throttle range when they start to use a new XRotor brushless ESC; if not, it is fine to use the default. And they can use the transmitter to calibrate the throttle range if a severe "out of sync" issue happens to the motor(s).

1 Connections

M3
M2
5.3V output
+5.3V
ADC_I
ADC_V
GND
Throttle signal input
S4-M4
S3-M3
S2-M2
S1-M1
+5.3V output
GND
M1
M4
12V output

Screw distributed from: 30.5x30.5mm

M4 M3
Throttle signal input
S4-M4
S3-M3
S2-M2
S1-M1
+5V output
Input
-
+
+5V output
-
M2 M1

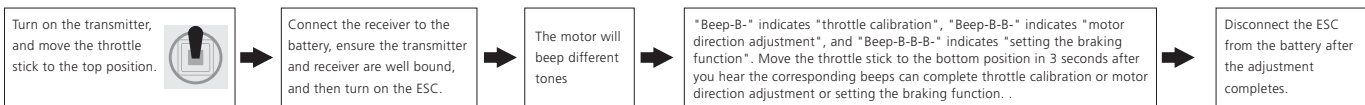Screw distributed from: 30.5x30.5mm

IMPORTANT This is an extremely powerful brushless motor system. We strongly recommend removing your propellers for your own safety and the safety of those around you before performing calibration and programming functions with this system.
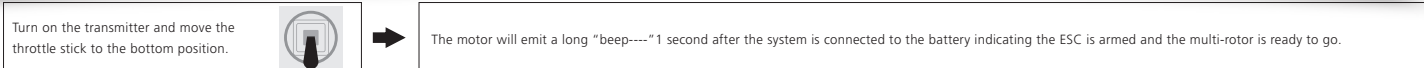
2 Throttle Calibration

| Turn on the transmitter, and move the throttle stick to the top position. | → | Connect the receiver to the battery, ensure the transmitter and receiver are well bound, and then turn on the ESC. | → | After the motor emits two short "beep-beep", move the throttle stick to the bottom position within 3 seconds | → | Throttle Calibration completed |

3 Parameter Adjustment

| Turn on the transmitter, and move the throttle stick to the top position. | → | Connect the receiver to the battery, ensure the transmitter and receiver are well bound, and then turn on the ESC. | → | The motor will beep different tones | → | "Beep-B-" indicates "throttle calibration", "Beep-B-B-" indicates "motor direction adjustment", and "Beep-B-B-B-" indicates "setting the braking function". Move the throttle stick to the bottom position in 3 seconds after you hear the corresponding beeps can complete throttle calibration or motor direction adjustment or setting the braking function. . | → | Disconnect the ESC from the battery after the adjustment completes. |

IMPORTANT
- The motor direction is set to CW by default; move the throttle stick to the bottom position in 3 seconds after the motor emits three short beeps will change the direction to CCW. Next time, move the throttle stick to the bottom position in 3 seconds after you hear the three short beeps will change the direction back to CW. (That's every time you move the throttle stick to bottom position in 3 seconds after the three short beeps, the motor direction will be different from the last time.)
- The braking function is set to "Brake On" by default, move the throttle stick to the bottom position after you hear"Beep-B-B-B-" can set this item to "Brake Off". Next time, you move the throttle stick to the bottom position after the four short beeps will change the setting back to "Brake On". (That's every time you move the throttle stick to the bottom postion after the four short beeps, the setting will be different from the last time.) When setting to "Brake Off", the motor will keep spinning for a while (or won't stop spinning immediately) due to inertia after the throttle stick is moved to the bottom position, and the braking effect won't disappear during the operation.

05 Normal Start-up Process and Protections

| Turn on the transmitter and move the throttle stick to the bottom position. | → | The motor will emit a long "beep----"1 second after the system is connected to the battery indicating the ESC is armed and the multi-rotor is ready to go. |

Start-up Protection: the ESC will shut down the motor if it fails to start the motor normally within 2 seconds by increasing the throttle value. In this case, you need to move the transmitter throttle stick back to the bottom position and restart the motor. (Possible causes of this problem: poor connection/ disconnection between the ESC and motor wires, propellers are blocked, etc.)

Over-load Protection: the ESC will cut off the power/output when the load suddenly increases to a very high value. Normal operation will not resume until the throttle stick is moved back to the bottom position. The ESC will automatically attempt to restart when the motor and the ESC are out of sync.

Throttle Signal Loss Protection: when the ESC detects loss of signal for over 0.25 second, it will cut off the output immediately to avoid an even greater loss which may be caused by the continuous high-speed rotation of propellers or rotor blades. The ESC will resume the corresponding output after normal signals are received.

Motor Lock-up Protection: the ESC will cut off its output to the motor immediately when it detects the motor is locked up, and then try to restart the motor. It will cut off the output completely and stop attempting to restart the motor if the motor is locked up for over 2 seconds. In this condition, you can only restart the ESC and resume its output through pulling the throttle stick to the bottom position first and then pushing the stick upward.

06 Trouble shooting

Trouble	Warning Tone	Possible Cause	Solution
The ESC was unable to start the motor after it was powered on.	"Beep beep beep…" (The motor beeps rapidly)	The throttle stick is not at the bottom position.	Move the throttle stick to the bottom position or re-calibrate the throttle range.
The ESC was unable to start the motor after it was powered on.	"Beep, beep, beep…" (Time interval is 2 seconds)	No output signal from the throttle channel on the receiver.	Check if the transmitter and receiver are well bound, the throttle cable has been correctly plugged into the TH channel on the receiver.
The ESC was unable to start the motor after it was powered on, or the throttle calibration failed.	"Beep beep beep…" (The motor beeps rapidly)	The entire throttle range is too narrow.	Refer to the manual of your transmitter and re-calibrate the throttle range.