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# OMPHOBBY 65A ESC MANUAL

## Important Warnings

1. Always place safety as your top priority when you use the product.
2. An electric motor that is connected to a battery pack and ESC may start up unexpectedly and cause serious danger. Always treat a powered system with respect. Mishandling may result in injury or death.
3. Always remove the propeller, rotor blades or disengage the pinion gear before the battery connected if you need to work on a plane or helicopter at short range.
4. Please observe all local laws regarding the flying of remote-control aircraft.
5. Never fly over or near people or crowds.

## Key Features

1. The ESC utilizes a high-performance 32-bit microprocessor that runs at a frequency of 170MHz, enabling it to provide strong computing ability and faster running speed.
2. The MOSFET utilize a new generation design which produces low heat generation, high reliability, and can withstand larger currents more reliably.
3. The ESC includes a self-check function that automatically detects power short circuits, motor phase loss, throttle not at zero position, and voltage range issues after powering on.
4. The ESC's special case design significantly enhances its heat dissipation performance.
5. The ESC features two flight modes: fixed-wing mode and helicopter mode.
6. The ESC is equipped with a helicopter rotor speed governing function which provides precise RPM control and is adjustable in gain.
7. The ESC has a separate programming interface that can be connected to an LCD programming card or Bluetooth module for programming purposes. (Available separately)
8. The ESC supports data telemetry including current, voltage, temperature, RPM, throttle values and ESC status code.
9. The ESC includes multiple protections, such as abnormal power-on voltage protection, start-up protection, temperature protection, throttle signal loss protection, overload protection, low voltage protection, and overcurrent protection, ensuring safe and reliable use.

## Specification

Continuous/Peak current	65A/100A
Input voltage	3-6S Lipo HV
BEC	6V/7.4V/8.4V, 10A
Input/output wire	1x Black & 1x Red 10AWG Silicon wire / 3x Black 10AWG Silicon wire
Size/Weight	60x36x18.5mm / 65g

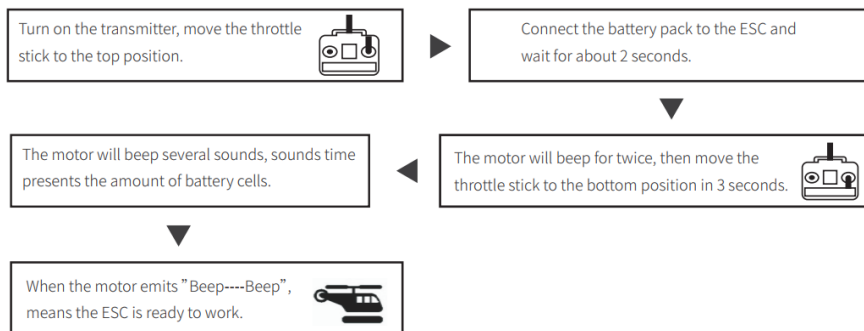
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## Wire Connections

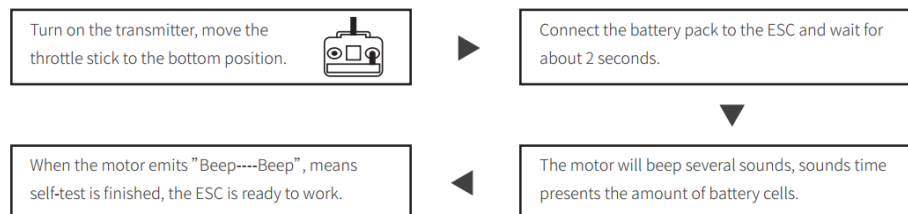
1. Throttle signal/BEC output wire (Black, Red, White): Plugs into the receiver throttle channel. The white wire carries the throttle signal, the red wire and black wire carry the BEC voltage and ground.
2. RPM signal wire (Yellow): Plug into the RPM input port. (If applicable)

## Throttle calibration procedure

(Important: Please make the throttle calibration for the first time using ESC!!!)



## Normal startup procedure



## Setting Rotor Speed

Throttle mapping is hard coded for ideal operation with OMPHOBBY M4. The following operation ranges exist:

- 0-24% OFF (Normal Soft Startup)
- 25-29% Autorotation Bailout
- 30-100% Normal Governor Operation

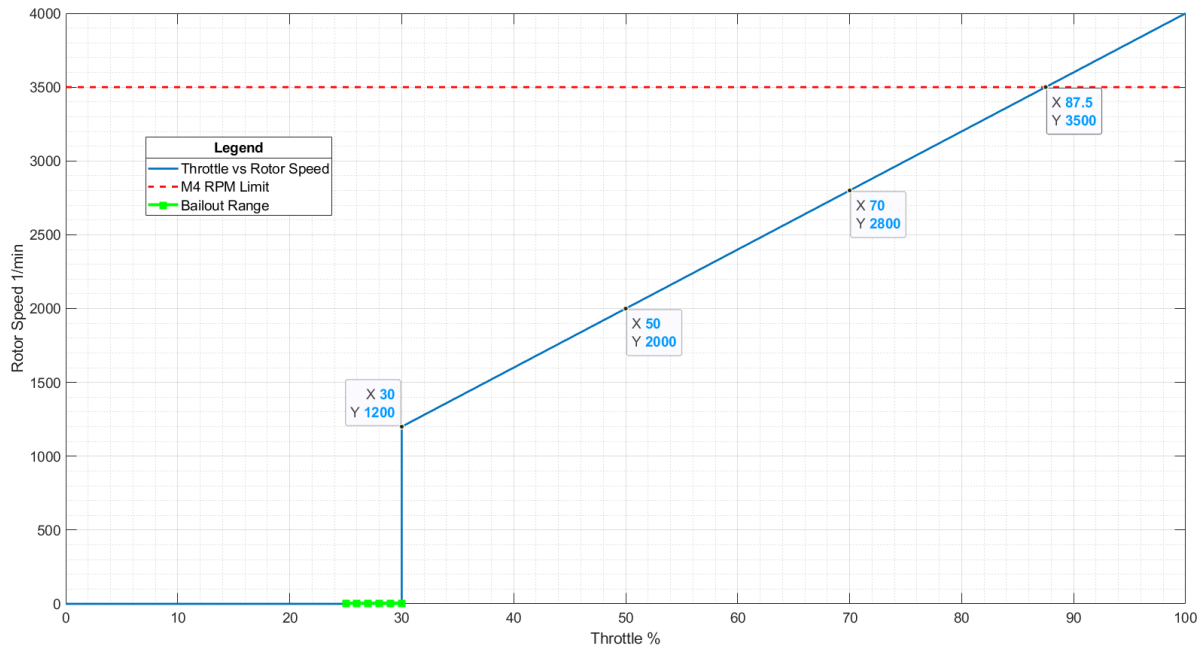
0-24% is the normal motor OFF range and will result in soft startup when the throttle is raised into the Governor range. Use the 25-29% throttle range for fast autorotation bailout. Governor mode will start at 30% throttle input. 30% throttle will start the motor and govern the rotor speed at 1200RPM. 50% throttle will result in 2000RPM rotor speed. Maximum achievable rotor speed is 4000 RPM at 100% throttle. RPM setpoint is controlled by the throttle percentage and interpolated linearly in between the aforementioned rotor speeds.

**△ It is not permitted to exceed 87.5% throttle, or 3500RPM rotor speed with the OMPHOBBY M4.**

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## Throttle vs. Rotor Speed Diagram

The following diagram schematically indicates the relationship between throttle input and rotor speed. Accurate RPM mapping requires prior throttle calibration.



## Parameter settings and checking ESC real time telemetry data

The ESC parameters can be programmed to meet different flight needs. (LCD Programming Card needs to be purchased separately)

### Operating instructions

1. Connect the ESC to the LCD programming card and battery correctly, based on the above wiring diagram.
2. (the LCD program card connecting wire: Red wire corresponds to the "+" and Black wire correspond to the "-" position, pay attention to the "+" "-" lettering on the LCD and ESC)
3. After connection is established, the LCD programming card turns on and will display the real time telemetry data interface first. (Real time data includes: voltage/current/throttle/RPM/temperature)
4. Press the "ITEM" or "OK" button to reach the parameter settings interface.
5. In the parameters setting interface, press "ITEM" to cycle through the programmable items, press the ▲ or ▼ button to choose the item parameters you want to set, and press "OK" to save settings.
6. After the new ESC parameters have been set, power-cycle the ESC for your changes to take effect.

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## Programmable parameters items and instructions

Programmable parameters and corresponding values. The options marked with “ \* ” are the factory default settings.  
(Requires final confirmation)

1 Brake Type	<b>*Normal</b> , Reverse
2 Brake Force	<b>*OFF</b> ,1-10
3 Timing	<b>*Auto</b> , 5° 10° 15° 20° 25° 30°
4 Motor Rotation	<b>*CW</b> , CCW
5 SR Function	<b>*ON</b> , OFF
6 Battery Cells	<b>*Auto</b> , 3S, 4S, 6S, 8S
7 Low Voltage Cutoff Threshold	OFF, 2.3V, 2.5V, 3.0V, <b>*3.2V</b> , 3.4V, 3.6V
8 Low Voltage Cutoff Type	<b>*Reduce Power</b> , Cutoff Power
9 BEC	6.0V, 7.4V, <b>*8.4V</b>
10 Acceleration	<b>*0</b> , 1, 2, 3
11 Start-up Power	Low, <b>*Middle</b> , High
12 Flight Mode	Fixed Wing, <b>*Helicopter StoGov</b>
15 Governor Parameter P	0-9, <b>*4</b>
16 Governor Parameter I	0-9, <b>*4</b>
17 Telemetry	<b>*1 Real Time Data</b> , 2 SBUS

## Parameter description

### 1 Brake Type

1.1 Normal Brake: When “Normal Brake” is turned on, after the throttle trigger return to zero position, it will make the motor stop running according to the parameter of brake force set, default setting is Normal brake.

1.2 Reverse Brake: Plug the 3-Pin signal wire into the throttle channel, and plug the 1-Pin signal wire into any 2-stage switch channel of the receiver, then turn on the transmitter 2-stage switch. The Reverse Brake function is turned on now, you can change the forward and reverse directions of the motor by flipping the 2-stage switch of the transmitter.

Warning: This function can only be effective when the throttle is below 50%, and it is only allowed to be used.

### 2 Brake Force

After throttle signal is pulled to zero position, a higher value means the stronger brake force, and it will take shorter time to bring the motor to a standstill.

0-10 adjustable, default setting is 0, This function only valid under normal brake mode.

### 3 Timing

Adjust the timing angle of the motor electrically, Auto/5°/10°/15°/20°/25°/30° adjustable, default setting is Auto.

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## 4 Motor Rotation

Clockwise and counter-clockwise direction is adjustable from the ESC without changing the motor wires, default setting is CW.

## 5 SR Function

The synchronous rectification function enables higher driving efficiency which can be energy-saving, resulting in longer flight time, default setting is on.

## 6 Battery Cells

The number of battery cells can either be calculated automatically or set manually. If auto-calculation is selected, the calculation is based on **3.8V** per cell. If battery cells errors occurs with motor beeps, for instance when using LiFe or LiHV batteries, then you can set the cell count manually. Default setting is auto.

## 7 Low Voltage Cutoff Threshold:

2.3V/2.5V/3.0V/3.2V/3.4V/3.6V adjustable, given in volt per cell. If you are, for example, using a 6 cells LiPo battery, then the low voltage threshold value is 6x the set voltage value. Default setting is 3.2V.

## 8 Low Voltage Cutoff Type

Reduce Power: When the voltage drops to the set low-voltage protection threshold, the ESC will reduce power to 70%, indicating that you should land immediately.

Cutoff: When the voltage drops to the set low-voltage protection threshold, the ESC will cut off the power immediately. Default setting is reduce power.

## 9 BEC:

The ESC's built in BEC is adjustable between 6.0V/7.4V/8.4V, default setting is 8.4V.

## 10 Acceleration

Throttle acceleration value, adjustable between 0/1/2/3. Default setting is 0.

## 11 Start Up Power

Startup power determines how strongly the motor will accelerate when switched on. Adjustable between 1/2/3, default setting is 2.

## 12 Flight Mode

**Fixed-wing mode:** Suitable for fixed-wing and multi-rotary aircraft, as well as for use with external FBL governors. In this mode, the motor will start up at 5% throttle without soft start, and the ESC will allow for rapid throttle response without any smoothing. Connect the yellow RPM signal wire to create a closed control loop with your FBL unit before use.

**Helicopter Mode (Heli StoreGov):** Suitable for helicopter flight using the internal governor. Featuring soft start, autorotation bailout and headspeed governing. Motor starts at 30% throttle and above.

Default setting is helicopter mode.

### 13 Governor Parameter P

Governor proportional gain for maintaining a fixed rotor speed. The higher the value, the greater the degree of compensation will be for deviations from the target rotor speed. Lower values will soften the governor response, higher values will make the governor hold the rotor speed more rigidly. Too high values can cause rapid oscillation and rapid tail shaking. 0 to 9 adjustable, default setting is 4, optimized for OMPHOBBY M4.

### 14 Governor Parameter I

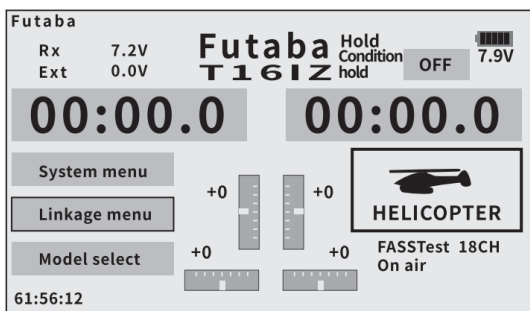
Governor integral gain for maintaining a fixed rotor speed. The higher the value, the faster the integration of the error between actual rotor speed and setpoint. Lower values will reduce the stationary accuracy of the governor, higher values will result in more precise RPM control. Too high values can cause rotor speed fluctuation and tail wag. 0 to 9 adjustable, default setting is 4, optimized for OMPHOBBY M4.

### 15 Telemetry

The ESC supports real time telemetry, which is an unencrypted data stream, as well as the FUTABA S.BUS2 protocol.

Let's take a FUTABA remote control as an example, to show you how to set up the Telemetry data return function.

1. Connected the ESC with battery and receiver, then turn on the transmitter, press the "Linkage" Menu



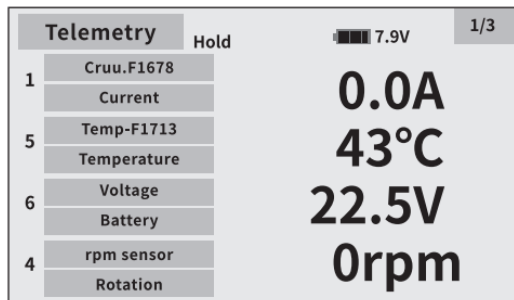
2. Select and press "Sensor"

Linkage menu	Hold	7.9V	1/2
Servo momtor	Model select	Model type	
Servo reverse	End point	Servo speed	
Sub-trim	Function	Fail safe	
System type	Trim setting	Throttle cut	
Idle down	Swash ring	Stick alarm	
Timer	Function name	Sensor	

3. After entering the sensor interface, select each data item in sequence:

Sensor		Hold	7.9V	1/3
	Sensor type	ID	Sensor type	ID
1	Curr.F1678	0	7 Voltage	
2	Curr.F1678		8 ---	
3	Curr.F1678		9 ---	
4	rpm sensor	0	10 ---	
5	Temp-F1713	0	11 ---	
6	Voltage	0	12 ---	

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- After exiting from the sensor interface, enter the Telemetry interface and add the selected data items. You can now view real time telemetry on your transmitter screen.



## Protection Function and Error Codes

- Abnormal power-on voltage protection: The ESC enters a protective state once the input voltage detected is not in the operating voltage range, prompting the LED light to flash.
- Start-up protection: If the motor fails to start normally within 2 seconds after raising the throttle, the ESC will cut power. You then need to power cycle the ESC. Possible reasons: Disconnection or poor connection (cold solder joint) between ESC and motor, propeller or motor being blocked by foreign objects, gearbox damage (if applicable), etc.
- Over-heat protection: When the temperature of the ESC is over about 110°C, the ESC will automatically reduce the output power for protection but will not fully shut down. Power will be reduced to 70%, indicating that you should land immediately.
- Throttle signal loss protection: The ESC will reduce the output power if throttle signal is lost for 1 second, will cut off output to the motor if the throttle signal is lost over 2 seconds. If the throttle signal is restored during the 1-second power down period, the ESC will immediately restore full throttle control. This gradual power reduction was put in place so that with short connection losses, the pilot has some to save the helicopter or plane if connection is restored in time.
- Overload protection: The ESC will cut off power or restart automatically when the load suddenly increases beyond a certain threshold, possible reason is a rotor/motor blockage.
- Low voltage protection: When the operating voltage of the ESC drops below the set protection threshold, power will be gradually reduced, but will not be turned off, ensuring the pilot has enough time to land.
- Over-current protection: When the peak current exceeds a specified value, the ESC will immediately cut off the output power, and then restart to restore the power. If the current exceeds the specified value again, the output power will be completely cut off. Possible reason is drastic overload, burned motor windings resulting in a short circuit, incorrect use of the product.