



E3

User Manual

Brushless Electronic Speed Controller

www.xc-bldc.com



Disclaimer

First of all thank you very much for using this product!  
This product has high power and incorrect use may cause equipment damage or personal injury. Please read this statement carefully before using this product. Once this product is used, it means that you agree to all the terms of this statement. Please use this product strictly in accordance with the instructions in this manual. We do not assume any liability arising from misuse, illegal modification or improper operation of this product, including butnot limited to indirect losses or joint and several liabilities.



Cautions

Before connecting the ESC to related equipment, please ensure that all wires are well connected and the connecting equipment are in well insulated protection to avoid damaging the ESC due to short circuit.  
Before using the ESC, please carefully read the instructions of the matching power equipment and frame to ensure a reasonable power combination, thereby avoiding improper power combination that may lead to motor overload and damage to the ESC.

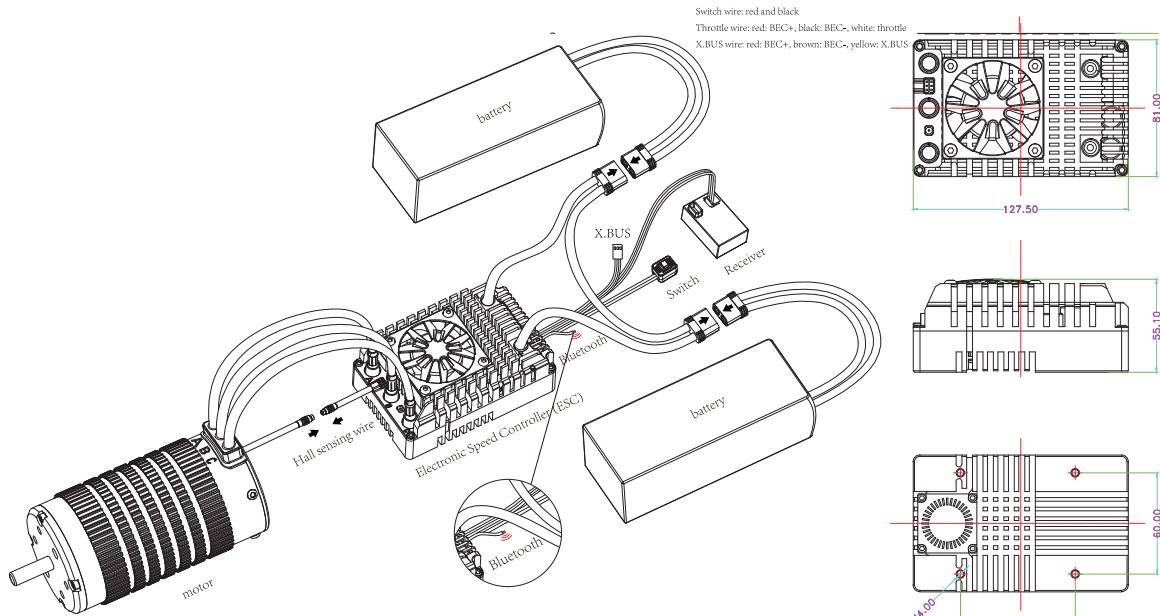
1. Specifications

| Item              | Description  | Cautions  |
|-------------------|--|---|
| Current           | 300A Continuous Current  | Current control is similar to wave-by-wave current limiting which effectively limit peak current to avoid motor damage.   |
| Power supply      | 6~12S LiPo   | When using DC power supply, discharge/brake energy recovery capacity should be considered.<br>If output is limited, reduce value of parameters (acceleration and braking options) properly. |
| Recommended motor | Sensored or sensorless square wave brushless motors  |   |
| Motor speed       | When the number of pole pairs is 1, the electrical speed is exactly equal to the mechanical speed.<br>Others: Electrical speed = Mechanical speed × Number of pole pairs ÷ KV value × Bus voltage × Number of pole pairs<br>Note: max electric speed 240,000rpm. | Speed of the motor is very high when idling. Stay safe.   |
| BEC               | Voltage: 6.0V/7.4V/8.4V, it can be switched through the mobile APP.<br>Current: 10A continuously, 25A short-term.  |   |
| Fan               | Temperature > 55℃, powersupply to the fan turns on.<br>Temperature < 50℃, powersupply to the fan turns off.  | 1. The fan powered by BEC<br>2. When a short-circuit current occurs to the fan, the power will be cut off. Power recovered in 1 second.   |
| Bluetooth         | 1. All parameters of the ESC can be adjusted by using the mobile APP.<br>2. The ESC firmware can be upgraded by using the mobile APP.<br>3.Motor operation data observation: data log and real-time data.  |   |
| Dimension         | 127.50(L)*81.00(W)*55.10(H)mm / ≈735g (with wire)  |   |

2. Features

- 2.1 Meticulously proved commutation scheme, even in sensorless mode.
- 2.2 Active freewheeling technology can reduce MOS heating while avoiding excessive current pulses.
- 2.3 Current limiting in each PWM cycle reduces the impact of pulse current on the motor.
- 2.4 Dual smart fans for efficient heat dissipation. Fans stay quiet at low temperature.
- 2.5 Built-in Bluetooth connects Mobile APP for firmware upgrade and parameter setting.
- 2.6 Mobile APP data observation interface for viewing ESC recording data (static data) and real-time debugging data.
- 2.7 High-power DC/DC conversion circuit makes BEC a potent loading capacity.
- 2.8 Full protection: low voltage, over voltage, throttle loss, abnormal braking, over temperature etc.
- 2.9 Turbo timing available.
- 2.10 No need to buy additional modules, you can completely control the ESC.
- 2.11 Supporting X.BUS protocol, real-time control of ESC and reading of operation data through Bus. It can be used for robot control or other automated programming control.

3. Connections

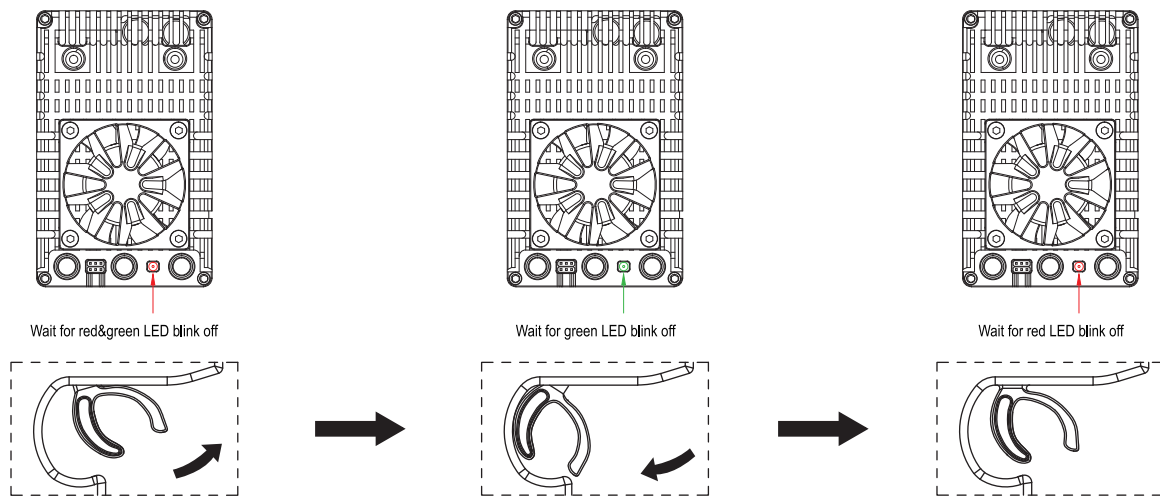


- \*Precautions:**
- 1. Please do not connect the ESC input wires DC+ and DC- in reverse, Reverse connection may damage ESC. If the ESC is damaged in this case, the relevant warranty service will not be provided.
  - 2. If a Hall sensor is used, be sure to check the motor phase wires and Hall wiring.
  - 3. For motors without temperature sensors, long-term high-power operation may cause burnout.
  - 4. The mechanical structure of some motors cannot support high speed. If the speed is forcibly increased, the motor may be damaged.
  - 5. If not used for more than 1 hour, it is recommended to unplug the power wires of the ESC.
  - 6. If there are any modifications to the connection line, check the circuit carefully before putting in use. It is recommended to open the throttle slowly and confirm that there are no errors before advancing it normally.

4. Start the process

- Steps:**
- 1. Check whether the circuit is open, short circuit or in poor contact.
  - 2. Check whether the motor is stuck.
  - 3. Plug in the power cable.
  - 4. Turn on the power button.
- When you hear the battery prompt tone (described in the "Normal Startup" prompt in the light/sound prompt section), the startup is normal. If the throttle is normal, you canperform the throttle operation normally.

5. Set the throttle range



- 4. Prompt for success setting: prompt repeats four times(red light and green light on + motor beep"so, mi, do" + red/green lights off + 0.2s vacancy); prompt for failure setting: no signs, ESC powers on.

6. Bluetooth

The naming rule of Bluetooth name is "general model" + "-" + "ESC code ID", for example, where "XC\_E3-1C89", XC\_E3 is the general model, and "1C-89" is the hexadecimal code ID of the ESC. Even if the user sets the Bluetooth name by himself, the ESC code ID is still retained to avoid two devices with the same name, Default password "1234".

7. Configurable items

| Seq | Item                      | Description        |                           |                      | Default                   |
|-----|---------------------------|--------------------|---------------------------|----------------------|---------------------------|
| 1   | Running mode              | Forward with brake | Forward&Reverse and Brake | Forward with reverse | Forward&Reverse and Brake |
| 2   | Lipo Cells                | Auto               | 6 ~ 12S                   |                      | Auto                      |
| 3   | BEC voltage               | 6.0V               | 7.4V                      | 8.4V                 | 6V                        |
| 4   | Cutoff Voltage            | Disabled           | 2.9~3.6V                  |                      | 3.2V                      |
| 5   | Motor Rotation            | Forward            | Reverse                   |                      | Forward                   |
| 6   | Max.Brake Force           |                    | 0~100%                    |                      | 60%                       |
| 7   | Max.Reverse Force         |                    | 0~100%                    |                      | 25%                       |
| 8   | Punch                     |                    | 0~12 level                |                      | 6 level                   |
| 9   | Drag Brake Force          |                    | 0~100%                    |                      | 0%                        |
| 10  | Turbo Timing              |                    | 0~26 degree               |                      | 26 degree                 |
| 11  | Turbo Delay               |                    | 0~1s                      |                      | 1s                        |
| 12  | Initial PWM               |                    | 1~10%                     |                      | 3%                        |
| 13  | Neutral Range of Throttle |                    | 2~15%                     |                      | 10%                       |
| 14  | Motor Pole Pairs          |                    | 1~64                      |                      | 2                         |
| 15  | Communication BUS         |                    | X.BUS Protocol            |                      | X.BUS Protocol            |
| 16  | X.BUS-ID                  |                    | 0~15                      |                      | 0                         |

- 1. Running Mode:**  
**Option 1: Forward with brake**  
The vehicle can only move forward and has brake function. This is also commonly acceptable at races.  
**Option 2: Forward/Reverse and Brake**  
This option is known to be the "training" mode with "Forward/Reverse with Brake" function. The vehide only brakes on the first time you push thethrottle trigger to the reverse/brake zone. If the motor stops when the throttle trigger return to the neutral zone and then re-push the trigger toreverse zone, the vehide will reverse, if the motor does not completely stop, then your vehide won't reverse but still brake, you need to return thethrottle trigger to the neutral zone and push it to reverse zone again. This method is for preventing vehicle from being accidentally reversed.  
**Option 3: Forward and Reverse**  
When the throttle trigger is pushed from neutral to reverse point, the motor reverses. This mode is generally used in special vehicles.
- 2. Lipo Cells:**  
Set the correct value according to the actual number of Lipo batteries used. The default is automatically calculated.
- 3. BEC Voltage:**  
BEC voltage support 6V/7.4V/8.4V. Generally, 6.0V is suitable for standard servos, while 7.4V/8.4V is suitable for high-voltage servos. Please set according to the servo specifications. WARNING! Do not set the BEC voltage above the maximum operating voltage of the servo, as this may damage the servo or even the ESC.
- 4. Low Voltage Cut-Off:**  
This function is mainly to prevent excessive discharge of lithium batteries causing damage. The ESC monitors the battery voltage at all times, and once the voltage falls below the set threshold, the power output is reduced and the power output is completely cut off after a few seconds,and generates a 10% braking force. ForNiMH batteries, it is recommended to set this parameter to "Disabled".
- 5. Motor Rotation:**  
Setting the rotation of the motor. Due to some differences with the drivetrains on different car kits, it is possible to that the car will go in the opposite directionupon full throttle. In the event that this happens, you can set the"motor rotation direction" to the opposite direction;"CW" or "CCW".
- 6. Max. Brake Force:**  
This ESC provides proportional braking function; the braking effect is decided by the position of the throttle trigger. It sets the percentage of available brakingpower when full brake is applied. Large amount will shorten the braking time but it may damage your pinion and spur gear.
- 7. Max. Reverse Force:**  
Refers to the reversing speed. Selecting different parameter values can produce different reversing speed. It is recommended to use a smaller reversing speed toavoid errors caused by reversing too quickly.
- 8. Punch:**  
Set in 1-9 stages, the higher the set value, the faster the acceleration. Kindly take into consideration according to the site, tire grip characteristics, vehicleconfiguration, etc. An aggressive setting may cause the tire to slip, the starting current to be too large and adversely affect the electronics performance.
- 9. Drag Brake Force:**  
Refers to the brake force generated by the motor when the throttle trigger returns to neutral position. Choose the appropriate value according to the type of vehicle, configuration, site, etc.
- 10. Turbo Timing:**  
The Turbo timing can additionally increase the motor rpm.It will initiate at full throttle. It is usually used on a long straight road to release the maximum power of the motor. The higher this value is, the more the rpm of the motor will increase, and the greater the running current will be, the higher the temperature of the motor and esc. Therefore, please set this value reasonably.
- 11. Turbo delay:**  
It refers to the duration of continuous full throttle required to trigger Turbo. When the full throttle time reaches this set value, Turbo can be triggered to turn on.
- 12. Initial PWM:**  
Also called minimum starting force, it refers to the starting force acting on the motor at the initial position of the throttle. The required starting force can be set according to the tires and site grip. If the venue is too slippery, set a smaller starting force to avoid slipping.
- 13. Neutral Range of Throttle:**  
Neutral range could be adjusted according to usage habits. Neutral range may deviate in some radio control, leading to move forward or reverse slowly. If this happens, neutral range needs to be set larger.
- 14. Motor Pole Pairs:**  
For setting pole pairs, Motor Rotation speed=Electrical Speed / Pole Pairs, To get the precise mechanical rotational speed, the pole pairs must be set correctly.
- 15. Communication BUS:**  
X.BUS Controls the throttle of ESC in the form of programming, or dynamically adjust the motion parameters, read operation parameters of ESC, etc. It can be used in automation or robot situations. For specific content of the protocol, please refer to the X.BUS Control Protocol.
- 16. X.BUS-ID:**  
If X.BUS is selected, this item will take effect, and the bus supports 16 ECSS.

8. Recover factory parameters

- How to restore Bluetooth to factory settings:**  
If the Bluetooth password is lost or if you need to forcibly enter Boot, please follow the instruction:  
1: Connect ESC wire(the white wire) to BEC+(red wire)  
2: Turn on ESC  
3: Disconnect from BEC when green light off and red light on  
4: Remove short circuiting  
When boot activated, the status of Bluetooth will restore to factory value(password will be restored to "1234", and the name will be restored to the factory state), then restart ESC, If there is a hardware error, Boot can be activated in this way to upgrade hardware.
- How to restore parameters to factory settings:**  
If you want to restore the parameters to factory settings, just click the default button on the APP parameter page.

9. LED status & beep instructions

| Item                     | Type description   |                              | Light cue  | Sound cue                               | Remark  |
|--------------------------|--|------------------------------|--|---|---|
| Basic information        | Throttle not zeroed  |                              | Red light flashes quickly  | Short tone "beep"                       | Red light flashes quickly   |
|                          | Throttle signal lost   |                              | Red light flashes slowly   | Long tone "beep"                        | In cycle of 2s  |
|                          | Voltage detection  | Low voltage protection       | (Redx1 Greenx2) ...  | Long tone "beep"x1, Short tone "beep"x2 | Check the input voltage or setting of number of cells if no "beep" before MOSFET detecting.   |
|                          |  | Over voltage protection      | (Redx1 Greenx3) ...  | Nil                                     | Voltage is too high, check whether the voltage is over the withstand value of ESC   |
|                          | The MOS temperature is too high, operating temp. > 125 ℃ / startup temp. > 110 ℃       |                              | (Redx1 Greenx4) ...  | Long tone beepx1, short tone beepx4     | The temperature of MOS is too high. ESC can resume normal operation when the temperature drops below 100 degrees Celsius  |
|                          | The capacitor temperature is too high, operating temp. > 105 ℃ / startup temp. > 100 ℃ |                              | (Redx1 Greenx5) ...  | Long tone beepx1, short tone beepx5     | The temperature of capacitor is too high. ESC can resume normal operation when the temperature drops below 100 degrees Celsius  |
|                          | Throttle parameters  | Abnormal throttle parameters | (Redx1 Greenx7) ...  | Long tone beepx1, short tone beepx7     | If there is still an abnormal prompt when positioning throttle to neutral point, throttle calibration process needs to be initiated.  |
| Hall sensing abnormality | Hall output logic abnormality  |                              | (Redx1 Greenx8) ...  | Long tone beepx1, short tone beepx8     | Re-plug Hall wire. If the abnormality persists, it may be a problem with the internal Hall of the motor, and the Hall wire needs to be unplugged.   |
| Throttle parameter       | Throttle calibration prompt  | Calibrate low range          | (Red Green) ...  | Nil                                     | If the calibration process is irregular or unsuccessful, the ESC will exit the calibration process and enter the normal Startup process.  |
|                          |  | Calibrate high range         | (Green) ...  |   |   |
|                          |  | Calibrate neutral throttle   | (Red) ...  |   |   |
|                          |  | Calibration success          | (Red Green) x4   |   |   |
| Normal operation         | All normal and no action to throttle   |                              | (Green) ...  | Nil                                     |   |
|                          | Throttle operation   | Normal                       | The greater the accelerator, the faster the green light flashes                          |   |   |
|                          |  | Turbo timing is on           | Green light remains on   |   |   |
|                          | Braking  | Red light is on              |  |   |   |
| Boot                     | Entering boot forcibly   |                              |  | Nil                                     | Follow the process of Bluetooth factory reset   |
|                          | Boot in progress   |                              | Green light: On 2s&Off 2s  | Nil                                     | CPU enter Boot mode   |
|                          |  |                              | Red light remains flashing   |   | CPU enter Boot, program upgrade in progress   |
| Normal startup           | Prompt for the number of battery cells after normal startup                            |                              | Quinary prompt light signal, long tone with red light on, short tone with green light on | do, mi, so + quinary prompt sound       | do, mi, so: prefix of quinary number<br>Quinary definition<br>Long tone = 5 cells, short tone = 1 cell<br>Example: 8-cell lithium battery prompt sound<br>do, ri, mi + long tone x1 + short tone x3 |
| Fault warning            | ESC self check abnormality   |                              | (Redx2) ...  | Nil                                     | Disconnect the motor wires, power on. if it is still abnormal,return it for maintenance   |
|                          |  |                              | (Redx2 Greenx1) ...  | Nil                                     |   |
|                          |  |                              | (Redx2 Greenx2) ...  | Nil                                     |   |

- \*Notes:**
- 1. Red light matches long tone, gree light matches short tone.
  - 2. For saving power, all "beep" lasts for 5mins; if all fault recovered, it takes effect again in next 5 mins.
  - 3. Ellipsis"..." in light cue represents repetition of previous action.