WT250

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 ESC to related devices, please ensure all wires are well connected and devices are well insulated to avoid short circuit damage to ESC
Before using the ESC, please read the instruction carefully to ensure a proper power configuration. An improper power configuration may lead to motor overload and damage the ESC.

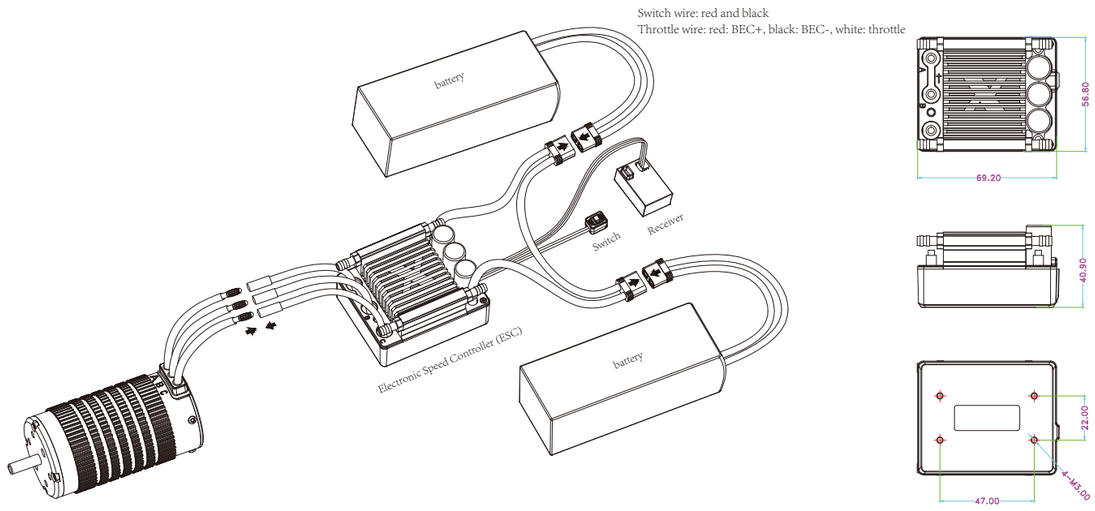
1. Specifications

Item	Description	Cautions
Current	250A Continuous Current	Control current quickly to avoid motor and drivetrain damage
Power supply	6~12S LiPo	When using DC power supply, discharge/brake energy recovery capacity should be considered. 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. Others: Electrical speed = Mechanical speed × Number of pole pairs = KV value × Bus voltage × Number of pole pairs 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. Current: 10A continuously, 25A short-term.	
Bluetooth	1. All parameters of the ESC can be adjusted by using the mobile APP. 2. The ESC firmware can be upgraded by using the mobile APP. 3.Motor operation data observation: data log and real-time data.	
Dimension	69.20(L)*56.80(W)*40.90(H)mm / ≈271g (with wire)	

2. Features

2.1 Meticulously proved commutation scheme, even in sensorless mode.
2.2 Control current quickly to reduce MOS generating heat and current pulse
2.3 Current limiting in each PWM cycle reduces the impact of pulse current on the motor.
2.4 Built-in Bluetooth connects Mobile APP for firmware upgrade and parameter setting.
2.5 Mobile APP data observation interface for viewing ESC recording data (static data) and real-time debugging data.
2.6 High-power DC/DC conversion circuit makes BEC a potent loading capacity.
2.7 Full protection: low voltage, over voltage, throttle loss, abnormal braking, over temperature etc.
2.8 No need to buy additional modules, you can completely control the ESC.

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. The mechanical structure of some motors cannot support high speed. If the speed is forcibly increased, the motor may be damaged.
3. If not used for more than 1 hour, it is recommended to unplug the power wires of the ESC.
4. 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.

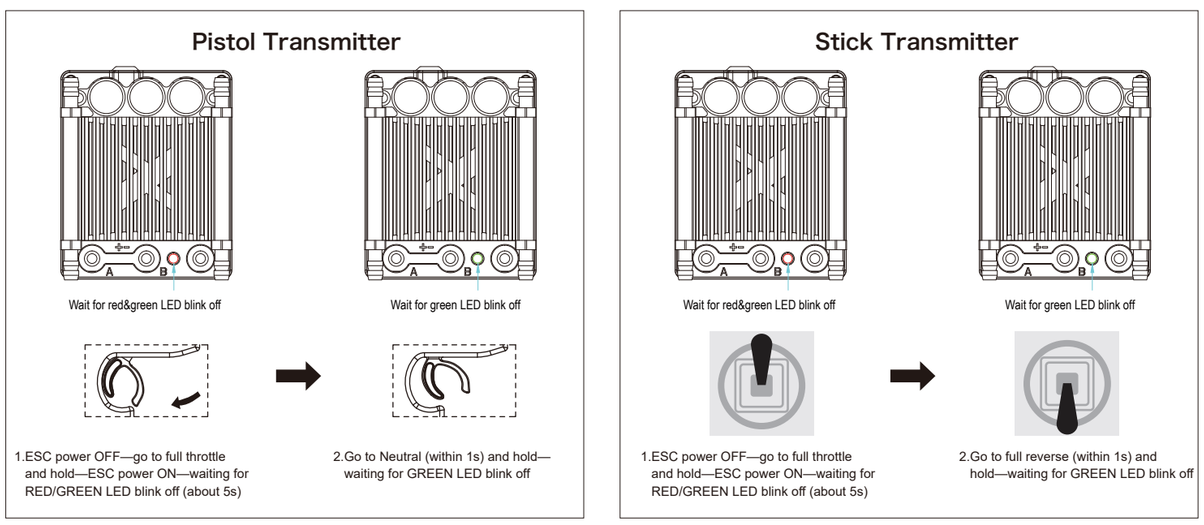
4. Start the process

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

Turn on transmitter, to set throttle as following:
1.NOR。Push trigger/stick to NOR
2.Set max throttle range to 90%
3.Throttle neutral deviation, set it to “0”



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 "WT200", WT200 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	Single-way	Forward&Reverse with Brake		Single-way
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	Punch	0~12 level			6 level
8	Drag Brake Force	0~100%			0%
9	Timing	4~24 degree			15 degree
10	Neutral Range of Throttle	3~15%			7%
11	Motor Pole Pairs	1~64			2

1. Running Mode:
Option 1: Single-way
Motor only rotates CW or CCW upon motor direction setting
Option 2: two-way
Motos rotates CW and CCW
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. 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.
8. 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.
9. Turbo Timing:
Three functions:
1）adjustable to be compatible with different motors, the smaller the value, the lower the efficiency
2）The smaller the value, the higher the motor RPM(the greater the current); motor RPM increasing depends on motor, load, etc. it's subject to objective test
10. 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.
11. 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.

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:
Step 1: Connect ESC wire(the white wire) to BEC+(red wire)
Step 2: Turn on ESC
Step 3: Disconnect from BEC when green light off and red light on
Step4. 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 promp when positioming 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	(so-mi-do) 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		
	Braking		Red light is on	Nil	Red light off when release brake
Boot	Entering boot forcibly			Nil	Follow the process of Bluettoth 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 Quinary definition Long tone = 5 cells, short tone = 1 cell Example: 8-cell lithium battery prompt sound 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.