



TZ-01

ESC User Manual

Thank you for purchasing our Team Zombie product, the TZ-01 ESC is our new generation of high performance sensored brushless electronic speed controller (competition version). The high power systems for RC models can be very dangerous, we strongly suggest that you read this manual carefully before using this speed control. Team Zombie have no control over the use, installation, application, or maintenance of this product, thus no liability shall be assumed nor accepted for any damages, losses of costs resulting from the use of this item.

Caution

- Do not let children use this product without the supervision of an adult.
- The ESC may get hot during use, be careful when handling it.
- When soldering input/output wires and connections, set the iron to 60W minimum.
- Always disconnect the battery after use, do not store with the battery connected.
- Do not use near flammable materials.
- If the ESC overheats, emits smoke or burns, immediately discontinue use, disconnect the battery and seek assistance.

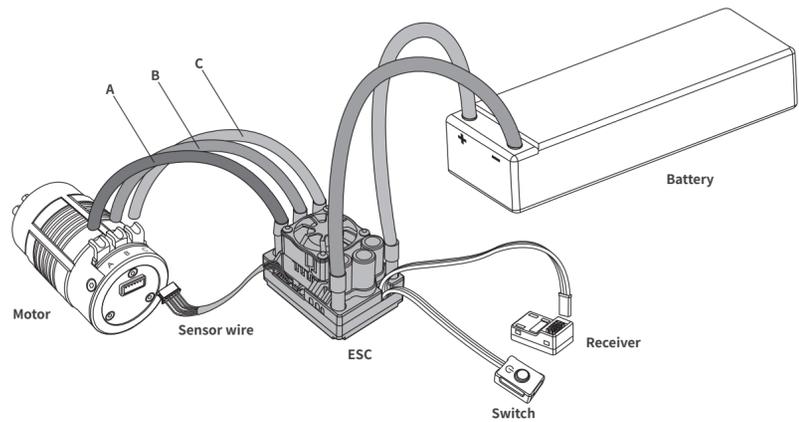
Features

- Full aluminum case and heat sink design, with high-efficiency heat dissipation system.
- Plenty of adjustable parameters allow adjusting the settings for most racing, such as Modified, stock, zero timing, drifting etc.
- 32-bit microprocessor can support more powerful processing capability and more accurate motor output.
- Enhanced throttle response, excellent acceleration, linearity and drive ability.
- Multiple protection features: Low voltage cut-off protection, over-heat protection and throttle signal loss protection.
- External Bluetooth (item sold separately) allows programming the parameter settings and firmware upgrades via app (support real-time programming, no need to restart the esc).
- Data logging for real-time maximum ESC temperature, motor RPM, Voltage and Adv. Timing and so on.

Specifications

Product Name	TZ-01
Cont. Current	160A
Burst Current	760A
Input Voltage	2-3S Lipo
BEC Output	6.0V, 7.4V/4A (Switch BEC)
Size(L*W*H)	37.0*38.2*31.5mm
Weight	96g
ESC Programming Via	Mobile Phone APP
Firmware Upgrade	Supported
Waterproof	No
Car Applicable	1/10 Touring Car/Buggy Racing

Connection



Battery Wire Connection

When connecting the battery, pay attention to the polarities: incorrect connection will damage the ESC and Battery. As shown in the figure above, the positive (+) wire is connected to (+) battery port, and the negative (-) wire is connected to the (-) battery port.

Motor Wire Connection

1. Sensored Mode: When using a sensored brushless motor, the three A/B/C ESC wires must be connected to the three A/B/C motor wires correspondingly. You need to connect the Sensor wire to the "Sensor" socket on the ESC. Don't change the wires sequence randomly.

2. Sensorless Mode:

When using a sensorless brushless motor, the #A, #B, #C wires of the ESC can be connected to the motor wires freely (without any sequence). If the motor runs in the opposite direction, please swap any two wire connections.

Receiver Wire Connection

The signal wire supplies a voltage of 6.0V to the receiver, servo, etc. There is no need to connect an additional battery. External power which is connected to the receiver may damage the ESC.

Black wire RX

Red wire RX+6.0V

White wire RX-Signal

Software Functions and Settings

Power On/Off ESC

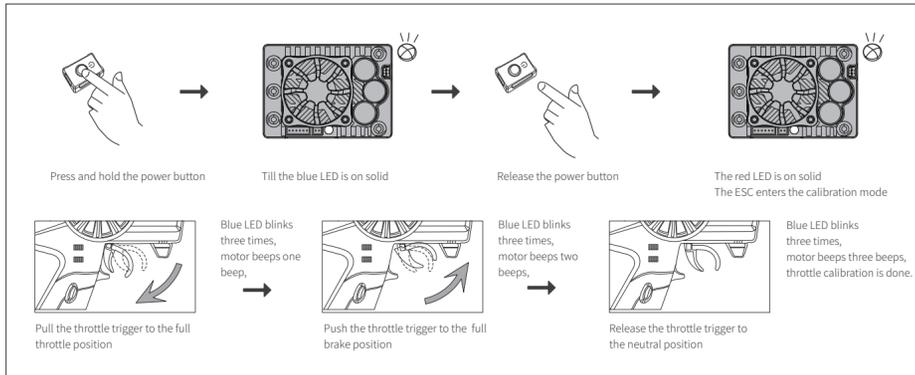
1. Press the power button, then the ESC will be powered on.
 2. Press and hold the power button until all the LEDs die out, then the ESC will be powered off.
- (Note: Please place the throttle trigger on the neutral position: within 10%, otherwise the ESC can not be powered off.)

Throttle Calibration

1. Connect the ESC to the battery and receiver well, then turn on the transmitter.
2. Press and hold the power button until the blue LED is on solid, the motor beeps a long beep at the same time, then release the power button, the red led will be on solid, the ESC enters the calibration mode.
3. Pull the throttle trigger to the full throttle position, the blue led blinks three times and the motor beeps once, the full throttle position is saved.
4. Push the throttle trigger to the full brake position, the blue led blinks three times and the motor beeps twice, the full brake position is saved.
5. Release the throttle trigger to the neutral position, the blue led blinks three times and the motor beeps three times, the throttle calibration is completed.
6. The ESC can support reverse throttle calibration, if the transmitter throttle is set to reverse (meaning that it will go to 1000 throttle position instead of 2000 throttle position when pulling the throttle trigger, it will go to 2000 throttle position instead of 1000 throttle position when pushing the throttle trigger), then you do the throttle calibration the same way as usual (as above), it will not affect the forward & reverse response of the ESC even if the throttle direction on the transmitter is set to reverse.

Remark: No need to restart the ESC again after throttle calibration is finished.

Do not move the throttle trigger when the blue led blinks.



LED Status

1. During operation

Throttle Position	Blue LED	Red LED
Neutral	Blinking	OFF
Full Throttle	ON	ON
Full Brake	OFF	ON

Note: when you pull the throttle trigger from the neutral position to the full throttle position, the Blue LED will blink, and the blinking frequency will go faster when the throttle goes higher.

2. When some protection is activated

- The RED LED is always on solid once the power button is pressed.
- The RED LED blinks single flash every one second. It repeats like "a a a" indicating that the voltage is abnormal.
- The RED LED blinks double flashes every one second. It repeats like "aa aa aa" indicating that the temperature is abnormal.
- The RED LED blinks single and double flashes alternately every one second. It repeats like "a aa a aa a aa" indicating that both of the voltage and temperature are abnormal at the same time.
- The RED LED will not have any response even the voltage or temperature is abnormal if no signal is detected.
- The BLUE LED blinks double flashes every two seconds. It repeats like "aa aa aa" indicating that the throttle is abnormal.
- (No throttle, or the throttle is not on the neutral position)

Throttle Signal

1. The Max. RPM throttle signal the ESC can support is 450Hz.
2. The ESC throttle protection will be activated in the following situation, and the BLUE LED will blink double flashes:
 - The throttle trigger is not at the neutral position when the ESC turns on.
 - The throttle signal is lost.
3. If the ESC loses the throttle signal during the operation, the BLUE LED will blink double flashes, and the ESC will not start to work again until the throttle signal gets back to normal.

Sensored & Sensorless

1. The sensored mode will be activated when the ESC detects the hall sensor signal.
2. The ESC will work in the sensorless mode when the ESC doesn't detect any hall sensor signal.
3. The ESC will have a slight power drop and then restore soon when switching modes between sensored & sensorless.
4. The PWM driving frequency will be selected automatically by the ESC in sensorless mode, and it doesn't allow to set it manually.
5. It is invalid to set the brake PWM frequency below 1KHz and the min. value is 1KHZ, if the ESC is in the sensorless mode.
6. Boost and turbo functions are not available in the sensorless mode.

Boost & Turbo

1. After the boost or turbo timing is triggered, the RPM and current will increase, and the battery/ESC/motor temperature will increase, so setting a proper timing and timing increase rate, and control the time of timing will affect the battery/ESC/motor's service life.
2. The difference between Boost Timing and Turbo Timing:
 - The Boost timing will be triggered even though you do not pull the throttle trigger to the full throttle position.
 - The Turbo timing will be triggered only when you pull the throttle trigger to the full throttle position.
3. The Boost timing plus the Turbo timing is equal to the final timing you choose when the throttle reaches its maximum position, and the final total timing is 60 degrees (for Best Pro 150A, the total timing is 15 degrees). For example: If the Boost timing is set to 45 degrees, the Turbo Timing is set to 50 degrees, so when the throttle reaches its maximum position, the Boost timing will be 45 degrees, and the Turbo Timing can only be set to 15 degrees.
4. If setting the low voltage or overheat protection to "ON", all the timing will be void when the protection is activated.

Protection

1. High Voltage Protection:
 - If the ESC detects the voltage is too high (higher than the esc standard voltage) when powering on the ESC, the voltage protection will be activated and the maximum throttle output will be limited within 50%. Even if the voltage protection is not set to "OFF". (The high voltage protection only works at the moment when the ESC is powered on, and it will not work in other situations even if it detects a high voltage; once the high voltage protection is activated, it will not be deactivated even though the voltage decreases to a normal value.)
2. Low Voltage Protection:
 - If the ESC detects the voltage is below the preset value, then this voltage will sustain for a while and then the low voltage protection will be activated, and the maximum throttle output will be limited within 50%. (Once the low voltage protection is activated, even though the voltage comes back to normal, the protection will not be deactivated.)
3. Thermal Protection:
 - The output throttle from the ESC will be limited, it will not exceed 50% of the throttle value you've preset. (This protection will be deactivated when the ESC temperature drops to 65°C.)
4. If the voltage protection and temperature protection are set to "OFF", when the voltage and temperature become abnormal, the LED indicators will indicate the status correspondingly, but it will not limit the throttle output and will make all ESC timing void.
5. If some issue happens and makes the ESC fail to drive the motor, it will go into a protection; you will hear motor "beep beep beep", and it will stop beeping till you release the throttle trigger to the neutral position and hold it for at least 0.2s.

Bluetooth

1. Reset password: when the ESC turns on, press and hold the power button for about 10 seconds, the ESC will restore the Bluetooth password to the default setting: 0000.
2. With our Team Zombie Bluetooth, users can program parameters, upgrade firmware, and check the real-time data of the ESC via a mobile APP.
3. Due to the range limit, the operational distance of the Bluetooth module is around 10 meters. (Metals, strong interference sources, or obstacles around will shorten the operational distance.)
4. The Bluetooth name can not be changed.
5. It will fail to connect the Bluetooth module to your mobile phone during the ESC throttle calibration process.

Programmable Items

1. Users can program parameters at any time as long as the ESC turns on, new parameters will take effect immediately, and there is no need to restart the ESC. It means parameters programming can be done online. However, there will be some impact on the battery/ESC/motor if you program some parameters when the motor is in high-speed rotation. For example, if you change the motor rotation when the motor is in high-speed rotation, then the ESC will reversely drive the motor immediately but the motor will not rotate in the reverse direction immediately because of its inertia, it will cause a big current and vibration. Or when the Boost or Turbo timing is activated, but you set it to "OFF" when the motor is in high-speed rotation, it also will cause a big current, so we would like to recommend not programming parameters when the motor is in high-speed rotation.
2. New parameters items can be saved in the embedded flash memory of the ESC. The flash card has a limited programming life (around 10K times), so pls don't program your ESC too often.

Real-time Data

1. The real-time data can be read only when the ESC has throttle signals.
2. The real-time data are just for reference, because they have a tolerance of ±10%; if you want to get more accurate real-time data, then you need to use more professional equipment.
3. The descriptions of real-time data items:

Number	Item	Description
1	Input Throttle	The throttle from the Receiver to the ESC
2	Output Throttle	The throttle from the ESC to the Motor
3	Voltage	The battery voltage which is read by the ESC
4	Min. Voltage	The minimum voltage which is read by the ESC
5	Temperature	The ESC temperature
6	Max. Temperature	The maximum temperature which is read by the ESC
7	RPM	Revolutions per minute
8	Max. RPM	The maximum RPM which is read by the ESC
9	Adv. Timing	Advance Timing, the ESC total timing (Boost & Turbo)

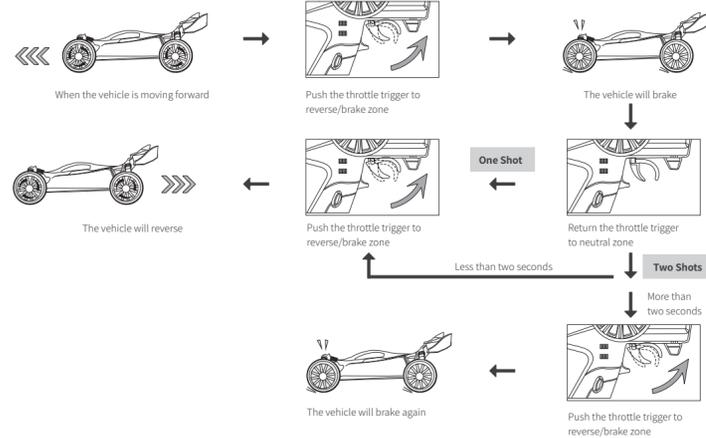
Firmware Upgrade

1. If you fail to upgrade the ESC firmware during the upgrading process, please restart the ESC, and you must upgrade the firmware via the APP again (all the other functions are not available), the ESC will get back to normal after the firmware is upgraded successfully.
2. The Red Led will blink a faint light when upgrading the ESC firmware, and the Blue Led will blink a faint light when the ESC is having a data transmission.
3. Please do not power off the ESC when upgrading the ESC firmware. (And the ESC can only be switched off after pressing the power button for about 5 seconds.)

Programmable Items

SECTION	PROGRAMMABLE ITEMS	DESCRIPTION
THROTTLE	Throttle Response	The shorter the time, the quicker the acceleration.
	Coast	With this function activated, the car won't slow down immediately but coast for a while when reducing the throttle input.
	Neutral Range	The wider the neutral range, the further the throttle trigger/stick must be moved away from the neutral point. Otherwise, the car won't move.
	Min. Throttle	The bigger the value, the more aggressive the start-up when moving the throttle trigger/stick away from the neutral range.
	Minus	The bigger the throttle minus value, the lower the car speed.
	Minus Range	It determines the throttle range within which the (Throttle) Minus function works. The bigger the value, the wider the effective range.
	Max. Forward force	The lower the value, the slower the maximum speed in the Forward direction.
BRAKE	Max. Reverse force	The lower the value, the slower the maximum speed in the Reverse direction.
	Brake Response	The shorter the time, the quicker the braking.
	Min. Brake Force	After entering the braking mode, the higher the value, the stronger the brake force when moving the throttle trigger/stick away from the neutral range.
	Max. Brake Force	The lower the value, the weaker the maximum brake force.
	Fwd. Drag Brake Force	The brake force when the throttle trigger/stick is at the neutral position. The lower the value, the further the coast.
	Rev. Drag Brake Response	The shorter the time, the faster the braking in the forward direction.
	Rev. Drag Brake Force	The brake force when the throttle trigger/stick is at the neutral position. The lower the value, the further the coast.
BOOST	Rev. Drag Brake Response	The shorter the time, the faster the braking in the Reverse direction.
	PWM Freq.	The PWM frequency for braking.
	Boost Timing	With this function activated, the motor will be able to get a higher RPM.
	Trigger	It's the way how Boost Timing is triggered, it can be triggered by throttle input or RMP.
	Throttle Threshold	The throttle threshold at which the Boost Timing will be triggered. The Boost Timing will be activated when the Boost Triggering is set to "By Throttle" and the throttle input exceeds the threshold.
	RPM Threshold	The RPM threshold at which the Boost Timing will be triggered. The Boost Timing will be activated when the Boost Triggering is set to "By RMP" and the motor RPM exceeds the RPM threshold.
	Initial Angle	It's the timing value when the Boost Timing is initially activated. The higher the value, the more aggressive the power, and the more difficult to control it.
TURBO	Angle Inc. Rate	The higher the value, the more aggressive the power, and the more difficult to control it.
	Angle Dec. Rate	The higher the value, the faster the speed decrease. The effect, similar to braking, will be generated when the speed is really high.
	Turbo Timing	It's the timing activated when the throttle input reaches 100%.
	Angle Inc. Rate	The higher the value, the more aggressive the power, and the more difficult to control it.
	Angle Dec. Rate	The higher the value, the faster the speed decrease. The effect, similar to braking, will be generated when the speed is really high.
	Turbo Delay	With this function activated, the Turbo Timing won't be activated immediately after the throttle trigger/stick is moved to the 100% position.
	Delay Reload	It determines whether or not to delay and reload when the throttle trigger/stick is moved away and quickly returned to the 100% point when the Turbo Timing is activated. There are two options: Wait (reload after the turbo timing is decreased to 0), Instant (reload immediately when the throttle trigger/stick is moved away from the 100% position).
GENERAL	Motor Rotation	It's the direction in which motor spins. With the factory default setting, it may run in the opposite direction in some scenarios. This function allows users to switch the rotational direction if necessary.
	Motor Poles	It allows users to manually set the pole count of the motor, so to get the correct RPM threshold at which the Boost Timing will be triggered. And users are able to check the actual motor RMP in the real-time data part of the mobile phone App.
	Running Mode	There are three running modes: Forward/Brake, Forward/Brake/Reverse, and Forward/Reverse.
	Reverse Mode	It's only available when the running mode is set to Forward/Brake/Reverse. There are two options: One Shot (pull the throttle trigger/stick once) & Two Shots (quickly pull the throttle trigger/stick twice).
	Drive PWM Freq.	It's the PWM frequency ESC used for driving motor. The lower the PWM driving frequency, the faster the acceleration, and the worse the throttle linearity; the higher the PWM driving frequency, the smoother the throttle linearity, and it will result in fast temperature increase.
	CutOFF Voltage	With it set to "Auto", the ESC will automatically identify the number of LiPo cells you've plugged in the moment it's powered on.
	CutOFF Thermal	The ESC will automatically cease operation when the internal temperature rises above user-selectable values.
BEC Output	Select the output of the Battery Eliminator Circuit depending on the operating voltage requirements of the servos.	
A/C Swap	It's for switching the motor wires: A & C. When setting to "No", the output wires at the ESC side will be connected to the motor in the following sequence: A-A, B-B, and C-C; when setting to "Yes", the wiring sequence will be: A-C, B-B, C-A.	

Reverse Mode: One shot & Two shots (In the Forward/Brake/Reverse Mode)



Trouble Shooting

Trouble Shooting	Possible Causes	Solutions
The ESC was unable to start the status LED, the motor, and the cooling fan after it was powered on.	1. No power was supplied to the ESC. 2. The ESC switch was damaged.	1. Check if all ESC & battery connectors have been well soldered or firmly connected. 2. Replace the broken switch.
The motor suddenly stopped or significantly reduced the output in operation.	1. The receiver was influenced by some foreign interference. 2. The ESC entered the battery LVC (Low Voltage Cut off) protection. 3. The ESC entered the thermal (over-heat) protection.	1. Check all devices and try to find out all possible causes, and check the transmitter's battery voltage. 2. The RED LED blinks, single flash between every one second. 3. The RED LED blinks, double flash between every one second.
The motor stuttered but couldn't start.	1. Some soldering between the motor and the ESC was not good. 2. The ESC was damaged (some MOSFETs were burnt).	1. Check all soldering points, please re-solder if necessary. 2. Contact the distributor for repair or other customer services.
The car ran forward/backward slowly when the throttle trigger was at the neutral position.	1. The neutral position on the transmitter was not stable, so signals were not stable either. 2. The ESC calibration was not proper.	1. Replace your transmitter 2. Re-calibrate the throttle range or fine tune the neutral position on the transmitter.

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