



**ZH-Racing Model.**  
<http://www.zh-racing.com/>

## New controlling brought to you by ZH-Racing Model Model

**ZH-Racing Model** series brushless motor speed controllers were designed and manufactured specifically for the R/C Bike. For the extra ordinary high efficiency and performance, it is a revolutionary product for R/C Bike market.

Its fuzzy program design offers you an easy interface to change settings from the throttle stick on your transmitter. It supports from traditional NiCd/NiMH batteries to the up-to-date popular Li-Polymer batteries. It supports all high-end in-runner, out-runner, high speed, and high torque brushless motors. You will be experiencing a totally new feeling on your R/C Bike with **ZH-Racing Model** controllers.

## Product Functions

- **Brake Strength**  
There were 4 options in brake function that allows you to choose from 0%, 30%, 50% and 70% strength.
- **Fuzzy Motor Timing**  
There were 4 options in this function that allows you to maximize the performance of your motor output. You could choose from Auto/Soft/Standard/Hard to fit with different brushless motors. Higher timing offers more power output at the expense of efficiency. Please check the current draw after changing the timing option in order to prevent overloading of battery.
- **Battery Management System**  
It was a built in Battery Management System function of the speed controller. The power cut off timing was based on the cell number and continues output current of the battery. There were 4 options defined in the battery management system in all *ZH-Racing Model* series controllers. 3 options were for Li-Polymer batteries and 1 option for using with NiCd/NiMH batteries. The battery management system allows you to protect your batteries from over discharge and moreover to extend the lifetime of your batteries.
- **Throttle Sensitivity**  
The throttle sensitivity function offers you different throttle response time for different set up in different occasions. It could be an ideal function while driving different Bike in different courses. The faster throttle response time will offer you quick and sensitive throttle feedback.
- **Start Mode**  
The Start Mode offers you different motor start power. The faster start speed offers quick and powerful motor output while from a completed stop. This is also an ideal function to be used in different course condition with different tire gear ratio and suspension set up.
- **Thermal Protection (Built in function, set-up free)**  
The ZH-Racing Model Series speed controller adapts high temperature cut off protection. If the controller reaches 120°C, the motor will not be allowed to start. If the controller reaches 120°C during operation, the power will be forced to cut off.

## Set Up Procedure

1. **Factory default setting:**  
0% brake + auto motor timing + Li Polymer standard battery management system + standard throttle response + soft start power

*ZH-Racing Model* series brushless motor speed controller Rev.A3.0

## To initialize throttle calibration and enter set up mode

Due to the signal differentiation amount different remote control brand names, it is strongly recommended to run the throttle calibration initiation process whenever set up a new car.

- I. Throttle position to the maximum
- II. Power on the transmitter
- III. Power on the *ZH-Racing Model* series speed controller, the motor will come up with acknowledge tones
- IV. Release the throttle stick to the neutral point
- V. Throttle position to the minimum/brake position, the motor will come up with acknowledge tones
- VI. Release the throttle stick to the neutral point, calibration completed.

This procedure was to calculate the throttle range by the microprocessor in order to optimize the throttle curve and the smoothness of operation. When finish the calibration process, we could simply shut down the power of the *ZH-Racing Model* controller. Then the system is intended to use the factory default settings. If you wish to enter SET UP mode, simply waiting for 1 second and the fuzzy system will lead you into the set up mode immediately.

## Describe Function Setting



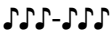
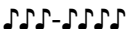
1. **Brake Strength**  
Following by the throttle calibration process, the system will enter brake mode. This section offers 4 options 0%, 30%, 50% and 70% brake. The motor will come up the corresponding tones as indicator. The following is the indication with graphic reference.
  - 0% Brake Strength (Factory Default)
  - 30% Brake Strength
  - 50% Brake Strength
  - 70% Brake Strength
2. **Fuzzy Motor Timing**  
Following by the brake mode, the system enters fuzzy motor timing set up section. In this section the system offers 4 options, auto timing, soft timing, standard timing and hard timing. The motor will come up the corresponding tones as indicator. The following is the indication with graphic reference.
  - Auto timing (Factory Default)
  - Soft timing
  - Standard timing
  - Hard timing

When intend to choose one of above options, simply position the throttle stick from "stop" position to maximum after the indication tone. The next step is to release the throttle stick back to the neutral position to confirm. If there is no need to enter next set up section, you could simply shut down the power. The selection was stored into the microprocessor when the throttle stick was in confirmation position. If there is need to enter fuzzy motor timing set up section, simply wait for the next tone.

Following by the brake mode, the system enters fuzzy motor timing set up section. In this section the system offers 4 options, auto timing, soft timing, standard timing and hard timing. The motor will come up the corresponding tones as indicator. The following is the indication with graphic reference.

When intend to choose one of above options, simply position the throttle stick from "stop" position to maximum after the indication tone. The next step is to position the throttle stick back to the minimum position to confirm. You could now simply shut down the power. The selection was stored into the microprocessor when the throttle stick was in confirmation position. If there is need to enter battery management set up section, simply wait for the next tone.


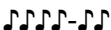
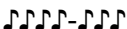
3. **Battery Management System**  
Following by the fuzzy motor timing, the system will enter battery management system. This section offers 4 options for using with either NiCd/NiMH or Li-Polymer battery. The motor will come up the corresponding tones as indicator. The following is the indication with graphic reference.

- NiCd/NiMH battery 
- Li-Polymer low discharge 
- Li-Polymer standard discharge (Factory Default) 
- Li-Polymer high discharge 

When intend to choose one of above options, simply position the throttle stick from “stop” position to maximum after the indication tone. The next step is to release the throttle stick back to the neutral position to confirm. If there is no need to enter next set up section, you could simply shut down the power. The selection was stored into the microprocessor when the throttle stick was in confirmation position. If there is need to enter run mode set up section, simply wait for the next tone.

#### 4. Throttle Sensitivity


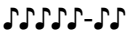
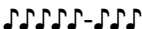
Following by the battery management system, that will enter throttle sensitivity setting. This section offers 3 options to be soft, standard and quick. The motor will come up the corresponding tones as indicator. The following is the indication with graphic reference.

- Soft throttle response 
- Standard throttle response (Factory Default) 
- Quick throttle response 

When intend to choose one of above options, simply position the throttle stick from neutral position to maximum after the indication tone. The next step is to release the throttle stick back to the neutral position to confirm. If there is no need to enter next set up section, you could simply shut down the power. The selection was stored into the microprocessor when the throttle stick was in confirmation position. If there is need to enter start mode set up section, simply wait for the next tone.

#### 5. Start Mode

Following by the throttle sensitivity, the system will enter start mode setting. This section offers 3 options. They were Auto, soft, standard, and powerful start mode. The motor will come up the corresponding tones as indicator. The following is the indication with graphic reference.

- Soft start 
- Standard start (Factory Default) 
- Powerful start 

When intend to choose one of above options, simply position the throttle stick from neutral position to maximum after the indication tone. You could simply shut down the power. The selection was stored into the microprocessor when the throttle stick was in confirmation position.

### More about Battery Management System

This section is to give you more details of the smart design of battery management system in order to help you to utilize the function. Technically the power cut off timing was based on the cell number and continues output current of the battery. The microprocessor will calculate the timing and to cut the power with two steps. Because the late stage of each battery discharge cycle has quick voltage change, such function will provide a safe process during the operation.

**1<sup>st</sup> step:** enabled when the single cell reaches the low point, the motor will be forced to lower the RPM by microprocessor

**2<sup>nd</sup> step:** enabled when the single cell reaches the lowest point defined in the system, the motor will be completely cut off. To regain the power, the user needs to adjust the throttle stick to the “stop” position until the battery voltage comes back to the safe level.

The following were the detailed definition of each option in battery management system.

- NiCd/NiMH battery (Factory Default)
  - +4.5 volt cut off
- Li-Polymer low discharge (per cell of Li-po)
  - 1<sup>st</sup> step voltage @ **3.2V**
  - 2<sup>nd</sup> step voltage @ **2.9V**
- Li-Polymer standard discharge (per cell of Li-po)
  - 1<sup>st</sup> step voltage @ **2.9V**
  - 2<sup>nd</sup> step voltage @ **2.6V**
- Li-Polymer high discharge (per cell of Li-po)
  - 1<sup>st</sup> step voltage @ **2.6V**
  - 2<sup>nd</sup> step voltage @ **2.3V**

### Caution!!

High power motor systems could be very dangerous. High current could generate heat on wires, batteries, and motors. Always follow the instruction and use proper tools to set up the system within safe range. Always to racing at a designed course with caution even though this controller is equipped with safety arming program.