

## **DISCLAIMER:**

Thanks for purchasing our Electronic Speed Controller(ESC).High power system for RC model can be very dangerous.Any improper use may result in injury and damage to human and devices.

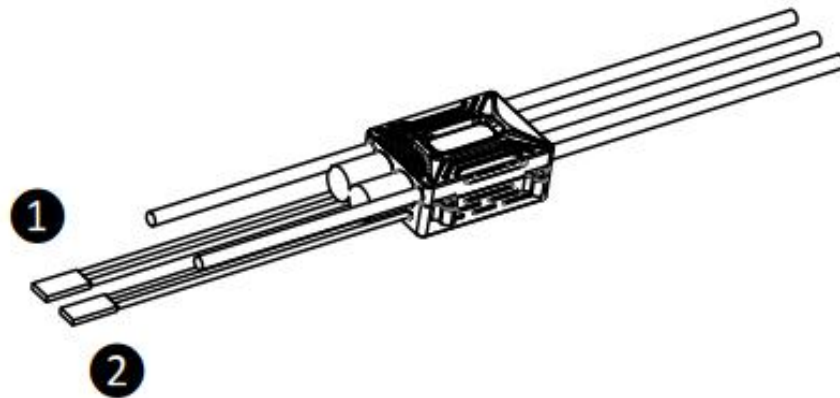
We strongly recommend that you read this manual carefully before use,and abide by its rules.

We assume no responsibility for personal injury.Property damage or consequential losses resulting from the product.

## **Product Features:**

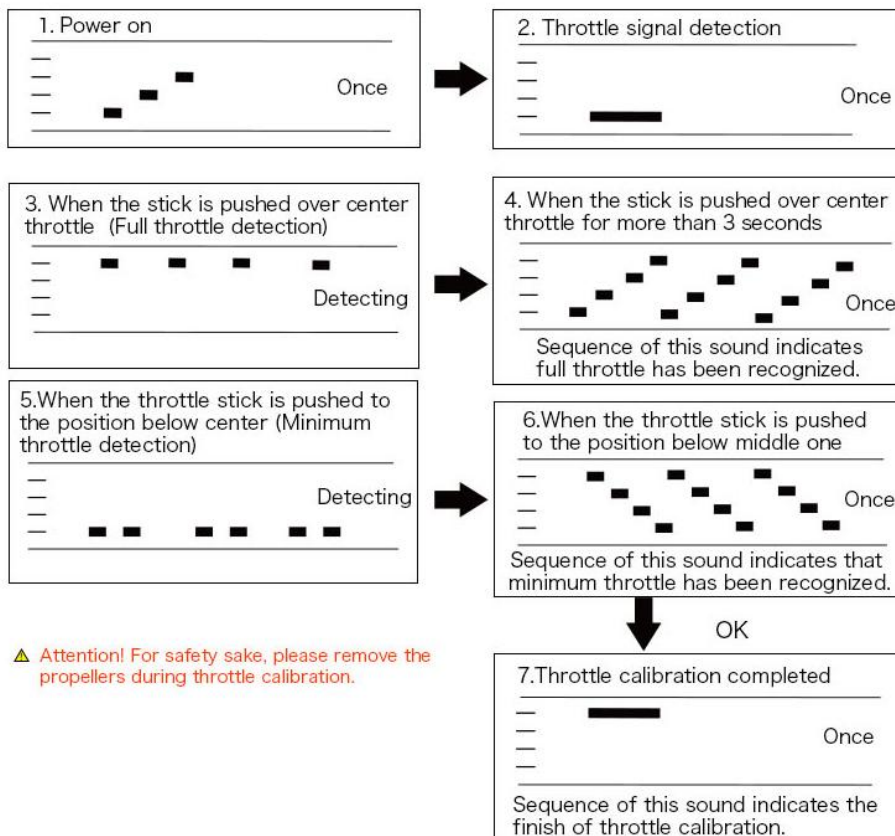
1. High-performance 32-bit ARM microprocessor with up to 48MHz operating frequency.
2. The BLHeli-32 firmware is the third generation BLHeli, following base BLHeli and BLHeli-S .
3. Use the damped light mode. Damped light does regenerative braking, causing very fast motor retardation, and inherently also does active freewheeling.
4. the code supports features to prevent sync loss. There are tuneable parameters that can make the code run well in most demanding situations, although default settings will work excellently in normal operating environments.
5. The ESC supports normal PWM throttle mode, OneShot125 throttle mode, OneShot42 throttle mode and MultShot throttle mode.
6. The ESC supports the DShot150/300/600/1200 digital throttle mode.
7. The code also supports a beacon functionality, where the ESC will start beeping after a given time of zero throttle. This can be very useful for finding lost crafts.

## **Interface definition**



- ① Throttle signal lines (**white, red, black** long lines): Insert the receiver throttle channel or the flight control throttle, the white line is used to transmit the throttle signal, while the red and black lines are the output lines of the BEC.
- ② Telemetry data lines (**orange, red, brown** long lines): the orange lines are used for telemetry output signals, while the red and brown lines are the output lines of the BEC.

## Throttle calibration



▲ Attention! For safety sake, please remove the propellers during throttle calibration.

Install the BLHeliSuite32 software, use the type-c interface data cable to connect

Am-link and computer power-on power.

Step 1: Click select BLHeli\_32 Interface at the top of the window

Step 2: Click on BLHeli32 Bootloader (USB/Com)

Step 3: Select the computer prompt Com, Baud default 19200

Step 4: Click on the Connect for connection at the bottom of the window.

Step 5: Click on the Red Setup for connection at the bottom of the window.

### BEC debugging tutorial:

Adjust the LED light color in the red circle of Figure 1 to select the appropriate BEC output voltage.

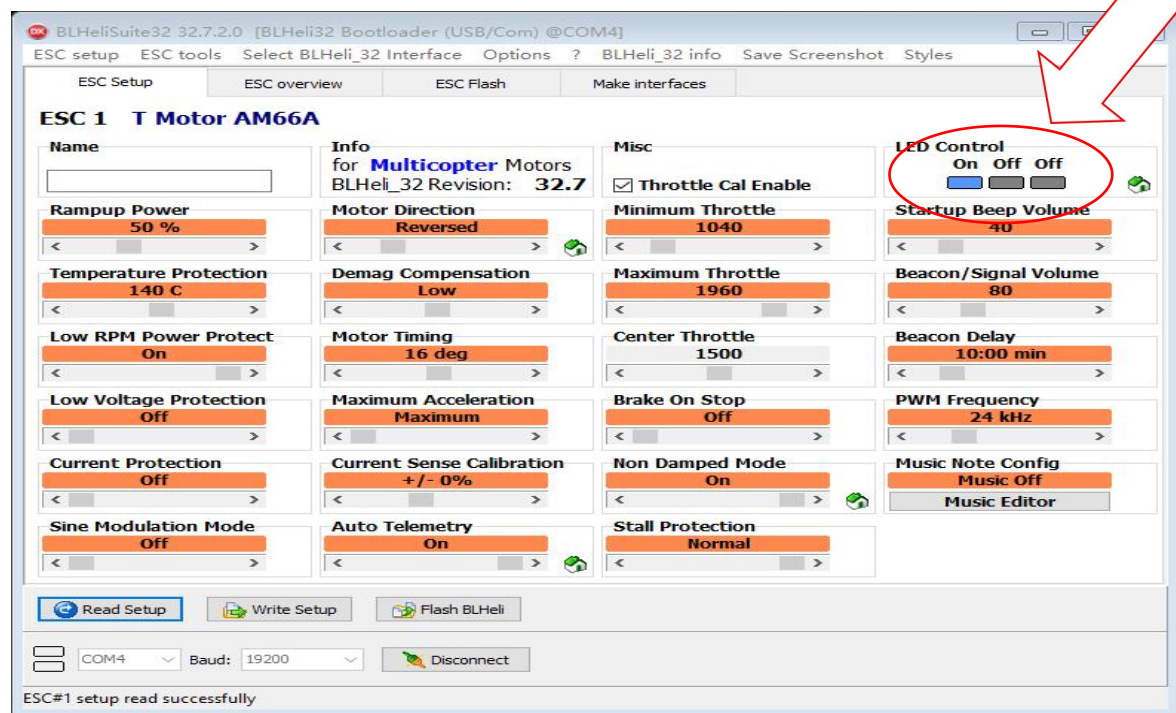


Figure 1

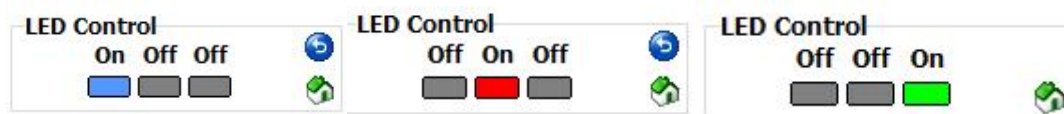


Figure 2

Figure 3

Figure 4

Turn on the **blue** light in the red circle of Figure 2, turn off the other two lights, and then click Write Setup write, the output is **5.8V**.

Turn on the **red** light in the red circle of Figure 3, turn off the other two lights, and then click Write Setup write, the output is **7.4V**.

Turn on the **green** light in the red circle of Figure 4, turn off the other two lights, and then click Write Setup write, the output is **8.2V**.

## **Programming parameters:**

### **1.Rampup power**

Rampup power refers to the maximum power allowed during Ramup, which can be set to any relative values from 3 to 150%. During start-up, the actual applied power depends on throttle input, the power can be large or small, but the minimum level is a quarter of the maximum level. In addition, rampup power affects bidirectional operation, as the parameter is used to limit the power applied during direction reversal. For low RPMS, the maximum power to the motor is limited in order to facilitate detection of low BEMF voltage, and the maximum allowed power can be set by setting the start-up power parameters. Starting with version 16.1 at low RPMS, the lower the startup power setting, the lower the maximum power.

### **2.Temperature Protection**

Temperature protection can be enabled or disabled.

### **3.Low RPM Power Protect**

Power limiting for low RPM can be enabled or disabled. Disabling it can be necessary in order to achieve full power on some low kV motors running on a low supply voltage. However, disabling it increases the risk of sync loss, with the possibility of toasting motor or ESC.

### **4.Low Voltage Protection**

Low voltage protection can be set between 2.5V and 4.0V per lipo cell, When this protection is enabled, it will limit power applied to the motor if the battery voltage

drops below the programmed threshold.

## **5.Current Protection**

Current protection can be enabled to limit current. When enabled, the current will be limited to maximum the programmed value. The reaction time of the current limiting is quite fast,so current will also be limited during accelerations.

## **6.Sine Modulation Mode**

On/off, throttle sine mode output.

## **7.Motor Direction**

Motor direction can be set to fwd,rev,bidirectional fwd,and bidirectional rev.In bidirectional mode,center throttle is zero and above is fwd rotation and below is reverse rotation.When bidirectional operation is selected,throttle calibration is disabled.

## **8.Demag Compensation**

Demag compensation is a feature to protect from motor stalls caused by long winding demagnetization time after commutation. Typically motor stop or stutter upon quick throttle increase,particularly when running at low RPM.As mentioned above, setting high commutation timing normally helps,but at the cost of efficiency.Demag compensation is an alternative way of combating the issue.First of all,it detects when a demag situation occurs. In this situation,there is no info on motor timing,and commutation proceeds blindly with a predicted timing.In addition to this,motor power is cut off some time before the next commutation. A metric is calculated that indicates how severe the demag situation is.The more severe the situation,the more power is cut off.When demag compensation is set to off,power will never cut. Generally,a high value of the compensation parameter gives better protection.If demag compensation is set too high,maximum power can be somewhat reduced for some motors.

## **9.Motor Timing**

Motor timing can be set between approximately 1\*~30\*. Typically a medium setting will work fine.But If motor stutters,you can try to change the number of

angles. Some motors with high inductance can have a very long communication demagnetization time. This can result in motor stop or shutter upon quick throttle increase, particularly when running at low RPM. Setting timing higher will allow more time for demagnetization, and often helps.

## **10. Maximum Acceleration**

The maximum acceleration of throttle changes.

## **11. Current Sense Calibration**

The current is adjusted to detect the offset value.

## **12. Auto Telemetry**

If disabled, the telemetry function is disabled/disabled.

## **13. Minimum Throttle, Maximum Throttle, Center Throttle**

These settings set the throttle range of ESC. Center throttle is only used only for bidirectional operation. The values given for these settings are for a normal 1000-2000us input signal. For other input signals, these values must be scaled

## **14. Brake On Stop**

Brake on stop can be turned on or off. When this function is turned on, the given brake force will be applied when throttle is zero. For nonzero throttle, this setting has no any effect.

## **15. Non Damped Mode**

Turn on/off Non Damped Mode.

## **16. Stall Protection**

Stall Protection Turn on/off, when the motor stalls, it will reduce the throttle to protect the motor and ESC.

## **17. Startup Beep Volume**

Startup beep volume during running.

### **18.Beacon/Signal Volume**

Sets the volume of beeps when beeping beacon beeps.The ESC will start beeping beacon beeps if the throttle signal has been zero for a given time. Note that setting a high volume can cause hot motors or ESC!

### **19.Beacon delay**

Beacon delay sets the delay before beacon beeping starts.

### **20.PWM Frequency**

The motor drive frequency can be modified Motor PWM frequency can be programmed.

### **21.Music Note Config**

Set the on-off ESC to prompt music.

### **Precautions:**

- 1.Before using this ESC, please carefully check all power equipment and aircraft instructions to ensure the power matching is reasonable, to avoid ESC damage ultimately due to the overload of ESC caused by the wrong power matching.
- 2.Install the ESC in aircraft, make sure that all wires and connecting parts are well insulated before flight.Please ensure to connect the components carefully,otherwise,short circuit will destroy the ESC.If the input and output lines of the ESC need to be welded, please weld with sufficient power welding equipment for safety. If the connection is not good, you may not be able to control the aircraft properly, or other unpredictable conditions such as equipment damage.
- 3.Do not block the motor during the ESC working, it will destroy the ESC and motor. If the motor is blocked for special reasons, zero the throttle or unplug the battery immediately.
- 4.Do not put the ESC in a high temperature environment or continue to use the heat ESC itself cause too high temperature, high temperature will trigger the electricity

temperature protection, will destroy the ESC more seriously.

5.Be sure to disconnect the battery from the ESC.If the battery is not disconnected, the ESC may drive the motor to turn by mistake with unpredictable danger.If the battery connect for a long time,it will be completely discharged and result in error occurred for battery or ESC.

6.For more information, please contact T-MOTOR after service or technical support.