

## #923601 - ESC 60A with built-in SBEC

Working Voltages(Maximum)	9 V ~ 25.2 V(Maximum)
Maximum Current(Instantaneous )	75 A
Continual Current	60 A
Low Battery Protect	3.2V~2.6V / cell
Temperature Overload	120 °C
SBEC Output voltages( 5 Options)	5.0V / 5.25V / 5.5V / 5.75V / 6.0V

### Product Functions

#### • Battery Management

There is a built-in Battery Management function in the speed controller. The power cut off timing is based on the cell number and continuous current drains of the battery. There are two options defined in the battery management, one is for Li-Polymer batteries and another for using with NiMH battery. The battery management allows you to protect your batteries from over discharge and moreover to extend the lifetime of your batteries.

#### • Flying Mode

The flying mode function offers you four options for different aircrafts. You could choose from Aircraft, Glider, Helicopter with governor and Helicopter without governor.

#### • Motor Timing

The Motor Timing offers you four 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.

#### • Throttle Speed

The throttle speed function offers you different throttle response time for different set up in different occasions. It could be an ideal function while driving different cars in different courses. The faster throttle response time will offer you quick and sensitive throttle feedback.

#### • Switching BEC Voltage (Built-in SBEC ESC Only)

The SBEC voltage offers you different BEC voltage output. You could choose from 5.0V, 5.25V, 5.5V, 5.75V and 6.0V output for your servo.

### Set Up Procedure

#### 1. To enter set up mode and throttle calibration

Due to the signal differentiation amount different remote control brands, it is strongly recommended to run the throttle curve initiation process whenever set up a new aircraft.

- I. Shifting the throttle position to the full throttle/full speed.
- II. Power on the transmitter
- III. Power on the speed controller, the motor will come up with acknowledge tones ♪-♪-♪-♪-♪-♪
- IV. Moving the throttle position to the minimum/stop position, the motor will come up with acknowledge tones ♪-♪-♪-♪

The speed controller recognized the exactly throttle range then optimizes the throttle curve after this progress. When finish the calibrating process, you could simply shutdown the power to leave the other settings unchanged. If not, simply waiting for 1 second. The speed controller will enter the set up mode.

#### 2. Battery Management

The first section of setup is **battery management**. This section offers 4 options for using with either NiMH or Li-Polymer battery. The motor will come up the corresponding tones as indicator. The following is the indication with graphic reference.

- Light discharge protection for Li-Polymer ♪-♪
- Standard discharge protection for Li-Polymer (Factory Default) ♪-♪-♪
- Light discharge protection for Li-Polymer ♪-♪-♪-♪
- +5V cut-off protection for Ni-MH ♪-♪-♪-♪-♪

When intending to choose one of above options, simply push throttle stick from minimum/stop to maximum/full throttle after the indication tone, then pull throttle stick back to the minimum/stop position to confirm after the acknowledge tone. You could simply shut down the power if you don't need any further settings. If you want to skip this section and leave current setting unchanged, just keep throttle stick in minimum position and wait the speed controller to enter next section.

#### 3. Flying Mode

The following section is **flying mode** setting. This section offers 4 options. They are Aircraft, Glider and Helicopter with Governor/without Governor. The motor will come up the corresponding tones as indicator. The following is the indication with graphic reference.

- Aircraft ♪-♪-♪
- Glider ♪-♪-♪-♪
- Helicopter with Governor ♪-♪-♪-♪-♪
- Helicopter without Governor (Factory Default) ♪-♪-♪-♪-♪

When intending to choose one of above options, simply push throttle stick from minimum/stop to maximum/full throttle after the indication tone, then pull throttle stick back to the minimum/stop position to confirm after the acknowledge tone. You could simply shut down the power if you don't need any further settings. If you want to skip this section and leave current setting unchanged, just keep throttle stick in minimum position and wait the speed controller to enter next section.

#### 4. Motor timing

Following by **flying 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 ♪-♪-♪-♪
- Soft timing ♪-♪-♪-♪-♪
- Standard timing(Factory Default) ♪-♪-♪-♪-♪-♪
- Hard timing ♪-♪-♪-♪-♪-♪-♪

When intending to choose one of above options, simply push throttle stick from minimum/stop to maximum/full throttle after the indication tone, then pull throttle stick back to the minimum/stop position to confirm after the acknowledge tone. You could simply shut down the power if you don't need any further settings. If you want to skip this section and leave current setting unchanged, just keep throttle stick in minimum position and wait the speed controller to enter next section.

#### 5. Throttle Speed

Following by the **motor timing**, the system will enter throttle speed setting. This section offers 3 options -- soft, standard and fast throttle speed. 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)      🎵🎵🎵-🎵
- Fast throttle response      🎵🎵🎵-🎵🎵

When intend to choose one of above options, simply position the throttle stick from minimum to maximum after the indication tone. The next step is to position the throttle stick back to the minimum 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 flying mode section, simply wait for the next tone.

#### 6. Switching BEC Voltage Setting (Only for the ESC with built-in SBEC)

Following by the **throttle speed**, the system will enter SBEC output voltage setting. This section offers 5 options, which were 5V, 5.25V, 5.5V, 5.75V and 6V. The motor will come up the corresponding tones as indicator. The following is the indication with graphic reference.

- SBEC Output Voltage = 5.0V      🎵🎵🎵🎵-🎵
- SBEC Output Voltage = 5.25V      🎵🎵🎵🎵-🎵
- SBEC Output Voltage = 5.5V(Factory Default)      🎵🎵🎵🎵-🎵🎵
- SBEC Output Voltage = 5.75V      🎵🎵🎵🎵-🎵🎵
- SBEC Output Voltage = 6.0V      🎵🎵🎵🎵-🎵🎵🎵

When intend to choose one of above options, simply position the throttle stick from minimum to maximum after the indication tone. The next step is to position the throttle stick back to the minimum position to confirm. Then you could simply shut down the power. The selection was stored into the microprocessor when the throttle stick was in confirmation position. The controller is now ready to fly.

#### Monitor LED indications

A. **The monitor LED lights / blinks in RED only in programming**, it will also blinks in RED with the motor acknowledge tones when power on the speed controller.

B. **The GREEN monitor LED indicates the Maximum / Minimum output control of ESC**, it is able to check of the Maximum / Minimum value of the Throttle Curve (Transmitter Function), and make sure the Travel Volume (End Point / Travel Adjust...in Transmitter Function) of the throttle was set properly.

- ◆ For the Normal throttle setting, if the throttle stick is at the lowest position, the monitor LED should light in Green and the motor should be stop; when the throttle stick is up to 1/6 position from bottom, the motor starts and the Green monitor LED should be off until the throttle stick comes up to the top position then it lights in Green again. **The Green monitor LED only lights in Maximum or Minimum power output.**

C. Check the setting of the Transmitter Function “Throttle Curve” or “Travel Volume (End Point / Travel Adjust...)” if the monitor LED indicates as below :

- **If the Green monitor LED is not on and the motor is still running when the throttle stick is at the lowest position:**  
Check the 1<sup>st</sup> point of the “Throttle Curve” (Transmitter Function) to make sure it is at 0%, if it was set at 0% initially, you might have to increase the “Travel Volume (End Point / Travel Adjust...)” at the lower side of throttle stick.
- **If the Green monitor LED is not off and the motor does not start when the throttle stick comes up to the 1/3 position from bottom:**  
Check the lower section of the “Throttle Curve” (Transmitter Function) from the 1<sup>st</sup> point to the middle point to make sure this section is not too close to the 0% value, if it was set

properly initially, you might have to decrease the “Travel Volume (End Point / Travel Adjust...)” at the lower side of throttle stick.

- **If the Green monitor LED is on when the throttle stick only comes up to 2/3 position from bottom:**

Check the higher section of the “Throttle Curve” (Transmitter Function) from middle point to top point, maybe this section is already 100% from the 2/3 throttle stick position, if it was set properly initially, you might have to decrease the “Travel Volume (End Point / Travel Adjust...)” at the higher side of throttle stick.

- **If the Green monitor LED is not on when the throttle stick comes up to the top position:**

It indicates the ESC is not at its Maximum power output, **it is still able to operate normally**, if you want to use the full power, Check the top point of the “Throttle Curve” (Transmitter Function) and set it to 100%, if it was set at 100% initially, you might have to increase the “Travel Volume (End Point / Travel Adjust...)” at the higher side of throttle stick.

- **The indications of the monitor LED may vary according to the different setting of the “Throttle Curve (Transmitter Function)” and the “Travel Volume (End Point / Travel Adjust...)”.**

D. **If the monitor LED is flashing in Green**, it indicates the ESC gets into the battery discharge protection mode, the motor will be forced to lower the RPM intermittently.

#### More about Battery Management System

This section gives you more details of the smart design of battery management in order to help you to utilize the function. Technically the power cut off timing was based on the cell number and continuous current drains of the battery. The speed controller will calculate the timing and cut the power off. Because the last stage of each battery discharge cycle has quick voltage drop, such function will provide a safe process during the operation.

when the single cell reaches the low point as below, the motor will be forced to lower the RPM by microprocessor

- Li-Polymer light discharge voltage @ **3.2V**
- Li-Polymer standard discharge (Factory Default) voltage @ **2.9V**
- Li-Polymer hard discharge voltage @ **2.6V**
- NiMH battery +5.0 volt cut off

#### 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 fly at a designed field with caution even though this controller is equipped with safety arming program.