

MSHeli Brushless – Electronic Speed Controllers (ESC) Operating instructions for the RC-Setup

Features:

- 6 step adjustable timing or automatic timing adjustment
 - Lipo(Auto) / NiMh adjustable.
 - Adjustable brake. Hardness and speed are proportional to the soft start.
 - Full utilization of stick range by programming in the RC-Setup
 - PWM switching rate of 8KHz-16KHz adjustable in 1KHz-steps!!
- With the PWM switching rate applies as little as possible and as much as necessary. Higher frequency for low inductive motors, lower frequency for less switching losses.
- Speed regulation with PI-controller.
- Active free-wheel.** Can be disabled with ProgCard II.
- Active free-wheel** reduces clearly the losses in the partial load range, but can however lead in rare cases to problems.
In relation with speed regulation it can come to rougher transitions from part load to full load, avoid therefore full power switching in speed controller mode.

RC-Setup:

General beep sequences outside of the RC-Setup:
Constant monotonous beep signals the programming mode.
A descending beep sequence signals recognition of receiver signals.
A ascending beep sequence signals that the ESC is armed! Caution!

Afterwards (after active signaling) other beeps are following to indicate the recognized or adjusted battery type.

The correct setting are particularly important with Lipos and BEC operation, therefore an acoustic control takes place after every power on of the ESC.

In case of Lipo-setting (Lipo auto-mode 2-6 (14) cells):

.
2 identical beeps => 2S Lipos recognized . .

.
3 identical beeps => 3S Lipos recognized . . .
etc...

To have a successful recognition even with more than 3 cells, the battery pack should always be fully charged!
Otherwise, with high cell numbers, it can happen that a cell is missed and thus the under voltage protection would trigger too late.

With the optionally available YGE ProgCard II the number of cells can also be set permanently.

With more than 6 cells the beep sequence becomes . . ., as following the count of so many beep seems unrealistic.

Such high numbers of cells should not be operated in the auto mode anyway. We recommend then to set the number of cells permanently with the ProgCard II.

The under voltage protection is triggered at 3.1V per cell. This is a conservative value however it leads to a longer Lipo life! It is important to verify the recognized cell count to avoid false under voltage triggering. A fixed under voltage limit can only be programmed with the ProgCard II. You can also set the specific limits for LiFePO with the ProgCard II.

With Ni-based batteries (NiCd/NiMh)

.
2 Beeps high/low => NiMh-Mode: . .
under voltage limit is about approx. 0.65 x open circuit voltage of a cell.
Thus with 1,3V open circuit voltage before flight, the limit will be 0,91V/cell.
Generally only sufficiently charged batteries should be connected before a flight for a reliable under voltage detection.

Freely programmable voltage activated:

.
2x2 different beeps low/high/low/high => Programmed under voltage limit is active (default 12V for future PC-Setup)

Basic-Setup:

The basic setup goes relatively quick. One should read this thoroughly before running it. Otherwise one may not be able to keep up with the pace!

1. Verify that the ESC is off, switch on the transmitter with the throttle stick at full power.
2. Hold the Model, Connect the ESC => a monotonous continuous beep should be heard.
..... : Multiprogramming is activated!
Full throttle position is learned!
3.
 - 3.1 **NO BRAKE** Move the stick to full back position to store lower stick position and disable brake.
 - 3.2 **BRAKE** To activate brake lower the stick in the lower quarter (not fully back).

Acknowledgement: . .

4. Now comes the setup of the Soft start.

4.2 To activate SOFT START leave the stick to full back position and wait for acknowledgement.

4.1 For extremely fast response (NOT FOR HELI USE!!!) simply push the stick back to full power and wait for acknowledgement. Then come back to full back position and the ESC is ready to run.

Acknowledgement: . .

=> Softstart is saved.

=> Softbrake, if activated, will also use this value!

Please notice that, with brushless motors, very fast response times can lead to several times higher current draws than in steady operation! Therefore this setting should be adjusted carefully. Allow only as much speed as necessary. A good average is to place the stick simply into the center. For geared motors the stick should remain below the center. This applies in particular to the soft start for helicopters!

Caution Heli-Pilots:

For helicopters the best is to move the stick in full back position!!

It is important that for autorotations trainings the motor is not taken fully back to 0! Otherwise an extremely slow normal softstart takes place in the case of an autorotation abort which eventually may lead to a real inadvertent autorotation.... Thus, the motor needs a certain remaining rpm, so that the ESC isn't considering it as a fresh start. One should select this remaining rpm low enough so that the helicopter cannot hover with it. If it is too small the acceleration could lead to an overload of the motor. Nevertheless the motor will engage only softly after an autorotation abort and not with full power. Therefore an appropriate security flight level must be always kept.

Advanced-Setup:

For the Advanced Setup the Basic Setup must have been performed at least once!

1. Verify that the ESC is off, switch on the transmitter with the throttle stick at full power.
2. Hold the Model, Connect the ESC => a monotonous continuous beep should be heard.
3.
..... : after approximately 20 tones, the advanced setup is activated as long as the basic setup has been performed!
Acknowledgement . . => Advanced Setup

If the continuous beep is not heard, please disconnect immediately the battery from the ESC and control everything again. Place the transmitter in a good range of the receiver if the antenna is not extended.

Important!!!

In the advanced setup only ONE Menu option can be selected, therefore menu choice must take place first:

place the stick again into full back position to select the parameter to modify:

Menu Options overview:

- Brake
- .. Batt-Typ
- ... Timing
- PWM-Frequency
- Governor mode

Move the stick to full power to select the desired parameter.
Acknowledgement: . .

Note: If no selection is taken, the menu begins again with “Brake” and so on.

Depending upon selection now the ESC switches to the setting of one Parameter.
Possible (sub) menus:

1 Brake (.)

Brake selection (Brake):
move stick into full back position at the 1 beep to enter BRAKE sub menu:

- No Brake
 - .. Brake
- Brake activated if stick range has been configured accordingly.

Move the stick to full power to select the desired setting in the submenu.

After the acknowledgement the menu option is programmed!

If the stick is taken back to full back position the ESC is armed and ready for use when the ready signal sounds. This applies to each programming step.

If no selection is made, the above selection menus start over again at the beginning until a selection is made.

2 Battery-Typ(..)

Battery selection (Batt-Typ):

move stick into full back position at the 2 beeps to enter BATTERY-TYP sub menu:

- NiMh
- .. 2-6Lipo
- Auto
- ... free voltage setup(PC-Setup)

Move the stick to full power to select the desired setting in the submenu.
Acknowledgement: . .
Setting done.

3 Timing(...)

Timing setting:

move stick into full back position at the 3 beeps to enter TIMING sub menu:

The ESC starts with a single beep (30°) and proceed up to 7 beeps (Autotiming).
Example: To set 18° : Move the stick to full power to at the third beep signal.

.
30°
..
24°
...
18° (**optimal setting for MSH/Scorpion 880 Motor**)
....
12°
.....
6°
.....
0°
.....
Autotiming

Move the stick to full power to select the desired setting in the submenu.
Acknowledgement: . .

4 PWM-Frequency(....)

PWM switching rate setting:

move stick into full back position at the 4 beeps to enter PWM sub menu:

.
8kHz (**optimal setting for MSH/Scorpion 880 Motor**)
..
9kHz
...
10kHz
....
11kHz
..... (5)
12kHz
.....(6)
13kHz
.....(7)
14kHz
.....(8)
15kHz
.....(9)
16kHz

Move the stick to full power to select the desired setting in the submenu.
Acknowledgement: . .

5 Governor Mode(.....)

move stick into full back position at the 5 beeps to enter GOVERNOR MODE sub menu:

·
Governor mode **OFF**

··
Governor mode **ON**

Move the stick to full power to select the desired setting in the submenu.

Acknowledgement : . .

After setting of the speed regulation the ESC will learn-in the operating speed at the next start. It is therefore important to wait until you can notice a small speed jump indicating that the regulation is active.

If no selection has been made, the above menu options will start over again until a selection is made.

Hint:

The beep starts always with the current setting. This gives a way to readback the ESC settings.

After the setting of any of these parameters, moving the stick back to full back position will arm the ESC.

Alternatively the

ESC can be disconnected and reconnected to allow the setting of other parameters.

OPTIMAL SETTINGS TO USE WITH MSH/SCORPION 880 MOTOR (MSH51063)

(some parameters are settable only using MSH/YGE programming card)

Timing 18°

P-Gain 0.9 (needs programming card)

I-Gain 0.05 (needs programming card)

PWM Frequency 8 kHz

Startup Power = Auto (needs programming card)

