Bay-Tec ICE
Drehzahlregler

Brushless Electronic Speed Controllers (ESC)

Manual for the RC (remote controller)-Setup

www.bay-tec.de

1 1 Features

-6 steps adjustable timing or automatic timing adjustment
-Lipo(Auto) / NiMh adjustable.
-Adjustable brake. Hardness and speed are proportional to the Soft-start.
-Full utilization of the range of throttle stick by programming in the RC-Setup
-PWM range from 8 KHz to16KHz adjustable by 1KHz!
-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.

-Active free-wheel, which can be disabled with the Prog Card II.
-Active free-wheel reduces clearly the losses in the partial load range, but can lead to problems in rare cases. In relation with speed regulation it can come to rougher transitions from part load to full load, avoiding switching into speed controller mode in full power.

2 2 RC-Setup

General beep sequences outside of the RC-Setup: Constant monotonous beep signals the programming mode.
When the throttle stick in the neutral position, a group of descending beep sequences means that it is sure for receiving signals. Afterwards (after active signaling) other beeps indicate the recognition of the adjusted battery type. And then, the other group of ascending beeps means that the ESC is armed! The ESC is ready for working. Caution!
The correct setting is particularly important for Lipos battery pack, therefore an acoustic control takes place after every power on of the ESC.

Lipo-setting (Lipo auto-mode 2-6 (14) cells):
2 identical beeps => 2S Lipos recognized ♪♪
3 identical beeps => 3S Lipos recognized ♪♪♪
And so on...

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. The cells of battery pack can be programmed by Prog Card II.
With more than 6 cells the beep sequence becomes two high pitch beeps and then two low pitch beeps as following, the count of so many beeps seem 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 Prog Card II.
The under voltage protection is triggered at 3.1V per cell. However, this conservative value can prolong the life of Lipo battery pack! It is important to make sure the number of cell to avoid wrong signal of under voltage protection.
A fixed under voltage limit can only be programmed with the Prog Card II. You can also set the fixed limits for LiFePo battery pack with the Prog Card II.

Ni-xx batteries--setting (NiCd/NiMh):
2 Beeps high/low => NiMh-Mode: under voltage limit approximately equals that 0.65 multiply the voltage of open circuit per 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:

- 2*2 different beeps low/high/low/high

2.1 Basic-Setup:

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

1. Verify that the ESC is off, and then switch on the transmitter with the throttle stick at full power(make sure the full power position with fine trimming).
2. Hold the Model, Connect the ESC with motor and battery pack => a monotonous continuous beep should be heard. ♪♪♪♪♪…: Multiprogramming is activated!
3. Move the stick to the desired neutral position; if the Brake is not needed, the throttle stick is on the "full back" position. If the Brake is needed, lower the stick to one fifth away from the lowest point (not fully back), you will hear two beeps (these high pitch and low pitch)to make sure the position of throttle stick. Then the throttle process was saved.
4. Now, do not move the throttle stick and hear the sounds, it comes the setup of the Soft start to wait for the acknowledgement of the sounds
    a. The Soft Start was saved
    b. The Soft Start with Brake, if activated, will also use this value!
5. For extremely fast response (NOT FOR HELI USE!!!!), the same operation as (procedure 1-3) the Basic-setup, after the 3 procedures, please make sure to push the stick back to full power and wait for acknowledgement . Then come back to full back position swiftly and the ESC is ready to run and wait for the acknowledgement

=> Quick Start is saved.
=> Quick Start with brake, 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. This very fast response is allowed only as occasion requires.

Caution for Heli-Pilots:
For helicopters the best is to move the stick in full back position!!
It is important that for auto rotations trainings the throttle can not be taken fully back to 0! Otherwise an extremely slow normal soft start will takes place again 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 will not consider it as a fresh start.

2.2 Advanced-Setup:

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

1. Make sure that the ESC is off; switch on the transmitter with the throttle stick at full power.
2. Hold the Model, Connect the ESC with motor and battery => 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 beeps are not heard, please disconnect immediately the battery from the ESC and operate everything again. Place the transmitter in a good range of the receiver if the antenna is not extended.

In the advanced setup only ONE Menu option can be selected, therefore the main menu choice must take place first:
Place the stick again into full back position to select the main meun to modify:

Main Menu Options overview:
♪ Brake ♪♪ Battery-Type ♪♪♪ Timing
♪♪♪♪ PWM-Frequency ♪♪♪♪♪ Governor mode

Move the stick to full power after hearing the sounds for the desired parameter.
Acknowledgement: ♪♪

Note: If any parameter has not be selected, the menu will begin again with “Brake” and so on; If selected, depending upon the selection now the ESC switches to the setting of the Parameter. Possible (sub) menus:

2.2.1 Brake (♪)
Brake selection
(Brake):
Move stick into full back position again
♪ No Brake
♪♪ Brake, Brake is activated if stick range has been configured accordingly.
Move the stick to full power to select the desired setting in the submenu.
Acknowledgement: ♪♪
After the acknowledgement the menu option is programmed!
If the stick is took back to full back position, the ESC is armed and ready for working after the ready signal sounds was heard. This applies to each programming step.
If no selection is made, the above selection menus start over again until a selection is made.

2.2.2 Battery-Type (♪♪)
Battery selection (Battery-Type):
Move stick into full back position again:
♪ NiMh
♪♪ Auto
♪♪♪ Reserved

Move the stick to full power to select the desired setting in the submenu after hearing the beeps for desired parameter. Acknowledgement: ♪♪ ,Setting is done.

2.2.3 Timing (♪♪♪)
Timing setting:
Move the stick into full back position:
The ESC starts with a single beep (30°) and processed up successively to 7 beeps (Auto Timing). Example: To set 18°: Move the stick to full power to at the third beeps signal.
30°♪ 24°♪♪ 18°♪♪♪ 12°♪♪♪♪
6°♪♪♪♪♪ 0°♪♪♪♪♪♪ Autotiming ♪♪♪♪♪♪

Move the stick to full power after selecting the desired setting sounds.
Acknowledgement: ♪♪. The selection is finished

2.2.4 PWM-Frequency (♪ ♪ ♪ ♪)

PWM switching rate setting: Move stick into full back position

(1) ♪ 8kHz	(2) ♪ ♪ 9kH	(3) ♪ ♪ ♪ 10kHz
(4) ♪ ♪ ♪ ♪ 11kHz	(5) ♪ ♪ ♪ ♪ ♪ 12kHz	(6) ♪ ♪ ♪ ♪ ♪ ♪ 13kHz
(7)♪ ♪ ♪ ♪ ♪ ♪ ♪ 14kHz	(8)♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ 15kHz	(9) ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ 16kHz

Move the stick to full power to select the desired setting (beeps counting) in the submenu.
Acknowledgement: ♪ ♪, the setting was saved.

2.2.5 Governor Mode (♪ ♪ ♪ ♪ ♪)

Move stick into full back position,
♪ Governor mode OFF
♪♪ Governor mode ON
Move the stick to full power after the hearing the desired beeps. Acknowledgement: , the setting was saved.
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 activated.
If no selection has been made, the above menu options will start over again until a selection is made.

Note:
The beep starts always with the current setting. This gives a way to sent a feedback to 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.