1 Features:

- 6 step adjustable timing or automatic timing adjustment
- Lipo(Auto) / NiMh adjustable.
- Adjustable brake, amount and speed are proportional to the soft-start.
- Full utilization of the throttle stick range by programming in the RC-Setup
- PWM range from 8 KHz to 16KHz adjustable in steps of 1KHz!
- The PWM switching rate can be applied as little as you require or as much as you require
- Higher frequency for low inductive motors,
- Lower frequency for less switching losses.
- **Active free-wheel**, this can be disabled with the Prog Card II.
- **Active free-wheel** reduces the losses in the partial load range but can lead to problems in rare cases. In relation to speed control it can lead to rougher transitions from part loads to full loads, avoid switching the speed controller mode when using full power.

2 RC-Setup:

General beep sequences outside of the RC-Setup programme: Constant monotonous beep signals you are in programming mode.

When the throttle stick in the neutral position, a group of descending beep sequences means that it is receiving a signal. Afterwards (after the signal is recognised) more beeps indicate the recognition of the selected battery type. Then the next group of ascending beeps means that the ESC is armed! The ESC is now ready for use. Take care once the ESC is armed!

The correct setting is particularly important for Lipo battery pack, therefore an acoustic control takes place every time you power on the ESC.

**Lipo-setting (Lipo auto-mode 2-6 (14) cells):**

2 identical beeps => 2S Lipo recognised ♫♫

3 identical beeps => 3S Lipo recognised ♫♫♫

And so on...

For the ESC to successfully recognise the number of cells the battery pack should always be fully charged, even with 3 cells or more.

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 packs 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, This is because following the count of so many beeps is difficult. A high numbers of cells should not be operated in the auto mode anyway. We recommend to set the number of cells permanently with the Prog Card II.

The under voltage protection is triggered at 3.1V per cell. This conservative value can prolong the life of your Lipo battery pack! It is important to make sure the correct number of cells is detected to avoid a wrong signal for under voltage protection.

A fixed under voltage limit can only be programmed with the Prog Card II. You can also set the limits for LiFePo battery pack using the Prog Card II.

**How to programme the ESC using a transmitter.**

**Ni-xx batteries--setting (NiCd/NiMh):** ♫♫

2 Beeps high/low => NiMh-Mode: under voltage limit approximately equals 0.65, multiply the open circuit voltage of each cell.
A cell with 1.3V open circuit voltage before use the limit will be set at 0.91V/cell. Generally only fully charged batteries should be connected before use for a reliable under voltage detection.

**Freely programmable voltage activated:**

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

**Basic-Setup:**
The basic setup is relatively easy. Please read this manual thoroughly before using your ESC. Incorrect use or set up could damage the product or cause serious injury.

1. Verify that the ESC is off, then switch on the transmitter with the throttle stick at full power (make sure you achieve full power position by use of fine trimming).

2. Hold the Model, Connect the ESC to the 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 required the throttle stick is moved to the “full back” position. If brake is required then lower the stick to one fifth away from the lowest point (not fully back), you will hear two beeps ♬♩♩♩♩♩ (these are high pitch and low pitch) to make sure the position of throttle stick is recognised. Then the throttle process is saved when you hear these beeps.

4. Do not move the throttle stick until you hear these sounds ♬♩♩♩♩♩, next is the setup for Soft start, wait for the acknowledgement of these sounds ♬♩♩♩♩♩,

   ◎ The Soft Start was saved.
   ◎ 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 you push the stick back to full power and wait for acknowledgement ♬♩♩♩♩♩. Then 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 note that with brushless motors very fast response times can lead to a higher current draw unlike a steady operation! Therefore this setting should be adjusted carefully, a very fast response should only be used occasionally and for a limited period.

**Caution for Heli-Pilots:**
For helicopters the best is to move the stick in full back position!!
It is important for auto rotation training the throttle can not be taken fully back to 0!
Otherwise an extremely slow normal soft start will take place again in the case of an autorotation abort, this eventually may lead to a real inadvertent autorotation.... Thus, the motor needs a certain rpm so that the ESC will not consider it as a fresh start.

**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 try again. Place the transmitter within range of the receiver if the antenna is not extended.

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

Place the stick again into full back position to select the main menu 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:

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 put back to full back position, the ESC is armed and ready for use after the ready signal sounds were heard. This applies to each programming step. If no selection is made, the above selection menus start over again until a selection is made.

**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.

**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 at the third beep 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

**PWM-Frequency(♪♪♪)**

PWM switching rate setting: Move stick into full back position

- ♬ 8kHz
Move the stick to full power to select the desired setting (count the beeps) in the submenu.

Acknowledgement: ♬ ♬, the setting was saved.

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 the speed regulation, the ESC will learn the operating speed at the next start. It is therefore important to wait until you notice a small speed jump indicating that the regulation has been activated.

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

Note:
The beeps always start with the current setting. This allows the ESC to send 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.