

Brushless ESC Programming Card Operating Instructions

The Airtek Synergie programming card has been designed to make programming your Synergie ESC a simple operation and can be used with any Airtek Synergie ESC.

WARNING! This card has been designed to be used ONLY with the Airtek Synergie Series of ESC's. Attempted use on other makes of ESC may result in damage due to the differences in firmware.

Using the Card to Programme your ESC

You will need a separate power source of between 4.8 - 6.0v to power the programming card. This will need a standard servo lead. A standard receiver NiMH is ideal. **PLEASE NOTE:** a 4.8v source is sufficient for the Synergie 6A, 12A, 20A and 30A. Users of the SBEC Synergie 40A, 60A and 80A will need a 6.0v input. Please also see the alternative method of powering the card at the end of this section.

1. Disconnect the ESC from the lipo but leave your motor connected by the 3 motor wires. (You can programme your ESC whilst not connected to the motor but you will not hear the audio tones which are created by the motor).
2. Remove the 3pin signal wire (orange, red, brown) from the receiver throttle output and place it in the connector on the top right of the programming card. Note this is connected to the 3 pin connector: Please pay attention to the polarity markings to make sure the connector is inserted the right way round (Brown to -, red to + and orange to signal).
3. Connect your battery to the two pin connector below the ESC cable you have just connected, again taking care to get the correct polarity. The motor will give a E 1 2 3 tune and the red LED on the Programme Card will light up and display No 1 (in the ITEM section) and 1 (in the VALUE section). The card is now ready to send programming instructions to the ESC.

Alternative method of powering your card.

The card can also be used without connecting to an external power source by using the lipo. This is particularly useful for programming at the field.

1. Disconnect the ESC from the throttle out put on your receiver and connect the lead to the front 3 pin connector on the top right of the card, taking note of the polarity markings. Attach the battery connector on the ESC to your lipo. The card LCD display will now light up and you can continue to programme your Synergie ESC as per the instructions below. **PLEASE NOTE:** if using this method the card can be programmed either with or without the motor attached to the ESC. If the motor is attached TAKE GREAT CARE as under some circumstances when programming the ESC may become armed and the motor run up without warning. For added safety we recommend removing the prop.

Explanation of the 3 Function Buttons

The 'ITEM' Button: This is pressed to scroll between the different programming parameters (1 to 7)

The 'OPTION' Button: This allows you to select the different values of your chosen programming parameter: The number of values available varies between the different parameters. (Please Note: The value screen only has a single digit, therefore if your chosen programming parameter has more than 9 options the display will go to a, b, c etc after the number 9. An example of this would be setting the start force which has 13 options).

The 'WRITE' Button: This writes your chosen programming parameter to the ESC. Press and release immediately, the LCD will flash when complete. You can also restore factory settings by holding this button for more than 3 seconds and then releasing.

Using the Programming Card

Firstly refer to the Programming Parameters at the base of this sheet. These are listed in the number order in which they appear on the card.

With your card connected to the ESC as described above press the 'ITEM' button to select one of the 7 different parameters. i.e. if you wish to set low-voltage protection press the 'ITEM' button repeatedly until No 6 appears in the 'ITEM' window on the LCD display. Then Press the 'OPTION' button to choose the value of the parameter; so in this instance let's set up the low voltage protection to 3.2v per cell which is the value 3, so we press the 'OPTION' button until the number 3 is displayed in the 'VALUE' window. Our LCD display now shows No6 (which is low voltage protection) and item 3 (which is 3.2v per cell) so if we are happy with this we then press 'WRITE', the LCD will flash 3 times and the ESC is now programmed with your desired option.

Programmable Parameters available on your Synergie ESC

1. Brake Type

Many flyers prefer a brake to be set on the motor to prevent the prop 'free-wheeling' or 'wind-milling' when the power is cut. For users of folding prop assemblies this is essential as it allows the blades to stop and fold back against the fuselage resulting in a reduction in drag. There are six brake types that can be programmed into the ESC. OFF - the brake is not set, Low - the brake is set but with a low braking force, Mid-Low, Middle (recommended for general use), Mid-High and High (fast acting braking with maximum holding force).

2. Timing Mode

The explanation of ESC timing is really beyond this instruction sheet, but for those interested there is a lot of extra information available on the internet. WE RECOMMEND IF YOU ARE UNSURE ABOUT TIMING ISSUES YOU LEAVE THESE AT THE DEFAULT (15°). In general terms high timing is recommended for high kv/low inductance motors, and low timing for low kv/high inductance motors. In broad terms higher timing will increase RPM and motor temp and lower timing will drop the RPM and the motor will run cooler. Most of the time you can just leave it on medium to get a good balance of performance/temperature. If your motor 'screeches' or has starting difficulties it may be worthwhile experimenting with the timing.

There are 5 timing modes available Low: 0°, Mid-low: 8°, Middle:15° (default) , Mid-high:23° and High:30°

3. Starting Force

There are 13 options for starting force, 0.03, 0.05, 0.06, 0.09, 0.13, 0.19, 0.25, 0.38, 0.50, 0.75, 1.00, 1.25, 1.50. The default is 0.75. WE RECOMMEND IF YOU ARE UNSURE ABOUT SETTING THE STARTING FORCE YOU LEAVE AT THE DEFAULT VALUE (0.75)

4. Open Entry

This is reserved for future programming options and contains no user changeable parameters.

5. Control Frequency

Most users will not need to adjust the Control Frequency and will leave it at the default value of 8KHz. for advanced users there is a second value of 22KHz

6. Low Voltage Protection

Lipo batteries are easily ruined if an individual cell goes below the minimum voltage threshold. Your Synergie ESC has a built-in low-voltage protection system. When your lipo reaches the critical voltage you have set the ESC will shut down power to the motor, leaving enough power for your receiver and servos to allow you to land or crash (whichever is your preference!). There are three settings available 2.8v per cell, 3.0v per cell (default) or 3.2v per cell. We recommend using one of the 2 highest values.

7. Cut-Off Mode

The cut-off mode determines how the ESC cuts off the motor when the voltage reaches the set low voltage protection threshold (please see value 6 above). There are 2 options, soft-cut (the default) and cut-off. With soft cut the ESC gradually reduces power to 30% of the current power: Cut-off immediately shuts down the motor to zero when the low voltage protection threshold is reached. Under either setting when the throttle is reduced to the lowest value and then pushed back to high the motor will re-start for a short burst. This can be useful in an emergency situation when on a 'dead stick' landing.

WARNING! When setting up your model with the prop attached TAKE GREAT CARE. Always ensure the model is adequately restrained and there are no loose items about. ESCs can arm unexpectedly particularly in the set-up stage.