Feature Highlight:

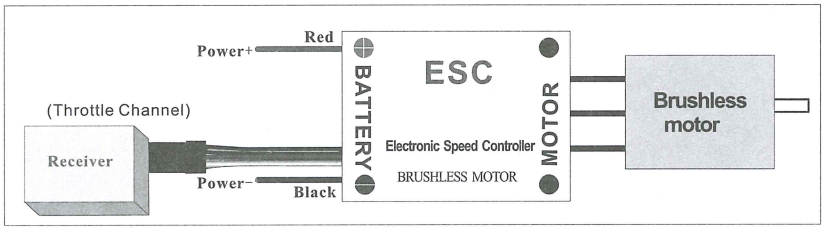
- Innovative Discharge Monitoring and Protection Design for real time battery pack monitor
- Multiple protection features: Low-voltage cut-off protection, over-heat protection, throttle signal loss protection
- 3 start modes: Normal / Soft / Super-Soft, compatible with fixed-wing aircrafts and helicopters
- Throttle range can be configured and is fully compatible with all transmitters currently available on the market
- Smooth, linear and precise throttle response
- Separate voltage regulator IC for the microprocessor
- Supported motor speed (Maximum): 210000 RPM (2 poles), 70000 RPM (6 poles), 35000 RPM (12 poles)
- Our pocket-sized Program Card can be purchased separately to provide easy programming to the ESC at the field. With a program card, you can activate the music playing function on the ESC

Proton Series

Class	Model	Cont. Current	Burst Current (>10s)	BEC Mode	BEC Output	Battery Cell		User Programm-able	Balance Discharge Protection	Weight	Size L*W*H
						Li-ion Li-poly	Ni-MH Ni-Cd				
6A	Proton-6	6A	8A	Linear	5V/0. 8	2-3	5-9	Available	N/A	6g	24*12*6
10A	Proton-10	10A	12A	Linear	5V/1A	2-4	5-12	Available	N/A	9g	27*17*6
12A											
	Proton-12	12A	15A	Linear	5V/2A	2-4	5-12	Available	N/A	13g	34*24*10
18A	Proton-18	18A	22A	Linear	5V/2A	2-4	5-12	Available	N/A	19g	45*24*11
25A	Proton-25	25A	35A	Linear	5V/2A	2-4	5-12	Available	N/A	22g	45*24*11
	Proton-25-OPTO	25A	35A	N/A	N/A	2-4	5-12	Available	N/A	21g	45*24*11
30A	Proton-30	30A	40A	Linear	5V/2A	2-4	5-12	Available	N/A	25g	45*24*11
40A	Proton-40	40A	55A	Switch	5V/3A	2-6	5-18	Available	N/A	33g	55*28*12
	Proton-40-OPTO	40A	55A	N/A	N/A	2-6	5-18	Available	N/A	32g	55*28*11
60A	Proton-60	60A	80A	Switch	5V/3A	2-6	5-18	Available	N/A	60g	70*31*14
	Proton-60-OPTO	60A	80A	N/A	N/A	2-6	5-18	Available	N/A	56g	70*31*13
80A	Proton-80	80A	100A	Switch	5V/3A	2-6	5-18	Available	N/A	62g	70*31*14
	Proton-80-OPTO	80A	100A	N/A	N/A	2-6	5-18	Available	N/A	58g	70*31*13
100A	Proton-100-OPTO	100A	120A	N/A	N/A	2-6	5-18	Available	N/A	120g	78*55*15

IMPORTANT! For ESC named "xxx-xxx-OPTO", or without a built-in BEC, an UBEC (Ultimate-BEC) or an individual battery pack is needed to power the receiver. And an individual battery pack is needed to power the program card when setting the programmable value of the ESCs, please read the user manual of program card for reference

Wiring Diagram:



Programmable Feature:

1. **Brake Settings**: Enabled / Disabled, default is Disabled
2. **Battery Type**: Li-xx(Li-ion or Li-Poly) / Ni-xx(NiMH or NiCd), default is Li-xx.
3. **Low Voltage Protection Mode:(Cut-Off Mode)**: Soft Cut-Off (Gradually reduces the output power) / Cut-Off (Immediately stops output power), default is Soft Cut-Off.
4. **Low Voltage Protection Threshold (Cut-Off Threshold)**: Low / Medium / High, default is Medium.
   The ESC only monitors the voltage of the whole battery pack
   1) For lithium batteries, the number of battery cells is calculated automatically. Low / medium / high cutoff voltage for each cell is: 2.6V/2.85V/3.1V. For example: For a 3 cell lithium pack, when medium cutoff voltage is set, the cut-off voltage will be: 2.85*3=8.55V.
   2) For nickel batteries, low / medium / high cutoff voltages are 0%/45%/60% of the startup voltage (i.e. the initial voltage of battery pack), and 0% means low voltage cut-off function is disabled. For example: For a 10 cell NiMH battery, fully charged voltage is 1.44*10=14.4V, when "medium"cut-off voltage is set, the cut-off voltage will be:14.4*45%=6.5V.
5. **Startup Mode**: Normal /Soft /Super-Soft, default is Normal.
   Normal is preferred for fixed-wing aircraft. Soft or Super-soft are preferred for helicopter. The initial acceleration of the Soft and Super-Soft modes are slower in comparison, usually taking 1 second for Soft startup or 2 seconds for Super-Soft startup from initial throttle advance to full throttle. If the throttle is closed (throttle stick moved to bottom) and opened again (throttle stick moved to top) within 3 seconds of the initial startup, the restart-up will be temporarily changed to normal mode to get rid of the chances of a crash caused by slow throttle response in aerobatic flight.
6. **Timing**: Low / Medium / High, default is Low.
   Usually, low timing can be used for most motors. But for high efficiency, we recommend the **Low** timing for 2 poles motor and **Medium** timing for 6 poles and above. For higher speed, **High** timing can be chosen.
   Important! After changing the timing setting, please test your RC model on ground prior to flight!

Special Note

Some high KV out-runner motors have very special construction, the space between each magnet is very large, and many ESCs can't drive these motors. Our ESCs have proven to work very well with these types of motors. We have provided some suggestions as follows:

Motor \ Programmable value suggestion	Timing	Startup Mode
Generic in-runner motor	Low	Usually, aircraft use "normal"startup mode and helicopter use "super-soft" startup mode
Generic out-runner motor	Low or Medium	
Align 420LF (Made in TAIWAN, out-runner)	High (MUST)	
450TH (Made in TAIWAN, out-runner)	Low	Soft (MUST)

Begin To Use Your New ESC

Please start the ESC in the following sequences:

1. Move the throttle stick to the lowest position, then turn on the transmitter.
2. Connect the battery pack to the ESC, the ESC begins the self-testing process, a special tone " ∫123" is emitted, which means the voltage of the battery pack is in normal range, and then N "beep" tones will be emitted, means the number of lithium battery cells. Finally a long "beep------" tone will be emitted, which means the self-test is OK, the aircraft/helicopter is ready to go.
   - Please check the battery pack and all the connections if nothing happens
   - If a special tone" ∫56712"is emitted after 2 beep tones ("beep-beep-"), the ESC has entered the program mode, it is because the throttle channel of your transmitter is reversed, please set it correctly;
   - If the very rapid "beep-beep-, beep-beep-" tone is emitted, means the input voltage is too low or too high, please check your battery's voltage.
3. **"VERY IMPORTANT!"** Because different transmitters have different throttle ranges, we strongly suggest you to use the "Throttle Range Setting Function" to calibrate throttle range. Please read the instructions for "Throttle Range Setting".

Alert Tone

1. Input voltage is abnormal: The ESC begins to check the voltage when the battery pack is connected, if the voltage is not in the acceptable range, such an alert tone will be emitted: "beep-beep-, beep-beep-,beep-beep-" (Every "beep-beep-" has a time interval of about 1 second.)
2. Throttle signal is abnormal: When the ESC can not detect the normal throttle signal, such an alert tone will be emitted: "beep-, beep-, beep-". (Every "beep-" has a time interval of about 2 second
3. Throttle stick is not in the bottom position: When the throttle stick is not in bottom (lowest) position, a very rapid alert tone will be emitted: "beep-, beep-, beep-". (Every "beep−"has a time interval of about 0.25 second.)

Protection Feature

1. Start up protection: If the motor fails to start within 2 seconds of throttle application, the ESC will cut-off the output power. In this case, the throttle stick **MUST** be moved to the lowest position again to restart the motor. (Such a situation happens in the following cases: The connection between ESC and motor is not reliable, the propeller or the motor is blocked, the gearbox is damaged, etc.)
2. Over-heat protection: When the temperature of the ESC is over 110°C, the ESC will reduce the output power.
3. Throttle signal loss protection: The ESC will reduce the output power if throttle signal is lost for 1 second, further loss for 2 seconds will cause its output to be cut-off completely.

Program example

Setting "Start Mode" to "Super-Soft", value #3 in the programmable item #5

1. Enter Program Mode

Turn on transmitter, move throttle stick to highest position, connect battery pack to ESC, wait for 2 seconds, "beep-beep" tone should be emitted. Then wait another 5 seconds, special tone " ∫ 56712" should be emitted, which indicate program mode is entered.

2. Select Programmable Items

You'll hear 8 tones in loop. When a long "beep------" tone is emitted, move throttle stick to the bottom to select the Start Mode

3. Set Item Value (Programmable Value)

"Beep-", wait for 3 seconds; "Beep-beep-", wait for another 3 secnds; then you'll hear "beep-beep-beep", move throttle stick to top position, then a special tone "∫i5i5 " is emitted, now you have set the "start mode"item to the value of "super-soft"

4. Exit Program Mode

After the special tone "∫i5i5", move throttle stick to bottom within 2 seconds.

Normal startup procedure:

- Move the throttle stick to the lowest position and turn on the transmitter
- Connect the battery to the ESC, Emitted tone "∫123"means the power supply is normal
- Several "Beep-" tones emitted to present the number of battery cells
- When self-testing is completed, a long "Beep----" tone will be emitted

Throttle range setting: (Throttle range should be reset whenever a new transmitter is being used)

- Move the throttle stick to the highest position and turn on the transmitter
- Connect the battery to the ESC and wait for 2 seconds
- "Beep-Beep-" tone emitted to confirm the highest position of the throttle range
- Move the throttle stick to the lowest position, several "Beep-" should be emitted to present the number of battery cells detected
- A long "Beep-" tone emitted to confirm the lowest position of the throttle range

Program the ESC with your transmitter (4 Steps):

1. Enter the program mode
2. Select the programmable items
3. Set the item's value (Programmable value)
4. Exit the program mode

1. Enter program mode

1) Turn on the transmitter, move throttle stick to top, connect the battery pack to the ESC
2) Wait for 2 seconds, the motor should emit a tone like "beep-beep-"
3) Wait for another 5 seconds, special tone like "∫567i̇i̇" should be emitted, which means program mode is entered

2. Select programmable items:

After entering program mode, you will hear 8 tones in a loop in the following sequence. If you move the throttle stick to bottom within 3 seconds after one kind of tones, this item will be selected.

1. "beep"	brake	(1 short tone)
2. "beep-beep-"	battery type	(2 short tone)
3. "beep-beep-beep-"	cutoff mode	(3 short tone)
4. "beep-beep-beep-beep-"	cutoff threshold	(4 short tone)
5. "beep-----"	startup mode	(1 long tone)
6. "beep-----beep"	timing	(1 long 1 short)
7. "beep----beep-beep-"	set all to default	(1 long 2 short)
8. "beep-----beep----"	exit	(2 long tone)

Note: 1 long "beep-----" = 5 short "beep-"

3. Set item value (Programmable value):

You will hear several tones in loop. Set the value matching to a tone by moving throttle stick to top when you hear the tone, then a special tone "∫i5i5" emits, means the value is set and saved. (Keeping the throttle stick at top, you will go back to step 2 and you can select other items; Moving the stick to bottom within 2 seconds will exit program mode directly)

Items \ Tones	"beep-" 1 short tone	"beep-beep-" 2 short tones	"beep-beep-beep" 3 short tones
Brake	(Off)	On	
Battery type	(Li-ion / Li-poly)	NiMH / NiCd	
Cutoff mode	(Soft-Cut)	Cut-Off	
Cutoff threshold	Low	(Medium)	High
Start mode	(Normal)	Soft	Super soft
Timing	(Low)	Medium	High

4. Exit program mode

There are 2 ways to exit program mode:

1. In step 3, after special tone" ∫i5i5", pleae move throttle stick to the bottom position within 2 seconds.
2. In step 2, after tone "beep-----beep----"(ie The item #8), move throttle stick to bottom within 3 seconds.