

感謝您購買泰世科技公司的產品！無刷動力系統功率強大，錯誤的使用可能造成人身傷害和設備損壞。為我們強烈建議您在使用設備前仔細閱讀本說明書，並嚴格遵守規定的操作程式。我們不承擔因使用本產品而引起的任何責任，包括但不限於對附帶損失或間接損失的賠償責任；同時，我們不承擔因擅自對產品進行修改所引起的任何責任。我們有權在不經通知的情況下變更產品設計、外觀、性能及使用要求。

產品特色

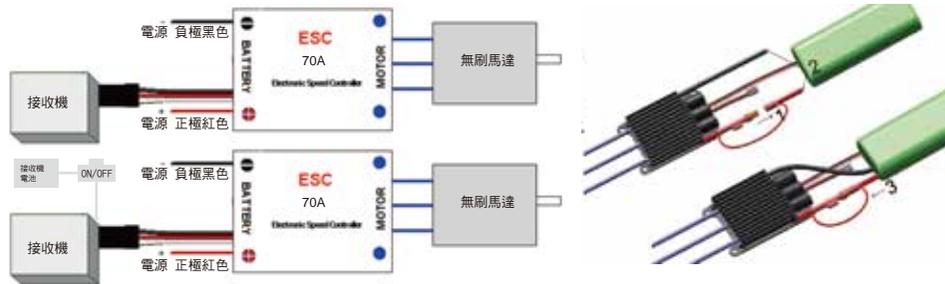
- 使用高性能處理器，具有出色的馬達相容性和很高的驅動效率。馬達最高轉速可以達到210000 RPM (2 極馬達)、70000 RPM (6 極馬達)、35000 RPM (12 極馬達)。
- 具有普通啟動/柔和啟動/超柔和啟動三種啟動模式，相容固定翼飛機及直升機。
- 可設定油門行程，相容市面上所有遙控器。具備平滑、細膩的變速手感、一流的變速線性和極快的油門回應速度。
- 微處理器採用獨立的穩壓IC 供電，具有更好的抗干擾能力，大大降低失控的可能性。
- 具備輸入電壓異常保護/電池低壓保護/過熱保護/油門信號丟失保護等多重保護功能，有效延長ESC使用壽命。
- 支援定速功能。
- 可配合多種編程設定卡(注：選配件)使用，編程卡具有簡單直觀的介面，便於您隨時隨地修改各項編程參數(詳見設定卡說明書)。
- 通過編程設定卡上的 USB 介面可進行軟體升級，讓您永久享用最新的電子變速器功能。
- 完全採用正品用料確保產品具有一流的品質和穩定的性能。

產品規格

電流級數	型號	持續輸出電流	瞬間電流(10秒)	鋰電	鎳鎘鎳氫	參數功能設定	重量	長*寬*高
70A	23700-GUEC GE-700 70A	70A	105A	5~12	15-36	有	82g	70x34x16

注1：HV 的高壓電子變速器無內置BEC，在使用時需要為接收機配備單獨的電源，或者使用外接的UBEC 為接收機供電。另外，當使用編程設定卡對這類電子變速器進行參數設置時，也需要使用一個單獨的電源為設定卡供電，詳見設定卡說明書。電源正極線(粗紅線)上附帶著一根細紅線和兩個接頭，這是新型的防打火結構，用於防止電子變速器通電瞬間在電源接頭處產生強烈火花。其接線順序應為：

- 1、將電調正極紅色粗線上的插頭分開
- 2、將電調紅黑線分別接上電池正負兩極
- 3、聽到通電提示音♪123 後，儘快連接電子變速器正極紅色粗線上的接頭(請注意，一定要確認聽到♪123 提示音再做第 3 步操作)。

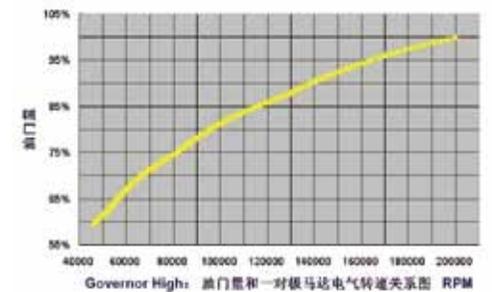
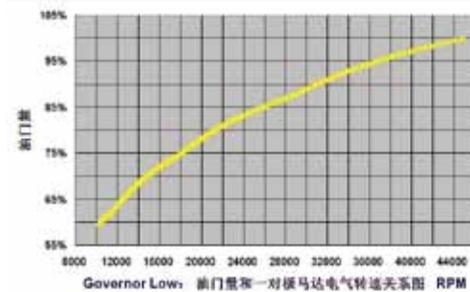


可編程參數說明

1. 煞車設定：*Off(無煞車)/Soft(軟煞車)/Hard(重煞車)/Very Hard(很重煞車)，出廠預設值為Off。
2. 電池類型：*LiPo/NiMH (鋰電/鎳氫)，預設值為 LiPo。
3. 低壓保護模式：*Soft Cut/Hard Cut (降低輸出功率/立即切斷輸出)，預設值為Soft Cut。
4. 低壓保護閾值：Low/*Middle/High/Custom (低/中/高/自定義)，預設值為Middle。
 - 1) 當設定為LiPo 電池時，電子變速器根據鋰電節數自動計算出整個電池組的低壓保護閾值。對於普通電壓電子變速器(支援2-6 節鋰電)，低/中/高情況下每節鋰電池的截止電壓分別為：2.85V/3.15V/3.30V。例如使用3 節鋰電，設定為中截止電壓，則該電池組低壓保護閾值為：3.15 ×3=9.45V。對於高壓電子變速器(支援5-12 節鋰電)，低/中/高情況下每節鋰電池的截止電壓分別為：2.75V/3.00V/3.25V。
 - 2) 當設定為NiMH 電池時，低/中/高情況下截止電壓為開機時輸入電壓的50%/62.5%/75%。例如：使用 6 節充滿電的鎳氫電池組，開機上電時電壓為1.44×6=8.64V，當低壓保護閾值設定為“低”時，則電池組的保護電壓閾值為：8.64×50%=4.3V。
 - 3) 當設定為“Custom(自定義)”時，可以精確地設定電池組的保護電壓閾值(精度達到0.1V)。但此時需使用LCD 編程卡或者通過USB 介面對電調參數進行設置。
5. 啟動模式：Normal/Soft/*Very Soft (普通/柔和/超柔和)，預設值為Very Soft。普通啟動適用於固定翼飛機，柔和啟動/超柔和和啟動適用於直升機。柔和啟動和超柔和和啟動的初始轉速都比較低，從啟動到全速分別需要3 秒和18 秒。需要注意的是，以柔和啟動或超柔和和啟動方式起飛後，若關閉油門，3 秒內再次啟動時均會臨時自動切換至普通啟動模式，以免在做一些特技飛行動作時因反應過慢而導致摔機。
6. 進角：0° /3.75° /7.5° /11.25° /15° /18.75° /22.5° /26.25°，預設值為15°。一般情況下，低進角可以適應大部分馬達。但是因為馬達結構差異很大，請試用各個進角以獲得滿意的驅動效果。為提高轉速，可以將進角設為高進角。改變進角設置後，建議先在地面進行測試，然後再飛行。

產品特色

7. 定速模式：*Off/Governor Low/Governor High (關閉/低速定速/高速定速)，預設值為Off。定速模式下，啟動後不論油門搖杆處於何種位置及負載如何變化，ESC都會盡力維持恒定的轉速(在定速模式下，遙控發射機中的油門曲線應設置為準直線，通過調整該直線的高度可以預設期望的轉速值)。低速定速模式下，2 極馬達的定速範圍是10000-45000RPM；高速定速模式下，2 極馬達的定速範圍是46000-200000 RPM(請參考下面的“油門量和馬達電氣轉速關係圖”)。需要注意的是，此處的RPM 都是指馬達的電氣轉速，即2 極馬達在無減速組情況下的轉速。實際應用時，用戶需要知道馬達的極對數、減速組齒輪比才可以算出對應的大槩轉速。請注意：ESC進入定速模式後，Very Soft上的紅色LED 快速閃亮(每秒約10 次)表示ESC正在進行定速運算處理，常亮表示ESC一直處於全速輸出狀態)。在非定速模式下，ESC上的紅色LED 閃亮時表示此刻ESC已經達到全速輸出狀態。例如：你使用6 極馬達(即3 對極)，大齒盤150T，馬達小齒13T，則根據如下公式就可計算出直升機主旋翼的轉速：主旋翼轉速 = (一對馬達的電氣轉速 * 13) / 3 / 150
請注意：油門量在60%以下時，禁止使用定速模式(即油門量在60%以下時，電調會自動關閉定速功能)。



8. 備用參數1：暫未使用。
9. PWM 頻率：*12KHz/8KHz，預設值為12KHz。對於一些極數多且轉速高的馬達，設置12KHz 的PWM 頻率可以使馬達驅動更平滑，但是也同時導致ESC的開關損耗加大，發熱更嚴重。多數電機可使用8KHz 的PWM 頻率。
10. 內置BEC 電壓：無內置BEC
11. 備用參數2：暫未使用。
12. 鋰電節數：*Auto/2S/3S/4S/5S/6S (自動/2 節/3 節/4 節/5 節/6 節)，預設值為Auto。(適用於支持2-6 節鋰電的普通電子變速器)

*Auto/5S/6S/8S/10S/12S (自動/5 節/6 節/8 節/10 節/12 節)，預設值為Auto。(適用於支援5-12 節鋰電的高壓電子變速器)此參數在電池類型選擇為鋰電時才有效。開機後，ESC會根據自動檢測出來的結果或手工設定的鋰電節數，驅動馬達發出N 聲“嗶”鳴音來表示當前鋰電節數。請注意如果選擇了“Auto(自動)”，當單節鋰電電壓低於3.7V 時，會導致誤判。因此，我們強烈建議您手工設定鋰電節數。

注2：高壓電子變速器(支援5-12 節鋰電)鳴報鋰電節數時，5 節鋰電的表示方式為一聲長音“嗶—”，6 節鋰電的表示方式為“嗶—嗶—”(一聲長音和一聲短音 = 5+1 = 6)，以此類推二聲長音表示10 節鋰電，二聲長音和二聲短音表示12 節鋰電。而普通電壓ESC(支援2-6 節鋰電)鳴報鋰電節數時，5 節鋰電仍為5 短音“嗶”，6 節鋰電為6 短音“嗶”。

注3：高壓電子變速器不支持7 節、9 節和11 節的鋰電。

首次使用您的無刷電子變速器

在使用全新的電子變速器之前請您仔細檢查各個連接是否正確可靠(此時請勿連接電池)。檢查無誤後，請按 以下順序 啟動電子變速器。

1. 將發射機油門搖杆推至最低位置，接通發射機電源；
2. 將電池組接上無刷電子變速器，調速器開始自檢，馬達發出“ 123”上電提示音後，接著發出 N 聲短促的“嗶”鳴音表示鋰電池節數，然後馬達發出一聲“嗶——”長鳴音表示自檢正常，系統準備就緒，等待您加大油門啟動馬達。
 - 若無任何反應，請檢查電池是否完好，電池連線是否可靠。♪♪
 - 若上電後馬達沒有鳴叫，電子變速器上的LED 持續閃燈(每秒快閃2 次)，表示電池組電壓過低或過高，請檢查電池組電壓。
 - 若上電後2 秒馬達發出 嗶 嗶 — 的鳴音，5 秒後又發出 “ ” 特殊提示音，表示電子變速器進入參數編程設定模式，這說明您的遙控器未設置好，油門通道反向，請參考遙控器說明書正確設置油門通道的“正/反”向。
3. 特別強調！為了讓電子變速器適應您的遙控器油門行程，在首次使用電子變速器或更換其他遙控器使用時，均應重新設定油門行程，以獲得最佳的油門線性。具體操作請參閱本頁下端的說明。

警示音說明

- 輸入電壓不正常警示音：電子變速器開機時，會對電源電壓進行檢測，當電源電壓不在正常範圍內時，電子變速器上的LED 會持續閃燈（每秒快閃2 次），直到電源電壓正常為止；
- 油門信號丟失警示音：當電子變速器未檢測到油門信號時，會作如下警示：“嗶-、嗶-、嗶-”（每聲之間間隔為 2 秒）；
- 油門未歸零（油門搖杆未置於最低位置）警示音：當油門未打到最低時，電調會作如下警示：“嗶-嗶-嗶-嗶-”（很急促的單音鳴叫）
- 油門行程過小警示音：當所設定油門總行程過窄時（電子變速器設計時，要求油門總行程不得小於三格油門），電子變速器會做警示，表明本次行程設定無效，需重新設定。警示方式為：“嗶-嗶-嗶-嗶-”（很急促的單音鳴叫）

其他保護功能說明

- 啟動保護：當加大油門時，兩秒內未能正常啟動馬達，電子變速器將會關閉馬達，油門搖杆需再次置於最低點後才可以重新啟動。（出現這種情況的原因可能有：電子變速器和馬達連線接觸不良或有個別輸出線斷開、螺旋槳被其他物體阻擋、減速齒卡死等）
- 溫度保護：當電子變速器工作溫度超過 110 攝氏度時，ESC會降低輸出功率進行保護，但不會將輸出功率全部關閉，最多只降到全功率的40%，以保證馬達仍有動力，避免因動力不足而摔機。溫度下降後，電子變速器會逐漸恢復最大動力。
- 油門信號丟失保護：當電子變速器檢測到油門遙控信號丟失0.25 秒以上立即關閉輸出，以免因螺旋槳繼續高速轉動而造成更大的損失。信號恢復後，電子變速器也隨即恢復相應的功率輸出。
- 過負荷保護：當負載突然變得極大時，電子變速器會切斷動力或自動重啟。出現負載急劇增大的原因通常是螺旋槳堵轉。

故障快速處理

故障現象	可能原因	解決方法
通電後馬達無法啟動，無任何鳴音	電源接頭接觸不良	重新插好接頭或更換接頭
通電後馬達無法啟動，LED 持續閃燈(每秒快閃2 下)	電池組電壓不正常	檢查電池組電壓
通電後馬達無法啟動，馬達鳴叫“嗶-、嗶-、嗶-”		
警示音（每聲之間間隔時間為 2 秒）	接收機油門通道無信號輸出	檢查發射機和接收機的配合是否正確，油門控制通道接線是否插緊
通電後馬達無法啟動，馬達鳴叫“嗶-嗶-嗶-嗶-”急促單音	油門未歸零或油門行程設置過小	將油門搖杆置於最低位置；
重新設置油門行程		
通電後馬達無法啟動，馬達鳴叫“嗶-嗶-”提示音，然後發出(♫ 56712) 特殊提示音	油門通道“正/反”向錯誤	參考遙控器說明書，調整油門通道的“正/ 反”向設置
馬達反轉	電子變速器輸出線和馬達線連接的順序錯誤	將三根輸出線中的任意兩根對調
馬達中途停轉	油門信號丟失保護	檢查遙控器和接收機的配合是否正確，檢查油門通道接線是否接觸良好
	電池電壓不足，進入低壓保護狀態	重新給電池充滿電
	接線接觸不良	檢查電池組插頭是否正確、ESC輸出線和馬達線連接是否穩固可靠

正常開機過程

開啟遙控器，將油門搖杆打到最低點 → 電子變速器接上電池，鳴叫“♫123” 提示音，表示通電正常 → 馬達發出一聲長鳴音“嗶——”，表示系統準備就緒，隨時可以起飛 → 馬達發出 N 聲短鳴音“嗶-”，表示鋰電節數

油門行程設定

強調！當首次使用電子變速器或者更換其他遙控器使用時，均應重新設定油門行程，其他時候則不用。

開啟遙控器，將油門打到最高點 → 電子變速器接上電池，馬達鳴叫“♫123” 提示音，表示通電正常 → 等待2 秒，馬達發出“嗶-嗶-” 雙短鳴音，表示油門最高點校準成功 → 將油門搖杆推到最低，等待1 秒，油門最低點 校準成功 → 馬達發出N 聲鳴音，表示鋰電節數 → 馬達發出長鳴音“嗶——” 表示系統準備就緒，可隨時起飛

使用遙控器進行參數編程設定的說明

使用遙控器油門搖杆設定參數分為四個步驟：

- 一、進入編程模式；
- 二、選擇設定項；
- 三、選擇設定項下的數值；
- 四、退出

一、進入編程模式：

1. 開啟遙控器，將油門搖杆打到最高點
2. 電子變速器接上電池，馬達鳴叫（♫ 123）提示音，表示通電正常
3. 等待2秒，馬達鳴叫（嗶-嗶-）提示音
4. 再等待5秒，馬達鳴叫（♫ 56712）特殊提示音，表示已經進入編程模式。

二、選擇設定項：

進入編程設定模式後，會聽到14組鳴音按如下順序迴圈鳴叫，在馬達發出某組鳴音後，3秒內將油門打到最低，則進入該設定項

1	煞車	嗶	(1短音)
2	電池類型	嗶-嗶-	(2短音)
3	低壓保護方式	嗶-嗶-嗶-	(3短音)
4	低壓保護閾值	嗶-嗶-嗶-嗶-	(4短音)
5	啟動模式	嗶——	(1長音)
6	進角	嗶——嗶-	(1長1短)
7	定速模式	嗶——嗶-嗶-	(1長2短)
8	備用參數1	嗶——嗶-嗶-嗶-	(1長3短)
9	PWM頻率	嗶——嗶-嗶-嗶-嗶-	(1長4短)
10	內置BEC電壓	嗶——嗶——	(2長音)
11	備用參數2	嗶——嗶——嗶-	(2長1短)
12	鋰電節數	嗶——嗶——嗶-嗶-	(2長2短)
13	恢復出廠預設值	嗶——嗶——嗶——嗶-	(3長1短)
14	退出	嗶——嗶——嗶——嗶-嗶-	(3長2短)

注：長音（嗶——）相當於5聲短音（嗶-），所以在第二步（選擇設定項）中，（嗶——嗶-）一長一短表示第為6選項。

三、選擇參數值：

馬達會迴圈鳴叫，在鳴叫某個提示音後將油門搖杆打到最高點，則選擇該提示音所對應的設定值。接著馬達鳴叫特殊提示音（♫ 1515）表示該參數值已被保存。（此時如果不想再設定其他選項，則在3秒內將油門搖杆打到最低，即可快速退出編程設定模式；如果還要設定其他選項，則繼續等待，退回第二步驟，再選擇其他設定項）

設定選項	提示音	1短音	2短音	3短音	4短音	1長音	1長音 1短音	1長音 2短音	1長音 3短音
1. 煞車	*Off	Soft	Hard	Very Hard					
2. 電池類型	*LiPo	NiMH							
3. 低壓保護方式	*Soft Cut	Hard Cut							
4. 低壓保護閾值	Low	*Middle	High	Custom					
5. 啟動模式	Normal	Soft	*Very Soft						
6. 進角	0°	3.75°	7.5°	11.25°	*15°	18.75°	22.5°	26.25°	
7. 定速模式	*Off	Governor Low	Governor High						
8. 備用參數1									
9. PWM頻率	*12KHz	8KHz							
10. 內置BEC電壓									
11. 備用參數2									
12. 鋰電節數	*Auto	2S	3S	4S	5S	6S	適用於普通電子變速器		
	*Auto	5S	6S	8S	10S	12S	適用於高壓電子變速器		

表中帶*符號的數值為出廠預設值

注意：使用油門搖杆或者參數設定卡更改電子變速器參數後，保存退出，馬達將長鳴5 聲“嗶——”，5 秒後電子變速器方可重新啟動。

- 一、進入編程：開啟遙控器，將油門搖杆打到最高點，電子變速器接上電池，馬達鳴叫（♫ 123）提示音，表示通電正常，等待2秒，馬達鳴叫（嗶-嗶-），再等待5秒，馬達鳴叫（♫ 56712）特殊提示音，表示已經進入編程模式。
- 二、進入設定選項：馬達開始鳴叫，當發出代表第5個設定項目（啟動模式）的一聲長音（嗶——）時，將油門打到最低點，此時已進入啟動模式設定選項。
- 三、選擇參數值：馬達開始鳴叫1短音（嗶-），等3秒後，馬達鳴叫2短音（嗶-嗶-），再等3秒後，馬達鳴叫3短音（嗶-嗶-嗶-），此時將油門搖杆打到最高，馬達隨後鳴叫（♫ 1515）表示已經設置為超柔啟動。
- 四、退出設定：在第三步驟完成後2秒內將油門打到最低點

四、退出設定：

有如下兩種方式退出設定。

1. 在第三步驟，選擇設定值時，鳴叫特殊提示音（♫ 1515）後，2秒內將油門打到最低點，則退出設定。
2. 在第二步驟，選擇設定項時，當馬達鳴叫出代表第14設定選項的3長2短的鳴音後，3秒內將油門打到最低點，則退出設定。

GAUI 923700-GUEC GE-700 ESC 70A HV (No build-in BEC)

Thanks for purchasing our Electronic Speed Controller (ESC). High power system for RC model can be very dangerous, so please read this manual carefully. In that we have no control over the correct use, installation, application, or maintenance of our products, no liability shall be assumed nor accepted for any damages, losses or costs resulting from the use of the product. Any claims arising from the operating, failure or malfunctioning etc. will be denied. We assume no liability for personal injury, property damage or consequential damages resulting from our product or our workmanship. As far as is legally permitted, the obligation to compensation is limited to the invoice amount of the affected product.

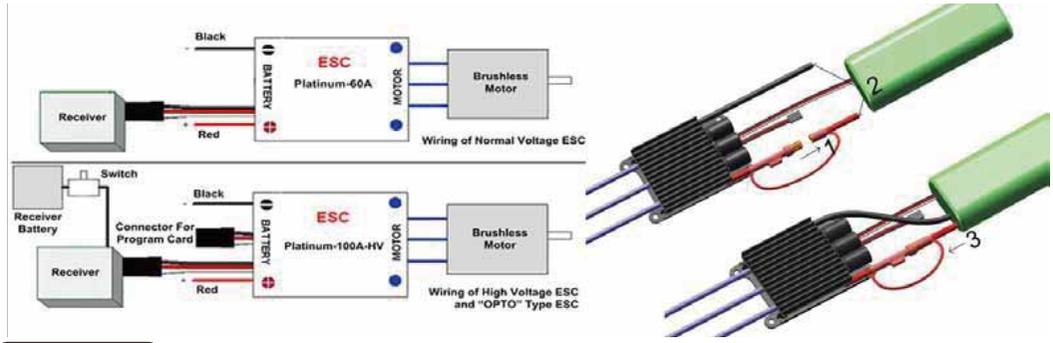
Features

- High performance microprocessor brings out the best compatibility with all kinds of motors and the highest driving efficiency.
- Maximum motor speed: 210000 RPM (2 poles), 70000 RPM (6 poles), 35000 RPM (12 poles).
- 3 start modes: Normal / Soft / Very-Soft, compatible with fixed-wing aircraft and helicopter.
- Throttle range can be configured to be compatible with all transmitters currently available on market.
- Smooth, linear, quick and precise throttle response.
- Separate voltage regulator IC for microprocessor to get a better anti-jamming capability.
- Multiple protection features: Low-voltage cut-off protection / over-heat protection / throttle signal loss protection.
- The output of the built-in BEC is switchable by user programming (5.25V or 6.0V).
- With governor mode for helicopter.
- USB supported. The firmware of the ESC can be updated by the USB adapter.
- Several kinds of Program Cards are supported. Very easy to program the ESC at home or at the field.

Specifications

Class	Model	Cont. Current	Burst Current	BEC Mode	BEC Output	User		Battery Cells		Weight	Size L*W*H
						Programmable		Lipo	NiMH		
70A	GUEC GE-700	70A	105A	None	None	Yes		5-12	15-36	82g	70*34*16

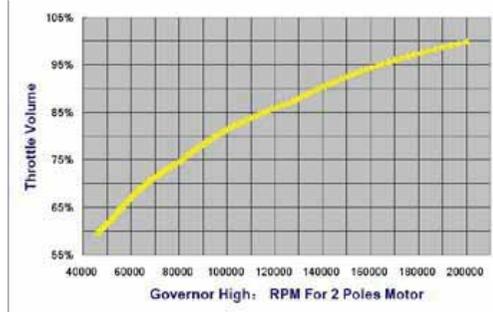
Note1: BEC means the "Battery Elimination Circuit". It is a DC-DC voltage regulator to supply the receiver and other equipments from the main battery pack. With the built-in BEC of an ESC, the receiver needn't be supplied with an additional battery pack.
 Note2: The ESC named "xxx-OPTO" or "xxx-HV" hasn't a built-in BEC, an UBEC (Ultimate-BEC) or an individual battery pack should be used to power the receiver. And an individual battery pack is needed to power the program card when setting the programmable values of such ESCs, please read the user manual of program card for reference.



Wiring Diagram

There are a pair of bullet connectors and a thin red wire attached with the positive input wire (red color, thick) of the ESC. They are used to eliminate sparks when the battery pack is connecting with the ESC. Please use it in the following sequence:
 1. Disconnect the two bullet connectors on the positive input wire (red color, thick) of the ESC.
 2. Connect battery wires.
 3. Connect the bullet connectors on the positive input wire (red color, thick) of the ESC as soon as you hear the 1s2p3e special tone). Default is "Soft Cut".

4. Low Voltage Protection Threshold (Cutoff Threshold) : Low / *Middle / High / Custom, default is Middle .
 1) For lithium batteries, the cutoff threshold of the whole battery pack is calculated according to the cells number.
 For normal voltage ESC (supports 2-6 cells Lipo), the Low / Middle / High value for each cell is: 2.85V / 3.15V / 3.30V
 For high voltage ESC (supports 5-12 cells Lipo), the Low / Middle / High value for each cell is: 2.75V / 3.0V / 3.25V
 For example, if the cutoff threshold is set to "Middle", then the threshold for a 3 cells Lipo battery pack is 3.15*3=9.45V.
 2) For NiMH and NiCd batteries, the cutoff threshold of the whole battery pack is calculated as follows:
 Low : 50% of the battery's full charged voltage
 Middle: 62.5% of the battery's full charged voltage
 High: 75% of the battery's full charged voltage
- 3) If this programmable item is set to "Custom", that means you can set the cutoff threshold for the whole battery pack very accurately with the step of ±0.1V. The LCD program box or PC software (through USB adapter) is needed to customize the value.
5. Start Mode : *Normal / Soft / Very-Soft, default is "Very-Soft".
 "Normal" is preferred for fixed-wing aircraft. "Soft" "Very-Soft" are preferred for helicopters.
 The initial acceleration of the "Soft" and "Very-Soft" modes are slower than "Normal" mode, usually it takes 3 second for "Soft" mode or 8 seconds for "Very-Soft" mode from 0% throttle advance to full throttle.
 After startup, if the throttle is closed (throttle stick is moved to the bottom position) and opened again (throttle stick is moved upwards) within 3 seconds, the restart will be temporarily changed to "Normal" mode to get rid of the chances of a crash caused by slow throttle response. This special design is useful for aerobatic flight.
6. Timing : 0° / 3.75° / 7.5° / 11.25° / *15° / 18.75° / 22.5° / 26.25°, default is 15°. Note3
 Usually, low timing value is suitable for most motors. But there are many differences among structures and parameters of different motors so please try and select the most suitable timing value according to the motor you are just using. The correct timing value makes the motor run smoothly. And generally, higher timing value brings out higher output power and higher speed.
 Note3: After changing the timing setting, please test your RC model on ground prior to flight!
7. Governor Mode : *Off / Governor Low / Governor High, default is "Off".
 If the governor mode is activated, the ESC will try its best to hold the motor speed at a fixed value. (Usually the throttle curve is a horizontal line, you can change the motor speed by changing the height of this line).
 The speed range of "Governor Low" mode is 10000RPM to 45000RPM for 2 poles brushless motor, "Governor High" mode is 46000RPM to 200000RPM for 2 poles brushless motor. In order to calculate the speed of the main rotor blades of your helicopter, you need to know the motor poles number and the gear rate of main drive gear vs. the pinion. For example, if you are using a 6 poles motor (that is: 3 pair poles), and the main drive gear is 150T, the pinion is 13T, so you can calculate as follows:
 The rotation speed for the main rotor blades = (The speed of 2 poles motor * 13) / 3 / 150
 When you adjust the throttle curve, please make sure that the motor can run at this preset speed even if the motor load is heaviest. Please note that the governor mode function is automatically disabled if the throttle volume is less than 60%.



8. Reserved Item #1 : Reserved for future.
9. PWM Frequency: *12KHz / 8KHz, default is "12KHz".
 For some motors with high KV (high speed) and many poles, the 12KHz PWM frequency may let them work more smoothly. But the higher PWM frequency will make the ESC hotter. Generally, the 8KHz PWM frequency is suitable for most motors.
10. Built-In BEC Output:
11. Reserved Item #2: Reserved for future.
12. Lipo Cells:
 For normal voltage ESC (supports 2-6 cells Lipo), the values are *Auto / 2S / 3S / 4S / 5S / 6S, the default is "Auto"; Note4
 For high voltage ESC (supports 5-12 cells Lipo), the values are *Auto / 5S / 6S / 8S / 10S / 12S, the default is "Auto".
 This programmable item is available for lithium battery. In the startup process, the motor will emit several "Be-e" p tones to represent the Lipo cells number, it is helpful for you to check whether it is coincident with the actual battery pack or not. Note5
 Note4: If you choose "Auto", the ESC may mistakenly judge the battery cells when the voltage is less than 3.7V/Cell, so we strongly suggest setting the "Lipo Cells" manually.
 Note5: For high voltage ESC (supports 5 to 12 cells Lipo), when the motor emits the "Beep" tones to represent the cells number, a long "Beep—" tone = 5 short "Beep-" tone. So 5S = "Beep—", 6S = "Beep—Beep—" (1 long 1 short), 8S = "Beep—Beep-Beep-Beep—" (1 long 3 short), 10S = "Beep—Beep—" (2 long), 12S = "Beep—Beep—Beep-Beep—" (2 long 2 short). While for normal voltage ESC (supports 2 to 6 cells Lipo), we still use 5 short "Beep-" tones to represent 5S lipo, and 6 short "Beep-" tones to represent 6S lipo.

Begin To Use The New ESC

Please check the wiring and connections carefully, and then start the ESC in the following sequences:

1. Move the throttle stick to the bottom position and then switch on the transmitter.
2. Connect the battery pack to the ESC, the ESC begins the self-test process, a special tone “J123” 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 lipo battery cells. Finally a long “Beep—” tone will be emitted, which means the self-test is OK, the aircraft or helicopter is ready to go flying.
 - If nothing is happened, please check the battery pack and all the connections;
 - If a special tone “J” is emitted after 2 Beep tones (“Beep-Beep-”), means the ESC has entered the program mode, it is because the throttle channel of your transmitter is reversed, please set it correctly;
 - If the red LED flashes very quickly (2 times per second), means the input voltage is too low or too high, please check your battery’s voltage.
3. VERY IMPORTANT! Because different transmitter has different throttle range, you need to calibrate the throttle range and let the ESC remember it. Please read the instruction on the left bottom of this page -----“Throttle Range Setting” . After correctly setting the throttle range, the red LED lights when the throttle stick is moved to the top position (Maximum throttle).

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:Be:e p-Beep-, Beep-Beep- (Every “Beep-Beep-” has a time interval of about 1 second), and at the same time, the red LED also flashes.
2. Throttle signal is lost: When the ESC can’t detect the normal throttle signal, such an alert tone will be emitted:Be:e p-, Beep-, Beep- (Every “Beep-” has a time interval of about 2 seconds)
3. Throttle stick is not in the bottom position: When the throttle stick is not in the 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 Function

1. Abnormal startup 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 bottom position again to restart the motor. (This 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 a factory-preset degree, the ESC will reduce the output power.
3. Throttle signal loss protection: The ESC will cutoff the output power if throttle signal is lost for more than 0.25 second, the output power will be resumed as soon as the throttle signal is normal again.

Trouble Shooting

Trouble	Possible Reason	Action
After power on, motor does not work, no sound is emitted	The connection between battery pack and ESC is not correct	Check the power connection. Replace the connector with new one
After power on, motor does not work, such analert tone is emitted and the red LED flashes at the same time.“Beep-Beep-, Beep-Beep-” (Every “Beep-Beep-” has a time interval of about 1 second)	Input voltage is abnormal, too high or too low.	Check the voltage of battery pack
After power on, motor does not work, such analert tone is emitted:“Beep-, Beep-, Beep-” (Every “Beep-” has a time interval of about 2 seconds)	Throttle signal is irregular or lost	Check the receiver and transmitter Check the control cable of the ESC
After power on, motor does not work, such analert tone is emitted:“Beep-, Beep-, Beep-” (Every “Beep-” has a time interval of about 0.25 second)	The throttle stick is not in the bottom (lowest) position	Move the throttle stick to bottom position Set the throttle trimmer to neutral or even lower.
After power on, motor does not work, a special tone (“J 56712”) is emitted after 2 “Beep” tones (Beep-Beep-)	Direction of the throttle channel is reversed, so the ESC has entered the program mode	Set the direction of throttle channel correctly (Please refer to the user manual of your transmitter)
The motor runs in the opposite direction	The connection between ESC and the motor need to be changed.	Swap any two wire connections between ESC and motor
The motor stop running while in working state	Throttle signal is lost	Check the receiver and transmitter Check the control cable of throttle channel
	ESC has entered Low Voltage Protection mode	Land RC model as soon as possible, and replace the battery pack
	Some connections are not reliable	Check all the connections: battery pack connection, throttle signal cable, motor connections, etc.

Normal Startup Procedure

1. Move the throttle stick to bottom position and then switch on your transmitter.
2. Connect the battery pack to the ESC, a special tone “J123” emits, that means the battery supply is OK.
3. Several “Beep-” tones emits to represent the number of lipo battery cells.
4. As soon as the self-test process is finished, a long “Beep—” tone will be emitted.
5. Move the throttle stick upwards to go flying now.

Throttle Range Setting

1. Switch on the transmitter, and then move the throttle stick to top position.
2. Connect battery pack to the ESC, a special tone “J123” emits, that means the battery supply is OK, then wait for 2 seconds.
3. “Beep-Beep-” tone emits, that means the highest point of throttle range has been correctly confirmed.
4. Move throttle stick to the bottom position, several “Beep-” tones emits to represent the number of Lipo battery cells.
5. A long “Beep—” tone emits, means the lowest position of throttle range has been confirmed.

Program The ESC With The Transmitter (4 Setps)

1. Enter program mode
 - a. Switch on transmitter, move the throttle stick to the top position.
 - b. Connect the battery pack to the ESC, a special tone “J123” emits, that means the battery supply is OK.
 - c. Wait for 2 seconds, the motor will emit “Beep-Beep-” tone.
 - d. Wait for another 5 seconds, special tone like “J” emits, that means the program mode is entered

2. Select programmable items:

After entering program mode, you will hear 14 groups of “Beep” tones in a loop with the following sequence.If you move the throttle stick to bottom position within 3 seconds after one kind of tones, thecorresponding item will be selected.

1	B	Brake	(1 short tone)
2	BB	Battery Type	(2 short tones)
3	BBB	Cutoff Mode	(3 short tones)
4	BBBB	Cutoff Threshold	(4 short tones)
5	Beep—	Start Mode	(1 long tone)
6	Beep—B	Timing	(1 long 1 short)
7	Beep—BB	Governor Mode	(1 long 2 short)
8	Beep—BBB	Reserved Item #1	(1 long 3 short)
9	Beep—BBBB	PWM Frequency	(1 long 4 short)
10	Beep—Beep—	Built-in BEC Output	(2 long tones)
11	Beep—Beep—B	Reserved Item #2	(2 long 1 short)
12	Beep—Beep—BB	Lipo Cells	(2 long 2 short)
13	Beep—Beep—Beep—B	Reset All To Defaults	(3 long 1 short)
14	Beep—Beep—Beep—BB	Exit	(3 long 2 short)

Note: “Beep—” means a long “Beep” tone, “B” means a short “Beep” tone. Usually, 1 long “Beep—” = 5 short “B” .

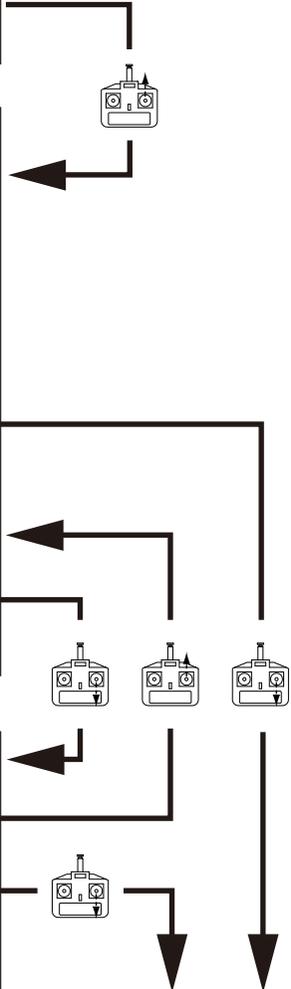
3. Set item value (Programmable value):

You will hear several “Beep” tones in loop. Set the value matching to a tone by moving the throttle stick to top position when you hear the tone, then a special tone “J” emits, that means the value is set and saved. (Keep the throttle stick at the top position, you will go back to Step #2 and you can select other items; Or Move the stick to bottom position within 2 seconds will exit program mode directly)

Items	Beep	1 short	2 short	3 short	4 short	1 long	1 long 1 short	1 long 2 short	1 long 3 short
Brake	*Off	Soft	Hard	Very Hard					
Battery Type	*LiPo	NiMH							
Cutoff Mode	*Soft Cut	Hard Cut							
Cutoff Threshold	Low	*Middle	High	Custom					
Start Mode	Normal	Soft	*Very Soft						
Timing	0°	3.75°	7.5°	11.25°	*15°	18.75°	22.5°	26.25°	
Governor Mode	*Off	Governor Low	Governor High						
Reserved Item #1									
PWM Frequency	*12KHz	8KHz							
Built-in BEC Output									
Reserved Item #2									
Lipo Cells	*Auto	2S	3S	4S	5S	6S	← For normal ESC (2 to 6S Lipo)		
	*Auto	5S	6S	8S	10S	12S	← For high voltage ESC (5 to 12S Lipo)		

The value with * symbol is the factory-preset value (That is: default value).

Note4: After setting the programmable items by the throttle stick or a Program Card, you will hear 5 long “Beep—” tones when the ESC exits the program mode. You can restart the ESC after 5 seconds.



4. Exit program mode

There are 2 ways to exit the program mode:

 - a. In Step #3, after special tone “J”, please move the throttle stick to the bottom position within 2 seconds.
 - b. In Step #2, after tone Beep—Beep—Beep—BB” (3 long 2 short Beep tones, that is the item #14), move the throttle stick to the bottom position within 3 seconds.