## 12.RCM-BL500M 1600KV POWER COLLOCATION REFERENCE 原裝動力數據參考表

**BATTERY 電池 :ALIGN Li-Poly 22.2V 2600mAh**

| Motor Pinion Gear 馬達主齒 | Main Rotor Blade 主旋翼規格 | Pitch 螺距 | | Current(A) approx. 電流(A)大約值 | Throttle Curve 油門曲線 | RPM approx. 主旋翼轉速大約值 |
|---|---|---|---|---|---|---|
| 13T | 425 Carbon Fiber Blades 425碳纖主旋翼 | Hover 停懸 | +5° | 10.5 | 0/50/70/85/100% | 2160 |
| | | Idle 1 | 0° | 12 | 85%Middle中 | 2750 ⚠ |
| | | | 0° | 14.2 | 100/100/100/100/100% | 2890 ⚠ |
| | | | ±12° | 32.5 | | 2650 |

**NOTE: 1. Please use a pitch gauge to adjust the pitch value. Incorrect excess pitch setting will result poor helicopter performance and reduce ESC's life and battery's life.**

**⚠2. For the safeties of flight and helicopter structure, please do not equip the power of main blade over 2650 RPM.**

註：1.請務必使用螺距規來量測調整螺距，不正確的過大螺距設定不但無法發揮直昇機的特性，反會影響到無刷調速器與電池的壽命。

⚠2.為了飛行安全與機體結構安全，主旋翼轉速設定禁止超過2650RPM。

## 13.RCE-BL60G BRUSHLESS SPEED CONTROLLER INSTRUCTION MANUAL 無刷調速器使用說明

### PRODUCT FEATURES 產品特色

1. 5-6V step-less adjustable BEC output allowing custom voltage setting to match servo specification.
2. BEC output utilizing switching power system, suitable for 7.4-22.2V (2s-6s) Li battery, with continuous current rating of 3A, and burst rating of 5A.
3. Three programmable throttle speed settings to support quick throttle response.
4. Include soft start and governor mode.
5. Small and compact PCB design for lightweight and simple installation.
6. Large heat sink for optimum thermal performance.
7. Highly compatible to work with 98% of all brushless motors currently on the market.
8. Ultra-smooth motor start designed to run with all kinds of brushless motors.
9. The power inlet utilizes a Japanese made "Low ESR" capacitor in order to provide stable power source.
10. The throttle has more than 200 step resolution that provides great throttle response and control.

1.5~6伏特無段可調式BEC輸出，可依伺服器規格與所需的特性自行設定電壓。
2.BEC輸入端採用交換式電源設計，適用7.4~22.2V(2S~6S)鋰電，持續耐電流3A，瞬間5A。
3.三段可程式油門反應速度，使動力的反應隨傳隨到。
4.具緩啟動及Govener Mode定速功能。
5.體積小，窄型設計，安裝於機身容易。
6.有散熱片設計，可延長電變壽命。
7.超高相容性，可對應市面上 98% 無碳刷馬達。
8.絕佳起步設計，無論國產、進口、內轉、外轉無刷馬達皆起步順暢。
9.電池電源端採用日製 Low ESR 低阻抗電解電容，大幅提高電源之穩定性。
10.油門達 200 段以上解析度，無格數之油門感覺。

### WIRING ILLUSTRATION 接線示意圖




### SPECIFICATION 規格

| Model 型號 | Continuous Current 持續 | Peak Current 瞬間 | BEC Output BEC輸出 | Dimension 尺寸 | Weight 重量 |
|---|---|---|---|---|---|
| RCE-BL60G | 60A | 70A | Output voltage: 5-6V step-less adjustment<br>Continuous current 3A; Burst current 5A<br>輸出電壓:5~6V無段可調式<br>承受電流:持續3A、瞬間5A | 65x28x12mm | 55g |

1. Good temperature situation for working at the maximum current
2. Supporting motor types: 2 ~10 pole in/outrunner brushless motors.
3. Supporting maximum RPM: 2 pole → 190,000 rpm ; 6 pole → 63,000 rpm.
4. Input voltage: 5.5V ~ 25.2V(2~6S Li-Po)

NOTE: 1. When setting to the Quick throttle response speed, the accelerative peak current will increase.
2. To minimize possible radio interference induced by switching power system, BEC should be installed at least 5cm away from the receiver. The use of PCM receiver is recommended.

1.持續最大電流需在機體散熱良好情況下。
2.支援馬達型式:二極至十數極之內外轉子無碳刷馬達。
3.支援最高轉速:二極→190,000rpm;六極→63,000rpm。
4.輸入電壓:5.5V~25.2V(2~6s Li-Po)

注意:1.設定為高油門反應速度時，加速瞬間電流會有增大情形。
2.內建Switching BEC，安裝時請與接收器保持至少5cm以上的距離以避免干擾接收器(建議使用較穩定的PCM系統接收器)。

### FUNCTIONS 產品功能

1. Brake Option - 3 settings that include Brake disabled/Soft brake/Hard brake.
2. Electronic Timing Option - 3 settings that include Low timing/Mid timing/High timing. Generally, 2 pole motors are recommended to use low timing, while 6 or more poles should use Mid timing. High timing gives more power at the expense of efficiency. Always check the current draw after changing the timing in order to prevent overloading of battery.
3. Battery Protection Option- 2 settings that include Li-ion, Li-poly High/Middle cutoff voltage protection.
   The default setting is high cutoff voltage protection. CPU will automatically determine cell number of input Lithium battery (2S~6S). This option will prevent over-discharge of the battery. The following reference is the guideline for setting the Battery Protection option.
   3-1 Li-ion/Li-poly High cutoff voltage protection-When the voltage of single cell drops to 3.2V, the first step of battery protection mode will be engaged by the ESC resulting in reduced power. The pilot should reduce the throttle and prepare landing. If the voltage of single cell drops to 3.0V, the second step of battery protection mode will be engaged resulting in power cutoff. (*Note 1) For 11.1V/3cells Lithium battery, the full charged voltage will be approximately 12.6V. According to this input voltage, CPU will determine that this is a 3cell battery.

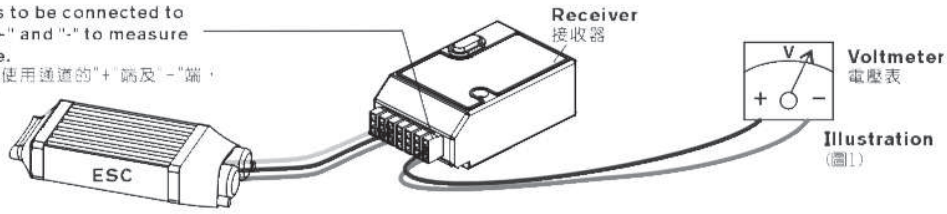
First step protection: 3.2V x 3cell=9.6V
Second step protection: 3.0V x 3cell= 9.0V
When the voltage drops to 9.6V, the power will be reduced. When the voltage drops to 9.0V, the power will be cut off.

3-2 Li-ion/Li-poly Middle cutoff voltage protection- This option is same as instruction 3-1, but when the voltage of single cell drops to 3.0V, the first step of battery protection will be engaged. When the voltage of single cell drops to 2.8V, the second step of battery protection will be engaged. (*Note 1)
Note 1: Second step of battery protection only works when Aircraft mode is setting to the option 4-1.
NOTE: THIS OPTION IS ONLY SUITABLE FOR A FULLY CHARGED BATTERY PACK IN GOOD WORKING CONDITION.

4. Aircraft Option: 3 settings that include Normal Airplane / Helicopter 1 / Helicopter 2.
Normal Airplane Mode is used for general airplanes and gliders. When flying Helicopters, you can choose Helicopter 1 Mode, or Helicopter 2 Mode. Helicopter 1 Mode provides Soft Start feature. Helicopter 2 Mode provides Soft Start and Governor Mode.

5. Throttle response speed: 3 settings that include standard/ Medium/ Quick throttle response speed.
The default setting is "quick speed". Use this option to adjust the setting according to flight character. For example, setting at Medium or Quick speed for 3D and powerful flight to make the power response more quickly, but note the accelerative peak current and power expense will increase.

6.BEC output voltage setting: 5-6V step-less adjustment.
This option allows custom voltage setting. Default setting is 5.5V; please adjust the voltage according to the specification of the servo (speed and resistance). Prior to entering the setup mode, a voltmeter needs to be connected to the power inlet of the receiver (as illustration) to monitor the selected voltage. The voltage is set by varying the throttle stick position from low (5V) to high (6V).




NOTE: Certain servos are designed to work with high voltage, while other servos are designed for lower voltage.
To avoid damage to servos, please follow the servo's factory specification to determine the proper voltage setting.
注意:部份伺服器不適合較高的電壓下操作，請依原廠適用電壓規格設定，避免造成伺服器燒毀。

7. Thermal Protection: When the ESC temperature reaches 80° C for any reason, it will engage the battery protection circuit, reducing power to the ESC. We recommend mounting the ESC in a location with adequate air flow and ventilation.

8. Safe Power On Alarm: When the operator turns on the ESC, it will automatically detect the transmitter signal. The ESC will emit a confirmation tone and enter normal operation mode if the throttle is set to the lowest position. If the throttle position is at full throttle, it will begin to enter Setup Mode. If the throttle is in any other position, the ESC will emit an alarm and not enter into user mode for safety precautions.

9. Aircraft Locator: If the aircraft should land or crash in an unexpected location and become lost, the pilot can enable the Aircraft Locator Option. The Aircraft Locator Option is engaged by turning off the transmitter. When the ESC does not receive a signal from the transmitter for 30 seconds, it will start to send an alarm to the motor. The sound of the alarm will aid the pilot to locate the aircraft. This option will not work with a PCM receiver that has SAVE function enabled, or with low noise resistant PPM receivers.

1.煞車設定:三段選擇分為無煞車 / 軟性煞車 / 急煞車

2.進角設定:三段選擇分為低進角 / 中進角 / 高進角
設定時機分為二種以及六種以上無碳刷馬達，二極無碳刷馬達一般適用低進角，若希望馬達轉速提高，可將進角設定為中進角。六極以上無碳刷馬達一般適用中進角，若希望馬達轉速提高，可將進角設定為高進角。然而進角之調整需要注意電流之變化，避免電池過載，影響電池及馬達壽命。

3.電池保護電壓設定:二段選擇分為 Li-Ion、Li-Po 高截止電壓保護/中截止電壓保護
出廠設定為高截止電壓保護：此功能會自動判定所輸入鋰電池的cell數(2~6S)，並提供使用者對該電池之放電保護，以避免因放電電壓過低而造成電池損壞，以下為設定值之解說：
3-1 Li-Ion/Li-Po高截止電壓保護：當鋰電單cell壓降達3.2V時，電變會啟動第一階段保護，使動力間歇性中斷，此時使用者應將油門收小，準備降落；
而當單cell電壓持續壓降達到3.0V時則會啟動第二階段保護，完全限制動力輸出(註1:僅在4-1選項"一般飛機模式"下才會啟動第二階段保護)。
例:以一個使用11.1V 3cell鋰電池之系統而言11.1V鋰電池充飽電壓約12.6V，此輸入電壓CPU會自動判定為3cell鋰電。
第一階段保護:3.2Vx3cell=9.6V 第二階段保護:3.0Vx3cell=9.0V 當電壓降至9.6V時，動力會間歇性中斷，當壓降達到9.0V時則完全限制動力輸出。
3-2 Li-Ion/Li-Po中截止電壓保護:同3-1功能說明，但單cell壓降達到3.0V時，會啟動第一階段保護，單cell壓降達到2.8V時啟動第二階段保護(註1)。
注意:以上功能僅適用於充飽電，且功能正常的鋰電池。

4.飛機模式設定:三段式選擇分為:一般飛機模式/直昇機模式1/直昇機模式2
使用於一般飛機或滑翔機時，請設定於一般飛機模式，使用於直昇機時可選擇直昇機模式1:具有緩啟動功能，或直昇機模式2:具有緩啟動及Govener Mode定速功能。

5.油門反應速度設定:三段選擇分為標準/中速/快速
出廠設定值為"快速"油門反應速度，此功能提供使用者依所需的飛行特性來作適當的調整，例如3D飛機與慣熟的3D直昇機飛行時可設定為中速或快速，使動力反應更加快速、靈敏，但須注意提高油門反應速度時，加速瞬間電流與耗電量會有增大的情形。

6.BEC輸出電壓設定:5~6V無段調整
本功能提供使用者自行設定BEC輸出電壓，初始電壓為5.5V，使用者可依伺服器的規格與所需的特性(速度與扭力)自行更改設定；進入此項設定前，請先將電壓表連接到接收器的電源端(如圖1)，用以監看所選擇的電壓，設定時以油門搖桿的位置來決定輸出電壓，油門搖桿最低為5伏特，最高為6伏特，之間的電壓值可移動搖桿的位置任意設定。

7.溫度保護:當電變因不良之空氣對流或是過載輸出導致溫度上升達 80°C時，電變會啟動溫度保護，而使動力間歇性中斷，建議將電變裝置在機艙內空氣對流之位置，並實際使用電流表量測輸出電流，以達到電變之最佳效率。

8.開機防暴衝提醒功能:當使用者開啟電變電源時，系統會自動偵測發射機之設定，如果發射機油門未置於最低點，或未置於最高點準備進入設定模式，馬達將不會轉動，同時會有警示聲響提醒。

9.尋機功能:當飛機降若再長草區無法以目視定位時，使用者可將發射機關閉，當電變無法接收來自接收機信號時，電變會於三十秒後使馬達發出警示聲響，以利定位。此功能不適用於設定了 SAVE 功能之 PCM 接收機，或抗雜訊低之 PPM 接收機。

## SETUP MODE 設定模式

1. Setup mode: Make sure to connect the ESC to the throttle channel of the receiver. Please refer to the user manual of your radio system.
The second step is to connect the 3 power-out signal pins to the brushless motor.
Before you turn on the transmitter, please adjust the throttle stick to the maximum full throttle position. Proceed to connect the battery to the ESC. You will hear confirmation sounds as soon as you enter the SETUP MODE. Please refer the attached flow chart for details.

2. Throttle stick positions in Setup mode: Setup mode includes six settings: Brake, Electronic Timing, Battery Protection, Aircraft, Throttle Response Speed and BEC output voltage. Every setting has three options. Simply place the throttle stick in the highest, middle, and lowest positions for each setting. For example, first brake setting (Hard):
move the stick to the highest position. Then timing setting (mid): move the throttle stick in the middle position.

1.進入設定模式:將電變與接收器之油門 Channel 連接，不同之遙控系統請參閱您遙控系統之使用手冊，馬達之三條線亦與電變連接，將發射器之油門搖桿推到最高點，使之於全油門狀態，先開啟發射器電源，再將電源連接至電變，進入設定模式後，馬達將有設定模式之提示聲響。請參考第二頁程式化設定模式說明。

2.設定模式中之動作:設定模式共含有六項設定，分別為煞車、馬達進角、電池保護、飛機模式、油門反應速度級 BEC 輸出電壓等設定，詳細內容請參考產品功能之解說。每一項設定中各含三段設定，各項設定以油門搖桿之上、中、下位置來決定其設定值。
例如:煞車設定時，油門搖桿撥至最高，則設定為急煞車，進入第二項進角設定時，油門搖桿撥至中間，則設定為中進角。

| Mode 設定模式 / Throttle position 油門搖桿 | Low 低 | Middle 中 | High 高 |
|---|---|---|---|
| Brake 煞車設定 | ●Brake disabled(1-1) 無煞車(1-1) | Soft brake(1-2) 軟性煞車(1-2) | Hard brake(1-3) 急煞車(1-3) |
| Electronic Timing 進角設定 | Low-timing(2-1) 低進角(2-1) | ●Mid-timing(2-2) 中進角(2-2) | High-timing(2-3) 高進角(2-3) |
| Battery Protection 電池保護電壓設定 | ●High cutoff voltage protection(3-1) 高截止電壓保護(3-1) | Middle cutoff voltage protection(3-2) 中截止電壓保護(3-2) | —— |
| Aircraft 飛機模式設定 | Normal Airpane/Glider(4-1) 一般飛機 / 滑翔機 (4-1) | ●Helicopter 1 (Soft Start)(4-2) 直升機模式1(緩啟動功能)(4-2) | Helicopter 2 (Soft Start+ Governor Mode)(4-3) 直升機模式2(緩啟動+Govener Mode定速功能)(4-3) |
| Throttle response speed 油門反應速度設定 | Standard(5-1) 標準(5-1) | Medium speed(5-2) 中速(5-2) | ●Quick speed(5-3) 快速(5-3) |
| BEC output voltage BEC輸出電壓設定 | 5.0V | ●5.5V | 6.0V |

Note: "●" default setting
註: "●" 表示出廠設定值

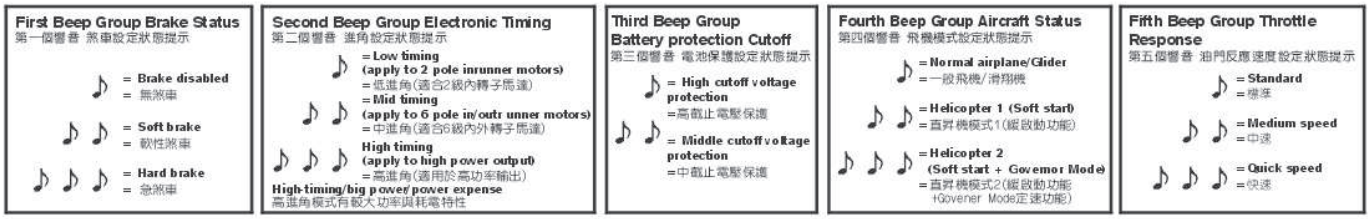
Chart A
表A

ARTICEN

## ESC START-UP INSTRUCTION 開機使用模式




## CURRENT SETTINGS INDICATOR BEEPS EXPLANATION 開機模式設定響音提示說明

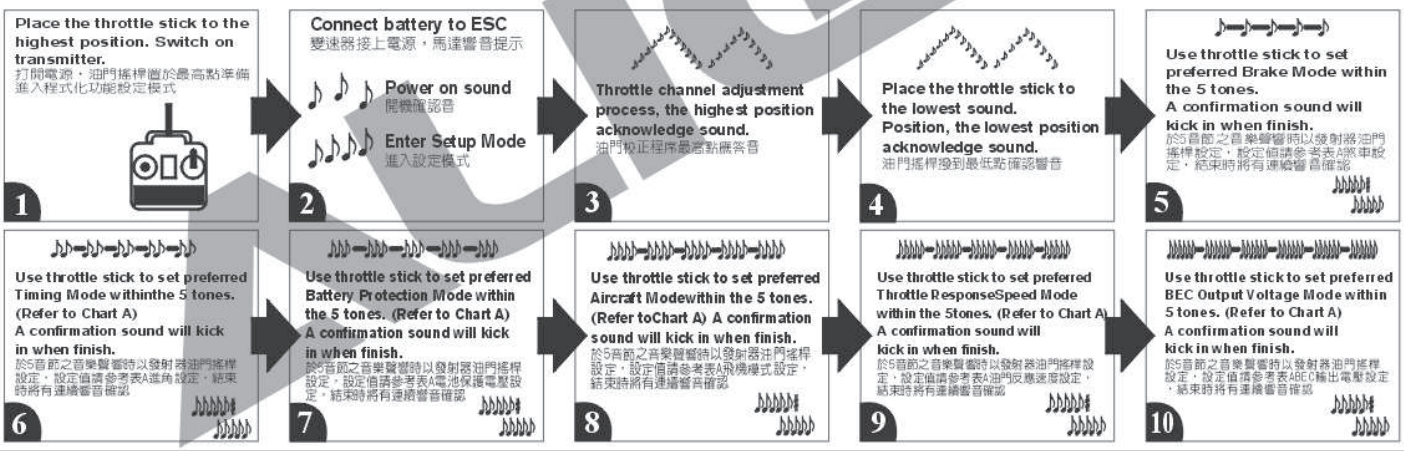



## INSTRUCTIONS ON AIRCRAFT MODE SETTINGS 飛機模式設定使用說明

Normal Airplane/Glider Mode (Option 4-1):
This option is applied to general airplanes and gliders.
Helicopter 1 Mode (Option 4-2):
This option provides a soft start feature and is applied to Helicopters for Normal, Idle Up 1, or Idle Up 2 modes.
Please note that the sensitivity of the gyro should be set lower when flying in Idle Up 1 or Idle Up 2 modes if tail hunting (wag) occurs due to higher rotor speed.
Helicopter 2 Mode (Option 4-3):
This option supports soft start as well as Governor Mode features and is applied to Helicopters for Idle Up 1 and Idle Up 2 modes(not suitable for Normal Flight Mode). When Governor Mode is in use, the throttle should be set between 75% and 85%. Again if tail wag occurs, lower the sensitivity of the gyro to eliminate the hunting effect. The Governor Mode may not work properly in cases of insufficient rotor speed (due to improper gear ratio), poor battery discharge capability, and improper setting of gyro sensitivity and the blade pitch, etc. Please make sure all the proper adjustments have been done when using Governor Mode.

一般飛機模式(選項4-1):適用於一般飛機及滑翔機。
直昇機模式1(選項4-2):具有緩啓動功能，適用於Normal、Idle1、Idle2等飛行模式，當切換至Idle1或Idle2模式,如有較高轉速造成陀螺儀有輕微的追蹤現象，此時應將陀螺儀的感度設定分別降低。
直昇機模式2(選項4-3):具有緩啓動及Govener Mode定速功能，適用於Idle1、Idle2特技飛行模式(不適合Normal飛行模式下選用)，選擇定速功能時，油門應定速在75%~85%之間，如果飛行時發現有輕微的追蹤現象時，應降低陀螺儀的感度；由於轉速不足(齒比搭配不當)，電池效能不佳，陀螺儀感度設定不當，Pitch設定錯誤，皆會導致無法發揮定速的功能，甚至產生尾部偏癈的情形，所以選擇此模式時應針對相關條件進行確認。

## SETUP MODE 程式化設定模式 Minimum 4 channel radio is required 四動以上標準發射器均可執行設定




# 14.GP780 HEAD LOCK GYRO SET USER MANUAL GP780鎖定式陀螺儀組使用說明

ALIGN

## Features 產品特色

- ●Utilizes Silicon Micro Machines (S.M.M) sensor with excellent stability to dramatically reduce in-flight tail drifts.
- ●Utilizes AHTCS (Active Helicopter Tail Control System) to compensate any drift caused by wind direction and force , as well as unintended yaw induced by helicopter itself during flight maneuvers.
- ●Tailor made specifically for use with high speed digital rudder servos. This gyro festures high sensitivity and minimal reaction time, fully utilizing the potential of modern high speed digital rudder servos.
- ●Suitable for all sizes of helicopters, from micro indoor to large 90 size glow helicopters.
- ●Metallic dampening plate built into bottom gyro casing, dramatically increasing anti-vibration and anti-interference abilities.
- ●Features 1520μs pulse wide and 760μs narrow pulse wide frame rate.
- ●Digital/Analog servo switchable.
- ●Reverse switch.
- ●Rudder servo travel limit adjustment (ATV).
- ●Mode switch for large/mini helicopter.
- ●Delay adjustment.
- ●Gyro locking mode and gain can be adjusted remotely from the transmitter.

- ●採用S.M.M矽微細加工技術感知器，具有極佳的穩定性，大幅降低尾舵偏移的機會。
- ●採用AHTCS (Active Helicopter Tail Control System)主動式直昇機尾旋翼控制系統，主動修正因風向、風力變化與直昇機不同飛行姿態所產生之偏移。
- ●專為高速型數位伺服器量身打造，具有高靈敏度與極短的反應時間，完全發揮伺服器高速反應的鎖定能力。
- ●適用迷你型室內電直至大型90油直。
- ●下蓋與金屬防震片一體成型，大幅提升抗震防干擾能力。
- ●相容標準1520μs與窄頻760μs伺服器。
- ●數位/類比伺服器切換。
- ●尾舵正逆向控制切換。
- ●LIMIT尾舵行程量設定。
- ●大/小型直昇機模式切換。
- ●DELAY控制延遲量設定。
- ●可由遙控器控制鎖定與非鎖定模式，以及調整陀螺儀感度。

ALIGN