# XBL

BRUSHLESS ESC 50A

Congratulations and thanks for purchasing MST electronic speed controller (ESC). The brushless power system for RC model can be very powerful and dangerous, so please read this manual carefully. Since we have no control over the installation, application, use or maintenance of this product, in no case shall we be liable for any damages, losses or costs. Besides, we have the rights to change the design, appearance, functions and operational requirements without any notifications.

FEATURES

− Water-proof and dust - proof for all - weather races.
(Note: please uninstall the cooling fan before using this ESC in water; Clean and dry it soon after the use for avoiding the connectors get rusty.)
− External programming port, easy to connect to the Program Card when setting the ESC.
− Proportional brake with 4 steps of maximum brake force adjustment and 8 steps of drag brake force adjustment.
− 9 steps of acceleration (punch) adjustment from "soft" to "Very aggressive" to fit for different kinds of models, tires and tracks.
− Multiple protections: Low voltage cut - off protection/ Over-heat protection/ Throttle signal loss protection/ Motor lock-up protection.
− One-button (the "SET" button on the ESC) to set the ESC, and easy to reset all parameters to the factory default settings.
− Compatible with the optional device-the portable Digital LED Program Card, especially convenient for outdoor use.

BEGIN TO USE A NEW BRUSHLESS ESC

STEP 1 Connections
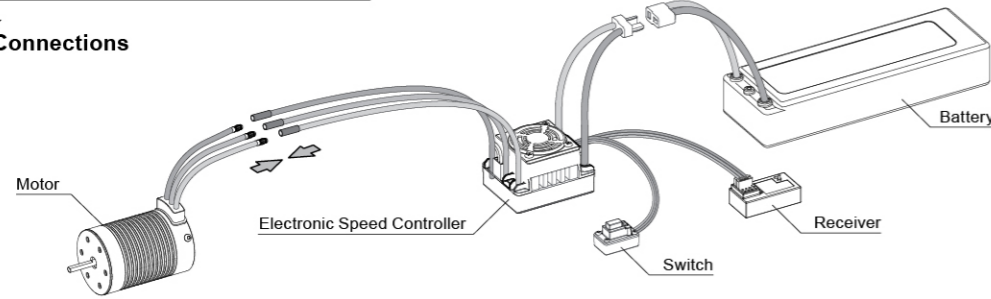
This brushless system is powerful and dangerous, for the safety of your own and those people around you, please turn on the ESC while keeping all the wheels in the air.
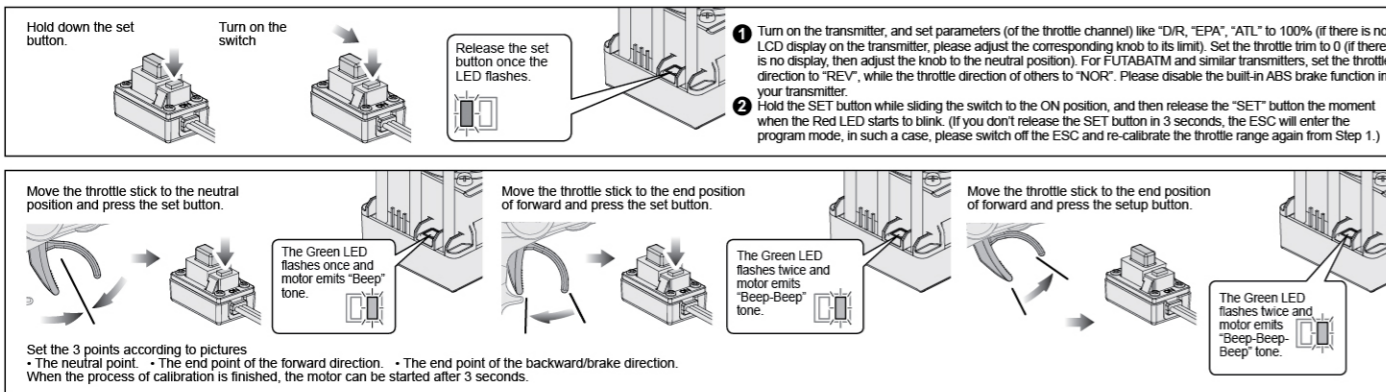
Specifications

MODEL	XBL BRUSHLESS ESC 50A
Continuous Current / Peak Current / Resistance	50A/ 300A/ 0.001Ω
Motor Type Supported	Sensorless Brushless Motor
Car Applicable	1:10 On-road / Off-road / Buggy / Monster / Drift
Motor Limit	For 2S Lipo or 6 cells NiMH: 1. On-road: 3650-size or smaller motor with the KV<6000 2. Off-road / Buggy / Monster: 3650-size or smaller motor with the KV<4000 For 3S Lipo or 9 cells NiMH: 1. On-road: 3650-size or smaller motor with the KV<4000 2. Off-road / Buggy / Monster: 3650-size or smaller motor with the KV<3000.
Battery	4-9 Cells NiMH, 2-3S Lipo
BEC Output	6V/3A (Switch Mode)
Dimensions / Weight	48.5×38×32mm / 90g
External Program Port	Available
Working voltage of Fan	From BEC (5V)

STEP 2 Set up Throttle Range

In order to make sure the ESC fits the throttle range of your transmitter, you must calibrate it when begin to use a new ESC, or a used transmitter if some of its settings have been changed, like the Throttle Trim, D/R, EPA or other parameters. Otherwise, the ESC cannot work properly. Besides, we strongly recommend users to enable the "failsafe" function of the transmitter, set the "F/S" of the throttle channel to the Shutdown mode or set the protection value to the neutral position, so the car can be stopped if the receiver fails to get the radio signals from the transmitter. Please calibrate the throttle range according to the following steps.

① Turn on the transmitter, and set parameters (of the throttle channel) like "D/R, "EPA", "ATL" to 100% (if there is no LCD display on the transmitter, please adjust the corresponding knob to its limit). Set the throttle trim to 0 (if there is no display, then adjust the knob to the neutral position). For FUTABATM and similar transmitters, set the throttle direction to "REV", while the throttle direction of others to "NOR". Please disable the built-in ABS brake function in your transmitter.

② Hold the SET button while sliding the switch to the ON position, and then release the "SET" button the moment when the Red starts to blink. (If you don't release the SET button in 3 seconds, the ESC will enter the program mode, in such a case, please switch off the ESC and re-calibrate the throttle range again from Step 1.)

Set the 3 points according to pictures
· The neutral point.   · The end point of the forward direction.   · The end point of the backward/brake direction.
When the process of calibration is finished, the motor can be started after 3 seconds.

STEP 3 Check the LED Status in Normal Running

① When the throttle stick is in the neutral range, neither the Red LED nor the Green LED lights up;
② When the car moves forward, the Red LED solidly lights; Green LED also lights up when the throttle stick is at the top position (100% throttle);
③ When the car brakes, the Red LED solidly lights; the Green LED also lights up when the throttle stick is at the bottom position and the maximum brake force is set to 100%;
④ When the car reverses; the Red LED solidly lights; the Green LED also lights up when the throttle stick is at the bottom position and the maximum reverse force is set to 100%.

EXPLANATION FOR THE BEEP SOUND
In normal case, when the ESC is switched on, the motor will emit several "Beep" tones to express the cell count of the battery pack. For example, "Beep-Beep-" means 2S LiPo, "Beep-Beep-Beep-" means 3S LiPo.

PROGRAM THE ESC

STEP 1 Program the ESC with the SET Button

In the programming process, the motor will emit "Beep" tone while the LED is flashing. If the "N" is bigger than the number "5", we use a long time flash and long "Beep—" tone to represent "5", so it is easy to identify the items of the big number. For example, if the LED flashes as the following:
"A long time flash + 1 short time flash" (Motor sounds "B—B") = the No. 6 item.
"A long time flash + 2 short time flash" (Motor sounds "B—BB") = the No. 7 item.
"A long time flash + 3 short time flash" (Motor sounds "B—BBB") = the No. 8 item, and so on.
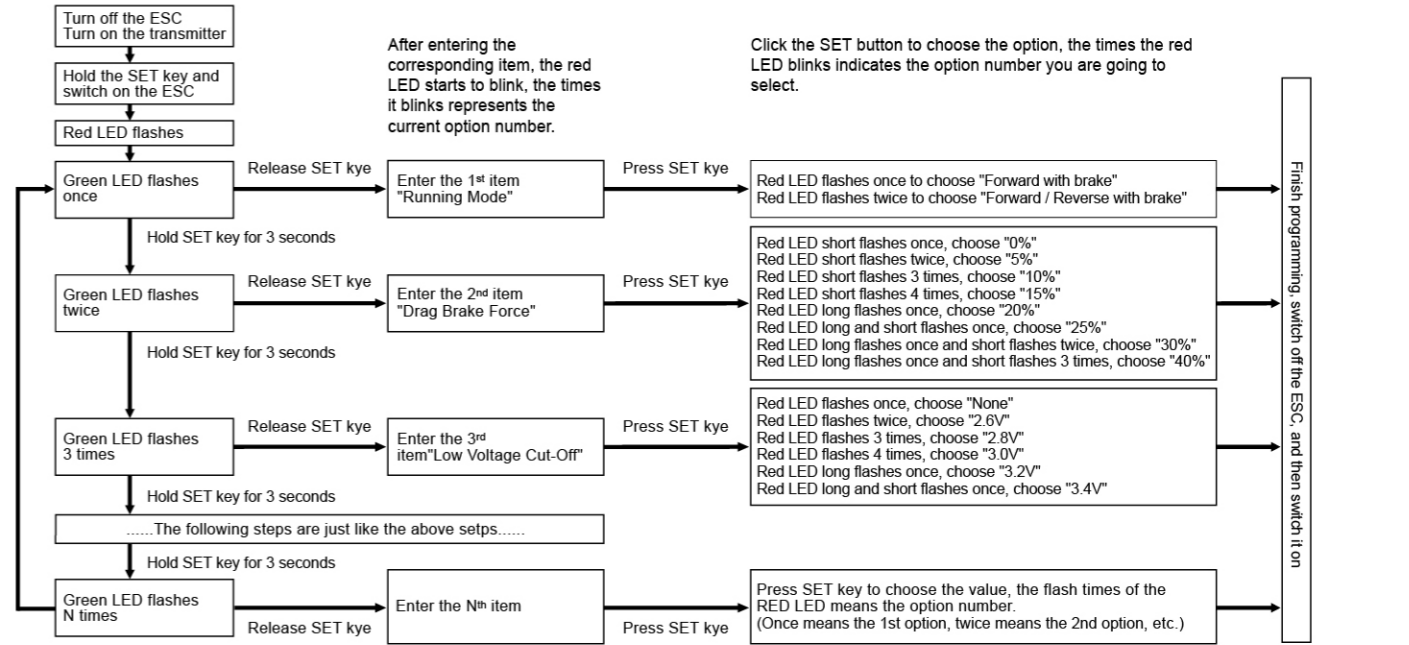
STEP 2 Set the ESC by the Program Card

The Program Card is optional equipment which needs to be purchased separately. It has 3 digital LEDs to display the programmable items' number and the options' number.
(Please refer to the user manual of the program card for detail info)

External Programming Port for Connecting Program Card.
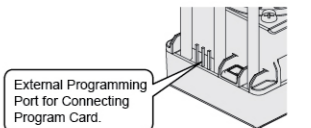
RESET ALL ITEMS TO DEFAULT VALUES

At any time when the throttle is located in neutral zone (except in the throttle calibration or parameters program process), press and hold the "SET" key for over 3 seconds, the red LED and green LED will flash simultaneously , which means each programmable item has been reset to its default value. The ESC needs to be restarted to complete the reset process.
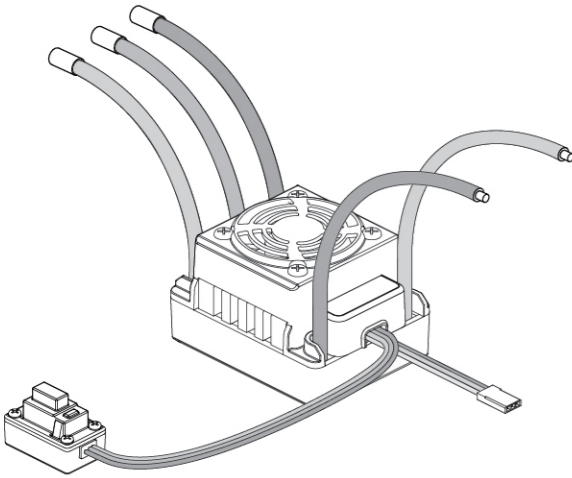
PROGRAMMABLE ITEMS

− Running Mode: With "Forward with Brake" mode, the car can go forward and brake, but cannot go backward, this mode is suitable for competition; "Forward / Reverse with Brake" mode provides backward function, which is suitable for daily training.
Note: "Forward/Reverse with Brake" mode uses "Double-click" method to make the car go backward. When you move the throttle stick from forward zone to backward zone for the first time (The 1st "click"), the ESC begins to brake the motor, the motor speeds down but it is still running, not completely stopped, so the backward action is NOT happened immediately. When the throttle stick is moved to the backward zone again (The 2nd "click"), if the motor speed is slowed down to zero, then the backward action will happen. The "Double-Click" method can prevent mistakenly reversing action when the brake function is frequently used in steering. By the way, in the process of braking or reversing, if the throttle stick is moved to forward zone, the motor will run forward at once.
− Drag Brake Force: Set the amount of drag brake applied at neutral throttle to simulate the slight braking effect of a neutral brushed motor while coasting.
− Low Voltage Cut-Off: The function mainly prevents the Lipo battery from over discharging. The ESC detects the battery voltage at any time, if the voltage is lower than the threshold for 2 seconds, the output power will be reduced 70%, after 15 seconds the output power will be completely shut off and the red LED flashes in such a way: "☆-, ☆-, ☆-". Please stop your car at the track side as soon as possible to avoid obstructing other racing cars.
− Start Mode (Also called "Punch" or "Acceleration"): Level 1 has very soft start acceleration, while level 4 has very quick start acceleration. From Level 1 to Level 4, the start force is increasing.
− Maximum Brake Force: The ESC provides proportional brake function. The brake force is related to the position of the throttle stick. Maximum brake force refers to the force when the throttle stick is located at the top point of the backward zone. A very large brake force can shorten the brake time, but it may damage the gears.

Parameter List of XBL Brushless ESC 50A:

Programmable Items	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
1.Running Mode Note 1	Fwd/Br	Fwd/Rev/Br							
2.Drag Brake Force		5%	10%	15%	20%	25%	30%	40%	
3. Low Voltage Cutoff	Disable	2.6V/Cell	2.8V/Cell	3.0V/Cell	3.2V/Cell	3.4V/Cell			
4. Start Mode (Punch)	Level 1	Level 2	Level 3	Level 4					
5. Max. Brake Force	25%	50%	75%	100%	Disable				

TROUBLE SHOOTING

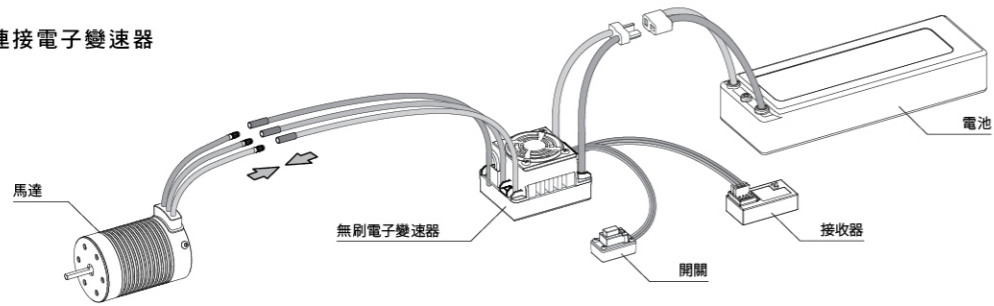| TROUBLE (S)	POSSIBLE CAUSES	SOLUTION (S)
Turn on the switch, no LED lights up, and neither the motor nor fan works.	No battery voltage is input to the ESC. The switch of the ESC is damaged.	Check the connections between the battery and the ESC, re-solder the connectors if needed. Change the switch.
After power on, motor doesn't work but emits "beep-beep, beep-beep-" alert tone. (there's 1 second pause between 2 "beep-beep-").	The voltage of the battery pack is not in the normal range, it's too high or too low.	Check the voltage of the battery pack.
After power on, the Red LED turns solid red but the motor doesn't work.	The throttle signal wire is oppositely inserted or into the incorrect channel.	Plug the signal wire (Rx lead) correctly into the throttle channel (usually Channel #2) of the receiver.
The car runs backwards when accelerating forward on radio.	The wire connections between the ESC and the motor need to be changed.	Swap any two wire connections between the ESC and the motor.
The car suddenly slows down, then stops about 15 seconds later.	Low voltage cutoff protection (Red LED blinks) Overheat protection (Green LED blinks)	Check the battery voltage. If still has some capacity, lower the cut-off threshold voltage; if not, replace a new battery. Wait several minutes to cool the ESC. Increase the gear ratio or the T number (Turns) of the motor.
The motor stutters, and cannot start up.	The connections between motor and ESC are not reliable. The ESC is damaged.	Check all the solder joints and ensure they are well soldered. Check connectors. Contact the distributor for after-sales service.
The vehicle can go forward but cannot reverse.	The throttle neutral point drifts to the brake area.	Calibrate the throttle neutral point again to ensure that no LED lights when the throttle stick is at the neutral position.

設置變速器參數

⚠ 指示燈閃爍的同時，馬達會發出鳴音"嗶"，以便於識別。
當 N≧5 時，我們使用一次較長時間的指示燈閃爍（同時伴有一次較長時間的鳴音）來表示數字"5"。
比如，電變內綠燈長閃 一次（同時馬達發出一次長鳴音"嗶--"），表示進入第 5 設定項；若電變內綠燈長閃一次再短閃一次(同時馬達發出一次長鳴 音"嗶--"
和一次短鳴音"嗶"），表示進入第 6 設定項，依次類推，第 7 設定項為"嗶--嗶嗶"，第 8 設定項為"嗶--嗶嗶 嗶"。
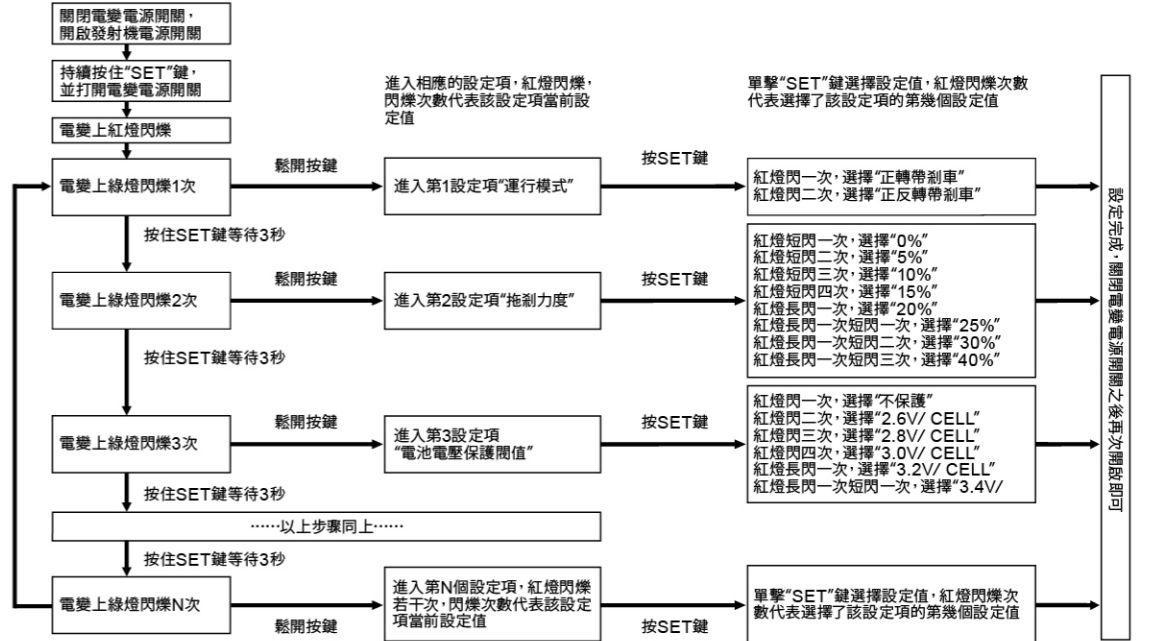
STEP 2 利用LED參數設定卡進行參數設置

編程設定卡為車用電變的升級選配件（需另外購買），體積小巧，適合外場使用。其界面直觀，參數讀取和設定過程十分簡單快捷。調整參
數時，只需將電變上的控制排線插入編程卡右上角標注著 -+ 的插座中，然後給電變接上電源，數秒後該電變的各項參數即可顯示出來。利
用編程卡上的"ITEM"和"VALUE"按鍵即可快速選擇編程項目和參數值，然後按"OK"鍵後，新參數即可存入電變中。
（詳情請參閱 LED 參數編程設定卡說明書）
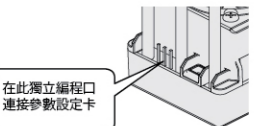
恢復出廠參數設定

在油門搖杆處於中立點位置的任意時刻(除進行油門校調或編程設定時)，按住SET鍵3秒以上，可恢復出廠設定。紅綠燈同時閃爍時表示恢復設定成功，出廠設定
需重新通電方可生效。

編程項目說明

- 運行模式(Running Mode)："正轉帶剎車"模式下，車輛僅能前進和剎車，但不能倒車，該模式通常用於競賽；"正反轉帶剎車" 模式則提供了倒車功能，通常用於
訓練。"正反轉帶剎車"模式采用雙擊式倒車方式，即油門搖杆在第一次從中點區域推至反向區域時，馬達只是剎車，不會產生倒車動作；當油門搖杆快速回到中立點
區域並第二次推至反向區域時，如果此時馬達已停止，則產生倒車動作，如果馬達未停止，則不會倒車，仍是剎車，需要再次將油門回到中點並推向反向區，此時如
果馬達已經停止才會倒車，這樣做的目的是防止車輛行駛過程中因多次剎剎而造成誤倒車。
- 拖剎(Drag Brake)力度：拖剎是指油門搖杆從正向區域轉入中點區域內時，對馬達產生一個微量的剎車力，這樣做可以模擬有刷馬達的碳刷對馬達轉子的阻力，
適合減速入彎等場合(值得注意的是，拖剎會消耗比較多的電量，選擇合適的拖剎力度即可)。
- 電池低壓保護閾值(Low Voltage Cut-Off)：這功能主要是防止鋰電池過度放電而造成不可恢復的損壞。電變會時刻監視電池電壓，一旦電壓低於設定的閾值，
將切斷動力輸出。當進入彎等環境時，紅色LED會以"☆-、☆-、☆-"方式閃爍。
- 啟動加速度(Start Mode / Punch)：可根據個人習慣、場地、輪胎抓地特性等條件，選擇從1級("非常柔和")和4級("非常勁暴")等4種啟動加速度，這個功能對於
防止啟動時輪胎打滑非常有用。
- 最大剎車力度(Brake Force)：本電變提供比例式剎車功能，剎車力度的大小和油門搖杆的位置相關，最大剎車力是指油門搖杆處於剎車極限位置時所產生的剎車
力。非常大的剎車力度會縮短剎車時間，但會對齒輪造成損傷。"Disable" 選項會禁止電變的剎車功能，剎車功能將被由伺服器驅動的傳統剎車碟剎實現。請根據車輛的
具體情況及個人的使用習慣，選擇合適的最大剎車力參數。

XBL 無刷電變 50A 參數表：

編程項目	選項1	選項2	選項3	選項4	選項5	選項6	選項7	選項8	選項9
1.運行模式	正轉帶剎車	正反轉帶剎車							
2.拖剎力度	0%	5%	10%	15%	20%	25%	30%	40%	
3.電池低壓保護閾值	不保護	2.6V/Cell	2.8V/Cell	3.0V/Cell	3.2V/Cell	3.4V/Cell			
4.啟動模式(Punch)	1級	2級	3級	4級					
5.最大剎車力度	25%	50%	75%	100%					

故障快速處理

故障現象	可能原因	解決方法
通電後指示燈不亮，電變無法啟動，風扇不轉	1、電池電壓沒有輸入到電變 2、電變開關損壞	1、檢查電源輸入通路是否有焊接不良情況，並重新焊接好 2、更換開關
通電後馬達無法啟動，發出 "嗶-.嗶-.嗶-."警示音 (每組響音間時間隔 1 秒)	電池組電壓不在正常範圍內	檢查電池組電壓
上電後紅色LED閃亮，馬達無法啟動	電變油門線插反或通道插錯	將電變的油門排線按正確方向插到接收機的"油門"(TH)通道(Throttle，通常為 CH2)
遙控器正向加大油門，車子反而倒退	1、電變輸出線和馬達連接的線序錯誤 2、底盤架同三相電流曲率的不一致	將馬達的三條線中任何兩相互換即可
馬達轉動過程中，突然停轉或功率輸出顯著降低	1、接收機受到干擾 2、電變進入電池低壓保護狀態 3、電變進入過溫保護狀態	1、檢查接收機出現干擾的原因，檢查接收器電池電量 2、紅燈持續閃爍為電壓過低，請更換電池 3、綠燈持續閃爍為溫度保護，請等電變溫度降低後繼續使用
馬達抖動，無法啟動	1、馬達和馬達連接線接頭有虛接 2、電變故障(部分功率部分 MOSFET 燒毀)	1、檢查各焊接點，必要時重新焊接 2、聯系經銷商處理維修事宜
前進正常，但無法倒車	遙控器油門通道中點偏離到剎車區域	重新校調油門通道中點，使遙控器油門搖杆處於中位時，電變上的指示燈不亮