2. Bruksanvisning
E-help super-M

DOK_02_E1_2404
2024-04-10
Niklas Fridstrand

Ändringslista

Datum	Ändring	Syfte	Ändrad av	Version
23MAJ23	1:a versionen	1:a versionen	N. Fridstrand	A
5JUL23	Information om risk vid flygning med defekt batteri är tillagd.	Lista vilka åtgärder som behöver vidtas vid en brand under flygning.	N. Fridstrand	B
5JUL23	Information om kompetenstillägget Motorbehörighet borttagen och ersatt med hänvisning till verksamhetshandboken.	Att hänvisa till aktuell information.	N. Fridstrand	B
5JUL23	Litiumjon —> Lithium polymer (Li-Po) batterier	Förtydligande av batterikemi.	N. Fridstrand	B
6AUG23	Tagit bort brandsläckare för metallbrand.	Brandsläckare för metallbrand behövs inte då litiumet brinner upp under de första 2-3 sekunderna.	N. Fridstrand	B
6AUG23	Ökning av E-help Super-M's vikt med 1 kg.	Uppdatering med avseende på brandskyddskomponenter.	N. Fridstrand	B
17DEC23	Information om underhållsladdning har förtydligats.	Minska risken för misstolkning.	N. Fridstrand	C
17DEC23	Info om Mungasens 3 lysdioder har lags till.	Ökad förståelse om funktion.	N. Fridstrand	C
14MAR24	Referens till "Monteringsanvisningen" justerad till "Byggbeskrivningen"	Rättelse.	N. Fridstrand	D
14MAR24	Krav på utrustning och pilot: Information om att även andra vingar kan användas har lagts till.	Förtydligande.	N. Fridstrand	D
14MAR24	Länk till Kalibreringsvideo tillagd.	Underlätta kalibrering av Mungasen.	N. Fridstrand	D
10APR24	Ändring av versionssystem från A, B, C, D.... till E1ÅÅMM	Anpassning till SHF's versionssystem för hantering av registrering av E-help.	N. Fridstrand	E1_2404

Datum	Ändring	Syfte	Ändrad av	Version
10APR24	Kravet på kontrollbesiktning är ersatt med en rekommendation om Kvalitetssäkring.	Korrigering av innehåll.	N. Fridstrand	E1_2404

Innehållsförteckning

1. Krav på utrustning och pilot

1.1. Vinge

E-help super-M är utprovad med Northwing Freedom 170 2. Vingen har en rekommenderad ikrokningsvikt på 160 - 240 lbs, dvs 73 - 109 kg samt löstagbart kölrör. Likvärdig vinge med löstagbart kölrör kan användas så länge maximal ikrokningsvikt inte överskrids.

1.2. Kvalitetssäkring

Det rekommenderas att en genomgång utförs av en representant från Svenska Hängflygförbundet efter att E-help super-M har färdigställts och innan första flygningen genomförs. Syftet med denna genomgång är att säkra kvalitén på E-help super-M.

1.3. Pilot

E-help super-M och Freedom 170 kan flygas med piloter som väger mellan 50 - 86 kg och är upp till 178 cm långa.

1.4. Registrering och märkning

Vinge och E-help skall märkas med registreringsnummer som fås av Svenska Hängflygförbundet vid registrering, se länk https://flygsport.se/grenar/hangflyg/SHF/verksamhet/motorflygning/registrering.

Del	Vikt (kg)
Hjälm	0,5
Kläder&skor	2,7
Sele Myth 3 inkl. räddningsskärm	9,0
E-help	10,8
Totalt	**23,0**
Max ikrokningsvikt Freedom 170	109,0
Kvar till Pilot, max	86,0
Kvar till Pilot, min	51,0

Freedom 170 · Specifications

Double Surface	40%
Area (square feet)	171
Span (feet)	32.6
Aspect Ratio	6.2
Number of Ribs	17 Top
Frame Material	7075
Rib Material	7075
Glider Weight (lbs)	61
* Control Frame (inches)	60
Pilot Hook-In Weight (lbs)	160-240
USHPA Rating	2 - 5
Break-down *(length in bag)*	17' 6"

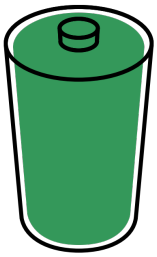
1.5. Kompetenstillägg Motorbehörighet

För aktuell information om vad som krävs för kompetenstillägget Motorbehörighet, se länk https://flygsport.se/grenar/hangflyg/SHF/verksamhet/motorflygning/kompetenstillagg

2. Lithium polymer (Li-Po) batterier, laddning och hantering

2.1. Inledning

Dessa rekommendationer är av stor betydelse för säker användning av Li-Po batterier. För tillverkarens mer omfattande manual för batterierna på engelska, se bilaga Manual Tattu LiPo batteries.pdf samt tillverkarens Li-Po Battery Guide (https://www.genstattu.com/bw/)



2.2. Kvalitetsbatterier

Välj Li-Po batterier av hög kvalitet från tillverkare såsom Gens Ace och Tattu med flera.

2.3. Laddning

Laddspänning

Li-Po batterier ska inte överladdas eftersom det kan orsaka skador på batteriet och i värsta fall kan det leda till brand eller explosion. Max laddspänning: 4,2 V/Cell.

Laddström

Max laddström: 1C, om inte annat framgår av specifikationerna. (Motsvarar 10A på ett batteri med 10 000 mAh),

Cellbalansering

Ladda alltid med cellbalansering. Cellbalansering förhindrar ojämnt cellslitage, minskad kapacitet samt överladdning på cellnivå. Cellbalansering möjliggör varje cells optimala laddningsnivå och ökar batteriets övergripande prestanda, livslängd och säkerhet.

Temperatur

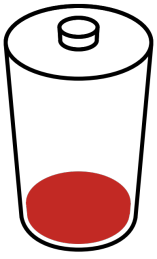
Undvik höga temperaturer: Li-Po batterier bör inte utsättas för höga temperaturer eftersom det kan orsaka överhettning och skador på batteriet. Sätt temperaturvarnaren på 40 °C under laddning även om max tillåtna temperatur vid laddning är 60 °C.

Laddplats

Ladda batterierna i ett välventilerat utrymme på ett eldfast underlag borta från lättantändliga material. Var alltid i samma rum med batterierna inom synhåll.

Internt motstånd

Kontrollera batteriernas interna motstånd under varje laddning med hjälp av laddaren.



2.4. Urladdning

Urladdningsspänning

Li-Po batterier ska inte djupurladdas eftersom det kan leda till kapacitetsförlust, cellskador i form av minskad effektivitet och ökad intern resistans samt ökad risk för instabilitet som i sin tur kan leda till överhettning, expansion, läckage av farliga kemikalier eller till och med risk för brand eller explosion. Lägsta urladdningsspänning: 3,3 V/Cell. Använd spänningsvarnaren!

Urladdningsström

Max urladdningsström: 30C (Motsvarar 300A på ett batteri med 10 000 mAh)

2.5. Underhållsladdning

För att ge batterierna ett långt liv, låt dem underhållsladdas en gång om de ej skall användas inom 24 timmar.

2.6. Förvaring

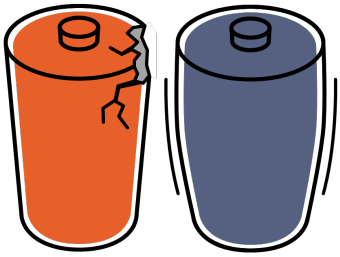
Förvara de underhållsladdade batterierna (3,8 - 3,9 V/cell) i en ammunitionslåda av stål på en sval och torr plats, gärna i en brandsäker förvaringspåse så att de inte utsätts för metallföremål som kan kortsluta dem.

2.7. Hantering

Kortslutning

Undvik att kortsluta batterierna då en kortslutning kan orsaka en snabb urladdning, brand eller explosion.

Skada

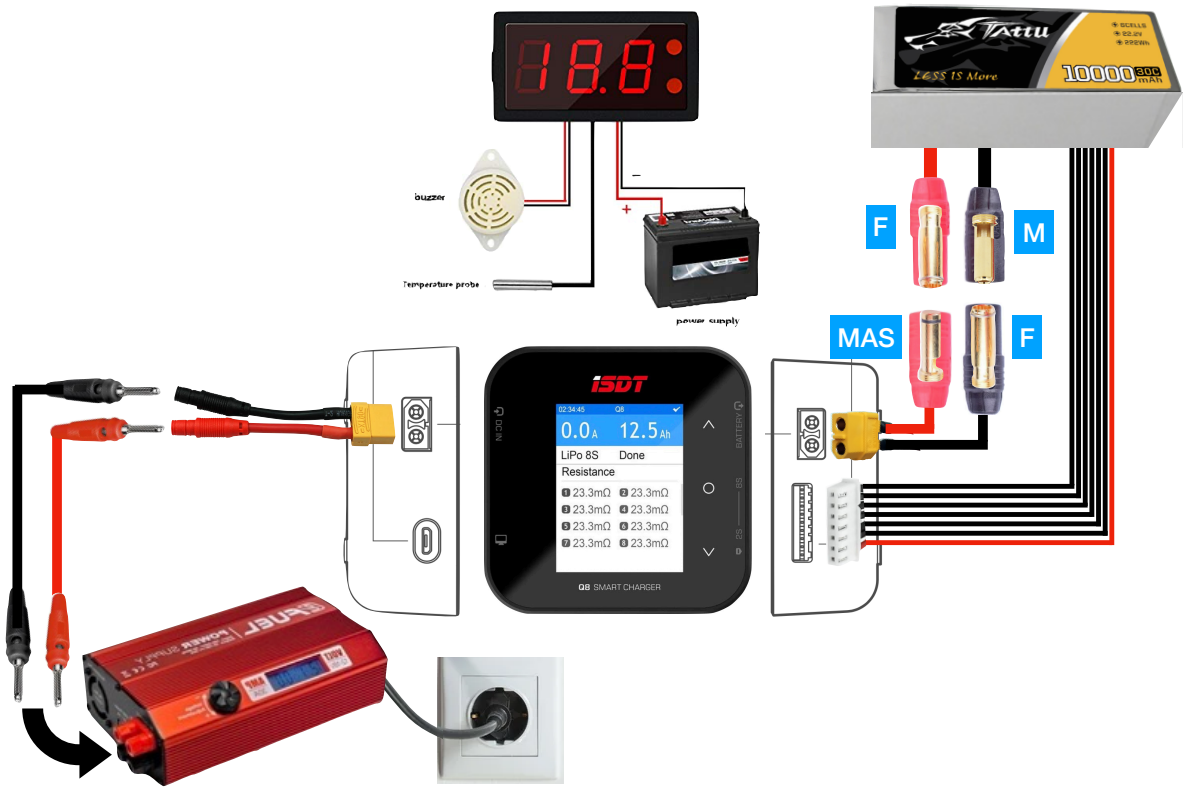


Inspektera batterierna före och efter varje användning för tecken på skador eller svullnad. Batterier ska inte släppas eller utsättas för stötar då det kan skadas. Punktering, ihoptryckning och modifiering skall undvikas.

Återvinning

Kassera batterier som svällt upp, tappat mer än 20% av sin kapacitet, ökat sitt inre motstånd med 20-30%, är skadat eller om någon cell hamnat efter. Återvinn batterierna på rätt sätt för att undvika miljöförstöring.

2.8. Laddduppkoppling



3. Driftsättning

3.1. Inställning Temperaturvarnare

Ställ in 2 st Temperaturvarnare genom att sätta den övre varningsnivån till +40 °C. För instruktioner, se bilaga: Manual Temperaturvarnare XH-B330.

3.2. Inställning Spänningsvarnare

Ställ in 2 st Spänningsvarnare genom att sätta den undre varningsnivån till 3,3 V/cell. Det görs genom att trycka på inställningsknappen tills 3,3 V/cell visas.

3.3. Inställning Motorstyrning

Ställ in följande parametrar på Motorstyrningen:

Parameter	Värde
Lvc	12s
Break type	hard
Cut off type	hard cut off
Cut off voltage	3,5v
Timing advance	auto
Start up type	slow start
Current limiter	standard

För instruktioner, se bilaga: Manual Motorstyrning.

3.4. Mungas

Mungasen har 3 lysdioder. Den översta lyser blå när motorstyrningen är aktiverad. De undre lysdioderna används ej. För kalibrering av Mungasen se följande video på https://www.dropbox.com/scl/fi/537ru8gveie64sjva7s42/Kalibrering_Mungas.MOV?rlkey=mscnkpr6y40u0efn7sai5qx2m&dl=0

4. Checklista vid start med E-help

Checklista vid start med E-help
Komplett version

- ❑ Hängglidaren har säkerhetskontrollerats.
- ❑ Selens funktion och slitage (blixtlås, benremmar, spännen/knäppen, snören etc) har kontrollerats.
- ❑ Räddningsskärmen har monterats korrekt.
- ❑ Kontroll att E-help-installationen (chassi, elsystem, skruvar, fjädrar, låstrådar, propeller etc) är felfri och rätt monterad har utförts.
- ❑ Selen har krokats in i vingens upphängningskrok.
- ❑ E-helpen har fästs på selens infästningar och säkrats med låsmuttrar.
- ❑ Upphängningslinan har fästs från E-helpens mast till upphängningskroken.
- ❑ Eventuella flyginstrument har slåts på.
- ❑ Batteriernas ladd-status har kontrollerats.
- ❑ E-helpens huvudströmbrytare har satts på.
- ❑ Vindriktningsindikator har satts upp.
- ❑ Att propellern går fritt har kontrollerats.
- ❑ Hastighetsreglaget (mungasen) har satts på.
- ❑ Hastighetsreglagets (mungasens) funktion har säkerställts (återgång till stillastånde).
- ❑ Propellerns rotationsriktning har kontrollerats.
- ❑ Hängglidaren kölrör har demonterats.

DIREKT FÖRE START

- ❑ Hjälmen har knäppts fast.
- ❑ Alla spännen/knäppen, snören, benremmarna etc. på selen har kontrollerats.
- ❑ Upphängningskroken har låsts.
- ❑ E-helpen har provkörts på max (strax innan start påbörjas).
- ❑ Fritt från hinder på stråket har säkerställts.

Checklista vid start med E-help
Minimal version

- ❑ Kontroll att E-help-installationen (chassi, elsystem, skruvar, fjädrar, låstrådar, propeller etc) är felfri och rätt monterad har utförts.
- ❑ Selen har krokats in i vingens upphängningskrok.
- ❑ E-helpen har fästs på selens infästningar och säkrats med låsmuttrar.
- ❑ Upphängningslinan har fästs från E-helpens mast till upphängningskroken.
- ❑ Batteriernas ladd-status har kontrollerats.
- ❑ E-helpens huvudströmbrytare har satts på.
- ❑ Att propellern går fritt har kontrollerats.
- ❑ Hastighetsreglaget (mungasen) har satts på.
- ❑ Hastighetsreglagets (mungasens) funktion har säkerställts (återgång till stillastånde).
- ❑ Propellerns rotationsriktning har kontrollerats.
- ❑ Hängglidaren kölrör har demonterats.

DIREKT FÖRE START

- ❑ E-helpen har provkörts på max (strax innan start påbörjas).

5. Risker vid flygning med E-help

Nedan listas några risker som tillkommer vid flygning med E-help.

1. Om piloten ökar hastigheten med hjälp av E-helpen alltför nära andra piloter (hängflygare/skärmflygare) så kan de utsättas för överraskande turbulens.
2. En propeller kan vara skadad före start eller skadas under start. För att undvika risk att åskådare skadas tillse att ingen person befinner sig vid sidan under start.
3. En E-help har en sekundär funktion och skall inte användas som livlina/ nödhjälp. Det får aldrig vara farligt om E-helpen skulle sluta ge kraft. Detta kan innebära att piloten måste flyga runt en stor skog istället för över den. Ett nödlandningsfält bör alltid finnas inom räckhåll.
4. Flygning med defekt batteri (skadat, uppsvällt, ej balanserat, låg kapacitet, högt inre motstånd etc.) kan leda till brand. Om detta sker vidta följande åtgärder:
   - Stäng av huvudbrytaren.
   - Nödlanda så fort som möjligt.
   - Tag av selen.
   - Begränsa om möjligt branden med hjälp av sand, brandfilt eller en ABC-brandsläckare.
   - Om branden inte kan hanteras säkert på egen hand bör brandkåren omedelbart kontaktas och deras instruktioner följas. Den personliga

säkerheten är alltid viktigast, så om branden sprider sig snabbt eller hotar din säkerhet, lämna omedelbart området och larma brandkåren.

6. Underhåll

Underhållsaktivitet	Intervall
Underhållsladdning av batterier.	Om de ej skall användas inom 24 timmar.
Kontroll av batteriernas inre motstånd. Byt ut batteri vars inre motstånd ökat med 20-30% jämfört med när det var nytt.	Under varje laddning.
Inspektion av batterier för tecken på skador eller svullnad. Vid skador och kassera batteriet på rätt sätt.	Före och efter varje användning.
Kontroll av E-help-installationen (chassi, elsystem, skruvar, fjädrar och låssprintar) är felfri och rätt monterad.	Före varje flygning.
Inspektion av propellern före varje flygning. Balansering vid behov.	Före varje flygning.
Kontroll av fästelement.	Var 10:e flygning.
Inoljning av mastlagret.	Var 10:e flygning.
Utbyte av gummilina.	1 gång per år.

7. Bilagor

7.1. Manual Temperaturvarnare XH-B330

Inställningsinstruktioner

Upp-knapp "+": Tryck kort för att visa larmvärdet vid hög temperatur, tryck länge för att ställa in alarmvärdet för hög temperatur.

Sänk knappen "-": Tryck kort för att visa larmvärdet vid låg temperatur, tryck länge för att ställa in larmvärdet för låg temperatur.

Tryck och håll knappen "+" och ner "-" för att återställa fabriksinställningarna.

Innan du slår på, tryck och håll knappen "+" och knappen "-" samtidigt för att ange temperaturkorrigeringen.

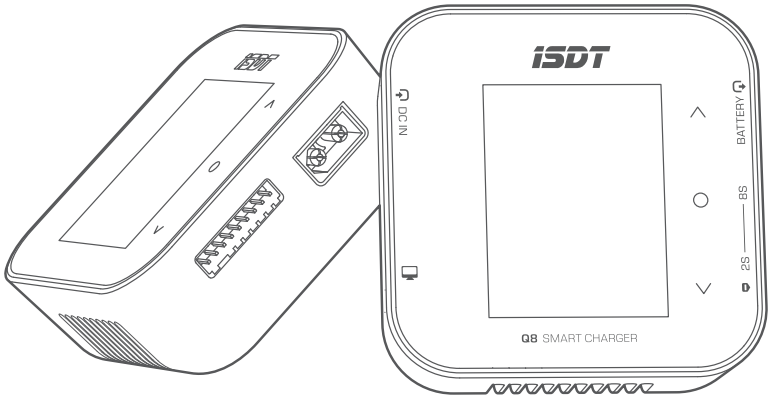
För alla installationsåtgärder lagrar systemet automatiskt data 5 sekunder efter att du slutat åtgärden.

7.2. Manual Batteriladdare Q8 500W SMART CHARGER

Q8

500W SMART CHARGER

Instruction Manual



ISDT®

Thanks for purchasing the ISDT Q8 Smart Charger.

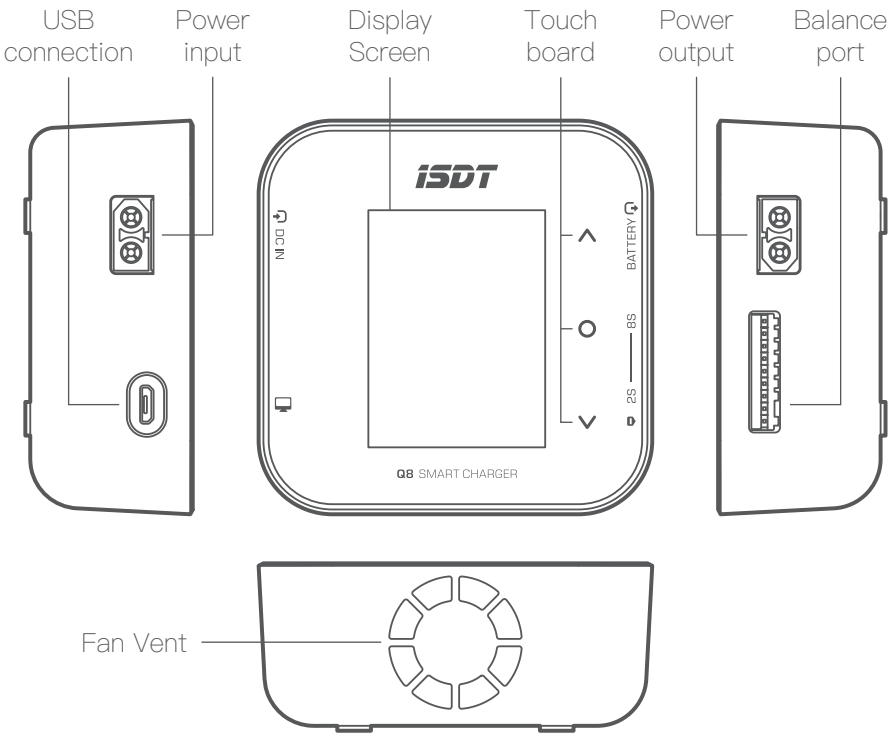
Please visit: www.isdt.co for more details on the functions of this smart charger, as well as purchase various accessories.
Functions of products will be kept on upgrading, the manual in your hand may be different from the actual operation, please refer to the actual functions.

Warnings and Safety Tips

For your safety and a better user experience, please read this manual and follow the instruction before using the new charger.

- Never use the charger without supervision, please stop using the charger and refer to the manual for reasons if any functional abnormity.
- Keep the charger away from dust, humidity, rain and high temperature, as well as avoid direct exposure to the sunlight and intense vibration.
- Place the charger on a heat–resisting, non–flammable and insulating surface. Do not use it on the car's seats, carpet or other similar places. Keep inflammable and explosive objects away from operation areas of the charger.
- Read the instruction manual carefully to be familiar with the features of the charger, and set proper charging parameters before operating. Setting the parameters incorrectly will result in damage to the product, personal property and cause serious injury as well.

Port / Buttons



Dimension：80×80×33mm Weight：170g

Product Specifications

Max. input current：20A
Input voltage：DC 10~34V
Output voltage：DC 1~34V
Balance current：1.5A/Cell Max
Abnormal voltage alarm：Support
Charging current：0.1~20A
Discharging current：0.1~1.5A
Max. charging power：500W
Max. discharging power：15W
Supported battery types and cell count：
LiFe,LiIon,LiPo 1~8S ; LiHv 1~7S ; Pb 1~12S ; NiMH/Cd 1~16S

Preset Battery Type of Charger and Task Parameters

	NiCd/MH	Pb	LiFe	LiIon	LiPo	LiHv
Rated voltage	1.20V	2.00V	3.20V	3.60V	3.70V	3.80V
Full charge voltage	1.40V	2.40V	3.65V	4.10V	4.20V	4.35V
Storage voltage	✗	✗	3.30V	3.70V	3.80V	3.85V
Discharge voltage	0.90V	1.90V	2.90V	3.20V	3.30V	3.40V
Balance charge	✗	✗	✓	✓	✓	✓
Unbalanced charge	✓	✓	✓	✓	✓	✓
Supported cell count	1~16S	1~12S	1~8S	1~8S	1~8S	1~7S
Max. charging current	20A	20A	20A	20A	20A	20A

How to Confirm Charging Current

Make sure to know the maximum charging current of the battery before charging, never use excessive current to charge to damage your battery, which will result in over heat even explosion during the charging process.
The charging and discharging capacity of battery is usually marked with C value. Multiplying the charging C value and battery capacity equals to the maximum charging current supported by the battery. For example, for a 1000 mAh battery with a charging capacity of 5C, the maximum charging current would be 1000×5=5000mA; therefore, the maximum charging current is 5A.
For a lithium battery, if it is impossible to confirm the supported charging C value, please set the charging current below 1C, for the sake of its (lithium battery) safety.
The reference relation between C value and charging time:
charging time ⩾60 minutes/ charging C value (e.g. it needs around 60~70 minutes to complete charging with 1C). Due to differences in battery conversion efficiency, the time to complete the charging might be extended.

Operating the Charger

Power on Q8 smart charger, connect the battery, and short touch the middle key of the touch board to enter the task setting menu as follows:

Charge

Balancing port is strongly recommended when charging lipo battery, which can make sure to monitor voltage on each cell battery and balance it when charging. Warning beeper will yell before start charging lipo if in non–balance mode(no connecting with balance port).
Current setting range: 0.1~20A
The battery type, cell count and charging current are auto set accordingly when connecting with BattGo battery.

Discharge

Current setting range: 0.1~1.5A
The battery type, cell count and discharging current are auto set accordingly when connecting with BattGo battery.

Storage

Current setting range: 0.1~20A
The battery type, cell count and storage current are auto set accordingly when connecting with BattGo battery.

DC Power supply

The charger can be used as a DC power supply when choosing this function, with adjustable voltage 2~30V, and current 0.5~10A.
The battery type, parameter and current are not optional in this task.

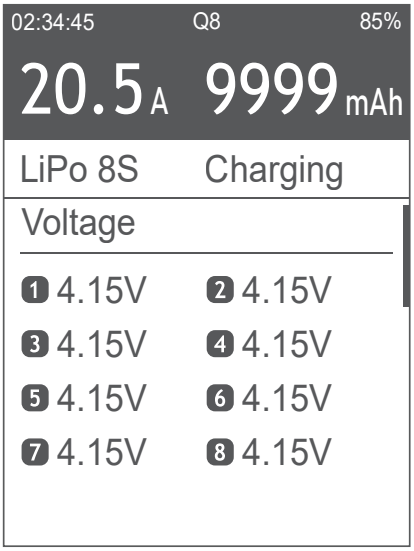
Destroy

Connect the battery to be scrapped, and select the scrap function in task options, which capable to discharge the battery to 0V.
Current setting range: 0.1~1.5A
The battery type and cell count are are auto set accordingly when connecting with BattGo battery.

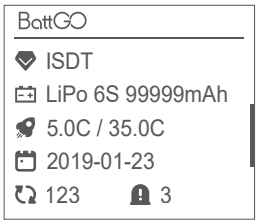
Task	Charge/Discharge/Storage/DC power supply/Destroy
Battery	LiHv、LiPo、Lilon、LiFe、Pb、NiMh/Cd
Battery and cell count	LiFe,Lilon,LiPo（1~8S），LiHv (1~7S), Pb（1~12S），NiMH/Cd（1~16S）
Current	0.1~20A

Charging Screen

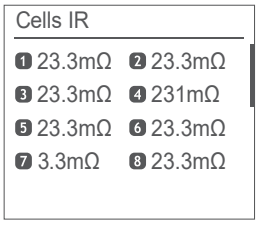
Touching the touch board to shift the charging information, as cell voltage, cell internal resistance, BattGo information, working parameter.
The cell voltage and internal resistance only on display in balancing charging mode. The BattGo information will display only when connected to the BattGo battery, and the cell voltage is able to display without connected to the balance port.



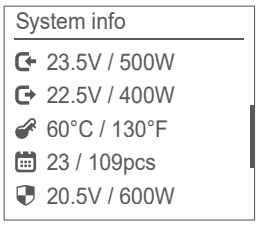
Cell voltage



BattGo information



cell internal resistance



working parameter

System Setting Menu

Under the standby interface,
long touch the touch board to enter the system setting menu:

Min. input voltage protection 10~30V: all tasks in operation will be stopped at once and hint warning of low voltage, when the input voltage is lower than the input voltage as set up. It will protect the battery from being discharged when using battery pack as power supply.

Max. input power setting 30~550W: if the input power is smaller than the max working power(550W), please set up the parameter as the actual output power as max input, to protect the input power and enable the charger to work stable.

Buzzer volume: The operation sound will be shielded when the volume is off, except the warning error beep.

Self–test: Enter system setting. select self–test task

Calibration: the input voltage, output voltage and balance voltage of the charger can be calibrated with this task.

NEVER USE CHARGER UNSUPERVISED

- Never attempt to charge primary (non–rechargeable) batteries.
- Batteries pose a severe risk of fire if not properly handled.
- Read entire operation manual before using charger.
- This unit may emit heat during use.
- Only operate this device in a cool ventilated area away from flammable objects.
- Failure to observe safety procedures may cause damages to property or injury.

*All product photos, statements and literature are for reference only. For up–to–date information, please visit our official web www.isdt.co
ISDT reserves the right of final explanation and revision for the terms.

7.3. Manual Motorstyrning Fatboy V2 300A ESC 4~15S (OPTO)

Brushless ESC Instructions

Thanks very much for purchasing brushless ESC manufactured by HIFEI. ESC are super HV and extreme powerful ESC for model aircraft and helicopters.

Please read the instruction booklet carefully before running.

Contents

I Using Notes

● This brushless ESC is specially developed for R/C electric-powered model aircrafts, helicopter and EDF, which are not toys. It is suggested ONLY adults can run it, little children must run it with wardship of adults.

● Please read the ESC's specifications in Page 3, correctly connect ESC to battery pack at right voltage.

Incorrect polarity connecting would cause short-circuit and permanent damage to ESC, and such damage would not covered under manufacturer's WARRANTY.

● Before beginning to flight , turn on the transmitter BEFORE powering on the receiver.

● When finish flying, power off the receiver BEFORE turning off the transmitter.

● Never disconnect the battery pack while the brushless motor is running, because this could cause damage to the speed controller and/or motor. And such damage would not covered under manufacturer's WARRANTY.

● Connectors with low conductivity may cause erratic motor rotations or other unexpected movements.

● Please keep the propeller away from humans and any objects.

● It can change the motor's rotation direction by swapping any two motor wires connecting.

● EACH new ESC is preset with default parameters in factory, which can be assembled for running directly. But in order to obtain optimum power performance and well compatible to work with the brushless motor, it is suggested to set the appropriate parameters before assemble it to hull for running.

● The ESC will cut-off output when no signal is checked within 100ms.

● Please calibrate the throttle range of transmitter when you first time use a new controller or when change a new/different transmitter or receiver .

Ⅱ A: *Features*

- **Microprocessor controlled, extremely low resistance;**
- **Adopts advanced aluminum PCB process;**
- **Solid heat dissipation;**
- **Full protection soft, include signal lose protection, temperature protection, motor block-up protection;**
- **Auto detecting Lipo cells.**
- **ESC is fully programmable by Hifei USB Linker on computer, and Hifei LCD program box;**
- **The firmware of the ESC is upgradeable from Internet as the new version of the software becomes available;**

II B: Specifications and programmable parameters

ESC	Voltage	Current / Max	BEC	Size(mm)	Weight (incl. wires)
Pro 300A ESC	4-15s Lipos 12-48s Ni-xx	300amp/ 350amp	Couple-opto	119×73×26	395g

LVC	Auto	4s Lipo*	5s Lipo	6s Lipo	7s Lipo	8s Lipo	9s Lipo	10s Lipo	11s Lipo	12s Lipo	13s Lipo	14s Lipo	15s Lipo
LVC/ per Lipo	2.5V	2.6V	2.7V	2.8V	2.9V	3.0V*	3.1V	3.2V	3.3V				
Current Limiting	Sensitivity		Standard		Insensitivity		Close						
Brake Type	Close *		Soft brake		Hard brake								
Timing Advance	Low		Middle		High		Auto *						
Cutoff Type	Hard cutoff *		Soft cutoff										
Startup Type	Soft start		Standard *		Fast start								
Governor Mode	Auto (for aircraft)		Low RPM (for heli)		High RPM (for heli)								
PWM Rate	8KHz *												

NOTE: *A. Parameters with asterisk behind above is the factory preset values.*

*B. When **'LVC'** of ESC is set at **'Auto'**, the motor will emit beeps to detect the number of Lipo cells after the two power beeps, and the red LED on ESC will blink in accompany with the beeps. **'3.0v'** is the default cut-off voltage of per Lipo cell when the LVC is set at **'Auto'** detect.*

For example: If connect ESC to a 4s Lipo battery pack, the motor will firstly emit ♪♪ , then detect the Lipo numbers ♪♪♪♪ , and the red LED will blink four times. The low voltage cut-off is calculated as '12.0V'.

***C.** Please ensure only when the battery packs is fully charged and it can set the LVC at **'Auto'**, it is suggested not to set LVC at **"Auto'** when the battery pack is over 4S cells Lipos.*

◆ Ⅱ D: Programmable parameters

Low voltage cut-off (LVC): The setting of LVC can protect battery from discharging too low and causing permanent damage to battery, especially important for Lithium polymer cells. It is strongly recommended to set the LVC carefully before running.

e.g. If you use 2S(2 Lipo in series), you can choose the “2s cells”; if you use 4S 1P battery packs, please set it at “4s cells”.

Cutoff voltage/ cell: The setting is to set the low voltage cut-off of each Lipo cell.

e.g. If set the LVC of per Lipo cell at ‘2.8v’, the LVC is set at ‘2s cells’, then the cut-off voltage of the whole battery pack is “2.8*2”=5.6v; If the LVC of per Lipo cell is set at “3.2v”, the cut-off voltage of whole battery pack is “3.2*2”=6.4v.

Current limiting: ‘***Sensitivity’*** setting Is low over-current threshold, will shut-down rapidly.
‘***Standard’*** Is moderate over-current threshold, will shut down after a slight delay.
‘Insensitivity’ Is high over-current threshold, will shut down after a slight delay. Recommend only experienced modelers would change to use this programming feature.
‘Close’ current limiting detection disabled. Only experienced modelers should use this option.

Brake type: ***‘Brake disabled’*** setting will close the brake function***;*** ***‘Soft brake’*** will provide 20% of full braking power.

Timing advance: ***‘Low timing’*** setting adjusts the timing at the range of 0º~15º, recommended for more lower pole count brushless motors (such as 2 poles, or 4 poles). It gives more power and slightly less efficient;
‘Middle timing’ adjusts the timing at the range of 5º~20º, recommended for most brushless motors. It gives a good balance of power and efficiency;
‘High timing’ adjusts the timing at the range of 15º~30º, recommended for higher pole count motors. (such as 8, 10, 12, 14 poles or higher brushless outrunner motor)
‘Auto timing’ setting is automatically adjust the timing degree according to motor’s rotating demand.

Cutoff type: cutoff type settings decide the way in which the ESC cutoff output to brushless motor when the LVC works, or temperature/ signal-lost protection works.
‘Hard cutoff’ : when the battery volts discharges to the set LVC value or soft protection works, the motor will shut down immediately. Motor can be restarted by closing the throttle to the lowest position and re-move the throttle as normal.
‘Soft cutoff’: when the battery volts discharges to the set LVC value or soft protection works, the ESC will slowly reduce motor power to zero, you will notice a decrease in power and it is time to dock.

Startup type: ***'Soft start'*** Very soft and smoothly start the motor, it will takes more time;

'Standard start' start the motor at normal speed. It depends on motor's quality and dynamic response.

'Fast start' will fast start the brushless motor, recommend to use it for racing.

Governor mode: ***'Auto'*** Recommended for general fixed-wing aircraft.

'Low RPM' Recommended for collective pitch helicopters. Used for low pole count motors and low RPM on higher pole count motors.

'High RPM' Recommended for collective pitch helicopters. Used for higher pole count motors and higher RPM.

NOTE: a. ***The poles mentioned above is the magnetic poles of brushless motor, not the stator numbers of motor.***

c. ***It is strongly RECOMMENDED to have bench testing and choose appreciate parameters for your configuration before assembling the ESC to hull for running.***

III Using the ESC

III A: *Connect ESC to BL Motor, Receiver, battery*

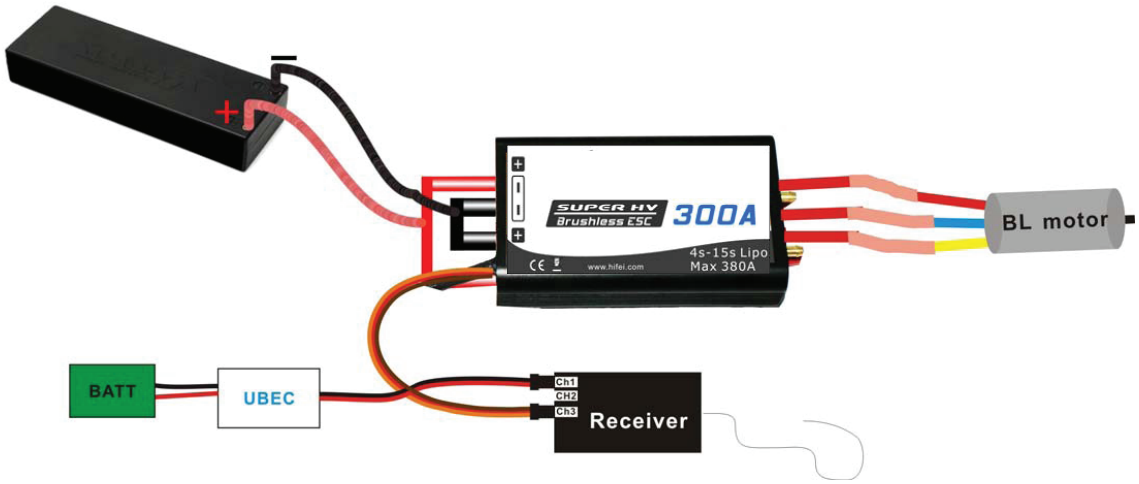
First step, ***please solder good-quality connectors to ESC's motor wires and power wires;***

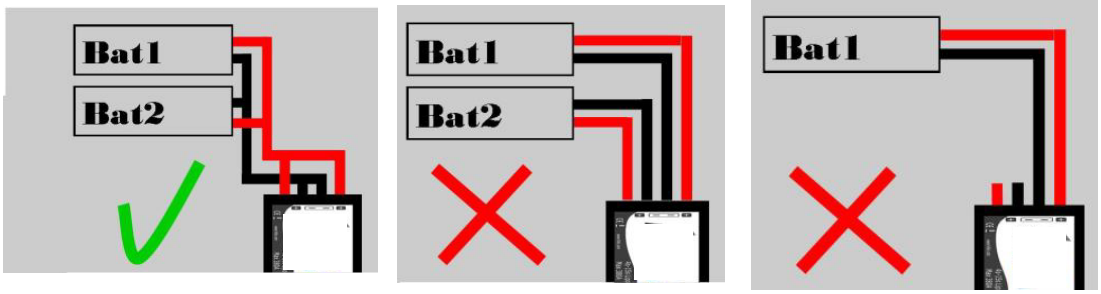
Please connect the two negative power wires in parallel simultaneously to negative polarity of battery pack, and two positive power wires in parallel simultaneously to the positive polarity of battery pack.

Second step, ***Switch 'OFF', connect ESC to brushless motor;***
Swap any two motor wires' connecting can change the rotation direction.

Third step, ***plug receiver lead to throttle channel of receiver; (If you use board transmitter radio, plug the receiver lead of ESC into CH3 of receiver; If you use pistol transmitter radio, plug the receiver lead of ESC into CH2 of receiver.)***

Fourth step, ***use separate receiver battery or UBEC to supply power for receiver.***
In order to prevent and reduce any signal disturbance generated by ESC hardware, please put the ESC far away from receiver.





◆ *III* B: *Calibrate the Throttle Range of Transmitter*

NOTE: ***In below three situations, it is required to calibrate the throttle range of transmitter.***

a. When it is first time to use a new speed controller.

b. When change a new TX or RX, or a set of new radio system.

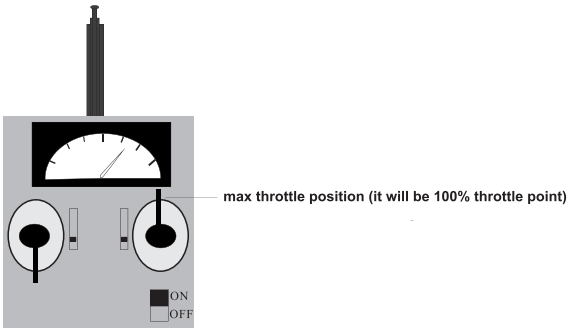
C. When upgrade the ESC into a new version firmware.

When running at the calibrated max throttle, the RED LED on ESC will be blinking to indicate the ESC is giving max throttle.

A. Board Transmitter

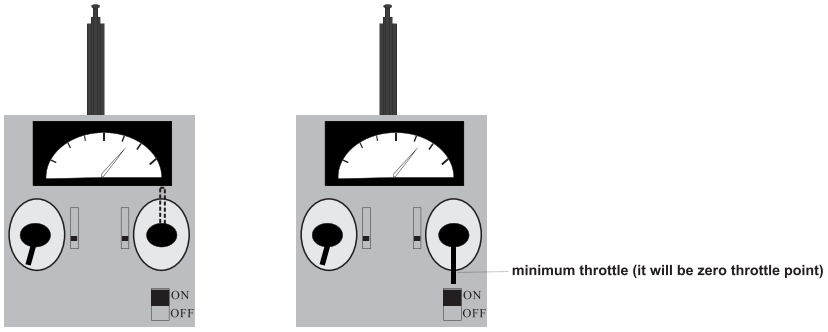
1st: Correctly connect ESC with brushless motor, plug the receiver lead of ESC into the throttle channel of receiver (usually CH3);

2nd: Push the joystick of transmitter to max throttle position, power on it.



3rd: Connect ESC to battery. There are 3 beeps ♪ ♪ ♪ emitted from the motor

4th: After the following 2 beeps ♪ ♪ , immediately pull joystick to minimum throttle .



5th: 2 beeps ♪ ♪ emitting, calibrating is finished.

Motor is needed to install for acoustic guide. Meanwhile, please keep the propeller away from human beings or any objects.

III C: *It's almost ready to run now!*

— Program ESC parameters. Do testing on test-bed and select appropriate parameters for the configuration.

— Check battery's volts

— Use UBEC or separate receiver battery to power the receiver. Switch 'ON', the green LED on ESC will light for a second and then extinguish. After the two power beeps, it is time to go.

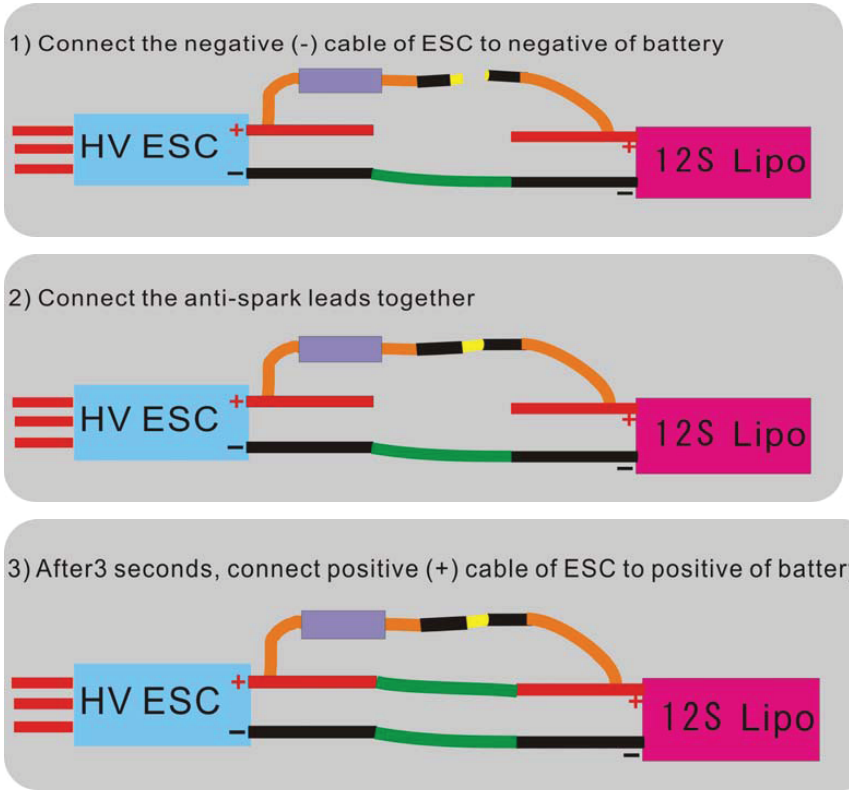
NOTE: ***When battery pack volts discharge and drop down to the set LVC value, ESC will cutoff output to motor in programmed 'Hard' or 'Soft' cutoff type, which notice it's time to change battery pack.***

When ESC cutoff output to motor, it can re-start the motor by moving throttle from 0 position again. But ESC will cutoff again soon in 3 seconds.

III D: *Wiring anti-spark cables*

300A ESC come with a anti-spark cables.

When run the ESC with 8s and more Lipo cells, please solder the anti-spark cable according to the below instructions, which would reduce the sparks and prevent ESC from any damage.



Ⅳ Program by Soft on PC

Fulcrum Pro 300A ***ESC support to be fully programmed the parameters by soft on PC, and 'Hifei Program box'.***

When program the ESC by soft, a 'USB Linker' is required to link the ESC to PC. 'USB Linker', and 'Hifei Program box' are the parts sold separately.

Please read the following instructions before programming.

Ⅳ A: Install Software to PC

A-a: Computer Operation System requirements

A. **Personal computer with Windows XP/ Vista/ Windows 7 operation system.**
B. **CD-ROM drive (or access to Internet)**
C. **Available USB port**
D. **8 Megabytes hard disk space**
E. **Computer screen resolution with 800X600, 1024X768**(recommended) , **1280X1024**

A-b: Hardware

The hardware include Fulcrum Pro 300A ESC HV, USB Linker a set-up CD (free to supply).

ESC

USB Linker

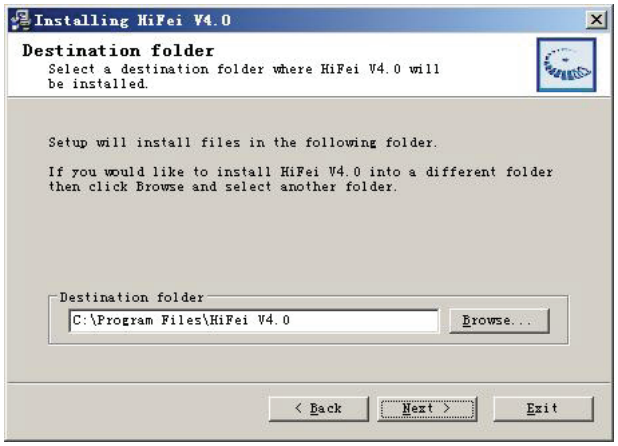
Set-up soft

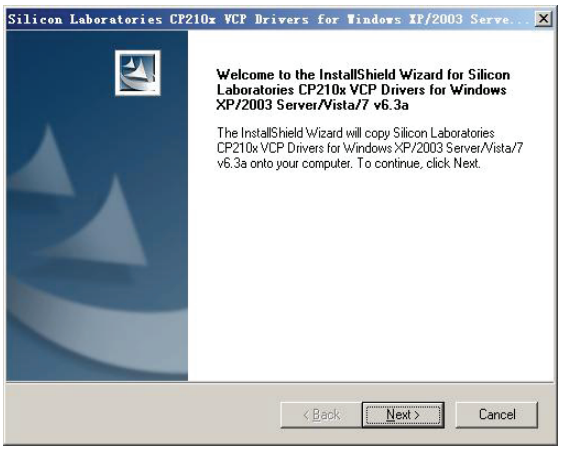
A-c: STEPS to install the soft

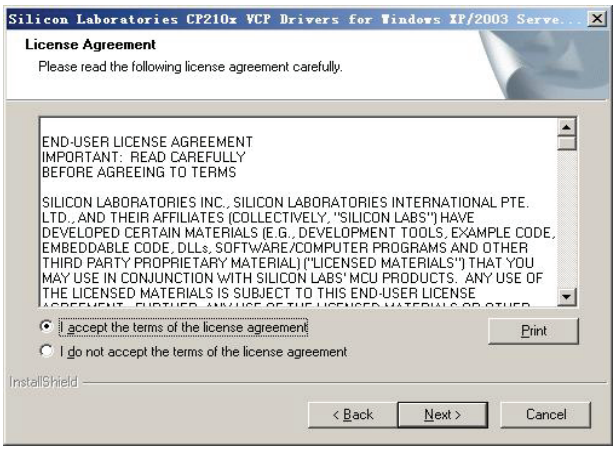
- Insert the CD into CD driver of computer.

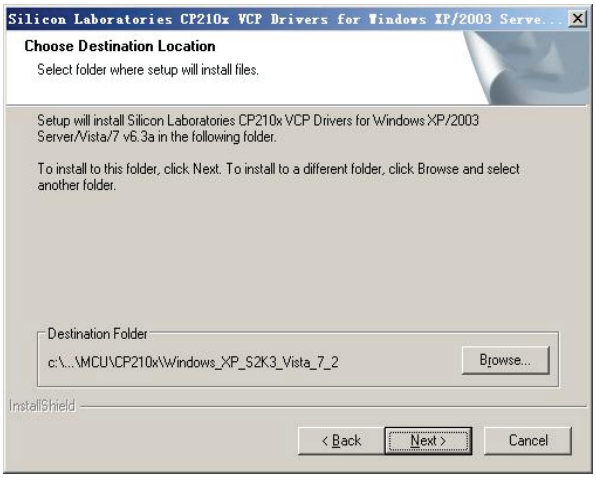
- Double click the icon 'HiFei Setup' to start the installation.

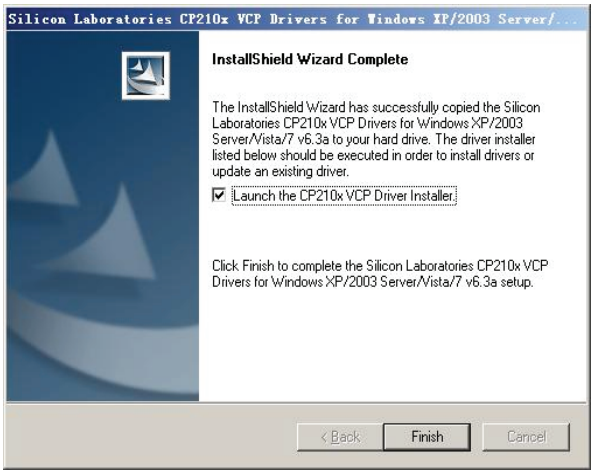
**** If your PC is with Windows 7 operation system, please DO NOT choose hard disc 'C' as destination folder, but install the soft into hard disc 'D', 'E' or 'F'.***

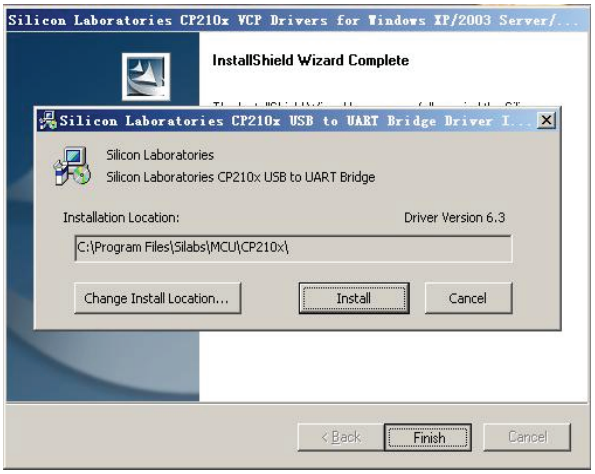












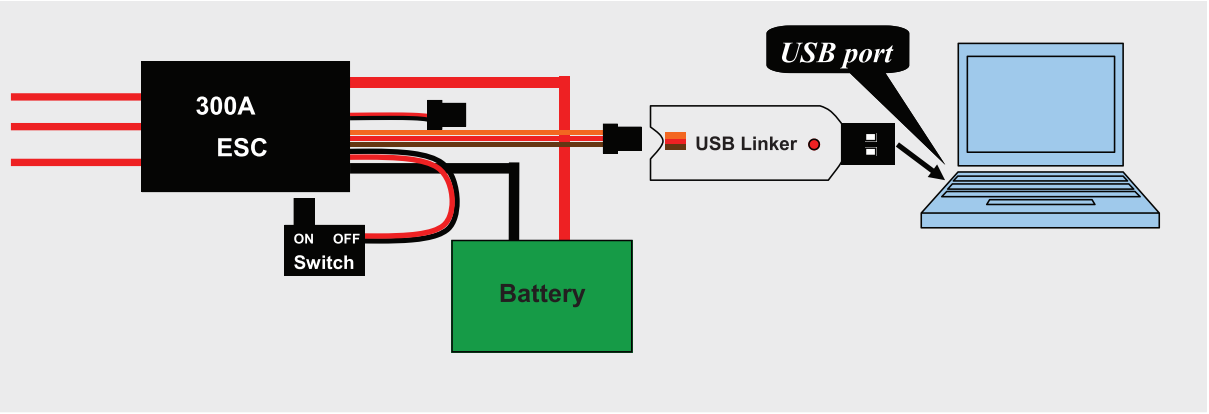
— After click 'Finish' button, the software shortcutting icon 

"HiFei V4.0" appears on computer desktop.

— Installation completed

Ⅳ B: Connect ESC to PC

- *Switch 'OFF' ESC.*
- *Connect ESC's receiver lead to Hifei USB Linker in right polarity.*
- *Insert Hifei USB Linker to one of USB Ports of PC.*
- *Connect ESC to battery. Switch 'ON'.*



NOTE: a. *When ESC is successfully connected to computer, red LED on USB Linker will light, and green LED on ESC will light.*

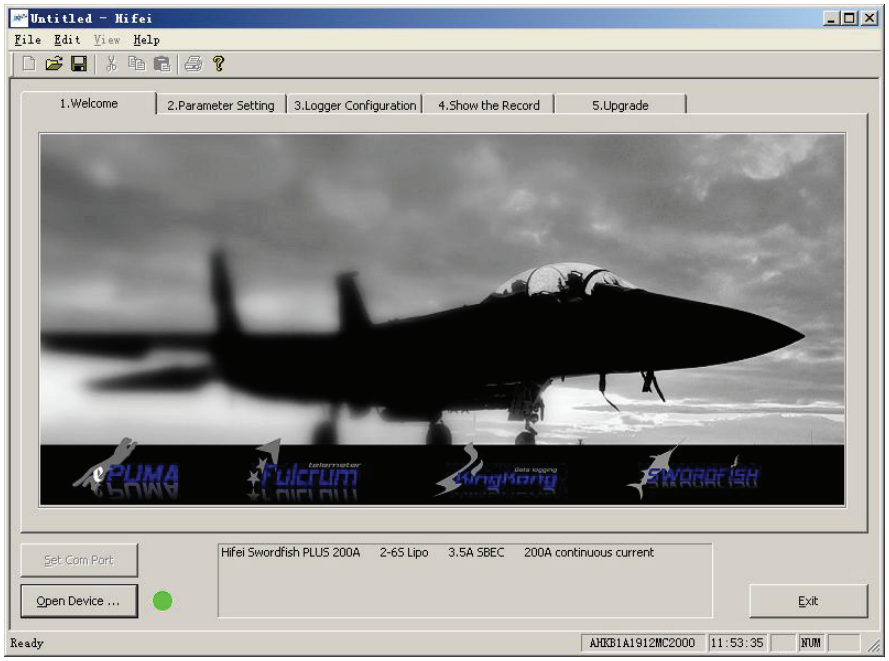
If the green LED on ESC does not light, please check the connecting polarity between ESC's receiver lead and USB Linker; and ensure connecting is tight.

Ⅳ C: *Open the software to program the ESC*

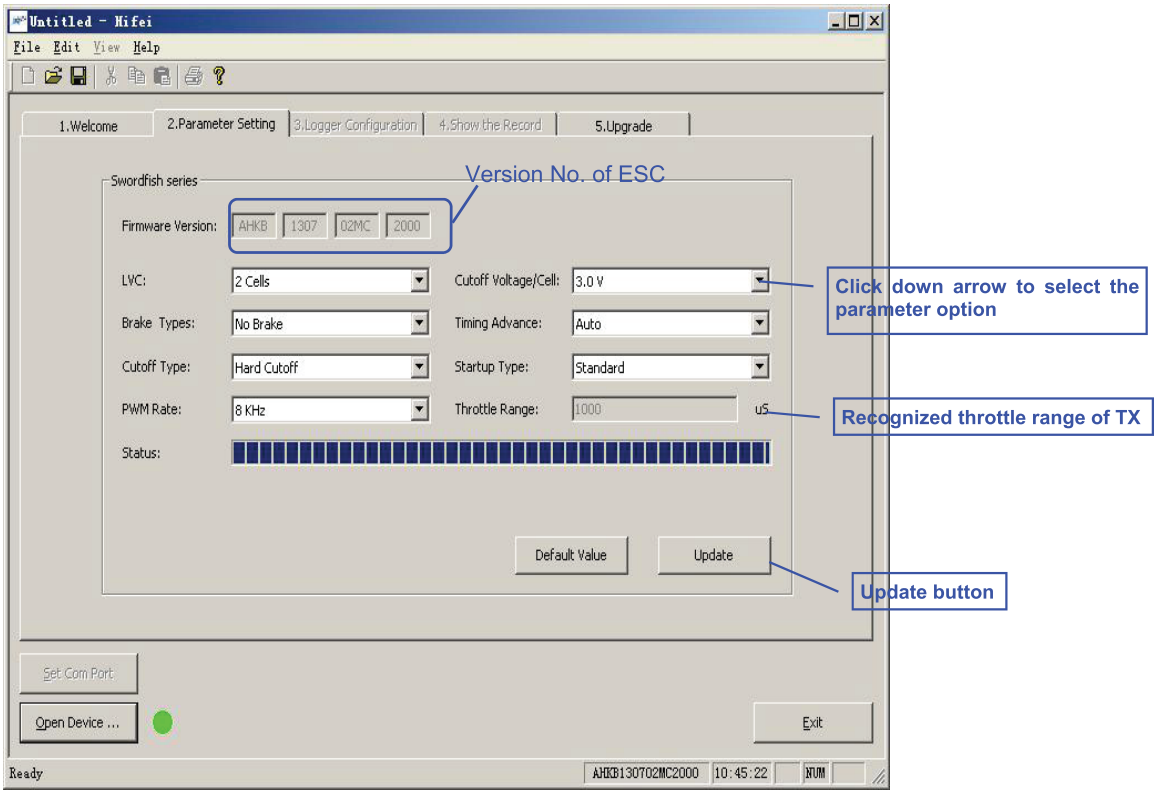
— Double left click mouse the software short-cutting icon on desktop

— **Click *'Open Device'* ,** the light will become green. And ESC's specification is showed at the bottom.

Soft 'HiFei V4.01' made great update with 'COM Port' auto identification when the USB Liker is connected to PC.

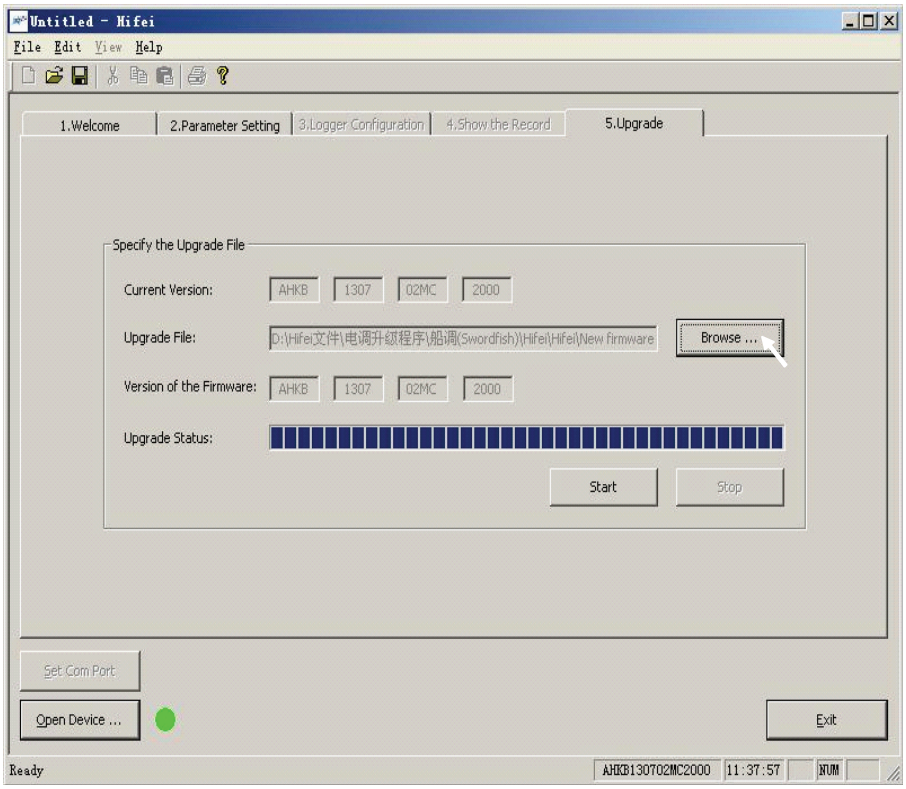


— Click tab *'Parameter Setting'* to change the settings of ESC.

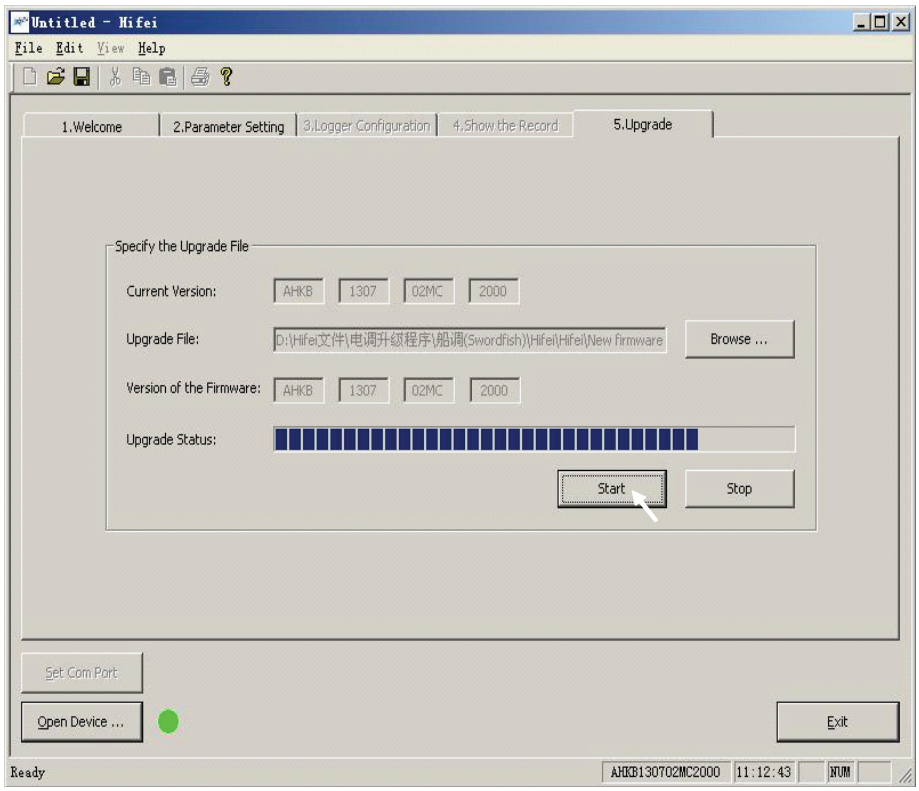


— Click down arrow to select the parameter options you would like to set, and click *'Update'* to save modifications.

— Click *'Exit'* to exit from the soft if you do not want to continue using it for other operation.



Click *'Start'* to get into upgrading process. Please wait for a while, it will be finished within 15 seconds.



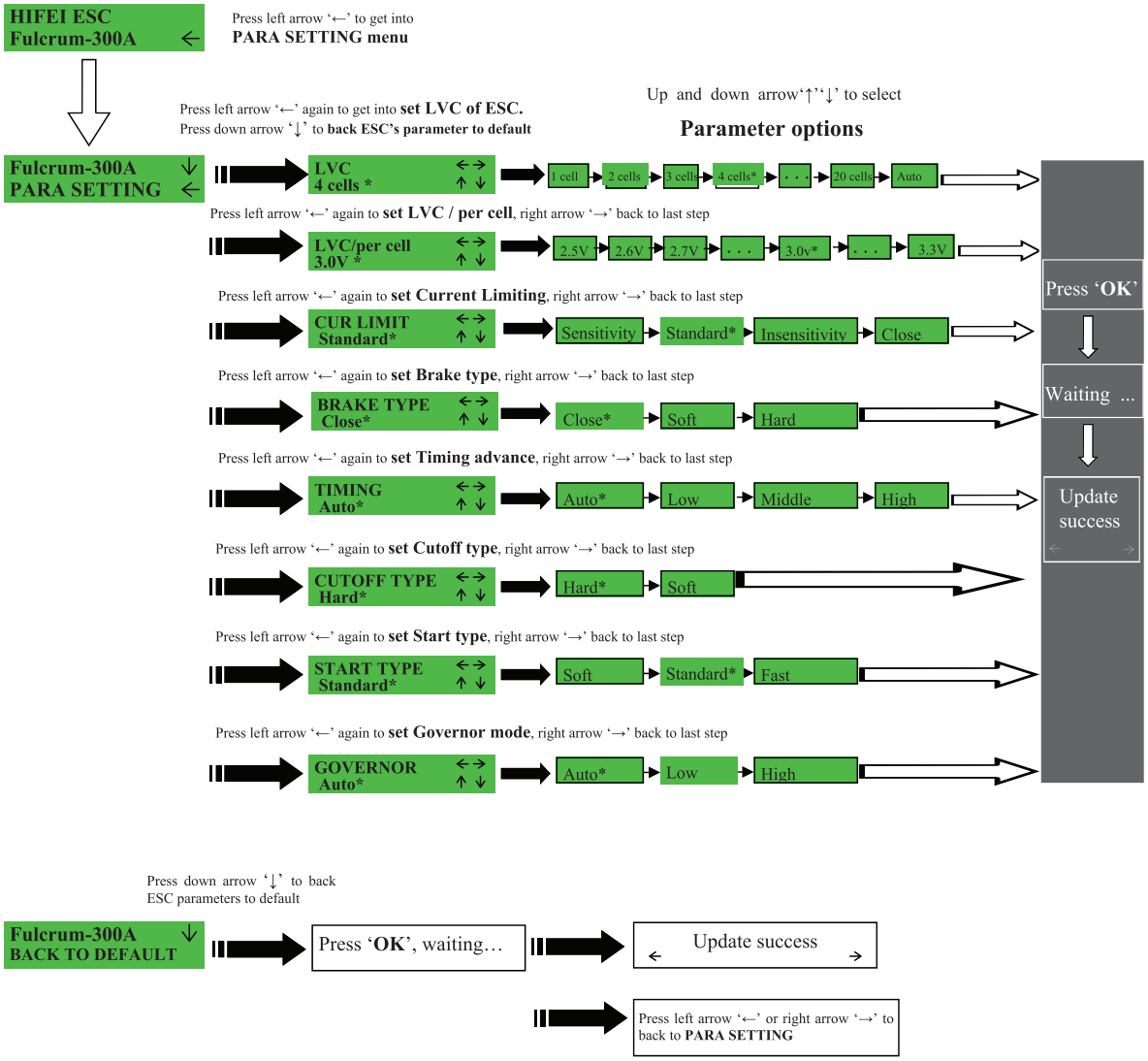
Program by program-box

Correctly connect ESC to prog-box

- Switch OFF
- Plug ESC's recevier lead to the right socket at the upper side of prog-box in correct polarity;
- Plug the other lead (small red and brown wire) which is a special lead to prog-box to the left socket;
- connect ESC to battery pack;
- Switch ON.
- The LCD of prog-box highlight, and shows ESC's model.

Program ESC

There are 'left', 'right', 'upper', 'down' and 'ok' buttons on prog-box.
Please refer to the below instructions to change the parameters of ESC.



- When finish the programming, switch 'OFF' the switch of ESC and disconnect ESC from program box.

- Connect ESC to brushless motor, receiver, and battery pack. Two power beeps emitting out, it is ready to fly now!

7.4. Manual Tattu LiPo batteries

Länk: https://www.genstattu.com/content/Ordinary.pdf

IMPORTANT SAFETY INSTRUCTIONS AND WARNINGS

TATTU
Unmanned System Battery

***You must read these safety instructions and warnings before using or charging your batteries.**
***Lithium Polymer batteries are volatile. Failure to read and follow these instructions may result in fire,personal injury and damage to property. Do not charge/ discharge a battery in side your house, garage, building, or vehicle.**
***Tattu and its distributors and retailers assume no liability for failure to comply with these warnings and safety guidelines.**
***By purchasing this battery, the buyer assumes all risks associated with this product. If you do not agree with these conditions, please return the battery immediately before use**

Before charging/ discharging:
1. Inspect the battery for any damages. Do not charge a damaged battery.
2. Inspect the battery for any swelling. Do not charge a swellen battery.
3. Inspect the battery for possible battery fluid leaks. Do not charge a leaking battery.
4. Inspect the voltage for each battery cell. if the cell voltage is significantly lower than the normal voltage(3. 3V per cell) or voltage of each cell has significant difference, The battery may be in defective condition. Do not charge the battery.
5. Make sure the wire connection polarity is correct; do not short circuit the battery.
6. Verify the lithium polymer charger is in good condition.

Charging/ discharging the battery:
Please follow below instructions to setup the charging station. Failure to do so will cause a fire,
which may result in serious personal injury and property damage.
1. Use a fireproof cement concrete bunker or fireproof material flower pot as the charging container.
2. Put the charging container on a cement concrete floor.
3. The horizontal clearance radius for the charging container should be at least 5 feet.
4. The vertical clearance for the charging container should be at least 10 feet.
5. Cover the charging container with a fireproof material cover.
6. Never leave while battery is in charging process. Do not charge the battery unattended.
7. In case of fire. disconnect the electrical wire from the electrical outlet immediately.
8. Do not put any combustible materials near the charging area.

Storing the battery:
Please follow below instructions to setup the storing station. Failure to do so will cause a fire,
which may result in serious personal injury and property damage.
1. Use a fireproof cement concrete bunker or fireproof material flower pot as the storage container.
2. Put the storage container on a cement concrete floor.
3. The horizontal clearance radius for the storage container should be at least 2 feet.
4. The vertical clearance for the storage container should be at least 10 feet.
5. Cover the storage container with a fireproof material cover.
6. Constantly check the condition of the battery in side the storage container at least once a week.Do not leave the battery unattended for a long period of time.
7. Do not put any combustible materials near the storage container.
8. Store batteries in a location with room temperature only.
9. Verify the battery is in good condition before storage.

Using the battery: Using the battery:
1. Inspect the battery for any damages. Do not use a damaged battery.
2. Inspect the battery for swelling. Do not use a swellen battery
3. Inspect the battery for possible battery fluid leaks. Do not use a leaking battery
4. Inspect the voltage for each cell. If the cell voltage is significantly lower than the normal voltage(3. 3V per cell) or voltage of each cell has significant difference, the battery may be in defective condition.Do not use the battery.
5. Make sure the wire connection polarity is correct; do not short circuit the battery

Lithum Polymer (Lipo) battery warnings
1.Never charge a lithium polymer battery with a charger designed for NiCd, NiMH, or any other type of battery chemistry. Use ONLY charger designed for LiPo battery. Failure to do so may cause a fire, which may result in personal injury and property damage.
2.Battery charging/discharging and observation should occur in an isolated safe location outside of any building or vehicle and away from any combustible material. The middle of cement driveway is a good example of a safe location. Never charge/discharge the battery inside the house, garage and vehicle
3.It is solely user's responsibility to assure that the charger used in the charging/discharging process works properly.Only charge LiPo batteries with a good quality Lithium Polymer balanced charge. Failure to do so may cause a fire, which may result in personal injury and property damage.
4.Inspect the battery before the charging/discharging, and storage process. Check for damage, leaks, broken connectors, and puffiness. Check the battery voltage. Normal voltage should be approximately between 3.3V-4.2 per cell. If the voltage is significantly less than the normal voltage(less than 3.3V per cell), do not charge/discharge the pack.
5.The charging rate should not exceed 1C (one time the capacity of the battery, for example: charge an 800mAh battery at or below 0.8A, charging a 3000mAh battery at or below 3A).Higher charging rate may damage the battery and result in fire.
6.Charge/discharge each battery pack individually. Set the cell count, charging current, and voltage on the charger for the charging/discharging process correctly.
7.Do not over charge/discharge the battery: doing so will damage the battery. Do not discharge the battery. Do not discharge a battery pack to a level below 3.3V per cell
8.Do not use batteries that lose 20% of their capacity.
9.Do not leave LiPo battery unattended during the charging/discharging process. During the charging/discharging process, user should monitor the process constantly and react to potential problem that may occur
10.Always place the battery in a fire resistant surface or fire safety container alone when charging/discharging. The middle of a cement driveway is a good example of a safe location. Do not charge/discharge battery inside house, garage, vehicle, building and away from any combustible material.
11.Always store the battery in a fire resistant surface or fire safety container alone. Do not store battery inside house, garage, vehicle, building and away from any combustible material.
12.Do not continue to use damage battery, Send damage battery to certified recycling facility as soon as possible
13.Allow battery to cool down to normal temperature before recharging. Never exceed 140 degrees F during the charging/discharging process.
14.Shorts circuit the battery can cause fires! If you accidentally short the battery, you should place the battery in a safe area for observation for approximately 30 minutes.
15.Never modify the battery by yourself. If you need to cut the terminal wires, soldering connectors, please consult an experienced user before operation.
16.Use the battery with care and avoid puncture to the battery. Puncturing a LiPo battery can cause fire.
17.Store batteries at room temperature between 40 to 70 digress F. Never store battery pack inside your vehicle if the internal temperature exceeds 120 degrees F. If storing for a period of time (more than a week), batteries should be stored at 3.8V to 3.9V per cell.
18.Never expose battery under direct sunlight or heat for extended periods of time. Expose batteries at temperature greater than 140 degrees F for extended period of time(more than 30 minutes)may result in damage to the batteries and possible fire.
19.Inspect batteries if crash, battery should be placed in a safe area for observation for at least 30 minutes after crash.
20.Do not allow LiPo cells to overheat at any time. Cells which reach greater than 140 degrees F will usually become damaged and will catch fire.
21.Do not expose LiPo cell to water or moisture at any time.
22.Do not assemble LiPo cells or pre-assembles packs together with other LiPo cells or packs.
23.Always store LiPo battery in a secure location away from children.
24.Always remove the LiPo battery if model is involved in any kind of crash. Carefully inspect the battery and connectors for even for the smallest damage.CATION: cells may be hot!
25.Do not allow the electrolyte to get into eyes or on skin. Wash affected areas immediately if they come into contact with electrolyte. Do not alter or modify connectors or wires of a LiPo battery pack.
26.Do not have contact with a leaky/damaged battery directly.
27.Do not charge/discharge battery at of recommended temperature range(Charge:32 to 110 degrees F;Discharge:32 to 140 Degrees F)
28.Do not charge/discharge process, if at any time you witness a battery starting or swell up, discontinue the charging/discharging process immediately. Disconnect the battery and place it in a safe observation area for approximately 30 minutes. Continuing to charge a battery that has begun to swell result in fire.

By purchasing and using this battery, the buyer and user assumes all risks associated with this product. If you do not agree with these conditions, do not proceed to use the battery. You must read the above safety instructions and warnings before charging/discharging your batteries. Manufacturers, distributors, and retailers assume to liability for failure to complywith the warning and safety guidelines.
This product is for experienced adult remote control users only. It is not recommended for children under the age of 18.All minors should be accompanied by an adult when operating a Li-Po battery.
This product requires proper operating knowledge to avoid any accidents. Failure to take caution when operating this product may result in serious injury or property damage. It is the owner's responsibility to operate this
product in a safe manner. Manufacturers and its distributors are not responsible for any bodily injury(s) and/or property damage that may occur from the use of or caused by this product.