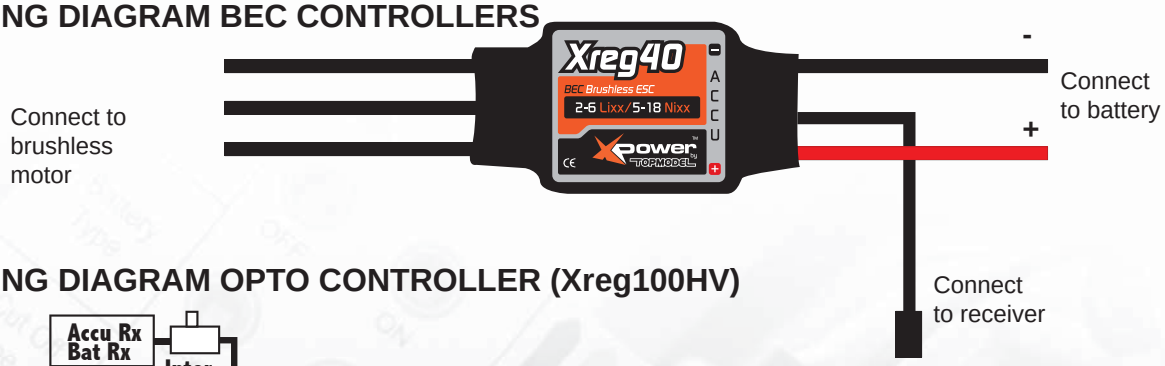
USER MANUAL FOR
XPower Brushless controllers

Dear Valued Customers,
Thank you for purchasing XPower Electronic Speed Controller (ESC) for sensorless brushless motor. High power system for RC model can be very dangerous, we strongly suggest you reading this manual carefully before operation.
That high quality controllers series can be programmed either from your transmitter or with the XPower programming card (#099PC).

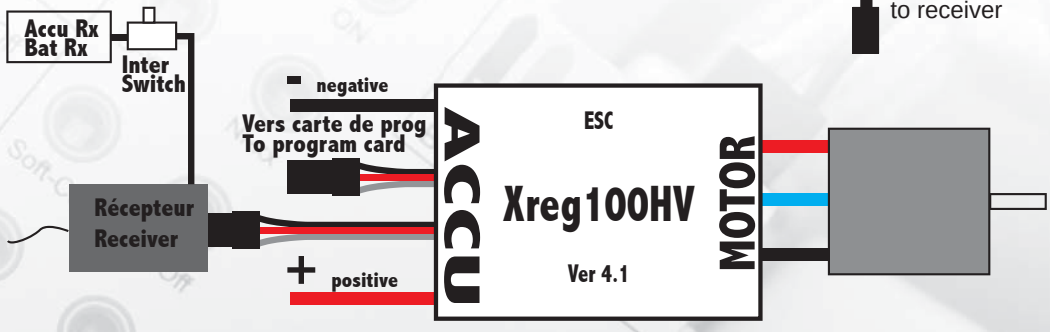
SPECIFICATION

Controllers XPower	XREG100HV #099REG100HV	XREG80 #099REG80	XREG60 #099REG60	XREG40 #099REG40	XREG30 #099REG30	XREG25 #099REG25	XREG18 #099REG18	XREG10 #099REG10	XREG6 #099REG6
Continuous current	100A	80A	60A	40A	30A	25A	18A	10A	6A
Burst current (t<10")	120A	100A	80A	55A	40A	35A	22A	12A	8A
BEC Mode	No, OPTO	Switch	Switch	Switch	Linear	Linear	Linear	Linear	Linear
BEC Output	/	5V/3A	5V/3A	5V/3A	5V/2A	5V/2A	5V/2A	5V/1A	5V/0,8A
Lixx Input	2-12	2-6	2-6	2-6	2-4	2-4	2-4	2-4	2-3
Nixx Input	5-36	5-18	5-18	5-18	5-12	5-12	5-12	5-12	5-9
Weight	120g	62g	60g	35g	25g	22g	19g	9g	6g
Size: LxlxH	78x55x15mm	70x31x14mm	70x31x14mm	55x28x12mm	45x24x11mm	45x24x11mm	45x24x11mm	27x17x6mm	24x12x6mm

WIRING DIAGRAM BEC CONTROLLERS



WIRING DIAGRAM OPTO CONTROLLER (Xreg100HV)



Note: There are 2 control wires on the HV controller. The longer one is close to the positive battery wire, which is connected with the receiver, and the shorter one is close to the negative battery wire, which can be connected with the program card to set the programmable parameters of the controller.

FEATURES EXPLANATIONS

1. Brake Settings: brake enabled / brake disabled, default is brake disabled.
2. Battery Type: Li-xx(Li-ion or Li-poly) / Ni-xx(NiMh or Nicd), default is Li-xx.
3. Low Voltage Protection Mode(Cutoff Mode): Soft Cutoff (Gradually reduces the output power) or Hard Cutoff (Immediately stops the output power), default is Soft Cutoff.
4. Low Voltage Protection Threshold(Cutoff Threshold): low / medium / high, default is medium cutoff voltage.
- For Li-xx battery: number of battery cells are judged automatically, low / medium / high cutoff voltage for each cell are: 2.6V/2.85V/3.1V. For example: 3 Cell Li-Poly, when medium cutoff voltage is set, the cutoff voltage is: 2.85*3=8.55V.
- For Ni-xx battery, low / medium / high cutoff voltages are 0%/45%/60% of the startup voltage. For example: 20 cell NiMH battery, fully charged voltage is 1.44*20=28.8V, when medium cutoff voltage is set, the cutoff voltage is : 28.8*45%=12.96V

5. Startup mode: normal / soft / super-soft, default is normal startup.

Normal is good for fixed-wing aircraft. Soft / super-soft are good for helicopters. The initial speeds of soft / super-soft mode are pretty slow ,1sec(soft startup) / 2secs(super-soft startup) from startup to full speed. But if throttle is closed (throttle stick moves to bottom)and opened again(throttle stick moves up) within 3 seconds after the first startup, the startup will be in normal mode to get rid of the chances of crash caused by slow throttle response in aerobatic fly.

6. Timing: low / medium / high, default is low timing.

In normal cases, Low or Medium timing can be suitable for most motors. In order to get higher speed, try the High timing value.

Note: After you changing the timing setting, please test your RC model on ground firstly!

SPECIAL HINT

Some high KV out-rotor motors have very special configuration, the space between each alnico is very large, and some ESC can't startup these motors. After program updating, our ESCs have very good compatibility with these motors. But some RC fans still have several questions about the programming value for special motors. So we just give some suggestion as follows:

Programming value suggestion / Motors types	Timing	Startup Mode
General inrunner motors	Low	Aircraft use "normal" startup mode
General outrunner motors	Medium/High	Hélicopter use "super soft" startup mode

BEGIN TO USE YOUR NEW ESC

Before using your new ESC, please check all the connections to make sure that they are reliable, then start up the ESC in the following sequence:

1. Move the throttle stick to bottom, and then switch on the transmitter.
2. Connect battery pack to ESC (Bat Rx in case of OPTO controllers), the ESC begin the self-test process, after 2 seconds a long "beep-----" tone should be emitted,

means self-test is OK, and then the motor begin to play music, now the aircraft/helicopter is ready to go flying.

· If nothing is happened, please check the battery pack and all the connections;

· If a special tone " " is emitted after 2 beep tone (beep-beep-), means the ESC has entered the programming mode, i.e. the throttle channel of your transmitter is reversed, please set it correctly;

· If a very rapid "beep-beep-, beep-beep-" tone is emitted, means the input voltage is too high or too low, please check your battery.

3. After the motor begin to play music, several "beep-"tone should be emitted, present the setting value of each program item. You can move throttle stick upwards to go flying at this time. It is unnecessary to wait the "beep-"tone finished.

"VERY IMPORTANT!" Different transmitter has different throttle range, we strongly suggest you using the "Throttle Range Setting Function" to calibrate throttle range. Please read the instruction on page 3------"Throttle Range Setting".

ALERT TONES

1. Input voltage abnormal alert tone: The ESC begin to check the voltage of battery pack when power on, when the voltage is not in acceptable range, such a alert tone will be emitted: "beep-beep-, beep-beep-,beep-beep-"(every "beep-beep-" has a time interval about 1 second.)

2. Throttle signal abnormal alert tone: When the ESC can't detect the normal throttle signal, such a alert tone will be emitted: "beep-,beep-,beep-"(every "beep-" has a time interval about 2 seconds.)

3. Throttle stick not in bottom alert tone: When the throttle stick is not in bottom (lowest) position, a very rapid alert tone will be emitted: "beep-,beep-,beep-" (every "beep-" has a time interval about 0.25 second.)

PROTECTION FUNCTIONS

1. Start up protection: If the motor failed to start up in 2 seconds while the throttle stick moving up, the ESC will cut off the output power. In this case, the throttle stick MUST be moved to bottom again to restart the motor. (Such a situation happens in the following cases:

The connection between ESC and motor is not reliable, Propeller is blocked, Gearbox is damaged, etc.)

2. Over-heat protection: When the temperature of control circuit PCB is over 110°C, the ESC will reduce the output power.

3. Throttle signal lost protection: The ESC will reduce output power if throttle signal lost for 1 second, further lost for 2 seconds will cause its output cut off.

NORMAL STARTUP PROCEDURE

Switch on transmitter, move throttle stick to bottom	Connect battery packs to ESC , special tone like " 1 2 3 " means power supply is OK	When self-test is finished, a long "beep - - - - - "tone should be emitted	Begin to play music, ready to go flying	Several "beep-" tone should be emitted, present the value of each program item	Move throttle stick upwards to go flying

THROTTLE RANGE SETTING (Throttle range should be set each time when a new transmitter is used together with this ESC)

Switch on transmitter, move throttle stick to top	Connect battery packs to ESC, and then wait for about 2 seconds	"Beep -beep " tone should be emitted, means throttle range highest point has been confirmed	Move throttle stick to bottom, wait for about 1 second	"Beep-" tone should be emitted, means throttle range lowest point has been confirmed	Begin to play music, ready to go flying

PROGRAMMING WITH TRANSMITTER (4 steps)

1. Entering program mode
2. Select programmable items
3. Set item value (programmable value)
4. Exit program mode

1. Entering programming mode

1) Switch on transmitter, move throttle stick to top, connect the battery packs to controller

2) Wait for 2 seconds, the controller should emit tone like "beep-beep-"

3) Wait for another 5 seconds, special tone like "56721 " should be emitted, this means programming mode is entered

2. Selecting items:

After entering programming mode, you can hear 8 tones in a loop in following sequence. After one tone within 3 seconds, if you move the throttle stick to bottom, then this item is selected.

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

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

3.Set item value:

You will hear tones in loop. Set the value matching to a tone by moving throttle stick to top after hearing this tone,then you can hear the special tone "1515 " means the value is set and saved. (Keeping the stick at top, you will go back to step 2 and you can select other items. Moving the stick to bottom within 2 seconds, you will exit the programming mode directly).

Tones / Items	«beep» 1 short	«beep-beep» 2 shorts	«beep-beep-beep» 3 shorts
Brake	Off	On	
Battery type	Li-ion/ LiPo	NiMH/NiCd	
Cutoff mode	Soft Cutoff	Hard Cutoff	
Cutoff threshold	Low	Medium	High
Startup mode	Normal	Soft	Super soft
Timing	Low	Medium	High
LiPo cells number	N beep tones represent N cells LiPo BATTERY (n≤4 means «Auto Detect»)		

4.Exit prgramming

There are 2 ways:

1. In step 3, after special tone "1515 ", move throttle stick to bottom within 2 seconds.

2. In step 2, after tone "beep----- beep-----" (item #9), move throttle stick to bottom within 3 seconds.

PROGRAMMING EXAMPLE

Setting startup mode to “super-soft”, i.e. value #3 in program item #5

1.Entering Programming Mode
Switch on transmitter, move throttle stick to top, connect battery pack to ESC, wait for 2 seconds, ”beep-beep” tone should be emitted. Then wait another 5 seconds, special tone like “ ”should be emitted, means programming mode is entered.
2.Selecting Items
Now you’ll hear 8 tones in a loop. When a long “beep------“ tone is emitted, move throttle stick to bottom, select the “Startup Mode” item
3.Set Item Value
“Beep-“, wait for 3 seconds; “Beep-beep-”, wait for another 3 seconds; then you’ll hear ”beep-beep-beep”, move throttle stick to top, then a special tone “1515 ” is emitted, now you have set the “Startup Mode” in “Super-soft Startup”
4.Exit Programming
After the special tone “1515 ”,move throttle stick to bottom within 2 seconds.

TROUBLE SHOOTING

TROUBLE	POSSIBLE REASON	ACTION
After power on, motor can’t work, no sound is emitted	The connection between battery pack and ESC is not OK	Check the power connection. Replace the connector.
After power on, motor can’t work, such a alert tone is emitted: “beep-beep-, beep-beep-,beep-beep-” (every “beep-beep-” has a time interval about 1 second.)	Input voltage abnormal, too high or too low	Check the voltage of battery pack
After power on, motor can’t work, such a alert tone is emitted: “beep-, beep-,beep- ” (every “beep-” has a time interval about 2 seconds.)	Throttle signal is abnormal	Check the receiver and transmitter Check the cable of throttle channel
After power on, motor can’t work, such a alert tone is emitted: “beep-, beep-,beep- “(every “beep-” has a time interval about 0.25 second.)	Throttle stick not in bottom(lowest) position	Move the throttle stick to bottom
After power on, motor can’t work, a special tone ”56721” is emitted after 2 beep tones (beep-beep-)	The direction of throttle channel is reversed, so the ESC has entered the programming mode	Set the direction of throttle channel correctly
The motor runs in 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 cable of throttle channel
	ESC has entered Low Voltage Protection mode	Land RC model as soon as possible, Replace the battery pack
	Some Connections are not reliable	Check all the connections: battery pack connection, throttle signal cable, motor connections, etc.

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