GL10 User Manual

Brushless Electronic Speed Controller

www.xc-bldc.com

Disclaimer

First of all thank you very much for using this product!
This product has high power and incorrect use may cause equipment damage or personal injury. Please read this statement carefully before using this product. Once this product is used, it means that you agree to all the terms of this statement. Please use this product strictly in accordance with the instructions in this manual. We do not assume any liability arising from misuse, illegal modification or improper operation of this product, including but not limited to indirect losses or joint and several liabilities.

Cautions

Before connecting the ESC to related equipment, please ensure that all wires are well connected and the connecting equipment are in well insulated protection to avoid damaging the ESC due to short circuit.
Before using the ESC, please carefully read the instructions of the matching power equipment and frame to ensure a reasonable power combination, thereby avoiding improper power combination that may lead to motor overload and damage to the ESC.

1. Specifications:

Item	Description	Cautions
Current	80A Continuous Current	Extra fans for ESC and motor cooling is necessary, or overheating protection may be activated
LiPo Cells	2~4S LiPo	Discharge/brake energy recovery should be considered when DC supply is applied If the supply is limited, degrade the operating parameters appropriately(acceleration and brake items)
Preferred Motor	GL-series sensored brushless motors	
Motor RPM	Max.Electrical Rotation Speed100K RPM	
BEC Voltage	Voltage: 6V / 7.4V adjustable using mobile App Current: 6A Continuous, 13A Peak	
Fan	Temp.Control and On In "On" mode, fan is on when ESC starts In "Temp. Control" mode: Fan starts when ESC temp.is above 55℃; Fan stays off when ESC temp. is below 50℃	Fan's powered by ESC When fan expereinces short circuit protection, power supply will be cut off by ESC. Then supply will be restored in 1 second.
APP	XC-Link.	Download from XC-ESC website or Apple store
Bluetooth Communication	1.All parameters of ESC can be adjusted on APP 2.Firmware upgrade using App 3.Real-time data and data log reading	
Dimension	48.0*37.5*33.60mm / ≈95g (with wires)	
Motors Recommended	GL540L / GL550	Even a motor is recommended, the GL10 ESC works with all GL-series motors, for other motors please visit website

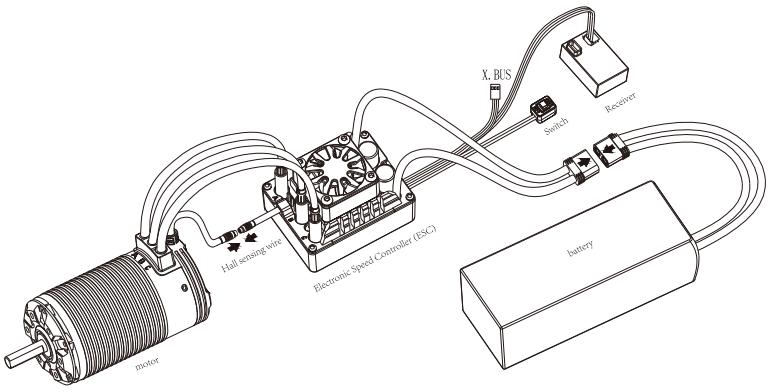
2. Features:

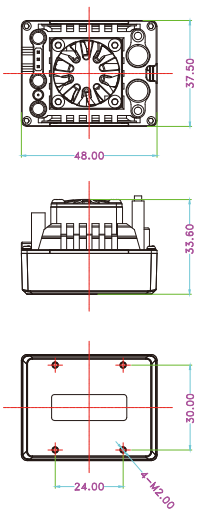
2.1 FOC high speed slip ring, Microsecond level current control, smooth torque output
2.2 Self-developed speed control technology, switch freely between ultra low speed with large torque and burst-out with high speed
2.3 Self-developed servo algorithm, not particular to load, easy to use
2.4 Smart heat dissipation, fan stays quiet at low temperature
2.5 Built-in Bluetooth connecting mobile App for firmware upgrade and parameter setting
2.6 Mobile App for real-time data and data log reading
2.7 Built-in DC/DC conversion circuit improves pwoerful loading capacity of BEC
2.8 Multi-protection includes low voltage protection/throttle loss protection/abnormal braking protection/overheating protection
2.9 Turbo timing is avialbable
2.10 You can completely control the ESC without need for additional modules
2.11 Supports X.BUS for ESC control and operation data reading, also applicable to robot or automation programming control
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3. Connections:

Remark: A/B/C of Motor and ESC must be connected correspondingly,
That is: Wire A of motor matches wire A of ESC, wire B of motor matches wire B of ESC, wire C of motor matches wire C of ESC

Switch wire: red and black
Throttle wire: red: BEC+, black: BEC-, white: throttle
X.BUS wire: red: BEC+, brown: BEC-, yellow: X.BUS





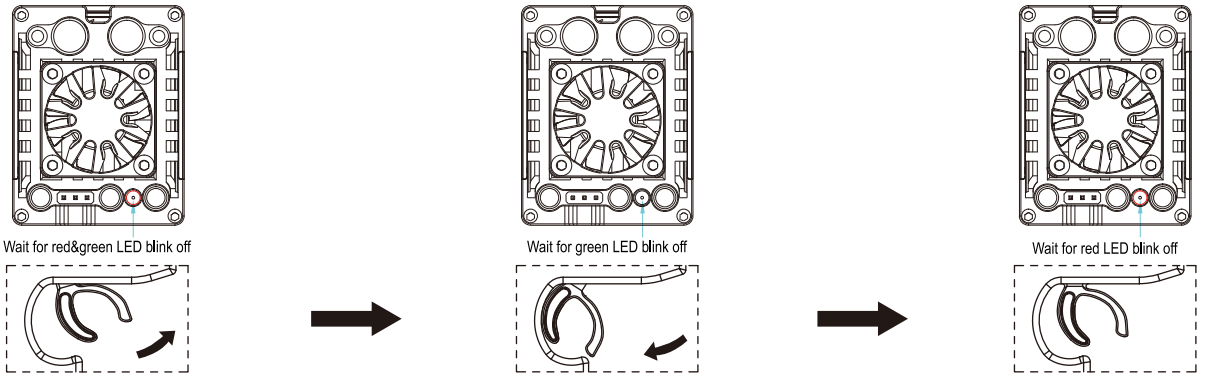
*Precautions:
1. Don't connect wires (+) (-) reversely.We shall not be reliable for any damage caused by reverse connection.
2.Sensor wire must be connected in use
3. A/B/C wires of motor must connect to A/B/C wires of ESC correspondingly
4. Check the wire connection before using. It is recommended to apply throttle slowly at beginning, when confirming all is correct, the throttle can be applied normally.

4. Start the process:

Steps:
1. Check whether the circuit is open, short circuit or in poor contact.
2. Check whether the motor is stuck.
3. Plug in the power cable.
4. Turn on the power button.

When you hear the battery prompt tone (described in the "Normal Startup" prompt in the light/sound prompt section), the startup is normal. If the throttle is normal, you canperform the throttle operation normally.

5. Set the throttle range:



Radio Control: go to full reverse

1. ESC power off-- go to full reverse--ESC power on--wait for red/green LED blink off

Radio Control: go to full throttle

2. Go to full throttle quickly, wait for green LED blink off

Go to neutral

3. Go to neutral throttle quickly, wait for red LED blink off

4. Prompt for success setting: prompt repeats four times(red light and green light on + motor beep"so, mi, do" + red/green lights off + 0.2s vacancy); prompt for failure setting: no signs, ESC powers on.

6. Bluetooth:

The naming rule of Bluetooth name is "model" + "-" + "ESC code ID", for example, "XC_GL10-1C89", where XC_GL10 is the general model, and "1C89" is the hexadecimal code ID of the ESC, to avoid two devices with the same name. Default password is "1234"

7. Configurable items:

Seq	Items	Parameters								Default
1	Running Mode	Forward/Reverse with Brake				Forward/Reverse				Forward/Reverse
2	LiPo Cells	Auto Identify				2~4S				Auto Identify
3	BEC Voltage	6.0V				7.4V				6V
4	Low Voltage Protection	Disable				2.9~3.6V				3.2V
5	Motor Rotation	CW				CCW				CW
6	Auto Hold	disable	instant	0.2s		0.3s	0.4s			0.3s
7	Drag Brake Increment	0~7								0
8	Drag Force	0~100%								20%
9	Max. Brake Force	0~100%								60%
10	Max. Throttle	25~100%								100%
11	Max. Reverse Force	25~100%								50%
12	Acceleration	0~12								8
13	Coasting Smoothness	high		medium		low				high
14	Torque Compensation	1~8								6
15	Turbo Timing	0~24								0
16	Turbo Delay	0~1s								1s
17	Neutral Range of Throttle	3~15%								7%
18	Cooling Fan	Temp. Control				On				Temp. Control
19	PLine1	X.BUS	9	12	8	15	16	14	7	X.BUS
20	X.BUS-ID	0~15								0
21	Choose Motor	XC				Other				XC
22	Motor Identifying	^-^				Start				^-^

1. Running Mode:
Option 1: Forward/Reverse with Brake
Reverse is available in this mode for training. When trigger goes to reverse range, braking is activated
Option 2: Forward/Reverse
When the throttle trigger is pushed from neutral to reverse point, the motor reverses. This mode is generally used in special vehicles.

2. Lipo Cells:
Set the correct value according to the actual number of Lipo batteries used. The default is automatically calculated.

3. BEC Voltage:
BEC voltage support 6V/7.4V. Generally, 6.0V is suitable for standard servos, while 7.4V is suitable for high-voltage servos. Please set according to the servo specifications.
WARNING! Do not set the BEC voltage above the maximum operating voltage of the servo, as this may damage the servo or even the ESC.

4. Low Voltage Protection:
Protecting batteries from over discharging. if voltage remains below preset value for 10s,protection will be activated and 20% power remains.

5. Motor Rotation:
For motor rotation setting.Due to some differences in drivetrains in different cars, it is possible that cars go opposite direction when applying throttle. If this happens, you can change the motor rotation direction, "cw" or "ccw"

6. Auto Hold:
It refers to how fast the intervention time for auto hold.A certain time T is required for filtering.the bigger the transsmition clearance the longer the time.

7. Drag Brake Increment:
The larger the number the faster the brake.

8. Drag Force:
When no throttle applied,automatic braking and drag brake increment will work simultaneously.

9. Max. Brake Force:
This ESC provides proportional braking function; the braking effect is decided by the position of the throttle trigger. It sets the percentage of available brakingpower when full brake is applied. Large amount will shorten the braking time but it may damage your pinion and spur gear.

10. Max. Throttle:
Refer to setting the max forward throttle. That is, max forward throttle is limited to this value (percent of full throttle).

11. Max Reverse Force:
Refer to setting the max reverse force. That is, max reverse force is limited to this value (percent of full throttle). A small reverse force is recommended to avoid accidents caused by reversing fast.
12. Acceleration:
Acceleration interacts with torque compensation to achieve motor accelerating control. If the lowest acceleration is preferred, you can select the lowest level of torque compensation, so is the acceleration, and a higher level of torque compensation and acceleration make a bigger acceleration
13. Coasting Smoothness:
Refers to coasting smoothness when reduce throttle. High value recommended for onroad and low for offroad.
14. Torque Compensation:
Output max torque when encounter obstacle, the higher the level, the bigger the torque. Default grade recommended.
15. Turbo Timing:
The Turbo timing can additionally increase the motor rpm.It will initiate at full throttle. It is usually used on a long straight road to release the maximum power of the motor. The higher this value is,the more the rpm of the motor will increase, and the greater the running current will be, the higher the temperature of the motor and esc. Therefore, please set this value reasonably.
16. Turbo delay:
It refers to the duration of continuous full throttle required to trigger Turbo. When the full throttle time reaches this set value, Turbo can be triggered to turn on.
17. Neutral Range of Throttle:
Neutral range could be adjusted according to usage habits. Neutral range may deviate in some radio control, leading to move forward or reverse slowly. If this happens, neutral range needs to be set larger.
18. Cooling Fan:
Temperature Control: Fan starts and stays off upon ESC temperature. On: Fan starts when ESC is power on
19. PLine1:
Parameters can be tuned by PWM with X.BUS, PWM width 1ms-2ms supported. Assuming Pline1 is acceleration item, if the width of PWM is set as 1ms, then acceleration level is set to 0; if width of PWM is set as 2ms, then acceleration is set to 12-level. Apply X.BUS in PLine1 if you want to put X.BUS into use.
20. X.BUS-ID:
Set the slave ID for this ESC. Supporting communication for 16 ESCs.
21. Choose Motor:
Besides XC motor, other motors that meet XC encoder specification are supported (analog sine and cosine signals, amplitude of about 1.5V, bias voltage of 1.65V) .
22. Motor Identifying:
Choose motor identifying to identify other motors' parameters.

8. Recover factory parameters:

How to restore Bluetooth to factory settings:
If the Bluetooth password is lost or if you need to forcibly enter Boot, please follow the instruction:
1: Connect ESC wire(the white wire) to BEC+(red wire)
2: Turn on ESC
3: Disconnect from BEC when green light off and red light on
4. Remove short circuiting
When boot activated, the status of Bluetooth will restore to factory value(password will be restored to“1234” , and the name will be restored to the factory state), then restart ESC,If there is a hardware error, Boot can be activated in this way to upgrade hardware.
How to restore parameters to factory settings:
If you want to restore the parameters to factory settings, just click the default button on the APP parameter page.

9. LED status & beep instructions:

Item	Type description		Light cue	Sound cue	Remark
Basic information	Throttle not zeroed		Red light flashes quickly	Short tone "beep"	Red light flashes quickly
	Throttle signal lost		Red light flashes slowly	Long tone "beep"	In cycle of 2s
	Voltage detection	Low voltage protection	(Redx1 Greenx2) …	Long tone "beep"x1, Short tone "beep"x2	Check the input voltage or setting of number of cells if no "beep" before MOSFET detecting.
		Over voltage protection	(Redx1 Greenx3) …	Nil	Voltage is too high, check whether the voltage is over the withstand value of ESC
	The MOS temperature is too high, operating temp. > 125 ℃ / startup temp. > 110 ℃		(Redx1 Greenx4) …	Long tone beepx1, short tone beepx4	The temperature of MOS is too high. ESC can resume normal operation when the temperature drops below 100 degrees Celsius
	The capacitor temperature is too high, operating temp. > 105 ℃ / startup temp. > 100 ℃		(Redx1 Greenx5) …	Long tone beepx1, short tone beepx5	The temperature of capacitor is too high. ESC can resume normal operation when the temperature drops below 100 degrees Celsius
Throttle parameters	Abnormal throttle parameters		(Redx1 Greenx7) …	Long tone beepx1, short tone beepx7	If there is still an abnormal promp when positioming throttle to neutral point, throttle calibration process needs to be initiated.
Hall sensing abnormality	Hall output logic abnormality		(Redx1 Greenx8) …	Long tone beepx1, short tone beepx8	Re-plug Hall wire. If the abnormality persists, it may be a problem with the internal Hall of the motor, and the Hall wire needs to be unplugged.
Throttle parameter	Throttle calibration prompt	Calibrate low range	(Red Green) …	Nil	If the calibration process is irregular or unsuccessful, the ESC will exit the calibration process and enter the normal Startup process.
		Calibrate high range	(Green) …		
		Calibrate neutral throttle	(Red) …		
		Calibration success	(Red Green) x4	(so-mi-do) x4	
Normal operation	All normal and no action to throttle		(Green) …	Nil	
	Throttle operation	Normal	The greater the accelerator, the faster the green light flashes		
		Turbo timing is on	Green light remains on		
	Braking		Red light is on	Nil	Red light off when release brake
Boot	Entering boot forcibly			Nil	Follow the process of Bluettoth factory reset
	Boot in progress		Green light: On 2s&Off 2s	Nil	CPU enter Boot mode
			Red light remains flashing		CPU enter Boot, program upgrade in progress
Normal startup	Prompt for the number of battery cells after normal startup		Quinary prompt light signal, long tone with red light on, short tone with green light on	do, mi, so + quinary prompt sound	do, mi, so: prefix of quinary number Quinary definition Long tone = 5 cells, short tone = 1 cell Example: 8-cell lithium battery prompt sound do, ri, mi + long tone x1 + short tone x3
Fault warning	ESC self check abnormality		(Redx2) …	Nil	Disconnect the motor wires, power on. if it is still abnormal,return it for maintenance
			(Redx2 Greenx1) …	Nil	
			(Redx2 Greenx2) …	Nil	

***Notes:**
1. Red light matches long tone, gree light matches short tone.
2. For saving power, all "beep" lasts for 5mins; if all fault recovered, it takes effect again in next 5 mins.
3. Ellipsis"..." in light cue represents repetition of previous action.