Lingbo

Controller Program Manual V1.2

2021-05-17

It is forbidden to non-specialists use!

This manual was explained in detail for the Lingbo series controller, which update download illustrates and parameter adjustment.

Before using the software, please read this manual. In order to facilitate the operation, please keep this manual.
In order to make the software of maximum utility, please make sure the end user to use this manual.
Please be sure to read the manual carefully before starting the operation.

Disclaimer:
For the Lingbo controller program updates and parameter adjustment can only be done by professional and technical personnel.
If without the written permission of our company for the Lingbo Controller, the application update to download and parameter of the controller adjustment is not allowed.
It is forbidden to non-professional personnel operate this software.

In the above event, our company will no longer be responsible for accident happens by controller.

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1. Abbreviation

ECU	Electronic Control Unit
eScooter	Electric Scooter
MCU	Microcontroller
PWM	Pulse Width Modulation
GND	Ground
Ta	Ambient temperature
B+	Battery positive
B-	Battery negative
LED	Light-emitting Diode

2. General Information

2.1 Application Scope

This technical customer document (TCD) refers to the LingBoeScooterECU.
This document describes the acceptable working conditions, boundary condition of LingBoeScooterECU and the interface specification with other modules installed on the eScooter. LingBoeScooterECUcan only work normallyunder the TCDspecified conditions.
LingBo is responsible only for the ECU failure which leads to the eScooter failure due to the design, production and transportation of ECU. LingBo is not responsible for the other parts failure in the system which leads to the eScooter failure.

2.2 Warning

The assembly and disassembly of ECU itself must only be carried out by LINGBO. A repair of the ECU or their sub-components is not admissible without written agreement.
The Customer acknowledges that the power classes, current and speed limitation built in LingBo's products are based on the Customer's requests and solely for the purpose of the Customer and/or its distributors' internal testing and diagnosis. The Customer undertakes to be solely responsible for ensuring that its products installed with LingBo's products comply with the applicable governmentmandatorycriteria from time to time before being released to the market. Further, the Customer shall indemnify and keep LingBo harmless from any claims from any third parties of whatever nature (including but not limited to human body injury/death or property loss) due to the Customer's failure to comply with the aforesaid criteria
LingBo will not be responsible for any usages which exceeds the TCD specified boundary condition.
Please pay attention to the following safety instructions and take these as a reference inthe manual of the eScooter which is equipped with LingBoECU:
(1) Ensure the throttle will not send out any wrong speed regulation signals during operation.
(2) Ensure the reliability of electric braking signal to ECU.

(3) Ensure the mechanical brake can provide sufficient braking force

(4) Ensure the correct battery connection, e.g. prevent reverse polarity or connecting battery wires to the pins for phase wires by mistake..

(5) Ensure the correct motor connection, e.g. prevent motor phase from short or open.

(6) When the eScooter is charging, ensure that the charger and the ECU are disconnected, or a suitable fuse is connected between them.

(7) Due to the high temperature of the ECU surface when eScooter running under heavy load, please give warning to the user that before touch the ECU or their mounting area, anticipation first in case of being scald.

(8) Due to the operation voltage exceeds the defined safety voltage of 36V, please give warning to the user that do not touch the electric part (connectors) directly to avoid to get an electric shock.

(9) Ensure the correct wire connection, e.g. prevent connecting battery wires to the pins for phase wires by mistake.

(10) Ensure that the B- of anti-theft device should be connected to the B- of battery directly. Meanwhile, connecting the B- of anti-theft to the logic GND of ECU is strictly forbidden.

(11) Ensure to install the ECU waterproof cover after wire harness assembly.

3. ECU Model List

Model	Mosfet	Volt/DC/Phase	Software	Function Cable
72122HK3A	12	72V/45A/150A	Gen 3	30P-76
72152K3AP	12	72V/60A/180A	Gen 3	30P-76
72182HJ3A-M6(NIU)	18	72V/80A/240A	Gen 3	30P-76
72182HJ5AE	18	72V/80A/240A	Gen 5	30P-76
72252HJ5AP	18	72V/100A/280A	Gen 5	30P-76
72352C5X	24	72V/180A/400A	Gen 5	30P-01
72352-410E	24	72V/150A/350A	Gen 5	35P
72552C5X	24	72V/240A/520A	Gen 5	30P-01
72552C5XT	24	72V/300A/620A	Gen 5	30P-01

4. ECU Name Regulation

72122 HK3A

Model Name 72122
K: 12 Mosfets
J: 18 Mosfets
C: 24 Mosfets
3: Gen 3 platform(software different)
5: Gen 5 platform(software different)

5. ECU Function Description

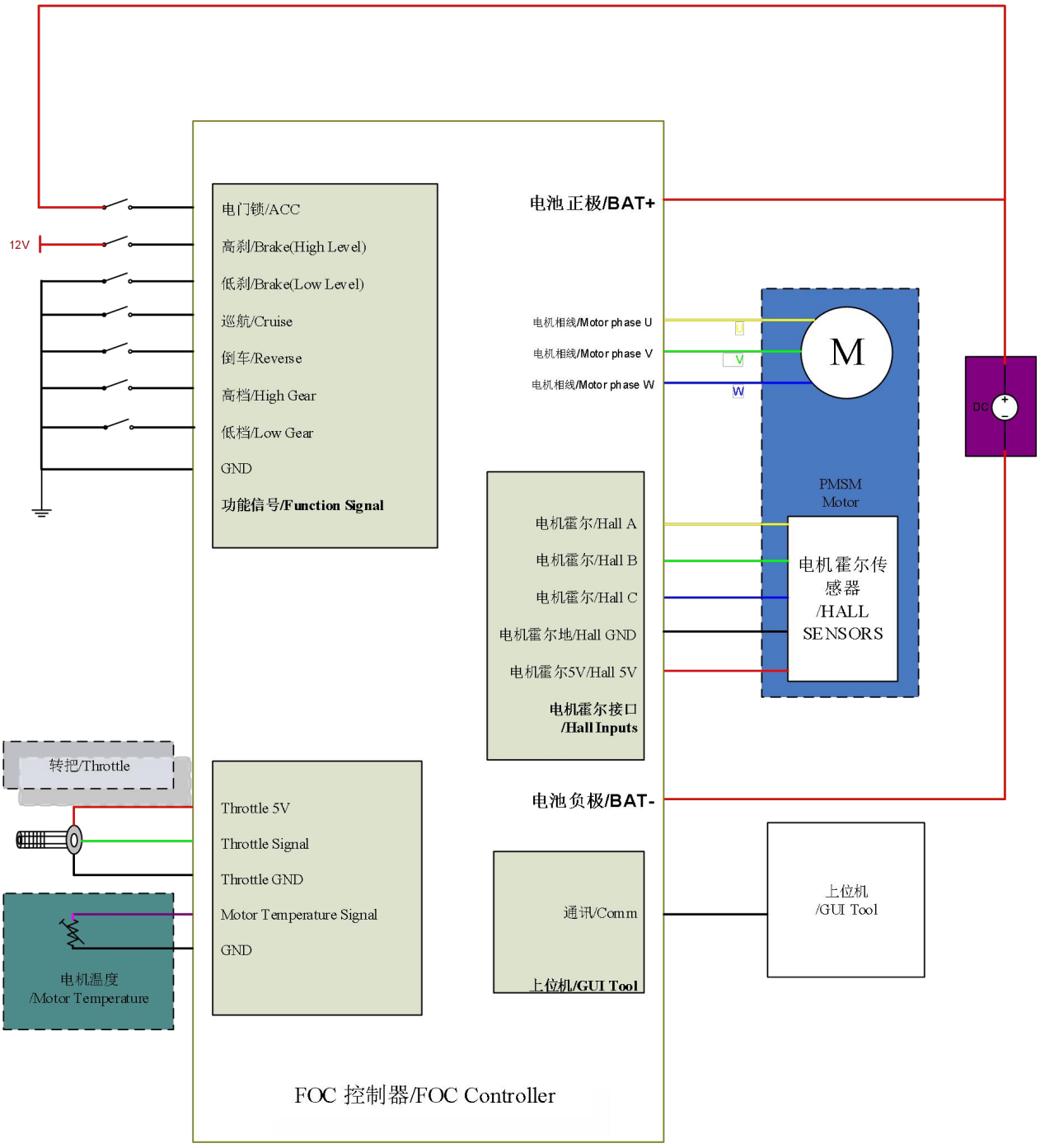
5.1 Function Description

Driving	Function Description
Stepless Speed Regulation	The ECU can stepless regulate eScooter speed through correct throttle input (1.2V-3.3V).
E-Brake	ECU will charge the battery base on the battery state of charge (SOC). Maximum battery voltage would be limited not greater than 84V.
Three Speed Modes	1.The signal is from button. 2.Three mode can be selected. The speed limit of the three speed mode is High(100%) , Middle(80%)， Low(60%) .
Cruise	1.The signal is from switch. 2.low level efficient. 3.Enter cruise mode if the button is pressed over 0.5 seconds during driving 4.Exit cruise mode if met any conditions below: 1) Effective braking 2) Power off or faults which causes motor stop 3) Press the button once again
Communication	1.Support the RS485 or CAN communication with different part number

Safety	Function Description
Startup Lockout	If the throttle is already out of neutral (>1.2V) while power up, ECU will not drive the motor, throttle should be returned to

	neutral to start the eScooter.
Throttle fault	ECU will stop output if any wires of throttle is open or any two wires are shorted.
Battery Current Limit	ECU will limit the max battery average current to prevent shorten the battery life (note: see 5.2.1 for more detail)
Over temperature protection	Prevent ECU damaged from overheating .
Overvoltage cut off	Cut off output to the motor if battery voltage is too high
Under voltage foldback	Battery current limit foldback start when the battery voltage below 4V+UV (under voltage), and the current limit will be reduced to 10A at under voltage.
Under voltage cut off	Cut off output to the motor if battery voltage is too low (note: refer to 5.1.2).
Motor stall cutoff	Cutoff output to the motor in 2s under stall condition.
Motor HALL fault check	ECU will cut off the output if detected HALL fail.
Motor short protection	ECU self-protection from motor short. Note: protection is valid for phase to phase, phase to B+, not valid for phase to ground. Note: Short protection is valid if induction is higher than 0.5uH (e.g. 22cm, 1.5mm^2 wire), or resistance is higher than 0.6ohm between the ECU motor phase pin to the short point of motor phase.
Anti-theft	1. The signal is from switch. 2. ECU will brake the motor and then block the motor when receives the available anti-theft signal during driving. 3.When eScooter is not running, the motor will be blocked.

5.2 ECU Block Diagram

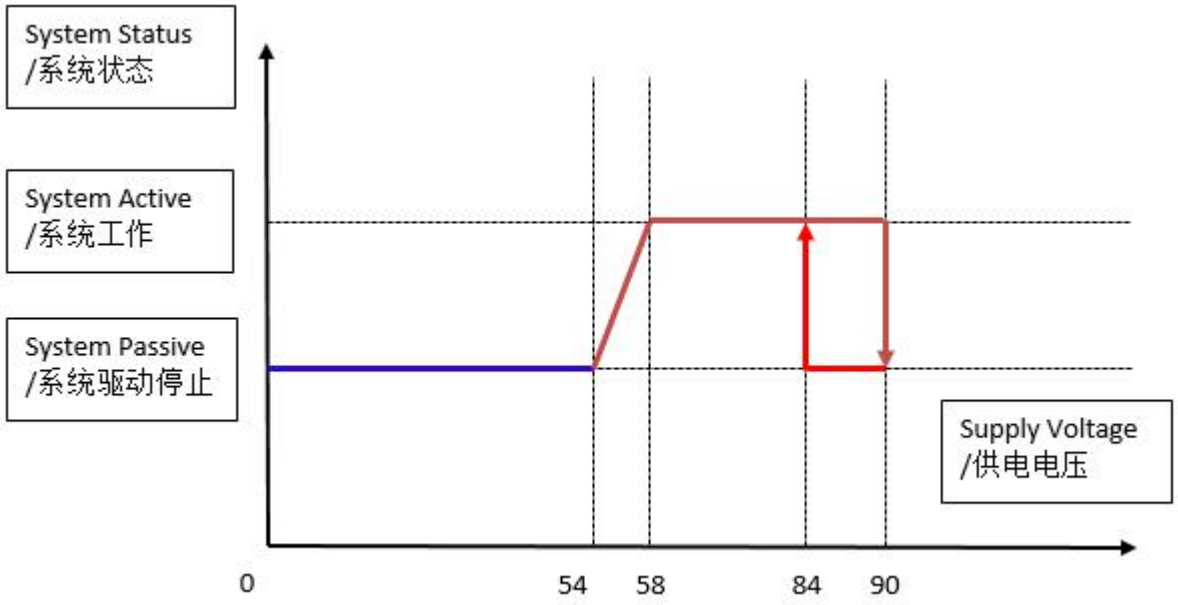


6. ECU Environmental Specification

The eScooter ECU operationenvironmental temperature range: -25°C ~ +60°C.
The eScooter ECU Storage environmental temperature range: -10 °C ~ +40°C.

7. ECU Electrical Boundary

7.1 Power Supply



The eScooter ECU could remain in operation under the voltage supply between 54VDC~90VDC.

(1) Overvoltage

The eScooter ECU stops output above the voltage supply at 90±1VDC.

(2) Under Voltage

The eScooter ECU stop work under the voltage supply at 54±1VDC.

Notice: If battery voltage decreases to less than 38V(under voltage point), ECU stops output, if battery voltage increase from the voltage below under voltage point, then ECU will start output at 40V when spin the throttle again from zero .

7.2 Current Boundary

Short Protection

ECU is preferred to be used at non short operation status. LINGBO shall not guarantee ECU function remains to be normal if short signal interfaces to each other, or to B+ or to ground or to motor phase.

In case of following conditions, the ECU will be damaged permanently. In the rare cases of the vehicle being in driving status during this short circuit, people on the vehicle may be injured under some extreme cases.

(1) B+ short to GND.

(2) Throttle Power short to B+.

(3) Anti-Theft Wheel Sensor short to B+ or GND.

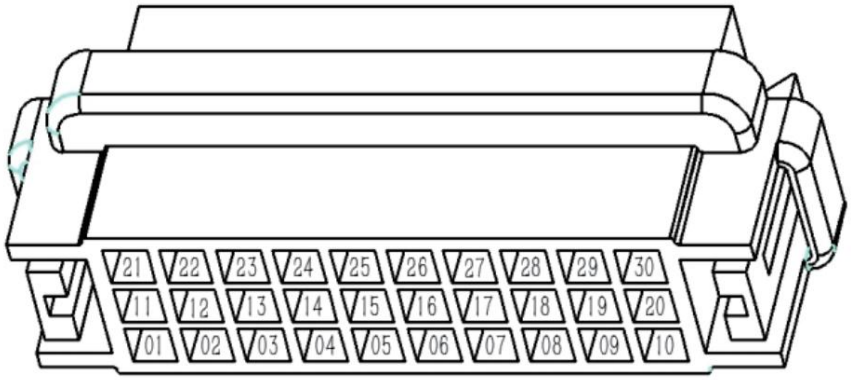
(4) Motor phase short to GND

To prevent the accidents under above cases, we recommend taking care of the special insulation on the naked areas

of the wiring harness and connectors which related whose pins mentioned above during e-scooter assembly.

8. Controller Functions Connection

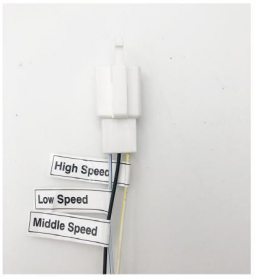
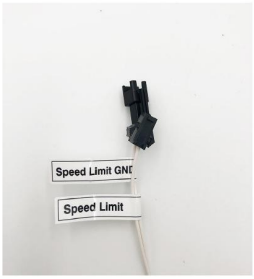
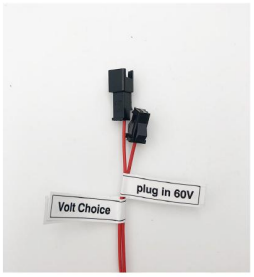
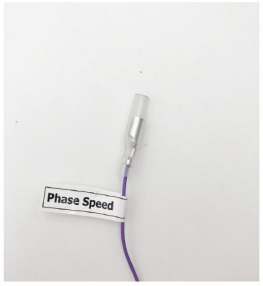
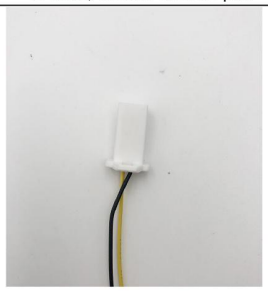
8.1 Controller's Function Wiring



30P-76, 30P-01

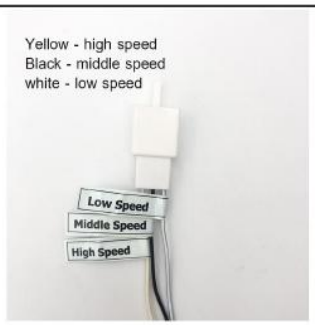
8.1.1 72122/72152/72182/72252 wiring (30P-76)

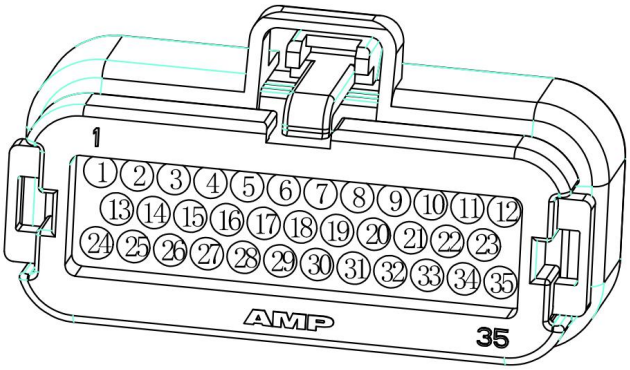
30P-76 Wiring Definition

1. Hall Plug (waterproof plug)	2. Throttle	3. Ignition	4. Low Brake (0V)
5 wires, connect with motor hall	3 wires, connect with throttle	1 wire, connect with B+	2 wires, connect with brake switch
			
5. High Brake (12V)	**6. Three Speed**	**7. Speed Limit**	**8. Volt Choice(60V/70V)**
1 wire, connect with 12V brake	3 wires, connect with three speed switch	2 wires, plug in speed limited	2 wires, plug in 60V
			
9. Cruise	**10. Reverse**	**11. Anti-Theft Power**	**12. Motor Lock**
2 wires, connect with cruise switch	2 wires, connect with reverse switch	2 wires + 3 wires, connect with anti-theft device	
			
13. One-LIN Meter	**14. Phase Speed**	**15. Program Port**	**16. NONE**
1 wire, connect with display One-Lin Wire	1 wire, connect with display phase speed	4 wires, connect with USB cable to PC	2 wires, custom function port
			

8.1.2 72352/72552 wiring (30P-01)

30P-01 Wiring Definition

1. Hall Plug (waterproof plug)	2. Throttle	3. Ignition	4. Low Brake (0V)
			
5. High Brake (12V)	**6. Three Speed**	**7. Cruise**	**8. Reverse**
			
9. Boost	**10. Hall Speed**	**11. NONE**	**12. Program Port**
			



35P

8.1.2 72352-410E wirings (35P)

35P	Color	Definition	Function	B Plug
9	Red	Hall 5V	Hall	
35	Purple	Temp Sensor		
32	Black	Hall GND		
21	Yellow	Hall A		
22	Green	Hall B		
33	Blue	Hall C		
1	orange	ignition	Ignition	
	green	motor signal	Anti-Theft lock motor	
	blue	theft signal		
2	orange	ignition		
7	purple	Program Port	Program Port	
8	white			
30	black-white	GND	Throttle	
18	green-white	throttle signal		
6	red-white	throttle 5v		
24	purple	high brake	High Brake	

35P	Color	Definition	Function	B Plug
12	white	hall speed	Hall Speed	
28	black	GND	Three Speed	
15	blue-white	low speed		
16	yellow-white	high speed		
28	Black	GND	Customize FUNC	
4	white	FUNC_1		
5	white	FUNC_2	Customize FUNC	
29	Black	GND		
26	white	FUNC_7	Customize FUNC	
29	Black	GND		
17	white	FUNC_5	Customize FUNC	
25	white	FUNC_6	Customize FUNC	
3	white	FUNC_OUT1	Customize FUNC	

8.2 Controller's Function Overview

(1) EBS:

1)EBS Brake: Electronic brake, which has high-level and low-level electronic brake. For example, if the brake is high level, brake cable connects to the signal wire. The voltage will be from low to high while high-level braking, and the voltage's scope is generally 12V to 0V. If the brake is low level, brake cable connects to ground wire. The voltage will be from high to low while low-level braking, and its voltage is generally 0V to 12V. EBS brake is default to have the function of reverse charge. Cathode should be always connects to the negative line of assembly line.

2)Normal Brake: it means to cut the power while braking, whose function will become true if closing EBS via debugging soft.

3)Mechanical Brake: if not connecting the brake line, it is mechanical brake.

(2) Cruise

The cruise mode will automatically exit when twisting the rolling handle. The cruise function had better not be used in the downtown.

1)Manual Cruise: it needs install the button. Signal lines connect to the cruise lines, and cathode connects to the negative lines of controller.
2)Automatic Cruise: it is effective without connection, and it can go into the cruise mode with keeping a constant speed.

(3) Three-speed Function
1)Shift Three-speed: if the switch is shift switch on the motor, please choose the shift three-speed and connect with the high-speed line, low-speed line and the controller's cathode line（black line).
2)Button Three-speed: if the switch is button switch on the motor, please choose the button three-speed and connect with the high-speed line and the controller's cathode line(black line). Button three-speed is inching, and it is deemed as the high speed, and the cycle of high, middle, and low speed.

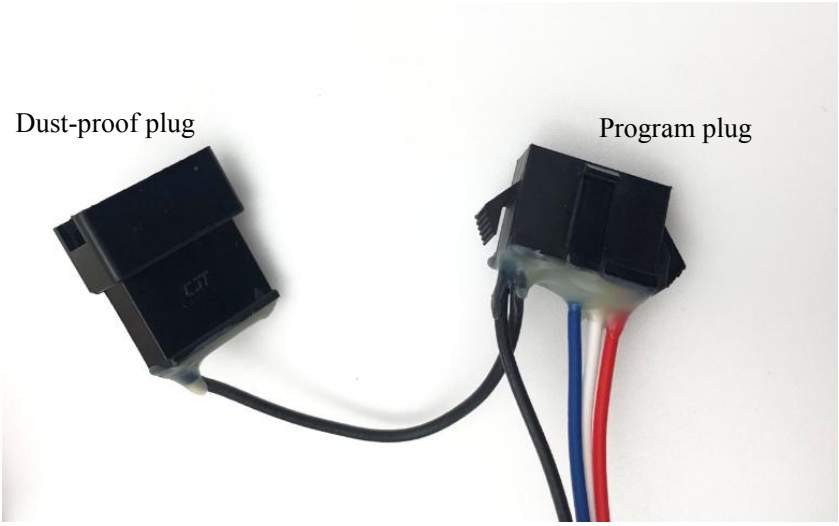
(4) Reverse Function: Reverse line connects to the controller's cathode, and the function can be true after fixing a button.

(5) Speed-limit Function: it is deemed as no speed-limit, if the function comes true, it need debug the soft.
The best discharge method for disconnecting the controller: Turn off the battery's air switch, and open the weak current lock to discharge, and there's no electricity after discharging for a while. When disassemblying the big power controller, please don't discharge if the positive and negative lines are short-circuit.

9. Connect with PC

9.1 72122HK3A/72152K3AP/72182HJ3A/72252HJ5A model controller

(1) Connect 72122HK3A/72152K3AP/72182HJ3A/72352-410E controllers with computer directly.



(2) When the program plug not for use, you can plug in the dust-proof connector.

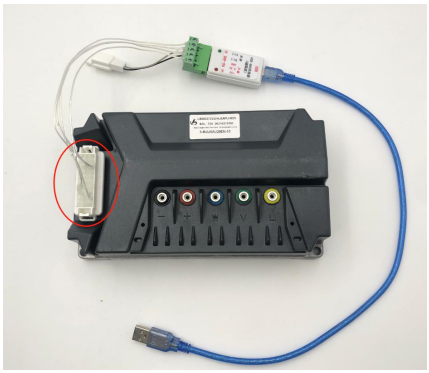
9.2 72352C5X/72552C5X model controller

(1) Connect 72352C5X/72552C5X controllers with computer(two USB should connect with PC)

When it connected with PC succeed, and controller no problem, the software will show COM port automatically.

9.3 72252HJ5APU/72352-410E model controller

The programmable cable of 72252HJ5APU/72352-410E controller with RS485 cables. Pls. Check below picture.
The 72252HJ5APU controller connect with 30P for programmable, 72352-410E controller connect with two pins plug for programmable. And 72352-410E controller need to connect battery B+, B-, ignition then it could be communicate with PC.



72252HJ5APU

72352-410E

10. Software installation

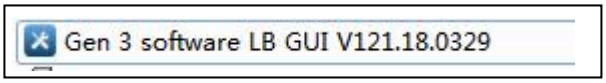
10.1 USB Driver Installation

(1) Download the “LB USB Driver” file, install the file.

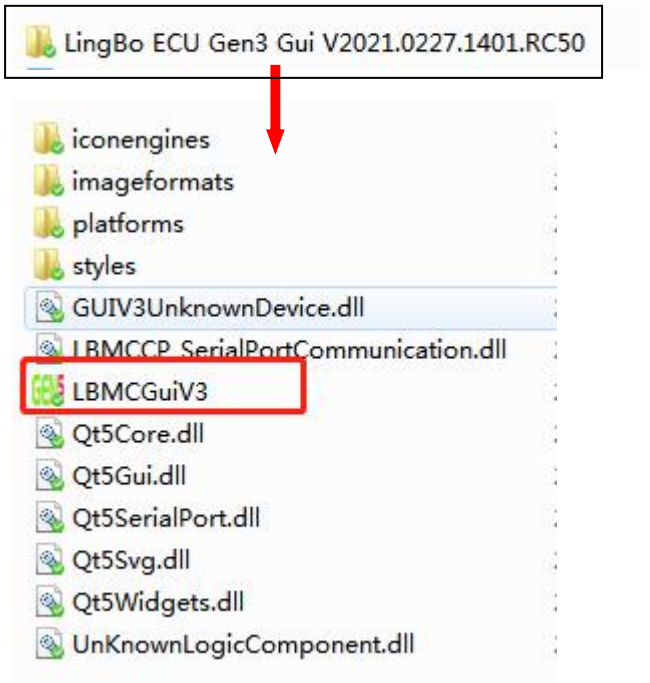
10.2 Software installation

(1) choose the suitable software for your controller

For Gen 3 controller, you can use this Gen 3 software.



For Gen 5 controller, you can choose this Gen 5 Software.



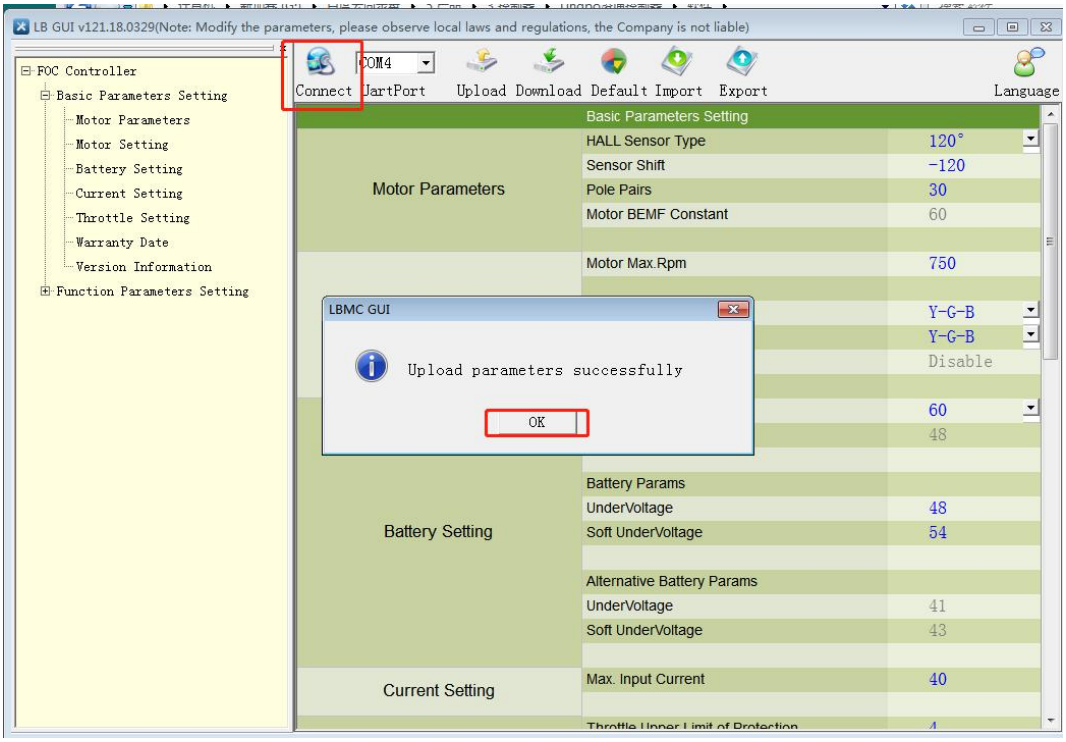
If after installation and cannot connect with controller correct, you can install the Patch. If your computer with 32bits, choose “VC_redist.x86”. If your computer with 64bits, choose “VC_redist.x64”.

11. Controller connection

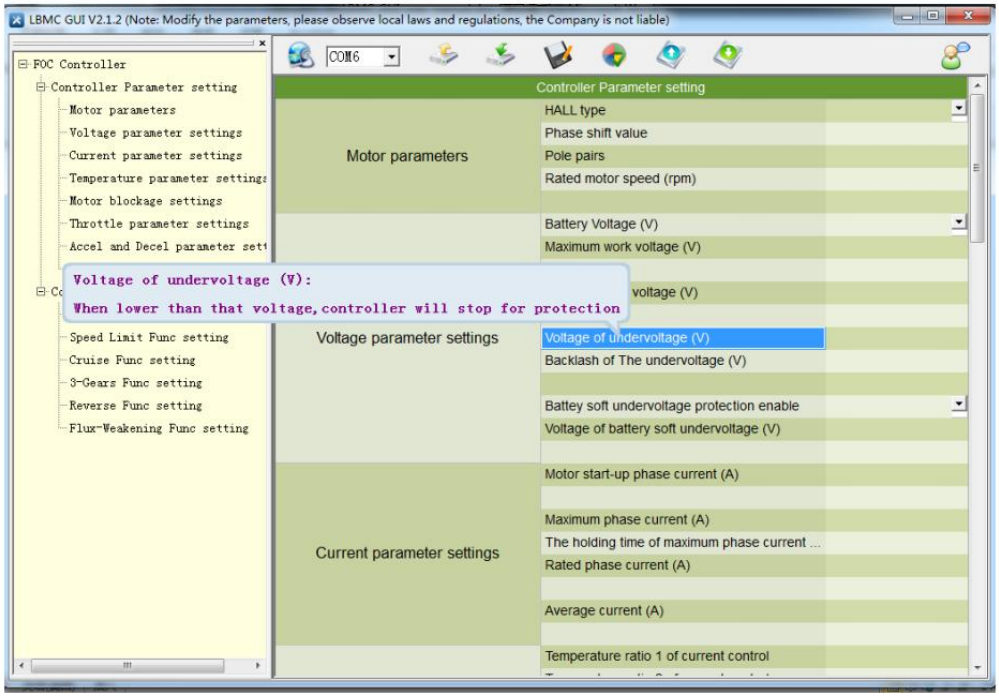
(1) Open the software after installation
(2) Connect the controller with computer
(3) Choose the correct COM port, click “connect”
(4) then the controller parameters can be adjusted accordingly.

12. Gen 3 Controller Parameters Setting

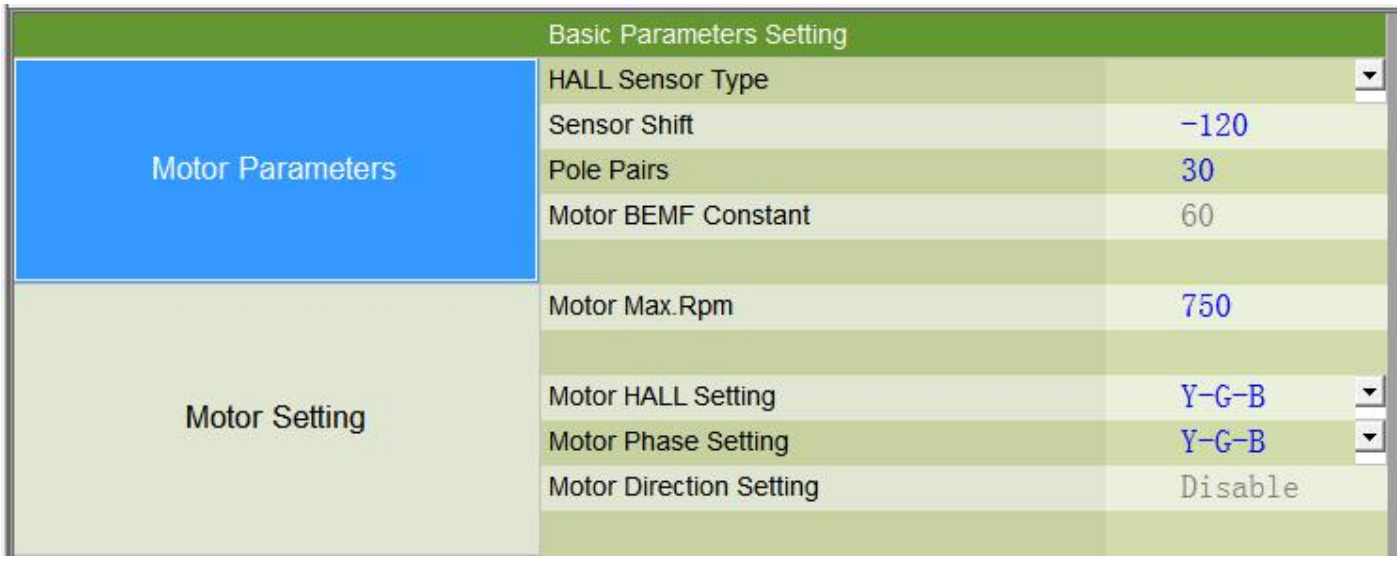
When you run the software succeed, there will be shown below surface:



On the left is a tree list, it shows setting parameters of each group for FOC conroller.
On the right side is the sidebar of software.
After you click the parameters from names on right, there will be one hanging box to show the sepcific natuer of parameters and value ranges, pls. See it on below picture.



12.1 Basic parameters setting



(1) Motor Parameters

" Hall sensor type": it can be choose 60 degree and 120 degree, it's depends on your motor, you can check this data with your motor supplier.

"Sensor Shift": this data will be different according to motor, you can refer to some data below to test.

"Pole Pairs": you can check this data with your motor supplier.

"Motor BEMF Constant": it will shown as default 60.

(2) Motor Setting

"Motor Max. Rpm": you can check this data with your motor supplier.

"Motor Hall Setting": there are "Y-G-B"(means yellow-green-blue), and "Y-B-G" (means yellow-blue-green) for choice, this data will be rated motor can run or not. It's basic match for running motor. When you match with new motor, you can test it with two options. If the motor can run smoothly, the data is no problem.

" Motor Phase Setting": there are "Y-G-B"(means yellow-green-blue), and "Y-B-G" (means yellow-blue-green) for

choice, this data will be rated motor can run or not. It's basic match for running motor. When you match with new motor, you can test it with two options. If the motor can run smoothly, the data is no problem.

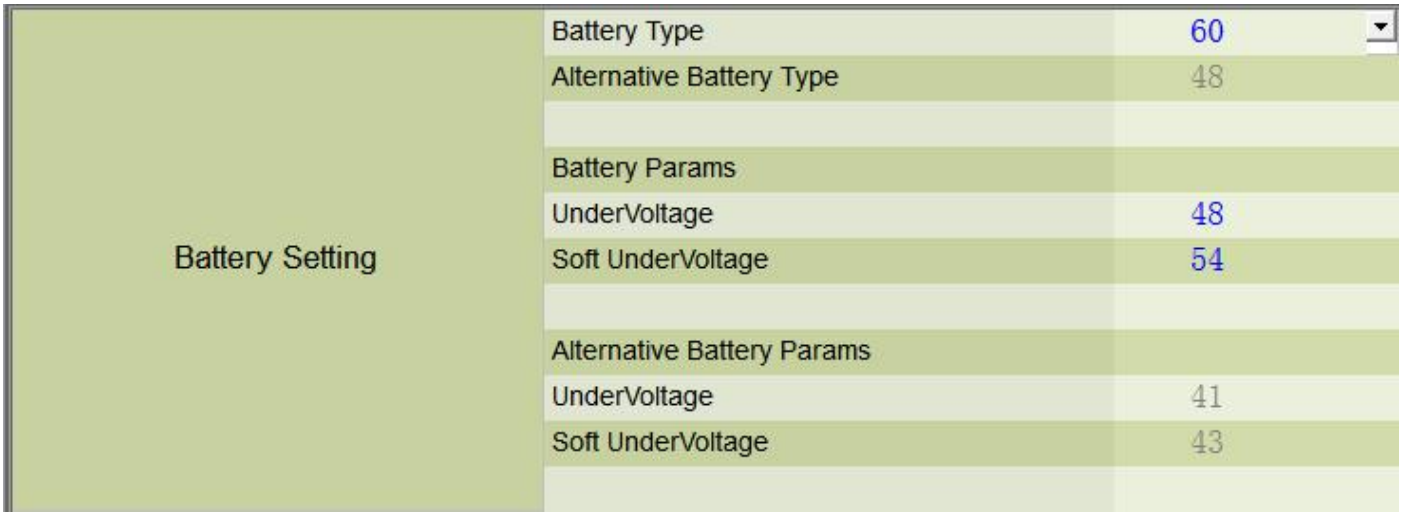
" Motor Direction Setting": disable as default.

When above iterms set corerct, motor can be run smoothly.

Here is **Motor Tuning Parameter List for reference.(some data may not correct).**

Motor Brand	Type of Motor	No. Of Pole-Pairs	Phase-shift	Phase Configuration			Hall Configuration		
				Yellow U	Green V	Blue W	yellow	green	blue
QS V3 Motor	10inch, 12inch, 13inch V3	16	-120	yellow	blue	green	yellow	blue	green
QS/WDF/Jinyuxing/Lianmeng	10 inches 、12 inches	23	-60		green	blue		green	blue
QS	12 inches full	24							
	13inches	28							
WDF	12、13 inches hollow	16							
Lianmeng	10inches Tile-shaped	16	-60		green	blue		green	blue
Jinyuxing	12inches	20	-60		blue	green		blue	green
Unite Motor	2.2KW（3000R）	6	-120		green	blue		green	blue
Lingbo Motor	2KW,3KW,5KW（5000R）	6	173		blue	green		green	blue
Haoya Motor	1.5KW	4	-60		blue	green		blue	green
Weilida	Multi-wire 10inches 13RV-45H	23	-60		green	blue		white	gray
	Single wire 10inches 10.8RV-30H		60		green	blue		blue	green
	Single wire 10inches 12RV-45H		-60		green	blue		blue	green
	Single wire 10inches 16RV-55H		-60		green	blue		blue	green
	Single wire 10inches 13.5RV-30H		60		green	blue	green	yellow	blue

							n	ow	
	Single wire 12inches 13RV-45H	28	120		green	blue	yellow	green	blue
	Single wire 12inches 12RV-45H		-60		blue	green		blue	green
	Single wire 13 inches		120		green	blue		blue	green
	Single wire 12 inches 14RV-45H	23	-60		blue	green		green	blue
	X-long 10 inches 13RV-45H	23	-60		green	blue		blue	green



(3) Battery Setting

"Battery Type": it could be choose by 48v, 60v, and 72v.

"Alternative battery type": disabled as default.

"Undervoltage": It depends on your battery undervoltage. Like your battery with overvolt 45V, you can set it a bit higher like 48v. When lower than this data, the controller will stop to work.

"Soft UnderVoltage": This is a volt to limit controller current to work. You can set it a bit higher than 48v to protect your battery.

Current Setting	Max. Input Current	40
Throttle Setting	Throttle Upper Limit of Protection	4
	Throttle Lower Limit of Protection	0. 4
	Throttle Highest Value	3. 3
	Throttle Lowest Value	1. 2
Warranty Date	Warranty Date	1908
Version Information	Version	121

(4) Current Setting

"Max. Imput Current": Pls. don't set it higher than controller DC Current.

(5) Throttle Setting

"Throttle Upper Limit of Protection": If throttle input more than this data, the controller will detected throttle as damaged, then stop for work.

"Throttle Lower Limit of Protection": If throttle input lower than this data, the controller will detected throttle as damaged, then stop for work.

"Throttle Highest Value": The lowest voltage for the effective work of the throttle.

"Throttle Lowest Value": The highest voltage for the effective work of the throttle.

12.2 Function parameters setting

Function Parameters Setting		
Mode Setting	Speed-Loop Mode Setting	Sport
	Throttle Response Setting	Normal
EBS Setting	EBS Function Switch	Enable
	EBS Charge Peak Current(A)	40
ATF Setting	Anti-Theft Function Switch	Enable
Cruise Setting	Cruise Function Switch	Enable
Speed Limit Setting	Speed Limit Function Switch	Enable
	Speed Limit Percent	50

(1) Mode setting

"speed-loop mode setting": there are three mode —— "Soft" , " normal", " sport" for choice.

"Throttle Response setting": there are three mode —— "Soft" , " normal", " sport" for choice.

(2) EBS Setting

"EBS function switch": when enable EBS function, the e-brake function will be enabled.

"EBS Charge Peak Current(A)": This data was related to recharge/regen function, we recommend the default data. Don't change it.

(3) "ATF Setting": when enable anti-theft function, and connect with your alarm, the anti-theft function will be enabled.

(4) Cruise Setting: when enable Cruise function, the cruise function will be enabled.

(5) Speed limit setting: when enable speed limit function, the speed limit function will be enabled and this speed was decided by speed limit percent. Speed limit cable should be connect with a switch.

TriSpeed Setting	Tri-Speed Function Switch	Enable
	Tri-Speed Key Mode	Shift
	Power-On Gear(Button Mode)	Low-Gear
	High-Speed Percent	130
	Middle-Speed Percent	100
	Low-Speed Percent	70
	Button-Four-Speed Switch	Disable
	Fourth-Speed Percent	50
	Flux Max.Peak Current	45
Reverse Setting	Reverse Function Switch	Enable
	Reverse Max.Rpm	-30

(6) Trispeed Setting

"Three speed function switch": Choose "enable" or "disable".

"three speed key mode": Choose "Shift" or "switch" according to your connection, if you connect three speed wire with a switch, pls. choose "switch". If you connect three speed wire with a button, pls. choose "shift".

"high-speed percent": You can set this percent ≤100.

"middle speed percent": You can set this percent lower than high speed.

"low speed percent": You can set this percent lower than middle speed.

"Flux Max. Peak current": this data is for flux weakening, we recommand to use default data.

(7) Reverse Setting

"reverse function switch": Choose "enable" or "disable".

"reverse max. Rpm": this data was related to recerse speed. You can set it in low rpm.

13. Gen 5 Controller Parameters Setting

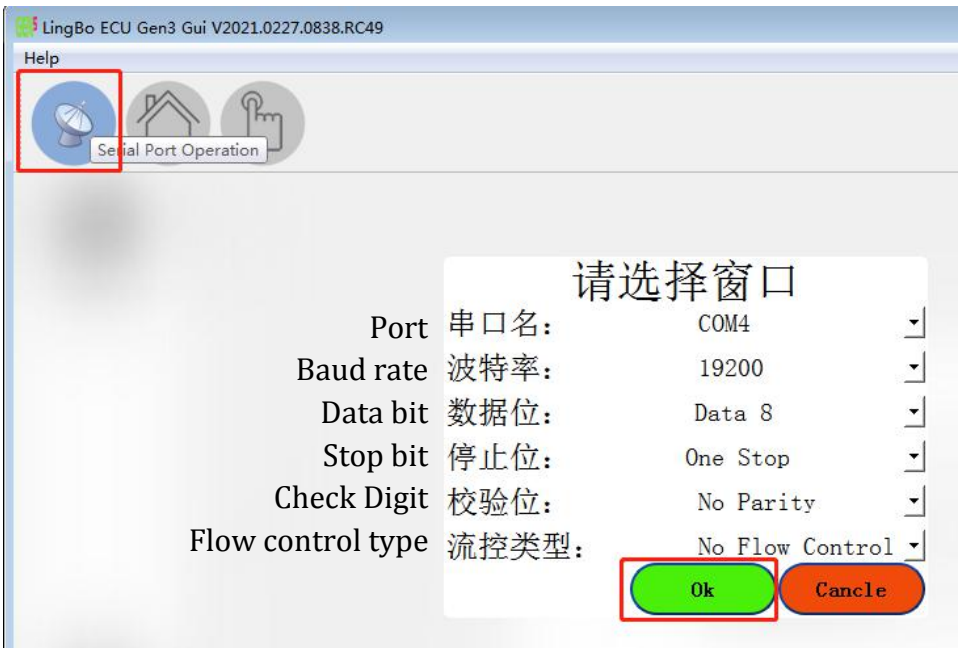
Now the Gen 5 with Chinese version, English version is on updating. For Gen 5 controller, it comes with self-learning function, so when you connect the motor and Gen 5 controller and power on, the controller will read the motor data. It's more easy to make match work for new brand motors.

13.1 Self-Learning

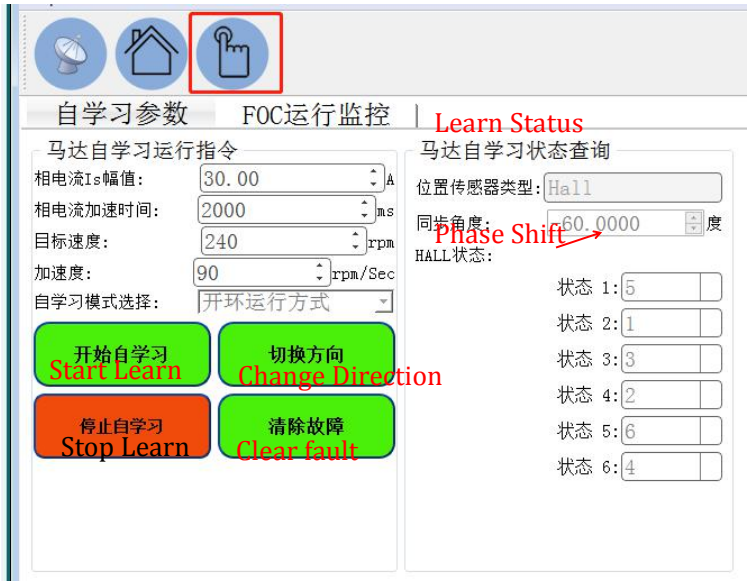
(1) Connection for motor and controller, battery

For self-learning, it should be connect three phase and hall plug for motor and controller, battery B+ and B- connected with controller.

(2) Connect controller with PC, and open software



(3) Click icon  , Click " start lean", the motor will be turn slightly, when it learn succeed, you can check the learn status.



13.2 Controller parameters setting

(1) Motor Parameters

" Motor type", "sensor type" will be shown as default.

"phase angle": you can choose the phase angle data according to motor, ask your motor supplier, they know it.

"phase shift": You can choose the phase angle data according to self-learn work.

“ Back EMF Constant”: this data don’t need to change.
“Max. Rpm”: You can ask your motor supplier for this data.
“Pole Pairs”: You can ask your motor supplier for this data.
“Phase Color”: there are “Y-G-B”(means yellow-green-blue), and “Y-B-G” (means yellow-blue-green) for choice, this data will be rated motor can run or not. It’s basic match for running motor. When you match with new motor, you can test it with two options. If the motor can run smoothly, the data is no problem.
“Hall Color”: there are “Y-G-B”(means yellow-green-blue), and “Y-B-G” (means yellow-blue-green) for choice, this data will be rated motor can run or not. It’s basic match for running motor. When you match with new motor, you can test it with two options. If the motor can run smoothly, the data is no problem.
“Motor forward & reverse”: when make it enable, the motor run direction will be reverse.

(2) Control Mode

There are three control mode for choice.
“speed control”: it means throttle was corresponding motor speed.
“torque control”: it means throttle was corresponding motor torque, this way with best control.
“volt control”: When a motor with 72v1000rpm, there is an algorithm in the controller that the throttle voltage corresponds to the motor speed. It’s similar to speed control.

(3) Voltage parameters.
The controller with two volt choice, when you plug out volt choose cable, it will be enable the first voltage parameters. when you plug in volt choose cable, it will be enable the second voltage parameters.
This is the first voltage choice.
“Battery volt”: Choose “48v” or “60” or “72V”.
“Overvolt”: it depends on your battery overvolt. Like your battery with overvolt 84V, you can set it in 84v
“Exit overvolt”: when the battery voltage higher than “overvolt”, it should be down lower than “exit overvolt”, the controller will rework.
“Undervolt”: it depends on your battery undervolt. Like your battery with undervolt 63V, you can set it in 63v
“Exit undervolt”: when the battery voltage lower than “undervolt”, it should be down higher than “exit undervolt”, the controller will rework.
“min. Work volt”: it’s means when battery reach this data, the controller will rework again.

(4) Second Voltage parameters

This was achieved by volt choice plug, when the plug connected, the controller will be use the second voltage paramteres.

(5) Current parameters

"Phase current": you can set this data ≤ your controller phase current.

"DC current": you can set this data ≤ your controller DC current.

(6) Controller temp set(no need to change)

When controller and motor with same temp sensor(for example KTY83-122), this function will be enable.

For sample order, temp sensor not included, only support for mass order customized.

"overtemp protect": this is temp data for stop work of controller.

"overtemp protect exit: after protected, and temp down to this data, the controller will rework again.

“temp control starting temp”: when controller reach this data, the contorller will start to limit current.
“temp control end temp”: when controller reach this data, the contorller will stop work.
“temp control terminal output ratio”: no need to change.

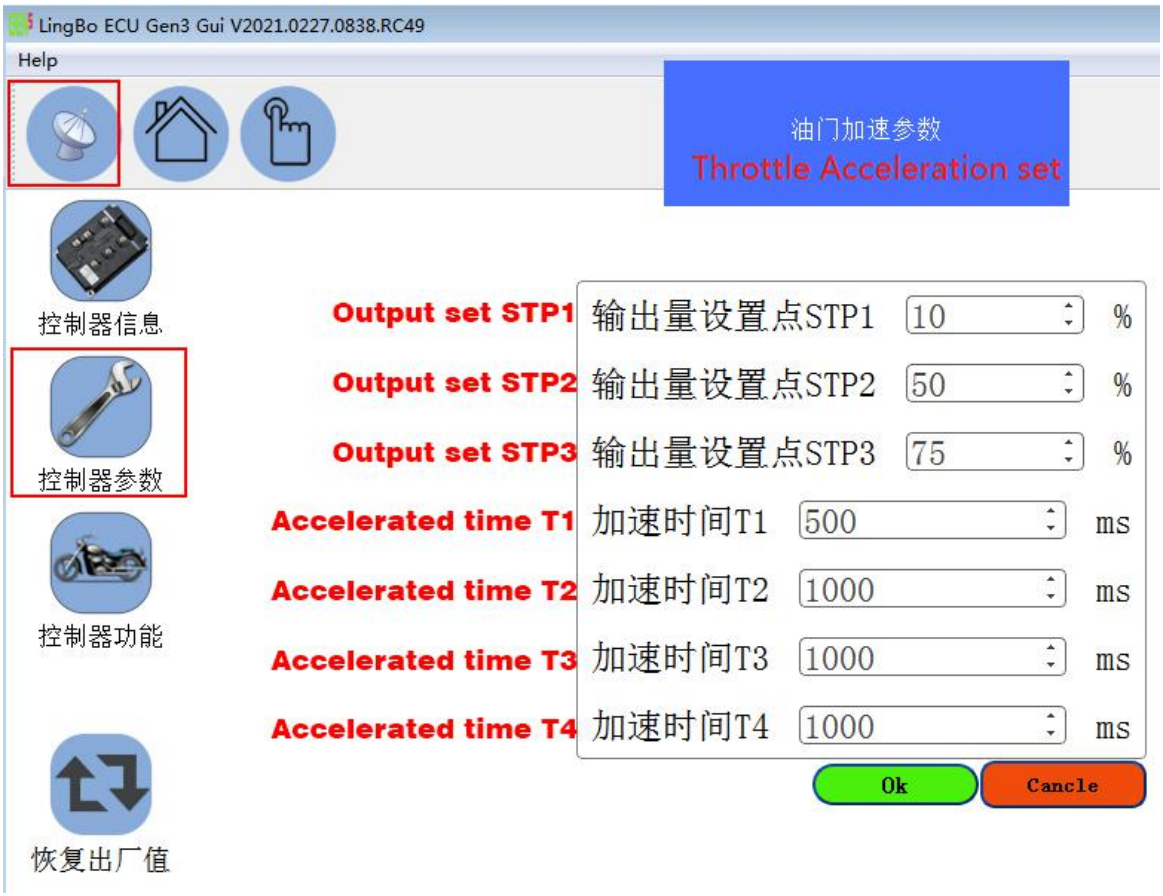
(7) Motor temp set(no need to change)

When controller and motor with same temp sensor(for example KTY83-122), this function will be enable.
For sample order, temp sensor not included, only support for mass order customized.
“overtemp protect”: this is temp data for stop work of motor.
“overtemp protect exit: after protected, and temp down to this data, the motor will rework again.
“temp control starting temp”: when motor reach this data, the contorller will start to limit current.
“temp control end temp”: when controller reach this data, the motor will stop work.
“temp control terminal output ratio”: no need to change.

(8) Throttle set & throttle acceleration set(no need to change)

For throttle paramteres, you can use the default parameters.


LingBo ECU Gen3 Gui V2021.0227.0838.RC49
Help
转把参数
Throttle Set
控制器信息
控制器参数
控制器功能
恢复出厂值
Throttle Effective start volt 转把有效起始电压 1.2 V
Throttle Effective end volt 转把有效终点电压 3.3 V
Throttle upper limit fault volt 转把上限故障电压阀值 4.0 V
Throttle lower limit fault volt 转把下限故障电压阀值 0.6 V
Throttle exit fault different 转把故障退出电压回差 0.2 V
Directional switch enable 方向性转把使能
Reverse throttle start volt 倒车转把有效起始电压 1.0 V
Reverse throttle end volt 倒车转把有效终点电压 0.8 V
Throttle characteristic curve 转把特性曲线选择 线性 Linear
Ponit 1 throttle offset voltage 设置点1的转把偏移电压 1.5 V
Point 1 output percent 设置点1的输出比例 10 %
Point 2 throttle offset volt 设置点2的转把偏移电压 2.0 V
Point 2 output percent 设置点2的输出比例 25 %
Point 3 throttle offset volt 设置点3的转把偏移电压 2.5 V
Point 3 output percent 设置点3的输出比例 85 %
Ok
Cancle


LingBo ECU Gen3 Gui V2021.0227.0838.RC49
Help
油门加速参数
Throttle Acceleration set
控制器信息
控制器参数
控制器功能
恢复出厂值
Output set STP1 输出量设置点STP1 10 %
Output set STP2 输出量设置点STP2 50 %
Output set STP3 输出量设置点STP3 75 %
Accelerated time T1 加速时间T1 500 ms
Accelerated time T2 加速时间T2 1000 ms
Accelerated time T3 加速时间T3 1000 ms
Accelerated time T4 加速时间T4 1000 ms
Ok
Cancle

13.3 Functions parameters setting

When the function background is gery, it means this function are not support for use.

(1) Three Speed

“Three speed mode”: You can choose “shift” or “switch” mode for use.

“low speed percent”: you can set it lower than middle speed percent.

“low speed DC limit”: this limit is for power out-put limit, you can set it ≤100

“low speed flux DC”: this data is flux weakening current, recommend no more 50A.

“middle speed percent”: you can set it lower than high speed percent.

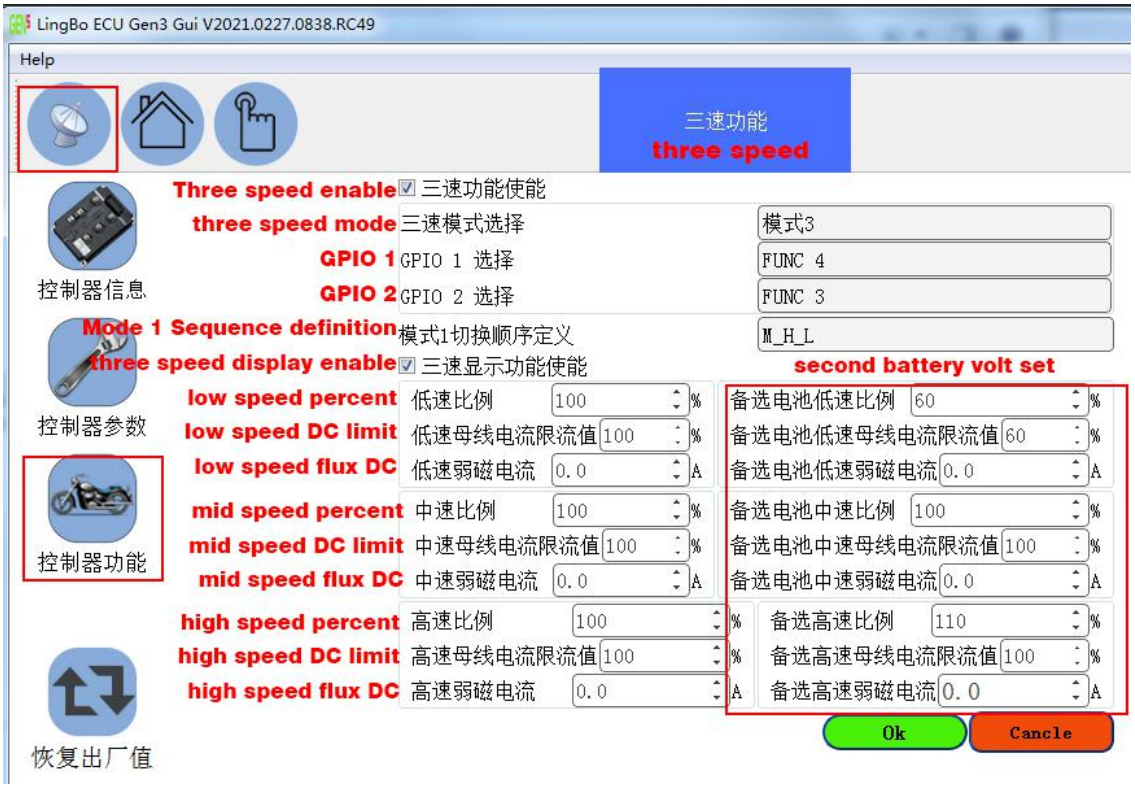
“middle speed DC limit”: this limit is for power out-put limit, you can set it ≤100

“middle speed flux DC”: this data is flux weakening current, recommend no more 50A.

“high speed percent”: you can set it ≤100.

“high speed DC limit”: this limit is for power out-put limit, you can set it ≤100

“low speed flux DC”: this data is flux weakening current, recommend no more 50A.



(2) Auto Weakening

“auot flus weakening”: you can enable it or disable it. This funtion is to make motor rpm higher than orignal.

“auot flus weakening phase volt percent”: when volt arrived in this data you set(like 95% of battery voltage), it will be enter to automatic flux weakening function.

“flux weakening DC”: this data determined weakening torque and motor rpm.

(3) Reverse

“Reverse enable”: when you need this function, you can enable reverse.

“reverse max. Output percent”: the percent is of forward speed.

“mini. Allowed reverse rpm”: this data was mini. Allowed to reverse(like 20rpm), it means when your motor with 20rpm, the reverse function could be enable, it does not required a complete stop to reverse. For safety, we do not recommend setting this value too high, it’s a risk.

“speed mode”: this is reverse speed enable.

“max. Speed percent”: it’s the reverse percent of forward speed percent.

(4) Boost

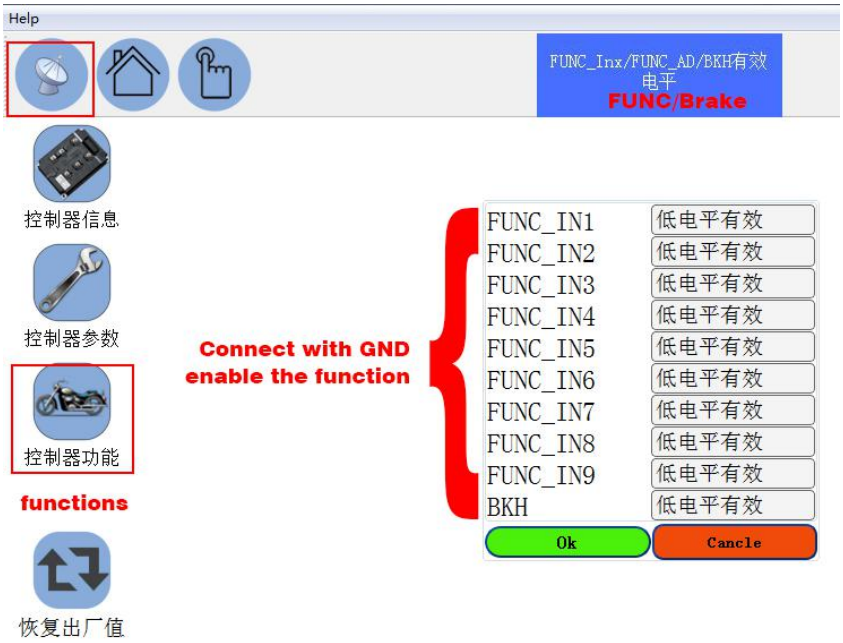
The boost intervals was boost start to boost 2nd stage time.

You can set it with your data.

(5) FUNC/Brake

This is port to customized your functions when the wiring not defined.

All function wires connect with GND enable the function.



(6) EBS

EBS function means e-brake.

“max. Brake torque ratio”: this ratio was related to brake strength.

“EBS max. Charge DC”: this data was regen/recharge current.

“EBS DC limit volt”: When the battery higher than this data, the controller will stop regen function to protect battery.

“EBS Enter speed”: when the speed at this data, the EBS enable.

“EBS exit speed”: when the speed at this data, the EBS disable.

(7) Speed Limit

Speed Limit Enable or Disable for choice.

“limit percent”: this is speed limit percent.

“DC limit”: this is data for dc limit when in speed limit mode.

(8) Cruise

You can choose it “auto cruise” or “manual cruise”.

(9) Key to Start

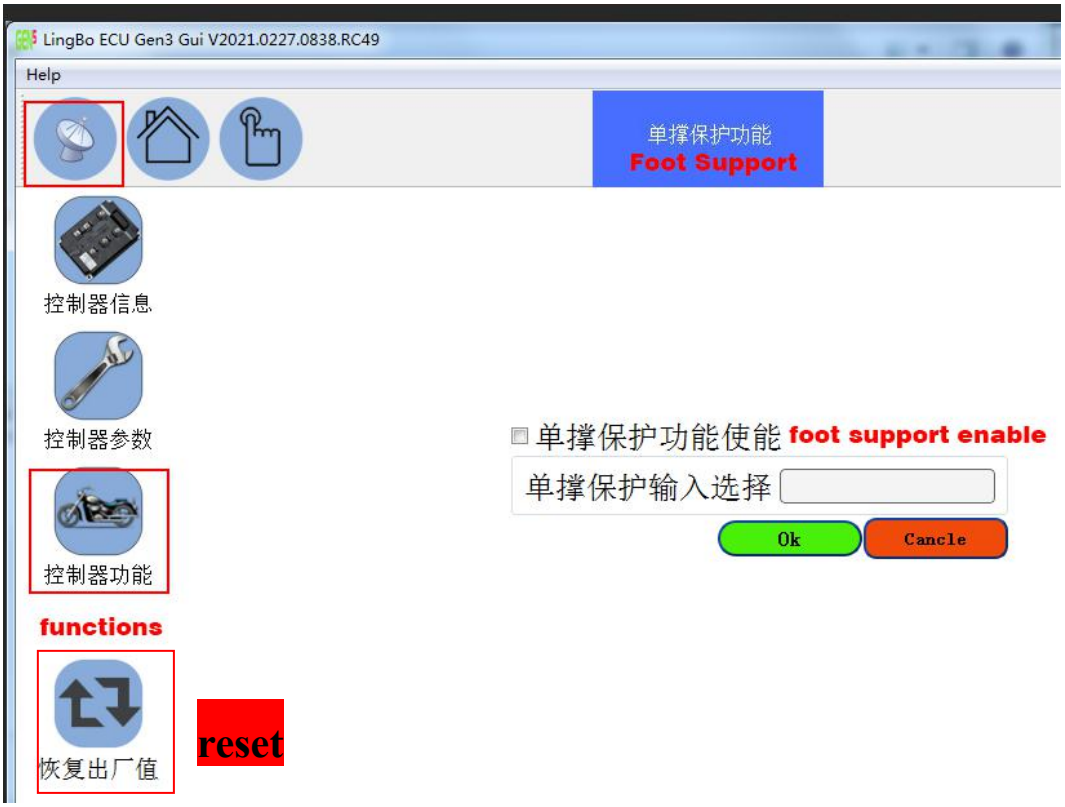
For the wiring connection of controller, you can connect

For Key GPIO choice, you can check a wiring without definition, then define this wire as key to start function.

The function wire is connect GND enable function.

(10) Foot Support

When enable foot support, it means when you stop your vehicle, and make your foot support on ground, the controller will closed up. This function wire should connect with GND wire directly, no need to add a switch.



14. Controller Fault Indication

fault	LED	fault	LED
overvolt	1	brake fault	9
undervolt	2	current sampling hardware failure	10
over current	3	controller overtemp	11
stall	4	FOC software fault	12
hall fault	5	motor overtemp	13
mosfet fault	6	throttle fault	14
motor phase loss	7	NVM parameter fault	15
motor over speed	8	motor self-learning fault	16

15. Contact

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