VOTOL EM Controller Program Manual

Non-profession do not operate!

This manual was explained in detail for the IV generation EM 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 Ⅳ generation of EM series 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 Ⅳ VOTOL generation EM series, the application update to download and parameter of the controller adjustment is not allowed.
Non-profession do not operate this software.

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

1. Software installation (only support win 7/10)

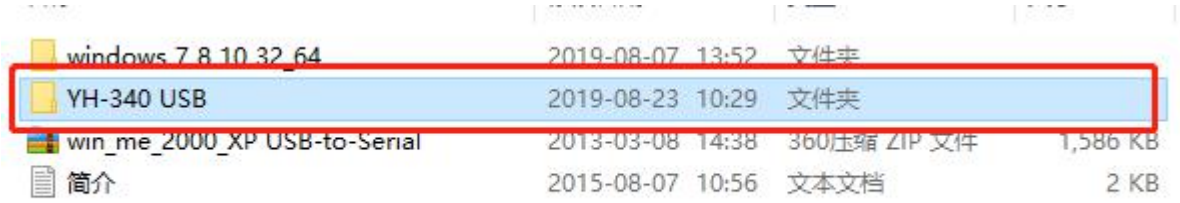
1.1 USB Driver Installation

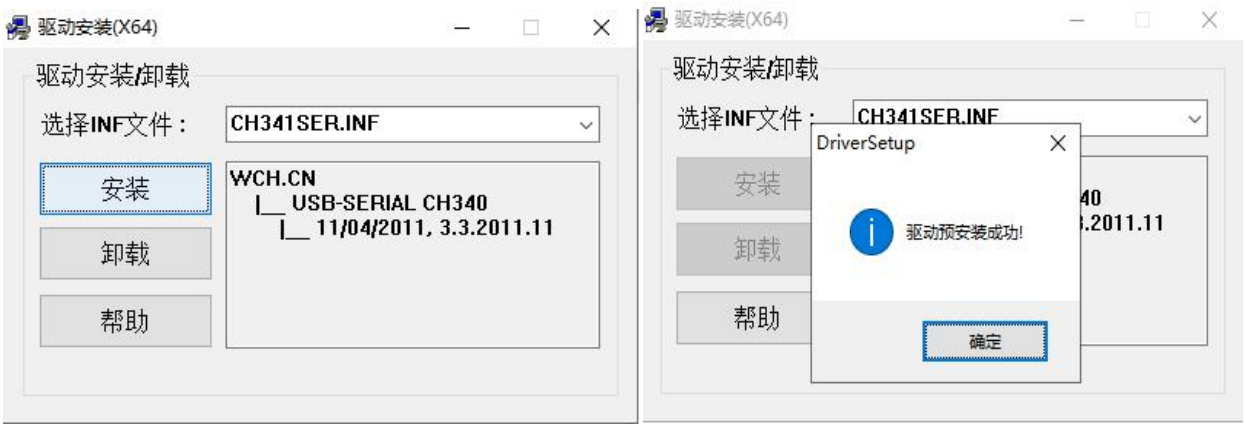
(1) Download the “USB-to-serial-win 10-20150814” file, decompressing file.

(2) choose the suitable driver with your computer for installation.
win7,win8, win 10 are available.

1.11. Decompress the operation first

2. Unzip the YH-340 USB package and select CH341SER.EXE to install it.



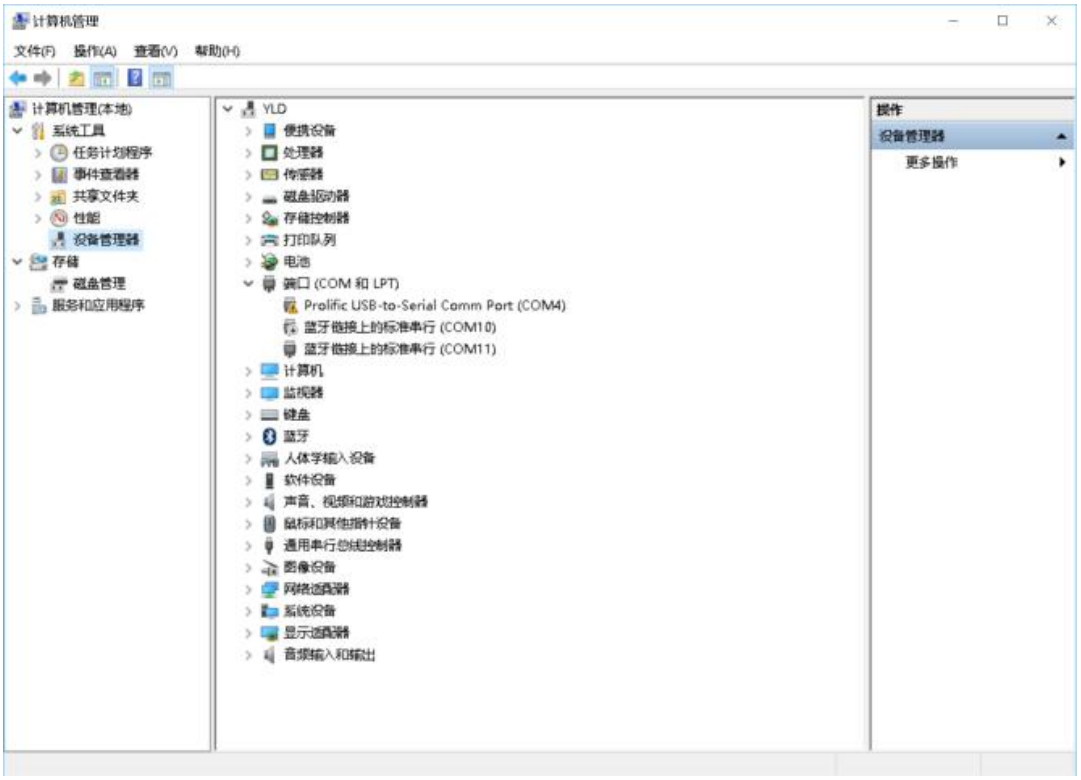


Follow the steps above to install

(3) After installation, please connect the USB cable with controller and computer.
If it’s unable to connect, pls Check below steps

Right click“my computer” 

in the desktop



then click “device manager”

choose “port(COM & LPT)”

choose the COM with“!”, click “search automatically for updated driver software

Close the software when you finish

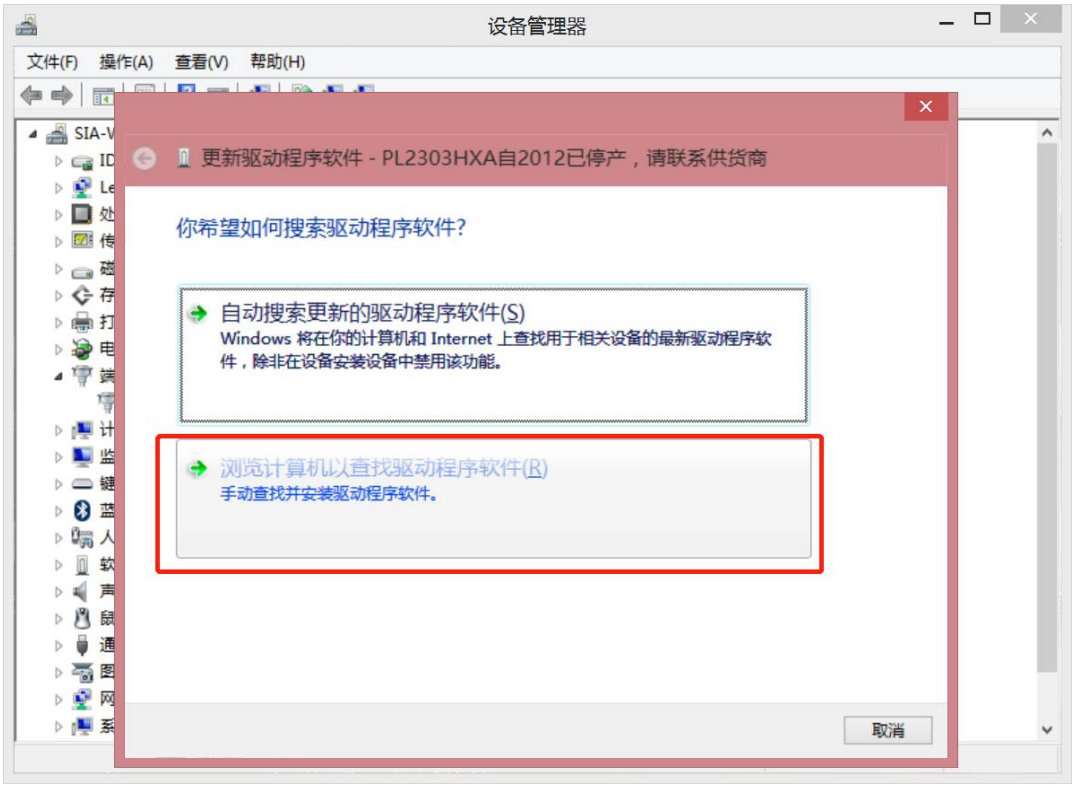
After running, please run the software directly: EM_V3 series debugging program;

If the port has"自 2012 已停产，请联系供货商(Pls contact supplier if it is stop production since 2012)"

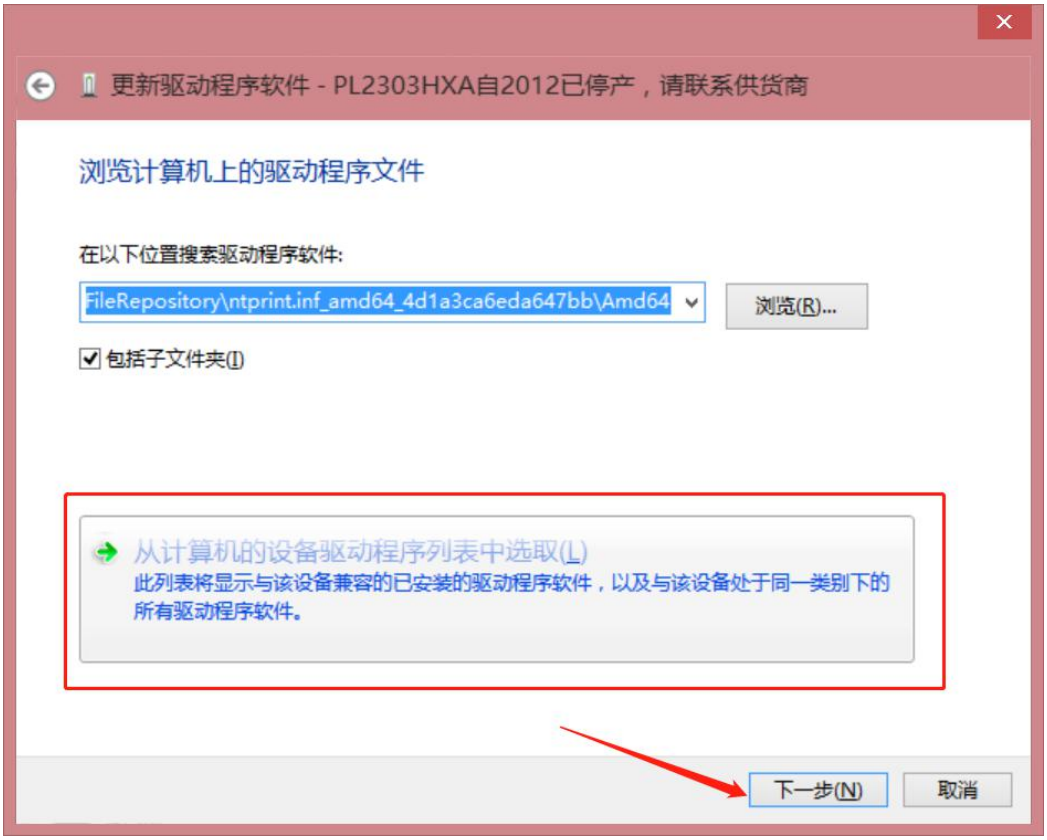
Methods and steps:

First step: Install driver PL2303_Prolific_DriverInstaller_v110

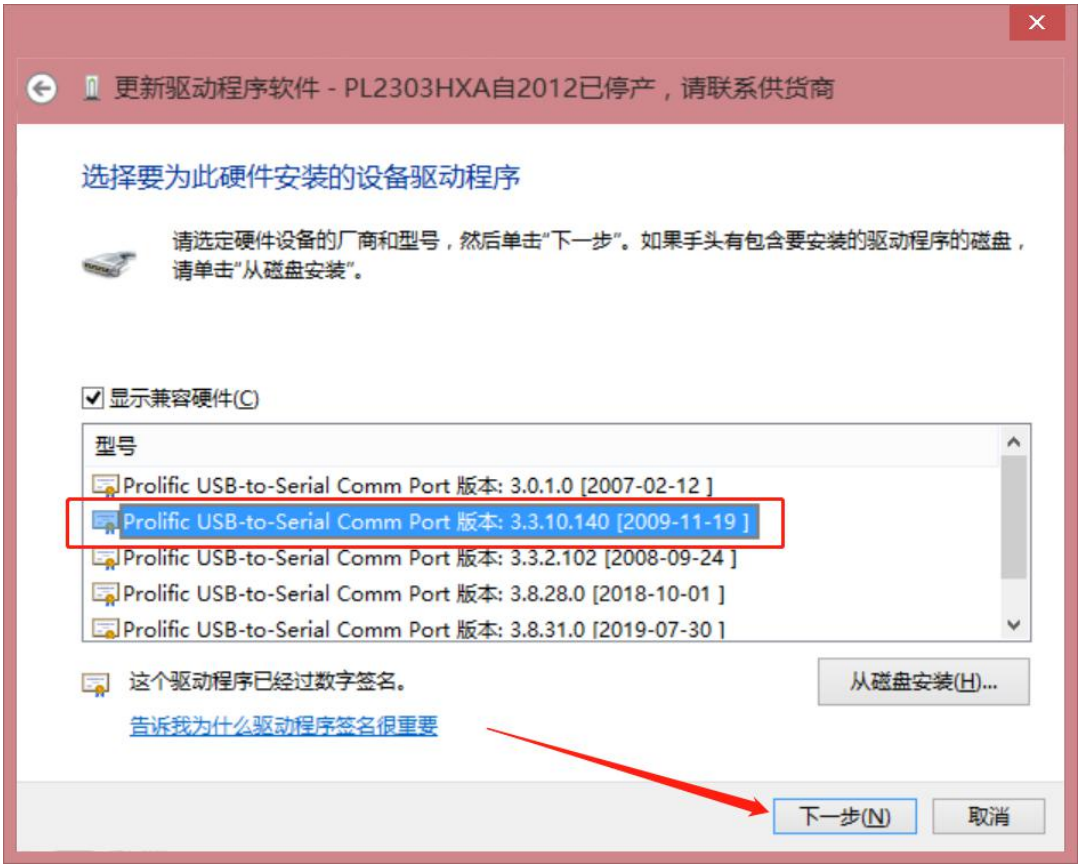
Second step: Right click to update the driver and select Browse Computer to find the driver software.



Third step: Click to select from the list of drivers for your computer;



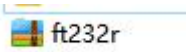
Fourth and finally, select version 3.3.10.140 (2009-11-19), click Next, close the window when finished;



Close the window when finished.

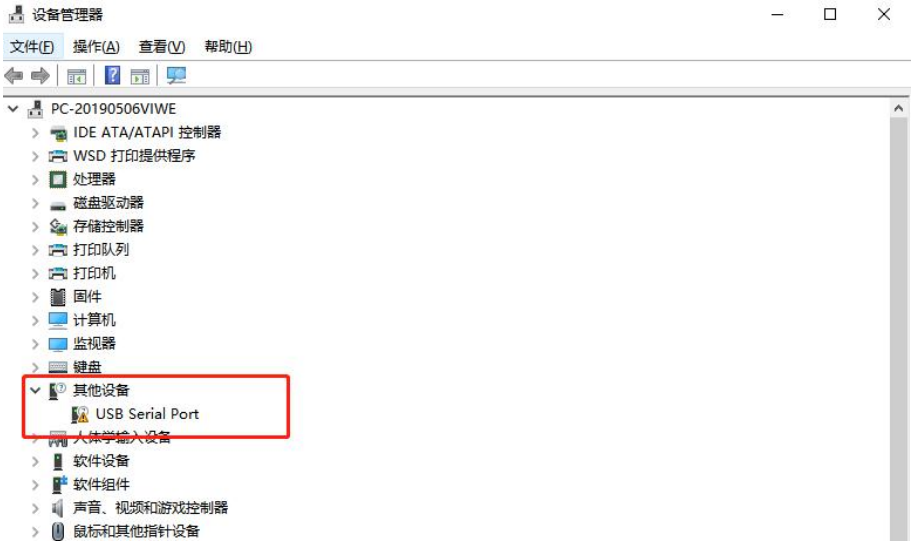
Please run "Em_V3 Series debugging program" directly after completion.

EM150-2 EM200-2 EM260 series controller



①Unzip ft232r or "ft232r usb uart driver for EM150-2 series" file

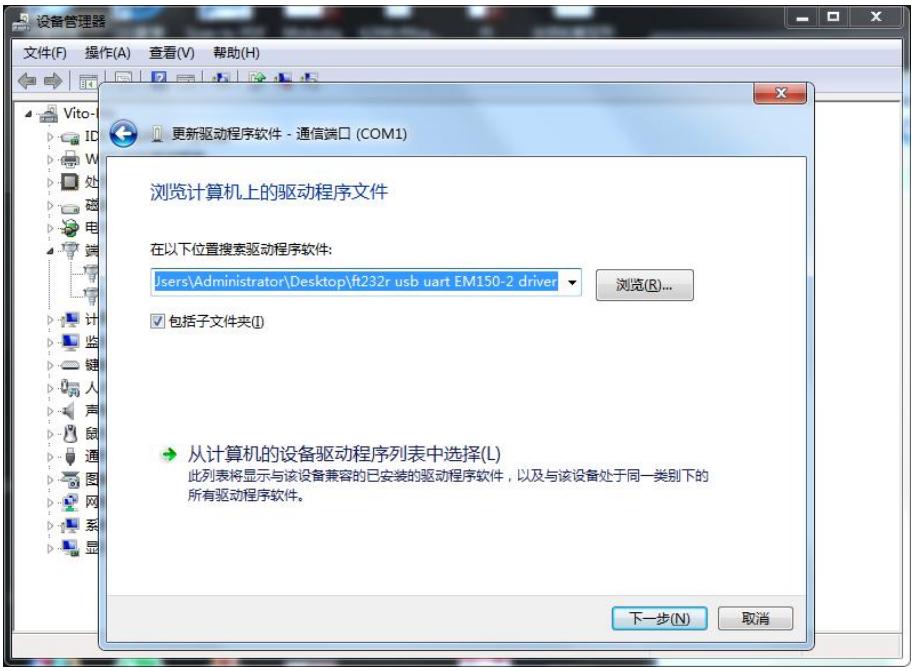
②Connect program cable with PC, if there is exclamation mark in device management, it need install the driver.



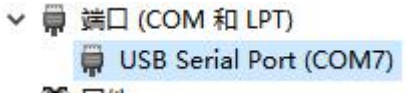
③ right click USB Serial, choose update.

④ click scan software in my PC

⑤ choose the file, click next step.



⑥ if there is no exclamation mark, it install successfully. If not, please plug out and in of the program cable and try again. please try twice if not work.



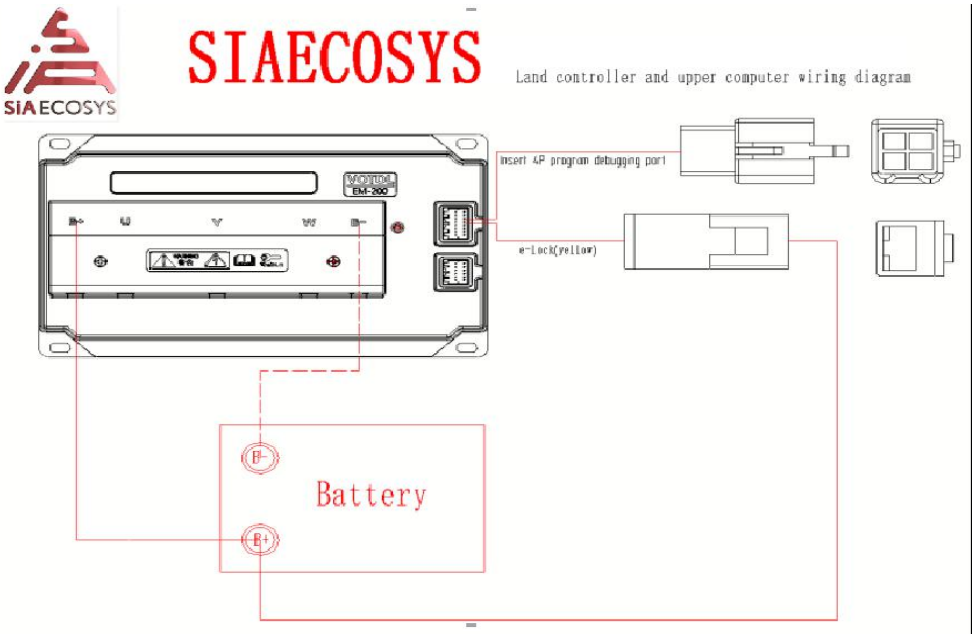
2. Controller connection

2.1 Connect controller

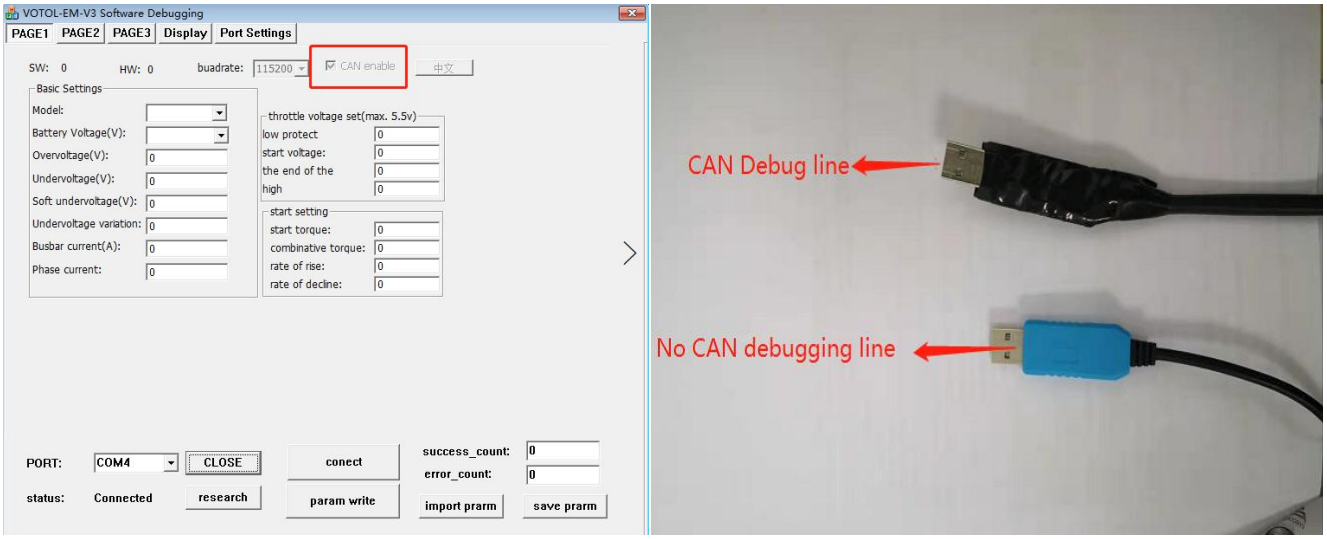
Controller host computer simple wiring diagram

Description: controller B+ connects battery B+ controller B-connects battery B-, controller electric door locks connect battery or controller B+;

The USB debug line is connected to the controller debug port;

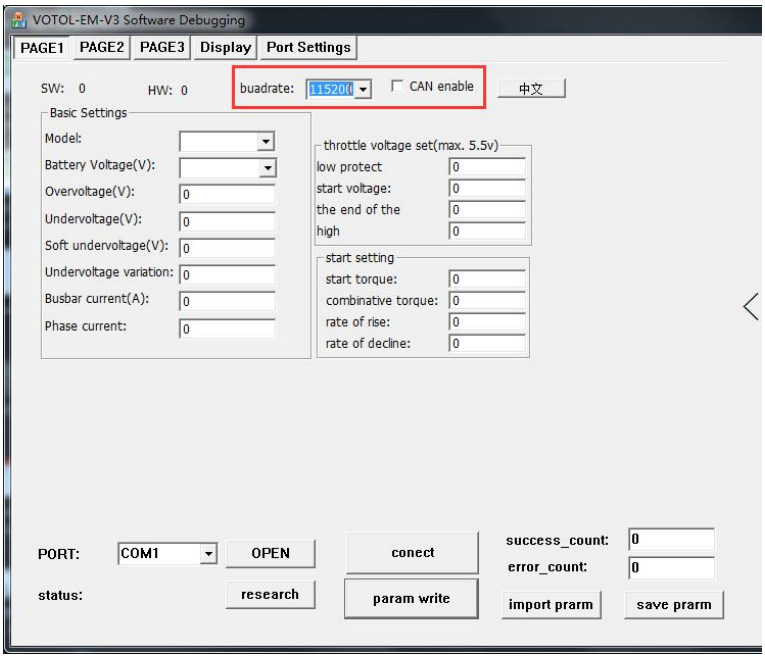


2.1.1 According to the controller with CAN or without CAN to select the appropriate USB debug line; with CAN controller need to check the CAN enable, without CAN does not need to check; EM200 controller needs to exchange the debug line CAN-H and CAN- L , otherwise can't connect the controller;

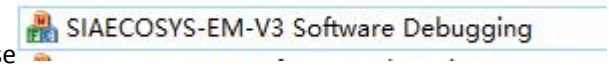


EM150-2 EM200-2 EM260, there need new program cable.

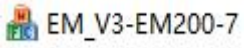
Choose 115200 in page 1, not tick CAN enable.



2.1.2 Host computer selection

EM50 EM100 EM150 without CAN choose 

EM50 EM100 EM150 with CAN choose 

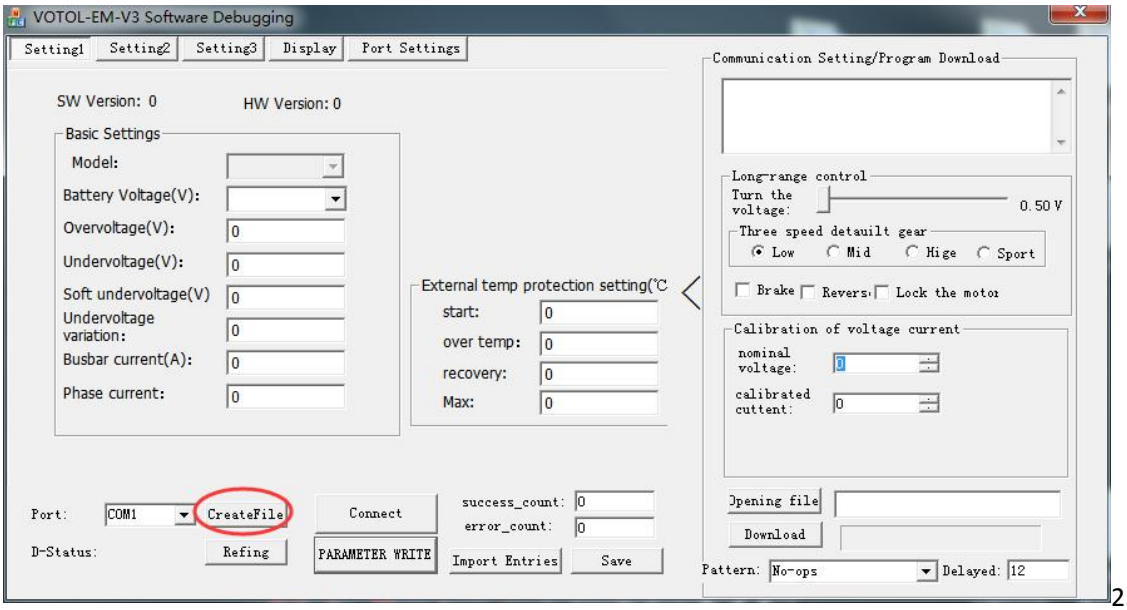


EM200 choose

EM50 EM100 EM150 EM200 model XY-03-P with CAN and without CAN can share a host computer

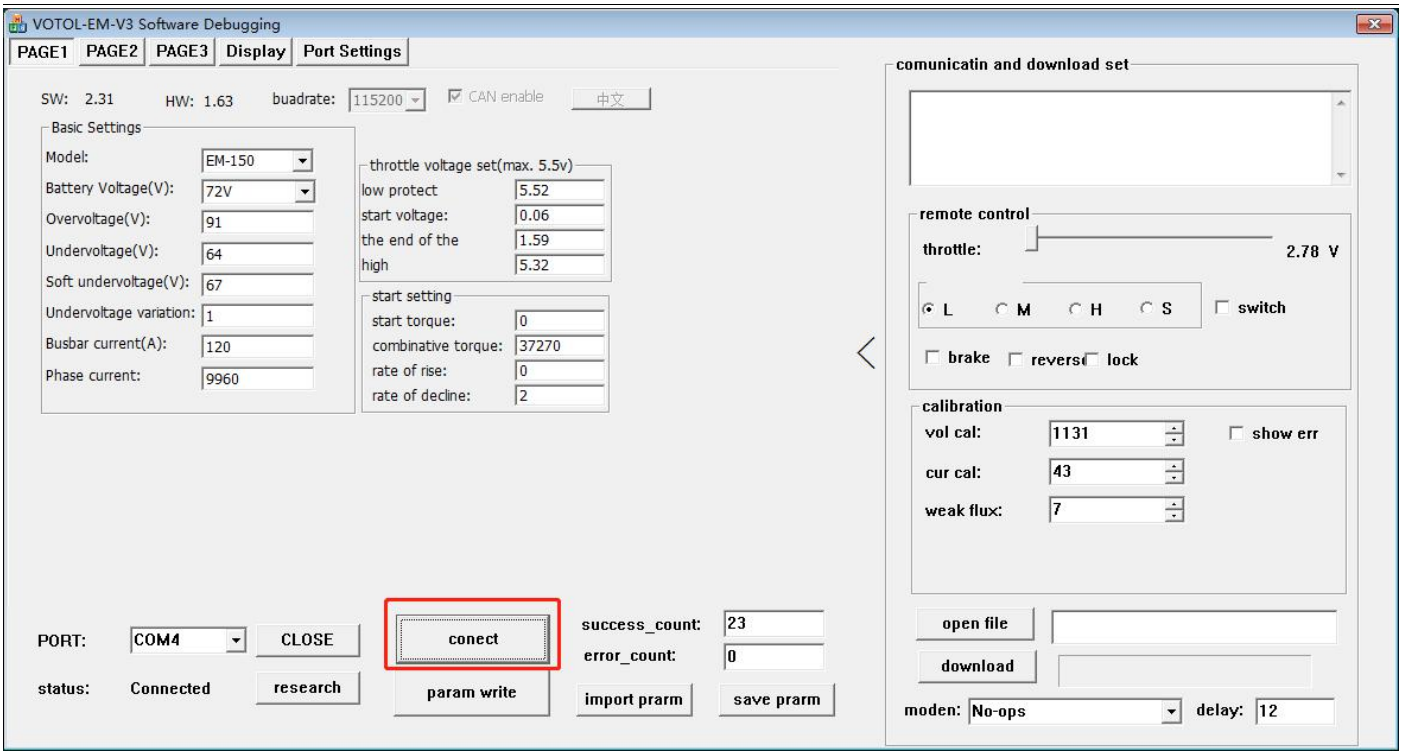
Specific host model needs to inquire the related sales;

3 Open the computer device manager before connecting to the computer to check whether the USB port is successfully installed. Select the appropriate host computer to connect the host computer to the serial port when the controller is not powered. After selecting the corresponding serial port on the device port, click CreateFile.



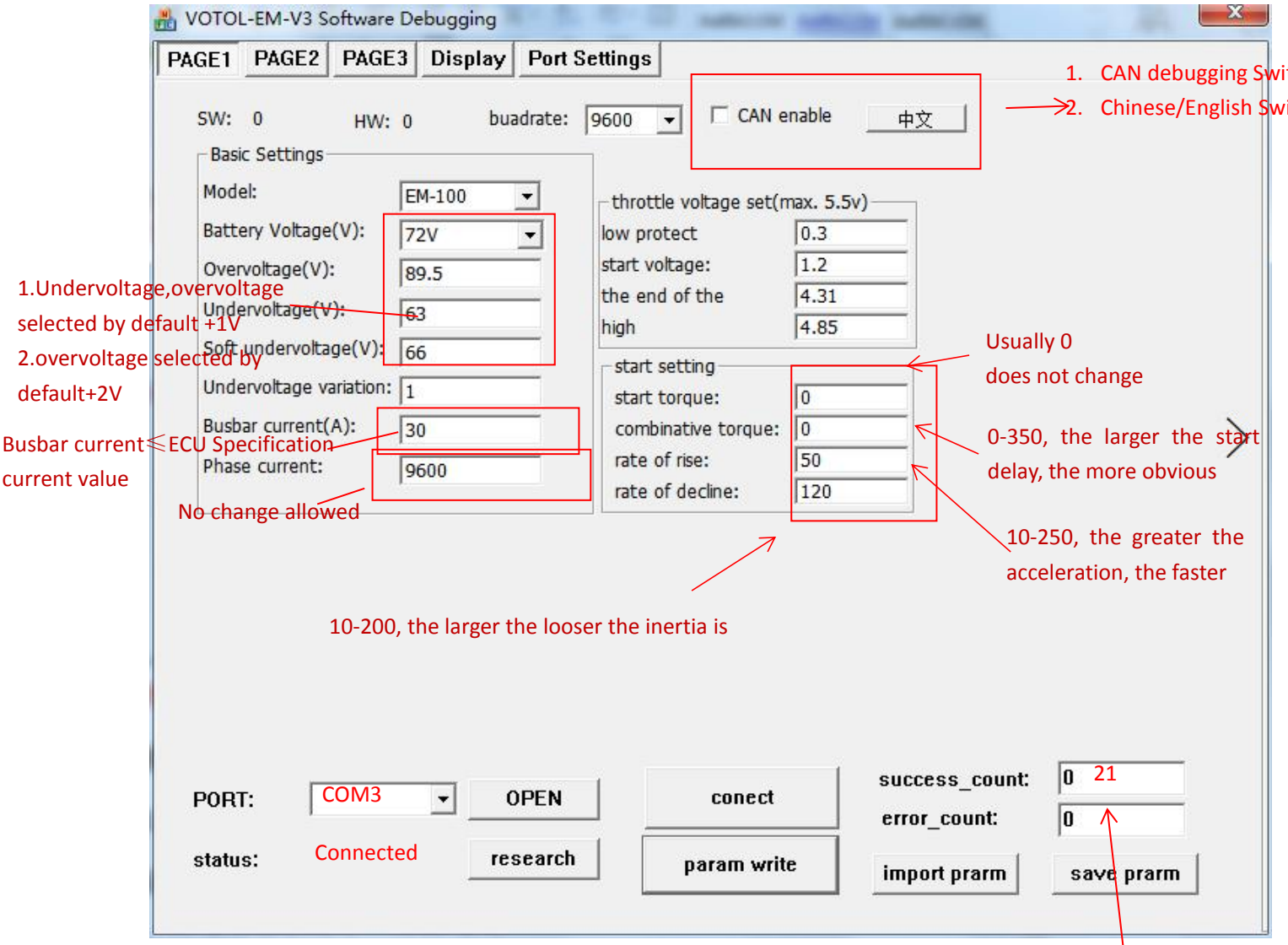
2.2

Then power on (connect with e-lock), click connect (in setting 1 page), the nominal voltage should not be 0. If it's 0, click connect again.


VOTOL-EM-V3 Software Debugging
PAGE1
PAGE2
PAGE3
Display
Port Settings
SW: 2.31
HW: 1.63
buadrate: 115200
CAN enable
中文
Basic Settings
Model: EM-150
Battery Voltage(V): 72V
Overvoltage(V): 91
Undervoltage(V): 64
Soft undervoltage(V): 67
Undervoltage variation: 1
Busbar current(A): 120
Phase current: 9960
throttle voltage set(max. 5.5v)
low protect 5.52
start voltage: 0.06
the end of the high 1.59 5.32
start setting
start torque: 0
combinative torque: 37270
rate of rise: 0
rate of decline: 2
comunicatin and download set
remote control
throttle:
2.78 V
L
M
H
S
switch
brake
reverse
lock
calibration
vol cal: 1131
show err
cur cal: 43
weak flux: 7
PORT: COM4
CLOSE
conect
success_count: 23
error_count: 0
status: Connected
research
param write
import prarm
save prarm
open file
download
moden: No-ops
delay: 12

3. The setting

1. SETTING PAGE 1



Steps to connect the upper computer:

1. Power on the controller,Connect the electric door lock, connect the serial port to the controller adapter cable and plug it into the computer

2.Open the upper computer debugging interface, as shown in the figure above. In the setting interface 1, click to search again. After the com? Appears on the device port, click to open the serial port. The device status shows that it is connected. Click to connect the controller. The corresponding number will pop up here and the connection success data will pop up. The connection is successful.

1.1: Voltage equipment

1.1.1、Battery voltage setting: Corresponding to the ECU voltage, over pressure is not allowed.

1.1.2、Lead-acid battery over voltage, under voltage, soft under voltage basic value default: due to software settings defects, the original voltage compensation +1V.

1.1.3、The lithium battery is set according to the actual lithium battery parameter value. Due to software setting defects, the original voltage compensation +1V. The original lithium battery parameters are compensated for +1V, and the total compensation is +2V.

1.1.4、Attention

1.1.4.1、Over voltage fault: After open the electric door lock, the vehicle doesn't move. The Controller over voltage protection function starts.

1.1.4.2、ECU under voltage fault: due to the lithium battery protection board over voltage device is too high or the under voltage setting is too low, resulting in lithium battery protection, burning MOS.

1.2：Current device

1.2.1、Bus bar current setting: The current is selected according to the ECU specification model.

VOLTAGE / MODEL	EM-30S	EM-50	EM-50S	EM-100	EM-100S	EM-150	EM-150S	EM-200	EM-300
48-60V	33A	45A	50A	85A		120A	150A	200A	400A
72V	33A	45A	50A	85A	100A	120A	180A	200A	400A
84V	30A	45A		80A		120A			
96V		40A		70A		100A		180A	350A

1.2.2、Phase current setting: can only be adjusted downwards.

1.2.3、Attention

1.2.3.1、Setting the bus bar current too high, causing the ECU burn MOS.

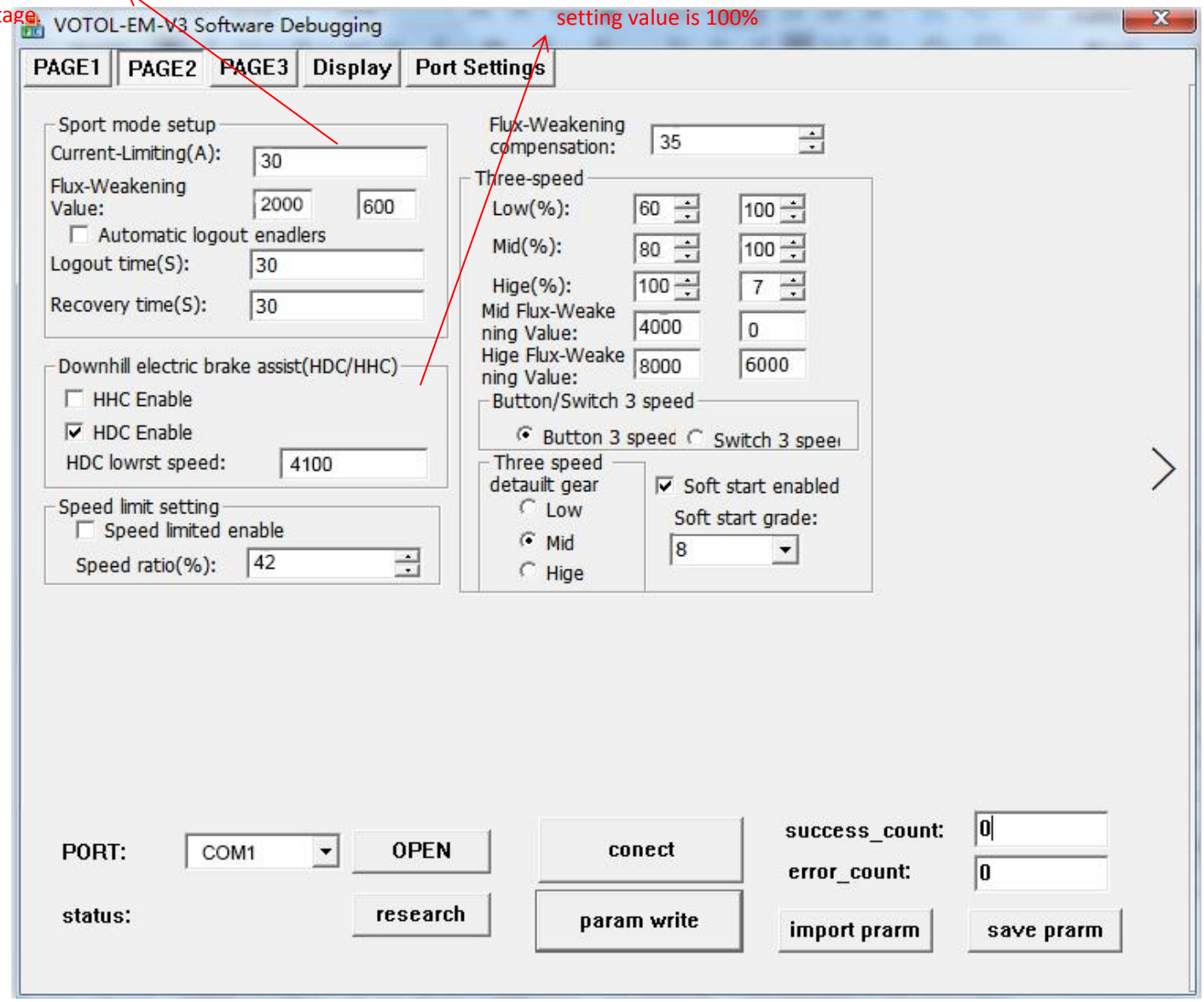
1.2.3.2、As the phase current value decreases, the corresponding motor stall protection time is shortened.

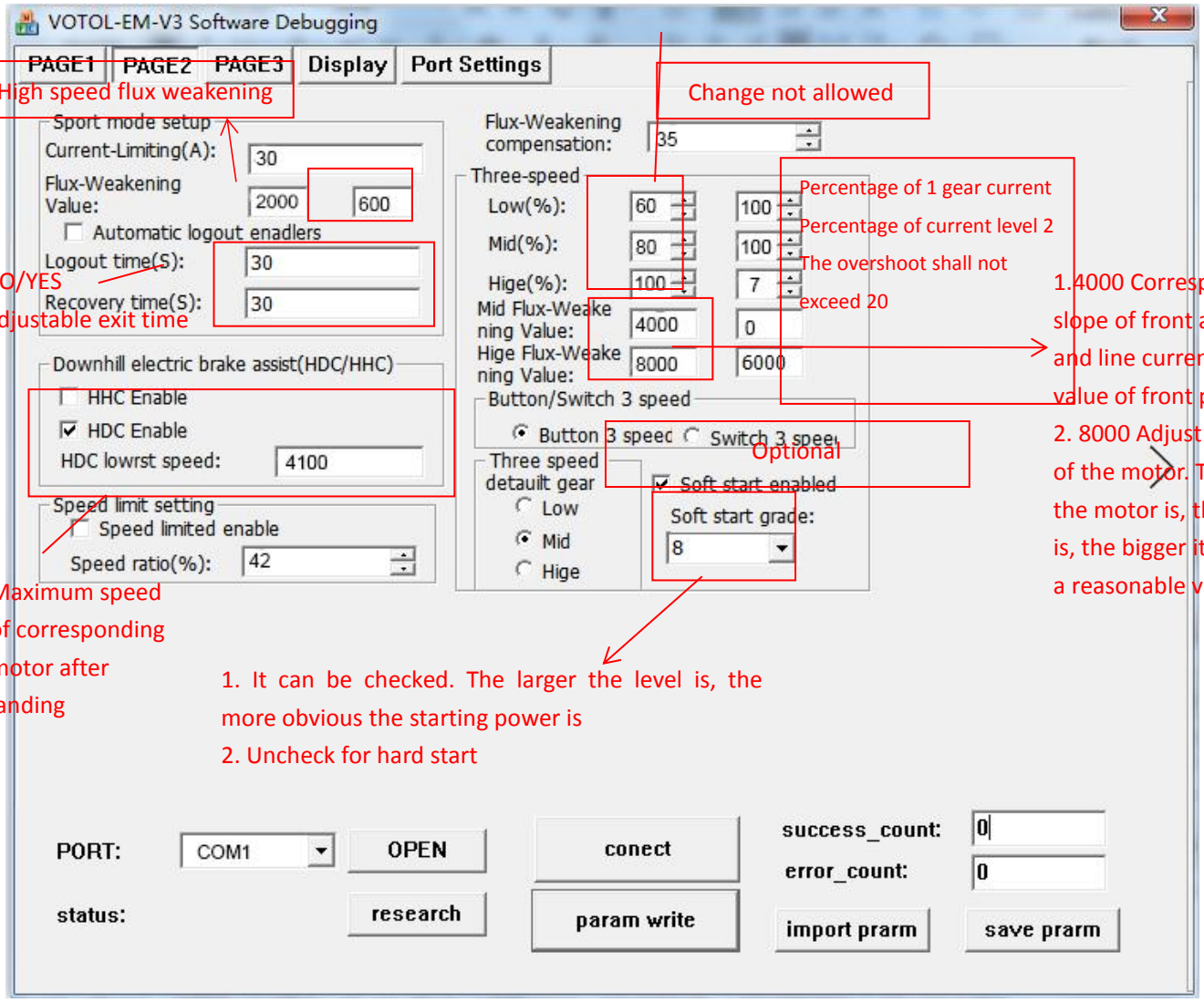
2. SETTING PAGE 2

Adjust motor jitter

1. The motor shakes more and more to the major
2. The motor does not shake to minor adjustment, take a reasonable value, range 100-1200, 50 each stage.

Three speed percentage, landing maximum speed setting value is 100%





1. NO/YES
2. Adjustable exit time

1.4000 Corresponding slope of front acceleration and line current limiting value of front phase
2. 8000 Adjust the sound of the motor. The louder the motor is, the smaller it is, the bigger it is, and take a reasonable value

Maximum speed of corresponding motor after landing

1. It can be checked. The larger the level is, the more obvious the starting power is
2. Uncheck for hard start

2.1： Parameters setting for sports mode(S gear)

2.2.1、 Bus bar current setting: According to the controller type current corresponding to the selection, absolutely no over current is allowed.

VOLTAGE / MODEL	EM-30 S	EM-50	EM-50S	EM-100	EM-100S	EM-150	EM-150S	EM-200	EM-300
48-60V	35A	50A	55A	100A	----	200A	----	320A	550A
72V	35A	50A	55A	100A	150A	200A	250A	320A	550A
84V	33A	50A	50A	100A	----	180A	----		
96V	----	45A	50A	80A	----	130A	----	250A	500A

2.2.2、Sport mode flux weakening value：Flux weakening value for S gear: the parameter value is <3000, and the vehicle speed is adjusted according to the motor parameters. BOOST weak magnetic value> high speed weak magnetic value

2.2.3、Auto exit function: tick to jog key / uncheck to long press key, select one from two.

2.2.3.1、Check to make the jog effective. The weak magnetic time enters the exit and can be adjusted.

2.2： Downhill electric brake assist：start by select “HDC Enable”, downhill electric brake assist (slow down in steep slopes) function. Enable electric brake by enter minimum speed, if less than the speed, the function will be invalid.

2.2.1、 Downhill brake assist function: the speed of entering downhill brake assist function is set according to the actual road test speed standard according to the motor parameters.

2.2.2、 Note: The drum motor is not suitable for use, resulting in loose motor shaft.

2.3、 Flux weakening compensation: only valid when the inner rotor motor type is selected as V-shaped magnetic steel

Note: The maximum value of 255 is generally filled in 95

2.4、Three gear setting：Confirm the motor base speed value adjustment setting parameter value. The basic speed is filled in according to the <Appendix EM_V3 Parameter Adjustment Calculation Formula>.

2.4.1、The low, medium, high, and third speed values are valid within 100% of the parameter value, and the medium, high, and high speed values are exceeded and the 100% parameter value is filled. Exceeded by weak magnetic file (medium, high, BOST)

2.4.2、In the flux weakening area, the actual parameters of the motor are adjusted, and the vehicle speed is based on the road test.

2.4.3、Single voltage mode: The high voltage value is invalid.

2.4.4、Attention

2.4.4.1、 Drum motor: 60KM/H motor weak magnetic speed is less than <120%, 80KM/H motor weak

magnetic speed is less than <125%, 110KM/H motor weak magnetic speed is less than <135%.

2.4.4.2 Inner rotor motor Hall: The built-in Hall weak magnetic speed is less than <135%, and the external Hall weak magnetic speed is less than 170%.

2.4.4.3、Internal rotor motor magnetic knitting: Built-in flux weakening speed <230%.

2.4.4.4The motor base speed exceeds 100% of the motor speed value and enters the weak value zone adjustment parameter. BOOST>High speed weak magnetic file.

2.4.4.5 Weak magnetic failure: The flux weakening value exceeds the motor and controller parameter values, causing the motor to demagnetize and the controller to burn MOS.

2.5、Jog/push selection: choose one

2.6、The three-speed default gear: the electric door lock opens the default several options.

2.7、Soft start setting: The smaller the value, the softer the start.

2.8、Speed limit setting:

2.8.1、Function selection: speed limit, unlimited speed, two choices, default speed limit

2.8.2、The speed limit speed is calculated based on vehicle parameter requirements. <Appendix EM V3 parameter adjustment calculation formula>

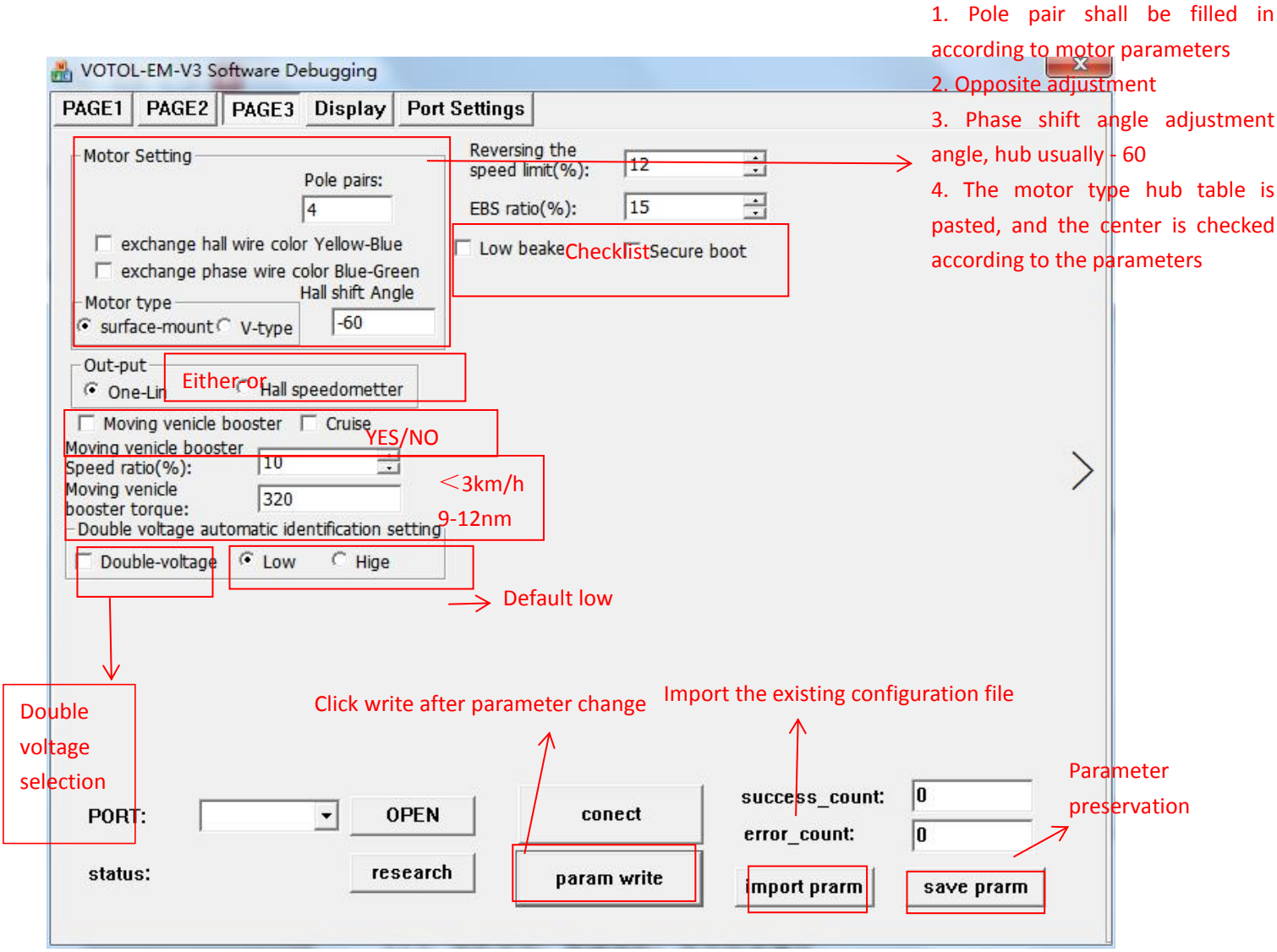
2.8.3、The upper limit speed and the solution speed limit are determined according to customer requirements.

2.8.4、Speed relation of electric brake setting corresponding to weak magnetic acceleration: the speed corresponding to the highest landing speed of the motor is set by the auxiliary enable of downhill electric brake. When the setting value is lower than the rated speed of the motor, weak magnetic acceleration is not required or optional. When the setting value is higher than the rated speed of the motor, weak magnetic acceleration is required. Note: due to the loss of motor landing relative to no-load, the setting value of downhill electric brake enabling is usually ≤ (motor basic speed + maximum gear flux weakening value) speed.

2.8.5、Judge whether the maximum speed demagnetization value is reasonable. First, check the d-axis current under the speed setting value of downhill electric brake enable. If the d-axis current value is multiplied by 1.2 times, it is the setting value of the maximum demagnetization value (the second gear demagnetization value on the setting page). For example, if the downhill point brake enable value is 800, the motor turns to 800, and the d-axis current displays 500, then the maximum speed demagnetization value is 500 × 1.2 = 600

Explanation under d-axis current

3. SETTING PAGE 3



3.1、 Motor Setting：

3.1.1、Motor pole pairs：Fill in according to the motor manufacturer parameters.

3.1.2、Hall phase shift angle：Fill in according to the motor manufacturer parameters.

3.1.3、Motor type：Fill in according to the motor manufacturer parameters.

Note: Wheel Hub motor is surface mount

3.1.4、Hall, phase line exchange: exchange the motor forward and reverse.

3.2、The controller to speedometer date output has 2 types: Single-line speedometer and hall speedometer, it needs to be decided by the vehicle's speedometer.

3.3、Moving assist and cruising function：Used in two-wheelers

Note: Speed "3KM / H, torque 9 ~ 19N.M

3.4 Cruise function: function selection, the default does not open.

3.5 Dual voltage setting: default single voltage。

Note: The dual voltage function speed parameter value is followed by the motor speed setting. Adjust the parameters on the setup page 2.

3.6、 Reversing speed limit: The calculation formula is adjusted with reference to the EM_V3 parameter adjustment calculation formula file.

Note: The speed of the two-wheeler is 5KM/H, and the tricycle is 15KM/H.

3.7、Reversing, EBS setting, low brake selection, starting safety switch function。

3.7.1、According to the weight of the vehicle (recommended within 30%)

3.7.2、Two-wheeler 35~60 interval

3.7.3、Two-wheeler 45~75 section

3.7.4、 Energy recovery with lithium battery parameter value equipment, the actual road test shall prevail. BMS protection results in burning MOS. Jianyi rushing discharge branch.

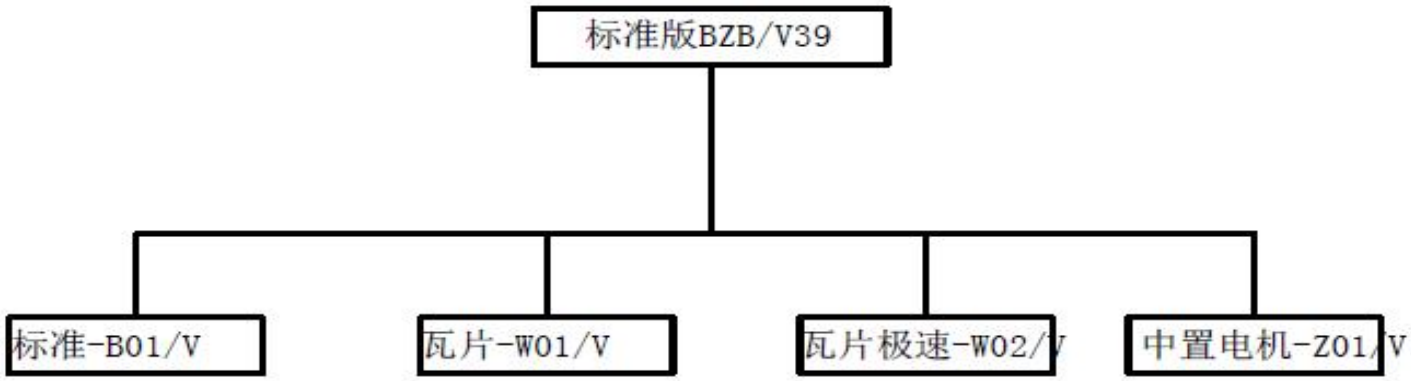
3.8、Low brake enable: brake signal high and low brake, default high brake, check low brake.

3.9、Safety Switch Function valid checked

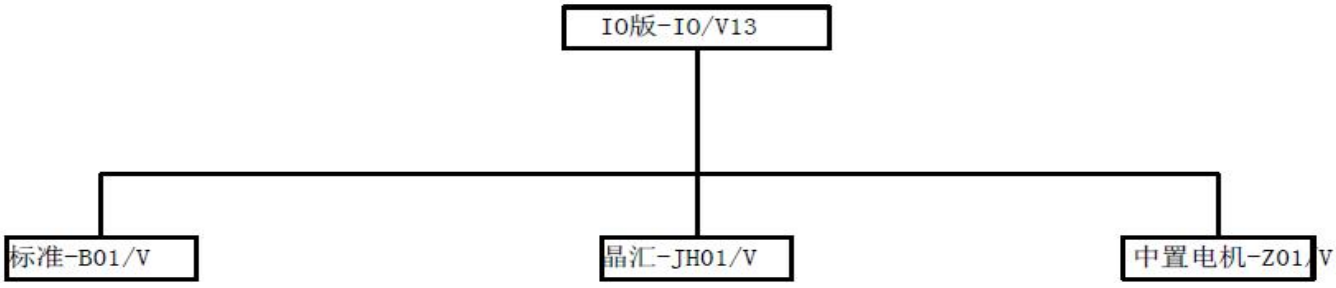
3.10、Import configuration files: configured files are imported from the computer

3.11、Save configuration file

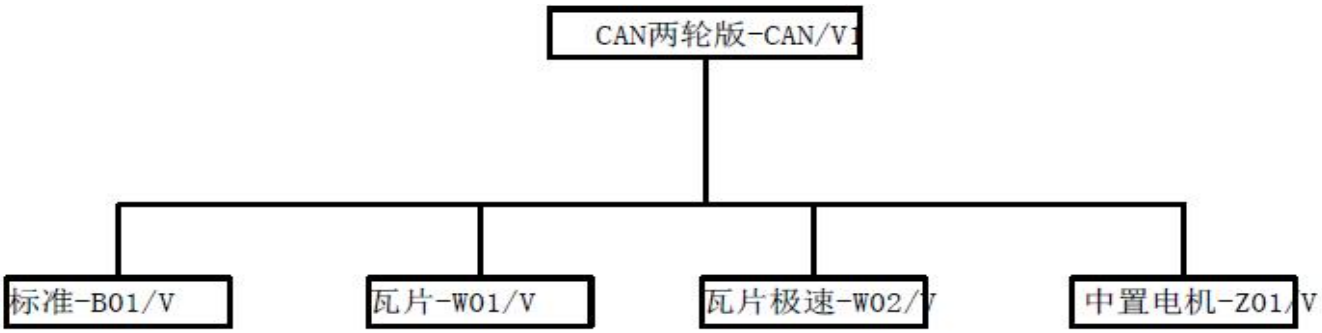
Standard Edition： BZB/V39



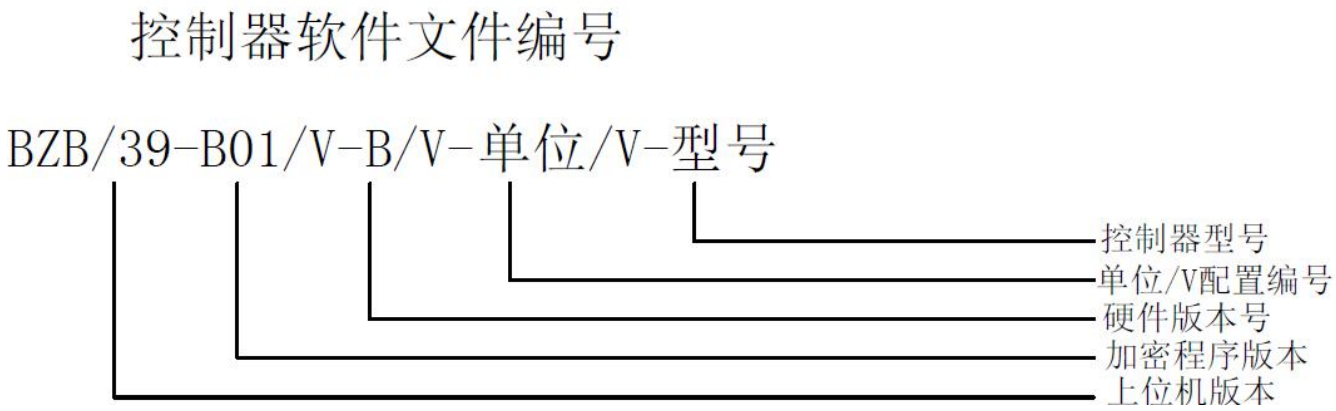
IO / V13 interface of IO version



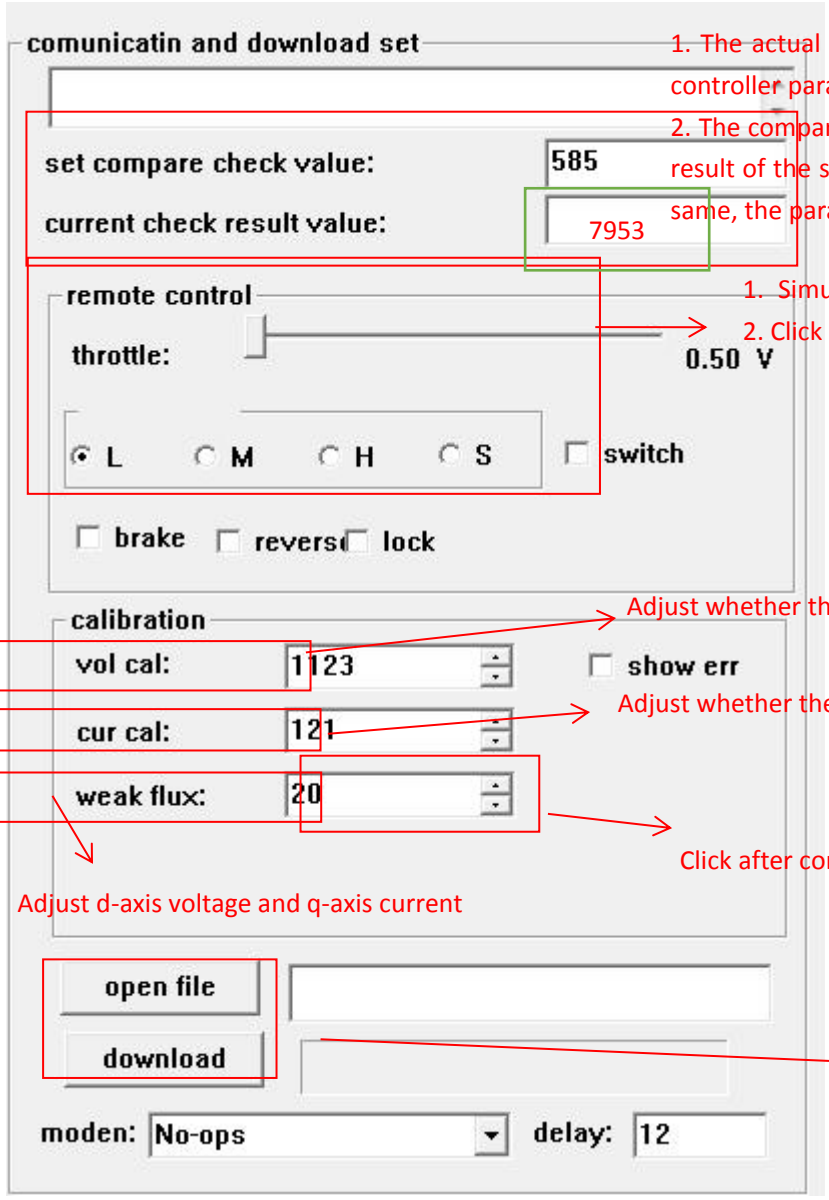
CAN-CAN/V1



Naming method



4. Expanded page



1. The actual value corresponds to the first inspection result of controller parameter software.
2. The comparison value corresponds to the parameter software result of the same batch of controllers. If the two values are the same, the parameters are the same.

1. Simulate the turning handle and function of the whole vehicle.
2. Click remote control first during operation

Adjust whether the display voltage is consistent with the actual voltage

Adjust whether the display current is consistent with the actual current

Click after configuration parameter import and software download

Adjust d-axis voltage and q-axis current

Download bin software

4.1 update ECU program.

4.1.1 connect the serial port line and the upper computer and controller successfully.

4.1.2 open the "bin" file, select the bin file and download it. The prompt "CCC The last digit of "d" shows

"d", indicating that the download is successful. Serial port line is divided into the following models: em-30 ~ em-150 general, em-200, em-300, can

4.2: import configuration

4.2.1: select the INI file, open the file, import the controller parameters, and receive the prompt "import succeeded"

4.3: change configuration

4.3.1: connecting the controller

4.3.2: change parameters to be modified

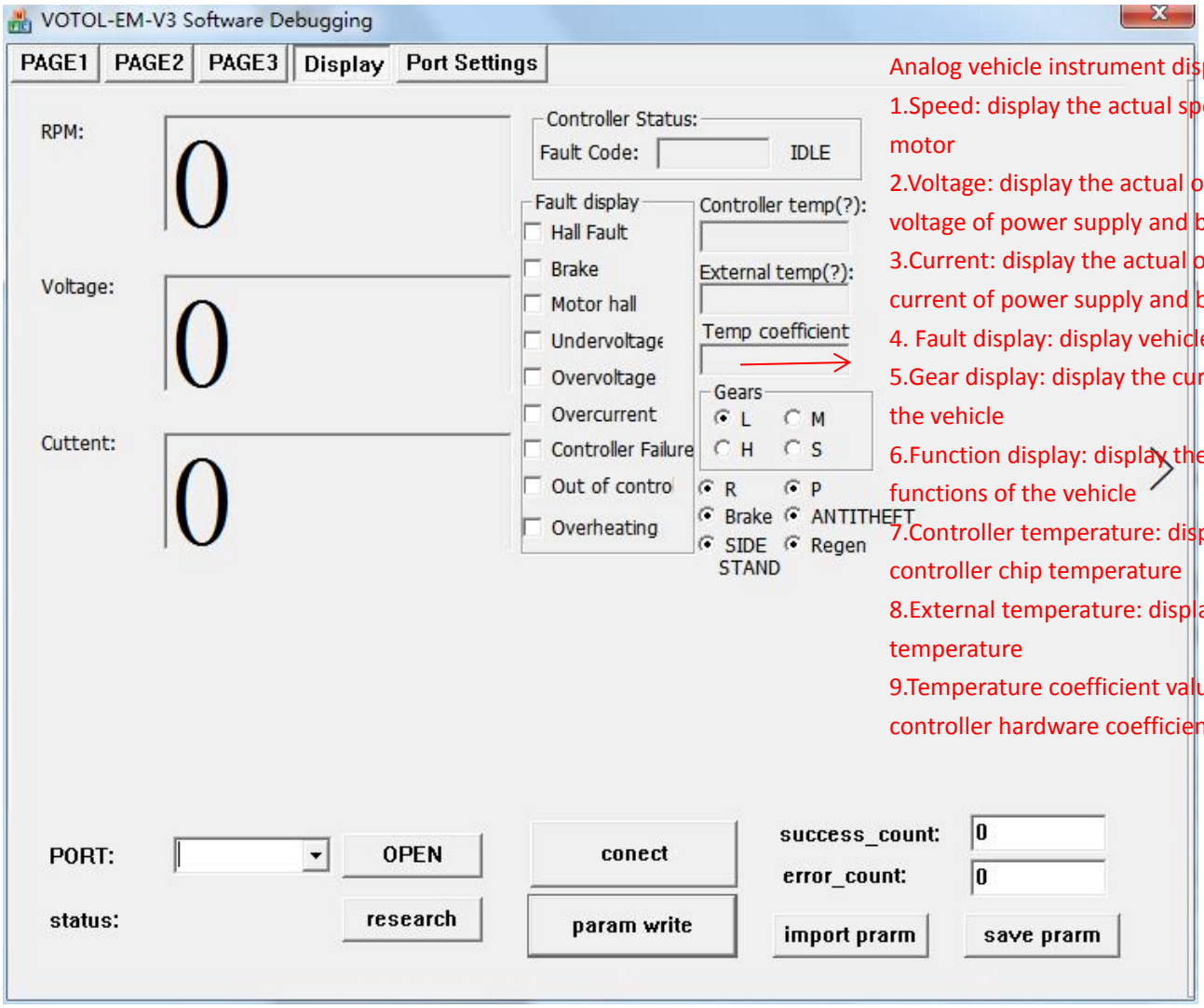
4.3.3: controller parameter writing

Be careful:

USB isolation cable is used. It is not a special isolation line that burns ECU serial port line and computer.

ECU is not read completely. Click more than once in setting meeting 1 to connect ECU.

5. The setting page Display



Analog vehicle instrument display

1.Speed: display the actual speed of the motor

2.Voltage: display the actual output voltage of power supply and battery

3.Current: display the actual output current of power supply and battery

4. Fault display: display vehicle fault

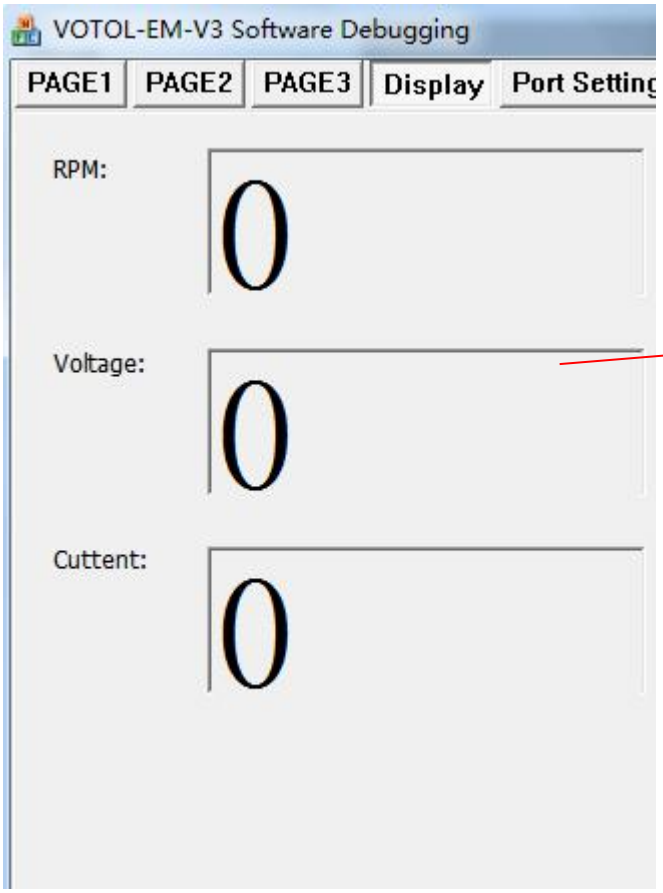
5.Gear display: display the current gear of the vehicle

6.Function display: display the current functions of the vehicle

7.Controller temperature: display controller chip temperature

8.External temperature: display motor temperature

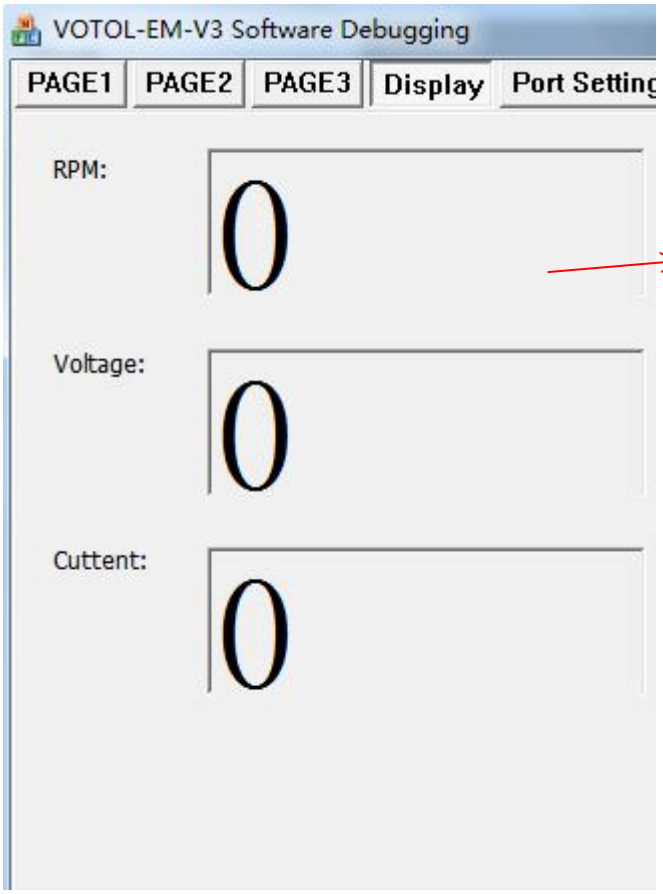
9.Temperature coefficient value: display controller hardware coefficient



1. Q-axis voltage: the range is 2000-3000 after the motor angle is correct

2. D-axis voltage: the range is - 600 to - 1000 after the motor angle is correct (there may be slight fluctuation)

2.1: after the final speed of the motor is confirmed by the speed increase of the weak magnetic field, adjust the d-axis voltage by adjusting the value of the weak magnetic coefficient. The normal range is 0 to - 300 (there may be slight fluctuation



1. Q-axis current: phase line current limit value corresponding to page 1

1.1: after the final speed of the motor is increased through the weak magnetic field, the q-axis current is adjusted by adjusting the value of the weak magnetic coefficient. The normal range is 100-200 (slight fluctuation may occur)

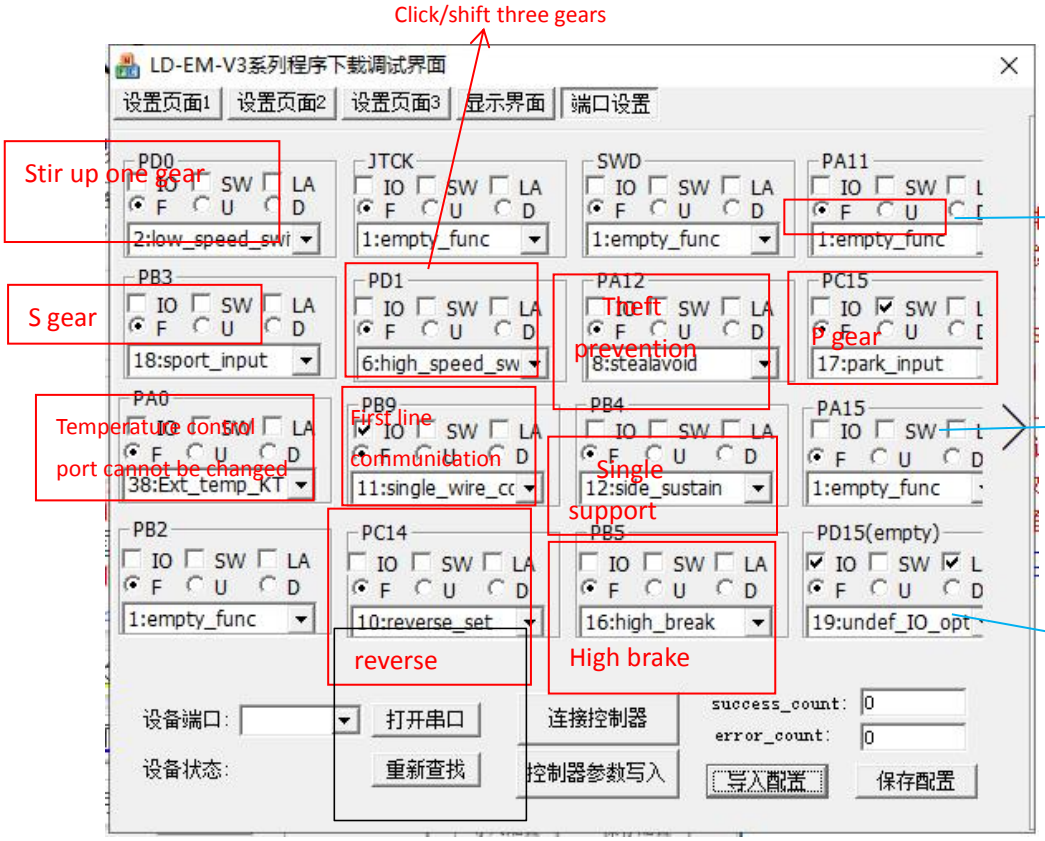
2. D-axis current: corresponding to the demagnetization value required at the current speed

2.1: if it is close to 0, the current speed does not need weak magnetism

2.2: if the display is 500, the current speed needs 500 weak magnetic field to reach

Note: the weak magnetic value corresponds to the weak magnetic value of the corresponding gear on the setting page 2

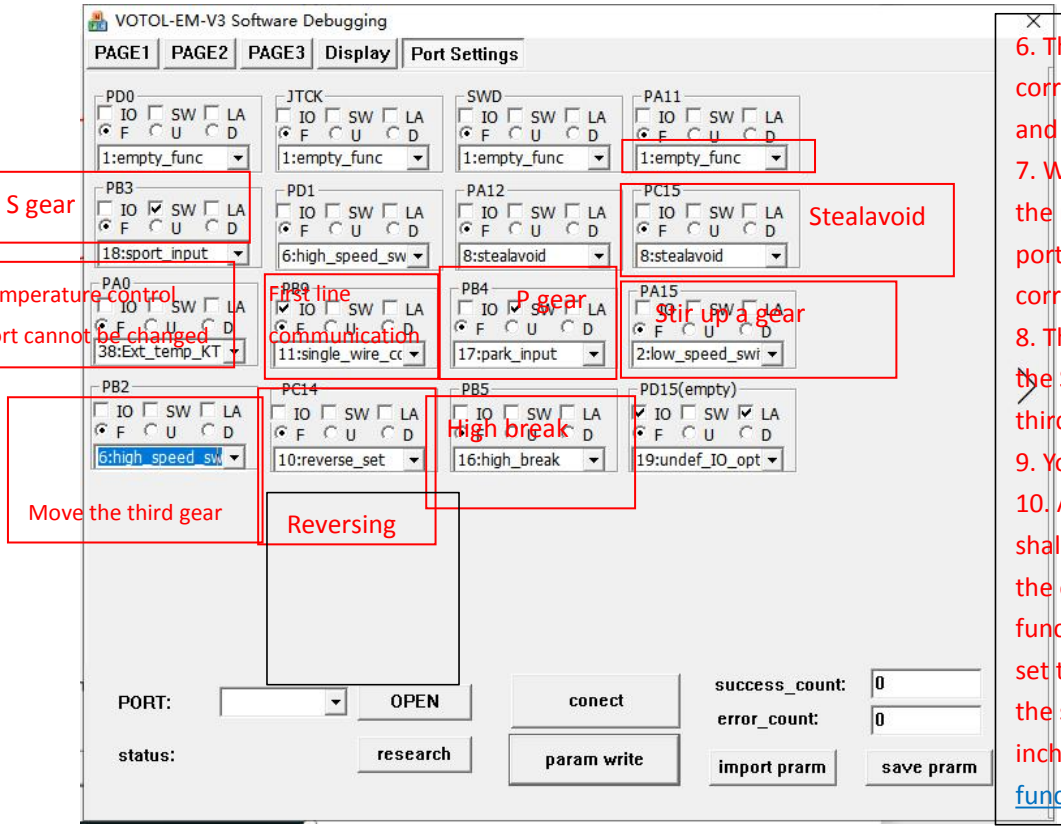
6. Port setting interface



6.1: the above port functions are factory default configuration, corresponding to Lande 2×8 transfer line drawing, em30s EM50 (EM100 without anti-theft) -EM150s is general.

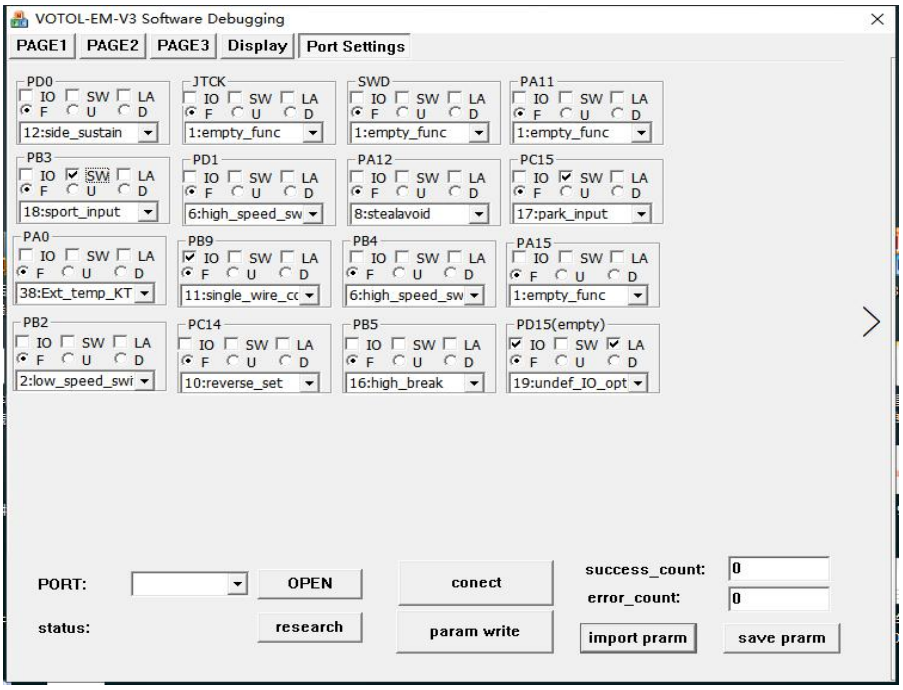
1. Arrange and insert each port corresponding to the main function of the controller
2. When changing the function, select the number sort table under each port to change, and the Numbers correspond to different functions.
3. Click the function to check the SW option.Dialing is not optional.For example, point to move three gear, point to move P gear
4. To move the P file, you need to check LA
5.After the function is changed, the function can take effect according to the Settings page options. (if the port is set to change to three levels, and the page is set to change to three levels, the function will be invalid.)

Port function configuration.xlsx



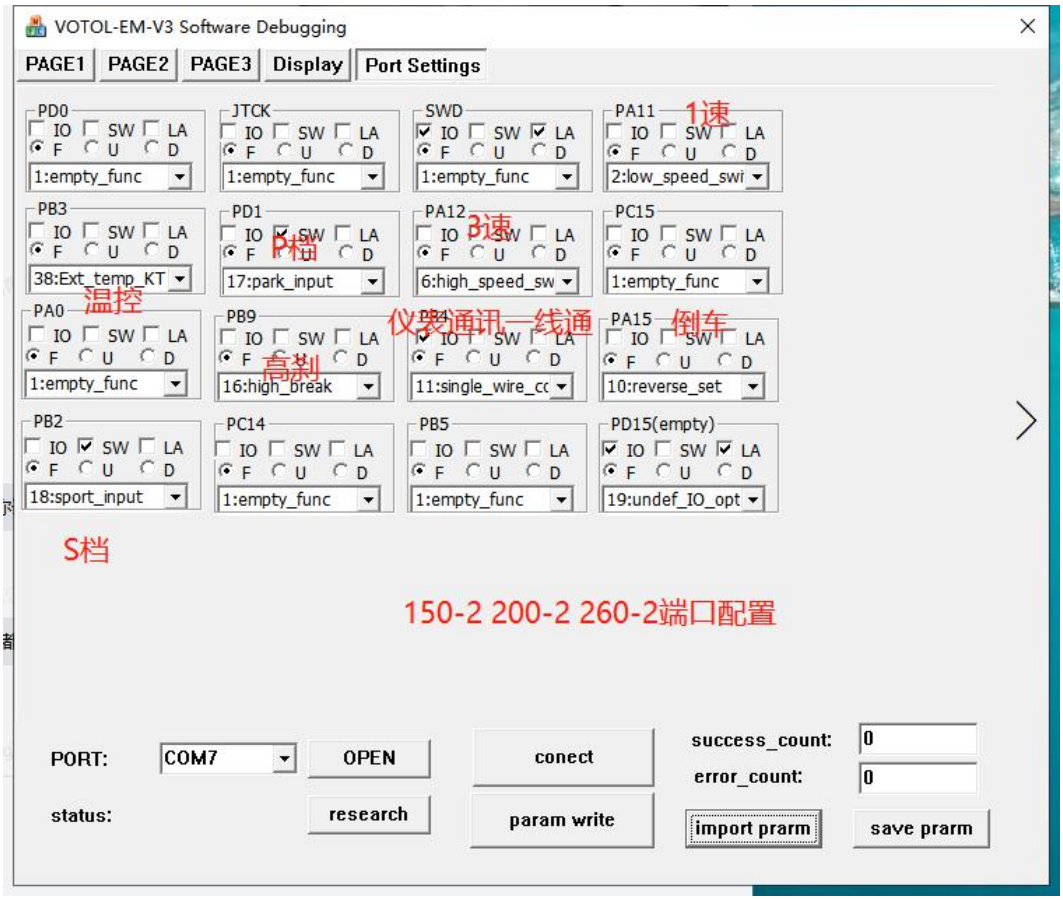
6. The main function of the corresponding controller is to arrange and plug each port
7. When changing the function, select the number sorting table under each port to change, and each number corresponds to different functions.
8. The inching function needs to check the SW option. Dial no option. If the third gear is inched, the P gear is inched
9. You need to tick LA to move P gear
10. After the function is changed, it shall be changed together according to the options on the setting page, and the function can take effect. (if the port is set to three gears for fluctuation, and the setting page is set to three gears for inching, the function will fail). Port function configuration.xlsx

6.2: the above port functions are factory default configuration, corresponding to Lande 2 × 8 transfer line drawing, and EM100 is dedicated with anti-theft harness.



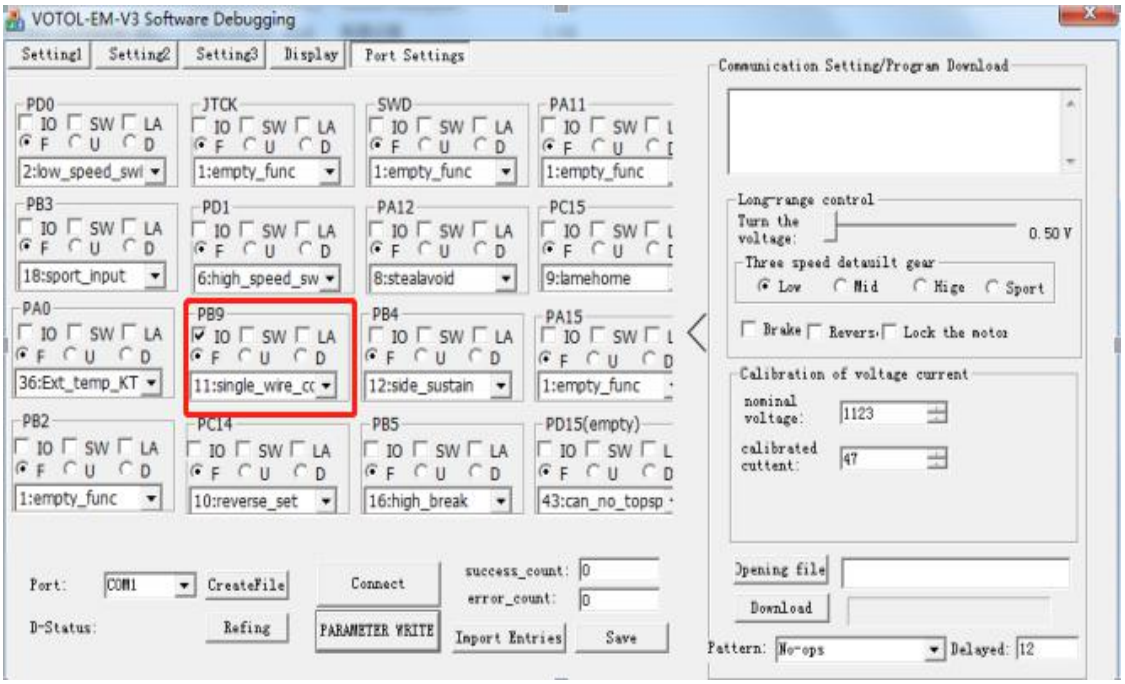
6.3: the above port functions are factory default configuration, corresponding to Lande 2 × 8 transfer line drawing, dedicated to em150sp (after 20200321) controller.

EM150-2 EM200-2 EM260 port setting

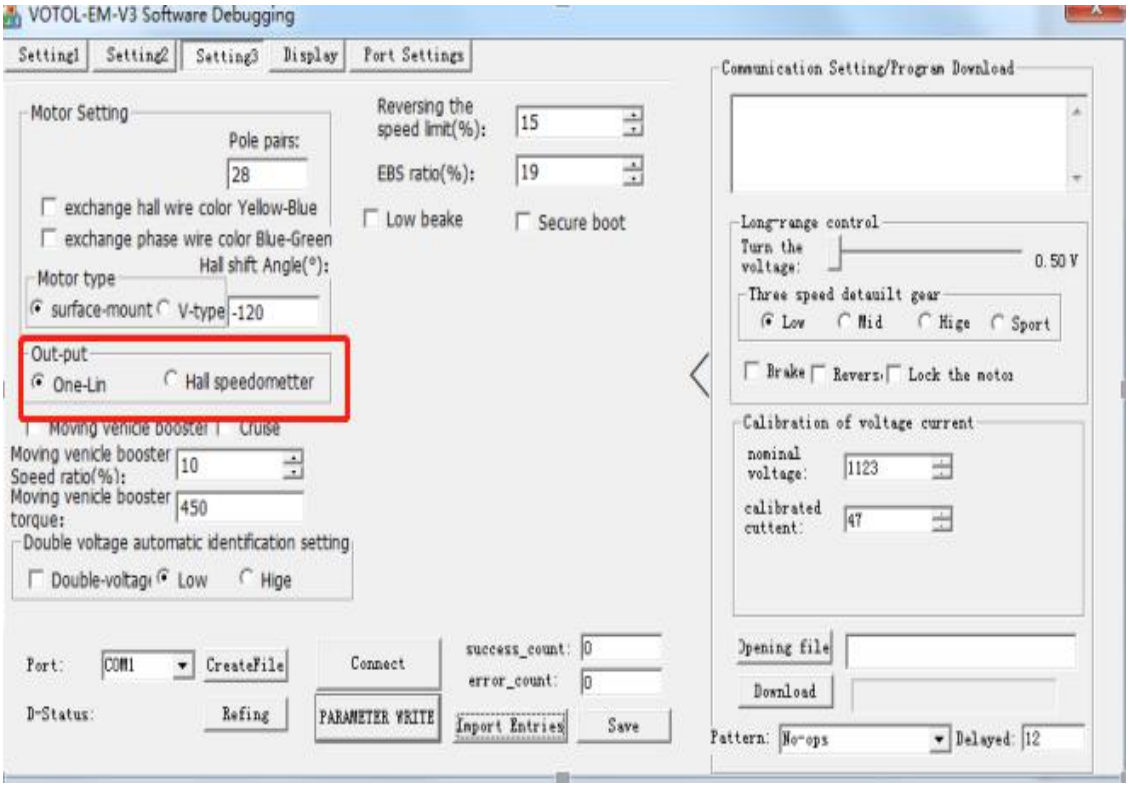


1. One-line setting

PB9 choose 11

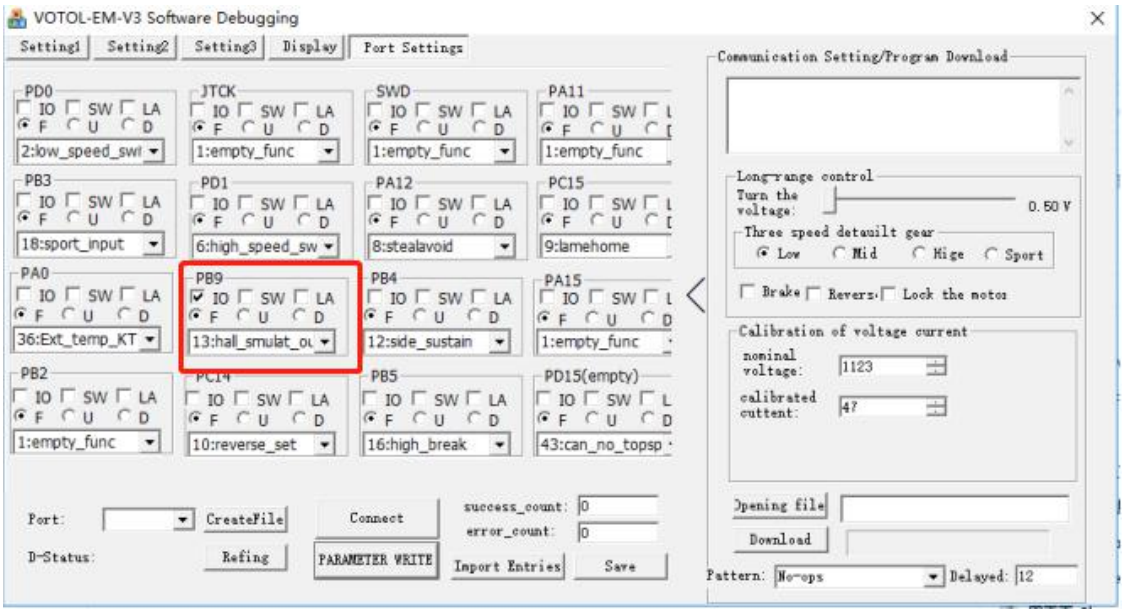


Output choose one- Lin

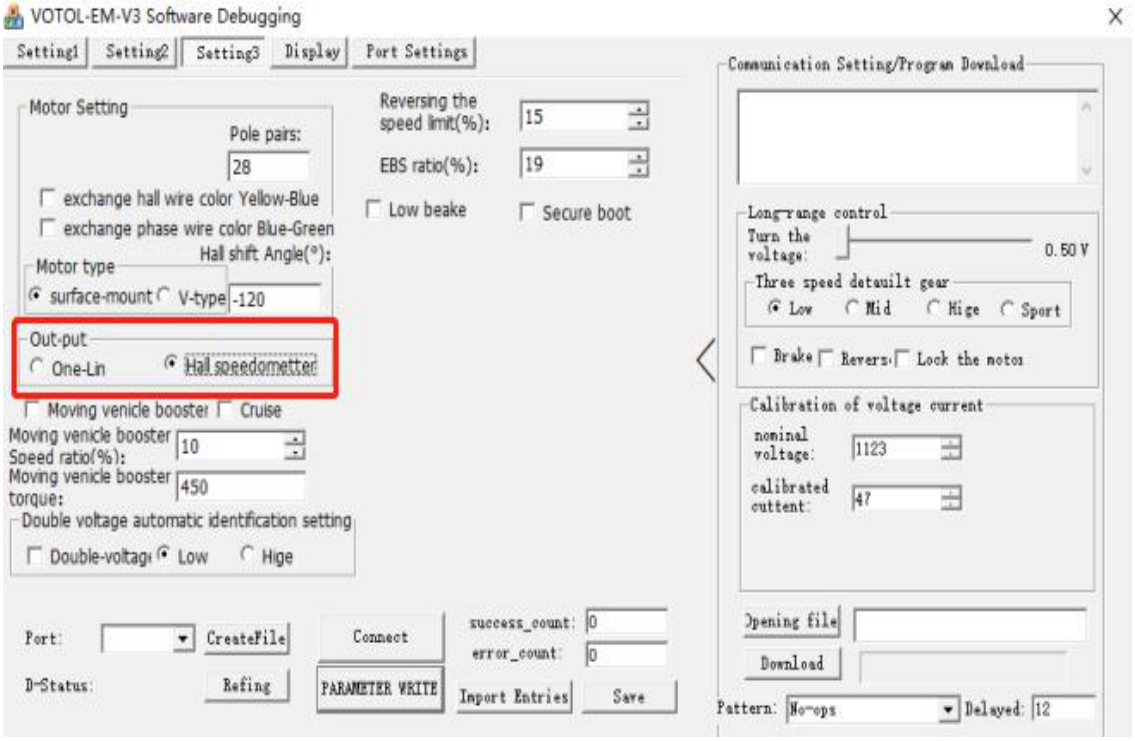


2.Hall setting

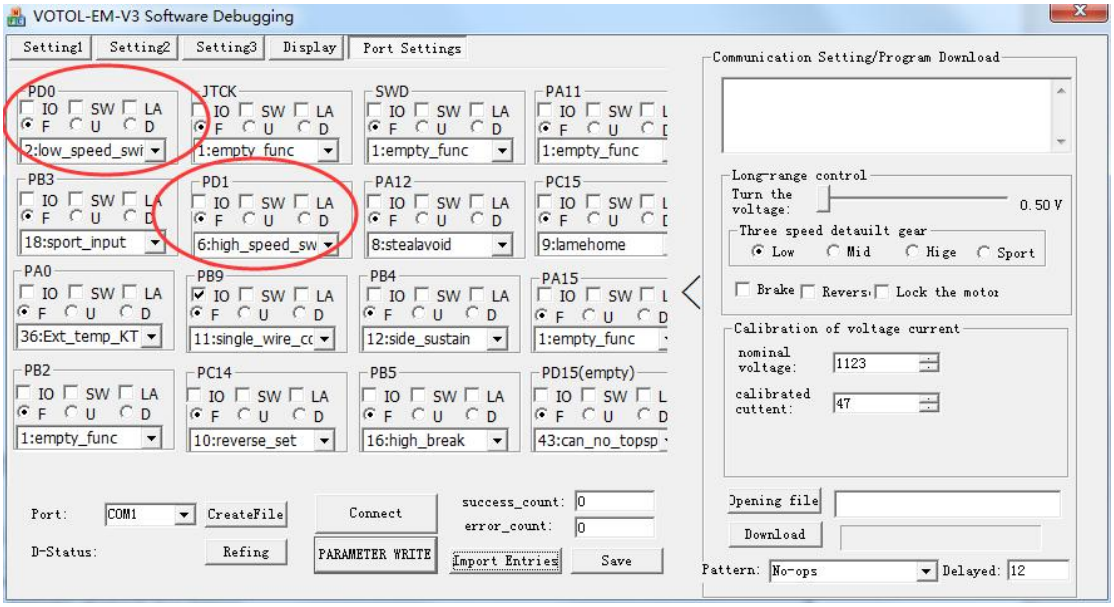
PB9 choose13

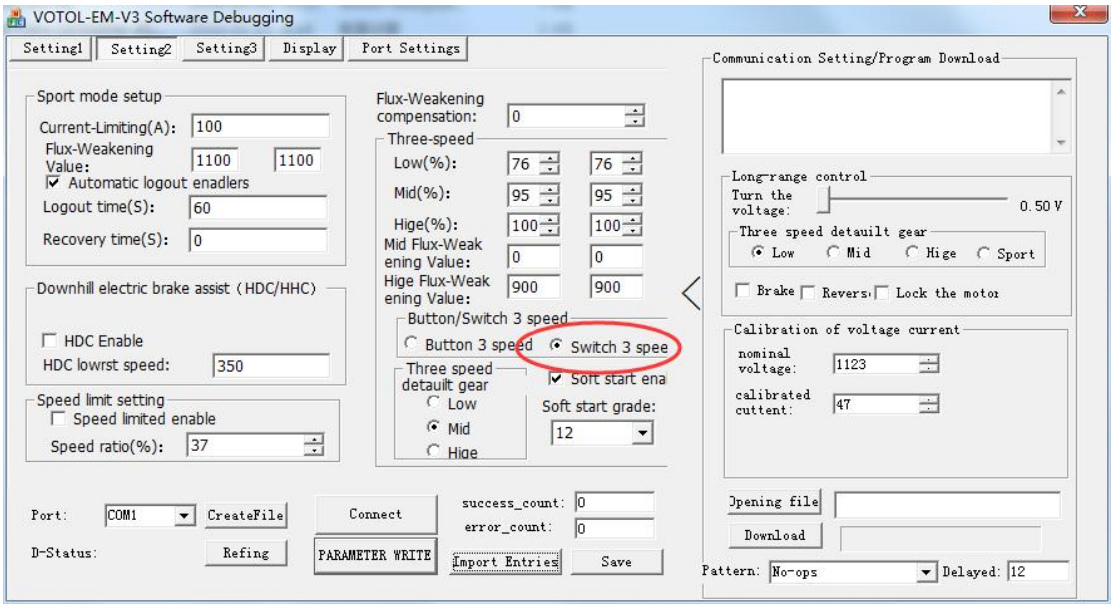


Output choose hall speedometer



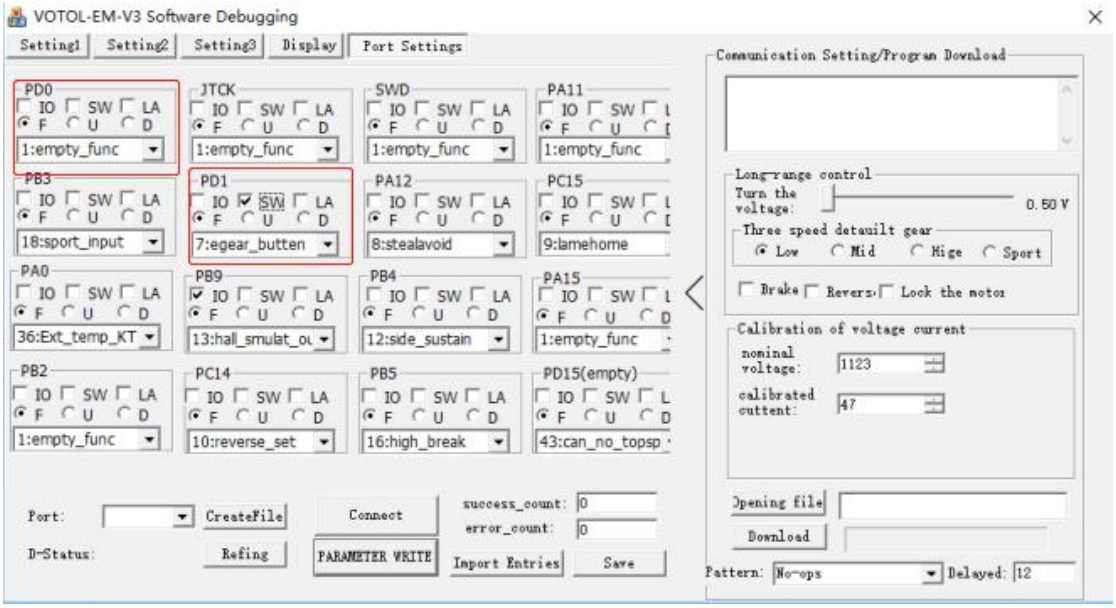
3. Trigger three-speed setting



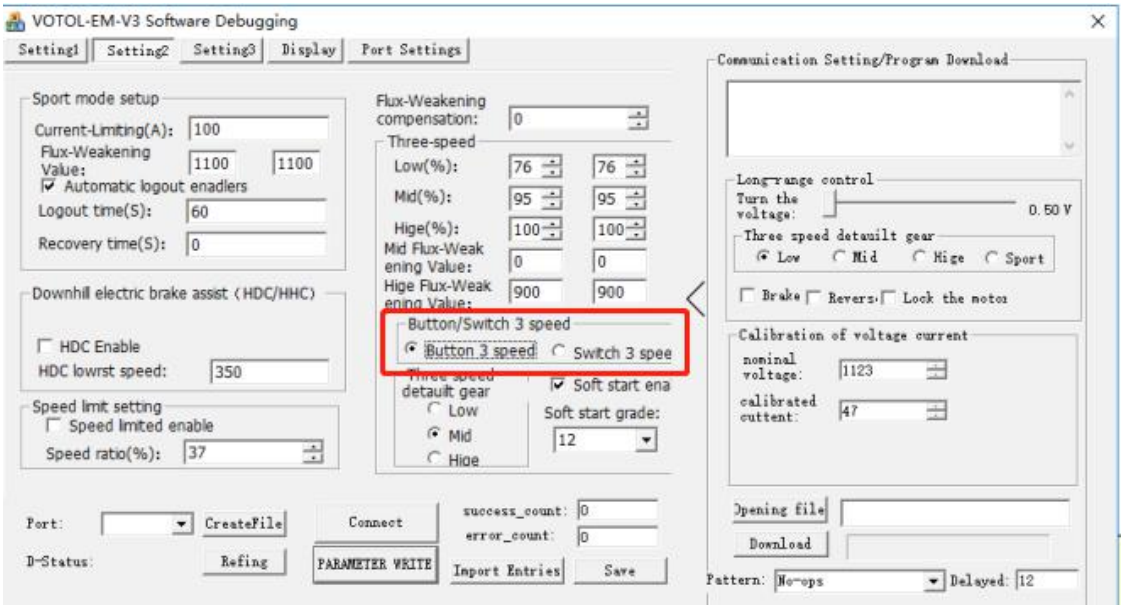


4.Jog three-speed setting

PD0 1 PD1 SW choose 7

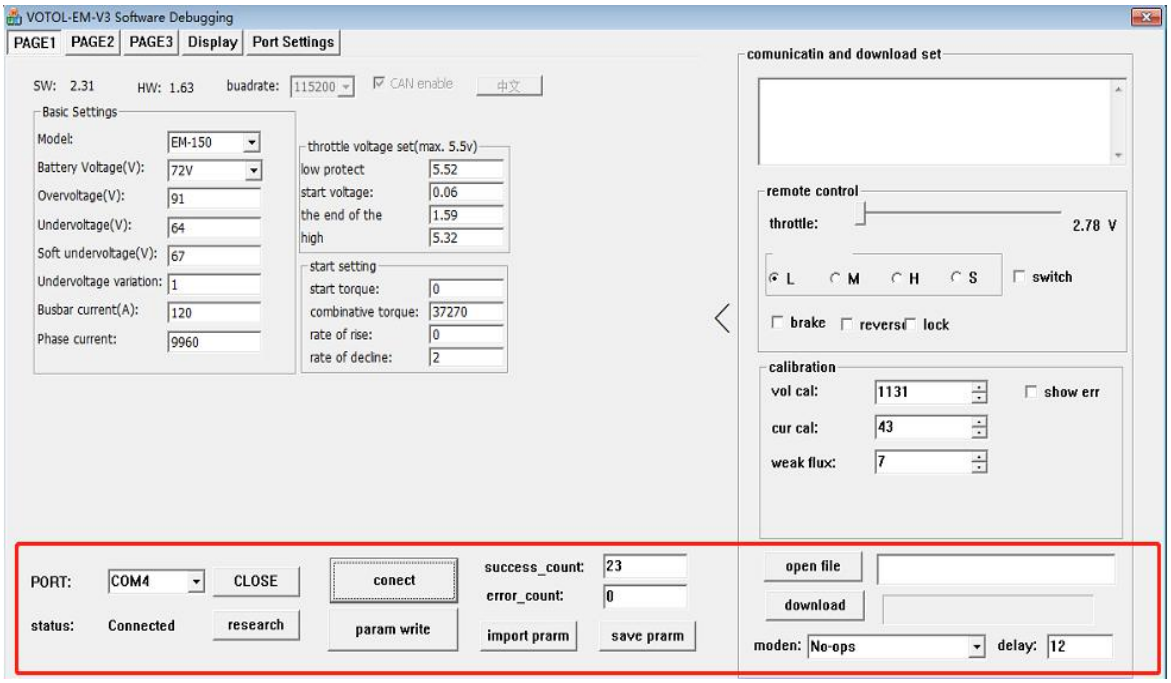


Choose Button 3 speed



5. To import the configuration, click import prarm, select the appropriate INI file, and then click param write; to export the configuration, click save pram and save；

After adjusting the parameters, click paparam write to save the parameters;



Remarks: Please carefully read this attentions before the user adjusts the parameters. Since the user does not adjust the parameters according to the precautions, the controller is not responsible for the after-sales of such controllers.