



SIAECOSYS (PROVIDE PROFESSIONAL ELECTRIC DRIVING SYSTEM FOR ELECTRIC VEHICLE)

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# EM Controller Program Manual V2.0

2018-06-26

**It is forbidden to non-specialists use!**



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.

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.

# 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.

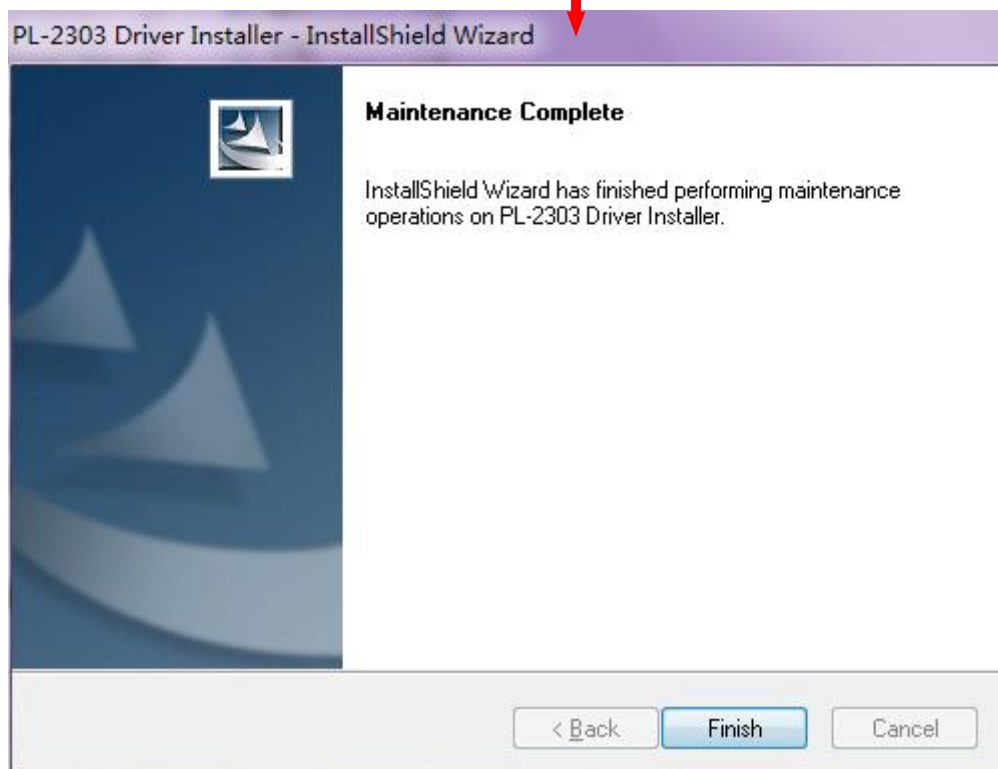
 USB-to-serial-win10-20150814	2016/12/26 10:44	WinRAR 压缩文件	6,422 KB
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(2) choose the suitable driver with your computer for installation.

win7, win 10 are available, IOS and XP system are not support.

 win_me_2000_XP USB-to-Serial	2013/3/8 14:38	WinRAR ZIP 压缩...	1,586 KB
 windows 7 10 32 64 USB-to-Serial ...	2013/3/8 14:38	WinRAR ZIP 压缩...	2,390 KB

 Setup 32.64位元	2012/8/3 12:31	应用程序	3,075 KB
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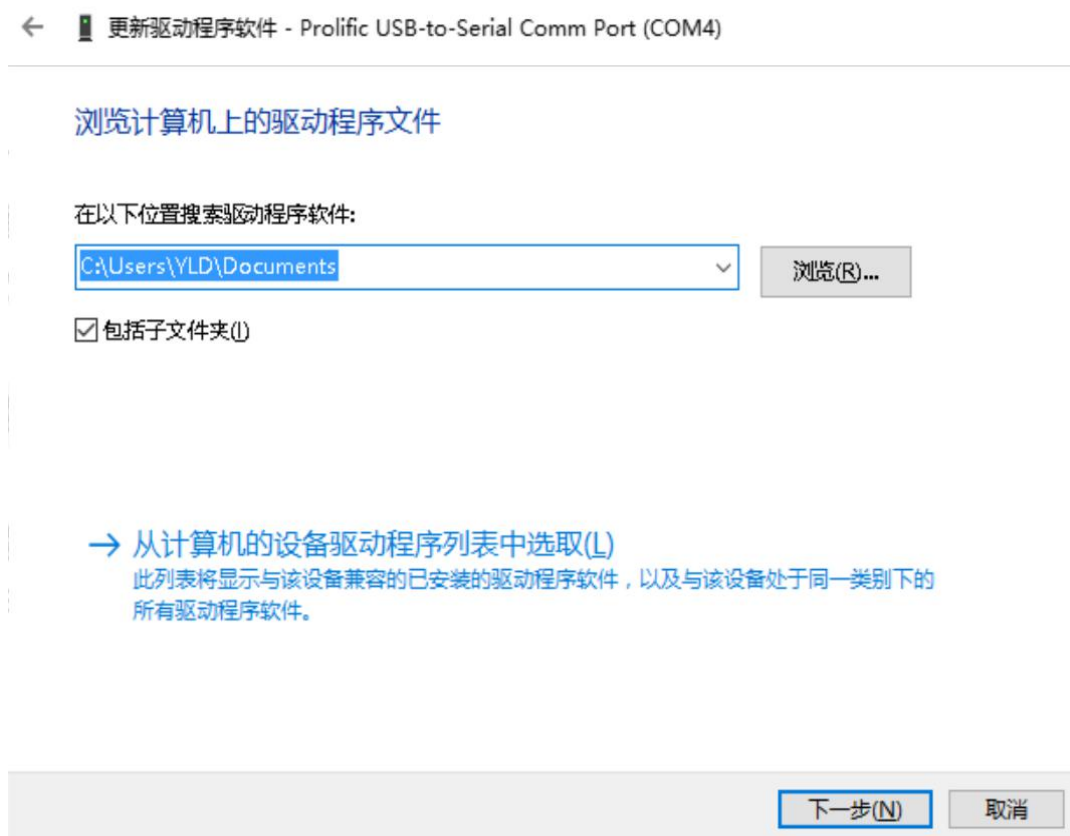
(3) After installation, pls. connect the USB cable with controller and computer. If it's unable to connect, pls. Check below steps.

Right click “my computer” in the desktop, then click “device manager” --> “port(COM & LPT)”, choose the COM with “!”, right click to update the software.

Select : Browse Computer to find out the drive software



Select from computer Drive program list





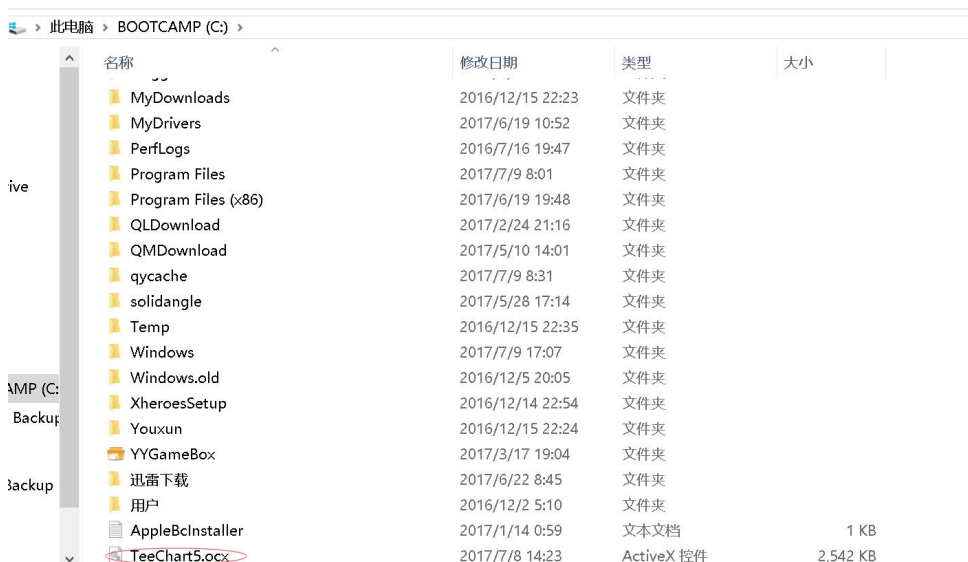
Select Prolific USB-to-Serial Comm Port Version: 3.3.2.102 【2008/9/24】

Click Next --> Do the installation --> Close the software when you finish



## 1.2 Software installation

(1) Please copy TeeChart5.ocx file to the C disk root directory



(2) Click the setup Register File Finish Installation (E.g. Allow the installation when the software shows intercept interface). After finishing the installation, please run the software: EM\_V3 program download



(3) Attn: Bluetooth serial port connection installation mode

Use the Bluetooth series port connection module by VOLT company, connect it, then power it

Select from the Bluetooth list pair with the Bluetooth series port accordingly

Input the password: "1234" to connect it



## 2. Controller connection

### 2.1 Connect controller

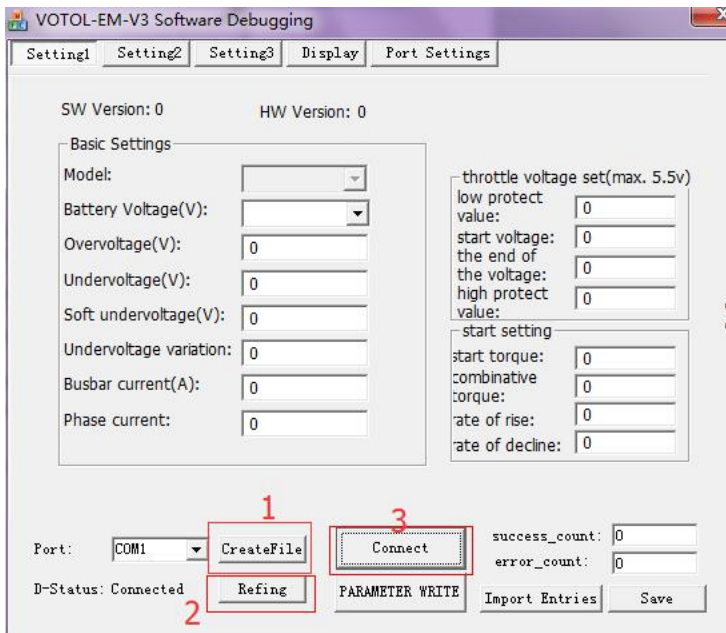
(1) Connect the port when the controller power on

(2) Click the researching bottom, then choose the series port from the device COM (generally the last one)

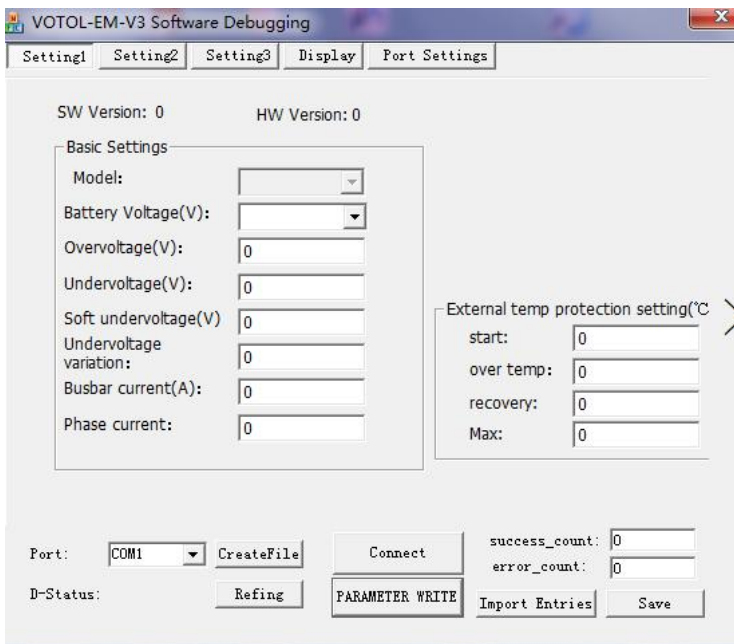
Click "open series port:, device shows "connected", then click connect controller (suggest you to click it more than twice)

The voltage parameter can be freely chosen under the hardware support of the controller.

## Surface for four wheelers/three wheelers



## Surface for two wheelers.



## 2.2 Battery voltage adjust

The voltage parameter can be freely chosen under the hardware support of the controller.

Model:

Battery Voltage(V):

Overvoltage(V):

Undervoltage(V):

Soft undervoltage(V):

Undervoltage variation:

EM-30S	48-72V	EM-100	48-60V
	84V		72V
EM-50	48-72V	EM-150	96V
	84V		72V
	96V		96V
	108V		

**Note: if the voltage parameter is adjusted without hardware support, the controller will be damaged.**

## 2.3 Controller under-voltage and soft under-voltage adjust

Fill in the required under - pressure protection parameters and software under - pressure parameters

Overvoltage(V):

Undervoltage(V):

Soft undervoltage(V):

Undervoltage variation:

- (1) Under voltage value: The controller enters the threshold required for hardware under-voltage protection. Setting Range (based on battery under voltage value to set)
  - (2) soft under-voltage: Setting Range (generally under-voltage add 3V)
  - (3) Undervoltage variation: it means the range of under-voltage back to the difference (unadjustable)
- P.s. under-voltage don't suggest to change, easy to damage the battery, and excessive discharge of the battery cause reduce life.

## 2.4 controller battery current and phase current limited adjust

Busbar current(A):

Phase current:

- (1) Battery current
- controller battery current adjust: Setting Range

EM-30S	48-72V	≤35A	EM-100	48-60V	≤100A
	84V	≤30A		72V	≤100A
EM-50	48-72V	≤50A		96V	≤100A





	84V	≤55A	EM-150	48-60V	≤150A
	96V	≤45A		72V	≤180A
	108V	≤45A		96V	≤120A

**P.s. Please don't fill in the value out of range, it will damage the controller**

(2) phase current limited value: if limit controller phase current out-put, it will limit the motor torque out-put.

Setting Range (the biggest value full power out-put, don't suggest adjust )

## 2.5 throttle voltage adjust

(1) low protection value: The throttle error is shown

(2) Starting voltage: when the value is reached, the motor starts running

(3) End voltage: when the value is reached, the controller thinks the full voltage is reached (it is recommended to set the voltage lower 0.2v compared with the actual torque voltage).

(4) High protection value: when the value is higher than that, the torque fault will be displayed

## 2.6 Start setting adjustment (for tricycle gear box only)

(1) Starting torque: used for gear combination

(2) Combined torque: a force of lifting after gear clearance is combined

(3) Upward slope: upward slope of motor torque

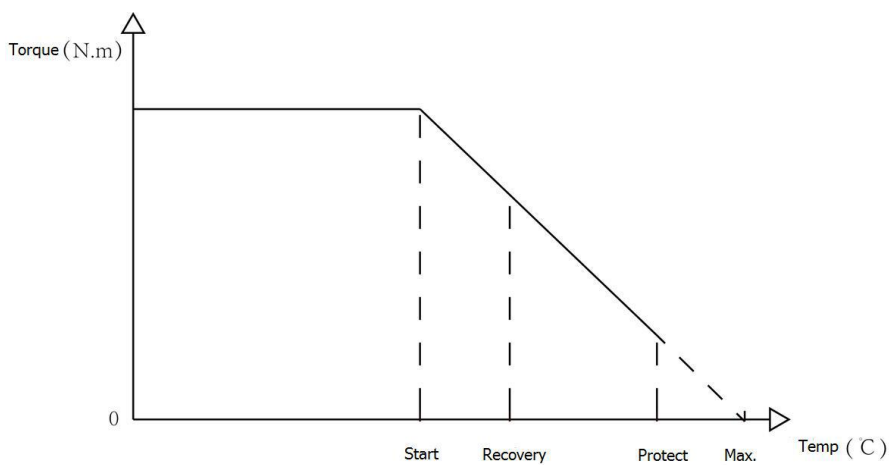
(4) Downward slope: downward slope of motor torque

## 2.7 Controller and motor temperature protection function adjustment

External temp protection setting(°C)

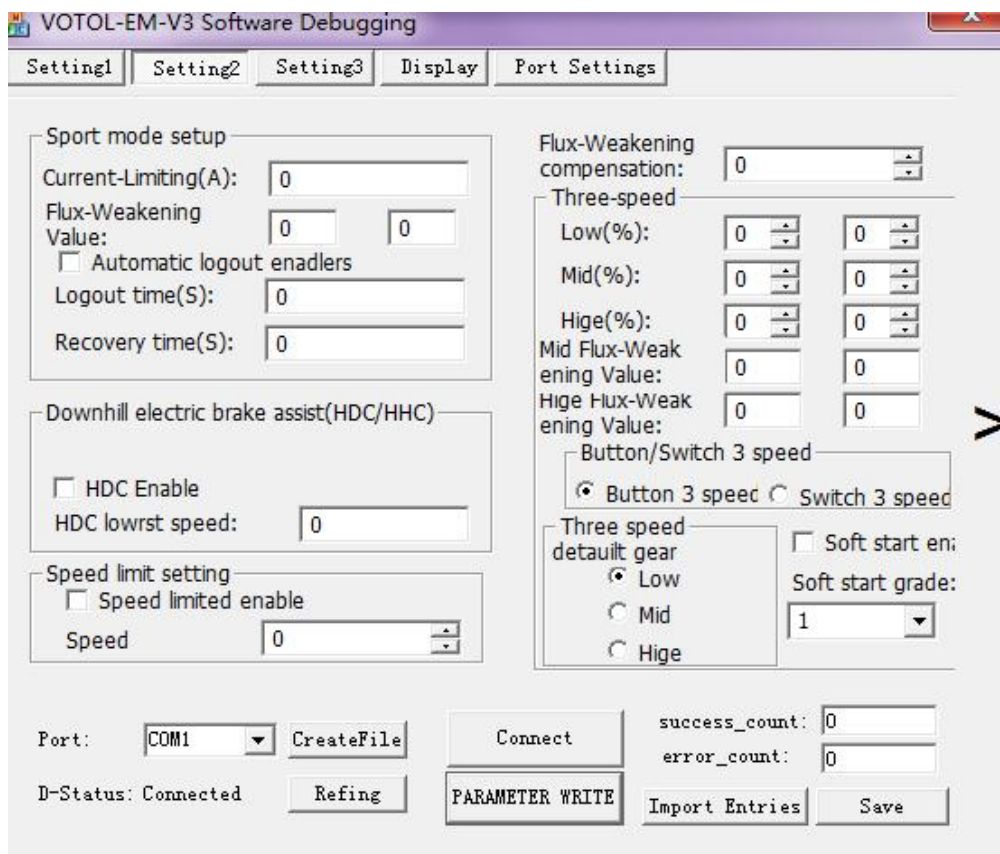
start:	<input type="text" value="0"/>
over temp:	<input type="text" value="0"/>
recovery:	<input type="text" value="0"/>
Max:	<input type="text" value="0"/>

- (1) Start: Enter into the function of temperature protection, limit the motor torque.
- (2) Over temperature: Cut off the output of motor torque
- (3) Recover: When the motor temperature lower than the temperature protection value, you can re-twist the throttle, then the motor will restore motivation
- (4) Maximum: The motor maximum temperature is 150

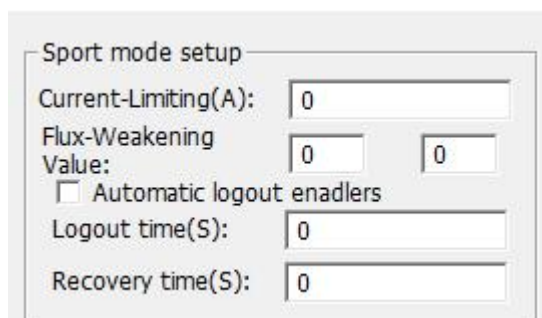


### 3. Setting for page 2

Controller function debugging interface



### 3.1 Parameters setting for sports mode(S gear)



(1) Current-limiting value for S gear:

When controller turn into S gears, the battery current will increase, it will be more powerful to climb.

Range of setting

EM-30S	48-72V	≤40A	EM-100	48-60V	≤120A
	84V	≤35A		72V	≤120A
EM-50	48-72V	≤55A	EM-150	96V	≤120A
	84V	≤55A		48-60V	≤200A
	96V	≤45A		72V	≤220A
	108V	≤45A		96V	≤130A

**Please noted: The setting value shouldn't be out of range, otherwise, it will damages the controller.**

**The range for flux weaken value on left/right side refers to in dual voltage mode, the speed is different because of the different voltage. Left side option refers to low voltage, right side option refers to high voltage.**



**For single voltage controller, Please keep the left/right in same value.**

(2) Flux weakening value for S gear:

When controller turn into S gears, the motor will be in flux weaken condition, speed increased.

Setting value range is determined by motor condition

Wheel hub motor, magnet high lower than 35mm	≤1500
Wheel hub motor, magnet high lower than 50mm	≤2300
Mid drive motor, surface attached magnetic steel	≤2300
Mid drive motor, V magnet steel	≤3000

**Please noted: The setting value shouldn't be out of range, otherwise, it will cause the motor demagnetizing, then damage the motor.**

(3) automatic logout enablers, confirm by select

Logout time: e.g. 30s after enter S gear sport mode (time is optional), auto-exit S gear sport mode.

Recovery time: auto-exit S gear, recover from to S gear time. During recovery time (Invalid by press S gear).

### 3.2 Downhill electric brake assist (Slow down in steep slopes)

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.

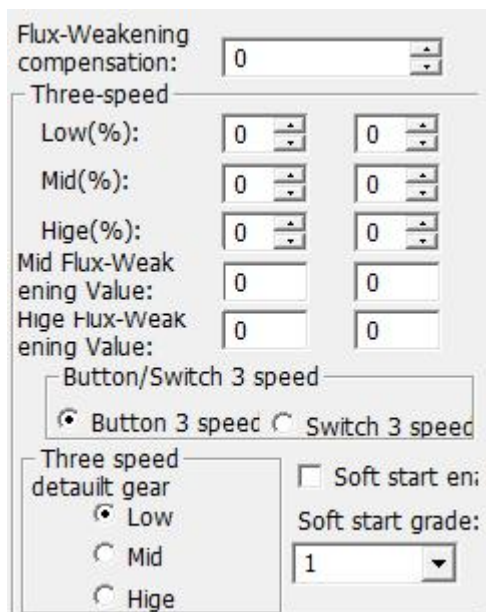
Value 400 corresponding to speed around 15kmh(it depends on motor feature, sometimes with a little different)

### 3.3 Speed Limit setting

Start by select, limit speed function

Adjustable controller speed limit from 0 to 100 percent

### 3.4 Three gear setting



The screenshot shows a control interface with the following settings:

- Flux-Weakening compensation: 0
- Three-speed settings:
  - Low(%): 0 (left), 0 (right)
  - Mid(%): 0 (left), 0 (right)
  - Hige(%): 0 (left), 0 (right)
  - Mid Flux-Weakening Value: 0 (left), 0 (right)
  - Hige Flux-Weakening Value: 0 (left), 0 (right)
- Button/Switch 3 speed:
  - ☒ Button 3 speed
  - ☐ Switch 3 speed
- Three speed default gear:
  - ☒ Low
  - ☐ Mid
  - ☐ Hige
- Soft start enable: ☐ Soft start enable
- Soft start grade: 1

(1) flux weakening compensation factor (suggest not to change)

Default value below:

Hub motor less than 40mm magnet	34
Other motor	64

It could be adjusted due to different motors

(2) Three gear setting

The three gear ratio range from 0~100%

Middle speed and high speed flux weakening adjust range.

Hub motor below 35mm magnet	≤1500
Hub motor below 50mm magnet	≤2300
Mid drive motor surface-paste magnet	≤2300
Mid drive motor V magnet	≤3000

Note: Please don't exceed the range, which will cause demagnetization and damage motor.

Left and right flux weakening value write value is dual voltage mode, base on different voltage, different speed options.

Left side is low voltage, right side is high voltage.

Single voltage control, please set the same value for the two side.

(3) three speed mode

There are two modes for choice for three gear: by button and switch.

Three gear default gear (enable for point switch )

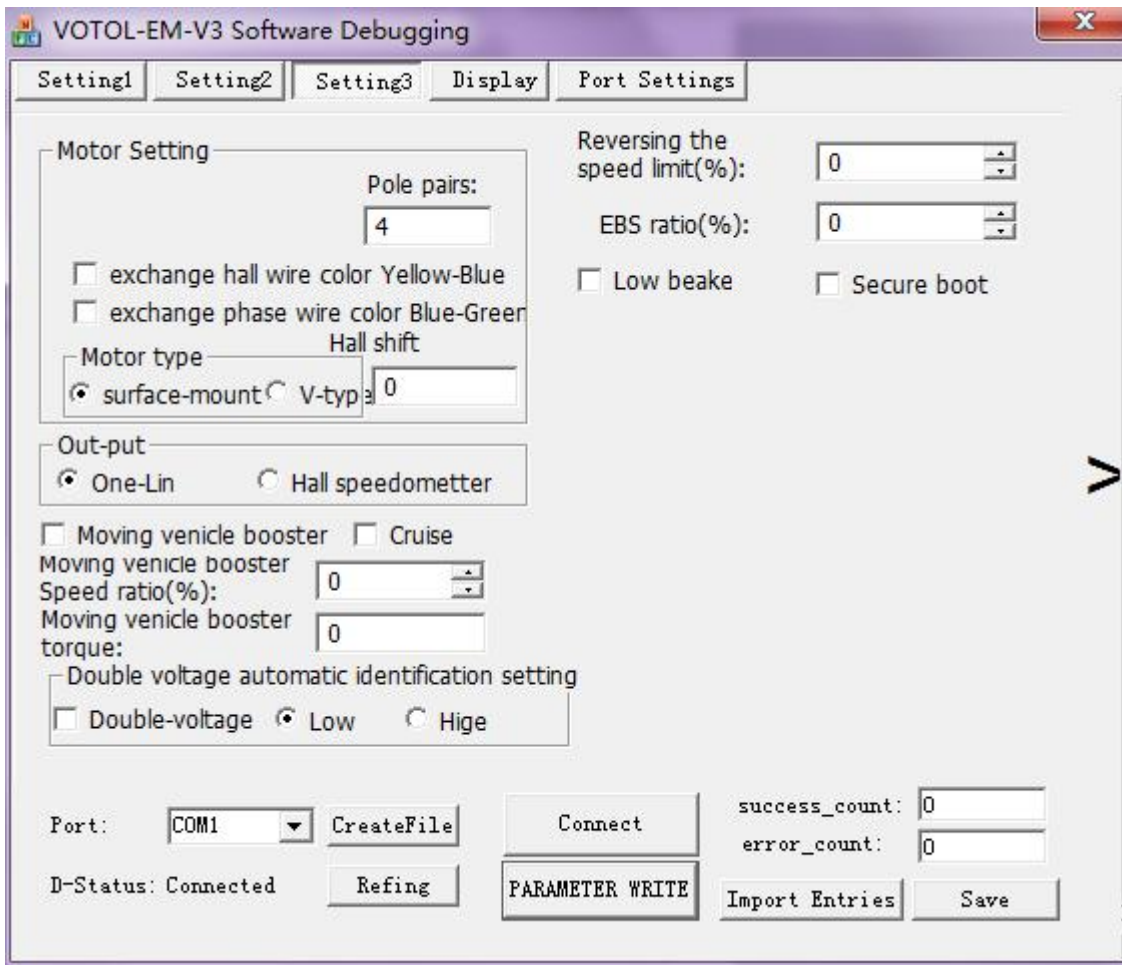
Change controller default gear when power on

(4) Soft start enable

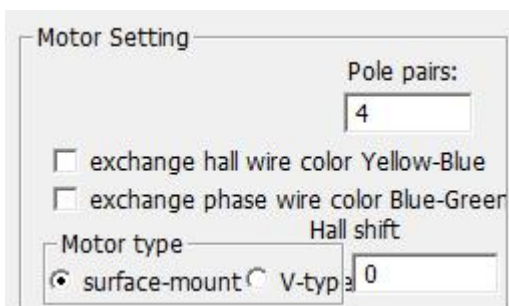
Open controller as soft start, close controller as hard soft

Soft start grade from (1~16) 16 grades, the less value is, the soft start it is.

## 4. Setting for page 3



### 4.1 Motor Setting



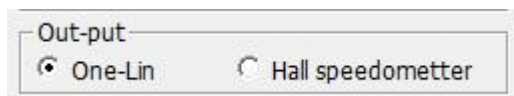
- (1) Motor pole pairs: Correctly fill in the motor pole pair for correct motor speed(RPM) acquisition
- (2) Motor type (middle drive motor): Correctly fill in the type of motor's magnet for motor matching

**Note: Wheel Hub motor is surface mount**

- (3) Hall phase shift angle (degrees) adjustment

Fill in the range (-180~180) for the controller and motor phase adjustment.

## 4.2 Choice of speedometer output

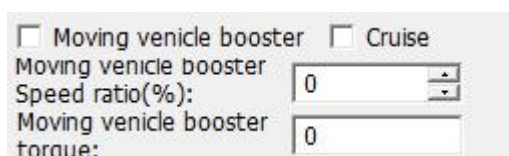


Out-put  
☒ One-Lin    ☐ Hall speedometer

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

The first-line fixed agreement is (new thinking standard agreement)

## 4.3 Moving assist and cruising function



☐ Moving vehicle booster    ☐ Cruise  
Moving vehicle booster  
Speed ratio(%):   
Moving vehicle booster  
torque:

(1) Move assist function, valid after check

The speed of the transfer assist is selected as the percentage of the motor base speed. The default is 10%.

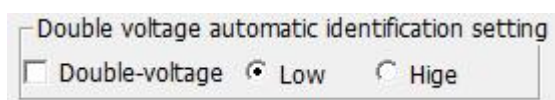
Moving assist torque value 320, corresponds to the torque value is 9~10N.m (varies depending on the motor characteristics)

(2) Cruise Function, valid after check

Turn to a certain angle and maintain more than 8 seconds, enter into the cruise control mode, any operation to exit the cruise mode (make a brake, turn the handle)

## 4.4 Dual Voltage Adaptive Function

Dual voltage adaptive function, Check valid

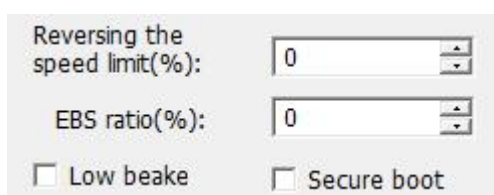


Double voltage automatic identification setting  
☐ Double-voltage    ☒ Low    ☐ Hige

Automatically switch dual voltage mode

mode	Volt for switching to low volt mode	Volt for switching to high volt mode
48~60V	<49V	>63.5V
60~72V	<61V	>77V
72~84V	<72V	>93.5V

## 4.5 Reversing, EBS setting, low brake selection, starting safety switch function



Reversing the speed limit(%):   
EBS ratio(%):   
☐ Low beake    ☐ Secure boot



(1) Reversing speed limit (%) 0~100 pole adjustment Speed adjustment for reversing the controller

Note: Do not exceed 30% to avoid accidents.

(2) EBS ratio (%) 0~100 pole adjustment for electronic brake force adjustment

(3) Low brake enable valid check

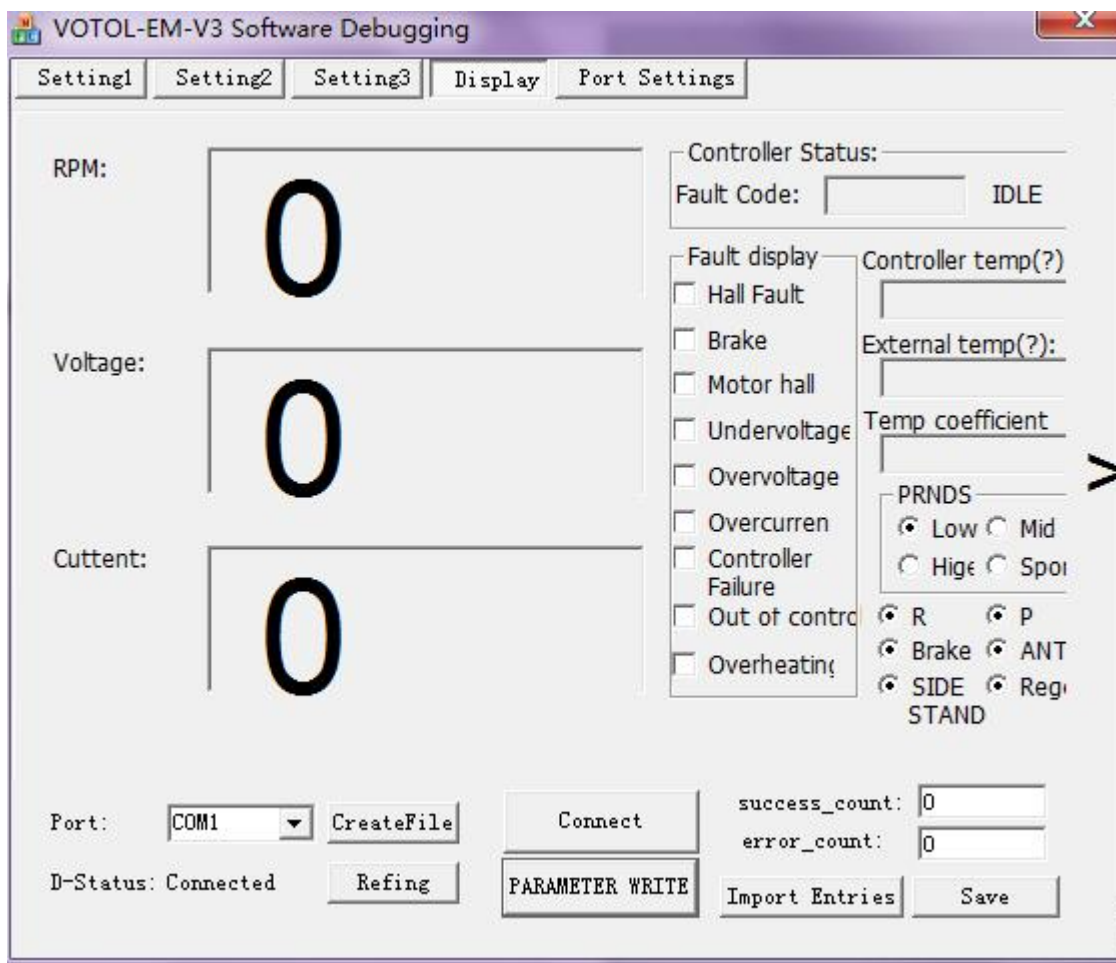
When the low brake is used, the original single-branch power-down function becomes a low-level brake.

(4) Safety Switch Function valid checked

**When using the safety switch function, need to press the safety switch before starting the vehicle.**

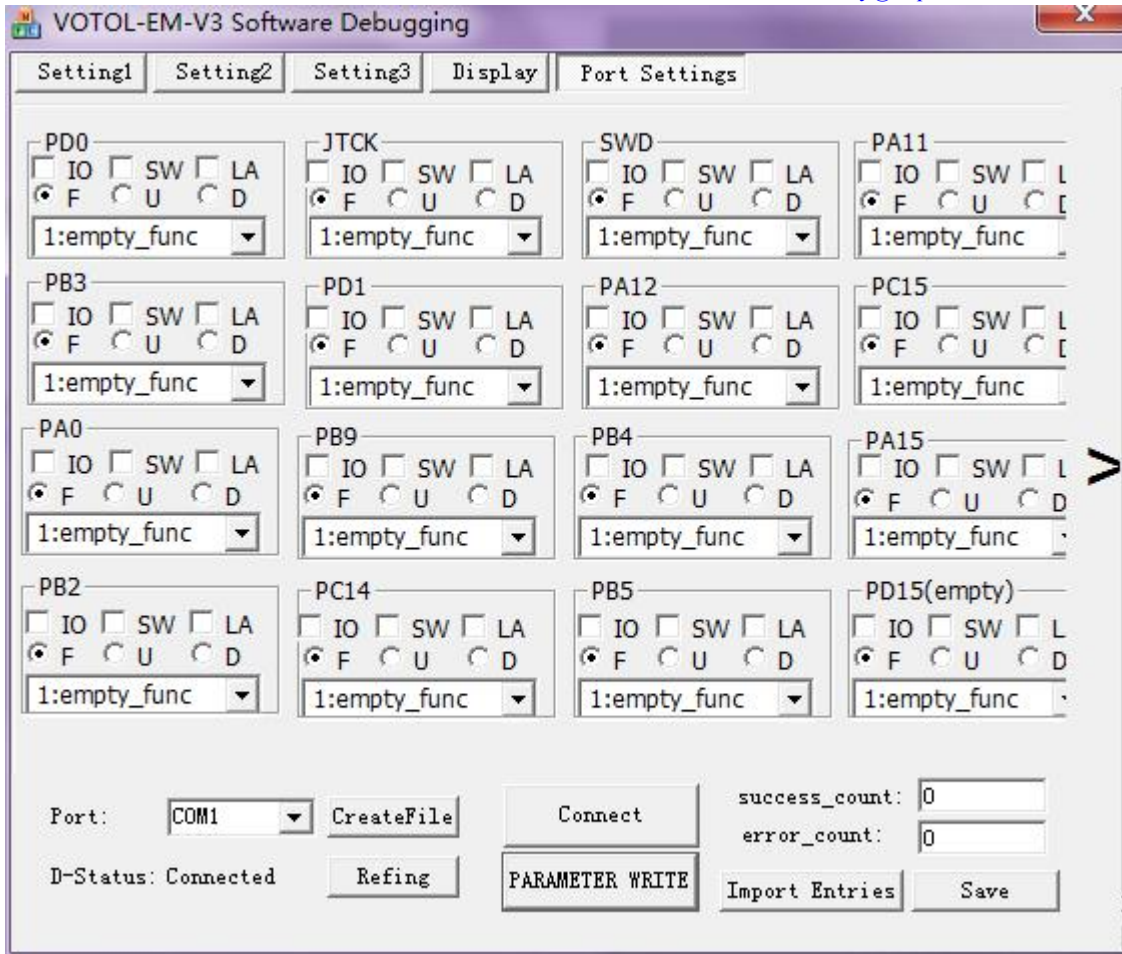
## 5. Controller Status Display

Controller working status display, makes it easy to observe the controller's real-time status



Port setting interface (temporarily unavailable)





## 6. Remote Operation

### Software update download and debugging

**Pls. use it under the guide of our company engineer.**

**It's used for the updated software, current calibration, remote operation.**

Click "opening file" --> choose the ".bin" file --> Click "download". When it shown in 100%, the file import succeed.

