Motion Control Card Manual

motion control card features:

1. Supports all Mach3 versions, including the Mach3 R3.042.040 version.

2. Supporting Windows series, no need to install any USB drivers and plug.

3. Full support for USB hot-swappable, the card is Monitoring USB connection status at any time. Under the operation of Mach3,it can be reconnect automatically after disconnect.

4. Supports 4 axis linkage,including point to point move.

5. Supporting auto tool zero,electronic handwheel and software limit,return difference eliminating.

6. 120M working frequency, Maximum step-pulse frequency is 1MHz, Perfectly drive servo and stepper motor in three ways: pulse / direction, CW / CCW, AB quadrature output.

7. Status indicator LED can be useful to show the USB connection, and working status by flashing.

8. 16 general-purpose inputs, PNP or NPN input status can be configured in Mach3.

9 . 8 electronic switch outputs. Darlington open-drain output.

10. Measures real-time spindle speed (Support the Hall element and quadrature encoder speed masurement, etc.) and spindle speed can be observed in March3 to perfectly support the application of spindle. Perfectly support the lathe spindle applications and other occasions, whitch requires precise spindle speed.

11. Use external 12V-24V DC power supply to isolate USB and external port,and to make the system more stable.

12. 11 high-speed optical couplers with 10MHz, and 24 general optical couplers(Total optocoupler reach to 35)for isolating all of the input/output signals, isolation voltage up to 2KV

1 3 . 2 spindle export interface: accurate 0-10V analog output, supporting converter to control spindle drive; PWM output with 5V drop-down , providing PWM speed drive,CW/CCW output,puls/dir output and quadrature output for servo or stepping driver.

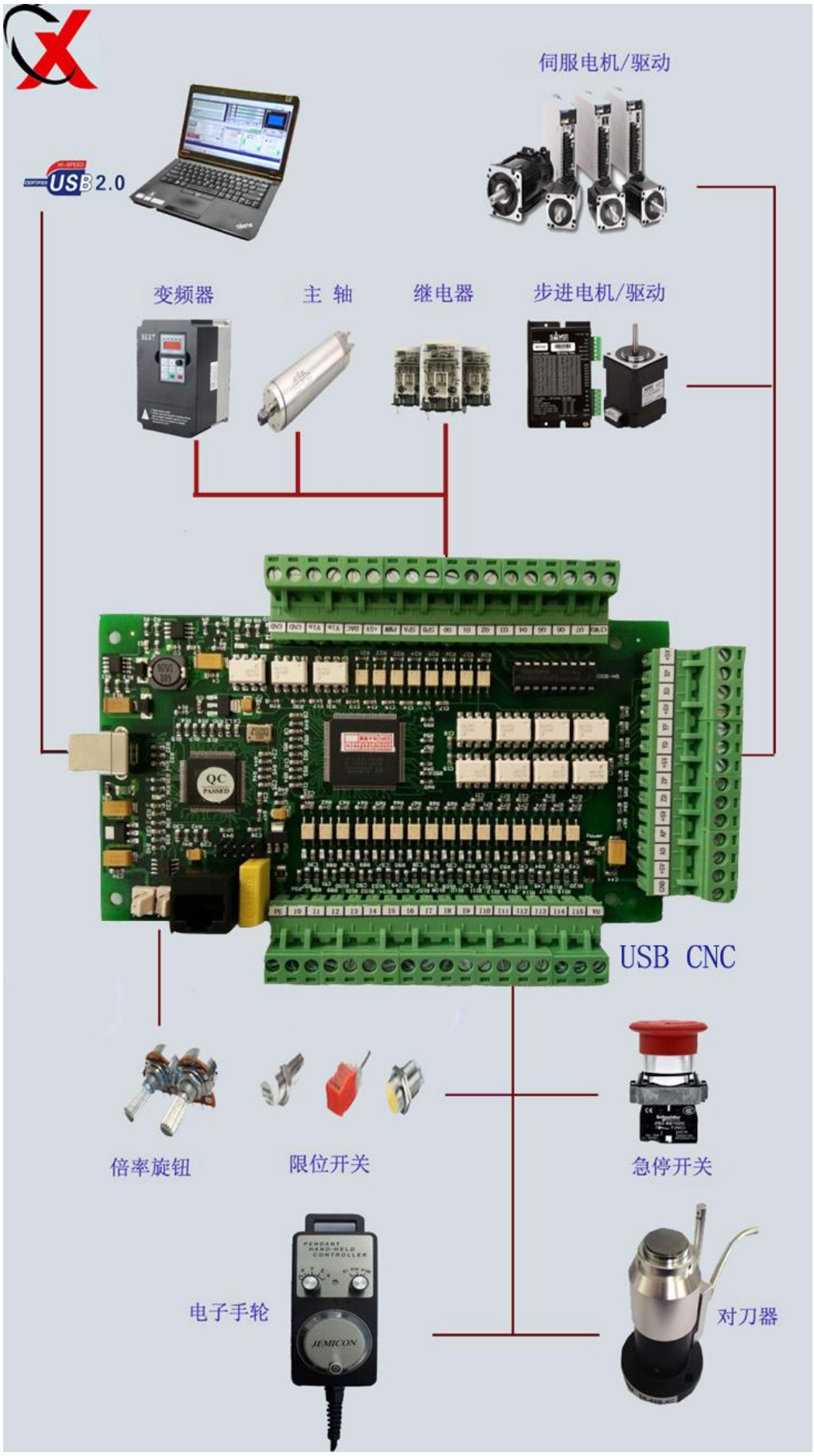
14. The output spindle can be configured into any axis of the 4 shaft through the software.

1 5 . 2 external adjustment-knob to adjust the processing speed ,spindle speed and manual mode processing speed.

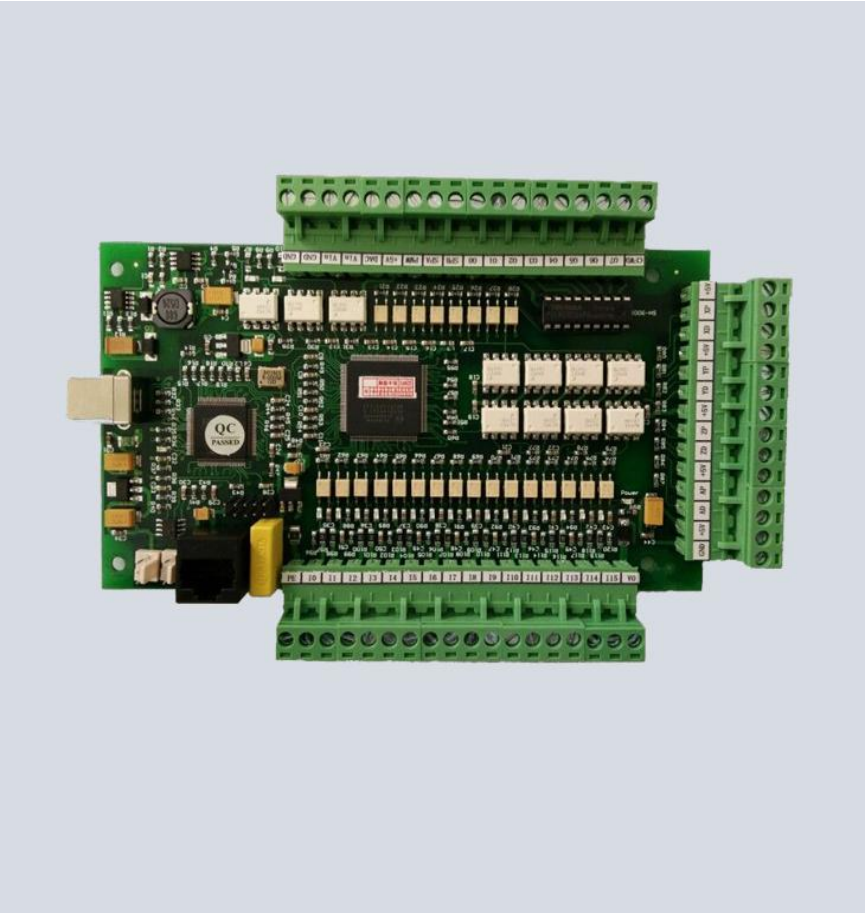
16. The 4 layers circuit board selected high-quality devices is exquisite.

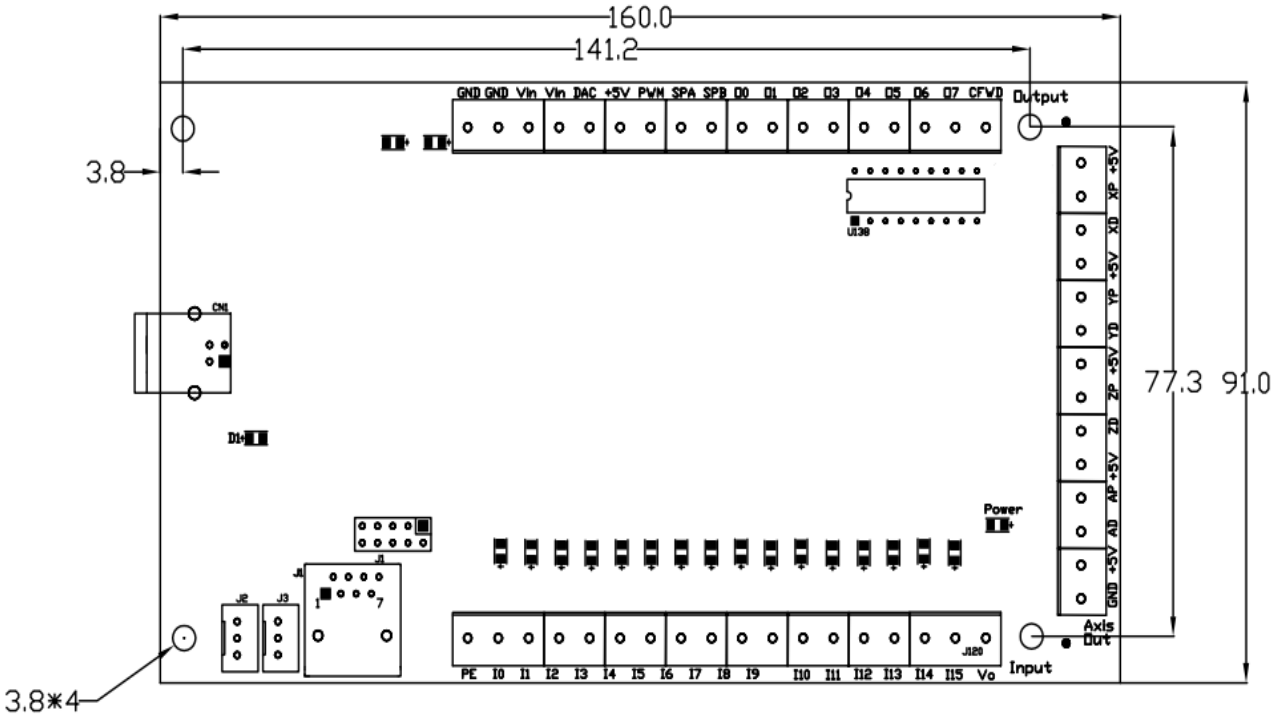
Manual Contents

Motion control card basic connection diagram



Mechanical dimensions diagram





1 Setup Mach3 software

1.1 Mach3 download and install

The card is 3/4 axis external motion control card based on USB interface of March3 software.

The latest version of March3 official website：

http://www.machsupport.com/downloads.php

Enter the official website and click the March3 download, as shown below red circle.

Home | Downloads | Purchase | Support | Resources

Downloads

For previous versions of Mach and LazyCam, XML's, and other Extra Information: Click Here

(Some of the older files are linked directly from the FTP server in order to avoid redundancy. If your download does not start immediately, please give it a few seconds - it's probably trying to contact/login to the FTP server.)

Mach

Mach3 is the flagship of the ArtSoft products. It is released in two versions: a Lockdown version, and a Development version. The Lockdown is a stable, static release recommended for new users, or people trialing the software. The Development version contains developing features and is released quite often so people can obtain new (but untested) features and capabilities. Both releases are limited to 500 lines of Gcode until licensed. Mach3 has a limit of 10,000,000 lines of Gcode even after licensing.

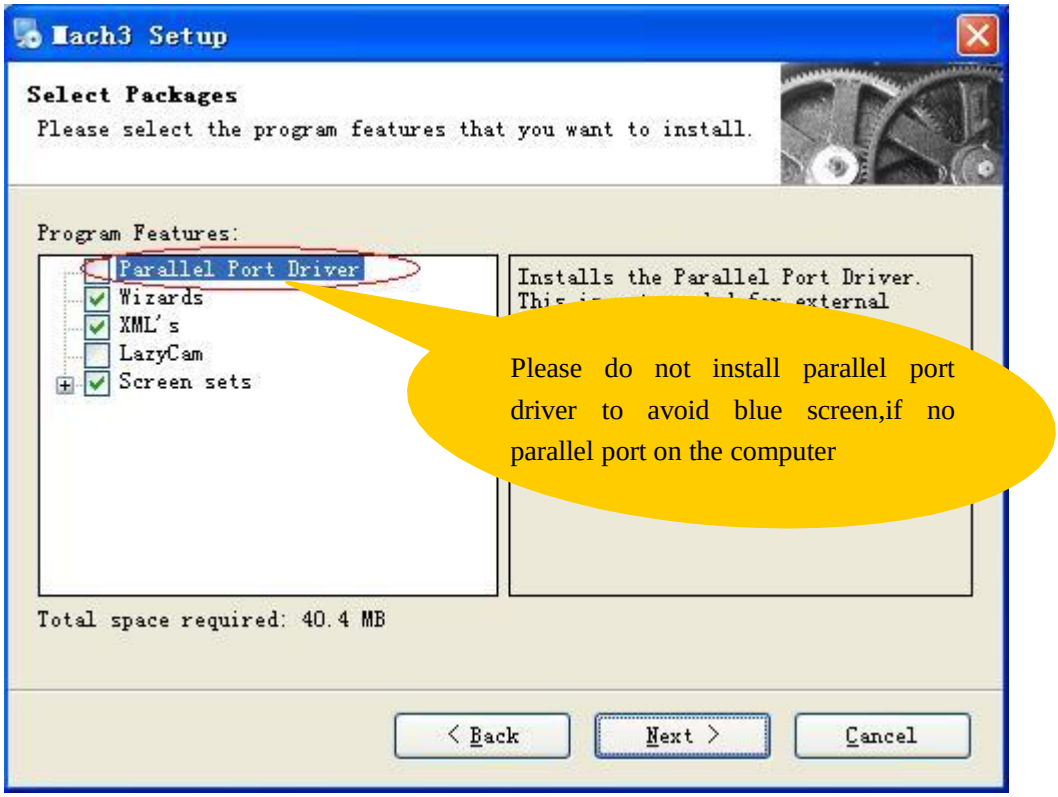
You must use a Desktop PC running a 32-bit version of Windows if you are using the Mach3 Parallel Port Driver. Laptops are not supported because the power saving features of the chipsets disrupt the pulse stream. Mach3 will only be supported on laptops running an external motion controller, such as one of those found on the Plugins page.

Lockdown:

Mach3 R3.042.040

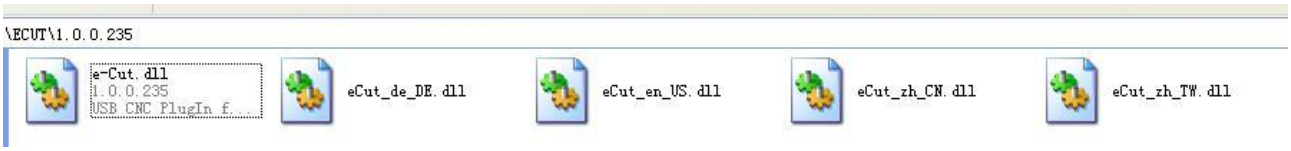
Mach3 Changelog

When installing March3 on the computer without parallel port,please do not install parallel port driver to avoid blue screen.

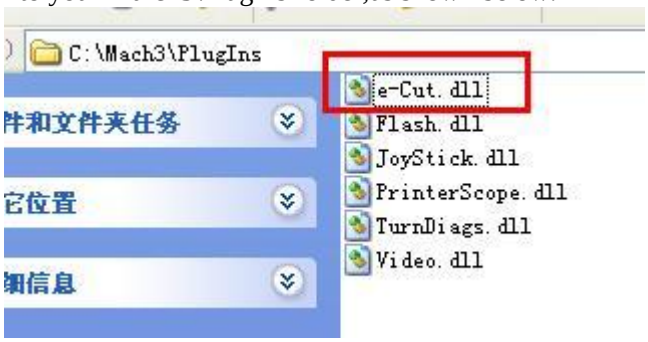


1.2 install the plugin

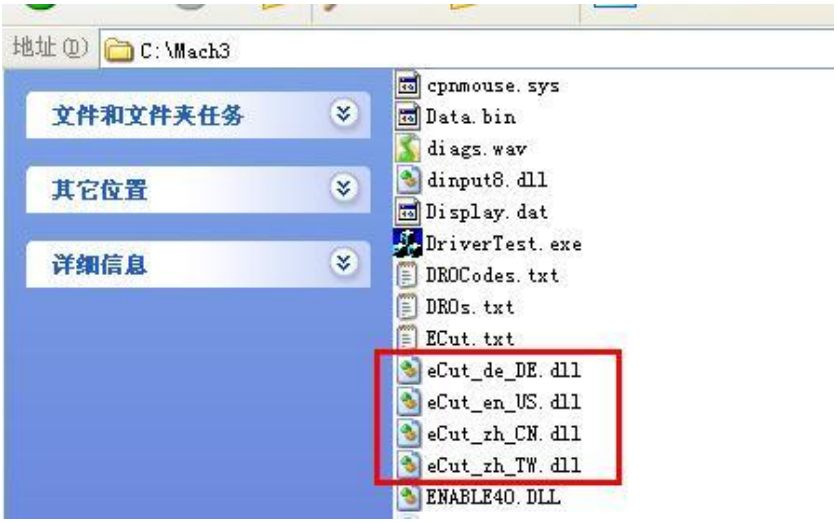
Unzip the ecut.zip for four DLL files,as shown below:



Copy the **e-cut.dll** file into your March3\PlugIns folder,as shown below:



Copy the **eCut_en_US.dll, eCut_zhCN.dll,eCut_de_DE.dll and eCut_zh_TW.dll** files into your March3 root directory,as shown below:



Note: the plug-in dll.zip in the CD-ROM

Prepare USB cable

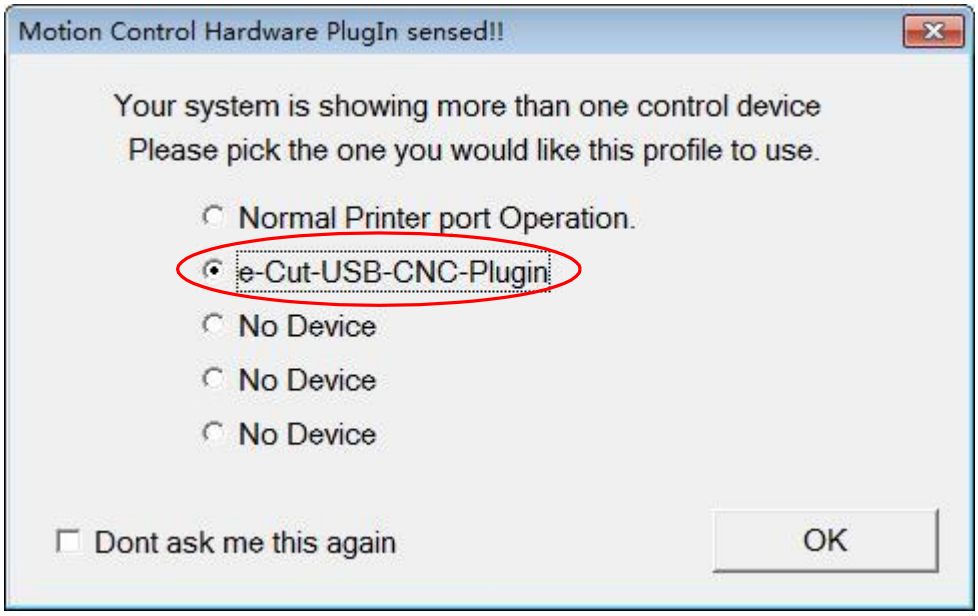
Magnet ring installed in the USB cable on the both ends.

Attention : use of acceptable quality USB cable

1.3 Installation the software of the motion control card

This e-cut card does not need install any USB driver,Windows2000/Xp/Vista/Windows7 can directly identify.

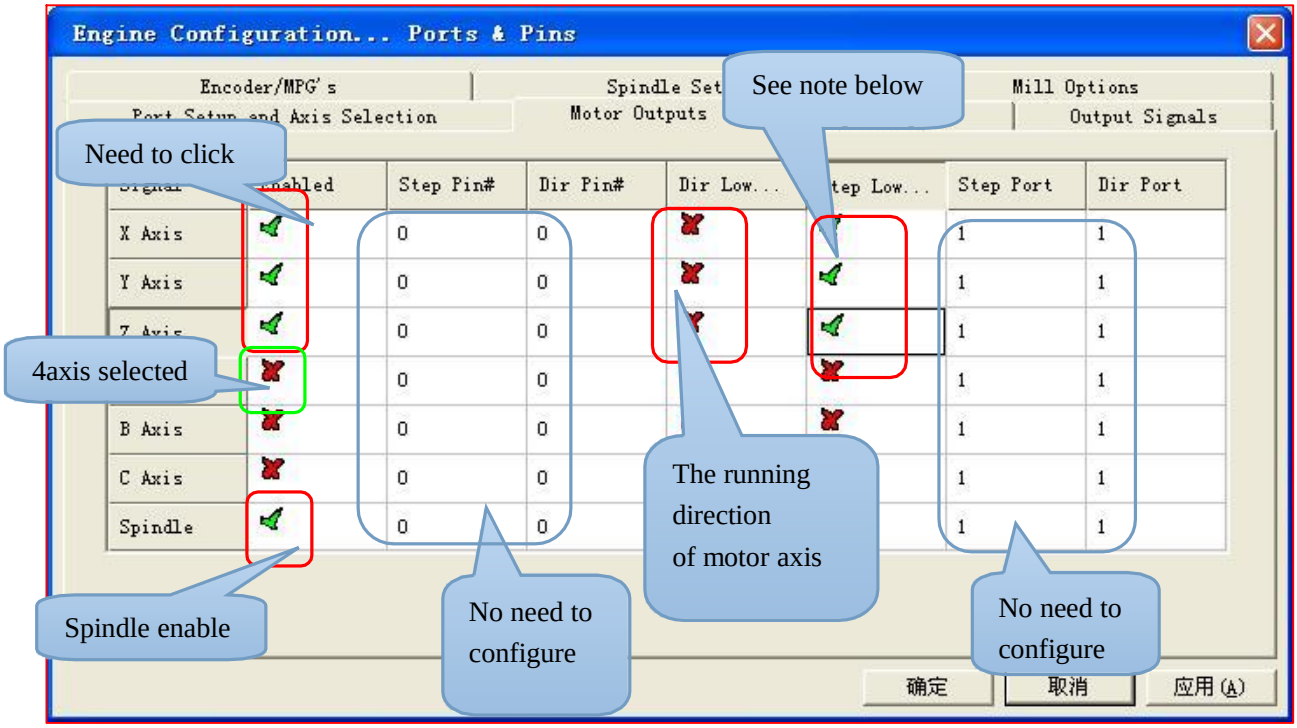
Start the Mach3 software, a dialogue box of “Motion Control Hardware PlugIn sensed!!”is shown. Please Select the“e-Cut-USB-CNC-Plugin”， you can also check”Don't ask me this again”.



When the Mach3 is connecting with the card, the Status indicator (LED on the card) is flashing.

2 Setup for Mach3

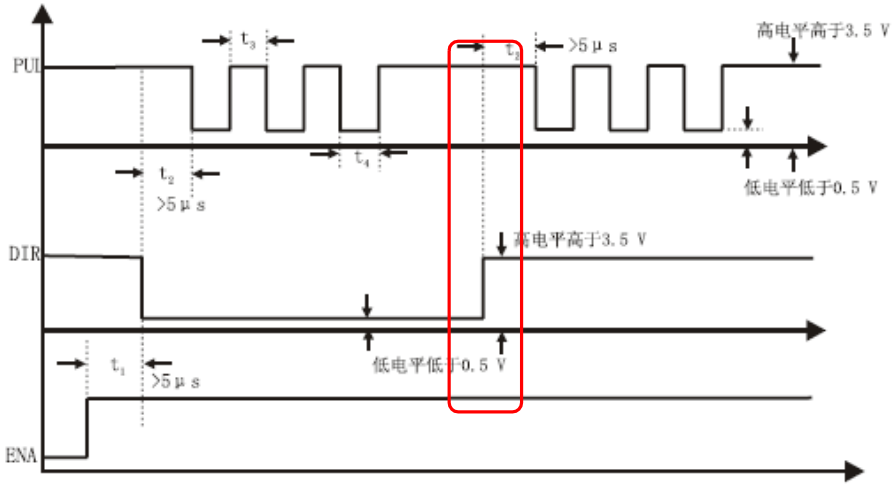
2.1 Mach3 X、Y、Z、A Axis configuration, the axis output of motion control card in the Axis Output Port as shown below: (Config => Ports and Pins)



Description:

The setting of Step Low active is according to the drive parameters.

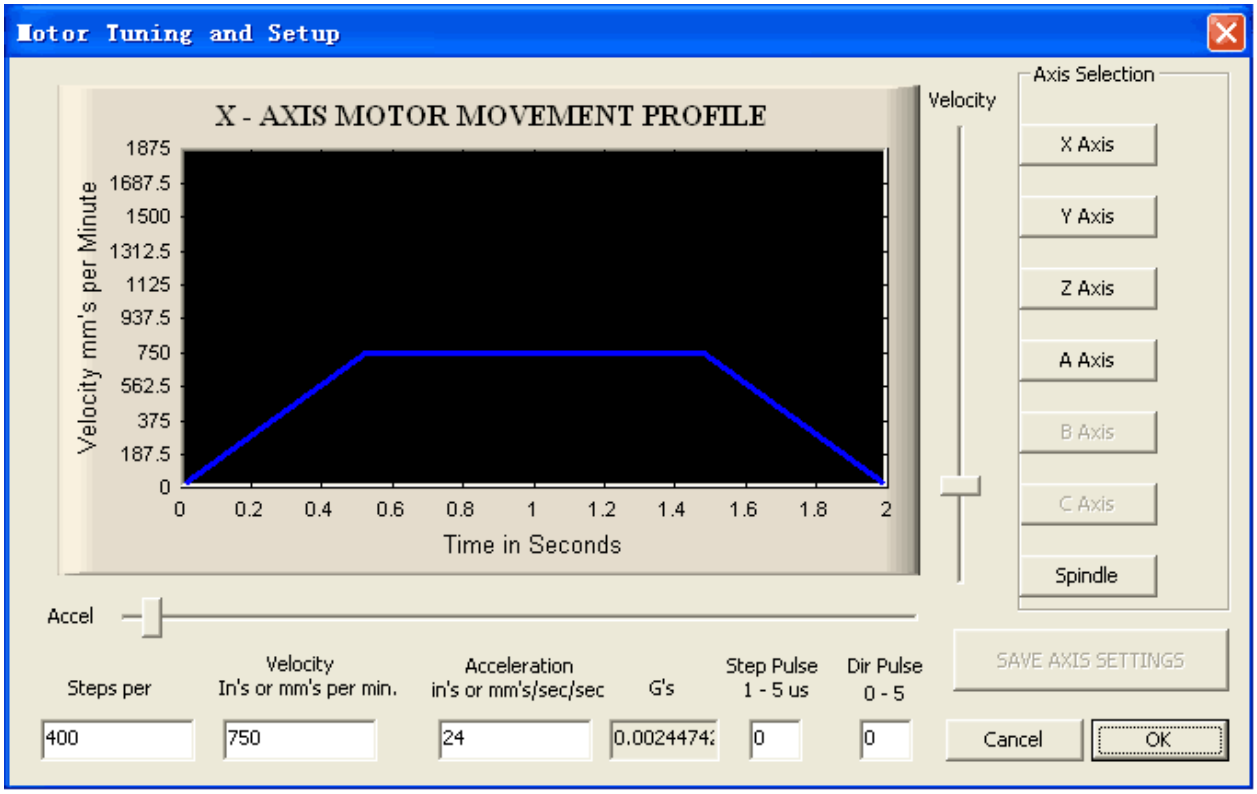
Such as Leisai M542 manual, the figure is below



Since the direction is switching when the pulse on a high level, so you can learn M542 is effective at low pulse, so Step Low active option should be set tick in March3.

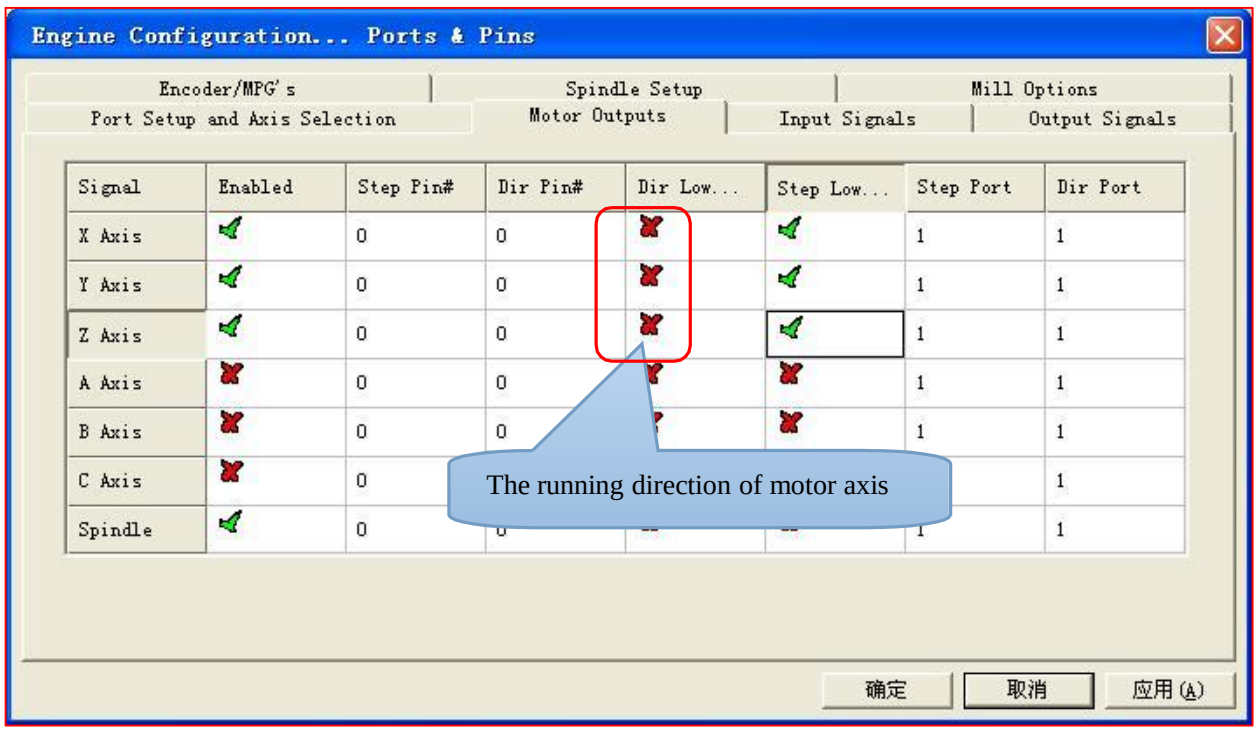
If customers do not know how to set the parameter of 'Step Low active', they do not need to set. Let machine perform an axis equidistant walking back and forth. If you found lost a pulse each time back and forth,and in X-axis direction walk farther, you can set up in the contrary as before in 'Step Low active

2.2 Motor tuning setup config as shown below: (Config => Ports and Pins)



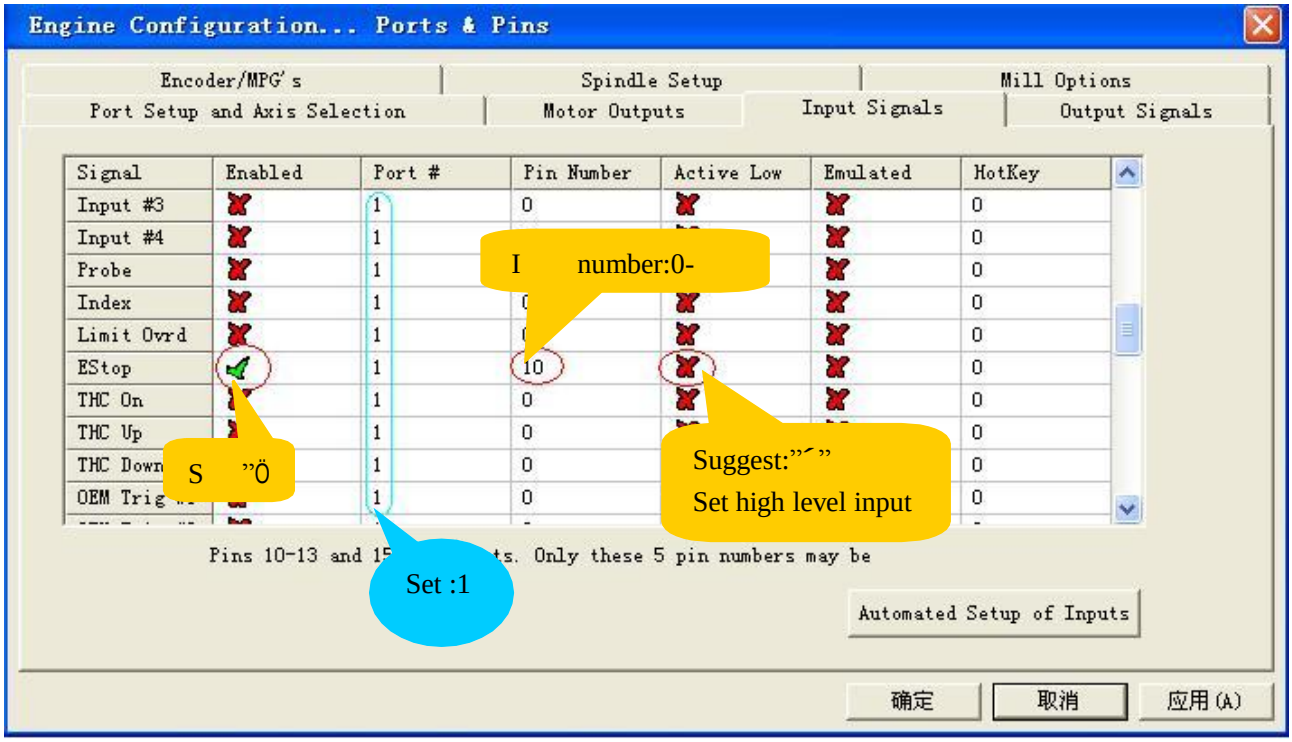
2.3 Axes direction, depends on the "Reversed"

Mach3 Menu=〉 Config =〉 Ports and Pins



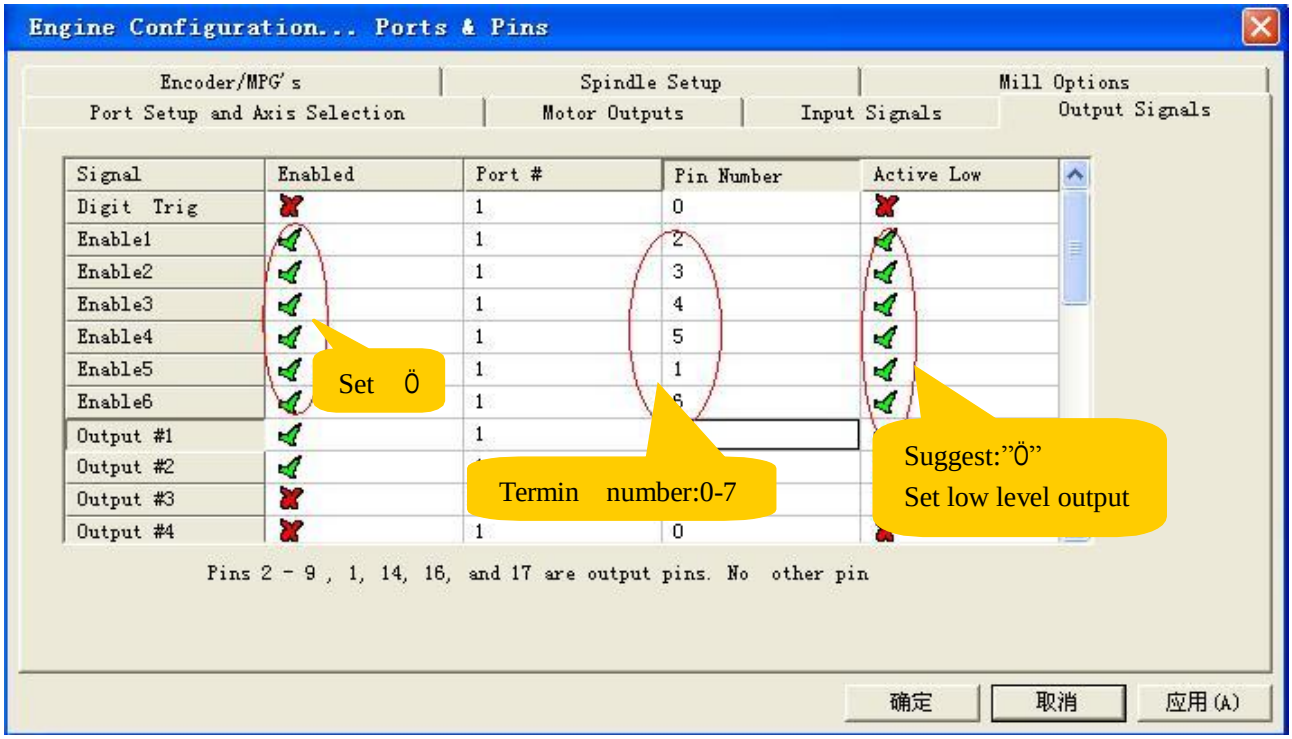
2.4 Setup the input singles

There are 16 general-purpose input channels. The channels number is from 0 to15.Suggest Active Low =”X” (Set High signal Level for Inputs)



2.5 Setup the Output signals

There are 8 general-purpose (open-drain) output channels, The channels number is from 0 to 7. Suggest Active Low =” Ö” (Set Low signal Level for outputs)



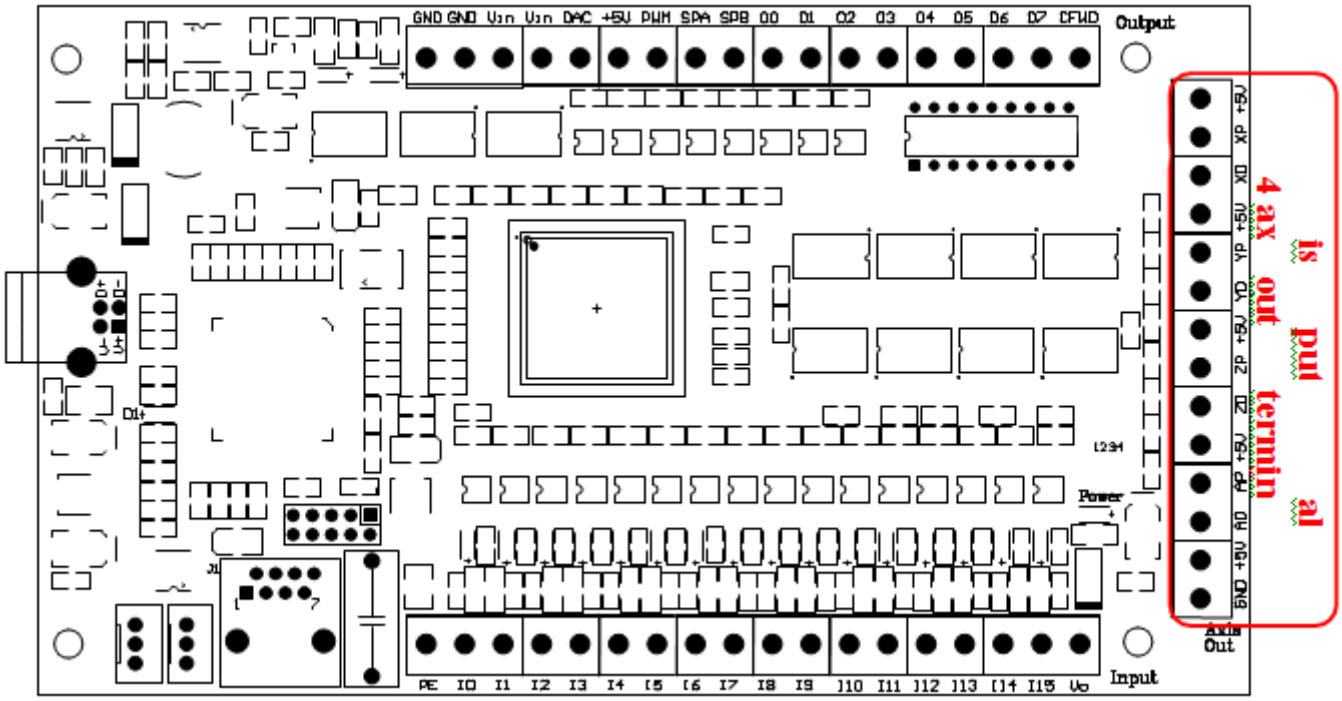
3 Setup Motion control card Hardware

3.1 The main circle of the board use USB power supply,external port with external power supply

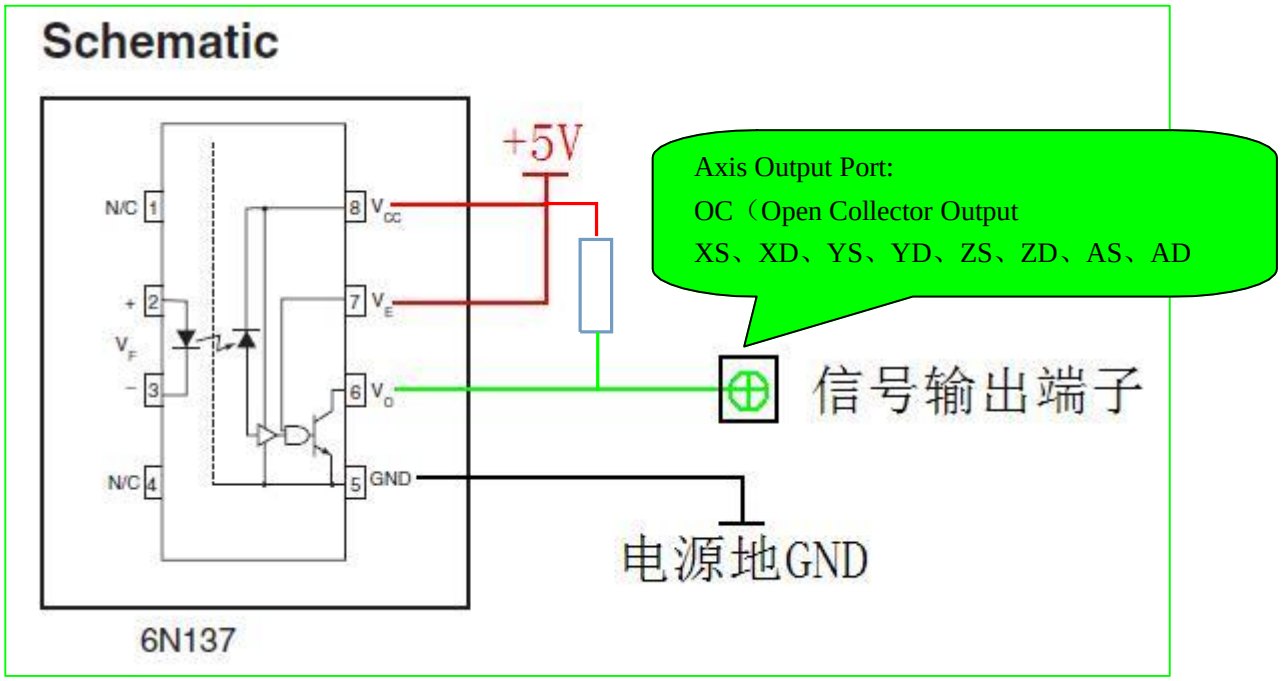
All outputs, including 4 axes pulse/DIR/8 output controls/Spindle-speed PWM output, are set to be high-resistance when USB is connected. When running Mach3, Level is controlled by Mach3.

Suggest: All output signals in Mach3 can be set to be Active Low.

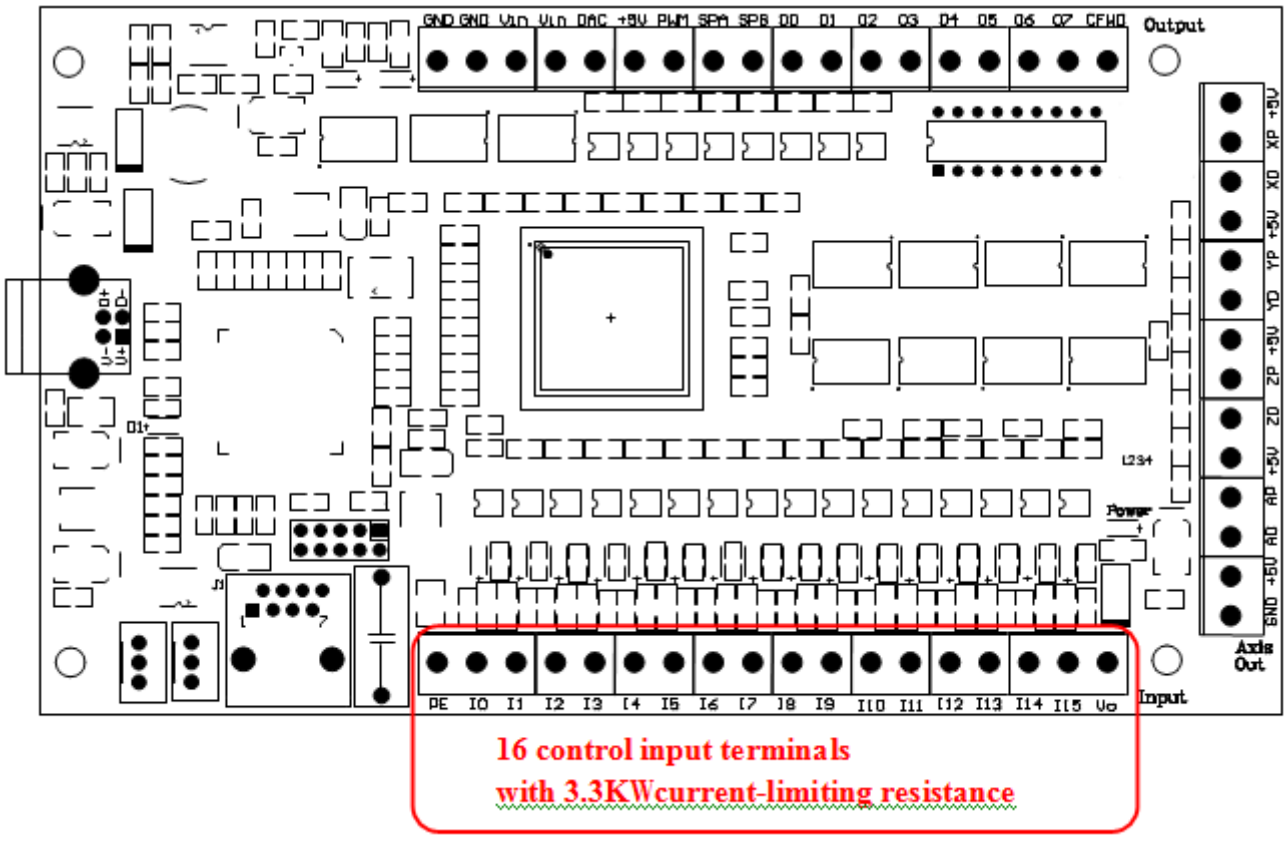
4 axis output port pin location map:



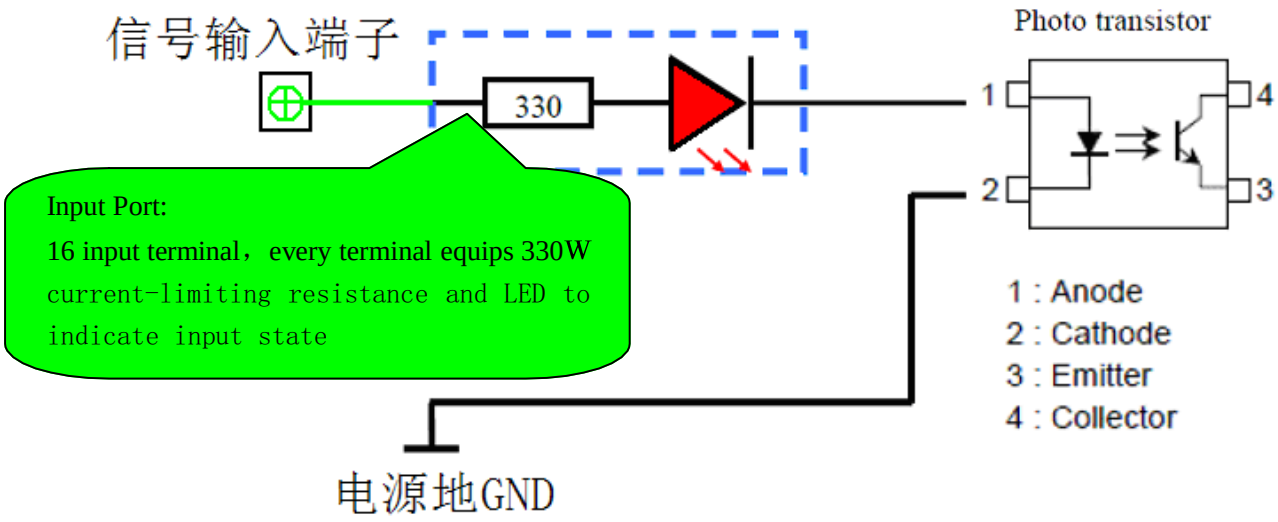
Interface diagram:



3.2 16 input port pins location map

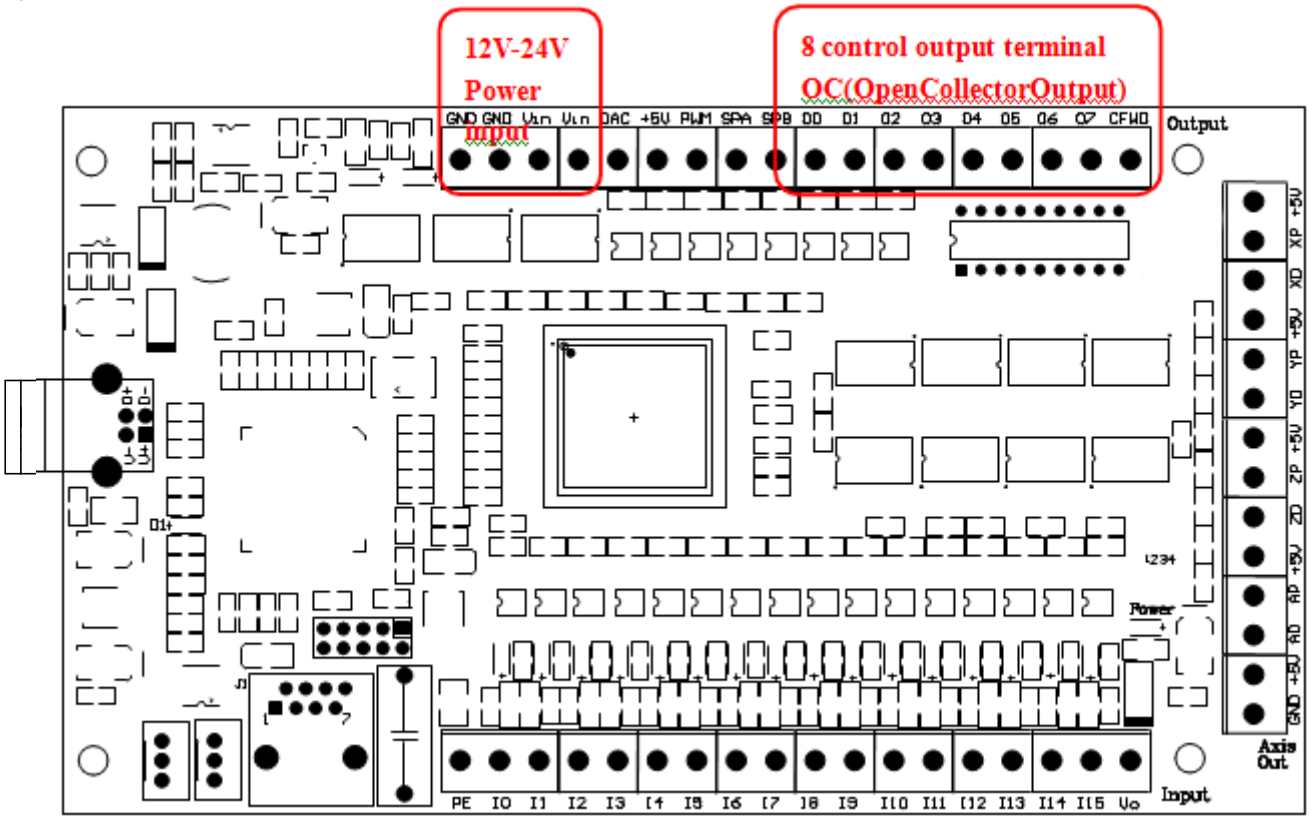


Interface diagram:

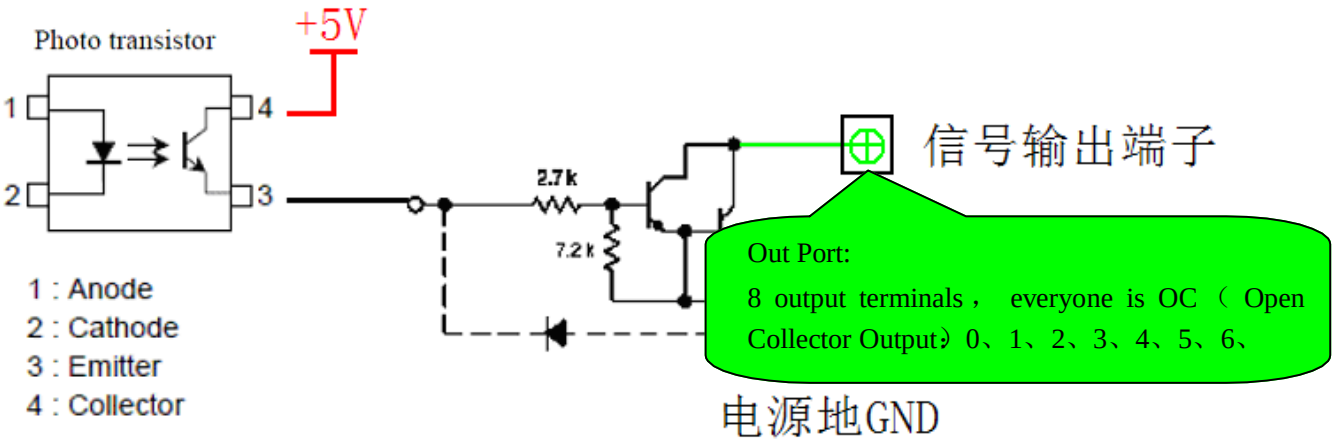


3.3 Output Port pin location map

Maximum Load voltage=24V / current=500mA, When output Low (turn on), otherwise the output is high-resistance.



Interface diagram:



4 Pin function description

4.1 4 Axis Output Port pin function description:

Pin Name	Function	Electrical	Description
+5V	+5V Power	Max:500mA	External Power Supply Output
XP	X Stepping(Xpuls)	OC Output,5V/30mA	X axis Pulse Output
XD	X Direction(Xdir)	OC Output,5V/30mA	X axis Direction Output
+5V	+5V Power	Max:500mA	External Power Supply Output
YP	Y Stepping(Ypuls)	OC Output,5V/30mA	Y axis Pulse Output
YD	Y Direction(Ydir)	OC Output,5V/30mA	Y axis Direction Output
+5V	+5V Power	Max:500mA	External Power Supply Output
ZP	Z Stepping(Zpuls)	OC Output,5V/30mA	Z axis Pulse Output
ZD	Z Direction(Zdir)	OC Output,5V/30mA	Z axis Direction Output
+5V	+5V Power	Max:500mA	External Power Supply Output
AP	A Stepping(Apuls)	OC Output,5V/30mA	A axis Pulse Output
AD	A Direction(Adir)	OC Output,5V/30mA	A axis Direction Output
+5V	+5V Power	Max:500mA	External Power Supply Output
GND	Power Ground	GND	External Power Supply Ground

4.2 16 Input Port pin function description:

Pin Name	Function	Electrical	Description
PE	Ground		Connect the shell or the ground
I0	General-purpose Input（each pin Corresponds a LED）	5V/7mA general-purpose input channels	Function are set by March3“Config”=>”Ports and Pins” =>“Input Signals”
I1			
I2			
I3			
I4			
I5			
I6			
I7			
I8			
I9			
I10			
I11			
I12			
I13			
I14			
I15			
Vo	+24V power output	Max:500mA	External Power Supply Output

4.3 Output Port pin function description:

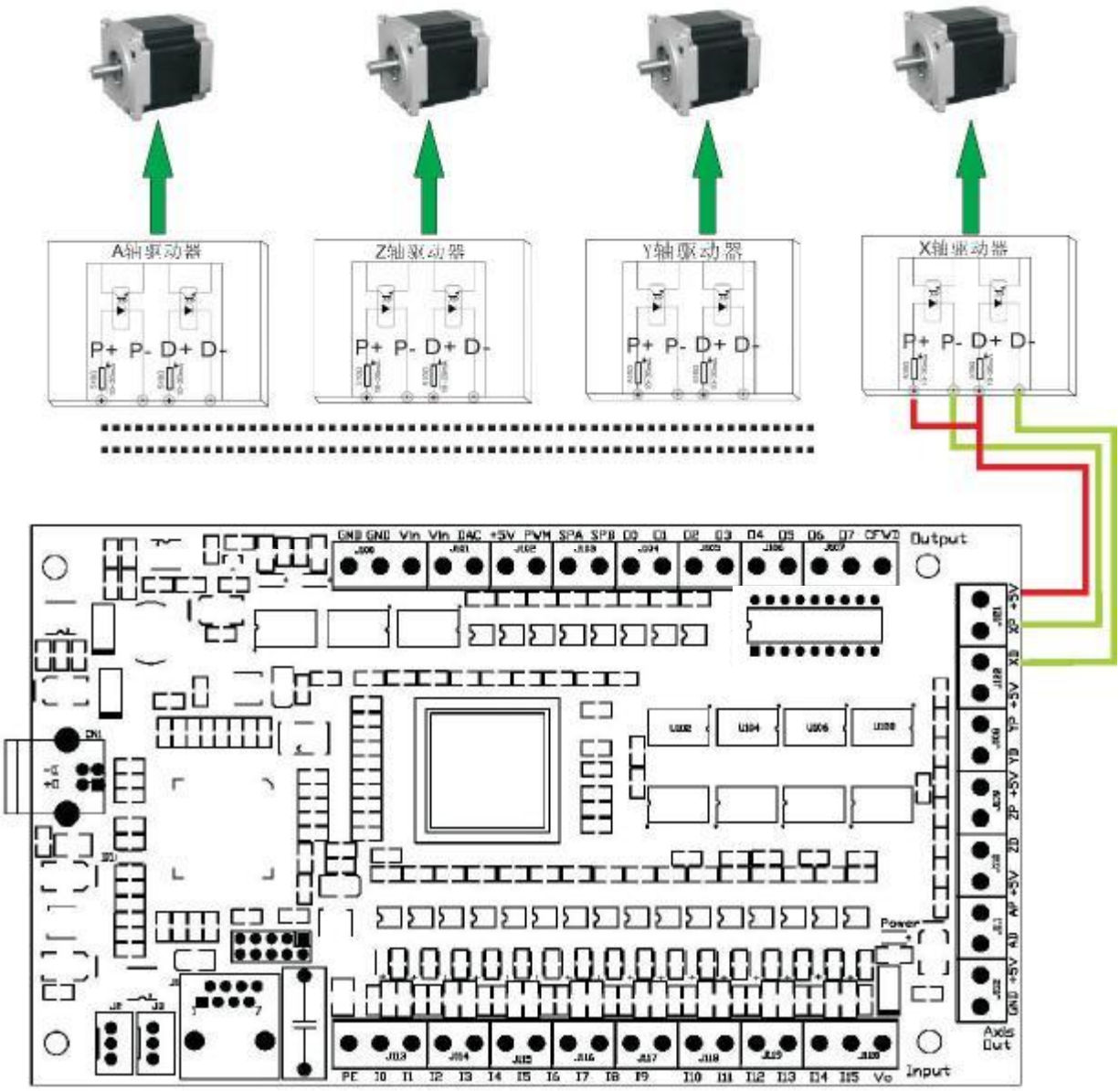
Pin Name	Function	Electrical	Description
GND	Power GND	GND	External Power Supply GND
GND	Power GND	GND	External Power Supply GND
Vin	External Power Input	12-24V	External Power Input
Vin	External Power Input	12-24V	External Power Input
DAC	0-10V standard linear analog output	Max output current: 20mA	0-10V analog speed output
+5V	+5V Power	Max:500mA	External Power Supply for +5V voltage sensor
PWM	5V（33KZ）PWM	OC Max input current:100mA	PWM speed output port
SPA	Spindle speed signal Positive input	5V/6mA	Spindle speed measure signal
SPB	Spindle speed signal Negative input	5V/6mA	Spindle speed measure signal
00	8 general-purpose (open- Collector) output channels	OC (open- Collector), Max 24V /500mA	Function are set by March3 “Config”=>”Ports and Pins” =>“Output Signals”
01			
02			
03			
04			
05			
06			
07			
CFWD			General output common diode negative end

5 Motion control card connection Diagram

5.1 X、Y、Z、A axes output

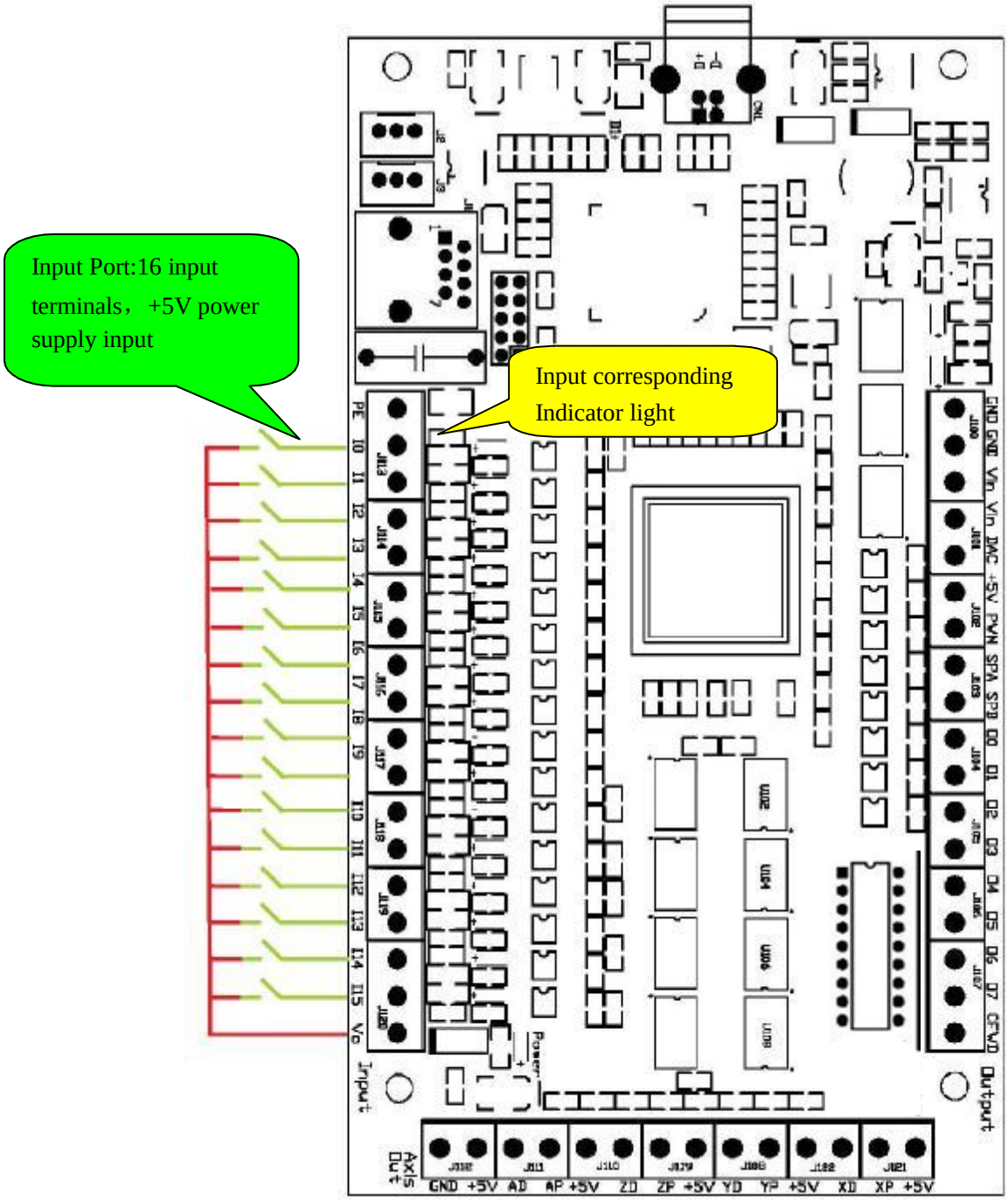
Only need to internal +5V power supply (output capacity of 500mA), simplifies the circuit connection

The stepper driver common anode connection diagram

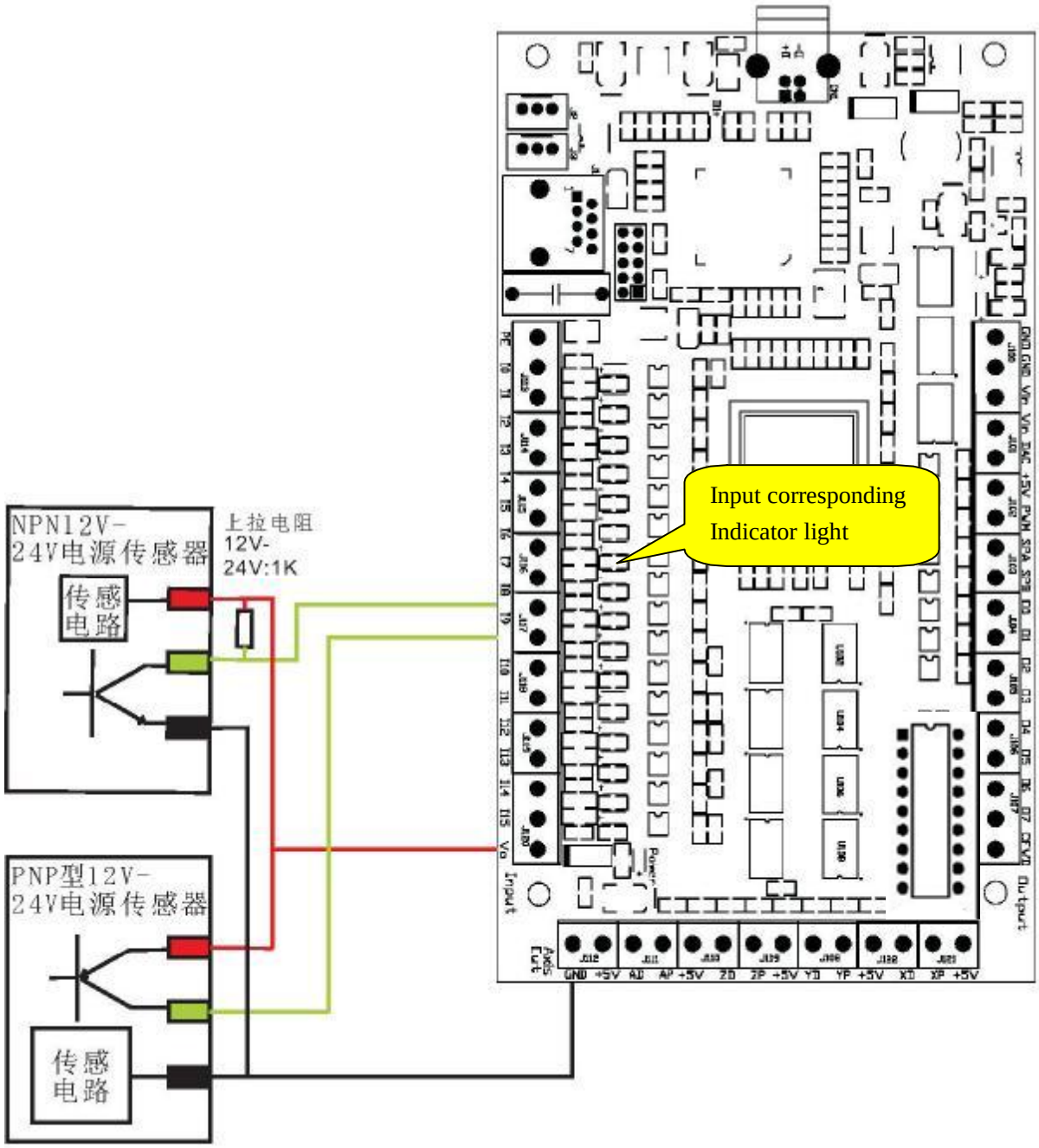


5.2 Input wiring mode.

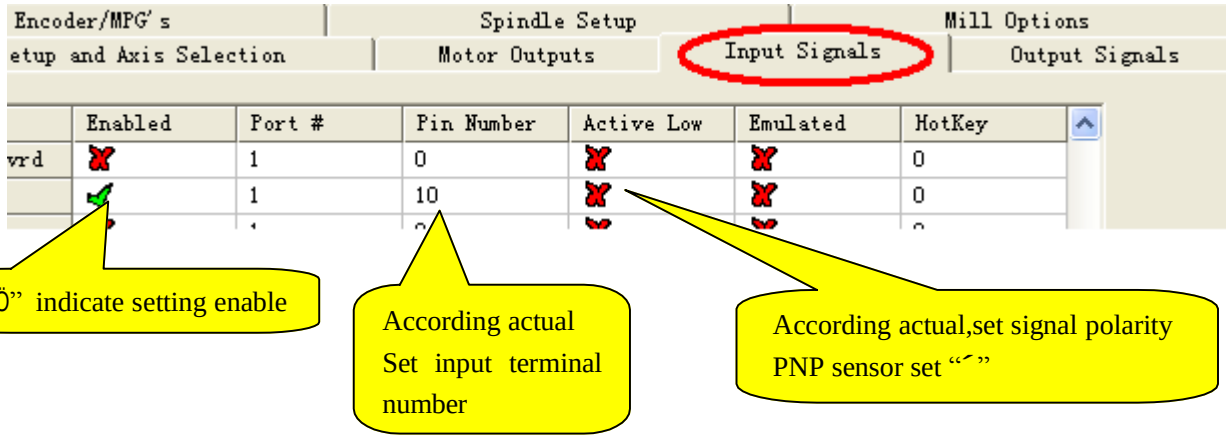
The onboard voltage is 24V, the internal power supply output of motion control card driver input point



5.3 Sensor's wiring and setting

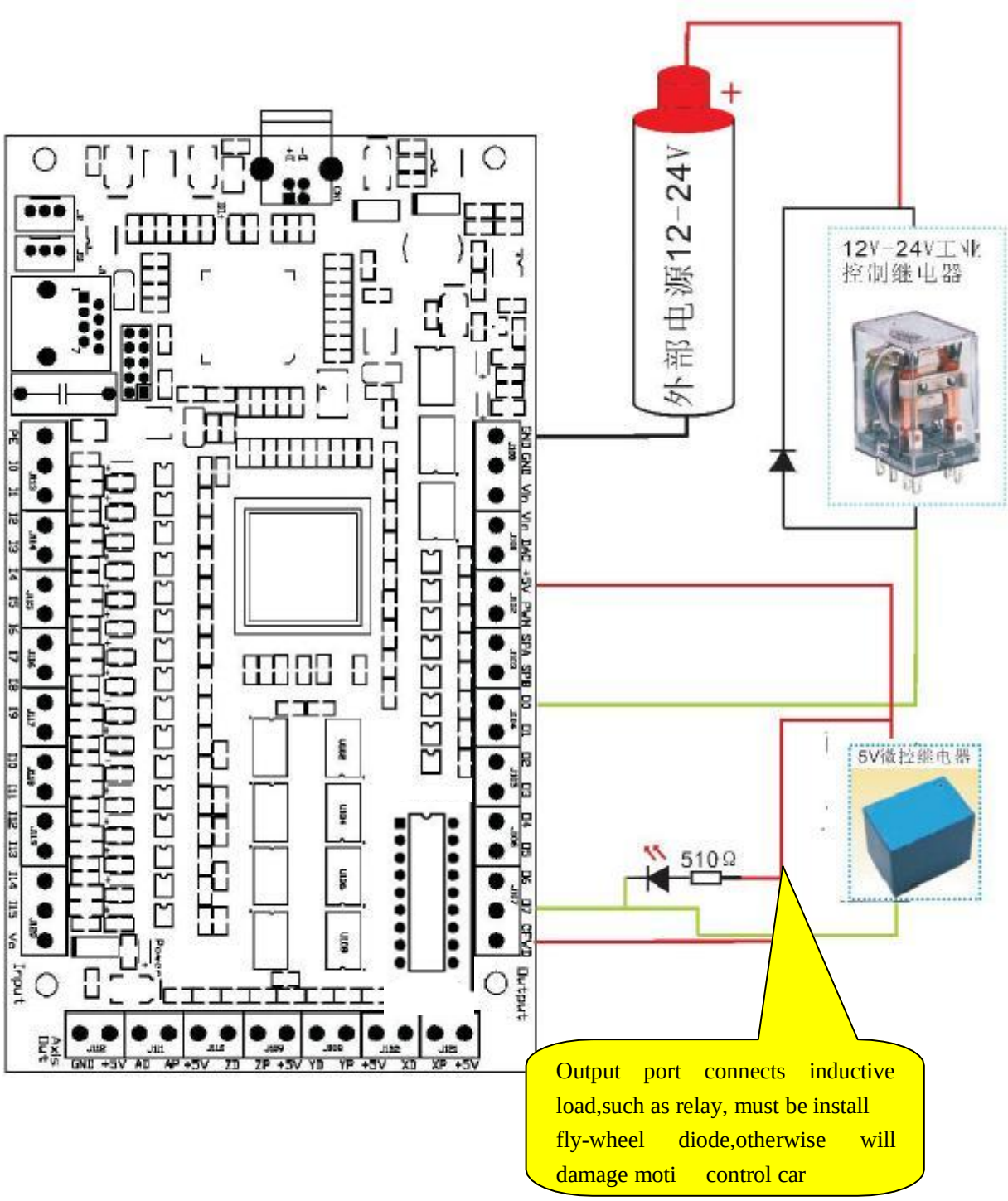


Mach3 Input Signals Setting

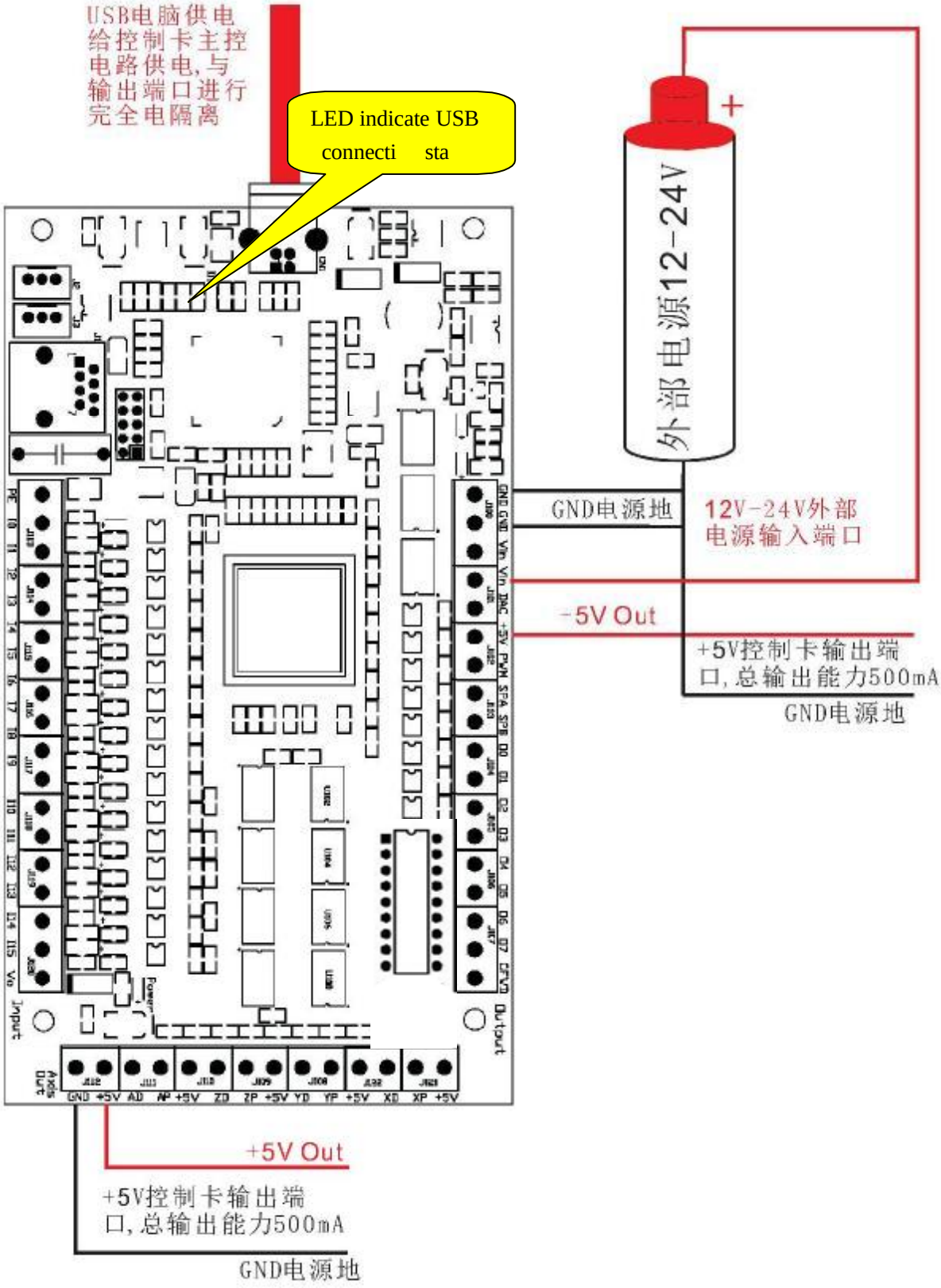


5.4 output wiring

8-general-outputs, Maximum Load voltage=24V / current=500mA, When output Low (turn on), otherwise the output is high-resistance .

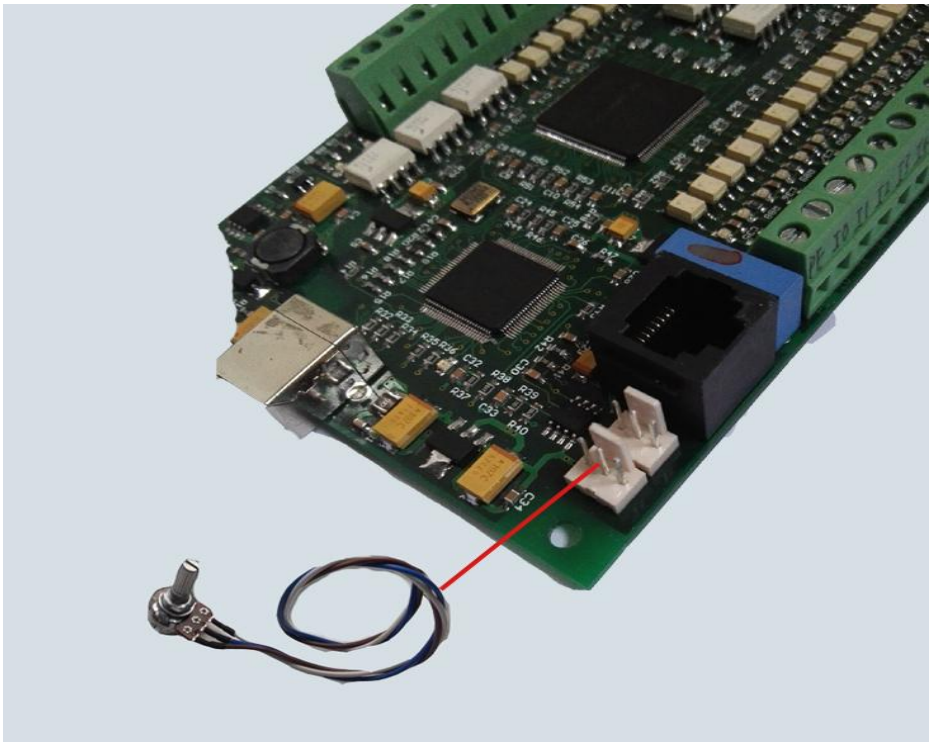


5.5 Motion control card power supply connection diagram

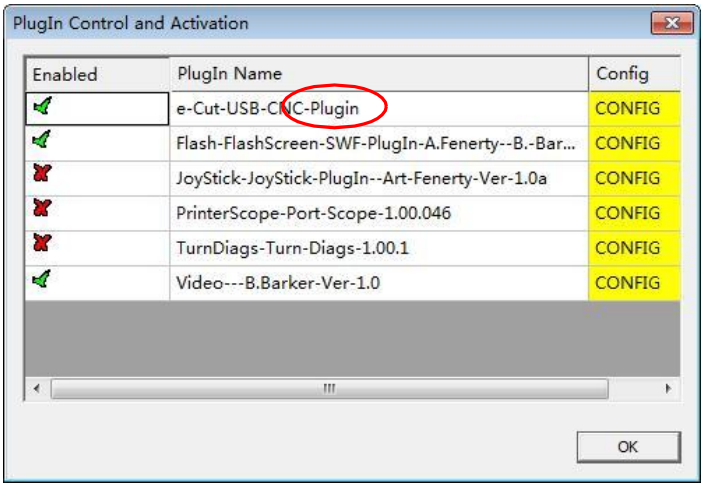


6 Adjustment-knob

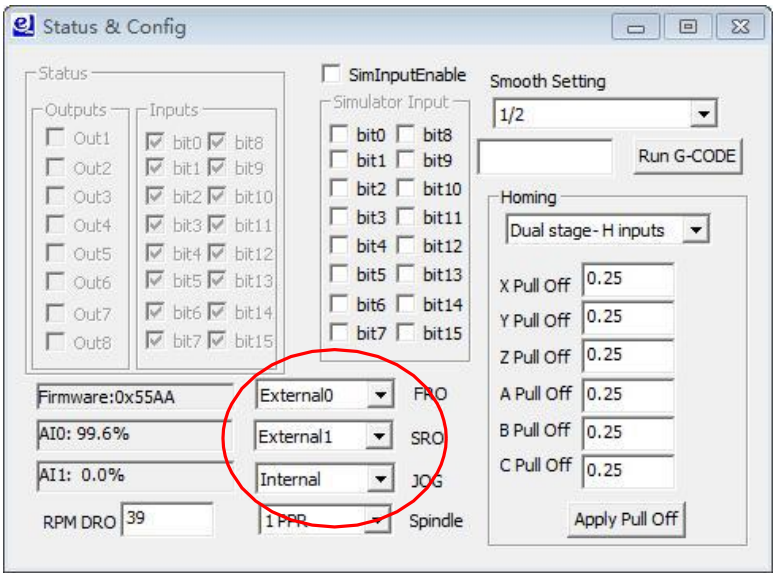
6.1 Connecting the adjustment-knob with the EXT0 or EXT1 of USB Motion Card



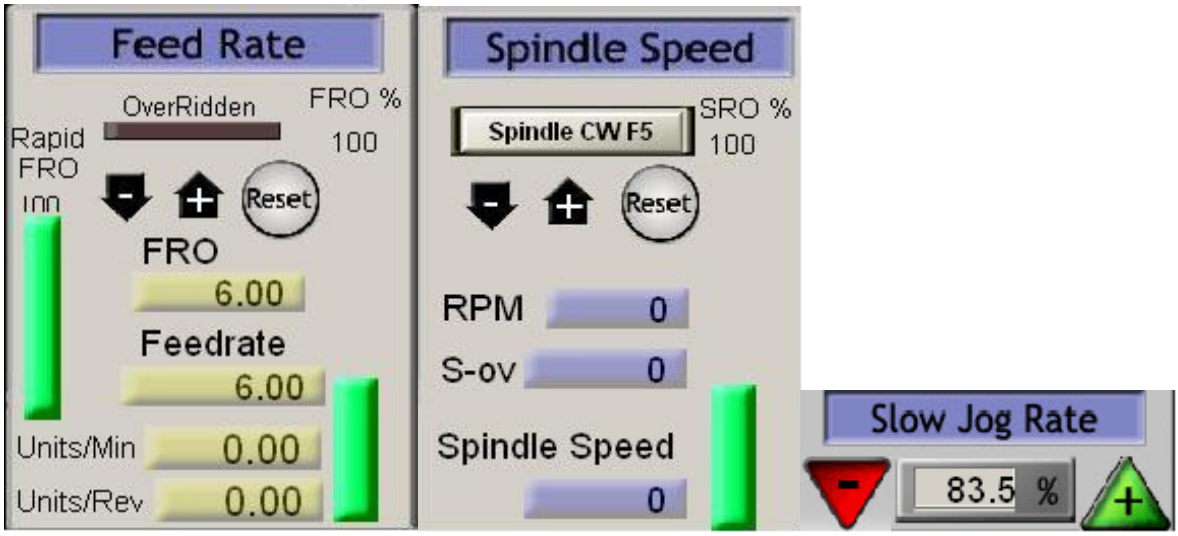
6.2 Go to “Config Plugins” under “Config” to go into “PlugIn Control and Activation”



6.3 After check the “Config”, USB Motion Card setting will be shown. You can select one of the functions which is able to controlled by the external knob. Please select “External 0” in your particular setting. Then, click “OK” to exit.



6.4 Now, you can try to turn the knob to adjust your selected function.

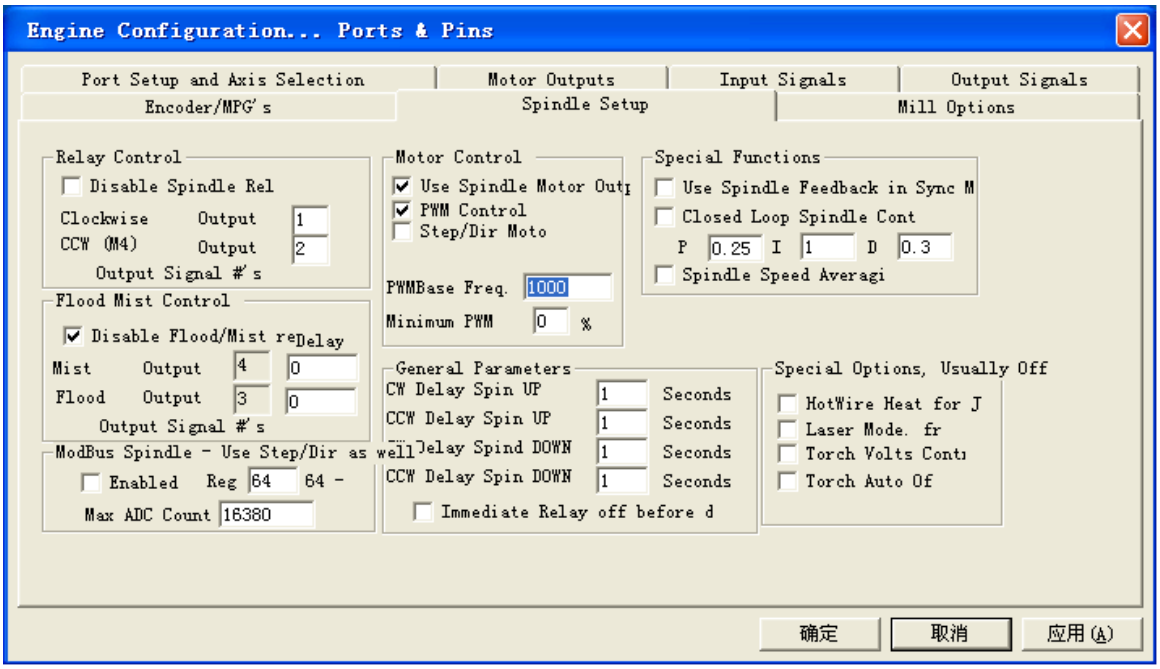


7 Spindle speed PWM output

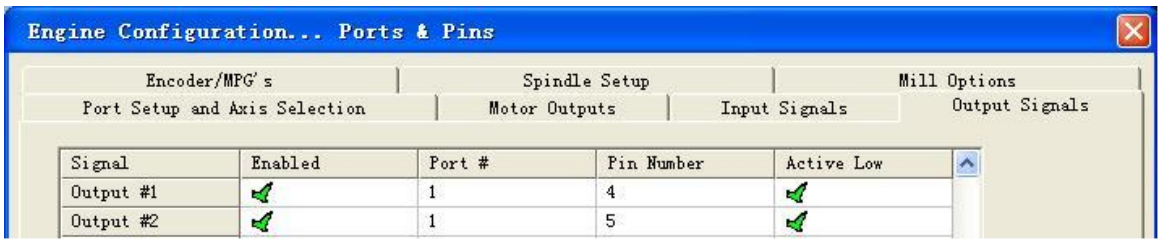
7.1 The spindle

7.1.1 Enter “Spindle Setup”,click “Use Spindle Motor Outpu”

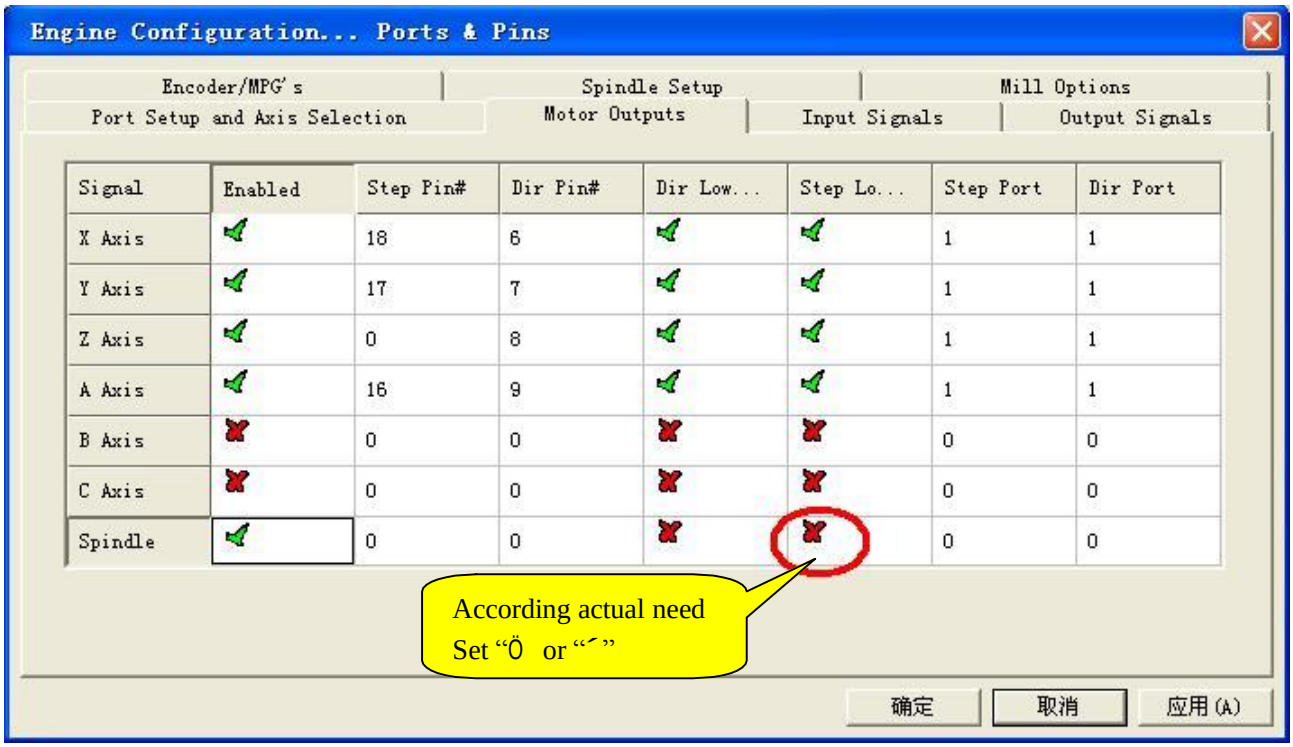
No need to fill the required frequency in the PWMBase Freq.



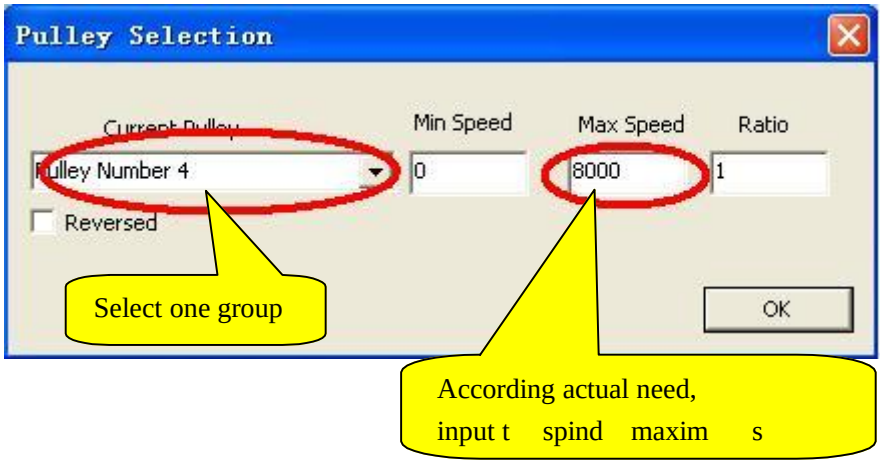
7.1.2 setup spindle relay



7.1.3 setup spindle speed signal PWM phase



7.1.4 Mach3 "Config=>Spindle Pulleys..", go into "Pulley Selection"



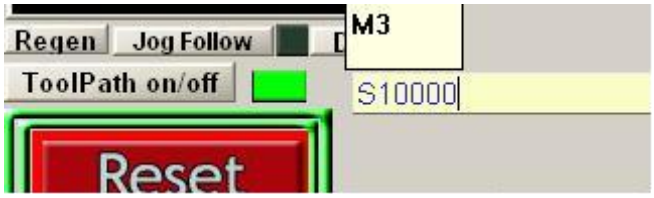
7.1.5 Please refer to "5.5.6 spindle motor setting" of "Mach3Chinese-Documents.pdf" about the other configuration instructions.

Spindle test: as shown blown

Input "M3" spindle relay closure

Input "S10000" spindle rotation (configured and installed spindle relay)

Input "M5" spindle stop

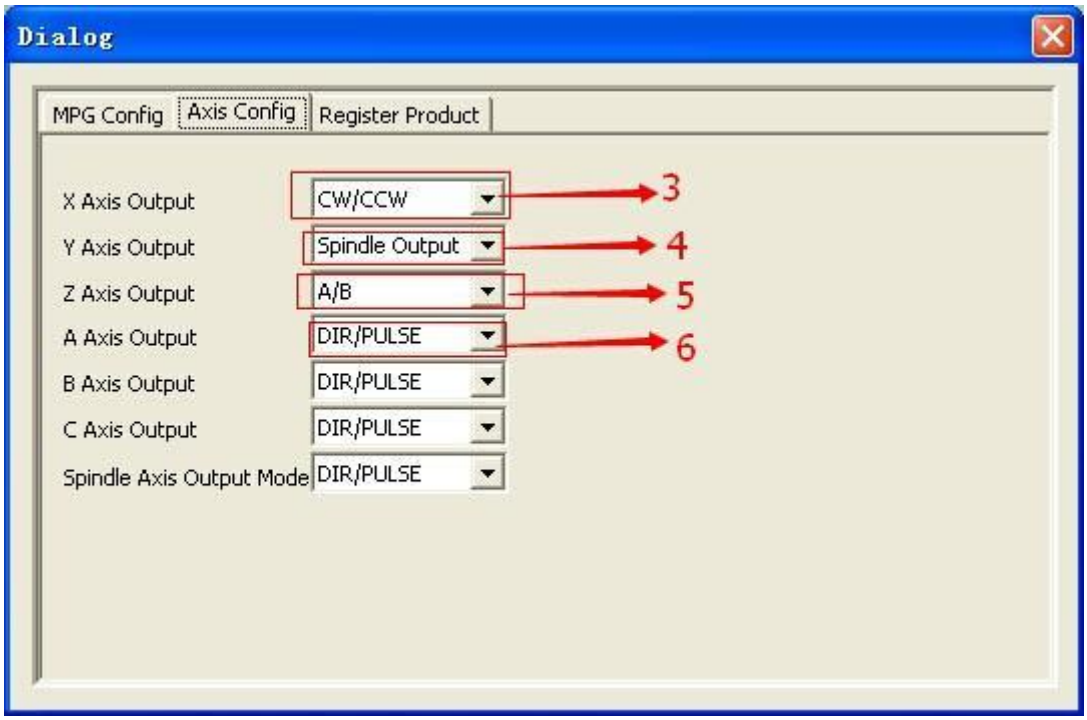


7.1.6 There are 3 output modes about 4 axis pulse

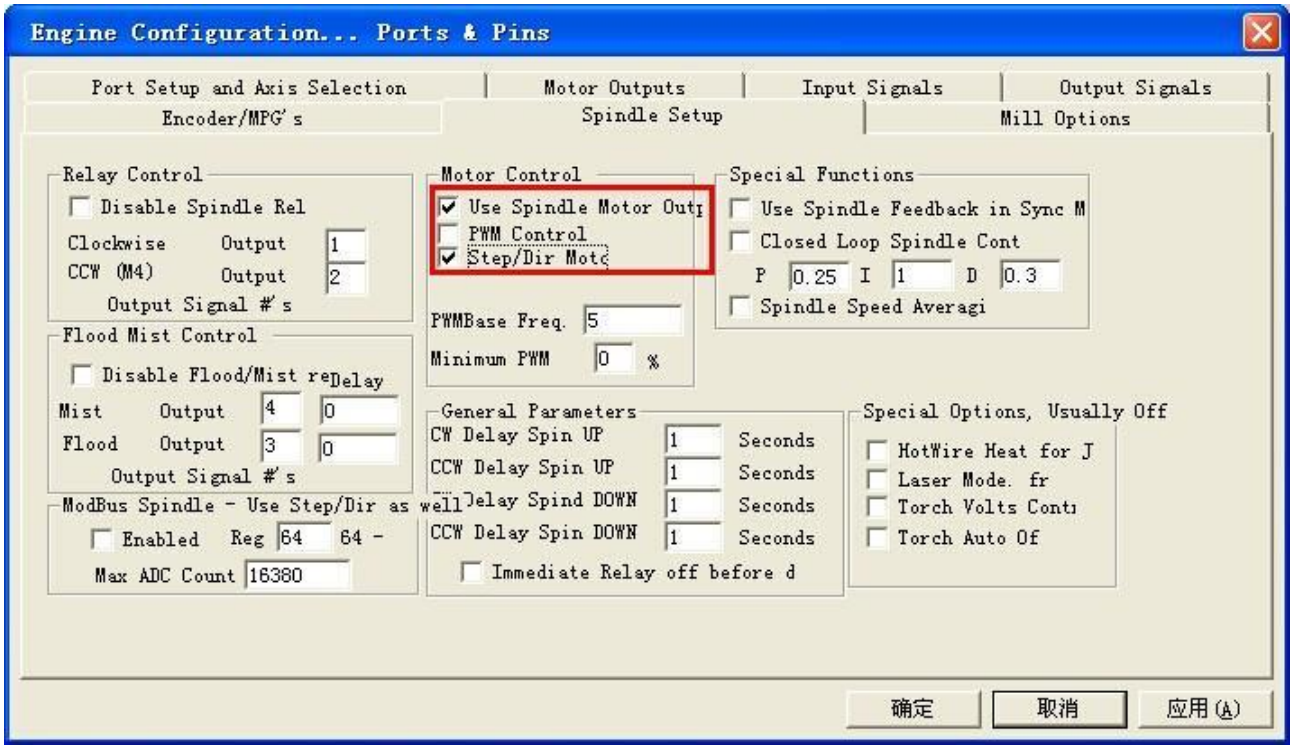
CW/CCW output in the red circle3

A/B output in the red circle5

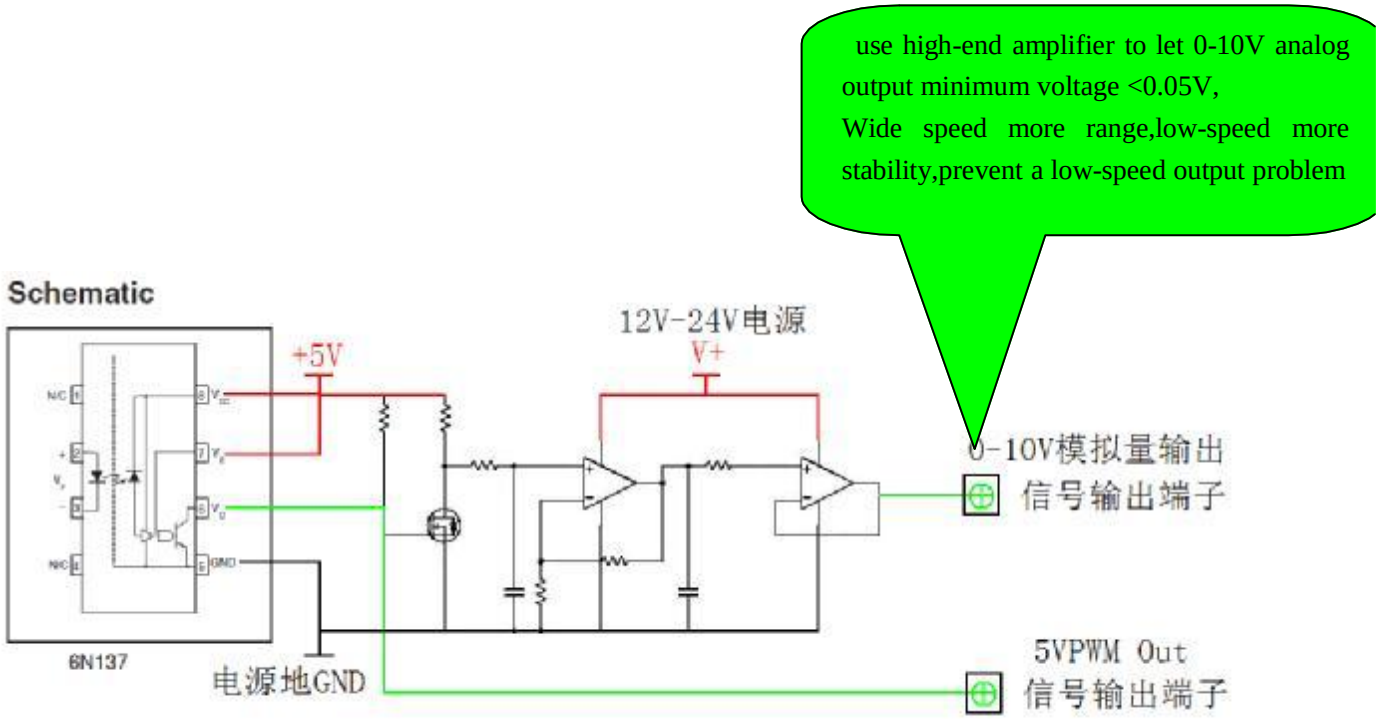
DIR/PULSE output in the red circle6



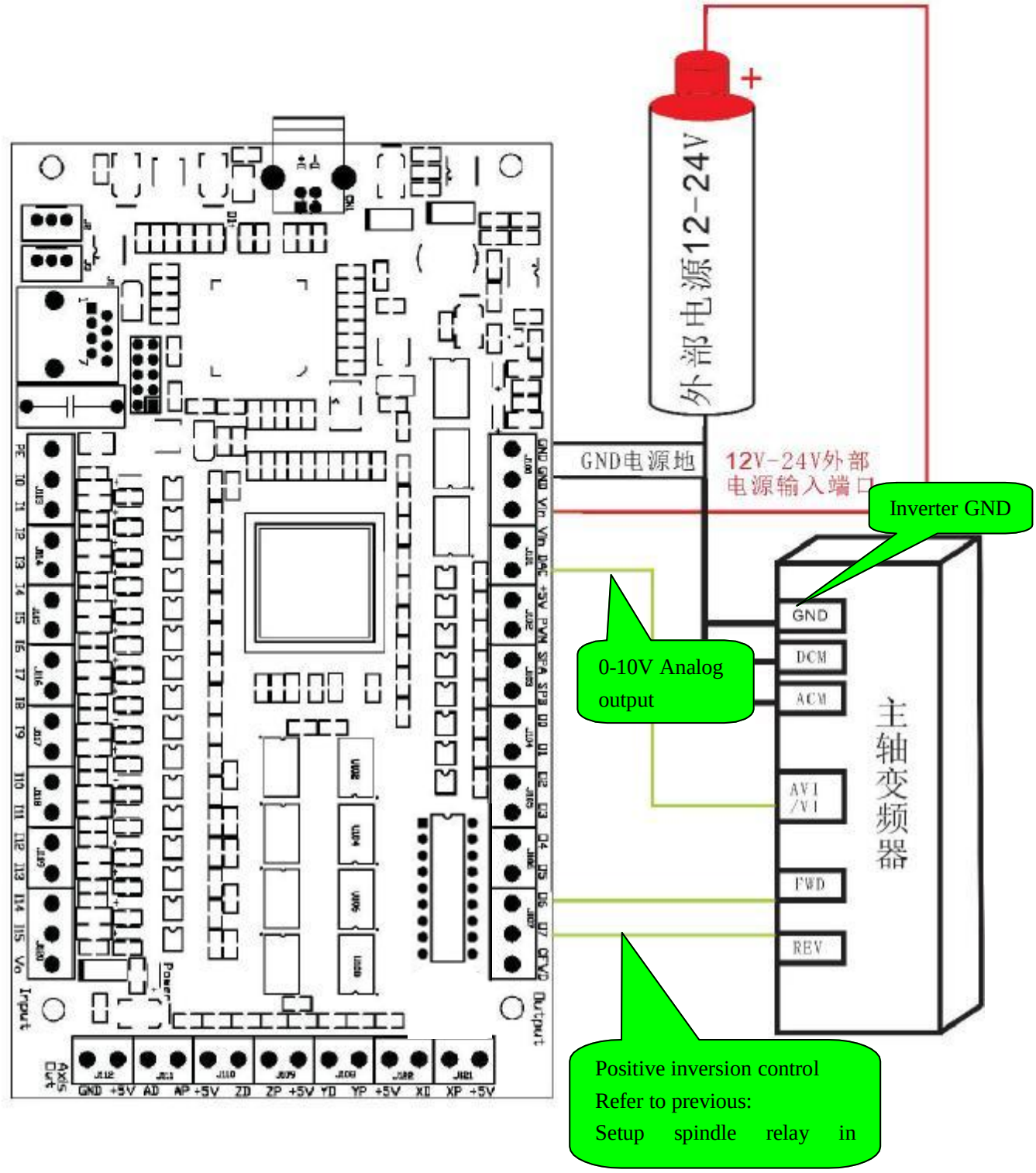
The mode of Spindle Output is used for servo motor driving the spindle output.At the same time,need to configure Ports&Pins => Motor Control ,as shown the red circle in the diagram .



7.2 spindle speed analog output interface schematic



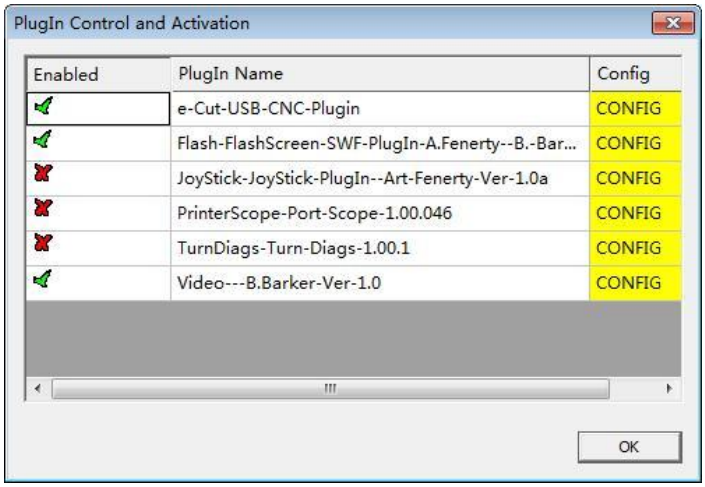
7.3 spindle output wiring digram (general inverter wiring diagram)



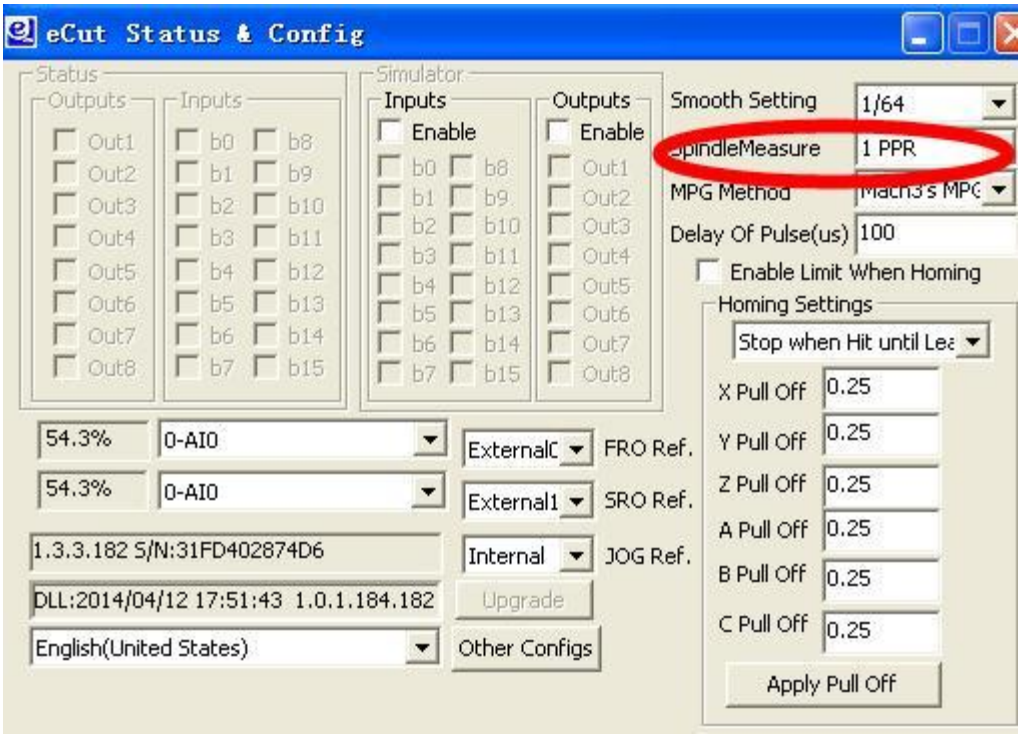
8 Measure the rotating speed of the spindle

8.1 Motion control card configuration dialog

"Config=>Config Plugins，go into "PlugIn Control and Activation".

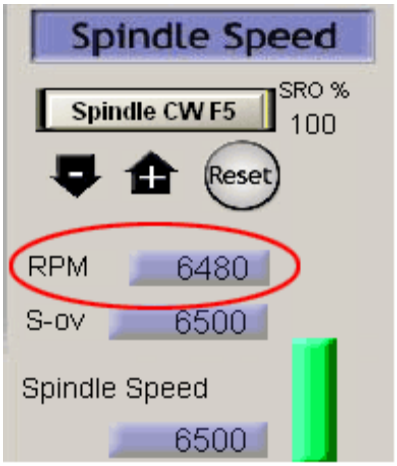


Check "Config" to entry "Status & Config"

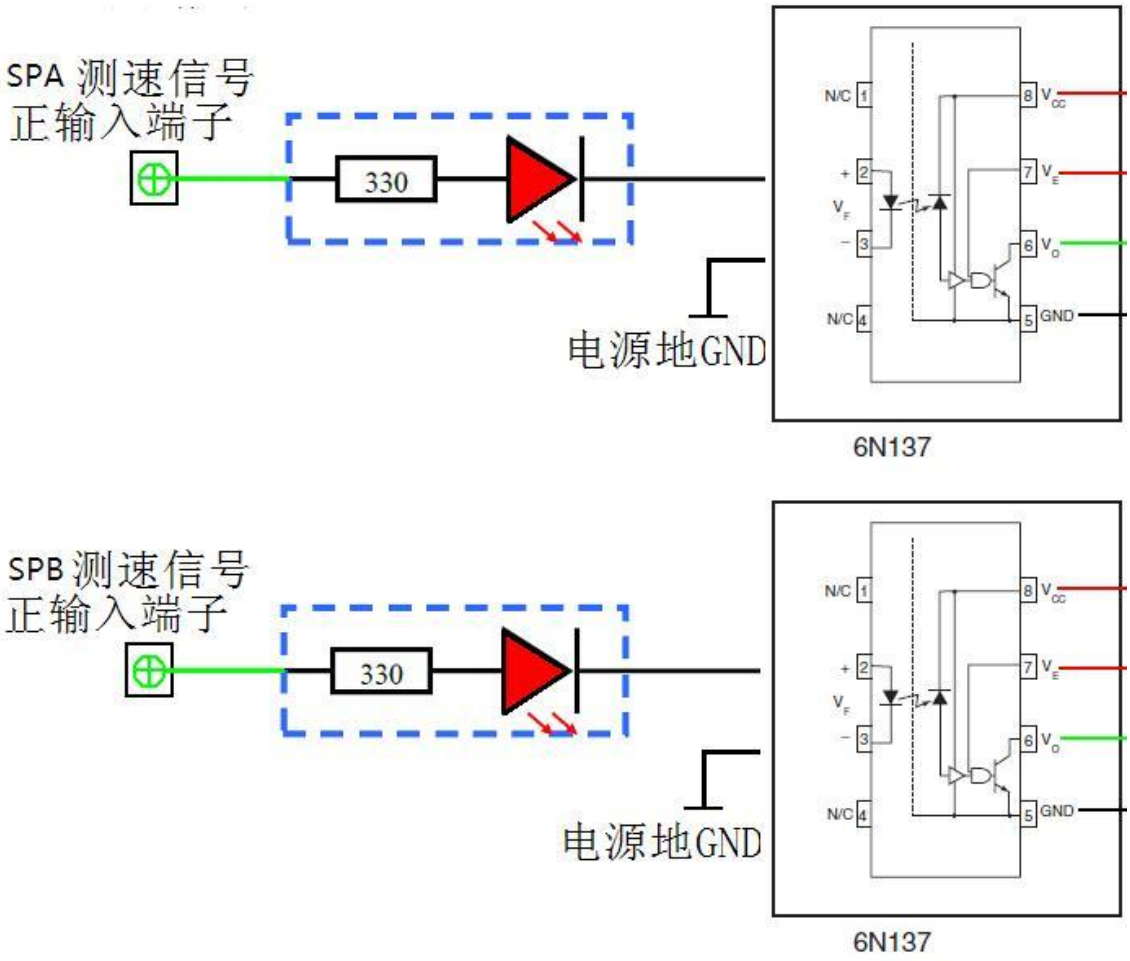


8.2 Show spindle speed

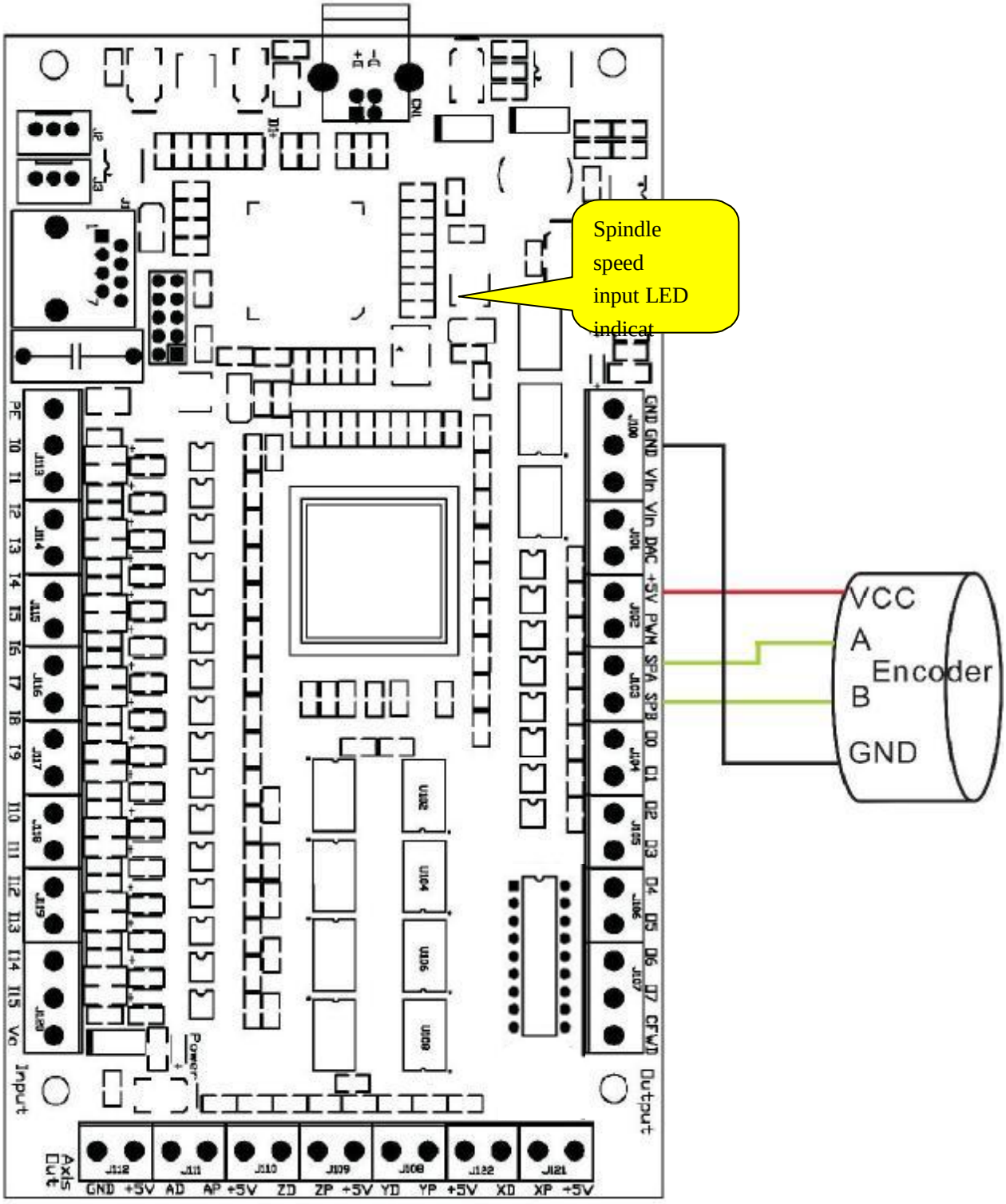
Measured speed will be displayed in the March3 ,as shown blown



8.3 Speed input interface diagram of the e-cut control card

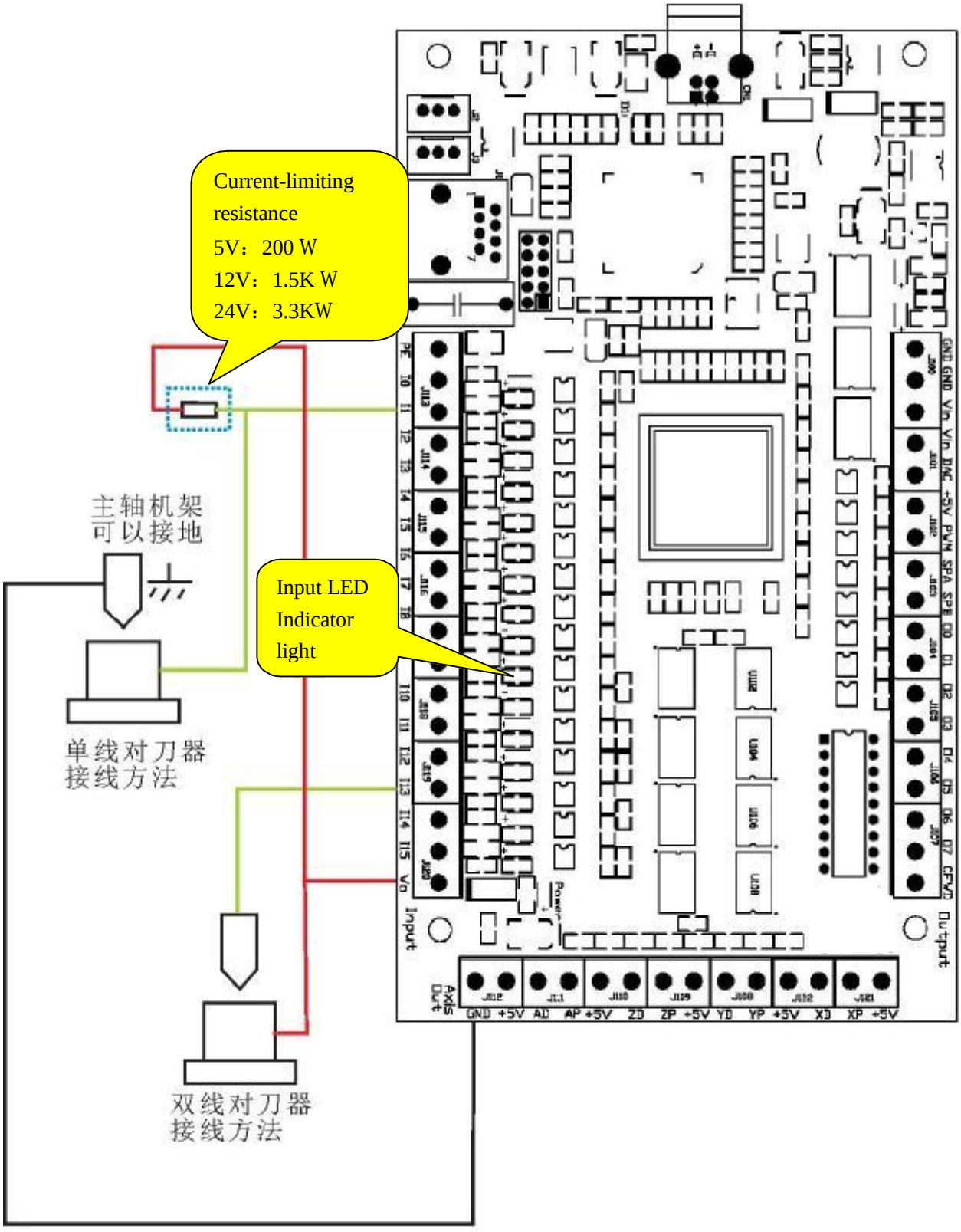


8.4 Rotary encoder speed sensor wiring diagram

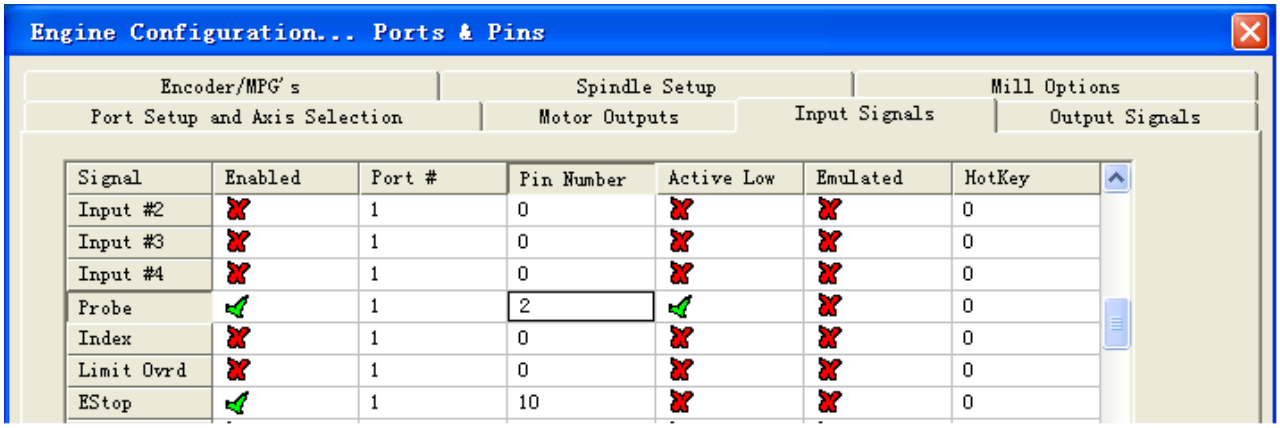


9 Auto tool zero

9.1 All tool touch sensor wires

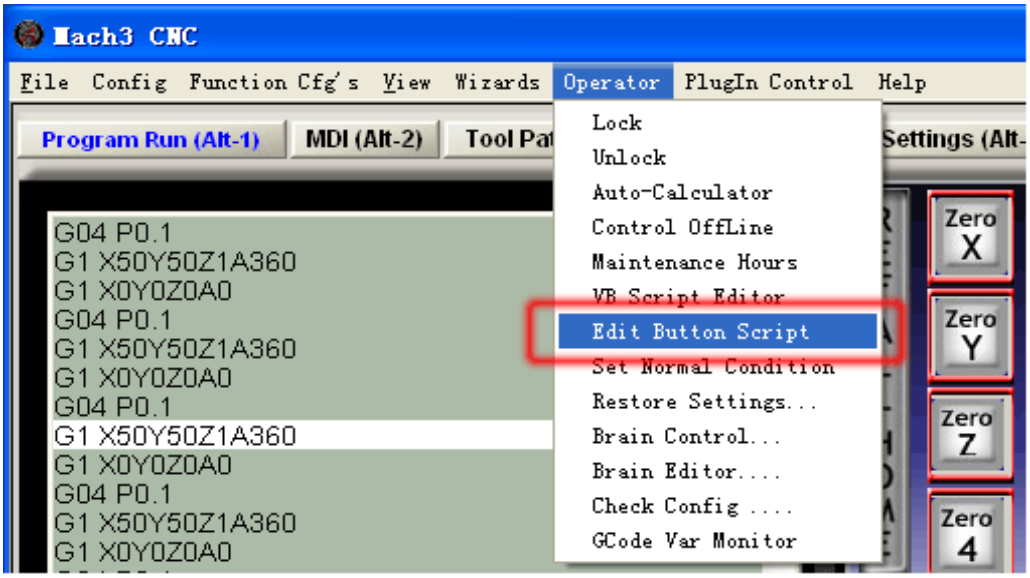


Setup Probe input signal, as shown below: (Config => Ports and Pins)

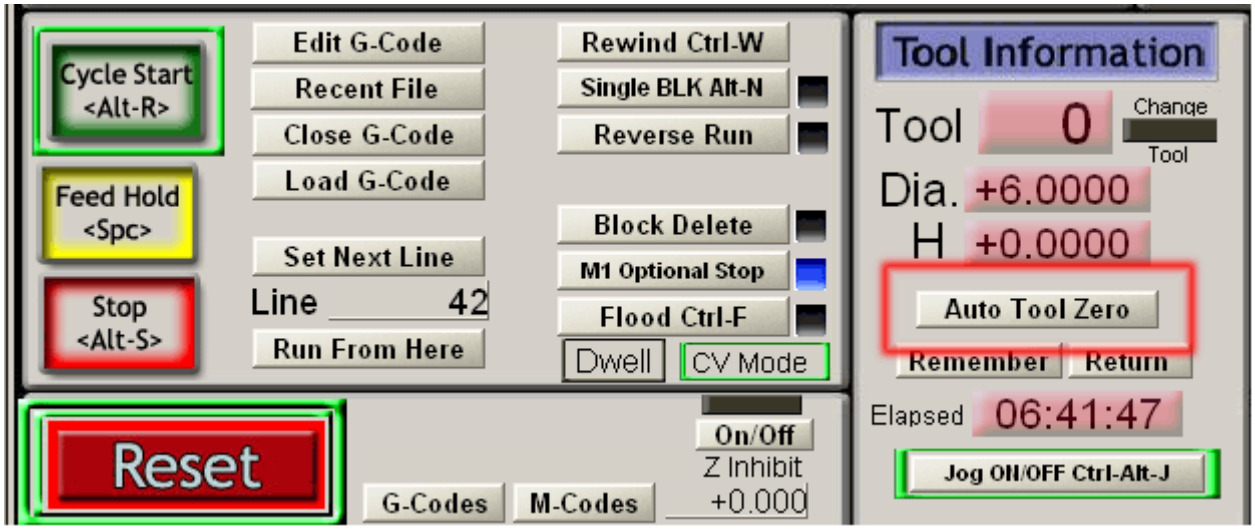


9.2 That Mach3 provides for customizable, user-defined button macros on some of the existing screen buttons is what makes this possible without having to do Mach3 screen designs to add new buttons. The Auto Tool Zero button on the Programs Run screen is the one used for this purpose.

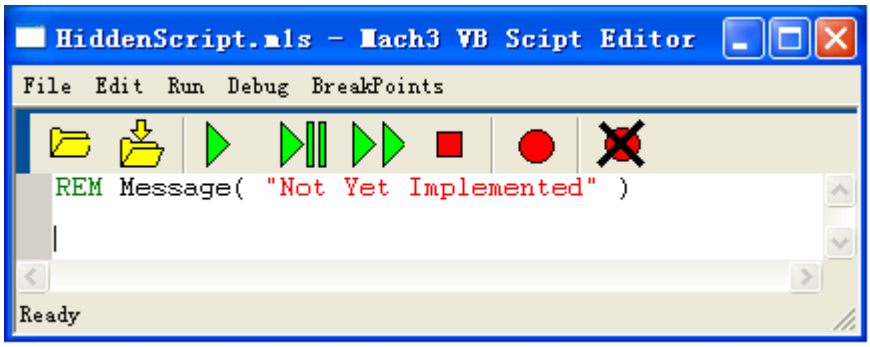
9.2.1 From the Mach3 Program Run screen, click "Operator" on the Menu bar (Operater => Edit Button Script)



9.2.2 then click “Auto Tool Zero”. The buttons that are editable will start flashing.



9.2.3 Eject the VB editor and delete the code



9.2.4 Write the auto tool zero code into the VB editor. The demo of VB auto tool zero code provided by “ecut.zip” can be open by notepad editor.

9.2.5Test:

click the button of “Auto Tool Zero” and test.The code of auto tool zero can be changed according to the actual demand.

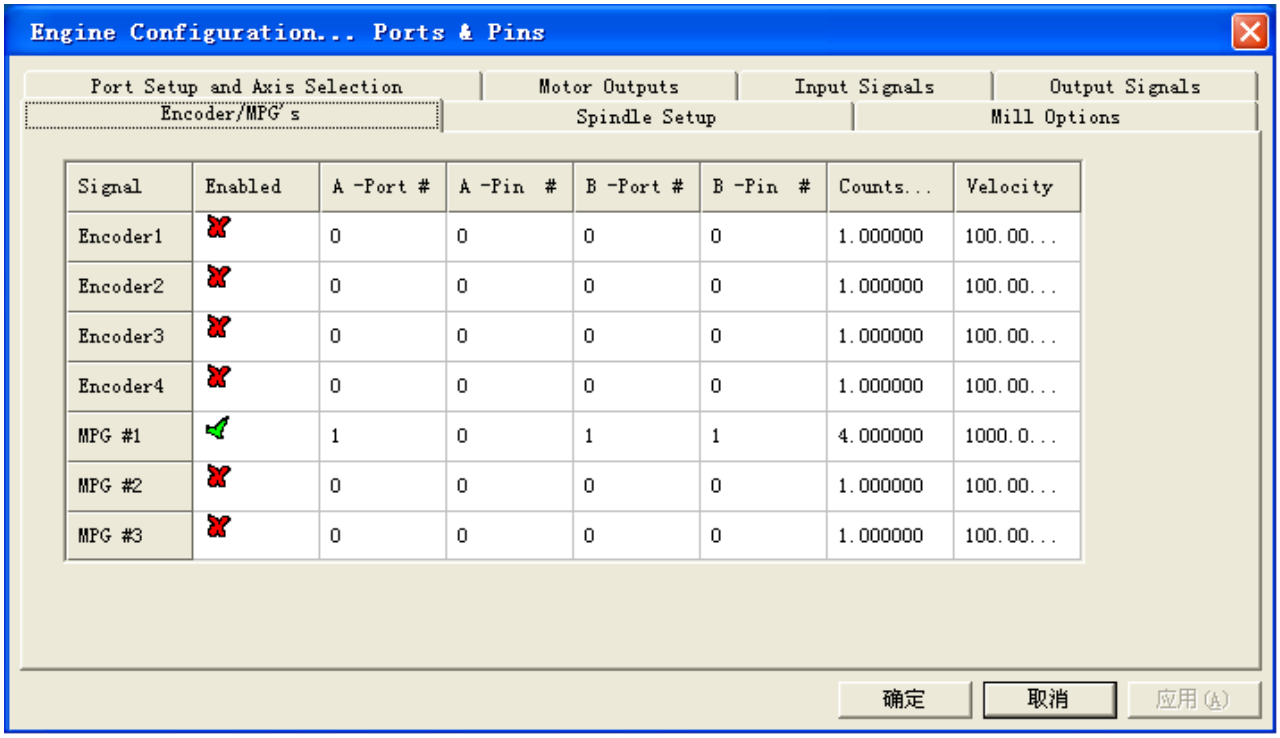
10 Electronic Handwheel

10.1 Electronic Handwheel

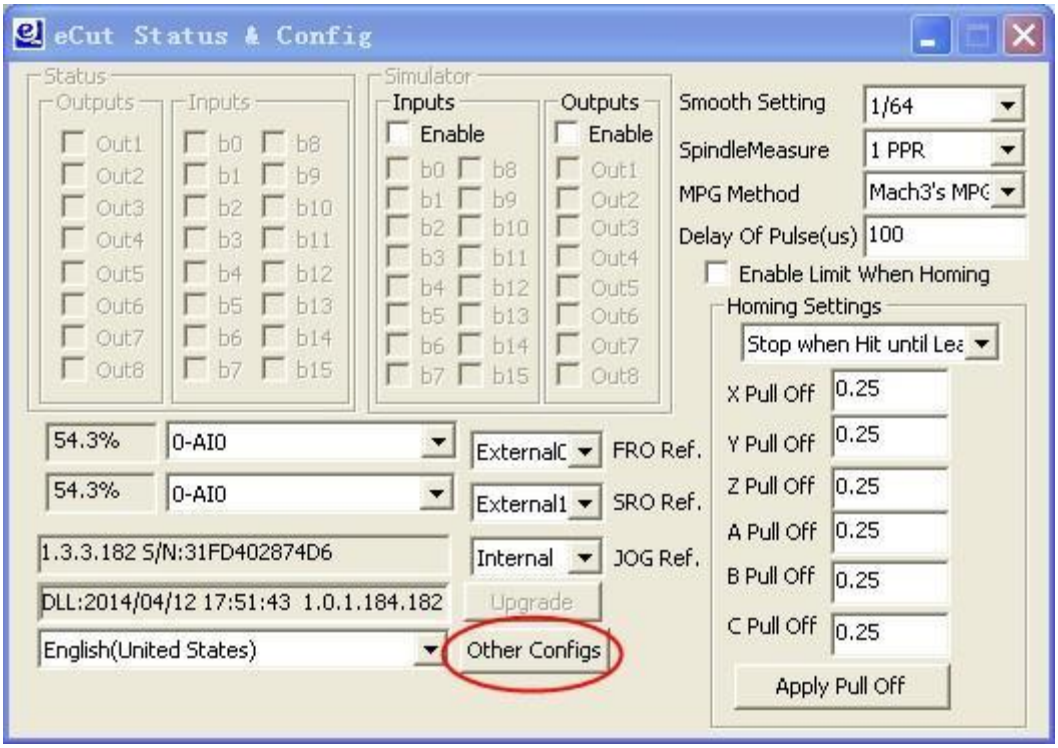
10.2 IOExpander

10.3 Software Configuration

10.3.1 In Mach3, Click Config => Ports and Pins，select MPG#1 Enable.



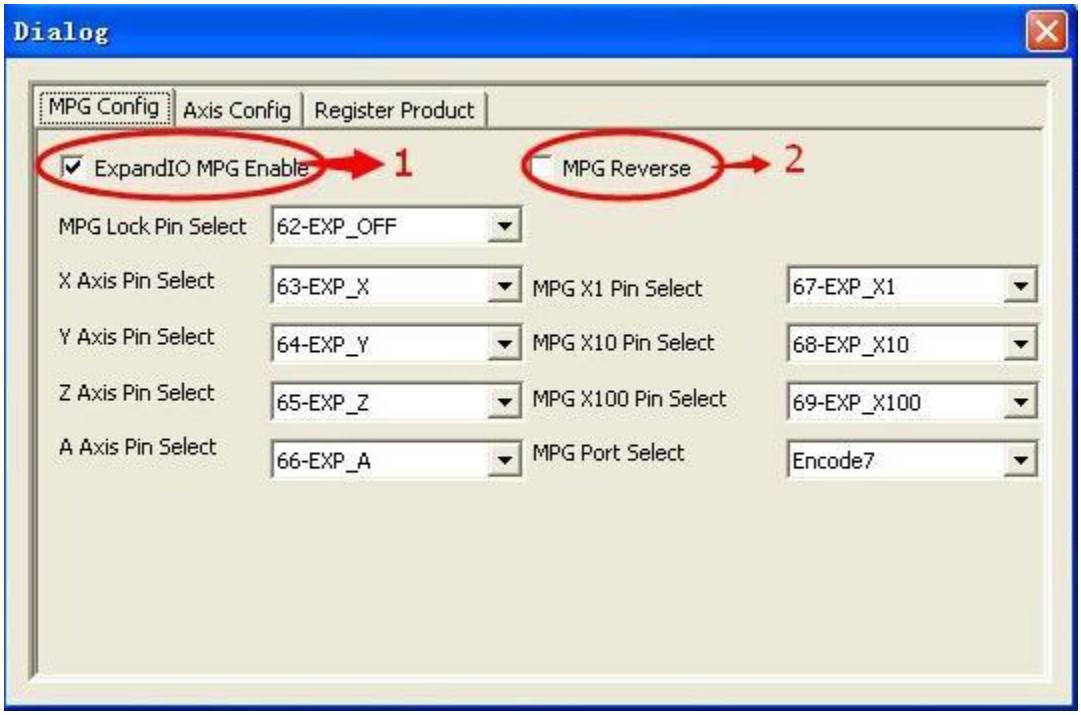
10.3.2 Mach3 Menu=〉Plug-in Control



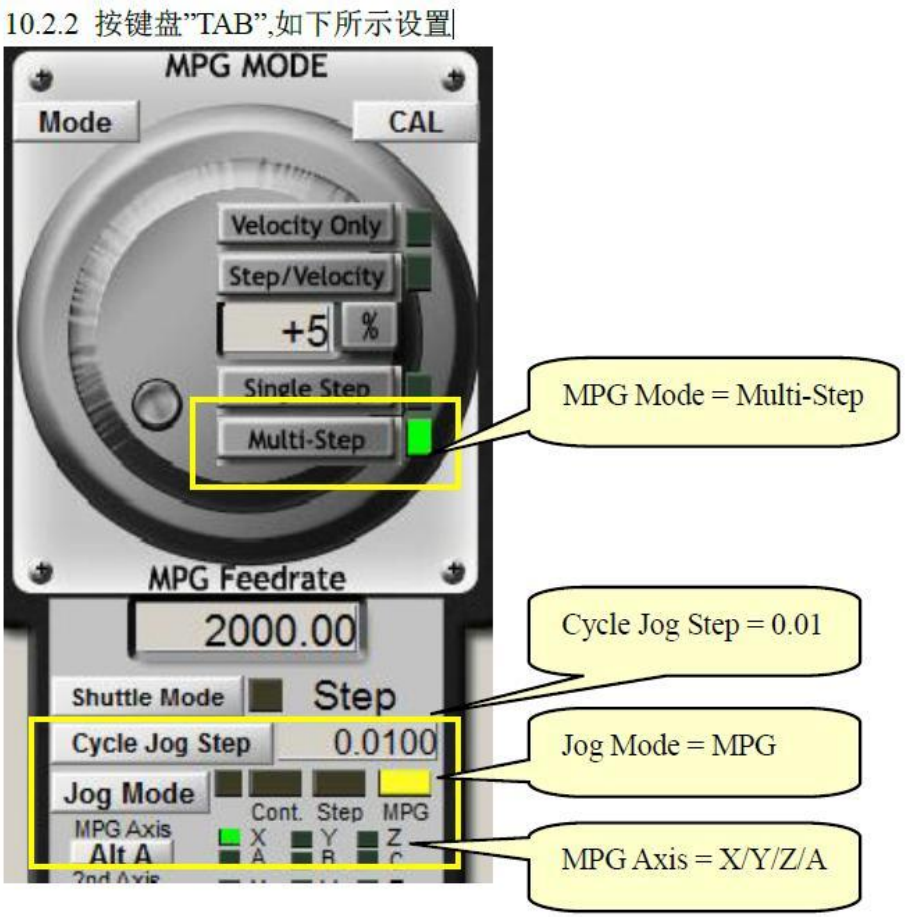
10.3.3 Select“Othere Configs”， get into the handwheel configuration,as shown below

1.if use IOExpander ,select the option in the circle 1

1.If IOExpander to reverse,select the option in the circle 2

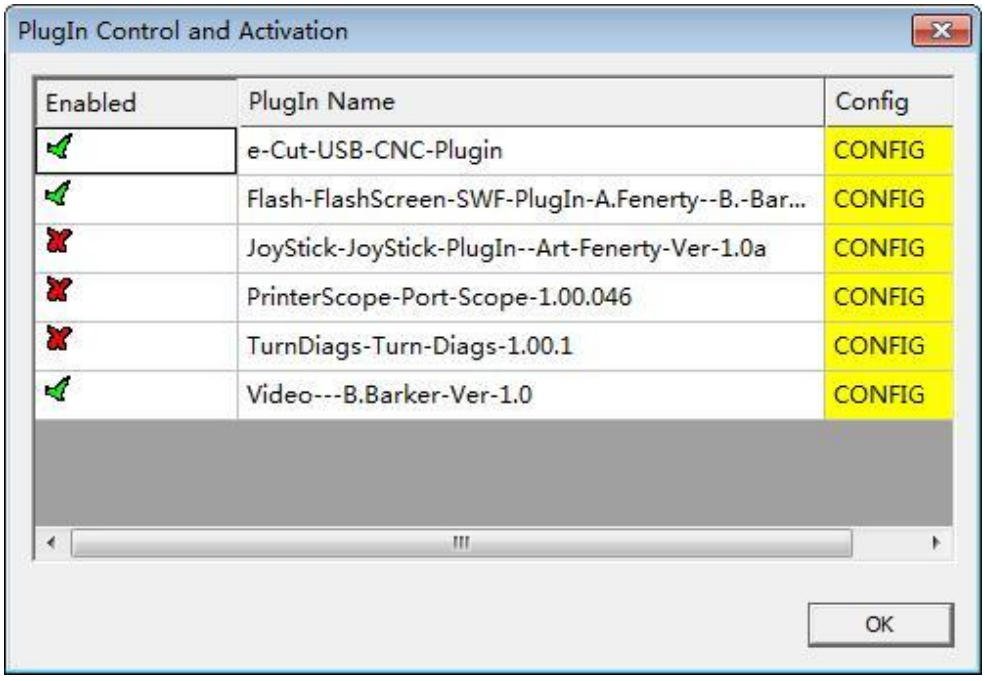


10.3 Press the “TAB”,as shown the following settings



11 Interpolation coefficient setting

11.1 Go to “Config Plugins” under “Config” to go into “PlugIn Control and Activation”.



11.2 Set Smooth Setting according to subdivision performance of the stepper drive