Mach3 USB/Ethernet Motion Board EDG381(Ver:B) Installation Manual

MODEL: LF77-EDG381-USBETH3(B)

Doc Ver: 2.1

Features:

- ✧ Ethernet (using TCP/IP) or USB Full-speed connection.
- ✧ 100M Ethernet interface, built-in network transformer isolation, support long-distance wired connection. With the wireless router, the wireless connection between the PC (laptop) and the motion control board can be realized.
- ✧ Up to 6 axes, 500kHz pulsing engine, which is suitable for the servo or stepping motor. Any axis can be configured as a Step/Dir Spindle.
- ✧ Support slave axis (dual side motor drive: dual X/Y/Z), support home automatic leveling (dual side home switch).
- ✧ 2 real-time Manual Pulse Generation (MPG) input ports for 2 MPG at the same time. When the MACH3 MPG is set in the multi-step mode, it has the same real-time performance as the CNC machining center, smoothly. The control board has no delay and the mechanical system performance is fully utilized.
- ✧ 18 general-purpose input, with particular indicators, the input signal states can clearly shows.
- ✧ 7 general-purpose output, It can be configured as: spindle clockwise / CCW / Mist / Flood / VB script programming control.
- ✧ PWM output*1 channel, 0-10V analog voltage output*1 channel, 0-5V analog voltage output*1 channel. 3 outputs channels are used for spindle motor speed adjustment: PWM pulse width / 0-10V or 0-5V inverter.
- ✧ 2 analog input ports for adjusting the machining speed / jog speed / spindle

speed.

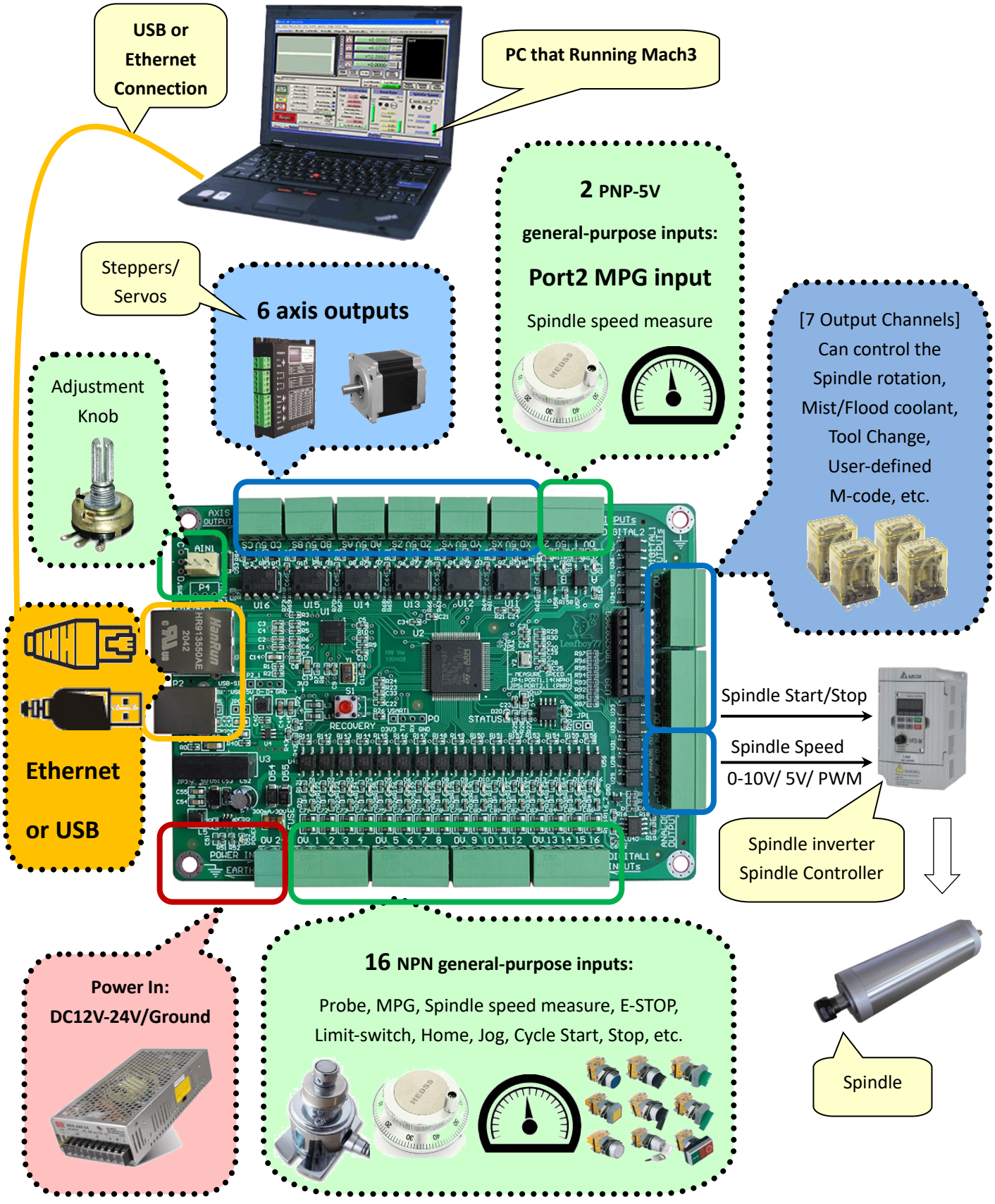
- ✧ Status indicator LED can be useful to show the USB/Ethernet connection, and working stauts by flashing.
- ✧ 6 high-speed optocouplers (Dual Channel) with 10MHz, 27 general optocouplers for isolating all of the input/output signals, this high-cost design can be provided high performance and stable system.
- ✧ Fully supporting all Mach3 versions. Supporting Windows series, including Windows XP-Windows10(32bit/64bit).
- ✧ No need to install any USB drivers, it can be used after plugging in the computer.
- ✧ Easy firmware update.

Contents

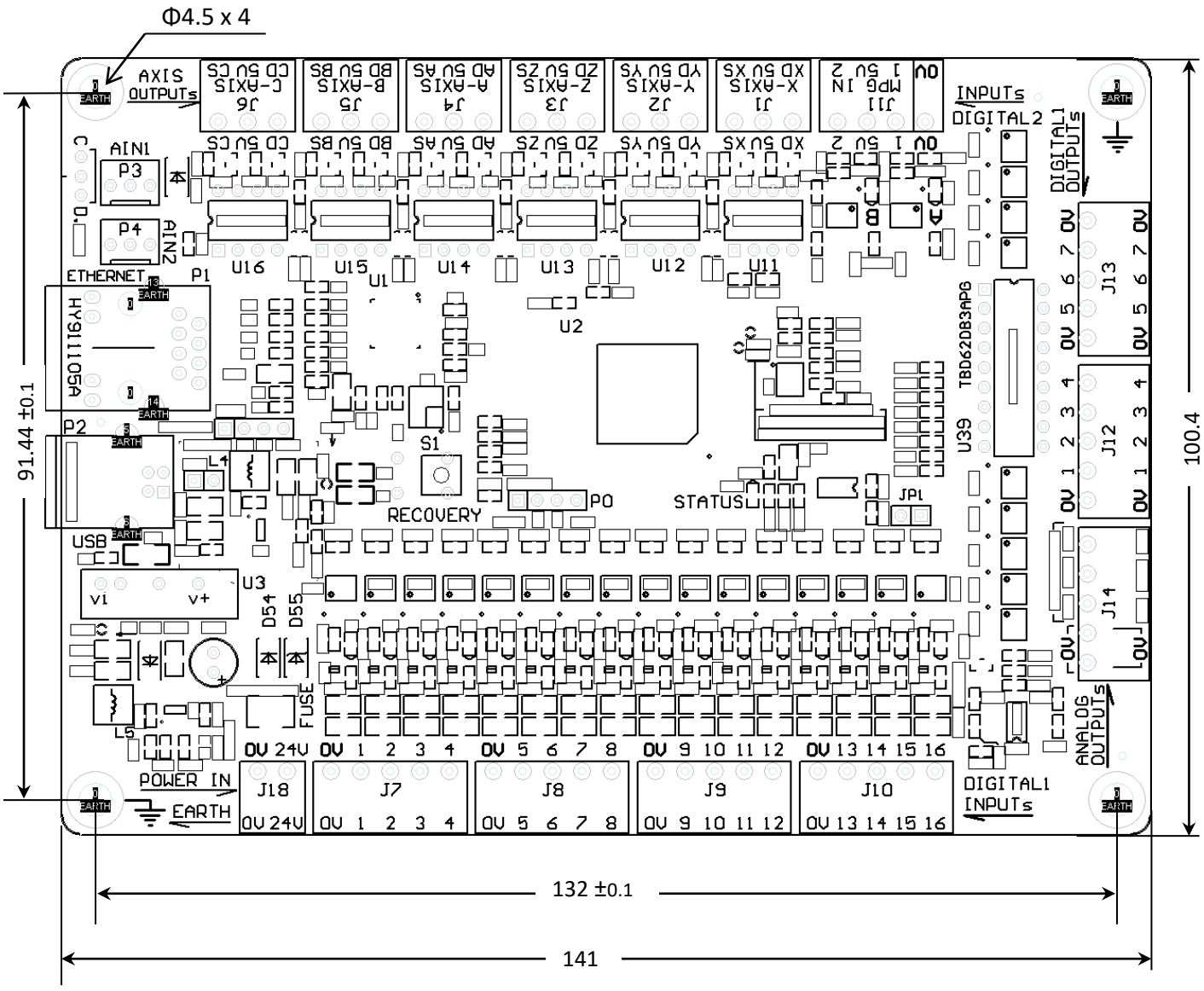
Revisions List

Date/Version	Info
2021-3-9 Ver2.0.0	Init
2021-4-27 Ver2.0.1	Added: MPG Enable Button wiring and description
20.1-8-2 Ver2.1	(1)Add slave axis, support home automatic leveling (dual-side home switch) (2)Add Axis-Link Configuration dialog, Pulse(Step/Dir) spindle configuration

Basic connection diagram (Overview)



Mechanical dimensions diagram

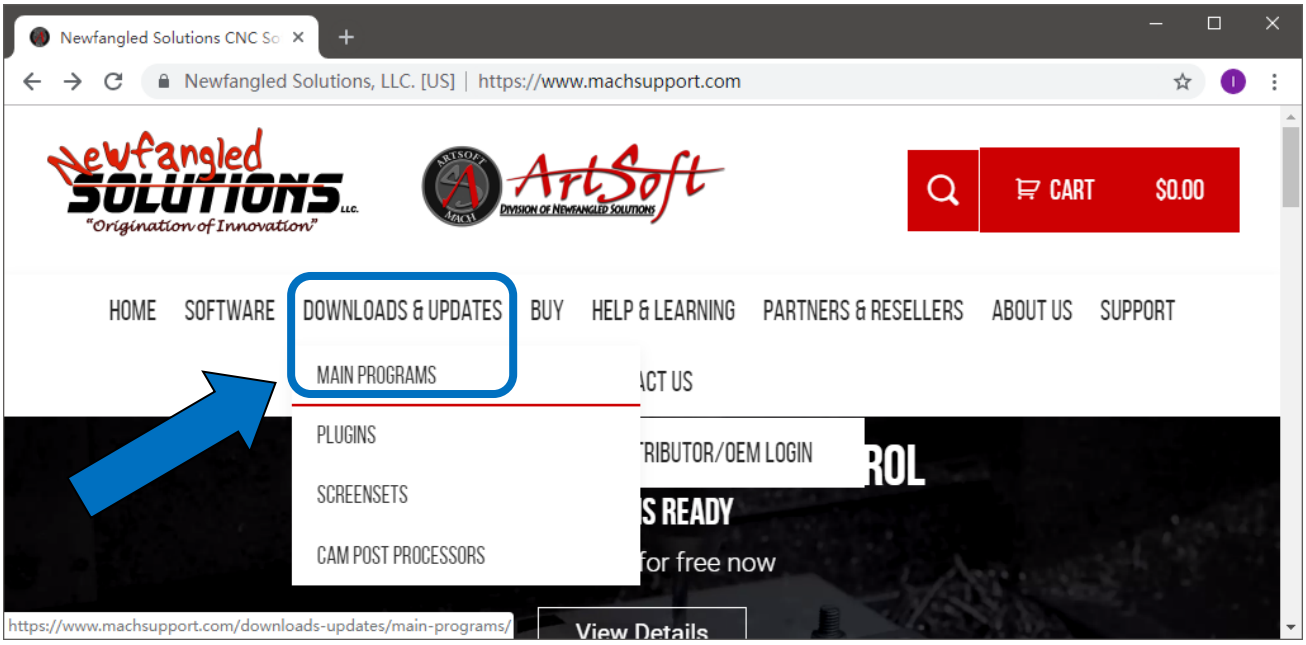


1. Prepare

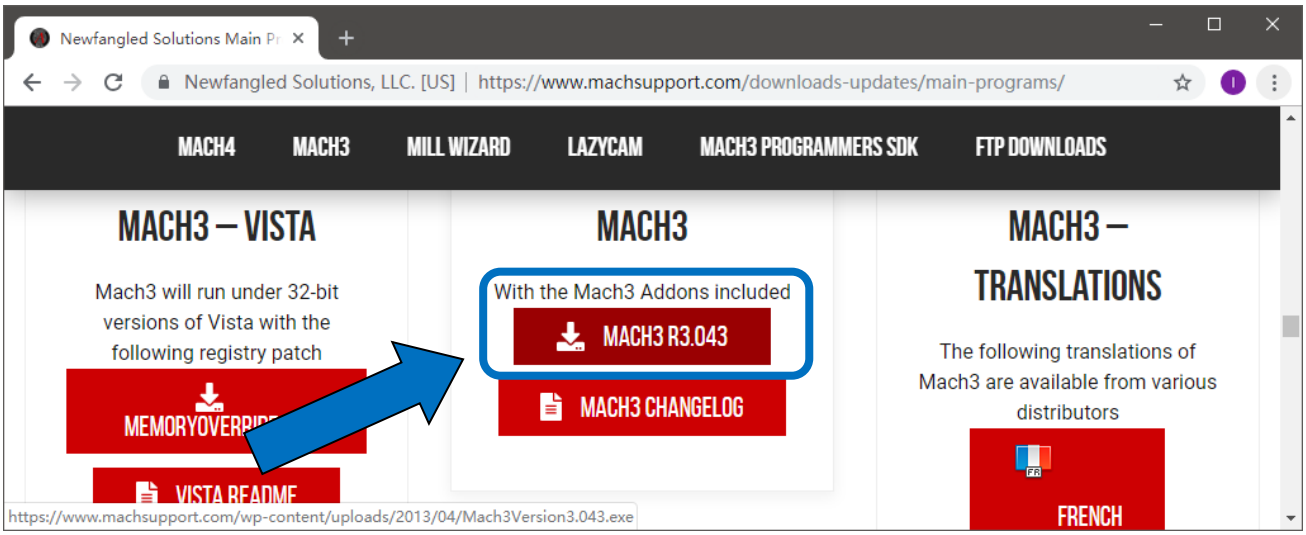
1.1 Mach3 download and install

The latest version of Mach3 official website download URL：https://www.machsupport.com/

After entering the official website, click DOWNLOADS & UPDATES => MAIN PROGRAMS as shown in the blue circle below

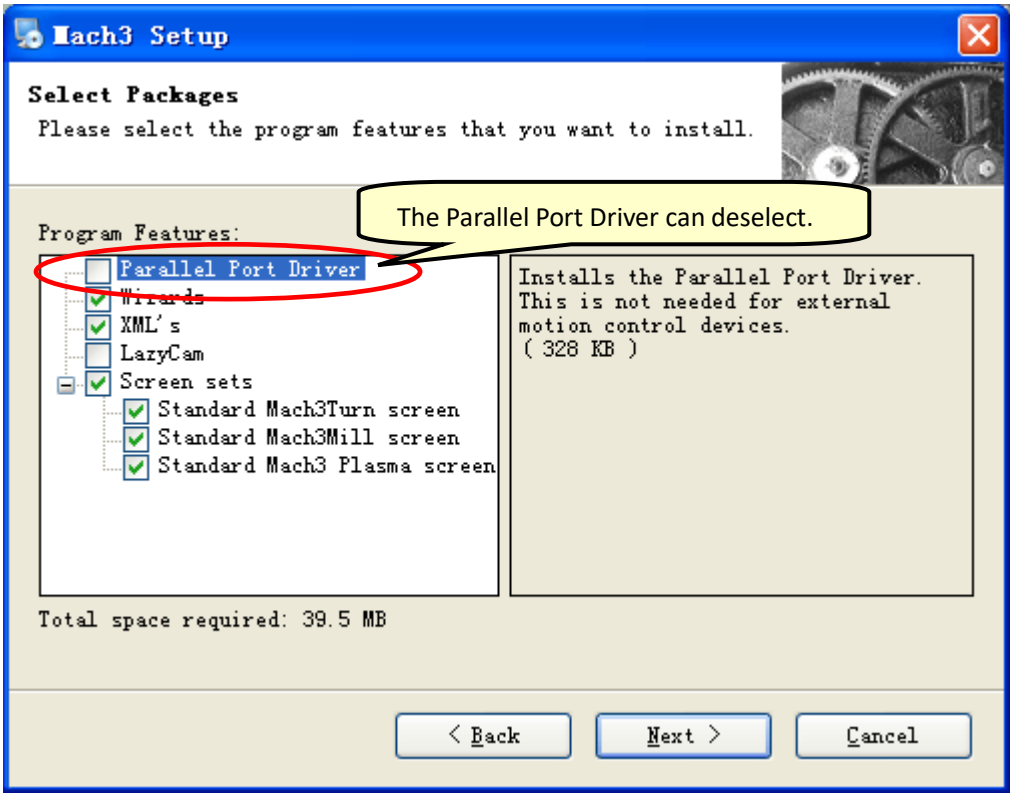


After entering the download page, find MACH3 and download it, as shown in the blue circle below.



After the download is complete, install Mach3

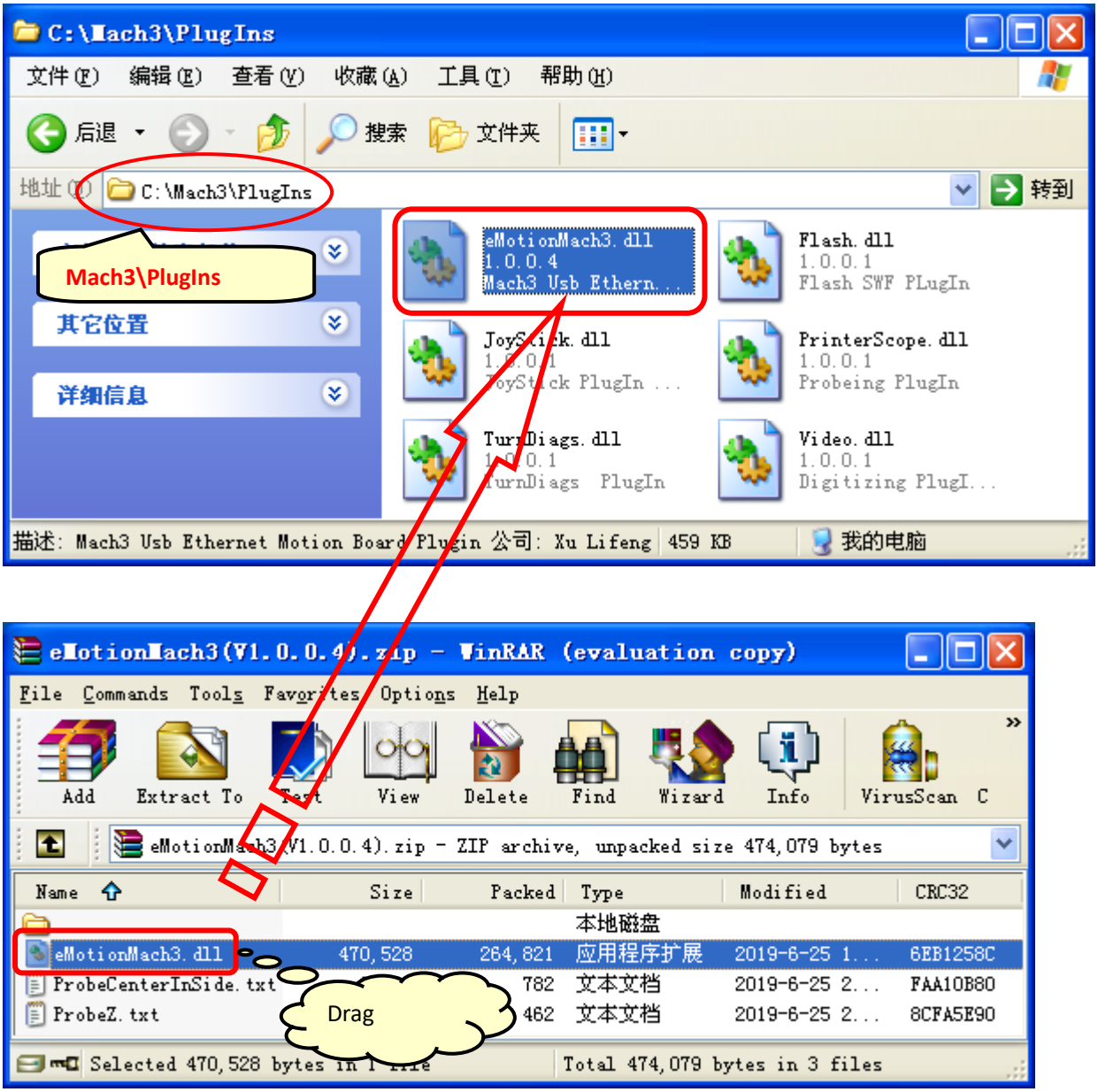
Note:
The Parallel Port Driver does not require.



1.2 Download and install the Mach3 plugin

In order to enable MACH3 to recognize and drive this motion control board, you need to install a mach3 plugin.

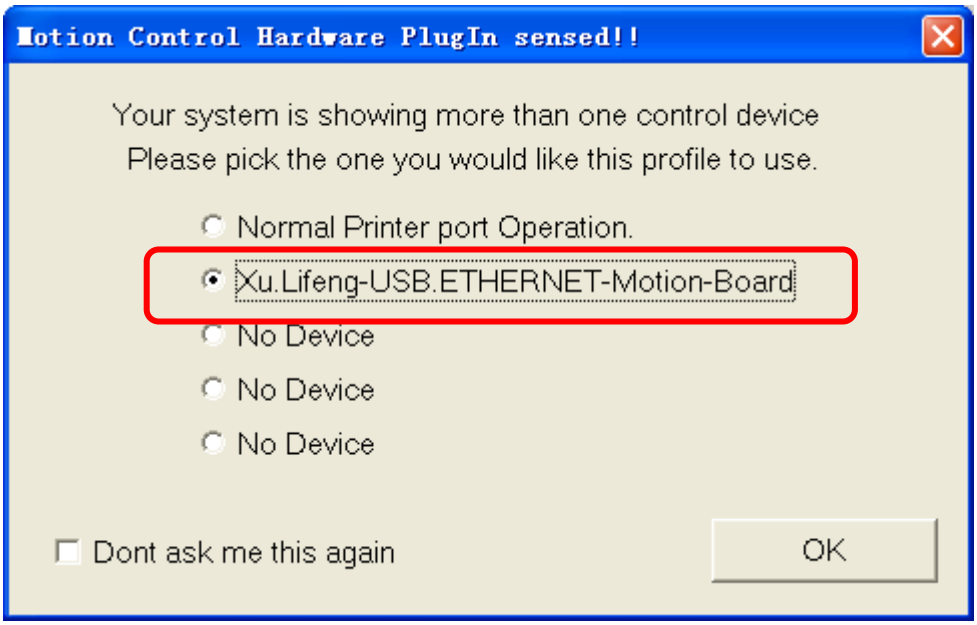
Copy or drag **eMotionMach3.dll** (Unzip the eMotionMach3.zip) into **Mach3\PlugIns** folder.
For example, if your Mach3 software is installed in C:\Mach3, place eMotionMach3.dll into C:\Mach3\PlugIns



Mach3 Plugin eMotionMach3.zip
Please go to the following URL to download the latest version.
http://leafboy77.com/

After completing the Mach3 plugin installation, start the Mach3 software.

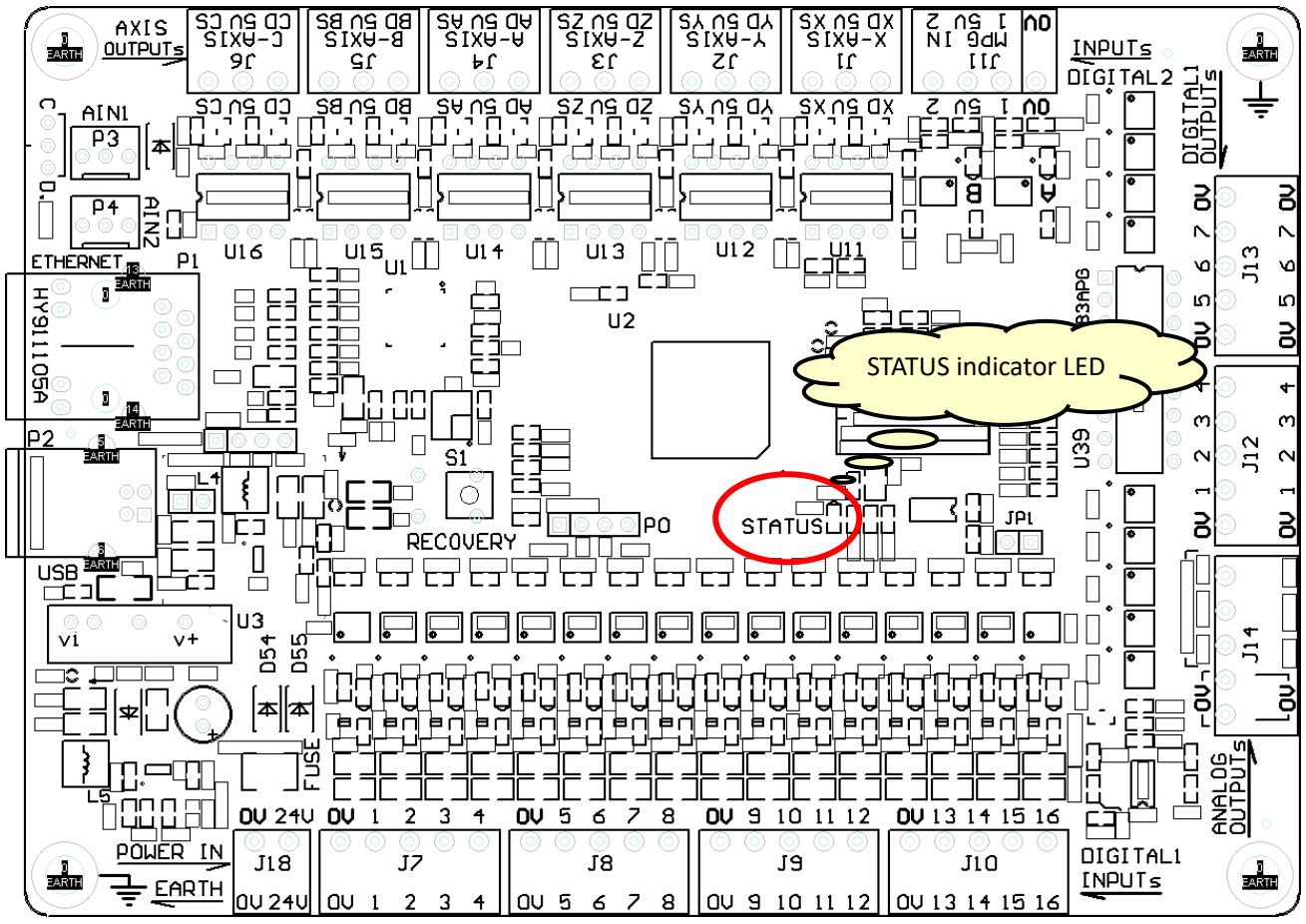
A dialogue of “Motion Control Hardware PlugIn sensed!!” is shown.
Please choose the option “USB.Ethernet-Motion-board“.
You can also check ”Don't ask me this again”.



1.3 Status indicator(LED) of motion control board,External power supply,Grounding

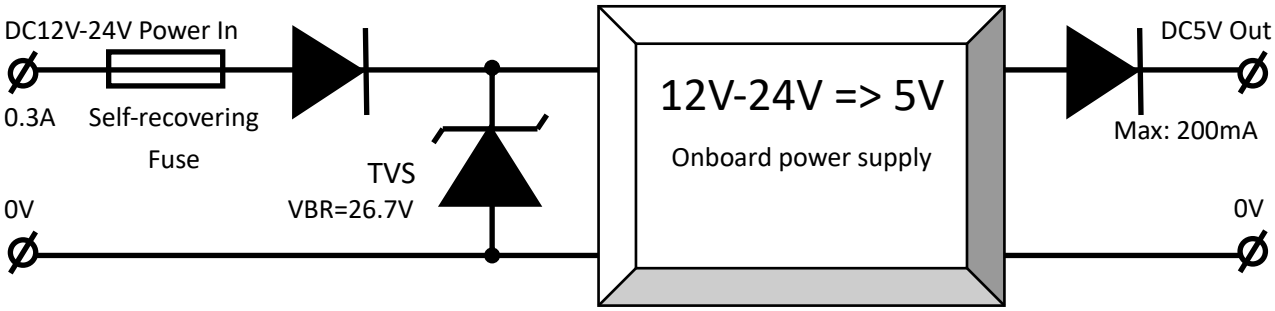
1.3.1 The motion board has a status indicator LED that indicates the current status by different blinking modes.

LED flashing mode	Status
Always bright	Standby(POWER ON)
Slow flashing	Connection (has already established a connection with MACH3 via USB or Ethernet)
Fast flashing	6-axis operation (eg running G code, jog, but not pulse spindle)
Slow flashing, gradually flashing quickly, turn off after 5 seconds	After pressing the RECOVERY button for 5 seconds, the IP parameters are restored to the factory settings.



1.3.2 External power supply, ground

1.3.2.1 Schematic



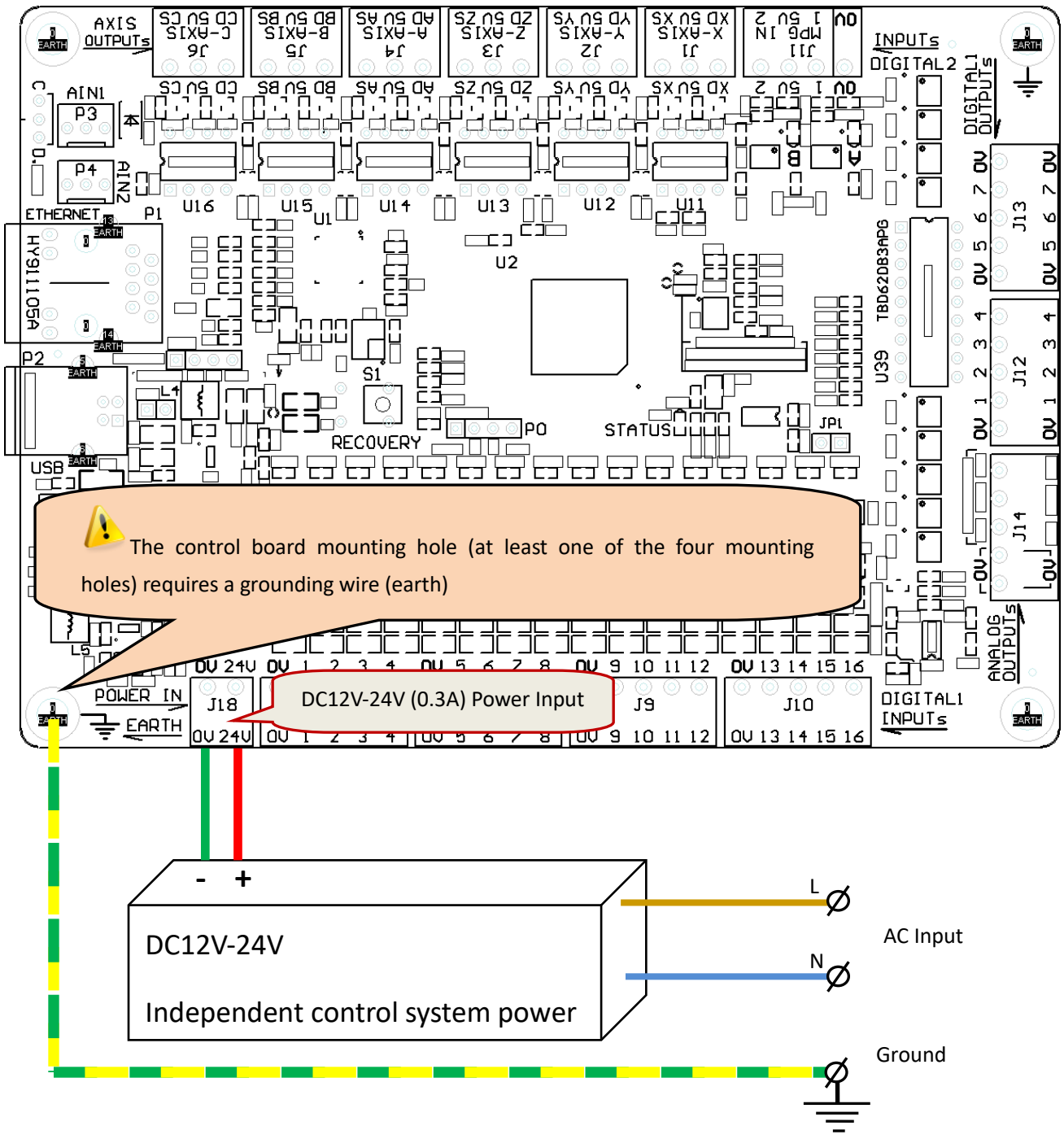
1.3.2.2 Wiring

Motion control board, requiring DC12V-24V (0.3A) power supply

Warning: The control panel input voltage (peak) cannot exceed 26V.

The board requires an independent power supply (control system power supply) that can be shared with sensors, handwheels, and the like.

Because the motor has a back EMF, the control board cannot share a power supply with the motor to ensure safety and reliability.



2. Motion control board and PC connection

Note:
First: complete the Mach3 plugin installation, start Mach3 and select the external motion control board

2.1 USB

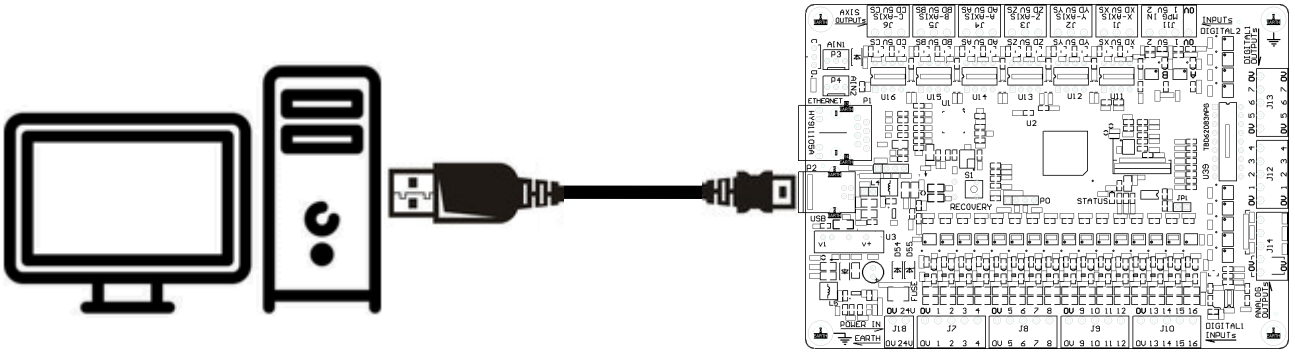
Magnet ring installed in the USB cable at both ends

Attention:

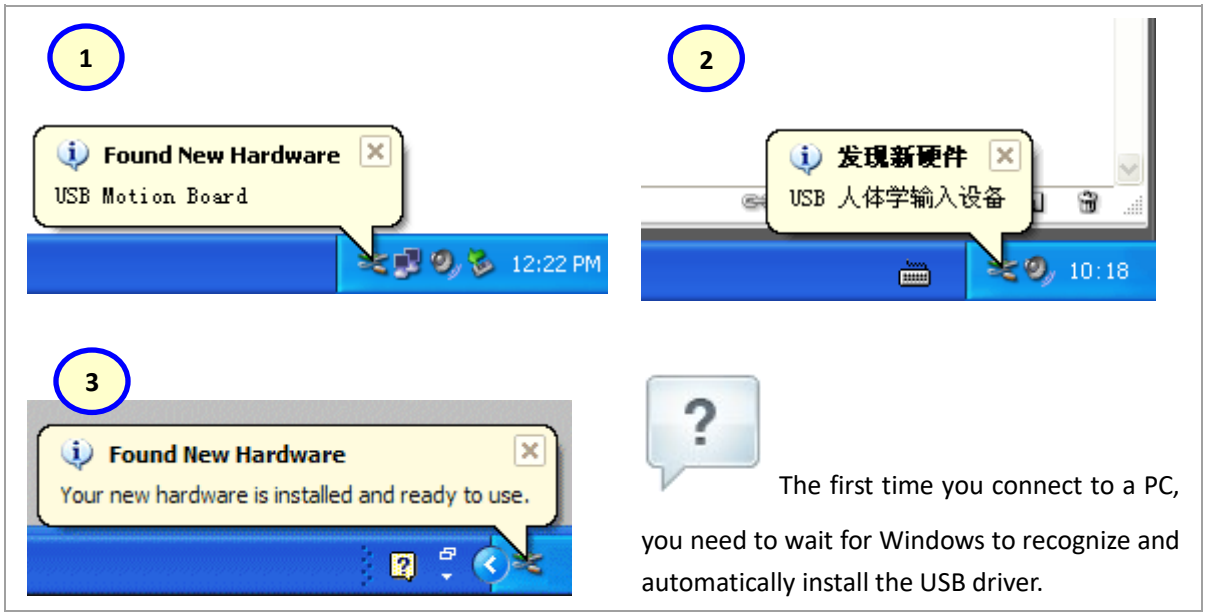
Please use the USB cable supplied with this product.

If you choose the USB cable yourself, please make sure to use a quality cable.

The motion control board is connected to the PC using a USB cable and is powered on (DC12V-24V)



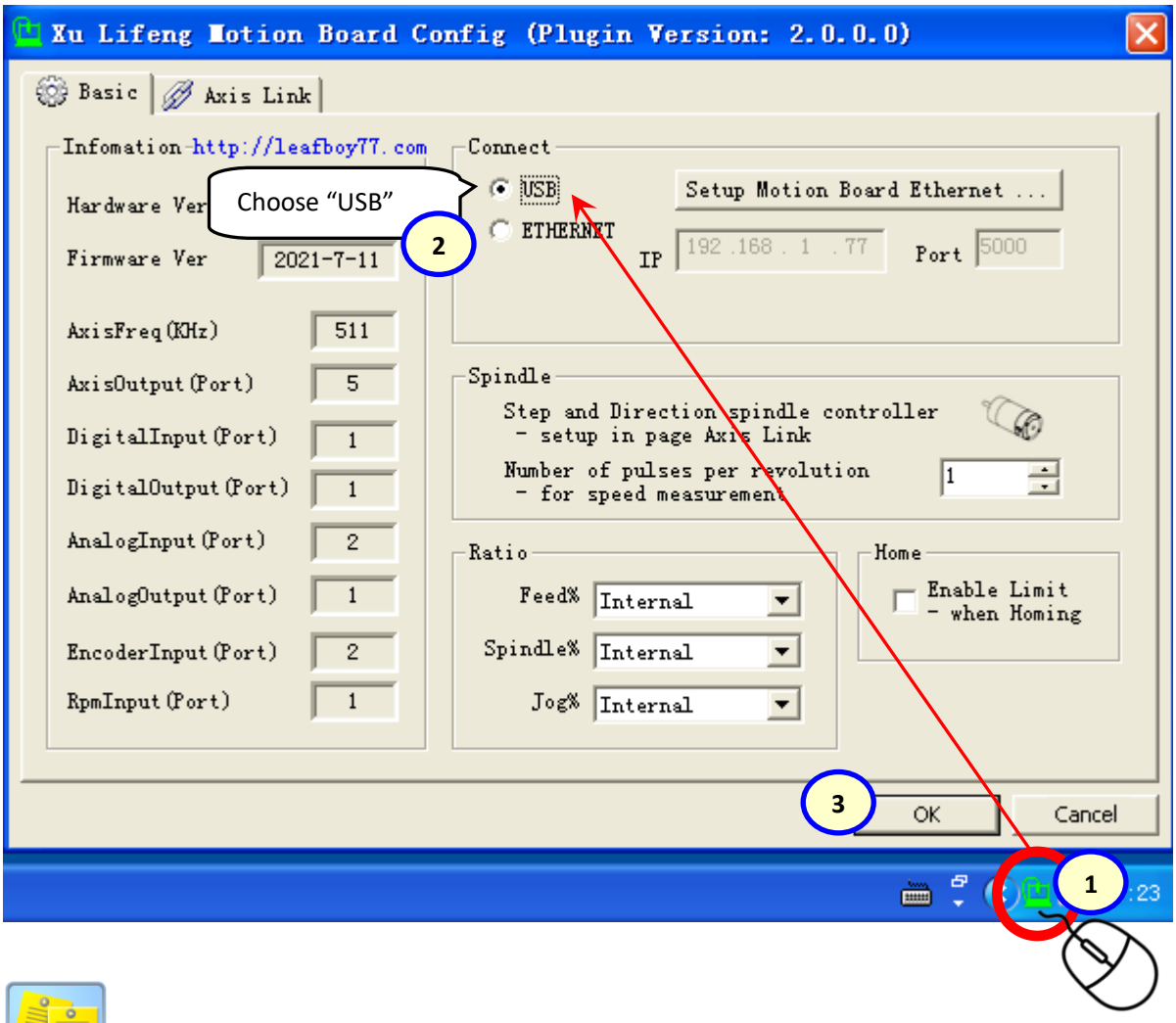
This motion board does not need install any USB driver， Windows XP - Windows 10 can directly identify



The first time you connect to a PC, you need to wait for Windows to recognize and automatically install the USB driver.

Start Mach3 and select external motion control board.

(1)Right click on the CNC icon, pop up the settings dialog, (2)select "USB", (3)press OK to save the settings.

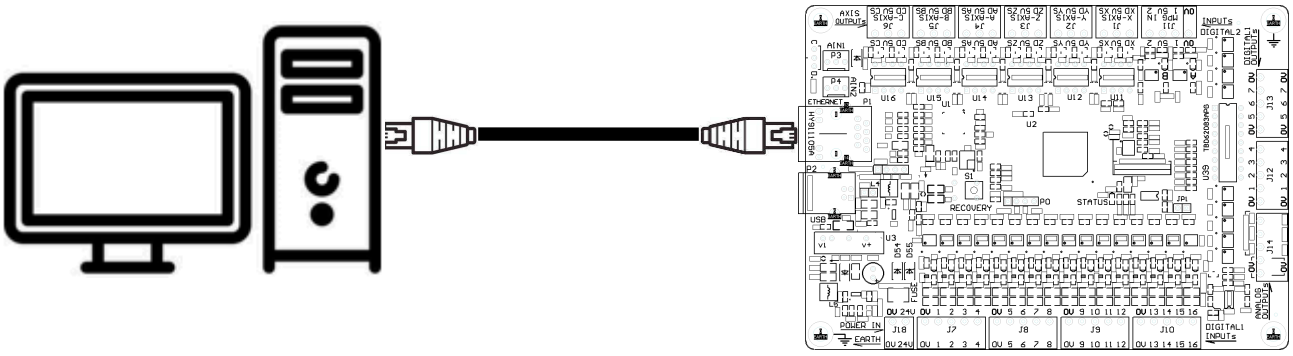


When the Mach3 is successfully connected to the motion control board (USB or Ethernet), the STATUS-LED indicator flashes slowly.

2.2 Ethernet

There are 3 connection methods between the motion control board and the PC through the Ethernet interface.

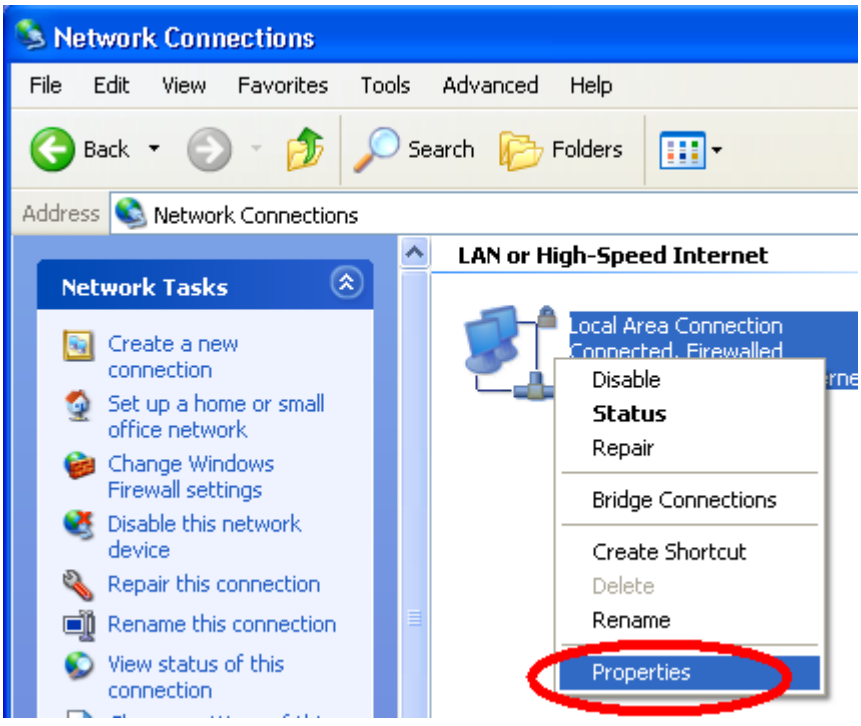
2.2.1 Ethernet cable directly connected



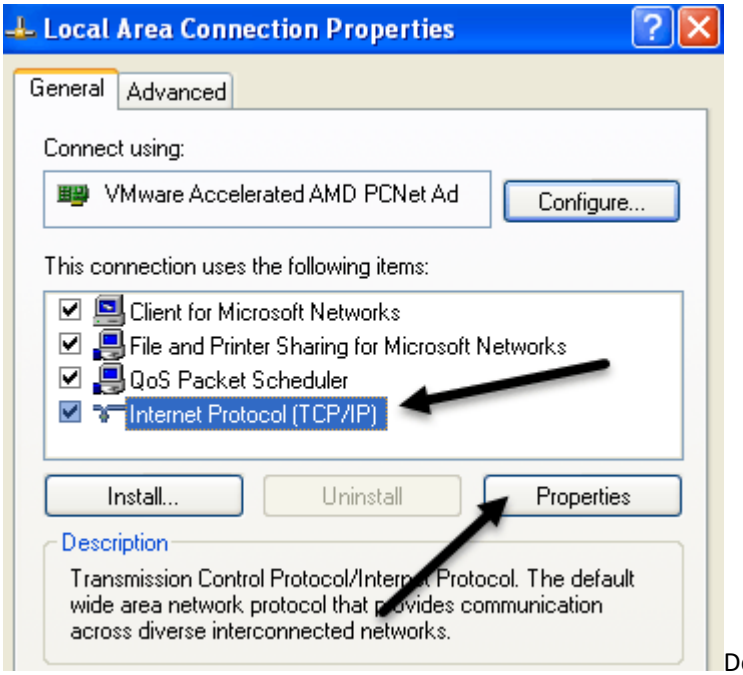
The PC does not have an IP address (because no router automatically assigns an IP address to the PC). You need to manually set the IP address parameter of the PC, which is on the same subnet as the IP address of the motion control board.

Step 1: Network parameter settings for the PC.

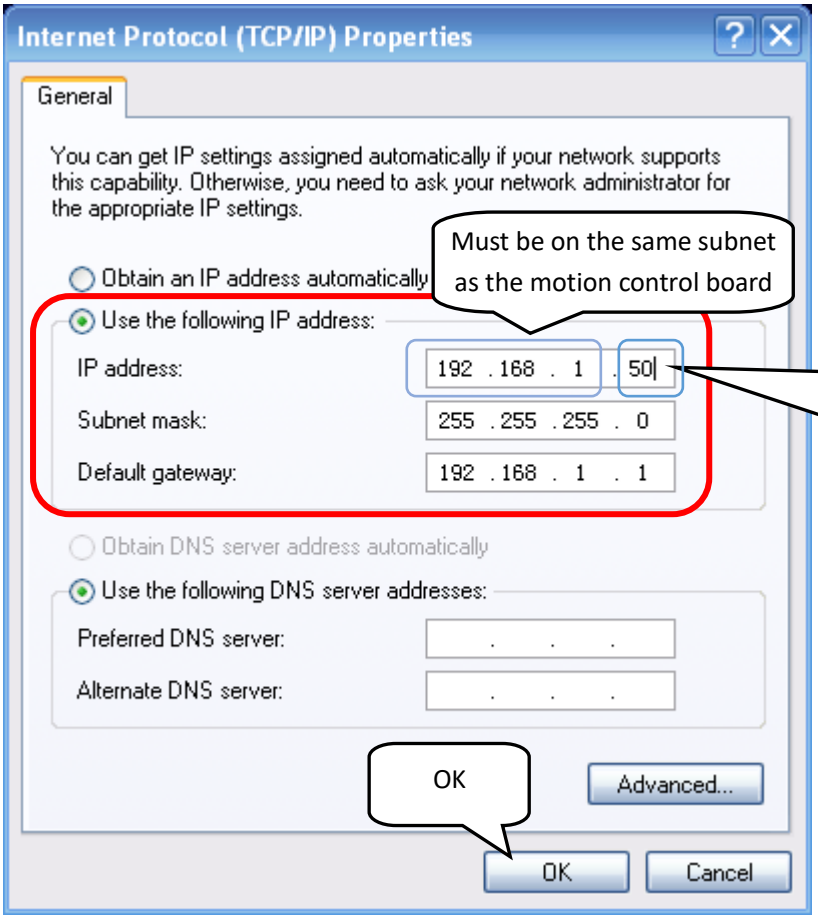
Since no router assigns an IP address to the PC (because it is a direct connection), it needs to be set manually.



For example Windows XP:
Control Panel =>
Network Connection =>
Local Area Connection (Right click) => Properties



Double click “Internet Protocol (TCP/IP)”



Must be on the same subnet as the motion control board

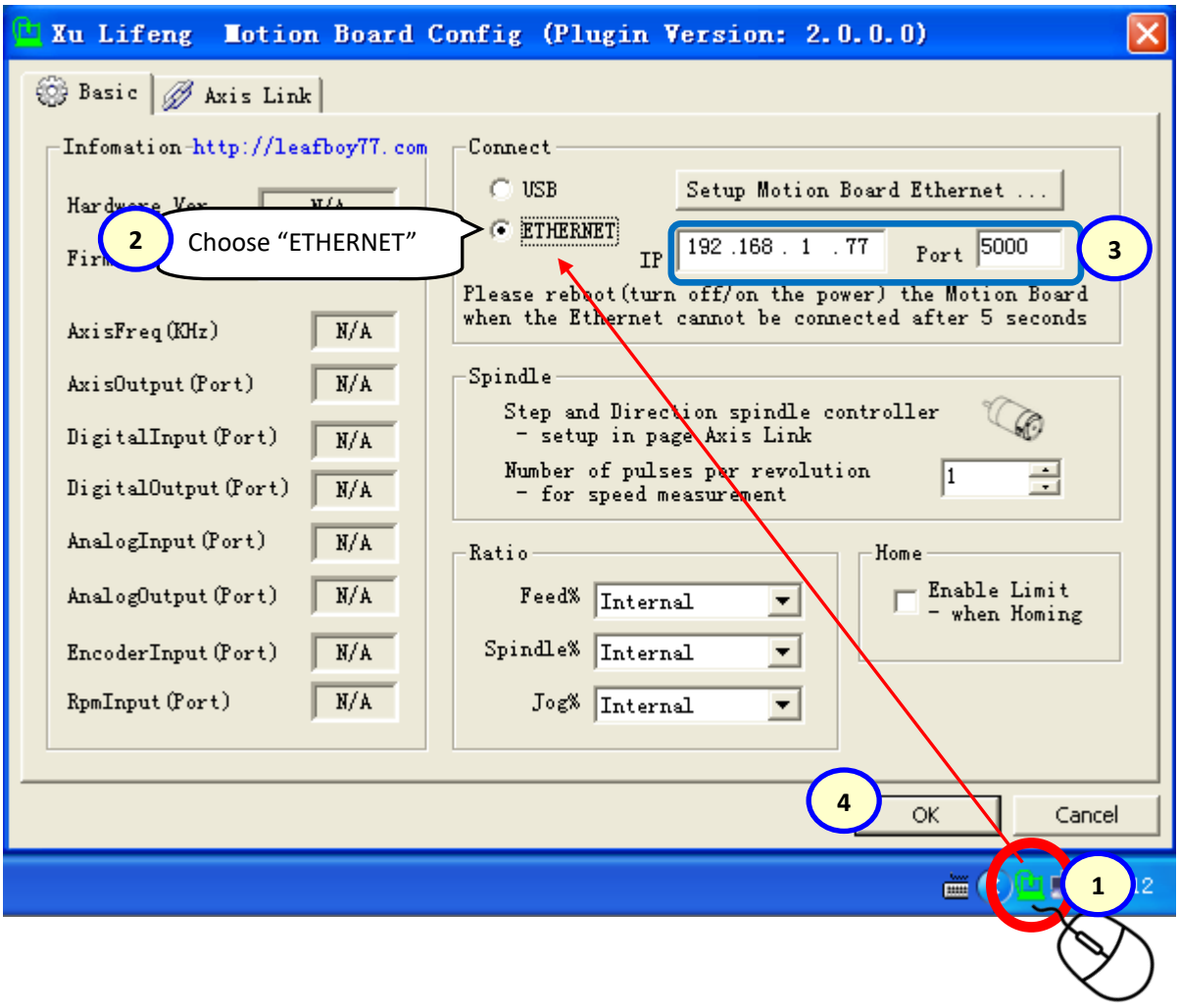
The IP address(Last number) of the PC cannot be the same as the motion control board (conflict)

Choose ”Use the following IP address:”, then type the computer’s IP address, subnet mask, and default gateway address. Press “OK”

Step 2: Motion Control Board Restore factory settings (power up => press the RECOVERY button for 5 seconds until the STATUS-LED goes out => lift button).

Note:
You can also configure the IP address parameters of the control board after USB connection.

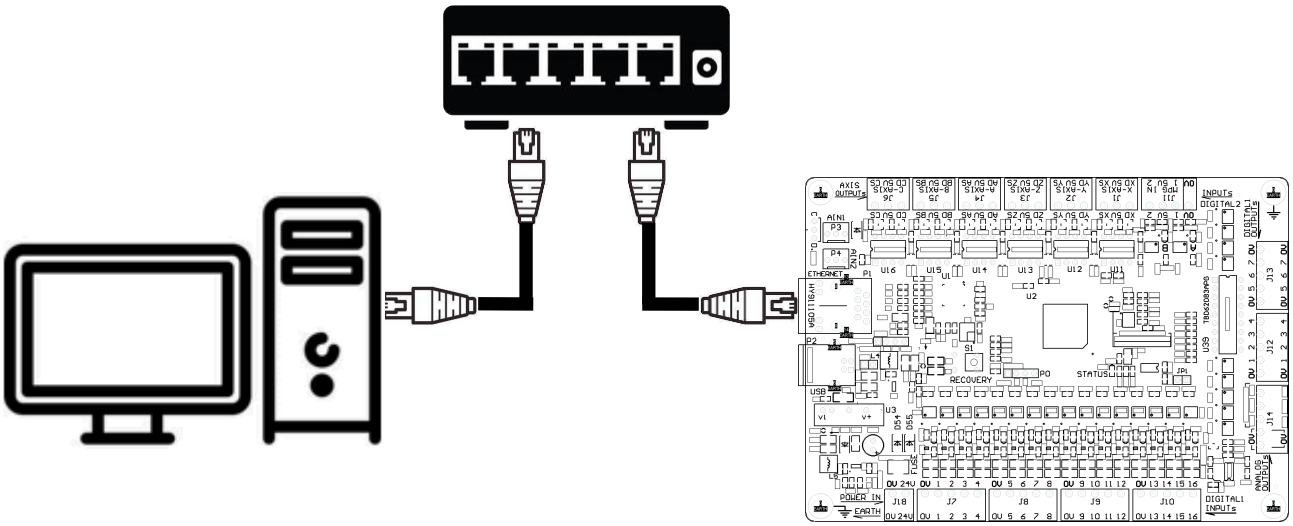
Step 3: Start Mach3 and select the external motion control board. Right click on the CNC machine icon and pop up the settings dialog box to confirm the selection of “ETHERNET”.
Type the motion control board IP to be connected: 192.168.1.77, Port: 5000, press OK to save the settings.



When the Mach3 is successfully connected to the motion control board (USB or Ethernet), The STATUS-LED flashes slowly.

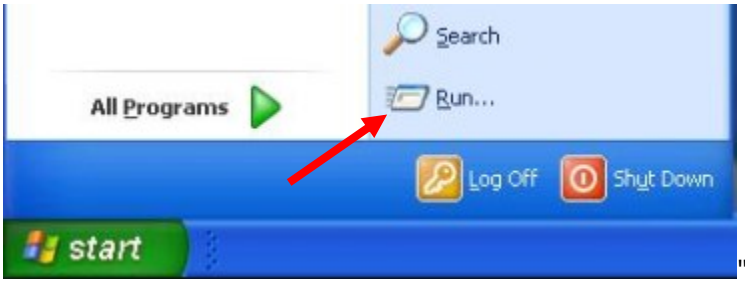
Connect the Ethernet cable before turning on the power to the motion control board.
If Ethernet cannot be connected for more than 10 seconds,
Please restart the control board (power off => re-open)

2.2.2 Router

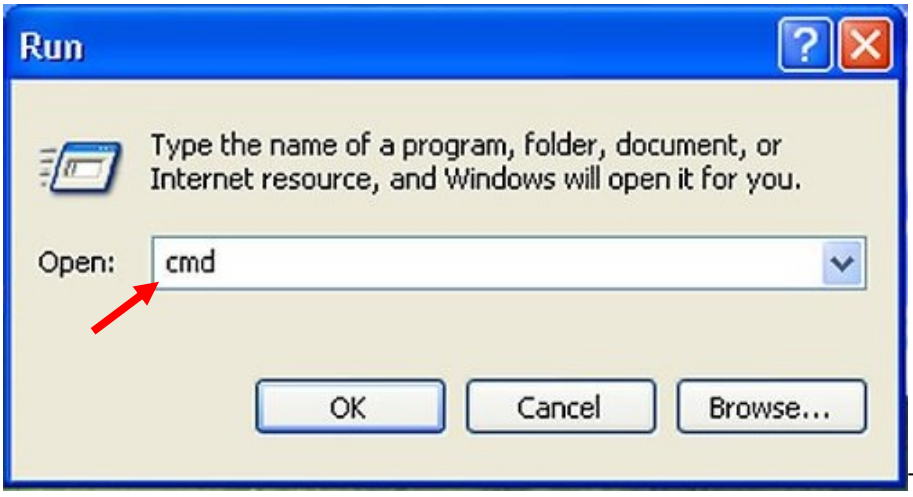


You need to set the IP address of the control board, which is on the same subnet as the IP address of the PC.

Step 1: View the IP address of the PC (automatically assigned by the router)

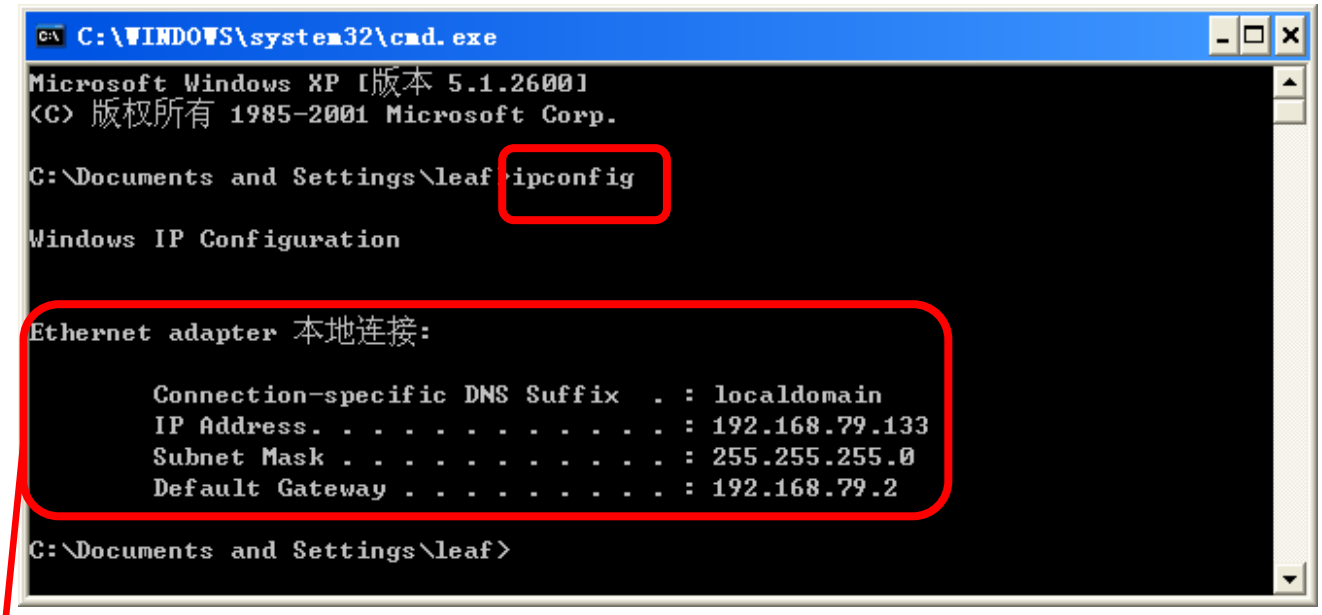


"Start" => "Run"



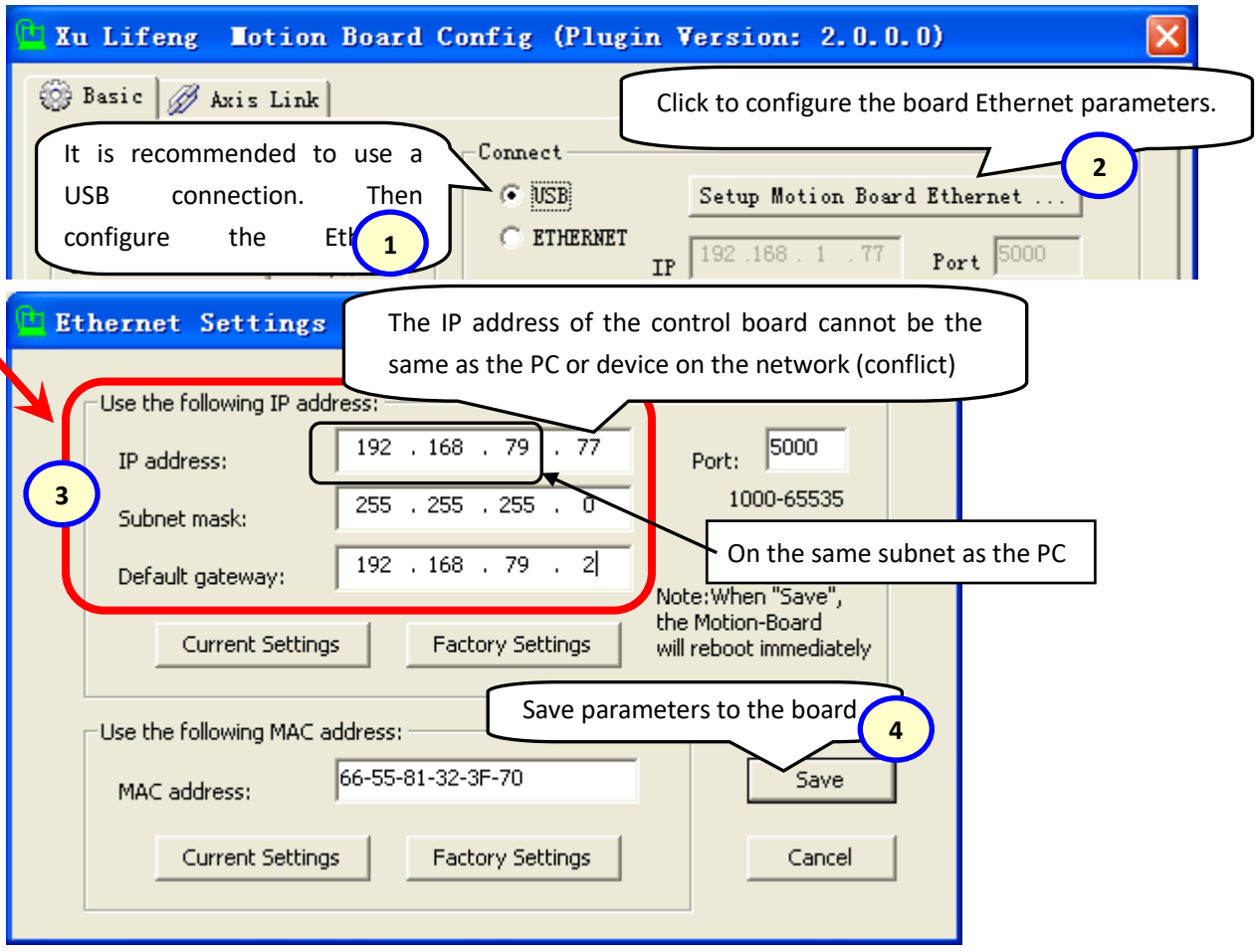
Type “cmd”, Press “OK” button

Enter the command "ipconfig" to see the IP address of the computer.

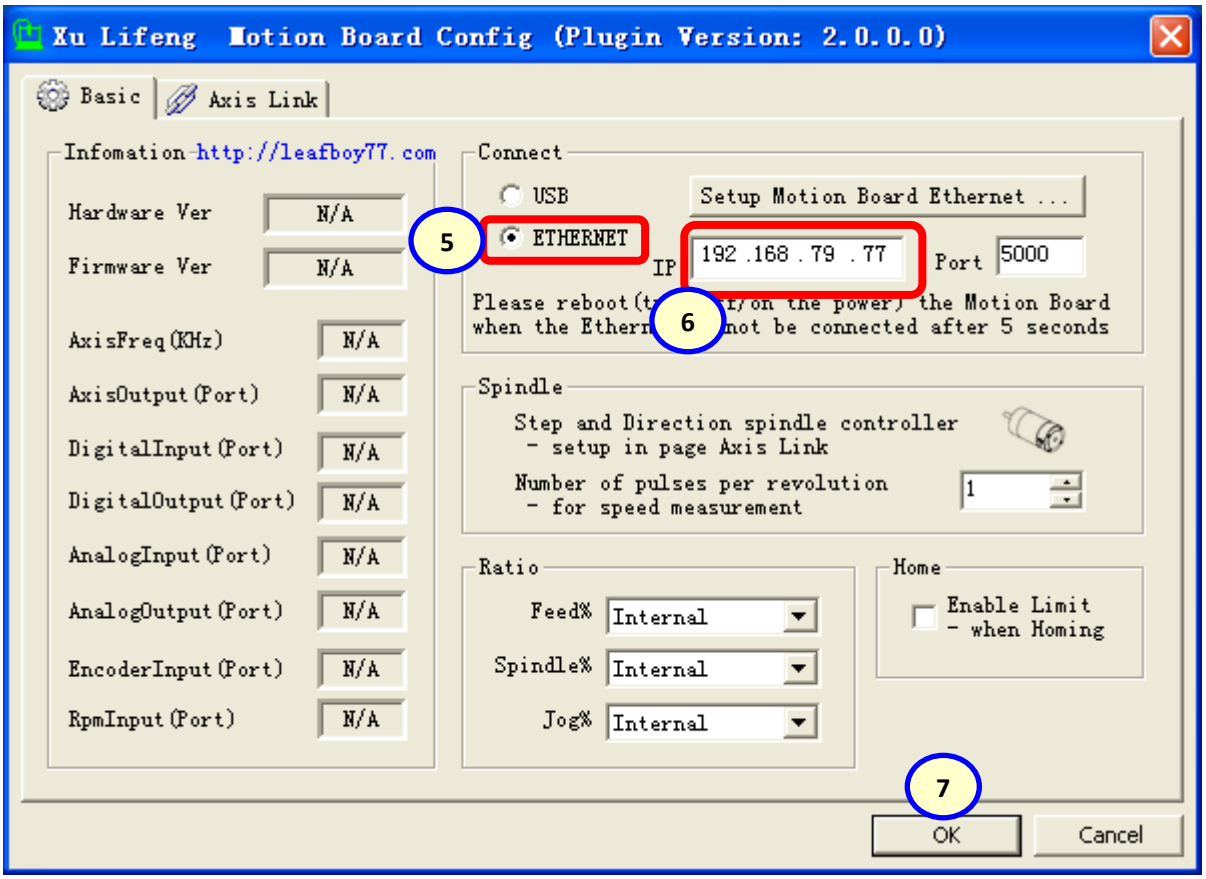


Step 2: Configure the IP address parameters of the motion control board.

After the PC needs to be connected to the board, the IP address parameters of the motion control board can be modified. You must use USB (recommended, easy to operate) connection, IP parameters can also be configured after the Ethernet cable is directly connected. After the connection is successful (the STATUS-LED indicator flashes slowly), then modify the IP address of the motion control board, on the same subnet as the router.



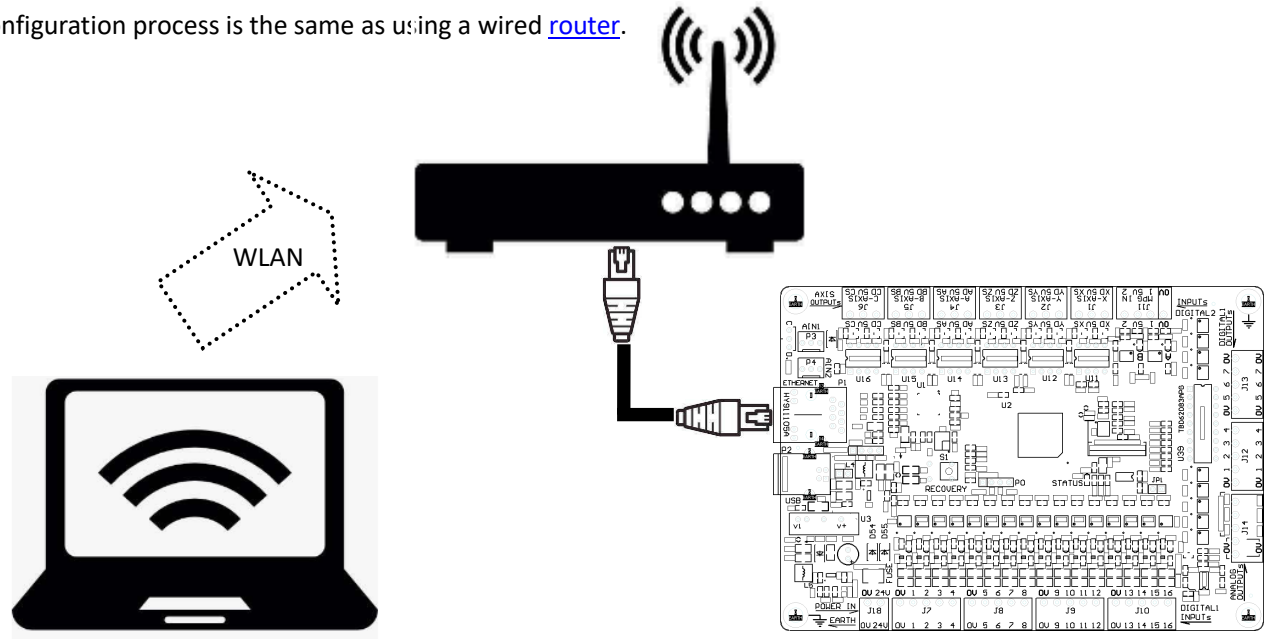
Next select the “ETHERNET” connection option and type the Motion Board IP address.



When the Mach3 is successfully connected to the motion control board (USB or Ethernet), the STATUS-LED indicator flashes slowly.

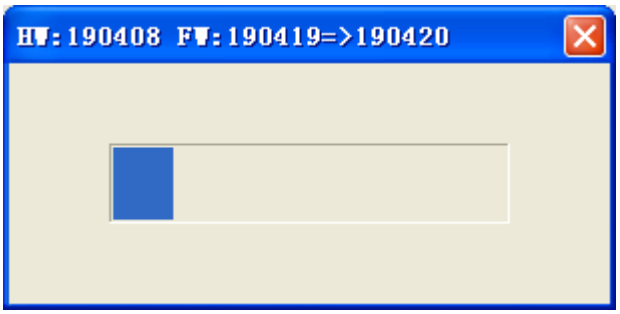
2.2.3 WLAN

Use a wireless router to connect wirelessly to a PC (such as a laptop) via WLAN. The motion control board IP configuration process is the same as using a wired router.



3. Firmware upgrade, Restore factory firmware, Restore factory settings

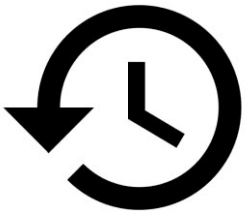
The chip firmware of this motion control board supports upgrades, and users can continuously get the latest feature support. The firmware is stored in the Mach3 plugin (the latest version of the Mach3 plugin, please download it from http://leafboy77.com). When Mach3 is launched and connected to the motion control board, the firmware version is checked and automatically upgraded.



Normally, the upgrade can be completed successfully. If the upgrade fails in a special situation and the board fails to start, the motion board provides the function of **restoring the factory firmware**. The steps are as follows:

i. Confirm that the control board is powered off (turn off 12V or 24V power)
ii. Press and hold the RECOVERY button
iii. Motion control board is powered on (12V or 24V power is turned on)
iv. Release the RECOVERY button
v. The STATUS LED is always on (standby status), indicating that the recovery operation is complete (It takes about a few seconds)

Note:
Restore the factory firmware operation, and the Ethernet parameters will be restored to the factory settings.

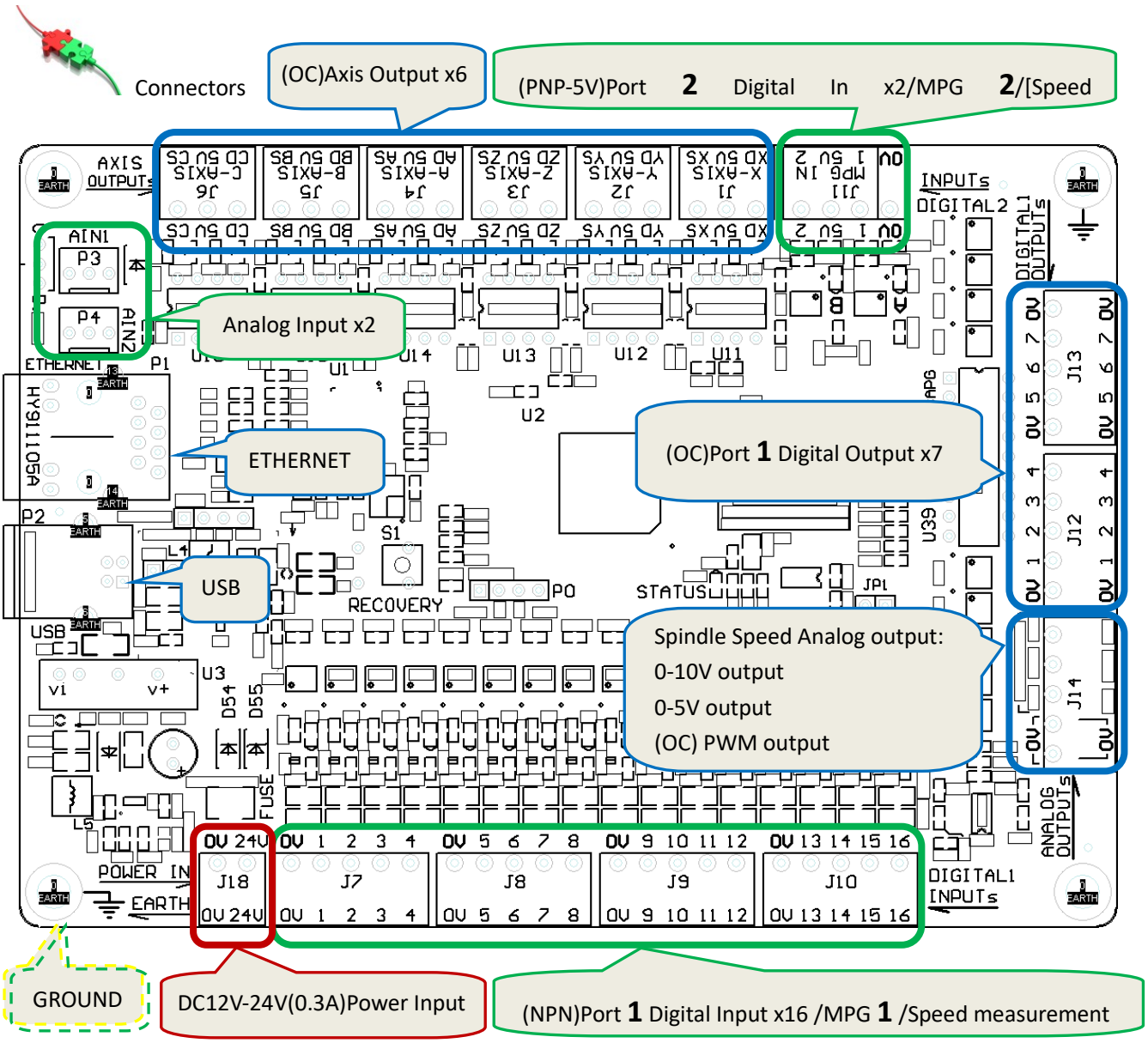


If only Ethernet parameters need to be **restored to factory settings**, the steps are as follows:

i. The control board is powered and the STATUS-LED is on.
ii. Press and hold the RECOVERY button for more than 5 seconds, STATUS-LED flashes slowly => fast flashing => off
iii. Release the RECOVERY button, the STATUS-LED is always on (standby), and the IP parameters are restored to factory settings.

Ethernet parameters (factory settings):
IP address:**192.168.1.77** Subnet mask:**255.255.255.0**
Default gateway:**192.168.1.1** Port:**5000**

4. Electrical characteristics and wiring table



4.1 Power Input

Connector	FUNCTIONS	ELECTRICAL	Description
0V	power input negative	0V	Common ground: (axis/digital input/digital output/PWM)
24V	power input positive	DC12V-24V / 0.3A	Independent power supply required, separate from motor

4.2 Power Output

The Motion board has a 5V output power supply for the interface of the 6 stepper drives and the PNP-5V MPG 2.

Connector	FUNCTIONS	ELECTRICAL	Description
5V	power output positive	DC5V / 200mA	All 5V Connectors, a total output of 200mA

4.3 (NPN) Port 1 Digital Input x16 / MPG 1

Connector	FUNCTIONS	ELECTRICAL	Description
1	Digital Input Pin 1	NPN Optocoupler isolation x16 Interface voltage = power input (12V-24V) Min trigger current: 3mA Max operating current (12V): 5mA Max operating current (24V): 9mA	Port 1 Digital Input MPG 1 Input Speed measurement input #14 hardware is enabled by default
2	Digital Input Pin 2		
3	Digital Input Pin 3		
4	Digital Input Pin 4		
5	Digital Input Pin 5		
6	Digital Input Pin 6		
7	Digital Input Pin 7		
8	Digital Input Pin 8		
9	Digital Input Pin 9		
10	Digital Input Pin 10		
11	Digital Input Pin 11		
12	Digital Input Pin 12		
13	Digital Input Pin 13		
14	Digital Input Pin 14		
	Speed measurement		
15	Digital Input Pin 15		
	MPG 1 Input A		
16	Digital Input Pin 16		
	MPG 1 Input B		

4.4 (PNP-5V) Port 2 Digital Input x2 / MPG 2 / Speed measurement

Connector	FUNCTIONS	ELECTRICAL	Description
1	Digital Input Pin 1	PNP Optocoupler isolation x2 Interface voltage: 5V Min trigger current: 2mA Max operating current: 7mA	Port 2 Digital Input MPG 2 Input Speed measurement input #1 hardware is off by default
	MPG 2 Input A		
	Speed measurement		
2	Digital Input Pin 2		
	MPG 2 Input B		

4.5 Analog Input x2

Analog input for external potentiometer control speed, electrical characteristics are **non-isolated**

Connector	FUNCTIONS	ELECTRICAL	Description
AIN1	Analog Input Port 1	**Non-isolated x2** Input voltage: 0V-3.3V Input current: <0.1mA	For external speed control: Spindle speed / jog speed / Feed
AIN2	Analog Input Port 2		

4.6 Axis Output x6

Connector	FUNCTIONS	ELECTRICAL	Description
XD (Xdir)	Xaxis Direction signal	High speed optocoupler isolation x12 Max: 24V / 13mA OC=Open collector output	Used to connect: Stepper drive server Driver
XS (Xstep)	Xaxis Step signal		
YD (Ydir)	Yaxis Direction signal		
YS (Ystep)	Yaxis Step signal		
ZD (Zdir)	Zaxis Direction signal		
ZS (Zstep)	Zaxis Step signal		
AD (Adir)	Aaxis Direction signal		
AS (Astep)	Aaxis Step signal		
BD (Bdir)	Baxis Direction signal		
BS (Bstep)	Baxis Step signal		
CD (Cdir)	Caxis Direction signal		
CS (Cstep)	Caxis Step signal		

4.7 (OC) Port 1 Digital Output x8

Connector	FUNCTIONS	ELECTRICAL	Description
1	Digital Output Pin 1	Optocoupler isolation x7 Max: 24V / 500mA OC=Open collector output	Digital output pin for driving inductive loads (eg relay / solenoid valve) In order to prevent the back EMF from breaking through the driver chip (TBD62083), need an external independent freewheeling diode
2	Digital Output Pin 2		
3	Digital Output Pin 3		
4	Digital Output Pin 4		
5	Digital Output Pin 5		
6	Digital Output Pin 6		
7	Digital Output Pin 7		

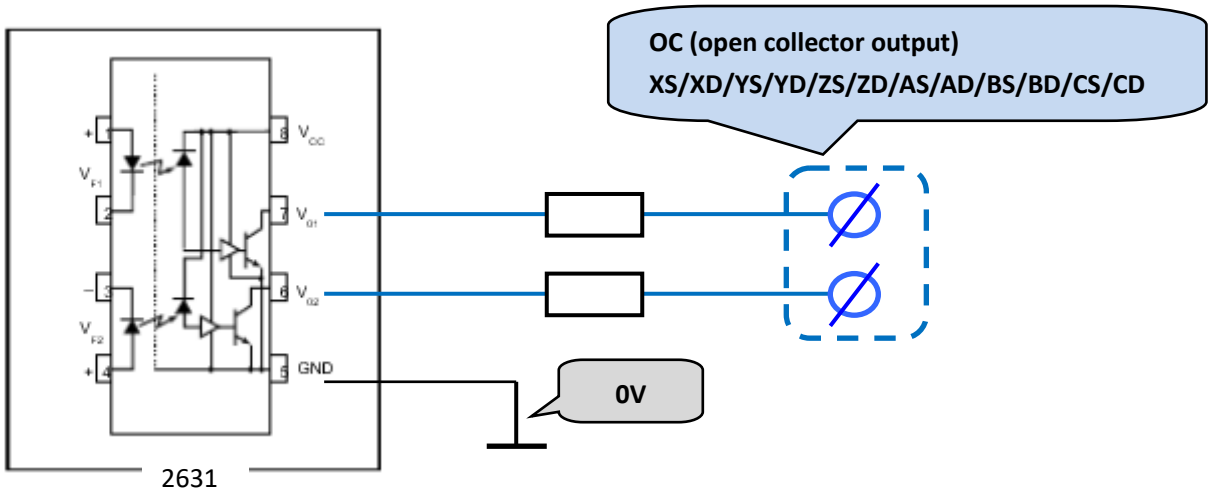
4.8 (OC) Spindle Speed control signal (PWM) output

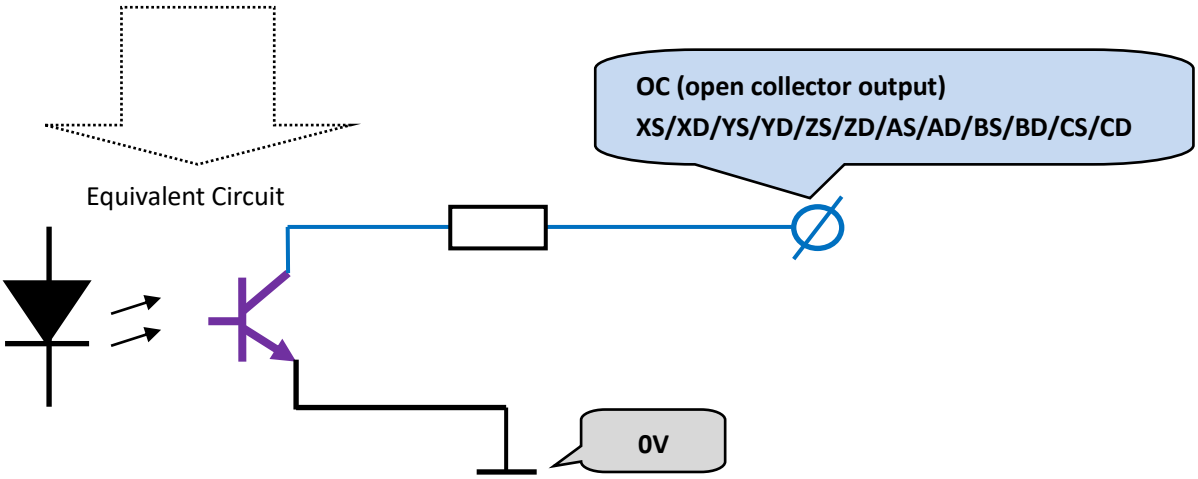
Connector	FUNCTIONS	ELECTRICAL	Description
PWM	PWM (Pulse-Width Modulation) output	Optocoupler isolation x1 Max: 24V / 10mA OC=Open collector output	Spindle speed control signal output **When using A10V, 24V power supply (>14V) is recommended for the control board**
A10V	0-10V analog output	Optocoupler isolation x1 0-10V / 10mA(max)	
A5V	0-5V analog output	Optocoupler isolation x1 0-5V / 10mA(max)	

5. Wiring and configuration with stepper (or servo) drives

5.1 6-axis outputs interface schematic

6 axis output of the control board (12 channels): open collector output, high speed optocoupler isolation





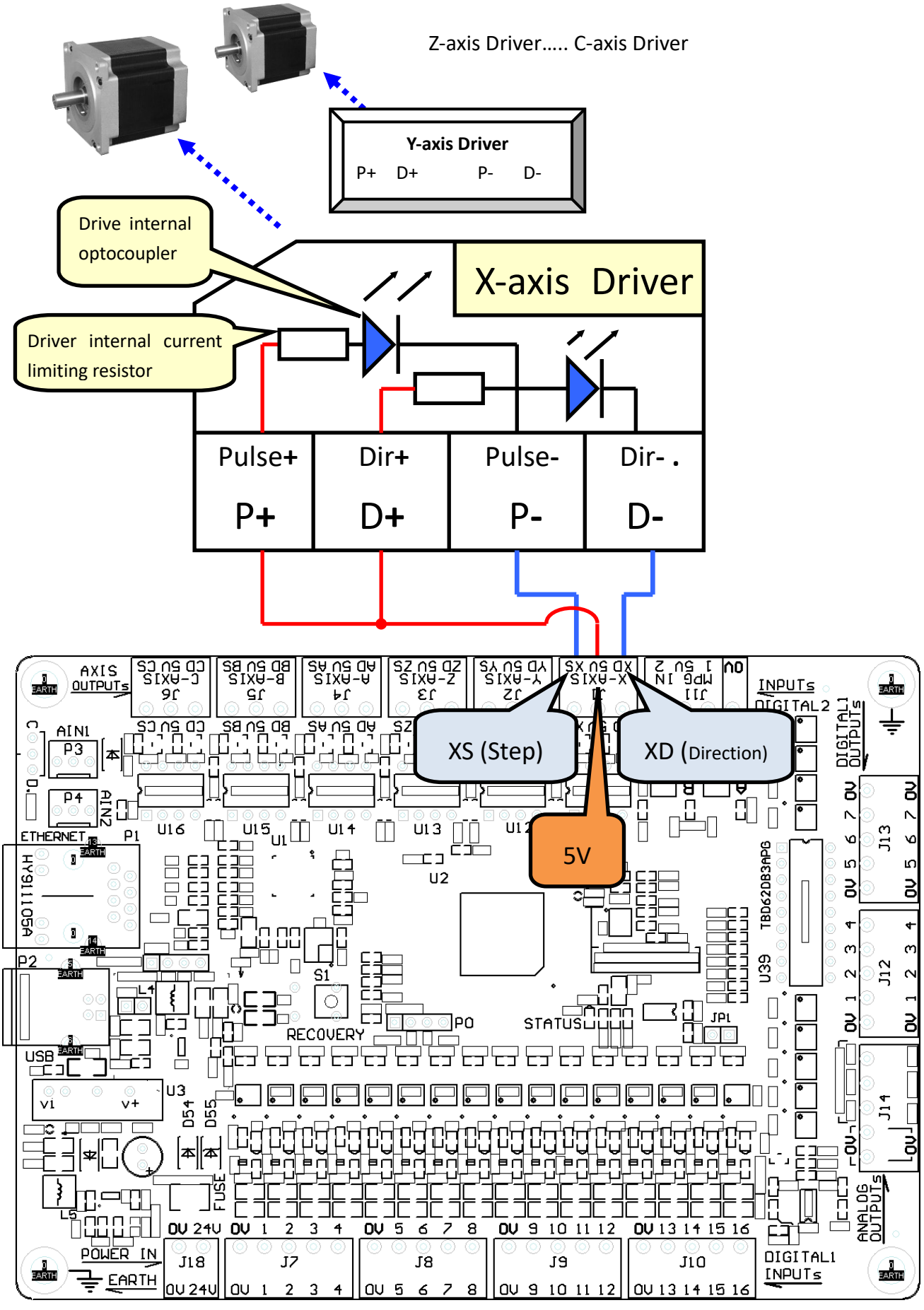
5.2 Stepper/Servo Driver Wiring Diagram

The interface of the stepper/servo drive uses the following two power supply methods:

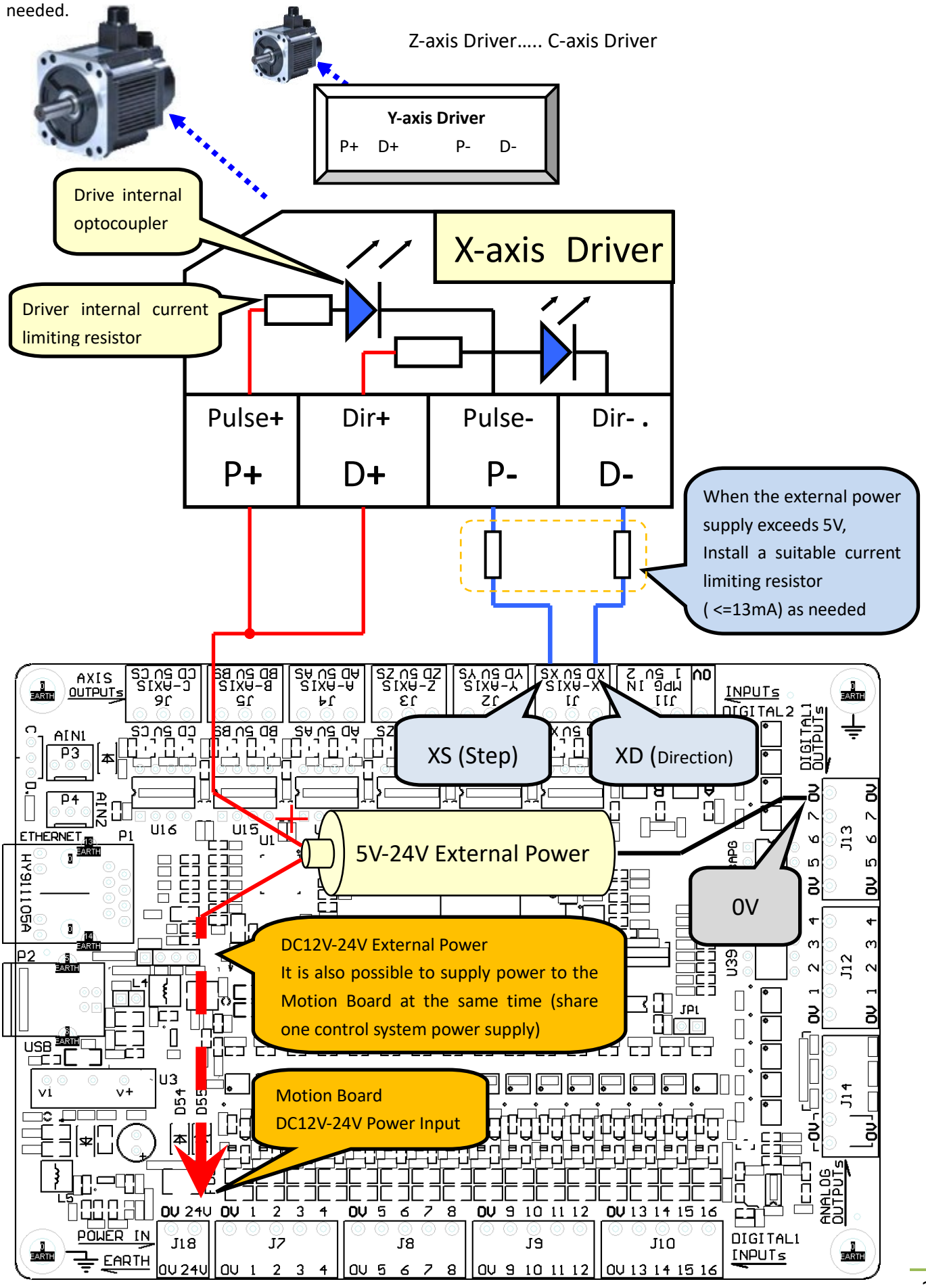
- Internal power supply 5V (suitable for stepper drive)
- External power supply 5V-24V (suitable for servo drive)

Note:
External power supply 12V-24V, this power supply can also supply power to the control board at the same time (share one control system power supply)

5.2.1 Use the 5V power supply inside the motion control board, suitable for stepper drivers, please install suitable current limiting resistors as needed.

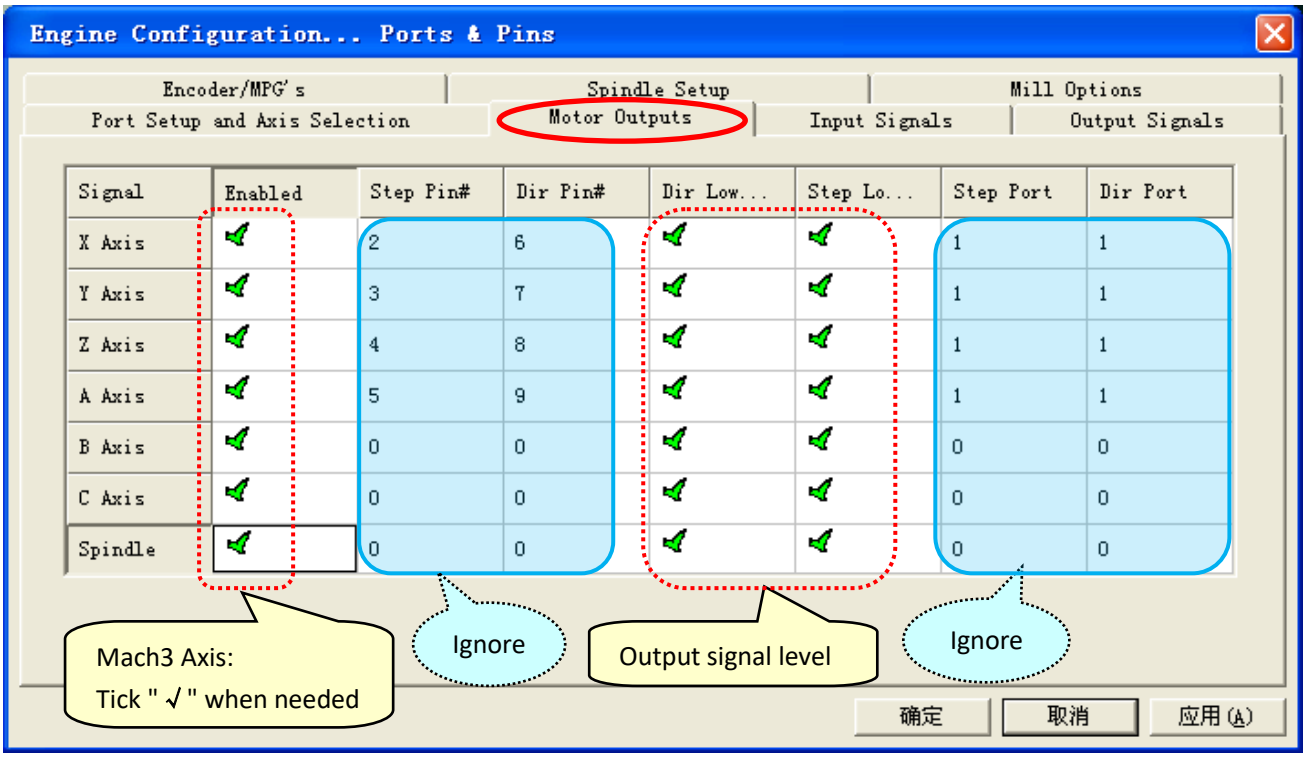


5.2.2Use 5V-24V external power supply, suitable for servo drive, please install suitable current limiting resistor as needed.

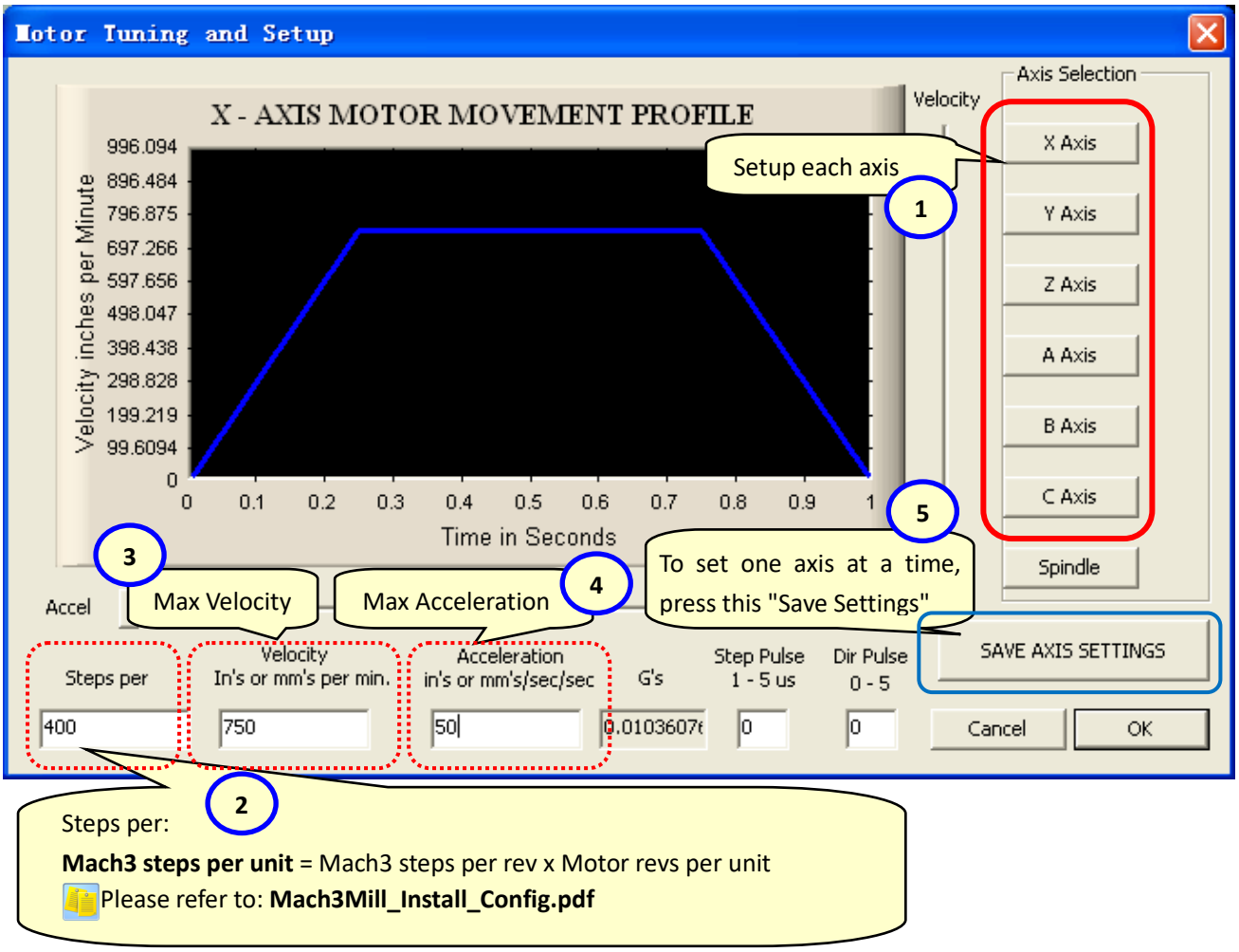


5.3 Motor parameter configuration

5.3.1 Mach3's X,Y,Z,A,B,C axis configuration, as shown below: (Config => Ports and Pins => Motor Outputs)

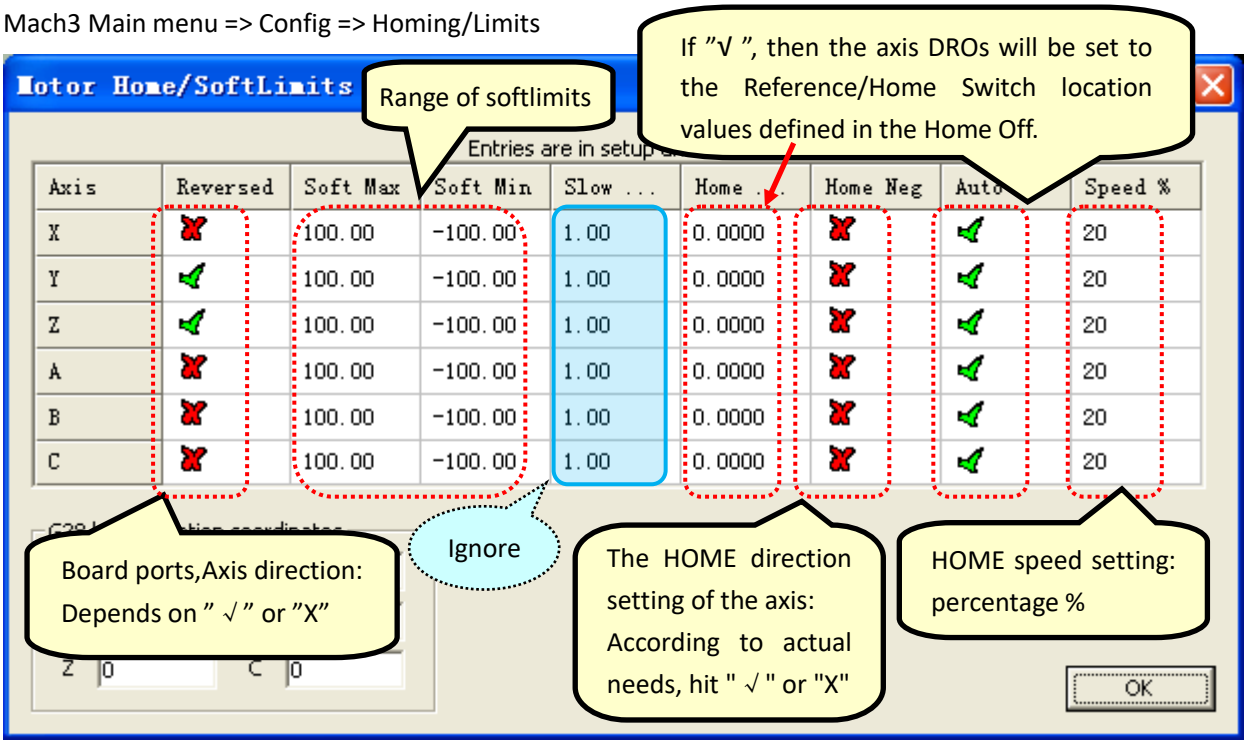


5.3.2 Mach3 tuning setup as shown below: (Config => Motor Tuning)



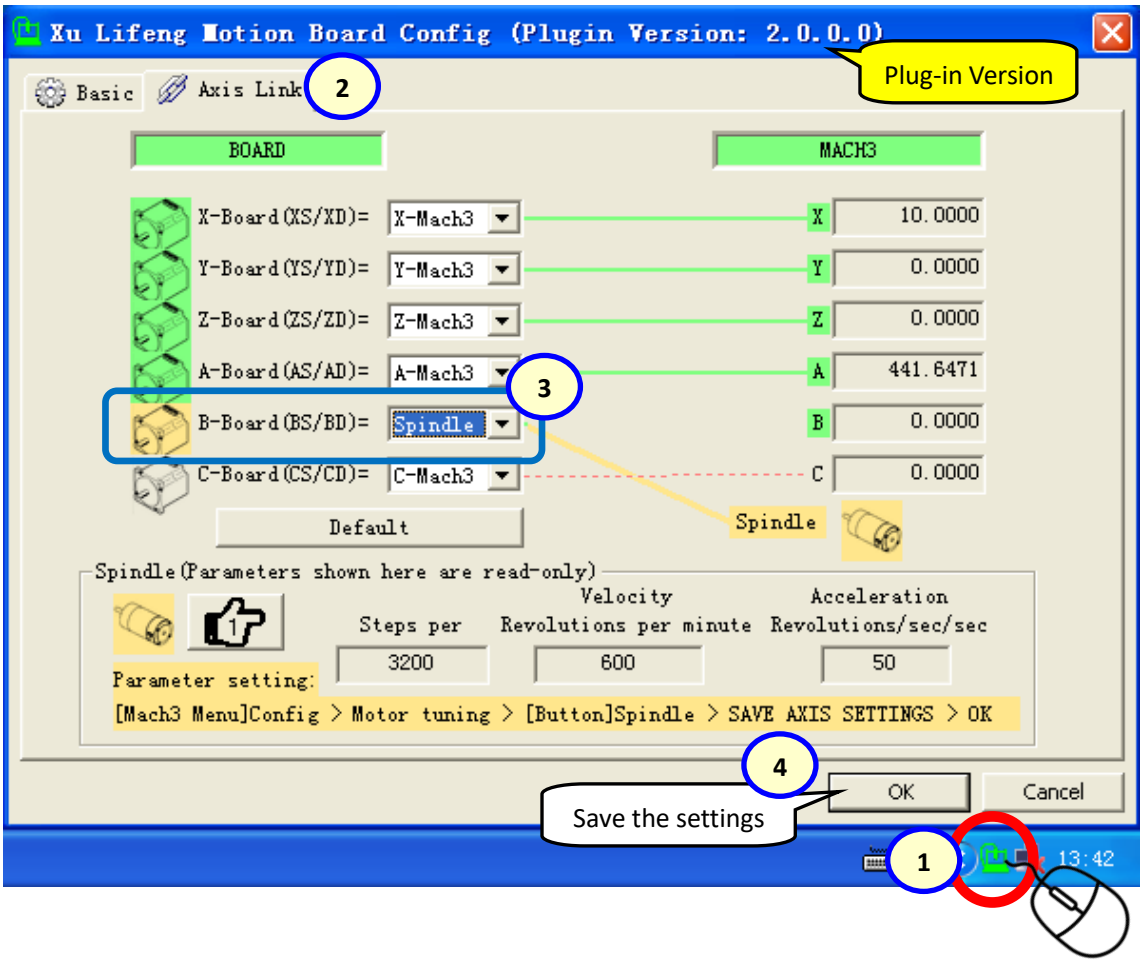
5.3.3 Mach3's **axis running direction** is recommended as shown below:

Mach3 Main menu => Config => Homing/Limits



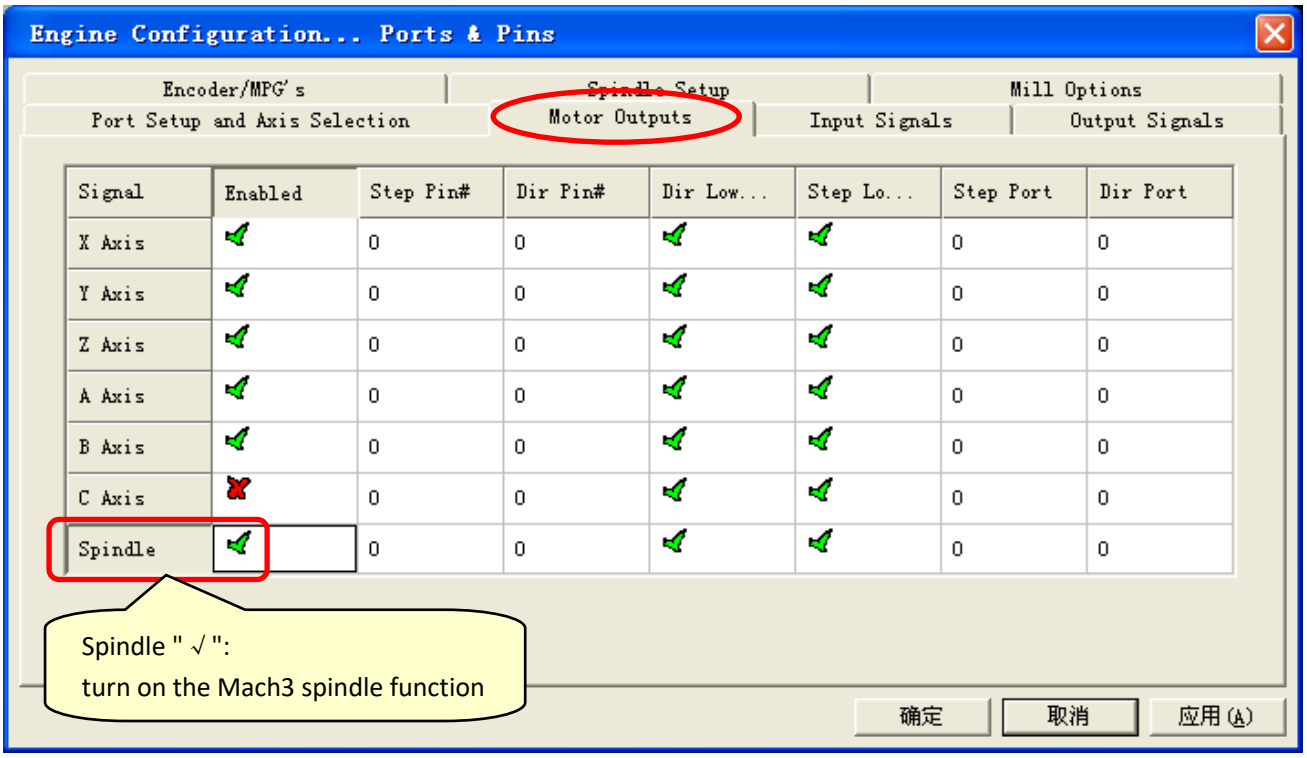
5.4 Pulse Spindle Configuration. (Requires plug-in version 2.0.0.0 or above, download the latest version)

5.4.1You can set any axis of the motion control board as the pulse spindle output, and specify the B axis as an example: (1)Right click on the CNC icon, pop up the settings dialog. (2)Switch to the "Axis Link" page. (3)Select "Spindle " for "B-Board(BS/BD)". (4)Press OK to save the settings.

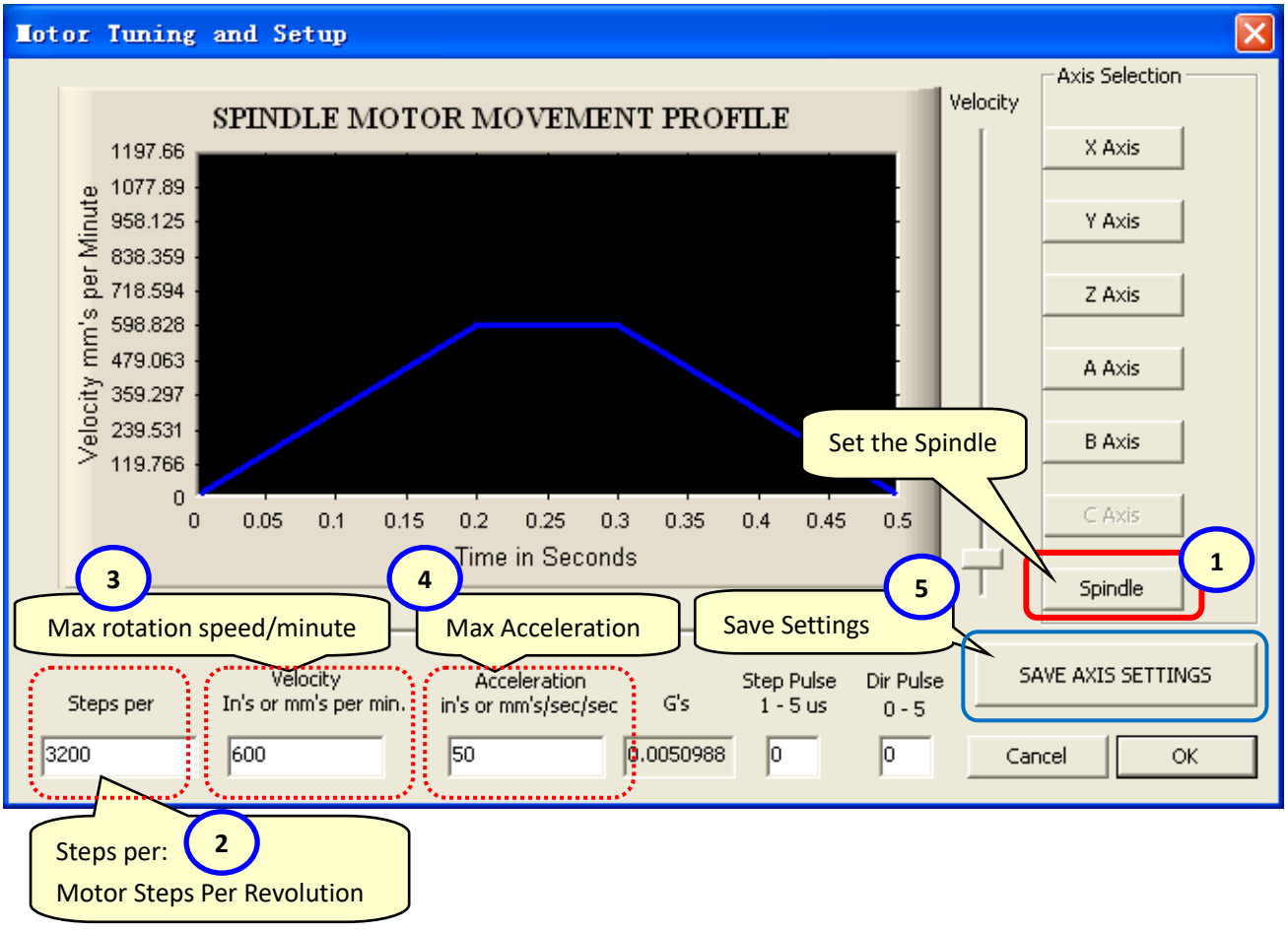


5.4.2 Confirm that the spindle function (Spindle) is turned on, as shown in the figure below:

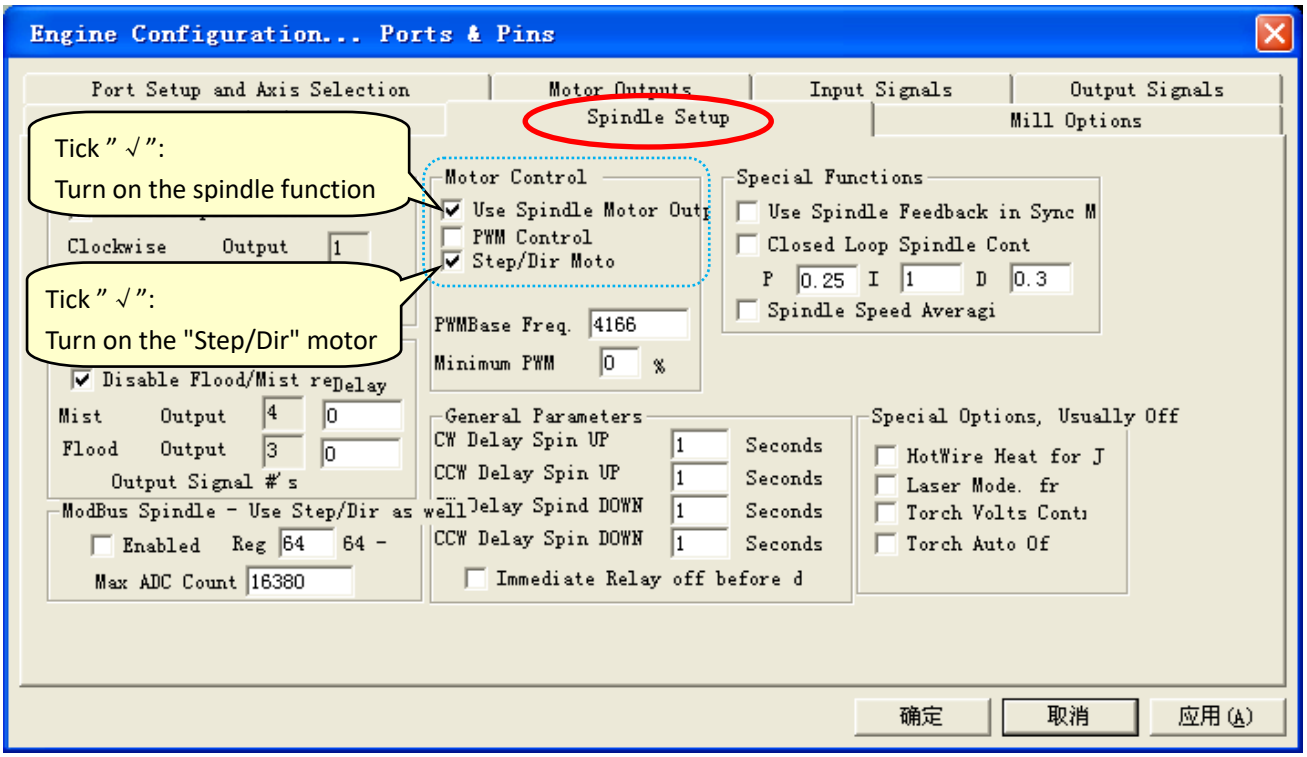
(Config => Ports and Pins => Motor Outputs)



5.4.3 Motor operating parameter setting of Spindle, as shown below: (Config => Motor Tuning)

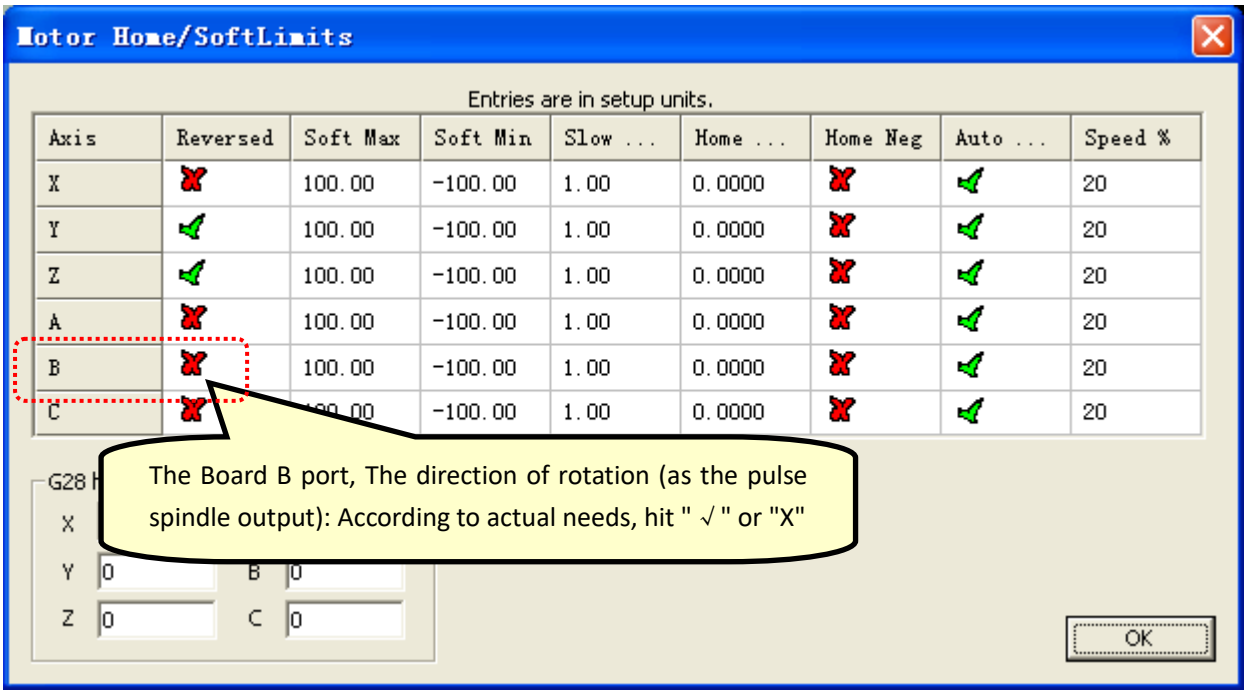


5.4.4 The spindle is set to: Step / direction motor (Config => Ports and Pins=>Spindle Setup)



5.4.5 The direction of rotation of the pulse spindle is recommended as shown in the following figure:

Mach3 main menu => Config => Homing/Limits



Note:

Spindle maximum speed (pulleys) setting, refer to this manual: Mach3 Menu "Config=>Spindle Pulleys.."

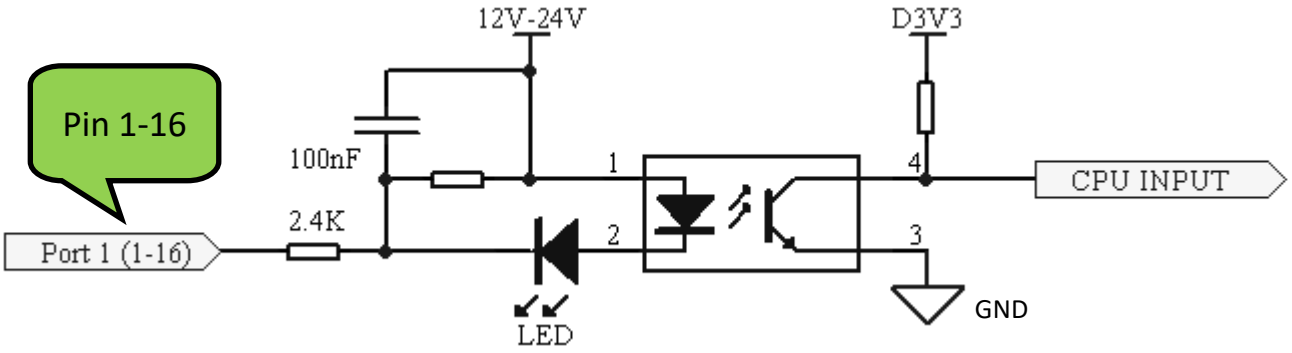
Spindle Running test (the speed must be set before starting the spindle),refer to this manual: Spindle test

6. Digital input

6.1 NPN input interface characteristics, wiring and configuration

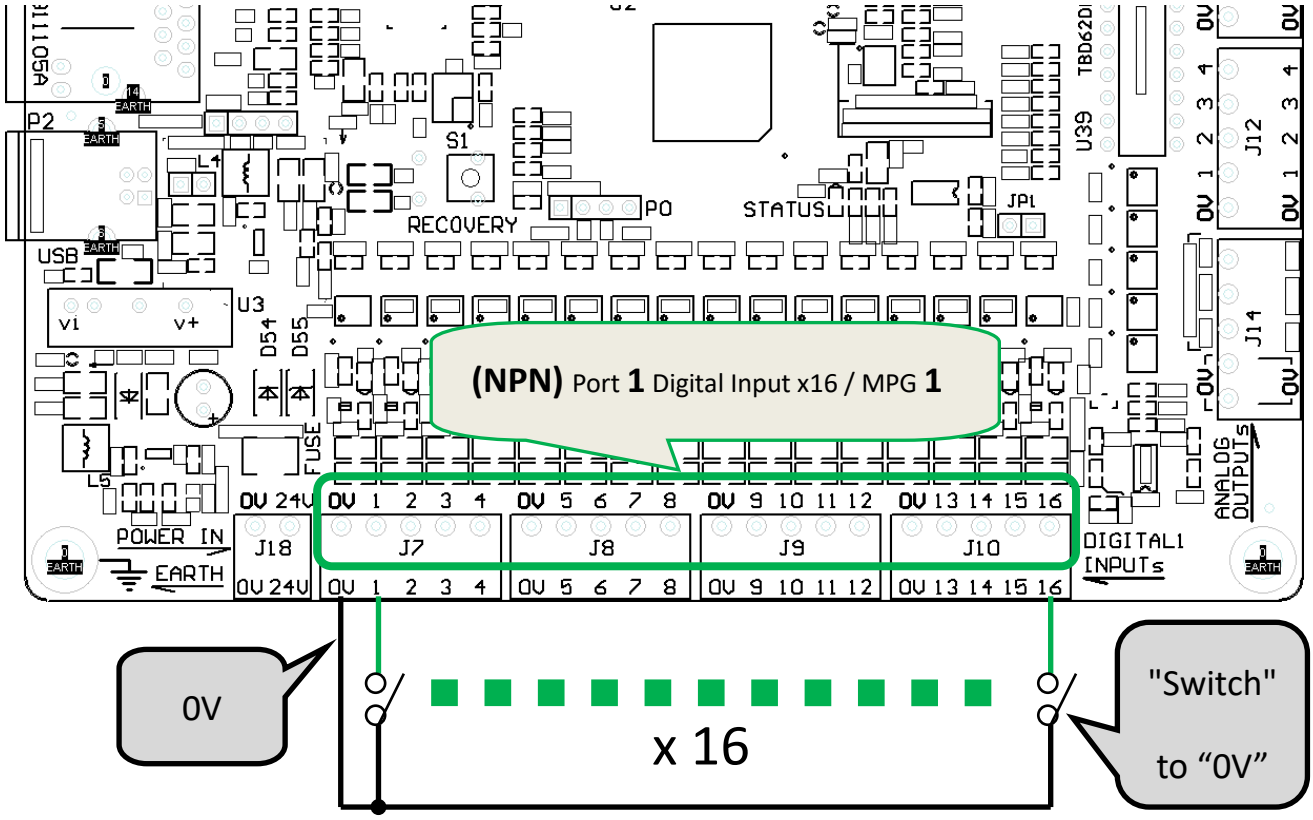
6.1.1 Interface schematic

Port **1** Digital Input: **NPN** Input x16, optocoupler isolation

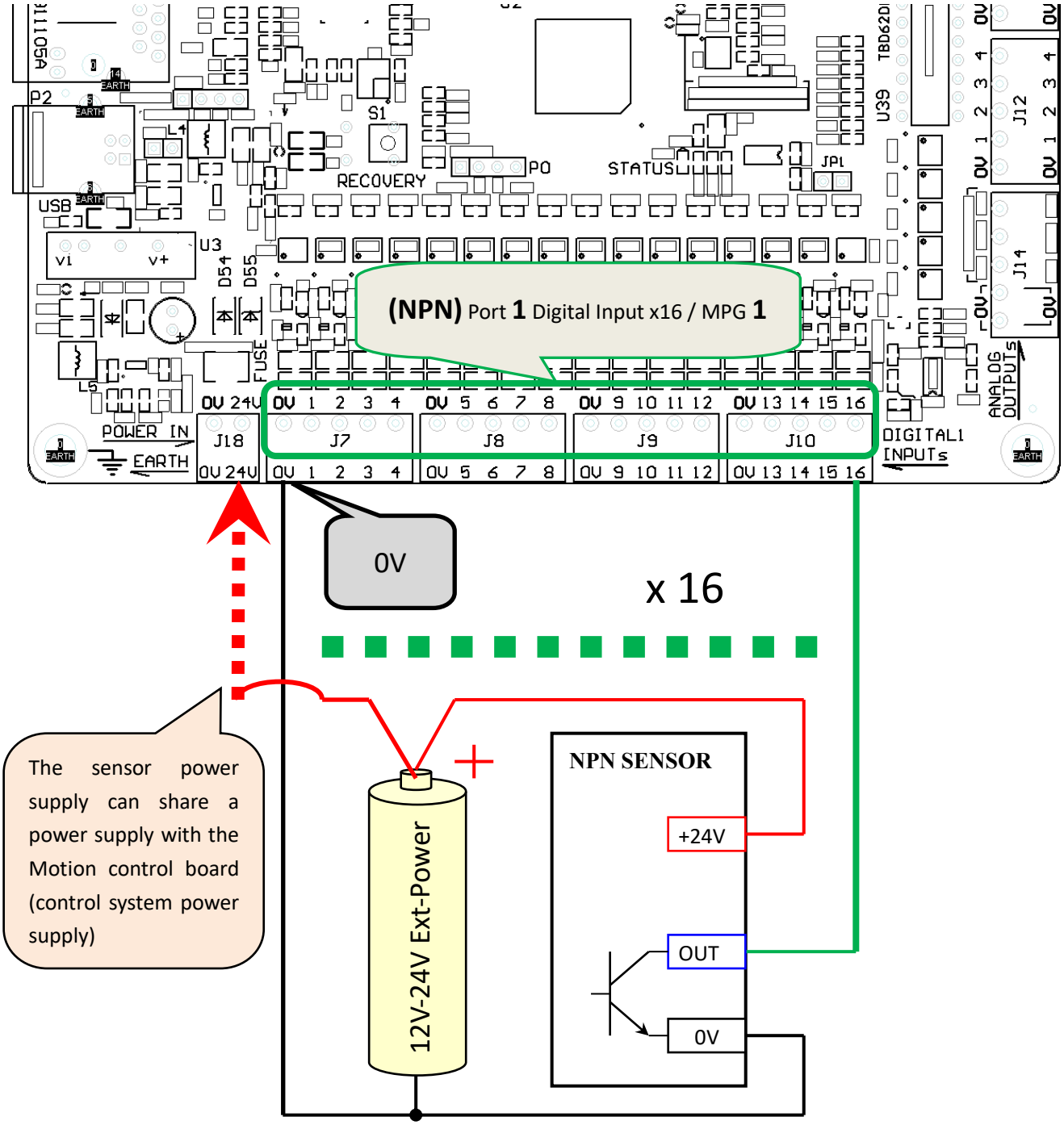


6.1.2 Wiring

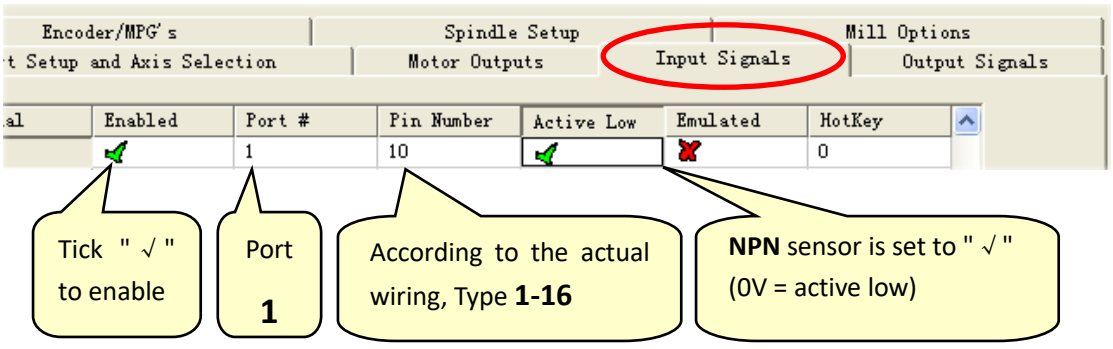
6.1.2.1 **Button, mechanical switch** wiring



6.1.2.2 **NPN sensor** wiring



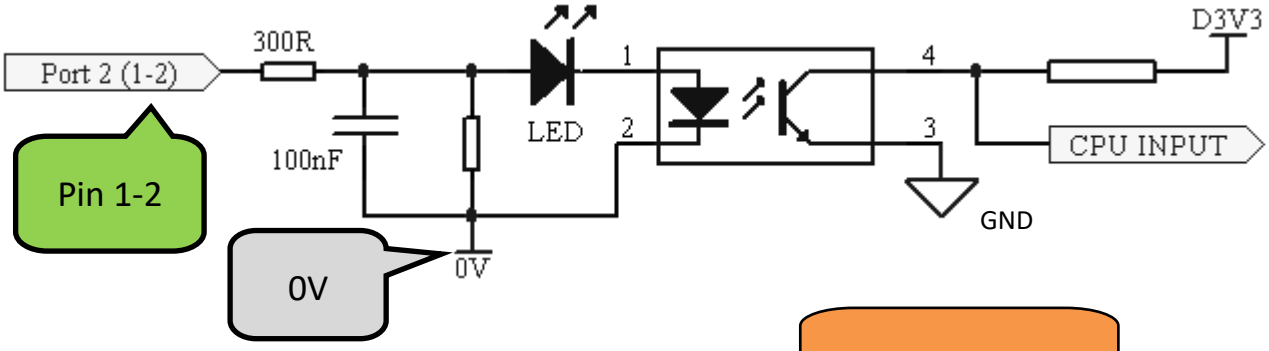
6.1.3 Mach3 input signal configuration (Config => Ports and Pins=>Input Signals)



6.2 PNP input interface characteristics, wiring and configuration

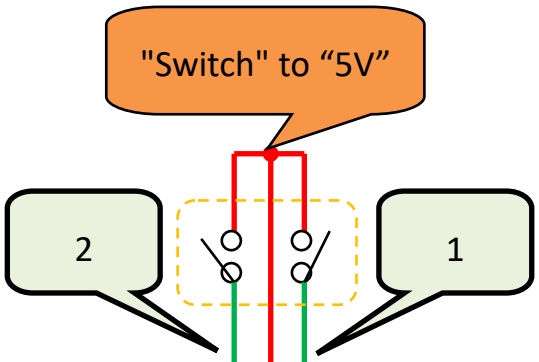
6.2.1 Interface schematic

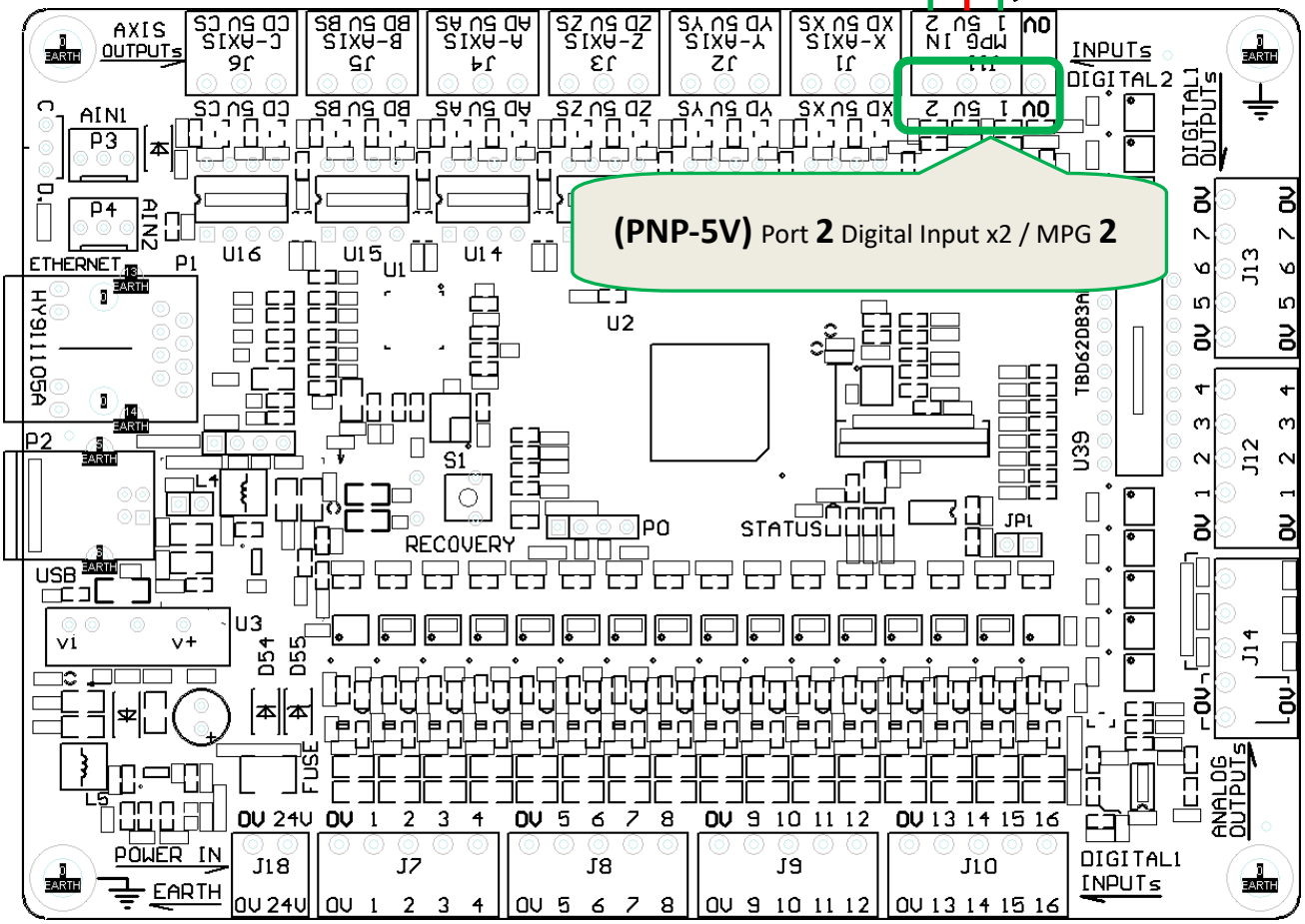
Port **2** Digital Input: **PNP-5V** Input x2, optocoupler isolation



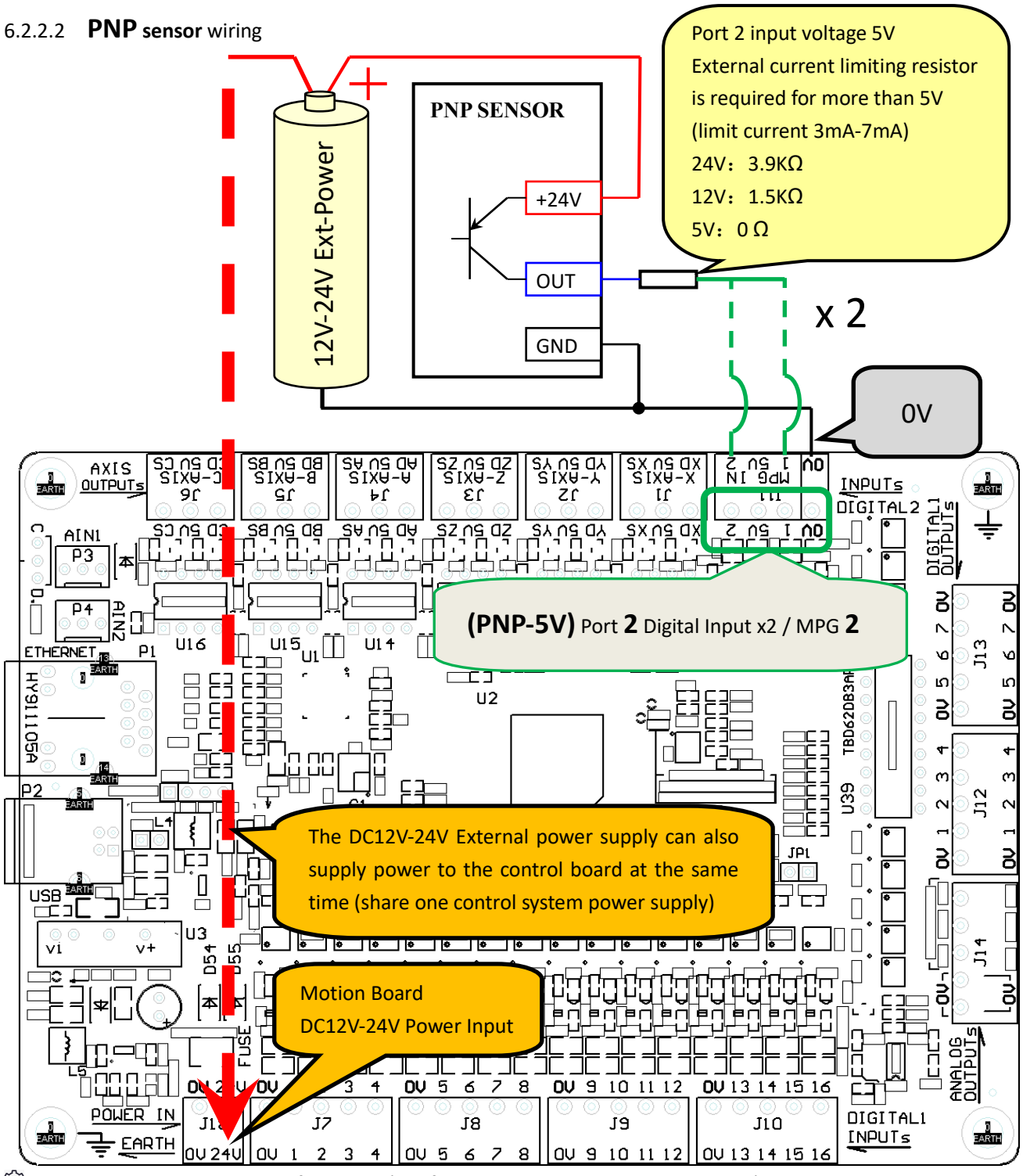
6.2.2 Wiring

6.2.2.1 **Button, mechanical switch** wiring

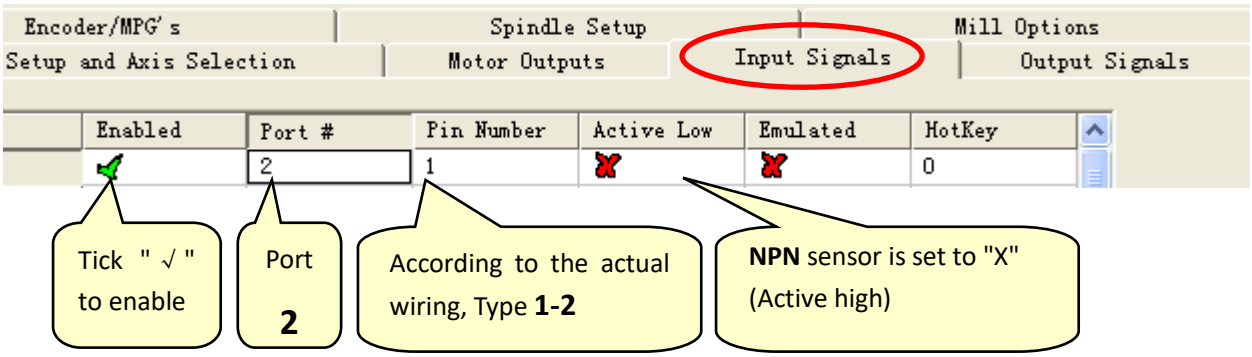




6.2.2.2 **PNP sensor** wiring

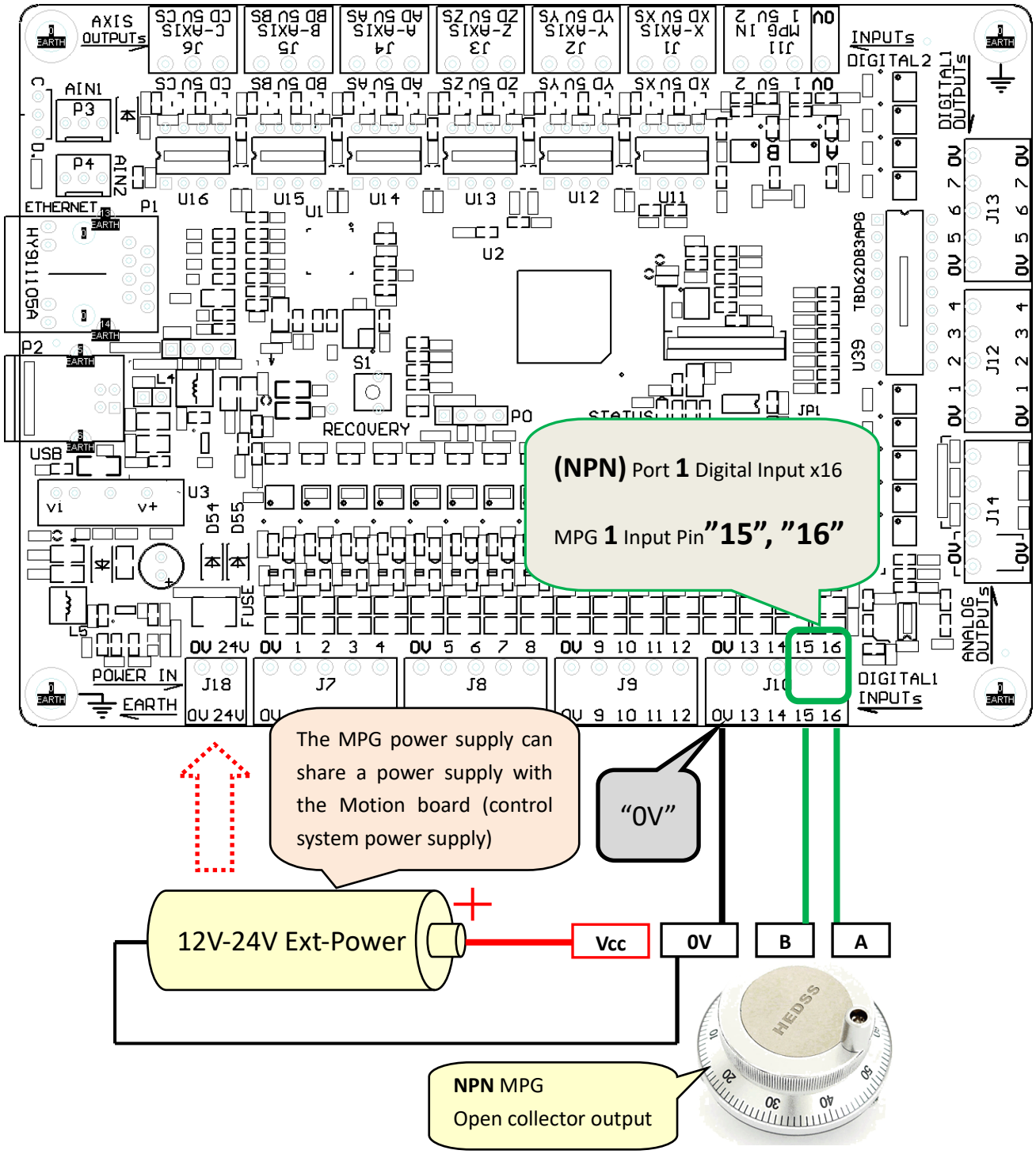


6.2.3 Mach3 input signal configuration (Config => Ports and Pins => Input Signals)



6.3 **NPN** MPG(Manual Pulse Generation) wiring

Output type of NPN MPG: **Open collector output (OC)**

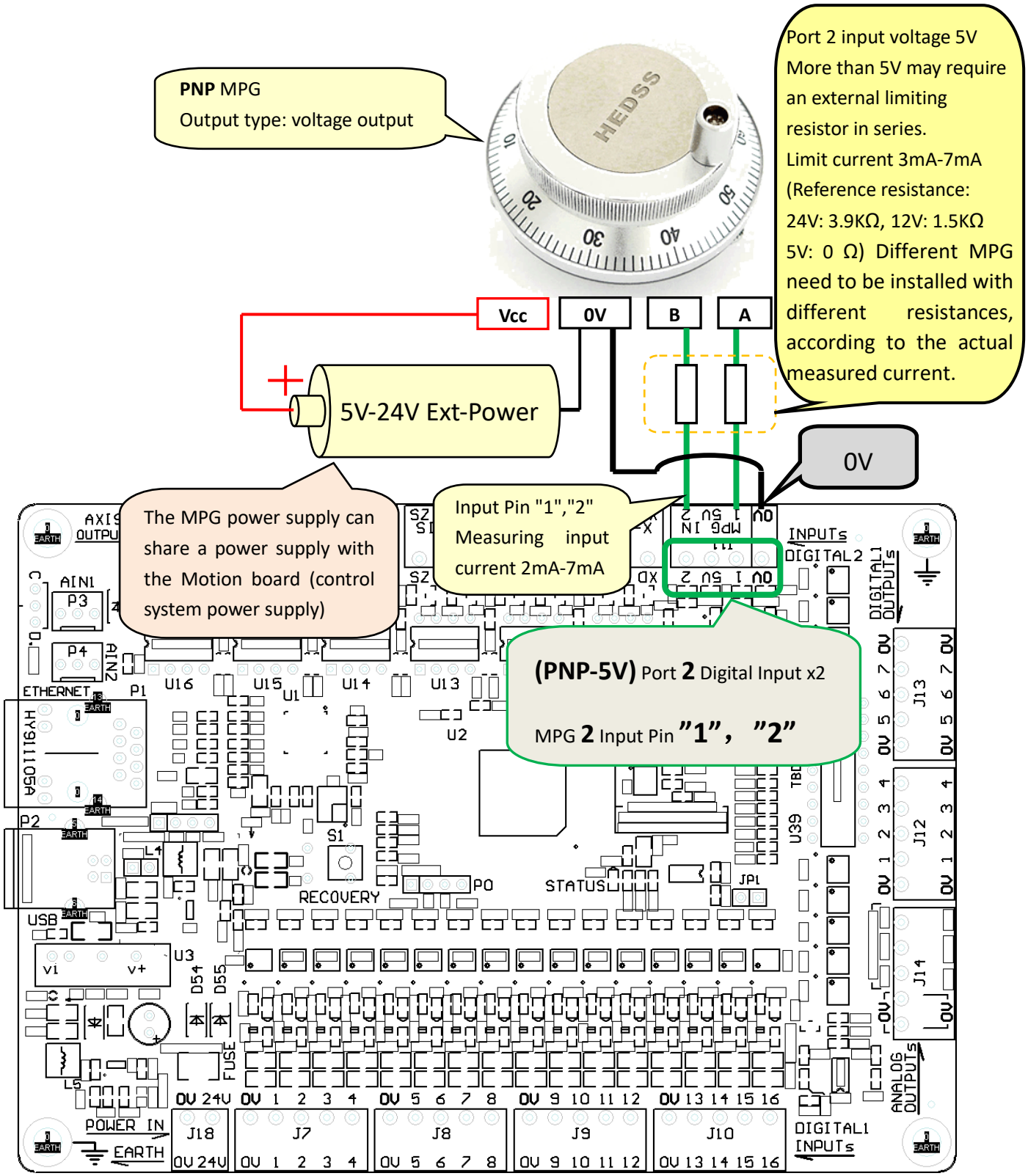


Usually the MPG rotates clockwise, the coordinates increase; counterclockwise rotation, the coordinates decrease.

If the direction of rotation of the electronic handwheel is opposite to the direction of the MACH3 coordinate, exchange the wiring of the electronic handwheels "A" and "B".

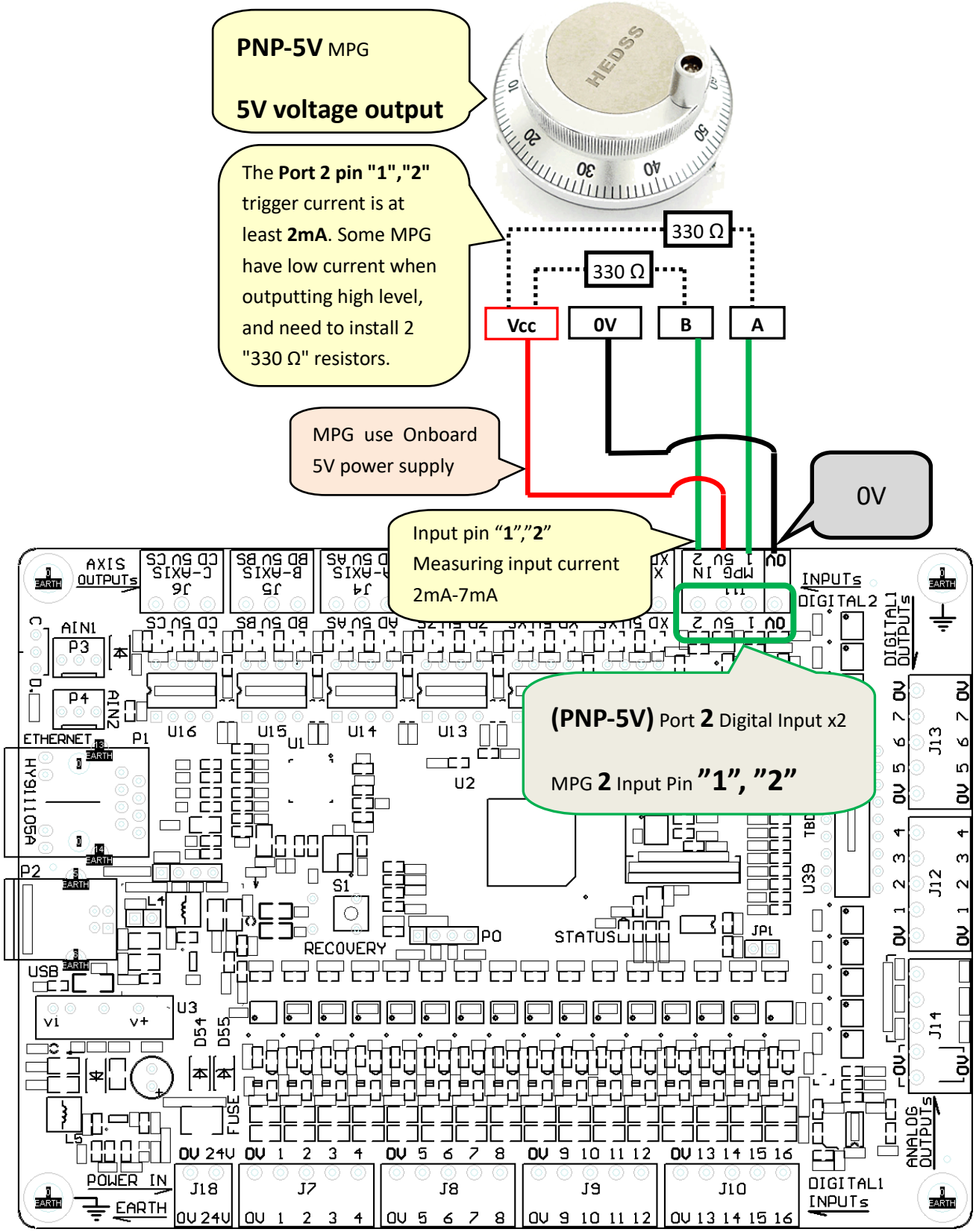
6.4 **PNP** MPG(Manual Pulse Generation) wiring

6.4.1 **PNP** MPG, output type: **voltage output** (if more than 5V, series current limiting resistor may be required)

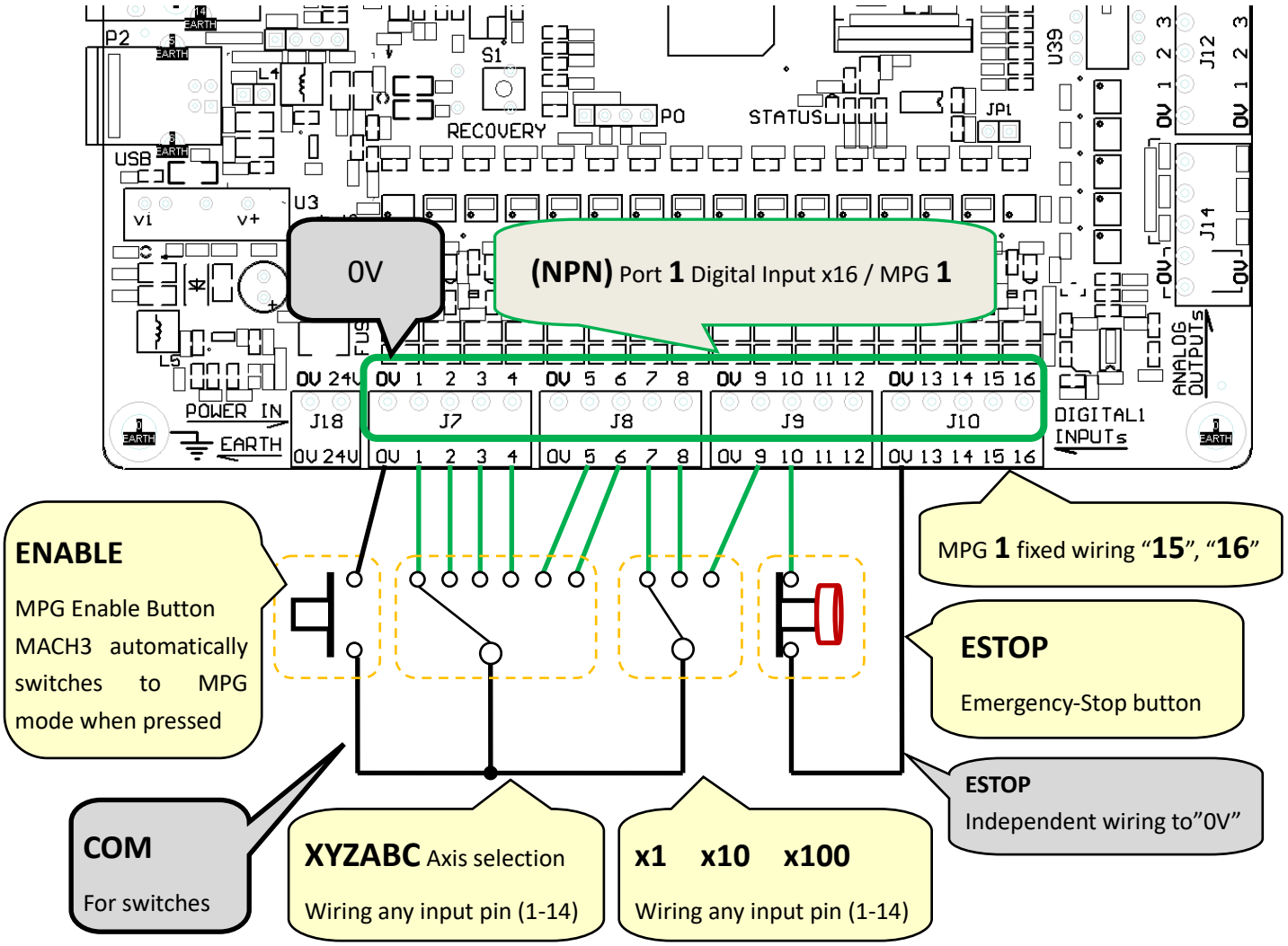


6.4.2 **PNP-5V** MPG, Output type: **5V voltage output**.

When the MPG operates at **5V** and the current consumption does not exceed **50mA**, it can be powered by the onboard 5V power supply of the Motion control board.。



6.5 Wiring of MPG switch



"Switch" and "Emergency Stop button" are connected to any input pin and then configured in Mach3.

When the "Enable Button" is pressed, the Jog Mode of Mach3 automatically switches to MPG mode, and automatically switches back to the original mode when the button is released.

The "Enable Button" automatically switches the JOG mode. The control board plug-in **v1.3.1.2** (or later) version is required. See "Download and install the Mach3 plugin" to download the latest version.

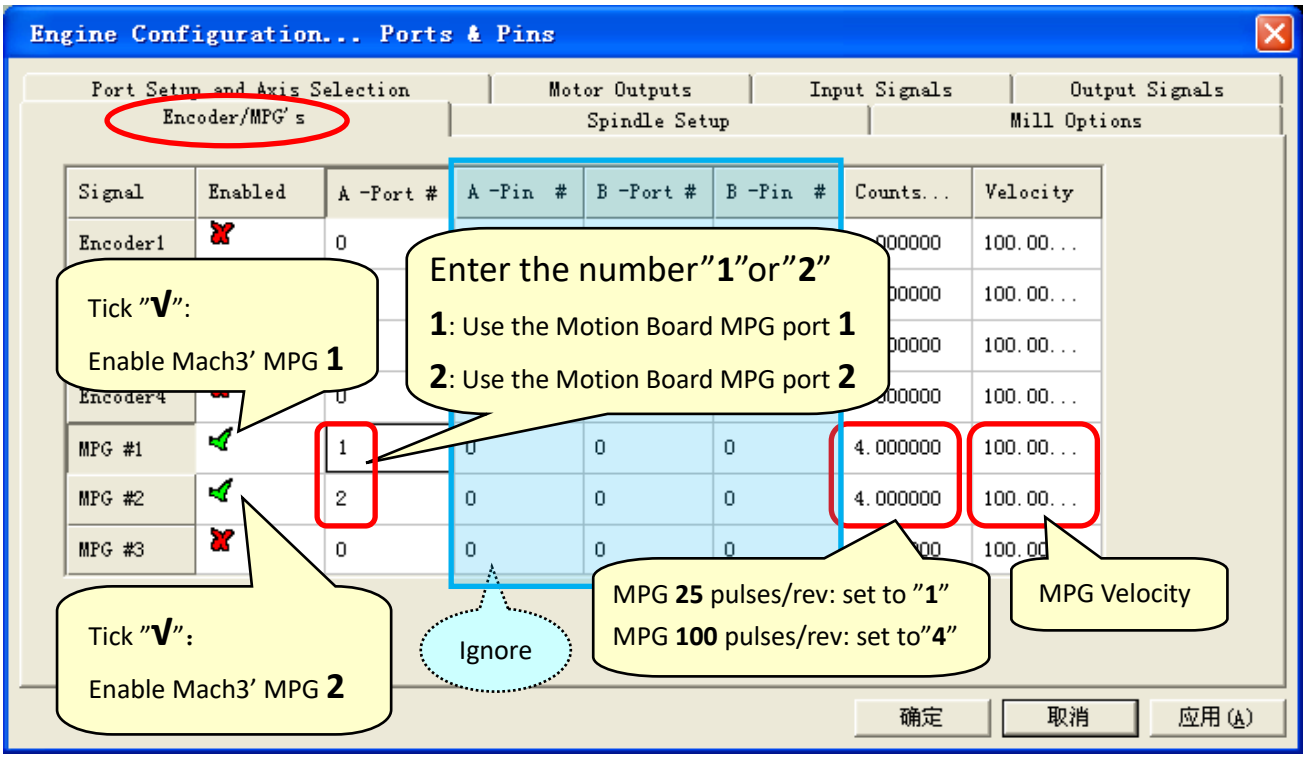
If the "Enable Button" is not needed, please short-circuit it (the common terminal "**COM**" of the switches is directly connected to the "**0V**" terminal of the control board).

Attention:

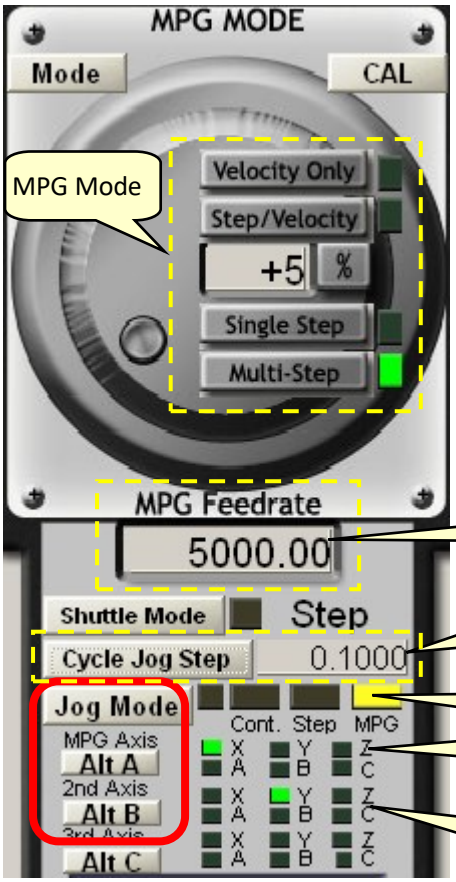
"Emergency-Stop button" It is recommended to use the "normally closed" contact. If a fault occurs in the disconnection of the wiring, an emergency stop will be triggered.

6.6 Configuration of the MPG

6.6.1 Mach3 MPG configuration, as shown below: (Config => Ports and Pins => Encoder/MPG's)

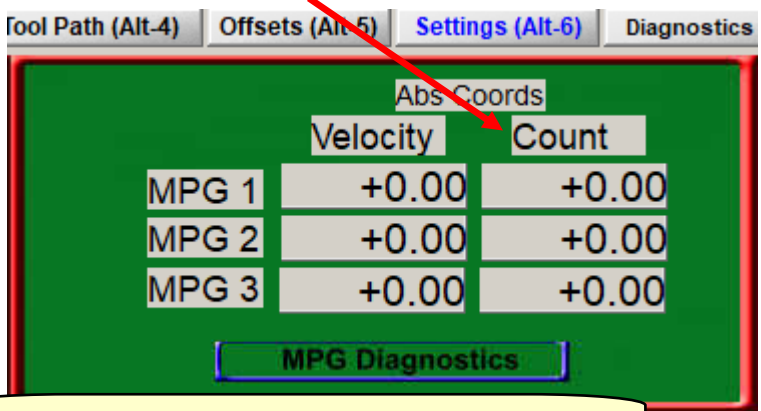


In Mach3, press the keyboard "TAB" and set it as shown below.



Multi-Step mode, MPG signal is processed in real time by motion control board

Mach3's MPG Count does not change at this time.



MPG Velocity: mouse click, type number, press **Enter**

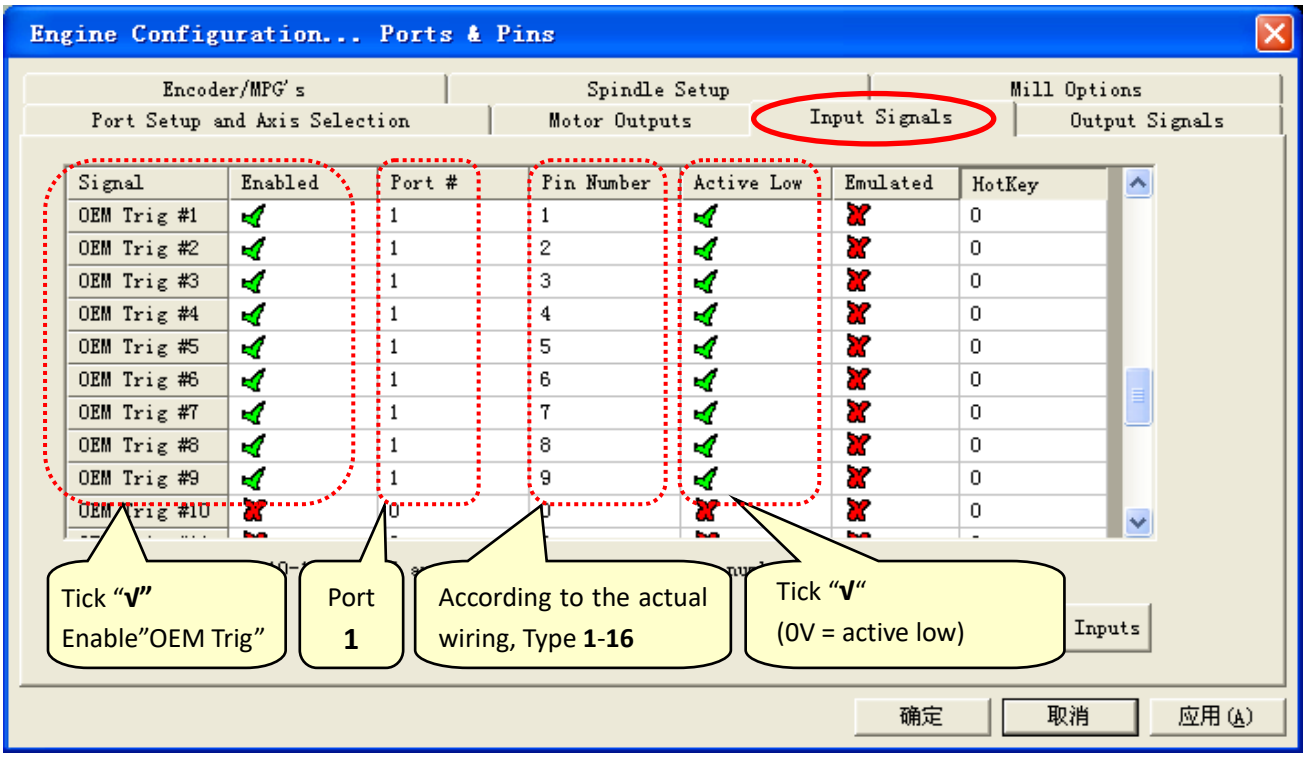
Jog Step: setup by click "Cycle Jog Step" button, or key in

Click "Jog Mode" button, set the jog to "MPG" mode

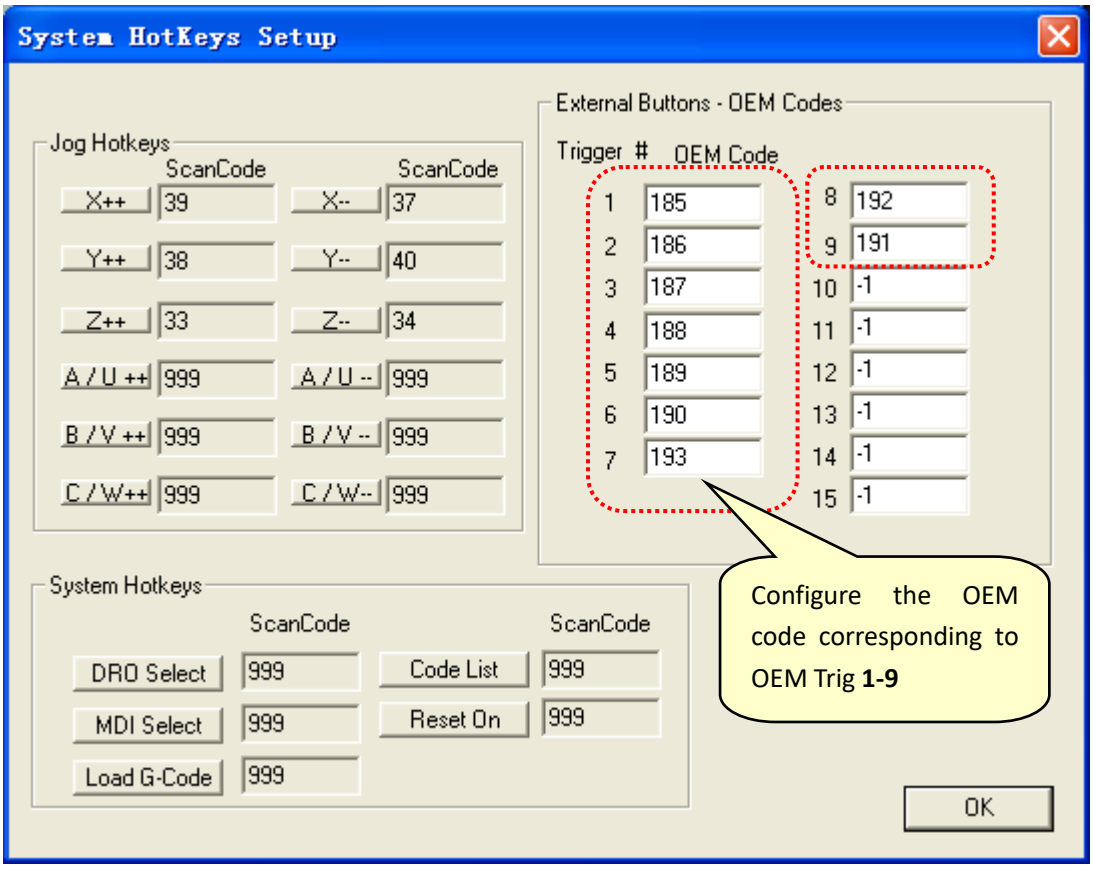
Click "Alt-A" button, select the axis(XYZABC) controlled by MPG **1**

Click "Alt-B" button, select the axis(XYZABC) controlled by MPG **2**

6.6.2 Mach3 electronic MPG switch configuration, as shown below: (Config => Ports and Pins=>Input Signals)



Configure the functions performed by "OEM Trig" as shown below： (Config => System Hotkeys)

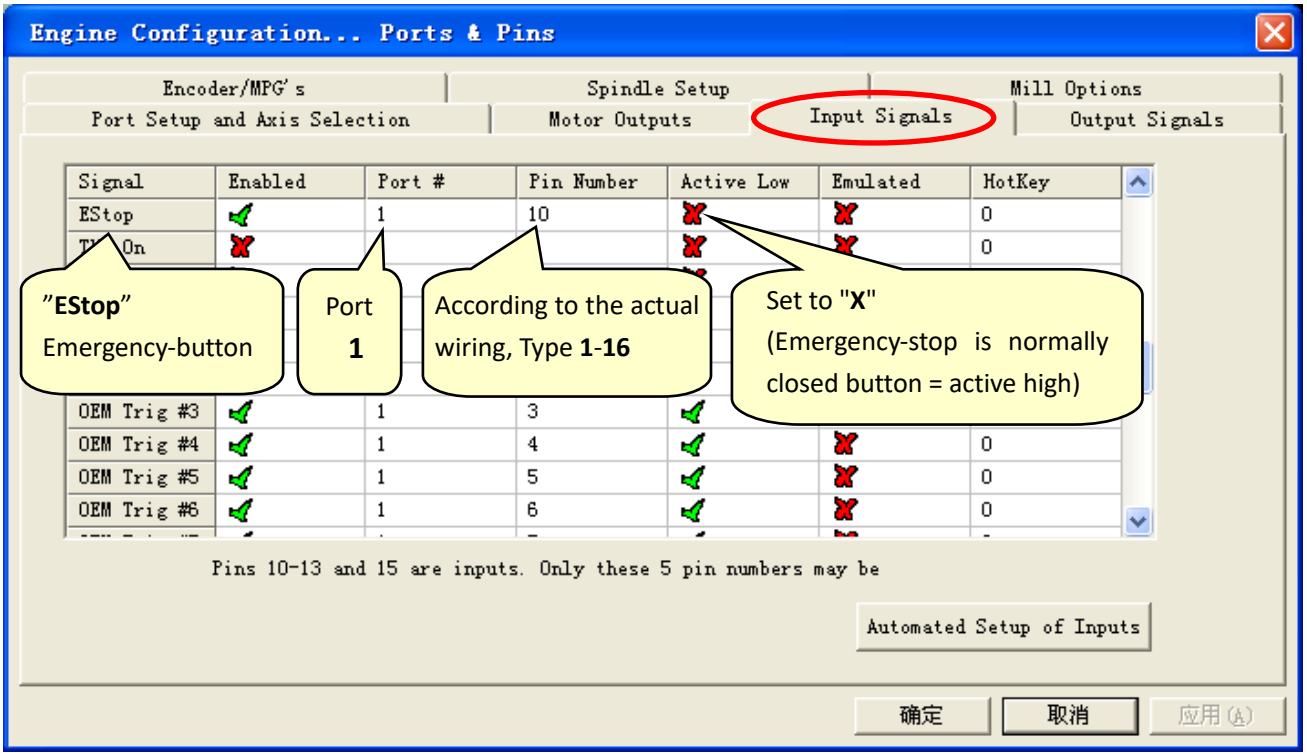


Mach3 axis selection for MPG / Jog step select OEM Buttons code table

Function	OEMCode
Select X for MPG 1	185
Select Y for MPG 1	186
Select Z for MPG 1	187
Select A for MPG 1	188
Select B for MPG 1	189
Select C for MPG 1	190
Select Jog Increment 1	191
Select Jog Increment 2	192
Select Jog Increment 3	193

Complete OEM Buttons code table, please search online

6.6.3 Mach3's **emergency-stop button** configuration, as shown below: (Config => Ports and Pins => Input Signals)

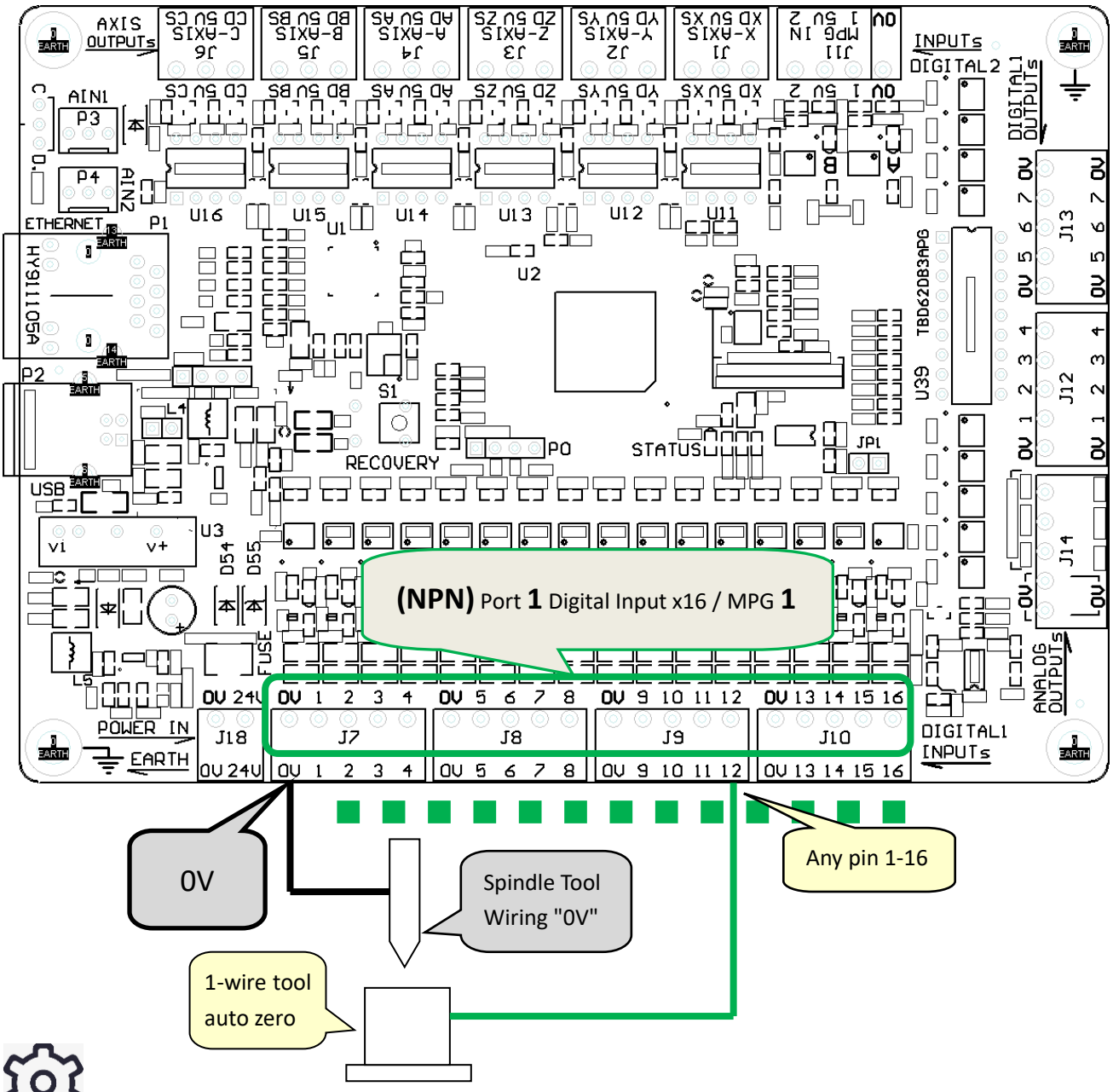


Attention:
"Emergency-stop button" It is recommended to use the "normally closed" contact. If a fault occurs in the disconnection of the wiring, an emergency stop will be triggered.

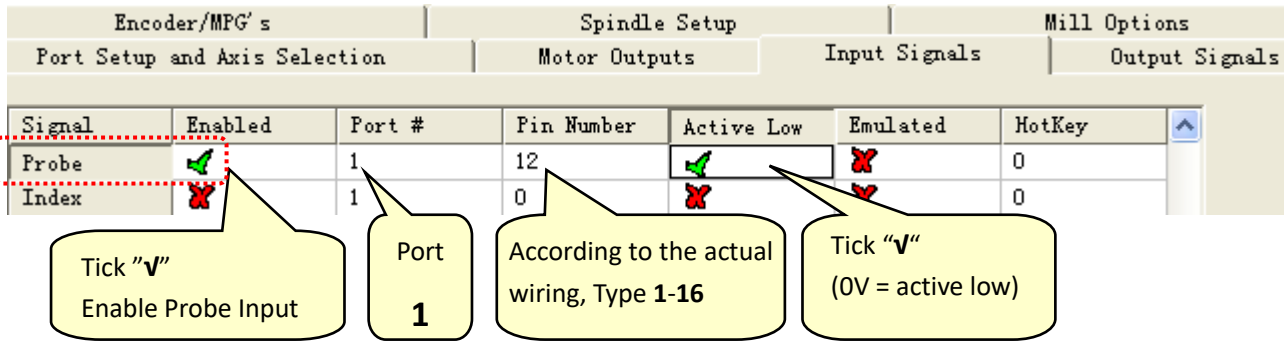
When there is an external emergency stop signal input, the Mach3 RESET button cannot turned off. Therefore, when testing, use a wire to temporarily short the 10#(Mach3 default) input point and 0V. And the board must have an external power supply (12V-24V) for Input / Output.

6.7 Probe (Auto Tool Zero) wiring and configuration

6.7.1 Wiring: Use digital input port **1**, any pin(1-16), as the Probe input signal



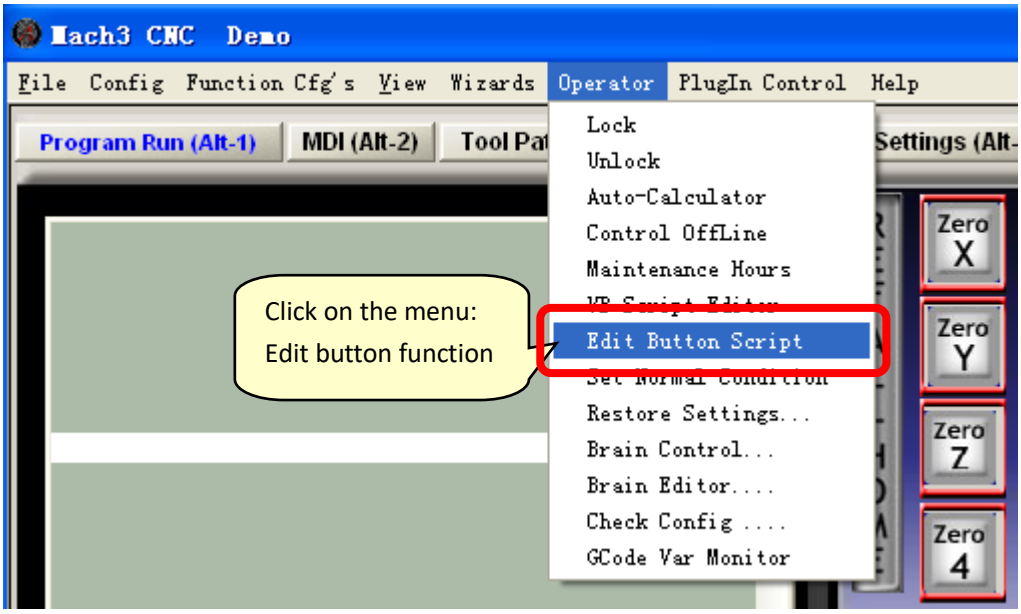
6.7.2 Mach3 Probe input signal configuration, as shown below: (Config => Ports and Pins=>Input Signals)



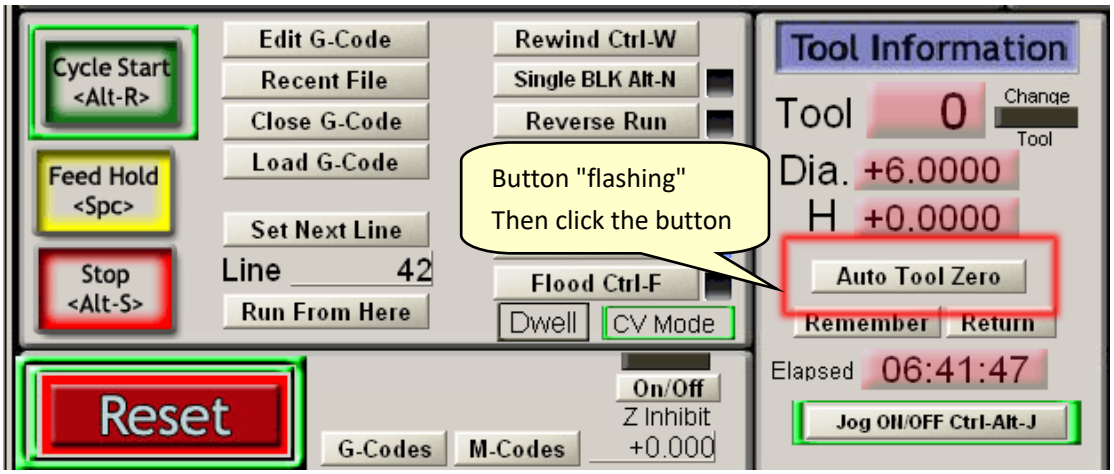
6.7.3 Mach3's "auto tool zero" button, loading VB code

Mach3 can customize the function of some existing buttons on the screen, such as the "Auto Tool Zero" button, set the VB script.

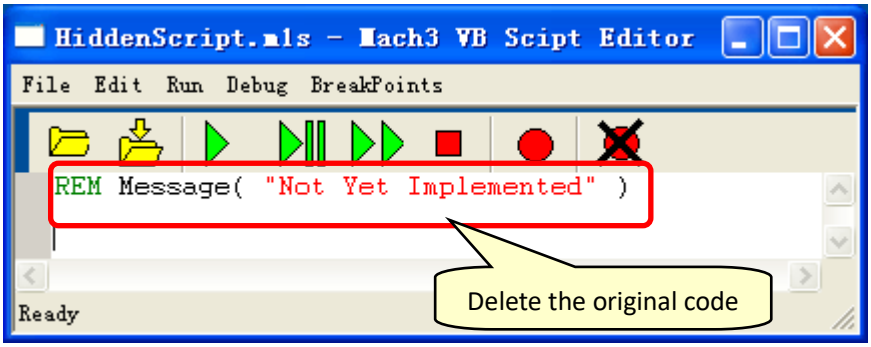
6.7.3.1 Mach3 menu (Operator => Edit Button Script)



6.7.3.2 Click the "**Auto Tool Zero**" button in the **flashing**

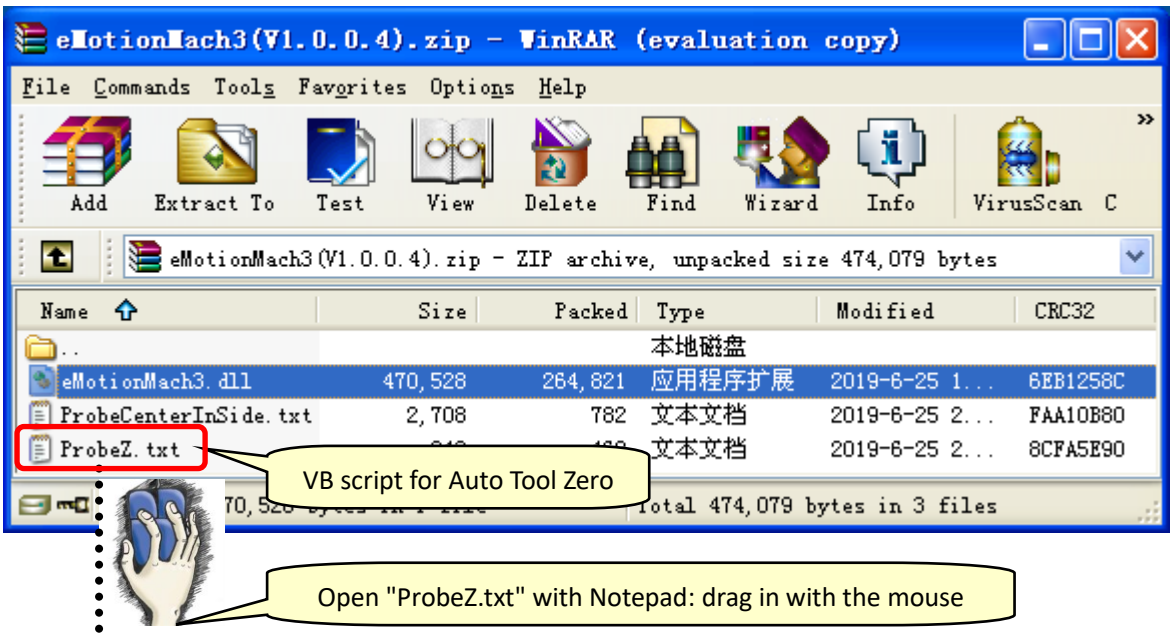


6.7.3.3 Pop up the VB editor and delete the code

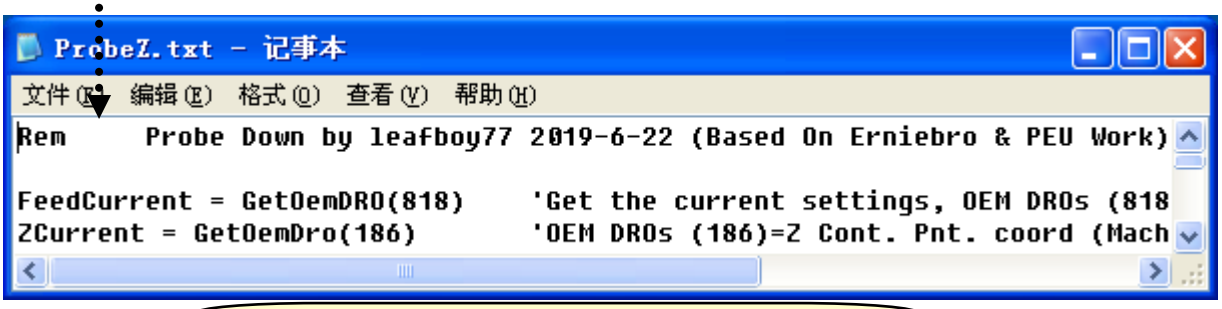


6.7.3.4 Enter the VB script in the VB editor

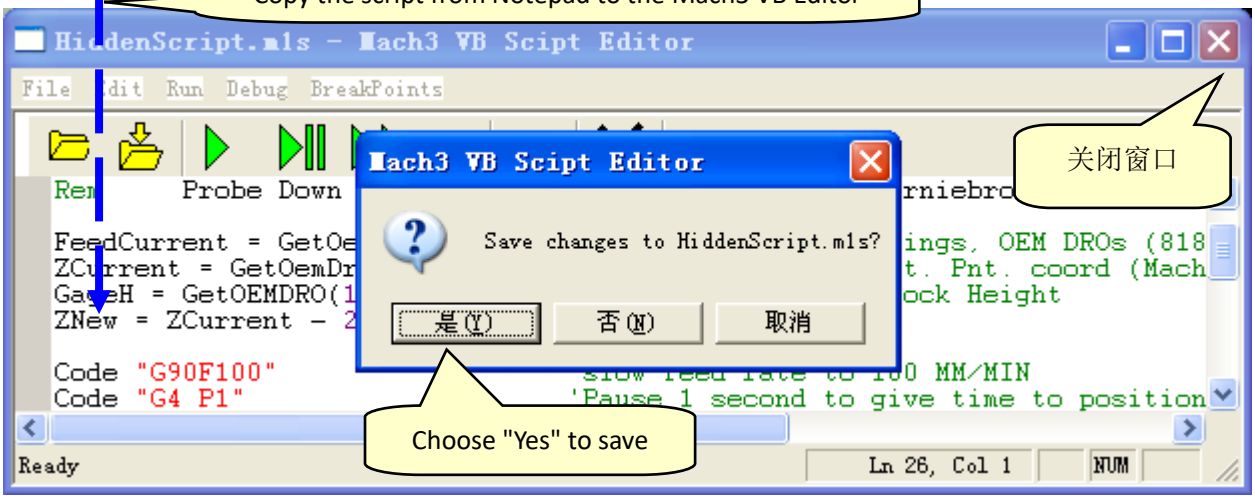
The VB "Auto Tool Zero" demonstration script "**ProbeZ.txt**" is provided in **eMotionMach3.zip** attached to the motion board. Please open it with Notepad.



Open "ProbeZ.txt" with Notepad: drag in with the mouse



Copy the script from Notepad to the Mach3 VB Editor



6.7.3.5. Test: Click the "**Auto Tool Zero**" button Auto Tool Zero to test the tool zero action.

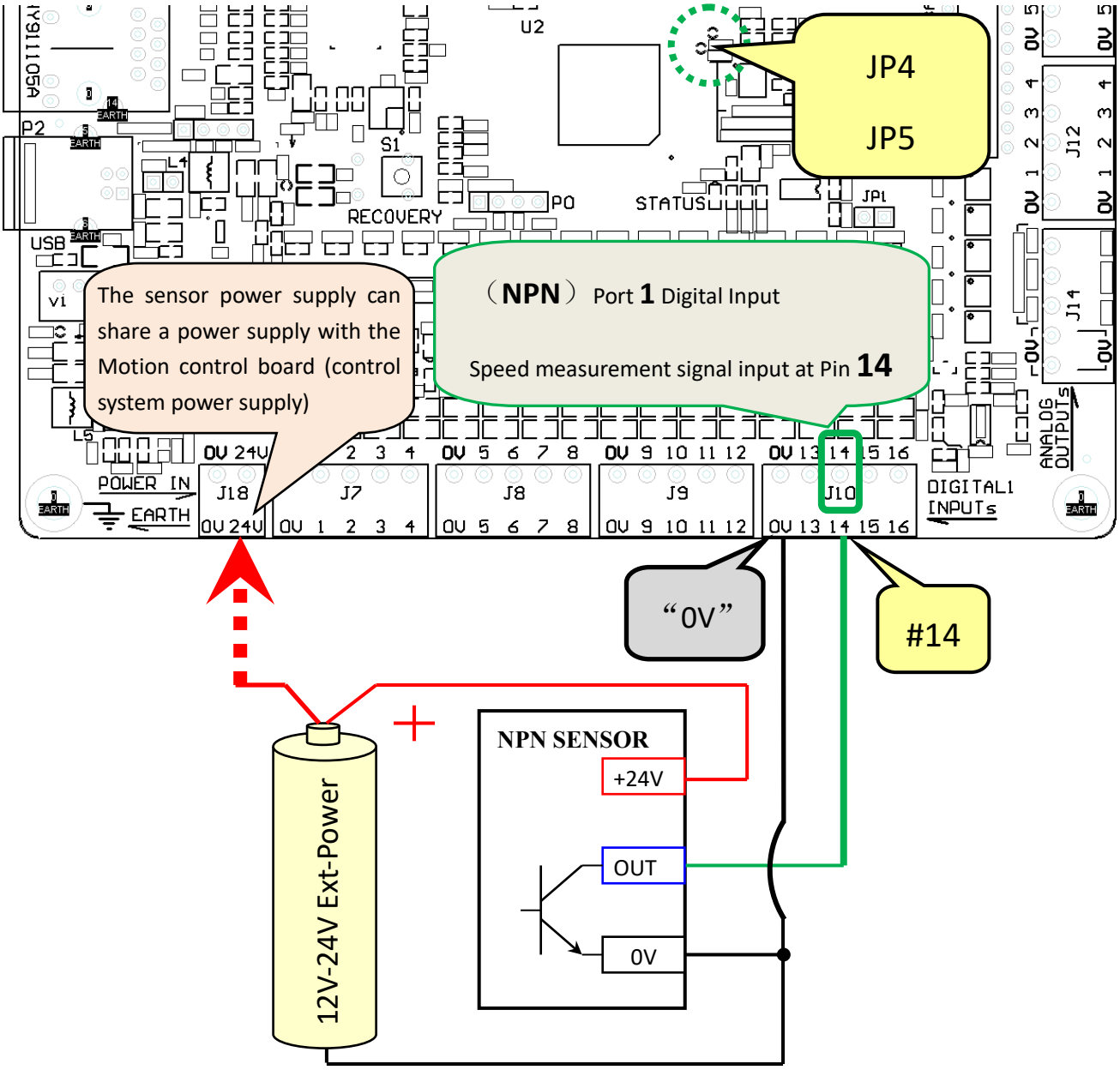
The VB "Auto Tool Zero" demonstration script "ProbeZ.txt", can be changed according to actual needs.

6.8 Wiring and configuration of spindle speed measurement signal input

6.8.1 Wiring: There are two speed measurement signal input points, which are configured through JP4 and JP5, and the signal common ground is "0V".

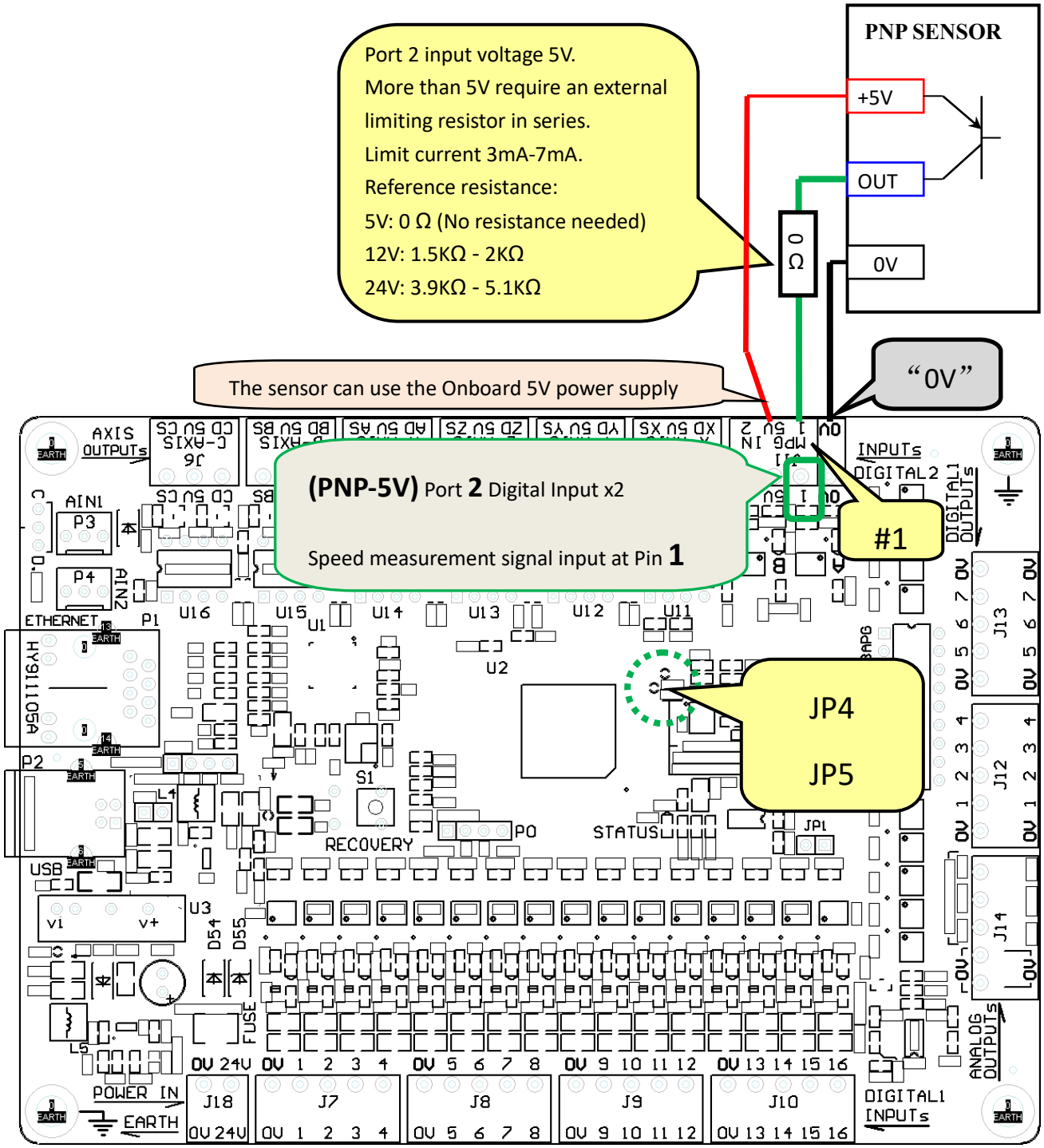
- **NPN** speed measurement signal input point: fixedly wired to the Pin **14** of digital input port **1**, Configured by JP4 (**factory default is connected**).
- **PNP-5V** speed measurement signal input point: fixedly wired to the Pin **1** of digital input port **2**, Configured by JP5 (disconnected by factory default).

6.8.1.1 Wiring of **NPN** sensor speed signal:



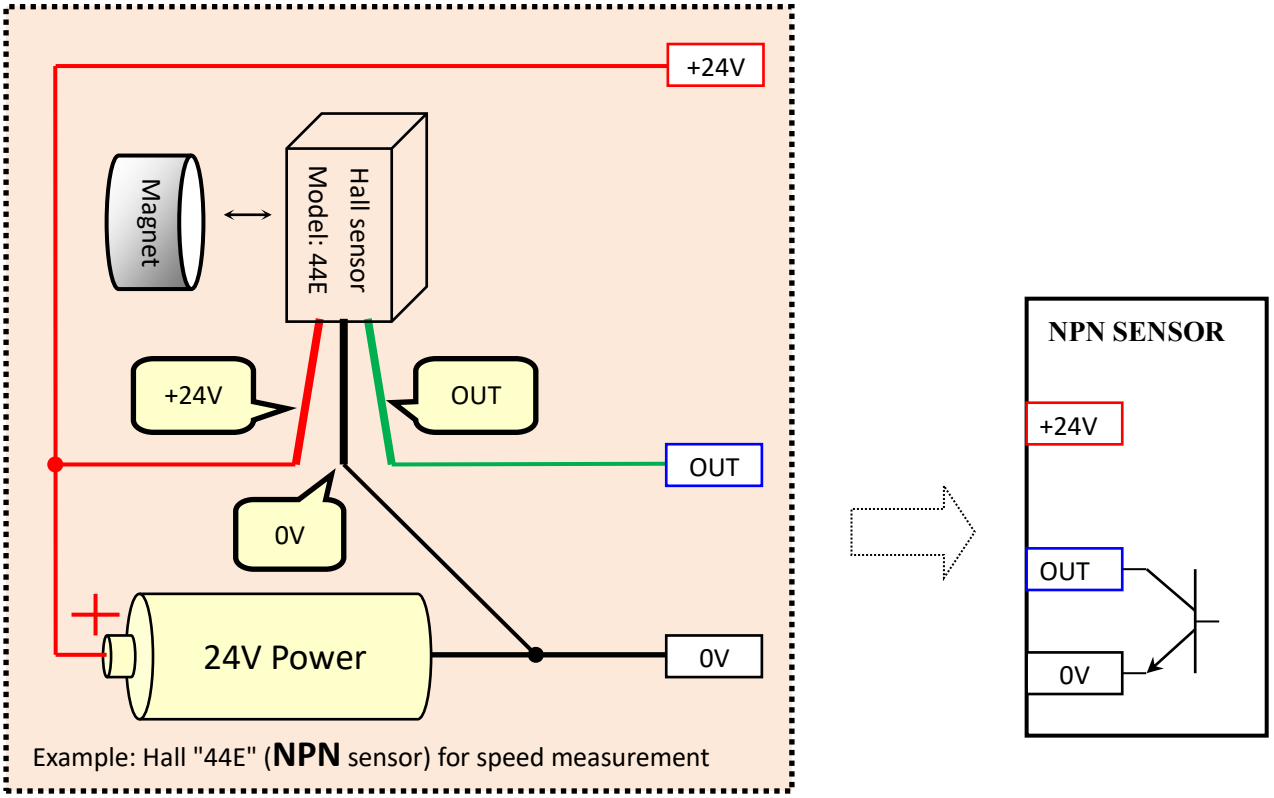
6.8.1.2 **PNP-5V** speed signal is directly wired to the Pin **1** of digital input port **2**.

To use the **PNP-5V** speed measurement input point, you need to connect JP5 and disconnect JP4.



6.8.1.3 Example: Hall sensor "44E" (**NPN** sensor) for speed measurement

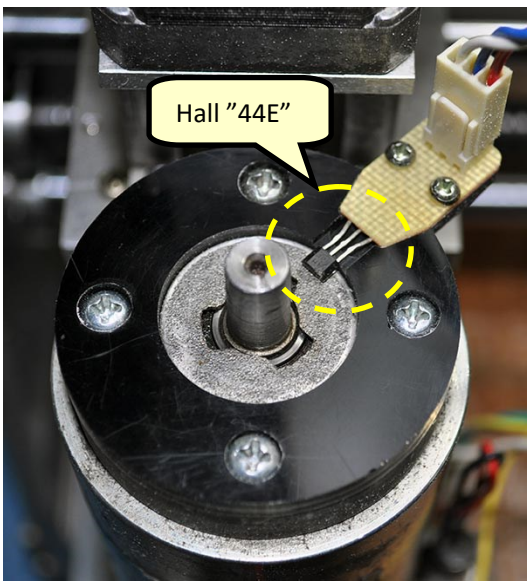
Hall sensor "44E": 24V power supply, open collector (OC) output , that is NPN.

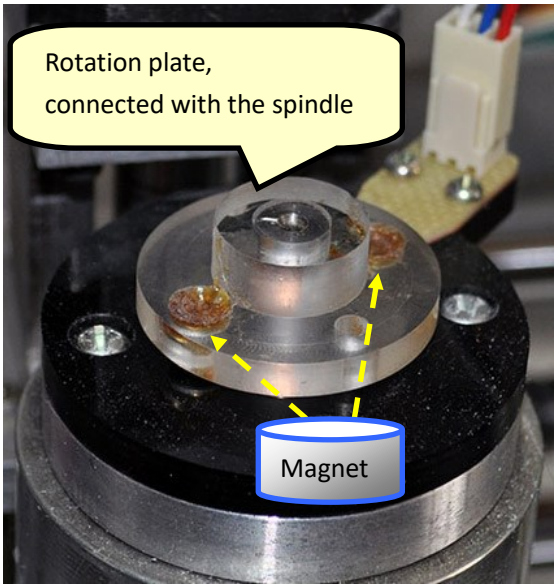


Example: Hall "44E" (**NPN** sensor) for speed measurement

Hall sensor / Rotation plate installation diagram

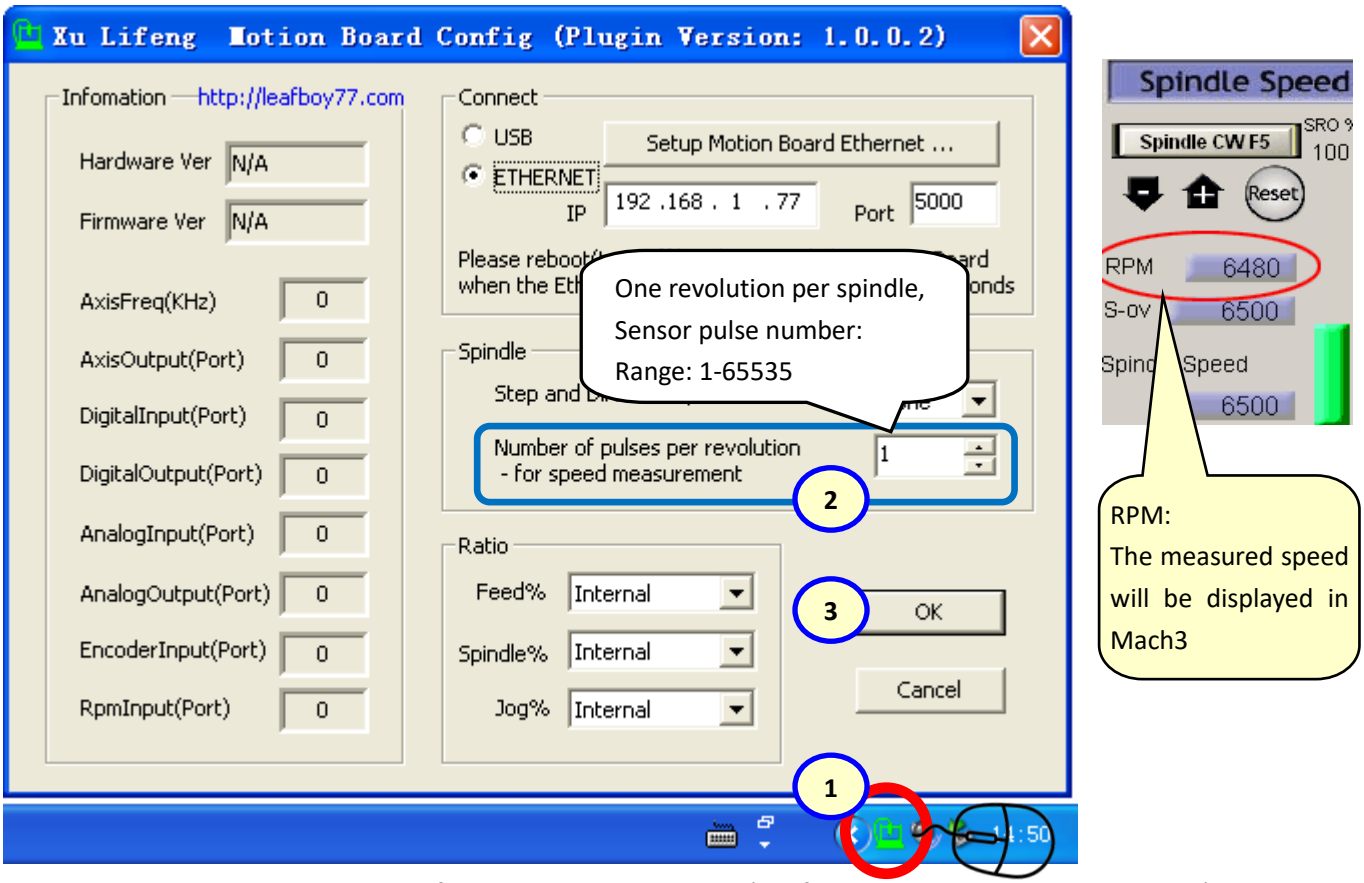
Note: The magnet has a SN pole and should be adjusted during installation.



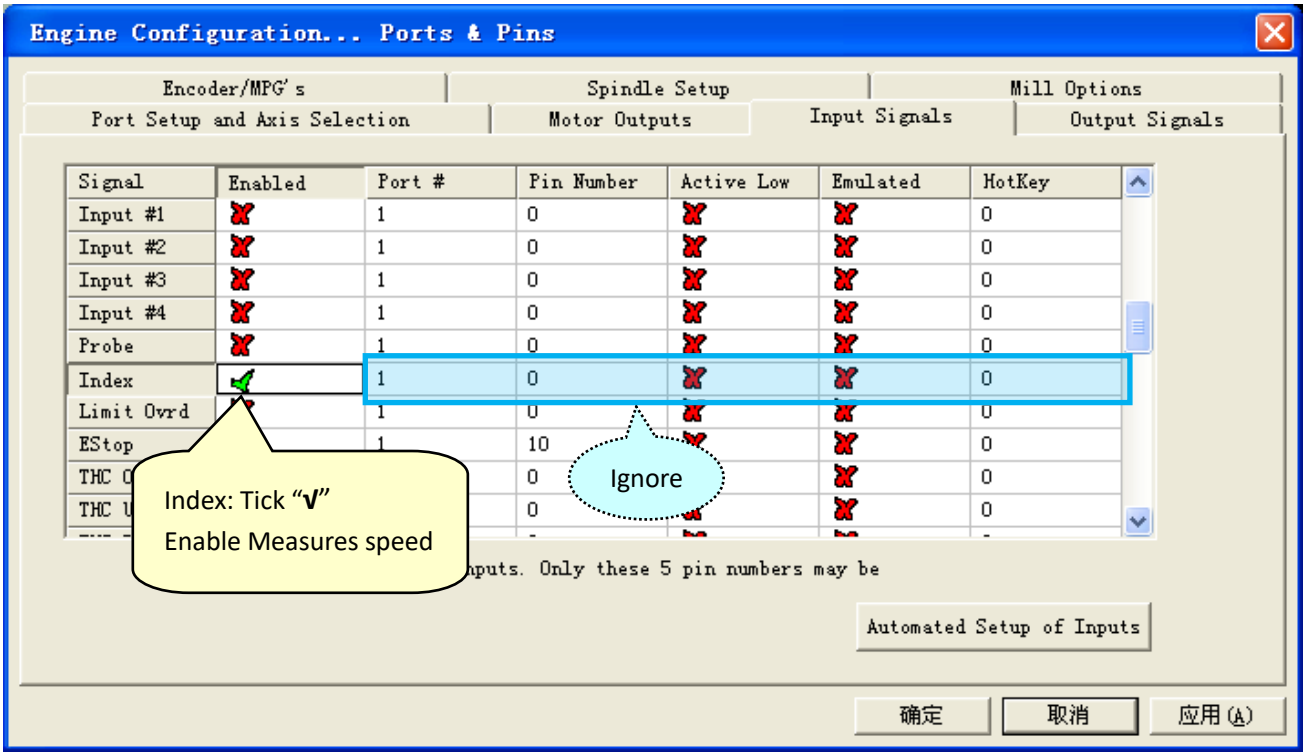


6.8.2 Mach3 measurement speed configuration

Start Mach3 and select the external motion board, right click on the CNC icon, type the "Number of Pulses" in the settings dialog box, press OK to save the settings.



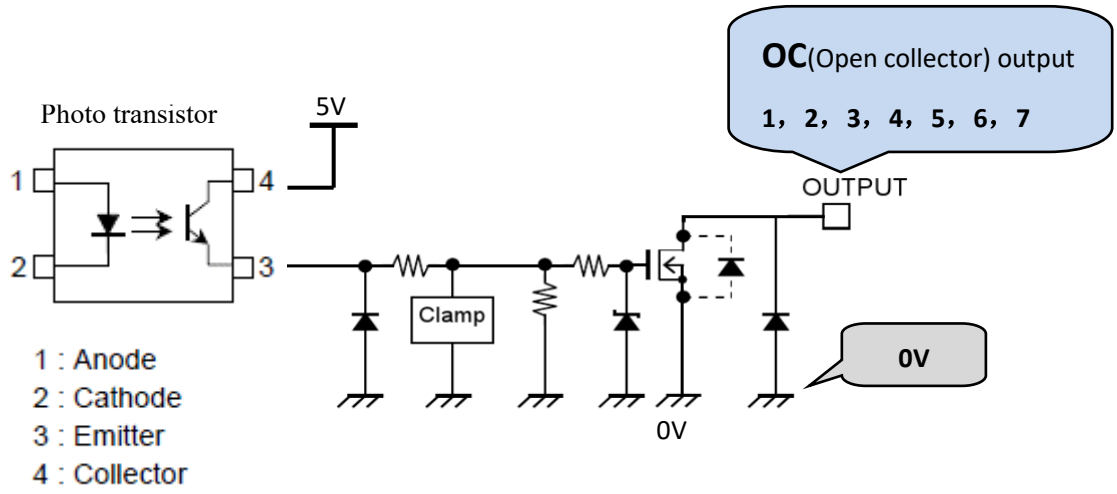
Mach3 measures the speed signal configuration as shown below: (Config => Ports and Pins=>Input Signals)



7. Digital output

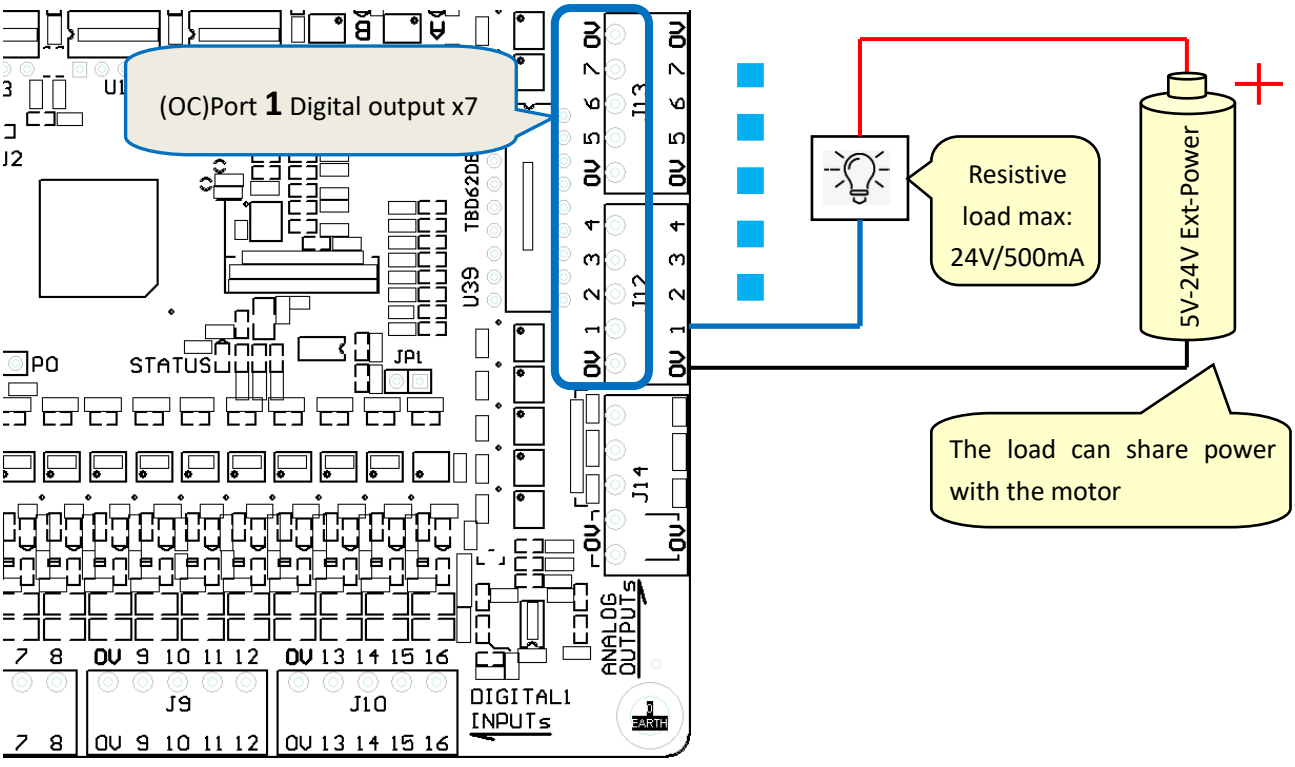
7.1 Interface characteristics of general digital output

Port **1** Digital Output: **OC**(Open collector) output x7, optocoupler isolation.

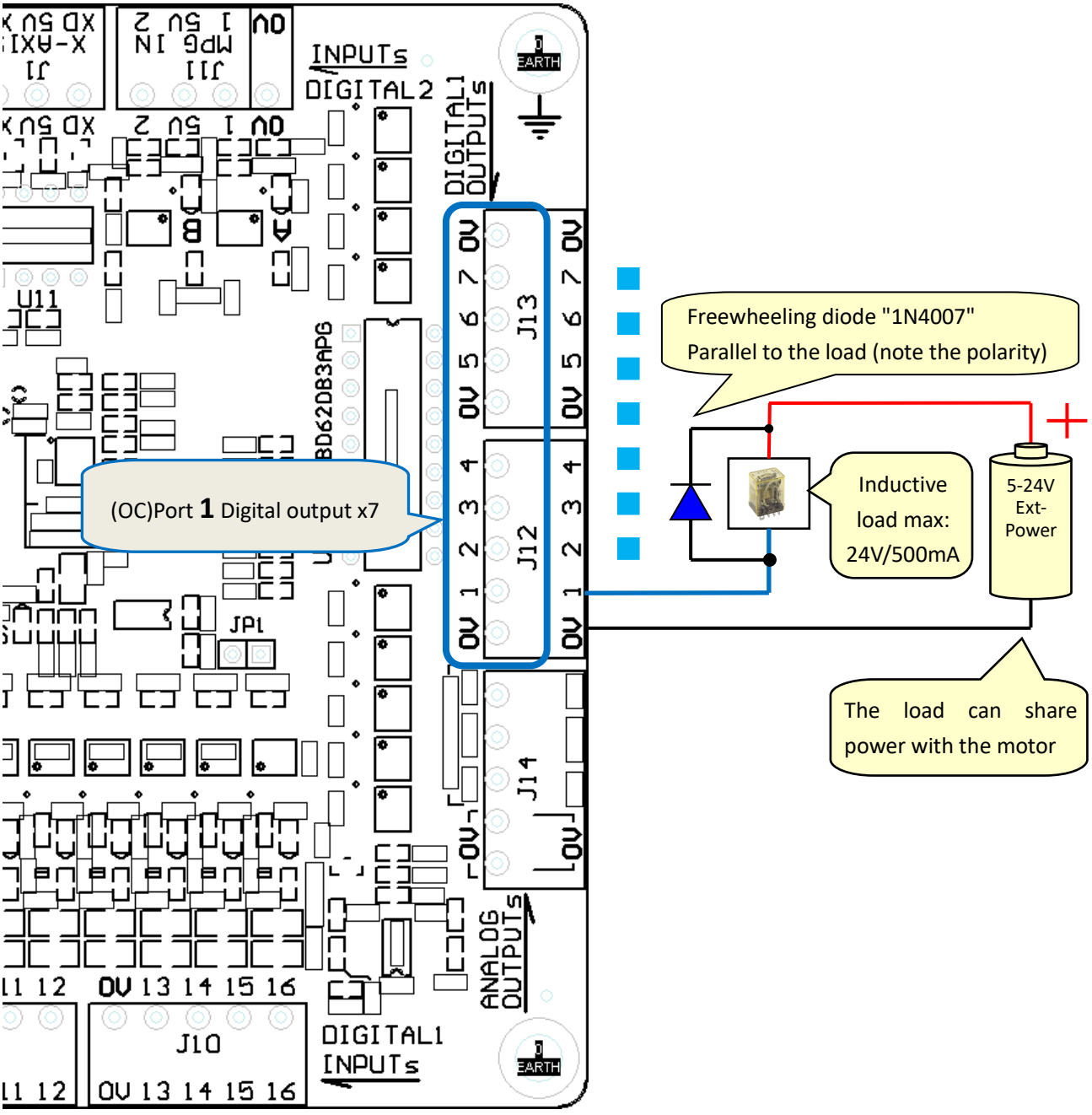


7.2 Wiring diagram

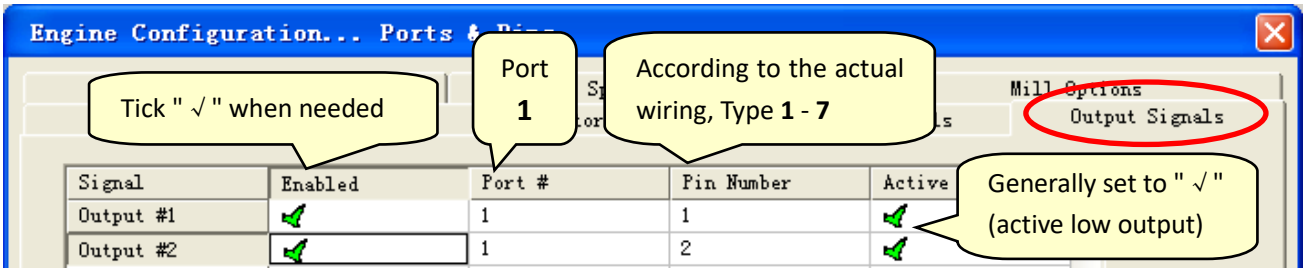
7.2.1 Driving **resistive load**



7.2.2 Driving **inductive loads** (such as relays, solenoid valves): installing **an external freewheeling diode**



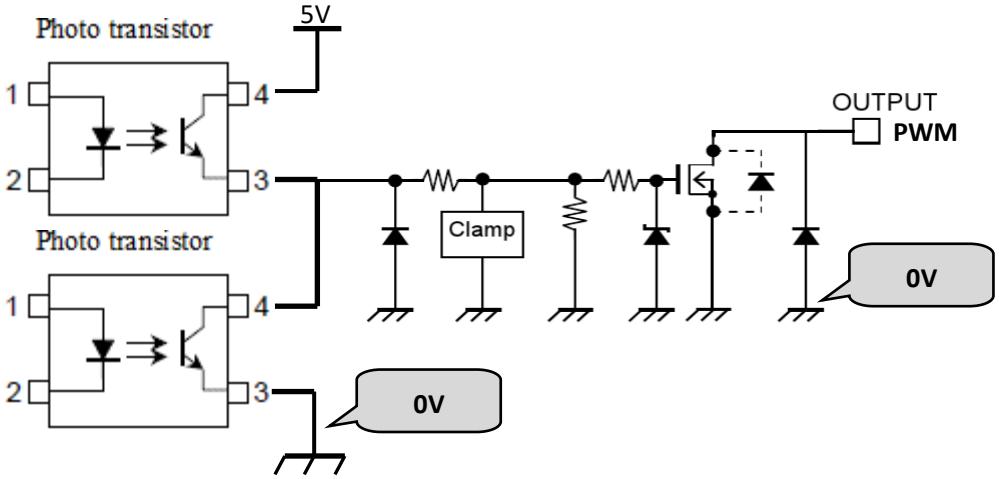
7.3 Mach3 output signal configuration, as shown below: (Config => Ports and Pins => Output Signals)



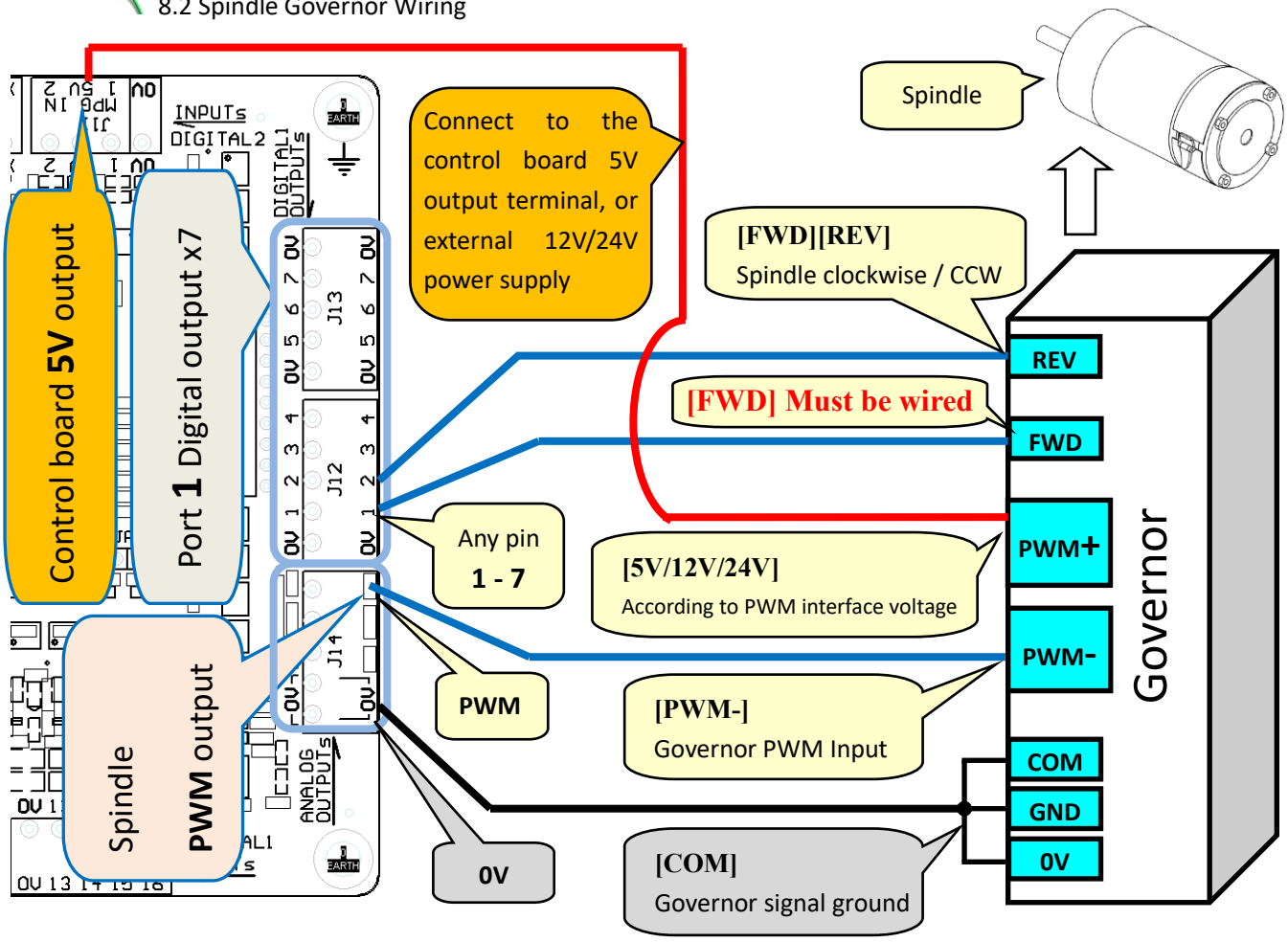
8. Spindle speed control analog PWM output

8.1 Interface Characteristics of PWM Output

PWM Analog (Pulse Width Modulation) output: **OC**(Open collector) output x1, optocoupler isolation.



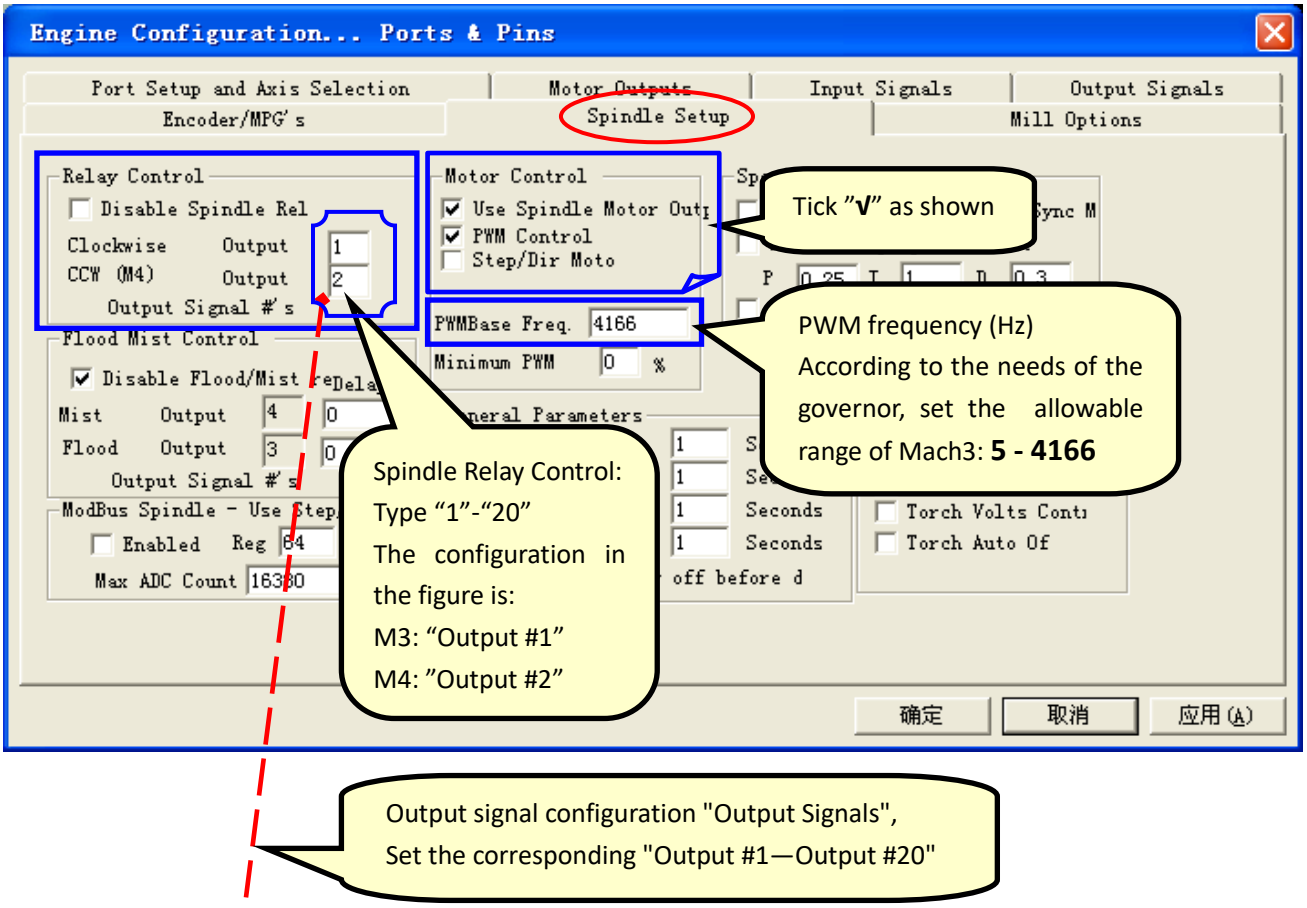
8.2 Spindle Governor Wiring



8.3 Configuration

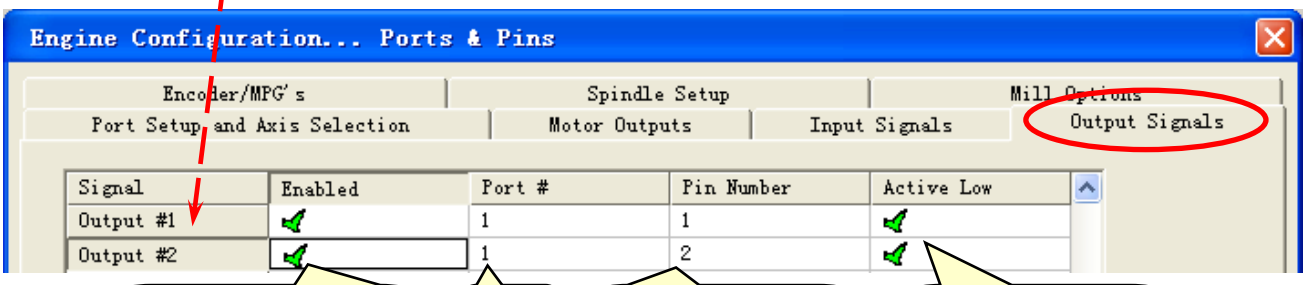
8.3.1 Mach3's Spindle configuration, as shown below: (Config => Ports and Pins=> Spindle Setup)

Tick “Use Spindle Motor Output” and ”PWM Control”, type the required frequency in "PWMBase Freq.", the unit is Hz.

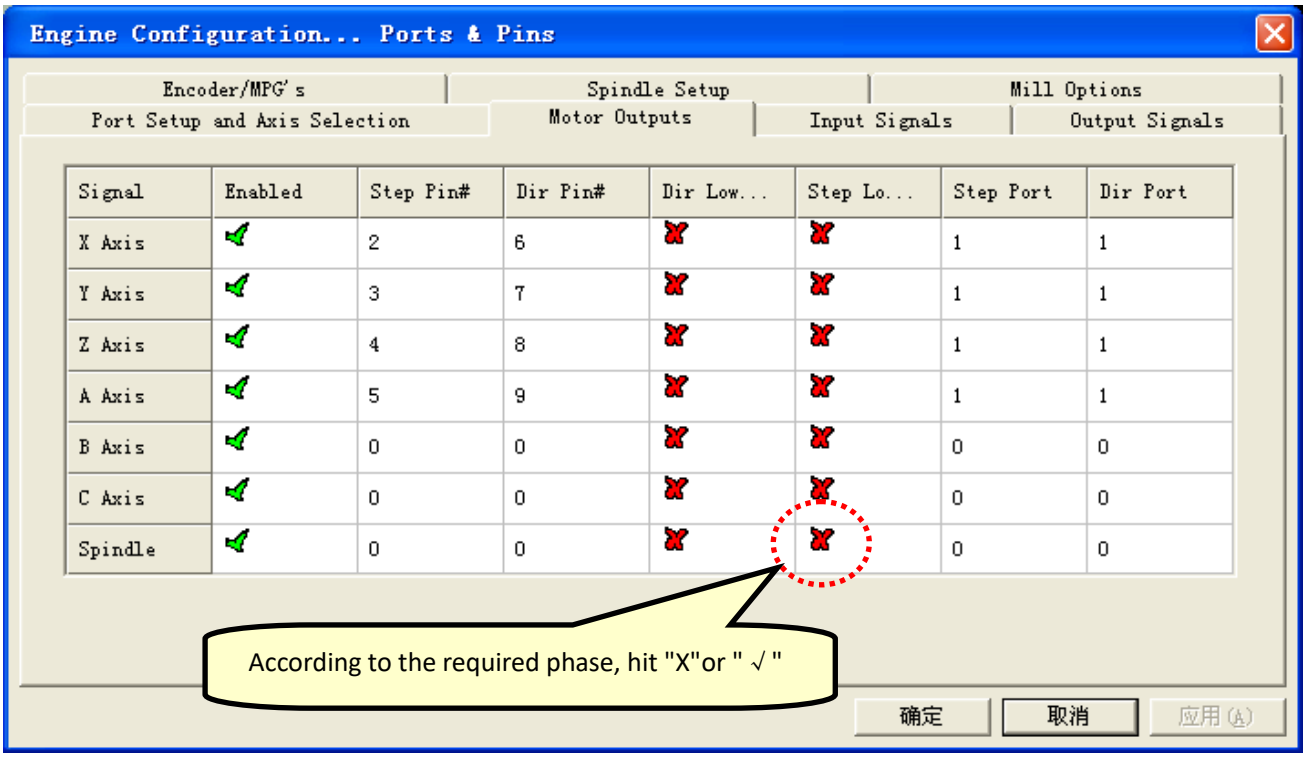


Output signal configuration "Output Signals",
Set the corresponding "Output #1—Output #20"

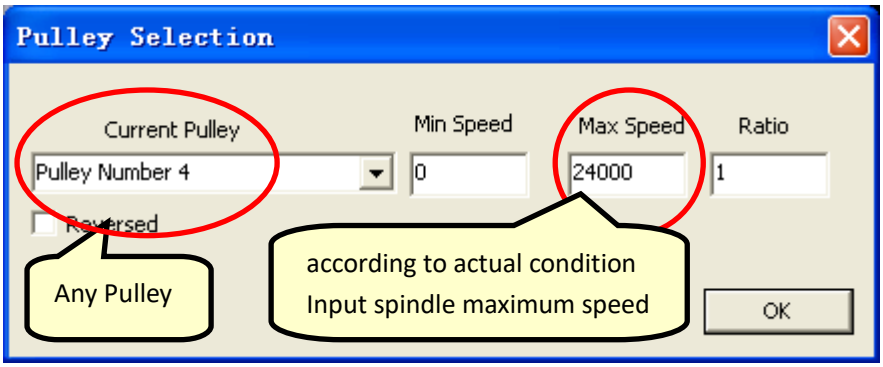
8.3.2 Spindle relay configuration, as shown below: (Config => Ports and Pins=>Output Signals)



8.3.3 The **phase configuration of the spindle speed control signal PWM** is shown in the figure below: (Config => Ports and Pins => Motor Outputs)



8.3.4 Mach3 menu ”Config => Spindle Pulleys..”, ”Pulley Selection”

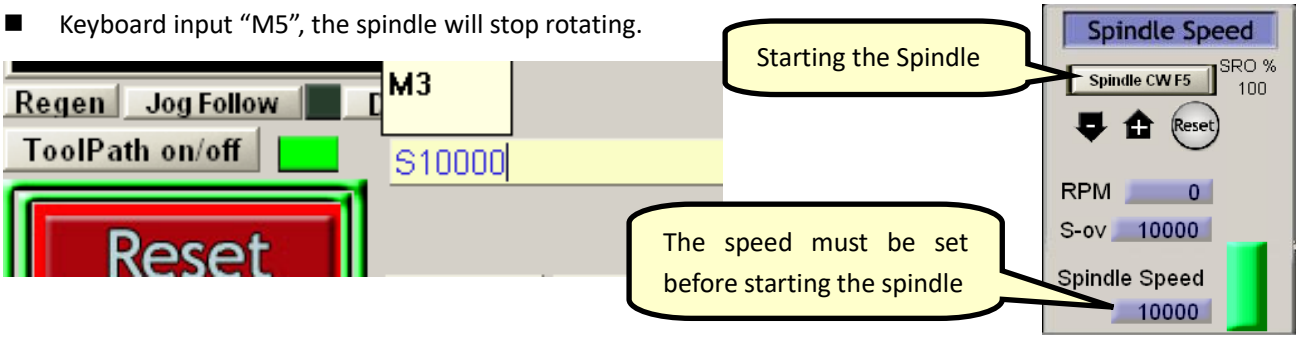


8.3.5 For other configurations of the spindle, please refer to “**Mach3Mill_Install_Config.pdf”**

8.3.6 Spindle test

In Diagnostics (Alt-7) or MDI(Alt-2):

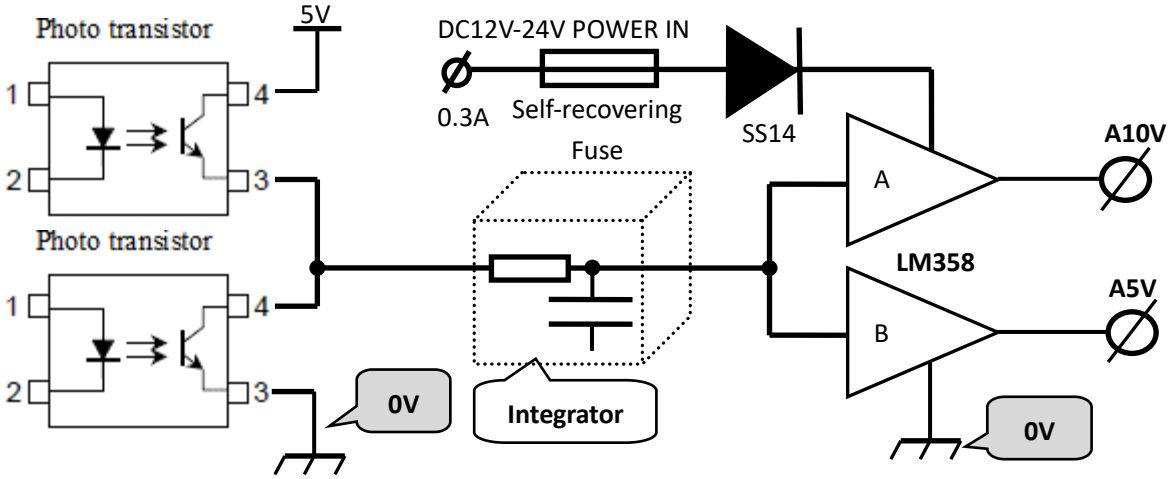
- Keyboard input “M3”.
- Keyboard input “S10000”, spindle starts to rotate. (When testing, it is recommended to use half of the maximum speed to avoid the phase setting error and the spindle does not rotate. After the spindle is running, adjust the speed. Adjust the spindle phase setting when the spindle speed is opposite to the set speed)
- Keyboard input “M5”, the spindle will stop rotating.



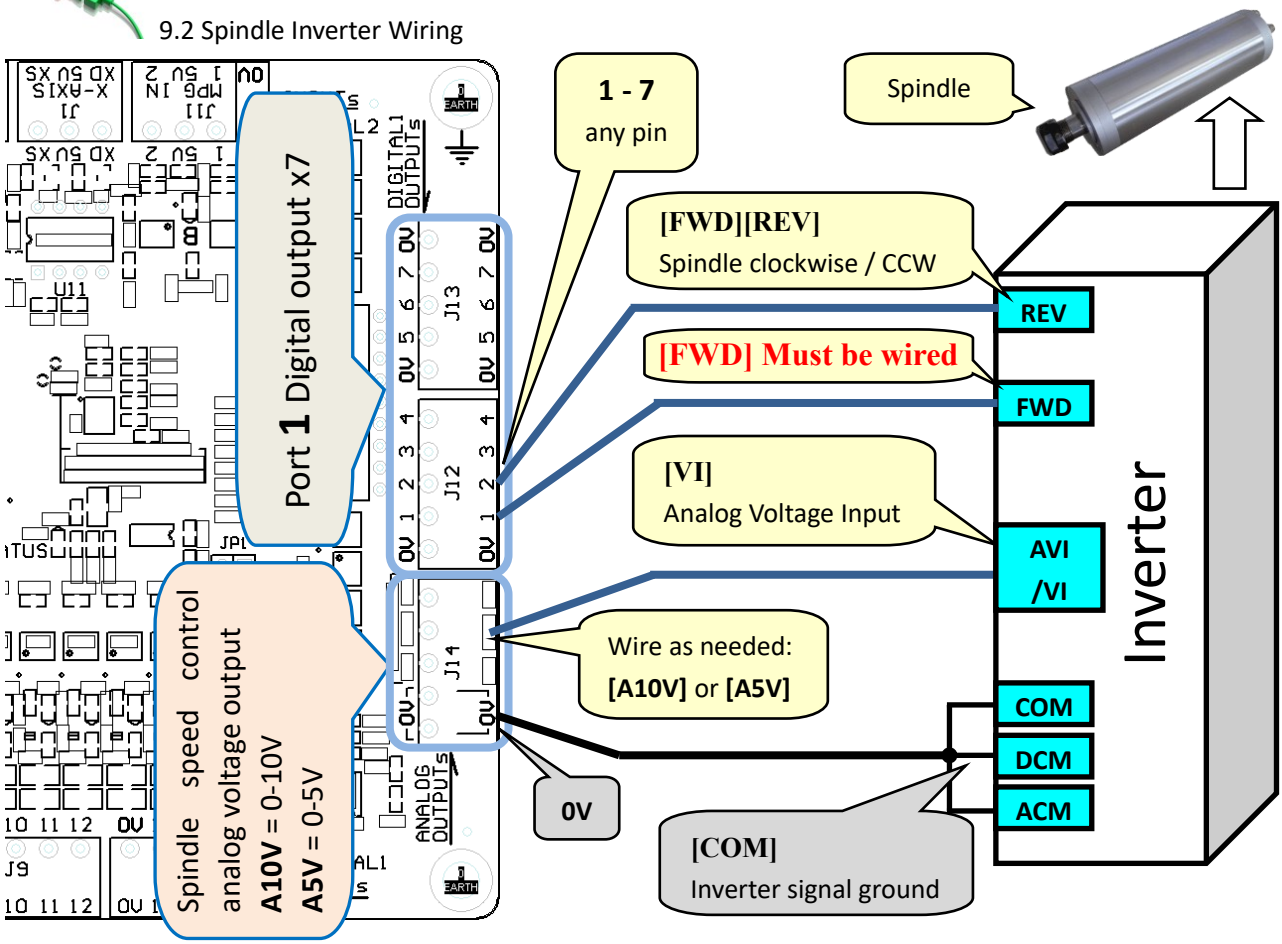
9. Spindle speed control analog voltage output

9.1 Interface Characteristics of voltage Output

Analog voltage output: **0-10V** output x1, **0-5V** output x1, optocoupler isolation.



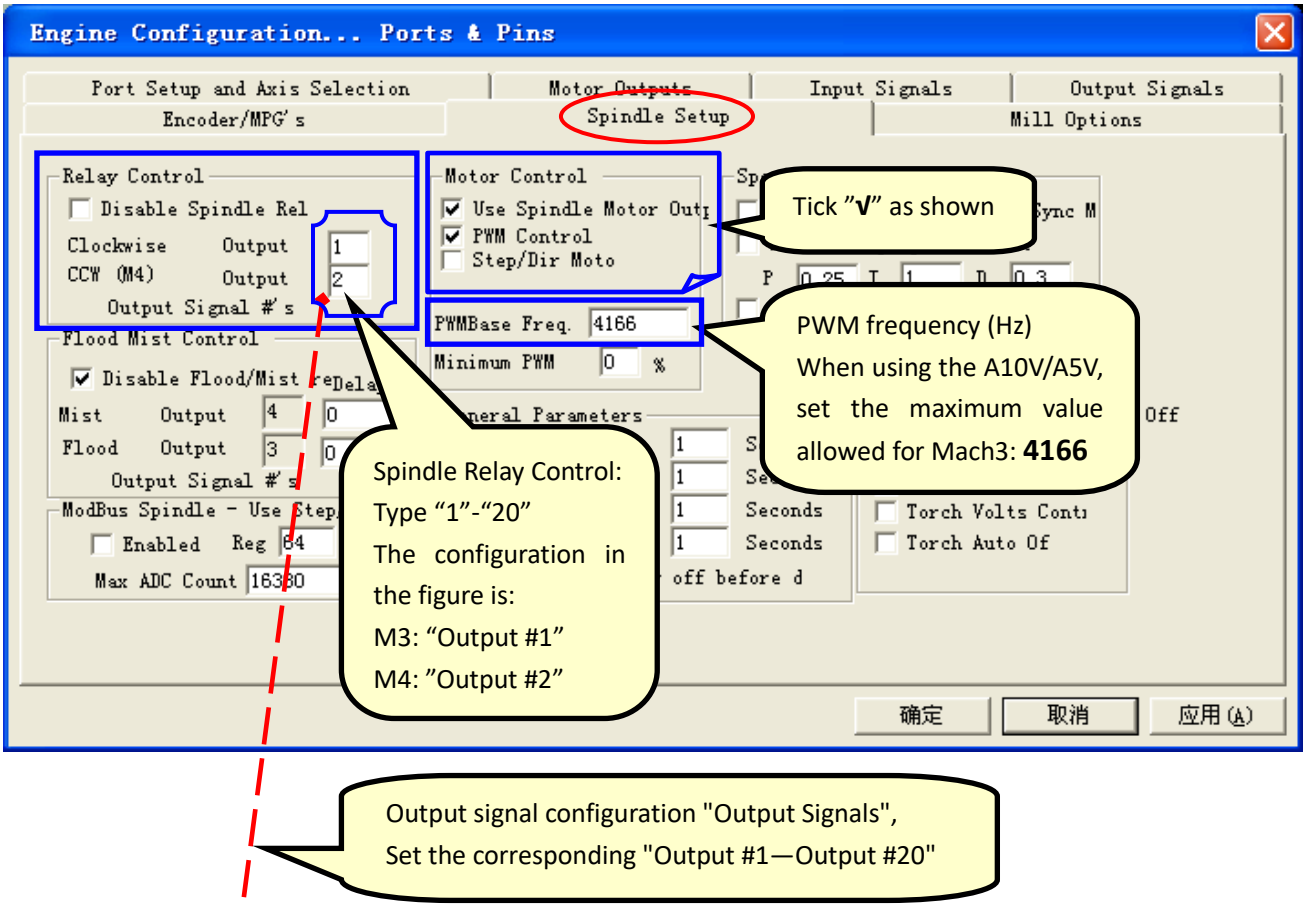
9.2 Spindle Inverter Wiring



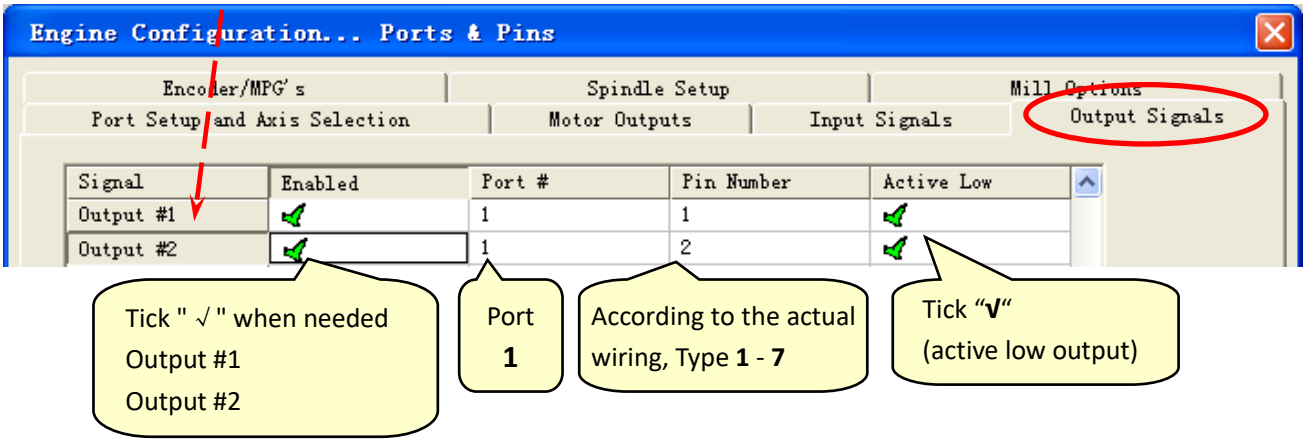
9.3 Configuration

9.3.1 Mach3's Spindle configuration, as shown below: (Config => Ports and Pins=> Spindle Setup)

Tick “Use Spindle Motor Output” and ”PWM Control”, type **4166** in "PWMBase Freq.", the unit is Hz.

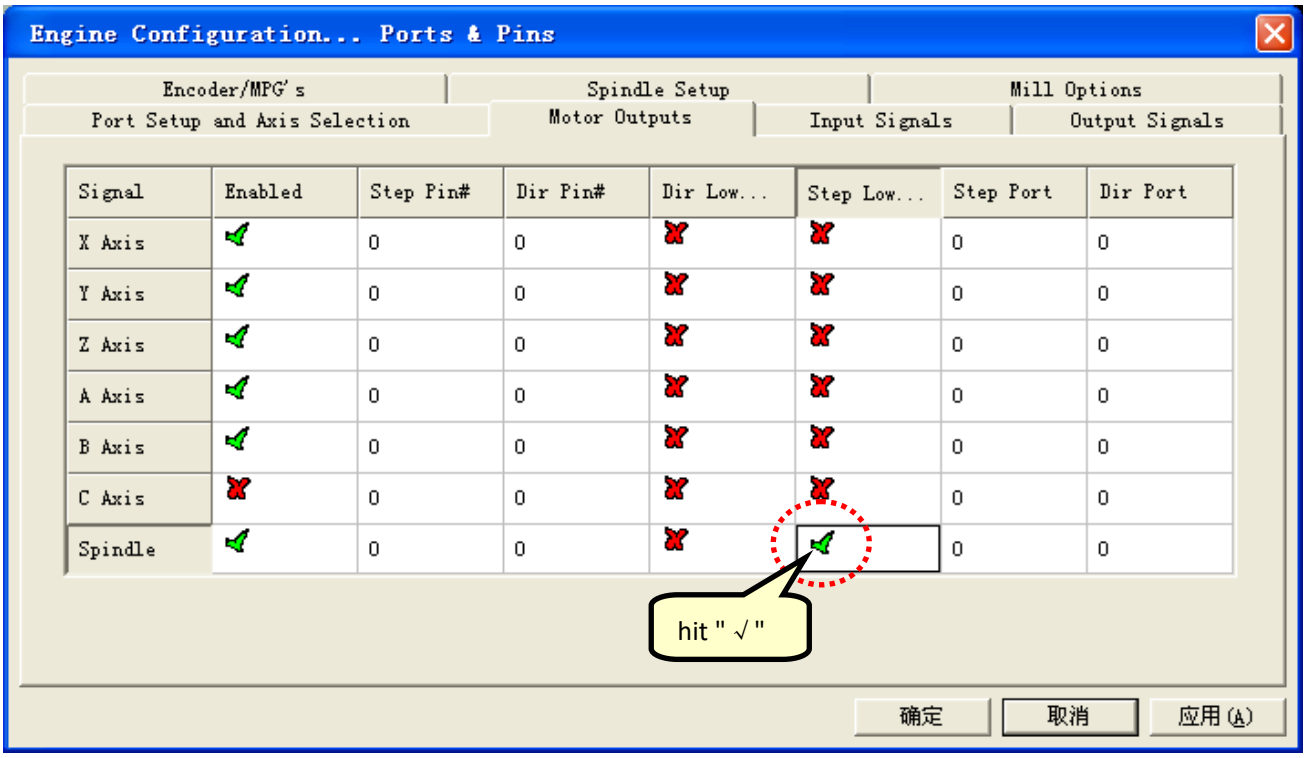


9.3.2 Spindle relay configuration, as shown below: (Config => Ports and Pins=>Output Signals)

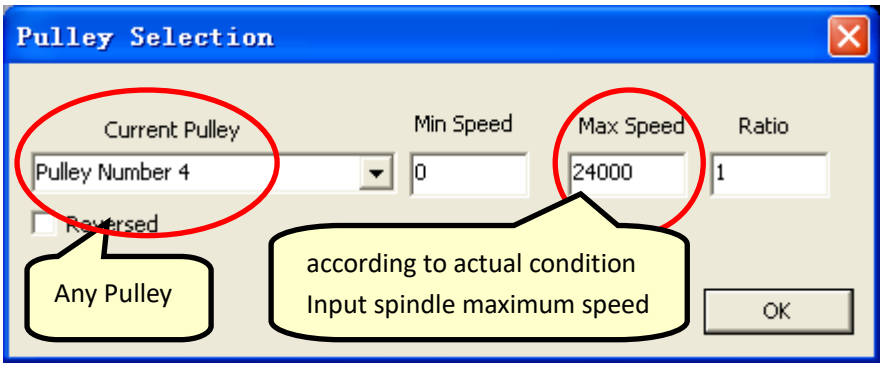


9.3.3 The **phase configuration of the spindle speed control signal A10V/A5V** is shown in the figure below:

(Config => Ports and Pins => Motor Outputs)



9.3.4 Mach3 menu "Config => Spindle Pulleys..", "Pulley Selection"

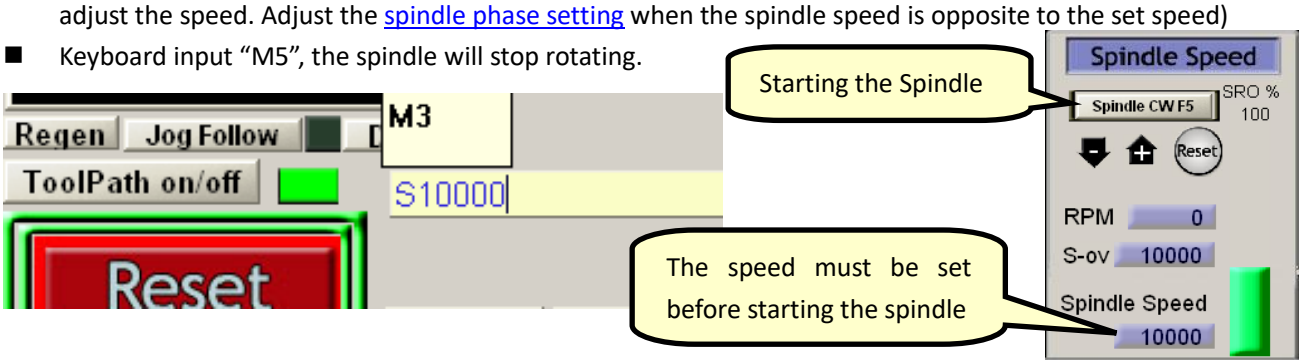


9.3.5 For other configurations of the spindle, please refer to "**Mach3Mill_Install_Config.pdf**"

9.3.6 Spindle test

In Diagnostics (Alt-7) or MDI(Alt-2):

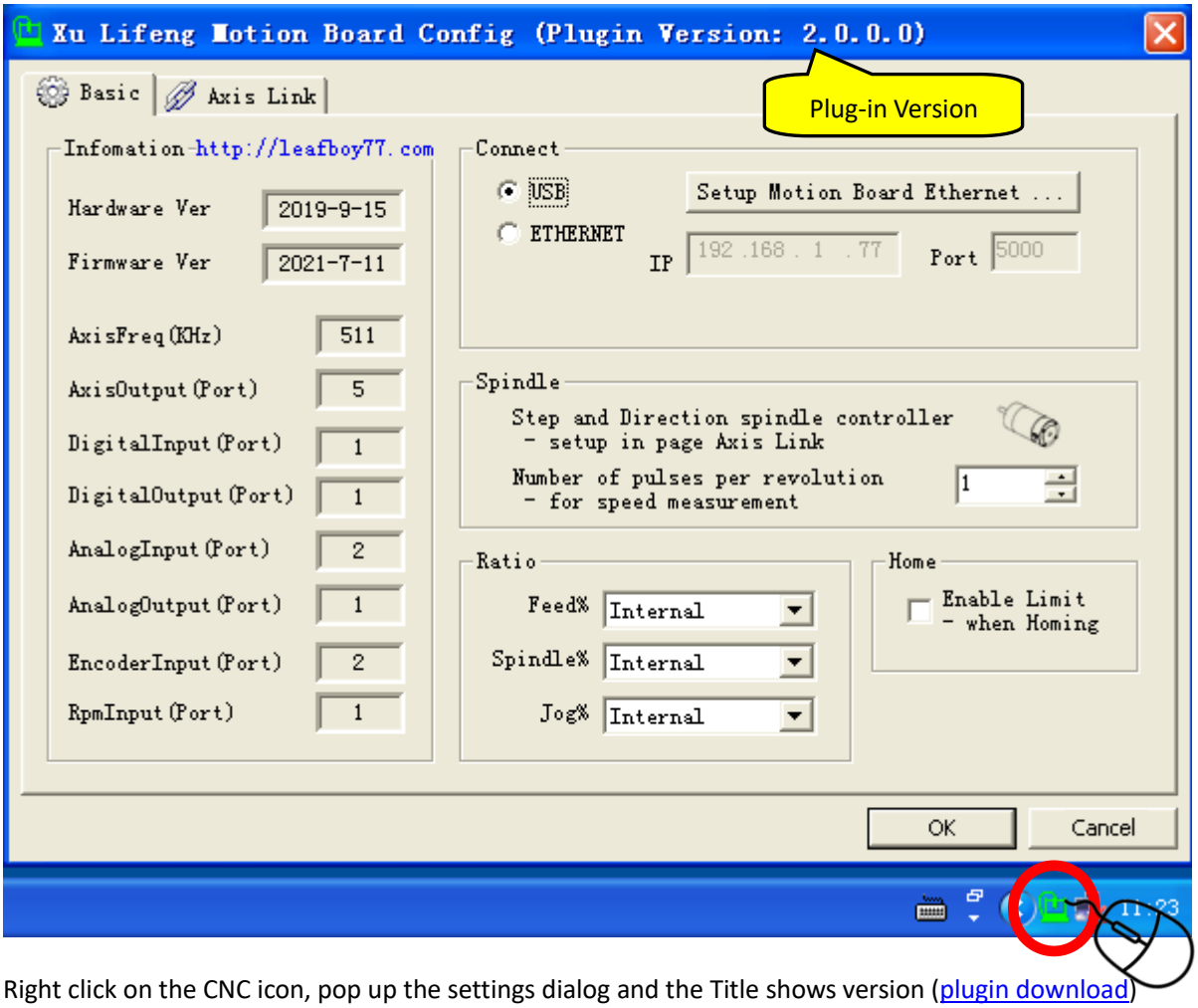
- Keyboard input "M3".
- Keyboard input "S10000", spindle starts to rotate. (When testing, it is recommended to use half of the maximum speed to avoid the phase setting error and the spindle does not rotate. After the spindle is running, adjust the speed. Adjust the spindle phase setting when the spindle speed is opposite to the set speed)
- Keyboard input "M5", the spindle will stop rotating.



10. Slave axis (dual side motor drive: dual X/Y/Z)

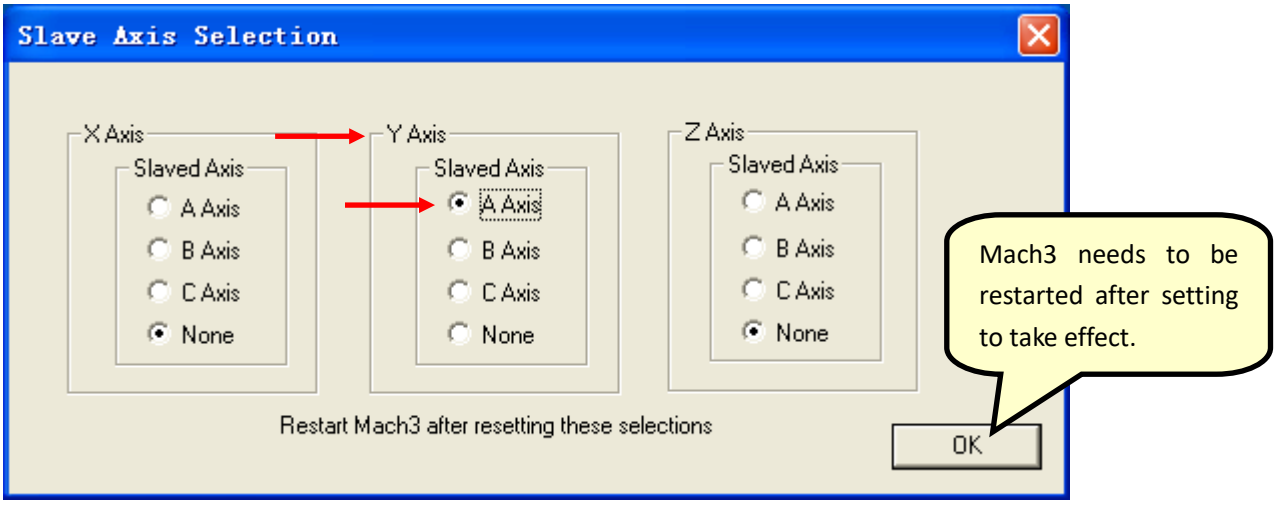
10.1 Slave axis configuration

10.1.1 Slave axis requires board plug-in version 2.0.0.0 (or above), check the plug-in version first:

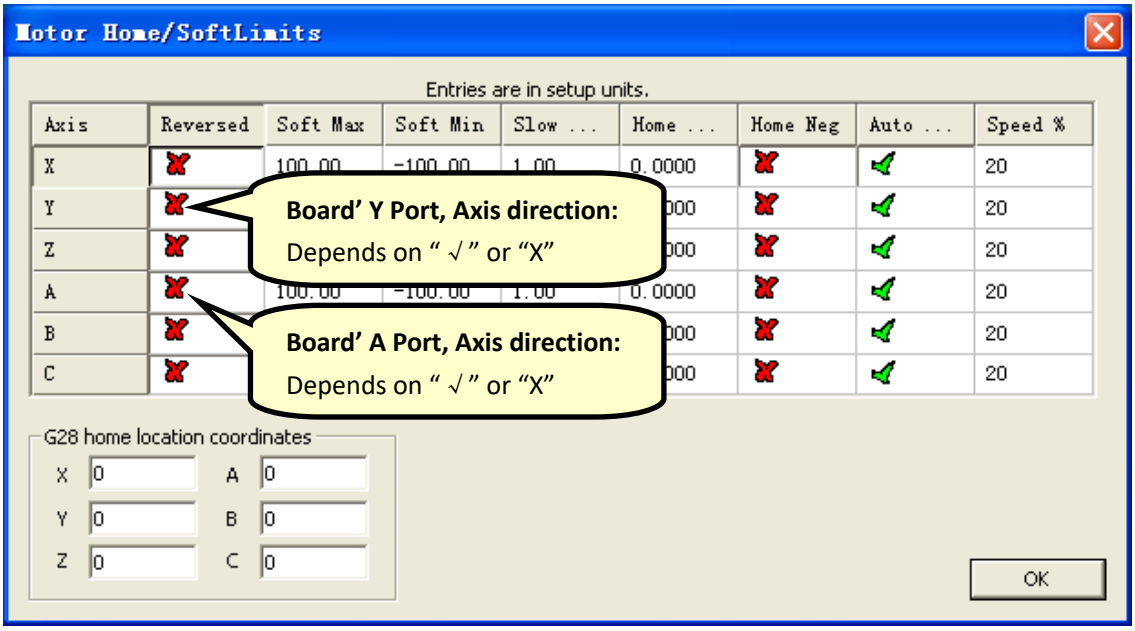


Right click on the CNC icon, pop up the settings dialog and the Title shows version (plugin download)

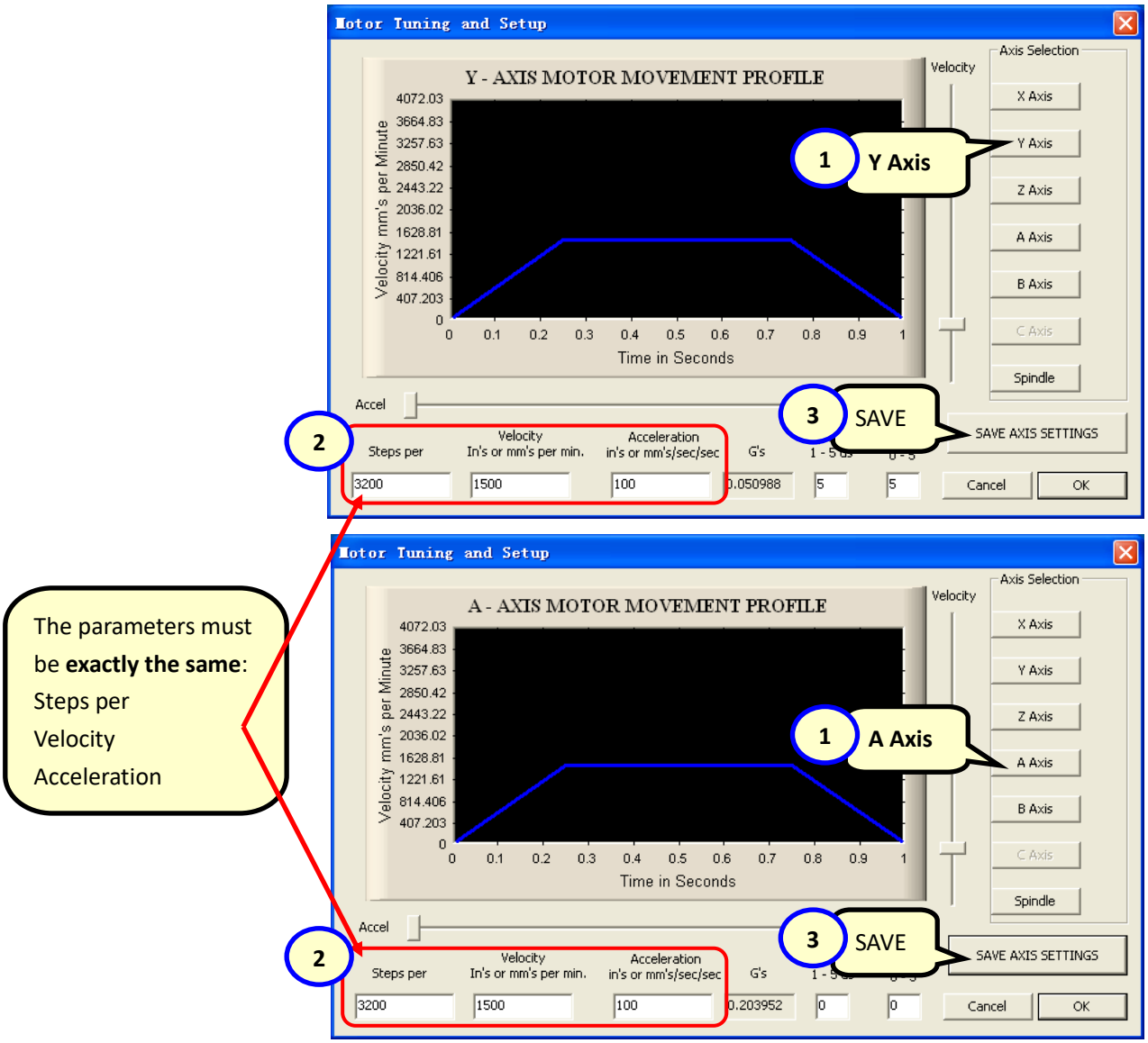
10.1.2 Slave axis setting (Config => Slave Axis), the fllowing example sets dual Y axis: A axis as slave.



10.1.3 Board' axis running direction is recommended as shown below: Mach3 menu => Config => Homing/Limits

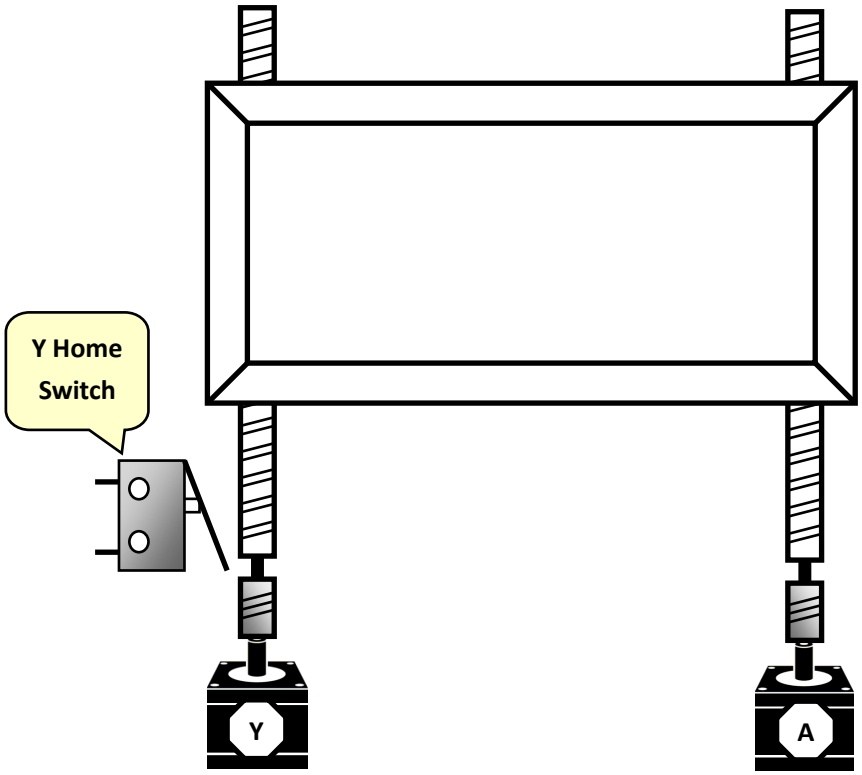


10.1.4 Mach3 tuning setup as shown below: (Config => Motor Tuning):



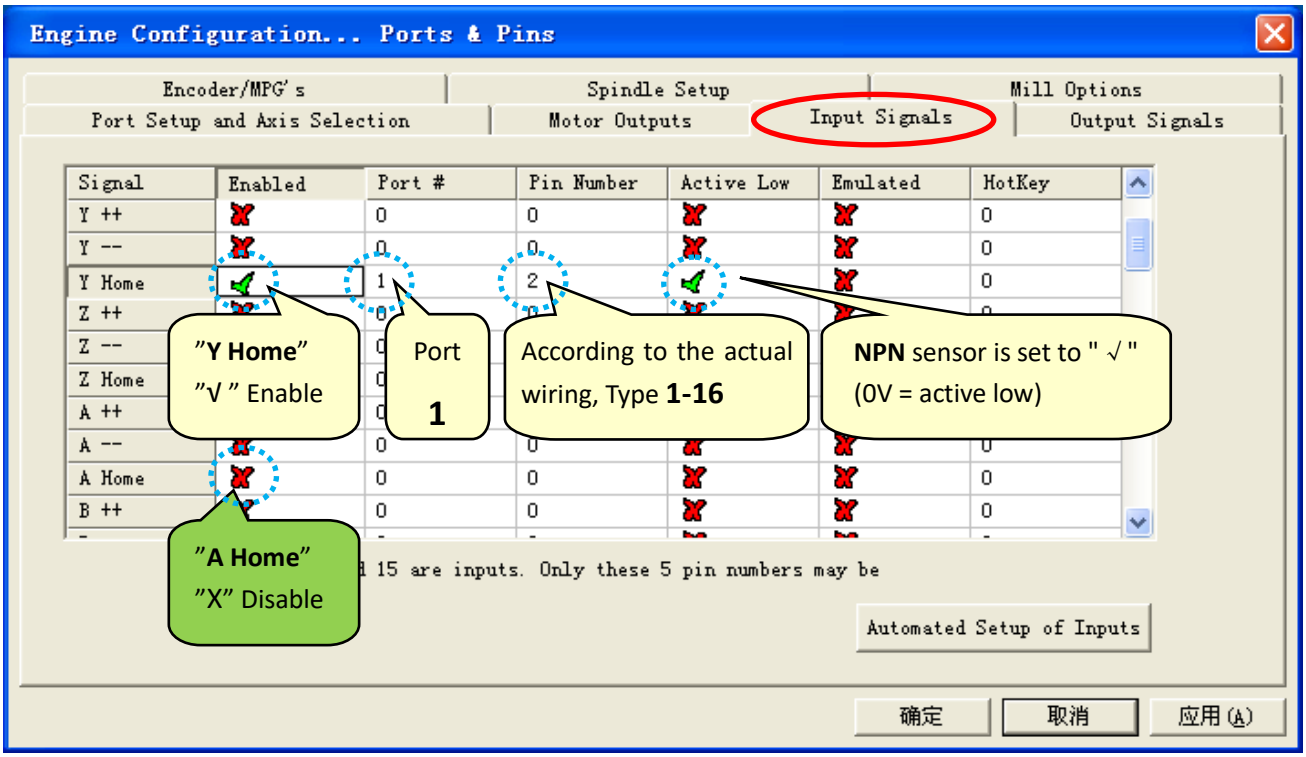
10.2 Single home switch configuration

10.2.1 Single Home Switch (Y axis) installation diagram



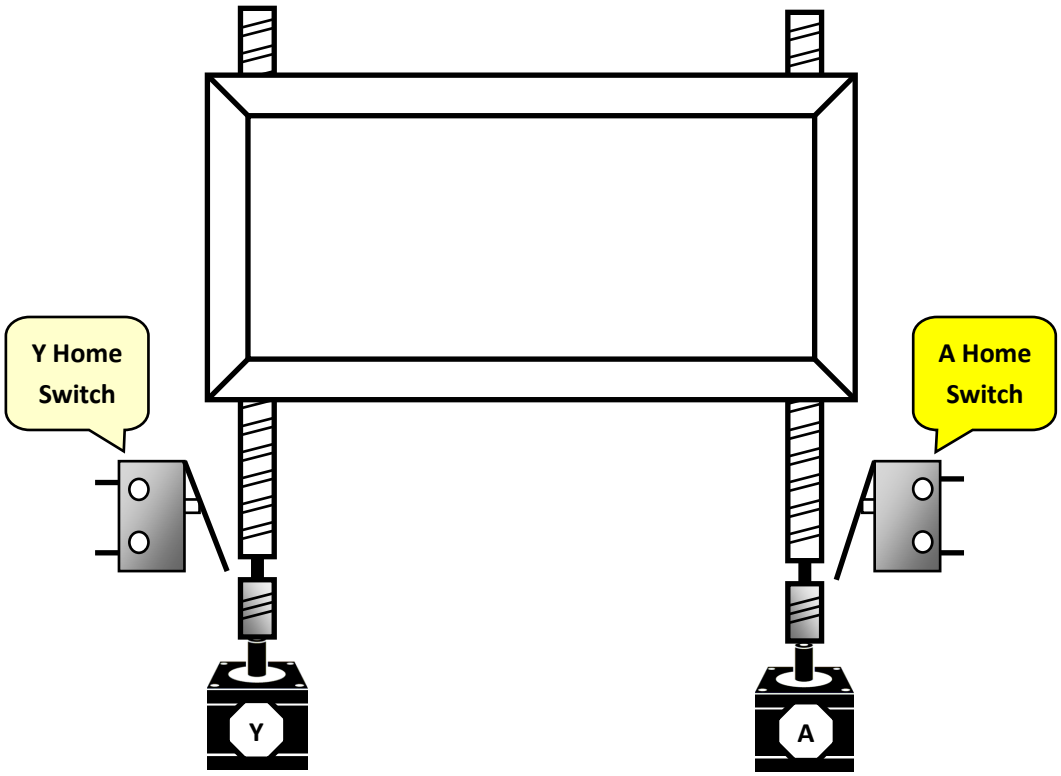
10.2.2 Only turn on the Y-axis Home Switch of Mach3.

(Config => Ports and Pins=>Input Signals)



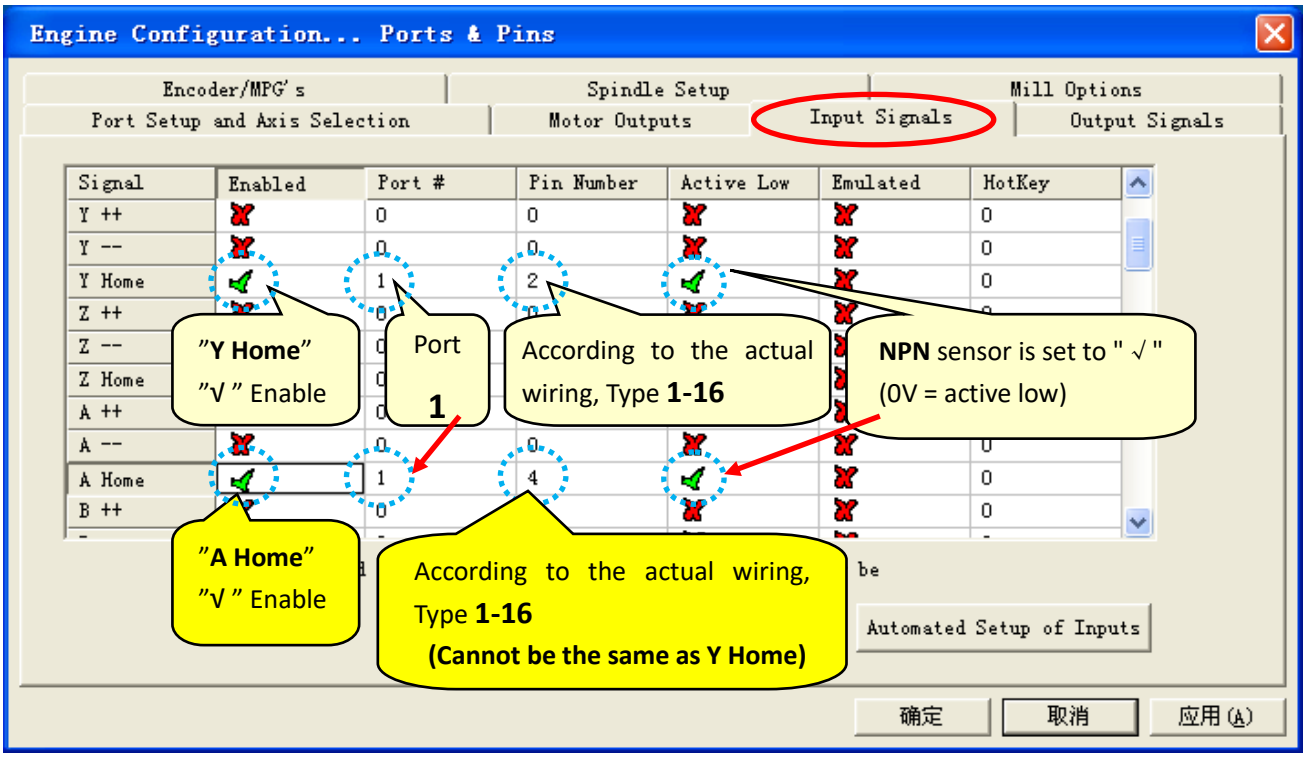
10.3 Dual home switch (automatic leveling) configuration

10.3.1 Dual Home Switch (Y-axis and A-axis) installation diagram



10.3.2 Turn on the Y-axis and A-axis Home Switches of Mach3 at the same time.

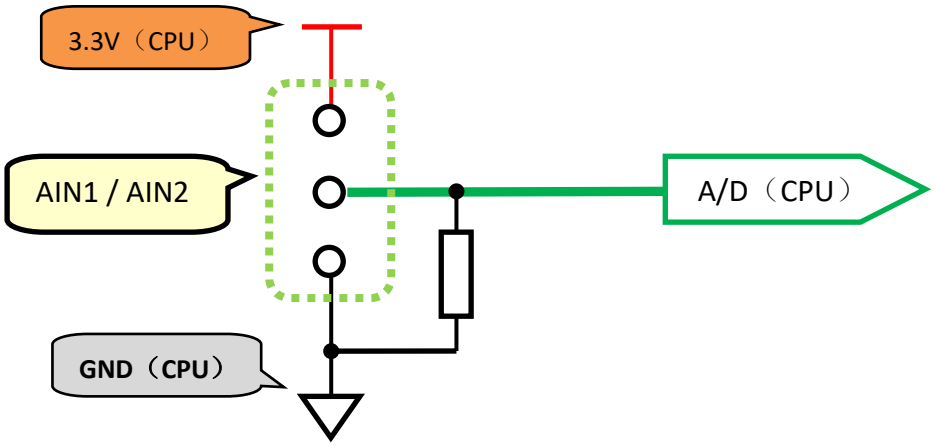
(Config => Ports and Pins => Input Signals)



11. External Adjustment Knob

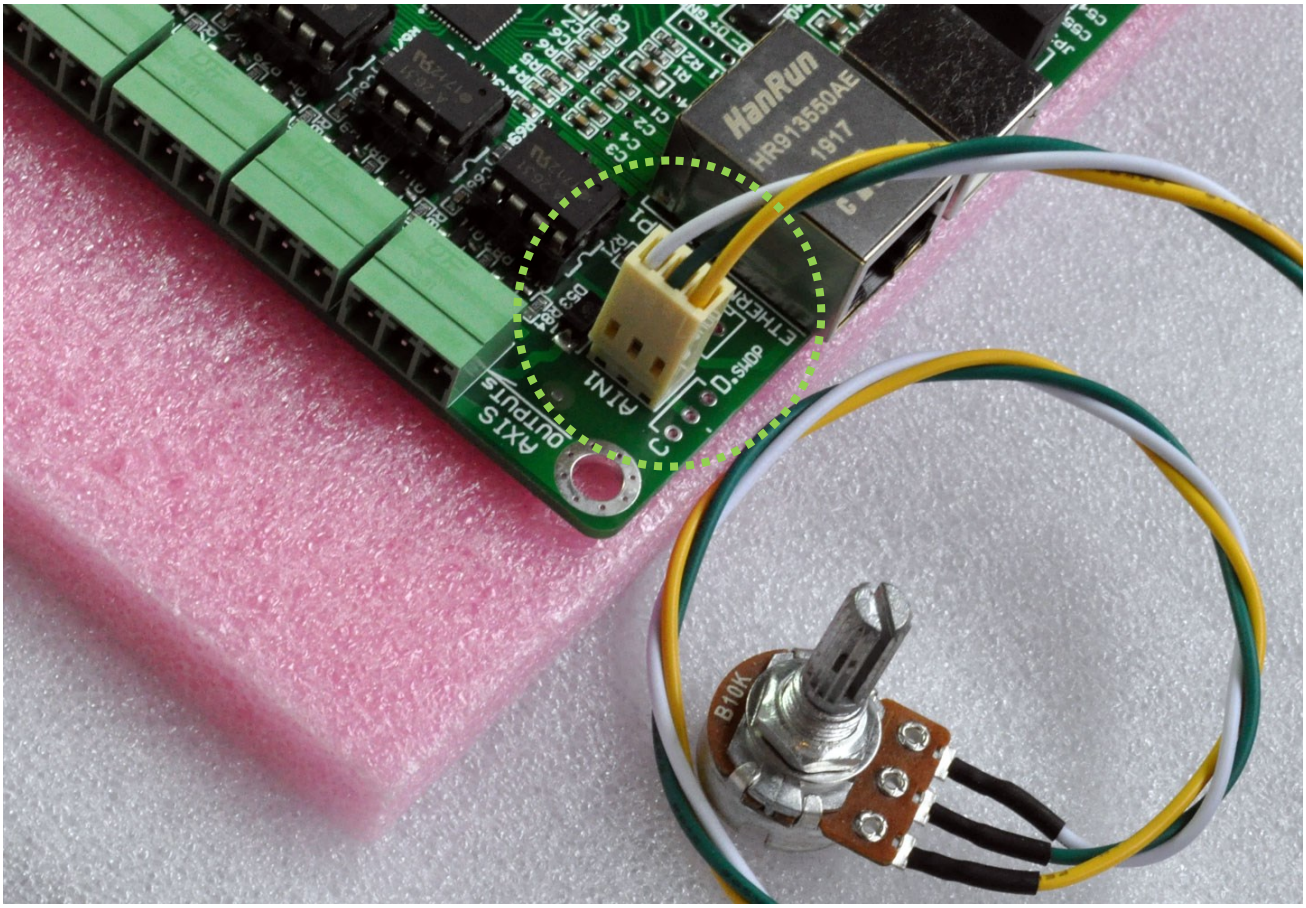
11.1 Interface characteristics of analog input

AIN1、AIN2 analog input port: 0 - 3.3V, **non-isolated**



11.2 Wiring diagram

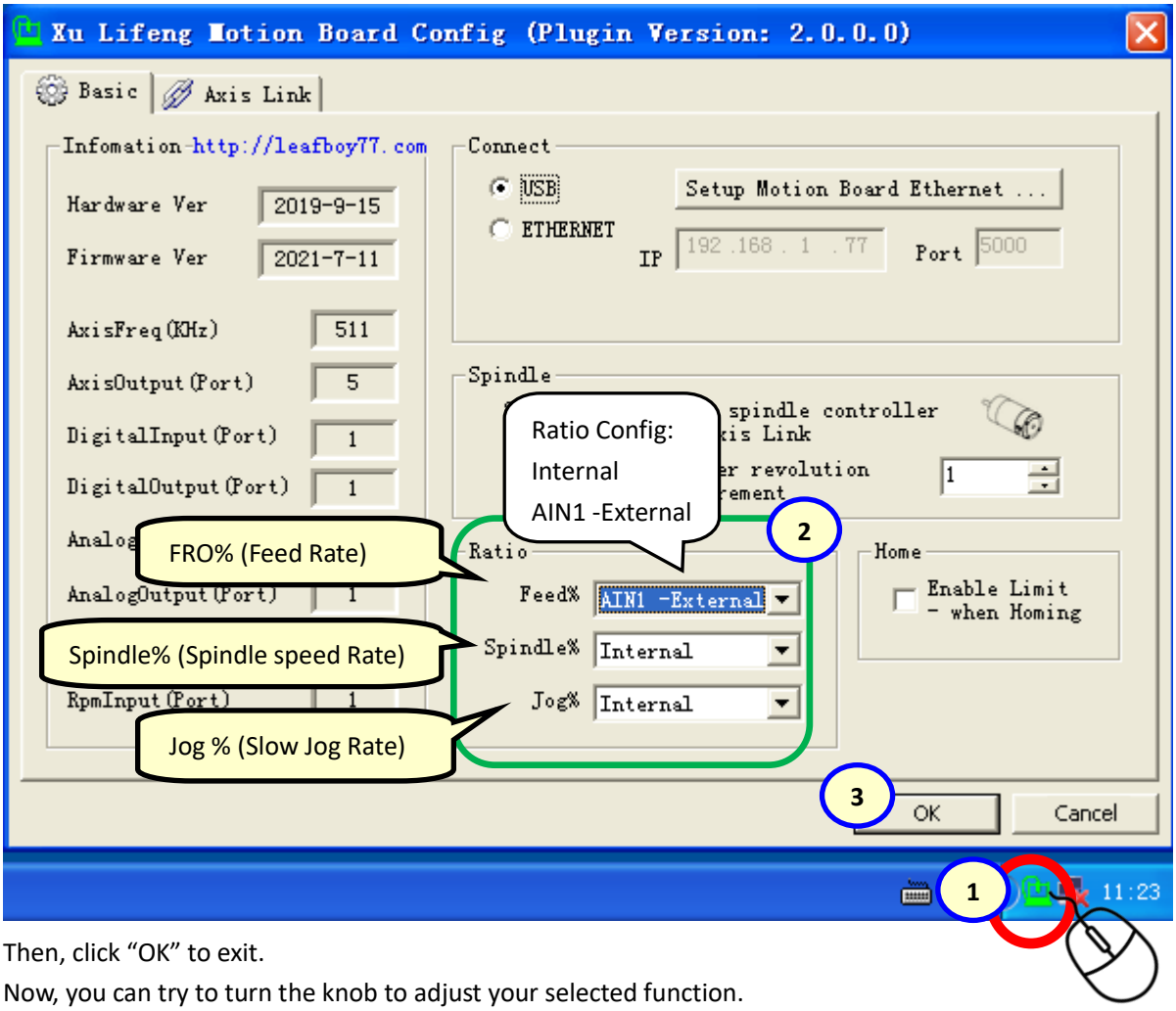
Connecting the adjustment-knob with the AIN1 of Motion board



11.3 Configuration

Start Mach3 and select the external motion board. Right click on the CNC machine icon, setting dialog will be shown. You can select one of the functions which is able to controlled by the external knob.

Please select “AIN1 -External” in your particular setting.



Then, click “OK” to exit.

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