

## **nMotion Mach3 USB Motion Card Installation Manual**

### **Features:**

- Fully supporting all Mach3 versions, including the Mach3 R3.043.066 version.
- Supporting Windows series, including Windows2000/XP/Vista/Win7/Win8/Win10.
- No need to install any USB drivers,it can be used aftr plugging in the computer.
- USB bus is the use of magnetic coupling isolation, isolation of real value, different from the general control card optocoupler input and output, do high reliability, absolute guarantee the safety of the computer USB. At the same time to ensure that the strong anti-interference ability of EMC.
- The single chip, the system stability is more streamlined, multi chip processing generally incomparable
- Dual core ultra - high speed CPU (the maximum single core frequency 204MHz), operation processing ability has great redundancy, and ensure the realization of four axis linkage under 500KHz frequency of the pulse output, 6 axis pulse output frequencies up to 300kHz, connected to the servo / step
- Motion control buffer size can be set and ensure the fast interpolation cycle can stable operation, computer running overload can also smooth operation and interpolation cycle adjustable, can adapt to a variety of different needs.
- Has 16 input port, input interface more simple, port of wet and dry contact can be, wiring is simple, dry contact method for as long as the external connected to a physical switch to the wire can be, all 16 input port are indication signal, for low power usually indicating lamp is bright, debugging simple and clear.
- With 8 output ports, a single output drive capability of 500mA, can be directly driven by DC relay.
- The PWM speed output port can be set, the frequency of PWM, pulse width 0~1000 continuously adjustable.
- With the function of the speed, the actual speed of the spindle in the Mach3 interface, real-time display, accurate and stable measurement.
- With 256 bytes of NVRAM space, can save the coordinates of the 6 axes, the next power without the need to find the mechanical origin.
- The circuit board is made by the engineer, the design level is clear at a glance.

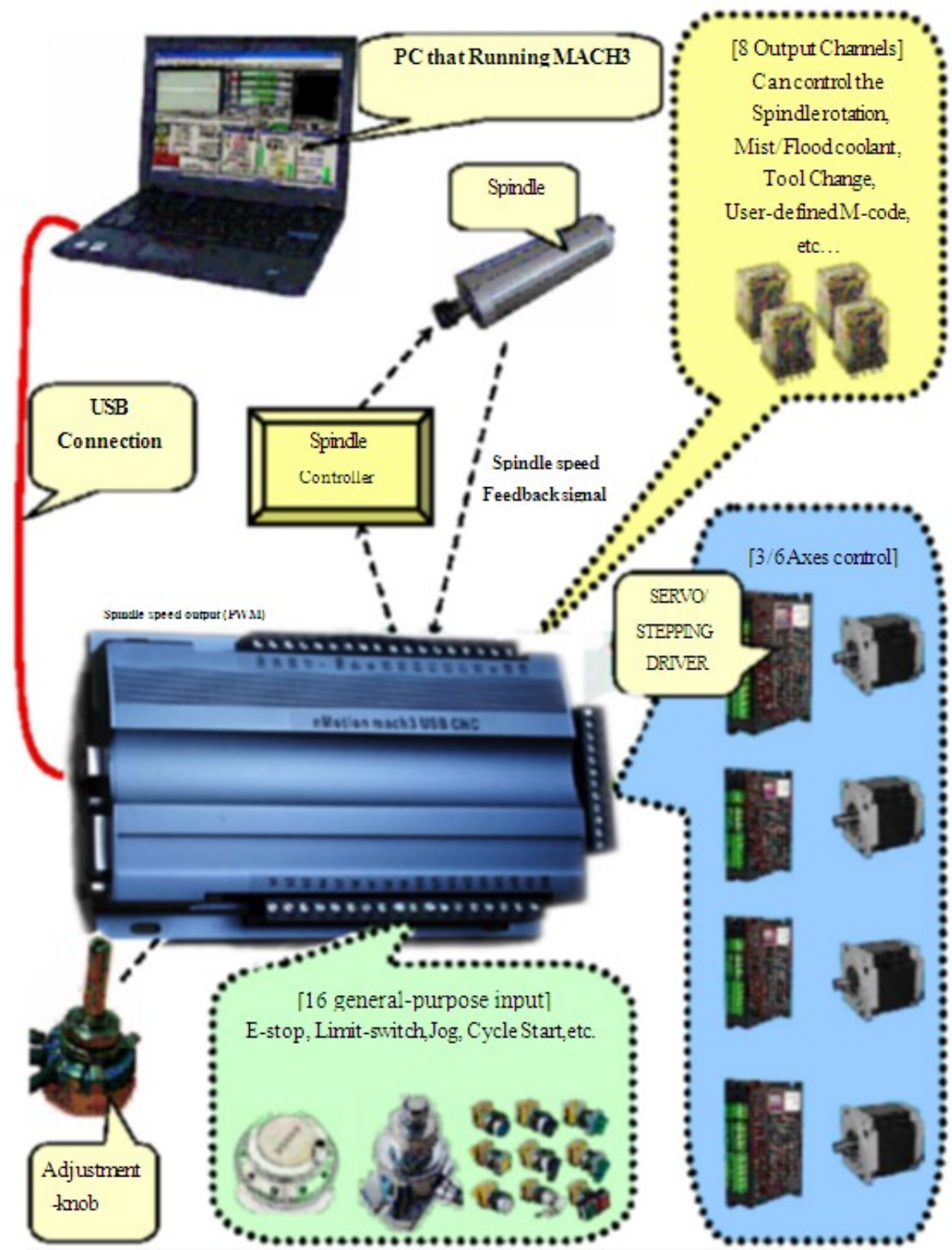
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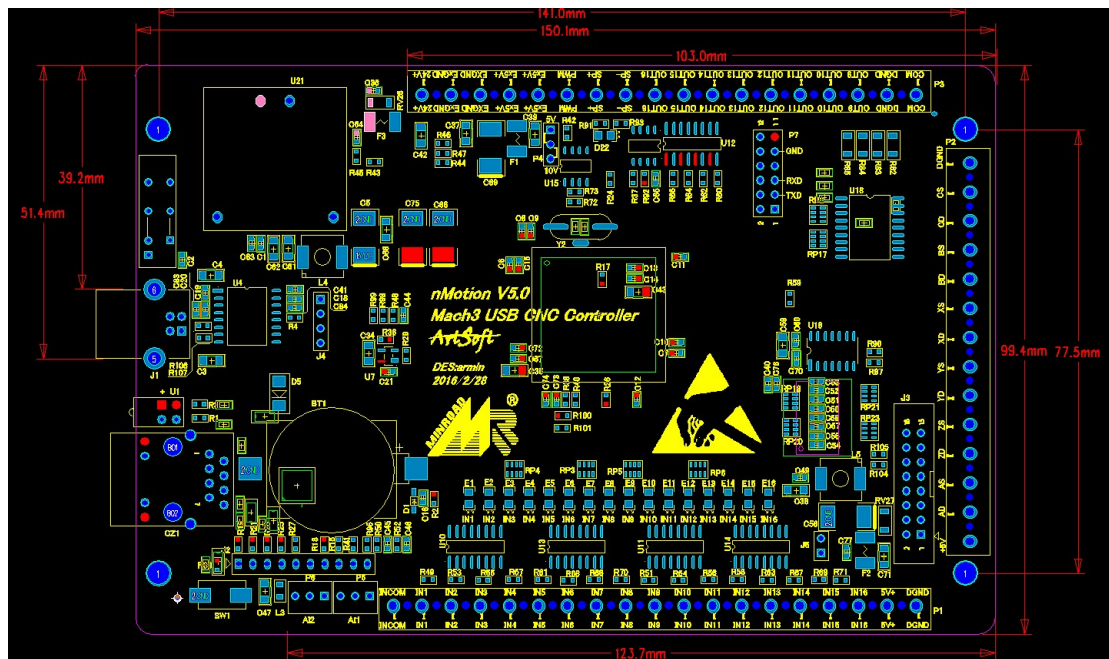
- **Basic connection diagram (an Overview)**



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- **Mechanical dimensions diagram**







## ● Prepare Mach3 software



This card is a Mach3 USB interface 3/6 axes external motion card.



The latest version of Mach3 official website:

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



Mach3 download: as shown below:



[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 100 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:

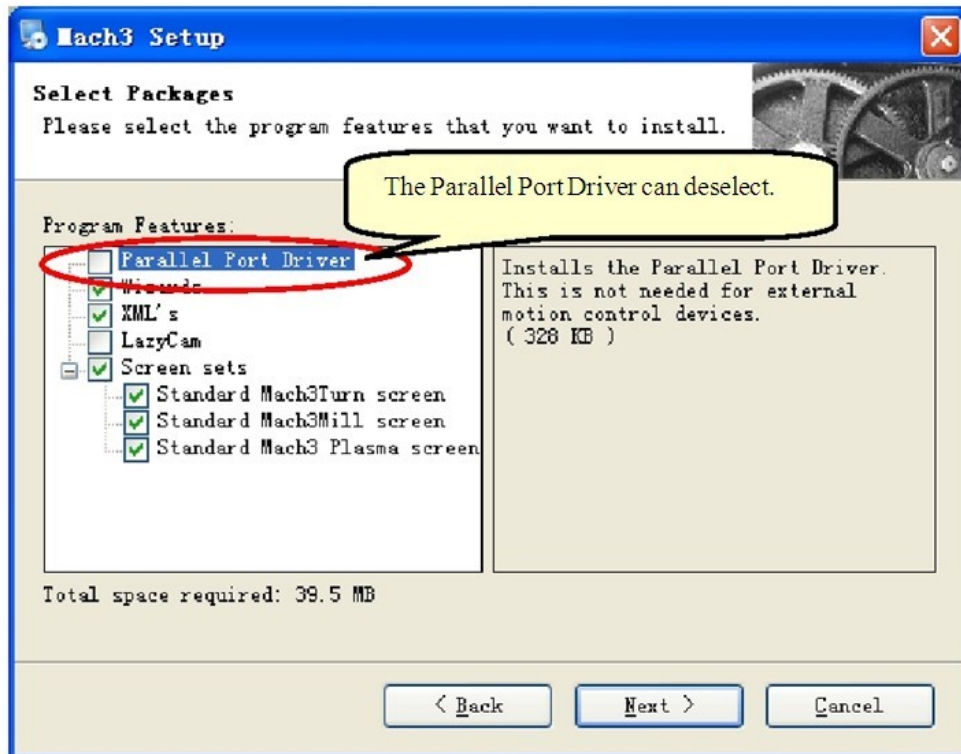
[Mach3 R3.042.040](#)

[Mach3 Changelog](#)



Installation the Mach3:

The Parallel Port Driver does not require.





## Installation the software of the USB motion card

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

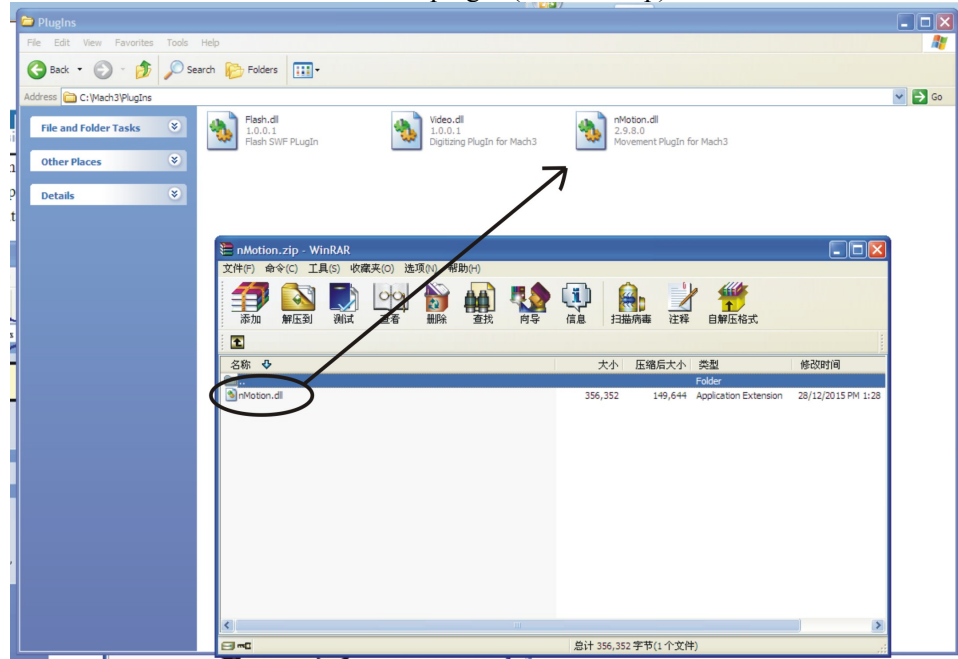
1. Connecting the USB cable to the PC and the motion card.



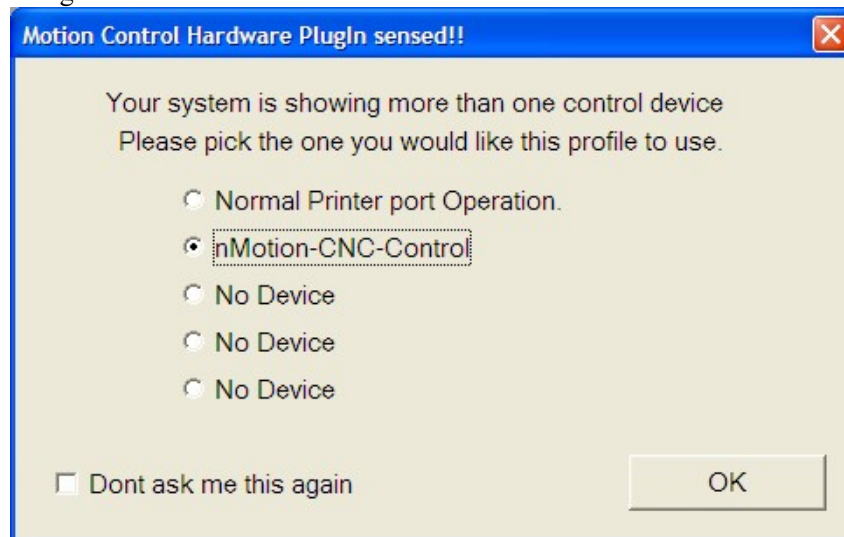
## A. Installing the motion card plug-in.

Unzip the usbmove.zip, copy or drag usbmove.dll into your Mach3\PlugIns folder.

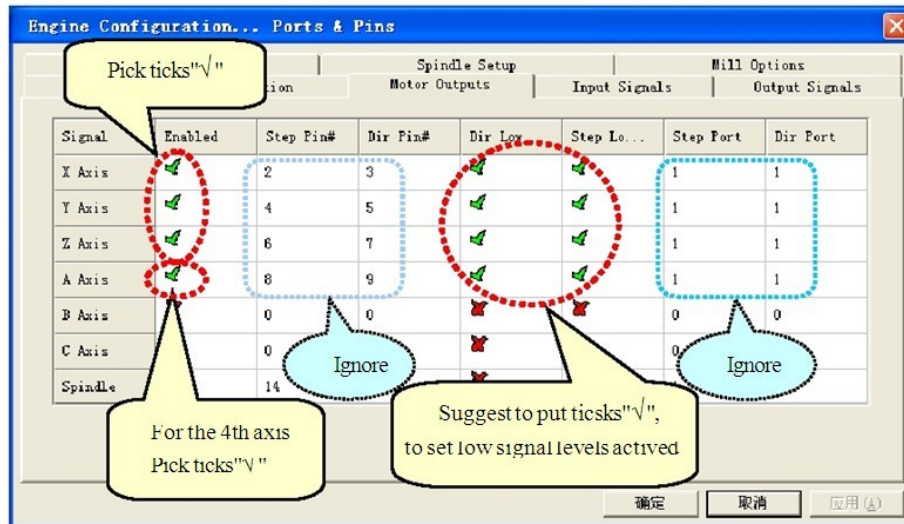
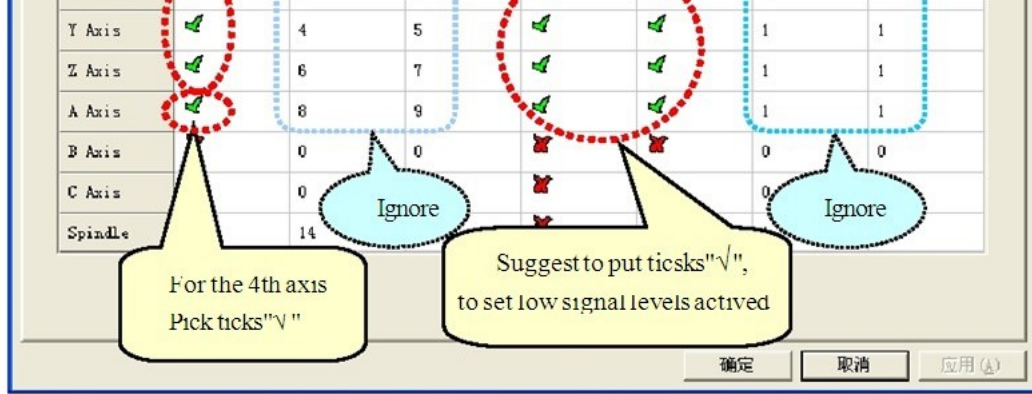
Note: Download the latest version of plug-in(nMotion.zip)



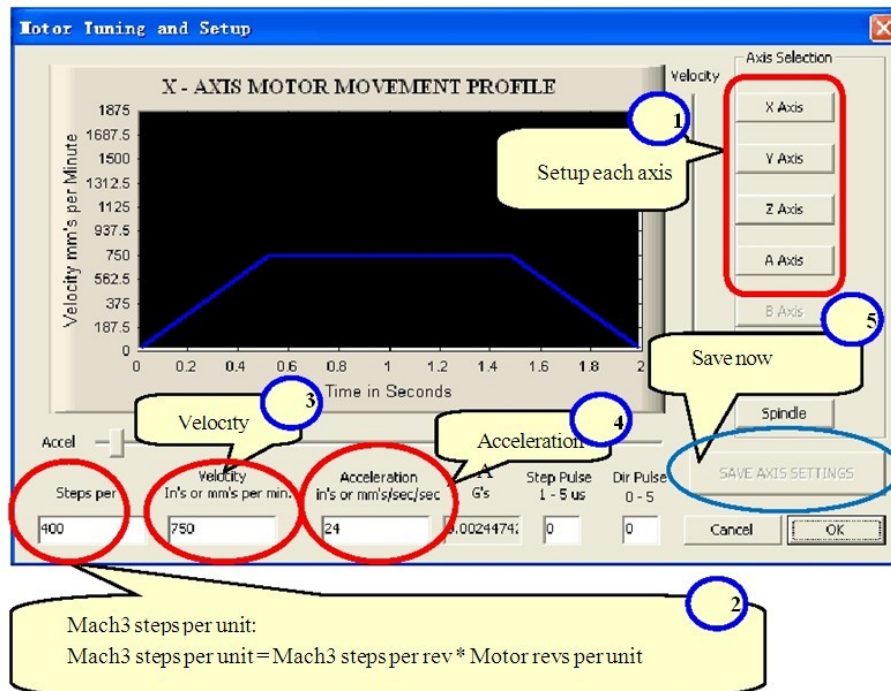
Start the Mach3 software, a dialogue of "Motion Control Hardware PlugIn sensed!!" is shown. Please select the "Mach3-USB-Motion-Card" you can also check "Don't ask me , this again".



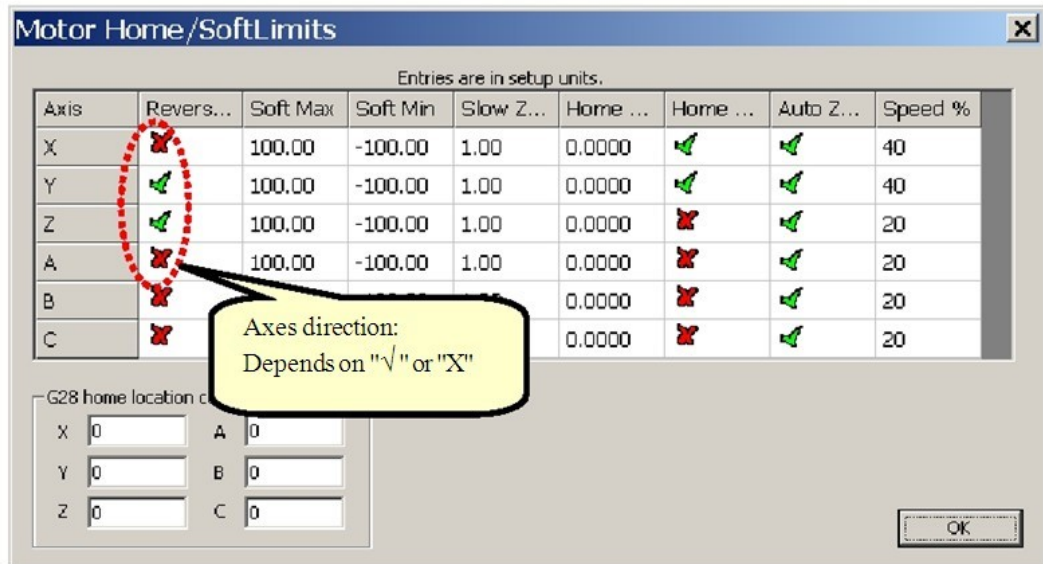
B.



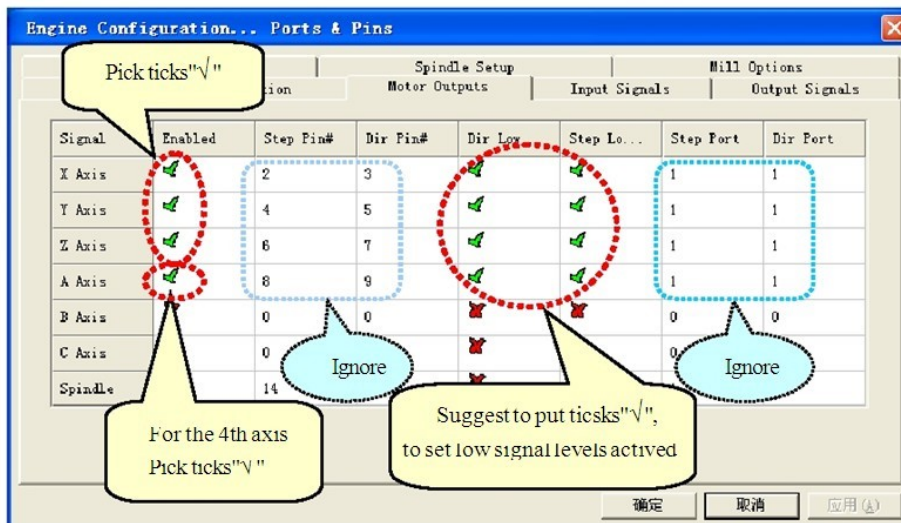
Motor config like this:(config=>Motor Tuning)



The Mach3 Menu => Config => Homing/Limits dialog Axes direction, depends on the "Reversed".



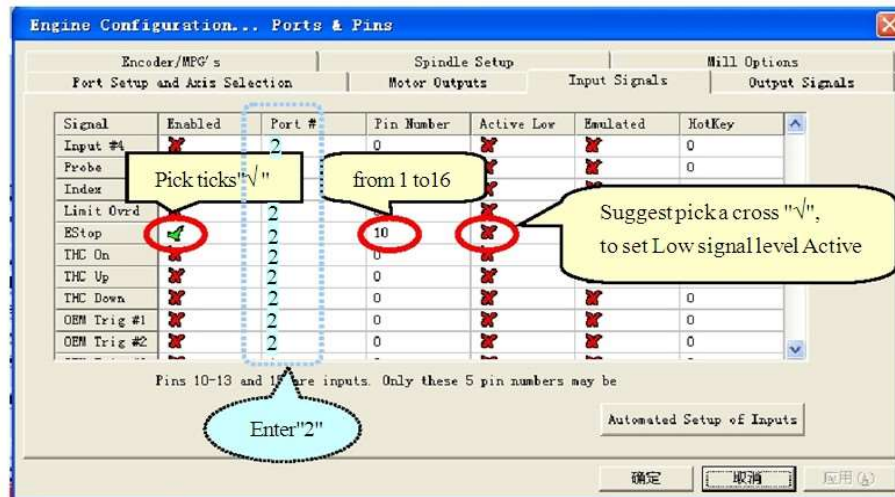
Or you can change the direction on this page: Dir Low select "X" or "√"



## b) Setup the input singles.

There are 16 general-purpose input channels. The channels number is from 1 to 16, Port Number is 2.

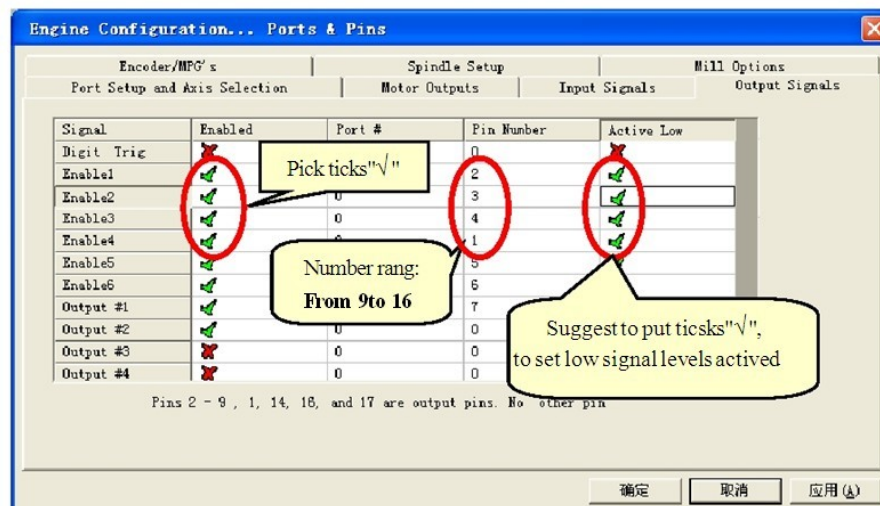
Suggest Active Low = "√" (Set Low signal level for Inputs)



## c) Setup the Output signals.

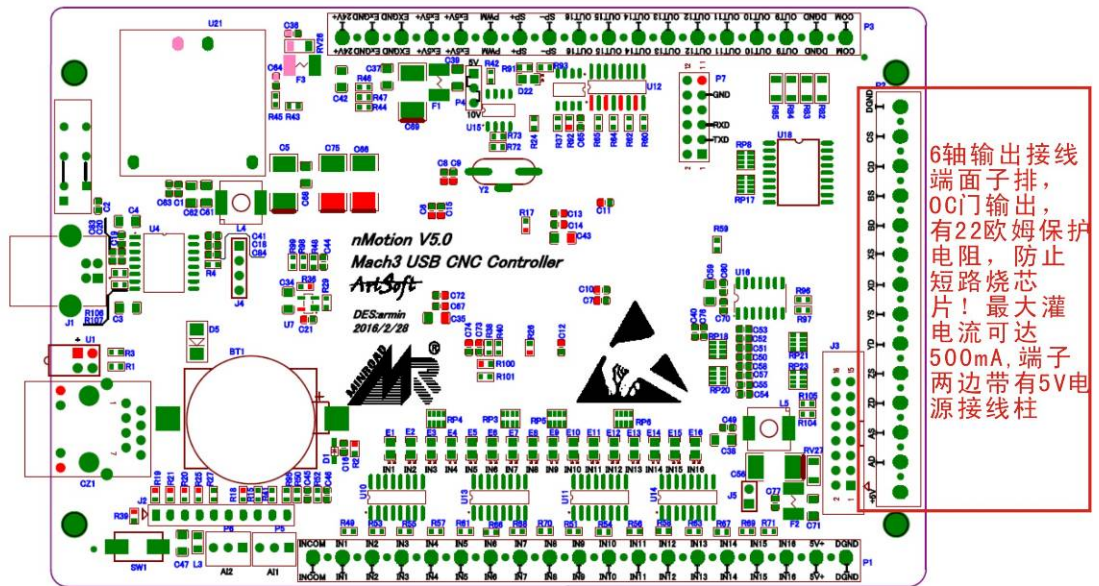
There are 8 general-purpose (open-drain) output channels, The channels number is from 9 to 16. Port Number is 2.

Suggest Active Low = "√" (Set Low signal level for outputs)

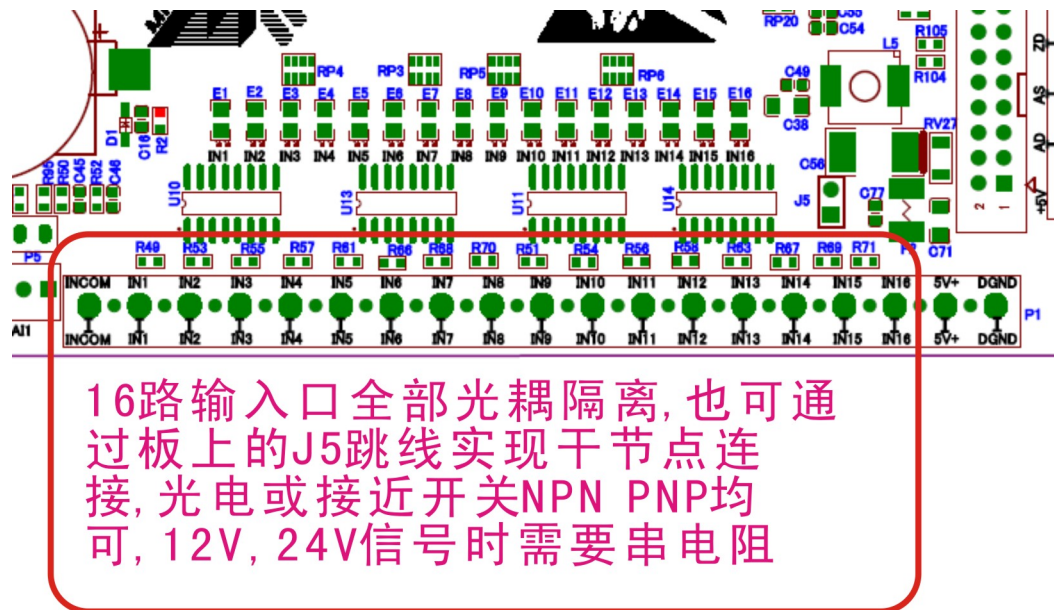




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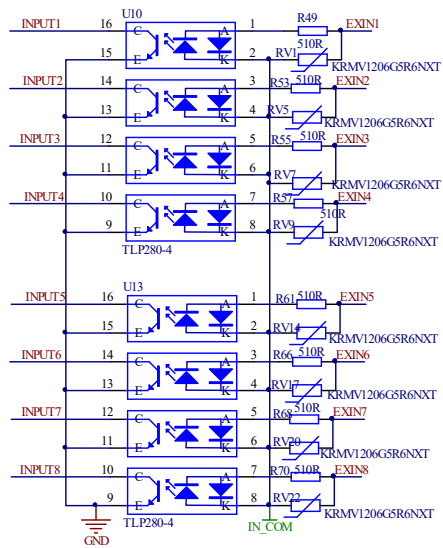


## Input port wiring instructions



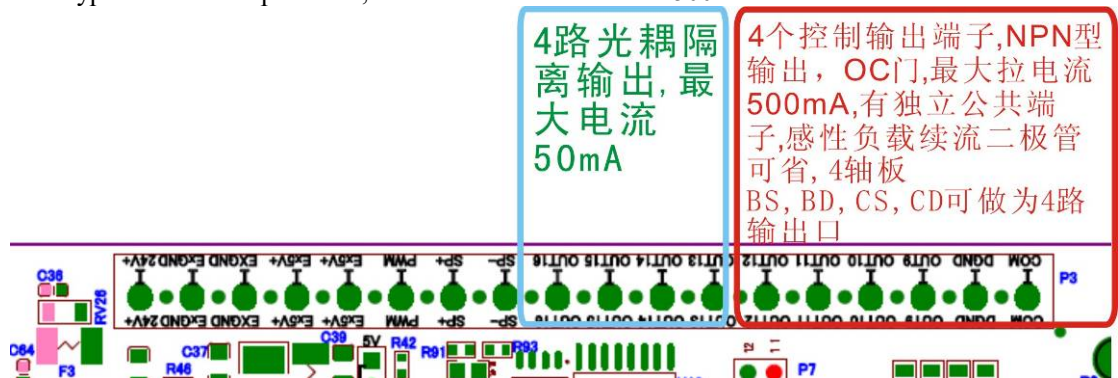
## Principle diagram of input port

## nMotion mach3 USB CNC controller

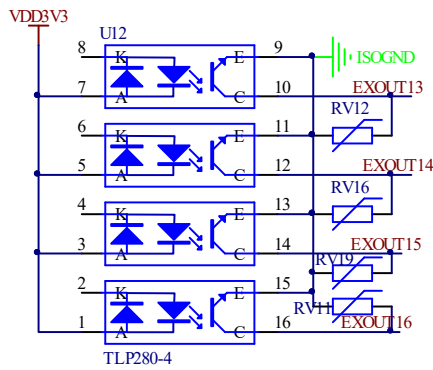


## 8 way control output pin position diagram

NPN type low level output mode, the maximum drive current 500mA.

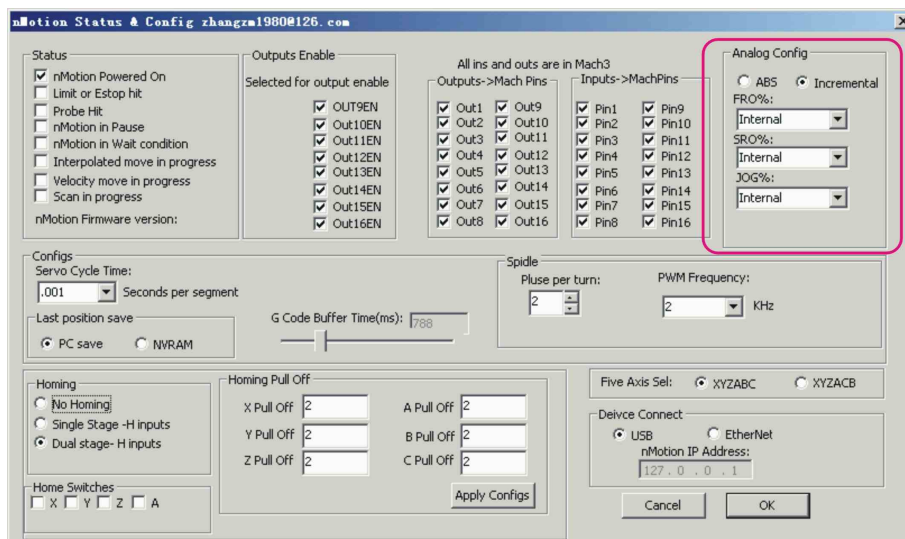


Principle diagram of Isolate Output



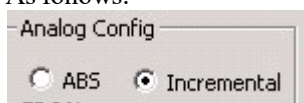
## External power knob

Two AI input port, the voltage input range of 0~3.3V, can be used to set the rate of FRO/SRO/JOG  
Mach3 menu “Plugins Config”=>”Config”, enter “PlugIn Control and Activation”.



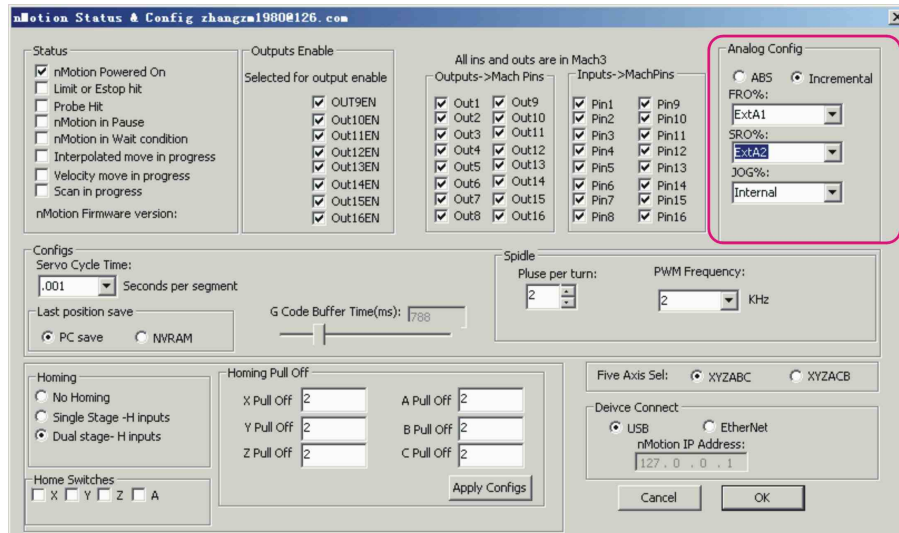
There are two kinds of application modes of analog quantity input: 1 absolute value model, 2 increment value model

As follows:

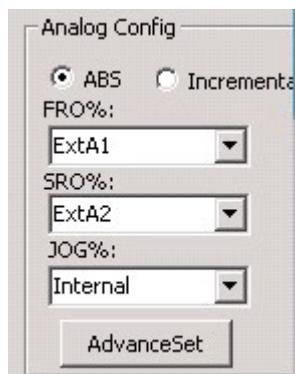


- The absolute value of FRO%, SRO%, Jog% under the mode of the value of a linear relationship with the AI, AI level is higher, the greater the value of the corresponding rate.
- Incremental value mode FRO%, SRO%, Jog% value with the relative change in volume changes, mainly referring to the last moment of external AI voltage value and present current AI voltage value comparison, if the voltage is relatively higher, corresponding to the rate value is increased, otherwise reduce.
- General incremental value model.
- FRO% (feed rate of F). SRO% (spindle speed ratio), Jog% (dynamic magnification) set external rate "ExtA1" or "ExtA2"

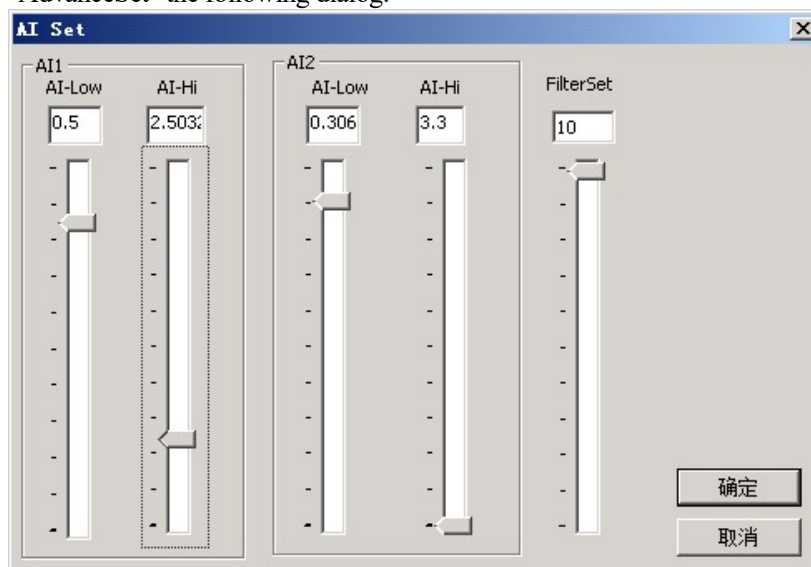
## nMotion mach3 USB CNC controller



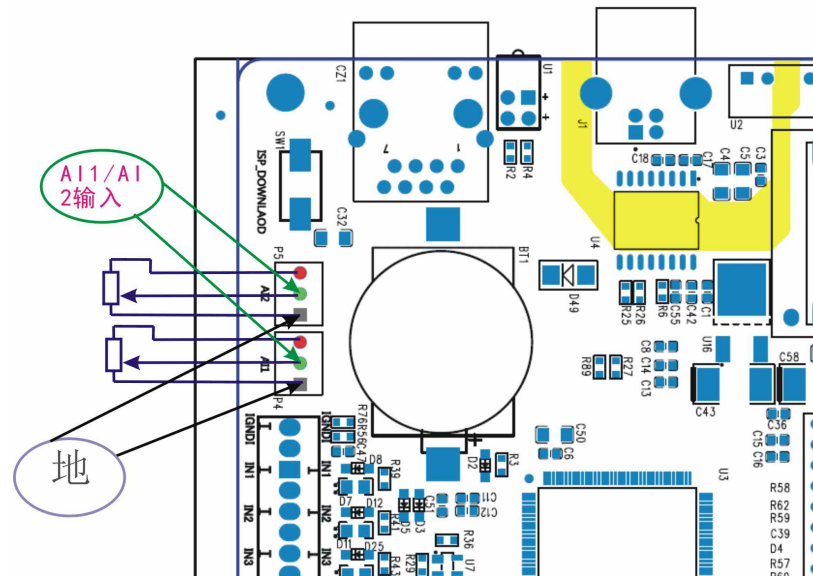
After the completion of the configuration, click "OK". Rotation rate knob Mach3 interface corresponding to the SRO%, FRO% numerical immediately change.  
Rotation rate knob, Mach3 interface corresponding to the Jog Rate% Slow value immediately change.



In absolute value mode will be more of a button, used to set the initial voltage of low level and high level at the end of the voltage, such as external input voltage range is 0.5V~2.5V, to rate value by the change of 0-300, low starting level voltage is 0.5V, the high level end voltage 2.5V. Click on the "AdvanceSet" the following dialog:

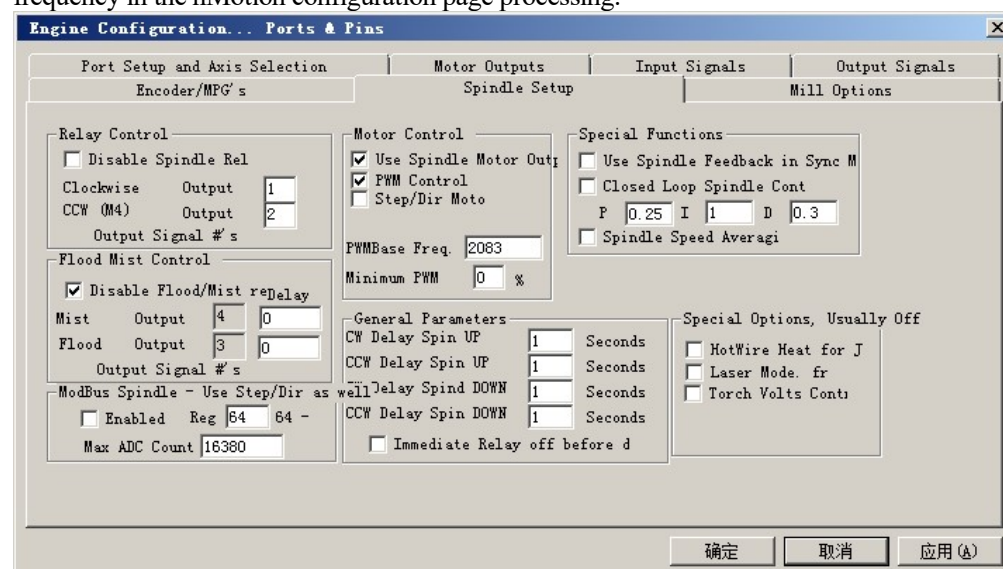


And a filtering coefficient, filter coefficient is small, rate value response faster, smoothing less, whereas response is slower, the change was more smooth. Generally do not move, set to 10~20 can be. AI input port as shown below, not marked red terminal 4.4V about power, this power only potentiometer power supply, please don't external use.



## Spindle speed PWM analog output

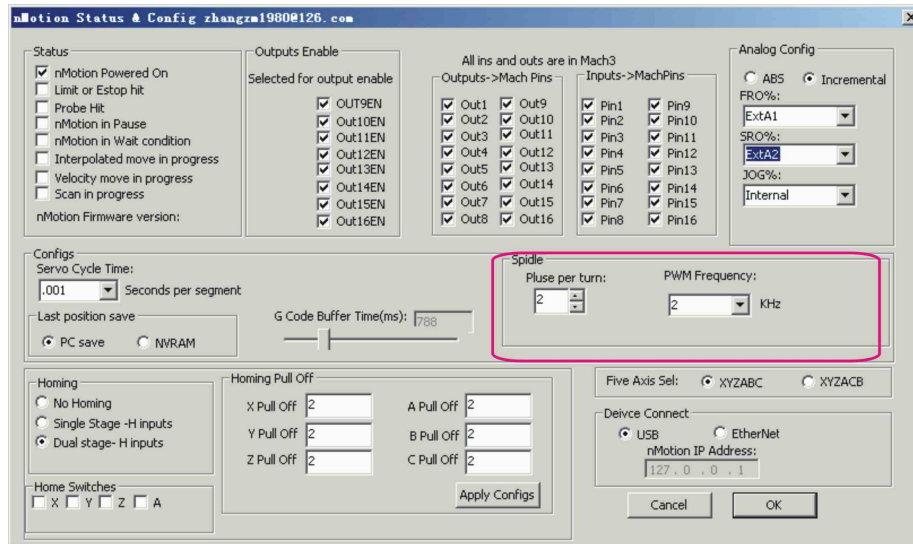
Click on the main menu "config" => "port and pins into the spindle spindle setup settings, tick the" use spindle motor output. In Freq. PWMBase, there is no need to fill in the required frequency. PWM frequency in the nMotion configuration page processing.



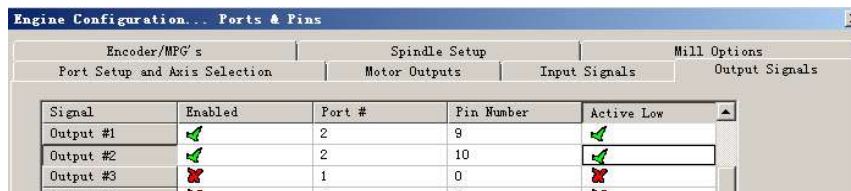
Spindle PWM (pulse width modulation output frequency in the Mach3 menu Config=>Config plugins into plugin control and selection of activation nMotion card to control the, click on the "config" after USB card configuration dialog.



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## spindle relay configuration



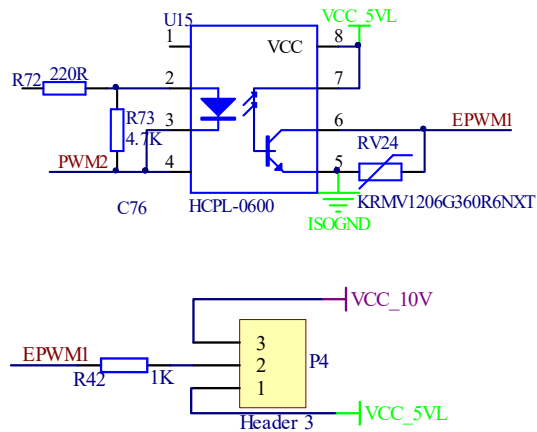
## Phase configuration of spindle speed control signal PWM



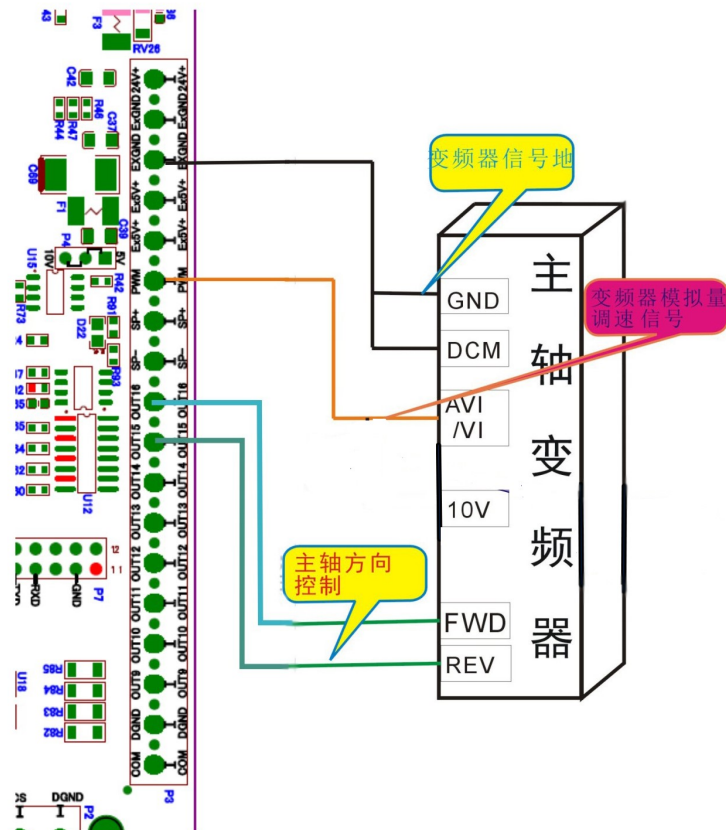
## Mach3 menu " Config=> Spindle Pulleys ", enter " Pulley Selection "



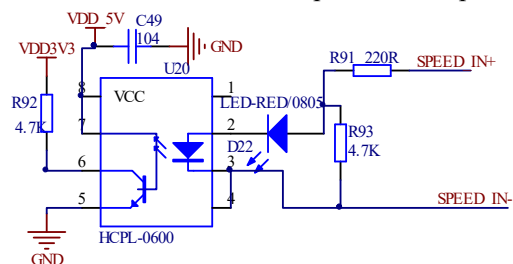
Principle diagram of the spindle speed control analog output interface

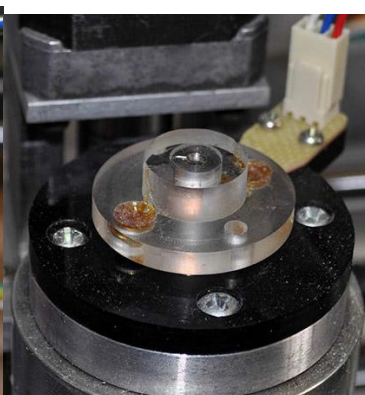
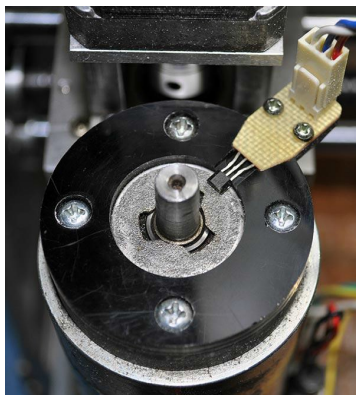
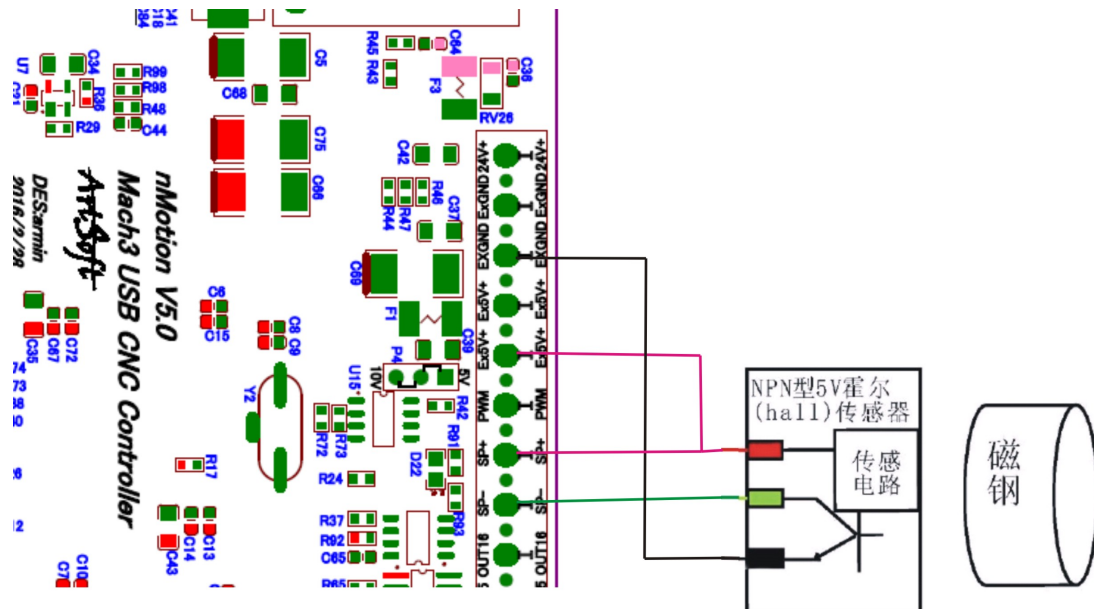
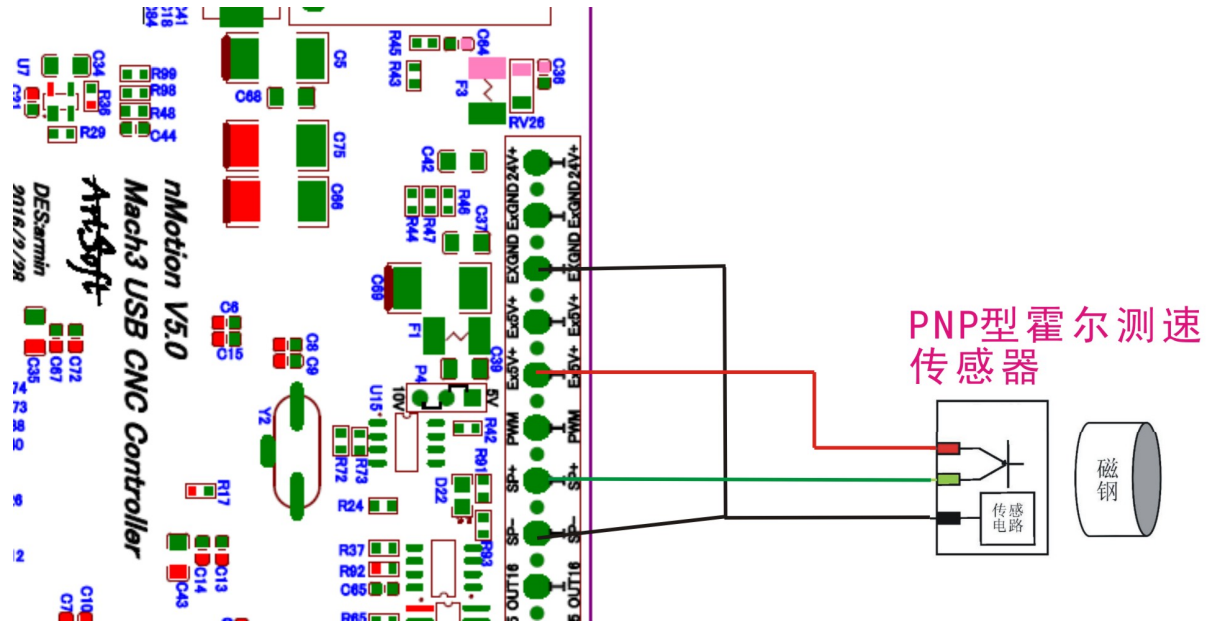


VCC 10V have not served , if you use a variable frequency speed control of the spindle and need in PWM feet pick a pull-up resistor to inverter 10V output ports.

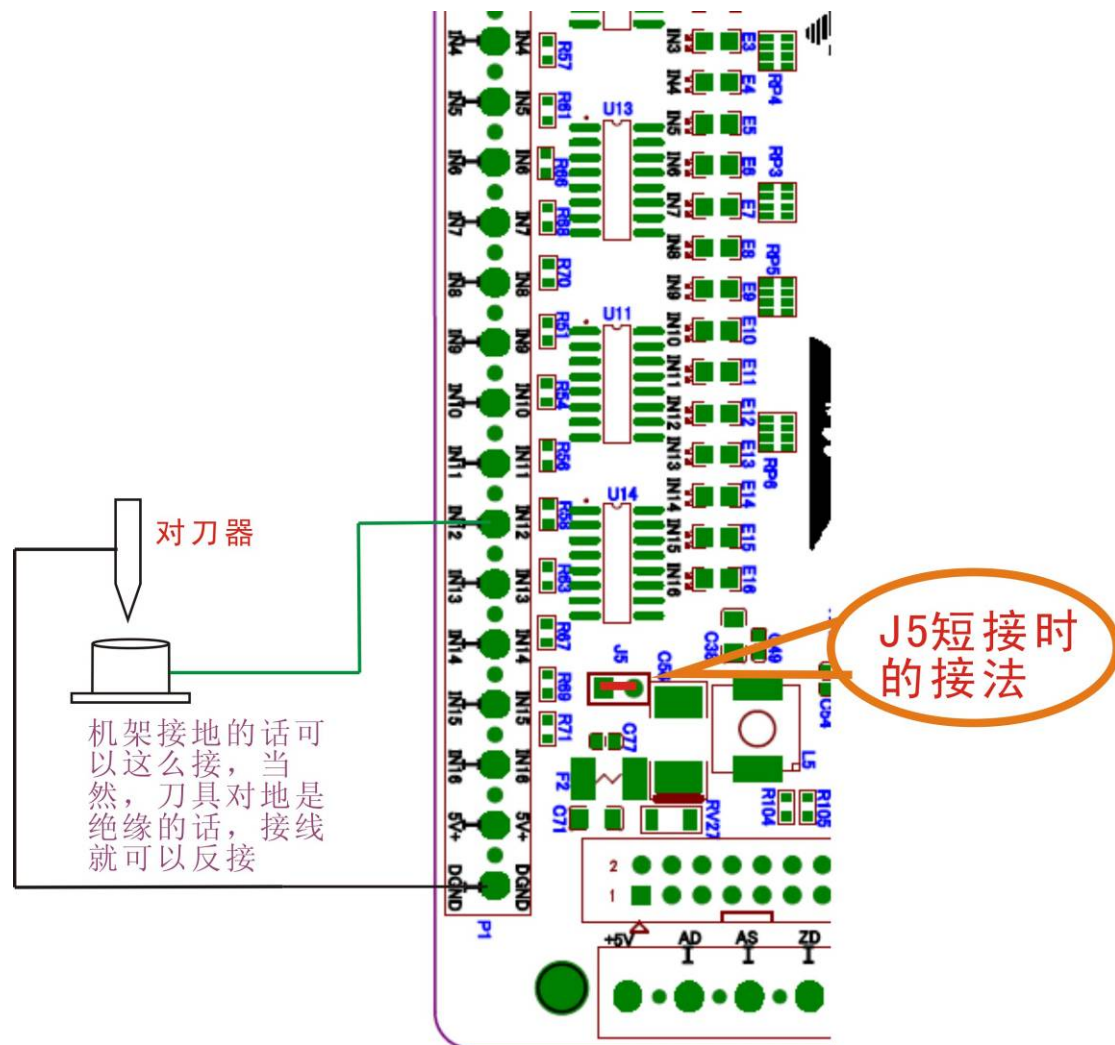


nMotion control card of the speed of the input interface schematic

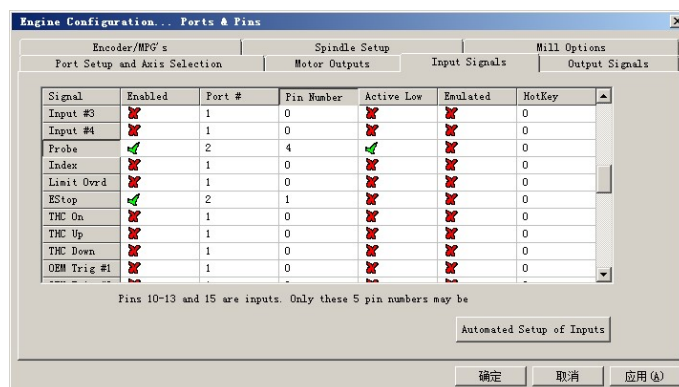




## Probe connection



Config (Config => Ports and Pins)



Probe script like this:

```
FeedCurrent = GetOemDRO(818) 'Get the current settings, OEM DROs (818)=Feedrate DRO
ZCurrent = GetOemDro(802) 'OEM DROs (802)=Z DRO
GageH = GetOEMDRO(1001) 'OEMDRO(1001)=Gage Block Height
```