MACH3 Motion Card (MKX version)Manual
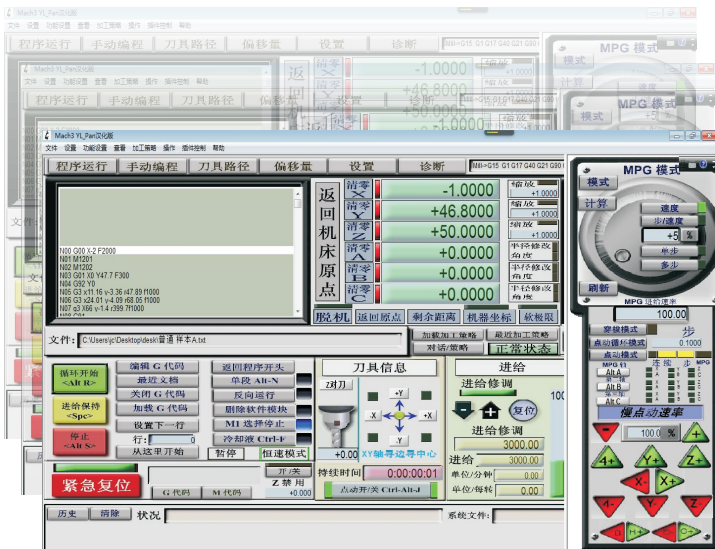
Catalogue

Catalogue

1.Mach3 Software installation

1.1 You can install the software we provide :Mach3Version 3.043.066 , or download from MACH3's website.

Open our CD , find Mach3 Soft>>Mach3Version3.043.066 , click it to installation. (see Figure)

Mach3Ver
sion3.043.
066
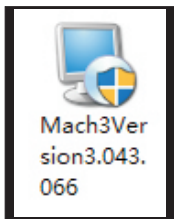
1.2 When you install it, please cancel "Parallel Port Driver" option. (see Figure)
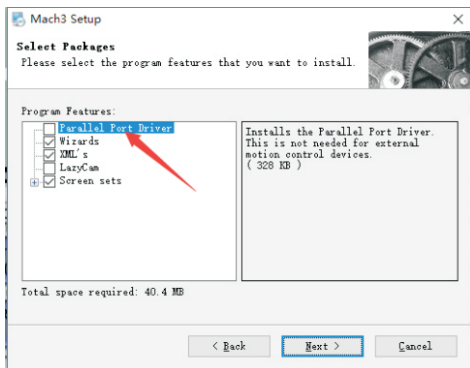
1.3 After the software installation is completed, you need to copy 'Mach1Lic.dat' file to C:/Mach3 folder.

Mach1Lic.dat	2016/3/21 14:25	DAT 文件

2.Driver and Configuration file

2.1 Driver installation

Please copy the driver file after the software installation is complete.

Open our Cd , and find the...English manual > > Driver file > > NcUsbPod.dll(Ethernet control card driver is NcEther.dll).Then copy it to MACH3 software folder...C:/Mach3 > > PlugIns folder (see Figure)
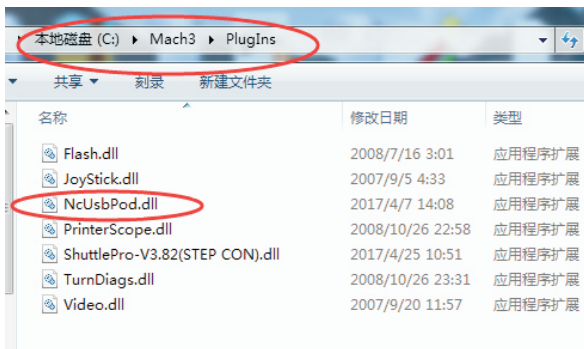
2.2 Configuration file installation

Open our CD,and find the   ...English manual > > MKX-V-Configuration file > > Mach3mill.xml file, then copy it to MACH3 software folder...C:/Mach3 folder.(see Figure)
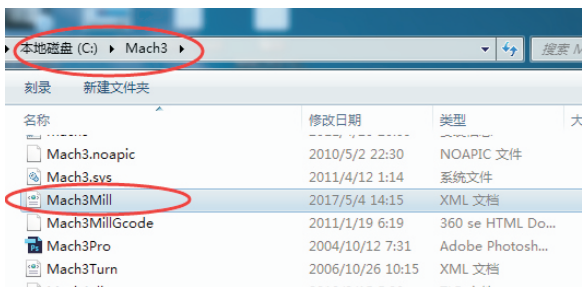
NOTE:**After you copy the file,all basic parameters have been set up. Only the motor parameters need to be set. Please do not modify other parameters.**

2.3 Macro code file installation

When you need to control the output port or other macro code functions, you must copy them to...C:/MACH3>>macros>>Mach3Mill folder , then you can use them.
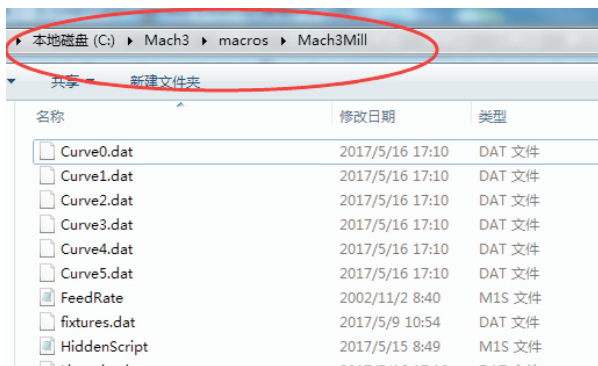
3.How to connect card and computer

3.1 How to connect USB port card and computer

NOTE :

Please use the cable that we provide, and don't extend it.

Connect the computer and USB card with the USB cable. There is a work indicator light on the control card. If flashing means the connection is successful.Or check your computer device manager>>Human body input device,check whether there is new equipment added.

3.2 How to connect the Ethernet card and pc

If you use the Ethernet control card, please use the Ethernet cable we provide.,The Ethernet port on the control card has two lights, yellow and green,if lighting means conenct is ok.
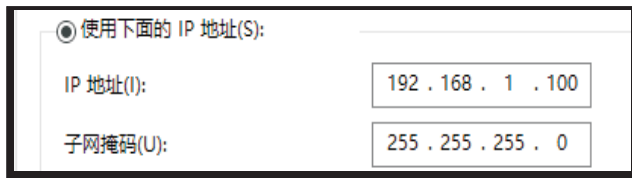
you need manually set the IP address in your pc :

1.WindowsXP

● Click right mouse button on "My Network Places" icon and select "Properties" position from the menu. You will see window with the icons/icon of network connections.

● Click right mouse button on "Local connection" icon and select "Properties" position from the menu.

● In this window – Double click "Internet protocol (TCP/IP)" position .

● In this window enter the IP address: 192.168.1.X(X=1~179) and mask: 255.255.255.0. Click "OK". Close the window. Network settings have been completed.

2.Windows 7/10

● In control panel, we choose "View network status and tasks"

● Next - select "Change adapter settings".

● Click with right mouse button on "Local connection" and select "Properties" of network connection.

● Double click on "internet TCP/IPv4 protocol", and next enter the address IP: 192.168.1.X(X=1~179) and mask: 255. 255.255.0. Click "OK". Close the window. Network settings have been completed.

◉ 使用下面的 IP 地址(S):	
IP 地址(I):	192 . 168 . 1 . 100
子网掩码(U):	255 . 255 . 255 . 0

4.Hardware wiring

Wiring diagram

电脑Windows PC
Mach3 Software

限位开关，急停开关等
Limit switch and
EStop button

主轴变频器或者驱动器
Spindle inverter or
driver

USB线

DC24V
0.5A-2A
电源 Power

继电器
Relay

步进或者伺服
驱动器Driver
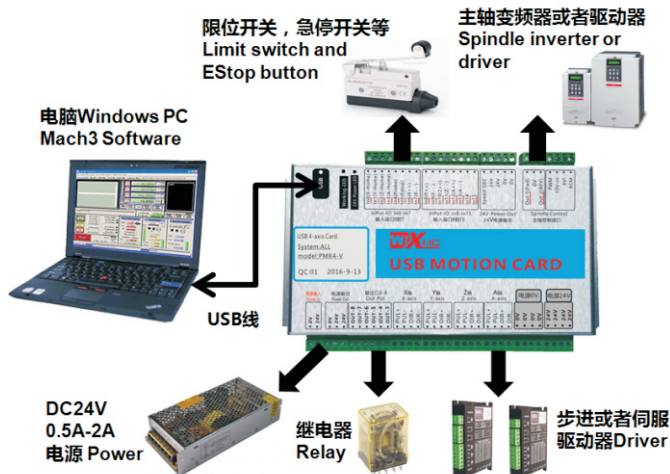
4.1 Power Supply

The control card need DC24V/1A as power

24V power
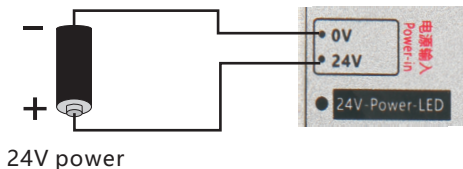
4.2 Driver connection

4.2.1 MKX-IV motion card driver wiring

MKX-IV motion card X.Y.Z.A axis outout port:

| XD- | XP- | 5V | YD- | YP- | 5V | ZD- | ZP- | 5V | AD- | AP- | 5V |

Port	Function	Note
XD-	X axis Direction output	X axis driver DIR- port
XP-	X axis Pulse output	X axis driver PUL- port
5V	5V output	X axis 5V port
YD-	Y axis Direction output	Y axis driver DIR- port
YP-	Y axis Pulse output	Y axis driver PUL- port
5V	5V output	Y axis 5V port
ZD-	Z axis Direction output	Z axis driver DIR- port
ZP-	Z axis Pulse output	Z axis driver PUL- port
5V	5V output	Z axis 5V port
AD-	A axis Direction output	A axis driver DIR- port
AP-	A axis Pulse output	A axis driver PUL- port
5V	5V output	A axis 5V port

**NOTE:**If the driver does not have a 5V port, connect the PUL+ and DIR+ to the control card 5V port

8
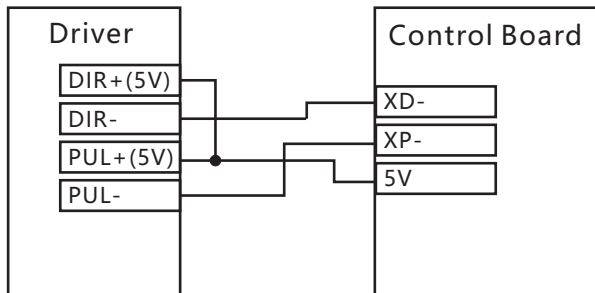
4.2.2 MKX-V motion card driver wiring

MKX-V motion card X axis output port:(Same as other axis)

| PUL+ | PUL- | DIR+ | DIR- |

| Port	Function	NOTE
PUL+	X axis Pulse output Positive	X axis driver PUL+
PUL-	X axis Pulse output Negative	X axis driver PUL-
DIR+	X axis Direction output Positive	X axis driver DIR+
DIR-	X axis Direction output Negative	X axis driver DIR-

Driver	Control Board
DIR+(5V)	DIR+(5V)
DIR-	DIR-
PUL+(5V)	PUL+(5V)
PUL-	PUL-
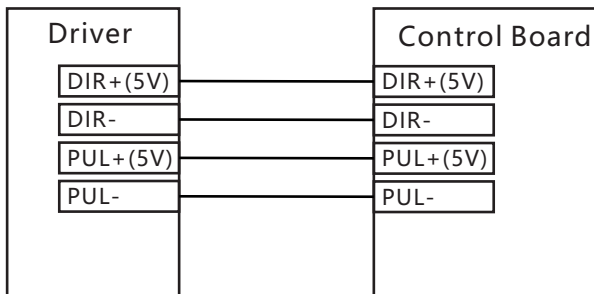
4.3 Spindle connection

4.3.1 Spindle frequency converter

Spindle output port

| FWD | 0V(DCM) | REV | PWM | 10V-in | AVI | 0V(ACM) |

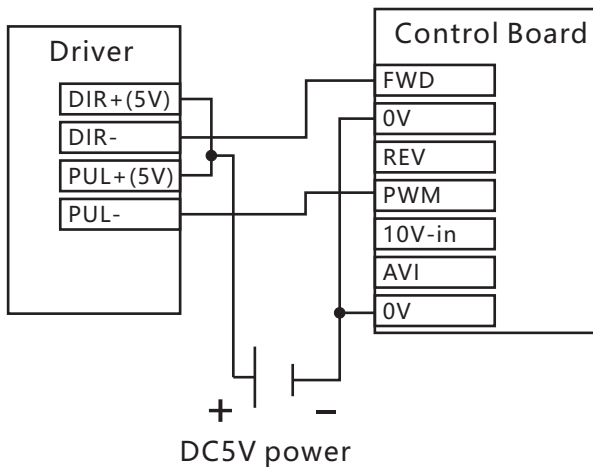| Port	Function	NOTE
FWD	Spindle forward signal	Converter forward
0V(DCM)	Forward signal ground	Forward GND
REV	Spindle reverse signal	Converter reverse
PWM	Spindle PWM output	Converter PWM
10V-in	10V Voltage input	Converter 10V
AVI	0-10V Analog voltage	Analog voltage port
0V(ACM)	Analog voltage ground	Analog voltage GND

Spindle frequency converter control speed by 0-10V analog voltage ,
wiring as follows:
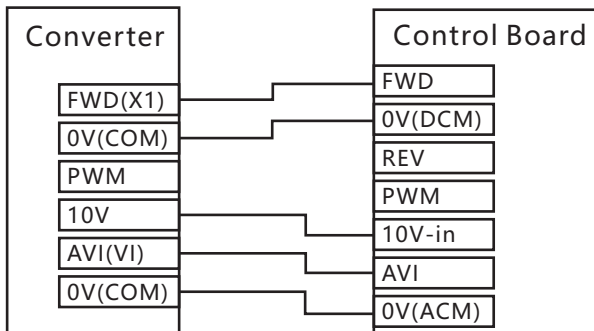
If you select PWM to control spindle speed, cancel the AVI port, and connect the PWM port to converter.

10

4.3.2 Spindle driver

Spindle connect stepper or servo driver, you need a 5V power supply, wiring as shown below

Driver		Control Board
DIR+(5V)		FWD
DIR-		0V
PUL+(5V)		REV
PUL-		PWM
		10V-in
		AVI
		0V

+   −

DC5V power

4.4 Home switch

Support NPN/PNP switch. Active low. Input current 5 mA, 24V

Home switch input port:

In0(X-HOME)	In1(Y-HOME)	In2(Z-HOME)	In3(A-HOME)
24V	0V		

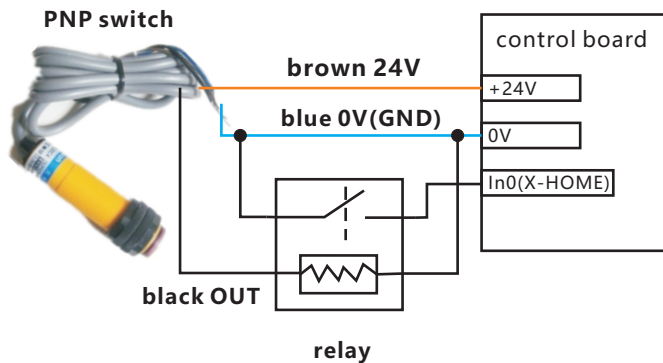| Port	Function	NOTE
In0(X-HOME)	X axis home signal	X axis home switch
In1(Y-HOME)	Y axis home signal	Y axis home switch
In2(Z-HOME)	Z axis home signal	Z axis home switch
In3(A-HOME)	A axis home signal	A axis home switch
24V	24V Output	Home switch 24V
0V	24V Ground	Home switch 24V GND

①NPN photoelectric switch, active low.
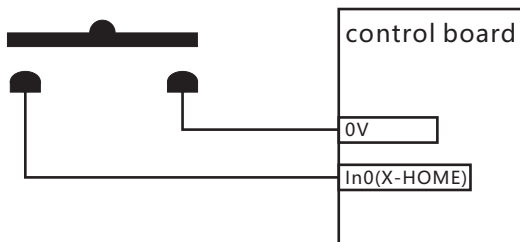   **Common types : SN04-N,SN05-N,SN10-N,SC1202-N, SC1204-N**

②The PNP switch requires a relay switch
Common types : SN04-P,SN05-P,SN10-P,SC1202-P,SC1204-P

PNP switch

control board

brown 24V

+24V

blue 0V(GND)

0V

In0(X-HOME)

black OUT

relay

③Mechanical switch, active low

control board

0V

In0(X-HOME)

4.5 Limit switch

Support NPN/PNP switch. Active low. Input current 5 mA, 24V

Limit switch input port: (Take the X.Y axis as an example)

| In6(X++) | In7(X--) | In8(Y++) | In9(Y--) |

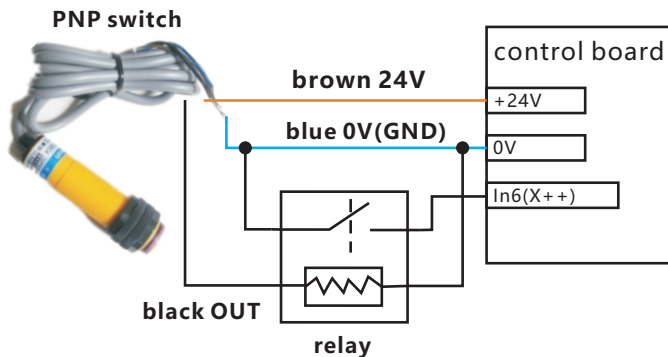| Port	Function	NOTE
In6(X++)	X positive limit signal	X axis positive limit
In7(X--)	X negative limit signal	
In8(Y++)	Y positive limit signal	
In9(Y--)	Y negative limit signal	

①**NPN photoelectric switch, active low.**
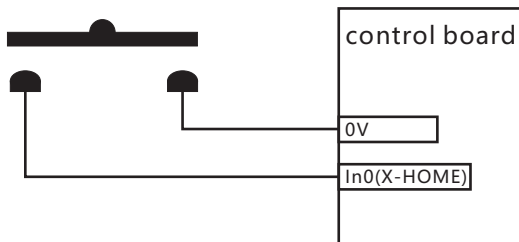   **Common types : SN04-N,SN05-N,SN10-N,SC1202-N, SC1204-N**
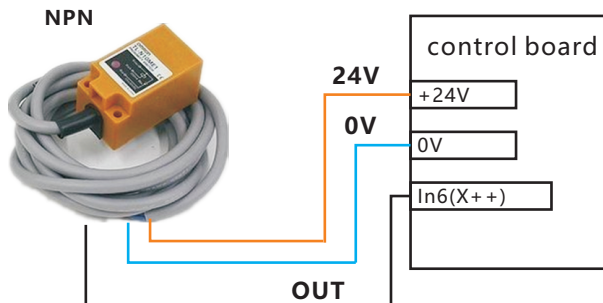
②The PNP switch requires a relay switch
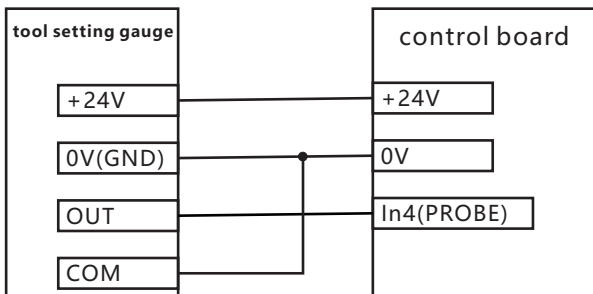**Common types : SN04-P,SN05-P,SN10-P,SC1202-P,SC1204-P**

③Mechanical switch, active low

4.6 tool setting gauge

Probe input port:

In4(PROBE)	24V	0V

Port	Function	NOTE
In4(PROBE)	Probe Z input signal	tool setting gauge signal
24V	24V output	tool setting gauge 24V
0V	0V Ground	tool setting gauge 0V
		(GND)

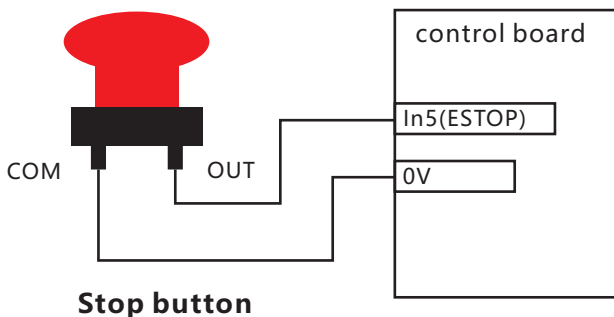If your tool setting gauge doesn't need power, please don't connect 24V port.

4.7 Emergency stop button

Support emergency stop signal input.Active low.

Emergency stop signal input port:

In5(ESTOP)   0V

| Port	Function	NOTE
In5(ESTOP)	Emergency stop signal	Emergency stop signal
0V	signal ground	

Stop button

4.8 Relay connection

MKX control board with 8 output port. OUT1 is spindle forward signal,OUT2 is spindle Reverse signal.OUT3-OUT8 port ,you can connect relays, relays can control cooling pump, etc.
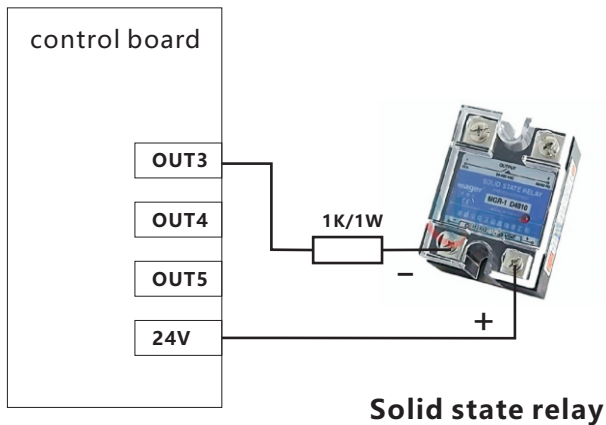
Supports maximum 24V, 80 mA relay.Active low.

Output port:

| OUT3 | OUT4 | OUT5 | OUT6 | OUT7 | OUT8 | 24V | 0V |

control board

| 0V |
| 24V |
| OUT3 |
| OUT4 |
| OUT5 |
| OUT6 |
| OUT7 |
| OUT8 |

+

−
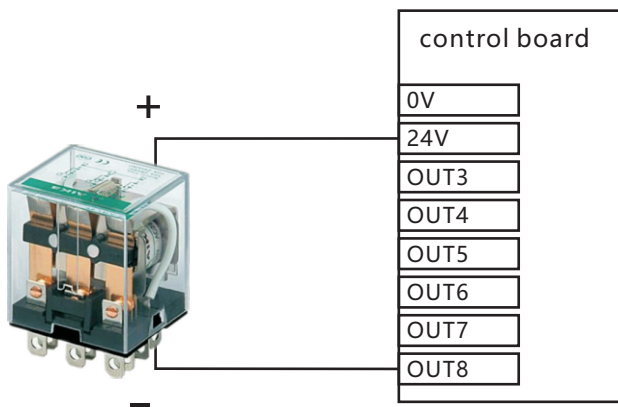
24V Coil type relay

If you connect Solid state relay, you need series connect a 1K/1W resistance.
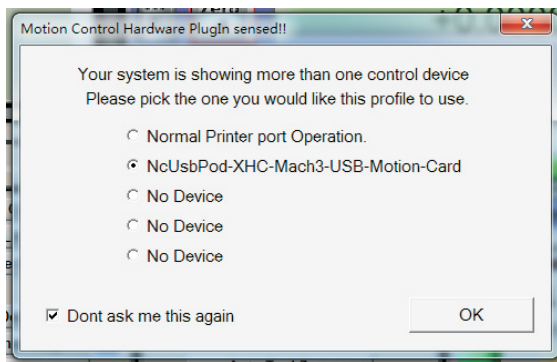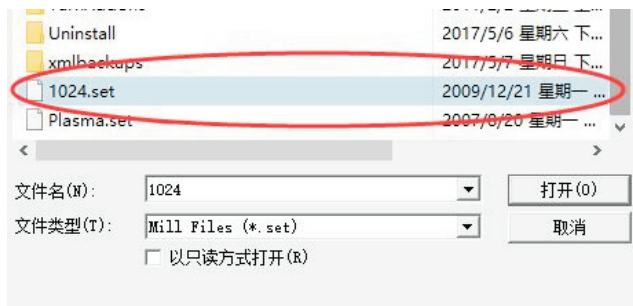

Solid state relay

5.Mach3 software operation

5.1 Open and Loading interface

Click on "Mach3mill" icon to open software, If there is an interface to select the plug-in, please chose "NcusbPod-XHC -Mach3-USB-Motion-Card" (see Figure).

If you open the software, there is a blank interface , please chose...View>>Load screens,then chose screen file(see Figure)

5.2 Spindle ON/Off

You can press the "Spindle CW F5" button to open or close spindle.(see Figure) , and you can manual input G code : M3(Spindle on),M5(Spindle off)
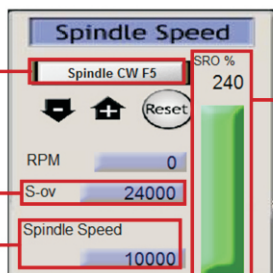
Spindle CW F5 :
Press the button Spindle on or off.

S-oV :
Spindle current speed

Spindle speed :
Spindle initial speed

SRO% :
Spindle speed percentage,

5.3 Jog move

Press the computer keyboard "Tab" key,

Cycle Jog Step :
press the button,
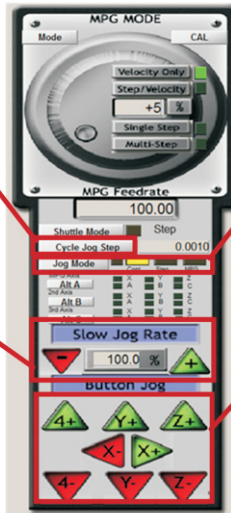chose Step value :
1mm'0.1mm'
0.01mm .etc.

Jog Mode :
Press the button,
chose jog mode.
"Cont","Step"
,"MPG"

Slow Jog Rate :
Percentage of Jog
move speed.

Button Jog :
X.Y.Z.4 axis Jog
move buttons,

5.4 Go to Home of machine

Press "REF ALL HOME" button, all axis will going to home of machine and coordinate clearing.You can click the "Machine coord`s" to see machine coordinate.
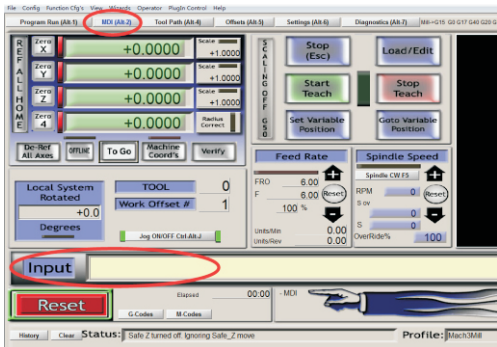

5.5 Go to Zero

Press the "Zero X" "Zero Y" "Zero Z" "Zero 4" buttons, The workpiece coordinates are cleared and set to the Zero of the workpiece.Click the "GOTO ZERO" button go to zero of workpiece.
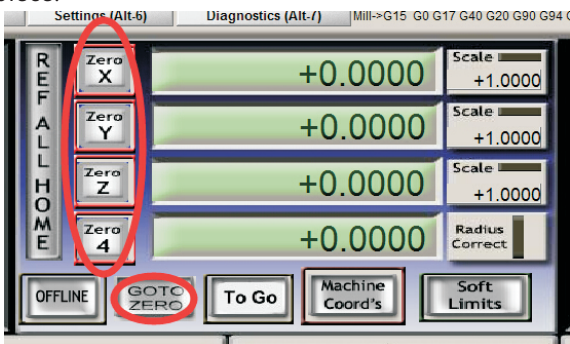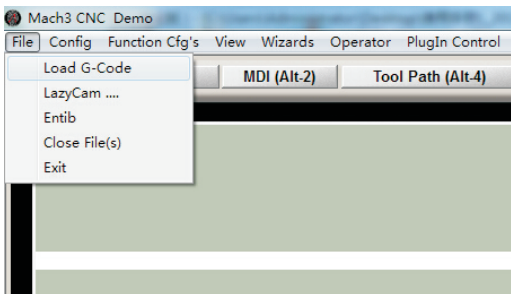
5.6 Manual input G code

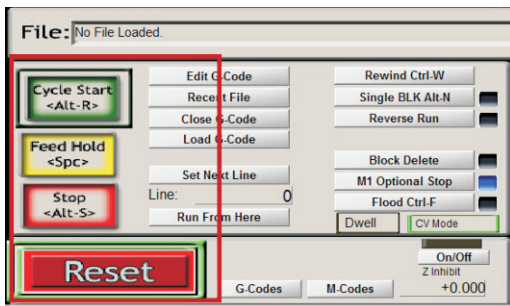When you need input G code,please click the "MDI(Alt-2)" ,then click the "Input" and input G code.

5.7 Load G code

MACH3 software only supports G code files.
Please choose "File">>"Load G-code" , and choose your processing file.

After the program is loaded, click "Cycle Start" and the program starts running;Click "Feed Hold" and program pause; Click "Reset" and software emergency stop.

5.8 How to control output ports

If you connect relays to control board output ports, you need some M macro code to control output ports ON or OFF. Open our CD, ...English Manual>>macro folder, and cpoy all M code to...C:/Mach3/macros/Mach3Mill folder.

M200 code : ActivateSignal (OUTPUT3)   >>Output 3 ON
M201code : DeactivateSignal(OUTPUT3)   >>Output 3 OFF
....

Other output ports M codes, and so on , You can change the "3" to "5" or "6" (3 of OUTPUT3) and save as M2XX code , then you can control other output ports by the M2XX code. M930 is Z floating tool code.

In the MACH3 software input bar, manually enter M code, you can open or close the output port , You can add M code to your program and automatically open the output port.

5.9 Z Auto Tool Zero

1.Open our CD...English Manual>>macro folder, and cpoy M930 code to...C:/Mach3/macros/Mach3Mill folder.

2.Open the M930 file in TXT format , then copy all program code. Open MACH3 software, click the "Operator"option , click " Edit button script" , (Figure 1) .Then click "Auto Tool Zero" button,delete the code in the button script, and then paste the copied M930 code program. (Figure 2)

3.In "Offsets"interface to sets Gage Block Height (Figure 2) After the setting is completed,click" Auto tool zero" .
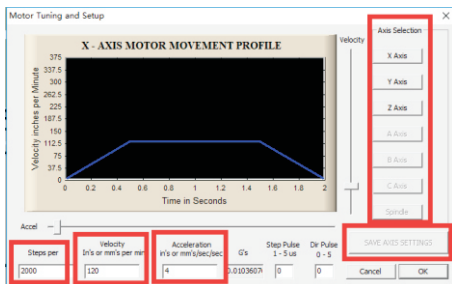

1
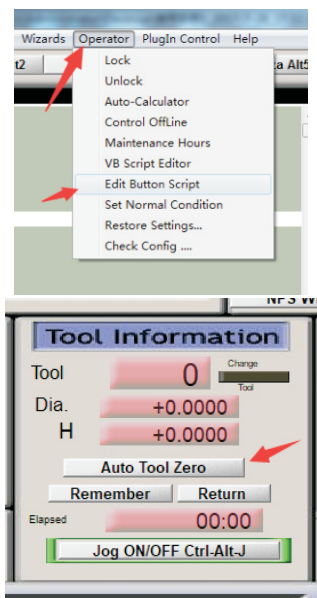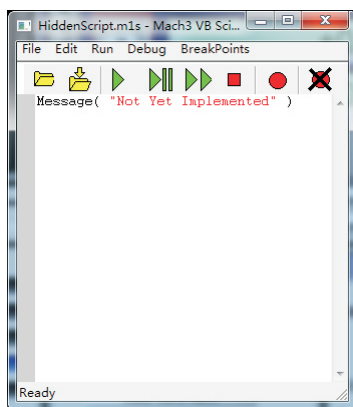
2
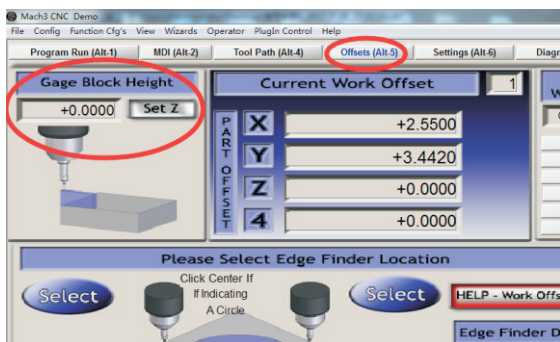
3

6.MACH3 Software parameters

6.1 Motor tuning

Open Mach3 software , select "Config" >> "Motor tuning" option ,

In the window, first select an axis you want to configure, next enter parameters and click „SAVE AXIS SETTINGS". Now you can select and set the next axis. If we forget to click on „SAVE AXIS SETTINGS" all the changes will not be saved.

1.Steps per:For correct axis scaling you must know how many steps falls on a unit (millimeter, inch or degree). To understand how to calculate it,

2.Veocity:In "Velocity" area, we set an axis speed. If we are using millimeters as an unit then speed is shown in mm/min, if we use degrees - degree/min, if inch - inch/min. Max. speed value is very individual and depends on what motors, drives etc. were used. For the first tests, we recommend to enter relatively small value e.g. 4000mm/min, in case something went wrong.

3.Acceleration: we define acceleration for an axis. At the beginning, we recommend to enter something about 200mm/s2.

6.2 Ports and Pins

6.2.1 Motor outputs
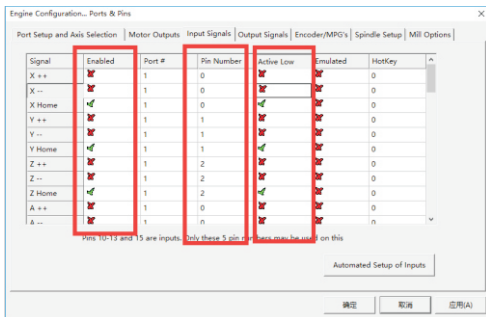
Open Mach3 Software , select "Config">> "Ports and Pins" >> "Motor tuning"
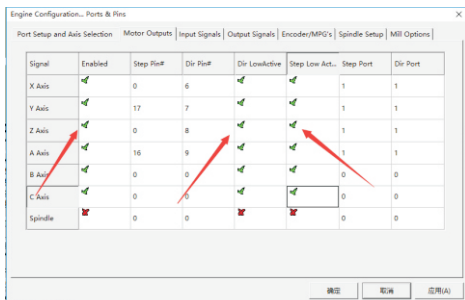
1.Enable:Tick to make the axis output
2.Dir Lowactive:Motor direction selection
3.Step Lowactive:Tick to make the axis output

6.2.2 Input signals

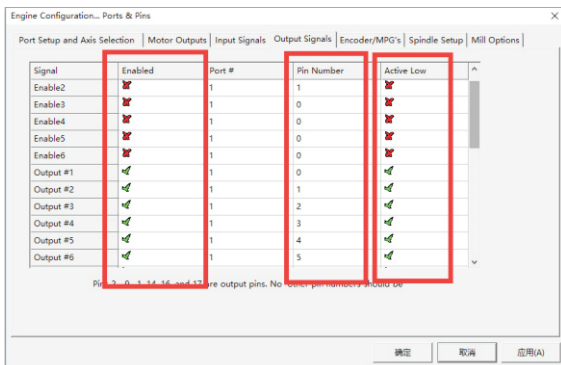Open Mach3 software , select "Config">> "Ports and Pins" >> "Input signals "

1.**Enable:**Tick to enable input ports
2.**Pin Number:**The control card input port
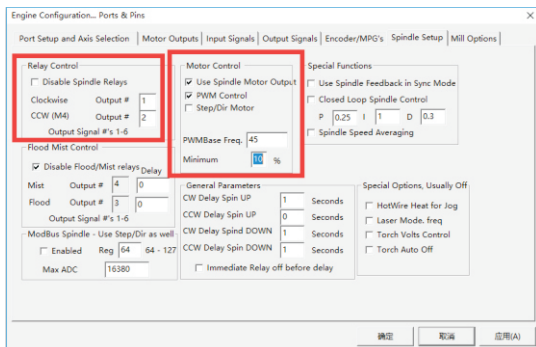3.**Active Lovw:**Low level active, tick to enable

6.2.3 Output signals

Open Mach3 software , select"Config">> "Ports and Pins"
>> "Output signals "

1.**Enable:**Tick to enable output ports
2.**Pin Number:**The control card output port
3.**Active Lovw:**Low level active, tick to enable

6.2.4 Spindle setup

Open Mach3 software , select"Config">> "Ports and Pins"
>> "Spindle setup"

1.Disable spindle relays:Cancel the tick
2.Motor control:if your spindle is VFD, tick "PWM" ;if your spindle is driver, tick "Step /dir motor"

6.3 Software limit

Open Mach3 software,select"Config">>"Homing/limits" option.
"Soft Max":Software limit maximum machine coordinates
"Soft Min":Software limit minimum machine coordinate
After setting up, click the "soft limit" button on the software to open the software limit function. When normal, the button will have a green light, indicating that the software limit is valid. It is important to note that if your machine's current mechanical coordinates are not within the limit of the software you set, the press button can't turn on this function. Please move the machine to the limit and press the button.

Motor Home/SoftLimits

Entries are in setup units.

Axis	Revers...	Soft Max	Soft Min	Slow Z...	Home ...	Home ...	Auto Z...	Speed %
X	✔	300.00	-1.00	1.00	0.0000	✘	✔	40
Y	✔	400.00	-2.00	1.00	0.0000	✘	✔	40
Z	✔	-1.00	-70.00	1.00	0.0000	✔	✔	40
A	✘	370.00	-370.00	1.00	0.0000	✘	✔	20
B	✘	100.00	-100.00	1.00	0.0000	✘	✔	20
C	✘	100.00	-100.00	1.00	0.0000	✘	✔	20

G28 home location coordinates

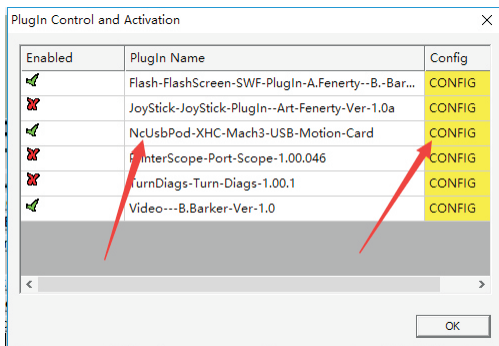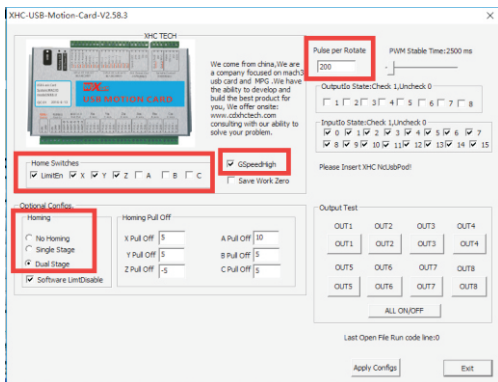| X	0	A	0
Y	0	B	0
Z	0	C	0

OK

6.4 Driver plug-in control

Open Mach3 software,select "Config">>"Config Plugins" >> "XHC Ncpod Config" clik "Config" button to open.

No Homing: not go to machine origin

Single Stage: go to machine origin only once

Dual Stage: go to machine origin twice

Home Switches: tick "LimitEn" enable , and tick X.Y.Z and so on to allow it to have a limit function

GSpeedHigh: Tick,Increase the arc running speed

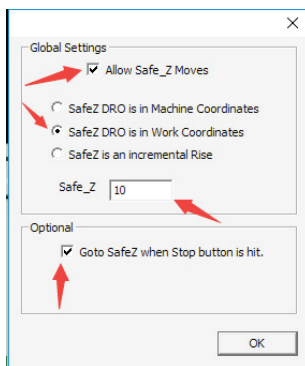Pulse per Rotate: if your spindle is driver control by Pulse/ Dir, you need set it up.

6.5 Z safety height

Open Mach3 software , select"Config">> "Safe Z setup" option.
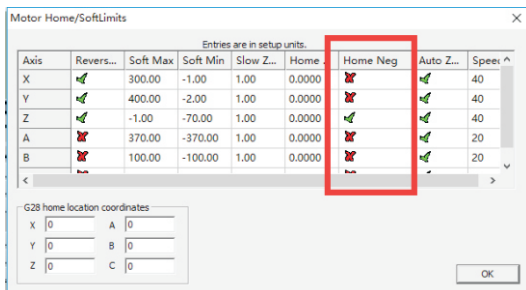
Tick"Allow safe Z move" enable;

tick "Safe Z DRO is in work coordinates" enable;
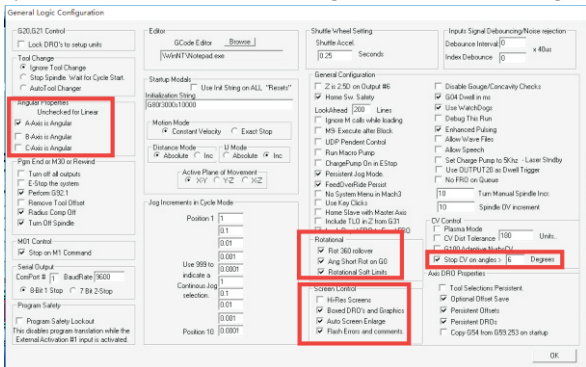
Fill in the "safe Z" height value;

6.6 Motor direction of go to Home

Open Mach3 soft,select"Config" > > "Homing and Limits" option,when you click "Ref all home" button, the origin of the direction of an axis error , you can change"Home Neg"option, tick or cancel tick to make it correct.

6.7 General Config

Open Mach3 soft,select"Config">>"General Config"option

A-Axis angular: If your A axis is the axis of rotation, and the angle of rotation is 0-360 degrees.please tick it.

Rotational :

"Rot 360 rollover": If your A axis is the axis of rotation, the angle of rotation is 0-360 degrees.please tick it.

"Ang Shot Rot on G0": if you tick "Rot 360 rollover",Please tick it too.Shortest path of circumferential motion.

CV control : If your arc is not good, it turns into a right angle or a straight line, please modify the value of "Stop CV on angles" , and tick ti.Until you find a suitable value for you.

Screen control : When you first open the software, the screen is not full screen display, please tick "Hi-Res screens"and "Auto screen enlarge" , Save the settings and reopen the software.

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