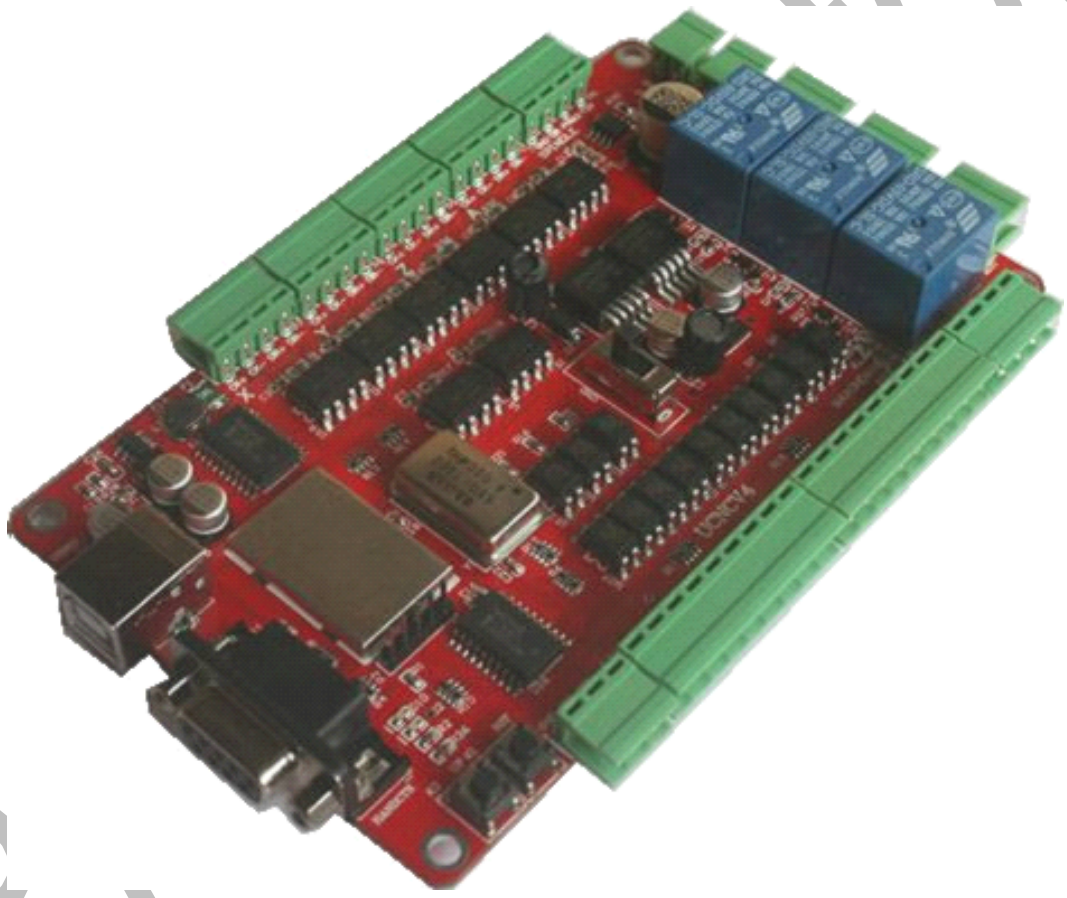
Changzhou RATTM Motor Co.,Ltd



USBCNC BOARD USER MANUAL

Content

1 overview

1.1 Products brief introduction

USBCNCV4.0 is a high performance motion controller which based on PC software USBCNC control, the system can complete the conversion from G code to connect stepper motor's driver motion control signal without requiring any additional hardware and software. This control card is compatible with most stepper driver and servo driver,it is a perfect controller that instead of parallel Mach3 interface board.

1.2 Computer system requirement

Minimum configuration:

1) CPU:1GHz

2) Memory: 512MB

3) 500MB free disk space

4) DIRECTX9 graphics device with WDDM 1.0 or higher driver

5) USB 2.0 interface

6) Net FRAMEWORK 3.5SP1

The recommended configuration:

1) CPU:2GHz dikaryon

2) Memory: 2GB;

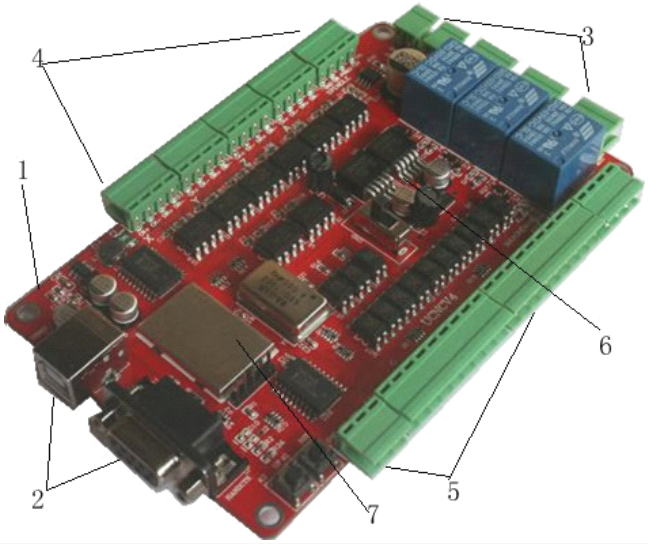
3) 1G free disk space

4) DIRECTX9 graphics device with WDDM 1.0 or higher driver

5) USB 2.0 interface

6) Net FRAMEWORK 3.5SP1

1.3 Production appearance and size



1.After the revision,V4 version using the red PCB board, PCB size is135.3*82.5mm.

2.The front of the narrow edge placed with USB communication interface and DB9 hand control interface for the convenience of customers drawn from the case panel directly;

3.The back-end of narrow edge is power input and output interface and 3 relay output interface; relay is strong interference source, relay away from the design of main control chip, it is conducive to the stability of the board;

4.One of the two wide sides is stepper motor and principal axiscontrol signal output;

5.The another side of two wide sides is the emergency stop, manual speed input, limiting input interface; one side for the input, another side output connection mode is simple and convenient;

6.5V and 12V power module compact independence, security, stability;

7. External ensure the stability of the system work effectively with crystal active and main control chip shield;

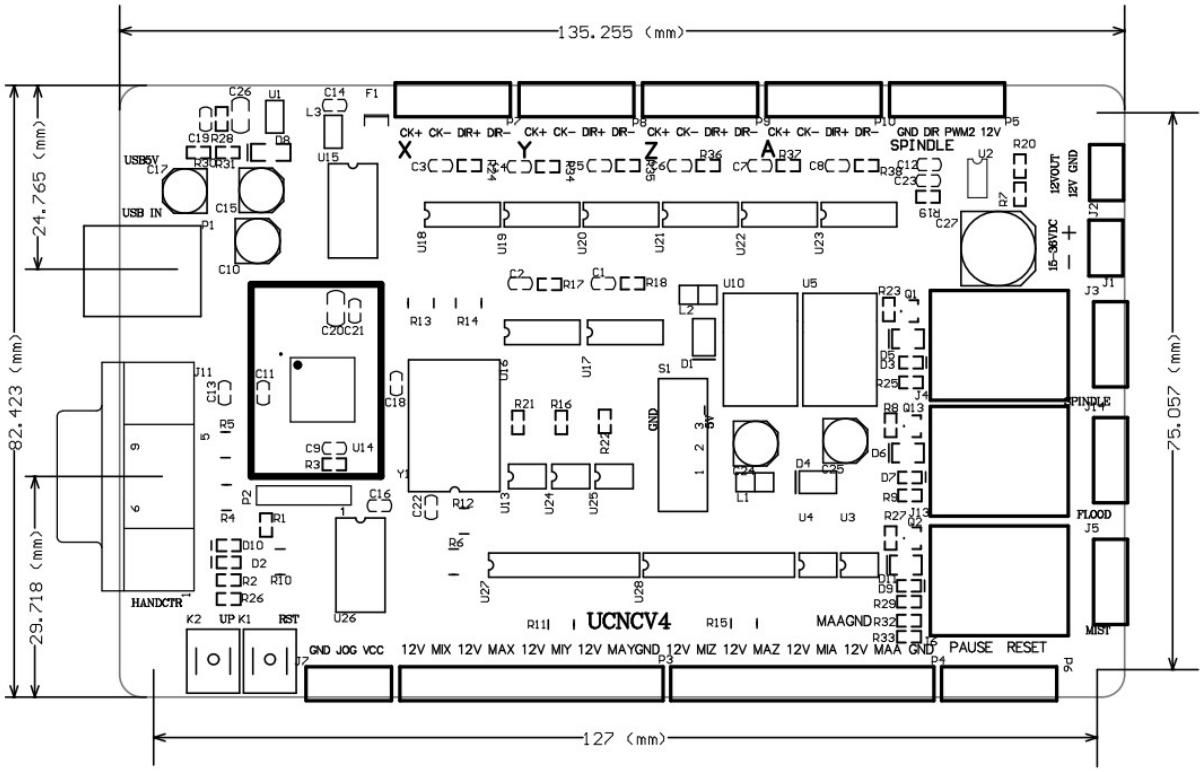


Figure 1-1. Product outline dimension drawing

As Figure 1-1shown, outline dimension is 135.3*82.5mm, product positioning hole installment dimension is 127*75mm

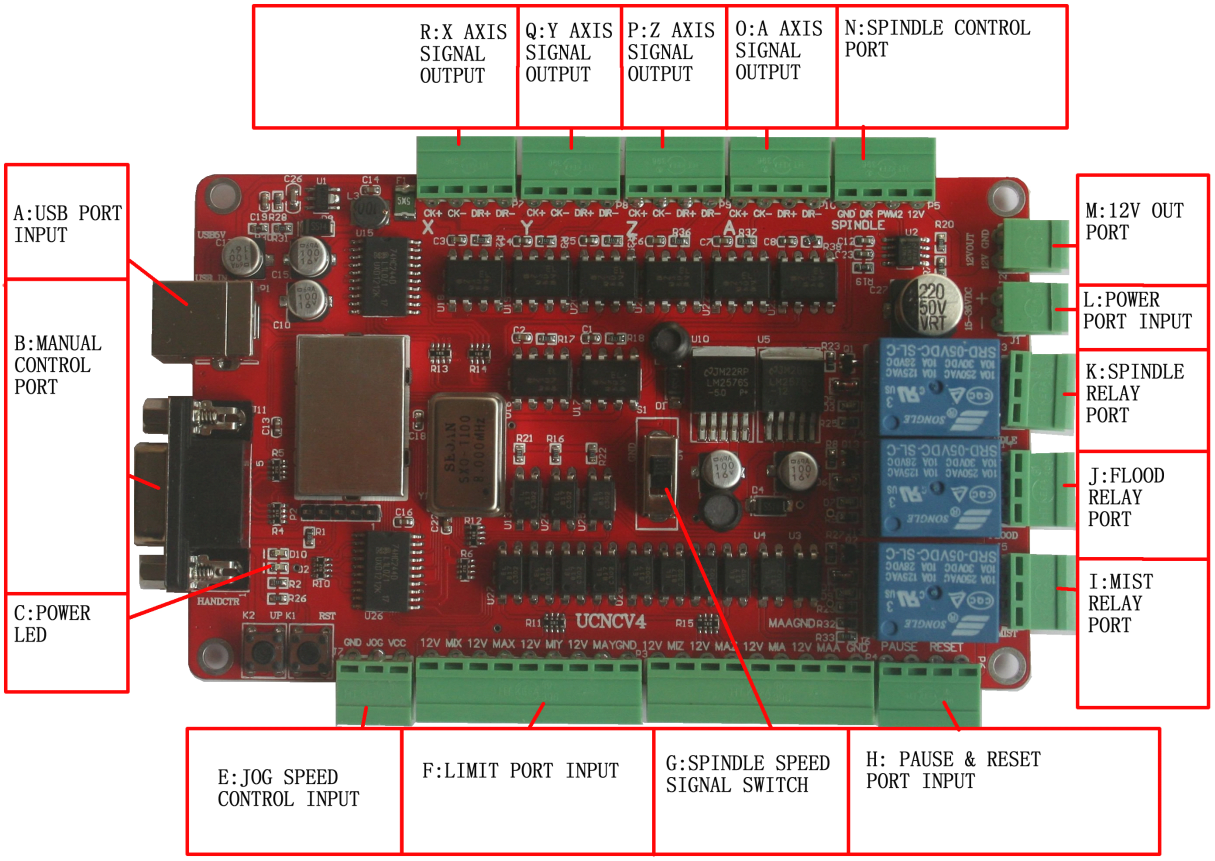


Figure1-2. the overall appearance picture

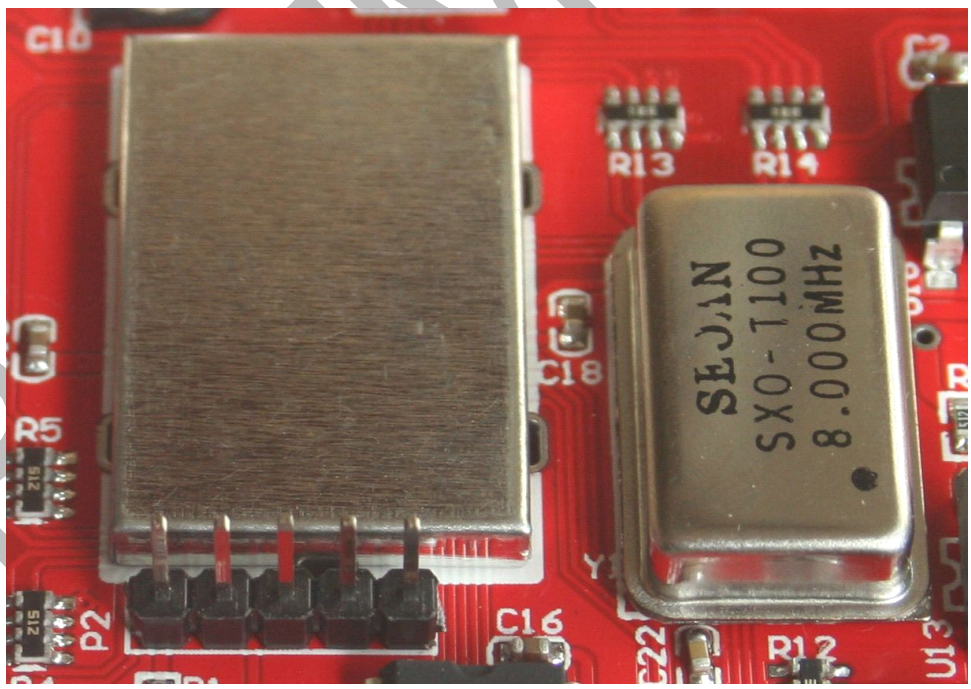


Figure 1-3. features 1 main control chip

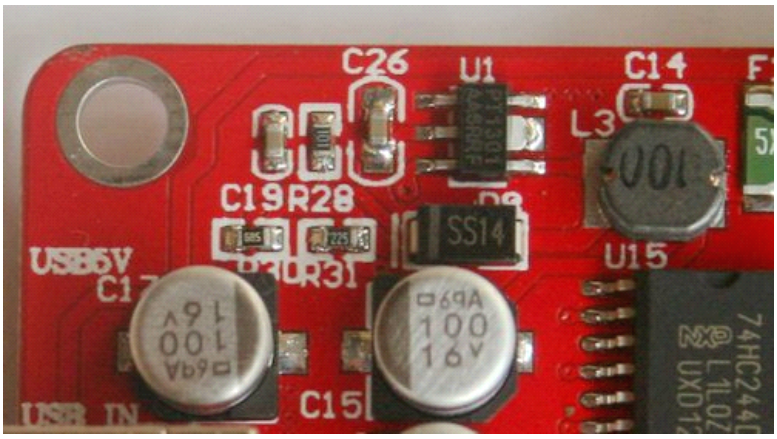


Figure 1-4. features 2 stable power supply system

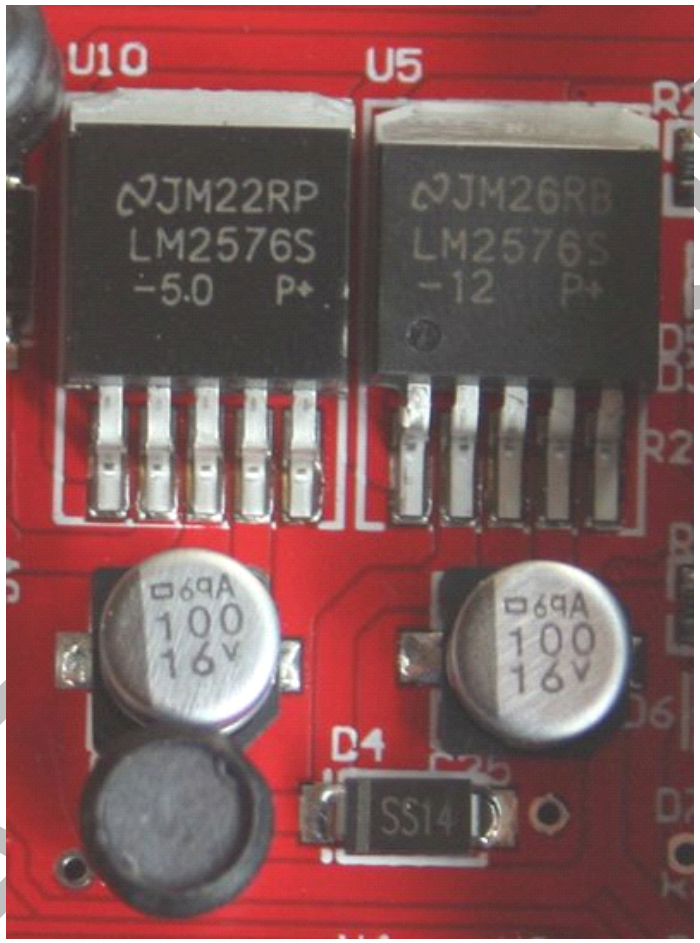


Figure 1-5. features 3 double regulated power supply

1.4 Note and Warning

-  No rain,the board is high performance precision equipment,rain can cause short circuit
-  Cautions warn, please strictly in accordance with the documentation for installation
-  High-pressure, the board away from high voltage

Chapter two detailed function instruction

2 Detailed functional introduction

2.1 electrical parameters

A. Card input voltage: 15~36V;

B. Limit port working voltage: 12V;

C. Stepper motor control signal output voltage: 5V;

D. External power supply voltage: 12V;

Special note: marked 15~36VDC is input interface, marked 12V is output interface, can not wiring wrong.

Chapter two detailed function instruction

2.2 Function and definition of each module

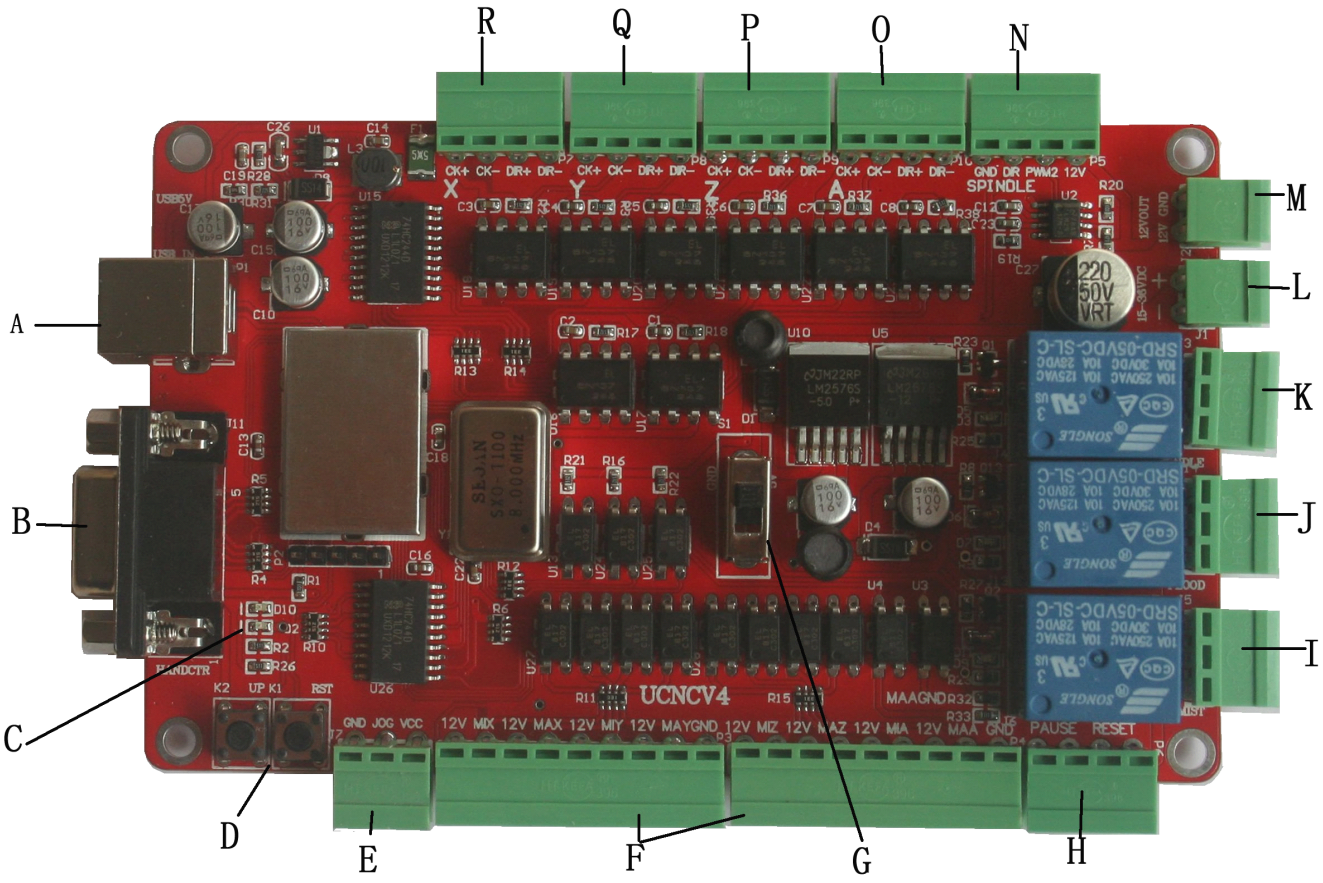


Figure2-1 features 3 double regulated power supply

A) USB interface, connect to the computer USB port through this interface,you can use the software usbcnc to control this board, this USB interface is the square B interface,please use USB2.0 connection cable which with shielding and magnetic and not to exceed 2 meters in length.

B) Hand control box interface, external hand control box can use this interface to access the system, the interface is standard DB9 form, its definition as shown in the following table.

Table 4-1 Hand control interface definition

Interface serial number	1	2	3	4	5
Interface definition	Common port	A axis corotation	Z axis down	Y axis forward	X axis left move
Interface serial number		6	7	8	9
Interface definition		A axis reversal	Z axis up	Y axis back	X axis right move

C) Power indicator, as shown in figure the above D10 indicator is the front-end USB power indicator, this light lit up after USB port connection with computer , D2 in below is the back -end power indicator light, this light also will lit up when board card work power access with it.

D) Board card firmware upgrade button UP and reset button RST, firmware has been updated, so upgrade button don't need to use, reset button be used when need to restart due to the board fault.

E) Manual speed control interface,wiring connection mode as shown in the following figure .

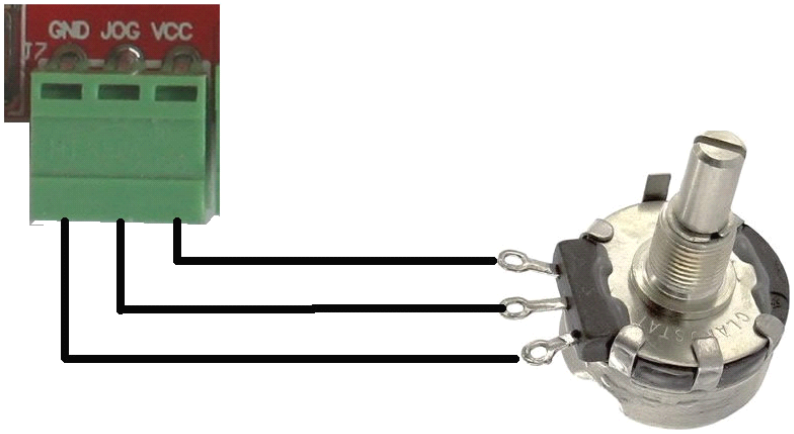


Figure 2-2 Manual speed control interface connection mode

F) Limit input interface. Limit interface definitions are listed in the following table

Table 4-2 Limit interface definition

Interface serial number	12V	MIX	12V	MAX	12V
Interface definition	Switch common port	X lower limit	Switch common port	X upper limit	Switch common port
Interface serial number	MIY	12V	MAY	GND	
Interface definition	Y lower limit	Switch common port	Y upper limit	GND	
Interface serial number	12V	MIZ	12V	MAZ	12V
Interface definition	Switch common port	Z lower limit	Switch common port	Z upper limit	Switch common port
Interface serial number	MIA	12V	MAA	GND	
Interface definition	A lower limit	Switch common port	A upper limit	GND	

Limit switch connection as shown in figure 1-8~ figure 1-10

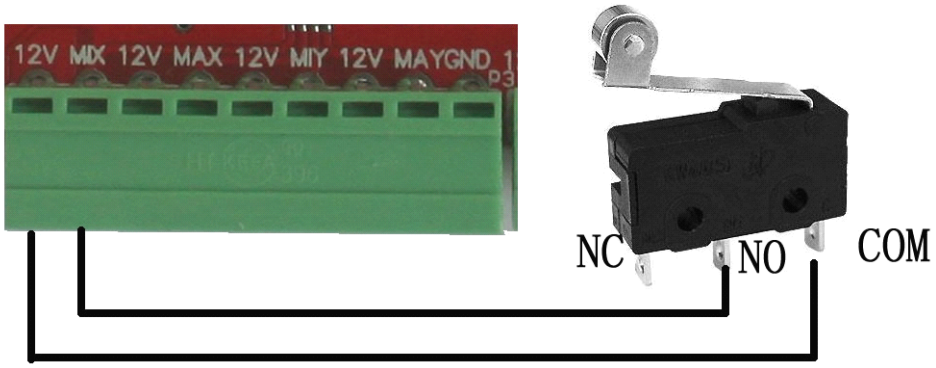


Figure 2-3. Common microswitch connection method

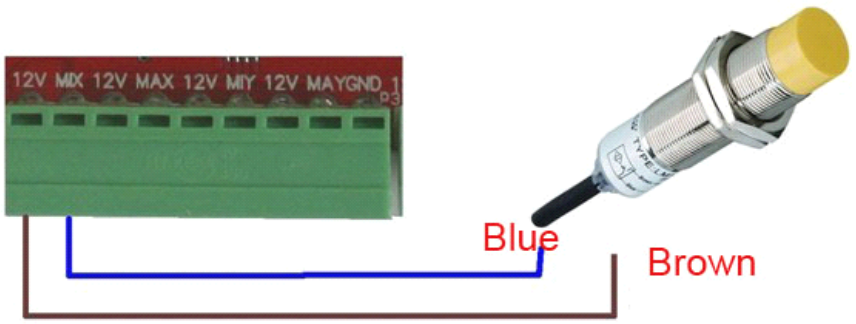


Figure 2-4. 2 wire inductive proximity switch connection

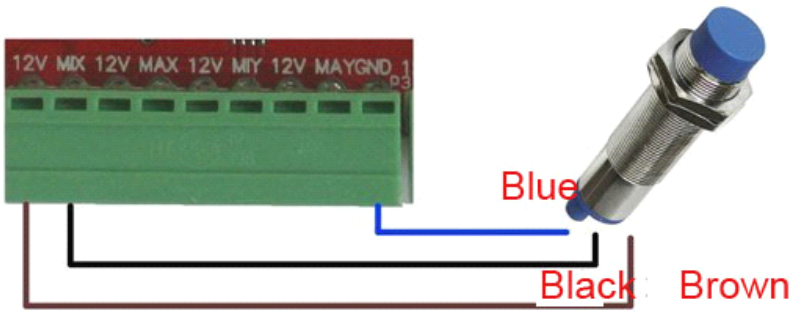


Figure 2-5. 3 wire inductive proximity switch connection

G) Spindle control selector switch, as shown in Figure 1-6, the switch shift up to the S1 position for the spindle speed control ; switching switch position On below for output control MIST relay .

H) External pause and reset interface; the 2 feet marked PAUSE connect suspend switch, 2 feet marked RESET connection reset switch.

I) Software MIST control relay output, software settings output marked 3, defined from top to bottom, 3 feet is **NC**, **NO**, **COM**.

J) Software FLOOD control relay output ,output marked 2 in the software settings , defined from top to bottom, 3 feet is **NC**, **NO**, **COM**.

K) Software SPINDLE control relay output , output marked 1 in the software settings , defined from top to bottom, 3 feet is **NC**, **NO**, **COM**.

L) Board working power input, levels above negative below as the board signed, please pay attention to input DC 15~36V, overvoltage or reverse connection will damage the board.

M) 12V output interface. as the board marked, GND is -, 12V is +.

N) Spindle control output interface: definitions turn for GND DIR PWM2 12V, respectively is ground,direction signal output, spindle 0~10V speed control signal output, 12V output.

O) A axis stepper motor control signal output, the definition is:CK+\CK-\DIR+\DIR-,respectively is impulsion positive, impulsion negative, direction positive, direction negative, the board using common anode connection method, so CK+ and DIR+ linked together to contact to the 5V on the board, this board does not support the common cathode connection method, the specific wiring methods refer to figure 1-11. This board does not contain the enable control, now most of driver in the market should not connect with the EN signal and directly work regularly by default .

Chapter two detailed function instruction

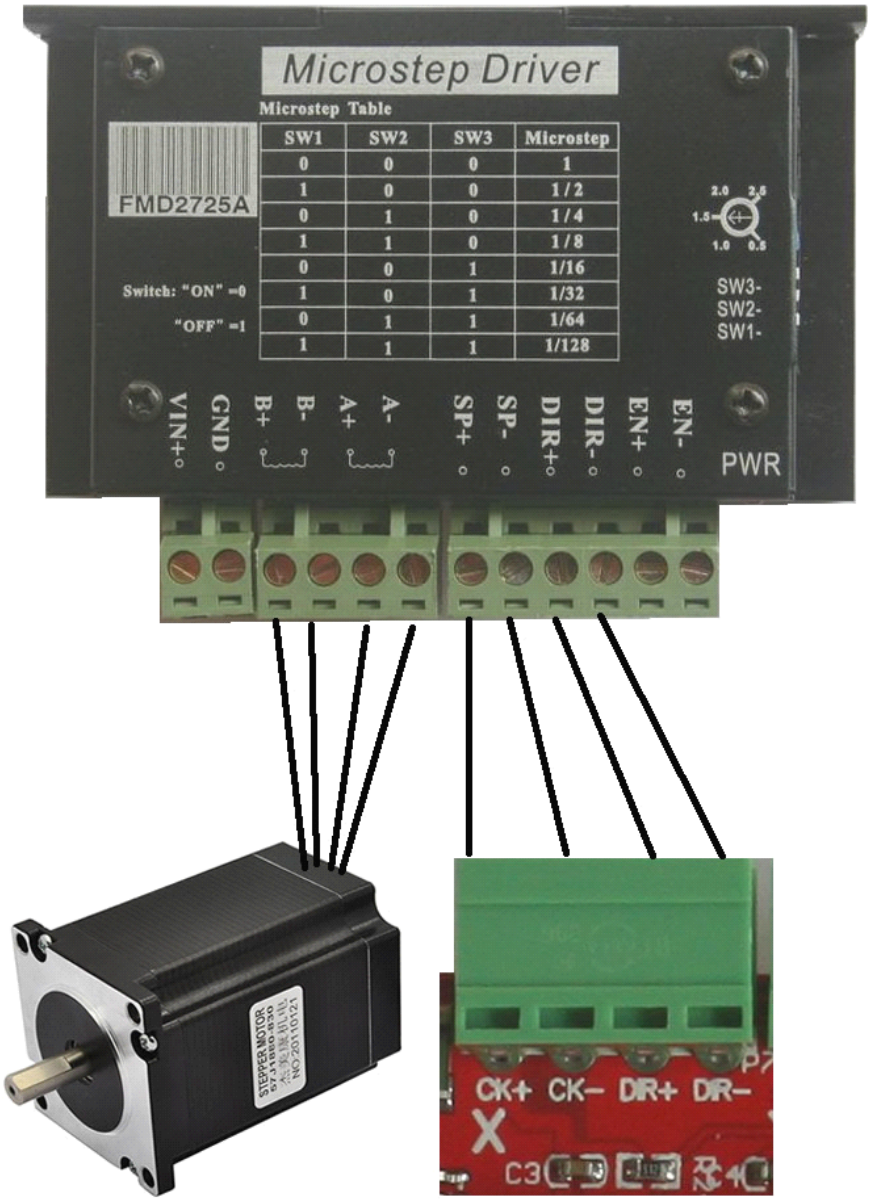


Figure2-6 connection methods with stepper motor drives

P) Z axis stepper motor control signal output, the definition is CK+\CK-\DIR+\DIR-, respectively for pulse positive, pulse negative, direction positive , direction negative, the board using anode common connection method, so CK+ and DIR+ linked together connect to the 5V on the board,this board does not support the common cathode connection method.

Q) Y axis stepper motor control signal output, the definition is CK+\CK-\DIR+\DIR-,respectively for pulse positive, pulse negative, direction positive , direction negative, the board using anode common connection method, so CK+ and DIR+ linked together connect to the 5V on the board,this board does not support the common cathode connection method.

R)X axis stepper motor control signal output, the definition is CK+\CK-\DIR+\DIR-,respectively for pulse positive, pulse negative, direction positive , direction negative, the board using anode common connection method, so CK+ and DIR+ linked together connect to the 5V on the board,this board does not support the common cathode connection method.

Chapter five question and answer

3 Software installation

3.1 DirectX Install

In real that install this softare is a little complex,because it developed by vc.net,and it need directx and .net framework software package support,also be strict required for these 2 type software package version,so it is better use our software to install which is in our CD,if meet the software package conflict or can't run the software after install it,pls use a new system PC to install this software,**pls remember this!**

Our CD contain USBCNC software,driver,directx and net framework,user manual,software install guide and register code.each controller match independent register code,so when you get pls safe keeping it.

Figure 3-1. Above is CD detail

directx_9c_redist

First install and run the "directx_9c_redist"

This software install is simple

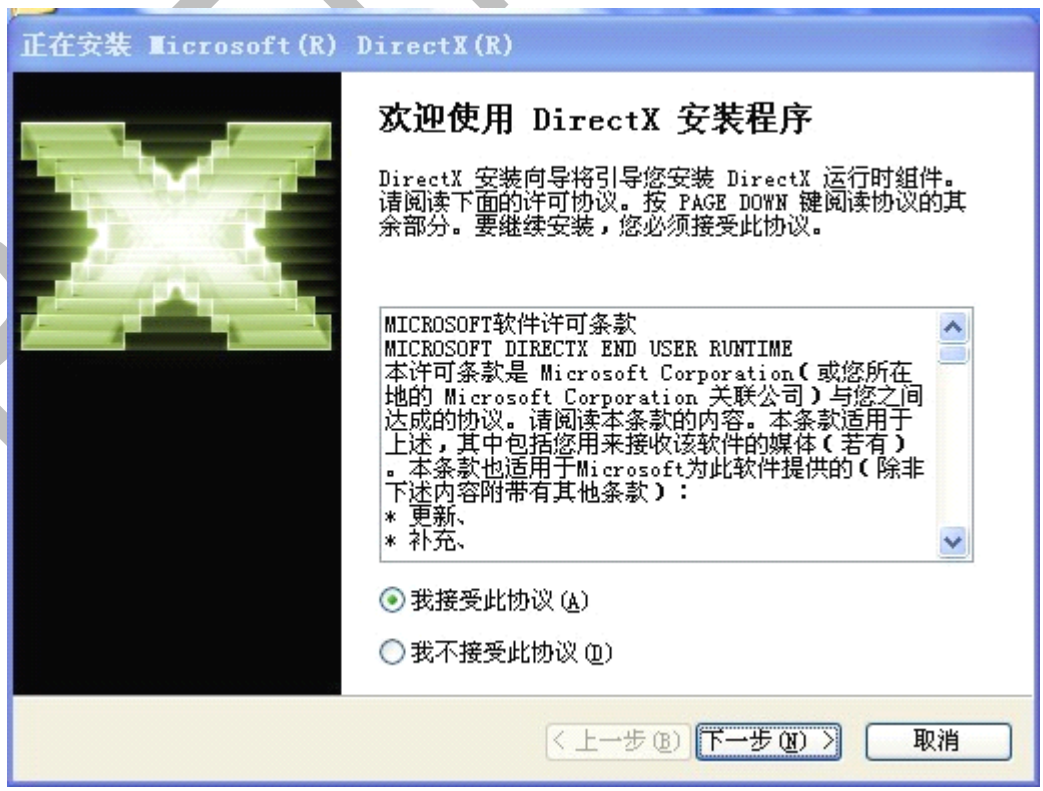


Figure 3-2. DIRECTX 1 installation process

Click accept and next step,

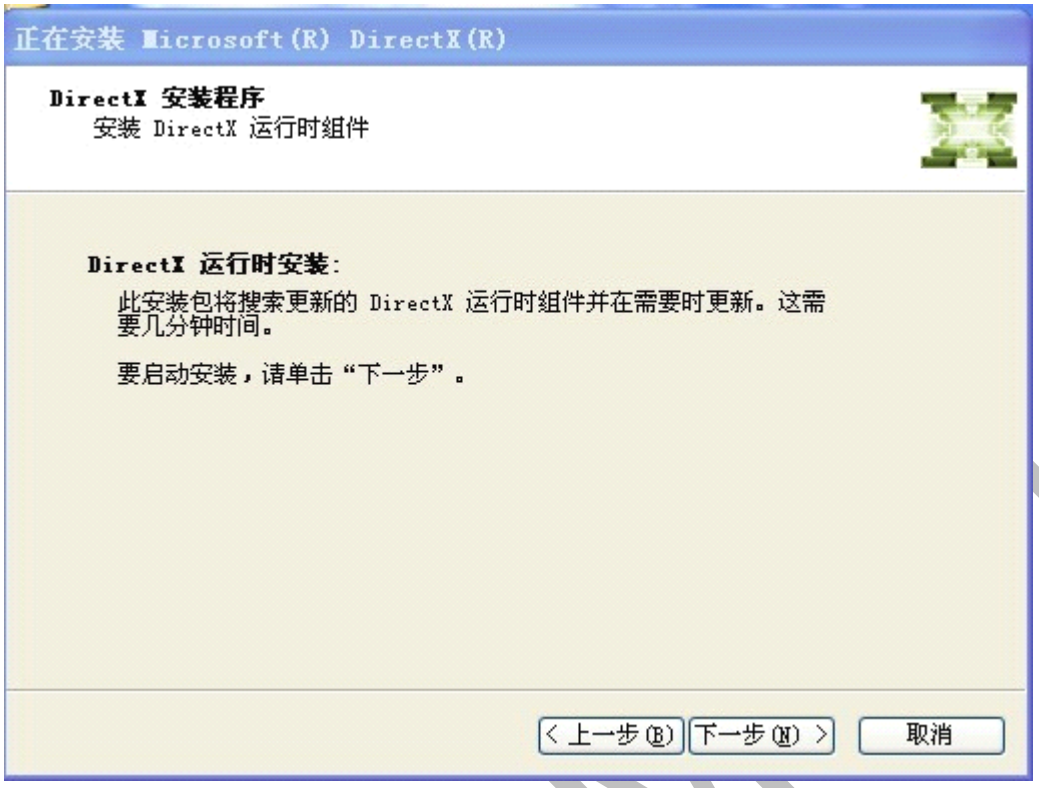


Figure 3-3. DIRECTX 1 installation process

Continue to next step

2: Run “dotnetfx35”  **install “net framework3.5sp1.”**

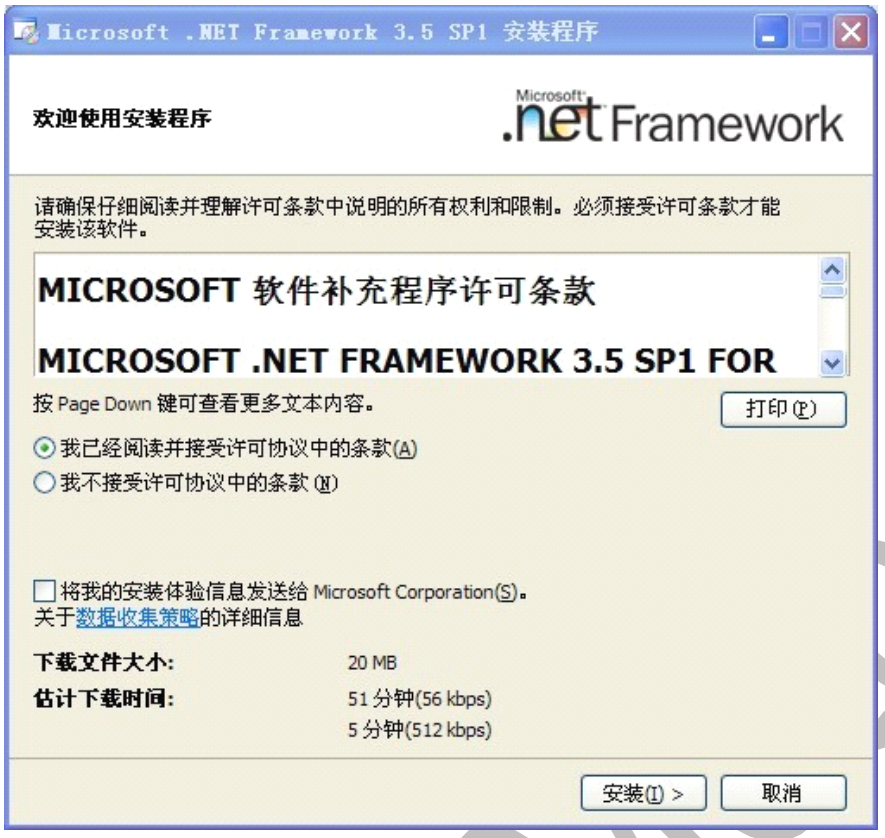


Figure 3-4. NETFRAME3.5 1 installation

Select the accept then click install

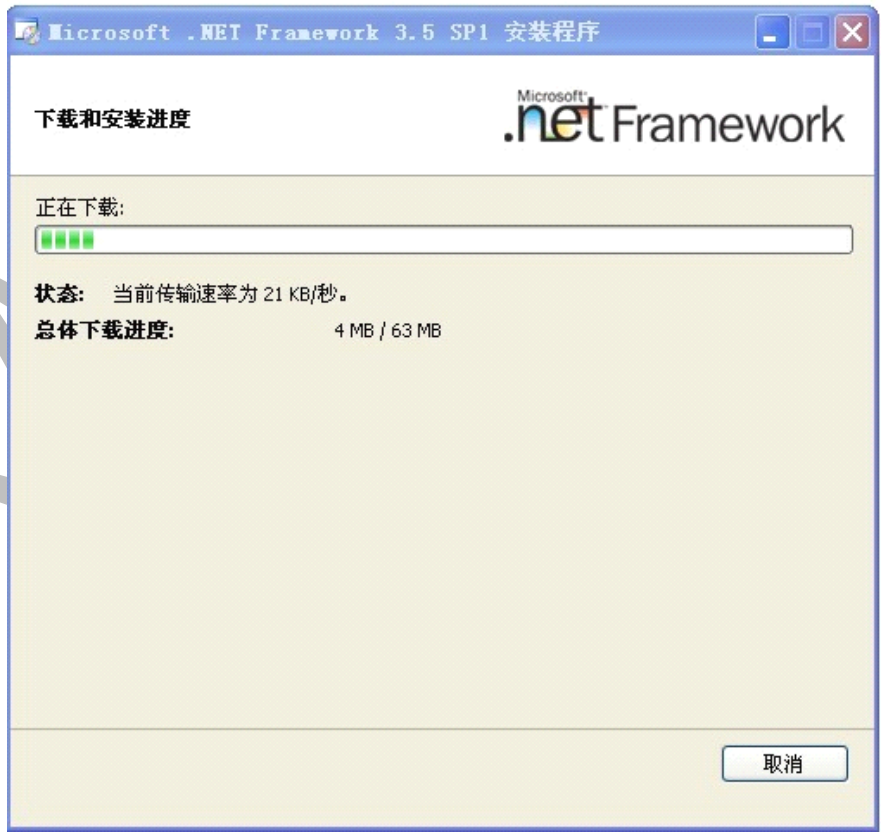


Figure 3-5. NETFRAME3.5 2 installation

Continue to click “ok”

3: Run CNCUSB_Setup **install the main program**

Figure 3-6. USBCNC installation step 1

Click”next”

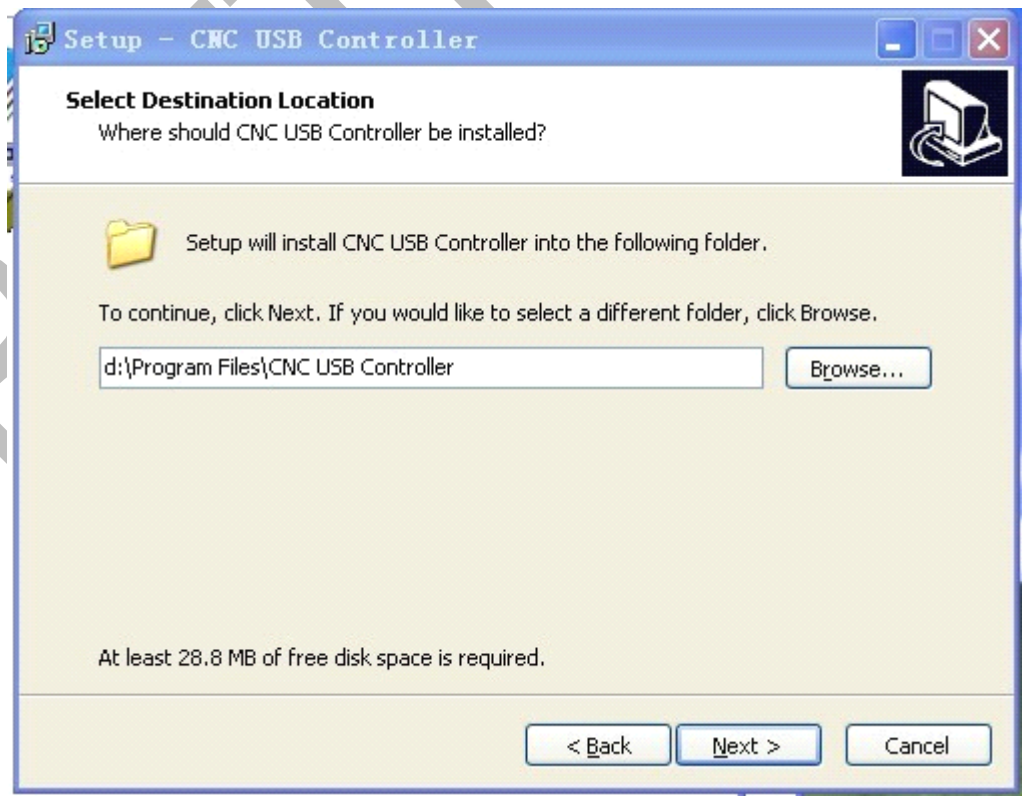


Figure 3-7. USBCNC installation step 2

Slect suitable install path,then “next”

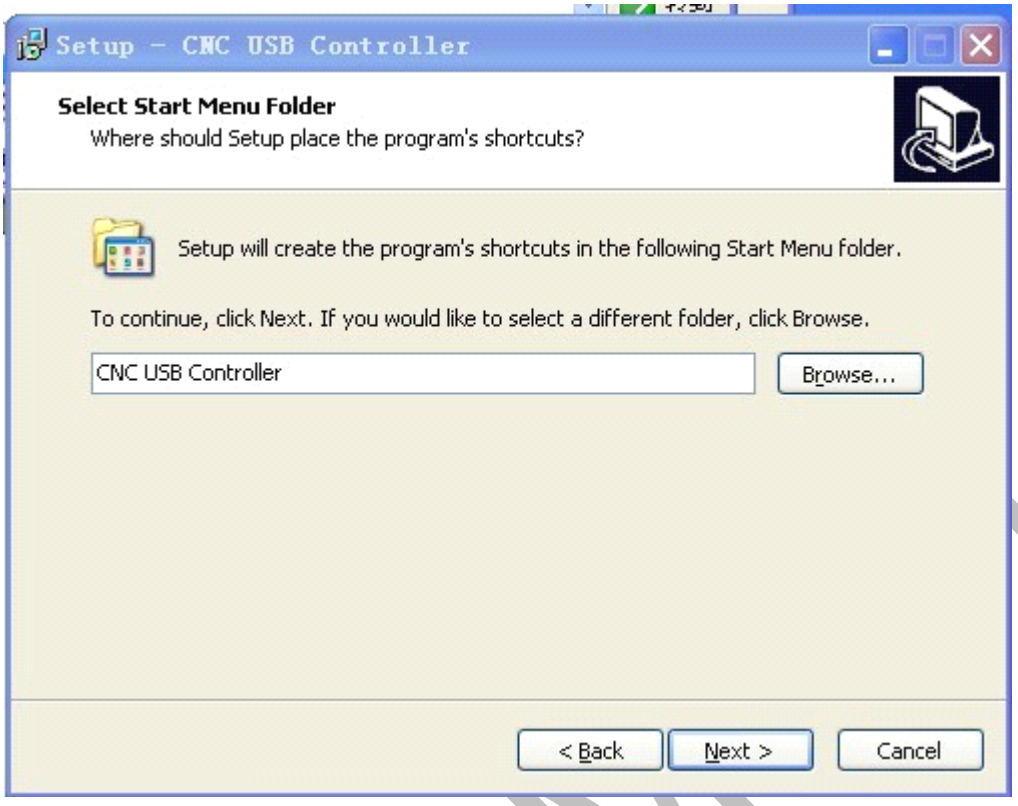


Figure 3-8. USBCNC installation step 3

“next”

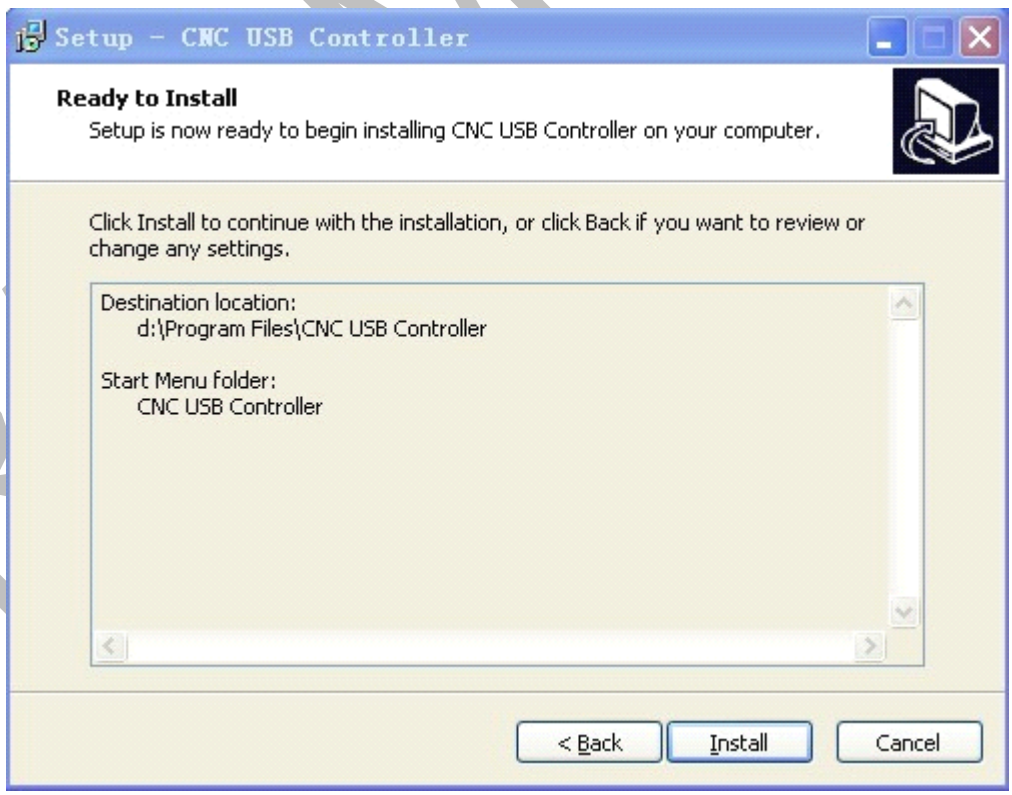


Figure 3-9. USBCNC installation step 4

Click “INSTALL” to begin

Figure 3-10. USBCNC installation step 5

The installation is complete

4: Intsall USB driver “CNCUSBControllerDriver”

Figure 3-11. the USB driver installation step 1

"next"

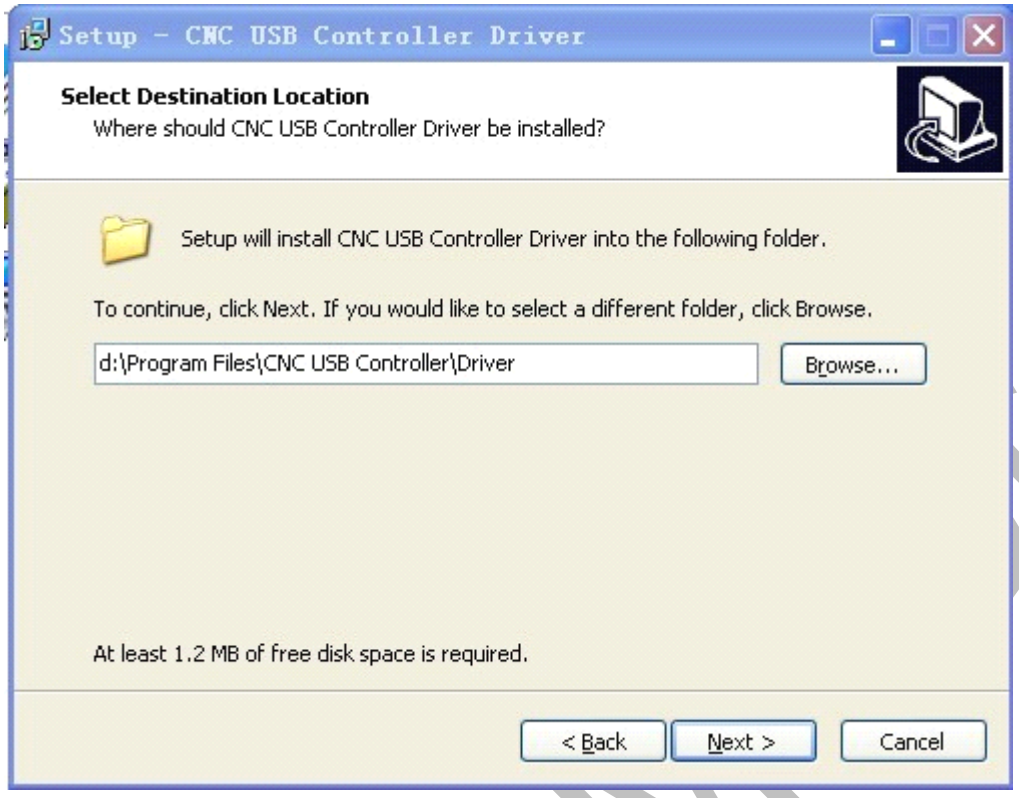


Figure 3-12. the USB driver installation step 2

Select path,pls keep the same path with main program

Figure 3-13. the USB driver installation step 1

Here I change to D disk,so see above and click "Yes"

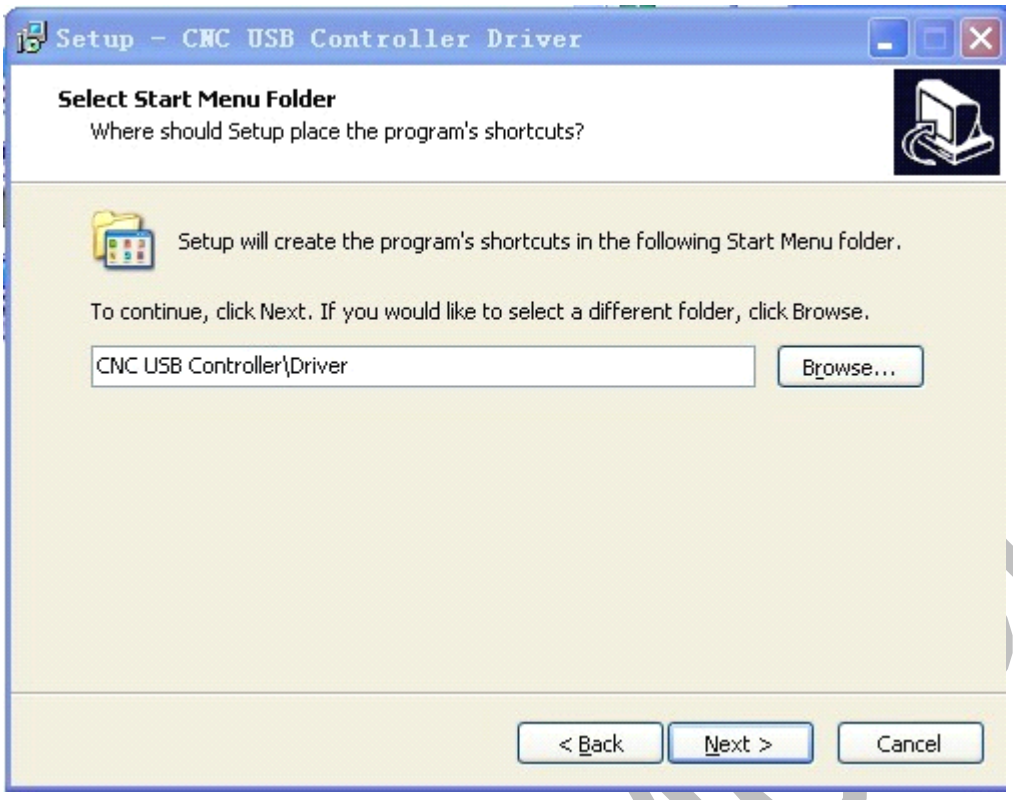


Figure 3-14. the USB driver installation step 1

"next"

Figure 3-15. the USB driver installation step 1

Click "finish"

Now the software install work is finished

3.5 Software register

The register is important and if un-successful register,the software won't work,so pls be careful to follow our guide.

1: After install the "usbcnc",to find the "usbcnc" software,so I setup a shortcut for this software on table,double click "usbcnc" 

enter it

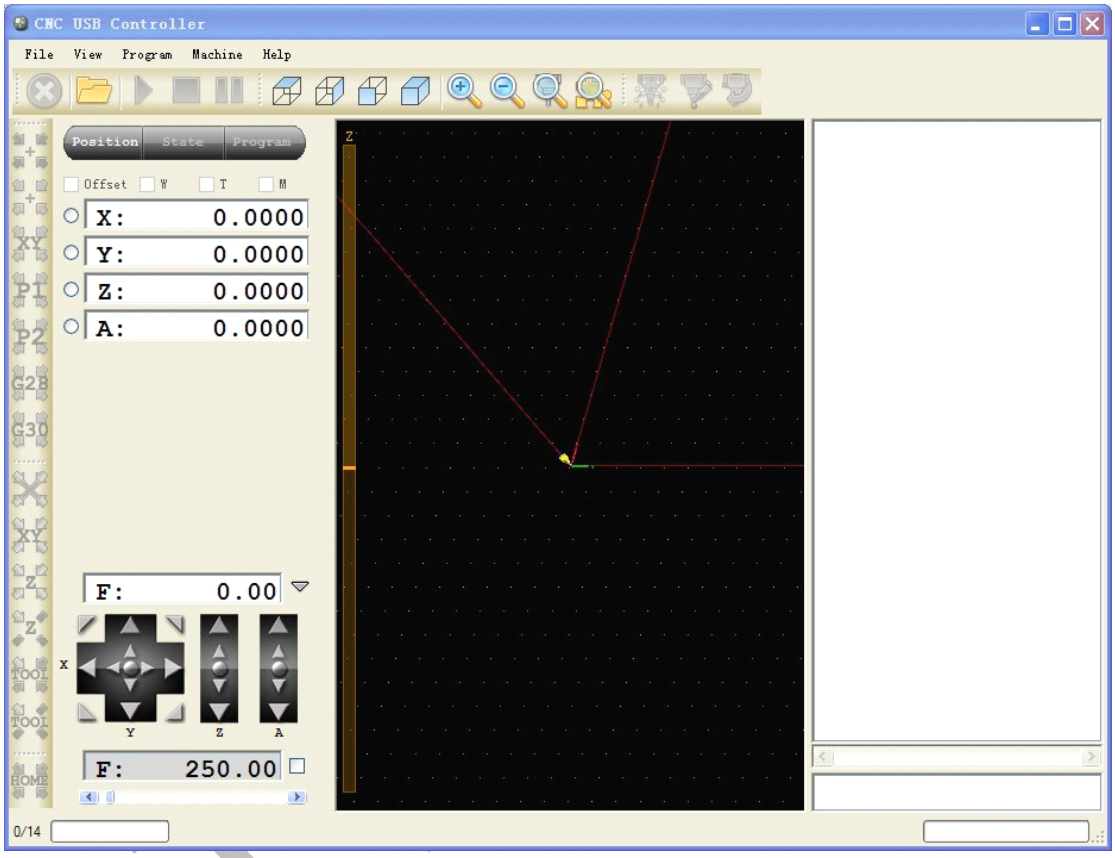


Figure 3-16. the main interface of software

2: Connect USBCNC controller to the PC by usb cable（pls use back usb port 2.0 type）,then will display below

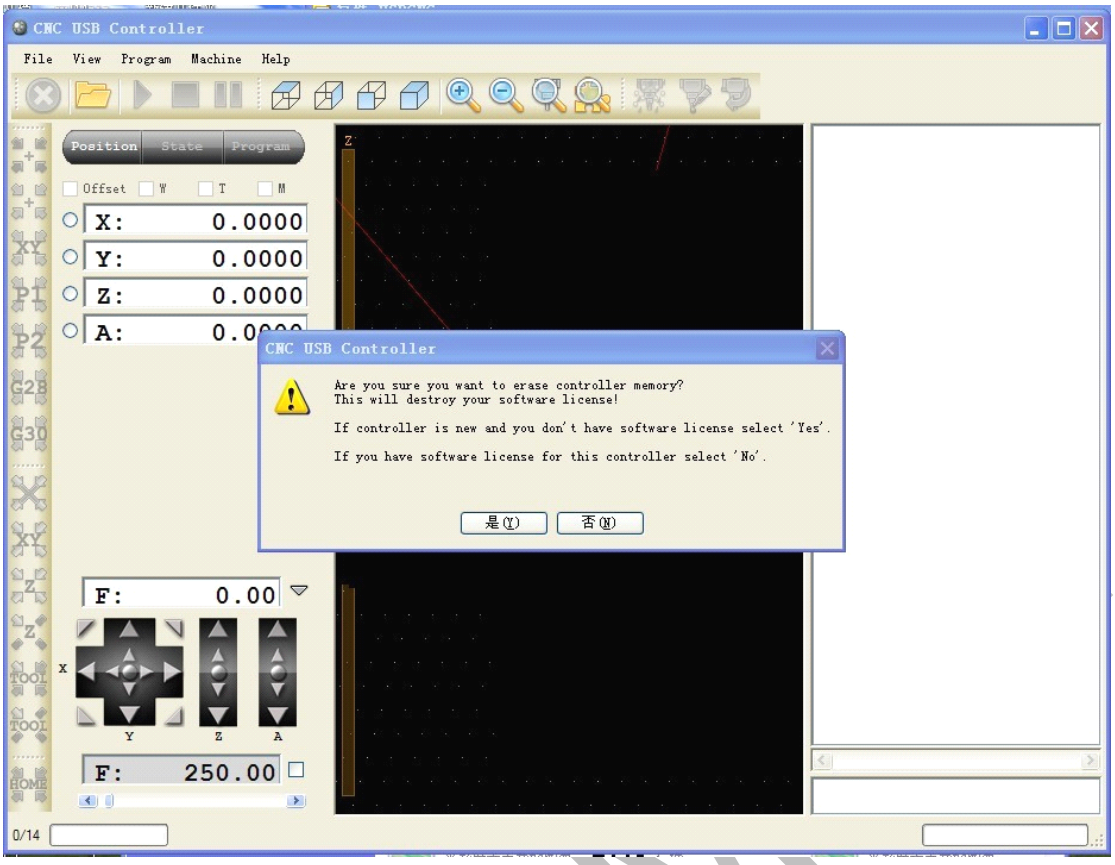


Figure 3-17. the interface by YES

Click"Yes",then display below

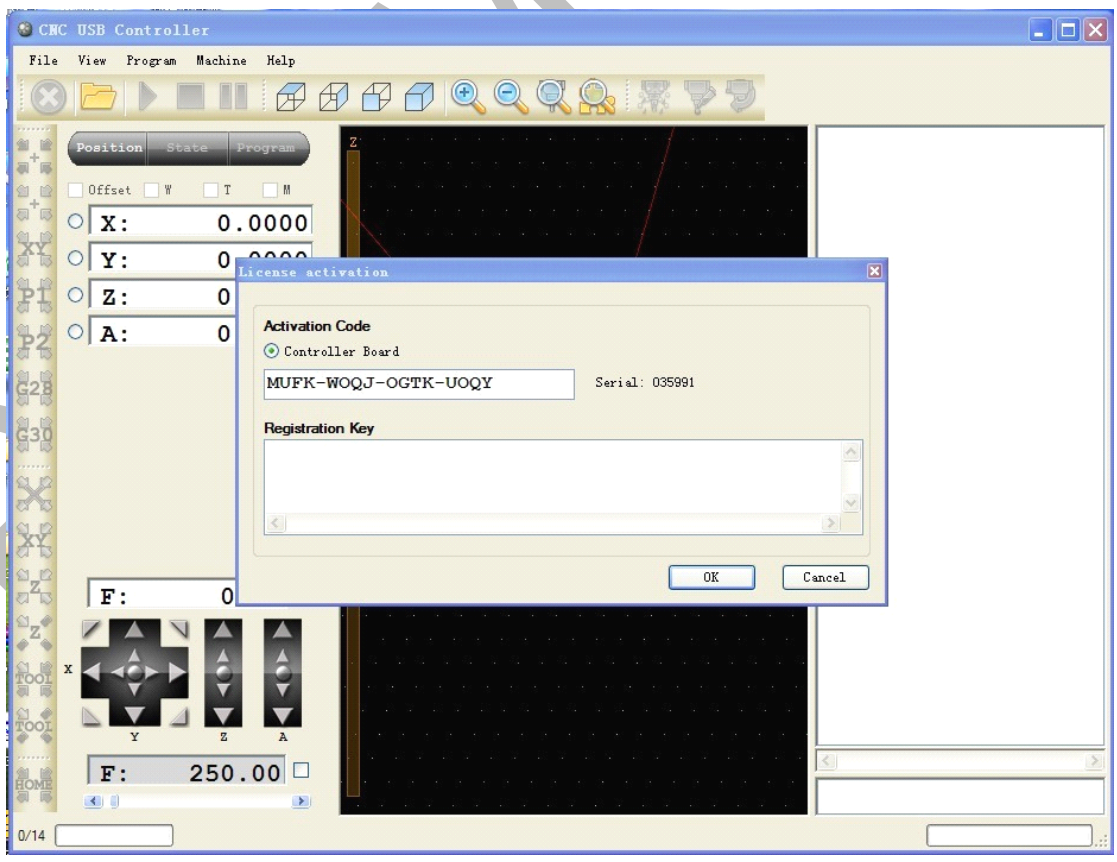


Figure 3-18. software registration interface

Here pls copy the register code(in the CD) to the “registration key”

Figure 3-19. the disc inside the key file

The “Key” file of CD see above,the first row character string pls check whether is same as in software,and the second row is key,pls copy this key to “registration key”

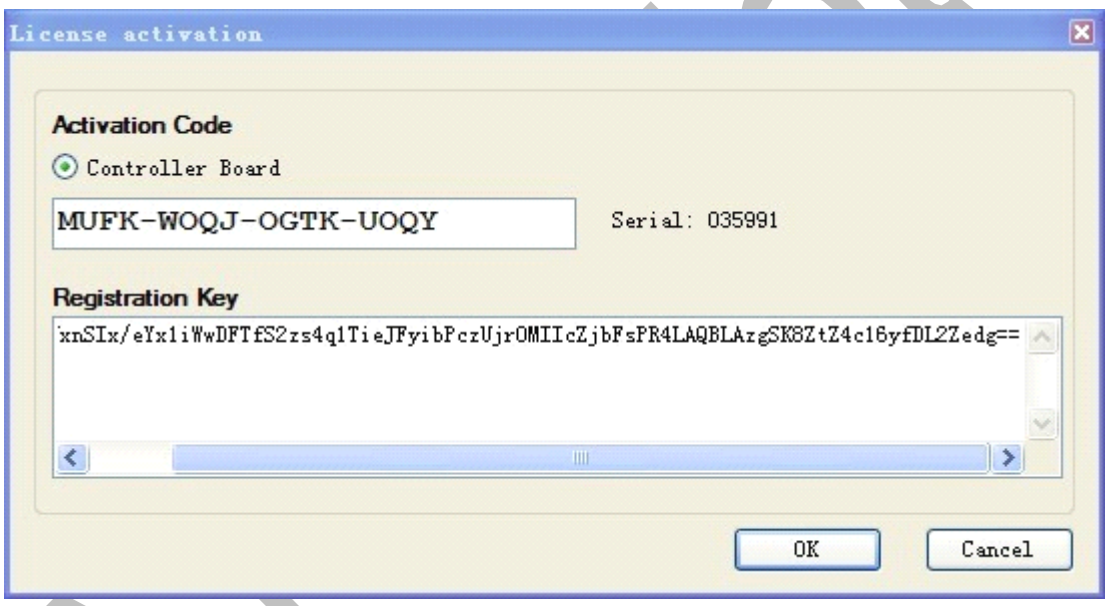
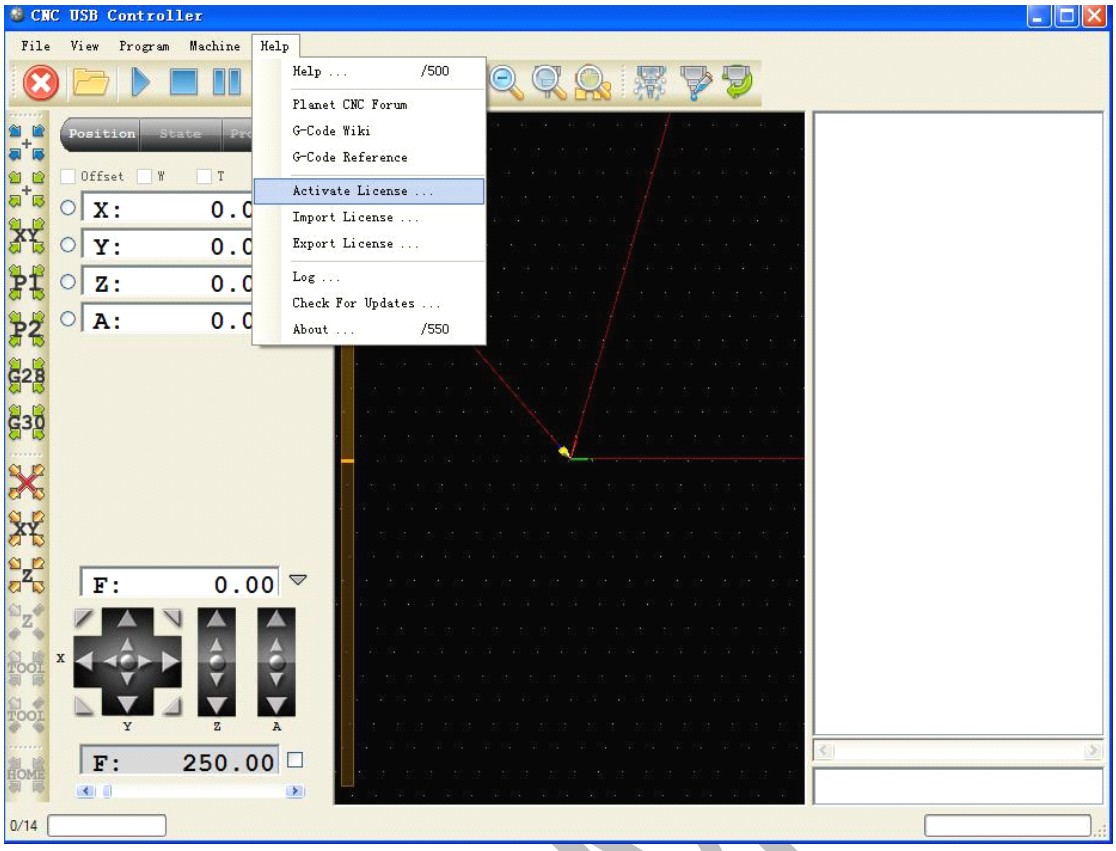


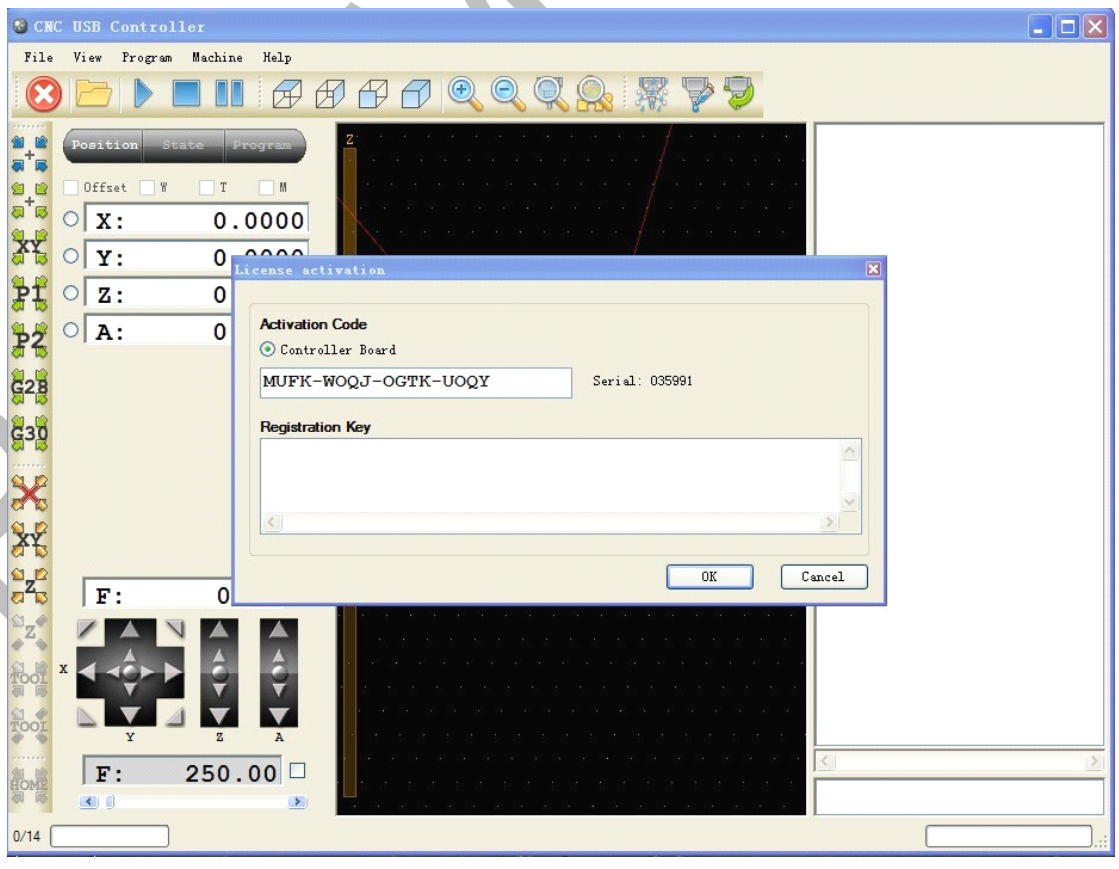
Figure 3-20. registration code copy to key bar

Click “OK” to confirm. Do not think that is over, there is a section, please read

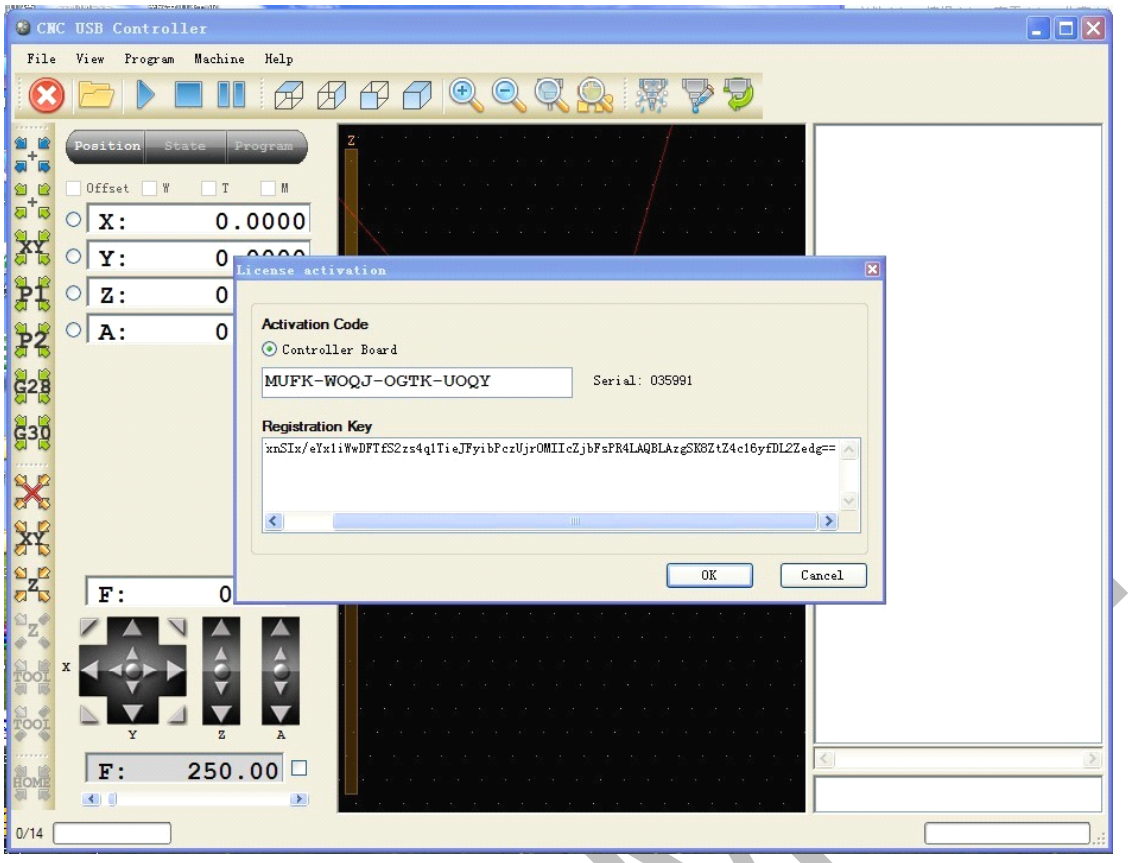


The following figure 3-21. click the HELP menu in the activate license menu.

Click the"activate license" submenu in the "Help" menu



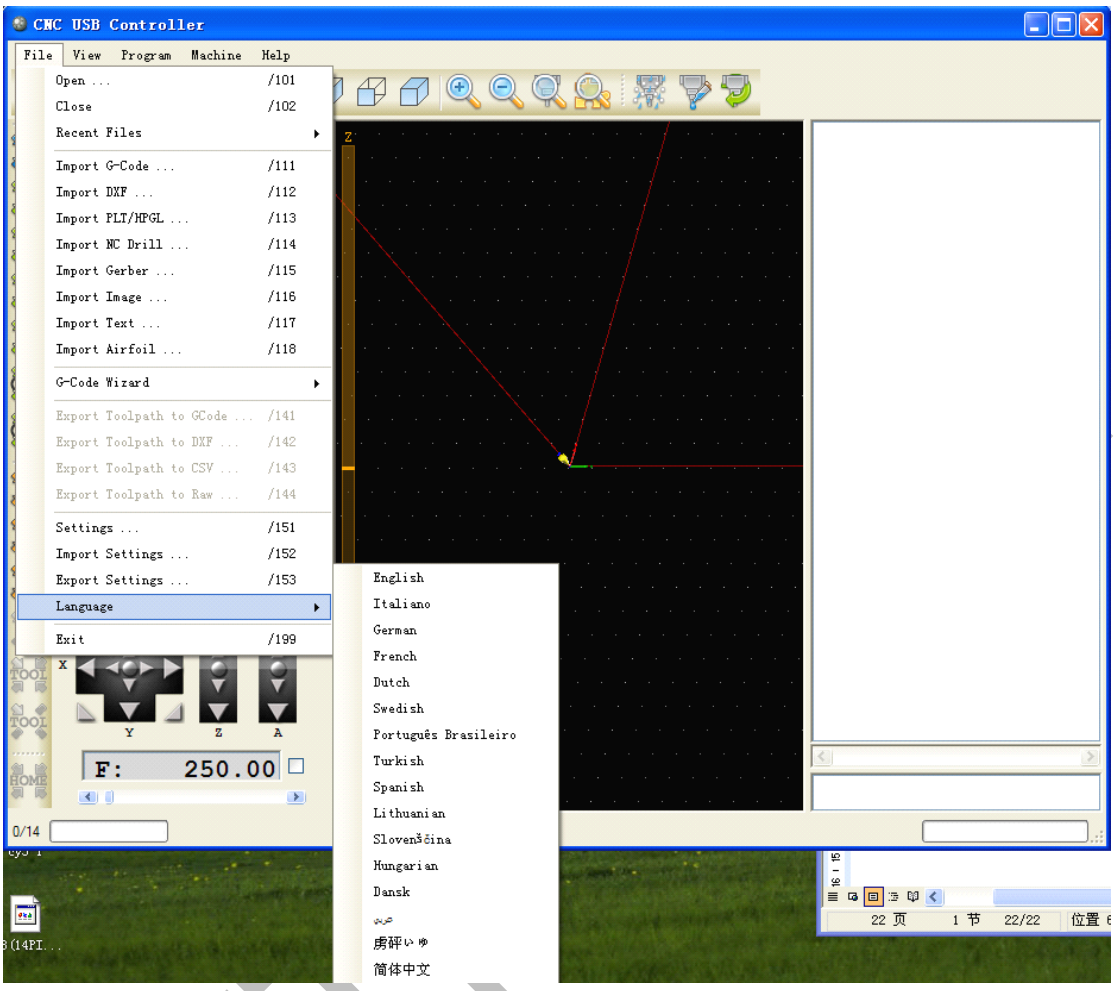
Will display the register code dialog box again,then copy the second row content of "key" file to this dialog box



Click"OK",so all register job is finished to start work

4.1 Normal Setting

1: Software language setting



Click File Menu's submenu "Language",then chose your language

2: Software setting

Click submenu “Settings” of “File”,then can configuration the software

Figure 4-2. software integrated set entrance

Enter the follow

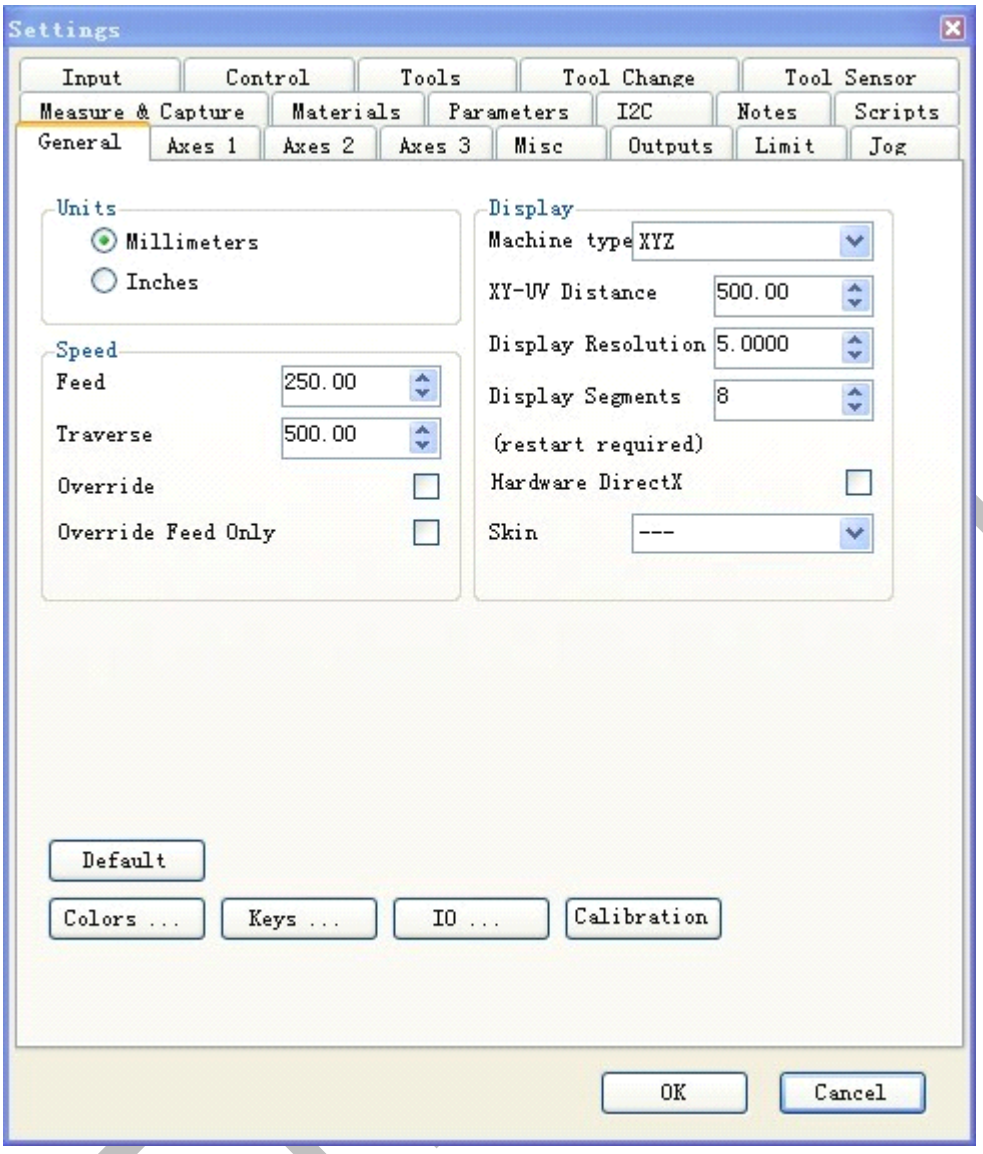


Figure 4-3. software interface

As above display have 20 subpage,and we will description some usual setting as below

1. "General":This is the most usual setting

- "Units" have metric and inch to chose
- "Speed" have feed(working speed) and traverse(un-load speed),and the below select "override" and "override feed only" indicate the speed and the working speed is valid
- "Display" is display setting,the "machine type" have "XYZ"(normal cnc router) model,"hot wire"(foam cutting machine)model,"rotary"(A axis)model and "rotary ABC" (ABC rotary) model to chose
- "XY-UV" is distance setting,and then resolution setting and segment display setting
- "Hardware DirectX" to chose the whether you need use DX,if you need the flash effect will be more better,"Skin" is the skin choice,these 2 choice need re-start the PC can be valid
- "Default" button is enable all setting to be the original,be careful for this select
- "Colors" is the forms color
- "Keys" is the shortcut key setting
- "IO" is the state observation
- "Cabibration" is all axis calibration

2. "AXES1" is the axis number and name setting

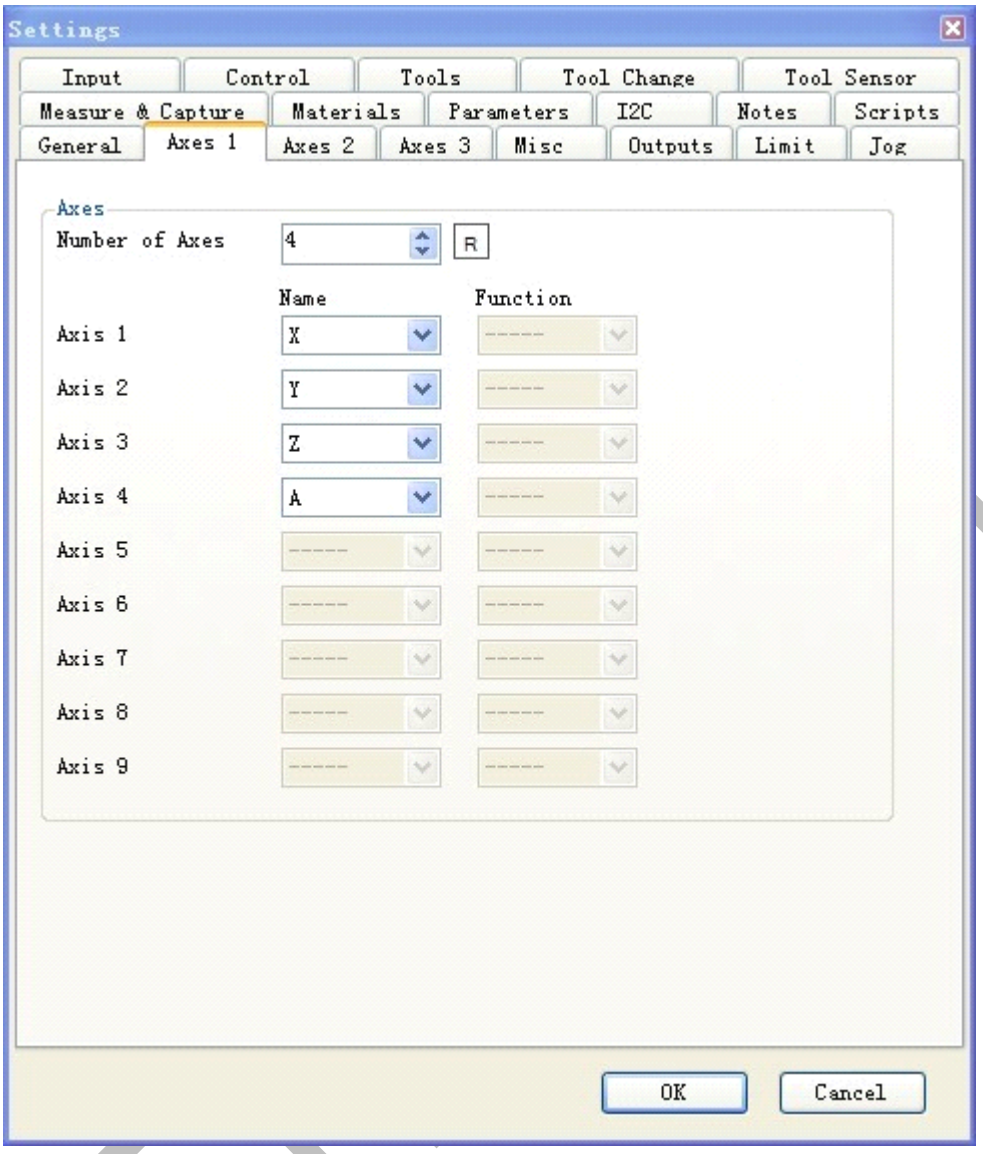


Figure 4-4.. AXES1 is the number of the shaft and shaft name selection

Figure number of axes is the number of selected axis, behind the R button for each axis automatic distribution definition name. The following items are manually assigned each axis definition name.

3.“AXES2” is the step, speed,acceleration speed,and backlash etc setting

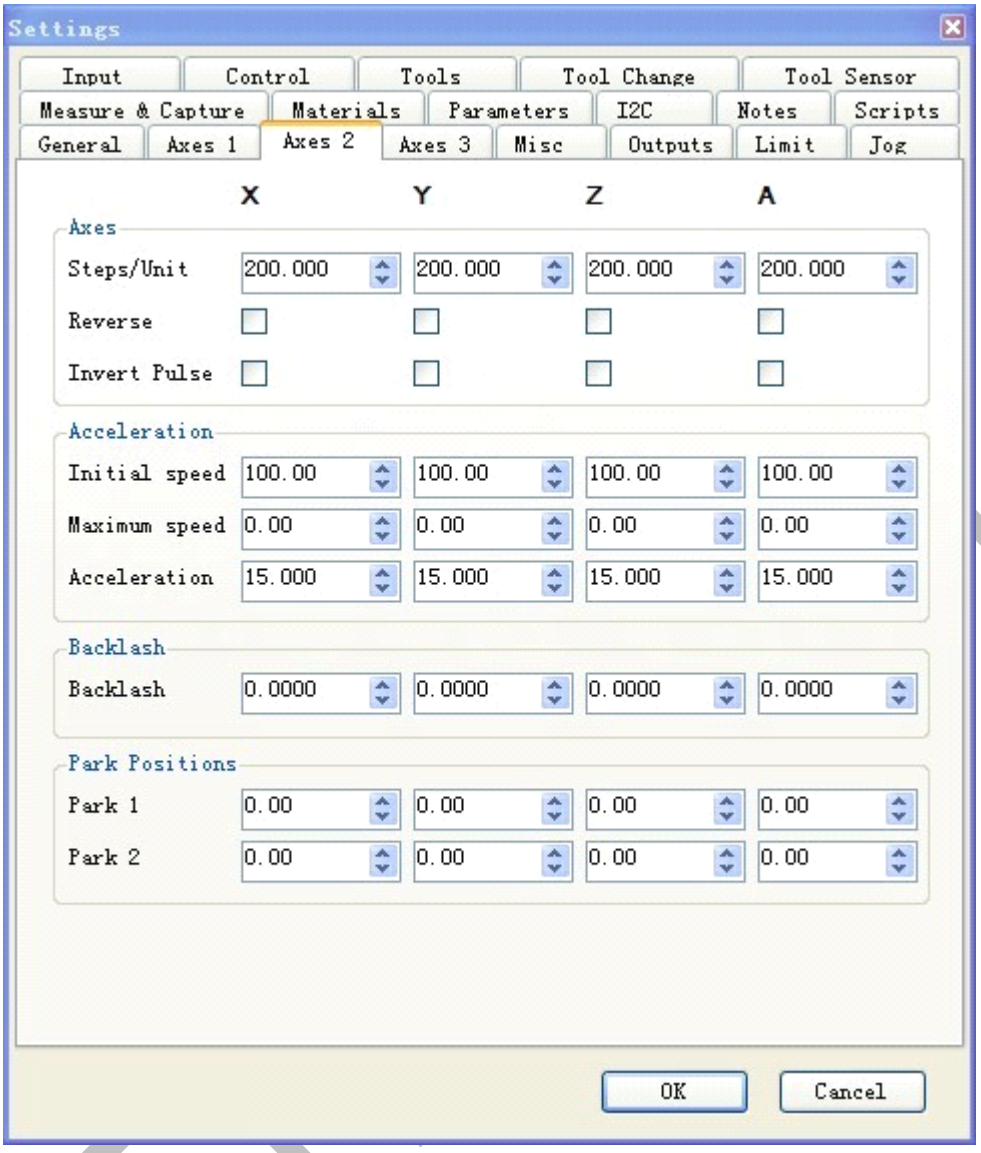


Figure 4-5. axis pulse equivalent, velocity, acceleration, back to poor settings

- “Step/unit” is step per setting,means when move 1mm need the pulse number,the “reserse” is the direction choice,when you find the movement is oppositely,you can chose this,”invert pluse” is pluse direction choice.
- “initial speed” is the start speed,”Maximum speed” is the max speed,if 0 means the max speed is according to the system max speed
- ”Backlash” setting need according to the real mechanical structure
- ”Park positions” is cutter tools position choice,if need automatic tool changing need chose this

4."AXES3" is for software limit and "Go to zero" setting

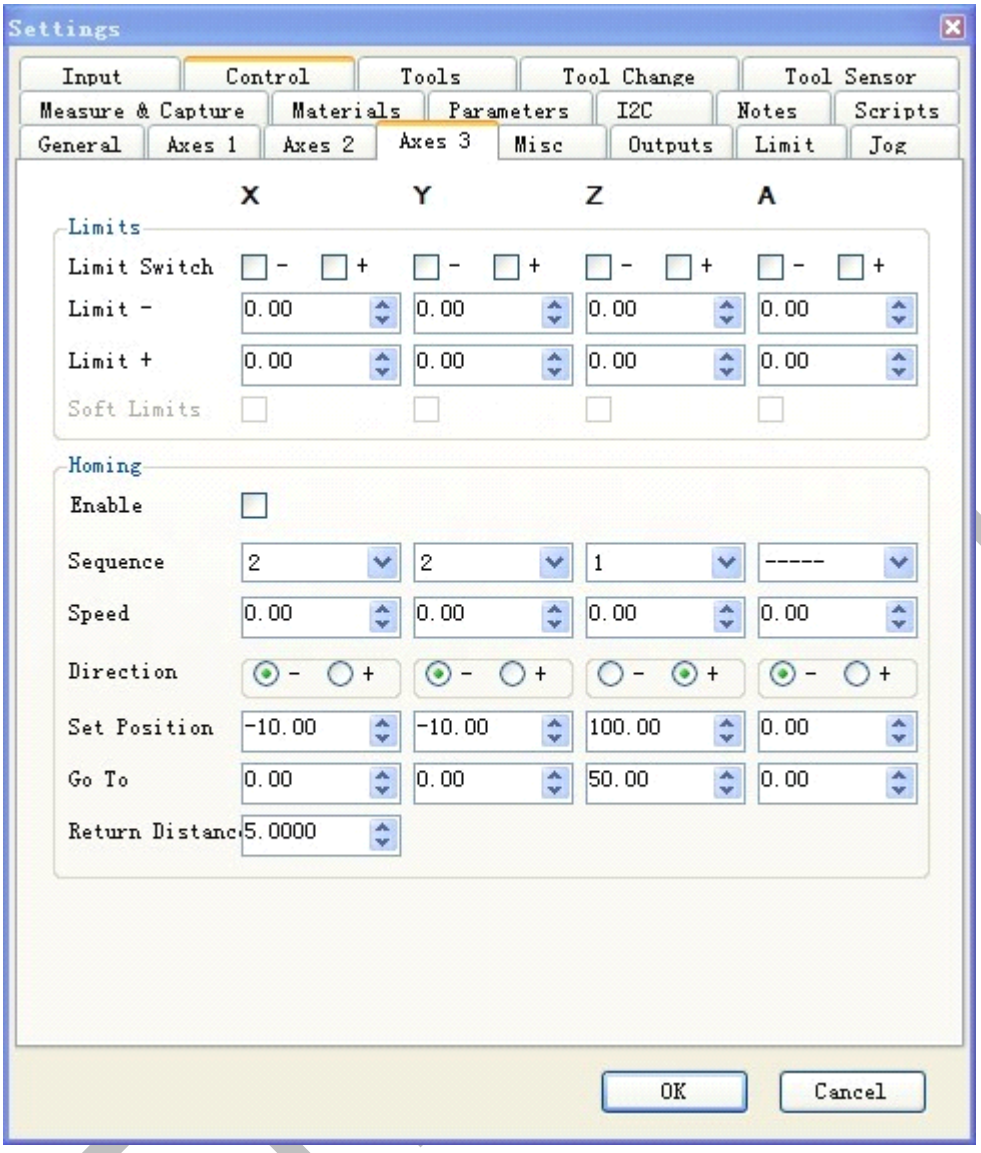


Figure 4-6. software limit and back to the origin set

- "-" and "+" of limit switch is soft limit setting,and "Limit –" and "Limit+" is upper limit and lower limit setting
- "enable" it is valid,"Sequence" is the sequence of all axis go to zero,"speed" is the speed setting,"direction" is go to zero direction setting,"set position" is setting the current position,"Go to" is setting the position want to move,and "Return distance" is setting for back distance

5.”OUTPUT” is for 3pcs relay ouput setting

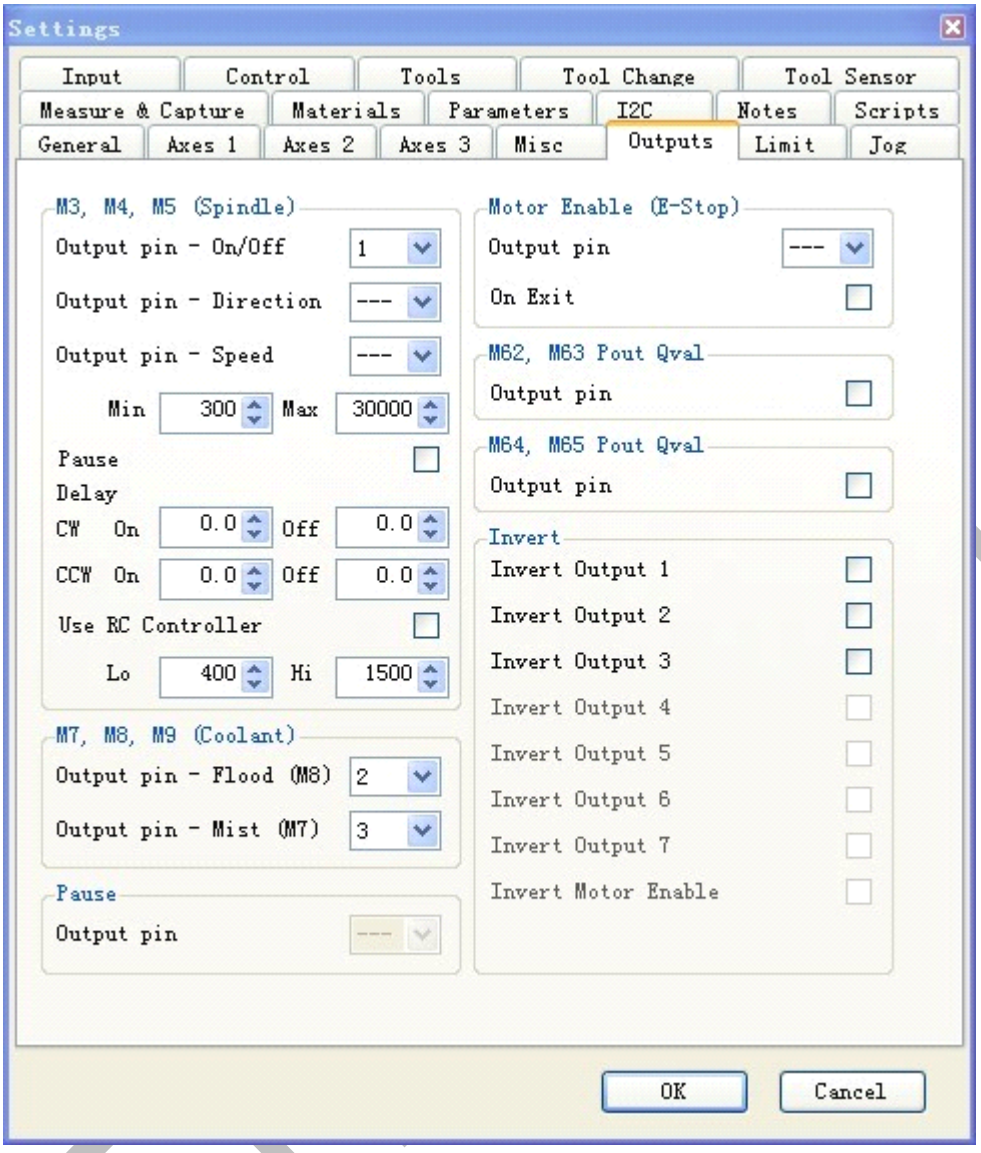


Figure 4-7. 3 relay outputs and the main control output settings

This board have 3 way relay output,and it could be setting in this column

- M3,M4,M5 is spindle on/off,direction and speed,here can setting min and max value for the pluse to control the spindle speed

“Delay” can setting the delay time for the CW and CCW rotary,if the spindle inertia is big,it is should be setting delay

“User rc controller” to chose whether use RC controller

- M7M8M9 is for water cooling or mist cooling,the “flood” default is relay2,and the “mist” defult is relay3
- “Invert” is for relay ouput convert

2. Jog Manual Input

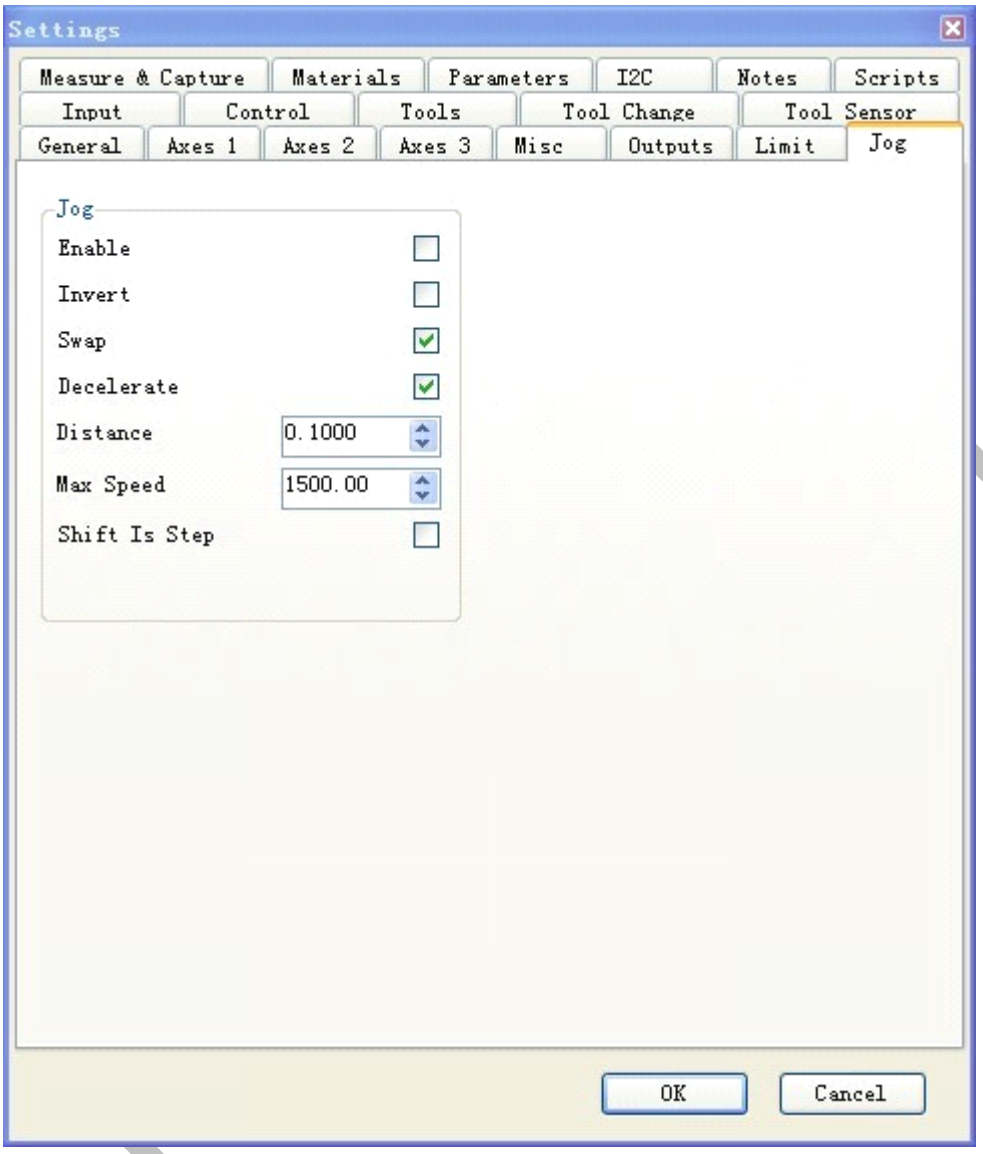


Figure 4-8. Jog manual input settings

"Enable" is for chose connect external manual control,our cnc board have this function,so pls chose it

"Invert" is electrical level convert,this product no need chose

"Swap" default chose

"decelerate"is whether need reduce the speed before stop,need chose it

"distance" is step distance,it is according to your required

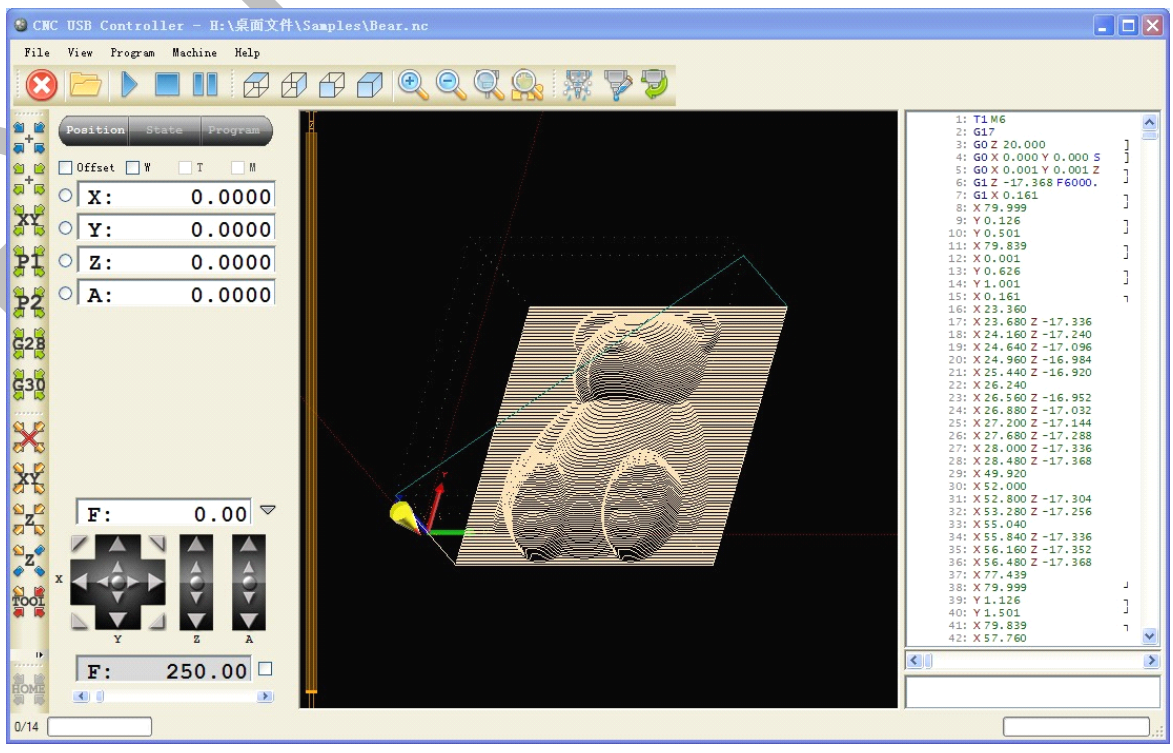
"max speed" is the speed setting。

"Shift is step" is single step speed setting

The usual setting is all description,and then can control the cnc machine now

4.2 Software Usage

Click"file"menu,can open the file directly or input the G-code WDXF etc file,here we open a little bear diagram



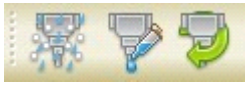
1、

This button is Reset,open,run,stop,suspend

2、

This button is top view,side view,front view, space diagram,amplification, minification,scale tool, panoramagram

3、

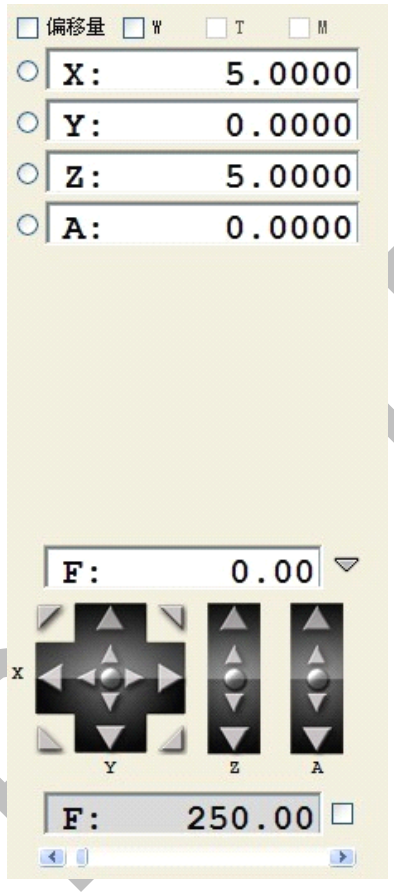


This button is mist cooling,water cooling,spindle on/off

4、This button is control each axis speed move to the position,from top to bottom is clear zero,go to zero,go to XY0,go to park1,go to park2,go to G28 and go to G30

5、 

This button is setting for offset,from top to bottom is clear zero,current position setting XY axis offset,current position setting Z axis offset,Z offset height value and cutter tool offset value

6、 

This button is 4 axis coordinate display.

Now you can input G-code,and setting the software,then run the machine.

If any questions pls contact us!

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