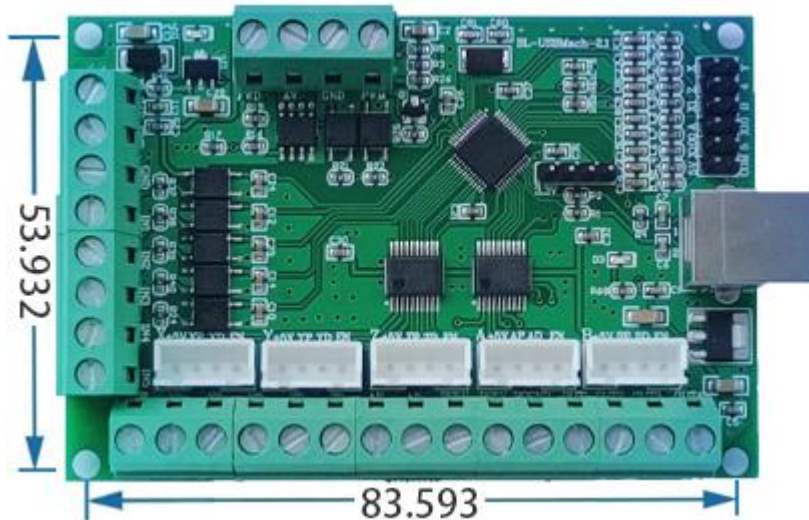


MACH3 USB interface board

BL-UsbMach-V2.1

Instructions for use

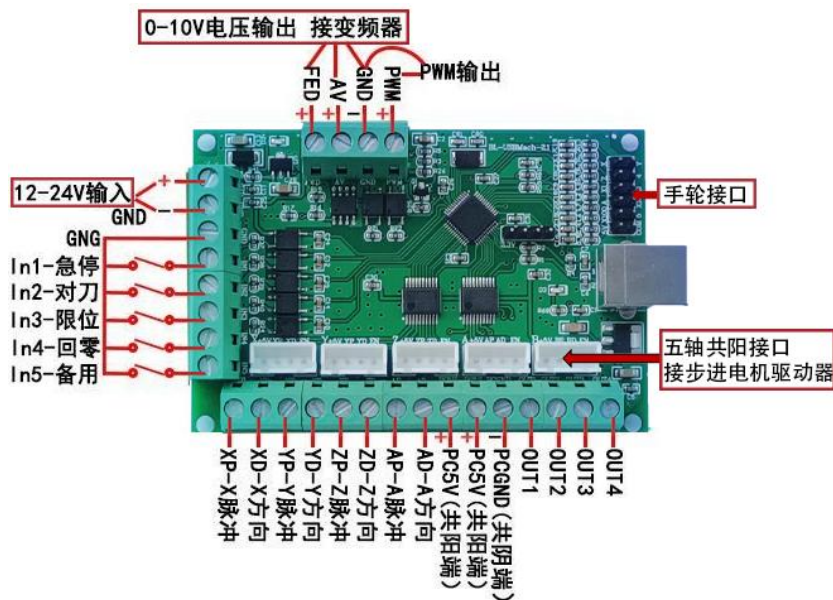


Features:

1. Fully support MACH3 software.
2. Support Windows XP, WIN7, WIN8, WIN10, support tablet computer, support 64-bit system.
3. Peripheral wide voltage input, 12-24V, and anti-reverse connection function.
4. All input signals are isolated by optical coupling, which can be connected to emergency stop, tool setting, limit, return to zero, etc., to ensure computer security.
5. Provide 0-10V analog voltage output isolated by optocoupler, which can control the frequency converter input by 0-10V analog voltage and control the spindle speed.
6. Provide PWM output (5V level) isolated by optocoupler to control other PWM-controlled spindle speed controllers.

Overall function, wiring diagram:

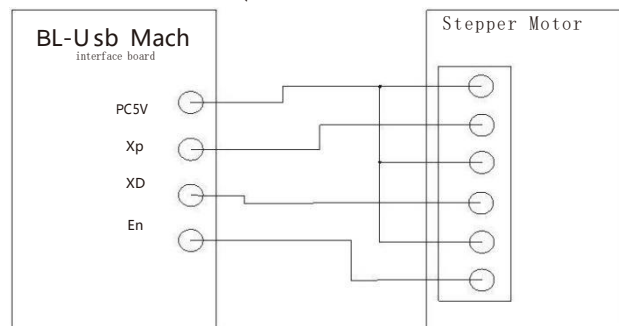
BL-USBMach3 five-axis interface board interface diagram



Driver wiring example

(X axis)

(Com

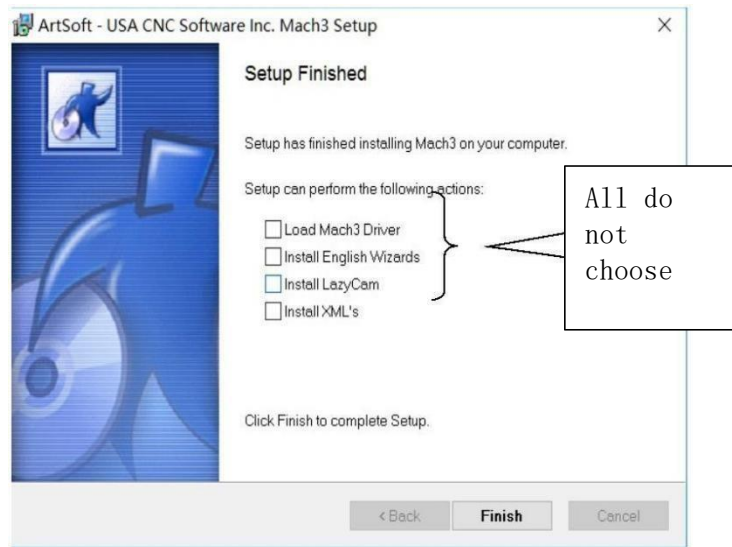


Note: En is optional and can be omitted. So there is no En terminal on the screw terminal. But there is on the cable seat. After getting the board, don't rush to wire it, read the following instructions first. If an inverter is used, also refer to the relevant instructions of the inverter.

Note: The following settings are set according to the common anode wiring method between the interface board and the driver.

Related settings of MACH3 software:

1. Install MACH3 software and drivers:



① Install MACH3 software: as shown in the above picture, install MACH3 normally until the above picture appears, do not select the first item (LoadMach3Driver), and the other 3 items can also be unselected, click Finish to complete. Then copy the Chinese package: Copy all the files in the Chinese package to the MACH3 installation directory, and overwrite the original files.

②, and then copy all the files in "USB drive and setting file" to the installation directory of MACH 3, and overwrite the original files.

Note: Please obtain the authorization file Mach1 Li c. d at for MAC h 3 by yourself, and copy it to the Mac h 3 directory, otherwise there will be a limit of 500 lines of code! After copying the setting file as above, the MAC H 3 software is basically set up. Generally, the following settings are not required.

③ Set the display compatibility of the software: We use the Mac 3 Mill icon for engraving, and other icons can be deleted.



After right-clicking the software icon with the mouse, click Properties:



2. Software operation:

After connecting the interface board with a USB cable, run the MACH3 software, when the following appears:



Click **UsbMach-V2.2** and click OK.

3. Set the speed:

Click "Plugin Control" on the top menu bar of the MACH3 software, and then click

"BL-UsbMach" will appear on the right window:

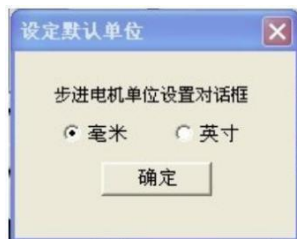
After selecting, click Save.

If you do not do this step, the software will default to 65KHZ.



Fourth, the software settings:

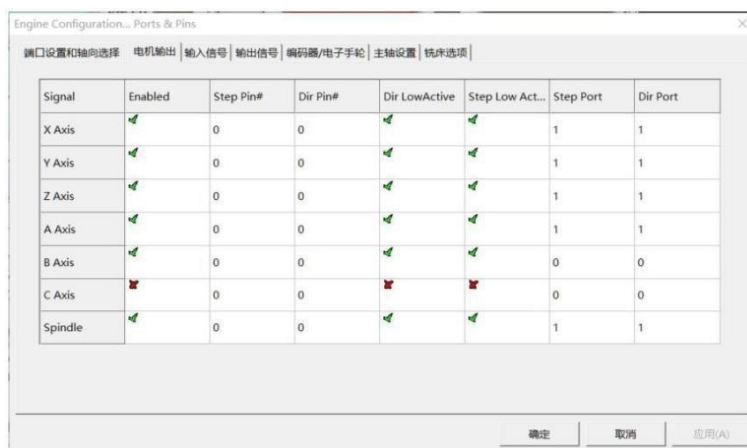
1. Metric and inch options. Setting unit: Select metric mm in "Metric/Imperial selection" in "Settings"



2. Ports/pins

Note- click Apply after setting

(1) , Motor output: click Apply after setting as shown in the figure.



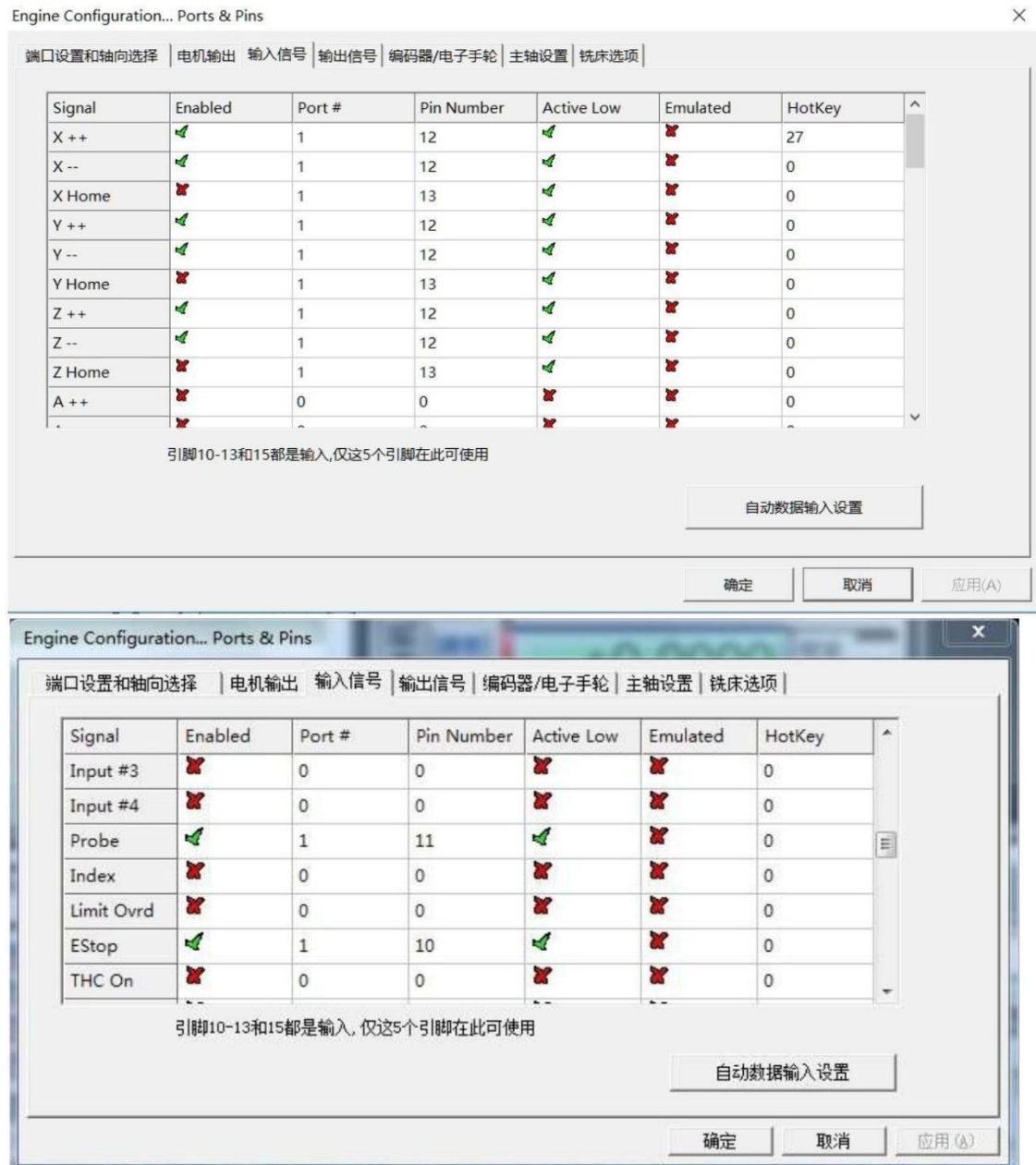
StepPin and DirPin can be left blank.

DirLowActive -Used to change the direction of the motor.

StepLowActive---Tick when the driver is connected to a common anode; mark "X" when it is connected to a common negative.

Note: The direction of the stepper motor is related to the wiring. If the direction is not correct, the wiring can also be adjusted (the AB can be adjusted relative to each other). It is recommended to connect the driver as a common anode.

(2) , Input signal: set as shown, click Apply after setting.



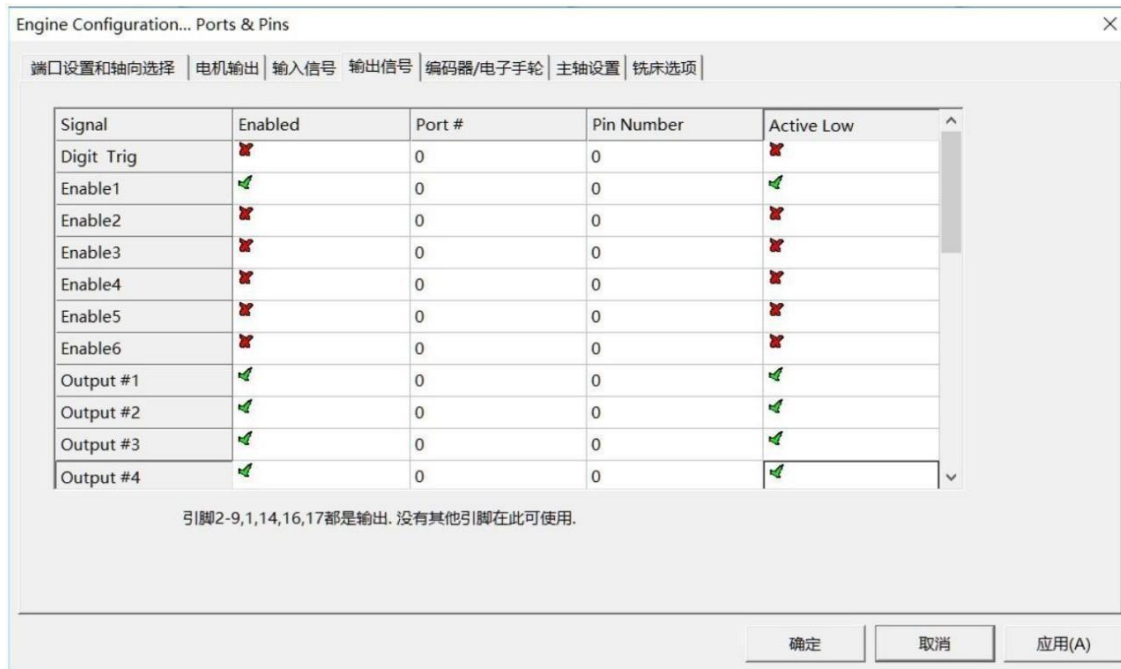
The above two pictures are about the input settings. Here 10, 11, 12, 13, 15 represent In1, In2, In3, In4,

In5 has five inputs, so it needs to be filled.

You can choose any input terminal for functions such as limit, return to zero, tool setting, and emergency stop. For example: X++ fills in 12, Y++ fills in 13, it means that X++ limit selects IN3, Y++ limit uses IN4. The limit and zero return can share the input port, for example: X++ fill in 12, Xhome also fill in 12.

If you want to set Home, similar settings and check Enabled.

(3) , Output signal: set as shown, click Apply after setting.



Enable1: Motor enable setting. After checking, when the software "emergency stop" (the "emergency reset" button flashes), it will output a signal to stop the motor enable. If not required, leave it unchecked.

Output #1, Output #2, Output #3, Output #4 are 4 outputs. If set according to the above picture (check ActiveLow), it will be low level when it is in action, and high level when it is not moving. If ActiveLow is not checked, it will be high level when it is active, and it will not act.

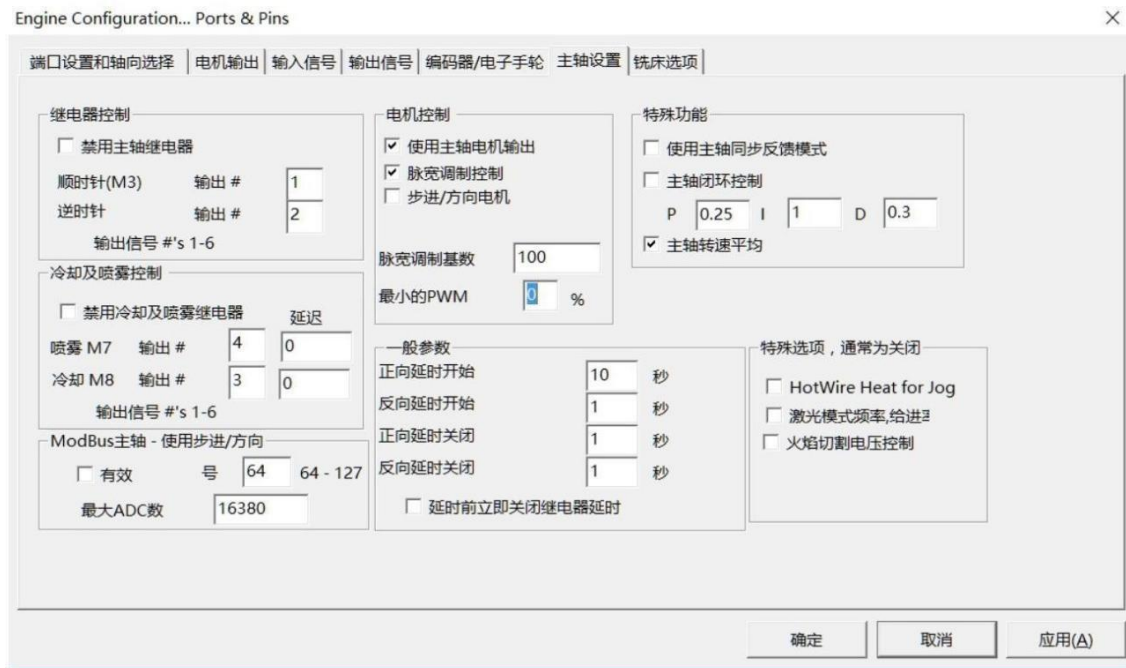
is low level.

These 4 outputs are mainly used to control



After this setting, M3 can be used to control output 1, M4—output 2, M7—output 4, and M8—output 3.

(4) , Spindle setting:



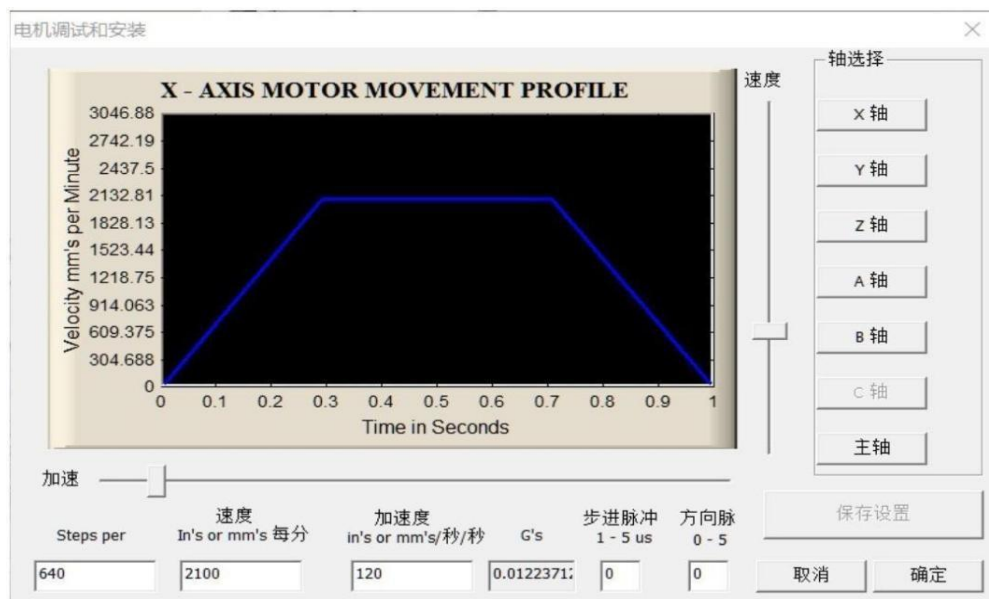
Use PWM or 0-10V voltage to control the spindle speed, and also set the "spindle pulley", as



shown below:

3. Motor debugging:

This is related to the pitch of the lead screw and the subdivision setting of the driver board. The figure below is the reference setting when the screw pitch is 5MM and the driver board is subdivided by 16.



"Steps per" refers to the number of steps required to move 1mm.

Here Steps per= $(360 \div \text{motor}$

$\text{step angle}) \times \text{subdivision} \div \text{pitch} = (360 \div 1.8) \times 16 \div 5 = 640$ X, Y, Z, A, B

axes are set accordingly, and the settings must be saved.

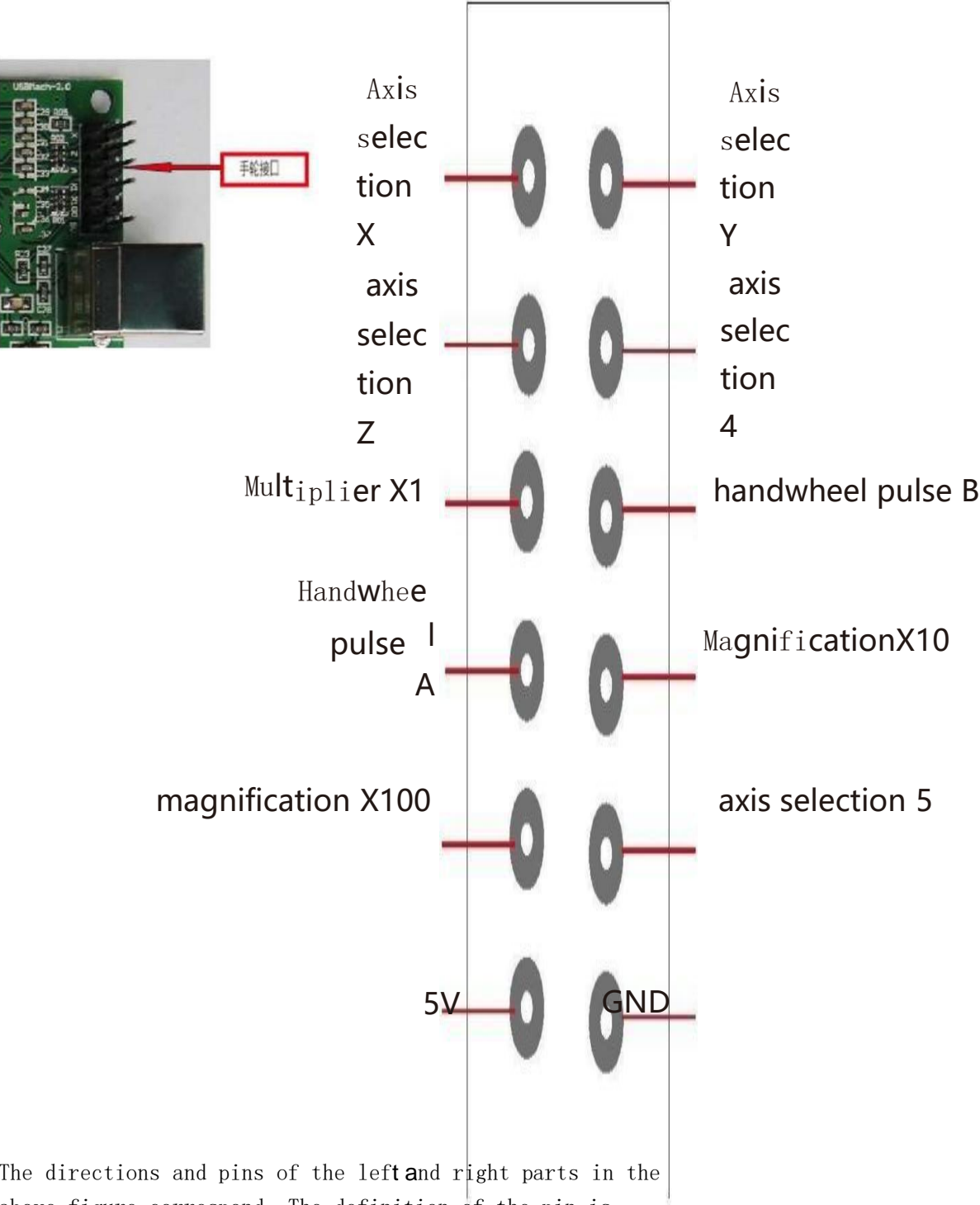
4. Set the system hotkey:



Set the hotkeys of X, Y and Z axes respectively as shown in the figure. In this way, the motor operation of the corresponding axis can be manually controlled through the hotkey.

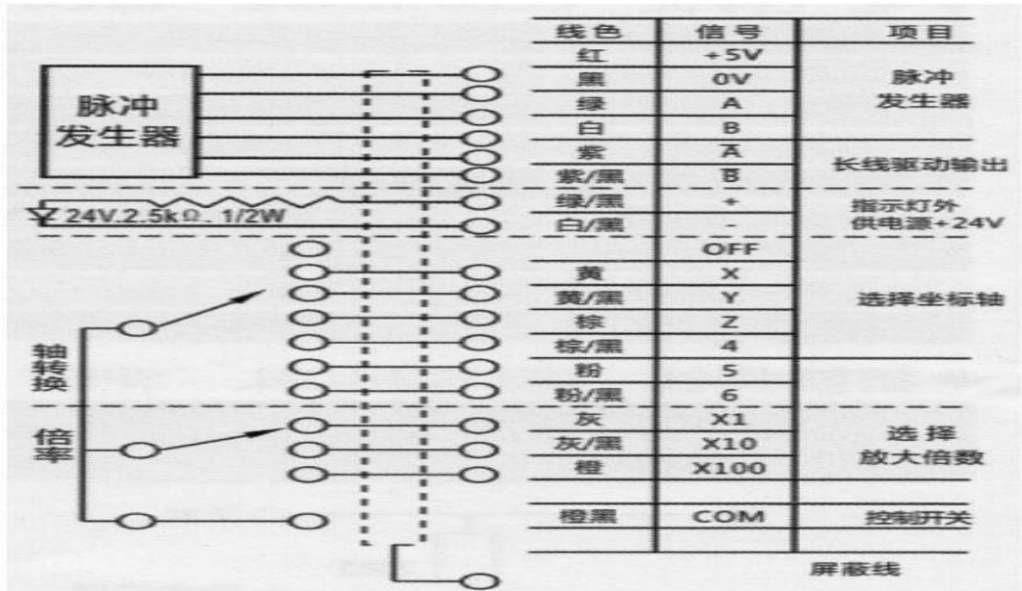
5. Handwheel interface:

BL-USBMach3 five-axis interface board
handwheel wiring diagram



The directions and pins of the left and right parts in the above figure correspond. The definition of the pin is based on the one on the right. Note that the handwheel powered by 5V should be selected.

Below is the wiring table for most handwheels, such as the 100B-5L handwheel:



The main things to note here are:

0V of handwheel pulse, COM, and '-' of indicator light are connected together, and connected to GND of handwheel interface on the interface board; handwheel pulse +5V is connected with the '+' of the indicator light, and connected to the 5V of the handwheel interface of the interface board. Others are connected by name.

- The connection method of the shield wire of the handwheel:
- (1) It should be truly grounded. If it is a metal case, the shielded wire should be connected to the metal case.
 - (2) If there is no metal case, then connect to the GND of the handwheel interface of the USB interface board.

6. The setting and use of the handwheel in the software:

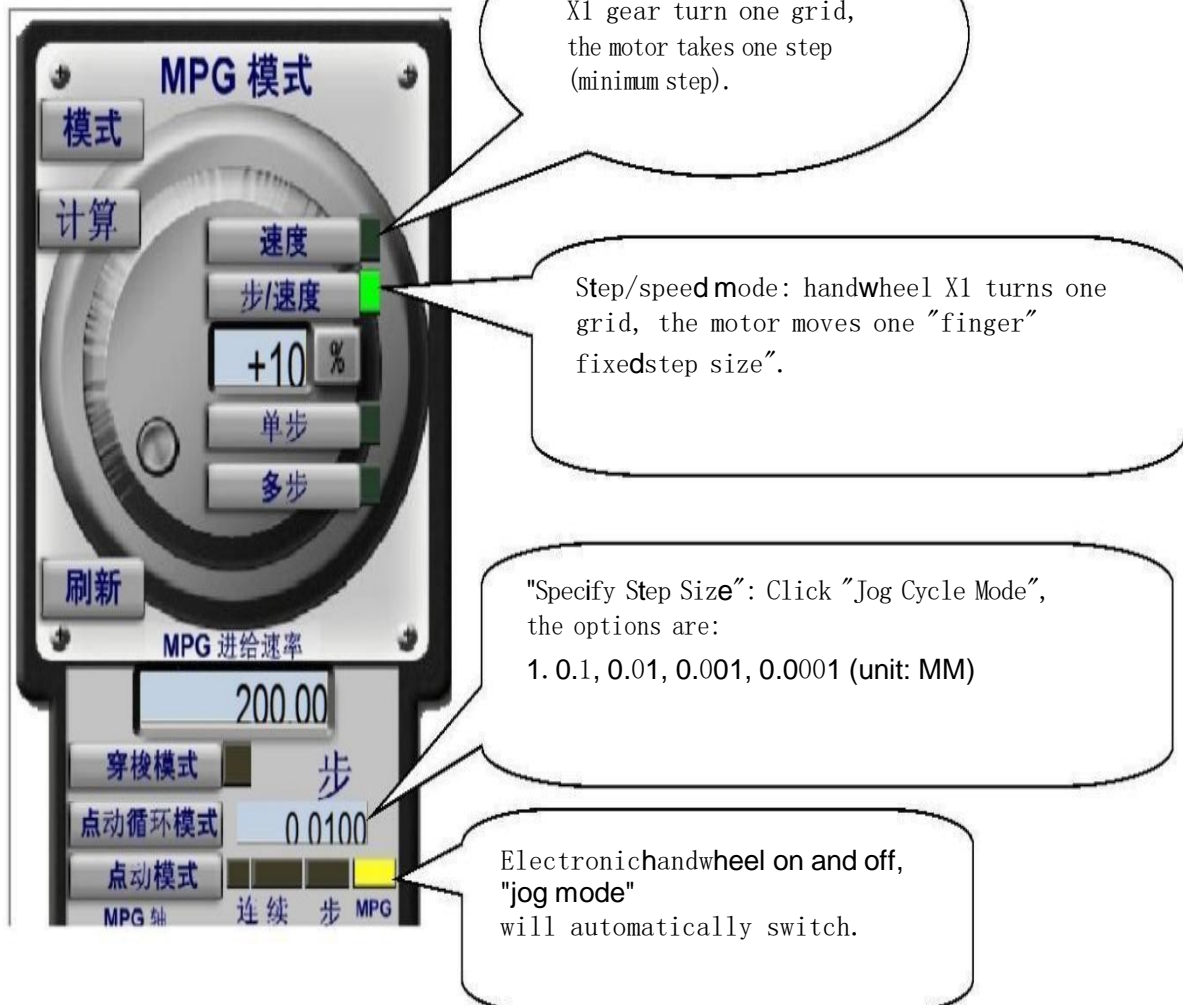
MACH3 handwheel encoder settings:

Engine Configuration... Ports & Pins

端口设置和轴向选择 电机输出 输入信号 输出信号 编码器/电子手轮 主轴设置 铣床选项						
Signal	Enabled	A -Port #	A -Pin #	B -Port #	B -Pin #	Co
Encoder1	<input checked="" type="checkbox"/>	0	0	0	0	1.0i
Encoder2	<input checked="" type="checkbox"/>	0	0	0	0	1.0i
Encoder3	<input checked="" type="checkbox"/>	0	0	0	0	1.0i
Encoder4	<input checked="" type="checkbox"/>	0	0	0	0	1.0i
MPG #1	<input checked="" type="checkbox"/>	0	0	0	0	1.0i
MPG #2	<input checked="" type="checkbox"/>	0	0	0	0	1.0i
MPG #3	<input checked="" type="checkbox"/>	0	0	0	0	1.0i

As shown in the figure, check the Enabled of MPG#1 and save it. Now, turn the electronic handwheel, the coordinates of the coordinate display box will change accordingly.

The software provides two handwheel operation modes:



"Speed" and "Step/Speed" are similar. The moving speed is related to the speed of turning the wheel, and the maximum speed is limited by G0 speed. If you choose the "Step/Speed" mode, "Specify the step It is more appropriate to use 0.01 for "long", in this way,

The moving distances of X1, X10 and X100 of the handwheel are 0.01, 0.1 and 1mm respectively, which can basically meet the needs of large

Some application requirements.

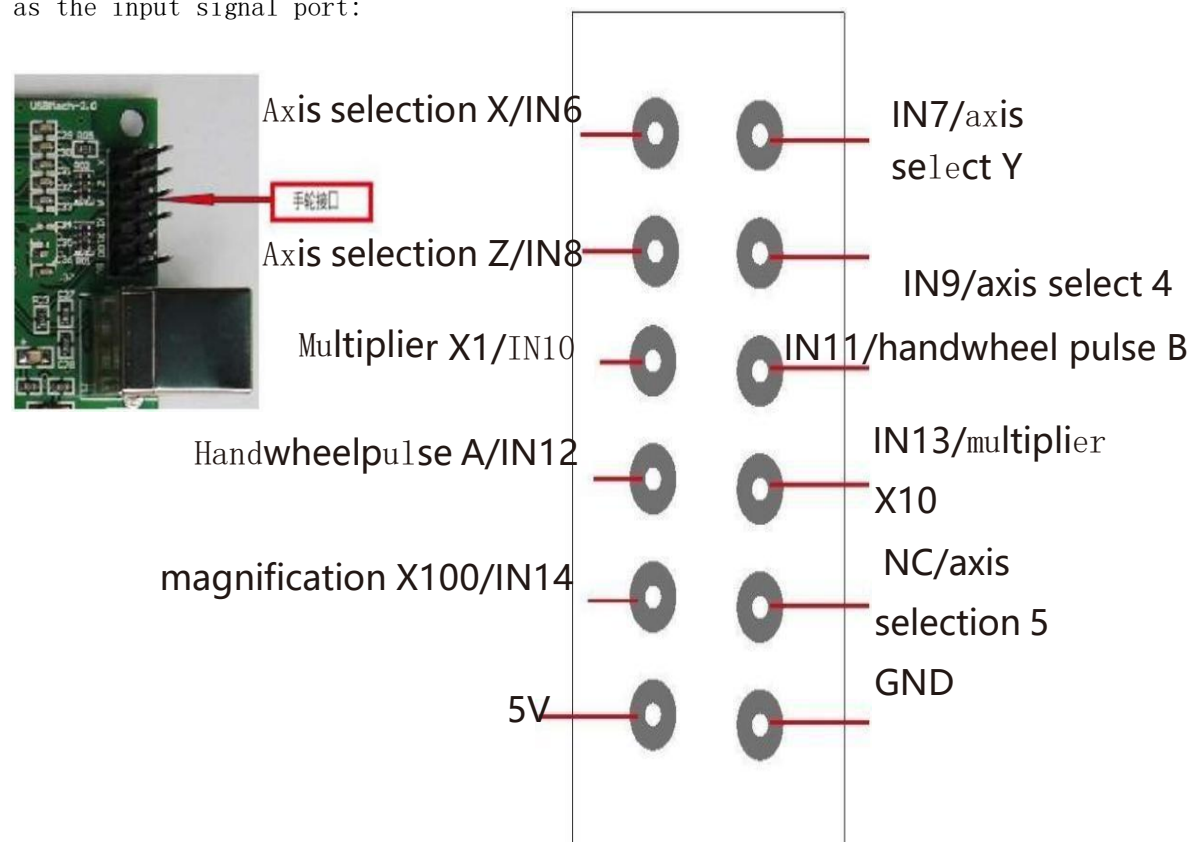
MACH3 software provides abundant shortcut keys and manual input for manual operation, so electronic handwheel is not necessary.

7. Extended input signal ports (IN6-IN14):

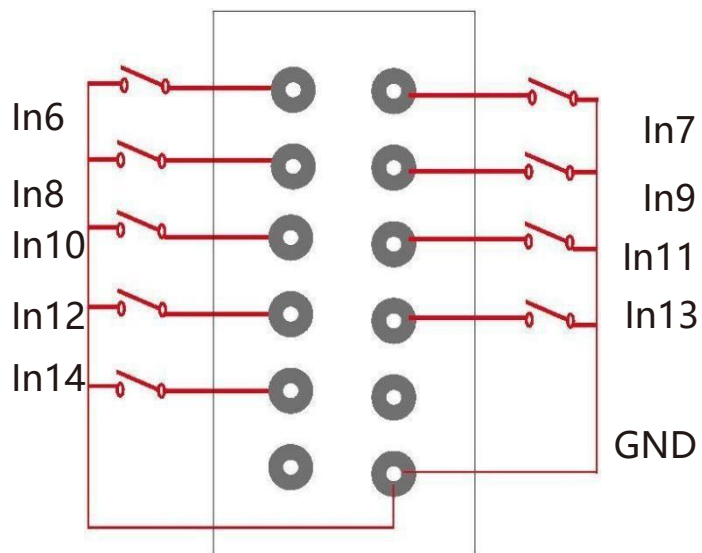
When the handwheels are not used, they can be used as input signal ports, thus adding 9 input ports: IN6-IN14.

Note: Since these 9 input terminals are not isolated by optocouplers, the principles of use are: 1. There should be no common terminals (such as common ground and common anode) with the outside, and no voltage can be introduced, so as not to damage the circuit due to improper use. 2. The lead wire should not be too long, so as not to introduce interference. 3. Therefore, try not to use it as limit, zero return, tool setting and emergency stop.

The following figure is the pin comparison diagram of using the handwheel interface as the input signal port:



Use wiring diagram: Wiring usage is similar to IN1-IN5.



5. Software settings of extended input port:

As mentioned earlier, the corresponding Pin Numbers of IN1-IN5 in the input settings are 10, 11, 12, 13, and 15 respectively.

The extended IN6-IN14 here correspond to 16--24 respectively. As shown below:

Engine Configuration... Ports & Pins					
端口设置和轴向选择 电机输出 输入信号 输出信号 编码器/电子手轮 主轴设置 铣床选项					
Signal	Enabled	Port #	Pin Number	Active Low	Emulated
OEM Trig #1		1	16		
OEM Trig #2		1	17		
OEM Trig #3		1	18		
OEM Trig #4		1	19		
OEM Trig #5		1	20		
OEM Trig #6		1	21		
OEM Trig #7		1	22		
OEM Trig #8		1	23		
OEM Trig #9		1	24		
OEM Trig #10		0	0		
OEM Trig #11		0	0		

6. Quickly understand the interface board and software:

1. Click the Mach3Mill icon. When entering the MACH3 software, this button will flash, and it will stop after clicking. Only then will the software work.

2. If the interface board is not connected, the button will keep flashing, and the click will not stop, and the software will not work.

3. If the interface board is connected, the status prompt box will display: . In many cases, there will be prompts in this status prompt box.



4. In this coordinate display box, if the coordinate number of a certain axis changes, the corresponding axis of the interface board should have corresponding pulse output. If it does not change, the interface board will not have pulse output, and the stepper motor will not rotate.

5. If the electronic handwheel works normally, turn the handwheel, and the coordinate numbers in the coordinate display box will also change accordingly.



6. Here is the manual input box. All commands in the G-code file can be entered manually here.

G1X10Y10 means to move from the current coordinate to X10Y10 at the current speed. **G0** means running at maximum speed.

The relationship between M command and output: M3—OUT1, M4—OUT2, M8—OUT3, M7—OUT4.

For example, after inputting M3 S8000, both 0-10V and PWM will have output. M5 closes OUT1, OUT2 and spindle output; M9 closes OUT3, OUT4. M30 is fully off.

7. If you do not fully understand the MACH3 software and interface board, do not rush to install peripheral equipment and wiring after getting the interface board. To test the motor, just test one axis first. Test IN1-IN5 inputs, can also be simulated with 1 short wire.

8. If the 12-24V input power supply is not connected, the 5 inputs, 0-10V and PWM will not work, and others will not be affected.

9. Many inverters provide 12V or 24V output, which can be used as the input power for the interface board.

10. For pictures, text, AutoCat and other files, generally use ArtCam software to generate tool path (G code) files.

ArtCam software can be found by yourself, and some people sell it at low prices on Taobao.