Smooth Stepper & Breakout Board for Mach3

Ethernet Smooth Stepper Feature

The 11-position green screw terminals that are on the USB SmoothStepper were replaced with a 3rd parallel port. It is identical to Port 2 of the SmoothStepper, which is a "bidirectional" port. The Ethernet SmoothStepper therefore has the following I/O possibilities:

Port 1: 12 Outputs and 5 Inputs

Port 2: 12 Outputs and 5 Inputs OR 4 Outputs and 13 Inputs

Port 3: 12 Outputs and 5 Inputs OR 4 Outputs and 13 Inputs

The maximum number of Outputs is 12 + 12 + 12 = 36. In that configuration there would be 5 + 5 + 5 = 15 Inputs.

The minimum number of Outputs is 12 + 4 + 4 = 20. In that configuration there would be 5 + 13 + 13 = 31 Inputs.

The other possibility is 12 + 12 + 4 = 28 Outputs, and 5 + 5 + 13 = 23 Inputs.

1.Install a "Plug-in"

Open the zip file and double-click the m3p file. It should copy it to the c:WMach3WPlugins folder and rename it with a dll extension.



Run the "ESS_v10a.m3p"in the folder unzipped.

This file will be disappeared automatically while installing ESS, Plug-in

2. Set-up, "Ethernet"

Here are the instructions for configuring your computer's Ethernet port and running the plugin.

1. The computer's Ethernet port needs to be configured with a static IP address. Usually Ethernet ports are set up for DHCP, which allows a cable or DSL router to assign a unique address to a device that is requesting an address for the local network.

Scroll down to the operating system you are using.

When you get to the part where you click the radio button that says "Use the following IP address", please type in the following:

IP address: 10.9.9.8 (or anything in the 10.9.9.x range, but not 10.9.9.9 because that is the address of the board) Subnet mask: 255.255.255.0

By default it will show a Subnet mask of 255.0.0.0 after you type in 10.9.9.8 It must be changed to 255.255.255.0.

The Default Gateway may be left blank, as well as the Preferred and Alternate DNS servers.

That is all you need to do for the static IP address.

2. You can try running Mach at this point, but you might need to disable the firewall if it doesn't communicate. When you run Mach, a firewall warning might pop up that says an application is trying to access the Internet. Give it permission to do so. I believe it needs to be valid for Public networks and not just Home or work (private) networks. That way you won't need to disable the Firewall because you are creating an exception for Mach.

| Motion Control Hardware PlugIn sensed!! | × |
|---|---|
| Your system is showing more than one control device | |
| Please pick the one you would like this profile to use. | |
| O Normal Printer port Operation. | |
| @ ESS_v10a | |
| O No Device | |
| C No Device | |
| O No Device | |
| | |
| ☑ Dont ask me this again OK | |
| | - |

If you run "Mach3Mill" the window above will show up and choose "ESS-v10a" and click "OK"

If you checked, "Don't ask me again"

It means that it will do automatically without asking next time.

Depending upon whether or not the user has previously checked off the box that says "Don't ask me again" when you select a motion control device, you might need to reset that. In order to do that you will need to have Mach running (which means you will need to be pretending to be running another device such as the parallel port). Choose the pull-down menu "Function Cfg's". Then choose the option "Reset Device Sel...". The next time you run Mach it will ask you which motion control device you want to run.

When you run the Ethernet SmoothStepper plugin, it will try to contact the board.

If this is the first time you are using this XML (profile) file, the IP address will not be set properly.

I am working on a better user interface for this so that it flows nicely. You will be presented with a semi-cryptic message that says:

| CTftp::WakeupClient Board does not reply. | |
|---|--|
| Select YES to retry | |
| No to config | |
| Cancel to quit | |

<u>Click No, and then you will be allowed to enter the Static IP address of the</u> <u>SmoothStepper board (10.9.9.9).</u>

| log | | | | | | | | OK |
|---|----|-------|---|--------|----|----|---|--------|
| SmoothStepper Board IP Address: | 10 | 2 | 9 | 2 | 9 | a. | 9 | Cancel |
| Board Nickname: | | | | | | | | |
| MAC Addrress of PC Ethernet Adapter Currently In Use: | | | | | | | | |
| MAC Address of | | 00.00 | | 2.00.0 | 10 | | 1 | |

You will only need to do this once, since the next time Mach runs, it will find it in the XML file when it starts.

Set-up of Ethernet connection has been finished showing picture below And started to Mach3



It will come out the window as follows and select "Yes" and go on to next.



3. Set-up, Mach3

Set Port & Pin to be fit with your equipment. And Set-up for ESS, do as follows.

| ator Plugin Contr | rol Help |
|--|---|
| of Video Win ESS-v10a ESS-v10a ESS-v10a | ethernet IP Setup Config Data Monitoring |
| log | |
| Controller Frequency The Controller Frequency controls how many times per second the velocity is updated when until thing nulses. | Port 2 Pins 2 through 9 Direction Out OK OK Port 3 Pins 2 through 9 Direction In Cancel |
| This setting has tradeoffs. At higher frequencies, the motion should be smoother because there are more velencify undates ner second | Output Mode Noise Filtering |
| But at higher frequencies the negative aspects include lower resolution (probably a minor point), a smaller data buffer, and more demands on USB bandwidth. At 250 Hz, up to 4 seconds of data can be queued up. Each doubling of frequency he buffer length, so at 500 Hz, 2 seconds can be buffered, 1 kHz, 1 second, etc. Max Step Frequency Set the maximum step frequency to the value that is greater than the mesimum step frequency for each axis. X-axis 256 kHz Set the maximum step frequency to the value that is greater than it needs to be will limit resolution. For example, if the real max step rate is 500 kHz, and you set the Max Step Frequency to the value that is greater than it needs to be will limit resolution. For example, if the real max is prate is 500 kHz, and you set the Max Step rate is 500 kHz, and you set the Max Step rate is 500 kHz, and you set the Max Step rate is 500 kHz, and you set the Max Step rate is 500 kHz, and you set the Max Step rate is 500 kHz, and you set the Max Step rate is 500 kHz, and you set the Max Step rate is 500 kHz, and you set the Max Step rate is 500 kHz, and you set the Max Step rate is 500 kHz, and you set the Max Step requency to the somets the set resolution. B-axis 256 kHz Image: Step and Dir Max Step and Dir Spindle Relay or None V PWM Step and Dir Spindle Pulse Weth (ws) 4 no | Step and Direction Quadrature alves X V X V V Y V V Z V V Z V V A V V B V V C V V B V V C V V Values will be assigned to groups of similar signals. The specified values will be rounded to the nearest multiple of about 1.43 microseconds. To disable filtering for a given groups of inputs, use a value of 0.00 Watchdog Home 0.00 If the PlugIn fails to communicate with the device, within the amount of time is nearest tenth of a second, Max value is 3.1 seconds. Jog 0.00 Seconds. 2.0 Miscellaneous 0.00 (includes A, B, Index, and timing) Miscellaneous 0.00 (includes A, B, Index, and timing) Miscellaneous 0.00 |
| Spindle Index Prescale 1 Max of 4096. Set to 1 for no prescale (default) Miscellaneous De-Reference Axes in EStop Don't Report Port and Pin Warnings 1023 Number of Data Points Mach Should Pre-Calculate | M11Px/M10Px Commands M11Px/M10Px Gates Spindle Output Dwell time associated with M11/M10 Commands M11 Dwell selected in this config Dwell selected Via User DRO User DRO #: 0 M10 |

The Breakout board is linked with Smooth Stepper board & Two_26Pin_Flat cable. 26Pin_Flat cable is made by 25Pin_parallel port_signal and 1Pin for 5V inputting.

Each input/output port in breakout board is connected with the driver or can be joined limit & home sensor and it offers Relay contact signal for speed control of spindle & exterior device.



4. Detailed function

• Switch or Sensor Input Port.

| +24V DC Power | 0 | 24V |
|---------------|---|-------|
| P1.15 Input | 0 | P1.15 |
| P2.15 Input | 0 | P2.15 |
| GND ' | 0 | GND |
| | 0 | 24V |
| P1.10 Input | 0 | P1.10 |
| P1.11 Input | 0 | P1.11 |
| P1.12 Input | 0 | P1.12 |
| P1.13 Input | 0 | P1.13 |
| GND i | 0 | GND |
| +24V DC Power | 0 | 24V |
| P2.10 Input | 0 | P2.10 |
| P2.11 Input | 0 | P2.11 |
| P2.12 Input | 0 | P2.12 |
| P2.13 Input | 0 | P2.13 |
| I GND I | 0 | GND |
| | | , |

There are total 10 connectors (5 for port1 / 5 for port2) as above picture, It has each 4 or 6 pins. 24V Pin here provides power of exterior sensor and can be joined to the sensor to be input by +24V

If the sensor is the contact by type of switch, you can do not to use 24V Pin.

Input signal here can connect "High" "Low" & "Switch Contact" The operation for each inputting can modify setting in port & pins in menu after checking it in Diagnostics(Alt-7)

It can link with emergency stop button to halt the system in this port when the emergency and can connect other input button too.



• Speed Control of spindle & Relay Port for controlling exterior device.

This port outputs $0\sim5V$ or $0\sim10V$ DC voltage for speed control of spindle.

In Mach3, it is outputted after the PWM signal is converted to DC voltage when speed control of spindle by PWM mode.

For DC voltage can change speed of motor by connecting to servo driver or inverter. You use No. 1 Pin in Port2



The output voltage is selected $0 \sim 5V$ or $0 \sim 10V$ range.

Relay Port is comprised of COM & NO.

"NO" is normal open so, it is open usually and if the relay works,

it means that it is connected.

No.1, 14, 16, 17 in Port 1 and No.14, 16, 17 in Port 2 are allocated.

To extend exterior output, you should need an output control code.

For an example, the 14 in Relay port P2 above is allotted by Pin No.14 in port2 and it is set Output #3.

This output can use after assigning to M3, M7, or M8 but I show you another example to use making other M Code.

M code is saved in Mach3-macros-Mach3Mill. Open an note pad to create a new M code

ActivateSignal(output3) Put down above and save as M12.m1s

DeActivateSignal(output3)

Put down above again and save as M13.m1s

And if you spell M12 in MDI screen, the relay3 should be "On" If you spell M13, you can check it out that it should be "Off"

MDI input window is in MDI(Alt-2)



• Port connecting to driver



This is the port to join the driver in each axis and is made by Pins above. This port can link with revolving axis as well as moving straightly in each axis and can do also speed control for by connecting to motor driver for spindle.

For linking with driver, It applies +/- line driver and

is the output 1 pulse as $\ensuremath{\mathsf{DIR}}$ / $\ensuremath{\mathsf{PLS}}$

It is allotted 2~9 in port1 and 2~5 in port2

EX) Samsung servo



"DIR" & "SIGN" as direction signal are same.

"PLS", "PULS", "CLOCK", & "CLK" as pulse signal are same.

• Open Collector / Output Port

| VOC DC Power | 0 | VOC |
|------------------|---|-------|
| P2.6 OC Output | ୦ | P2.6 |
| P2.7 OC Output | 0 | P2.7 |
| P2.8 OC Output | 0 | P2 8 |
| i P2.9 OC Output | _ | 1 2.0 |
| GND | 0 | P2.9 |
| 'i | 0 | GND |
| | - | |

It is assigned 6,7,8,9 in Port2 and can join motor driver & can link with the relay for exterior control too.

Power VOC using here can select below pins.

If you connect with motor driver, use 5V and if the relay, use 24V

VOC Power Select 24 VOC

• Power Input Port



It is the port accepting +24V power for Board-driven.

If you don't use Power for driver in exterior, it has about 80mA current consumption.

It doesn't need to input power to smooth stepper board. It is providing 5V power from CM106 board through 26Pin Flat Cable.

5. Mach3/Run Screen

| <mark>@ Mach3 CNC Licensed To: JI Robotics</mark> Elie Config Function Cfg's ⊻lew Wizards Operator Plugin Control Help | _ Ø X |
|---|--|
| Program Run Alt.1 MDI Alt2 ToolPath Alt4 Offsets Alt5 Settings Alt6 Diagnostics Alt-7 M | till->G15 G1 G17 G40 G21 G90 G94 G54 G49 G99 G64 G97 |
| $ \begin{array}{c} \mathbb{P} \\ \mathbb{P} \\ $ | 5.0000 +1.0000 6.9850 +1.0000 5 cale +1.0000 5 cale |
| File: No File Loaded. | d Wizards Last Wizard Regen. Display Jog rersational November Toolpath Mode Follow |
| Edit G-Code Rewind Ctrl W Recent File Single BLK Alt.N Close G-Code ON Code ON Geode Code ON Stop Set Next Line Line : O Run From Here Dwell JOG Rate 50.0 On/Off Classed JOG Rate 50.0 JOG Rate 50.0 Jog ON/OFF Ctrl.Alt.J | Feed Rate Spindle Speed OverRidden FR0 % 100 FR0 % 100 FR0 2000.00 Feedrate 2000.00 2000.00 Feedrate 2000.00 Spindle Speed Units/Min 0.00 Units/Rev 0.00 Profile: Mach3Mill |
| | |
| | |

6. Mach3/Set-Up

"Set Value" made here, is just an example.

It can possible to set it variously and can do detailed modification.

Menu / Config \rightarrow Select Native Units \rightarrow Choose " MM's "

| Units for Moto | or Setup Dialog |
|----------------|-----------------|
| • MM's | C Inches |
| [[| |
| | DK |

Menu / Config \rightarrow Set up in Port and Pins as below.

| Port #1 ↓ Por ↓0x378 Entry in ←Kernel Speed ← 25000Hz ← 65000hz Note: Softy | t Enabled Port Hex 0-9 A-F C 35000Hz C 75000hz vare must be re kernel speed | Port #2 Port Enabled Ox278 Port Entry in Hex 0-9 A-F Pins 2-9 as inputs 45000Hz 60000hz 100khz started and motors retuned is | OR | MaxNC Mode Max CL Mode enabled Max NC-10 Wave Drive Program restart Restart if changed Sherline 1/2 Pulse mode, ModBus InputOutput Support ModBus Plugin Supported, TCP Modbus support Event Driven Serial Control Servo Serial Link Feedback | |
|--|---|--|----|---|--|
|--|---|--|----|---|--|

Confirm Pin No. & Port No. exactly.

**** Make sure to press "Apply" button before going on to each tap. If it is not, it isn't saved. ****

| | | 0.000 mm | 011 F 111 | | | | |
|---------|---|----------|-----------|---|---|---|---|
| X Axis | | 2 | 3 | | | 3 | 1 |
| Y Axis | 4 | 4 | 5 | X | 4 | 1 | 1 |
| Z Axis | 4 | 6 | 7 | × | 4 | 1 | 1 |
| A Axis | 4 | 8 | 9 | X | 4 | 1 | 1 |
| B Axis | 4 | 2 | 3 | X | 4 | 2 | 2 |
| C Axis | 4 | 4 | 5 | × | 4 | 2 | 2 |
| Spindle | 4 | 1 | 0 | × | X | 2 | 0 |
| | | | | | | | |

If you use A,B,C axis, Set up them and if you don't want to, Remove "Enabled" For both "Dir Low Active" and "Step Low Active"

You should set after judging the direction well in each axis in CNC in view of surroundings your driver is working.

And Voltage Output Pin for speed control of spindle is set No.17

This process can be differ depending on users and it has to be followed some efforts experiencing a few trial & error experiments.

| ngnar | Enabled | Port # | Pin Number | Active Low | Emulated | HotKey | - |
|------------|---------|--------------|------------|--|----------|--------|---|
| (<u></u> | | 1 | 10 | 4 | 22 | 0 | |
| < | * | 1 | 10 | 4 | X | 0 | |
| Home | 4 | 1 | 10 | 4 | X | 0 | |
| / ++ | X | 1 | 11 | 4 | X | 0 | |
| / | X | 1 | 11 | 4 | X | 0 | |
| / Home | 4 | 1 | 11 | 4 | X | 0 | |
| <u></u> ++ | X | 1 | 12 | 4 | X | 0 | |
| | * | 1 | 12 | 4 | X | 0 | |
| . Home | 4 | 1 | 12 | 4 | X | 0 | |
| \ ++ | X | 1 | 13 | 4 | X | 0 | - |
| 22 | I ha | a all the an | 12 | and the second s | b.a | 1.0 | |

Set up X Home, Y Home & Z Home.

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|--|------------|-------------|-------------|-----------|--------|
|--|------------|-------------|-------------|-----------|--------|

| Signal | Enabled | Port # | Pin Number | Active Low | Emulated | HotKey | • |
|----------|---------------|--------------------|----------------------|-----------------|-------------|-------------------|-----|
| A ++ | 8 | 1 | 13 | 4 | 2 | 0 | |
| <u>.</u> | 100 | 1 | 13 | - | 50 | 0 | |
| A Home | 4 | 1 | 13 | 4 | 8 | 0 | |
| B ++ | × × | 2 | 10 | 4 | X | 0 | |
| B | X | 2 | 10 | 4 | 8 | 0 | |
| B Home | 4 | 2 | 10 | 4 | X | 0 | |
| C ++ | 8 | 2 | 11 | 4 | X | 0 | |
| C | * | 2 | 11 | 4 | X | 0 | |
| C Home | 4 | 2 | 11 | 4 | 2 | 0 | |
| Input #1 | 2 | 19 1 ,0 | U | 2 | 8 | U | |
| 1.00 | | | and a second second | | | 0 | |
| | Pins 10-13 an | d 15 are inputs, I | Only these 5 pin nur | nbers may be us | sed on this | | |
| | | | | | Autoro | ated Setun of Inc | uts |

If use A,B,C axis, set it and if it is not, remove "Enable"

"Set Value" can be much different because users could do "Home" or 'Limit"

| Signal | Enabled | Port # | Pin Number | Active Low | Emulated | HotKey | A |
|------------|---------------|--------------------|----------------------|-----------------|------------|-------------------|----------|
| nput #2 | X | 1 | 0 | X | X | 0 | |
| nput #3 | X | 1 | 0 | X | X | 0 | |
| Innut #4 | 27 | 1 | n | 37 | 7 | 0 | |
| Probe | 4 | 2 | 12 | 4 | X | 0 | |
| index | X | 1 | 0 | × | X | 0 | |
| Limit Ovrd | X | 1 | 0 | X | X | 0 | |
| EStop | 4 | 1 | 15 | 4 | X | 0 | |
| THC On | X | 1 | 0 | * | X | 0 | |
| тно бр | 65 | Ť. | Ū | 20 | 65 | Ū | |
| THC Down | X | 1 | 0 | 2 | X | 0 | T |
| OC1471 H | | 0 | 112 | | | | |
| | Pins 10-13 an | d 15 are inputs, (| Only these 5 pin nun | nbers may be us | ed on this | | |
| | | | | | Autom | ated Setup of Inc | uts |

Set up "EStop Pin" as above.

In "ActiveLow" case here, should apply after checking out whether your emergency stop button is "Active Low" or "Active High"

For probe, it is allotted for Tool Zero Sensor in Z axis.

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|---|----|
|---|----|

| Signal | Enabled | Port # | Pin Number | Active Low | Emulated | HotKey | |
|-------------|---------------|--------------------|----------------------|-----------------|----------------------|-------------------|------|
| THC Down | X | 1 | 0 | X | X | 0 | |
| OEM Trig #1 | 4 | 2 | 13 | 4 | X | 0 | - |
| OEM Trig #2 | 4 | 2 | 15 | 4 | X | 0 | |
| OEM Trig #3 | X | 1 | 0 | X | X | 0 | |
| OEM Trig #4 | X | 1 | 0 | X | X | 0 | |
| OEM Trig #5 | * | 1 | 0 | X | X | 0 | |
| OEM Trig #6 | X | 0 | 0 | 8 | X | 0 | |
| OEM Trig #7 | X | 0 | 0 | X | X | 0 | |
| OEM Trig #8 | X | 0 | 0 | X | X | 0 | |
| OEM Trig #9 | X | 0 | 0 | * | X | 0 | |
| 0011T | | 0 | | | - | 0 | |
| | Pins 10-13 an | d 15 are inputs, (| Only these 5 pin nur | nbers may be us | ed on this Autom: | ated Setup of Inp | outs |

For OEM Trigger #1 & #2 are assigned for Cycle Start and Feed Hold button.

The 1000 inputted in OEM Trigger #1 is Cycle Start OEM Code.

1001 of #2 is OEM Code in Feed Hold.

For more detailed thing, hope to refer to MACH3 manual.

| Signal | Epobled | Dort # | Din Number | Activo Low | | |
|---|--|--|--|--|--------|------------|
| Digit Trig | | 1 | | | | |
| Enable1 | - | 1 | 1 | | | |
| Enable? | | 2 | 6 | | | |
| Enable3 | 4 | 2 | 7 | | | |
| Enable/ | | 2 | 8 | | | |
| Enable5 | <u> </u> | 2 | q | | | |
| Enable6 | | 1 | 0 | | | |
| Output #1 | | 1 | 14 | 2 | | |
| Output #2 | | 1 | 1 | 2 | | |
| Output #3 | | 1 | 17 | 2 | | |
| Output #4 | | i | 16 | 2 | - | |
| ne Configuratio | n Ports & Pins | | | ок | Cancel | Apply |
| ne Configuration t Setup and Axis S | n Ports & Pins Selection Motor Ou | utputs Input Signals C | Dutput Signals Encoder, | ок 🔤 | Cancel | Apply s |
| ne Configuration t Setup and Axis S Signal | n Ports & Pins Selection Motor Ou Enabled | utputs Input Signals C Port # | Dutput Signals Encoder, Pin Number | OK | Cancel | Apply s |
| n <mark>e Configuratio</mark> t Setup and Axis S Signal Enable3 | n Ports & Pins Selection Motor Ou Enabled | utputs Input Signals C Port # 2 | Dutput Signals Encoder, Pin Number 7 | OK | Cancel | Apply s |
| ne Configuration t Setup and Axis S Signal Enable3 Enable4 | n Ports & Pins Selection Motor Ou Enabled | utputs Input Signals C Port # 2 2 | Dutput Signals Encoder/ Pin Number 7 8 | OK /MPG's Spindle Setu Active Low | Cancel | Apply s |
| ne Configuration t Setup and Axis S Signal Enable3 Enable4 Enable5 | n Ports & Pins Selection Motor Ou Enabled | utputs Input Signals C Port # 2 2 2 2 | Dutput Signals Encoder, Pin Number 7 8 9 | OK /MPG's Spindle Setu Active Low | Cancel | Apply s |
| ne Configuration t Setup and Axis S Signal Enable3 Enable4 Enable5 Enable6 | n Ports & Pins Selection Motor Ou Enabled 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | utputs Input Signals C Port # 2 2 2 2 0 | Dutput Signals Encoder, Pin Number 7 8 9 0 | OK /MPG's Spindle Setu Active Low | Cancel | Apply s |
| ne Configuration t Setup and Axis S Signal Enable3 Enable4 Enable5 Enable6 Output #1 | n Ports & Pins Selection Motor Ou Enabled 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | utputs Input Signals C Port # 2 2 2 2 0 1 | Dutput Signals Encoder, Pin Number 7 8 9 0 14 | OK /MPG's Spindle Setu Active Low | Cancel | Apply s |
| ne Configuration t Setup and Axis S Signal Enable3 Enable4 Enable5 Enable6 Output #1 Output #2 | n Ports & Pins Selection Motor Ou Enabled 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | utputs Input Signals C Port # 2 2 2 2 0 1 1 | Dutput Signals Encoder, Pin Number 7 8 9 0 14 16 | OK /MPG's Spindle Setu Active Low X X X X X X X X X X X X X X X X X X X | Cancel | Apply s |
| ne Configuration t Setup and Axis S Signal Enable3 Enable4 Enable5 Enable6 Output #1 Output #2 Output #3 | n Ports & Pins Selection Motor Ou Enabled 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | utputs Input Signals C Port # 2 2 2 2 0 1 1 1 2 | Dutput Signals Encoder, 7 8 9 0 14 16 14 | OK | Cancel | Apply s |
| ne Configuration t Setup and Axis S Signal Enable3 Enable4 Enable5 Enable6 Output #1 Output #2 Output #3 Output #4 | n Ports & Pins Selection Motor Ou Enabled 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | utputs Input Signals C Port # 2 2 2 2 0 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 | Dutput Signals Encoder, 7 8 9 0 14 16 14 16 14 | OK /MPG's Spindle Setu Active Low X X X X X X X X X X X X X X X X X X X | Cancel | Apply s |
| ne Configuration t Setup and Axis S Signal Enable3 Enable4 Enable5 Enable6 Output #1 Output #2 Output #3 Output #4 Output #5 | n Ports & Pins Selection Motor Ou Enabled 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | utputs Input Signals C Port # 2 2 2 0 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 | Dutput Signals Encoder, 7 8 9 0 14 16 14 16 14 16 17 | OK /MPG's Spindle Setu Active Low X X X X X X X X X X X X X X X X X X X | Cancel | Apply s |
| te Configuration t Setup and Axis S Signal Enable3 Enable4 Enable5 Enable6 Output #1 Output #2 Output #3 Output #4 Output #5 Output #6 | n Ports & Pins Selection Motor Ou Enabled 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | utputs Input Signals C Port # 2 2 2 2 0 1 1 1 2 2 2 2 2 2 2 2 2 2 1 | Dutput Signals Encoder, Pin Number 7 8 9 0 14 16 14 16 14 16 17 0 | OK | Cancel | Apply s |
| te Configuration t Setup and Axis S Signal Enable3 Enable4 Enable5 Enable6 Output #1 Output #2 Output #3 Output #4 Output #5 Output #6 Charge Pump | n Ports & Pins Selection Motor Ou Enabled 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | utputs Input Signals C Port # 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 2 2 2 1 1 1 1 | Dutput Signals Encoder, 7 8 9 0 14 16 14 16 14 16 17 0 1 | OK /MPG's Spindle Setu Active Low X X X X X X X X X X X X X X X X X X X | Cancel | Apply s |

Enable 2~5 is the pin assigned by Open Collector Output.

For Output #1, #2, #3, #4, & #5Pin are relay output port and set as above.

In ActiveLow, should apply after thinking according to exterior device connected your CNC.

If you want to use spindle & pump for cutting oil, remove "checking" above picture. If it is checked, it means that it does not use.

To set speed control of spindle is as follows..

| Pleady Control Disable Spindle Relays Clockwise Output # Output # Output Signal #'s 1-6 Plood Mist Control Disable Flood/Mist relays Delay Mist Output # Output # Output # Output # Output # Output Signal #'s 1-6 ModBus Spindle - Use Step/Dir as well | Wotor Control Image: Use Spindle Motor Output Image: PWM Control Step/Dir Motor PWMBase Freq. PWMBase Freq. Image: Open state | Special Fun Use Spin Closed L P [0,25 Spindle S Seconds Seconds Seconds | Cons dle Feedback in Sync Mode oop Spindle Control I [1 D [0,3 peed Averaging Special Options, Usually Off HotWire Heat for Jog Laser Mode, freq Torch Volts Control | | |
|--|---|--|--|--|--|
| ☐ Enabled Reg 64 64 - 127 Max ADC Count 16380 | CCW Delay Spin DOWN 0 Secon | | Torch Auto Off | | |

7. Motor Tuning

Menu / Config → choose "Motor Tuning"
Select "X axis" and set to be fit user's equipment.
For Velocity or Acceleration, it can alter adequately.

***** Make sure to press "Save Axis Setting" after inputting.

| Motor Tuning | and Setup | × |
|---|---|--------------------|
| 3072 | X - AXIS MOTOR MOVEMENT PROFILE | Axis Selection |
| et 2764.8 2457.6 W 2150.4 | | Y Axis |
| 8, 1843.2 .∞ 1536 E 1228.8 ↓ 921.6 | | Z Axis A Axis |
| | | B Axis |
| | 0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 Time in Seconds | Spindle |
| Steps per | velocity Acceleration Step Pulse Dir Pulse In's or mm's per min. in's or mm's/sec/sec G's 1 - 5 us 0 - 5 | SAVE AXIS SETTINGS |
| 160 | 1999.8 500 0.050988 1 1 | Cancel OK |













Menu / Config \rightarrow Choose "Motor Homing" and set as below.

For more detailed explanation as for each functions, refer to mach3 program manual.

| | 102.00 | | Entries | are in setup u | nits. | 1.000 | 1000 000 000 | 1.400 |
|------|------------|----------|----------|----------------|--------|-------|--------------|---------|
| Axis | s Reversed | Soft Max | Soft Min | Slow Z | Home | Home | Auto Z | Speed % |
| X | X | 100,00 | -100,00 | 1,00 | 0,0000 | X | 4 | 20 |
| Y | X | 100,00 | -100,00 | 1,00 | 0,0000 | × | 4 | 20 |
| Z | * | 100,00 | -100,00 | 1,00 | 0,0000 | 8 | 4 | 20 |
| A | * | 100,00 | -100,00 | 1,00 | 0,0000 | × | 4 | 20 |
| В | X | 100,00 | -100,00 | 1,00 | 0,0000 | X | 4 | 20 |
| С | X | 100,00 | -100,00 | 1,00 | 0,0000 | X | 4 | 20 |

8. How to adjust spindle speed

Set up as follows after you finish setting above. Config \rightarrow Click "Spindle Pulleys"

| | Fixtures, | |
|----|------------------|--|
| | ToolTable,, | |
| | Config Plugins | |
| •• | Spindle Pivleys, | |
| | Safe_Z Settep,, | |

Input "Max Speed" of spindle as below. If Max Speed is 20,000RPM , input 20000

| - | Min Speed | Max Speed | Ratio |
|----------|--------------|---|--|
| | J <u>7</u>) | <u>, </u> | <u>. </u> |
| | | | ОК |
| | - | Min Speed | Min Speed Max Speed |

If so, can do speed control of spindle in mach program.



If it is S1000 on G code, It means the spindle RPM is 1000 and if it is S5000 It means the RPM is 5000