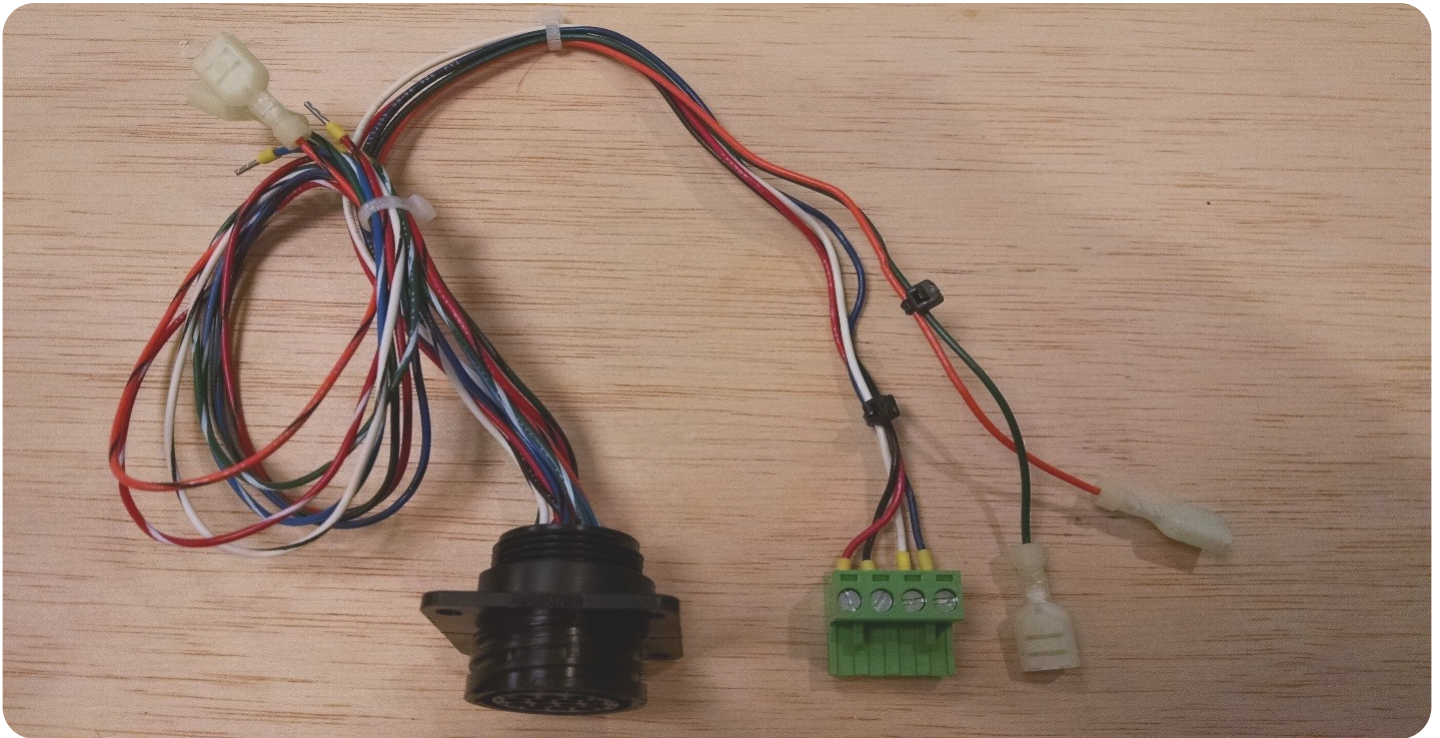


# CRP800 Retrofit Guide

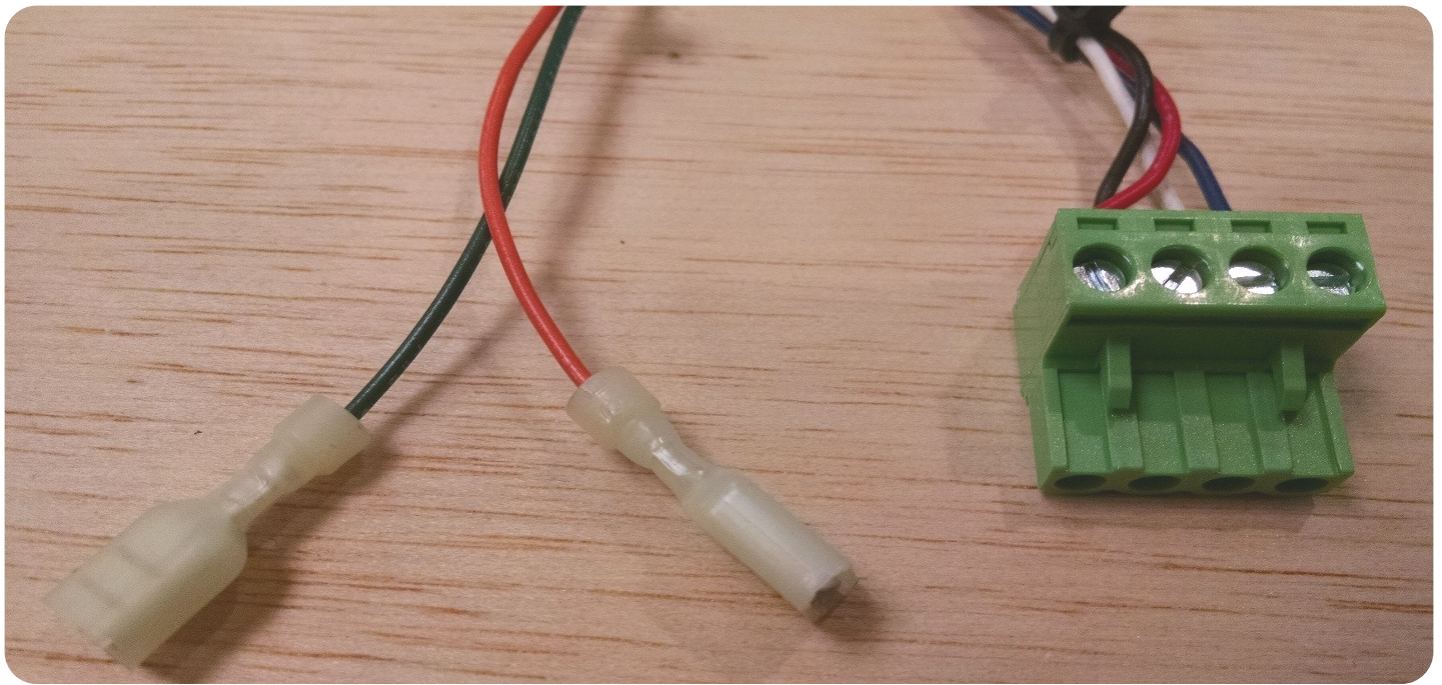
**Congratulations on your purchase of the CNC Router Parts  
2.2 kW Plug and Play Spindle / VFD System!**

## Step 1

The first step in setting up your Spindle will be to upgrade your current CRP800 Control Unit with VFD compatibility. You should have received a 14 pin connector with your Retrofit Kit. (See Below)



This connector will be zip tied to separate out the 4 pins used for speed and fault signaling from the relay wiring. (See Below)

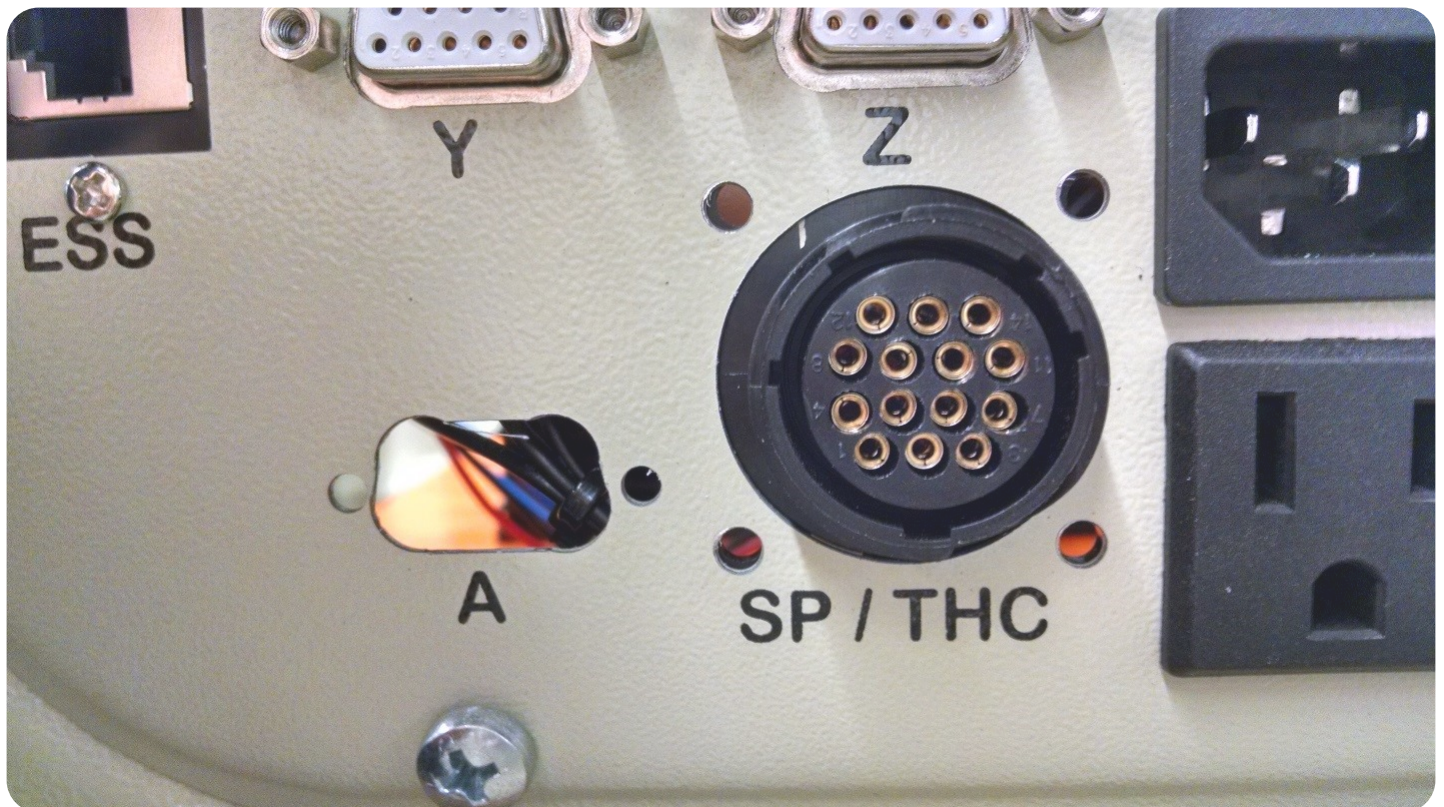




To install this 14 pin connector, first remove the SP/THC port cover on your CRP800 Control Unit. (See Below)

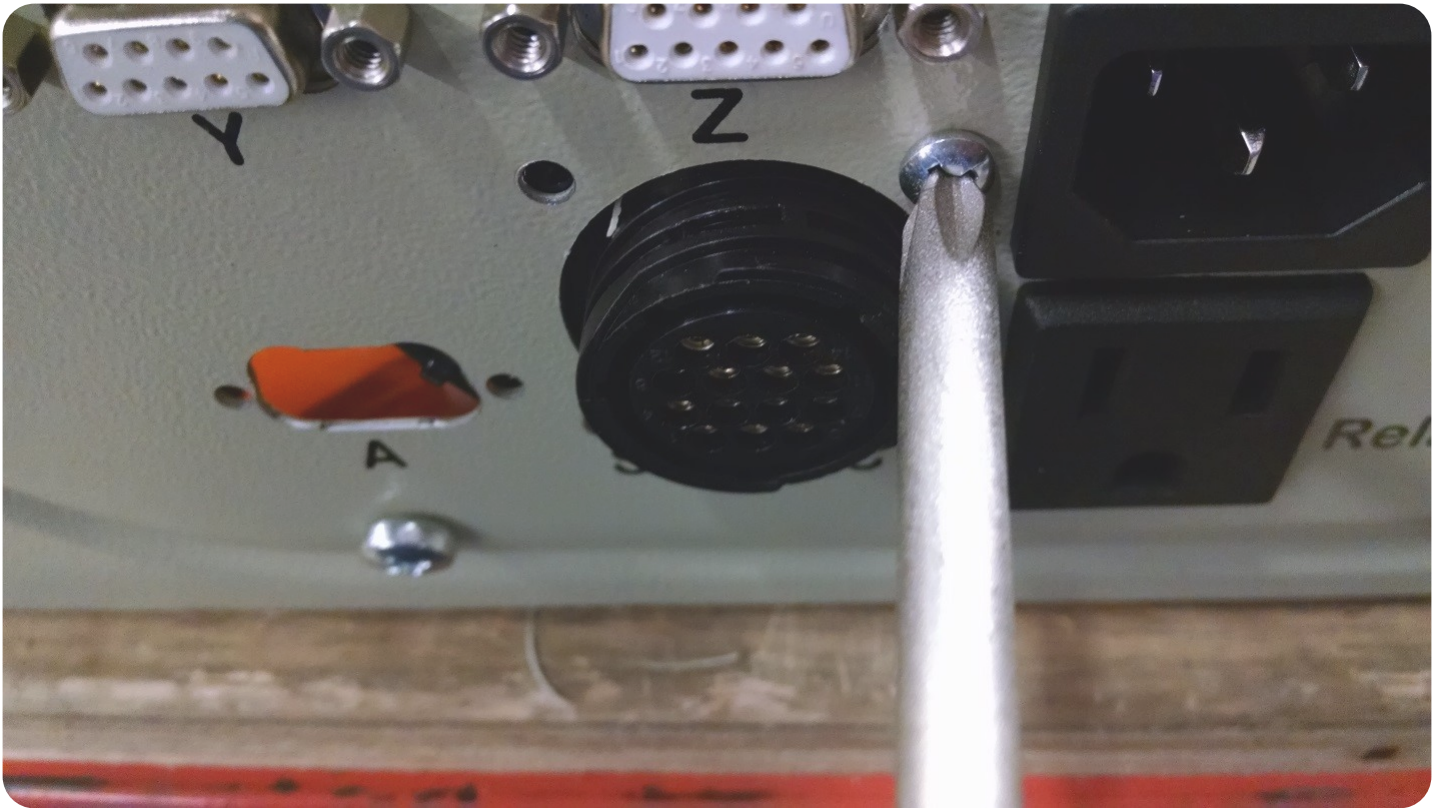


Next install the 14 pin connector from the back side of the gland plate, with the square plastic flange on the inside of the Control Unit. (See Below)

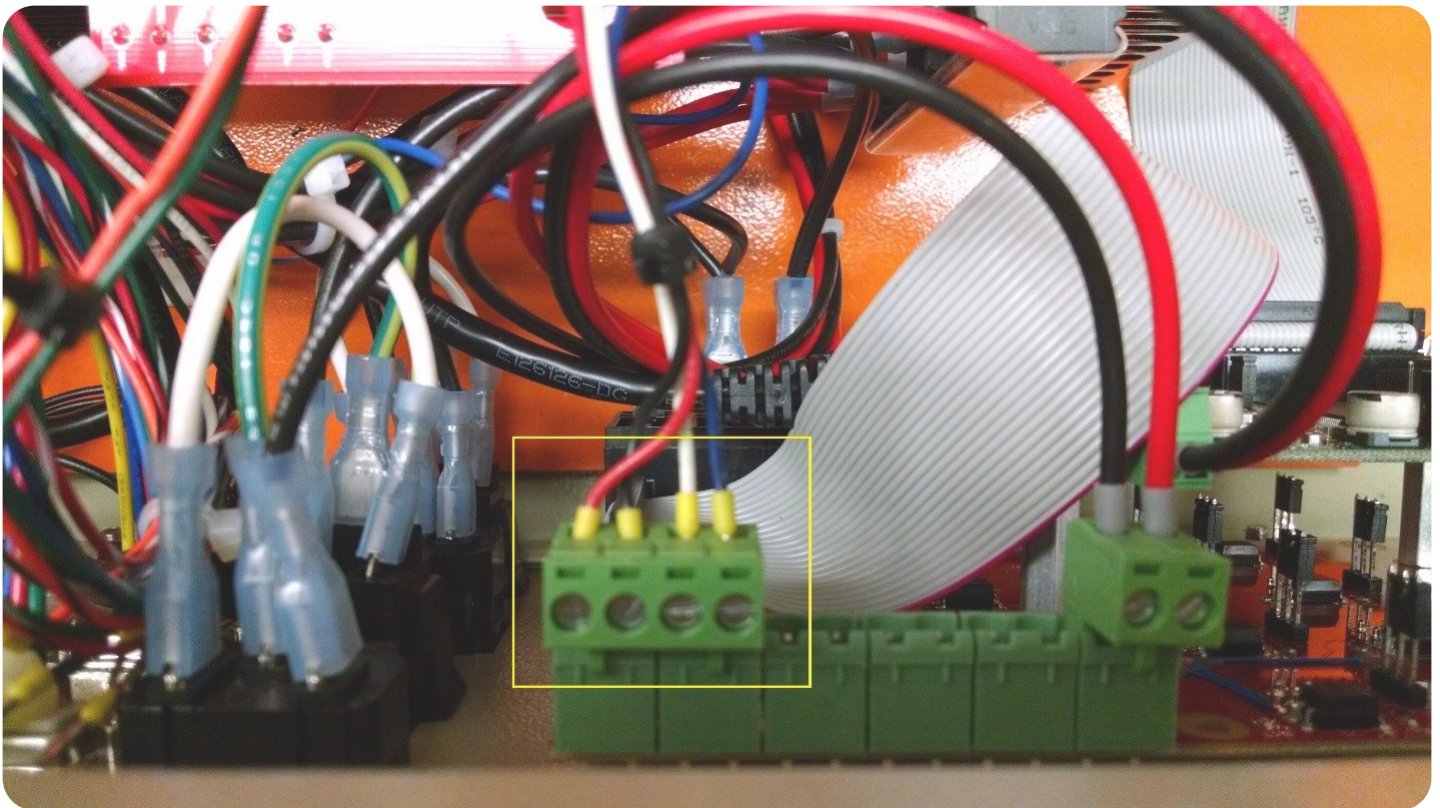




Now using the supplied #6-32 screws and nuts, secure the 14 pin connector to the gland plate. (See Below)

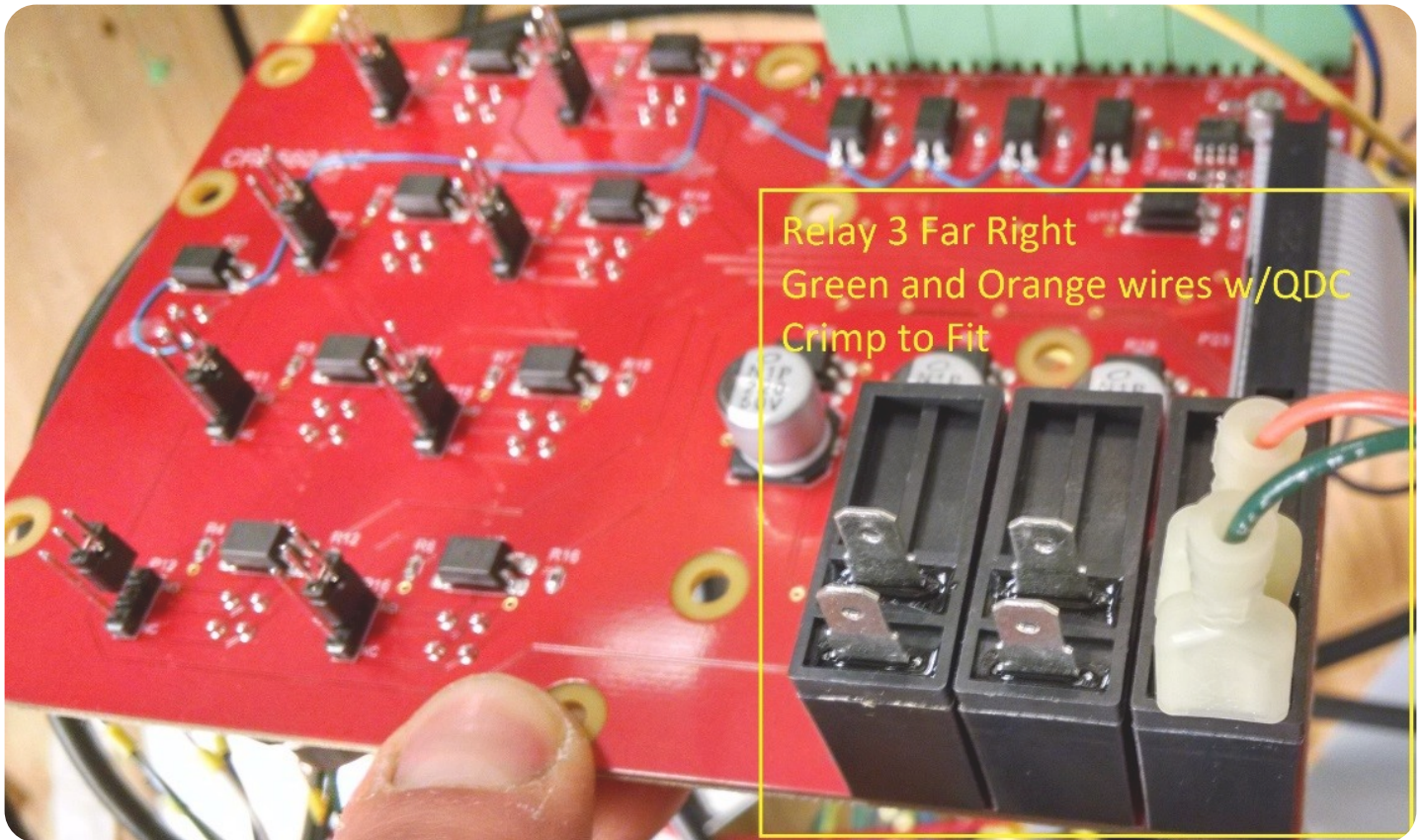


The 14 pin connector must now be wired to the break out board inside of the Control Unit. Install the four pin SUPU connector onto the break out board in the orientation and position shown.





Then, install the Orange and Green quick disconnects on the 3<sup>rd</sup> relay of the red break out board mounted to the gland plate (furthest on the left when facing down into the control unit, closest to the relay sockets on the gland plate). Note, you may have to crimp down on the QDC's to create a solid connection.



Your CRP800 Control Unit is now ready to connect to the VFD via the grey 14 pin cable included with your Spindle and VFD package.

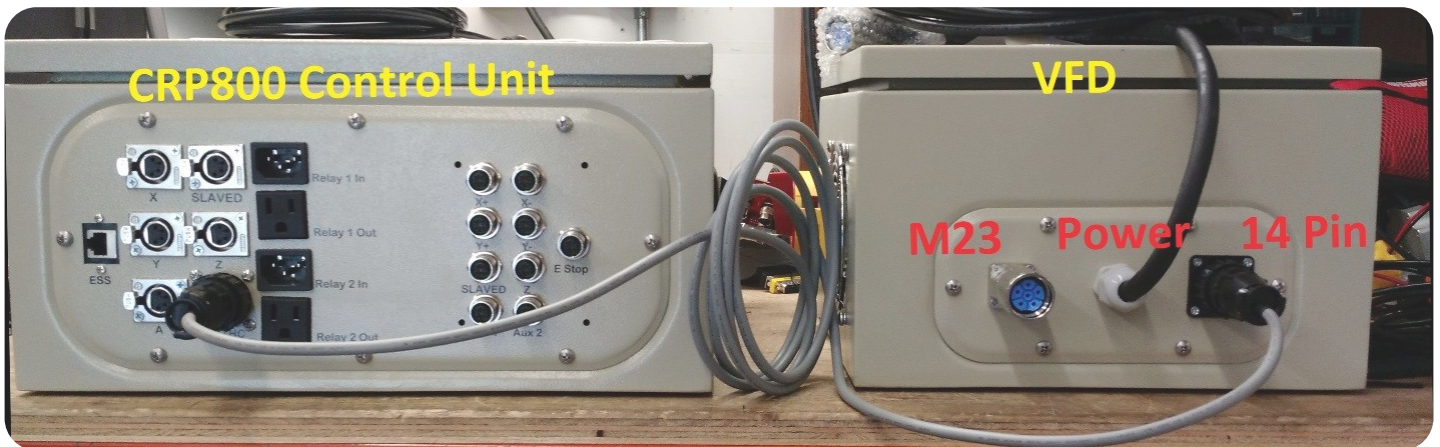


## Step 2

You may now physically connect your VFD to your CRP800 Control Unit with the supplied 14 pin cable. (See Below)



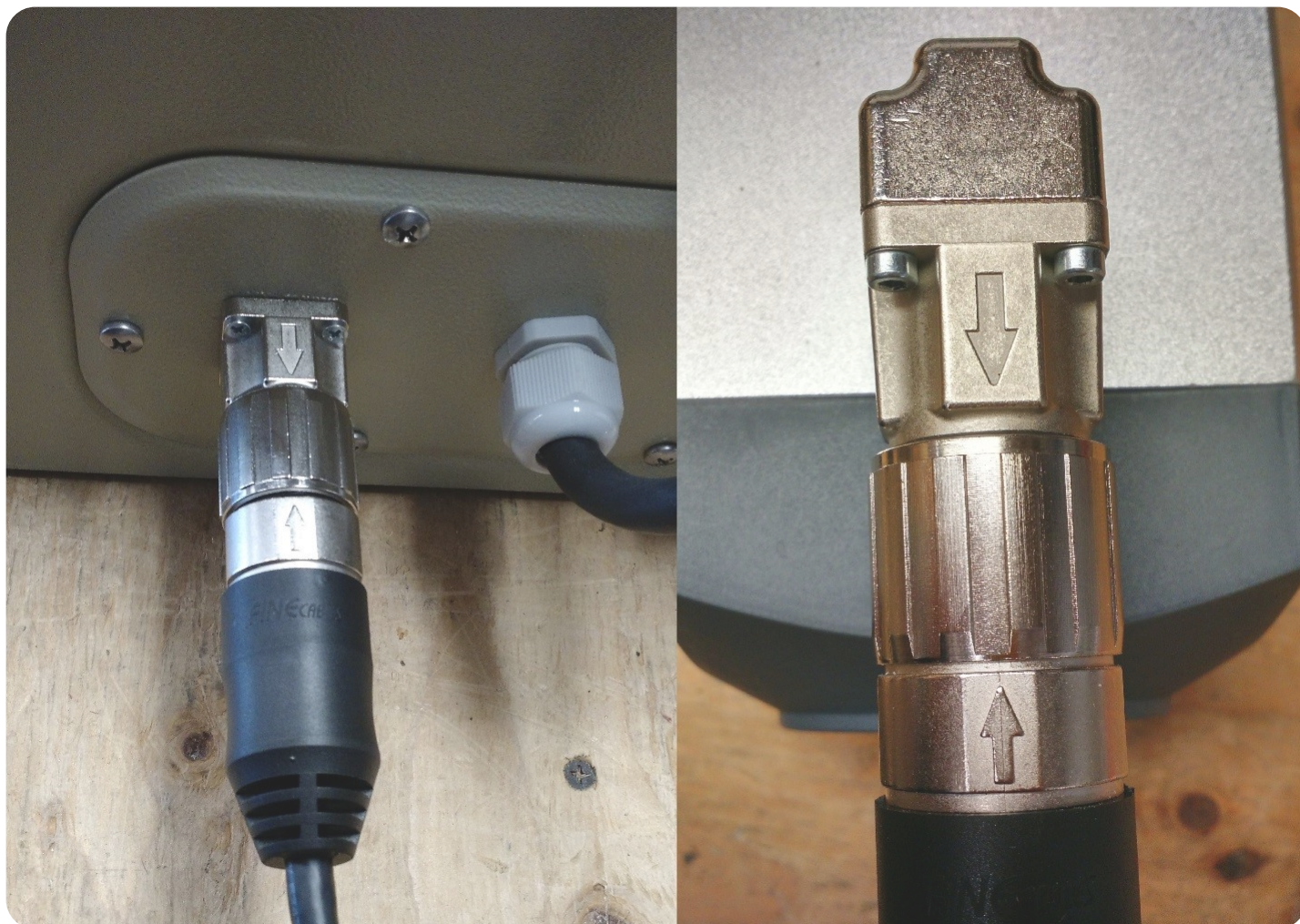
The 14 pin male-to-male cable should connect to the female 14 pin connectors on both the control box and the VFD as shown below.



The included M23 cable should be used to connect your VFD to your spindle and the VFD power cable should be plugged into an appropriate L6-30 240 volt outlet.



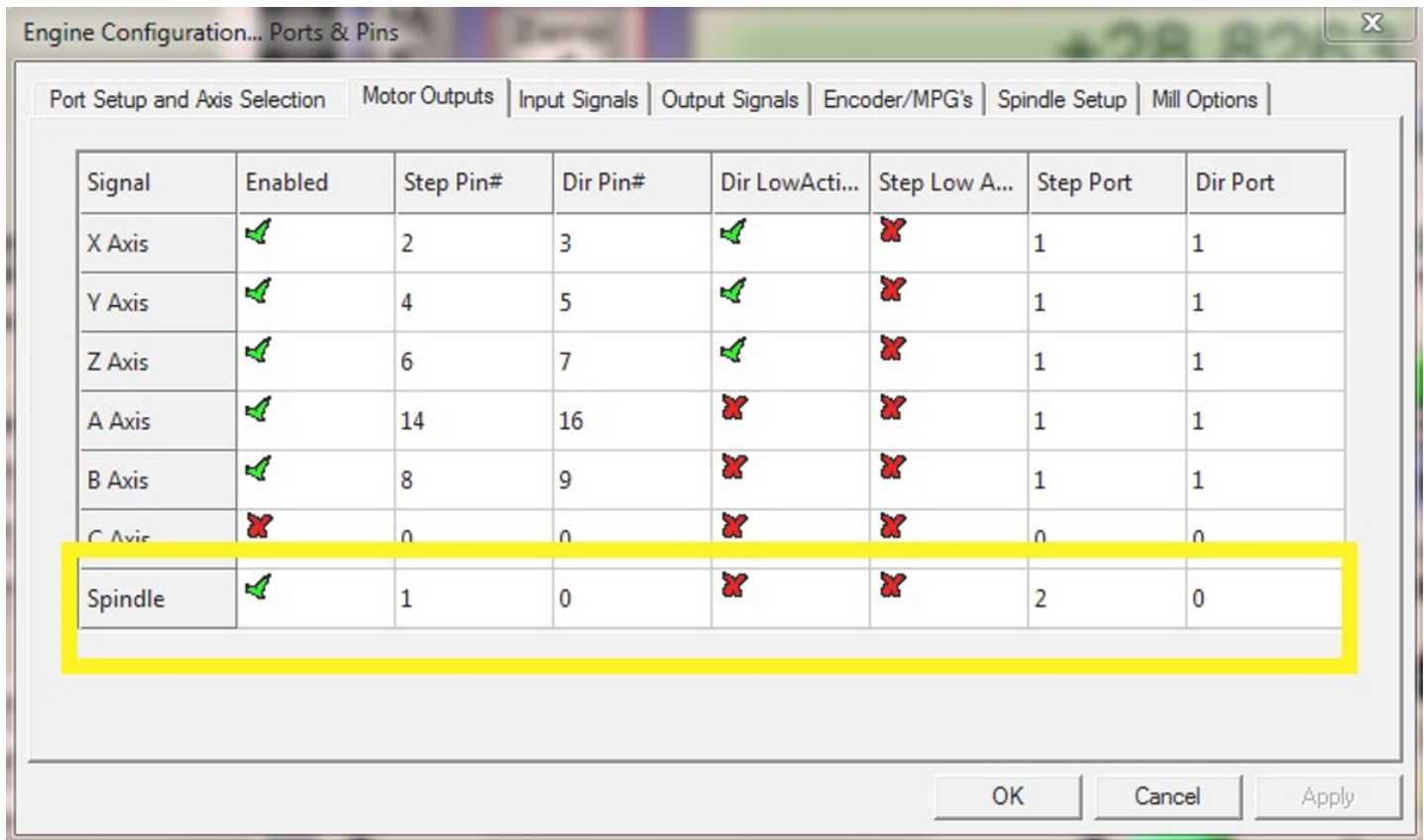
The arrows on the M23 cable ends should align with the panel mount M23 receptacles on both the spindle and the VFD enclosure. If these arrows do not align, the cable will not make a functional connection. (see below).



### Step 3

Now that all physical connections are complete, you must modify the Mach3 settings on your PC to ensure proper spindle operation.

Under "Config" select "ports and pins," then select "Motor Outputs"

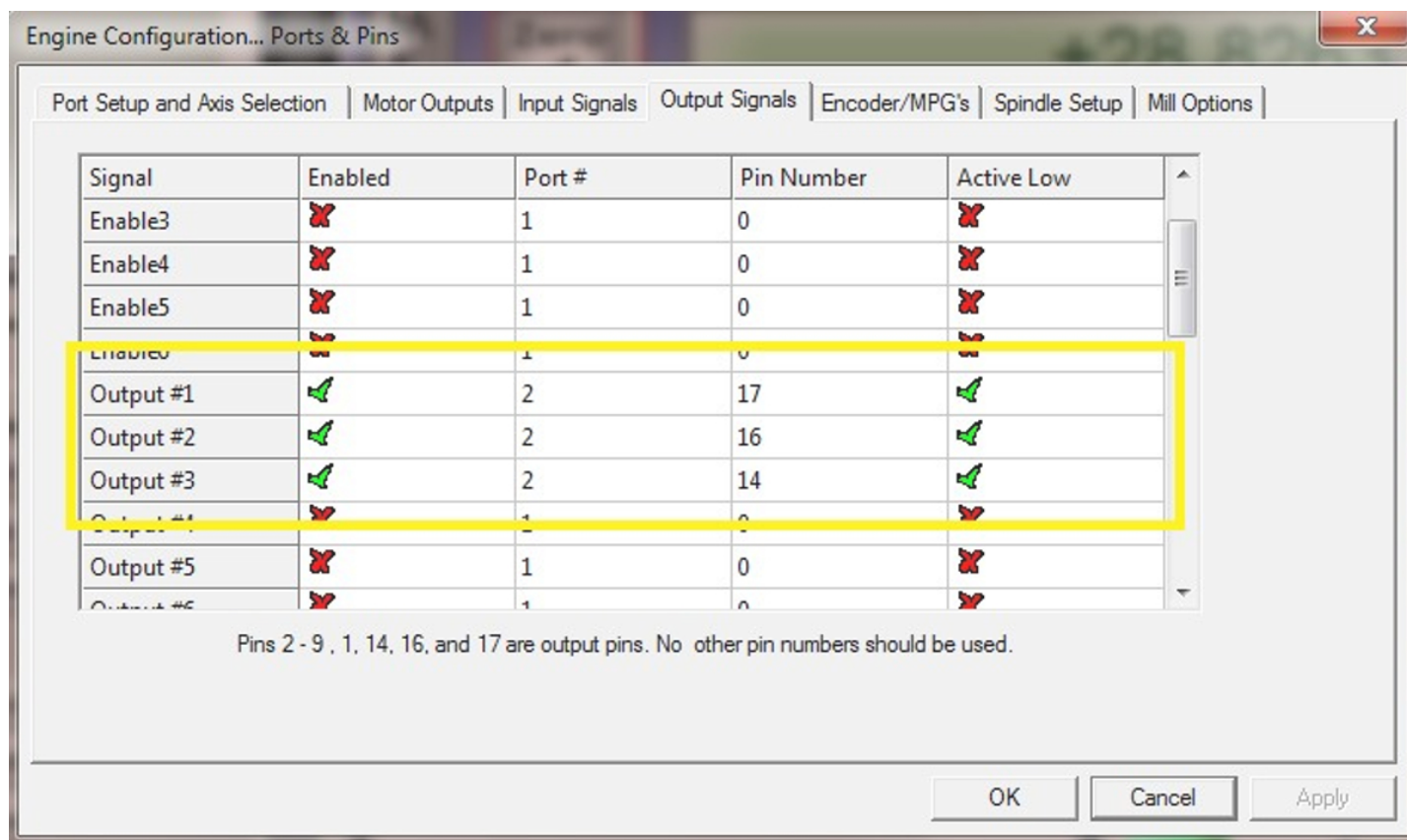


Under the "Motor Outputs" tab, make the following changes to the "Spindle" row:

- Spindle Enabled must show a green check mark (click on the red X to change it to a green check mark)
- Step Pin set to 1
- Dir Low Active must show a red X
- Step Low Active must show a red X
- Step Port set to 2



Now navigate to the "Output Signals" tab (Under "Config" select "ports and pins," then select "Output Signals").

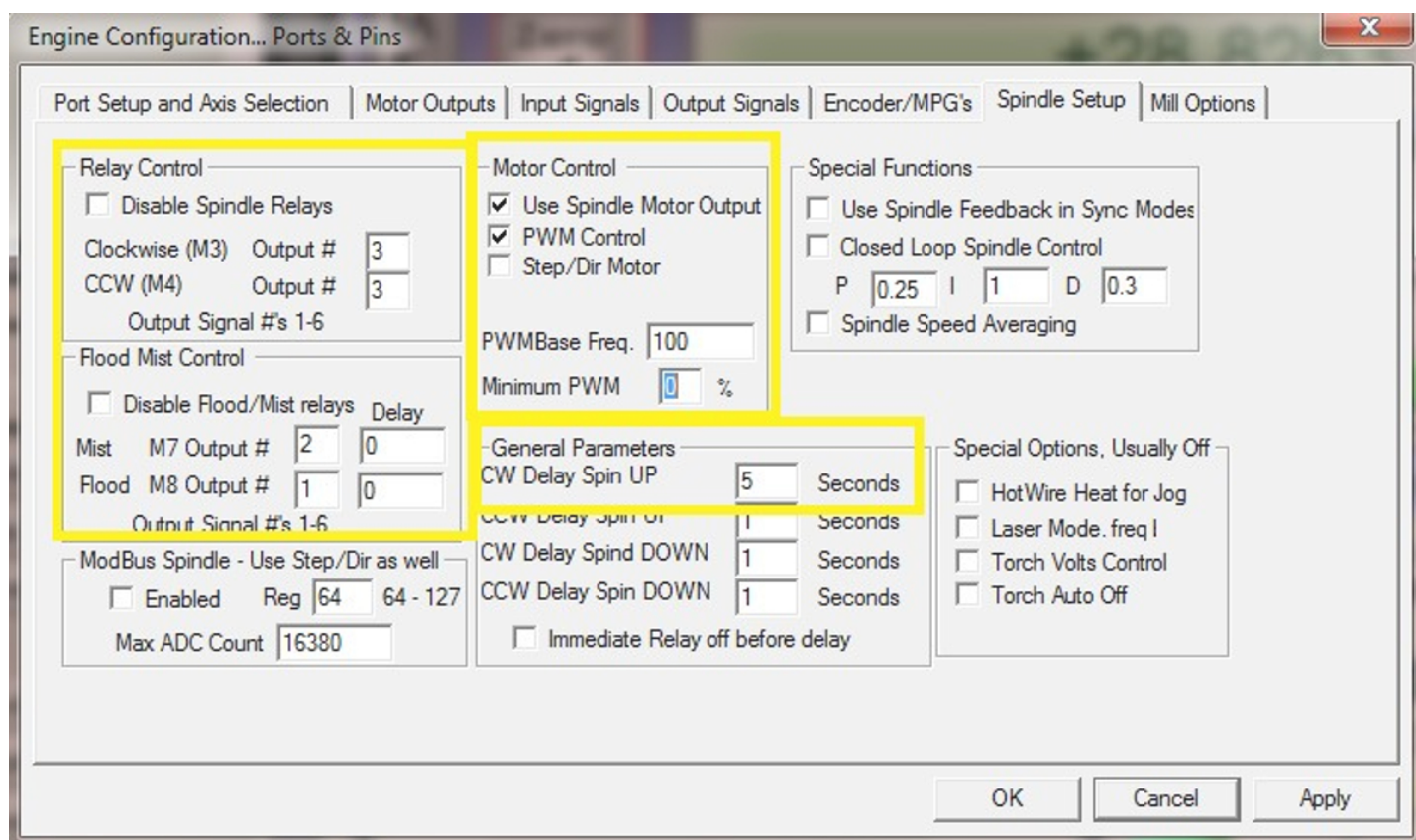


Under the "Output Signals" tab make the following changes:

- In the Output #1 Row
  - Enable must show a green check
  - Port must be set to 2
  - Pin Number must be set to 17
  - Active Low must show a green check
- In the Output #2 Row
  - Enable must show a green check
  - Port must be set to 2
  - Pin Number must be set to 16
  - Active Low must show a green check
- In the Output #3 Row
  - Enable must show a green check
  - Port must be set to 2
  - Pin Number must be set to 14
  - Active Low must show a green check



Now navigate to the "Spindle Setup" Tab (Under "Config" select "ports and pins," then select "Spindle Setup").

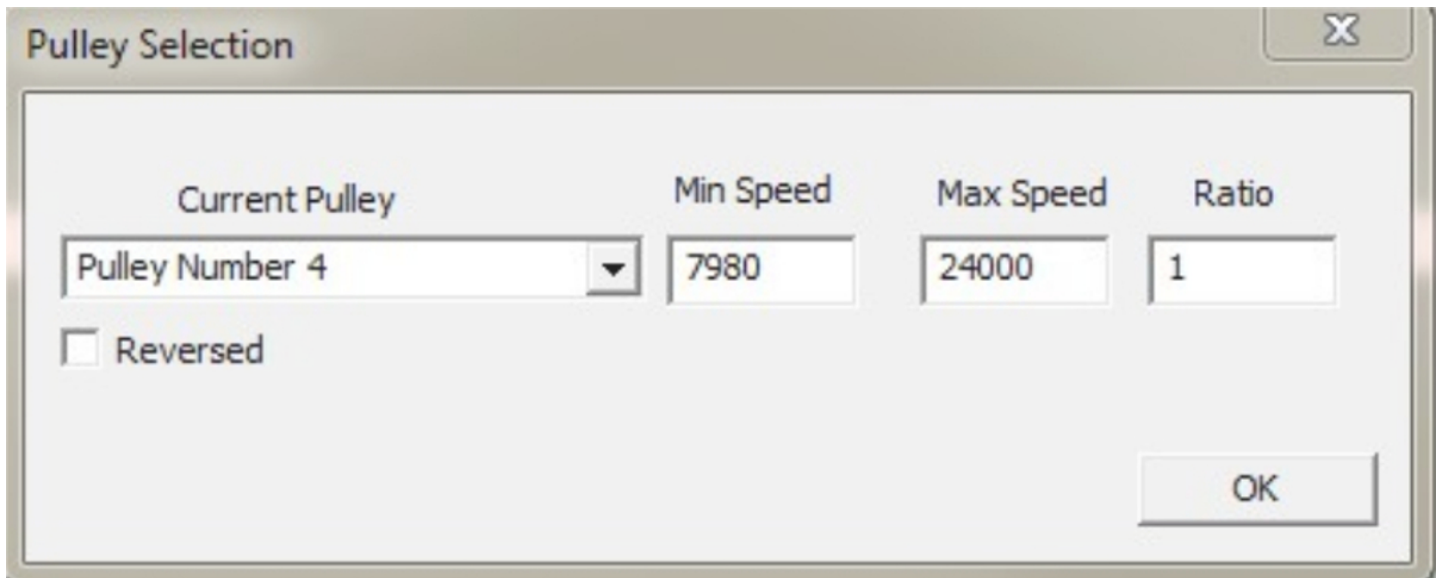


Under the "Spindle Setup" tab make the following changes:

- In the Relay Control
  - Clockwise M3 - Output # must be 3
  - CCW M4 - Output # must be 3
- In Flood Mist Control
  - Mist M7 - Output # must be 2
  - Flood M8 - Output # must be 1
- In Motor Control
  - Use Spindle Motor Output must be checked
  - PWM Control must be checked
  - PWM Base Freq. must be 100
  - **Minimum PWM % MUST BE 0**
- In General Parameters
  - CW Delay Spin UP should be 5 seconds (or greater if you prefer a longer delay)



Now navigate to the "Pulley Selection" (Under "Config" select "Spindle Pulleys", then select "Pulley Number 4")



Current Pulley	Min Speed	Max Speed	Ratio
Pulley Number 4	7980	24000	1

☐ Reversed

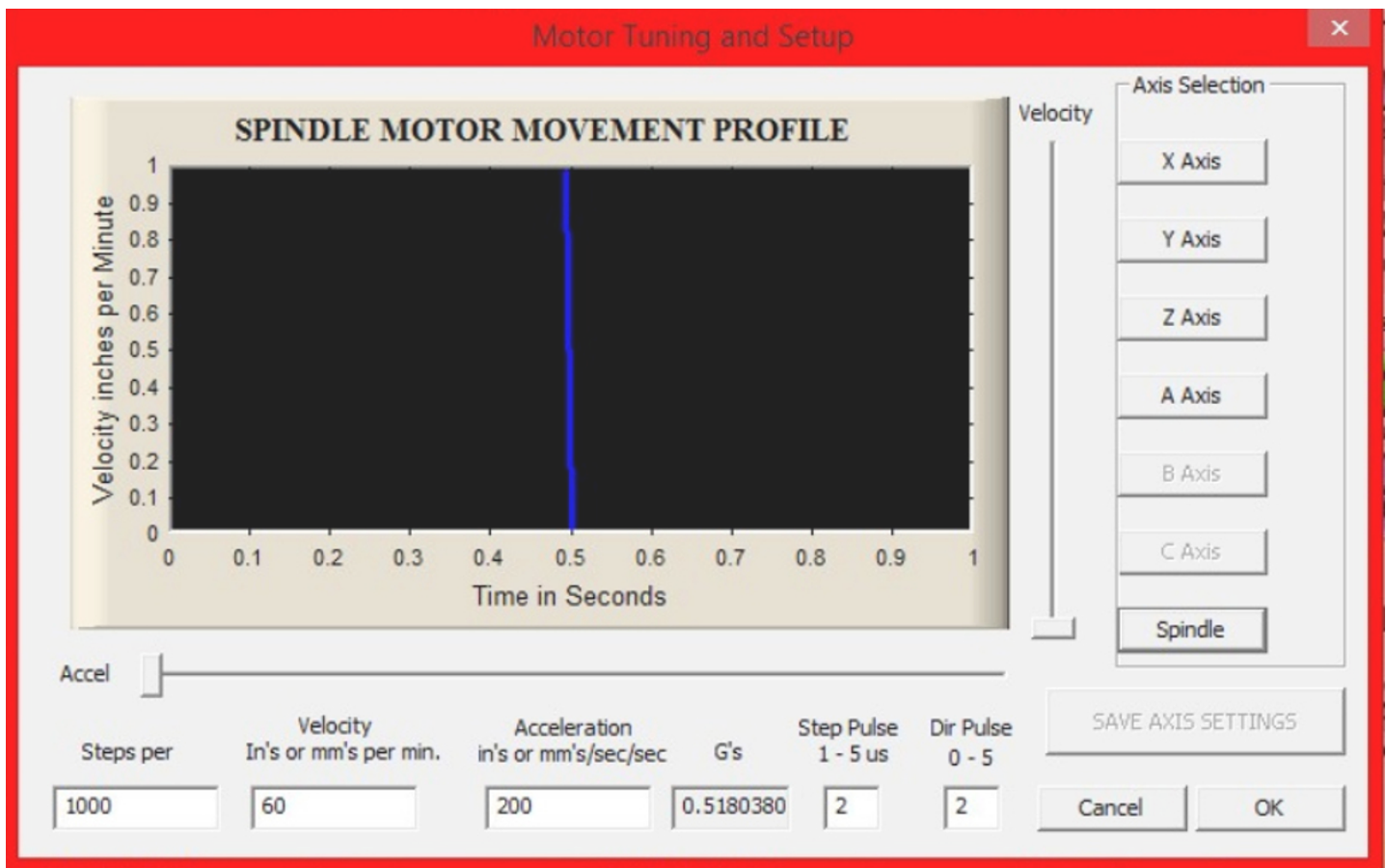
OK

Under "Pulley Settings" make the following changes:

- Set Min Speed to 7980
- Set Max Speed to 24000
- Set Ratio to 1



Now navigate to "Motor Tuning" (Under "Config" select "Motor Tuning" then select the "Spindle" tab)



Under the "Spindle" tab in "Motor Tuning" make the following changes:

- Set "Steps Per" to 1000
- Set "Velocity" to 60
- Set "Acceleration" to 200
- **Save Axis Settings** and then hit "OK"

Now navigate to "ESS Config" (Under "Plugin Control" select "ESS-XXXXX Config")

**Dialog**

Controller Frequency: 1 kHz  
The Controller Frequency controls how many times per second the velocity is updated when outputting pulses.

At 250 Hz, up to 4 seconds of data can be queued up. Each doubling of frequency halves the buffer length, so at 500 Hz, 2 seconds can be buffered, 1 kHz, 1 second, etc.

**Max Step Frequency**

X-axis: 256 kHz  
Y-axis: 256 kHz  
Z-axis: 256 kHz  
A-axis: 256 kHz  
B-axis: 256 kHz  
C-axis: 256 kHz  
Spindle: 32 kHz

**Output Mode**

Step and Direction: X ☒ Y ☒ Z ☒ A ☒ B ☒ C ☒  
Quadrature: ☐ ☐ ☐ ☐ ☐ ☐

**Watchdog**

If the Plugin fails to communicate with the device within the amount of time listed below, an EStop will be triggered in the device.

The time is in seconds and is rounded to the nearest tenth of a second. Max value is 3.1 seconds.

2.0

**Feed Hold**

☒ Controlled By Mach  
☐ Controlled By SmoothStepper

**Spindle**

Relay or None: ☐  
PWM: ☒  
Base Hz: 100  
Step and Dir: ☐  
Pulse Width (us): 0.0  
Quadrature: ☐

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  
☐ THC Mode  
1023 Number of Data Points Mach Should Pre-Calculate

Port 2 Pins 2 through 9 Direction: In  
Port 3 Pins 2 through 9 Direction: In

**Noise Filtering of Inputs**

An input must be stable for the specified amount of time in microseconds before it will be considered valid. 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 0.0 microseconds.

Encoders/MPGs: 0.00 (includes A, B, Index, and timing)  
Miscellaneous: 0.00 (Miscellaneous covers all other inputs)

Probe: 0.00  
EStop: 0.00  
Jog: 0.00  
Limits: 0.00  
Home: 0.00

**M11Px/M10Px Commands**

M11Px/M10Px Gates Spindle Output: ☐  
Output Number to use for M11P#/M10P#: 0

**Dwell time associated with M11/M10 Commands**

**M11**

Dwell selected in this config: ☒ Delay: 0 milliseconds  
Dwell selected Via User DRO: ☐ User DRO #: 0

**M10**

Dwell selected in this config: ☒ Delay: 0 milliseconds  
Dwell selected Via User DRO: ☐ User DRO #: 0

**Spindle PWM Proportional to XY Feed Rate**

Enable: ☐  
When enabled, the spindle PWM is a function of the XY Feed Rate. The mapping function is a table in the specified file located in the Plugins folder of the Mach directory.

Mapping Function Filename:

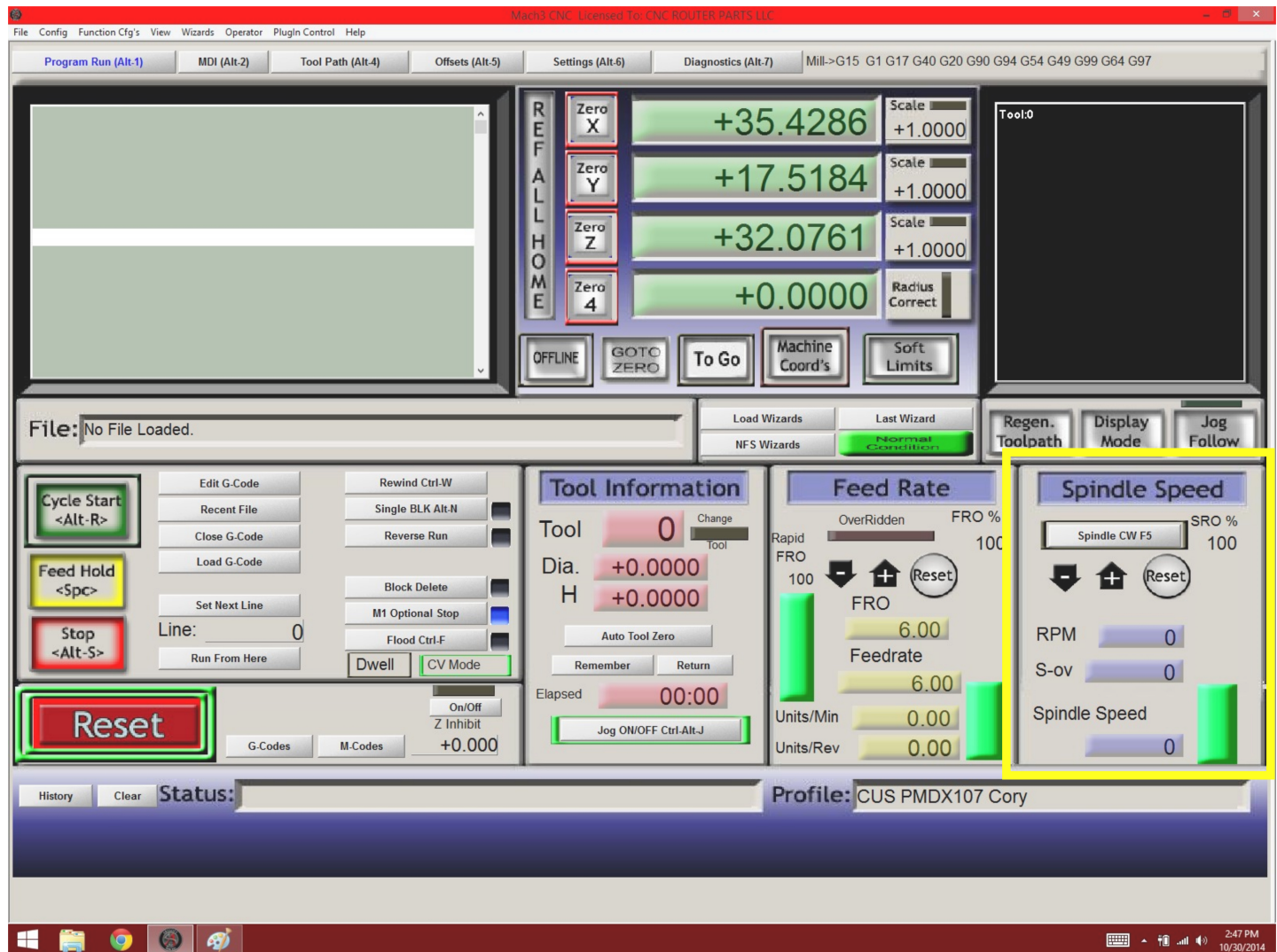
Under "ESS Config" make the following changes:

- Under "Spindle" ensure the PWM box is checked
- Base Hz must be 100



With the above changes complete, you are now ready to run your new Spindle with Mach3!

Please read the below guidelines for operation of your spindle.



When using your spindle, enter a speed between 8000 and 24000 into the "**Spindle Speed**" box. If you enter a value too low, it will bump to 7980, too high and it will bump to 24000. If you accidentally enter a value too low or high, hit reset twice to clear the "Status."

Once you have input a valid **Spindle Speed (not rpm or S-OV)**, Click the "Spindle CW F5" button to turn the spindle on and run it at that speed.

Check that you can adjust speed while the spindle is on by entering various speeds between 8000 and 24000 into "Spindle Speed."

If the spindle responds to these speed commands your VFD and Spindle package is ready for use!

If you experience any trouble while following this guide, please feel free to **Contact Us**.