

## Programming the VFD (Variable Frequency Drive)

Important parameters that need to be programmed in order to use the VFD, variable frequency drive. Please read and understand the manual before operating. Failure to follow directions will result in damage to the spindle and the VFD.

NOTE: Do not run the air cooled spindles below 7200 RPM (PD011).

PD001 – 0 – for panel / 1 for remote on off control

PD002 – 1 for potentiometer or external speed control (use jumper for external speed control)

PD003 – 400

PD004 – 400

PD005 – 400

PD008 – 220

PD-011 – 120

PD-014 – 3.5 spin up delay in sec.

PD072 – 400 for potentiometer control, high end

PD073 – 100 low end

PD141 – 220

PD142 – 5 to 7 /Low speed spindle – 6 Check motor plate for rated Amps.

PD143 – 2

PD144 – 3000        /Low speed spindle - 1500

Programming parameters are different for the low speed spindle. Please be sure to read the owner's manual or motor plate for your spindle parameters and make sure they match the parameters programmed in the VFD or damage to the spindle and VFD will occur.

### **Control Settings:**

For spindle Start/Stop using Mach controlled relay connect DCM to FOR with the relay wired between the two. NOTE: Wiring DCM to REV will give reverse spindle rotation.

For variable speed control using an external 10k ohm pot, connect ACM and 10v to the pot with IV on the Wiper.

PD001 - 0 = Start from VFD Panel (Manual control), 1 = Control from inputs(use if Mach is start/stopping your spindle as explained above)

PD044 - 2

PD045 – 3

### **Spindle motor:**

Pins are numerically marked on the inside of the plug. Pin 1,2, and 3 are power, Pin 4 is ground. To change the direction of the spindle swap any 2 of the 3 power wires inside the VFD.

### **Spindle wiring:**

The spindle is connected to the motor terminals U, V, and W. The green wire goes to ground (g). NOTE: The direction of the spindle needs to be checked. If the spindle runs CCW then swap any 2 of the 3 wires so that the spindle runs CW.

## VFD

### AC Voltage in:

Single phase

R = HOT- Black, T = Neutral - White, E = Earth – Green

There are 4 terminals, 3 for 220V and 1 for earth (E). See the manual, page 12, R, S or T are the 220V inputs. If you do not have 220V you need to get the converter.



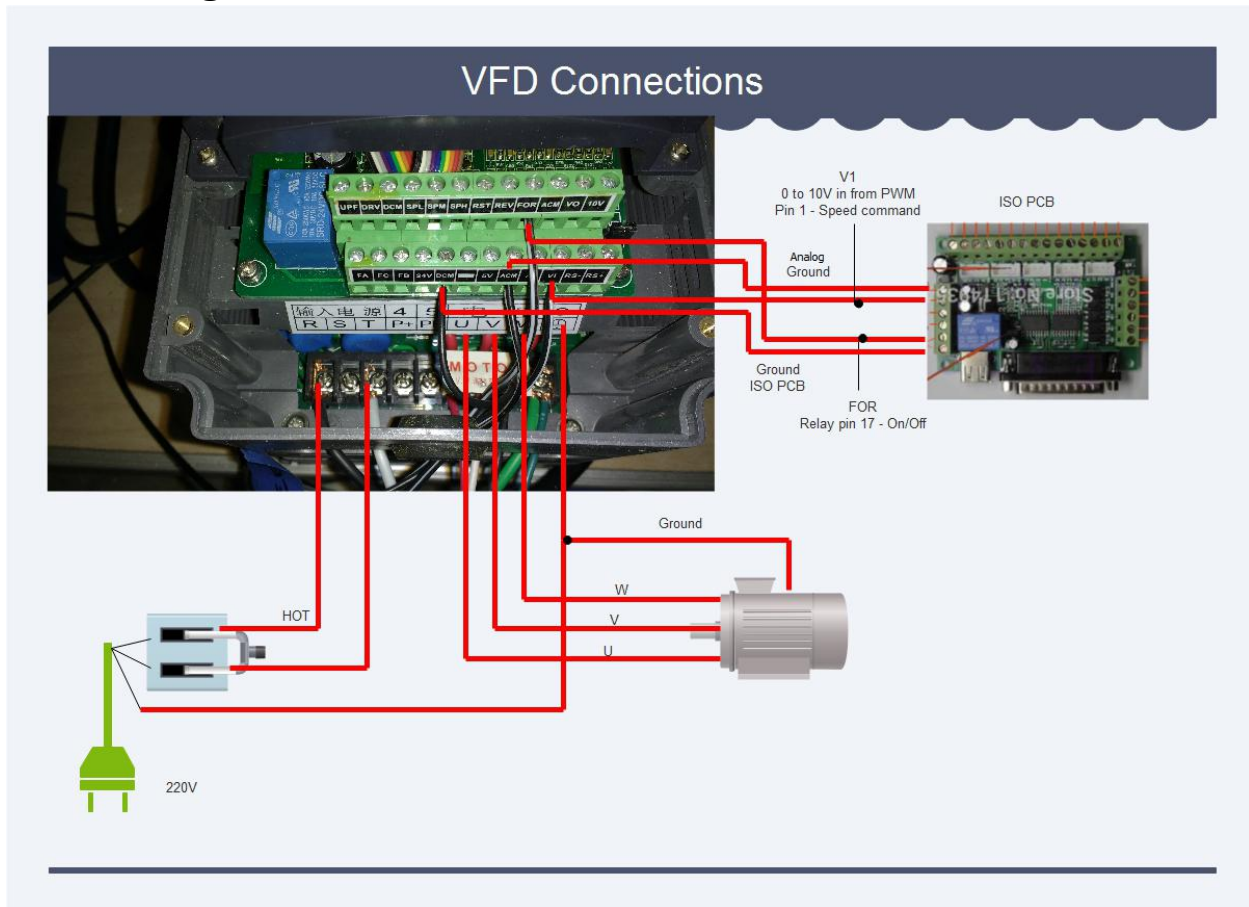
You can buy a power cord at home depot, plug one end into the converter and wire the other end to the VFD. 1 wire (black) to the R, the other wire to T (white), and the green wire the E. The spindle and the power share the g terminal (GROUND). You need to add a light switch between the VFD and power.

Speed control is done via a change in frequency. The control frequency is 0 to 400Hz, the speed range is from 0 to 24000

RPM. So 1Hz control frequency equals 60RPM, or  $24000/400=60$ .

The control frequency at 50Hz equals a spindle speed of 3000RPM ( $50 \times 60 = 3000$ )

### VFD wiring:



On page 10, VFD manual, notes: with power off move jumper to position 1 and 2 for external Voltage control. Move the jumper from VR to the first 2 pins labeled V1. This jumper is located next to the top row of terminals.

Set Mach3 to use pin 17 for spindle on/off – output 1

(config/ports and pins/ output signals – set output 1 to enable, pin 17)

Set mach3 to use output 1 for relay control for on/off  
(config/ports and pins/ spindle setup – set relay control to clockwise output # 1)

Set mach3 to use motor control-  
(config/ports and pins/ spindle setup – set motor control as below)

- Check Use spindle motor output
- Check PWM control
- PWMBase freq – 400

Set mach3 to use pin 1 for spindle control-  
(config/ports and pins/ motor outputs – set spindle to enable, Step pin=1, port pin=1, step low active green check. Dir pin and port can be set to 1 as well.

Hit OK and go to the spindle pulleys menu

Set mach3 to use the correct max speed-  
(config/spindle pulleys – set motor control as below)  
Spindle pulley – max speed 24000

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