



## C6 - VARIABLE SPEED CONTROL BOARD Rev 5

### Overview

### Features

This card lets you control your spindle with step and direction signals, as if it was an axis motor. It converts the step signal into and an analog (0-10VDC). This card also has a couple of relays that can be used to control the direction (CW/CCW) and enable the drive (On/Off).

A Variable Frequency Drive or Inverter works by modifying the frequency for AC motors. You can control most of these devices with an external analog signal (0-10VDC). That is, if there is 5VDC coming into through the control signal, the motor will run at 50% of full speed, if there was 10VDC, the motor will run at 100% of full speed. If there is no signal coming out, then the motor will stop.

This unit can also be used on many DC motor controllers by replacing the potentiometer that controls the speed.

- ***Inputs a frequency (step) and outputs an analog 0-10VDC.***
- ***Has two relays that can be used to control the direction and enable and disable the drive.***
- ***Optoisolated output signals.***

The analog and CW and CCW signals are optically isolated, so this board can be used with drives that make grounds common with the mains that drive the VFD or motor.

- ***All TTL +5VDC or +3.3VDC Signals.***

Interface directly with parallel port interface products and other cnc4pc.com cards. 5VDC (TTL) signals are very common among automation devices.

- ***Screw-On connections for all terminals.***

You only have to screw-on the wires to make all your connections.

- ***Flexible design.***

It works with cnc4pc's products, directly through your parallel port, or through many other parallel port control products.

# Installation

## Requirements:

It requires a +12VDC@200mA power supply to operate.



**WARNING:** To keep the output signals optoisolated, these must not have common ground or current with other circuits you are using.

You will require a voltmeter to fine tune your system.

## Wiring:

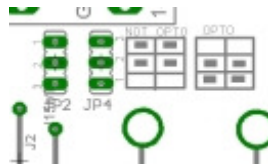
Before connecting anything, please be sure to read your VFD's manual and make sure you understand all the safety issues.

Please check the wiring guide and wiring samples here:

<http://cnc4pc.com/Tech Docs/C6R5 WG.pdf> and  
<http://cnc4pc.com/Tech Docs/C6R5 WS.pdf>



**WARNING:** Te jumpers must be kept on the OPTO position, unless you are using an optoisolated VFD.

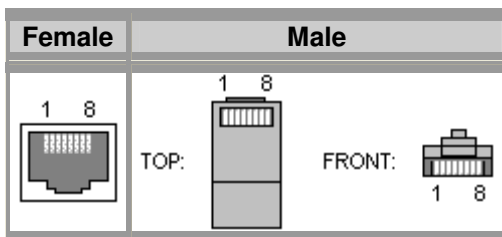


## RJ45 Connector:

The RJ45 connector is for connecting the boards directly using a standard RJ45 cable. A standard RJ45 cable has straight through wiring. That means that Pin1 = Pin1, etc...

This Connector is been provided in many of our boards and soon we will have breakout boards that will come with this connectors. This is to ease the installation process by eliminating the screw on terminals. The RJ45 connectors are used not just to carry the I/O signals, but also to power the external board. That way you will have it all in one connection.

Pin4 carries the step signal and pin5 carries the direction signal.



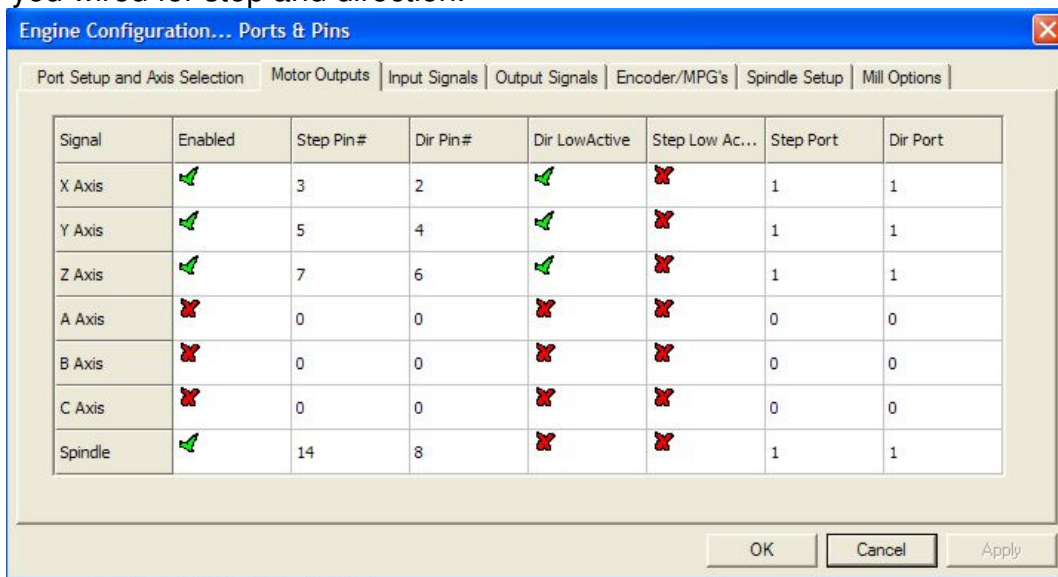
Pin	Description
1	+12vdc
2	+5vdc
3	NC1
4	NC2
5	NC3
6	NC4
7	NC5
8	GND

### Configuring the Control Software:

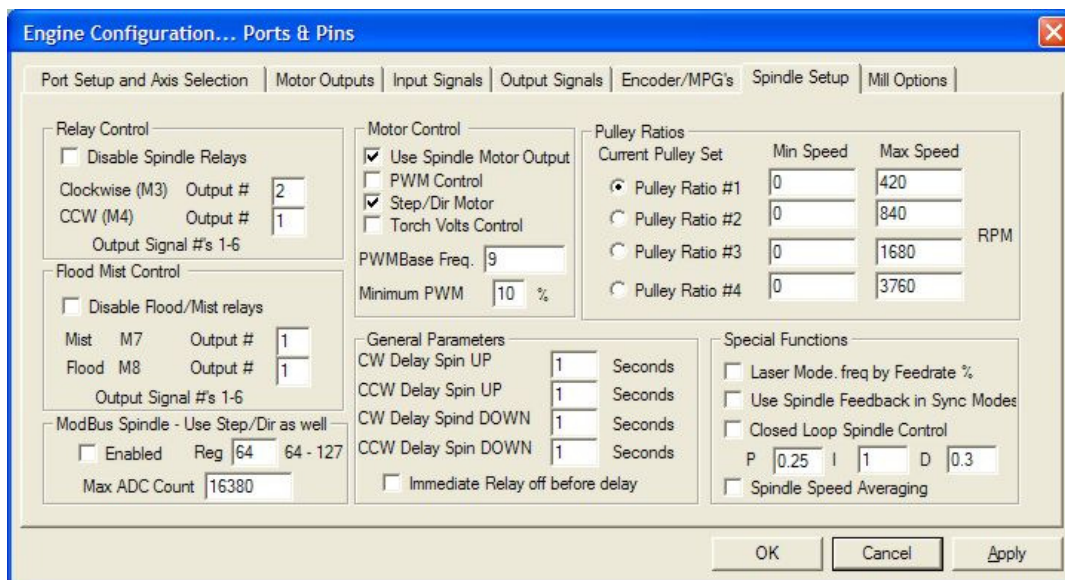
It is strongly recommend you read your control software's manual. You need to configure your control software to control the spindle as if it was an angular axis. This card requires a 25 KHz input signal to deliver 10VDC. So you have to set the speed of the motor (spindle) at maximum. For acceleration values adjust them to where you feel comfortable. Keep in mind the acceleration of the motor must also be set in your VFD.

For configuring Mach follow these steps:

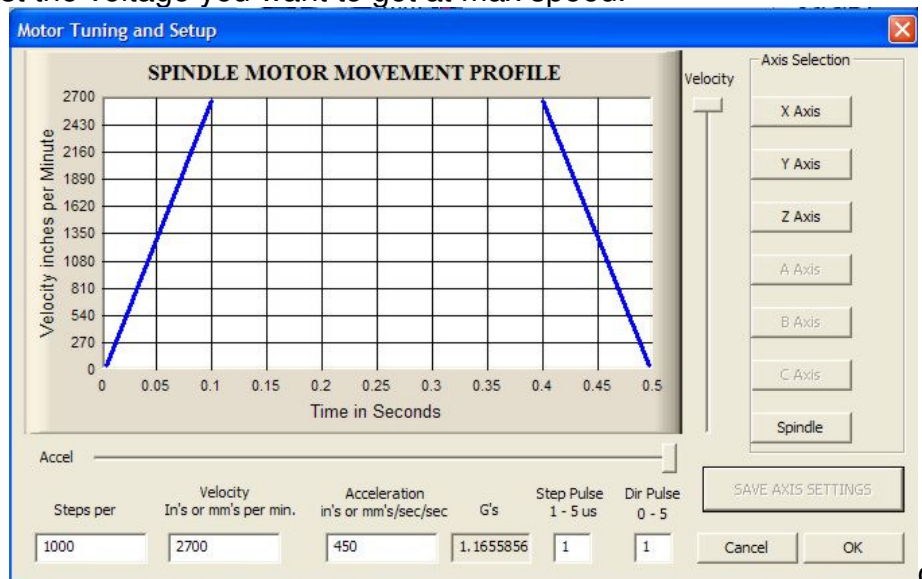
1. Go to Config / Ports&Pins / Motor Outputs. Enable the spindle and select the port and pins you wired for step and direction.



- Go to Config / Ports&Pins / Spindle Setup. In the motor control box, check Use Spindle Motor Output and Step /Dir Motor. Under Pulley Ratios set the pulley ratios of the machine.

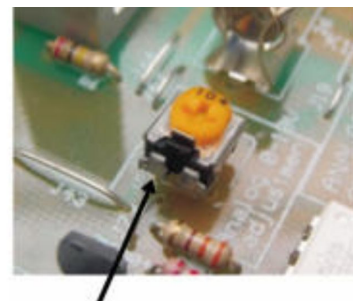


- Go to Config / Motor Tuning / Spindle. On Steps per unit put 1,000, set velocity to maximum. For Acceleration, choose the acceleration that you feel comfortable with. Start slow, increase acceleration as you test your system. Under Step Pulse length, use a number from 1 to 5, but start with 1. This number is directly proportional to the final voltage you will get in the analog output. Use this number and the fine tuning pot to adjust the voltage you want to get at max speed.



### Fine Tuning:

Make sure that when you reach the max speed in the control software you get 10VDC out. This voltage can vary depending on many things, including the electrical properties of parallel port or breakout board you are using, the length of the step pulse your software is



Pot for fine tuning the analog 0-10vdc output

delivering, and the normal hi or low status of your step pin. Play with the fine tuning pot in the card, the normally hi or low status of your pin, and the pulse width.

### **Replacing a Potentiometer:**

This circuit can be used to replace a potentiometer of DC motor speed control circuits. This speed controller circuits are very commonly used by SIEG, KB Electronics, and many other oriental machines. Before explaining how to do it, please first keep in mind that it can be done if the voltage that goes though the pot is +12vdc or less. This circuit cannot be used for AC currents.

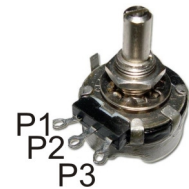
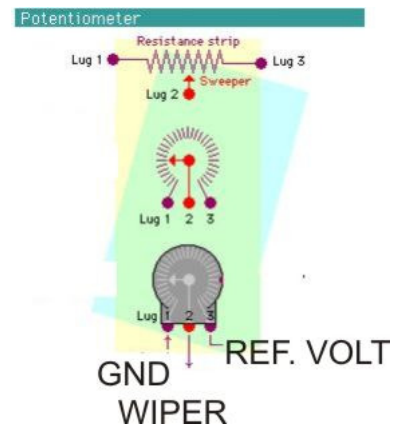
In most cases the terminals that go to the potentiometer will carry these signals:

- P1 = GND
- P2 = WIPER
- P3 = REFERENCE VOLTAGE

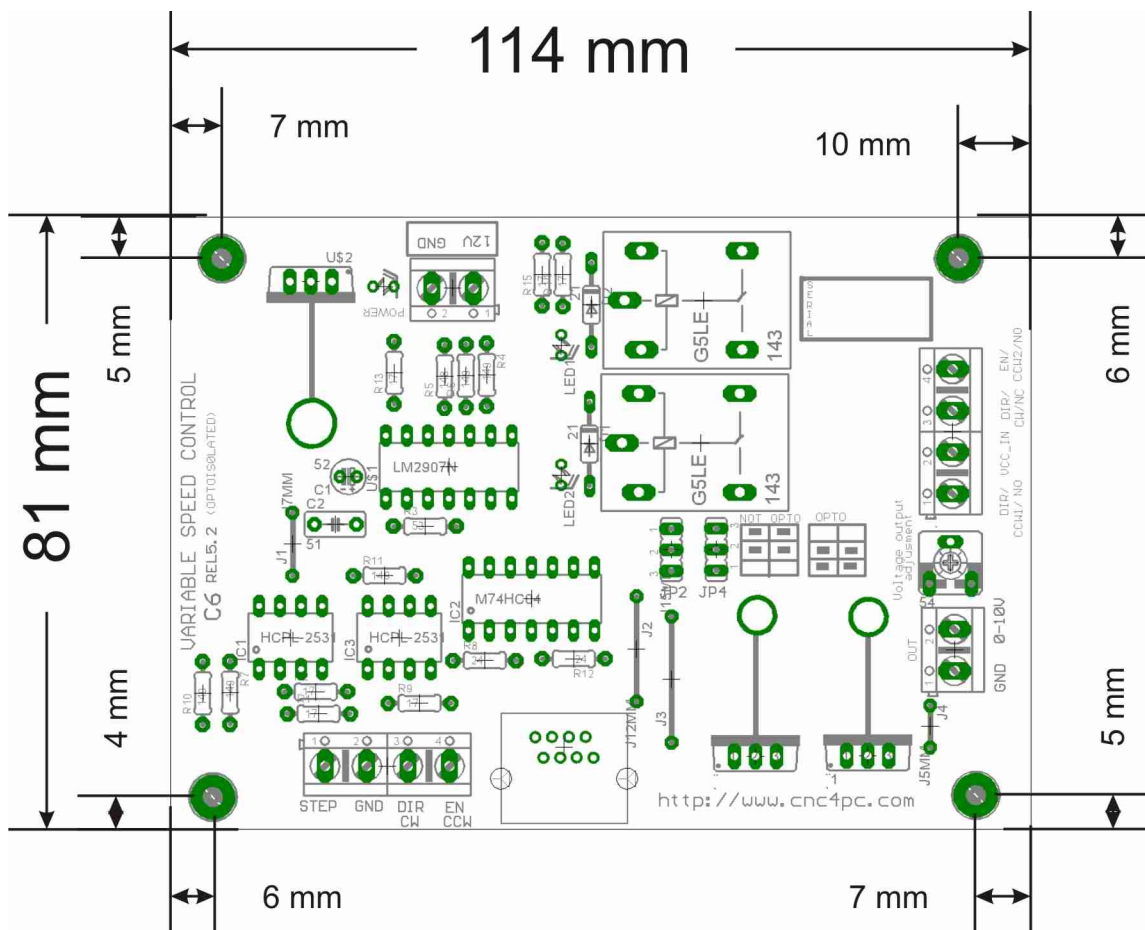
These are the steps for replacing a potentiometer:

1. Measure the voltage difference between P1 and P3. Make sure it measures under +12vdc.
2. Fine tune the analog output to the output voltage you got from step 1.
3. Connect the ground from the analog output to the ground of the potentiometer (P1).
4. Connect the analog output to the wiper connection of the potentiometer (P2).

If the reference voltage from pot is between +10 and 12vdc, you can use it to power the analog circuit (not for the C6, because the relays might draw too much power). In this case, connect P1 to the ground of the power terminal, and P3 to the +12vdc power connector.



## Dimensions:



## Disclaimer:

Use caution. CNC machines are dangerous machines. DUNCAN USA, LLC or Arturo Duncan are not liable for any accidents resulting from the improper use of these devices.