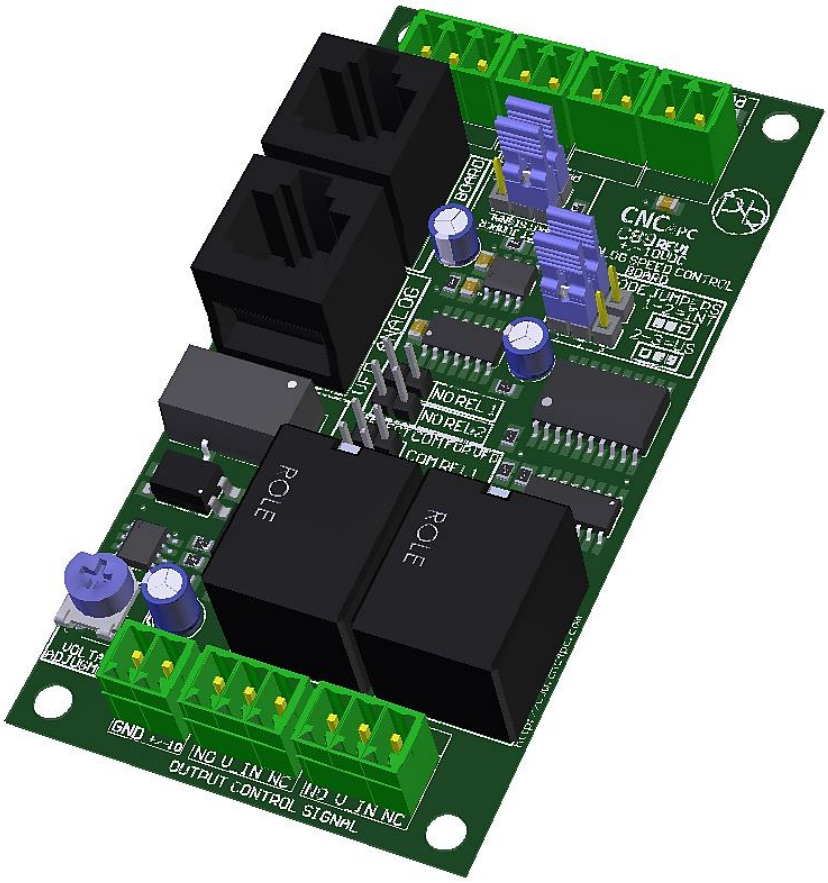
CNC4PC

Integration Solutions for CNC Projects

USER'S MANUAL VER. 1

C89 – +/-10VDC ANALOG SPEED CONTROL BOARD Rev.1



DECEMBER 2019

USER'S MANUAL

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1.0 OVERVIEW

This card lets you control a motor with a controller requiring a +/-10vdc control signal from a PWM signal and direction or an analog and direction signal. This card also has two relays that can be used to control the direction (CW / CCW) and enable the drive (On / Off).

2.0 FEATURES

- **Inputs a PWM signal or inputs analog of 0-10VDC signal.**

- **Uses only two pins, one for PWM and one for direction.** It is the presence of absence of the valid PWM signal what would start/stop the spindle.

- **Has two relays that can be used to control the direction and enable and disable the drive.**

- **Jumper to select mode of operation, US or International mode.** On US mode, one relay would be used to start CW and the second one to start CCW. On International mode Relay 1 will start/stop, and Relay 2 will determine the direction of rotation.

- **Optoisolated input signal PWM**.

- **Has a Built-in DC-DC converter that generates an isolated power required to drive the analog output.**.

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

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

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

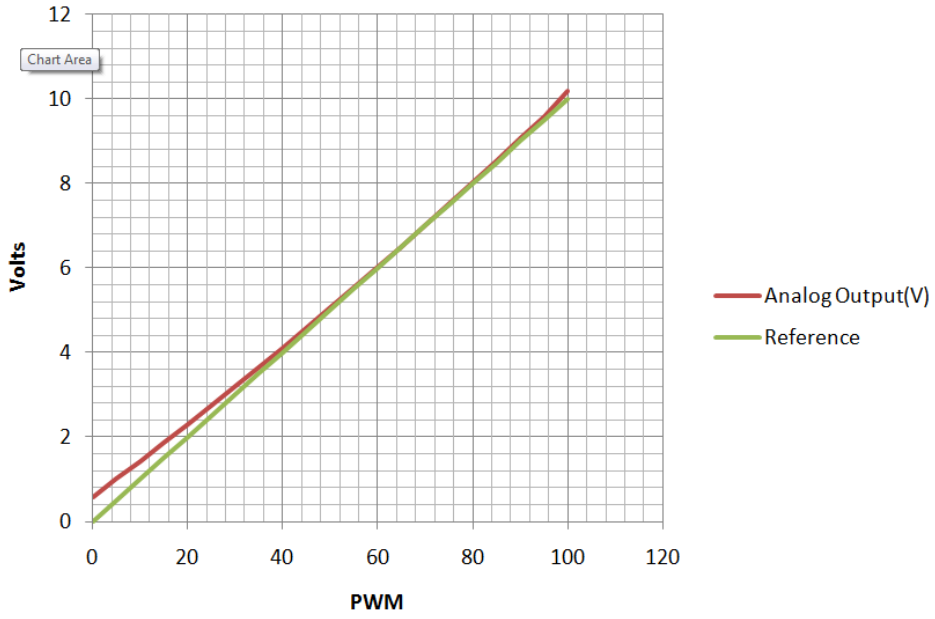
- **Din Rail Support.**

3.0 SPECIFICATIONS

INPUT SPECIFICATIONS	
On-state voltage range	2 to 5V DC
Minimum on-state input current	10 mA
Recommended PWM signal frequency	(200Hz)
Signal Type	Active High

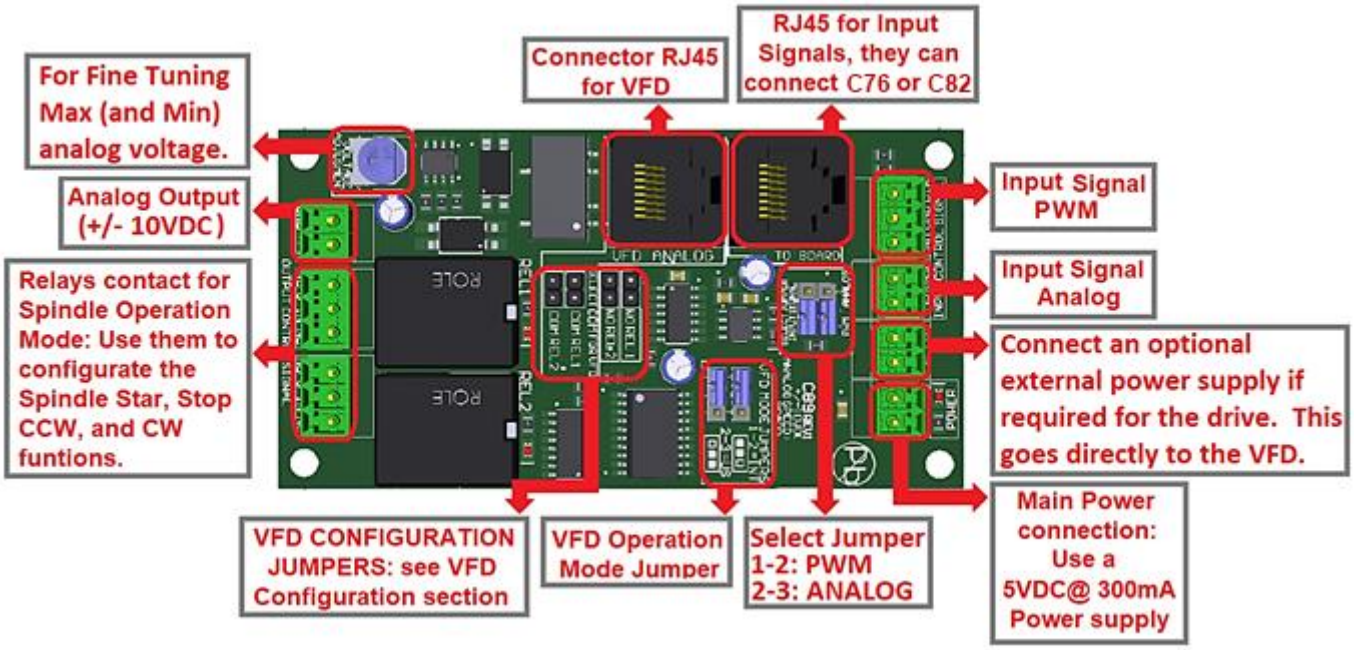
ELECTROMECHANICAL RELAYS SPECIFICATIONS	
Maximum Current (AC)	7A@240VAC; 10A@125VAC
Maximum Current (DC)	15A@24VDC; 10A@28VDC

GENERAL SPECIFICATIONS	
Dimensions	Millimeters: 105L x 75W x22D
External power	5V DC @ 300mA



Linearity Analysis (Analog voltage vs. %PWM)

4.0 BOARD DESCRIPTION



WARNING: Check the polarity and voltage of the external power source and connect the 5VDC and GND. Overvoltage or reverse-polarity power applied to these terminals can cause damage to the board, and/or the power source.

5.0 POWER TERMINAL

5.1 IT REQUIERES A +5VDC@300mA POWER SUPPLY TO OPERATE.

5.2 OPTIONAL 12VDC or 24VDC

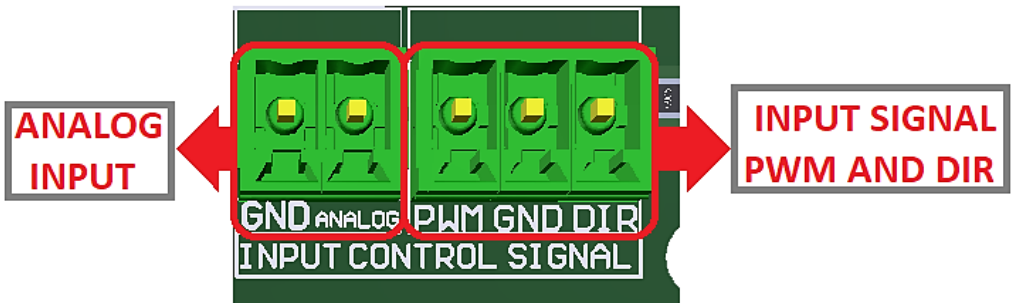
External 12VDC or 24VDC power supply for using it with VFDs that require an external power source.

6.0 INPUT TERMINAL AND CONFIGURATION JUMPERS

Before connecting the power supplies, follow steps below.

6.1 INPUT TERMINAL

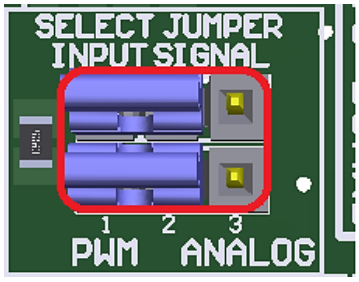
Connect an Analog input signal or a discrete PWM signal. Keep in mind that the PWM and DIR signal can be used to activate the enable relays. The use of the relays is optional.



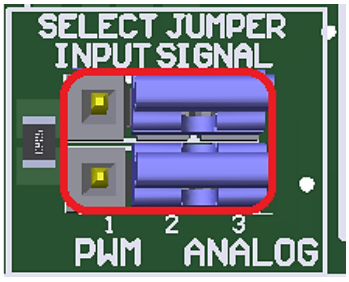
6.2 CONFIGURATION JUMPER

6.2.1 SELECT JUMPER

1-2: PWM

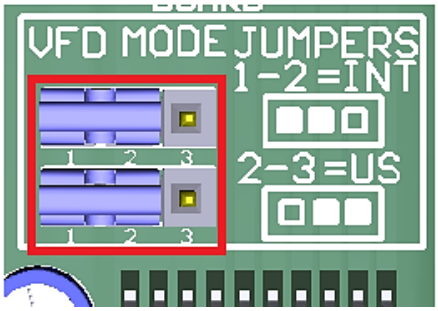


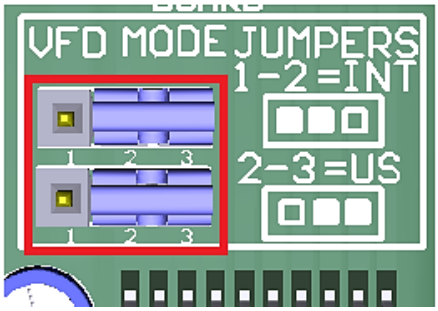
2-3: ANALOG



6.2.2 OPERATION MODE JUMPER

1-2:INT **2-3: US**





Operation mode jumpers

This jumper allows selecting the way how the relays go to be activated when a PWM signal and REV signal are present in the inputs terminals. See the tables below.

AMERICAN MODE (US)			
INPUTS		**RELAYS**	
PWM	***REV***	***REL 1***	***REL 2***
ON	ON	OFF	ON
ON	OFF	ON	OFF
OFF	ON	OFF	OFF
OFF	OFF	OFF	OFF

INTERNATIONAL MODE (INT)			
INPUTS		**RELAYS**	
PWM	***REV***	***REL 1***	***REL 2***
ON	ON	ON	ON
ON	OFF	ON	OFF
OFF	ON	OFF	OFF
OFF	OFF	OFF	OFF

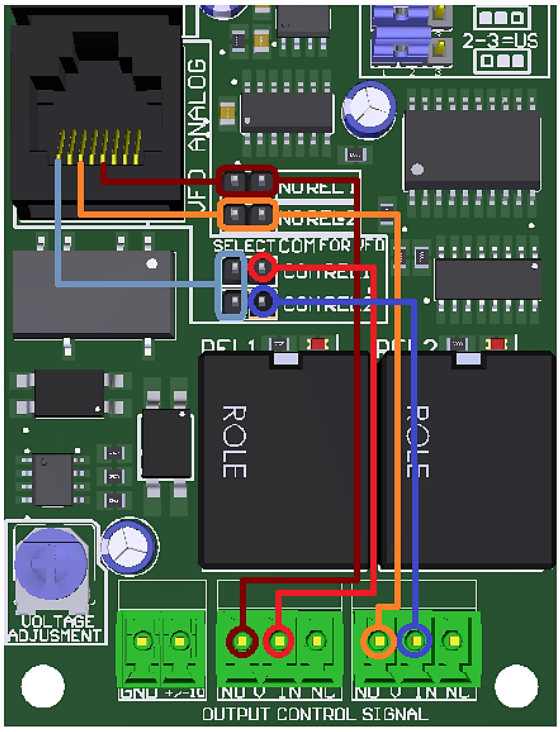
Relay 1 and 2

They can be used to control the VFD. The specification of the relays are:

ELECTROMECHANICAL RELAYS SPECIFICATIONS	
Maximum Current (AC)	7A@240VAC; 10A@125VAC
Maximum Current (DC)	15A@524VDC; 10A@28VDC

Electromechanical Relays Specifications

7.0 RELAY AND JUMPER INTERNAL WIRING TO RJ45.



8.0 RJ45 FOR VFD CONNECTION

The RJ45 allows connecting to a VFD using a CAT5 cable from the C89 to pigtails on the other end of the wire to the terminals of the VFD.

RJ45 for VFD	
RJ45 PIN	**Function**
1	An. GND
2	Analog Output
3	Not Used
4	REL 1 N.O. Contact
5	Ext. GND
6	REL 2 N.O. Contact
7	Ext. 12VDC or 24VDC
8	Relay Common

An. GND: Ground of the Analog output signal

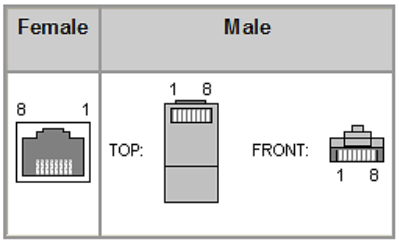
Analog Output: Isolated Analog Output Signal (0 +/- 10VDC)

Relay Common: The signal or voltage wired to this terminal can be connected to the common terminals of the relay 1 and relay 2. Use the on-board RELAY COMMON JUMPERS to do this connection. Remove the jumper if this connection is not required.

9.0 RJ45 FOR INPUT SIGNAL

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

This connector eases the installation process by eliminating the screw on terminals. The RJ45 connector is used not just to carry the I/O signals placed in terminals, but also to power board.



Pin	Description
1	GND
2	Not Used
3	Not Used
4	REV
5	PWM
6	Not Used
7	5V
8	Not Used

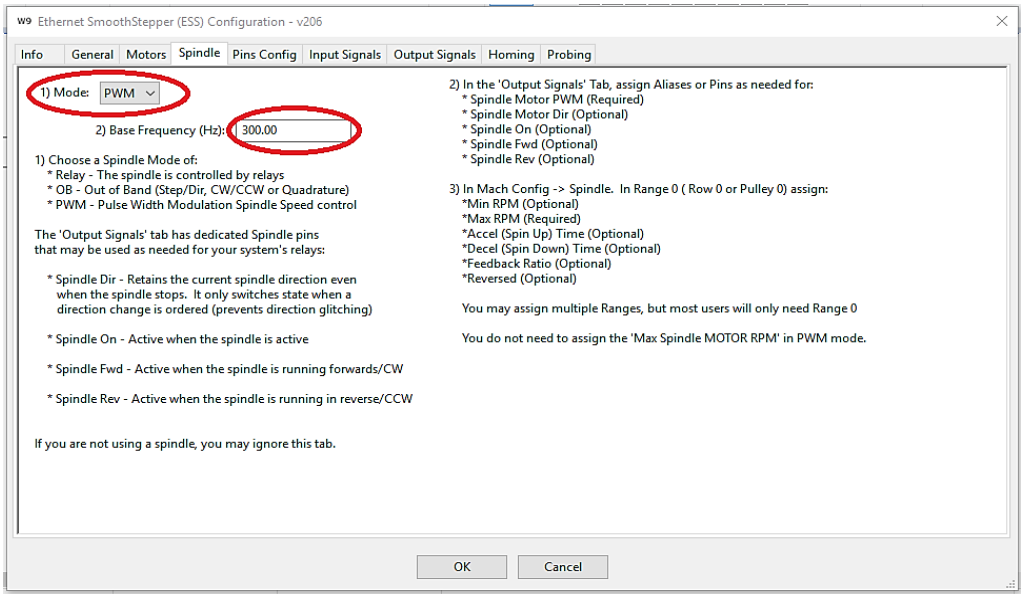
Before connecting anything, please be sure to read your VFD's manual and make sure you understand all the safety issues.

10.0 CONFIGURING THE CONTROL SOFTWARE:

It is strongly recommended you read the 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 PWM input signal to deliver 0 +/-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.

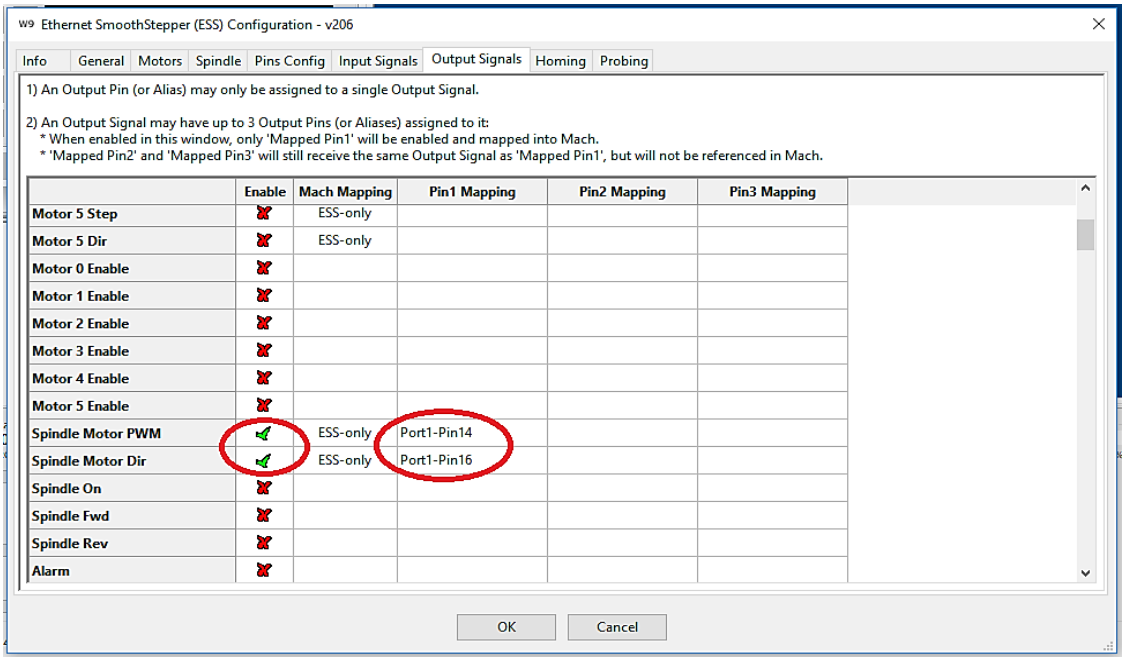
10.1 For configuring Mach4 follow these steps:

1. Go to Configure / Plugins / ESS / Spindle. Active the mode in PWM and select the Frequency.



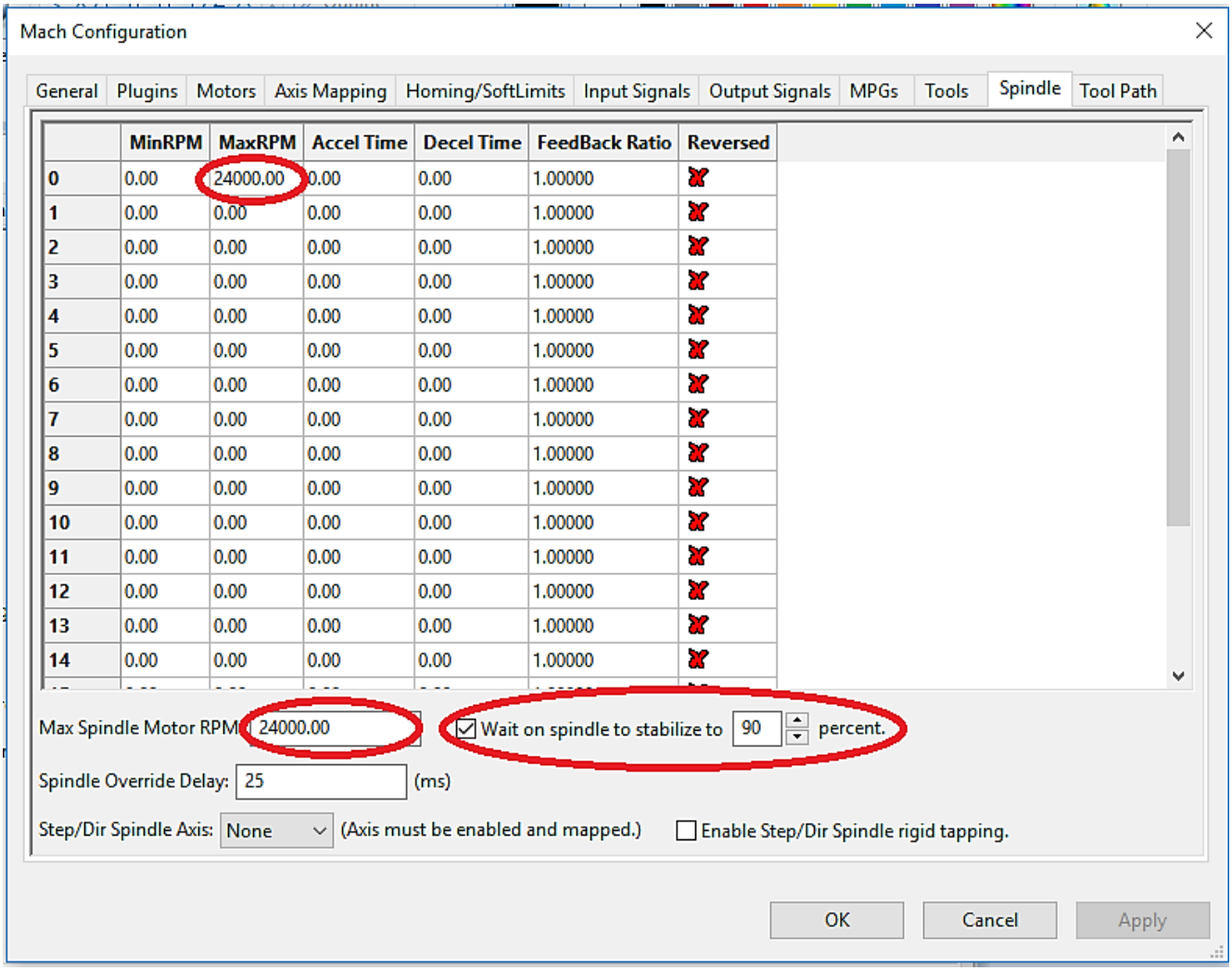
Spindle configuration screenshot

2. Go Configure / Plugins / ESS / Output Signals. In the Spindle Motor PWM, check Use Spindle Motor PWM and Spindle Motor Dir. Under Pulley Ratios set the pulley ratios of the machine.



Output Signals screenshot

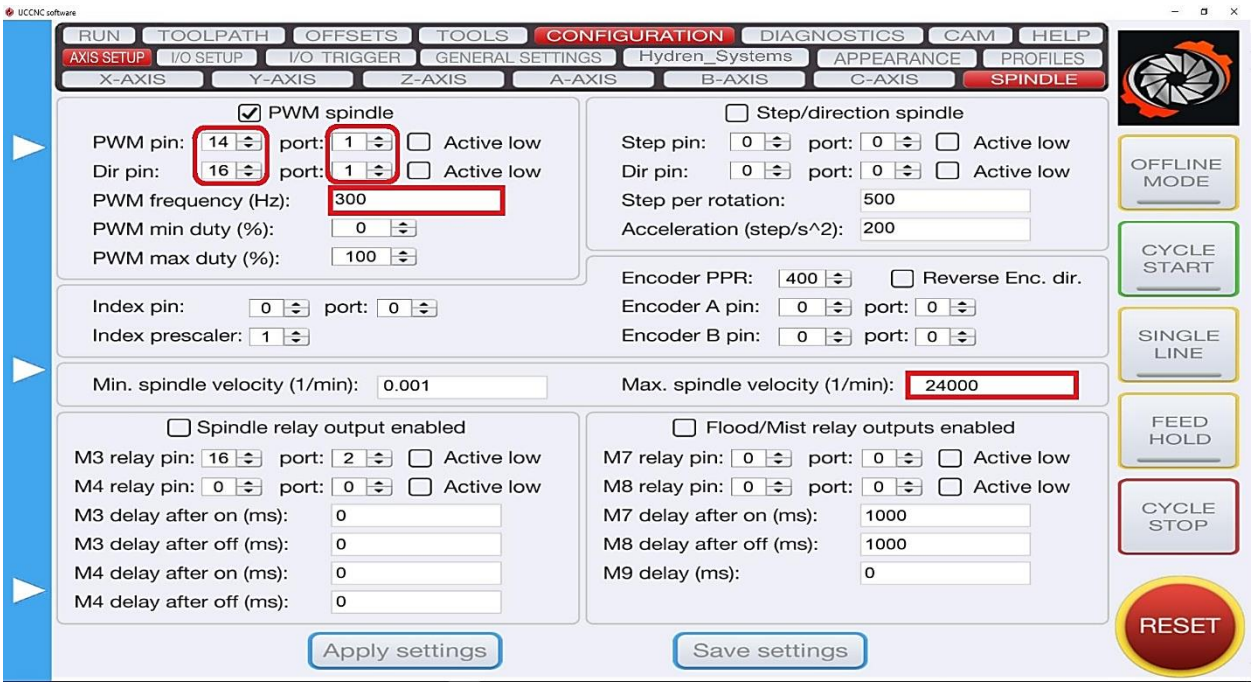
3. Go Configure / Mach / Spindle. Maximum for Velocity, Check use Wait on spindle to stabilize the spindle.



Spindle Velocity screenshot

10.2 For configuring UCCNC+UC300+C76 follow these steps:

Go to CONFIGURATION / AXIS SETUP / SPINDLE. Check use PWM spindle and select the Port, Pins, Velocity and Frequency.



Spindle Setup screenshot

11.0 TIPS AND RECOMMENDATIONS:

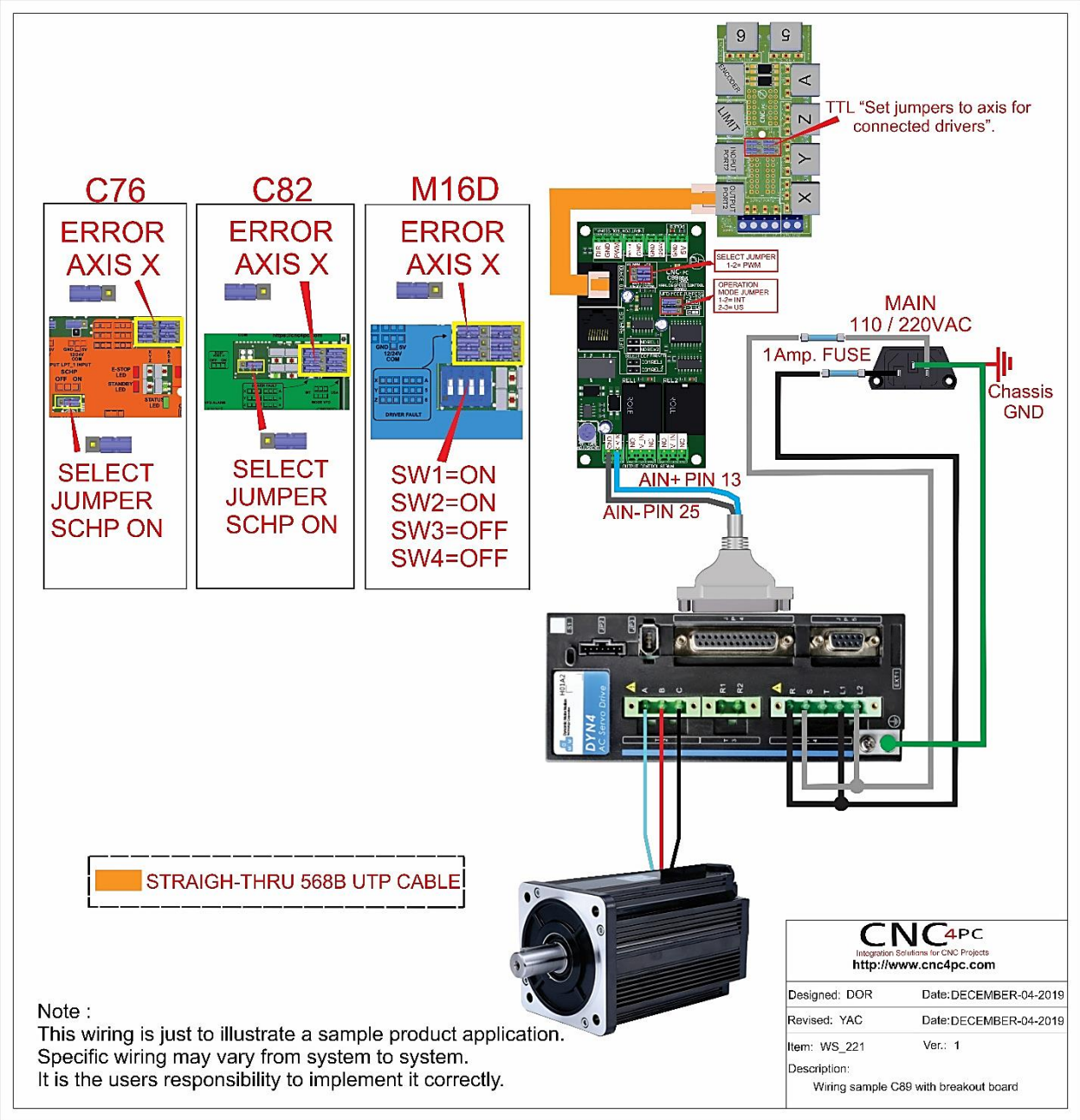
Before applying power to the system, use a multimeter to verify isolation of the grounds. That is that the negative of the +5vdc that power the board are not common with the negative of the speed controller or VFD. You do that by setting the multimeter in the "beep mode", then with each lead touch each ground that you want to verify.

12.0 REPLACING A POTENTIOMETER:

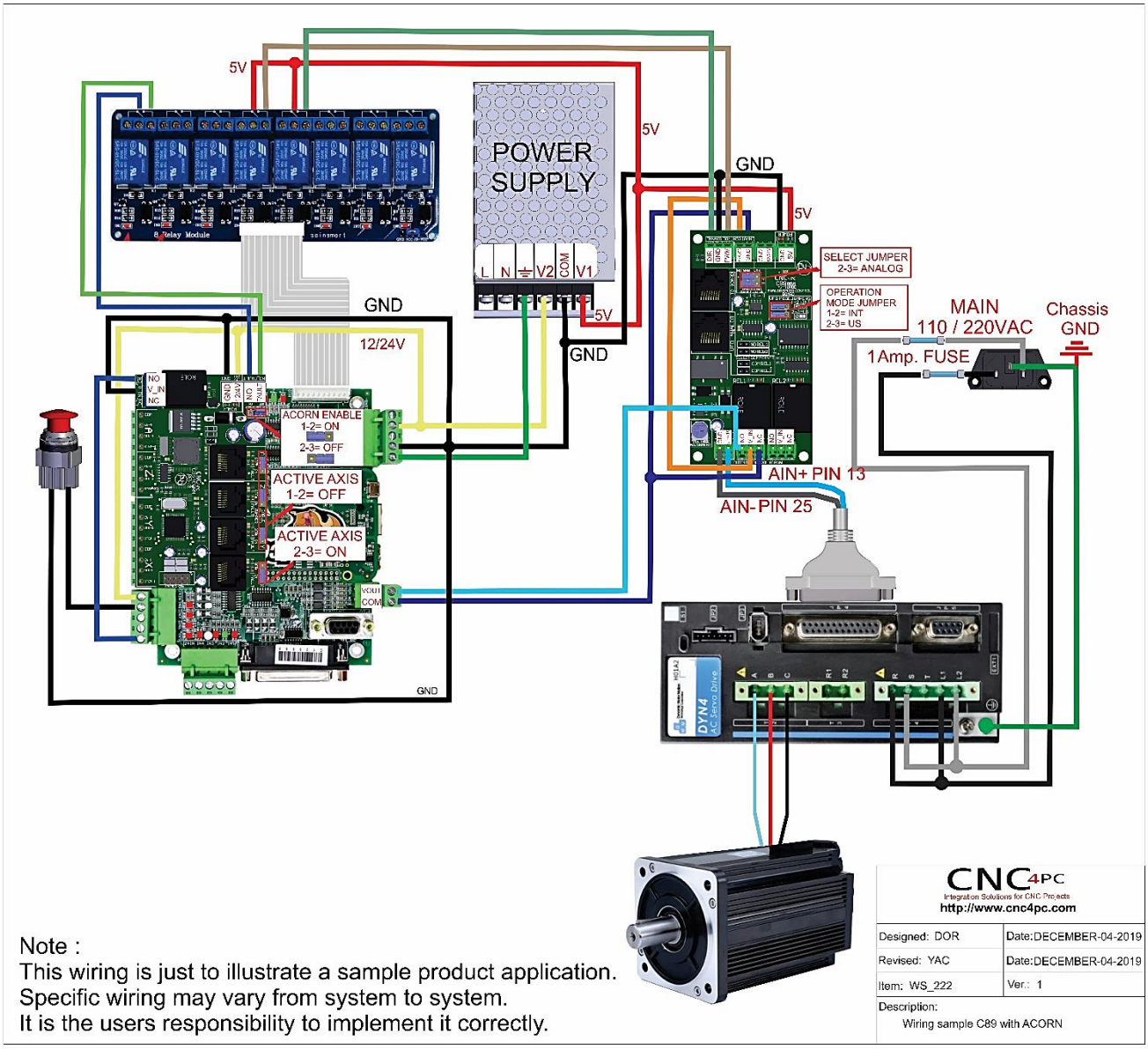
For Replacing Potentiometer go to
http://cnc4pc.com/Tech_Docs/Replacing%20a%20Potentiometer.pdf

13.0 WIRING EXAMPLE

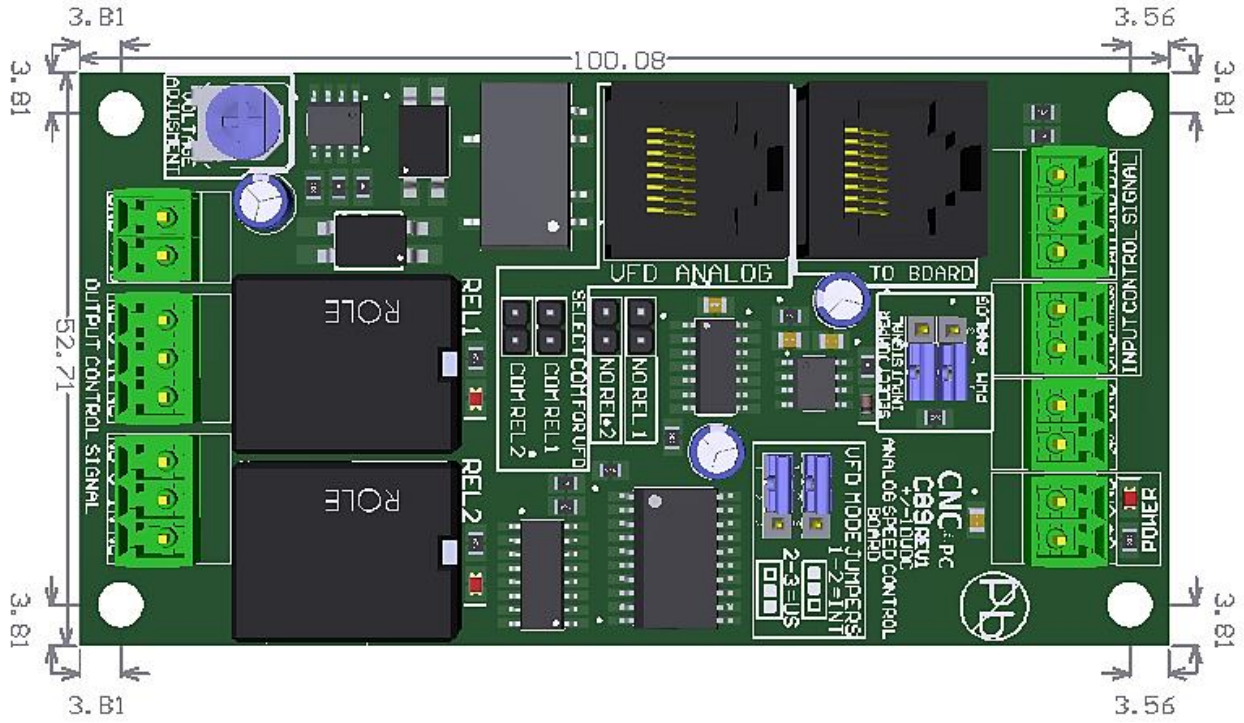
Wiring sample for multifunction board



Wiring sample for Acorn



14.0 DIMENSIONS



All dimensions are in Millimeters.
Fixing holes (4mm)

Disclaimer:

Use caution. CNC machines can be dangerous machines. Neither DUNCAN USA, LLC nor Arturo Duncan are liable for any accidents resulting from the improper use of these devices. This product is not a fail-safe device and it should not be used in life support systems or in other devices where its failure or possible erratic operation could cause property damage, bodily injury or loss of life.