



C11G - MULTIFUNCTION CNC BOARD Rev. 5.4

Overview

This card has been designed to provide a flexible interface and functions to your computer projects, by using the parallel port control software. This board comes as a response to many customers that have been asking for a faster way to connect devices and reduce the possibility of wiring errors.

Features

- ***Built-in Safety Charge Pump.***

It has a built-in safety charge pump that can be enabled or disabled. It also comes with an external enabling if you would also need an additional safety control device.

- ***Easy installation of an On/Off switch. You can control the card externally.***

An On/Off or an additional Safety Charge Pump can easily be installed to enable or disable the card. CNC could be dangerous machines and, remember, safety comes first. Having the power supplied externally gives you the ability to turn your system on or off. This card is provided with an extra pin (EN) that allows you to control the card externally by enabling or disabling outputs externally. The card must have +5vdc supplied in the EN pin to enable outputs. You can hardwire the connection if you are not going to use this safety feature. That way can choose which safety feature to implement, or a combination of both, or no safety feature at all.

- ***Built-in Optoisolated Variable Speed Control.***

It has an analog 0-10VDC output that will convert a step signal into an analog signal that can be used to command a commercial VFD.

- ***Built-in 8 amp AC Solid State Relay.***

It is very useful to use a solid state relay instead of a mechanical relay for starting motors or other devices that might produce arcs at contact. This will increase the life of the motors and relay. This relay is also optoisolated from the rest of the board and has a replaceable fuse.

- ***Built-in 8 amp Solid State Relay with NO and NC positions.***

Mechanical relays are very flexible because they can be used for AC or DC and come with NO and NC (Normally Open and Normally Closed) positions.

- **Buffered outputs.**

All inputs and outputs are buffered through the use of high speed and high power buffers, with the result that your devices receive all the power they need.

- **Output pins 1,2,3,4,5,6,7,8,9,14,16,17.**

- **Input pins 10,11,12,13,15.**

- **Status LEDs on all inputs and output connections.**

No more guessing. You can SEE all your signals. Save valuable time and brainpower for cncing.

- **Inputs and output pins with close by ground connections.**

Easily connect your pin by using your close by ground connection. No need to be an electronics expert to ground all your stuff.

- **All TTL 5VDC signals.**

Interface directly with parallel port interface products and other CNC4PC cards. 5VDC (TTL) cards are very common among automation devices.

- **Works directly with popular CNC hardware and software.**

That goes for GeckoDrive, DeskCNC or Rutex and parallel port control software such as mach2, Linux EMC, TurboCNC, CNCPlayer, CNCZeus and other/ (Not all have been tested).

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

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

Installation

Requirements:

A power supply with 5vdc@ 1 amperes for operation. Cnc4pc offers an electronic switching power supply that is ideal for this board.

Wiring:

Check the sample installation below.

1. Connect the board to power.
2. Provide +5 to enable pin next to the power connection. This pin must be connected to +5 in order to enable outputs. If you are not going to use this feature, you can hardwire it. If you are using an e-stop button with a NC connections, you can connect this line into this terminal, and to terminal you have assigned for e-stop. This will disable the outputs as soon as the button is pressed. Check this wiring information: <http://cnc4pc.com/Tech Docs/E STOP N EN Wiring.pdf>.

3. If you are going to use the built-in safety charge pump, configure your software to output the safety charge signal to pin 17 and place the jumper on position 2-3. If you are not going to use this feature, place the jumper in position 1-2. If you hardwire the EN pin and disable the safety charge pump your outputs will be enabled at all times. Confirm at this time that the "Outputs LED" is lit. This indicates that the output signals are getting through.
4. You can connect the parallel port cable and run your control software. You should be able to see the status of each pin.
5. Confirm at this time that the "Outputs LED" is lit. This indicates that the output signals are getting through.
6. For connecting the Solid State A/C Relay, keep in mind it can only be used for AC currents. This is ideal for motors or other devices that might create an arc on startups. These arcs will eventually damage an electromechanical relay and the motor. Use this connection just as you would connect any other switch.
7. Use the electromechanical relay for when you need the NO (Normally Open) and NC (Normally Closed) connections. Feed the input current to the center pin, connect to the NO and NC accordingly.
8. For connecting the analog output, please refer to your speed controller's or VFD's documentation. There is more specific information with the documentation of the C6 – Variable Speed Control. The circuit that comes with this board is basically the same as the circuit that comes with the C6. there is some useful information on wiring specific controllers. <http://www.cnc4pc.com/Variable Speed Control Board.htm>
9. Pin Assignment:

INPUT PINS:

PIN	FUNCTION
10	E-STOP
11	X-HOMING
12	Y-HOMING
13	Z-HOMING
15	X,Y,Z,A LIMIT SWITCHES (CONNECTED IN SERIES USING THE NC CONNECTION)

This is a suggestion, you can assign this pins freely.

OUTPUT PINS:

PIN	FUNCTION
1	A/C SOLID STATE RELAY (PRE-WIRED)
2	X- STEP
3	X-DIR
4	Y-STEP
5	Y-DIR
6	Z-STEP
7	Z-DIR
8	4-STEP
9	4-DIR
14	0-10 VDC ANALOG OUTPUT (PRE-WIRED)
16	ELECTROMECHANICAL RELAY (PRE-WIRED)
17	SAFETY CHARGE PUMP (PRE-WIRED)

Terminals for all pins are provided. You can still access the signal on these terminals whether you are using the pre-wired function or not.

Configuring the Analog Output:

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 any other angular axis. This card requires a 25 KHz input signal to deliver 10VDC. So you need to configure the steps per minute and velocity, to deliver a total of 1,500,000 (25,000 hz x 60 seconds) pulses when going at max speed. I suggest setting using 1,000 for steps per unit and 1,500 for velocity. 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 Machx 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.
2. 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 your machine.
3. Go to Config / Motor Tuning / Spindle. On Steps per unit put 1,000, for velocity put 1,500. 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. 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 your 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 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

Performance:

OUTPUT:

Output Pins	2000 khz
Voltage	5 VDC
Max Current	24 mA

INPUT:

Max Speed on pins 10-13.	10Khz.
Max speed on pin 15	2000Khz.
Voltage	0 - 5 VDC

It can work with parallel ports with voltages from 3.3 and 5 volts.
This board consumes about (depending on the features used) 1.5 amperes.

