

# RoutOut CNC 10 Amp Microstepping Bipolar Stepper Motor Data Sheet Version 1.1

The RoutOut CNC stepper motor drive has many uses including for CNC retrofitting / robot control or driving you own CNC machine. It is simple to wire and operates with no external current setting resistors needed.

The RoutOut CNC stepper motor driver is a single axis, pulse width modulated (PWM), Micro-stepping Bipolar driver with Half / Quarter / Sixteenth stepping capabilities.



## Features.

- 10 A 37V Output Drive Capabilities.
- 3V to 5V logic inputs.
- Synchronous Rectification for low power / heat dissipation
- Internal UVLO and Thermal shutdown circuitry.
- Small PCB foot print only 105mm x 123mm
- Internal 5V logic driver onboard (no need for 5v Supply)
- Enable – Turns the motor off when not being driven.
- Large built in heatsink with mounting flanges.
- Opto isolated Inputs

## Table 1.

To set the resolution see the following table

<b>Resolution</b>	<b>M1 Switch</b>	<b>M2 Switch</b>
Half Step	OFF	ON
Quarter Step	ON	OFF
Sixteenth Step (Default)	OFF	OFF

For Example with a 1.8 Degree stepper motor the number of steps for 1 full shaft rotation is shown in the table below.

<b>Mode</b>	Number of Steps per 1 Shaft Revolution (based on a 1.8 Degree motor)
Half Step	400
Quarter Step	800
Sixteenth Step	3200

△ Note Smoother operation will be obtained by using sixteenth micro-stepping mode.

### **Table 2.**

Setting the current for your stepper motors.

The formula  $V_{REF} = \text{Motor Current} \times 0.176$  can be used to determine the Value for  $V_{REF}$

The most common current ratings are shown in a table below.

Motor Current (A)	$V_{REF}$ Voltage (V)
3.5 A	0.616 V
4.0 A	0.704 V
4.5 A	0.787 V
5.0 A	0.875 V
5.5 A	0.962 V
6.0 A	1.05 V
6.5 A	1.13 V
7.0 A	1.225 V
7.5 A	1.312 V
8.0 A	1.4 V
8.5 A	1.496 V
9.0 A	1.584 V
9.5 A	1.672 V
10 A	1.76 V

**Note: It is normal to exceed the motors rated voltage by up to 20 times, for instance a 5V stepper motor run at 24 V would be perfectly expectable.**

**△ Never exceed a motors rated current or the drive cards 37V DC Max. Doing so could damage the motor and the stepper drive card.**

## Absolute Maximum Ratings

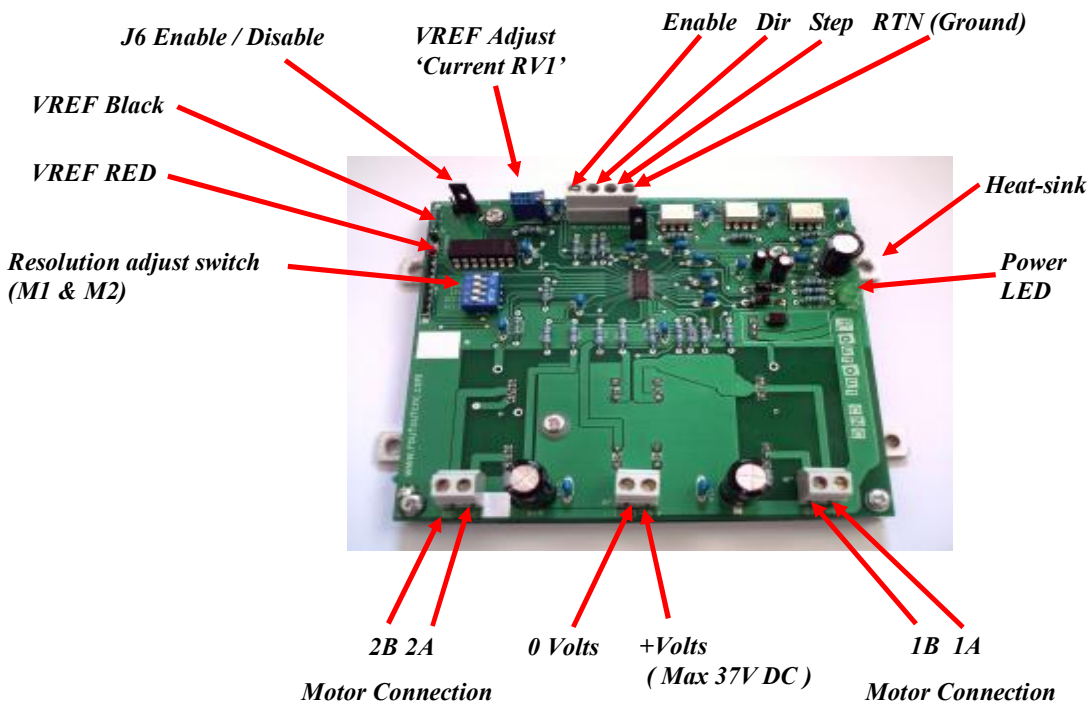
Δ Exceeding these ratings **WILL** destroy your stepper card !

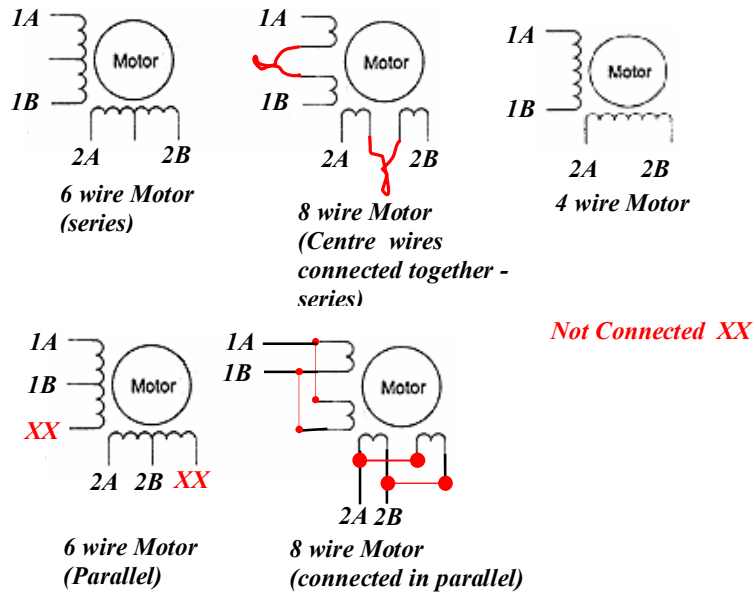
- Power Supply Voltage 37 Volts DC
- Logic Input :  
Step / Direction / Enable Voltage  
Logic High Min 3.0 MAX 5 V  
Logic Low MAX 1.5 V
- VREF MAX Voltage 2 Volts
- MAX Output Current 10 A

## Timing Requirements

- 200nS Minimum Command active time before step pulse.
- 1.0uS Minimum command active time after step pulse.
- 1.0uS Minimum step Low time.

## Quick Step Setup Guide ( Figure 1 ).





- Set the resolution using the Switches M1 & M2, see Table 1 (Default setting Sixteenth step )
- Put Jumper (J6) in the disabled position. See Figure 1. (Disable Motor Output)
- With your DC power supply OFF connect 0V to the screw terminal (J2) marked ground - GND (See Figure 1). Now connect the positive terminal of your power supply (Max 37V DC) to the terminal marked +VE.

**Δ Check and double-check the polarity because if it's wrong it WILL blow the board up ! You have been warned.**

- Turn on your Power Supply and the green LED should light. If it does not turn off the power supply immediately, and re-check all of the above steps.
- Setting the VREF (Motor Current) using a multimeter (Set to DC Range) Put the black lead through the black hoop (VREF GND) and the red lead through the red hoop (VREF RED). Turn the pot (Do not force it past it's end stops) marked 'Current RV1' Until the voltage is set to the correct value (See Figure 1).  
For Example  $0.616 = 3.5$  Amps stepper drive current.
- Turn off the Power supply.
- Connect up the stepper motor.( First phase connected between 1A and 1B and the second phase connected between 2A and 2B.
- Move jumper (J6) to the enable position.

- Power on your power supply, your motor should now lock up and be difficult to turn by hand. '*You may also hear motor noise showing that the motor is powered up*'. If not turn off your power supply and re-check the above steps.
- Power off the power supply.
- If you are using the stepper card with a PC stepper motor program like RoutOut CNC or Turbo CNC / Mach 2 or Mach 3 then connect up the step and direction terminals on (J5) and also connect the Terminal RTN to the PC printer port PIN 25 (GND). If you are unsure about these connections we do a dedicated cable made up so you can simply plug it into your PC. Unless you specifically need it, leave the Enable input unconnected.
- Run your chosen software package – Power on your power supply and try jogging the Motor through the software. If the motor works fine, power off and connect your next axis Driver Board (repeating the steps above as before)
- Continue the above procedures for all newly attached drive boards.

**WARNING: Please note that the driver above 6 Amps requires additional heatsinking. For example: Mounting the drive to the metal enclosure is usually enough.**

△ NOTE If the motor runs the wrong way round change one of the phase wires i.e. swap 1A – 1B or swap 2A – 2B but don't swap them both.

△ Note With some motors when they are stationary they may vibrate slightly, this is normal and is no cause for concern.

