

## G202 INSTALLATION NOTES:

(April 25, 2008)

Thank you for purchasing the G202 drive. The G202 microstep drive is warranted to be free of manufacturing defects for 1 year from the date of purchase. Also anyone who is dissatisfied with it or is unable to make it work will be cheerfully refunded the purchase price if the G202 is returned within 15 days of the purchase date.

### PLEASE READ FIRST BEFORE USING THE G202

Before you start, you must have a suitable step motor, a DC power supply suitable for the motor and a current set resistor. The motor's rated phase current must be between 0.3 Amp and 7 Amps. The power supply voltage must be between 4 times and 20 times the motor's rated voltage. The current set resistor may be a 1/4 Watt, 5% part. Finally have a STEP and DIRECTION pulse source available.

### G202 TERMINAL WIRING

#### POWER SUPPLY HOOKUP

**(TERM. 1) POWER GND** Connect the power supply ground to term.1

**(TERM. 2) 24 - 80 VDC** Connect the power supply "+" to this terminal

**CAUTION!** Never put a switch on the DC side of the power supply! This will damage, if not destroy, your drive!

The power supply voltage must be between 24 VDC and 80 VDC. The maximum power supply current required is 67% of the motor's rated phase current. An unregulated power supply may be used as long as the voltage stays between the limits; keep the ripple voltage to 10% or less for best results. The drive has a 2 second power-on reset time before the motor is energized.

**CAUTION!** Power supply voltage in excess of 80 VDC will damage the G202.

The choice of power supply voltage depends on the high speed performance required of the motor; doubling the voltage doubles the motor's high speed power. In all cases the power supply voltage should be no less than 4 times or no more than 25 times the motor's rated voltage. The motor may not run as smoothly as possible if the power supply voltage is less than 4 times the motor's rated voltage. A power supply voltage greater than 25 times the motor's rated voltage will overheat and damage the motor, even if it is not turning. Motor winding inductance should be 500uH or greater, but generally not above 5.5mH.

A more accurate calculation of power supply voltage is to find your motor's inductance, and put it into the following equation.

$$32 * (\sqrt{\text{mH inductance}}) = \text{Power Supply Voltage}$$

If your motor has 2mH of inductance, the equation would look as follows.

$$32 * (\sqrt{2}) = 45.12\text{V}$$

**(TERM. 3) COIL A** Connect one motor winding to this terminal

**(TERM. 4) COIL /A** Connect the other end of the winding to this terminal

**(TERM. 5) COIL B** Connect the other motor winding to this terminal

**(TERM. 6) COIL /B** Connect the other end of the winding to this terminal

Connect one motor winding to terminals 3 and 4. Connect the other winding to terminals 5 and 6. Turn the power supply off when connecting or disconnecting the motor. If the motor turns in the wrong direction, reverse the motor winding connections to terminals 3 and 4.

4-wire, 6-wire and 8-wire motor may be used. When 6-wire motors are used, they may be connected in half winding or full winding. This is equivalent to an 8-wire motor connected in parallel or series. If a motor is connected in series or full winding, the motor's phase current rating is half of its parallel or unipolar rating. The choice depends on the high-speed performance required; a parallel-connected motor will provide twice the power of a series-connected motor at the same power supply voltage.

**(TERM. 7) NC** This terminal is not used.

**(TERM. 8) DIRECTION** Connect the DIRECTION line to this terminal.

**(TERM. 9) STEP PULSE** Connect the STEP line to this terminal.

**(TERM. 10) COMMON** Connect the +5V line to this terminal.

These inputs are optically isolated from the rest of the drive. Terminal 10 is the common anode connection for the opto-isolators and must be connected to the +5 VDC supply of your indexer or pulse generator.

These inputs are meant to be driven by standard TTL logic or other driver capable of sinking 16 mA of current. The minimum logic "0" time is .5 uS while the minimum logic "1" time is 4.5uS. Microstepping occurs on the falling edge of the step input.

**(TERM. 11) CURRENT SET** Connect the current set resistor to this terminal

**(TERM. 12) CURRENT SET** Connect the other end of the current set resistor to this terminal

This input programs the G202's current output to the motor windings. The G202 will accommodate motor winding currents from 1 to 7A and 0.3 to 2A. Use the following equation to calculate the value, (in kilo-ohms) of the current set resistor:

**R (in kilo-ohms) =  $47 * I / (7 - I)$  or for the low current range,  $R = 47 * I / (2 - I)$**

Here are the current set resistor values for motor current in .5A increments. Round the appropriate answer to the nearest 5% resistor value.

- a. 1A – 7.8K
- b. 1.5A – 12.8K
- c. 2A – 18.8K
- d. 2.5A – 26.1K
- e. 3A – 35.25K
- f. 3.5A – 47K
- g. 4A – 62.67K
- h. 4.5A – 84.6K
- i. 5A – 117.5K
- j. 5.5A – 172.33K
- k. 6A – 282K
- l. 6.5A – 611K
- m. 7A – OPEN

**HEATSINKING:** The G202 needs heatsinking for current settings greater than 6 amps. The case temperature (measured on the bottom plate) should not exceed 70 degrees C, and for best life should be kept to 50 degrees or less. Use heatsink compound between the G202 and the heatsink.

The drive must be heatsinked to a piece of aluminum, preferably with fins and a fan to increase heat dissipation and surface area. Do not screw the drives directly to the door of your control cabinet, as this will typically not provide adequate heatsinking properties.

**OPTION JUMER BLOCK:** The G202 has four settable options. These options are enabled/disabled via the jumper block shunt settings. See the diagram below for how to set the shunts. The four options are described below.

**(1) AUTO CURRENT REDUCTION:** The G202 reduces motor phase current to 33% of the set value when the motor is stopped. If enabled, this reduction occurs 1 second after the last step pulse is sent to the drive. Auto current reduction can be enabled or disabled.

**(2) REDUCED CURRENT RANGE:** In addition to the normal current range (1A to 7A), the G202 can also operate over a reduced current range (0.3A to 2A). This range is used for motor phase currents of less than 1A. Auto current reduction is not available for this reduced current range.

**(3) NEMA-42 MOTOR:** Use this option if the drive is to be used with NEMA-42 frame size motors. This option adjusts the mid-band compensation circuit for optimum performance with this size motor.

**(4) MID-BAND COMPENSATION DISABLE:** Some step pulse sources generate very "ragged" timing. If the pulse-to-pulse period varies by more than +/-30%, the drive may have problems counting that step pulse. This option disables the mid-band compensation circuit, making the drive insensitive to this timing restriction. As a consequence, the motor may exhibit mid-band instability problems.

**ADJUST:** This trimpot adjusts the motor for the smoothest possible low-speed operation. Set the motor speed to about 1/4 revolution per second, and then turn the trimpot until a distinct null is noted in the motor's vibration. This will result in the most even microstep placement for a given motor and power supply voltage.

**CONVERTING THE G202 TO A G212:** The G202 can be converted to a G212 by installing the G901 step pulse multiplier board. Remove the cover of the drive, and then use a small pair of needle-nose pliers to remove the opto-isolator from its socket. Plug the G901 board into this socket and replace the cover.

#### **REMOVING AND REPLACING THE COVER:**

The STEP PULSE MULTIPLIER and the INPUT OPTION settings are jumpered internally. It is necessary to remove the cover of the drive to change these settings from their default values. Please follow the steps below on how to remove and replace the cover to avoid damaging the drive:

#### **REMOVING THE COVER:**

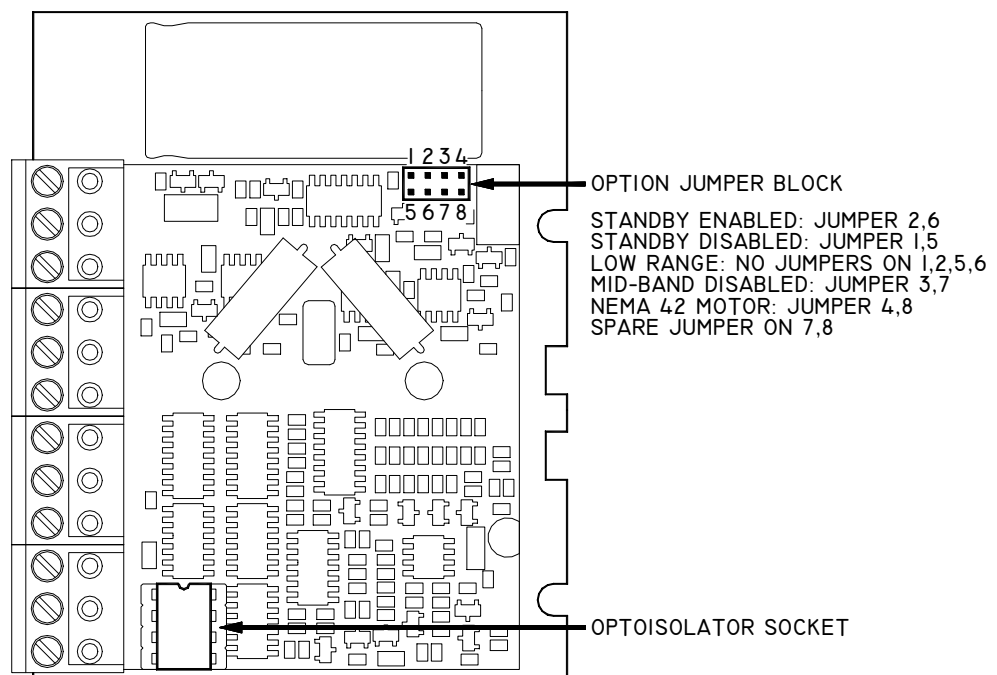
- 1) Remove the two 2-56 phillips-head screws on the bottom of the drive.
- 2) Gently lift the back of the cover upward until the LED clears the rectangular hole
- 3) Slide the cover backwards while still lifting until it clears the drive.

#### REPLACING THE COVER:

- 1) Make sure the LED is vertical relative to the drive printed circuit board.
- 2) Slide the cover forward over the drive while lifting the back of the cover.
- 3) When the cover is fully forward, look to see the LED is aligned with the hole.
- 4) Gently press the cover down, making sure the LED moves into the hole.
- 5) Replace the screws on the bottom of the drive.

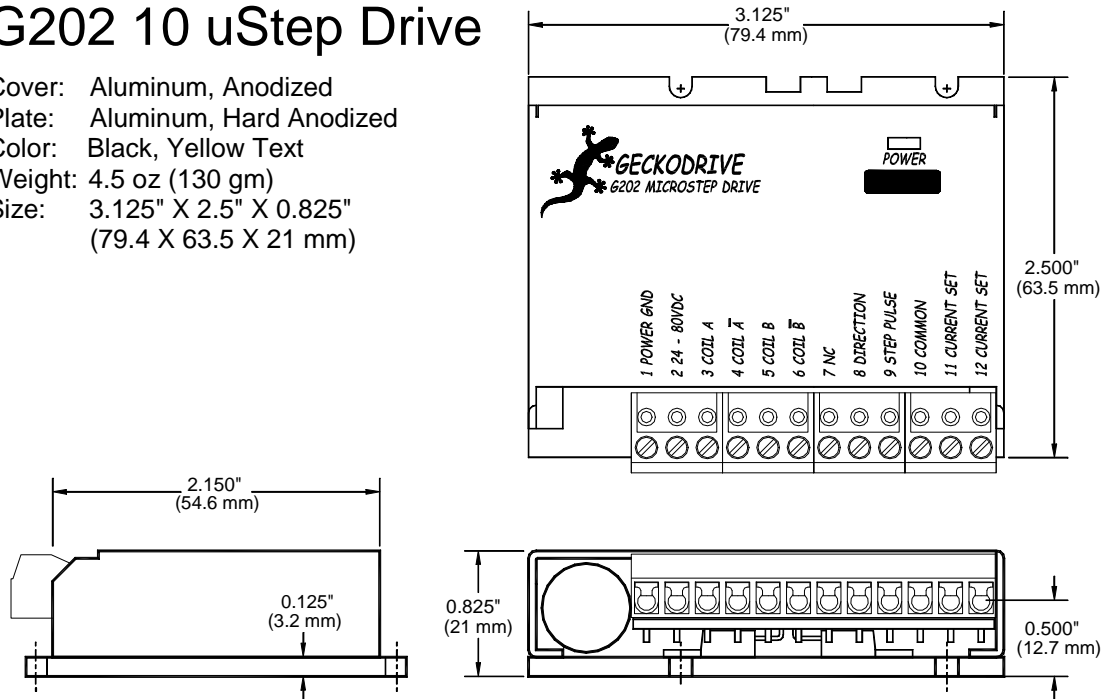
It is recommended to use small needle-nose pliers or tweezers to move the jumpers on the internal headers.

**MAIN CONNECTOR:** The G202 uses a 2-piece modular main connector. The connector is split in two pieces; terminals 1 thru 6 (power supply and motor leads) and terminals 7 thru 12 (control interface). Each can be removed separately by pulling the connector body upwards and off of the mating header pins on the G201. The connectors must initially be removed to mount the G202 to a heatsink or chassis.



# G202 10 uStep Drive

Cover: Aluminum, Anodized  
 Plate: Aluminum, Hard Anodized  
 Color: Black, Yellow Text  
 Weight: 4.5 oz (130 gm)  
 Size: 3.125" X 2.5" X 0.825"  
 (79.4 X 63.5 X 21 mm)



## SPECIFICATIONS:

Supply Voltage:	24 to 80 VDC
Phase Current:	1 to 7 Amps and 0.3 to 2 Amps (2 ranges)
Auto Current Reduction:	33% of set current, 1 second after last Step Pulse
Size:	3.125"W, 2.5"D, .85"H (79.4mm, 63.5mm, 21.5mm)
Mounting Pattern:	4 6-32 screws, 1.75" by 2.375" (44.5 mm, 60 mm)
Quiescent Current:	15mA or less
Weight:	4.5 oz. (130 gm)
Step Frequency:	0 to 200 kHz
Step Pulse "0" Time:	0.5uS min (Step on falling edge)
Temp:	0 to 70 C
Step Pulse "1" Time:	4.5uS min
Humidity:	0 to 95 % (non-condensing)
Direction Setup:	1uS min (20uS min hold time after Step edge)
Power Dissipation:	1 to 18 W (1 to 7 Amps)

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