

# CN0124

## STEP MOTOR DRIVE



## OPERATING MANUAL



This manual contains information for installing and operating the following Centent Company product:

CN0124 Half-Step Drive

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## **GENERAL DESCRIPTION**

The Centent CN0124 is a small high frequency chopper type half-step drive for use with 4, 6, and 8 wire PM hybrid step motors rated from .1 to 2 amps per phase. It incorporates a dual 'H' bridge output and features anti-resonance circuitry that eliminates mid-band instability. The CN0124 has opto-isolated step and direction inputs that can either be driven directly by TTL gates or by open collector transistor outputs. The power supply voltage can range from 10 VDC to 46 VDC and may be unregulated. The control measures only 2" x 3" x .8", and weighs approximately 5.5 ounces. It is encapsulated in a heat conductive epoxy that makes it suitable for use in harsh environments.

Centent Company also manufactures full/half-step drives and high resolution microstep drives designed to run step motors rated up to 20 amps per phase.

## **INSTALLATION**

The CN0124 generates 10 watts of heat per amp of motor current. The drive must be adequately heat sunk at current set values greater than .5 amps. Maximum case temperature must not exceed 70°C (158°F).

No terminals or connectors are required on the wiring to the CN0124 drive. A wire size of 16-22 gauge is recommended. Either stranded or solid conductor wire may be used. The insulation should be stripped back .25 inches and the wire left untinned.

### **TERMINAL 1**

The DIRECTION input is sampled on every step pulse to determine which direction the motor will move. A low level on the DIRECTION terminal will result in clockwise motion while a high level will cause counter-clockwise motion. The input is TTL compatible and requires a current sink of 8 mA to operate.

### **DIRECTION**

### **TERMINAL 2**

Half-stepping of the motor occurs on the '1 to 0' logic transition of the STEP input. The maximum step rate is 50 KHz when driven with a square wave. The minimum allowable pulse 'on' or 'off' time is 10 microseconds. The input is TTL compatible and requires a current sink of 8 mA to operate.

### **STEP**

**TERMINAL 3**

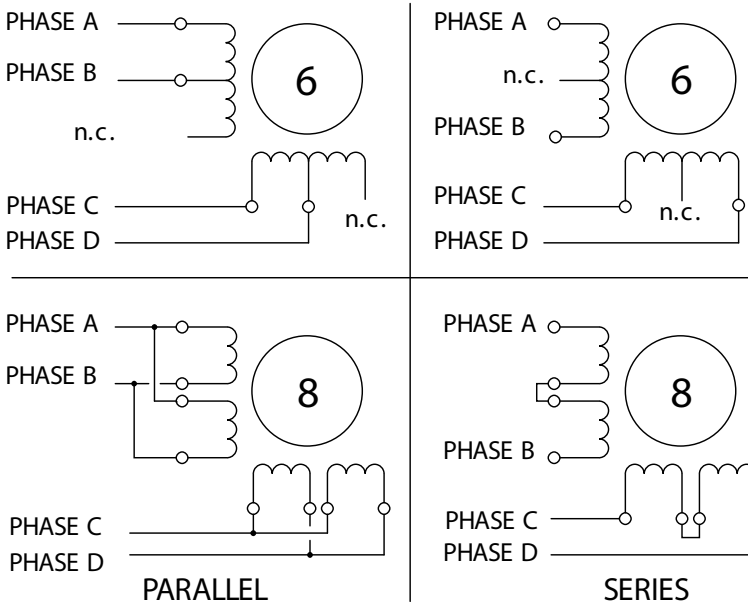
**+5 VOLTS**

This input provides the power supply for the STEP and DIRECTION opto-couplers. It must be supplied from the user's 5 volt logic power supply. It provides power only to the anodes of the opto-coupler LEDs; electrically isolating the STEP and DIRECTION inputs from the other circuitry in the drive.

**TERMINAL 4, 5, 6, 7**

**PHASE A, B & C, D**

The motor output terminals are organized as pairs (PHASE A, B and PHASE C, D) and drive the motor's phase windings. One motor winding goes to PHASE A & PHASE B, the other goes to PHASE C & PHASE D.



With 6 or 8 wire motors the user has the option of connecting the motor in high performance (parallel) or low performance (series) configuration. Parallel operation has twice the maximum motor power output, at the expense of greater motor and drive heating. The diagrams show both configurations for 6 and 8 wire motors. Unused wires should not be left exposed; insulate them to prevent damage to the control or motor.

**TERMINAL 8**

**+10 TO 46 VDC**

This is the power supply input to the CN0124. The minimum voltage is 10 VDC; the maximum is 46 VDC. The power supply may be unregulated, however the ripple voltage must be limited to a maximum of 10% of the DC output voltage.

**TERMINAL 9****GROUND**

This is the CN0124's power supply GROUND input. It also serves as the return side of the current set resistor (Terminal 10).

**TERMINAL 10****CURRENT SET**

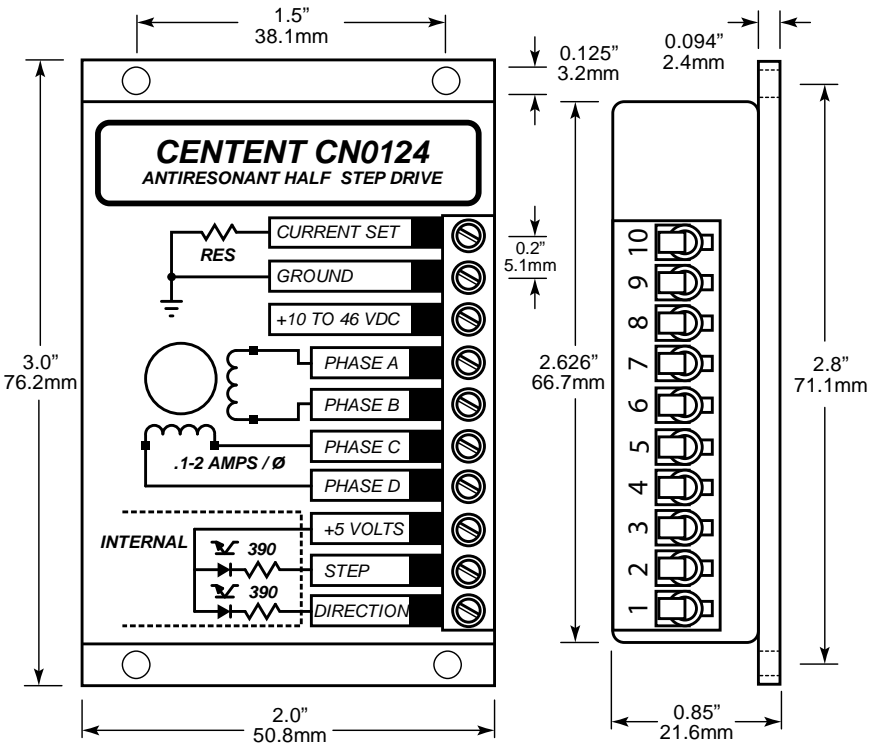
A resistor from the CURRENT SET pin to the GROUND pin sets the operating phase current. The resistor value for a motor in the high performance configuration is calculated from the following formula:

$$R = \frac{780 I_{SET}}{(2 - I_{SET})}$$

Where  $R$  is the current set resistor value in ohms and  $I_{SET}$  is the desired phase current in amperes (parallel)

The CURRENT SET TABLE lists resistor values for both parallel and series operation. Use the high performance column in the table when selecting phase current for 4 wire motors.

| CURRENT SET TABLE |                    |                  |
|-------------------|--------------------|------------------|
| AMPERES (SERIES)  | AMPERES (PARALLEL) | RESTISTOR (OHMS) |
| .2                | .1                 | 39               |
| .4                | .2                 | 82               |
| .6                | .3                 | 130              |
| .8                | .4                 | 200              |
| 1.0               | .5                 | 270              |
| 1.2               | .6                 | 330              |
| 1.4               | .7                 | 430              |
| 1.6               | .8                 | 510              |
| 1.8               | .9                 | 620              |
| 2.0               | 1.0                | 750              |
| 2.2               | 1.1                | 1.0 K            |
| 2.4               | 1.2                | 1.2 K            |
| 2.6               | 1.3                | 1.5 K            |
| 2.8               | 1.4                | 1.6 K            |
| 3.0               | 1.5                | 2.4 K            |
| 3.2               | 1.6                | 3.0 K            |
| 3.4               | 1.7                | 4.2 K            |
| 3.6               | 1.8                | 6.8 K            |
| 3.8               | 1.9                | 15 K             |
| 4.0               | 2.0                | OPEN             |



## SPECIFICATIONS

|                                   | MIN.       | MAX. | UNITS  |
|-----------------------------------|------------|------|--------|
| <b>ELECTRICAL</b>                 |            |      |        |
| Resolution                        | 1/2        | 1/2  | Step   |
| Supply voltage                    | 10         | 46   | VDC    |
| Motor phase current               | .1         | 2    | A      |
| <b>STEP PULSE INPUT</b>           |            |      |        |
| Step rate                         | --         | 50   | KHz    |
| Logic '0' current                 | 8          | 10   | mA     |
| Pulse width                       | 10         | --   | µSec   |
| <b>ENVIRONMENTAL / MECHANICAL</b> |            |      |        |
| Operating temperature             | -20        | +70  | °C     |
| Weight                            | 5          | 6    | oz.    |
| Mounting screw size               | 2          | 4    | #      |
| Terminal Screw Torque             |            | 4.5  | lb/in  |
| Size (L x W x H)                  | 3 x 2 x .8 |      | inches |
| Mounting hole centers             | 2.8 x 1.5  |      | inches |