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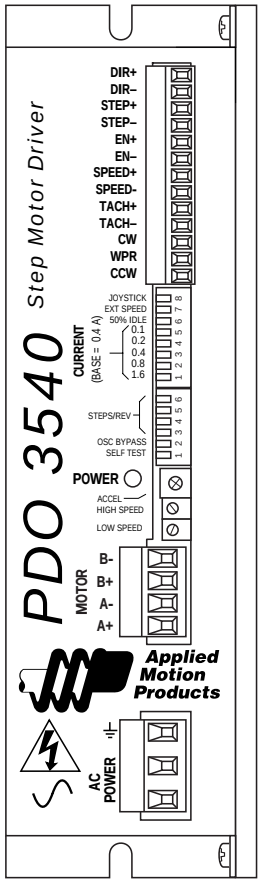
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Hardware Manual

PDO 3540

Step Motor Driver w/ Oscillator



Applied Motion Products

motors • drives • controls

Table of Contents

Introduction ---------- 4
Features ---------- 4
Getting Started ---------- 5
Connecting the AC Line ---------- 6
Connecting the Motor ---------- 8
Modes of Operation ---------- 10
Setting Up for Pulse & Direction Mode ---------- 11
Microstepping ---------- 12
Selecting Microstepping Resolution ---------- 13
Joystick Mode ---------- 14
Oscillator Mode ---------- 15
Speed Control from 0 to 5 Volt Analog Signal ---------- 17
Connecting Digital Inputs ---------- 18
Enable Input ---------- 19
Setting Phase Current ---------- 20
Current Set Table ---------- 21
Mounting the Drive ---------- 22
Recommended Motors ---------- 23
Block Diagram ---------- 23
Technical Specifications ---------- 24

Introduction

Thank you for selecting an Applied Motion Products motor control. We hope our dedication to performance, quality and economy will make your motion control project successful. If there's anything we can do to improve our products or help you use them better, please call or fax. We'd like to hear from you. Our phone number is (800) 525-1609 or you can reach us by fax at (831) 761-6544.

Features

- Powerful, precise and efficient mosfet driver providing up to 3.5 amps per phase and microstepping to 50,800 steps per revolution.
- Reliable, efficient, low noise 40 VDC linear, toroidal power supply.
- Automatic idle current reduction reduces motor and drive heating, saves power.
- Inputs and outputs are optically isolated, differential (sourcing or sinking). Speed & Enable 5 - 24 VDC, Step & Direction 5 - 12 VDC.
- Digital oscillator provides smooth accel/decel ramps and precise speed control.
- Easy to configure with on-board switches and potentiometers for all settings.
- Oscillator Mode operates from internal pots, external pots, 0 - 5 V analog signal, or analog joystick.
- Two speed ranges, can be selected "on the fly" by a digital signal with automatic ramping between speeds.
- Tach Out signal allows easy measurement of speed.
- Built-in self test for troubleshooting.
- Accepts 110 or 220 volt AC power (factory preset for 110 volts).
- Sturdy 2.25 x 7.8 x 5 inch metal chassis.
- Pluggable screw terminal connectors for motor, AC power and I/O signals makes wiring easy.
- CE and TUV Compliant

Getting Started

To use your PDO 3540 motor control, you will need the following:

✔ a power cable (line cord)

✔ a compatible step motor

✔ a small flat blade screwdriver for tightening the connectors - an Applied Motion Products screwdriver suitable for this purpose is included with your drive.

For pulse & direction mode:

✔ a source of step pulses (usually an indexer is used)

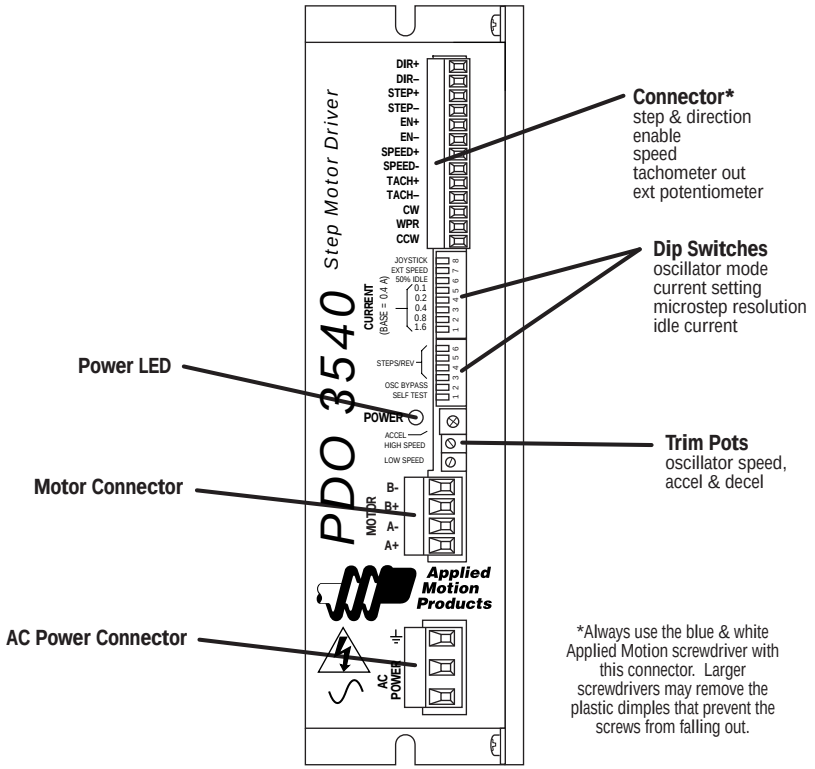
For oscillator mode:

✔ an instrument for measuring motor speed (tachometer, freq. counter or o-scope)

For joystick mode:

✔ an analog joystick (see page 25 for recommended joystick)

The sketch below shows where to find the important connection and adjustment points. Please examine it now. ***All mating connectors are included.***



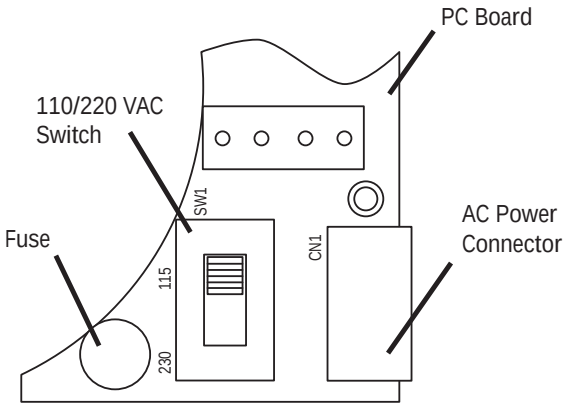
Connecting the AC Line

The PDO 3540 is set for 110 VAC operation at the factory. If you use **110 VAC** power, all you need to do is install a power cord and plug it in. If you plan to use **220 VAC** power, follow the instructions below. *Note: If you plan to hard wire the PDO 3540 to AC power, consult a qualified electrician and observe all building and electrical codes. AC power can be dangerous.*

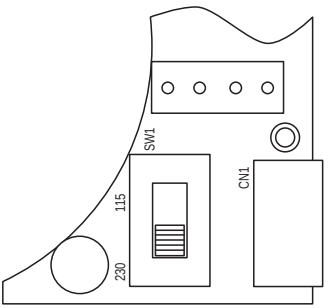
220 VAC Instructions

In order to use 220 volts, you'll need to change a fuse and a switch setting inside the case.

- Remove all mating connectors from the drive.
- Set the drive on it's widest side, so that you can read *PDO 3540 Step Motor Driver* properly.
- Remove the four (4) phillips head screws that mount the chassis sheet metal to the chassis heat sink. See page 17 for a mechanical outline of the drive.
- The 110/220 switch is located near the position of the AC power connector, next to the toroidal transformer (see sketch below).
- For 220 VAC operation slide the switch towards the bottom of the drive, or towards the transformer end of the drive. The position of the switch is labeled on the PC board also, "230" being for 200-240 VAC operation, and "115" for 100-120 VAC operation.
- Replace the fuse next to the switch with the 220 VAC fuse that came with the drive. See technical specifications on page 25 to order more fuses.
- Replace the drive's cover and assembly screws.



Switch set for 110 VAC



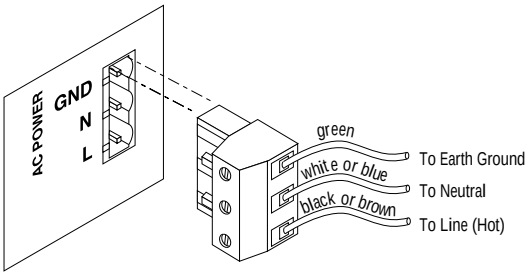
Switch set for 220 VAC

Installing an AC Line Cord

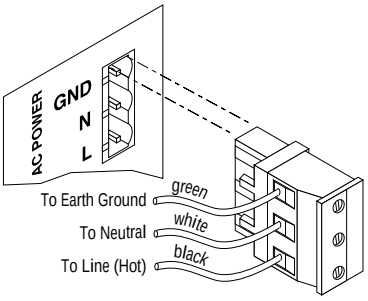
Remove about 5 mm (3/16 inces) of insulation from each of the three wires of your line cord. (That's right, three wires. For safety, always use a three wire power cord on anything with a metal case). Depending on where you got your power cord, it may have black, white and green wires, or brown, white and green wires.

The AC power plug that was shipped with your PDO 3540 might be one of two types. The "old style" is shown below, on the left. The "new style" , which comes with an insulating rubber boot, is shown below, on the right.

Make sure you follow the proper sketch for you connector style.



"Old Style"
AC Power Plug



"New Style"
AC Power Plug



Always unplug the line cord from the wall before attaching it to the PDO 3540.

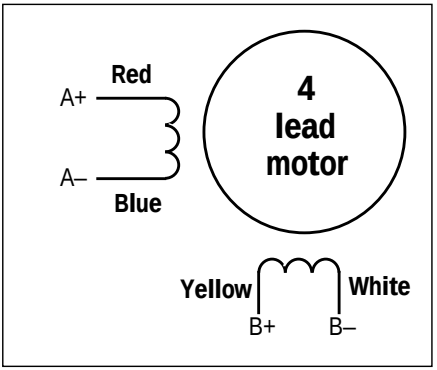
- Connect the black or brown wire to the PDO 3540 "L" terminal of the AC power connector. That is the line, or "hot" connection.
- Connect the white or blue wire to neutral, the "N" terminal.
- Finally, and most importantly, connect the green wire to the "GND" terminal. That connects the PDO 3540 metal enclosure and DC power supply ground to earth ground.

Connecting the Motor

Secure any unused motor leads, insulate exposed conductors. Never connect motor leads to ground or to a power supply. Never connect or disconnect the motor to the driver when the AC power is on.

You must now decide how to connect your motor to the drive.

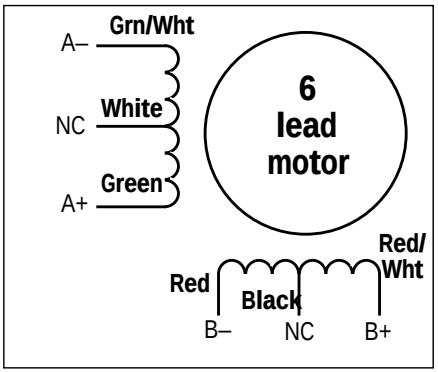
Four lead motors can only be connected one way. Please follow the sketch at the right.



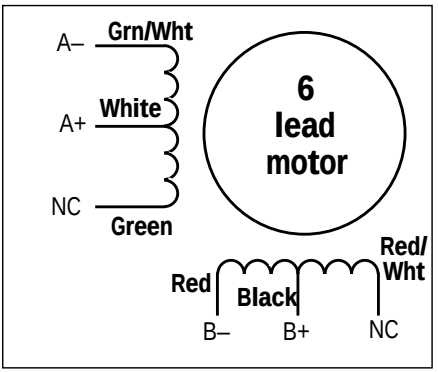
4 Leads

Six lead motors can be connected in series or center tap. In series mode, motors produce more torque at low speeds, but cannot run as fast as in the center tap configuration. In series operation, the motor should be operated at 30% less than the rated current to prevent overheating. Wiring diagrams for both connection methods are shown below.

Note: NC means not connected to anything.

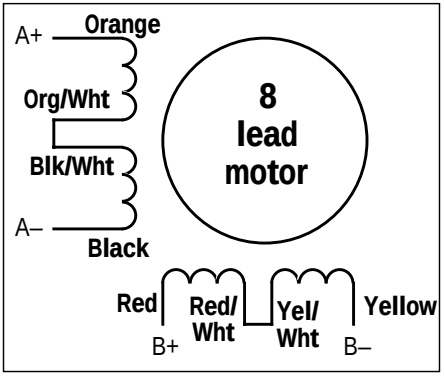


6 Leads Series Connected

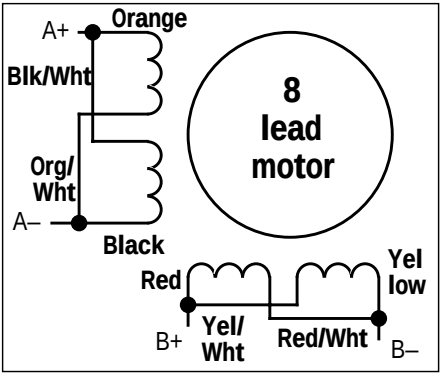


6 Leads Center Tap Connected

Eight lead motors can also be connected in two ways: series and parallel. As with six lead motors, series operation gives you more torque at low speeds and less torque at high speeds. In series operation, the motor should be operated at 30% less than the rated current to prevent overheating. The wiring diagrams for eight lead motors are shown below.



8 Leads Series Connected



8 Leads Parallel Connected

Modes of Operation

The PDO 3540 has four modes of operation, selected by three dip switches.

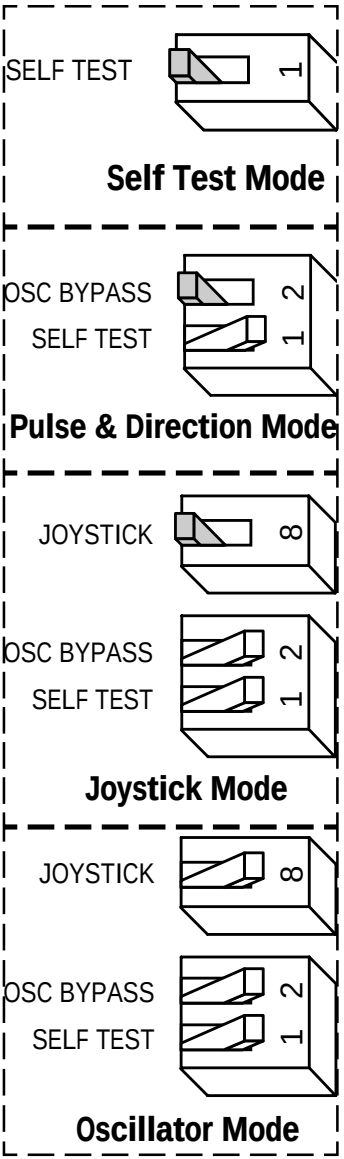
Self Test Mode is used for trouble shooting. If you are unsure about the motor or signal connections to the drive, or if the PDO 3540 isn't responding to your step pulses, you can turn on the self test.

To activate the self test, slide switch #1 toward the TEST label. The drive will slowly rotate the motor, 1/2 revolution forward, then 1/2 revolution backward. The pattern repeats until you slide the switch away from the TEST label. The PDO 3540 always uses half step mode during the self test, no matter how you set the steps/rev switches. The self test ignores the STEP and DIRECTION inputs while operating. The ENABLE input continues to function normally.

Pulse & Direction Mode - the PDO 3540 receives step pulses from an indexer such as the Applied Motion Si-1 or Si-100. Steps/revolution are set by switches 3 - 6 (see page 13).

Joystick mode - speed and direction are determined by an external analog voltage. STEP and DIR inputs can be used for limit switches. SPEED input selects speed range. LO SPEED and HI SPEED pots adjust the 2 speed ranges.

Oscillator mode - speed can be controlled by onboard potentiometers and/or by an external analog voltage. STEP input starts and stops the motor. DIR input controls direction of rotation. SPEED input selects the speed range.



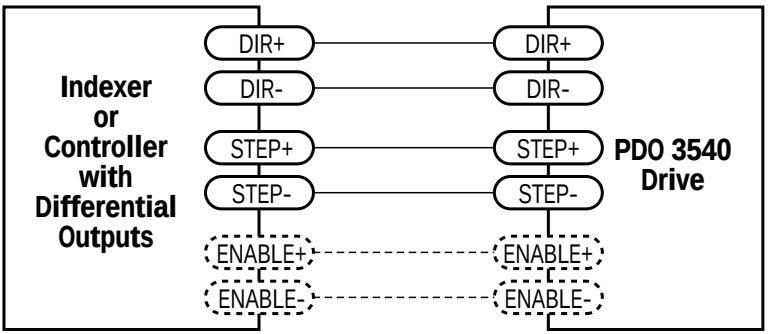
Setting up for Pulse & Direction Mode

To operate the drive in Pulse & Direction mode, you must:

✔ Connect an indexer/controller to the STEP and DIR inputs.
✔ Set the microstep resolution (steps/rev).
✔ Turn off the SELF TEST switch and turn on the OSC BYPASS switch.

Differential Logic

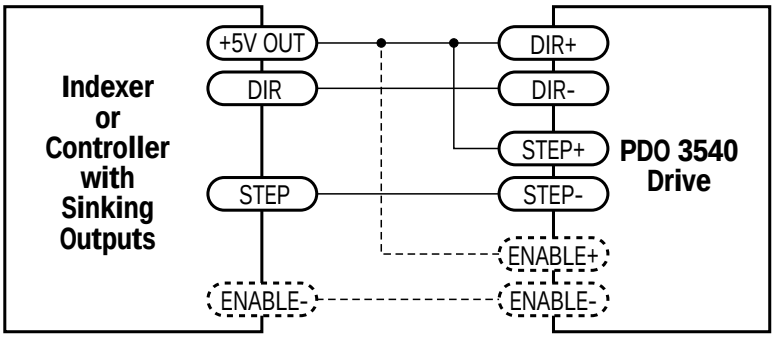
If your controller has STEP+, STEP-, DIR+ and DIR- outputs, which many indexers do, the connections are simple. Just connect STEP+ to STEP+, STEP- to STEP- and so forth, as shown below.



----- = optional signal

Sinking Logic

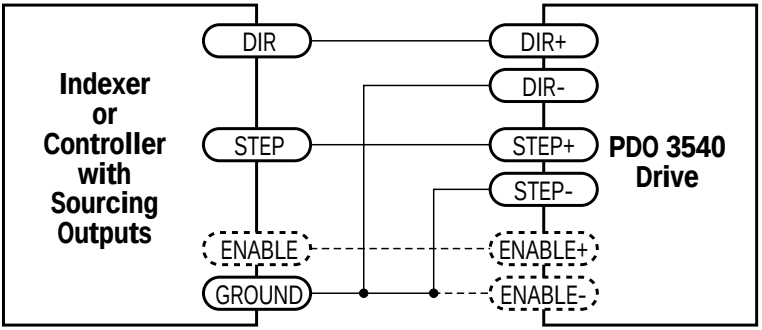
If your controller has STEP, DIR and +5V outputs, like the Applied Motion Products Si-1 indexer, connect STEP+ and DIR+ to +5V. Connect STEP- to STEP. Connect DIR- to DIR.



----- = optional signal

Sourcing Logic

If your controller has STEP, DIR and GND (ground or common) outputs, connect STEP- and DIR- to GND. Connect STEP+ to STEP. Connect DIR+ to DIR.



----- = optional signal

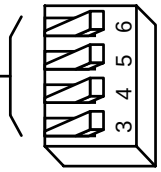
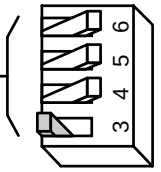
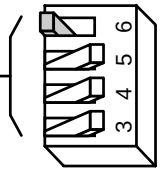
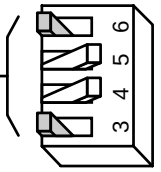
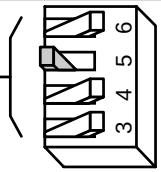
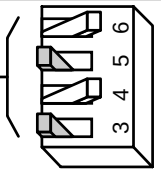
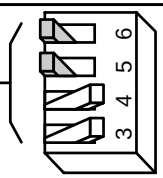
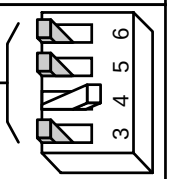
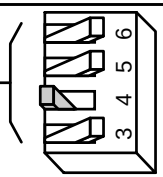
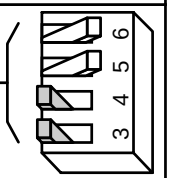
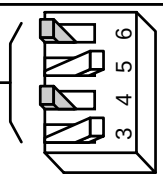
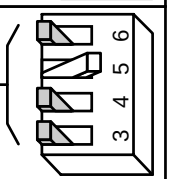
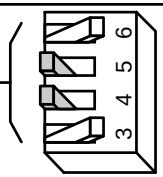
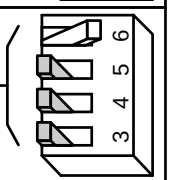
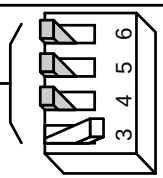
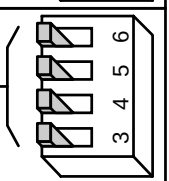
Microstepping

Most step motor drives offer a choice between full step and half step resolutions. In full step mode, both motor phases are used all the time. Half stepping divides each step into two smaller steps by alternating between both phases on and one phase on.

Microstepping drives like the PDO 3540 precisely control the amount of current in each phase at each step position as a means of electronically subdividing the steps even further. The PDO 3540 offers a choice of 16 step resolutions in pulse & direction mode. The highest setting divides each full step into 254 microsteps, providing 50,800 steps per revolution when using a 1.8° motor. *Note: In oscillator/joystick mode the microstep resolution is fixed at 12800 steps/rev, regardless of the dip switch settings.*

In addition to providing precise positioning and smooth motion, microstep drives can be used for motion conversion between different units. The 25,400 step/rev setting is provded as a means of converting motion from metric to english (there are 25.4 mm in an inch). Other settings provide step angles that are decimal degrees (36,000 steps/rev makes the motor take 0.01° steps). Some settings are used with lead screws. When the drive is set to 2000 steps/rev and used with a 0.2 pitch lead screw, you get 0.0001 inches/step.

Selecting Microstep Resolution

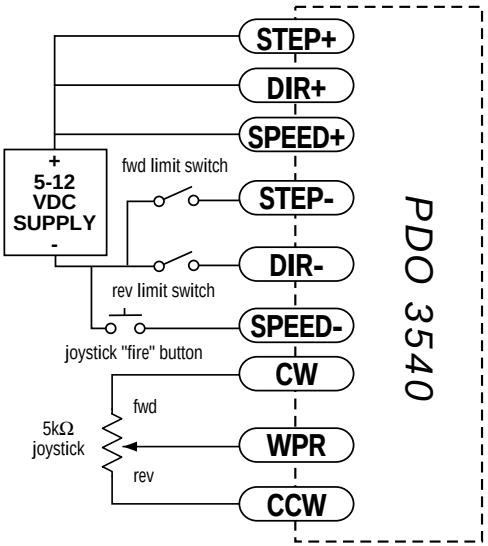
200 (FULL) STEPS/REV 	**20000** (1/100) STEPS/REV 
400 (HALF) STEPS/REV 	**21600** (1 arc min) STEPS/REV 
1000 (1/5) STEPS/REV 	**25000** (1/125) STEPS/REV 
2000 (1/10) STEPS/REV 	**25400** (1/127) STEPS/REV 
5000 (1/25) STEPS/REV 	**25600** (1/128) STEPS/REV 
10000 (1/50) STEPS/REV 	**36000** (.01°) STEPS/REV 
12800 (1/64) STEPS/REV 	**50000** (1/250) STEPS/REV 
18000 (.02°) STEPS/REV 	**50800** (1/254) STEPS/REV 

Joystick Mode

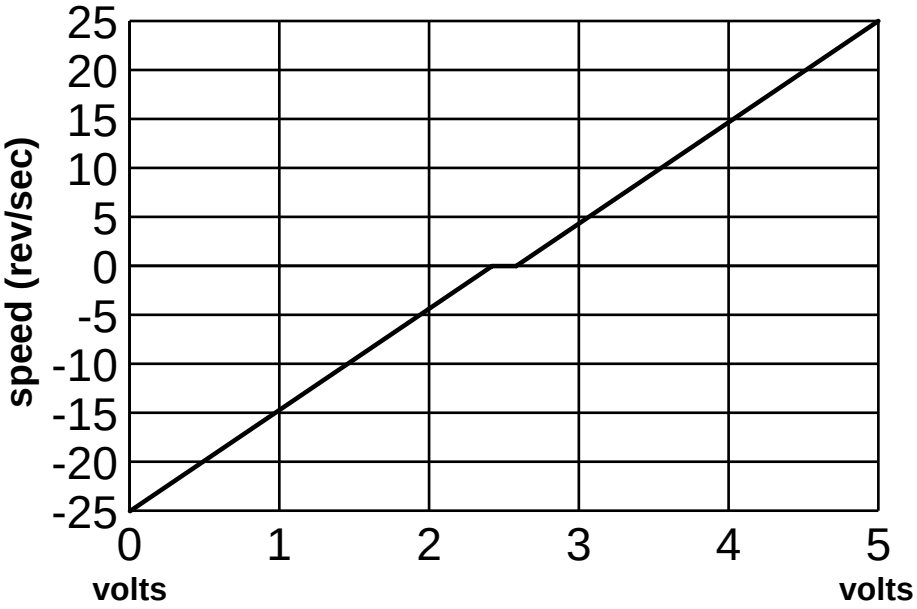
In this mode, speed and direction are determined by the voltage applied to the WPR (wiper) terminal. 2.5 volts is "stopped" (no speed). Increasing the WPR voltage toward 5 volts results in forward motion: speed increases with voltage. Decreasing the WPR voltage from 2.5 toward 0 results in reverse motion, with speed increasing as voltage decreases. In joystick mode, the PDO 3540 operates at 12800 steps/rev.

The maximum speed is determined by two things: the state of the SPEED input and the HI SPEED and LO SPEED trimpots. When the SPEED input is ON, the speed range of the joystick can be adjusted with the LO SPEED pot, up to 5 rev/sec (300 rpm). When the SPEED input is OFF (or open), the joystick speed range is adjusted with the HI SPEED pot, up to 25 rev/sec (1500 rpm). Turning the pots clockwise increases the speed.

In joystick mode, limit switches can be connected to the PDO 3540 to prevent motion outside of defined limits. The forward limit should be connected to the STEP input and the reverse limit should be connected to the DIR input. When the forward limit is ON, the motor will not move forward (that is, when the joystick voltage is between 2.5 and 5 volts). When the reverse limit is ON, the motor will not move when the joystick is in the 0 to 2.5 volt range. If you don't need limits, you can leave the STEP and DIR inputs unconnected.



Typical Wiring for Joystick Mode



Speed vs. Input Voltage
Joystick Mode, SPEED input off (open)
HI SPEED pot at maximum

Oscillator Mode

In oscillator mode, the PDO 3540 uses the direction set by the DIR input. Off, or open, gives clockwise motion, if the motor is wired according to pages 8 and 9. Motor speed and the function of the STEP input can be determined from the following table. In oscillator mode, the PDO 3540 operates at 12800 steps/rev.

SPEED input	switches 7 & 8	speed set by	when STEP goes ON	when STEP goes OFF
ON	joystick ext speed 	 LO SPEED	accel to speed	instant stop
ON	joystick ext speed 	 LO SPEED	accel to speed	instant stop
OFF/open	joystick ext speed 	 HI SPEED	accel to speed	decel to stop
OFF/open	joystick ext speed 	**WPR input** trimmed by  HI SPEED	accel to speed	decel to stop

There are two speed ranges in oscillator mode. One is the low speed range, which is activated when the SPEED input is on. The low speed can be set from 0 to 5 rev/sec (0 - 300 rpm) by adjusting the LO SPEED pot. Turning the pot clockwise increases the speed.

The high speed setting is used when the SPEED input is off, or open. If switch #7 is toward the words EXT SPEED, then the high speed is proportional to the voltage applied to the WPR terminal, and is trimmed by the HI SPEED pot. You can connect an external 1K - 5K pot to the WPR, CW and CCW terminals, or you can apply a 0 to 5 volt analog signal to the WPR terminal (ground your analog signal to the CCW terminal). The high speed range is 0 - 25 rev/sec (0 - 1500 rpm). You can reduce the range by turning down the HI SPEED pot. For example, if you want the motor to go 750 rpm when the external pot is on maximum, turn the HI SPEED pot down about half way.

When switch #7 is away from the EXT SPEED label, the high speed is set by the HI SPEED pot and the WPR input does nothing.



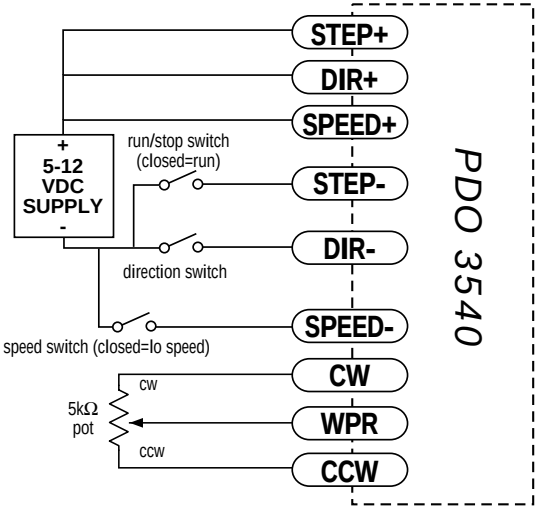
Never apply more than 5 volts DC or less than 0 volts to the WPR pin.

In joystick and oscillator modes, the accel/decel rate is set by the ACCEL pot.

The acceleration range is 1 to 250 rev/sec/sec. Turning the pot clockwise makes the motor start and stop faster, but if you set it too high the motor may run out of torque and stall.

In nearly all cases, the accel/decel rate you set is respected by the PDO 3540. For example, if you switch the SPEED input while the motor is moving, the drive will change speeds smoothly. If you are operating in EXT SPEED mode and make a sudden change in the voltage to the WPR terminal, the drive accelerates (or decelerates) to the new speed smoothly, according to the accel pot setting.

The only time the drive makes an instant change is when the SPEED input is on and the STEP input goes off. That is done so that you can stop instantly (and exactly) from a low speed.



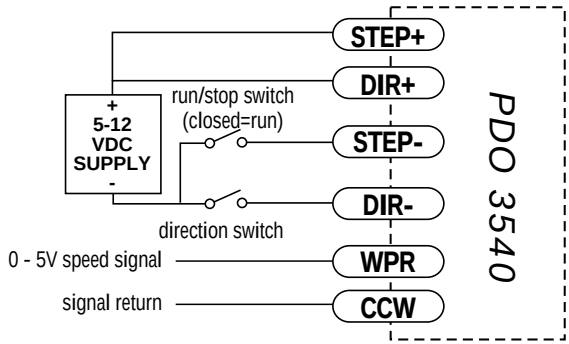
Typical Wiring for Oscillator Mode Using External Speed Control Pot

Speed Control from a 0 to 5 Volt Analog Signal

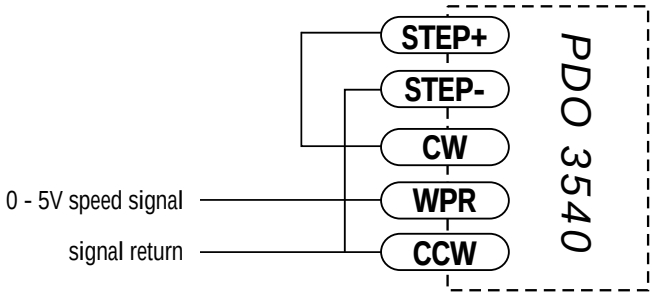
In oscillator mode, the PDO 3540 can rotate the motor at a speed proportional to an analog voltage. The voltage must be applied to the WPR terminal. The direction of rotation is controlled by the digital DIR input and the motor can be stopped either by setting the analog input voltage to 0 or by turning the digital STEP signal off.

To use the PDO 3540 in this mode, set switch #8 away from the JOYSTICK label, and set switch #7 toward the EXT SPEED label.

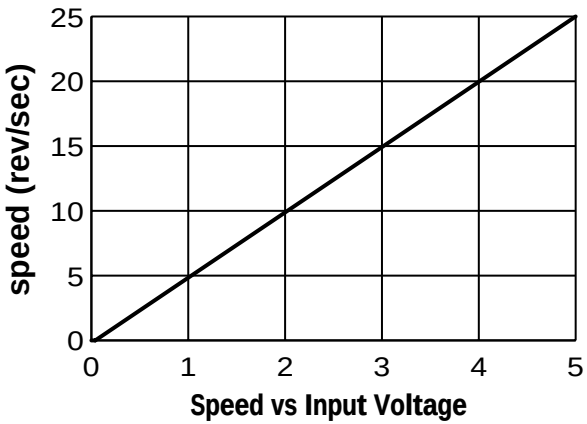
The HI SPEED pot sets the maximum speed (the motor speed when the analog signal is at 5 volt DC). The range is 0 - 25 rev/sec. Wiring diagrams and a plot of speed v. voltage are shown below and on the next page.



Wiring for Speed Control by 0 - 5 V Analog Signal (with Dir Control)



Wiring for Speed Control by 0 - 5 Volt Analog Signal (Unidirectional)



Speed vs Input Voltage

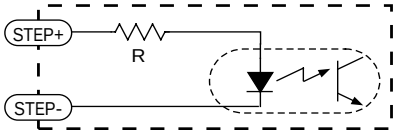
EXT SPEED mode, HI SPEED pot at maximum

Connecting Digital Inputs

The PDO 3540 contains optical isolation circuitry to prevent the electrical noise inherent in switching amplifiers from interfering with your circuits. This arrangement also allows a wide range of input voltages to be used and gives you the option of using sinking or sourcing inputs.

A schematic diagram of the input circuit is shown on the next page.

You must supply 5 - 12 volts DC to supply current to the LEDs on the input side of the optoisolators. 5 - 24 VDC is acceptable for the SPEED and ENABLE inputs. You can operate the STEP and DIR inputs at 24 VDC if you add a 1000 ohm resistor to each input. Most CMOS and open collector TTL devices are directly compatible with this drive, as are typical PLC and proximity sensor outputs.



PDO 3540 Input circuit

Sinking Circuits (NPN)

If your output devices sink current, then connect the "+" terminals to your positive power supply, and the "-" terminals to your signals (i.e. STEP-, DIR-, etc.). If you are using a TTL circuit to drive the PDO 3540, connect the "+" terminals to your 5 volt bus. No ground connection is needed. If you are using a PLC or proximity sensor, you'll need a power supply.

Sourcing Circuits (PNP)

If your output devices can only source current (some PLC outputs are this way), connect the "-" terminals to the ground of the DC power supply that powers your output circuits. Then connect your signals to the "+" terminals (STEP+, DIR+, etc.).

Note: We refer to an input as being ON when current is flowing through the input. A signal is OFF when no current is flowing. An input is OFF when COM and the input terminal are at the same voltage, or when the input is left unconnected (open).

Tach Output

The Tach Out signal is provided for measuring the motor speed. It generates 100 pulses per revolution, so if you connect a frequency counter, the speed reads out in revs/second with two decimal places.



Do not connect the Tach output to more than 24 VDC. The current into the Tach+ terminal must not exceed 20 mA.

Enable Input

ENABLE allows the user to turn off the current to the motor by setting this signal to logic 0. The logic circuitry continues to operate, so the drive "remembers" the step postion even when the amplifiers are disabled. However, the motor may move slightly when the current is removed depending on the exact motor and load characteristics. ***If you have no need to disable the amplifiers, you don't need to connect anything to the ENABLE input.***

Setting Phase Current

Before you turn on the power supply the first time, you need to set the driver for the proper motor phase current. The rated current is usually printed on the motor label. The current you set on the PDO 3540 is the peak current, not RMS.

The PDO 3540 drive current is easy to set. If you wish, you can learn a simple formula for setting current and never need the manual again. Or you can skip to the table on the next page, find the current setting you want, and set the DIP switches according to the picture.

Current Setting Formula

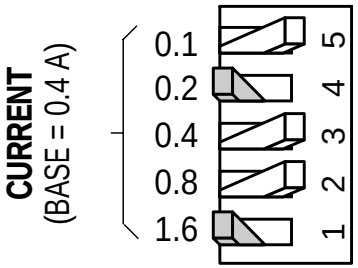
Locate the bank of eight switches. Five of the switches have a value of current printed next to them, such as 0.2 and 1.6. Each switch controls the amount of current, in amperes (A), that it's label indicates. There is always a base current of 0.4 A. To add to that, slide the appropriate switches toward their labels. You may need your small screwdriver for this.

Example

Suppose you want to set the driver for 2.2 amps per phase. You need the 0.4 A base current plus another 1.8 A.

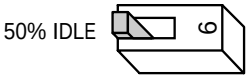
2.2 (TOTAL) = 0.4 (BASE) + 1.6 + 0.2

Slide the 1.6 and 0.2 A switches toward the labels as shown in the figure.



Idle Current Reduction

Your drive is equipped with a feature that automatically reduces the motor current by 50% anytime the motor is not moving. This reduces drive heating by about 50% and lowers motor heating by 75%. This feature can be disabled if desired so that full current is maintained at all times. This is useful when a high holding torque is required. To minimize motor and drive heating we highly recommend that you use the idle current reduction feature unless your application strictly forbids it. Idle current reduction is enabled by sliding switch #6 toward the 50% IDLE label, as shown in the sketch below. Sliding the switch away from the 50% IDLE label disables the reduction feature.

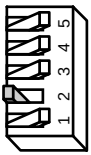
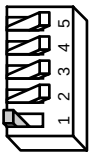
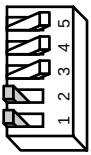
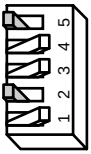
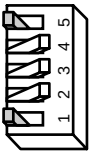
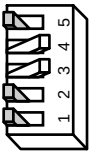
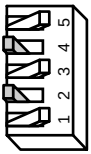
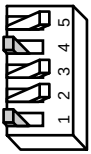
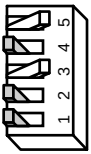
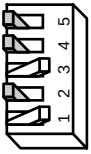
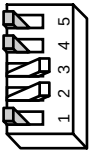
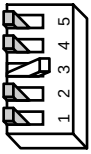
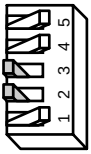
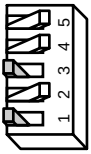
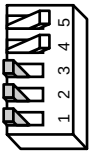
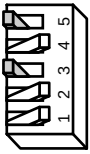
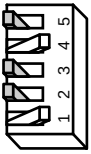
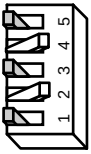
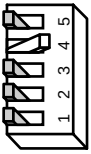
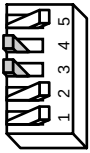
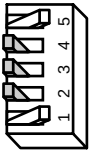
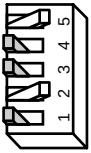
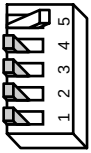
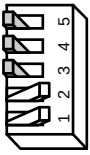
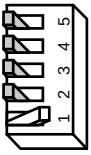
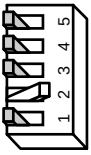
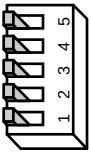


Idle Current Reduction Enabled



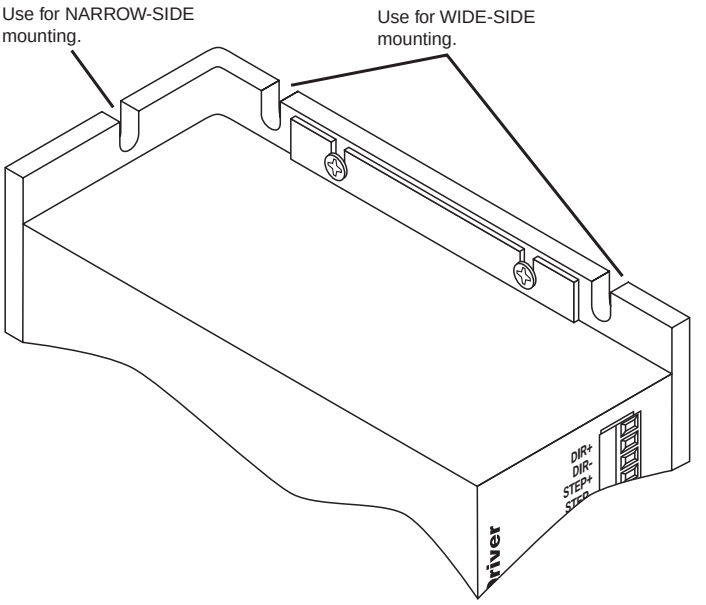
Idle Current Reduction Disabled

Current Set Table

0.4 AMPS/ PHASE 	1.2 AMPS/ PHASE 	2.0 AMPS/ PHASE 	2.8 AMPS/ PHASE 
0.5 AMPS/ PHASE 	1.3 AMPS/ PHASE 	2.1 AMPS/ PHASE 	2.9 AMPS/ PHASE 
0.6 AMPS/ PHASE 	1.4 AMPS/ PHASE 	2.2 AMPS/ PHASE 	3.0 AMPS/ PHASE 
0.7 AMPS/ PHASE 	1.5 AMPS/ PHASE 	2.3 AMPS/ PHASE 	3.1 AMPS/ PHASE 
0.8 AMPS/ PHASE 	1.6 AMPS/ PHASE 	2.4 AMPS/ PHASE 	3.2 AMPS/ PHASE 
0.9 AMPS/ PHASE 	1.7 AMPS/ PHASE 	2.5 AMPS/ PHASE 	3.3 AMPS/ PHASE 
1.0 AMPS/ PHASE 	1.8 AMPS/ PHASE 	2.6 AMPS/ PHASE 	3.4 AMPS/ PHASE 
1.1 AMPS/ PHASE 	1.9 AMPS/ PHASE 	2.7 AMPS/ PHASE 	3.5 AMPS/ PHASE 

Mounting the Drive.

You can mount your drive on the wide or the narrow side of the chassis.

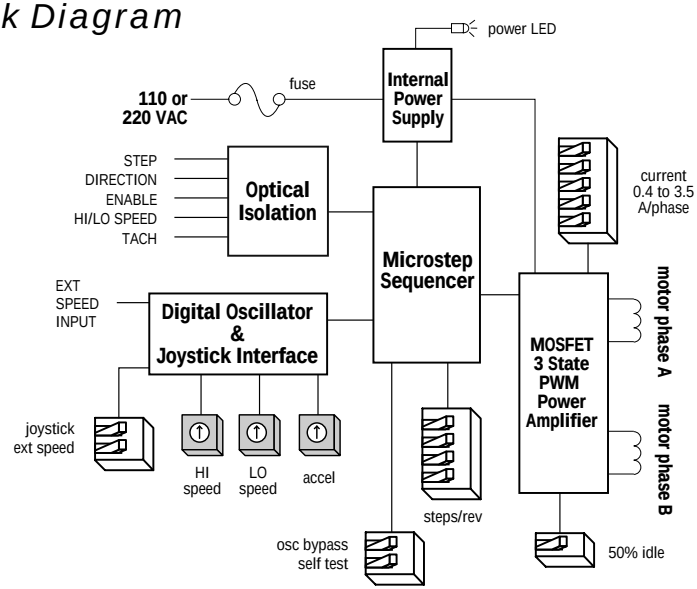


Never use your drive in a space where there is no air flow or where the ambient temperature exceeds 50 °C (120 °F).
Never put the drive where it can get wet.
Never allow metal particles near the drive.

Recommended Motors

Motor Number	Size inches	Winding Connection	Max Torque oz-in	Current Amps
5014-842	1.38 x 1.38 x 1.57	4 lead	19	1.0
HT17-068	1.65 x 1.65 x 1.30	parallel	23	1.4
HT17-071	1.65 x 1.65 x 1.54	parallel	30	1.7
HT17-075	1.65 x 1.65 x 1.85	parallel	40	1.7
5023-122	2.22 x 2.22 x 2.0	parallel	60	2.0
5023-123	2.22 x 2.22 x 3.0	parallel	100	2.5
5023-124	2.22 x 2.22 x 4.0	parallel	150	3.5
HT23-394	2.22 x 2.22 x 1.54	parallel	60	2.8
HT23-397	2.22 x 2.22 x 2.13	parallel	140	2.8
HT23-400	2.22 x 2.22 x 2.99	parallel	180	2.8
5034-348	3.38 x 3.38 x 2.50	parallel	130	3.5

Block Diagram



Technical Specifications

Amplifiers Dual, MOSFET H-bridge, 3 state, pulse width modulated (PWM) switching at 20 kHz. 0.4 - 3.5 amps/phase output current, dip switch selectable. 122 watts maximum output power. Automatic idle current reduction (defeatable) reduces motor current to 50% of setting after one second. Minimum motor inductance is 0.8 mH.

Power Supply Linear, toroidal transformer based for high reliability and low noise. 100-120 or 200-240 VAC input, switch selectable. 50/60 Hz. DC voltage at nominal line voltage: 35 VDC full load, 40 VDC no load.

Inputs Speed, Enable: optically isolated, differential 5 - 24 VDC logic. 2200 ohms internal resistor.

Step, Direction: optically isolated, differential 5 - 12 VDC logic, 680 ohms internal resistance. (24 VDC with external 1000 ohm resistance).

Wiper: 0 - 5 VDC analog signal. Maximum recommended pot/joystick impedance: 1K - 5K ohms. Joystick dead zone: +/- 80 mV. Potentiometer/analog signal dead zone: 40 mV.

In pulse & direction mode, motor steps on rising edge of STEP+ input (falling edge of STEP-). 0.25 µsec minimum pulse, 2 MHz maximum step rate. 1 µsec minimum set up time, 50 µsec minimum hold time for direction signal.

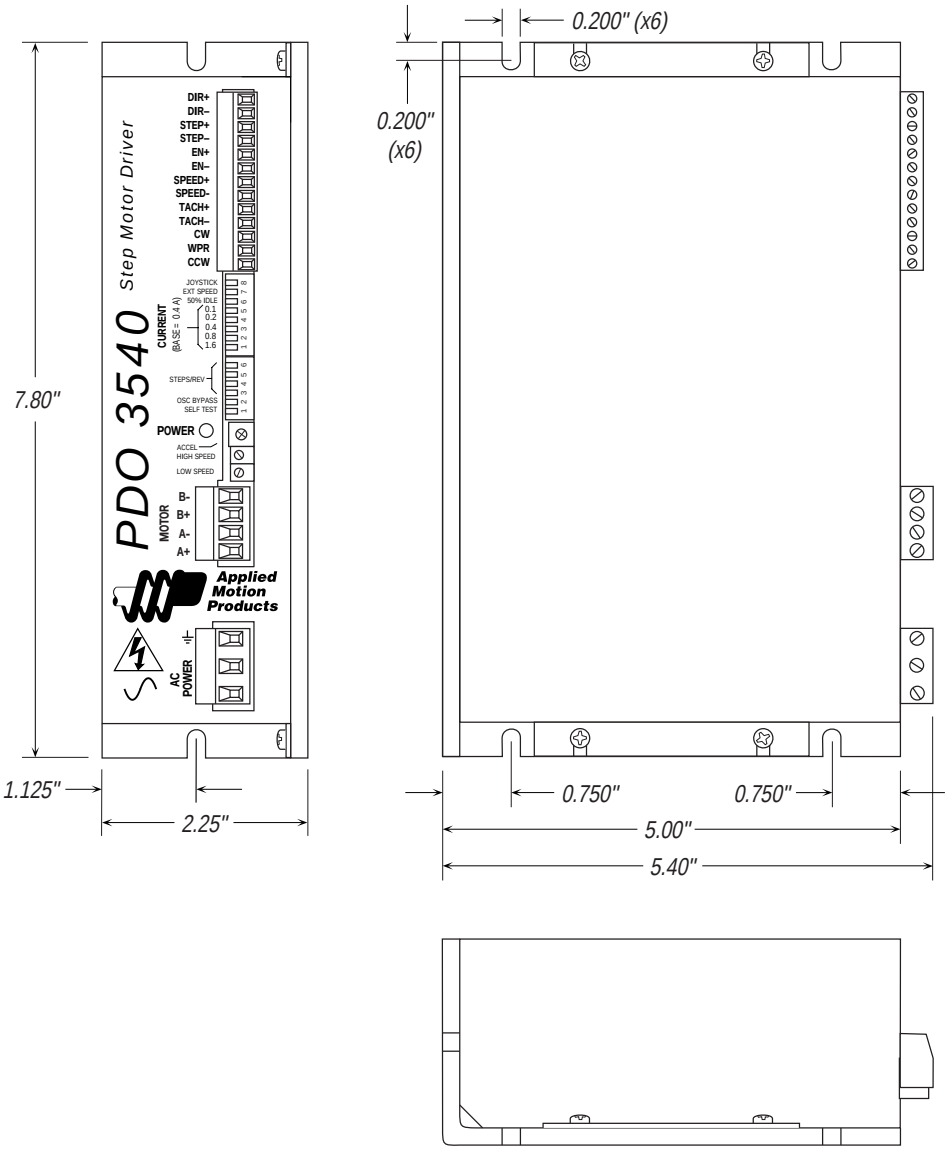
Tach Output Optically isolated, uncommitted (open collector, open emitter) photo transistor. 30 VDC, 20 mA max. 100 pulses per motor revolution, 50% duty cycle (square wave).

Microstepping 16 switch selectable resolutions. Steps per revolution with 1.8° motor: 200, 400, 1000, 2000, 5000, 10000, 12800, 18000, 20000, 21600, 25000, 25400, 25600, 36000, 50000, 50800. Waveform: pure sine. 12800 steps/rev in OSC/JOY mode.

Technical Specifications (cont'd.)

Recommended Joystick	Maurey Instrument Corp., Chicago, IL (773) 581-4555 JS31462S5T3 (2 axis) or SAJ2515-F-502 (1 axis)
Speed Ranges	LO speed range: 0 - 5 rev/sec HI speed range: 0 - 25 rev/sec Accel/decel range: 1 to 250 rev/sec/sec
Physical	Constructed with black anodized aluminum heat sink and heavy gauge steel housing. 2.25 x 5.4 x 7.8 inches overall. 4.0 lbs. Ambient temperature range: 0 - 50 °C. See page 26 for detailed drawing.
Connectors	European style, pluggable screw termminal blocks. Motor: 4 position. Wire size: AWG 12 - 26 Signal Input/Output: 13 position. Wire size: AWG 16 - 28 AC Input: 3 position. Wire size: AWG 12 - 20
CE Marks	Complies with EN55011a, EN50082-1(1997), EN50178(1997)
Fuses	Wickman TR-5 style. Order from Digikey (1-800-DIGIKEY) 110V: P/N WK4250BK-ND (T 1.25 A IEC) 220V: P/N WK4243BK-ND (T 0.63 A IEC)

Mechanical Outline



Notes

11/2/99

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(800) 525-1609 Tel (831) 761-6555 Fax (831) 761-6544
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