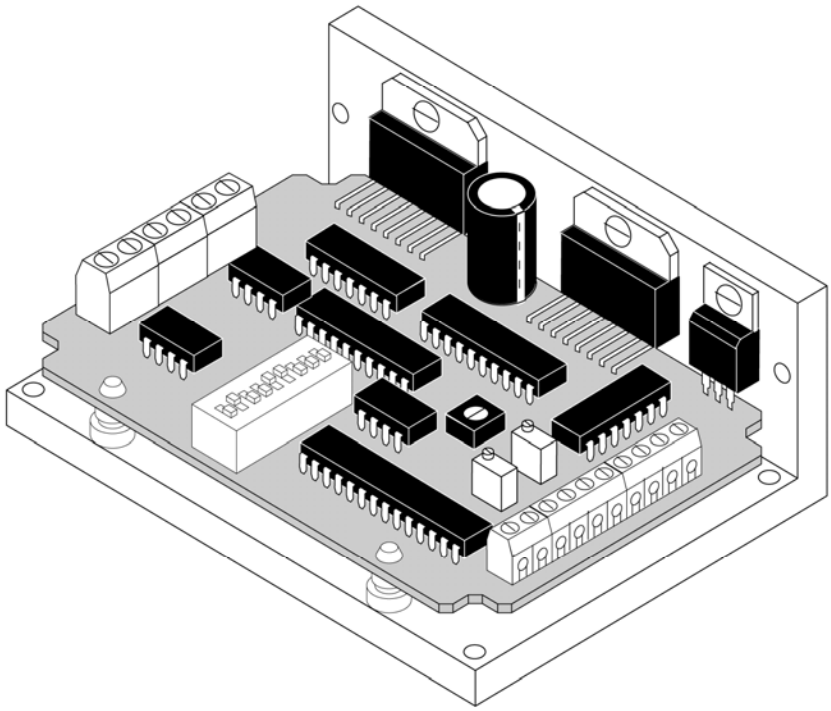
Open-Frame Stepper Drives

88-029134-01B

OFS350-OSC
Microstep Driver/Oscillator
Hardware Installation Guide

Effective: April 2010



ENGINEERING YOUR SUCCESS.

User Information

Warning — The OFS350 series step motor drivers are used to control electrical and mechanical components of motion control systems. You should test your motion system for safety under all potential conditions. Failure to do so can result in damage to equipment and/or serious injury to personnel.

The OFS350 series step motor drivers and the information in this guide are the proprietary property of Parker Hannifin Corporation or its licensers, and may not be copied, disclosed, or used for any purpose not expressly authorized by the owner thereof.

Since Parker Hannifin constantly strives to improve all of its products, we reserve the right to change this guide, and software and hardware mentioned therein, at any time without notice.

In no event will the provider of the equipment be liable for any incidental, consequential, or special damages of any kind or nature whatsoever, including but not limited to lost profits arising from or in any way connected with the use of the equipment or this guide.

Technical Assistance

Contact your local automation technology center (ATC) or distributor.

North America and Asia
Parker Hannifin
5500 Business Park Drive
Rohnert Park, CA 94928
Telephone: (800) 358-9070 or (707) 584-7558
Fax: (707) 584-3793
Email: emn_support@parker.com
Internet: http://www.parkermotion.com

Germany, Austria, Switzerland
Parker Hannifin
Postfach: 77607-1720
Robert-Bosch-Str. 22
D-77656 Offenburg
Telephone: +49 (0) 781 509-0
Fax: +49 (0) 781 509-176
Email: sales.hauser@parker.com
Internet: http://www.parker-emd.com

Europe (non-German speaking)
Parker Hannifin plc
Electromechanical Automation, Europe
Arena Business Centre
Holy Rood Close
Poole
Dorset, UK
BH17 7BA
Telephone: +44 (0) 1202 606300
Fax: +44 (0) 1202 606301
Email: support.digiplan@parker.com
Internet: http://www.parker-emd.com

Italy
Parker Hannifin
20092 Cinisello Balsamo
Milan, Italy via Gounod, 1
Telephone: +39 02 6601 2478
Fax: +39 02 6601 2808
Email: sales.sbc@parker.com
Internet: http://www.parker-emd.com

Parker Automation

Technical Support E-mail
emn_support@parker.com

Table of Contents

Product Type .....Step Motor Driver OFS350-OSC and OFS350-DRI

The above product complies with the requirements of directives:

- EMC Directive 89/336/EEC;
- Low Voltage Directive 73/23/EEC; and
- CE Marking Directive 93/68/EEC

provided the installation requirements described in this guide are met, and there are no special requirements of the installation and operating environment so that the application may be considered typical.

The above equipment conforms with the protection requirements of Council Directive 89/336/EEC as amended by Directive 92/31/EEC on the approximation of the laws of the Member States relating to Electromagnetic Compatibility when installed, operated and maintained as intended. Also: -The above equipment conforms with the requirements of Council Directive 73/23/EEC (Low Voltage Directive) as amended by Directive 93/68/EEC (CE Marking Directive), when installed, operated, and maintained as intended.

In accordance with IEC 61800-3:1997 (Adjustable speed electrical power drive systems) this product is of the restricted sales distribution class which meets the needs of an industrial environment when installed as directed. However, further measures may need to be taken for use of the product in a domestic environment.

The installation requirements are detailed in the Information supplied with the equipment. The equipment is sold only to competent system builders.

Compliance is demonstrated by the application of the following standards:

- BS EN 61800-3 (1997) including Amendment A11 Adjustable speed electrical Power drive systems Part 3. EMC product standard including specific test methods.
- BS EN 50081-2 (1994) Electromagnetic compatibility—Generic emission standard Part 2. Industrial Environment.
- BS EN 61000-6-2 (1999) Electromagnetic compatibility Part 6-2: Generic Standards – Immunity for industrial environments.
- BS EN 61010-1 (1993) including Amendment A2. Safety requirements for electrical equipment for measurement, control, and laboratory use. Part 1 General Requirements.

Warning — Risk of damage and/or personal injury

The OFS350-DRI step motor driver described in this guide contains no user-serviceable parts. Attempting to open the case of any unit, or to replace any internal component, may result in damage to the unit and/or personal injury. This may also void the warranty.

Important Safety Information

It is important that motion control equipment is installed and operated in such a way that all applicable safety requirements are met. It is your responsibility as an installer to ensure that you identify the relevant safety standards and comply with them; failure to do so may result in damage to equipment and personal injury. In particular, you should study the contents of this user guide carefully before installing or operating the equipment.

The installation, set up, test, and maintenance procedures given in this user guide should only be carried out by competent personnel trained in the installation of electronic equipment. Such personnel should be aware of the potential electrical and mechanical hazards associated with mains-powered motion control equipment—please see the safety warnings below. The individual or group having overall responsibility for this equipment must ensure that operators are adequately trained.

Under no circumstances will the suppliers of the equipment be liable for any incidental, consequential or special damages of any kind whatsoever, including but not limited to lost profits arising from or in any way connected with the use of the equipment or this guide.

Warning — High-performance motion control equipment is capable of producing rapid movement and very high forces. Unexpected motion may occur especially during the development of controller programs. **KEEP WELL CLEAR** of any machinery driven by stepper or servo motors. Never touch any part of the equipment while it is in operation.

This product is sold as a motion control component to be installed in a complete system using good engineering practice. Care must be taken to ensure that the product is installed and used in a safe manner according to local safety laws and regulations. In particular, the product must be positioned such that no part is accessible while power may be applied.

This and other information from Parker Hannifin Corporation, its subsidiaries, and authorized distributors provides product or system options for further investigation by users having technical expertise. Before you select or use any product or system, it is important that you analyze all aspects of your application and review the information concerning the product in the current product catalog. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, safety, and warning requirements of the application are met.

If the equipment is used in any manner that does not conform to the instructions given in this user guide, then the protection provided by the equipment may be impaired.

Change Summary

Revision B Changes

This document, 88-029134-01B, supercedes 88-029134-01A. Document changes are as follows:

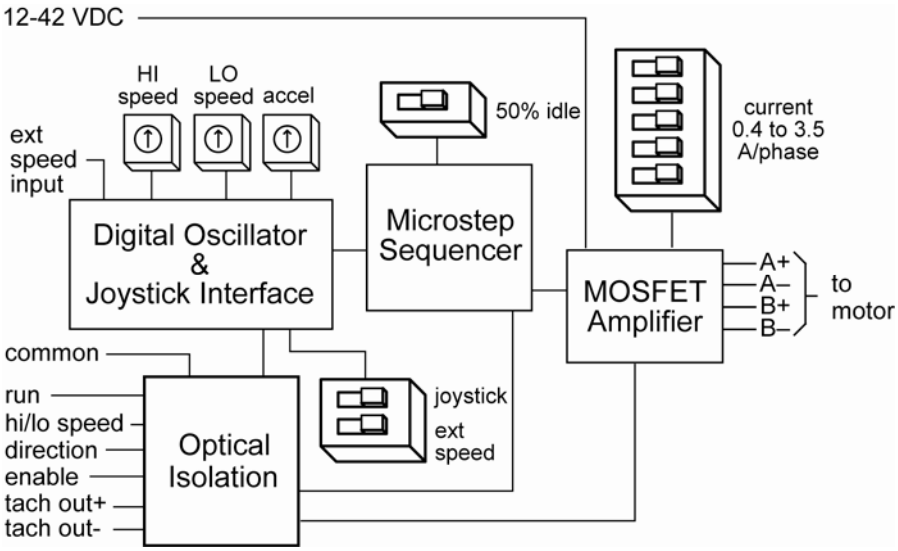
Topic	Description
Enable input	Added Note regarding cautions when using ENABLE input to disable the drive in sourcing circuits (Connecting Digital Inputs and Limit Switches section).

Overview

The OFS350-OSC (3.5 Amp Open Frame Stepper with oscillator) is a microstepping driver which contains an on-board oscillator controlled by three on-board trimmer pots. It can be operated standalone without an external step and direction controller. The OFS350-OSC has the following features:

- Digital oscillator provides smooth accel/decel ramps and precise speed control.
- Powerful microstepping amplifier provides high torque and smooth, quiet motion.
- Easy to configure with on-board switches and trimmer pots for all settings.
- Can operate from internal trimmer pots, external potentiometers, 0 – 5 V analog signal, analog joystick, pushbuttons, or PLC.
- 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.
- Drives size 11 through 34 frame stepper motors.
- Uses pulse width modulated, MOSFET three-state switching amplifiers.
- Accepts a wide range of DC power supply voltages: 12 – 42 volts DC.
- Phase current adjusts from 0.4 to 3.5 amps peak, selectable with 32 switch settings.
- Inputs are optically isolated.
- Fixed microstepping resolution of 12,800 steps per revolution (1/64th)
- Automatic 50% idle current reduction lowers motor and drive heating, and is switch selectable.
- Screw terminal connectors make wiring easy.
- Compact size: 1.5 x 3 x 4 inches.

The OFS350-OSC is represented in the following block diagram:



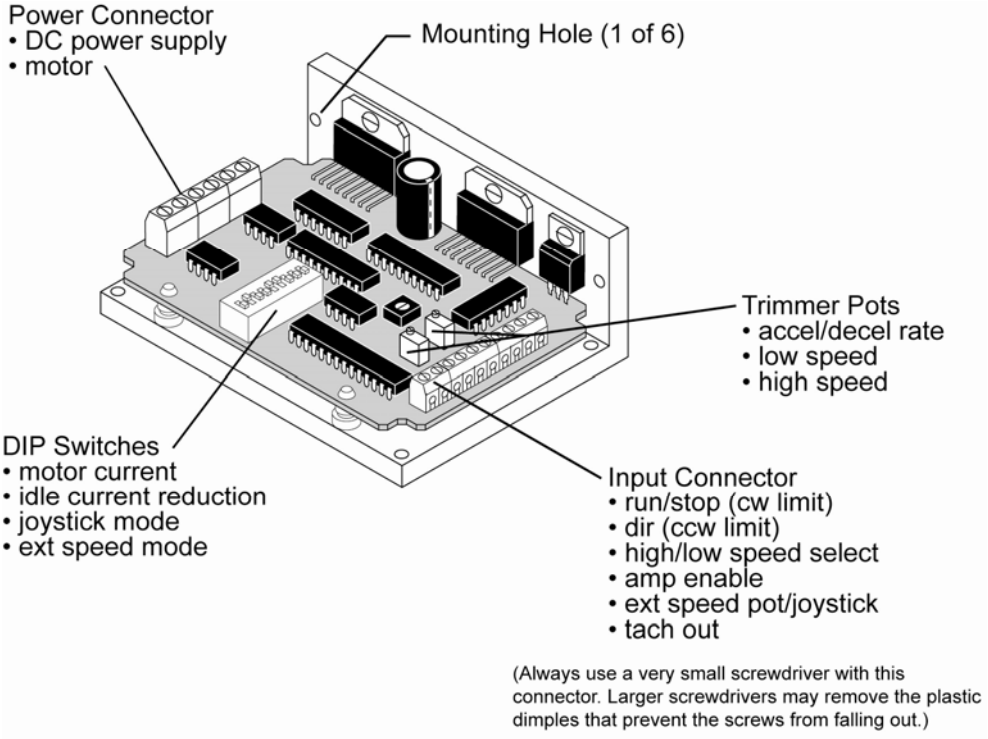
Getting Started

The OFS350-OSC requires the following for installation:

- A 12 – 42 volt DC power supply for the motor. (See the section *Choosing a Power Supply* on page 26 for recommendations on determining the appropriate power supply for your application.) Parker recommends the STP-32PRK4 power supply, available from Parker.
- A compatible step motor, such as Parker's LV series.
- Appropriate wire or cabling. (See the section *Cabling Requirements* on page 11.)
- A small flat-blade screwdriver for tightening the connectors
- **For Joystick Mode:** A three-terminal analog joystick with 1K – 5K impedance. Use normally open switches and a 5 – 24 volt power supply if you want to use limit switches. (See the section *Modes of Operation* for more information on Joystick Mode. See the section *Drive Specifications* for recommendations on appropriate joysticks.)

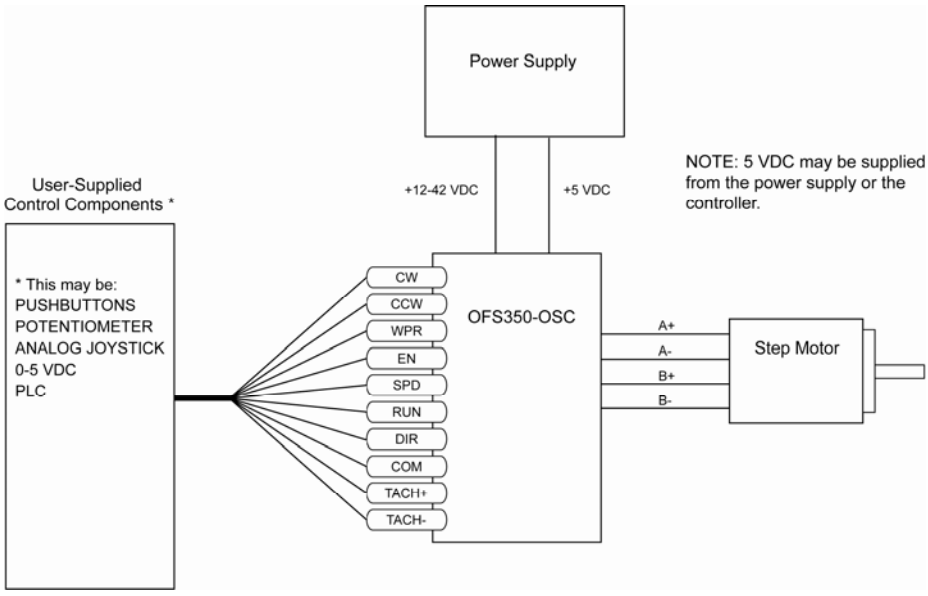
- **For Oscillator Mode:** Run/stop and direction signals (or switches).
  - Because the input circuits are optically isolated, you may also need a 5 – 24 volt DC power supply. (For more information, see the section *Modes of Operation*.)
  - If you want to control the motor speed externally, you need a 1K – 5K ohm potentiometer or a 0 – 5 volt analog signal.

The following drawing shows the connectors and adjustment points for the OFS350-OSC:



System Setup

The following block diagram shows the required setup for the OFS350-OSC.



See the section Modes of Operation on page 12 for specific wiring diagrams.

Cabling Requirements

The OFS series of stepper drives require the user to supply cabling for power supply, signal, and motor connections:

- Cabling from the power supply to the OFS drive should use a minimum wire gauge of 20 AWG.
- Motor extension cabling to the OFS drive should use a minimum wire gauge of 20 AWG.
- Signal wiring from the controller to the OFS drive does not carry appreciable amounts of current, and a wire of greater than 28 AWG is recommended. Shielded cabling is recommended to reduce the effects of electromagnetic interference (EMI). The cable shield should be connected to earth ground.

NOTE: The smaller the AWG number, the larger the wire and the more current it can carry. For example, 28 AWG is smaller wire than 24 AWG, which is smaller than 20 AWG.

Modes of Operation

The OFS350-OSC can be configured to run in Joystick mode or Oscillator mode:

- Joystick mode – Speed and direction are determined by an external analog voltage. RUN and DIR inputs can be used for limit switches. Speed (SPD) input selects speed range. LO SPEED and HI SPEED trimmer pots adjust the two speed ranges.
- Oscillator mode – Speed can be controlled by the on-board trimmer pots and/or by an external analog voltage. RUN input starts and stops the motor. DIR input controls direction of rotation. SPD input selects the speed range.

CONVENTION: An input is ON when current is flowing through the input. An input 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).

Joystick Mode

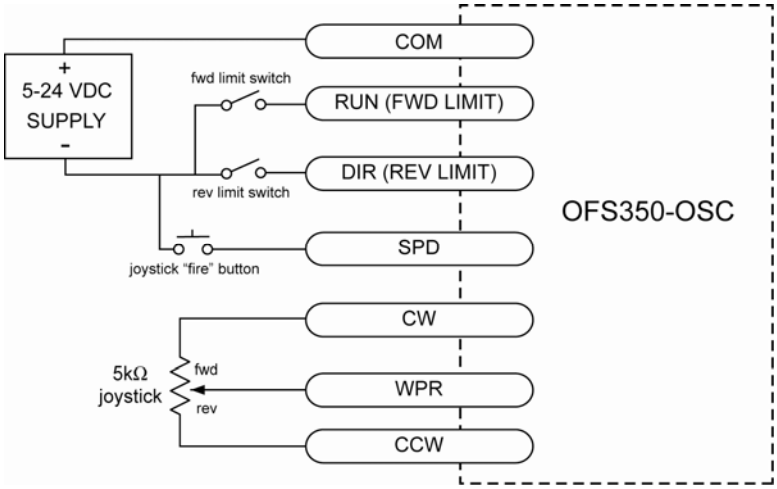
In this mode, speed and direction are determined by the voltage applied to the wiper (WPR) terminal. A WPR voltage of 2.5 volts is "stopped" (no speed). Increasing the WPR voltage toward 5 volts results in forward motion (speed increases with voltage.) Decreasing the WPR voltage from 2.5 toward 0 volts results in reverse motion, with reverse speed increasing as voltage decreases.

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

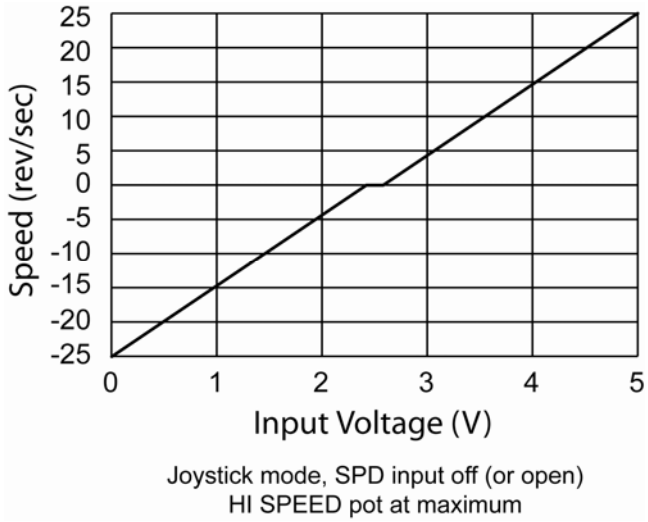
In Joystick mode, limit switches can be connected to the OFS350-OSC to prevent motion outside of defined limits. The forward limit should be connected to the RUN input and the reverse limit should be connected to the DIR input. When the forward limit is ON, the motor will not move forward when the joystick 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 RUN and DIR inputs unconnected.

Joystick mode is set by moving switch #1 toward the word "Joystick." Switch #2 (EXT SPEED) has no effect in Joystick mode.

Following is a diagram of typical wiring for Joystick mode:



The graph below shows the commanded speed vs. input voltage curve in Joystick mode.



Joystick mode, SPD input off (or open)
HI SPEED pot at maximum

NOTE: Commanding a speed from the oscillator does not guarantee that the motor and load combination will be able to attain that speed. Applications should be sized accordingly with respect to motor size, load inertia, velocity, and acceleration rates, as well as power supply voltages.

Oscillator Mode

In this mode, the OFS350-OSC uses the direction set by the DIR input. Off, or open, gives counter-clockwise motion if the motor is wired according to the instructions in the section Connecting the Motor.

Motor speed and the function of the RUN input can be determined from the following table.

SPD Input	Switch #2	Set Speed w/ this Pot	When RUN Goes ON	When RUN 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

Oscillator mode is selected by moving switch #1 away from the word Joystick. There are two speed ranges in Oscillator mode. One is the low speed range which is activated when the SPD input is on. The low speed can be set from 0 to 5 rev/sec (0 – 300 rpm) by adjusting the LO SPEED trimmer pot. Turning the trimmer pot clockwise increases the speed.

The high speed setting is used when the SPD input is off, or open. If switch #2 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 trimmer pot. You can connect an external 1K – 5KΩ potentiometer 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 pin.) The high speed range is 0 – 25 rev/sec (0 – 1500 rpm.) You can reduce the range by turning down the HI SPEED trimmer pot. For example, if you want the motor to go 750 rpm when the external potentiometer is on maximum, turn the HI SPEED trimmer pot down about half way.

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

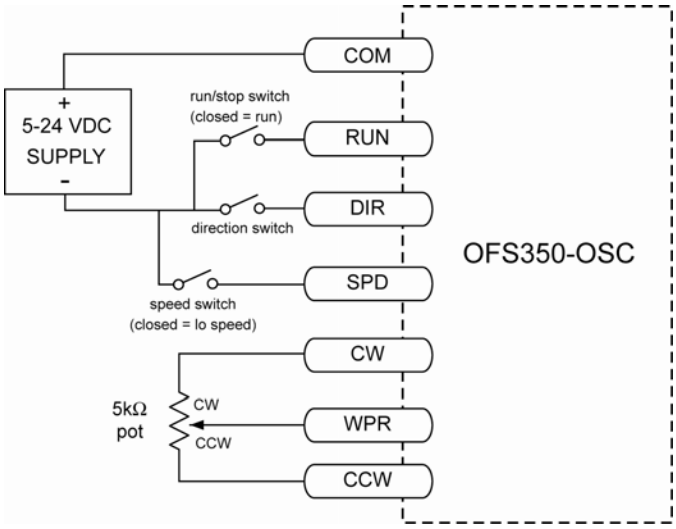
More on Modes of Operation

In both operating modes, the accel/decel rate is set by the ACCEL trimmer pot. The range is 1 – 250 rev/sec/sec. Turning the trimmer 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 OFS350-OSC. For example, if you switch the SPD 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 trimmer pot setting.

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

The following diagram shows typical wiring for Oscillator mode using an external speed control potentiometer.



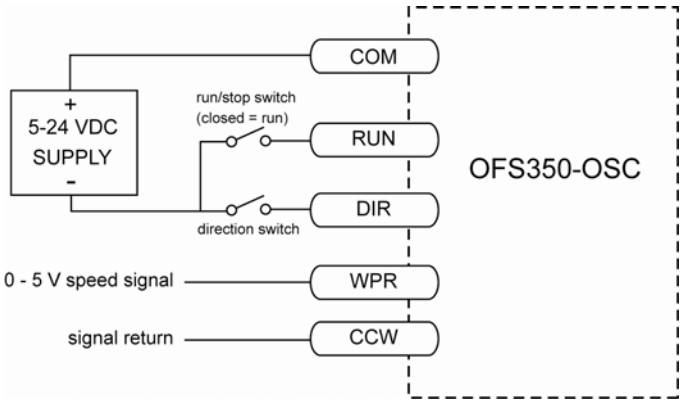
Speed Control from a 0 to 5 Volt Analog Signal

In Oscillator mode, the OFS350-OSC can rotate the motor a speed proportional to an analog voltage. The voltage must be applied to the WPR terminal. The direction of rotation will be 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 RUN signal off.

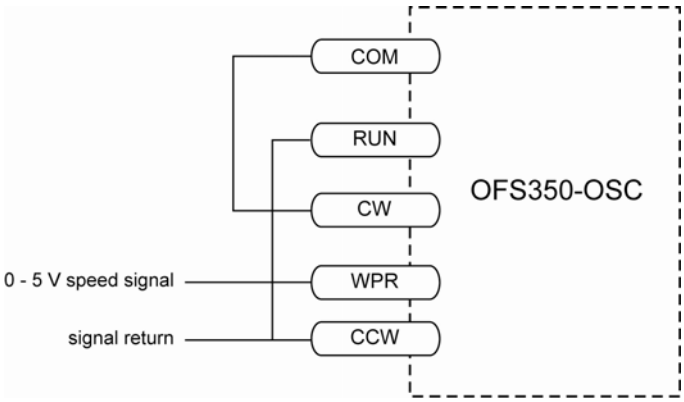
To use the OFS350-OSC in this mode, set switch #1 away from the Joystick label, and set switch #2 toward the EXT SPEED label. See the following drawing.

The HI SPEED trimmer pot sets the maximum speed (the motor speed when the analog signal is at 5 volts DC). The range is 0 – 25 rev/sec.

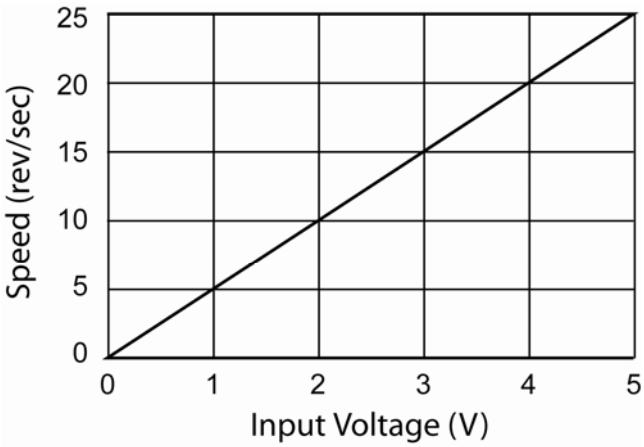
The following wiring diagram is for speed control by a 0 – 5 volt analog signal. Direction control is by a digital signal or switch.



The following is a wiring diagram also for speed control by a 0 – 5 volt analog signal. This configuration includes unidirectional rotation.



The graph below shows the commanded speed vs. input voltage curve in Oscillation mode.



Oscillator mode, EX SPEED mode,
HI SPEED pot at maximum

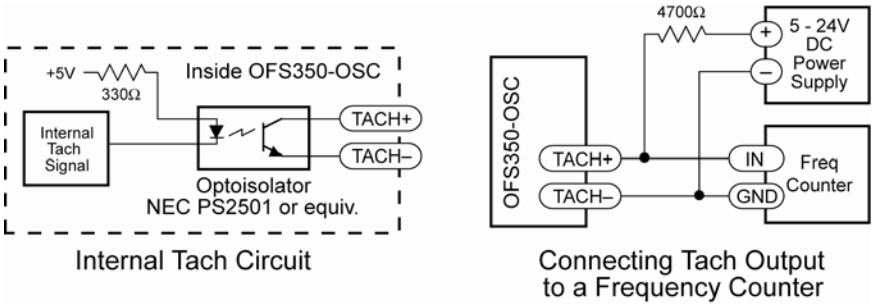
NOTE: Commanding a speed from the oscillator does not guarantee that the motor and load combination will be able to attain that speed. Applications should be sized accordingly with respect to motor size, load inertia, velocity, and acceleration rates, as well as power supply voltages.

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/sec with two decimal places.

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

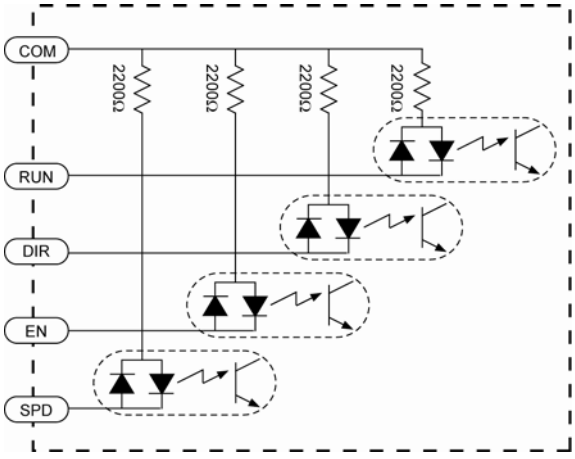
The schematic diagram of the Tach Out optical isolation circuit is show here.



Connecting Digital Inputs and Limit Switches

The OFS350-OSC 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.

Following is a schematic diagram of the input circuit.



You must supply 5 – 24 volts DC to supply current to the LEDs on the input side of the optoisolators. Your controlling logic must be capable of sinking or sourcing at least 3 mA at 5 volts and 10 mA at 24 volts to control each drive input. Most CMOS and open collector TTL devices are directly compatible with this drive, as are typical PLC and proximity sensor outputs.

Sinking Circuits (NPN)

If your output devices prefer to sink current, then connect the COM terminal to your positive power supply. If you are using a TTL circuit to drive the OFS350-OSC, connect the COM terminal to the 5 volt bus. No ground connection is needed. If you are using a PLC or proximity sensor, you will need a power supply.

Sourcing Circuits (PNP)

If your output devices can only source current (some PLC outputs are this way), connect the COM terminal to the ground of the DC power supply that powers your output circuits.

CONVENTION: An input is ON when current is flowing through the input. An input 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).

The ENABLE input allows the user to turn off the current to the motor by setting this signal on. The logic circuitry continues to operate, so the drive "remembers" the step position 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.

NOTE: If you have no need to disable the amplifiers, you do not need to connect anything to the ENABLE input.

NOTE: When using the ENABLE input to disable the drive, care should be taken on drive shut down to ensure that the voltage powering the ENABLE input is removed after the main drive power. If not, the drive may re-enable and the motor may turn.

Connecting the Motor

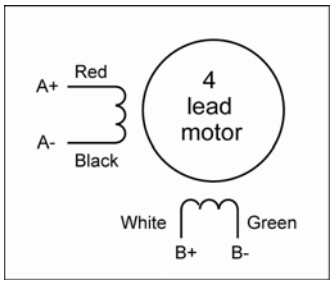
You must now decide how to connect the motor to the OFS350-OSC driver.

Warning — When connecting the motor to the driver, be sure that the motor power supply is off. Secure any unused motor leads so that they cannot short out to anything. Never disconnect the motor while the drive is powered up. Never connect motor leads to ground or to a power supply!

Following are several ways to connect your motor to the OFS350-OSC.

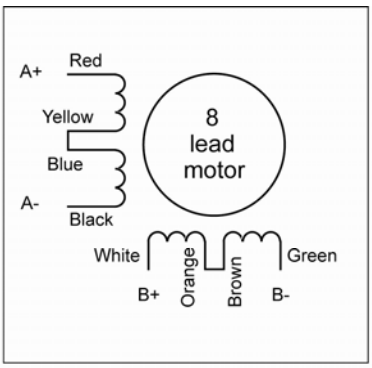
Four-Lead Motors

Four-lead motors can be connected in only one way. The color codes shown are for the Parker LV11 series motors. Other four-lead motor color codes may vary.



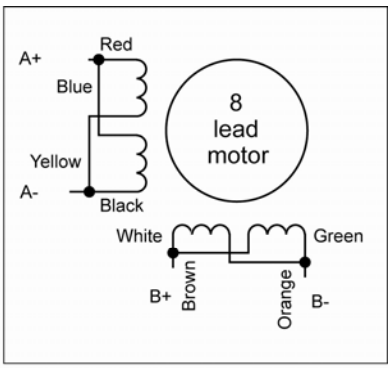
Eight-Lead Motors

Eight-lead motors can be connected in two ways, series or parallel. Series operation gives you more torque at low speeds and less torque at high speeds. The wiring diagrams for eight-lead motors are shown below. The color codes are for Parker's LV series motors, size 17 – 34. Other motor color codes may vary.



8 Leads - Series Connected

Using solder, link Yellow and Blue leads, and link Orange and Brown leads; electrically isolate with shrink tube.



8 Leads - Parallel Connected

Microstepping

Most step motor drives offer a choice between full step and half step resolutions. In most full step drives, 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 OFS350-OSC precisely control the amount of current in each phase at each step position as a means of electronically subdividing the steps even further.

The OFS350-OSC divides each full step into 64 microsteps, providing 12,800 steps per rev for precise positioning and smooth motion.

Setting Phase Current

Before turning on the power supply the first time, you need to set the DIP switches for the proper motor phase current. (You can determine the DIP switch settings either by formula or by using the Current Setting Table in this manual.) You may need to use a very small screwdriver for this task. See the following table for a list of Parker-recommended motors to find the current value of your motor.

Recommended Motors Table

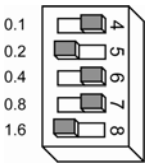
The following table lists Parker Hannifin's motor recommendations for use with the OFS350-OSC step motor drive. See the last column for current values.

Motor P/N	Winding	Max. Running Torque (oz.-in.)	Current (Amps Peak)
LV111	4-Lead	4	1.3
LV113	4-Lead	7	1.3
LV171	Series Parallel	39 40	1.1 2.2
LV173	Series Parallel	60 60	1.2 2.5
LV231	Series Parallel	55 29	2.8 3.5
LV233	Series Parallel	164 71	3.5 3.5
LV341	Series Parallel	410 255	3.5 3.5

Setting Motor Phase Current by Formula

Locate the DIP switches on the OFS350-OSC. Five of the switches are labeled with current values. There is always a base of 0.4 A, and you must add to that as necessary by setting the current switches. (Each switch controls the amount of current, in amperes (A), that its label indicates.)

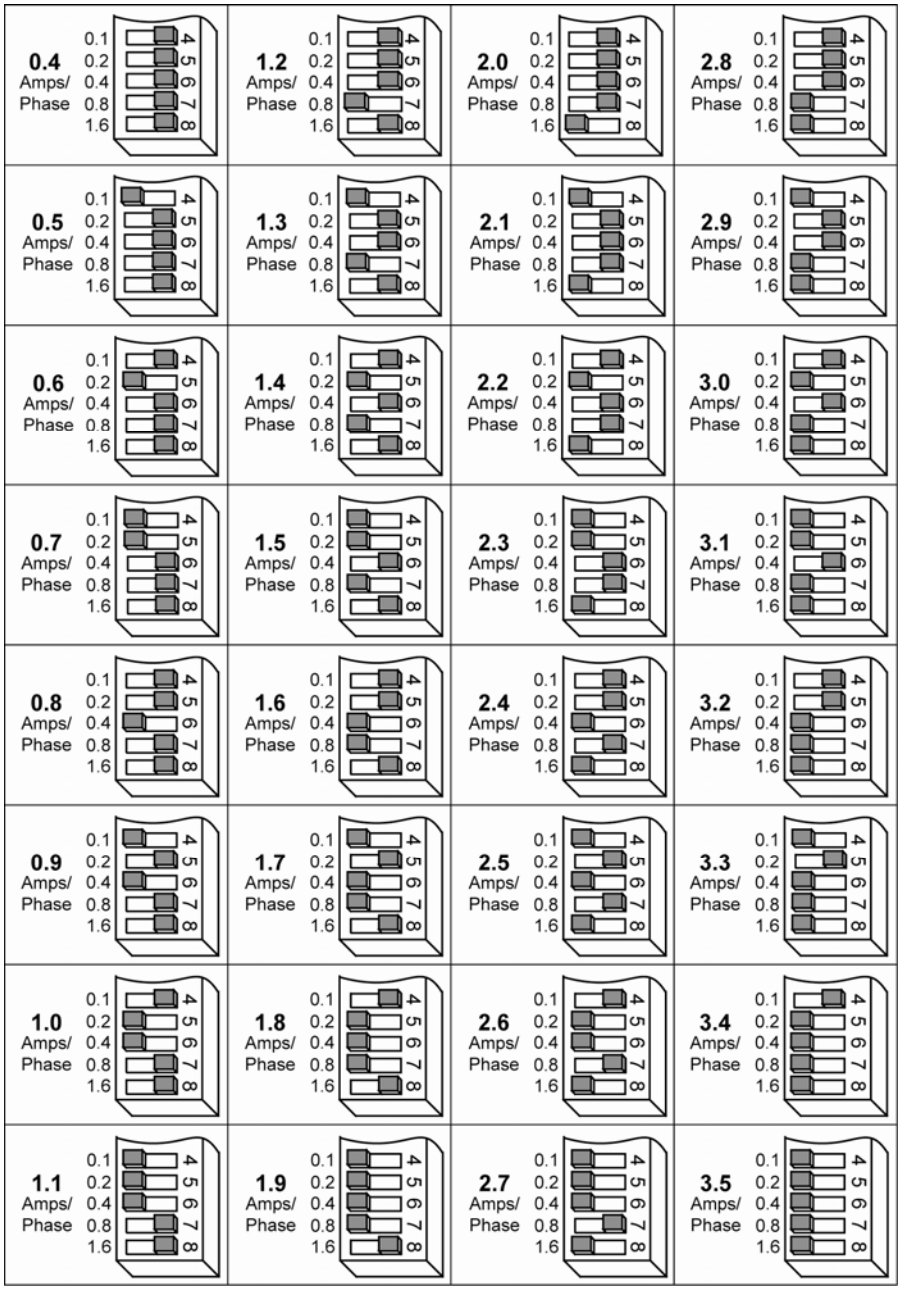
Example: To set the driver for 2.2 amps per phase, set the 1.6 switch and the 0.2 switch by sliding them toward the labels as shown here. These two values add to the base of 0.4 to make the required 2.2 amps.



(2.2 = 0.4 + 1.6 + 0.2)

Setting Motor Phase Current by Pictorial

Alternatively, you can set the motor phase current on the DIP switches according to the illustrations below. Locate the desired current/phase value and set the switches as shown in the corresponding pictorial.



Idle Current Reduction

The OFS350-OSC 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, which is useful when a high holding torque is required.

To minimize motor and drive heating, we highly recommend that you enable the idle current reduction feature unless your application strictly forbids it.

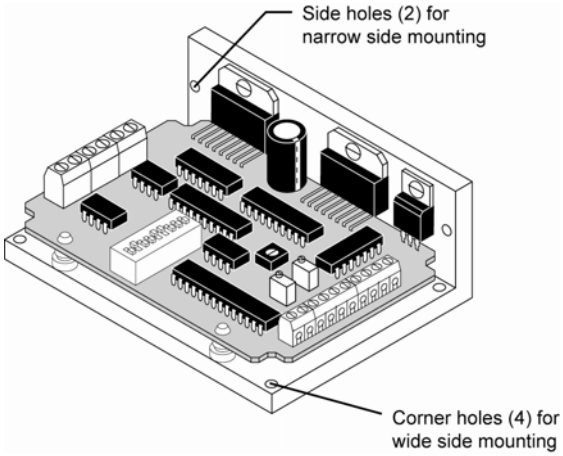
Idle current reduction is enabled by sliding switch #3 toward the 50% IDLE label. Sliding the switch away from the 50% IDLE label disables the reduction feature. Both selections are shown here.

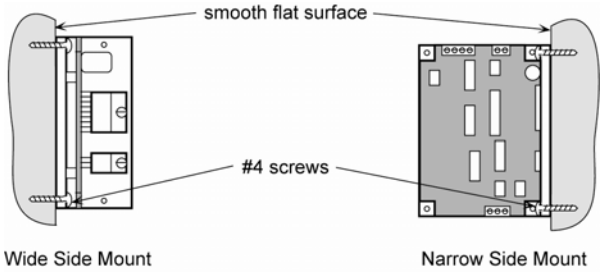
Mounting the Drive

The amplifiers on the OFS350-OSC generate heat. Operating the unit continuously at maximum power requires use of a heat sinking surface with a thermal constant of no more than 4°C/watt. Often, the metal enclosure of your system will make an effective heat sink. (If you are running the drive at 1 amp or below, you might not need a heatsink.)

Warning — Never use your drive where there is no air flow or where other devices cause the surrounding air to be more than 70°C. Don't put the drive where it can get wet or where metal particles can get on it.

The OFS350-OSC drive can be mounted on the wide or the narrow side of the chassis. If you mount the drive on the wide side, use #4 screws through the four corner holes. For narrow side mounting applications, use #4 screws in the two side holes.





Connecting the Power Supply

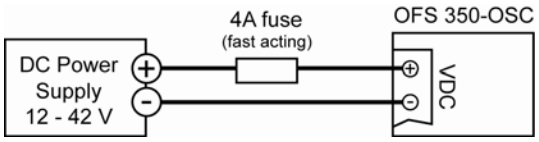
Parker recommends the STP-32PRK4 power supply, available from Parker.

If your power supply does not have a fuse on the output or some kind of short circuit current-limiting feature, you must put a 4 amp fast-acting fuse between the drive and power supply. Install the fuse on the positive (+) power supply lead. Use no smaller than 20 gauge wire.

NOTE: The STP-32PRK4 power supply is internally fused. No additional fuses are required when connecting to the OFS350 drive.

Connect the DC power supply positive (+) terminal to the driver terminal labeled **+VDC**. Connect the DC power supply negative (-) terminal to the driver terminal labeled **VDC–**.

Warning — Be careful not to reverse the wires. Reversing connections will destroy the driver and void the warranty.



Choosing a Power Supply

This section is included to help you select a power supply that is suitable for your application. (Parker recommends the STP-32PRK4 power supply, available from Parker.)

Voltage

Chopper drives work by switching the voltage to the motor terminals ON and OFF while monitoring current to achieve a precise level of phase current. To do this efficiently and silently, it is important to have a power supply with a voltage rating at least five times that of the motor. Depending on how fast you want to run the motor, you may need even more voltage. More voltage is better, with the upper limit being the maximum voltage rating of the drive itself (42 volts, including ripple).

If you choose an unregulated power supply, do not exceed 35 VDC (as unregulated supplies are rated at full load current). At lesser loads, such as when the motor is not moving, the actual voltage can be up to 1.4 times the voltage listed on the power supply label.

NOTE: Parker rates the STP-32PRK4 power supply at no load conditions (contrary to most other unregulated supply ratings) for consistency with older Parker power supply ratings. The STP-32PRK4 outputs 40VDC at no load, and 32VDC fully loaded.

Current

The maximum supply current needed is the sum of the two phase currents. However, you will generally need a lot less than that, depending on the motor type, voltage, speed, and load conditions. That's because the OFS350-OSC uses switching amplifiers, converting a high voltage and low current into lower voltage and higher current. The more the power supply voltage exceeds the motor voltage, the less current you will need from the power supply.

Recommended Selection Procedure:

1. If you plan to use only a few drives, use a power supply with at least twice the rated phase current of the motor.
2. If you are designing for mass production and must minimize cost, get one power supply with more than twice the rated current of the motor. Install the motor in the application and monitor the current coming out of the power supply and into the drive at various motor loads. This will tell you how much current you really need so you can design in a lower cost power supply.

If you plan to use a regulated power supply you may encounter a problem with current foldback. When you first power up your drive, the full current of both motor phases will be drawn for a few milliseconds while the stator field is being established. After that, the amplifiers start chopping and much less current is drawn from the power supply. If your power supply thinks this initial surge is a short circuit it may "foldback" to a lower voltage. With many foldback schemes the voltage returns to normal only after the first motor step and is fine thereafter. In that sense, unregulated power supplies are better. They are also less expensive.

Drive Specifications

Following are technical specifications for the OFS350-OSC.

Amplifiers

Dual, bipolar MOSFET H-bridge, pulse-width modulated three-state switching at 20 kHz.

Input voltage is 12 – 42 VDC.

Output current is 0.4 – 3.5 amps peak / phase, switch selectable in 0.1 A increments.

Maximum output power is 122 Watts.

Automatic idle current reduction (switch selectable) reduces current to 50% of setting after one second.

Minimum motor inductance is 1 mH.

Inputs

Run/stop (cw limit), direction (ccw limit), hi/lo speed and enable inputs are optically isolated, 5 - 24V logic.

Input current of 3 – 15 mA. Input impedance is 2200 ohms. Can be configured for sinking or sourcing signals.

Recommended external potentiometer/joystick resistance is 1K – 5K. Joystick dead zone is ± 80 mV.

Potentiometer/analog signal dead zone is 40 mV.

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

Tach Output

Phototransistor, open collector, open emitter.

Maximum output voltage is 24 volts.

Maximum output current is 20 mA.

100 pulses per motor revolution, 50% duty cycle (square wave).

Physical

Mounted on a ¼-inch thick black anodized aluminum heat transfer chassis.

Power on LED is red.

Ambient temperature range is 0 – 70˚C.

Connectors

European style screw terminal blocks.

Power supply and motor connector has 6 terminals with wire sizes 12 – 28 AWG.

Signal input connector has 10 terminals with wire sizes 16 – 28 AWG.

Microstepping Resolution

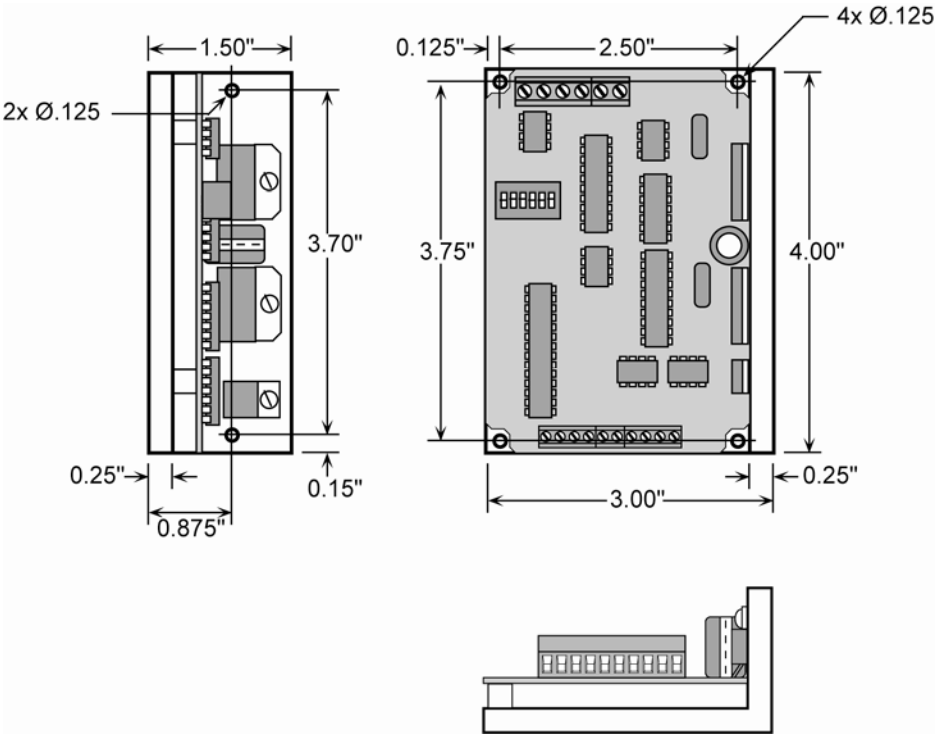
Pure sine waveform of 1/64 step (12,800 steps per rev.) with 1.8-degree motor.

CE Certification

Complies with EN55011A and EN50082-1 (1992).

Mechanical

Dimensions are 1.5 x 3.0 x 4.0 inches overall.



Power Supply Specifications

Following are technical specifications for the STP-32PRK4 power supply.

Electrical Specifications

Feature	Specification
Input Power	120/240 VAC, switch selectable
Input Power Tolerance	±10%
Inrush Current	12A at 120V, 15A at 240V
Output Power No Load Full Load (4A) 5V Logic	 40 VDC 35 VDC 5 VDC ±5% at 500mA
Storage Temperature	-55ºC to +85ºC
Operating Temperature	0 to 50ºC
Humidity	95%, non-condensing relative humidity
Connections	Screw Terminals
Cooling	Natural convection; allow adequate airflow
Mounting	Use four #8 or #10 screws for mounting
Agency Approvals	UL, CSA, CE

Mechanical Dimensions

Power supply dimensions are 7.0 x 4.0 x 3.64 overall.