Sure-step™ Stepping Systems

User Manual

Manual #: STP-SYS-M-WO
2nd Ed, Rev C

STP-DRV-xxxx
Microstepping Drives

STP-PWR-xxxxx
Stepping System
Power Supplies

STP-EXT(H)-020
Step Motor Extension Cable

STP-MTR(H)-xxxx
Connectorized Bipolar Stepping Motors

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WARNING

WARNING: Read this manual thoroughly before using *Sure*Step™ Stepping System drives, motors, and power supplies.

WARNING: AC input power must be disconnected before performing any maintenance. Do not connect or disconnect wires or connectors while power is applied to the circuit. Maintenance must be performed only by a qualified technician.

WARNING: There are highly sensitive MOS components on the printed circuit boards, and these components are highly sensitive to static electricity. To avoid damage to these components, do not touch the components or the circuit boards with metal objects or with your bare hands.

WARNING: Ground the *Sure*Step™ power supply using the ground terminal. The grounding method must comply with the laws of the country where the equipment is to be installed. Refer to "Power Supply Terminal & Component Layout" in the Power Supply chapter.

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SURESTEP™ Stepping Systems

USER MANUAL

Please include the Manual Number and the Manual Issue, both shown below, when communicating with Technical Support regarding this publication.

Manual Number: **STP-SYS-M-WO**

Issue: **Second Edition, Revision C**

Issue Date: **02/2011**

Publication History		
Issue	**Date**	**Description of Changes**
First Edition	7/28/04	Original
1st Ed, Rev A	8/26/04	AC power fuse changed from 2A slow blow to 3A fast acting, plus other minor changes and corrections.
1st Ed, Rev B	3/28/07	Added wiring diagrams for both sink and source for indexers and PLCs with 12-24 VDC outputs. Also corrected value for r^4 from 64 to 1296 in formula under Step 4 on page 15 of Appendix A.
Second Edition	11/2008	Changed name of user manual (was STP-SYS-M). Added new components: 3 new power supplies: STP-PWR-4805, -4810, -7005 2 new drives: STP-DRV-4850, -80100 5 new motors: STP-MTR-17040, STP-MTRH-23079, -34066, -34097, -34127 2 new cables: STP-EXTH-020, STP-232RJ11-CBL Other minor changes throughout.
2nd Ed, Rev A	06/2009	Advanced drives RS-232 communication port pin-out; pages 3-4 & B-7
2nd Ed, Rev B	09/2009	Advanced drives Digital Output max current rating; page 3-10
2nd Ed, Rev C	02/2011	Ch 2,3: drive storage temperature specs Ch 4: motor storage temperature specs; motor Torque vs Speed curves Ch 5: power supply Watt loss specs

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CHAPTER 1
GETTING STARTED

In This Chapter...

Manual Overview

Overview of this Publication

Thank you for selecting the *Sure*Step™ Stepping System components. This user manual describes the selection, installation, configuration, and methods of operation of the *Sure*Step™ Stepping System. We hope our dedication to performance, quality and economy will make your motion control project successful.

Who Should Read this Manual

This manual contains important information for those who will install, maintain, and/or operate any of the *Sure*Step™ Stepping System devices.

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When you see the "notepad" icon in the left-hand margin, the paragraph to its immediate right will be a special note which presents information that may make your work quicker or more efficient.

When you see the "exclamation mark" icon in the left-hand margin, the paragraph to its immediate right will be a WARNING. This information could prevent injury, loss of property, or even death (in extreme cases).

*Sure*Step™ System Introduction

*Sure*Step open-loop stepping systems provide simple and accurate control of position and speed where lower power and cost are considerations. The *Sure*Step family of stepping components includes power supplies, drives, motors, and cables. The ***Direct***LOGIC family of PLCs or other indexers and motion controllers can be used to provide the signals that are "translated" by the microstepping drives into precise movement of the stepping motor shaft.

*Sure*Step™ System Recommended Component Compatibility

***Sure*Step™ System Recommended Component Compatibility**				
Drives (1)	**Power Supplies (1)**			**Motors & Extension Cables (2,3)**
STP-DRV-4035	-	-	STP-PWR-3204	STP-MTR-xxxxx & STP-EXT-020 STP-MTR**H**-xxxxx & STP-EXT**H**-020
STP-DRV-4850	-	STP-PWR-4805 STP-PWR-4810		
STP-DRV-80100	STP-PWR-7005			
1) Caution: Do not use a power supply that exceeds the drive input voltage range. Using a lower voltage power supply with a higher voltage drive is acceptable, but will not provide full system performance.				
2) MTR motors have connectors compatible with the EXT extension cables.				
3) MTRH motors have connectors compatible with the EXTH extension cables.				

*Sure*Step™ Part Number Explanation

STP- M T R H - 23079

Component Capacity
For DRV: 2-digit max nominal voltage followed by max current with 1 implied decimal place
4035: 40V, 3.5A
4850: 48V, 5.0A
80100: 80V, 10.0A
For EXT(H): cable length in feet
For MTR(H): 2-digit NEMA frame size followed by approximate length in mm
For PWR: 2-digit output voltage followed by output current

Component Type
DRV: stepper drive
EXT: motor extension cable
EXTH: high-power motor extension cable
MTR: stepper motor
MTRH: high-power stepper motor
PWR: power supply

***Sure*Step Series Designation:** STP

Microstepping Drives Introduction

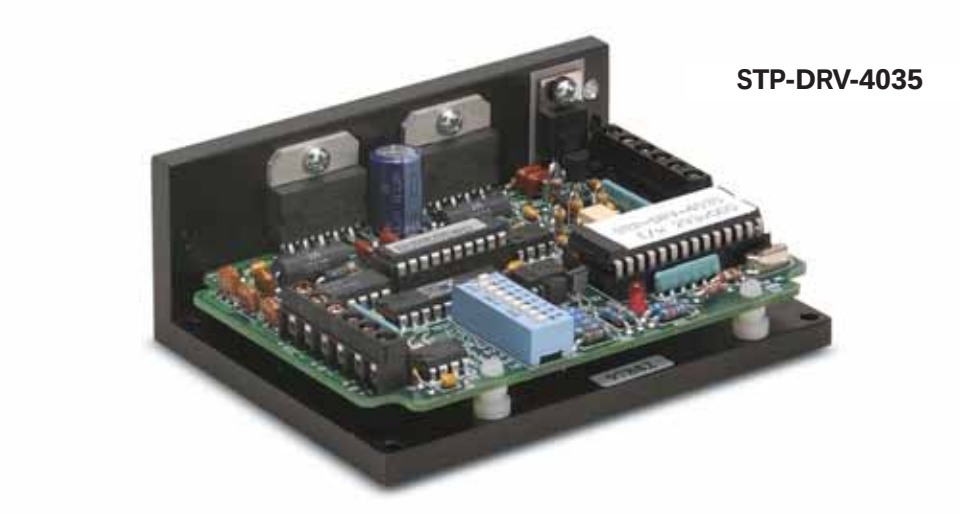
There are two different basic types of microstepping drives offered in the *Sure*Step™ series. One DIP-switch configurable model with a pulse input is available, as well as two software configurable advanced models with multiple operating modes.

Standard Microstepping Drive

The *Sure*Step™ STP-DRV-4035 standard microstepping drive uses pulse input signals, and is configured with DIP switches on the drive. To use this drive in a step motor control system, you will need the following:

- 12-42 volt DC power supply for the motor drive. The *Sure*Step STP-PWR-3204 power supply from AutomationDirect is the best choice. If you decide not to use the STP-PWR-3204, please read the section entitled "Choosing a Power Supply" in the STP-DRV-4035 Drive chapter of this user manual.
- A source of step pulses. Signal may be sinking (NPN), sourcing (PNP), or differential.
- The step inputs can be CW/CCW, step and direction, or quadrature.
- A compatible step motor, such as an AutomationDirect *Sure*Step STP-MTR(H)-xxxxx. (Motor extension cables STP-EXT(H)-020 are also available.)
- A small flat blade screwdriver for tightening the connectors.

The STP-DRV-4035 standard microstepping drive is an open frame design.



STP-DRV-4035

Refer to the "*Sure*Step STP-DRV-4035 Microstepping Drive" chapter of this user manual for complete details on the installation, configuration, and wiring of this drive.

Advanced Microstepping Drive

The *Sure*Step™ advanced microstepping drives (STP-DRV-4850 & -80100) are capable of accepting several different forms of input signals for control: pulse, analog, serial communication, or internal indexing. These drives are configured by computer with software which is included with the drive. To use one of these drives in a step motor control system, you will need the following:

- A DC power supply for the motor drive. A compatible *Sure*Step STP-PWR-xxxx power supply from AutomationDirect is the best choice.
- A source of input control signals, such as a ***Direct***Logic PLC from AutomationDirect.
- A compatible step motor, such as an AutomationDirect *Sure*Step STP-MTR(H)-xxxxx. (Motor extension cables STP-EXT(H)-020 are also available.)
- A small flat blade screwdriver for tightening the connectors.

The *Sure*Step advanced microstepping drives are enclosed with removable wiring terminal blocks.

STP-DRV-80100

Refer to the "*Sure*Step™ Advanced Microstepping Drives" chapter of this user manual for complete details on the installation, configuration, and wiring of this drive.

Bipolar Step Motor Introduction

AutomationDirect offers nine different models of bipolar step motors with mounting flanges in NEMA frame sizes 17, 23, and 34. There are five High Torque (STP-MTR-xxxxx) motors available, as well as four Higher Torque (STP-MTR**H**- xxxxx) motors. All of the motors have a 12 inch connectorized pigtail cable, and optional matching 20 ft connectorized extension cables (STP-EXT(H)-020) are also available.

Refer to the "*Sure*Step™ Stepping Motors" chapter in this user manual for complete details on the specifications, installation, mounting, dimensions, and wiring of the *Sure*Step step motors.

STP-MTR(H)-xxxxx
NEMA 17, 23, 34
Frame Sizes

Stepping System Power Supply Introduction

The *Sure*Step stepping system power supplies are designed to work with *Sure*Step microstepping drives and motors. The different power supply models can provide unregulated DC power at the applicable voltage and current levels for various *Sure*Step drives and motors. The power supplies also provide a regulated 5VDC, 500 mA logic supply output for indexer and PLC logic outputs to control the *Sure*Step drives.

The stepping system power supplies can supply power for multiple *Sure*Step STP-DRV-xxxx microstepping motor drives, depending on step motor size and application requirements.

Refer to the Power Supply chapter of this user manual for complete details on the specifications, installation, mounting, dimensions, and wiring of the *Sure*Step stepping system power supplies.

Selecting the Stepping System

Refer to Appendix A: Selecting the *Sure*Step™ Stepping System for detailed information on how to calculate requirements for various applications using stepping motors for motion control.

Use with *Direct*LOGIC PLCs

Refer to Appendix B: Using *Sure*Step™ with ***Direct***LOGIC PLCs for detailed information on wiring the *Sure*Step Stepping System components to ***Direct***LOGIC PLCs and high-speed counter modules.

The following is a summary of the ***Direct***LOGIC PLCs(1) and module part numbers that are suitable to work with the *Sure*Step Stepping Systems:

D0-05AD
D0-05DD
D0-05DD-D
D0-06DD1
D0-06DD2
D0-06DD1-D
D0-06DD2-D
H0-CTRIO
F1-130AD
F1-130DD
F1-130DD-D
H2-CTRIO(2)
D2-CTRINT
T1H-CTRIO(2)
H4-CTRIO

(1) Any ***Direct***LOGIC PLC capable of RS-232 ASCII communication can write serial commands to the *Sure*Step Advanced Microstepping Drives (STP-DRV-4850 & -80100). These PLCs include DL 05, 06, 250-1, 260, 350, & 450. However, we strongly recommend using DL06 or DL260 PLCs for serial commands due to their more advanced ASCII instruction set which includes PRINTV and VPRINT commands.

(2) The H2-CTRIO and T1H-CTRIO High Speed Counter I/O Interface Modules can also be used to control the *Sure*Step Stepping System in PC-Based Control systems with Think & Do/Studio, or with our embedded WinPLC/EBC module plugged into the CPU slot of the DL205 base.

SureStep™ STP-DRV-4035 Microstepping Drive

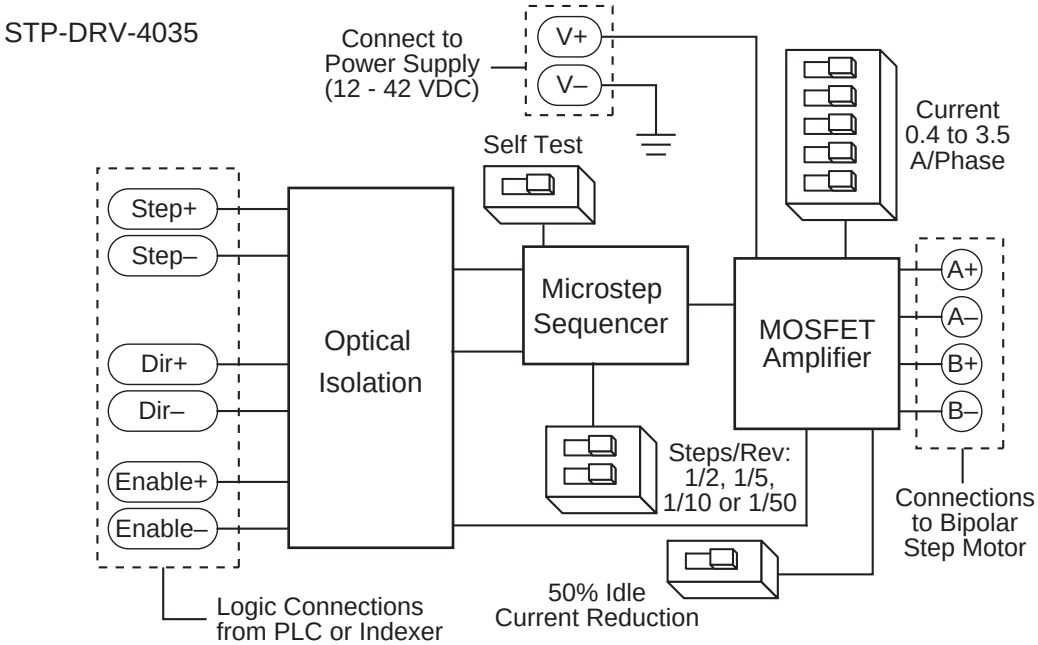
Chapter 2

In This Chapter...

Features

- Drives sizes 17 through 34 step motors
- Pulse width modulation, MOSFET 3 state switching amplifiers
- Phase current from 0.4 to 3.5 amps (switch selectable, 32 settings)
- Optically isolated step, direction and enable inputs
- Half, 1/5, 1/10, 1/50 step (switch selectable)
- Automatic 50% idle current reduction (can be switched off)

Block Diagram

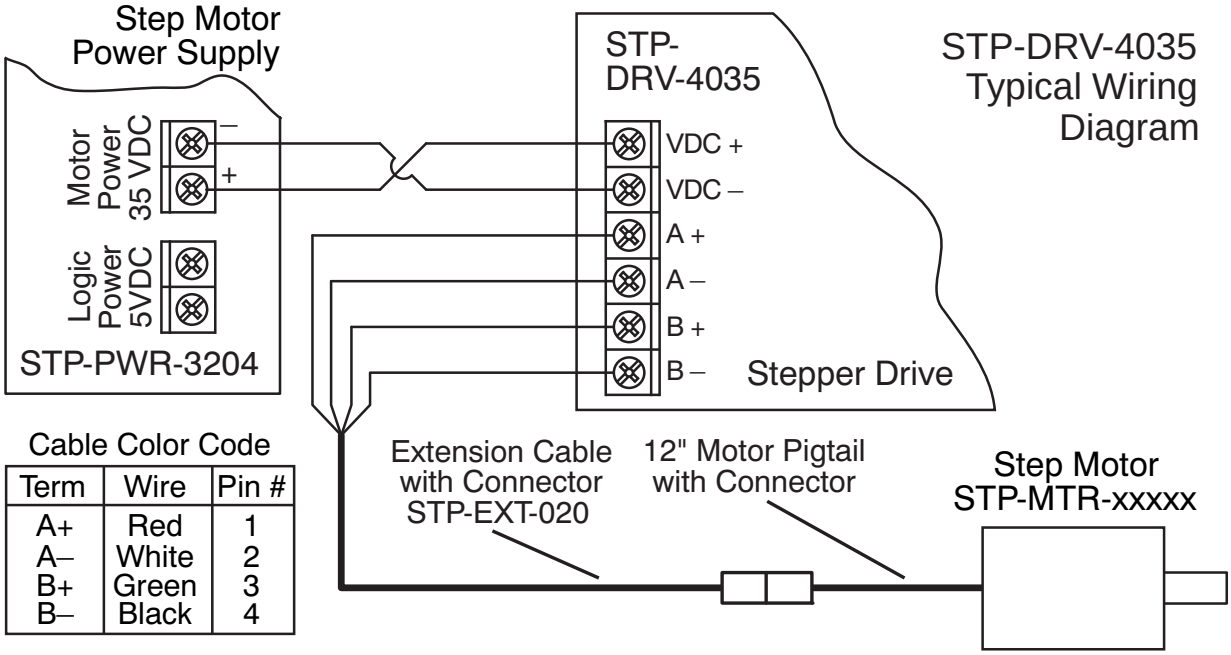


Specifications

*Sure*Step™ Microstepping Drives Specifications		
Part Number		**STP-DRV-4035**
Input Power (with red Power On LED)		12-42 VDC (including ripple voltage)
Output Power		Output current selectable from 0.4 to 3.5 Amps/phase motor current (maximum output power is 140 W)
Current Controller		Dual H-bridge Bipolar Chopper (3-state 20 kHz PWM with MOSFET switches)
Input Signals	**Input Signal Circuit**	Opto-coupler input with 440 Ohm resistance (5 to 15 mA input current), Logic Low is input pulled to 0.8 VDC or less, Logic High is input 4 VDC or higher
	Pulse Signal	Motor steps on falling edge of pulse and minimum pulse width is 0.5 microseconds
	Direction Signal	Needs to change at least 2 microseconds before a step pulse is sent
	Enable Signal	Logic 1 will disable current to the motor (current is enabled with no hook-up or logic 0)
DIP Switch Selectable Functions	**Self Test**	Off or On (uses half-step to rotate 1/2 revolution in each direction at 100 steps/second)
	Microstepping	400 (200x2), 1,000 (200x5), 2,000 (200x10), or 10,000 (200x50) steps/rev
	Idle Current Reduction	0% or 50% reduction (idle current setting is active if motor is at rest for 1 second or more)
	Phase Current Setting	0.4 to 3.5 Amps/phase with 32 selectable levels
Drive Cooling Method		Natural convection (mount drive to metal surface if possible)
Dimensions		3 x 4 x 1.5 inches [76.2 x 101.6 x 38.1 mm]
Mounting		Use #4 screws to mount on wide side (4 screws) or narrow side (2 screws)
Connectors		Screw terminal blocks with AWG 18 maximum wire size
Weight		9.3 oz. [264g]
Storage Temperature		-20–80 °C [-4–176 °F]
Chassis Operating Temperature		0–55 °C [32–131 °F] recommended; 70 °C [158 °F] maximum (use fan cooling if necessary); 90% non-condensing maximum humidity
Agency Approvals		CE (complies with EN55011A and EN50082-1 (1992))

Note: The STP-DRV-4035 Microstepping Drive works with 4, 6 and 8 lead bipolar step motors. All ***AUTOMATIONDIRECT*** *SureStep™ motors are four lead bipolar step motors.*

Typical Wiring Diagram

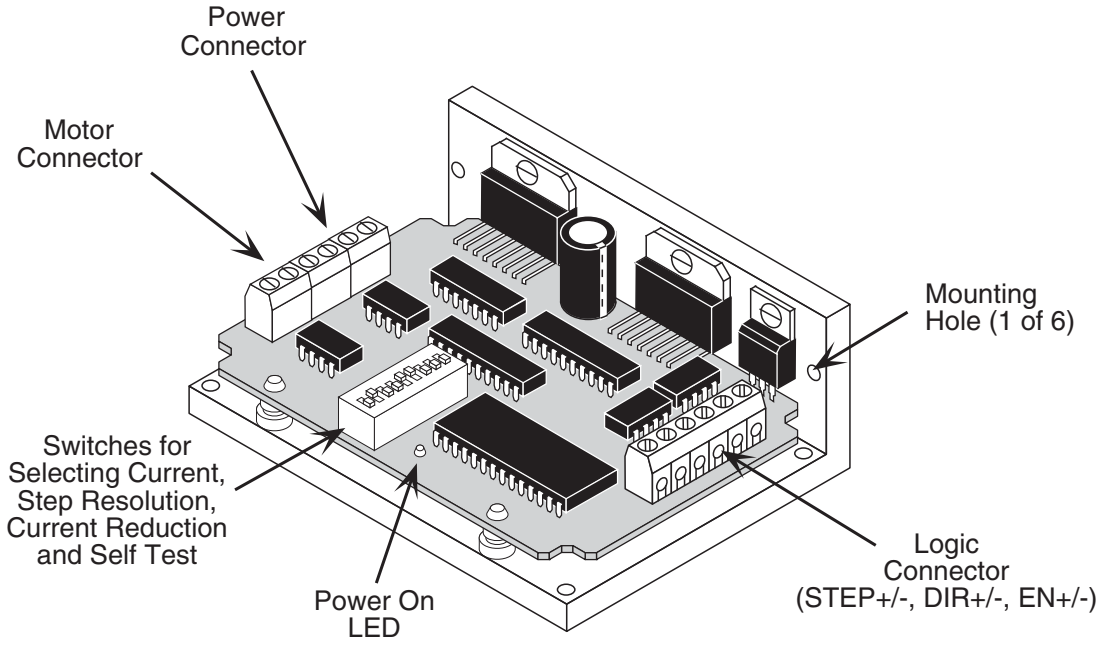


Cable Color Code

Term	Wire	Pin #
A+	Red	1
A–	White	2
B+	Green	3
B–	Black	4

Connection and Adjustment Locations

The sketch below shows where to find the important connection and adjustment points.



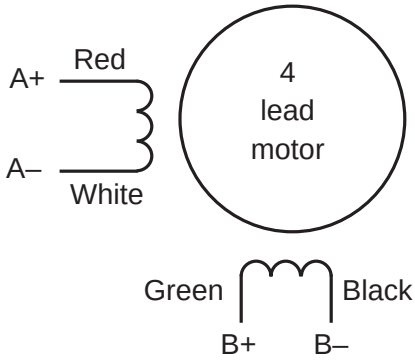
Connecting the Motor

WARNING: When connecting a step motor to the *Sure*Step™ STP-DRV-4035 microstepping drive, be sure that the motor power supply is switched off. When using a motor not supplied by AUTOMATIONDIRECT, secure any unused motor leads so that they can't 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. (See the Typical Wiring Diagram shown on page 2-4 of this chapter for the step motor lead color code of AUTOMATIONDIRECT supplied motors.)

You must now decide how to connect your stepping motor to the *Sure*Step™ STP-DRV-4035 microstepping drive.

Four lead motors

Four lead motors can only be connected one way. Please follow the wiring diagram shown to the right.

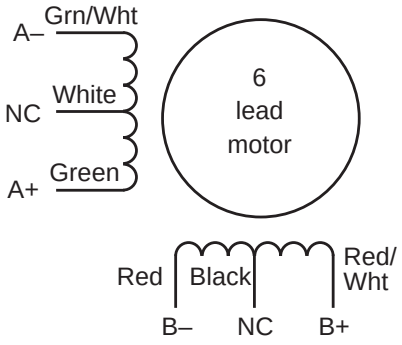


4 Leads

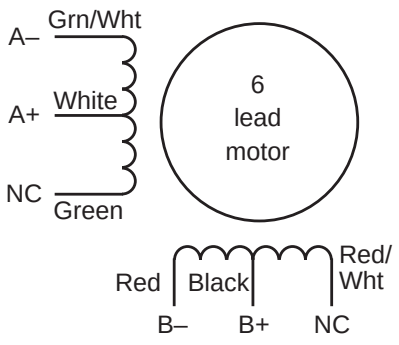
Note: All AUTOMATIONDIRECT SureStep™ motors are four lead bipolar step motors.

Six lead motors

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 rated current to prevent overheating. Wiring diagrams for both connection methods are shown below. **NC** means not connected to anything.



6 Leads Series Connected

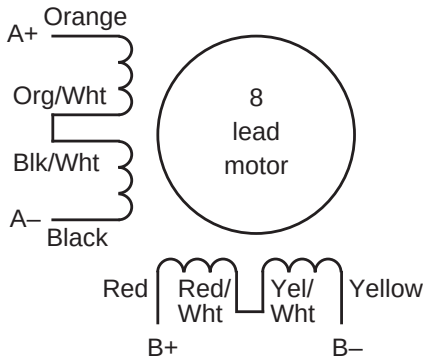


6 Leads Center Tap Connected

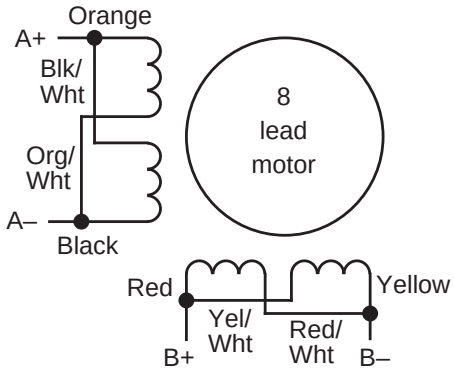
Note: Be aware that step motor wire lead colors vary from one manufacturer to another.

Eight lead motors

Eight lead motors can also be connected in two ways: series or parallel. Series operation gives you more torque at low speeds and less torque at high speeds. When using series connection, the motor should be operated at 30% less than the rated current to prevent over heating. Parallel operation allows a greater torque at high speed. When using parallel connection, the current can be increased by 30% above rated current. Care should be taken in either case to assure the motor is not being overheated. The wiring diagrams for eight lead motors are shown below.



8 Leads Series Connected



8 Leads Parallel Connected

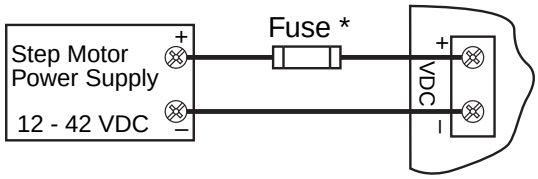
Note: Be aware that step motor wire lead colors vary from one manufacturer to another.

Connecting the Power Supply

The STP-PWR-3204 power supply from **AUTOMATIONDIRECT** is the best choice to power the step motor drive. If you need information about choosing a different power supply, please read the section titled “Choosing a Power Supply” in this manual.

If your power supply does not have a fuse on the output or some kind of short circuit current limiting feature you need to put a 4 amp fast acting fuse between the drive and power supply. Install the fuse on the + power supply lead.

Connect the motor power supply "+" terminal to the driver terminal labeled "+ VDC". Connect power supply "-" to the drive terminal labeled "VDC-". Use no smaller than 18 gauge wire. **Be careful not to reverse the wires.** Reverse connection will destroy your drive and void the warranty.

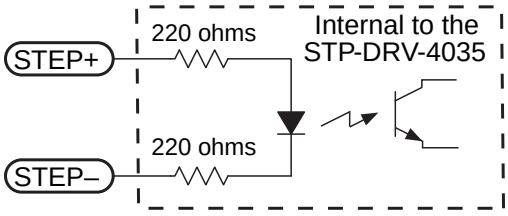


* External fuse not req'd when using an STP-PWR-3204 P/S; fuse is internal.

Do NOT use STP-PWR-48xx or -70xx power supplies with an STP-DRV-4035 drive, because those power supplies exceed the voltage limit of this drive.

Connecting the Logic

The *Sure*Step drive contains optical isolation circuitry to prevent the electrical noise inherent in switching amplifiers from interfering with your circuits. Optical isolation is accomplished by powering the motor driver from a different supply source than your control circuits. There is no electrical connection between the two; signal communication is achieved by infrared light. When your circuit turns on or turns off, an infrared LED (built into the drive), signals a logic state to the phototransistors that are wired to the brains of the drive. A schematic diagram input circuit is shown to the right.



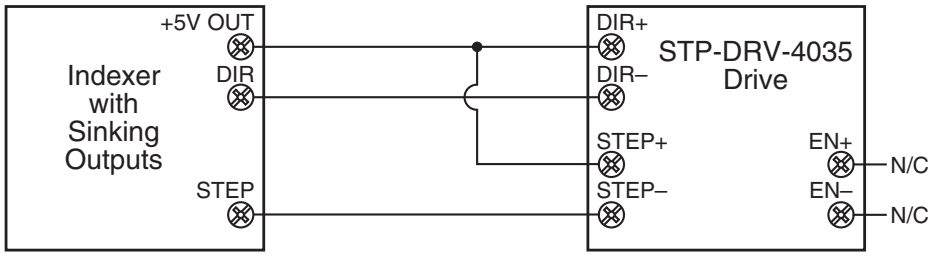
Drive Input Circuit

You will need to supply a source of step pulses to the drive at the STEP+ and STEP– terminals and a direction signal at the DIR+ and DIR– terminals, if bidirectional rotation is required. You will also need to determine if the **ENABLE** input terminals will be used in your application. Operation, voltage levels and wiring on the **ENABLE** terminals is the same as the **STEP** and **DIRECTION** terminals. The EN+ and EN– terminal can be left not connected if the enable function is not required.

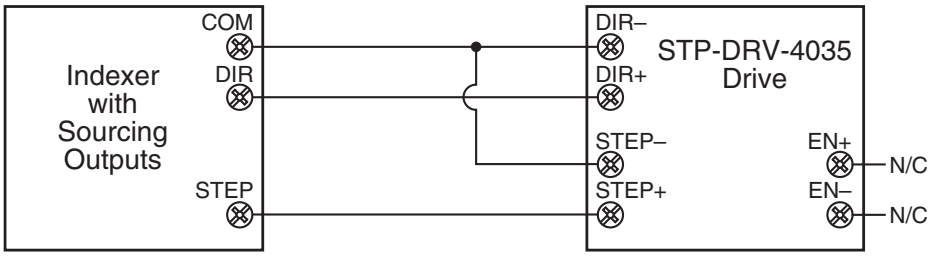
All logic inputs can be controlled by a DC output signal that is either sinking (NPN), sourcing (PNP), or differential.

On the next couple of pages are examples for connecting various forms of outputs from both indexers and PLCs.

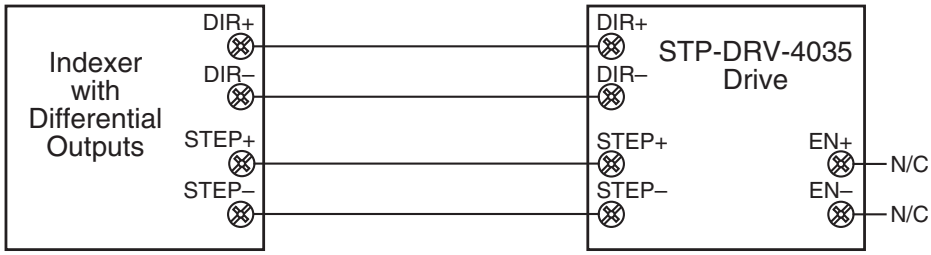
Connecting to an Indexer with Sinking Outputs



Connecting to an Indexer with Sourcing Outputs



Connecting to an Indexer with Differential Outputs



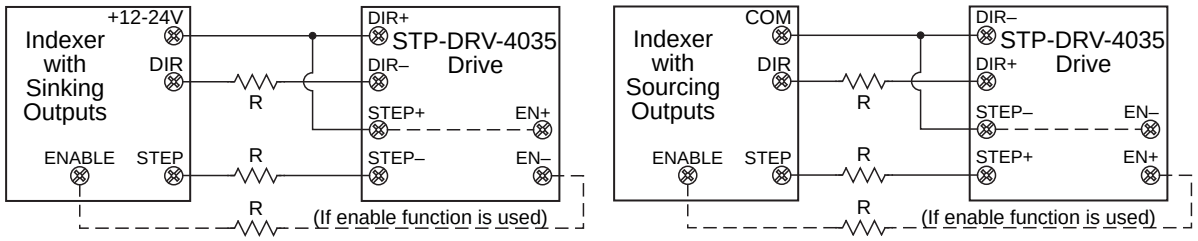
Note: Many high speed indexers have differential outputs.

Using Logic That is Not 5 volt TTL Level

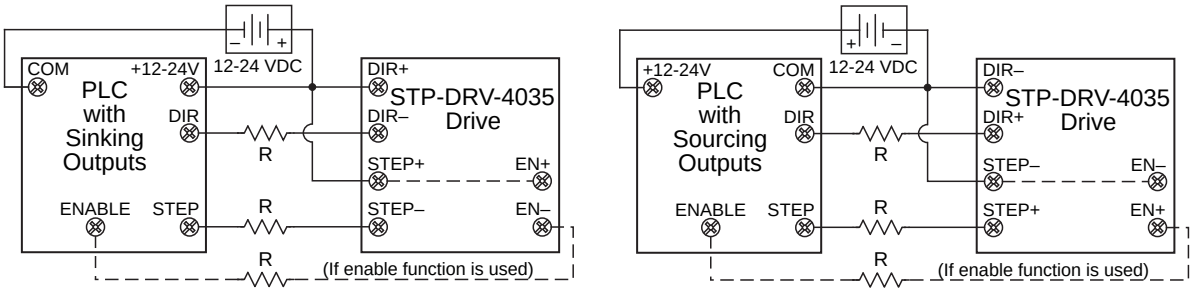
Some step and direction signals, especially those of PLCs, don't use 5 volt logic. You can connect signal levels as high as 24 volts to the *Sure*Step drive if you add external dropping resistors to the STEP, DIR and EN inputs, as shown below.

- For 12 volt logic, add 820 ohm, 1/4 watt resistors
- For 24 volt logic, use 2200 ohm, 1/4 watt resistors

Connecting to an Indexer with Sink or Source 12-24 VDC Outputs



Connecting to a PLC with Sink or Source 12-24 VDC Outputs



Note: Most PLCs can use 24 VDC Logic.

The Enable Input

The **ENABLE** input allows the user to turn off the current to the motor by providing a positive voltage between EN+ and EN-. 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 don't need to connect anything to the **ENABLE** input.*

Step Table
(half stepping)

DIR=1 cw

Step	A+	A–	B+	B–
0	open	open	+	–
1	+	–	+	–
2	+	–	open	open
3	+	–	–	+
4	open	open	–	+
5	–	+	–	+
6	–	+	open	open
7	–	+	+	–
8	open	open	+	–

DIR=0 ccw

Step 0 is the Power Up State

Setting Phase Current

Before you turn on the power supply the first time, you need to set the drive for the proper motor phase current. The rated current is usually printed on the motor label. The *Sure*Step 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 tiny switches near the motor connector. Five of the switches, DIP switch positions 5-9, have a value of current printed next to them, such as 0.1, 0.2, 0.4, 0.8 and 1.6. Each switch controls the amount of current, in amperes (A), that its label indicates in addition to the minimum current value of 0.4 Amps. **There is always a base current of 0.4 Amps, even with all five DIP switches set to the "off" position (away from their labels).** To add to that, slide the appropriate switches toward their labels on the PC board. You may need a small screwdriver for this.

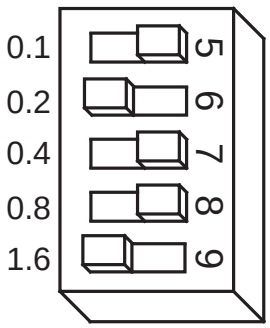
DIP switch current total settings =
step motor required phase current – 0.4 Amps always present base current

Example

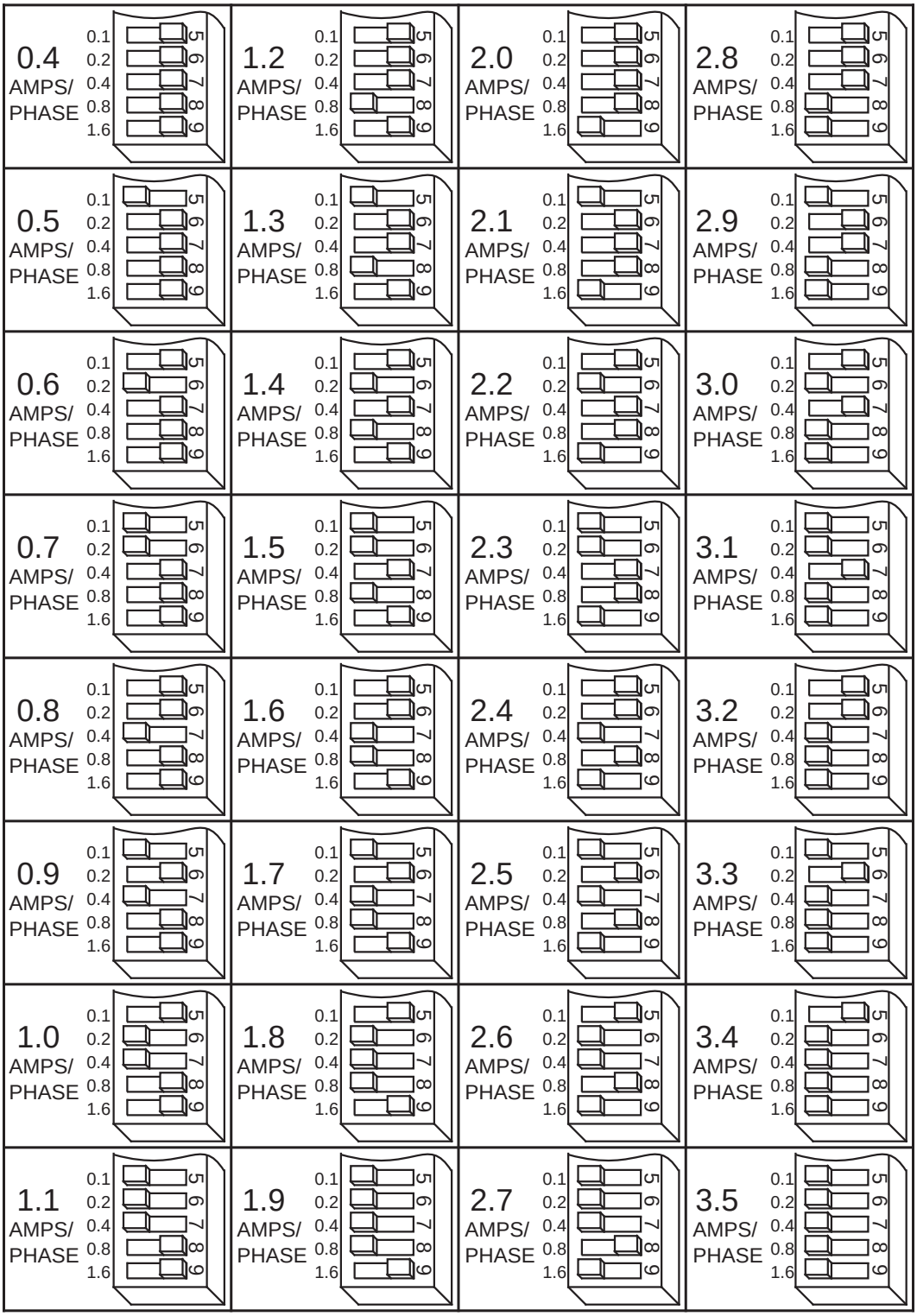
Suppose you want to set the drive for 2.2 Amps per phase based on the step motor showing a phase current of 2.2 Amps. You need the base current of 0.4 Amps plus another 1.6 and 0.2 Amps.

2.2 = 0.4 + 1.6 + 0.2

Slide the 1.6 and 0.2 Amp DIP switches toward the labels as shown in the figure to the right.



Current Setting Table



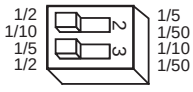
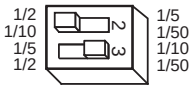
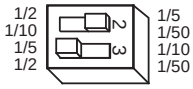
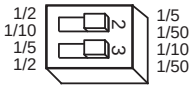
Microstepping

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 *Sure*Step drive precisely control the amount of current in each phase at each step position as a means of electronically subdividing the steps even further. The *Sure*Step drive offers a choice of half step and three microstep resolutions. The highest setting divides each full step into 50 microsteps, providing 10,000 steps per revolution when using a 1.8° motor.

In addition to providing precise positioning and smooth motion, microstep drives can be used to provide motion in convenient units. When the drive is set to 2,000 steps/rev (1/10 step) and used with a 5 pitch lead screw, you get .0001 inches/step.

Setting the step resolution is easy. Look at the dip switch on the *Sure*Step drive. Next to switches 2 and 3, there are labels on the printed circuit board. Each switch has two markings on each end. Switch 2 is marked 1/5, 1/10 at one end and 1/5, 1/50 at the other. Switch 3 is labeled 1/2, 1/5 and 1/10, 1/50. To set the drive for a resolution, push both switches toward the proper label. For example, if you want 1/10 step, push switch 2 toward the 1/10 label (to the left) and push switch 3 toward 1/10 (on the right).

Please refer to the table below and set the switches for the resolution you want.

	400 STEPS/REV (HALF) 	2,000 STEPS/REV (1/10) 
Factory Default	1,000 STEPS/REV (1/5) 	10,000 STEPS/REV (1/50) 

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 enable the idle current reduction feature unless your application strictly forbids it.

Idle current reduction is enabled by sliding switch #4 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 Selected

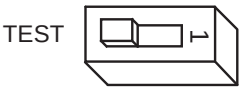
(Factory Default)

No Current Reduction

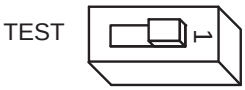
Self Test

The *Sure*Step drive includes a self test feature. This is used for trouble shooting. If you are unsure about the motor or signal connections to the drive, or if the *Sure*Step drive 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 rev backward. The pattern repeats until you slide the switch away from the ***TEST*** label. The *Sure*Step drive always uses half step mode during the self test, no matter how you set switches 2 and 3. The self test ignores the ***STEP*** and ***DIRECTION*** inputs while operating. The ***ENABLE*** input continues to function normally.



Self Test ON



Self Test OFF

(Factory Default)

Choosing a Power Supply

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, you'll want 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 is better, the only 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 30 volts DC. This is because unregulated supplies are rated at full load current. At lesser loads, like when the motor is not moving, the actual voltage can be up to 1.4 times the voltage list on the power supply label. The STP-PWR-3204 power supply is designed to provide maximum voltage, approximately 32 VDC, while under load without exceeding the upper limit of 42 VDC when unloaded.

Current

The maximum supply current you will need 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 *Sure*Step drive 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'll need from the power supply.

We recommend the following selection procedure:

1. If you plan to use only a few drives, get a power supply with at least twice the rated phase current of the motor.

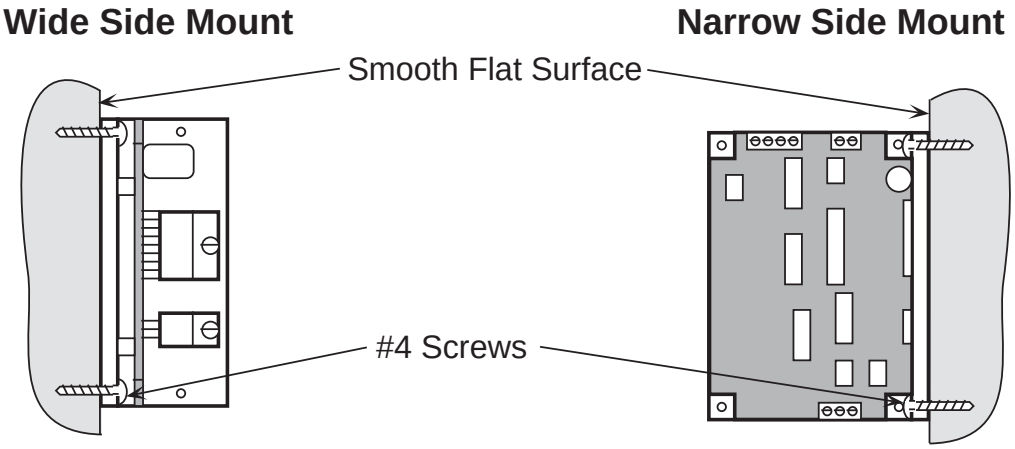
2. If you are designing for mass production and must minimize cost, get one power supply with more than twice the rated current of the motor. Install the motor in the application and monitor the current coming out of the power supply and into the drive at various motor loads. This will tell you how much 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.

*The Sure*Step™ *STP-PWR-3204 power supply from AutomationDirect is the best choice of DC power supply to use with the Sure*Step™ *STP-DRV-4035 microstepping drive.*

Mounting the Drive

You can mount your drive 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, you can use #4 screws in the two side holes.

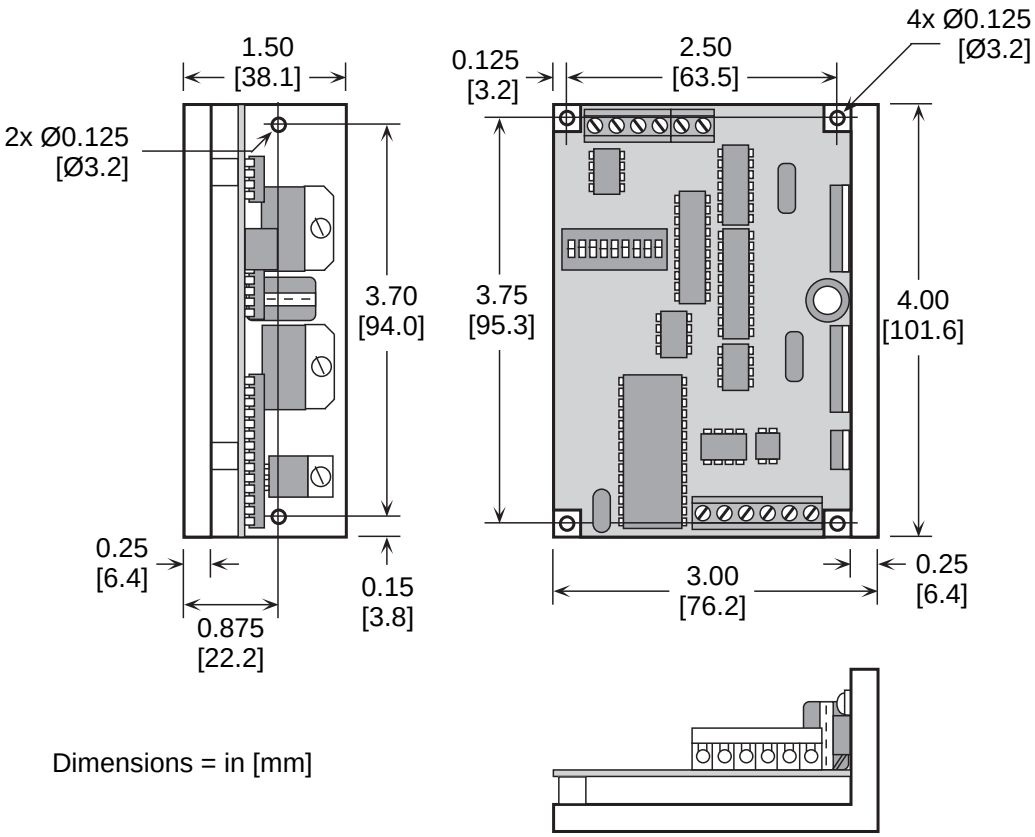


Unless you are running at 1 Amp/phase motor current or below, you may need a heat sink. Often, the metal subpanel being used for the control system will make an effective heat sink.

The amplifiers in the drive generate heat. Unless you are running at 1 amp or below, you may need a heat sink. To operate the drive continuously at maximum power you must properly mount it on 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.

Never use your drive in a space where there is no air flow or where other devices cause the surrounding air to be more than 70 °C. Never put the drive where it can get wet or where metal particles can get on it.

Dimensions



Dimensions = in [mm]