SureStep™ STEPPING SYSTEMS

STP-DRV-4035 Microstepping Drive

Power Connector
Motor Connector
Mounting Hole (1 of 6)
Switches for Selecting Current, Step Resolution, Current Reduction and Self Test
Power On LED
Logic Connector (STEP+/-, DIR+/-, EN+/-)
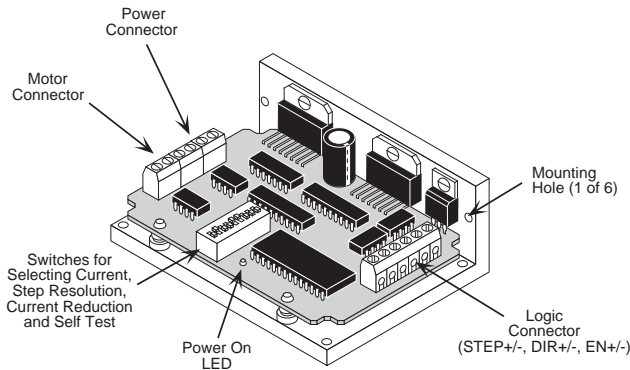
Note: The Microstepping Drive works with 4, 6 and 8 lead bipolar step motors.

WARNING

To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and it is your responsibility to determine which codes should be followed, and to verify that the equipment, installation, and operation are in compliance with the latest revision of these codes.
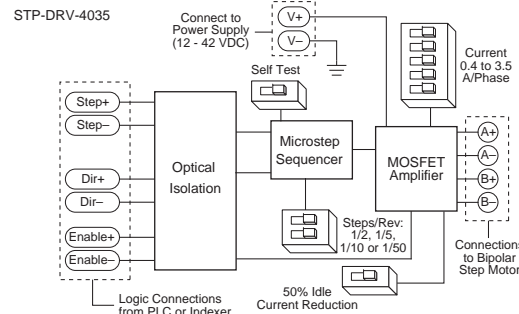
Equipment damage or serious injury to personnel can result from the failure to follow all applicable codes and standards. We do not guarantee the products described in this publication are suitable for your particular application, nor do we assume any responsibility for your product design, installation, or operation.

If you have any questions concerning the installation or operation of this equipment, or if you need additional information, please call us at 770-844-4200.

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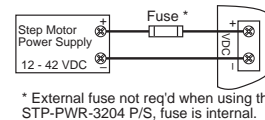
SureStep™ Microstepping Drive Specifications

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 0 will disable current to the motor (current is enabled with no hook-up or logic 1)
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]
Operating Environment		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))

Block Diagram

STP-DRV-4035

Connect to Power Supply (12 - 42 VDC)
Self Test
Current 0.4 to 3.5 A/Phase
Step+
Step−
Dir+
Dir−
Enable+
Enable−
Optical Isolation
Microstep Sequencer
MOSFET Amplifier
A+ A− B+ B−
Steps/Rev: 1/2, 1/5, 1/10 or 1/50
Connections to Bipolar Step Motor
50% Idle Current Reduction
Logic Connections from PLC or Indexer

Connecting the Power Supply

The STP-PWR-3204 power supply from AutomationDirect is the best choice to power the step motor drive.

Step Motor Power Supply 12 - 42 VDC
Fuse *
+ VDC −
* External fuse not req'd when using the STP-PWR-3204 P/S, fuse is internal.

If the power supply you choose does not have a fuse on the output, you will need to install a 4 amp fast acting fuse on the "+" power supply lead as shown in the above diagram.

WARNING: Be careful not to reverse the polarity from the power supply to the drive. Reverse connection will destroy your drive and void the warranty.

Connecting the Motor

WARNING: When connecting a step motor to the STP-DRV-4035 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 the motor leads to ground or directly to the power supply. (See the Typical Wiring Diagram on the back side of this data sheet for the step motor lead color code of AutomationDirect supplied motors.)

Connecting the Logic

The logic inputs are optically isolated to prevent electrical noise problems to the drive. The logic inputs require using DC power from a different supply source than what is used to power the step motor power circuits. A schematic diagram of the input circuit is shown to the right.
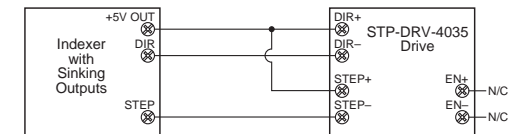

STEP+   220 ohms   Internal to the STP-DRV-4035
STEP−   220 ohms
Drive Input Circuit
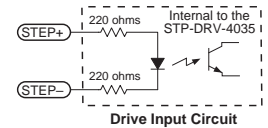
You will need to supply a source of step pulses to the drive at the STEP+ and STEP– terminals and a direction signal at the DIR+ and DIR– terminals, if bidirectional rotation is required.

The ENABLE input allows the logic to turn off the current to the step motor by providing a signal to the EN+ and EN– terminals. If you do not have a need to disable the output to the step motor, just leave the EN+ and EN– terminals disconnected.
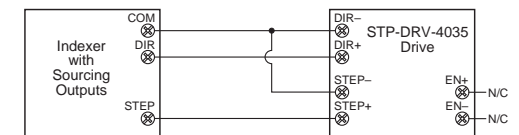
All logic inputs can be controlled by a DC output signal that is either sinking (NPN), sourcing (PNP), or differential.

Below and on the back of this data sheet are examples for connecting various forms of outputs from both indexers and PLCs.
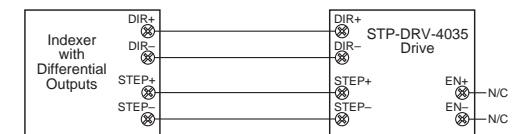
Connecting to an Indexer with Sinking Outputs

Indexer with Sinking Outputs — +5V OUT, DIR, STEP
STP-DRV-4035 Drive — DIR+, DIR−, STEP+, STEP−, EN+, EN− N/C

Connecting to an Indexer with Sourcing Outputs

Indexer with Sourcing Outputs — COM, DIR, STEP
STP-DRV-4035 Drive — DIR−, DIR+, STEP−, STEP+, EN+, EN− N/C

Connecting to an Indexer with Differential Outputs

Indexer with Differential Outputs — DIR+, DIR−, STEP+, STEP−
STP-DRV-4035 Drive — DIR+, DIR−, STEP+, STEP−, EN+, EN− N/C

Using Logic That is Not 5 Volt TTL Level

Some step and direction signals, especially those of some PLCs, do not use 5 volt logic. In these cases, a signal as high as 24 VDC can be used with the step motor drive by adding an external dropping resistor to the STEP, DIR and EN input logic terminals.
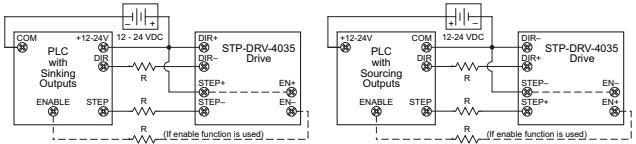
For 12 VDC logic, add an 820 Ohm, 1/4 watt resistor

For 24 VDC logic, add an 2200 Ohm, 1/4 watt resistor

Indexer with 12-24 VDC Sink or Source Outputs
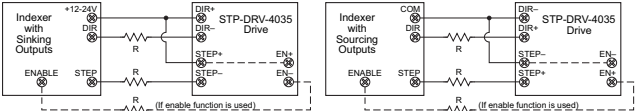
PLC with 12-24 VDC Sink or Source Outputs

Setting Phase Current

Set the drive to the proper motor phase current before applying power to the drive. The rated current is usually printed on the step motor label. Setting the DIP switches for the rated current can be achieved by either following the simple formula that follows below or skipping to the Current Setting Table shown to the top right and setting the DIP switch positions to match what is shown in the table for the current.

Current Setting Formula

Locate the 9 position DIP switch on the drive. The last five positions, 5-9, have a value of current printed adjacent, and are used to set the motor phase current. There is always a base current of 0.4 A. To add to the base current, slide the appropriate switches toward their labels marked on the drive's PC board.   **Example: 2.2 Amps = 0.4 (base current) + 1.6 + 0.2**

Microstepping

The microstepping drive has the ability to be set up for more than just the normal full and half step resolutions found in other drives. This ability is referred to as microstepping. It is accomplished by precisely controlling the amount of current in each phase at each step position and allows the steps to be electronically subdivided even further. The drive can be set up for either half step or three microstep resolutions, 1/5, 1/10 or 1/50 microsteps. In a typical 1.8° step motor, this will equate to 1,000, 2,000 or 10,000 steps per revolution. DIP switch positions 2 and 3 are used to set the resolution as shown below:
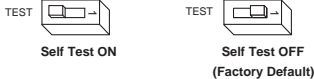
Current Setting Table

Idle Current Reduction

The microstepping drive has a built-in feature that will reduce the motor current by 50% anytime the motor is not moving. Drive heating is reduced by about 50% and the feature lowers motor heating by 75%. Slide DIP switch position 4 toward the label marked "50% Idle" to enable this feature. Please be aware that when this feature is used, holding torque is reduced.

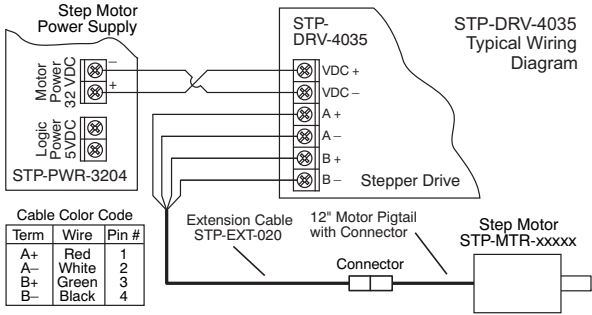| Idle Current Reduction Selected (Factory Default) | No Current Reduction |
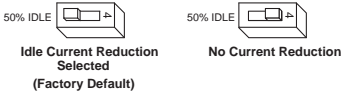
Self Test

The microstepping drive includes a self test feature. This feature can be used for trouble shooting your system. Slide DIP switch position 1 toward the label marked "TEST" and the step motor will slowly rotate 1/2 revolution forward and then 1/2 revolution backward. This motion will repeat until the DIP switch is returned to the off position.

The self test will use half step mode and ignore any input signals on the STEP and DIR terminals. The ENABLE input will continue to function normally.


| Self Test ON | Self Test OFF (Factory Default) |

Typical Wiring Diagram

STP-DRV-4035 Typical Wiring Diagram

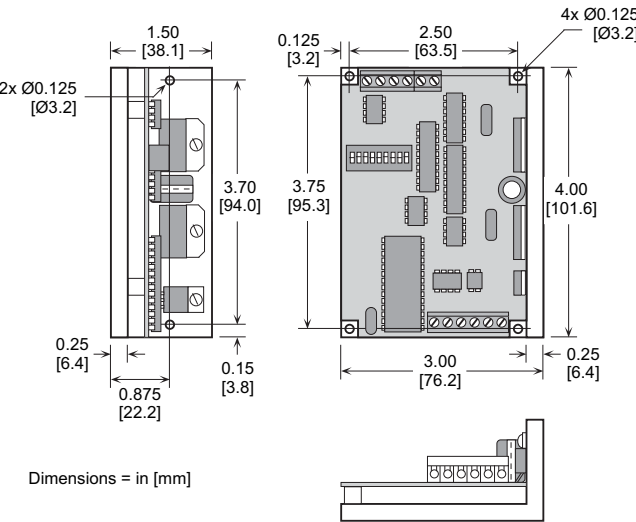| Cable Color Code		
Term	Wire	Pin #
A+	Red	1
A–	White	2
B+	Green	3
B–	Black	4

Mounting the Drive

The microstepping drive can be mounted on either the wide or the narrow side of the chassis using #4 screws. The wide side requires four screws, while the narrow side requires two screws.

WARNING: Never use the drive in a space where there is no air flow or the surrounding air temperature is greater than 70 °C.
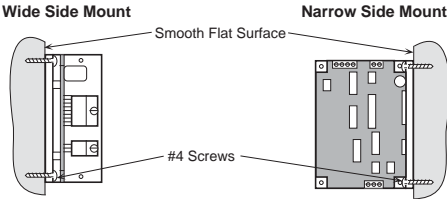
Unless you are running at 1 Amp/phase motor current or below, you may need a heat sink. Often, the metal subpanel being used for the control system will make an effective heat sink.

Dimensions

Dimensions = in [mm]