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.

Technical Support

By Telephone: 770-844-4200
(Mon.-Fri., 9:00 am – 6:00 pm E.T.)

On the Web: www.automationdirect.com

Our technical support group is glad to work with you in answering your questions. If you cannot find the solution to your particular application, or, if for any reason you need additional technical assistance, please call technical support at **770-844-4200**. We are available weekdays from 9:00 am to 6:00 pm Eastern Time.

We also encourage you to visit our web site where you can find technical and non-technical information about our products and our company. Visit us at **www.automationdirect.com**.

Special Symbols

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™ Part Number Explanation

STP- M T R H - 23079 x

Motor Shaft Type
blank: single
D: dual

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
6575: 65V, 7.5A
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
DRVA: drive accessory
EXT: motor extension cable
EXTH: high-power motor extension cable
MTR: stepper motor
MTRA: motor accessory
MTRH: high-power stepper motor
PWR: power supply

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

*Sure*Step™ System Recommended Component Compatibility

*Sure*Step Power Supply / Drive Compatibility				
Drive (1)(2)	Recommended Power Supply (1)(2)			
Model Number	STP-PWR -3024	STP-PWR -4805	STP-PWR -4810	STP-PWR -7005
STP-DRV-4035 (40 VDC max input)	√	No	No	No
STP-DRV-4850 (48 VDC max input)	√	√	√	No
STP-DRV-6575 (65 VDC max input)	√	√	√	No
STP-DRV-80100 (80 VDC max input)	√	√	√	√

1) Do NOT use a power supply that exceeds the drive's input voltage range. If using a non-STP linear power supply, ensure that the unloaded voltage does not float above the drive's maximum input range.

2) For best performance, use the lowest voltage power supply that supplies the required speed and torque.

*Sure*Step Drive / Motor Compatibility						
Motor (1)(2)			Recommended Drive (1)			
Model Number (1)(2)	Rated Amps	Extension Cable(2)	STP-DRV -4035(1) (3.5A max output)	STP-DRV -4850(1) (5.0A max output)	STP-DRV -6575(1) (7.5A max output)	STP-DRV -80100(1) (10.0A max output)
STP-MTR-17040(D)	1.7	STP-EXT-020	√	√	√	–
STP-MTR-17048(D)	2.0		√	√	√	
STP-MTR-17060(D)	2.0		√	√	√	
STP-MTR-23055(D)	2.8		√	√	√	
STP-MTR-23079(D)	2.8		√	√	√	
STP-MTR-34066(D)	2.8		√	√	√	
STP-MTR*H*-23079(D)	5.6	STP-EXT*H*-020	–		√	√
STP-MTR*H*-34066(D)	6.3				√	√
STP-MTR*H*-34097(D)	6.3				√	√
STP-MTR*H*-34127(D)	6.3				√	√

1) The combinations above will perform according to the published speed/torque curves. However, any STP motor can be used with any STP drive. Using a motor with a current rating higher than the drive's output rating will proportionally limit the motor torque.

2) MTR motors have connectors compatible with the EXT extension cables.
MTRH motors have connectors compatible with the EXTH extension cables.

Microstepping Drives Introduction

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

Standard Microstepping Drives

STP-DRV-6575

The *Sure*Step™ STP-DRV-6575 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:

- A 24–65 VDC power supply for the motor drive. *Sure*Step STP-PWR-3204 or STP-PWR-48xx power supplies from AutomationDirect are good choices. If you decide not to use one of these recommended power supplies, then please read the section entitled "Choosing a Power Supply" in the STP-DRV-6575 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 or Step & Direction.
- A compatible step motor, such as an AutomationDirect *Sure*Step STP-MTR(H)-xxxxx(D). (Motor extension cables STP-EXT(H)-020 are also available.)
- A small flat blade screwdriver for tightening the connectors.

The STP-DRV-6575 standard microstepping drive is an enclosed design.

STP-DRV-6575

Refer to the "*Sure*Step STP-DRV-6575 Microstepping Drive" chapter of this user manual for complete details on the installation, configuration, and wiring of this drive.

Standard Microstepping Drives (continued)

STP-DRV-4035

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(D). (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(D). (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 twenty different models of bipolar step motors with mounting flanges in two different shaft configurations (single and dual-shaft), and in three different NEMA frame sizes (17, 23, and 34). There are twelve High Torque (STP-MTR-xxxxx(D)) motors available, as well as eight Higher Torque (STP-MTR**H**- xxxxx(D)) 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

STP-MTR(H)-xxxxx(D) Motors Available in Single-shaft and Double-shaft Models

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 C: 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 AutomationDirect 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 AutomationDirect PLCs(1) and module part numbers that are suitable to work with the SureStep 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)
H2-CTRIO2
D2-CTRINT
T1H-CTRIO(2)
H4-CTRIO
P3-HSO

(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; P3-550; H2-DM1(E); or CLICK. However, of the ***Direct***LOGIC PLCs, 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.