

Sure^{step}™ Stepping Systems

User Manual

Manual #: **STP-SYS-M-W0**
2nd Ed, Rev E

STP-DRV-xxxx
Microstepping Drives



STP-PWR-xxxx
Stepping System
Power Supplies



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



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

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⚡ WARNING ⚡



WARNING: Read this manual thoroughly before using *SureStep*[™] 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 *SureStep*[™] 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 E

Issue Date: 02/2012

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
2nd Ed, Rev D	11/2011	Ch 2: RoHS, Wiring for Encoder Following Ch 3: Connection Locations & Pin-out; Wiring for Encoder Following Appx B: PLC connection diagrams
2nd Ed, Rev E	02/2012	Appx B: PLC connection diagrams

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GETTING STARTED



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Manual Overview

Overview of this Publication

Thank you for selecting the *SureStep*™ Stepping System components. This user manual describes the selection, installation, configuration, and methods of operation of the *SureStep*™ 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 *SureStep*™ 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

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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).

SureStep™ System Introduction

SureStep open-loop stepping systems provide simple and accurate control of position and speed where lower power and cost are considerations. The SureStep 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.

SureStep™ System Recommended Component Compatibility

SureStep™ 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-MTRH-xxxxx & STP-EXTH-020
STP-DRV-4850	-	STP-PWR-4805		
STP-DRV-80100	STP-PWR-7005	STP-PWR-4810		
<p>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.</p> <p>2) MTR motors have connectors compatible with the EXT extension cables.</p> <p>3) MTRH motors have connectors compatible with the EXTH extension cables.</p>				

SureStep™ Part Number Explanation

STP- MTR 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

SureStep Series Designation: STP

Microstepping Drives Introduction

There are two different basic types of microstepping drives offered in the *SureStep*™ 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 *SureStep*™ 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 *SureStep* 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 *SureStep* 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 “*SureStep* 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 *SureStep*™ 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 *SureStep* 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 *SureStep* STP-MTR(H)-xxxxx. (Motor extension cables STP-EXT(H)-020 are also available.)
- A small flat blade screwdriver for tightening the connectors.

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



STP-DRV-80100

Refer to the “*SureStep*™ 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-MTRH-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 “*SureStep™* Stepping Motors” chapter in this user manual for complete details on the specifications, installation, mounting, dimensions, and wiring of the *SureStep* step motors.



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

Stepping System Power Supply Introduction

The *SureStep* stepping system power supplies are designed to work with *SureStep* microstepping drives and motors. The different power supply models can provide unregulated DC power at the applicable voltage and current levels for various *SureStep* 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 *SureStep* drives.



The stepping system power supplies can supply power for multiple *SureStep* 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 *SureStep* stepping system power supplies.

Selecting the Stepping System

Refer to Appendix A: Selecting the *SureStep*™ 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 *SureStep*™ with *Direct*LOGIC PLCs for detailed information on wiring the *SureStep* 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 *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⁾	
D2-CTRINT	
T1H-CTRIO ⁽²⁾	
H4-CTRIO	

(1) Any *Direct*LOGIC PLC capable of RS-232 ASCII communication can write serial commands to the *SureStep* 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 *SureStep* 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.