

# SureStep™ Stepping Systems

## High-performance microstepping drives with high-torque stepping motors

SureStep stepping systems provide simple and accurate control of position and speed where open-loop control and cost are considerations. Pulses (or "step" and "direction" signals) from the **DirectLOGIC** family of PLCs or other indexers and motion controllers are "translated" by the microstepping drive into precise movement of the stepping motor shaft. The SureStep stepping motors use 2-phase technology with 200 full steps per revolution or 1.8° per full step. Older type stepping motor drives, which operate stepping motors in full step mode, can result in stalling or lost motion due to potential problems with low speed mechanical vibration (usually between 100 to 200 RPM). To minimize this vibration

problem, the SureStep microstepping drives use advanced microstepping technology to smooth the motor motion and stepping response. The 4035 has selectable microstep resolutions of 400 (half-step), 1,000 (each full step ÷ 5 microsteps), 2,000 (÷ 10), and 10,000 (÷ 50). The advanced drives (STP-DRV-4805, STP-DRV-80100) have software-selectable resolutions ranging from 200 (full step) to 51,200 (÷ 256) steps per revolution.

The advanced drives can operate with traditional high-speed inputs, but can also be commanded via 0 - 5V analog input and have an internal indexer that can accomplish point-to-point moves controlled via ASCII communication.

### FREE configuration software!

The advanced drives include the SureStep Pro configuration tool on CD that makes setting parameters a snap!. Or download from:

<http://support.automationdirect.com/products/surestep.html>

Standards and Agency Approvals 

### How fast can my system go?

$$\text{Stepping Motor RPM} = (A \div B) \times (60 \text{ seconds/minute})$$

where A = PLC output frequency (pulses per second)  
B = microstepping resolution selection (steps/revolution)

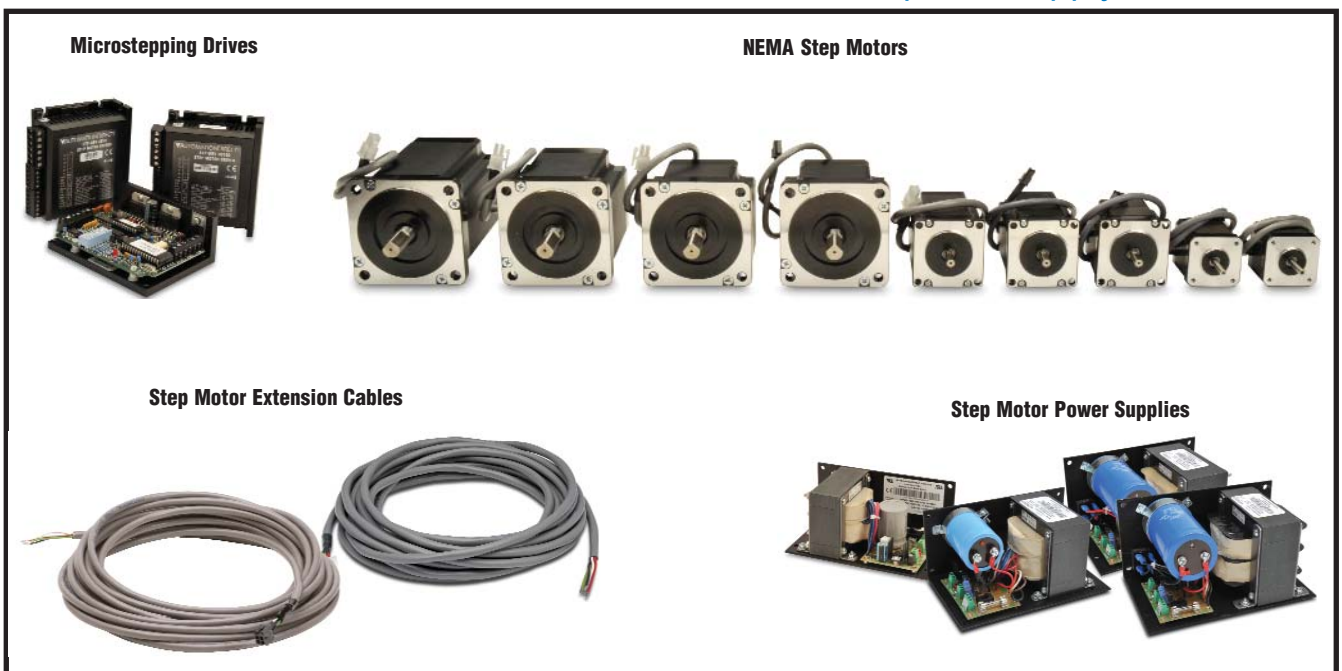
DirectLOGIC PLC Pulse Frequency	SureStep™ Drive Selection (Steps/Rev)			
	400 Steps/Rev	1000 Steps/Rev	2000 Steps/Rev	10,000 Steps/Rev
5,000 Hz	750 rpm	300 rpm	150 rpm	30 rpm
7,000 Hz	1050 rpm	420 rpm	210 rpm	42 rpm
10,000 Hz	1500 rpm	600 rpm	300 rpm	60 rpm
25,000 Hz	3750 rpm	1500 rpm	750 rpm	150 rpm

\*Full step (200 steps/rev) will allow higher top speed.  
Full stepping, however, can create vibration at low speed.

RPM =	Steps/Sec A		Steps/Rev B		Sec/Min	
<b>Example 1:</b>	<b>1,500 =</b>	<b>10,000</b>	<b>÷</b>	<b>400</b>	<b>X</b>	<b>60</b>
DL06 with 10 kHz Built-in Pulse Output						
<b>Example 2:</b>	<b>3,750 =</b>	<b>25,000</b>	<b>÷</b>	<b>400</b>	<b>X</b>	<b>60</b>
Hx-CTR10 with 25 kHz Pulse Output						

## 4 components to make a complete system

Choose a drive, motor, motor extension cable and power supply



## Stepping System : Head to Head

AutomationDirect **VS.** Competition

Hey - I can do the math! - AutomationDirect

A complete 2-axis SureStep™ Stepping System for less than just the competition's stepping drives.

SureStep™ NEMA 23 System Long Stack



**\$511**  
Complete  
2 Axis System

Ours includes:

- Two Microstepping Drives (STP-DRV-4035)
- 2 Stepper Motors (STP-MTR-23079)
- One Power Supply (STP-PWR-3204)
- Two Extension Cables (STP-EXT-020)



Parker

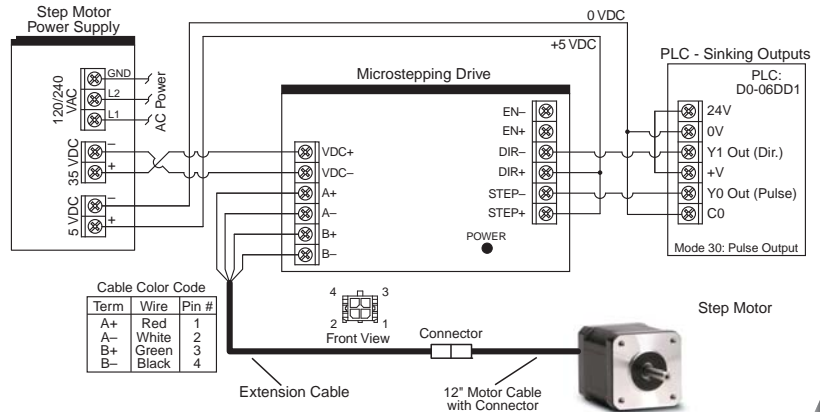
E-DC

**\$608**

for 2 drives



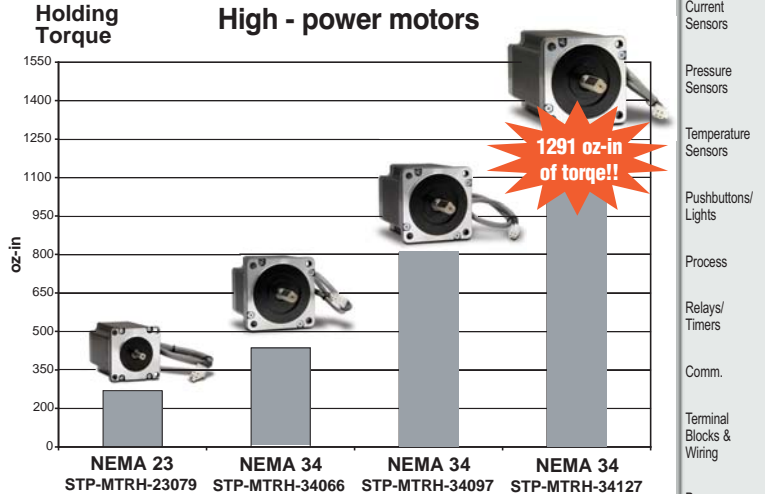
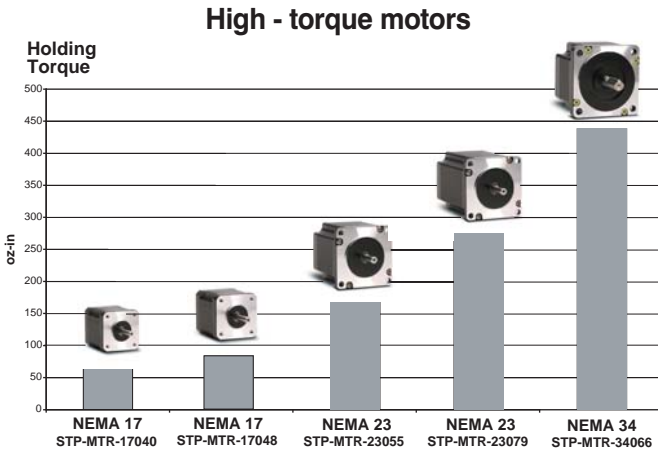
All prices are U.S. published prices. AutomationDirect prices are from March 2010 Price List. Parker prices are from <http://buy.compumotor.com> 2/1/10.



## Nine high-torque motors with 1 ft. cable and 4-wire locking connector

The SureStep stepping family has nine high-torque motors to handle a wide range of automation applications such as wood-working, assembly, and test machines. Our square frame or "high torque" style stepping motors are the latest technology, resulting in the best torque to volume. We have NEMA 17, 23, and 34

mounting flanges and holding torque ranges from 61 oz-in to 1291 oz-in. 20-foot extension cables with locking connectors are a standard option to interface any of the stepping motors to the microstepping drive. The extension cables can be easily cut to length if desired.



## High-performance microstepping drive

- Standard high-speed pulse input (pulse and direction)
- On-board screw terminals for easy hook-up
- Optically-isolated inputs ready for +5 VDC logic from DirectLOGIC PLCs
- No software or add-on resistors required for drive configuration; 9-position dipswitch set-up
- Dipswitch used for built-in self-test, microstep resolution selection, current level selection, and optional idle current reduction.

## Advanced microstepping drives

All the features of the high-performance drive, plus:

- Software configurable
- 200 - 51,200 microsteps (software selectable)
- High-speed pulse input (Quadrature, cw/ccw, pulse/direction)
- Analog velocity mode (0-5v or potentiometer)
- Internal indexer (point-to-point moves via ASCII command)

## Linear power supplies

- 32V @ 4A, 48V @ 5A, 48V @ 10A, 70V @ 5A
- Input and output fuses included on power supplies
- Includes 5 VDC Logic supply for all low voltage signals

## 1. Choose a motor

Determine the torque and speed required by your application. Then look at the motor speed-torque curves in this chapter's Technical Info section. Choose a motor that can run your application with plenty of speed and torque reserve (most stepper systems should have a 100% safety margin for torque).

**NEMA 17, 23 and 34 mounting flanges**

**Holding torque ranges from 61 to 1291 oz-in**

**Nine bipolar step motors to cover a wide range of applications**

**1-ft cable (4-wire) with locking connector on the end**

**Square frame style produces high torque and achieves best torque to volume ratio**

## 2. Choose a motor extension cable

Our 20-ft motor extension cables having a locking connector that mates up to the motor cable. The extension cables allow you to quickly connect the motor to the drive without having to splice wires or cut any cables. If you chose an STP-MTR-xxxx motor, select an STP-EXT-020 cable. If you chose an STP-MTRH-xxxx motor, select an STP-EXTH-020 cable. (The "H" motors and cable can handle higher motor current)

**20-foot extension cable with locking connector; for use with all SureStep motors**

**STP-EXT-020  
STP-EXTH-020**

## 3. Choose a drive

This chart is a quick selection guide. For a full list of features, check out the Technical Info later in this chapter.

What you need	STP-DRV-4035	STP-DRV-4850	STP-DRV-80100
32V Speed-Torque Curve (from Step 1)	✓	✓	✓
48V Speed-Torque Curve (from Step 1)		✓	✓
70V Speed-Torque Curve (from Step 1)			✓
Pulse & Direction Input	✓	✓	✓
More than 3.5A/motor phase		✓	✓
More than 5A/motor phase ("H" motors)			✓
Internal Indexing (Drive can move from Point A to Point B with a serial communication command)		✓	✓
Analog Velocity Input		✓	✓

**Optional idle current reduction**

**Adjustable microstep resolutions**

**0.1 to 10 amps (depending on drive model)**

**Optically isolated step, direction and enable inputs**

**Screw terminal connections**

**Input voltage ranges 12V-80V (depending on drive model)**

**Drive NEMA sizes 17 through 34 step motors**

# ...in 4 easy steps

## 4. Choose a power supply

Since all SureStep motors can operate at 32V, 48V, and 70V, the selection of a power supply is dependent on the selected speed-torque curve of the motor and on the selection of drive. Choose a power supply that matches the desired speed-torque curve

and stays within the voltage limit of the selected drive. Each power supply has incoming AC and outgoing DC fusing. There is also an electronically overload protected 5V supply for all your logic needs.

### Permissible Drive/Power Supply Combinations

Power Supply	STP-PWR-3204	STP-PWR-4805	STP-PWR-4810	STP-PWR-7005
Drive				
STP-DRV-4035	✓			
STP-DRV-4850	✓	✓	✓	
STP-DRV-80100	✓	✓	✓	✓

For systems that use multiple drives and only one power supply, please read our SureStep Manual (under "Product Documentation") to properly size multiple systems.

120 or 240 VAC, 50/60 Hz power input (switch selectable)

Screw terminal AC input and DC output connections

32V, 48V and 70V linear supplies

Power ON LEDs

Unregulated linear supplies perfect for stepper systems

Input and output fusing included



5 VDC ±5% at 500 mA regulated logic power

### 2-Phase Microstepping Drive

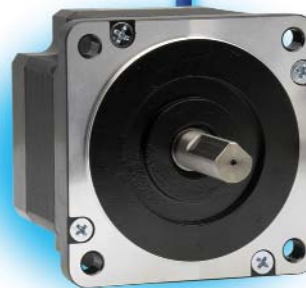


### Motor Extension Cable

### Typical System

### NEMA Step Motor

### Step Motor Power Supply



# SureStep™ Stepping Systems

## System Overview



**SureStep™  
Step Motor Power Supply**

**SureStep™  
Microstepping Drive**

**SureStep™  
Extension Cable**

**SureStep™  
Connectorized Step Motor**

The SureStep™ stepping system series includes:

- Four step motor power supplies
- One DIP-switch configurable microstepping drive
- Two software configurable advanced microstepping drives
- Two motor extension cables
- Nine step motors (NEMA 17, 23, 34 frame sizes)

## SureStep Part Number Explanation

**STP-MTRH-23079**

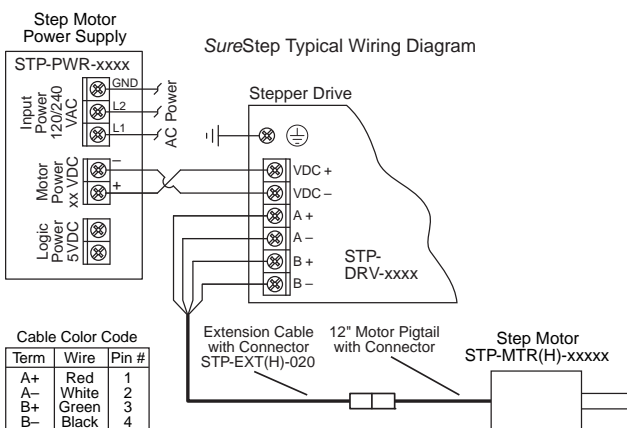
### Component Capacity

- 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



## Standard stepper drive features

- Max 3.5A, 40V
- DIP switch configurable
- Selectable microstepping: x2, x5, x10, x50 steps/revolution
- Self test feature
- Idle current reduction

## Advanced stepper drive features

- Max 5A, 48V and max 10A, 80V models available
- Software configurable
- Programmable microsteps
- Internal indexer (via ASCII commands)
- Self test feature
- Idle current reduction
- Anti-resonance
- Torque ripple smoothing
- Step, analog, & serial communication inputs
- Serial communications allow point-to-point positioning

## Motor features

- High torque, 2-phase, bipolar, 1.8° per step, 4-lead
- (2) NEMA 17 motors
- (3) NEMA 23 motors
- (4) NEMA 34 motors

## Power supply features

- Linear, unregulated DC power supplies
- 120/240 VAC selectable input
- 32V, 48V, 70V DC output models available
- All models have additional 5VDC, 500 mA regulated logic supply
- Fusing included for both incoming AC and outgoing DC
- 5V supply has electronic overload protection

### SureStep™ System Recommended Component Compatibility

Drives (1)	Power Supplies (1)	Motors & Extension Cables (2,3)
STP-DRV-4035	-	-
STP-DRV-4850	-	STP-MTR-xxxxx & STP-EXT-020
STP-DRV-80100	STP-PWR-4805 STP-PWR-7005	STP-PWR-3204 STP-MTRH-xxxxx & STP-EXTH-020

**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.**

Company Information

Systems Overview

Programmable Controllers

Field I/O

Software

C-more & other HMI

Drives

Soft Starters

Motors & Gearbox

Steppers/Servos

Motor Controls

Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Current Sensors

Pressure Sensors

Temperature Sensors

Pushbuttons/Lights

Process

Relays/Timers

Comm.

Terminal Blocks & Wiring

Power

Circuit Protection

Enclosures

Tools

Pneumatics

Appendix

Product Index

Part # Index