

Stepping Drives

Ever Stepper Drives

The Titanio family of drives from Ever Motion Solutions (formerly Ever Elettronica) are high performance vector stepper drives that provide industryleading quality and control. The drives are available in Open Loop (no encoder feedback) and Closed Loop (motor-mounted encoder provides position feedback to the drive). Like most Closed Loop stepper drives, Ever's Titanio drives can alert the upper control system if a motor stalls (Stall Detection). However, the Ever Titanio drives also have Stall Detection capability in Open Loop control mode: the drive uses the motor's back EMF to monitor motor movement. This means the Titanio drives can detect and report Stall Detection without encoder feedback.

The Titanio drive technology is based on ELSE – Error Less Servo Efficient – technology pioneered by Ever. ELSE provides precise sinusoidal stepper motor current control. ELSE is built on the f4d2 (Fast Forward Feed Full Digital Drive) technology. The proprietary and patented f4d2 algorithms reduce the parasitic phase current harmonics that cause unnecessary motor heating and noisy/ inefficient motor operation.



The breakthrough of ELSE technology and the f4d2 algorithms result in greatly improved phase current control and near "stepless" operation of stepper motors. The benefits of better and smoother current control include:

- drastic reduction of motor noise
- extremely smooth movement of the motor, regardless of microstep resolution
- significant damping of motor vibrations and resonances
- increased positioning accuracy
- · better and more constant torque output at every rotational speed
- · less heating and higher efficiency of the motor and drive system
- all drives with ELSE technology also have BEMF stall detection, with or without encoder feedback

For more information on f4d2: https://www.everelettronica.com/en/technologies/f4d2-fast-forward-feed-full-digital-drive

For more information on ELSE: https://www.everelettronica.com/en/technologies/-else-technology-for-different-type-of-motors

For more information on Closed Loop stepper technology: <u>https://www.everelettronica.com/en/technologies/closed-loop-of-torque-speed-and-position-systems</u>

The Titanio drives are available in models with complete drive setup using DIP switches only, as well as models that can be finetuned and set up with free Ever Studio software in addition to DIP switch setup.

Features

- ELSE[®] (ErrorLess Servo Efficient) step loss detection without encoder
- Quiet and smooth operation
- 36 month warranty
- Closed Loop for drive LW4D
- Protection against short circuit and open circuit
- Alarms for over/under voltage, temperature, short circuit
- Basic setup configured by DIP switches, optional advanced software setup for LW3A and LW4D drives

Ενε	Ever Steppers – Drive Feature Comparison								
Drive Model	LW4D3070N2I1-00	LW3D3070N0A1-00	LW3A9030N2A1-00						
Price	\$105.00	\$205.00	\$290.00						
Drawing	PDF	PDF	PDF						
Drive Type	2-phase dig	ital stepper drive for hybrid ste	pper motors						
Supply Voltage	24–75 VDC	24-80 VDC	100–240 VAC						
Pulse Input Type		Differential, Single-ended							
Step Input Modes	Differential, Single-ended, AB Quadrature	, Single-ended, uadrature Differential, Single-ended							
Digital Input Voltage	5–24 VDC	2–24 VDC	5–24 VDC						
PPR Range	200–25600 (DIP switch) 200–65536 (software)	200–51200 (DIP switch)	200–2000 (DIP switch) 200–65536 (software)						
Motor Output Current Range	0.0–7.1 (A/ph rms) 0.0–10.0 (A/ph peak)	1.7– 7.1 (A/ph rms) 2.4–10.0 (A/ph peak)	0.0–3.0 (A/ph rms) 0–4.2 (A/ph peak)						
Digital Output	2 opto-isolated, 5–24 VDC, 100mA max NPN or PNP for Alarm and In Position	1 opto-isolated, 24VDC, 400mA max, , NPN or PNP for Alarm	1 opto-isolated, 24VDC, 400mA max PNP or NPN for Alarm						
Self-test Capable	Software-based (internal indexing)	Pulse Input Test (LEDs signal if the incoming pulse rate is 0Hz, <1kHz, or ≥1kHz))	Software-based (internal indexing)						
Special Features	Advanced software setup	-	Basic software setup						



Stepping Drives

Ever Stepper Drive Feature Overview

Vector Control

The sinusoidal phase current with "ELSE" technology keeps the motor torque constant allowing smooth and noiseless movements.



Drive Model Number Explanation



Easy Drive Configuration

- Set motor current value using dip-switches. Option to set motor current with Ever Studio software (LW3A and LW4D)
- Select step angle using roto-switches. Option to set motor current with Ever Studio software. Step angles have been emulated through software to maintain compatibility with traditional drives. Current regulation is always sinusoidal.
- Enable motor stall detection with DIP switches (LW3D, LW3A) or software (LW4D)..
 By reading the motor BEMF, LWx drivers detect step loss without encoder input. Drive displays alarm status with Fault digital OUT and an LED sequence.
- DIP switches to select Step/Direction or CW/CCW control mode.
- ENABLE input can be set for active high or active low.
- 30% or 70% automatic current reduction (when motor is not moving).
- Enable "Clock Test" function during drive installation to show the presence of the high speed pulse signals via status LED flashes (LW3D).

PLC	Clock frequency					
		Status	LEDs			
	LED1	LED2	Meaning			
	Green Red No incoming pul					
	Green flash Yellow Incoming pulses < 1					
	Green flash	Red	Incoming pulses > 1kHz			



Even at 1/4 stepping, Ever's vector current control results in smooth motor operation and low motor temperatures







Stepping Drives

LW4D3070N2I1-00 Stepper Drive

The LW4D from Ever Motion Solutions (formerly Ever Elettronica) is a high-performance vector stepper drive from Ever's Titanio family. The LW4D is a two-phase stepper drive that can run in Open Loop mode (no encoder) or Closed Loop mode (motor-mounted encoder), will accept an incoming voltage of 24-75VDC, and can power hybrid bipolar stepper motors with up to 10A peak output current. The LW4D can be setup via DIP switches to run with many SureStep motors (see below), or can be configured via Ever Studio software to run almost any stepper motor.

The stepper drive utilizes Ever's ELSE (Error Less Servo Efficient) technology that supplies the motor with sinusoidal current, resulting in reduced harmonic currents, lower motor temperature, and smoother/quieter motor operation. The LW4D can detect motor stall in Closed Loop mode (monitoring the motor encoder), but also has **sensorless motor stall detection** when running in Open Loop mode to detect missed motor steps (machine jams, overload conditions, etc.). The drive has built-in protections that include overcurrent, under/over voltage, overheating, and motor output short circuit protection.

The LW4D has been pre-configured to work with SureStep motors that have encoders mounted on the rear shaft. A rotary DIP switch on the unit will automatically set up the drive to run these motors in Closed Loop (encoder feedback) mode. No software is needed to run these motors in Closed Loop mode.

Rotary Switch Position	Preconfigured Motor Part Number
0	STP-MTRL-14026E
1	STP-MTRL-14034E
2	STP-MTR-17040E
3	STP-MTR-17048E
4	STP-MTR-17060E
5	STP-MTR-23055E
6	STP-MTR-23079E
7	STP-MTRH-23079E
8	STP-MTR-34066D
9	STP-MTRH-34066D
А	STP-MTRH-34097D
В	STP-MTRH-34127D
С	STP-MTRAC-42100D
D	STP-MTRAC-42151D
E	STP-MTRAC-42202D
F	Software Configurable

To run one of the SureStep motors in Open Loop mode (no encoder feedback) or to configure the drive to run any other stepper motor, choose rotary position "F". The motor settings can then be configured with Ever Studio software. The software is available for free download at AutomationDirect (requires USB-serial cable EVER-PGM-1).

Ever Studio can be used to modify all drive parameters and can be used to troubleshoot your system. The software includes a built-in Oscilloscope feature to monitor values and has the ability to jog and index the motor without needing the PLC's high-speed pulses.

Download the AutomationDirect LW4D QuickStart Guide to get your system up and running quickly. The QSG can be found on the LW4D Item Page (link in chart below) and includes step by step instructions on how to configure the drive and navigate the Ever Studio software. Really. Download the QSG. Now.



LW4D3070	V2I1-00 Drive Specifications
Drive Model	LW4D3070N2I1-00
Power Supply Voltage	24–75 VDC
Digital Input Voltage	5–24 VDC
Output current	0.0–7.1 (A/ph rms) 0.0–10.0 (A/ph peak)
Control mode	Pulse + Direction, CW/CCW, AB Quadrature (quadrature only available through software when rotary switch is set to 'F')
Power stage	H bridge bipolar chopper at 40 kHz
Feedback Interface	Incremental encoder input 5VDC differential RS422 non-isolated
Digital Inputs	3 opto isolated 5–24VDC NPN or PNP or Line Driver
Digital Outputs	2 opto isolated, 5–24 VDC, 100mA
Open or Close Loop	Open or Closed
Step Resolution	From full step up to 1/128 and from full step up to 1/100 step (emulated).
PPR Range	200–25600 (DIP switch) 200–65536 (software)
Safety Protections	Over/Under voltage, Over Current, Over Temperature, Short Circuit Phase/Phase and Phase/Ground
Status Monitoring	2 LEDs (green and red/yellow)
Operating Temperature	5 to 40 °C [41 to 104 °F]
Storage Temperature	-25 to +55 °C [-13 to 131 °F]
Operating Humidity	5–85 %
Protection class	IP20
Mounting	Wall mount
Dimensions H x L x W	118.0 x 25.5 x 75.5 mm
Weight	0.25 Kg
Agency Approvals	CE



Stepping Drives

LW4D3070N2I1-00 Input/Output Wiring

Digital Input Wiring

Differential PNP, NPN, and Line Driver type.





Note: EVER-PGM-1 connection to LW4D. Ensure the white and green/yellow wires are facing toward the front of the drive.



Digital Output Wiring

Digital outputs are 5–24 VDC PNP/NPN, I_{OUT}=100mA, F_{MAX}= 2kHz





Stepping Drives

LW4D3070N2I1-00 Drive with Preconfigured Motors

The LW4D stepper drive can run in both closed and open loop. The rotary switch is used to select from 14 different preconfigured motors in the drive. The table on this page shows these settings.

When selection 0 through E are chosen the drive configuration cannot be changed with software, but you can still troubleshoot and monitor the drive using Ever Studio. When set to positions 0-E the drive will not operate in open loop–it must have encoder feedback. Also, for positions 0–E the drive's micro-step resolution setting is 800 steps per revolution (1/8th step) and cannot be changed in software. If you need to run in open loop, a different resolution or encoder PPR, then choose rotary selection "F". AutomationDirect recommends Line driver encoders for this purpose, but open collector encoders will also work.

The SureStep NEMA 14, 17, and 23 "E" model motors already come with the correct encoder attached and the drive is configured for the default PPR on the encoder. Do not change the default encoder setting of 400 PPR. The drive is configured to use the x4 value of 1600 and cannot be changed when the rotary switch is set to 0 through 7. The encoder that is mounted to the rear end cap is a line driver encoder (AMT112Q-V). Purchase an AMT-17C-1-xxx signal cable to connect the AMT112Q encoder to the LW4D drive.

Note: The default PPR of the AMT112Q-V premounted to the "E" model motors is set for 400 PPR. If you purchase this encoder separately it will be configured by default to 2048 PPR. AMT-PGRM-17C programming cable will be required to change this to 400 PPR.

For the SureStep NEMA 34 and 42 stepper motors there are no "E" models (motors with encoders pre-mounted). You must purchase a dual shaft "D" motor (STP-MTR-34066D, STP-MTRAC-42100D, etc.) and field mount the encoder. We suggest using AMT132Q-V line driver encoders with these motors.

- The AMT132Q-V encoder is configured by default to 2048 pulses per revolution (quadrature = x4 = 8192 counts/rev). For NEMA 34 and 42 motor settings (LW4D rotary DIP switch positions 8 E), the LW4D is set up to use the default AMT132Q-V default PPR, so there is no need to reconfigure the AMT132Q-V for use with the LW4D.
- To wire an AMT132Q-V encoder to the LW4D drive, purchase an encoder signal cable (AMT-18C-3-xxx).
- The NEMA 42 motors also require an encoder adapter mounting kit (STP-MTRA-42ENC).

Preconfigured Motors with Ever Drives									
Rotary Switch Position	Preconfigured Motor Part Number	NEMA Frame Size	Phase Current (A rms)	Holding Torque (oz-in)	Inertia (Kg∙cm ²)	Frame Stack Size	Encoder	Encoder Cable	Default PPR of Encoder (do not change)
0	STP-MTRL-14026E	14	0.35	8	0.0003	Single			
1	STP-MTRL-14034E	14	0.8	20	0.00035	Double			400
2	STP-MTR-17040E	17	1.7	61	0.05	Single			
3	STP-MTR-17048E	17	2	83	0.07	Double	AMT1120 V	AMT-17C-1-xxx	
4	STP-MTR-17060E	17	2	115	0.1	Triple	AIVITTZQ-V		
5	STP-MTR-23055E	23	2.8	166	0.27	Single			
6	STP-MTR-23079E	23	2.8	276	0.48	Double			
7	STP-MTRH-23079E	23	5.6	286	0.48	Triple			
8	STP-MTR-34066D	34	2.8	434	1.4	Single			
9	STP-MTRH-34066D	34	6.3	434	1.4	Single			
А	STP-MTRH-34097D	34	6.3	800	2.71	Double	AIVIT132Q-V		2048
В	STP-MTRH-34127D	34	6.3	1288	4.01	Triple		AMT-18C-3-xxx	
С	STP-MTRAC-42100D	42	4.2	12.2 N·m	5.5	SIngle	AMT132Q-V		
D	STP-MTRAC-42151D	42	6	22 N·m	10.9	Double	and mounting kit	;	
E	STP-MTRAC-42202D	42	6	31 N·m	16.9	Triple	STP-MTRA-42ENC		
F	F Software Configurable								



Stepping Drives

LW3D3070N0A1-00 Stepper Drive

The LW3D from Ever Motion Solutions (formerly Ever Elettronica) is a highperformance vector stepper drive from Ever's Titanio family. The LW3D is a two-phase stepper drive that operates in Open Loop mode (no motor encoder required). The drive accepts an incoming voltage of 24-80VDC, and can power hybrid bipolar stepper motors with up to 10A peak output current. The LW3D is completely setup via DIP switches (no software required) and can run most 2-phase hybrid stepper motors.

The LW3D stepper drive utilizes Ever's ELSE (Error Less Servo Efficient) technology that supplies the motor with sinusoidal current, resulting in reduced harmonic currents, lower motor temperature, and smoother/ quieter motor operation. The LW3D has sensorless motor stall detection that detects motor missed steps (machine jams, overload conditions, etc.) without the need for encoder feedback. The drive has built-in protections that include overcurrent, under/over voltage, overheating, and motor output short circuit

protection.

The DIP switches on the LW3D provide setup and configuration for the drive and motor (step angle, phase current, Step/Direction vs CW/CCW, etc.), but they also provide some unique features:

- Clock Test: This feature uses the status LEDs to show if the incoming PLC high-speed pulses are 0Hz, <1kHz, or >1kHz. This greatly simplifies troubleshooting high-speed pulses without the need for an oscilloscope.
- Torque Filter: While the LW3D results in a smoother and quieter motor than other stepper drives, the second rotary DIP switch allows each application to be fine-tuned with a built-in Torque Filter. This rotary DIP switch allows each application to find a balance between noise and power. The default setting is None (no filtering). If your system could use additional motor smoothness, simply increase the Torque Filter until the system responds as needed. Tuning, simplified.



LW3D3070N0A1-00 Drive Specifications					
Drive Model	LW3D3070N0A1-00				
Power Supply Voltage	24-80 VDC				
Digital Input Voltage	2–24 VDC				
Output current	1.7–7.1 (A/ph rms) 2.4–10.0 (A/ph peak)				
Control mode	Pulse + Direction, CW/CCW				
Power stage	H bridge bipolar chopper at 40 kHz				
Feedback Interface	n/a				
Digital Inputs	4 opto isolated 2–24VDC 2 MHz NPN or PNP or Line Driver.				
Digital Outputs	4 opto isolated, 2–24 VDC, NPN, PNP or Line Driver, 2 MHz				
Open or Close Loop	Open				
Step Resolution	From full step up to 1/256 (emulated)				
PPR Range	200–51200				
Safety Protections	Over/Under voltage, Over Current, Over Temperature, Short Circuit Phase/Phase and Phase/Ground				
Status Monitoring	2 LEDs with guiding light (solid green and flashing red/yellow)				
Operating Temperature	5 to 40 °C [41 to 1104 °F]				
Storage Temperature	0 to +55 °C [32 to 131 °F]				
Operating Humidity	0–90 %				
Protection class	IP20				
Mounting	Wall mount				
Dimensions H x L x W	128.0 x 30.0 x 74.0 mm				
Weight	0.29 Kg				
Agency Approvals	CE				





LW3D3070N0A1-00 Input/Output Wiring

Digital Input Wiring

Differential PNP, NPN, and Line Driver type.



Digital Output Wiring





CAUTION: THE FAULT OUTPUT IS NOT PROTECTED IN CURRENT. PROVIDE AN EXTERNAL CURRENT LIMITATION DEVICE (I_{OUTMAX}=100MA). THE PROTECTIVE DEVICE MAY BE PLACED ON THE POWER CONDUCTOR +24VDC (CN2.10).



Stepping Drives

LW3A9030N2A1-00 Stepper Drive

The LW3A from Ever Motion Solutions (formerly Ever Elettronica) is a highperformance AC-input vector stepper drive from Ever's Titanio family. The LW3A is a two-phase stepper drive that can run in Open Loop mode (no encoder needed), will accept an incoming voltage of 100-240VAC, and can power hybrid bipolar stepper motors with up to 4.2A peak output current.



CAUTION: USE ONLY HIGH VOLTAGE STEPPER MOTORS, LIKE STP-MTRAC-XXXXX AND STP-MTRACH-XXXXX, WITH A HIGH-VOLTAGE STEPPER DRIVE. THE AC INPUT RESULTS IN HIGH VOLTAGE BEING APPLIED TO THE MOTOR. STANDARD LOW-VOLTAGE STEPPER MOTORS (STP-MTR-XXXXX) CAN BE DAMAGED.

The LW3A can be setup via DIP switches to run with many high-voltage SureStep motors (STP-MTRAC-xxxxx or STP-MTRACH-xxxx). Ever's configuration software, Ever Studio, can be used to configure the drive for phase currents and step angles (microsteps) not available via the DIP switches. Ever Studio is available as a free download from AutomationDirect (LW3A requires USB-serial programming cable EVER-PGM-2).

The stepper drive utilizes Ever's ELSE (Error Less Servo Efficient) technology that supplies the motor with sinusoidal current, resulting in reduced harmonic currents, lower motor temperature, and smoother/quieter motor operation. The LW3A has sensorless motor stall detection that detects motor missed steps (machine jams, overload conditions, etc.) without the need for encoder feedback. The drive has built-in protections that include overcurrent, under/over voltage, overheating, and motor output short circuit protection.

Download the AutomationDirect LW3A QuickStart Guide for step-by-step instructions on how use Ever Studio to fine-tune the min/max motor currents and step angle (microstep resolution). The LW3 QuickStart Guide can be found on the LW3A Item Page (link in chart below).



LW3A9030N2A1-00 Drive Specifications						
Drive Model	LW3A9030N2A1-00					
Power Supply Voltage	100–240 VAC					
Digital Input Voltage	5–24 VDC					
Output current	0.0–3.0 (A/ph rms) 0–4.2 (A/ph peak)					
Control mode	Pulse + Direction, CW/CCW					
Power stage	H bridge bipolar chopper at 40 kHz					
Feedback Interface	n/a					
Digital Inputs	4 opto isolated 5–24 VDC NPN or PNP or Line Driver					
Digital Outputs	1 opto isolated, 24VDC 400mA PNP or NPN for FAULT					
Open or Close Loop	Open					
Step Resolution	Full Step, ½, ¼, 1/8, 1/2.5, 1/5, 1/10 configurable bymeans of Dip-Switches and other step angle can be set with software					
PPR Range	200–2000 (DIP switch) 200–65536 (software)					
Safety Protections	Over/Under voltage, Over Current, Over Temperature, Short Circuit Phase/Phase and Phase/ Ground					
Status Monitoring	2 LEDs with guiding light (solid green and flashing red/yellow)					
Operating Temperature	5 to 40 °C [41 to 104 °F]					
Storage Temperature	-25 to +55 °C [-13 to 131 °F]					
Operating Humidity	5–85 %					
Protection class	IP20					
Mounting	Wall mount					
Dimensions H x L x W	152.0 x 130.0 x 46.0 mm					
Weight	0.80 Kg					
Agency Approvals	CE					





LW3A9030N2A1-00 Input/Output Wiring

Digital Input Wiring

Differential PNP, NPN, and Line Driver type.



Digital Output Wiring

24VDC - PNP/NPN photo relay output (optoisolated)

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lout<sub>MAX</sub> = 400mA
F<sub>MAX</sub> = 250Hz
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Stepping Drives

LW3A9030N2A1-00 Bipolar Drive Wiring

The LW3A AC drive allows high voltage AC stepper motors to be run in either Series or Parallel wiring. Only use step motors rated for a high DC bus voltage. Standard lower DC voltage step motors will be damaged when driven by this drive.

If the motor's rated parallel-wired current is not higher than the drive's rated current, wire the motor for parallel operation: a parallel wired motor has higher torque and speed than the same motor wired in series.

Example 1:

STP-MTRAC-34115 can be used with the LW3A drive wired in series or parallel (both values are within the drive's output range):

Series Parallel STP-MTRAC-34115 2.05A 4.1A

Wire this motor in parallel to get more available torque and a higher max speed.

Example 2:

STP-MTRAC-42100 should only be used with the LW3A wired in series (the parallel-wired current exceeds the drive max output).

Series Parallel

STP-MTRAC-42100 4.2A 8.4A

Note: Motors with rated phase currents greater than the drive maximum 4.2A can be used. The resulting torque will be proportionally lower than the motor rated torque: The STP-MTRAC-42151 is rated for 6A (series wiring). Used with an LW3A drive, the motor will generate roughly 2/3 of the motor's rated torque.





Bi-polar series

Bi-polar parallel



STP-MTRAC-34075(x) STP-MTRAC-34115(x)





Bi-polar parallel



Stepping Drives

Ever Stepper Drive Accessories

ever

E-MOTION SOLUTIONS

Ever Stepper Drive Accessories							
Part Number	Price	Description	Drawing Links	Use With			
<u>EVER-PGM-1</u>	\$89.00	Ever Motion Solutions programming cable, USB A connector to 4-pin connector, 6ft cable length. For use with Ever Motion Solutions LW4D3070N2I1-00 microstepping drive.	n/a	LW4D3070N2I1-00			
EVER-PGM-2	\$89.00	Ever Motion Solutions programming cable, USB A connector to RJ11, 6ft cable length. For use with Ever Motion Solutions LW3A9030N2A1-00 microstepping drive.	n/a	LW3A9030N2A1-00			
<u>LW4D3KIT-C0</u>	\$8.00	Ever Motion Solutions connector kit, for use with Ever Motion Solutions LW4D3070N2I1-00 microstepping drive, includes (1) drive power connector, (1) motor power connector, (1) encoder connector and (1) control signal connector.	n/a	LW4D3070N2I1-00			
<u>LW4D3KIT-050</u>	\$60.00	Ever Motion Solutions cable kit, for use with Ever Motion Solutions LW4D3070N2I1-00 microstepping drive, includes (1) 1.6ft/0.5m power cable, (1) 1.6ft/0.5m motor extension cable, (1) 1.6ft/0.5m encoder cable and (1) control signal connector.	n/a	LW4D3070N2I1-00			
<u>LW3D-CON-A</u>	\$11.00	Ever Motion Solutions drive/motor power connector, replacement. For use with Ever Motion Solutions LW3D3070N0A1-00 microstepping drive.	PDF	LW3D3070N0A1-00			
<u>LW3D-CON-B</u>	\$20.00	Ever Motion Solutions control signal connector, replacement. For use with Ever Motion Solutions LW3D3070N0A1-00 microstepping drive.	PDF	LW3D3070N0A1-00			
<u>LW3A-CON-A</u>	\$14.50	Ever Motion Solutions drive/motor power connector, replacement. For use with Ever Motion Solutions LW3A9030N2A1-00 microstepping drive.	PDF	LW3A9030N2A1-00			
<u>LW3A-CON-B</u>	\$28.50	Ever Motion Solutions control signal connector, replacement. For use with Ever Motion Solutions LW3A9030N2A1-00 microstepping drive.	PDF	LW3A9030N2A1-00			



EVER-PGM-1



EVER-PGM-1 connection to drive



EVER-PGM-2



LW4D3KIT-C0



LW4D3KIT-050



LW3D-CON-A



LW3D-CON-B



LW3A-CON-A



LW3A-CON-B

1-800-633-0405

For the latest prices, please check AutomationDirect.com.



Stepping Drive Accessories

Ever Studio Drive Software

Ever Studio is a Windows PC software tool for the configuration of Ever's LW4D and LW3A series stepper drives. The software allows easy modification of drive parameters. Ever Studio allows more flexibility in configuring a motor than DIP switches. For example, LW3A has 6 DIP switch options for Step Angle, but Ever Studio can set the drive for many other microstep settings. Ever Studio also allows jogging/indexing of LW4D and has a built-in oscilloscope to help with tuning and debugging the LW4D.

System requirements:

- CPU: Intel i3 or better
- Operating System: Windows 7/8/8.1/10/11
- Memory: 512MB over the Windows OS requirement
- Hard Disk: 50MB free space
- Communications Interface: PC's USB to the drive's serial service interface (using <u>EVER-PGM-1</u> or <u>EVER-PGM-2</u> cable)



		Ever Steppe	er Drive Software		
Part Number	Price		Description	Use With	
<u>EVER-STUDIO</u>	Free	Ever Motion Solutions Wind download only. For use with with service interface port.	dows configuration software, free n Ever Motion Solutions stepper drives Requires PC USB port.	<u>LW4D3070N2I1-00</u> LW3A9030N2A1-00	
	Εv	er Stu	dio		ATTENTION!!! Correct insertio direction of the CN6: TAB UP.
the clever of	In the second seco	NVN Stude- Nebase L.2 / (n.44: 0) - options: Heige - etting: - etting: - onfiguration: 490 - Bu: Modulas: Store/Restore - Working Setting: - Motor Rotalian Direction - Endale L2 Poteckion - Endale	Dive lafo & Communication Interface: Service Scale Aussie Firmmane Venture: Firmmane Venture: Firmma	Direct Commands Move for encade Store for add Store for add Store for add Store for add Move f	Steps Roation: Steps Roation: Steps: Current,Actual/Value: Curre



Stepper Systems

Complete SureStep system in 4 components: Power Supply, Stepper Drive, Motor Extension Cable, Motor. Standard Drives (pulse and direction input; DIP-switch configuration) and Advanced Drives (communication/analog control and setup) are available.



Complete SureStep system in 2 components: Power Supply and Integrated Stepper Motor/Drive. Standard Motor/Drives (pulse and direction input; DIP-switch configuration) and Advanced Motor/ Drives (communication/analog control and setup) are available.





Stepping System Overview

High-performance microstepping drives with high-torque stepping motors

SureStep stepping systems provide simple and accurate control of position and speed. Pulses (or "step" and "direction" signals) from an AutomationDirect PLC or other indexer and motion controller 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 SureStep family has options for open loop control (no encoder), position monitoring (external encoder feedback), and inclusive position verfication (integrated motor/drives with internal encoder). Inclusive position verification provides for stall prevention and detection along with position completion after a temporary stall.

SureStep stepper drives support a wide range of selectable microstep resolutions, from 200 steps per revolution (full step) to 51,200 (full step \div 256) steps per revolution, depending on model.

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

FREE configuration software!

SureMotion Pro software is available that makes setting parameters a snap for the advanced drives and advanced integrated motor/drives! SureMotion Pro replaces SureStep Pro configuration software. Download free from our website:

https://support.automationdirect.com/products/surestep.html

Standards and Agency Approvals

How fast can my system go?

Maximum Potential Speed Chart (rpm) *							
PLC		SureSte	p Drive Step	os/Rev Sele	ction **		
Model	Max Output (kHz)	400 1000 Steps/Rev Steps/Rev S		2000 Steps/Rev	10,000 Steps/Rev		
DL05, DL105	7	1,050	420	210	42		
DL06	10	1,500	600	300	60		
H0/H2/H4/T1H -CTRIO	25	>2,500***	1,500	750	150		
H2-CTRIO2	250	>2,500*** 1,500					
P2-HSO	1000	>2,500***					
P3-HSO	1000	>2,500***					
BRX	2000		>2,5	00***			

* These speeds are theoretical maximums. See torque curves of specific motors for their rpm limits.

** Full step (200 steps/rev) will allow higher top speed.

Full stepping, however, can create vibration at low speed.

*** Typical stepper systems do not run faster than 2500 rpm.

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

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

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



Stepping System Overview

Two or Four components to make a complete system

Choose an integrated motor/drive and power supply



OR . . .

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





1-800-633-0405



For the latest prices, please check AutomationDirect.com.

Stepping System Overview

NEMA frame stepping motors

The SureStep stepping family has a wide variety of high-torque motors to handle a wide range of automation applications such as woodworking, assembly, and test machines. The motors are available in both single-shaft and dual-shaft configurations, with or without an encoder. Our square frame or "high-torque" style stepping motors are the latest in bipolar technology, resulting in very high torque to volume ratios. We have NEMA 14, 17, 23, 34, and 42 size motors with holding torque ranging from 8 to

4532 oz-in. Wash down "W" motors (IP65) are also available. Optional 6, 10, or 20-foot extension cables with locking connectors are available to interface any of the stepping motors to the microstepping drive, except the NEMA 23 and NEMA 34 STP-MTRAC-x motors. Those MTRAC motors have an integrated 10-foot pigtail cable. The

Holding Torque (oz·in)





Note that the integrated motor/drive systems have a lower maximum torque due to heat constraints with the drive connected to the motor. For solutions requiring the highest torque, use the systems with our NEMA MTRH (low voltage, higher torque) or MTRAC (high voltage, high torque) motors.



extension cables can be easily cut to length, if desired. Integrated motor/drives and separate motors with an "E" in their part number include an encoder for position feedback. The MTRAC motors are designed to work with 115 or 230 VAC powered drives and can withstand high voltages. This allows higher torque, especially at higher speeds.



Holding Torque (oz·in) Integrated Motors/Drives (MTRD)





Note: While possessing similar holding torques, the MTRACH motors have much higher torque at high speeds than the MTRAC motors.



For the latest prices, please check AutomationDirect.com. Stepping System Overview

NEMA frame stepping motors, continued

SureStep Stepper Linear Actuators combine all the great features of our stepper motors with a lead screw as the motor's shaft. NEMA 17 and 23 frame size motors are available with leads from 1.25mm/rev to 1inch/rev.



High-performance microstepping drives

SureStep microstepping drives (STP-DRV-4035,-4830,-4845,-6575, & STP-MTRD-x)

- SIP-DRV-4035,-4830,-4845,-05/5, & SIP-MIRD-X)
- Standard high-speed pulse input (pulse and direction)
- On-board or removable screw terminals for easy hook-up
- Optically-isolated inputs ready for +5VDC logic from AutomationDirect PLCs, or 5–24 VDC (depending on model)
- No software or add-on resistors required for drive configuration; dipswitch and/or rotary-dial setup
- Dipswitch used for built-in self-test, microstep resolution selection, current level selection, and optional idle current reduction.
- Optional external encoder feedback for integrated models

SureStep high bus voltage microstepping drives (STP-DRVAC-24025)

- Auto-setup measures motor parameters and configures motor current control and anti-resonance gain settings
- \bullet Uses universal AC input 90 to 240 VAC, AC input voltage must be selected by switch
- Switch selectable microstep resolution, 16 settings from 200 to 25600 steps/rev
- Switch configurable running current, anti-resonance, input signal filter, step smoothing filter, and self test
- Motor selection via 16-bit rotary switch

SureStep advanced microstepping drives (STP-DRV-4850, STP-DRV-80100, & STP-MTRD-xR)

All the features of the standard 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)
- · AB quadrature/encoder following for all advanced models
- Advanced "E" integrated models contain a built-in encoder (encoder is not accessible and not available for signaling outside the drive)

Power supplies

- SureStep 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
- Switching power supplies also available (12V, 24V, 48V)



Choose your SureStep System

Choose a motor

NEMA 17, 23 and 24

integrated motor/drives

Determine the torque and speed required by your application. Then look at the motor speed-torque curves in the Motors and Standard Integrated and Advanced Integrated sections of this catalog chapter, or the thrust-speed curves for Linear Actuators. Choose a standalone or integrated motor or linear actuator that can run your application with plenty of speed and torque/thrust reserve (most stepper systems should have a 100% safety margin for torque/thrust). If encoder feedback is desired, be sure to choose a "D" or "E" model motor, or "ADJ" model actuator. If an IP65 rating is desired, choose a "W" motor (no IP65 linear actuator models available at this time).

Note: If you chose an Integrated motor/drive, you can skip to "Choose a Power Supply". If you chose an STP-MTRAC-23xxx or -34xxx motor, you are done. These motors use the <u>STP-DRVAC-24025</u> drive, have no motor extension cable (10' leads on the motor), and require no power supply (the drive uses AC input power). Note: The STP-MTRAC-42xxx motors cannot use the <u>STP-DRVAC-24025</u> drive as it doesn't provide enough current. NEMA 14, 17, 23, 34, and 42 mounting flanges

Variety of bipolar step motors to cover a wide range of applications

Holding torque ranges from 8 to 4532 oz·in

Single-shaft, Dual-shaft, IP65, high bus voltage, and encoder-mounted models available (Linear series does not have high bus voltage or IP65 models)

> 1-ft cable with locking connector on the end (not for linear actuators) (NEMA 23/34 MTRAC motors have 10' leads)

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

NEMA 42 MTRAC(H)



2 Choose a motor extension cable

[If you chose an Integrated motor/drive in Step 1, skip to "Choose a Power Supply"; an extension cable is not required.]

Our 6-, 10-, and 20-ft motor extension cables have 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.

Note: All NEMA 23/34 STP-MTRAC-x motors have integrated 10-foot cables and don't need an extension cable.

SureStep Motor / Cable Compatibility						
Motor	Cable					
STP-LE17 series linear actuator	STP-LA-EXT17-xx					
STP-LE23 series linear actuator	STP-LA-EXT23-xx					
STP-MTR-xxxx	STP-EXT-0xx					
STP-MTR-xxxxW	STP-EXTW-0xx					
STP-MTRAC-23xxx/34xxx	None					
STP-MTRAC-42xxx	STP-EXT42-0xx					
STP-MTRACH-42xxx	STP-EXT42H-0xx					
STP-MTRH-xxxx	STP-EXTH-0xx					
STP-MTRH-xxxxW	STP-EXTHW-0xx					
STP-MTRL-xxxx	STP-EXTL-0xx					

20-foot extension cable with locking connector



NEMA 17 and 23 linear actuators





Choose your SureStep System

3 Choose a drive

Note: If you chose an Integrated motor/drive in Step 1, skip to "Choose a Power Supply"... you have already chosen your drive. If you chose STP-MTRAC-23xxx or STP-MTRAC-34xxx, you are done - these motors use the STP-DRVAC-24025 drive and don't require an extension cable or DC power supply.

Note: The STP-MTRAC-42xxx motors cannot use the <u>STP-DRVAC-24025</u> drive as it doesn't provide enough current. The chart below is a quick selection guide. For a full list of features, check out the Technical Info later in this chapter. The requirements for what you will need from a drive are determined by your applications. Deciding whether you plan to operate the drive via high-speed pulses, analog control, encoder following, or communication commands is an important factor. The voltage supplied to the drive as determined by the speed torque curves is another important factor to consider when choosing a drive. If you need to select a drive based on RMS step motor phase current, please see the next page.

- Standard and Advanced Drives and Integrated Motor/Drives can accept high-speed pulse input control.
- Advanced Drives and some Integrated Motor/Drives can also accept serial communication control.
- STP-MTRAC-23xxx and -34xxx and STP-DRVAC motors and drives are designed for use with high voltages. These components are not designed to work at low voltages (12V, 32V, 48V, 70V).



STP-MTRD Series



What you need	STP- DRV- 4035	STP- DRV- 4845	STP- DRV- 4850	STP- DRV- 6575	STP- DRV- 80100	STP- MTRD- 17x(E)	STP- MTRD- 23x(E)	STP- MTRD- 17xR(E)	STP- MTRD- 23xR(E)	STP- MTRD- 24xRV(E)
12V Speed-Torque Curve (from Step 1)	-	-	-	-	-	\checkmark	~	~	\checkmark	√
32V Speed-Torque Curve (from Step 1)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	~	~	\checkmark	√
48V Speed-Torque Curve (from Step 1)	-	\checkmark	\checkmark	\checkmark	\checkmark	-	√	-	\checkmark	~
70V Speed-Torque Curve (from Step 1)	-	-	-	-	\checkmark	-	\checkmark	-	\checkmark	\checkmark
More than 3.5A/motor phase	-	~	✓	~	~	-	-	-	-	-
More than 5A/motor phsae ("H" motors)	-	-	-	\checkmark	\checkmark	-	-	-	-	-
Supply voltage	12–32	24–48	24–48	24–65	24–80	12–48	12–70	12–48	12–70	12–70
Digital Input Voltage	5V (12V*, 24V*)	5–24V	5V (12V*, 24V*)	5–24V	5V (12V*, 24V*)	5–24V	5–24V	5–24V	5–24V	5–24V
Internal Indexing (Drive can move from point A to point B with a serial communication command)	-	-	\checkmark	-	\checkmark	-	-	✓	\checkmark	V
High-speed pulse input	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	~
Analog Velocity input	-	-	✓	-	~	-	-	✓	√	~
Position Verification (internal encoder)	-	-	-	-	-	-	-	E models only	E models only	E models only
External encoder	-	-	-	-	-	E models only	E models only	-	-	-
RS-232 communication (ASCII)	-	-	\checkmark	-	\checkmark	-	-	-	-	-
RS-485 communication (ASCII)	-	-	-	-	-	-	-	1	\checkmark	~
Variable I/O (I/O can be either a digital input or digital output)	_	-	-	_	-	_	-	-	-	\checkmark

* External dropping resistor required for 12V and 24V I/O use. See Product Data Sheet for wiring details and resistor values.



Choose your SureStep System

3a. Using RMS Step Motor Phase Current to Select an Appropriate Stepper Drive Rated in Peak Phase Current

(Drive Amps)_{peak} = 1.2 x (Motor Amps)_{RMS}

Generic stepper drives usually have output current specified in peak phase current while stepper motors will have their phase current specified in RMS phase current. This can cause suboptimal drive to motor pairing unless this is understood. There is no need to understand this difference if you are selecting a system that uses the SureStep drives that are tuned for specific SureStep motors. These drives will have a rotary switch setting (STP-DRV-6575 and STP-DRVAC-24025) or a motor selection in the SureMotion Pro software (STP-DRV-4850 and STP-DRV-80100). These drives when properly paired with a SureStep motor will output 1.2 times the motor rated phase current. When choosing a drive that only has current selections instead of motor specific selections you will want to select a peak current that is 1.2 times the motor's listed RMS current. The true peak drive current value would be 1.4 times the RMS motor value but this amount of current will cause a lot of motor heating and the torque at higher speeds will actually suffer with due to higher back electro-magnetic force caused by the inductive field of the coils changing polarity quickly.

Example of a SureStep matched stepper system

To use an <u>STP-MTR-23055</u> motor with a <u>STP-DRV-6575</u> drive, the drive's rotary switch should be positioned to selection 9 (STP-MTR-23055x). The <u>STP-MTR-23055</u> has a phase current of 2.8 A (RMS), so the drive will actually output 1.2 x 2.8 A (RMS) = 3.36 A (peak). You do not need to calculate peak or RMS current with a pre-configured SureStep motor and drive system.

Example of an adjustable current stepper drive

To use an <u>STP-MTR-23055</u> motor with a <u>STP-DRV-4845</u> drive, you should calculate the correct phase current setting for the drive. The motor phase current is 2.8 A (RMS).

- If you do not understand peak vs RMS current, you would select phase current position #8, the 2.8 A selection on the drive (blue box). This setting will work (and the motor will run very cool) but will provide slightly less than the motor's rated torque.
- If a true peak current value is selected $(1.4 \times 2.8 \text{ A} = 3.92 \text{ A})$ then the rotary switch selection would be set to the C position (red box). This will cause excessive motor heating and a lack of performance at higher speeds.
- The optimal phase current selection for stepper motors is 1.2 times the motor RMS phase current (1.2 x 2.8 A (RMS) = 3.36 A (peak)). This will be the rotary switch selection A (green box)



AUTOMATIONDIRECT

Surestep

166 oz-in 2.8 A

0.75 0

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STP-DRV-4845 Motor Selection Ta (A/Phase)(Peak of Sine A)						
Rotary Switch Position	SW1 & SW2 @100%	SW1 & SW2 @90%	SW1 & @80			
0	1.1	1.0	0.9			
1	1.3	1.2	1.0			
2	1.5	1.4	1.2			
3	1.7	1.5	1.4			
4	2.0	1.8	1.0			
5	2.2	2.0	1.8			
6	2.4	2.2	1.9			
7	2.6	2.3	2.			
8	2.8	2.5	2.2			
9	3.1	2.8	2.5			
A	3.4	3.1	2.7			
В	3.6	3.2	2.9			
C	3.8	3.4	3.0			
D	4.0	3.6	3.2			
E	4.3	3.9	3.4			
F	4.5	4.1	3.0			

MOTOR

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EN+ Co

DIR

DIR

STEP

CURRENT

Matching an adjustable stepper drive with any step motor

Matched stepper system



Choose your SureStep System

Choose a power supply

Since all low voltage SureStep (non-integrated) 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. If using an integrated motor/drive, then the power supply is dictated by the specifications of the integrated product. If using an STP-MTRAC-23xxx or -34xxx drive, no DC power supply is needed since the drive is powered directly from 115 to 230 VAC. Choose a power supply that matches the desired speed-

torque curve and stays within the voltage limit of the selected drive. Each SureStep linear power supply has incoming AC and outgoing DC fusing. The linear supplies have an electronic overload protected 5V supply for all your logic needs. Stepper applications without large fluctuations in load, without aggressive deceleration, and without regeneration (where the load pushes the motor) can often use a switching power supply instead.

Permissible Drive/Power Supply Combinations

		Linear Pov	ver Supply	Switching Power Supply			
DC Powered Drive	<u>STP-PWR-3204</u>	<u>STP-PWR-4805</u>	<u>STP-PWR-4810</u>	<u>STP-PWR-7005</u>	PSB12-xxxS	PSB24-xxxS	PSB48-xxxS
<u>STP-DRV-4830</u> 12-48 VDC input (53V max)	\checkmark	\checkmark	\checkmark	-	\checkmark	\checkmark	\checkmark
<u>STP-DRV-4845</u> 24-48 VDC input (60V max)	\checkmark	\checkmark	\checkmark	_	_	\checkmark	\checkmark
<u>STP-DRV-4850</u> 24-48 VDC input (53V max)	\checkmark	\checkmark	\checkmark	-	-	\checkmark	\checkmark
<u>STP-DRV-6575</u> 24-65 VDC input (85V max)	\checkmark	\checkmark	\checkmark	-	-	\checkmark	\checkmark
<u>STP-DRV-80100</u> 24-80 VDC input (88V max)	\checkmark	\checkmark	\checkmark	\checkmark	-	\checkmark	\checkmark
STP-MTRD-17 series 12-48 VDC input (55V max)	\checkmark	\checkmark	\checkmark	-	\checkmark	\checkmark	\checkmark
STP-MTRD-23, -24 series 12-70 VDC input (75V max)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Supply current calculation	For systems that use currents:	multiple steppers and	l only one power supp l(ps) ≥ 2/3 x (l_	y, the power supply cu motor1 + I_motor2 + I_	rrent must be at least motor 3 +)	the sum of 2/3rds of th	e combined motor

Linear Power Supply

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

32V, 48V and 70V linear supplies

Power ON LEDs

unregulated linear supplies perfect for stepper systems

> Input and output fusing included





regulated logic power

Switching Power Supply

85-264 VAC (DC input range 120-375 VDC)

Rugged plastic or aluminum housings with integral 35mm DIN rail mounting adapters





Output voltage status LED

DC Output Overload and Short-Circuit Protected

Adjustable

output voltage

Note: For detailed information on the switching power supplies, please see: https://cdn.automationdirect.com/static/specs/rhinopsbc1d2.pdf



Stepping System Components



SureStep stepping family includes:

- Linear step motor power supplies
- DIP-switch configurable microstepping drives
- Software-configurable advanced microstepping drives
- Motor extension cables
- NEMA 14, 17, 23, 24, 34, and 42 frame size step motors in single shaft, dual-shaft, IP65, high bus voltage, or encoder mounted configurations
- NEMA 17, 23, and 24 frame size integrated motor/drives
- NEMA 17 and 23 linear actuators (6", 9", and 12" lengths)
- Variety of step motor accessories including encoders, control cables, and connector kits
- SureStep PC adapter, USB to RS-485
- SureMotion Pro software for advanced drive and integrated motor/drive systems

Motor features

- Low voltage, high torque, 2-phase, bipolar, 1.8° per step, 4-lead
- High voltage, high torque, 2-phase, bipolar, 1.8° per step, 8-lead
- Available in single-shaft and dual-shaft models
- Connectorized pigtails or integrated 10' cable (STP-MTRAC only)
- Optional encoder feedback (STP-MTR-xxxxE)
- IP65 versions available (STP-MTR-xxxxW)
- High bus voltage versions available (STP-MTRAC-xxxx)
- Linear actuators have lead screws for motor shafts (STP-LExx-xxxxx)
- Linear actuators ADJ series available with encoder-ready rear shaft and machined journals on screw ends for easy bearing mounting
- Wide variety of NEMA 14 , 17, 23, and 34 motors

Power supply features

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

NOTE: If a switching power supply is desired, we recommend the PSB12-xxxS, PSB24-xxxS, or PSB48-xxxS series.

Standard stepper drive features

(<u>STP-DRV-4035</u>, -4830, -4845, -6575, STP-MTRD-x, <u>STP-DRVAC-24025</u>)

- Low cost, digital step motor driver in compact package
- Operates from Step and Direction signals, or Step CW and Step CCW (jumper selectable).
- Fault output and Enable input
- Optically isolated I/O
- Digital filters prevent position error from electrical noise on command signals; jumper selectable: 150 kHz or 2MHz
- Rotary or DIP switch easily selects from many popular motors
- Electronic damping and anti-resonance
- Automatic idle current reduction to reduce heat when motor is not moving; switch selectable: 50% or 90% of running current
- Switch-selectable step resolution: 200–25,600 steps per revolution depending on drive
- Switch-selectable microstep emulation provides smoother, more reliable motion in full- and half-step modes
- Automatic self test (switch selectable)
- Optional external encoder feedback (integrated models)
- Operates from a 24–65 VDC or 12–40 VDC power supply, depending upon model. STP-DRVAC drive operates off AC voltage.
- Running current from 0.35-7.5A

Advanced stepper drive features

(<u>STP-DRV-4850</u>, <u>STP-DRV-80100</u>, STP-MTRD-xR, & STP-MTRD-xRE)

- 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, and serial communication inputs
- · Serial communications allow point-to-point positioning
- AB quadrature/encoder following (integrated models)
- Optional internal encoder feedback (integrated models)
- RS-485 communications (integrated models)
- Four 5 to 24 volt digital "Variable I/O" points (NEMA 24 integrated models)
- Controllable via streaming SCL commands



Stepping System Components

SureStep Power Supply / DC Input Drive Compatibility

Company								
Drive(1)(2)	Recom	Recommended Linear Power Supply(1)(2)(5)						
Model #	<u>STP-</u> <u>PWR-3204</u>	<u>STP-</u> <u>PWR-4805</u>	<u>STP-</u> <u>PWR-4810</u>	<u>STP-</u> <u>PWR-7005(</u> 3)				
<u>STP-DRV-4035</u>	\checkmark	No	No	No				
<u>STP-DRV-4830</u>	\checkmark	\checkmark	\checkmark	No				
<u>STP-DRV-4845</u>	\checkmark	\checkmark	\checkmark	No				
<u>STP-DRV-4850</u>	\checkmark	\checkmark	\checkmark	No				
<u>STP-DRV-6575</u>	\checkmark	\checkmark	\checkmark	No				
<u>STP-DRV-80100</u>	\checkmark	\checkmark	\checkmark	\checkmark				
STP-MTRD-17 ⁽⁴⁾	\checkmark	\checkmark	\checkmark	No				
STP-MTRD-23 ⁽⁴⁾	\checkmark	\checkmark	\checkmark	\checkmark				
STP-MTRD-24 ⁽⁴⁾	\checkmark	\checkmark	\checkmark	\checkmark				

1) Do NOT use a power supply that exceeds the drive's input voltage range. If using a 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.

3) An unloaded STP-PWR-7005 can float above the allowable input voltages of some drives if it is fed with a high AC input voltage (greater than 120VAC).

4) Integrated motor/drives are included here because they include a drive as well as a motor.

5) STP-DRVAC-x drives are AC powered and cannot be powered by DC power supplies.

SureStep Power Supply / DC Input Drive Compatibility

Drive ⁽¹⁾⁽²⁾	Recommended Switching Power Supply ⁽¹⁾⁽²⁾⁽⁴⁾						
Model #	PSB12-xxxS	PSB24-xxxS	PSB48-xxxS				
STP-DRV-4035	\checkmark	\checkmark	No				
<u>STP-DRV-4830</u>	\checkmark	\checkmark	\checkmark				
<u>STP-DRV-4845</u>	No	\checkmark	\checkmark				
<u>STP-DRV-4850</u>	No	\checkmark	\checkmark				
STP-DRV-6575	No	\checkmark	\checkmark				
<u>STP-DRV-80100</u>	No	\checkmark	\checkmark				
STP-MTRD-17 ⁽³⁾	\checkmark	\checkmark	\checkmark				
STP-MTRD-23 ⁽³⁾	\checkmark	\checkmark	\checkmark				
STP-MTRD-24 ⁽³⁾	\checkmark	\checkmark	\checkmark				

1) Do NOT use a power supply that exceeds the drive's input voltage range.

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

3) Integrated motor/drives are included here because they include a drive as well as a motor. 4) STP-DRVAC-x drives are AC powered and cannot be powered by DC power supplies.

SureStep AC Motor/Drive Compatibility

Madal #	STP-DRVAC-24025					
wouer #	Series Wired Motor	Parallel Wired Motor				
STP-MTRAC-23044(x)	\checkmark	No				
STP-MTRAC-23055(x)	\checkmark	No				
STP-MTRAC-23078(x)	\checkmark	No				
STP-MTRAC-34075(x)	\checkmark	No				
STP-MTRAC-34115(x)	\checkmark	No				
STP-MTRAC-34156(x)	\checkmark	No				

NOTE: STP-MTRAC-34156(x) motors have a 5/8" front shaft.

SureStep DC In	out	Drive	/ Mo	otor (Com	patib	ility ⁽	3)
Motor ⁽¹⁾			Recommended Drive ⁽¹⁾					
Model # ⁽¹⁾	Rated Amps ⁽²⁾	Extension Cable	<u>STP-DRV-4035</u> ⁽¹⁾	<u>STP-DRV-4830</u>	<u>STP-DRV-4845</u>	<u>STP-DRV-4850⁽¹⁾</u>	<u>STP-DRV-6575</u> (1)	<u>STP-DRV-80100⁽¹⁾</u>
STP-MTRL-14026(x)	0.35	STP-	\checkmark	\checkmark	-	\checkmark		
STP-MTRL-14034(x)	0.8	Oxx	\checkmark	\checkmark	\checkmark	\checkmark	-	_
STP-MTR-17040(x)	1.7		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
STP-MTR-17048(x)	2.0		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
STP-MTR-17060(x)	2.0	STP-	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
STP-MTR-23055(x)	2.8	0xx	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
STP-MTR-23079(x)	2.8		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
STP-MTR-34066(x)	2.8		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
STP-MTRAC-42100(x)	4.2	STP-	-	-	\checkmark	\checkmark	\checkmark	\checkmark
STP-MTRAC-42151(x)	6	EXT42					\checkmark	\checkmark
STP-MTRAC-42202(x)	6	0xx					\checkmark	\checkmark
STP-MTRH-23079(x)	5.6	075					\checkmark	\checkmark
STP-MTRH-34066(x)	6.3	STP-					\checkmark	\checkmark
STP-MTRH-34097(x)	6.3	0xx		-	-		\checkmark	\checkmark
STP-MTRH-34127(x)	6.3						\checkmark	\checkmark
STP-MTRACH-42100(x)	6	стр			\checkmark	\checkmark		

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

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2) Listed NEMA42 motor amperages are for Bipolar Series wiring. See the NEMA42 motor specs for amperages with other wiring types.

3) Table not applicable to integrated motor/drives as drives and motors are already paired.

8 EXTH42

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Typical Wiring Diagram

STP-MTRACH-42151(x)

STP-MTRACH-42202(x)



NOTE: STP-MTRAC-23xxx/34xxx motors and STP-DRVAC drives are designed to work with AC input power to the drive. They are not designed to work with DC input power.



SureStep Series – Microstepping Drives Features Comparison										
				Standard M	licrosteppin	g Drives		Adv	anced Microst	epping Drives
Drive Model		<u>STP-</u> Drvac-24025	<u>STP-</u> DRV-4830	<u>STP-</u> <u>DRV-4845</u>	<u>STP-</u> DRV-6575	STP-MTRD-x	<u>STP-DRV-4035</u>	<u>STP-</u> <u>DRV-4850</u>	<u>STP-</u> <u>DRV-80100</u>	STP-MTRD-xR
Price		\$236.00	\$97.00	\$98.00	\$110.00	See Integrated Motor/Drives section	Retired	\$286.00	\$338.00	See Integrated Motor/ Drives section
Drive Type		Microstepping drive with pulse input			Integrated stepper motor/ drive	Micro-stepping drive with pulse input	Advanced microstepping drive with pulse or analog input, serial communication;includes programming/communication cable <u>STP-232RJ11-CBL</u>		Advanced integrated stepper motor/drive with internal encoder	
			enclos	ed		enclosed	open-frame	encl	osed	enclosed
Output Curre	nt	0.6–2.5 A/ phase	0.35–3.0 A/phase	0.8–4.5 A/ phase	1.0–7.5 A/ phase	-	0.4–3.5 A/phase	0.1–5 A/ phase	0.1–10 A/ phase	-
Input Voltage	,	nominal: 120/240 VAC range: 90–240 VAC	nominal: 12–48 VDC range: 10–53 VDC	nominal: 24–48 VDC range: 20–60 VDC	nominal: 24–75 VDC range: 20–85 VDC	nominal: 12-48 VDC (NEMA 17) 12-70 VDC (NEMA 23) range: 10-55 VDC (NEMA 17) 11-74 VDC (NEMA 23)	nominal: 12–32 VDC range: 12–42 VDC	nominal: 24–48 VDC range: 18– 53 VDC	nominal: 24–80 VDC range: 18–88 VDC	nominal: 12-48 VDC (NEMA 17) 12-70 VDC (NEMA 23, 24) range: 10-55 VDC (NEMA 17) 11-74 VDC (NEMA 23) 10-75 VDC (NEMA 24)
Configuration	n Method	rotary	dial, dip swi	tches, jumpe	rs	dip s	switches	SureMotion	Pro software (S	M-PRO: free download)
Amplifier Type MOSFET, dual H-bridge, 4-quadrant Dual H-bridge 4 quadrant		Dual H-bridge, 4 quadrant	MOSFET, dual H-bridge, bipolar chopper	MOSFET, dual H-bridge, 4-quadrant Dual H-bridge, 4 quadrant						
Current Control		4-state PWM @ 20 kHz	4-state PWM @ 16 kHz	4-state P kł	WM @ 20 Hz	4-state PWM @ 16 kHz		4-state PWM @ 20 kHz		
			dipswitch selectable						software se	lectable
Microstep Re	solution	200 to 25,600	0 steps/rev 200 to 20,000 steps/rev			200 to 25,600 steps/rev	400 to 10,000 steps/rev		200 to 51200	steps/rev
	Step & Dir	YES	YES	YES	YES	YES	YES	YES	YES	YES
	CW/CCW	YES	YES	YES	YES	YES	n/a	YES	YES	YES
Modes of	A/B Quad	n/a	n/a	n/a	n/a	n/a	n/a	YES	YES	YES
operation	Oscillator	n/a	n/a	n/a	n/a	n/a	n/a	YES	YES	YES
	Serial Indexing	n/a	n/a	n/a	n/a	n/a	n/a	YES	YES	YES
Digital Input	Step/Pulse Direction	step & direction, CW/CCW step			step & direction, CW/ CCW step	step & direction	step & direction, CW/CCW step, A/B quadrature, run/stop & direction, jog CW/CCW, CW/CCW limits			
Signals	Enable		motor dis	sable		motor enable	motor disable	motor enable, alarm reset, speed select (oscill mode)		
Analog Input		n/a	n/a	n/a	n/a	n/a	n/a	speed	control	signal range, offset, dead band, and filtering
Output Signa	I	fault	n/a	fault	fault	fault	n/a	fault, mo	tion, tach	brake, fault, motion, tach
Communication Interface		n/a	n/a	n/a	n/a	n/a	n/a	YES (progra	amming/commu	nication cable included)
Non-volatile Memory Storage		n/a	n/a	n/a	n/a	n/a	n/a		YES	
Idle Current Reduction							YES			
Self Test							YES			
Additional Features		Step pulse noise filter, accepts AC power input	Step pulse noise filter	Load inertia feature to i St	a (anti-resona improve moto tep pulse nois	ance & damping or performance) se filter	n/a	Anti-resonance (Electronic Damping) Auto setup Microstep emulation Torque ripple smoothing (allows for fine adjustment of phase in the range (to 1.5 rps) Waveform (command signal) smoothing		

Refer to Specifications Tables for detailed specifications.



SureStep[®] Standard Microstepping Drives





	Sure	Step Series Specifications – Standard M	licrostepping Drives		
Microstepp	ing Drive	<u>STP-DRV-4035</u>	<u>STP-DRV-4830</u>		
Drive Type		Microstepping drive with pulse input	Microstepping drive with pulse input		
Drawing		PDF	PDF		
Output C	urrent	Selectable from 0.4 to 3.5 A/phase (maximum output power is 140W)	Selectable from 0.35 to 3.0 A/phase (peak of sine)		
Input Volt (external	tage p/s required)	Nominal: 12–32 VDC Range: 12–42 VDC (including ripple voltage)	Nominal: 12–48 VDC Range: 10–53 VDC		
Configura	ation Method	DIP switches	DIP switches		
Amplifier	Туре	MOSFET, dual H-bridge, bipolar chopper	MOSFET, dual H-bridge, 4-quadrant		
Current C	Control	4-state PWM @ 20 kHz	4-state PWM @ 16 kHz		
Protectio	n	n/a	n/a		
Recomme	ended Input Fusing	Fuse: 4A fast-acting; ADC # <u>AGC4</u> ; Holder: ADC # <u>DN-F6L110</u>	Fuse: 3A fast-acting; ADC # <u>AGC3;</u> Holder: ADC # <u>DN-F6L110</u>		
	Input Circuit	Opto-coupler input with 440Ω resistance (5 to 15 mA input current); Logic Low is input 0.8 VDC or less; Logic High is input 4VDC or higher.	5 –24 VDC nominal (range: 4–30 VDC); (5mA @ 4V; 15 mA @ 30V); Optically isolated, differential		
Input	Step/Pulse	Motor steps on falling edge of pulse and minimum pulse width is 0.5 μs (1MHz)	Minimum pulse width = 1µs. Maximum pulse frequency = 150kHz or 500kHz (user selectable).		
Signais	Direction	Needs to change at least 2 microseconds before a step pulse is sent	FU NCTIONS: step & direction, CW/CCW step		
	Enable	Logic 1 will disable current to the motor (current is enabled with no hook-up or logic 0)	FUNCTION: disable motor when closed		
	Analog	n/a	n/a		
Output Signal		n/a	n/a		
	Current Reduction	n/a	n/a		
	Idle Current Reduction	0% or 50% reduction (Idle current setting is active if motor is at rest for 1 second or more)	90% or 50% of running current. (Holding torque is reduced by the same %.)		
	Microstep Resolution	400 (200x2), 1,000 (200x5), 2,000 (200x10), or 10,000 (200x50) steps/rev	200, 400, 800, 1000, 1600, 2000, 3200, 4000, 5000, 6000, 6400, 8000, 10000, 12800, 20000, 25600		
Features	Phase Current Setting	0.4 to 3.5 A/phase with 32 selectable levels	(peak)(0.35–3.0) (0.25–2.3) RMS		
	Self Test	Uses half-step to rotate 1/2 revolution in each direction at 100 steps/ second.	Automatically rotates the motor back and forth two turns in each direction in order to confirm that the motor is operational.		
	Step Pulse Noise Filter	n/a	Select 150kHz or 500kHz		
	Load Inertia	n/a	n/a		
Connectors		Screw terminal blocks with AWG 18 maximum wire size	DEGSON 15EDGK-5.08-02P-14-00AH 2-pin power connector DEGSON 15EDGK-3.1.04P-14-00A(H) 4-pin motor connector DEGSON 15EDGK-3.5-06P-14-00A(H) 6-pin I/O connector ADC part <u>STP-CON-5</u> contains replacement connectors		
Maximum Humidity		90% non-condensing	90% non-condensing		
Storage/Ambient Temperature		-20 to 80 °C [-4 to 176 °F]	0 to 40 °C [32 to 104 °F] (mount to suitable heat sink)		
Operating Temperature		0 to 55 °C [32 to 131 °F] recommended; 70 °C [158 °F] maximum	0 to 85 °C [32 to 185 °F] (interior of electronics section)		
Drive Coo	oling Method	Natural convection (mount drive to metal surface to dissipate heat)	Natural convection (mount drive to metal surface)		
Mounting	1	(4) #4 screws to mount on wide side; (2) #4 screws to mount on narrow side	(2) #6 screws to mount to metal surface		
Weight		9.3 oz. [264 g]	3.0 oz [85.9 g]		
Agency A	pprovals	CE	CE		

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Stepper Systems tSTP-25



SureStep[®] Standard Microstepping Drives, continued



	SureSte	p Series Specifications – Standard M	licrostepping Drives				
Microstepp	ing Drive	<u>STP-DRV-4845</u>	<u>STP-DRV-6575</u>				
Drive Typ	e	Microstepping driv	ve with pulse input				
Drawing		PDF	PDF				
Output C	urrent	Selectable from 0.8–4.5 A/phase (peak of sine)	Selectable from 1.0-7.5 A/phase (peak of sine)				
Input Volt (external	age p/s required)	Nominal: 24–48 VDC Range: 20–60 VDC	Nominal: 24–65 VDC Range: 20–85 VDC				
Configura	ation Method	Rotary dial, DIP	switches, jumpers				
Amplifier	Туре	MOSFET, dual H-bridge, 4-quadrant					
Current C	control	4-state PW	M @ 20 kHz				
Protection	n	n	/a				
Recomme	ended Input Fusing	Fuse: 4A fast-acting; ADC #AGC4; Holder: ADC # DN-F6L110	Fuse: 7A fast-acting; ADC # <u>AGC7;</u> Holder: ADC # <u>DN-F6L110</u>				
	Input Circuit	5 –24 VDC nominal (range: 4–30 VDC); (5mA @	4V; 15 mA @ 30V); Optically isolated, differential				
Input	Step/Pulse	Minimum pulse width = 1µs. Maximum pulse t	requency = 150kHz or 2MHz (user selectable).				
Signals	Direction	FUNCTIONS: step & d	lirection, CW/CCW step				
	Enable	FUNCTION: disable	e motor when closed				
	Analog	n/a					
Output Signal		30 VDC / 80 mA max, optically isolated photodarlington, sinking or sourcing. Function = closes on drive fault.					
	Current Reduction	Reduce power consumption and heat generation by limiting motor running current to 100%, 90%, 80%, or 70% of maximum. Current should be increased to 100% if microstepping. (Torque is reduced/increased by the same %.)	Reduce power consumption and heat generation by limiting motor running current to 100%, 90%, or 80% of maximum. Current should be increased to 120% if microstepping. (Torque is reduced/increased by the same %.)				
	Idle Current Reduction	90% or 50% of running current. (Holding torque is reduced by the same %.)					
Features	Microstep Resolution	200, 200 smooth, 400, 400 smooth, 2000, 5000, 12800, 20000					
	Phase Current Setting	(peak)(1.1–4.5) x 70%–100% DIP switch selectable (0.79–3.2) RMS	(1.3–6.3) x 80%–120% DIP switch selectable				
	Self Test	Automatically rotates the motor back and forth two turns in e	ach direction in order to confirm that the motor is operational.				
	Step Pulse Noise Filter	Select 150k	Hz or 2MHz				
	Load Inertia	Set motor and load inertia	a range to 0–4x or 5–10x.				
Connecto	rs	Removable screw terminal blocks. Motor & Power Supply: 30–12 AWG; Signals: 30–14 AWG ADC part <u>STP-CON-1</u> contains replacement connectors					
Maximum Humidity		90% non-c	condensing				
Storage/Ambient Temperature		0 to 50 °C [32 to 122 °F] (mount to suitable heat sink)				
Operating Temperature		0 to 85 °C [32 to 185 °F] (ii	nterior of electronics section)				
Drive Coo	oling Method	Natural convection (mou	nt drive to metal surface)				
Mounting		(2) #6 screws to mo	unt to metal surface				
Weight		10.8 oz	z [306g]				
Agency A	pprovals	CE, _C UR _{US}					

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Stepping System Drives

SureStep[®] Advanced Microstepping Drives



	SureSt	ep Series Specifications – Advanced Mi	crostepping Drives					
Mic	rostepping Drive	<u>STP-DRV-4850</u>	<u>STP-DRV-80100</u>					
Dri	ve Туре	Advanced microstepping drive with pulse or analog input, serial com	munication (serial communication allows indexing capability)					
Dra	wing	PDF	PDF					
Ou	tput Current	0.1-5.0 A/phase (in 0.01A increments)	0.1-10.0 A/phase (in 0.01A increments)					
Inp (ex	ut Voltage ternal p/s required)	24-48 VDC (nominal) (range: 18-53 VDC)	24-80 VDC (nominal) (range: 18-88 VDC)					
Co	nfiguration Method	SureMotion Pro softw	are (included)					
Am	plifier Type	MOSFET, dual H-bridg	je, 4-quadrant					
Cu	rrent Control	4-state PWM @	20 kHz					
Pro	otection	Over-voltage, under-voltage, over-temperature, external output fault	s (phase-to-phase & phase-to-ground), inter-amplifier shorts					
Re	commended Input Fusing	Fuse: 4A 3AG delay (ADC # <u>MDL4)</u> Fuse Holder: ADC # <u>DN-F6L110</u>	Fuse: 6.25A 3AG delay (ADC # <u>MDL6-25)</u> Fuse Holder: ADC # <u>DN-F6L110</u>					
	Input Circuit	Opto-coupler input with 5 to 15 mA input current; Logic Low is in	put 0.8 VDC or less; Logic High is input 4 VDC or higher.					
als	Step/Pulse	Optically isolated, differe	ential, 5V, 330Ω;					
put Signe	Direction	Adjustable bandwidth i Max pulse frequen Adjustable bandwidth digital r FUNCTIONS: step & direction, CW/CCW step, A/B quadratur	Min pulse width = 250 ns Max pulse frequency = 2MHz Adjustable bandwidth digital noise rejection feature FUNCTIONS: step & direction, CW/CCW step, A/B quadrature, run/stop & direction, jog CW/CCW, CW/CCW limits					
1	Enable	Optically isolated, 5-12V, 680Ω; FUNCTIONS: motor en	able, alarm reset, speed select (oscillator mode)					
	Analog	Range: 0–5 VDC; Resolution: 12 bit; FUNCTION: speed control						
Ou	tput Signal	Optically isolated, 24V, 10mA max; FUNCTIONS: fault, motion, tach						
Co	mmunication Interface	RS-232; RJ11 (6P4C) receptacle						
No	n-volatile Memory Storage	Configurations are saved in FLASH memory on-board the DSP.						
	Idle Current Reduction	Reduction range of 0-90% of running current after delay selectable in ms						
	Microstep Resolution	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev						
	Modes of Operation	Step & direction, CW/CCW, A/B quadrature, oscillator, joystick, serial commands						
res	Phase Current Setting	0.1-5.0 A/phase (in 0.01A increments)	0.1-10.0 A/phase (in 0.01A increments)					
atu	Self Test	Checks internal & external power supply volt	ages, diagnoses open motor phases					
Fe	Additional Features	Anti-resonance (Electronic Damping) Auto setup Microstep emulation Torque ripple smoothing (allows for fine adjustment of phase in the range 0.25 to 1.5 rps) Waveform (command signal) smoothing						
Co	nnectors	Communication: RJ11 (6P4C); programming/comm Other: removable screw terminal blocks; Motor & Pow	unication cable <u>STP-232RJ11-CBL</u> included er Supply: 26–12 AWG; Signals: 28–16 AWG					
Ма	ximum Humidity	90% non-cond	ensing					
Sto	orage Temperature	-20 to 80 °C [-4 t	o 176 °F]					
Ор	erating Temperature	0 to 55 °C [32 to 131 °F]; (mou	nt to suitable heat sink)					
Dri	ve Cooling Method	Natural convection (mount to	o suitable heat sink)					
Мо	unting	#6 mounting screws (mount	to suitable heat sink)					
We	ight	8 oz [227g] (app	roximate)					
Ag	ency Approvals	CE						

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SureStep[®] High Bus Voltage Microstepping Drives



	SureStep Se	eries Specifications – Standard Microstepping Drives				
Microstepp	ing Drive	<u>STP-DRVAC-24025</u>				
Price		\$236.00				
Drawing		PDF				
Drive Typ	е	Microstepping drive with pulse input				
Output C	urrent	Selectable from 0.6–2.5 A/phase (peak of sine)				
Input Volt	age	90–240 VAC				
Configura	ation Method	Rotary dial, DIP switches, jumpers				
Amplifier	Туре	MOSFET, dual H-bridge, 4-quadrant				
Current C	Control	4-state PWM @ 20 kHz				
Protectio	n	Over temp, over voltage, under voltage, over current, excess regen, open circuit				
Recomme	ended Input Fusing	Fuse: 4A fast-acting; ADC # <u>AGC4;</u> Holder: ADC # <u>DN-F6L110</u>				
	Input Circuit	5–24 VDC nominal (range: 4–28 VDC); optically isolated, differential.				
Input	Step/Pulse	Minimum pulse width = 1µs. Maximum pulse frequency = 150kHz or 2MHz (user selectable).				
Signals	Direction	FUNCTIONS: step & direction, CW/CCW step				
	Enable	FUNCTION: disable motor when closed				
	Analog	n/a				
Output Signal		30 VDC / 100 mA max, optically isolated photodarlington, sinking or sourcing. Function = closes on drive fault.				
	Current Reduction	n/a				
	Idle Current Reduction	90% or 50% of running current. (Holding torque is reduced by the same %.)				
	Microstep Resolution	200, 400, 800, 1000, 1600, 2000, 3200, 4000, 5000, 6000, 6400, 8000, 10000, 12800, 20000, 25600				
Features	Phase Current Setting	0.6–2.5 Amps RMS				
	Self Test	Automatically rotates the motor back and forth two turns in each direction in order to confirm that the motor is operational.				
	Step Pulse Noise Filter	Select 150kHz or 2MHz				
	Load Inertia	Set motor and load inertia range to 0–4x or 5–10x.				
Connectors		DEGSON 2EDGK-7.62-02P-14-00A(H) 2-pin power connector DEGSON 2EDGK-5.08-04P-14-00A(H) 4-pin motor connector DEGSON 15EDGK-3.81-08P-14-00A(H) 8-pin I/O connector ADC part <u>STP-CON-6</u> contains replacement connectors				
Maximum	Humidity	90% non-condensing				
Storage/A	mbient Temperature	0 to 40 °C [32 to 104 °F]				
Operating	Temperature	0 to 85 °C [32 to 185 °F] (interior of electronics section)				
Drive Cod	oling Method	Natural convection (mount drive to metal surface)				
Mounting		(2) M4 screws to mount to metal surface				
Weight		1 lb 15 oz [0.88 kg]				
Agency A	pprovals	CE, CUR				

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SureStep[®] Microstepping Drives Dimensions

Dimensions = in [mm]

STP-DRV-4830





STP-DRV-4845 & STP-DRV-6575



STP-DRV-4850 & STP-DRV-80100



 $\begin{array}{c} 0.18 \\ (24.5) \\ 0.41 \\ (10.5) \end{array} \longrightarrow \begin{array}{c} 0.24 \\ (15.5) \\ (130.7) \end{array} \longrightarrow \begin{array}{c} 0.18 \\ (4.5) \\ (130.7) \end{array} \longrightarrow \begin{array}{c} 0.18 \\ (4.5) \\ (130.7) \end{array} \longrightarrow \begin{array}{c} 0.18 \\ (4.5) \\ (10.5) \\ (10.5) \end{array} \longrightarrow \begin{array}{c} 0.18 \\ (4.5) \\ (10.5) \\ (10.5) \\ (10.5) \end{array} \longrightarrow \begin{array}{c} 0.18 \\ (10.5)$

STP-DRVAC-24025







SureStep[®] Microstepping Drives Dimensions

Dimensions = in [mm]

STP-DRV-4035





Stepping System Motors

SureStep[®] Stepping Motors

Bipolar Stepping MotorsPriceShaft TypeTorque LevelEncoder MountingDrawingSTP-MTRL-14026D\$29.00singleSTP-MTRL-14026E**\$112.00dualSTP-MTRL-14034D\$28.00singleSTP-MTRL-14034D\$41.00dualSTP-MTRL-14034E**\$117.00GTP-MTRL-14034E**\$117.00Mathematic AdditionPDESTP-MTR-17040D\$31.00STP-MTR-17040D\$31.00GTP-MTR-17040D\$31.00STP-MTR-17040D***\$16.00SinglesingleSTP-MTR-17048D\$36.50GTP-MTR-17048D\$36.50GTP-MTR-17048D***\$116.00STP-MTR-17048D***\$16.00STP-MTR-170600\$55.00GTP-MTR-170600\$55.00GTP-MTR-170600***\$13.300GTP-MTR-170600***\$13.00STP-MTR-23055\$43.50STP-MTR-23055\$43.50STP-MTR-23055\$43.50STP-MTR-23079\$60.00STP-MTR-23079\$60.00STP-MTR-23079\$60.00StP-MTR-23079\$60.00StP-MTR-23079\$60.00StP-MTR-23079\$60.00StP-MTR-23079\$60.00StP-MTR-23079\$63.00StP-MTR-23079\$63.00StP-MTR-23079\$63.00StP-MTR-23079\$63.00StP-MTR-23079\$63.00StP-MTR-23079\$63.00StP-MTR-23079\$63.00StP-MTR-23079\$63.00StP-MTR-23079\$63.00 <t< th=""><th>SureStep Serie</th><th>s Part N</th><th>umbers –</th><th>Bipolar S</th><th>Stepping Ma</th><th>tors*</th></t<>	SureStep Serie	s Part N	umbers –	Bipolar S	Stepping Ma	tors*
STP-MTRL-14026\$29.00singleSTP-MTRL-14026D\$32.50dualSTP-MTRL-14034E**\$112.00dualSTP-MTRL-14034D\$44.00dualSTP-MTRL-14034E**\$117.00dualSTP-MTRL-14034E**\$117.00dualSTP-MTR-17040D\$23.00singleSTP-MTR-17040E**\$110.00dualSTP-MTR-17040E**\$110.00dualSTP-MTR-17040E**\$110.00dualSTP-MTR-17040E**\$110.00dualSTP-MTR-17040E**\$110.00dualSTP-MTR-17048E**\$116.00dualSTP-MTR-17048E**\$116.00dualSTP-MTR-17048E**\$116.00singleSTP-MTR-17048E**\$116.00singleSTP-MTR-17060E**\$13.00dualSTP-MTR-17060E**\$13.00dualSTP-MTR-17060E**\$13.00dualSTP-MTR-23055D\$43.50singleSTP-MTR-23055D\$43.50singleSTP-MTR-23055D\$43.50singleSTP-MTR-23055D\$43.50singleSTP-MTR-2305D\$43.50singleSTP-MTR-2305D\$43.50singleSTP-MTR-2305D\$43.50singleSTP-MTR-2305D\$43.50singleSTP-MTR-2305D\$43.50singleSTP-MTR-2305D\$43.50singleSTP-MTR-23079\$56.00singleSTP-MTR-23079\$56.00singleSTP-MTR-3406E0\$164.00dualSTP-MTR-3406E0\$164.00 <th>Bipolar Stepping Motors</th> <th>Price</th> <th>Shaft Type</th> <th>Torque Level</th> <th>Encoder Mounting</th> <th>Drawing</th>	Bipolar Stepping Motors	Price	Shaft Type	Torque Level	Encoder Mounting	Drawing
STP-MTRL-14026D \$32.50 dual STP-MTRL-14034 \$32.50 dual STP-MTRL-14034 \$28.00 single STP-MTRL-14034E** \$117.00 dual STP-MTRL-14034E** \$117.00 dual STP-MTR-17040D \$23.00 single STP-MTR-17040D \$31.00 dual STP-MTR-17040E** \$110.00 dual STP-MTR-17040E** \$110.00 dual STP-MTR-17040E** \$110.00 dual STP-MTR-17048 \$30.00 single STP-MTR-17048 \$30.00 single STP-MTR-17048 \$30.00 single STP-MTR-17048 \$168.00 single STP-MTR-17060 \$54.00 single STP-MTR-17060 \$55.00 dual STP-MTR-17060 \$43.50 single STP-MTR-23055 \$43.50 single STP-MTR-23055 \$43.50 single STP-MTR-23079 \$56.00 single STP-MTR-23079 \$63.00 <	<u>STP-MTRL-14026</u>	\$29.00	single		not available	PDF
STP-MTRL-14026E***\$112.00dualpre-installedPDESTP-MTRL-14034D\$41.00dualnot availablePDESTP-MTRL-14034E**\$117.00dualpre-installedPDESTP-MTR-17040D\$31.00dualoptionalPDESTP-MTR-17040D***\$116.00dualoptionalPDESTP-MTR-17040W***\$162.00singlenot availablePDESTP-MTR-17040W***\$162.00singlenot availablePDESTP-MTR-17048\$30.00singlenot availablePDESTP-MTR-17048\$30.00singlenot availablePDESTP-MTR-17060D\$55.00dualpre-installedPDESTP-MTR-17060D\$55.00dualoptionalPDESTP-MTR-17060D\$55.00dualoptionalPDESTP-MTR-17060D\$55.00dualoptionalPDESTP-MTR-23055D\$43.50singlenot availablePDESTP-MTR-23079E\$56.00singlenot availablePDESTP-MTR-23079D\$72.00dualPDEnot availablePDESTP-MTR-34066D\$116.00dualPDEnot availablePDESTP-MTR-34066D\$164.00dualPDEnot availablePDESTP-MTR-34066D\$164.00dualPDEnot availablePDESTP-MTR-34066D\$160.00singlenot availablePDESTP-MTR-34066D\$161.00singlenot availablePDE	STP-MTRL-14026D	\$32.50	dual		optional	PDF
STP-MTRL-14034 \$28.00 single into available PDE STP-MTRL-14034D \$41.00 dual optional PDE STP-MTRL-14034E** \$117.00 dual pre-installed PDE STP-MTR-17040 \$23.00 single not available PDE STP-MTR-17040 \$31.00 dual optional PDE STP-MTR-17040E** \$110.00 dual optional PDE STP-MTR-17048E** \$162.00 single not available PDE STP-MTR-17048D \$36.50 dual pre-installed PDE STP-MTR-17048D*** \$186.00 single not available PDE STP-MTR-170600 \$55.00 dual pre-installed PDE STP-MTR-23055 \$43.50 single not available PDE STP-MTR-23055 \$43.50 single optional PDE STP-MTR-23079D \$72.00 dual pre-installed PDE STP-MTR-23079D \$72.00 dual PDE<	<u>STP-MTRL-14026E</u> **	\$112.00	dual	low	pre-installed	PDF
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STP-MTR-17060D \$55.00 dual STP-MTR-17060E** \$133.00 dual STP-MTR-17060E** \$133.00 dual STP-MTR-17060W **** \$221.00 single STP-MTR-23055 \$43.50 single STP-MTR-23055D \$49.50 dual STP-MTR-23055E** \$137.00 dual STP-MTR-23055D*** \$137.00 dual STP-MTR-23079 \$56.00 single STP-MTR-23079D \$72.00 dual STP-MTR-23079D \$72.00 dual STP-MTR-23079E** \$151.00 dual STP-MTR-34066 \$132.00 single STP-MTR-34066 \$132.00 single STP-MTR-34066D \$164.00 dual STP-MTR-34066D \$164.00 dual STP-MTR-32079D \$85.00 dual STP-MTR-32079D \$85.00 dual STP-MTR-32079D \$315.00 single STP-MTRH-32079D \$85.00 dual STP-MTRH-34066 \$161.00	<u>STP-MTR-17060</u>	\$54.00	single		not available	PDF
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STP-MTR-17060W *** \$221.00 single high not available PDE STP-MTR-23055 \$43.50 single not available PDE STP-MTR-23055D \$49.50 dual optional PDE STP-MTR-23055E** \$137.00 dual pre-installed PDE STP-MTR-23079 \$56.00 single not available PDE STP-MTR-23079D \$72.00 dual optional PDE STP-MTR-23079D \$72.00 dual optional PDE STP-MTR-23079W *** \$151.00 dual optional PDE STP-MTR-34066D \$164.00 dual optional PDE STP-MTR-34066D \$164.00 dual optional PDE STP-MTRH-23079D \$85.00 dual optional PDE STP-MTRH-23079D \$85.00 dual optional PDE STP-MTRH-23079D \$85.00 dual optional PDE STP-MTRH-34066D \$175.00 dual optiona	STP-MTR-17060E**	\$133.00	dual	-	pre-installed	PDF
STP-MTR-23055 \$43.50 single STP-MTR-23055D \$49.50 dual STP-MTR-23055E** \$137.00 dual STP-MTR-23055W \$199.00 single STP-MTR-23079D \$56.00 single STP-MTR-23079D \$72.00 dual STP-MTR-23079D \$72.00 dual STP-MTR-23079E** \$151.00 dual STP-MTR-23079E** \$151.00 dual STP-MTR-23079W **** \$218.00 single STP-MTR-34066 \$132.00 single STP-MTR-34066D \$164.00 dual STP-MTR-34066D \$164.00 dual STP-MTR-34066D \$164.00 dual STP-MTR-34066D \$164.00 dual STP-MTR-34066D \$161.00 single STP-MTR-34066D \$161.00 single STP-MTRH-34066D \$161.00 single STP-MTRH-34066D \$161.00 single STP-MTRH-34066D \$161.00 single STP-MTRH-34066D \$16	STP-MTR-17060W ***	\$221.00	single	high	not available	PDF
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STP-MTRH-34127W *** \$444.00 single not available PDF	STP-MTRH-34127D	\$217.00	dual	1	optional	PDF
	STP-MTRH-34127W ***	\$444.00	single	1	not available	PDF

* For integrated motor/drives part numbers and pricing, see the integrated motor/drives section.

** E model motors come with an <u>AMT112Q-V</u> encoder pre-installed. Requires STP-CBL-EBxx for encoder wiring. To change from the default 400ppr, use <u>AMT-PGRM-17C</u>. See the SureStep Stepping System Encoders section for more details. *** W models are IP65 washdown rated. All others are IP40.

STP-MTR-xxxxx (single-shaft)



STP-MTR-xxxxE (encoder mount)



STP-MTR-xxxxD (dual-shaft)



STP-MTR-xxxxW (IP65)



Surestep

Stepping System Motors

SureStep[®] Stepping Motors

SureStep Series Part Numbers – Bipolar Stepping Motors, continued											
Bipolar Stepping Motors	Price	Shaft Type	Torque Level	Encoder Mounting	Drawing						
Motors listing continued from previous	page										
<u>STP-MTRAC-23044</u>	\$140.00	single		not available	PDF						
<u>STP-MTRAC-23044D</u>	\$165.00	dual		optional	PDF						
<u>STP-MTRAC-23055</u>	\$170.00	single		not available	PDF						
STP-MTRAC-23055D	\$195.00	dual		optional	PDF						
<u>STP-MTRAC-23078</u>	\$182.00	single		not available	PDF						
STP-MTRAC-23078D	\$229.00	dual	High voltage	optional	PDF						
STP-MTRAC-34075	\$267.00	single	High torque	not available	PDF						
<u>STP-MTRAC-34075D</u>	\$268.00	dual		optional	PDF						
STP-MTRAC-34115	\$276.00	single		not available	PDF						
<u>STP-MTRAC-34115D</u>	\$277.00	dual		optional	PDF						
STP-MTRAC-34156	\$295.00	single*		not available	PDF						
STP-MTRAC-34156D	\$296.00	dual*		optional	PDF						
STP-MTRAC-42100	\$289.00	single		not available	PDF						
<u>STP-MTRAC-42100D</u>	\$312.00	dual		optional**	PDF						
<u>STP-MTRAC-42151</u>	\$472.00	single		not available	PDF						
<u>STP-MTRAC-42151D</u>	\$495.00	dual		optional**	PDF						
<u>STP-MTRAC-42202</u>	\$582.00	single		not available	PDF						
<u>STP-MTRAC-42202D</u>	\$599.00	dual	High voltage	optional**	PDF						
<u>STP-MTRACH-42100</u>	\$289.00	single	Higher torque	not available	PDF						
STP-MTRACH-42100D	\$312.00	dual		optional**	PDF						
STP-MTRACH-42151	\$472.00	single		not available	PDF						
STP-MTRACH-42151D	\$495.00	dual		optional**	PDF						
STP-MTRACH-42202	\$587.00	single		not available	PDF						
STP-MTRACH-42202D	\$607.00	dual		optional**	PDF						





STP-MTRACH-42xxxD (dual-shaft)



* NOTE: STP-MTRAC-34156(x) motors have a 5/8" front shaft.

** NOTE: NEMA 42 "D" motors require an STP-MTRA-42ENC adapter plate for AMT13/AMT33 encoder mounting.

SureStep[®] Stepping Motors Mounting Accessories

Mounting Accessories – for NEMA 17 and NEMA 42 SureStep Stepping Motors									
Part Number	Price	Description	Drawing Links	Use With					
<u>STP-MTRA-RB-85</u>	\$9.25	Reducer bushing, 8mm OD to 5mm ID, 16mm length, aluminum alloy. Connects NEMA size 17 stepper motors to Koyo TRD-NH and TRD-SH hollow shaft encoders.	n/a	SureStep NEMA 17 motors					
<u>STP-MTRA-42ENC</u>	\$12.00	SureStep encoder mounting plate, metal body. For use with SureStep NEMA 42 stepper motors with dual shafts. Encoder mounting screws and mounting plate screws included. Mounting holes for Same Sky AMT132/ AMT332 encoders and US Digital E6 encoders.	PDF	SureStep NEMA 42 motors					

STP-MTRA-42ENC





Stepping System Motors

SureStep[®] Stepping Motors

SureStep Series Specifications						inecto	rized	Bipola	r Step	ping N	lotors		
		Low V Low 1	oltage Torque			Low V High 1	'oltage Torque	1			Low V Higher	oltage Torque	
Bipolar Stepping Motors		<u>STP-MTRL-14026(x)</u>	<u>STP-MTRL-14034(x)</u>	<u>STP-MTR-17040(x)</u>	<u>STP-MTR-17048(x)</u>	<u>STP-MTR-17060(x)</u>	<u>STP-MTR-23055(x)</u>	<u>STP-MTR-23079(x)</u>	<u>STP-MTR-34066(x)</u>	<u>STP-MTRH-23079</u> (x)	<u>STP-MTRH-34066(x)</u>	<u>STP-MTRH-34097(x)</u>	<u>STP-MTRH-34127(x)</u>
NEMA Frame Size		14	14	17	17	17	23	23	34	23	34	34	34
Marrier II a latin a	(lb∙in)	0.5	1.25	3.81	5.19	7.19	10.37	17.25	27.12	17.87	27.12	50.00	80.50
Maximum Holding Torque*	(oz∙in)	8	20	61	83	115	166	276	434	286	434	800	1288
	(N·m)	0.06	0.14	0.43	0.59	0.81	1.17	1.95	3.06	2.02	3.06	5.65	9.10
Potor Inortia	(oz∙in2)	0.06	0.08	0.28	0.37	0.56	1.46	2.60	7.66	2.60	7.66	14.80	21.90
	(kg·cm2)	0.0003	0.00035	0.05	0.07	0.10	0.27	0.48	1.40	0.48	1.40	2.71	4.01
Rated Current (A/phase)	0.35	0.8	1.7	2.0	2.0	2.8	2.8	2.8	5.6	6.3	6.3	6.3
Resistance (Ω/phase)		8.5	7.66	1.6	1.4	2.0	0.75	1.1	1.11	0.4	0.25	0.3	0.49
Inductance (mH/phase)		5.77	6.92	3.0	2.7	3.3	2.4	3.8	6.6	1.2	1.5	2.1	4.1
Insulation Class		130°C [266°F] Class B; 300V rms											
Basic Step Angle		1.8°											
Shaft Runout (in)		0.002 in [0.051 mm]											
Max Shaft Radial Play @ 1lb load		0.001 in [0.025 mm]											
Perpendicularity		0.003 in [0.076 mm]											
Concentricity		0.003 in [0.076 mm]											
Maximum Radial Load ((lb [kg])*			6.0 [2.7]			15.0	[6.8]	39.0 [17.7]	15.0 [6.8]		39.0 [17.7]]
Maximum Thrust Load	(lb [kg])*			6.0 [2.7]			13.0 [5.9] 25.0 13. [11.3] [5.9]				3.0 (.9] 25.0 [11.3]		
Storage Temperature R	ange					-20°0	C to 100°C	[-4°F to 2	12°F]				
Operating Temperature	Range		-20°C to 50°C [-4°F to 122°F] (motor case temperature should be kept below 80°C [176°F])										
Operating Humidity Rai	nge					55%	% to 85% n	on-conden	sing				
Product Material						steel mot	or case; st	ainless ste	el shaft(s)				
Environmental Rating						IP	40 (IP65 fo	r "W" moto	rs)				
Weight (Ib [kg]) (E models)		0.25 [0.11] (0.3 [0.1])	0.35 [0.15] (0.4 [0.2])	0.6 [0.3] (0.7 [0.3])	0.7 [0.3] (0.8 [0.4])	0.9 [0.4] (0.9 [0.4])	1.5 [0.7] (1.5 [0.7])	2.2 [1.0] (2.4 [1.1])	3.9 [1.7]	2.4 [1.1] (2.4 [1.1])	3.9 [1.7]	5.9 [2.7]	8.4 [3.8]
Agency Approvals							C	E					
Design Tips	D Mo Use a	Allow s O NOT disa punt the mo flexible cou	sufficient tir assemble s otor to a sur upling with	ne to accel step motors DO NOT c face with g "clamp-on"	erate the loss because is connect or of good therm connection bading on b	bad and siz motor perfo disconnect al conductions to both to bearings fro	the step ormance wi the step m ivity, such a the motor s om minor m	motor with Il be reduce otor during as steel or a haft and th isalignmer	a 100% to ed and the operation. aluminum, e load sha it.	rque safety warranty w to allow he ft to preven	r factor. rill be voide at dissipati t radial and	ed. ion. d thrust	
Accessory Extension C	able	STP-E	XTL-0xx		STP-I	STP-E EXTW-0xx	XT-0xx (for "W" m	otors)		STP-E	STP-EX	(TH-0xx k (for "W" n	notors)

* For dual-shaft motors (STP-MTR-xxxxD):

The sum of the front and rear Torque Loads, Radial Loads, and Thrust Loads must not exceed the applicable Torque, Radial, and Thrust load ratings of the motor.



Stepping System Motors

SureStep[®] Stepping Motors

SureStep Series Specifications – High Voltage Bipolar Stepping Motors												
					High V High 1	oltage Torque						
Bipolar Stepping Motors			STP-MTRAC-23044(x)	STP-MTRAC-23055(x)	STP-MTRAC-23078(x)	STP-MTRAC-34075(x)	STP-MTRAC-34115(x)	STP-MTRAC-34156(x)**				
NEMA Frame Size			23	23	23	34	34	34**				
		(lb∙in)	4.69	9.31	14.19	51.31	69.48	115.06				
Maximum Holding	-	(oz∙in)	75	149	227	821	1110	1841				
loique		(N·m)	0.53	1.05	1.6	5.8	7.84	13				
		(oz∙in2)	0.66	1.64	2.62	7.38	14.74	24.06				
Rotor Inertia	-	(g·cm2)	120	300	480	1350	2700	4400				
Rated Current	Ser	ries	0.71	0.71	0.71	2.15	2.05	2.55				
(A/phase)	Par	rallel	1.41	1.41	1.41	4.3	4.1	5.1				
Resistance (Ω/	Ser	ries	12.4	14.4	18	4	4.8	4.8				
phase)	Par	rallel	3.1	3.6	4.5	1.0	1.2	1.375				
Inductance	Ser	ries	30.4	51.2	60.8	32	43.2	44.8				
(mH/phase)	Par	rallel	7.6	12.8	15.2	8.0	10.8	11.2				
Insulation Class					E	3						
Steps per Revolution	1		200									
Basic Step Angle				1.8°								
Shaft Runout (in)					0.002 in	0.05 mm]		0.00 : 10.54				
Max Shaft Radial Play	y @	1lb load	(0.02 in [0.51 mm]	0.025 in [0.02 IN [0.51 mm]					
Max End Play @ 2.2-I	b Ax	cial load	0.08 in [2.03 mm] 0.075 in [1.91 mm]					0.08 in [2.03 mm]				
Connectors			8 leads, 24AWG 8 leads, 22AWG									
Temperature Rise			80°C [176°F] max									
Storage Temperature	Rar	nge			-40°C to 70°C	-40°F to 158°F]						
Operating Temperature Range					-20°C to 50°C	[-4°F to 122°F]						
Operating Humidity Range				01	5% to 95% no	n-condensing	G(_)					
Product Material				Ste	ei motor case; st	ainiess steel sha	n(s)					
Environmental Rating			1 03 10 471	1 5/ 10 71	1P	40	10 C1 N Q	11 /6 15 01				
			1.03 [0.47]	1.04 [U.7]	Z.Z [1.U]	4.2 [1.9]	0.4 [J.0]	11.40 [3.2]				
Agency Approvais		None C ^{UR} US										

* For dual-shaft motors (STP-MTRAC-xxxxxD): The sum of the front and rear Torque Loads, Radial Loads, and Thrust Loads must not exceed the applicable Torque, Radial, and Thrust load ratings of the motor.

** STP-MTRAC-34156(x) motors have a 5/8" front shaft

Surestep

Stepping System Motors

SureStep[®] Stepping Motors

Su	reStep Series Sp	ecificatio	ns – Con	nectorize	ed Steppi	ng Motor	S			
			Higher voltage High torque							
Stu	epping Motors	<u>STP-MTRAC-42100(x)</u>	<u>STP-MTRAC-42151(x)</u>	<u>STP-MTRAC-42202</u> (x)	STP-MTRACH-42100(x)	STP-MTRACH-42151(x)	STP-MTRACH-4220 <u>2</u> (x)			
NEMA Frame	Size	42	42	42	42	42	42			
Optional Enc	oder ¹	Y	Y	Y	Y	Y	Y			
Max Holding	Unipolar Series	9.7	19.0	26.0	9.7	17.5	26.0			
Torque	Bipolar Series	12.2	22.0	31.0	12.3	22.0	32.0			
(N·m)	Bipolar Parallel	12.2	22.0	31.0	12.3	22.0	32.0			
Rotor Inertia	(g·cm2)	5500	10900	16200	5500	10900	16200			
Rated RMS	Unipolar Series	6	9.4	9	8.5	11.3	11.5			
Current	Bipolar Series	4.2	6	6	6	8	8			
(A/phase)	Bipolar Parallel	8.4	12	12	12	16	16			
Destatores	Unipolar Series	0.6	0.34	0.46	0.32	0.215	0.29			
Resistance	Bipolar Series	1.19	0.68	0.91	0.64	0.43	0.58			
()	Bipolar Parallel	0.3	0.17	0.23	0.159	0.108	0.144			
	Unipolar Series	5	3.6	5.5	2.5	1.9	3.2			
(mH/phase)	Bipolar Series	19.8	14.5	22	10.1	7.6	13			
(Bipolar Parallel	5	3.6	5.5	2.5	1.9	3.2			
Insulation Cla	ass	В								
Steps per Re	volution			20	00					
Basic Step A	ngle	1.8°								
Shaft Runout	t			0.05 mm						
Max Shaft Ra	dial Play @ 1lb load	1.1 in								
Connectors		8 leads, 18AWG								
Temperature	Rise	80°C max								
Storage Tem	р.		-	30°C to 70°C	-22°F to 158°F]				
Operating Te	mperature			-20°C to 40°C	[-4°F to 104°F]					
Operating Hu	Imidity			5% to 95% no	n-condensing					
Product Mate	erial		Stee	l motor case, st	ainless steel sha	aft(s)				
Environment	al Rating	IP40								
Weight (Ib [k	g])	10.6 [4.8]	17.6 [8]	25.6 [11.6]	10.6 [4.8]	17.6 [8]	25.6 [11.6]			
Agency Appr	oval			CUE	Rus					

1 - Dual-shaft versions only. For US Digital E6 or Same Sky AMT13/AMT33 encoder mounting, the <u>STP-MTRA-42ENC</u> encoder adapter plate is required.



Stepping System Motors

SureStep[®] Motor Running Torque vs. Speed Charts

STP-MTRL-14xxx(x) NEMA 14 Step Motors





STP-MTR-17xxx(x) NEMA 17 Step Motors

Note: "W" series motors have 5% less running torque than other models

STP-MTR-17040(x) Torque vs Speed (1.8° step motor; 1/2 stepping)







Note: Motor torque vs speed charts for STP-MTRD series integrated motor/ drives can be found in the integrated motor/drives section of the full catalog

STP-MTR-17060(x) Torque vs Speed (1.8° step motor; 1/2 stepping)




SureStep[®] Motor Torque vs. Speed Charts (continued)

STP-MTR(H)-23xxx(x) NEMA 23 Step Motors

Note: "W" series motors have 5% less running torque than other models



STP-MTR-23079(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



STP-MTRH-23079(x) Torque vs Speed (1.8° step motor; 1/2 stepping) Speed (rpm) 450 900 1350 1800 2250 0 200 150 Torque (oz·in) 100 50 0 0 2000 4000 6000 8000 10000 12000 14000 Speed (pps) [1 pulse = 0.9°]

STP-MTRAC-23xxxx Torque vs Speed @ 340VDC bus (1.8° step motor; 1/2 stepping)





SureStep[®] Motor Torque vs. Speed Charts (continued)

STP-MTR(H)-34xxx(x) NEMA 34 Step Motors

Note: "W" series motors have 5% less running torque than other models





STP-MTRH-34097(x) Torque vs Speed (1.8° step motor; 1/2 stepping)







STP-MTRH-34127(x) Torque vs Speed (1.8° step motor; 1/2 stepping)





SureStep[®] Motor Torque vs. Speed Charts (continued)

STP-MTRAC(H)-42xxx(x) NEMA 42 Step Motors







For all NEMA 42 charts: "S" = Series Bipolar Wiring "P" = Parallel Bipolar Wiring



STP-MTRAC-42151x 72/160VDC



STP-MTRAC-42202x 72/160VDC S 6.0 A, 72vDC - - S 6.0 A, 160vDC P 12.0 A, 160vDC Speed (RPM) 1500 2000 4000 3500 3000 (u 2500 2000 1500 1500 1000 500 0 23333 0 3333 6667 10000 16667 20000





SureStep[®] Motor Torque vs. Speed Charts (continued)

STP-MTRAC(H)-42xxx(x) NEMA 42 Step Motors



For all NEMA 42 charts: "S" = Series Bipolar Wiring "P" = Parallel Bipolar Wiring



STP-MTRACH-42151x 24/48 VDC







STP-MTRACH-42202x 72/160VDC



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Stepping System Motors

SureStep[®] Motor Dimensions and Cabling



STP-MTR-xxxxW Motors



** Dimension H2 applies only to dual-shaft (D) and encoder (E) motors. Dimension D is the same for both front and rear shafts of dual-shaft and encoder motors. Dimensions J & K do NOT apply to rear shafts of dual-shaft and encoder motors (all rear shafts are round style).

SureStep	Series Din	nensions &	Cabling -	– NEMA 1	4, 17, and	23 Conne	ctorized E	Bipolar Stepping Motors
Dimonoiono*	Low Torqu	e Motors		Н	igh Torque Motol	rs		Higher Torque Motors
(in [mm]*)	<u>STP-MTRL-</u> <u>14026(</u> x)	<u>STP-MTRL-</u> <u>14034(</u> x)	<u>STP-MTR-</u> <u>17040(</u> x)	<u>STP-MTR-</u> <u>17048(</u> x)	<u>STP-MTR-</u> <u>17060(x)</u>	<u>STP-MTR-</u> <u>23055(</u> x)	<u>STP-MTR-</u> 23079(x)	<u>STP-MTRH-23079(</u> x)
Α	1.39 [35.3]	1.39 [35.3]		1.67 [42.3]		2.25	[57.2]	2.25 [57.2]
В	1.02 [25.9]	1.02 [25.9]		1.22 [31.0]		1.86 [[47.2]	1.86 [47.2]
С			Ø 0.87 [22.1]			Ø 1.50	[38.1]	Ø 1.50 [38.1]
D**			Ø 0.20 [5.0]			Ø 0.2	5 [6.4]	Ø 0.25 [6.4]
E	4-40 thread 0.15	[3.8] min depth	M3 x 0.5	thread 0.15 [3.8]	min depth	Ø 0.20 [5.	1] through	Ø 0.20 [5.1] through
E2	M2.5 x 0.45 thread	M2.5 x 0.45 thread	M2.5 x 0.	45 thread	M2 x 0.4 thread	4-40		4-40
F**	1.02 [25.9]	1.34 [34.0]	1.58 [40.1]	1.89 [48.0]	2.34 [59.5]	2.22 [56.4]	3.10 [78.7]	3.10 [78.7]
F2**	n/	а	1.90 [48.3]	2.24 [56.9]	2.67 [67.8]	2.33 [59.1]	3.19 [81.0]	3.19 [81.0]
G1	0.375	0.375	0.375	0.375	0.411	0.906	0.906	0.906
G2	0.75	0.75	0.75	0.75	n/a	1.812	1.812	1.812
H1	0.60 [15.2]	0.60 [15.2]		0.94 [24.0]		0.81 [[20.6]	0.81 [20.6]
H2**					0.51 [13.0]			
H3***					0.40			
J**			n/a				().59 [15.0]
K**			n/a					0.23 [5.8]
L					12 [305]			
Conductor	(4) #26	AWG		(4) #20 AWO	G, (5) #18 AWG (fc	or W motors)		(4) #18 AWG, (5) #18 AWG (for W motors)
Connector	TE # 10	3653-3	Мо	blex # 43025-040	0, PXP4010/06S/6	6065 (for W moto	rs)	Molex # 39-01-3042, PXP4010/06S/6065 (for W motors)
Pin	TE # 1-10450	5-3 (LOOSE)	r	Molex # 43030-00	007, Socket: SA33	47 (for W motors)	Molex # 39-00-0039, Socket: SA3347 (for W motors)

* mm dimensions are for reference purposes only.

** Dimension H2 applies only to dual-shaft (D) and encoder (E) motors.

Dimension D (shaft diameter) is the same for both front and rear shafts of dual-shaft (D) and encoder (E) motors.

Dimensions J & K do NOT apply to rear shafts of dual-shaft (D) and encoder (E) motors (all rear shafts are round style). Dimension F2 applies to IP65 (W) motors only.

*** Dimension H3 applies only to "E" models with the encoder pre-mounted.



SureStep[®] Motor Dimensions and Cabling



** Dimension A is the same for both front and rear shafts of dual-shaft motors.

** Dimensions C & D do NOT apply to rear shafts of dual-shaft motors (all rear shafts are round style). Dimension applies only to dual-shaft (D) motors.

SureStep 8	SureStep Series Dimensions & Cabling – NEMA 34 Connectorized Bipolar Stepping Motors									
Dimensions	High Torque Motors		Higher Torque Motors							
(in [mm]*)	<u>STP-MTR-34066(</u> x)	<u>STP-MTRH-34066(x)</u>	<u>STP-MTRH-34097(</u> x)	<u>STP-MTRH-34127(</u> x)						
A**		Ø 0.50 [12.7]								
В	2.64 [67.1]	2.64 [67.1] 3.82 [97.0] 5.00 [127.0]								
C**	0.98 [25.0]									
D**		0.45 [11.4]								
Conductor	(4) #20 AWG, (5) #18 AWG (for W motors)	(4	#18 AWG, (5) #18 AWG (for W motor	s)						
Connector	Molex # 43025-0400, PXP4010/06S/6065 (for W motors)	Molex # 39-01-3042, PXP4010/06S/6065 (for W motors)								
Pin	Molex # 43030-0007, Socket: SA3347 (for W motors)	Molex #	⁴ 39-00-0039, Socket: SA3347 (for W r	notors)						

* mm dimensions are for reference purposes only.

** Dimension A (shaft diameter) is the same for both front and rear shafts of dual-shaft (D series) motors. Dimensions C & D do NOT apply to rear shafts of dual-shaft (D series) motors (all rear shafts are round style).

*** This dimension only applies to dual-shaft (D series) motors.



SureStep[®] Motor Dimensions and Cabling

STP-MTRAC-23xxx Motors



STP-MTRAC-34xxx Motors







Dimension H2 applies only to dual-shaft (D) motors. Dimensions J & K do NOT apply to rear shafts of dual-shaft motors (all rear shafts are round style).

SureStep Series Dimensions & Cabling – High Voltage Bipolar Stepping Motors											
Dimensions* (in [mm]*)	High Voltage High Torque										
	<u>STP-MTRAC-</u> <u>23044(</u> x)	<u>STP-MTRAC-</u> 23055(x)	<u>STP-MTRAC-</u> <u>23078(x)</u>	<u>STP-MTRAC-</u> <u>34075(</u> x)	<u>STP-MTRAC-</u> <u>34115(</u> x)	<u>STP-MTRAC-</u> <u>34156(</u> x)					
A	2.25 [57.15]	2.25 [57.15]	2.25 [57.15]	3.39 [86.1]	3.39 [86.1]	3.39 [86.1]					
В	1.86 [47.24]	1.86 [47.24]	1.86 [47.24]	2.74 [69.6]	2.74 [69.6]	2.74 [69.6]					
С	1.50 [38.1]	1.50 [38.1]	1.50 [38.1]	2.87 [72.9]	2.87 [72.9]	2.87 [72.9]					
D**	0.25 [6.35]	0.25 [6.35]	0.25 [6.35]	0.5 [12.7]	0.5 [12.7]	0.625 [15.9]					
E	0.2 [5.08]	0.2 [5.08]	0.2 [5.08]	0.22 [5.59]	0.26 [6.6]	0.22 [5.59]					
E2***	2-56 thru	2-56 thru	2-56 thru	2-56 UNC Tap 0.2 Deep	2-56 UNC Tap 0.2 Deep	2-56 UNC Tap 0.2 Deep					
E3***	4-40 UNC x 0.2 Deep	4-40 UNC x 0.2 Deep	4-40 UNC x 0.2 Deep	4-40 UNC Tap 0.2 Deep	4-40 UNC Tap 0.2 Deep	4-40 UNC Tap 0.2 Deep					
E4***	2-56 UNC Tap 0.2 Deep	2-56 UNC Tap 0.2 Deep	2-56 UNC Tap 0.2 Deep	-	-	-					
F	1.71 [43.43]	2.16 [54.86]	3.05 [77.47]	2.95 [74.93]	4.52 [114.81]	6.14 [155.96]					
H1	0.81 [20.57]	0.81 [20.57]	0.81 [20.57]	1.25 [31.75]	1.25 [31.75]	1.25 [31.75]					
H2***	0.63 [16.0]	0.63 [16.0]	0.63 [16.0]	1.12 [28.45]	1.12 [28.45]	1.12 [28.45]					
J	0.60 [15.24]	0.60 [15.24]	0.60 [15.24]	0.87 [22.1]	0.87 [22.1]	0.87 [22.1]					
L	120 [3048]	120 [3048]	120 [3048]	120 [3048]	120 [3048]	120 [3048]					





34115(x) Motor Wiring

* mm dimensions are for reference purposes only.

** Dimension D (shaft diameter) is the same for both front and rear shafts of NEMA 23 dual-shaft motors. See diagrams for NEMA 34.

*** Dimension applies only to dual-shaft (D) motors.

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Stepping System Motors

STP-MTRAC-42xxx Motors



Uni-polar									
+ 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0									

Bi-polar series



Bi-polar parallel



Motors Higher Voltage High Torque STP-MTRACH-42151D STP-MTRACH-42100D STP-MTRACH-42202D STP-MTRACH-42100 STP-MTRACH-42151 STP-MTRAC-42151D STP-MTRAC-42202D STP-MTRACH-42202 STP-MTRAC-42100D STP-MTRAC-42100 STP-MTRAC-42202 STP-MTRAC-42151 Dimensions* (in [mm]*) 4.33 [110] 4.33 [110] 4.33 [110] 4.33 [110] 4.33 [110] 4.33 [110] Α 3.50 [88.9] В 3.50 [88.9] 3.50 [88.9] 3.50 [88.9] 3.50 [88.9] 3.50 [88.9]

2.19 [55.6]

0.75 [19.05]

0.327 [8.31]

n/a

7.91

2.19 [55.6]

n/a

1.37 [34.8]

12 [305]

2.19 [55.6]

0.75 [19.05]

0.327 [8.31]

4-40 UNC Tap 0.2

Deep

3.88***

2.19 [55.6]

1.12 [28.4]

1.37 [34.8]

2.19 [55.6]

0.75 [19.05]

0.327 [8.31]

4-40 UNC Tap 0.2

Deep

5.94***

2.19 [55.6]

1.12 [28.4]

1.37 [34.8]

2.19 [55.6]

0.75 [19.05]

0.327 [8.31]

4-40 UNC Tap 0.2

Deep

7.91***

2.19 [55.6]

1.12 [28.4]

1.37 [34.8]

SureStep Series Dimensions & Cabling – Higher Voltage Bipolar Stepping

* mm dimensions are for reference purposes only.

2.19 [55.6]

0.75 [19.05]

0.327 [8.31]

n/a

3.88

2.19 [55.6]

n/a

1.37 [34.8]

С

Ε

E2

F

H1

H2

J**

D**

** Dimension D (shaft diameter), J, and Key do not apply to rear shafts of dual-shaft motors.

2.19 [55.6]

0.75 [19.05]

0.327 [8.31]

n/a

5.94

2.19 [55.6]

n/a

1.37 [34.8]

*** For encoder mounting the required STP-MTRA-42ENC bracket will add 0.13 inches [3.2 mm] to the length of the motor.

For the latest prices, please check AutomationDirect.com.



Linear Actuators

SureStep[®] Linear Actuators

SureStep Linear Actuators consist of Surestep NEMA 17 or NEMA 23 stepper motors that incorporate a stainless steel lead screw as the rotor. This translates the motor's torque into linear thrust. No maintenance, non-lubricated PTFE-infused polymer lead screw nuts allow for a long life. Triangular nuts come standard on the actuators. Replacement triangular nuts and spare round nuts are available. The motors in these actuators are from the same family of motors as the other SureStep stepper motors. The linear actuators come in 6, 9, and 12 inch lengths. A 1-ft motor power cable ships with the actuator and plugs into the motor's integrated connectors. Longer motor power cables are available in 6, 10, and 20 foot lengths.



ADJ series journal end

Linear actuators ending in "ANN" are the most cost effective. Actuators ending in "ADJ" have a journal machined at the end of the screw to accept a bearing for mounting. There is also a groove cut into the journal for a retaining clip. See the SureStep User Manual for more details and bearing/clip specifications. The "ADJ" actuators also feature a rear motor shaft and encoder mounting holes pre-drilled and tapped. See our line of Same Sky stepper motor encoders for a complete line of available encoders that can mount onto the linear actuators.

SureStep Series Part Numbers – Linear Actuators											
Linear Actuator	Price	Screw End Machining	NEMA Frame Size	Lead Screw Length	Lead Screw Material	Lead (in/rev or mm/rev)	Linear (per 1.8°	Travel rotation)	Nominal Thrust (lbs)	Motor Weight (lbs)	Drawing
STP-I F17-2406ANN	\$127.00			g		0.25"	0.00125	0.03175	45	0.7	PDF
STP-LETT-2200ANN	\$129.00	-				3mm	0.00120	0.00170	73	0.7	PDF
STP-LE17-2D06ANN	\$131.00	-				1 25 mm	0.00025	0.00625	87	0.8	PDF
STP-LE17-3A06ANN	\$137.00	None				0.25"	0.00125	0.03175	69	0.9	PDF
STP-LE17-3B06ANN	\$145.00	-				0.5"	0.0025	0.0635	38	0.9	PDF
STP-LE17-3E06ANN	\$142.00	-				8mm	0.0016	0.04	55	1.0	PDF
STP-LE17-2A06ADJ	\$141.00		17		Stainless Steel	0.25"	0.00125	0.03175	45	0.7	PDF
STP-LE17-2C06ADJ	\$145.00					3mm	0.00059	0.015	73	0.7	PDF
STP-LE17-2D06ADJ	\$146.00	Journal and		6"		1.25 mm	0.00025	0.00625	87	0.8	PDF
STP-LE17-3A06ADJ	\$160.00	groove				0.25"	0.00125	0.03175	69	0.9	PDF
STP-LE17-3B06ADJ	\$161.00					0.5"	0.0025	0.0635	38	0.9	PDF
STP-LE17-3E06ADJ	\$159.00					8mm	0.0016	0.04	55	1.0	PDF
STP-LE23-1F06ANN	\$172.00					10.5 mm	0.0021	0.0525	63	1.4	PDF
STP-LE23-1H06ANN	\$188.00					6mm	0.0012	0.03	87	1.4	PDF
STP-LE23-1G06ANN	\$189.00	None				2mm	0.0004	0.01	137	1.4	PDF
STP-LE23-3K06ANN	\$248.00]				1"	0.005	0.127	62	2.7	PDF
STP-LE23-3H06ANN	\$232.00					6mm	0.0012	0.03	193	2.7	PDF
STP-LE23-1F06ADJ	\$199.00		23			10.5 mm	0.0021	0.0525	63	1.4	PDF
STP-LE23-1H06ADJ	\$217.00					6mm	0.0012	0.03	87	1.4	PDF
STP-LE23-1G06ADJ	\$218.00	Journal and				2mm	0.0004	0.01	137	1.4	PDF
STP-LE23-3K06ADJ	\$263.00	9.0010				1"	0.005	0.127	62	2.7	PDF
STP-LE23-3H06ADJ	\$250.00					6mm	0.0012	0.03	193	2.7	PDF

Motors listing continued on next page





1-800-633-0405

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Linear Actuators



SureStep[®] Linear Actuators

STP-LE23-1G09ADJ

	and the second s	
9ADJ		
	A Property	0

Inter Actuators Price Machine Machine STP-LE17-2609ANN States Lead Scree Lead Scree Langth Lead Scree Lead Scree Langth Lead Scree Langth			SureS	tep Serie	es Part N	lumbers	– Linear	Actuato	rs (Cont'd)			
Linden Landando Frame Size Length Matchian instep minitety minity minitety <thminitety< th=""></thminitety<>	Lincor Actuators	Drico	Screw End	NEMA	Lead Screw	Lead Screw	Lead (in/rev	Linear Trav	el (per 1.8° rot.)	Nominal	Motor	Drowing
STP-LET:2A09ANN \$133.00 STP-LET:2A09ANN \$133.00 STP-LET:2A09ANN \$133.00 STP-LET:2A09ANN \$143.00 STP-LET:2A09ANN \$143.00 STP-LET:2004ANN \$140.00 STP-LET:2004ANN	Linear Actuators	Price	Machining	Frame Size	Length	Material	or mm/rev)	in/step	mm/step	Thrust (lbs)	Weight (lbs)	Drawing
STP-LET:2008ANN Si3100 STP-LET:2008ANN None 3mm 0.00090 0.016 73 0.8 PDE PDE PDE STP-LET:3008ANN Si4800 STP-LET:3008ANN Si4800 T/ 0.0025 0.0025 0.00125 0.00125 0.00125 0.0015 1.1 PDE DDE Corr 0.0025 0.0015 0.008 0.0015 1.2 PDE DDE DDE Corr 0.00125 0.00175 4.5 0.8 PDE DDE DDE Corr 0.0015 0.0015 7.3 0.8 PDE DDE DDE DDE DDE DDE DDE DDE DDE DDE	STP-LE17-2A09ANN	\$135.00	_				0.25"	0.00125	0.03175	45	0.8	PDF
STP-LE1:2009ANN 133.00 None 17 STP-LE1:3009ANN 314.00 11 PDE STP-LE1:3009ANN 314.00 11 PDE STP-LE1:3009ANN 314.00 11 PDE STP-LE1:2009ADJ 314.00 11 PDE STP-LE1:3009ANN 314.00 20 0.0125 0.03175 69 1.1 PDE STP-LE1:3009ADJ 314.00 20 0.0125 0.03175 69 1.1 PDE STP-LE1:3009ADJ 316.00 20 0.0125 0.03175 69 1.1 PDE STP-LE2:17:09ANN 316.00 20 0.015 73 0.8 PDE STP-LE2:309ANN 300.00 None 37 0.9 PDE STP-LE2:309ANN 3160.00 None 37 0.0 0.0025 0.0025 0.033 68 1.1 PDE STP-LE2:309ANN 328.00 None 37 0.9 PDE STP-LE2:309ANN 328.00	STP-LE17-2C09ANN	\$131.00					3mm	0.00059	0.015	73	0.8	PDF
STP_LE17:3409ANN \$14.00 1.1 PDE STP_LE17:3609ANN \$14.00 1.1 PDE STP_LE17:3609ANN \$14.00 0.025 0.0025 0.0025 3.8 1.1 PDE STP_LE17:3609ANN \$14.00 0.016 0.04 55 1.2 PDE STP_LE17:3609ADJ \$15.00 Journal and groove 3mm 0.0025 0.0025 8.7 0.9 PDE STP_LE17:3609ADJ \$15.00 Journal and groove 125 mm 0.0025 0.0025 8.7 0.9 PDE STP_LE21:AD9AND \$15.00 Journal and groove 0.0025 0.0025 0.015 7.0025 0.0265 0.16 PDE STP_LE23:AG9ANN \$289.00 STP_LE23:AG9ANN \$289.00 <th>STP-LE17-2D09ANN</th> <th>\$133.00</th> <th>None</th> <th>1.25 mm</th> <th>0.00025</th> <th>0.00625</th> <th>87</th> <th>0.9</th> <th>PDF</th>	STP-LE17-2D09ANN	\$133.00	None				1.25 mm	0.00025	0.00625	87	0.9	PDF
STP-LE1:-3609ANN \$140.00 11 D05 0.0025 0.00233 38 1.1 PDE STP-LE1:-2009ADJ \$150.00 0 0 55 1.2 PDE STP-LE1:-2009ADJ \$160.00 growe growe 0.0125 0.00125 0.03175 45 0.8 PDE STP-LE1:-2009ADJ \$163.00 growe growe growe 1.1 PDE STP-LE1:-2009ADJ \$163.00 growe growe 0.0125 0.03175 69 1.1 PDE STP-LE2:-1609ANN \$190.00 smm 0.0016 0.04 55 1.2 PDE STP-LE2:-1609ANN \$205.00 smm 0.0016 0.04 55 1.2 PDE STP-LE2:-1609ANN \$205.00 smm 0.0016 0.04 50 1.2 PDE STP-LE2:-1609ANN \$205.00 smm 0.0016 0.04 1.3 1.7 PDE STP-LE2:-1609ANN \$205.00 sto.0012 0.033	STP-LE17-3A09ANN	\$148.00	NONE				0.25"	0.00125	0.03175	69	1.1	PDF
STP-LE17-3E09ANN S146.00 T Str	STP-LE17-3B09ANN	\$148.00	_				0.5"	0.0025	0.0635	38	1.1	PDF
STP_LE17_2009ADJ S194.00 STP_LE17_2009ADJ S194.00 STP_LE17_2009ADJ S194.00 STP_LE17_2009ADJ S194.00 STP_LE17_3009ADJ S183.00 STP_LE17_3009ADJ S183.00 STP_LE17_3009ADJ S183.00 STP_LE17_3009ADJ S183.00 STP_LE23-1609ANN S190.00 STP_LE23-1609ANN S190.00 STP_LE23-1609ANN S190.00 STP_LE23-1609ANN S190.00 STP_LE23-1609ADJ S190.00 STP_LE17-2012ADJ S180.00 STP_LE17-2012ADJ S180.00 STP_LE1	STP-LE17-3E09ANN	\$146.00		17			8mm	0.0016	0.04	55	1.2	PDF
STP_LE17.2009ADJ S151:00 Journal and groove grow Mammedia	STP-LE17-2A09ADJ	\$152.00	-	11			0.25"	0.00125	0.03175	45	0.8	PDF
STP_LET7-2009ADJ \$151:00 Journal and growe gr 0.0025 0.0025 87 0.9 PDF STP_LET7-3809ADJ \$163:00 growe 0.25'' 0.0025 0.00375 69 1.1 PDF STP_LET7-3809ADJ \$163:00 growe 0.25'' 0.0025 0.0635 38 1.1 PDF STP_LE23-1609ADN \$190:00 store 0.05'' 0.0021 0.033 87'' 1.7 PDF STP_LE23-1609ADN \$258:00 store 0.0012 0.03 87'' 1.7'' PDF STP_LE23-1609ADJ \$228:00 store 0.0012 0.03 87'' 1.7'' PDF STP_LE23-1609ADJ \$228:00 store 0.0012 0.03 87'' 1.7''' PDF STP_LE23-1609ADJ \$228:00 store store 6mm 0.0012 0.03 87''' 1.6''''''''''''''''''''''''''''''''''''	STP-LE17-2C09ADJ	\$146.00	-				3mm	0.00059	0.015	73	0.8	PDF
STP_LET7.3809ADJ \$163.00 grouve 0.25" 0.00125 0.00125 0.01375 69 1.1 PDE STP_LET7.3809ADJ \$163.00 Strolet7.3809ADJ \$163.00 38 1.1 PDE STP_LET2.3509ANN \$190.00 STP_LE23.1609ANN \$205.00 38 1.1 PDE STP_LE23.1609ANN \$205.00 STP_LE23.1609ANN \$205.00 6mm 0.0016 0.04 55 1.2 PDE STP_LE23.1609ANN \$205.00 STP_LE23.3609ADN \$2300 11" 0.0021 0.033 67 1.7 PDE STP_LE23.1609ADN \$22300 Journal and grouve 23 10.5 mm 0.0012 0.03 67 1.7 PDE STP_LE23.3609ADJ \$226.00 Journal and grouve 10.5 mm 0.0012 0.03 67 1.7 PDE STP_LE23.3609ADJ \$226.00 Journal and grouve Steel 6mm 0.0012 0.03 67 1.7 PDE STP_LE3.3609ADJ \$282.00	STP-LE17-2D09ADJ	\$151.00	Journal and				1.25 mm	0.00025	0.00625	87	0.9	PDF
STP_LE17.3E093ADJ \$163.00 9" 0.5" 0.0025 0.0635 38 1.1 PDE STP_LE23.H093ANN \$190.00 STP_LE23.H093ANN \$208.00 1.1 PDE STP_LE23.H093ANN \$208.00 None STP_LE23.S093ANN \$208.00 1.1 PDE STP_LE23.H093ANN \$208.00 None STP_LE23.S093ANN \$208.00 1.1 PDE STP_LE23.S093ANN \$208.00 None STP_LE23.S093ANN \$208.00 PDE STP_LE23.S093ADJ \$208.00 Journal and growe Gmm 0.0012 0.03 87 1.7 PDE STP_LE23.S093ADJ \$208.00 Journal and growe Gmm 0.0012 0.03 87 1.7 PDE STP_LE23.S093ADJ \$208.00 StPLE33.S093ADJ \$208.00 T 1.7 PDE STP_LE23.S093ADJ \$208.00 StPLE33.S093ADJ \$208.00 0.011 137 1.7 PDE STP_LE33.S093ADJ \$208.00 StPLE33.S093ADJ \$208.00 0.015	STP-LE17-3A09ADJ	\$163.00	groove				0.25"	0.00125	0.03175	69	1.1	PDF
STP_LE23-IF09ADJ \$190.00 None PDF STP_LE23-IF09ADN \$205.00 None 10.5 mm 0.0016 0.044 55 1.2 PDF STP_LE23-IF09ADN \$205.00 None 10.5 mm 0.0012 0.033 87 1.7 PDF STP_LE23-IF09ADJ \$203.00 110.5 mm 0.0012 0.033 87 1.7 PDF STP_LE23-IF09ADJ \$203.00 100mal and grove 11 0.0014 0.011 137 1.7 PDF STP_LE23-IF09ADJ \$223.00 100mal and grove 10.5 mm 0.0012 0.033 87 1.7 PDF STP_LE23-IF09ADJ \$225.00 100mal and grove 10.5 mm 0.0012 0.033 87 1.7 PDF STP_LE23-IF09ADJ \$252.00 100mal and grove 17 0.0012 0.031 133 0.0 PDF STP_LE17-2012ANN \$130.00 STP_LE17 0.0014 0.015 7.8 0.9 PDF STP_LE17-3812ADJ <	STP-LE17-3B09ADJ	\$163.00	-		9"		0.5"	0.0025	0.0635	38	1.1	PDF
STP-LE23-IF09ANN \$205.00 None STP-LE23-IG09ANN \$208.00 None STP-LE23-IG09ADJ \$205.00 Strp-LE23-IG09ADJ \$205.00 STP-LE23-IG09ADJ \$205.00 Strp-LE23-IG09ADJ \$205.00 STP-LE23-IG09ADJ \$225.00 Strp-LE23-IG09ADJ \$225.00 STP-LE23-IG09ADJ \$225.00 Strp-LE3-IG09ADJ \$225.00 STP-LE23-IG09ADJ \$225.00 Stainless Stainless STP-LE23-IG09ADJ \$225.00 Strp-LE3-IG09ADJ \$225.00 STP-LE3-IG09ADJ \$225.00 Stainless Stainless Stainless STP-LE3-IG09ADJ \$225.00 Strp-LE3-IG09ADJ \$225.00 Intro 0.0012 0.03 13 DDE STP-LE3-IG09ADJ \$256.00 Intro Stainless Stainless Stainless Stainless Stainless<	STP-LE17-3E09ADJ	\$162.00			Ŭ		8mm	0.0016	0.04	55	1.2	PDF
STP-LE23-1109ANN \$208.00 None Strap (E23-1609AN) \$208.00 None STP-LE23-3609ANN \$208.00 None 23	STP-LE23-1F09ANN	\$190.00	-				10.5 mm	0.0021	0.0525	63	1.6	PDF
STP_LE23-1609ANN S208.00 None STP_LE23-3K09ANN S208.00 None STP_LE23-3H09ANN S208.00 1" 0.005 0.127 62 3.0 PDE STP_LE23-1F09ADJ S208.00 sournal and groove 1" 0.005 0.127 62 3.0 PDE STP_LE23-1F09ADJ S228.00 sournal and groove 10.5 mm 0.0012 0.03 87 1.7 PDE STP_LE23-3K09ADJ S228.00 sournal and groove 1" 0.0021 0.0525 63 1.6 PDE STP_LE72-3K09ADJ S282.00 1" 0.0004 0.01 137 1.7 PDE STP_LE72-3K09ADJ S282.00 1" 0.0004 0.01 137 1.7 PDE STP_LE72-212ANN \$135.00 stainless Steinless Steinless Steinless 0.015 7.3 0.9 PDE STP_LE72-212ADJ \$152.00 sto.00 0.00655 87 1.0 PDE 0.5" 0.0015 </th <th>STP-LE23-1H09ANN</th> <th>\$205.00</th> <th>-</th> <th></th> <th></th> <th rowspan="4">-</th> <th>6mm</th> <th>0.0012</th> <th>0.03</th> <th>87</th> <th>1.7</th> <th>PDF</th>	STP-LE23-1H09ANN	\$205.00	-			-	6mm	0.0012	0.03	87	1.7	PDF
STP-LE23-3K09ANN \$259.00 3.0 PDF STP-LE23-3H09ADJ \$205.00	STP-LE23-1G09ANN	\$208.00	None				2mm	0.0004	0.01	137	1.7	PDF
STP-LE23-3H09ADJ \$2000 23 STP-LE23-1F09ADJ \$2000 Journal and groove 23 STP-LE23-1G09ADJ \$2000 Journal and groove 10.5 mm 0.0021 0.03 193 3.0 PDE STP-LE23-1G09ADJ \$2000 Journal and groove 10.5 mm 0.0021 0.03 87 1.7 PDE STP-LE23-3H09ADJ \$2000 STP-LE33-3H09ADJ \$2000 11 0.0004 0.01 137 1.7 PDE STP-LE17-2A12ANN \$131.00 STP-LE17-2A12ANN \$133.00 PDF 11 0.0004 0.015 73 0.9 PDE STP-LE17-3D12ANN \$130.00 STP-LE17-3D12ANN \$151.00 3mm 0.00059 0.015 73 0.9 PDE STP-LE17-3D12ANN \$151.00 Journal and groove 12' 8mm 0.0012 0.03175 45 0.9 PDE STP-LE17-3D12ADJ \$151.00 groove 12' 8mm 0.0015 0.03175 45 0.9 PDE </th <th>STP-LE23-3K09ANN</th> <th>\$259.00</th> <th>-</th> <th>1"</th> <th>0.005</th> <th>0.127</th> <th>62</th> <th>3.0</th> <th>PDF</th>	STP-LE23-3K09ANN	\$259.00	-				1"	0.005	0.127	62	3.0	PDF
STP-LE23-If09ADJ \$205.00 STP-LE23-If09ADJ burnal and grove journal and grove	STP-LE23-3H09ANN	\$239.00		23			6mm	0.0012	0.03	193	3.0	PDF
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STP-LE23-G09ADJ \$225.00 oomaand groove stainess STP-LE23-3K09ADJ \$226.00 1 0.0004 0.01 137 1.7 PDF STP-LE23-3K09ADJ \$262.00 1 0.0012 0.033 193 3.0 PDF STP-LE17-2A12ANN \$131.00 1 0.0012 0.03175 45 0.9 PDF STP-LE17-3A12ANN \$133.00 PDF 3mm 0.00025 0.03175 69 1.3< PDF STP-LE17-3A12ANN \$153.00 900 PDF 3mm 0.00125 0.03175 69 1.3< PDF STP-LE17-3A12ANN \$152.00 \$152.00 \$150.00 \$167.00 \$150.00 \$167.00 \$150.00 \$150.00 \$150.00 \$150.00 \$150.00 \$167.00 \$150.00 \$150.00 \$167.00 \$150.00 \$167.00 \$167.00 \$167.00 \$167.00 \$167.00 \$167.00 \$167.00 \$167.00 \$1	STP-LE23-1H09ADJ	\$223.00	Journal and				6mm	0.0012	0.03	87	1.7	PDF
STP-LE23-3K09ADJ \$262.00 PDF STP-LE23-3H09ADJ \$266.00 6mm 0.0012 0.03 193 3.0 PDF STP-LE17-2A12ANN \$131.00 Stainless 6mm 0.0012 0.03175 45 0.9 PDF STP-LE17-2012ANN \$130.00 STP-LE17-2012ANN \$130.00 3.00 PDF STP-LE17-2012ANN \$130.00 None 0.00125 0.00125 0.03175 45 0.9 PDF STP-LE17-2012ANN \$130.00 112 0.00059 0.015 73 0.9 PDF STP-LE17-2012ANN \$150.00 125 0.00125 0.00155 87 1.0 PDF STP-LE17-2012ADJ \$150.00 155.00 1.4 PDF 0.25" 0.00125 0.03175 45 0.9 PDF STP-LE17-2012ADJ \$157.00 groove 12° 0.00125 0.0015 73 0.9 PDF STP-LE17-3812ADJ \$167.00 groove 12° 0.0015 6	STP-LE23-1G09ADJ	\$225.00	groove				2mm	0.0004	0.01	137	1.7	PDF
STP-LE23-3H09ADJ S256.00 C Stainless 6mm 0.0012 0.03 193 3.0 PDF STP-LE17-2A12ANN \$131.00 Stainless Steinless 6mm 0.0012 0.03175 45 0.9 PDF STP-LE17-2A12ANN \$133.00 Stainless Steinless Steinless 6mm 0.00125 0.03175 45 0.9 PDF STP-LE17-2A12ANN \$133.00 Stainless Steinless Steinless 6mm 0.00125 0.03175 45 0.9 PDF STP-LE17-3A12ANN \$163.00 Strinest 8trinest 6mm 0.00125 0.03175 69 1.3 PDF STP-LE17-2A12ADJ \$153.00 Journal and groove Journal and groove 3tr 0.0025 0.03175 45 0.9 PDF STP-LE17-2D12ADJ \$153.00 Journal and groove Journal and groove 3tr 12'' 0.0125 0.03175 69 1.3 PDF STP-LE17-3B12ADJ \$165.00 Journal and g	STP-LE23-3K09ADJ	\$262.00	-				1"	0.005	0.127	62	3.0	PDF
STP-LE17-2A12ANN \$\frac{13.00}{31.00} PDF STP-LE17-2C122ANN \$\frac{13.00}{31.00} 3mm 0.00059 0.015 7.3 0.9 PDF STP-LE17-2D122ANN \$\frac{13.00}{31.00} 3mm 0.00059 0.015 7.3 0.9 PDF STP-LE17-3D12ANN \$\frac{14.00}{31.00} \$\frac{10.00125}{31.00} 0.00025 0.00155 6.87 1.0 PDF STP-LE17-3B12ANN \$\frac{15.00}{31.00} 0.00125 0.00125 0.00125 0.001375 6.9 1.3 PDF STP-LE17-2A12ADJ \$\frac{15.00}{31.00} 0.00125 0.0015 7.3 0.9 PDF STP-LE17-2D12ADJ \$\frac{15.00}{31.00} 0.00125 0.0015 7.3 0.9 PDF STP-LE17-3B12ADJ \$\frac{16.00}{31.00} 0.0012 0.0015 7.3 0.9 PDF STP-LE17-3B12ADJ \$\frac{16.00}{31.00} 0.0012 0.0015 7.3 0.9 PDF STP-LE23-1H12ANJ \$\frac{16.00}{31.00} 0.0012 0.0015 0.015 1.3	STP-LE23-3H09ADJ	\$256.00				Stainless	6mm	0.0012	0.03	193	3.0	PDF
STP-LE17-2C12ANN \$133.00 None 3mm 0.00059 0.015 73 0.9 PDE STP-LE17-2D12ANN \$136.00 None 1.25 mm 0.00025 0.00625 87 1.0 PDE STP-LE17-3B12ANN \$153.00 151.00 0.00125 0.00125 0.003175 69 1.3 PDE STP-LE17-3B12ANN \$151.00 0.0015 0.00125 0.00175 45 0.9 PDE STP-LE17-2D12ADJ \$150.00 Journal and groove 90025 0.00125 0.00175 45 0.9 PDE STP-LE17-3B12ADJ \$150.00 Journal and groove 90025 0.00125 0.00175 45 0.9 PDE STP-LE17-3B12ADJ \$167.00 groove 90025 0.00125 0.00175 69 1.3 PDE STP-LE23-1fr12ANN \$194.00 STP-LE23-1fr12ANN \$105.00 None 90025 0.00125 0.0015 33 1.8 PDE STP-LE23-1fr12ANN \$211.00 None	STP-LE17-2A12ANN	\$131.00	-			Steel	0.25"	0.00125	0.03175	45	0.9	PDF
STP-LE17-2D12ANN \$136.00 None STP-LE17-3A12ANN \$149.00 STP-LE17-3B12ANN \$153.00 STP-LE17-3B12ANN \$153.00 STP-LE17-3E12ANN \$151.00 STP-LE17-2C12ADJ \$150.00 STP-LE17-2C12ADJ \$150.00 STP-LE17-2D12ADJ \$150.00 STP-LE17-3D12ADJ \$150.00 STP-LE17-3D12ADJ \$150.00 STP-LE17-3D12ADJ \$150.00 STP-LE17-3D12ADJ \$167.00 STP-LE17-3B12ADJ \$167.00 STP-LE17-3B12ADJ \$167.00 STP-LE23-1F12ANN \$194.00 STP-LE23-1F12ANN \$194.00 STP-LE23-1F12ANN \$194.00 STP-LE23-1F12ANN \$212.00 STP-LE23-1F12ANN \$212.00 STP-LE23-3H12ANN \$227.00 STP-LE23-1F12ADJ \$210.00 STP-LE23-1F12ADJ \$211.00 STP-LE23-1F12ADJ \$211.00 STP-LE23-1F12ADJ \$211.00 STP-LE23-1F12ADJ \$211.00 STP-LE23-1F12ADJ \$211.00	STP-LE17-2C12ANN	\$133.00	-				3mm	0.00059	0.015	73	0.9	PDF
SIP-LE17-3A12ANN \$149.00 STP-LE17-3B12ANN \$153.00 STP-LE17-3E12ANN \$153.00 STP-LE17-3E12ANN \$151.00 STP-LE17-2A12ADJ \$152.00 STP-LE17-2D12ADJ \$153.00 STP-LE17-2D12ADJ \$153.00 STP-LE17-3B12ADJ \$153.00 STP-LE17-3B12ADJ \$153.00 STP-LE17-3B12ADJ \$167.00 STP-LE17-3B12ADJ \$167.00 STP-LE23-1F12ANN \$163.00 STP-LE23-1F12ANN \$163.00 STP-LE23-1F12ANN \$167.00 STP-LE23-1F12ANN \$217.00 STP-LE23-1F12ANN \$220.00 STP-LE23-1F12ANN \$220.00 STP-LE23-1F12ANN \$220.00	STP-LE17-2D12ANN	\$136.00	None				1.25 mm	0.00025	0.00625	87	1.0	PDF
STP-LE17-3B12ANN \$153.00 13 PDE STP-LE17-3E12ANN \$151.00 17 8mm 0.0025 0.0035 38 1.3 PDE STP-LE17-3E12ANN \$151.00 155.00 0.0016 0.04 55 1.4 PDE STP-LE17-2C12ADJ \$150.00 155.00 0.00125 0.0015 73 0.9 PDE STP-LE17-3E12ADJ \$167.00 groove 12" 12" 0.0025 0.00125 0.00175 69 1.3 PDE STP-LE17-3E12ADJ \$167.00 groove 0.5" 0.0025 0.00635 38 1.3 PDE STP-LE17-3E12ADJ \$165.00 112" 0.5" 0.00125 0.003175 69 1.3 PDE STP-LE23-1F12ANN \$194.00 \$155.00 \$14 PDE STP-LE23-1F12ANN \$194.00 \$155.00 \$14 PDE STP-LE23-1F12ANN \$21.00 \$0.012 0.0033 87 2.0 PDE STP-LE23-3H12ANN	STP-LE17-3A12ANN	\$149.00	-				0.25"	0.00125	0.03175	69	1.3	
SIP-LE1-3E12ANN \$151.00 11 STP-LE17-3E12ANJ \$152.00 \$152.00 STP-LE17-2C12ADJ \$150.00 STP-LE17-2C12ADJ \$150.00 STP-LE17-2D12ADJ \$153.00 STP-LE17-3A12ADJ \$167.00 STP-LE17-3B12ADJ \$167.00 STP-LE17-3B12ADJ \$167.00 STP-LE17-3E12ADJ \$165.00 STP-LE23-1F12ANN \$194.00 STP-LE23-1F12ANN \$194.00 STP-LE23-1F12ANN \$194.00 STP-LE23-1F12ANN \$212.00 STP-LE23-1F12ANN \$212.00 STP-LE23-3H12ANN \$212.00 STP-LE23-3H12ANN \$214.00 STP-LE23-1F12ADJ \$210.00 STP-LE23-3H12ANN \$220.00 STP-LE23-1F12ADJ \$211.00 STP-LE23-1G12ADJ	STP-LE17-3B12ANN	\$153.00	-				0.5″	0.0025	0.0635	38	1.3	PDF
SIP-LE17-2A12ADJ \$152.00 STP-LE17-2C12ADJ \$150.00 STP-LE17-2D12ADJ \$153.00 Journal and groove groove 12" 0.00125 0.00125 0.00175 73 0.9 PDF 3mm 0.00059 0.015 73 0.9 PDF 3mm 0.00059 0.015 73 0.9 PDF 3mm 0.00025 0.00625 87 1.0 PDF 3mm 0.0025 0.00125 0.03175 69 1.3 PDF 3mm 0.00125 0.00125 0.03175 69 1.3 PDF 3mm 0.0016 0.044 55 1.4 PDF 3mm 0.0021 0.0525 63 1.8 PDF 3mm 0.0012 0.03 87 2.0 PDF 3mm 0.0021 0.0525 63 1.8 PDF 3mm 0.0012 0.03 87 2.0 PDF	STP-LE17-3E12ANN	\$151.00		17			8mm	0.0016	0.04	55	1.4	PDF
SIP-LE17-2C12ADJ \$150.00 ST3 0.9 PDE STP-LE17-2D12ADJ \$153.00 Journal and groove 1.25 mm 0.00025 0.00625 87 1.0 PDE STP-LE17-3A12ADJ \$167.00 groove 1.2" 0.00125 0.00125 0.03175 69 1.3 PDE STP-LE17-3B12ADJ \$167.00 9 0.5" 0.00125 0.0635 38 1.3 PDE STP-LE23-1F12ANN \$194.00 9 <t< th=""><th>STP-LE17-2A12ADJ</th><th>\$152.00</th><th>-</th><th></th><th></th><th></th><th>0.25″</th><th>0.00125</th><th>0.03175</th><th>45</th><th>0.9</th><th>PDF</th></t<>	STP-LE17-2A12ADJ	\$152.00	-				0.25″	0.00125	0.03175	45	0.9	PDF
STP-LE17-3A12ADJ \$13.00 Journal and groove journal and groove 1.2" 0.00025 0.00025 0.00125 0.00125 0.00175 69 1.3 PDF STP-LE17-3B12ADJ \$165.00 10 0.00125 0.00125 0.00125 0.001375 69 1.3 PDF STP-LE23-1F12ANN \$165.00 11 12" 0.00125 0.00125 0.00125 0.00125 0.00125 0.00125 0.00125 0.00125 0.00125 0.00125 0.00125 0.00125 0.0012 0.00125 0.0012 0.0013	STP-LE17-2C12ADJ	\$150.00					3mm	0.00059	0.015	13	0.9	
STP-LE17-3B12ADJ \$167.00 \$105.00 \$105.00 \$0.00125 \$0.0035 38 \$1.3 \$PDF STP-LE23-1F12ANN \$194.00 \$105.00 \$10.5 mm \$0.0012 \$0.003 \$87 \$2.0 \$PDF STP-LE23-1F12ANN \$217.00 \$0.00 \$0.0012 \$0.0012 \$0.003 \$87 \$2.0 \$PDF STP-LE23-3H12ANN \$269.00 \$23.33 PDF STP-LE23-3H12ANN \$246.00 23 \$11" \$0.0012 \$0.03 \$87 \$2.0 \$PDF STP-LE23-1F12ADJ \$211.00 \$241.00 \$23.00 \$00012 \$0.03 \$87 \$2.0 \$PDF STP-LE23-1F12ADJ \$211.00 \$227.00 \$000000 \$000000 \$00012 \$0.03 \$87 \$2.0 \$PDF STP-LE23-1G12ADJ \$230.00 \$000000 \$000000 \$00012 <th>STP-LETT-ZDTZADJ</th> <th>\$155.00 ¢167.00</th> <th>Journal and</th> <th></th> <th></th> <th></th> <th>1.20 mm</th> <th>0.00025</th> <th>0.00625</th> <th>60</th> <th>1.0</th> <th></th>	STP-LETT-ZDTZADJ	\$155.00 ¢167.00	Journal and				1.20 mm	0.00025	0.00625	60	1.0	
STP-LE23-1F12ADJ \$167.00 STP-LE23-1F12ADJ \$165.00 12" 8mm 0.0023 0.0033 36 1.3 PDF STP-LE23-1F12ANN \$194.00 STP-LE23-1H12ANN \$212.00 STP-LE23-1G12ANN \$217.00 None	STP-LE17-3A12ADJ	\$107.00	gioove				0.25	0.00125	0.03175	09	1.3	
STP-LE23-1F12ADJ \$165.00 I.4 PDF STP-LE23-1F12ANN \$194.00 \$105.00 1.4 PDF STP-LE23-1F12ANN \$212.00 \$105.00 10.5 mm 0.0021 0.0525 63 1.8 PDF STP-LE23-1G12ANN \$217.00 None 5 5 1.4 PDF STP-LE23-1G12ANN \$217.00 None 6mm 0.0012 0.03 87 2.0 PDF STP-LE23-3K12ANN \$269.00 5 5 1.8 PDF STP-LE23-3H12ANN \$246.00 23 10.5 mm 0.0012 0.03 193 3.3 PDF STP-LE23-1H12ADJ \$211.00 5 6mm 0.0021 0.0525 63 1.8 PDF STP-LE23-1H12ADJ \$211.00 5 6mm 0.0012 0.03 87 2.0 PDF STP-LE23-1H12ADJ \$227.00 5 6mm 0.0012 0.03 87 2.0 PDF STP-LE23-1G12ADJ \$230.00	STP-LETT-3BTZADJ	\$107.00 \$165.00			12"		0.0	0.0025	0.0635	50	1.0	
STP-LE23-1H12ANN \$194.00 None 610.5 mm 0.0021 0.0323 63 1.3 PDF STP-LE23-1G12ANN \$212.00 None 6mm 0.0012 0.03 87 2.0 PDF STP-LE23-1G12ANN \$217.00 None 1" 0.0004 0.01 137 2.0 PDF STP-LE23-3H12ANN \$269.00 1" 0.005 0.127 62 3.3 PDF STP-LE23-3H12ANN \$246.00 23 6mm 0.0012 0.03 193 3.3 PDF STP-LE23-1H12ADJ \$211.00 5TP-LE23-1H12ADJ \$227.00 30umal and propue 0.0012 0.03 87 2.0 PDF STP-LE23-1G12ADJ \$230.00 Journal and propue 0.0004 0.01 137 2.0 PDF	STP-LETT-SETZADJ	\$105.00					00000000000000000000000000000000000000	0.0010	0.04	62	1.4	
STP-LE23-1G12ANN \$217.00 None STP-LE23-3K12ANN \$269.00 STP-LE23-3H12ANN \$246.00 STP-LE23-1F12ADJ \$211.00 STP-LE23-1H12ADJ \$227.00 STP-LE23-1G12ADJ \$220.00 STP-LE23-1G12ADJ \$220.00	STP-LE23-1F12ANN	\$194.00 \$212.00	-				10.5 mm	0.0021	0.0525	03 97	2.0	
STP-LE23-3K12ANN \$269.00 STP-LE23-3H12ANN \$246.00 STP-LE23-1F12ADJ \$211.00 STP-LE23-1F12ADJ \$211.00 STP-LE23-1F12ADJ \$227.00 STP-LE23-1G12ADJ \$220.00 STP-LE23-1G12ADJ \$200.00	STP-LE23-1112ANN	\$212.00 \$217.00	Nono				2mm	0.0012	0.03	137	2.0	
STP-LE23-3H12ANN \$246.00 23 STP-LE23-1F12ADJ \$211.00 STP-LE23-1H12ADJ \$227.00 Journal and grouve Journal and grouve	STP-I F23-2K12ANN	\$260.00	NULLE				∠ııllı 1"	0.0004	0.01	62	2.0	
STP-LE23-1F12ADJ \$211.00 23 10.5 mm 0.0012 0.03 153 3.3 PDF STP-LE23-1H12ADJ \$227.00 Journal and grouve 0.0012 0.03 87 2.0 PDF STP-LE23-1G12ADJ \$230.00 Journal and grouve 0.0004 0.01 137 2.0 PDF	STP-I F23-2012ANN	\$246.00	-				6mm	0.003	0.127	102	3.3	
STP-LE23-1H12ADJ \$227.00 Journal and grouve Journal and grouve STP-LE23-1G12ADJ \$230.00 Journal and grouve PDF	STP-I F23-1F12AD	\$211.00		23			10.5 mm	0.0012	0.05	63	1.8	PDF
STP-LE23-1G12ADJ \$230.00 Journal and groove Control Control <thcontrol< th=""> Contro Contr</thcontrol<>	STP-I F23-1H12AD1	\$227.00	-				6mm	0.0021	0.0325	87	20	PDF
	STP-I F23-1G12AD1	\$230.00	Journal and				2mm	0.0012	0.00	137	2.0	PDF
STP-LE23-3K12ADJ \$266.00 1" 0.005 0.127 62 3.3 PDF	STP-LE23-3K12AD1	\$266.00	groove				1"	0.005	0 127	62	3.3	PDF
STP-LE23-3H12ADJ \$261.00	STP-LE23-3H12AD.I	\$261.00	1				6mm	0.0012	0.03	193	3.3	PDF

tSTP-46

SureStep[®] Linear Actuators Specifications

Sure	SureStep Series Specifications – NEMA 17 Linear Actuators									
Linear Actuator Motors	STP-LE17- 2Axxyyy	STP-LE17- 2Cxxyyy	STP-LE17- 2Dxxyyy	STP-LE17- 3Axxyyy	STP-LE17- 3Bxxyyy	STP-LE17- 3Exxyyy				
NEMA Frame Size			1	7						
Phases				2						
Rated Current			2	A						
Phase Resistance	1	1.04 Ω ± 10% (@20°C) 1.25 Ω ± 15% (@20°C)								
Phase Inductance	2.5	mH ± 20% (1kHz 1V	rms)	2.8 г	mH ± 20% (1kHz 1V	rms)				
Rotor Inertia		57 g·cm2			82 g∙cm2					
Rotational Shaft Holding Torque	().46 N·m (65.14 oz-ir	n)	C).63 N·m (89.21 oz-in	ı)				
No. of Motor Stacks		2			3					
Motor Length		39.8 mm			48.3 mm					
Lead Screw Material			SUS303Cu (cold-fini	shed stainless steel)						
Nut Material		-	TECAFORM AD AF (F	TFE-infused polymer	r)					
Lead	0.25"/rev	3 mm/rev	1.25 mm/rev	0.25"/rev	0.5"/rev	8mm/rev				
Linear Travel/Step (per 1.8° rotation)	0.00125 in/step	0.015 mm/step	0.00625 mm/step	0.00125 in/step	0.0025 in/step	0.04 mm/step				
Linear Speed (@150rpm)1	0.625 in/sec	7.5 mm/sec	3.125 mm/sec	0.625 in/sec	1.25 in/sec	20 mm/sec				
Thrust (@150rpm)	45lbs	73lbs	87lbs	69lbs	38lbs	55lbs				
Load Limit (lbs)2	75	75	80	75	75	80				
Radial Deflection (Max)3			6" lead scr 9" lead scre 12" lead sc	ew: 0.015" ew: 0.0225" crew 0.03"						
Ambient Operating Temperature			-20-5	50°C						
Insulation Class		1	B (13	0°C)	1					
Screw Diameter	0.25"	6.5 mm	8mm	0.25"	0.25"	8mm				
Agency Approvals			С	E						
· · · · · ·										

1 To determine your linear speed as it relates to RPM use the following formula: Linear Speed = RPM x (Lead/60 sec)

2 The load limit indicates max load before the nut begins to have its lifespan negatively impacted, not what the linear actuator can move. 3 Calculated deflection is the deflection value measured at the end of the lead screw.

Note: For dual-shaft motors (STP-LExx-xxxADJ series) the sum of the front and rear torque loads, radial loads, and thrust loads must not exceed the applicable torque, radial and thrust load ratings of the motor.





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Linear Actuators

SureStep[®] Linear Actuators Specifications

Sure	Step Series S	pecifications –	NEMA 23 Line	ar Actuators					
Linear Actuator Motors	STP-LE23-1Fxxyyy	STP-LE23-1Hxxyyy	STP-LE23-1Gxxyyy	STP-LE23-3Kxxyyy	STP-LE23-3Hxxyyy				
NEMA Frame Size			23	1	1				
Phases			2						
Rated Current		2.1 A 3A							
Phase Resistance		1.6 Ω ± 10% (@20°C)		1.1 Ω ± 10	% (@20°C)				
Phase Inductance	3.	9 mH ± 20% (1kHz 1V m	ns)	5.0 mH ± 20%	(1kHz 1V rms)				
Rotor Inertia		180 g∙cm2		460 g	g∙cm2				
Rotational Shaft Holding Torque		0.9 N·m (127.45 oz-in)		2.3 N·m (32	25.70 oz-in)				
No. of Motor Stacks		1		:	3				
Motor Length		45mm		791	nm				
Lead Screw Material	SUS303Cu (cold-finished stainless steel)								
Nut Material		TECAFO	RM AD AF (PTFE-infused	polymer)					
Lead	10.5 mm/rev	6mm/rev	2mm/rev	1"/rev	6mm/rev				
Linear Travel/Step (per 1.8° rotation)	0.0525 mm/step	0.03 mm/step	0.01 mm/step	0.005 in/step	0.03 mm/step				
Linear Speed (@150rpm)1	26.25 mm/sec	15 mm/sec	5 mm/sec	2.5 in/sec	15 mm/sec				
Thrust (@150rpm)	63lbs	87lbs	137 lbs	62 lbs	193 lbs				
Load Limit (Ibs)2	100	175	175	175	175				
Radial Deflection (Max)3			6" lead screw: 0.015" 9" lead screw: 0.0225" 12" lead screw 0.03"						
Ambient Operating Temperature			-20-50°C						
Insulation Class			B (130°C)						
Screw Diameter	10mm	12mm	12mm	0.5"	12mm				
Agency Approvals			CE						

1 To determine your linear speed as it relates to RPM use the following formula: Linear Speed = RPM x (Lead/60 sec)

2 The load limit indicates max load before the nut begins to have its lifespan negatively impacted, not what the linear actuator can move.

3 Calculated deflection is the deflection value measured at the end of the lead screw.

Note: For dual-shaft motors (STP-LExx-xxxADJ series) the sum of the front and rear torque loads, radial loads, and thrust loads must not exceed the applicable torque, radial and thrust load ratings of the motor.



For the latest prices, please check AutomationDirect.com.



SureStep[®] Linear Actuator Thrust vs. Speed Charts

The charts below detail the thrust output by the motor depending on the linear speed of the motor. The highest thrust is acheivable at the lowest speeds. Note that for some motors, the output thrust (solid lines) can exceed the load tolerance (horizontal dashed lines) of the nut on the shaft. *Allow sufficient time to accelerate the load and size the step motor with a 100% thrust safety factor (i.e.: design the system using a maximum of 50% of the motor's thrust).*



STP-LE17-2xxxx NEMA 17 Step Motor Linear Actuators (Double-stack motors)

STP-LE17-3xxxx NEMA 17 Step Motor Linear Actuators (Triple-stack motors)





SureStep[®] Linear Actuator Thrust vs. Speed Charts, continued



STP-LE23-1xxxx NEMA 23 Step Motor Linear Actuators (Single-stack motors)

STP-LE23-3xxxx NEMA 23 Step Motor Linear Actuators (Triple-stack motors)





SureStep[®] Linear Actuator Dimensions and Cabling

STP-LE17-xxxxANN Motors



See the cables section on page tSTP-55 for connector pin-out and wire color information.



STP-LE17-xxxxANN Dimensions (mm [inch])									
Part #	L1	L2	L3	\$1					
STP-LE17-2A06ANN	152.4 [6.00]	39.3 [1.55]	191.7 [7.55]	6.4 [0.25] 0.25" Lead					
STP-LE17-2A09ANN	228.6 [9.00]	39.3 [1.55]	267.9 [10.55]	6.4 [0.25] 0.25" Lead					
STP-LE17-2A12ANN	304.8 [12.00]	39.3 [1.55]	344.1 [13.55]	6.4 [0.25] 0.25" Lead					
STP-LE17-2C06ANN	152.4 [6.00]	39.3 [1.55]	191.7 [7.55]	6.5 [0.47] 3.0 mm Lead					
STP-LE17-2C09ANN	228.6 [9.00]	39.3 [1.55]	267.9 [10.55]	6.5 [0.47] 3.0 mm Lead					
STP-LE17-2C12ANN	304.8 [12.00]	39.3 [1.55]	344.1 [13.55]	6.5 [0.47] 3.0 mm Lead					
STP-LE17-2D06ANN	152.4 [6.00]	39.3 [1.55]	191.7 [7.55]	8.0 [0.31] 1.25 mm Lead					
STP-LE17-2D09ANN	228.6 [9.00]	39.3 [1.55]	267.9 [10.55]	8.0 [0.31] 1.25 mm Lead					
STP-LE17-2D12ANN	304.8 [12.00]	39.3 [1.55]	344.1 [13.55]	8.0 [0.31] 1.25 mm Lead					
STP-LE17-3A06ANN	152.4 [6.00]	47.8 [1.88]	200.2 [7.88]	6.4 [0.25] 0.25" Lead					
STP-LE17-3A09ANN	228.6 [9.00]	47.8 [1.88]	276.4 [10.88]	6.4 [0.25] 0.25" Lead					
STP-LE17-3A12ANN	304.8 [12.00]	47.8 [1.88]	352.6 [13.88]	6.4 [0.25] 0.25" Lead					
STP-LE17-3B06ANN	152.4 [6.00]	47.8 [1.88]	200.2 [7.88]	6.4 [0.25] 0.5" Lead					
STP-LE17-3B09ANN	228.6 [9.00]	47.8 [1.88]	276.4 [10.88]	6.4 [0.25] 0.5" Lead					
STP-LE17-3B12ANN	304.8 [12.00]	47.8 [1.88]	352.6 [13.88]	6.4 [0.25] 0.5" Lead					
STP-LE17-3E06ANN	152.4 [6.00]	47.8 [1.88]	200.2 [7.88]	8.0 [0.31] 8.0 mm Lead					
STP-LE17-3E09ANN	228.6 [9.00]	47.8 [1.88]	276.4 [10.88]	8.0 [0.31] 8.0 mm Lead					
STP-LE17-3E12ANN	304.8 [12.00]	47.8 [1.88]	352.6 [13.88]	8.0 [0.31] 8.0 mm Lead					



SureStep[®] Linear Actuator Dimensions and Cabling

STP-LE17-xxxxADJ Motors







NOTE: On some screw codes, the journals are not machined completely smooth in order to keep from machining the screw to

too small of a diameter. Some threads are still visible. This is intentional and will not affect bearing performance.



See the encoder compatibility section on page tSTP-56 for a list of compatible encoders. See the cables section on page tSTP-55 for connector pinout and wire color information.

STP-LE17-xxxxADJ Dimensions (mm [inch])								
Part #	L1	L2	L3	S1				
STP-LE17-2A06ADJ	152.4 [6.00]	39.3 [1.55]	203.6 [8.02]	6.4 [0.25] 0.25" Lead				
STP-LE17-2A09ADJ	228.6 [9.00]	39.3 [1.55]	279.8 [11.02]	6.4 [0.25] 0.25" Lead				
STP-LE17-2A12ADJ	304.8 [12.00]	39.3 [1.55]	356.0 [14.02]	6.4 [0.25] 0.25" Lead				
STP-LE17-2C06ADJ	152.4 [6.00]	39.3 [1.55]	203.6 [8.02]	6.5 [0.47] 3.0 mm Lead				
STP-LE17-2C09ADJ	228.6 [9.00]	39.3 [1.55]	279.8 [11.02]	6.5 [0.47] 3.0 mm Lead				
STP-LE17-2C12ADJ	304.8 [12.00]	39.3 [1.55]	356.0 [14.02]	6.5 [0.47] 3.0 mm Lead				
STP-LE17-2D06ADJ	152.4 [6.00]	39.3 [1.55]	203.6 [8.02]	8.0 [0.31] 1.25 mm Lead				
STP-LE17-2D09ADJ	228.6 [9.00]	39.3 [1.55]	279.8 [11.02]	8.0 [0.31] 1.25 mm Lead				
<u>STP-LE17-2D12ADJ</u>	304.8 [12.00]	39.3 [1.55]	356.0 [14.02]	8.0 [0.31] 1.25 mm Lead				
STP-LE17-3A06ADJ	152.4 [6.00]	47.8 [1.88]	212.1 [8.35]	6.4 [0.25] 0.25" Lead				
<u>STP-LE17-3A09ADJ</u>	228.6 [9.00]	47.8 [1.88]	288.3 [11.35]	6.4 [0.25] 0.25" Lead				
<u>STP-LE17-3A12ADJ</u>	304.8 [12.00]	47.8 [1.88]	364.5 [15.35]	6.4 [0.25] 0.25" Lead				
STP-LE17-3B06ADJ	152.4 [6.00]	47.8 [1.88]	212.1 [8.35]	6.4 [0.25] 0.5" Lead				
<u>STP-LE17-3B09ADJ</u>	228.6 [9.00]	47.8 [1.88]	288.3 [11.35]	6.4 [0.25] 0.5" Lead				
<u>STP-LE17-3B12ADJ</u>	304.8 [12.00]	47.8 [1.88]	364.5 [15.35]	6.4 [0.25] 0.5" Lead				
STP-LE17-3E06ADJ	152.4 [6.00]	47.8 [1.88]	212.1 [8.35]	8.0 [0.31] 8.0 mm Lead				
STP-LE17-3E09ADJ	228.6 [9.00]	47.8 [1.88]	288.3 [11.35]	8.0 [0.31] 8.0 mm Lead				
STP-LE17-3E12ADJ	304.8 [12.00]	47.8 [1.88]	364.5 [15.35]	8.0 [0.31] 8.0 mm Lead				

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SureStep[®] Linear Actuator Dimensions and Cabling

STP-LE23-xxxxANN Motors





STP-LE23-xxxxANN Dimensions (mm [inch])									
Part #	L1	L2	L3	D1	D2	D3	S1		
STP-LE23-1F06ANN	152.4 [6.00]	44.5 [1.75]	196.9 [7.75]	Ø22.2 [0.87] BC	3x Ø3.56 [0.14]	Ø29.5 [1.16]	10.0 [0.39] 10.5 mm Lead		
STP-LE23-1F09ANN	228.6 [9.00]	44.5 [1.75]	273.1 [10.75]	Ø22.2 [0.87] BC	3x Ø3.56 [0.14]	Ø29.5 [1.16]	10.0 [0.39] 10.5 mm Lead		
STP-LE23-1F12ANN	304.8 [12.00]	44.5 [1.75]	349.3 [13.75]	Ø22.2 [0.87] BC	3x Ø3.56 [0.14]	Ø29.5 [1.16]	10.0 [0.39] 10.5 mm Lead		
STP-LE23-1G06ANN	152.4 [6.00]	44.5 [1.75]	196.9 [7.75]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 2.0 mm Lead		
STP-LE23-1G09ANN	228.6 [9.00]	44.5 [1.75]	273.1 [10.75]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 2.0 mm Lead		
STP-LE23-1G12ANN	304.8 [12.00]	44.5 [1.75]	349.3 [13.75]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 2.0 mm Lead		
STP-LE23-1H06ANN	152.4 [6.00]	44.5 [1.75]	196.9 [7.75]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 6.0 mm Lead		
STP-LE23-1H09ANN	228.6 [9.00]	44.5 [1.75]	273.1 [10.75]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 6.0 mm Lead		
STP-LE23-1H12ANN	304.8 [12.00]	44.5 [1.75]	349.3 [13.75]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 6.0 mm Lead		
STP-LE23-3H06ANN	152.4 [6.00]	78.5 [3.09]	230.9 [9.09]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 6.0 mm Lead		
STP-LE23-3H09ANN	228.6 [9.00]	78.5 [3.09]	307.1 [12.09]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 6.0 mm Lead		
STP-LE23-3H12ANN	304.8 [12.00]	78.5 [3.09]	383.3 [15.09]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 6.0 mm Lead		
STP-LE23-3K06ANN	152.4 [6.00]	78.5 [3.09]	230.9 [9.09]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.5 [0.50] 1in Lead		
STP-LE23-3K09ANN	228.6 [9.00]	78.5 [3.09]	307.1 [12.09]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.5 [0.50] 1in Lead		
STP-LE23-3K12ANN	304.8 [12.00]	78.5 [3.09]	383.3 [15.09]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.5 [0.50] 1in Lead		



SureStep[®] Linear Actuator Dimensions and Cabling

STP-LE23-xxxxADJ Motors





See the cables section on page tSTP-55 for connector pinout and wire color information.

See the encoder compatibility section on page tSTP-56 for a list of compatible encoders.

STP-LE23-xxxxADJ Dimensions										
Part # L1 L2 L3 D1 D2 D3 S1										
STP-LE23-1F06ADJ	152.4 [6.00]	44.5 [1.75]	208.9 [8.22]	Ø22.2 [0.87] BC	3x Ø3.56 [0.14]	Ø29.5 [1.16]	10.0 [0.39] 10.5 mm Lead			
STP-LE23-1F09ADJ	228.6 [9.00]	44.5 [1.75]	285.1 [11.22]	Ø22.2 [0.87] BC	3x Ø3.56 [0.14]	Ø29.5 [1.16]	10.0 [0.39] 10.5 mm Lead			
STP-LE23-1F12ADJ	304.8 [12.00]	44.5 [1.75]	361.3 [14.22]	Ø22.2 [0.87] BC	3x Ø3.56 [0.14]	Ø29.5 [1.16]	10.0 [0.39] 10.5 mm Lead			
STP-LE23-1G06ADJ	152.4 [6.00]	44.5 [1.75]	208.9 [8.22]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 2.0 mm Lead			
STP-LE23-1G09ADJ	228.6 [9.00]	44.5 [1.75]	285.1 [11.22]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 2.0 mm Lead			
STP-LE23-1G12ADJ	304.8 [12.00]	44.5 [1.75]	361.3 [14.22]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 2.0 mm Lead			
STP-LE23-1H06ADJ	152.4 [6.00]	44.5 [1.75]	208.9 [8.22]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 6.0 mm Lead			
STP-LE23-1H09ADJ	228.6 [9.00]	44.5 [1.75]	285.1 [11.22]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 6.0 mm Lead			
STP-LE23-1H12ADJ	304.8 [12.00]	44.5 [1.75]	361.3 [14.22]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 6.0 mm Lead			
STP-LE23-3H06ADJ	152.4 [6.00]	78.5 [3.09]	242.9 [9.06]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 6.0 mm Lead			
STP-LE23-3H09ADJ	228.6 [9.00]	78.5 [3.09]	319.1 [12.56]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 6.0 mm Lead			
STP-LE23-3H12ADJ	304.8 [12.00]	78.5 [3.09]	395.3 [15.56]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.0 [0.47] 6.0 mm Lead			
STP-LE23-3K06ADJ	152.4 [6.00]	78.5 [3.09]	242.9 [9.06]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.5 [0.50] 1in Lead			
STP-LE23-3K09ADJ	228.6 [9.00]	78.5 [3.09]	319.1 [12.56]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.5 [0.50] 1in Lead			
STP-LE23-3K12ADJ	304.8 [12.00]	78.5 [3.09]	395.3 [15.56]	Ø28.58 [1.13] BC	3x Ø5.2 [0.20]	Ø38.1 [1.50]	12.5 [0.50] 1in Lead			



For the latest prices, please check AutomationDirect.com.

Linear Actuators

SureStep[®] Linear Actuators Cables

Cables for SureStep Series Linear Actuators							
Part Number	Price	Description	Drawing				
STP-LA-EXT17-006	\$26.00	SureStep extension cable, 6-pin (4-wire) connector to pigtail, 6ft cable length. For use with SureStep NEMA 17 STP-LE series linear actuators.	PDF				
STP-LA-EXT17-010	\$33.50	SureStep extension cable, 6-pin (4-wire) connector to pigtail, 10ft cable length. For use with SureStep NEMA 17 STP-LE series linear actuators.	PDF				
STP-LA-EXT17-020	\$55.00	SureStep extension cable, 6-pin (4-wire) connector to pigtail, 20ft cable length. For use with SureStep NEMA 17 STP-LE series linear actuators.	PDF				
STP-LA-EXT23-006	\$29.50	SureStep extension cable, 6-pin (4-wire) connector to pigtail, 6ft cable length. For use with SureStep NEMA 23 STP-LE series linear actuators.	PDF				
STP-LA-EXT23-010	\$39.00	SureStep extension cable, 6-pin (4-wire) connector to pigtail, 10ft cable length. For use with SureStep NEMA 23 STP-LE series linear actuators.	PDF				
STP-LA-EXT23-020	\$60.00	SureStep extension cable, 6-pin (4-wire) connector to pigtail, 20ft cable length. For use with SureStep NEMA 23 STP-LE series linear actuators.	PDF				

STP-LA-EXT17-0xx Dimensions (mm [in])



STP-LA-EXT23-0xx Dimensions (mm [in])



www.automationdirect.com

For the latest prices, please check AutomationDirect.com.

Linear Actuators



SureStep[®] Linear Actuators Accessories

Replacement Parts for SureStep Series Linear Actuators							
Part Number	Price	Description	Drawing				
<u>STP-LA-NTFA</u>	\$25.00	SureStep lead screw flange nut, replacement, triangular, 0.25 in/rev, 0.25 inch lead screw diameter. For use with SureStep STP-LE series screw code A linear actuators.	<u>PDF</u>				
<u>STP-LA-NTFB</u>	\$25.00	SureStep lead screw flange nut, replacement, triangular, 0.5 in/rev, 0.25 inch lead screw diameter. For use with SureStep STP-LE series screw code B linear actuators.	<u>PDF</u>				
<u>STP-LA-NTFC</u>	\$25.00	SureStep lead screw flange nut, replacement, triangular, 3mm/rev, 6.5 mm lead screw diameter. For use with SureStep STP-LE series screw code C linear actuators.	<u>PDF</u>				
<u>STP-LA-NTFD</u>	\$24.00	SureStep lead screw flange nut, replacement, triangular, 1.25 mm/rev, 8mm lead screw diameter. For use with SureStep STP-LE series screw code D linear actuators.	<u>PDF</u>				
<u>STP-LA-NTFE</u>	\$28.00	SureStep lead screw flange nut, replacement, triangular, 8mm/rev, 8mm lead screw diameter. For use with SureStep STP-LE series screw code E linear actuators.	<u>PDF</u>				
<u>STP-LA-NTFF</u>	\$40.00	SureStep lead screw flange nut, replacement, triangular, 10.5 mm/rev, 10mm lead screw diameter. For use with SureStep STP-LE series screw code F linear actuators.	<u>PDF</u>				
<u>STP-LA-NTFG</u>	\$42.50	SureStep lead screw flange nut, replacement, triangular, 2mm/rev, 12mm lead screw diameter. For use with SureStep STP-LE series screw code G linear actuators.	<u>PDF</u>				
<u>STP-LA-NTFH</u>	\$42.50	SureStep lead screw flange nut, replacement, triangular, 6mm/rev, 12mm lead screw diameter. For use with SureStep STP-LE series screw code H linear actuators.	<u>PDF</u>				
<u>STP-LA-NTFK</u>	\$44.00	SureStep lead screw flange nut, replacement, triangular, 1in/rev, 0.5 inch lead screw diameter. For use with SureStep STP-LE series screw code K linear actuators.	<u>PDF</u>				
<u>STP-LA-NRFA</u>	\$24.00	SureStep lead screw flange nut, round, 0.25 in/rev, 0.25 inch lead screw diameter. For use with SureStep STP-LE series screw code A linear actuators.	<u>PDF</u>				
<u>STP-LA-NRFB</u>	\$24.00	SureStep lead screw flange nut, round, 0.5 in/rev, 0.25 in lead screw diameter. For use with SureStep STP-LE series screw code B linear actuators.	<u>PDF</u>				
<u>STP-LA-NRFC</u>	\$24.00	SureStep lead screw flange nut, round, 3mm/rev, 6.5 mm lead screw diameter. For use with SureStep STP-LE series screw code C linear actuators.	<u>PDF</u>				
<u>STP-LA-NRFD</u>	\$24.00	SureStep lead screw flange nut, round, 1.25 mm/rev, 8mm lead screw diameter. For use with SureStep STP-LE series screw code D linear actuators.	<u>PDF</u>				
<u>STP-LA-NRFE</u>	\$25.00	SureStep lead screw flange nut, round, 8mm/rev, 8mm lead screw diameter. For use with SureStep STP-LE series screw code E linear actuators.	<u>PDF</u>				
<u>STP-LA-NRFF</u>	\$27.50	SureStep lead screw flange nut, round, 10.5 mm/rev, 10mm lead screw diameter. For use with SureStep STP-LE series screw code F linear actuators.	<u>PDF</u>				
STP-LA-NRFG	\$42.50	SureStep lead screw flange nut, round, 2mm/rev, 12mm lead screw diameter. For use with SureStep STP-LE series screw code G linear actuators.	PDF				
STP-LA-NRFH	\$42.50	SureStep lead screw flange nut, round, 6mm/rev, 12mm lead screw diameter. For use with SureStep STP-LE series screw code H linear actuators.	PDF				
STP-LA-NRFK	\$42.50	SureStep lead screw flange nut, round, 1in/rev, 0.5 inch lead screw diameter. For use with SureStep STP-LE series screw code K linear actuators.	PDF				

All STP-LA series nuts are formed from TECAFORM AD AF (a PTFE-infused polymer) and require no lubrication. Using any sort of lubricant is not recommended as it will eventually dry out and contaminate the screw.

SureStep Linear Actuators have a "Screw Code" built into the part number. Each screw has a specific diameter and lead (pitch). The "Y" variable in the Linear Actuator part numbers below represents the Screw Code:

STP-LE17-x**Y**xxxxx

STP-LE23-x**Y**xxxxx

To find a compatible nut, match the actuator's Screw Code to the nut screw code ("Y" below):

STP-LA-xxx**Y**

Example: An <u>STP-LA-NTFB</u> nut will fit onto an <u>STP-LE17-3B06ADJ</u> actuator.



STP-LA-NTFA



NEMA 17 Linear Actuator Compatible Encoders

NEMA 17 Compatible Encoders						
Same Sky Configurable Encoders	SureStep Encoders					
AMT102-V (config. ppr, Push-pull)	STP-MTRA-ENC1 (1000ppr, Line Driver)					
AMT103-V (config. ppr, Push-pull)	STP-MTRA-ENC3 (400ppr, Line Driver)					
AMT112S-V (config. ppr, Push-pull)	STP-MTRA-ENC2 (1000ppr, Push-pull)					
AMT112Q-V (config. ppr, Line Driver)	STP-MTRA-ENC4 (400ppr, Push-pull)					
AMT312D-V (config. ppr, Line Driver)	STP-MTRA-ENC9 (config. ppr, Line Driver)					
AMT312S-V (config. ppr, Push-pull)	STP-MTRA-ENC10 (config. ppr, Push-pull)					

NEMA 23 Linear Actuator Compatible Encoders

NEMA 23 Compatible Encoders						
Same Sky Configurable Encoders	SureStep Encoders					
AMT102-V (config. ppr, Push-pull)	STP-MTRA-ENC5 (1000ppr, Line Driver)					
AMT103-V (config. ppr, Push-pull)	STP-MTRA-ENC7 (400ppr, Line Driver)					
AMT112S-V (config. ppr, Push-pull)	STP-MTRA-ENC6 (1000ppr, Push-pull)					
AMT112Q-V (config. ppr, Line Driver)	STP-MTRA-ENC8 (400ppr, Push-pull)					
AMT312D-V (config. ppr, Line Driver)	STP-MTRA-ENC9 (config. ppr, Line Driver)					
AMT312S-V (config. ppr, Push-pull)	STP-MTRA-ENC10 (config. ppr, Push-pull)					



Stepping System Power Supplies

SureStep[®] Power Supplies

SureSte	SureStep Series Specifications – Stepping System Power Supplies								
Power Supply	STP-PWR-3204	STP-PWR-4805	<u>STP-PWR-4810</u>	<u>STP-PWR-7005</u>					
Drawing	PDF	PDF	PDF	PDF					
Price	\$150.00	\$183.00	\$237.00	\$233.00					
Input Power (fuse protected *)	1-phase, 120/240 VAC, 50/60 Hz, 150 VA Fuse*: 3A	1-phase, 120/240 VAC, 50/60 Hz, 350 VA Fuse*: 5A	1-phase, 120/240 VAC, 50/60 Hz, 650 VA Fuse*: 8A	1-phase, 120/240 VAC, 50/60 Hz, 500 VA Fuse*: 7A					
Input Voltage Range (switch selectable)	120/24	0 VAC ±10% (Voltage range swite	ch is set to 240 VAC from facto	ry)					
Inrush Current	120 VAC < 12 A / 240 VAC < 14 A	120 VAC < 20A / 240 VAC < 24A	120 VAC < 40A	/ 240 VAC < 50A					
Motor Supply Output (linear unregulated, fuse protected *, and power on LED indicator)	32 VDC @ 4A (fully loaded) 35 VDC @ 1A load 41 VDC @ no load Fuse*: 6A (Electrically isolated from Logic Supply Output)	46.5 VDC @ 5A (fully loaded) 52 VDC @ 1A load 57.5 VDC @ no load Fuse*: 8A	46.5 VDC @ 10A (fully loaded) 50 VDC @ 1A load 57.5 VDC @ no load Fuse*: 15A	70 VDC @ 5A (fully loaded) 79 VDC @ 1A load 86.5 VDC @ no load Fuse*: 8A					
Logic Supply Output (regulated and power on LED indicator)		5 VDC ±5% @ Electronically Overlo(Electrically isolated from M	500 mA ad Protected) otor Supply Output)						
Watt Loss	13W	25W	51W	42W					
Storage Temperature Range		-55 to 85 °C [-67	to 185 °F]						
Operating Temperature Range	0 to 50 °C [32 to 122 °	F] full rated; derate current 1.1% p	er degree above 50°C; 70 °C	[158 °F] maximum					
Humidity		95% (non-condensing) relativ	e humidity maximum						
Cooling Method	Nat	ural convection (mount power supp	ly to metal surface if possible)						
Mounting	Mount on o	either wide or narrow side with mac	hine screws per dimension dia	igrams					
Weight (lb [kg])	6.5 [2.9]	11 [4.9]	18 [8.3]	16 [7.2]					
Connections		Screw Termi	nals						
Agency Approvals		UL (file # E181899)), CSA, CE						

* Fuses to be replaced by qualified service personnel only. Use (1-1/4 x 1/4 in) ceramic fast-acting fuses (Edison type ABC from AutomationDirect, or equivalent).

Power Supply Dimensions

STP-PWR-3204 Power Supply





Stepping System Power Supplies

SureStep[®] Power Supply Dimensions (continued)

STP-PWR-4805, -4810, -7005 Power Supplies



SureStep Series Dimensions – 48V & 70V Power Supplies												
Power Supply Part	Dimensions* (in [mm]*)									Mtg		
Number	Α	В	С	D	Ε	F	G	Н	J	K	L	Screw
<u>STP-PWR-4805</u>	8.10 [205.7]	3.88 [98.6]	5.00 [127.0]	0.87 [22.1]	4.67 [118.6]	0.25 [6.4]	7.15 [181.6]	7.75 [196.9]	0.50 [12.7]	3.53 [89.7]	0.200 [5.1]	#10
STP-PWR-4810 STP-PWR-7005	9.00 [228.6]	4.62 [117.3]	5.62 [142.7]	1.56 [39.6]	4.06 [103.1]	0.35 [8.9]	n/a	8.59 [218.2]	0.50 [12.7]	4.27 [108.5]	9/32 [7.1]	1/4

* mm dimensions are for reference purposes only.



SureStep[®] Integrated Motors System

General integrated motor/drive features

- DC power supply required (12-48 VDC or 12-70 VDC)
- Pulse/Direction or CW Pulse/CCW Pulse
- Digital input filtering
- "E" models include an encoder
- Three optically isolated digital inputs, 5 to 24 volts
- Step input signal smoothing (microstep emulation), performs high resolution stepping by synthesizing coarse steps into fine microsteps
- Dynamic smoothing, software-configurable filtering for use in removing spectral components from command sequence, reduces jerk, limiting excitation of system resonance
- Anti-resonance (electronic damping): raises the system-damping ratio to eliminate midrange instability and allow stable operation throughout the speed range of the motor
- Idle current reduction range of 0-90% of running current after a delay selectable in milliseconds (Standard models = 50/90%, DIP switch selectable)
- Configurable hardware digital noise filter, software noise filter
- Non-volatile storage, configurations are saved in FLASH memory on-board the DSP
- Dynamic current control, software configurable for running current, accel current, idle current, to make motion smoother and the motor run cooler

Standard integrated motor/drive features

(STP-MTRD-x)

- "E" models have an externally wireable encoder which can provide feedback to an external controller
- Configurable via DIP switches
- Available torque from 68 to 210 oz-in

Advanced integrated motor/drive features

(STP-MTRD-xR)

- Step and Direction, CW/CCW, and AB Quadrature/Encoder following
- Velocity (Oscillator) and position mode
- Control via streaming SCL commands
- RS-485 ASCII (2- or 4-wire) communications
- On "E" models, the internal encoder provides improved position and speed control
- Four "Variable I/O" points, 5 to 24 volts (NEMA 24 models)
- Analog input for speed and position, 0 to 5 VDC
- Configurable via SureMotion Pro software
- Available torque from 54 to 340 oz-in

SureStep Series Part Numbers Standard Integrated Motor/Drives								
Integrated Motor/Drive	NEMA Size	Price	Drawing					
STP-MTRD-17038	17	\$170.00	PDF					
STP-MTRD-17038E	17	\$260.00	PDF					
STP-MTRD-23042	23	\$205.00	PDF					
STP-MTRD-23042E	23	\$350.00	PDF					
STP-MTRD-23065	23	\$247.00	PDF					
STP-MTRD-23065E	23	\$369.00	PDF					

Note: Standard Integrated motor/drives with an "E" have an external encoder that can be wired to an external controller.



Standard NEMA 17 and 23 motor/drives



Advanced NEMA 17, 23, and 24 motor/drives

SureStep Series Part Numbers Advanced Integrated Motor/Drives							
Integrated Motor/Drive	NEMA Size	Price	Drawing				
STP-MTRD-17030R	17	\$305.00	PDF				
STP-MTRD-17030RE	17	\$490.00	PDF				
STP-MTRD-17038R	17	\$310.00	PDF				
STP-MTRD-17038RE	17	\$483.00	PDF				
STP-MTRD-23042R	23	\$346.00	PDF				
STP-MTRD-23042RE	23	\$494.00	PDF				
<u>STP-MTRD-23065R</u>	23	\$347.00	PDF				
STP-MTRD-23065RE	23	\$507.00	PDF				
STP-MTRD-24075RV	24	\$449.00	PDF				
STP-MTRD-24075RVE	24	\$525.00	PDF				

Note: Advanced Integrated motor/drives with an "E" have an internal encoder used for stall prevention (cannot be wired to an external PLC or controller).



SureStep[®] Standard Integrated Motor/Drives Specifications



	SureStep Integrated Series Specifications – Standard								
Microstepp	ing Driv	e/Motor	<u>STP-MTRD-17038</u> STP-MTRD-17038E	<u>STP-MTRD-23042</u> STP-MTRD-23042E	<u>STP-MTRD-23065</u> <u>STP-MTRD-23065E</u>				
Input Voltage (external p/s required)			12-48 VDC	12-70 VDC	12-70 VDC				
Configurati	on Meth	od		DIP switches					
Current Co	ntroller			Digital MOSFET, PWM @ 16kHz					
Encoder Fe	edback		"E" models only.	External encoder must be wired to external	feedback device.				
Encoder Sp	ecs ("E	" models only)	1000 ppr, Line Detailed specs, other encoder option	e Driver, Supply Voltage (Typ: 5V, Max: 5.5 ns, and PLC compatibility are listed in Appe	V, Min: 4.5 V). Indix A of the SureStep user manual.				
Motor/Driv	e Protec	tion	Sho	rt circuit, over-voltage, under-voltage, over-	temp				
	Step/Pu	llse	5-24 VDC nominal (range 4-30VDC); (5r 0.25µs (at 150kHZ), Maximum pulse f	nA @ 4V; 15 mA @ 30V); Optically isolated frequency = 150kHz or 2MHz (switch select	. Minimum pulse width = 3µs (at 2 MHz), able), Function = Step Input, Limit CW				
Input Signals	Direction		5-24 VDC nominal (range 4-30VDC); (5mA @ 4V; 15 mA @ 30V); Optically isolated. Minimum pulse width = 3µs (at 2 MHz), 0.25µs (at 150kHZ), Maximum pulse frequency = 150kHz or 2MHz (switch selectable), Function = Direction Input, Limit CCW						
	Enable		5-24 VDC nominal (range 4-30VDC); (5mA @ 4V; 15 mA @ 30V); Optically isolated. Minimum pulse width = 3μs (at 2 MHz), 0.25μs (at 150kHZ), Maximum pulse frequency = 150kHz or 2MHz (switch selectable), Function = Enable Input						
Output Sigi	nal		30 VDC / 100mA max, photodarlington, voltage drop = 1.2V max at 100mA Function = Alarm Output						
Jumper Se	lectable	Step Pulse Type	Step and Direction: Step signal = step/pulse; Direction signal = direction. Step CW & CCW: Step signal = CW step; Direction signal = CCW step.						
Functions		Step Pulse Noise Filter	Selectable 150 kHz or 2MHz						
	Current Reduction		This is the percentage of full current that the motor will use when the shaft is rotating. 100%, 90%, 70%, and 50% current selections.						
	Idle Cui	rrent Reduction	Reduce power consumption and heat generation by limiting motor idle current to 90% or 50% of running current. (Holding torque is reduced by the same %.)						
Features	Microst	ep Resolution		200-25000 (dip switch selectable)					
	Self Tes	it	Automatically rotate the motor back and	d forth 2 1/2 turns in each direction in order	to confirm that the motor is operational.				
	Load In	ertia	Anti-resonance and damping feature	improves motor performance. Set motor ar	nd load inertia range to 0–4x or 5–10x.				
Connectors	3	Control	Housing: Tyco 4-643498-1 Cover: Tyco 1-643075-1	Connector part number: Weidmuller	1610200000, included in <u>STP-CON-3</u>				
		Encoder	Two 5 pin inse	rts (Molex# 14-60-0058), one housing Mole	ex# 15-04-5104				
Drive Cooli	ing Meth	od	Na	atural convection (mount to suitable heat sin	nk)				
Status LED	s			One red/green					
Mounting			Four M3 screws	Four #6	screws				



SureStep[®] Standard Integrated Motor/Drives Specifications

SureStep Integrated Series Specifications – Standard								
Integrated Stepping Motor/	Drives	<u>STP-MTRD-17038</u> <u>STP-MTRD-17038E</u>	<u>STP-MTRD-23042</u> <u>STP-MTRD-23042E</u>	<u>STP-MTRD-23065</u> <u>STP-MTRD-23065E</u>				
NEMA Frame Size		NEMA 17	NEMA 23	NEMA 23				
	(lb∙in)	4.25	7.8125	13.125				
Maximum Holding Torque	(oz∙in)	68	125	210				
	(N·m)	0.480189	0.8827	1.482936				
Potor Inortio	(oz∙in2)	0.448	1.420	2.515				
	(kg·cm2)	0.082	0.260	0.460				
Insulation Class			Class B (130°C)					
Basic Step Angle			1.8 degrees					
Shaft Runout (in)		0.03	0.	05				
Max Shaft Radial Play @ 1	lb load		0.02					
Perpendicularity (mm)		0.08						
Concentricity (mm)		0.05						
* Maximum Radial Load (Ib	[kg])	6.7 13.9						
* Maximum Thrust Load (Ib	[kg])	34 63						
Storage Temperature Range	e	0-40°C (32-104°F)						
Operating Temperature Ran	ige	0-85°C						
Operating Humidity Range		90% max, non-condensing						
Product Material		Aluminum, steel, plastic, FR4, etc						
Environmental Rating			IP40	1				
Weight (oz [g])		14.7 [417]	30 [850]	42 [1200]				
Agency Approvals			CE					
Design Tips		Allow sufficient time to accelerate the load and size the step motor with a 100% torque safety factor. DO NOT disassemble step motors because motor performance will be reduced and the warranty will be voided. DO NOT connect or disconnect the step motor during operation. Mount the motor to a surface with good thermal conductivity, such as steel or aluminum, to allow heat dissipation. Use a flexible coupling with "clamp-on" connections to both the motor shaft and the load shaft to prevent radial and thrust loading on bearings from minor misalignment and to prevent loosening due to vibration.						



SureStep[®] Advanced Integrated Motor/Drives



	SureStep Integrated Series Specifications – Advanced									
Inte	grated Moto	or/Drive	<u>STP-MTRD-</u> <u>17030RSTP-MTRD-</u> <u>17030RE</u> <u>STP-MTRD-17030RE</u>	<u>STP-MTRD-</u> <u>17038RSTP-MTRD-</u> <u>17038RE</u> <u>STP-MTRD-17038RE</u>	<u>STP-MTRD-23042R</u> <u>STP-MTRD-23042RE</u>	<u>STP-MTRD-23065R</u> <u>STP-MTRD-23065RE</u>				
Inpu (ext	it Voltage ernal p/s re	quired)	12-48	VDC	12-70) VDC				
Con	figuration N	lethod		SureMotion Pro software	(<u>SM-PRO</u> : free download)					
Sup	ply Output			+4.8 - 5 volts @	50mA maximum					
Curi	rent Control	ler	Dual H-Bridge, 4 Quadrar	it, 4 state PWM @ 16kHz	Dual H-Bridge, 4 Quadra	nt, 4 state PWM @ 20kHz				
Enc	oder Feedba	ack	"E" models only. Enco	der is internal and provides posi	tion verification and stall preven	tion control by default.				
Mot	or/Drive Pro	otection		Short circuit, over-voltage,	under-voltage, over-temp					
	Step/Pulse		5-24 VDC nominal. Optically	isolated. Minimum pulse width = curr draw = iction = Step Input, Jog CW, Lim	= 250ns (at 3 MHz). Maximum p rent : 12mA it CW, Start/Stop, General Purp	ulse frequency = 3MHz, max ose				
Signals	Direction		5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3 MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA Function = Direction Input, Jog CCW, Limit CCW, General Purpose							
Input	Enable		5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3 MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA Function = Enable Input, Reset Input, Change Speed, General Purpose							
	Analog		0-5 VDC nominal (AIN referenced to GND). Input impedance: 30K ohms minimum, resolution = 12 bits Function = analog control modes and general purpose analog usage; programmable for signal range, offset, dead band, and filtering							
Outp	out Signal		30VDC, 40mA maximum. Optically isolated, open collector. Maximum pulse frequency 10kHz. Functions = Brake Output, Alarm Output, Motion Output, Tach Output, General Purpose							
Con	nmunication	Interface	RS-485 ASCII							
Non	-volatile Me	emory Storage	Configurations are saved in FLASH memory on-board the DSP							
	Current Re	duction	Selectable in SureMotion Pro software							
res	Idle Currei	nt Reduction	Redu	uction range of 0–90% of running	g current after delay selectable i	n ms				
eatu	Microstep	Resolution	Softwa	are selectable from 200 to 51200	steps/rev in increments of 2 steps	ps/rev				
L.	Modes of C	Operation	Pulse (step) & dir	ection, CW/CCW, A/B quadratur	e, velocity (oscillator), SCL strea	aming commands				
	Self Test	_	Checks internal and external	power supply voltages. Diagnos	ses open motor phases and moto	or resistance changes > 40%				
		DC Power		2-position screw terminal:	Weidmuller 1615780000					
Con	nectors	I/O		11-position spring ca	ge: Phoenix 1881419					
		Comm	5-position spring cage: Phoenix 1881354							
Driv	e Cooling N	lethod		Natural convection (mou	unt to suitable heat sink)					
Stat	us LEDs			1 red, 1	l green					
Мои	Inting		Four M3	screws	Four #6	5 screws				

www.automationdirect.com

Stepper Systems



SureStep[®] Advanced Integrated Motor/Drives

	SureStep Integrated Series Specifications – Advanced Variable I/O							
Integrated Motor/Drive			STP-MTRD-24075RV / STP-MTRD-24075RVE					
Input Voltage (external p/s required)			12-70 VDC					
Configuration Method			SureMotion Pro software (<u>SM-PRO</u> : free download)					
Supply Output			+4.8 - 5 volts @ 50mA maximum					
Current Controller			Dual H-Bridge, 4 Quadrant, 4 state PWM @ 20kHz					
Encoder Feedback			"E" models only. Encoder is internal and provides position verification and stall prevention control by default.					
Motor/Drive Protection			Short circuit, over-voltage, under-voltage, over-temp					
Variable I/O	I/O 1 (Step/Pulse)		INPUT: 5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA, Function = Step Input, Jog CW, Enable Input, Start/Stop, General Purpose OUTPUT: 30VDC, 40mA maximum. Optically isolated, open collector. Maximum pulse frequency 10kHz. Functions = Brake Output, Fault Output, Motion Output, Tach Output, General Purpose					
	I/O 2 (Direction)		INPUT: 5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA, Function = Direction Input, Jog CCW, Alarm Reset Input, General Purpose OUTPUT: 30VDC, 40mA maximum. Optically isolated, open collector. Maximum pulse frequency 10kHz. Functions = Brake Output, Fault Output, Motion Output, Tach Output, General Purpose					
	1/0 3		INPUT: 5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA, Function = Limit CW Input, Enable Input, Change Speed Input, General Purpose OUTPUT: 30VDC, 40mA maximum. Optically isolated, open collector. Maximum pulse frequency 10kHz. Functions = Brake Output, Fault Output, Motion Output, Tach Output, General Purpose					
	1/0 4		INPUT: 5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3 MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA, Function = Limit CCW Input, Alarm Reset Input, General Purpose OUTPUT: 30VDC, 40mA maximum. Optically isolated, open collector. Maximum pulse frequency 10kHz. Functions = Brake Output, Fault Output, Motion Output, Tach Output, General Purpose					
Analog			0-5 VDC nominal (AIN referenced to GND). Input impedance: 30K ohms minimum, resolution = 12 bits, Function = analog control modes and general purpose analog usage; programmable for signal range, offset, dead band, and filtering					
Communication Interface			RS-485 ASCII (2- or 4-wire)					
Non-volatile Memory Storage		emory Storage	Configurations are saved in FLASH memory on-board the DSP					
	Current Reduction		Selectable in SureMotion Pro software					
Features	Idle Current Reduction		Reduction range of 0–90% of running current after delay selectable in ms					
	Microstep Resolution		Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev					
	Modes of Operation		Pulse (step) & direction, CW/CCW, A/B quadrature, velocity (oscillator), SCL streaming commands					
	Self Test		Checks internal and external power supply voltages. Diagnoses open motor phases and motor resistance changes > 40%					
		DC Power	2-position screw terminal: Weidmuller 1615780000					
Connectors I		1/0	11-position spring cage: Phoenix 1881419					
		Comm	5-position spring cage: Phoenix 1881354					
Drive Cooling Method			Natural convection (mount to suitable heat sink)					
Status LEDs			1 red, 1 green					
Mounting			Four #6 screws					



SureStep[®] Advanced Integrated Motor/Drives

SureStep Integrated Series Specifications – Advanced							
Integrated Motor/Drive		<u>STP-MTRD-17030R</u> STP-MTRD-17030RE	STP-MTRD-17038R STP-MTRD-17038RE	<u>STP-MTRD-23042R</u> STP-MTRD-23042RE	<u>STP-MTRD-23065R</u> STP-MTRD-23065RE	<u>STP-MTRD-24075RV</u> STP-MTRD-24075RVE	
NEMA Frame Size		NEMA 17	NEMA 17	NEMA 23	NEMA 23	NEMA 24	
	(lb∙in)	3.375	4.25	7.8125	13.125	21.25	
* Maximum Holding Torque	(oz∙in)	54	68	125	210	340	
101940	(N·m)	0.381326	0.480189	0.8827	1.482936	2.400944	
Potor Inortia	(oz∙in2)	0.310	0.448	1.420	2.515	4.900	
	(kg·cm2)	0.057	0.082	0.260	0.460	0.897	
Insulation Class		Class B (130°C)					
Basic Step Angle		1.8 degrees					
Shaft Runout (in)		0.03 0.05					
Max Shaft Radial Play @ 1lb load		0.02					
Perpendicularity (mn	1)	0.08					
Concentricity (mm)		0.05					
* Maximum Radial Load (Ib [kg])		6.7		13.9			
* Maximum Thrust Load (Ib [kg])		3	4	63			
Storage Temperature Range		0-40°C (32-104°F)					
Operating Temperatu	re Range	0-85°C 0-70°C					
Operating Humidity R	lange	90% max, non-condensing					
Product Material		Aluminum, steel, plastic, FR4, etc.					
Environmental Rating		IP40					
Weight (oz [g])		12.7 [360]	15.6 [441]	30 [850]	42 [1191]	56 [1580]	
Agency Approvals		CE*					
Design Tips		Allow sufficient time to accelerate the load and size the step motor with a 100% torque safety factor. DO NOT disassemble step motors because motor performance will be reduced and the warranty will be voided. DO NOT connect or disconnect the step motor during operation. Mount the motor to a surface with good thermal conductivity, such as steel or aluminum, to allow heat dissipation. Use a flexible coupling with "clamp-on" connections to both the motor shaft and the load shaft to prevent radial and thrust loading on bearings from minor minor minor minor minor motor and to prevent loadoning due to vibration.					
		minor misaignment and to prevent loosening due to vibration.					

* For NEMA 24 motors, an EMI filter (RES10F03) is needed on the power supply for CE compliance.



SureStep[®] Integrated Motor/Drives Motor Torque vs. Speed





STP-MTRD-23042 Torque vs Speed (1.8° step motor; 1/2 stepping)





STP-MTRD-23065 Torque vs Speed (1.8° step motor; 1/2 stepping)





SureStep[®] Standard Integrated Motor/Drives Dimensions

Dimensions = in [mm]

STP-MTRD-17038





STP-MTRD-17038E







SureStep[®] Standard Integrated Motor/Drives Dimensions, continued

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Dimensions = in [mm]

STP-MTRD-23042







STP-MTRD-23042E









SureStep[®] Standard Integrated Motor/Drives Dimensions, continued

Dimensions = in [mm]

STP-MTRD-23065

















SureStep[®] Advanced Integrated Motor/Drives Dimensions

Dimensions = in [mm]

STP-MTRD-17030R / STP-MTRD-17030RE







NOTE: Encoder is internal only - not available externally

STP-MTRD-17038R / STP-MTRD-17038RE









NOTE: Encoder is internal only - not available externally



SureStep[®] Advanced Integrated Motor/Drives Dimensions, continued

Dimensions = in [mm]

STP-MTRD-23042R / STP-MTRD-23042RE







NOTE: Encoder is internal only - not available externally

STP-MTRD-23065R / STP-MTRD-23065RE





NOTE: Encoder is internal only - not available externally





SureStep[®] Advanced Integrated Motor/Drives Dimensions, continued

Dimensions = in [mm]

STP-MTRD-24075RV / STP-MTRD-24075RVE

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Stepping System Accessories

SureStep[®] Microstepping Drives Accessories

Braking Accessories

As a load rapidly decelerates from a high speed, much of the kinetic energy of that load is transferred back to the motor. This energy is then pushed back to the drive and power supply, resulting in increased system voltage. If there is enough overhauling load on the motor, the DC voltage will go above the drive and/or power supply limits. In general, the more torque the motor is capable of producing then the more energy it can push back into the drive.

When using a regulated/switching power supply, this can trip the overvoltage protection of the power supply or drive, and cause it to shut down.

To solve this problem, AutomationDirect offers a regeneration clamp as an optional accessory. The regen clamp has a built-in 50W braking resistor. The STP-DRVA-RC-050A does not have the ability to use an external resistor.

Regeneration Clamp Features

STP-DRVA-RC-050A

- Built-in 50W power resistor for more continuous current handling
- Mounted on a heat sink
- Voltage range: 24-80 VDC; no user adjustments required
- Power: 50W continuous; 800W peak
- Indicators (LED): Green = power supply voltage is present Red = clamp is operating (usually when stepper is decelerating)
- Protection: The external power supply is internally connected to an "Input Diode" in the regen clamp that protects the power supply from high regeneration voltages. This diode protects the system from connecting the power supply in reverse. If the clamp circuit fails, the diode will continue to protect the power supply from over-voltage.

SureStep Damper

A step motor inertia damper can smooth out steps in a typical step motor resulting in a quieter and smoother motion when rotating between steps. Reducing the resonance and possible micro oscillations when moving from step to step is the main purpose of a "hockey puck" style damper, but it can also be used as a hand wheel to directly rotate the position of the rotor when power is removed from the motor. The damper is a properly sized machined piece of aluminum encased in plastic. It is sized and weighted for general damping of the respective frame size motor.



Regeneration Clamp STP-DRVA-RC-050A

- Three drive connections, 7A max per channel, 15A total output current
- Removable terminal blocks (replacement kit STP-CON-4)
- Uses 18-20 AWG wire for connections



Sure Step Series Specifications – Microstepping Drives Optional Accessories									
Part Number	Price	Description							
STP-DRVA-RC-050A*	\$91.00	Regen Clamp: 50W, for DC input stepper and servo drives, enclosed	PDF						
STP-MTRA-17DMP	\$16.50	SureStep damper, metal body. For use with NEMA 17 stepper motors with 5mm shafts. Mounting set screw included.	PDF						
STP-MTRA-23DMP	\$37.50	SureStep damper, metal body. For use with NEMA 23 stepper motors with 1/4 inch shafts. Mounting set screw included.	PDF						

* Do not use the regeneration clamp in an atmosphere containing corrosive gases.
0.20 [5.0]



Stepping System Accessories

SureStep[®] Microstepping Drives Accessories

Dimensions = in [mm]

STP-DRVA-RC-050A





SureStep[®] Microstepping Drives Accessories

USB to RS-485 Adapter

The <u>STP-USB485-4W</u> is a USB to RS-232/RS-485 converter that can be used in 2-wire or 4-wire serial networks. Serial communication can be wired up via the 9-pin D-sub connector or through the 6-screw terminals.

The STP-USB485-4W can be set for several different configurations. These modes are set up by the 4 DIP switches on the outside of the case (RS-232/RS-485, full/half duplex) and by the 7 jumpers located inside the case (termination/bias resistors).

SureStep Advanced Drives communicate via RS-232 (for control and for configuration via SureMotion Pro).

The Advanced Integrated motor/drives use RS-485. While the Advanced Integrated motor/drives can be wired for either 2- or 4-wire networks, 4-wire is require for use with SureMotion Pro due to the Firmware Download utility and the Status Monitor Screen.

Depending on the host controller's RS-485 implementation, either 2- or 4-wire RS-485 can be used for control. All RS-485 PLCs that have 2-wire capability (Productivity, BRX, Click, DirectLogic, etc.) can control the Advanced Integrated steppers.



SureStep PC Adapter - STP-USB485-4W				
Price	\$132.00			
Drawing	PDF			
Communications	2-wire RS-232 2- or 4-wire RS-485			
Configure With	Internal jumpers and external DIP switches			
Compatible Cables	STP-232RJ11-CBL STP-485DB9-CBL-2 USB			

Dimensions = in [mm]





SureStep[®] Stepping System Encoders

Replacement Encoders

The <u>STP-MTRA-ENC1</u> is a replacement for the encoder that comes standard with the <u>STP-MTRD-17038E</u>, <u>STP-MTRD-23042E</u>, and <u>STP-MTRD-23065E</u> integrated motor/drives. Note that the encoder included with (E) model advanced integrated motor/drives is internal and cannot be replaced.

The <u>AMT112Q-V</u> is a replacement for the encoder that comes standard with the STP-MTR(x)-xxxxE stand alone step motors.

Installation tool and mounting hardware is included with all replacement encoders. For more information and details on how to wire the replacement encoders, please see the SureStep User Manual.

Optional Encoders

Optional encoders can be purchased separately for standard integrated motor/drives and standalone dual-shaft motors in all NEMA 14, 17, and 23 sizes, and also for STP-MTRAC-34xxxD motors (currently not available for STP-MTRx-34xxxD motors). All (D) model (dual-shaft) step motors come with pre-drilled holes in the rear end cap for easy encoder mounting. Pre-installed encoders on standalone dual-shaft motors and standard integrated motor/drives can be retrofitted with an appropriate optional encoder if desired. Please see the chart on the following page for encoder compatibility.

Features:

- Fixed resolutions include 400ppr or 1000ppr
- Configurable models have up to 4096ppr (default = 400ppr)
- Choose line driver or push-pull (totem) output signals



STP-MTRA-ENC2



AMT112Q-V



STP-MTRA-ENC11

Sure Step Series Specifications – Encoders					
Part Number	Price	Description	Drawing		
<u>STP-MTRA-ENC1</u>	\$91.00	SureStep incremental (quadrature) modular encoder, 5VDC, line driver (differential) output, 1000 ppr. For use with SureStep stepper motors with 5mm rear shaft. Installation tool and mounting hardware included.	<u>PDF</u>		
<u>STP-MTRA-ENC2</u>	\$79.00	SureStep incremental (quadrature) modular encoder, 5VDC, Push-pull (totem) output, 1000 ppr. For use with SureStep stepper motors with 5mm rear shaft. Installation tool and mounting hardware included.	<u>PDF</u>		
<u>STP-MTRA-ENC3</u>	\$89.00	SureStep incremental (quadrature) modular encoder, 5VDC, line driver (differential) output, 400 ppr. For use with SureStep stepper motors with 5mm rear shaft. Installation tool and mounting hardware included.	<u>PDF</u>		
STP-MTRA-ENC4	\$76.00	SureStep incremental (quadrature) modular encoder, 5VDC, Push-pull (totem) output, 400 ppr. For use with SureStep stepper motors with 5mm rear shaft. Installation tool and mounting hardware included.	<u>PDF</u>		
<u>STP-MTRA-ENC5</u>	\$91.00	SureStep incremental (quadrature) modular encoder, 5VDC, line driver (differential) output, 1000 ppr. For use with SureStep stepper motors with 1/4 inch rear shaft. Installation tool and mounting hardware included.	<u>PDF</u>		
STP-MTRA-ENC6	\$79.00	SureStep incremental (quadrature) modular encoder, 5VDC, Push-pull (totem) output, 1000 ppr. For use with SureStep stepper motors with 1/4 inch rear shaft. Installation tool and mounting hardware included.	<u>PDF</u>		
STP-MTRA-ENC7	\$89.00	SureStep incremental (quadrature) modular encoder, 5VDC, line driver (differential) output, 400 ppr. For use with SureStep stepper motors with 1/4 inch rear shaft. Installation tool and mounting hardware included.	<u>PDF</u>		
STP-MTRA-ENC8	\$76.00	SureStep incremental (quadrature) modular encoder, 5VDC, Push-pull (totem) output, 400 ppr. For use with SureStep stepper motors with 1/4 inch rear shaft. Installation tool and mounting hardware included.	<u>PDF</u>		
<u>STP-MTRA-ENC11</u>	\$105.00	SureStep incremental (quadrature) modular encoder, 5 VDC, line driver (differential) output, 1000 ppr. For use with SureStep stepper motors with 3/8in rear shaft. Installation hardware included. Requires STP-CBL-EAxx cable.	<u>PDF</u>		
STP-MTRA-ENC12	\$92.00	SureStep incremental (quadrature) modular encoder, 5 VDC, push-pull (totem) output, 1000 ppr. For use with SureStep stepper motors with 3/8in rear shaft. Installation hardware included. Requires STP-CBL-EDxx cable.	<u>PDF</u>		
STP-MTRA-ENC13	\$103.00	SureStep incremental (quadrature) modular encoder, 5 VDC, line driver (differential) output, 400 ppr. For use with SureStep stepper motors with 3/8in rear shaft. Installation hardware included. Requires STP-CBL-EAxx cable.	PDF		
STP-MTRA-ENC14	\$90.00	SureStep incremental (quadrature) modular encoder, 5 VDC, push-pull (totem) output, 400 ppr. For use with SureStep stepper motors with 3/8in rear shaft. Installation hardware included. Requires STP-CBL-EDxx cable.	PDF		



SureStep[®] Stepping System Encoders

Sure Step Series Encoder Compatibility						
Part Number	PPR	Bore Diameter	Output Type	Encoder Cable	PLC Compatibility	Motor Compatibility
<u>STP-MTRA-ENC1</u>	1000		Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0- 1xDxE-D*	STP-MTRy-14yyyD
<u>STP-MTRA-ENC2</u>		Emm	Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0- 1xDxE-D*	STP-MTRx-14xxxE STP-MTRx-17xxxD
STP-MTRA-ENC3	400	mmc	Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0- 1xDxE-D*	STP-MTRx-17xxxE Standard STP-MTRD- xxxxxE
<u>STP-MTRA-ENC4</u>			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0- 1xDxE-D*	
STP-MTRA-ENC5	1000		Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0- 1xDxE-D*	
<u>STP-MTRA-ENC6</u>		0.25 inch	Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0- 1xDxE-D*	STP-MTRx-23xxxD
<u>STP-MTRA-ENC7</u>		0.25 Inch	Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0- 1xDxE-D*	STP-MTRAC-23xxxD
<u>STP-MTRA-ENC8</u>			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0- 1xDxE-D*	
STP-MTRA-ENC11	1000		Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0- 1xDxE-D*	
<u>STP-MTRA-ENC12</u>	400	0.275 inch	Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0- 1xDxE-D*	STD MTDAC 24mmD
STP-MTRA-ENC13		0.373 INCN	Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0- 1xDxE-D*	STT-IVITKAU-34XXXU
STP-MTRA-ENC14			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0- 1xDxE-D*	

* Requires FC-ISO-C



SureStep[®] Stepping System Encoders

Dimensions = in [mm]

STP-MTRA-ENC1, 3, 5, 7



Bolt Hole Circles for Mounting				
Encoder	Holes			
ENC1, ENC2, ENC3, ENC4, ENC5, ENC6, ENC7, ENC8	2 holes @ 19.05mm (.75") 3 holes @ 20.9mm (.823")			

STP-MTRA-ENC2, 4, 6, 8





SureStep[®] Stepping System Encoders

Dimensions = in [mm]

STP-MTRA-ENC11, 13







Bolt Hole Circles for Mounting				
Encoder	Holes			
ENC11, ENC12, ENC13, ENC14	2 holes @ 19.05mm (.75") 3 holes @ 20.9mm (.823") 2 holes @ 46.02mm (1.812")			

STP-MTRA-ENC12, 14





PIN 1



Same sky Stepping System Accessories

AMT Series Stepping System Encoders

Same Sky's (formerly CUI Devices) AMT series encoders are award-winning technologically advanced capacitive encoders with a variety of uses. Small, configurable, robust, and inexpensive, AMT encoders have won Product of the Year from Electronic's Weekly and from Electronic Products magazines.

AMT series encoders are typically mounted to the back of a stepper motor, but they can be used in many other applications. Instead of manufacturing many different encoders with different resolutions, Same Sky offers the AMT series encoders with configurable pulses per revolution (PPR). The PPR can be set for most models using the free AMT Viewpoint software (available at https://www.automationdirect.com/support/softwaredownloads?itemcode=AMT%20ViewPoint). The AMT10 family of encoders are configured using DIP switches.

Encoder Model Overview

AMT series encoders include six distinct model lines (families) designed to meet specific needs.

- AMT10 DIP switch configurable incremental quadrature encoders. Good for NEMA 14, NEMA 17, and NEMA 23/24 size motors.
- AMT11 SW configurable resolution incremental guadrature encoders. Good for NEMA 14, NEMA 17, and NEMA 23/24 size motors (motor shaft sizes 2mm, 3mm, 1/8", 4mm, 3/16", 5mm, 6mm, 1/4", 8mm).
- AMT13 Similar to AMT11, but these are larger sized and good for NEMA 34 and NEMA 42 motors (motor shaft sizes 9mm, 3/8", 10mm, 11mm, 12mm, 1/2", 13mm, 14mm, 5/8").
- AMT31 A modified version of AMT11 with additional Hall-effect sensor outputs for commutation. This is needed for motors that don't have Hall-effect sensors mounted inside the motor. Typically "commutation encoders" are used with brushless DC (BLDC) motors and drives. Good for NEMA 14, NEMA 17, and NEMA 23/24 size motors.
- AMT33 Same encoder + commutation features as the AMT31 family, but larger size for use with NEMA 34 and NEMA 42 motors.

Capacitive Encoders

A capacitive encoder is comprised of three main components: a rotor, a stationary transmitter, and a stationary receiver. The rotor contains a sinusoidal pattern and, as it rotates, the high frequency reference signal of the transmitter is modulated in a predictable way. The encoder detects the changes in capacitance-reactance on the receiver board and translates them, using a demodulation algorithm, into increments of rotary motion.

Advantages of Capacitive Encoders

Derived from the same principles used in digital calipers, capacitive encoders have an excellent track record. The AMT series has proven to be both highly reliable and accurate. A capacitive encoder is more rugged than an optical encoder, tolerating a range of environmental contaminants such as dust, dirt, and oil. Capacitive encoders also hold-up much better to vibration and temperature extremes. Further, with no LED, it has a longer lifetime, a smaller footprint, and lower current consumption (6 to 18 mA) than an optical encoder. Immune to magnetic interference and electrical noise, it is as rugged as a magnetic encoder, but delivers greater accuracy and higher resolution.

Given their digital nature, capacitive encoders also offer increased flexibility, allowing users to change the encoder's resolution while a typical optical or magnetic encoder must be swapped out each time a different resolution is needed.



The programmable resolutions available in capacitive encoders are not only useful for system optimization, particularly when designing the PID control loop, but can reduce inventory holding, as one model can be used across multiple applications. Capacitive technology also allows the ability to digitally set the index pulse and alignment of the encoder for BLDC commutation, while its built-in diagnostic capabilities provide designers access to valuable system data for quick troubleshooting in the field.



AMT Series Stepping System Encoders

Replacement Encoders

The AMT112Q-V is a replacement for the encoder that comes pre-mounted on the STP-MTR(x)-xxxxE step motors. Step motor part numbers that end in "E" have encoders premounted on the rear shaft. Models that end in "D" are the same motors, without the pre-mounted encoders. If you would like a different encoder then should purchase the "D" model motor and the encoder separately.

Installation tools and mounting hardware are included with all Same Sky (formerly CUI Devices) brand AMT series replacement encoders. For more information and details on how to wire the replacement encoders, please see the SureStep User Manual.

Optional Encoders

Optional encoders can be purchased separately for standard integrated motor/drives and standalone dual-shaft motors in all NEMA 14, 17, 23, 34, and 42 motors. All "D" model (dualshaft) step motors come with pre-drilled holes in the rear end cap for easy modular encoder mounting. Pre-installed encoders on standalone dual-shaft motors and standard integrated motor/drives can be retrofitted with an appropriate optional encoder if desired. Please see the chart on the following page for encoder compatibility.

PPR

Same Sky defines PPR, pulses per revolution, as the number of high pulses per channel per revolution. CPR, the number of counts that a controller could determine from a quadrature encoder (both channels have a rising and a falling edge), is 4 x PPR.

For more information regarding PPR, CPR, or LPR (Lines Per Revolution) view https://www.sameskydevices.com/ blog/what-is-encoder-ppr-cpr-and-lpr.



AMT102-V



AMT103-V

AMT Series Encoders					
Part Number	listprice	Description	Drawing		
<u>AMT102-V</u>	\$25.00	Same Sky incremental (quadrature) modular encoder, 5 VDC, radial, push- pull (totem) output, DIP switch configurable up to 2048 ppr. For use with NEMA 14, 17, and 23 dual shaft motors.	<u>PDF</u>		
<u>AMT103-V</u>	\$25.00	Same Sky incremental (quadrature) modular encoder, 5 VDC, axial, push- pull (totem) output, DIP switch configurable up to 2048 ppr. For use with NEMA 14, 17, and 23 dual shaft motors.	<u>PDF</u>		
<u>AMT112S-V</u>	\$41.50	Same Sky incremental (quadrature) modular encoder, 5 VDC, radial, push-pull (totem) output, configurable up to 4096 ppr. For use with NEMA 14, 17, and 23 dual shaft motors.	<u>PDF</u>		
<u>AMT112Q-V</u>	\$46.50	Same Sky incremental (quadrature) modular encoder, 5 VDC, radial, line driver (differential) output, configurable up to 4096 ppr. For use with NEMA 14, 17, and 23 dual shaft motors.	<u>PDF</u>		
<u>AMT312D-V</u>	\$54.00	Same Sky incremental (quadrature)/commutation modular encoder, 5 VDC, radial, line driver (differential) encoder output, configurable up to 4096 ppr, line driver (differential) commutation output. For use with NEMA 14, 17, and 23 dual shaft motors.	<u>PDF</u>		
<u>AMT312S-V</u>	\$44.00	Same Sky incremental (quadrature)/commutation modular encoder, 5 VDC, radial, push-pull (totem) encoder output, configurable up to 4096 ppr, push-pull (totem) commutation output. For use with NEMA 14, 17, and 23 dual shaft motors.	<u>PDF</u>		



AMT112S-V



See Accessories section for configuration and signal cables.

Same Sky Datasheets provide detailed encoder specifications. These datasheets can be found on each encoder's web page at www.automationdirect.com.

AMT312D-V

Same sky Stepping System Accessories

AMT Series Stepping System Encoders

AMT Series Encoders, continued				
Part Number	Price	Description	Drawing	
<u>AMT132S-V</u>	\$44.00	Same Sky incremental (quadrature) modular encoder, 5 VDC, radial, push-pull (totem) output, configurable up to 4096 ppr. For use with NEMA 34 and 42 dual shaft motors.	<u>PDF</u>	
<u>AMT132Q-V</u>	\$47.00	Same Sky incremental (quadrature) modular encoder, 5 VDC, radial, line driver (differential) output, configurable up to 4096 ppr. For use with NEMA 34 and 42 dual shaft motors.	PDF	
<u>AMT332S-V</u>	\$48.50	Same Sky incremental (quadrature)/commutation modular encoder, 5 VDC, radial, push-pull (totem) encoder output, configurable up to 4096 ppr, push-pull (totem) commutation output. For use with NEMA 34 and 42 dual shaft motors.	PDF	
<u>AMT332D-V</u>	\$52.00	Same Sky incremental (quadrature)/commutation modular encoder, 5 VDC, radial, line driver (differential) encoder output, configurable up to 4096 ppr, line driver (differential) commutation output. For use with NEMA 34 and 42 dual shaft motors.	PDF	



AMT132S-V



See Accessories section for configuration and signal cables.

Same Sky (formerly CUI Devices) Datasheets provide detailed encoder specifications. These datasheets can be found on each encoder's web page at www.automationdirect.com.

AMT332S-V

AMT Series Encoder Accessories					
Part Number	Price	Description			
<u>CUI-KIT-1</u>	\$6.50	Same Sky encoder accessory kit, replacement. For use with Same Sky AMT102 encoders. Includes (1) AMT102 base, (1) AMT102 wide base, and (1) AMT10 sleeve kit (9 sleeves sized from 2-8mm).			
<u>CUI-KIT-2</u>	\$6.50	Same Sky encoder accessory kit, replacement. For use with Same Sky AMT103 encoders. Includes (1) AMT standard base, (1) AMT standard wide base, and (1) AMT10 sleeve kit (9 sleeves sized from 2-8mm).			
<u>CUI-KIT-3</u>	\$6.50	Same Sky encoder accessory kit, replacement. For use with Same Sky AMT11, AMT21, and AMT31 encoders. Includes (1) AMT standard base, (1) AMT standard wide base, and (1) AMT standard sleeve kit (9 sleeves sized from 2-8mm).			
<u>CUI-KIT-4</u>	\$6.50	Same Sky encoder sleeve kit, replacement. For use with Same Sky AMT13 and AMT33 encoders. Includes (8) sleeves sized from 9-14mm.			
STP-MTRA-SCRWKT-1	\$5.50	SureStep encoder mounting screw kit, for use with all stepper encoders.			



CUI-KIT-1



CUI-KIT-2



CUI-KIT-3 www.automationdirect.com





CUI-KIT-4

AMT Series Stepping System Encoders

AMT Series Encoder Compatibility							
Part Number	Max PPR ¹	Bore Diameter	Output Type	PLC Compatibility	Encoder Cable	Configuration Cable	Motor Compatibility
<u>AMT102-V</u>	2048		push-pull (totem) (radial connector)		CUI-3131-x CUI-3132-1FT	2/2	
<u>AMT103-V³</u>	2048		push-pull (totem) (axial connector)	BRX ² , CLICK C0- 1xDxE-D ²	CUI-435-x CUI-3934-6FT	n/a	
<u>AMT112S-V</u>	4096	0	push-pull (totem)		AMT-17C-1-x		
<u>AMT112Q-V</u>	4096	2mm, 3mm, 1/8", 4mm, 3/16", 5mm, 6mm, 1/4", 8mm	line driver (differential)	P2-HSI, P3-HSI, BRX ² , CLICK C0- 1xDxE-D ²	AMT-17C-1-x	AMT-PGRM-17C	NEMA 14, 17, 23 dual-shaft
<u>AMT312D-V</u>	4096		line driver (differential) encoder+commutation	P2-HSI, P3-HSI, BRX ² , CLICK C0- 1xDxE-D ²	AMT-17C-1-x	AMT-PGRM-17C	-
<u>AMT312S-V</u>	4096		push-pull (totem) encoder+commutation	BRX ² , CLICK C0-	AMT-17C-1-x		
<u>AMT132S-V</u>	4096		push-pull (totem)	TXDXL-D	AMT-18C-3-x		
<u>AMT132Q-V</u>	4096	9mm, 3/8", 10mm 11mm	line driver (differential)	P2-HSI, P3-HSI, BRX ² , CLICK C0- 1xDxE-D ²	AMT-18C-3-x		NEMA 34 and 42 ⁴ dual-shaft
<u>AMT332S-V</u>	4096	12mm, 1/2", 13mm, 14mm, 5/8"	push-pull (totem) encoder+commutation	BRX ² , CLICK C0- 1xDxE-D ²	AMT-18C-3-x	AMT-PGRM-18C	(Does not fit STP-
<u>AMT332D-V</u>	4096	5/0	line driver (differential) encoder+commutation	P2-HSI, P3-HSI, BRX ² , CLICK C0- 1xDxE-D ²	AMT-18C-3-x		

Note: For specific AutomationDirect PLC and step motor model compatibility, please see Appendix A in the SureStep User Manual.

1 - Configurable (default=400). AMT103-V is dip switch configurable. All others require configuration cable, see below.

1 - Requires FC-ISO-C (see wiring diagrams for DIP switch settings).

2 - For AMT103-V to maintain NEMA23 compatibility, CUI-KIT-2 must be purchased to use the standard wide base for mounting.

3 - For STP-MTRAC(H)-42 series motors, encoder mounting kit STP-MTRA-42ENC is required.

AMT Series Encoder Signal Cables					
Part Number	Price	Description	Drawing		
<u>CUI-3132-1FT</u>	\$5.00	Same Sky encoder cable, 5-pin connector to pigtail, 1ft cable length. For use with Same Sky AMT102 encoders.	<u>PDF</u>		
<u>CUI-3131-6FT</u>	\$10.50	Same Sky encoder cable, 5-pin connector to pigtail, shielded, twisted pair, 6ft cable length. For use with Same Sky AMT102 encoders.	<u>PDF</u>		
<u>CUI-3131-10FT</u>	\$30.00	Same Sky encoder cable, 5-pin connector to pigtail, shielded, twisted pair, 10ft cable length. For use with Same Sky AMT102 encoders.	<u>PDF</u>		
<u>CUI-3131-20FT</u>	\$49.00	Same Sky encoder cable, 5-pin connector to pigtail, shielded, twisted pair, 20ft cable length. For use with Same Sky AMT102 encoders.	PDF		
<u>CUI-435-1FT</u>	\$5.50	Same Sky encoder cable, 5-pin connector to pigtail, 1ft cable length. For use with Same Sky AMT103 encoders.	PDF		
<u>CUI-3934-6FT</u>	\$26.50	Same Sky encoder cable, 5-pin connector to pigtail, shielded, twisted pair, 6ft cable length. For use with Same Sky AMT103 encoders.	<u>PDF</u>		
<u>CUI-435-10FT</u>	\$22.00	Same Sky encoder cable, 5-pin connector to pigtail, 10ft cable length. For use with Same Sky AMT103 encoders.	PDF		
<u>CUI-435-20FT</u>	\$30.00	Same Sky encoder cable, 5-pin connector to pigtail, 20ft cable length. For use with Same Sky AMT103 encoders.	PDF		



CUI-3132-1FT www.automationdirect.com





CUI-435-1FT CUI-435-10FT CUI-435-20FT

CUI-3934-6FT

CUI-3131-10FT CUI-3131-20FT

AMT Series Stepping System Encoders

AMT Series Encoder Signal Cables					
Part Number	Price	Description	Drawing		
<u>AMT-17C-1-036</u>	\$40.00	Same Sky encoder cable, 17-pin connector to pigtail, shielded, twisted pair, 3ft cable length. For use with Same Sky AMT112 and AMT312 encoders.	<u>PDF</u>		
<u>AMT-17C-1-072</u>	\$81.00	Same Sky encoder cable, 17-pin connector to pigtail, shielded, twisted pair, 6ft cable length. For use with Same Sky AMT112 and AMT312 encoders.	<u>PDF</u>		
<u>AMT-17C-1-120</u>	\$121.00	Same Sky encoder cable, 17-pin connector to pigtail, shielded, twisted pair, 10ft cable length. For use with Same Sky AMT112 and AMT312 encoders.	PDF		
<u>AMT-18C-3-036</u>	\$27.50	Same Sky encoder cable, 18-pin connector to pigtail, shielded, twisted pair, 3ft cable length. For use with AMT13 and AMT33 encoders.	PDF		
<u>AMT-18C-3-072</u>	\$67.00	Same Sky encoder cable, 18-pin connector to pigtail, shielded, twisted pair, 6ft cable length. For use with AMT13 and AMT33 encoders.	PDF		
<u>AMT-18C-3-120</u>	\$105.00	Same Sky encoder cable, 18-pin connector to pigtail, shielded, twisted pair, 10ft cable length. For use with AMT13 and AMT33 encoders.	PDF		



AMT-17C-1-036 AMT-17C-1-072 AMT-17C-1-120



AMT-18C-3-036 AMT-18C-3-072 AMT-18C-3-120

AMT Series Encoders Programming Cables				
Part Number	Price	Description		
AMT-PGRM-17C	\$27.00	Same Sky programming cable, miniB-USB to 17-pin connector, 1ft cable length. For use with Same Sky AMT112 and AMT312 encoders.		
<u>AMT-PGRM-18C</u>	\$24.50	Same Sky programming cable, miniB-USB to 18-pin connector, 1ft cable length. For use with Same Sky AMT13 and AMT33 encoders.		



AMT-PGRM-17C



AMT-PGRM-18C

AMT Series Stepping System Encoders

Line Driver Encoder Wiring Colors						
Encoder		<u>AMT112Q-V</u> AMT312D-V	<u>AMT132Q-V</u> <u>AMT332D-V</u>			
Pin Function	Pin #	STP-CLB-EBx AMT-17C-1-xxx Wire Color	Pin #	AMT-18C-3-xxx Wire Color		
+5V	6	RED/BLK	6	RED/GRN		
GND	4	BLK/RED	4	GRN/RED		
Α	10	WHT/BLK	8	BRN/WHT		
Ā	11	BLK/WHT	9	WHT/BRN		
В	8	GRN/BLK	10	GRN/WHT		
Ē	9	BLK/GRN	11	WHT/GRN		
Ζ	12	BLU/BLK	12	BLU/WHT		
z	13	BLK/BLU	13	WHT/BLU		

Single Ended (Push-pull/Totem) Encoder Wiring Colors											
Encoder	<u>AMT112S-V</u> AMT312S-V			<u>AMT132S-V</u> <u>AMT332S-V</u>		<u>AMT102-V</u>			<u>AMT103-V</u>		
Pin Function	Pin #	STP-CLB-EBx AMT-17C-1-xxx Wire Color	Pin #	AMT-18C-3-xxx Wire Color	Pin #	CUI-3131-xxx Wire Color	CUI-3132-1FT Wire Color	Pin #	CUI-435-xxx Wire Color	CUI-3934-6FT Wire Color	
+5V	6	RED/BLK	6	RED/GRN	5V	RED	ORG	5V	ORG	RED	
GND	4	BLK/RED	4	GRN/RED	G	BLACK	BRN	G	BRN	BLACK	
A+	10	WHT/BLK	8	BRN/WHT	Α	WHT	BLU	A	BLU	WHT	
B+	8	GRN/BLK	10	GRN/WHT	В	BRN	YEL	В	YEL	BRN	
Z+	12	BLU/BLK	12	BLU/WHT	Х	GRN	PUR	Х	PUR	GRN	

Single Ended (Push-pull/Totem) Commutation Wiring Colors							
Encoder		<u>AMT312S-V</u>	<u>AMT332S-V</u>				
Pin Function	Pin #	AMT-17C-1-xxx Wire Color	Pin #	AMT-18C-3-xxx Wire Color			
+5V	6	RED/BLK	6	RED/GRN			
GND	4	BLK/RED	4	GRN/RED			
U+	3	BRN/BLK	3	BRN/RED			
W+	5	ORG/BLK	5	ORG/RED			
V+	7	RED/WHT	7	BLU/RED			



AMT Series Encoders – PLC Connectivity

Line Driver Encoder to Line Driver PLC Input



Single Ended (Push-pull/Totem) Encoder to Sourcing PLC



Single Ended (Push-pull/Totem) Encoder to Sinking PLC





SureStep[®] Microstepping Drives Accessories

SureMotion Pro Drive Configuration Software - for Advanced Stepper Drives and Advanced Integrated Motor/Drives

Free Download

SureMotion Pro configuration software is available as a free download from our website for SureStep advanced components (<u>STP-DRV-4850</u>, -80100, & STP-MTRD-xxxxR).

- Completely replaces SureStep Pro. Required for integrated motor/drives.
- Used for easy configuration and setup of the drive, including drive, motion control mode, I/O, motor.
- Open, Save, Upload, Download configuration files to Advanced Drives and Drive/Motors.
- Status Monitor screen aids in troubleshooting alarms and faults.
- Self Test Mode verifies motor wiring and functionality.
- SCL Terminal window allows testing/ verification of SCL (serial ASCII) commands before PLC programming begins.
- Help files include technical data, application information, advanced setup, serial command instructions.
- Runs on 32-bit/64-bit Windows operating systems.



SureStep Drive Configuration Software - for Advanced Stepper Drives				
Part Number	Price	Description		
<u>SM-PRO</u>	\$10.50	SureMotion Pro Windows configuration software, USB drive or free download. For use with SureStep stepper drives with serial port Requires PC serial port, USB-RS232-1 or STP-USB485-4W serial adapters.		

* Available for purchase on USB or can be downloaded for free from the AutomationDirect Web site (www.AutomationDirect.com).



SureStep[®] Cables

SureStep Series – Stepping System Cables								
Cable	Price	Purpose	Length	Use With	Cable End Connectors	Drawing		
STP-EXT-006	\$16.00		6 ft			PDF		
STP-EXT-010	\$18.00		10 ft	STP-MTR-xxxxx(x)	pigtail / Molex 43020-0401	PDF		
STP-EXT-020	\$25.00		20 ft			PDF		
STP-EXTH-006	\$31.00		6 ft			PDF		
STP-EXTH-010	\$36.00		10 ft	STP-MTR H -xxxxx(x)	pigtail / Molex 39-01-2041	PDF		
STP-EXTH-020	\$45.50		20 ft			PDF		
STP-EXTHW-006	\$62.00		motor to drive extension 10 ft STP-MTR HW -xxxxx(x) Bu			PDF		
STP-EXTHW-010	\$78.00	motor to drive extension			Bulgin # PXP4011/06P/6065	PDF		
<u>STP-EXTHW-020</u>	\$113.00		20 ft			PDF		
STP-EXTL-006	\$13.00		6 ft			PDF		
<u>STP-EXTL-010</u>	\$16.50		10 ft	STP-MTRL-xxxxx(x)	pigtail / Molex 105308-22004 connector	PDF		
<u>STP-EXTL-020</u>	\$21.00		20 ft			PDF		
<u>STP-EXTW-006</u>	\$61.00		6 ft			PDF		
<u>STP-EXTW-010</u>	\$76.00		10 ft	STP-MTR W -xxxxx(x)	Bulgin # PXP4011/06P/6065	<u>PDF</u>		
<u>STP-EXTW-020</u>	\$107.00		20 ft			PDF		
<u>STP-EXT42-006</u>	\$28.50		6 ft			<u>PDF</u>		
<u>STP-EXT42-010</u>	\$34.00		10 ft	STP-MTRAC-42xxxx	- 10-pin / piotail	PDF		
<u>STP-EXT42-020</u>	\$50.00	motor to drive extension	20 ft			PDF		
<u>STP-EXT42H-006</u>	\$28.50		6 ft		ro pin, pigtai	PDF		
<u>STP-EXT42H-010</u>	\$34.00		10 ft	10 ft STP-MTRACH-42xxxxx		PDF		
<u>STP-EXT42H-020</u>	\$50.00		20 ft			PDF		
<u>STP-232RJ11-CBL</u> *	\$19.00	programming/ communication	10 ft	STP-DRV-4850, STP-DRV-80100	DB9 female / RJ11(6P4C)	<u>PDF</u>		
<u>STP-232HD15-CBL-2</u> **	\$19.00	communication	6.6 ft	STP-DRV-4850, STP-DRV-80100 DL06, D2-250-1, D2-260	HD 15-pin male / RJ12 6-pin plug	n/a		
<u>STP-232RJ12-CBL-2</u> **	\$12.00	communication	6.6 ft	STP-DRV-4850, STP-DRV-80100 DL05, CLICK	RJ11 (6P4C) plug / RJ12 6-pin plug	n/a		
STP-CBL-CA6	\$42.00	control cable	6 ft	CTD MTDD 17020	11-pin / pigtail	PDF		
STP-CBL-CA10	\$60.00	control cable	10 ft	STP-MTRD-17038 STP-MTRD-17038E	11-pin / pigtail	PDF		
STP-CBL-CA20	\$108.00	control cable	20 ft		11-pin / pigtail	PDF		
STP-CBL-EA6	\$39.00	encoder cable	6 ft	STP-MTRD-XXXXE STP-MTRA-ENC1_STP-MTRA-ENC3	10-pin / pigtail	PDF		
STP-CBL-EA10	\$40.00	encoder cable	10 ft	STP-MTRA-ENC5, STP-MTRA-ENC7 STP-MTRA-FNC11 STP-MTRA-FNC13	10-pin / pigtail	<u>PDF</u>		
STP-CBL-EA20	\$69.00	encoder cable	20 ft	(for line driver encoders)	10-pin / pigtail	PDF		
<u>STP-CBL-EB3</u>	\$67.00	encoder cable	3 ft	AMT112O-V	17-pin / pigtail	PDF		
<u>STP-CBL-EB6</u>	\$94.00	encoder cable	6 ft	AMT112S-V	17-pin / pigtail	PDF		
<u>STP-CBL-EB10</u>	\$131.00	encoder cable	10 ft	(for both line driver and push-pull (totem) encoders)	17-pin / pigtail	PDF		
<u>STP-CBL-EB20</u>	\$221.00	encoder cable	20 ft		17-pin / pigtail	PDF		
STP-CBL-ED6	\$42.00	encoder cable	6 ft	STP-MTRA-ENC2, STP-MTRA-ENC4	5-pin / pigtail	PDF		
STP-CBL-ED10	\$57.00	encoder cable	10 ft	STP-MTRA-ENC6, STP-MTRA-ENC8 STP-MTRA-ENC12, STP-MTRA-ENC14	5-pin / pigtail	<u>PDF</u>		
STP-CBL-ED20	\$68.00	encoder cable	20 ft	(tor push-pull (totem) encoders)	5-pin / pigtail	<u>PDF</u>		
<u>STP-CON-1</u>	\$37.00	replacement connector kit	n/a	STP-DRV-4845 & -6575	-	n/a		
STP-CON-2	\$37.00	replacement connector kit	n/a	STP-DRV-4850 & 80100	-	n/a		
* Programming/communication cabl (One cable is included with each s	Programming/communication cable STP-232RJ11-CBLis available for spare or replacement purposes.							

** Refer to the ZIPLinks Wiring Solutions section for complete information regarding cables STP-232HD15-CBL-2 and STP-232RJ12-CBL-2.

1-800-633-0405

Stepping System Cables

SureStep[®] Cables, continued

SureStep Series – Stepping System Cables							
Cable	Price	Purpose	Length	Use With	Cable End Connectors	Drawing	
STP-CON-3	\$62.00	replacement connector kit	n/a	STP-MTRD-xxxxR	-	n/a	
STP-CON-4	\$35.00	replacement connector kit	n/a	STP-DRVA-RC-050A	-	n/a	
STP-CON-5	\$35.00	replacement connector kit	n/a	STP-DRV-4830	-	<u>PDF</u>	
STP-CON-6	\$38.00	replacement connector kit	n/a	STP-DRVAC-24025	-	n/a	
STP-485DB9-CBL-2	\$64.00	4-wire programming cable	6.5 ft	STP-MTRD-xxxxR	DB9 / Phoenix 5-conductor plug	PDF	

STP-EXT(x)-0xx Extension Cable Wiring Diagram



STP-EXTW-0xx and STP-EXTHW-0xx Extension Cable Wiring Diagram





SureStep[®] Cables, continued

STP-232RJ11-CBL Programming Cable Wiring Diagram



STP-485DB9-CBL-2 4-wire Programming Cable Wiring Diagram

CONNECTION CHART						
DB-9 CONN	DBO SIGNAL		PHOENIX	PHOENIX		
PIN	DB9 SIGNAL	WIRE COLOR	PIN	SIGNAL		
2	TX+	RED	5	RX+		
1	TX-	ORANGE	4	RX-		
3	RX+	BLACK	3	TX+		
4	RX-	BROWN	2	TX-		
5	GND	YELLOW	1	GND		
METAL HOUSING	SHIELD	SHIELD	N/C	N/C		





SureStep[®] Cables, continued

STP-CBL-CAxx Control Cable Wiring Diagram



STP-CBL-EAxx Encoder Cable Wiring Diagram



WIRE: 24AWG, CABLE: UL2464.

STP-CBL-EBxx Encoder Cable Wiring Diagram





SureStep[®] Cables, continued

STP-CBL-EDxx Encoder Cable Wiring Diagram



SPECIAL LABEL: PANDUIT# LJSL5-Y3-2.5

STP-EXT42(H)-xxx Cable Wiring Diagram



B-

B+

A-

A+



Stepping Systems with PLCs

Controller Compatibility

High Speed Pulse Motion Control with AutomationDirect PLCs* and SureStep [®] Stepping Systems						
DLC Sozian	Starting at \$213.00	Starting at \$329.00	Starting at \$391.00			
PLC Series	BX-DM1x-10	BX-DM1x-18	BX-DM1x-36			
Maximum Number of Axes	2	3	3			
Output Signal Type		Sink/Source				
Maximum Pulse Rate (pulses/ sec)	250,000					
Position Control	Trapezoidal Profiles (linear and S-curve ramps)					
Velocity Control	Dy	namic Velocity (controlled accel/de	cel)			

High Speed Pulse Motion Control with AutomationDirect PLCs* and SureStep™ Stepping Systems							
1–16 axis control depending on base size and power supply budget **							
PLC Series	CPUs starting at	\$365.00	CPUs starting at \$735.00				
PLC Series	P2000		P3000				
I/O Modules Pulse Outputs	P2-HSO		P3-HSO				
Maximum Number of Axes	2 per module, 22 per PLC rack, 44 per PLC system						
Output Signal Type	Line Driver Sink/Source		Line Driver	Sink/Source			
Maximum Pulse Rate (pulses/	1,000,000	500,000	1,000,000	500,000			

sec)	1,000,000	500,000	1,000,000	500,000		
Position Control	Trapezoidal Profiles (linear and S-curve ramps)					
Velocity Control	Dynamic Velocity (controlled accel/decel)					
Maximum Number of Modules	s 11 per PLC rack, 22 per PLC system					

High Speed Pulse Motion Control with AutomationDirect PLCs* and SureStep® Stepping Systems

otcpping bystems						
DIC Sozian	Starting at Retired	Starting at \$252.00	Starting at \$476.00			
PLC Series	DL105	DL05	DL06			
Built-In PLC Pulse Outputs	1 axis pulse output included with the PLC base unit					
Maximum Number of Axes	1 axis control**	1-2 axis control***	1-5 axis control***			
Maximum Pulse Rate (pulses/sec)	7,000 10,000					
Position Control		Trapezoidal Profiles (linear only)				
Velocity Control	Velocity Leve	els (no ramps available when chan	ging velocity)			
I/O Modules Pulse Outputs		H0-CTRIO2 (1 a	axis per module)			
Maximum Pulse Rate (pulses/sec)		65,	000			
Position Control	Not Applicable for DL105	Trapezoidal Profiles (li	near & S-curve ramps)			
Velocity Control		Dynamic Velocity (co	ontrolled accel/decel)			
Maximum Number of Modules		1	4			

* Any PLC capable of RS-232 ASCII communication can write serial commands to the STP-DRV-4850, -80100 Drives. Any PLC capable of RS-485 ASCII communication can write serial commands to the Advanced Integrated drives. Most AutomationDirect PLCs will communicate using either RS-232 or RS-485 communications, however we recommend using either Click, Productivity, or BRX (DoMore) as they are modern PLCs. DirectLogic will also work but is older technology. ** When using DC output models only. *** When using either DC output model or H0-CTRIO option module.



Stepping Systems with PLCs

Controller Compatibility (continued)

High Speed Pulse Motion Control with AutomationDirect PLCs* and SureStep™ Stepping Systems					
1–16 axis control depending on base size and power supply budget **					
PLC Series	CPUs starting at Retired			CPUs starting at \$437.00	
	DL205			Do-more	
I/O Modules Pulse Outputs	D2-CTRINT (1 axis per module)	H2-CTRIO2 (2 axes)	T1H-CTRIO (2 axes per module)		H2-CTRIO2 (2 axes)
Maximum Pulse Rate (pulses/ sec)	5,000	65,000	25,000		250,000
Position Control	Trapezoidal Profiles (linear and S-curve ramps)				
Velocity Control	Dynamic Velocity (controlled accel/decel)				
Maximum Number of Modules	1 1-8				

* Any PLC capable of RS-232 ASCII communication can write serial commands to the STP-DRV-4850, -80100 Drives. Any PLC capable of RS-485 ASCII communication can write serial commands to the Advanced Integrated drives. Most AutomationDirect PLCs will communicate using either RS-232 or RS-485 communications, however we recommend using either Click, Productivity, or BRX (DoMore) as they are modern PLCs. DirectLogic will also work but is older technology.

** using D2-CITRANT or Hx-CTRIO modules.

Stepping Drives

Leadshine 2-phase Digital Stepper Drives

Leadshine has been an industry leading motion control supplier since 1997, and is one of the largest stepper drive manufacturers in the world. Leadshine steppers offer high quality products (Leadshine factories are ISO9001 certified) at very affordable prices. Leadshine steppers are simple, easy to use, long-lasting, and reliable.

AutomationDirect sells a wide range of linear and switching power supplies, stepper motors, cables, and PLCs with hi-speed outputs that are compatible with Leadshine stepper drives.

Features

• 2-phase digital stepper drives

Leadshine

- Anti-resonance for optimal torque, extra smooth motion, low motor heating and noise
- · Motor auto-config on power up
- All drives support step and direction control, some models support CW/CCW as well
- Micro-stepping for smooth motor movement
- DIP switch configurable
- Wide range of input voltages supported (12-110 VDC, 18-80 VAC)

- Pulse input frequency up to 200kHz
- Soft-start with no "jump" when powered on
- Automatic idle-current reduction
- Protections for over-voltage and overcurrent
- NEMA 11, 14, 17, 23, 24, 34 and 42 frame size step motors supported



1 - Refer to Specifications Tables for detailed specifications.

2 - See the User Manual or Quick Start Guide for instructions on wiring Single-Ended drives to a Differential (Line Driver) controller.







1-800-633-0405

For the latest prices, please check AutomationDirect.com.



Stepping Drives



DM542E, DM556E, DM860E, DMA860E

The DM542E and DM556E drives are capable of pulse and direction operation, with auto-motor config on power up.

The DM860E and DMA860E drives possess the same capabilities but can also do CW and CCW pulse operation. The main difference between these models are output current range to the motor and supply voltage.

Leadshine DM542E, DM556E, DM860E, DMA860E Specifications						
Drive Model	Drive Model		<u>DM556E</u>	<u>DM860E</u>	<u>DMA860E</u>	
Output Curren	t	1.0–4.2 A peak (0.7–3.0 RMS)	1.8–5.6 A peak (1.3–4.0 RMS)	2.4–7.2 A peak (1.7–5.1 RMS)	2.4–7.2 A peak (1.7–5.1 RMS)	
Input Voltage		20–50 VDC (24–48 VDC typical)		24–74 VDC (48–68 VDC typical)	24–110 VDC (48–90 VDC typical) or 18–80 VAC (36–70 VAC typical)	
Logic Signal C	Current		7–16 mA (1	0mA typical)		
Pulse Input Fr	equency	0–200 kHz				
Minimal Pulse	Width	2.5 µs				
Minimal Direct	tion Setup	5.0 µs				
Isolation Resis	stance	500mΩ				
	PUL+	Pulse signal: 5V signal, diffe	erential input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 μs. Add a 1k			
Connector P1 Functions	PUL-	resistor for +12V signals, 2k□ for +24V signals.				
	DIR+	Direction signal: 5V signal, differential input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1k resistor for +12V signals, 2k∃ for +24V signals. Direction Function: requires 5µs setup time. CW/CCW Function (DM860E and DMA860E only): see DIP switch SW14.				
	DIR-					
ENA+		Enable signal: 5V signal, differential input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1k				
	ENA-		Enable Function: Close (pull low) to disable the drive.			
Replacement (Connectors	Power = DN-6PLUG, I/O = DN-4PLUG, Enable = DN-2PLUG				
Cooling		Natural cooling or forced cooling				
Ambient Temp	oerature	0°C to 65°C (32°F to 149°F)				
Humidity		40–90% relative humidity				
Operating Ten	nperature	0°C to 50°C (32°F to 122°F)				
Vibration	10–50 Hz / 0.15 mm					
Storage Temp	-20°C to 65°C (-4°F to 149°F)					
Self Test			N	0		
Weight 227g (8 oz) 300g (10.6 oz) 510g (1.13 lbs)			510g (1.13 lbs)			



Stepping Drives

Leadshine Drive Dimensions

Dimensions = in [mm]

DM542E

DM860E







DMA860E



2.97 [75.5]

1



Stepping Drives

Leadshine Drive Wiring

DM542E, DM556E, DM860E, DMA860E Connection to Open Collector Signal



DM542E, DM556E, DM860E, DMA860E Connection to PNP Signal



Controller Drive PUL Step ¥% PUL-DIR+ Direction ≰兆 DIR-ENA+ Enable ¥≉ ENA-VDC Power Supply GND A+ A-Stepping Motor B+ B-

DM542E, DM556E, DM860E, DMA860E Connection to Differential Signal

1-800-633-0405



For the latest prices, please check AutomationDirect.com.

Stepping Drives

DM332E

The DM322E is a compact drive capable of pulse and direction operation, with motor auto-configuration on power up.



Leadshine DM322E Specifications				
Drive Model		<u>DM322E</u>		
Output Current		0.3–2.2 A peak (0.2–1.6 RMS)		
Input Voltage		12–30 VDC (24 VDC typical)		
Logic Signal Curi	rent	7–16 mA (10mA typical)		
Pulse Input Frequ	iency	0–70 kHz		
Minimal Pulse Wi	dth	7.5 µs		
Minimal Direction	Setup	7.5 µs		
Isolation Resistar	nce	100mΩ		
Connector P1 Functions	PUL	Pulse signal: 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 μs. Add a 1kl resistor for +12V signals, 2kl for +24V signals.		
	DIR	DIR signal: 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1ki resistor for +12V signals, 2ki for +24V signals. Direction Function: requires 5µs setup time. CW/CCW Function: see DIP switch SW14.		
	ΟΡΤΟ	This input is the voltage supply for the Pulse, Direction, and Enable opto-couplers. Conn 5VDC (or +12V, +24V with appropriate resistors on Pulse, Direction, and Enable inputs		
	ENA	Enable signal: 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V Minimum pulse width = 2.5 μs. Add a 1k⊡ resistor for +12V signals, 2k⊔ for +24V signal Enable Function: Close (pull low) to disable the drive.		
Replacement Cor	nnectors	Power = 6-pin from STP-CON-4; I/O = 4-pin from STP-CON-5		
Cooling		Natural cooling or forced cooling		
Ambient Tempera	nture	0°C to 65°C (32°F to 149°F)		
Humidity		40–90% relative humidity		
Operating Tempe	rature	0°C to 50°C (32°F to 122°F)		
Vibration		10–50 Hz / 0.15 mm		
Storage Temperature		-20°C to 65°C (-4°F to 149°F)		
Self Test		No		
Weight		90g (3.5 oz)		



Stepping Drives

DM322E Dimensions and Wiring

Dimensions = in [mm]



DM322E Connection to Open Collector Signal



DM322E Connection to Differential Control Signal



1-800-633-0405



DM805-AI

The DM805-AI is capable of pulse and direction as well as analog input and speed control, with motor auto-configuration on power up and motor selftest capability. Comes with built in potentiometers for adjusting accel and decel rates and can be controlled via an external potentiometer.



Stepping Drives



Leadshine DM805-AI Specifications				
Drive Model		DM805-AI		
Output Current		2.6–7.0 A peak (0.3–5.0 RMS)		
Input Voltage		20–80 VDC (60VDC typical)		
Logic Signal Curre	nt	7–16 mA (10mA typical)		
Pulse Input Freque	псу	0–200 kHz		
Minimal Pulse Widt	th	2.5 µs		
Minimal Direction S	Setup	5.0 µs		
Isolation Resistanc	e	500mΩ		
Pin Functions	Run/Stop or Pulse	Pulse signal: 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1i resistor for +12V signals, 2ki for +24V signals. Run/Stop Function: Close (pull low) to enable the motor.		
	Direction or +Limit	t DIR signal: 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum width = 2.5 µs. Add a 1ki resistor for +12V signals, 2ki for +24V signals. Direction Function: requires 5µs setup time. (+)Limit Function: Close (pull low) to stop motor movement in the positive direction.		
	Speed or (-)Limit	Speed: 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 μs. Add a 1kl resistor for +12V signals, 2kl for +24V signals. Speed Function (Low Speed/High Speed Mode): Close (pull low) to select Lo Speed pot setpoint. Open (float high) to enable Hi Speed pot setpoint. (-)Limit Function: Close (pull low) to stop motor movement in the negative direction.		
	Enable/Disable	Enable signal: 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1k∂ resistor for +12V signals, 2k∂ for +24V signals. Enable Function: Close (pull low) to disable the drive.		
Replacement Conn	ectors	Power = 6-pin from STP-CON-4; I/O = 6-pin from STP-CON-4; Analog = 4-pin from STP-CON-4		
Cooling		Natural cooling or forced cooling		
Ambient Temperatu	ure	0°C to 50°C (32°F to 122°F)		
Humidity		40–90% relative humidity		
Operating Temperature		70°C (158°F) max		
Vibration		4.9 m/s2 max		
Storage Temperature		-20°C to 65°C (-4°F to 149°F)		
Self Test		Yes		
Configuration Cable		<u>1.4.4-0609505-B3</u>		
Weight		264g (9.3 oz)		

Leadshine Series Drive Cables			
Optional Configuration Cable	Compatible With	Price	
<u>1.4.4-0609505-B3</u>	DM805-AI	\$6.50	



Note: Configuration cable only required if using optional configuration software. Software configuration not necessary unless DIP switch settings and auto-tuning aren't sufficient for your application. Requires an RS232 port on your PC, or a USB to RS232 converter, like <u>USB-RS232-1</u>.

Note: ProTuner for DM805-AI is not officially supported by the manufacturer for Operating Systems newer than Windows 7. Some Win10 and Win11 PCs will still run the software, but there is no guarantee from the manufacturer. See a potential solution for newer OS compatibility in our Community Forum: <u>https://community.automationdirect.com/s/question/0D5Dp00000WPRm8KAH/fix-for-dm805ai-protune</u>





Stepping Drives

DM805-AI Dimensions

Dimensions = in [mm]





DM805-AI Wiring

The DM805-AI has four different operation modes that can be selected through DIP SW7 and SW8, and can also be wired to a differential controller.

DM805-AI Wiring for Analog Speed Mode



DM805-AI Wiring for External Pot Mode





Stepping Drives

DM805-AI Wiring for Low/High Speed Mode



٩ Ľ Controller COM+ +5V Run/Stop/Pulse Direction/+Limit PUL Speed/-Limit Enable/Disable DM805-AI Signal GND DIR Ľ +5V Output 0~5V Input Signal GND Tach Output 000 ENABLE 5 Power GND +20-80VDC Motor A+ Motor A-20-80 VDC Motor Motor B+ Motor B-۲

DM805-AI Wiring for Pulse/Direction Mode

DM805-AI Wiring for Differential Control Signal



Stepping Drives



EM542S, EM556S

The EM542S and EM556S are digital stepper drives capable of pulse and direction as well as CW and CCW operation, with motor autoconfiguration on power up and self-test capability. EM542S and EM556S have a built-in current-limiting resistor (on a switch) to allow either 5V or 24V input pulses. They also include a fault and a brake output, and a shaft lock feature. The brake output can be used with an external holding brake to hold the motor in place if power fails or the drive is disabled - you lose power, the brake engages. The shaft lock is set via DIP switch and will lock the motor into position using phase current, but only works when the drive has power.



Leadshine EM542S, EM556S Specifications						
Drive Model		<u>EM542S</u>	<u>EM556S</u>			
Output Current ¹		0.5-4.2A peak (0.4-2.9 RMS)	0.5-5.6A peak (0.4-3.9 RMS)			
Input Voltage		20–50 VDC (24–48 VDC typical)				
Logic Signal Currei	nt	7–16 mA (10mA typical)				
Pulse Input Freque	псу	0–200 kHz				
Minimal Pulse Widt	h	2.5 µs				
Minimal Direction S	Setup	5.0) µs			
Isolation Resistanc	е	50	OmΩ			
	PUL+	Pulse signal: 5V or 24V signal (Switch S3	determines voltage), differential input. High			
	PUL-	input is 4-5V or 22-24V, Low input is 0-0.5 V. Minimum pulse width = 2.5 μs. Switch S3 factory default = 24V position. WARNING! If switch S3 is in the 5V position and 24V is applied, the drive will be damaged				
	DIR+	DIR signal: 5V or 24V signal (Switch S3 determines voltage), differential input. High input				
Connector P1 Functions	DIR-	is 4-5V or 22-24V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Direction Function: requires 5µs setup time. CW/CCW Function: see DIP switch SW14. WARNING! If switch S3 is in the 5V position and 24V is applied, the drive will be damage				
	ENA+	Enable signal: 5V or 24V signal (Switch S3 determines voltage), differential input. High				
	ENA-	input is 4-5V or 22-24V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Enable Function: Close (pull low) to disable the drive. WARNING! If switch S3 is in the 5V position and 24V is applied, the drive will be damaged.				
ALM						
Fault and Brake	BR	Optional output connection. Maximum of 30V/100mA output, sinking or sourcing				
ouput connector	СОМ-					
Replacement Conn	ectors	Incoming Power = DN-2PLUG; Motor Powe	er = DN-4PLUG; I/O = 6-pin from STP-CON-4			
Cooling		Natural cooling	or forced cooling			
Ambient Temperatu	ıre	0°C to 65°C (32°F to 149°F)				
Humidity		40–90% relative humidity				
Operating Temperature		0°C to 50°C (32°F to 122°F)				
Vibration		10–50 Hz / 0.15 mm				
Storage Temperature		-20°C to 65°C (-4°F to 149°F)				
Self Test		Yes				
Configuration Cable		<u>1.4.4-0409505-B3</u>				
Weight		250g (8.8 oz)	250g (8.8 oz)			
1 - Output current ranges are for software settings which allow for a wider current range than DIP switches.						

Leadshine Series Drive Cables			
Optional Configuration Cable	Compatible With	Price	
<u>1.4.4-0409505-B3</u>	EM542S, EM556S	\$6.50	

Note: Configuration cable only required if using optional configuration software. Software configuration not necessary unless DIP switch settings and auto-tuning aren't sufficient for your application. Requires an RS232 port on your PC, or a USB to RS232 converter, like <u>USB-RS232-1</u>.



1.4.4-0409505-B3 Stepper Systems

tSTP-103



Stepping Drives

EM542S, EM556S Dimensions

Dimensions = in [mm]

EM542S





EM556S







Stepping Drives

EM542S, EM556S Wiring

Note: These drives can accept Vcc of 24V or 5V. Set switch S3 before applying power.

EM542S, EM556S Connection to Open-Collector Signal



EM542S, EM556S Connection to PNP Signal



EM542S, EM556S Connection to Differential Signal; Typical Connection with Brake and Fault Outputs

