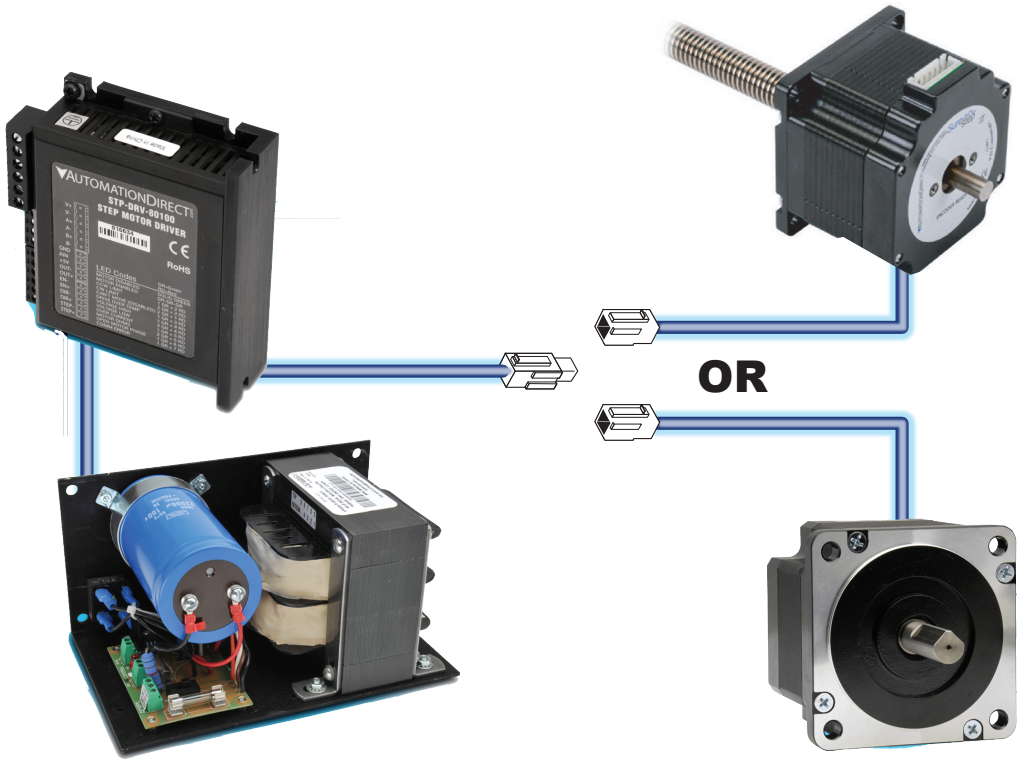
Stepper Systems

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 ÷ 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

CE

How fast can my system go?

Maximum Potential Speed Chart (rpm) *

PLC		SureStep Drive Steps/Rev Selection **			
Model	Max Output (kHz)	400 Steps/Rev	1000 Steps/Rev	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	>2,500***			

*** 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÷B) x (60 seconds/minute)

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

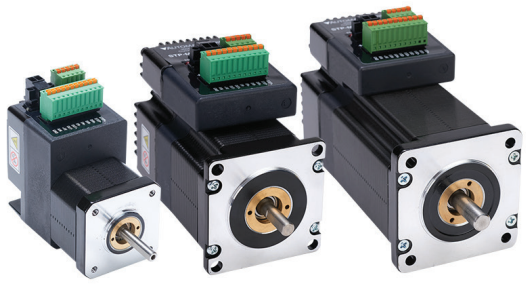
Maximum RPM =		Steps/Sec A		Steps/Rev B		Sec/Min
Example 1:	*1,500 =*	*10,000*	÷	*400*	*x*	*60*
DL06 with 10 kHz Built-in Pulse Output						
Example 2:	*3,750 =*	*25,000*	÷	*400*	*x*	*60*
Hx-CTRIO with 25 kHz Pulse Output						

Stepping System Overview

Two or Four components to make a complete system

Choose an integrated motor/drive and power supply

Integrated Motor/Drives

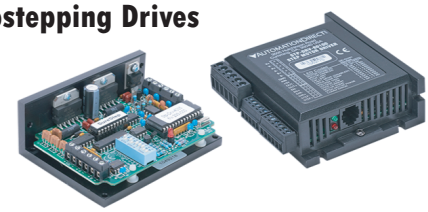


Step Motor Power Supplies

OR . . .

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

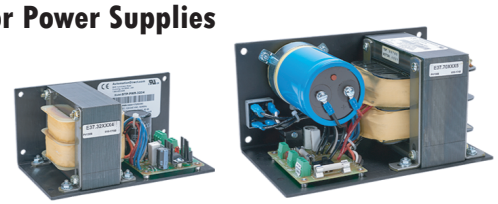
Microstepping Drives

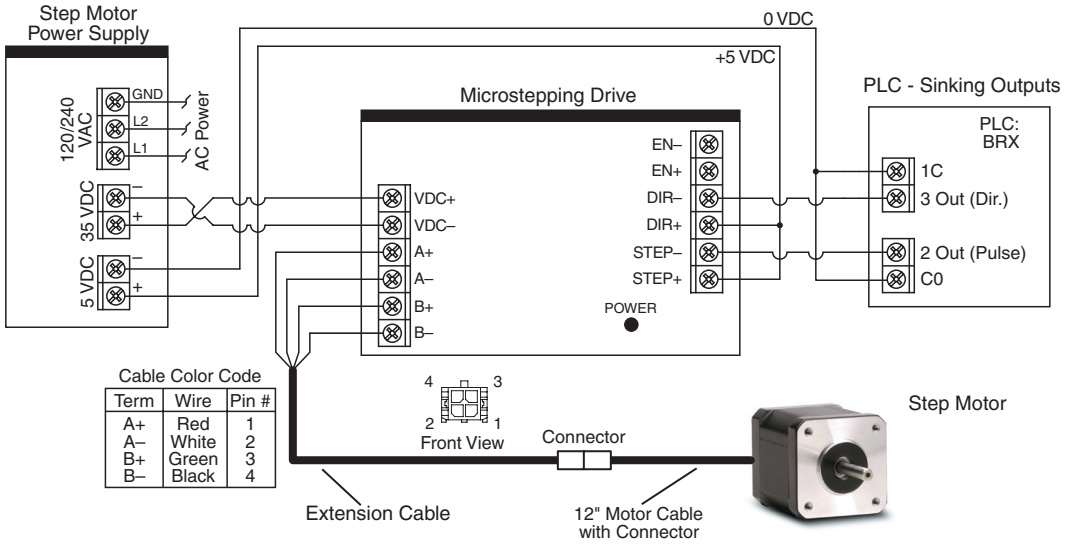


NEMA Step Motors/Linear Actuators

Step Motor Extension Cables

Step Motor Power Supplies

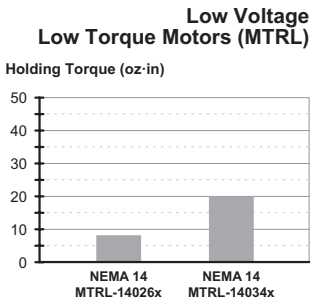


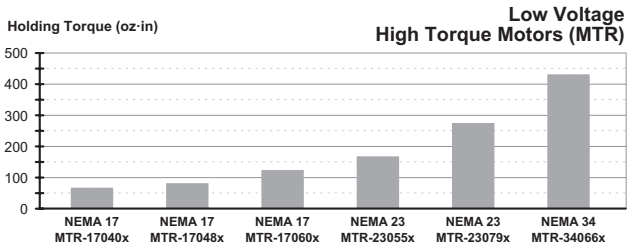


Stepping System Overview

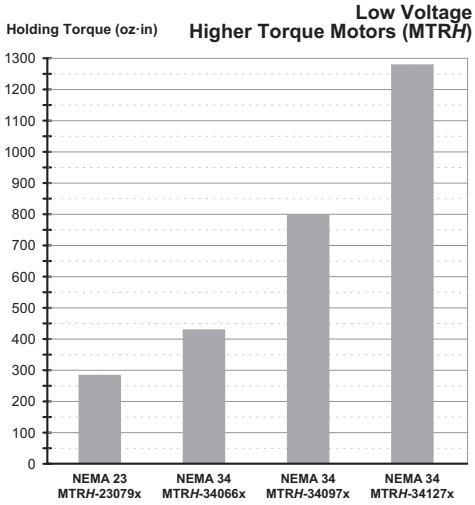
NEMA frame stepping motors

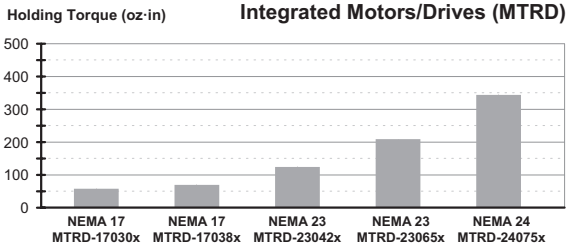
The SureStep stepping family has a wide variety of high-torque motors to handle a wide range of automation applications such as woodworking, assembly, and test machines. The motors are available in both single-shaft and dual-shaft configurations, with or without an encoder. Our square frame or "high-torque" 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 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.

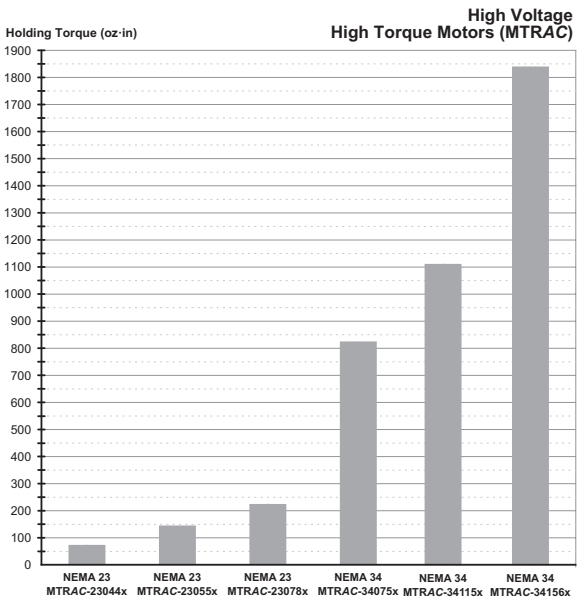


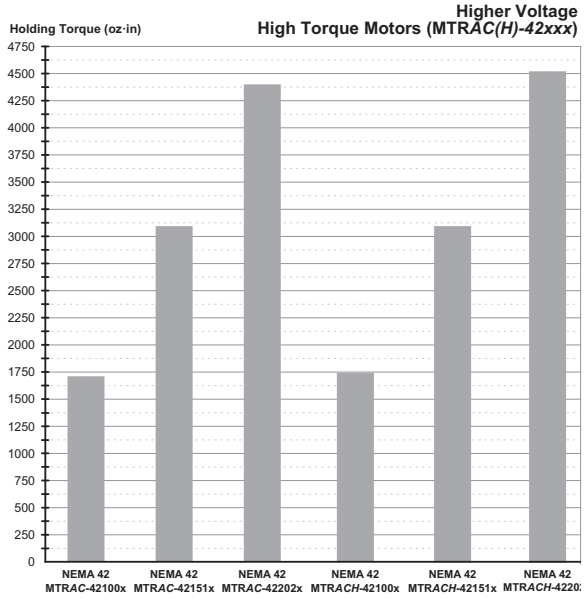


Note that the integrated motor/drive systems have a lower maximum torque due to heat constraints with the drive connected to the motor. For solutions requiring the highest torque, use the systems with our NEMA MTRH (low voltage, higher torque) or MTRAC (high voltage, high torque) motors.





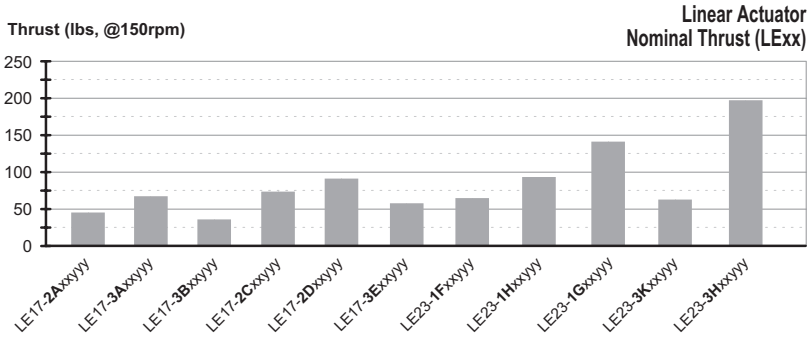




Note: While possessing similar holding torques, the MTRACH motors have much higher torque at high speeds than the MTRAC motors.

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)

- 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
- 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

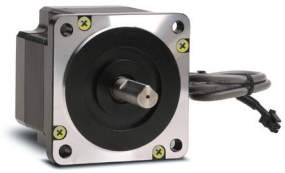
1. Choose a motor

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 STP-DRVAC-24025 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 STP-DRVAC-24025 drive as it doesn't provide enough current.

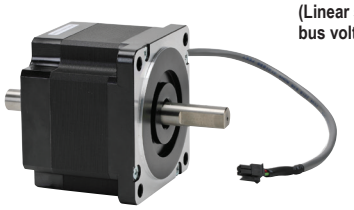
NEMA 14, 17, 23, 34, and 42 mounting flanges

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



Holding torque ranges from 8 to 4532 oz·in

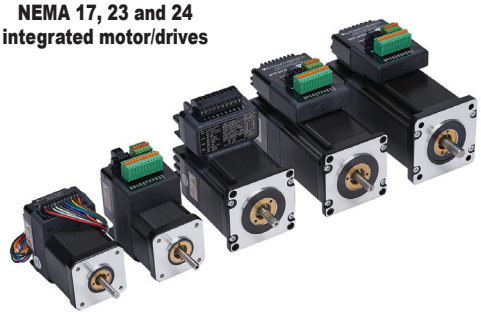
Single-shaft, Dual-shaft, IP65, high bus voltage, and encoder-mounted models available (Linear series does not have high bus voltage or IP65 models)



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 17, 23 and 24 integrated motor/drives



NEMA 17 and 23 linear actuators

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.

20-foot extension cable with locking connector

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

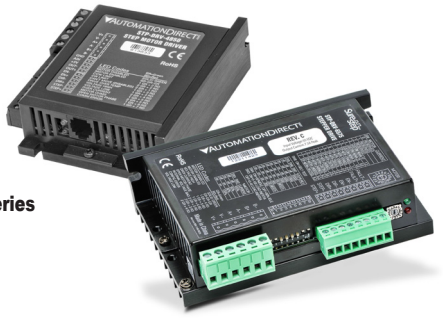
Choose your SureStep System

3. Choose a drive

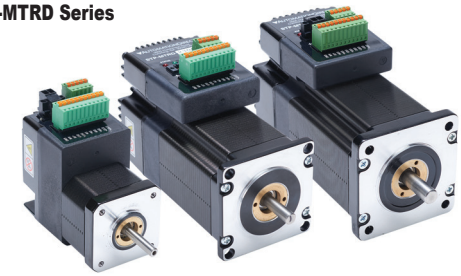
Note: If you chose an Integrated motor/drive in Step 1, skip to "Choose a Power Supply" . . . you have already chosen your drive. If you chose STP-MTRAC-23xxx or STP-MTRAC-34xxx, you are done - these motors use the STP-DRVAC-24025 drive and don't require an extension cable or DC power supply.
Note: The STP-MTRAC-42xxx motors cannot use the STP-DRVAC-24025 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-DRV Series



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)	–	–	–	–	–	✓	✓	✓	✓	✓
32V Speed-Torque Curve (from Step 1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
48V Speed-Torque Curve (from Step 1)	–	✓	✓	✓	✓	–	✓	–	✓	✓
70V Speed-Torque Curve (from Step 1)	–	–	–	–	✓	–	✓	–	✓	✓
More than 3.5A/motor phase	–	✓	✓	✓	✓	–	–	–	–	–
More than 5A/motor phsae ("H" motors)	–	–	–	✓	✓	–	–	–	–	–
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)	–	–	✓	–	✓	–	–	✓	✓	✓
High-speed pulse input	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
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)	–	–	✓	–	✓	–	–	–	–	–
RS-485 communication (ASCII)	–	–	–	–	–	–	–	✓	✓	✓
Variable I/O (I/O can be either a digital input or digital output)	–	–	–	–	–	–	–	–	–	✓

** 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

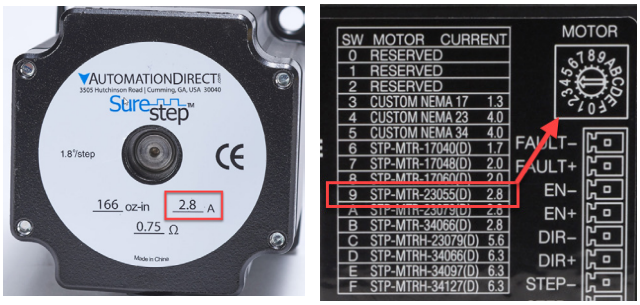
$$(\text{Drive Amps})_{peak} = 1.2 \times (\text{Motor Amps})_{RMS}$$

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 sub-optimal 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 STP-MTR-23055 motor with a STP-DRV-6575 drive, the drive's rotary switch should be positioned to selection 9 (STP-MTR-23055x). The STP-MTR-23055 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.

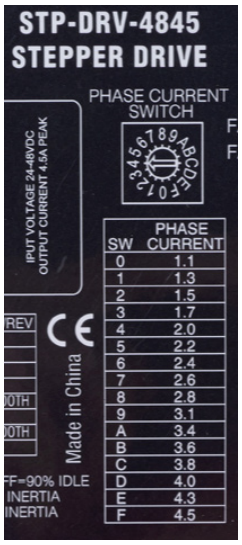


Matched stepper system

Example of an adjustable current stepper drive

To use an STP-MTR-23055 motor with a STP-DRV-4845 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 x 2.8 A = 3.92 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)



STP-DRV-4845 Motor Selection Table (A/Phase)(Peak of Sine A)			
Rotary Switch Position	SW1 & SW2 @100%	SW1 & SW2 @90%	SW1 & SW2 @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	1.6
5	2.2	2.0	1.8
6	2.4	2.2	1.9
7	2.6	2.3	2.1
8	2.8	2.5	2.2
9	3.1	2.8	2.5
A	3.4	3.1	2.7
B	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	3.6

Matching an adjustable stepper drive with any step motor

Choose your SureStep System

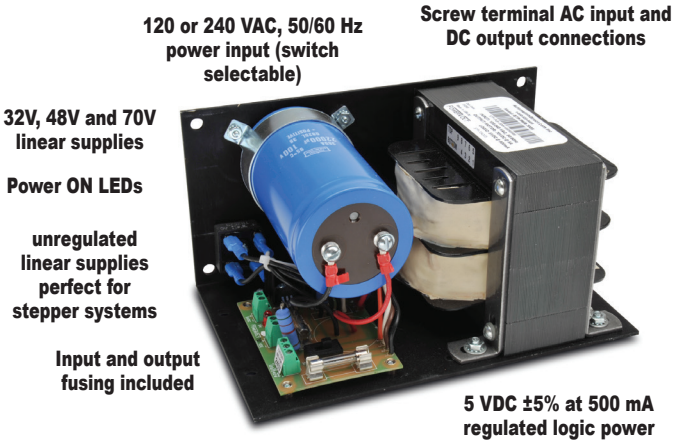
4. Choose a power supply

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

DC Powered Drive	Linear Power Supply				Switching Power Supply		
	STP-PWR-3204	*STP-PWR-4805*	*STP-PWR-4810*	*STP-PWR-7005*	*PSB12-xxxS*	*PSB24-xxxS*	*PSB48-xxxS*
STP-DRV-4830 12-48 VDC input (53V max)	√	√	√	–	√	√	√
STP-DRV-4845 24-48 VDC input (60V max)	√	√	√	–	–	√	√
STP-DRV-4850 24-48 VDC input (53V max)	√	√	√	–	–	√	√
STP-DRV-6575 24-65 VDC input (85V max)	√	√	√	–	–	√	√
STP-DRV-80100 24-80 VDC input (88V max)	√	√	√	√	–	√	√
STP-MTRD-17 series 12-48 VDC input (55V max)	√	√	√	–	√	√	√
STP-MTRD-23, -24 series 12-70 VDC input (75V max)	√	√	√	√	√	√	√
Supply current calculation	*For systems that use multiple steppers and only one power supply, the power supply current must be at least the sum of 2/3rds of the combined motor currents:* $I(ps) \geq 2/3 \times (I\_motor1 + I\_motor2 + I\_motor\ 3 + \ldots)$						

Linear Power Supply

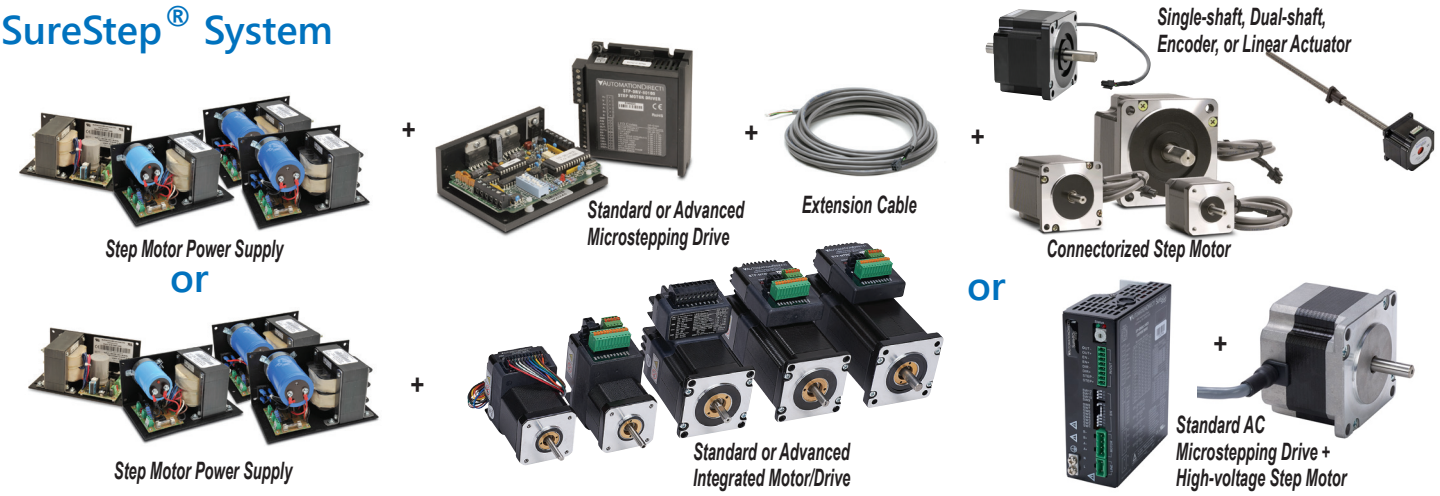


Switching Power Supply

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

Stepping System Components

SureStep® System



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-xxxxxx)
- 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

(STP-DRV-4035, -4830, -4845, -6575, STP-MTRD-x, STP-DRVAC-24025)

- 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

(STP-DRV-4850, STP-DRV-80100, 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

Drive(1)(2)	Recommended Linear Power Supply(1)(2)(5)			
Model #	STP-PWR-3204	STP-PWR-4805	STP-PWR-4810	STP-PWR-7005(3)
STP-DRV-4035	√	No	No	No
STP-DRV-4830	√	√	√	No
STP-DRV-4845	√	√	√	No
STP-DRV-4850	√	√	√	No
STP-DRV-6575	√	√	√	No
STP-DRV-80100	√	√	√	√
STP-MTRD-17(4)	√	√	√	No
STP-MTRD-23(4)	√	√	√	√
STP-MTRD-24(4)	√	√	√	√

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	√	√	No
STP-DRV-4830	√	√	√
STP-DRV-4845	No	√	√
STP-DRV-4850	No	√	√
STP-DRV-6575	No	√	√
STP-DRV-80100	No	√	√
STP-MTRD-17(3)	√	√	√
STP-MTRD-23(3)	√	√	√
STP-MTRD-24(3)	√	√	√

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

Model #	STP-DRVAC-24025	
	Series Wired Motor	Parallel Wired Motor
STP-MTRAC-23044(x)	√	No
STP-MTRAC-23055(x)	√	No
STP-MTRAC-23078(x)	√	No
STP-MTRAC-34075(x)	√	No
STP-MTRAC-34115(x)	√	No
STP-MTRAC-34156(x)	√	No

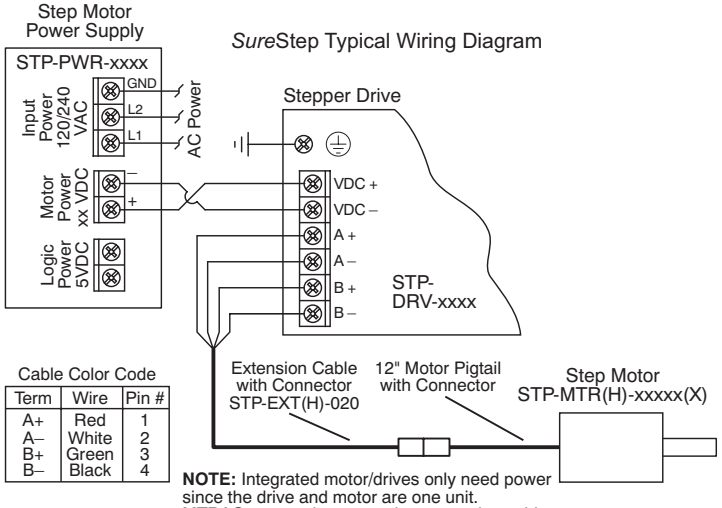
NOTE: STP-MTRAC-34156(x) motors have a 5/8" front shaft.

SureStep DC Input Drive / Motor Compatibility(3)

Motor(1)			Recommended Drive(1)					
Model #(1)	Rated Amps(2)	Extension Cable	STP-DRV-4035(1)	STP-DRV-4830	STP-DRV-4845	STP-DRV-4850(1)	STP-DRV-6575(1)	STP-DRV-80100(1)
STP-MTRL-14026(x)	0.35	STP-EXTL-0xx	√	√	–	√	–	–
STP-MTRL-14034(x)	0.8		√	√	√	√		
STP-MTR-17040(x)	1.7	STP-EXT-0xx	√	√	√	√	√	√
STP-MTR-17048(x)	2.0		√	√	√	√	√	√
STP-MTR-17060(x)	2.0		√	√	√	√	√	√
STP-MTR-23055(x)	2.8		√	√	√	√	√	√
STP-MTR-23079(x)	2.8		√	√	√	√	√	√
STP-MTR-34066(x)	2.8		√	√	√	√	√	√
STP-MTRAC-42100(x)	4.2	STP-EXT42 0xx	–	–	√	√	√	√
STP-MTRAC-42151(x)	6		–				√	√
STP-MTRAC-42202(x)	6						√	√
STP-MTRH-23079(x)	5.6	STP-EXTH-0xx					√	√
STP-MTRH-34066(x)	6.3						√	√
STP-MTRH-34097(x)	6.3						√	√
STP-MTRH-34127(x)	6.3						√	√
STP-MTRACH-42100(x)	6	STP-EXTH42 0xx					√	√
STP-MTRACH-42151(x)	8						–	√
STP-MTRACH-42202(x)	8						–	√

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.
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.

Typical Wiring Diagram



NOTE: Integrated motor/drives only need power since the drive and motor are one unit. MTRAC motors do not need an extension cable, they have 10' leads coming from the motor.

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.

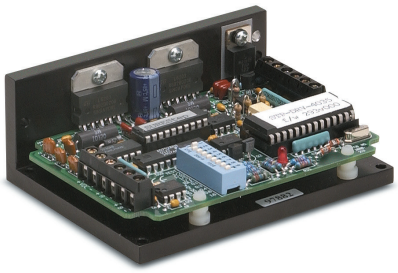
SureStep Series – Microstepping Drives Features Comparison

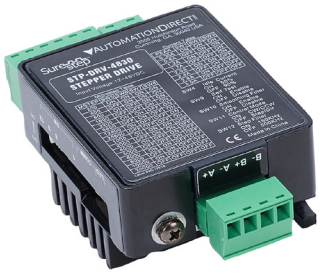
Drive Model		Standard Microstepping Drives						Advanced Microstepping Drives		
		STP-DRVAC-24025	STP-DRV-4830	STP-DRV-4845	STP-DRV-6575	STP-MTRD-x	STP-DRV-4035	STP-DRV-4850	STP-DRV-80100	STP-MTRD-xR
Price		$222.00	$77.00	$93.00	$107.00	See Integrated Motor/Drives section	Retired	$278.00	$332.00	See 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 STP-232RJ11-CBL		Advanced integrated stepper motor/drive with internal encoder
		enclosed				enclosed	open-frame	enclosed		enclosed
Output Current		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 Method		rotary dial, dip switches, jumpers				dip switches		SureMotion Pro software (SM-PRO: free download)		
Amplifier Type		MOSFET, 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 PWM @ 20 kHz		4-state PWM @ 16 kHz	4-state PWM @ 20 kHz			
Microstep Resolution		dipswitch selectable						software selectable		
		200 to 25,600 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		
Modes of Operation	**Step & Dir**	YES	YES	YES	YES	YES	YES	YES	YES	YES
	CW/CCW	YES	YES	YES	YES	YES	n/a	YES	YES	YES
	A/B Quad	n/a	n/a	n/a	n/a	n/a	n/a	YES	YES	YES
	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 Signals	**Step/Pulse**	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		
	Direction									
	Enable	motor disable				motor enable	motor disable	motor enable, alarm reset, speed select (oscillator 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 Signal		fault	n/a	fault	fault	fault	n/a	fault, motion, tach		brake, fault, motion, tach
Communication Interface		n/a	n/a	n/a	n/a	n/a	n/a	YES (programming/communication 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 (anti-resonance & damping feature to improve motor performance) Step pulse noise filter			n/a	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		

Refer to Specifications Tables for detailed specifications.

Stepping System Drives

SureStep® Standard Microstepping Drives





SureStep Series Specifications – Standard Microstepping Drives			
Microstepping Drive		***STP-DRV-4035***	***STP-DRV-4830***
Drive Type		Microstepping drive with pulse input	Microstepping drive with pulse input
Drawing		PDF	PDF
Output Current		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 Voltage (external p/s required)		Nominal: 12–32 VDC Range: 12–42 VDC (including ripple voltage)	Nominal: 12–48 VDC Range: 10–53 VDC
Configuration Method		DIP switches	DIP switches
Amplifier Type		MOSFET, dual H-bridge, bipolar chopper	MOSFET, dual H-bridge, 4-quadrant
Current Control		4-state PWM @ 20 kHz	4-state PWM @ 16 kHz
Protection		n/a	n/a
Recommended Input Fusing		Fuse: 4A fast-acting; ADC # AGC4; Holder: ADC # DN-F6L110	Fuse: 3A fast-acting; ADC #AGC3; Holder: ADC # DN-F6L110
Input Signals	***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
	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).
	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
Features	***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
	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 STP-CON-5 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 Cooling Method		Natural convection (mount drive to metal surface to dissipate heat)	Natural convection (mount drive to metal surface)
Mounting		(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 Approvals		CE	CE

SureStep® Standard Microstepping Drives, continued

SureStep Series Specifications – Standard Microstepping Drives			
Microstepping Drive		***STP-DRV-4845***	***STP-DRV-6575***
Drive Type		Microstepping drive with pulse input	
Drawing		PDF	PDF
Output Current		Selectable from 0.8–4.5 A/phase (peak of sine)	Selectable from 1.0–7.5 A/phase (peak of sine)
Input Voltage (external p/s required)		Nominal: 24–48 VDC Range: 20–60 VDC	Nominal: 24–65 VDC Range: 20–85 VDC
Configuration Method		Rotary dial, DIP switches, jumpers	
Amplifier Type		MOSFET, dual H-bridge, 4-quadrant	
Current Control		4-state PWM @ 20 kHz	
Protection		n/a	
Recommended Input Fusing		Fuse: 4A fast-acting; ADC #AGC4; Holder: ADC # DN-F6L110	Fuse: 7A fast-acting; ADC #AGC7; Holder: ADC # DN-F6L110
Input Signals	***Input Circuit***	5 –24 VDC nominal (range: 4–30 VDC); (5mA @ 4V; 15 mA @ 30V); Optically isolated, differential	
	Step/Pulse	Minimum pulse width = 1µs. Maximum pulse frequency = 150kHz or 2MHz (user selectable). FUNCTIONS: step & direction, CW/CCW step	
	Direction		
	Enable	FUNCTION: disable motor when closed	
	Analog	n/a	
Output Signal		30 VDC / 80 mA max, optically isolated photodarlington, sinking or sourcing. Function = closes on drive fault.	
Features	***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 %.)	
	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 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		Removable screw terminal blocks. Motor & Power Supply: 30–12 AWG; Signals: 30–14 AWG ADC part STP-CON-1 contains replacement connectors	
Maximum Humidity		90% non-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] (interior of electronics section)	
Drive Cooling Method		Natural convection (mount drive to metal surface)	
Mounting		(2) #6 screws to mount to metal surface	
Weight		10.8 oz [306g]	
Agency Approvals		CE, $_{C}$UR$_{US}$	

Stepping System Drives

SureStep® Advanced Microstepping Drives

SureStep Series Specifications – Advanced Microstepping Drives			
Microstepping Drive		***STP-DRV-4850***	***STP-DRV-80100***
Drive Type		Advanced microstepping drive with pulse or analog input, serial communication (serial communication allows indexing capability)	
Drawing		PDF	PDF
Output Current		0.1-5.0 A/phase (in 0.01A increments)	0.1-10.0 A/phase (in 0.01A increments)
Input Voltage (external p/s required)		24-48 VDC (nominal) (range: 18-53 VDC)	24-80 VDC (nominal) (range: 18-88 VDC)
Configuration Method		SureMotion Pro software (included)	
Amplifier Type		MOSFET, dual H-bridge, 4-quadrant	
Current Control		4-state PWM @ 20 kHz	
Protection		Over-voltage, under-voltage, over-temperature, external output faults (phase-to-phase & phase-to-ground), inter-amplifier shorts	
Recommended Input Fusing		Fuse: 4A 3AG delay (ADC #MDL4) Fuse Holder: ADC #DN-F6L110	Fuse: 6.25A 3AG delay (ADC #MDL6-25) Fuse Holder: ADC #DN-F6L110
Input Signals	***Input Circuit***	Opto-coupler input with 5 to 15 mA input current; Logic Low is input 0.8 VDC or less; Logic High is input 4 VDC or higher.	
	Step/Pulse	Optically isolated, differential, 5V, 330Ω; 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	
	Direction		
	Enable	Optically isolated, 5-12V, 680Ω; FUNCTIONS: motor enable, alarm reset, speed select (oscillator mode)	
	Analog	Range: 0–5 VDC; Resolution: 12 bit; FUNCTION: speed control	
Output Signal		Optically isolated, 24V, 10mA max; FUNCTIONS: fault, motion, tach	
Communication Interface		RS-232; RJ11 (6P4C) receptacle	
Non-volatile Memory Storage		Configurations are saved in FLASH memory on-board the DSP.	
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	Step & direction, CW/CCW, A/B quadrature, oscillator, joystick, serial commands	
	Phase Current Setting	0.1-5.0 A/phase (in 0.01A increments)	0.1-10.0 A/phase (in 0.01A increments)
	Self Test	Checks internal & external power supply voltages, diagnoses open motor phases	
	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	
Connectors		Communication: RJ11 (6P4C); programming/communication cable STP-232RJ11-CBL included Other: removable screw terminal blocks; Motor & Power Supply: 26–12 AWG; Signals: 28–16 AWG	
Maximum Humidity		90% non-condensing	
Storage Temperature		-20 to 80 °C [-4 to 176 °F]	
Operating Temperature		0 to 55 °C [32 to 131 °F]; (mount to suitable heat sink)	
Drive Cooling Method		Natural convection (mount to suitable heat sink)	
Mounting		#6 mounting screws (mount to suitable heat sink)	
Weight		8 oz [227g] (approximate)	
Agency Approvals		CE	

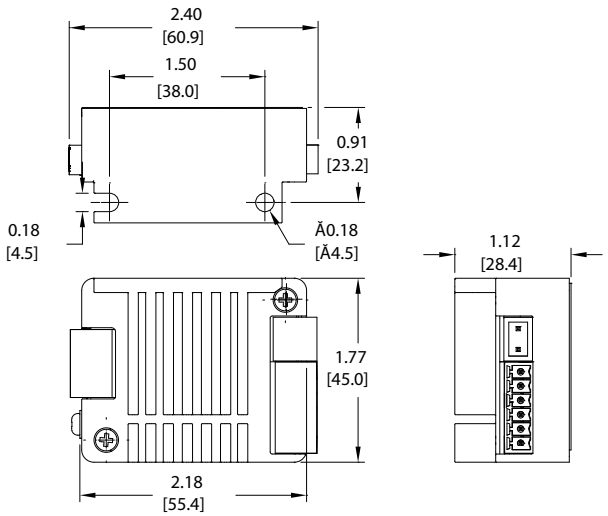
SureStep® High Bus Voltage Microstepping Drives

SureStep Series Specifications – Standard Microstepping Drives		
Microstepping Drive		***STP-DRVAC-24025***
Price		$222.00
Drawing		PDF
Drive Type		Microstepping drive with pulse input
Output Current		Selectable from 0.6–2.5 A/phase (peak of sine)
Input Voltage		90–240 VAC
Configuration Method		Rotary dial, DIP switches, jumpers
Amplifier Type		MOSFET, dual H-bridge, 4-quadrant
Current Control		4-state PWM @ 20 kHz
Protection		Over temp, over voltage, under voltage, over current, excess regen, open circuit
Recommended Input Fusing		Fuse: 4A fast-acting; ADC #AGC4; Holder: ADC # DN-F6L110
Input Signals	***Input Circuit***	5–24 VDC nominal (range: 4–28 VDC); optically isolated, differential.
	Step/Pulse	Minimum pulse width = 1µs. Maximum pulse frequency = 150kHz or 2MHz (user selectable). FUNCTIONS: step & direction, CW/CCW step
	Direction	
	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.
Features	***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
	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 STP-CON-6 contains replacement connectors
Maximum Humidity		90% non-condensing
Storage/Ambient Temperature		0 to 40 °C [32 to 104 °F]
Operating Temperature		0 to 85 °C [32 to 185 °F] (interior of electronics section)
Drive Cooling 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 Approvals		CE, $_{C}$UR$_{US}$

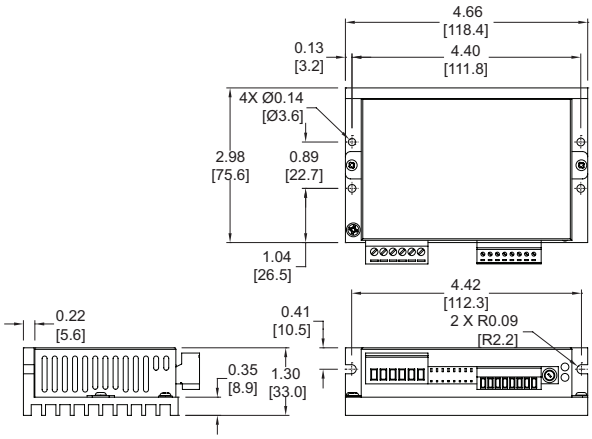
SureStep® Microstepping Drives Dimensions

Dimensions = in [mm]

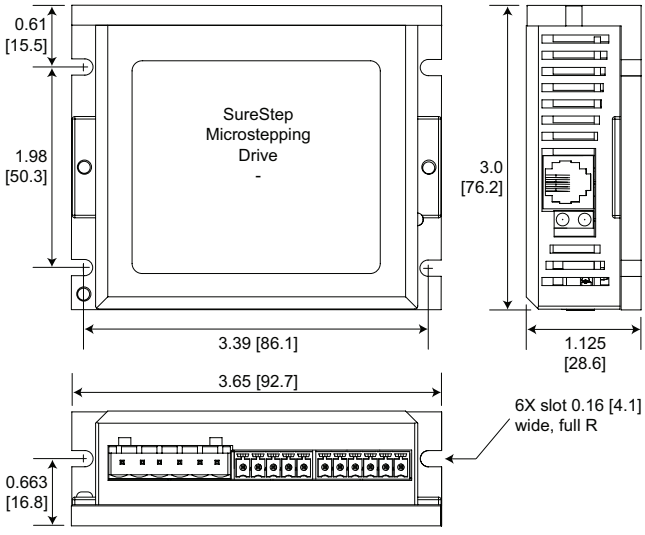
STP-DRV-4830



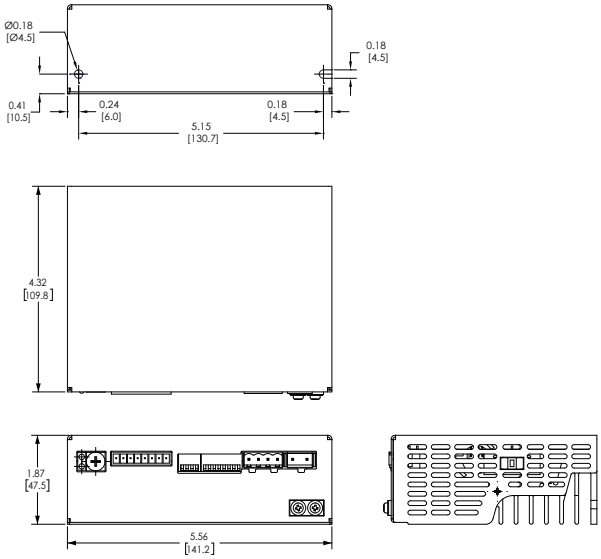
STP-DRV-4845 & STP-DRV-6575



STP-DRV-4850 & STP-DRV-80100



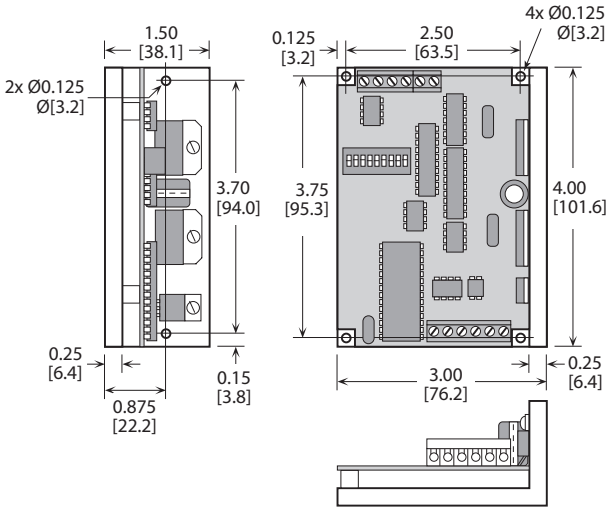
STP-DRVAC-24025



SureStep® Microstepping Drives Dimensions

Dimensions = in [mm]

STP-DRV-4035



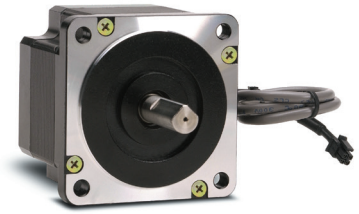
Stepping System Motors

SureStep® Stepping Motors

SureStep Series Part Numbers – Bipolar Stepping Motors*					
Bipolar Stepping Motors	*Price*	*Shaft Type*	*Torque Level*	*Encoder Mounting*	*Drawing*
STP-MTRL-14026	$25.00	single	low	not available	PDF
STP-MTRL-14026D	$29.50	dual		optional	PDF
STP-MTRL-14026E**	$107.00	dual		pre-installed	PDF
STP-MTRL-14034	$31.00	single		not available	PDF
STP-MTRL-14034D	$36.50	dual		optional	PDF
STP-MTRL-14034E**	$111.00	dual		pre-installed	PDF
STP-MTR-17040	$22.50	single	high	not available	PDF
STP-MTR-17040D	$26.50	dual		optional	PDF
STP-MTR-17040E**	$103.00	dual		pre-installed	PDF
STP-MTR-17040W***	$146.00	single		not available	PDF
STP-MTR-17048	$26.50	single		not available	PDF
STP-MTR-17048D	$31.00	dual		optional	PDF
STP-MTR-17048E**	$108.00	dual		pre-installed	PDF
STP-MTR-17048W***	$150.00	single		not available	PDF
STP-MTR-17060	$43.00	single		not available	PDF
STP-MTR-17060D	$48.50	dual		optional	PDF
STP-MTR-17060E**	$125.00	dual		pre-installed	PDF
STP-MTR-17060W ***	$193.00	single		not available	PDF
STP-MTR-23055	$42.50	single		not available	PDF
STP-MTR-23055D	$48.50	dual		optional	PDF
STP-MTR-23055E**	$126.00	dual		pre-installed	PDF
STP-MTR-23055W ***	$181.00	single		not available	PDF
STP-MTR-23079	$55.00	single		not available	PDF
STP-MTR-23079D	$60.00	dual		optional	PDF
STP-MTR-23079E**	$137.00	dual		pre-installed	PDF
STP-MTR-23079W ***	$196.00	single		not available	PDF
STP-MTR-34066	$129.00	single		not available	PDF
STP-MTR-34066D	$146.00	dual		optional	PDF
STP-MTR-34066W ***	$234.00	single		not available	PDF
STP-MTRH-23079	$61.00	single	higher	not available	PDF
STP-MTRH-23079D	$66.00	dual		optional	PDF
STP-MTRH-23079E **	$144.00	dual		pre-installed	PDF
STP-MTRH-23079W ***	$291.00	single		not available	PDF
STP-MTRH-34066	$144.00	single		not available	PDF
STP-MTRH-34066D	$160.00	dual		optional	PDF
STP-MTRH-34066W ***	$331.00	single		not available	PDF
STP-MTRH-34097	$163.00	single		not available	PDF
STP-MTRH-34097D	$180.00	dual		optional	PDF
STP-MTRH-34097W ***	$371.00	single		not available	PDF
STP-MTRH-34127	$192.00	single		not available	PDF
STP-MTRH-34127D	$212.00	dual		optional	PDF
STP-MTRH-34127W ***	$406.00	single		not available	PDF

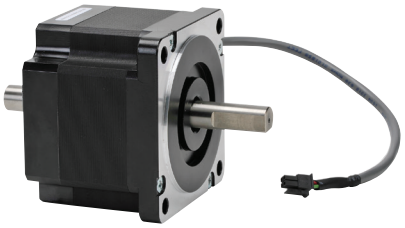
** For integrated motor/drives part numbers and pricing, see the integrated motor/drives section.*
*** E model motors come with an AMT112Q-V encoder pre-installed. Requires STP-CBL-EBxx for encoder wiring. To change from the default 400ppr, use AMT-PGRM-17C. See the SureStep Stepping System Encoders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

STP-MTR-xxxxx (single-shaft)



STP-MTR-xxxxxE (encoder mount)

STP-MTR-xxxxxD (dual-shaft)



STP-MTR-xxxxxW (IP65)

Stepping System Motors

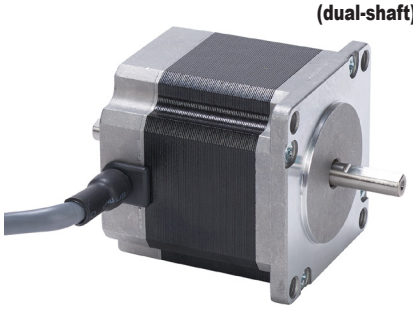
SureStep® Stepping Motors

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					
STP-MTRAC-23044	$63.00	single	High voltage High torque	not available	PDF
STP-MTRAC-23044D	$64.00	dual		optional	PDF
STP-MTRAC-23055	$71.00	single		not available	PDF
STP-MTRAC-23055D	$72.00	dual		optional	PDF
STP-MTRAC-23078	$99.00	single		not available	PDF
STP-MTRAC-23078D	$100.00	dual		optional	PDF
STP-MTRAC-34075	$265.00	single		not available	PDF
STP-MTRAC-34075D	$265.00	dual		optional	PDF
STP-MTRAC-34115	$274.00	single		not available	PDF
STP-MTRAC-34115D	$275.00	dual		optional	PDF
STP-MTRAC-34156	$295.00	single*		not available	PDF
STP-MTRAC-34156D	$295.00	dual*		optional	PDF
STP-MTRAC-42100	$244.00	single	High voltage Higher torque	not available	PDF
STP-MTRAC-42100D	$265.00	dual		optional**	PDF
STP-MTRAC-42151	$409.00	single		not available	PDF
STP-MTRAC-42151D	$430.00	dual		optional**	PDF
STP-MTRAC-42202	$501.00	single		not available	PDF
STP-MTRAC-42202D	$519.00	dual		optional**	PDF
STP-MTRACH-42100	$244.00	single		not available	PDF
STP-MTRACH-42100D	$265.00	dual		optional**	PDF
STP-MTRACH-42151	$409.00	single		not available	PDF
STP-MTRACH-42151D	$430.00	dual		optional**	PDF
STP-MTRACH-42202	$501.00	single		not available	PDF
STP-MTRACH-42202D	$519.00	dual		optional**	PDF

** 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.*

STP-MTRAC-xxxxx (single-shaft)

STP-MTRAC-xxxxxD (dual-shaft)



STP-MTRACH-42xxxD (dual-shaft)

SureStep® Stepping Motors Mounting Accessories

Mounting Accessories – for NEMA 17 and NEMA 42 SureStep Stepping Motors				
Part Number	**Price**	**Description**	**Drawing Links**	**Use With**
STP-MTRA-RB-85	$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
STP-MTRA-42ENC	$9.25	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 CUI Devices AMT132/AMT332 encoders and US Digital E6 encoders.	PDF	SureStep NEMA 42 motors

STP-MTRA-42ENC

SureStep® Stepping Motors

SureStep Series Specifications – Connectorized Bipolar Stepping Motors													
		Low Voltage Low Torque		Low Voltage High Torque						Low Voltage Higher Torque			
Bipolar Stepping Motors		STP-MTRL-14026(x)	STP-MTRL-14034(x)	STP-MTR-17040(x)	STP-MTR-17048(x)	STP-MTR-17060(x)	STP-MTR-23055(x)	STP-MTR-23079(x)	STP-MTR-34066(x)	STP-MTRH-23079(x)	STP-MTRH-34066(x)	STP-MTRH-34097(x)	STP-MTRH-34127(x)
NEMA Frame Size		14	14	17	17	17	23	23	34	23	34	34	34
Maximum Holding Torque*	(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
	(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
Rotor Inertia	(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 [11.3]	13.0 [5.9]	25.0 [11.3]		
Storage Temperature Range		-20°C to 100°C [-4°F to 212°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 Range		55% to 85% non-condensing											
Product Material		steel motor case; stainless steel shaft(s)											
Environmental Rating		IP40 (IP65 for "W" motors)											
Weight (lb [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		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.											
Accessory Extension Cable		STP-EXTL-0xx		STP-EXT-0xx STP-EXTW-0xx (for "W" motors)						STP-EXTH-0xx STP-EXTHW-0xx (for "W" motors)			

*** For dual-shaft motors (STP-MTR-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.

Stepping System Motors

SureStep® Stepping Motors

SureStep Series Specifications – High Voltage Bipolar Stepping Motors							
		High Voltage High 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**
Maximum Holding Torque*	(lb·in)	4.69	9.31	14.19	51.31	69.48	115.06
	(oz·in)	75	149	227	821	1110	1841
	(N·m)	0.53	1.05	1.6	5.8	7.84	13
Rotor Inertia	(oz·in2)	0.66	1.64	2.62	7.38	14.74	24.06
	(g·cm2)	120	300	480	1350	2700	4400
Rated Current (A/phase)	Series	0.71	0.71	0.71	2.15	2.05	2.55
	Parallel	1.41	1.41	1.41	4.3	4.1	5.1
Resistance (Ω/phase)	Series	12.4	14.4	18	4	4.8	4.8
	Parallel	3.1	3.6	4.5	1.0	1.2	1.375
Inductance (mH/phase)	Series	30.4	51.2	60.8	32	43.2	44.8
	Parallel	7.6	12.8	15.2	8.0	10.8	11.2
Insulation Class		B					
Steps per Revolution		200					
Basic Step Angle		1.8°					
Shaft Runout (in)		0.002 in 0.05 mm]					
Max Shaft Radial Play @ 1lb load		0.02 in [0.51 mm]			0.025 in [0.635 mm]		0.02 in [0.51 mm]
Max End Play @ 2.2-lb Axial 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 Range		-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		5% to 95% non-condensing					
Product Material		Steel motor case; stainless steel shaft(s)					
Environmental Rating		IP40					
Weight (lb [kg])		1.03 [0.47]	1.54 [0.7]	2.2 [1.0]	4.2 [1.9]	8.4 [3.8]	11.46 [5.2]
Agency Approvals		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**

Stepping System Motors

SureStep® Stepping Motors

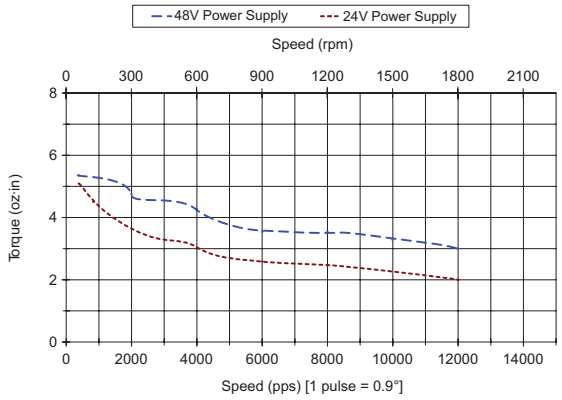
SureStep Series Specifications – Connectorized Stepping Motors							
Stepping Motors			*Higher voltage High torque*				
		STP-MTRAC-42100(x)	*STP-MTRAC-42151(x)*	*STP-MTRAC-42202(x)*	*STP-MTRACH-42100(x)*	*STP-MTRACH-42151(x)*	*STP-MTRACH-42202(x)*
NEMA Frame Size		42	42	42	42	42	42
Optional Encoder[1]		Y	Y	Y	Y	Y	Y
Max Holding Torque (N·m)	*Unipolar Series*	9.7	19.0	26.0	9.7	17.5	26.0
	Bipolar Series	12.2	22.0	31.0	12.3	22.0	32.0
	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 Current (A/phase)	*Unipolar Series*	6	9.4	9	8.5	11.3	11.5
	Bipolar Series	4.2	6	6	6	8	8
	Bipolar Parallel	8.4	12	12	12	16	16
Resistance (Ω/phase)	*Unipolar Series*	0.6	0.34	0.46	0.32	0.215	0.29
	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
Inductance (mH/phase)	*Unipolar Series*	5	3.6	5.5	2.5	1.9	3.2
	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 Class		B					
Steps per Revolution		200					
Basic Step Angle		1.8°					
Shaft Runout		0.05 mm					
Max Shaft Radial Play @ 1lb load		1.1 in					
Connectors		8 leads, 18AWG					
Temperature Rise		80°C max					
Storage Temp.		-30°C to 70°C [-22°F to 158°F]					
Operating Temperature		-20°C to 40°C [-4°F to 104°F]					
Operating Humidity		5% to 95% non-condensing					
Product Material		Steel motor case, stainless steel shaft(s)					
Environmental Rating		IP40					
Weight (lb [kg])		10.6 [4.8]	17.6 [8]	25.6 [11.6]	10.6 [4.8]	17.6 [8]	25.6 [11.6]
Agency Approval		$_{C}$UR$_{US}$					

1 - Dual-shaft versions only. For US Digital E6 or CUI Devices AMT13/AMT33 encoder mounting, the STP-MTRA-42ENC encoder adapter plate is required.

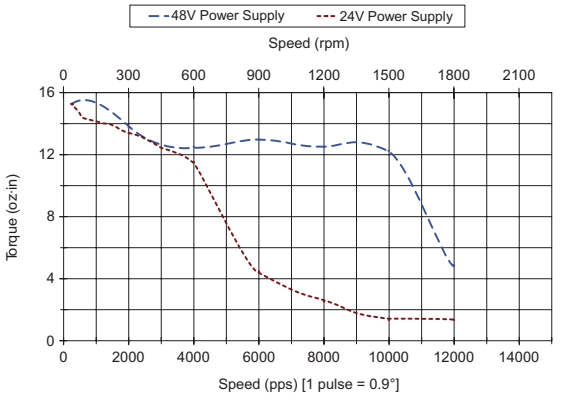
SureStep® Motor Running Torque vs. Speed Charts

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

STP-MTRL-14026(x) Torque vs Speed (1.8° step motor; 1/2 stepping, RMS phase current)



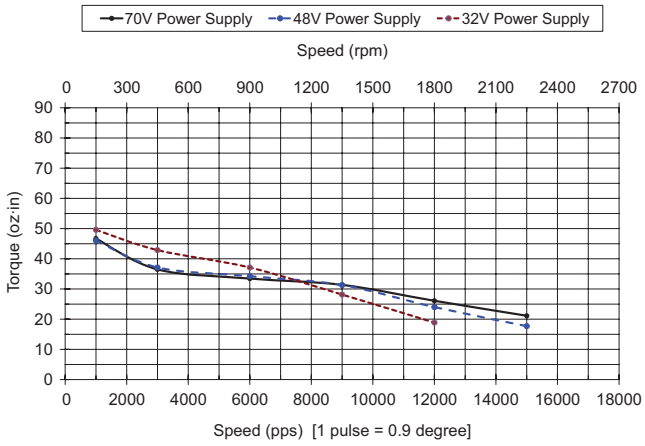
STP-MTRL-14034(x) Torque vs Speed (1.8° step motor; 1/2 stepping, RMS phase current)



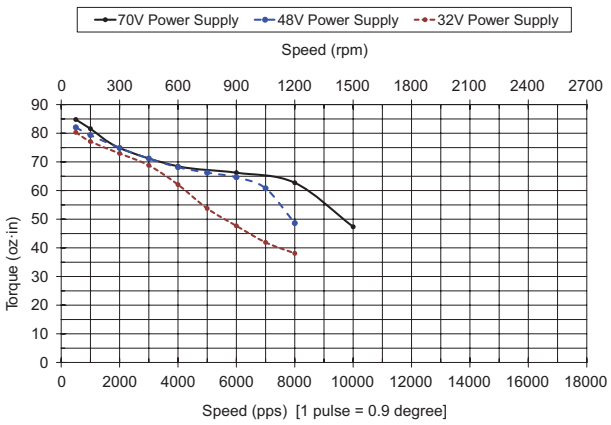
STP-MTR-17xxx(x) NEMA 17 Step Motors

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

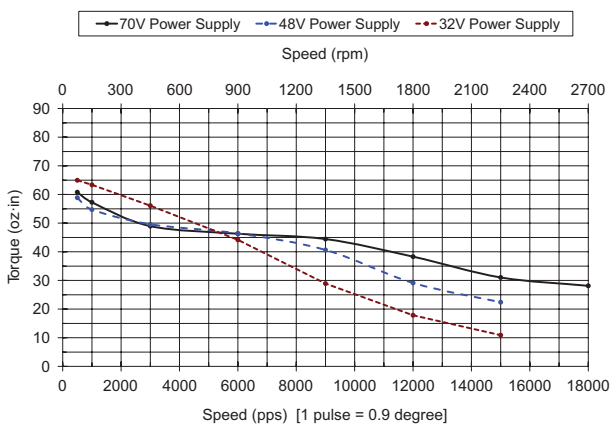
STP-MTR-17040(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



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



STP-MTR-17048(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



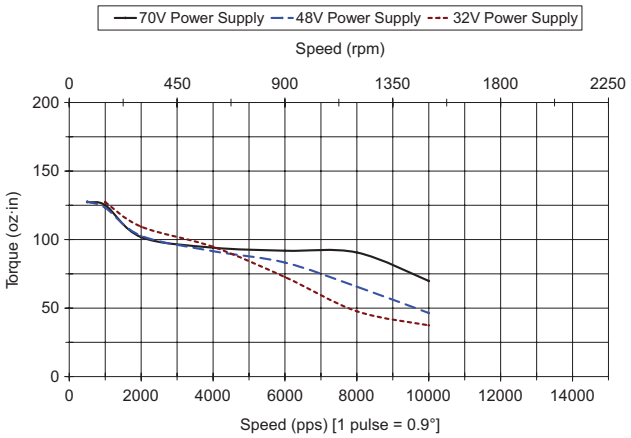
Note: Motor torque vs speed charts for STP-MTRD series integrated motor/ drives can be found in the integrated motor/drives section of the full catalog

SureStep® Motor Torque vs. Speed Charts (continued)

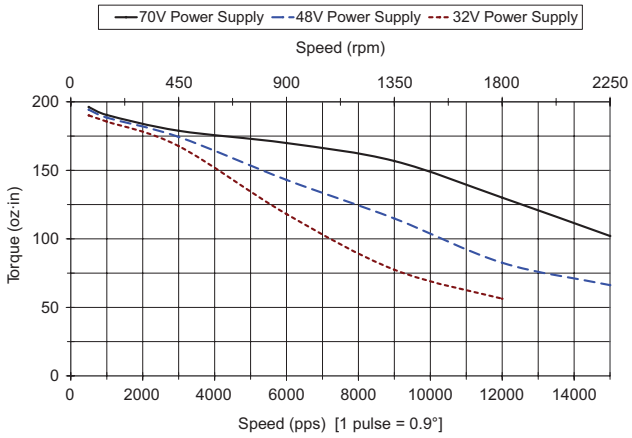
STP-MTR(H)-23xxx(x) NEMA 23 Step Motors

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

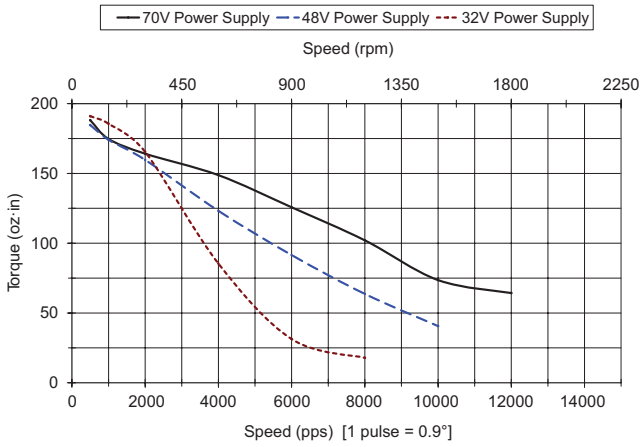
STP-MTR-23055(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



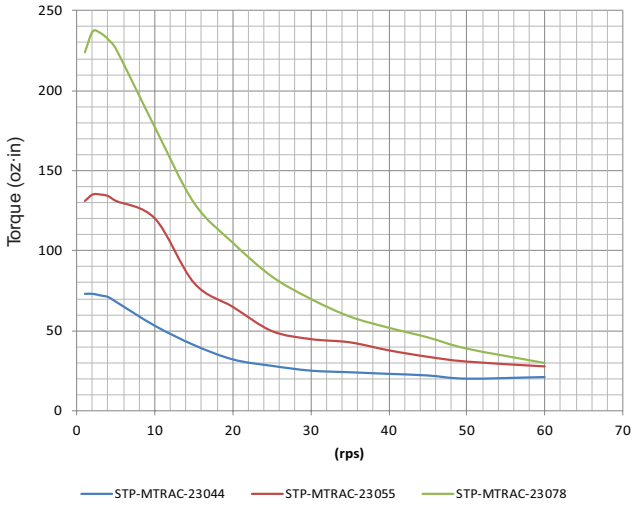
STP-MTR*H*-23079(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



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



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

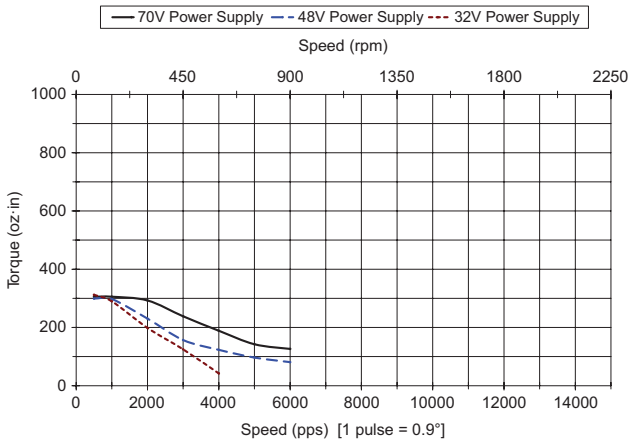


SureStep® Motor Torque vs. Speed Charts (continued)

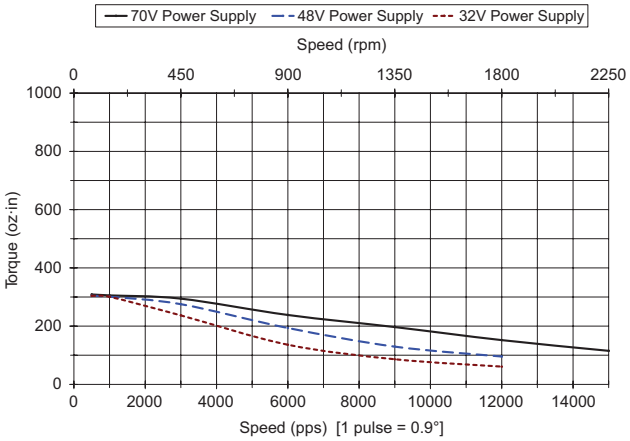
STP-MTR(H)-34xxx(x) NEMA 34 Step Motors

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

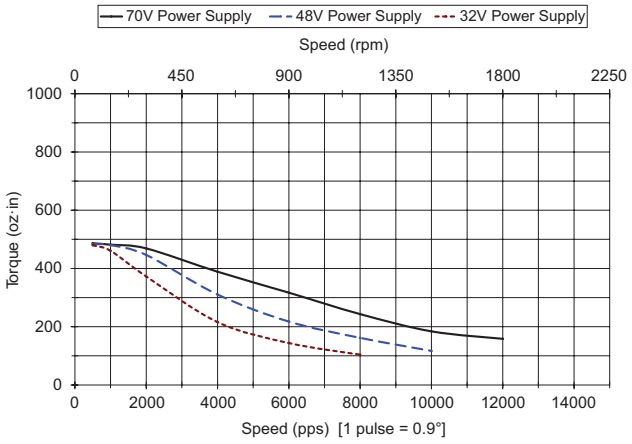
STP-MTR-34066(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



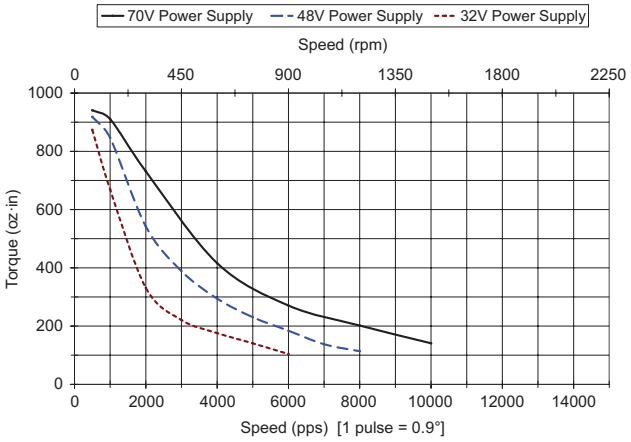
STP-MTR*H*-34066(x) Torque vs Speed (1.8° motor; 1/2 stepping)



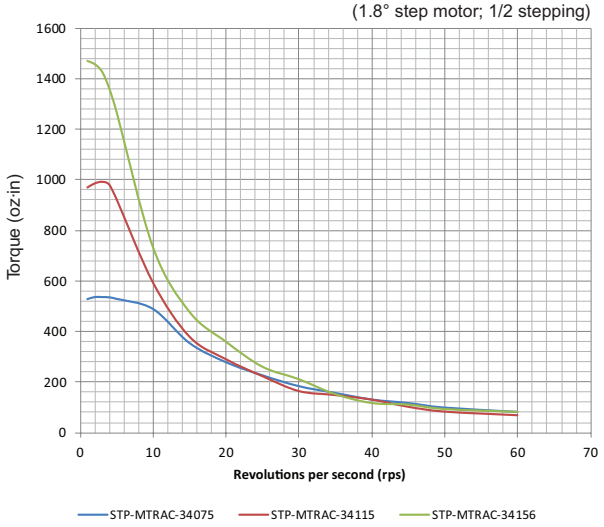
STP-MTR*H*-34097(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



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



STP-MTRAC-34xxxx Torque vs Speed @ 340VDC bus (1.8° step motor; 1/2 stepping)

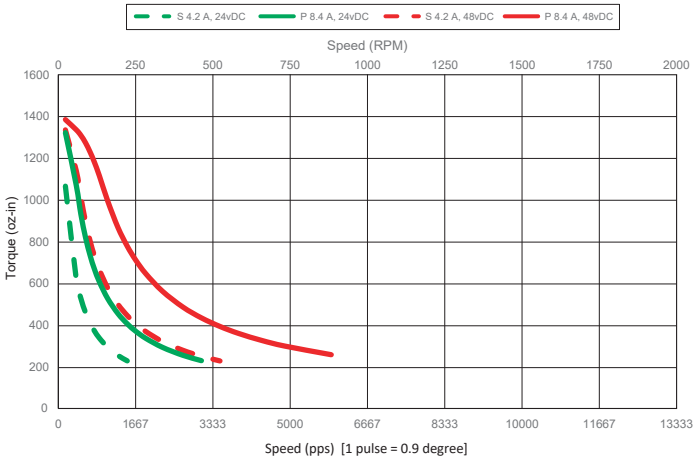


SureStep® Motor Torque vs. Speed Charts (continued)

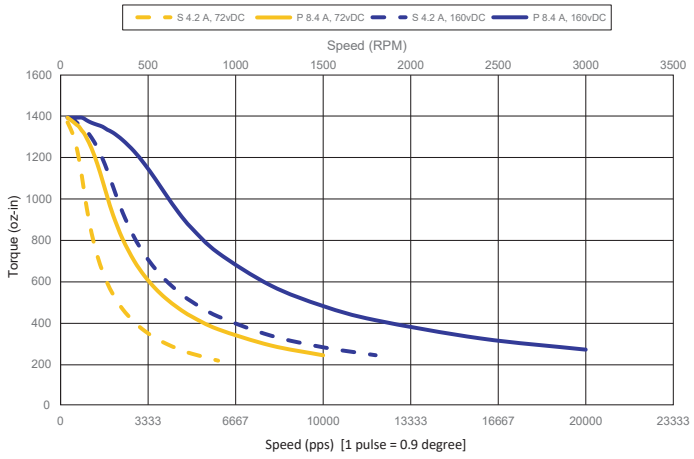
STP-MTRAC(H)-42xxx(x) NEMA 42 Step Motors

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

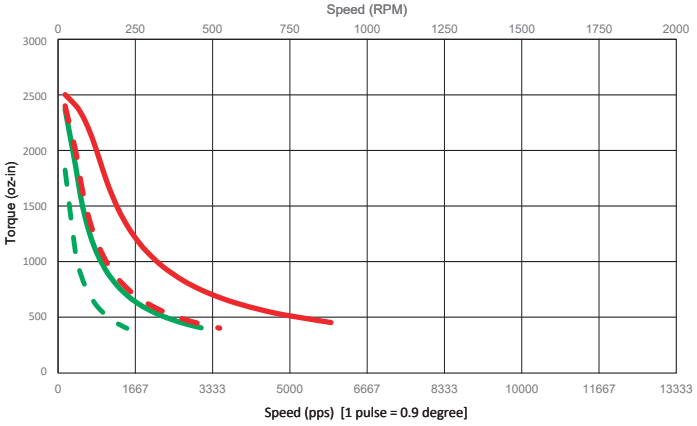
STP-MTRAC-42100x 24/48 VDC



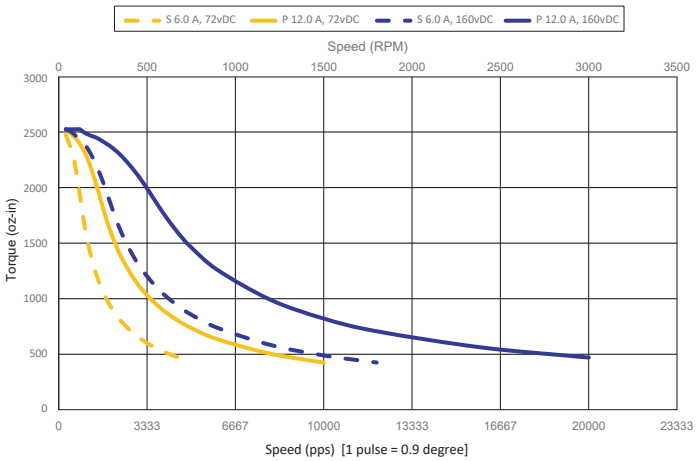
STP-MTRAC-42100x 72/160VDC



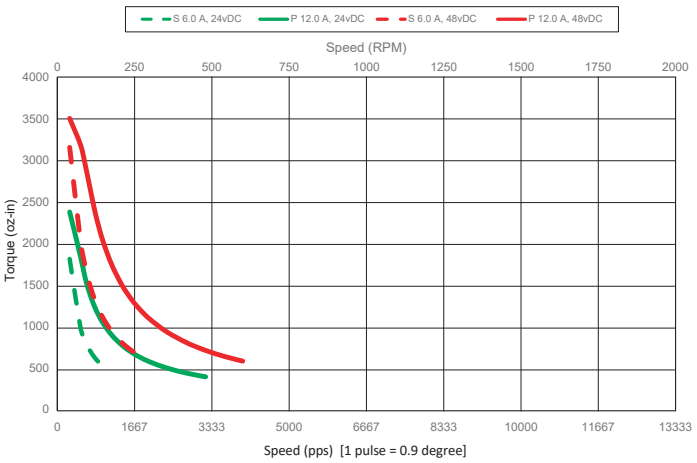
STP-MTRAC-42151x 24/48 VDC



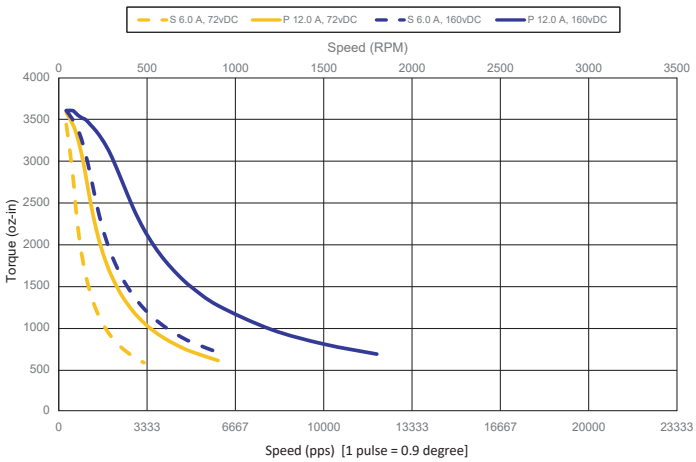
STP-MTRAC-42151x 72/160VDC



STP-MTRAC-42202x 24/48 VDC



STP-MTRAC-42202x 72/160VDC

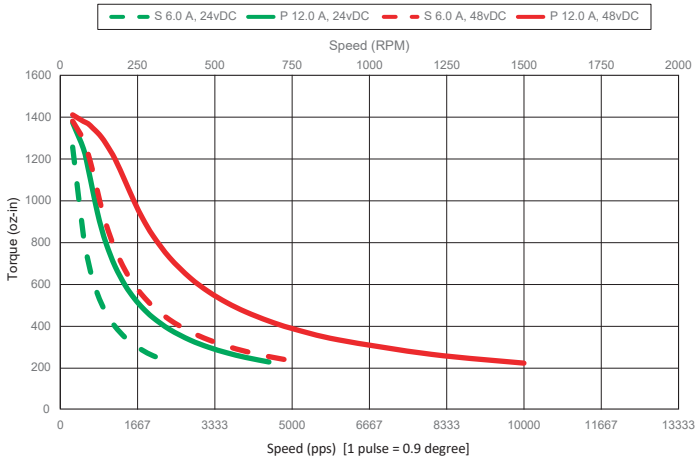


SureStep® Motor Torque vs. Speed Charts (continued)

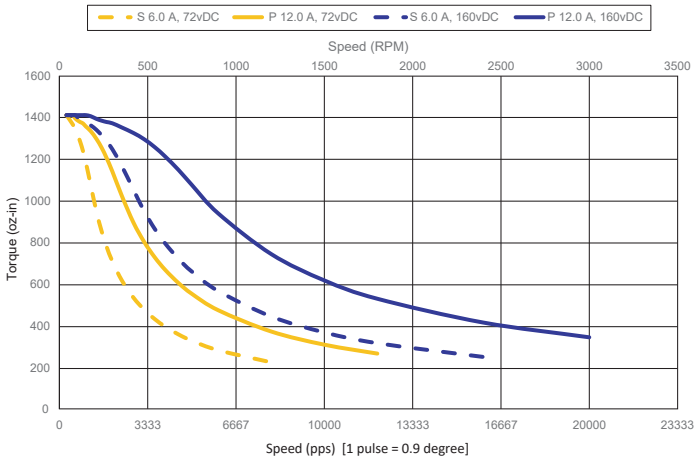
STP-MTRAC(H)-42xxx(x) NEMA 42 Step Motors

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

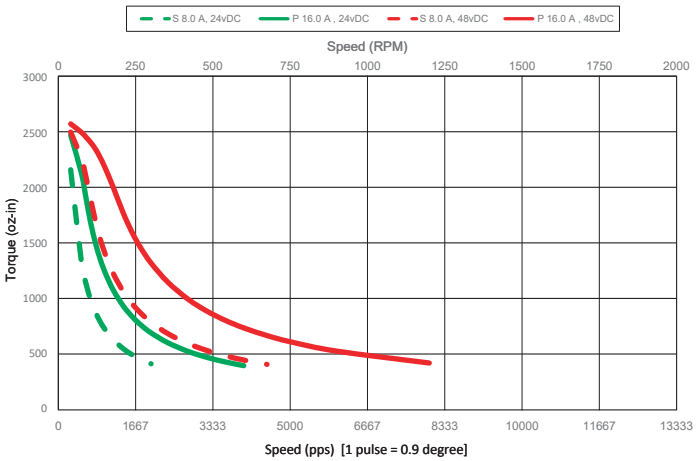
STP-MTRACH-42100x 24/48 VDC



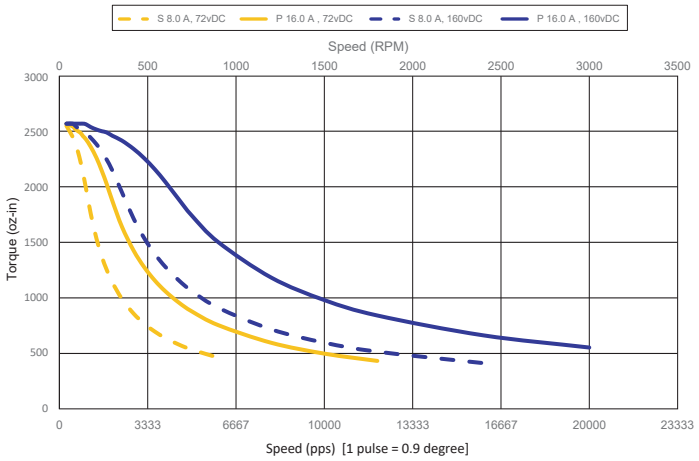
STP-MTRACH-42100x 72/160VDC



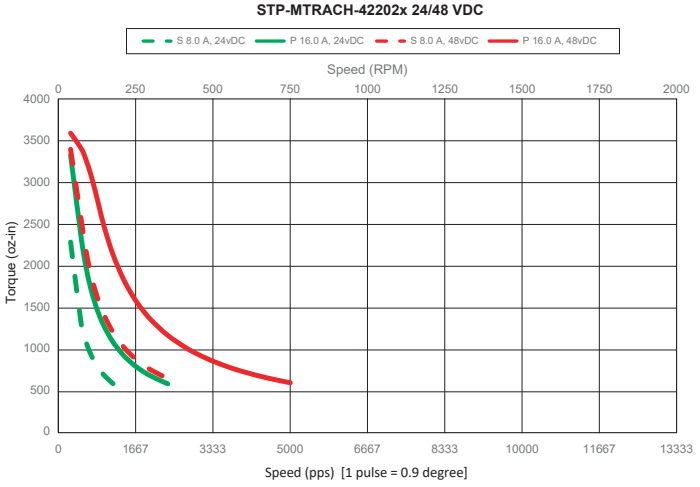
STP-MTRACH-42151x 24/48 VDC



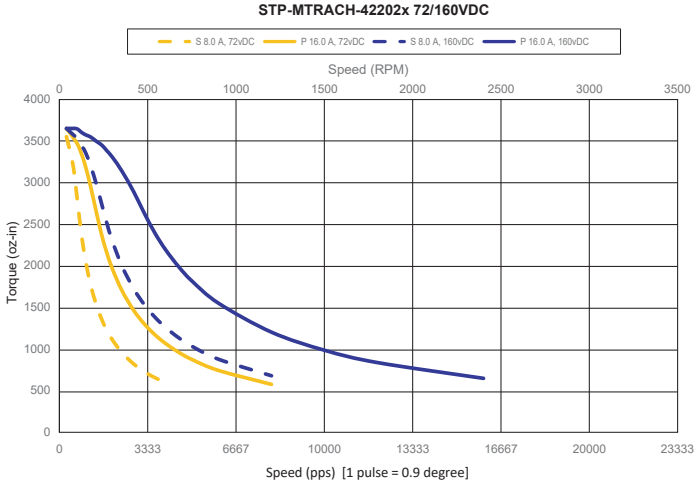
STP-MTRACH-42151x 72/160VDC



STP-MTRACH-42202x 24/48 VDC



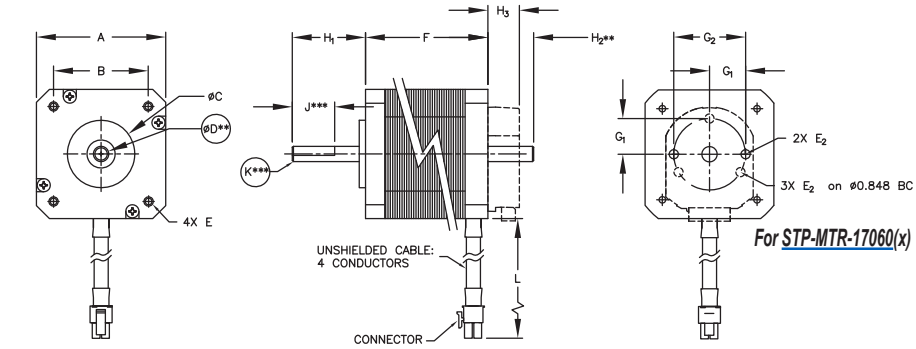
STP-MTRACH-42202x 72/160VDC

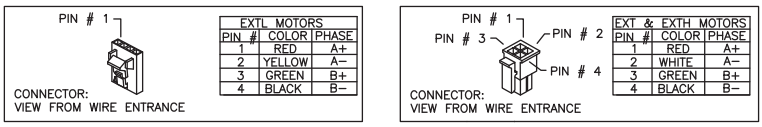


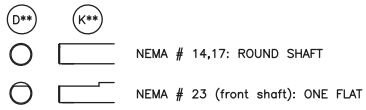
Stepping System Motors

SureStep® Motor Dimensions and Cabling

STP-MTR(x)-14,17,23xxx(X) Motors



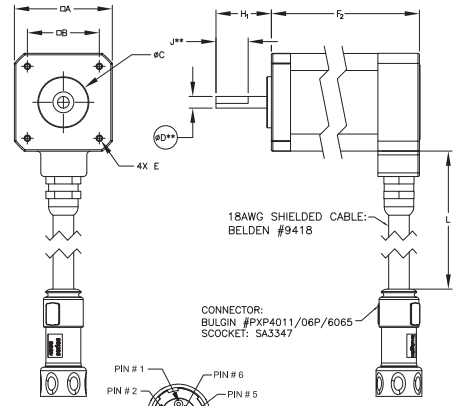




Note: Drawings and dimensions for STP-MTRD series integrated motor/drives can be found in the integrated motor/drives section of the manual

** 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).

STP-MTR-xxxxxW Motors



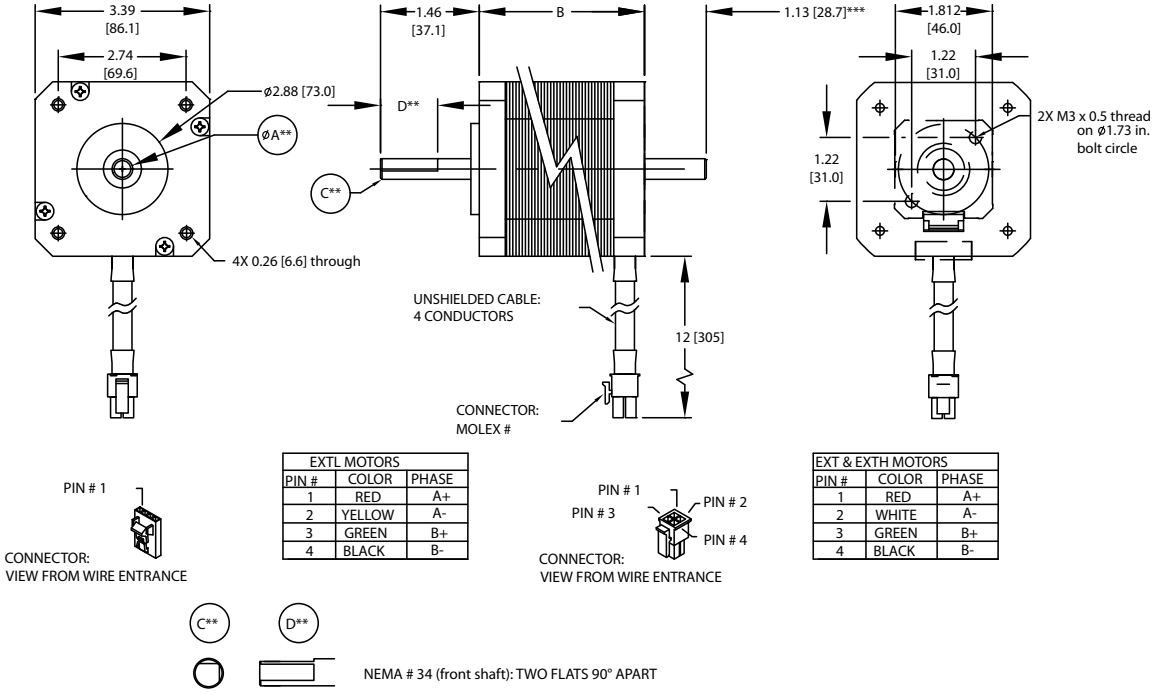
SureStep Series Dimensions & Cabling – NEMA 14, 17, and 23 Connectorized Bipolar Stepping Motors

Dimensions (in [mm]*)*	*Low Torque Motors*		*High Torque Motors*					*Higher Torque Motors*
	STP-MTRL-14026(x)	*STP-MTRL-14034(x)*	*STP-MTR-17040(x)*	*STP-MTR-17048(x)*	*STP-MTR-17060(x)*	*STP-MTR-23055(x)*	*STP-MTR-23079(x)*	*STP-MTRH-23079(x)*
A	1.39 [35.3]	1.39 [35.3]	1.67 [42.3]			2.25 [57.2]		2.25 [57.2]
B	1.02 [25.9]	1.02 [25.9]	1.22 [31.0]			1.86 [47.2]		1.86 [47.2]
C	Ø 0.87 [22.1]					Ø 1.50 [38.1]		Ø 1.50 [38.1]
D*	Ø 0.20 [5.0]					Ø 0.25 [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/a		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					0.59 [15.0]		
K*	n/a					0.23 [5.8]		
L	12 [305]							
Conductor	(4) #26 AWG		(4) #20 AWG, (5) #18 AWG (for W motors)					(4) #18 AWG, (5) #18 AWG (for W motors)
Connector	TE # 103653-3		Molex # 43025-0400, PXP4010/06S/6065 (for W motors)					Molex # 39-01-3042, PXP4010/06S/6065 (for W motors)
Pin	TE # 1-104505-3 (LOOSE)		Molex # 43030-0007, Socket: SA3347 (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

STP-MTR(x)-34xxx(X) Motors



EXTL MOTORS		
PIN #	COLOR	PHASE
1	RED	A+
2	YELLOW	A-
3	GREEN	B+
4	BLACK	B-

EXT & EXTH MOTORS		
PIN #	COLOR	PHASE
1	RED	A+
2	WHITE	A-
3	GREEN	B+
4	BLACK	B-

** 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.

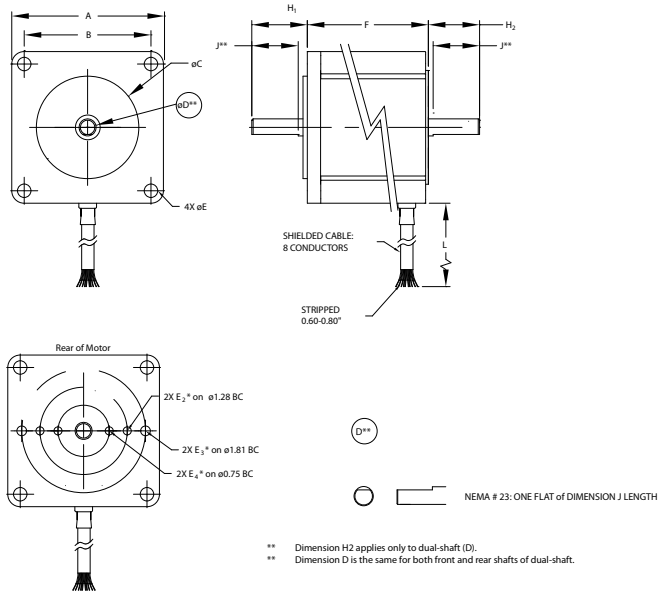
SureStep Series Dimensions & Cabling – NEMA 34 Connectorized Bipolar Stepping Motors				
Dimensions (in [mm]*)	***High Torque Motors***	***Higher Torque Motors***		
	STP-MTR-34066(x)	***STP-MTRH-34066(x)***	***STP-MTRH-34097(x)***	***STP-MTRH-34127(x)***
A*	Ø 0.50 [12.7]			
B	2.64 [67.1]	2.64 [67.1]	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 motors)		
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 # 39-00-0039, Socket: SA3347 (for W motors)		

*** 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.**

Stepping System Motors

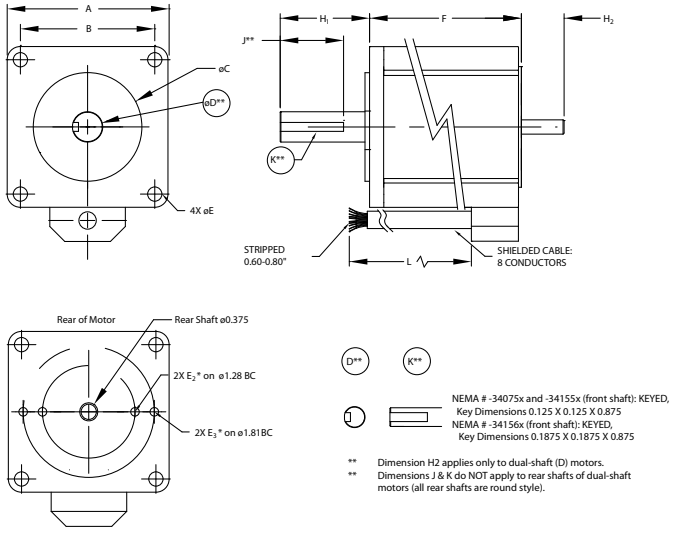
SureStep® Motor Dimensions and Cabling

STP-MTRAC-23xxx Motors



** Dimension H2 applies only to dual-shaft (D).
** Dimension D is the same for both front and rear shafts of dual-shaft.

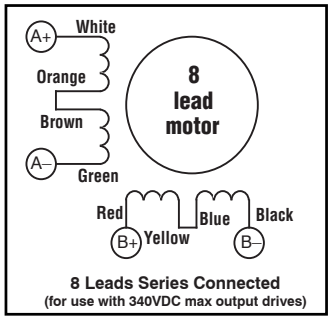
STP-MTRAC-34xxx Motors



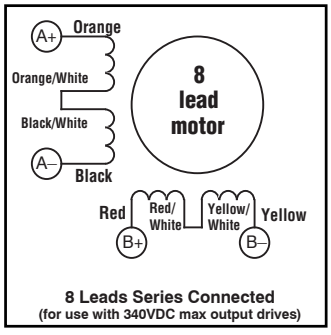
** Dimension H2 applies only to dual-shaft (D) motors.
** Dimensions J & K do NOT apply to rear shafts of dual-shaft motors (all rear shafts are round style).

SureStep Series Dimensions & Cabling – High Voltage Bipolar Stepping Motors						
Dimensions (in [mm]*)*	*High Voltage High Torque*					
	STP-MTRAC-23044(x)	*STP-MTRAC-23055(x)*	*STP-MTRAC-23078(x)*	*STP-MTRAC-34075(x)*	*STP-MTRAC-34115(x)*	*STP-MTRAC-34156(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]
B	1.86 [47.24]	1.86 [47.24]	1.86 [47.24]	2.74 [69.6]	2.74 [69.6]	2.74 [69.6]
C	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]

*** 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.**



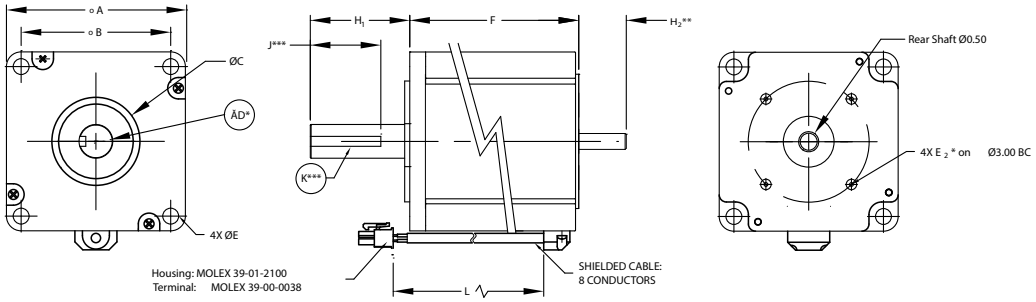
STP-MTRAC-230xx(x), 34156(x) Motor Wiring

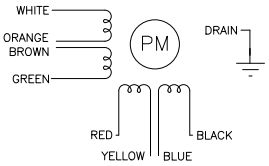


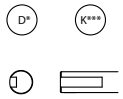
STP-MTRAC-34075(x), 34115(x) Motor Wiring

Stepping System Motors

STP-MTRAC-42xxx Motors



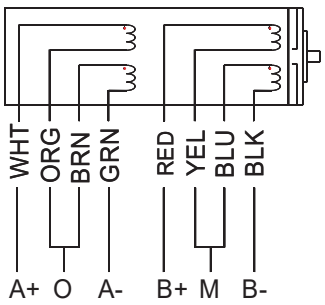




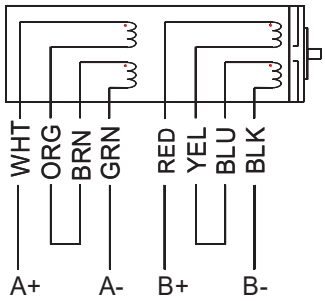
NEMA # 42 (front shaft): KEYED, Key Dimensions 0.188 X 0.188 X 1.377

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

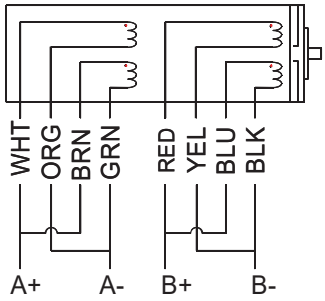
Uni-polar



Bi-polar series



Bi-polar parallel



SureStep Series Dimensions & Cabling – Higher Voltage Bipolar Stepping Motors

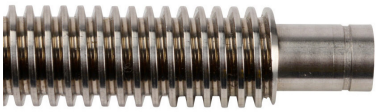
Dimensions (in [mm]*)*	*Higher Voltage High Torque*											
	STP-MTRAC-42100	*STP-MTRACH-42100*	*STP-MTRAC-42151*	*STP-MTRACH-42151*	*STP-MTRAC-42202*	*STP-MTRACH-42202*	*STP-MTRAC-42100D*	*STP-MTRACH-42100D*	*STP-MTRAC-42151D*	*STP-MTRACH-42151D*	*STP-MTRAC-42202D*	*STP-MTRACH-42202D*
A	4.33 [110]		4.33 [110]		4.33 [110]		4.33 [110]		4.33 [110]		4.33 [110]	
B	3.50 [88.9]		3.50 [88.9]		3.50 [88.9]		3.50 [88.9]		3.50 [88.9]		3.50 [88.9]	
C	2.19 [55.6]		2.19 [55.6]		2.19 [55.6]		2.19 [55.6]		2.19 [55.6]		2.19 [55.6]	
D**	0.75 [19.05]		0.75 [19.05]		0.75 [19.05]		0.75 [19.05]		0.75 [19.05]		0.75 [19.05]	
E	0.327 [8.31]		0.327 [8.31]		0.327 [8.31]		0.327 [8.31]		0.327 [8.31]		0.327 [8.31]	
E2	n/a		n/a		n/a		4-40 UNC Tap 0.2 Deep		4-40 UNC Tap 0.2 Deep		4-40 UNC Tap 0.2 Deep	
F	3.88		5.94		7.91		3.88***		5.94***		7.91***	
H1	2.19 [55.6]		2.19 [55.6]		2.19 [55.6]		2.19 [55.6]		2.19 [55.6]		2.19 [55.6]	
H2	n/a		n/a		n/a		1.12 [28.4]		1.12 [28.4]		1.12 [28.4]	
J**	1.37 [34.8]		1.37 [34.8]		1.37 [34.8]		1.37 [34.8]		1.37 [34.8]		1.37 [34.8]	
L	12 [305]											

*** mm dimensions are for reference purposes only.**
**** Dimension D (shaft diameter), J, and Key do not apply to rear shafts of dual-shaft motors.**
***** For encoder mounting the required STP-MTRA-42ENC bracket will add 0.13 inches [3.2 mm] to the length of the motor.**

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.

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 CUI stepper motor encoders for a complete line of available encoders that can mount onto the linear actuators.



ADJ series journal end

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 Travel (per 1.8° rotation)		Nominal Thrust (lbs)	Motor Weight (lbs)	Drawing
							in/step	mm/step			
STP-LE17-2A06ANN	$104.00	None	17	6"	Stainless Steel	0.25"	0.00125	0.03175	45	0.7	PDF
STP-LE17-2C06ANN	$105.00					3mm	0.00059	0.015	73	0.7	PDF
STP-LE17-2D06ANN	$107.00					1.25 mm	0.00025	0.00625	87	0.8	PDF
STP-LE17-3A06ANN	$118.00					0.25"	0.00125	0.03175	69	0.9	PDF
STP-LE17-3B06ANN	$118.00					0.5"	0.0025	0.0635	38	0.9	PDF
STP-LE17-3E06ANN	$116.00					8mm	0.0016	0.04	55	1.0	PDF
STP-LE17-2A06ADJ	$121.00	Journal and groove				0.25"	0.00125	0.03175	45	0.7	PDF
STP-LE17-2C06ADJ	$119.00					3mm	0.00059	0.015	73	0.7	PDF
STP-LE17-2D06ADJ	$120.00					1.25 mm	0.00025	0.00625	87	0.8	PDF
STP-LE17-3A06ADJ	$131.00					0.25"	0.00125	0.03175	69	0.9	PDF
STP-LE17-3B06ADJ	$132.00					0.5"	0.0025	0.0635	38	0.9	PDF
STP-LE17-3E06ADJ	$130.00					8mm	0.0016	0.04	55	1.0	PDF
STP-LE23-1F06ANN	$140.00	None	23			10.5 mm	0.0021	0.0525	63	1.4	PDF
STP-LE23-1H06ANN	$153.00					6mm	0.0012	0.03	87	1.4	PDF
STP-LE23-1G06ANN	$154.00					2mm	0.0004	0.01	137	1.4	PDF
STP-LE23-3K06ANN	$202.00					1"	0.005	0.127	62	2.7	PDF
STP-LE23-3H06ANN	$189.00					6mm	0.0012	0.03	193	2.7	PDF
STP-LE23-1F06ADJ	$163.00	Journal and groove				10.5 mm	0.0021	0.0525	63	1.4	PDF
STP-LE23-1H06ADJ	$177.00					6mm	0.0012	0.03	87	1.4	PDF
STP-LE23-1G06ADJ	$179.00					2mm	0.0004	0.01	137	1.4	PDF
STP-LE23-3K06ADJ	$215.00					1"	0.005	0.127	62	2.7	PDF
STP-LE23-3H06ADJ	$204.00					6mm	0.0012	0.03	193	2.7	PDF

Motors listing continued on next page

STP-LE17-3B06ADJ

STP-LE17-2A06ANN

Linear Actuators

SureStep® Linear Actuators


STP-LE23-1G09ADJ

SureStep Series Part Numbers – Linear Actuators (Cont'd)											
Linear Actuators	Price	Screw End Machining	NEMA Frame Size	Lead Screw Length	Lead Screw Material	Lead (in/rev or mm/rev)	Linear Travel (per 1.8° rot.)		Nominal Thrust (lbs)	Motor Weight (lbs)	Drawing
							in/step	mm/step			
STP-LE17-2A09ANN	$110.00	None	17	9"	Stainless Steel	0.25"	0.00125	0.03175	45	0.8	PDF
STP-LE17-2C09ANN	$107.00					3mm	0.00059	0.015	73	0.8	PDF
STP-LE17-2D09ANN	$109.00					1.25 mm	0.00025	0.00625	87	0.9	PDF
STP-LE17-3A09ANN	$121.00					0.25"	0.00125	0.03175	69	1.1	PDF
STP-LE17-3B09ANN	$121.00					0.5"	0.0025	0.0635	38	1.1	PDF
STP-LE17-3E09ANN	$119.00					8mm	0.0016	0.04	55	1.2	PDF
STP-LE17-2A09ADJ	$125.00	Journal and groove				0.25"	0.00125	0.03175	45	0.8	PDF
STP-LE17-2C09ADJ	$120.00					3mm	0.00059	0.015	73	0.8	PDF
STP-LE17-2D09ADJ	$124.00					1.25 mm	0.00025	0.00625	87	0.9	PDF
STP-LE17-3A09ADJ	$134.00					0.25"	0.00125	0.03175	69	1.1	PDF
STP-LE17-3B09ADJ	$134.00					0.5"	0.0025	0.0635	38	1.1	PDF
STP-LE17-3E09ADJ	$133.00					8mm	0.0016	0.04	55	1.2	PDF
STP-LE23-1F09ANN	$155.00	None	23			10.5 mm	0.0021	0.0525	63	1.6	PDF
STP-LE23-1H09ANN	$167.00					6mm	0.0012	0.03	87	1.7	PDF
STP-LE23-1G09ANN	$170.00					2mm	0.0004	0.01	137	1.7	PDF
STP-LE23-3K09ANN	$211.00					1"	0.005	0.127	62	3.0	PDF
STP-LE23-3H09ANN	$194.00					6mm	0.0012	0.03	193	3.0	PDF
STP-LE23-1F09ADJ	$167.00	Journal and groove				10.5 mm	0.0021	0.0525	63	1.6	PDF
STP-LE23-1H09ADJ	$182.00					6mm	0.0012	0.03	87	1.7	PDF
STP-LE23-1G09ADJ	$184.00					2mm	0.0004	0.01	137	1.7	PDF
STP-LE23-3K09ADJ	$214.00					1"	0.005	0.127	62	3.0	PDF
STP-LE23-3H09ADJ	$209.00					6mm	0.0012	0.03	193	3.0	PDF
STP-LE17-2A12ANN	$113.00	None	17	12"		0.25"	0.00125	0.03175	45	0.9	PDF
STP-LE17-2C12ANN	$109.00					3mm	0.00059	0.015	73	0.9	PDF
STP-LE17-2D12ANN	$111.00					1.25 mm	0.00025	0.00625	87	1.0	PDF
STP-LE17-3A12ANN	$125.00					0.25"	0.00125	0.03175	69	1.3	PDF
STP-LE17-3B12ANN	$125.00					0.5"	0.0025	0.0635	38	1.3	PDF
STP-LE17-3E12ANN	$123.00					8mm	0.0016	0.04	55	1.4	PDF
STP-LE17-2A12ADJ	$128.00	Journal and groove				0.25"	0.00125	0.03175	45	0.9	PDF
STP-LE17-2C12ADJ	$123.00					3mm	0.00059	0.015	73	0.9	PDF
STP-LE17-2D12ADJ	$126.00					1.25 mm	0.00025	0.00625	87	1.0	PDF
STP-LE17-3A12ADJ	$137.00					0.25"	0.00125	0.03175	69	1.3	PDF
STP-LE17-3B12ADJ	$137.00					0.5"	0.0025	0.0635	38	1.3	PDF
STP-LE17-3E12ADJ	$135.00					8mm	0.0016	0.04	55	1.4	PDF
STP-LE23-1F12ANN	$158.00	None	23			10.5 mm	0.0021	0.0525	63	1.8	PDF
STP-LE23-1H12ANN	$173.00					6mm	0.0012	0.03	87	2.0	PDF
STP-LE23-1G12ANN	$177.00					2mm	0.0004	0.01	137	2.0	PDF
STP-LE23-3K12ANN	$220.00					1"	0.005	0.127	62	3.3	PDF
STP-LE23-3H12ANN	$200.00					6mm	0.0012	0.03	193	3.3	PDF
STP-LE23-1F12ADJ	$172.00	Journal and groove				10.5 mm	0.0021	0.0525	63	1.8	PDF
STP-LE23-1H12ADJ	$186.00					6mm	0.0012	0.03	87	2.0	PDF
STP-LE23-1G12ADJ	$189.00					2mm	0.0004	0.01	137	2.0	PDF
STP-LE23-3K12ADJ	$218.00					1"	0.005	0.127	62	3.3	PDF
STP-LE23-3H12ADJ	$213.00					6mm	0.0012	0.03	193	3.3	PDF

SureStep® Linear Actuators Specifications

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	17					
Phases	2					
Rated Current	2A					
Phase Resistance	1.04 Ω ± 10% (@20°C)			1.25 Ω ± 15% (@20°C)		
Phase Inductance	2.5 mH ± 20% (1kHz 1V rms)			2.8 mH ± 20% (1kHz 1V rms)		
Rotor Inertia	57 g·cm2			82 g·cm2		
Rotational Shaft Holding Torque	0.46 N·m (65.14 oz-in)			0.63 N·m (89.21 oz-in)		
No. of Motor Stacks	2			3		
Motor Length	39.8 mm			48.3 mm		
Lead Screw Material	SUS303Cu (cold-finished stainless steel)					
Nut Material	TECAFORM AD AF (PTFE-infused polymer)					
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 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	0.25"	6.5 mm	8mm	0.25"	0.25"	8mm
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-xxxxADJ 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.

SureStep® Linear Actuators Specifications

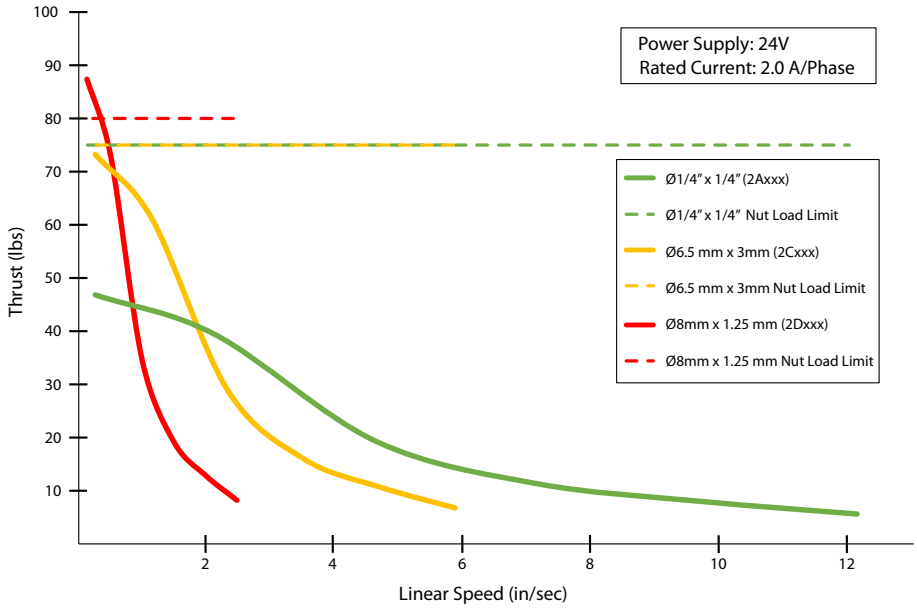
SureStep Series Specifications – NEMA 23 Linear Actuators					
Linear Actuator Motors	***STP-LE23-1Fxxyyy***	***STP-LE23-1Hxxyyy***	***STP-LE23-1Gxxyyy***	***STP-LE23-3Kxxyyy***	***STP-LE23-3Hxxyyy***
NEMA Frame Size	23				
Phases	2				
Rated Current	2.1 A			3A	
Phase Resistance	1.6 Ω ± 10% (@20°C)			1.1 Ω ± 10% (@20°C)	
Phase Inductance	3.9 mH ± 20% (1kHz 1V rms)			5.0 mH ± 20% (1kHz 1V rms)	
Rotor Inertia	180 g·cm2			460 g·cm2	
Rotational Shaft Holding Torque	0.9 N·m (127.45 oz-in)			2.3 N·m (325.70 oz-in)	
No. of Motor Stacks	1			3	
Motor Length	45mm			79mm	
Lead Screw Material	SUS303Cu (cold-finished stainless steel)				
Nut Material	TECAFORM 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 (lbs)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-xxxxADJ 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.

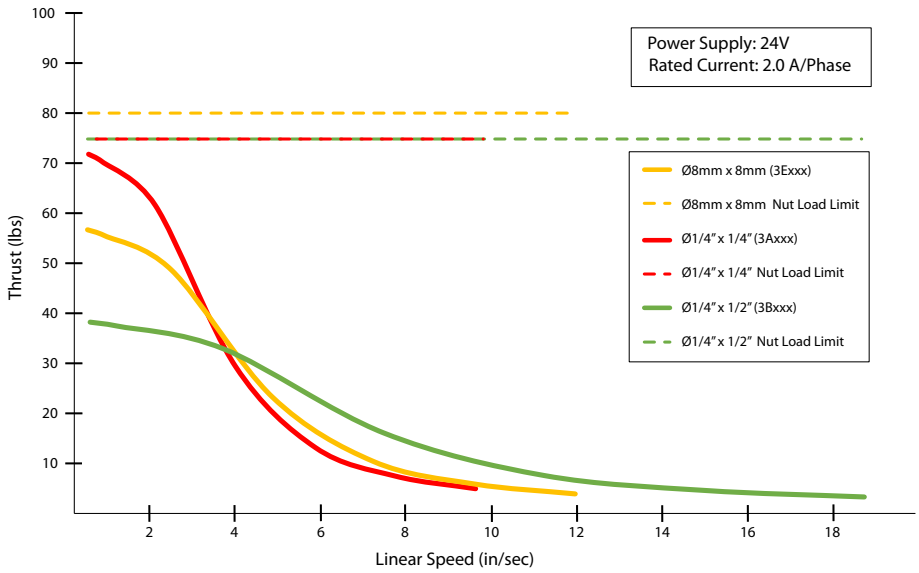
SureStep® Linear Actuator Thrust vs. Speed Charts

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)

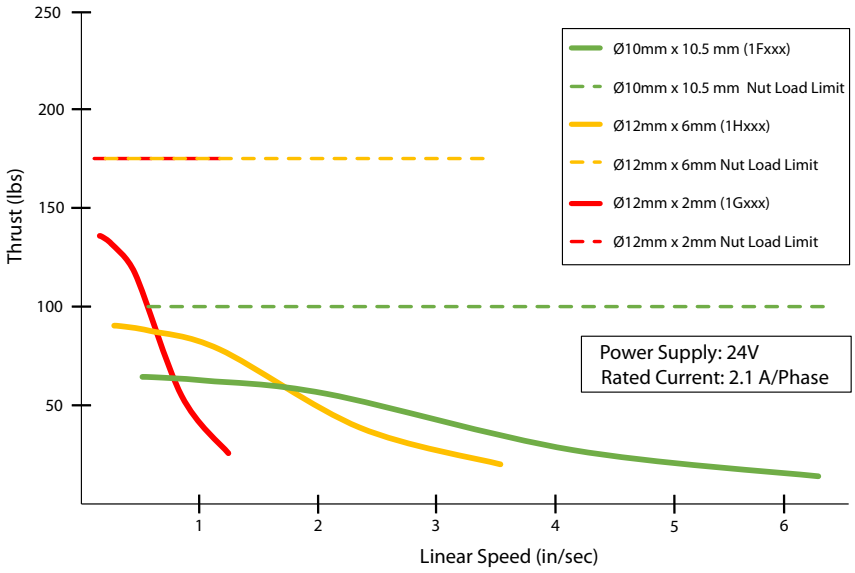


STP-LE17-3xxxx NEMA 17 Step Motor Linear Actuators (Triple-stack motors)

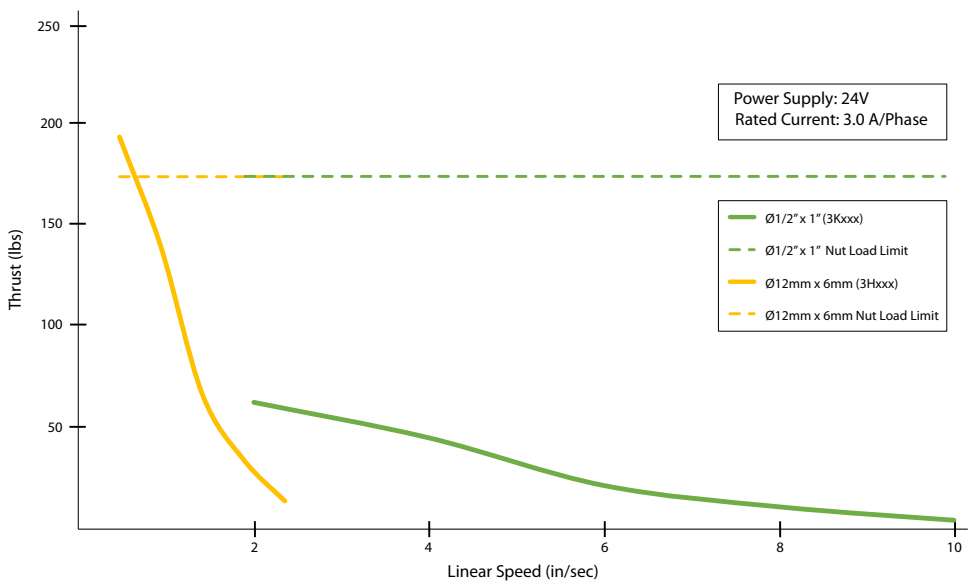


SureStep® Linear Actuator Thrust vs. Speed Charts, continued

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

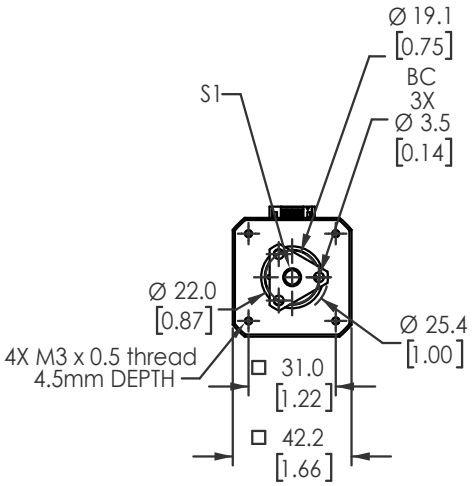


STP-LE23-3xxxx NEMA 23 Step Motor Linear Actuators (Triple-stack motors)

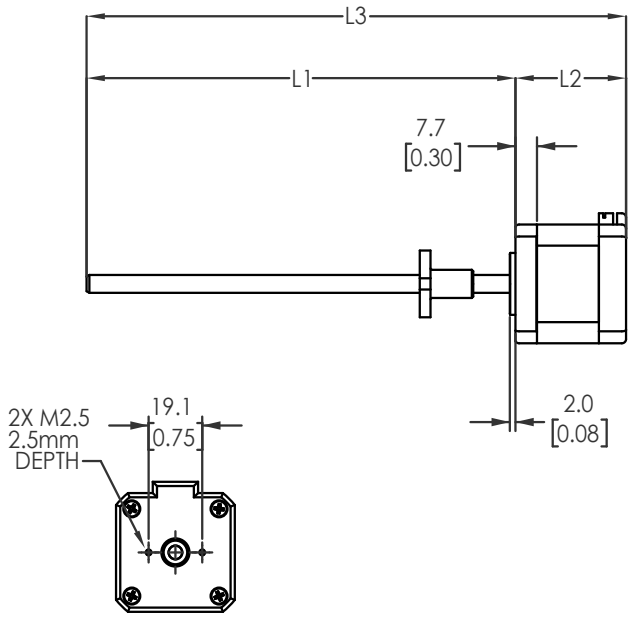


SureStep® Linear Actuator Dimensions and Cabling

STP-LE17-xxxxANN Motors



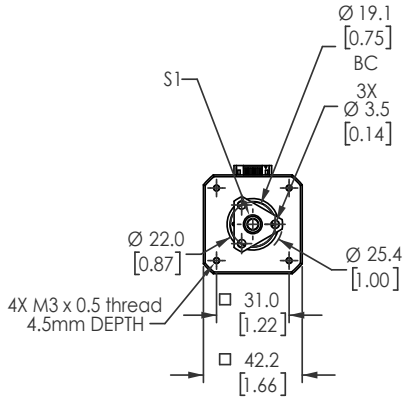
See the cables section on page tSTP-43 for connector pin-out and wire color information.

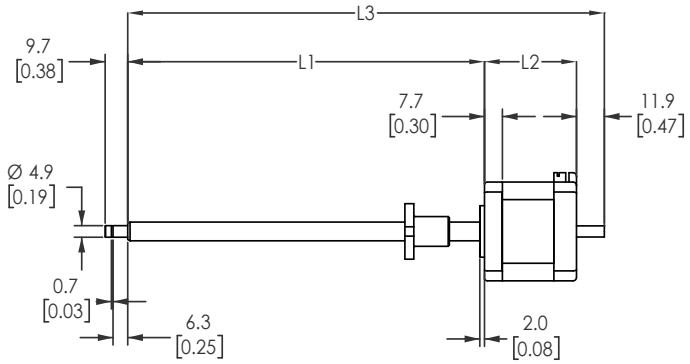


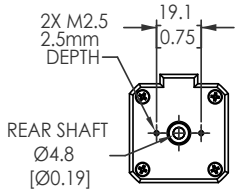
STP-LE17-xxxxANN Dimensions (mm [inch])				
Part #	*L1*	*L2*	*L3*	*S1*
STP-LE17-2A06ANN	152.4 [6.00]	39.3 [1.55]	191.7 [7.55]	6.4 [0.25] 0.25" Lead
STP-LE17-2A09ANN	228.6 [9.00]	39.3 [1.55]	267.9 [10.55]	6.4 [0.25] 0.25" Lead
STP-LE17-2A12ANN	304.8 [12.00]	39.3 [1.55]	344.1 [13.55]	6.4 [0.25] 0.25" Lead
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







See the encoder compatibility section on page tSTP-44 for a list of compatible encoders.

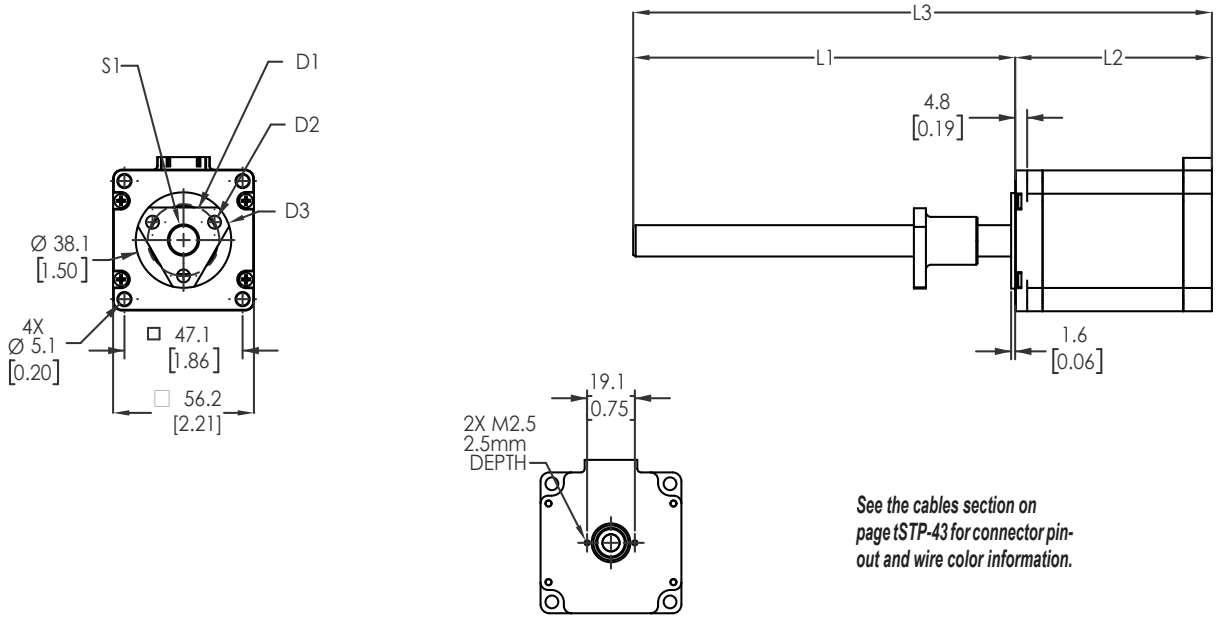
See the cables section on page tSTP-43 for connector pinout and wire color information.

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.

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
STP-LE17-2D12ADJ	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
STP-LE17-3A09ADJ	228.6 [9.00]	47.8 [1.88]	288.3 [11.35]	6.4 [0.25] 0.25" Lead
STP-LE17-3A12ADJ	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
STP-LE17-3B09ADJ	228.6 [9.00]	47.8 [1.88]	288.3 [11.35]	6.4 [0.25] 0.5" Lead
STP-LE17-3B12ADJ	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

SureStep® Linear Actuator Dimensions and Cabling

STP-LE23-xxxxANN Motors

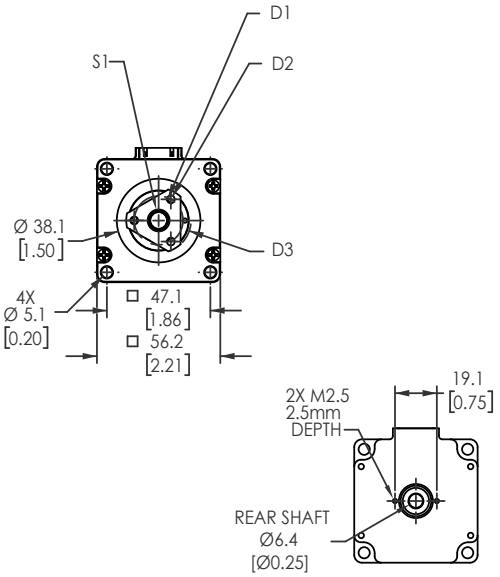


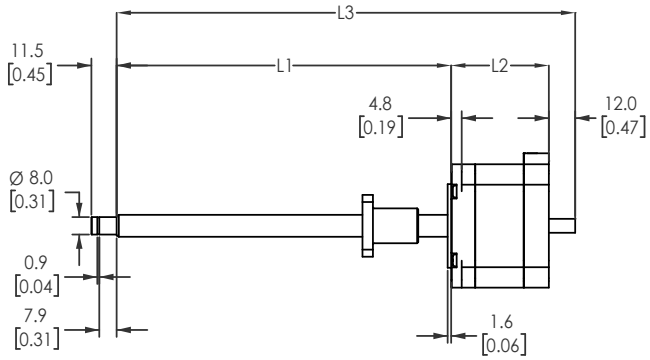
See the cables section on page tSTP-43 for connector pin-out and wire color information.

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-43 for connector pin-out and wire color information.

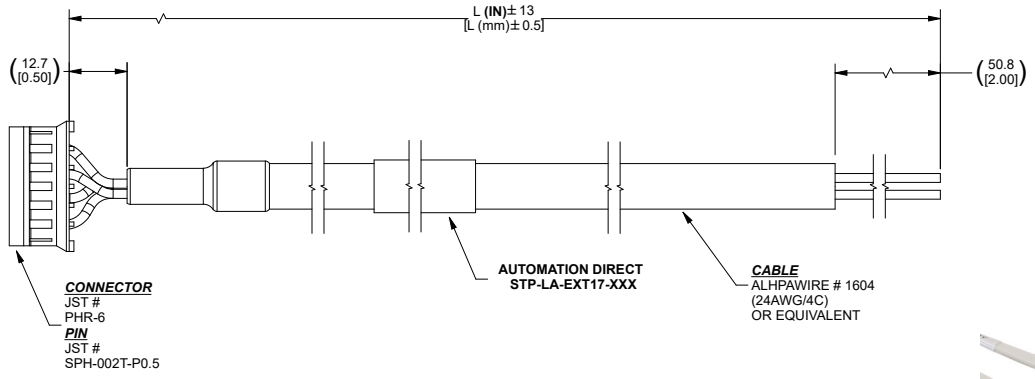
See the encoder compatibility section on page tSTP-44 for a list of compatible encoders.

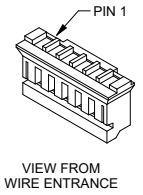
STP-LE23-xxxxADJ Dimensions (mm [inch])							
Part #	***L1***	***L2***	***L3***	***D1***	***D2***	***D3***	***S1***
STP-LE23-1F06ADJ	152.4 [6.00]	44.5 [1.75]	208.9 [8.22]	Ø22.2 [0.87] BC	3x Ø3.56 [0.14]	Ø29.5 [1.16]	10.0 [0.39] 10.5 mm Lead
STP-LE23-1F09ADJ	228.6 [9.00]	44.5 [1.75]	285.1 [11.22]	Ø22.2 [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

SureStep® Linear Actuators Cables

Cables for SureStep Series Linear Actuators			
Part Number	**Price**	**Description**	**Drawing**
STP-LA-EXT17-006	$25.00	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	$32.00	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	$53.00	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	$28.00	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	$37.00	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	$57.00	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])



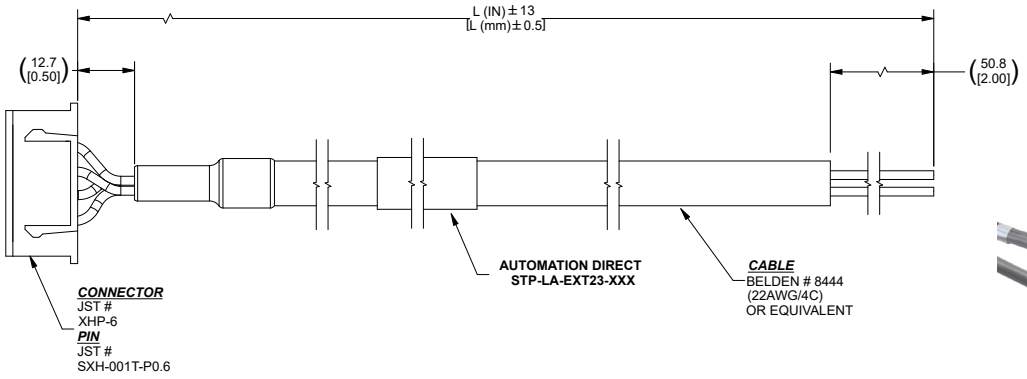


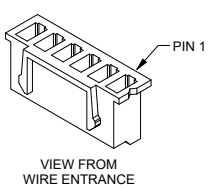
PINOUT CHART		
PIN #	COLOR	WIRE
1	RED	A+
2	N/A	
3	YELLOW	A-
4	GREEN	B+
5	N/A	
6	BLACK	B-

CABLES		
CABLE PART #	LENGTH L (IN)	LENGTH L (mm)
STP-LA-EXT17-006	72	1828
STP-LA-EXT17-010	120	3048
STP-LA-EXT17-020	240	6096

STP-LA-EXT17-006

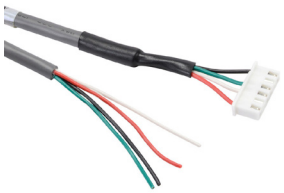
STP-LA-EXT23-0xx Dimensions (mm [in])





PINOUT CHART		
PIN #	COLOR	WIRE
1	RED	A+
2	N/A	
3	WHITE	A-
4	GREEN	B+
5	N/A	
6	BLACK	B-

CABLES		
CABLE PART #	LENGTH L (IN)	LENGTH L (mm)
STP-LA-EXT23-006	72	1828
STP-LA-EXT23-010	120	3048
STP-LA-EXT23-020	240	6096



STP-LA-EXT23-006

SureStep® Linear Actuators Accessories

Replacement Parts for SureStep Series Linear Actuators			
Part Number	*Price*	*Description*	*Drawing*
STP-LA-NTFA	$21.00	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.	PDF
STP-LA-NTFB	$21.00	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.	PDF
STP-LA-NTFC	$21.00	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.	PDF
STP-LA-NTFD	$21.00	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.	PDF
STP-LA-NTFE	$21.00	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.	PDF
STP-LA-NTFF	$24.00	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.	PDF
STP-LA-NTFG	$37.00	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.	PDF
STP-LA-NTFH	$37.00	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.	PDF
STP-LA-NTFK	$37.00	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.	PDF
STP-LA-NRFA	$21.00	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.	PDF
STP-LA-NRFB	$21.00	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.	PDF
STP-LA-NRFC	$21.00	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.	PDF
STP-LA-NRFD	$21.00	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.	PDF
STP-LA-NRFE	$21.00	SureStep lead screw flange nut, round, 8mm/rev, 8mm lead screw diameter. For use with SureStep STP-LE series screw code E linear actuators.	PDF
STP-LA-NRFF	$24.00	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.	PDF
STP-LA-NRFG	$37.00	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	$37.00	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	$37.00	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 STP-LA-NTFB nut will fit onto an STP-LE17-3B06ADJ actuator.

STP-LA-NTFA

STP-LA-NRFK

NEMA 17 Linear Actuator Compatible Encoders

NEMA 17 Compatible Encoders	
CUI Devices 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	
CUI Devices 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

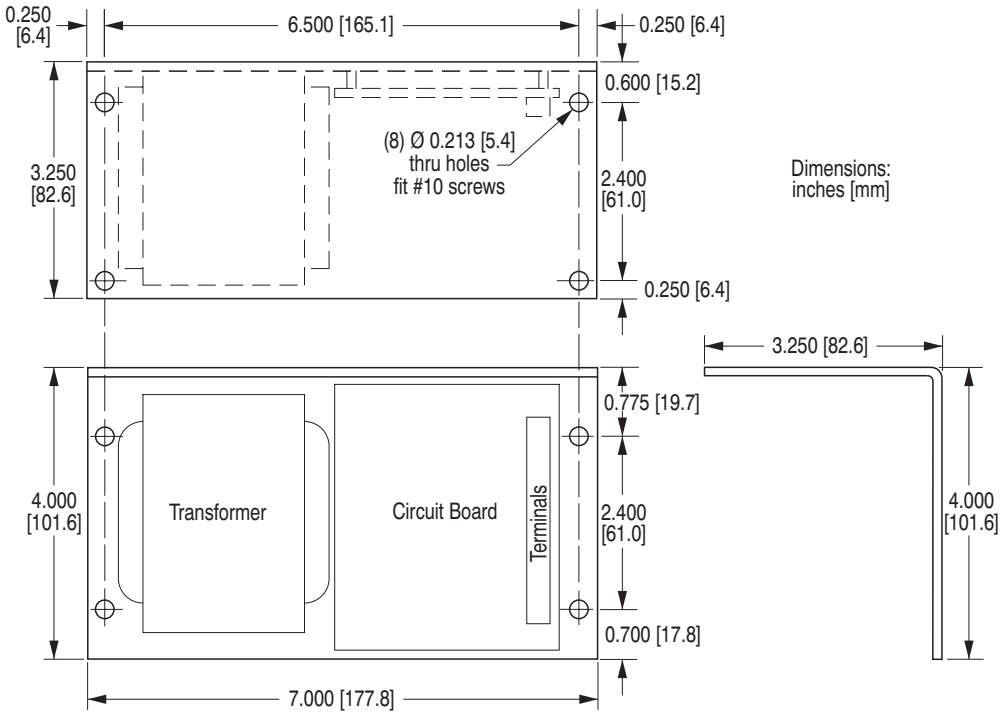
SureStep® Power Supplies

SureStep Series Specifications – Stepping System Power Supplies				
Power Supply	***STP-PWR-3204***	***STP-PWR-4805***	***STP-PWR-4810***	***STP-PWR-7005***
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)	120/240 VAC ±10% (Voltage range switch is set to 240 VAC from factory)			
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% @ 500 mA (Electronically Overload Protected) (Electrically isolated from Motor 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% per degree above 50°C; 70 °C [158 °F] maximum			
Humidity	95% (non-condensing) relative humidity maximum			
Cooling Method	Natural convection (mount power supply to metal surface if possible)			
Mounting	Mount on either wide or narrow side with machine screws per dimension diagrams			
Weight (lb [kg])	6.5 [2.9]	11 [4.9]	18 [8.3]	16 [7.2]
Connections	Screw Terminals			
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).**

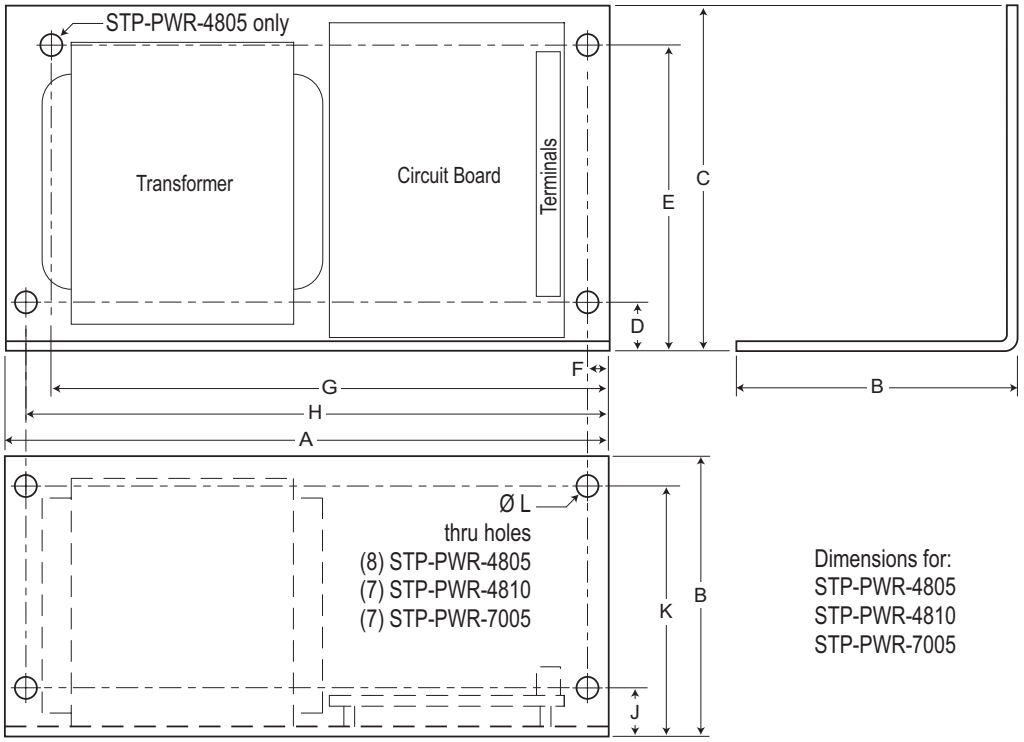
Power Supply Dimensions

STP-PWR-3204 Power Supply



SureStep® Power Supply Dimensions (continued)

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



SureStep Series Dimensions – 48V & 70V Power Supplies

Power Supply Part Number	Dimensions* (in [mm]*)											Mtg Screw
	A	B	C	D	E	F	G	H	J	K	L	
STP-PWR-4805	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

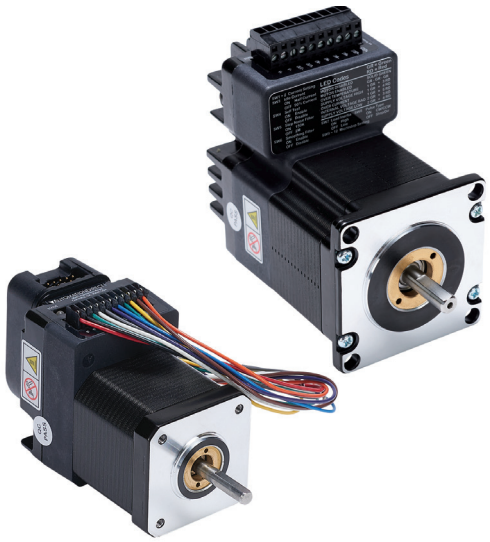
*** mm dimensions are for reference purposes only.**

Integrated Microstepping Motors and Drives

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 NEMA 17 and 23 motor/drives

Standard integrated motor/drive features

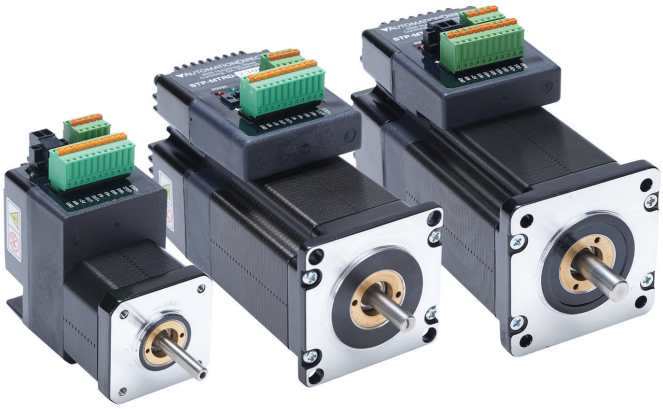
(STP-MTRD-x)

- "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



Advanced NEMA 17, 23, and 24 motor/drives

SureStep Series Part Numbers Standard Integrated Motor/Drives

Integrated Motor/Drive	NEMA Size	Price	Drawing
STP-MTRD-17038	17	$115.00	PDF
STP-MTRD-17038E	17	$202.00	PDF
STP-MTRD-23042	23	$178.00	PDF
STP-MTRD-23042E	23	$265.00	PDF
STP-MTRD-23065	23	$187.00	PDF
STP-MTRD-23065E	23	$272.00	PDF

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

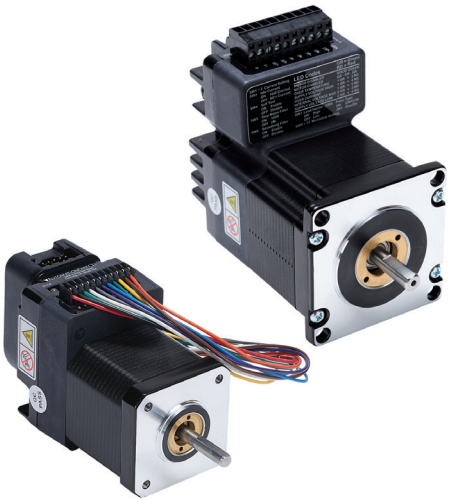
SureStep Series Part Numbers Advanced Integrated Motor/Drives

Integrated Motor/Drive	NEMA Size	Price	Drawing
STP-MTRD-17030R	17	$274.00	PDF
STP-MTRD-17030RE	17	$352.00	PDF
STP-MTRD-17038R	17	$287.00	PDF
STP-MTRD-17038RE	17	$384.00	PDF
STP-MTRD-23042R	23	$295.00	PDF
STP-MTRD-23042RE	23	$409.00	PDF
STP-MTRD-23065R	23	$307.00	PDF
STP-MTRD-23065RE	23	$415.00	PDF
STP-MTRD-24075RV	24	$415.00	PDF
STP-MTRD-24075RVE	24	$493.00	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).

Integrated Microstepping Motors and Drives

SureStep® Standard Integrated Motor/Drives Specifications



SureStep Integrated Series Specifications – Standard				
Microstepping Drive/Motor			***STP-MTRD-17038*** ***STP-MTRD-17038E***	***STP-MTRD-23042*** ***STP-MTRD-23042E***	***STP-MTRD-23065*** ***STP-MTRD-23065E***
Input Voltage (external p/s required)			12-48 VDC	12-70 VDC	12-70 VDC
Configuration Method			DIP switches		
Current Controller			Digital MOSFET, PWM @ 16kHz		
Encoder Feedback			"E" models only. External encoder must be wired to external feedback device.		
Encoder Specs ("E" models only)			1000 ppr, Line Driver, Supply Voltage (Typ: 5V, Max: 5.5 V, Min: 4.5 V). Detailed specs, other encoder options, and PLC compatibility are listed in Appendix A of the SureStep user manual.		
Motor/Drive Protection			Short circuit, over-voltage, under-voltage, over-temp		
Input Signals	***Step/Pulse***		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 = Step Input, Limit CW		
	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 Signal			30 VDC / 100mA max, photodarlington, voltage drop = 1.2V max at 100mA Function = Alarm Output		
Jumper Selectable Functions	***Step Pulse Type***		Step and Direction: Step signal = step/pulse; Direction signal = direction. Step CW & CCW: Step signal = CW step; Direction signal = CCW step.		
	Step Pulse Noise Filter		Selectable 150 kHz or 2MHz		
Features	***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 Current 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 %.)		
	Microstep Resolution		200-25000 (dip switch selectable)		
	Self Test		Automatically rotate the motor back and forth 2 1/2 turns in each direction in order to confirm that the motor is operational.		
	Load Inertia		Anti-resonance and damping feature improves motor performance. Set motor and load inertia range to 0–4x or 5–10x.		
Connectors	***Control***		Housing: Tyco 4-643498-1 Cover: Tyco 1-643075-1	Connector part number: Weidmuller 1610200000, included in STP-CON-3	
	Encoder		Two 5 pin inserts (Molex# 14-60-0058), one housing Molex# 15-04-5104		
Drive Cooling Method			Natural convection (mount to suitable heat sink)		
Status LEDs			One red/green		
Mounting			Four M3 screws	Four #6 screws	

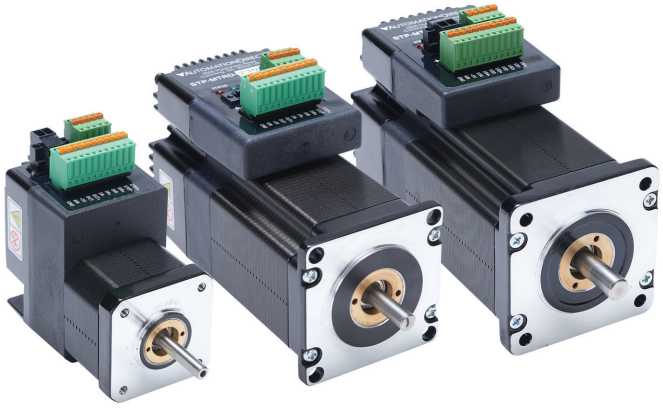
Integrated Microstepping Motors and Drives

SureStep® Standard Integrated Motor/Drives Specifications

SureStep Integrated Series Specifications – Standard				
Integrated Stepping Motor/Drives		***STP-MTRD-17038 STP-MTRD-17038E***	***STP-MTRD-23042 STP-MTRD-23042E***	***STP-MTRD-23065 STP-MTRD-23065E***
NEMA Frame Size		NEMA 17	NEMA 23	NEMA 23
Maximum Holding Torque	***(lb·in)***	4.25	7.8125	13.125
	(oz·in)	68	125	210
	(N·m)	0.480189	0.8827	1.482936
Rotor Inertia	***(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 @ 1lb load		0.02		
Perpendicularity (mm)		0.08		
Concentricity (mm)		0.05		
**** Maximum Radial Load (lb [kg])***		6.7	13.9	
**** Maximum Thrust Load (lb [kg])***		34	63	
Storage Temperature Range		0-40°C (32-104°F)		
Operating Temperature Range		0-85°C		
Operating Humidity Range		90% max, non-condensing		
Product Material		Aluminum, steel, plastic, FR4, etc		
Environmental Rating		IP40		
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.		

Integrated Microstepping Motors and Drives

SureStep® Advanced Integrated Motor/Drives



SureStep Integrated Series Specifications – Advanced					
Integrated Motor/Drive			**STP-MTRD-17030RSTP-MTRD-17030RE STP-MTRD-17030RE**	**STP-MTRD-17038RSTP-MTRD-17038RE STP-MTRD-17038RE**	**STP-MTRD-23042R STP-MTRD-23042RE**	**STP-MTRD-23065R STP-MTRD-23065RE**
Input Voltage (external p/s required)			12-48 VDC		12-70 VDC	
Configuration Method			SureMotion Pro software (SM-PRO: free download)			
Supply Output			+4.8 - 5 volts @ 50mA maximum			
Current Controller			Dual H-Bridge, 4 Quadrant, 4 state PWM @ 16kHz		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			
Input Signals	**Step/Pulse**		5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3 MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA Function = Step Input, Jog CW, Limit CW, Start/Stop, General Purpose			
	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			
	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			
Output Signal			30VDC, 40mA maximum. Optically isolated, open collector. Maximum pulse frequency 10kHz. Functions = Brake Output, Alarm Output, Motion Output, Tach Output, General Purpose			
Communication Interface			RS-485 ASCII			
Non-volatile Memory Storage			Configurations are saved in FLASH memory on-board the DSP			
Features	**Current Reduction**		Selectable in SureMotion Pro software			
	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%			
Connectors		**DC Power**	2-position screw terminal: Weidmuller 1615780000			
		I/O	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 M3 screws		Four #6 screws	

Integrated Microstepping Motors and Drives

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 (SM-PRO: 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
	I/O 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
	I/O 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		Configurations are saved in FLASH memory on-board the DSP
Features	***Current Reduction***	Selectable in SureMotion Pro software
	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%
Connectors	***DC Power***	2-position screw terminal: Weidmuller 1615780000
	I/O	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

Integrated Microstepping Motors and Drives

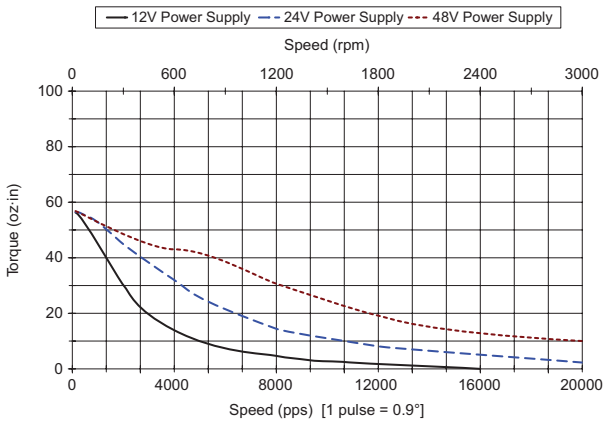
SureStep® Advanced Integrated Motor/Drives

SureStep Integrated Series Specifications – Advanced						
Integrated Motor/Drive		***STP-MTRD-17030R STP-MTRD-17030RE***	***STP-MTRD-17038R STP-MTRD-17038RE***	***STP-MTRD-23042R STP-MTRD-23042RE***	***STP-MTRD-23065R STP-MTRD-23065RE***	***STP-MTRD-24075RV STP-MTRD-24075RVE***
NEMA Frame Size		NEMA 17	NEMA 17	NEMA 23	NEMA 23	NEMA 24
**** Maximum Holding Torque***	***(lb·in)***	3.375	4.25	7.8125	13.125	21.25
	(oz·in)	54	68	125	210	340
	(N·m)	0.381326	0.480189	0.8827	1.482936	2.400944
Rotor Inertia	***(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 (mm)		0.08				
Concentricity (mm)		0.05				
**** Maximum Radial Load (lb [kg])***		6.7		13.9		
**** Maximum Thrust Load (lb [kg])***		34		63		
Storage Temperature Range		0-40°C (32-104°F)				
Operating Temperature Range		0-85°C				0-70°C
Operating Humidity Range		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 misalignment and to prevent loosening due to vibration.				

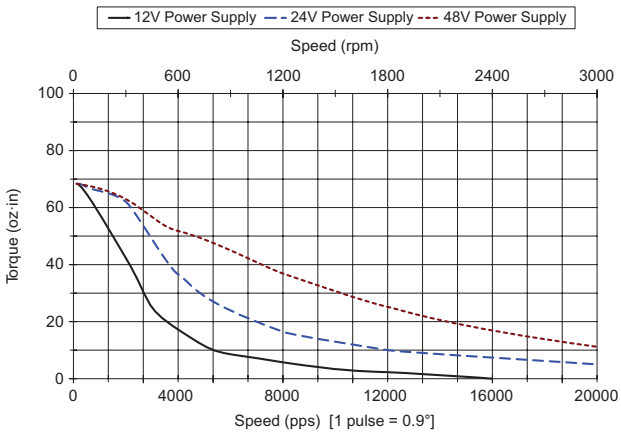
*** For NEMA 24 motors, an EMI filter (RES10F03) is needed on the power supply for CE compliance.**

SureStep® Integrated Motor/Drives Motor Torque vs. Speed

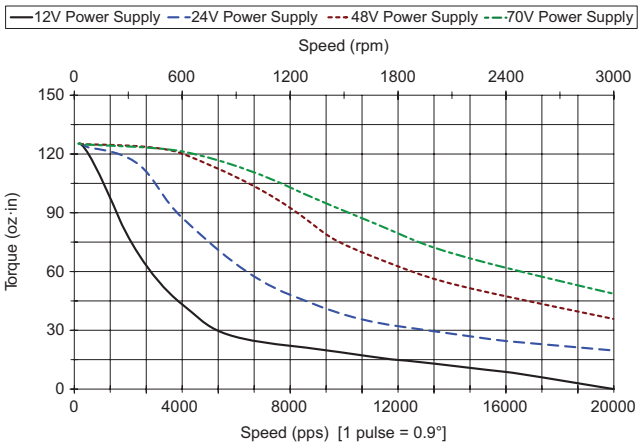
STP-MTRD-17030 Torque vs Speed (1.8° step motor; 1/2 stepping)



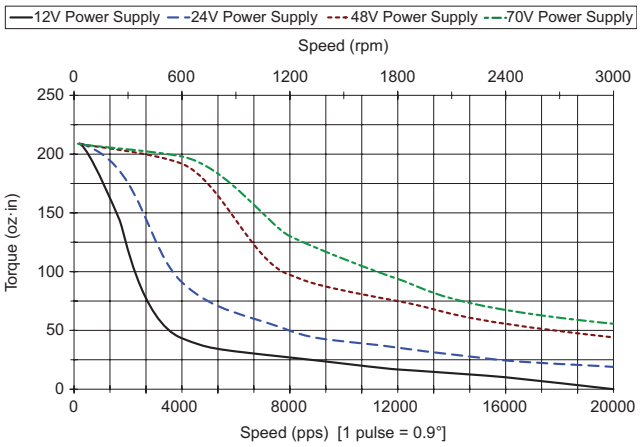
STP-MTRD-17038 Torque vs Speed (1.8° step motor; 1/2 stepping)



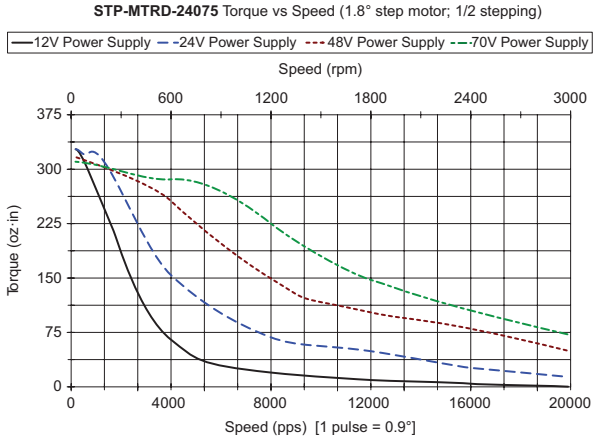
STP-MTRD-23042 Torque vs Speed (1.8° step motor; 1/2 stepping)



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



STP-MTRD-24075 Torque vs Speed (1.8° step motor; 1/2 stepping)

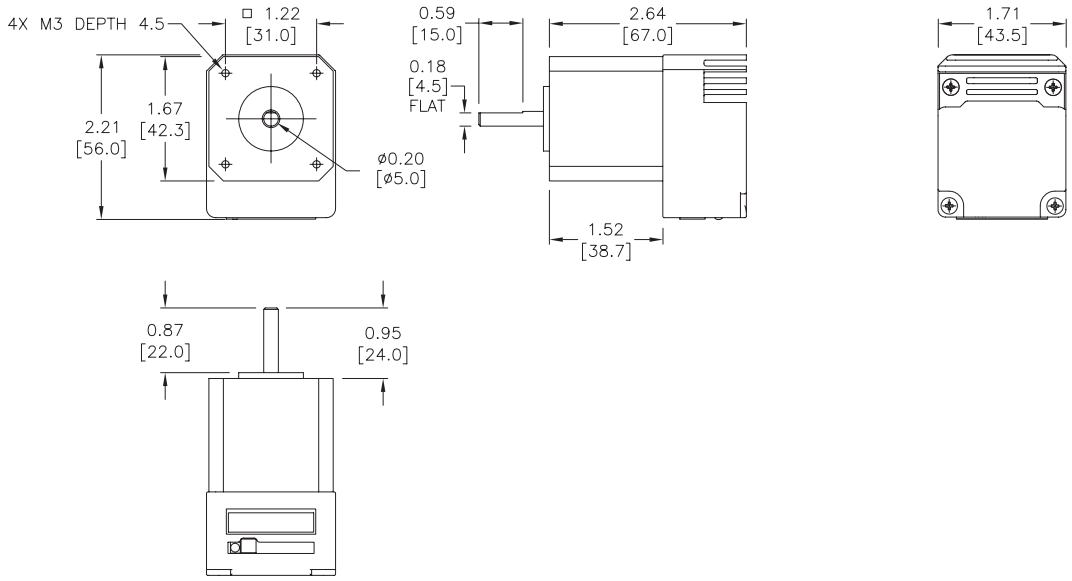


Integrated Microstepping Motors and Drives

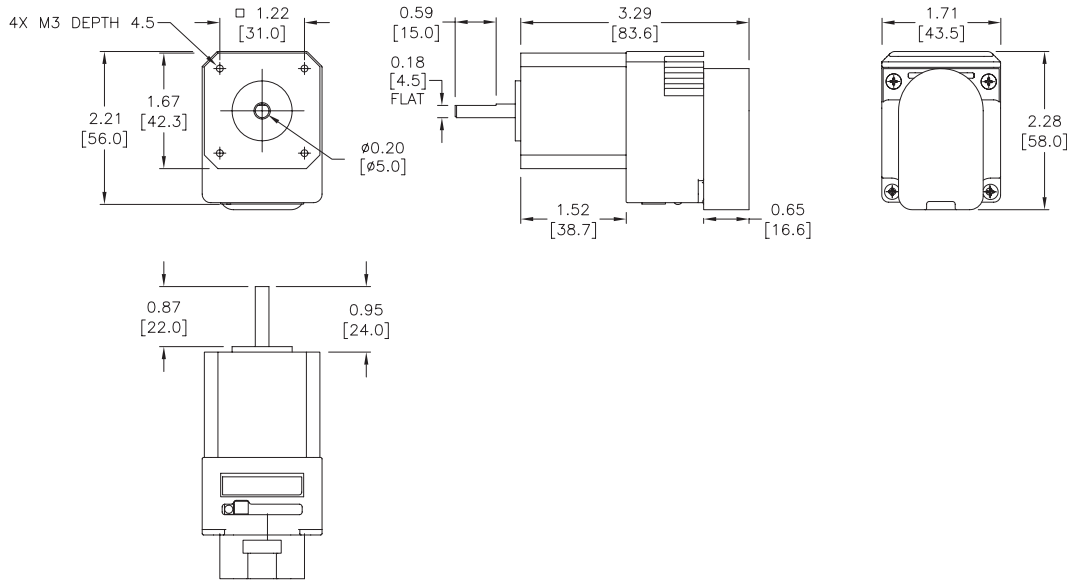
SureStep® Standard Integrated Motor/Drives Dimensions

Dimensions = in [mm]

STP-MTRD-17038



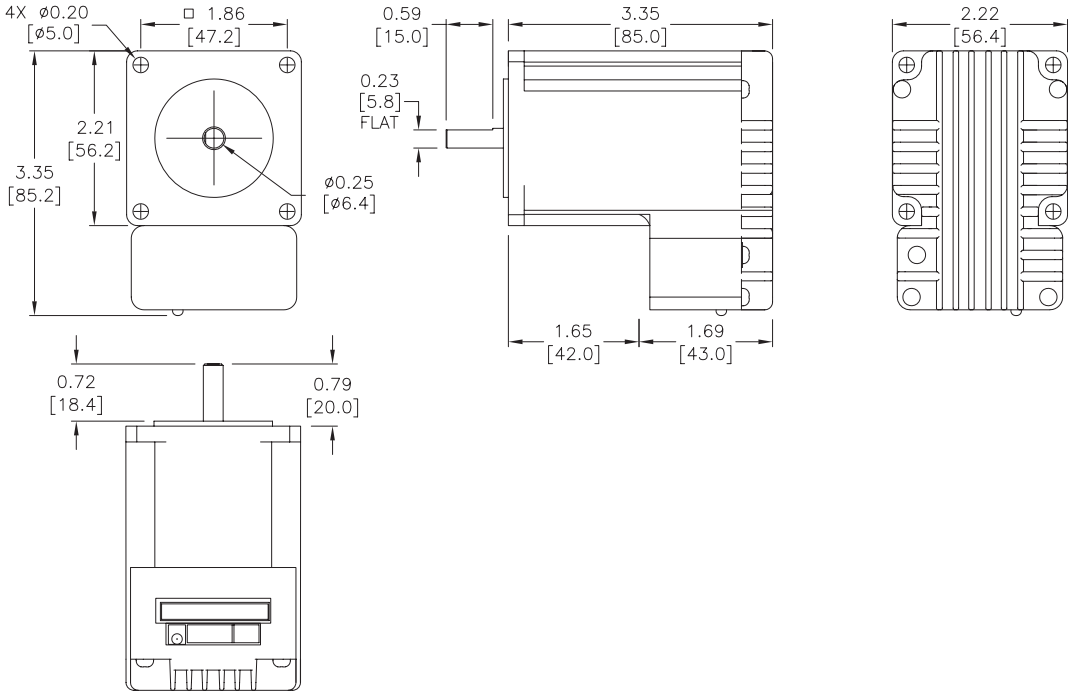
STP-MTRD-17038E



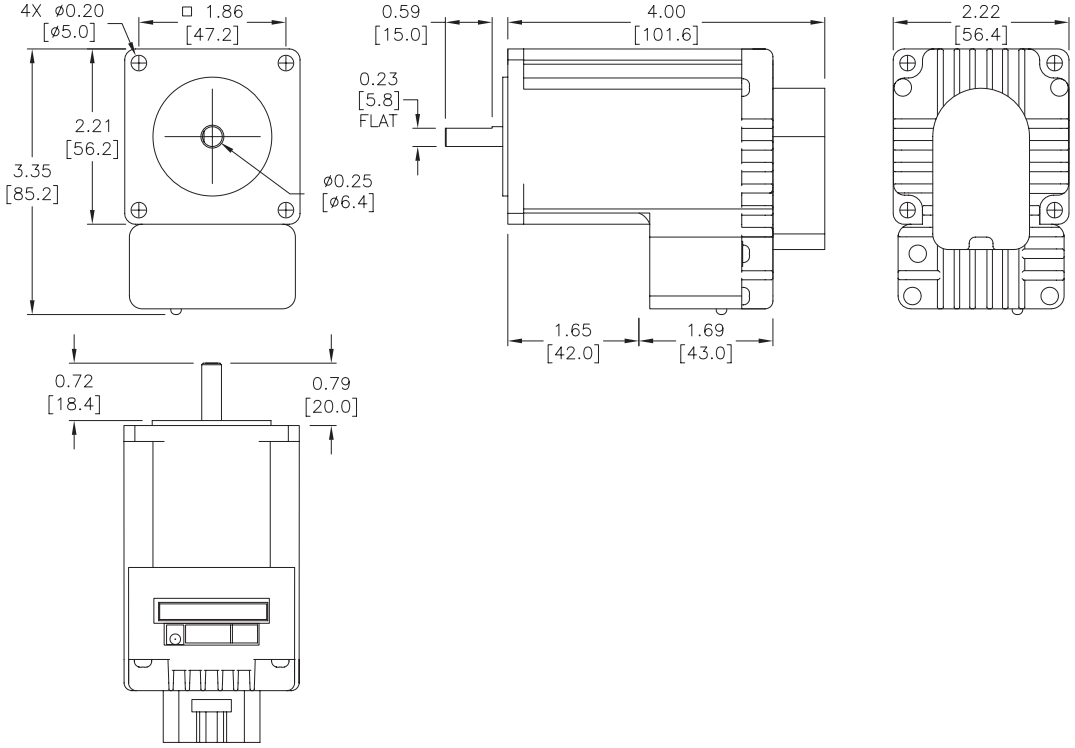
SureStep® Standard Integrated Motor/Drives Dimensions, continued

Dimensions = in [mm]

STP-MTRD-23042



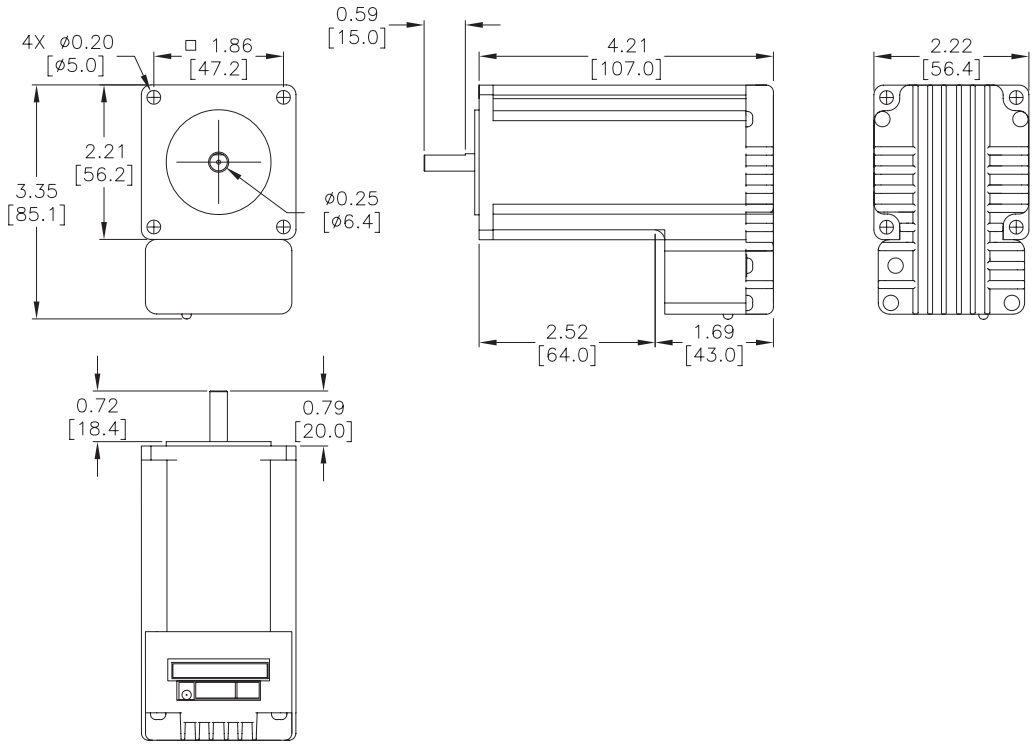
STP-MTRD-23042E



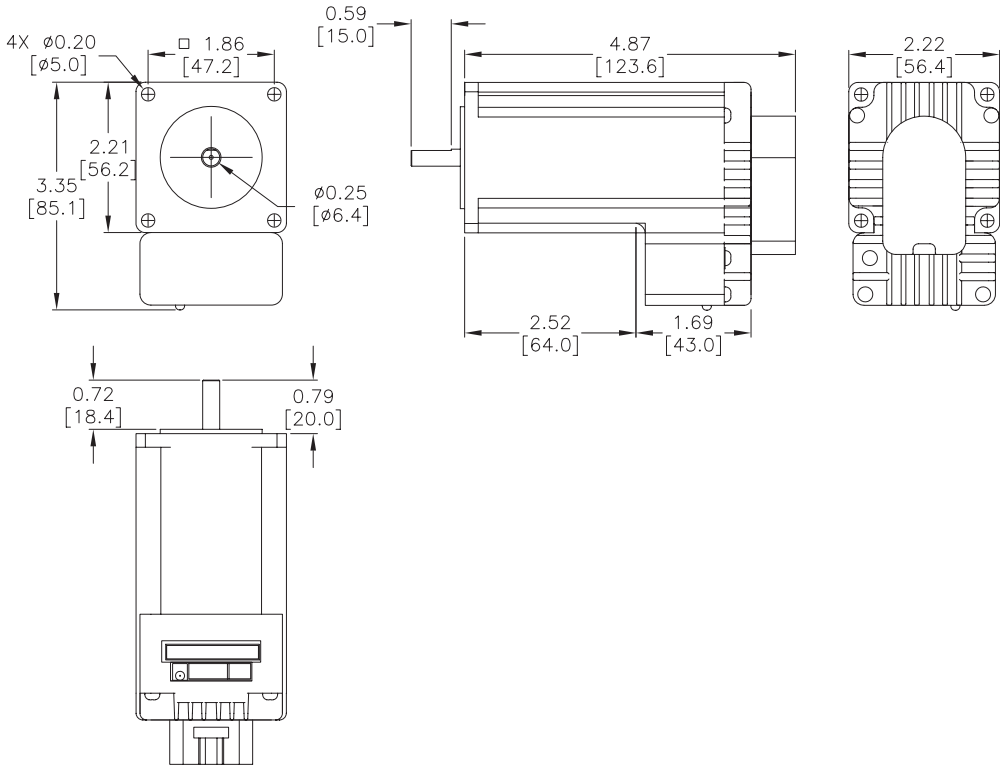
SureStep® Standard Integrated Motor/Drives Dimensions, continued

Dimensions = in [mm]

STP-MTRD-23065



STP-MTRD-23065E

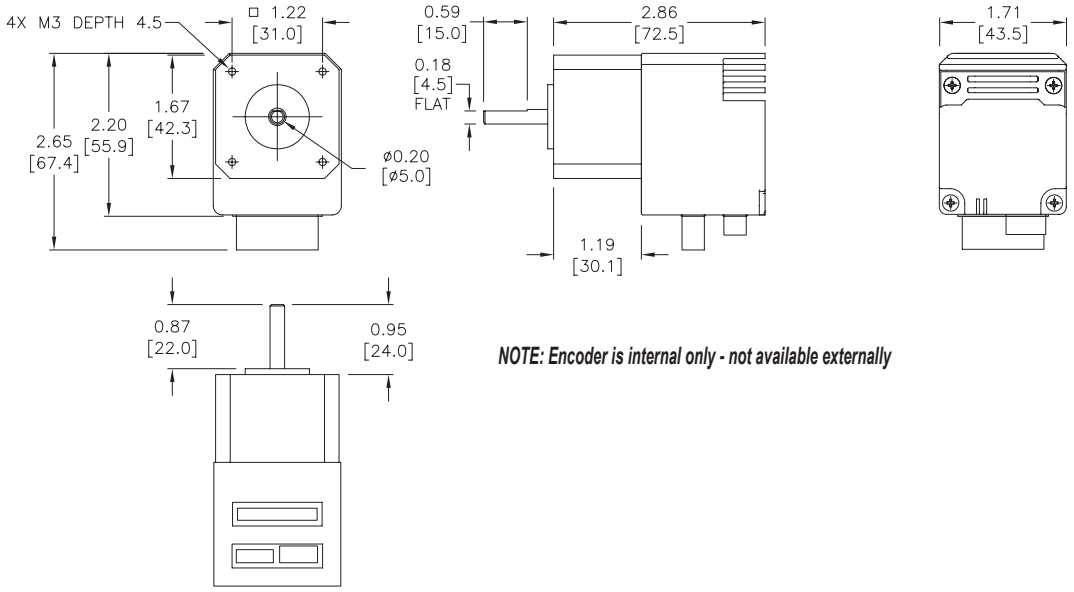


Integrated Microstepping Motors and Drives

SureStep® Advanced Integrated Motor/Drives Dimensions

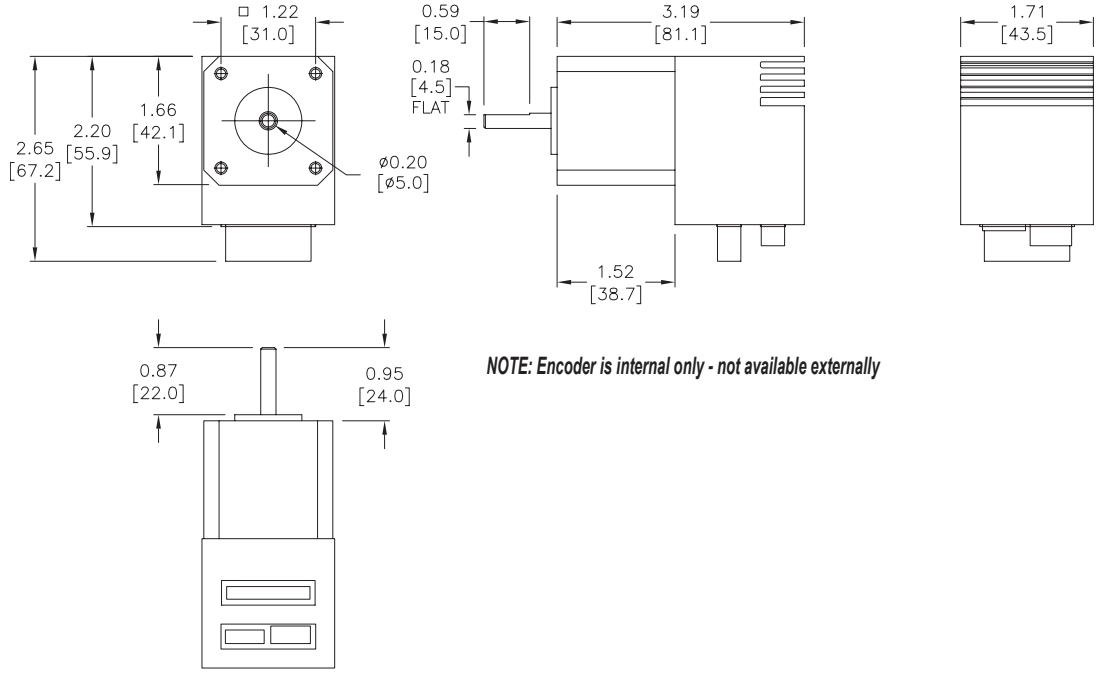
Dimensions = in [mm]

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



NOTE: Encoder is internal only - not available externally

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

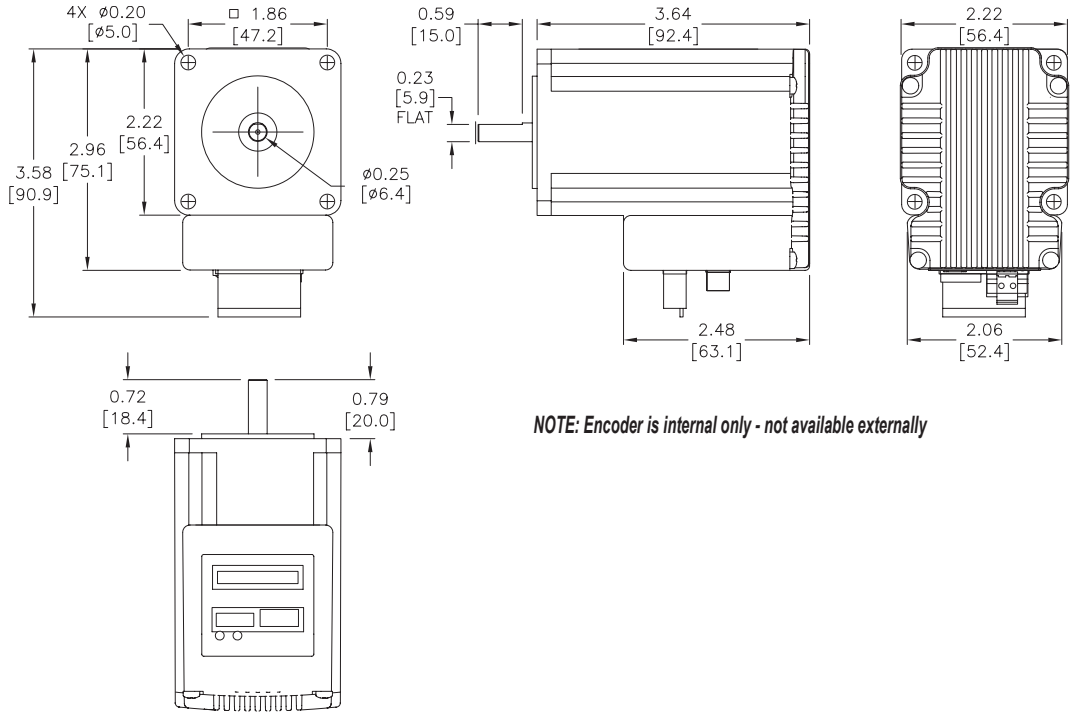


NOTE: Encoder is internal only - not available externally

SureStep® Advanced Integrated Motor/Drives Dimensions, continued

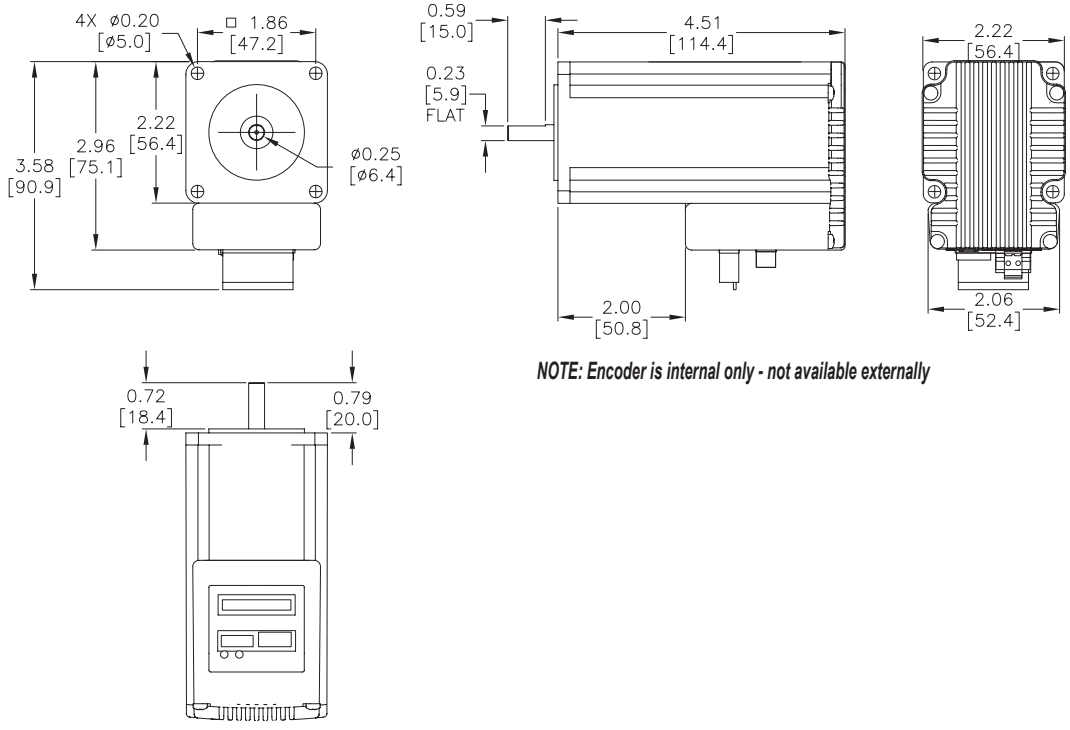
Dimensions = in [mm]

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



NOTE: Encoder is internal only - not available externally

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

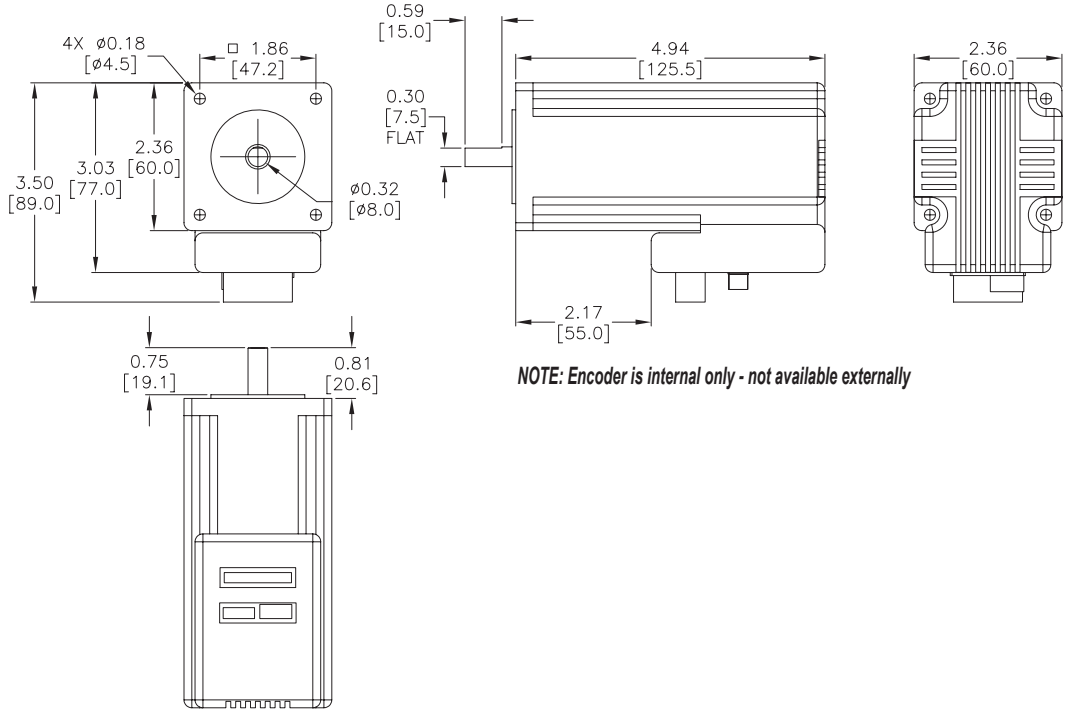


NOTE: Encoder is internal only - not available externally

SureStep® Advanced Integrated Motor/Drives Dimensions, continued

Dimensions = in [mm]

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



NOTE: Encoder is internal only - not available externally

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 STP-DRVA-RC-050A

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.
- 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

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.

Damper

Sure Step Series Specifications – Microstepping Drives Optional Accessories

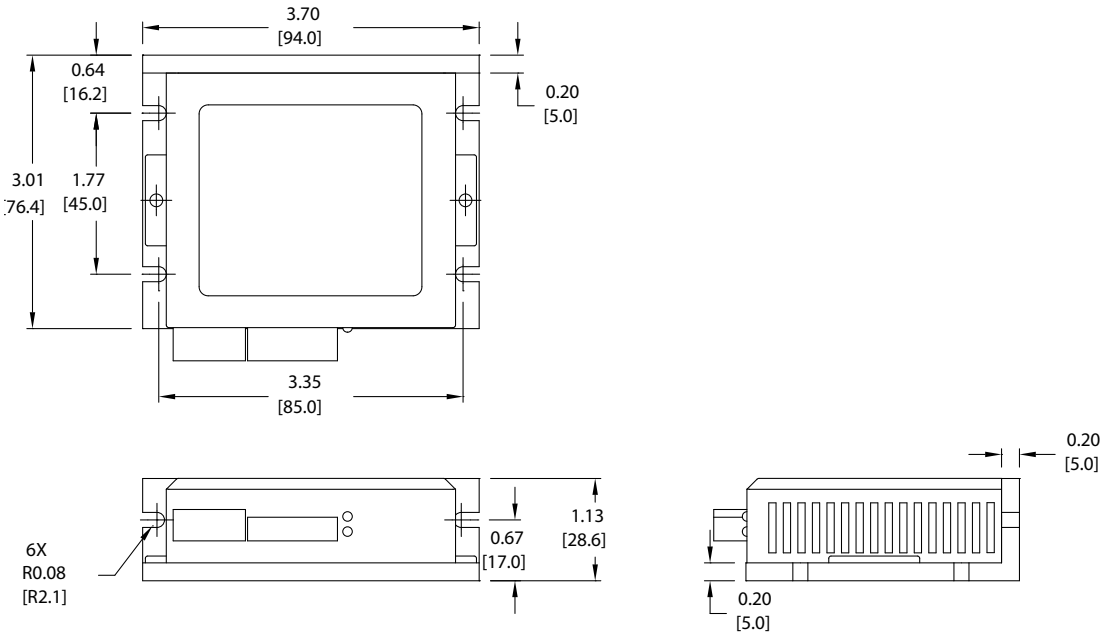
Part Number	Price	Description	Drawing
STP-DRVA-RC-050A*	$61.00	Regen Clamp: 50W, for DC input stepper and servo drives, enclosed	PDF
STP-MTRA-17DMP	$15.00	SureStep damper, metal body. For use with NEMA 17 stepper motors with 5mm shafts. Mounting set screw included.	PDF
STP-MTRA-23DMP	$34.50	SureStep 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.**

SureStep® Microstepping Drives Accessories

Dimensions = in [mm]

STP-DRVA-RC-050A



SureStep® Microstepping Drives Accessories

USB to RS-485 Adapter

The STP-USB485-4W 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).

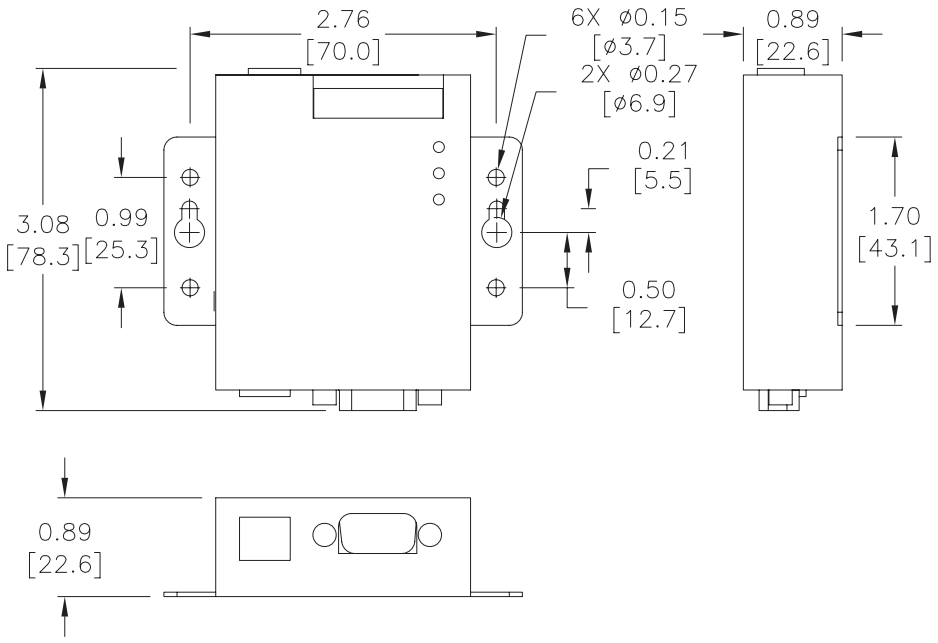
SureStep Advanced Drives communicate via RS-232 (for control and for configuration via SureMotion Pro).

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	$130.00
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]



Stepping System Accessories

SureStep® Stepping System Encoders

Replacement Encoders

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

The AMT112Q-V 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
STP-MTRA-ENC1	$67.00	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.	PDF
STP-MTRA-ENC2	$67.00	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.	PDF
STP-MTRA-ENC3	$69.00	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.	PDF
STP-MTRA-ENC4	$58.00	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.	PDF
STP-MTRA-ENC5	$80.00	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.	PDF
STP-MTRA-ENC6	$67.00	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.	PDF
STP-MTRA-ENC7	$69.00	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.	PDF
STP-MTRA-ENC8	$58.00	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.	PDF
STP-MTRA-ENC11	$72.00	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.	PDF
STP-MTRA-ENC12	$60.00	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.	PDF
STP-MTRA-ENC13	$61.00	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	$52.00	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

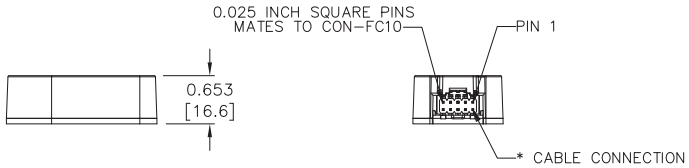
Sure Step Series Encoder Compatibility						
Part Number	***PPR***	***Bore Diameter***	***Output Type***	***Encoder Cable***	***PLC Compatibility***	***Motor Compatibility***
STP-MTRA-ENC1	1000	5mm	Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	STP-MTRx-14xxxD STP-MTRx-14xxxE STP-MTRx-17xxxD STP-MTRx-17xxxE Standard STP-MTRD-xxxxxE
STP-MTRA-ENC2			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC3	400		Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC4			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC5	1000	0.25 inch	Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	STP-MTRx-23xxxD STP-MTRx-23xxxE STP-MTRAC-23xxxD
STP-MTRA-ENC6			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC7	400		Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC8			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC11	1000	0.375 inch	Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	STP-MTRAC-34xxxD
STP-MTRA-ENC12			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC13	400		Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC14			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0-1xDxE-D*	

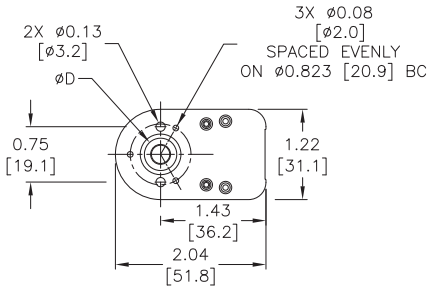
*** Requires FC-ISO-C**

SureStep® Stepping System Encoders

Dimensions = in [mm]

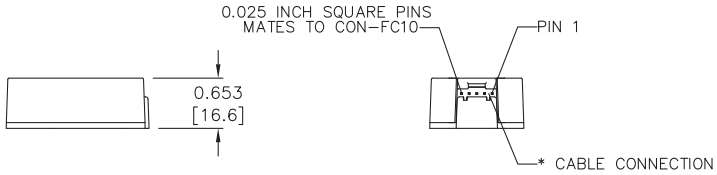
STP-MTRA-ENC1, 3, 5, 7

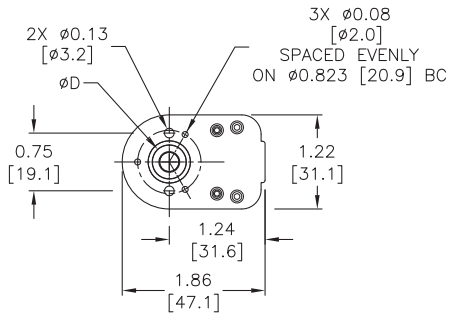




Bolt Hole Circles for Mounting	
Encoder	***Holes***
ENC1, ENC2, ENC3, ENC4, ENC5, ENC6, ENC7, ENC8	2 holes @ 19.05mm (.75") 3 holes @ 20.9mm (.823")

STP-MTRA-ENC2, 4, 6, 8

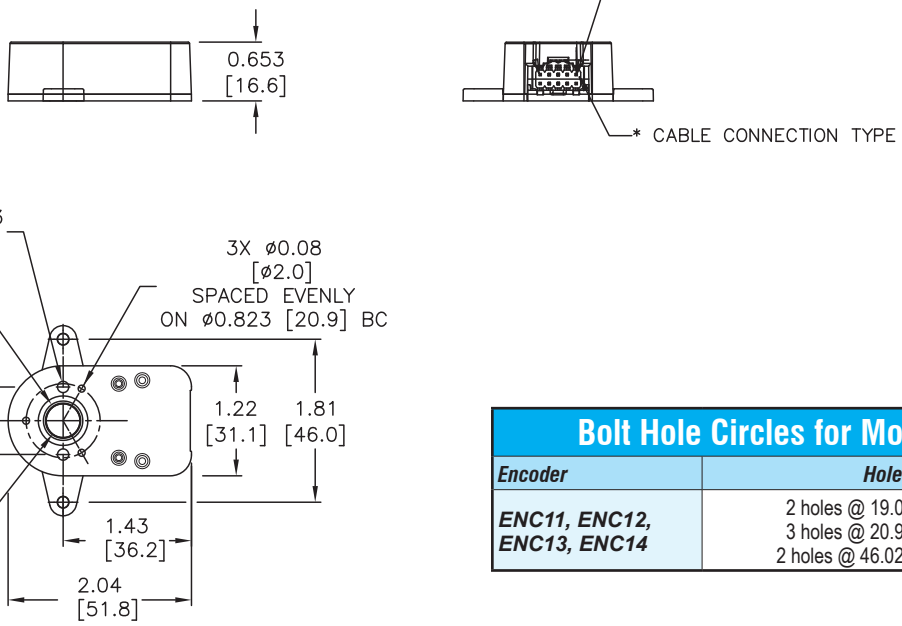




SureStep® Stepping System Encoders

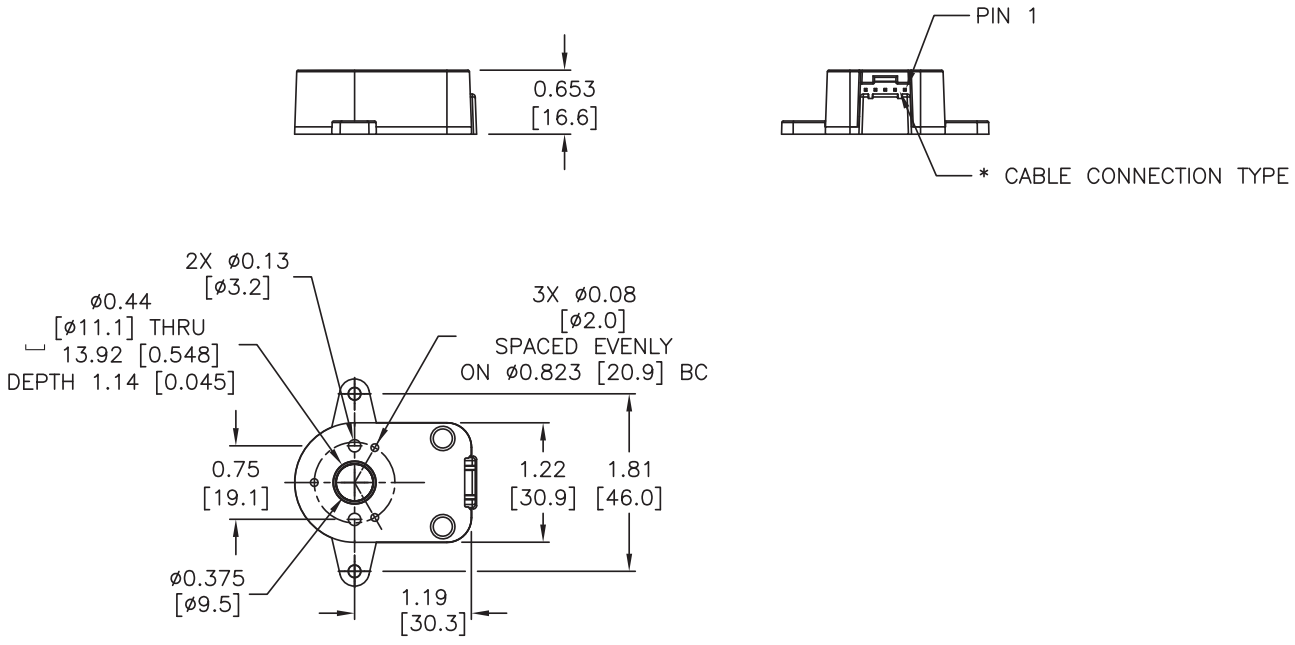
Dimensions = in [mm]

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

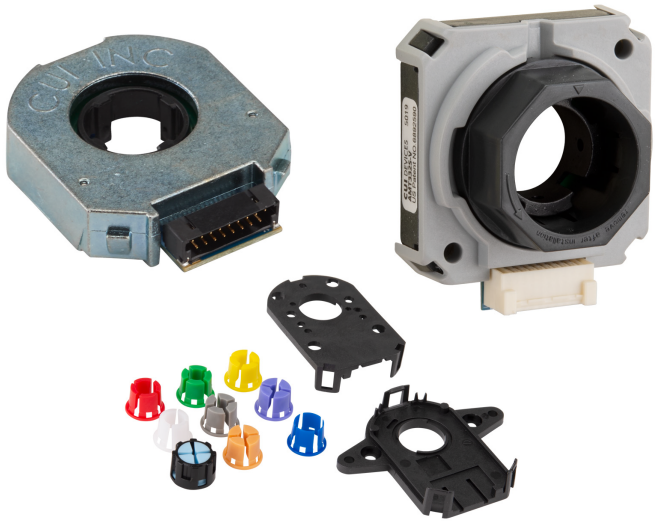


Stepping System Accessories

AMT Series Stepping System Encoders

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, CUI Devices 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/software-downloads?itemcode=AMT%20ViewPoint). The AMT10 family of encoders are configured using DIP switches.



CUI Devices AMT Series Encoders

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 quadrature 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.

AMTxxxx-V

Installation Kit
Models with -V include an installation kit

Output
S = Single-ended signals
Q = Line Driver (differential) encoder signals
D = Line Driver encoder + Line Driver commutation signals
F = Absolute encoder: 14-bit single-turn encoder
H = Absolute encoder: 14-bit multi-turn encoder

Connector Orientation
2 = radial
3 = axial

Encoder Series
10 = DIP switch configurable incremental
11 = SW configurable incremental
13 = NEMA 34/42 SW configurable incremental
31 = SW configurable incremental with commutation signals
33 = NEMA 34/42 SW configurable incremental with commutation signals

AMT series name

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.

Stepping System Accessories

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 pre-mounted 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 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 (dual-shaft) 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

CUI Devices 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.cuidevices.com/blog/what-is-encoder-ppr-cpr-and-lpr.

AMT102-V

AMT103-V

AMT Series Encoders			
Part Number	***listprice***	***Description***	***Drawing***
AMT102-V	$25.00	CUI Devices 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.	PDF
AMT103-V	$25.00	CUI Devices 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.	PDF
AMT112S-V	$34.50	CUI Devices 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.	PDF
AMT112Q-V	$39.50	CUI Devices 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.	PDF
AMT312D-V	$46.50	CUI Devices 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.	PDF
AMT312S-V	$38.50	CUI Devices 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.	PDF

AMT112S-V

AMT312D-V

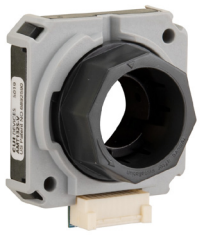
See Accessories section for configuration and signal cables.
CUI Devices Datasheets provide detailed encoder specifications. These datasheets can be found on each encoder's web page at www.automationdirect.com.

Stepping System Accessories

AMT Series Stepping System Encoders

AMT Series Encoders, continued			
Part Number	*Price*	*Description*	*Drawing*
AMT132S-V	$34.50	CUI Devices 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.	PDF
AMT132Q-V	$38.50	CUI Devices 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
AMT332S-V	$38.50	CUI Devices 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
AMT332D-V	$42.50	CUI Devices 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

See Accessories section for configuration and signal cables.
CUI Devices Datasheets provide detailed encoder specifications. These datasheets can be found on each encoder's web page at www.automationdirect.com.



AMT132S-V

AMT332S-V

AMT Series Encoder Accessories		
Part Number	*Price*	*Description*
CUI-KIT-1	$6.50	CUI Devices encoder accessory kit, replacement. For use with CUI Devices AMT102 encoders. Includes (1) AMT102 base, (1) AMT102 wide base, and (1) AMT10 sleeve kit (9 sleeves sized from 2-8mm).
CUI-KIT-2	$6.50	CUI Devices encoder accessory kit, replacement. For use with CUI Devices AMT103 encoders. Includes (1) AMT standard base, (1) AMT standard wide base, and (1) AMT10 sleeve kit (9 sleeves sized from 2-8mm).
CUI-KIT-3	$6.50	CUI Devices encoder accessory kit, replacement. For use with CUI Devices 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).
CUI-KIT-4	$6.50	CUI Devices encoder sleeve kit, replacement. For use with CUI Devices 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

CUI-KIT-4

STP-MTRA-SCRWKT-1

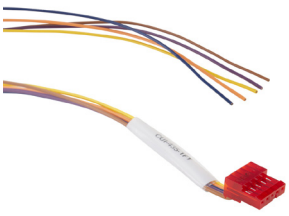
Stepping System Accessories

AMT Series Stepping System Encoders

AMT Series Encoder Compatibility							
Part Number	***Max PPR***	***Bore Diameter***	***Output Type***	***PLC Compatibility***	***Encoder Cable***	***Configuration Cable***	***Motor Compatibility***
AMT102-V	2048	2mm, 3mm, 1/8", 4mm, 3/16", 5mm, 6mm, 1/4", 8mm	push-pull (totem) (radial connector)	BRX[1], CLICK C0-1xDxE-D2	CUI-3131-x CUI-3132-1FT	n/a	NEMA 14, 17, 23 dual-shaft
AMT103-V[2]	2048		push-pull (totem) (axial connector)		CUI-435-x CUI-3934-6FT		
AMT112S-V	4096		push-pull (totem)		AMT-17C-1-x	AMT-PGRM-17C	
AMT112Q-V	4096		line driver (differential)	P2-HSI, P3-HSI, BRX[1], CLICK C0-1xDxE-D2	AMT-17C-1-x		
AMT312D-V	4096		line driver (differential) encoder+commutation	P2-HSI, P3-HSI, BRX[1], CLICK C0-1xDxE-D2	AMT-17C-1-x	AMT-PGRM-17C	
AMT312S-V	4096		push-pull (totem) encoder+commutation	BRX[1], CLICK C0-1xDxE-D2	AMT-17C-1-x		
AMT132S-V	4096	9mm, 3/8", 10mm, 11mm, 12mm, 1/2", 13mm, 14mm, 5/8"	push-pull (totem)		AMT-18C-3-x	AMT-PGRM-18C	NEMA 34 and 42[3] dual-shaft (Does not fit STP-MTR**AC**-34 motors)
AMT132Q-V	4096		line driver (differential)	P2-HSI, P3-HSI, BRX_1, CLICK C0-1xDxE-D2	AMT-18C-3-x		
AMT332S-V	4096		push-pull (totem) encoder+commutation	BRX_1, CLICK C0-1xDxE-D2	AMT-18C-3-x		
AMT332D-V	4096		line driver (differential) encoder+commutation	P2-HSI, P3-HSI, BRX[1], CLICK C0-1xDxE-D2	AMT-18C-3-x		

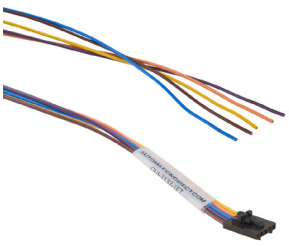
Note: For specific AutomationDirect PLC and step motor model compatibility, please see Appendix A in the SureStep User Manual.
1 - Requires FC-ISO-C (see wiring diagrams for DIP switch settings).
2 - For AMT103-V to maintain NEMA23 compatibility, CUI-KIT-2 must be purchased to use the standard wide base 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***
CUI-3132-1FT	$5.00	CUI Devices encoder cable, 5-pin connector to pigtail, 1ft cable length. For use with CUI Devices AMT102 encoders.	PDF
CUI-3131-6FT	$10.50	CUI Devices encoder cable, 5-pin connector to pigtail, shielded, twisted pair, 6ft cable length. For use with CUI Devices AMT102 encoders.	PDF
CUI-3131-10FT	$30.00	CUI Devices encoder cable, 5-pin connector to pigtail, shielded, twisted pair, 10ft cable length. For use with CUI Devices AMT102 encoders.	PDF
CUI-3131-20FT	$49.00	CUI Devices encoder cable, 5-pin connector to pigtail, shielded, twisted pair, 20ft cable length. For use with CUI Devices AMT102 encoders.	PDF
CUI-435-1FT	$5.50	CUI Devices encoder cable, 5-pin connector to pigtail, 1ft cable length. For use with CUI Devices AMT103 encoders.	PDF
CUI-3934-6FT	$26.50	CUI Devices encoder cable, 5-pin connector to pigtail, shielded, twisted pair, 6ft cable length. For use with CUI Devices AMT103 encoders.	PDF
CUI-435-10FT	$22.00	CUI Devices encoder cable, 5-pin connector to pigtail, 10ft cable length. For use with CUI Devices AMT103 encoders.	PDF
CUI-435-20FT	$30.00	CUI Devices encoder cable, 5-pin connector to pigtail, 20ft cable length. For use with CUI Devices AMT103 encoders.	PDF

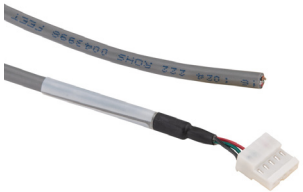


CUI-435-1FT
CUI-435-10FT
CUI-435-20FT

CUI-3131-6FT
CUI-3131-10FT
CUI-3131-20FT



CUI-3132-1FT

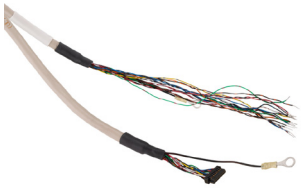


CUI-3934-6FT

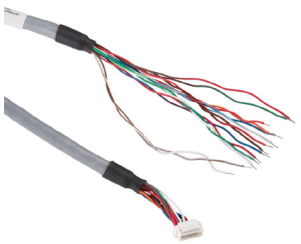
Stepping System Accessories

AMT Series Stepping System Encoders

AMT Series Encoder Signal Cables			
Part Number	*Price*	*Description*	*Drawing*
AMT-17C-1-036	$40.00	CUI Devices encoder cable, 17-pin connector to pigtail, shielded, twisted pair, 3ft cable length. For use with CUI Devices AMT112 and AMT312 encoders.	PDF
AMT-17C-1-072	$81.00	CUI Devices encoder cable, 17-pin connector to pigtail, shielded, twisted pair, 6ft cable length. For use with CUI Devices AMT112 and AMT312 encoders.	PDF
AMT-17C-1-120	$121.00	CUI Devices encoder cable, 17-pin connector to pigtail, shielded, twisted pair, 10ft cable length. For use with CUI Devices AMT112 and AMT312 encoders.	PDF
AMT-18C-3-036	$27.50	CUI Devices encoder cable, 18-pin connector to pigtail, shielded, twisted pair, 3ft cable length. For use with AMT13 and AMT33 encoders.	PDF
AMT-18C-3-072	$67.00	CUI Devices encoder cable, 18-pin connector to pigtail, shielded, twisted pair, 6ft cable length. For use with AMT13 and AMT33 encoders.	PDF
AMT-18C-3-120	$96.00	CUI Devices 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	CUI Devices programming cable, miniB-USB to 17-pin connector, 1ft cable length. For use with CUI Devices AMT112 and AMT312 encoders.
AMT-PGRM-18C	$24.50	CUI Devices programming cable, miniB-USB to 18-pin connector, 1ft cable length. For use with CUI Devices AMT13 and AMT33 encoders.

AMT-PGRM-17C

AMT-PGRM-18C

AMT Series Stepping System Encoders

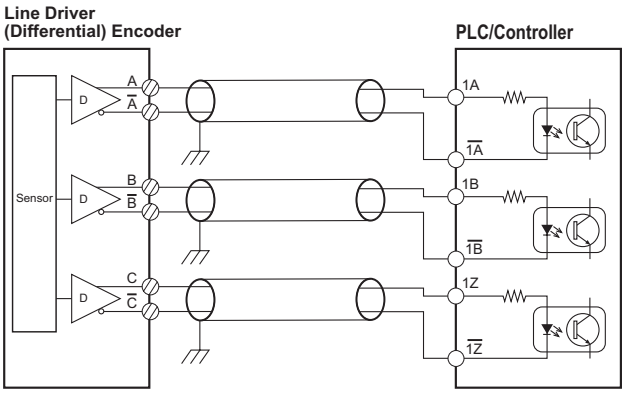
Line Driver Encoder Wiring Colors				
Encoder	***AMT112Q-V AMT312D-V***		***AMT132Q-V AMT332D-V***	
Pin Function	Pin #	STP-CLB-EBx AMT-17C-1-xxx Wire Color	Pin #	AMT-18C-3-xxx Wire Color
+5V	6	RED/BLK	6	RED/GRN
GND	4	BLK/RED	4	GRN/RED
A	10	WHT/BLK	8	BRN/WHT
$\bar{A}$	11	BLK/WHT	9	WHT/BRN
B	8	GRN/BLK	10	GRN/WHT
$\bar{B}$	9	BLK/GRN	11	WHT/GRN
Z	12	BLU/BLK	12	BLU/WHT
$\bar{Z}$	13	BLK/BLU	13	WHT/BLU

Single Ended (Push-pull/Totem) Encoder Wiring Colors										
Encoder	***AMT112S-V AMT312S-V***		***AMT132S-V AMT332S-V***		***AMT102-V***			***AMT103-V***		
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	A	WHT	BLU	A	BLU	WHT
B+	8	GRN/BLK	10	GRN/WHT	B	BRN	YEL	B	YEL	BRN
Z+	12	BLU/BLK	12	BLU/WHT	X	GRN	PUR	X	PUR	GRN

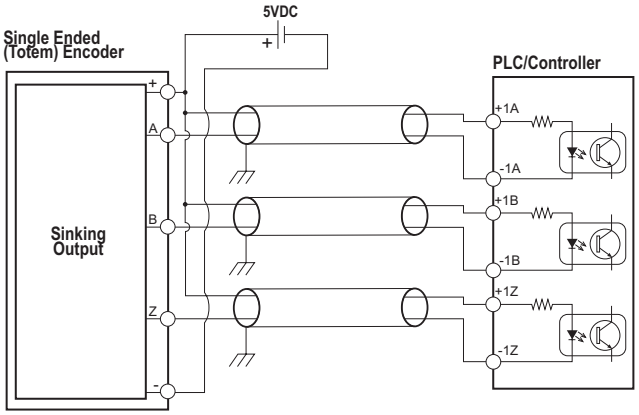
Single Ended (Push-pull/Totem) Commutation Wiring Colors				
Encoder	***AMT312S-V***		***AMT332S-V***	
Pin Function	Pin #	AMT-17C-1-xxx Wire Color	Pin #	AMT-18C-3-xxx Wire Color
+5V	6	RED/BLK	6	RED/GRN
GND	4	BLK/RED	4	GRN/RED
U+	3	BRN/BLK	3	BRN/RED
W+	5	ORG/BLK	5	ORG/RED
V+	7	RED/WHT	7	BLU/RED

AMT Series Encoders – PLC Connectivity

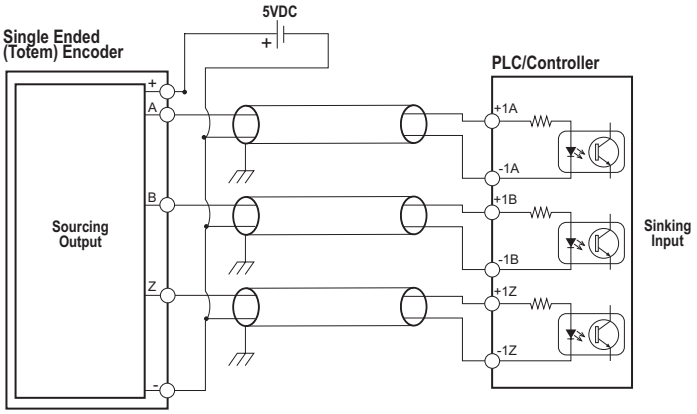
Line Driver Encoder to Line Driver PLC Input



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



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



Stepping System Accessories

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 (STP-DRV-4850, -80100, & STP-MTRD-xxxxxR).

- 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***
SM-PRO	$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 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).**

Stepping System Cables

SureStep® Cables

SureStep Series – Stepping System Cables						
Cable	**Price**	**Purpose**	**Length**	**Use With**	**Cable End Connectors**	**Drawing**
STP-EXT-006	$13.00	motor to drive extension	6 ft	STP-MTR-xxxxx(x)	pigtail / Molex 43020-0401 connector	PDF
STP-EXT-010	$14.50		10 ft			PDF
STP-EXT-020	$18.50		20 ft			PDF
STP-EXTH-006	$26.50		6 ft	STP-MTR**H**-xxxxx(x)	pigtail / Molex 39-01-2041 connector	PDF
STP-EXTH-010	$31.50		10 ft			PDF
STP-EXTH-020	$38.00		20 ft			PDF
STP-EXTHW-006	$50.00		6 ft	STP-MTR**HW**-xxxxx(x)	Bulgin # PXP4011/06P/6065	PDF
STP-EXTHW-010	$55.00		10 ft			PDF
STP-EXTHW-020	$71.00		20 ft			PDF
STP-EXTL-006	$11.50		6 ft	STP-MTR**L**-xxxxx(x)	pigtail / Molex 105308-22004 connector	PDF
STP-EXTL-010	$14.50		10 ft			PDF
STP-EXTL-020	$18.00		20 ft			PDF
STP-EXTW-006	$50.00		6 ft	STP-MTR**W**-xxxxx(x)	Bulgin # PXP4011/06P/6065	PDF
STP-EXTW-010	$55.00		10 ft			PDF
STP-EXTW-020	$71.00		20 ft			PDF
STP-EXT42-006	$26.00	motor to drive extension	6 ft	STP-MTRAC-42xxxx	10-pin / pigtail	PDF
STP-EXT42-010	$31.00		10 ft			PDF
STP-EXT42-020	$44.50		20 ft			PDF
STP-EXT42H-006	$26.00		6 ft	STP-MTRACH-42xxxxx		PDF
STP-EXT42H-010	$31.00		10 ft			PDF
STP-EXT42H-020	$44.50		20 ft			PDF
STP-232RJ11-CBL*	$11.00	programming/ communication	10 ft	STP-DRV-4850, STP-DRV-80100	DB9 female / RJ11(6P4C)	PDF
STP-232HD15-CBL-2**	$17.00	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
STP-232RJ12-CBL-2**	$10.50	communication	6.6 ft	STP-DRV-4850, STP-DRV-80100 DL05, CLICK	RJ11 (6P4C) plug / RJ12 6-pin plug	n/a
STP-CBL-CA6	$19.00	control cable	6 ft	STP-MTRD-17038 STP-MTRD-17038E	11-pin / pigtail	PDF
STP-CBL-CA10	$23.00	control cable	10 ft		11-pin / pigtail	PDF
STP-CBL-CA20	$33.50	control cable	20 ft		11-pin / pigtail	PDF
STP-CBL-EA6	$19.00	encoder cable	6 ft	STP-MTRD-xxxxxE STP-MTRA-ENC1, STP-MTRA-ENC3 STP-MTRA-ENC5, STP-MTRA-ENC7 STP-MTRA-ENC11, STP-MTRA-ENC13 (for line driver encoders)	10-pin / pigtail	PDF
STP-CBL-EA10	$23.00	encoder cable	10 ft		10-pin / pigtail	PDF
STP-CBL-EA20	$33.50	encoder cable	20 ft		10-pin / pigtail	PDF
STP-CBL-EB3	$60.00	encoder cable	3 ft	AMT112Q-V AMT112S-V (for both line driver and push-pull (totem) encoders)	17-pin / pigtail	PDF
STP-CBL-EB6	$83.00	encoder cable	6 ft		17-pin / pigtail	PDF
STP-CBL-EB10	$113.00	encoder cable	10 ft		17-pin / pigtail	PDF
STP-CBL-EB20	$187.00	encoder cable	20 ft		17-pin / pigtail	PDF
STP-CBL-ED6	$19.00	encoder cable	6 ft	STP-MTRA-ENC2, STP-MTRA-ENC4 STP-MTRA-ENC6, STP-MTRA-ENC8 STP-MTRA-ENC12, STP-MTRA-ENC14 (for push-pull (totem) encoders)	5-pin / pigtail	PDF
STP-CBL-ED10	$23.50	encoder cable	10 ft		5-pin / pigtail	PDF
STP-CBL-ED20	$34.50	encoder cable	20 ft		5-pin / pigtail	PDF
STP-CON-1	$18.00	replacement connector kit	n/a	STP-DRV-4845 & -6575	-	n/a
STP-CON-2	$18.00	replacement connector kit	n/a	STP-DRV-4850 & 80100	-	n/a

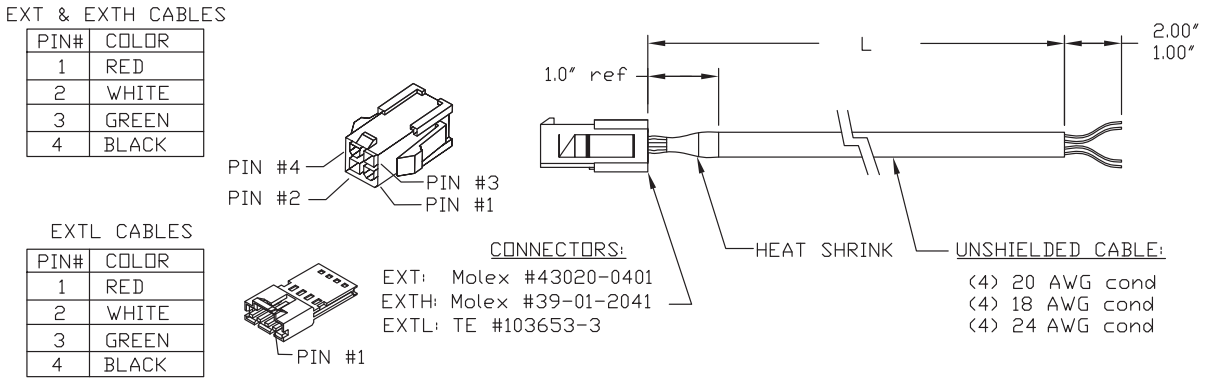
** Programming/communication cable STP-232RJ11-CBLis available for spare or replacement purposes. (One cable is included with each software programmable drive.)*

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

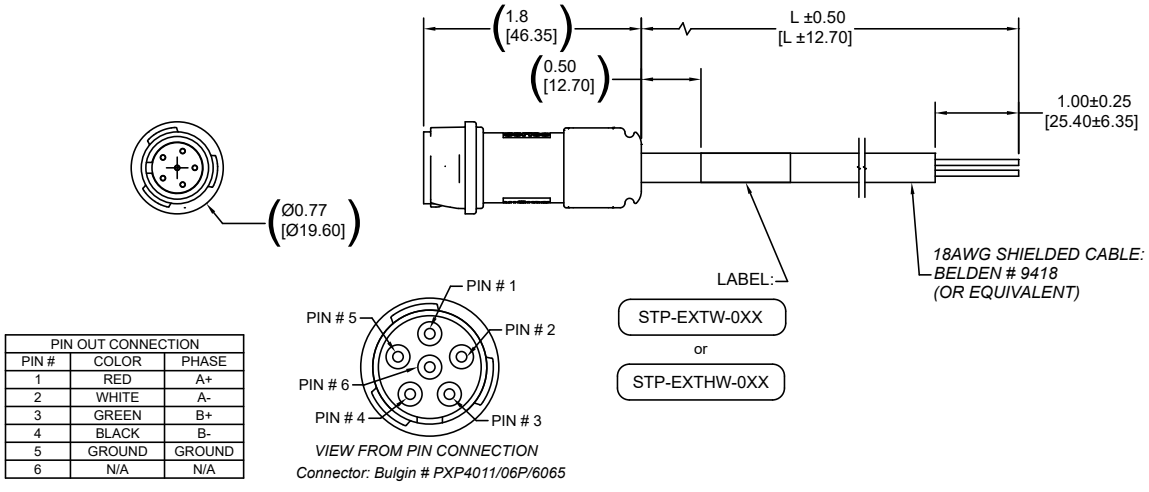
SureStep® Cables, *continued*

SureStep Series – Stepping System Cables						
Cable	***Price***	***Purpose***	***Length***	***Use With***	***Cable End Connectors***	***Drawing***
STP-CON-3	$36.50	replacement connector kit	n/a	STP-MTRD-xxxxxR	-	n/a
STP-CON-4	$18.00	replacement connector kit	n/a	STP-DRVA-RC-050**A**	-	n/a
STP-CON-5	$18.00	replacement connector kit	n/a	STP-DRV-4830	-	PDF
STP-CON-6	$23.50	replacement connector kit	n/a	STP-DRVAC-24025	-	n/a
STP-485DB9-CBL-2	$42.00	4-wire programming cable	6.5 ft	STP-MTRD-xxxxxR	DB9 / Phoenix 5-conductor plug	PDF

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



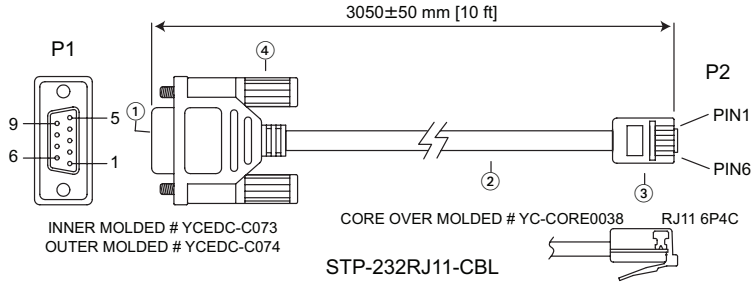
STP-EXTW-0xx and STP-EXTHW-0xx Extension Cable Wiring Diagram



PIN OUT CONNECTION		
PIN #	COLOR	PHASE
1	RED	A+
2	WHITE	A-
3	GREEN	B+
4	BLACK	B-
5	GROUND	GROUND
6	N/A	N/A

SureStep® Cables, continued

STP-232RJ11-CBL Programming Cable Wiring Diagram



WIRE CONNECTION

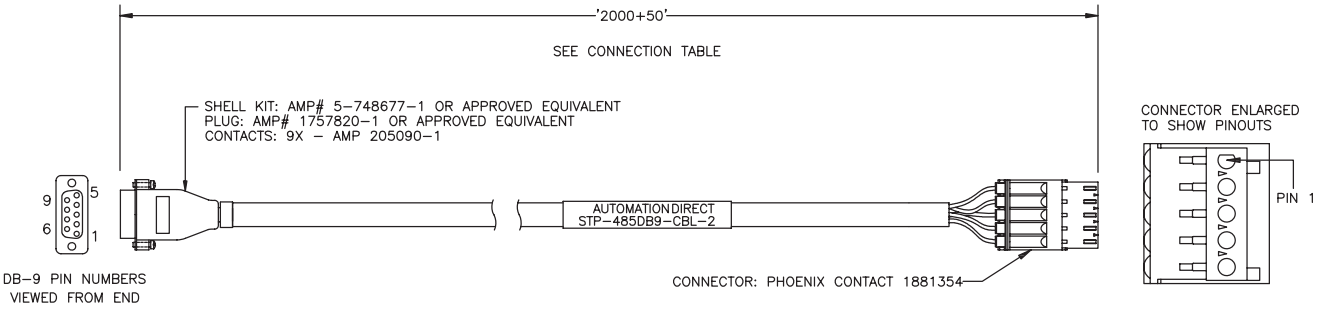
(DB9) P1		P2 (RJ11 6P4C)
2	RX — TX	3
3	TX — RX	5
4	nc — nc	4
5	GND — GND	2

①	DB 9P FEMALE CONNECTOR SHELL: FRONT NICKEL BACK TIN INSULATOR COLOR: BLACK
②	CABLE: CAT-5 UTP 24AWG (7/0.203BA*2PR) 100MHz COLOR: BLACK OD: 4.5mm
③	RJ11 6P4C PLATED GOLD 3U"
④	SCREW: #4-40UNC PD40*175TNP COLOR: BLACK

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

CONNECTION CHART

DB–9 CONN PIN	DB9 SIGNAL	WIRE COLOR	PHOENIX PIN	PHOENIX 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

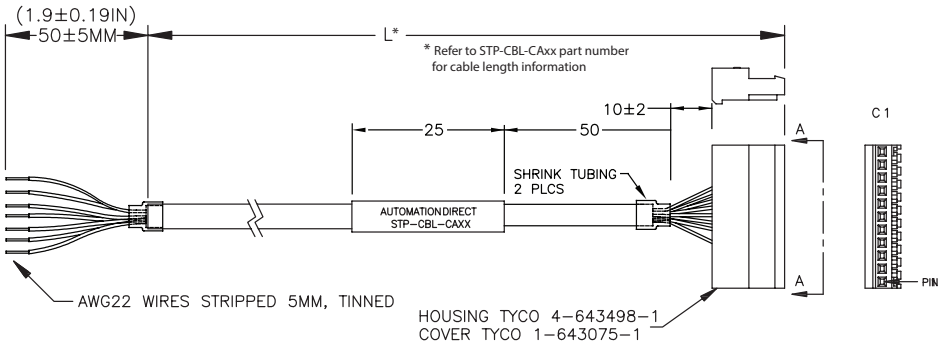


SureStep® Cables, continued

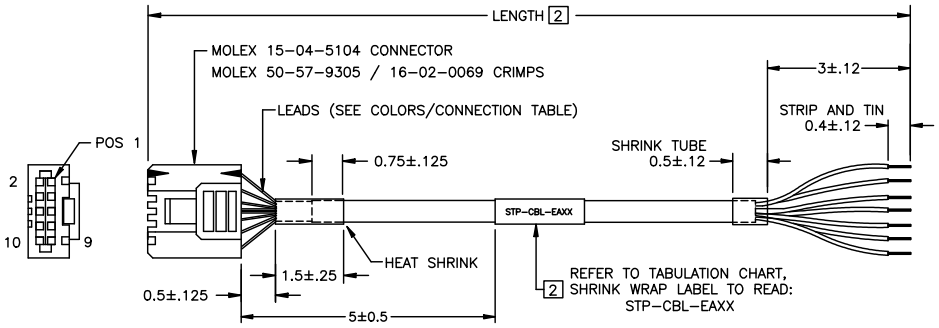
STP-CBL-CAxx Control Cable Wiring Diagram

C1		
PIN NO:	SIGNAL	WIRE COLOR
1	STEP+	ORANGE
2	STEP–	BROWN
3	DIR+	YELLOW
4	DIR–	GREEN
5	EN+	BLUE
6	EN–	TAN
7	OUT+	GRAY
8	OUT–	WHITE
9	N.C.	PINK
10	V–	BLACK
11	V+	RED
12	N/C	PURPLE – CUT

Note: For Rev A of this cable, STEP+ is Grey/Pink and EN- is Red/Blue



STP-CBL-EAxx Encoder Cable Wiring Diagram



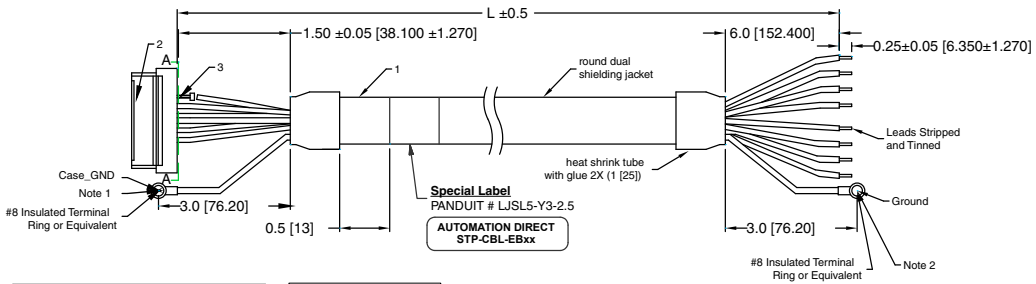
CONN	CONNECTION TABLE		
PIN	LEAD COLOR	SIGNAL	
2	GREEN/WHITE	GROUND	
7	GREEN	POWER+	TWISTED PAIR
3	ORANGE/WHITE	Z–	
4	ORANGE	Z+	TWISTED PAIR
5	BLUE/WHITE	A–	
6	BLUE	A+	TWISTED PAIR
9	BROWN/WHITE	B–	
10	BROWN	B+	TWISTED PAIR
1	N/C	N/A	
8	N/C	N/A	NO CONNECTION

WIRE: 24AWG, CABLE: UL2464.

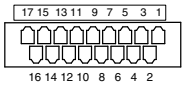
STP-CBL-EBxx Encoder Cable Wiring Diagram

NOTE:
1. Case_GND is connected internally to GND (BLACK/RED)
2. Ground connected internally to cable shielding-customer ref. only
3. Tolerance: ± 0.2" [5] unless otherwise specified
4. All meterials must be ROHS compliant

TABLE INFORMATION	
CABLE NUMBER	CABLE LENGTH L
STP-CBL-EB3	3 Feet
STP-CBL-EB6	6 Feet
STP-CBL-EB10	10 Feet
STP-CBL-EB20	20 Feet



Connector Pinout			
#	Function	Color	
		Primary	Stripe
4	GND	Black	Red
6	+5V	Red	Black
8	B+	Green	Black
9	B-	Black	Green
10	A+	White	Black
11	A-	Black	White
12	Z+	Blue	Black
13	Z-	Black	Blue



SECTION A-A
SCALE 3:1
(Back of Connector Housing)

PARTS LIST			
#	PART	DESCRIPTION	QTY
1	CABLE	3M # 3600B/14	1
2	CONNECTOR	JAE # FI-W175	1
3	CRIMP PINS	JAE #FI-C3-A1-15000	8

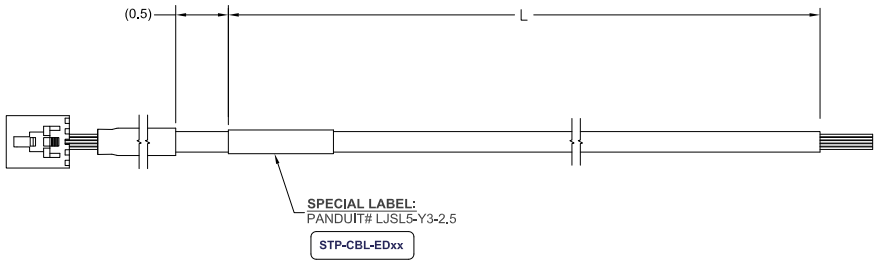
SureStep® Cables, continued

STP-CBL-EDxx Encoder Cable Wiring Diagram

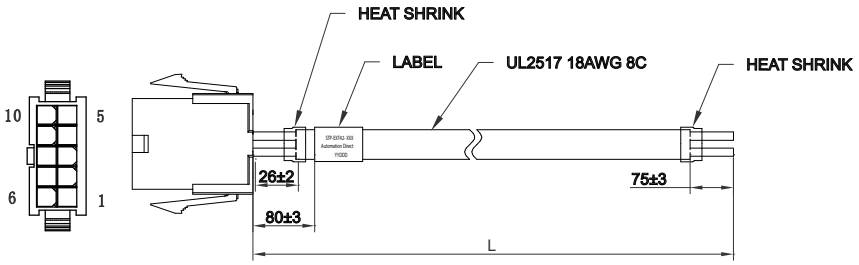
STP–EDxx CABLES

PIN#	Function	Color
1	Ground	Black
2	Index	Green
3	A Channel	White
4	+5VDC Power	Red
5	B Channel	Brown

TABLE INFORMATION	
CABLE NUMBER	CABLE LENGTH L
STP-CBL-ED6	6 Feet
STP-CBL-ED10	10 Feet
STP-CBL-ED20	20 Feet

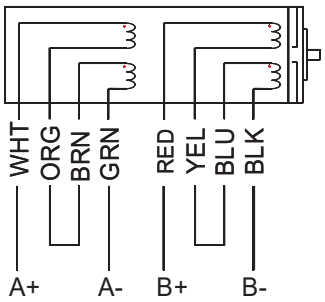


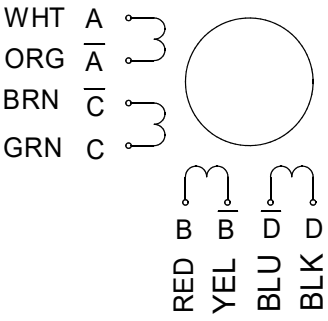
STP-EXT42(H)-xxx Cable Wiring Diagram



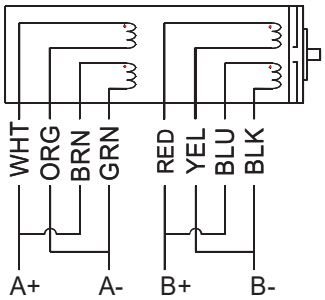
Pin	Wire Description
1	A - White
2	$\overline{A}$ - Orange
3	C - Green
4	$\overline{C}$ - Brown
5	B - Red
6	$\overline{B}$ - Yellow
7	D - Black
8	$\overline{D}$ - Blue
9	GND - Drain wire

Bi-polar series





Bi-polar parallel



Controller Compatibility

High Speed Pulse Motion Control with AutomationDirect PLCs* and SureStep® Stepping Systems			
PLC Series	***Starting at $199.00***	***Starting at $310.00***	***Starting at $368.00***
	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	Dynamic Velocity (controlled accel/decel)		

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 $361.00		CPUs starting at $735.00	
	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/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	11 per PLC rack, 22 per PLC system			

High Speed Pulse Motion Control with AutomationDirect PLCs* and SureStep® Stepping Systems			
PLC Series	***Starting at Retired***	***Starting at $212.00***	***Starting at $392.00***
	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 Levels (no ramps available when changing velocity)		
I/O Modules Pulse Outputs	Not Applicable for DL105	H0-CTRIO2 (1 axis per module)	
Maximum Pulse Rate (pulses/sec)		65,000	
Position Control		Trapezoidal Profiles (linear & S-curve ramps)	
Velocity Control		Dynamic Velocity (controlled 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.**

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 $411.00	
	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.**

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
- 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 over-current
- NEMA 11, 14, 17, 23, 24, 34 and 42 frame size step motors supported

Leadshine Series – Drives Features Comparison1

Drive Model	DM322E	DM542E	DM556E	DM860E	DMA860E	DM805-AI	EM542S	EM556S
Price	$27.50	$39.00	$43.00	$53.00	$69.00	$113.00	$50.00	$61.00
Drawing	PDF	PDF	PDF	PDF	PDF	PDF	PDF	PDF
Drive Type	2-phase digital stepper drive							
Supply Voltage	12–30 VDC (24 VDC typical)	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)	20–80 VDC (30–60 VDC typical)	20–50 VDC (24–48 VDC typical)	
Pulse Input Type	Single-ended2	Differential, Single-ended				Single-ended2	Differential, Single-ended	
Step Input Modes	Step & Direction			Step & Direction, CW & CCW		Step & Direction, Analog input	Step & Direction, CW & CCW	
Digital Input Voltage	5V (add a 1K resistor to accept +12V input, or a 2K resistor to accept +24V input)						DIP switch selectable for 5V or 24V	
PPR Range	400–12800	400–25600		400–51200		200-12800	200–25600	
Motor Output Current Range	0.3–2.2 A peak (0.2–1.6 RMS)	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)		2.6–7.0 A peak (0.3–5.0 RMS)	0.5-4.2A peak (0.4-2.9 RMS)	0.5-5.6A peak (0.4-3.9 RMS)
Digital Output	No						+24VDC (Brake and Fault Detection)	
Self-test Capable	No	No	No	No	No	Yes	Yes	Yes
Special Features	Soft-start, motor auto-config				Accepts a DC or an AC power supply, soft-start, motor auto-config	Built-in pulse generator, command source	Auto-tuning, soft-start, fault and brake outputs, shaft lock	

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.

Leadshine

Stepping Drives

DM542E

DMA860E

DM542E, DM556E, DM860E, DMA860E

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

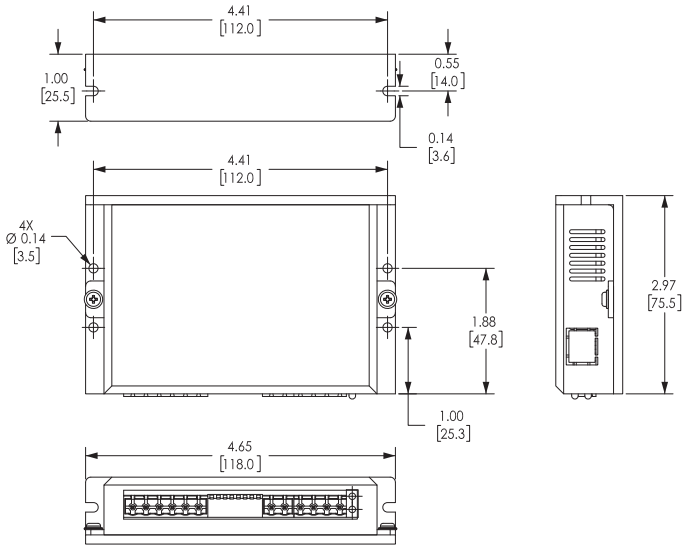
The DM860E and DMA860E drives possess the same capabilities but can also do CW and CCW pulse operation. The main difference between these models are output current range to the motor and supply voltage.

Leadshine DM542E, DM556E, DM860E, DMA860E Specifications					
Drive Model		***DM542E***	***DM556E***	***DM860E***	***DMA860E***
Output Current		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 Current		7–16 mA (10mA typical)			
Pulse Input Frequency		0–200 kHz			
Minimal Pulse Width		2.5 µs			
Minimal Direction Setup		5.0 µs			
Isolation Resistance		500mΩ			
Connector P1 Functions	***PUL+***	Pulse 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 1kΩ resistor for +12V signals, 2kΩ for +24V signals.			
	PUL-				
	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 1kΩ resistor for +12V signals, 2kΩ 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 1kΩ resistor for +12V signals, 2kΩ for +24V signals. Enable Function: Close (pull low) to disable the drive.			
	ENA-				
Replacement Connectors		Power = DN-6PLUG, I/O = DN-4PLUG, Enable = DN-2PLUG			
Cooling		Natural cooling or forced cooling			
Ambient Temperature		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		No			
Weight		227g (8 oz)	300g (10.6 oz)	510g (1.13 lbs)	510g (1.13 lbs)

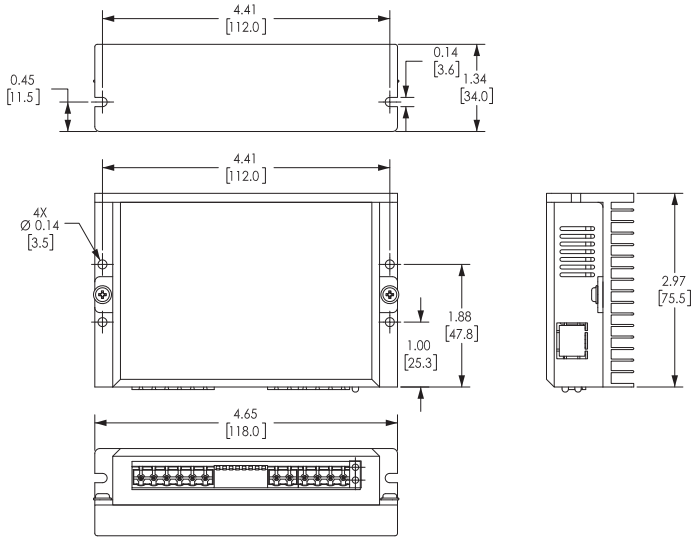
Leadshine Drive Dimensions

Dimensions = in [mm]

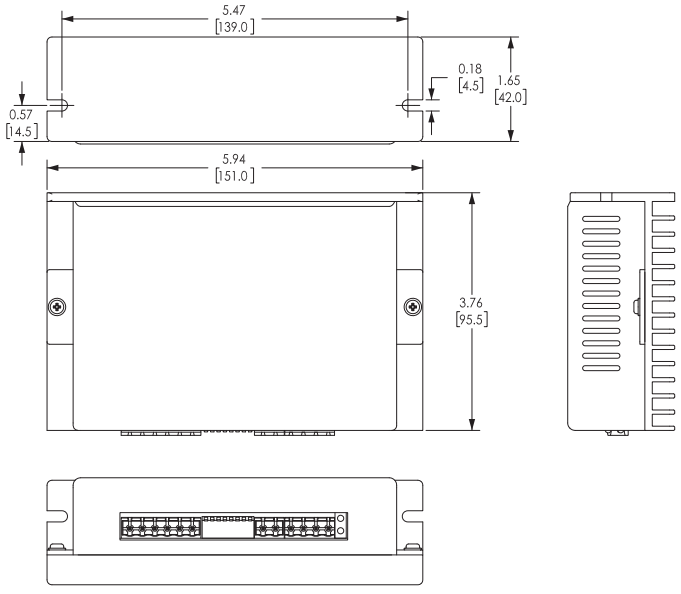
DM542E



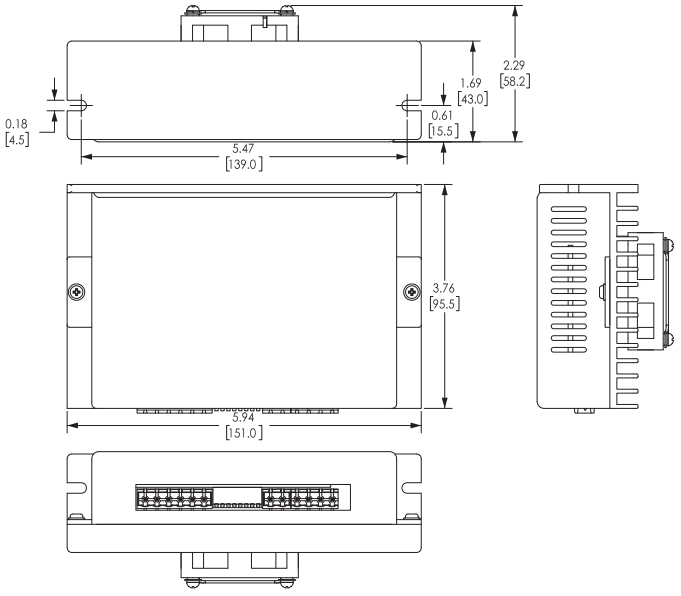
DM556E



DM860E

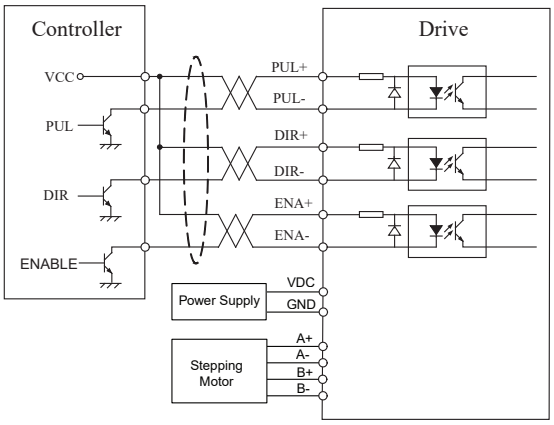


DMA860E

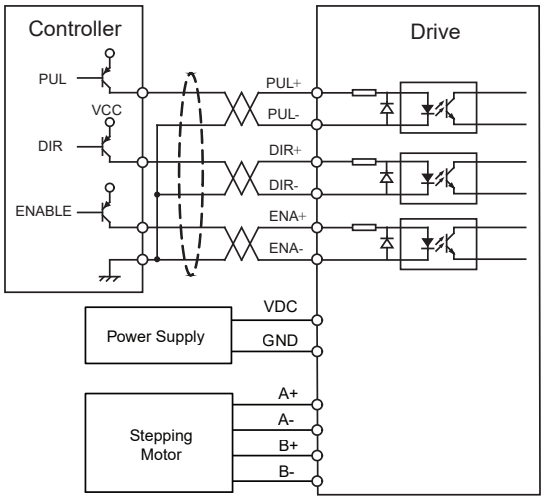


Leadshine Drive Wiring

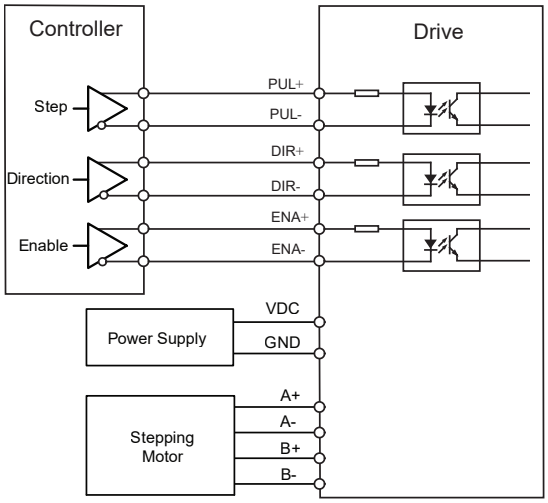
DM542E, DM556E, DM860E, DMA860E Connection to Open Collector Signal



DM542E, DM556E, DM860E, DMA860E Connection to PNP Signal



DM542E, DM556E, DM860E, DMA860E Connection to Differential Signal



Leadshine

DM332E

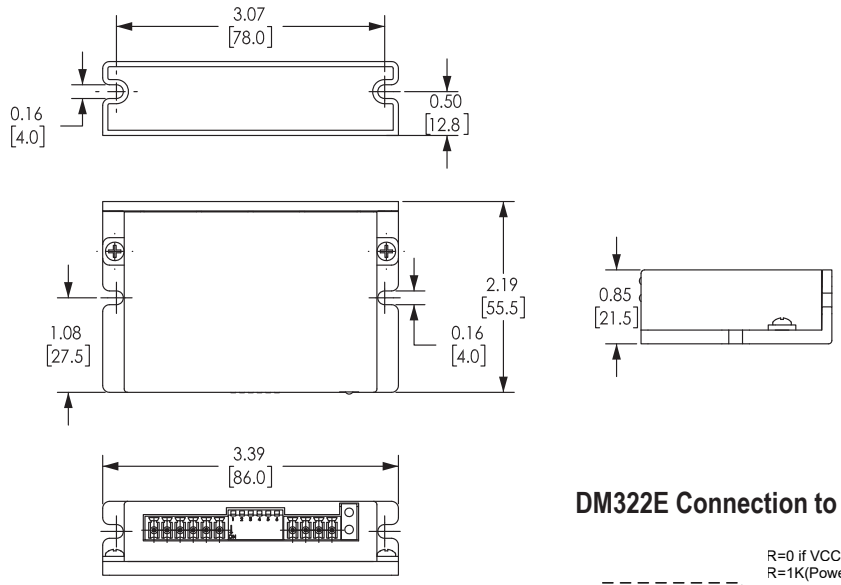
The DM322E is a compact drive capable of pulse and direction operation, with motor auto-configuration on power up.

DM322E

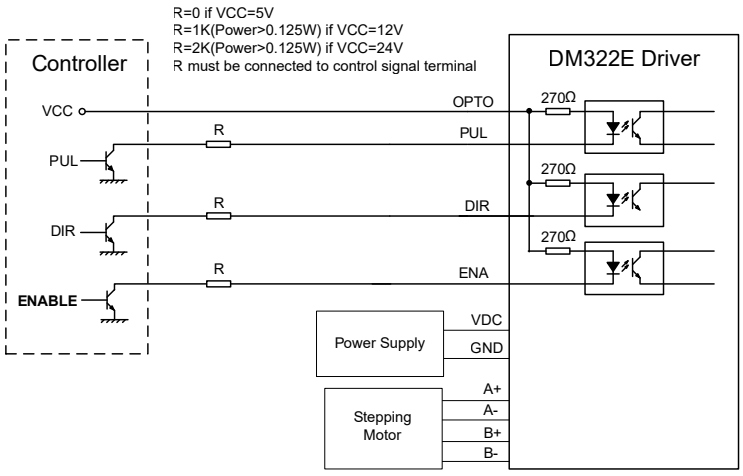
Leadshine DM322E Specifications		
Drive Model		***DM322E***
Output Current		0.3–2.2 A peak (0.2–1.6 RMS)
Input Voltage		12–30 VDC (24 VDC typical)
Logic Signal Current		7–16 mA (10mA typical)
Pulse Input Frequency		0–70 kHz
Minimal Pulse Width		7.5 µs
Minimal Direction Setup		7.5 µs
Isolation Resistance		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 1kΩ resistor for +12V signals, 2kΩ 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 1kΩ resistor for +12V signals, 2kΩ for +24V signals. Direction Function: requires 5µs setup time. CW/CCW Function: see DIP switch SW14.
	OPTO	This input is the voltage supply for the Pulse, Direction, and Enable opto-couplers. Connect 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 1kΩ resistor for +12V signals, 2kΩ for +24V signals. Enable Function: Close (pull low) to disable the drive.
Replacement Connectors		Power = 6-pin from STP-CON-4; I/O = 4-pin from STP-CON-5
Cooling		Natural cooling or forced cooling
Ambient Temperature		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		No
Weight		90g (3.5 oz)

DM322E Dimensions and Wiring

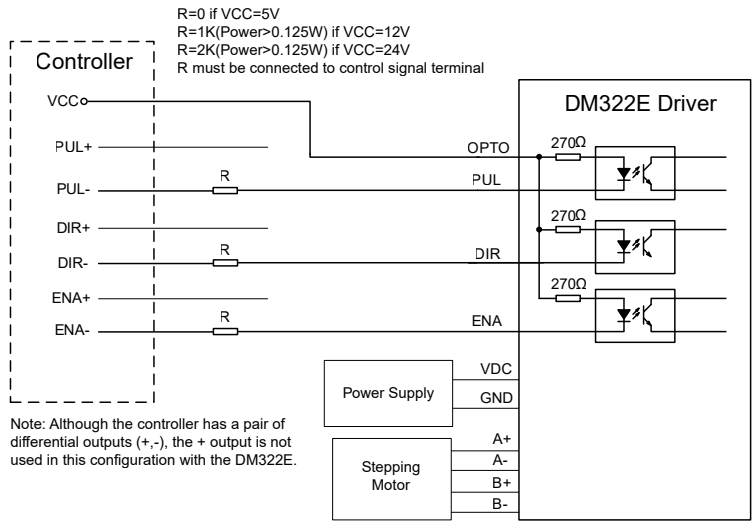
Dimensions = in [mm]



DM322E Connection to Open Collector Signal



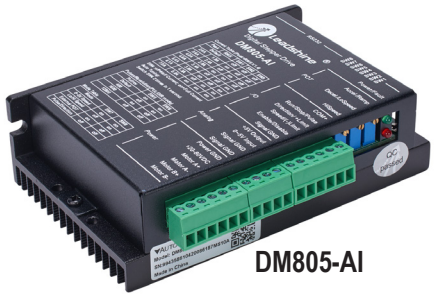
DM322E Connection to Differential Control Signal



Note: Although the controller has a pair of differential outputs (+,-), the + output is not used in this configuration with the DM322E.

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 self-test capability. Comes with built in potentiometers for adjusting accel and decel rates and can be controlled via an external potentiometer.



DM805-AI

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 Current		7–16 mA (10mA typical)
Pulse Input Frequency		0–200 kHz
Minimal Pulse Width		2.5 µs
Minimal Direction Setup		5.0 µs
Isolation Resistance		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 1 resistor for +12V signals, 2k for +24V signals. Run/Stop Function: Close (pull low) to enable the motor.
	Direction or +Limit	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 1k resistor for +12V signals, 2k 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 1k resistor for +12V signals, 2k 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 Connectors		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 Temperature		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		1.4.4-0609505-B3
Weight		264g (9.3 oz)

Leadshine Series Drive Cables		
Optional Configuration Cable	***Compatible With***	***Price***
1.4.4-0609505-B3	DM805-AI	$5.50

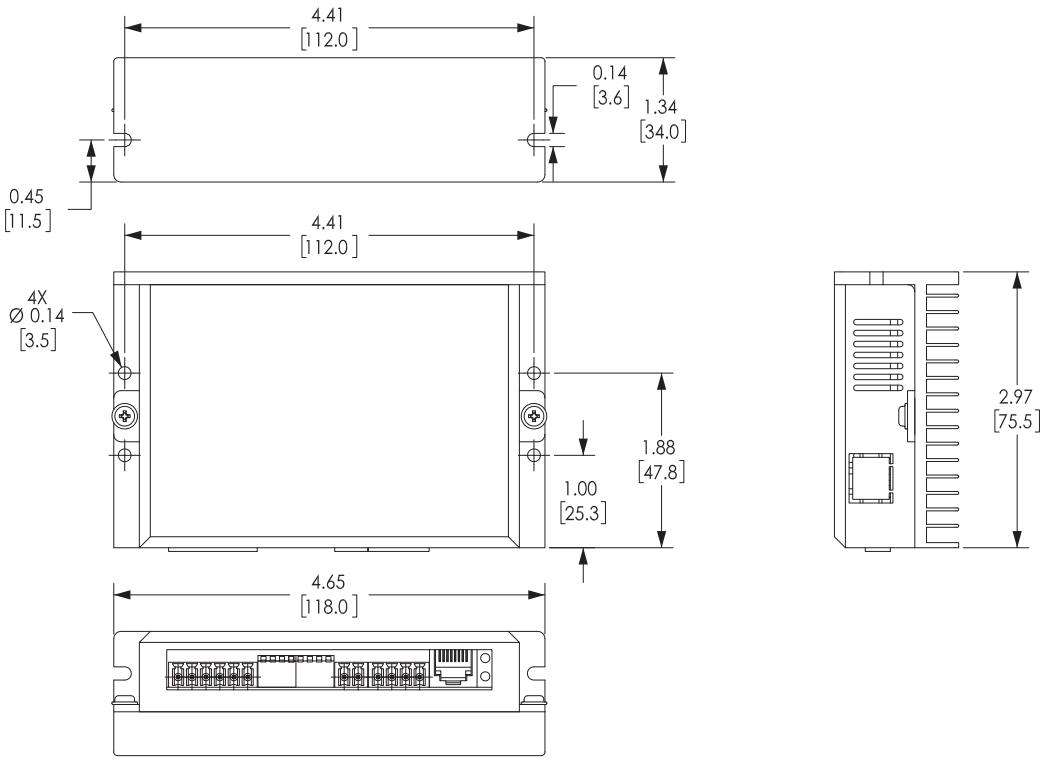
Note: *Configuration cable only required if using optional configuration software. Software configuration not necessary unless DIP switch settings and auto-tuning aren't sufficient for your application. Requires an RS232 port on your PC, or a USB to RS232 converter, like USB-RS232.*

1.4.4-0609505-B3

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: https://community.automationdirect.com/s/question/0D5Dp00000WPRm8KAH/fix-for-dm805ai-protune

DM805-AI Dimensions

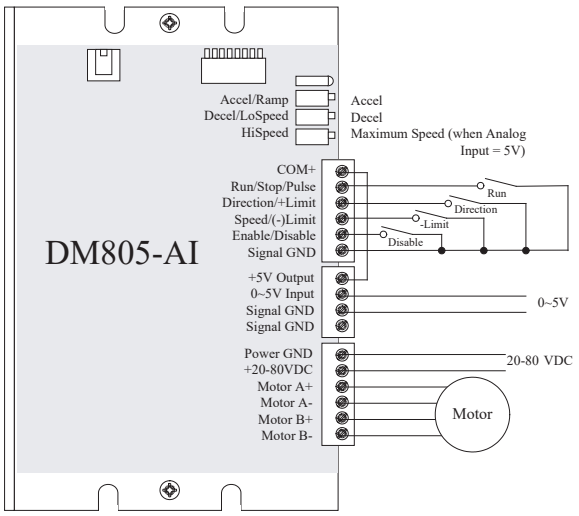
Dimensions = in [mm]



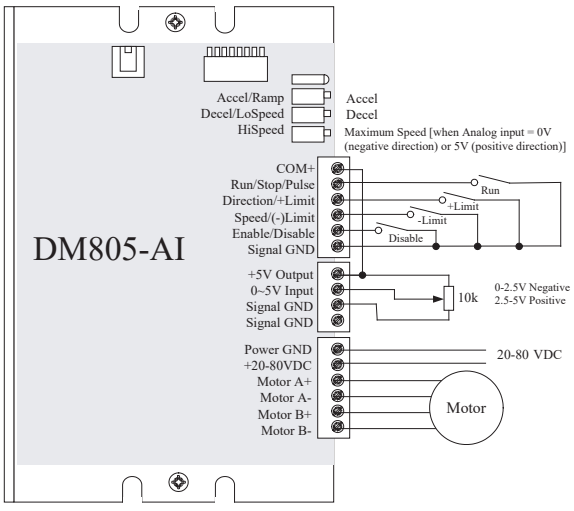
DM805-AI Wiring

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.

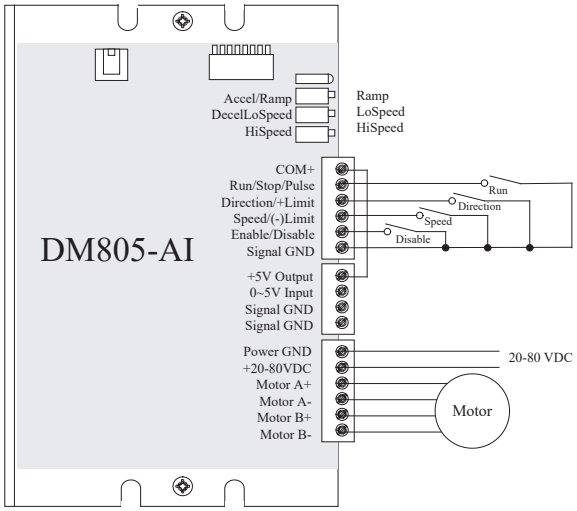
DM805-AI Wiring for Analog Speed Mode



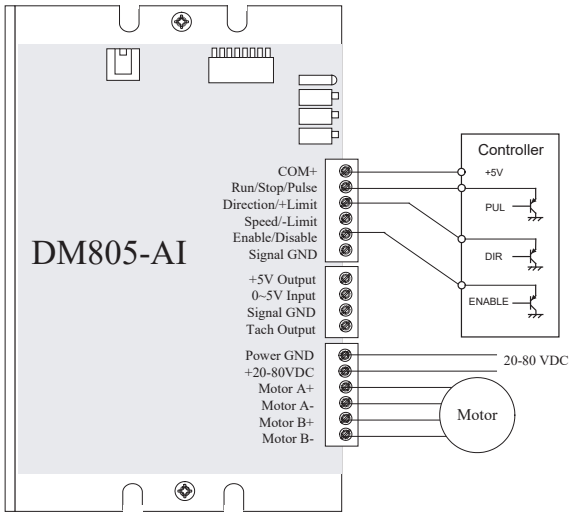
DM805-AI Wiring for External Pot Mode



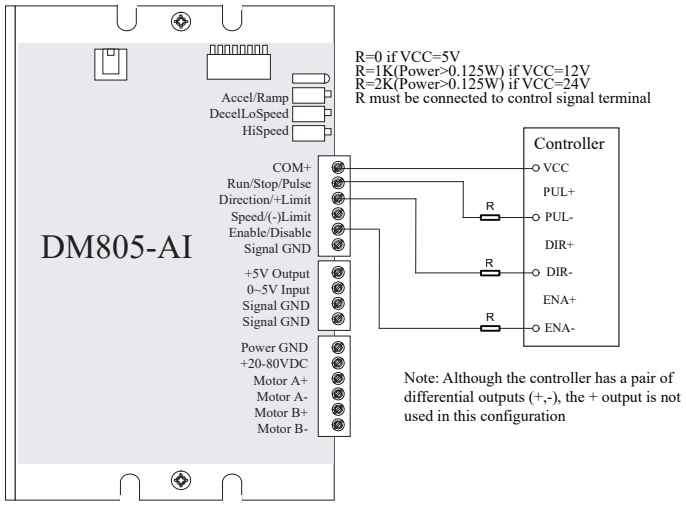
DM805-AI Wiring for Low/High Speed Mode



DM805-AI Wiring for Pulse/Direction Mode



DM805-AI Wiring for Differential Control Signal



Note: Although the controller has a pair of differential outputs (+,-), the + output is not used in this configuration

EM542S, EM556S

The EM542S and EM556S are digital stepper drives capable of pulse and direction as well as CW and CCW operation, with motor auto-configuration 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.

EM542S

Leadshine EM542S, EM556S Specifications

Drive Model		EM542S	EM556S
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 Current		7–16 mA (10mA typical)	
Pulse Input Frequency		0–200 kHz	
Minimal Pulse Width		2.5 µs	
Minimal Direction Setup		5.0 µs	
Isolation Resistance		500mΩ	
Connector P1 Functions	PUL+	Pulse signal: 5V or 24V signal (Switch S3 determines voltage), differential input. High 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.	
	PUL-		
	DIR+	DIR signal: 5V or 24V signal (Switch S3 determines voltage), differential input. High input 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 damaged.	
	DIR-		
	ENA+	Enable signal: 5V or 24V signal (Switch S3 determines voltage), differential input. High 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.	
	ENA-		
Fault and Brake Output Connector	ALM	Optional output connection. Maximum of 30V/100mA output, sinking or sourcing.	
	BR		
	COM-		
Replacement Connectors		Incoming Power = DN-2PLUG; Motor Power = DN-4PLUG; I/O = 6-pin from STP-CON-4	
Cooling		Natural cooling or forced cooling	
Ambient Temperature		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		1.4.4-0409505-B3	
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
1.4.4-0409505-B3	EM542S, EM556S	$5.50

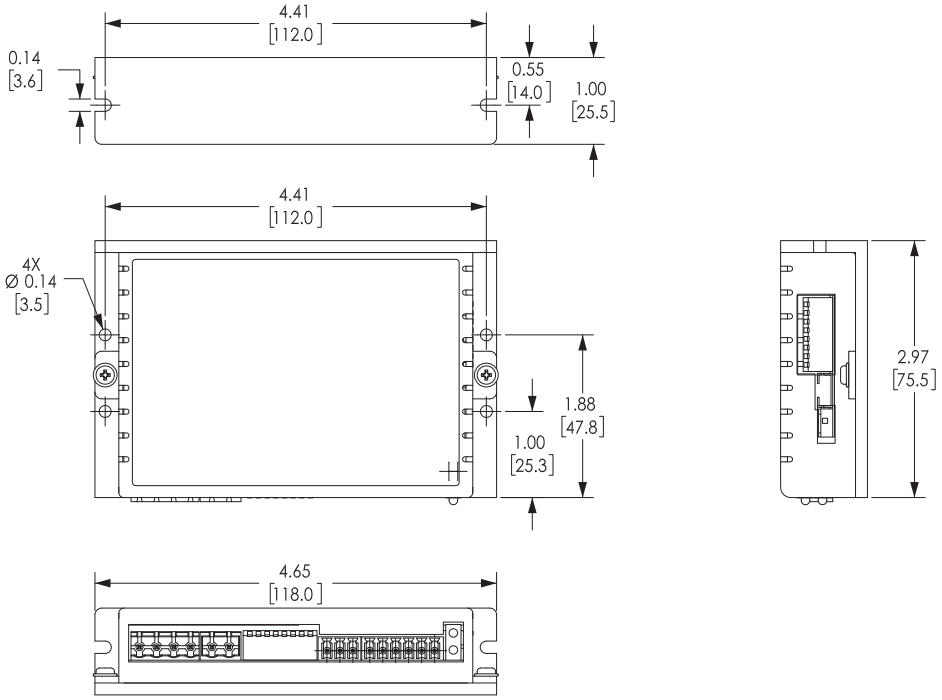
Note: Configuration cable only required if using optional configuration software. Software configuration not necessary unless DIP switch settings and auto-tuning aren't sufficient for your application. Requires an RS232 port on your PC, or a USB to RS232 converter, like USB-RS232.

1.4.4-0409505-B3

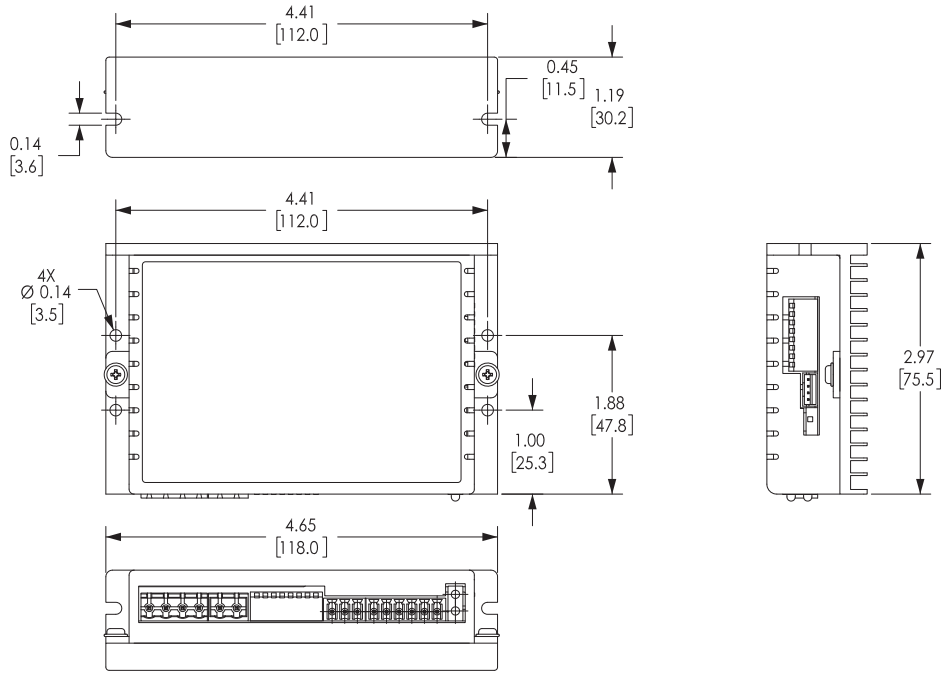
EM542S, EM556S Dimensions

Dimensions = in [mm]

EM542S



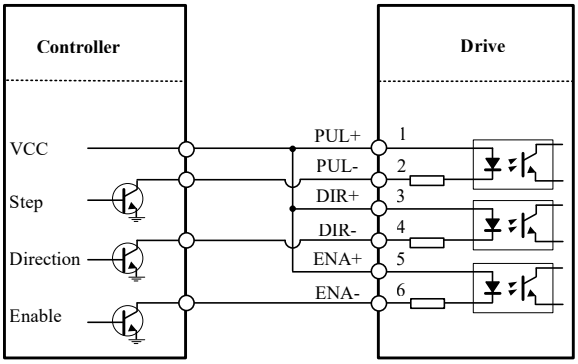
EM556S



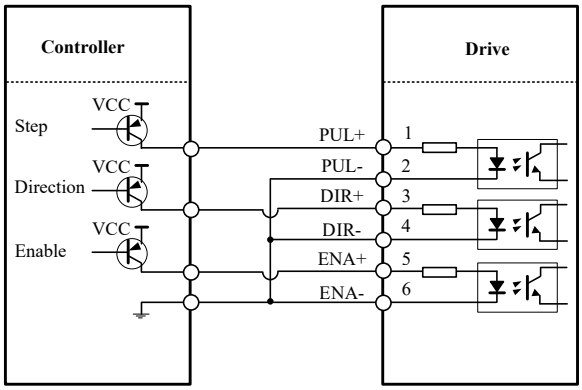
EM542S, EM556S Wiring

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