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

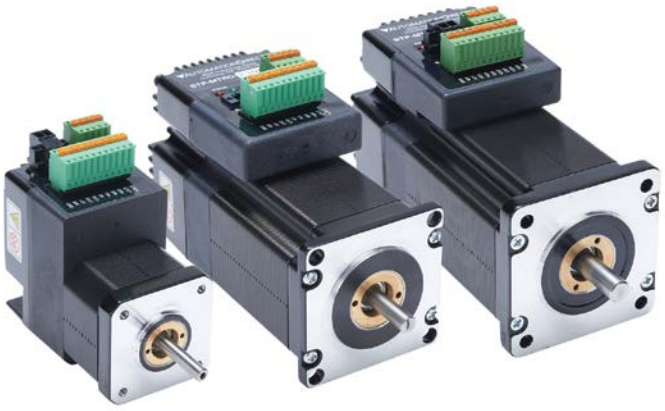
(STP-MTRD-x)

- "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	$;02b[o:	PDF
STP-MTRD-17038E	17	$;02b[n:	PDF
STP-MTRD-23042	23	$;02b[q:	PDF
STP-MTRD-23042E	23	$;02b[p:	PDF
STP-MTRD-23065	23	$;;02b[t:	PDF
STP-MTRD-23065E	23	$;02b[s:	PDF

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

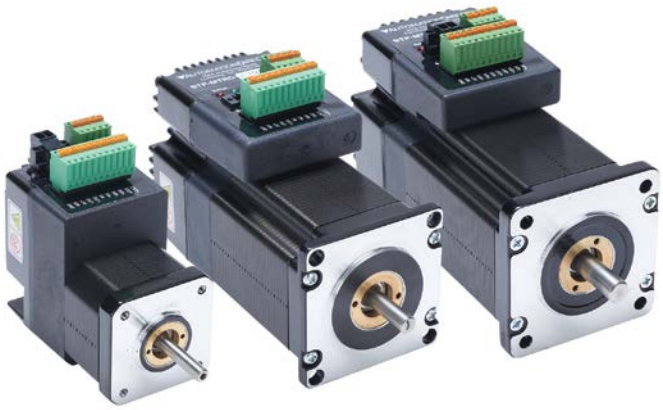
SureStep Series Part Numbers Advanced Integrated Motor/Drives

Integrated Motor/Drive	*NEMA Size*	*Price*	*Drawing*
STP-MTRD-17030R	17	$;02b[d:	PDF
STP-MTRD-17030RE	17	$;02b[c:	PDF
STP-MTRD-17038R	17	$;;02b[f:	PDF
STP-MTRD-17038RE	17	$;02b[e:	PDF
STP-MTRD-23042R	23	$;02b[h:	PDF
STP-MTRD-23042RE	23	$;02b[g:	PDF
STP-MTRD-23065R	23	$;-02b[j:	PDF
STP-MTRD-23065RE	23	$;-02b[i:	PDF
STP-MTRD-24075RV	24	$;-02b[l:	PDF
STP-MTRD-24075RVE	24	$;02b[k:	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® 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

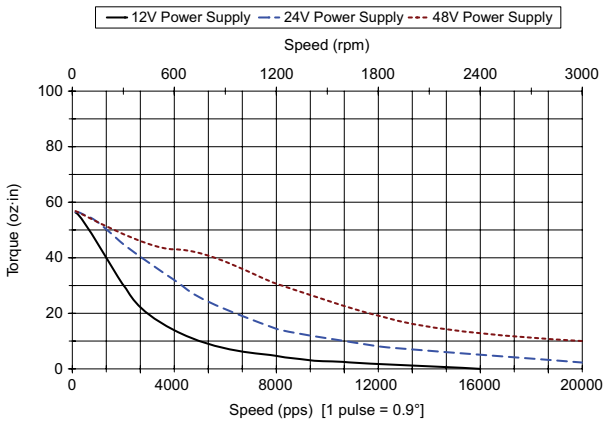
SureStep Integrated Series Specifications – Advanced						
Integrated Motor/Drive		***STP-MTRD-17030R STP-MTRD-17030RE***	***STP-MTRD-17038R STP-MTRD-17038RE***	***STP-MTRD-23042R STP-MTRD-23042RE***	***STP-MTRD-23065R STP-MTRD-23065RE***	***STP-MTRD-24075RV STP-MTRD-24075RVE***
NEMA Frame Size		NEMA 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.**

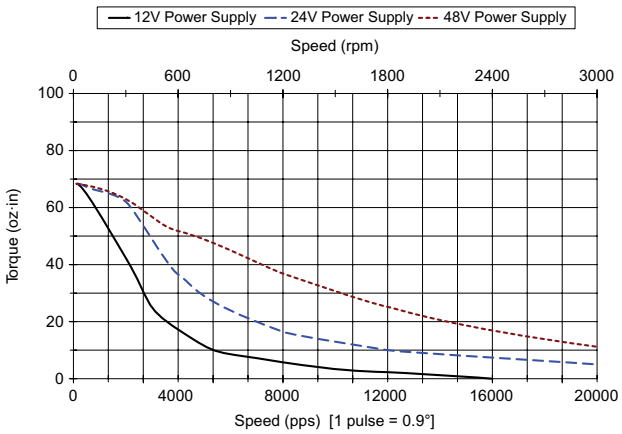
Integrated Microstepping Motors and Drives

SureStep® Integrated Motor/Drives Motor Torque vs. Speed

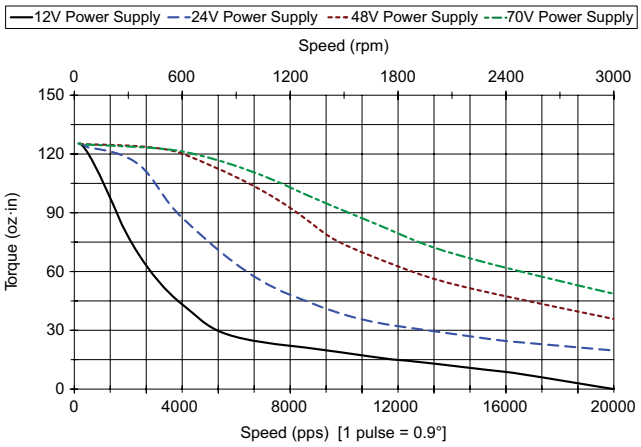
STP-MTRD-17030 Torque vs Speed (1.8° step motor; 1/2 stepping)



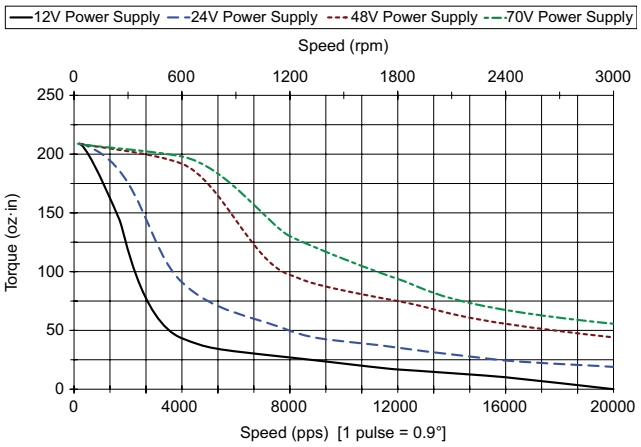
STP-MTRD-17038 Torque vs Speed (1.8° step motor; 1/2 stepping)



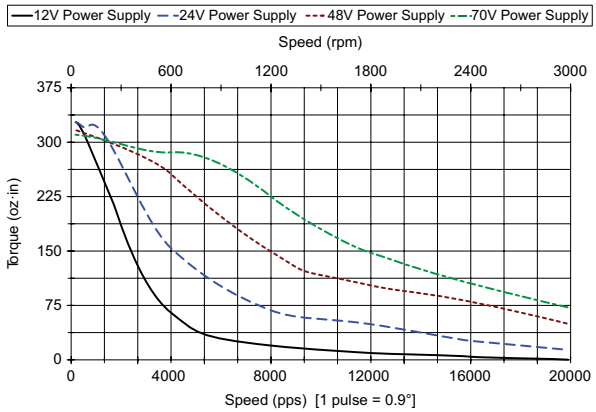
STP-MTRD-23042 Torque vs Speed (1.8° step motor; 1/2 stepping)



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



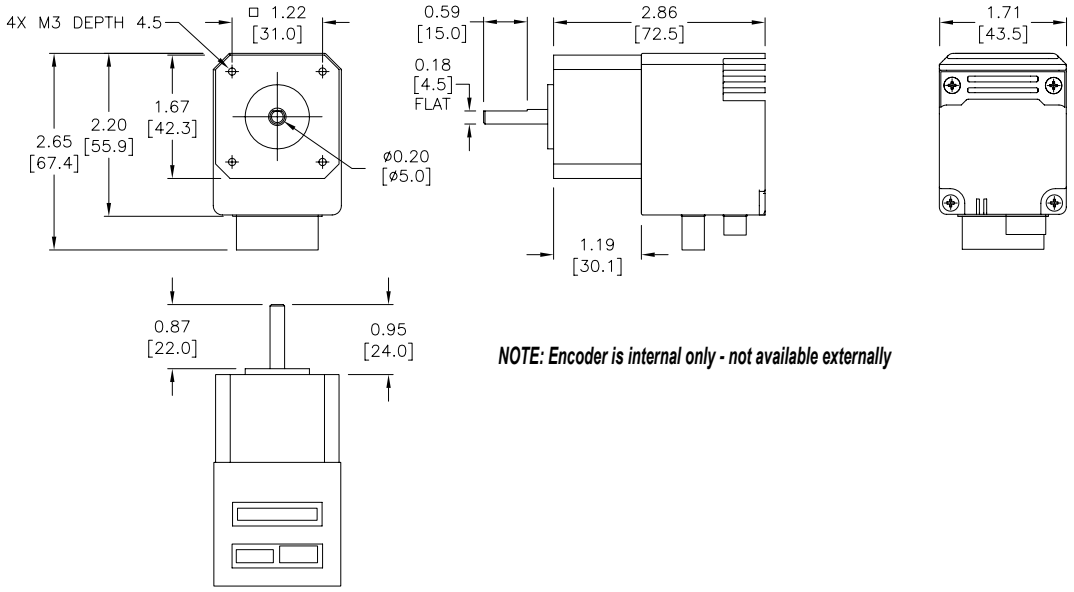
STP-MTRD-24075 Torque vs Speed (1.8° step motor; 1/2 stepping)



SureStep® Advanced Integrated Motor/Drives Dimensions

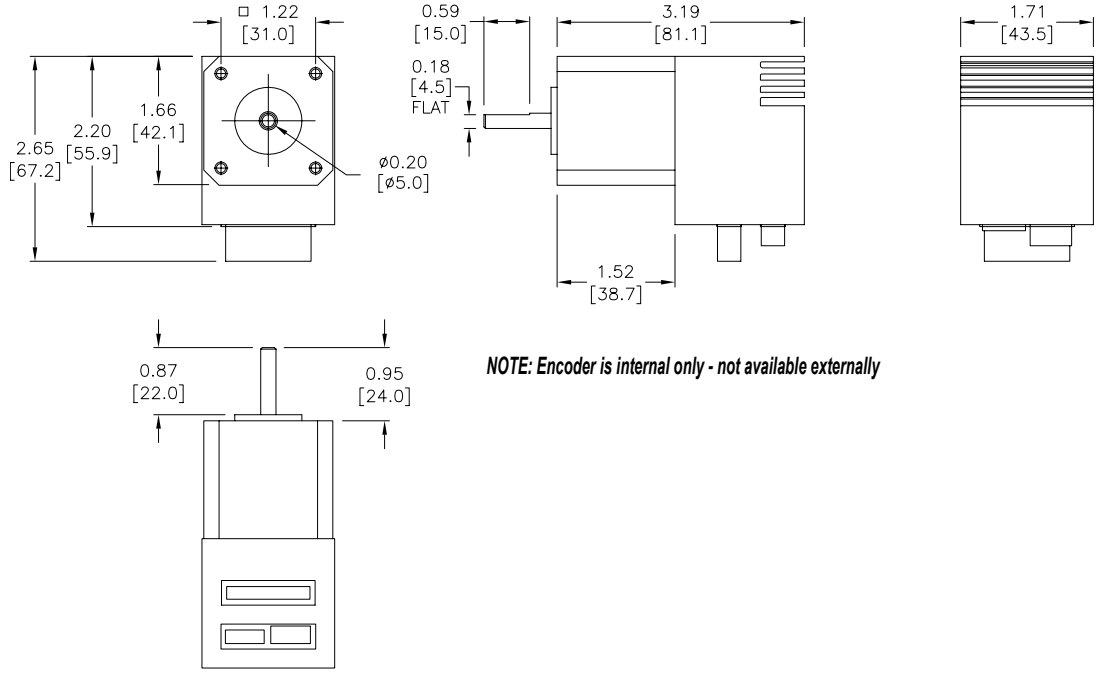
Dimensions = in [mm]

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



NOTE: Encoder is internal only - not available externally

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

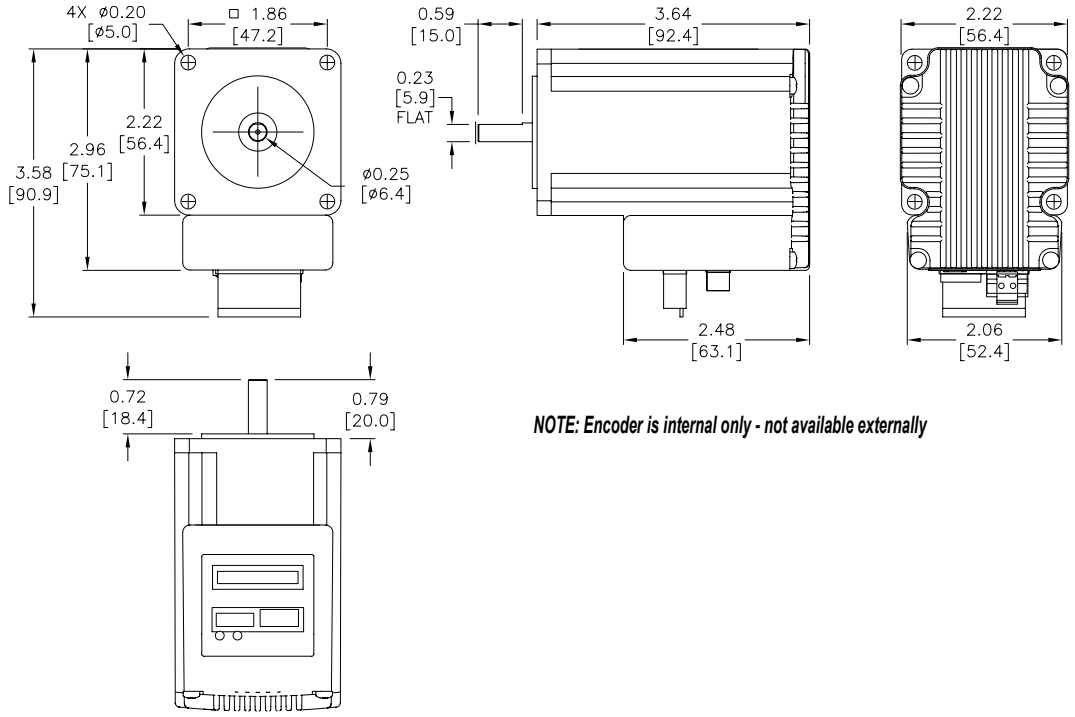


NOTE: Encoder is internal only - not available externally

SureStep® Advanced Integrated Motor/Drives Dimensions, continued

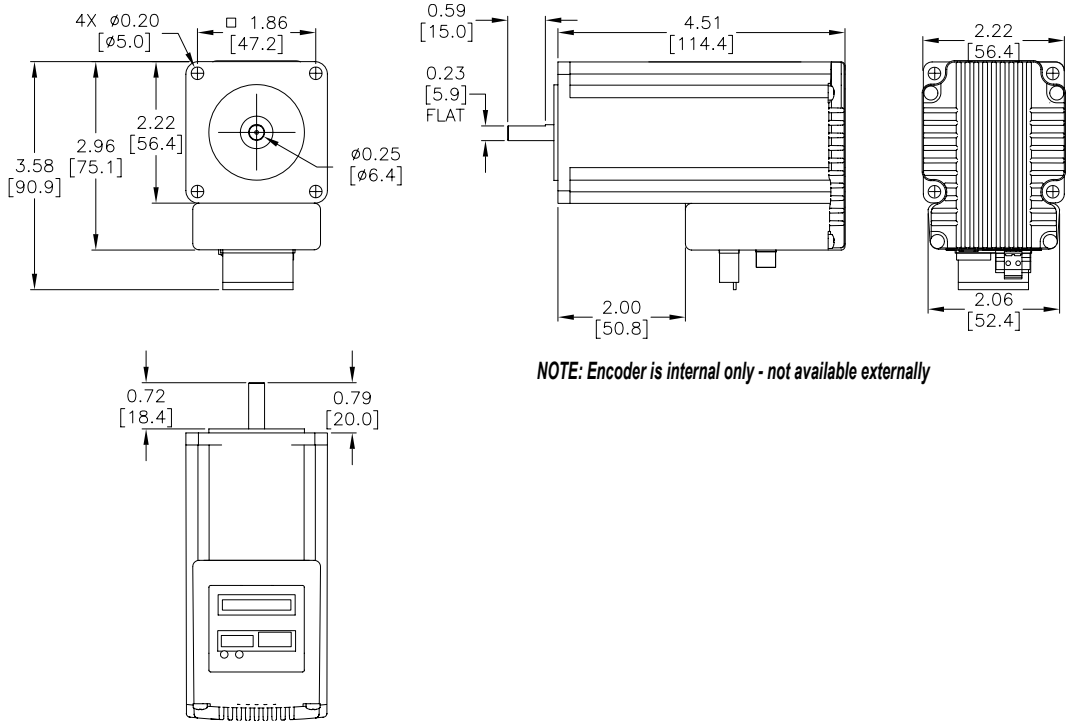
Dimensions = in [mm]

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



NOTE: Encoder is internal only - not available externally

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

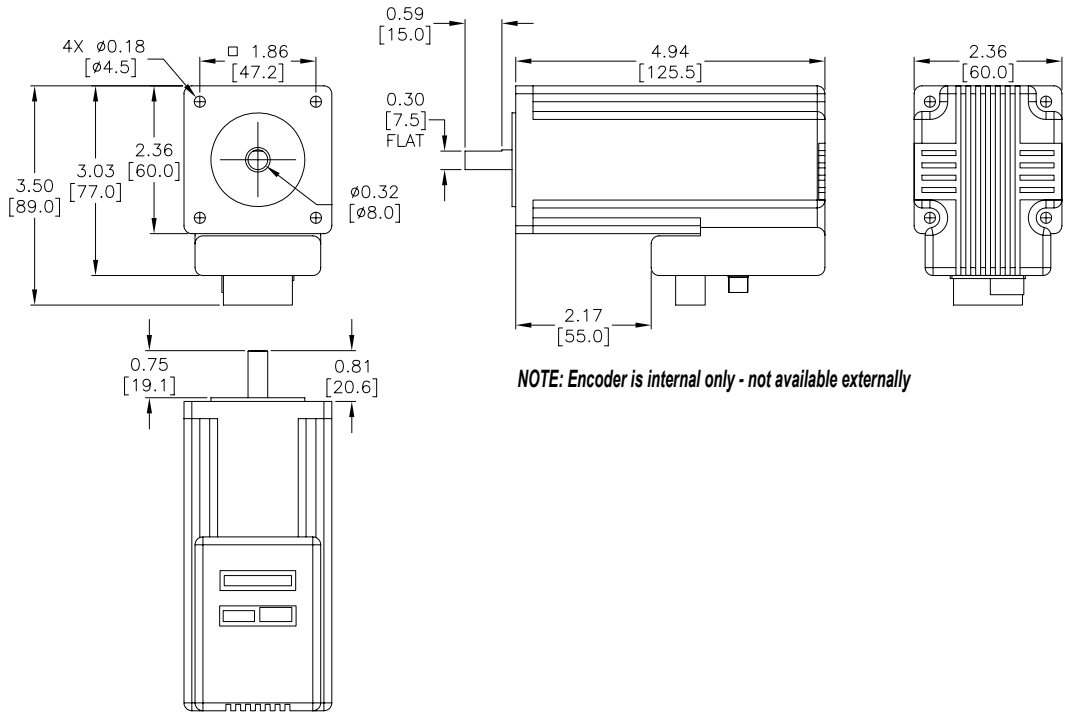


NOTE: Encoder is internal only - not available externally

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

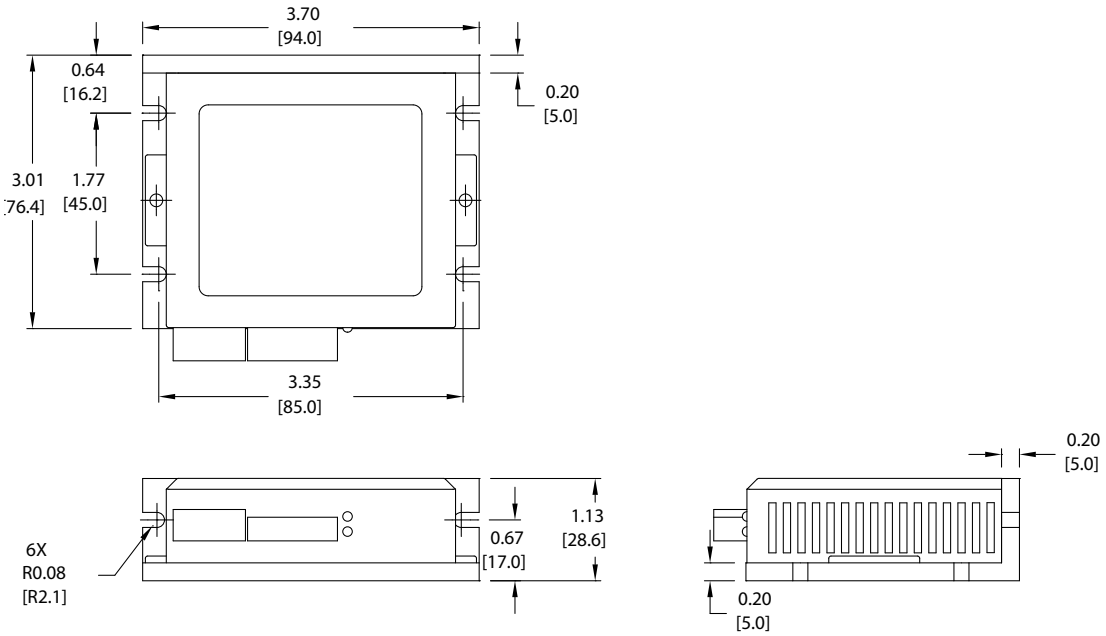
Sure Step Series Specifications – Microstepping Drives Optional Accessories			
Part Number	***Price***	***Description***	***Drawing***
STP-DRVA-RC-050A*	$4327:	Regen Clamp: 50W, for DC input stepper and servo drives, enclosed	PDF
STP-MTRA-17DMP	$2e9y:	SureStep damper, metal body. For use with NEMA 17 stepper motors with 5mm shafts. Mounting set screw included.	PDF
STP-MTRA-23DMP	$2e9z:	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).

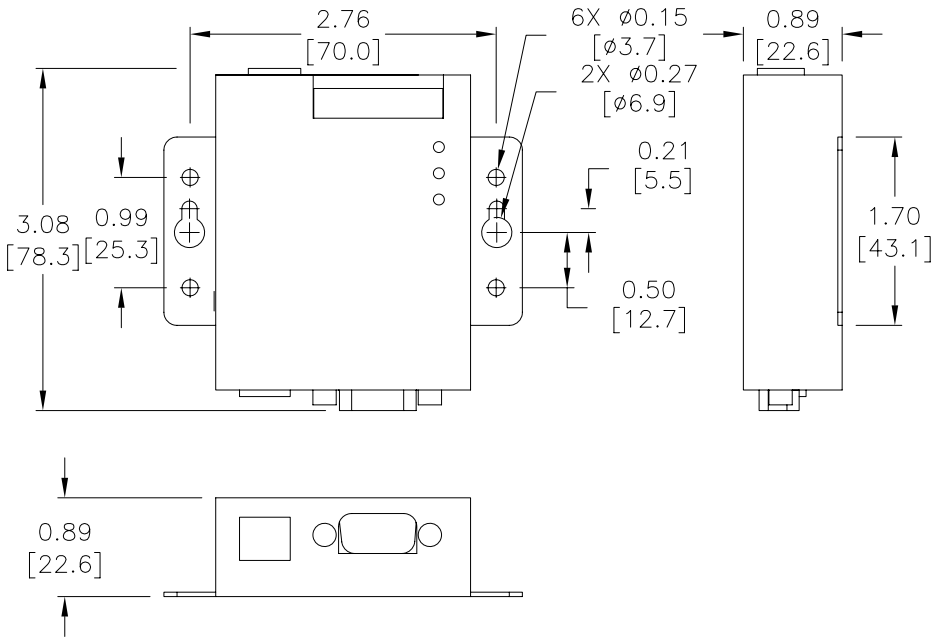
SureStep Advanced Drives communicate via RS-232 (for control and for configuration via SureMotion Pro).

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	$;02b[_:
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	$2e69:	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	$;2e9]:	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	$;2e9[:	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	$2e9_:	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	$2e9#:	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	$;2e9!:	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	$2e9?:	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	$;2e9,:	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	$02ea2:	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	$2ea3:	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	$04328:	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	$4329:	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

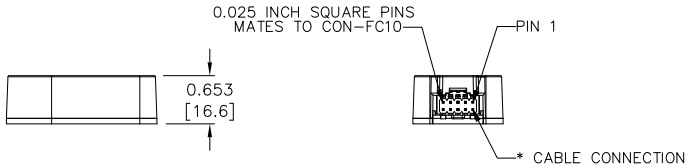
Sure Step Series Encoder Compatibility						
Part Number	***PPR***	***Bore Diameter***	***Output Type***	***Encoder Cable***	***PLC Compatibility***	***Motor Compatibility***
STP-MTRA-ENC1	1000	5mm	Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	STP-MTRx-14xxxD STP-MTRx-14xxxE STP-MTRx-17xxxD 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*	

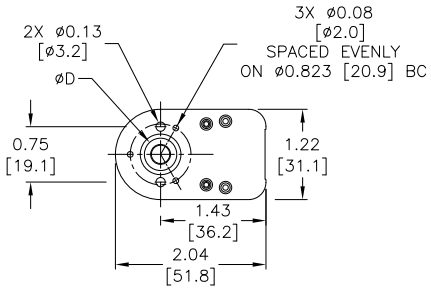
*** Requires FC-ISO-C**

SureStep® Stepping System Encoders

Dimensions = in [mm]

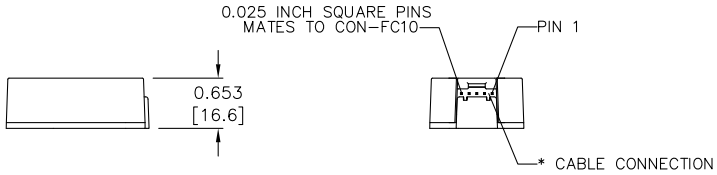
STP-MTRA-ENC1, 3, 5, 7

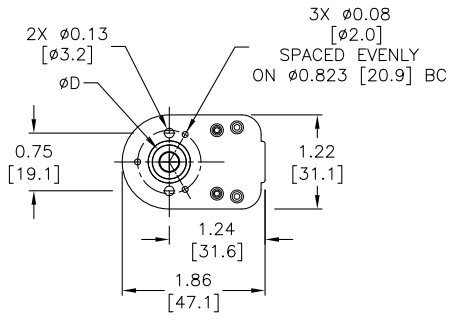




Bolt Hole Circles for Mounting	
Encoder	***Holes***
ENC1, ENC2, ENC3, ENC4, ENC5, ENC6, ENC7, ENC8	2 holes @ 19.05mm (.75") 3 holes @ 20.9mm (.823")

STP-MTRA-ENC2, 4, 6, 8

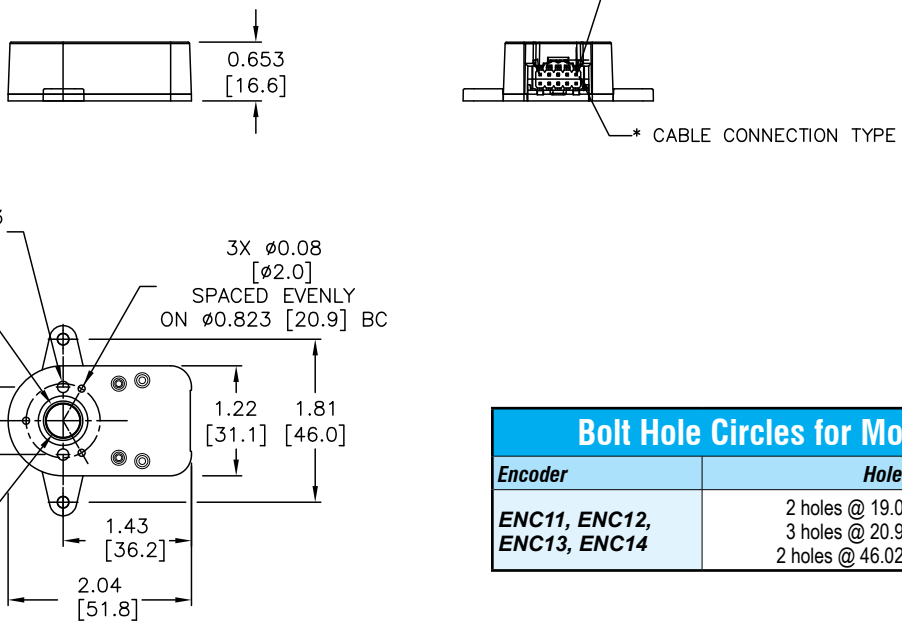




SureStep® Stepping System Encoders

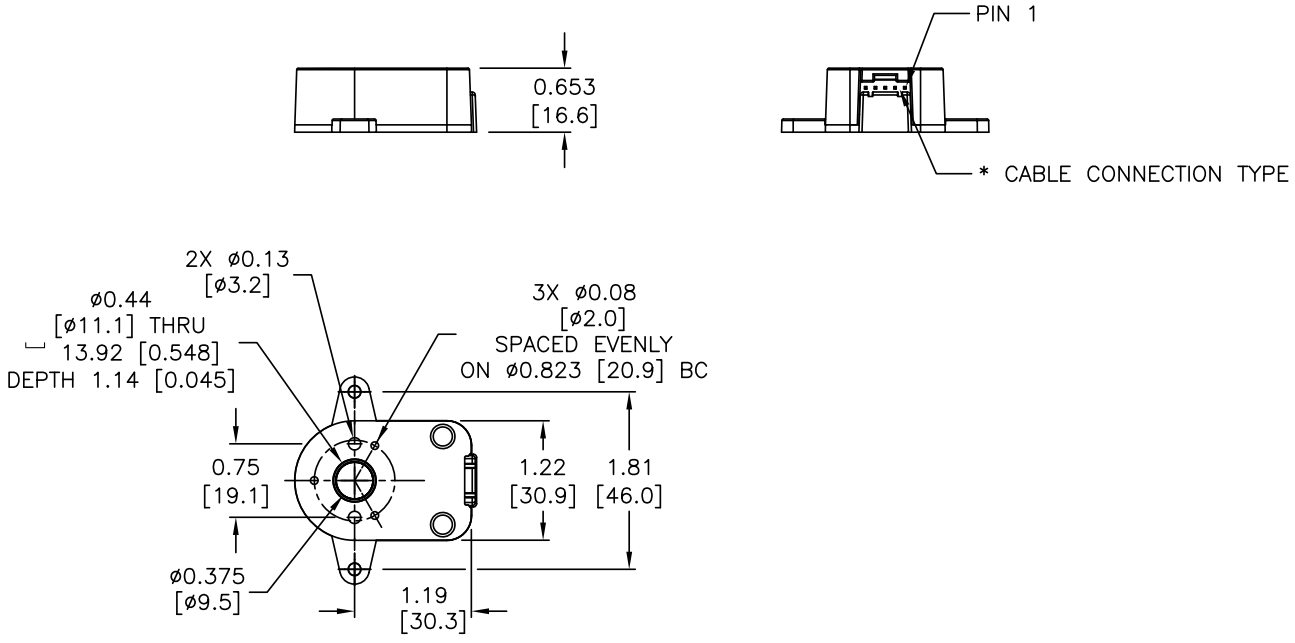
Dimensions = in [mm]

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 Cables

SureStep® Cables

SureStep Series – Stepping System Cables						
Cable	**Price**	**Purpose**	**Length**	**Use With**	**Cable End Connectors**	**Drawing**
STP-EXT-006	$-2e9i:	motor to drive extension	6 ft	STP-MTR-xxxxx(x)	pigtail / Molex 43020-0401 connector	PDF
STP-EXT-010	$-2e9j:		10 ft			PDF
STP-EXT-020	$04vd:		20 ft			PDF
STP-EXTH-006	$2e9k:		6 ft	STP-MTR**H**-xxxxx(x)	pigtail / Molex 39-01-2041 connector	PDF
STP-EXTH-010	$-2e9l:		10 ft			PDF
STP-EXTH-020	$04ve:		20 ft			PDF
STP-EXTHW-006	$;3?]8:		6 ft	STP-MTR**HW**-xxxxx(x)	Bulgin # PXP4011/06P/6065	PDF
STP-EXTHW-010	$;3?]3:		10 ft			PDF
STP-EXTHW-020	$;03?]5:		20 ft			PDF
STP-EXTL-006	$2e9n:		6 ft	STP-MTR**L**-xxxxx(x)	pigtail / Molex 105308-22004 connector	PDF
STP-EXTL-010	$2e9d:		10 ft			PDF
STP-EXTL-020	$2e9e:		20 ft			PDF
STP-EXTW-006	$;3?]6:		6 ft	STP-MTR**W**-xxxxx(x)	Bulgin # PXP4011/06P/6065	PDF
STP-EXTW-010	$;3?]7:		10 ft			PDF
STP-EXTW-020	$;03?]4:		20 ft			PDF
STP-EXT42-006	$;4!qb:	motor to drive extension	6 ft	STP-MTRAC-42xxxx	10-pin / pigtail	PDF
STP-EXT42-010	$;4!qc:		10 ft			PDF
STP-EXT42-020	$;4!qd:		20 ft			PDF
STP-EXT42H-006	$;4!qe:		6 ft	STP-MTRACH-42xxxxx		PDF
STP-EXT42H-010	$;;4!qf:		10 ft			PDF
STP-EXT42H-020	$;4!qa:		20 ft			PDF
STP-232RJ11-CBL*	$04yx:	programming/ communication	10 ft	STP-DRV-4850, STP-DRV-80100	DB9 female / RJ11(6P4C)	PDF
STP-232HD15-CBL-2**	$;04yf:	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**	$04yg:	communication	6.6 ft	STP-DRV-4850, STP-DRV-80100 DL05, CLICK	RJ11 (6P4C) plug / RJ12 6-pin plug	n/a
STP-CBL-CA6	$;2b[y:	control cable	6 ft	STP-MTRD-17038 STP-MTRD-17038E	11-pin / pigtail	PDF
STP-CBL-CA10	$;2b[z:	control cable	10 ft		11-pin / pigtail	PDF
STP-CBL-CA20	$;;02b[]:	control cable	20 ft		11-pin / pigtail	PDF
STP-CBL-EA6	$;2b[u:	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	$;2b[v:	encoder cable	10 ft		10-pin / pigtail	PDF
STP-CBL-EA20	$;2b[x:	encoder cable	20 ft		10-pin / pigtail	PDF
STP-CBL-EB3	$3?8z:	encoder cable	3 ft	AMT112Q-V AMT112S-V (for both line driver and push-pull (totem) encoders)	17-pin / pigtail	PDF
STP-CBL-EB6	$;2e9f:	encoder cable	6 ft		17-pin / pigtail	PDF
STP-CBL-EB10	$02e9g:	encoder cable	10 ft		17-pin / pigtail	PDF
STP-CBL-EB20	$02e9h:	encoder cable	20 ft		17-pin / pigtail	PDF
STP-CBL-ED6	$2e9s:	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	$;2e9t:	encoder cable	10 ft		5-pin / pigtail	PDF
STP-CBL-ED20	$2e9u:	encoder cable	20 ft		5-pin / pigtail	PDF
STP-CON-1	$;2b[#:	replacement connector kit	n/a	STP-DRV-4845 & -6575	-	n/a
STP-CON-2	$;;2b[!:	replacement connector kit	n/a	STP-DRV-4850 & 80100	-	n/a

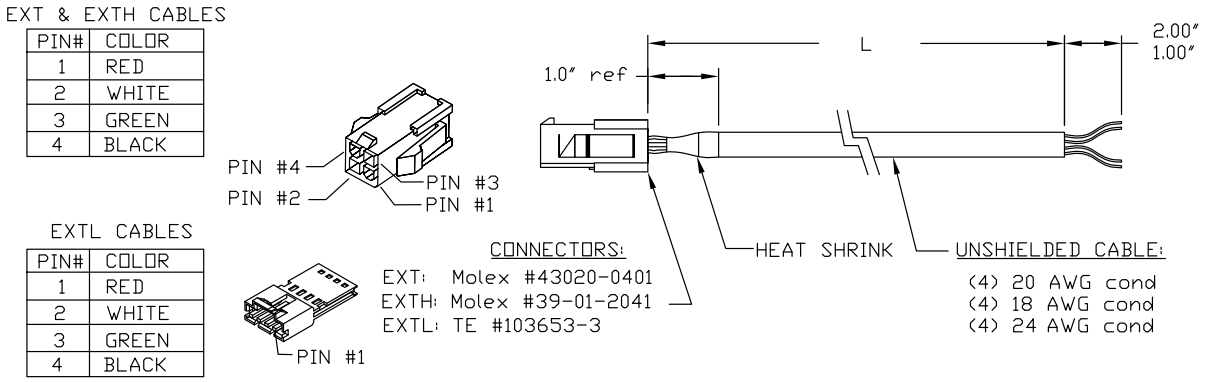
** Programming/communication cable STP-232RJ11-CBLis available for spare or replacement purposes. (One cable is included with each software programmable drive.)*

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

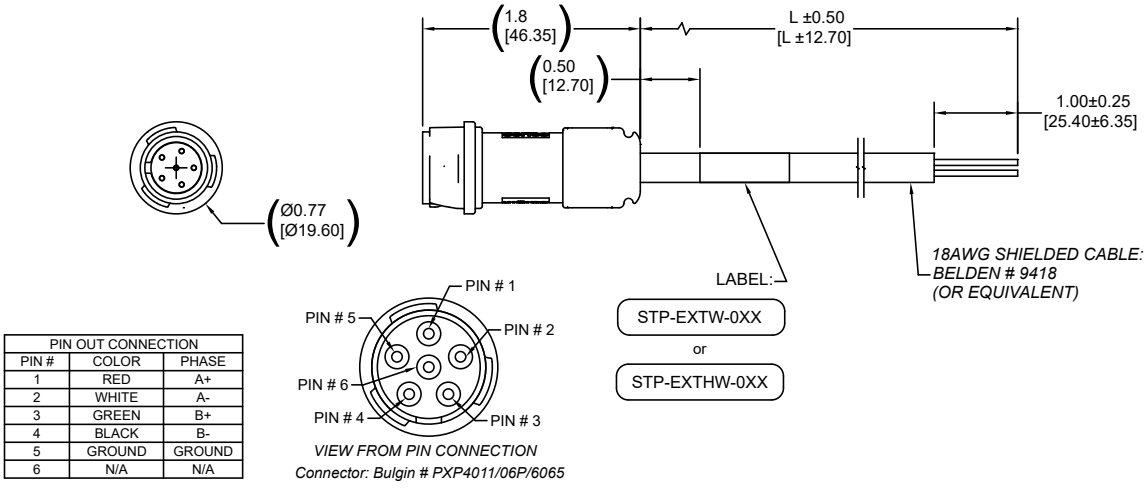
SureStep® Cables, *continued*

SureStep Series – Stepping System Cables						
Cable	***Price***	***Purpose***	***Length***	***Use With***	***Cable End Connectors***	***Drawing***
STP-CON-3	$;2b[?:	replacement connector kit	n/a	STP-MTRD-xxxxxR	-	n/a
STP-CON-4	$432s:	replacement connector kit	n/a	STP-DRVA-RC-050**A**	-	n/a
STP-CON-5	$;432t:	replacement connector kit	n/a	STP-DRV-4830	-	PDF
STP-CON-6	$432u:	replacement connector kit	n/a	STP-DRVAC-24025	-	n/a
STP-485DB9-CBL-2	$;;2b[[:	4-wire programming cable	6.5 ft	STP-MTRD-xxxxxR	DB9 / Phoenix 5-conductor plug	PDF

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



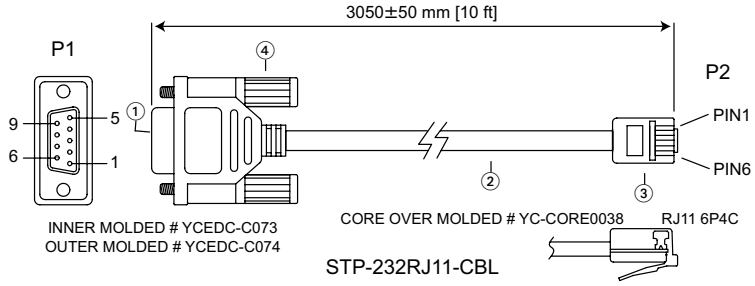
STP-EXTW-0xx and STP-EXTHW-0xx Extension Cable Wiring Diagram



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

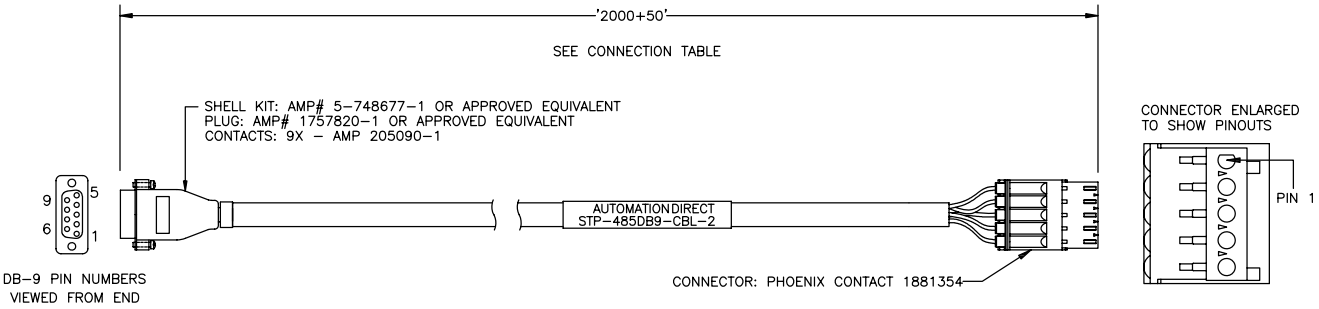
(DB9) P1		P2 (RJ11 6P4C)
2	RX — TX	3
3	TX — RX	5
4	nc — nc	4
5	GND — GND	2

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

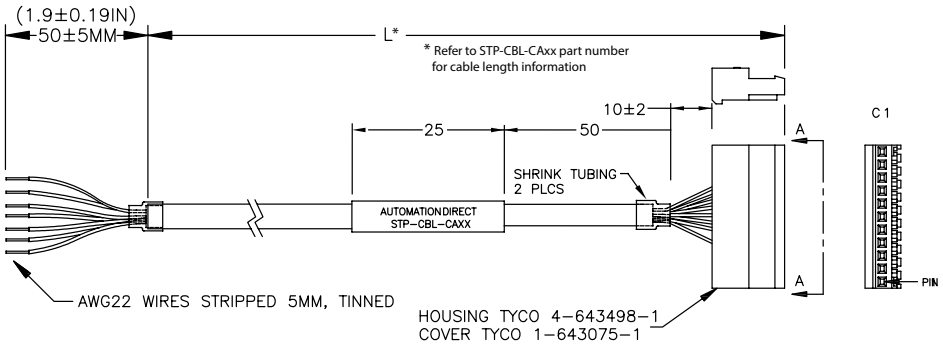


SureStep® Cables, continued

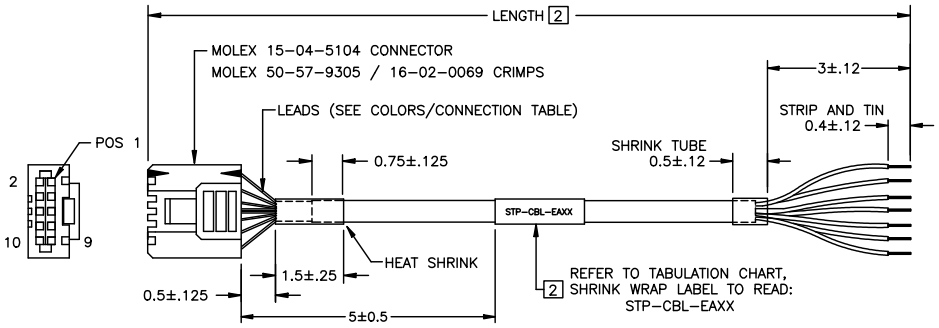
STP-CBL-CAxx Control Cable Wiring Diagram

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



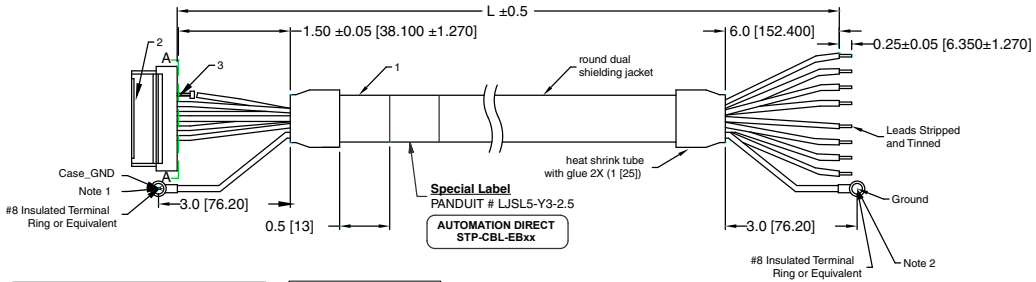
CONN	CONNECTION TABLE		
PIN	LEAD COLOR	SIGNAL	
2	GREEN/WHITE	GROUND	
7	GREEN	POWER+	TWISTED PAIR
3	ORANGE/WHITE	Z–	
4	ORANGE	Z+	TWISTED PAIR
5	BLUE/WHITE	A–	
6	BLUE	A+	TWISTED PAIR
9	BROWN/WHITE	B–	
10	BROWN	B+	TWISTED PAIR
1	N/C	N/A	
8	N/C	N/A	NO CONNECTION

WIRE: 24AWG, CABLE: UL2464.

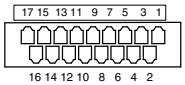
STP-CBL-EBxx Encoder Cable Wiring Diagram

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