SureStep® Stepping System Drives

SureStep® Microstepping Drives Overview

SureStep Series – Microstepping Drives Features Comparison							
Drive Model		**Standard Microstepping Drives**			**Advanced Microstepping Drives**		
		STP-DRV-6575	**STP-DRV-4035**	**STP-MTRD-x**	**STP-DRV-4850**	**STP-DRV-80100**	**STP-MTRD-xR**
Price		$89.00	$165.00	See Integrated Motor/ Drives section	$230.00	$275.00	See Integrated Motor/Drives section
Drive Type		Microstepping drive with pulse input		Integrated stepper motor/drive	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	open-frame	enclosed	enclosed		enclosed
Output Current		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: 24–65 VDC range: 20–75 VDC	nominal: 12–32 VDC range: 12–42 VDC	nominal: 12-48 VDC (NEMA 17) 12-70 VDC (NEMA 23) range: 10-55 VDC (NEMA 17) 11-74 VDC (NEMA 23)	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	MOSFET, dual H-bridge, bipolar chopper	Dual H-bridge, 4 quadrant	MOSFET, dual H-bridge, 4-quadrant		Dual H-bridge, 4 quadrant
Current Control		4-state PWM @ 20 kHz	4-state PWM @ 20 kHz	4-state PWM @ 16 kHz	4-state PWM @ 20 kHz	4-state PWM @ 20 kHz	4-state PWM @ 20kHz
Microstep Resolution		dipswitch selectable			software selectable		
		200 to 20,000 steps/rev	400 to 10,000 steps/rev	200 to 25,600 steps/rev	200 to 51200 steps/rev		
Modes of Operation	**Step & Dir**	YES	YES	YES	YES	YES	YES
	CW/CCW	YES	n/a	YES	YES	YES	YES
	A/B Quad	n/a	n/a	n/a	YES	YES	YES
	Oscillator	n/a	n/a	n/a	YES	YES	YES
	Serial Indexing	n/a	n/a	n/a	YES	YES	YES
Digital Input Signals	**Step/Pulse**	step & direction, CW/ CCW step	step & direction	step & direction, CW/ CCW step	step & direction, CW/CCW step, A/B quadrature, run/stop & direction, jog CW/CCW, CW/CCW limits		
	Direction						
	Enable	motor disable	motor disable	motor enable	motor enable, alarm reset, speed select (oscillator mode)		
Analog Input		n/a	n/a	n/a	speed control		signal range, offset, dead band, and filtering
Output Signal		fault	n/a	fault	fault, motion, tach		brake, fault, motion, tach
Communication Interface		n/a	n/a	n/a	YES (programming/communication cable included)		
Non-volatile Memory Storage		n/a	n/a	n/a	YES		
Idle Current Reduction		YES					
Self Test		YES					
Additional Features		Load inertia (anti-resonance & damping feature to improve motor performance) Step pulse noise filter	n/a	Load inertia (anti-resonance & damping feature to improve motor performance) Step pulse noise filter	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.							

SureStep® Stepping System Drives

SureStep® Standard Microstepping Drives

SureStep Series Specifications – Standard Microstepping Drives			
Microstepping Drive		***STP-DRV-6575***	***STP-DRV-4035***
Drive Type		Microstepping drive with pulse input	Microstepping drive with pulse input
Output Current		Selectable from 1.0–7.5 A/phase (peak of sine)	Selectable from 0.4 to 3.5 A/phase (maximum output power is 140W)
Input Voltage (external p/s required)		Nominal: 24–65 VDC Range: 20–75 VDC	Nominal: 12–32 VDC Range: 12–42 VDC (including ripple voltage)
Configuration Method		Rotary dial, DIP switches, jumpers	DIP switches
Amplifier Type		MOSFET, dual H-bridge, 4-quadrant	MOSFET, dual H-bridge, bipolar chopper
Current Control		4-state PWM @ 20 kHz	4-state PWM @ 20 kHz
Protection		n/a	n/a
Recommended Input Fusing		Fuse: 7A fast-acting; ADC #ACG7; Holder: ADC # DN-F6L110	Fuse: 4A fast-acting; ADC # ACG4; Holder: ADC # DN-F6L110
Input Signals	***Input Circuit***	5–24 VDC nominal (range: 4–30 VDC); optically isolated, differential.	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.
	Step/Pulse	Minimum pulse width = 0.25 µs. Maximum pulse frequency = 150 kHz or 2MHz (user selectable).	Motor steps on falling edge of pulse and minimum pulse width is 0.5 µs (1MHz)
	Direction	FUNCTIONS: step & direction, CW/CCW step	Needs to change at least 2 microseconds before a step pulse is sent
	Enable	FUNCTION: disable motor when closed	Logic 1 will disable current to the motor (current is enabled with no hook-up or logic 0)
	Analog	n/a	n/a
Output Signal		30 VDC / 80 mA max, optically isolated photodarlington, sinking or sourcing. Function = closes on drive fault.	n/a
Features	***Current Reduction***	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 %.)	n/a
	Idle Current Reduction	90% or 50% of running current. (Holding torque is reduced by the same %.)	0% or 50% reduction (Idle current setting is active if motor is at rest for 1 second or more)
	Microstep Resolution	20000, 12800, 5000, 2000, 400 smooth, 400, 200 smooth, or 200 steps/rev.	400 (200x2), 1,000 (200x5), 2,000 (200x10), or 10,000 (200x50) steps/rev
	Phase Current Setting	(1.3–6.3) x 80%–120% DIP switch selectable	0.4 to 3.5 A/phase with 32 selectable levels
	Self Test	Automatically rotates the motor back and forth two turns in each direction in order to confirm that the motor is operational.	Uses half-step to rotate 1/2 revolution in each direction at 100 steps/second.
	Step Pulse Noise Filter	Select 150 kHz or 2MHz	n/a
	Load Inertia	Set motor and load inertia range to 0–4x or 5–10x.	n/a
Connectors		Removable screw terminal blocks. Motor & Power Supply: 30–12 AWG; Signals: 30–14 AWG	Screw terminal blocks with AWG 18 maximum wire size
Maximum Humidity		90% non-condensing	90% non-condensing
Storage/Ambient Temperature		0 to 50 °C [32 to 122 °F] (mount to suitable heat sink)	-20 to 80 °C [-4 to 176 °F]
Operating Temperature		0 to 85 °C [32 to 185 °F] (interior of electronics section)	0 to 55 °C [32 to 131 °F] recommended; 70 °C [158 °F] maximum
Drive Cooling Method		Natural convection (mount drive to metal surface)	Natural convection (mount drive to metal surface to dissipate heat)
Mounting		(2) #6 screws to mount wide or narrow side to metal surface	(4) #4 screws to mount on wide side; (2) #4 screws to mount on narrow side
Weight		10.8 oz [306g] – (including mating connectors)	9.3 oz. [264 g]
Agency Approvals		CE	CE

SureStep® Stepping System Drives

SureStep® Advanced Microstepping Drives

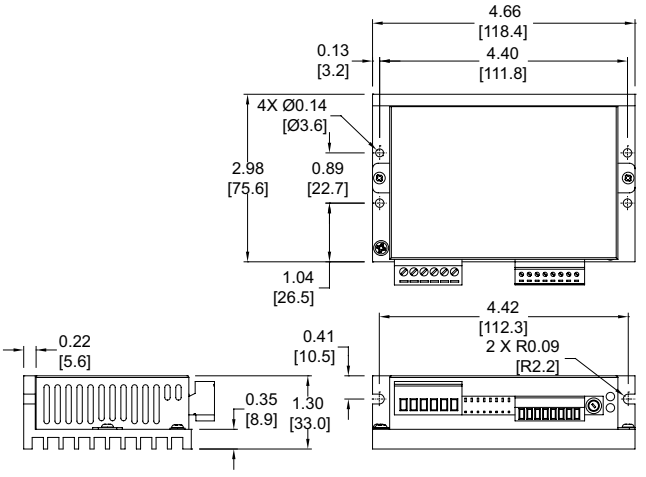
SureStep Series Specifications – Advanced Microstepping Drives			
Microstepping Drive		**STP-DRV-4850**	**STP-DRV-80100**
Drive Type		Advanced microstepping drive with pulse or analog input, serial communication (serial communication allows indexing capability)	
Output Current		0.1-5.0 A/phase (in 0.01A 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		*Sure*Motion 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	

Stepping System Drives

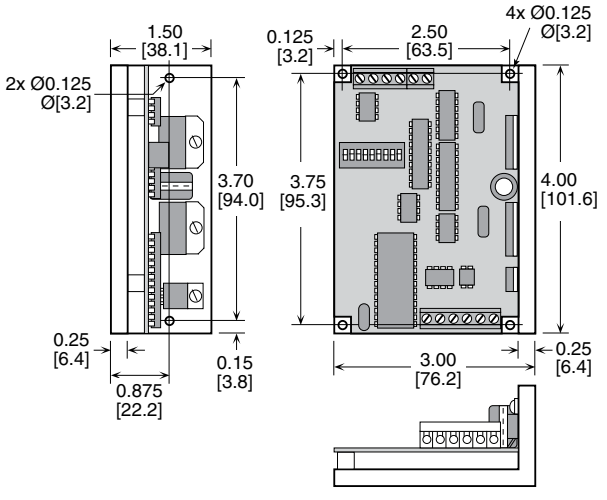
SureStep® Microstepping Drives Dimensions

Dimensions = in [mm]

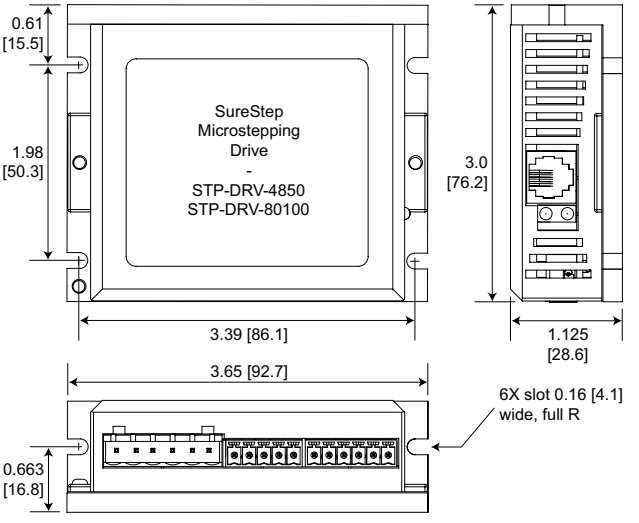
STP-DRV-6575



STP-DRV-4035



STP-DRV-4850 & -80100



Sure step® Stepping System Accessories

SureStep® Microstepping Drives Accessories

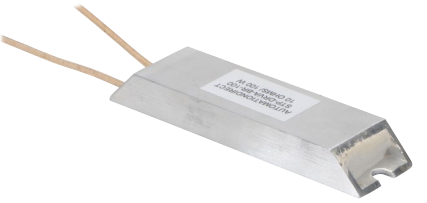
Braking Accessories

If you plan to use a regulated or switching power supply, you might encounter problems from regeneration. 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.

This can trip the overvoltage protection of a switching power supply or a drive, and cause it to shut down.

To solve this problem, AutomationDirect offers a regeneration clamp and a braking resistor as optional accessories. The regen clamp has a built-in 50W braking resistor. For additional braking power (larger overhauling loads), an optional 100W braking resistor is also available.

Regeneration Clamp



Braking Resistor

Regeneration Clamp Description

As with most stepper systems, a clamp circuit is often required to limit increased power supply bus voltage when the motor is decelerating under load. This is commonly referred to as "regeneration," which is what happens when DC motors are driven by their load. During regeneration, the DC motor can produce enough voltage to actually exceed the input power supply voltage.

With a Regen Clamp, one or more stepper drives can be protected from "Over Voltage" conditions by placing the clamp module between the power supply and the drive. The clamp tracks the input power supply, and will operate from 24 to 80 volts. No adjustments are needed.

The Regen Clamp is designed to handle a wide range of conditions. The voltage input matches the needs of the SureStep stepper drives by providing 24 to 80 VDC capabilities, and external power resistors can be added for even greater continuous power requirements. The clamp modules are small and compact to minimize impact on the system design. More than one stepper drive can be connected to the clamp module with the potential to handle an entire multi-axis sytem.

Regeneration Clamp Features

- Built-in 50W power resistor for more continuous current handling (optional 100W resistor is also available)
- Mounted on a heat sink
- Voltage range: 24–80 VDC; no user adjustments required
- Power: 50W continuous; 800W peak
- Wire connection: 6-pin screw terminal block; 12–18 AWG wire.
- 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.
- RoHS

Replacement Encoder

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. Installation tool and mounting hardware is included. For more information and details on how to wire the STP-MTRA-ENC1, please see the SureStep User Manual.

Sure Step Series Specifications – Microstepping Drives Optional Accessories

Part Number	*Price*	*Description*
STP-DRVA-RC-050 *	$89.00	Regen Clamp: use with DC-powered stepper & servo drives; 50W, 24–80 VDC
STP-DRVA-BR-100	$64.00	Braking Resistor: use with STP-DRV-RC-050 regen clamp; 100W, 10Ω
STP-MTRA-ENC1	$85.00	Replacement encoder: use with STP-MTRD-xxxxxE models, 5VDC, line driver (differential) output, 1000 ppr. Installation tool and mounting hardware included.

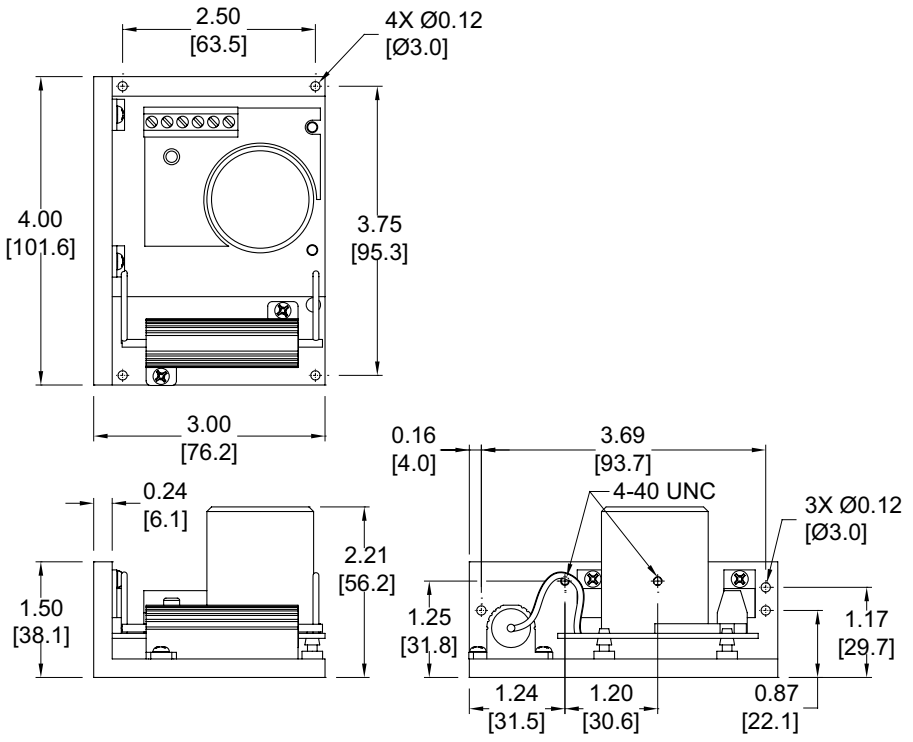
**** Do not use the regeneration clamp in an atmosphere containing corrosive gases.***

Stepping System Accessories

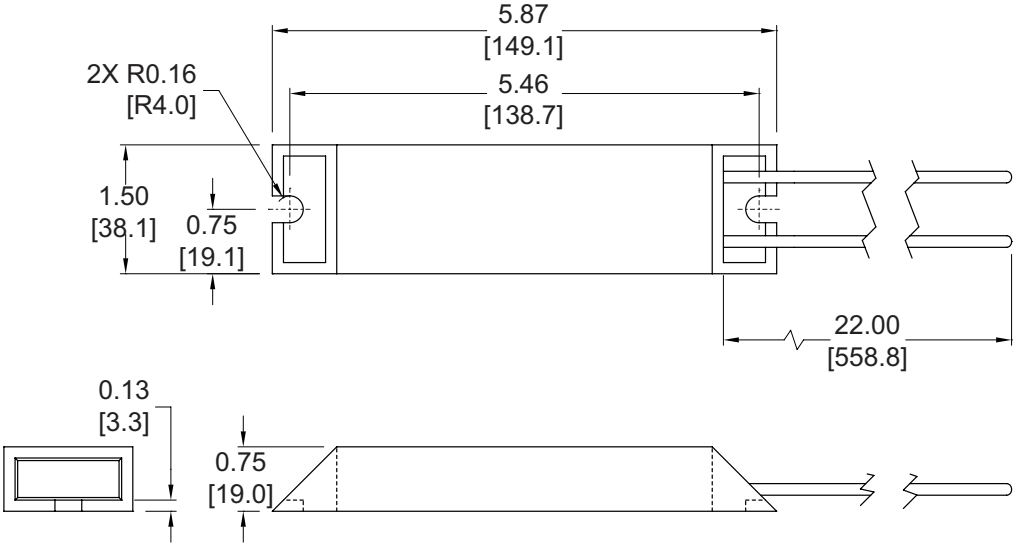
SureStep® Microstepping Drives Accessories

Dimensions = in [mm]

STP-DRVA-RC-050



STP-DRVA-BR-100



SureStep® Stepping System Accessories

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).

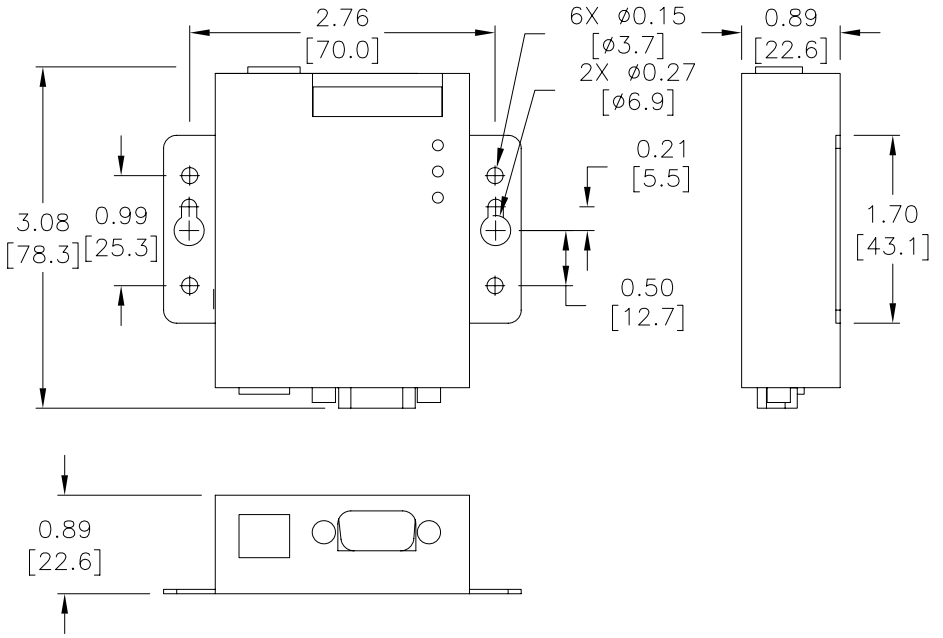
SureStep Advanced Drives communicate via RS-232 (for control and for configuration via SureMotion Pro).

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	$99.00
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 Cables

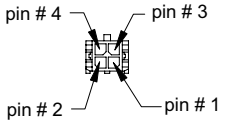
SureStep® Cables

SureStep Series – Stepping System Cables					
Cable	**Price**	**Purpose**	**Length**	**Use With**	**Cable End Connectors**
STP-EXT-020	$15.00	motor to drive extension	20 ft	STP-MTR-xxxxx(D)	pigtail / Molex 43020-0401 connector
STP-EXTH-020	$30.00	motor to drive extension	20 ft	STP-MTR**H**-xxxxx(D)	pigtail / Molex 39-01-2041 connector
STP-232RJ11-CBL *	$9.00	programming/communication	10 ft	STP-DRV-4850 STP-DRV-80100	DB9 female / RJ11(6P4C)
STP-232HD15-CBL-2 **	$10.50	communication	6.6 ft	STP-DRV-4850 STP-DRV-80100 DL06, D2-250-1, D2-260	HD 15-pin male / RJ12 6-pin plug
STP-232RJ12-CBL-2 **	$6.00	communication	6.6 ft	STP-DRV-4850 STP-DRV-80100 DL05, CLICK	RJ12 6-pin plug / RJ12 6-pin plug
STP-CBL-EA6	$16.00	encoder cable	6 ft	STP-MTRD-17038E STP-MTRD-23042E STP-MTRD-23065E	10-pin / pigtail
STP-CBL-EA10	$19.00	encoder cable	10 ft		10-pin / pigtail
STP-CBL-EA20	$28.00	encoder cable	20 ft		10-pin / pigtail
STP-CBL-CA6	$16.00	control cable	6 ft	Standard STP-MTRD-x integrated motor/drives	11-pin / pigtail
STP-CBL-CA10	$19.00	control cable	10 ft		11-pin / pigtail
STP-CBL-CA20	$28.00	control cable	20 ft		11-pin / pigtail
STP-CON-1	$15.00	replacement connector kit	n/a	STP-DRV-6575	-
STP-CON-2	$15.00	replacement connector kit	n/a	STP-DRV-4850 & 80100	-
STP-CON-3	$30.00	replacement connector kit	n/a	STP-MTRD-xxxxxR	-
STP-485DB9-CBL-2	$35.00	4-wire programming cable	6.5 ft	STP-MTRD-xxxxxR	DB9 / Phoenix 5-conductor plug

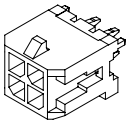
**** Programming/communication cable STP-232RJ11-CBLis available for spare or replacement purposes. (One cable is included with each software programmable drive.)***

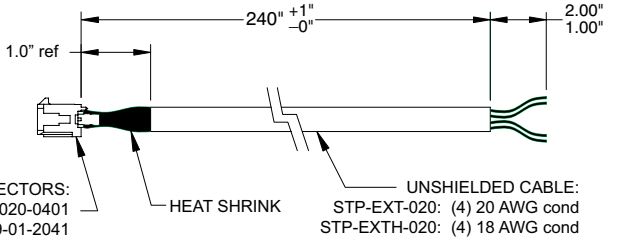
***** Refer to the ZIPLinks Wiring Solutions section for complete information regarding cables STP-232HD15-CBL-2 and STP-232RJ12-CBL-2.***

Extension Cable Wiring Diagram

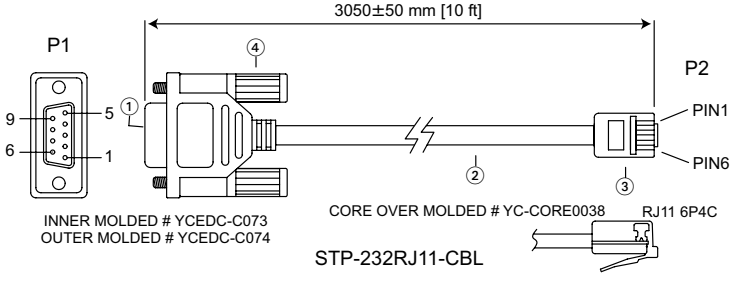


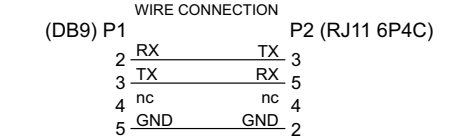
PIN #	COLOR
1	red
2	white
3	green
4	black





STP-232RJ11-CBL Programming Cable Wiring Diagram





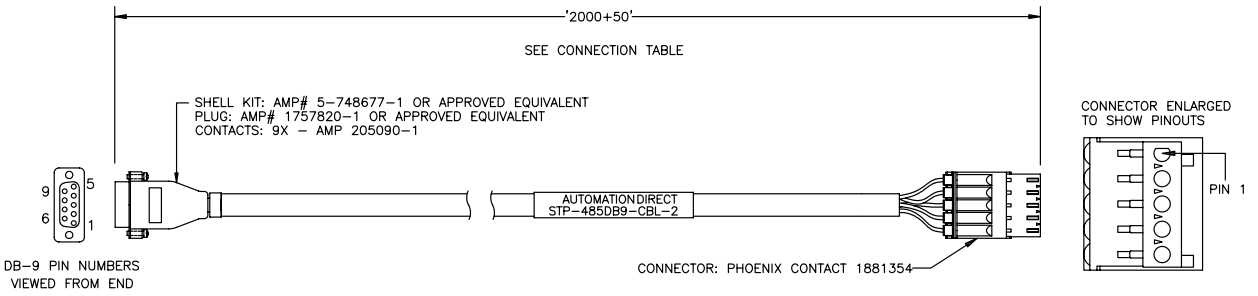
①	DB 9P FEMALE CONNECTOR SHELL: FRONT NICKEL BACK TIN INSULATOR COLOR: BLACK
②	CABLE: CAT-5 UTP 24AWG (7/0.203BA*2PR) 100MHz COLOR: BLACK OD: 4.5mm
③	RJ11 6P4C PLATED GOLD 3U"
④	SCREW: #4-40UNC PD40*175TNP COLOR: BLACK

Stepping System Cables

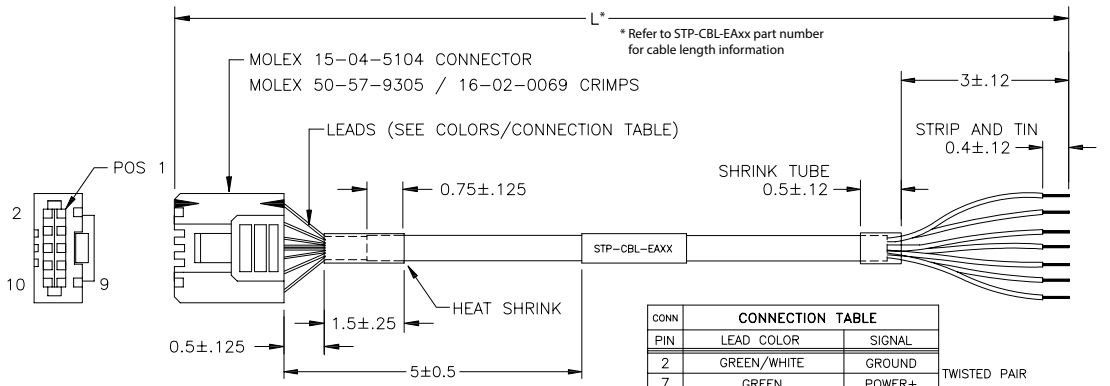
SureStep® Cables

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



STP-CBL-EAxx Encoder Cable Wiring Diagram



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

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