

ST5-Q-EN

DC Advanced Microstep Drive w/ Ethernet & Q Programming



Product Features

- Programmable microstepping drive with advanced current control
- Q Programmer™ for robust motion control programming
- 744 lines of stored program capability
- Math calculations using analog and digital parameters
- Supports all "S" drive control modes as well
- Modbus TCP for easy PLC and HMI communication
- Compatible with many 3rd party HMIs
- Wide current range 0.1 to 5.0 A/phase (peak of sine) with idle current reduction
- Advanced anti-resonance algorithm
- Torque ripple smoothing
- Microstepping and Microstep Emulation
- 8 digital inputs, 4 digital outputs, optically isolated
- 2 analog inputs, +/-10 volt range
- Fast 10/100 Ethernet for programming and communications
- UDP & TCP support

Description

The ST5-Q-EN stepper drive is a DC-powered microstepping drive for controlling two-phase, bipolar step motors. It offers advanced current control and a sophisticated 3rd generation anti-resonance algorithm that electronically dampens motor and system resonances to improve motor smoothness and usable torque over a wide speed range. The drive also employs electronic torque ripple smoothing and microstep emulation to greatly reduce motor noise and vibration. The drive must be powered from 24-48 VDC and can output up to 5.0 A/phase (peak-of-sine) to the step motor. Over-voltage, over-temperature and over-current protection features prevent damage while running in adverse conditions. The drive is complemented by a specifically matched set of NEMA 11 through NEMA 23 frame stepper motors (see Related and Recommended products below).

The ST5-Q-EN can operate in pulse & direction, velocity, and streaming command modes, plus it has the ability to run stand-alone Q programs stored in non-volatile memory. Q programs are created using the [Q Programmer™](#) software, which provides multi-tasking, math functions, conditional processing, data register manipulation, and more features in a robust yet simple text-based programming language. The drive is setup and configured using Applied Motion's [ST Configurator™](#) software. Preconfigured motor setup files included with [ST Configurator™](#) make it easy to set up the drive for optimum results.

For connecting to external devices such as control signals, incremental encoders, limit switches, proximity or photoelectric sensors, PLC I/O, lamps, and other devices, the drive comes with 8 digital inputs, 4 digital outputs, and 2 single-ended analog inputs (analog inputs can be wired together as 1 differential analog input). Adjustable digital filters are present on the digital inputs for enhanced reliability in noisy environments.

The drive comes with an Ethernet port for configuration and programming. The Ethernet port is fast 10/100 Mbit, and the drive supports both TCP and UDP communication protocols.

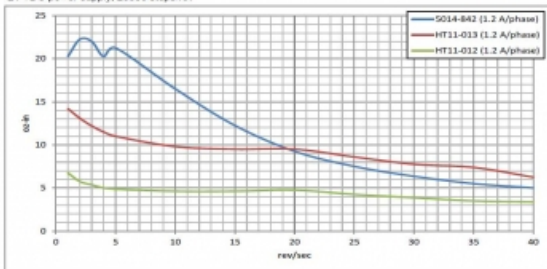
All ST drives are CE approved and RoHS compliant.

Specifications

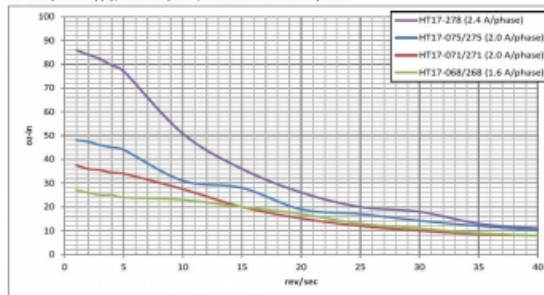
Model Number:	ST5-Q-EN
Part Number:	5000-177
Supply Voltage:	24-48 VDC
Supply Voltage Type:	DC
Control Modes:	Step & Direction Velocity (Oscillator) Streaming Commands Analog Positioning Encoder Following Q Programming Modbus TCP
Output Current:	0.1-5.0 A/phase
Communication Ports:	Ethernet
Encoder Feedback:	No
Step Resolution:	Full Half Microstepping Microstep Emulation
Idle Current Reduction:	0-90%
Setup Method:	Software setup
Digital Inputs:	8
Digital Outputs:	4
Analog Inputs:	1 differential or 2 single-ended
Dimensions:	5.0 x 3.0 x 1.75 inches
Weight:	10.4 oz
Operating Temperature Range:	0-70 °C
Ambient Temperature Range:	0-55 °C
Ambient Humidity:	90% max, non-condensing
Status LEDs:	1 red, 1 green
Circuit Protection:	Short circuit Over-voltage Under-voltage Over-temp

Torque Curves

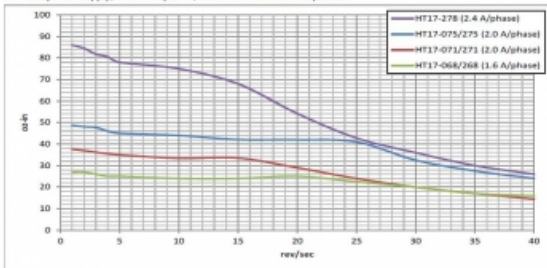
HT11-012, HT11-013, 5014-842
24 VDC power supply, 20000 steps/rev



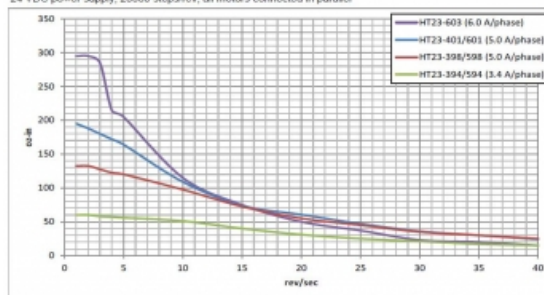
HT17
24 VDC power supply, 20000 steps/rev, all motors connected in parallel



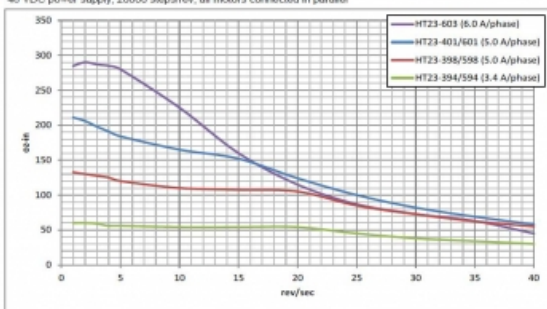
HT17
48 VDC power supply, 20000 steps/rev, all motors connected in parallel



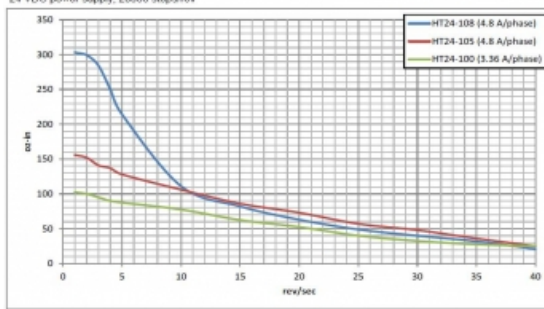
HT23
24 VDC power supply, 20000 steps/rev, all motors connected in parallel



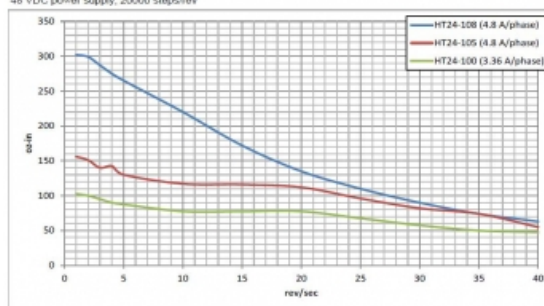
HT23
48 VDC power supply, 20000 steps/rev, all motors connected in parallel



HT24
24 VDC power supply, 20000 steps/rev



HT24
48 VDC power supply, 20000 steps/rev



Software

Software: [SCL Utility](#)
[ST Configurator™](#)

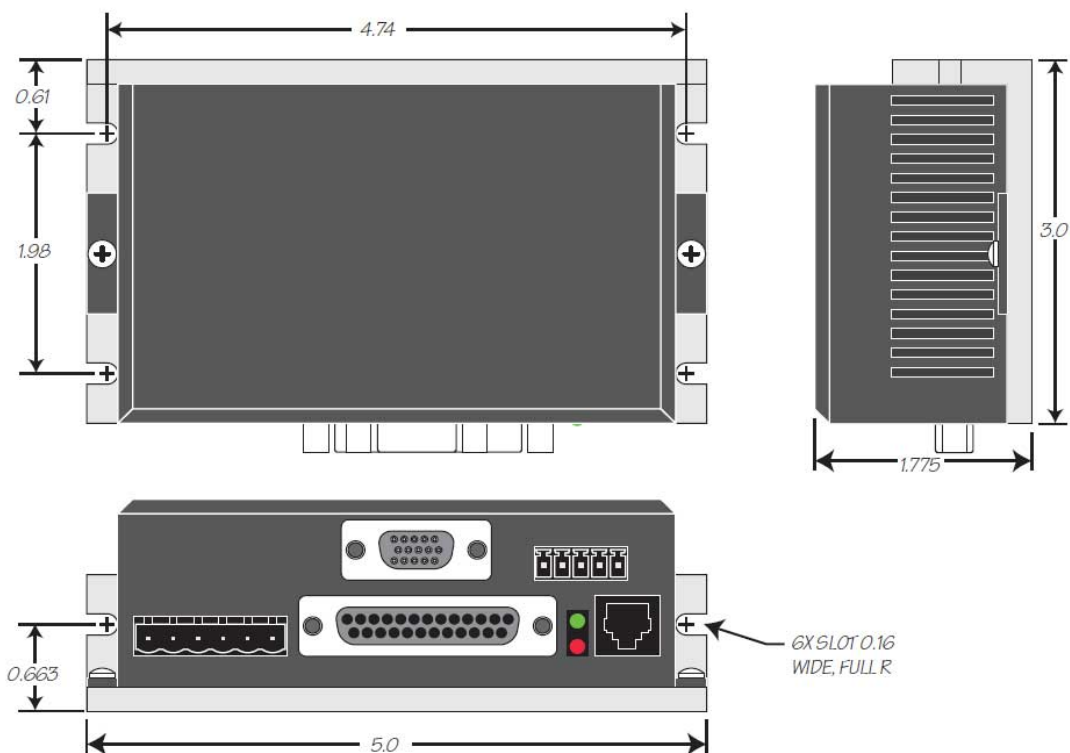
Sample Code: [C_sharp_UDP_example.zip](#)
[VB6_UDP_example.zip](#)
[VB6_TCP_example.zip](#)

Downloads

Manuals:	ST5-10-QSi_Hardware_Manual_920-0004F-opt-.pdf ST5_10_Q_QuickSetupGuide_920-0007F.pdf eSCL_Comm_Reference.pdf Host-Command-Reference_920-0002R.pdf
Product PDF - S3 Link:	http://s3.amazonaws.com/applied-motion-pdf/ST5-Q-EN.pdf
Datasheet:	ST-Datasheet_925-0007.pdf
2D Drawing:	ST5_10_Dimensions.pdf ST_T_simple_3D.pdf
3D Drawing:	ST5_10-Q_Si_C_SIMPLE.igs
Speed-Torque Curves:	ST_Speed_Torque_revF.pdf
Agency Approvals:	ST-Q-Si-C-IP_CE_DOC.pdf
Application Notes:	APPN0037-ModbusTCP-from-Pro-face-HMI.zip APPN0026B-LabVIEW-communication-using-streaming-commands.zip APPN0020-Maple-Systems-with-Ethernet-Drive.zip APPN0019_Analog-positioning-using-Q-program.zip APPN0016_Simple-25-pin-mating-connections.pdf

2D Drawings

Mechanical Outline



Products in the Series *Modbus TCP Products*

Model Number	Supply Voltage	Control Modes	Output Current	Communication Ports	Encoder Feedback	1pc.
	12-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, EtherNet/IP, Velocity Control, Modbus TCP	NA	Ethernet, EtherNet/IP	Yes	\$690.00
	48-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet, Ethernet, dual-port	Yes	\$1006.00
	12-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, EtherNet/IP, Velocity Control, Modbus TCP	NA	Ethernet, EtherNet/IP	Yes	\$702.00
	12-70 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	NA	Ethernet	Yes	\$542.00
	12-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet	Yes	\$942.00
	12-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, EtherNet/IP, Velocity Control, Modbus TCP	NA	Ethernet, EtherNet/IP	Yes	\$714.00
	12-70 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	NA	Ethernet	No	\$452.00
	12-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet	Yes	\$995.00
	12-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet	Yes	\$629.00
	12-70 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	NA	Ethernet	Yes	\$562.00
	12-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet, EtherNet/IP	Yes	\$1006.00

	24-70 VDC	Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet, Ethernet, dual-port	Yes	\$1231.00
	12-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet	Yes	\$641.00
	12-70 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	NA	Ethernet	No	\$472.00
	12-70 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	NA	Ethernet	Yes	\$953.00
	24-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet, Ethernet, dual-port	Yes	\$1302.00
	12-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet	Yes	\$654.00
	12-70 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	NA	Ethernet	Yes	\$691.00
	24-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet, Ethernet, dual-port	Yes	\$743.00
	24-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet, Ethernet, dual-port	Yes	\$1393.00
	12-70 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	NA	Ethernet	No	\$601.00
	24-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet, Ethernet, dual-port	Yes	\$814.00
	48-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet, Ethernet, dual-port	Yes	\$1495.00
	24-70 VDC	Step & Direction, Analog Torque / Velocity, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Velocity Control, Modbus TCP	NA	Ethernet, Ethernet, dual-port	Yes	\$905.00

ST10-IP-EE	24-80 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, EtherNet/IP, Modbus TCP	0.1-10.0 A/Phase	Ethernet, EtherNet/IP	Yes	\$852.00
ST10-IP-EN	24-80 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, EtherNet/IP, Modbus TCP	0.1-10.0 A/Phase	Ethernet, EtherNet/IP	No	\$791.00
ST10-Q-EE	24-80 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	0.1-10.0 A/Phase	Ethernet	Yes	\$871.00
ST10-Q-EN	24-80 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	0.1-10.0 A/Phase	Ethernet	No	\$792.00
ST5-IP-EE	24-48 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, EtherNet/IP, Modbus TCP	0.1-5.0 A/Phase	Ethernet, EtherNet/IP	Yes	\$786.00
ST5-IP-EN	24-48 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, EtherNet/IP, Modbus TCP	0.1-5.0 A/Phase	Ethernet, EtherNet/IP	No	\$728.00
ST5-Q-EE	24-48 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	0.1-5.0 A/Phase	Ethernet	Yes	\$737.00
ST5-Q-EN	24-48 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	0.1-5.0 A/Phase	Ethernet	No	\$677.00
STF03	12-48 VDC	Streaming Commands, Q Programming, CANopen, EtherNet/IP, Modbus RTU, Modbus TCP, EtherCAT	0.1-3.0 A/Phase	RS-485, CANopen, Ethernet, EtherNet/IP, EtherCAT, Ethernet, dual-port	No	\$185.00
STF06	12-48 VDC	Streaming Commands, Q Programming, CANopen, EtherNet/IP, Modbus RTU, Modbus TCP, EtherCAT	0.1-6.0 A/Phase	RS-485, CANopen, Ethernet, EtherNet/IP, EtherCAT, Ethernet, dual-port	No	\$198.00
STF10	24-70 VDC	Streaming Commands, Q Programming, CANopen, EtherNet/IP, Modbus RTU, Modbus TCP, EtherCAT	0.1-10.0 A/Phase	RS-485, CANopen, Ethernet, EtherNet/IP, EtherCAT, Ethernet, dual-port	No	\$211.00
SV2A5-Q-EE	78-139 VAC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	NA	Ethernet	NA	\$790.00
SV2B3-Q-EE	156-264 VAC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	NA	Ethernet	NA	\$634.00
SV2B5-Q-EE	156-264 VAC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	NA	Ethernet	NA	\$790.00
SV2D10-IP-DE	24-60VDC	Q Programming, EtherNet/IP	NA	Ethernet, EtherNet/IP, Ethernet, dual-port	NA	\$478.00
		Streaming Commands				

<u>SV2D10-Q- DE</u>	24-60VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	NA	Ethernet, Ethernet, dual-port	NA	\$431.00
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Products in the Series *ST Stepper Drives*

Model Number	Supply Voltage	Control Modes	Output Current	Communication Ports	Encoder Feedback	1pc.
ST10-C-CE	24-80 VDC	CANopen	0.1-10.0 A/Phase	RS-232, CANopen	Yes	\$818.00
ST10-C-CN	24-80 VDC	CANopen	0.1-10.0 A/Phase	RS-232, CANopen	No	\$757.00
ST10-IP-EE	24-80 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, EtherNet/IP, Modbus TCP	0.1-10.0 A/Phase	Ethernet, EtherNet/IP	Yes	\$852.00
ST10-IP-EN	24-80 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, EtherNet/IP, Modbus TCP	0.1-10.0 A/Phase	Ethernet, EtherNet/IP	No	\$791.00
ST10-Plus	24-80 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming	0.1-10.0 A/Phase	RS-232	No	\$322.00
ST10-Q-EE	24-80 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	0.1-10.0 A/Phase	Ethernet	Yes	\$871.00
ST10-Q-EN	24-80 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	0.1-10.0 A/Phase	Ethernet	No	\$792.00
ST10-Q-NE	24-80 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, SiNet Hub Compatible, Velocity Control, Modbus RTU	0.1-10.0 A/Phase	RS-232	Yes	\$696.00
ST10-Q-NF	24-80 VDC	Step & Direction, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, SiNet Hub Compatible, Velocity Control, Modbus RTU	0.1-10.0 A/Phase	RS-232	Yes	\$668.00
ST10-Q-NN	24-80 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, SiNet Hub Compatible, Modbus RTU	0.1-10.0 A/Phase	RS-232	No	\$618.00
ST10-Q-RE	24-80 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus RTU	0.1-10.0 A/Phase	RS-232, RS-485	Yes	\$828.00
ST10-Q-RN	24-80 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus RTU	0.1-10.0 A/Phase	RS-232, RS-485	No	\$756.00
ST10-S	24-80 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, SiNet Hub Compatible	0.1-10.0 A/Phase	RS-232	No	\$274.00
ST10-Si-NE	24-80 VDC	Si Programming	0.1-10.0 A/Phase	RS-232	Yes	\$756.00
ST10-Si-NF	24-80 VDC	Si Programming	0.1-10.0 A/Phase	RS-232	Yes	\$763.00
ST10-Si-NN	24-80 VDC	Si Programming	0.1-10.0 A/Phase	RS-232	No	\$696.00
ST5-C-CE	24-48 VDC	CANopen	0.1-5.0 A/Phase	RS-232, CANopen	Yes	\$702.00
ST5-C-CN	24-48 VDC	CANopen	0.1-5.0 A/Phase	RS-232, CANopen	No	\$649.00
ST5-IP-EE	24-48 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, EtherNet/IP, Modbus TCP	0.1-5.0 A/Phase	Ethernet, EtherNet/IP	Yes	\$786.00
		Streaming Commands, Analog				

ST5-IP-EN	24-48 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming, EtherNet/IP, Modbus TCP	0.1-5.0 A/Phase	Ethernet, EtherNet/IP	No	\$728.00
ST5-Plus	24-48 VDC	Streaming Commands, Analog Positioning, Encoder Following, Q Programming	0.1-5.0 A/Phase	RS-232	No	\$295.00
ST5-Q-EE	24-48 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	0.1-5.0 A/Phase	Ethernet	Yes	\$737.00
ST5-Q-EN	24-48 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus TCP	0.1-5.0 A/Phase	Ethernet	No	\$677.00
ST5-Q-NE	24-48 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, SiNet Hub Compatible, Modbus RTU	0.1-5.0 A/Phase	RS-232	Yes	\$648.00
ST5-Q-NF	24-48 VDC	Step & Direction, Streaming Commands, Analog Positioning, Encoder Following, Q Programming, SiNet Hub Compatible, Velocity Control, Modbus RTU	0.1-5.0 A/Phase	RS-232	Yes	\$636.00
ST5-Q-NN	24-48 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, SiNet Hub Compatible, Modbus RTU	0.1-5.0 A/Phase	RS-232	No	\$560.00
ST5-Q-RE	24-48 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus RTU	0.1-5.0 A/Phase	RS-232, RS-485	Yes	\$750.00
ST5-Q-RN	24-48 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, Analog Positioning, Encoder Following, Q Programming, Modbus RTU	0.1-5.0 A/Phase	RS-232, RS-485	No	\$684.00
ST5-S	24-48 VDC	Step & Direction, Velocity (Oscillator), Streaming Commands, SiNet Hub Compatible	0.1-5.0 A/Phase	RS-232	No	\$247.00
ST5-Si-NE	24-48 VDC	Si Programming	0.1-5.0 A/Phase	RS-232	Yes	\$695.00
ST5-Si-NF	24-48 VDC	Si Programming	0.1-5.0 A/Phase	RS-232	Yes	\$727.00
ST5-Si-NN	24-48 VDC	Si Programming	0.1-5.0 A/Phase	RS-232	No	\$588.00