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STAC5 Stepper Drives

Applied Motion Products



A high performance, compact and cost-effective stepper drive with advanced features and control options

- ✓ Ethernet & EtherNet/IP
- ✓ Advanced Current Control
- ✓ Anti-Resonance
- ✓ Torque Ripple Smoothing
- ✓ Microstep Emulation
- ✓ Stall Detection/Prevention

Specifications

POWER SUPPLY:

STAC5-120	120 VAC Nominal
STAC5-220	220 VAC Nominal

OUTPUT CURRENT:

STAC5-120	0.5-5.0 A
STAC5-220	0.5-2.55 A

PROTECTION:

- Over-voltage
- Under-voltage
- Over-temp
- Motor shorts/open phase
- Regeneration

Control Options

S

- Pulse & direction
- CW/CCW pulse
- A/B quadrature
- Velocity (oscillator) mode
- Host commands (SCL compatible)
- *STAC Configurator™* software for setup

Q

- Executes stored Q Programs
- Networking with Ethernet port
- Math functions
- Register manipulation
- Encoder following
- Third-party HMI compatibility

IP

- EtherNet/IP industrial networking
- Connects to industry's most popular PLCs
- Same control modes as Q model

SPECIFICATIONS

AMPLIFIER TYPE	MOSFET, dual H-bridge, 4 quadrant
CURRENT CONTROL	4 state PWM at 16 kHZ
OUTPUT CURRENT	**STAC5-120:** 0.5-5.0 amps/phase (peak-of-sine) in 0.01 amp increments **STAC5-220:** 0.5-2.55 amps/phase (peak-of-sine) in 0.01 amp increments
POWER SUPPLY	**STAC5-120:** 120 VAC nominal, 50/60 Hz **STAC5-220:** 220 VAC nominal, 50/60 Hz
PROTECTION	Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)
REGENERATION	Built-in regeneration circuit, 10 watts max.
IDLE CURRENT REDUCTION	Reduction range of 0-90% of running current after delay selectable in milliseconds
MICROSTEP RESOLUTION	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
MICROSTEP EMULATION	Performs high resolution stepping by synthesizing fine microsteps from coarse steps. Reduces jerk and extraneous system resonances. (Step & direction mode only).
ANTI-RESONANCE (Electronic Damping)	Raises the system damping ratio to eliminate midrange instability and allow stable operation throughout the speed range and improves settling time
TORQUE RIPPLE SMOOTHING	Allows for fine adjustment of phase current waveform harmonic content to reduce low-speed torque ripple in the range of 0.25 to 1.5 rps
MODES OF OPERATION	**STAC5-S:** Step & direction, CW/CCW pulse, A/B quadrature, velocity (oscillator, joystick), streaming serial commands (SCL) **STAC5-Q, STAC5-IP:** Same as S models, plus Q programming
INPUTS/OUTPUTS: All models	**X1, X2 inputs:** Optically isolated, differential, 5-24 VDC, minimum pulse width = 250 ns, maximum pulse frequency = 2 MHz **X3, X4 inputs:** Optically isolated, differential, 5-24 VDC **Y1, Y2 outputs:** Optical darlington, sinking or sourcing, 30 VDC max, 100 mA max **Analog input:** Single-ended. Range is software selectable 0-5, +/-5, 0-10, or +/-10 VDC. Software configurable offset, deadband and filtering. Resolution is 12 bits (+/- 10 volt range), 11 bits (+/-5 or 1-10 volt range) or 10 bits (0-5 volt range).
INPUTS/OUTPUTS: Q and IP models only	*Q and IP models have the same I/O as above plus the following:* **IN1, IN2, IN7, IN8 inputs:** Optically isolated, differential, 5-24 VDC **IN3-IN6 inputs:** Optically isolated, single-ended, shared common, sinking or sourcing, 12-24 VDC **OUT1-OUT3 outputs:** Optical darlington, single-ended, shared common, sinking, 30 VDC max, 100 mA max **OUT4 output:** Optical darlington, sinking or sourcing, 30 VDC max, 100 mA max
COMMUNICATION INTERFACE	**All models:** Ethernet 100BASE-T, supports TCP and UDP **IP models only:** EtherNet/IP industrial networking
ENCODER INTERFACE	**STAC5-x-Exxx:** For connecting to motor-mounted encoder. Used to provide stall detection and stall prevention with static position maintenance. Differential line receivers, up to 2 MHz.
NON-VOLATILE STORAGE	Drive configuration and Q program are stored in FLASH memory onboard the DSP
AGENCY APPROVALS	RoHS CE EN 61800-3 :2004, EN 61800-5-1 :2003 UL 508c
AMBIENT TEMPERATURE	0 to 40 °C (32 to 104 °F) with adequate ventilation
HUMIDITY	90% max, non-condensing
WEIGHT	22.4 oz

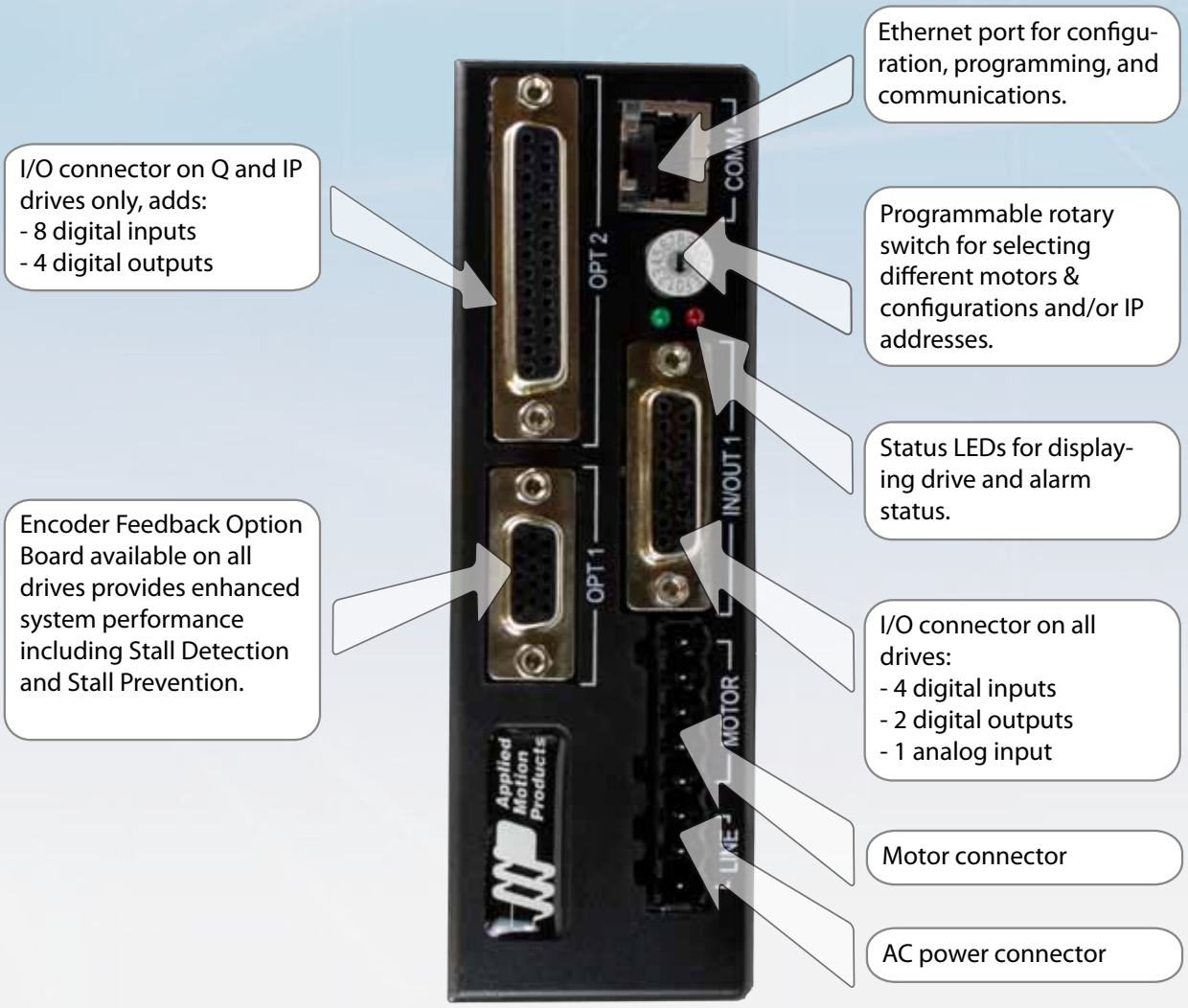
MULTI-USE ROTARY SWITCH



The STAC5 drives come with a rotary switch that can be used to select pre-programmed IP addresses and drive configurations from non-volatile (NV) memory. Each STAC5 drive ships with a predetermined list of 16 IP addresses (including DHCP) and 1 default drive configuration. As your requirements dictate, these 16 rotary switch positions can be customized using the STAC Configurator™ software to define the IP addresses and drive configurations you need for your application.

Each rotary switch position can store one IP address and one drive configuration. Drive configurations include all drive settings, such as control mode, I/O settings, and encoder functions, as well as motor settings like running current, idle current, and load-to-motor inertia ratio.

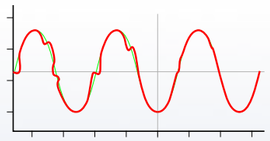
OPTION CARDS



Features

Anti Resonance

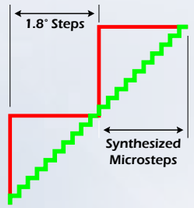
Step motor systems have a natural tendency to resonate at certain speeds. The STAC5 drive automatically calculates the system's natural frequency and applies damping to the control algorithm. This greatly improves midrange stability, allows higher speeds and greater torque utilization, and also improves settling times.



Delivers better motor performance and higher speeds

Micro Step Emulation

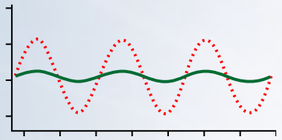
With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low-resolution step pulses and create fine resolution motion.



Delivers smoother motion in any application

Torque Ripple Smoothing

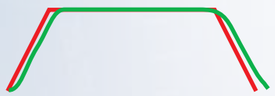
All step motors have an inherent low speed torque ripple that can affect the motion of the motor. By analyzing this torque ripple the system can apply a negative harmonic to negate this effect, which gives the motor much smoother motion at low speed.



Delivers smoother motion at lower speeds

Command Signal Smoothing

Command Signal Smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components.



Delivers smoother system performance

Self Test & Auto Setup

At start-up the drive measures motor parameters, including the resistance and inductance, then uses this information to optimize the system performance. It also compares this information to the last configuration and checks to see if the motor data has changed (this could indicate a fault or system change). The drive can also detect open and short circuits.

Inputs & Outputs

S	Q	IP
4 digital inputs 2 digital outputs 1 analog input	12 digital inputs 6 digital outputs 1 analog input	12 digital inputs 6 digital outputs 1 analog input

Power Ratings

	STAC5-120	STAC5-220
Input Voltage:	120 VAC	220 VAC
Output Current:	5.0A Peak	2.55A Peak

For more information go to www.applied-motion.com/STAC5

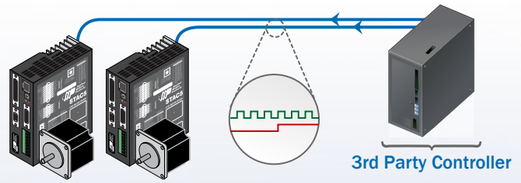


Option - Encoder Feedback

Encoder Feedback
Example: STAC5-Q-**E**120
The Encoder Feedback option board provides Stall Detection and Stall Prevention functionality to the drive. Stall Detection detects the moment the motor has stalled and triggers a drive fault. Stall Prevention automatically senses rotor lag (just before stalling) and reduces motor speed to avoid stalling. Stall Prevention includes Position Maintenance, which maintains shaft position when the motor is stopped.

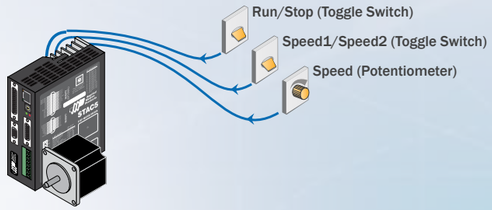
Control Options

Step & Direction



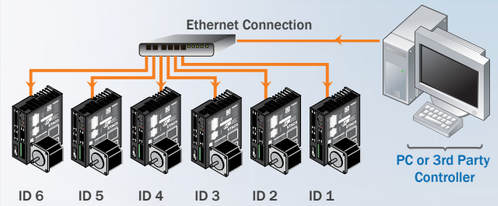
- Step & direction
- CW & CCW pulse
- A/B quadrature (master encoder)

Oscillator/Run-Stop



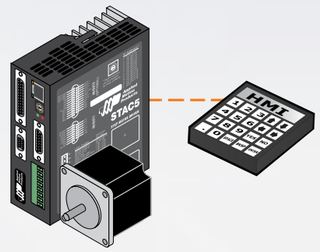
- Software configuration
- Two speeds
- Vary speed with analog input
- Joystick compatible

Host Control



- Accepts serial commands from PC or PLC
- Multi-axis capable
- EtherNet/IP available on IP models

Stand-Alone Programmable



- Comprehensive text based language
- Download, store & execute programs
- High level features
  -Multi tasking
  -Conditional programming
  -Math functions
- Host interface while executing internal programs

NEMA 23 MOTOR DATA



	Part No.	Holding Torque (oz-in)	Amps*	Ohms	mH	Rotor Inertia (oz-in-sec²)	Motor Length (inch)	Motor Weight (lbs)
USE PARALLEL CONNECTION FOR STAC5-120	HT23-552	84.4	1.41	2.8	5.6	1.70E-03	1.71	1.0
	HT23-553	167	1.41	3.6	12.8	4.25E-03	2.17	1.5
	HT23-554	255	1.41	4.5	15.2	6.80E-03	3.05	2.2
USE SERIES CONNECTION FOR STAC5-220	HT23-552	84.4	0.71	11.2	22.4	1.70E-03	1.71	1.0
	HT23-553	167	0.71	14.4	51.2	4.25E-03	2.17	1.5
	HT23-554	255	0.71	18.0	60.8	6.80E-03	3.05	2.2

* Motor only rating. Optimal current setting in STAC5 may differ.
Step angle 1.8 degrees for all motors.
Encoder holes only on double shaft version. Add D to part number for double shaft (example: HT23-552D)
These motors fitted with 10ft cable.

NEMA 34 MOTOR DATA

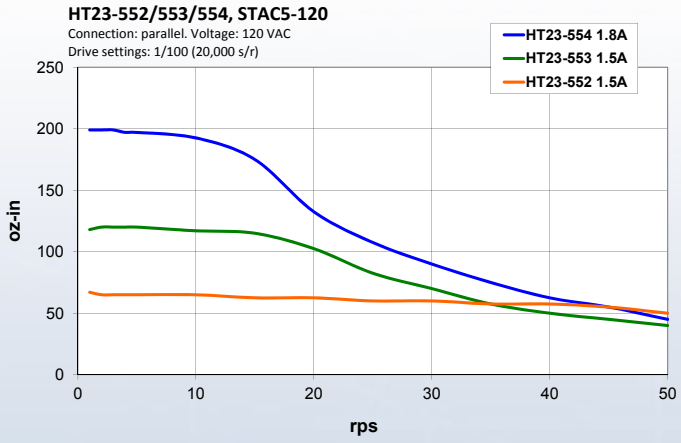


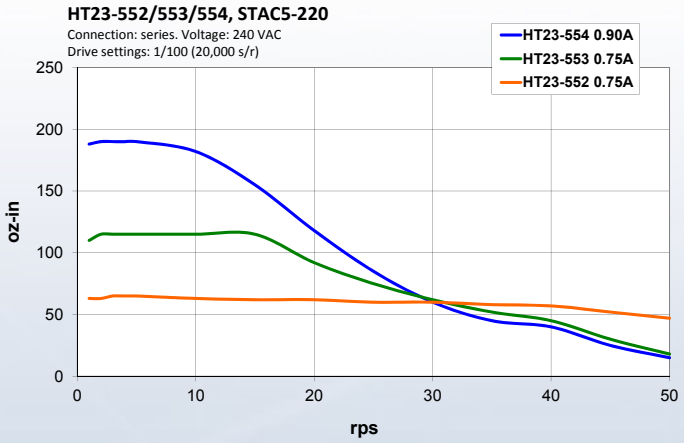
	Part No.	Holding Torque (oz-in)	Amps*	Ohms	mH	Rotor Inertia (oz-in-sec²)	Motor Length (inch)	Motor Weight (lbs)
USE PARALLEL CONNECTION FOR STAC5-120	HT34-495	555	4.30	0.91	6.5	2.27E-02	3.11	4.6
	HT34-496	1110	4.10	1.2	10.5	4.53E-02	4.63	7.7
	HT34-497	1694	5.10	1.2	9.6	6.80E-02	6.14	11.0
USE SERIES CONNECTION FOR STAC5-220	HT34-495	555	2.15	3.7	26.0	2.27E-02	3.11	4.6
	HT34-496	1110	2.05	4.9	42.0	4.53E-02	4.63	7.7
	HT34-497	1694	2.55	4.9	38.4	6.80E-02	6.14	11.0

* Motor only rating. Optimal current setting in STAC5 may differ.
Step angle 1.8 degrees for all motors.
Encoder holes only on double shaft version. Add D to part number for double shaft (example: HT23-552D)
These motors fitted with 10ft cable.

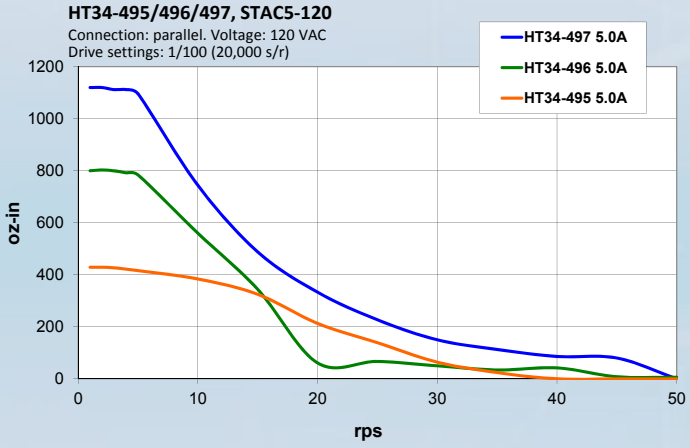
TORQUE CURVES

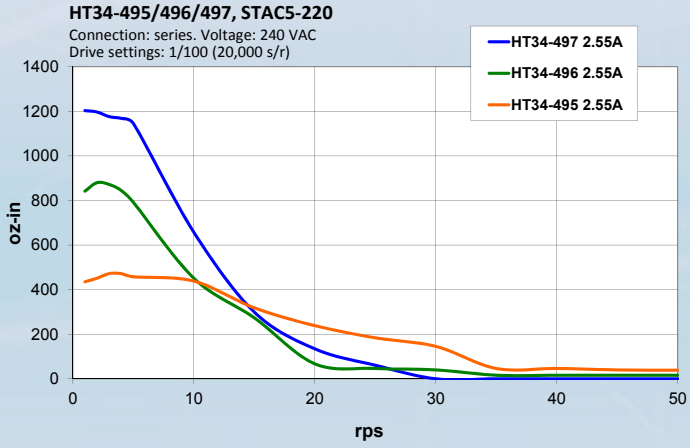
NEMA 23



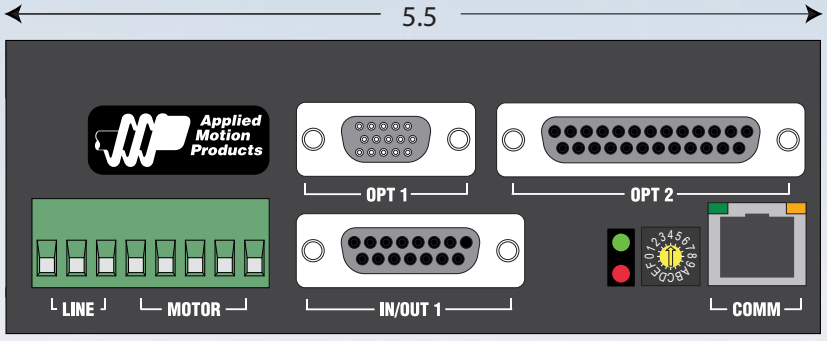


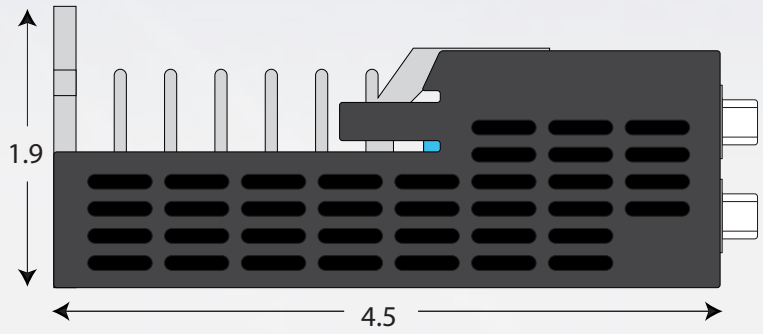
NEMA 34





DIMENSIONS





SOFTWARE



STAC Configurator

Used for setup and configuration of the STAC series drives. For more information about the STAC Configurator visit the STAC5 webpage: www.applied-motion.com/STAC5



Q Programmer

Q Programmer is used to create and edit stand-alone programs for drives with the Q control option. The functions of these drives include multi-tasking, math, register manipulation, encoder following, and more.

All application software runs on Windows 7 (32 & 64 bit), Vista, XP, 2000, NT, ME & 98.

STAC5 Drive Model Numbers

STAC5-S-E120

- Series: STAC5 Series Step Drive
- Control Options: S = Basic Version, Q = Q Programming, IP = EtherNet/IP
- Feedback: N = None, E = Encoder
- Input Voltage: 120 = 120VAC, 220 = 220VAC

MODEL NUMBERS	Q PROGRAM	ETHERNET	ETHERNET/IP	ENCODER	120 VAC	220 VAC
STAC5-IP-E120	X	X	X	X	X	
STAC5-IP-E220	X	X	X	X		X
STAC5-IP-N120	X	X	X		X	
STAC5-IP-N220	X	X	X			X
STAC5-Q-E120	X	X		X	X	
STAC5-Q-E220	X	X		X		X
STAC5-Q-N120	X	X			X	
STAC5-Q-N220	X	X				X
STAC5-S-E120		X		X	X	
STAC5-S-E220		X		X		X
STAC5-S-N120		X			X	
STAC5-S-N220		X				X

Applied Motion Products

404 Westridge Dr.
Watsonville, CA 95076
Tel: 800-525-1609
Fax: 831-761-6544
www.applied-motion.com

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