## Software

### STAC5 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 Q control options.
- 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**

- Input Voltage: 120 = 120VAC, 220 = 220VAC
- Feedback:
  - N = None
  - E = Encoder

### Control Options

- Series Q = Q Programming
- IP = EtherNet/IP

#### MODEL NUMBERS

<table>
<thead>
<tr>
<th>MODEL NUMBERS</th>
<th>Q PROGRAM</th>
<th>ETHERNET/IP</th>
<th>Encoder</th>
<th>120 VAC</th>
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</table>

**STAC5-120**

- 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

**STAC5-220**

- Specifications

- **Power Supply:**
  - 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
**SPECIFICATIONS**

**AMPLIFIER TYPE**
- MOSFET, dual H-bridge, 4 quadrant

**CURRENT CONTROL**
- 4 state PWM at 16 kHz

**OUTPUT CURRENT**
- STACS-220: 0.5-3.5 amps/phase (peak of sine) in 0.01 amp increments
- STACS-222: 0.5-5.5 amps/phase (peak of sine) in 0.01 amp increments

**POWER SUPPLY**
- STACS-220: 120 VAC nominal, 50/60 Hz
- STACS-222: 220 VAC nominal, 50/60 Hz

**PROTECTION**
- Over-voltage, under-voltage, over-temperature, motor/wiring shorts (phase-to-phase, phase-to-ground)

**REGENERATION**
- Built-in regeneration circuit, 50 watts max

**MOTOR RESOLUTION**
- Software selectable from 200 to 512 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 midspace 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 rpm

**MODES OF OPERATION**
- STACS-5: Same as STACS-4 models, plus Q programming
- STACS-5: Same as STACS-4 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 (±5 volt range).

**INPUTS/OUTPUTS: Q and IP models only**
- Q and IP models have the same /Q as above plus the following:
- I1, I2, I3, I4, IN8 inputs: Optically isolated, differential, 5-24 VDC
- I5, I6 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

**COMMUNICATION INTERFACE**
- All models: Ethernet 100BASE-T, supports TCP and UDP
- IP models only: EtherCAT/Industrial networking

**ENCODER INTERFACE**
- STACS-x-EXXX: For connecting to motor-attached encoder. Used to provide stall detection and stall prevention with static position maintenance. Differential line receivers, up to 2 Mbit/s.

**NON-VOLATILE STORAGE**
- Home configuration and Q program are stored in FLASH memory onboard the DSP

**AGENCY APPROVALS**
- UL 508c

**AMBIENT TEMPERATURE**
- 0 to 40°C (32 to 104 °F) with adequate ventilation

**HUMIDITY**
- 90% max, non-condensing

**WEIGHT**
- 22.4 oz

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**TORQUE CURVES**

**DIMENSIONS**

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**ELECTROMATE**

Toll Free Phone: (877) SERVO98
Toll Free Fax: (877) SERV099
www.electromate.com
sales@electromate.com
### NEMA 23 MOTOR DATA

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* Motor only rating. Optimal current setting in NEMA may differ. Step angle: 1.8 degree for all motors. Encoder Notes: only on double-shaft version. Add D to part number for double-shaft (example: HT23-652D). These motors fitted with soft codes.

### NEMA 34 MOTOR DATA

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<td>4.14</td>
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</tbody>
</table>

* Motor only rating. Optimal current setting in NEMA may differ. Step angle: 1.8 degree for all motors. Encoder Notes: only on double-shaft version. Add D to part number for double-shaft (example: HT34-652D). These motors fitted with soft codes.

### 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

- **I/O connector on Q and IP drives only, adds:**
  - 8 digital inputs
  - 4 digital outputs

- **Programmable rotary switch for selecting different motors & configurations and/or IP addresses.**

- **Status LEDs for displaying drive and alarm status.**

- **I/O connector on all drives:**
  - 4 digital inputs
  - 2 digital outputs
  - 1 analog input

- **Encoder Feedback Option Board available on all drives provides enhanced system performance including Stall Detection and Stall Prevention.**

- **Ethernet port for configuration, programming, and communications.**

- **Motor connector**

- **AC power connector**
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.

Power Ratings

<table>
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<tr>
<th>Model</th>
<th>Input Voltage</th>
<th>Output Current</th>
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<td>120 VAC</td>
<td>5.0A Peak</td>
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<tr>
<td>STAC5-220</td>
<td>220 VAC</td>
<td>2.55A Peak</td>
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</tbody>
</table>

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

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
- Ethercat/IP available on IP models

Stand-Alone Programmable
- Comprehensive text based language
- Download, store & execute programs
- High level features
- Math functions
- Pause/Resume
- Duty cycle
- Selecting internal programmable

Option - Encoder Feedback
Encoder Feedback
Example: STAC5-Q.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.
**NEMA 23 MOTOR DATA**

<table>
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<tr>
<th>Part No.</th>
<th>Holding Torque (oz-in)</th>
<th>Amps</th>
<th>Ohms</th>
<th>N.</th>
<th>M-1</th>
<th>Motor Length (in)</th>
<th>Motor Weight (lbs)</th>
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**NEMA 34 MOTOR DATA**

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**MULTI-USE ROTARY SWITCH**

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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 lead-to-motor inertia ratio.

**OPTION CARDS**

- **Ethernet port** for configuration, programming, and communications.
- **Programmable rotary switch** for selecting different motors & configurations and/or IP addresses.
- **Status LEDs** for displaying drive and alarm status.
- **I/O connector on all drives**:
  - 4 digital outputs
  - 1 analog input
- **Encoder Feedback Option Board** available on all drives provides enhanced system performance including Stall Detection and Stall Prevention.
- **AC power connector**
- **Motor connector**
- **I/O connector on Q and IP drives only, adds**:
  - 8 digital inputs
  - 4 digital outputs

* Motor only rating. Optional current setting in STAC5 may differ. 8-step single 1.8-degree for all motors.
* Encoder feedback only on double shaft version. Add D to part number for double shaft (example: HT23-552D)
* These motors fitted with soft stops.

**CONNECTION NEMA 23 MOTOR DATA**

- **SERIES CONNECTION** for NEMA 23
- **PARALLEL CONNECTION** for NEMA 23
**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-lamp, motor/wiring shorts (phase-to-phase, phase-to-ground)

**Regeneration**
- Built-in regeneration circuit, 50 watts max

**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)

**Antiresonance**
- Electronic damping. Rises the system damping ratios 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 rms

**Modes of Operation**
- STAC5-S: Step & direction, CRC/CCW pulse, A/B quadranture, 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, deadband and filtering. Resolution is 12 bits (2^-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 /0 as above plus the following:
  - IN2, IN3, 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, 100 VDC max
  - OUT4 output: Optical darlington, sinking or sourcing, 30 VDC max, 100 mA max

**Communication Interface**
- All models: Ethernet 10/100BASE-T, supports TCP and UDP
- IP models only: Ethercat/IP industrial networking

**Encoder Interface**
- STAC5-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**
- UL508c
- SRCC: 1000 oz-in

**Ambient Temperature**
- 0 to 40°C (32 to 104 °F) with adequate ventilation

**Humidity**
- 90% max, non-condensing

**Weight**
- 22.4 oz

---

**Torque Curves**

**NEMA 23**
- Connections: parallel, voltage: 120 VAC
- Motor: STAC5-120
- Current: 1.0 A

**NEMA 34**
- Connections: parallel, voltage: 230 VAC
- Motor: STAC5-220
- Current: 1.0 A

---

**Dimensions**

- Width: 5.5 inches
- Height: 4.5 inches
- Depth: 1.9 inches

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**Electromate**

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Toll Free Fax: (877) SERV099
www.electromate.com
sales@electromate.com
Sold & Serviced By:
## SOFTWARE

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**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

<table>
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<th>Ethernet/TP</th>
<th>Encoder</th>
<th>120 VAC</th>
<th>220 VAC</th>
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Series: STAC5 Series Step Drive

Feedback: N = None, E = Encoder

Control Options:
- S = Basic Version
- Q = Q Programming
- IP = EtherNet/IP

### Specifications

**Power Supply:**
- STAC5-120: 120 VAC Nominal
- STAC5-220: 220 VAC Nominal

**Output Current:**
- STAC5-120: 0.5–5.0 A
- STAC5-220: 0.5–2.5 A

**Protection:**
- Over-voltage
- Under-voltage
- Over-temp
- Motor shorts/open phase
- Regeneration

**Control Options:**

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

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

### 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