Specifications

High Performance Step Motor Drives with Multiple Control Options

- Advanced Current Control
- Anti-Resonance
- Torque Ripple Smoothing
- Microstep Emulation
- Stall Detection/Prevention

**Model Numbers**

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Q Program</th>
<th>Si Program</th>
<th>RS-232</th>
<th>RS-422/485</th>
<th>EtherNet/IP</th>
<th>CANopen</th>
<th>Encoder</th>
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<td>ST5-IP-ENE</td>
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<td>ST5-IP-EEE</td>
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</tr>
</tbody>
</table>

- **Feedback** (not available on S or Plus control options)
  - N = None
  - E = Encoder
- **Communications Option Board** (not available on S, Plus or Si control options)
  - N = None (RS-232 standard communications)
  - R = RS-485 option board (Q control option only)
  - C = CANopen option board (required on C control option)
- **ST Configurator™ software for setup**
  - Same size and I/O as S model
  - Execute stored Q programs like Q model
  - Executes stored Q programs
  - Networking with RS-485 or EtherNet options
  - Conditional processing & multi-tasking
  - Math functions, register manipulation
  - Encoder following
  - Third-party HMI compatibility
  - SI Program™ with built-in Configurator
  - Point-and-click indexing software
  - User Friendly GUI
  - I/O and motion programming
  - MMI-01 compatibility
  - EtherNet/IP industrial networking
  - Same control modes as Q model

**Series**

- ST5 Series
- ST5-Si-NE

**Control Options**

- Pulse & direction, CW/CCW pulse, A/B quadrature
- Velocity (Oscillator) mode
- Host commands (SCL compatible)
- SiNet Hub compatible
- ST Configurator™ software for setup

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**Control Options**

- EtherNet/IP industrial networking
- Same control modes as Q model

**Control Options**

- CANopen protocols DS301 and DS402
- Profile Position, Profile Velocity, and Homing Modes
- Up to 127 axes per channel
- Execute stored Q programs

**Control Options**

- Same control modes as Q model

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**Control Options**

- Same control modes as Q model
**Recommended Motors Continued**

**NEMA 34 - HIGH TORQUE**

<table>
<thead>
<tr>
<th>Part #</th>
<th>Motor Length (in)</th>
<th>Nema-holding Torque (oz-in)</th>
<th>Amps*</th>
<th>Ohms</th>
<th>Motor Inertia (oz-in-sec^2)</th>
<th>Motor Weight (lb)</th>
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</table>

* Motor current rating; optional current setting at ST drive may differ. All ratings subject to the application and connection. Step angle 1.8 degrees for all motors.

**Dimensions**

**3 AND PLUS MODELS**

**Q, S, C AND IP MODELS**

Dimensions in inches, not to scale
### Recommended Motors

**NEMA 17** - High Torque

<table>
<thead>
<tr>
<th>Part #</th>
<th>Motor Length (inch)</th>
<th>Min-Holding Torque (oz-in)</th>
<th>Amps*</th>
<th>Ohms</th>
<th>Motor Inertia (oz-in-sec²)</th>
<th>Motor Weight (lbs)</th>
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* Motor only rating. Optimal current setting in ST drive may differ. All ratings are for bipolar parallel connection. Step angle 1.8 degrees for all motors.

---

**NEMA 23** - High Torque

<table>
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<th>Part #</th>
<th>Motor Length (inch)</th>
<th>Min-Holding Torque (oz-in)</th>
<th>Amps*</th>
<th>Ohms</th>
<th>Motor Inertia (oz-in-sec²)</th>
<th>Motor Weight (lbs)</th>
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---

**NEMA 24** - High Torque

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</table>

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---

### Software

**Si Programmer™**

Intended for use in stand-alone applications, Si Programmer™ provides a user-friendly, point-and-click, graphical interface that doesn’t require any previous programming experience.

**Q Programmer™**

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

**ST Configurator™**

Used for setup and configuration of the drive. For more information about the ST Configurator™ visit the Applied Motion Products website.

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### Accessories

**RC-050 Regeneration Clamp**

The RC-050 regeneration clamp is for use where regeneration from the motor may cause an over-voltage condition at the power supply. In these cases the RC-050 is connected between the drive and power supply and absorbs regenerated energy.

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**ELECTROMATE**

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Toll Free Fax  (877) SERV099
www.electromate.com
sales@electromate.com

*Sold & Serviced By:*
Option Boards

The following option boards are available with the ST drives (depending on control option):

**Encoder Feedback**
(Q, Si, C and IP control options)
Example: ST5-Ss-NE
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 stalled) and reduces motor speed to avoid stalling. Stall Prevention includes Position Maintenance, which maintains shaft position when the motor is stopped.

**RS-485**
(Q control option)
Example: ST10-Qs-RS
The RS-485 option board enhances the ability to stream serial commands (SCL) by allowing you to connect up to 32 drives in a serial communications network.

Ethernet & EtherNet/IP
(Q control option for Ethernet TCP/UDP) (IP control option for EtherNet/IP) Examples: ST5-Q-EN, ST5-IP-EN
ST-Q drives with the EtherNet option can accept streaming serial commands (SCL) and Q serial commands over a high throughput, high-reliability 100Mbit network. The drives can also execute Q programs stored in built-in, non-volatile memory. IP models communicate with PLCs and other industrial devices supporting the EtherNet/IP standard. They can also be commanded to execute stored Q programs.

**CANopen**
(Q control option)
Example: ST5-Q-C-CN
The CANopen option board used with ST-Q drives allows the drive to be connected to a CANopen network along with other CANopen devices. Drives can be controlled and interrogated over the network.

Step & Direction

- Step & Direction
- CW & CCW Pulse
- A/B Quadrature (Master Encoder)

Oscillator / Run-Stop

- Software Configuration
- Two speeds
- Very speedy with analog input
- Joystick compatible

Host Control

- Accepts streaming commands from host PC or PLC
- Connect to CANopen network
- Up to 32 axes with RS-485 option
- 1000’s of axes with EtherNet and EtherNet/IP

Stand-Alone Programmable

- Point & click graphical interface
- MMI option
- Download, store & execute programs
- Comprehensive text based language
- Download, store & execute programs
- High level features: multi-tasking, conditional programming, & math functions
- Host interface while executing internal programs

Multi-Axis Systems

Use Sinet Hub Programm software to develop your sequence of events, then download them to a Sinet Hub for a stand-alone system or stream serial commands to the drives from a PC, PLC, MMI, or other host controller.

Features

**Anti-Resonance/Electronic Damping**
Step motor systems have a natural tendency to resonate at certain speeds. The ST drives automatically calculate the system’s natural frequency and apply damping to the control algorithm. This greatly improves mid-range stability, allows higher speeds and greater torque utilization, and also improves settling times.

**Benefit:** Delivers higher speeds and torque utilization

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

**Benefit:** 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.

**Benefit:** 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.

**Benefit:** 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. The drive can also detect open and short circuits.

Inputs & Outputs

<table>
<thead>
<tr>
<th>Q</th>
<th>C</th>
<th>IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 digital inputs</td>
<td>8 digital inputs</td>
<td>8 digital inputs</td>
</tr>
<tr>
<td>1 digital output</td>
<td>4 digital outputs</td>
<td>4 digital outputs</td>
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<td>2 analog inputs</td>
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<td>32.2</td>
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<td>0.46</td>
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<td>1.7</td>
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<td>0.66</td>
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<td>1.58E-03</td>
<td>1.08</td>
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All curves run at 20,000 steps per rev.

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<td>3.68E-03</td>
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<td>HT23-601</td>
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<td>4.24</td>
<td>0.5</td>
<td>1.7</td>
<td>6.51E-03</td>
<td>2.2</td>
</tr>
</tbody>
</table>

* Motor only rating. Optimal current setting in ST drive may differ. All ratings are for bipolar parallel connection. Step angle 1.8 degrees for all motors.

#### NEMA 24 - HIGH TORQUE

<table>
<thead>
<tr>
<th>Part #</th>
<th>Motor Length (inch)</th>
<th>Min-Holding Torque (oz-in)</th>
<th>Amps*</th>
<th>Ohms</th>
<th>mH</th>
<th>Rotor Inertia (oz-in-sec²)</th>
<th>Motor Weight (lbs)</th>
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</thead>
<tbody>
<tr>
<td>HT24-268</td>
<td>1.31</td>
<td>31.2</td>
<td>1.34</td>
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<tr>
<td>HT24-271</td>
<td>1.57</td>
<td>38.4</td>
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<td>3.0</td>
<td>6.07E-06</td>
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<td>HT24-275</td>
<td>1.90</td>
<td>77.8</td>
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<td>5.7</td>
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<td>1.58E-03</td>
<td>1.08</td>
</tr>
</tbody>
</table>

* Motor only rating. Optimal current setting in ST drive may differ. All ratings are for bipolar parallel connection. Step angle 1.8 degrees for all motors.

All curves run at 20,000 steps per rev.

### Software

#### ST Configurator™

Used for setup and configuration of the drive. For more information about the ST Configurator™ visit the Applied Motion Products website.

#### Q Programmer™

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

#### Table of Contents

- Si Programmer™
  - Intended for use in stand-alone applications, Si Programmer™ provides a user friendly, point-and-click, graphical interface that doesn’t require any previous programming experience.

#### Help Manuals

ST Configurator™ incorporates context sensitive help. All the technical data, application information and advice on setting up the drive is just a mouse click away.

### Accessories

#### Power Supplies

Applied Motion offers two matched power supplies for use with the ST Drives. A 24VDC, 150W supply (part number PS150A24) and a 48VDC, 320W supply (part number PS320A48). These power supplies have current overload capability making them ideal for use with stepper drives.

#### RC-050 Regeneration Clamp

The RC-050 regeneration clamp is for use where regeneration from the motor may cause an over-voltage condition at the power supply. In these cases the RC-050 is connected between the drive and power supply and absorbs regenerated energy.
### SPECIFICATIONS

**ST-S, ST-Plus:**
- **WEIGHT:** 10.4 oz
- **HUMIDITY:** 90% max, non-condensing
- **AMBIENT TEMPERATURE:** 0 to 55 ºC (32 to 131 ºF). ST10 must be mounted to a suitable heatsink.
- **RATING:**
  - RoHS

**ST-Q-xE, ST-Si-xE, ST-C-CE, ST-IP-EE:**
- **ENCODER INTERFACE:**
- **COMMUNICATION INTERFACE:**
  - **ST-S, ST-Plus:**
  - **ST-Q, ST-Si, ST-C, ST-IP:**
- **INPUTS/OUTPUTS:**
  - **ST-S, ST-Plus:**
  - **ST-Q, ST-Si, ST-C, ST-IP:**
  - **Step & Direction Inputs:**
    - **ST-S, ST-Plus:**
    - **ST-Q, ST-Si, ST-C, ST-IP:**
  - **Mode of Operation:**
    - **ST-S:**
      - Electronic damping
      - Anti-resonance
      - Microstep emulation
      - Microstep resolution
    - **ST-C:**
      - Same as Q models, plus Si programming
    - **ST-Si:**
      - Same as Q models, plus Si programming
    - **ST-IP:**
      - Same as Q models, plus EtherNet/IP communications
  - **Overcurrent Reduction:**
    - **ST-Plus:**
    - **ST-Q, ST-Si, ST-C, ST-IP:**
    - Reduction range of 0-90% of running current after delay selectable in milliseconds
    - **Protection:**
      - Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)
  - **Power Supply:**
    - **ST5:**
      - **OUTPUT CURRENT:**
      - **Output Current:** 2.5 VDC
      - **Idle Current Reduction:** 0-90% of running current after delay selectable in milliseconds
      - **Protection:**
        - Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)
      - **Power Supply:**
    - **ST5:**
      - **OUTPUT CURRENT:**
      - **Output Current:** 2.5 VDC
      - **Idle Current Reduction:** 0-90% of running current after delay selectable in milliseconds
      - **Protection:**
        - Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)
      - **Power Supply:**

**Recommended Motors Continued**

**NEMA 34 - HIGH TORQUE**

<table>
<thead>
<tr>
<th>Part #</th>
<th>Motor Weight (lb)</th>
<th>Min-Holding Torque (oz-in)</th>
<th>Amps*</th>
<th>Ohms</th>
<th>Mhos</th>
<th>Rotor Inertia (oz-in-sec²)</th>
<th>Motor Weight (lb)</th>
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<tbody>
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<td>100</td>
<td>3.0</td>
<td>1.98</td>
<td>0.75</td>
<td>6X SLOT 0.16 WIDE, FULL R</td>
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* Motor rating. Optimal current setting in ST drive may differ. A rating is for reference only and the selection, step angle, lab degrees for each motor.

**DIMENSIONS**

### 3 AND PLUS MODELS

<table>
<thead>
<tr>
<th>Q, SI, C AND IP MODELS</th>
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<tr>
<td>3.0</td>
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</tr>
<tr>
<td>3.55</td>
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<tr>
<td>0.63</td>
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Dimensions in inches, not to scale.
Specifications

- **High Performance Step Motor Drives with Multiple Control Options**
  - Advanced Current Control
  - Anti-Resonance
  - Torque Ripple Smoothing
  - Microstep Emulation
  - Stall Detection/Prevention

**Control Options**
- Pulse & direction, CW/CCW pulse, A/B quadrature
- Velocity (Oscillator) mode
- Host commands (SCL compatible)
- SiNet Hub compatible
- ST Configurator™ software for setup
- Same size and I/O as S model
- Execute stored Q programs like Q model
- Executes stored Q programs
- Networking with RS-485 or Ethernet options
- Conditional processing & multi-tasking
- Math functions, register manipulation
- CANopen protocols DS301 and DSP402
- Profile Position, Profile Velocity, and Homing Modes
- Up to 127 axes per channel
- Execute stored Q programs
- EtherNet/IP industrial networking
- Same control modes as Q model

**Specifications**

- **POWER SUPPLY:**
  - ST5 24-48 VDC
  - ST10 24-80 VDC
- **OUTPUT CURRENT:**
  - ST5 0.1 - 5.0A
  - ST10 0.1 - 10.0A
- **PROTECTION:**
  - Over-Voltage
  - Under-Voltage
  - Over-Temp
  - Motor Shorts
  - Motor Open Phase

**Model Numbers**

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Program</th>
<th>Si-Program</th>
<th>RS-232</th>
<th>RS-422/485</th>
<th>Ethernet</th>
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</tbody>
</table>

*CANopen drives cannot run Q Programs stand-alone at power-up.*

For more information, visit: [www.applied-motion.com/ST](http://www.applied-motion.com/ST)