

## Advanced Step Drives

The STM is part of a larger family of step drives sharing a common configuration interface and all supporting common programming languages and tools.



The family consists of:

**STAC6 models** - Available in 110VAC and 220VAC input versions. This offers the highest power output, driving even the largest HT34 motors to their full potential.

It also features RS-485 connection and encoder input as standard. The 110VAC version has UL recognition.

**ST-Q/SI models** - 5 or 10A versions with bus voltages to 80V. Offered in a number of build options, including the addition of encoder feedback and RS-485.

**ST-S models** - 5A or 10A versions, bus voltages to 80VDC, offered in a compact 3.65" x 3.0" x 1.125" package. Control is by Step/Direction, Oscillator (velocity mode) or Streaming mode from PC or PLC.

**STR models** - 4A or 8A versions, bus voltages to 80VDC, offered in a compact 4.64" x 2.97" x 1.29" package. This is the step and direction input model for OEM applications.

For more information or to download a brochure, please visit our website.

## Accessories

### Power Supplies

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



### USB to RS232/485 Adapter

For users wishing to take advantage of the benefits of an RS-485 network, Applied Motion offers an adapter (part number 8500-003) that will plug into a USB port and communicate to RS-232 and RS-485 networks.



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# STM Drive+Motor

The STM is a Drive+Motor unit, fusing step motor and drive technologies into a single device, offering savings on space, wiring and cost over conventional motor and drive solutions.



Drive + Motor + Control

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

## Specifications

### OUTPUT TORQUE:

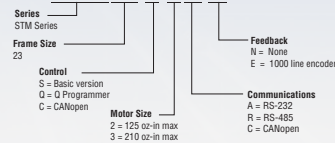
- STM23X-2 - to 125 oz-in
- STM23X-3 - to 210 oz-in

### PROTECTION:

- Over-Voltage
- Under voltage
- Over-Temp
- Motor Shorts
- Motor Open Phase

## Ordering

### STM23S-2AN



For more information go to  
[www.applied-motion.com/STM](http://www.applied-motion.com/STM)

## Models

- Pulse & Direction
- CW/CCW Pulse
- A/B Quadrature
- Velocity (Oscillator) mode
- Host commands (SCL compatible)
- SiNet Hub compatible
- ST Configurator software for setup

- Stand-alone Operation
- Q Programmer for complex motion
- Conditional Processing
- Math Functions
- Multi-tasking
- Register Manipulation
- Encoder Following
- Third-party HMI compatibility

- CANopen protocols DS301 and DSP402
- Profile Position, Profile Velocity, and Homing modes
- Up to 127 axes per channel
- Execute stored Q programs



## STM technical specs.

### POWER AMPLIFIER: All Models

AMPLIFIER TYPE	Dual H-Bridge, 4 Quadrant
CURRENT CONTROL	4 state PWM at 20 KHz
OUTPUT TORQUE	<b>STM23X-2 Series</b> - TO 125 OZ.IN WITH SUITABLE POWER SUPPLY <b>STM23X-3 Series</b> - TO 210 OZ.IN WITH SUITABLE POWER SUPPLY
POWER SUPPLY	External 12 - 70 VDC Power Supply Required
INPUT VOLTAGE RANGE	12 - 70 VDC
PROTECTION	Over-Voltage, Under-voltage, Over-Temp, Motor/wiring shorts (Phase-to-Phase, Phase-to-Ground)
IDLE CURRENT REDUCTION	Reduction range of 0 - 90% of Running Current after delay selectable in milliseconds
AMBIENT TEMPERATURE	0 to 40°C (32 - 104°F) (mounted to suitable heatsink)
HUMIDITY	90% non-condensing
OPERATING TEMP RANGE	-20° TO +50° Degrees C

### CONTROLLER: All Models

MICROSTEP RESOLUTION	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
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 0.25 to 1.5 rps
AUTO SETUP	Measures motor parameters and configures motor current control and anti-resonance gain settings
SELF TEST	Checks Internal & External Power supply voltages. Diagnoses open motor phases and motor resistance changes >40%. Detects encoder wiring and signal faults (differential encoder only)
MICROSTEP EMULATION	Performs high resolution stepping by synthesizing fine microsteps from coarse steps (Step & Direction Mode Only)
COMMAND SIGNAL SMOOTHING	Software configurable filtering reduces jerk and excitation of extraneous system resonances (Step & Direction Mode Only)
NON-VOLATILE STORAGE	Configurations are saved in FLASH memory on-board the DSP
MODE OF OPERATION	Step & Direction, CW/CCW, A/B Quadrature, Oscillator, Joystick, SCL, Hub
STEP AND DIRECTION INPUTS	STEP +/-: Optically Isolated, 5-24 Volt. Minimum pulse width = 250 ns. Maximum pulse frequency = 3MHz. Function: Step, CW Step, A Quadrature, Encoder Following, CW Limit, CW Jog, START/STOP (Oscillator mode), General Purpose Input. DIR +/-: Optically Isolated, 5-24 Volt. Minimum pulse width = 250 ns. Maximum pulse frequency = 3 MHz. Function: DIR, CCW Step, B Quadrature, Encoder Following, CCW Limit, CCW Jog, Sensor, DIR (Oscillator mode), General Purpose Input.
ENABLE INPUT	EN +/-: Optically Isolated, 5-24 Volt. Minimum pulse width = 250 ns. Maximum pulse frequency = 3 MHz. Function: ENABLE, RESET, SPEED 1/SPEED 2 (Oscillator mode)
OUTPUT	Optically Isolated, 24V, 40mA MAX. NPN/sinking. Function: Fault, Motion, Tach or general purpose programmable
ANALOG INPUT RANGE	0 to 5VDC
ANALOG INPUT RESOLUTION	12 bits
COMMUNICATION INTERFACE	RS-232, RS-485 or CANopen/RS232

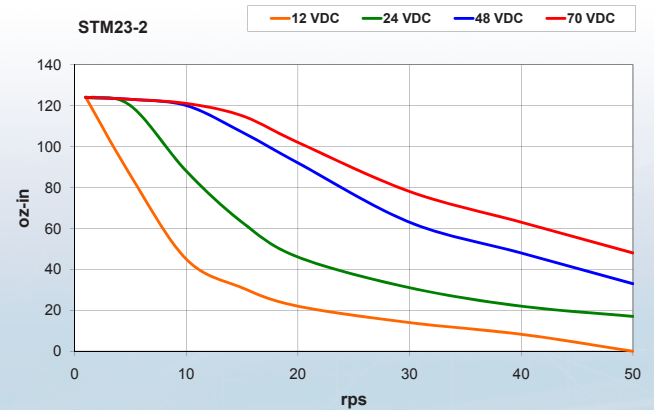
### APPROVALS: All Models

AGENCY APPROVALS	RoHS CE Certified
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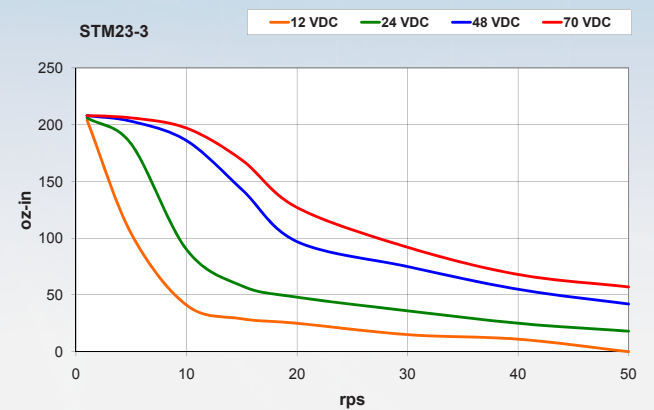
### PHYSICAL: All Models

MASS	STM23X-2XX = 1lb 14oz	STM23X-3XX = 2lb 10oz
ROTOR INERTIA	STM23X-2XX = 1.42 oz-in <sup>2</sup>	STM23X-2XX = 2.51 oz-in <sup>2</sup>

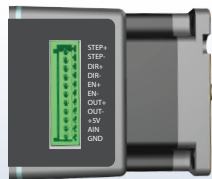
## STM23-2 TORQUE CURVES



## STM23-3 TORQUE CURVES



## Connections



Input/Output connections

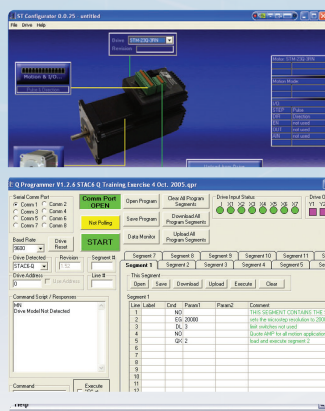
## Inputs & Outputs

**S**  
3 digital inputs  
1 digital output  
1 analog input

**Q**  
3 digital inputs  
1 digital output  
1 analog input

**C**  
3 digital inputs  
1 digital output  
1 analog input

## Software



### ST Configurator

Used for setup and configuration of the drive+motor. For more information about the ST Configurator visit the Applied Motion Products Web site.

### Q Programmer

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

### Help Manuals

ST Configurator incorporates new on-line help menus. All the technical data, application information and advice on setting up the drive is now just a mouse click away.



All software applications run on Windows Vista, XP, 2000, NT, ME, 98.

## Encoder Option

The STM drive+motor is offered with an optional 1000 line encoder that is integrated into the housing of the motor, without increasing the size of the unit.

The encoder feedback option provides the following functionality:

**Stall Detection:** The drive detects if the motor has stalled and triggers a fault.

**Stall Prevention:** The drive automatically senses rotor lag and reduces motor speed to avoid stalling. This way the move is completed, but takes longer.

**Position Maintenance:** When the motor is stopped, the encoder detects if the shaft is being moved out of position by an external force. The motor is then moved back to the correct position.

**Align to Index Pulse:** The encoder has an index pulse that can be used for precise repeatable alignment of the motor shaft.

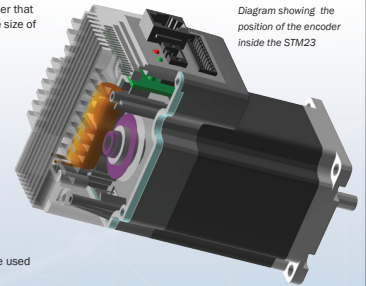


Diagram showing the position of the encoder inside the STM23

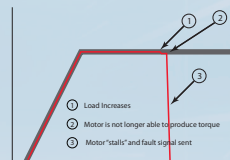


Figure 1. Diagram showing the Stall Detection process

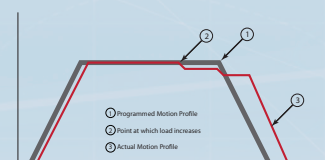
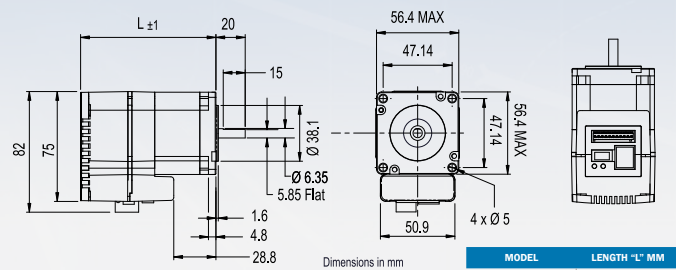


Fig 2. Diagram showing the Stall Prevention process

## Dimensions

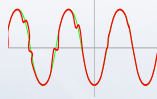


Dimensions in mm

MODEL	LENGTH "L" MM
STM23X-2	92.4
STM23X-3	114.4

### Anti-Resonance/Electronic Damping

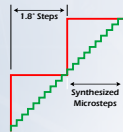
Step motor systems have a natural tendency to resonate at certain speeds. The STM drive+motor automatically calculates the system's natural frequency and applies damping to the control algorithm. This greatly improves midrange stability, allows for higher speeds, greater torque utilization and also improves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



**Delivers better motor performance and higher speeds**

### Microstep Emulation

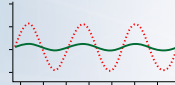
With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low-resolution step pulses and create fine resolution micro-step motion.



**Delivers smoother motion in any application**

### Torque Ripple Smoothing

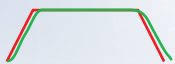
All step motors have an inherent low speed torque ripple that can affect the motion of the motor. By analyzing this torque ripple the system can apply a negative harmonic to negate this effect, which gives the motor much smoother motion at low speed.



**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**

### Dynamic Current Control

Allows for three current settings to help the motor run cooler and reduce power consumption.

- Running Current - the current the drive will deliver for continuous motion.
- Accel Current - the current the drive will deliver when accelerating or decelerating.
- Idle Current - reduces current draw when motor is stationary.

**System Runs Cooler**

### 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.

RS232 Model



RS485 Model



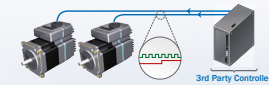
CANopen Model



### Q over CANopen

The ST drive with the CANopen option board has the ability to access, modify and trigger a Q program stored in the drive. The user develops and downloads a program using the Q Programmer™ software via RS-232. The program sequences can then be triggered via the CANopen network, creating a powerful distributed motion control system.

### 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



- RS-232 Model
- Accepts serial commands from host PC or PLC

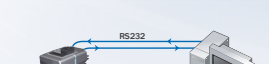


- RS-485 Model
- Accepts serial commands from host PC or PLC
  - Multi-axis capable



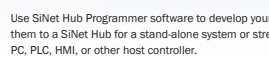
- CANopen Model
- Connect to CANopen network
  - DS301 and DSP402 protocols

### 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

### Multi-axis Systems



Use SiNet Hub Programmer 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, HMI, or other host controller.

