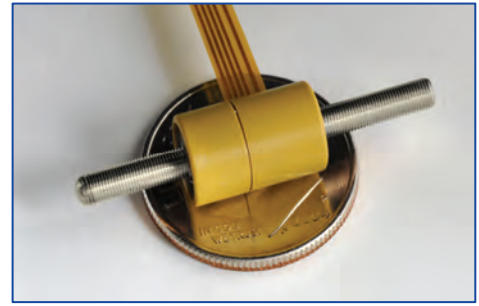




# SQL-3.4 Piezo Motors and MC-1100 Controller for OEM Product Applications



## FEATURES

- Less than 7 mm diameter
- Simple construction for high-volume, low-cost manufacturing
- No gears or cams - reduces part count in OEM products
- Uses power only when moving
- Robust construction withstands high shock loads
- Sub-micrometer resolution
- Silent, ultrasonic operation
- Wide operating temperature range

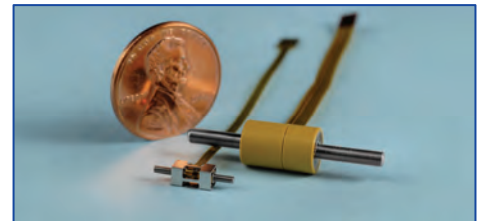
## APPLICATIONS

- Hand-held devices
- Mobile phone cameras
- Digital still and video cameras
- Electronic locks and fasteners
- Microfluidics, lab-on-a-chip
- Medical devices
- Defense and security controls
- Micro actuation for robotics, UAVs, instruments and more

### Compact, powerful linear micro motor for OEM products

The SQL-3.4 piezoelectric SQUIGGLE<sup>®</sup> micro motor offers millimeters of stroke and sub-micrometer precision, with significantly higher force than our smaller SQL-RV-1.8 motor. It withstands high shock and has low power requirements for battery-driven devices.

We work with OEM customers to tailor SQUIGGLE motors, drivers and modules to your needs. We will help you navigate trade-offs among size, speed, force and power. To get you started, we offer developer's kits including a SQUIGGLE motor and controller with New Scale Pathway<sup>™</sup> software – a flexible and sophisticated development tool with easy to use graphical user interface and intuitive scripting environment.

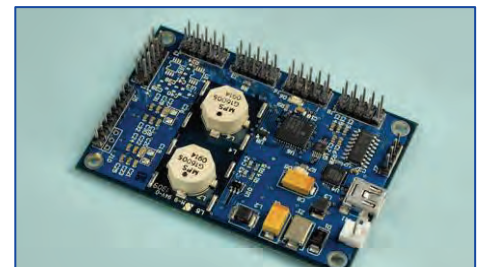


**SQL-RV-1.8 and SQL-3.4 SQUIGGLE** motors. SQL Series motors are also available in custom sizes for OEMs.

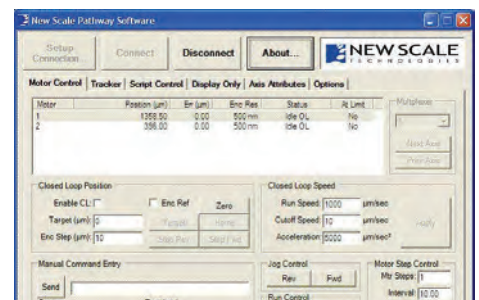
Specifications	Model SQL-3.4-10
Travel Range	7 mm, 20 mm
Housing Dimensions	∅ 6.83 x 11.02 mm
Stator Dimensions	3.4 x 3.4 x 10mm
Stall Force	200 gram force (2N)
Speed (at ½ stall force)	4 mm/s
Resolution	0.5 µm
Input Power (stopped)	OFF-POWER HOLD (0 mW, 0 V to hold position)
Input Power to motor (moving) *	1000 mW typical
Input Power to controller (moving) *	~2.5 W max (MC-1100 controller)
Lifetime **	>70,000 cycles
Operating Temperature	-30 to +80° C
Storage Temperature	-40 to +85° C
Shock Resistance	2500 Gs
Operating Frequency	~ 115 KHz
Capacitance per Phase	~ 1.29 nF
Motor Controller	MC-1100
Motor Weight (without screw)	0.7 grams

\* Power depends on motor speed and load.

\*\*Lifetime test: continuous operation, full speed, room temperature, 100 gram force load

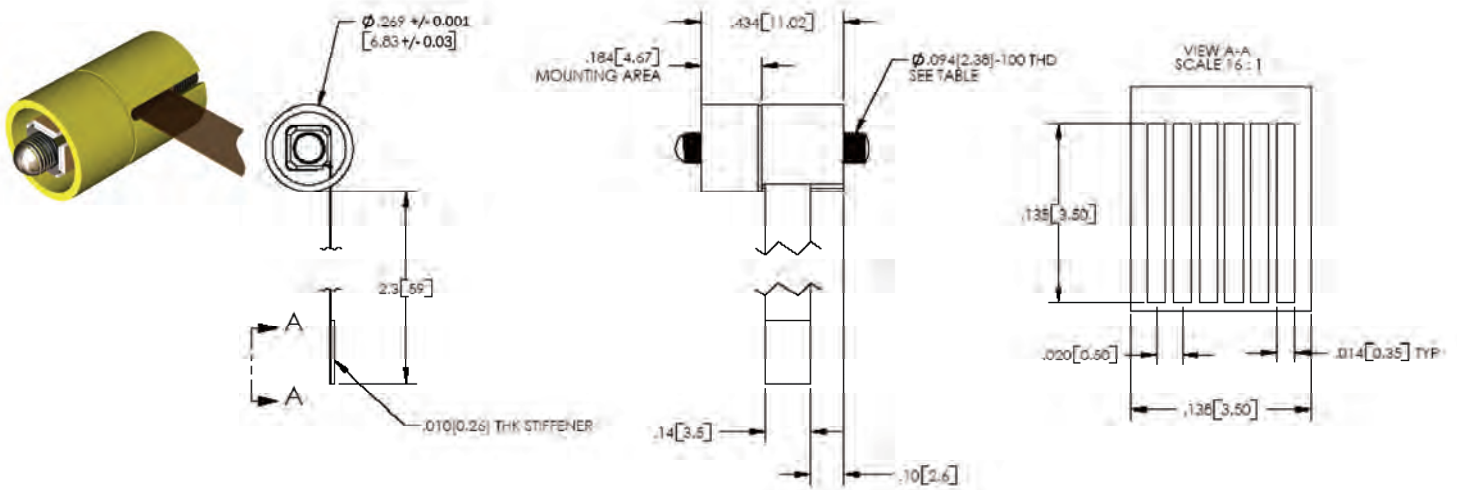


**MC-1100 controller** measures only 2x3 inches. It includes a 10-bit A/D converter for closed-loop operation. Use it as a reference design or integrate it into OEM instruments.



**New Scale Pathway<sup>™</sup> software** facilitates motor evaluation, system development and prototype test.

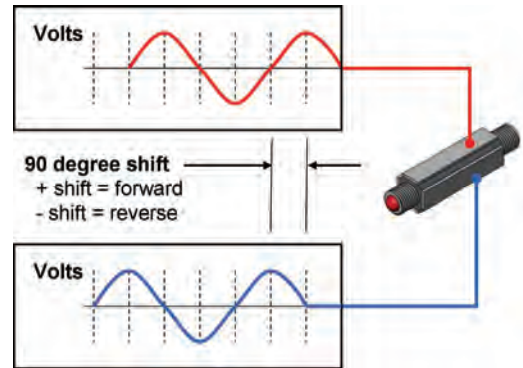
## SQL-3.4-10 SQUIGGLE motor



### MC-1100 Controller

The MC-1100 motor controller generates ultrasonic signals to drive SQL-3.4 Series SQUIGGLE motors. The credit-card sized controller is designed for easy integration into OEM instruments. It can be used for open-loop or closed-loop systems.

Frequency tracking integrated into the board optimizes motor performance with minimal power by compensating for motor frequency variation, which can result from temperature or load variations.



### Driving the motor

An MC-1100 motor controller sends drive signals to a SQUIGGLE motor based on the input from a computer, analog input, or manual handset.

- **Computer control** – connect the MC-1100 to a PC through a USB or RS-232 port. The **ActiveX command library** makes operation easy, from either the New Scale Pathway™ software or third-party software such as Visual Basic. You can also build custom scripts using the intuitive scripting interface.
- **Analog control** – provide a 0 volt to 3.3 volt input command, which corresponds to +/- the maximum velocity.

Each MC-1100 drive card operates a single SQUIGGLE motor. You can control multiple drive cards simultaneously from a single computer screen using the software provided.

### Open-loop operation

When using the MC-1100 controller in an open-loop configuration, you can calibrate a motor's average step size in response to a number of drive pulses.

### Closed-loop operation

We recommend closed-loop operation when repeatable step size, absolute position or precise velocity control is needed. The MC-1100 accepts analog or digital input from a remote position sensor for closed-loop motion control. (refer to application note, "Using SQUIGGLE Motors in miniature closed-loop motion systems" on our website at [www.newscaletech.com/application\\_notes.html](http://www.newscaletech.com/application_notes.html)).

With an analog position sensor, closed-loop position resolution is determined by the A/D converter, the resolution of the position sensor, and the resolution of the motor.

The A/D converter must be capable of resolving the position sensor feedback signal into small enough increments to allow signals to the motor at its best resolution. The MC-1100 drive card has a 10-bit A/D converter. With a digital (incremental) encoder as a position sensor, the resolution is determined by the resolution of the encoder. The MC-1100 drive card accepts digital position feedback signals directly to the RS-422 input.

### MC-1100 motor controller specifications

For use with SQL-3.4 motor	
<b>Input Power</b>	5 V DC 500 mA max
<b>Output Signals</b>	Motor Phase 1, Motor Phase 2, Ground
<b>Computer Control</b>	USB or RS-232 New Scale Pathway software ActiveX command library included
<b>Position Sensor Input</b>	Digital (RS-422) or Analog (0-3.3V) port
<b>A/D Converter Resolution</b>	10 bits
<b>Closed Loop Commands</b>	including Speed, Target, Step, Zero, Enable Reference Mark and more
<b>Open Loop Commands</b>	including Speed, Run, Stop, Timed Step(s) and more
<b>Dimensions (l x w x h)</b>	2 x 3 x 0.8 inches (50.8 x 76.2 x 14 mm)



**SQL-3.4 Evaluation Packs** available for rapid implementation into your prototype designs. Open loop or closed loop (w/ TRACKER NSE-5310) systems available.

### Ordering information

Model	Description
<b>SQL-3.4-10-30</b> <b>SQL-3.4-10-17</b>	20 mm travel range (30 mm screw length)* in a Torlon housing 7 mm travel range (17 mm screw length)* in a Torlon housing
<b>SQL-3.4-E-30</b> evaluation pack	SQUIGGLE Motor 3.4 Evaluation Pack with 20 mm travel, includes SQL-3.4-30 Motor, MC-1100-3.4 controller, motor extension cable, power supply, power adapter cable, USB cable and software
<b>SQL-3.4-E-17</b> evaluation pack	SQUIGGLE Motor 3.4 Evaluation Pack with 7 mm travel, includes SQL-3.4-17 Motor, MC-1100-3.4 controller, motor extension cable, power supply, power adapter cable, USB cable and software.
<b>SQL-3.4-TRK-E-17</b> evaluation pack with TRACKER NSE-5310 position sensor (standard resolution controller)***	SQUIGGLE Motor 3.4 Evaluation Pack with 7 mm travel and TRACKER NSE-5310 Sensor, includes SQL-3.4-17 Motor with TRK-1T02 Sensor Assembly, MC-1100-3.4 controller, TRACKER adapter board, 2mm x 11mm magnet, motor extension cable, power supply, power adapter cable and USB cable and software.
<b>MC-1100-3.4</b>	Controller for SQL-3.4 Series SQUIGGLE Motor

\* Call for custom travel range, screw lengths or other configurations.