

Quick Tips for Integrating SQUIGGLE Motors

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SQUIGGLE motors, the world's smallest linear motors, are now routinely integrated into motion systems by OEM customers all over the world. With the new easy-mount metal housing along with the drive ASIC, integrating SQUIGGLE motion solutions has never been easier.

As you design your motion system and integrate SQUIGGLE motors into your product, there are a few key design practices to follow:

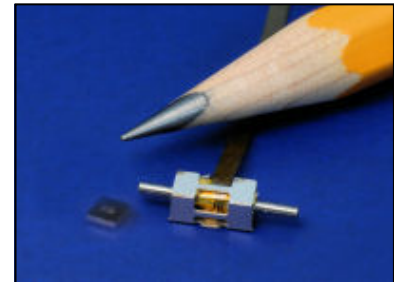


Figure 1: SQUIGGLE motor and NSD Series piezo motor driver ASIC – the world's smallest linear motor system.

1. Make sure you always provide a return force to the SQUIGGLE motor screw.

The motor requires that a few of grams of force be applied to the screw, to ensure that the threads are properly engaged for proper operation of the motor. If this “return force” is not present, the motor may stall, exhibit intermittent motion, or otherwise not operate to specification. This will not damage the motor, but will result in poor operation of your system. *Please see the reference design example in the SQL-1.8 or SQL-RV-1.8 SQUIGGLE Motor Manual for more information.*

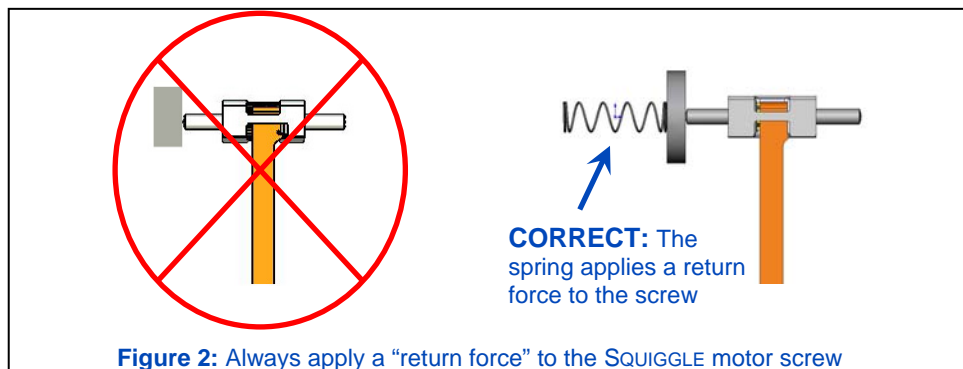
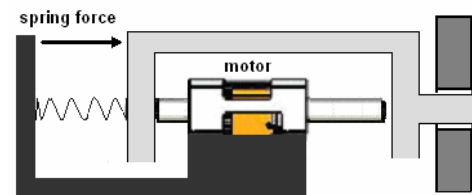


Figure 2: Always apply a “return force” to the SQUIGGLE motor screw

2. Proper return force prevents motor screw drift due to strong external vibrations.

The SQUIGGLE motor is very robust and can easily survive strong vibration and shock. To use this feature to your advantage, it is a good practice to mount the motor with the return force in the direction of your locked (or closed fail-safe) position. This way if the system is subject to strong vibration, the mechanism will remain locked. An example is shown at right.



3. Do not side-load the motor screw.

The screw should be allowed to rotate freely, pushing against a low-friction surface on the load. A common mistake is to fix a component such as an end cap or disc on the screw, and then to apply a side load to the component. Such a side load will shorten the life of the motor and may prevent the screw from rotating—reducing performance or stalling the motor. This can be avoided by decoupling the component from the screw. Note in the reference design example in the motor manual how the stages are NOT directly connected to the motor.

4. Avoid friction in the system.

The SQUIGGLE motor has a high thrust force which easily accommodates a few grams of return force plus the mass or load of the system you are moving. Any friction will reduce the total load you will be able to move with the motor, so in designing your system it is always better to minimize the friction between moving parts. Be particularly careful to prevent friction from side-loading (see #3).

5. Avoid running the SQUIGGLE motor into a hard stop.

The motor will not be damaged by running it into a hard stop. More often it simply backloads the screw until the force is higher than 30 grams, at which point the motor stalls. In these cases the motor may sometimes remain jammed against the hard stop, unable to free itself. The easiest way to prevent this is to use limit switches to stop the motor at the ends of travel. There are several different types of limits that may be used including position sensors. New Scale has also made available to its customers a proprietary way to prevent jamming purely through the mechanical design of the screw. *A reference design is available in the SQL-1.8 or SQL-RV-1.8 SQUIGGLE Motor Manual, or contact our applications engineering team, (sales@newscaletech.com), for more information.*

6. For NSD-1202 only: Use the proper master clock frequency of 20MHz.

NOTE: New Scale recommends the newer SQL-RV-1.8 reduced voltage SQUIGGLE motor with NSD-2101 driver. The NSD-2101 driver features a built-in oscillator and does not require an external clock.

When using an SQL-1.8 motor and NSD-1202 driver, the accuracy of switching frequency and phase shift will be defined depending on master clock frequency of the NSD-1202, specified at 20MHz. Lower master clock frequencies give higher deviations, therefore a 20MHz master clock frequency is strongly recommended. Using a lower frequency could result in reduced performance over the operating temperature range as well as potential variation in performance from motor to motor in your motion system. If you need to use the NSD-1202 with a lower master clock frequency, please consult our applications engineering team to learn more about the frequency doubling functionality and other options available.

Additional SQUIGGLE Motor Integration Resources

For more information please review the SQL-RV-1.8 or SQL-1.8 SQUIGGLE Motor Manual available on the Downloads portion of our website www.newscaletech.com or consult the applications engineering team at New Scale Technologies: email sales@newscaletech.com or call (585) 924-4450. We will be happy to work with you to ensure your design's success. New Scale engineers can assist OEM customers with integration structure design, create customized motor housings, or design complete application-specific modules (including drive electronics and miniature position sensors) to fit your requirements.