

# Product Document

# M3-L Linear Actuator

## Smart Module for Precision Motion



### FEATURES

- **Small**
  - Complete, closed-loop system with embedded controls in less than 27.5 x 13.2 x 7.5 mm
- **Precise**
  - 0.5  $\mu\text{m}$  resolution
  - 6 mm of travel
- **Simple system integration**
  - High-level motion commands over standard serial interface (I<sup>2</sup>C or SPI)
- **Flexible system, fast to market**
  - Rapidly configurable for single- or multi-axis motion
  - Customizable for travel to 20 mm
- **Low voltage / low power use**
  - 3.3 V input, <500 mW power use
  - Holds position when power is off

### APPLICATIONS

- High Resolution Tuning Systems
- Hand-held Instrumentation
- Precision Photonics
- Targeting System
- UAV/UGV Controls and Optics
- Miniature Camera Systems
- Micro Surgical Devices
- Biomedical Inspection and Sampling

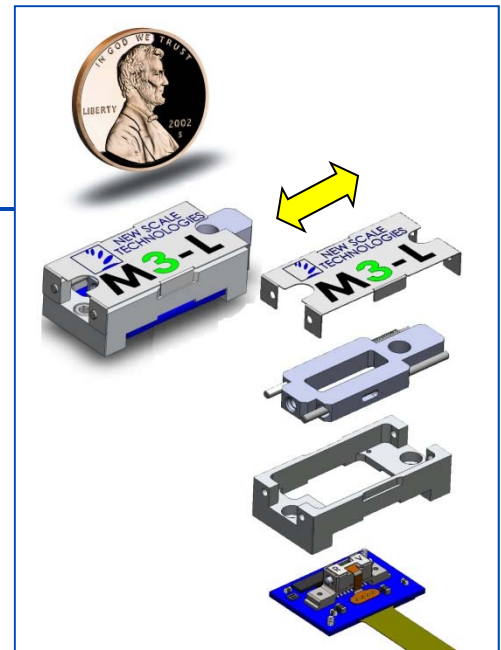
### High resolution M3-L linear actuators

The M3-L is a miniature high-resolution positioning system with integrated driver and closed-loop control. It delivers 0.5 micron resolution at less than half the size and one-fourth the weight of comparable positioning systems.

This compact, powerful motion system helps OEM designers improve performance and reduce the size of instruments in a wide range of applications. It is ideal for precision tuning of photonics, microwave and RF systems. Defense applications include laser beam steering and targeting, UAV and UGV flight controls, and field-portable systems for biomedical and chemical detection and analysis. Medical applications include micro surgical devices and point-of-care systems.

### The M3 micro-mechatronic module platform

M3-L module is built on New Scale's M3 Micro-Mechatronic Module technology platform: the smallest, highest resolution and most repeatable closed-loop micro-mechatronic system available – all in an easily integrated, customizable package. The platform includes a patented SQUIGGLE® RV piezo micro motor, an NSD-2101 drive ASIC, an NSE-5310 high-resolution magnetic position sensor, a microprocessor and firmware. The modules operate on 3.3V input and accept simple high-level motion commands via standard serial interface.



**The M3-L linear actuator** is a complete closed-loop linear actuator with integrated drive electronics. Modules are easily configured for single or complex multi-axis systems.



**SQUIGGLE RV motor and NSD-2101 drive ASIC** - the world's smallest linear motor system- inside every M3-F smart

## M3-L Developer's Kits

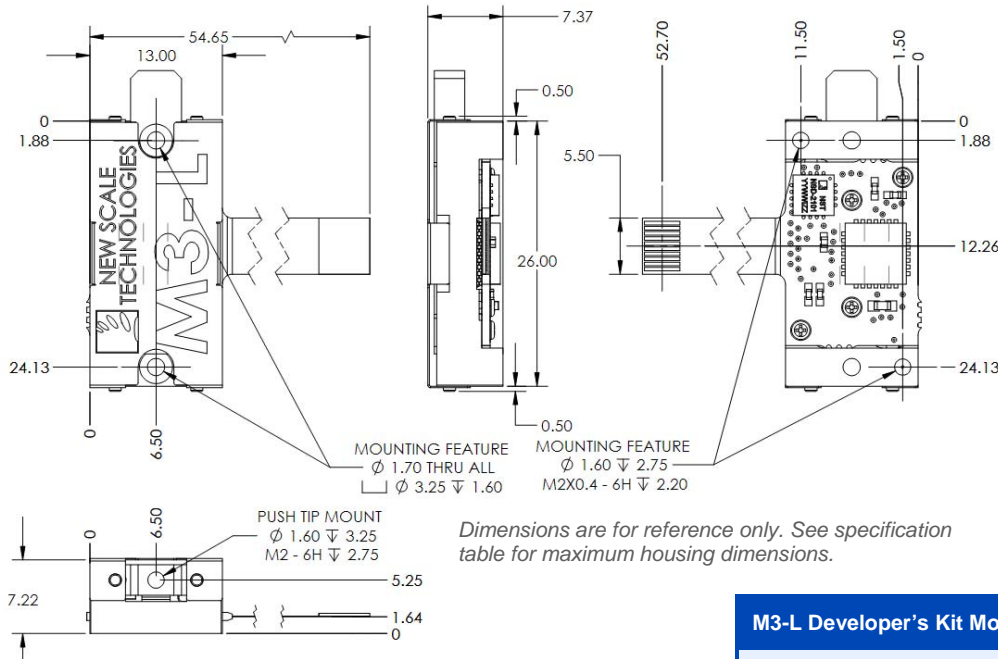
M3-L Developer's Kits offer convenience for initial evaluation, system development and integration into your prototype. Kits include an M3-L linear smart actuator and a USB adapter to convert motion commands from the New Scale Pathway™ PC software into SPI commands for the linear module. The Developer's Kit module features both a bullet-nose tip for pushing and an eye-end for pulling.

## Custom M3-L Linear Module System Development

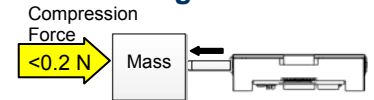
The Developer's Kit is designed to help you define your system specifications for subsequent development of custom micro motion modules with New Scale Technologies. Custom M3-L systems can be designed to push and/or pull loads, and meet your specific needs for travel range, size, force, special environmental conditions and more. For details refer to the module specification worksheet at <http://www.newscaletech.com/micro-mechatronics/contact-m3-l-rfp.php>



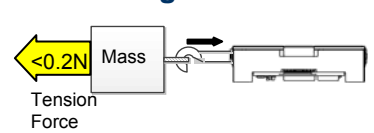
**M3-L Developer's Kits** allow OEMs to rapidly integrate high-resolution linear micro motion into OEM instruments. Kits include one M3-L module, USB control adapter with SPI output, and New Scale Pathway™ development software.



### Push Configuration



### Pull Configuration



## Ordering information



Order Developer's Kits online at Digi-Key:  
<http://www.digikey.com/product-detail/en/DK-M3L-1.8-TRK-6.0-S/DK-M3L-1.8-TRK-6.0-S-ND/2563771>

## Integration information

Additional information including integration guide and CAD file is available on our website. Please register at [http://www.newscaletech.com/register\\_for\\_download.php](http://www.newscaletech.com/register_for_download.php)

Part Number	Description
DK-M3-L-1.8-TRK-6.0-S	M3-L Linear Micro-mechatronic developer's kit. Includes M3-L module with push and pull ends, USB adapter (SPI), connecting cables, mounting hardware and New Scale Pathway™ development software

## M3-L Developer's Kit Module Specifications

Travel Range	6 mm
Maximum Housing Dimensions	27.5 x 13.2 x 7.5 mm
Speed	5 mm/s @ 0.15 N load (typical)
Resolution	0.5 $\mu$ m
Linear Accuracy	$\pm$ 25 $\mu$ m
Maximum Load (Push Pull Stall Force with $\pm$ 1 degree axial alignment)	<0.20 Newtons
Maximum Recommended Mass	5 grams
Input Voltage	3.1 - 3.6 V DC
Input Power**	< 0.5 W (5mm/s at 0.15 Newtons) < 0.2 W quiescent
Digital Interface	I <sup>2</sup> C or SPI
Weight (without tip)	4.5 grams

\*\*Power depends on input voltage, speed & load.