New Scale Technologies

SMALL, PRECISE, SMART … IN MOTION

M3-RS-U2-4.5-360

Rotary Smart Stage

Miniature piezoelectric positioning module with embedded controller

- **Smallest rotary stage:** 11.75 x 21.9 x 16 mm
- Embedded closed-loop controller
  - *No separate electronics needed*
  - 3.3 VDC input
  - Accepts direct motion commands (I^2C, SPI, UART or analog servo)
- Continuous 360° rotary motion
- Angular resolution ~21.9727 mdeg closed loop
- Built-in absolute position sensor
- Millisecond step and settle times
  - 0.5 deg in 16 ms closed loop
  - 0.5 deg in 1.2 ms open loop
- Holds position with zero power and no jitter

Smallest size, high resolution

The M3-RS-U2-4.5-360 Rotary Smart Stage is a miniature, "all-in-one" rotary positioning stage with closed-loop position resolution better than 0.022 degrees. It provides continuous 360° rotation with absolute position feedback.

The compact housing measures only 11.75 mm long x 21.9 mm wide x 16 mm tall and incorporates a *built-in controller* with all drive electronics and embedded firmware, along with patented piezoelectric motors, position sensors and bearings.

With no need for an external controller, this smart stage enables smallest system size in hand-held and portable instruments.

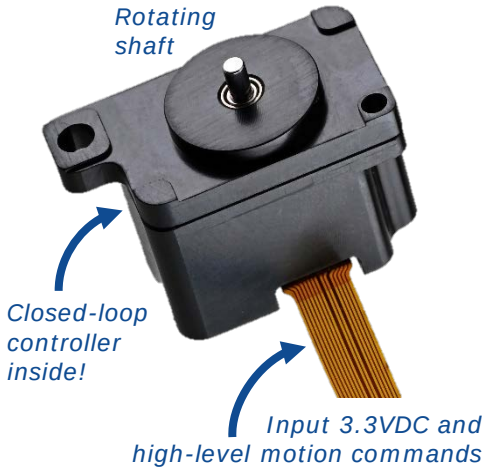
Embedded controller for fastest integration

The embedded controller also means rapid and easy integration into your system. It accepts direct input of high-level digital motion commands from your system processor over UART, SPI, I2C or analog servo interface.

Developer's kits include a USB adapter for PC control, and New Scale Pathway™ software for evaluation and system development.

Low power use for battery-powered systems

The positioning module needs only 3.3 V DC and uses approximately 750 mW when moving. It can be powered by USB or standard batteries. The integrated piezo motor holds position without using power.

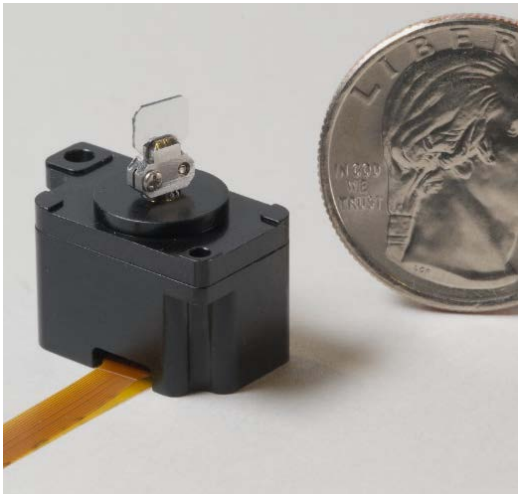


The M3-RS-U2 Rotary Smart Stage is an ultra-compact positioning module with embedded closed-loop control. This smart stage accepts direct input of simple motion commands via I^2C, SPI, UART or analog servo interface.

APPLICATIONS

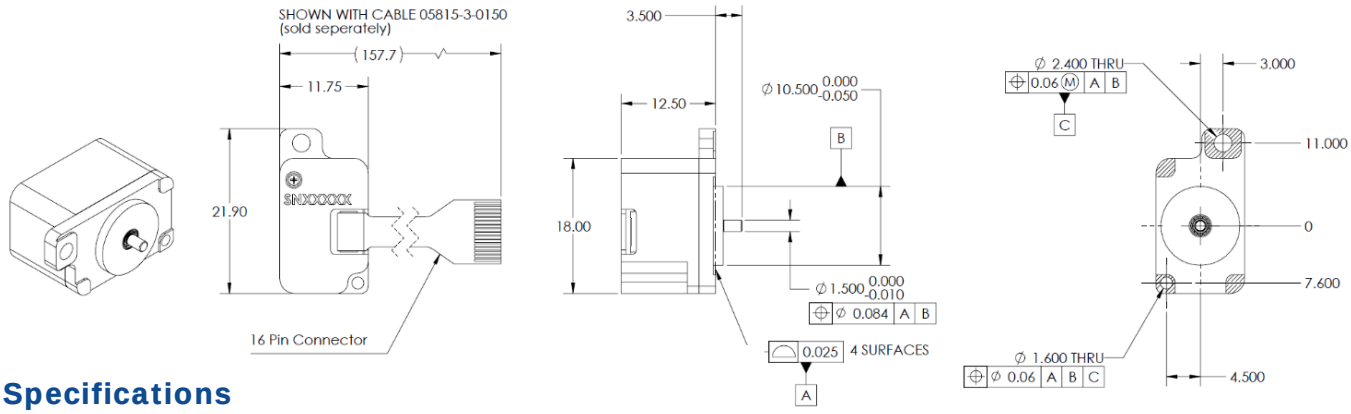
Scientific and industrial instruments requiring precise rotational positioning in a limited space.

- Point-to-point beam steering
- Optical tuning (with gratings or filters)
- Sample alignment
- Hand-held and battery-powered devices



M3-RS-U2 Rotary Smart Stage with mirror mounted on rotating shaft for point-to-point beam steering. (Mirror and mount not included.)

M3-RS-U2-4.5-360



Specifications

M3-RS-U2-4.5-360 Rotary Smart Stage	
Rotation Range	360 deg continuous rotation
Speed	> 1100 deg/sec
Acceleration	> 1,000,000 deg/sec^2 *
Stall Torque (minimum)	0.04 N-mm
Holding Torque (minimum)	0.08 N-mm (zero power)
Recommended Maximum Payload mounted to rotating shaft (Payload must be balanced)	
Mass	3 g
Inertia	350 g-mm^2
CLOSED-LOOP performance (with built-in position sensor)	
Recommended Step Frequency	Up to 100 Hz
Absolute Encoder Resolution	~21.9727 mdeg
Repeatability	+/-0.05 deg
Accuracy	0.25 deg
Closed-Loop Step & Settle Times (Typical)*	
0.5 deg	16 ms
5 deg	22 ms
20 deg	31 ms
Open-Loop Step & Settle Times (Typical)*	
0.05 deg	0.5 ms
0.5 deg	1.2 ms
5 deg	5 ms
20 deg	11.2 ms
Input Voltage	3.3 VDC +/- 10%
Power Consumption (typical)	750 mW active, moving 190 mW active, ready 50 mW standby
Stage Mass	4.7 g
Operational Lifetime	>2 million random positions or 7-years, whichever occurs first
Temperature/Relative Humidity	0 to +60 C, non-condensing
Compliance	RoHS; CE pending
Communication Interface	I^{2}C, SPI, UART, analog servo *Input directly to M3-RS*
Controller	Integrated into stage, 64 MIPS *NO external controller needed*

* With 0.6 g-mm^2 inertial load mounted to output shaft, based on a target tolerance of 2 encoder counts.

Developer's kits

Developer's kits provide easy smart stage evaluation and system prototyping. New Scale Pathway™ software and USB-to-PC adapter provides access to stage settings, motion commands, diagnostics, and more. Use the intuitive script generator to create command sequences for automated operation.

Ordering information

Developer's kits are available from New Scale and select reps and distributors. Contact New Scale regarding additional stages and flex cables for use with the developer's kit to create more complicated systems, or to inquire about volume pricing.

Model	Description
DK-M3-RS-U2-4.5-360	**Rotary Stage Developer's Kit** • M3-RS-U2-4.5-360 Rotary Smart Stage • Breakout PCB • M3 USB Adapter • Screwdriver and Mounting Screws • 10 Pin Straight flex cable • 16 Pin Straight flex cable • USB Extension cable • New Scale Pathway Software • Quick Start Guide

Download CAD files and user manuals at https://www.newscaletech.com/downloads/please-register/ (registration required).