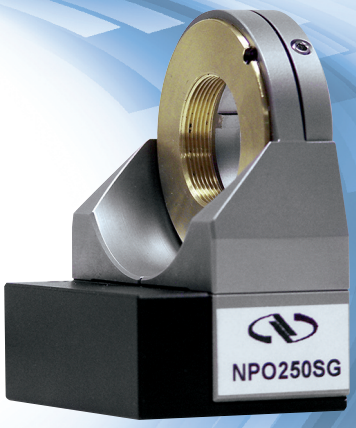
Objective NanoFocusing Stages



NPO SERIES

RoHS Compliant

Nano-focusing objective stages are high-speed, piezoelectric-driven devices providing fast focusing and scanning over long travel ranges of up to 250 µm and are compatible with most microscopes and objective lenses. Typical applications include surface profilometry, high-resolution imaging, auto-focusing, scanning interferometry, and confocal microscopy.

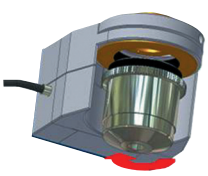
- Sub-nanometer piezoelectric positioning resolution
- Piezoelectric travel range of 140 or 250 µm
- High resonant frequency for dynamic applications
- Precision parallelogram design minimizes beam offsets

Piezoelectric Transducer (PZT) Stack Actuators

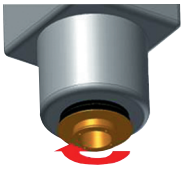
NPO stages feature highly reliable, multi-layer, low-voltage, piezoelectric transducer (PZT) stacks, which are optimized for high-duty cycle operations. Image shifts and tilt are minimized by an FEA-modeled and precision EDM-cut parallelogram, solid-state flexure that ensures perfectly straight motion. The sophisticated guide also provides the highest possible stiffness for superior focus stability, higher frequency auto-focusing, shorter settling times and faster scans. NPO stages are maintenance-free and are not subject to wear.

Microscope Mounting

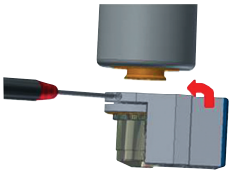
The NPO NanoFocusing stages mount between the turret and the microscope objective and add only 11.5 mm to the optical path length. All models can be used for standard and inverted microscopes. The standard thread size is W0.8x1/36” and is compatible with all Newport objective lenses.



❶ Screw the microscope objective into the NPO NanoFocusing stage .



❷ Screw the adapter into the microscope.



❸ Clamp to NPO NanoFocusing stage on the adapter.

Open-loop or Closed-loop Versions

NPO NanoFocusing stages are available as open-loop (no position feedback) or closed-loop versions with integrated position feedback. In open-loop, the resolution is only limited by the noise of the control electronics, but repeatability and stability are compromised due to the hysteresis and creep of the piezoelectric ceramic material. The closed-loop systems (model numbers ending in SG) feature high resolution strain-gauge position sensors for highly accurate and repeatable motion. Also, the position feedback compensates for actuator creep. For highest position stability and highest temperature-insensitive performance, the sensors are assembled in a full Wheatstone bridge design. The closed-loop devices can be operated in open or closed-loop control.

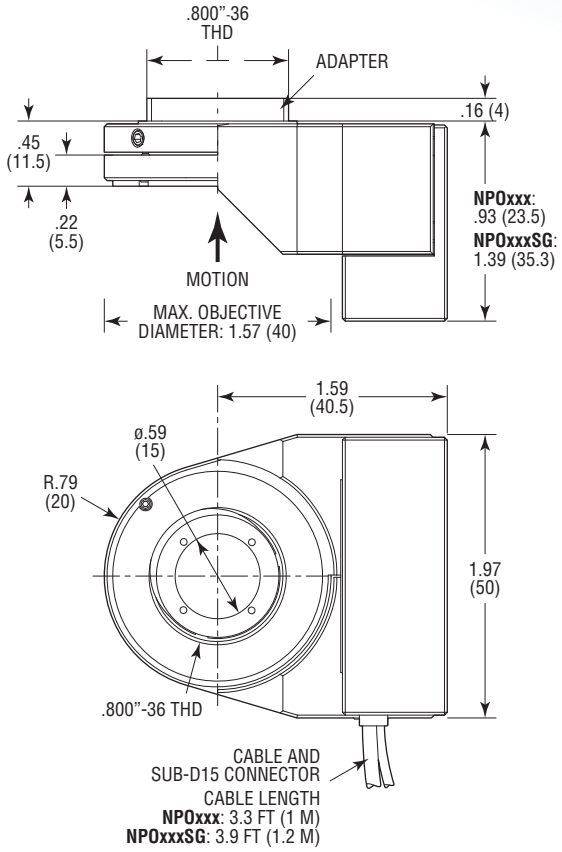
Newport®

SPECIFICATIONS

	NPO140	NPO250
Open loop travel (± 10%), (µm) (1)	140	250
Closed loop travel (µm) (1, 2)	100	200
Open loop resolution (nm) (3)	0.3	0.5
Closed loop resolution (nm) (2)	3	5
Typ. Repeatability (nm) (2)	30	46
Capacitance (± 20%) (µF)	3.4	10.2
Resonant frequency, unloaded (Hz)	370	310
With 80 g load (Hz)	300	270
With 105 g load (Hz)	270	250
With 300 g load (Hz)	210	155
Axial stiffness (N/µm)	1.4	0.4
Max lens weight (g)	500	500
Typ. Tilt, full travel (µrad)	<4	<10
Weight (g)	150	255

1) Typical value measured with NPC3 and NPC3SG, (-20 V to +130 VDC range).
2) Applies to devices with ending SG in closed-loop control only.
3) Equal to rms noise value measured with NPC3 and NPC3SG controller.

DIMENSIONS



DIMENSIONS IN INCHES (AND MILLIMETERS)

RECOMMENDED CONTROLLERS/DRIVERS

Model	Description
XPS-D	1- to 8-axis universal high-performance motion controller/driver
XPS-DRV11	Universal digital driver card for stepper, DC, brushless and direct motors
XPS-RL	1- to 4-axis universal high-performance motion controller/driver
XPS-DRVP1	NanoPositioning drive module for piezo-stack based products
NPC3	3-channel piezo stack amplifier, open-loop control
NPC3SG	3-channel piezo amplifier, strain-gauge position control

ORDERING INFORMATION

Model	Description
NPO140	Nanofocusing Objective Stage, 140 µm, Open-loop
NPO140-D	Nanofocusing Objective Stage, 140 µm, XPS, Open-loop
NPO140SG	Nanofocusing Objective Stage, 140 µm, Strain-gauge
NPO140SG-D	Nanofocusing Objective Stage, 140 µm, Strain-gauge, XPS
NPO250	Nanofocusing Objective Stage, 250 µm, Open-loop
NPO250-D	Nanofocusing Objective Stage, 250 µm, XPS, Open-loop
NPO250SG	Nanofocusing Objective Stage, 250 µm, Strain-gauge
NPO250SG-D	Nanofocusing Objective Stage, 250 µm, Strain-gauge, XPS
NPO250SGV6	Vacuum Nanofocusing Objective Stage, 250 µm, Strain-gauge
NPO250V6	Vacuum Nanofocusing Open-loop Objective Stage, 250 µm

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