Ultra-Fast Piezo Steering Mirror Mount

PSM2

mks | Newport

The PSM2 provides high-speed, sub-microradian resolution, tip, tilt, and z-motion for mirrors, gratings and other optics. Equipped with a direct piezo actuation system without lever arm transmission, the PSM2 is ideally suited for high bandwidth laser beam steering, switching and stabilization, beam scanning, image stabilization, and laser cavity tuning.

Fast and reliable motion is supplied by three multi-layer, low voltagepiezo stacks (PZT) in a triangle configuration. The length of each piezo stack can be controlled individually. Applying a voltage to one stack, results in a rotation. Changing the length of all three stacks simultaneously, results in a linear z-displacement.

For simple operation, the three piezo stack of the PSM2 are arranged in a right-angled triangle configuration. This results in orthogonal rotation axis with no need for coordinate transformations as required with alternative designs where the piezo stacks are placed in 120° intervals.

Features

- Excellent Ultra-fast, two-axis rotation and linear z-motion for up to 50 mm diameter optics
- 2 mrad angular range and 16 µm linear range
- Direct piezo design provide high-bandwidth control
- Ultra-compact
- RoHS Compliant

	PSM2 Open Loop		PSM2G Closed Loop
Active Axes		Θx, Θy, Z	
Angular Range, Θx, Θy (± 10%) (mrad)	2 (1, 4)		1.6 (1, 2, 4)
Travel Range, Z (± 10%) (µm)	16 (1, 4)		12 (1, 2, 4)
Resolution, Θx, Θy (µrad)	0.004 (3)		0.04 (2)
Resolution, Z (nm)	0.03 (3)		—
Typical Repeatability, Θx, Θy (µrad)	—		1.1 (2)
Capacitance (± 20%) (µF)	1.8		
Resonant frequency, unloaded (Hz)	5400		
Stiffness in Z (N/mm)	65		
Max load (N)	1		
Weight (g)	85		

1) Typical value measured with NPC3 and NPC3SG, (-20 V to +130 VDC range).
2) Applies to PSM2SG in closed-loop control only.
3) Equal to rms noise value measured with NPC3 and NPC3SG controller.
4) Linear travel and angular travel are interdependent. The values provided here are for pure linear or pure angular motion.

The parallel motion design of the PSM2 has also the advantage of being fully temperature compensated, i.e. changes in the environmental temperature do not affect the tilting angle. PSM2 units are also maintenance-free and are not subject to wear.

The PSM2 is available as an open-loop (no position feedback) or a closed-loop device with integrated position feedback. The open-loop version is ideal for applications where the position is controlled by an external sensor, e.g. a lateral effect diode, quad cell, photodiode, CCD camera, etc.

The closed-loop version PSM2SG provides absolute position control, high linearity, and high repeatability based on internal strain-gauge position sensors. The position feedback compensates also for actuator creep. For highest position stability and highest temperature insensitive performance, the sensors are built in a full Wheatstone bridge design.

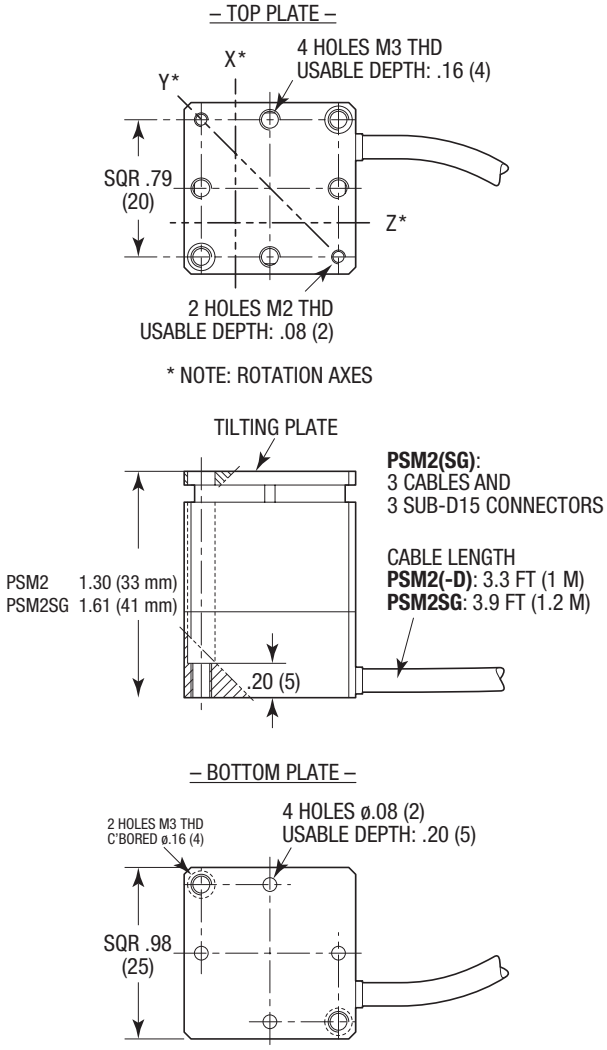
The PSM2SG can be operated in either open or closed-loop control.

The PSM2 models are internally preloaded and can be mounted in any orientation. The PSM2 supports mirrors up to 50 mm diameter and can be glued directly to the top plate.

Ordering Information

PSM2	Piezo steering mirror mount, 2 mrad x 2 mrad x 16 µm, open-loop
PSM2-D	Piezo steering mirror mount, 2 mrad x 2 mrad x 16 µm, open-loop, XPS compatible
PSM2SG	Piezo steering mirror mount, 2 mrad x 2 mrad x 16 µm, with strain gauge sensors

Dimensional Drawing



DIMENSIONS IN INCHES (AND MILLIMETERS)

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