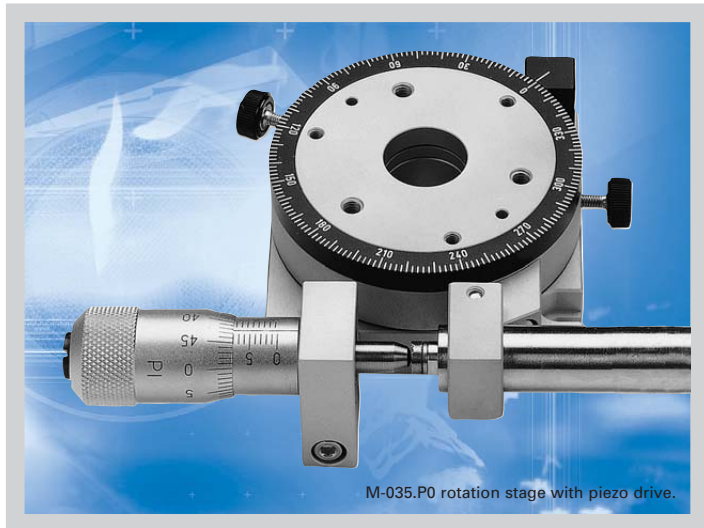


M-035

Compact Precision Tangent-Arm Rotation Stages with Optional DC-Motor and Piezo Drives

>> Click [http://www.pi.ws/fwd/Micropositioning for the Latest Specs on these Products](http://www.pi.ws/fwd/Micropositioning%20for%20the%20Latest%20Specs%20on%20these%20Products)



M-035.P0 rotation stage with piezo drive.

- Sub-Microradian Resolution
- 360° Coarse Range, up to 19° Fine Range with < 1 μrad Resolution
- Precision Micrometer or DC Motor Drives
- Piezo Option for High-Resolution Scanning and Tracking
- ø 20 mm Clear Aperture

M-035 series precision rotation stages with tangent-arm drive feature high resolution, excellent repeatability and minimum wobble. The stages are equipped with double-row ball bearings for zero backlash and high load capacity. Both the rotation platform and the scale ring (graduated in 2-degree increments) can be independently coarse positioned over 360 degrees and then locked with screws.

Drive Options

A total of six different drive types are offered. They include various combinations of piezoelectric fine-positioners (closed-loop or open-loop), manual and motorized micrometer drives.

Manual Drive

The basic version, the M-035.50, is equipped with a micrometer drive and a zero-backlash magnetic coupling.

The micrometer motion, when converted into rotation, provides a positioning range of 19 degrees. The resolution is approximately 23 μrad.

DC Motor Drives

The motorized version, the M-035.D01 features a high-resolution DC motor drive unit (M-227.10, p. 7-76) and has a range of about 12.6° with resolution of 2 μrad. A set of limit switches on the rotation stage protects against overtravel damage.

High-Resolution Piezo Option

For applications requiring extremely high angular resolution, models M-035.PS and M-035.P0 (with manual micrometer drive) and M-035.DS1 and M-035.DP1 (motorized) are available. They have an additional piezoelectric fine adjustment, which can also be used for dynamic operation. The piezo drive has a linear

travel range of 45 μm with sub-nanometer-resolution, which converts to a rotation range of approx. 1 mrad and sub-μrad resolution.

The piezo drives in the M-035.PS and M-035.DS1 versions are also equipped with a position sensor, making closed-loop operation possible, with higher stability, reproducibility and accuracy. For more details on the piezo drives, see the "Piezo Actuators" section.

Upgrades

M-035 stages without piezo or DC-motor drives can be upgraded at a later date.

Notes

See "Accessories", page 7-92 ff. for adapters, brackets, etc.

Ordering Information

M-035.50
Precision Rotation Stage, ø 60 mm, Micrometer Drive

M-035.P0
Precision Rotation Stage, ø 60 mm, Micrometer + Piezo Drive

M-035.PS
Precision Rotation Stage, ø 60 mm, Micrometer + Closed-Loop Piezo Drive

M-035.D01
Precision Rotation Stage, ø 60 mm, DC Motor Drive

M-035.DP1
Precision Rotation Stage, ø 60 mm, DC Motor + Piezo Drive

M-035.DS1
Precision Rotation Stage, ø 60 mm, DC Motor + Closed-Loop Piezo Drive

Upgrade Kits

M-035.U0
Upgrade Kit with Open-Loop Piezo Drive

M-035.US
Upgrade Kit with Closed-Loop Piezo Drive

M-035.UD
Upgrade Kit with DC Motor Drive (Factory Installed)

Ask about custom designs!

Rotation Range Conversion

M-035 and M-036 rotation stages use a tangent-arm which extends beyond the platform. The angular equivalent of the linear actuator displacement can be calculated by the following equation:

$$\alpha \approx \arctan (x/r_0)$$

where:

x = displacement of linear actuator [mm]

α = rotation angle [°]

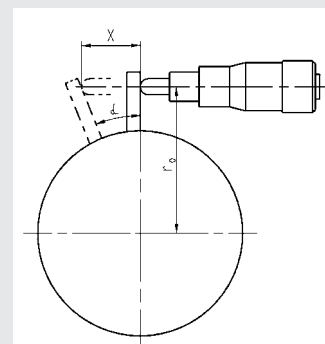
r₀ = distance of linear actuator contact point to center of rotation @ 0 degrees [mm]

r₀ is 44 mm for the M-035 rotation stages and 66 mm for the M-036 rotation stages.

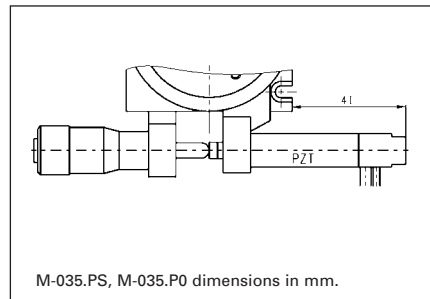
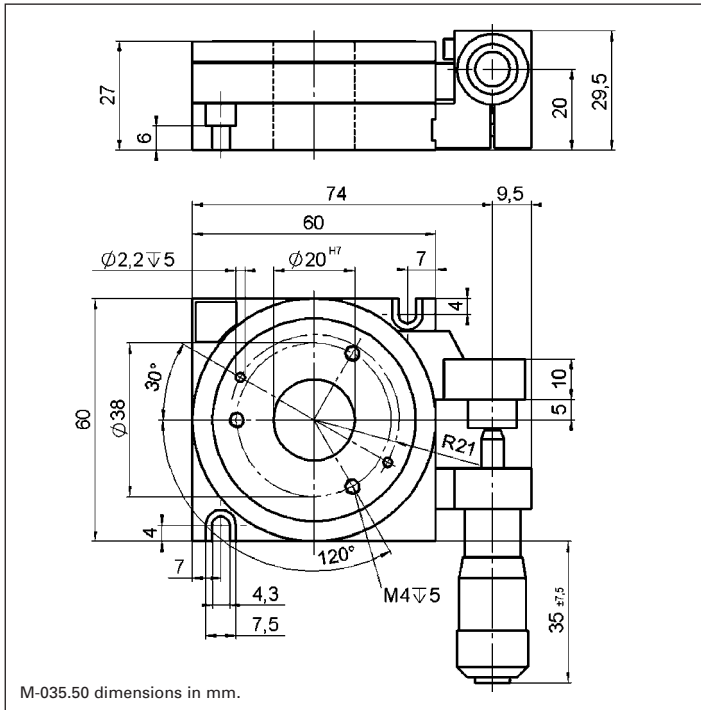
Example:

The rotation angle of an M-035 for a linear displacement x = 5 mm:

$$\alpha \approx \arctan (5/44) \approx 6.48^\circ$$



Relation between linear displacement and rotation



Piezo Actuators

Nanopositioning & Scanning Systems

Active Optics / Steering Mirrors

Tutorial: Piezo-electrics in Positioning

Capacitive Position Sensors

Piezo Drivers & Nanopositioning Controllers

Hexapods / Micropositioning

Photonics Alignment Solutions

Motion Controllers

Ceramic Linear Motors & Stages

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Technical Data

Models	M-035.50	M-035.P0	M-035.PS	M-035.D01	M-035.DP1	M-035.DS1	Units	Notes, see p. 7-106
Coarse rotation range	360	360	360	360	360	360	°	
Rotation range (micrometer drive)	19	19	19	6**	6**	6**	°	
Rotation range (piezo drive)	-	1,040	1,040	-	1,040	1,040	μrad	
Minimum incremental motion (piezo drive)	-	<1	<1	-	<1	<1	μrad	
Repeatability (piezo drive)	-	-	2	-	-	2	μrad	
Unidirectional repeatability (motor drive)	-	-	-	10	10	10	μrad	
Backlash (motor drive)	-	-	-	50	50	50	μrad	
Design resolution (motor drive)	-	-	-	0.08	0.08	0.08	μrad	A3
Minimum incremental motion (motor drive)	-	-	-	2	2	2	μrad	A4
Minimum incremental motion (micrometer drive)	23	23	23	-	-	-	μrad	
Rotation / linear input	22.7	22.7	22.7	22.7	22.7	22.7	μrad/μm	A5
Tangent arm length	44	44	44	44	44	44	mm	A5
Wobble	<150	<150	<150	<150	<150	<150	μrad	
Max. velocity (motor drive)	-	-	-	1.2	1.2	1.2	°/s	
Max. axial force	±300	±300	±300	±300	±300	±300	N	
Max. torque (θ _x , θ _y)	±3	±3	±3	±3	±3	±3	Nm	
Max. torque CW*	3	3	3	3	3	3	Nm	
Max. torque CCW*	0.05	0.05	0.05	0.05	0.05	0.05	Nm	
Drive (manual or motor)	M-622	M-622	M-622	M-227.10	M-227.10	M-227.10		
Piezo drive	-	P-840.30	P-841.30	-	P-840.30	P-841.30		D1
Weight	0.4	0.5	0.52	0.6	0.65	0.67	kg	
Body material	Al, St	Al, St	Al, St	Al, St	Al, St	Al, St		L
Recommended controller	-	-	-	C-843, C-848, C-862	C-843, C-848, C-862	C-843, C-848, C-862		D2
Recommended piezo controllers (codes explained p. 6-11)	-	A, C, G	D, H	-	A, C, G	D, H		

* CW: clockwise CCW: counter-clockwise

** Limited by limit switch position.