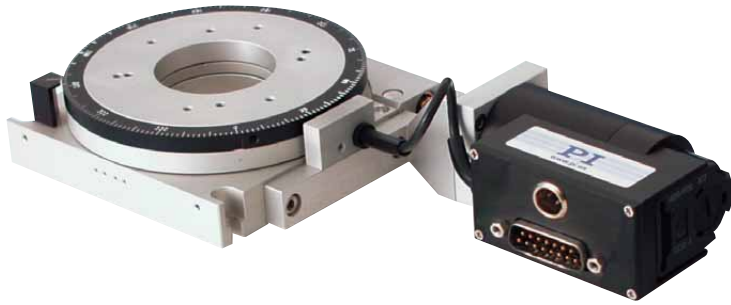


# M-038 Precision Motorized Rotation Stage

## Unlimited Travel Range, Vacuum-Compatible Versions



M-038.PD1 Rotation Stage

- Ultra-High Resolution
- Max. Velocity 90°/s
- Continuous Rotation Range
- Preloaded Worm Drive for Zero Backlash
- ActiveDrive™ Manual, DC-Servo and Stepper-Motor Drives
- Clear Aperture Ø 40.2 mm
- Vacuum-Compatible Versions Available to 10<sup>-6</sup> hPa

M-038 rotation stages are equipped with an ultra-precise worm gear drive allowing continuous rotation in either direction. Double-row ball bearings allow high load capacity, zero backlash and extremely low wobble. The new and improved

M-038.xx1 versions now feature a larger central aperture and a higher-performance worm wheel drive.

The worm gear ratio of 176:1 allows an extraordinary high position resolution of the turntable.

### DC-Motor and Stepper Motor Drives

A variety of servo motor and stepper motors are available, besides the manual version.

Model M-038.DG1 equipped with a closed-loop DC motor with shaft-mounted position encoder and precision gearhead providing minimum incremental motion of 3.5 µrad at a design resolution of 0.6 µrad.

Model M-038.2S1 models feature a cost-effective direct-drive, 2-phase stepper motor,

providing very smooth operation and a resolution of 5.45 µrad at a minimum incremental motion of 21 µm.

### ActiveDrive™

Model M-038.PD1 is equipped with the highly efficient Active Drive™ direct drive and reaches velocities up to 90°/s. The ActiveDrive™ design, developed by PI, features a high-efficiency PWM (pulse width modulation) servo-amplifier mounted side-by-side with the DC motor and offers several advantages:

- Increased efficiency, by eliminating power losses between the amplifier and motor
- Reduced cost of ownership and improved reliability, because no external driver is required
- Elimination of PWM amplifier noise radiation, by mounting the amplifier and motor together in a single, electrically shielded case

Coarse position can be read from an adjustable scale ring on the outer edge of the turntable graduated in 2 degree incre-

### Ordering Information

- M-038.001**  
Rotation Stage, Ø 100 mm, 360°, Manual Drive
  - M-038.DG1**  
Rotation Stage, Ø 100 mm, 360°, Closed-Loop DC Motor Gearhead
  - M-038.VG1**  
Rotation Stage, Ø 100 mm, 360°, Closed-Loop DC Motor Gearhead, Vacuum Compatible to 10<sup>-6</sup> hPa
  - M-038.PD1**  
Rotation Stage, Ø 100 mm, 360°, ActiveDrive™ DC Motor (Includes 24 V Power Supply)
  - M-038.VP1**  
Rotation Stage, Ø 100 mm, 360°, ActiveDrive™ DC Motor (Includes 24 V Power Supply), Vacuum Compatible to 10<sup>-6</sup> hPa
  - M-038.2S1**  
Rotation Stage, Ø 100 mm, 360°, 2-Phase Stepper Motor
- Ask about custom designs!**

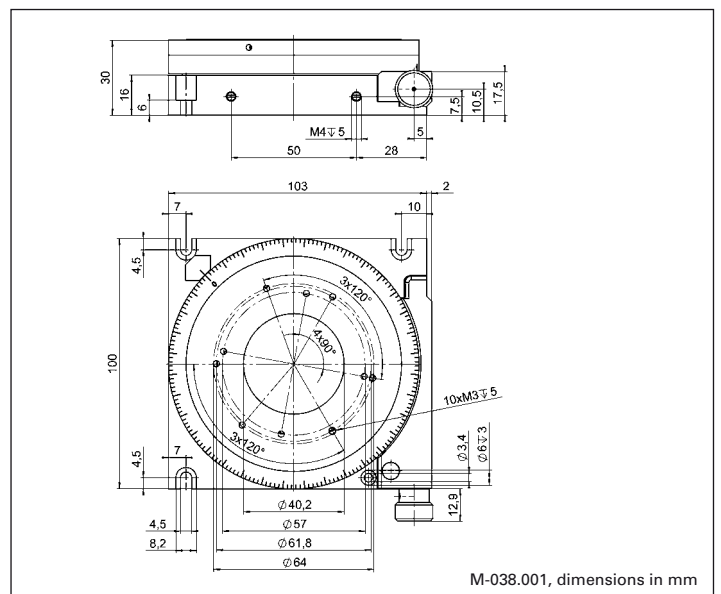
ments. Each M-038 stage is individually broken-in before delivery to achieve the exceptional mechanical precision.

### Notes

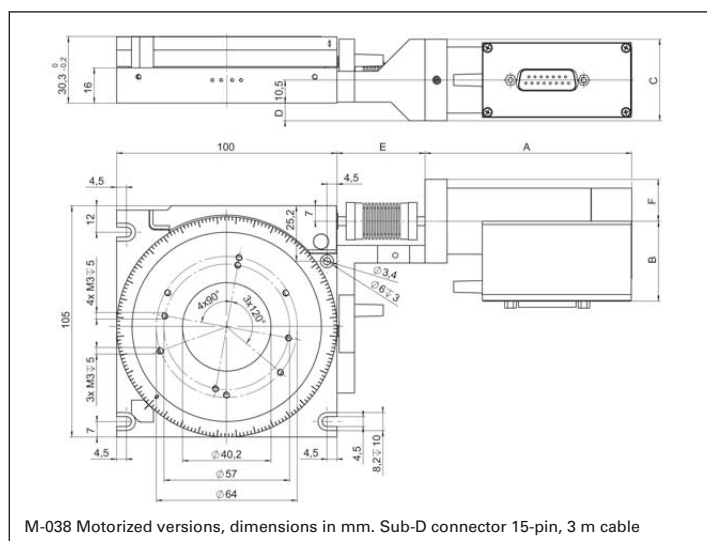
See "Accessories" for adapters, bracket, etc. see page 4-90 ff.



Custom M-038 stages at the coordinate measuring machine



More information: [www.rotation-stage.com](http://www.rotation-stage.com)



Custom M-038 with folded drive

M-038 Motorized versions, dimensions in mm. Sub-D connector 15-pin, 3 m cable

### Technical Data

Model	M-038.001	M-038.DG1	M-038.PD1	M-038.2S1	Units
Active axes	Rotation	Rotation	Rotation	Rotation	
<b>Motion and positioning</b>					
Rotation range	>360°	>360°	>360°	>360°	
Integrated sensor	–	Rotary encoder	Rotary encoder	–	
Sensor resolution	–	2000	4000	–	steps/rev.
Design resolution	–	0.60 (35 x 10 <sup>-6</sup> )	8.95 (0.0005)	5.58* (0.00032)	µrad (°)
Min. incremental motion	–	3.5	27	21	µrad
Backlash	–	200	200	200	µrad
Unidirectional repeatability	–	20	20	20	µrad
Wobble	<75	<75	<75	<75	µrad
Max. velocity	–	6	90	10	°/s
<b>Mechanical properties</b>					
Worm gear ratio	176:1	176:1	176:1	176:1	
Gear ratio	–	2401:81 ≈ 29.6:1	–	–	
Motor resolution	–	–	–	6400*	steps/rev.
Max. load/axial force	±400	±400	±400	±400	N
Maximum torque (θ <sub>x</sub> , θ <sub>y</sub> )	±6	±6	±6	±6	
Maximum torque CW**	2	2	2	2	Nm
Maximum torque CCW**	0.8	0.8	0.8	0.8	Nm
<b>Drive properties</b>					
Motor type	–	DC Motor, gearhead	ActiveDrive™ DC Motor	2-phase stepper motor*	
Electrical power	–	3	30	–	W
Reference switch	–	Hall-effect	Hall-effect	Hall-effect	
<b>Miscellaneous</b>					
Operating voltage	–	12 V differential	24 (PWM)	24	V
Operating temperature range	-20 to +65	-20 to +65	-20 to +65	-20 to +65	°C
Material	Aluminum	Aluminum	Aluminum	Aluminum	
Mass	0.9	1.25	1.35	1.25	kg
Recommended controller/driver		C-863 (single-axis) C-843 PCI board (for up to 4 axes)	C-863 (single-axis, p. 4-114) C-843 PCI board (p. 4-120) (for up to 4 axes)	C-663 (single-axis, p. 4-112)	

\*2-phase stepper motor, 24 V chopper voltage, max. 0.8 A/phase, 400 full steps/rev., motor resolution with C-663 stepper motor controller

\*\*CW: clockwise; CCW: counter-clockwise

Linear Actuators & Motors

Nanopositioning/Piezoelectrics

Nanometrology

**Micropositioning**

Hexapod 6-Axis Systems / Parallel Kinematics

Linear Stages

Translation (X)

Vertical (Y)

Multi-Axis

**Rotary & Tilt Stages**

Accessories

Servo & Stepper Motor Controllers

Single-Channel

Hybrid

Multi-Channel

Micropositioning Fundamentals

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