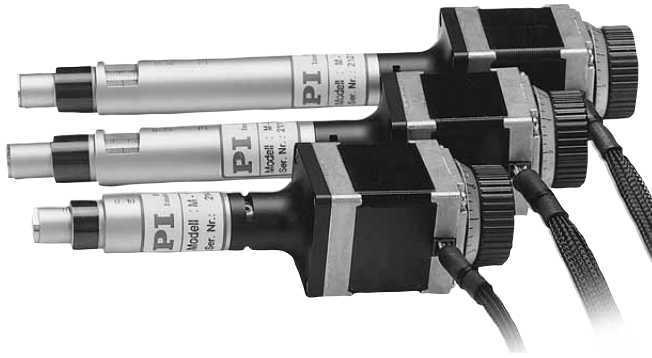


M-168 Stepper-Mike Precision Linear Actuator

Non-Rotating Tip, Strokes to 50 mm



M-168 Stepper-Mikes providing 10, 25 and 50 mm travel range (from front to back)

- 10, 25 and 50 mm Travel Range
- Resolution <math><0.1 \mu\text{m}</math>
- 2-Phase Stepper Motor
- Manual Positioning Knob
- Sub-nm-Resolution with Optional PZT Actuator
- >5,000 h MTBF

M-168 are compact, high-resolution linear actuators providing linear motion up to 50 mm with sub-micron resolution. They consist of a micrometer drive with non-rotating tip driven by a 6400 microstep/rev and 2-phase stepper motor.

Non-Rotating Tip

Compared to conventional rotating-tip micrometer drives, the non-rotating-tip design offers several advantages:

- Elimination of torque-induced positioning errors
- Elimination of sinusoidal motion errors
- Elimination of wear at the contact point
- Elimination of tip-angle-dependent wobble

M-168 Stepper-Mikes feature an extremely low-stiction, low-friction construction allowing for high resolution and repeatability. A manual positioning knob provides coarse resolution of $5 \mu\text{m}$. All models come with standard flat tips (see

p. 1-58 for spherical tips and other options).

High-Resolution Piezo Option

The optional piezo tip provides $20 \mu\text{m}$ travel with sub-nanometer resolution for dynamic scanning and tracking (see p. 1-73).

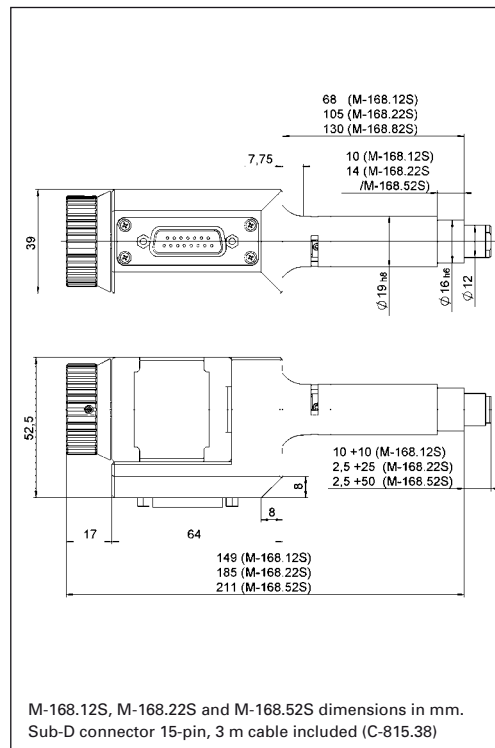
Ordering Information

M-168.12S
High-Resolution Stepper-Mike Linear Actuator, 10 mm

M-168.22S
High-Resolution Stepper-Mike Linear Actuator, 25 mm

M-168.52S
High-Resolution Stepper-Mike Linear Actuator, 50 mm

Ask about custom designs!



Technical Data

Model	M-168.12S	M-168.22S	M-168.52S	Unit
Travel range	10	25	50	mm
Design resolution	0.078	0.078	0.078	μm
Min. incremental motion	0.3	0.3	0.3	μm
Unidirectional repeatability	0.1	0.1	0.1	μm
Backlash	2	2	2	μm
Max. velocity	5	5	5	mm/s
Max. push/pull force	50	50	50	N
Max. lateral force	0.02	0.02	0.02	N (at tip)
Motor resolution*	6400*	6400*	6400*	steps/rev.
Drive screw pitch	0.5	0.5	0.5	mm/rev.
Weight	0.4	0.45	0.5	kg
Recommended motor controllers	C-663 single-axis	C-663 single-axis	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

Linear Actuators & Motors

PiezoWalk® Motors / Actuators

PILine® Ultrasonic Motors

DC-Servo & Stepper Actuators

Piezo Actuators & Components

Guided / Preloaded Actuators

Unpackaged Stack Actuators

Patches/Benders/Tubes/Shear..

Nanopositioning / Piezoelectrics

Nanometrology

Micropositioning

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M-228 · M-229 Stepper Linear Actuator Series

High-Load, Compact and Highly Cost-Efficient, with Limit Switches



M-228 and M-229 series linear actuators are driven by powerful direct-drive stepper motors, or are equipped with more compact, gearhead stepper motors: M-229.26S, M-228.11S, M-229.25S, M-228.10S (from left)

- **Highly Cost-Efficient, Compact Design**
- **10 and 25 mm Travel Range**
- **High Load Capacity to 80 N**
- **Gearhead Version: 46 nm Resolution (with C-663 Controller)**
- **Direct Drive: Max. Velocity 5 mm/s**
- **Non-Rotating Tip**
- **Non-Contact Limit and Reference Switches**

M-228 and M-229 series linear actuators provide a travel range of 10, resp. 25 mm, and are equipped with high-resolution stepper motors. The stepper mikes can push or pull loads up to 80 N, and provide speeds up to 5 mm/s. Models featuring gearhead/stepper motor combinations offer the same stroke in a more compact package.

Application Examples

- Quality assurance testing
- Testing equipment
- Alignment of secondary mirrors
- Automation
- Metrology
- Precision machining

Cost-Effective Design, Valuable Features

The cost-effective design offers many useful features such as a non-rotating tip, limit and reference switches and a mechanical position display.

A spherical tip and a 3 m extension cable are included in the delivery. The more compact gearhead versions include an additional flat tip.

Non-Rotating Tip

Compared to conventional rotating-tip micrometer drives, the non-rotating tip design offers several advantages:

- Elimination of torque-induced positioning errors
- Elimination of sinusoidal motion errors
- Elimination of wear at the contact point

- Elimination of tip-angle-dependent wobble

Limit and Reference Switches

For the protection of your equipment, non-contact Hall-effect limit and reference switches are installed. The direction-sensing reference switch supports advanced automation applications with high precision.

Low Cost of Ownership

The combination of these actuators with the networkable C-663 Mercury Step controller (s. p. 4-112) offers high performance for a very competitive price in both single and multi-axis configurations.

Ordering Information

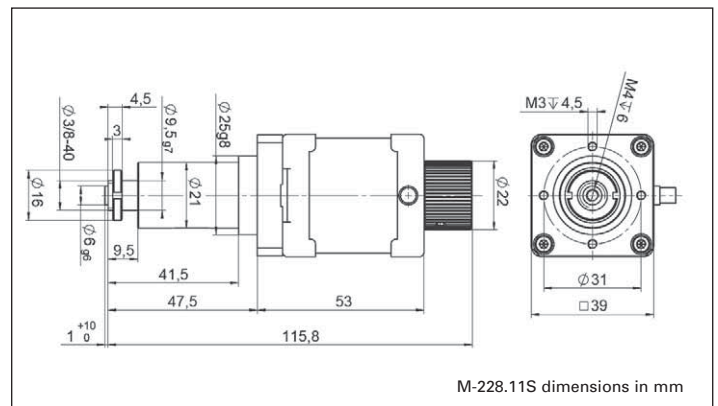
M-228.10S
Stepper-Mike Linear Actuator, 10 mm, Stepper Motor, Gearhead, Limit Switches

M-228.11S
Stepper-Mike Linear Actuator, 10 mm, Stepper Motor, Direct Drive, Limit Switches

M-229.25S
Stepper-Mike Linear Actuator, 25 mm, Stepper Motor, Gearhead, Limit Switches

M-229.26S
Stepper-Mike Linear Actuator, 25 mm, Stepper Motor, Direct Drive, Limit Switches

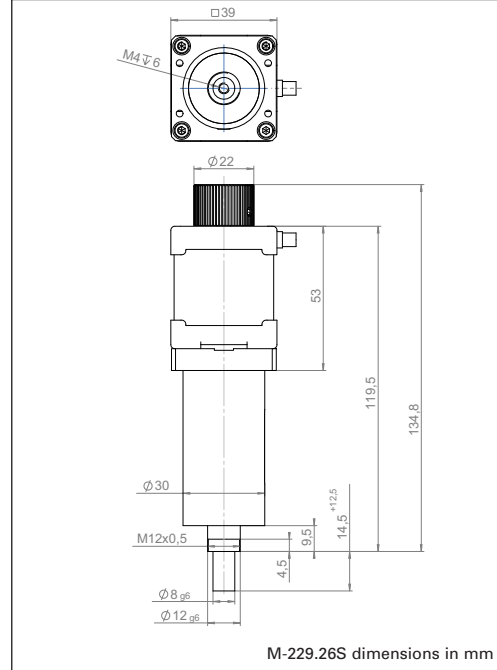
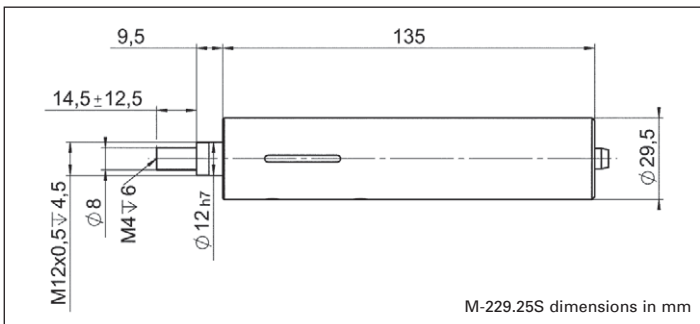
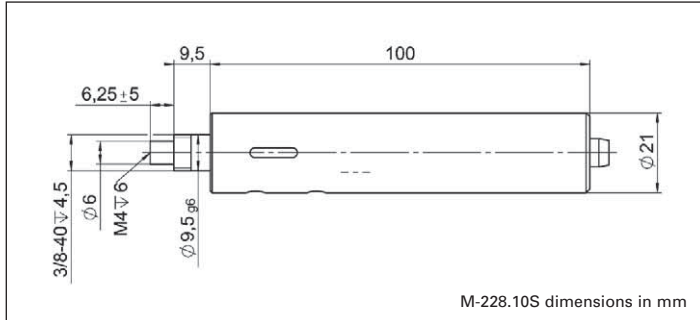
Ask about custom designs!



M-228.11S dimensions in mm



M-229 high-load stepper mike with gearhead, C-663 Mercury stepper motor controller (rear)



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Technical Data

Model	M-228.10S	M-228.11S	M-229.25S	M-229.26S	Units
Active axes	X	X	X	X	
Motion and positioning					
Displacement	10	10	25	25	mm
Design resolution*	0.046	0.078	0.046	0.078	µm
Min. incremental motion*	1	1	1	1	µm
Backlash**	5	10	10	10	µm
Unidirectional repeatability	±2	±2	±2	±2	µm
Max. velocity*	1.5	5	1.5	5	mm / s
Reference switch repeatability	1	1	1	1	µm
Mechanical properties					
Drive screw	Leadscrew	Leadscrew	Leadscrew	Leadscrew	
Thread pitch	0.5	0.5	0.5	0.5	mm / rev.
Gear ratio	28.44444:1	–	28.44444:1	–	
Motor resolution*	384	6400	384	6400	steps / rev.
Max. push/pull force	20	50	50	80	N
Drive properties					
Motor type	2-phase stepper motor	2-phase stepper motor	2-phase stepper motor	2-phase stepper motor	
Operating voltage	24***	24*	24**	24*	V
Reference and limit switches	Hall-effect	Hall-effect	Hall-effect	Hall-effect	
Miscellaneous					
Operating temperature range	-20 to +65	-20 to +65	-20 to +65	-20 to +65	°C
Material	Al-(anodized), steel, brass	Al-(anodized), steel, brass	Al-(anodized), steel, brass	Al-(anodized), steel, brass	
Mass	0.23	0.36	0.4	0.61	kg
Cable length	0.5	0.6	0.5	0.6	m
Connector	15-pin sub-D connector	15-pin sub-D connector	15-pin sub-D connector	15-pin sub-D connector	
Recommended controller	C-663 single-axis	C-663 single-axis	C-663 single-axis	C-663 single-axis	

Please avoid lateral forces at the tip.

* with C-663 stepper motor controller

** with preload

*** max. 0.25 A / phase; 24 full steps / rev.

* max. 0.85 A / phase; 400 full steps / rev.

** max. 1 A / phase; 24 full steps / rev.