M-227 DC-Mike High-Resolution Linear Actuator

Non-Rotating Tip, Long Stroke to 50 mm

M-227.10 (w/ piezo tip), M-227.25, M-227.50 (w/ ball tip), high-resolution DC-Mike actuators and several tip options

Ordering Information

M-227.10
High-Resolution DC-Mike Linear Actuator, 10 mm

M-227.25
High-Resolution DC-Mike Linear Actuator, 25 mm

M-227.50
High-Resolution DC-Mike Linear Actuator, 50 mm

M-219.10
Ball Tip

P-855.20
Piezo Actuator for Micrometer Drive

- **Travel Ranges 10, 25 and 50 mm**
- **Min. Incremental Motion to 0.05 µm**
- **Non-Rotating Tip**
- **Closed-Loop DC-Motors**
- **Sub-nm Resolution with Optional PZT Drive**
- **MTBF >5,000 h**

M-227 are ultra-high-resolution linear actuators providing linear motion up to 50 mm with sub-micron resolution in a compact package. They consist of a micrometer with non-rotating tip, driven by a closed-loop DC-motor/gearhead combination with motor-shaft-mounted high-resolution encoder. The combination of an extremely low stiction/friction construction and high-resolution encoder allows for a minimum incremental motion of 50 nanometers at speeds up to 1 mm/sec.

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

Compact, High-Precision, Cost-Effective

M-227 actuators provide a cost-effective solution for industrial and OEM environments.

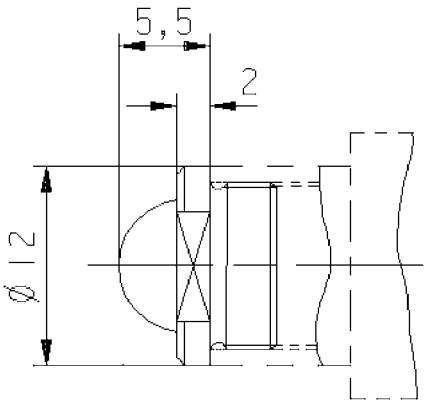
Integrated Line Drivers

All actuators include an integral 0.5 m cable with 15-pin sub-D connector and come with a 3 m extension cable. On the DC servo versions, the connector features integrated line drivers for cable lengths up to 10 meters between actuator and controller.

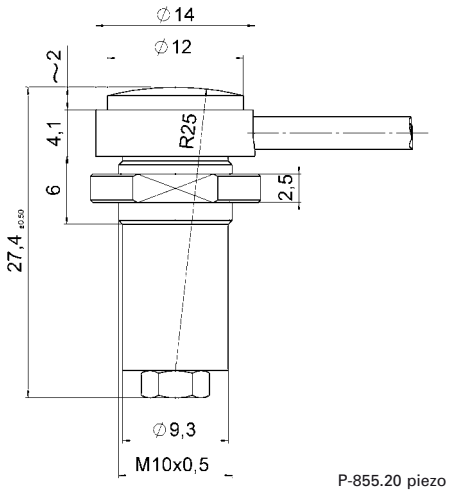
High-Resolution Piezo Option

All models come with standard flat tips. A variety of other tips are also available, such as a piezoelectric tip featuring 20 µm travel with sub-nanometer resolution for dynamic scanning and tracking see p. 1-73 and 1-58.

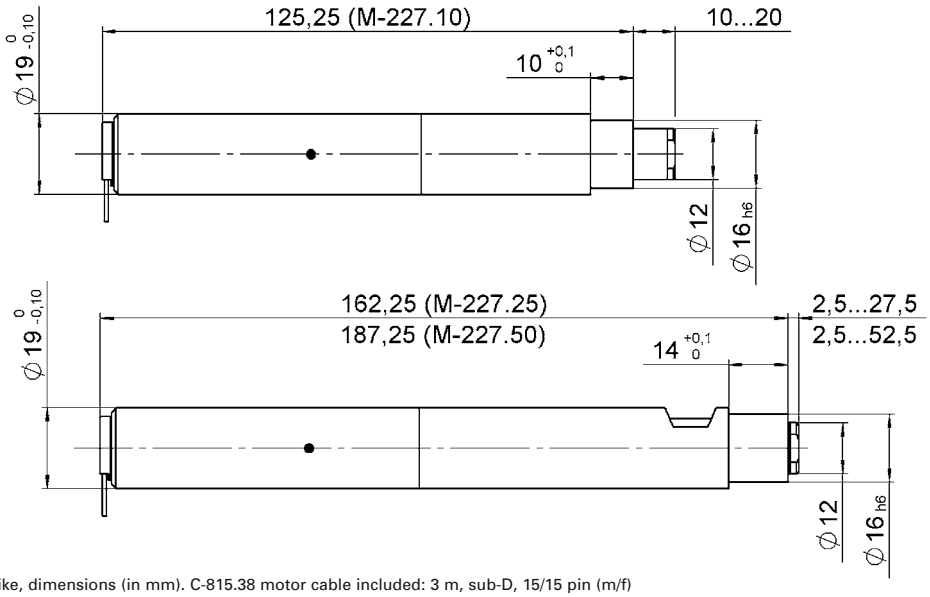
For higher loads and integrated limit switches refer to the M-230 (see p. 1-46 *ff*), M-235 (see p. 1-50 *ff*) and M-238.



M-219.10 ball tip option



P-855.20 piezo tip option



M-227 DC-Mike, dimensions (in mm). C-815.38 motor cable included: 3 m, sub-D, 15/15 pin (m/f)

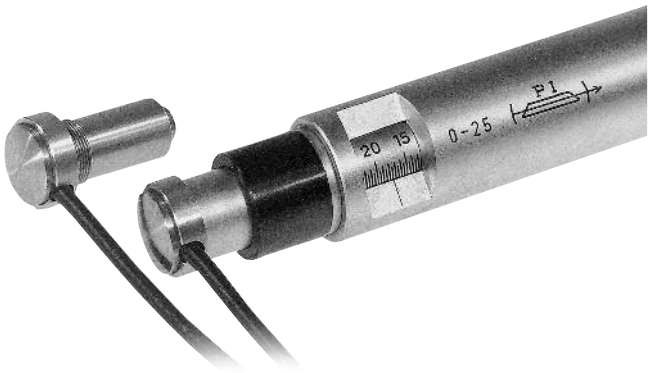
Technical Data

Model	M-227.10	M-227.25	M-227.50	Units
Active axes	X	X	X	
Motion and positioning				
Travel range	10	25	50	mm
Integrated sensor	Rotary encoder	Rotary encoder	Rotary encoder	
Sensor resolution	2048	2048	2048	Cts./rev.
Design resolution	0.0035	0.0035	0.0035	µm
Min. incremental motion	0.05	0.05	0.05	µm
Backlash	2	2	2	µm
Unidirectional repeatability	0.1	0.1	0.1	µm
Max. velocity	0.75	0.75	0.75	mm/s
Mechanical properties				
Drive screw	Leadscrew	Leadscrew	Leadscrew	
Thread pitch	0.5	0.5	0.5	mm
Gear ratio	69.12:1	69.12:1	69.12:1	
Max. push/pull force	40	40	40	N
Max. lateral force	0.1	0.1	0.1	N
Drive properties				
Motor type	DC-motor, gearhead	DC-motor, gearhead	DC-motor, gearhead	
Operating voltage	0 to ±12	0 to ±12	0 to ±12	V
Electrical power	1.25	1.25	1.25	W
Miscellaneous				
Operating temperature range	-20 to +65	-20 to +65	-20 to +65	°C
Material	Al (anodized), steel	Al (anodized), steel	Al (anodized), steel	
Mass	0.16	0.22	0.26	kg
Cable length	0.1	0.1	0.1	m
Connector	15-pin sub-D connector	15-pin sub-D connector	15-pin sub-D connector	
Recommended controller/driver	C-863 single-axis C-843 PCI-board, for up to 4 axes	C-863 single-axis C-843 PCI-board, for up to 4 axes	C-863 single-axis (see p. 4-114) C-843 PCI-board, for up to 4 axes (see p. 4-120)	

*Higher forces on request

P-855 Miniature Piezo Actuator

Micrometer-Mountable Open-Loop Piezo Translator



P-855.20 piezo translator

- **Displacement 20 µm**
- **Mounts Inside Micrometer Tip**
- **Sub-msec Response**
- **Sub-nm Resolution**

P-855 piezo translators are high-resolution linear actuators specially designed for integration in micrometer tips. They fit the M-227 DC-Mike motorized actuators (see p. 1-42), the M-168 Stepper Mike (see p. 1-55) motorized actuators and the M-631 to M-633 manual micrometers (see p. 1-56).

The piezo translators consist of a monolithic PICMA® piezo ceramic integrated in a stainless steel housing.

P-855 actuators provide submillisecond response and subnanometer resolution.

Application Examples

- Laser tuning
- Static and dynamic positioning of small parts
- Fiber positioning

Superior Lifetime with Ceramic-Encapsulated Piezos

Highest possible reliability is assured by the use of award-winning PICMA® multilayer piezo actuators. PICMA® actuators are the only ceramic-encapsulated PZT actuators on the market, which makes them resistant to ambient humidity and leakage-current failures. They are thus far superior to conventional actuators in reliability and lifetime.

Accessories

Extension cables, adapters & connectors: see in "Accessories" in the "Piezo Drivers / Servo Controllers" (see p. 2-168 *ff*) section.

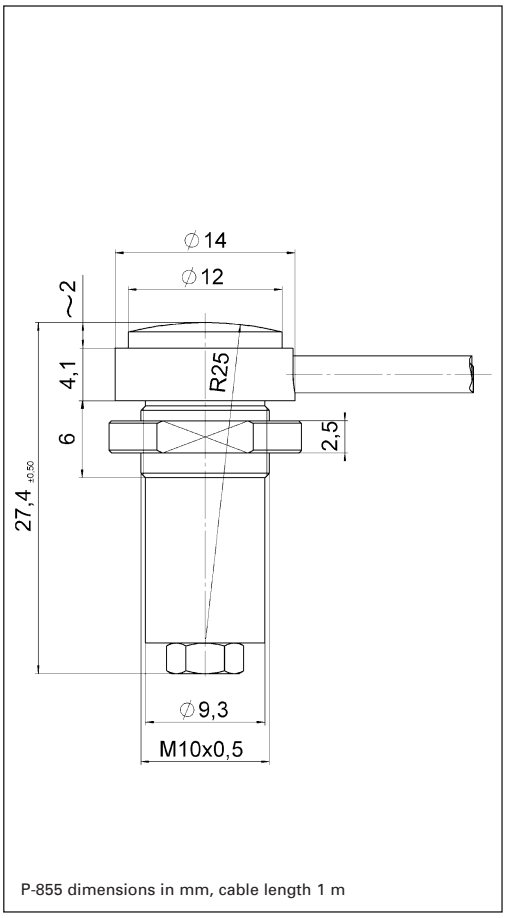
Notes

See the "Piezo Drivers / Servo Controllers" (see p. 2-99 *ff*) section for our comprehensive line of low-noise modular and OEM control electronics for computer and manual control.

Read details in Mounting and Handling Guidelines (p. 1-67).

Ordering Information

P-855.20
Piezo Actuator for Micrometer Drive



P-855 dimensions in mm, cable length 1 m

Technical Data

Model	P-855.20	Tolerance
Open-loop travel @ -20 to 120 V	20 µm	±20 %
*Open-loop resolution	0.2 nm	
**Static large-signal stiffness	48 N/µm	±20 %
Push / pull force capacity	100 / 5 N	
Operating voltage range	-20 to 120 V	
Piezo ceramic type	PICMA®	
Electrical capacitance	1.5 µF	±20 %
Dynamic operating current coefficient (DOCC)	12.5 µA/(Hz • µm)	
Unloaded resonant frequency	18 kHz	±20 %
Operating temperature range	-40 bis +80 °C	
Voltage connection	VL	
Mass	28 g	±5 %
Recommended amplifier	E-610 (p. 2-110) E-500 System (p. 2-142)	

*Resolution of piezo actuators is not limited by friction or stiction.
Noise equivalent motion with E-505 amplifier
**Dynamic small-signal stiffness ~50 % higher

M-219 Optional Tips

For Micrometers and Actuators

Ordering Information

M-219.00
Spherical Tip, M10 x 0.5 mm

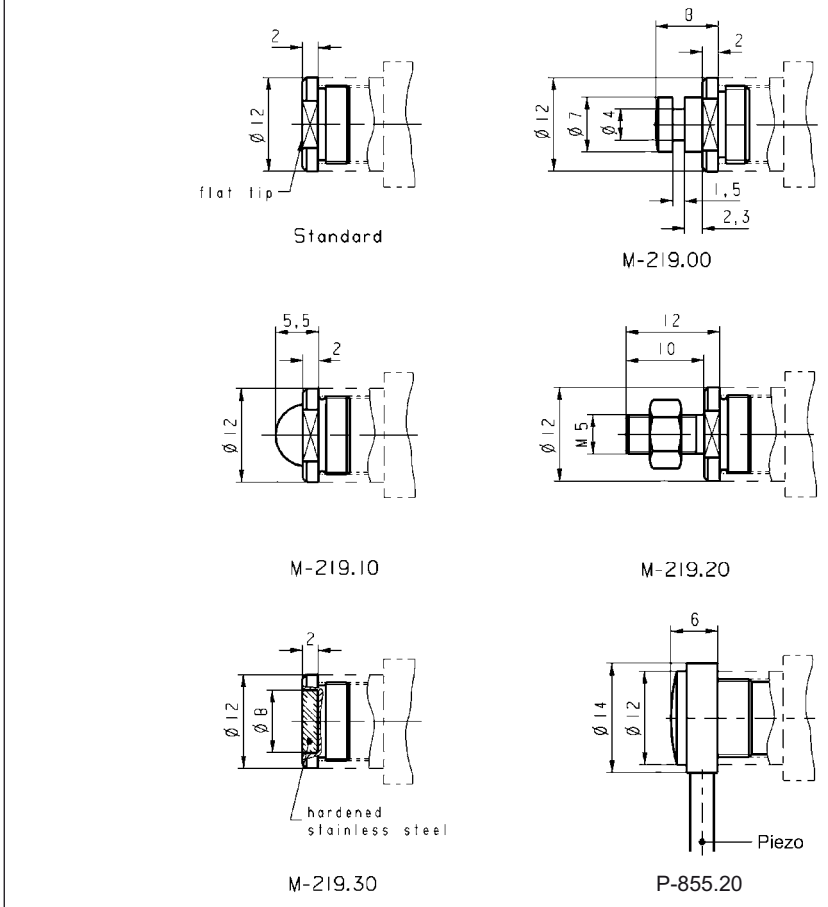
M-219.10
Ball Tip, M10 x 0.5 mm

M-219.20
Tip with M 5 Threaded Stud, M10 x 0.5 mm

M-219.30
Hardened Stainless Steel Tip, M10 x 0.5 mm

Ask about custom designs!

M-227 DC-Mikes, M-168 Stepper Mikes and M-631 to M-633 manual micrometer drives are supplied with flat tips. The following optional replacement tips are available (all with M10x 0.5 mm fine threads):



Optional tips, dimensions in mm