M-230 Precision Linear Actuator

Non-Rotating Tip, Limit Switches, Stroke to 25 mm

M-230.10, M-230.25, high-resolution DC-Mike actuators, 10 and 25 mm travel range

Ordering Information

M-230.10
High-Resolution DC-Mike Linear Actuator, 10 mm, Limit Switches

M-230.10S
High-Resolution Stepper-Mike Linear Actuator, 10 mm, Limit Switches

M-230.25
High-Resolution DC-Mike Linear Actuator, 25 mm, Limit Switches

M-230.25S
High-Resolution Stepper-Mike Linear Actuator, 25 mm, Limit Switches

- **Travel Range 10 & 25 mm**
- **Min. Incremental Motion to 0,05 µm**
- **Non-Rotating Tip**
- **Max. Velocity 1.5 mm/s**
- **Closed-Loop DC Motors and Stepper Motors**
- **Non-Contact Limit and Reference Switches**
- **Front Mount or Clamp Mount**
- **MTBF>20.000 h**

M-230 are ultra-high-resolution linear actuators providing linear motion up to 25 mm with sub-micron resolution in a compact package. They consist of a micrometer with non-rotating tip driven by a 2-phase stepper motor or a closed-loop DC motor / gearhead combination with motor-shaft-mounted, high-resolution encoder.

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

High Accuracy & Long Life

M-230 actuators provide a cost-effective solution for heavier-duty industrial and OEM environments. They feature extremely low-stiction, low-friction construction, allowing for minimum incremental motion as low as 50 nanometers.

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.

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.

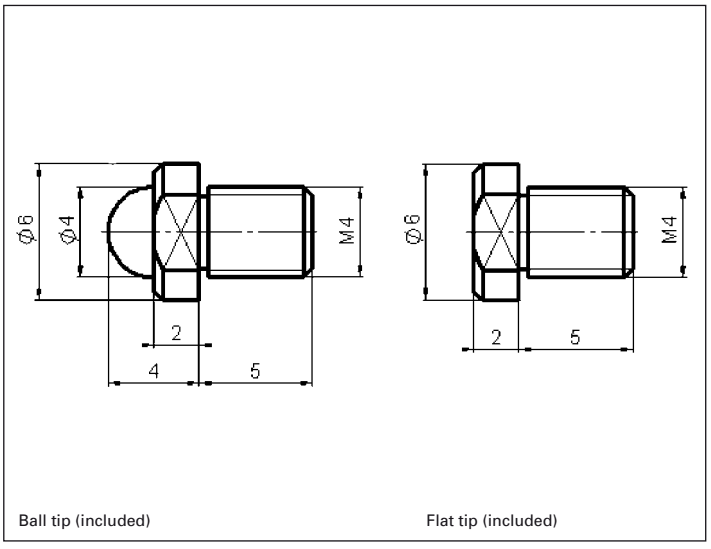
High-Load Versions

For higher loads and travel ranges refer to the M-235 (see p. 1-50) and M-238 (see p. 1-52).

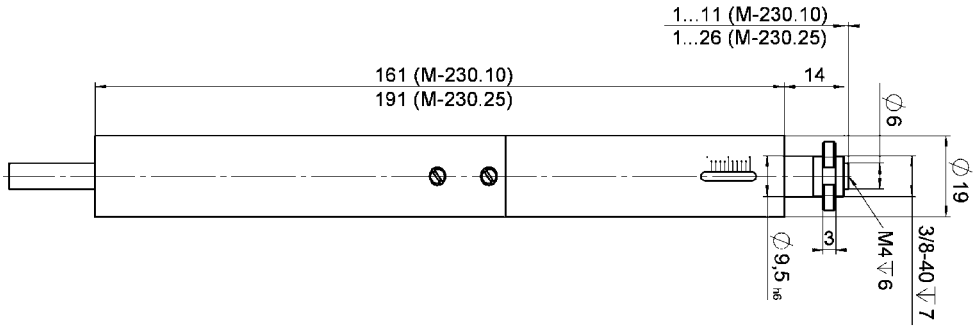
A screw-in ball tip and a flat tip are included.

Application Examples

- Fiber positioning
- Metrology
- Photonics packaging
- Quality assurance testing
- Testing equipment



Ball tip (included) Flat tip (included)



M-230. Cable length: 500 mm, 15-pin sub-D connector with integrated line drivers (DC motor models). Dimensions in mm

Technical Data

Model	M-230.10	M-230.25	M-230.10S	M-230.25S	Units
Active axes	X	X	X	X	
Motion and positioning					
Travel range	10	25	10	25	mm
Integrated sensor	Rotary encoder	Rotary encoder			
Sensor resolution	2,048	2,048			Cts./rev.
Design resolution	0.0046	0.0046	0.037	0.037	µm
Min. incremental motion	0.05	0.05	0.05	0.05	µm
Backlash	2	2	2	2	µm
Unidirectional repeatability	0.1	0.1	0.1	0.1	µm
Max. velocity	0.8	0.8	1.5	1.5	mm/s
Reference switch repeatability	1	1	1	1	µm
Mechanical properties					
Spindle	Leadscrew	Leadscrew	Leadscrew	Leadscrew	
Spindle pitch	0.4	0.4	0.4	0.4	mm
Gear ratio	42.92063:1	42.92063:1	28.44444:1	28.44444:1	
Motor resolution**			384**	384**	steps/rev.
Max. push/pull force	70	70	45*	45*	N
Max. lateral force	30	20	30	20	N
Drive properties					
Motor type	DC-motor, gearhead	DC-motor, gearhead	2-phase stepper motor**	2-phase stepper motor**	
Operating voltage	0 to ±12	0 to ±12	24	24	V
Electrical power	2	2			W
Limit and reference 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	Al (anodized), steel	Al (anodized), steel	Al (anodized), steel	
Mass	0.3	0.35	0.3	0.35	kg
Cable length	0.5	0.5	0.5	0.5	m
Connector	15-pin sub-D 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 (p. 4-114) C-843 PCI board, for up to 4 axes (p. 4-120)	C-663 single-axis	C-663 single-axis (p. 4-112)	

*at velocities of up to 1 mm/s
**2-phase stepper motor, 24 V chopper voltage, max. 0.25 A/phase, 24 full steps/rev., motor resolution with C-663 stepper motor controller

M-231 DC-Mike Precision Linear Actuator

With Limit Switches, Suitable for Fiber Alignment

M-231.17 high-resolution DC-Mike actuator, 17 mm travel range

Ordering Information

M-231.17
High-Resolution DC-Mike Linear Actuator, 17 mm, Limit Switches

- **Travel Range 17 mm**
- **Min. Incremental Motion to 0.1 µm**
- **Max. Velocity 2.5 mm/s**
- **Closed-Loop DC-Motors**
- **Non-Contact Limit and Reference Switches**
- **Fits M-105 Fiber Aligners**
- **MTBF >5.000 h**

The M-231 is an ultra-high-resolution linear actuator providing linear motion up to 17 mm with sub-micron resolution in a compact package. It consists of a leadscrew which is driven by a closed-loop DC-motor/gearhead combination with motor-shaft-mounted, high-resolution encoder (2048 counts/rev.).

Upgrade for Manual Aligners

The M-231 was especially designed to fit existing manual translation stages (e. g. M-105, see p. 4-50 *ff*) as a direct replacement for a manual micrometer.

Limit and Reference Switches

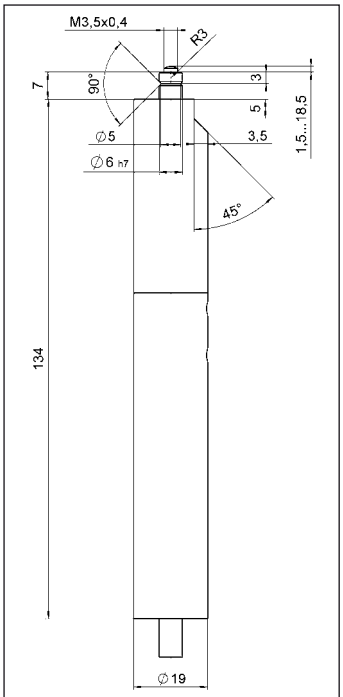
For the protection of your equipment, non-contact Hall-effect limit and reference switches are installed. The reference switch supports advanced automation applications with high precision.

Application Examples

- Fiber positioning
- Metrology
- Photonics packaging
- Quality assurance testing
- Testing equipment

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.



M-231, dimensions (in mm). Cable length: 500 mm, 15-pin, sub-D connector with integrated line drivers

For higher loads and travel ranges, refer to the M-230 (see p. 1-46), M-235 (see p. 1-50) and M-238 (see p. 1-52).

M-231 mounted on M-105 XYZ positioning systems

Technical Data

Model	M-231.17	Units
Active axes	X	
Motion and positioning		
Travel range	17	mm
Integrated sensor	Rotary encoder	
Sensor resolution	2,048	Cts./rev.
Design resolution	0.007	µm
Min. incremental motion	0.1	µm
Backlash	2	µm
Unidirectional repeatability	0.2	µm
Max. velocity	1.5	mm/s
Reference switch repeatability	1	µm
Mechanical properties		
Spindle	Leadscrew	
Spindle pitch	0.4	mm
Gear ratio	28.44444:1	
Max. push/pull force	40	N
Drive properties		
Motor type	DC-motor, gearhead	
Operating voltage	0 to ±12	V
Electrical power	2	W
Limit and reference switches	Hall-effect	
Miscellaneous		
Operating temperature range	-20 to +65	°C
Material	Al (anodized), steel	
Mass	0.17	kg
Recommended controller/driver	C-863 single-axis (p. 4-114) C-843 PCI board, for up to 4 axes (p. 4-120)	