

High-Precision Linear Stage

High Travel Accuracy, Long Travel Ranges, Many Motor Variants



M-511 • M-521 • M-531

- Travel ranges 102, 204, and 306 mm (4", 8", 12")
- Max. velocity to 100 mm/s
- Encoder resolution 50 nm
- Load capacity to 100 kg
- Zero-play ball screw
- XY and XYZ combinations

Reference-class linear stage

High travel accuracy and load capacity due to precision linear guides with preloaded recirculating ball bearings. Backlash-compensated ball screw with 2 mm pitch. Stress-relieved aluminum base for highest stability. XY and XYZ combinations possible with M-501 precision Z stages.

Drive types and position measurement

- M-5x1.DD1: DC motor with integrated ActiveDrive amplifiers for high velocity combined with direct-measuring linear encoder for high resolution and repeatability. M-5x1.DD2 also with integrated holding brake.
- M-5x1.DG1: DC gear motor with direct control and rotary encoder.
- M-5x1.PG1: DC gear motor with integrated ActiveDrive amplifier and rotary encoder.
- M-5x1.PD1: DC motor with integrated amplifier and rotary encoder.
- M-5x1.EC: Brushless DC motor with integrated block commutation and rotary encoder.

Noncontact limit switches. Noncontact reference switch in the middle of the travel range.

Application fields

Industry and research. Laser materials processing, surface inspection.

Specifications

Motion and positioning	M-5x1.DD1 M-5x1.DD2	M-5x1.EC M-5x1.PD1	M-5x1.DG1 M-5x1.PG1	Unit	Tolerance
Travel range	M-511: 102 (4") M-521: 204 (8") M-531: 306 (12")	M-511: 102 (4") M-521: 204 (8") M-531: 306 (12")	M-511: 102 (4") M-521: 204 (8") M-531: 306 (12")	mm	
Integrated sensor	Linear encoder	Rotary encoder	Rotary encoder		
Sensor resolution linear encoder	0.05			µm	
Sensor resolution rotary encoder	–	4096	2048	Cts./rev.	
Design resolution	0.05	0.488	0.033	µm	Typ.
Minimum incremental motion	0.1	0.5	0.4	µm	Typ.
Unidirectional repeatability	0.1	0.5	0.4	µm	Typ.
Bidirectional repeatability	±0.2	–	–	µm	Typ.
Backlash	–	1	1	µm	Typ.
Pitch / yaw per 100 mm	±35	±35	±35	µrad	Typ.
Straightness / flatness per 100 mm	1	1	1	µm	
Velocity	50	100	6	mm/s	Max.

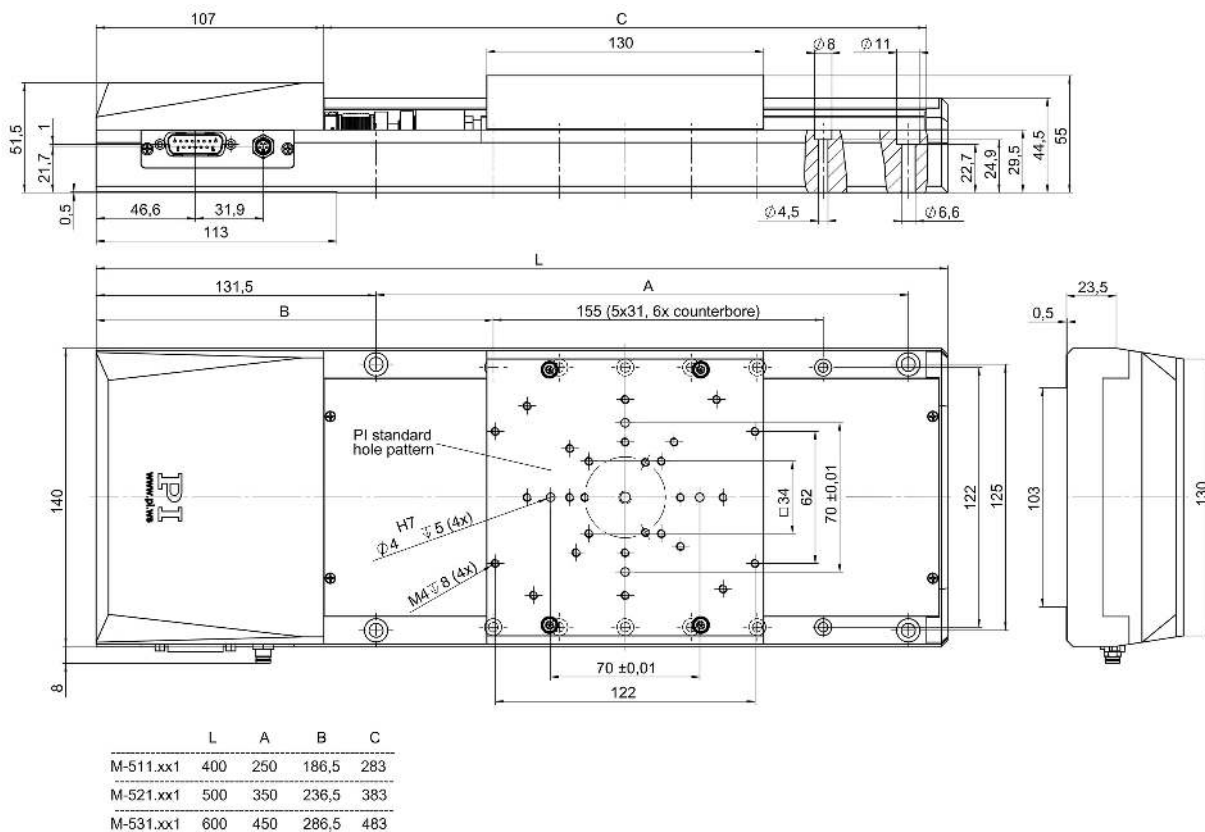
Mechanical properties	M-5x1.DD1 M-5x1.DD2	M-5x1.EC M-5x1.PD1	M-5x1.DG1 M-5x1.PG1	Unit	Tolerance
Drive screw pitch of ball screw	2	2	2	mm	
Gear ratio	–	–	$(28/12)^4 \sim 29.6:1$		
Load capacity	1000	1000	1000	N	Max.
Push/pull force	80	80	80	N	Max.
Permissible lateral force	200	200	200	N	Max.

Drive properties	M-5x1.DD1 M-5x1.DD2	M-5x1.EC M-5x1.PD1	M-5x1.DG1 M-5x1.PG1	Unit	Tolerance
Motor type	DC motor with PWM control	DC motor with PWM control*	DC gear motor		
Motor resolution	–	–	–	Steps/rev	
Guide	Recirculating ball bearing guide	Recirculating ball bearing guide	Recirculating ball bearing guide		
Operating voltage	24	24	M-5x1.DG1: 0 to ±12 M-5x1.PG1: 24	V	
Motor power	30	60	3	W	Nom.
Torque	80	70	5	mNm	Nom.
Reference and limit switches	Hall effect	Hall effect	Hall effect		

Miscellaneous	M-5x1.DD1 M-5x1.DD2	M-5x1.EC M-5x1.PD1	M-5x1.DG1 M-5x1.PG1	Unit	Tolerance
Operating temperature range	10 to 50	-20 to 65	-20 to 65	°C	
Material	Aluminum, black anodized				
Mass	M-511: 5 M-521: 6.1 M-531: 7.2	M-511: 5 M-521: 6.1 M-531: 7.2	M-511: 5 M-521: 6.1 M-531: 7.2	kg	±5 %
Connector	D-sub 15 (m)	D-sub 15 (m)	D-sub 15 (m)		
Recommended controllers	C-863 C-884	C-863 C-884	C-863 C-884		

* M-5xx.EC: Brushless DC motor with integrated block commutation (PWM control).
 Connecting cables are not in the scope of delivery and must be ordered separately.
 Ask about customized versions.

Drawings / Images



M-511, M-521, M-531, dimensions in mm

Ordering Information

Stages with 102 mm travel range

M-511.DD1

Microtranslation stage, 102 mm travel range, ActiveDrive DC motor, linear encoder

M-511.DD2

Microtranslation stage, 102 mm travel range, ActiveDrive DC motor, linear encoder, motor brake

M-511.PD1

Microtranslation stage, 102 mm travel range, ActiveDrive DC motor, rotary encoder

M-511.EC

Microtranslation stage, 102 mm travel range, brushless DC motor, rotary encoder

M-511.DG1

Microtranslation stage, 102 mm travel range, DC gear motor, rotary encoder

M-511.PG1

Microtranslation stage, 102 mm travel range, ActiveDrive DC gear motor, rotary encoder

Stages with 204 mm travel range

M-521.DD1

Microtranslation stage, 204 mm travel range, ActiveDrive DC motor, linear encoder

M-521.DD2

Microtranslation stage, 204 mm travel range, ActiveDrive DC motor, linear encoder, motor brake

M-521.PD1

Microtranslation stage, 204 mm travel range, ActiveDrive DC motor, rotary encoder

M-521.EC

Microtranslation stage, 204 mm travel range, brushless DC motor, rotary encoder

M-521.DG1

Microtranslation stage, 204 mm travel range, DC gear motor, rotary encoder

M-521.PG1

Microtranslation stage, 204 mm travel range, ActiveDrive DC gear motor, rotary encoder

Stages with 306 mm travel range

M-531.DD1

Microtranslation stage, 306 mm travel range, ActiveDrive DC motor, linear encoder

M-531.DD2

Microtranslation stage, 306 mm travel range, ActiveDrive DC motor, linear encoder, motor brake

M-531.PD1

Microtranslation stage, 306 mm travel range, ActiveDrive DC motor, rotary encoder

M-531.EC

Microtranslation stage, 306 mm travel range, brushless DC motor, rotary encoder

M-531.DG1

Microtranslation stage, 306 mm travel range, DC gear motor, rotary encoder

M-531.PG1

Microtranslation stage, 306 mm travel range, ActiveDrive DC gear motor, rotary encoder