

High- Precision Linear Translation Stage

HIGH TRAVEL ACCURACY, LARGE TRAVEL RANGES, MANY MOTOR VARIANTS



M-511 • M-521 • M-531

- + Travel ranges 102, 204 and 306 mm (4", 8", 12")
- + Max. velocity up to 100 mm/ s
- + Encoder resolution 50 nm
- + Load capacity to 100 kg
- + Zero- backlash ball screws
- + XY & XYZ combinations
- + Noncontact limit and reference point switches
- + MTBF >20,000 h

Reference- class linear stage

High travel accuracy and load capacity due to precision linear guides with preloaded recirculating ball bearings. Backlash- compensated recirculating ballscrews with 2 mm pitch. Stress- relieved aluminum for high stability. XY and XYZ combinations possible using M-501/ M-451 precision Z stages. Vacuum versions available

Drive types and position metrology

M-5x1.DD1: Direct drive. DC motor with integrated ActiveDrive amplifiers for high velocity in combination with directly- measuring linear encoder for high resolution and repeatability
M-5x1.DD2: Version with integrated brake

Direct drive. DC motor for high velocity in combination with precision rotary encoder

M-5x1.EC: Brushless DC motor with integrated block commutation

M-5x1.PD1: DC motor with integrated ActiveDrive amplifiers

DC servo motor with gearhead in combination with precision rotary encoder for high resolution and repeatability

M-5x1.DG1: DC motor with direct control (analog)

M-5x1.PG1: DC motor with integrated ActiveDrive amplifiers

M-5x1.2S1: Stepper motor

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

Fields of Application

Science and industry. Vacuum environment up to 10^{-6} hPa. Inspection, MEMS fabrication

Specifications

	M-5x1.DD1 / M-5x1.DD2	M-5x1.EC / M-5x1.PD1	M-5x1.DG1 / M-5x1.PG1	M-5x1.2S1	Unit	Tolerance
Motion and positioning						
Travel range	M-511: 102 (4") / M-521: 204 (8") / M-531: 306 (12")				mm	
Integrated sensor	Linear encoder	Rotary encoder	Rotary encoder	-		
Sensor resolution	0.02 µm	4096	2048	-	Cts./ rev.	
Design resolution	0.05	0.5	0.033	0.31**	µm	typ.
Min. incremental motion	0.1	0.5	0.1	0.1	µm	typ.
Unidirectional repeatability	0.1	0.5	0.2	0.2	µm	typ.
Backlash	±0.2*	1	1	1	µm	typ.
Pitch / yaw	±25 / ±35 / ±35				µrad	
Straightness / flatness per 100 mm	1	1	1	1	µm	
Velocity	50	100	6	20	mm/ s	max.
Mechanical properties						
Spindle pitch of ball screw	2	2	2	2	mm	
Gear ratio	—	—	(28/12) ⁴ ~ 29.6:1	—		
Load capacity	1000				N	max.
Push / pull force	80				N	max.
Permissible lateral force	200				N	max.
Drive properties						
Motor type	DC motor with PWM control	DC motor with PWM control***	DC gear motor	2- phase stepper motor**		
Motor resolution	—	—	—	6400**	steps/ rev.	
Guiding	Precision linear guiding rails, recirculating ball bearings					
Operating voltage	24 (PWM)	24 (PWM)	M-5x1.DG1: 0 to ±12 M-5x1.PG1: 24 (PWM)	24	V	
Motor power	30	60	3	5	W	nominal
Torque	80	70	5	150	mNm	nominal
Reference point and limit switches	Hall effect	Hall effect	Hall effect	Hall effect		
Miscellaneous						
Operating temperature range	10 to 50	-20 to 65	-20 to 65	-20 to 65	°C	
Material	Al (black anodized)					
Mass	5 (M-511) / 6.1 (M-521) / 7.2 (M-531)				kg	±5 %
Connector	Sub- D 15- pin, 3 m cable incl.					
Recommended controllers	C-863 C-884	C-863 C-884	C-863 C-884	C-663		

Ask about custom designs!

*Bidirectional repeatability for versions with linear encoder.

** Max. 0.85 A/ phase; 400 full steps/ rev., motor resolution with C-663 stepper motor controller.

*** M-5xx.EC: Brushless DC motor with PWM control

Order Information

Stages with 102 mm travel range:

M-511.DD1

Precision Translation Stage, 102 mm, ActiveDrive DC Motor, Linear Encoder

M-511.DD2

Precision Translation Stage, 102 mm, ActiveDrive DC Motor, Linear Encoder, Motor Brake

M-511.PD1

Precision Translation Stage, 102 mm, ActiveDrive DC Motor, Rotary Encoder

M-511.EC

Precision Translation Stage, 102 mm, Brushless DC Motor, Rotary Encoder

M-511.DG1

Precision Translation Stage, 102 mm, DC Gear Motor, Rotary Encoder

M-511.PG1

Precision Translation Stage, 102 mm, ActiveDrive DC Gear Motor, Rotary Encoder

M-511.2S1

Precision Translation Stage, 102 mm, Stepper Motor

Stages with 204 mm travel range:

M-521.DD1

Precision Translation Stage, 204 mm, ActiveDrive DC Motor, Linear Encoder

M-521.DD2

Precision Translation Stage, 204 mm, ActiveDrive DC Motor, Linear Encoder, Motor Brake

M-521.PD1

Precision Translation Stage, 204 mm, ActiveDrive DC Motor, Rotary Encoder

M-521.EC

Precision Translation Stage, 204 mm, Brushless DC Motor, Rotary Encoder

M-521.DG1

Precision Translation Stage, 204 mm, DC Gear Motor, Rotary Encoder

M-521.PG1

Precision Translation Stage, 204 mm, ActiveDrive DC Gear Motor, Rotary Encoder

M-521.2S1

Precision Translation Stage, 204 mm, Stepper Motor

Stages with 306 mm travel range:

M-531.DD1

Precision Translation Stage, 306 mm, ActiveDrive DC Motor, Linear Encoder

M-531.DD2

Precision Translation Stage, 306 mm, ActiveDrive DC Motor, Linear Encoder, Motor Brake

M-531.PD1

Precision Translation Stage, 306 mm, ActiveDrive DC Motor, Rotary Encoder

M-531.EC

Precision Translation Stage, 306 mm, Brushless DC Motor, Rotary Encoder

M-531.DG1

Precision Translation Stage, 306 mm, DC Gear Motor, Rotary Encoder

M-531.PG1

Precision Translation Stage, 306 mm, ActiveDrive DC Gear Motor, Rotary Encoder

M-531.2S1

Precision Translation Stage, 306 mm, Stepper Motor

Vacuum versions and special designs available on request

Adapter plates, adapter brackets, and accessories

Controllers / Drivers / Amplifiers

[C-863 Mercury Servo Controller](#)

[C-884 Four Axis Motion Controller](#)

[C-663 Mercury Step Controller](#)

Accessories

[M-060.HP Adapter Plate](#)

[M-061.HP Adapter Plate](#)

[M-062.HP Adapter Plate](#)

[M-110.01 Adapter Plate](#)

[M-403.AP1 Adapter Plate](#)

[M-403.AP3 Adapter Plate](#)

[M-590.00 Three- Point Support Set](#)

[M-592.10 Z- Axis Mounting Bracket](#)

[M-105.AP Adapter Plate](#)

[M-125.90 Z- Axis Mounting Bracket](#)

[M-592.00 Z- Axis Mounting Bracket](#)

[M-400.AP Adapter Plate](#)

Related Products

[M-406 Precision Linear Stage](#)

[M-414 High- Load Precision Stage](#)

[M-511.HD Nano- Precision Heavy- Duty Stage](#)

[M-417 Precision Linear Stage](#)

