

L-511

High-Precision Linear Stage

High Travel Accuracy



- Travel ranges to 155 mm (6")
- Optional linear encoder for direct position measurement
- Efficient ActiveDrive DC servo motor, Stepper Motor or DC Gear Motor
- Direction-sensing reference point switch

Reference-class linear stage

Recirculating ball bearings for high travel accuracy and load capacity. Precision ball screw with 2 mm pitch. Stress-relieved aluminum base for highest stability. Travel range of the variants: L-511.2: 52 mm (2"), L-511.4: 102 mm (4"), L-511.6: 155 mm (6").

Drive types

- .xxAD variant: ActiveDrive DC motor for high velocity: Control via pulse-width-modulated (PWM) signals, the operating voltage is attained via an amplifier integrated in the motor housing.
- .xxDG variant: DC servo motor with gearhead for high torques and resolution at low motor power
- .xxSD variant: 2-phase stepper motor for low velocity and high resolution

Noncontact limit switches. Noncontact optical reference point switch with direction sensing in the middle of the travel range.

Position measurement

- Integrated rotary encoder on the motor shaft (variants with DC gear motor)
- Integrated linear encoder, centrally installed. Direct position measurement of the motion platform without influence on the positioning precision by mechanical play or hysteresis in the drivetrain

Minimum incremental motion and slow motion

In conjunction with the SMC Hydra controller, versions with stepper motor and integrated linear encoder (L-511.xASD00) achieve repeatable minimum incremental motion in the range of the sensor resolution. The same configuration attains constant low velocities of a few sensor increments per second.

Fields of application

Precision positioning in industry and research, high duty cycles.

Related and Compatible Products

Compatible electronics

C-863 Mercury Servo Controller
C-884 Four-Axis Motion Controller
C-663 Mercury Step Controller
C-863.20C885 DC Motor Controller Module
SMC Hydra Motion Controller

Compatible accessories

L-500 Adapter Bracket

Related products

M-511 • M-521 • M-531 High-Precision Linear Positioning Stage
M-406 Precision Linear Stage
M-413 High-Load Precision Stage
M-414 High-Load Precision Stage
HPS-170 High Precision Linear Stage
L-509 Precision Linear Stage
L-406 Compact Linear Stage

Specifications

	L-511.x4AD00	L-511.x0AD10	L-511.x0DG10	L-511.xASD00	L-511.x0SD00	Unit	Tolerance
	Linear stage with ActiveDrive DC motor and linear encoder (direct position measurement)	Linear stage with ActiveDrive DC motor and rotary encoder	Linear stage with DC gear motor and rotary encoder	Linear stage with stepper motor and linear encoder (direct position measurement)	Linear stage with stepper motor		
Motion axes	X	X	X	X	X		
Motion and positioning							
Travel range*	52 / 102 / 155	52 / 102 / 155	52 / 102 / 155	52 / 102 / 155	52 / 102 / 155	mm	
Integrated sensor	Linear encoder	Rotary encoder	Rotary encoder	Linear encoder	—		
Sensor resolution rotary encoder	-	5000	1024	-	-		
Design resolution	0.05	0.05	0.0164	0.001**	0.625***	µm	
Minimum incremental motion	0.1	0.2	0.1	0.2	0.625***	µm	typ.
Unidirectional repeatability	0.05	0.2	0.2	0.1	0.6	µm	typ.
Backlash		2	1		1	µm	typ.
Bidirectional repeatability	±0.2			±0.2		µm	typ.
Crosstalk, angular error xry (pitch)	±40 / ±60 / ±70	±40 / ±60 / ±70	±40 / ±60 / ±70	±40 / ±60 / ±70	±40 / ±60 / ±70	µrad	
Crosstalk, angular error xrz (yaw)	±40	±40	±40	±40	±40	µrad	
Max. velocity	90	90	6	45	45	mm/s	
Mechanical properties							
Spindle pitch	2	2	2	2	2	mm	
Gear ratio	-	-	2401:81	—	—		
Load capacity	500	500	500	500	500	N	max.
Push/pull force	100	100	100	100	100	N	max.
Permissible lateral force	250	250	250	250	250	N	max.
Holding force	10	10	20	40	40	N	max.

Drive properties							
Motor Type	DC motor with PWM control	DC motor with PWM control	DC gear motor	2-phase stepper motor	2-phase stepper motor		
Operating voltage	24 (PWM)	24 (PWM)	0 to ± 12	24	24	V	
Motor power	80	80	8.5			W	nominal
Reference and limit switches	Optical	Optical	Optical	Optical	Optical		
Miscellaneous							
Operating temperature range	0 to 55	-20 to 65	-20 to 65	0 to 55	-20 to 65	°C	
Material	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel		
Mass	2.5 / 2.9 / 3.3	2.5 / 2.9 / 3.3	2.3 / 2.7 / 3.1	2.5 / 2.9 / 3.3	2.5 / 2.9 / 3.3	kg	$\pm 5\%$
Connector	Sub-D 15 (Motor and Encoder), 3 m cable incl.	Sub-D 15 (Motor and Encoder), 3 m cable incl.	HD Sub-D 26 (motor and rotary encoder), 3 m cable incl. (HD Sub-D 26 to Sub-D 15)	HD Sub-D 26 (motor), Sub-D 9 (linear encoder), 3 m cable set incl.	HD Sub-D 26 (motor), 3 m cable incl. (HD Sub-D 26 to Sub-D 15)		
Recommended controllers	C-863 (single axis) C-884 (up to 4 axes)	C-863 (single axis) C-884 (up to 4 axes)	C-863 (single axis) C-884 (up to 4 axes)	SMC Hydra motion controller (double axis)	C-663 (single axis)		

All cables required for operation with the recommended controller are included in the scope of delivery.

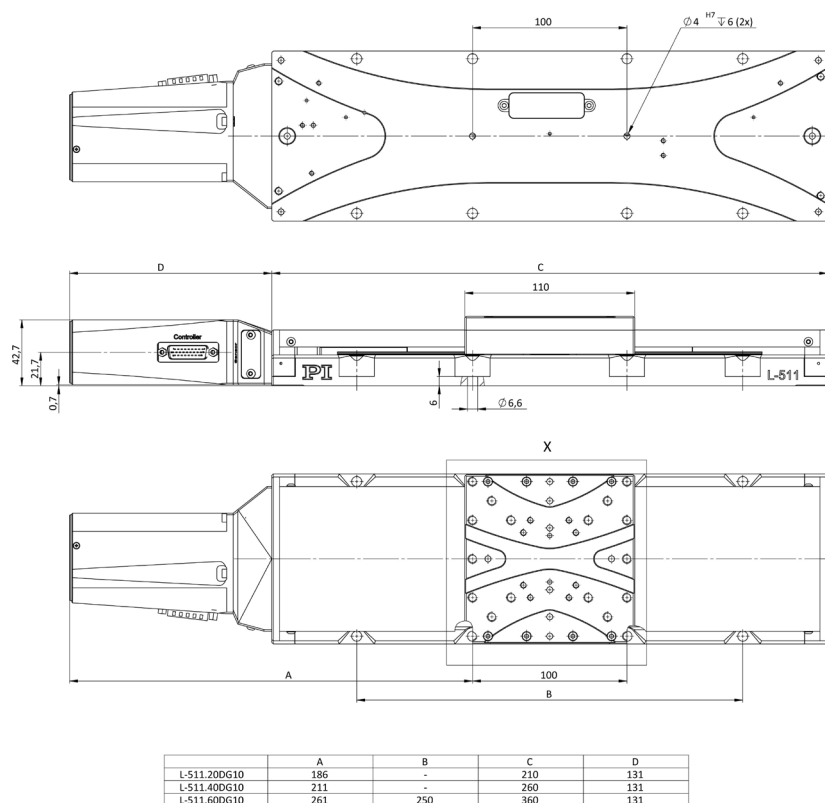
* Travel range of the variants: L-511.2: 52 mm (2"), L-511.4: 102 mm (4"), L-511.6: 155 mm (6").

** Sin/cos analog signals with 1 V_{pp}, operation with SMC Hydra controller with maximum interpolation.

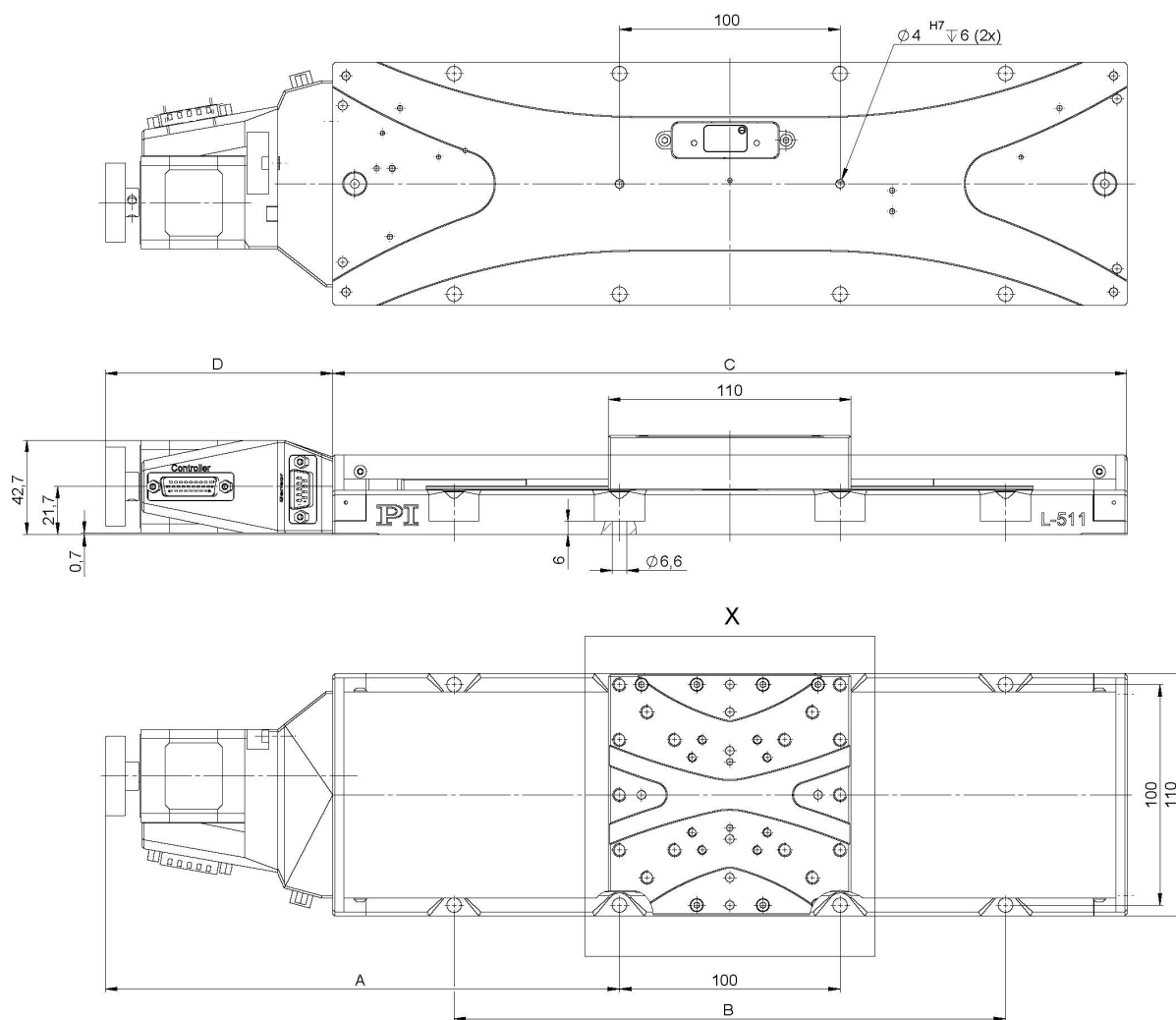
*** 200 full steps/rev., max. 1.2 A/phase.

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Drawings and Images

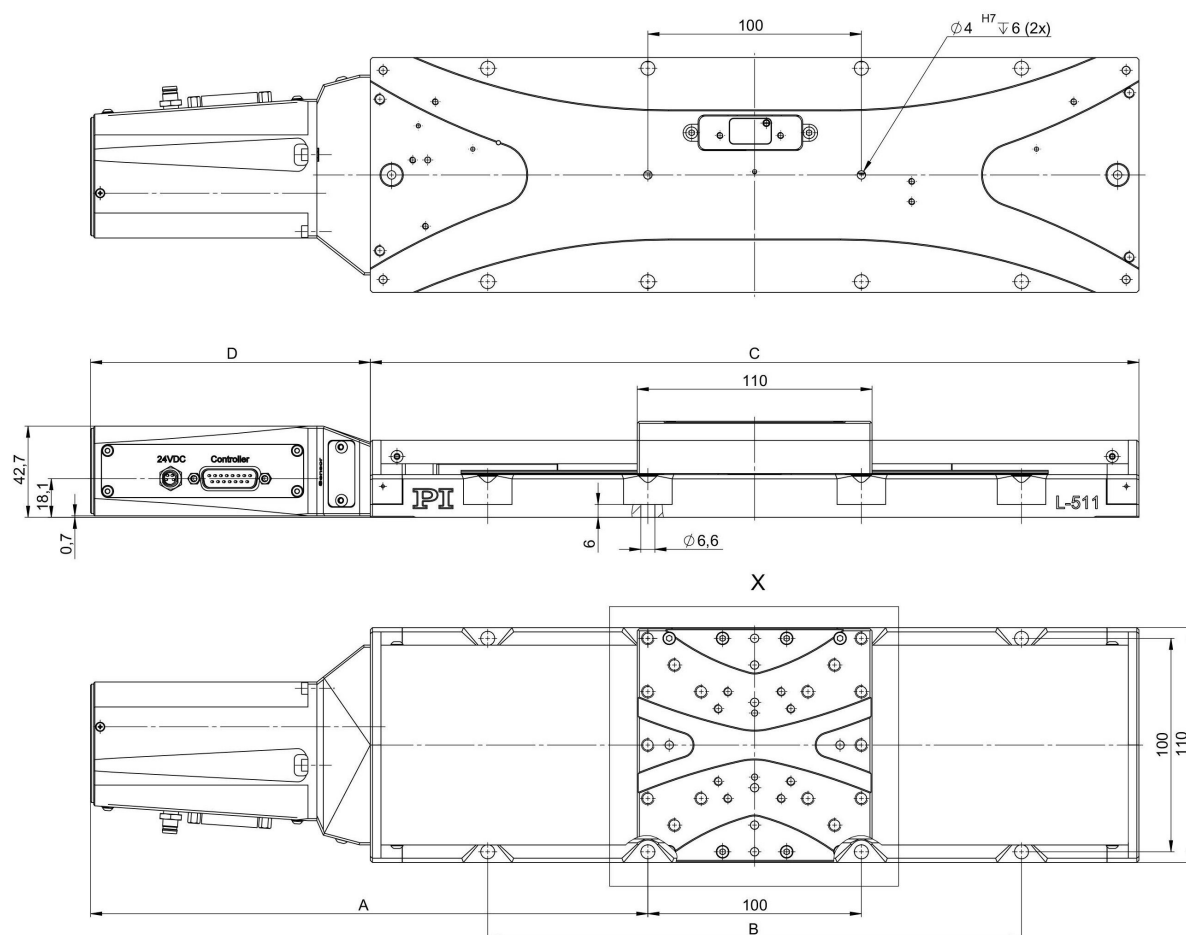


L-511 versions with DC gear motor, dimensions in mm



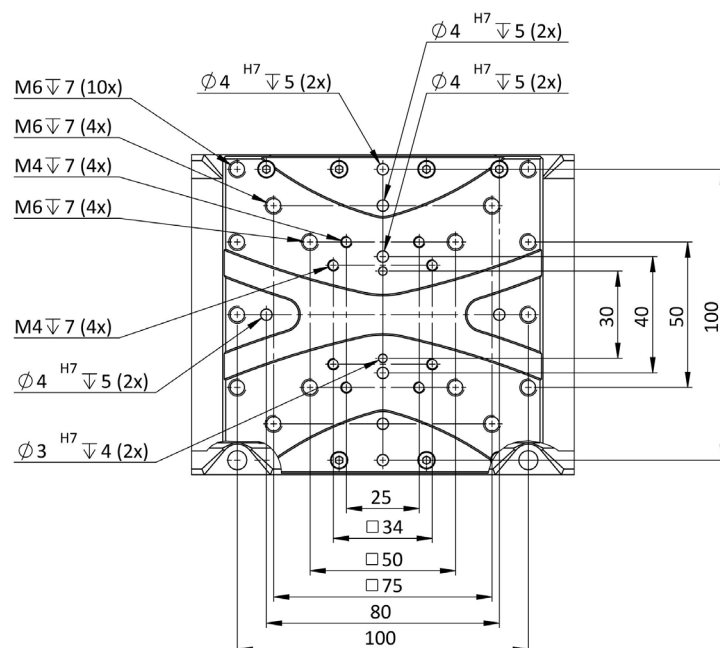
	A	B	C	D
L-511.20SD00	158	-	210	103
L-511.2ASD00	158	-	210	103
L-511.40SD00	183	-	260	103
L-511.4ASD00	183	-	260	103
L-511.60SD00	233	250	360	103
L-511.6ASD00	233	250	360	103

L-511 versions with stepper motor, dimensions in mm



	A	B	C	D
L-511.20AD10	186	-	210	131
L-511.24AD00	186	-	210	131
L-511.40AD10	211	-	260	131
L-511.44AD00	211	-	260	131
L-511.60AD10	261	250	360	131
L-511.64AD00	261	250	360	131

L-511 versions with ActiveDrive DC motor, dimensions in mm



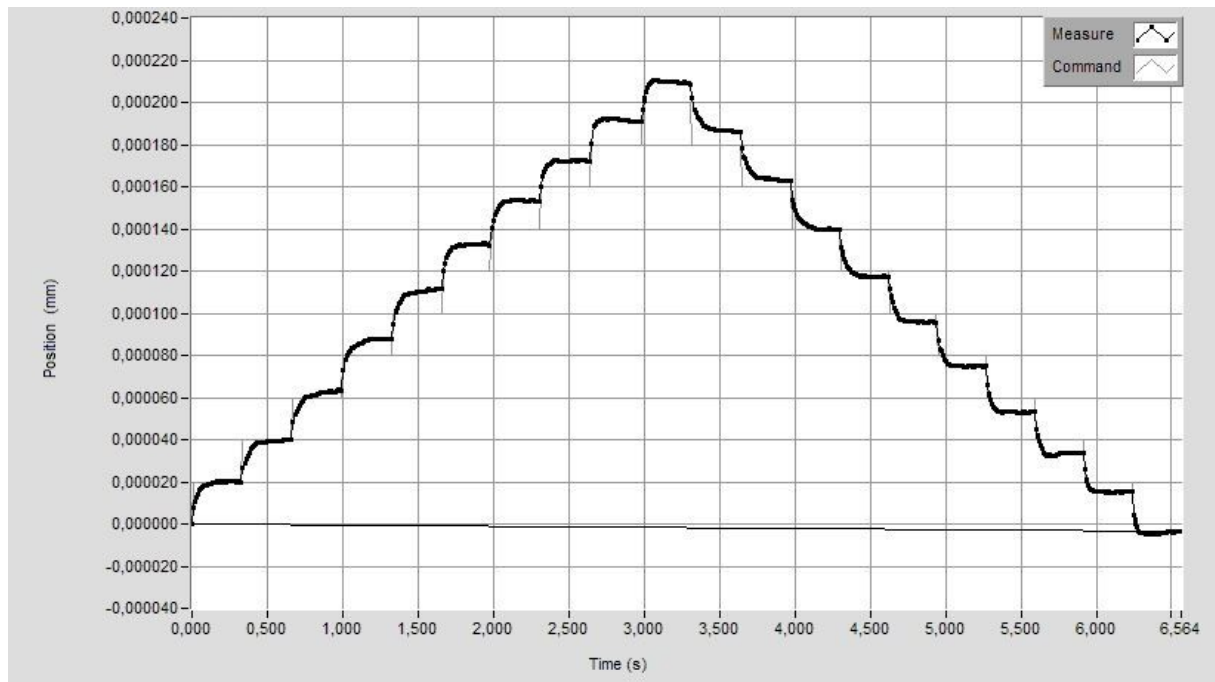
Detail drawing of the sled of the L-511



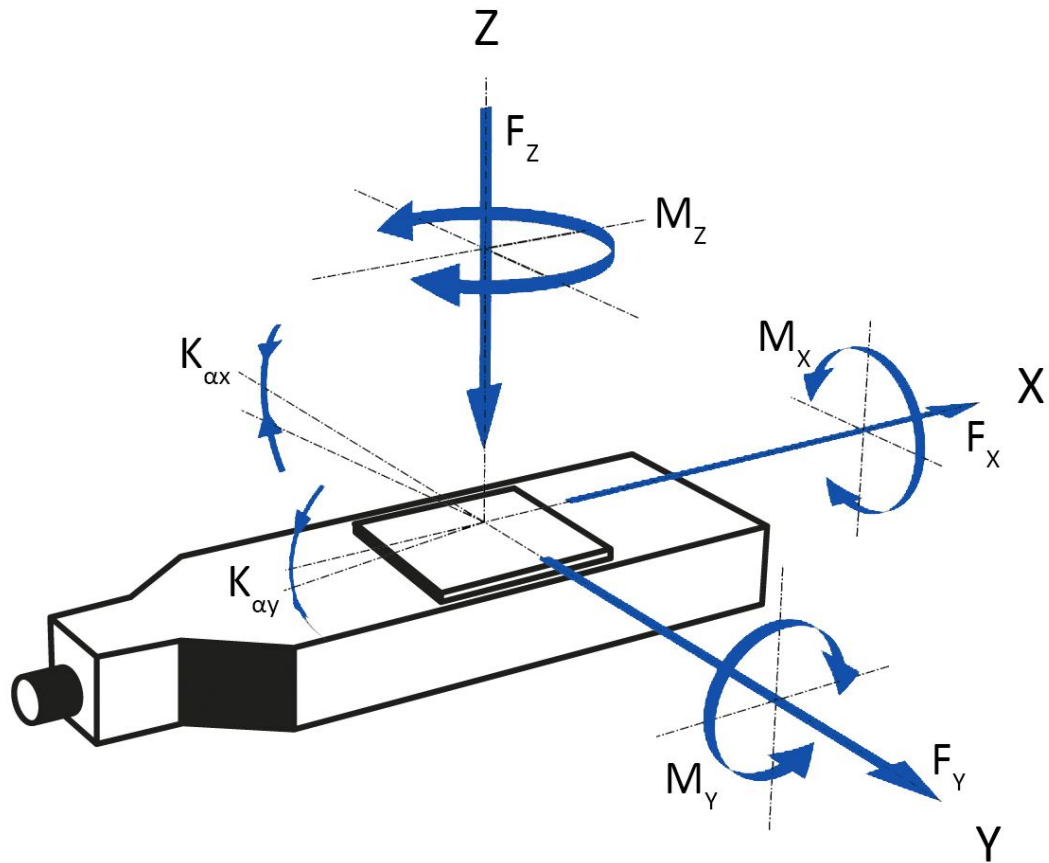
L-511 and L-509 precision stages can be combined without adapter plate for multi-axis positioning on several axes



Multi-axis set-up with L-511 (horizontal) and L-509 (vertical) precision stages



The L-511 reliably performs repeatable 20-nm steps with the linear encoder and SMC Hydra motion controller



Direction of the axes and torques for linear stages

Ordering Information

L-511.20AD10

Precision Linear Stage, 110 mm Width, ActiveDrive DC Motor, 52 mm (2") Travel Range, Optical Limit Switches

L-511.20DG10

Precision Linear Stage, 110 mm Width, DC Gear Motor, 52 mm (2") Travel Range, Optical Limit Switches

L-511.20SD00

Precision Linear Stage, 110 mm Width, 2-Phase Stepper Motor, 52 mm (2") Travel Range, Optical Limit Switches

L-511.40AD10

Precision Linear Stage, 110 mm Width, ActiveDrive DC Motor, 102 mm (4") Travel Range, Optical Limit Switches

L-511.40DG10

Precision Linear Stage, 110 mm Width, DC Gear Motor, 102 mm (4") Travel Range, Optical Limit Switches

L-511.40SD00

Precision Linear Stage, 110 mm Width, 2-Phase Stepper Motor, 102 mm (4") Travel Range, Optical Limit Switches

L-511.60AD10

Precision Linear Stage, 110 mm Width, ActiveDrive DC Motor, 155 mm (6") Travel Range, Optical Limit Switches

L-511.60DG10

Precision Linear Stage, 110 mm Width, DC Gear Motor, 155 mm (6") Travel Range, Optical Limit Switches

L-511.60SD00

Precision Linear Stage, 110 mm Width, 2-Phase Stepper Motor, 155 mm (6") Travel Range, Optical Limit Switches

Stages with direct position measurement

L-511.24AD00

Precision Linear Stage, 110 mm Width, ActiveDrive DC Motor, 52 mm (2") Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, Optical Limit Switches

L-511.2ASD00

Precision Linear Stage, 110 mm Width, 2-Phase Stepper Motor, 52 mm (2") Travel Range, Linear Encoder with Sin/Cos Signal Transmission, Optical Limit Switches

L-511.44AD00

Precision Linear Stage, 110 mm Width, ActiveDrive DC Motor, 102 mm (4") Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, Optical Limit Switches

L-511.4ASD00

Precision Linear Stage, 110 mm Width, 2-Phase Stepper Motor, 102 mm (4") Travel Range, Linear Encoder with Sin/Cos Signal Transmission, Optical Limit Switches

L-511.64AD00

Precision Linear Stage, 110 mm Width, ActiveDrive DC Motor, 155 mm (6") Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, Optical Limit Switches

L-511.6ASD00

Precision Linear Stage, 110 mm Width, 2-Phase Stepper Motor, 155 mm (6") Travel Range, Linear Encoder with Sin/Cos Signal Transmission, Optical Limit Switches

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