

## Precision Linear Stage

COMPACT DESIGN, FOR LOADS UP TO 10 KG

### L-509

- + Travel ranges from 26 to 102 mm (1" to 4")
- + Repeatability to 0.05  $\mu\text{m}$
- + Optional direct metrology linear encoder
- + Stepper Motor or DC Gear Motor
- + Direction- sensing reference point switch
- + Integrated optical limit switches



### Reference- class linear stage

High travel accuracy and load capacity due to crossed roller guides. Precision ball screw with 1 mm pitch. Compact design. Stress- relieved aluminum base for highest stability. Optical limit switches. Travel ranges L-509.2 versions: 26 mm (1"), L-509.4: 52 mm (2"), L-509.6: 102 mm (4")

### Drive types

- .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, direction- sensing reference point switch in the middle of the travel range

### Position measurement

- Integrated rotary encoder on motor shaft (variants with DC gear motor).
- Laterally mounted linear encoder. Direct position measurement of moved platform without impact on positioning precision due to mechanical play or hysteresis in the drive

### Min. incremental motion and slow motion

In conjunction with the SMC Hydra controller, versions with stepper motor and integrated linear encoder (L-509.xASD00) achieve repeatable minimum incremental motion in the range of the sensor resolution. With this configuration, constant, low velocities of a few sensor steps per second can be attained

### Fields of application

Precision positioning for science and industry, high duty cycles.

L-511 and L-509 precision stages can be combined without adapter plates for positioning on several axes.



Multi- axis setup consisting of L-511 (horizontal) and L-509 (vertical) precision stages.



## Specifications

Preliminary Data	L-509.x0DG10	L-509.xASD00	L-509.x0SD00	Unit	Tolerance
	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		
<b>Motion and Positioning</b>					
Travel range #	26 / 52 / 102	26 / 52 / 102	26 / 52 / 102	mm	
Integrated sensor	Rotary encoder	Linear encoder	–		
Sensor resolution rotary encoder	4096	–	–	cts./rev.	typ.
Sensor resolution linear encoder	–	1##	–	nm	typ.
Minimum incremental motion	0.1	0.01	0.315*	µm	typ.
Unidirectional repeatability	0.1	0.1	0.3	µm	typ.
Backlash	0.3	0.1	0.5	µm	typ.
Crosstalk, angular error xry (pitch)	±120	±120	±120	µrad per 100 mm travel	typ.
Crosstalk, angular error xrz (yaw)	±100	±100	±100	µrad per 100 mm travel	typ.
Max. velocity	3	20	20	mm/s	
Min. velocity	–	0.05	–	mm/s	
<b>Mechanical Properties</b>					
Thread/ spindle pitch	1	1	1	mm	
Gear ratio	2401:81	–	–		
Load capacity	100	100	100	N	max.
Push / pull force	60	60	60	N	max.
Lateral force	50	50	50	N	max.
Holding force	40	80	80	N	max.
<b>Drive Properties</b>					
Motor type	DC gear motor	2- phase stepper motor	2- phase stepper motor		
Operating voltage	0 to ±12	24	24	V	
Motor power	8.5	10	10	W	nominal
Reference point and limit switches	Optical	Optical	Optical		
<b>Miscellaneous</b>					
Operating temperature range	-20 to 65	-20 to 65	-20 to 65	°C	
Material	Aluminum, steel	Aluminum, steel	Aluminum, steel		
Mass	1.4 / 1.6 / 1.9	1.4 / 1.6 / 1.9	1.4 / 1.6 / 1.9	kg	± 5%
Connector	HD Sub- D 26- pin (motor and rotary encoder) to Sub- D 15- pin, 3 m cable	HD Sub- D 26- ppin (motor), Sub- D 9- pin (linear encoder), 3 m cable set	HD Sub- D 26- pin (motor) to Sub- D 15- pin, 3 m cable		
Recommended controller/ driver	C-863 (single- axis), C-884 (up to 4 axes)	SMC Hydra (double- axis)	C-663 (single- axis)		

Ask about custom designs!

All cables required for operation with the recommended controller are included in the scope of delivery. Cables for connection with other controllers are available separately.

# Travel ranges of the variants: L-509.1: 26 mm (1"), L-509.2: 52 mm (2"), L-509.4: 102mm (4").

## Sin/ cos analog signals with 1 V<sub>pp</sub>, operation with SMC Hydra controller with maximum interpolation.

\*\* 200 full steps/ rev. With C-663 stepper motor controller

## Order Information

### L-509.10DG10

Precision Linear Stage, 85 mm Wide, DC Gear Motor, 26 mm (1") Travel Range, Optical Limit Switches

### L-509.10SD00

Precision Linear Stage, 85 mm Wide, 2- Phase Stepper Motor, 26 mm (1") Travel Range, Optical Limit Switches

### L-509.20DG10

Precision Linear Stage, 85 mm Wide, DC Gear Motor, 52 mm (2") Travel Range, Optical Limit Switches

### L-509.20SD00

Precision Linear Stage, 85 mm Wide, 2- Phase Stepper Motor, 52 mm (2") Travel Range, Optical Limit Switches

### L-509.40DG10

Precision Linear Stage, 85 mm Wide, DC Gear Motor, 102 mm (4") Travel Range, Optical Limit Switches

### L-509.40SD00

Precision Linear Stage, 85 mm Wide, 2- Phase Stepper Motor, 102 mm (4") Travel Range, Optical Limit Switches

## Stages with direct position measurement

### L-509.1ASD00

Precision Linear Stage, 85 mm Wide, 2- Phase Stepper Motor, 26 mm (1") Travel Range, Linear Encoder with Sin/ Cos Signal Transmission, Optical Limit Switches

### L-509.2ASD00

Precision Linear Stage, 85 mm Wide, 2- Phase Stepper Motor, 52 mm (2") Travel Range, Linear Encoder with Sin/ Cos Signal Transmission, Optical Limit Switches

### L-509.4ASD00

Precision Linear Stage, 85 mm Wide, 2- Phase Stepper Motor, 102 mm (4") Travel Range, Linear Encoder with Sin/ Cos Signal Transmission, Optical Limit Switches

## Controllers / Drivers / Amplifiers

[C-863 Mercury Servo Controller](#)

[C-863.20C885 DC Motor Controller Module](#)

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

[C-663 Mercury Step Controller](#)

[SMC hydra SMC- series](#)

[SMC pollux SMC- series](#)

## Accessories

[L-500 Adapter Bracket](#)

## Related Products

[VT-80 Translation Stage](#)

[M-404 Precision Translation Stage](#)

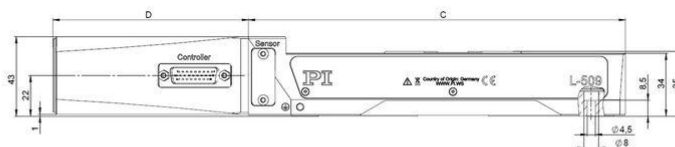
[M-403 Precision Translation Stage](#)

[M-605 High- Accuracy Translation Stage](#)

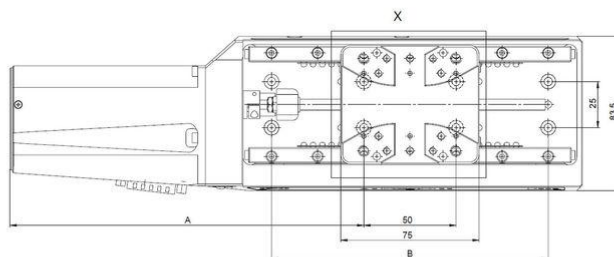
[L-511 High- Precision Linear Positioning Stage](#)

[PLS-85 Precision Linear Stage](#)

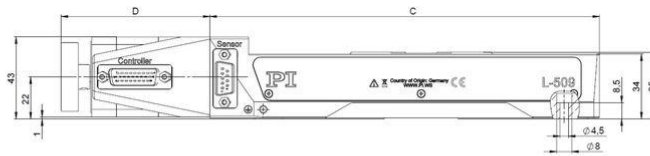
## Drawings / Images



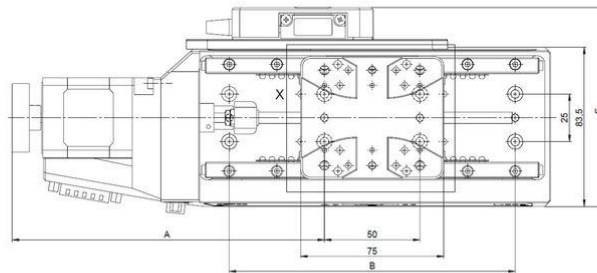
L-509 Versions with DC gear motor, dimensions in mm



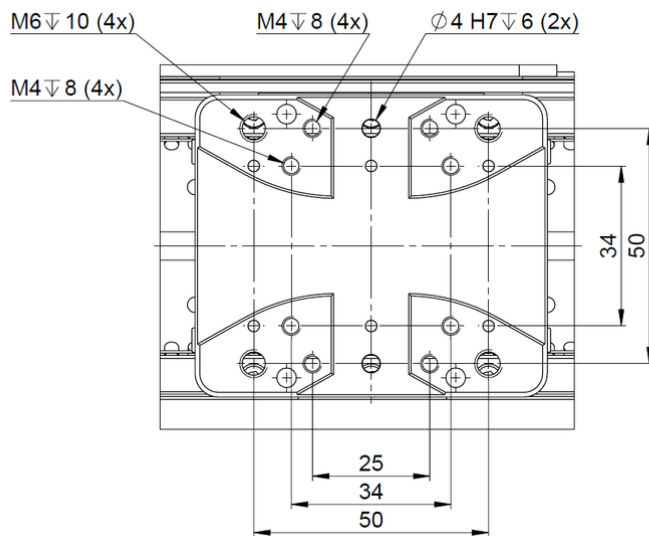
	A	B	C	D
L-509.10DG10	157.3	100	135.3	106
L-509.20DG10	166.8	100	154.3	106
L-509.40DG10	191.8	150	204.3	106



L-509 Versions with  
stepper motor,  
dimensions in mm



	A	B	C	D	E
L-509.10SD00	129.3	100	135.3	78	-
L-509.1ASD00	129.3	100	135.3	78	104.2
L-509.20SD00	138.8	100	154.3	78	-
L-509.2ASD00	138.8	100	154.3	78	104.2
L-509.40SD00	163.8	150	204.3	78	-
L-509.4ASD00	163.8	150	204.3	78	104.2



L-509 slide detail  
drawing