

L-509

Precision Linear Stage

Compact Design, for Loads to 10 kg



- Travel ranges from 26 to 102 mm (1" to 4")
- Repeatability to 0.1 μm
- Optional with Direct Measuring Linear Encoder
- Efficient ActiveDrive DC servo motor, 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 of the variants: L-509.1: 26 mm (1"), L-509.2: 52 mm (2"), L-509.4: 102 mm (4").

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).
- Laterally mounted linear encoder. Direct position measurement of the motion platform without influence on the positioning precision by mechanical play or hysteresis in the drivetrain

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. 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.

Specifications

	L-509.x4AD00	L-509.x0AD10	L-509.x0DG10	L-509.xASD00	L-509.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 and positioning							
Travel range*	26 / 52 / 102	26 / 52 / 102	26 / 52 / 102	26 / 52 / 102	26 / 52 / 102	mm	max.
Integrated sensor	Linear encoder	Rotary encoder	Rotary encoder	Linear encoder	–		
Sensor resolution rotary encoder	-	16384	4096	–	–	cts./rev.	
Design resolution	0.05	0.06	0.008	0.001**	0.315***	µm	typ.
Minimum incremental motion	0.2	0.8	0.1	0.01	0.315***	µm	typ.
Unidirectional repeatability	0.1	0.2	0.1	-	0.3	µm	typ.
Backlash	0.2	0.3	1		0.5	µm	typ.
Bidirectional repeatability	±0.3	±0.5		±0.2		µm	
Crosstalk, angular error xry (pitch)	±60 / ±90 / ±120	±60 / ±90 / ±120	±60 / ±90 / ±120	±60 / ±90 / ±120	±60 / ±90 / ±120	µrad	typ.
Crosstalk, angular error xrz (yaw)	±60 / ±90 / ±120	±60 / ±90 / ±120	±60 / ±90 / ±120	±60 / ±90 / ±120	±60 / ±90 / ±120	µrad	typ.
Max. velocity	50	50	3	20	20	mm/s	max.
Mechanical properties							
Spindle pitch	1	1	1	1	1	mm	
Gear ratio	-	-	2401:81	–	–		

Load capacity	100	100	100	100	100	N	max.
Push/pull force	60	60	60	60	60	N	max.
Permissible lateral force	50	50	50	50	50	N	max.
Holding force	15	15	60	60	60	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	24	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	1.4 / 1.6 / 1.9	1.4 / 1.6 / 1.9	1.4 / 1.6 / 1.9	1.4 / 1.6 / 1.9	1.4 / 1.6 / 1.9	kg	
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) to Sub-D 15, incl. 3 m cable	HD Sub-D 26 (motor), Sub-D 9 (linear encoder), 3 m cable set incl.	HD Sub-D 26 (motor) to Sub-D 15, 3 m cable incl.		
Recommended controller/driver	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 (double-axis)	C-663 (single-axis)		

All cables required for operation with the recommended controller are included in the scope of delivery. Cables for connecting to other controllers can be ordered as accessory.

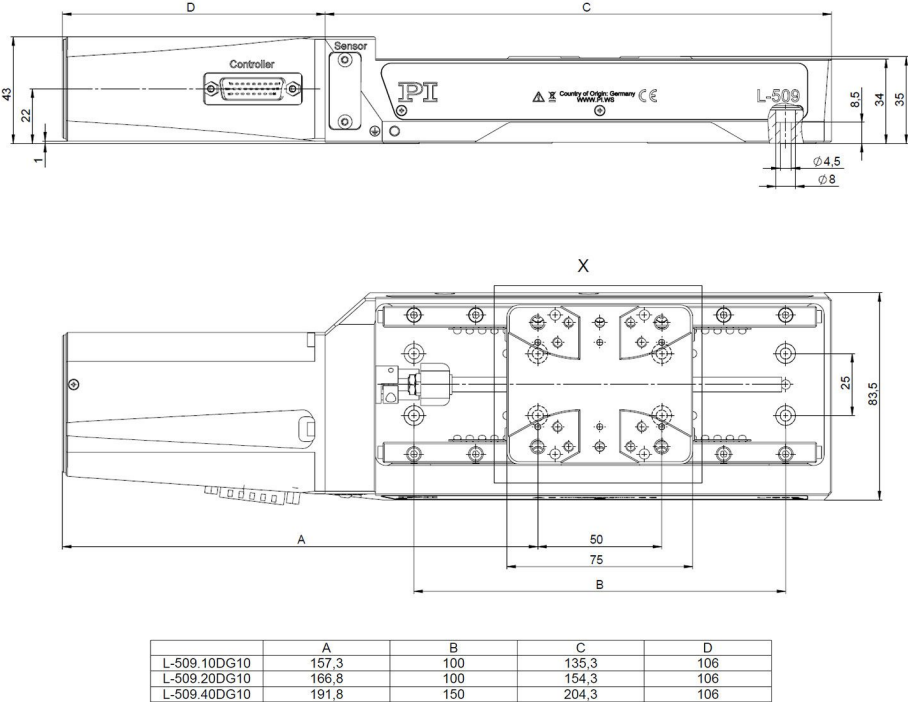
* Travel ranges of the variants: L-509.1: 26 mm (1"), L-509.2: 52 mm (2"), L-509.4: 102 mm (4").

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

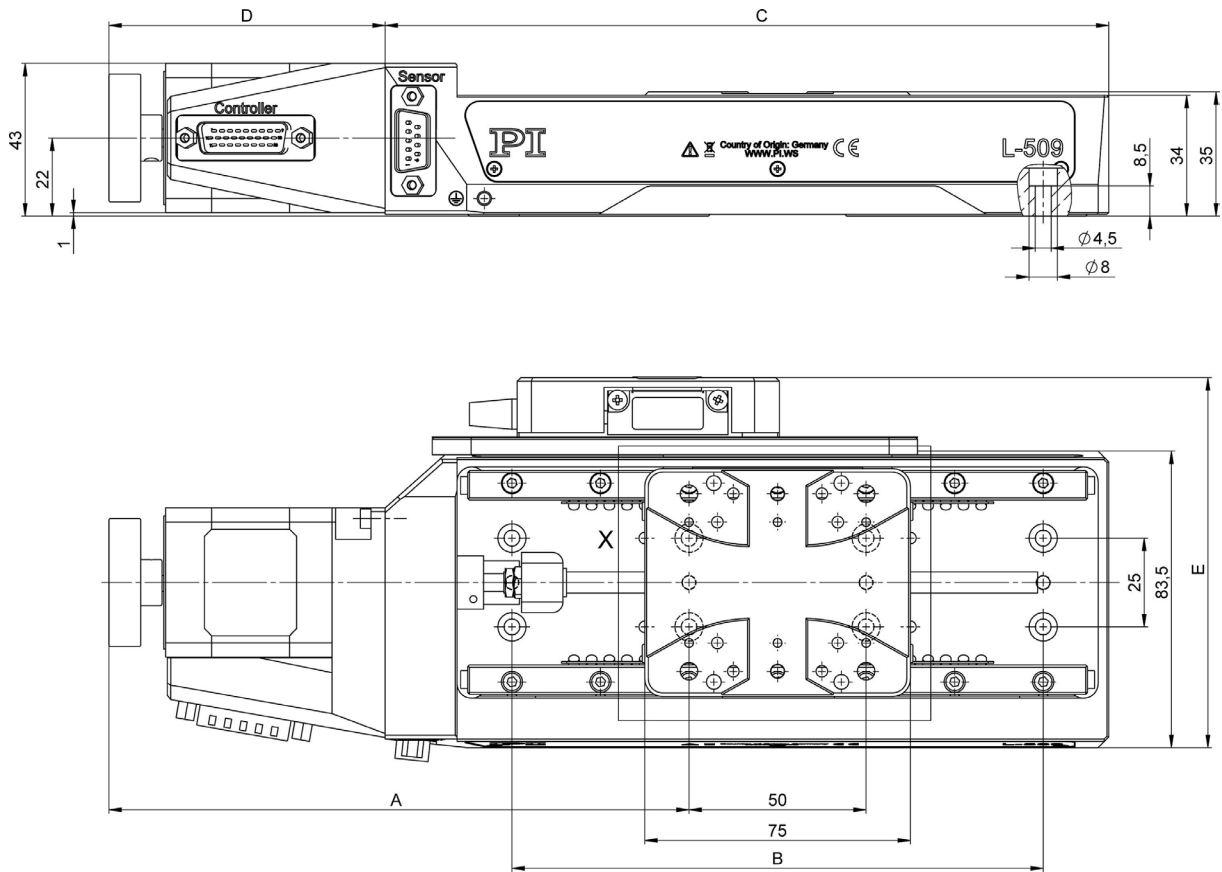
*** 200 full steps/rev., max. 1.2 A/phase. Motor resolution with C-663 stepper motor controller.

Ask about custom designs!

Drawings and Images

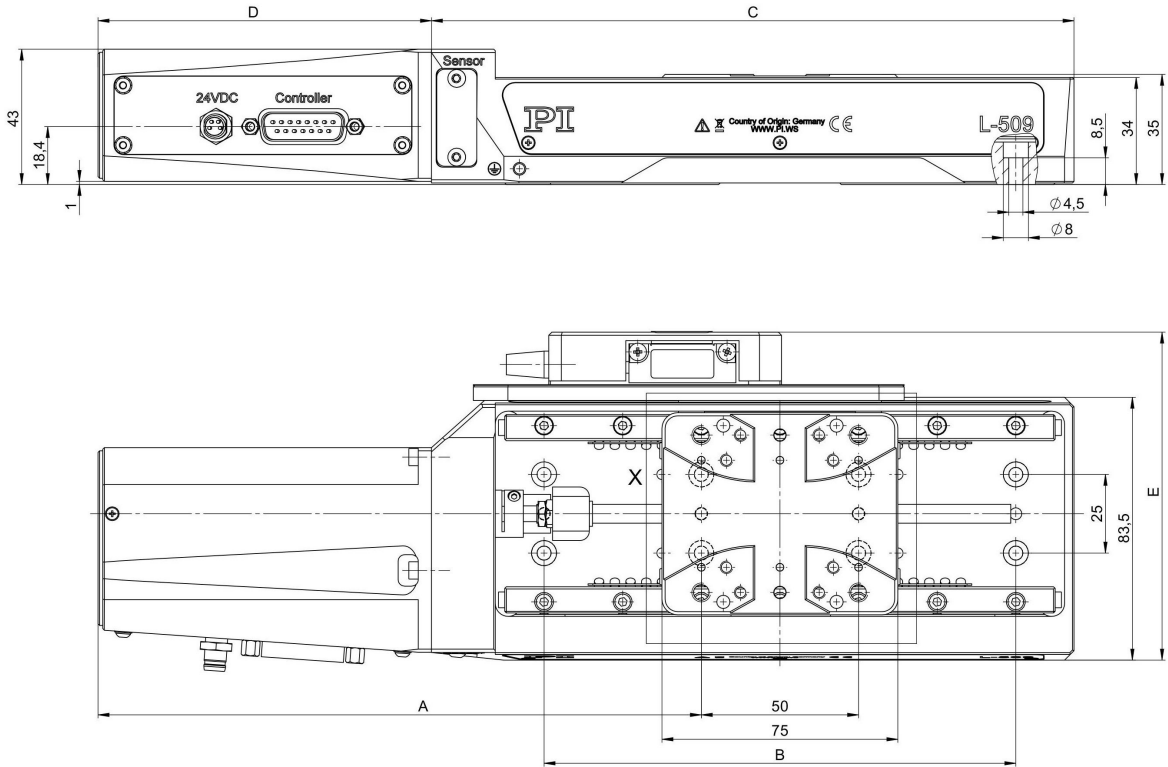


L-509 versions with DC gear motor, dimensions in mm



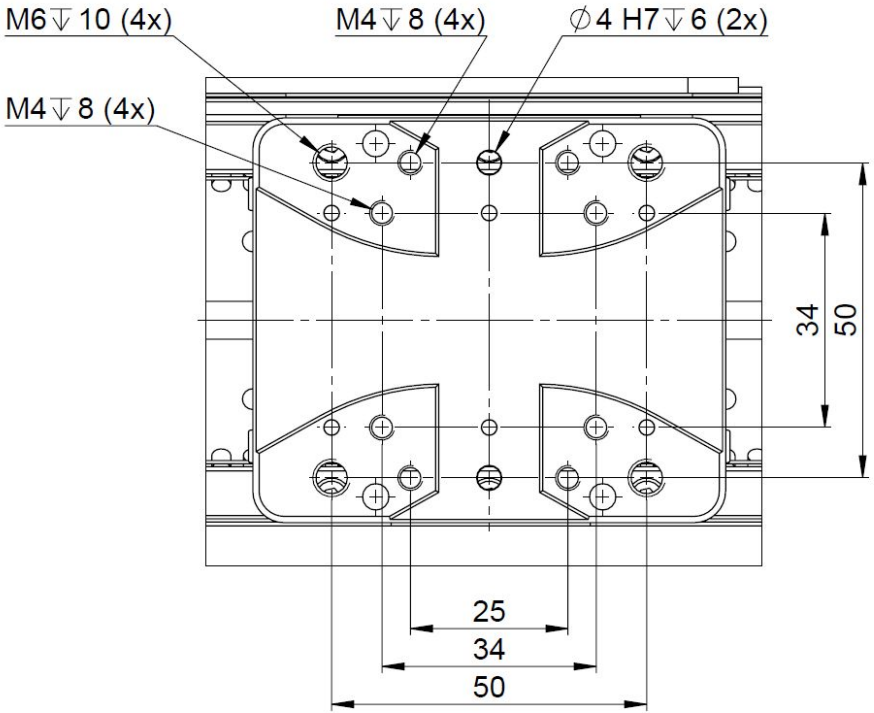
	A	B	C	D	E
L-509.10SD00	129,3	100	135,3	78	-
L-509.1ASD00	129,3	100	135,3	78	104,2
L-509.20SD00	138,8	100	154,3	78	-
L-509.2ASD00	138,8	100	154,3	78	104,2
L-509.40SD00	163,8	150	204,3	78	-
L-509.4ASD00	163,8	150	204,3	78	104,2

L-509 versions with stepper motor, dimensions in mm



	A	B	C	D	E
L-509.10AD10	157,3	100	135,3	106	-
L-509.14AD00	157,3	100	135,3	106	104,2
L-509.20AD10	166,8	100	154,3	106	-
L-509.24AD00	166,8	100	154,3	106	104,2
L-509.40AD10	191,8	150	204,3	106	-
L-509.44AD00	191,8	150	204,3	106	104,2

L-509 versions with ActiveDrive DC motor, dimensions in mm



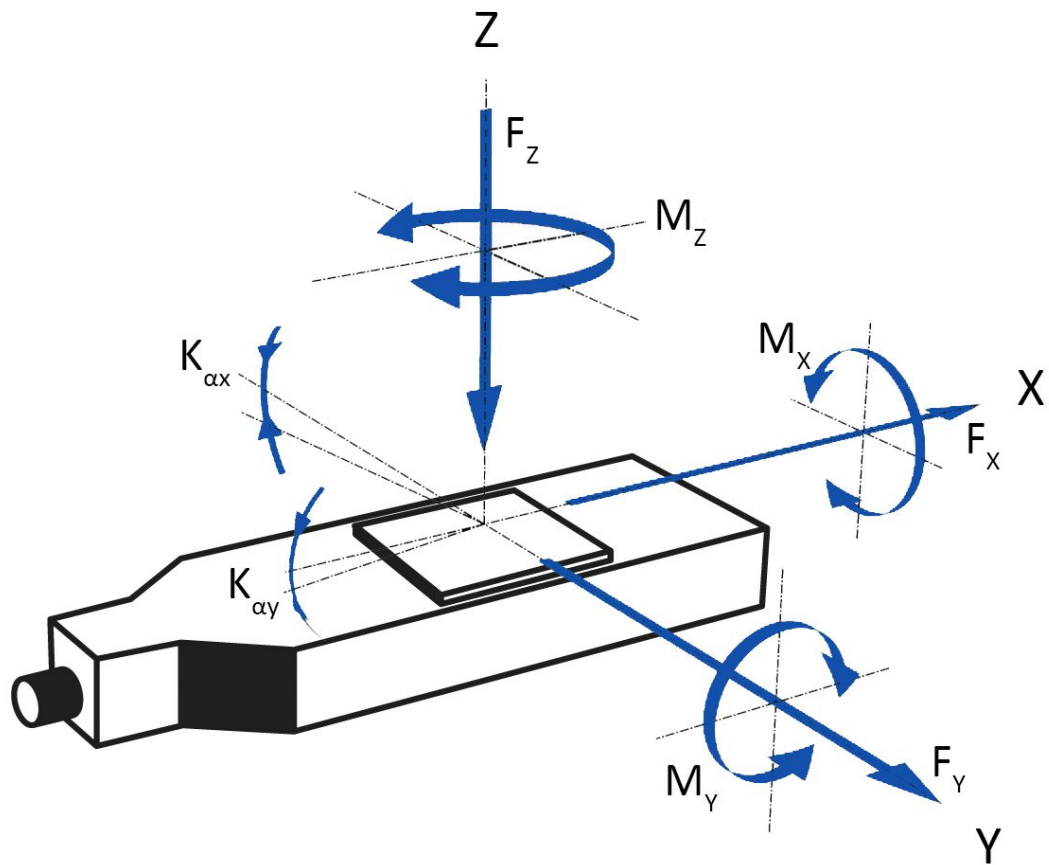
Detail drawing of the sled of the L-509



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



Direction of the axes and torques for linear stages

Ordering Information

L-509.10AD10

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

L-509.10DG10

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

L-509.10SD00

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

L-509.20AD10

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

L-509.20DG10

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

L-509.20SD00

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

L-509.40AD10

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

L-509.40DG10

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

L-509.40SD00

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

Stages with direct position measurement

L-509.14AD00

Precision Linear Stage, 85 mm Width, ActiveDrive DC Motor, 26 mm (1") Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, Optical Limit Switches

L-509.1ASD00

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

L-509.24AD00

Precision Linear Stage, 85 mm Width, ActiveDrive DC Motor, 52mm (2") Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, Optical Limit Switches

L-509.2ASD00

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

L-509.44AD00

Precision Linear Stage, 85 mm Width, ActiveDrive DC Motor, 102 mm (4") Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, Optical Limit Switches

L-509.4ASD00

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