

# Precision Z Stage

Compact Multi-Axis Combinations with Linear and Rotation Stages



## L-310

- Travel range 26 mm (1")
- High-resolution encoder
- DC, BLDC, and stepper motors
- Zero-play ball screw
- Load capacity to 10 kg
- Vacuum-compatible items available

### Precision-class Z stage

High guiding accuracy and stiffness due to ball screws and crossed roller guides. Stress-relieved aluminum base for highest stability. Vacuum-compatible product variants on request. Noncontact limit and reference switches (Hall effect). Reference switch with direction sensing in the middle of the travel range.

### Drive types

- .xxSD variant: 2-phase stepper motor for high torque even at low velocities and high resolution.
- .xxAD variant: ActiveDrive DC motor for high velocity: Control via pulse-width-modulated (PWM) signals, the operating voltage is achieved via an amplifier integrated in the motor housing.
- .023xxx variant: DC servo motor
- .025xxx variant: Brushless DC motor (BLDC) for high rotational velocity. Smooth running and low wear, therefore longer lifetime.

### Position measuring

- Versions with DC motor: Rotary encoder
- Optional: Integrated linear encoder, installed centrally.

### Highly accurate position measuring with incremental linear encoder

Noncontact optical encoders measure the position directly at the platform with the greatest accuracy. Nonlinearity, mechanical play or elastic deformation have no influence on the measurement.

### Minimum incremental motion and slow motion

In conjunction with the SMC Hydra controller, versions with stepper motor and integrated linear encoder (L-310.xASD) achieve repeatable minimum incremental motion in the range of the sensor resolution. The same configuration achieves constant low velocities of a few sensor increments per second.

## Application fields

Precision positioning in industry and research, high duty cycles.

## Specifications

Motion	L-310.2xSD	L-310.2xAD	L-310.023xxx	L-310.025xxx	Unit	Tolerance
Active axis	Z	Z	Z	Z		
Travel range	26	26	26	26	mm	
Pitch / yaw	±150	±150	±150	±150	µrad	typ.
Straightness / flatness	±3	±3	±3	±3	µm	typ.
Velocity	15	20	50	50	mm/s	max.

Positioning: L-310.xxxD	L-310.20SD	L-310.2ASD	L-310.20AD	L-310.24AD	Unit	Tolerance
Design resolution	5	0.005	0.061	0.05	µm	
Integrated sensor	–	Incremental linear encoder	Rotary encoder	Incremental linear encoder		
Sensor signal	–	Sin/cos, 1 V peak-peak, 20 µm signal period	A/B quadrature, TTL	A/B quadrature, TTL		
Sensor resolution rotary encoder	–	–	16384	–	Cts./rev.	
Sensor resolution linear encoder	–	–	–	0.05	µm	
Minimum incremental motion	0.3	0.05	0.3	0.3	µm	typ.
Unidirectional repeatability	0.3	0.1	0.3	0.3	µm	typ.
Bidirectional repeatability	±2	±0.2	±2	±0.2	µm	typ.
Limit switches	Hall effect	Hall effect	Hall effect	Hall effect		
Reference switch repeatability	2	2	2	2	µm	typ.

Positioning: L-310.02x2xx	L-310.023211	L-310.023212	L-310.023232	L-310.025212	L-310.025232	Unit	Tolerance
Design resolution	0.025*	0.05	0.061	0.05	0.05	µm	
Integrated sensor	Incremental linear encoder	Incremental linear encoder	Rotary encoder	Incremental linear encoder, rotary encoder	Rotary encoder		
Sensor signal	Sin/cos, 1 V peak-peak, 20 µm signal period	A/B quadrature, TTL	A/B quadrature, TTL	A/B quadrature, TTL	A/B quadrature, TTL		
Sensor resolution rotary encoder	–	–	16384	20000	20000	Cts./rev.	
Sensor resolution linear encoder	–	0.05	–	0.05	–	µm	
Minimum incremental motion	0.2	0.2	0.3	0.2	0.3	µm	typ.
Unidirectional repeatability	0.2	0.2	0.3	0.2	0.3	µm	typ.
Bidirectional repeatability	±0.2	±0.2	±2	±0.2	±2	µm	typ.
Limit switches	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect		
Reference switch repeatability	2	2	2	2	2	µm	typ.

Mechanical properties	L-310.2xSD	L-310.2xAD	L-310.023xxx	L-310.025xxx	Unit	Tolerance
Drive screw	Ball screw	Ball screw	Ball screw	Ball screw		
Drive screw pitch	1	1	1	1	mm	
Guide	Crossed roller guides with anti-creep system	Crossed roller guides with anti-creep system	Crossed roller guides with anti-creep system	Crossed roller guides with anti-creep system		
Holding force, power off	50	30	30	30	N	max.
Permissible lateral force, F <sub>x</sub>	100	100	100	100	N	max.
Permissible lateral force, F <sub>y</sub>	50	50	50	50	N	max.
Load capacity (push/pull force)	55	30	100	100	N	max.
Permissible torque in $\theta_x$ (M <sub>x</sub> )	40	40	40	40	Nm	max.
Permissible torque in $\theta_y$ (M <sub>y</sub> )	80	80	80	80	Nm	max.
Permissible torque in $\theta_z$ (M <sub>z</sub> )	80	80	80	80	Nm	max.

Drive properties	L-310.2xSD	L-310.2xAD	L-310.023xxx	L-310.025xxx	Unit	Tolerance
Motor type	2-phase stepper motor	ActiveDrive DC motor (PWM)	DC motor	BLDC motor		
Operating voltage, nominal	24	24	24	24	V	nom.
Operating voltage, max.	48	48	48	48	V	max.
Step resolution	200	–	–	–	Full steps/rev	

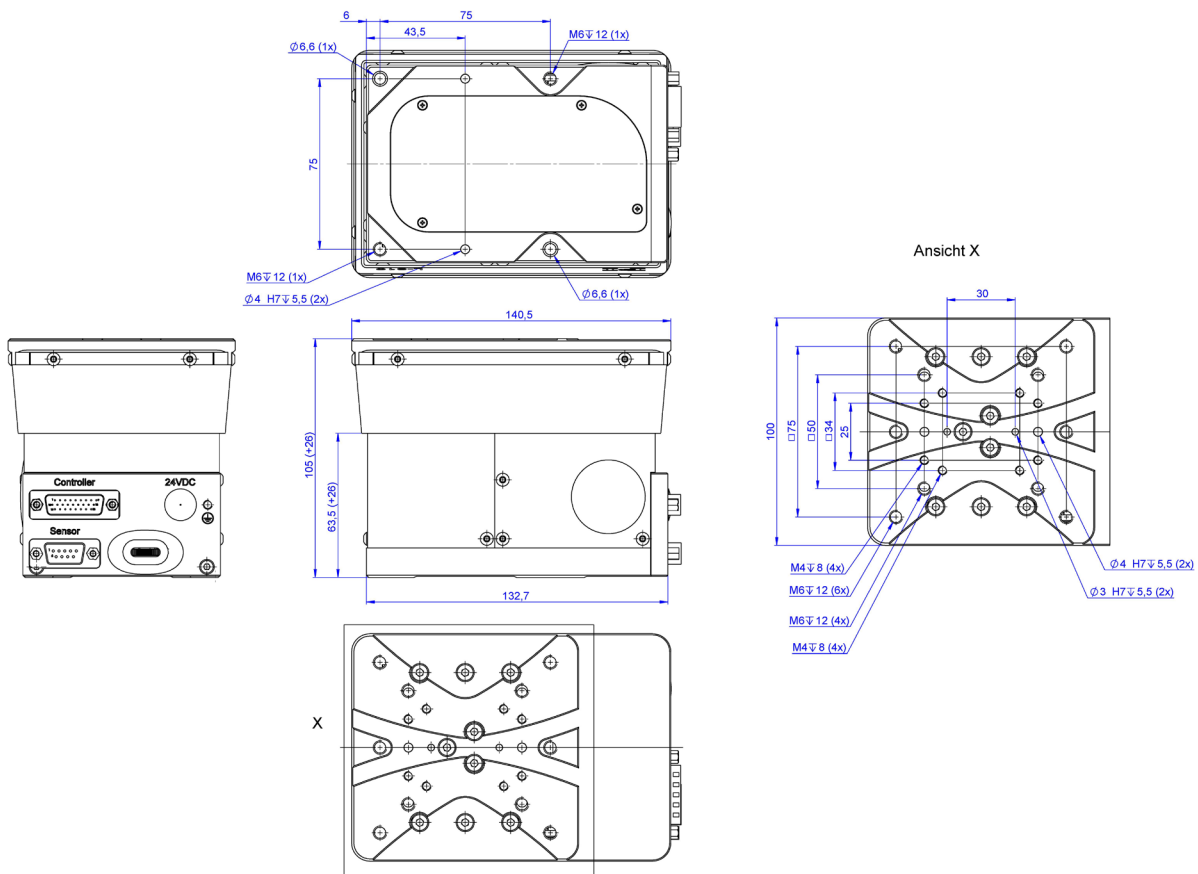
Miscellaneous	L-310.2xSD	L-310.2xAD	L-310.023xxx	L-310.025xxx	Unit	Tolerance
Operating temperature range	5 to 40	5 to 40	5 to 40	5 to 40	°C	
Material	Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum		
MTBF	–	–	–	10000	h	
Mass	L-310.20SD: 2.7 L-310.2ASD: 2.8		2.7	2.7	kg	±5 %
Moved mass, unloaded	0.9	0.9	0.9	0.9	kg	±5 %
Connector	HD D-sub 26 (m) L-310.2ASD: HD D-sub 26 (m) (motor), D-sub 9 (m) (sensor)	D-sub 15 (m)	L-310.023232: HD D-sub 26 (m) L-310.02321x: HD D-sub 26 (m) (motor), D-sub 9 (m) (sensor)	HD D-sub 26 (m)		
Recommended controllers/drivers	C-663.12 (single axis) SMC Hydra (double axis) C-885 with C-663.12C885 (up to 20 axes) ACS modular controller	C-863 (single axis) C-884 (up to 6 axes) C-885 with C-863.20C885 (to 40 axes)	C-863 (single axis) C-884 (up to 6 axes) C-885 with C-863.20C885 (to 40 axes) ACS modular controller	C-891 (single axis) C-885 with C-891.11C885 (up to 20 axes) ACS modular controller		

\* 200x interpolated

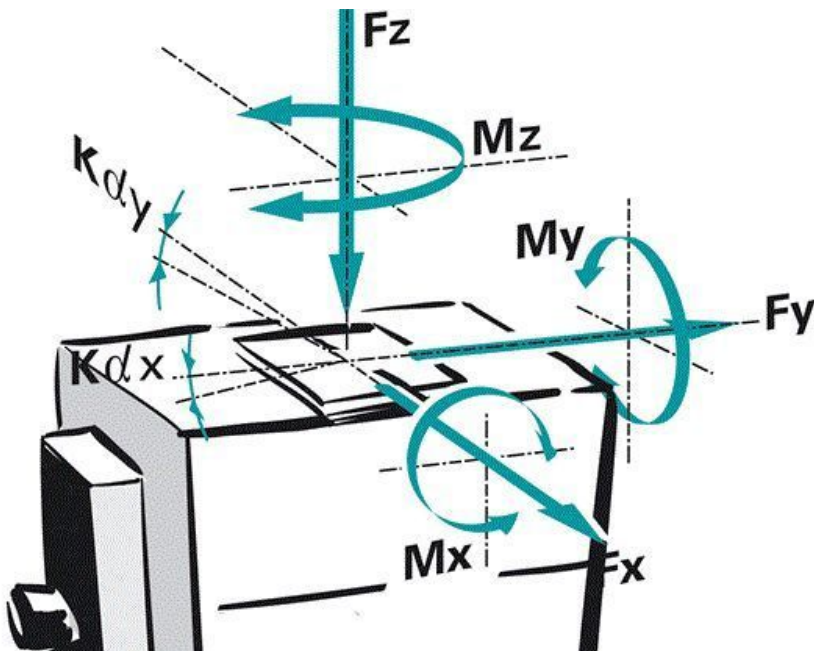
Provided that the controller is ordered at the same time as the positioner, all cables required for operation with the recommended controller are included in the scope of delivery (exception: ACS controller). The cable length is 3 m. Cables for connecting to ACS controllers or other controllers can be ordered as accessories.

Ask about customized versions.

## Drawings / Images



L-310, dimensions in mm



Direction of the axes and torques for Z stages

## Ordering Information

### **L-310.20SD**

Precision Z stage, 26 mm travel range, 55 N load capacity, stepper motor, including 3 m cable set

### **L-310.2ASD**

Precision Z stage, 26 mm travel range, 55 N load capacity, stepper motor, linear encoder with sin/cos signal transmission, 20 µm sensor signal period, including 3 m cable set

### **L-310.023211**

Precision Z stage, 26 mm travel range, 100 N load capacity, DC motor, linear encoder with sin/cos signal transmission, 20 µm sensor signal period, including 3 m cable set

### **L-310.023212**

Precision Z stage, 26 mm travel range, 100 N load capacity, DC motor, linear encoder with A/B quadrature signal transmission, 50 nm sensor resolution, including 3 m cable set

### **L-310.023232**

Precision Z stage, 26 mm travel range, 100 N load capacity, DC motor, rotary encoder, including 3 m cable set

### **L-310.025212**

Precision Z stage, 26 mm travel range, 100 N load capacity, brushless DC motor, linear encoder with A/B quadrature signal transmission, 50 nm sensor resolution, including 3 m cable set

### **L-310.025232**

Precision Z stage, 26 mm travel range, 100 N load capacity, brushless DC motor, rotary encoder, including 3 m cable set

### **L-310.20AD**

Precision Z stage, 26 mm travel range, 30 N load capacity, ActiveDrive DC motor, rotary encoder, including 3 m cable set

### **L-310.24AD**

Precision Z stage, 26 mm travel range, 30 N load capacity, ActiveDrive DC motor, linear encoder with A/B quadrature signal transmission, 50 nm sensor resolution, including 3 m cable set