

Piezo Z and Tip/Tilt Scanner

High Dynamics System with Aperture



S-310 • S-316

- Clear aperture 10 mm
- Tripod piezo drive
- Linear travel ranges to 12 μm (phase shifter)
- Sub-ms response time
- Sub- μrad resolution
- Closed-loop versions for increased precision

Fields of application

- Image processing / stabilization
- Laser scanning / beam steering
- Laser tuning
- Optical filters / switches
- Beam stabilization
- Interferometry

Outstanding lifetime thanks to PICMA® piezo actuators

The patented PICMA® piezo actuators are all-ceramic insulated. This protects them against humidity and failure resulting from an increase in leakage current. PICMA® actuators offer an up to ten times longer lifetime than conventional polymer-insulated actuators. 100 billion cycles without a single failure are proven.

High guiding accuracy due to zero-play flexure guides

Flexure guides are free of maintenance, friction, and wear, and do not require lubrication. Their stiffness allows high load capacity and they are insensitive to shock and vibration. They are 100 % vacuum compatible and work in a wide temperature range.

Automatic configuration and fast component exchange

Mechanics and controllers can be combined as required and exchanged quickly. All servo and linearization parameters are stored in the ID chip of the D-sub connector of the mechanics. The autocalibration function of the digital controllers uses this data each time the controller is switched on.

High dynamics multi-axis operation due to parallel kinematics

In a parallel-kinematic multi-axis system, all actuators act on a common platform. The minimum mass inertia and the identical design of all axes allow fast, dynamic, and nevertheless precision motion.

Specifications

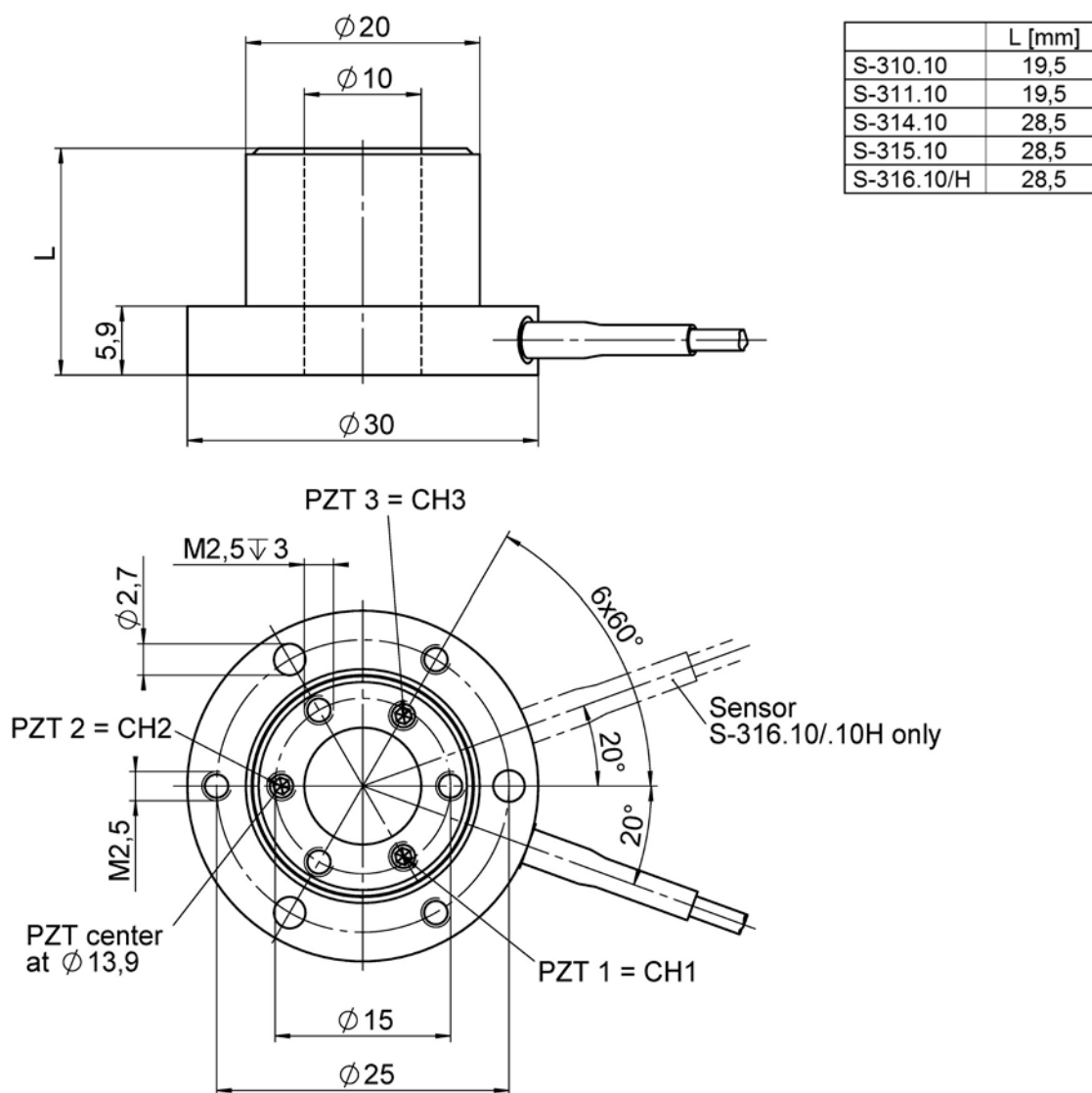
	S-310.10	S-314.10	S-311.10	S-315.10	S-316.10 S-316.10H	Unit	Tolerance
Active axes	Z	Z	Z, θ_x , θ_y	Z, θ_x , θ_y	Z, θ_x , θ_y		
Motion and positioning							
Integrated sensor	–	–	–	–	SGS		
Travel range in Z at 0 to 100 V, open loop	6	12	6	12	12	μm	+20 % / -0 %
Tip/tilt angle at 0 to 100 V, open loop	–	–	600	1200	1200	μrad	+20 % / -0 %
Travel range in Z, closed loop	–	–	–	–	12	μm	
Tip/tilt angle, closed loop	–	–	–	–	1200	μrad	
Resolution in Z, open loop	0.1	0.2	0.1	0.2	0.2	nm	typ.
Resolution in θ_x , θ_y , open loop	–	–	0.02	0.05	0.05	μrad	typ.
Resolution in Z, closed loop	–	–	–	–	0.4	nm	typ.
Resolution in θ_x , θ_y , closed loop	–	–	–	–	0.1	μrad	typ.
Linearity error	–	–	–	–	0.2	%	typ.
Mechanical properties							
Stiffness in Z	20	10	20	10	10	N/ μm	± 20 %
Resonant frequency, no load, in Z	9.5	5.5	9.5	5.5	5.5	kHz	± 20 %
Resonant frequency, under load (with 15 mm \times 4 mm glass mirror)	6.5	4.4	6.5	4.1	4.1	kHz	± 20 %
Resonant frequency, under load (with 20 mm \times 4 mm glass mirror)	6.1	4.2	6.1	3.4	3.4	kHz	± 20 %
Distance of pivot point to platform surface	–	–	5	5	5	mm	± 0.5 mm
Platform moment of inertia	–	–	150	150	150	$\text{g} \times \text{mm}^2$	± 20 %
Drive properties							
Ceramic type	PICMA® P-882	PICMA® P-882	PICMA® P-882	PICMA® P-882	PICMA® P-882		
Electrical capacitance	0.39	0.93	0.39 (0.13 per axis)	0.93 (0.31 per axis)	0.93 (0.31 per axis)	μF	± 20 %
Miscellaneous							
Operating temperature range	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	$^{\circ}\text{C}$	
Material	Steel	Steel	Steel	Steel	Steel		
Mass	0.053	0.055	0.045	0.055	0.055	kg	± 5 %
Cable length	2	2	2	2	2	m	+100 mm / -0 mm
Voltage connection	LEMO	LEMO	LEMO	LEMO	S-316.10: LEMO S-316.10H: Sub-D 37 (m)		
Sensor connection	–	–	–	–	S-316.10: LEMO S-316.10H: Sub-D 37 (m)		
Recommended electronics	E-505, E-610	E-505, E-610	E-503, E-505, E-610	E-503, E-505, E-610	S-316.10: E-503, E-505, E-509, E-610, E-625 S-316.10H: E-727		

The resolution of the system is limited only by the noise of the amplifier and the measuring technology because PI piezo nanopositioning systems are free of friction.

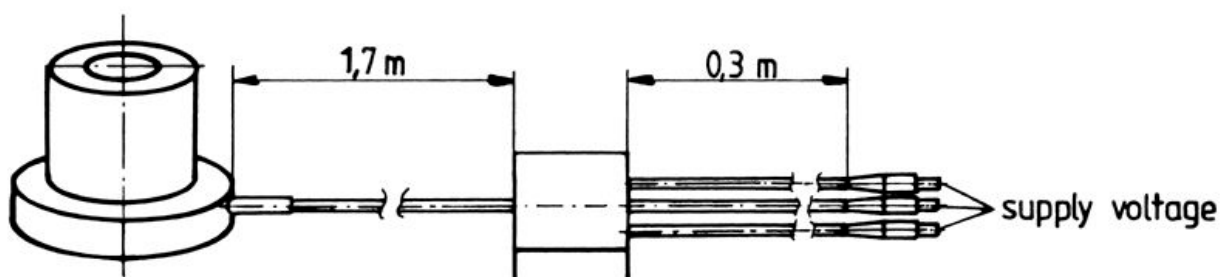
Mechanical tilt, optical beam deflection is twice as large. For maximum tilt range, all three piezo actuators must be biased at 50 V. Due to the parallel-kinematics design, linear travel and tip/tilt angle are interdependent. The specified values are the maximum for pure linear respectively tilt motion.

All specifications based on room temperature (22 $^{\circ}\text{C} \pm 3$ $^{\circ}\text{C}$).

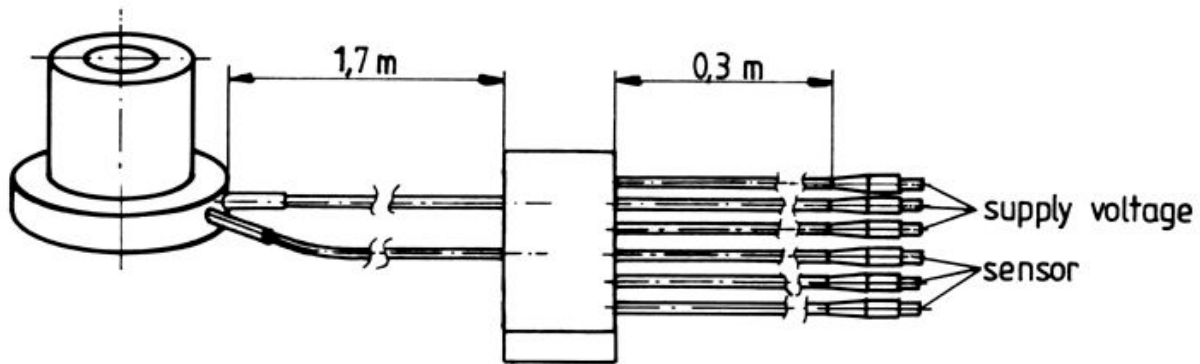
Drawings / Images



S-31x, dimensions in mm. The general tolerance according to DIN ISO 2768-f-H applies to all nontolerated dimensions.



S-315, cable configuration



S-316, cable configuration

Ordering Information

S-310.10

Piezo actuator, clear aperture, 6 μm , LEMO connectors

S-311.10

3-axis piezo tip/tilt system, clear aperture, 600 μrad , 6 μm , LEMO connectors

S-314.10

Piezo actuator, clear aperture, 12 μm , LEMO connectors

S-315.10

3-axis piezo tip/tilt system, clear aperture, 1.2 mrad, 12 μm , LEMO connectors

S-316.10

3-axis piezo tip/tilt system, clear aperture, 1.2 mrad, 12 μm , strain gauge sensors, LEMO connectors

S-316.10H

3-axis piezo tip/tilt system, clear aperture, 1.2 mrad, 12 μm , strain gauge sensors, Sub-D 37 connector (m)