

Piezo Z and Tip/Tilt Scanner

High Dynamics Piezo Scanner with Aperture



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

Application fields

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

Outstanding lifetime thanks to PICMA® piezo actuators

The 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 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.

Motion	Unit	Tolerance	S-316.10	S-316.10H
Active axes			Z θ_X θ_Y	Z θ_X θ_Y
Travel range in Z	μm		12	12
Travel range in Z, open loop	μm	+20 / -0 %	12	12
Rotation range in θ_X	μrad		1200	1200
Rotation range in θ_Y	μrad		1200	1200
Rotation range in θ_X , open loop	μrad	+20 / -0 %	1200	1200
Rotation range in θ_Y , open loop	μrad	+20 / -0 %	1200	1200
Linearity error in Z	%	Typ.	0.2	0.2
Linearity error in θ_X	%	Typ.	0.2	0.2
Linearity error in θ_Y	%	Typ.	0.2	0.2

Positioning	Unit	Tolerance	S-316.10	S-316.10H
Resolution in Z, open loop	nm	Typ.	0.2	0.2
Resolution in θX , open loop	μrad	Typ.	0.05	0.05
Resolution in θY , open loop	μrad	Typ.	0.05	0.05
Integrated sensor			SGS, indirect position measuring	SGS, indirect position measuring
System resolution in Z	nm		0.4	0.4
System resolution in θX	μrad		0.1	0.1
System resolution in θY	μrad		0.1	0.1

Drive Properties	Unit	Tolerance	S-316.10	S-316.10H
Drive type			PICMA®	PICMA®
Electrical capacitance in Z	μF	$\pm 20\%$	0.31	0.31
Electrical capacitance in θX	μF	$\pm 20\%$	0.31	0.31
Electrical capacitance in θY	μF	$\pm 20\%$	0.31	0.31

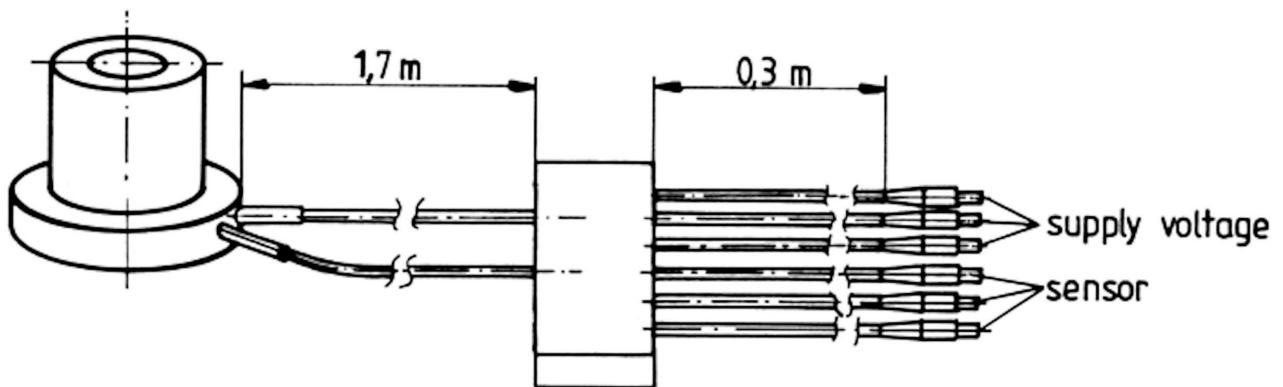
Mechanical Properties	Unit	Tolerance	S-316.10	S-316.10H
Stiffness in Z	N/ μm	$\pm 20\%$	10	10
Resonant frequency in X, under load with glass mirror ($\varnothing$ 15 mm; thickness 4 mm)	kHz	$\pm 20\%$	4.1	4.1
Resonant frequency in X, under load with glass mirror ($\varnothing$ 20 mm; thickness 4 mm)	kHz	$\pm 20\%$	3.4	3.4
Resonant frequency in Z, unloaded	kHz	$\pm 20\%$	5.5	5.5
Resonant frequency in Z, under load with glass mirror ($\varnothing$ 15 mm; thickness 4 mm)	kHz	$\pm 20\%$	4.1	4.1
Resonant frequency in Z, under load with glass mirror ($\varnothing$ 20 mm; thickness 4 mm)	kHz	$\pm 20\%$	3.4	3.4
Moment of inertia in θX , unloaded	g·mm ²	$\pm 20\%$	150	150
Moment of inertia in θY , unloaded	g·mm ²	$\pm 20\%$	150	150
Distance of pivot point to platform surface	mm	± 0.5 mm	5	5
Guide			Flexure guide with lever amplification	Flexure guide with lever amplification
Overall mass	g	$\pm 5\%$	55	55
Material			Steel	Steel

Miscellaneous	Unit	Tolerance	S-316.10	S-316.10H
Operating temperature range	°C		-20 to 80	-20 to 80
Connector			LEMO LVPZT	D-sub 37 (m)
Sensor connector			LEMO for strain gauge sensors	—
Cable length	m	+100 / -0 mm	2	2
Recommended controllers / drivers			E-503, E-505, E-509, E-610, E-625	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.

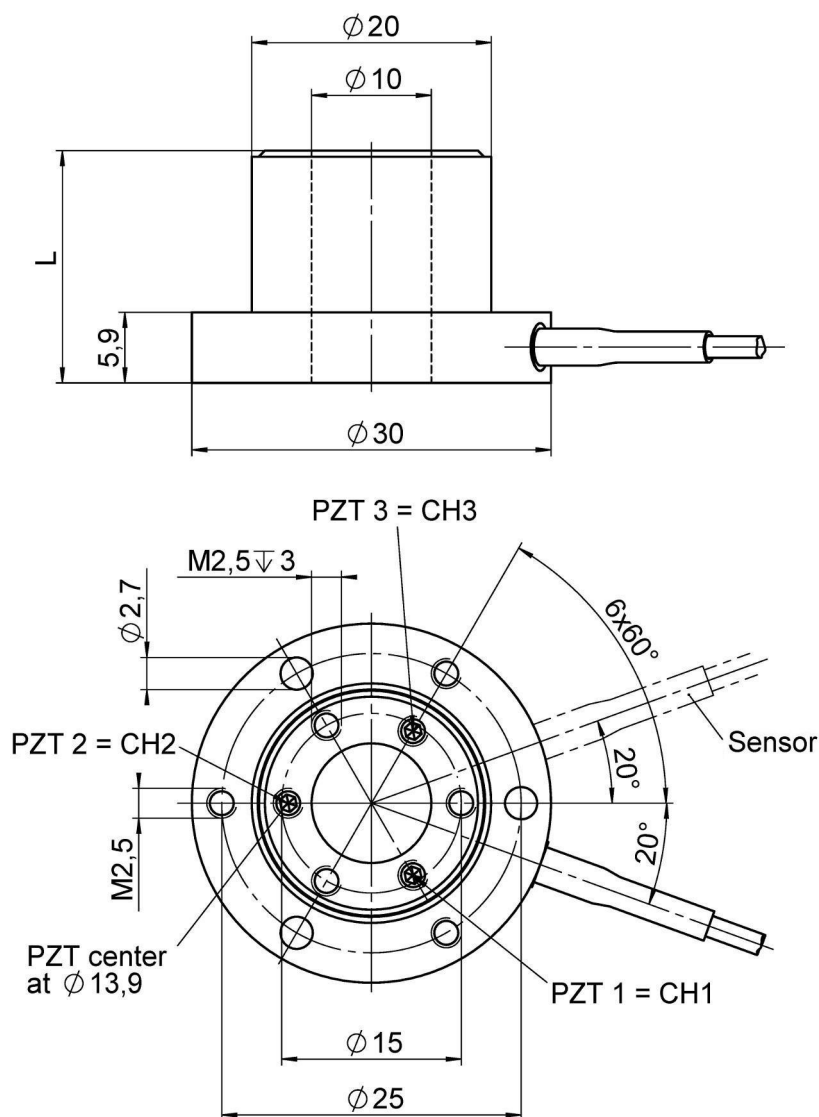
At PI, technical data is specified at 22 $\pm$ 3 °C. Unless otherwise stated, the values are for unloaded conditions. Some properties are interdependent. The designation "typ." indicates a statistical average for a property; it does not indicate a guaranteed value for every product supplied. During the final inspection of a product, only selected properties are analyzed, not all. Please note that some product characteristics may deteriorate with increasing operating time.

Drawings / Images



S-316, Cable configuration

Drawings / Images



	L [mm]
S-316.10/H	28,5

S-316[H], dimensions in mm. The general tolerance according to DIN ISO 2768-f-H applies to all nontolerated dimensions. Note that a comma is used in the drawings instead of a decimal point.

Order Information

S-316.10

Piezo Z and tip/tilt scanner; 12 μm linear travel range; 1200 μrad $\times$ 1200 μrad rotation range (θX $\times$ θY); SGS, indirect position measuring; LEMO LVPZT connectors; 2 m cable length

S-316.10H

Piezo Z and tip/tilt scanner; 12 μm linear travel range; 1200 μrad $\times$ 1200 μrad rotation range (θX $\times$ θY); SGS, indirect position measuring; D-sub 37-pole (m) connector; 2 m cable length