S-340 Piezo Tip / Tilt-Platform

High-Dynamics for Mirrors and Optics with a Diameter of up to 100 mm (4")

S-340 tip/tilt platform for mirrors with a diameter of up to 100 mm

- **Resolution up to 20 nrad, Excellent Position Stability**
- **Optical Beam Deflection to 4 mrad**
- **Higher Precision and Dynamics via Parallel Kinematics**
- **Only One Moving Platform with a Fixed Pivot Point Prevents the Change of the Polarization**
- **Sub-ms Response**
- **For Mirrors with a Diameter up to 100 mm**
- **Position-Controlled Versions for Better Linearity**
- **Excellent Temperature Stability**

Ordering Information

S-340.A0L
Piezo Tip/Tilt Platform, 2 mrad, Open-Loop, LEMO Connector, Aluminum Top Plate

S-340.ASL
Piezo Tip/Tilt Platform, 2 mrad, SGS, LEMO, Aluminum Top Plate

S-340.ASD
Piezo Tip/Tilt Platform, 2 mrad, SGS, Sub-D Connectors, Aluminum Top Plate

Various material for the top platforms are available on demand:

S-340.S0L / .SSL / .SSD: High-Grade Steel

S-340.T0L / .TSL / .TSD: Titanium

S-340.i0L / .iSL / .iSD: Invar

S-340 tip/tilt platforms allow high-dynamic and precise angular movements of the top platform in two orthogonal axes with a common pivot point (parallel kinematics).
The systems are designed for mirrors with a diameter of up to 100 mm and their differential drive enables an outstanding angular stability in a wide temperature range. A variety of top platforms are available to achieve an optimum thermal adaptation to different mirror materials. For operation in closed-loop, the SD versions are equipped with high-resolution strain gauge sensors in a thermally stable circuit. All versions feature a sub-µrad resolution and a tip/tilt range of 2 mrad (equivalent to 4 mrad optical beam deflection).

Application Examples

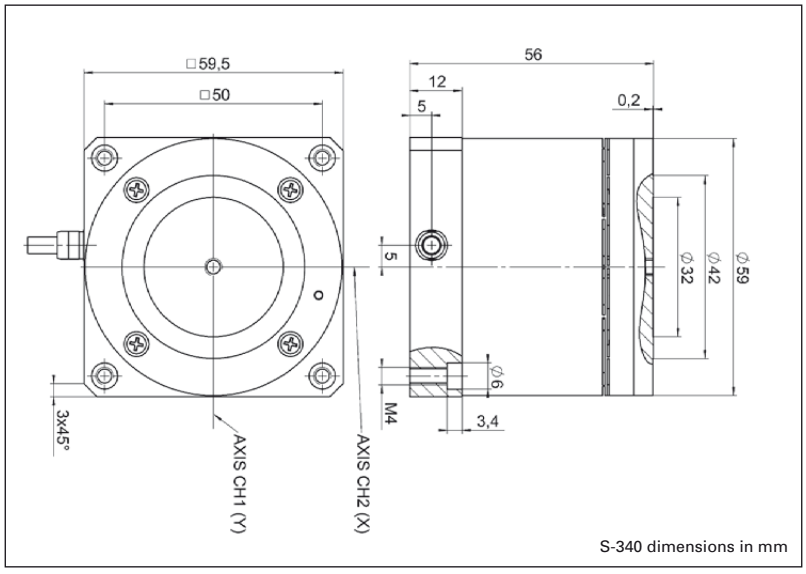
- Image processing / stablilization
- Laser scanning / beam steering
- Active and adaptive optics
- Optical filters
- Beam stabilization
- Correction of polygon mirror errors

Parallel-Kinematic Design for Improved Stability, Linearity and Dynamics

Piezo tip/tilt mirror systems of PI are based on parallel kinematics with a single movable platform for all directions of motion. The four actuators are controlled differentially in pairs depending on the tip/tilt movement of the platform. This results in an excellent stability in linear and angular positioning for a wide temperature range. Compared to systems with an independent positioner per tilt axis, parallel-kinematics offer the advantage of symmetrical dynamic properties of motion for all axes, faster response and better linearity with a compact design. For this kind of design no change of polarization of the reflected light occurs, different than for stacked single axis systems like e. g. galvo scanners.

Ceramic-Insulated Piezo Actuators Provide Superior Lifetime

The highest possible reliability is assured by employing the award-winning PICMA® multilayer piezo actuators. PICMA® actuators are the only actuators on the market with a ceramic-only insulation which makes them resistant to ambient humidity and leakage-current failures. They are thus far superior to conventional actuators in reliability and lifetime.



S-340 dimensions in mm

E-616 OEM steering mirror controller shown with the miniature S-334 tip/tilt mirror system

Technical Data

Model	S-340.ASD/.ASL	S-340.A0L	Units	Tolerance
Active axes	θ X, θY	θX, θY		
Motion and Positioning				
Integrated sensor	SGS	–		
Open-loop tip/tilt angle, -20 to +120 V	2	2	mrad	min.
Closed-loop tip/tilt angle	2	–	mrad	
Open-loop tip/tilt angle resolution	0.02	0.02	µrad	typ.
Closed-loop tip/tilt resolution	0.2	–	µrad	typ.
Linearity in θX, θY	0.1	–	%	typ.
Repeatability in θX, θY	0.15	–	µrad	typ.
Mechanical properties				
Unloaded resonant frequency (θX, θY)	1.4	1.4	kHz	±20 %
Resonant frequency loaded in θX, θY (with glass mirror diameter 50 mm, thickness 15 mm)	0.9	0.9	kHz	±20 %
Resonant frequency loaded in θX, θY (with glass mirror diameter 75 mm, thickness 22 mm)	0.4	0.4	kHz	±20 %
Distance of pivot point to platform surface	7.5	7.5	mm	±1 mm
Platform moment of inertia	18000	18000	g · mm²	±20 %
Drive properties				
Ceramic type	PICMA®	PICMA®		
Electrical capacitance	6/axis	6/axis	µF	±20 %
Dynamic operating current coefficient	0.45/axis	0.45/axis	µA/(Hz · mrad)	±20 %
Miscellaneous				
Operating temperature range	-20 to 80	-20 to 80	°C	
Material case	Aluminum	Aluminum		
Material platform	Aluminum; or optionally Steel, Titanium or Invar	Aluminum; or optionally Steel, Titanium or Invar		
Mass	0.355	0.35	kg	±5 %
Cable length	2	2	m	±10 mm
Sensor/voltage connection	Sub-D connector / LEMO	LEMO		

Recommended controller / amplifier
Closed-loop versions with Sub-D connectors: E-616 servo controller for tip/tilt mirror systems s. p. 2-132; with LEMO connector: E-500 System s. p. 2-142.
Open-loop: E-500 System s. p. 2-142.