

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

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

Application Examples

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

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- μ rad resolution and a tip/tilt range of 2 mrad (equivalent to 4 mrad optical beam deflection).

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

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

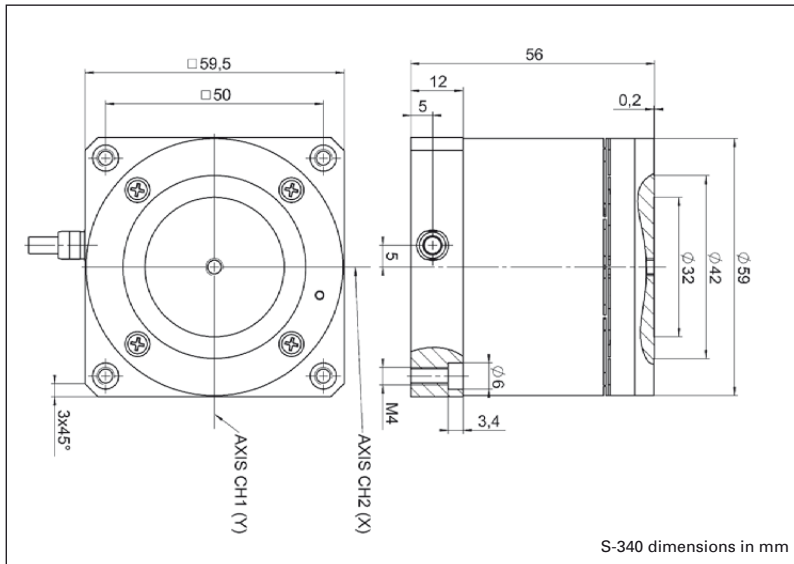
S-340.T0L / .TSL / .TSD: Titanium

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

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® multi-layer 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

Technical Data

| Model | S-340.ASD/.ASL | S-340.A0L | Units | Tolerance |
|---|--|--|-----------------------|-------------|
| Active axes | $\theta X, \theta Y$ | $\theta X, \theta Y$ | | |
| 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 | μ rad | typ. |
| Closed-loop tip / tilt resolution | 0.2 | – | μ rad | typ. |
| Linearity in $\theta X, \theta Y$ | 0.1 | – | % | typ. |
| Repeatability in $\theta X, \theta Y$ | 0.15 | – | μ rad | typ. |
| Mechanical properties | | | | |
| Unloaded resonant frequency ($\theta X, \theta Y$) | 1.4 | 1.4 | kHz | ± 20 % |
| Resonant frequency loaded in $\theta X, \theta Y$ (with glass mirror diameter 50 mm, thickness 15 mm) | 0.9 | 0.9 | kHz | ± 20 % |
| Resonant frequency loaded in $\theta X, \theta Y$ (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 | $g \cdot mm^2$ | ± 20 % |
| Drive properties | | | | |
| Ceramic type | PICMA® | PICMA® | | |
| Electrical capacitance | 6/axis | 6/axis | μ F | ± 20 % |
| Dynamic operating current coefficient | 0.45/axis | 0.45/axis | μ A / (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.