

## Piezo Tip/Tilt Platform

### Beam Steering with Very Large Deflection Angles for Mirrors and Optics



### S-335

- Tip/tilt angle to 35 mrad, high optical deflection angle to 70 mrad (4°)
- Resonant frequencies to 0.7 kHz (1" mirror) for dynamic motion and fast step-and-settle
- Parallel-kinematic design: Two orthogonal tip/tilt axes with one common pivot point
- Strain sensors for high linearity
- Different versions available: Without mirror, ½" mirror, 1" mirror

#### Application fields

- Image processing / stabilization
- Optical trapping
- Laser scanning / beam steering with large deflection angle
- Laser tuning
- Optical filters / switches
- Optics
- Beam stabilization

#### 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.

#### 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-335.2SH	S-335.2SHM1	S-335.2SHM2
Active axes			θX, θY	θX, θY	θX, θY
Rotation range in θX	mrad		35	35	35
Rotation range in θY	mrad		35	35	35
Linearity error in θX, unidirectional	%	Typ.	0.05	0.05	0.05
Linearity error in θY, unidirectional	%	Typ.	0.05	0.05	0.05

Positioning	Unit	Tolerance	S-335.2SH	S-335.2SHM1	S-335.2SHM2
Bidirectional repeatability in $\theta_X$	$\mu\text{rad}$	Typ.	1	1	1
Bidirectional repeatability in $\theta_Y$	$\mu\text{rad}$	Typ.	1	1	1
Resolution in $\theta_X$ , open loop	$\mu\text{rad}$	Typ.	0.1	0.1	0.1
Resolution in $\theta_Y$ , open loop	$\mu\text{rad}$	Typ.	0.1	0.1	0.1
Integrated sensor			SGS, direct position measuring	SGS, direct position measuring	SGS, direct position measuring
System resolution in $\theta_X$	$\mu\text{rad}$		1	1	1
System resolution in $\theta_Y$	$\mu\text{rad}$		1	1	1

Drive Properties	Unit	Tolerance	S-335.2SH	S-335.2SHM1	S-335.2SHM2
Drive type			Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®
Electrical capacitance in $\theta_X$	$\mu\text{F}$	$\pm 20\%$	6.2	6.2	6.2
Electrical capacitance in $\theta_Y$	$\mu\text{F}$	$\pm 20\%$	6.2	6.2	6.2

Mechanical Properties	Unit	Tolerance	S-335.2SH	S-335.2SHM1	S-335.2SHM2
Resonant frequency in $\theta_X$ , unloaded	kHz	$\pm 20\%$	2		
Resonant frequency in $\theta_Y$ , under load with glass mirror ( $\varnothing$ 12.5 mm; thickness 3 mm)	kHz	$\pm 20\%$	1.6	1.6	
Resonant frequency in $\theta_Y$ , under load with glass mirror ( $\varnothing$ 25.4 mm; thickness 4 mm)	kHz	$\pm 20\%$	0.7		0.7
Resonant frequency in $\theta_Y$ , unloaded	kHz	$\pm 20\%$	2		
Resonant frequency in $\theta_Y$ , under load with glass mirror ( $\varnothing$ 12.5 mm; thickness 3 mm)	kHz	$\pm 20\%$	1.6	1.6	
Resonant frequency in $\theta_Y$ , under load with glass mirror ( $\varnothing$ 25.4 mm; thickness 4 mm)	kHz	$\pm 20\%$	0.7		0.7
Distance of pivot point to platform surface	mm	$\pm 0.25$ mm	3.3	3.3	3.3
Overall mass	g	$\pm 5\%$	320	325	330
Material			Platform and base body: titanium. Housing cover: aluminum.	Platform and base body: titanium. Housing cover: aluminum.	Platform and base body: titanium. Housing cover: aluminum.

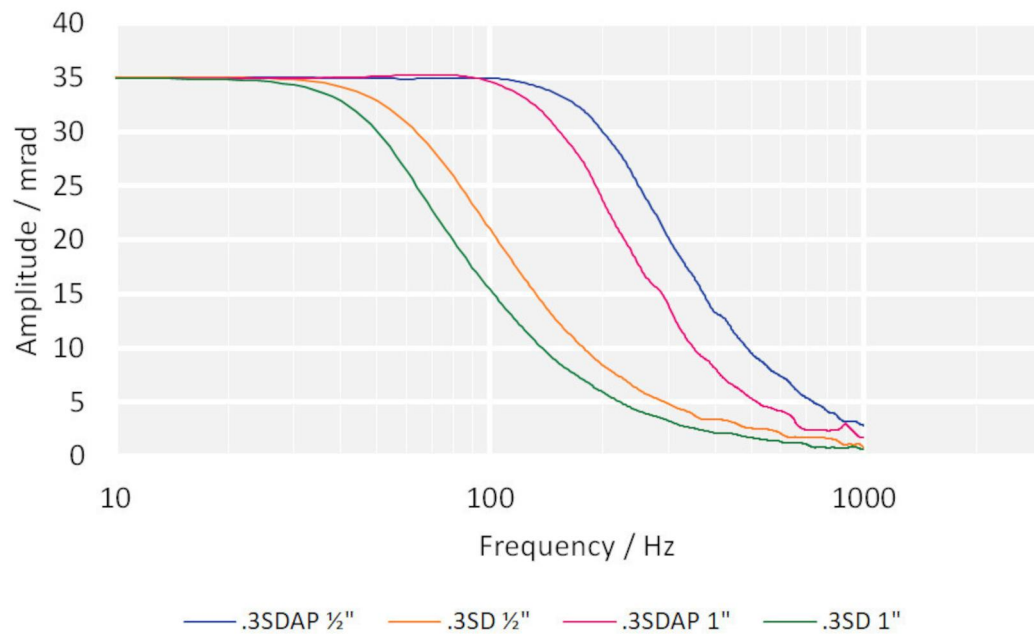
Miscellaneous	Unit	Tolerance	S-335.2SH	S-335.2SHM1	S-335.2SHM2
Operating temperature range	$^{\circ}\text{C}$		-20 to 80	-20 to 80	-20 to 80
Connector			D-sub 37-pin (m)	D-sub 37-pin (m)	D-sub 37-pin (m)
Cable length	m	+100 / -0 mm	2	2	2
Recommended controllers / drivers			E-727	E-727	E-727

S-335.2SH: Version without mirror  
S-335.2SHM1: Version with mirror  $\varnothing$  12.5 mm  
S-335.2SHM2: Version with mirror  $\varnothing$  25.4 mm

Rotation range in  $\theta_X$  /  $\theta_Y$ : Quasistatic motion at 0 to 120 V.

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.

## Drawings / Images



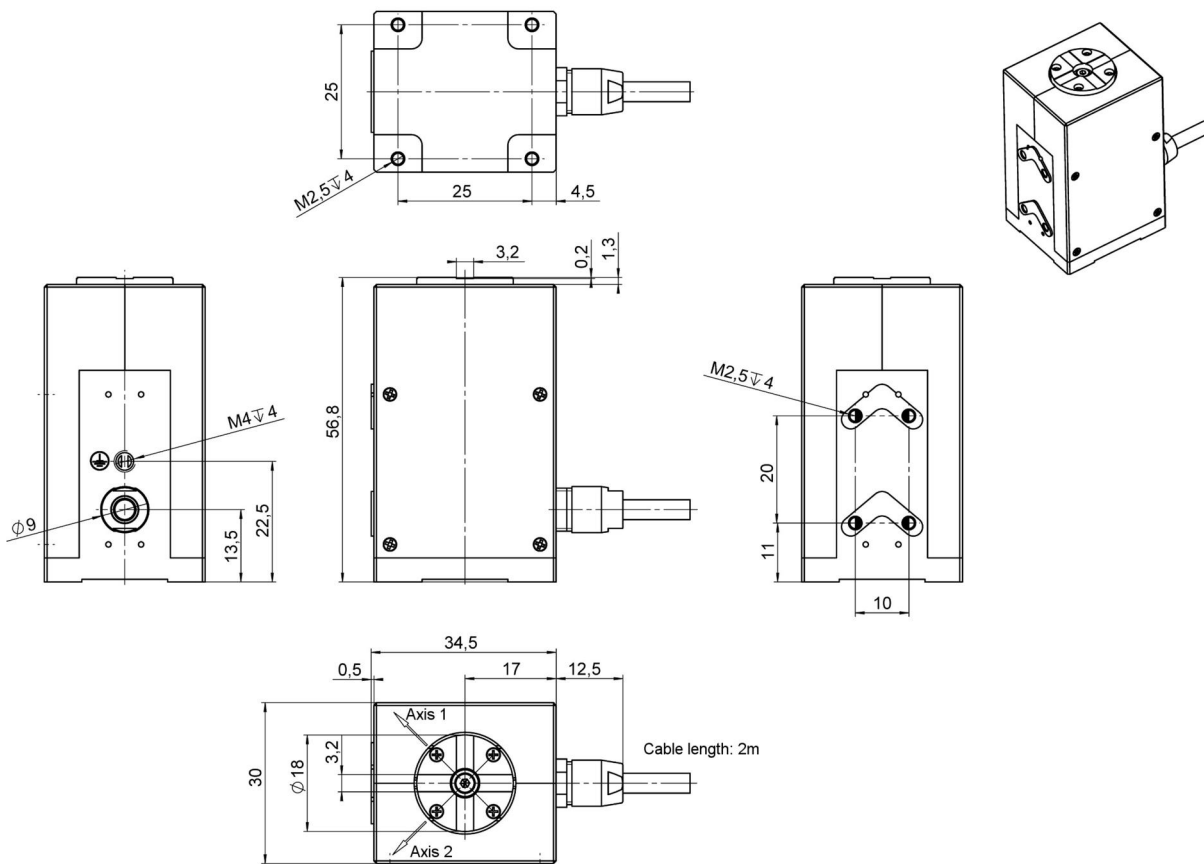
System frequency response with different E-727 controllers and mirror sizes.

The different performance of the E-727 controller variants and the different mirror masses (1/2" or 1" mirror) influence the dynamic properties of the system significantly.

E-727.3SD: 35 mrad, tuning optimized for 20 Hz.

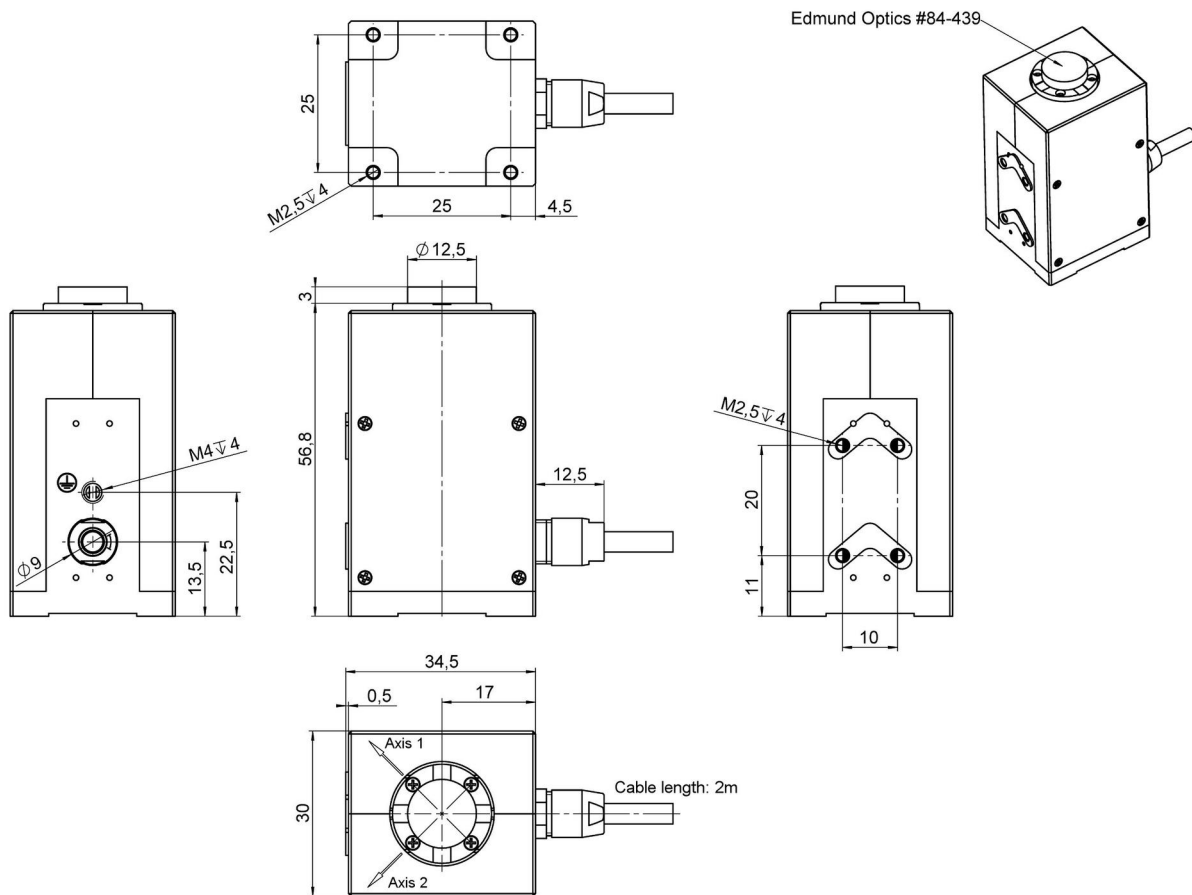
E-727.3SDAP: 35 mrad, tuning optimized for 100 Hz.

## Drawings / Images



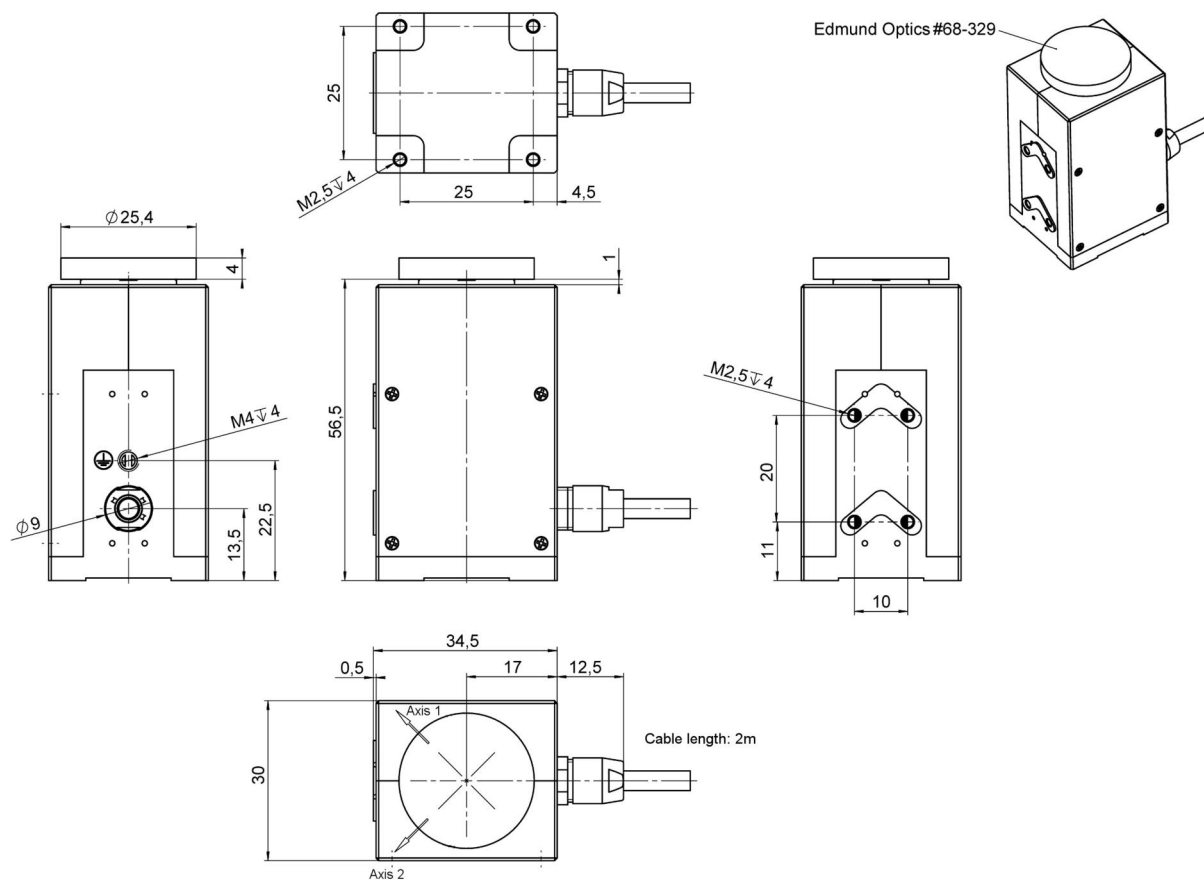
S-335.2SH, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point. The general tolerances as specified in DIN ISO 2768-f-H are valid for all dimensions without specified tolerances.

## Drawings / Images



S-335.2SHM1, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point. The general tolerances as specified in DIN ISO 2768-f-H are valid for all dimensions without specified tolerances.

## Drawings / Images



S-335.2SHM2, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point. The general tolerances as specified in DIN ISO 2768-f-H are valid for all dimensions without specified tolerances.

## Order Information

### S-335.2SH

High-dynamics piezo tip/tilt platform; 35 mrad × 35 mrad rotational angle ( $\theta_X \times \theta_Y$ ); SGS, direct position measuring; D-sub 37-pole (m); 2 m cable length

### S-335.2SHM1

High-dynamics piezo tip/tilt platform; 35 mrad × 35 mrad rotational angle ( $\theta_X \times \theta_Y$ ); SGS, direct position measuring; D-sub 37-pole (m); 2 m cable length; incl. mirror  $\varnothing$  12.5 mm

### S-335.2SHM2

High-dynamics piezo tip/tilt platform; 35 mrad × 35 mrad rotational angle ( $\theta_X \times \theta_Y$ ); SGS, direct position measuring; D-sub 37-pole (m); 2 m cable length; incl. mirror  $\varnothing$  25.4 mm