

## Miniature Piezo Hexapod for Dynamic Active Error Compensation

FINE ADJUSTMENT AND ACTIVE, DYNAMIC ERROR CORRECTION

### P-915KWEF



- + Very Stiff Design, 1kHz natural frequency, high dynamics
- + 6 axis system: XYZ and rotation ( $\theta_X$ ,  $\theta_Y$ ,  $\theta_Z$ )
- + Resolution 1nm linear / 0.07 $\mu$ rad rotary  
Positioning range up to 70 $\mu$ m
- + Direct sensing capacitance sensors for closed-loop operation
- + Space-saving, parallel-kinematics design for integration
- + Wear-free piezo drives, operate in strong magnetic fields / high vacuum

This miniature hexapod was designed for dynamic error correction in all degrees of freedom. It can be added or integrated into long travel positioning systems to improve motion accuracy limited by guiding errors or external forces, such as those found in machining processes.

Due to its very stiff design with piezo direct drives and capacitance direct metrology feedback, it is capable of delivering repeatable motion with the identical dynamics and accuracy in all linear and rotary axes and with its sophisticated vector controller can run high-precision trajectories with the very high dynamics.

#### Highly dynamic reference- class 6- axis positioning system

Parallel- kinematic design for six degrees of freedom making it significantly more compact and stiff than serial-kinematic systems, higher dynamic range, no moved cables: Higher reliability, reduced friction. Piezo actuator direct drives with high stiffness and resonant frequency for dynamic positioning. A powerful real-time digital controller controls the drive axes.

#### Capacitive position sensors

Direct, absolute position measurement with subnanometer accuracy and a high bandwidth and stability.

#### Applications

Dynamic optimization of axial runout, eccentricity and evenness of rotation stages. Vibration insulation, fine adjustment.

## Specifications

Preliminary Data	P-915KWEF	Unit
Active axes	X, Y, Z, $\theta_x$ , $\theta_y$ , $\theta_z$	200 N
<b>Motion and positioning</b>		
Travel range* X, Y, Z	$\pm 35$	$\mu\text{m}$
Travel range* $\theta_x$ , $\theta_y$ , $\theta_z$	$\pm 0.04$	$^\circ$
Min. incremental motion X, Y, Z	1	nm
Min. incremental motion $\theta_x$ , $\theta_y$ , $\theta_z$	0.07	$\mu\text{rad}$
Repeatability X, Y	$\pm 1$	nm
Repeatability Z	$\pm 0.2$	nm
Repeatability $\theta_x$ , $\theta_y$	$\pm 0.03$	$\mu\text{rad}$
Repeatability $\theta_z$	$\pm 0.05$	$\mu\text{rad}$
Resonant frequency X, Y	900	Hz
Resonant frequency X, Y, Z	1300	Hz
Resonant frequency $\theta_x$ , $\theta_y$	1500	Hz
Resonant frequency $\theta_z$	1700	Hz
<b>Mechanical properties</b>		
Max. load	2.5	kg
<b>Miscellaneous</b>		
Material	Aluminum	
Dimensions	Base plate $\varnothing$ 135 Moving platform $\varnothing$ 100 Clear aperture $\varnothing$ 50 Hexapod height in home position 50	mm
Mass	1.6	kg

Ask about custom designs!

Technical data specified at  $20 \pm 3^\circ\text{C}$ .

\* The travel ranges of the individual coordinates (X, Y, Z,  $\theta_x$ ,  $\theta_y$ ,  $\theta_z$ ) are interdependent. The data for each axis in this table shows its maximum travel, where all other axes are at their zero positions. If the other linear or rotational coordinates are not zero, the available travel may be less.

## Order Information

### P-915KWEF

Piezo Hexapod for Active and Dynamic Correction of Angular Errors of Rotation Stages

## Technology

[Piezo Actuators | Piezoelectric actuators offer sub- nanometer resolution and very short response times, making them ideally suitable for nanometer- precision positioning at high dynamics. Learn more ...](#)

[Hexapods – Parallel- Kinematics Positioning Systems | Hexapod platforms are used for precision positioning and alignment of loads in all six degrees of freedom, three linear axes, and three rotational axes. Learn more ...](#)