6-Axis-Parallel Kinematic Positioning Systems

HXP50 Hexapods

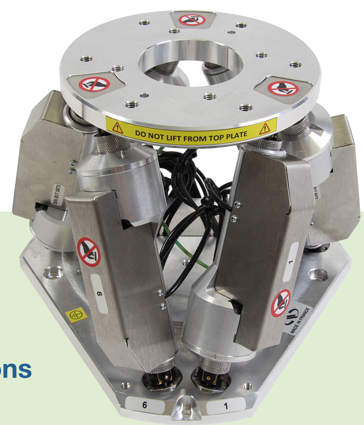
mks | Newport™

The HXP50 hexapod is a parallel kinematic motion device that provides six degrees of freedom: X, Y, Z, pitch, roll, and yaw. Hexapods are effective solutions for complex motion applications that demand high load capacity and accuracy in up to six independent axes. Newport's Hexapods are not only affordable but extremely easy to use.

The HXP50 is driven by six DC servo motor driven actuators with encoder feedback at the leadscrew nut, providing precise MIM, low backlash and fast speed. To enhance the stiffness of the hexapod, our engineers came up with innovative spherical joints that are not only simple but compact and rigid.

To further ensure positioning performance, the High Accuracy (HA) HXP50HA-MECA is available with guaranteed accuracy values. This enables the use of a Newport Hexapod in positioning applications, where position accuracy is required. In addition to accuracy along an axis, the Pitch and Yaw deviations during axial motion are also monitored and guaranteed. When the HA Hexapod is used with Rightpath™, this combination achieves positioning performance close to standard Newport stages.

The HXP50-ELEC-D and HXP50HA-ELEC-D controllers accurately masters the synchronized transformations from Cartesian input coordinates to the motion of the Hexapod legs. In addition, the HXP50-ELEC-D and HXP50HA-ELEC-D provide advanced features including instrument grade I/O's, hardware based input triggers, event triggers, high-speed on-the-fly data acquisition, fast TCP/IP communication, and integrated TCL programming language for on-board processes. All these features improve accuracy and throughput, making the programmer's life much easier.

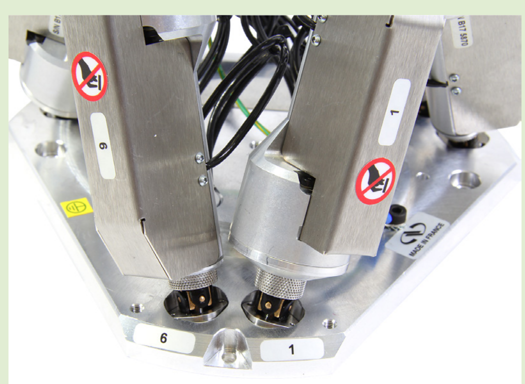


Features

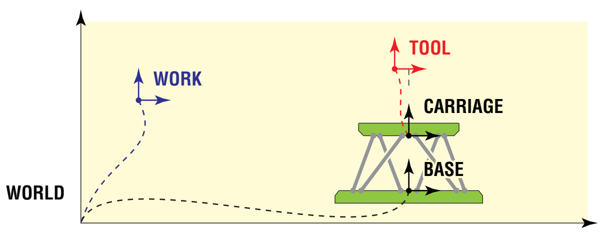
- Integrated 6-axis positioner
- Light, compact and low-profile
- No moving cables
- High stiffness (particular in z)
- No accumulation of motion errors
- Virtual center of rotation, set by software
- RightPath™ trajectory control

Applications

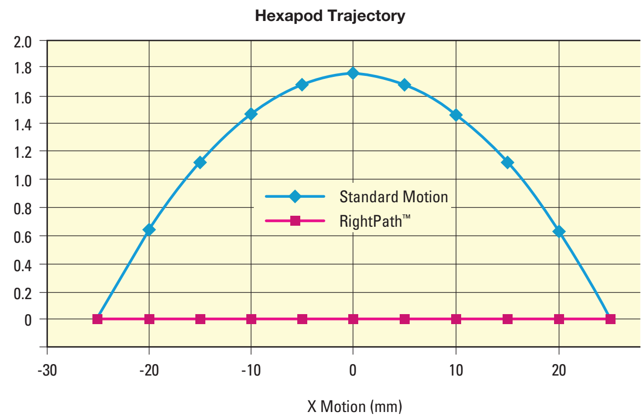
- Optics and satellite assembly and testing
- Alignment (camera to sensor, waveguides)
- Biotechnology, surgery
- X-Ray diffraction
- Micromachining, micro-manipulation



What distinguishes of the HXP50, as with the other Newport hexapods, is the ability to program two pivot points represented by the Tool and Work coordinate systems. The Tool CS moves with the top plate and the Work is stationary. Imagine a machine tool where one can adjust the orientation of both the cutting tool and workpiece or in photonics, the optical beam and the sample. Incremental displacements are possible in either one in user-friendly Cartesian coordinates, and positions can be easily switched from one system to the other by a function call or by numerical input in the HXP's web site interface. These powerful functions are a completely new way of mastering Hexapod motions without the need for complex external coordinate transformations.



Absolute moves and positions are defined in the work coordinate system. Incremental moves can be done in the tool or in the work coordinate systems.



RightPath™ Trajectory Control enables minimal runout in linear and arc trajectories.

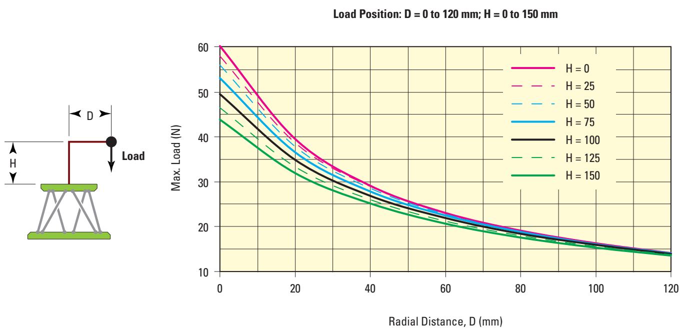
Specifications

	HXP50-MECA	HXP50HA-MECA	HXP50V6-MECA
Travel Range X, Y, Z [1]	±17, ±15, ±7 mm	±17, ±15, ±7 mm	±17, ±15, ±7 mm
Travel Range ΘX, ΘY,ΘZ	±9, ±8.5, ±18°	±9, ±8.5, ±18°	±9, ±8.5, ±18°
Minimum Incremental Motion X, Y, Z [2]	0.10, 0.10, 0.05 µm	0.10, 0.10, 0.05 µm	0.2, 0.2, 0.1 µm
Minimum Incremental Motion ΘX, ΘY, ΘZ	0.05, 0.05, 0.10 mdeg	0.05, 0.05, 0.10 mdeg	0.1, 0.1, 0.2 mdeg
Uni-directional Repeatability X, Y, Z, Typical	±0.10, ±0.10, ±0.05 µm	±0.10, ±0.10, ±0.05 µm	±0.20, ±0.20, ±0.20 µm
Uni-directional Repeatability X, Y, Z, Guaranteed	–	±0.15, ±0.15, ±0.075 µm	–
Uni-directional Repeatability ΘX, ΘY, ΘZ, Typical	±0.05, ±0.05, ±0.10 mdeg	±0.05, ±0.05, ±0.10 mdeg	±0.40, ±0.40, ±0.20 mdeg
Accuracy XYZ, Guaranteed	–	±5.0, ±5.0, ±2.5 µm	–
Maximum Speed X, Y, Z	14, 12, 5 mm/s	14, 12, 5 mm/s	2, 1.9, 0.8 mm/s
Maximum Speed ΘX, ΘY, ΘZ	6, 6, 15 °/s	6, 6, 15 °/s	2.4, 2.4, 6 °/s
Rigidity X, Y, Z [3]	2, 2, 25 N/µm	2, 2, 25 N/µm	2, 2, 25 N/µm
Pitch X, Y, Z, Guaranteed	–	±50, ±50, ±25 µrad	–
Yaw X, Y, Z, Guaranteed	–	±50, ±50, ±25 µrad	–
Centered Load Capacity (4)	50 N	50 N	50 N
Cable Length	3 m	3 m	1.5 m
Motor	DC Servo	DC Servo	Stepper motor
Weight	2.2 kg	2.2 kg	2.2 kg

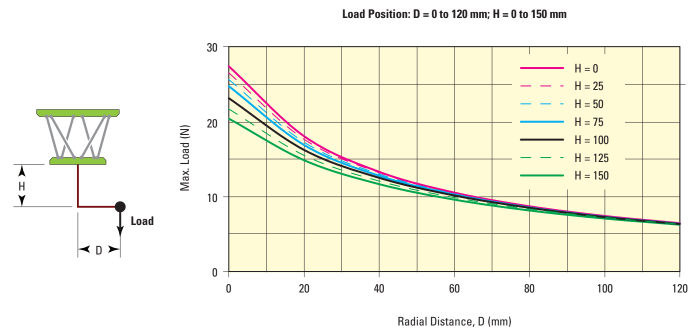
1) Travel ranges are interdependent. The listed values aremax. travels per axis when all other axis are in their centered position.
2) Open loop values shown.
3) Stiffness depends on Hexapod position. Values are given for all axis in their centered position.
4) For Value shown for horizontal base plate. See graphs for maximum payload height and cantilever distance on next page

Max. Cantilever Distance of the Load

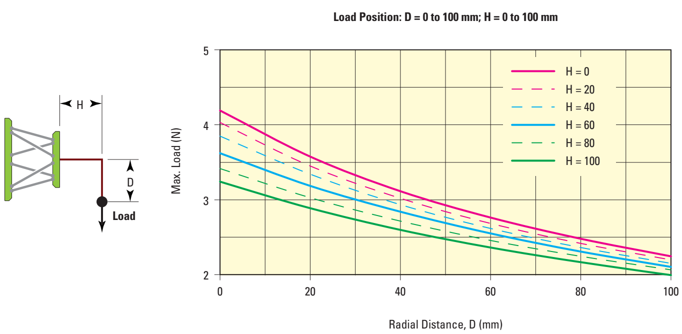
Horizontal Base Plate



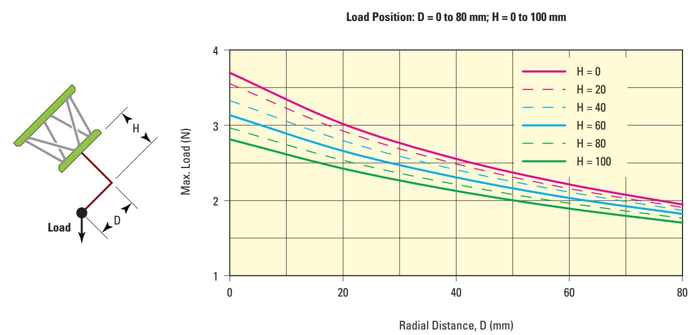
Base Plate Upside-Down



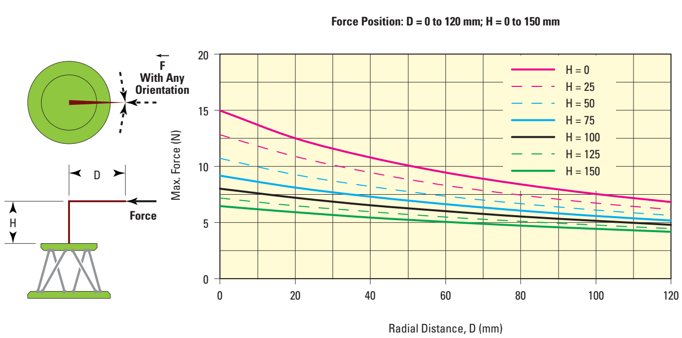
Vertical Base Plate

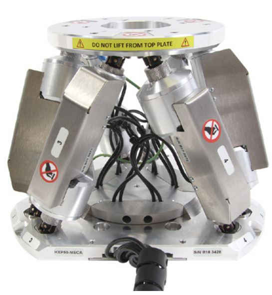


Base Plate of Position

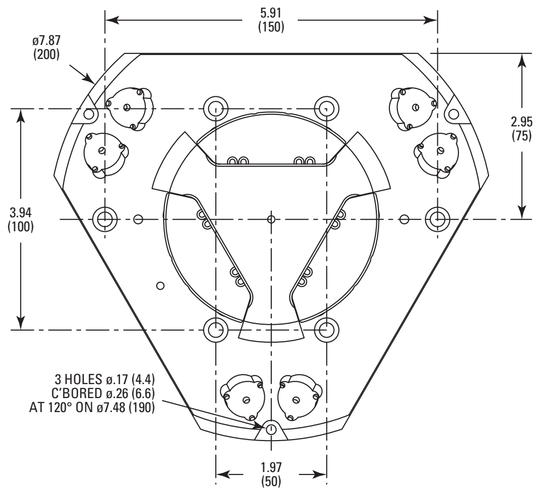


Horizontal Base Plate
Lateral Force

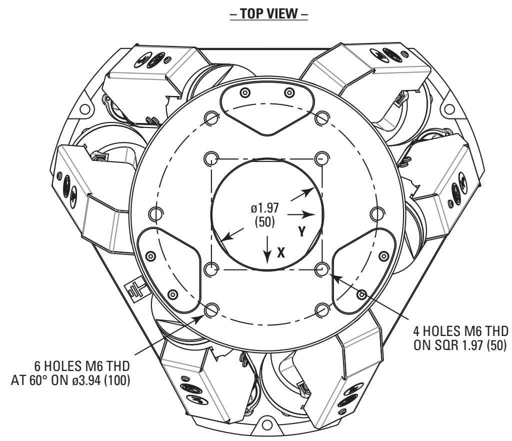


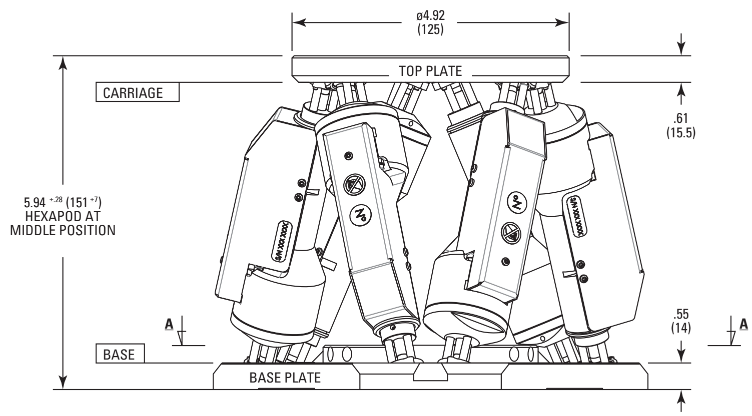


Dimensional Drawings



DIMENSIONS IN INCHES (AND MILLIMETERS)





Note: Other top plate hole patterns or a center aperture are available upon request.

Ordering Information

Model	Description
HXP50-MECA	Hexapod, 50 N load capacity
HXP50-ELEC-D (1)	Hexapod controller for HXP50-MECA
HXP50HA-MECA	Hexapod with guaranteed specifications, 50 N load capacity
HXP50HA-ELEC-D (1)	Hexapod controller for HXP50HA-MECA

1) Contact Newport for the two additional SingleAxis drive capability

Note: Call Newport for quotes on the 10-6 hPa vacuum version.

www.newport.com

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