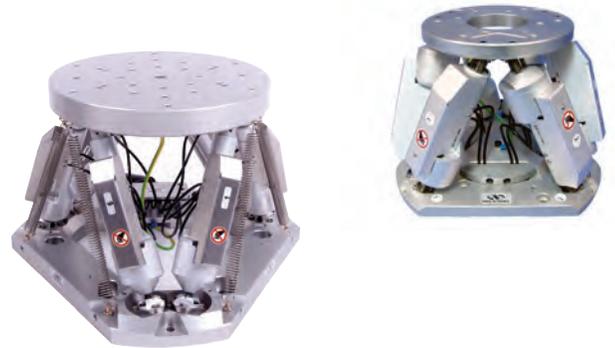# HXP Hexapods

6-Axis-Parallel Kinematic Positioning Systems

*Precision Motion—**Guaranteed**™*

Newport®

Experience | Solutions

6 DOF MOTION POSITIONERS

- Compact, integrated 6-axis positioner
- Light but with high stiffness (particularly in z)
- No moving cables
- No accumulation of motion errors
- Two virtual centers of rotation, set by software
- 50 to 4500 N centered load capacity
- Vacuum (10^{-6} hPa) and high accuracy versions available

Introduction

A hexapod is a parallel kinematic motion device that provides six degrees of freedom: X, Y, Z, pitch, roll, and yaw. Hexapods are creative and effective solutions to complex motion applications that require high load capacity and accuracy in up to six independent axes.

Newport hexapods are driven by six industry proven, high performance actuators that leverage over 55 years of Newport expertise in actuators. The actuator's quality clearly has a strong impact on the overall motion performance of a hexapod, and of equal importance are the 12 joints connecting the actuators to both the base plate and the moving top plate. Embracing this challenge, our engineers came up with innovative joint designs that provide significantly higher rigidity than ordinary universal joints. The result is a hexapod that is more rigid with a higher load capacity compared to other, similarly-sized hexapods.

Newport hexapods are high performance motion devices, very affordable and extremely easy to use.

Hexapod versus Stack of Stages
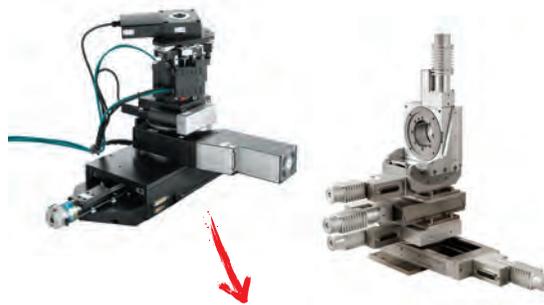
|	
Integrated 6-axis positioner	Configurable to the exact needs
Light, **compact** and low-profile	Longer travel ranges possible
No moving cables	Versatile and re-configurable
High performance tip/tilt	Superior linear motion
High stiffness (particular in z)	Manual positioning possible (depending on stage type)
No accumulation of motion errors	Superior performance per axis
Virtual centers of rotation, set by software	Superior trajectory accuracy (in particular for Cartesian motion)
Cost effective for 4 to 6 degrees of freedom with emphasis on rotation	Cost effective for 1 to 4 degrees of freedom

Hexapod Applications

Newport hexapods are widely used solutions to a comprehensive range of applications that require high precision motion in 4 or more degrees of freedom. Hexapods are traditionally used for adjustments. The introduction of High Accuracy (HA) hexapod versions enable their use in accurate positioning, where the final position must be known and exact.
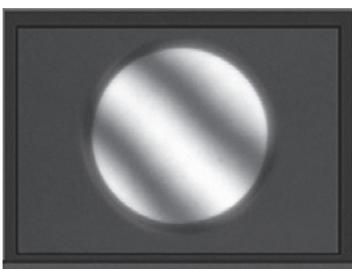
Interferometry

Generally, interferometry is a family of techniques in which waves, usually electromagnetic, are superimposed in order to extract information. Interferometry can illustrate the flatness of optical surfaces to a very high resolution. Newport offers an extensive range of hexapod sizes that enable high precision interferometry. Our motion experts can also custom engineer a hexapod to meet your specifications, even for optics larger than 1.5 m in diameter.
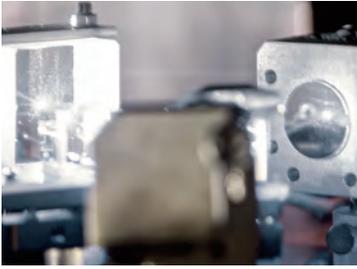
Mirror or Optic Positioning

Optical assemblies often require strict alignment and holding position tolerance of sensitive optical elements to accurately direct beams. Hexapods offer the advantage of high precision and repeatable motion in six degrees of freedom. In conjunction with feedback systems, hexapod-based optical systems will meet even the highest requirements.

Vacuum Applications

Remote positioning of a component inside a vacuum chamber is typically accomplished with a motion system. For particular applications that require more than 4 axis of motion, Newport offers standard, off-the-shelf vacuum compatible hexapods (up to 10^{-6} Torr) to meet this demand.
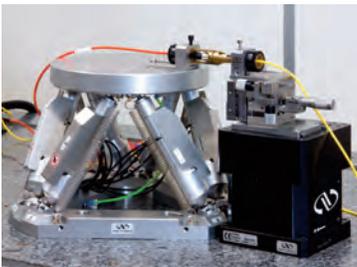
Optical Fiber or Device Alignment

For alignment of optical fibers or optical devices (single or multi-mode, single to multi-channel, Si photonics) it is critical that motion is controlled not just in X, Y, and Z but also in tip and tilt. When coupled with alignment software such as APOGEE, the solution becomes a turnkey automated alignment system.
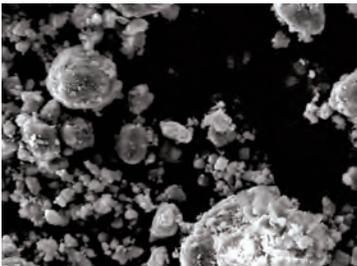
Imaging and Microscopy

Optical and electron imaging/microscopy involve the diffraction, reflection, or refraction of light/electron beams interacting with the specimen. The scattered radiation or electrons are measured and used in the construction of an image. When imaging small complex structures, Newport hexapods offer a competitive advantage with high precision, six degree of freedom and motion control in a compact solution.

Diffractometers

Newport's expertise in the design of advanced diffractometry solutions for synchrotrons is second to none. Sample position at beam ends can best be solved with hexapods. These solutions serve fundamental and applied research in areas such as life health sciences, physics and materials sciences.
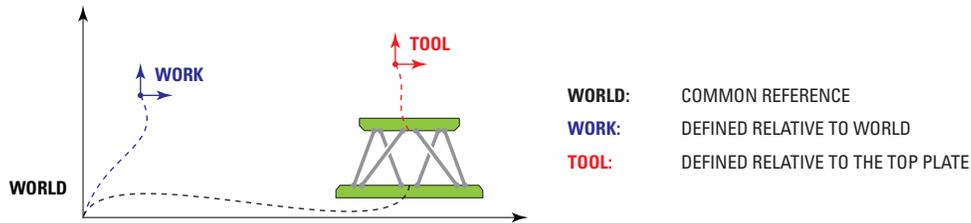
Other Applications Include

Astronomy, Wafer Positioning, Simulation, Automated Manufacturing, etc.

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Differentiators – The Newport Hexapod Advantage

Work and Tool Coordinate Systems

Hexapod motion is defined by a global coordinate system and a local coordinate system, making programming motion more intuitive for standard research, metrology and manufacturing applications. By defining motion in two coordinate systems, global Work and local Tool, users get the added benefit of having two, reprogrammable virtual centers of rotation.

WORLD:	COMMON REFERENCE
WORK:	DEFINED RELATIVE TO WORLD
TOOL:	DEFINED RELATIVE TO THE TOP PLATE

Translation Along Tool
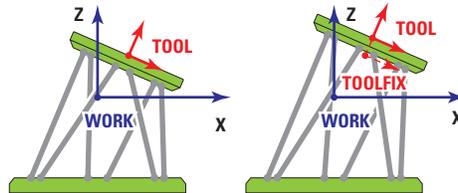
Rotation Around Tool
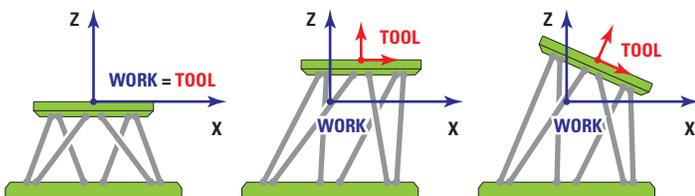
Rotation Around Work

RightPath™ Trajectory Control

In parallel kinematic devices, motion is synchronized on the hexapod legs; all legs start and stop at the same time and always complete the same part of the trajectory. As a result, the motion does not necessarily translate into a straight trajectory in the World coordinate system. For small motion the effect is negligible, but for larger motion it could become noticeable.

REAL MOTION IN
WORLD COORDINATES

IDEAL, STRAIGHT MOTION
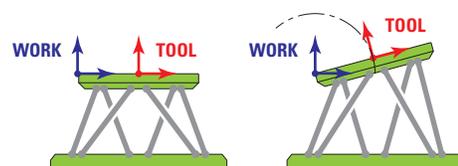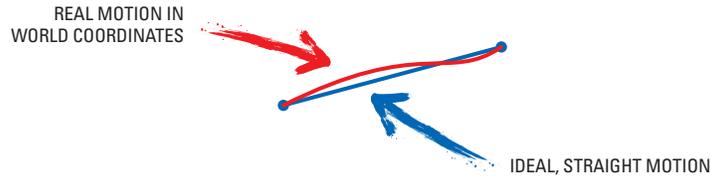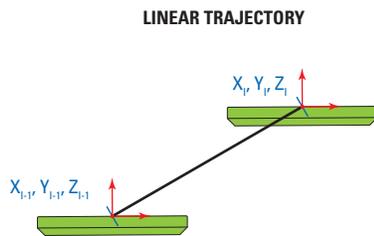
Newport engineers devised a solution to minimize the runout of hexapods through RightPath™ Trajectory Control. This firmware feature is unique to Newport hexapods and enables scanning motion along three types of trajectory functions - line, arc or rotation - in either Work or Tool.

LINEAR TRAJECTORY

X_i, Y_i, Z_i

$X_{i-1}, Y_{i-1}, Z_{i-1}$

THE LINE TRAJECTORY IS A TRAJECTORY
DEFINED BY A STRAIGHT LINE SEGMENT.

ARC TRAJECTORY

R

α
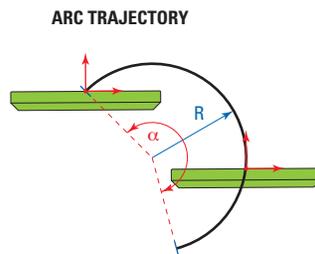
THE ARC TRAJECTORY IS A TRAJECTORY
DEFINED BY A CURVE SEGMENT.

ROTATION

TOOL

WORK
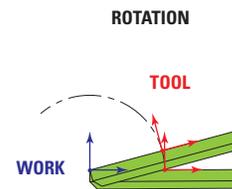
THE ROTATION TRAJECTORY IS A TRAJECTORY
DEFINED BY A ROTATION AROUND X, Y OR Z AXIS.

These trajectory functions facilitate motion with:

- Minimal runout (deviation from the trajectory) during the move

- Continuous multi-dimensional motion path

- Constant velocity along the trajectory path

- Equal trajectory acceleration at start and end of move: acceleration = deceleration

- Calculations are performed before motion so there is no lag time

RIGHTPATH™ TRAJECTORY IMPROVES RUNOUT BY OVER A FACTOR OF 10

Z MOTION (mm) vs X MOTION (mm)

- STANDARD MOTION
- RIGHTPATH™
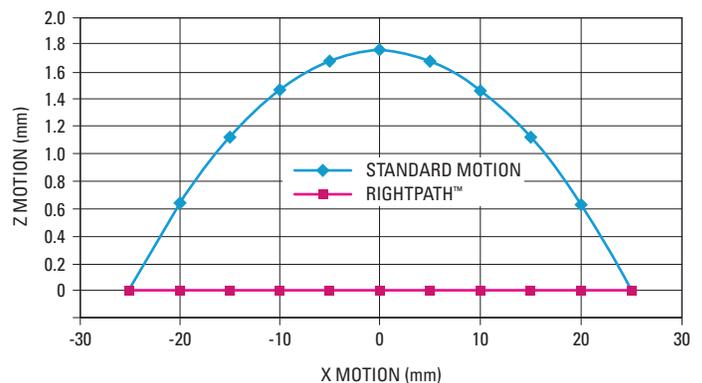
HXP Hexapod Simulator

This simulator provides an easy-to-use tool to check if any of the Newport hexapods is suitable for your application, in terms of travel range and load capacity.

- Select the hexapod from the data base

- Check the travel range

  – Configure the coordinate systems

  – Display the hexapod (realistic view) and frames

  – Display the travel range: Axis by axis, 2D views or XYZ 3D view

- Check the load capacity

  – Apply loads, forces or torque

  – Search worst case position

  – Verify if actuators are overloaded

- Save configuration

HXP Orientation, Coordinate System Adjustments, Motion Simulation

Workspace Limits
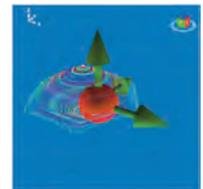
Loading: Loads, Forces, Torque

Guaranteed Accuracy and Repeatability

Newport engineers developed a patent pending process to deliver Newport hexapods with guaranteed translation accuracy and repeatability.

Newport's actuators are based on fifty five years of experience in design, manufacturing and testing. The combination of these industry proven actuators with a new patent pending process results in hexapods with 10x improved accuracy and repeatability - **guaranteed**. Metrology reports are included at no additional cost.

Guaranteed accuracy and guaranteed repeatability translation specifications give customers a cutting edge advantage at a time when good needs to be better.

Available High Accuracy Model Numbers

- HXP50HA-MECA

- HXP100PHA-MECA

- HXP100HA-MECA

GUARANTEED SPECIFICATIONS

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Hexapod Selection Guide

KEY FEATURES

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

Standard Versions

		HXP50-MECA	HXP50HA-MECA	HXP100-MECA	HXP100HA-MECA
Size	H [in. (mm)]	5.94 (151)	5.94 (151)	8.23 (209)	8.23 (209)
	Ø [in. (mm)]	7.87 (200)	7.87 (200)	11.81 (300)	11.81 (300)
Mass	[lb (kg)]	5.9 (2.7)	5.9 (2.7)	12.3 (5.6)	12.3 (5.6)
Travel Range	X, Y, Z (mm)	±17, ±15, ±7	±17, ±15, ±7	±27.5, ±25, ±14	±27.5, ±25, ±14
	U, V, W (°)	±9, ±8.5, ±18	±9, ±8.5, ±18	±11.5, ±10.5, ±19	±11.5, ±10.5, ±19
MIM *	X, Y, Z (µm)	0.1, 0.1, 0.05	0.1, 0.1, 0.05	0.5, 0.5, 0.25	0.5, 0.5, 0.25
	U, V, W (mdeg)	0.05, 0.05, 0.1	0.05, 0.05, 0.1	0.25, 0.25, 0.5	0.25, 0.25, 0.5
Uni-Dir. Repeatability	X, Y, Z (µm)	±0.1, ±0.1, ±0.05	±0.15, ±0.15, ±0.075	±0.25, ±0.25, ±0.125	±0.25, ±0.25, ±0.125
	U, V, W (mdeg)	±0.05, ±0.05, ±0.1	±0.05, ±0.05, ±0.1	±0.125, ±0.125, ±0.25	±0.125, ±0.125, ±0.25
Max. Velocity	X, Y, Z (mm/s)	14, 12, 5	14, 12, 5	2.5, 2, 1	2.5, 2, 1
	U, V, W (°/s)	6, 6, 15	6, 6, 15	1.8, 1.7, 3	1.8, 1.7, 3
Stiffness	X, Y, Z (N/µm)	2, 2, 25	2, 2, 25	5, 5, 40	5, 5, 40
Max. Load [1]	(N)	50	50	200	200
Cable length	(m)	3	3	3	3

* Minimum incremental motion.

[1] Horizontal base plate.

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The hexapods are driven by six actuators with encoder feedback, providing precise MIM, low backlash and fast speed. To enhance the stiffness of the hexapod, our engineers came up with innovative joints that are not only simple but also compact and rigid. Another unique feature of Newport hexapods are the programmable pivot points, Work and Tool, allowing easy manipulation of the sample (Work) relative to a laser source or detector (Tool). There is no need to power down the controller or recalculate transformations.

To further ensure positioning performance, some High Accuracy (HA) versions are available with guaranteed accuracy values. This enables the use of a Newport hexapod in applications where position accuracy is required. In addition to accuracy along an axis, the pitch and yaw deviations during axial motion are also

guaranteed. Combining an HA hexapod with RightPath™ will result in a positioning performance that is close to standard Newport stages.

The HXP-ELEC controllers accurately master the synchronized transformations from Cartesian input coordinates to the motion of the hexapod legs. In addition, the controllers 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.

The HXP-ELEC can also drive two Newport stages independently, if longer travel is required. Contact Newport for this feature.

HXP100P-MECA	HXP100PHA-MECA	HXP200-MECA	HXP200S-MECA	HXP1000-MECA
8.23 (209)	8.23 (209)	12.17 (309)	11.81 (300)	15.56 (395)
11.81 (300)	11.81 (300)	13.19 (335)	19.09 (485)	21.65 (550)
12.3 (5.6)	12.3 (5.6)	34.2 (15.5)	55.1 (25)	55.1 (25)
±27.5, ±25, ±14	±27.5, ±25, ±14	±59, ±54, ±25	±40, ±45, ±27	+93/-62, ±69, ±39.5
±11.5, ±10.5, ±19	±11.5, ±10.5, ±19	±15, ±14.5, ±30	±9, ±8, ±15	±11, ±10, ±19.5
0.1, 0.1, 0.05	0.1, 0.1, 0.05	0.2, 0.2, 0.1	0.15, 0.15, 0.15	0.3, 0.3, 16
0.05, 0.05, 0.1	0.05, 0.05, 0.1	0.1, 0.1, 0.2	0.1, 0.1, 0.1	0.06, 0.06, 0.1
±0.1, ±0.1, ±0.05	±0.15, ±0.15, ±0.075	±0.125, ±0.125, ±0.1	±0.1, ±0.1, ±0.1	±0.15, ±0.15, ±0.08
±0.05, ±0.05, ±0.1	±0.05, ±0.05, ±0.1	±0.1, ±0.1, ±0.125	±0.1, ±0.1, ±0.1	±0.03, ±0.03, ±0.015
12, 10, 5	12, 10, 5	81, 70, 26	47, 54, 29	9, 9, 4
8, 8, 16	8, 8, 16	16, 15, 41	10, 9.3, 16.5	1.4, 1.4, 2.8
3, 3, 24	3, 3, 24	3, 3, 40	6, 6, 30	10, 10, 100
60	60	500	850	4500
3	3	5	5	3

Vacuum Versions

		HXP50V6-MECA	HXP100V6-MECA
Size	H [in. (mm)]	5.94 (151)	8.23 (209)
	Ø [in. (mm)]	7.87 (200)	11.81 (300)
Mass	[lb (kg)]	5.9 (2.7)	12.3 (5.6)
Travel Range	X,Y, Z (mm)	±17, ±15, ±7	±27.5, ±25, ±14
	U, V, W (°)	±9, ±8.5, ±18	±11.5, ±10.5, ±19
MIM *	X, Y, Z (µm)	0.2, 0.2, 0.1	1, 1, 0.5
	U, V, W (mdeg)	0.1, 0.1, 0.2	0.5, 0.5, 1
Uni-Dir. Repeatability	X, Y, Z (µm)	±0.2, ±0.2, ±0.1	±0.5, ±0.5, ±0.25 µm
Repeatability	U, V, W (mdeg)	±0.4, ±0.4, ±0.2	0.25, 0.25, 0.5
Max. Velocity	X, Y, Z (mm/s)	2, 1.9, 0.8	0.5, 0.5, 0.25
	U, V, W (°/s)	2.4, 2.4, 6	0.2, 0.2, 0.4
Stiffness	X, Y, Z (N/µm)	2, 2, 25	2, 2, 25
Max. Load [1]	(N)	50	200
Cable length	(m)	3	3

* Minimum incremental motion.

[1] Horizontal base plate.

Newport Hexapod Features

Easy Code Development

The **HXP-ELEC** controllers drive Newport hexapods and offer several features that facilitate rapid user testing and code development.

- The firmware of Newport hexapods features two programmable coordinate systems: **Tool and Work**. Tool is a local reference system defined relative to Work, a fixed reference. Tool and Work are the **two virtual pivot points** users can easily redefine in code or in the GUI. Controller restart is not required.

- **RightPath Trajectory Control** easily defines three types of trajectories, linear, arc and rotary motions with minimal run out, constant velocity along the motion path and equal acceleration and deceleration.

- The controller has an extensive number of **preconfigured APIs** to command motion, gather data, or interface with other devices.

- The Terminal window of HXP GUI allows selecting API's from a drop down menu and converting the command history into a TCL script by simply clicking on the **TCL Generator** button.

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Additional Controller Features

- Fast Ethernet communication

- Multi-user capability

- Data gathering

- Sockets for parallel processes

- 30 TTL inputs and outputs

- 4 analog inputs and outputs

- Automatic script execution upon boot up

- Rack mountable

- HXP+2-- Drive 2 axis in addition to the hexapod (optional)

- Manual Joystick (optional)

Additional 2 axis slots for long travel stages, load/unload for example.
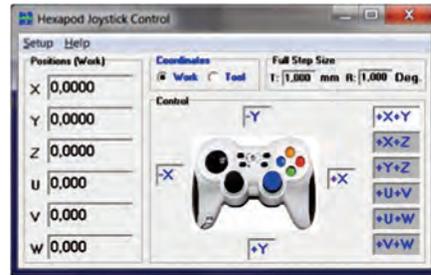
HXP-JOYSTICK
Joystick Control Software

www.newport.com/Motion-Control
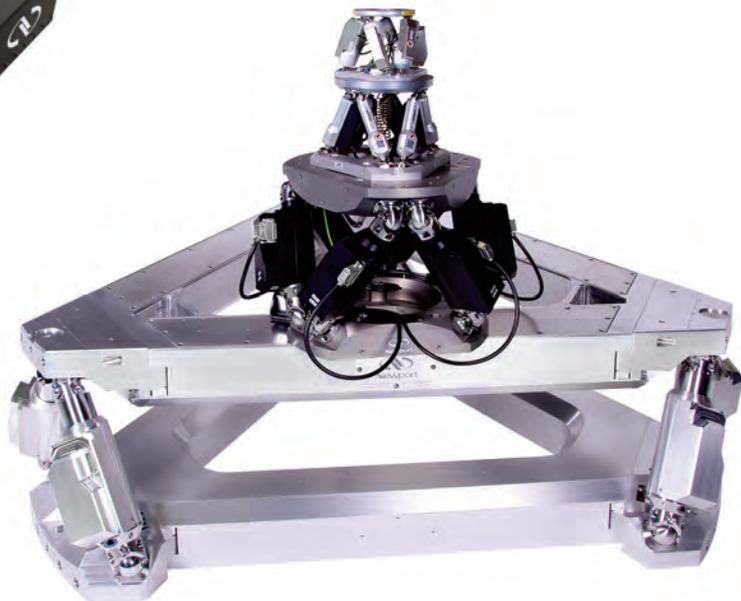
HXP50 HEXAPODS

Additional Applications

- Alignment (fiber, camera to sensor, waveguides)
- X-Ray diffraction

Specifications

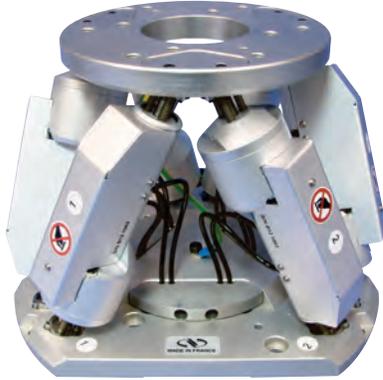|	HXP50-MECA						HXP50V6-MECA					
	X	Y	Z	U (Rx)	V (Ry)	W (Rz)	X	Y	Z	U (Rx)	V (Ry)	W (Rz)
Travel range [1]	±17 mm	±15 mm	±7 mm	±9°	±8.5°	±18°	±17 mm	±15 mm	±7 mm	±9°	±8.5°	±18°
MIM * [6]	0.1 µm	0.1 µm	0.05 µm	0.05 mdeg	0.05 mdeg	0.1 mdeg	0.2 µm (0.8 µm)	0.2 µm (0.8 µm)	0.1 µm (0.4 µm)	0.1 mdeg (0.4 mdeg)	0.1 mdeg (0.4 mdeg)	0.2 mdeg (0.4 mdeg)
Uni-directional repeatability, typical	±0.1 µm	±0.1 µm	±0.05 µm	±0.05 mdeg	±0.05 mdeg	±0.1 mdeg	±0.2 µm	±0.2 µm	±0.1 µm	±0.4 mdeg	±0.4 mdeg	±0.2 mdeg
Bi-directional repeatability, typical [2]	±0.6 µm (±0.2 µm)	±0.6 µm (±0.2 µm)	±0.3 µm (±0.1 µm)	±0.3 mdeg (±0.1 mdeg)	±0.3 mdeg (±0.1 mdeg)	±0.6 mdeg (±0.2 mdeg)	±1 µm	±1 µm	±0.5 µm	±0.5 mdeg	±0.5 mdeg	±1 mdeg
Max. speed	14 mm/s	12 mm/s	5 mm/s	6 °/s	6 °/s	15 °/s	2 mm/s	1.9 mm/s	0.8 mm/s	2.4 °/s	2.4 °/s	6 °/s
Stiffness [3]	2 N/µm	2 N/µm	25 N/µm	–	–	–	2 N/µm	2 N/µm	25 N/µm	–	–	–
Centered load capacity [4]						50 N						

* Minimum incremental motion. Same values for HA versions.

[1] Travel ranges are interdependent. The listed values are max. travels per axis when all other axis are in their centered position. Same values for HA versions.

[2] With standard setting (with hysteresis compensation).

[3] Stiffness depends on hexapod position. Values are given for all axis in their centered position.

[4] For allowable cantilevered loads, see "Max. Cantilever Distance of the Load" below.

[5] Vacuum version to 10^{-6} hPa.

[6] Values in Open-loop and (Closed-loop).

Guaranteed Specifications (High Accuracy)

	HXP50HA-MECA		
	X	Y	Z
Uni-directional repeatability	±0.15 µm	±0.15 µm	±0.075 µm
Bi-directional repeatability	±1.5 µm	±1.5 µm	±1.25 µm
Absolute Accuracy	±5 µm	±5 µm	±2.5 µm
Pitch	±50 µrad	±50 µrad	±25 µrad
Yaw	±50 µrad	±50 µrad	±25 µrad

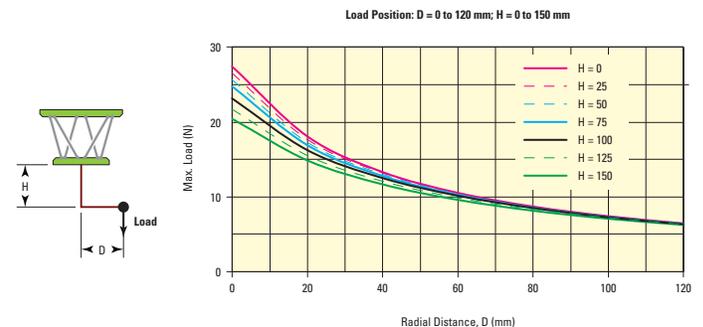**GUARANTEED SPECIFICATIONS**

Note: Travel range, MIM, max speed, stiffness and load capacity are the same as the standard HXP's.

Max. Cantilever Distance of the Load

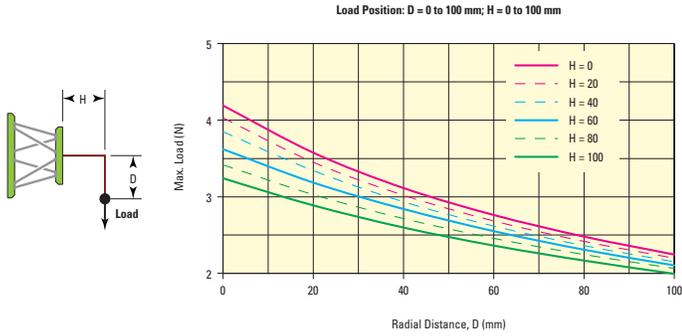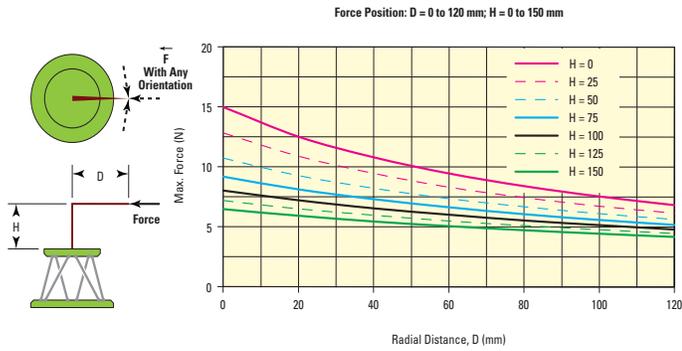### Horizontal Base Plate

Load Position: D = 0 to 120 mm; H = 0 to 150 mm

Base Plate Upside-Down

Load Position: D = 0 to 120 mm; H = 0 to 150 mm

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Vertical Base Plate

Load Position: D = 0 to 100 mm; H = 0 to 100 mm

Legend:
- H = 0
- H = 20
- H = 40
- H = 60
- H = 80
- H = 100

Axes: Max. Load (N) vs Radial Distance, D (mm)

Base Plate at Any Position

Load Position: D = 0 to 80 mm; H = 0 to 100 mm

Legend:
- H = 0
- H = 20
- H = 40
- H = 60
- H = 80
- H = 100

Axes: Max. Load (N) vs Radial Distance, D (mm)

Horizontal Base Plate, Lateral Force

Force Position: D = 0 to 120 mm; H = 0 to 150 mm

Legend:
- H = 0
- H = 25
- H = 50
- H = 75
- H = 100
- H = 125
- H = 150

Axes: Max. Force (N) vs Radial Distance, D (mm)

Dimensions

ø4.92 (125)

ø7.87 (200)
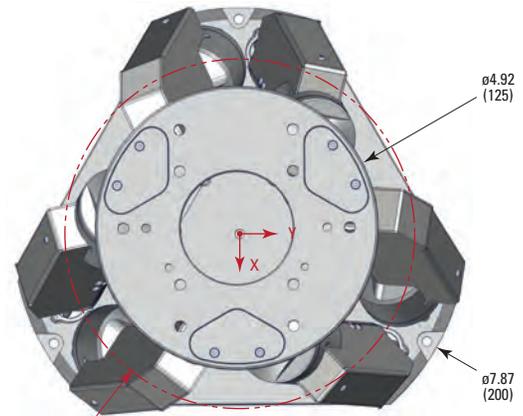
CARRIAGE RANGE FOR XY RANGE OF ±.59 (±15) ø6.10 (155)

MODEL SHOWN: HXP50-MECA
DIMENSIONS IN INCHES (AND MILLIMETERS)

$5.94^{\pm.28}$ ($151^{\pm7}$)
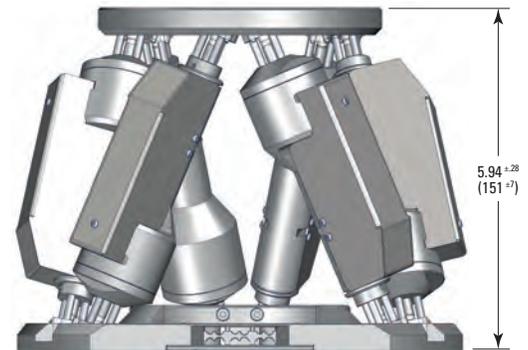
Ordering Information

Model	Description
HXP50-MECA	Hexapod, 50 N load capacity
HXP50-ELEC [1]	Hexapod controller for HXP50-MECA
HXP50HA-MECA	Hexapod with guaranteed specifications, 50 N load capacity
HXP50HA-ELEC [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.

WEB For **CAD** files, visit
www.newport.com

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HXP100 HEXAPODS

Additional Applications

- AED simulation
- Astronomy
- X-Ray diffraction

Specifications

	HXP100-MECA						HXP100V6-MECA [4]					
	X	Y	Z	U (Rx)	V (Ry)	W (Rz)	X	Y	Z	U (Rx)	V (Ry)	W (Rz)
Travel range [1]	±27.5 mm	±25 mm	±14 mm	±11.5°	±10.5°	±19°	±27.5 mm	±25 mm	±14 mm	±11.5°	±10.5°	±19°
MIM *	0.5 µm	0.5 µm	0.25 µm	0.25 mdeg	0.25 mdeg	0.5 mdeg	1 µm	1 µm	0.5 µm	0.5 mdeg	0.5 mdeg	1 mdeg
Uni-directional repeatability, typical	±0.25 µm	±0.25 µm	±0.125 µm	±0.125 mdeg	±0.125 mdeg	±0.25 mdeg	±0.5 µm	±0.5 µm	±0.25 µm	±0.25 mdeg	±0.25 mdeg	±0.5 mdeg
Bi-directional repeatability, typical [2]	±2 µm (±0.5 µm)	±2 µm (±0.5 µm)	±1 µm (±0.25 µm)	±1 mdeg (±0.25 mdeg)	±1 mdeg (±0.25 mdeg)	±2 mdeg (±0.2 mdeg)	±2.5 µm (±0.075 µm)	±2.5 µm (±0.075 µm)	±1.5 µm (±0.5 µm)	±1.25 mdeg (±0.5 mdeg)	±1.25 mdeg (±0.5 mdeg)	±2.5 mdeg (±0.5 mdeg)
Max. speed	2.5 mm/s	2 mm/s	1 mm/s	1.8 °/s	1.7 °/s	3 °/s	0.5 mm/s	0.5 mm/s	0.25 mm/s	0.2 °/s	0.2 °/s	0.4 °/s
Stiffness	5 N/µm	5 N/µm	40 N/µm	–	–	–	2 N/µm	2 N/µm	25 N/µm	–	–	–
Centered load capacity [3]						200 N						

	HXP100P-MECA					
	X	Y	Z	U (Rx)	V (Ry)	W (Rz)
Travel range [1]	±27.5 mm	±25 mm	±14 mm	±11.5°	±10.5°	±19°
MIM *	0.1 µm	0.1 µm	0.05 µm	0.05 mdeg	0.05 mdeg	0.1 mdeg
Uni-directional repeatability, typical	±0.1 µm	±0.1 µm	±0.05 µm	±0.05 mdeg	±0.05 mdeg	±0.1 mdeg
Bi-directional repeatability, typical [2]	±0.25 µm	±0.25 µm	±0.125 µm	±0.125 mdeg	±0.125 mdeg	±0.25 mdeg
Max. speed	12 mm/s	10 mm/s	5 mm/s	8 °/s	8 °/s	16 °/s
Stiffness	3 N/µm	3 N/µm	24 N/µm	–	–	–
Centered load capacity [3]			60 N			

* Minimum incremental motion. Same values for HA versions.

1) Travel ranges are interdependent. The listed values are max. travels per axis when all other axis are in their centered position. Same values for HA versions.

2) With standard compensation (with hysteresis compensation).

3) For allowable cantilevered loads, see "Max. Cantilever Distance of the Load" next page.

4) Vacuum version to 10⁻⁶ hPa.

HXP100P-MECA hexapod.

Guaranteed Specifications (High Accuracy)

	HXP100HA-MECA			HXP100PHA-MECA		
	X	Y	Z	X	Y	Z
Uni-directional repeatability	±0.25 µm	±0.25 µm	±0.125 µm	±0.15 µm	±0.15 µm	±0.075 µm
Bi-directional repeatability	±3 µm	±3 µm	±2 µm	±0.5 µm	±0.5 µm	±0.25 µm
Absolute Accuracy	±10 µm	±10 µm	±5 µm	±5 µm	±5 µm	±2.5 µm
Pitch	±75 µrad	±75 µrad	±75 µrad	±37.5 µrad	±37.5 µrad	±37.5 µrad
Yaw	±75 µrad	±75 µrad	±75 µrad	±37 µrad	±37 µrad	±37 µrad

Note: *Travel range, MIM, max speed, stiffness and load capacity are the same as the standard HXP's.*

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Max. Cantilever Distance of the Load

HXP100 Horizontal Base Plate

Load Position: D = 0 to 140 mm; H = 0 to 200 mm

HXP100P Horizontal Base Plate

Load Position: D = 0 to 140 mm; H = 0 to 200 mm

Dimensions

CARRIAGE RANGE FOR
XY RANGE OF ±.98 (±25)
ø9.84 (250)

ø7.87
(200)

ø11.81
(300)
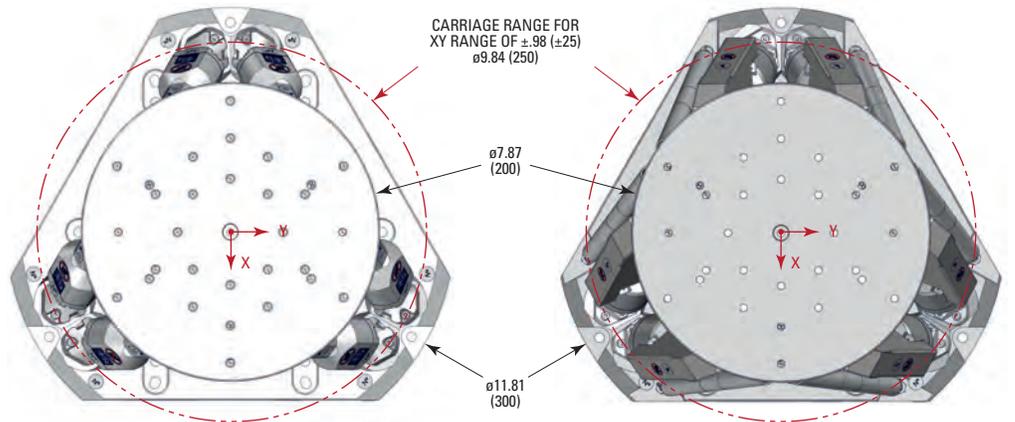
MODEL SHOWN: HXP100-MECA & HXP100HA-MECA
DIMENSIONS IN INCHES (AND MILLIMETERS)

MODEL SHOWN: HXP100P-MECA & HXP100PHA-MECA
DIMENSIONS IN INCHES (AND MILLIMETERS)

8.23 ±.55
(209 ±14)

For CAD files, visit
www.newport.com
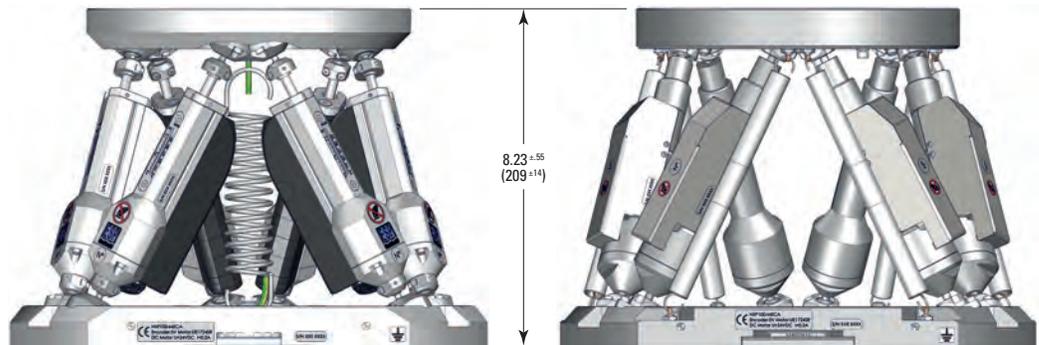
Ordering Information

Model	Description
HXP100-MECA	Hexapod, 200 N load capacity
HXP100-ELEC [1]	Hexapod controller for HXP100-MECA
HXP100P-MECA	Hexapod Precision, 60 N load capacity
HXP100P-ELEC [1]	Hexapod controller for HXP100P-MECA

Model	Description
HXP100HA-MECA	Hexapod with guaranteed specifications, 200 N load capacity
HXP100HA-ELEC [1]	Hexapod controller for HXP100HA-MECA
HXP100PHA-MECA	Hexapod Precision with guaranteed specifications, 60 N load capacity
HXP100PHA-ELEC [1]	Hexapod controller for HXP100PHA-MECA

[1] *Contact Newport for the two additional SingleAxis drive capability.*

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

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HXP200 HEXAPODS

Additional Applications

- Telescope M2 mirror holders
- Piece holder for automotive industry
- Alignment and bonding
- Material analysis
- Sensor calibration and simulation

Specifications

	HXP200-MECA						HXP200S-MECA					
	X	Y	Z	U (Rx)	V (Ry)	W (Rz)	X	Y	Z	U (Rx)	V (Ry)	W (Rz)
Travel range [1]	±59 mm	±54 mm	±25 mm	±15°	±14.5°	±30°	±40 mm	±45 mm	±27 mm	±9°	±8°	±15°
MIM *	0.2 µm	0.2 µm	0.1 µm	0.1 mdeg	0.1 mdeg	0.2 mdeg	0.15 µm	0.15 µm	0.15 µm	0.1 mdeg	0.1 mdeg	0.1 mdeg
Uni-dir. repeat., typical	±0.125 µm	±0.125 µm	±0.1 µm	±0.1 mdeg	±0.1 mdeg	±0.125 mdeg	±0.1 µm	±0.1 µm	±0.1 µm	±0.1 mdeg	±0.1 mdeg	±0.1 mdeg
Max. speed	81 mm/s	70 mm/s	26 mm/s	16 °/s	15 °/s	41 °/s	47 mm/s	54 mm/s	29 mm/s	10 °/s	9.3 °/s	16.5 °/s
Stiffness [2]	3 N/µm	3 N/µm	40 N/µm	–	–	–	6 N/µm	6 N/µm	30 N/µm	–	–	–
Centered load capacity [3]	500 N						850 N					

*   Minimum incremental motion.

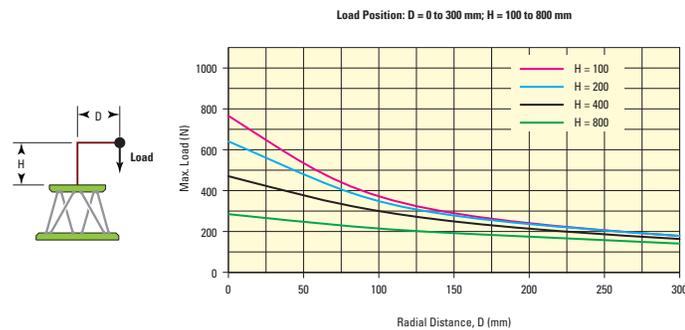[1]   Travel ranges are interdependent. The listed values are max. travels per axis when all other axis are in their centered position (Height = 309 mm for Z).

[2]   Stiffness depends on hexapod position. Values are given for all axis in their centred position.
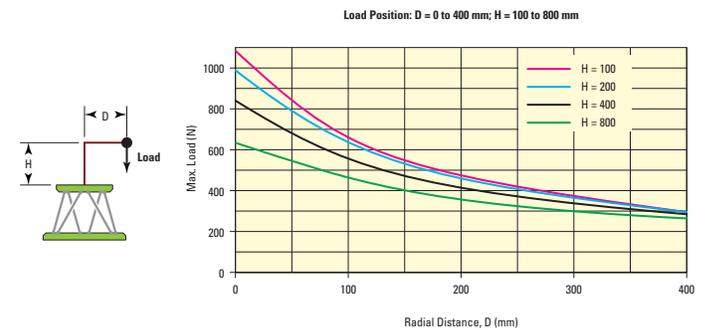
[3]   For allowable cantilevered loads, see "Max. Cantilever Distance of the Load" below.

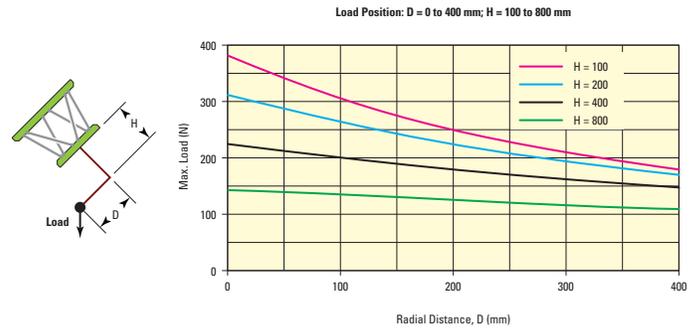## Max. Cantilever Distance of the Load

HXP200 Horizontal Base Plate

Load Position: D = 0 to 300 mm; H = 100 to 800 mm

HXP200S Horizontal Base Plate

Load Position: D = 0 to 400 mm; H = 100 to 800 mm

HXP200 Base Plate at Any Position

Load Position: D = 0 to 300 mm; H = 100 to 800 mm

HXP200S Base Plate at Any Position

Load Position: D = 0 to 400 mm; H = 100 to 800 mm

Dimensions

For **CAD** files, visit
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ø13.19
(335)

ø8.46
(215)

CARRIAGE RANGE FOR
XY RANGE OF ±2.13 (±54)
ø12.72 (323)
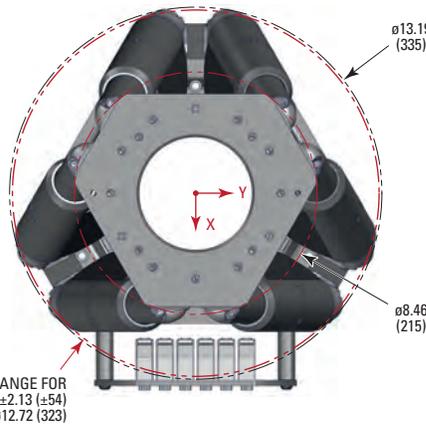
MODEL SHOWN: HXP200-MECA
DIMENSIONS IN INCHES (AND MILLIMETERS)

ø15.94
(405)

CARRIAGE RANGE FOR
XY RANGE OF ±1.57 (±40)
ø19.09 (485)
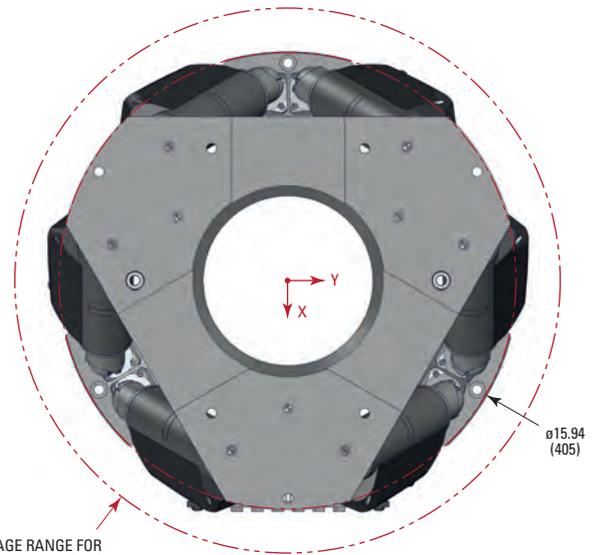
MODEL SHOWN: HXP200S-MECA
DIMENSIONS IN INCHES (AND MILLIMETERS)

12.17 ±.98
(309 ±25)

11.81 ±1.06
(300 ±27)
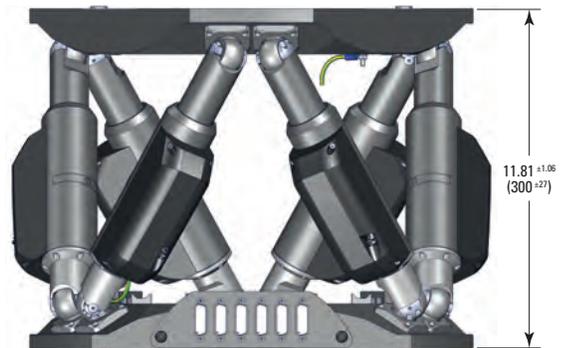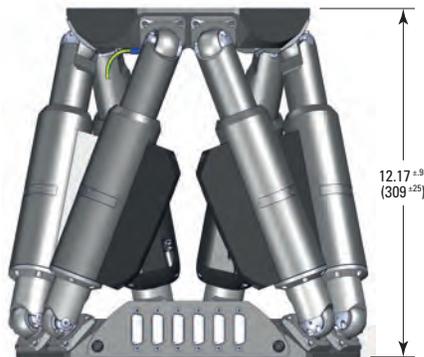
Ordering Information

Model	Description
HXP200-MECA	Hexapod, 500 N load capacity
HXP200-ELEC [1]	Hexapod controller for HXP200-MECA

1) *Contact Newport for the two additional SingleAxis drive capability.*

Model	Description
HXP200S-MECA	Hexapod, 850 N load capacity
HXP200S-ELEC [1]	Hexapod controller for HXP200S-MECA

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HXP1000 HEXAPOD

Additional Applications

- Alignment and bonding
- Material analysis
- Sensor calibration and simulation

Specifications

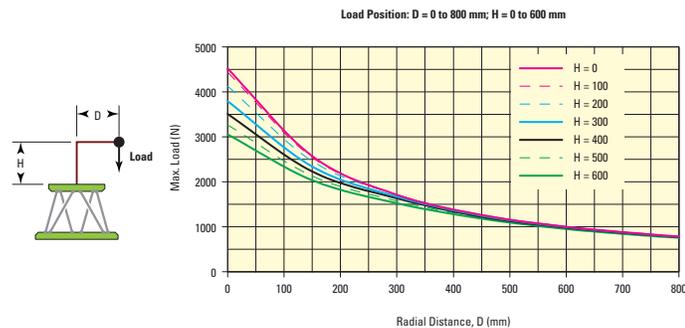|	X	Y	Z	U (Rx)	V (Ry)	W (Rz)
Travel range [1]	-62; +93 mm	±69 mm	±39.5 mm	±11°	±10°	±19.5°
MIM *	0.3 µm	0.3 µm	0.16 µm	0.06 mdeg	0.06 mdeg	0.1 mdeg
Uni-directional repeatability, typical	±0.15 µm	±0.15 µm	±0.08 µm	±0.03 mdeg	±0.03 mdeg	±0.05 mdeg
Max. speed	9 mm/s	9 mm/s	4 mm/s	1.4 °/s	1.4 °/s	2.8 °/s
Stiffness [2]	10 N/µm	10 N/µm	100 N/µm	–	–	–
Centered load capacity [3]	4500 N					

* *Minimum incremental motion.*

[1] *Travel ranges are interdependent. The listed values are max. travels per axis when all other axis are in their centered position (Height = 395 mm for Z).*

[2] *Stiffness depends on hexapod position. Values are given for all axis in their centred position.*
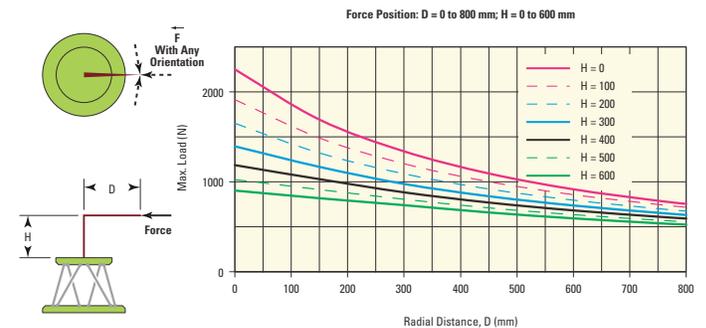
[3] *For allowable cantilevered loads, see "Max. Cantilever Distance of the Load" below.*

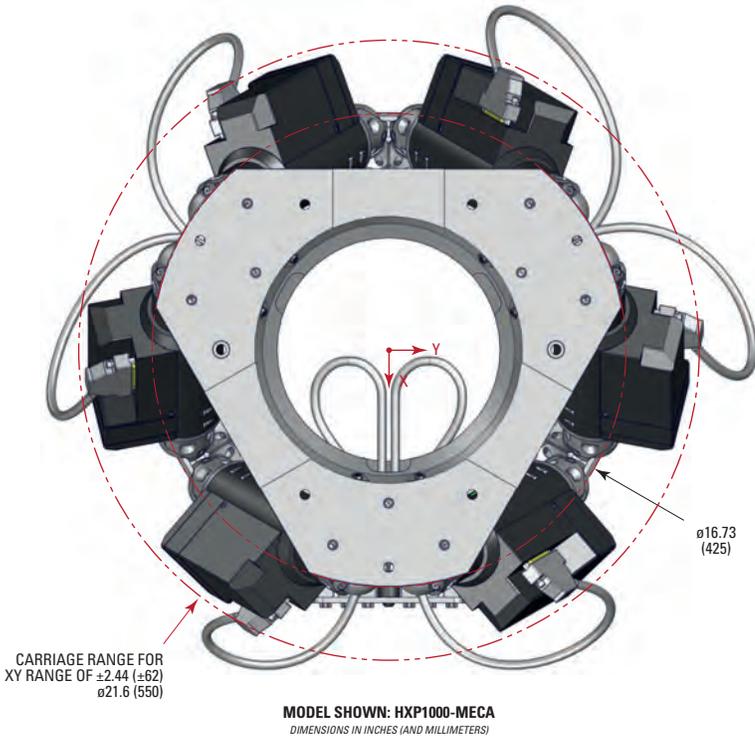## Max. Cantilever Distance of the Load

Horizontal Base Plate

Load Position: D = 0 to 800 mm; H = 0 to 600 mm

Horizontal Base Plate, Lateral Force

Force Position: D = 0 to 800 mm; H = 0 to 600 mm

Vertical Base Plate

Load Position: D = 0 to 800 mm; H = 0 to 600 mm

Legend
H = 0
H = 100
H = 200
H = 300
H = 400
H = 500
H = 600

Max. Load (N) vs. Radial Distance, D (mm)

Base Plate at Any Position

Load Position: D = 0 to 800 mm; H = 0 to 600 mm

Legend
H = 0
H = 100
H = 200
H = 300
H = 400
H = 500
H = 600

Max. Load (N) vs. Radial Distance, D (mm)

Dimensions

ø16.73
(425)

CARRIAGE RANGE FOR
XY RANGE OF ±2.44 (±62)
ø21.6 (550)

MODEL SHOWN: HXP1000-MECA
DIMENSIONS IN INCHES (AND MILLIMETERS)

15.55 ±1.55
(395 ±39.5)

For CAD files, visit
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Ordering Information

Model	Description
HXP1000-MECA	Hexapod, 4500 N load capacity
HXP1000-ELEC [1]	Hexapod controller for HXP1000-MECA

[1] *Contact Newport for the two additional SingleAxis drive capability.*

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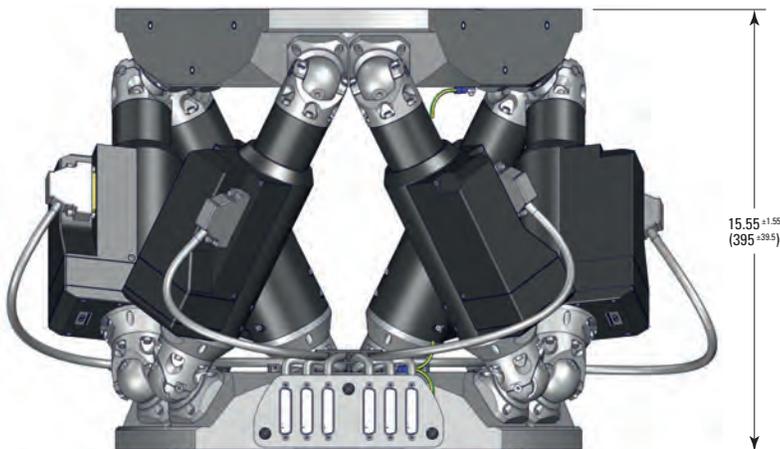
THE NEWPORT HEXAPODS
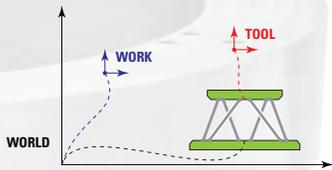
Programmable Work and Tool

Newport hexapods allow you to program up to two virtual pivot points without calculating system transformations or powering down the controller. The two virtual pivot points are the origins of two definable coordinates systems: Tool, which moves with the top plate, and Work, which is a stationary reference.

RightPath™ Trajectory Control

RightPath™ Trajectory Control is a Newport firmware feature that enables scanning motion along a defined trajectory, line, arc or rotation, with minimal runout and at a constant, definable speed.

Guaranteed Accuracy and Repeatability

Newport has developed a patent-pending process to deliver hexapods with guaranteed translation accuracy and repeatability. A metrology report is included with every hexapod.

HXP Hexapod Simulator

The hexapod simulator software is an easy-to-use tool to which Newport hexapod is the best match for your specific application.

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