



(<https://www.alioindustries.com/>)



# Parallel Kinematics Motion Systems

## Hybrid Hexapod®

ALIO brings a revolutionary new approach to 6D motion. ALIO Hybrid Hexapod® Systems introduce increased rigidity to the linkages and maintain sub-micron positioning which together provides the most precise positioning possible.

Forward & Inverse Kinematics: Calculating where you are and your destination allows ALIO to calculate a smooth path to the target position. Example: your mirror will travel along an arced path towards your destination instead of “dancing at various angles” in an approach to the target location.

## Unmatched precision, performance, and quality for 5 or 6 axis motion

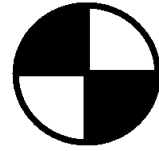
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THE MINI HYBRID HEXAPOD®

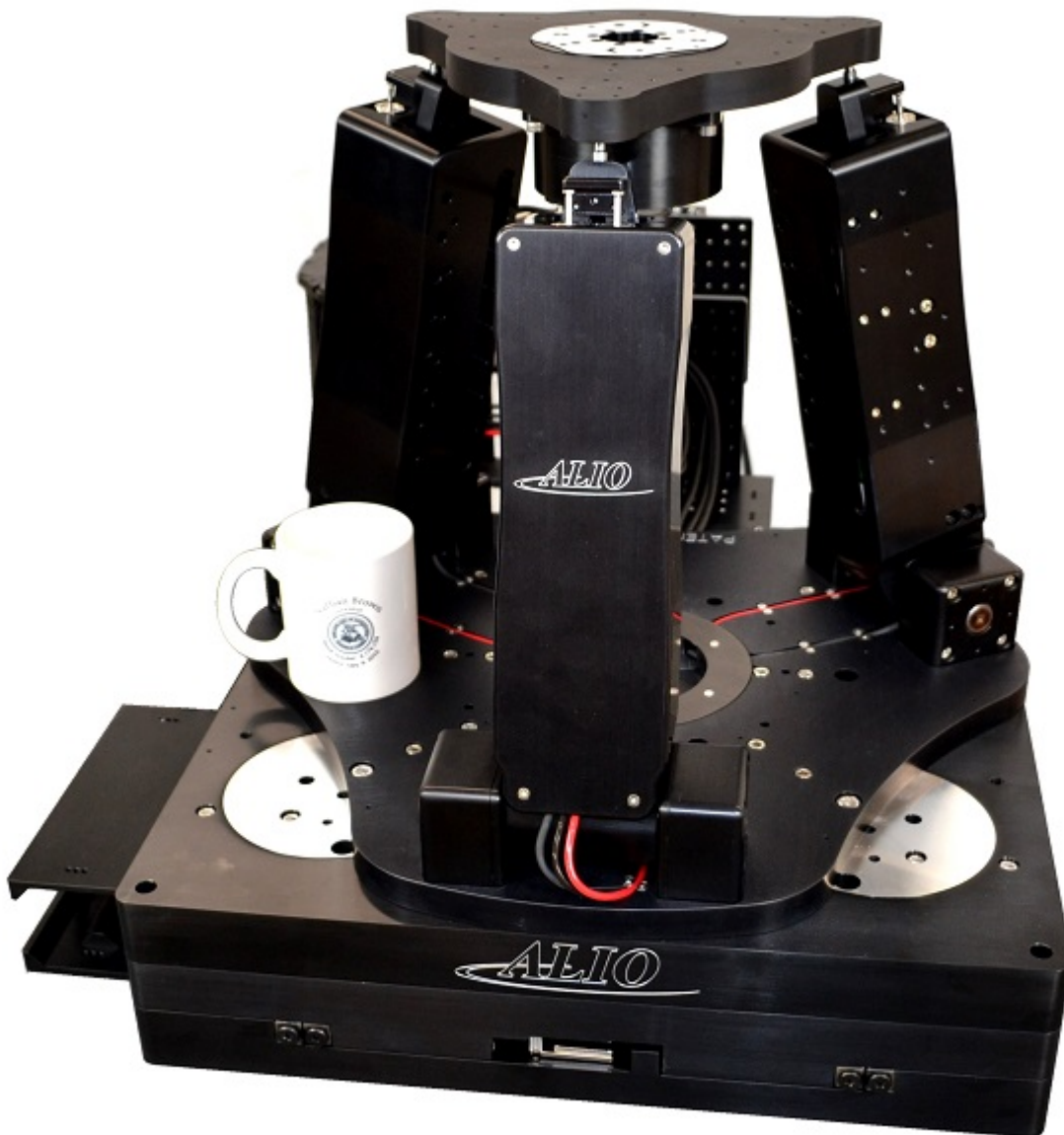
# Precision, Performance, and Quality

Currently the smallest of our Hybrid Hexapod® line, the MINI is compact and still provides a 54,000 mm<sup>2</sup> working volume (60x60x15mm). With the flexibility to add this tripod and rotary to a larger, monolithic XY, you can size your MINI to your working volume. Brakes, gear reduction, ball screw drive, and linear motor drive are some of the options to match the performance to your application.



## SPECIFICATIONS

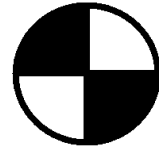
- Travel XY/Z/AB/G: 60/15/10/360
- Max. Linear and Angular Velocity: 25 mm/s and 30 deg/sec
- Linear Resolution:< 5nm
- Bi-Directional Repeatability:< ± 80nm
- Displacement Accuracy:< 1 μm



Hybrid Hexapod® WITH LINEAR MOTOR DRIVE

This is the smoothest, fastest, and most precise 5D or 6D motion system in the world. Our DC Servo driven Hybrid Hexapod® line will stand out against the competition where performance, precision, and reliability are important.

- Max. Travel XY/Z/AB/G: Unlimited/206/40/360
- Min. Travel XY/Z/AB/G: 60/6/5/360
- Max. Linear and Angular Velocity: 500 mm/s and 180 deg/sec
- Linear Resolution:< 5nm
- Bi-Directional Repeatability:< ± 80nm
- Displacement Accuracy:< 1 µm



## **SPECIFICATIONS**



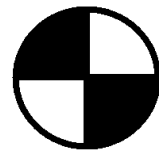
## **VACUUM Hybrid Hexapod® WITH LINEAR MOTOR DRIVE**

With vacuum compatible components, the Vacuum Hybrid Hexapod® System will keep your precision requirements in an environment up to 10<sup>-7</sup> Torr. Select your XYZ working volume, your specific payload, and your TCP location and ALIO can provide you a solution.

- Travel XY/Z/AB/G: 100/24/12/360
- Max. Linear and Angular Velocity: 500 mm/s and 180 deg/sec
- Linear Resolution:< 5nm
- Bi-Directional Repeatability:< ± 80nm
- Displacement Accuracy:< 1 µm



## **DIMENSIONS**



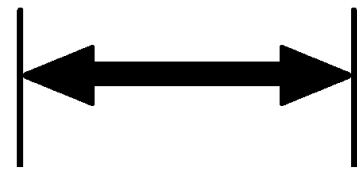
## **SPECIFICATIONS**



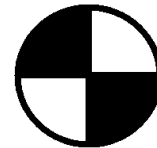
TRIPOD WITH WITH LINEAR MOTOR DRIVE

This 3-axis motion system is capable of tip, tilt, and z-axis motion up to  $\pm 18^\circ$  and 208 mm travel. This motion platform is available with either Linear Motor with counterbalance OR Ball Screw drive. The motion capable with a tripod is Z-Axis, Theta-X, and Theta-Y.

- Min. Travel Z/AB: 6mm /  $\pm 2$  degrees
- Max. Travel Z/AB: 206mm /  $\pm 22$  degrees
- Max. Linear and Angular Velocity: 500 mm/s and 180 deg/sec
- Linear Resolution: < 5nm
- Bi-Directional Repeatability: <  $\pm 80$ nm
- Displacement Accuracy: < 1  $\mu$ m



**DIMENSIONS**



**SPECIFICATIONS**



## TRIPOD + ROTARY WITH LINEAR MOTOR DRIVE

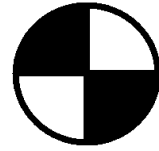
This 4-axis motion system is capable of Tip, Tilt, Z-Axis, and Theta-Z motion. Tip/Tilt up to  $\pm 18^\circ$ , Z-Travel up to 208 mm and continuous Theta-Z make this product is unique to the motion industry. This motion platform is available with either Linear Motor OR Ball Screw drive tripods and has various rotary diameter stages incorporated with or without a brake. These can be added to large-travel XY stages or gantries to create large volume Hybrid Hexapod® solutions.

- Min. Travel Z/AB/G: 6mm /  $\pm 2$  degrees / Unlimited
- Max. Travel Z/AB/G: 206mm /  $\pm 22$  degrees / Unlimited
- Max. Linear and Angular Velocity: 500 mm/s and 180 deg/sec

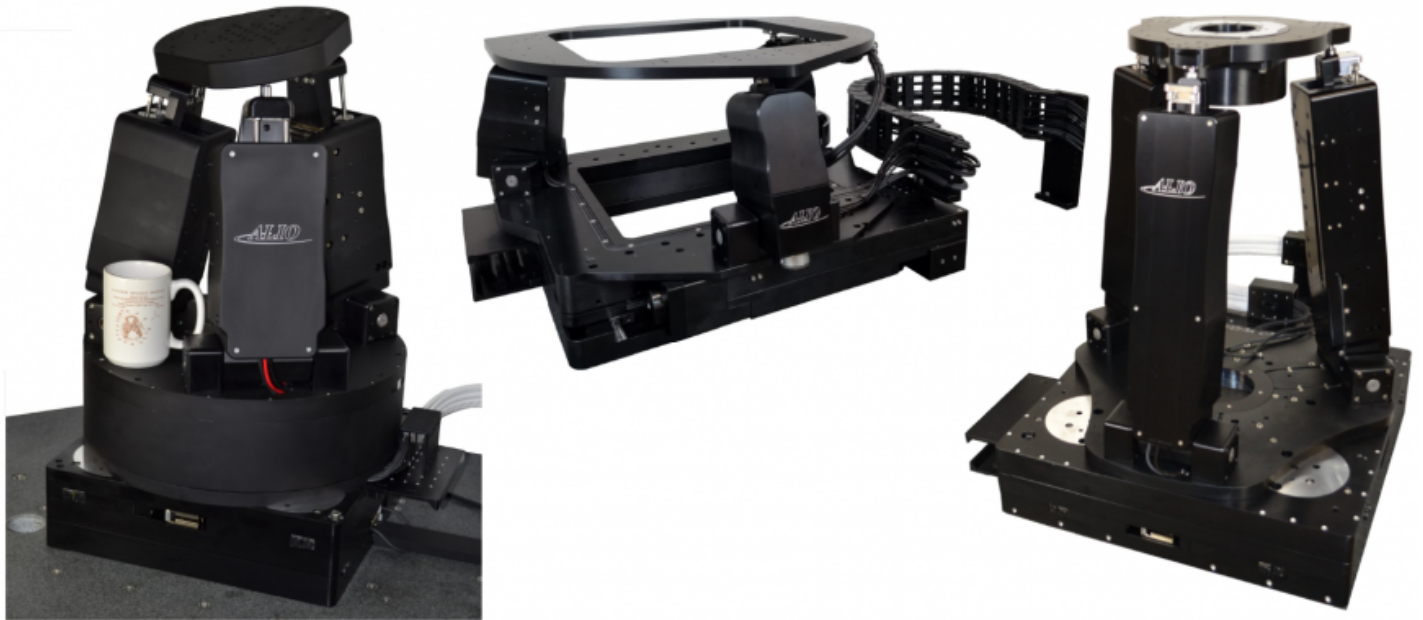


**DIMENSIONS**

- Linear Resolution:< 5nm
- Bi-Directional Repeatability:<  $\pm 80\text{nm}$
- Displacement Accuracy:<  $1\ \mu\text{m}$



## **SPECIFICATIONS**



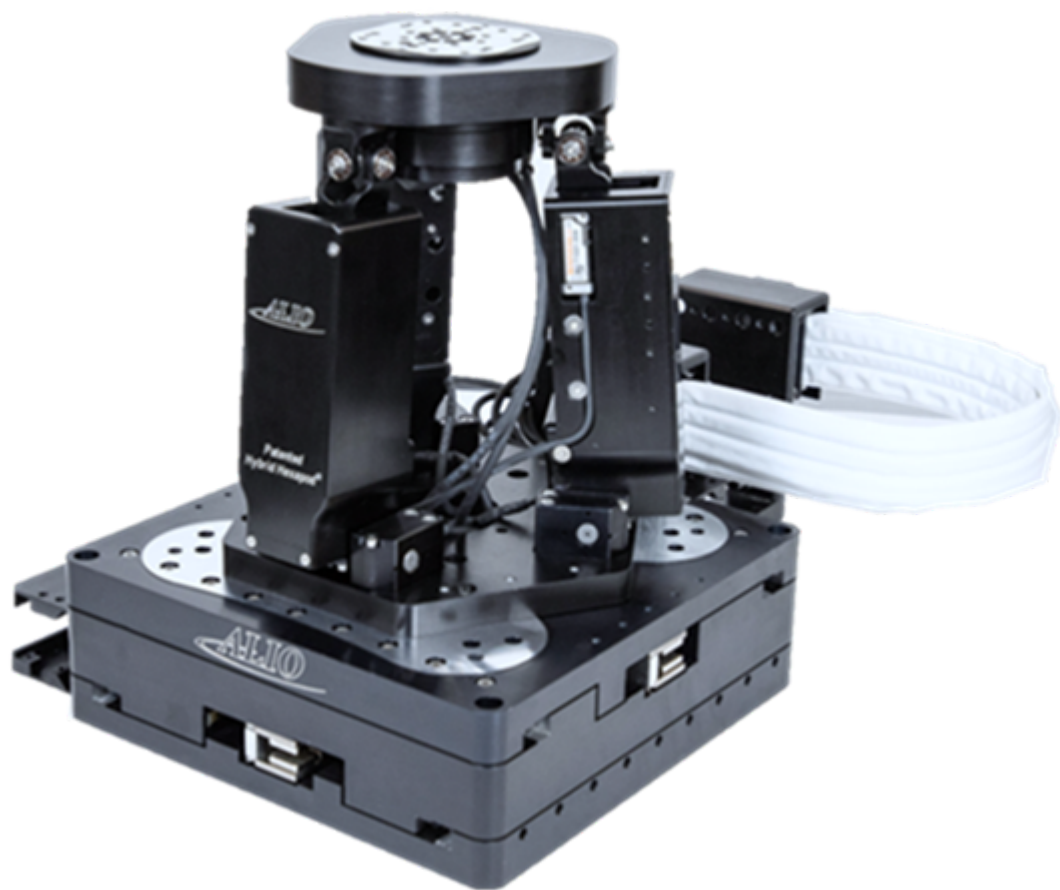
(/application/files/5915/4516/5460/VARIANTS\_CUSTOM\_SOLUTIONS.png)

## **VARIATIONS TO STANDARD HYBRID HEXAPOD® SYSTEMS**

For our OEM partners, ALIO has developed various customizations to standard products which we can consider for your application.

### **CONTACT ALIO:**

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## ALIO's $\pm 30^\circ$ Hybrid Hexapod®

The Hybrid Hexapod® was developed by ALIO Industries to address the inherent performance limitations of conventional hexapods. ALIO's Patented 6-Degree-Of-Freedom (6-DOF) design seamlessly blends and takes advantage of the strengths of serial and parallel kinematic structures while avoiding their weaknesses. The Hybrid Hexapod offers far greater functional versatility, nanometer-level accuracy, repeatability, and superior 6-DOF trajectories than is possible with any traditional hexapod or stacked stage configuration. The unique design is comprised of a parallel kinematic tripod to deliver Z plane and tip/tilt motion. This tripod is integrated with a monolithic serial kinematic stage for XY planar motion. A rotary stage integrated into the top of the tripod (or beneath depending on application needs) provides 360-degree continuous yaw (Theta-Z) rotation. In this hybrid design, individual axes can be customized to provide XY travel ranges from millimeters to virtually unlimited ranges while maintaining nanometer-levels of precision. Novel forward and inverse controller kinematics provide an unlimited number of programmable Tool Center Point locations. The HH-30D's  $\pm 30$  degree tip/tilt travel is by far the most angular travel range available from any 6-DOF positioner on the market and offers the same unmatched positioning performance found in any of ALIO's full-line of Hybrid Hexapod systems.

HH30 Sales Data Sheet ([https://www.alioindustries.com/download\\_file/view/265/210](https://www.alioindustries.com/download_file/view/265/210))

