Hybrid Hexapods®
Serial & Parallel Kinematic 6-DOF Positioners

Angulares™ Hybrid Hexapod®
The Industry’s First and Only 6 Degree-of-Freedom Nano-Positioner with 60 Degrees Tip and Tilt Travel

FEATURES
Precision Crossed Roller Bearing Guides
Direct-Read Incremental or Absolute Encoder Feedback on All Axes
Linear Motor and/or Ball Screw Drives
Unlimited Programmable Tool Center Point Locations and Coordinate Offsets
Zero Backlash on All Axes

KEY PERFORMANCE
XY Travel 60 & 100mm, Up To 450mm Standard (Capable of Unlimited XY Travel)
Z Travel 62mm (Up To 208mm with Other Tripod Models)
Tip/Tilt Travel 60 Deg (±30), Continuous 360 Deg Theta-Z
XYZ Bidirectional Repeatability Less Than ±100nm
Angular Bidirectional Repeatability Less Than ±0.6 arc-sec
Velocity Up To 100mm/sec XY and 20mm/sec Z (> in Linear Motor Versions)
Less Than 20nm Linear and 0.1 arc-sec Angular Minimum Incremental Motion

APPLICATIONS
Aspheric and Freeform Optical Metrology
Silicon Photonics Packaging and Probing
Laser Micro Processing (non-planar substrates and taper control)
Wafer Metrology
Camera Module Alignment and Assembly
Sensor/Image Stabilization Testing
Optical Element and Fiber Alignment

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 60 degree tip/tilt travel of the Angulares Hybrid Hexapod 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.
**Angulares™ Hybrid Hexapod®**

**NOTE:** AI-HH-60D-100XY-62Z-80R MODEL SHOWN

<table>
<thead>
<tr>
<th>Model Number</th>
<th>XY Travel (Drive Type)</th>
<th>Z Travel (Drive Type)</th>
<th>Tip &amp; Tilt Travel (Drive Type)</th>
<th>Theta Z Travel (Drive Type)</th>
<th>R Diameter</th>
<th>Length</th>
<th>Width</th>
<th>Height @ Mid-Stroke</th>
<th>A (inch)</th>
<th>B (inch)</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI-HH-60D-60XY-62Z-80R</td>
<td>60mm (Ball Screw)</td>
<td>62mm (Ballscrew)</td>
<td>± 30 Deg (Ballscrew)</td>
<td>360 Deg (Torque Motor)</td>
<td>80</td>
<td>204.8</td>
<td>180</td>
<td>330.8</td>
<td>4</td>
<td>3</td>
<td>75</td>
<td>100</td>
<td>35</td>
<td>35</td>
<td>60</td>
<td>25</td>
<td>M6 or 1/4-20</td>
<td>M4</td>
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<tr>
<td>AI-HH-60D-100XY-62Z-80R</td>
<td>100mm (Linear Motor)</td>
<td>62mm (Ballscrew)</td>
<td>± 30 Deg (Ballscrew)</td>
<td>360 Deg (Torque Motor)</td>
<td>80</td>
<td>244</td>
<td>244</td>
<td>343.3</td>
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<td>6</td>
<td>125</td>
<td>175</td>
<td>70</td>
<td>35</td>
<td>60</td>
<td>25</td>
<td>M6 or 1/4-20</td>
<td>M4</td>
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**Additional Model Travel Ranges (Drive Options)**
- 150mm - 450mm - Unlimited (Linear Motor)
- ± 10° - ± 18° (Linear Motor)