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## Hexapod Six-DOF Positioning System

# HexGen<sup>®</sup>

# HEX300-230HL

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### Unmatched Performance, Superior Design

Our HEX300-230HL HexGen hexapod combines high speeds and sub-micrometer precision to eliminate compromises on application specifications. Driven by our AC brushless, slotless servo motors and actuated with six high-accuracy struts built with precision preloaded bearings and ball screws, the HEX300-230HL delivers maximum device lifetime, increased drive stiffness, higher positioning accuracy and superior minimum incremental motion (20 nm in XYZ and 0.2  $\mu$ rad for  $\theta_x, \theta_y, \theta_z$ ).

### Key Applications

The HEX300-230HL is the premier medium load, ultra-precision hexapod for many demanding applications, including:

- ◆ Sensor testing
- ◆ Synchrotron sample manipulation
- ◆ Optics manipulation
- ◆ Semiconductor manufacturing & inspection
- ◆ Satellite sensor testing

### KEY FEATURES:

- ◆ Six degree-of-freedom positioning with **LINEAR TRAVELS TO 60 MM & ANGULAR TRAVELS TO 30°**
- ◆ Precision design with **GUARANTEED POSITIONING ACCURACY SPECIFICATIONS**
- ◆ **MINIMUM INCREMENTAL MOTION** to 20 nm in XYZ & 0.2  $\mu$ rad in  $\theta_x, \theta_y, \theta_z$
- ◆ Flexible configurations & customization
- ◆ Vacuum preparation available upon request
- ◆ Powerful controls & software with **VISUALIZATION OF WORK & TOOL COORDINATE SYSTEMS**

## HEX300-230HL SPECIFICATIONS

| Mechanical Specifications                               |                         |                        | HEX300-230HL  |       |                        |   |                  |  |
|---|-------------------------|------------------------|---|-------|------------------------|---|------------------|--|
| Axis  |                         |                        | X   | Y     | Z                      | A ( $\theta_x$ )                                      | B ( $\theta_y$ ) | C ( $\theta_z$ )                                     |
| <b>Travel<sup>(1)</sup></b>                             |                         |                        | 55 mm   | 60 mm | 25 mm                  | 15 deg  |                  | 30 deg   |
| <b>Axis Positioning Accuracy<sup>(2,3)</sup></b>        | <b>Over Full Travel</b> | <b>Standard (-PL3)</b> | $\pm 4 \mu\text{m}$   |       | $\pm 3 \mu\text{m}$    | $\pm 50 \mu\text{rad}$ ( $\pm 10.3 \text{ arc-sec}$ ) |                  | $\pm 25 \mu\text{rad}$ ( $\pm 5.2 \text{ arc-sec}$ ) |
|   |                         | <b>ULTRA (-PL4)</b>    | $\pm 1 \mu\text{m}$   |       | $\pm 0.75 \mu\text{m}$ | $\pm 10 \mu\text{rad}$ ( $\pm 2.1 \text{ arc-sec}$ )  |                  |  |
| <b>Resolution (Minimum Incremental Motion)</b>          |                         |                        | 20 nm   |       |                        | 0.2 $\mu\text{rad}$ (0.04 arc sec)                    |                  |  |
| <b>Bidirectional Repeatability, pk-pk<sup>(3)</sup></b> |                         |                        | $\pm 0.75 \mu\text{m}$  |       | $\pm 0.35 \mu\text{m}$ | $\pm 5 \mu\text{rad}$ ( $\pm 1 \text{ arc sec}$ )     |                  |  |
| <b>Unidirectional Repeatability, pk-pk</b>              |                         |                        | $\pm 0.35 \mu\text{m}$  |       | $\pm 0.15 \mu\text{m}$ | $\pm 2.5 \mu\text{rad}$ ( $\pm 0.5 \text{ arc sec}$ ) |                  |  |
| <b>Maximum Speed<sup>(4)</sup></b>                      |                         |                        | 50 mm/s   |       | 25 mm/s                | 15 deg/s  |                  | 30 deg/s   |
| <b>Load Capacity, All Positions<sup>(5)</sup></b>       |                         | <b>Vertical</b>        | 45 kg   |       |                        |   |                  |  |
|   |                         | <b>Horizontal</b>      | 21 kg   |       |                        |   |                  |  |
| <b>Holding Capacity, De-Energized<sup>(6)</sup></b>     |                         |                        | 14 kg   |       |                        |   |                  |  |
| <b>Stage Mass</b>                                       |                         |                        | 12 kg   |       |                        |   |                  |  |
| <b>Material</b>   |                         |                        | Anodized Aluminum Platform and Base; Steel Used in Joints and Inside Struts |       |                        |   |                  |  |

**Notes:**

1. Travels are mutually-exclusive. Consult our HexGen workspace simulator for detailed workspace sizing.
2. Measured with single-axis moves at a height of 50 mm above the moving platform. Results can be payload and workpoint dependent.
3. X, Y, Z performance certified as standard. X, Y, Z, A, B, C performance certified with ULTRA.
4. Requires the selection of an appropriate amplifier with sufficient voltage and current.
5. Centered loading – consult load curves.
6. Horizontal base plate, centered loading – consult load curves.

| Electrical Specifications  | HEX300-230HL  |
|----------------------------|---|
| <b>Drive System</b>        | Precision Ball Screw, Brushless Servomotor            |
| <b>Feedback</b>            | Noncontact Encoder – Incremental and Absolute Options |
| <b>Maximum Bus Voltage</b> | 80 VDC  |
| <b>Limit Switches</b>      | 5 V, Normally-Closed (Located on Each Strut)          |



## HEX300-230HL SERIES ORDERING OPTIONS

### Feedback (Required)

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- E1 Incremental encoders
- E2 Absolute encoders

### Performance Grade (Required)

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- PL3 Base performance
- PL4 Ultra high-accuracy performance, ULTRA

### Integration (Required)

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Aerotech offers both standard and custom integration services to help you get your system fully operational as quickly as possible. The following standard integration options are available for this system. Please consult Aerotech if you are unsure what level of integration is required, or if you desire custom integration support with your system.

**-TAS Integration - Test as system**

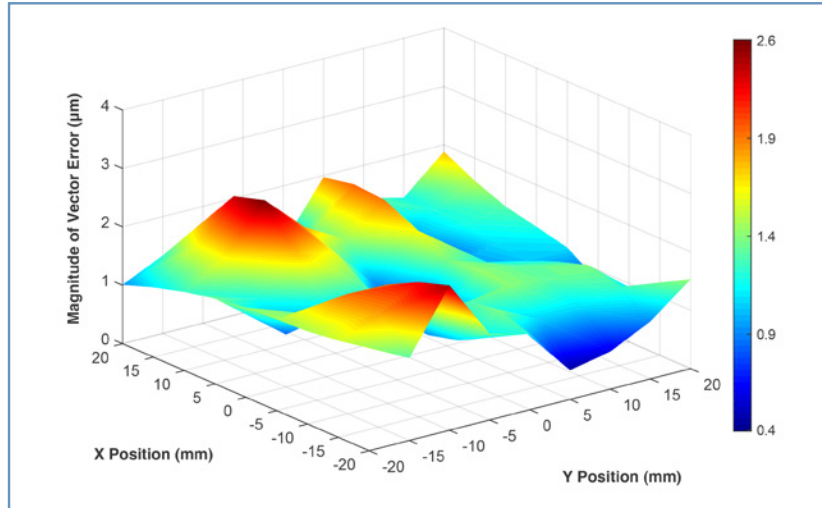
Testing, integration, and documentation of a group of components as a complete system that will be used together (ex: drive, controller and stage). This includes parameter file generation, system tuning and documentation of the system configuration.

**-TAC Integration - Test as components**

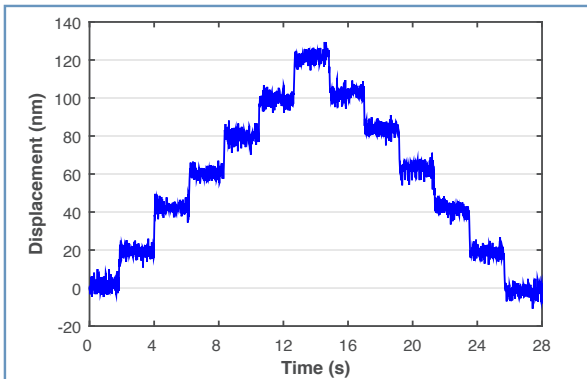
Testing and integration of individual items as discrete components that ship together. This is typically used for spare parts, replacement parts, or items that will not be used together. These components may or may not be part of a larger system.



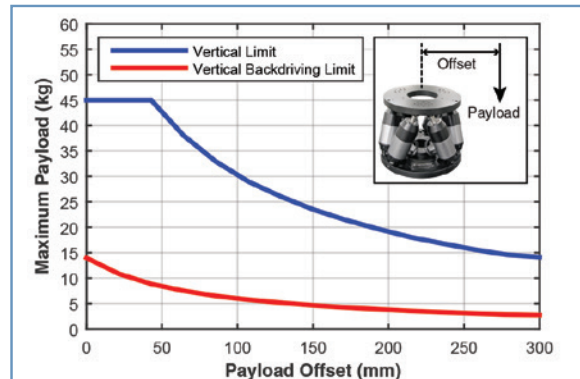
## HEX300-230HL SERIES SPECIFICATIONS



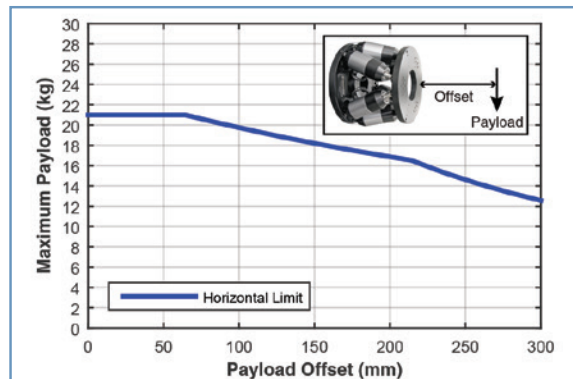
HEX300-230HL three-dimensional accuracy error measured when commanded to move in the XY plane at a Z position of 0 mm. The measurement was taken with three interferometers (X, Y, and Z directions) targeting a three-sided optic. The results show the outstanding three-dimensional accuracy capability of the HEX300-230HL.



Minimum incremental step plot of the X-axis of the HEX300-230HL. All axes of the HEX300-230HL have industry-leading resolutions enabling higher-resolution processes.

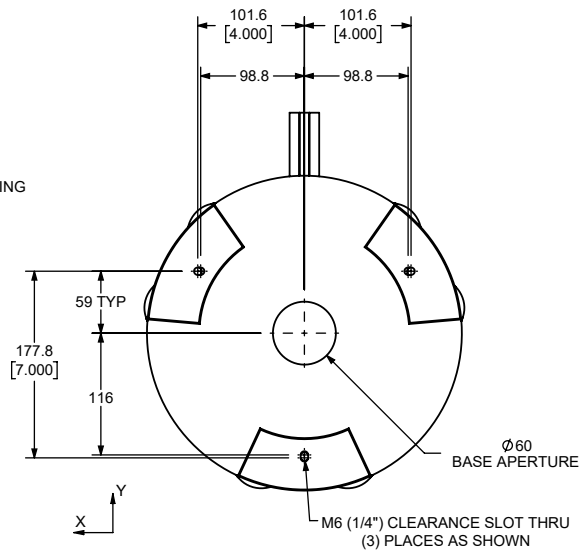
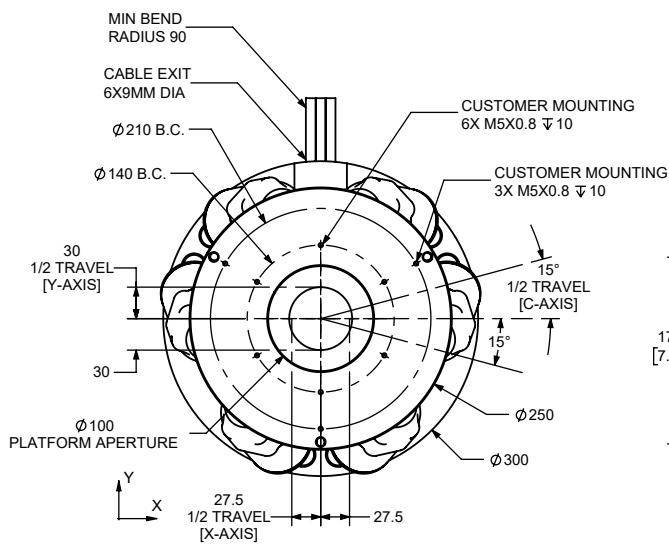
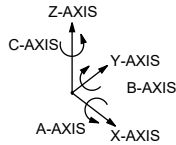
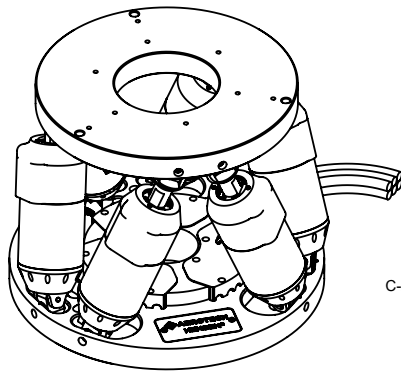


HEX300-230HL vertical load capacity.



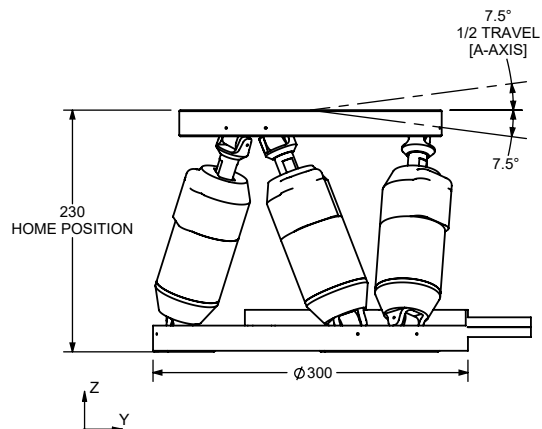
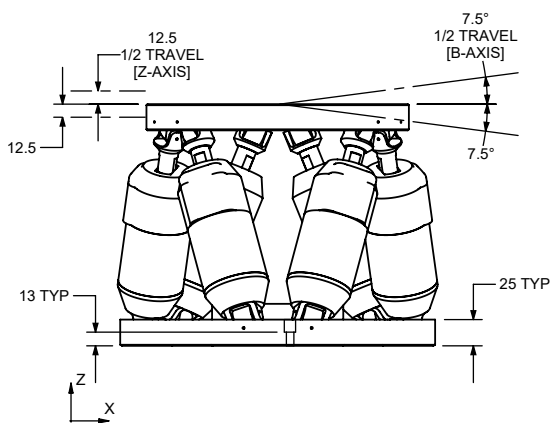
HEX300-230HL horizontal load capacity.

# HEX300-230HL DIMENSIONS



BOTTOM VIEW

NOTE: ALL TRAVELS SPECIFIED AS SINGLE-AXIS MOVES FROM HOME POSITION



DIMENSIONS: MILLIMETERS [INCHES]

