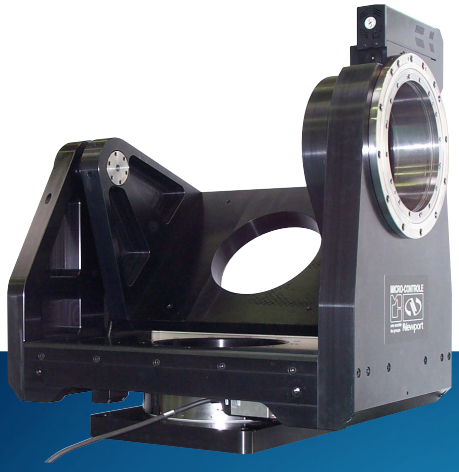
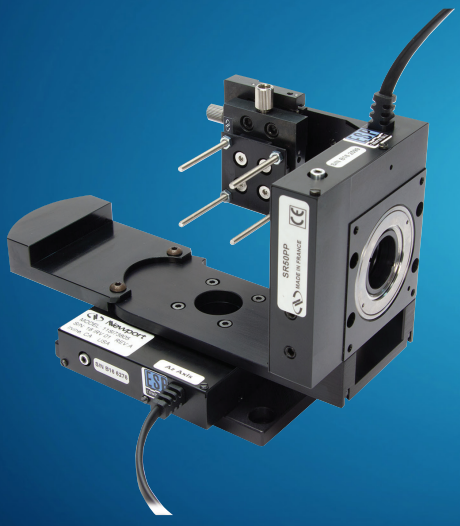
mks | Newport™

Motion Solutions

Newport Gimbal Systems





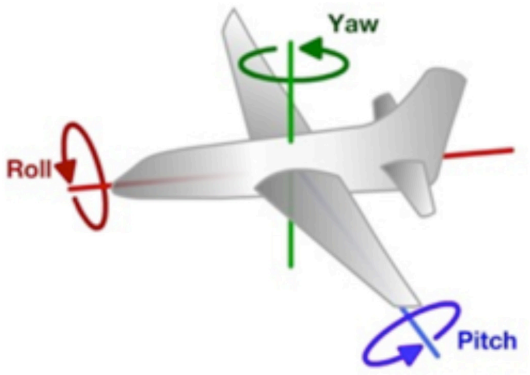
Newport Gimbal Systems

Introduction

In the past 55 years Newport has designed and manufactured thousands of high accuracy positioning systems for Scientific Research, Defense and Security, Microelectronics and Industrial markets. Gimbal systems are significant part of these solutions.

A gimbal is a platform that can pivot, so instead of being fixed to a stationary base an object on a gimbal can rotate along at least one axis (3 axes called roll, pitch and yaw are commonly used). The easiest way to understand roll, pitch and yaw is to visualize an airplane. Think of an imaginary line that runs through the front of the plane and out the back. A rotation along this line would result in a roll -- the plane would start doing barrel rolls. Now imagine another line running through both wings of the plane. A rotation along this line is a change in pitch. The plane either climbs or dives, depending on the direction of the pitch.

Finally, imagine a vertical line that comes out of the top and bottom of the plane. This is the yaw axis. Rotating along this line results in a change in direction for the plane -- either right or left.



Applications:

Gimbals are used in wide variety of applications. Below are some examples, where Newport Gimbal Systems are implemented:

Optical Sensor Testing

Inertial Navigation Testing/Calibration

Target Tracking

LIDAR

Radars

Seekers

Antennas

Telescopes

Simple Gimbal Solutions:

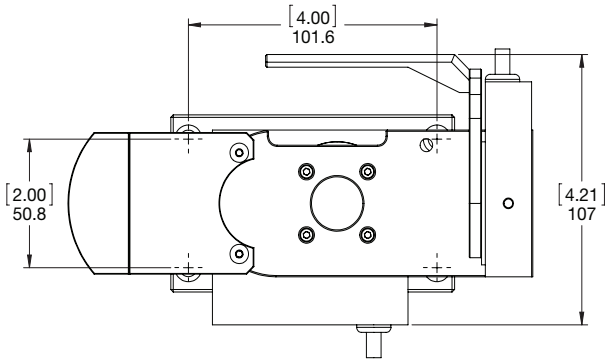
HG-SR50 - Half Gimbal System based on SR50 Series Stages:

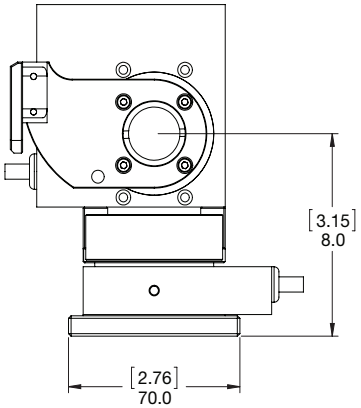
The HG-SR50 is our smallest gimbal based on standard SR50 rotation stages. It is ideally suited for simulation of small sensors. The travel range can either be full 360° or less (limited via software). Two motor options are available: stepper and DC.
The system is compatible with SMC100, ESP301 and XPS series controllers.

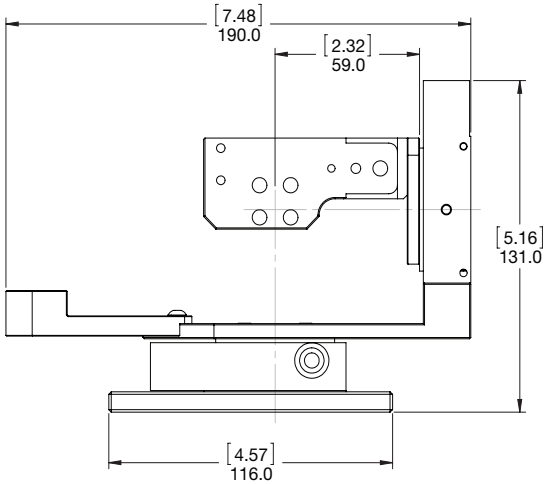
Note: Specifications will vary depending on selected motor type.

Single Axis Specifications (using SR50PP stages)	
Travel range (system)*	Az ±90º, El ±60°
Accuracy Typical (Guaranteed)	±15 (±30) mdeg
Bi-Directional Repeatability Typical (Guaranteed)	±15 (±25) mdeg
Resolution	0.001°
MIM	4.0 mdeg
Speed (no load)	4°/sec
Load Capacity (stage)	30N
Load Capacity (system)**	5N

*For the configuration shown
**At the distance defined in the drawing below, with CG at gimbal point. For any other configuration please contact Newport.

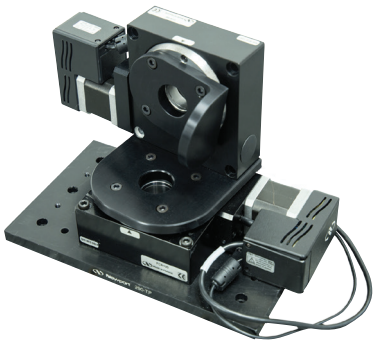






HG-FCR100 - Half Gimbal System based on FCR100 Stage:

The HG-FCR100 is a compact and very affordable system with integrated controller.



Single Axis Specifications	
Travel range (system)*	±180°
Accuracy, Guaranteed	±0.02°
Bi-Directional Repeatability, Guaranteed	±0.006°
MIM	0.00025°
Speed (no load)	20°/sec
Load Capacity (stage)	300N
Load Capacity (system)**	20N

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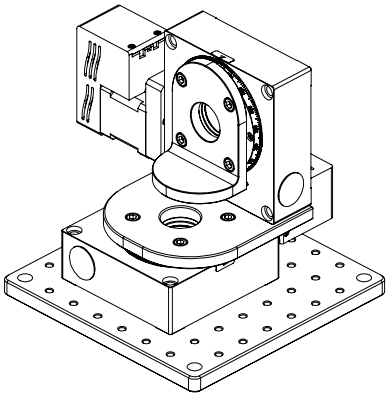
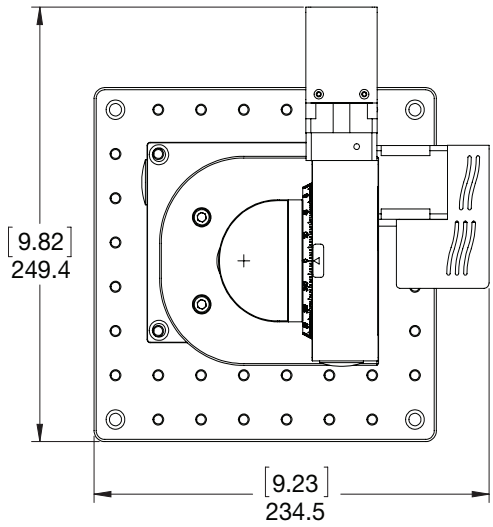
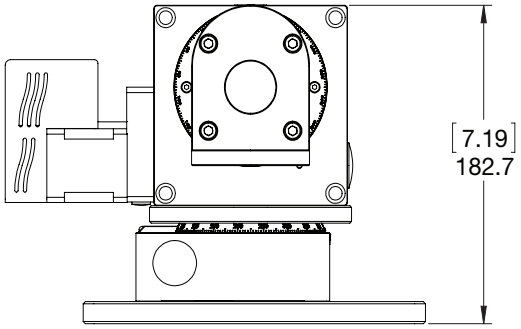
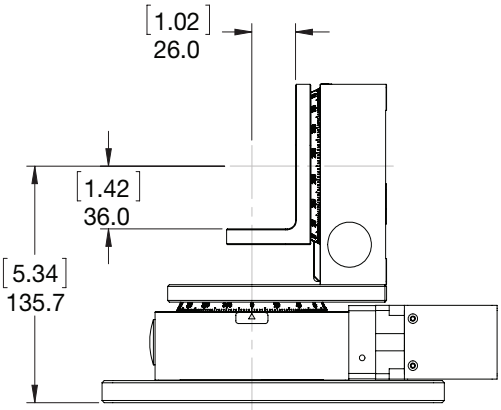


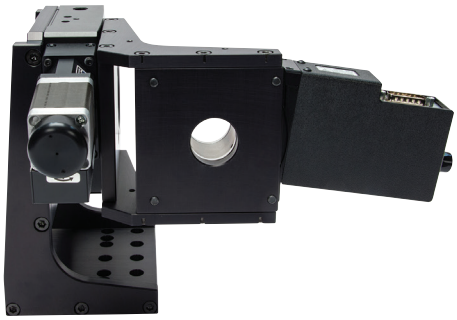






HG-URS - Half Gimbal System based on URS Stages

The HG-URS is a quite flexible gimbal that can use two of the four URS standard product sizes (50, 75, 100 and 150) as the loading condition and application requires. Available in stepper and DC motor versions. This general purpose and economical gimbal solution is compatible with SMC100, ESP301 and XPS series controllers.



Note: Specifications will vary depending on selected motor type.

Single Axis Specifications (using URS100BPP and URS75BCC)	
Travel range (system)*	±180°
Accuracy Typical (Guaranteed)	±6.0 (±11.5) mdeg
Bi-Directional Repeatability Typical (Guaranteed)	±1.4 (±3.0) mdeg
Resolution	0.0005° (Az) 0.00016°(El)
MIM	2.0 mdeg
Speed (no load)	80°/sec (Az) 20°/sec (El)
Load Capacity (stage)	300N (Az), 100N (El)
Load Capacity (system)**	20N

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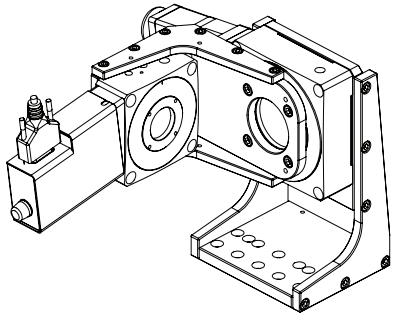
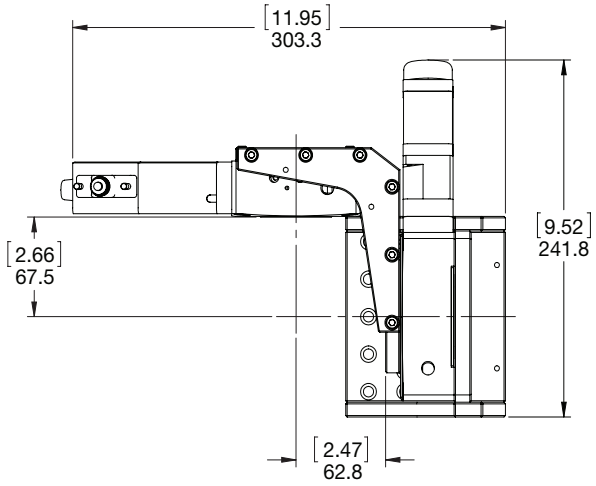
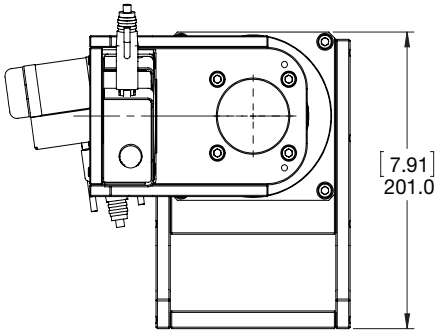
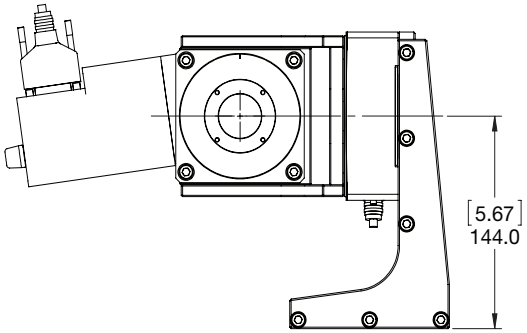
**At the distance defined in the drawing below, with CG at gimbal point. For any other configuration please contact Newport.









FG-FCR100 - Full Gimbal System with FCR Stages

The FG-FCR100 Gimbal is an affordable system with integrated controller, targeting sensor applications.

Single Axis Specifications	
Travel range (system)*	Az ±180º, El ±45°
Accuracy, Guaranteed	±0.02°
Bi-Directional Repeatability, Guaranteed	±0.006°
MIM	0.00025°
Load Capacity (stage)	300N
Load Capacity (system)**	50N

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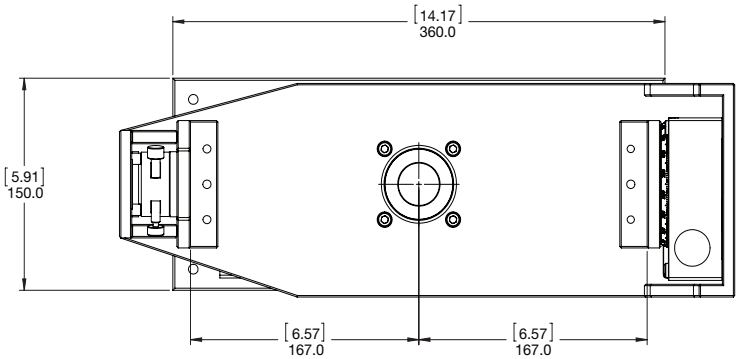
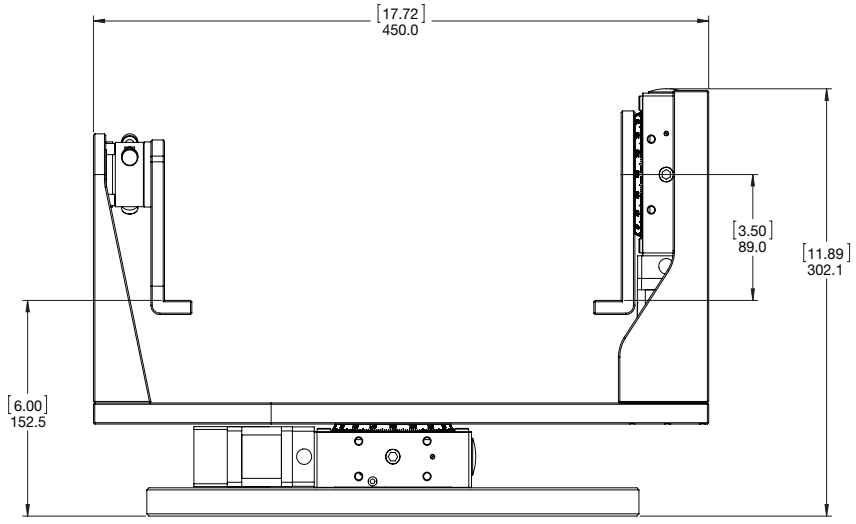
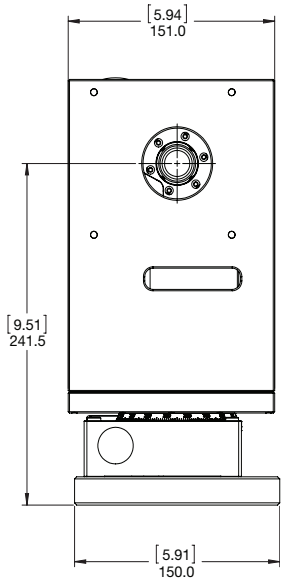
For any other configuration please contact Newport.







FG-URS - Full Gimbal with URS Series Stages

The FG-URS is a quite flexible gimbal that can use two of the four URS standard product sizes (50, 75,100 and 150) along with a slave bearing to accommodate loading conditions and application requirements. Available in stepper or DC motor versions. This general purpose and economical gimbal solution is compatible with SMC100, ESP301 and XPS series controllers.

Note: Specifications will vary depending on selected motor type.

Single Axis Specifications (using URS150BCC's)	
Travel range (system)*	Az ±180º, El ±60°
Accuracy Typical (Guaranteed)	±6.0 (±11.5) mdeg
Bi-Directional Repeatability Typical (Guaranteed)	±1.4 (±3.0) mdeg
Resolution	0.0005° (Az) 0.00016°(El)
MIM	2.0 mdeg
Speed (no load)	80°/sec (Az) 20°/sec (El)
Load Capacity (stage)	300N (Az), 100N (El)
Load Capacity(system)**	100N

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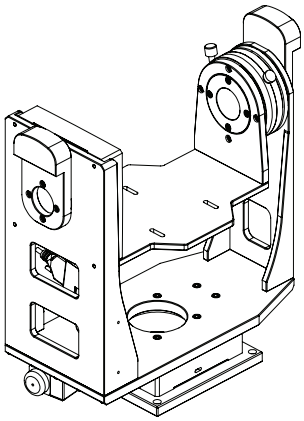
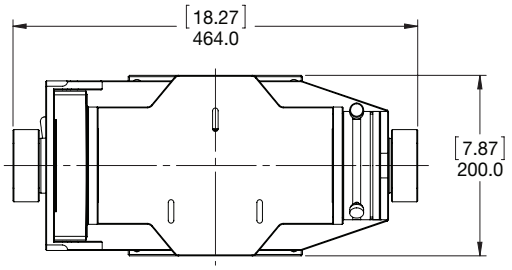
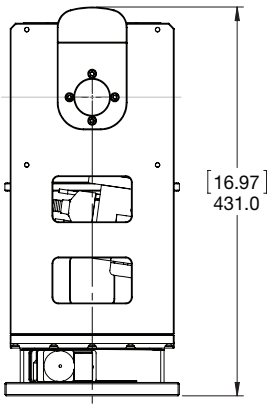
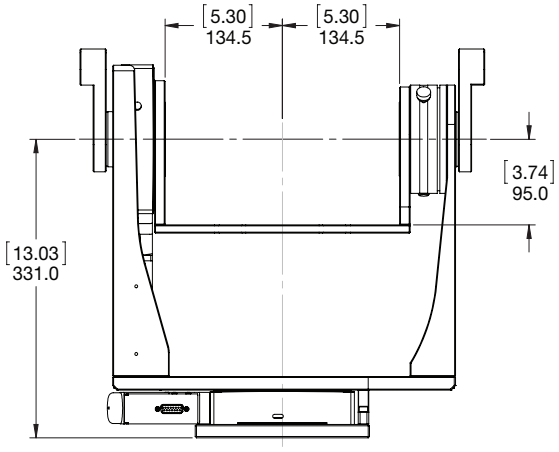




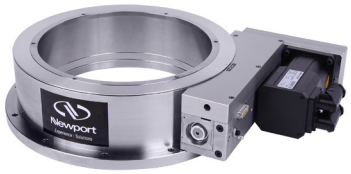




Other standard rotation stage options, that could be used in gimbal assembly:

RVU series high precision and high torque

The RVU rotation stages are specifically designed for applications that require high torque, rigidity and speed. These stages can be integrated with direct high resolution encoders for higher accuracy.



Single Axis Specifications	RVU350HAHS	RVU240HAHS
Travel range	±170°	±170°
Accuracy Typical (Guaranteed)	±2.0 (±2.5) mdeg	±2.0 (±2.5) mdeg
Bi-Directional Repeatability Typical (Guaranteed)	±0.4 (±0.6) mdeg	±0.4 (±0.6) mdeg
Speed	40°/sec	40°/sec
Load Capacity	6500 N	4000 N
Resolution	0.05 mdeg	0.05 mdeg

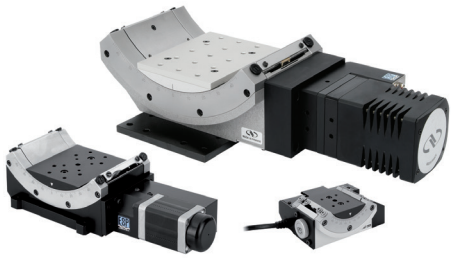
RGV series high precision and high speed

The RGV is used in applications that require very fast motion and high precision. Examples are motion simulators, specifically for MEMS, gyros and accelerometer testing, as well as high speed beam pointing applications.

Single Axis Specifications	RGV160BL-s	RGV100HL-s
Travel range	360°	360°
Accuracy, Guaranteed	±7.5 mdeg	±5.0 mdeg
Bi-Directional Repeatability, Guaranteed	±0.15 mdeg	±0.15 mdeg
Speed	1000°/sec	720°/sec
Load Capacity	2700 N	100 N
Resolution	0.001 mdeg	0.01 mdeg
MIM	0.04 mdeg	0.1 mdeg

BG Series

For tip and tilt applications the BG series of goniometers allow open access to the load. When two BG stages are stacked together, the sample rotates about a common pivot point. The usual configuration is the BG mounted on a URS or RV rotation stage.



Single Axis Specifications	BGM120	BGM160	BGM200
Travel range	±45°	±45°	±45°
Accuracy Typical	±25 mdeg	±25 mdeg	±25 mdeg
Bi-Directional Repeatability Typical	±12 mdeg	±12 mdeg	±12 mdeg
Speed	20°/sec	20°/sec	20°/sec
Load Capacity	200N	300N	500N
Resolution	0.001°	0.001°	0.001°
MIM	2.0 mdeg	2.0 mdeg	2.0 mdeg

RV Series

These robust rotation stages combine high precision positioning and extremely high load capacities to operate in a large variety of conditions including industrial applications.

Single Axis Specifications	RV120 &160 CC,CCHL, PP,PE	RV120 &160 HAT	RV120 & 160 HAHLT	RV240 &350 CC,CCHL, PP,PE CC,CCHL,PP,PE"
Travel range, deg	360	±170	±170	360
Accuracy Typical (Guaranteed) mdeg	±4.0 (±7.5)	±2.0 (±2.5)	±2.0 (±2.5)	±3.5 (±5.0)mdeg
Bi-Directional Repeatability Typical (Guaranteed) mdeg	±0.7 (± 2.0)	±0.4 (± 0.6)	±0.4 (± 0.6)	±0.6 (± 2.0)
Load Capacity, N	up to 6500	up to 6500	up to 6500	up to 6500
MIM, mdeg	1	0.75	0.2	1

*Speed ranges from 2-80°/sec depending on the motor type

*Resolution ranges from 0.000035°-0.001° depending on the version

Custom Capabilities:

Besides offering precise Simple Gimbals described above, we at Newport also have capabilities to design and deliver customized, high precision and high accuracy gimbal solutions tailored for customer's payload size, shape and weight requirements.

Special Services:

The following special services are also available upon request:

Metrology

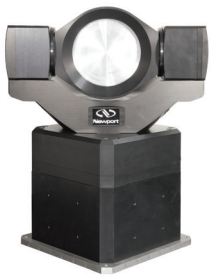
- System orthogonality alignment (down to 100 urad)
- Sphere of confusion (down to 50 um)
- Mapping to improve single axis accuracy

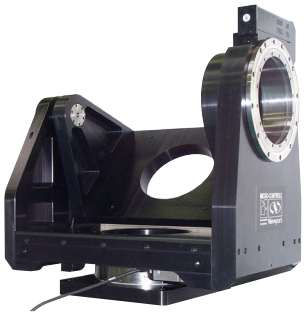
Design

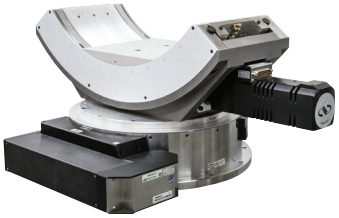
- Direct on- axis high resolution encoder integration, to get down to 1 urad single axis resolution, ±5 urad accuracy and ±10 urad repeatability
- Slip ring integration
- Adjustable counterweights
- Cleanroom compatibility
- Vacuum compatibility

Other

- Tuning with a dummy load, to optimize the system for the given load
- Acceptance test
- On-site installation







Controller / Driver:

XPS Series:

This high performance XPS universal motion controller drives a variety of motor types and executes complex motion through high speed Ethernet TCP/IP interface. Aside from its outstanding servo rate and triggering, the XPS is user friendly with its intuitive GUI and Plug-and-Play ESP technology. The powerful features of the XPS make it an excellent choice for both research and industrial applications.

The following features are available through our XPS series controllers:

- Analog tracking
- Complex Trajectories
- Data Gathering
- Triggering
- Analog and Digital I/O

All custom gimbals are delivered with compatible controllers.

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About MKS Instruments

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