

HyBrYXTM G5 Large Substrate Positioning Stage



The unique hybrid architecture of HyBrYX G5 offers the following outstanding performance characteristics for demanding large payload applications:

Innovative Architecture

HyBrYX stages blend the cost-effectiveness of mechanical bearings with the precision of a single plane air bearing carriage to deliver a powerful combination of throughput, precision and value. During motion, a ceramic carriage freely slides in X and Y on a precision lapped granite reference plane using a proprietary pressure-vacuum air bearing design. This XY carriage is pressure-vacuum preloaded to, and guided along the Y-axis by a rigid and lightweight ceramic beam. The beam is supported (and guided) at each end by recirculating ball bearing carriages resulting in a low-profile design that is extremely rigid, well-damped, and capable of quick & precise point-to-point moves and exceptional high-speed scanning performance. For large payloads, such as Generation-5 LCD display or Photovoltaic panels, the HyBrYX-G5 offers an oversized carriage with higher air bearing load capacity on both the horizontal and vertical reference surfaces.

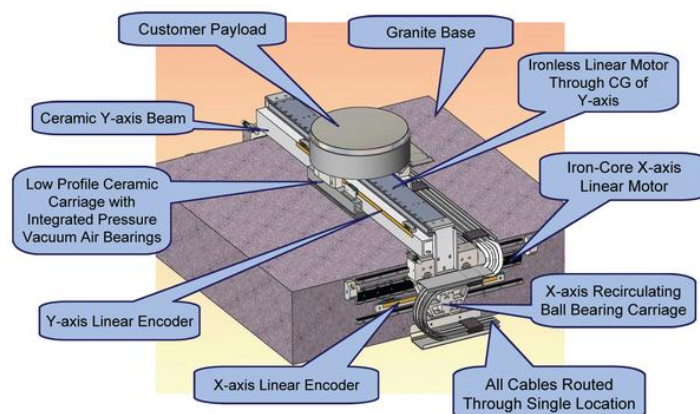
Performance without Compromise

HyBrYX was developed to overcome the disadvantages found in conventional "stacked" XY stage systems. Truck-and-rail based stages have limited performance capabilities, long-travel crossed roller bearing designs are hindered by large footprints and may not have adequate life-time or MTBF characteristics, and a (pure) dual axis air bearing is often cost prohibitive.

Features and Benefits

Newport's HyBrYX stages offer unique advantages and a robust feature set that includes:

- Excellent price-to-performance value for demanding industrial OEM applications
- Ideal choice for scanning applications requiring ultra-low velocity ripple and dynamic following error
- True single plane XY architecture with optional theta and Z-Tip-Tilt solutions
- Reliable, long-life operation well suited for high duty cycle environments
- Large (>1 meter) XY Travel range
- Scanning velocities up to 600mm/sec and 0.6G acceleration



They HybrYX™ G5 Large Substrate Positioning Stage is ideal for a wide range of applications including:

- PCB Patterning
- Automated Optical Inspection
- Array Checking
- Edge Isolation
- Scribing
- Fiducial and Barcode Generation
- Wave Guide Direct Writing

Design Details	HybrYX G5
Stage Architecture	Single Plane XY Air Bearing / Mechanical Bearing Hybrid
Material	Ceramic (SiC), Granite
Drive Mechanism	Brushless linear servo motor (Y-axis Ironless, X-axis Iron-core)
Position Feedback	Non-contact optical linear encoders - Standard: Heidenhain LIDA, steel scale with 20 μm signal period - Optional: Heidenhain LIF, glass scale with 4 μm signal period - Optional: Renishaw Signum, Invar scale with 20 μm signal period
Bearings	Pressure-Vacuum Air Bearing (XY Carriage and Y-travel), Recirculating ball-bearing (X-travel)
Cable Management	Fully integrated, clean-room compatible, single point exit/entry, minimal external force
General Specifications	
Travel Range (standard)	450 mm X-axis 1400 mm Y-axis
Footprint (without bridge pillars)	2000 mm x 900 mm x 450 mm (with ZTT & Theta)
Rated Payload (maintains dynamic specifications)	30 kg on ZTT & Theta
Maximum Load Capacity	40 kg (without ZTT & Theta)
Maximum Velocity (rated payload)	300 mm/sec X-axis (stepping) 600 mm/sec Y-axis (scanning)
Peak Acceleration (rated payload)	0.15 G X-axis with ZTT & Theta 0.25 G X-axis with ZTT & Theta
RMS Acceleration (rated payload)	0.075 G X-axis with ZTT & Theta 0.1 G X-axis with ZTT & Theta
Granite Base Thickness	250 mm
Total Weight	1400 kg
Stiffness, First Natural Frequency	150 Hz
MTBF	20,000 hrs.
Performance Specifications	
Pitch, Yaw, Roll (300 mm by 600 mm travel)	<15 μrad
Y-axis Straightness (300 mm line)	1 μm TIR
Y-axis Straightness (25 mm line)	0.15 μm TIR
Noise on Y-axis Straightness (sampled at >5 Hz.)	± 25 nm
XY Flatness (300mm circle)	0.6 μm TIR
Y-axis Position Accuracy over 25 mm	± 100 nm with 20 μm with Invar scale
Accuracy in XY (with linear and perpendicularity error compensation)	± 3 μm over 1.2 m x 0.4 m with 20 μm Invar Scale
Noise on XY Flatness (sampled at > 5Hz)	± 25 nm
XY Orthogonality	< 20 μrad
Y-axis Speed Stability (velocity ripple sampled at 2kHz and 400mm/sec)	0.1%
Step-and-Settle Times (using ND40 Passive Isolators)	Settling into ± 1 μm window