MOTION CONTROL

Our Solutions at Your Service

Over 40 years of proven performance, expertise and experience.

For Motion, Think Newport™

Newport®

Experience | Solutions

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About Us

Newport Corporation is a globally recognized leader in advanced technology products and solutions for fields such as Research, Life and Health Science, Aerospace and Defense, Industrial Manufacturing, Semiconductors and Microelectronics. With decades of experience in motion control, Newport has both the capability and the capacity to provide the optimum solution for your individual needs. Our product portfolio includes standard products, special adaptations, custom systems and OEM solutions.

Valued Customer

Our Value Proposition

For almost half a century we, at Newport, have accommodated the demands of you, our customers, around the world. We have supplied products and services to research labs, manufacturing and test environments as well as OEM applications.

We have always listened to your needs, and as a direct result of your feedback, we are continuously investing in new products and resources in order to continue to make you successful.

We take pride in offering high-quality products and services that minimize your cost of ownership and enhance your competitive edge. We publish specifications to reflect the true performance that you expect. Every product within our extensive range is supported by a combination of proven technologies, cutting edge design elements, global and world-class manufacturing, and the highest level of customer service and technical support available in the industry.

Newport's motion technologies incorporate expertise in design and manufacturing, offering you the state-of-the-art products and solutions including:

- *Standard and customized motion control products*
- *Tailored products and solutions for OEMs*
- *Advanced custom multi-axis motion systems*
- *Best in class air bearing technology solutions*

This brochure provides an overview of our product offering, services, engineering and manufacturing capability in the field of motion. Call and let us help you.

For Motion, Think Newport™

Sincerely

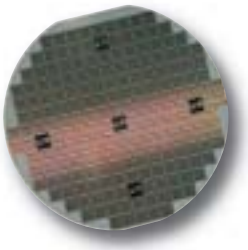
Newport Motion Team

At the Cutting Edge of Research and Industry

For over 40 years, Newport Corporation has been a globally recognized leader in advanced technology products for research and industrial applications. We have helped researchers break through the frontiers of science and technology. By applying our innovative perspective to the manufacturing processes, we have worked with manufacturers to improve their performance, their time-to-market and to increase their competitive edge.

Newport plays a vital role in the following disciplines:

- *Research and development*
- *Life & health sciences*
- *Aerospace, defense and security*
- *Industrial manufacturing*
- *Semiconductor wafer manufacturing*
- *Microelectronics applications*



Innovation at All Times

Based on strong, solid and long-term relationships with all leading research centers, our vast industry knowledge and expertise spans a broad range of technologies. Our pledge is to continually and consistently deliver innovative products and solutions in a myriad areas including:

- *Lasers*
- *Light sources*
- *Opto-mechanics*
- *Optics*
- *Spectroscopic and photonic instruments*
- *Vibration control*
- *Precision positioning*
- *Customized systems*

Newport is truly unique in combining all these technologies and providing exceptional application knowledge for the true benefit of our customers.

Global Services

Availability at All Times

The value of the Newport corporate philosophy means that you will always receive the shortest lead times for our product range. Through our website, you can check pricing and leadtimes for the best service available.

Global Service

Newport's global infrastructure means that wherever you are, and whatever you want, we can help! At all times, we offer application support for our product selection and with one of the best after sales service organization available, you can be assured that any issues will be instantly resolved.

Milestones

Over Four Decades of Evolutionary Expertise and World-Class Experience. Founded on Innovation – Based on Technology

The world's largest scientific research centers and leading equipment manufacturers have trusted Newport's innovative technologies for over four decades.

60's - Laying the Foundations

The 1960s saw the beginning of Newport's history in precision positioning, when the French company, MICRO-CONTROLE S.A was founded. One of the first products was **MR8.25** linear stages and **TR80** rotation stages, the predecessors of the highest installed base product UMR linear stages and UTR rotation stages still produced today. This decade saw a rapid extension in the product ranges of positioning products, as well as the introduction of opto-mechanical components and optics for research and aerospace/defense applications.

70's - Introducing the First Motorized Stages

This decade witnessed the extension of the product line to motorized stages with the introduction of **UT** series linear stages, predecessor of the popular UTM/UTS series linear stages and the introduction of the **TL17** stepper motor controller.

80's - Developing Technology Platforms

As the company evolved, so did the products, in tandem with developing and advanced emerging technologies. MICRO-CONTROLE introduced the first air-bearing stages for metrology applications, as well as the **FAB200**, the first integrated XY air-bearing stage with 0.1 µm resolution, and Newport introduced the **PM500** high-precision motion system with crossed-roller bearings and integrated linear optical encoder feedback.

90's - Becoming a Global Leader in Motion Control

The 1990s saw Newport acquiring new companies to further consolidate its strong position in the marketplace. Newport Corporation acquired the French company MICRO-CONTROLE and with combined resources, Newport further developed its global leadership in **high precision positioning and motion control systems**.

New Focus™ introduces the **Picomotor™** actuator, a revolutionary motor that uses a piezoelectric transducer to turn a screw.

2000's - Present - The Technology Experts

With the advent of the Millennium, Newport takes up the challenge of leveraging its expertise and experience into new market applications, pursuing its tradition of excellence and innovation. Our latest development is the Agilis™, a family of piezo motor based micro-positioning devices enabling more precise and remote control of critical optical setups and the SolaryX®, a high performance motion platform for laser scribing of thin film solar panels.

Newport acquires Oclaro's New Focus™ business, which is comprised of a portfolio of high-performance photonics products that includes opto-electronics, high-resolution actuators, opto-mechanics, tunable lasers, vacuum and ultraclean solutions, and OEM-engineered solutions.

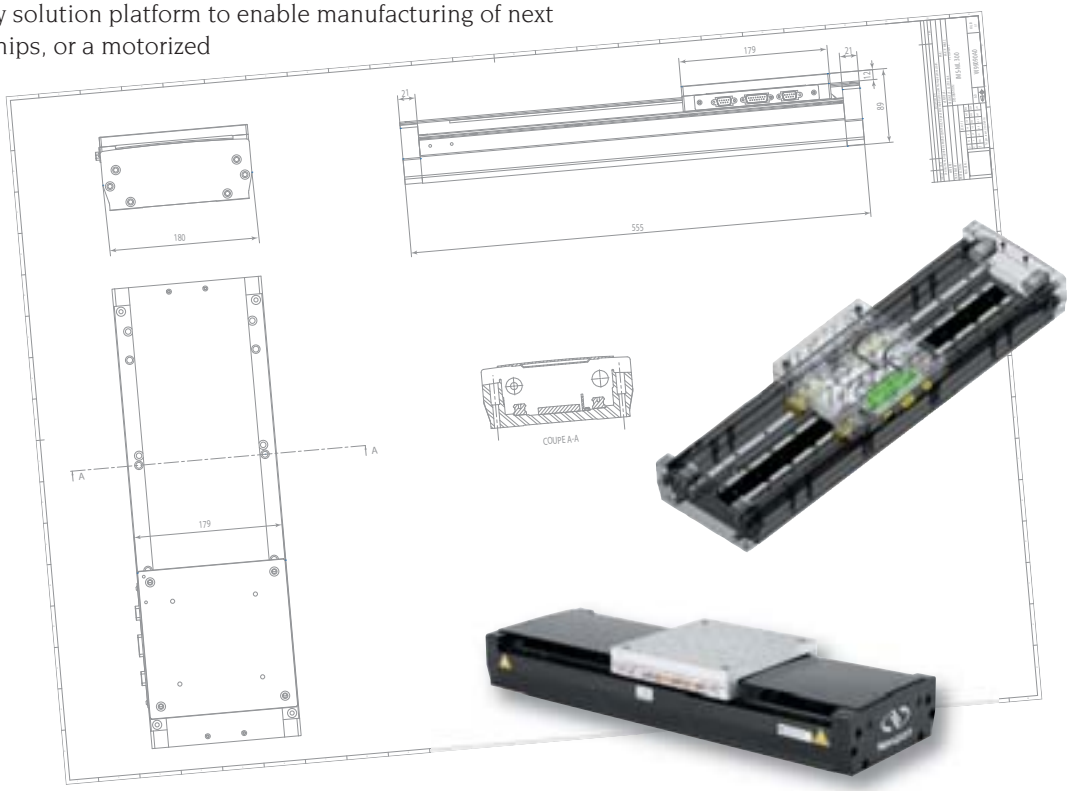
Expertise and Experience

Over Forty Years of Proven Performance, Expertise and Experience

Evolving in a dynamically changing research and industrial environment since the founding of Newport Corporation some 40 years ago, Newport and its subsidiaries have acquired a tremendous wealth of knowledge and experience second to none.

Newport's technologies and capabilities have constantly evolved and strengthened over the past decades. With a best-in-class R&D organization, Newport's engineers have the necessary resources and powerful design and metrology tools to enhance product quality and deliver the best performance products and to bring new and innovative perspective to your motion control application.

Whether it is a key customized multi-axis motion system for a diffractometry application in a synchrotron or the development of a technology solution platform to enable manufacturing of next generation semiconductor chips, or a motorized component to fit into a quality inspection system, we have the capability to adapt our expertise and experience to match to your needs and to deliver the right solution. Our experts understand your business and the challenges you face every day.



Spearheading Market Development

Our expertise and experience have led to the development of many innovative products and solutions that have spearheaded development of new markets. Today, our motion control solutions serve in a broad range of applications in multiple sectors such as: scientific research, aerospace and defense, life & health sciences, industrial manufacturing, quality assurance, metrology, semiconductor wafer manufacturing, microelectronics and photovoltaics, among others.

At Newport you can trust your project in the hands of experts and rely on a company that keeps its promises and delivers bottom-line profits!

Life & health sciences

Microelectronics and semiconductor

Photovoltaics

Aerospace and defense

Our Core Capabilities Meet Every Challenge

Commitment to Excellence – Capacity to Deliver

With over forty years of unprecedented experience behind us, Newport has both the capability and the capacity to provide the optimum solution for your individual needs! We have the most comprehensive portfolio of high precision positioning products and solutions in the industry, ranging from standard products, special adaptations and OEM solutions to subassemblies, fully engineered systems and customized OEM technology platforms. Simply tell us your application requirements and we will provide a solution.

Industry Best Products

Newport is justifiably proud of an extensive offering of standard linear stages, rotation stages, actuators and control electronics. These highly engineered products are not only specifically designed to meet the majority of research and industrial end-user requirements but are the perfect solution for OEM applications.

With our standard products, you can reap the benefits of:

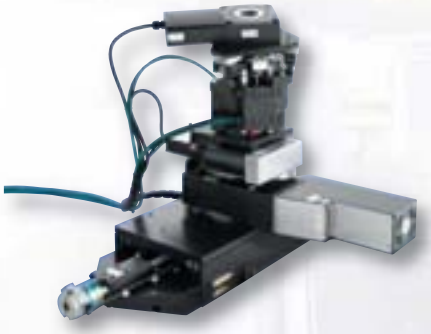
- *Short lead times*
- *Wide range of choices*
- *High compatibility*
- *Competitive pricing due to high-volume manufacturing*

More details about our standard product offering can be found on pages 11 to 23.

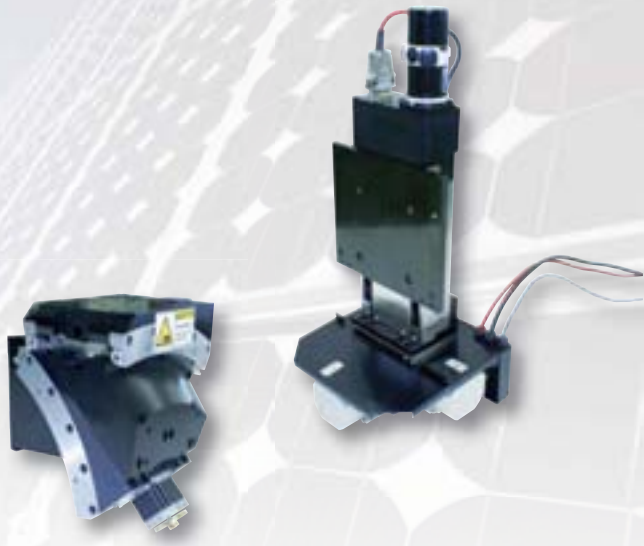
Tailor-Made Solutions

Depending on your requirements, we have the capacity to tailor a solution for you! Whether the change involves cabling, mechanical adapters, metrology or the environmental preparation of a motion component, our dedicated engineering group at Newport can deliver special requirements with the utmost precision, accuracy and efficiency.

To learn more about our special solutions, please refer to pages 24 to 25.



Shaping the Future with OEM



With over forty years of specialized expertise and experience resulting in Newport's recognition as a world leader in precision motion technologies, we can help you consistently achieve the next levels of performance. We are perfectly positioned to handle the positioning requirements of your current and next generation tools, through cutting edge technology and our ultimate commitment to the highest standards of quality.

To learn more about our OEM capabilities, please refer to pages 28 to 32.

Fully Engineered Systems

Leveraging upon tremendous expertise and capability, Newport provides comprehensive design, engineering and manufacturing services for the design of custom motion systems to exact customer specifications. Our engineering team has the expertise in CAD design, simulation modeling and software development to design the right systems for your needs and we ensure close communication throughout the process. All our motion systems are backed by a worldwide dedicated team of application engineers and world-class technical support.

To learn more about our systems engineering capability, please refer to page 26.

Partnering for Success - Newport's customized technology platforms

Newport has built upon decades of experience in motion solutions to establish the closest partnerships with clients through our customized technology platforms (CTP), specifically developed to cater to application-specific needs. These platforms have already seen massive success in partnership with OEM's such areas as semiconductor manufacturing, DNA sequencers, inkjet printing and other industrial manufacturing processes. Other applications include flat panel display (FPD) inspection and processing, as well as laser scribing of thin-film solar panels.

CTPs are designed from leading technologies and combine the very latest in materials, manufacturing, assembly and motion control. Technologies such as air bearings, linear and rotary ball bearings, high resolution direct encoders, linear motors, piezos, flexures, ceramic materials and vibration isolation are optimally integrated into these platforms to satisfy the individual requirements of any application.

More details about our customized technology platforms can be found on pages 34 to 40.

Standard Products – Simply the Best!

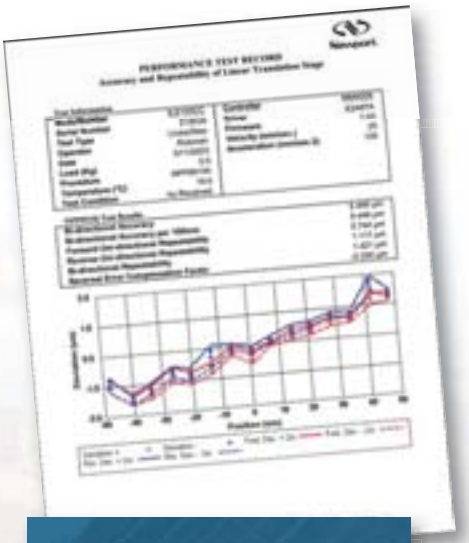
Decades of Unparalleled Performance

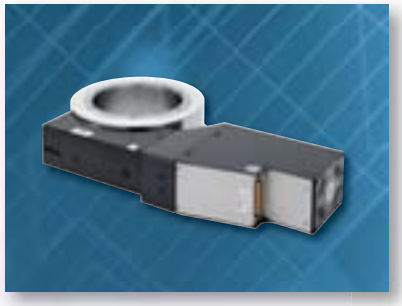
Newport's extensive range of standard motion products incorporates more than 40 years of specialized knowledge in precision motion control. During this time, we have provided thousands of expert solutions for hundreds of different applications in:

- *Aerospace, defense and security*
- *Laser research*
- *Fiber optic communications*
- *Semiconductor wafer manufacturing*
- *Computer peripherals*
- *Bio-medical research*
- *Metrology*
- *Industrial manufacturing*

We know what matters when it comes to precision motion control. We relish opportunities in new product development, taking the full range of applications into account and thoroughly analyzing and testing our products under the most extreme conditions. That's how we can be assured that our products not only perform to their best capabilities under ideal circumstances, but will give optimum performance in your application and throughout the life of the product.

Our product range undergoes a rigorous 100% metrology control with test certificates supplied free of charge - the only way to ensure that every product meets or exceeds performance expectations.





Precision Engineered Quality Linear Stages

Our high precision and high performance linear stages are the best in the industry, because we know how to manufacture excellence the way that you want it! From mid to long-travel, vertical and horizontal, Newport's linear stages provide the ultimate solution for the most demanding applications.

XM Series

Ultra-Precision Linear Motor Stages ▶

Travel range: 50–350 mm
Bi-directional repeatability: 0.08 µm
Max. speed: 300 mm/s
Load capacity: 100–300 N

GTS Series

◀ High-Precision Linear Stages

Travel range: 70 and 150 mm
Bi-directional repeatability: 0.2 µm
Max. speed: 50 mm/s
Load capacity: 100 N

IMS-LM Series

◀ High-Performance Long-Travel Linear Motor Stages

Travel range: 300–600 mm
Bi-directional repeatability: 0.5 µm
Max. speed: 500 mm/s
Load capacity: 600 N

VP-25X

Precision Compact Linear Stages ▶

Travel range: 25 mm
Bi-directional repeatability: 0.14–0.2 µm
Max. speed: 25 mm/s
Load capacity: 60 N

IMS Series

High-Performance Long-Travel Linear Stages ▶

Travel range: 300–600 mm
Bi-directional repeatability: 1.0–2.5 µm
Max. speed: 100–200 mm/s
Load capacity: 600 N

ILS Series

◀ High-Performance Mid-Range Travel Linear Stages

Travel range: 50–250 mm
Bi-directional repeatability: 0.7–2.5 µm
Max. speed: 50–100 mm/s
Load capacity: 250 N

MTM Series

◀ Long-Travel Steel Linear Stages

Travel range: 100–250 mm
Bi-directional repeatability: 3–3.5 µm
Max. speed: 0.2–40 mm/s
Load capacity: 1000 N

UTS Series

Mid-Range Travel Steel Linear Stages ▶

Travel range: 50–150 mm
Bi-directional repeatability: 4.0–6.0 µm
Max. speed: 20–40 mm/s
Load capacity: 200 N

MFA Series

Miniature Linear Stages ▶

Travel range: 25 mm
Bi-directional repeatability: 2.3–3.0 µm
Max. speed: 0.3–2.5 mm/s
Load capacity: 50 N

FMS Series

◀ Precision Linear Stages

Travel range: 100–300 mm
Max. speed: 20–100 mm/s
Load capacity: 150 N
Straightness/Flatness 0.5 µm over 10 mm
1 µm per 50 mm travel

Agilis™ – AG-LS25

Piezo Motor Driven Linear Stages ▶

Travel range: 12 and 27 mm
Min. incremental motion: 0.05 µm
Max. speed: >0.5 mm/s
Load capacity: 2.5–3 N

NPX Series

◀ NanoPositioning Linear Stages

Travel range: 100–400 µm
Resolution: 0.2–8 nm
Repeatability: 30–75 nm
Load capacity: 10–100 N

CONEX-MFA-CC

◀ MFA-CC Stage with CONEX-CC Controller

Travel range: 25 mm
Bi-directional repeatability: 2.3–3.0 µm
Max. speed: 0.3–2.5 mm/s
Load capacity: 50 N

Picomotor™ Stages

Integrated Motion Control Solutions ▶

Travel range: 13–25 mm
Max. speed: 0.02 mm/s
Load capacity: 13 N

The Widest Selection of Vertical Stages

GTS30V

◀ High-Precision Long Travel Lift Stage

Travel range: 30 mm
Bi-directional repeatability: 0.2 µm
Max. speed: 10 mm/s
Load capacity: 40 N

VP-5ZA

High-Precision Low Profile Lift Stage ▶

Travel range: 4.8 mm
Bi-directional repeatability: 0.5 µm
Max. speed: 5 mm/s
Load capacity: 50 N

IMS-V Series

High-Load Long Travel Vertical Stages ▶

Travel range: 100 and 300 mm
Bi-directional repeatability: 1.0 µm
Max. speed: 5–20 mm/s
Load capacity: 100–400 N

UZ Series

◀ Compact Steel Lift stages

Travel range: 4.5 and 9 mm
Bi-directional repeatability: 3.4–5.9 µm
Max. speed: 0.1–4 mm/s
Load capacity: 30 and 300 N

Superior Rotation Stages

Newport's reputation for rotation stages is unsurpassed. High speed, superior reliability, positioning accuracy – we design our rotations stages to offer the optimum in flexibility and size.

RV Series

High-Performance Precision Rotation Stages ▶

- Bi-directional repeatability: 0.0012–0.007°
- Max. speed: 2–80 °/s
- Wobble: 16–40 µrad
- Load capacity: 900–6500 N

RGV100BL

◀ High-Speed Precision Rotation Stage

- Bi-directional repeatability: 0.0004°
- Max. speed: 720 °/s
- Wobble: 20 µrad
- Load capacity: 100 N

URB100CC

◀ Belt Drive Rotation Stage

- Bi-directional repeatability: 0.1515°
- Max. speed: 720 °/s
- Wobble: 50 µrad
- Load capacity: 100 N

URS Series

Precision Rotation Stages ▶

- Bi-directional repeatability: 0.006–0.012°
- Max. speed: 40–80 °/s
- Wobble: 50 µrad
- Load capacity: 200–300 N

BG Series

Goniometric Cradles ▶

- Travel range: up to ±45°
- Bi-directional repeatability: 0.005–0.024°
- Max. speed: 2–20 °/s
- Load capacity: 20–500 N

SR50 & PR50 Series

◀ Compact Rotation Stages

- Bi-directional repeatability: 0.05–0.15°
- Max. speed: 4–20 °/s
- Wobble: 100 µrad
- Load capacity: 10–30 N

NSR1

◀ Universal Rotator

- Uni-directional repeatability: 0.25°
- Max. speed: 120 °/s
- Wobble: 600 µrad

Picomotor™ Stages

Picomotor Rotary Stage ▶

- 0.2-mrad resolution
- Max. speed: <0.16 °/s
- Load capacity: 5 N

Agilis™ – AG-PR100

Piezo Motor Driven Rotation Stage ▶

- Travel range: 360 °, continuous
- Min. incremental motion: 5 µrad (1 arc-sec)
- Max. speed: 2 °/s
- Graduation: 2°

CONEX-SR50CC & CONEX-PR50CC

◀ SR50CC or PR50CC Stage with CONEX-CC Controller

- Bi-directional repeatability: 0.05–0.15°
- Max. speed: 4–20 °/s
- Wobble: 100 µrad
- Load capacity: 10–30 N

CONEX-BGS50CC

◀ BGS50CC Goniometric Cradle with CONEX-CC Controller

- Travel range: up to ±30°
- Bi-directional repeatability: 0.0013°
- Max. speed: 10 °/s
- Load capacity: 20 N

Optimum Performance Precision Actuators

Our high speed, state of the art actuators are designed for a purpose – combining high precision with compactness and accuracy every time. Nothing competes with the Newport product range.

VP-25AA

High-Precision Actuator ▶

- Travel range: 25 mm
- Bi-directional repeatability: 0.15 µm
- Max. speed: 25 mm/s
- Load capacity: 40 N

LTA Series

◀ Precision Long Travel Actuators

- Travel range: 25 and 50 mm
- Bi-directional repeatability: 0.6 µm
- Max. speed: 5 and 1 mm/s
- Load capacity: 120 and 50 N

NSA12

◀ Miniature Actuator

- Travel range: 11 mm
- Bi-directional repeatability: 10 µm
- Max. speed: 0.9 mm/s
- Load capacity: 28 N

PZA12

Ultra-High Resolution Actuator Using Open-Loop Piezo Step Motor ▶

- Travel range: 12.5 mm
- Minimum incremental motion: 30 nm
- Max. speed: 0.2 mm/s
- Load capacity: 50 N

TRA Series

Compact Actuators ▶

- Travel range: 6–25 mm
- Bi-directional repeatability: 3 µm
- Max. speed: 0.4 mm/s
- Load capacity: 60 N

Picomotor™

◀ Piezo Motor Actuators

- <30 nm resolution in a compact design
- Set-and-forget long-term stability-these actuators stay put
- Lifetimes of 1,000,000,000 steps

NPA Series

◀ NanoPositioning Piezo Actuators

- Travel range: 20–100 µm
- Resolution: 0.05–2 nm
- Repeatability: 16–28 nm
- Load capacity: 1000 N

NPM140

Piezoelectric Micrometer Adapter ▶

- Travel range: 90–140 µm
- Resolution: 0.1–1 nm
- Repeatability: 35 nm
- Load capacity: 100 N

CONEX-LTA-HL & CONEX-LTA-HS

LTA Precision Long Travel Actuator with CONEX-CC Controller ▶

- Travel range: 25 and 50 mm
- Bi-directional repeatability: 0.6 µm
- Max. speed: 5 and 1 mm/s
- Load capacity: 120 and 50 N

CONEX-TRAxxCC

◀ TRA Precision Long Travel Actuator with CONEX-CC Controller

- Travel range: 6–25 mm
- Bi-directional repeatability: 3 µm
- Max. speed: 0.4 mm/s
- Load capacity: 60 N

Motorized Optical Mounts

Newport offers a large selection of motorized optical mounts for any research or laboratory need

Agilis™

Compact Piezo Driven Optical Mount ▶
Optic diameter: 0.5" and 1.0"
Angular Range: ±2°
Adjustment sensitivity: 1–2 µrad
Maximum speed: 0.5–0.75 °/s

NPO140 & NPO250

◀ Nanofocusing Objective Stages
Travel range: 140–250 µm
Resolution: 0.3–5 nm
Repeatability: 30–46 nm
Max lens weight: 500 g

Picomotor™

◀ Motorized Optical Mounts
Optic diameter: 0.5", 1.0" and 2.0"
Motorized axes: 2 or 3
Angular resolution: 0.7 µrad
Angular range: ±4°

PSM2

Ultra-Fast Piezo Steering Mirror ▶
Angular range: 1.6–2 mrad
Travel range: 12–16 µm
Angular resolution: 0.004–0.04 µrad
Linear resolution: 0.03–3 nm

FSM-300

Fast Steering Mirrors ▶
Number of axes: 2 (tip-tilt)
Angular range: ±26 mrad, mechanical
Resolution: ≤1 µrad rms, typical
Repeatability: ≤3 µrad rms, mechanical

◀ VGM *optical mount with NanoPZ ultra-high resolution actuator*

A typical example of mounting a motorized actuator to other Newport manual products, as an example, NanoPZ actuators are mounted on a U100 ULTIMA® mirror mount. Generally, actuators are designed to be mounted on larger mirror mounts or manual stages.

Resolution: ~1 µrad
Travel: ±7°
Speed: 0.2 °/s

◀ ULTIMA® *optical mount with NanoPZ ultra-high resolution actuator*

Hexapod

HXP100

A Hexapod is a parallel kinematic motion device that provides six degrees of freedom: X, Y, Z, pitch, roll, and yaw. Hexapods are well known as effective solutions to complex motion applications that demand high load capacity and accuracy in up to six independent axes.

6 Axis Parallel Kinematic Positioner ▶
Travel (X, Y, Z): ±29, ±26, 28 mm
Min. incremental motion (X, Y, Z): 0.5 µm
Repeatability (X, Y, Z): 0.5 µm
Travel range (Θx, Θy, Θz): ±12°, ±10°, ±20°
Min. incremental motion (Θx, Θy, Θz): 5 µrad
Repeatability (Θx, Θy, Θz): 0.001° = 17 µrad
Max. speed (X, Y, Z): 1 mm/s
Centered load capacity: 200 N
Rigidity (Z): 40 N/µm

Broadest Range of Motion Controllers

Newport delivers solutions with our advanced range of motion electronics, offering the most advanced motion controllers and drivers available in the world. Whatever your requirements, our product range covers every requirement with precision, accuracy and optimum performance.

XPS

◄ High-Performance Multi-Axis Motion Controller

- Integrated 1–8 axes motion controller/driver for steppers, DC servos, brushless motors, piezos, voice coils, and other motion devices
- High-speed Ethernet TCP/IP communication
- Wide variety of motion modes, trajectories, and compensations
- Advanced servo loop and filter functions
- Extensive I/O, triggers, axis and process synchronization capabilities

ESP301

The Most User-Friendly and Versatile Motion Controller in the World ►

- 1 to 3 axes motion controller for steppers and DC servos
- Compatible with most Newport stages and actuators
- ESP technology, Newport's exclusive stage recognition for easy setup and safe operation
- Manual front panel interface
- Synchronized linear/circular interpolation and continuous path contouring

SMC100

◄ Inexpensive and Compact Single-Axis Motion Controller/Driver

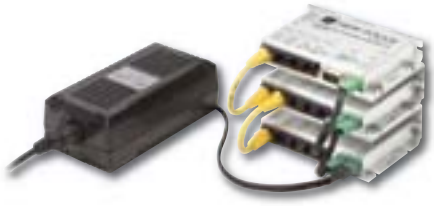
- For DC-servo and stepper motors up to 48 VDC and 1.5 Arms
- Internal RS-485 link allows networking up to 31 controllers
- Convenient multi-axis programming
- Advanced backlash and Hysteresis compensation mode
- Enhanced system safety by reading parameters from Newport ESP compatible stages

PZC200

NanoPZ Controller ►

- High reliable operation with 30 nm motion sensitivity over 12.5 mm travel
- 10x faster speed (>0.2 mm/s)
- No loss of position with removal of power; ideal for set-and-forget applications

iPico™



◄ Picomotor Controller

- Easy-to-use, flexible controllers and drivers
- Our Intelligent Picomotor™ (iPico™) controller and drivers are modular
- Daisy chain up to 93 standard Picomotors or 31 closed loop Picomotors
- Interface options include joystick, handpad or computer control or use the TTL/Analog driver

NSC200

◄ NewStep™ Expandable Motion Controller System

Compact, hand held, single axis controller for NewStep actuators, MFA-PP linear stages, CMA-PP actuators and NSR1 rotators

Expandable - the NSC-SB allows control of up to 8 axes with one NSC200 controller

RS485 communications link for computer control

Manual adjustment knob allows convenient remote control at variable speeds and increments

NPC3/NPC3SG

3-channel Piezo Amplifier ►

Compact, 3-channel piezoelectric amplifier

Manual, analog and computer control

RS232 and USB interface

Low-noise voltage output (0.3 mV rms@500 Hz)

QVGA color display

Agilis™ AG-UC2 & AG-UC8

◄ Agilis™ Series Controllers

Compatible with all Agilis piezo motor-driven products

Available in: 2-channel hand-held AG-UC2 or the 8-channel AG-UC8, both with USB interface

Available in the 8-channel AG-UC8PC, with USB, RS232 and RS485 interfaces

ASCII commands, DLL's and LabView VI's included

Optional USB power supply

CONEX-IOD

General purpose Input/Output Module ►

Digital inputs: 4 channel, +5 V pull-up

Digital outputs: 4 channel, open drain

Analog inputs: 2 channel, ±1 V, ±10 V, 1 V or 10 V, programmable
12-Bit resolution, 50 Hz analog bandwidth

Analog outputs: 2 channel, ±10 V or 10 V programmable
12-Bit resolution

Application-Specific Standard Motion Products

Micromanipulators

Micromanipulators provide researchers with precision motorized, hydraulic or manual positioners in electrophysiology applications like patch clamping, intracellular recording or micro-injection.

◄ Motorized Micromanipulators

M3 micromanipulators have 3 motorized axis and features 25 mm travel and 0.079 µm resolution. Extremely stable and low noise. Includes 2 rotation stages for easy load and unload of pipette or amplifier headstage. Left- or right-hand versions for mounting on the left or on the right of the microscope. Includes control knobs dedicated to each linear axis. Knob control has a range of slow to fast motion, with the ability to home to a switch location. Software utility allows customization of speed and sensitivity of knob control.

3-axis Hydraulic Micromanipulator ►

MW high precision three axis hydraulic micromanipulators are specifically designed for patch clamping, intracellular recordings and microinjection. MW micromanipulators are engineered to provide high precision, low drift, smooth responsive motion, and long and reliable product life. A proprietary hydraulic mechanism reduces drift to less than 1 micron per hour at constant temperature, while providing enough travel for fine positioning. Water, the hydraulic medium, has a thermal expansion 2 to 3 times less than that of an oil-based fluid. The hydraulic mechanism is designed for field-refill if needed.

◄ 5-Axis Precision Micromanipulator

5-axis precision micromanipulators incorporate crossed-roller bearings for smooth and precise motion and a rack-and-pinion drive for fast positioning. They are specifically designed as a coarse positioner to complement the MW series hydraulic micromanipulators in high-precision and high-stability applications. For general physiology tasks, the M5 can also be used as a stand-alone micromanipulator.

Metrology

The LDS-Vector electronic autocollimator performs high resolution angular measurements for alignment, quality assurance, and metrology applications. Featuring a highly collimated, 670 nm laser diode, the LDS-Vector allows for non-contact measurements over long working distances of up to 20 meters

LDS-Vector Electronic Autocollimator ►

- 0.1 µrad resolution for high resolution angular measurements
- 2 kHz sampling frequency allows vibration measurements
- Visible laser diode (Class II) and integrated eyepiece with ±15 mrad field of view provide quick and easy alignment
- Controller includes RS-232-C, IEEE-488 and analog outputs

Optical Delay Line Kit

The Optical Delay Line Kit provides researchers and scientists with all the necessary components to create a high quality free-space optical delay line assembly. The ODL-OPT allows users to choose among the most widely used options for motorized positioning, optics, mechanics, beam delivery and steering in a combined kit. Delay options range from 333 ps up to 4000 ps maximum delays and delay position sensitivities from 0.07 fs to 8.33 fs. Optical access heights range from 2.9 in to 5.5 in depending on the motion option selected. These motorized positioners are combined with Newport controllers to ensure easy integration with high performance. The various optics and opto-mechanical options have also been selected to ensure the appropriate performance for the delay application.

Motion Option	Travel Range (mm)	Stage Model	Stage Resolution/Sensitivity (nm)	Maximum Delay (ps)	Delay sensitivity (fs)
Standard Performance					
01	50	LTA-HS, UMR8.51, ADAPT-BM17-375, M-BPN-8 [1]	100	333	0.67
02	100	ILS100CC [1]	500	666	3.33
03	200	ILS200CC [1]	500	1333	3.33
04	400	IMS400PP [2]	1250	2666	8.33
05	600	IMS600PP [1]	1250	4000	8.33
Premium Performance					
10	25	VP-25XA [1]	100	167	0.67
11	50	ILS50CCHA [1]	100	333	0.67
12	100	ILS100CCHA [1]	100	666	0.67
13	200	ILS200CCHA [1]	100	1333	0.67
14	400	IMS400CCHA [2]	100	2666	0.67
15	600	IMS600CCHA [2]	100	4000	0.67
High Performance					
20	25	VP-25XL [2]	10	167	0.07

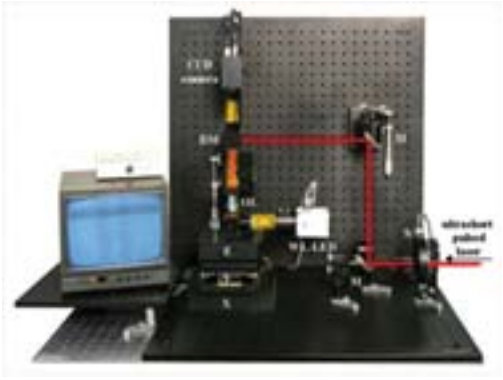
[1] Includes ESP301-1G. [2] Includes XPS-C4 and XPS-DRV03.

Beam Stabilization

GuideStar™ Universal Beam-Stabilization Controller ▶

- Integrated controller/driver for 4-axis active beam-stabilization
- Auto-configuration for easy setup
- Flexible standard interfaces including USB, Ethernet and RS-232
- Easily connects to standard motorized mirrors and beam-position detectors

Paired with the New Focus™ position-sensing detectors and the Picomotor™ actuated motorized mirror mounts, the GuideStar™ Controller provides high-precision compensation for laser pointing and position drift.



◀ Workstation for Laser Direct-Write Processing

- Flexible device for Laser-Direct Writing processes
- Easy to assemble with standard off the shelf Newport Corp. parts
- Easy to couple with CW, ns, and fs lasers
- Real-time imaging of microfabrication trough bright-field transmission light microscopy
- User-friendly interface

The M-LDW-KT workstation for laser direct-write processing is designed to be integrated with several lasers to perform both 2D and 3D micromachining in different materials. In this solution from Newport, high-end stages are stacked on top of each other in order to move the sample around a fixed laser beam.

Branded Products

Agilis™ – Piezo Motor Driven Positioners

The new Agilis™ series of piezo motor driven miniature positioners takes a new approach to the adjustments needed for many optical setups. The Agilis series provides the ultra-high adjustment sensitivity and convenient remote operation of a motorized positioner at the price and size of a high quality manual component.

- Convenient, hands-off remote or computer automated adjustment of critical optical setups
- Impressive 50 nm (0.2 arcs) adjustment sensitivity
- Ultra-compact, ideal for space constrained setups and system integration
- Set and forget long term stability
- Comparably priced to a high quality manual component

Conex™ – Photonics Control Devices

The affordable Conex™ family of compact, photonics control instruments. features three new devices that connect easily via USB plug-and-play technology and allow simple, but highly functional PC-computer control solutions. Multiple units can be connected to a single USB port and for CONEX-PSD9 and CONEX-IOD models, the USB port also powers the modules, eliminating the need for additional power supplies and/or cables. The intuitive LabVIEW-based utility program software provides a graphical user interface (GUI) for each module. A comprehensive set of LabVIEW VIs (virtual instruments) is also available.

Picomotor™ – Piezo Motor Actuators

- <30 nm resolution in a compact design
- Set-and-forget long-term stability- these actuators stay put
- Lifetimes of 1,000,000,000 steps

New Focus™ A Newport Corporation Brand

Picomotor™ actuators are ideal devices for motorizing fine-positioning stages and mounts in your optical or mechanical systems. Use them with our opto-mechanical translation stages or your own custom devices. They have better than 30 nm resolution with minimal backlash, and can exert a 22 N (5 lb) force. Moreover, they have exceptional long-term stability and the ability to hold their position with no power applied. These last two features make the Picomotor actuators unique among motion-control devices and ideal for typical set-and-hold applications.

NanoPositioning Stages




Piezoelectric-based, NanoPositioning products enable users to reliably manipulate samples and objects or adjust the beam focus in the nanometer realm. Applications include scanning, beam focusing, tool adjustment, sample manipulation, etc. Newport's piezo, NanoPositioning products include actuators, X, XY and XYZ stages, microscope focusing objectives, micrometer adjusters, ultra-fast steering mirrors and controllers. NanoPositioners feature high response and high speeds within their short travel range. Strain gage sensors enable higher repeatability and vacuum versions are also available as standard.

Vacuum Compatible Products

▲ URS75BPPV6
Rotation stage

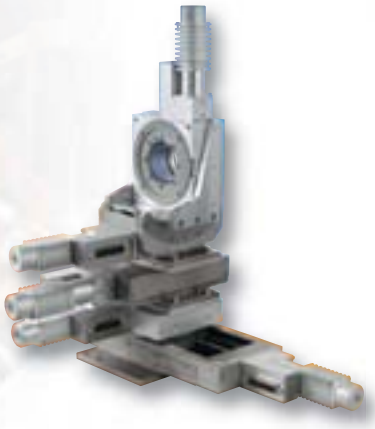
Procedures used at Newport to specially prepare products for use in vacuum environments ensure that our products will function as designed at pressure levels down to 10^{-6} hPa and at the same time not release unacceptable quantities of contaminants into the vacuum environment. For proper preparation, more information in addition to operating pressure is needed. Acceptable levels of outgassing, mass loss, and volatile condensable materials can vary with the application, pumping capacity, temperature, etc.

▲ LTAPPV6
Motorized actuator

▲ NSA12V6
Motorized linear actuator

▲ 8817-6-V
Motorized Stability™ mount

▲ M-UMR5XY-TRA12PPV6
XY stage



▲ *Vacuum compatible standard products assembly*

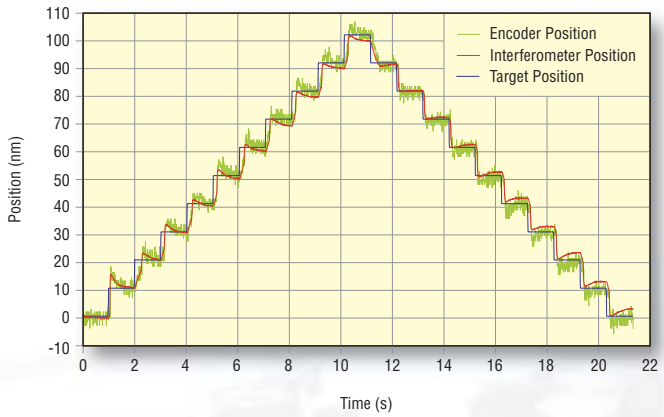
▲ *Agilis™ – Compact piezo driven optical mounts*

User Friendly ESP Technology

Exclusive to Newport, ESP is a proprietary, communication recognition channel system between stages and electronics. Minimizing system setup time and maximizing operational safety, this system brings you total peace of mind. Today, almost all our stages and electronics are ESP compatible. It couldn't be simpler - during system boot, the motion controller retrieves all relevant information from a memory inside the stage and either self-configures to the connected hardware or checks for conformance to a stored configuration. Newport's ESP is the only system that provides true plug-and-play compatibility, avoiding accidental damage caused by the wrong configurations.

Furthermore, our motion electronics are equipped with the most advanced features and high-level commands to minimize the time for system optimization and application development. Examples of this technology in use include:

- *Auto-scaling*
- *Auto-tuning*
- *Automatic jerk settings*
- *Auto-tracking*
- *Unidirectional motion mode avoiding the effects of backlash and hysteresis*
- *Free programmable event triggers*
- *Motion done trigger signal taking into account system settling times.*



Last but not least, all of our stages and electronics have standard mechanical and electrical interfaces for maximum compatibility and interchangeability. At Newport we do not only talk about ease of use, we apply it.

Engineered Systems

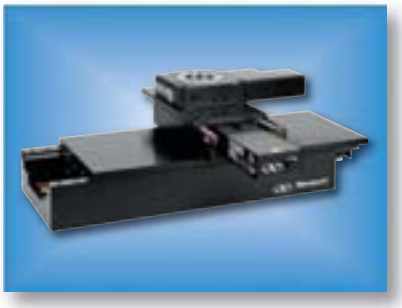
In addition to an extensive offering of standard motion products and OEM work, Newport provides custom motion systems tailored to unique application needs. Our systems engineering team is focused on developing high precision custom systems solutions for research and industrial end users. Whether you require an adaptation of a standard product, a simple sub-assembly or a complex multi-axis system, Newport is your right partner. We shall assist you with the feasibility study of your application, recommend the solution that best meets your needs, and provide support throughout the lifetime of the motion system. In addition and up to final acceptance, our systems engineering department provides project management that ensures timely delivery of a motion system that meets or exceeds the expected system performance. The latter is guaranteed by extensive testing and metrology during the manufacturing process as well as on site.

Four levels of custom motion systems are typically provided:

1. Adaptations of Standard Products

Whether the change involves a cable, mechanical adapters, metrology, or an environmental preparation of a motion component, the systems engineering team handles your special adaptation requirements with highest efficiency.

◀ *Vacuum compatible* LTA *actuator: Most of Newport's positioners can be prepared for vacuum environments up to* 10^{-6} *hPa, in some cases up to* 10^{-9} *hPa*



Example of an X-Y-theta assembly entirely built by standard products: Newport provides orthogonality and sphere of confusion alignments including metrology reports upon request. ▶

◀ *Newport offers custom length or environmentally prepared cables that ensure the integrity of your application.*

Newport provides clean standard solutions for cable routing including supplementary cables and vacuum tubes per individual requirement. ▶

2. Special Motion Devices

For years, Newport's systems engineering team has been designing and manufacturing special motion devices for niche applications such as high energy laser fusion systems and synchrotrons. Examples include high class clean room compatible, high-load motorized actuators, binary inserter devices, motorized mirror mounts, very long travel linear stages, and large scale rotation stages.

▲ *Actuator:*
High resolution and high load capacity actuator for high power laser facility mirror mount. High level of cleanliness.

▲ *TBU stages (travels 400 to 1600 mm):*
High load capacity and high geometry quality to build test bench for large component metrology like large mirrors, antennas, concrete block, etc.

▲ *RTN660:*
High load capacity rotary stage for building diffractometers for synchrotron.

3. Sub-Assemblies

These are economical solutions made exclusively from Newport's standard catalog components. We add value by optimizing the performance level of these components to your requirements and commit ourselves to the global specifications of the system by performing metrology before delivery.

◀ *Sensor calibration bench for car-safety systems in automotive industry. 11 catalogue stages in 3 stacks with custom brackets and interface plates.*

This three axis rotation system is used to position specimens and sensors in 3D space for simulation and calibration. ▶

◀ *Target positioner:*
High vacuum system to position the target in a high power laser facility.

Azimuth/elevation gimbals: This system is used for calibration measurement of a 150 kg rangefinder. ▶

4. Advanced Customized Systems

These tailor-made pieces of technology represent the pinnacle of Newport's system design capabilities. In addition to the traditional electro-optical components, these multi-faceted systems typically include application specific sensors or devices, application software and system-level safety features. System level safety features are not limited to safety interlocks, but can include collision and simulation algorithms. Metrology and testing are two of the most intensive phases of the development of these systems that clearly distinguish their superb performance on site. Examples are: X-ray diffractometers, metrology systems, and various sample positioners.

◀ *Newport designs and manufactures motorized mirror mounts for high power laser facilities. These mounts accommodate a variety of large optics for laser beam up to 600-mm diameter in very demanding environmental conditions (cleanliness, vacuum).*

Air-bearing system:
This system was designed for large-scale assembly and testing of optics. The multi-axis system features a very rigid silicon carbide and granite structure for superior stability and flatness, 19 motorized axes for alignment and positioning and 2 long travel air-bearing stages driven by linear motors. ▶

◀ *X-ray diffractometers are full custom and turnkey systems used to study the structure and properties of materials. About 30 diffractometer systems in synchrotrons all over the world serve the scientific community in a large variety of application fields.*

6-axis sample stage:
A compact, fully integrated stage including 3 translations and 3 rotations for the positioning and orientation of loads up to 150 kg. The sphere of confusion of the 3 rotation axes is 25 µm. ▶

▲ *Vibrometer test bench:*
3-axis system used at the LCPC (Roads and Bridges laboratory) to measure the density of large concrete blocks. A shock is created in one point with an explosion, the resulting vibrations are measured in another point. Transfer function analysis gives knowledge of the concrete density.

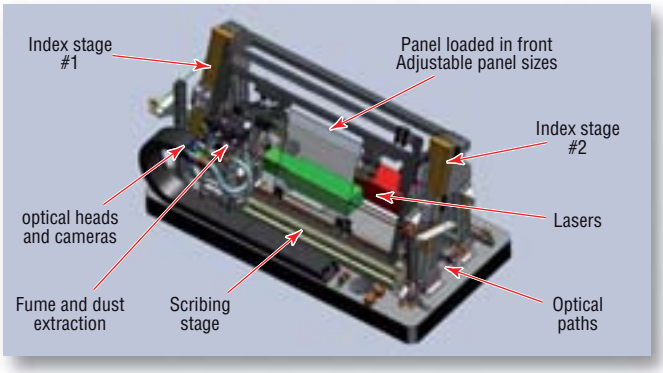
▲ *Sample positioner:*
2-tons sample positioner for Neutron synchrotron.

▲ *LB Leveling base:*
High precision 5-axis heavy motorized base used for leveling and positioning a complete optical system. Tripod system, vertical range ±100 mm, tilt ±2.5°. 3000 kg centered load capacity. Optional air-bearing kit.

SolaryX® – Laser Scribing Solutions for Thin-Film Photovoltaic Cells

Newport's SolaryX® Laser Scribing solutions provide fast, scalable and accurate thin-film processing techniques for a broad range of substrates and materials. These turn-key systems combine Newport's full breath of knowledge and expertise in the fields of lasers, motion control, optics, precision mechanics and vibration isolation.

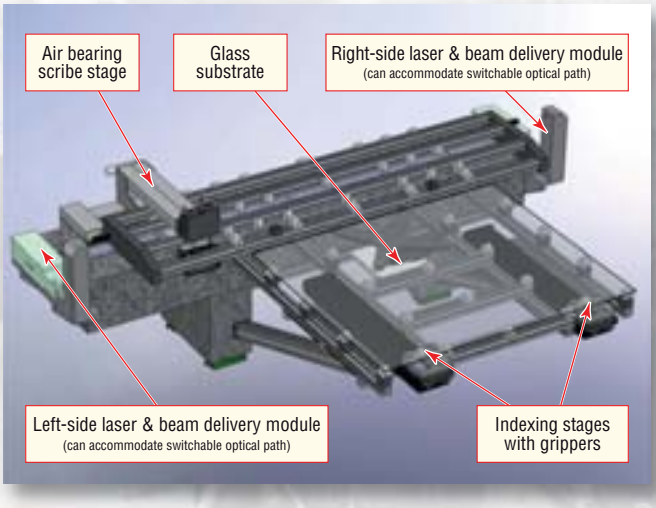
▼ SolaryX 420 Laser Scribing System for Research & Process Development



The SolaryX 420 is a flexible, manual load laser system designed for scribing the interconnect patterns of thin-film-on-glass solar panels up to a size of 420 x 420 mm. Utilizing lasers operating at 355 nm, 532 nm or 1064 nm, this system is ideally suited for prototyping and process optimization prior to full-scale thin film solar panel production and also for research and development of higher-efficiency cell architectures.

▼ SolaryX® 1250 Laser and Mechanical Scribing System for Process Development

The SolaryX® 1250 is a flexible, semi-automated system designed for scribing of interconnect patterns of thin-film-on-glass solar panels up to a size of 650 x 1650 mm. Laser scribing of P1/P2/P3 layers is accomplished with IR, Green or UV lasers through the glass, while mechanical scribing of P2/P3 layers can also be implemented from the top side of the glass. This system is ideally suited for process optimization and pilot lines prior to full-scale thin film solar panel production.



OEM – Developing for the Future

«Our reputation as the leading OEM motion supplier is hard-earned. Our product performance, cost, delivery, and quality directly impacts your competitiveness – and that is why we get it right the first time!»

Our dedicated OEM group focuses solely on the unique requirements of OEM customers. This experienced, professional department was developed as a small worldwide group within a large company – hence, you get the best of both worlds. Draw upon the resources that a large company offers and get the individualized service and rapid response of a small company.

Your Project Matters

Our OEM strategy is to offer our customers a competitive advantage in their marketplace by providing direct access to our expert resources – engineering, manufacturing, logistics, and service organizations. We thoroughly evaluate a product, sub-assembly or sub-system from every angle to perform a rapid and in-depth feasibility review. During this initial assessment process, we determine the value we add based on our core technologies and competencies.

Working as Part of Your Business

We are with you every step of the way, with a team consisting of engineering, manufacturing, logistics, marketing and customer service for maximum support. We view this team as an integral part of your organization that reports directly to your project team.

Discretion at All Times

Your program's confidentiality is imperative and we make special provisions to ensure that the highest levels of confidentiality are maintained. Non-disclosure agreements are signed up-front before we begin technical discussions and design ownership issues are firmly established. Upon request, Newport will dedicate work cells for your application to ensure total confidentiality within our company for your own peace of mind.

Full Design and Manufacturing Control

Newport's OEM project leaders use a controlled procedure to manage your project. Complete BOMs are developed and controlled through our formalized ECO process with all assembly and test procedures fully and formally documented.

The Optimum in Quality Control

ISO 9001
FM 27207

Newport operates under the ISO 9001 registered quality system. As a result, our exemplary quality system is audited by a third party. As a further measure of our commitment to quality, we perform internal audits routinely to ensure we are compliant with our procedures. At Newport, we ensure that quality is built into the process and monitor quality through closed loop performance metrics.

We Put It Right

Should things not go according to plan, Newport has put in place closed loop corrective action systems. Complaints are entered into our customer management database and made directly accessible to our executive staff. This information is then reviewed for immediate corrective action. Once the root cause and course of corrective action has been determined, this information is provided to you in writing.

Examples of OEM Products

Newport is at the cutting edge of OEM technology and design, delivering standard and bespoke value for money solutions in materials, manufacturing, assembly and motion control. Our solutions serve a broad variety of applications from lithography and photovoltaics to industry, research and defense.

◀ Laser Radar Atmospheric Observation

High-speed, low profile rotation stage developed for a LIDAR *remote atmospheric observation system. The stage is based on the* URS100 *rotation stage and features a precision belt drive to achieve a scanning speed of* 720 °/s. *The wobble error is maintained within* 50 µrad.

Automotive Sensor Testing ▶

Standard BGS80PP *Goniometric cradle with custom stepper motor used for quality control of adaptive cruise control sensors for the automotive industry. Another application for the same stage is for calibrating laser targeting systems. These goniometric cradles rotate on a transverse axis above the platform and offer maximum free access to the rotating part. This simplifies system layout compared to the use of* 360° *rotation stages.*

◀ Aviation Simulation

Azimuth/elevation system used for image alignment within a professional aircraft simulator. The system is made of standard rotation stages with custom brackets and metrology.

3D Micro-Fabrication ▶

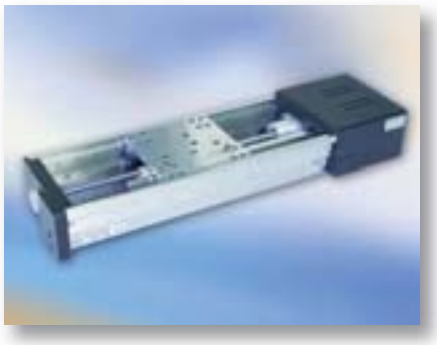
X-ThetaZ-Y-ThetaZ motion system for high accuracy 3D micro-fabrication of ceramic components by micro-deposition (ink-jet technology). Newport developed and delivers the complete motion platform including granite structure, cable management and control electronics. The application requires a dynamic accuracy of ±3 µm accuracy over 300 x 300 mm while the stage is moving at 500 mm/s speed. Other demanding requirements are less than 300 ms settling time and 20 nm incremental motion on the lower Y-axis.

◀ Electrical Discharge Machining

XYZ linear stage assembly for electrical discharge machining. The application requires high repeatability in XY and very high stiffness and straightness in vertical direction. More than one hundred of these machines are installed worldwide and have continued to work successfully many years, 24 hours per day.

DNA Analysis ▶

Linear stage developed for a high-throughput DNA microarray scanner. The stage is capable of performing 5 µm incremental steps in less than 100 ms with high precision and at a high duty cycle. To meet this demanding throughput requirement, the drive chain stiffness and component reliability were specially adapted.



Single Molecule DNA Sequencing ▶

The NanoPZ actuators offer 30 nm incremental adjustment capability over 12.7 mm range. They are perfectly suited for alignment of crucial optical setups such as those included in single-molecule DNA sequencers. Newport delivers standard actuators and a special PC-card controller for this application.

◀ Optical Surface Profiling

This custom cradle assembly is used for motorized tip and tilt motion in an optical surface metrology system. The assembly allows large angle tilts without lateral motion of the field of view. As the system rotates the entire microscope scan head, a high load capacity and position stability is required.

Tactile Metrology for Optic and Automotive Industry ▶

3-axis part handling system for automated surface form and finish measurement of multi-featured parts. Newport supplies allow fully automated measurement routines to reduce operating errors and to free up operators time. The high stability and repeatability of the motion stack allows highly repeatable measurements, crucial especially when analyzing features such as small angles and radii.

◀ Film Thickness Measurements

Non-contact film thickness and refractive index measurement tool for the semiconductor and solar industry. This tool is mainly determined for R&D and off-line production quality control. The use of standard motion components allows a flexible adaptation to specific customer needs.

Semiconductor Wafer Metrology

This XY-ThetaZ motion system allows in-situ inspection of 300 mm wafers on a minimum footprint of 450 x 450 mm. Throughput, low-cost, accuracy, and cleanliness were major design criteria in the development of this sub-system, which can yield speeds up to 300 mm/s and 720 °/s and accuracies down to 10 µm over the surface area of the wafer.

Flat Panel and PCB Inspection

This system is used for large area 3D critical dimension metrology of flat panels and PCB's. The split gantry system allows inspection of large panel sizes up to 600 x 600 mm on a minimum footprint. Newport delivers the complete motion sub-system including granite, vibration isolation and control electronics.

Maskless Lithography and Micro-Manufacturing

This special version of our LTA actuators provides 120 N axial load capacity, a non-rotating tip and spherical joints on both sides. It is perfectly suited for building custom multi-axis motion devices. Typical applications are custom Z-tip-tilt platforms for micro-manufacturing, maskless lithography of PCB's, and flat panel processing/inspection.

Laser Scribing of Thin-Film PV Cells

Newport's IMS-LM linear motor stages provide fast and accurate scribing of PV substrates yielding the smallest possible dead zones.

Quality Control

Hexapods offer motion in all 6 degrees of freedom (XYZ, tip, tilt, and rotation) in a very compact envelope and with maximum access to the moving platform. They are ideally suited for complex quality control, simulation or calibration systems that need to control several degrees of motion.

Precision Actuation in Engineered OEM Sub-Systems

New Focus™
A Newport Corporation Brand

▲ *Integration of precision actuators into custom-designed beam-alignment systems.*

- *Picomotor™ OEM actuators with <30 nm precision*
- *OEM high-speed actuation platform*
- *Engineered sub-systems*
- *Sophisticated control electronics*

Our New Focus™ precision Picomotor™ actuators are widely used in OEM applications including semiconductor lithography, industrial manufacturing, metrology and test applications. Picomotor actuators deliver 30 nm set-and-forget precision motion control and are customized for UV, vacuum, high-radiation, e-beam and other OEM environmental conditions. For instance, our Ultrahigh-Vacuum (UHV) Picomotor actuators and Picomotor Actuator Ultra are very low-outgassing actuators proven in demanding OEM applications. For closed-loop performance, these actuators can incorporate encoders.

Additionally, we provide engineered OEM sub-systems incorporating our Picomotor actuators and customized OEM opto-mechanical components and assemblies. These OEM precision motion control solutions are engineered for OEM-specific requirements and are customizable for OEM environmental conditions.

To complete the solution, we also deliver sophisticated control electronics to drive the actuators using feedback from other sources. Beyond our standard drivers and controls, we engineer custom control electronics for OEM applications.

Partnering for Success – Newport's OEM Technology Platforms

Newport has built upon decades of experience in motion solutions to partner with customers in creating customized OEM technology platforms that cater to application-specific needs. These platforms have been successfully implemented in partnership with OEM's in the semiconductor industry in wafer inspection and lithography applications, for example. Other applications include flat panel display (FPD) inspection and processing and laser scribing of thin-film photovoltaic panels.

These customized technology platforms are designed from leading technologies and combine the collective knowledge of Newport in materials, manufacturing, assembly and motion control. Technologies such as air bearings, linear and rotary ball bearings, high resolution direct encoders, linear motors, piezos, flexures, ceramic materials and vibration isolation are optimally integrated into these platforms to address the customer's specific requirements. A major part of this technology knowledge comes from supplying numerous and proven standard motion products over the years to industry, research and defense.

Generally, Newport supports the customer's product development process by engaging early on with collaborative discussions on the requirements and solutions until the optimum platform that meet those requirements is agreed upon. Collaboration continues past stages of development into the actual implementation of the platform into the customer's final product.

OEM Project Leaders

We are with you every step of the way, with a team consisting of engineering, manufacturing, logistics, marketing and customer service for maximum support. We view this team as an integral part of your organization that reports directly to your project team.

Your Foundation of Support

Behind our OEM group are highly skilled teams of engineers and scientists who help you configure a solution to your specific application. Working together on an open exchange, collaborative basis to solve problems has proven to be the fastest, most efficient method to deliver results.

Service and Support

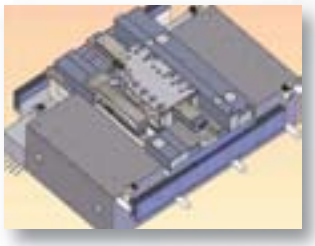
Newport has a global infrastructure to ensure that after sales service and support extends on-site, at your facility or your customers facility. Our ability to solve your problems has no borders or time restrictions. Cooperative service agreements and extended warranties for specific support levels are available. Our factory-trained technicians bring test equipment and spare parts on-site to service our systems. Metrics can be established to track your product's service history.

Air Bearing Stage Capabilities & Solutions

Newport's reputation for being the premier supplier of high-precision motorized stages is exemplified by our full line of Air Bearing Positioning Systems. From the all-new DynamYX® Datum™ capable of 5 G acceleration and nanometer accuracy to the evolutionary HybrYX™ air and mechanical bearing "hybrid" stage, Newport has the knowledge and expertise needed to address the most complex and demanding motion control applications.

Newport currently offers air bearing solutions from three families of products. For the highest levels of positioning performance in all categories DynamYX offers single-plane air bearing designs for both wafer and reticle applications. The HybrYX™ family blends mechanical bearings with air bearings in a single-plane architecture to provide a cost-effective solution for applications where performance is only needed in a few key areas. For single axis, split XY, and gantry applications the SinguLYS™ line of stage and self-supporting bridge configurations combine high performance with modularity ideal for a wide range of markets. Within each of these three families are a variety of features and options intended to suit the specific needs of your application.

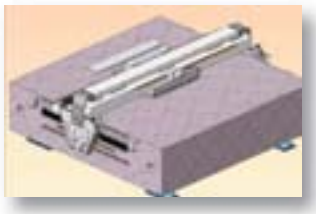
DynamYX® Technology



- *Single plane XY air bearing*
- *Granite base*
- *Ceramic moving elements*
- *Integrated pressure vacuum air bearing elements*
- *Ultra-low profile architecture*

DynamYX air bearing stages are focused on applications requiring the highest levels of accuracy, repeatability, and overall system throughput.

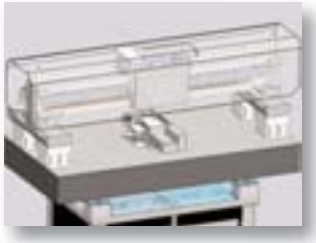
HybrYX™ Technology



- *Single plane XY air bearing hybrid*
- *Granite base*
- *Ceramic Y-axis carriage*
- *Integrated pressure vacuum air bearing elements*
- *Truck-and-rail mechanical bearings*

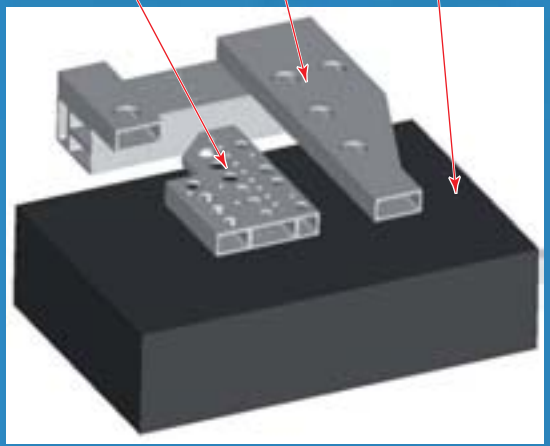
HybrYX stages are engineered to provide exceptional velocity regulation, straightness, flatness, and MTBF.

SinguLYS™ Technology



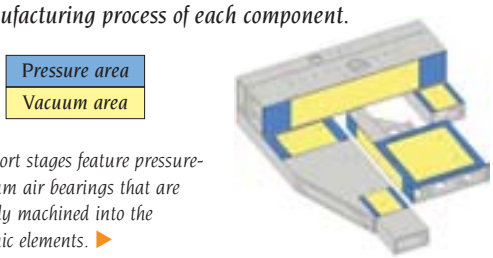
- *Single-axis air bearing*
- *All-ceramic construction*
- *Integrated pressure vacuum air bearing elements*
- *Stage and bridge configurations*

SinguLYS family provides a modular approach for single-axis, split-XY, and long-travel Gantry Applications.



Clean and Simple Architecture of DynamYX includes Three Monolithic Elements

Newport's philosophy of "designed-in" precision is a shared feature of all Newport air bearing stages. Our designs minimize the number of stage elements (bases, carriages, reference surfaces) and incorporate critical alignment (reference) features as to greatly reduce and/or eliminate the need for complex (and costly) assembly, alignment, and testing procedures. This design philosophy is realized by creating monolithic structures with integral tolerances that are part of the manufacturing process of each component.



Newport stages feature pressure-vacuum air bearings that are directly machined into the ceramic elements. ▶

DynamYX® Family of Stages for Semiconductor Wafer Processing and Inspection

With the launch of the 300 mm wafer initiative more than a decade ago, DynamYX was designed to provide equipment manufacturers in the semiconductor industry with a tool capable of achieving the highest levels of precision and throughput. DynamYX provides high resolution dynamic positioning of a wafer chuck or other similar substrate in two orthogonal translation axes from a single-plane carriage. A vertical (Z) axis with tip-tilt function and a rotary axis for wafer offset correction may be added on the carriage beneath the wafer chuck. Over the years, the form and function of DynamYX has evolved to keep pace with customer requirements. Today the DynamYX family consists of four specific designs each with their own specific features and benefits:

▼ DynamYX® 300

Key Performance Values

- *Acceleration*: 0.75 G X-Axis, 1.5 G Y-Axis
- *Velocity*: 400 *mm/s*
- *Repeatability*: ±50 *nm (long term)*
- *Accuracy*: 0.4 *µm*
- *Travel range*: 520 *x* 340 *mm*

Newport introduced the DynamYX 300 more than 10 years ago as the first single-plane dual-axis Air Bearing system for 300 mm wafer inspection applications. Today, it is still a very capable solution for demanding applications such as wafer bump inspection, nano imprint lithography, laser direct writing, or optical calibration, and provides the smallest footprint of all DynamYX stages.

▼ DynamYX® GT

Key Performance Values

- *Acceleration*: 1.2 G X-Axis, 2 G Y-Axis
- *Velocity*: 800 *mm/s*
- *Repeatability*: ±50 *nm (long term)*
- *Accuracy*: 0.3 *µm*
- *Travel range*: 520 *x* 340 *mm*

Similar in design to the DynamYX 300, the DynamYX GT is intended for higher throughput applications with aggressive duty-cycles such as optical lithography or memory repair. Compared to the DynamYX 300 stage, the GT version has larger linear motors with integrated cooling in X & Y, a second (X2) linear motor, and more rigid structure with larger air bearings for increased load capacity.

▼ DynamYX® Datum™

Key Performance Values

- *Acceleration*: 3 G X-Axis, 5 G Y-Axis
- *Velocity*: 1000 *mm/s*
- *Repeatability*: ±25 *nm (long term)*
- *Accuracy*: 0.2 *µm (linear encoders)*
- *Natural frequency*: 300 Hz

The all-new DynamYX® Datum™ achieves performance never before possible in a commercially available air bearing stage. Datum is the bi-product of Newport's continuous investment in advanced materials, proprietary fabrication techniques, and meticulous structural analysis and design. Our goal in creating Datum was to provide our customers with accuracy and throughput needed for today's most demanding semiconductor applications as well as the ability to stay-ahead of tomorrow's challenges. The DynamYX Datum stage meets the most challenging requirements for high aspect ratio wafer inspection, and optical or nano imprint lithography.

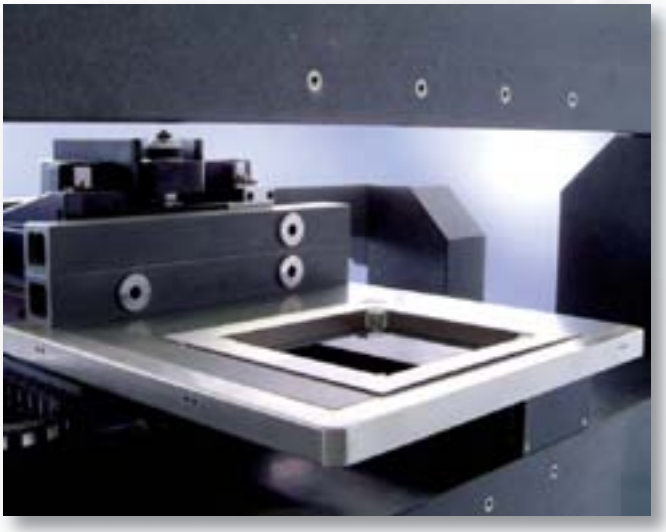
Key Performance Values

- *Travel range*: 290 *x* 155 *mm*
- XYZ *position stability*
  – *On-air*: ±10 *nm*
  – *Clamped*: ±1 *nm*
- XY *repeatability* [1]: ±50 *nm*
- XY *accuracy* [1]: 1 *µm*
- *Natural frequency (reticle holder)*: 400 Hz

[1] *After clamping.*

The DynamYX® RS is dedicated to reticle inspection and repair applications. It is based on the same single plane architecture found in the DynamYX 300 & GT stages with a cantilevered substrate holder located away from all moving elements of the stage providing the cleanest possible environment. The full-open-aperture accommodates flexible optical component integration as well as ease of service access. The footprint of this architecture is much smaller than traditional open-frame solutions.

▼ DynamYX® RS Reticle Stage



HybrYX™ – High-Performance Solutions for Semiconductor Wafer Inspection, Flat Panel, PCB and Photovoltaic Applications

The HybrYX™ single plane XY hybrid stages provide the advantages of a single plane air bearing stage at a much lower cost than previously possible. HybrYX is well suited for semiconductor wafer inspection systems as well as being an excellent choice for use in large substrate (flat panel display and photovoltaic panel) inspection and processing tools.

▼ HybrYX™ XY Hybrid Air Bearing Stage

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 for demanding scanning applications.

Key Performance Values

- *Travel range*: 350 *mm* (*step*) *x* 650 *mm* (*scan*)
- *Acceleration*: 0.3 G (*step*)-Axis; 0.6 G (*scan*)-Axis
- *Scanning velocity*: 600 *mm/s*
- *Better than* 0.1% *velocity ripple*
- *Step-and-settle time* (25 *mm*, ±40 *nm*): <350 *ms*
- *Accuracy*: ±1 *µm* (*over* 300 *x* 600 *mm*)

▼ HybrYX™ G5 Large Substrate Positioning Stage

The HybrYX™ G5 is closely based on the smaller HybrYX stage, but with larger ceramic carriage and Y-axis beam. It is well suited for up-to Generation 5 flat panel display substrates or photovoltaic panels.

Key Performance Values

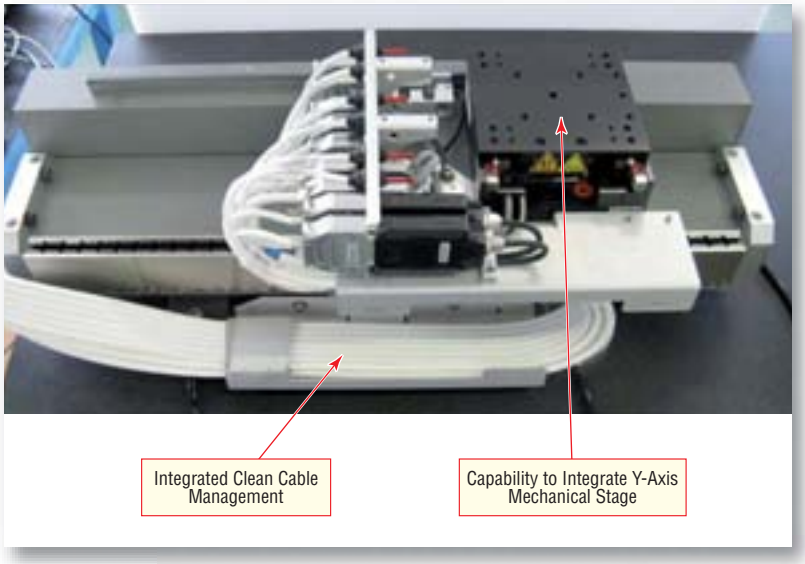
- *Travel range*: 450 *mm* (*step*) *x* 1400 *mm* (*scan*)
- *Acceleration*: 0.15 G (*step*)-Axis; 0.25 G (*scan*)-Axis
- *Scanning velocity*: 1200 *mm/s*
- *Better than* 0.1% *velocity ripple*
- *Step-and-settle time* (25 *mm*, ±40 *nm*): <350 *ms*
- *Accuracy*: ±3 *µm* (*over* 400 *x* 1200 *mm*)

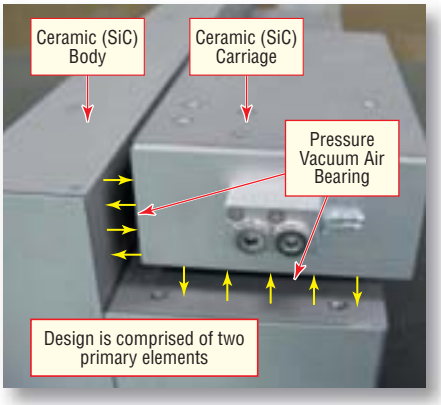
◀ *The G5 stage is available with an optional Z-Tip-Tilt-Theta stage which incorporates Newport's patented flexure guide found in the DynamYX GT stage. Like the DynamYX version, Active Plane™ drive technology provides fast, repeatable, and stable positioning for active surface tracking applications.*

SinguLYS™ – Single Axis Air Bearing Stage and Bridge

SinguLYS™ S-370 Air Bearing Stage ▶

Newport's SinguLYS™ S-Series stage features ceramic components similar to those found in the DynamYX and HybrYX families. The light-weight carriage with integrated pressure-vacuum elements is guided by a precisely lapped ceramic (L-shape) body. The rigidity and compact footprint of the SiC body allows this high-precision stage to be used in tight spaces typically reserved for mechanical bearing designs. The S-370 is perfect for applications with very high duty-cycles and require low pitch/yaw, tight velocity regulation, and high cleanliness.





- *Ceramic body provides extremely straight and flat reference surface over full travel of stage*
- *Ceramic carriage provides thermally stable reference and low moving mass*

Key Performance Values

- *Travel range*: 370 *mm*
- *Incremental motion*: 10 *nm*
- *Max. speed*: 500 *mm/s*
- *Max. acceleration*: 0.5 G
- *Payload*: 5 *kg*
- *Controller*: XPS / DRV02
- *Dimensions (mm)*: 640 (L) x 300 (W) x 150 (H)

SinguLYS™ B-1200 Air Bearing Bridge ▶

The Proprietary SiC ceramic beam used in the SinguLYS B-Series Bridge is 3 times lighter than steel and offers triple the stiffness of granite. These properties have allowed our customers to increase throughput in current and next-generation Flat Panel Display Inspection tools. The light and rigid pressure-vacuum air bearing carriage accommodates high (10 kg) cantilevered payloads and significantly reduces contamination to the payload below. Besides cleanliness, the frictionless design eliminates the need for mechanical bearing maintenance/lubrication.

Well suited applications include:

- *Gen 8-11 flat panel display processing*
- *Thin film photovoltaic scribing*
- *Precision pick & place assembly*
- *Laser micromachining*
- *Split XY wafer processing*

Key Performance Values

- *Travel range*: 1200 *mm*
- *Rated payload*: 10 *kg*
- *Max. speed*: 2.5 *m/s*
- *Max. acceleration*: 2 G
- *Efficient iron-core linear motor*
- *Natural frequency*: >100 Hz

ZT3 Z-Tip-Tilt-Theta with Active Plane™ Technology

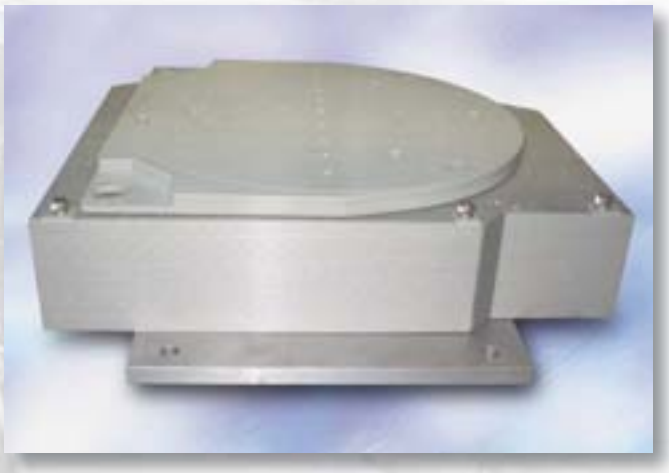
▲ ZT3 shown as integrated assembly with DynamYX GT air bearing stage.

Key Performance Values

- Travel Range: 5 mm Z; ±2 mrad (tip/tilt); ±3° (Θz)
- High resolution linear encoders directly measure movement of all voice coil driven axes
- Minimum incremental motion: 5 nm
- XY Stiffness: >200 Hz
- Step & Settle: 5 µm displacement in 40 ms settled to ±20 nm

The patented ZT3 (Z-Tip-Tilt-Theta) is designed for applications such as optical lithography or wafer inspection that require active alignments of a wafer/chuck in vertical, tip, tilt, and theta. The Active Plane™ drive technology provides high-bandwidth repeatable and stable positioning without compromising the dynamic performance of the XY stage. The ZT3 integrates cleanly within the SiC carriage of DynamYX® GT and DynamYX® Datum™ stages and is also available as a standalone version for use with other high performance XY stages. The compact design includes an air bearing theta off-set stage which clamps for ultimate stability and a lift-pin mechanism for simplified wafer loading and unloading. An optional piezo driven fine-theta axis with 0.1 µrad sensitivity may be added to allow for active yaw control/compensation.

The ZT3 concept is homogenous with the DynamYX GT/Datum concept in that they both follow low mass, low profile, high stiffness, and non-contact design philosophies. With a chuck surface height of 113 mm above the top surface of the reference granite, a DynamYX GT with integrated ZT3 is the industry's lowest profile 6-axis air bearing positioning system.



◀ Metal enclosure of standalone ZT3 shield internal components from surrounding environment

Capabilities in Advanced Ceramic Materials

Newport's expertise in ceramic materials is "home-grown" with a team of engineers specialized in material science and a fully equipped in-house machining center. These R&D and manufacturing resources allow us to quickly react to challenging customer requirements as well as maintain a constant effort in product advancements needed to keep pace with industry road maps.

The basic properties of these core (ceramic) components used in the construction of our products are low mass (density is similar to aluminum) and high strength or stiffness (Young's modulus similar to steel). In addition to stages which have very high accuracy and throughput capabilities, our systems are thermally stable with clean and repeatable transfer functions capable of being tuned with ease in applications requiring high servo bandwidth.

Beyond positioning in the XY plane, Newport offers several options for precise control in Z, Tip, Tilt, and Theta, and can provide integrated solutions which include ceramic wafer chucks, lift pin mechanisms, and precision SiC interferometer mirrors with cost-effective replicated optical surfaces. Requirements for integrated optical bridge structures are often met using our expertise in granite and/or ceramics. When used with our XPS and SPS motion controllers Newport's air bearing stages achieve the highest level of positioning performance by virtue of sophisticated control algorithms, multi-dimensional error mapping, proprietary low-noise encoder interpolators, and integrated interferometer control boards.

▼ Ceramic Wafer Chuck

◀ *SiC wafer chuck on DynamYX® Datum™.*

◀ *Support for 200 & 300 mm wafers, <2% backside contact, 100 nm flatness per 50 mm² area.*

Key Performance Values

Provides lower mass and greater flatness

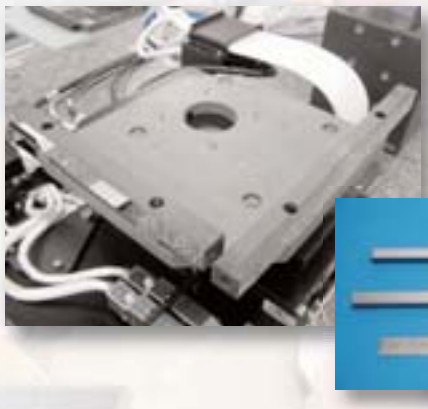
Thermal coefficient of expansion values of stage and chuck are matched
- *Allows for direct mounting of chuck to carriage*
- *Best possible wafer surface flatness and stability*

Minimal contact design for exceptional backside cleanliness

Key Performance Values

- *Two or three axis measurement at plane of wafer*
- *Ceramic (SiC) mirrors with master replicated surfaces*
  - *Allows for direct mounting of mirrors to chuck*
  - *Replica process yields exceptional mirror quality and is more cost-effective than lapping*
- *High thermal conductivity (> zerodur) minimizes thermal surface distorsion*
- *Rigid material with very high (~900 Hz) natural frequency*

▼ Interferometer Feedback and SiC Mirrors

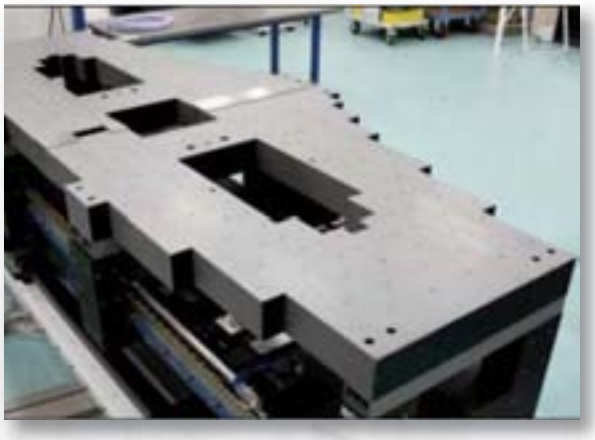


◀ *Ceramic plate with integrated (replica) interferometer mirrors on Newport XML crossed roller bearing stages can provide 50 nm XY bidirectional repeatability (when used with XPS controller and Renishaw interferometer).*

◀ *Thermally matched mirrors are directly affixed to ceramic wafer chuck.*

Very Large and Rigid Ceramic Bridge Structures

Most of our systems are delivered with an overhead bridge structure that allows direct integration of the optical system. The bridge structure is an important piece to meet the overall system performance as precision and position stability are typically defined between the wafer and a reference point on the bridge. Newport has tremendous experience in materials and structural analysis and provides the optimum design solution for each application.



Material Properties of SiC, Granite and Other "Traditional" Air Bearing Stage Material				
	Granite	***Steel***	***Aluminum***	***SiC***
Density: d	3	7.8	2.7	2.7–3.0
Young's Modulus: E, (GP*a*)	70	210	70	210–350
Stiffness (E/*d*)	23	27	26	78–115
Thermal Conductivity: TC (W/*m**K)	2	50	150	30–140
Thermal Expansion: TE (10^{-6}/K)	5	11	22	4.0–4.8

▲ *This material properties table above illustrates the advantages of Silicon Carbide (SiC) ceramic over other materials commonly found in stage and bridge designs. Newport has developed capabilities around several forms of SiC material and applies the technology according to the requirements of the given product or application.*

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