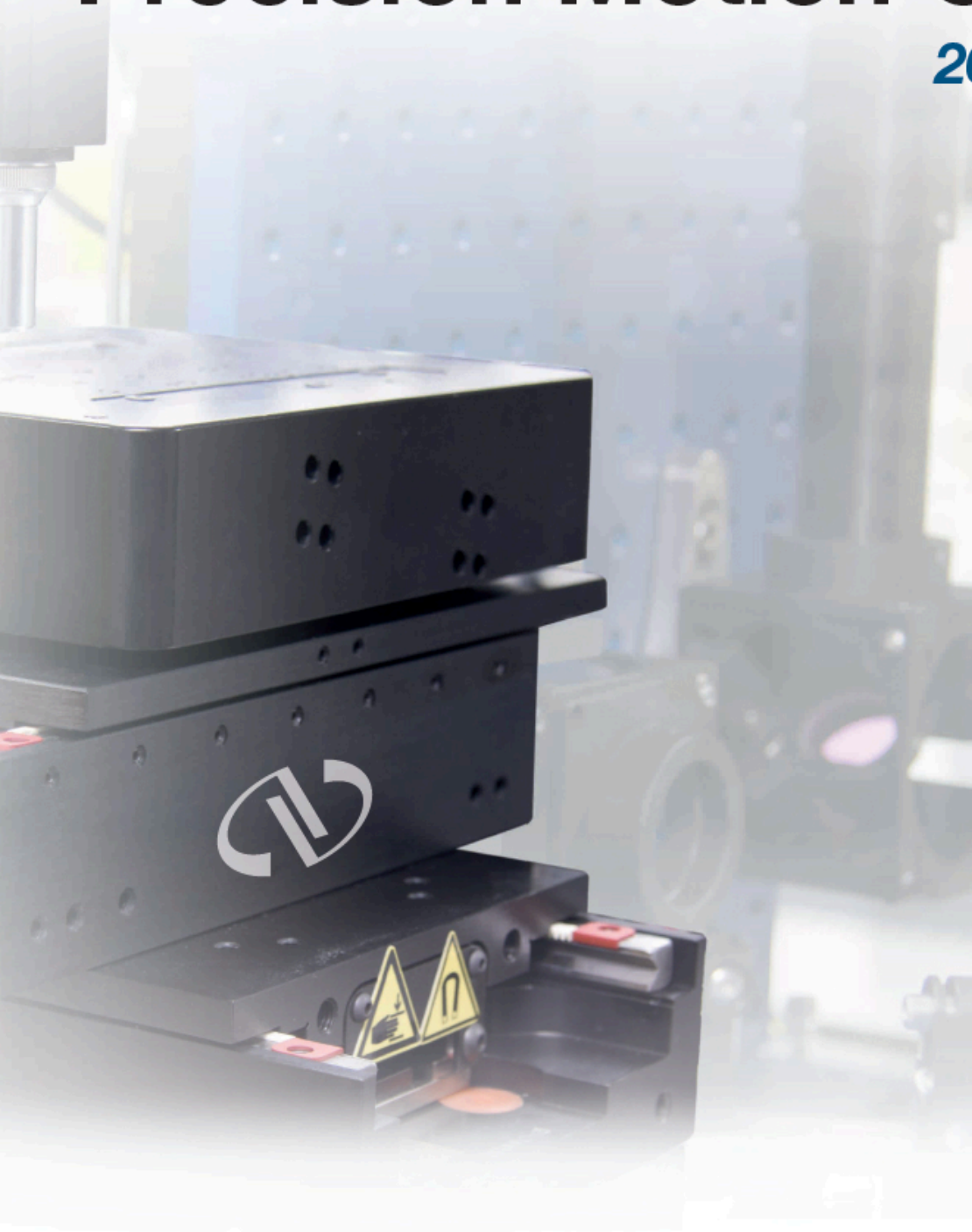


Precision Motion Control

2018 Catalog



Linear Stages



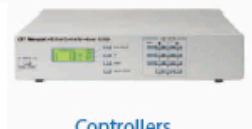
Rotation Stages



Actuators



Hexapods



Controllers



Air Bearing Stages

Global Availability and Service

Product Availability at All Times

Newport has three global stocking locations for standard Motion products, enabling orders to be delivered within the shortest possible lead time from the closest warehouse serving the US, Europe and Asia-Pacific. In addition, there are a few Newport offices and distributors that stock a limited number of motion products, which can ship locally from their inventory, reducing lead times and also delivery risk. Listed below are Newport sales offices that can assist with Motion product quotes and orders. Please check newport.com regularly for pricing and lead times and feel free to contact us for faster delivery.

Irvine, CA, USA
800-222-6440
sales@newport.com

China
86-510-8113-5000
china@newport.com

France
+33-1-60-91-68-68
france@newport.com

Germany
+49 (0) 6151-708-0
germany@newport.com

Netherlands
+31-30-659-21-11
netherlands@newport.com

Singapore
+65-6664-0400
sales.sg@newport.com

United Kingdom
+44 (0) 1235-432-710
uk@newport.com



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.

Asia

Newport Opto-Electronics Technologies
(Wuxi) Co., Ltd.
Lot J3-8, Wuxi Export Processing Zone,
New District, Jiangsu, China, 214028
phone: +86 510 8113 5000
email: asiatech@newport.com

Europe

MICRO-CONTROLE Spectra-Physics S.A.S
Zone industrielle
45340 Beaune-la-Rolande, France
phone: +33 (0)2 38 40 5155
email: dst-bea-rma-service@newport.com

USA

Newport Corporation
1791 Deere Ave
Irvine, CA. 92606
phone: 1-949-863-3144
email: service@newport.com

Dear Valued Newport Motion Customer,

Welcome to the second edition of the dedicated catalog for Newport's Motion Control products, your single point source for high performance, mechanical, and air bearing stages, controllers, custom and OEM solutions. In this catalog, you will find product information for over 600 standard products, which is designed to help you choose the right stage and controller solution for your application. If you do not find exactly what you need or you would like assistance for your demanding application, feel free to contact one of our application specialists.

Also please do not hesitate to visit our website at <https://www.newport.com/c/motion-control> for additional information and updates on all of our capabilities.

We are always available to support you with your precision positioning and motion control needs.

Sincerely,
Motion Team



About the Newport Brand

Newport is a brand within the MKS Instruments Light & Motion division. The Newport product portfolio consists of a full range of solutions including motion control, optical tables and vibration isolation systems, photonic instruments, optics and opto-mechanical components. Newport's innovative solutions leverage core expertise in vibration isolation and sub-micron positioning systems, opto-mechanical and photonics subsystems, to enhance our customers' capabilities and productivity in the semiconductor, industrial technologies, life and health sciences, and research and defense markets. For information, visit www.newport.com

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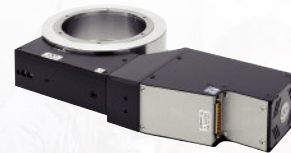
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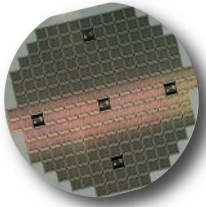
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At the Cutting Edge of Industry and Research

For over 55 years, Newport 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 OEM's to improve their performance, to reduce their time-to-market and to increase their competitive edge.

Newport plays a vital role in the following disciplines:



- Industrial manufacturing
- Semiconductor wafer manufacturing
- Microelectronics applications



- Research and development
- Life & health sciences
- Aerospace, defense and security

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 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.



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



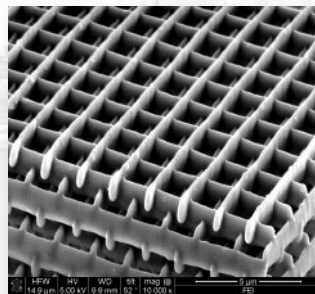
Microelectronics and semiconductor



Photovoltaics



Aerospace and defense



Laser applications

Milestones

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 five and a half decades.



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to watch video



1960's – Laying the Foundation



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.

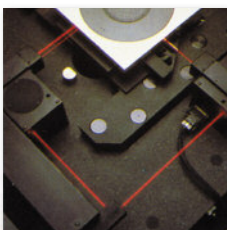
1970's – Introducing the First Motorized Stages



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.



1980'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.



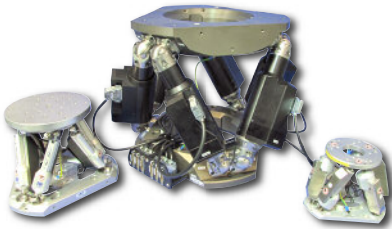
1990's – Becoming a Global Leader in Motion Control

The 1990s saw Newport acquiring new companies to further consolidate its strong position in the marketplace. Newport 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 – Continuous Innovation

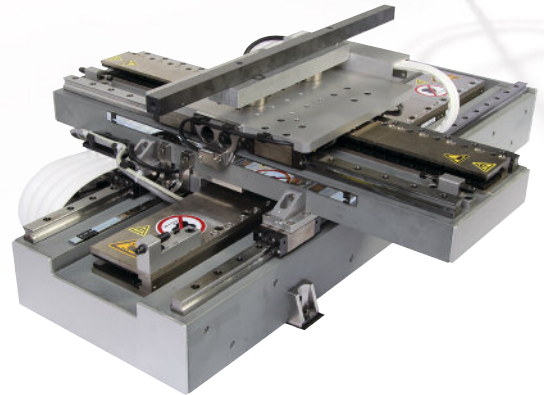


With the advent of the Millennium, Newport takes up the challenge of leveraging its expertise and experience into new market applications, pursuing its tradition of excellence and innovation. The HXP series Hexapod, an easier to use family of 6-axis parallel kinematic positioning systems, is introduced for precise control in complex motion applications demanding high load capacity and accuracy. Another product innovation took advantage of our manufacturing creativity to introduce the closed-loop version of the Agilis piezo motor product.

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

2010's – Present - Technology Experts

Continued to develop the DynamYX air-bearing platforms utilizing SiC technology, that are designed to handle the larger travel ranges, payloads and increased throughput requirements of next generation tools for the semiconductor wafers. Leveraged SiC design and manufacturing capability to the CeraMech platform for high dynamic performance XY stages required in industrial applications.



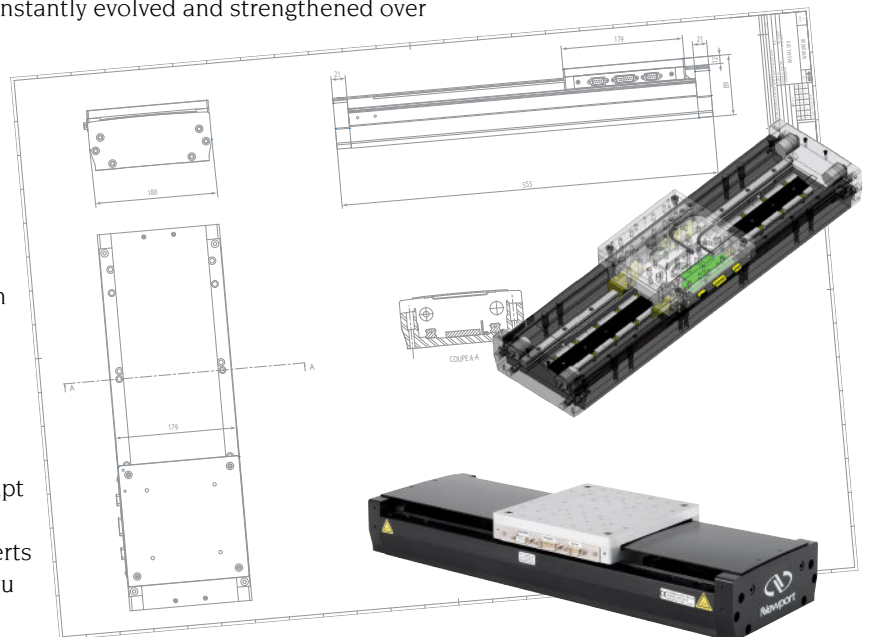
Expertise and Experience

Over Fifty-five Years of Proven Performance, Expertise and Experience

Evolving in a dynamically changing research and industrial environment even prior to the founding of Newport, Newport Motion has 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, deliver the best performing 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.



Our Core Capabilities Meet Every Challenge

Commitment to Excellence – Capacity to Deliver

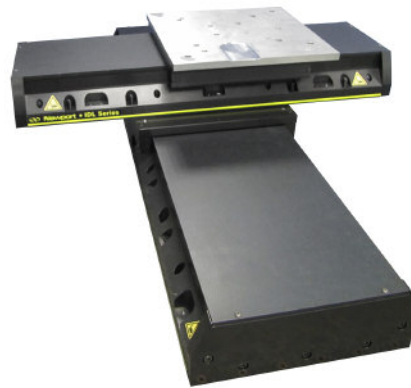
With over fifty-five years of unprecedented experience behind us, Newport has both the capability and the capacity to provide the optimum solution for your individual needs! We have the most comprehensive portfolio of high precision positioning products and solutions in the industry, ranging from standard 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:

- *In stock or short lead times*
- *Wide range of choices*
- *High compatibility*
- *Competitive pricing due to high-volume manufacturing*



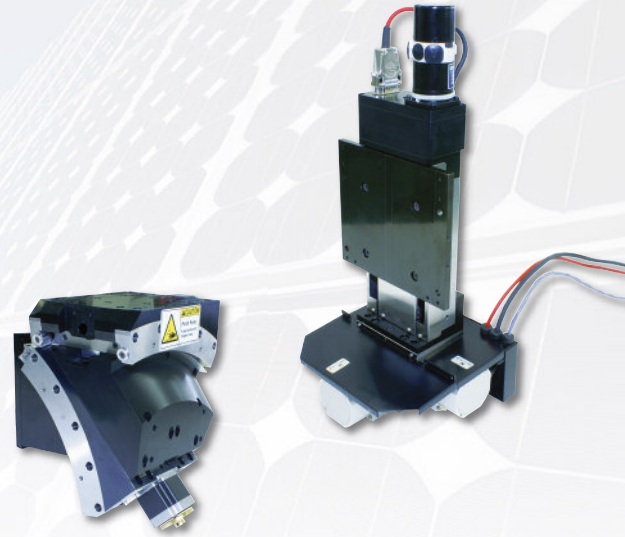
Tailor-Made Solutions

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.



Shaping the Future with OEM's

With decades 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 and on time delivery.



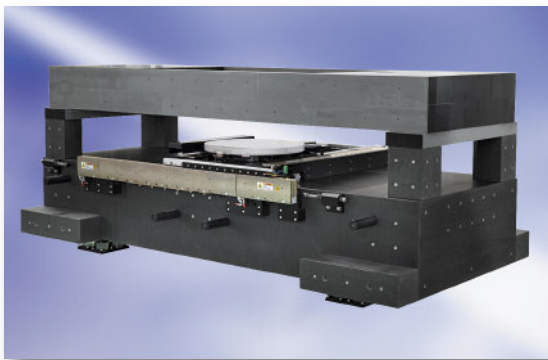
Fully Engineered Systems



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.



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 in 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.



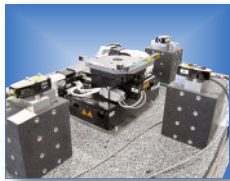
Metrology and Acceptance Test Procedure

Extensive metrology capabilities and resources are used to test, analyze and measure critical system specifications to achieve excellence in quality, precision and performance. The best available metrology tools are used to provide customers with real performance data.

5 LEVELS OF METROLOGY

Depending on your need, the Newport technical team can propose 5 distinct and complementary levels of metrology with your custom motion solution. We will provide calibration data with our advanced products clearly stating the guaranteed specifications. At Newport we want to make sure that we deliver on our promises and that your purchase will perform exactly as you expect it.

In case of an Assembly, we will demonstrate system performance. This performance can be demonstrated using two complementary methods. The first one is called Global Accuracy measurement and it consists of metrology performed on a combination of multiple linear and rotation axes that can be measured as a group. There are limitations to this method due to the availability of metrology systems and is augmented



▲ XY calibration using interferometer.



▲ Multi-axis SOC using autocollimator.



with a secondary method that consists of a theoretical error analysis for stack up of tolerances for the remaining axis that could not physically be measured as part of the group. The use of both methods has demonstrated, in our extensive systems experience, to be an excellent gage of the true quality of the performance of the completed system.

For very demanding applications, we can also perform dynamic performance verification as well as single or multi axis error mapping.

We will work with you to put in place a metrology plan that is tailored to your needs and will ensure that it is representative of your application. We can use simulated loads, measure performance at the point of interest on assembled sub-systems, following your system's motion range.

QUALITY CONTROL

At Newport, we provide quality control services and can customize these to account for your specific environment. Newport continuously maintains its ISO9001.2008 registration.

METROLOGY TOOLS

- ▶ Interferometers
- ▶ Autocollimators
- ▶ Modal tests systems
- ▶ Environmental chambers
- ▶ Very high precision encoders
- ▶ Temperature controlled metrology room
- ▶ Real time acquisition
- ▶ Vibration isolated platform

ADDITIONAL CUSTOMER SERVICES

- ▶ On-site installation
- ▶ Metrology services both at factory and customer sites
- ▶ Maintenance contracts
- ▶ Training
- ▶ After sales services
- ▶ Documentation

User Friendly ESP Technology



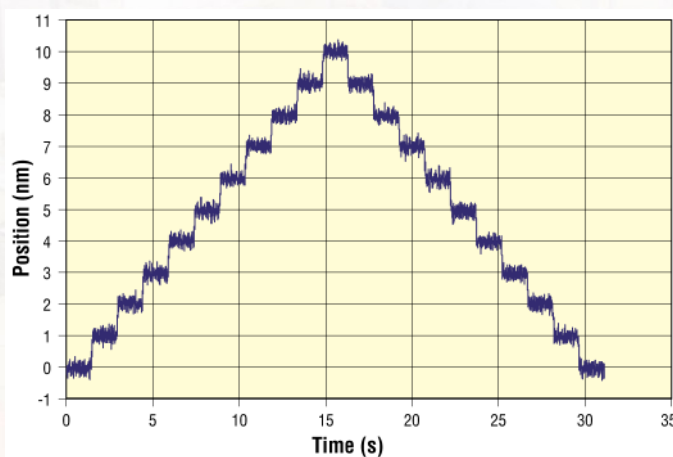
Exclusive to Newport, ESP is a proprietary, recognition system between stages and electronics. Minimizing system setup time and maximizing operational safety, this system brings you total peace of mind. Today, almost all our stages and electronics are ESP compatible. It couldn't be simpler - during system boot, the motion controller retrieves all relevant information from the 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 configuration.

OTHER ADVANCED FEATURES

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.*

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.



◀ 1 nm MIM with the XM series linear motor stages. Nanometer MIM with long travel.

Engineered Systems

In addition to an extensive offering of standard motion products and OEM building blocks, 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.



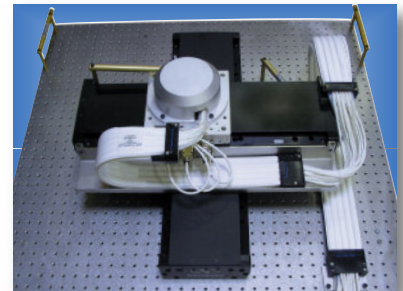
◀ Vacuum compatible MTN-PPV6 stage: Most of Newport's positioners can be prepared for standard vacuum environments of 10^{-6} hPa, in some cases up to 10^{-9} hPa

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



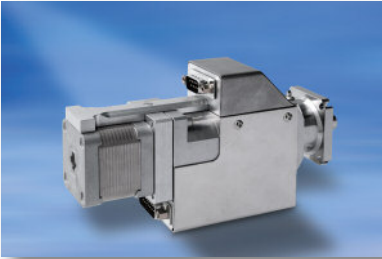
◀ Newport offers custom length or environmentally prepared cables that ensure the integrity of your application.

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

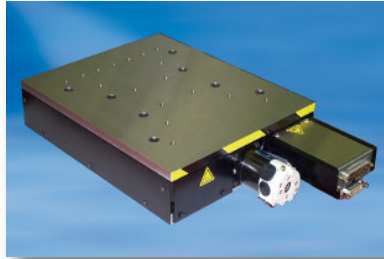


2. Special Motion Devices

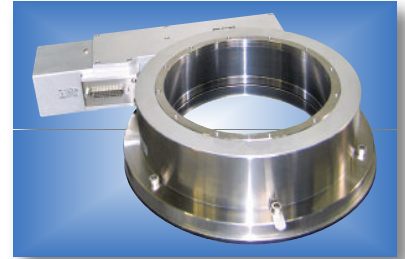
For years, Newport's systems engineering team has been designing and manufacturing special motion devices for niche applications such as high energy laser fusion systems and synchrotrons. Examples include high class clean room compatible, high-load motorized actuators, binary inserter devices, motorized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



▲ **High Resolution Z-Stage:**
Vertical linear stage with 10 nm sensitivity, 20 kg load capacity using backlash-free ballscrew and steel construction.



▲ **RVU240:**
High sensitivity, high torque, high angular stiffness rotation stages providing 5 μ rad sensitivity and 0.1 Nm/ μ rad angular stiffness.

3. Sub-Assemblies



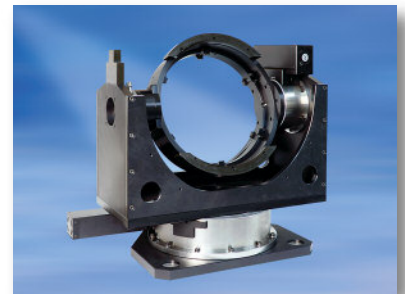
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These are economical solutions made exclusively from Newport's standard catalog components. We add value by optimizing the performance level of these components to your requirements and commit ourselves to the global specifications of the system by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



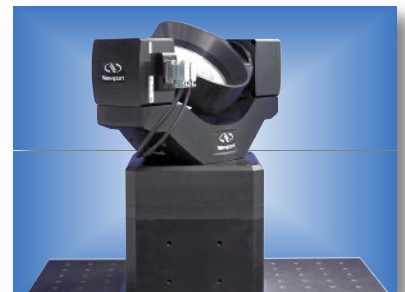
◀ **Sensor calibration bench for car-safety systems in automotive industry.**
11 catalogue stages in 3 stacks with custom brackets and interface plates.

Azimuth/elevation gimbal with 350 mm diameter for LIDAR analysis, target tracking or optical sensor testing. ▶



◀ **2-Axis gimbal with custom RTM660 stages for load capacity up to 2000 N used in remote sensing instrument test and measurement.**

High speed 2-axis motion simulator using RGV series for continuous 360° rotation, speeds up to 720 °/s, high acceleration, 0.001° MIM for MEMS-based inertial sensors testing. ▶



4. Advanced Customized Systems



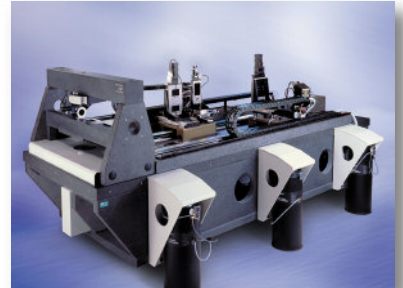
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These tailor-made pieces of technology represent the pinnacle of Newport's system design capabilities. In addition to the traditional electro-optical components, these multi-faceted systems typically include application specific sensors or devices, 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).

This air-bearing 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. Over 30 diffractometer systems in synchrotrons all over the world serve the scientific community in a large variety of application fields.

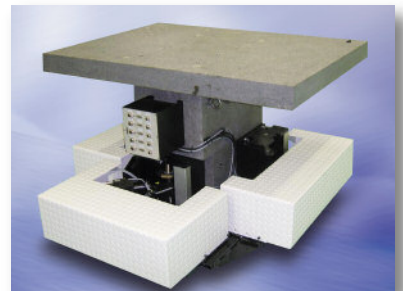
XYZ,ΘZ system used for laser conditioning of large optical components, measuring up to 800 x 800 x 100 mm. ▶



▲ 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 for analysis 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 $\pm 2.5^\circ$. 3000 kg centered load capacity. Optional air-bearing kit.

OEM – Developing for the Future

«Our reputation as the leading motion supplier to OEM's is hard-earned.

*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.



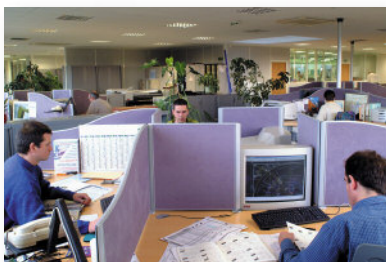
Your Project Matters

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 Process

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



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 Make 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 solutions in materials, manufacturing, assembly and motion control. Our solutions serve a broad variety of applications from lithography and photovoltaics to industry, life sciences, research and defense.



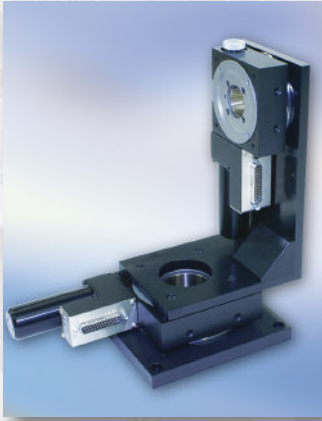
◀ Laser Radar Atmospheric Observation

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 μ rad.

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.



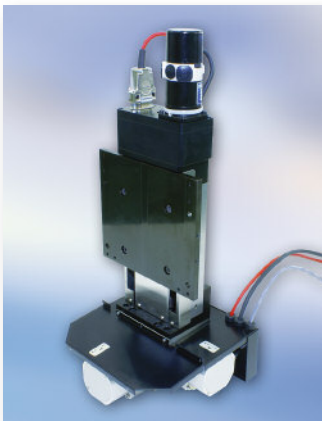
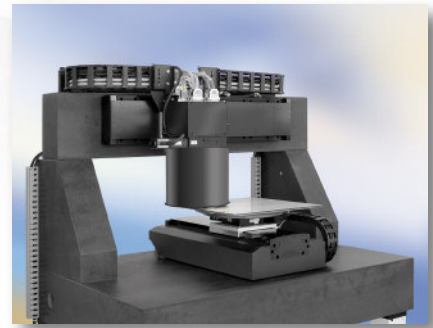


◀ Aviation Simulation

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 $\pm 3 \mu\text{m}$ accuracy over $300 \times 300 \text{ mm}$ 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.

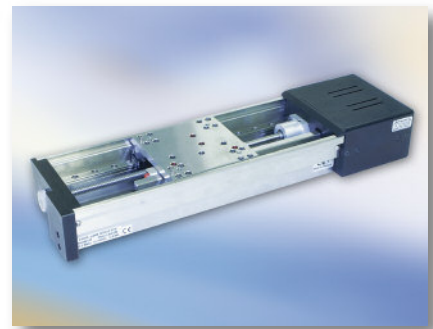


◀ Electrical Discharge Machining

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.

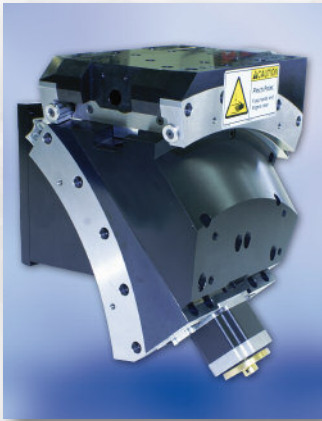
DNA Analysis ▶

Linear stage developed for a high-throughput DNA microarray scanner. The stage is capable of performing $5 \mu\text{m}$ 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.

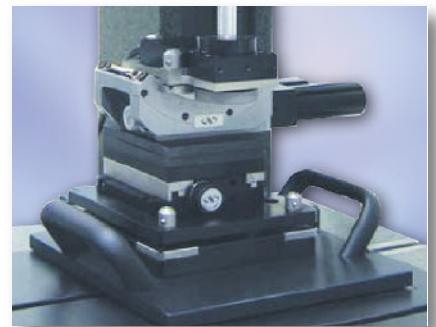


◀ Optical Surface Profiling

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.

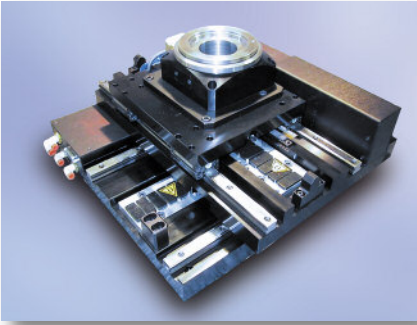
Tactile Metrology for Optic and Automotive Industry ►

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.

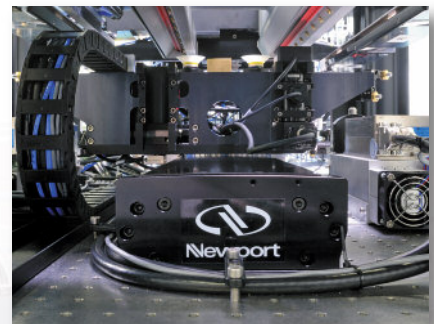


◀ Maskless Lithography and Micro-Manufacturing

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.



◀ Test and Assembly

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 test and assembly of devices, calibration and quality control that need to control several degrees of motion.

Precision Actuation in Engineered OEM Sub-Systems



▲ *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 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 and are customized for UV, vacuum, high-radiation, low-magnetic, 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 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 devices. Beyond our standard drivers and controls, we engineer custom control electronics for OEM applications.

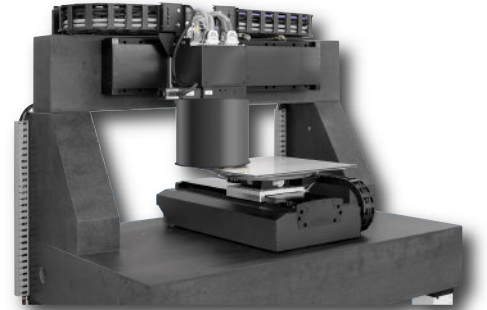
Partnering for Success – Newport's OEM Technology Platforms

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.

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 on into the actual implementation of the motion 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 in an open, collaborative basis to solve problems has proven to be the fastest, most efficient method to deliver results.

Service and Support

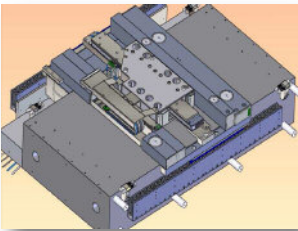
Newport has a global infrastructure to ensure that after sales service and support extends on-site, at your facility or your customers facility. Our ability to solve your problems has no borders or time restrictions. Cooperative service agreements and extended warranties for specific support levels are 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.

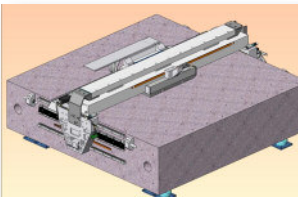
▼ DynamYX® Technology



- 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.

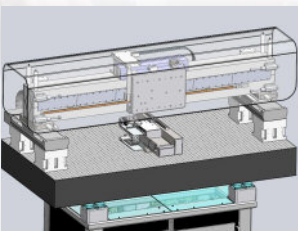
▼ HybrYX™ Technology



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

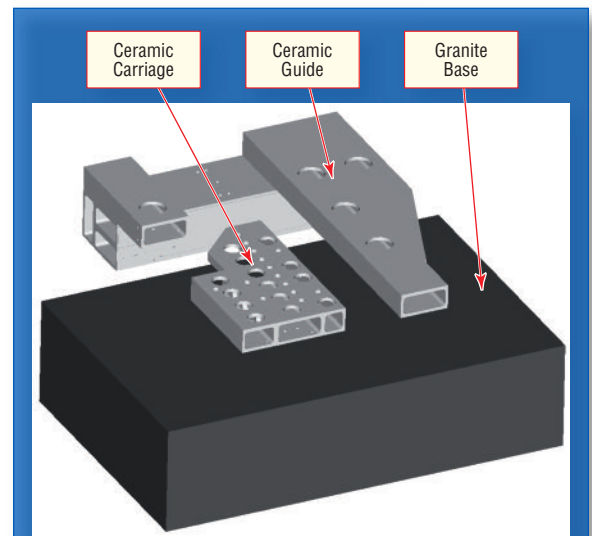
HybrYX stages are engineered to provide exceptional velocity regulation, straightness, flatness, and MTBF.

▼ SinguLYS™ Technology



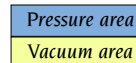
- Single-axis air bearing
- All-ceramic construction
- Integrated pressure vacuum air bearing elements
- Stage and bridge configurations

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

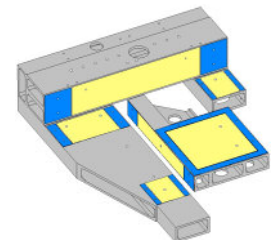


Clean and Simple Architecture of DynamYX includes Three Monolithic Elements

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 achieved by creating monolithic structures with tolerances integral to 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

Newport is heavily involved in the Semiconductor industry, supplying the DynamYX to this industry. 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® Datum® 450 and 450GT



YouTube™



scan QR code
to watch video

Key Performance Values

- Acceleration: 3G X-Axis, 2G Y-Axis
- Velocity: 1500 mm/s
- Repeatability: 10 nm
- Accuracy: 50 nm
- Natural frequency: 300 Hz
(20 kg load)

DynamYX® Datum® 450's heritage started from the DynamYX 300 and GT stages, where a simple three-piece architecture and designed-in precision have been satisfying demanding semiconductor applications for over fifteen years. Almost two decade's worth of technological advancement brings to DATUM a new, dynamically symmetric architecture constructed from next-generation ceramics with all-new micro-structure air bearings that, as in all Newport air bearing stages, are directly machined into the structure, providing low-profile, monolithic stage elements.

▼ 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: $0.4 \mu\text{m}$
- Travel range: 520 x 340 mm

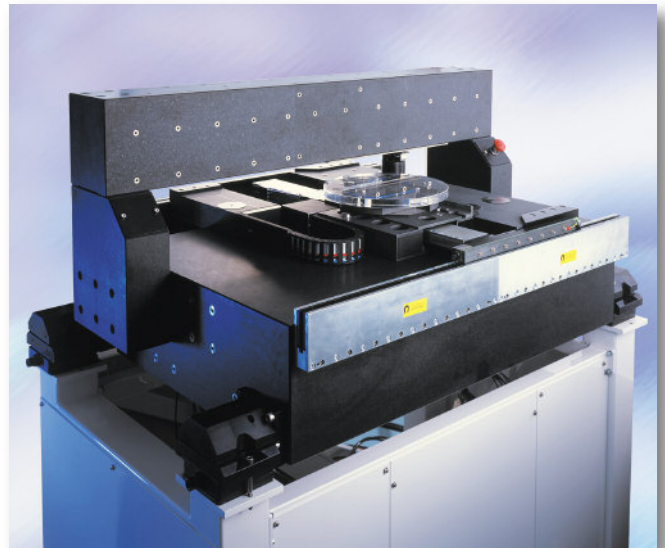
Newport introduced the DynamYX 300 more than 10 years ago as the first single-plane dual-axis Air Bearing system for 300 mm wafer inspection applications. Today, it is still a very capable solution for demanding applications such as wafer bump inspection, nano imprint lithography, laser direct writing,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

Key Performance Values

- Acceleration: 1.2 G X-Axis, 2 G Y-Axis
- Velocity: 800 mm/s
- Repeatability: ± 50 nm (long term)
- Accuracy: $0.3 \mu\text{m}$
- 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® GT



▼ DynamYX® Datum®



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 μ m
- Natural frequency (reticle holder): 400 Hz

¹⁾ After clamping.

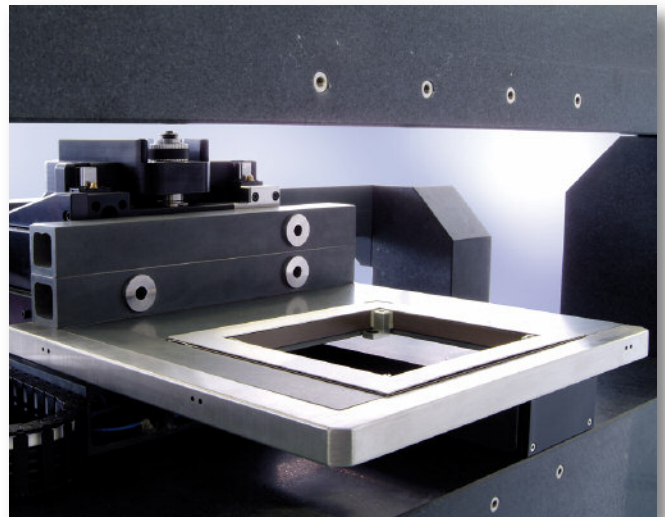
The DynamYX® RS is dedicated to reticle inspection and repair applications. It is based on the same single plane architecture found in the DynamYX 300 & GT stages with a cantilevered substrate holder located away from all moving elements of the stage providing the cleanest possible environment. The full-open-aperture 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.

Key Performance Values

- Acceleration: 3 G X-Axis, 5 G Y-Axis
- Velocity: 1000 mm/s
- Repeatability: ± 25 nm (long term)
- Accuracy: 0.2 μ m (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.

▼ 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.

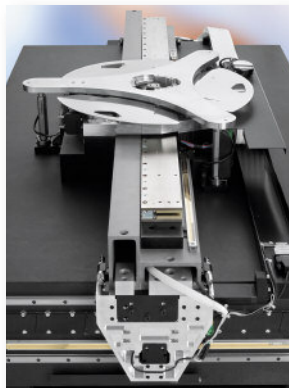
Key Performance Values

- 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 μ m (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

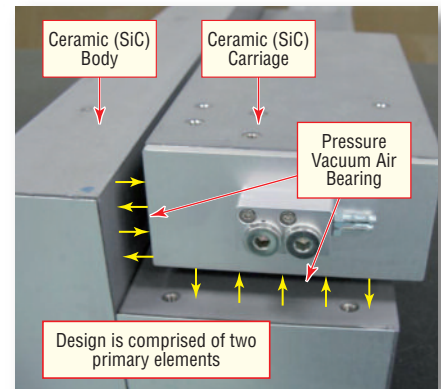
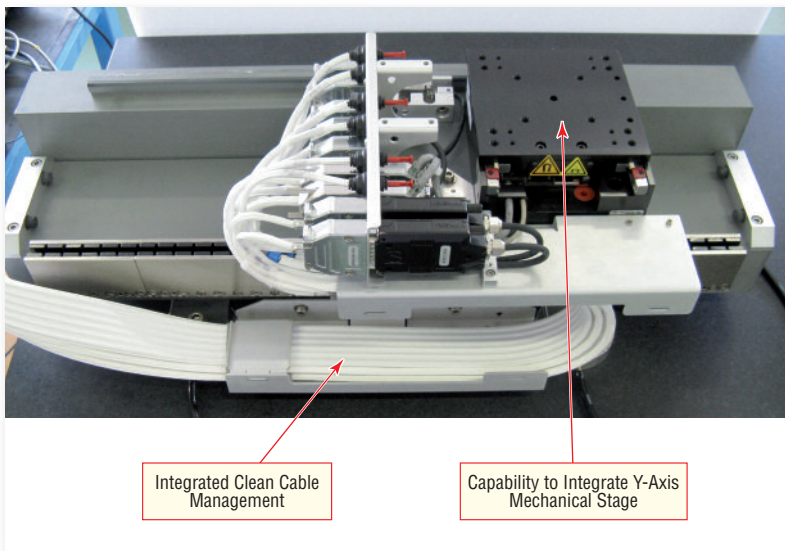
- Travel range: 450 mm (step) x 1400 mm (scan)
- Acceleration: 0.15 G (step)-Axis; 0.25 G (scan)-Axis
- Scanning velocity: 1200 mm/s
- Better than 0.1% velocity ripple
- Step-and-settle time (25 mm, ± 40 nm): <350 ms
- Accuracy: ± 3 μ m (over 400 x 1200 mm)

◀ 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.



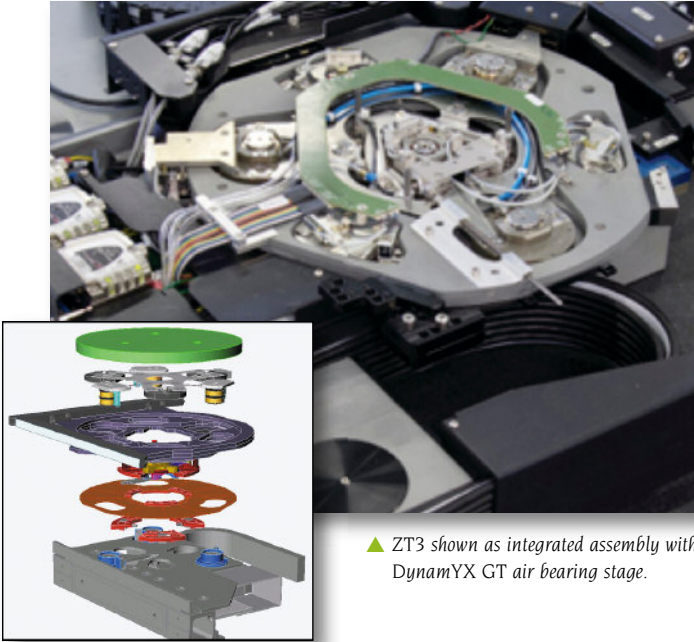
Key Performance Values

- 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

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

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



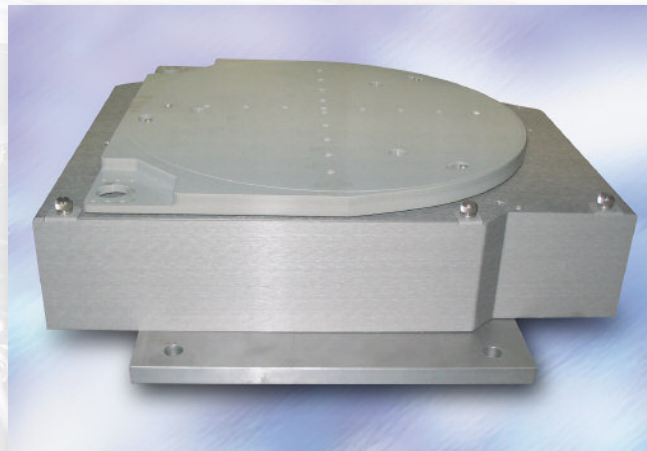
▲ ZT3 shown as integrated assembly with DynamYX GT air bearing stage.

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.

Key Performance Values	
● Travel Range:	5 mm Z; ± 2 mrad (tip/tilt); $\pm 3^\circ$ (Θ_z)
● 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 ZT3 concept is homogenous with the DynamYX GT/Datum concept in that both are 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

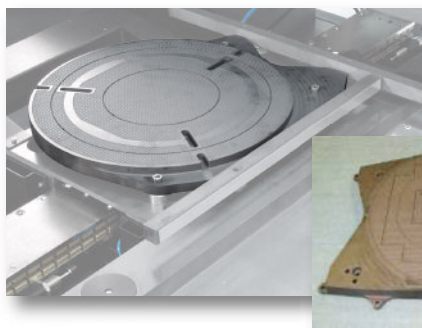
Capabilities in Advanced Ceramic Materials

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.

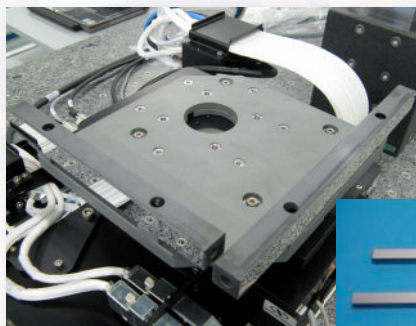
Key Performance Values

- 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 (> zirconium) minimizes thermal surface distortion
- 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).

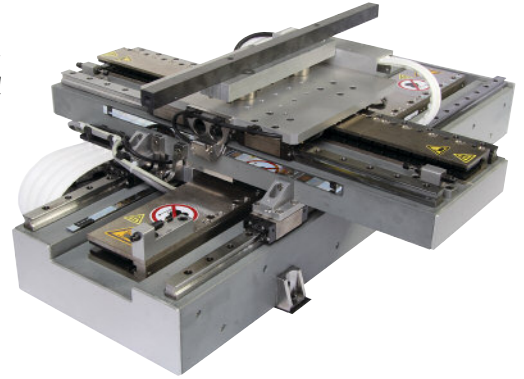


◀ Thermally matched mirrors are directly fixed to the ceramic wafer chuck.

▼ CeraMech

To solve the issue of higher dynamic performance that is limited by the materials used in stages, SiC based CeraMech has shown major advantages compared to the traditional materials used in high precision stages.

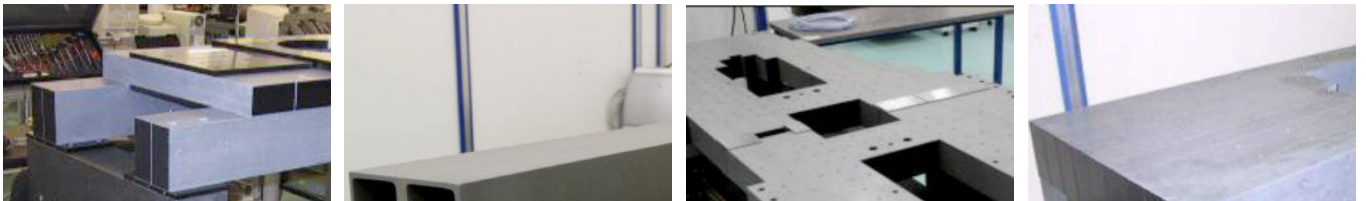
- High stiffness and low density for faster settling
- High flatness for better trajectory control
- Low thermal expansion and high thermal conductivity for stability



▲ CeraMech XY stages with standard linear rails approaches dynamic performance of air bearings.

▼ 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 , (GPa)	70	210	70	210–350
Stiffness (E/d)	23	27	26	78–115
Thermal Conductivity: TC ($W/m \cdot K$)	2	50	150	30–140
Thermal Expansion: TE ($10^{-6}/K$)	5	11	22	4.0–4.8

Standard Products – Simply the Best!



Decades of Unparalleled Performance

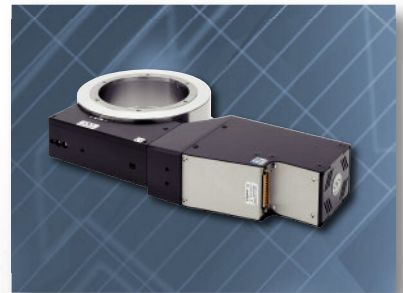
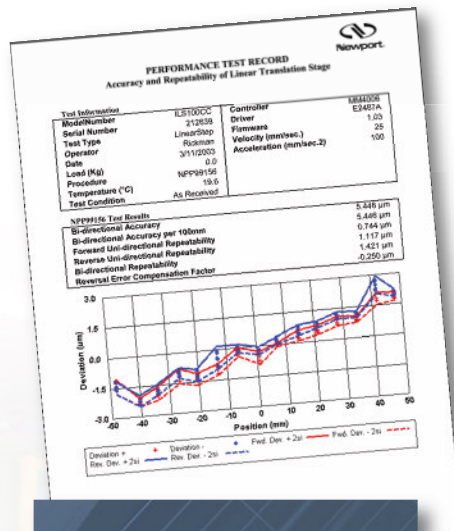
Newport's extensive range of standard motion products incorporates over 55 years of specialized knowledge in precision motion control. During this time, we have provided thousands of expert solutions for hundreds of different applications in:

- 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.

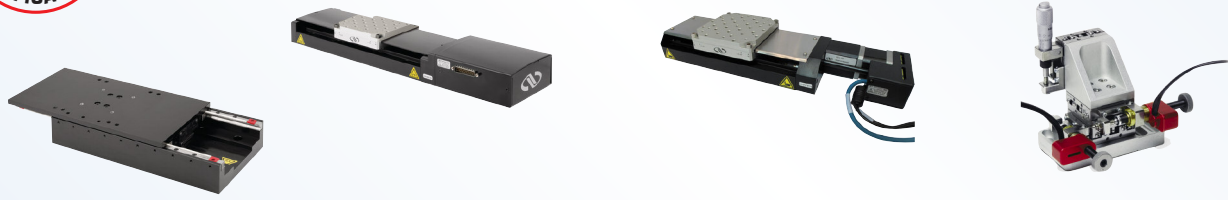
Our product range undergoes a rigorous 100% metrology control with test certificates supplied free of charge – the only way to ensure that every product meets or exceeds performance expectations.



MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS



Motorized Linear Stage Selection Guide



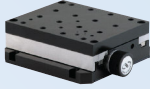






Motorized Linear Stages from Newport and New Focus are designed and built with over 50 years of experience in providing solutions to many markets including research and academia, industrial, semiconductor, aerospace and defense. Starting from the XM family of direct drive ultra-precision stages to the compact Agilis piezomotor linear stage, there are over 200 models of stages to choose from. Many more linear positioning solutions can be created by matching our popular manual stages with the wide selection of compatible motorized actuators.

Linear motorized stages can be selected based on Travel, Minimum Incremental Motion, Repeatability, Accuracy, Speed, etc. To begin, use the selection guides below with more details in the following product family pages.

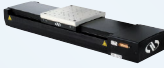
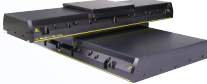
Mid-Range Travel Linear Stage Selection

Series	Travel Range (mm)	Minimum Incremental Motion (μm)	Bi-directional Repeatability (μm)	Accuracy (μm)	Maximum Speed (mm/s)	Centered Load Capacity (Cz)(N)
 XM-S Series Ultra-Precision Linear Motor Stages see page 34	50 - 350	0.001	0.08	1.5 - 3.0	300	100 - 300
 GTS Series High-Precision Linear Stages see page 37	70, 150	0.1	0.2	2.0	50	100
 ILS Series High-Performance Mid-Range Travel Linear Motor Stages see page 39	50 - 300	0.01-1	0.6-2	3-10	100-500	250
 IDL-BL Mid-Travel Industrial Linear Stages see page 45	150, 300	1	2	6-10	300	450
 DL Series Affordable Linear Motor Optimized for Ultrafast Spectroscopy see page 49	125 - 325	0.075	0.3	3-5	500	20N
 FMS Series Linear Metrology Stages see page 54	100 - 300	0.1 - 0.5	3-5.5	6-13	20 - 100	150
 MTN Series Mid-Travel Steel Linear Stages see page 56	100 - 300	0.1-0.6	3-5.5	5-6	40-100	1000
 UTS Series Mid-Travel Steel Linear Stages see page 58	50 - 150	0.3	3.5 - 6.0	4.5 - 8.0	20-40	100 - 200
 FCL Series Intelligent Stepper Motor Linear Stages see page 62	50 - 200	0.15	5-5.5	4-8	20	250
 One-XY Integrated XY Linear Stages see page 64	50 - 290	0.05	0.16-0.2	1-6	200	100 - 350

Miniature Linear Stage Selection

Series		Travel Range (mm)	Minimum Incremental Motion(μm)	Bi-directional Repeatability (μm)	Accuracy (μm)	Maximum Speed (mm/s)	Centered Load Capacity (Cz)(N)
	VP-25X Precision Compact Linear Stages see page 51	25	0.01 - 0.1	0.14 - 0.2	2.0	25	40 - 60
	MFA Series Miniature Steel Linear Stages see page 60	25	0.1	1.5	6.0	1 - 2.5	50
	NPX Series NanoPositioning Linear Stages see page 66	0.1 - 0.4	0.0002 - 0.008	NA	NA	NA	16-110
	Agilis™ Series Piezo Motor Driven Linear Stages see page 67	12, 27	0.05	NA	NA	0.5	3
	Multi-Axis Kinematic Alignment Stages see page 69	3	<30 nm	NA	NA	NA	NA
	Linear Stages with Integrated Picomotors see page 70-76	10 - 25	< 0.3	NA	Depends on actuators and stages used		
	Picolis Integrated Picomotor Linear Stage see page 77	15	<30 nm	NA	Depends on actuators and stages used		

Long-Range Travel Linear Stage Selection

Series		Travel Range (mm)	Minimum Incremental Motion(μm)	Bi-directional Repeatability (μm)	Accuracy (μm)	Maximum Speed (mm/s)	Centered Load Capacity (Cz)(N)
	IMS Series High-Performance Long-Travel Linear Stages see page 42	300 - 1200	0.02 - 1.25	0.5 - 2.5	8-30	100 - 1000	600
	IDL-LM Series Industrial Linear Stages see page 47	300 - 1200	0.05-1	1.2-2	4-10	2000	450-2000

MOTORIZED
LINEAR STAGES

MOTORIZED
VERTICAL STAGES

MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

HEXAPODS

CONTROLLERS
AND DRIVERS

MOTORIZED
OPTICAL MOUNTS

BEAM
MANAGEMENT

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MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

XM-S Series

Ultra-Precision Linear Motor Stages

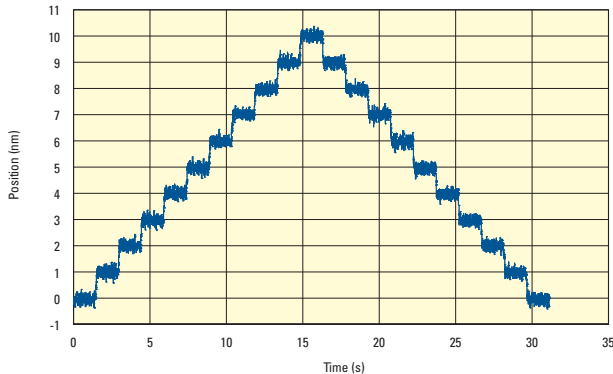


scan QR code to watch video

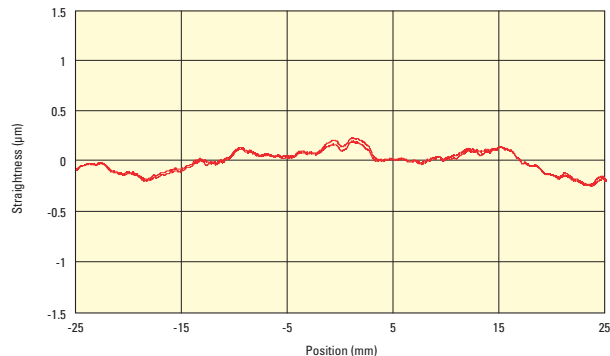


- Ultra-high Performance with 1 nm Minimum Incremental Motion
- Non-contact, direct-drive system for ultra-precision, high dynamics & reliability
- Sub-nm, high precision glass scale encoder with 80 nm repeatability
- Extra-large, ironless, high-efficiency linear motor minimizes heat generation
- Ultra-quiet anti-creep crossed roller bearings assure ripple-free motion
- Optional granite bases ensures ultra flat mounting conditions for optimal performance

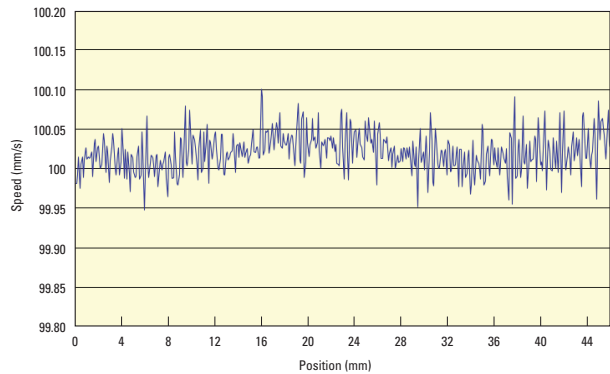
The XM-S Series of Ultra-Performance Linear Stages deliver world-leading dynamic performance capable of consistent, reliable motion to 1 nm. Innovative and compact; XM stages provide robust, repeatable motion with outstanding accuracy on the most complex trajectories. Featuring precision engineered components and design that minimizes both wear and motor heating, XM-S performance maximizes your motion investment for the long-term. XM-S stages are stackable with other Newport stages to address multi-axis application needs. For critical positioning applications, micropositioning calibration service is available to improve the on-axis accuracy of XM-S stages to 1 μm per 100 mm travel, using an error mapping compensation feature of XPS motion controllers. Applications include laser machining, semiconductor wafer process, sensor test and calibration, ultra-precision assembly and more. A test certificate is provided with XM stages at no additional charge.



Ultra-high performance XM-S Stages are capable of 1 nm incremental motion in a controlled environment using an XPS-D controller and an XPS-DRV11 driver.



XM-S stages deliver ripple-free motion as required by many precision scanning and wafer inspection processes. Shown is the straightness of an XMS50-S during one forward and return cycle, measured with an interferometer.



XM-S stages provide exceptional speed stability in continuous scanning or laser machining applications. Shown is the speed of an XMS50-S gathered at a rate of 1 kHz using an interferometer.



Accuracy of a XMS50-S stage after linear error correction. The data was taken dynamically at a rate of 10 kHz while the stage was moving at a speed of 100 mm/s. Both the encoder and the interferometer positions were acquired by an XPS motion controller with a latency of less than 50 ns between the different signals.

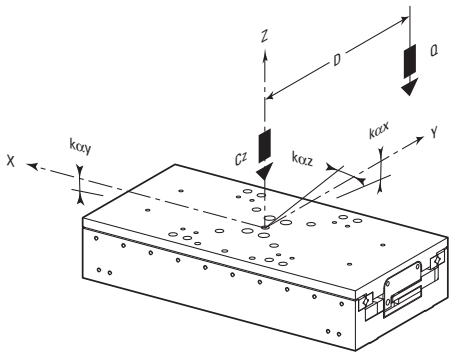
Specifications

	XMS50-S	XMS100-S	XMS160-S	XML210-S	XML350-S
Travel Range	50 mm	100 mm	160 mm	210 mm	350 mm
Maximum Speed ¹	300 mm/s				
Centered Load Capacity	100 N			300 N	
Accuracy, Typical	±0.2 μm	±0.3 μm	±0.5 μm		
Minimum Incremental Motion ²	0.001 μm				
Bi-directional Repeatability, Typical	±0.030 μm			±0.032 μm	±0.035 μm
Continuous Motor Force ³	25 N			50 N	
Peak Motor Force	100 N			240 N	
Yaw, Typical	±10 μrad				
Pitch, Typical	±10 μrad	±12 μrad		±15 μrad	±20 μrad
Flatness Typical (Guaranteed) ⁴	±0.37 (±0.75) μm			±0.75 (±1.50) μm	
Straightness Typical (Guaranteed) ⁵	±0.37 (±0.75) μm			±0.75 (±1.50) μm	
Origin Repeatability	±0.025 μm				
Cable Length	5 m				
MTBF	20,000 h (25% load, 30% duty cycle)				
CE	Compliant				
Weight.	2.5 kg	3.5 kg	4.5 kg	13 kg	22 kg

1. Maximum speed is driver dependent. Contact Newport for additional information.
2. MIM depends on driver type and environment, refer to data sheet for more information.
3. Continuous motor force is driver dependent. Contact Newport for additional information.
4. Middle 80% o travel. To obtain arcsec units, divide the μrad value by 4.8.
5. Middle 80% o travel.

Load Characteristics

Model	XMS50-S	XMS100-S	XMS160-S	XML210-S	XML350-S
Cz, Normal centered load capacity (N)		100		300	
Kαx, Compliance in roll (μrad/Nm)	3.5	2.0	1.5	0.5	0.1
Kαy, Compliance in pitch (μrad/Nm)	6.0	2.5	2.0	2.0	0.7
Kαz, Compliance in yaw (μrad/Nm)	8.0	3.5	2.0	1.0	0.2
a, Construction Parameter	109	109	109	155	155



- Q Off-center load, $Q \leq Cz / (1 + D/a)$
- D Cantilever distance in mm
- Cz Normal centered load capacity on bearings



A typical assembly using XML210-S, XMS50-S and GTS30V

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LINEAR STAGES

MOTORIZED
VERTICAL STAGES

MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

HEXAPODS

CONTROLLERS
AND DRIVERS

MOTORIZED
OPTICAL MOUNTS

BEAM
MANAGEMENT

SPECIAL
COLLECTIONS

Ordering Information

Model	Description
XMS50-S	Ultra-Precision Linear Motor Stage, 50 mm Travel, XMS Series
XMS100-S	Ultra-Precision Linear Motor Stage, 100 mm Travel, XMS Series
XMS160-S	Ultra-Precision Linear Motor Stage, 160 mm Travel, XMS Series
XML210-S	Ultra-Precision Linear Motor Stage, 210 mm Travel, XML Series
XML350-S	Ultra-Precision Linear Motor Stage, 350 mm Travel, XML Series
GB50	Granite Base for XMS50
GB100	Granite Base for XMS100
GB160	Granite Base for XMS160
GB210	Granite Base for XML210
GB350	Granite Base for XML350

Recommended Motion Controllers

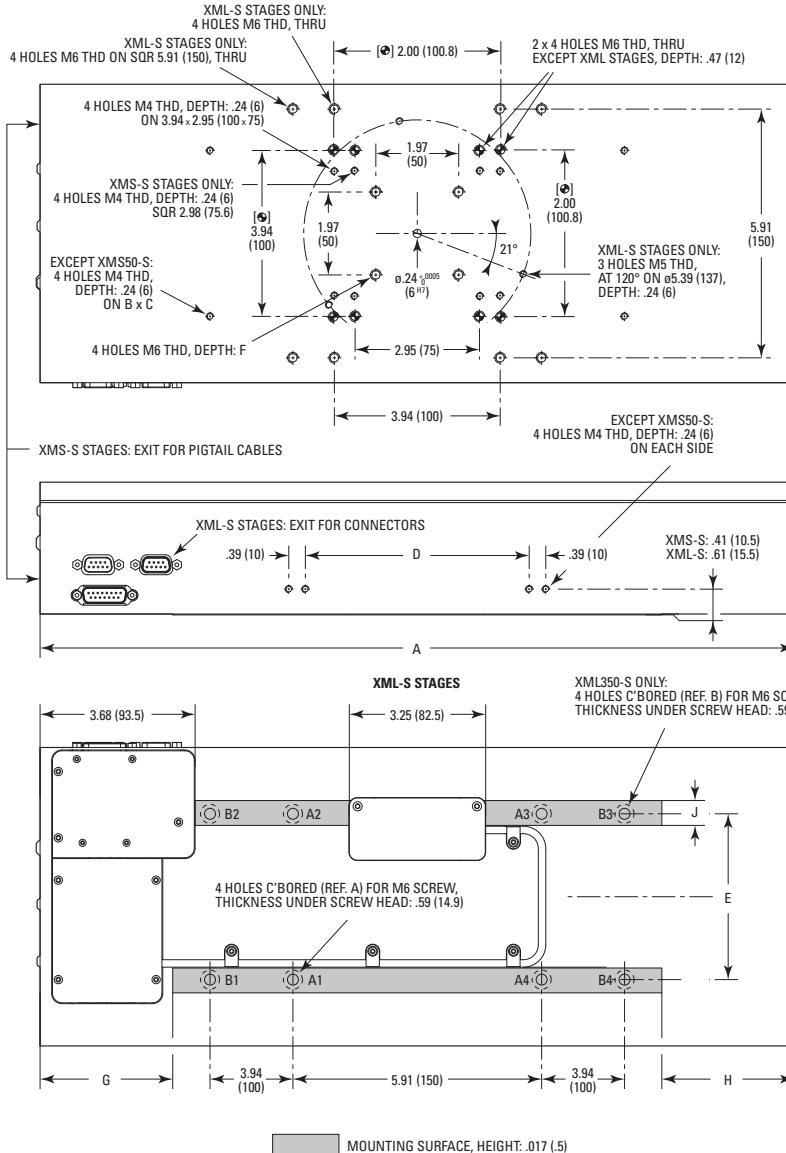
XPS-RL see page 153

XPS-D see page 148

Driver cards and cable kits to be ordered separately. Please refer to compatibility charts on pages 146 and 151.

CAD See our website for CAD files

The flatness of the surface is a major factor in the positioning accuracy and repeatability of a motion system. Polished granite plates are among the flattest, commercially available surfaces. Granite's tight flatness tolerance and extreme hardness make it logical option to complement Newport's Ultra-Precision Linear Motor XM-S series stage. The GB series granite base plates feature 3 point mounting, to make-up for non-flat tables. Edge handles facilitate handling and locating the base plate on the work surface.

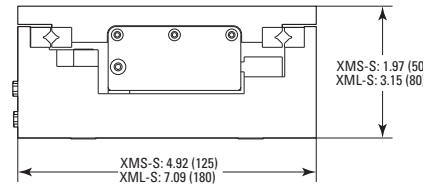


DIMENSIONS IN INCHES (AND MILLIMETERS)

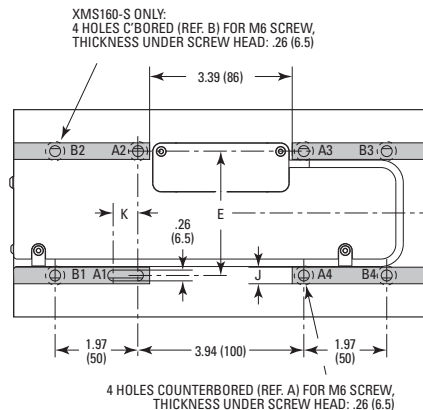
	A	B	C	D	E
XMS50-S	4.92 (125)	-	-	-	2.95 (75)
XMS100-S	7.28 (185)	6.10 (155)	1.77 (45)	5.31 (135)	2.98 (75.6)
XMS160-S	9.84 (250)	7.28 (185)	1.77 (45)	7.87 (200)	2.98 (75.6)
XML210-S	13.98 (355)	9.84 (250)	3.94 (100)	5.31 (135)	3.97 (100)
XML350-S	21.85 (555)	9.84 (250)	3.94 (100)	13.19 (335)	3.97 (100)

	F	G	H	J	K
XMS50-S	.28 (7)	-	-	.39 (10)	.28 (7)
XMS100-S	.28 (7)	-	-	.39 (10)	.59 (15)
XMS160-S	.28 (7)	-	-	.39 (10)	.59 (15)
XML210-S	.47 (12)	2.91 (74)	2.66 (67.5)	.59 (15)	-
XML350-S	.47 (12)	3.15 (80)	3.15 (80)	.59 (15)	-

XMS-S & XML-S STAGE CONNECTORS:
SUB-D9M FOR MOTOR
SUB-D9F FOR END-OF-RUNS & THERMISTANCE
SUB-D15M FOR ENCODER



XMS-S STAGES



GTS Series

High-Precision Linear Stages



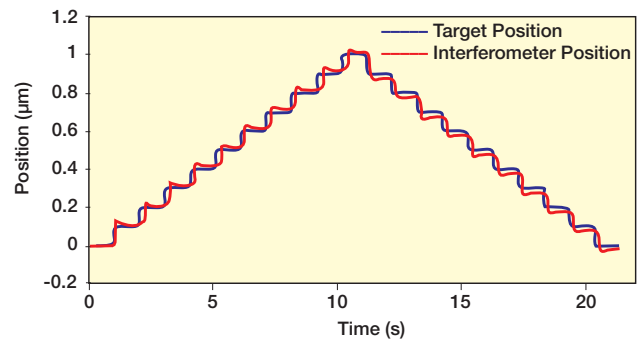
- Ultra-quiet, anti-creep crossed roller bearings for outstanding straightness and flatness without cage migration
- Integrated encoder with exceptional 100 nm MIM, which ensures highly repeatable and accurate motion
- Low friction ball screw drive minimizes stick and slip effects
- Long-term strength and stability
- Plug and Play - ESP compatible



The GTS Series combines the straightness and flatness of crossed-roller bearing stages with improved accuracy and repeatability of higher-end stages.

Specifications

	GTS70	GTS150
Travel Range	70 mm	150 mm
Maximum Speed	50 mm/s	
Minimum Incremental Motion	0.10 μm	
Centered Load Capacity	100 N	
Axial Load Capacity (+Cx)	25 N	20 N
Inverse Axial Load Capacity (-Cx)	-25 N	-20 N
Accuracy, Typical	$\pm 0.30 \mu\text{m}$	$\pm 0.50 \mu\text{m}$
Accuracy, Guaranteed	$\pm 1.0 \mu\text{m}$	$\pm 1.0 \mu\text{m}$
Bi-directional Repeatability, Typical	$\pm 0.10 \mu\text{m}$	$\pm 0.10 \mu\text{m}$
Pitch, Typical	$\pm 15 \mu\text{rad}$	$\pm 30 \mu\text{rad}$
Yaw, Typical	$\pm 15 \mu\text{rad}$	$\pm 25 \mu\text{rad}$
Origin Repeatability	$\pm 0.05 \mu\text{m}$	
Cable Length	3 m	
Weight	2.7 kg	3.6 kg
MTBF	20,000 h (25% load, 30% duty cycle)	
CE	Compliant	

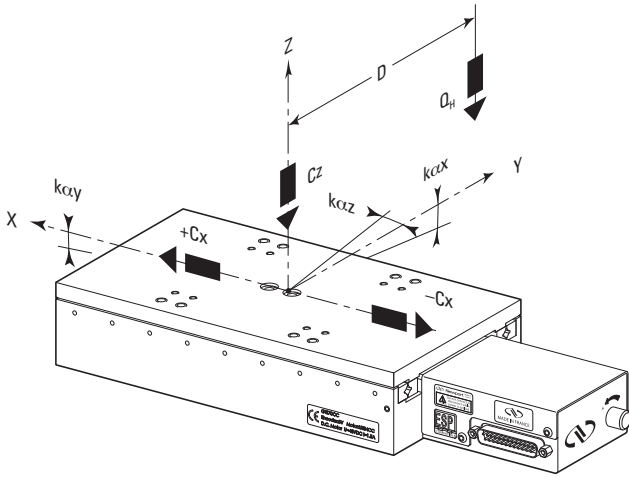


GTS stages deliver 100 nm motion sensitivity with high reliability and stability.



A typical assembly with a GTS150, a GTS70 linear stage and a URS100 rotation stage.

Load Characteristics and Stiffness



Model	GTS70	GTS150
Cz, Normal centered load capacity	100 N	
-Cx, +Cx, Axial load capacity	25 N	20 N
K α_x , Compliance in roll	10 μ rad/Nm	5 μ rad/Nm
K α_y , Compliance in pitch	10 μ rad/Nm	5 μ rad/Nm
K α_z , Compliance in yaw	10 μ rad/Nm	5 μ rad/Nm
Q, Off-center load	$Q \leq C_z / (1 + D / 100)$	
Where D = Cantilever distance in mm		

Ordering Information

Model	Description
GTS70	High Precision Linear Stage, 70 mm Travel, GTS Series
GTS150	High Precision Linear Stage, 150 mm Travel, GTS Series

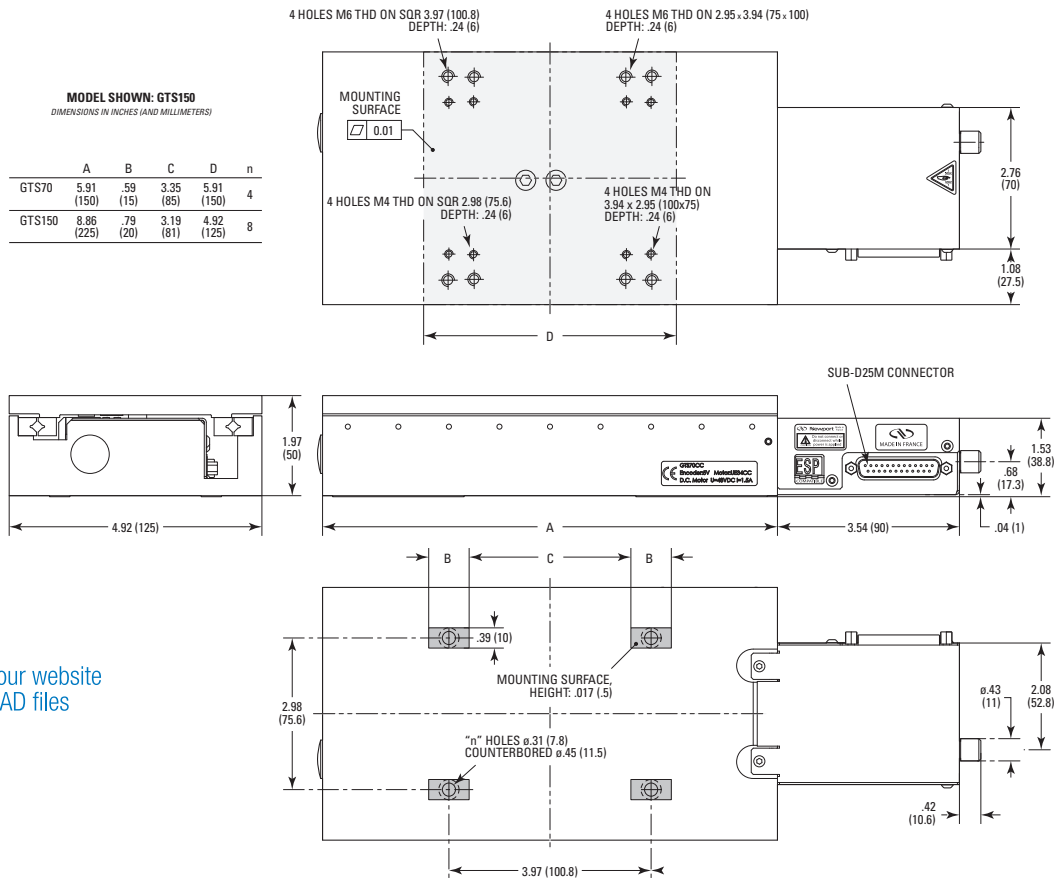
Recommended Motion Controllers

XPS-RL see page 153
XPS-D see page 148
ESP301 see page 157
SMC100CC see page 159

The GTS30V is compatible with both the GTS70 and GTS150.

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146. Motor cables are included.

Dimensions



CAD See our website for CAD files

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

ILS Series

High-Performance Mid-Range Travel Linear Stages



scan QR code
to watch video

- Stiff, FEM optimized extruded aluminum body prevents thermal bending effects
- Precision recirculating ball bearing slides provide accurate linear motion without ball cage migration
- 50-300mm of travel
- Ideal for extended use in light industrial applications
- Plug and Play - ESP compatible



The ILS Series is a robust line of sub-micron resolution linear stages, constructed with a light, stiff aluminum body and reliable components capable of high-duty cycle applications.

Specifications

	ILS100LM-S	ILS200LM-S	ILS300LM-S
Travel Range	100 mm	200 mm	300 mm
Accuracy, Guaranteed	±1.5 μm	±2.0 μm	±2.5 μm
Accuracy, Typical	±0.5 μm	±1.0 μm	±1.2 μm
Pitch, Guaranteed	±110 μrad	±135 μrad	±150 μrad
Yaw, Guaranteed	±100 μrad	±125 μrad	±150 μrad
Maximum Speed	500 mm/s		
Minimum Incremental Motion	0.010 μm		
Continuous Motor Force	20 N		
Peak Motor Force	72 N		
Centered Load Capacity	250 N		
Bi-directional Repeatability, Guaranteed	±0.30 μm		
Bi-directional Repeatability, Typical	±0.12 μm		
Pitch, Typical	±20 μrad	±40 μrad	
Yaw, Typical	±15 μrad	±25 μrad	
Thread Type 1	43834		
Weight	2.9 kg	3.7 kg	4.5 kg
CE	Compliant		

Dynamic Specifications (LM Models)

Model	(M-)ILS100LM-S	(M-)ILS200LM-S	(M-)ILS300LM-S
Maximum Acceleration, No Load (m/s ²)	20		
Max. Force (Cont.) (N)	15		
Max Force (Peak) 4 s (N)	30		

For the definition of specifications, visit Newport.com in the Motion Basics and Standards.

	ILS100CC	ILS150CC	ILS200CC	ILS250CC	ILS50CC	ILS100HA	ILS150HA	ILS200HA	ILS250HA	ILS50HA
Travel Range	100 mm	150 mm	200 mm	250 mm	50 mm	100 mm	150 mm	200 mm	250 mm	50 mm
Maximum Speed	100 mm/s									
Minimum Incremental Motion	1.0 μm					0.30 μm				
Centered Load Capacity	250 N									
Axial Load Capacity (+Cx)	40 N									
Inverse Axial Load Capacity (-Cx)	-40 N									
Accuracy, Typical	±0.8 μm	±1.5 μm	±1.2 μm	±1.7 μm	±0.6 μm	±0.6 μm	±1.2 μm	±0.8 μm	±1.5 μm	±0.3 μm
Accuracy, Guaranteed	±2.0 μm	±2.5 μm	±3.7 μm	±5.0 μm	±1.5 μm	±1.5 μm	±2.0 μm	±3.0 μm	±3.75 μm	±2.0 μm
Uni-directional Repeatability, Typical	±0.20 μm	±0.25 μm		±0.35 μm		±0.08 μm				±0.10 μm
Bi-directional Repeatability, Typical	±0.40 μm		±0.45 μm		±0.60 μm	±0.10 μm		±0.15 μm		
Uni-directional Repeatability, Guaranteed	±0.50 μm					±0.08 μm			±0.10 μm	±0.08 μm
Bi-directional Repeatability, Guaranteed ¹	±1.0 μm					±0.10 μm	±0.15 μm			±0.10 μm
Pitch, Typical	±20 μrad	±37 μrad		±42 μrad	±15 μrad	±25 μrad	±50 μrad	±35 μrad	±45 μrad	±17 μrad
Yaw, Typical	±17 μrad	±20 μrad	±25 μrad		±12 μrad	±17 μrad	±25 μrad		±30 μrad	±7 μrad
Yaw, Guaranteed	±37 μrad	±65 μrad	±80 μrad	±95 μrad	±25 μrad	±37 μrad	±65 μrad	±80 μrad	±95 μrad	±25 μrad
Origin Repeatability	±0.5 μm					±0.1 μm				
Cable Length	3 m									
Weight	4.5 kg	4.8 kg	5.1 kg	5.4 kg	4.2 kg	4.5 kg	4.8 kg	5.1 kg	5.4 kg	4.2 kg
MTBF	20,000 h (25% load, 30% duty cycle)									
CE	Compliant									

Ordering Information

Model	Series	Travel (mm)	Drive
M-	ILS	<ul style="list-style-type: none"> 50 100 150 200 250 300⁽¹⁾ 	<ul style="list-style-type: none"> CC CCL HA PP LM⁽²⁾

Example: The ILS150HA is an ILS stage with 150 mm travel, a DC motor drive with linear encoder, in English version.

- ¹⁾ Only for LM drive version.
- ²⁾ 100, 200 and 300 mm travels only.
- M-: For metric version
- CC: DC motor
- CCL: DC motor for SMC100CC controller
- HA: DC motor with linear encoder
- PP: Stepper motor
- LM: Linear motor

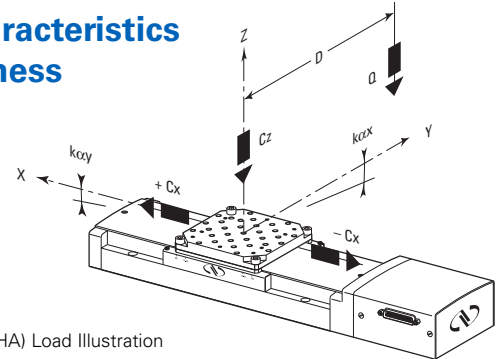
Recommended Motion Controllers

XPS-RL	see page 153
XPS-D	see page 148
ESP301	see page 157
SMC100	see page 159
	ILSCCL and ILSPP only

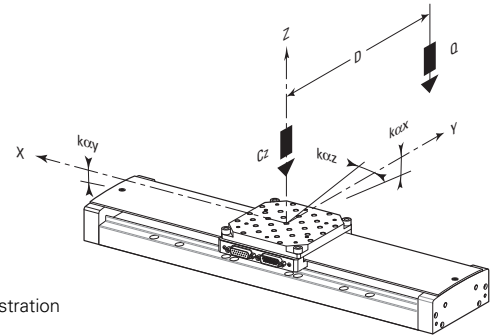
Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146. Motor cables are included for the PP and CC versions only.

Order cable kits for -LM stages based on the driver card and XPS controller.

Load Characteristics and Stiffness



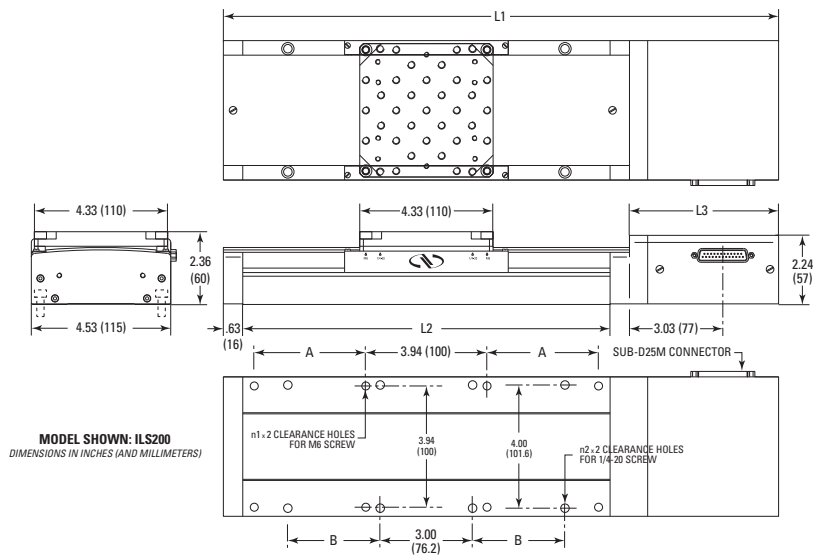
ILS (PP, CC, CCL, HA) Load Illustration



ILS-LM-S Load Illustration

	ILS	ILS-LM-S
Cz, Normal center load capacity on bearings	250 N	
+Cx/-Cx, Direct/Inverse load capacity on X axis	<40 N	-
kcx, Compliance in roll	15 μrad/N.m	
kcy, Compliance in pitch	10 μrad/N.m	
kcz, Compliance in yaw	10 μrad/N.m	
Q, Off-center load	$Q \leq Cz / (1 + D/60)$	
D, Cantilever distance in mm		

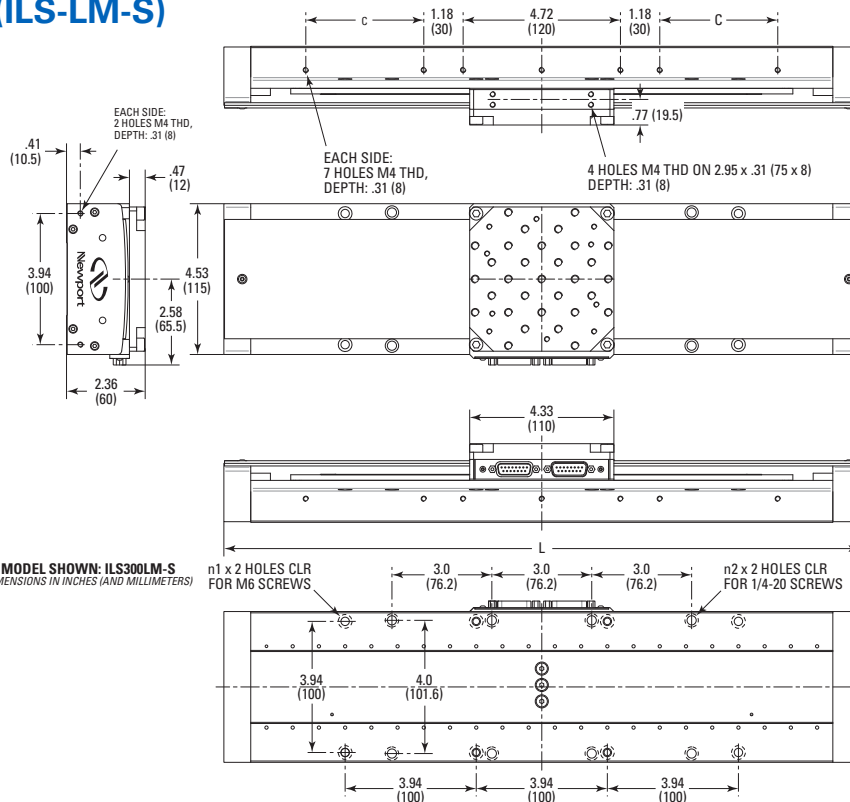
Dimensions (ILS PP, CC, CCL and HA)



MODEL SHOWN: ILS200
DIMENSIONS IN INCHES (AND MILLIMETERS)

Model (Metric)	Dimensions for CC, CCL and PP						Dimensions for HA		
	A	n ₁	B	n ₂	L2	L1	L3	L1	L3
ILS50 (M-ILS50)		2		2	7.99 (203)	14.09 (358)	4.84 (123)	15.5 (394)	6.3 (159)
ILS100 (M-ILS100)		2		2	9.96 (253)	16.14 (408)	4.92 (125)	17.5 (444)	6.3 (159)
ILS150 (M-ILS150)		2	3 in.	4	11.93 (303)	18.11 (458)	4.92 (125)	19.4 (494)	6.3 (159)
ILS200 (M-ILS200)	100 mm	4	3 in.	4	13.90 (353)	20.08 (508)	4.92 (125)	21.4 (544)	6.3 (159)
ILS250 (M-ILS250)	100 mm	4	3 in.	4	15.87 (403)	22.06 (558)	4.2 (125)	23.4 (594)	6.3 (159)

Dimensions (ILS-LM-S)



MODEL SHOWN: ILS300LM-S
DIMENSIONS IN INCHES (AND MILLIMETERS)

MODEL (METRIC)	n ₁	n ₂	C	TRAVEL	L
(M-ILS100LM-S)	2	2	1.08 (27.5)	3.94 (100)	11.22 (285)
(M-ILS200LM-S)	4	4	2.76 (70)	7.87 (200)	15.16 (385)
(M-ILS300LM-S)	4	4	3.54 (90)	11.8 (300)	19.09 (485)

CAD See our website
for CAD files

IMS Series High-Performance Long-Travel Linear Stages



scan QR code to watch video



- Single axis or gantry configurations up to 1200 mm travel
- High stiffness, FEM optimized extruded aluminum body avoids thermal bending effects
- Precision recirculating ball bearing slides provide accurate linear motion without ball cage migration
- Preloaded, backlash-free ballscrew drive allows rapid movement with short step and settling time
- LM version for non-contact drive system with high dynamic response and high reliability in a small footprint

The IMS-S Series linear stage complements the ILS Series by providing longer linear travel ranging from 300 to 1200 mm. The IMS-S stages feature a robust design and high performance at low cost, making them cost-effective solutions for precision industrial and laboratory applications. Features include: recirculating ball bearing slides to provide excellent payload capabilities and long life; FEM-optimized extruded aluminum body to avoid bending effects or deflection under load. The IMS series are available in ball screw and linear motor drive versions. The preloaded, backlash-free ballscrew version provides rapid motion with fast, step and settling times. For PP and CC models, position measurements are read with a 4000 pts/rev. encoder mounted directly on the screw. The CCHA model features an integral linear scale providing 0.1 μm resolution feedback. The linear motor version IMS-LM series employs a centered, high efficiency 3-phase synchronous ironless, linear motor as driving element, providing high speed, high acceleration and high system responsiveness. The IMS series stages are ideal for many precision industrial applications such as semiconductor wafer inspection, micro-electronics test and assembly, pick and place, DNA sequencing or laser machining. The IMS-LM-SA version with 4-pt mounting is ideal for delay lines and other applications on non-flat mounting surfaces.

Ordering Information

Model	Series	Travel (mm)	Drive	4-Point Mounting
M-	IMS	300	CC CCHA PP LM	-SA ⁽²⁾
		400		
		500		
		600		
		800 ⁽¹⁾		
		1000 ⁽¹⁾		
		1200 ⁽¹⁾		

*Example:
The M-IMS800LM-SA-S is a metric version of IMS stage with 800 mm travel, a linear motor drive and 4-point mounting.*

¹⁾ Only for LM drive version.
²⁾ 800, 1000 and 1200 mm travels available.

- M-: For metric version
- CC: DC motor with rotary encoder
- CCHA: DC motor with linear encoder
- PP: Stepper motor with rotary encoder
- LM-S: Linear motor
- SA: 4-point mounting

Dynamic Specifications (LM Models)

Maximum Speed (mm/s), No Load	500
Maximum Acceleration (m/s ²), No Load	26
Max. Force (Cont.) (N)	100
Max Force (Peak) (N)	140

For the definition of specifications, visit Newport.com for the Motion Basics and Standards.

Recommended Motion Controllers

XPS-RL see page 153

XPS-D see page 148

ESP301 see page 157

IMS-PP Only

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

Motor cables are included with the CC and PP versions only.

Order cable kits with the -LM stages based on the driver card and XPS controller.

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Specifications

	IMS300LM-S	IMS400LM-S	IMS500LM-S	IMS600LM-S	IMS1000LM-S	IMS800LM-S	IMS1200LM-S
Travel Range	300 mm	400 mm	500 mm	600 mm	1000 mm	800 mm	1200 mm
Maximum Speed ¹	1000 mm/s						
Minimum Incremental Motion	0.020 μ m						
Continuous Motor Force	100 N						
Peak Motor Force	210 N						
Centered Load Capacity	600 N						
Accuracy, Typical	$\pm 1.7 \mu$ m	$\pm 2.0 \mu$ m	$\pm 2.5 \mu$ m	$\pm 3.0 \mu$ m	$\pm 4.0 \mu$ m		$\pm 5.0 \mu$ m
Accuracy, Guaranteed	$\pm 4.5 \mu$ m			$\pm 5.5 \mu$ m	$\pm 7.5 \mu$ m	$\pm 9.0 \mu$ m	
Bi-directional repeatability, Typical	$\pm 0.08 \mu$ m	$\pm 0.08 \mu$ m	$\pm 0.09 \mu$ m	$\pm 0.09 \mu$ m	$\pm 0.10 \mu$ m	$\pm 0.12 \mu$ m	$\pm 0.13 \mu$ m
Bi-directional Repeatability, Guaranteed	$\pm 0.25 \mu$ m				$\pm 0.50 \mu$ m		
Pitch, Typical	$\pm 37 \mu$ rad			$\pm 50 \mu$ rad	$\pm 112 \mu$ rad	$\pm 100 \mu$ rad	$\pm 125 \mu$ rad
Pitch, Guaranteed	$\pm 75 \mu$ rad			$\pm 125 \mu$ rad	$\pm 225 \mu$ rad	$\pm 200 \mu$ rad	$\pm 250 \mu$ rad
Yaw, Typical	$\pm 25 \mu$ rad			$\pm 30 \mu$ rad	$\pm 40 \mu$ rad		
Yaw, Guaranteed	$\pm 50 \mu$ rad	$\pm 75 \mu$ rad	$\pm 75 \mu$ rad	$\pm 75 \mu$ rad	$\pm 150 \mu$ rad		
Origin Repeatability	$\pm 0.05 \mu$ m						
Cable Length	5 m						
Weight	17 kg	19 kg	21 kg	23 kg	28 kg	24 kg	32 kg
MTBF	20,000 h (25% load, 30% duty cycle)						

Also available in a stepper motor IMS-PP version.

1. Maximum speed is reduced to 100 mm/sec for -PP versions.
2. Also available in a metric -M version.

	IMS300CC	IMS400CC	IMS500CC	IMS600CC	IMS300CCHA	IMS400CCHA	IMS500CCHA	IMS600CCHA
Travel Range	300 mm	400 mm	500 mm	600 mm	300 mm	400 mm	500 mm	600 mm
Maximum Speed ¹	200 mm/s							
Minimum Incremental Motion	1.25 μ m				0.20 μ m			
Centered Load Capacity	600 N							
Axial Load Capacity (+Cx)	30 N							
Inverse Axial Load Capacity (-Cx)	-30 N							
Accuracy, Typical	$\pm 2.5 \mu$ m		$\pm 3.0 \mu$ m	$\pm 4.0 \mu$ m	$\pm 2.0 \mu$ m		$\pm 2.5 \mu$ m	$\pm 3.5 \mu$ m
Accuracy, Guaranteed	$\pm 5.0 \mu$ m		$\pm 6.0 \mu$ m	$\pm 9.0 \mu$ m	$\pm 4.0 \mu$ m		$\pm 5.0 \mu$ m	$\pm 6.5 \mu$ m
Uni-directional Repeatability, Typical	$\pm 0.45 \mu$ m	$\pm 0.50 \mu$ m		$\pm 0.50 \mu$ m	$\pm 0.12 \mu$ m			
Bi-directional Repeatability, Typical	$\pm 0.70 \mu$ m	$\pm 0.75 \mu$ m	$\pm 0.75 \mu$ m	$\pm 0.75 \mu$ m	$\pm 0.20 \mu$ m	$\pm 0.20 \mu$ m	$\pm 0.20 \mu$ m	$\pm 0.20 \mu$ m
Bi-directional repeatability, Guaranteed	$\pm 1.25 \mu$ m				$\pm 0.50 \mu$ m			
Uni-directional Repeatability, Guaranteed	$\pm 0.65 \mu$ m				$\pm 0.25 \mu$ m			
Pitch, Typical	$\pm 37 \mu$ rad			$\pm 50 \mu$ rad	$\pm 37 \mu$ rad			$\pm 50 \mu$ rad
Pitch, Guaranteed	$\pm 75 \mu$ rad			$\pm 125 \mu$ rad	$\pm 75 \mu$ rad			$\pm 125 \mu$ rad
Yaw, Typical	$\pm 15 \mu$ rad		$\pm 25 \mu$ rad	$\pm 30 \mu$ rad	$\pm 25 \mu$ rad	$\pm 15 \mu$ rad	$\pm 25 \mu$ rad	$\pm 30 \mu$ rad
Yaw, Guaranteed	$\pm 50 \mu$ rad	$\pm 75 \mu$ rad			$\pm 50 \mu$ rad	$\pm 75 \mu$ rad		
Limit Switches	Optical							
Origin Repeatability	$\pm 0.5 \mu$ m				$\pm 0.1 \mu$ m			
Cable Length	5 m							
Weight	17 kg	18.7 kg	20.3 kg	22 kg	17 kg	18.7 kg	20.3 kg	22 kg
MTBF	20,000 h (25% load, 30% duty cycle)							

Also available in a stepper motor IMS-PP version.

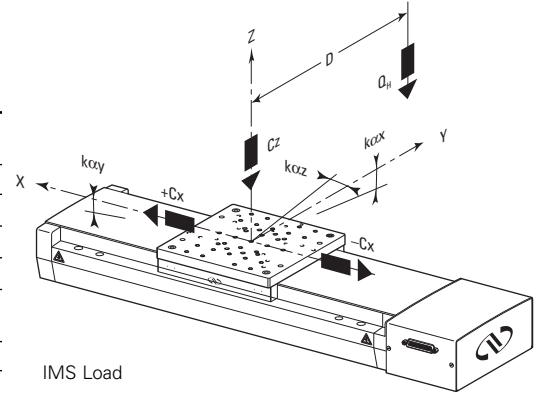
1. Maximum speed is reduced to 100 mm/sec for -PP versions.
2. Also available in a metric -M version

MOTORIZED
LINEAR STAGES

Load Characteristics and Stiffness

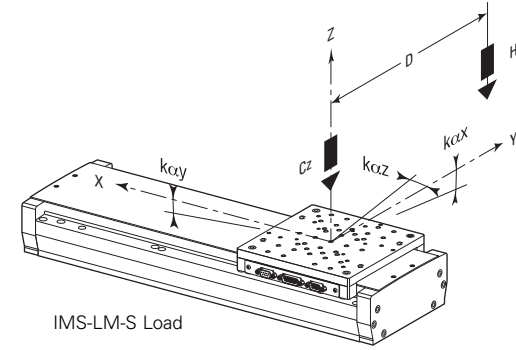
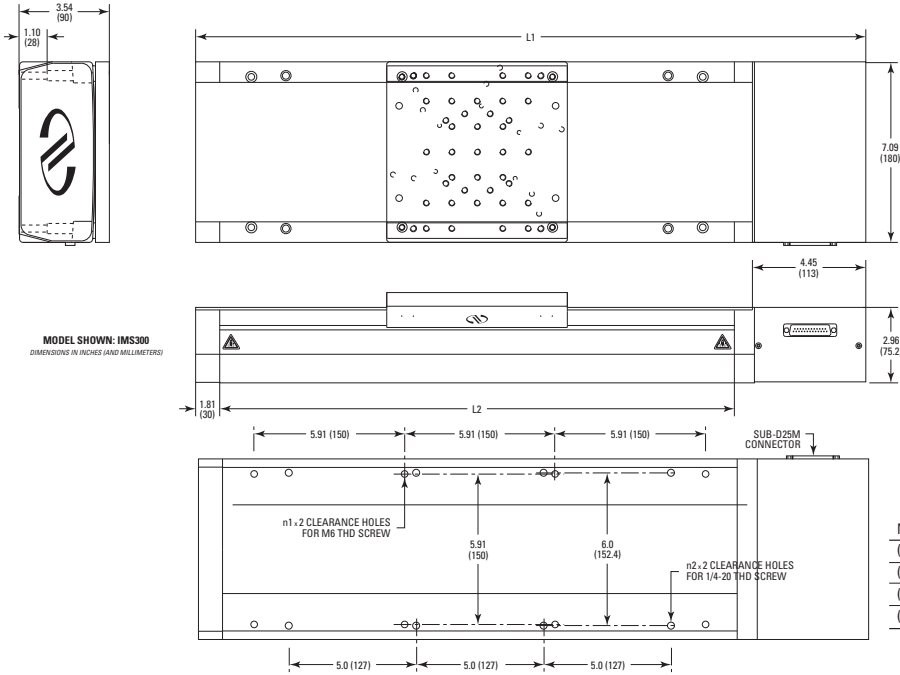
	IMS (CC, PP, CCHA)	IMS-LM-S	IMS-LM-SA-S
Cz, Normal centered load capacity-	600 N		100 N
-Cx, +Cx, Axial load capacity	<30 N	-	-
k _{cx} , Compliance in roll	1 μrad/N.m		2 μrad/N.m
k _{cy} , Compliance in pitch	0.2 μrad/N.m		2 μrad/N.m
k _{cz} , Compliance in yaw	1 μrad/N.m		1 μrad/N.m
Q, Off-center load	Q _H , Q _V ≤ Cz / (1 + D/90) and Q _V must be ≤ Cx	Q _H , Q _V ≤ Cz / (1 + D/90) and Q _V must be ≤ Cx	

D, cantilever distance in mm between the center of the mass of the load and the bearings center.



MOTORIZED
VERTICAL STAGES

Dimensions (IMS PP, CC, CCHA)



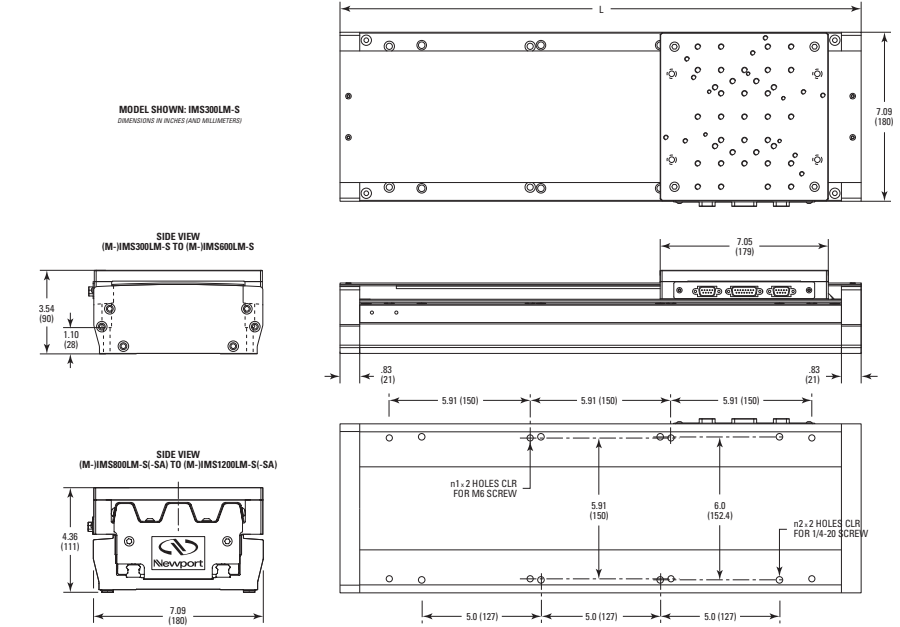
MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

HEXAPODS

CONTROLLERS
AND DRIVERS

Dimensions (IMS-LM)



MODEL (METRIC)	n1	n2	TRAVEL	L1	L2
(M-)IMS300LM-S	4	4	11.81 (300)	26.30 (668)	20.20 (513)
(M-)IMS400LM-S	4	4	15.75 (400)	30.24 (768)	24.13 (613)
(M-)IMS500LM-S	4	6	19.69 (500)	34.17 (868)	28.07 (713)
(M-)IMS600LM-S	6	6	23.62 (600)	38.11 (968)	32.01 (813)

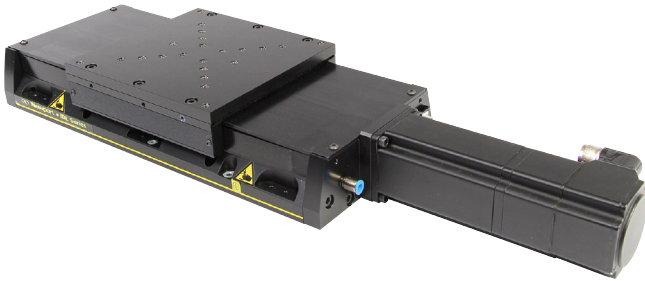
MODEL (METRIC)	n1	n2	TRAVEL	L
(M-)IMS300LM-S	4	4	11.81 (300)	21.85 (555)
(M-)IMS400LM-S	4	4	15.75 (400)	25.79 (655)
(M-)IMS500LM-S	4	6	19.69 (500)	29.72 (755)
(M-)IMS600LM-S	6	6	23.62 (600)	33.66 (855)
(M-)IMS800LM-S	6	-	31.49 (800)	44.48 (1130)
(M-)IMS1000LM-S	7	-	39.36 (1000)	52.35 (1330)
(M-)IMS1200LM-S	8	-	47.23 (1200)	60.22 (1530)
(M-)IMS800LM-SA-S	4 HOLES ON 28 x 6 (600 x 150)		31.49 (800)	44.48 (1130)
(M-)IMS1000LM-SA-S	4 HOLES ON 28 x 6 (750 x 150)		39.36 (1000)	52.35 (1330)
(M-)IMS1200LM-SA-S	4 HOLES ON 34 x 6 (900 x 150)		47.23 (1200)	60.22 (1530)

MOTORIZED
OPTICAL MOUNTS

BEAM
MANAGEMENT

SPECIAL
COLLECTIONS

IDL-BL Mid-Travel Industrial Linear Stages



- Choose between 150 or 300mm travel
- High efficiency, brushless DC torque motor for speeds up to 300 mm/s
- Designed for easy direct mounting of XY or XYZ configurations on English or Metric tables
- Compatible with many industrial controllers
- Brake version available

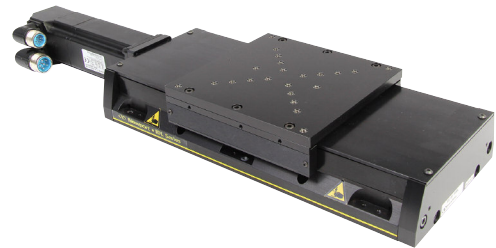
Ordering Information

Model	Description
IDL165-150BL	Industrial linear stage with brushless DC motor, 150 mm travel
IDL165-150BLBK	Industrial linear stage with brushless DC motor and brake, 150 mm travel
IDL165-300BL	Industrial linear stage with brushless DC motor, 300 mm travel
IDL165-300BLBK	Industrial linear stage with brushless DC motor, 300 mm travel

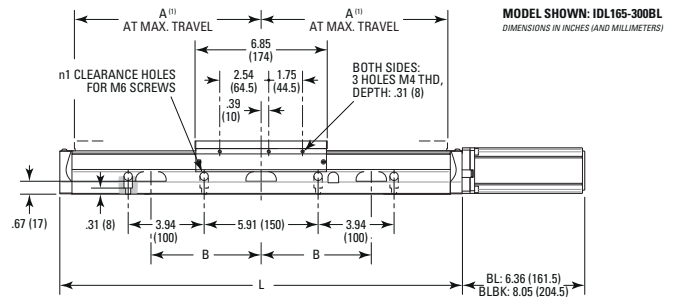
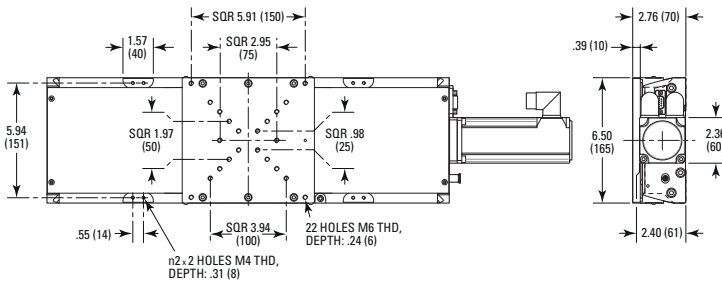
Controllers

Model
XPS-Dx
XPS-DRV11

Contact Newport for more information about compatibility with the XPS controllers.



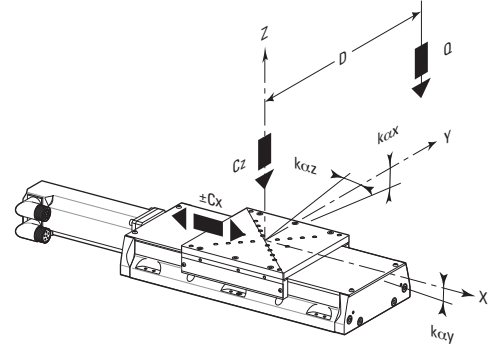
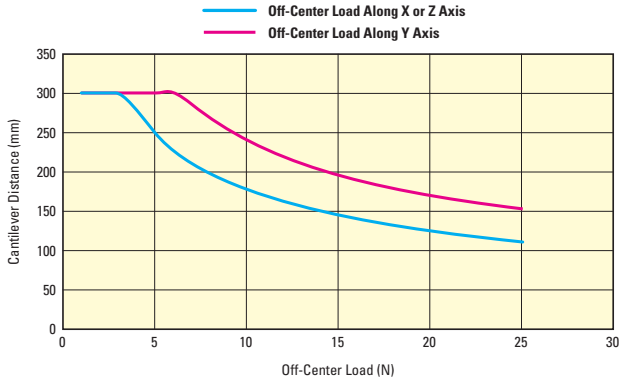
Dimensions



MODEL	TRAVEL	L	A ⁽¹⁾	n1	B	n2
IDL165-150BL	7.87 (200)	14.94 (379.5)	6.71 (170.3)	4	5.71 (145)	6
IDL165-300BL	11.81 (300)	20.85 (529.5)	9.66 (245.3)	8	5.71 (145)	6

⁽¹⁾ INCLUDING OVER-TRAVEL ALLOWED BY THE HARD STOP.

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS



C_z , Normal center load capacity on bearings	450 N
$\pm C_x$, Continuous axial load capacity	250 N
k_{cx} , Angular stiffness (Roll)	0.3 $\mu\text{rad}/\text{Nm}$
k_{cy} , Angular stiffness (Pitch)	0.4 $\mu\text{rad}/\text{Nm}$

Specifications

	IDL165-150BL	IDL165-150BLBK	IDL165-300BL	IDL165-300BLBK
Travel Range	150 mm		300 mm	
Maximum Speed	300 mm/sec			
Minimum Incremental Motion ¹	1.0 μm			
Accuracy, Guaranteed	$\pm 3.0 \mu\text{m}$		$\pm 5.0 \mu\text{m}$	
Bi-directional Repeatability, Guaranteed	$\pm 1.0 \mu\text{m}$			
Centered Load Capacity	450 N			
Axial Load Capacity (+Cx)	250 N			
Inverse Axial Load Capacity (-Cx)	-250 N			
Pitch, Guaranteed	$\pm 35 \mu\text{rad}$			
Yaw, Guaranteed	$\pm 25 \mu\text{rad}$			
Origin Repeatability	$\pm 0.5 \mu\text{m}$		$\pm 0.1 \mu\text{m}$	$\pm 0.5 \mu\text{m}$
Cable Length	4.5 m			
Weight	11.1 kg	9.8 kg	11.1kg	11.6 kg
MTBF	20,000 h (25% load, 30% duty cycle)			
CE	Compliant			

¹ Driver Dependent



scan QR code
to watch video

IDL Long-Travel Industrial Linear Stages



- Built for industrial environments with debris protection, high throughput & reliability
- High-efficiency, non-contact, ironless linear motor for fast motion & speed stability
- Designed for easy direct mounting of XY configurations on English or Metric tables
- Various sizes capable of high load capacities to fit different applications
- Compatible with many industrial controllers
- Quick and reliable delivery based on customers' production needs

The long-travel IDL industrial-grade linear stages boasts the highest load capacity and speed of all linear motor stages with a wide variety of sizes and travels to choose from, making it well-suited for demanding production environments. With IP50 level dust protection, the IDL stages protect themselves in these environments with its protective side-bands, hard cover, and air purge. They are driven with a high-efficiency, non-contact, and ironless linear motor. The linear motor ensures zero cogging for ultra-smooth velocity control and less heat generation. The design of the stage allows for various widths, travel range, and load capacities to fit numerous applications. Given the variety, these stages are directly stackable with each other; minimizing design and assembly time.

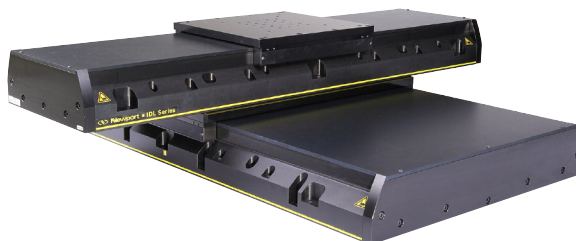
Ordering Information

Model (Metric)	Description
Width: 165 mm	
IDL165-100LM (M-IDL165-100LM)	100 mm Travel, 165 mm Width
IDL165-200LM (M-IDL165-200LM)	200 mm Travel, 165 mm Width
IDL165-300LM (M-IDL165-300LM)	300 mm Travel, 165 mm Width
Width: 225 mm	
IDL225-200LM (M-IDL225-200LM)	200 mm Travel, 225 mm Width
IDL225-300LM (M-IDL225-300LM)	300 mm Travel, 225 mm Width
IDL225-400LM (M-IDL225-400LM)	400 mm Travel, 225 mm Width
IDL225-500LM (M-IDL225-500LM)	500 mm Travel, 225 mm Width
IDL225-1200LM (M-IDL225-1200LM)	1200 mm Travel, 225 mm Width
Width: 280 mm	
IDL280-300LM (M-IDL280-300LM)	300 mm Travel, 280 mm Width
IDL280-400LM (M-IDL280-400LM)	400 mm Travel, 280 mm Width
IDL280-500LM (M-IDL280-500LM)	500 mm Travel, 280 mm Width
IDL280-600LM (M-IDL280-600LM)	600 mm Travel, 280 mm Width
IDL280-700LM (M-IDL280-700LM)	700 mm Travel, 280 mm Width
IDL280-1000LM (M-IDL280-1000LM)	1000 mm Travel, 280 mm Width
IDL280-1200LM (M-IDL280-1200LM)	1200 mm Travel, 280 mm Width
Width: 560 mm	
IDL560-450LM (M-IDL560-450LM)	450 mm Travel, 560 mm Width
IDL560-600LM (M-IDL560-600LM)	600 mm Travel, 560 mm Width
IDL560-750LM (M-IDL560-750LM)	750 mm Travel, 560 mm Width
IDL560-1000LM (M-IDL560-1000LM)	1000 mm Travel, 560 mm Width

Recommended Motion Controller

Model
XPS-Dx (see page 148)
XPS-DRV11 (see page 148) (with IDL165 only)
XPS-EDBL (see page 148)

Contact Newport for more information about compatibility with the XPS controllers.



Specifications for IDL

	165-100LM	165-200LM	165-300LM	225-1000LM	225-1200LM	225-200LM	225-300LM	225-400LM	225-500LM	225-600LM
Travel Range	100 mm	200 mm	300 mm	1000 mm	1200 mm	200 mm	300 mm	400 mm	500 mm	600 mm
Maximum Speed	2000 mm/s									
Minimum Incremental Motion	0.050 μm									
Maximum Continuous Force	68 N			136 N						
Maximum Peak Force	289 N			278 N						
Centered Load Capacity	450 N			1000 N						
Accuracy, Typical	NA	±0.8 μm	±1.5 μm	NA	NA	NA	±0.9 μm	NA	NA	±1.2 μm
Accuracy, Guaranteed	±2.0 μm	±2.0 μm	±2.0 μm	±4.3 μm	±5.0 μm	±2.0 μm	±2.0 μm	±2.3 μm	±2.7 μm	±3.0 μm
Bi-directional Repeatability, Typical	±0.10 μm									
Bi-directional Repeatability, Guaranteed	±0.75 μm									
Pitch Typical	NA	NA	NA	NA	NA	±18 μrad	±18 μrad	NA	NA	±35 μrad
Pitch, Guaranteed	±15 μrad	±23 μrad	±30 μrad	±55 μrad	±65 μrad	±20 μrad	±25 μrad	±30 μrad	±35 μrad	±40 μrad
Compliance in Pitch.	0.4 μrad/Nm			0.55 μrad/Nm						
Yaw Typical	NA	NA	NA	NA	NA	NA		NA	NA	±15 μrad
Yaw, Guaranteed	±15 μrad	±20 μrad	±40 μrad			±20 μrad	±25 μrad	±30 μrad		
Compliance in Yaw	0.4 μrad/Nm			0.3 μrad/Nm						
Compliance in Roll	0.3 μrad/Nm			0.7 μrad/Nm						
Origin Repeatability	±0.1 μm									
Cable Length	4.5 m			5 m						
Width	165 mm			225 mm						
Weight	8.7 kg	10 kg	12 kg	45 kg	56 kg	25 kg	26.5 kg	31.9 kg	33.8 kg	35.8 kg
MTBF	20,000 h (25% load, 30% duty cycle)									
CE	Compliant									

	280-1000LM	280-1200LM	280-300LM	280-400LM	280-500LM	280-600LM	280-700LM	560-1000LM	560-450LM	560-600LM	560-750LM
Travel Range	1000 mm	1200 mm	300 mm	400 mm	500 mm	600 mm	700 mm	1000 mm	450 mm	600 mm	750 mm
Maximum Speed	2000 mm/s										
Minimum Incremental Motion	0.050 μm										
Maximum Continuous Force	265 N						472 N				
Maximum Peak Force	1248 N						2830 N				
Centered Load Capacity	1500 N						2000 N				
Accuracy, Typical	NA	NA	±0.7 μm	NA	NA	±1.3 μm	NA	NA	NA	±1.5 μm	NA
Accuracy, Guaranteed	±4.3 μm	±5.0 μm	±2.0 μm	±2.3 μm	±2.7 μm	±3.0 μm	±3.3 μm	±4.3 μm	±2.5 μm	±3.0 μm	±3.5 μm
Bi-directional Repeatability, Typical	±0.10 μm										
Bi-directional Repeatability, Guaranteed	±0.75 μm										
Pitch Typical	NA	NA	±21 μrad	NA	NA	±20 μrad	NA	NA	NA	NA	NA
Pitch, Guaranteed	±55 μrad	±60 μrad	±25 μrad	±30 μrad	±35 μrad	±40 μrad	±45 μrad	±55 μrad	±33 μrad	±40 μrad	±45 μrad
Compliance in Pitch.	0.3 μrad/Nm						0.37 μrad/Nm				
Yaw Typical	NA	NA	±15 μrad	NA	NA	±14 μrad	NA	NA	NA	NA	NA
Yaw, Guaranteed	±40 μrad		±25 μrad	±30 μrad				±40 μrad	±30 μrad		
Compliance in Yaw	0.2 μrad/Nm						0.1 μrad/Nm				
Compliance in Roll	0.3 μrad/Nm						0.12 μrad/Nm				
Origin Repeatability	±0.1 μm										
Cable Length	5 m										
Thread Type	M6										
Width	280 mm						560 mm				
Weight	82.5 kg	94 kg	48 kg	55.1 kg	59.7 kg	65 kg	69.5 kg	159 kg	114 kg	124 kg	142 kg
MTBF	20,000 h (25% load, 30% duty cycle)										

DL Series

Optical Delay Line Motorized Stages



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- Very affordable
- Excellent delay sensitivity and bi-directional repeatability
- Low angular deviation where it counts (pitch)
- Small footprint
- No moving cables

The Delay Line family of affordable linear motor driven stages is optimized for ultrafast spectroscopy applications that require repeatable and precise delays (0.5fs). 3 travel versions and 7 beam kits are available. Delays can be as long as 8.7ns with the 325mm travel version and a 4-pass beam kit. The controller is included with the stage and a user-friendly GUI can be downloaded from the DL family page – making setup quick and easy.

Specifications

	DL125	DL225	DL325
Travel Range	125 mm	225 mm	325 mm
Maximum Speed	500 mm/s		
Minimum Incremental Motion	0.075 μm		
Maximum Acceleration	7,500 mm/s ²		
Accuracy, Guaranteed	$\pm 1.5 \mu\text{m}$	$\pm 2.0 \mu\text{m}$	$\pm 2.5 \mu\text{m}$
Bi-directional Repeatability, Guaranteed	$\pm 0.15 \mu\text{m}$		
Pitch, Typical	$\pm 60 \mu\text{rad}$		$\pm 90 \mu\text{rad}$
Pitch, Guaranteed	$\pm 100 \mu\text{rad}$		$\pm 150 \mu\text{rad}$
Yaw, Typical	$\pm 30 \mu\text{rad}$	$\pm 40 \mu\text{rad}$	$\pm 50 \mu\text{rad}$
Yaw, Guaranteed	$\pm 60 \mu\text{rad}$	$\pm 90 \mu\text{rad}$	$\pm 120 \mu\text{rad}$
Origin Repeatability	0.4 μm		
Cable Length	3 m		
Weight	2.8 kg	3.8 kg	4.8 kg
MTBF	20,000 hours		
CE	Compliant		

Ordering Information

Model	Description
DL125	Delay Line Stage and Controller, 125 mm Travel
DL225	Delay Line Stage and Controller, 225 mm Travel
DL325	Delay Line Stage and Controller, 325 mm Travel

Recommended Accessory

Model	Description
DL-PS	Power Supply, Delay Line Stages

MOTORIZED
LINEAR STAGES

MOTORIZED
VERTICAL STAGES

MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

HEXAPODS

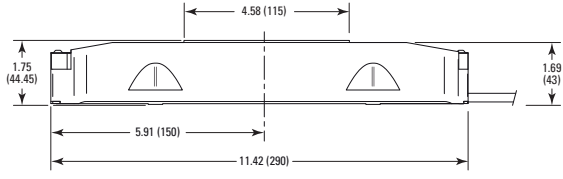
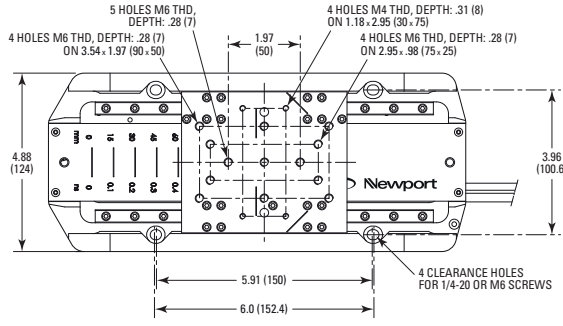
CONTROLLERS
AND DRIVERS

MOTORIZED
OPTICAL MOUNTS

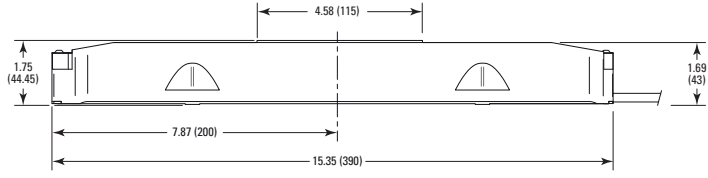
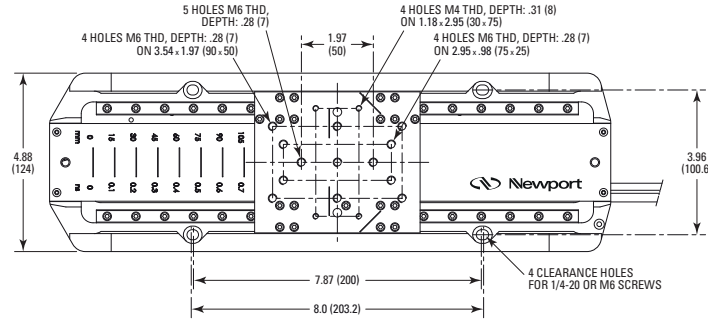
BEAM
MANAGEMENT

SPECIAL
COLLECTIONS

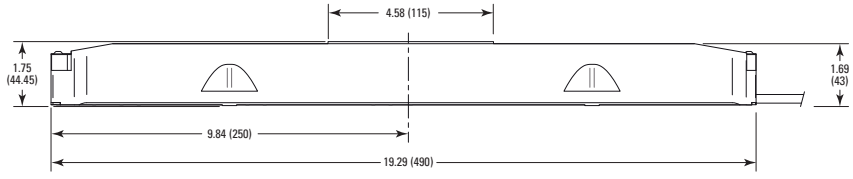
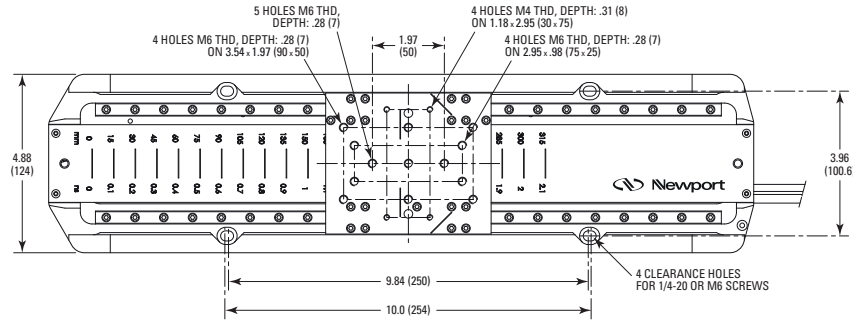
DLS125 STAGE



DLS225 STAGE

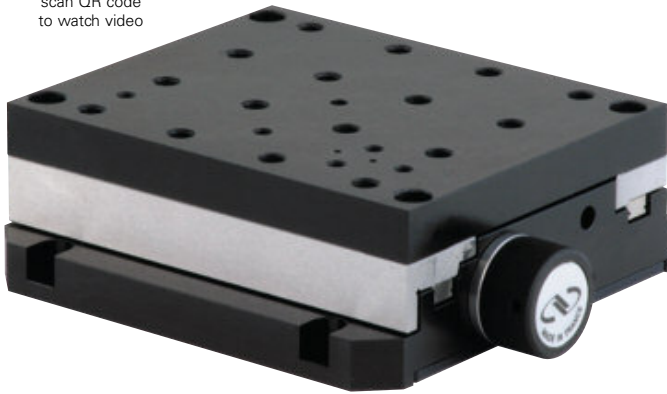


DLS325 STAGE





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to watch video



VP-25X

Precision Compact Linear Stages

- Easy XY and XYZ configuration
- Highly sensitive 10nm Minimum Incremental Motion
- Low-profile, compact, and lightweight
- Convenient manual adjustment knob
- Built-in linear encoder for highly repeatable and precise motion
- Plug and Play - ESP compatible



The VP-25X Series linear stage provides high-precision positioning performance in an ultra-compact form factor. A low friction ball screw drive provides robust, reliable performance with excellent thrust and minimal heat induced position drift. Combined with excellent minimum incremental motion of 10nm and travel of 25mm, the VP-25X is ideal for applications requiring fine manipulation of small parts. Featuring a manual adjustment knob, VP-25X stages are versatile enough to handle automated and non-automated tasks alike. Typical applications include fiber alignment, micro-assembly, and micro-machining. Available in VP-25XA and the finer MIM, VP-25XL models.

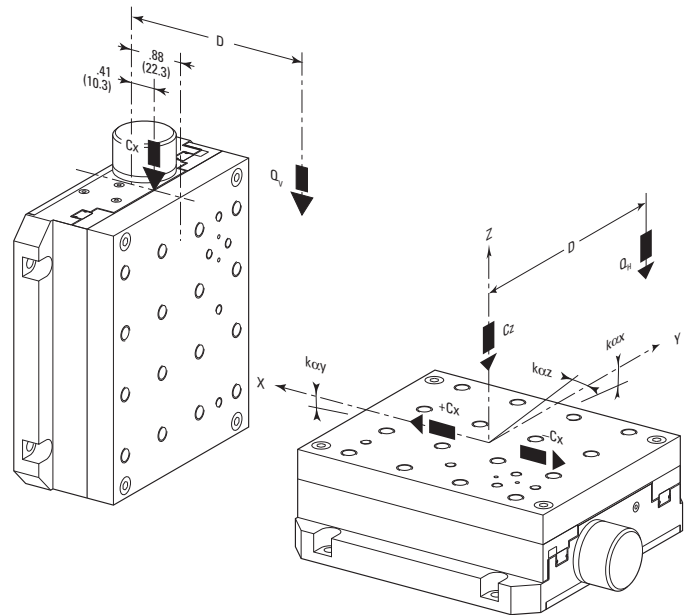
Specifications

	VP-25XA	VP-25XA-XYZL ¹	VP-25XL	VP-25XL-XYZL ²
Accuracy, Guaranteed	±1.0 μm	±1.0 μm	±1.0 μm	±1.0 μm
Accuracy, Typical	±0.4 μm	±0.4 μm	±0.5 μm	±0.5 μm
Axial Load Capacity (+Cx)	40 N	40 N	40 N	40 N
Bi-directional Repeatability, Guaranteed	±0.10 μm	±0.10 μm	±0.07 μm	±0.07 μm
Bi-directional Repeatability, Typical	±0.06 μm	±0.06 μm	±0.05 μm	±0.05 μm
Cable Length	1.5 m	1.5 m	3 m	3 m
Centered Load Capacity	60 N	35 N	60 N	35 N
Inverse Axial Load Capacity (-Cx)	-40 N	-40 N	-40 N	-40 N
Maximum Speed	25 mm/s	25 mm/s	25 mm/s	25 mm/s
Minimum Incremental Motion	0.10 μm	0.10 μm	0.010 μm	0.010 μm
Motorized Axes	X	XYZ - Left Handed	X	XYZ - Left Handed
Pitch, Guaranteed	±50 μrad	±50 μrad	±50 μrad	±50 μrad
Pitch, Typical	±22 μrad	±22 μrad	±20 μrad	±20 μrad
Travel Range	25 mm	25 mm	25 mm	25 mm
Weight	1.5 kg	5 kg	1.5 kg	5 kg
Yaw, Guaranteed	±50 μrad	±50 μrad	±50 μrad	±50 μrad
Yaw, Typical	±17 μrad	±17 μrad	±20 μrad	±20 μrad

1. Select version ending in "R" for right handed configuration
2. Select version ending in "R" for right handed configuration
3. M- versions have metric threaded mounting holes

For the definition of specifications, visit Newport.com's section on **Motion Basics and Standards**.

Load Characteristics and Stiffness



Cz, Normal centered load capacity	60 N
+Cx, -Cx, Axial load capacity	40 N
k _x , Compliance in roll	20 μrad/N.m
k _{cy} , Compliance in pitch	20 μrad/N.m
k _{czz} , Compliance in yaw	30 μrad/N.m
Q _v , Off-center load	$Q_H, Q_V \leq C_z / (1+D/30)$
Where D = Cantilever distance in mm between the center of the mass of the load and the bearings center	
Distance between top surface and bearings center	22.3 mm

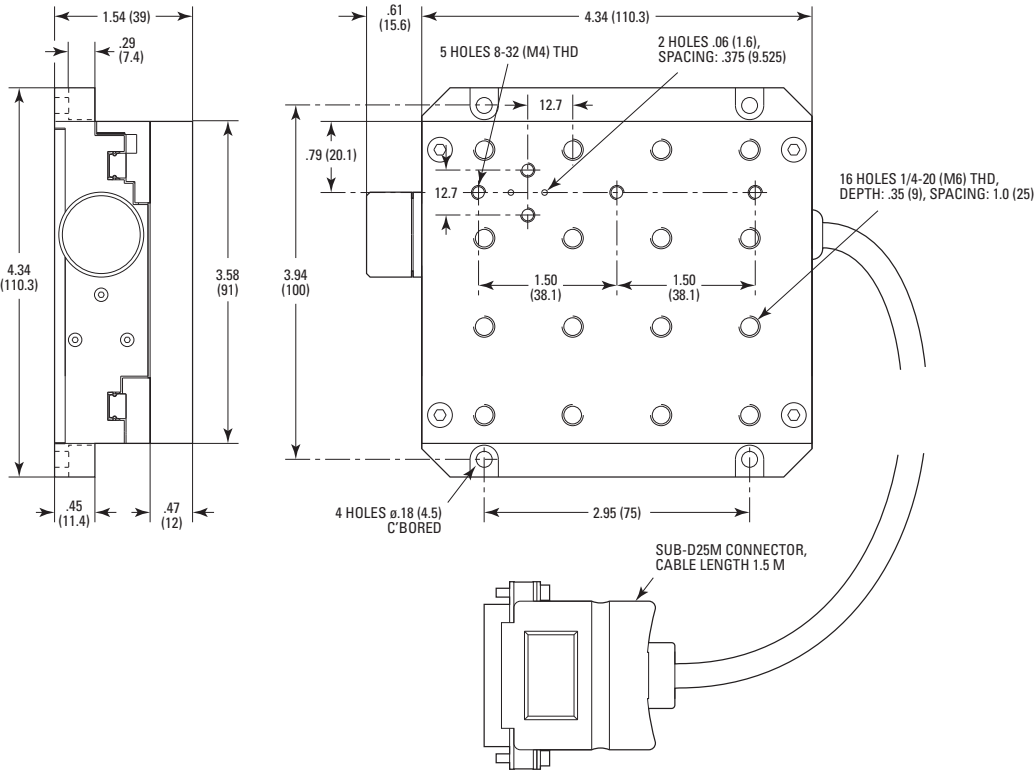
MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Ordering Information

Model (Metric)	Description
VP-25XA (M-VP-25XA)	Precision Compact Linear Stage, 25 mm, 0.1 μm, DC Servo w/Tach
VP-25XL (M-VP-25XL)	Precision Compact Linear Stage, 25 mm, 0.005 μm, DC Servo w/Tach
VP-BK (M-VP-BK)	Multi-Axis Bracket for M-VP-25X Linear Stages, Metric
VP-25XA-XYZL (M-VP-25XA-XYZL)	Compact XYZ Stage Stack, Left-handed, M-VP-25XA Stages with Bracket, Metric
VP-25XA-XYZR (M-VP-25XA-XYZR)	Compact XYZ Stage Stack, Right-handed, M-VP-25XA Stages with Bracket, Metric
VP-25XL-XYZL (M-VP-25XL-XYZL)	Compact XYZ Stage Stack, Left-handed, M-VP-25XL Stages with Bracket, Metric
VP-25XL-XYZR (M-VP-25XL-XYZR)	Compact XYZ Stage Stack, Right-handed, M-VP-25XL Stages with Bracket, Metric
VP-BP	Universal Base Plate
VP-BC	Base Clamp Set, VP Series Stages, Set of Four
Dovetail rail for ULTRAlign™ positioning system:	
562-RAIL-3.7	Length: 3.7 in. (94 mm)
561-RAIL-1	Length: 1 in. (25.4 mm)

Note: XYZ stacks are assembled with ±50 μrad XY orthogonality; ±100 μrad XZ and YZ orthogonality.

Dimensions

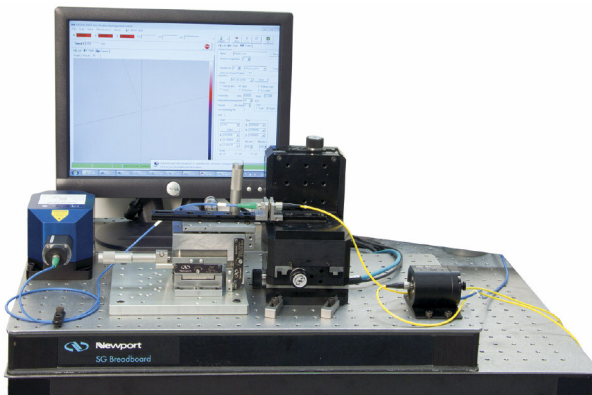


Recommended Motion Controllers

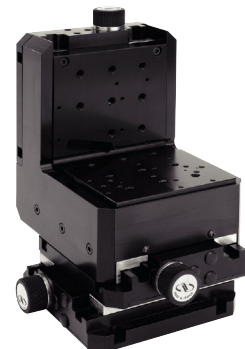
XPS-RL see page 153	
XPS-D see page 148	VP-25XA and VP-25XL
ESP301 see page 157	Only VP-25XA
SMC100CC see page 159	Only VP-25XA

Motor cables are included.

CAD See our website for CAD files

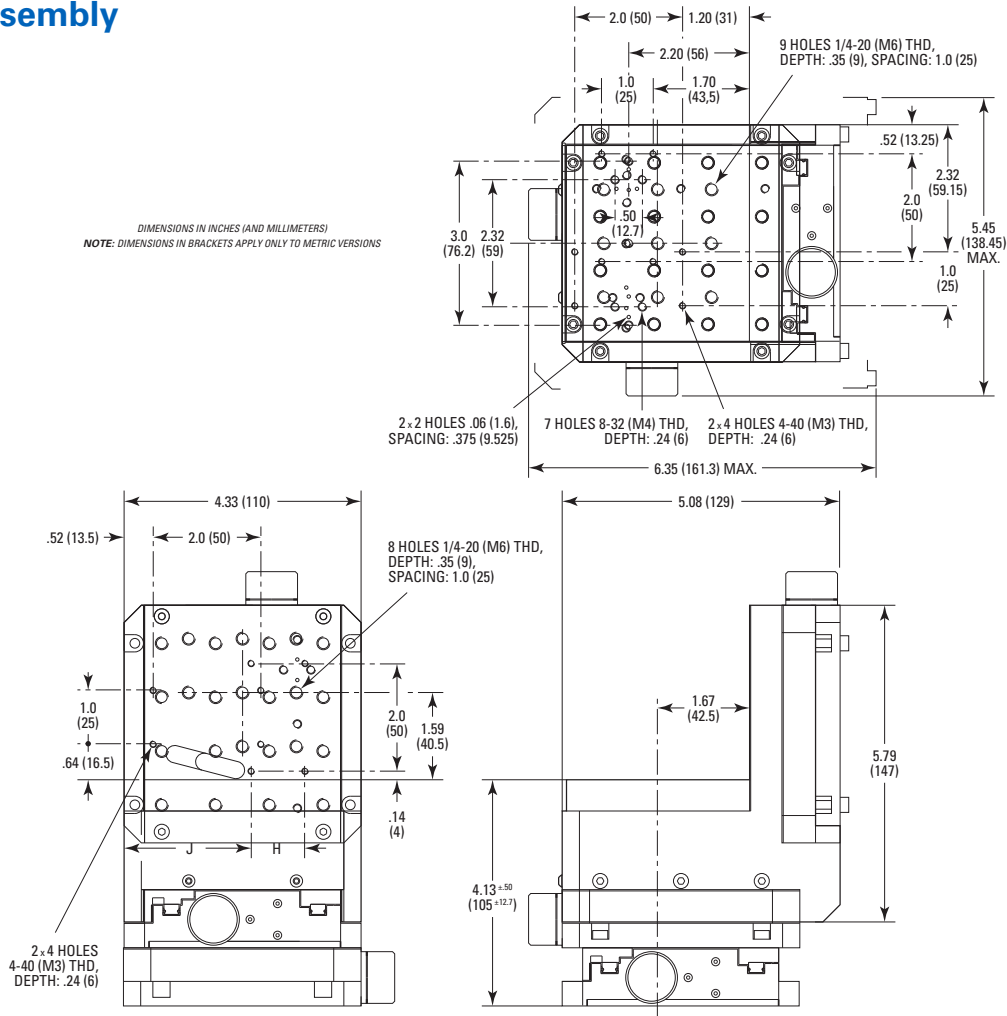


VP25XL-XYZR single-mode fiber alignment setup

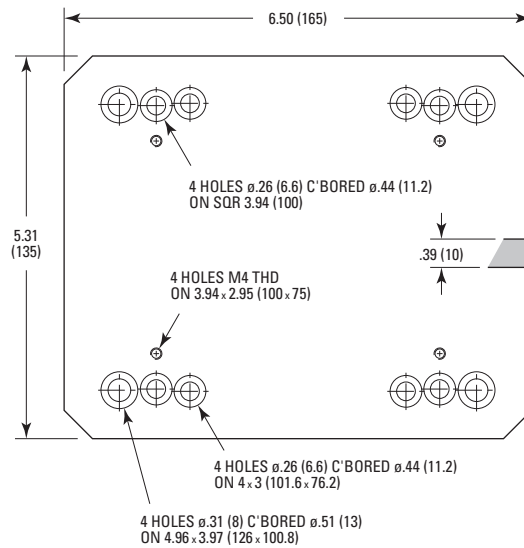


VP-25X stages can easily be assembled into an XYZ configuration with optional VP-BK bracket. Shown here is a left-handed stack, (M-)VP-25X-XYZL.

XYZ Assembly



VP-BP Drawing





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FMS Series Linear Metrology Stages



- All steel build offers high stiffness, thermal stability, repeatable positioning and overall durability
- Anti-creep crossed roller bearings provide exceptional straight, smooth motion, reducing measurement noise and eliminating measurement variability
- Engineered to address demanding applications of surface measurement and profilometry
- Linear encoder combined with a precision ground ball screw enables high accuracy and repeatability
- Plug and Play – ESP compatible



The FMS Series precision linear stages have been engineered to address the demanding applications of surface measurement and profilometry. Featuring monolithic steel construction, patent-pending preload technology and innovative anti-creep cross-roller bearings, FMS stages are capable of smooth motion with exceptional flatness and straightness. Steel construction and thermally-matched design insure optimal repeatability and stability. Typical applications include: contact and non-contact profilometry, mechanical and tribological testing, microstructure characterization and laser micromachining. FMS stages are available in CC, PP and PPHA models.

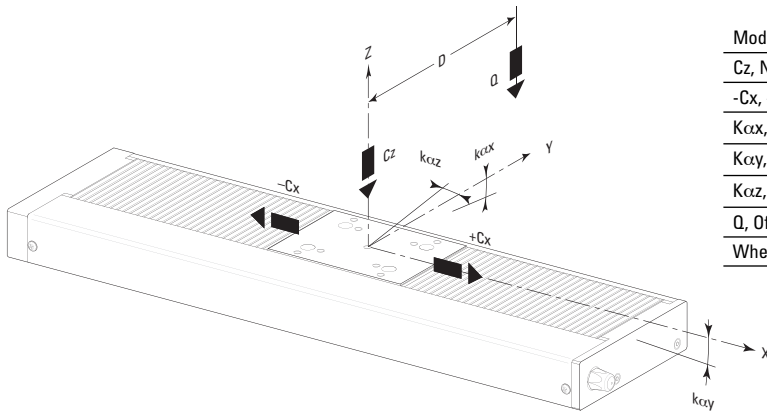
Specifications

	FMS100CC	FMS200CC	FMS300CC	FMS100PP	FMS200PP	FMS300PP
Travel Range	100 mm	200 mm	300 mm	100 mm	200 mm	300 mm
Maximum Speed	100 mm/s			20 mm/s		
Minimum Incremental Motion	0.50 μm			0.10 μm		
Centered Load Capacity	150 N					
Axial Load Capacity (+Cx)	30 N					
Inverse Axial Load Capacity (-Cx)	-30 N					
Accuracy, Typical	$\pm 1.5 \mu\text{m}$	$\pm 2.0 \mu\text{m}$	$\pm 2.5 \mu\text{m}$	$\pm 1.5 \mu\text{m}$	$\pm 2.0 \mu\text{m}$	$\pm 2.5 \mu\text{m}$
Accuracy, Guaranteed	$\pm 3.0 \mu\text{m}$	$\pm 5.0 \mu\text{m}$	$\pm 6.5 \mu\text{m}$	$\pm 3.0 \mu\text{m}$	$\pm 5.0 \mu\text{m}$	$\pm 6.5 \mu\text{m}$
Uni-directional Repeatability, Typical	$\pm 0.40 \mu\text{m}$			$\pm 0.35 \mu\text{m}$		
Bi-directional Repeatability, Typical	$\pm 0.8 \mu\text{m}$			$\pm 1.3 \mu\text{m}$		
Uni-directional Repeatability, Guaranteed	$\pm 0.75 \mu\text{m}$					
Bi-directional Repeatability, Guaranteed	$\pm 1.5 \mu\text{m}$			$\pm 2.25 \mu\text{m}$		
Flatness Typical (Guaranteed)	$\pm 0.25 (\pm 0.75) \mu\text{m}$	$\pm 0.50 (\pm 1.50) \mu\text{m}$	$\pm 1.0 (\pm 3.0) \mu\text{m}$	$\pm 0.25 (\pm 0.75) \mu\text{m}$	$\pm 0.50 (\pm 1.50) \mu\text{m}$	$\pm 1.0 (\pm 3.0) \mu\text{m}$
Straightness Typical (Guaranteed)	$\pm 0.25 (\pm 0.75) \mu\text{m}$	$\pm 0.50 (\pm 1.50) \mu\text{m}$	$\pm 1.0 (\pm 3.0) \mu\text{m}$	$\pm 0.25 (\pm 0.75) \mu\text{m}$	$\pm 0.50 (\pm 1.50) \mu\text{m}$	$\pm 1.0 (\pm 3.0) \mu\text{m}$
Pitch, Typical	$\pm 15 \mu\text{rad}$	$\pm 20 \mu\text{rad}$	$\pm 30 \mu\text{rad}$	$\pm 15 \mu\text{rad}$	$\pm 20 \mu\text{rad}$	$\pm 30 \mu\text{rad}$
Pitch, Guaranteed	$\pm 40 \mu\text{rad}$	$\pm 50 \mu\text{rad}$	$\pm 60 \mu\text{rad}$	$\pm 40 \mu\text{rad}$	$\pm 50 \mu\text{rad}$	$\pm 60 \mu\text{rad}$
Yaw, Typical	$\pm 4.0 \mu\text{rad}$	$\pm 5.0 \mu\text{rad}$	$\pm 6.0 \mu\text{rad}$	$\pm 4.0 \mu\text{rad}$	$\pm 5.0 \mu\text{rad}$	$\pm 6.0 \mu\text{rad}$
Yaw, Guaranteed	$\pm 10 \mu\text{rad}$	$\pm 15 \mu\text{rad}$	$\pm 20 \mu\text{rad}$	$\pm 10 \mu\text{rad}$	$\pm 15 \mu\text{rad}$	$\pm 20 \mu\text{rad}$
Origin Repeatability	$\pm 0.5 \mu\text{m}$			$\pm 2.5 \mu\text{m}$		
Cable Length	3 m					
Weight	6.5 kg	7.7 kg	8.9 kg	6.5 kg	7.7 kg	8.9 kg
MTBF	20,000 h (25% load, 30% duty cycle)					
CE	Compliant					

Also available in high accuracy version FMS-PPHA

1. $\pm 0.06 \mu\text{m}$
2. $\pm 0.10 \mu\text{m}$
3. $\pm 0.15 \mu\text{m}$
4. $\pm 0.25 \mu\text{m}$
- 5,6 Accuracy 5 x better compared to PP's

Load Characteristics and Stiffness



Model	FMS
Cz, Normal centered load capacity	150 N
-Cx, +Cx, Axial load capacity	30 N
Kcx, Compliance in roll	3 μ rad/Nm
Kcy, Compliance in pitch	2 μ rad/Nm
Kcz, Compliance in yaw	2 μ rad/Nm
Q, Off-center load	$Q \leq Cz/(1+D/80)$

Where D = Cantilever distance in mm



Ordering Information

Model	Description
FMS100CC	100 mm Travel, DC Motor, Rotary Encoder
FMS100PP	100 mm Travel, Stepper Motor
FMS100PPHA	100 mm Travel, Stepper Motor, Linear Encoder
FMS200CC	200 mm Travel, DC Motor, Rotary Encoder
FMS200PP	200 mm Travel, Stepper Motor
FMS200PPHA	200 mm Travel, Stepper Motor, Linear Encoder
FMS300CC	300 mm Travel, DC Motor, Rotary Encoder
FMS300PP	300 mm Travel, Stepper Motor
FMS300PPHA	300 mm Travel, Stepper Motor, Linear Encoder

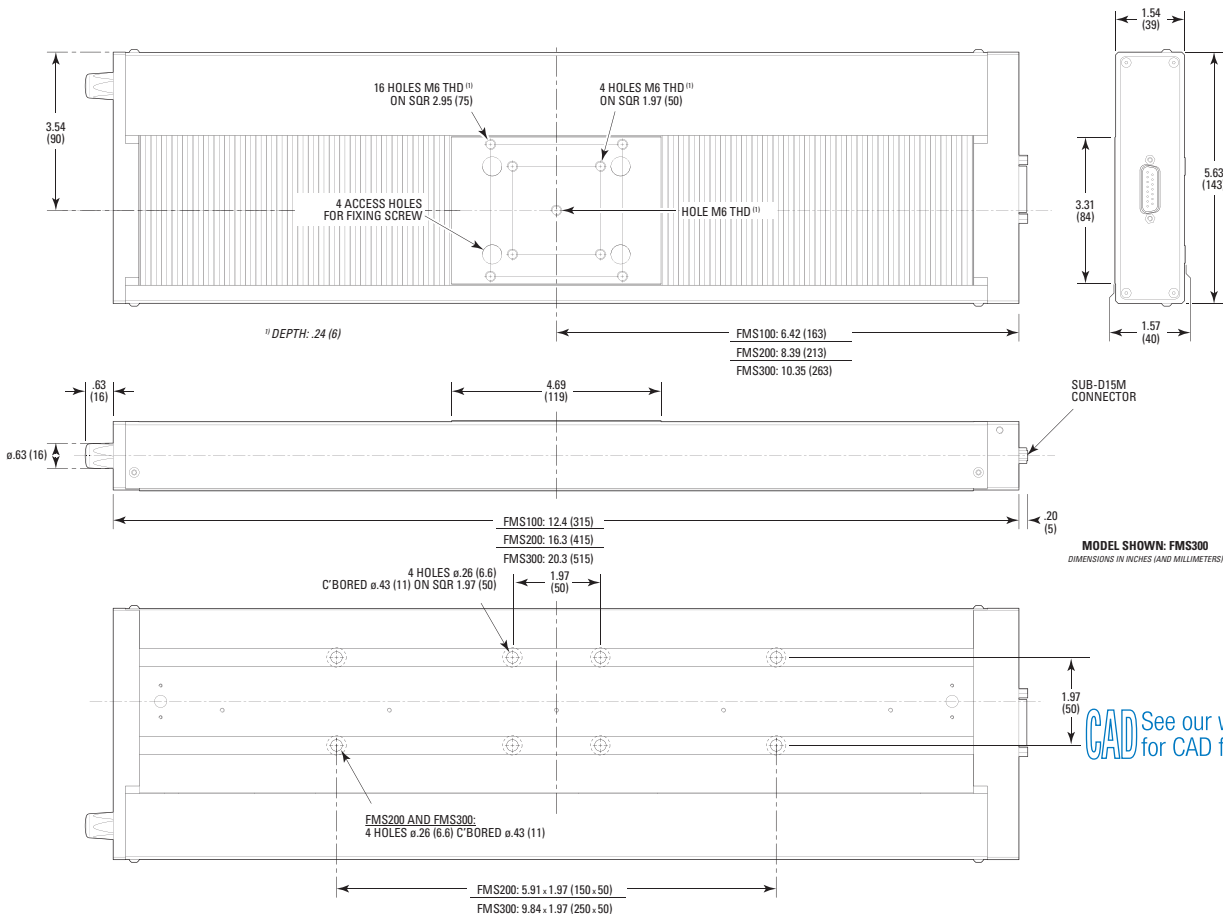
Recommended Motion Controllers

- XPS-RL see page 153
- XPS-D see page 148
- ESP301 see page 157
- SMC100CC see page 159

Motor cables are included.

FMS-PPHA models are compatible with the XPS Controller only.

Dimensions



MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS



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MTN Series

Mid-Travel Steel Linear Stages



- 100kg load and high axial load capacity up to 200N
- All steel construction offers high stiffness and thermal stability
- Backlash-compensated, diamond-corrected leadscrew produces accurate linear motion, even for vertical applications
- Non-migrating ball cage design reliable performance
- Plug and Play - ESP compatible
- Vacuum compatible versions available

The MTN Series linear stages are durable, all-steel construction linear stages with excellent stiffness, load capacity and thermal stability. They are available in DC and Stepper motor versions and are ideal for applications that require moving heavy loads with micron scale precision. Recommended for up to 300 mm travel, MTN stages can bear up to 100 kg with an axial load capacity up to 200 N. Features include: opposing single-row bearing surface, a diamond-corrected lead screw, a matched, precision-lapped nut and a non-migrating ball cage design. The nut design includes anti-backlash preloading and a sophisticated decoupling system ensuring little to no stage movement. The non-migrating ball cage design prevents any drift in vertical applications.

Specifications

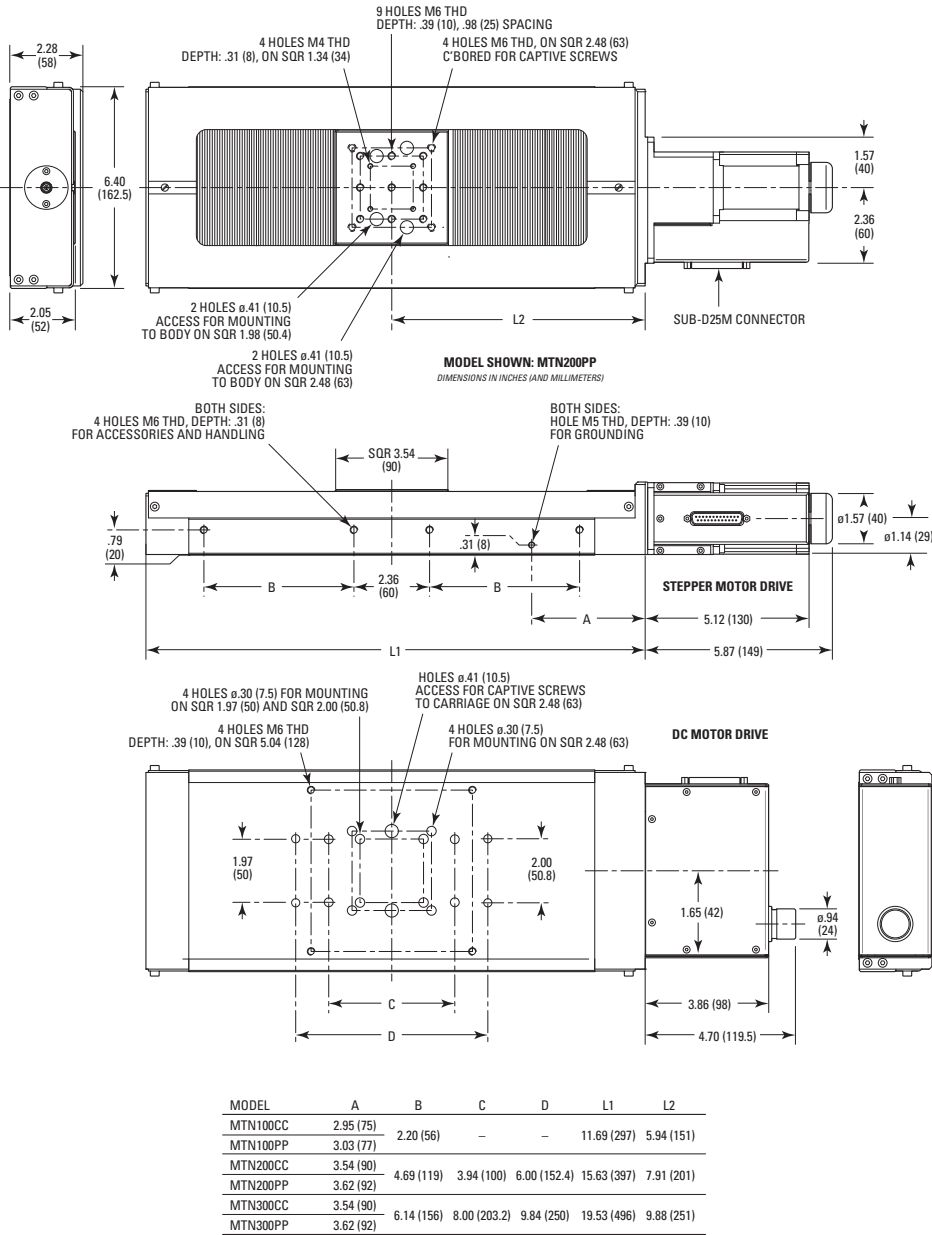
	MTN100CC	MTN200CC	MTN300CC	MTN100PP	MTN200PP	MTN300PP
Travel Range	100 mm	200 mm	300 mm	100 mm	200 mm	300 mm
Maximum Speed	100 mm/s			40 mm/s		
Minimum Incremental Motion	0.60 μm			0.10 μm		
Centered Load Capacity	1000 N					
Axial Load Capacity (+Cx)	200 N					
Inverse Axial Load Capacity (-Cx)	21 N					
Uni-directional Repeatability, Typical	$\pm 0.30 \mu\text{m}$	$\pm 0.50 \mu\text{m}$		$\pm 0.30 \mu\text{m}$	$\pm 0.50 \mu\text{m}$	
Bi-directional Repeatability, Guaranteed	$\pm 1.5 \mu\text{m}$			$\pm 2.75 \mu\text{m}$		
Accuracy, Typical	$\pm 1.5 \mu\text{m}$	$\pm 2.0 \mu\text{m}$	$\pm 2.5 \mu\text{m}$	$\pm 1.5 \mu\text{m}$	$\pm 2.0 \mu\text{m}$	$\pm 2.5 \mu\text{m}$
Accuracy, Guaranteed	$\pm 2.5 \mu\text{m}$		$\pm 3.0 \mu\text{m}$	$\pm 2.5 \mu\text{m}$		$\pm 3.0 \mu\text{m}$
Uni-directional Repeatability, Guaranteed	$\pm 0.75 \mu\text{m}$					
Bi-directional Repeatability, Typical	$\pm 0.75 \mu\text{m}$			$\pm 2.75 \mu\text{m}$		
Pitch, Typical	$\pm 10 \mu\text{rad}$	$\pm 20 \mu\text{rad}$	$\pm 30 \mu\text{rad}$	$\pm 10 \mu\text{rad}$	$\pm 20 \mu\text{rad}$	$\pm 30 \mu\text{rad}$
Pitch, Guaranteed	$\pm 20 \mu\text{rad}$	$\pm 40 \mu\text{rad}$	$\pm 60 \mu\text{rad}$	$\pm 20 \mu\text{rad}$	$\pm 40 \mu\text{rad}$	$\pm 60 \mu\text{rad}$
Yaw, Typical	$\pm 10 \mu\text{rad}$	$\pm 17 \mu\text{rad}$	$\pm 30 \mu\text{rad}$	$\pm 10 \mu\text{rad}$	$\pm 17 \mu\text{rad}$	$\pm 30 \mu\text{rad}$
Yaw, Guaranteed	$\pm 17 \mu\text{rad}$	$\pm 35 \mu\text{rad}$	$\pm 53 \mu\text{rad}$	$\pm 17 \mu\text{rad}$	$\pm 35 \mu\text{rad}$	$\pm 53 \mu\text{rad}$
Origin Repeatability	$\pm 0.75 \mu\text{m}$			$\pm 5 \mu\text{m}$		
Cable Length	3 m					
Weight	10 kg	12.3 kg	14.6 kg	10.7 kg	13 kg	15.3 kg
MTBF	20,000 h (25% load, 30% duty cycle)					
CE	Compliant					

1. Also available in a vacuum compatible version MTN-PPV6.
2. Maximum speed is reduced to 20 mm/sec for MTN-PPV6 versions.
3. Axial load capacity is reduced to 100 N for MTN-PPV6 versions.

Ordering Information

Series	Travel (mm)	Drive	
MTN	100	CC PP	<i>Example: The MTN200PP is an MTN stage with 200 mm travel and a stepper motor drive.</i>
	200		
	300		
CC:	DC motor		
PP:	Stepper motor		

Dimensions

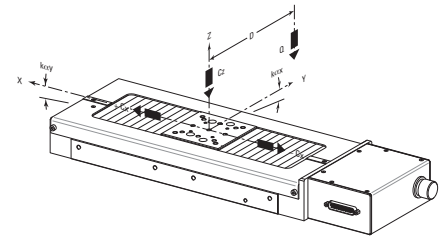


Accessories



Use EQ160 Series right-angle brackets for vertical mounting configurations.

Load Characteristics and Stiffness



Cz, Normal center load capacity on bearings	1000 N
+Cx, Direct load capacity on X axis	200 N
-Cx, Inverse load capacity on X axis	21 N
kαx, Compliance in roll	5 μrad/Nm
kαy, Compliance in pitch	10 μrad/Nm
kαz, Compliance in yaw	7 μrad/Nm
Q, Off-center load	QCz / (1 + D/100)
D, Cantilever distance in mm	

Recommended Motion Controllers

XPS-RL see page 153

XPS-D see page 148

ESP301 see page 157

Motor cables are included.

CAD See our website for CAD files

For the definition of specifications, visit Newport.com section on Motion Basics and Standards.

UTS Series

Mid-Travel Steel Linear Stages



- All-steel construction offers high stiffness and high thermal stability
- Ultra-low profile design with up to 150 mm travel
- Diamond-corrected lead screw with matched nut for high precision positioning
- DC motor and Stepper motor versions
- Plug and Play ESP compatible
- Vacuum compatible versions

The UTS Series linear stages feature low-profile design with all steel construction, ideal for environments where temperature is not very well controlled. They have been engineered for excellent stiffness, thermal stability and load capacity with travel ranges to 150 mm with Minimum Incremental Motion (MIM) of 0.3 μm . The DC motor version features an ultra-high resolution encoder mounted on the lead screw and a reduction belt providing precise incremental motion capability and high dynamic speed control. The stepper motor version is an economical solution for less demanding applications. The high output torque of the stepper motor minimizes the risk of lost steps and provides optimum MIM. All UTS Series Stages feature: a homogenous steel design, a diamond-corrected lead screw, and a precision lapped nut which includes anti-backlash preloading and a sophisticated decoupling system.

Specifications

	UTS100CC	UTS150CC	UTS50CC	UTS100PP	UTS150PP	UTS50PP
Travel Range	100 mm	150 mm	50 mm	100 mm	150 mm	50 mm
Maximum Speed	40 mm/s			20 mm/s		
Minimum Incremental Motion	0.30 μm					
Centered Load Capacity	200 N					
Axial Load Capacity (+Cx)	50 N					
Inverse Axial Load Capacity (-Cx)	-10 N					
Accuracy, Typical	$\pm 1.5 \mu\text{m}$	$\pm 2.0 \mu\text{m}$	$\pm 1.1 \mu\text{m}$	$\pm 1.7 \mu\text{m}$	$\pm 2.0 \mu\text{m}$	$\pm 1.2 \mu\text{m}$
Accuracy, Guaranteed	$\pm 2.75 \mu\text{m}$	$\pm 3.25 \mu\text{m}$	$\pm 2.25 \mu\text{m}$	$\pm 3.5 \mu\text{m}$	$\pm 4.0 \mu\text{m}$	$\pm 2.5 \mu\text{m}$
Uni-directional Repeatability, Guaranteed	$\pm 0.5 \mu\text{m}$					
Bi-directional Repeatability, Guaranteed	$\pm 1.75 \mu\text{m}$			$\pm 3.0 \mu\text{m}$		
Uni-directional Repeatability, Typical	$\pm 0.30 \mu\text{m}$		$\pm 0.20 \mu\text{m}$	$\pm 0.30 \mu\text{m}$		$\pm 0.20 \mu\text{m}$
Bi-directional Repeatability, Typical	$\pm 0.8 \mu\text{m}$		$\pm 0.6 \mu\text{m}$	$\pm 2.3 \mu\text{m}$		$\pm 2.2 \mu\text{m}$
Pitch, Typical	$\pm 25 \mu\text{rad}$		$\pm 17 \mu\text{rad}$	$\pm 25 \mu\text{rad}$		$\pm 17 \mu\text{rad}$
Pitch, Guaranteed	$\pm 50 \mu\text{rad}$	$\pm 60 \mu\text{rad}$	$\pm 37 \mu\text{rad}$	$\pm 55 \mu\text{rad}$	$\pm 60 \mu\text{rad}$	$\pm 37 \mu\text{rad}$
Yaw, Typical	$\pm 20 \mu\text{rad}$	$\pm 30 \mu\text{rad}$	$\pm 12 \mu\text{rad}$	$\pm 20 \mu\text{rad}$	$\pm 30 \mu\text{rad}$	$\pm 12 \mu\text{rad}$
Yaw, Guaranteed	$\pm 35 \mu\text{rad}$	$\pm 45 \mu\text{rad}$	$\pm 25 \mu\text{rad}$	$\pm 35 \mu\text{rad}$	$\pm 45 \mu\text{rad}$	$\pm 25 \mu\text{rad}$
Origin Repeatability	$\pm 0.5 \mu\text{m}$			$\pm 2.5 \mu\text{m}$		
Cable Length	3 m					
Weight	3.2 kg	3.7 kg	2.8 kg	3.3 kg	3.8 kg	2.9 kg
MTBF	20,000 h (25% load, 10% duty cycle)					
CE	Compliant					

Notes:

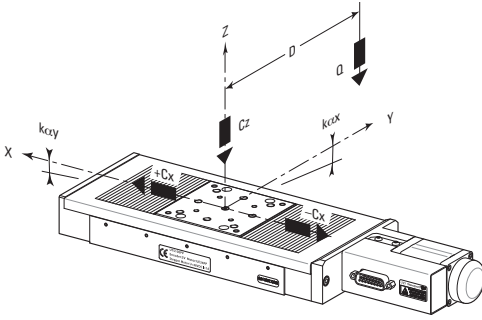
PP Version Available in Vacuum

Max speed is reduced to 10 mm/sec for UTS PPV6 versions

Centered load capacity reduced to 100 N for UTSPPV6 versions

For UTS-CC with axial loads greater than 1 kg, max speed must be reduced to 20 mm/s

Load Characteristics and Stiffness



Cz, Normal centered load capacity	200 N
+Cx, Axial load capacity	50 N
-Cx, Inverse axial load capacity	10 N
Kcα, Compliance in roll	10 μrad/Nm
Kcβ, Compliance in pitch	15 μrad/Nm
Kcγ, Compliance in yaw	15 μrad/Nm
Q, Off-center load	$Q \leq Cz/(1+D/50)$
D, Cantilever distance in mm	

Ordering Information

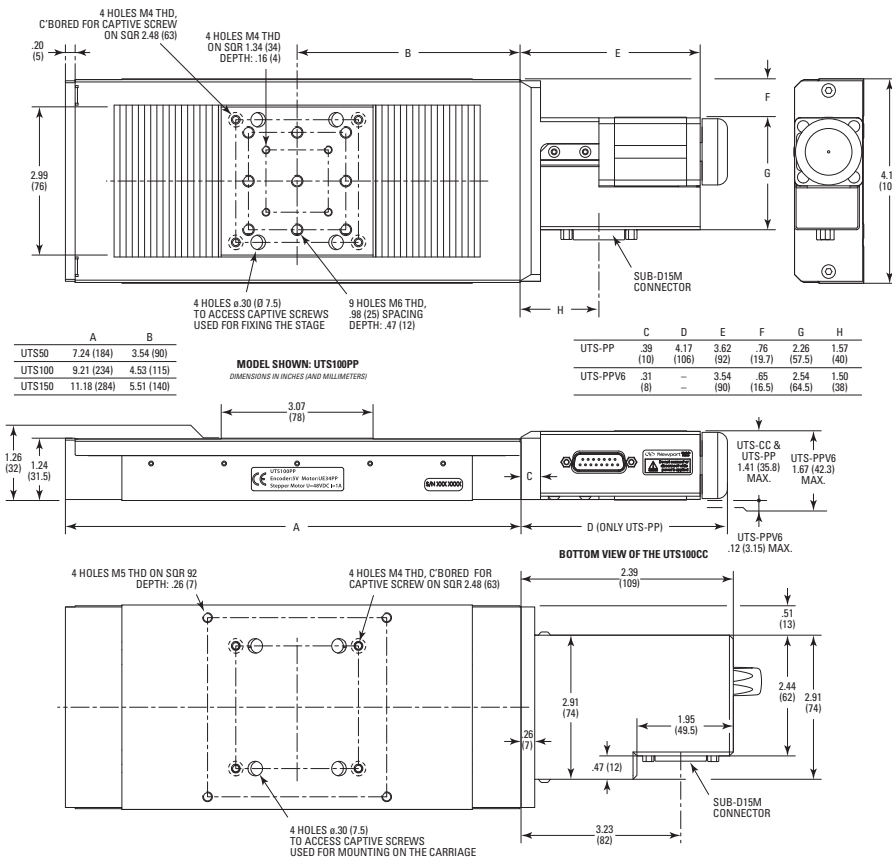
Model	Travel (mm)	Drive	Vacuum Prep. ⁽¹⁾
UTS	50	CC PP	V6
	100		
	150		

*Example:
The UTS50CC is a UTS stage with 50 mm travel and a DC motor drive.*

¹⁾ Vacuum compatible to 10⁻⁶ hPa. In this case max. speed and load capacity are divided by two.

CC: DC motor
PP: Stepper motor

Dimensions



Recommended Motion Controllers

XPS-RL	see page 153
XPS-D	see page 148
ESP301	see page 157
SMC100CC	see page 159

Motor cables are included.



Example of an XY assembly with UTS50CC and UTS150CC



Use the EQ100 Series right-angle brackets for vertical mounting configurations. Mounting brackets are included with the bracket

CAD See our website for CAD files

MFA Series

Miniature Steel Linear Stages



- All steel construction offers high stiffness and thermal stability
- Compact design utilized for space limited applications
- Stiff double-row linear ball bearings
- Vacuum-compatible versions to 10^{-6} hPa.
- Plug and Play - ESP compatible
- High-resolution, encoder feedback enables ultra-smooth motion with 100 nm sensitivity

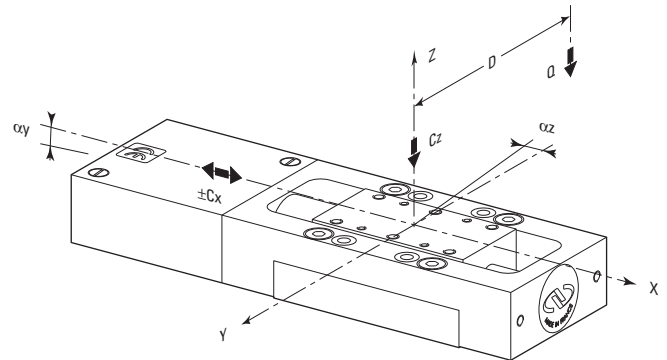
The MFA Series compact all-steel construction linear stages provide precision motion with 0.3 μm Minimum Incremental Motion and excellent stability and stiffness. The MFA-CC DC-motor version features an integrated gear-box and a motor-mounted high resolution rotary encoder. Faster motion with higher reliability and lower backlash makes it ideal for applications requiring small incremental motion with high dynamic speed and good repeatability. The MFA-PP and MFA-PPD stepper motor versions are more economical solutions for less demanding applications. Additional features include: all-steel construction for high stiffness-to-weight ratio and excellent thermal stability; a double-row linear ball bearing design for ultra-smooth motion; and 4 widely spaced mounting holes for base mounting and XY/XYZ configurations. Typical applications for this stage are fiber optic alignment, laser diode research, bio-medical applications and inspection systems.

The CONEX-MFACC is the MFA-CC linear stage with the integrated CONEX-CC controller/driver. The CONEX-CC is a very compact and inexpensive driver for Newport's low power DC servo motor driven devices. For out-of-the box control, the CONEX-CC is preconfigured and delivered with the MFA-CC.

Specifications

	MFA-CC	MFA-CCV6	MFA-PPD
Travel Range	25 mm		
Maximum Speed	2.5 mm/s	1.25 mm/s	1 mm/s
Centered Load Capacity	50 N	25 N	50 N
Axial Load Capacity (+Cx)	10 N	5 N	10 N
Inverse Axial Load Capacity (-Cx)	-10 N	-5 N	-10 N
Minimum Incremental Motion	0.10 μm		
Accuracy, Typical	$\pm 0.7 \mu\text{m}$	$\pm 1.0 \mu\text{m}$	$\pm 0.9 \mu\text{m}$
Accuracy, Guaranteed	$\pm 3.0 \mu\text{m}$		
Uni-directional Repeatability, Typical	$\pm 0.08 \mu\text{m}$		$\pm 0.12 \mu\text{m}$
Uni-directional Repeatability, Guaranteed	$\pm 0.15 \mu\text{m}$		$\pm 0.25 \mu\text{m}$
Bi-directional Repeatability, Guaranteed	$\pm 0.75 \mu\text{m}$	$\pm 1.0 \mu\text{m}$	$\pm 0.75 \mu\text{m}$
Bi-directional Repeatability, Typical	$\pm 0.15 \mu\text{m}$	$\pm 0.2 \mu\text{m}$	$\pm 0.2 \mu\text{m}$
Pitch, Typical	$\pm 25 \mu\text{rad}$		
Pitch, Guaranteed	$\pm 100 \mu\text{rad}$		
Yaw, Typical	$\pm 30 \mu\text{rad}$		
Yaw, Guaranteed	$\pm 50 \mu\text{rad}$		
Origin Repeatability	$\pm 2.5 \mu\text{m}$		
Cable Length	3 m	1.5 m	3 m
Vacuum Compatibility	N/A	10^{-6} hPa	N/A
MTBF	10,000 h (25% load, 30% Duty cycle)	10,000 h (25% load, 30% Duty cycle)	
CE	Compliant		

Load Characteristics and Stiffness



Cz, Normal centered load capacity	50 N
-Cx, +Cx, Axial load capacity	10 N
k_{cx} , Compliance in roll	60 $\mu\text{rad}/\text{Nm}$
k_{cy} , Compliance in pitch	10 $\mu\text{rad}/\text{Nm}$
Q, Off-center load	$Q \leq C_z / (1 + D/20)$
D, Cantilever distance in mm	

For the definition of specifications,
visit Newport.com for the
Motion Basics and Standards.

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

Ordering Information

Model	Description
MFA-CC	Miniature linear stage, DC motor
MFA-PPD	Miniature linear stage, stepper motor, 25-pin D-Sub connector Compatible with SMC100PP, ESP301, and XPS
MFA-CCV6	Vacuum Compatible Miniature Linear Stage, DC Motor
CONEX-MFACC ¹	MFA-CC Linear Stage Integrated with CONEX Controller
MFA-BK	Universal top plate for XZ and XYZ mounting
MFA-TP (M-MFA-TP)	Top Plate, MFA Series Miniature Linear Stage, English Thread
MFA-BP	Universal base plate

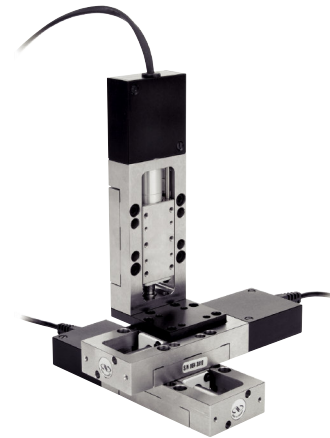
Recommended Motion Controllers

XPS-RL see page 153	Except MFA-PP
XPS-D see page 148	Except MFA-PP
ESP301 see page 157	Except MFA-PP
SMC100CC see page 159	Except MFA-PP and MFA-PPD
SMC100PP see page 159	MFA-PPD only
CONEX-CC see page 161	Included in CONEX-MFACC

Motor cables are included.



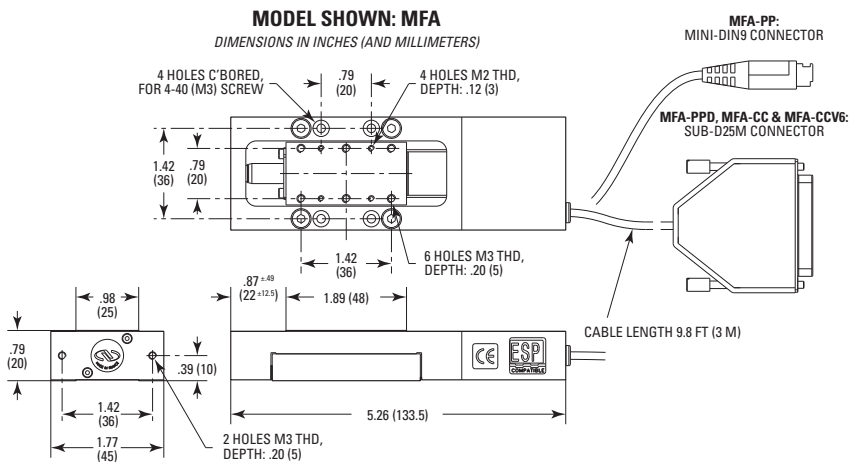
CONEX-MFACC Integrated Linear Stage and Controller



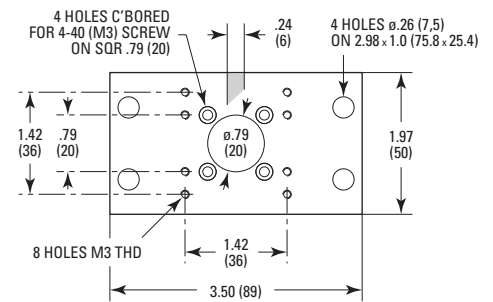
MFA stages in an XYZ configuration

Dimensions

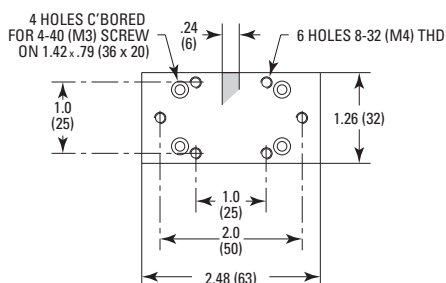
MFA-CC and MFA-PP



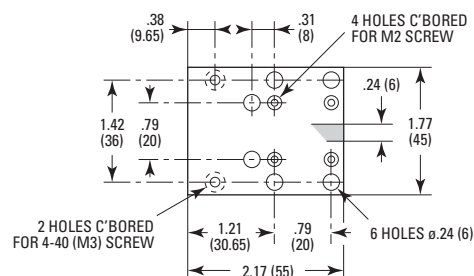
MFA-BP



MFA-TP



MFA-BK

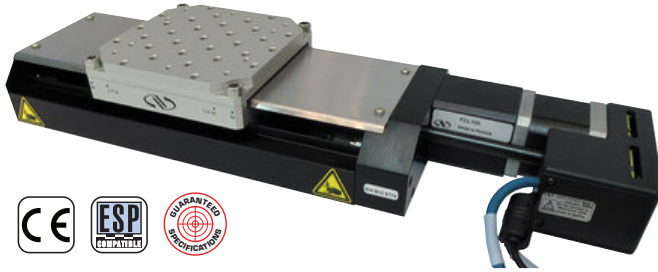


FCL Series

Intelligent Stepper Motor Linear Stages



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to watch video



- Built-in stepper motor controller with iPP technology, eliminating any motor cables and driver setup
- Fully pre-configured with USB communication and enables out-of-the-box control
- Up to 4 FC units can be daisy-chained and controlled via RS-422 with one GUI, or more units via USB hub
- Most economical stage and controller available without compromising MIM
- FEM-optimized aluminum body

The FCL Series linear stages combine a fully integrated stepper motor controller (iPP™ technology) and mid-range travel linear stage in a small footprint. Similar to the CONEX series for DC motor, the FCL stage comes fully pre-configured and enables true out-of-the box control. The iPP™ technology used in the FC series completely eliminates controller or driver set up, allowing users to simply connect USB communication, plug in the power supply and start the motion GUI. Available in 50, 100 and 200 mm travel, features of the FCL stages include: FEM optimized aluminum body to minimize thermal expansions, robust construction of recirculating ball bearing for highly accurate linear motion and backlash-free ballscrew drive for rapid movement with short, step and settling time. Up to 4 FCL units can be daisy-chained and controlled with the same GUI.

Specifications

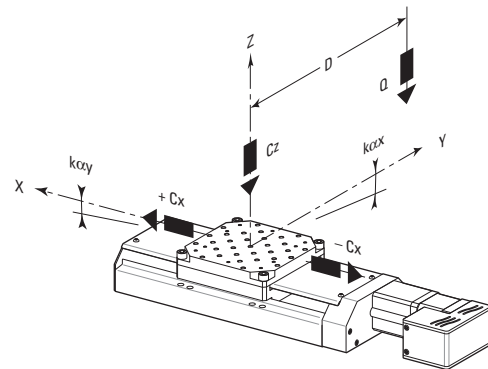
	FCL50	FCL100	FCL200
Travel Range	50 mm	100 mm	200 mm
Maximum Speed	20 mm/s		
Minimum Incremental Motion	0.15 μm		
Centered Load Capacity	250 N		
Compliance in Pitch	10 $\mu\text{rad}/\text{Nm}$		
Compliance in Yaw	10 $\mu\text{rad}/\text{Nm}$		
Compliance in Roll	15 $\mu\text{rad}/\text{Nm}$		
Limit Switches	Optical		
Origin	Optical, centered		
Origin Repeatability	$\pm 2.5 \mu\text{m}$		
Computer Interfaces	RS232 and USB		
Weight	4.1 kg	3.3 kg	3.6 kg
MTBF	20,000 h (25% load, 30% duty cycle)		
CE	Compliant		

Ordering Information

Model	Description
FCL50	50 mm Travel, iPP motor/controller
FCL100	100 mm Travel, iPP motor/controller
FCL200	200 mm Travel, iPP motor/controller
FC-PS40	Power supply, iPP step motor, RoHS
USB-RS422-1.8	Cable adapter, USB to RS422, 1.8m
FC-CB1	1m communication cable, daisy chain, RS422

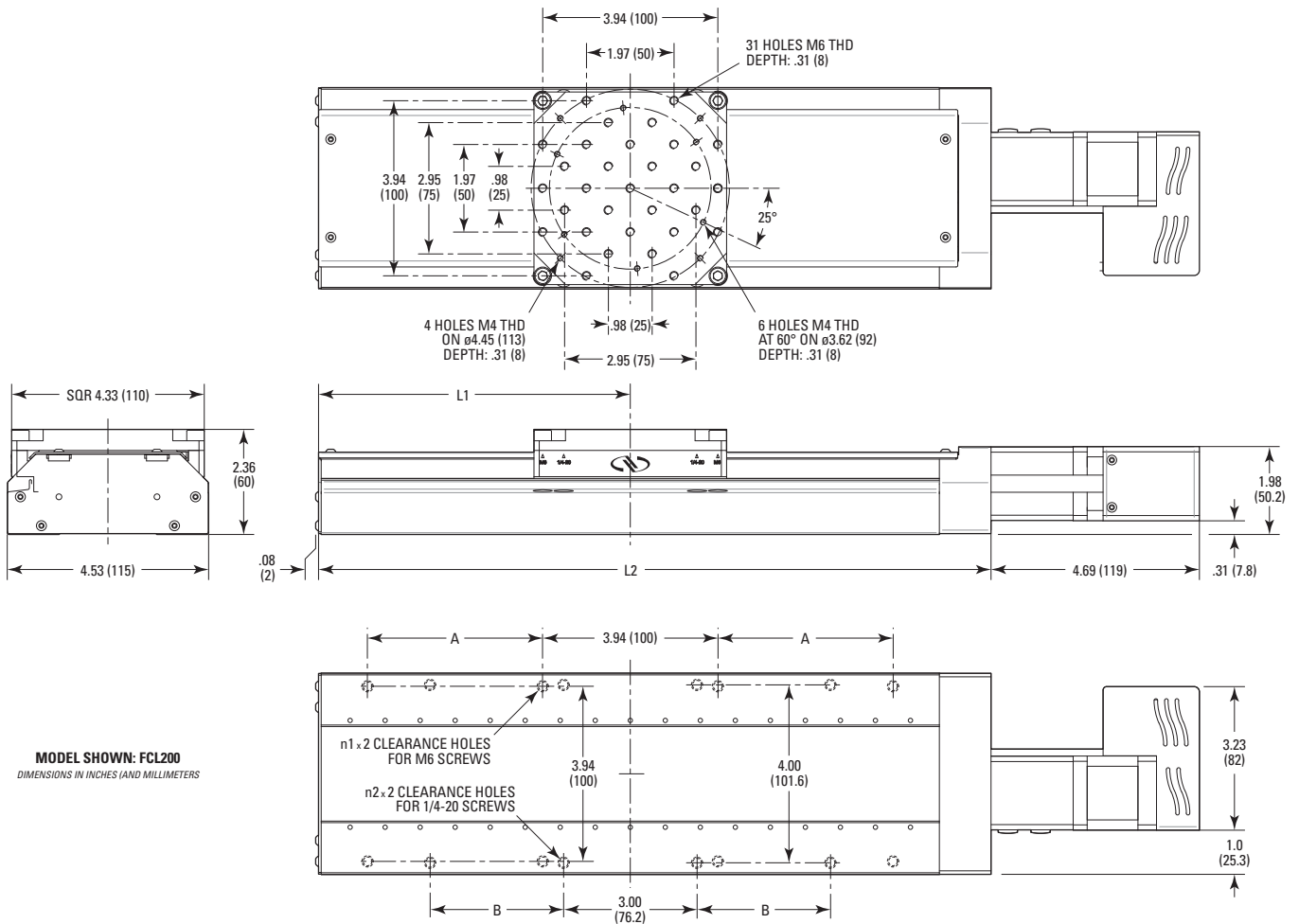
Power supply and cables are sold separately.

Load Characteristics and Stiffness



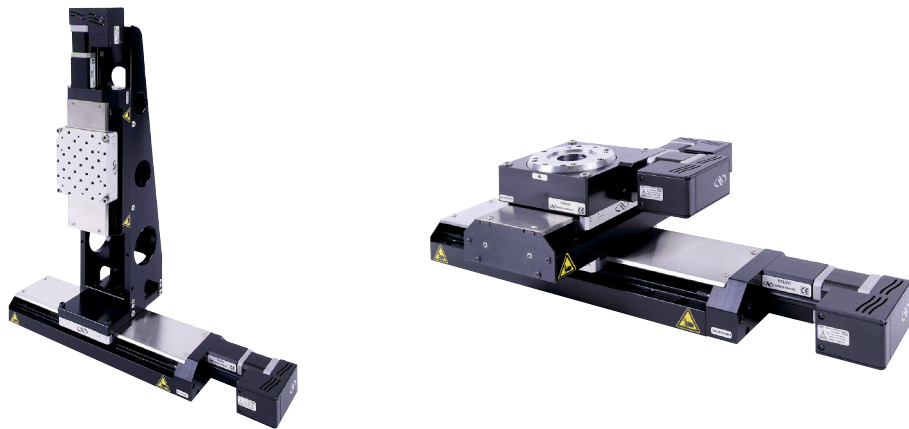
C_z , Normal center load capacity on bearings	250 N
$+C_x/-C_x$, Direct/Inverse load capacity on X axis	<40 N
$k_{\alpha x}$, Compliance in roll	15 $\mu\text{rad}/\text{N}\cdot\text{m}$
$k_{\alpha y}$, Compliance in pitch	10 $\mu\text{rad}/\text{N}\cdot\text{m}$
$k_{\alpha z}$, Compliance in yaw	10 $\mu\text{rad}/\text{N}\cdot\text{m}$
Q , Off-center load	$Q \leq C_z / (1 + D/60)$
D , Cantilever distance in mm	

Dimensions



MODEL SHOWN: FCL200
DIMENSIONS IN INCHES (AND MILLIMETERS)

MODEL	A	n1	B	n2	L1	L2
FCL50	-	2	-	2	4.06 (103)	9.21 (234)
FCL100	-	2	-	2	5.04 (128)	11.18 (284)
FCL200	3.94 (100)	4	3.0 (76.2)	4	7.01 (178)	15.12 (384)



MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

One-XY Mid-Travel Integrated XY Linear Stages



- Integrated XY stages with built-in orthogonality
- Excellent planarity with micron-level straightness and flatness
- Low profile three plate design reduces stacking errors and increases stiffness
- High efficiency, non-cogging linear motor
- Linear encoder for nano-scale MIM and repeatability

The ONE-XY series stage utilizes an integrated XY linear motor designed to eliminate the integration of individual X and Y stages and increase system stiffness for dynamic applications. The series features a travel range from 60 mm to 290 mm, with precise orthogonality alignment between the X and Y axes. This stage utilizes robust components such as its iron-less motor drive and cross-roller bearings to deliver high performance, making them ideal solutions for precision industrial applications such as semiconductor wafer inspection, microelectronics test and assembly, metrology, laser microprocessing.

Specifications

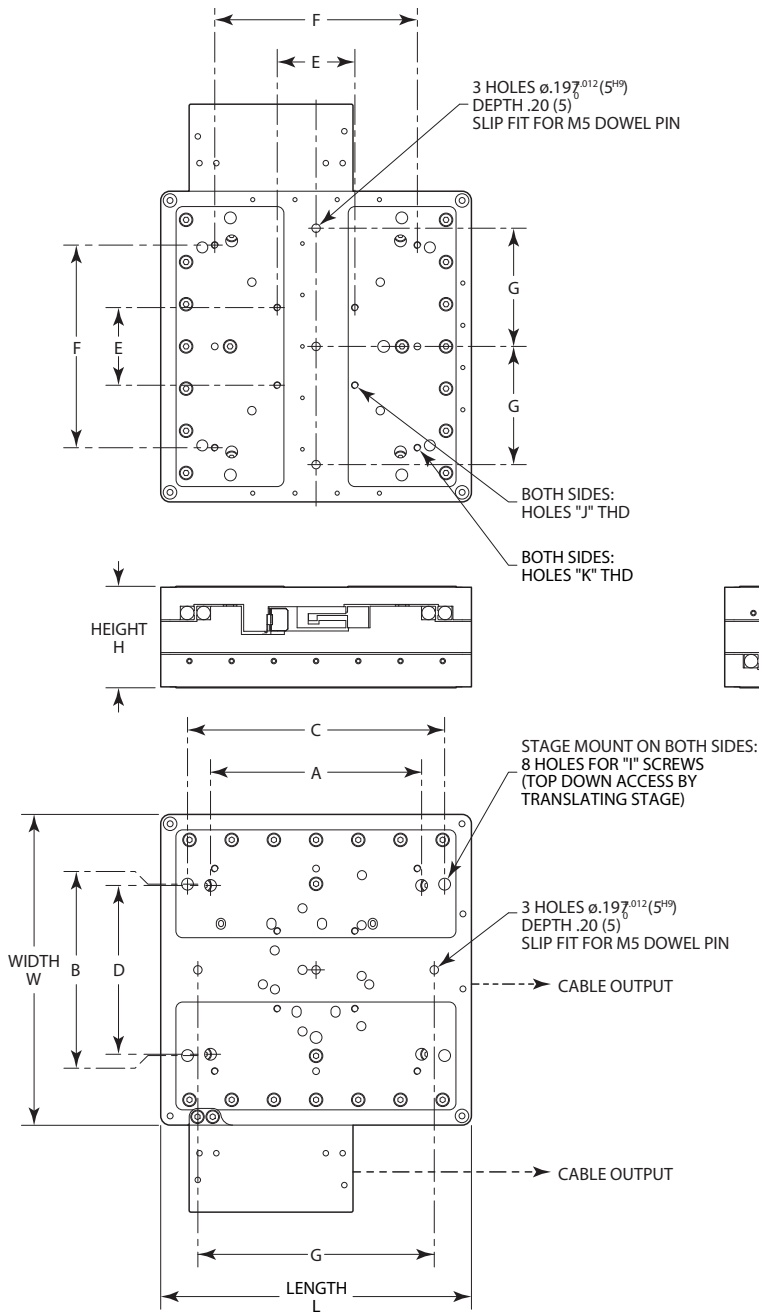
Models	ONE-XY60	ONE-XY100	ONE-XY200	ONE-XY300
Motorized Axes	XY			
Travel Range	50 mm	90 mm	190 mm	290 mm
Maximum Speed	200 mm/s			
Minimum Incremental Motion	0.050 μm			
Maximum Acceleration	0.3 G		0.2 G	
Continuous Motor Force	10 N		20 N	53 N
Peak Motor Force	21 N		42 N	107 N
Centered Load Capacity	100 N	120 N	150 N	350 N
Accuracy, Typical	$\pm 0.4 \mu\text{m}$		$\pm 0.5 \mu\text{m}$	
Accuracy, Guaranteed ¹	$\pm 1.5 \mu\text{m}$	$\pm 2.0 \mu\text{m}$	$\pm 2.5 \mu\text{m}$	$\pm 3.0 \mu\text{m}$
Bi-directional Repeatability, Typical	$\pm 0.040 \mu\text{m}$			
Flatness, Typical	$\pm 0.5 \mu\text{m}$	$\pm 1.0 \mu\text{m}$	$\pm 2.0 \mu\text{m}$	$\pm 3.0 \mu\text{m}$
Straightness, Typical	$\pm 0.5 \mu\text{m}$	$\pm 1.0 \mu\text{m}$	$\pm 2.0 \mu\text{m}$	$\pm 3.0 \mu\text{m}$
Pitch, Typical	$\pm 15 \mu\text{rad}$	$\pm 20 \mu\text{rad}$		$\pm 90 \mu\text{rad}$
Pitch, Guaranteed	$\pm 55 \mu\text{rad}$	$\pm 65 \mu\text{rad}$	$\pm 75 \mu\text{rad}$	
Yaw, Typical	$\pm 15 \mu\text{rad}$	$\pm 25 \mu\text{rad}$		
Yaw, Guaranteed	$\pm 55 \mu\text{rad}$	$\pm 65 \mu\text{rad}$	$\pm 75 \mu\text{rad}$	$\pm 90 \mu\text{rad}$
Roll, Typical	$\pm 29 \mu\text{rad}$		$\pm 36 \mu\text{rad}$	$\pm 24 \mu\text{rad}$
Orthogonality ²	96 μrad			
Origin Repeatability	$\pm 0.1 \mu\text{m}$			
Cable Length	3 m			
Width	125 mm	184 mm	275 mm	500 mm
Weight	2.9 kg	5.8 kg	12 kg	75 kg
MTBF	20,000 h (25% load, 30% duty cycle)			
CE	Compliant			

Notes:

Also available in HA version

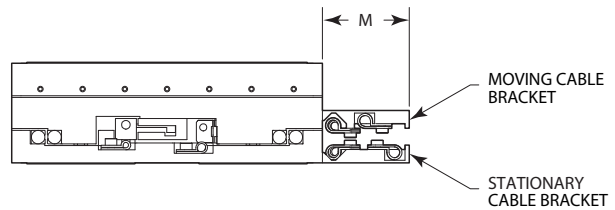
1. Guaranteed accuracy varies for the ONE-XY-HA versions. 2. Orthogonality is reduced to 5 μrad for the ONE-XY-HA versions.

Dimensions



MODEL	TRAVEL	L	W	H	A
ONE-XY60	1.97 (50)	4.92 (125)	4.92 (125)	2.36 (60)	4.0 (101.6)
ONE-XY100	3.54 (90)	7.24 (184)	7.24 (184)	2.36 (60)	6.0 (152.4)
ONE-XY200	7.48 (190)	10.83 (275)	10.83 (275)	2.36 (60)	6.0 (152.4)
ONE-XY300	11.42 (290)	19.69 (500)	19.69 (500)	3.94 (100)	12.0 (304.8)

MODEL SHOWN: ONE-XY100
DIMENSIONS IN INCHES (AND MILLIMETERS)



MODEL	B	C	D	E	F
ONE-XY60	3.0 (76.2)	3.94 (100)	2.95 (75)	1.81 (46)	2.36 (60)
ONE-XY100	4.0 (101.6)	4.92 (125)	3.94 (100)	1.81 (46)	4.72 (120)
ONE-XY200	6.0 (152.4)	6.89 (175)	4.92 (125)	4.72 (120)	6.69 (170)
ONE-XY300	8.0 (203.2)	13.78 (350)	9.84 (250)	6.69 & 8.86 (170 & 225)	10.83 (275)

MODEL	G	I	J	K	M
ONE-XY60	1.38 (35)	1/4-20 or M6	4 HOLES M4	4 HOLES M5	-
ONE-XY100	2.76 (70)	1/4-20 or M6	4 HOLES M4	6 HOLES M5	2.05 (52)
ONE-XY200	2.76 (70)	1/4-20 or M6	8 HOLES M5	6 HOLES M6	2.56 (65)
ONE-XY300	3.94 (100)	5/16-18 or M8	8 HOLES M6	6 HOLES M8	3.78 (96)

Ordering Information

Model	Description
ONE-XY60	50 mm integrated XY stage
ONE-XY100	90 mm integrated XY stage
ONE-XY200	190 mm integrated XY stage
ONE-XY300	290 mm integrated XY stage

Recommended Motion Controllers

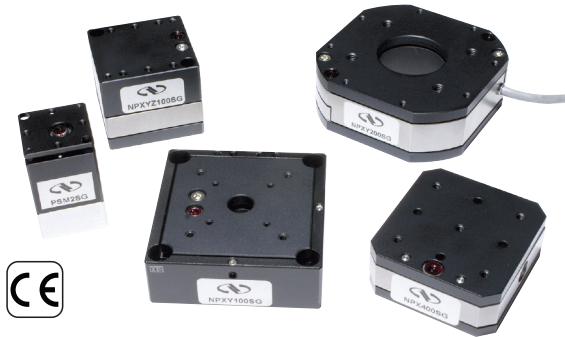
XPS-RL see page 153

XPS-D see page 148

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146. Motor cables are included.

NPX Series

NanoPositioning Linear Stages



- Sub-nanometer piezoelectric positioning resolution
- Motion in X, XY, or XYZ
- Piezoelectric travel range of up to 400 μm
- Optional integrated strain-gauge for closed-loop operation
- High resonant frequency for high dynamic applications
- Vacuum versions

The NPX Series is a family of compact, long travel piezo-based linear stages providing nanometer resolution motion in one, two or three axis. These versatile stages are ideally suited for nanopositioning of small components such as mirrors, fibers, laser diodes, micro-optics, sensors, or cellular samples. NPX stages feature highly reliable, multi-layer, low-voltage piezoelectric transducer (PZT) stacks for high-duty cycle operations. A sophisticated, FEA-optimized, parallelogram solid state flexure guide system ensures perfect parallel motion and up to 400 μm travel range. Due to the frictionless guide principle, NPX stages are maintenance-free and are not subject to wear. Applications include optical delay lines, path length changes of interferometers, laser lithography, scanning microscopy, and patch-clamping, among others.

Specifications

	NPX200	NPX200-D	NPX200SG	NPX200SG-D	NPX200SGV6	NPX400	NPX400-D	NPX400SG	NPX400SG-D	NPX400SGV6
Motorized Axes	X									
Travel Range	0.2 mm					0.4 mm				
Axial Load Capacity	16 N					64 N				
Axial Stiffness	0.08 N/ μm					0.16 N/ μm				
Vertical Load Capacity	10 N									
Cable Length	1 m		2 m	1.2 m	2 m	1 m		2 m	1.2 m	2 m
Vacuum Compatibility	NA	NA	NA	NA	10 ⁻⁶ hPa	NA	NA	NA	NA	10 ⁻⁶ hPa
Capacitance	1.8 μF					5.2 μF				
Closed Loop Resolution	NA	NA	4 nm			NA	NA	4 nm		
Closed Loop Travel	NA	NA	160 μm			NA	NA	320 μm		
Open Loop Resolution	0.4 nm									
Open Loop Travel	200 μm					400 μm				
Resonant Frequency, Unloaded	177 Hz					200 Hz				
Weight	180 g									
CE	Compliant									

Ordering Information*

Model	Description
NPXY100	Nanopositioning Open-loop XY Stage, 100 μm
NPXY100-D	Nanopositioning Open-loop XY Stage, 100 μm , XPS
NPXY100SG	Nanopositioning XY Stage, 100 μm , Strain-gauge
NPXY100SG-D	Nanopositioning XY Stage, 100 μm , Strain-gauge, XPS
NPXY100SGV6	Vacuum Nanopositioning XY Stage, 100 μm , Strain-gauge

* Selected examples only. See full product offering at Newport.com

Recommended Motion Controllers

XPS-RL see page 153

Use XPS-DRVP1

XPS-D see page 148

Use XPS-DRVP1

NPC3 see page 173

NPC3SG see page 173

NPC1USB see page 174

Piezo Stack Amplifier, Single Channel, Low Cost

Agilis™ Series

Piezo Motor Driven Linear Stages



- Small minimum incremental motion
- Set-and-forget stability when not in use
- Ripple-free with low friction travel
- Available with direct read encoder and CONEX controller
- Available in vacuum compatible versions



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The AG-LS25, AG-LS25-27 and CONEX-AG-LS25-27P are high precision miniature linear stages featuring Newport's proprietary Agilis™ piezo motor. With ultra-high adjustment sensitivity, convenient programmable operation and compact design, Agilis stages provide outstanding motion performance at the cost of a high-quality manual stage. Precision motion is achieved by calibrated, pre-stressed linear ball bearings. The thermally matched stainless steel design and precision manufactured bearing surfaces provide ripple-free, low friction linear travel and angular deviations better than 100 μ rad in any axis. The Agilis piezo motor is also directly coupled to the moving carriage with no intermediate screw or gear avoiding problems with coupling in drivetrain. In contrast to ultrasonic motors, the Agilis non-resonant motor makes small incremental adjustments more predictable with 50 nm incremental motion capability, ideal for ultra-sensitive alignments and adjustments. Available with integrated direct read encoder and CONEX Controller, the CONEX-AG-LS25-27P is well-suited for applications where repeatability is critical. For vacuum applications, see V6 versions of Agilis.

Specifications

	AG-LS25	AG-LS25-27	AG-LS25-27V6	AG-LS25V6
Travel Range	12 mm	27 mm		12 mm
Minimum Incremental Motion	0.05 μ m	0.1 μ m		0.05 μ m
Maximum Speed	0.5 mm/s			
Vertical Load Capacity	3 N	3.5 N	2.5 N	3 N
Axial Load Capacity	2 N	1.5 N		2 N
Vacuum Compatibility			10-6 hPa	10-6 hPa
Holding Force	4 N			
Material	Stainless Steel			
Pitch	200 μ rad			
Yaw	200 μ rad			
Cable Length	1.2 mm			
Operating Temperature	+10 to +35 °C			
Weight	70 g	125 g		70 g

Ordering Information

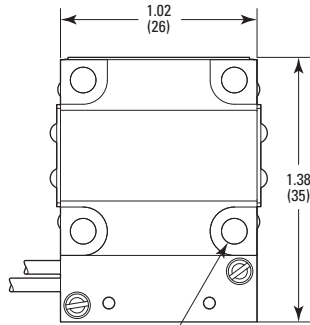
Model	Description
AG-LS25	Piezo Motor Driven Linear Stage, 12 mm travel
AG-LS25-27	Piezo Motor Driven Linear Stage, 27 mm travel
AG-LS25V6	Piezo Motor Driven Linear Stage, 12 mm travel, Vacuum Compatible
AG-LS25-27V6	Piezo Motor Driven Linear Stage, 27 mm travel, Vacuum Compatible
CONEX-AG-LS25-27P	Piezo Motor Linear Stage, Direct Encoder, Integrated Controller

Recommended Motion Controllers

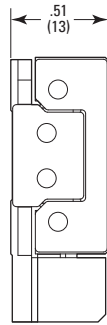
Agilis™ Series Controller, see page 165

Dimensions

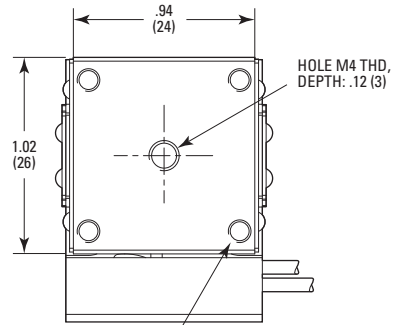
Model AG-LS25



4 HOLES C'BORED FOR M3 SCREW ON SQR .79 (20)

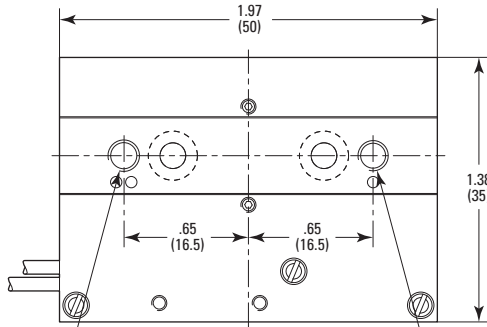
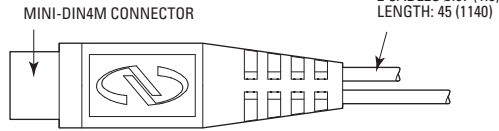


MODEL SHOWN: AG-LS25
DIMENSIONS IN INCHES (AND MILLIMETERS)



4 HOLES M3 THD ON SQR .79 (20), DEPTH: .14 (3.5)

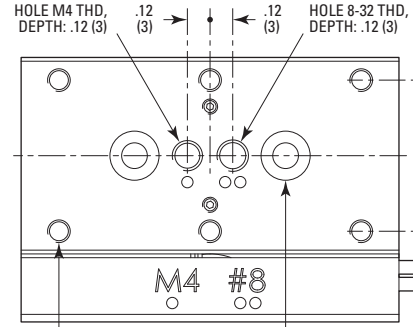
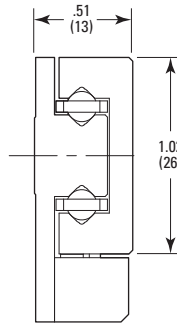
HOLE M4 THD, DEPTH: .12 (3)



HOLE 8-32 THD, DEPTH: .24 (6)

HOLE M4 THD, DEPTH: .24 (6)

MODEL SHOWN: AG-LS25-27
DIMENSIONS IN INCHES (AND MILLIMETERS)

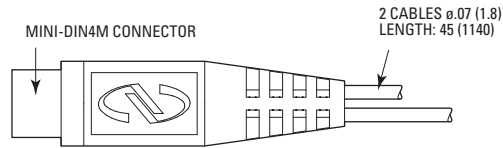


HOLE M4 THD, DEPTH: .12 (3)

HOLE 8-32 THD, DEPTH: .12 (3)

6 HOLES M3 THD .79 (20) SPACING, DEPTH: .14 (3.5)

2 HOLES C'BORED FOR M3 SCREW .79 (20) SPACING



CONEX-AG-LS25-27P shown

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Multi-Axis Kinematic Alignment Stages



Model 8071 Four-Axis Tilt Aligner shown

- Easily align modulators and isolators
- 4-axis, 5-axis, and 6-axis versions
- <30 nm resolution
- Standard and vacuum compatible versions



New Focus' Multi-Axis Kinematic Alignment Stages increase the utility of our popular kinematic stages by motorizing each of the axes. The addition of Picomotor™ actuators to each stage allows remote high-resolution (<30-nm) adjustment of various combinations of X, Y, Z, x, and y. The four-axis and five-axis aligners are ideal for positioning modulators or isolators and for coupling light into waveguide devices. The six-axis aligner is ideal for semiconductor-wafer alignment.

Specifications

	8071 (8071-M)	8081 (8081-M)	8081-UHV (8081M-UHV)	8082 (8082-M)	8095 (8095-M)
Axes of Travel	X, Y, x, y	X, Y, Z, x, y			X, Y, Z, x, y, z
Mechanism	Piezo Motor				
Travel Range	3 mm				
Angular Range	8°		x=8°, y=10°	8°	4°
Load Capacity	13 N				
MIM	<30 nm				
Angular Resolution	x, y≤0.7 μrad				x, y, z≤0.2 μrad
Vacuum Compatibility	NA	NA	10 ⁻⁹ Torr	NA	NA
Wire Type	NA	NA	Kapton® Ribbon Ultrahigh	NA	NA
Connector Type	6-pin Connectors (2)		DB15 Female	6-pin Connectors (2)	4-pin Connectors (6)
Operating Temperature	10 to 40°C				
Thread Type	*8-32 (M4)	8-32 and 1/4-20 (M4 and M6)	8-32 and 1/4-20 (M4 and M6)	8-32 and 1/4-20 (M4 and M6)	1/4/2020 (M6)

Ordering Information

Model	Description
8071	Motorized XY x y Tilt Aligner, 3 mm, 8°
8081	Motorized XYZ x y Tilt Aligner, 3 mm, 8°
8082	Motorized Wide XYZ x y Tilt Aligner, 3 mm, 8°
8095	Motorized XYZ x y z Aligner, 3 mm, 4°
8081-UHV	Ultra High Vacuum Motorized XYZ x y Tilt Aligner
8081-UHV-C	8081-UHV cable, 1.83m, DB15 Female to 6-pin RJ25 Connector

Add -M to model number for metric version.

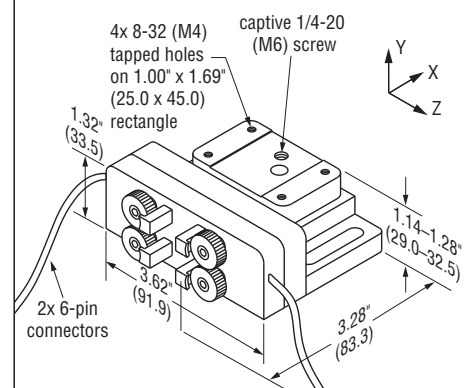
Recommended Motion Controller

8742 see page 166



Model 8081 Motorized Five-Axis Tilt Aligner shown

Dimensions



Model 8071 shown.
Visit Newport.com for other drawings.

Gothic Arch Bearing Picomotor Linear Stages



Model 9062-XYZ-PPN

- < 30 nm resolution
- gothic-arch bearings for demanding applications
- Ultra-compact motorized and manual axis configurations
- True set-and-forget long-term stability
- Easy-to-use, flexible controllers and drivers



Model 9065-XYZ-PPN

New Focus' Gothic Arch Bearing Motorized Linear Stages (Model 9062 and 9063 Series) include integrated Picomotor™ actuators to provide the ultimate stability and rigidity along with remote-control operation. These motorized stages offer stainless-steel construction, thumbscrew locks, and 13-mm travel ranges. They are ideal for demanding applications in the laboratory, OEM, or on the manufacturing floor. Gothic-arch bearings offer the smooth motion of ball bearings but high stiffness and repeatability. The unique gothic profile provides increased contact area so that the load and momentum are more evenly distributed.

The Compact Gothic Arch Bearing Motorized Linear Stages (Model 9061 Series) feature integrated Tiny Picomotor™ actuators. Note the Tiny Picomotor is recommended only for driving XY axes due to the lower force limit compared with standard Picomotor.

The Crossed Roller Bearing Motorized Stages (Model 9066 and 9067 Series) provide smooth and accurate positioning for critical optical alignment applications such as fiber alignment and high-stability positioning in laser systems. To ensure accurate linear travel, the stages use thermally matched hardened-steel, crossed-roller bearing and high-precision reference surfaces.

The Triple Divide motorized translation stage system (Model 9064 and 9065 Series) is based on the unique e•z•trac™ rail system and delivers the stability of an integrated stage but is effortlessly adaptable and easy to use. Because of its modularity, these stages are extremely economical.

Specifications

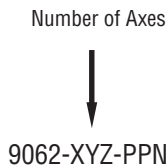
	9062-X-P	9062-XY-NP	9062-XY-PN	9062-XY-PP	9062-XYZ-NNP	9062-XYZ-NPN	9062-XYZ-NPP	9062-XYZ-PNN	9062-XYZ-PNP	9062-XYZ-PPN	9062-XYZ-PPP
Motorized Axes	X	Y	X	X	Z	Y	Y, Z	X	X, Z	X, Y	X, Y, Z
Micrometer Axes		X	Y	Y	X, Y	X, Z	X	Y, Z	Y	Z	
Travel Range	12.7 mm										
Platform Size	40 x 40 mm										
Minimum Incremental	<30 nm										
Thread Type	8-32 and 1/4-20										
Material	Stainless Steel										
Bearings	Gothic Arch Bearings										
Horizontal Load Capacity	84 N										
Feedback	Open Loop										
Cable Length	2.1 m										
Connector Type	4-Pin										
Operating Temperature	10 to 40°C										

	9063-X-P	9063-XY-NP	9063-XY-PN	9063-XY-PP	9063-XYZ-NNP	9063-XYZ-NPN	9063-XYZ-NPP	9063-XYZ-PNN	9063-XYZ-PNP	9063-XYZ-PPN	9063-XYZ-PPP
Motorized Axes	X	Y	X	X, Y	Z	Y	Y, Z	X	X, Z	X, Y	X, Y, Z
Micrometer Axes		X	Y		X, Y	X, Z	X	Y, Z	Y	Z	
Travel Range	25.4 mm										
Platform Size	65 x 65 mm										
Minimum Incremental	<30 nm										
Thread Type	8-32 and 1/4-20										
Material	Stainless Steel										
Bearings	Gothic Arch Bearings										
Horizontal Load Capacity	173 N										
Vertical Load Capacity	35 N										
Feedback	Open Loop										
Cable Length	2.1 m										
Connector Type	4-Pin										
Operating Temperature	10 to 40°C										

Recommended Motion Controller

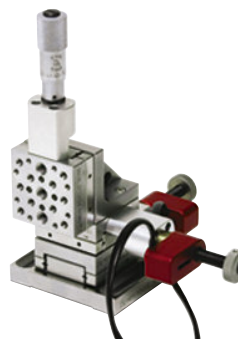
8742 see page 166

Ordering Information

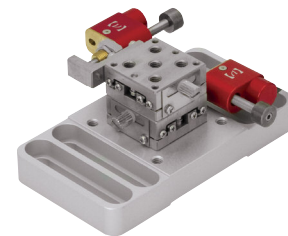


Indicates if Corresponding Axis has a Picomotor™ Actuator (P) or Manual Micrometer (N)

Example Model Number: 9062-XYZ-PPN
 9062-XYZ stage with Picomotor actuators integrated on X and Y axes and manual micrometer on Z axis.



Model 9066-XYZ-PPN



Model 9061-XY-PP

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

Motorized Fiber Positioners



Model 8051



- Unique flexure design
- Picomotor actuators
- <math><30\text{ nm}</math> minimum incremental motion

New Focus motorized XY fiber positioners provide the resolution from $1.0\ \mu\text{m}$ down to finer than $0.1\ \mu\text{m}$. A multimode-fiber positioner can be assembled by combining one of these stages with Model 9092 coupler body and clamp.

Specifications

	8051	8051-M
Axes of Travel	X, Y	
Thread Type	*8-32	M4
Connector Type	6 Pin	
Maximum Speed	1 mm/min	
Minimum Incremental Motion	30 nm	
Operating Temperature	10-40 °C	

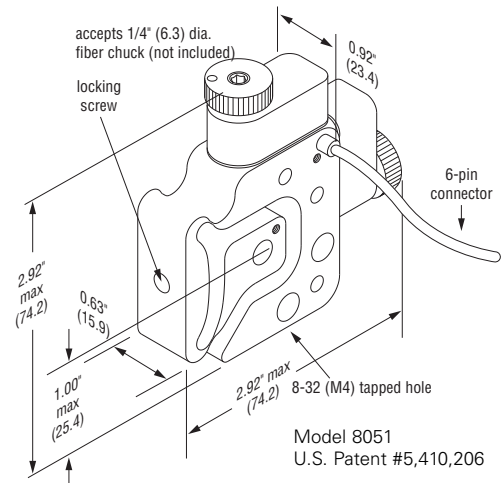
Ordering Information

Model	Description
8051	Motorized XY Fiber Positioner, 8-32 Tapped Hole
8051-M	Motorized XY Fiber Positioner, M4 Tapped Hole

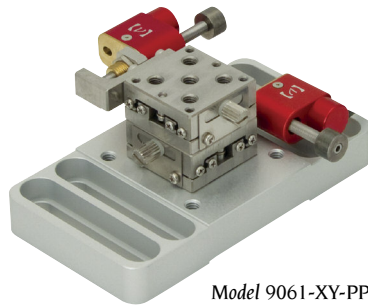
Recommended Motion Controller

8742 see page 166

Dimensions



Compact Gothic Arch Bearing Picomotor Linear Stages



- < 30 nm resolution
- Gothic-arch bearings for demanding applications
- Ultra-compact motorized and manual axis configurations
- True set-and-forget long-term stability
- Easy-to-use, flexible controllers and drivers

We've incorporated our Tiny Picomotor actuators with our compact gothic-arch-bearing translation stages to achieve the ultimate in stability and rigidity along with remote-control operation. Please note that the Tiny Picomotor is only recommended for driving XY axes of our Gothic arch bearing stages due to the lower force limit compared with our regular Picomotor.

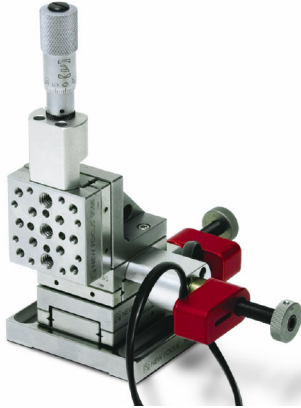
Specifications

	9061-X-P	9061-XY-NP	9061-XY-PN	9061-XY-PP	9061-XYZ-NPN	9061-XYZ-PNN	9061-XYZ-PPN
Motorized Axes	X	Y	X	X, Y	X, Z	X	X, Y
Micrometer Axes		X	Y			Y, Z	Z
Travel Range	5 mm						
Platform Size	25 x 25 mm						
Minimum Incremental Motion	<30 nm						
Thread Type	*8-32						
Material	Stainless Steel						
Bearings	Gothic Arch Bearings						
Axial Load Capacity	13 N						
Vertical Load Capacity	4 N						
Feedback	Open Loop						
Cable Length	2.1 m						
Connector Type	4-Pin						
Operating Temperature	10 to 40°C						

Recommended Motion Controller

8742 see page 166

Crossed Roller Bearing Picomotor Translation Stages



- Crossed-roller-bearing design for smooth and accurate positioning
- < 30 nm resolution
- True set-and-forget long-term stability
- Easy-to-use, flexible controllers and drivers

We've incorporated our Picomotor™ actuators with our crossed-roller-bearing translation stages to meet your demanding photonics applications. Crossed-roller-bearing motorized stages provide smooth and accurate positioning for critical optical alignment applications such as fiber alignment and high-stability positioning in laser systems.

Specifications

	9066-X-P	9066-XY-NP	9066-XY-PN	9066-XY-PP	9066-XYZ-NNP	9066-XYZ-NPN	9066-XYZ-NPP	9066-XYZ-PNN	9066-XYZ-PNP	9066-XYZ-PPN	9066-XYZ-PPP	9067-X-P	9067-XY-NP	9067-XY-PN	9067-XY-PP	9067-XYZ-NNP	9067-XYZ-NPN	9067-XYZ-NPP	9067-XYZ-PNN	9067-XYZ-PNP	9067-XYZ-PPN	9067-XYZ-PPP
Motorized Axes	X	Y	X	X, Y	Z	Y	Y, Z	X	X, Z	X, Y	X, Y, Z	X	Y	X	X, Y	Z	Y	Y, Z	X	X, Z	X, Y	X, Y, Z
Micrometer Axes		X	Y		X, Y	X, Z	X	Y, Z	Y	Z			X	Y		X, Y	X, Z	X	Y, Z	Y	Z	
Travel Range	12.7 mm											25.4 mm										
Platform Size	36.8 x 36.8 mm											63.5 x 63.5 mm										
Minimum Incremental Motion	<30 nm																					
Thread Type	8-32 and 1/4-20																					
Material	Stainless Steel																					
Bearings	Crossed Roller Bearings																					
Straightness	3 μm																					
Flatness	3 μm																					
Center Load Capacity	25 lb (111 N)											50 lb (222 N)										
Vertical Load Capacity	10 lb (44.5 N)											18 lb (80 N)										
Cable Length	2.1 m																					
Connector Type	4-Pin																					
Operating Temperature	10 to 40°C																					

Recommended Motion Controller

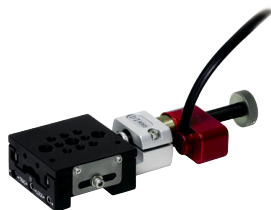
8742 see page 166

Triple-Divide Picomotor™ Translation Stages

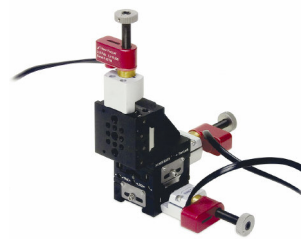
We've incorporated our Picomotor actuators with our Triple Divide translation stages to meet your laboratory applications. The Triple Divide motorized translation stage system is based on the unique e•z•trac™ rail system and delivers the stability of an integrated stage but is effortlessly adaptable and easy to use. Because of its modularity, these stages are extremely economical.



Model 9065-XY-PP



Model 9065-X-P



Model 9065-XYZ-PPP

Specifications

	9065-X-P	9065-XY-NP	9065-XY-PN	9065-XY-PP	9065-XYZ-NNP	9065-XYZ-NPN	9065-XYZ-NPP	9065-XYZ-PNN	9065-XYZ-PNP	9065-XYZ-PPN	9065-XYZ-PPP
Motorized Axes	X	Y	X	X, Y	Z	Y	Y, Z	X	X, Z	X, Y	X, Y, Z
Micrometer Axes		X	Y		X, Y	X, Z	X	Y, Z	Y	Z	
Travel Range	12.7 mm										
Platform Size	39.4 x 39.4 mm										
Thread Type	8-32 and 1/4-20										
Material	Aluminum										
Bearings	Ball Bearings										
Straight Line Accuracy	<3 μm										
Maximum Nominal Load	12 lbs (53 N)										
Orthogonality	N/A	<2 mrad									
Resolution	0.5 μm										
Cable Length	2.1 m										
Connector Type	4-Pin										
Operating Temperature	10 to 40°C										

	9064-X-P	9064-XY-NP	9064-XY-PN	9064-XY-PP	9064-XYZ-NNP	9064-XYZ-NPN	9064-XYZ-NPP	9064-XYZ-PNN	9064-XYZ-PNP	9064-XYZ-PPN	9064-XYZ-PPP
Motorized Axes	X	X	X	X, Y	Z	Y	Y, Z	X	X, Z	X, Y	X, Y, Z
Micrometer Axes			Y		X, Y	X, Z	X	Y, Z	Y	Z	
Travel Range	25.4 mm										
Platform Size	63.5 x 63.5 mm										
Thread Type	8-32 and 1/4-20										
Material	Aluminum										
Bearings	Ball Bearings										
Straight Line Accuracy	<2.5 μm										
Maximum Nominal Load	20 lbs (88 N)										
Orthogonality	N/A	<1 mrad									
Resolution	0.5 μm										
Cable Length	2.1 m										
Connector Type	4-Pin										
Operating Temperature	10 to 40°C										

Recommended Motion Controller

8742 see page 166

Optically Encoded Stainless-Steel Translation Stages



Model 9066-COM-E stage with a Picomotor actuator

- Vacuum compatible crossed roller bearing stages to 10^{-6} Torr
- Stages are clean assembled and use low vapor pressure grease
- Precision control and smooth translation with $<150 \mu\text{rad}$ deviation
- Available without baseplate for minimal profile
- Ultrastable, sub-micron performance



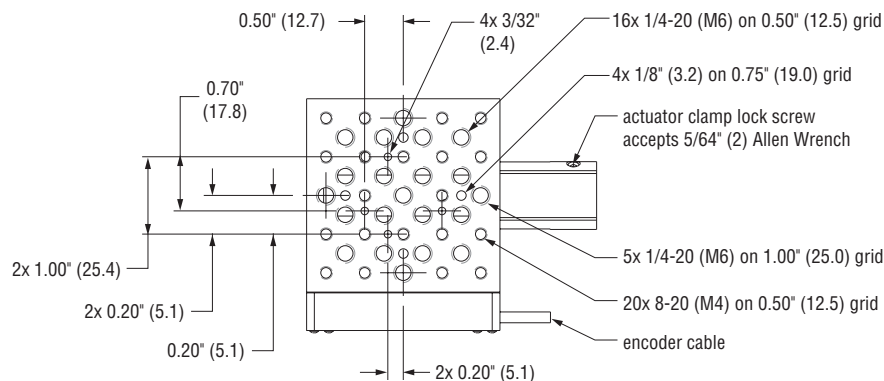
New Focus' stainless-steel, crossed-roller-bearing translation stages include linear optical encoders that create a closed-loop Picomotor™ actuated stage. Highly repeatable motion and outstanding accuracy can be achieved by using these stages with their integrated encoders and selected Picomotor actuators. These encoders are fully compatible with the Model 8743-CL Closed-Loop Picomotor Driver. For example, a 9066-COM-E stage with a Model 8302 Picomotor actuator and Model 8743-CL driver becomes a closed-loop linear stage.

	9066-COM-E	9066-COM-E-M	9067-COM-E	9067-COM-E-M
Travel Range	12.7 mm	12.7 mm	25.4 mm	25.4 mm
Platform Size	36.8 x 36.8 mm	63.5 x 63.5 mm	36.8 x 36.8 mm	63.5 x 63.5 mm
Height	22.1 mm			
Bearings	Crossed Roller Bearings			
Material	Stainless Steel			
Thread Type	8-32 and 1/4-20	M4 and M6	8-32 and 1/4-20	M4 and M6
Resolution	80 nm			
On-Axis Accuracy	3 μm			
Feedback	Closed Loop			

Ordering Information

Model	Description
9066-COM-E(-M)	Stainless Steel Translation Stage, Optical Encoder, 0.5 in. (12.7 mm), 8-32 (M4)
9067-COM-E(-M)	Stainless Steel Translation Stage, Optical Encoder, 1.0 in. (25.4mm), 1/4-20 (M6)

Dimensions



Model 9067-COM-E

Picolis™ Integrated Picomotor Linear Stage



- Picomotor set and forget technology
- Configurable for XYZ stacking
- 15 mm travel compact linear stage
- 10 N push force

When you need fine control of your laser alignment, precise set and forget nozzle and optics adjustments on your flow cytometry instruments, or remote laser correction in your medical tools, our Picolis stage is the ideal solution due to its precision and stability. Our popular Picomotor with its set and forget technology, is directly coupled to the moving carriage with no intermediate mechanism, to offer the ultimate in stability and rigidity of a 37.5 x 37.5 x 13 mm platform. The Picolis™ stages feature a thermally matched stainless steel design and precision manufactured bearing surfaces to provide a ripple-free 15 mm of low friction linear travel.

Picolis stages can be easily configured into compact XY, XZ, or XYZ nanopositioning stage stacks. Z stacks require an optional 90 degree mounting bracket Model 8520. We offer single-box controller/driver solutions that can be computer controlled via USB or Ethernet using the Newport Motion Control Language (NMCL) command set.

Ordering Information

Model	Description
8525	Picolis Piezo Linear Stage, 15 mm Travel, 37.5 x 37.5 mm Platform
8535	Closed-loop Picolis Piezo Linear Stage, 15 mm Travel, 37.5 x 37.5 mm Platform

Specifications

	8525	8535-CL
Travel Range	15 mm	
Maximum Speed	1.2 mm/min	
Minimum Incremental Motion	<30 nm	
Platform Size	37.5 x 37.5 mm	
Height	13 mm	
Horizontal Load Capacity	100 N	
Vertical Load Capacity	7 N	
On-Axis Accuracy	NA	± 3 μm
Closed Loop Repeatability, Typical	NA	± 1 μm
Closed Loop Resolution	NA	1 μm
Cable Length	2.1 m	
Connector Type	4-Pin	High Density DB-15
Thread Type	M3	
Weight	105 g	

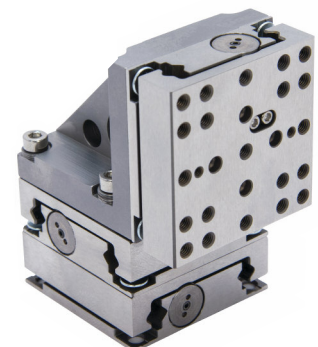
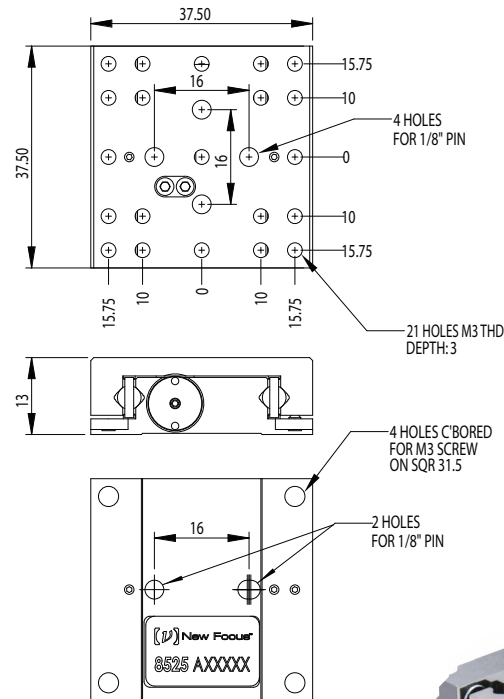
Compatible With Picomotor Controller/Drivers

8742 see page 166

Accessories

Model	Description
8520	90 Degree Angle Bracket, PICOLIS

Dimensions



Motorized Vertical Stage Selection Guide

Motorized vertical stages add the 3rd dimension to orient objects in 3D space. Newport's precision vertical stages range from the high load, long travel IMS family to the high accuracy XMS100V. Typical applications include focusing and imaging, metrology, inspection, laser writing, etc. Vertical stages can be selected based on load capacity, travel, Minimum Incremental Motion and repeatability.

Series	Travel Range (mm)	Minimum Incremental Motion (μm)	Bi-directional Repeatability (μm)	Accuracy (μm)	Maximum Speed (mm/s)	Centered Load Capacity (Cz)(N)
 <p>XMS-V Ultra-high Precision Vertical Linear Stage see page 79</p>	50-100	0.05	0.1	1.5	300	100
 <p>VP-5ZA Precision Vertical Linear Stage see page 81</p>	4.8	0.06	0.5	3.0	5	50
 <p>GTS30V High-Precision Vertical Linear Stage see page 83</p>	30	0.1	0.2	1.5	10	40
 <p>IDL280-Z20 Industrial Vertical Stage see page 85</p>	20	0.1	1.2	4.0	5	500
 <p>IMS-V Series High-Load Vertical Linear Stages see page 87</p>	100, 300	0.3	1.0	4.0 - 10.0	20	400
 <p>UZ Series Vertical Linear Stages see page 89</p>	4.5, 9	0.2	0.8-5.5	0.7 - 8.0	0.1 - 4.0	30 - 300
 <p>ZVR Series Integrated Vertical and Rotation Stage see page 91</p>	10	0.05	4.0	4.0	10	100

XMS-V Series

Ultra-high Precision Direct Drive Vertical Linear Stage



- Ultra-high performance vertical stage with superior accuracy, repeatability and MIM
- Non-contact, direct-drive system with counterbalance for ultra-precision, high dynamic motion and reliable operation
- Extra-large, ironless, high-efficiency linear motor minimizes heat generation
- Ultra-quiet anti-creep crossed roller bearings assure ripple-free motion without cage migration
- Highest maximum speed at 300 mm/s
- Two types of counterbalances available: pneumatic or fail-safe, magnetic

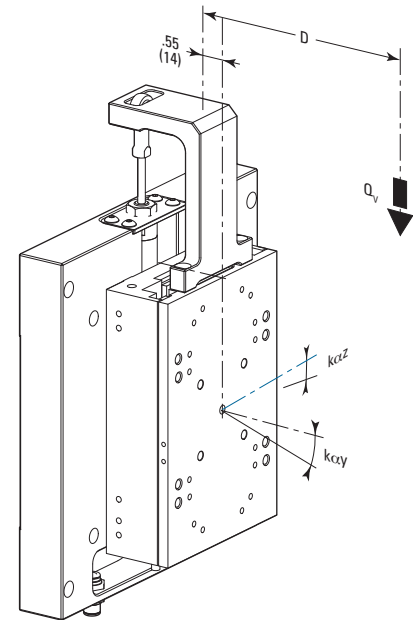


The XMS100V stage is a standard XMS100 ultra-precision linear stage mounted vertically on a high flatness plate with a pneumatic counterbalance. The air cylinder valve is used to achieve a perfect balance of the load while enabling a controlled descent of the carriage in a vertical setup. Innovative and compact, XM stages provide robust, repeatable motion with outstanding accuracy on the most complex trajectories. Features include precision position feedback with a linear scale encoder and a frictionless direct drive with ironless linear motor for high speed, high acceleration and excellent ripple-free motion. Typical applications include focusing, sensor test and calibration, direct laser lithography, fiber alignment, ultra-precision assembly and more.

Specifications

	XMS50V	XMS100V
Travel Range	50 mm	100 mm
Maximum Speed	300 mm/s	
Centered Load Capacity	100 N	
Minimum Incremental Motion	0.05 μm	
Accuracy, Guaranteed	$\pm 0.75 \mu\text{m}$	
Bi-directional Repeatability, Guaranteed	$\pm 0.05 \mu\text{m}$	
Limit Switches	Optical, fiducial on ncoder	
Origin	Optical, at center of travel, including mechanical zero signal	
Cable Length	5 m	
Straightness, Flatness	$\pm 0.75 \mu\text{m}$	
Weight	2.5 kg	3.5 kg
MTBF	20,000 h	

Load Characteristics



Model	XMS100V
K_{ax} , Compliance in roll ($\mu\text{rad}/\text{Nm}$)	2.0
K_{ay} , Compliance in pitch ($\mu\text{rad}/\text{Nm}$)	2.5
K_{az} , Compliance in yaw ($\mu\text{rad}/\text{Nm}$)	3.5
Q_v	Off-center load, $Q_v \leq 100\text{N}/(1 + D/109)$
D	Cantilever distance in mm between the center of mass of the load and the bearing center
Distance between top surface and the bearing center	14 mm

MOTORIZED
LINEAR STAGES

XM Series Models

Model	Description
XMS100V	Ultra-Precision Vertical Linear Motor Stage, 100 mm Travel, XMS-V Series

MOTORIZED
VERTICAL STAGES

Recommended Motion Controllers

XPS-D see page 148

XPS-RL see page 153

Driver cards and cable kits to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

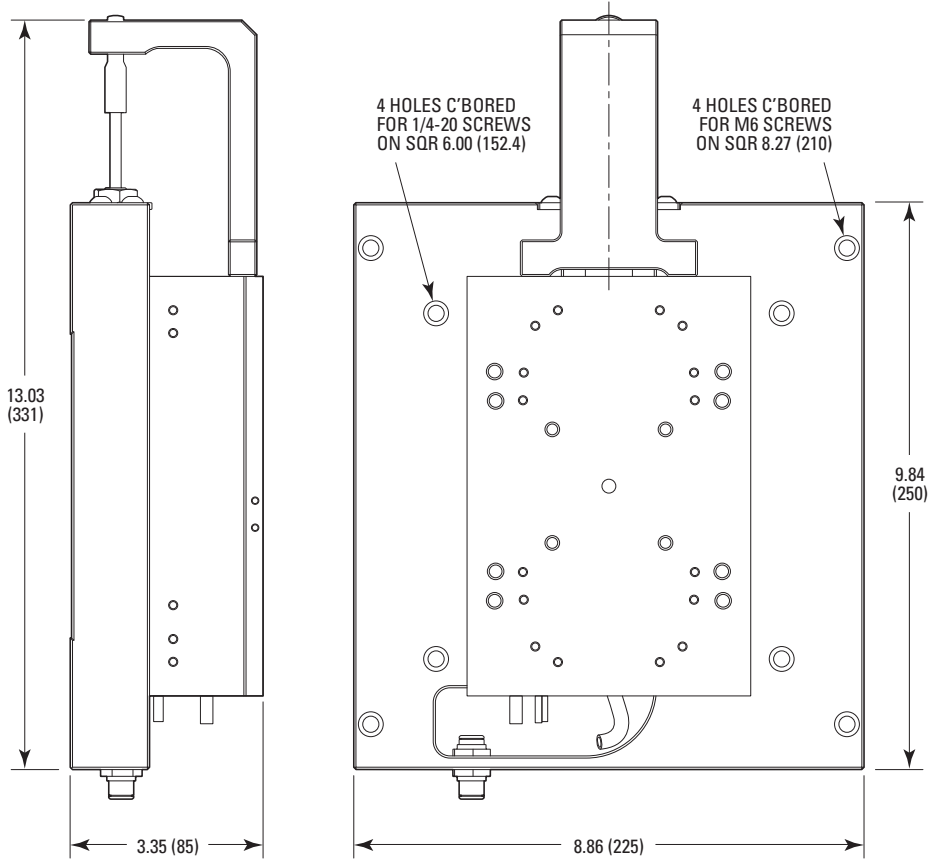
Dimensions

MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

HEXAPODS

CONTROLLERS
AND DRIVERS



MODEL SHOWN: XMS100V
DIMENSIONS IN INCHES (AND MILLIMETERS)

NOTE:
FOR DIMENSIONS AND HOLES PATTERN
OF THE STAGE, SEE XMS100 DRAWING.

Optional bracket for XYZ mounting is available

MOTORIZED
OPTICAL MOUNTS

BEAM
MANAGEMENT

SPECIAL
COLLECTIONS

VP-5ZA

Precision Vertical Linear Stages



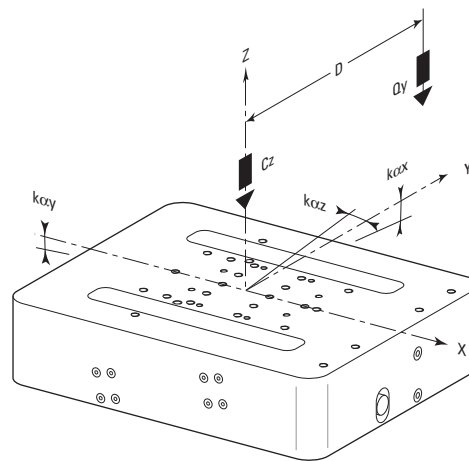
- 4.8 mm of precision vertical motion with unique inclined plane concept
- Ultra-low profile design for compact XYZ configurations
- Unobstructed access to the moving platform from any direction
- Highly repeatable and accurate motion with integrated linear encoder
- Excellent 60 nm minimum incremental motion
- Plug and play ESP compatibility

The VP-5ZA vertical stage is an ultra-low profile, precision vertical stage with minimum incremental motion capability of 60 nm, high-responsiveness and perfectly straight trajectory over 4.8 mm travel. Features include: an innovative inclined-plane design; a cool running, high torque DC motor with a precision preloaded, long-life, ball screw ensuring high speed motion with minimum settling time; a high-resolution linear scale directly attached to the moving rail, eliminating all drive-train induced motion errors; and two pairs of vertically mounted double-row linear ball bearing slides resulting in pure vertical motion. A standard 3-point mounting interface for a wafer chuck is provided as well. Manual vertical adjustments can be made using a flat screw driver for convenience. Typical applications include: semiconductor wafer inspection, photonics test and packaging, micro-assembly, precision metrology, and surface inspection systems. The VP-5ZA is compatible with the VP-25X linear stages and other Newport positioning products. For mounting to optical tables or to the ILS linear stages, use the optional base plate VP-BP.

Specifications

	VP-5ZA
Travel Range	4.8 mm
Minimum Incremental Motion	60 nm
Maximum Speed	5 mm/s
Centered Load Capacity	50 N
Accuracy, Typical	$\pm 0.6 \mu\text{m}$
Accuracy, Guaranteed	$\pm 1.5 \mu\text{m}$
Bi-directional Repeatability, Typical	$\pm 0.10 \mu\text{m}$
Bi-directional Repeatability, Guaranteed	$\pm 0.25 \mu\text{m}$
Uni-directional Repeatability, Typical	$\pm 0.06 \mu\text{m}$
Uni-directional Repeatability, Guaranteed	$\pm 0.15 \mu\text{m}$
Origin Repeatability	$\pm 0.1 \mu\text{m}$
Cable Length	1.5 m
Pitch, Typical	$\pm 30 \mu\text{rad}$
Pitch, Guaranteed	$\pm 50 \mu\text{rad}$
Roll, Typical	$\pm 30 \mu\text{rad}$
Roll, Guaranteed	$\pm 100 \mu\text{rad}$
Yaw, Typical	$\pm 30 \mu\text{rad}$
Yaw, Guaranteed	$\pm 50 \mu\text{rad}$
Weight	2.4 kg
MTBF	20,000 h (25% load, 10% duty cycle)
CE	Compliant

Load Characteristics and Stiffness



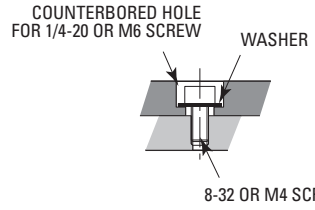
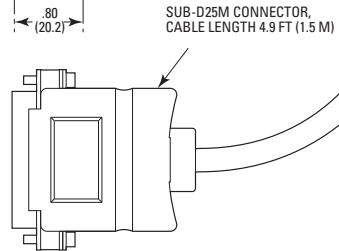
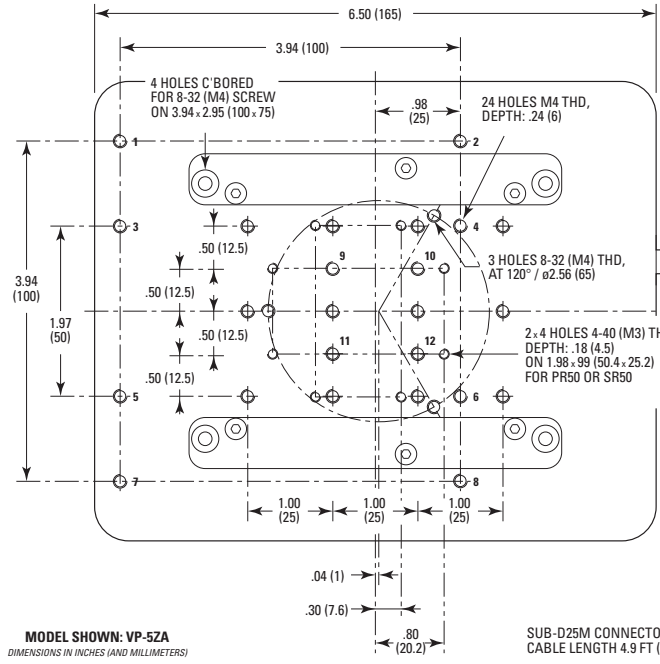
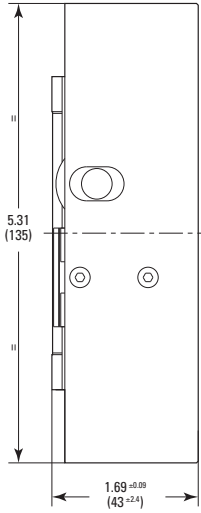
C_z , Normal centered load capacity	50 N
k_{cx} , Compliance in roll	$50 \mu\text{rad}/\text{N}\cdot\text{m}$
k_{cy} , Compliance in pitch	$45 \mu\text{rad}/\text{N}\cdot\text{m}$
k_{cz} , Compliance in yaw	$10 \mu\text{rad}/\text{N}\cdot\text{m}$
Q , Off-center load	$Q_x, Q_y \leq C_z / (1+D/30)$
Where D = Cantilever distance in mm	

Ordering Information

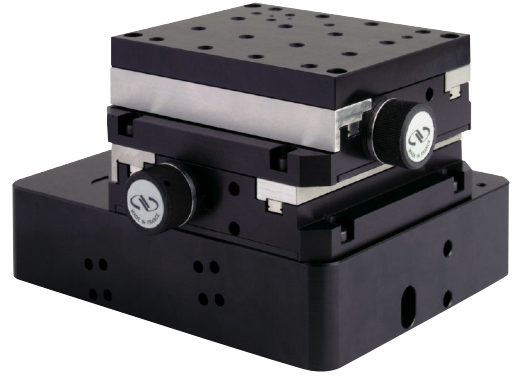
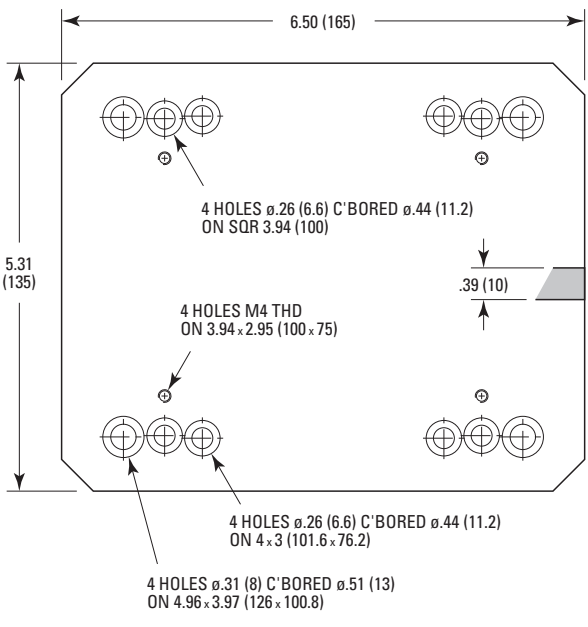
Model (Metric)	Description
VP-5ZA (M-VP-5ZA)	Compact Precision Vertical Stage, 4.8 mm Travel, DC Servo Motor with Tachometer, Metric
VP-BP	Universal Base Plate

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

Dimensions



Components with counterbored holes for 1/4-20 (M6) screws can be attached to the top plate of the VP-5ZA (M-VP-5ZA) using 8-32 (M4) screws and the washers supplied with each stage.



Ultra low-profile precision XYZ system consisting of two VP-25XA linear stages and one VP-5ZA vertical translation stage. Compared to traditional stacks of stages, this solution offers a lower-profile alternative with easy access to the load from any side.

Recommended Motion Controllers:

- XPS-D see page 148
- XPS-RL see page 153
- ESP301 see page 157
- SMC100CC see page 159

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

GTS30V

High-Precision Vertical Linear Stage



- 30 mm of precision vertical travel in a compact unit
- Unobstructed access to the payload from any side
- Ripple-free motion and outstanding trajectory accuracy with vertical anti-creep crossed roller bearings
- High sensitivity, excellent repeatability and high accuracy motion from integrated linear encoder

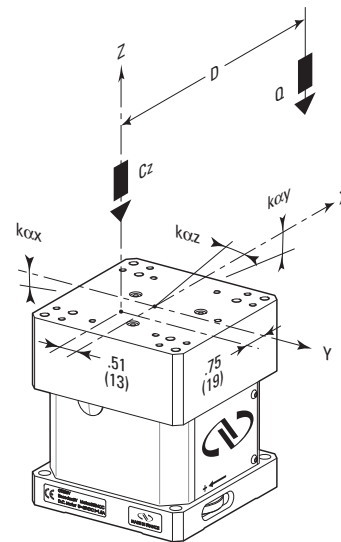


The GTS30V is a compact, vertical stage that combines outstanding trajectory accuracy with fine adjustment capability of 0.1 μm Minimum Incremental Motion with a travel range of 30 mm. Features include: a vertical guide system composed of matched pairs of anti-creep crossed roller bearings resulting in high-precision, ripple-free motion, a folded DC motor with a precision ground and a low-friction lead screw designed to deliver ultra-smooth motion. The GTS30V also does not back drive even with heavy loads, offering excellent in-position stability. A reduction belt between the motor and lead screw increases available output torque and robustness for servo loop sensitivity. The GTS30V is ideal for applications such as semiconductor wafer inspection, scanning, microscopy, laser machining, automated device alignment, metrology, quality control and applications requiring long travel vertical motion of 30 mm.

Specifications

	GTS30V
Travel Range	30 mm
Minimum Incremental Motion	0.1 μm
Maximum Speed	10 mm/s
Centered Load Capacity	40 N
Accuracy, Typical	$\pm 0.37 \mu\text{m}$
Accuracy, Guaranteed	$\pm 0.75 \mu\text{m}$
Bi-directional Repeatability, Typical	$\pm 0.07 \mu\text{m}$
Bi-directional Repeatability, Guaranteed	$\pm 0.1 \mu\text{m}$
Origin Repeatability	$\pm 0.05 \mu\text{m}$
Cable Length	3 m
Pitch, Typical	$\pm 20 \mu\text{rad}$
Pitch, Guaranteed	$\pm 25 \mu\text{rad}$
Roll, Typical	$\pm 12 \mu\text{rad}$
Roll, Guaranteed	$\pm 25 \mu\text{rad}$
Weight	3.3 kg
MTBF	20,000 h (25% load, 10% duty cycle)
CE	Compliant

Load Characteristics and Stiffness



C_z , Normal centered load capacity	40 N
$K_{\alpha x}$, Compliance in roll	40 $\mu\text{rad}/\text{Nm}$
$K_{\alpha y}$, Compliance in pitch	40 $\mu\text{rad}/\text{Nm}$
$K_{\alpha z}$, Compliance in yaw	25 $\mu\text{rad}/\text{Nm}$
Q_x, Q_y , Off-center load	$Q \leq C_z / (1 + D/30)$
D_{max} , Cantilever distance	100 mm

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

Ordering Information

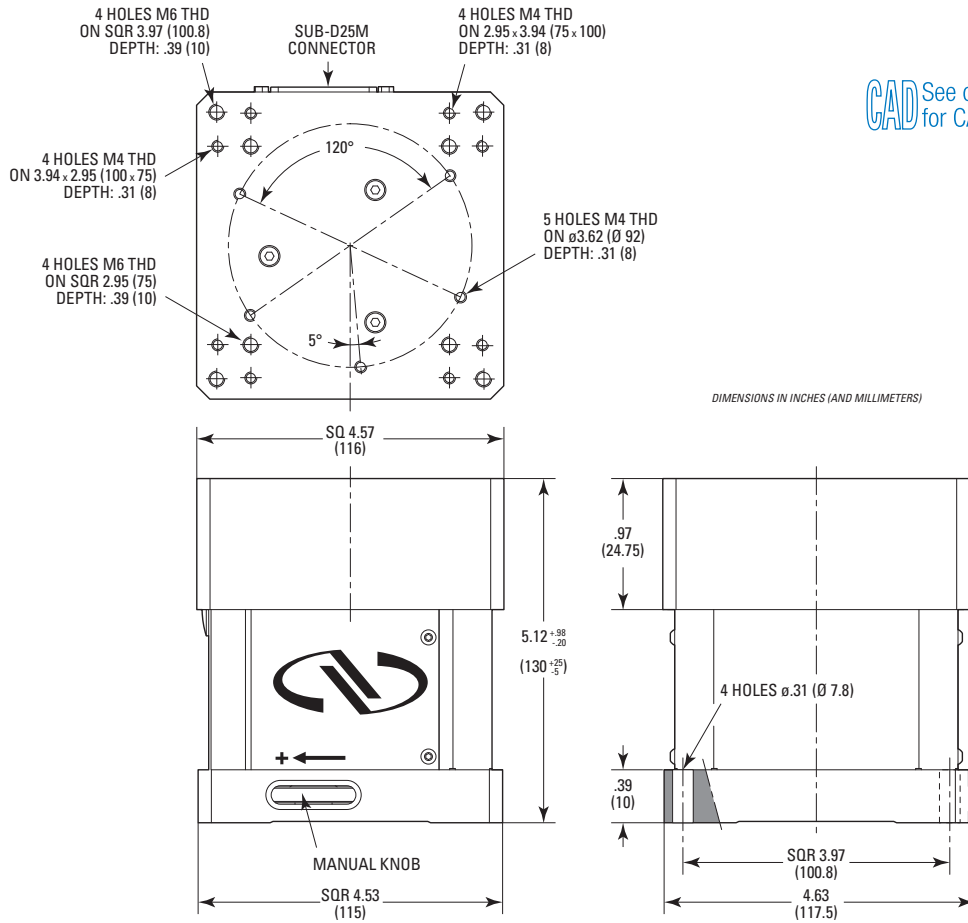
Model	Description
GTS30V	High Precision Vertical Stage, 30 mm Travel, GTS Series

Recommended Motion Controllers:

XPS-D	see page 148
XPS-RI	see page 153
ESP301	see page 157
SMC100CC	see page 159

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

Dimensions



CAD See our website for CAD files



A typical assembly with an ILS250 linear stage, a GTS30V vertical stage and a URS100 rotation stage.



A compact XYZ assembly consisting of a GTS150 linear stage, a GTS70 linear stage and a GTS30V vertical stage.

IDL280-Z20 Industrial Vertical Stage



- Built for industrial applications
- Up to 500 N load capacity
- Stiff construction
- Fine positioning

The IDL280-20Z Industrial Grade Vertical Stage offers 20 mm travel and 500N load capacity. Specifically designed for high load industrial applications, it can directly be mounted on any IDL280 series Industrial Linear Stages for easy XZ or XYZ assemblies.

Specifications

Travel Range	20 mm
Minimum Incremental Motion	0.10 μm
Maximum Speed	5 mm/s
Centered Load Capacity	500 N
Accuracy, Typical	2.0 μm
Bi-directional Repeatability	$\pm 0.6 \mu\text{m}$
Uni-directional Repeatability, Guaranteed	$\pm 0.1 \mu\text{m}$
Origin Repeatability	$\pm 0.5 \mu\text{m}$
Cable Length	3 m
Pitch, Guaranteed	$\pm 50 \mu\text{rad}$
Compliance in Pitch	10 $\mu\text{rad/ Nm}$
Compliance in Roll	10 $\mu\text{rad/ Nm}$
Yaw, Guaranteed	$\pm 50 \mu\text{rad}$
Compliance in Yaw	10 $\mu\text{rad/ Nm}$
Weight	14.5 kg
MTBF	20,000 h (25% load, 30% duty cycle)
CE	Compliant

Ordering Information

Model	Description
IDL280-Z20	Industrial Grade Vertical Stage, 20 mm Travel

Recommended Motion Controllers

XPS-D4 see page 148
XPS-RL2 see page 153

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

Specifications

MOTORIZED
LINEAR STAGES

MOTORIZED
VERTICAL STAGES

MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

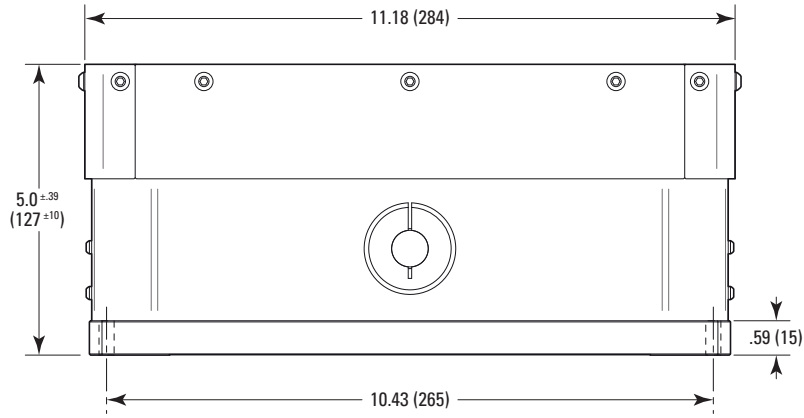
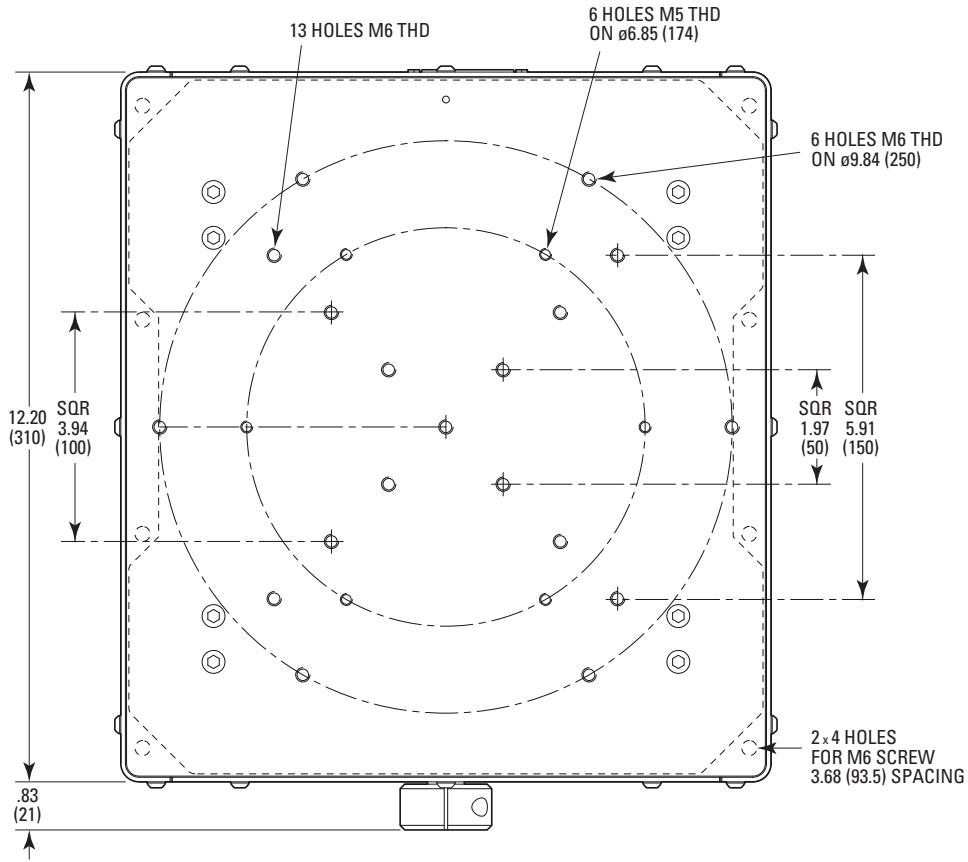
HEXAPODS

CONTROLLERS
AND DRIVERS

MOTORIZED
OPTICAL MOUNTS

BEAM
MANAGEMENT

SPECIAL
COLLECTIONS



IMS-V Series

High-Load Vertical Linear Stages



- Highest vertical load capacity (400 N) and longest travel range (300 mm)
- Self-locking lead screw ensures best position stability even with power off
- FEM-optimized aluminum body allows for high stiffness and minimizes bi-metal bending
- Proprietary nut design minimizes wear
- Direct position feedback provides superior accuracy and repeatability with minimum hysteresis
- Recirculating ball bearings offer support for high loads and counteract moment loads



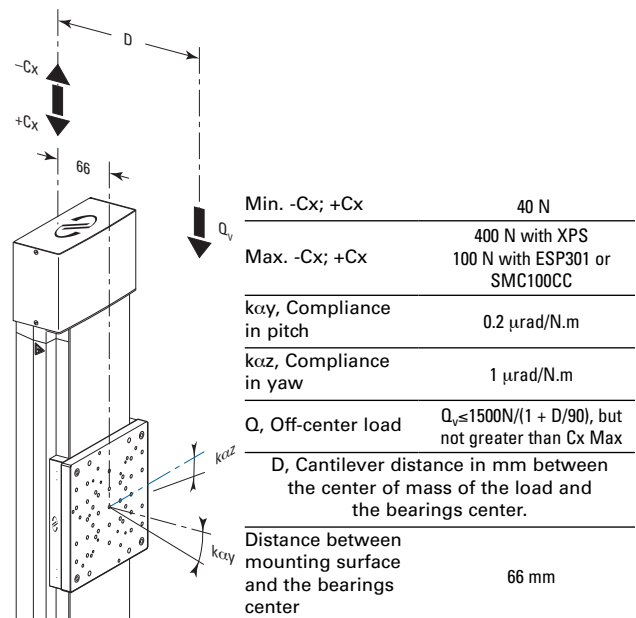
IMS-V Series stages are long travel vertical stages offering high performance in a cost effective package. They are an ideal solution for both precision industrial and laboratory applications requiring precise vertical motion with $0.3 \mu\text{m}$ MIM for loads up to 400 N and 300 mm travel. Features include: four-way equal load ball bearings to provide superior cantilevered loading characteristics, caged recirculating ball bearings to ensure maintenance-free operation without cage migration, self-locking lead screw to ensure superior in-position stability with no change of position at power off, and a direct-read to encoder provide superior accuracy and minimum hysteresis. Available in IMS300V and IMS100V models. Ideal for a wide range of precision industrial and research applications.

Specifications

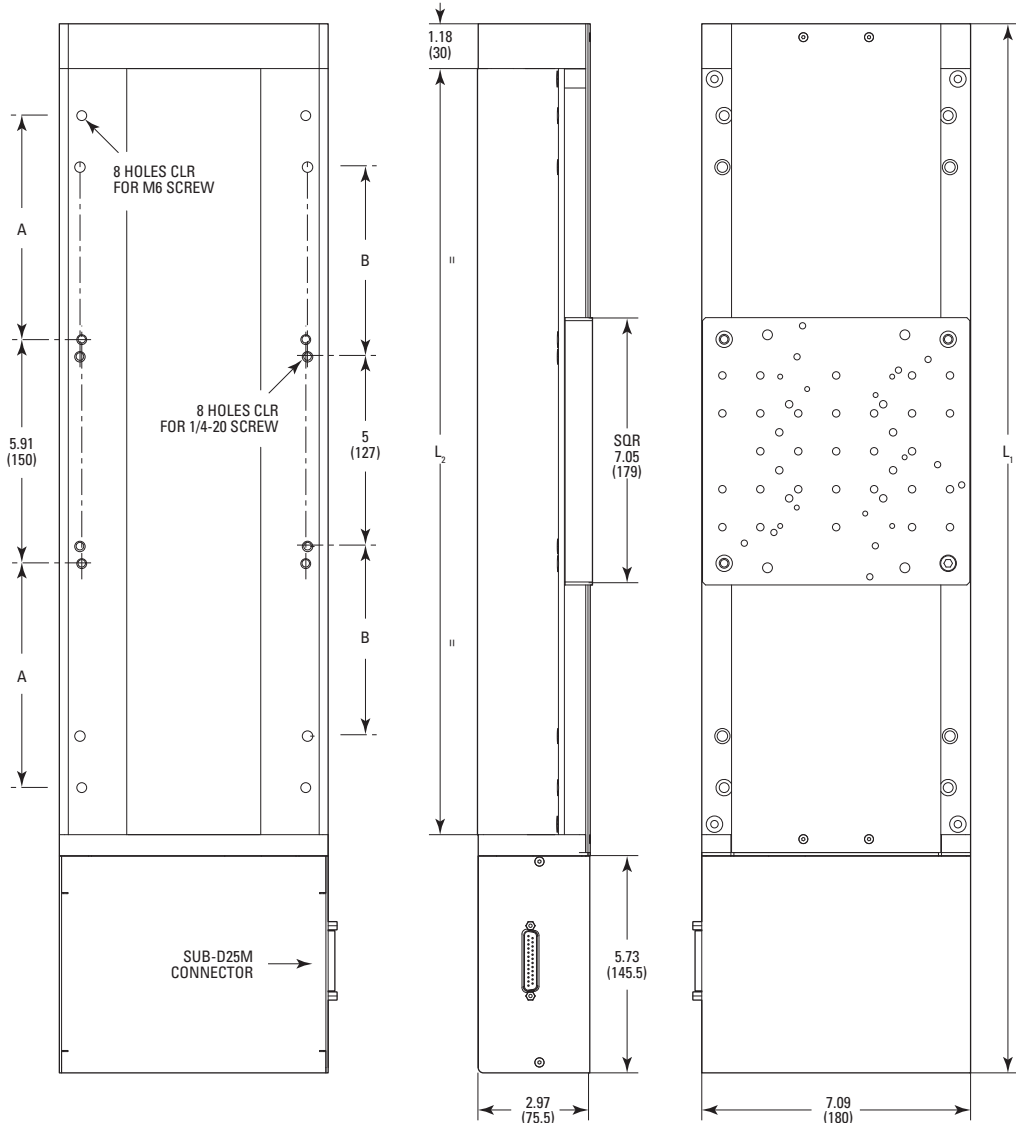
	IMS100V	IMS300V
Travel Range.	100 mm	300 mm
Maximum Speed	20 mm/s	
Centered Load Capacity	400 N	
Minimum Incremental Motion	0.30 μm	
Accuracy, Typical	$\pm 0.6 \mu\text{m}$	$\pm 3.5 \mu\text{m}$
Accuracy, Guaranteed	$\pm 2 \mu\text{m}$	$\pm 5 \mu\text{m}$
Bi-directional Repeatability, Typical	$\pm 0.15 \mu\text{m}$	$\pm 0.20 \mu\text{m}$
Bi-directional Repeatability, Guaranteed	$\pm 0.5 \mu\text{m}$	
Uni-directional Repeatability, Typical	$\pm 0.10 \mu\text{m}$	$\pm 0.12 \mu\text{m}$
Uni-directional Repeatability, Guaranteed	$\pm 0.25 \mu\text{m}$	
Origin Repeatability	$\pm 0.1 \mu\text{m}$	
Cable Length	5 m	
Pitch, Typical	$\pm 15 \mu\text{rad}$	$\pm 35 \mu\text{rad}$
Yaw, Typical	$\pm 10 \mu\text{rad}$	$\pm 20 \mu\text{rad}$
Weight	13.6 kg	17 kg
MTBF	20,000 h (300 N load, 10% duty cycle)	
CE	Compliant	

Note: Also available in metric version, p/n M-

Load Characteristics and Stiffness

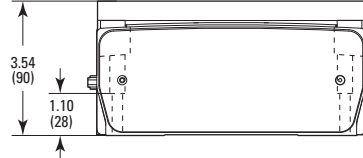


Dimensions



MODEL SHOWN: IMS300V
DIMENSIONS IN INCHES (AND MILLIMETERS)

MODEL (METRIC)	A	B	L ₁	L ₂	TRAVEL
(M-)IMS100V	1.97 (50)	2.00 (50.8)	19.78 (502.5)	12.32 (313)	3.94 (100)
(M-)IMS300V	6.91 (150)	5.00 (127)	27.66 (702.5)	20.20 (513)	11.81 (300)



CAD See our website for CAD files

Ordering Information

Model (Metric)	Description
(M-)IMS100V	Vertical Stage, 100 mm Travel, DC motor, IMS-V Series
(M-)IMS300V	Vertical Stage, 300 mm Travel, DC motor, IMS-V Series

Recommended Motion Controllers/Drivers

XPS-D see page 148	(max. 400 N payload, 0.3 μm MIM)
XPS-RL see page 153	(max. 400 N payload, 0.3 μm MIM)
ESP301 see page 157	(max. 100 N payload, 0.6 μm MIM)
SMC100 see page 159	(max. 100 N payload, 0.6 μm MIM)

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

UZ Series

Vertical Linear Stages



- All steel construction offers high stiffness, thermal stability, repeatable positioning and overall durability
- Screw mounted rotary encoder produces sub-micron MIM
- Unobstructed access to moving platform from any direction
- Plug and Play - ESP compatible

UZ Series vertical stages offer high precision vertical translation for space-limited applications requiring sub-micron sensitivity. They are available in two sizes, the UZS80 and the UZM160. The UZS80CC DC motor version provides high speed adjustments and accurate bi-directional positioning capabilities and features a high resolution encoder directly attached to the drive spindle, eliminating most error sources associated with indirect feedback devices. The UZS80PP stepper motor version is a more economical model for less demanding applications. The UZM160 is specifically designed for high load applications, capable of bearing loads up to 300N, and is available with a DC-motor drive, a full step motor drive, or a mini-step motor drive. In addition, the stages utilize a 2,000 cts/rev. rotary encoder to ensure consistent operation under high loads. UZ Series stages feature a center home position and are available in vacuum versions as well.

Ordering Information

Model (Metric)	Description
UZS80CC	UZS80 vertical stage, DC motor
UZS80PP	UZS80 vertical stage, stepper motor
UZM160CC.05 (M-UZM160CC.05)	UZM160 vertical stage, DC drive
UZM160PE.05 (M-UZM160PE.05)	UZM160 vertical stage, full-step drive
UZM160PE.05V6 (M-UZM160PE.05V6)	UZM160PE.05 vertical stage, vacuum compatible to 10 ⁻⁶ hPa
UZM160PP.05 (M-UZM160PP.05)	UZM160 vertical stage, micro-step drive
M-CAP-M41	4 Captive screws for mounting UZS80 on top of UTS linear stages
M-CAP-M61	4 Captive screw for mounting MTM linear stages on top of UZM160
M-PBN12	Base plate for UZS80
UTS-TP	UZS80 top plate with English holes

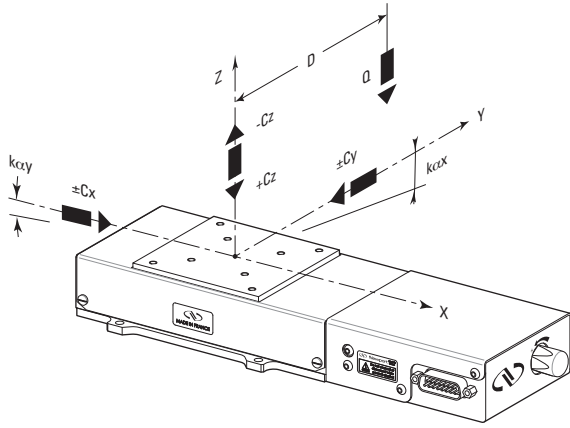
Specifications

	UZS80CC	UZS80PP	UZM160CC.05	UZM160PP.05	UZM160PE.05
Travel Range	4.5 mm		9 mm		
Maximum Speed	4 mm/s	2 mm/s	1 mm/s		0.1 mm/s
Centered Load Capacity	30 N		300 N		
Minimum Incremental Motion	0.20 μ m				
Accuracy, Typical	± 0.35 μ m		± 4.0 μ m		
Bi-directional Repeatability, Typical	± 0.4 μ m	± 0.5 μ m	± 2.75 μ m		
Uni-directional Repeatability, Typical	± 0.25 μ m				
Origin Repeatability	± 1 μ m	± 2 μ m	± 0.25 μ m		
Cable Length	3 m				
Pitch, Typical	± 37 μ rad		± 50 μ rad		
Yaw, Typical	NA	NA	± 100 μ rad		
Weight	2.8 kg		22 kg		
MTBF	20,000 h (25% load, 10% duty cycle)				
CE	Compliant				

M- versions have M6 threaded mounting holes.

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

Load Characteristics



	UZS80	UZM160
Cz, Normal centered load capacity	±30 N	-200 N, +300 N
Cx, Cy	±150 N	±200 N
k _{cx} , Compliance in roll	100 μrad/Nm	0.13 μrad/Nm
k _{cy} , Compliance in pitch	100 μrad/Nm	0.65 μrad/Nm
Max torque (Q x D)	0.75 Nm	20 Nm
Q, Off-center load		
D, Cantilever distance in m		

Recommended Motion Controllers:

XPS-D see page 148	
XPS-RL see page 153	
ESP301 see page 157	
SMC100CC see page 159	UZS80CC only
SMC100PP see page 159	UZS80PP and UZM160PP.05 only

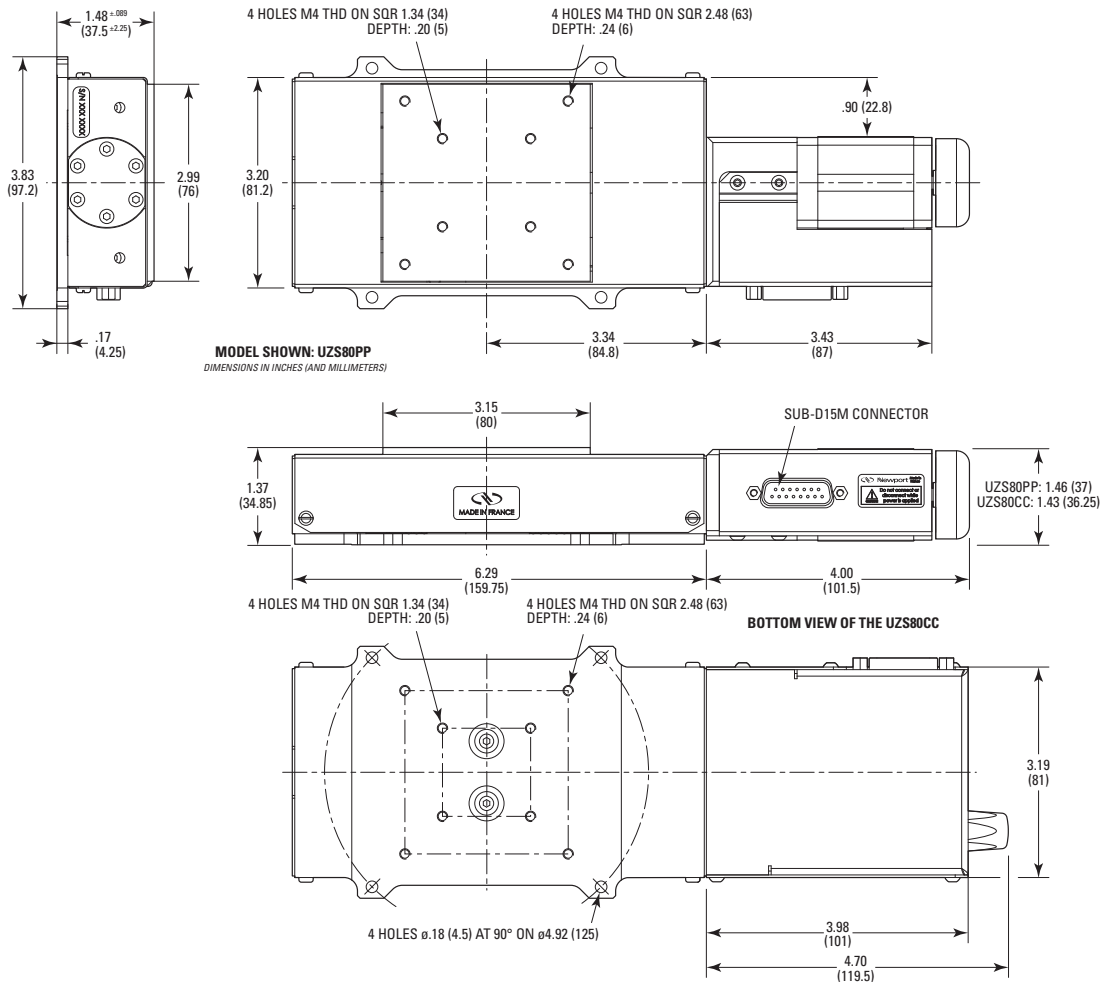
Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.



A BGS80CC stage mounted on top of an UZS80CC stage

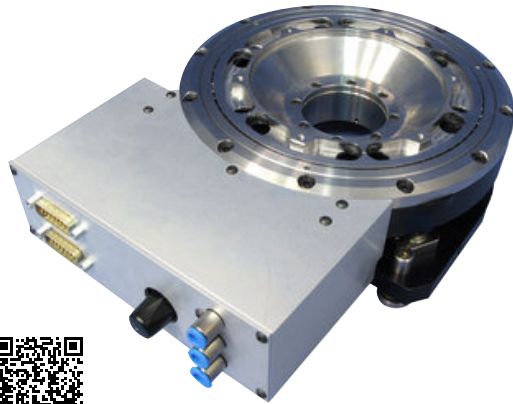
CAD See our website for CAD files

Dimensions



ZVR Series

Integrated Vertical and Rotation Stage for Wafer Positioning



scan QR code
to watch video

- Precise 10 mm vertical and continuous 360 degree angular travel in a very low profile design
- Three-point bottom interface for stable mounting to any XY stage or other platfor
- Large center aperture simplifies vacuum and electrical cable management
- Low mass and a high natural frequency enable rapid step-and-settle applications
- Stainless steel recirculating ball bearings
- Plug and Play - ESP compatible



Newport's ZVR-PP and ZVR-PC are integrated Z-vertical and Theta-rotation positioning stages designed to precisely elevate and rotate 200 mm and/or 300 mm diameter wafer chucks. The ZVR stages rigidly support and drive the payload at three points (separated by 120 degrees) along the outer circumference of the stage. Newport's three point design has advantages for applications that have slight to extreme unbalanced loading such as wafer probing, which can have vertical forces applied at locations along the outer edges of the chuck. Angular deflections due to these off-centre loads are minimized and binding during vertical motion is eliminated. The ZVR's unique design also permits the center of the stage to remain open down through the bottom plate. Guiding the stage through its vertical trajectory are three miniature, ultraquiet, recirculating bearing guides. The ZVR is also equipped with a hardware origin allowing the stage to be returned to an absolute reference (home) position and a limit switch enabling the user to set the upper limit for vertical travel.

Specifications

	ZVR-PC	ZVR-PP
Angular Range	360°	
Travel Range	10 mm	
Maximum Speed	80°/s	40°/s
Maximum Linear Speed	10 mm/s	
Centered Load Capacity	100 N	
Aperture Diameter	50 mm	
Minimum Incremental Motion, Rotary	2 mdeg	
Minimum Incremental Motion, Linear	0.05 µm	
Bi-directional Repeatability, Typical	Rotary: ±1.3 mdeg ; Linear: ±1.2 µm	Rotary : ±3.0 mdeg ; Linear: ±1.2 µm
Bi-directional Repeatability, Rotary, Guaranteed	Rotary: ± 3.0 mdeg ; Linear: ±2.0 µm	Rotary : ± 6.0 mdeg; Linear: ± 2.0 µm
Uni-directional Repeatability, Typical	Rotary: ±0.5 mdeg ; Linear: ±0.2 µm	Rotary: ±1.0 mdeg, Linear: ±0.1 µm
Uni-directional Repeatability, Guaranteed	Rotary: ±1.5 mdeg ; Linear: ±1.0 µm	Rotary: ±1.5 mdeg, Linear: ±1.0 µm
Accuracy, Typical	Rotary: ±10 mdeg , Linear: ±0.5 µm	
Accuracy, Guaranteed	Rotary: ±15 mdeg , Linear: ±2.0 µm	Rotary: ±17 mdeg , Linear: ±2.0 µm
Origin Repeatability (rotary)	Rotary: ±7.5 mdeg	Rotary: ±20 mdeg
Origin repeatability(linear)	Linear: ±2.5 µm	
Cable Length	3 m	
MTBF	20,000 h (25% load, 10% duty cycle)	
CE	Compliant	

MOTORIZED
LINEAR STAGES

Ordering Information

Model	Description
ZVR-PP	Integrated Vertical and Stepper Motor Rotation Stage for Wafer Positioning
ZVR-PC	Integrated Vertical and DC Rotation Stage for Wafer Positioning

For a vertical only version, please contact Newport.

MOTORIZED
VERTICAL STAGES

Recommended Motion Controllers/Drivers:

XPS-D see page 148
XPS-RL see page 153
ESP301 see page 157
SMC100CC see page 159
SMC100PP see page 159

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

Dimensions

MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

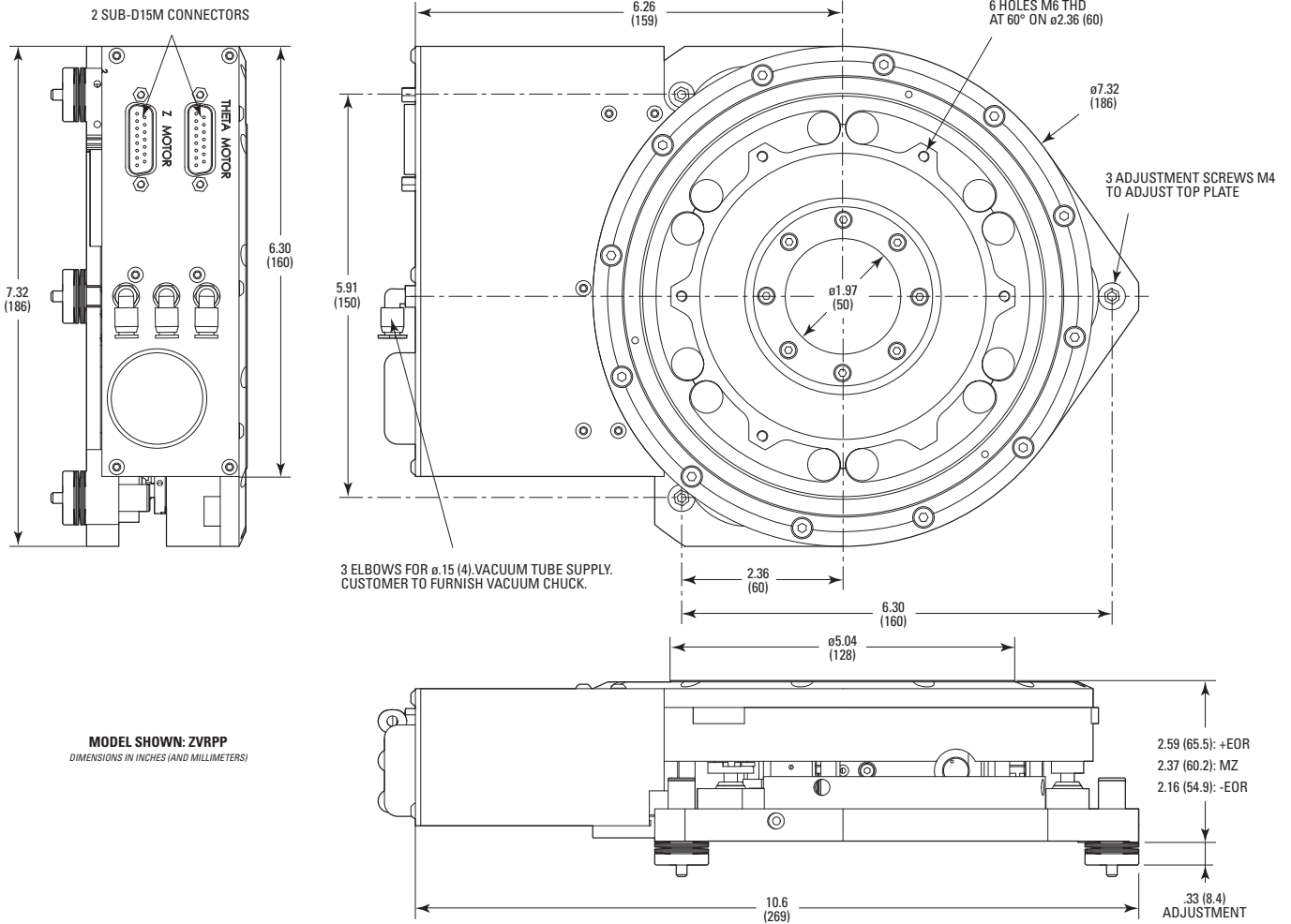
HEXAPODS

CONTROLLERS
AND DRIVERS

MOTORIZED
OPTICAL MOUNTS

BEAM
MANAGEMENT












SPECIAL
COLLECTIONS



Motorized Rotation Stage Selection Guide

Motorized rotation stages are precision positioning products designed and built over many decades of experience in providing solutions to research and academia, industry and defense markets. Applications of Rotation Stages include semiconductor wafer inspection or scribing, metrology, micro-robotics, sensor testing, disk texturing, optics positioning like polarizers, waveplates, etc. Newport rotation stages offering ranges from the direct drive, direct read, high rotation speed RGV series to the multi-use low-cost NSRI Universal Rotator, with over 100 model numbers to choose from. Vacuum versions, as well as multiple axis designs, OEM or custom solutions are available upon request.

Motorized rotation stages can be selected based on Minimum Incremental Motion, Bi-directional Repeatability, Accuracy, Maximum Speed, Wobble, Load Capacity, etc.

	Series	Minimum Incremental Motion(°)	Bi-directional Repeatability(°)	Accuracy(°)	Maximum Speed(°/s)	Wobble(μrad)	Normal Load Capacity (Cz)(N)
	RGV-S Series High Speed Precision Rotation Stage see page 94	0.00004 - 0.00011	0.0003	0.015	720 - 1000	20 - 40	100 - 2700
	RV Series High-Performance Precision Rotation Stages see page 96	0.0002 - 0.001	0.0012 - 0.020	0.005 - 0.020	1 - 80	16 - 40	900 - 6500
	RVU Series High Angular Stiffness Rotation Stages see page 102	0.0002 - 1	NA	NA	NA	NA	4000 - 6500
	URS Series Precision Rotation Stages see page 104	0.0002 - 0.002	0.004-0.012	0.023 - 0.050	20 - 80	50	100 - 300
	URB Series High-Speed Belt-Driven Rotation Stage see page 106	0.02	0.094	0.2	720	50	100
	FCR100 Intelligent Stepper Motor Rotary Stage see page 108	0.00025	0.012	0.04	20	50	300
	SR50 and PR50 Series Compact Rotation Stages see page 110	0.004 - 0.02	0.05 - 0.15	0.06 - 0.10	4, 20	100	10, 30
	BG Series Goniometric Cradles see page 112	0.0002 - 0.002	0.003 - 0.024	0.05 - 0.07	2 - 20	200	20 - 500
	CONEX-NSR1 Controller and Accessories see page 162	1	3	NA	120	600	NA
	Agilis™ Series Piezo Motor Driven Rotation Stages see page 115	0.0003	NA	NA	-2	100	2
	Picomotor Motorized Rotation Stages see page 117	0.2	NA	NA	6 - 12	NA	NA

RGV-S

High-Speed Precision Rotation Stage



scan QR code
to watch video

- Direct drive for outstanding speed of up to 1000 deg/s and high reliability.
- Large diameter, steel ball bearings for stiffness, low runout and high load capacity.
- Precision glass scale encoder for high position repeatability, MIM, and high accuracy.
- High torque DC brushless motor with a maximum torque of 112 Nm.



The RGV series are compact, direct-drive rotation stages that provide ultra-fast rotation with very high MIM and outstanding positioning performance. Features include: a direct drive motor which ensures operational reliability due to no wear, high precision glass scales for position repeatability and large diameter bearings for stiffness and low runout. The RGV can be used in positioning or as a spindle. Applications include semiconductor wafer inspection, micro-robotics, precision metrology and motion simulators, specifically for MEMS, gyros and accelerometer testing. The RGV is compatible with the XPS controller with driver options depending on speed and torque requirements.

General Specifications

	RGV100BL-S	RGV100HL-S	RGV160BL-S
Travel Range (°)	360 continuous		
Max. Speed (no load) (°/s)	720		1000
Minimum Incremental Motion (mdeg)	0.10		0.04
Centered Load Capacity (N)	100		2700
Bi-directional Repeatability, Typical ⁽¹⁾ (mdeg)	±0.15		
Uni-directional Repeatability, Typical (Guaranteed) ⁽¹⁾ (mdeg)	±0.08 (±0.15)	±0.10 (±0.15)	±0.05 (±0.15)
Accuracy, Typical (Guaranteed) ⁽¹⁾ (mdeg)	±3.0 (±5.0)		na (±7.5)
Wobble, Typical (Guaranteed) ⁽¹⁾ (μrad)	±5.0 (±10)	±7.0 (±20)	±5.0 (±10)
Eccentricity, Typical (Guaranteed) ⁽¹⁾ (μm)	±1.0 (±1.5)		±0.8 (±2.0)
Inertia (no load) (kg.m ²)	0.00104	0.00123	0.02411
Weight (kg)	2.6	3.6	17.5
MTBF	20,000 with 5 kg load, 720 °/s speed and a duty cycle of 30%		20,000 with 90 kg load, 1,000 °/s speed and a duty cycle of 30%
CE	Compliant		
Aperture Diameter (mm)	30		110

(1) For difference between typical and guaranteed specifications see Motion Control Metrology Primer at www.newport.com

NOTE

The following specifications are controller/drive dependent. Refer the RGVxxx-S page on www.newport.com for specifications achievable with specific Newport controller/drive combination.

- MIM
- Accuracy
- Repeatability
- Max Speed
- Max Acceleration

Ordering Information

Model	Description
RGV100BL-S	High Speed, High Precision Rotation Stage, 360°, Brushless Direct Drive, Ultra-Compact
RGV100HL-S	High Torque, High Precision Rotation Stage, 360°, Brushless Direct Drive, Ultra-Compact
RGV160BL-S	High Load, High Speed Rotation Stage, 360°, Brushless Direct Drive, Compact

Recommended Motion Controller:

XPS-RL see page153

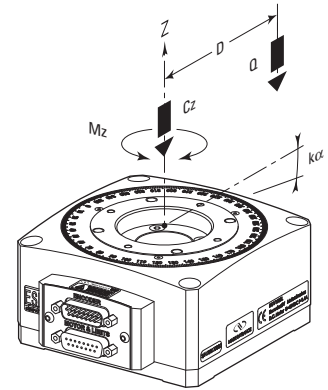
XPS-D see page 148

Driver cards and cable kits to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

Load Characteristics and Stiffness

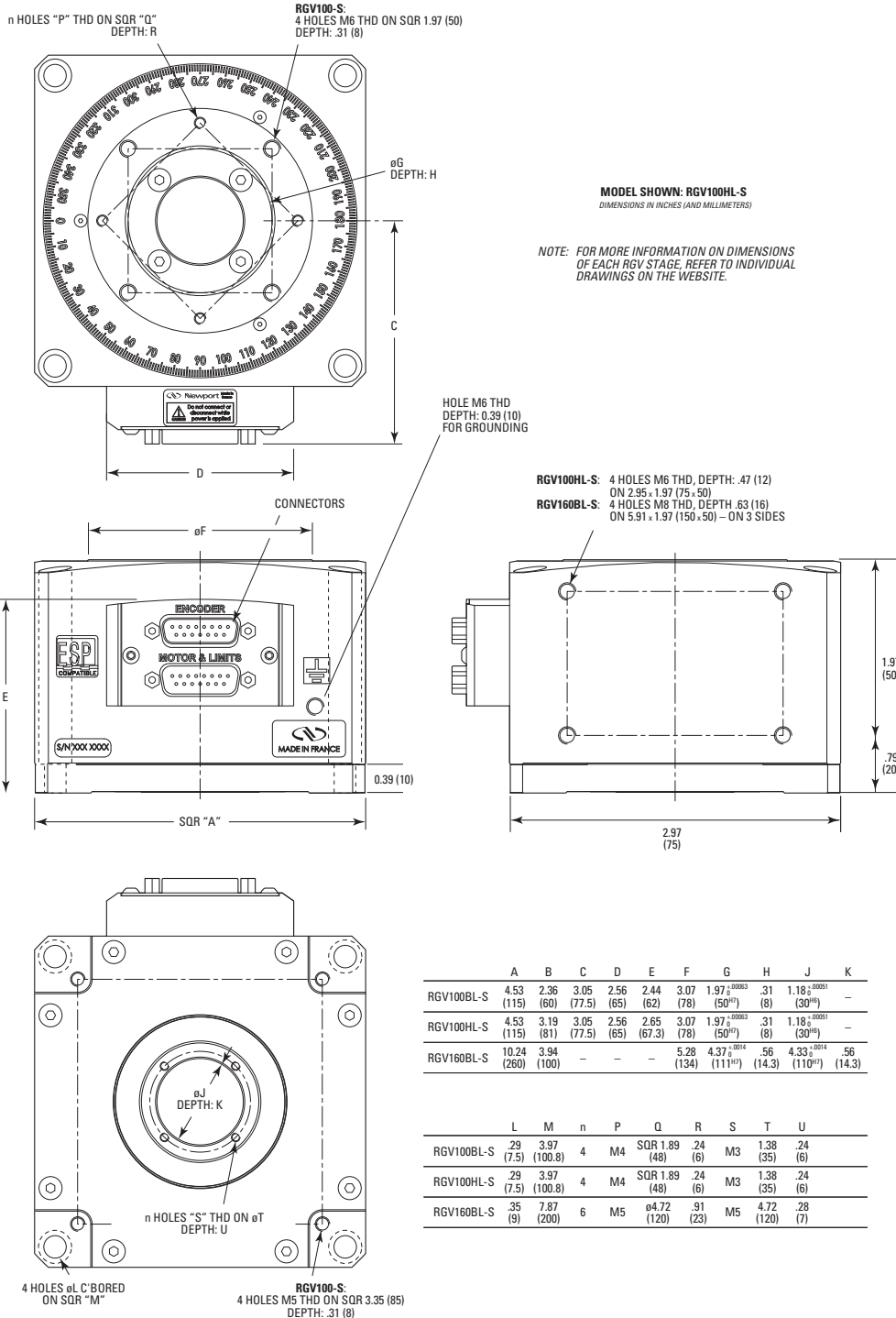
	RGV100BLS	RGV100HLS	RGV160BLS
Cz, Normal centered load capacity	100 N	100 N	2700 N
Kα, Transversal compliance	15 μrad/Nm	15 μrad/Nm	1 μrad/Nm
Mz, Maximum torque	0.42 Nm @ 0°/s	-	-
Jz, Maximum Inertia	0.032 kgm ²	0.032 kgm ²	-
Q, Off-center load	$Q \leq Cz/(1+D/35)$		$Q \leq Cz/(1+D/50)$
	and $Q \leq (Jz-Jq)/D^2$		

Where: D = Cantilever distance in mm; Jq = Inertia of payload



(RGV100BLS shown)

Dimensions

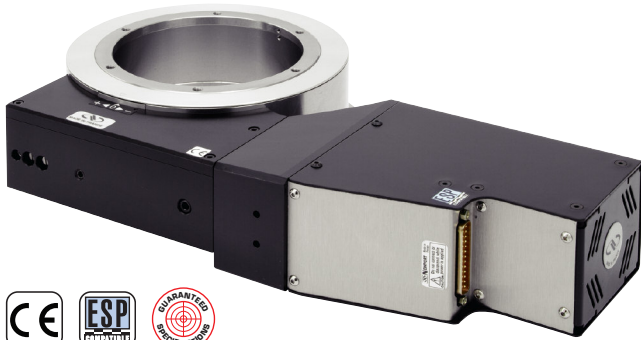


High speed motion simulator with RGV series rotation stages

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SPECIAL COLLECTIONS

RV Series

High-Performance Precision Rotation Stages



- Ideal for high load applications with up to 6500 N load and torque capacity of 80 Nm
- All steel construction offers high stiffness and thermal stability
- Over 50 different versions with varying performance characteristics, diameters, and vacuum compatibility
- Double row ball bearings -Ground worm gear with self compensating preload
- Largest aperture ranging from 78 to 280 mm

The RV Series rotation stages provide high-precision angular positioning accuracy combined with high load capacity. There are five stage sizes and six drive configurations available, optimizing load capacity, torque, speed and resolution for a variety of operating conditions. All RV stages are constructed of tool steel, with rotation accuracy ensured by ground bearing surfaces. A double row of preloaded bearings allows for high off-center loads in a reduced footprint, and the single monolithic design improves stiffness without compromising dynamic performance. The larger models, RV120BPP to RV350BPP, feature a worm mounted rotary encoder for improved accuracy and repeatability and the full-step BPE version is equipped with a reduction gear providing higher torque. The DC motor-driven CCHL and HAHLT versions are equipped with a reduction gear providing higher torque and payload inertia capacity. The HAT and the HAHLT feature a high-resolution direct reading encoder and tachometer for superior repeatability, position stability and speed regulation.

Specifications

	RV120CC	RV120CCHL	RV120HAHLT	RV120HAT	RV120BPE	RV120BPEBV6	RV120BPP	RV160CC	RV160CCHL	RV160HAHLT	RV160HAT	RV160BPE	
Angular Range	360°			±170°			360°			±170°			360°
Maximum Speed	80°/s	16°/s	80°/s	2°/s	1°/s	20°/s	80°/s	16°/s	80°/s	2°/s	80°/s	2°/s	
Maximum Torque	10 N·m	15 N·m	10 N·m	20 N·m	10 N·m	15 N·m	11 N·m	20 N·m	11 N·m	11 N·m	35 N·m	35 N·m	
Centered Load Capacity	1800 N					900 N	1800 N	2700 N					
Minimum Incremental Motion	1.0 mdeg	0.20 mdeg	0.75 mdeg	1.0 mdeg			0.20 mdeg	0.75 mdeg	1.0 mdeg	0.20 mdeg	0.75 mdeg	1.0 mdeg	
Uni-directional Repeatability, Typical	±0.35 mdeg	±0.09 mdeg		±0.35 mdeg			±0.08 mdeg		±0.35 mdeg				
Uni-directional Repeatability, Guaranteed	±1.0 mdeg	±0.10 mdeg		±1.0 mdeg			±0.10 mdeg		±1.0 mdeg				
Bi-directional Repeatability, Typical	±0.7 mdeg	±0.4 mdeg		±0.7 mdeg			±0.45 mdeg		±0.7 mdeg				
Bi-directional Repeatability, Guaranteed	±2.0 mdeg	±0.6 mdeg		±2.0 mdeg			±0.6 mdeg		±2.0 mdeg				
Accuracy, Typical	±4.0 mdeg	±2.0 mdeg		±4.0 mdeg			±2.0 mdeg		±4.0 mdeg				
Accuracy, Guaranteed	±7.5 mdeg	±2.5 mdeg		±7.5 mdeg			±5.0 mdeg		±2.5 mdeg				
Wobble, Typical	±5.0 µrad												
Wobble, Guaranteed	±10 µrad												
Eccentricity, Typical	±0.6 µm						±0.8 µm						
Eccentricity, Guaranteed	±2.0 µm												
Inertia	0.2 kg.m ²	7 kg.m ²	0.2 kg.m ²	70 kg.m ²	1 kg.m ²	0.7 kg.m ²	24 kg.m ²	0.7 kg.m ²	100 kg.m ²	0.7 kg.m ²	100 kg.m ²	100 kg.m ²	
Transversal Compliance	1.5 µrad/N·m						0.6 µrad/N·m						
Origin Repeatability	±0.5 mdeg	±0.1 mdeg		±0.5 mdeg			±0.1 mdeg		±0.5 mdeg				
Encoder Resolution	0.001°	0.1 mdeg		0.001°			0.075 mdeg		0.001°				
Cable Length	3 m												
Diameter	120 mm						160 mm						
Aperture Diameter	78 mm						110 mm						
Vacuum Compatibility	NA	NA	NA	NA	NA	10 ⁻⁶ hPa	NA	NA	NA	NA	NA	NA	
Weight	6.5 kg		8 kg		6.5 kg		9 kg		11 kg		9 kg		
MTBF	20,000 h (25% load, 10% duty cycle)												
CE	Compliant												

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Load Characteristics

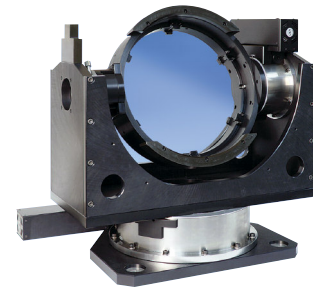
	RVS80	RV120	RV160	RV240	RV350
Cz, Normal centered load capacity (N)	900	1800	2700	4000	6500
a, construction parameter (mm)	30	40	50	70	100
b*, (mm) except HAT & HAHLT	39	53	57	59	73
b*, (mm) for HAT & HAHLT		71	75	77	91
k, radial compliance (μrad/Nm)	3.5	1.5	0.6	0.3	0.1
Q _H , Off-center load, vertical rotation axis	$Q_H \leq Cz / (1+D/a)$				
Q _V , Off-center load, horizontal rotation axis	$Q_V \leq Cz \cdot 2 / (1+D/a)$				

* Construction parameter = Distance between the top surface of the RV stage and the bearing center.

Example:

Q_V at a distance of 80 mm from the top surface for a RV160HAT rotation stage,
 D = 80 mm + 75 mm = 155 mm:

$$Q_V = 2700 \text{ N} / 2 / (1 + 155 \text{ mm} / 50 \text{ mm}) = 329 \text{ N}$$



This Azimuth/Elevation gimbal system positions a 350 mm dia. mirror that can be used for laser based qualification and characterization of precision optical sensors, LIDAR analysis, or target tracking.

RV160BPEV6			RV160BPP			RV240CC			RV240CCHL			RV240HAHLT			RV240HAT			RV120BPE			RV240BPEV6			RV240BPP			RV350CC			RV350HAHLT			RV350HAT			RV350BPE			RV350BPEV6			RV350BPP			RVS80CC			RVS80BPP		
360°						±170°						360°						±170°						360°																										
1°/s			20°/s			80°/s			16°/s			80°/s			2°/s			1°/s			20°/s			80°/s			16°/s			80°/s			2°/s			1°/s			20°/s			40°/s			20°/s					
17 N·m			20 N·m			13 N·m			30 N·m			60 N·m			30 N·m			22 N·m			14 N·m			30 N·m			14 N·m			80 N·m			40 N·m			25 N·m			2 N·m			2 N·m								
1350 N			2700 N			4000 N						2000 N			4000 N			6500 N						3250 N			6500 N			900 N																				
1.0 mdeg						0.20 mdeg			0.75 mdeg			1.0 mdeg						0.20 mdeg			0.75 mdeg			1.0 mdeg						0.20 mdeg																				
±0.35 mdeg						±0.07 mdeg						±0.35 mdeg						±0.07 mdeg						±0.35 mdeg			±0.36 mdeg			±0.50 mdeg																				
±1.0 mdeg						±0.10 mdeg						±1.0 mdeg						±0.10 mdeg						±1.0 mdeg			±0.50 mdeg			±1.0 mdeg																				
±0.7 mdeg			±0.6 mdeg			±0.4 mdeg			±0.4 mdeg			±0.6 mdeg			±0.6 mdeg			±0.4 mdeg			±0.6 mdeg			±0.6 mdeg			±0.6 mdeg			±1.2 mdeg			±2.8 mdeg																	
±2.0 mdeg						±0.6 mdeg						±2.0 mdeg						±0.6 mdeg						±2.0 mdeg			±2.0 mdeg			±1.5 mdeg			±3.5 mdeg																	
±4.0 mdeg			±3.5 mdeg			±2.0 mdeg			±2.0 mdeg			±3.5 mdeg			±3.5 mdeg			±2.0 mdeg			±3.5 mdeg			±3.5 mdeg			±7.0 mdeg																							
±5.0 mdeg						±2.5 mdeg						±5.0 mdeg						±2.5 mdeg						±5.0 mdeg			±5.0 mdeg			±10 mdeg																				
±5.0 μrad						±4.0 μrad						±4.0 μrad						±8.0 μrad			±8.0 μrad			±20 μrad																										
±10 μrad						±8.0 μrad						±8.0 μrad						±1.4 μm			±0.5 μm																													
±0.8 μm						±2.0 μm						±1.4 μm						±0.5 μm																																
100 kg.m ²			3 kg.m ²			1.5 kg.m ²			38 kg.m ²			1.1 kg.m ²			150 kg.m ²			4 kg.m ²			1.8 kg.m ²			10 kg.m ²			1.2 kg.m ²			220 kg.m ²			4 kg.m ²			0.1 kg.m ²			0.5 kg.m ²											
0.6 μrad/N·m			0.3 μrad/N·m						0.1 μrad/N·m						3.5 μrad/N·m																																			
±0.5 mdeg						±0.1 mdeg						±0.5 mdeg						±0.1 mdeg			±0.5 mdeg			±0.25 mdeg			±10 mdeg																							
0.001°						0.05 mdeg						0.001°						0.035 mdeg			0.001°			0.25 mdeg			0.1 mdeg																							
3 m																																																		
160 mm			240 mm						350 mm						80 mm																																			
110 mm			175 mm						280 mm						50 mm																																			
10 ⁻⁶ hPa			NA			NA			NA			10 ⁻⁶ hPa			NA			NA			NA			10 ⁻⁶ hPa			NA			NA			NA																	
9 kg			16 kg			19 kg			16 kg			27 kg			33 kg			27 kg			1.8 kg																													
20,000 h (25% load, 10% duty cycle)																																																		
Compliant																																																		

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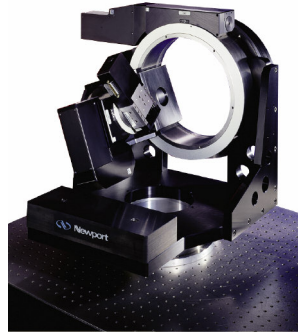
MOTORIZED
LINEAR STAGES

MOTORIZED
VERTICAL STAGES

MOTORIZED
ROTATION STAGES



SM300 mirror mount for a high power laser application, built with custom, high sensitivity and high angular stiffness RVU rotary stages



Antenna and sensor positioner for guidance and field communication systems

Ordering Information

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LINEAR ACTUATORS

HEXAPODS

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AND DRIVERS

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OPTICAL MOUNTS

BEAM
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Series	Diam. (mm)	Drive	Folded Motor	Vacuum Prep. ⁽²⁾
RV	S80 ⁽¹⁾	CC	-F	V6
	120	CCHL		
	160	HAHLT		
	240	HAT		
	350	BPE		
		BPP		

*Example:
The RV240HAHLT-F is a Ø 240 mm RV rotation stage with a DC motor, a reduction gear, an integral optical encoder and with a folded motor.*

- ¹⁾ RVS80 is only available as RVS80CC and RVS80BPP.
- ²⁾ Vacuum compatible to 10⁻⁶ hPa. In this case max. speed and load capacity have to be divided by two.

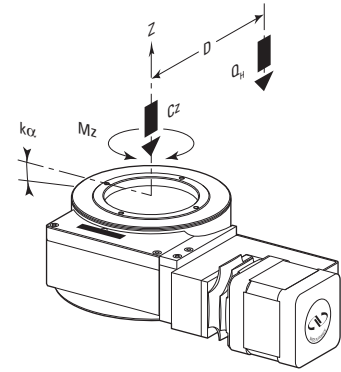
- CC: DC motor
- CCHL: DC motor with reduction gear
- HAHLT: DC motor with reduction gear and integral optical encoder
- HAT: DC motor with integral optical encoder
- BPE: Full-step motor
- BPP: Mini-step motor

Recommended Motion Controllers

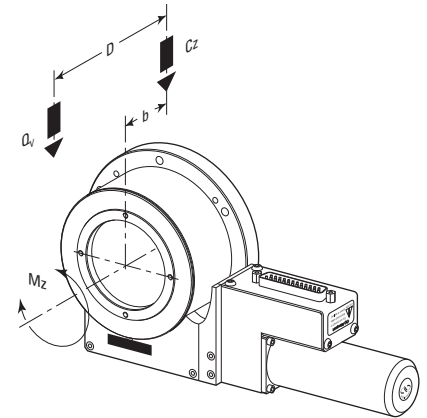
XPS-D see page 148	All models
XPS-RL see page 153	All models
ESP301 see page 157	Except HAT, HAHLT, CC and CCHL
SMC100CC see page 159	RVS80CC only
SMC100PP see page 159	RVS80BPP only

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

Load Rotation Axes



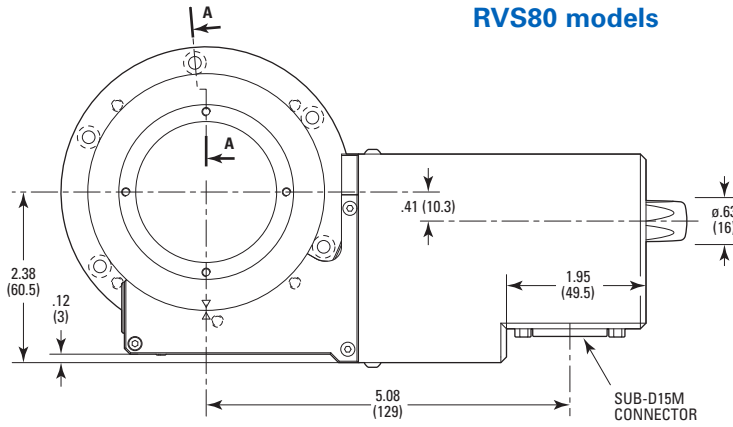
Vertical Axis



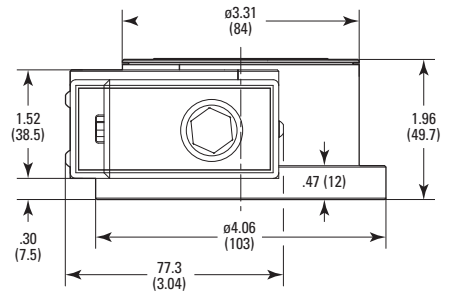
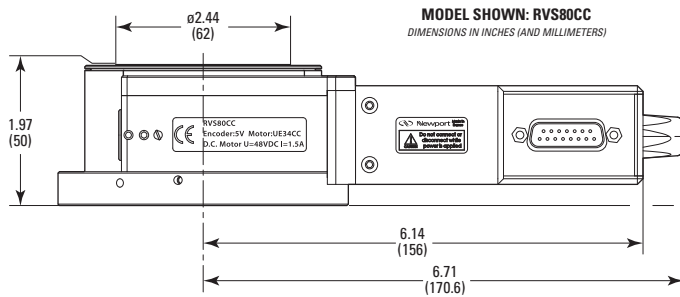
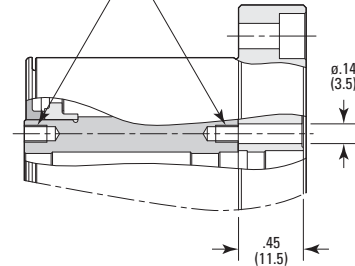
Horizontal Axis

Dimensions

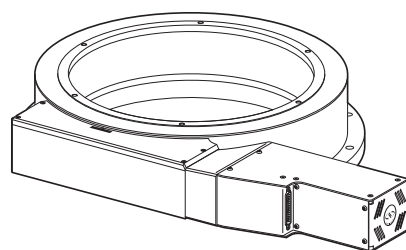
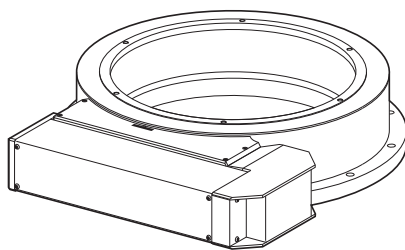
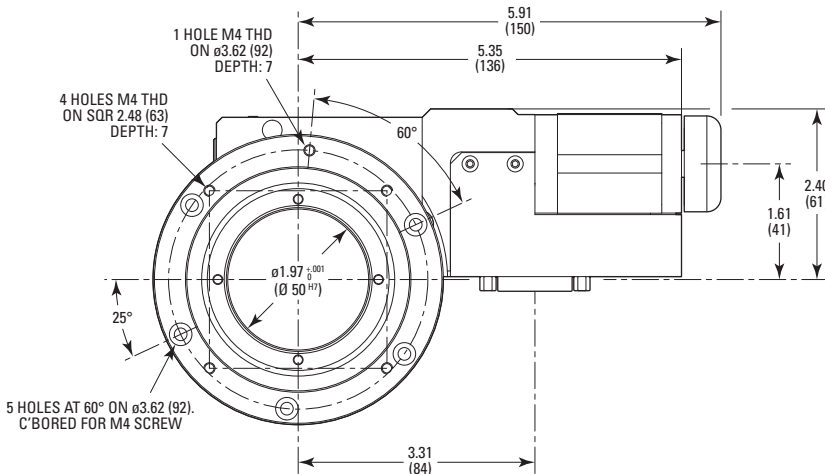
RVS80 models



A - A
 2 x 4 HOLES M3 THD ON ø2.24 (Ø 57),
 DEPTH: .16 (4)
 TOP AND BOTTOM HOLES ARE ALIGNED



BOTTOM VIEW OF THE RVS80PP



ROTATION STAGE, FOLDED MOTOR

MODEL	L ₁	M ₁	L ₂	M ₂
RV120	6.12 (155.5)	2.15 (54.5)		
RV160	6.61 (168)	2.48 (63)	6.32 (160.5)	4.35 (110.5)
RV240	7.60 (193)	3.25 (82.5)		
RV350	8.62 (219)	4.49 (114)		

ROTATION STAGE, DIRECT MOTOR

MODEL	L ₁				M ₁	L ₂	M ₂
	BPP	BPE	CC	CCHL			
RV120	9.90 (251.5)	9.90 (251.5)	9.90 (251.5)	11.87 (301.5)	1.79 (45.5)		
RV160	10.39 (264)	12.36 (314)	10.39 (264)	12.36 (314)	2.13 (54)	4.61 (117)	1.32 (33.5)
RV240	11.38 (289)	13.35 (339)	11.38 (289)	13.35 (339)	2.89 (73.5)		
RV350	12.40 (315)	14.37 (365)	12.40 (315)	14.37 (365)	4.13 (105)		

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MOTORIZED
LINEAR STAGES

MOTORIZED
VERTICAL STAGES

MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

HEXAPODS

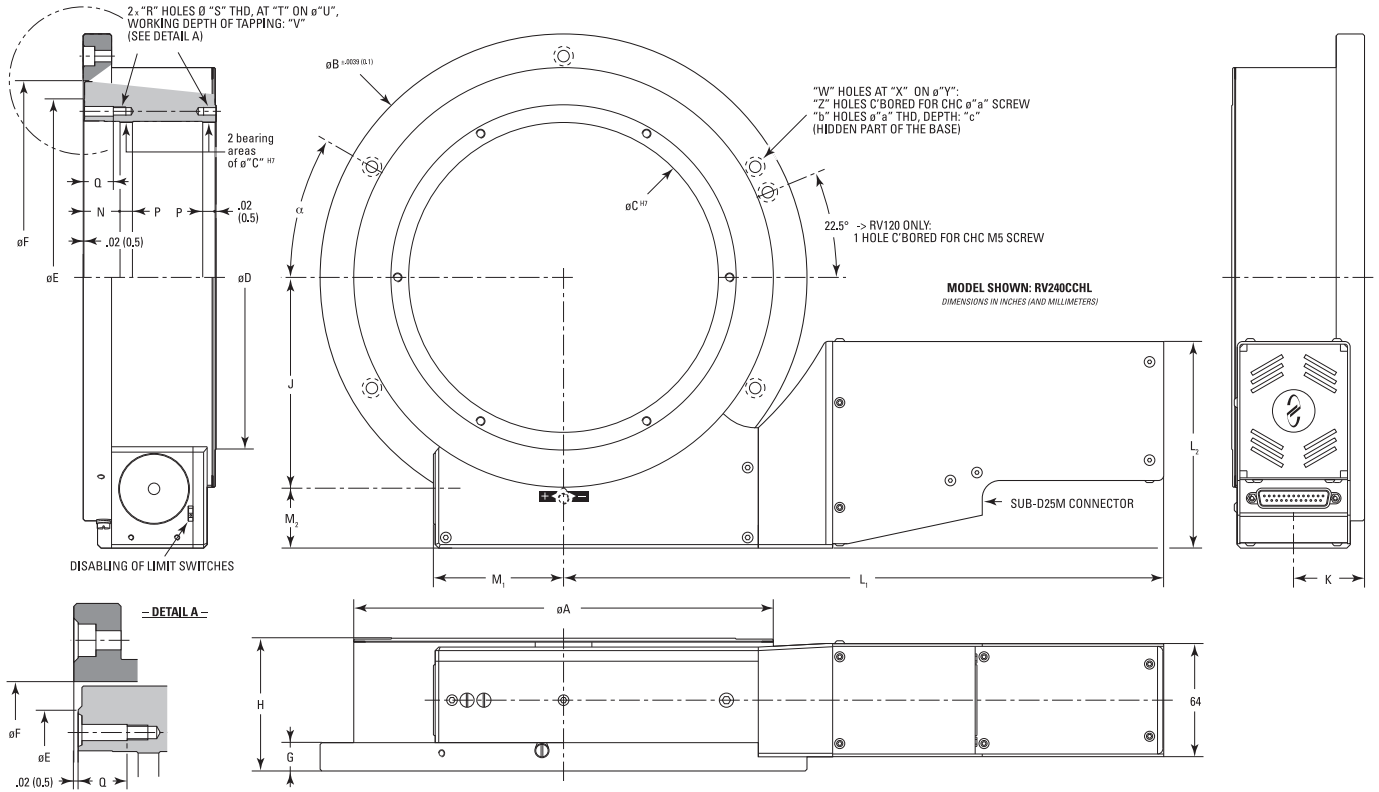
CONTROLLERS
AND DRIVERS

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OPTICAL MOUNTS

BEAM
MANAGEMENT

SPECIAL
COLLECTIONS

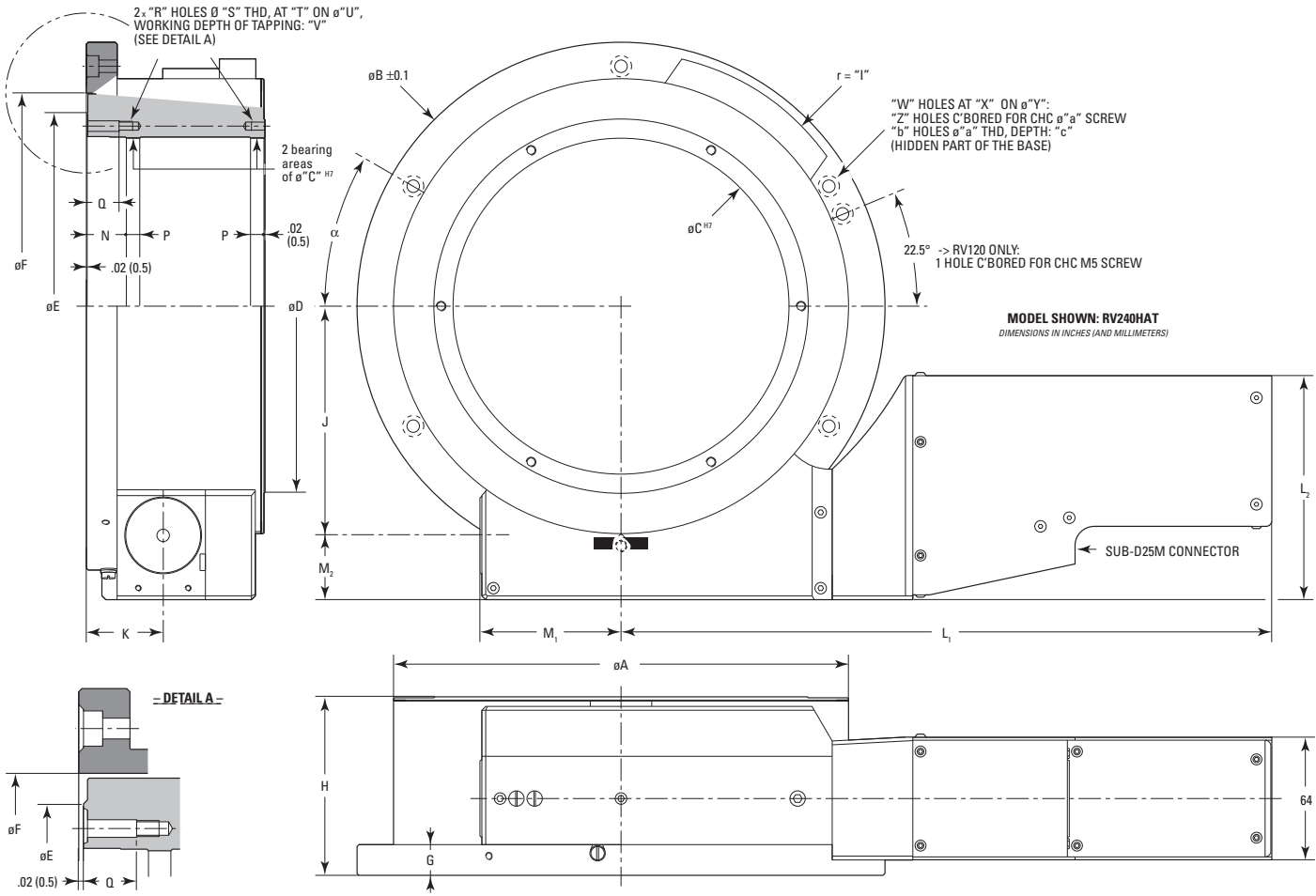
RV120 to RV350 Models



MODEL	A	B	C	D	E	F	G	H	J	K	N	P	Q
RV120	4.96 (126)	6.10 (155)	3.07 (78)	3.66 (93)	3.90 (99)	4.55 (115.5)	.55 (14)	2.68 (68)	2.48 (63)	1.34 (34)	.75 (19)	.16 (4)	.59 (15)
RV160	6.42 (163)	7.56 (192)	4.33 (110)	5.08 (129)	5.28 (134)	5.98 (152)	.55 (14)	2.80 (71)	3.21 (81.5)	1.42 (36)	.73 (18.5)	.20 (5)	.57 (14.5)
RV240	9.33 (237)	10.83 (275)	6.89 (175)	7.64 (194)	8.03 (204)	8.74 (222)	.63 (16)	2.95 (75)	4.70 (119.5)	1.58 (40)	.80 (20.3)	.28 (7)	.65 (16.6)
RV350	14.02 (356)	15.55 (395)	11.02 (280)	11.89 (302)	12.40 (315)	13.05 (331.5)	.69 (17.5)	3.54 (90)	7.05 (179)	1.97 (50)	.84 (21.3)	.31 (8)	.68 (17.3)

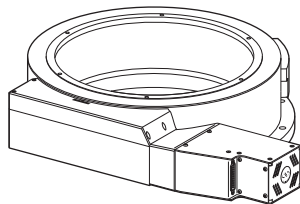
MODEL	R	S	T	U	V	W	X	Y	Z	a	b	c	α
RV120	4	M4	90°	3.44 (87.5)	.24 (6)	6	60°	5.39 (137)	5	M5	1	7	17.5°
RV160	6	M5	60°	4.72 (120)	.28 (7)	6	60°	6.85 (174)	5	M5	1	7	25°
RV240	6	M5	60°	7.38 (187.5)	.28 (7)	6	60°	9.84 (250)	5	M6	1	10	30°
RV350	6	M6	60°	11.61 (295)	.28 (7)	12	30°	14.65 (372)	10	M8	2	12	10°

RVHAT & RVHAHLT Models



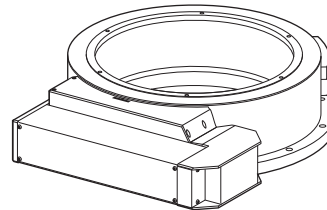
MODEL	A	B	C	D	E	F	G	H	I	J	K	N	P	Q
RV120	4.96 (126)	6.10 (155)	3.07 (78)	3.66 (93)	3.90 (99)	4.55 (115.5)	.55 (14)	3.39 (86)	3.15 (80)	2.48 (63)	1.34 (34)	.75 (19)	.16 (4)	.59 (15)
RV160	6.42 (163)	7.56 (192)	4.33 (110)	5.08 (129)	5.28 (134)	5.98 (152)	.55 (14)	3.50 (89)	3.86 (98)	3.21 (81.5)	1.42 (36)	.73 (18.5)	.20 (5)	.57 (14.5)
RV240	9.33 (237)	10.83 (275)	6.89 (175)	7.64 (194)	8.03 (204)	8.74 (222)	.63 (16)	3.66 (93)	5.22 (132.5)	4.70 (119.5)	1.58 (40)	.80 (20.3)	.28 (7)	.65 (16.6)
RV350	14.02 (356)	15.55 (395)	11.02 (280)	11.89 (302)	12.40 (315)	13.05 (331.5)	.69 (17.5)	4.25 (108)	7.44 (189)	7.05 (179)	1.97 (50)	.84 (21.3)	.31 (8)	.68 (17.3)

MODEL	R	S	T	U	V	W	X	Y	Z	a	b	c	α
RV120	4	M4	90°	3.44 (87.5)	.24 (6)	6	60°	5.39 (137)	5	M5	1	7	17.5°
RV160	6	M5	60°	4.72 (120)	.28 (7)	6	60°	6.85 (174)	5	M5	1	7	25°
RV240	6	M5	60°	7.38 (187.5)	.28 (7)	6	60°	9.84 (250)	5	M6	1	10	30°
RV350	6	M6	60°	11.61 (295)	.28 (7)	12	30°	14.65 (372)	10	M8	2	12	10°



ROTATION STAGE, DIRECT MOTOR

MODEL	L ₁		M ₁	L ₂	M ₂
	HAT	HAHLT			
RV120	11.87 (301.5)	11.87 (301.5)	1.79 (45.5)		
RV160	12.36 (314)	14.06 (357)	2.13 (54)	4.61 (117)	1.32 (33.5)
RV240	13.35 (339)	15.04 (382)	2.89 (73.5)		
RV350	14.37 (365)	16.06 (408)	4.13 (105)		



ROTATION STAGE, FOLDED MOTOR

MODEL	L ₁	M ₁		L ₂	M ₂
		HAT-F	HAHLT-F		
RV120	6.12 (155.5)	2.15 (54.5)	3.13 (79.5)		
RV160	6.61 (168)	2.48 (63)	4.23 (107.5)	6.32 (160.5)	4.35 (110.5)
RV240	7.60 (193)	3.25 (82.5)	3.25 (82.5)		
RV350	8.62 (219)	4.49 (114)	4.49 (114)		

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

MOTORIZED
LINEAR STAGES

MOTORIZED
VERTICAL STAGES

MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

HEXAPODS

CONTROLLERS
AND DRIVERS

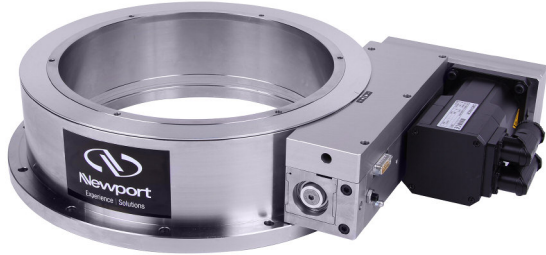
MOTORIZED
OPTICAL MOUNTS

BEAM
MANAGEMENT

SPECIAL
COLLECTIONS

RVU Series

RVU Series – High Angular Stiffness Rotation Series



- 100:1 harmonic drive box provides high torque & good sensitivity
- Vacuum compatible versions for use in ISO 7 clean environment
- All steel construction offers high stiffness and thermal stability

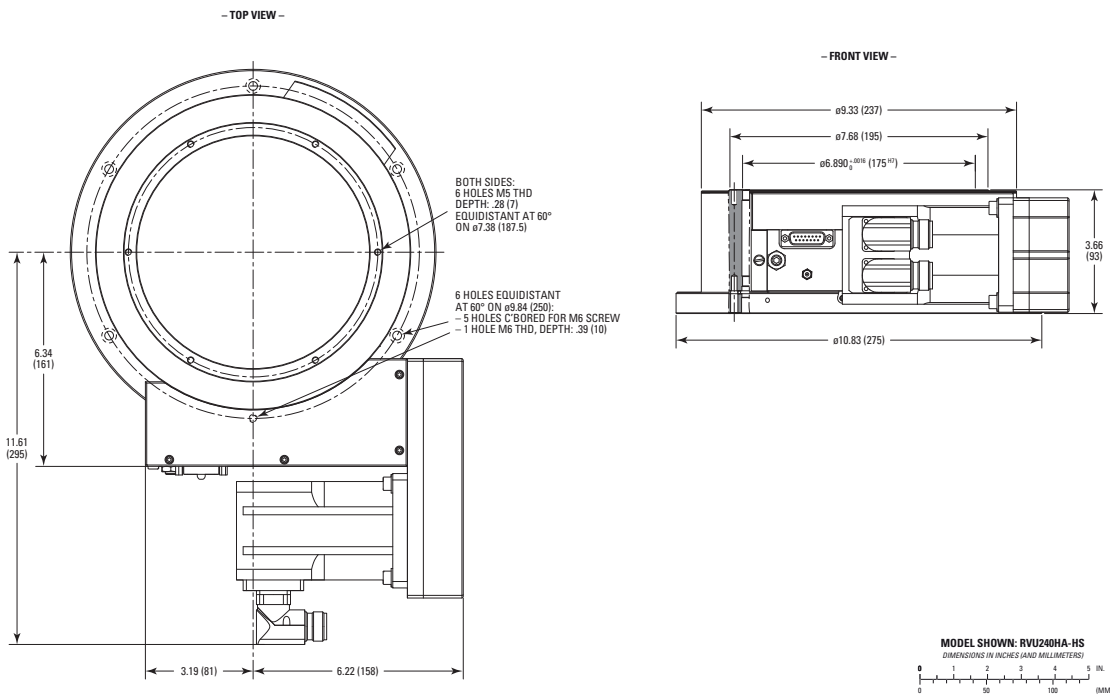
The RVU rotation stages are designed to meet the specifications of large mirror mounts which require high torque, rigidity, and sensitivity.

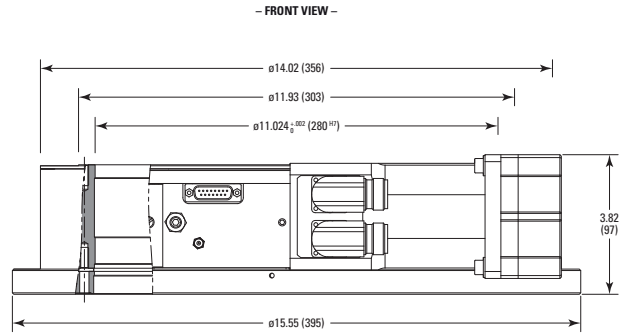
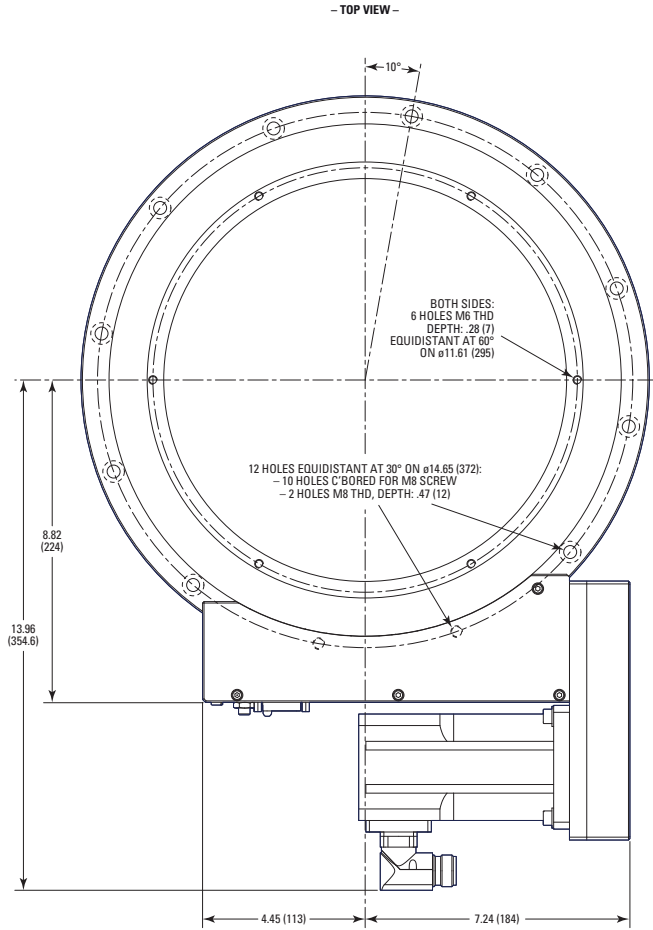
Specifications

	RVU240HAHS	RVU240HS	RVU350HAHS	RVU350HS
Angular Range	±170°			
Centered Load Capacity	4000 N		6500 N	
Minimum Incremental Motion	0.20 mdeg	1 mdeg	0.20 mdeg	1 mdeg
Maximum Torque	130 N·m		250 N·m	
Inertia	100 kgm ²		200 kgm ²	
Origin Repeatability	±0.1 mdeg	±0.5 mdeg	±0.1 mdeg	±0.5 mdeg

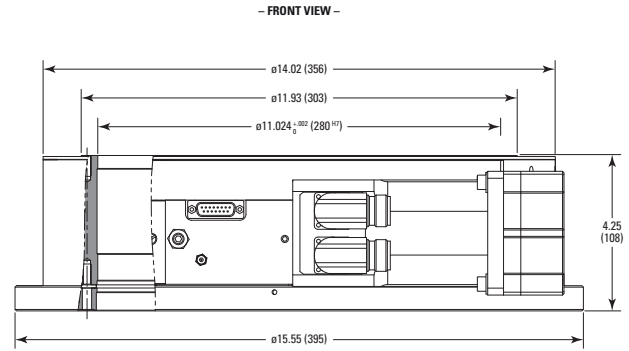
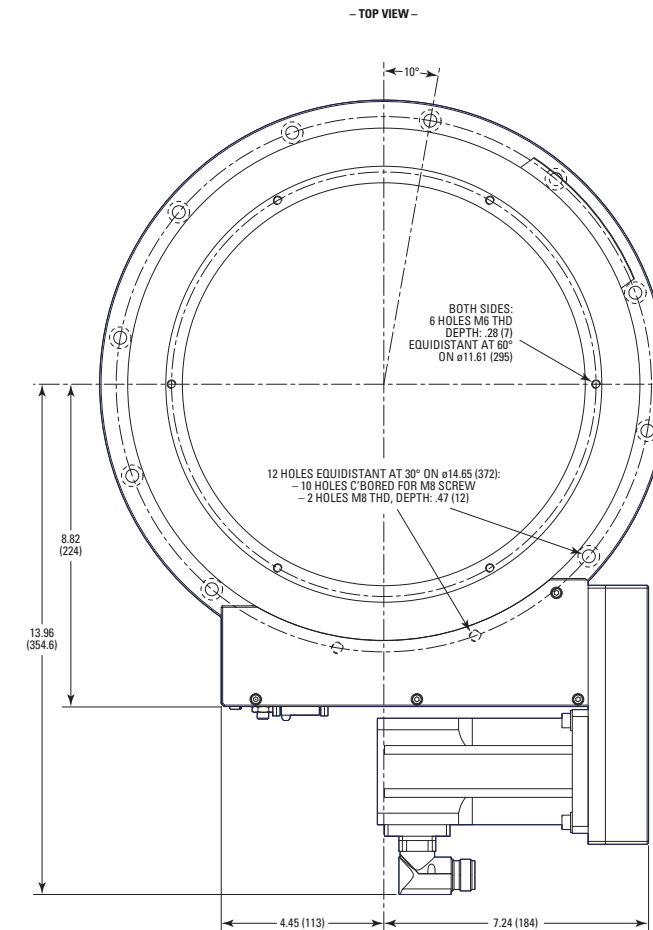
Ordering Information

Model	Description
RVU350HS	Rotation Stage, 350 mm, High Sensitivity, High Speed
RVU240HS	Rotation Stage, 240 mm, High Sensitivity, High Speed
RVU240HAHS	Rotation Stage, 240 mm, High Sensitivity, High Torque
RVU350HAHS	Rotation Stage, 350 mm, High Sensitivity, High Torque





MODEL SHOWN: RVU350-HS
DIMENSIONS IN INCHES (AND MILLIMETERS)



MODEL SHOWN: RVU350HA-HS
DIMENSIONS IN INCHES (AND MILLIMETERS)

MOTORIZED
LINEAR STAGES

MOTORIZED
VERTICAL STAGES

MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

HEXAPODS

CONTROLLERS
AND DRIVERS

MOTORIZED
OPTICAL MOUNTS

BEAM
MANAGEMENT

SPECIAL
COLLECTIONS

URS Series

Precision Rotation Stages



scan QR code
to watch video



- Economical, general purpose
- Flexible preloading system guarantees backlash-free operation
- Tilted worm screw arrangement and 4 symmetric mounting holes provide better support for cantilevered loads with a smaller footprint
- Vacuum compatible version available

URS Series provide precision 360° continuous motion in a low profile package. URS Series stages feature: a proprietary ball bearing with exceptional stiffness, high reliability, minimal wobble and eccentricity; a tilted worm screw arrangement to allow 4 symmetric mounting holes, providing better support for cantilevered loads; adjustable limit switches to prevent over-travel (except for URS50B); and a flexible preloading system to guarantee backlash-free operation with an MTBF of 20,000 hours. The DC motor version features an ultra-high resolution encoder, 8,000 cts/rev, mounted on the worm screw, ensuring excellent bi-directional repeatability and high accuracy motion. The DC motor versions provides the highest dynamic speed range and allows rotation speeds up to 80 °/s. The stepper motor version is an economical solution for less demanding applications and with its high output torque, minimizes any risk of lost steps, providing good linearity between the stage's motion and commanded steps. The URS is also available in vacuum compatible versions down to 10e-6hPa. Additionally the CONEX-URS50BCC is the URS50BCC rotational stage with the integrated CONEX-CC controller/driver and is pre-configured for the highest level of out-of-the-box control. The CONEX-CC is a very compact and inexpensive driver for Newport's low power DC servo motor driven devices.

Specifications

	URS100BCC	URS150BCC	URS50BCC	URS75BCC	URS100BPP	URS150BPP	URS50BPP	URS75BPP
Angular Range	360°							
Maximum Speed	80°/s		20°/s	80°/s	40°/s			
Maximum Torque	1 N·m	2 N·m	0.25 N·m	0.5 N·m	1 N·m	2 N·m	0.25 N·m	0.5 N·m
Centered Load Capacity	300 N		100 N	200 N	300 N		100 N	200 N
Thread Type	M6		M3		M6		M3	
Minimum Incremental Motion	2.0 mdeg		1.0 mdeg	2.0 mdeg	0.20 mdeg		0.50 mdeg	0.20 mdeg
Uni-directional Repeatability, Typical	±0.35 mdeg	±0.35 mdeg	±0.30 mdeg	±0.35mdeg	±0.35mdeg		±0.60mdeg	±0.35mdeg
Bi-directional Repeatability, Typical	±1.4 mdeg	±1.1 mdeg	N/A	±0.30mdeg	±0.35mdeg		±0.60mdeg	±0.35mdeg
Uni-directional Repeatability, Guaranteed	±1.0 mdeg							
Bi-directional Repeatability, Guaranteed	±3.0 mdeg		N/A	±3.0 mdeg	±6.0 mdeg		±3.0 mdeg	±6.0 mdeg
Accuracy, Typical	±6.0 mdeg		±10 mdeg	±6 mdeg	±8.0 mdeg		±12 mdeg	±8 mdeg
Accuracy, Guaranteed	±11.5 mdeg		±20 mdeg	±11.5 mdeg	±15 mdeg		±25 mdeg	±15 mdeg
Wobble, Typical	±12 μrad							
Wobble, Guaranteed	±25 μrad							
Eccentricity, Typical	±0.40 μm	±0.50 μm	±3.0 μm	±0.30 μm	±0.40 μm	±0.50 μm	±3.0 μm	±0.30 μm
Transversal Compliance	10 μrad/N·m	5 μrad/N·m	100 μrad/N·m	30 μrad/N·m	10 μrad/N·m	5 μrad/N·m	100 μrad/N·m	30 μrad/N·m
Origin Repeatability	±0.25 mdeg		±25 mdeg	±0.25 mdeg	±20 mdeg		±25 mdeg	±20 mdeg
Limit Switches	Two independently adjustable optical limit switches							
Cable Length	3 m							
Aperture Diameter	50 mm	90 mm	25.7 mm	30 mm	50 mm	90 mm	25.7 mm	30 mm
Weight	2 kg	3.4 kg	0.7 kg	1.7 kg	2 kg	3.4 kg	0.7 kg	1.7 kg
MTBF	20,000 h (25% load, 10% duty cycle)							
CE	Compliant							

1. URS50 and URS75 also available in a vacuum compatible version -PPV6.
2. Maximum speed is reduced to 20°/s for URS75BPPV6.
3. Uni-directional repeatability varies for URS50BPPV6.
4. Bi-directional repeatability varies for URS50BPPV6.

Ordering Information

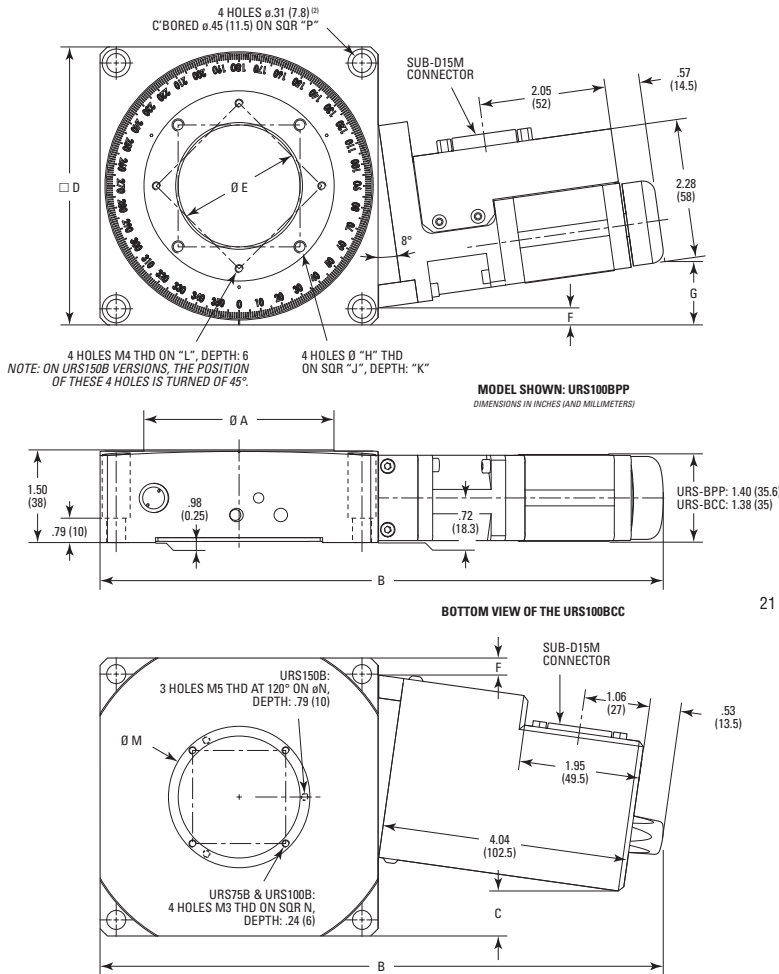
Model (Metric)	Description
URS50BCC	Precision Rotation Stage, DC, Continuous 360° Motion, URS50
URS50BPP	Precision Rotation Stage, Stepper, Continuous 360° Motion, URS50
URS50BPPV6	Vacuum Compatible Precision Rotation Stage, Stepper, URS50
URS75BCC	Precision Rotation Stage, DC, Continuous 360° Motion, URS75
URS75BPP	Precision Rotation Stage, Stepper, Continuous 360° Motion, URS75
URS75BPPV6	Vacuum Rotation Stage, Stepper Motor, URS75
URS100BCC	Precision Rotation Stage, DC, Continuous 360° Motion, URS100
URS100BPP	Precision Rotation Stage, Stepper, Continuous 360° Motion, URS100
URS150BCC	Precision Rotation Stage, DC, Continuous 360° Motion, URS150
URS150BPP	Precision Rotation Stage, Stepper, Continuous 360° Motion, URS150
CONEX-URS50BCC ¹	URS50BCC Rotation Stage Integrated with CONEX Controller
URS75TP (M-URS75TP)	Solid Top Mounting Plate, URS75 Series, M6 Threaded Holes
URS100TP (M-URS100TP)	Solid Top Mounting Plate, URS100 Series, M6 Threaded Holes
URS150TP (M-URS150TP)	Solid Top Mounting Plate, URS150 Series, M6 Threaded Holes
URS75P1	Adapter for B25.4 lens barrel on URS75 stages
URSBK	90° Mounting Bracket URS Series Rotation Stages

¹Order CONEX-PS separately.

Dimensions

Dimensions in inches (millimeters)

MODEL URS100B



	A	B	C	D	E	F	G	H	J	K	L	M	N	P
URS75B	1.97 (50)	8.19 (208)	-.20 ⁽¹⁾ (-5) ⁽¹⁾	3.54 (90)	1.18 ⁽¹⁾ (30) ⁽¹⁾	.08 (2)	.83 (21)	M3	1.26 (32)	.24 (6)	-	1.50 (38)	1.34 (34)	2.98 (75.6)
URS100B	3.07 (78)	9.13 (232)	.71 (18)	4.49 (114)	1.97 ⁽¹⁾ (50) ⁽¹⁾	.26 (6.5)	1.02 (26)	M6	1.97 (50)	.24 (6)	SQR 1.89 (SQR 48)	2.28 (58)	2.13 (54)	3.97 (100.8)
URS150B	5.18 (131.5)	11.14 (283)	2.56 (65)	6.50 (165)	3.54 ⁽¹⁾ (90) ⁽¹⁾	.41 (10.5)	1.14 (29)	M6	2.95 (75)	.31 (8)	ø4.92 (ø 125)	4.13 (105)	3.86 (98)	5.91 AND 6 ⁽²⁾ (150 AND 152.4) ⁽²⁾

NOTES:
¹ THE DRIVE BOX OF THE URS75BCC EXCEEDS .20 IN. (5 MM) FROM THE BODY.
² URS150B: 4 SLOTS COUNTERBORED.

Recommended Motion Controllers

XPS-D see page 148

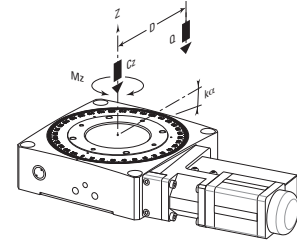
XPS-RL see page 153

ESP301 see page 157

SMC100CC see page 159 CC versions only

SMC100PP see page 159 BPP versions only

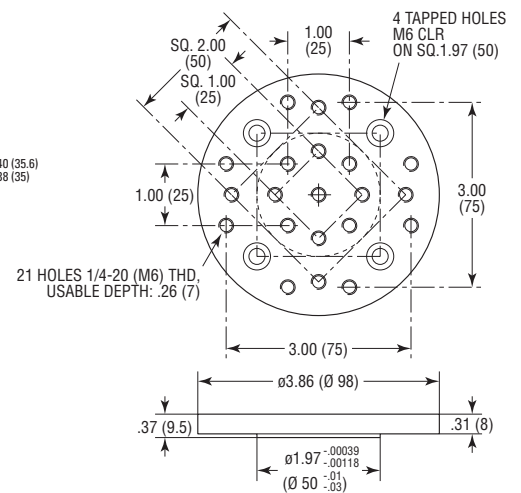
Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.



	URS50	URS75	URS100	URS150
Cz, Normal centered load capacity (N)	100	200	300	300
Kcx, Transversal compliance (µrad/Nm)	100	30	10	5
Mz, Nominal torque (Nm)	±0.25	±0.5	±1.0	±2.0
a, Construction parameter (mm)	20	25	35	55
Q, Off-center load (N)	Q = Cz + (1 + D/a)			

Where D = Cantilever distance (mm)

MODEL (M-)URS100TP



MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

URB100CC

High-Speed Belt-Driven Rotation Stage



- Belt driven version of URS series offers higher rotation speeds without sacrificing life time expectancy
- 720°/s maximum speed
- Most economical for its high speed
- Designed for high speed with small footprint
- Economic motor mounted rotary encoder with 0.01° resolution

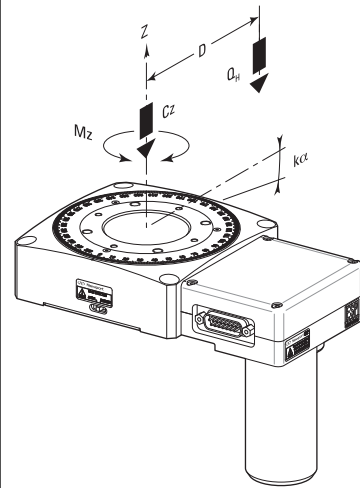


The URB100CC rotation stage is a high-speed, belt driven rotation stage. It is engineered for applications requiring fast moves over larger angles or continuous rotation at very high duty cycles, with high precision requirements. Features include: the belt drive which provides high rotational speeds of up to 720°/s; a proprietary four point contact ball bearing and 2-piece design to provide exceptional stiffness and high reliability while minimizing wobble and eccentricity; an enhanced low-profile package to ensure easy top down mounting. Typical applications for the URB stage are LIDAR, 3D imaging, or film thickness measurements of semiconductor wafers.

Specifications

	URB100CC
Angular Range	360°
Maximum Speed	720°/s
Maximum Torque	0.6 Nm
Maximum Acceleration	1300°/s
Centered Load Capacity	100 N
Minimum Incremental Motion	20 mdeg
Uni-directional Repeatability, Typical	±2.5 mdeg
Uni-directional Repeatability, Guaranteed	±7.5 mdeg
Bi-directional Repeatability, Typical	±15 mdeg
Bi-directional Repeatability, Guaranteed	±47 mdeg
Accuracy, Typical	±50 mdeg
Accuracy, Guaranteed	±100 mdeg
Wobble, Typical	±15 μrad
Wobble, Guaranteed	±25 μrad
Eccentricity, Typical	±0.40 μm
Origin	Optical, centered
Origin Repeatability	±7.5 mdeg
Cable Length	3 m
Aperture Diameter	50 mm
Weight	2 kg
MTBF	20,000 h (25% load, 30% duty cycle)
CE	Compliant

Load Characteristics



Cz, Normal centered load capacity (N)	100
a, Construction parameter (mm)	35
kα, Transversal compliance (μrad/Nm)	10
Mz, Maximum Torque (Nm)	± 0.6
Jz, Maximum Inertia (kg.m ²)	0.025
Q, Off-center load	$Q \leq Cz / (1 + D/a)$
D, Cantilever distance in mm	

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Ordering Information

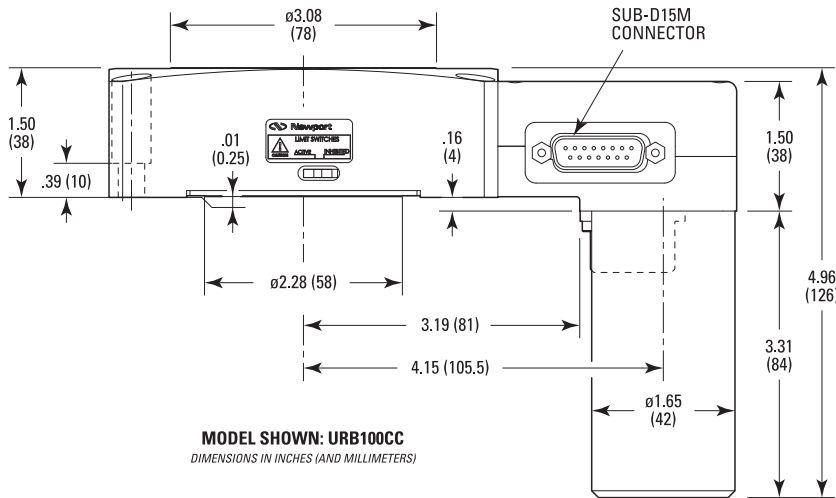
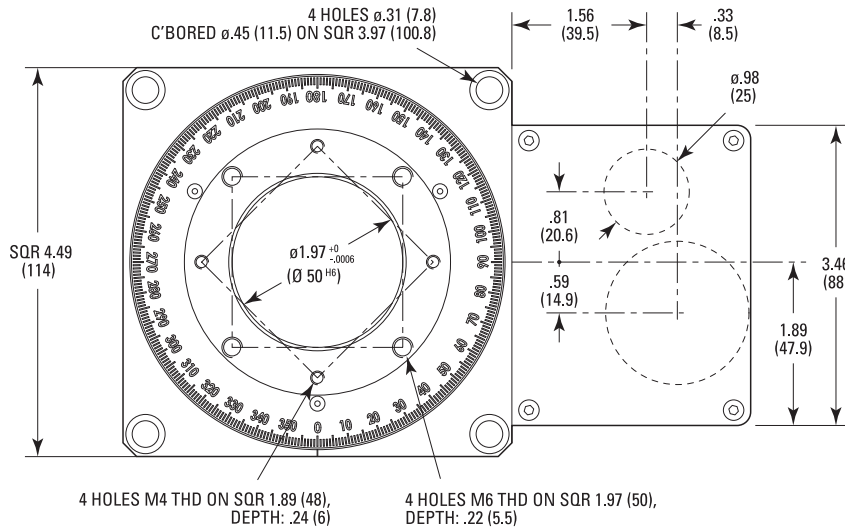
Model (Metric)	Description
URB100CC	Belt Drive Rotation Stage, 360°, DC Servo Motor
URS100TP (M-URS100TP)	Solid Top Mounting Plate, URS100 Series, 1/4-20 Threaded Holes
URSBK	90° Mounting Bracket URS Series Rotation Stages

Recommended Motion Controllers

XPS-D see page 148
XPS-RL see page 153
ESP301 see page 157
SMC100CC see page 159

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

MODEL URB100CC

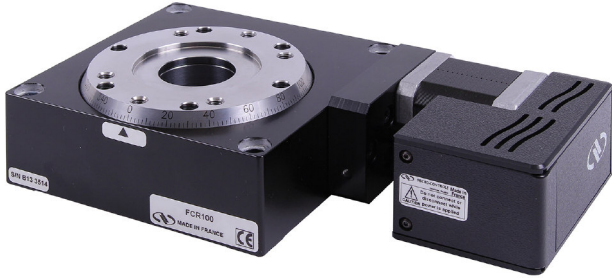


MODEL SHOWN: URB100CC
DIMENSIONS IN INCHES (AND MILLIMETERS)

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

FCR100

Intelligent Stepper Motor Rotary Stages



- Value-engineered
- Proven and robust construction
- Space-saving (no separate controller box)
- Plug and play
- Easy connection via the USB or directly via RS-422



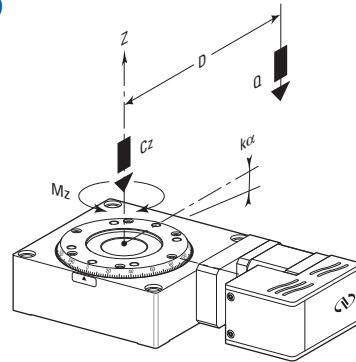
The FCR100 rotation stage combines a fully integrated stepper motor controller (iPP™ technology) and precision rotation stage in a small footprint. Similar to the CONEX series for DC motor, the FCR100 comes fully pre-configured and enables true out-of-box control. The iPP™ technology used in the FC series completely eliminates controller or driver set up, allowing users to simply connect USB communication, plug in the power supply and start the motion GUI. Features of the FCR100 includes: robust construction of crossed roller bearing for high position accuracy and the stepper motor directly attached to the worm screw providing high output torque. Up to 4 FC series units can be daisy-chained and controlled by a single GUI, via USB or direct RS-422 interface.

General Specifications

	FCR100
Travel Range	360°
Load Capacity	300 N
Maximum Speed	20°/s
Maximum Torque	0.5 Nm
Minimum Incremental Motion	0.00025°
Uni-directional Repeatability, Guaranteed	0.002°
Absolute Accuracy, Guaranteed	± 0.02°
Bi-directional Repeatability, Guaranteed	± 0.006°
Wobble	50 µrad
Eccentricity	3 µm
Cable Length	5 m
Transversal Stiffness	12 µrad/Nm
Computer Interfaces	RS422, USB
Weight	2.25 kg
MTBF	20,000 h

Load Characteristics and Stiffness

FCR100



Cz, Normal centered load capacity	300 N
Kα, Transversal compliance	12 µrad/Nm
Mz, Maximum torque	0.5 Nm
Jz, Maximum Inertia	0.1 kgm²
Q, Off-center load	$Q \leq Cz/(1+D/30)$
Where: D = Cantilever distance in mm	

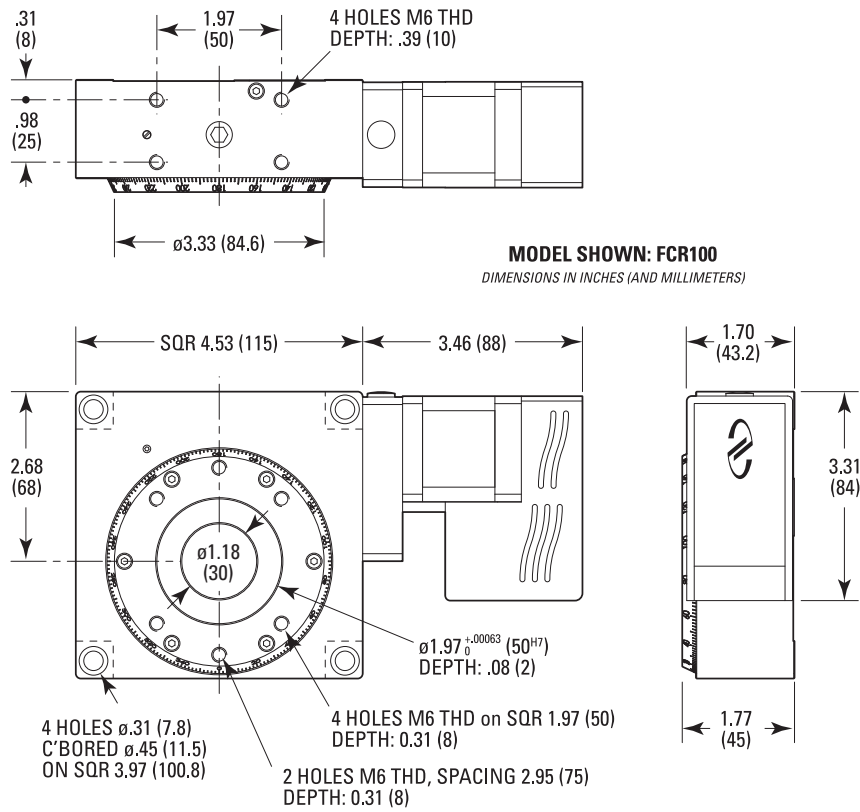
For the definition of specifications visit Newport.com for the Motion Basics and Standards.

Ordering Information

Model	Description
FCR100	Precision Rotation Stage, Intelligent Stepper Motor, Continuous 360° Motion
FC-PS40	Power supply, iPP step motor, RoHS
USB-RS422-1.8	Cable adapter, USB to RS422, 1.8m
FC-CB1	1m communication cable, daisy chain, RS422

Dimensions

FCR100



A typical assembly using FCR100, FCL100 and FCL200



An FCR100 stage mounted to an FCL200 stage

PR50 & SR50 Series

Compact Rotation Stages



- Compact, low-profile rotation stage for 1 in. diameter optics
- Lightweight, folded motor design
- Proprietary ball bearings provide smooth motion with low wobble
- high speed or high resolution versions



The SR50 and PR50 Series are compact, lightweight rotation stages designed for optical components up to 1" in diameter, such as polarizers, wave plates, or wedges. The SR50 stages provide high precision rotation with Minimum Incremental Motion of 0.004° with either DC servo or open-loop stepper motors. The PR50 stages are a cost-efficient alternative to the SR50 for applications that do not require precision of the SR50 or that could benefit from higher speeds up to 20°/s. SR50/PR50 feature: a lightweight, low profile design with the proprietary ball bearings to provide smooth rotation with minimal wobble ($\pm 50 \mu\text{rad}$); a precision ground worm gear producing consistent driving torque to the rotating carriage; an internally foldered motor provides a small footprint for easy integration in the optics path. Typical applications include rotation of optical elements in confined spaces, such as laser cavities, disk texturing machines, or fiber optics component manufacturing.

The CONEX SR50CC and PR50CC are rotation stages with the integrated CONEX-CC controller/driver and is pre-configured for the highest level of out-of-the-box control. The CONEX-CC is a very compact and inexpensive driver for Newport's low power DC servo motor driven devices.

Specifications

	PR50CC	PR50PP	SR50CC	SR50PP
Optic Diameter	25.4 mm			
Aperture Diameter	25.7 mm			
Angular Range	360°			
Maximum Speed	20°/s		4°/s	
Maximum Torque	0.1 Nm		0.4 Nm	
Centered Load Capacity	10 N		30 N	
Minimum Incremental Motion	20 mdeg		4.0 mdeg	
Accuracy, Typical	± 25 mdeg		± 15 mdeg	± 20 mdeg
Bi-directional Repeatability, Typical	± 30 mdeg		± 15 mdeg	± 16 mdeg
Uni-directional Repeatability, Typical	± 5.0 mdeg		± 2.5 mdeg	± 3.5 mdeg
Wobble, Typical	$\pm 20 \mu\text{rad}$			
Inertia	0.015 kg.m ²			
Origin	Optical, centered			
Origin Repeatability	± 25 mdeg			
Cable Length	3 m			
MTBF	10,000 h (25% load, 30% Duty cycle)			
Weight	0.4 kg		0.3 kg	
CE	Compliant			

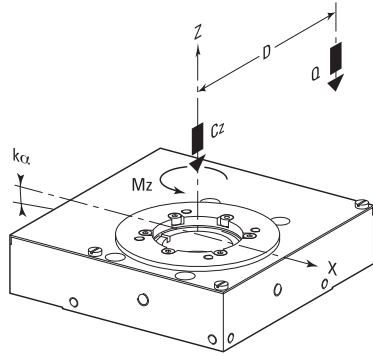


CONEX-PR50CC shown



Two PR50 stages with an EQ45.

For the definition of specifications, visit Newport.com's section on Motion Basics and Standards.



Load Characteristics

	SR50 Series	PR50 Series
Normal Load Capacity (Cz) N	30	10
Construction parameter (a) mm	25	22
Transversal Stiffness (kα) μrad/Nm	160	100
Nominal Torque (Mz) Nm	SR50CC: 0.4 SR50PP: 0.5	0.1
Off-center load (Q)	For SR50 $Q \leq Cz/(1 + D/25)$, where D is a cantilever distance in mm For PR50 $Q \leq Cz/(1 + D/22)$, where D is a cantilever distance in mm	

Also applicable to the PR50 Series

Ordering Information

Model	Description
SR50CC	Compact Rotation Stage, 360°, DC Servo Motor, SR Series
SR50PP	Compact Rotation Stage, 360°, Micro Step Drive Stepper, SR Series
PR50CC	Compact Rotation Stage, 360°, DC Servo Motor, PR Series
PR50PP	Compact Rotation Stage, 360°, Micro Step Drive Stepper, PR Series
CONEX-SR50CC	SR50CC Rotation Stage Integrated with CONEX Controller
CONEX-PR50CC	PR50CC Rotation Stage Integrated with CONEX Controller
EQ45	Right-Angle Bracket for PR50 and SR50

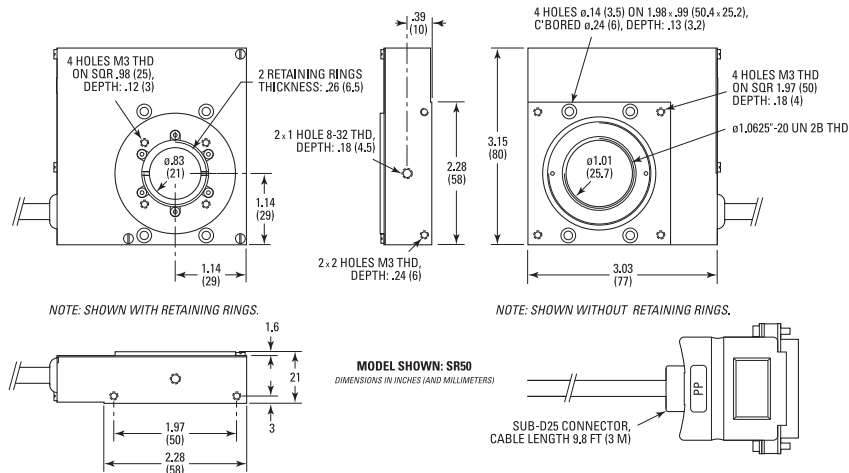
Recommended Motion Controllers

XPS-D see page 148	
XPS-RL see page 153	
ESP301 see page 157	
SMC100CC see page 159	SR50CC and PR50CC
SMC100PP see page 159	SR50PP and PR50PP

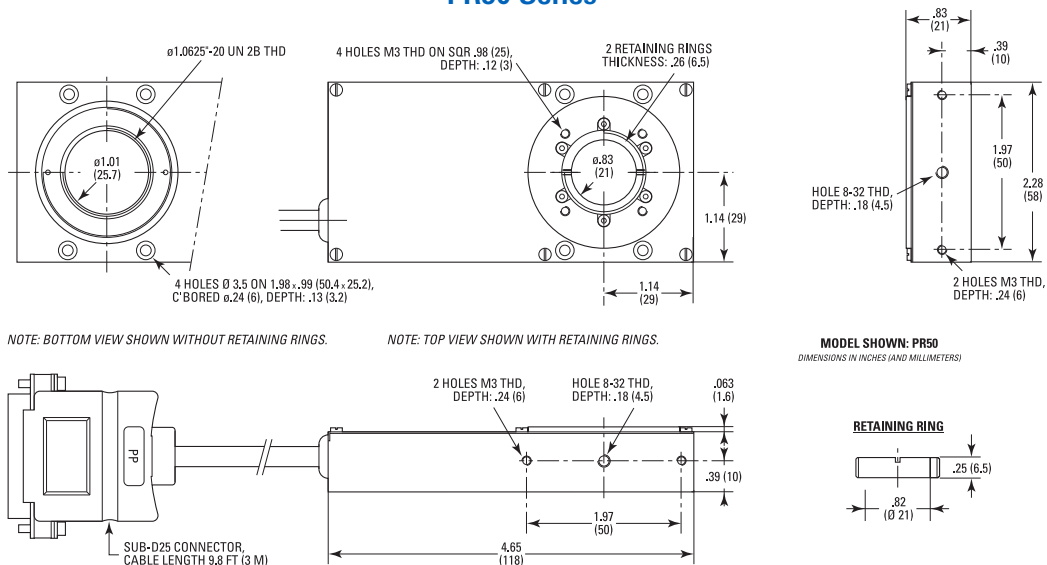
Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146.

Dimensions

SR50 Series



PR50 Series



MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

BG Series

Goniometric Cradles



- $\pm 45^\circ$ transverse axis rotation with maximum free access to the rotating platform
- Stacked cradles provide orthogonal rotation about the same pivot point
- Precision machined ball bearing races assure smooth motion and high stability
- Precision ground worm gear provides 0.002° MIM
- Vacuum compatible versions up to 10^{-6} hPa

BG Series Goniometric Cradles are designed to provide precision transverse axis rotational motion with maximum free access to the rotating platform and an MIM to 0.0002° . BG stages can be stacked for two-axis rotation about the same pivot point. Mounting a rotation stage under the assembly adds a third orthogonal rotation axis through the same point. Features include: a precision ground, hardened worm gear drive for high accuracy rotation; single row ball bearings and precision ground tool-steel races to ensure smooth rotational motion with minimal wobble and eccentricity; and a home switch conveniently located at the center of travel. BG Series goniometric cradles are available in 5 sizes and may be configured with DC motors (CC) or stepper motors (PP with mini-step or PE with full-step), depending on the applications. These highly versatile stages can be used for applications with high loads or torques, vacuum applications and compact multi-axis rotation assemblies.

The CONEX-BGS50CC is a goniometric cradle stage with the integrated CONEX-CC controller/driver and is pre-configured for the highest level of out-of-the-box control. The CONEX-CC is a very compact and inexpensive driver for Newport's low power DC servo motor driven devices.

Specifications

	BGM120BPP	BGM160CC	BGM160BPE	BGM160PEBV6	BGM160BPP	BGM200CC	BGM200BPE	BGM200BPP	BGS50CC	BGS50BPP	BGS80CC	BGS80BPP		
Stage Type	Motorized Goniometer													
Angular Range	-45 to $+45^\circ$								-30 to $+30^\circ$		-45 to $+45^\circ$			
Load Capacity	200 N		300 N			500 N			20 N		60 N			
Platform Size	120 x 99 mm		160 x 130 mm			200 x 200 mm			50 x 50 mm					
Height	94 mm		138.2 mm			196 mm			57.5 mm					
Rotation Axis Height	164 mm		245 mm								100 mm			
Graduations	1°								1°					
Thread Type	1/4/20								8/32		8/32		1/4/20	
Minimum Incremental Motion	2.0 mdeg								0.50 mdeg		0.20 mdeg		0.50 mdeg 0.20 mdeg	
Maximum Speed	20°/s		2°/s			20°/s			2°/s		20°/s		10°/s 4°/s 20°/s	
Maximum Torque	6 Nm		10 Nm		20 Nm		20 Nm		16 Nm		10 Nm		29 Nm 17 Nm 0.5 Nm 0.5 Nm 1 Nm 1 Nm	
Wobble, Typical	± 100 μ rad													
Absolute Accuracy (Typical)	± 25 mdeg													
Uni-directional Repeatability (Typical)	± 2.0 mdeg								± 0.5 mdeg		± 0.5 mdeg		± 0.5 mdeg ± 0.5 mdeg	
Bi-directional Repeatability (Typical)	± 12 mdeg								± 6.5 mdeg		± 8 mdeg		± 1.5 mdeg ± 2.5 mdeg	
Transversal Compliance	10 μ rad/Nm		5 μ rad/Nm			2 μ rad/Nm			100 μ rad/Nm		20 μ rad/Nm			
Origin	Optical, centered													
Origin Repeatability	± 2.5 mdeg										± 0.5 mdeg		± 2.5 mdeg	
Limit Switches	Mechanical, at $\pm 45^\circ$													
Cable Length	3 m		3 m		3 m		3 m		3 m		3 m		3 m	
Axial Stiffness			5 N/ μ m											
Vacuum Compatibility			10-6 hPa											
Weight	8.5 kg		18 kg			38 kg			0.8 kg		2.1 kg			
MTBF	20,000 h (25% load, 10% duty cycle)													
CE	Compliant													

For the definition of specifications visit Newport.com for the Motion Basics and Standards.

Ordering Information

Model	Series	Travel (mm)	Drive	Vacuum Prep. ⁽²⁾
	BGS	50	CC	
		80		
		120		
M-	BGM	160	BPE ⁽¹⁾	V6
		160		
		200		

Example:
The **BGM160BPE** is an BGM goniometric cradle with a full-step motor drive, English version.

- ¹⁾ Only available as BGM Series stage.
- ²⁾ Vacuum compatible to 10⁻⁶ hPa. In this case max. speed and load capacity are divided by two.

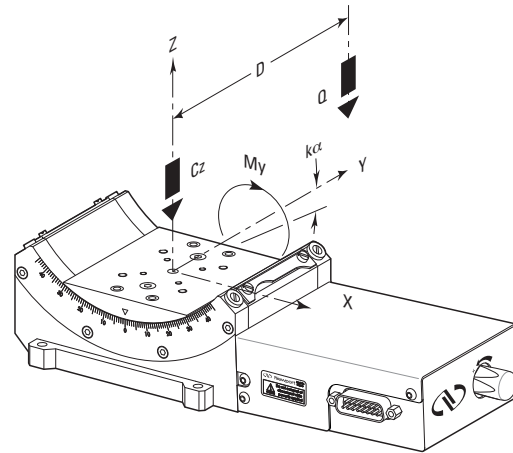
- M-: For metric version
- CC: DC motor
- PP: Micro-step motor
- PE: Full-step motor

Recommended Motion Controllers:

Model	
XPS	see page 148
ESP301	see page 157
SMC100CC	see page 159 BGS50CC and BGS80CC only
SMC100PP	see page 159 BGS50BPP and BGS80BPP only
CONEX-CC	see page 161 BGS50CC only

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146. Motor cables are included.

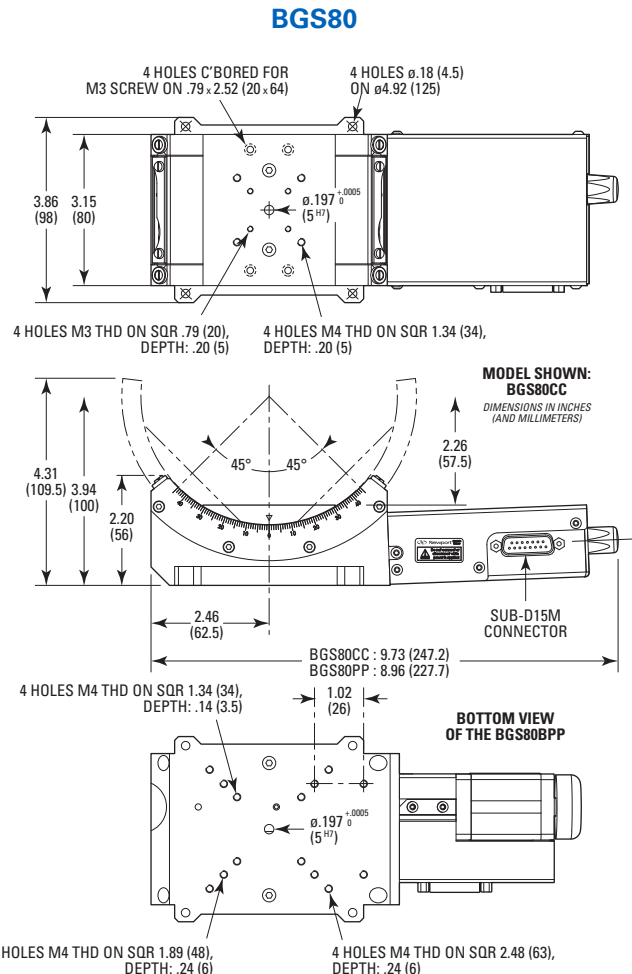
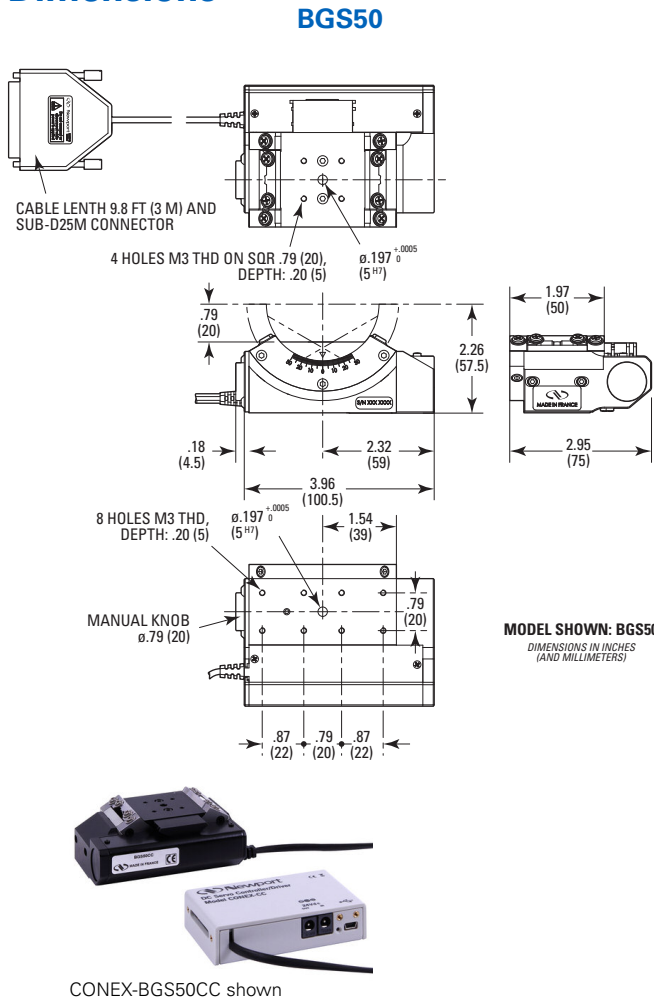
Load Characteristics and Stiffness



	BGS50	BGS80	BGM120	BGM160	BGM200	
C _z , Normal centered load capacity (N)	20	60	200	300	500	
a, Construction parameter (mm)	30	40	70	90	120	
κ _α , Radial compliance (μrad/Nm)	100	20	10	5	2	
M _y , Maximum torque (Nm)	(PE)		10	20	29	
	(PP)	0.5	1	6	16	17
	(CC)	0.5	1	9	10	10

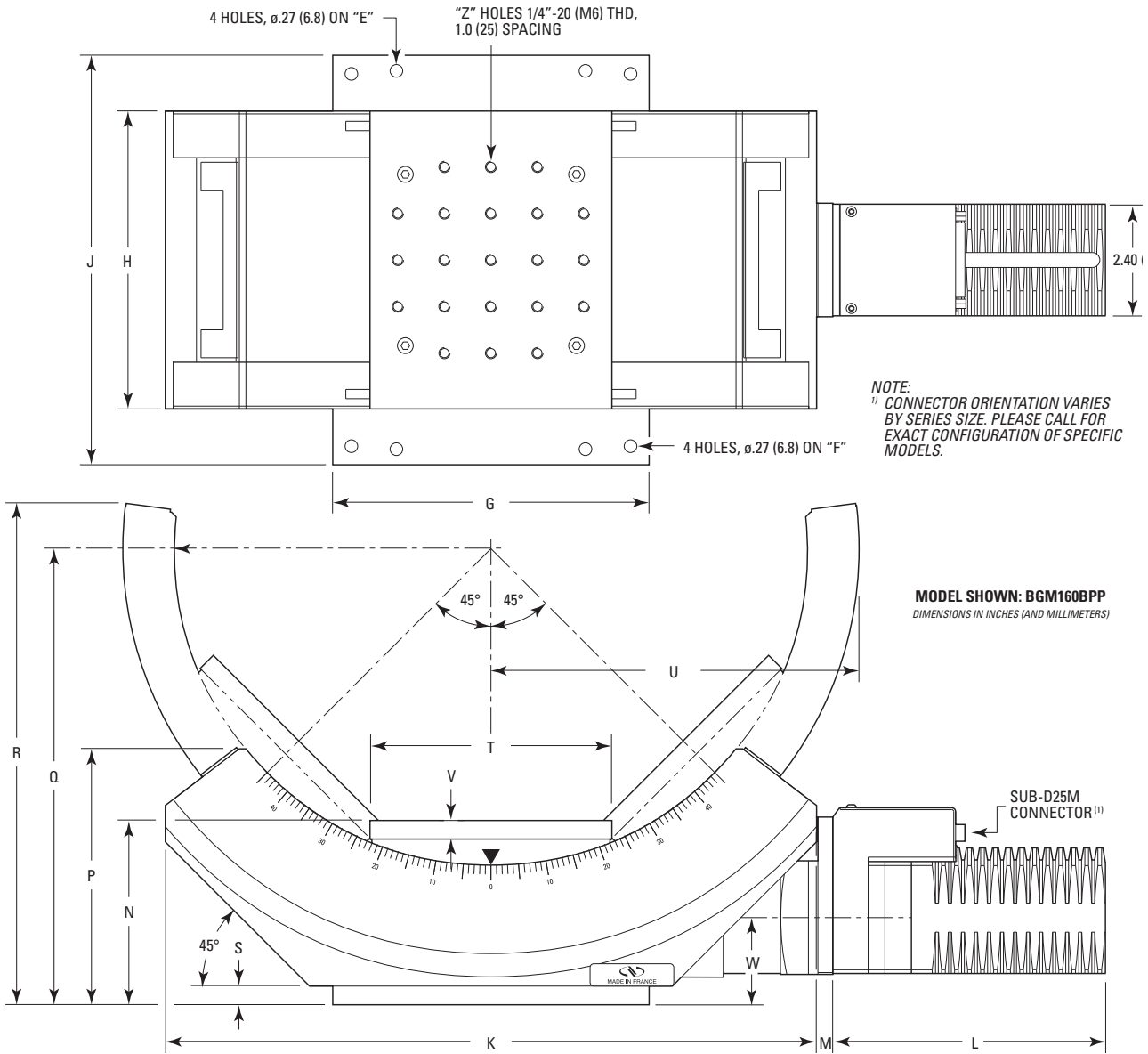
Q, Off-center load: $Q \leq C_z / (1 + D/a)$, where D = Cantilever distance in mm

Dimensions



MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

BGM120 to BGM200



MODEL (METRIC)	E	F	G	H	J	K	M
(M)-BGM120	6.0 x 2.0 (152.4 x 50.8)	5.91 x 3.94 (150 x 100)	4.72 (120)	4.72 (120)	6.69 (170)	8.11 (206)	1.22 (31)
(M)-BGM160	8.0 x 4.0 (203.2 x 101.6)	7.87 x 5.91 (200 x 150)	6.69 (170)	6.30 (160)	8.66 (220)	13.78 (350)	.34 (8.7)
(M)-BGM200	10.0 x 8.0 (254 x 203.2)	9.84 x 9.84 (250 x 250)	10.63 (270)	7.87 (200)	10.63 (270)	20.47 (520)	-

MODEL (METRIC)	N	P	Q	R	S	T	U	V	W	Z
(M)-BGM120	2.76 (70)	3.70 (94)	6.46 (164)	7.09 (180)	.31 (8)	3.90 (99)	5.04 (128)	.24 (6)	1.70 (43.2)	15
(M)-BGM160	3.90 (99)	5.44 (138.2)	9.65 (245)	10.63 (270)	.39 (10)	5.12 (130)	7.78 (197.5)	.39 (10)	1.84 (48.8)	21
(M)-BGM200	5.31 (135)	7.72 (196)	15.67 (360)	15.67 (398)	.39 (10)	7.87 (200)	11.81 (300)	.39 (10)	2.46 (62.5)	49

For interface assembly details, refer to the BGM series page at Newport.com.

Agilis™ Series

Piezo Motor Driven Rotation Stages



scan QR code
to watch video



- Highly repeatable angular motion
- High sensitivity (MIM)
- Compact size
- Affordable with quick delivery
- Integrated and easy to set up



The Agilis Series of high precision miniature rotation stages feature Newport's Agilis piezo step direct motor. Agilis stages provides the benefits of ultra-high adjustment sensitivity and convenient remote operation at a price and size comparable to that of a high quality manual stage. Agilis rotation stages include both compact conventional piezo rotation stages and goniometers. The compact and light weight AG-PR100 and CONEX-AG-PR100P rotation stages feature 1" apertures with retaining rings and are ideal for continuous rotation of waveplates and polarizers. The CONEX-AG-PR100P is based on the Agilis AG-PR100 rotary stage, but features an innovative miniature direct read encoder, providing 0.002° uni-directional repeatability. The CONEX-AG-GON Series goniometers provide easy access to the tip/tilt platform and can be stacked for multi-axis rotations.

Specifications

	AG-PR100	AG-PR100V6
Optic Diameter	25.4 mm	25.4 mm
Maximum Speed	2°/s	2°/s
Centered Load Capacity	2 N	2 N
Minimum Incremental Motion	5 μrad	5 μrad
Graduations	2°	2°
Transverse Stiffness	100 μrad	100 μrad
Cable Length	1.2 m	1.2 m
Operating Temperature	+10 to +35 °C	10 to +35 °C
Weight	135 g	135 g

Vacuum Version Available

	AG-PR100P
Travel Range	340°
Drive Type	Piezo Motor
Stage Type	AG-PR100P
Load Capacity	2 N
Maximum Speed	1.5°/s
Maximum Torque	0.02 Nm
Minimum Incremental Motion	0.001°
Uni-directional Repeatability, Typical	0.002°
Uni-directional Repeatability, Guaranteed	0.002°
Accuracy, Typical	0.08°
Bi-directional Repeatability, Typical	0.003°
Wobble, Typical	100 μrad
Cable Length	1.8 m
Control Loop	Digital PI loop at 100 Hz servo rate
Operating Temperature	10 to +35 °C
Transversal Stiffness	200 μrad/Nm
Computer Interfaces	USB
Weight	135 g



AG-PR100 in a vertical mounting position for easy placement in optical path



CONEX-AG-PR100P shown

Ordering Information

Model	Description
AG-PR100	Agilis Piezo Driven Rotation Stage, 1 inch ⁽¹⁾
AG-PR100V6	Vacuum Compatible Piezo Rotation Stage, Agilis ⁽¹⁾
CONEX-AG-PR100P	Piezo Motor Rotation Stage, 1 in., Direct Encoder, Includes Controller
CONEX-AG-GON-UP	Goniometer, Direct Encoder Feedback, CONEX Controller
CONEX-AG-GON-LP	CONEX Goniometer, Direct Encoder Feedback and Integrated Controller
AG-PR100-TP	Top Plate, CONEX-AG-PR100P, Mount AG-LS25 Stages or GON goniometers
RSA-1TI	Solid Insert for RSP-1T Rotation Stage
PRA-05	Polarizer Adaptor, 12.7 mm Optics to 1.063-20 Threaded Mounts
AG-MD4-1.2	Agilis Extension Cable, 1.2 m, 4-wire mini-DIN connector
USB-CH ⁽²⁾	USB Power Supply, Includes clips for US, EU, UK & Australia, 2m Cable

⁽¹⁾ One A-1.25-1RR retaining ring is included with every stage.

⁽²⁾ The USB-CH is required only with AG-UC2 and only if power is not available from a PC.

	CONEX-AG-GON-UP	CONEX-AG-GON-LP
Travel Range	±7.5°	±5.5°
Drive Type	Piezo Motor	
Stage Type	AG-GON-UP	
Normal load capacity (N)	3.5 N	
Maximum Speed	0.45°/sec	0.33°/sec
Minimum Incremental Motion	0.00032°	0.00025°
Uni-directional Repeatability, Guaranteed	0.00064°	0.0005°
Origin repeatability ⁽¹⁾	0.00064°	0.0005°
Encoder Resolution	0.00013°	0.00009°
Cable Length	1.8 m	
Control Loop	Digital PI loop at 100 Hz servo rate	
Operating Temperature	10 to +35 °C	
Computer Interfaces	USB	
Weight	171 g	

(1) Origin is located at the negative limit.

Recommended Motion Controllers

Model

AG-UC2 see page 165

AG-UC8 see page 165

AG-UC8PC see page 165



CONEX-AG-GON-LP shown

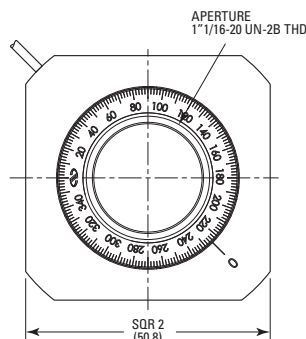
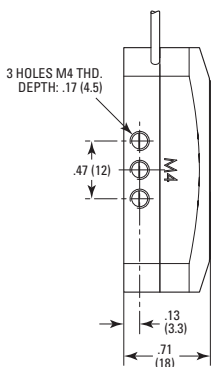
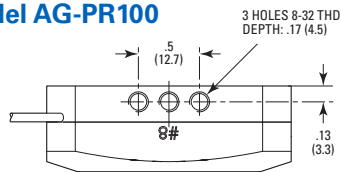


CONEX-AG-GON-LP and CONEX-AG-GON-UP assembly shown

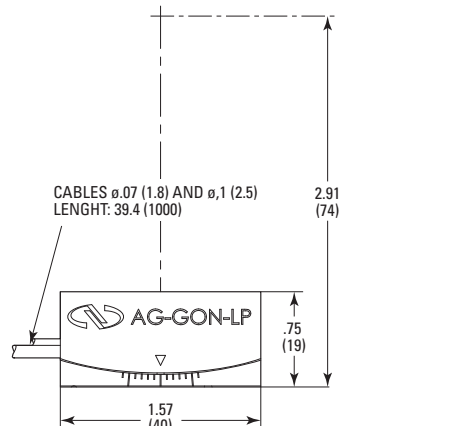
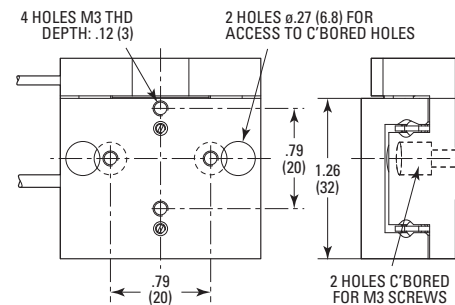
Dimensions

Model AG-PR100

MODEL SHOWN: AG-PR100
DIMENSIONS IN INCHES (AND MILLIMETERS)

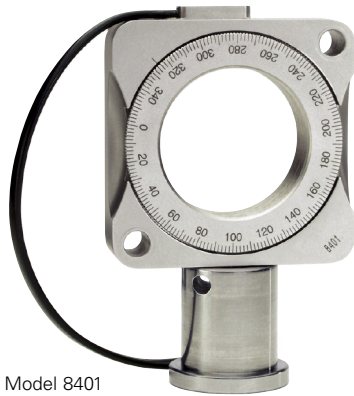


Model CONEX-AG-GON-LP



MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Picomotor™ Rotary Stages



Model 8401

- Compact design
- 0.7 μrad angular resolution
- Picomotor™ actuators
- Set-and-forget long-term stability
- Easy-to-use, flexible controller/drivers



With a resolution better than 0.011° and an overall thickness of just 0.63" (16.0 mm), the compact Picomotor™ Rotary Stages can be used for a number of applications, including positioning wave plates and polarizers. Each rotary stage includes an adapter for mounting components with a 1" (25-mm) diameter. For motorized beam-steering applications, use our 45° adapter model 9922. For applications requiring high accuracy and repeatability, the 8410 Closed-Loop Picomotor Rotary Stage includes an encoder for superior position feedback. The closed-loop version provides microradian level of precision and continuous 360° rotation.

Specifications

	8401 (-M)	8410
Optic Diameter	25.4 mm	25.4 mm
Maximum Speed	1-2 RPM	1-2 RPM
Angular Resolution	0.2 N	2 μrad
Thread Type	5 μrad	8-32
Centered Load Capacity	4.4 N	4.4 N
Operating Temperature	+10 to +35 °C	10 to 45 °C

Ordering Information

Model	Description
8401(-M)	Picomotor Rotary Stage, Stainless Steel, 1 in. With 0.5 in. Adapter
8410	Closed-Loop Picomotor Rotary Stage, 1 in. Diameter Components



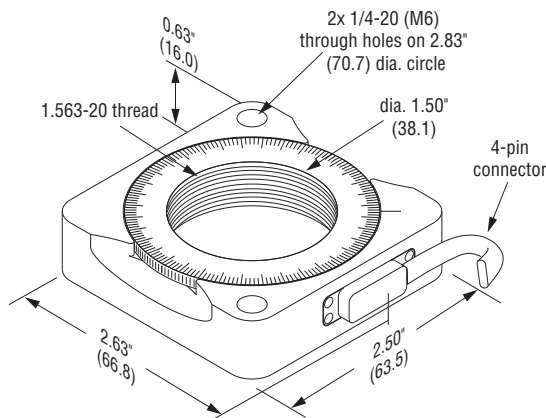
Model 8410

Recommended Motion Controllers

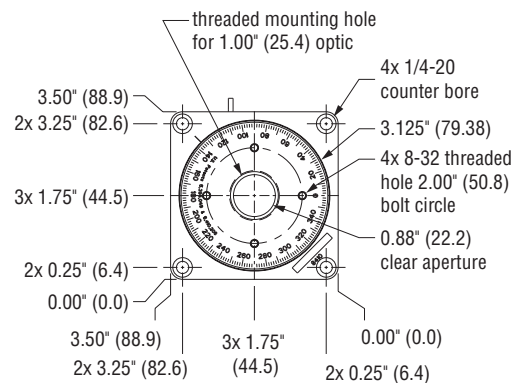
Model	Description
8742	Open-Loop Picomotor Controller & Driver Module, 4 Channels
8743-CL	Closed-Loop Picomotor Controller & Driver Module, 2 Channel

Note: Use 8742 for 8401 (-M) and 8743-CL for 8410

Dimensions



Model 8401



Model 8410

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Motorized Linear Actuator Selection Guide












Series	Travel (mm)	Minimum Incremental Motion (μm)	Uni-directional Repeatability (μm)	Bi-directional Repeatability (μm)	Accuracy (μm)	Maximum Speed (mm/s)	Axial Load Capacity (+Cx)(N)
 VP-25AA High Performance Precision Motorized Actuator see page 122	25	0.1	0.1	0.6	2	25	40
 LTA Series Precision Motorized Actuators see page 123	25, 50	0.05 - 0.1	0.5 - 0.6	2	6 - 10	0.25- 5	40 - 120
 TRB Series Compact Motorized Actuators see page 125	6 - 25	0.1	0.5	1.5	6 - 10	0.3-2	90
 TRA Series Compact Motorized Actuator see page 127	6 - 25	0.1 - 0.2	1	2.5	6 - 10	0.2-0.4	60
 Picomotor Piezo Linear Actuators see page 129	12.7 - 50.8	0.03	NA	NA	NA	0.02	22
 TinyPicomotor Piezo Linear Actuators see page 131	12.7	0.03	NA	NA	NA	0.02	22
 Vacuum and Ultra-High Vacuum Picomotor™ Actuators see page 132	12.7-50.8	0.03	NA	NA	NA	0.02	22
 NanoPZ Series Ultra-High Resolution Actuators see page 135	12.5	0.03	NA	NA	NA	0.2	50
 NPA Series Nanopositioning Piezo Translators see page 136	25 - 100 (μm)	0.05 - 2 (nm)	NA	NA	NA	NA ²	1000/150 (push/pull)
 NPM Series Nanopositioning Piezoelectric Micrometer Adaptor see page 137	140 (μm)	0.1 - 1 (nm)	NA	NA	NA	NA ²	100
 CONEX-NSA12 Controller and Accessories see page 162	11	0.2	NA	± 5.0	NA	0.9	28

¹ Typical Value² Refer to the specific NanoPositioner product for more details about resonant frequency and stiffness.³ For TRB, axial loads over 60N, the max. speed must be reduced to 1 mm/s (CC) and 0.3 mm/s (PP). For TRA, axial loads over 45N, the max. speed must be reduced to 0.3 mm/s.





Motorized Actuator and Manual Positioner Compatibility

Many Newport manual positioning products can be motorized by using Newport motorized precision actuators. Once the manual positioner is chosen for the application, use the tables below to select the appropriate motorized actuator.

Manual Linear Stages










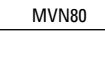
	NewStep	TRA & TRB			NanoPZ	LTA	
	NSA12	TRA6 TRB6	TRA12 TRB12	TRA25 TRB25	PZA12	LTA-HS	LTA-HL
 M-461 Series	i	●	i	●	i	i	●
 M-462 Series	●	●	●	●	●	i	●
 M-561 series	i	●	i	●	●	●	●
 M-562 Series	●	●	i	●	i	i	i
 UMR8.25	●	●	i	i	●	i	●
 UMR8.51	●	●	●	●	●	i	●
 UMR12.40	●	●	●	●	●	i	●
 UMR12.63	●	●	●	●	●	i	●
 423	●	●	●	●	●	i	●
 433	●	●	●	●	●	●	●
 443	●	●	●	●	●	●	●

Compatibility Key

	Fully Compatible ¹
	Compatible but may require standard interface adaptor and/or include small performance limitation (See website for details)
	² Call the local sales office or email tech@newport.com
	Not Compatible or Not Recommended

¹ In some cases, one must limit the travel range of actuators. See Newport website for details.

² 'Yellow' may require custom interface adaptor or may include significant performance limitations in terms of travel length, load capacity and etc. See Newport.com/motorize for details.

	NewStep	TRA & TRB			NanoPZ	LTA	
	NSA12	TRA6 TRB6	TRA12 TRB12	TRA25 TRB25	PZA12	LTA-HS	LTA-HL
 426	●	●	●	●	●	i	●
 436	●	●	●	●	●	i	●
 460P-05	i	●	i	●	●	i	●
 460P	●	●	●	●	●	i	●
 460A-X	●	●	●	●	●	i	●
 460A-XY	●	●	●	●	●	i	●
 460A-XZ	●	●	●	●	●	i	●
 460A-XYZ	●	●	●	●	●	i	●
 401 and 406	●	●	i	●	●	i	●
 MVN80	●	●	●	i	●	●	●

















MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Manual Rotation Stages

	NewStep		TRA		NanoPZ		LTA	
	NSA12	TRA6 TRB6	TRA12 TRB12	TRA25 TRB25	PZA12	LTA-HS	LTA-HL	
MOTORIZED LINEAR STAGES RS65								
MOTORIZED VERTICAL STAGES 481-A								
MOTORIZED ROTATION STAGES GON40-U								
GON40-L								
MOTORIZED LINEAR ACTUATORS GON65-U								
GON65-L								
HEXAPODS 561-GON								
TGN80								
CONTROLLERS AND DRIVERS TGN120								
M-36								
MOTORIZED OPTICAL MOUNTS M-37								

Mirror Mounts

	NewStep		TRA		NanoPZ		LTA	
	NSA12	TRA6 TRB6	TRA12 TRB12	TRA25 TRB25	PZA12	LTA-HS	LTA-HL	
SN100								
U100-A								
U200-A								
U300-A								
U100-AC2K								
U200-AC2K								
U300-AC2K								
U400-AC2K								
U100-ACG								
U100-G								
U200-G								
VGM-1N								
VGM-2N								
600A-2R								
600A-4R								

	NewStep	TRA		NanoPZ		LTA	
	NSA12	TRA6 TRB6	TRA12 TRB12	TRA25 TRB25	PZA12	LTA-HS	LTA-HL
 625-RC2	●	i	i	●	●	●	●
 625-RC4	●	i	i	●	●	●	●
 625-RC6	●	i	i	●	●	●	●
 605-2	●	i	●	●	i	i	●
 605-4	i	i	i	●	i	i	●
 SL8A	i	i	●	●	i	i	i
 SL15A	i	i	●	●	i	i	i
 SL20A	i	i	●	●	i	●	i
 SL25.4	i	i	●	●	i	●	i
 SL50	i	i	●	●	i	●	i
 SL51	i	i	●	●	i	●	i
 SL76.2	i	i	●	●	i	●	i
 SL101.6	i	i	●	●	i	●	i
 SB18YZ	i	i	●	●	i	●	i
 BSD-2A	i	i	i	●	i	i	●
 ULM-TILT	●	i	●	●	●	●	●

MOTORIZED
LINEAR STAGES

MOTORIZED
VERTICAL STAGES

MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

HEXAPODS

CONTROLLERS
AND DRIVERS

MOTORIZED
OPTICAL MOUNTS

BEAM
MANAGEMENT

SPECIAL
COLLECTIONS

VP-25AA

High-Precision Motorized Actuators



- Integrated linear encoder for exceptional repeatability and accuracy
- Non-rotating tip eliminates periodic motion variations
- Can be used as a single rail linear stage
- Very low friction design provides high sensitivity with 0.1 μm MIM
- Convenient manual adjustment knob
- 20,000 hr MTBF



The VP-25AA actuators combine precise positioning with highly reliable performance. It is based on the same innovative design used in the VP-25XA linear stages (see page 45) and features a high-resolution linear scale for exceptional repeatability and accuracy. The scale is fixed on a moving rail to which the actuator's tip is permanently attached without any contact to the mounting shaft. This concept eliminates all drivetrain induced motion errors and minimizes hysteresis between the scale and the actuator tip. The non-rotating tip is essential to avoid undesirable periodic motion variations caused by the variable contact made between the actuator tip and the mating surface.

The top rail of the VP-25AA can also be used as a single-rail linear stage to position optical fibers, micro-optics, sensors, or other small and lightweight parts. For added versatility, a mounting interface for a dovetail rail compatible with the popular ULTRAlign™ positioning system is provided. This system offers a wide selection of interchangeable mounts for optical fibers, fiber arrays, objectives, or GRIN lenses in a variety of fiber alignment applications..

Specifications

	VP-25AA
Axial Load Capacity (+Cx)	40 N
Inverse Axial Load Capacity (-Cx)	-40 N
Travel Range	25 mm
Minimum Incremental Motion	0.10 μm
Maximum Speed	25 mm/s
Accuracy, Typical	$\pm 0.5 \mu\text{m}$
Accuracy, Guaranteed	$\pm 1.0 \mu\text{m}$
Bi-directional Repeatability (Typical)	$\pm 0.2 \mu\text{m}$
Bi-directional Repeatability, Guaranteed	$\pm 0.30 \mu\text{m}$
Uni-directional Repeatability (Typical)	$\pm 0.04 \mu\text{m}$
Uni-directional Repeatability, Guaranteed	$\pm 0.05 \mu\text{m}$
Origin Repeatability	$\pm 0.05 \mu\text{m}$
Cable Length	1.5 m
Weight	1.0 kg
MTBF	20,000 h (25% load, 30% duty cycle)
CE	Compliant

For the definition of specifications visit Newport.com for the Motion Basics and Standards.

Ordering Information

Model	Description
VP-25AA (M-VP-25AA)	High-Precision Motorized Actuator, 25 mm Travel Range

Recommended Motion Controllers

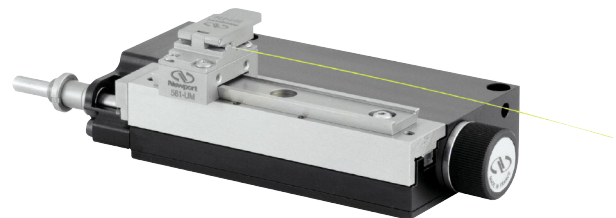
XPS-RL see page 153

XPS-D see page 148

ESP301 see page 157

SMC100CC see page 159

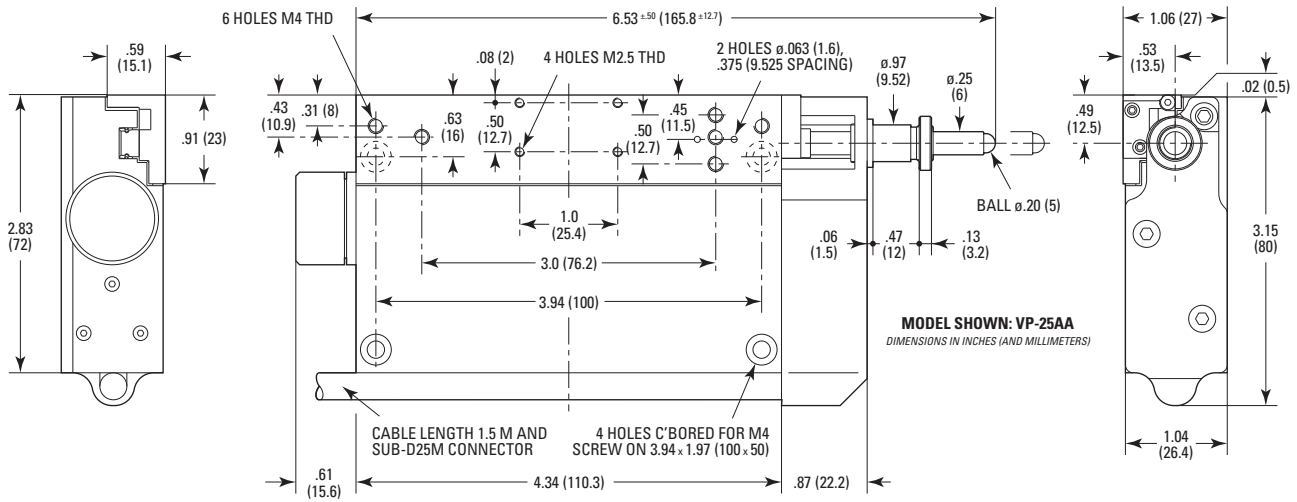
Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146. Motor cable included.



The VP-25AA actuator as a single-rail linear stage to position small and light weight parts with the optional 561-RAIL rails

Dimensions

Dimensions in millimeters



LTA Series

Precision Motorized Actuators



- Up to 50 mm travel in a space saving design
- Non-rotating tip improves motion smoothness and has no wear
- Exceptional Minimum Incremental Motion
- Adjustable limit switch prevents damage from over-travel
- Convenient manual positioning knob
- Vacuum versions with encoders



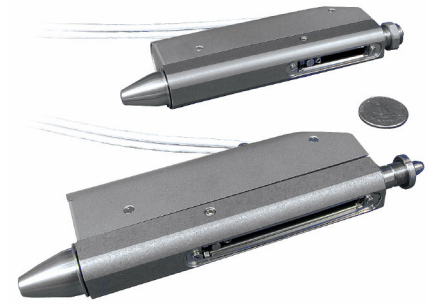
LTA actuators are designed to fit into existing manual stages and other opto-mechanical components directly replacing manual micrometers. The LTA series has a space-saving design that reduces the actuator length by 50% and minimizes the unwanted effects of cantilever loads on micro-positioning equipment. The series features two DC servo models with optimized output torque for faster motion (-HS) and higher load capacity (-HL). The LTA-HL is recommended for heavy load applications and the LTA-HS is optimized for high speed applications while providing a longer travel range. The LTAHSPPV6 and LTAHLPPV6 are two stepper motor models specifically designed for vacuum applications down to 10⁻⁶hPa. Common features include: a non-rotating tip to prevent wear and avoid periodic motion variations, a movable limit switch to prevent over-travel, a manual adjustment knob which permits quick positioning of the actuator when the motor is off, and a scale to indicate coarse actuator position in both millimeters and inches.

The CONEX-LTA-HS (or -HL) is LTA actuator with the integrated CONEX-CC controller/driver and is pre-configured for the highest level of out-of-the-box control. The CONEX-CC is a very compact and inexpensive driver for Newport's low power DC servo motor driven devices.

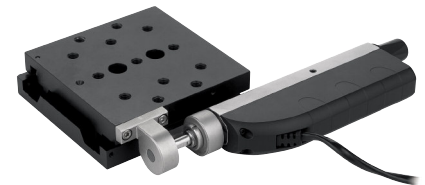


Specifications

	LTA-HL	LTA-HS	LTAHSPPV6	LTAHLPPV6
Travel Range	25 mm	50 mm		25 mm
Axial Load Capacity (+Cx)	100 N	40 N		100 N
Inverse Axial Load Capacity (-Cx)	-120 N	-50 N	-40 N	-100 N
Minimum Incremental Motion	0.05 µm	0.10 µm	0.08 µm	0.08 µm
Maximum Speed	1 mm/s	5 mm/s	0.5 mm/s	0.25 mm/s
Accuracy, Typical	±1.2 µm	±2.2 µm		±1.2 µm
Accuracy, Guaranteed	±3.0 µm	±5.0 µm		±3.0 µm
Uni-directional Repeatability (Typical)	±0.10 µm	±0.10 µm		±0.10 µm
Uni-directional Repeatability, Guaranteed	±0.25 µm	±0.25 µm		±0.30 µm
Bi-directional Repeatability (Typical)				±0.30 µm
Bi-directional Repeatability, Guaranteed				±1.0 µm
Origin Repeatability				±2 µm
Cable Length	3 m		1.5 m	
Vacuum Compatibility			10 ⁻⁶ hPa	
Weight	0.52 kg	0.48 kg	0.35 kg	0.35 kg
MTBF	10,000 h (25% load, 30% Duty cycle)			
CE	Compliant			



LTAxxPPV6 vacuum compatible actuator.



For the definition of specifications visit Newport.com's section on the Motion Basics and Standards.

Ordering Information

Model	Description
LTA-HS	High Speed LTA Motorized Actuator, 50 mm travel, LTA, 3/8-40 thread
LTA-HL	High Load Motorized Actuator, 25 mm travel, LTA, M12 thread
LTAHSPPV6	Vacuum Compatible High Speed Motorized Actuator, 50 mm travel, LTA
LTAHLPPV6	Vacuum Compatible High Load Motorized Actuator, 25 mm travel, LTA
CONEX-LTA-HS ¹	LTA-HS actuator Integrated with CONEX Controller
CONEX-LTA-HL ¹	LTA-HL actuator Integrated with CONEX Controller
LTA-M12	Mounting Adapter, M12-0.5, LTA-HS to UMR8, MVN80 and SL products

¹Order CONEX-PS separately.

Recommended Motion Controllers

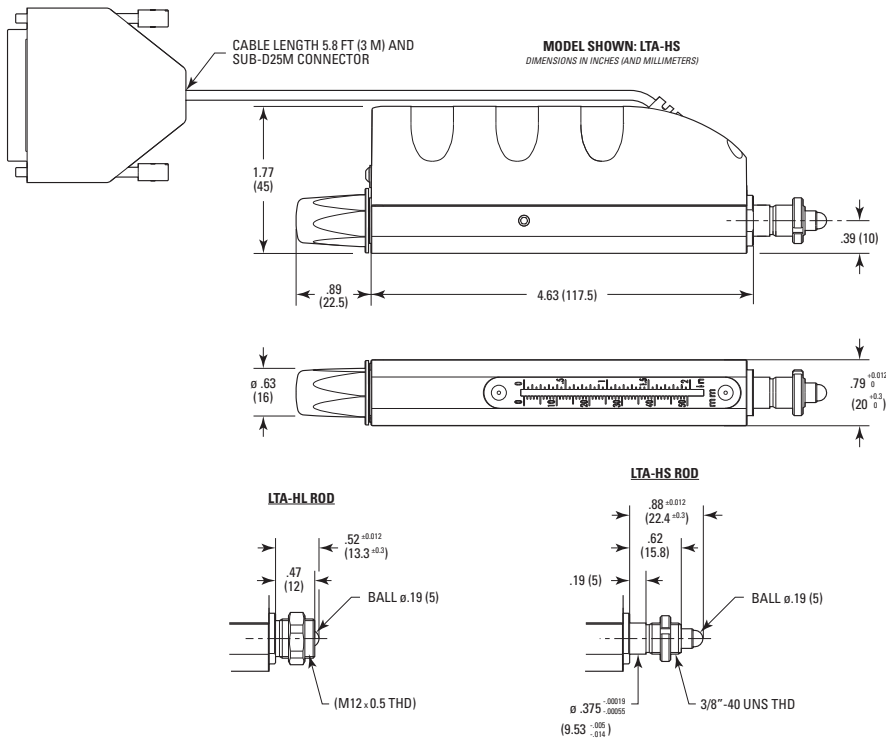
XPS-RL see page 153	
XPS-D see page 148	
ESP301 see page 157	
SMC100CC see page 159	LTA-HS and LTA-HL only
SMC100PP see page 159	LTAHLPPV6 and LTAHSPPV6 only
CONEX-CC see page 161	Included in CONEX-LTA-HS or CONEX-LTA-HL

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146. Motor cable included.

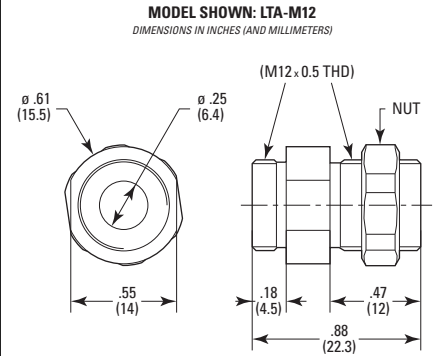
MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Dimensions

Model LTA-HS



Model LTA-M12



TRB Series Compact Motorized Actuators



scan QR code to watch video



- Slim and lightweight design
- Flexible cable routing on the side
- Integrated optical limit switches
- Used to motorize manual stages and mounts



The TRB motorized actuator series provide reliable motorized linear motion in a lightweight and very compact package. Improvements compared to the TRA actuator include: higher speed, better repeatability and higher axial loading. The cable on the side provides more flexibility for cable routing. To provide the best fit to an application, the TRB actuators are available in open-loop stepper and closed-loop DC servo motor versions. The integrated optical limit switches of the TRB actuators provide a repeatable reference/home. TRB actuators are direct replacement of micrometers which are found in a wide variety of linear and rotation stages, and are ideal for OEM applications.

The CONEX-TRB series is TRB actuator with the integrated CONEX-CC controller/driver and is pre-configured for the highest level of out-of-the-box control. The CONEX-CC is a very compact and inexpensive driver for Newport's low power DC servo motor driven devices.

Specifications

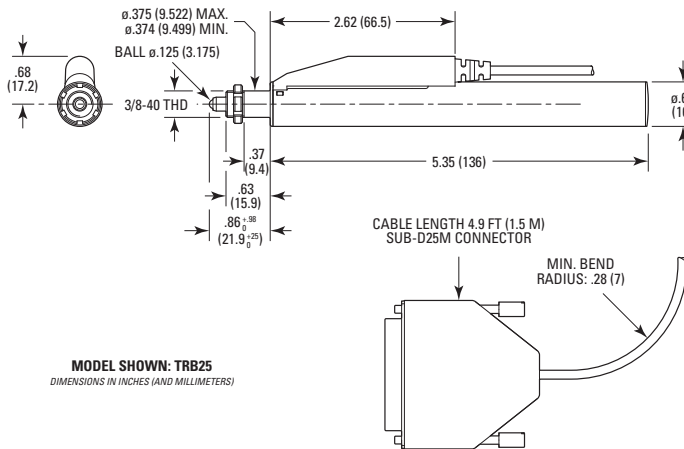
	TRB25CC	TRB12CC	TRB6CC	TRB12PP	TRB25PP	TRB6PP
Axial Load Capacity (+Cx)	0 N					
Inverse Axial Load Capacity (-Cx)	-90 N					
Travel Range	25 mm	12 mm	6 mm	12 mm	25 mm	6 mm
Minimum Incremental Motion	0.10 μ m					
Maximum Speed	2 mm/s			0.3 mm/s		
Accuracy, Typical	\pm 2.0 μ m			\pm 2.0 μ m		
Accuracy, Guaranteed	\pm 5.0 μ m	\pm 4.0 μ m	\pm 3.0 μ m	\pm 4.0 μ m	\pm 5.0 μ m	\pm 4.0 μ m
Bi-directional Repeatability, Typical	\pm 0.15 μ m	\pm 0.13 μ m		\pm 0.15 μ m		
Uni-directional Repeatability, Typical	\pm 0.08 μ m	\pm 0.08 μ m	\pm 0.08 μ m	\pm 0.08 μ m		
Bi-directional Repeatability, Guaranteed	\pm 0.15 μ m	\pm 0.13 μ m	\pm 0.75 μ m	\pm 0.75 μ m		
Uni-directional Repeatability, Guaranteed	\pm 0.25 μ m			\pm 0.25 μ m		
Origin Repeatability	\pm 2 μ m					
Cable Length	1.5 m					
Weight	0.23 kg					
MTBF	10000 h (25N load, 10% duty cycle)					
CE	Compliant					

Ordering Information

Model	Description
TRB6CC	Compact Motorized Actuator, 6 mm Travel, DC Servo Motor, 90N
TRB6PP	Compact Motorized Actuator, 6 mm Travel, Stepper Motor
TRB12CC	Compact Motorized Actuator, 12 mm Travel, DC Servo Motor, 90N
TRB12PP	Compact Motorized Actuator, 12 mm Travel, Stepper Motor
TRB25CC	Compact Motorized Actuator, 25 mm Travel, DC Servo Motor, 90N
TRB25PP	Compact Motorized Actuator, 25 mm Travel, Stepper Motor
CONEX-TRB6CC ¹	TRA6CC Actuator Integrated with CONEX Controller
CONEX-TRB12CC ¹	TRA12CC Actuator Integrated with CONEX Controller
CONEX-TRB25CC ¹	TRB25CC Actuator Integrated with CONEX Controller
ADAPT-TRA25	TRA25 Actuator Adapter for Opto-Mechanics

¹Order CONEX-PS separately.

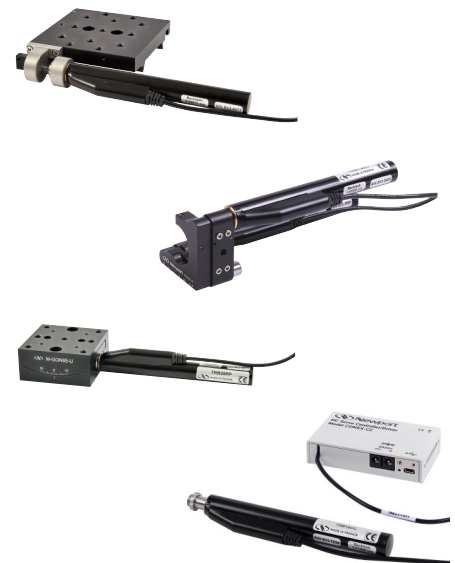
Dimensions



Recommended Motion Controllers

- XPS-RL see page 153
- XPS-D see page 148
- ESP301 see page 157
- SMC100CC see page 159 CC versions only
- SMC100PP see page 159 PP versions only
- CONEX-CC see page 161 Included in Conex-TRBXCC

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146. Motor cable included.



TRA Series

Compact Motorized Actuators



- Low cost stepper & DC servo actuators
- Light and compact in-line design
- Vacuum compatible stepper motor versions
- Replaces manual micrometer drives with similar form-factor
- Integrated optical limit switches prevent component & motor damage
- Hard-coated steel actuator ball tip

The TRA series miniature motorized actuators provide reliable motorized motion in a small diameter, lightweight package. TRA actuators incorporate an excellent space saving design that allows them to be used with a wide variety of linear stages, mirror mounts, and OEM applications. The TRA6 is recommended for motorizing 561 series linear stages, 481 and RS65 rotation stages. The TRA12 is compatible with Ultima and Suprema mirror mounts, ULTRAlign, 460A series linear stages. The TRA25 is recommended for 25 mm travel in a slightly larger package and is the recommended choice for motorizing longer travel linear stages and other devices with long travel. To provide the best fit for your application, TRA actuators are available in stepper, stepper vacuum and closed-loop DC servo motor versions. All TRA actuators feature integrated optical limit switches, preventing over travel and providing a method for repeatable referencing. TRA actuators also feature a hard-coated steel ball tip that minimizes contact surface wear compared to other designs that use regular steel ball tips.

The CONEX-TRA series is TRA actuator with the integrated CONEX-CC controller/driver and is pre-configured for the highest level of out-of-the-box control. The CONEX-CC is a very compact and inexpensive driver for Newport's low power DC servo motor driven devices.

Specifications

	TRA12CC	TRA25CC	TRA6CC	TRA12PPD	TRA25PPD	TRA6PPD
Axial Load Capacity (+Cx)	0 N					
Inverse Axial Load Capacity (-Cx)	-60 N					
Travel Range	12 mm	25 mm	6 mm	12 mm	25 mm	6 mm
Minimum Incremental Motion	0.20 μm			0.10 μm		
Maximum Speed	0.4 mm/s			0.4 mm/s		
Accuracy, Typical	$\pm 2.2 \mu\text{m}$	$\pm 2.5 \mu\text{m}$	$\pm 1.5 \mu\text{m}$	$\pm 2.2 \mu\text{m}$	$\pm 2.5 \mu\text{m}$	$\pm 1.5 \mu\text{m}$
Accuracy, Guaranteed	$\pm 4.0 \mu\text{m}$	$\pm 5.0 \mu\text{m}$	$\pm 3.0 \mu\text{m}$	$\pm 4.0 \mu\text{m}$	$\pm 5.0 \mu\text{m}$	$\pm 3.0 \mu\text{m}$
Bi-directional Repeatability, Typical	$\pm 0.15 \mu\text{m}$	$\pm 0.18 \mu\text{m}$	$\pm 0.15 \mu\text{m}$		$\pm 0.18 \mu\text{m}$	$\pm 0.15 \mu\text{m}$
Uni-directional Repeatability, Typical	$\pm 0.10 \mu\text{m}$	$\pm 0.15 \mu\text{m}$	$\pm 0.10 \mu\text{m}$		$\pm 0.15 \mu\text{m}$	$\pm 0.10 \mu\text{m}$
Bi-directional Repeatability, Guaranteed	$\pm 1.25 \mu\text{m}$					
Uni-directional Repeatability, Guaranteed	$\pm 0.50 \mu\text{m}$					
Origin Repeatability	$\pm 2 \mu\text{m}$					
Cable Length	3 m					
Weight	0.25 kg	0.28 kg	0.23 kg	0.25 kg	0.28 kg	0.23 kg
MTBF	10000 h (25N load, 10% duty cycle)					
CE	Compliant					

1. Also available in a vacuum compatible version TRA-PPV6.
2. Inverse axial load capacity is reduced to -30 N for TRA-PPV6 versions.
3. Maximum speed is reduced to 0.2 mm/sec for TRA-PPV6 versions.



For compatible manual positioners see page 119

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Ordering Information

Model	Description
TRA6CC	Miniature Motorized Actuator, 6 mm Travel, DC Servo Motor
TRA6PPD	Miniature Motorized Actuator, 6 mm Travel, Stepper, 25-pin D-Sub
TRA6PPV6	Miniature Motorized Actuator, 6 mm Travel, Vacuum Compatible
TRA12CC	Miniature Motorized Actuator, 12 mm Travel, DC Servo motor
TRA12PPD	Miniature Motorized Actuator, 12 mm Travel, Stepper, 25-pin D-Sub
TRA12PPV6	Miniature Motorized Actuator, 12 mm Travel, Vacuum Compatible
TRA25CC	Miniature Motorized Actuator, 25 mm Travel, DC Servo Motor
TRA25PPD	Miniature Motorized Actuator, 25mm Travel, Stepper Motor, 25-pin D-Sub
TRA25PPV6	Miniature Motorized Actuator, 25 mm Travel, Vacuum Compatible
CONEX-TRA6CC ¹	TRA6CC Actuator Integrated with CONEX Controller
CONEX-TRA12CC ¹	TRA12CC Actuator Integrated with CONEX Controller
CONEX-TRA25CC ¹	TRA25CC Actuator Integrated with CONEX Controller
ADAPT-TRA25	TRA25 Actuator Adapter for Opto-Mechanics
ADAPT-TRA	TRA6 & TRA12 Actuator Adapter for Opto-Mechanics

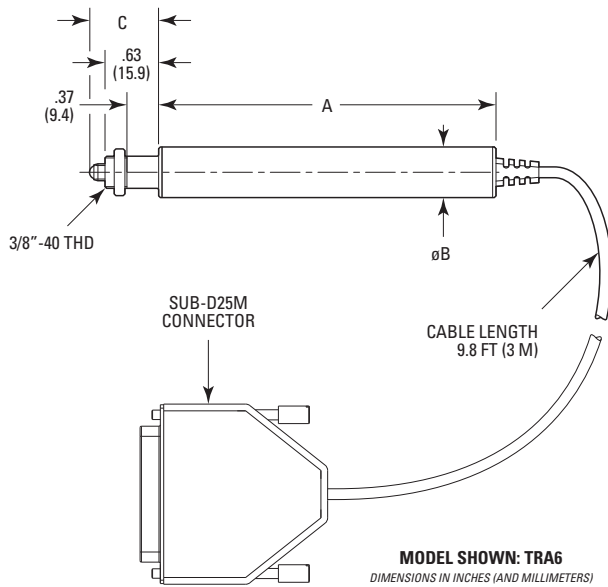
¹Order CONEX-PS separately.

Recommended Motion Controllers

XPS-RL see page 153	
XPS-D see page 148	
ESP301 see page 157	
SMC100CC see page 159	TRA-CC only
SMC100PP see page 159	TRA-PPD and TRA-PPV6 only
CONEX-CC see page 161	Included in CONEX-TRAXXCC

Driver cards to be ordered separately. Please refer to Stage to Controller compatibility chart on page 146. Motor cable included.

Dimensions



	A	B	C
TRA6	3.94 (100)	.59 (15)	.81 ⁺²⁴ ₀ (20.5 ⁺⁶ ₀)
TRA12	4.45 (113)	.59 (15)	.66 ⁺⁴⁹ ₀ (16.8 ^{+12.5} ₀)
TRA25	4.72 (120)	.71 (18)	.66 ⁺⁵⁸ ₀ (16.8 ⁺²⁵ ₀)



Compact XY module used for focus and cell-to-cell pitch adjustments in PV laser scribe systems.



CAD See our website for CAD files

Picomotor™ Piezo Linear Actuators



From left to right: Models 8341, 8301, 8302, and 8303.

- 30 nm positioning resolution
- Substantial 22 N axial load capacity
- Set-and-forget long-term stability
- Easy-to-use, flexible controller/drivers
- Manual adjustment knob
- Simple integration



New Focus Picomotor actuators are ideal devices for motorizing fine-positioning stages and mounts in optical or mechanical systems. Use them with optomechanical translation stages or custom devices. They have better than 30-nm resolution with minimal backlash, and can exert a 5-lb (22-N) force. Moreover, they have exceptional longterm 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. Such applications include precision control of sample holders inside cold and/or vacuum chambers, hands-off adjustment of hard-to-reach mirror mounts, or adjustments of optical mounts that are sensitive to forces applied while twisting a knob (for instance optimizing the alignment of a laser cavity or adjusting the pointing of a beam over a long distance).

The standard sized shanks of the Models 830X and 12X0.5-mm threading of the Models 832X let them fit into standard micrometer mounting holes. The Tiny Model 8353 gives you a solution for even the smallest application. For rotation without translation, use the Model 8341NF rotating shaft.

Use these Picomotor actuators with our Model 8742 Open-Loop Picomotor Controller/Driver or Model 8743-CL Closed-Loop Picomotor Controller/Driver.

Contact us for custom configurations and volume pricing.

Specifications








	8301NF	8302	8303	8310	8321	8322NF
Travel Range	12.7 mm	25.4 mm	50.8 mm	12.7 mm	12.7 mm	25.4 mm
Maximum Speed	1.2 mm/min					
Axial Load Capacity	22 N					
Minimum Incremental Motion	<30 nm					
Drive Torque	0.018 Nm					
Frequency	2 kHz					
Mounting	9.5 mm Shank			M12 x 0.5 mm Thread		
Cable Length	2.1 m					
Connector Type	4-Pin RJ-22					
Rated Life	> 1 x 10 ⁹ steps					
Operating Temperature	10 ⁻⁴⁰ C					

Ordering Information

Model	Description
8301NF	Picomotor Actuator, 0.5 in. Travel, 30 nm Resolution, 9.5 mm Shank
8302	Picomotor Actuator, 1 in. Travel, 30 nm Resolution, 9.5 mm Shank
8303	Picomotor Actuator, 2 in. Travel, 30 nm Resolution, 9.5 mm Shank
8321	Picomotor Actuator, 0.5 in. Travel, 30 nm Res., M12 x 0.5 mm Thread
8322NF	Picomotor Actuator, 1 in. Travel, 30 nm Res., M12 x 0.5 mm Thread
8341NF	Rotating Picomotor Actuator, 3-4 RPM, 9.5 mm Shank
8310	Closed Loop Picomotor Actuator, 12.7 mm Travel

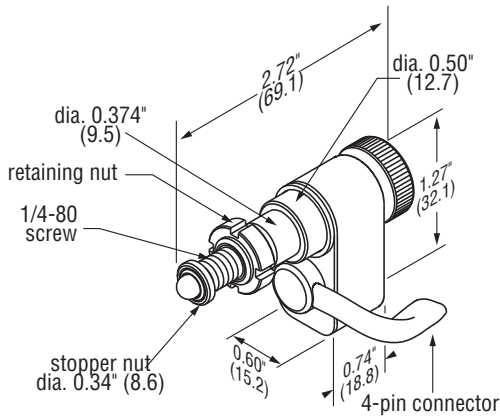
MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

Picomotor Piezo Linear Actuators

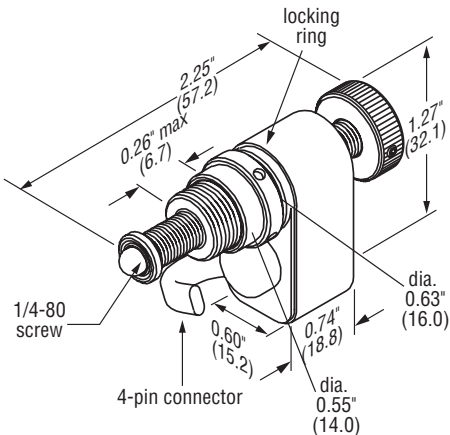
	Model	Travel Range(mm)	Mounting
	8301NF	12.7	0.375 in. (9.5 mm) Shank
	8302	25.4	0.375 in. (9.5 mm) Shank
	8303	50.8	0.375 in. (9.5 mm) Shank
	8321	12.7	M12 x 0.5 mm Thread
	8322NF	25.4	M12 x 0.5 mm Thread
	8341NF	NA	0.375 in. (9.5 mm) Shank
	8310	12.7	0.375 in. shank (9.5 mm shank)

Dimensions

Model 8302

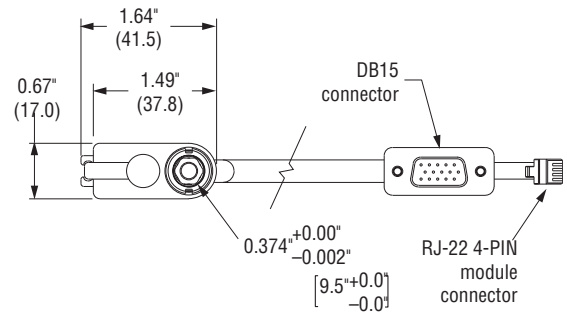
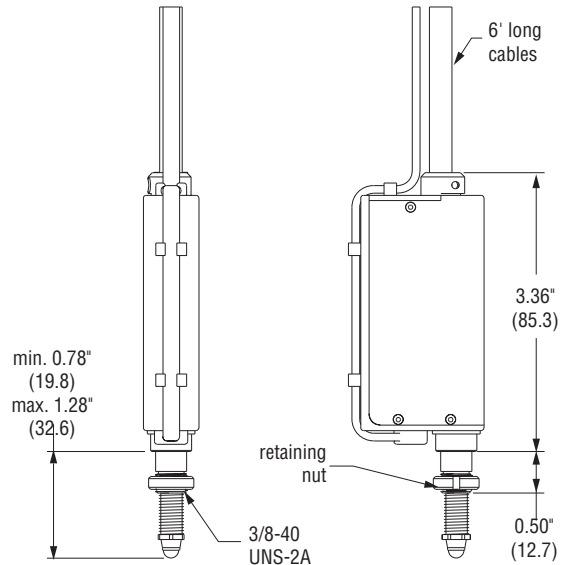


Model 8321

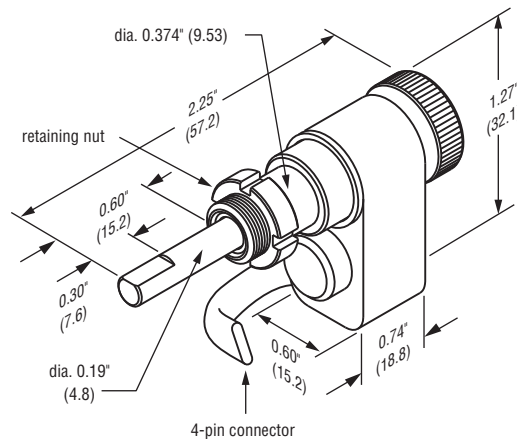


Model 8310

U.S. Patent #5,394,049 & #5,410,206



Model 8341



Recommended Motion Controllers

8742 see page 166

8743 see page 166

Tiny Picomotor™ Actuators



- 30 nm positioning resolution
- Ultra-compact design
- Set-and-forget long-term stability
- Simple integration
- Substantial force
- Easy-to-use, flexible controller/drivers

Our Tiny Picomotor actuator is a smaller-sized version of our standard Picomotor actuators. We have improved the design so that it will meet even more of your compact-area needs.

The Tiny Picomotor actuator is ideal for moving small linear stages, like our Compact Gothic-Arch-Bearing stage. It is also integrated with some of our Pint-Sized mounts. The overall footprint is even smaller now; the cable exits from the side, similarly to our standard Picomotor actuators. For such a small device, it has an impressive pushing force. The maximum load for the Tiny Picomotor actuator is now 3 lbs (13 N).

With two mounting options, a standard 0.25" shank and a 1/4-40 thread version, it is straight-forward to incorporate it into your design. The Tiny Picomotor Actuator should be used with the 8742 Intelligent Picomotor controller/driver or our 8712 TTL/Analog Picomotor driver.

Specifications

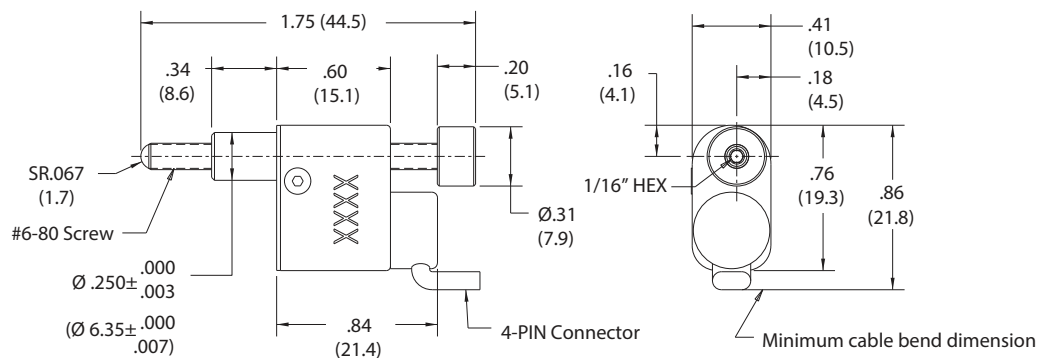
	8353	8354
Travel Range		12.7 mm
Minimum Incremental Motion		<30 nm
Maximum Speed		1.0 mm/min
Axial Load Capacity		13 N
Mounting	6.35 mm Shank	1/4-40 Thread with Retaining Nut
Frequency		1.75 kHz
Drive Torque		0.014 Nm
Cable Length		2.1 m
Connector Type		4-Pin RJ-22
Rated Life		>1.5x10 ⁸ steps
Operating Temperature		10 ⁻⁴⁰ C

Ordering Information

Model	Description
8353	Tiny Picomotor Actuator, 12.7mm Travel, 30 nm Resolution, 6.35 mm Shank
8354	Tiny Picomotor Actuator, 12.7mm Travel, 30 nm Resolution, 1/4-40 Thread with Retaining Nut

Recommended Motion Controller

8742 see page 166



Vacuum and Ultra-High Vacuum Picomotor™ Actuators



- Vacuum and ultra-high vacuum versions
- <30 nm linear resolution
- Set-and-forget long-term stability
- Teflon or Kapton wires

All New Focus vacuum compatible and ultra-high vacuum compatible Picomotor actuators come with short, Teflon®-coated leads so you can make connections to your vacuum-chamber feedthrough. Working with x-rays or other high-radiation applications can require ordering a custom version with Kapton®-coated wire extensions. While Teflon is compatible for use in high-vacuum environments, it is not recommended for use in high-radiation applications where, with repeated exposure to X-rays and other radiation, it can degrade and fall off, possibly causing electrical shorts. Contact New Focus tech support for ordering these customized Picomotor version actuators for use in high-radiation applications.

Specifications

	8301-V 8301-UHV 8301-UHV-KAP 8301-UHV-NM	8302-V 8302-UHV 8302-UHV-KAP 8302-UHV-NM	8303-V	8321-V 8321-UHV 8321-UHV-KAP 8321-UHV-NM	8322-V	8341-V 8341-UHV	8310-V	8353-V 8353-UHV
Travel Range	12.7 mm	25.4 mm	50.8	12.7 mm	25.4 mm	360°	12.7 mm	12.7 mm
Minimum Incremental Motion	30 nm							
Maximum Speed	1.2 mm/min							
Axial Load Capacity	22 N							
Mounting	9.5 mm Shank			M12 x 0.5 mm Thread		9.5 mm Shank	9.5 mm Shank	6.35 mm Shank (-V) 5.08 mm Shank (-UHV)
Frequency	2 kHz							
Drive Torque	0.018 Nm							
Cable Length	2.1 m							
Connector Type	4-pin RJ-22 (non-vacuum-rated)							
Environment	Ultra High Vacuum							
Vacuum Compatibility	10 ⁻⁹ Torr							
Vacuum Wire Material	Kapton							
Wire Length	152 mm							
Operating Temperature	10-40 C							

Closed Loop Vacuum Picomotor Actuators



Model 8310-V

- Compatible to 10^{-6} Torr
- Calibrated highly accurate positioning with all the benefits of our traditional Picomotor actuators
- Completely compatible with our modular iPico™ network controllers

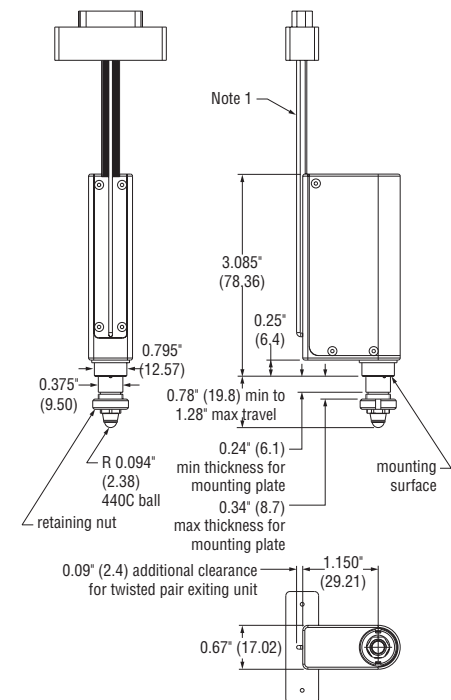
The 8310-V Vacuum-Compatible Closed-Loop Picomotor™ Actuator is ideal for applications where closed-loop control and absolute position calibration is required in a clean environment. Just like the Model 8310 closed-loop Picomotor actuator, the Model 8310-V offers an integrated rotary encoder and forward and reverse limit switches. It offers the best attributes of the standard Picomotor™ actuator including <30-nm resolution, >5 lbs (22 N) of force along with set-and-forget long-term stability with the added benefits of exceptional accuracy and $\pm 1\text{-}\mu\text{m}$ bi-directional repeatability over the entire half-inch travel range.

Specifications

	8310-V
Travel Range	12.7 mm
Minimum Incremental Motion	30 nm
Maximum Speed	1.2 mm/min
Axial Load Capacity	22 N
Mounting	9.5 mm Shank
Bi-directional Repeatability, Guaranteed	$\pm 1\ \mu\text{m}$
Frequency	2 kHz
Drive Torque	0.018 Nm
Limit Switches	2
Cable Length	1.8 m
Connector Type	15-Pin D and 4-Pin RJ-22
Encoder Type	Optical
Rated Life	$>1 \times 10^8$ steps
Closed Loop Resolution	63.5 nm
Operating Temperature	10-40° C

Model 8310-V

U.S. Patent #5,394,049, #6,911,763, & #5,410,206

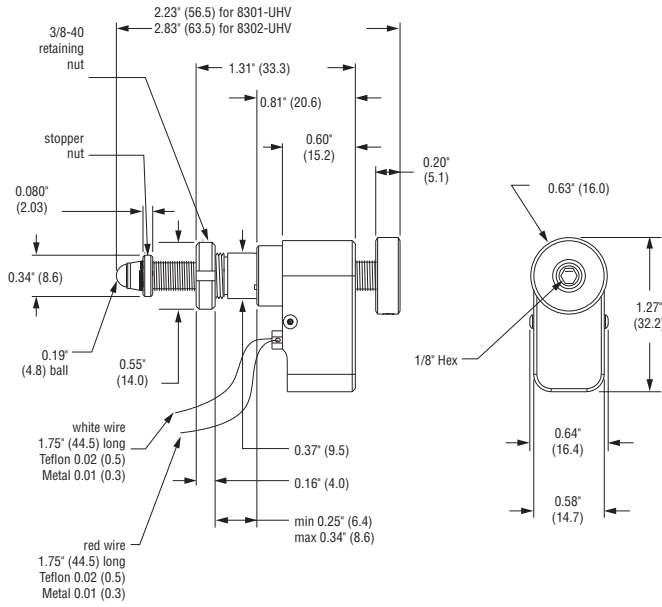


1. Cables shown are 19' long with a PEEK 15 PIN miniature Sub-D Connector. Sensor wire is a 11 Conductor Teflon Ribbon Cable and Picomotor wire is a shielded 2 wire twisted pair.

MOTORIZED LINEAR STAGES
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 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

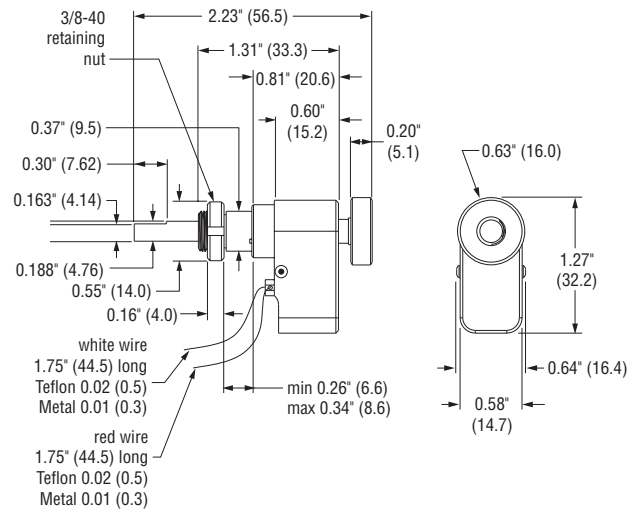
Model 830x

U.S. Patent #5,394,049 & #5,410,206



Model 8321

U.S. Patent #5,394,049 & #5,410,206



Ordering Information

Model	Description
8301-V	Vacuum Compatible Picomotor Actuator, 0.5 in. Travel, 0.375 in. Shank
8302-V	Vacuum Compatible Picomotor Actuator, 1.0 in. Travel, 0.375 in. Shank
8303-V	Vacuum Compatible Picomotor Actuator, 2.0 in. Travel, 0.375 in. Shank
8321-V	Vacuum Compatible Picomotor Actuator, 12.7 mm Travel, 12x0.5 mm Thread
8322-V	Vacuum Compatible Picomotor Actuator, 25.4 mm Travel, 12x0.5 mm Thread
8341-V	Vacuum-Compatible Picomotor Actuator, Rotating Shaft
8310-V	Vacuum-Compatible Closed-Loop Picomotor Actuator, 12.7 mm Travel
8353-V	Vacuum-Compatible Tiny Picomotor Actuator, 0.5 in. Travel

Recommended Motion Controller

8742 see page 166

8743 see page 166

NanoPZ

Ultra-High Resolution Actuators



- Ultra-high resolution
- 50 N load capacity
- 0.2mm/s max speed
- Non-rotating tip
- Ideal for set-and-forget applications



The NanoPZ Ultra-High Resolution Actuator provides exceptional nanometer-scale remote control of manual-positioning stages and optomechanical components over large distances, in hard to reach spaces and in hazardous hands-off applications, like high-power laser experiments. The NanoPZ's non-rotating tip prevents contact surface wear and allows for direct load attachments. Newport's exclusive design and innovative piezo motor ensures 30 nm incremental motion capabilities with no loss of position when power is removed. The NanoPZ incorporates the exclusive piezo micro stepping motor and, with ergonomic controls, provides consistent results and superior reliability. The NanoPZ is compatible with an array of Newport products including ULTIMA® Series optical mounts, GON Series goniometers, and ULTRAlign™ Series of linear stages.

PZA12 Specifications

	PZA12
Travel Range	12.5 mm
Minimum Incremental Motion	30 nm
Maximum Speed	0.2 mm/s
Axial Load Capacity	50 N
Cable Length	3 m
Weight	0.13 kg
Motor	Non-resonant piezo micro-stepping

Recommended Motion Controller

PZC200 see page 172

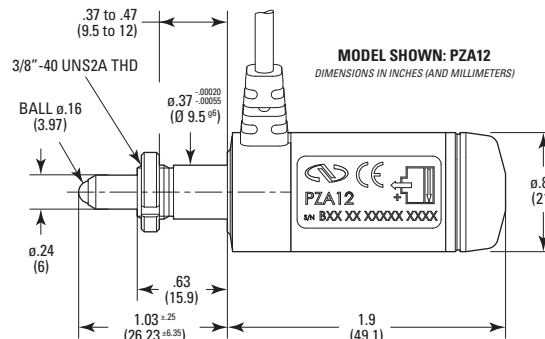
Ordering Information

Model	Description
PZA12	NanoPZ Ultra-High Resolution Actuator, 12.5mm Travel
PZC200	Hand-held controller for PZA12
PZC200-KT	PZA12 Actuator Kit, PZC200 Cont. NSC-PS25 Power Supply, NSC-PSC3 Cable
PZC-SB	PZC200 Switchbox, Includes Power, Driver & Controller Cables Switchbox allows one PZC200 to drive up to 8 actuators. Included cables: P/N 417971-01 1.8 m (6 ft) power cable to controller, P/N 44415-01 6 pin Mini DIN motor cable (6 ft), P/N NSC-CB2 1.8 m (6 ft) RS-485 cable to controller

Notes:

1. For high duty applications, please consult with Newport applications engineering.
2. The PZC200 must be used with the PZA12.

Dimensions



NPA Series

NanoPositioning Piezo Translators



- Sub-nanometer positioning resolution
- Ultra-high load capacity
- Optional strain-gauge position feedback
- Vacuum compatible versions



The NPA Series Piezo Translators are ideally suited for integration into custom motion devices and provide nanometer resolution, up to 100 mm travel range, and micro-second response time in a very compact housing. NPA translators are equipped with a highly reliable, multi-layer, low-voltage, piezoelectric transducer (PZT) stack protected by a cylindrical stainless steel housing. The high internal mechanical preload simplifies handling allowing for high load, dynamic applications. NPA translators can generate large forces up to 1000 N making them particularly useful for machine tools, active vibration isolation, or adaptive mechanics. Their small size and high resonant frequency are suitable for scanning microscopy, laser tuning, beam steering, patch clamping, or micro lithography applications. NPA actuators are available as open-loop (no position feedback) or closed-loop devices with integrated position feedback. In open-loop, the resolution is limited by the noise of the control electronics, but repeatability and stability are compromised due to the hysteresis and creep of the piezo ceramic material.

Fastening is accomplished by M3 threads at the top and the base of the translator. Like all piezoelectric devices, moment loads and side forces should be avoided. Spanner flats are provided and should be used when securing screws.

Specifications

	NPA100	NPA100SG	NPA100SGV6	NPA100V6	NPA25	NPA25SG
Travel Range	100 μ m				25 μ m	
Axial Load Capacity	1000 N					
Load Capacity, Pull	150 N					
Axial Stiffness	10 N/ μ m				40 N/ μ m	
Capacitance	9				2.5	
Resonant Frequency	3000				12000	
Cable Length	1 m	2 m	2 m	1 m	1 m	2 m
Closed Loop Repeatability		28 nm	28 nm			16 nm
Closed Loop Resolution		2.0 nm	2.0 nm			0.5 nm
Open Loop Resolution	0.2 nm	0.2 nm	0.2 nm	0.2 nm	0.05 nm	0.05 nm
Closed Loop Travel Range		80 μ m	80 μ m			20 μ m
Vacuum Compatibility			10 ⁻⁶ hPa	10 ⁻⁶ hPa		

D-Versions Available

Ordering Information

Model	Description
NPA25	Nano-Positioning Open-loop Piezo Actuator, 25 μ m
NPA25SG	Nano-Positioning Piezo Actuator, 25 μ m, Strain-gauge
NPA50	Nano-Positioning Open-loop Piezo Actuator, 50 μ m
NPA50SG	Nano-Positioning Piezo Actuator, 50 μ m, Strain-gauge
NPA100	Nano-Positioning Open-loop Piezo Actuator, 100 μ m
NPA100SG	Nano-Positioning Piezo Actuator, 100 μ m, Strain-gauge

Add -D for XPS compatible models
Add V6 for vacuum compatible models

Recommended Motion Controllers

NPC3 see page 173	
NPC3SG see page 173	
XPS-D see page 148	For -D version only
XPS-RL see page 153	For -D version only
NPC1USB see page 174	For -D version only

Note: NPM140 is compatible with NPC3. NPM140SG is compatible with NPC3SG.

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BEAM MANAGEMENT
SPECIAL COLLECTIONS

NPM Series

NanoPositioning Piezoelectric Micrometer Adapter



NPM140SG shown with AJS100-2. Order actuators separately.

- Sub-nanometer positioning resolution
- Large piezoelectric travel range
- 100 N axial load capacity
- Nanometer scale automated positioning of manual products
- Optional strain-gauge position feedback



The New Focus NPM140 Piezoelectric micrometer adapter provides nanometer positioning capability for manual products. This adapter mounts to the actuator seat on the stage and is mechanically compatible with all Newport stages, mounts and actuators with .375" (Ø 9.5mm) mounting flange.

Specifications

	NPM140	NPM140SG
Travel Range	140 µm	
Axial Load Capacity	100 N	
Load Capacity, Pull	150 N	
Axial Stiffness	0.4 N/µm	
Capacitance	1.7	
Resonant Frequency	670	
Cable Length	1 m	2 m
Closed Loop Repeatability	35 nm	
Closed Loop Resolution	1 nm	
Open Loop Resolution	0.1 nm	
Closed Loop Travel Range	90 µm	
Weight	0.125 kg	

Ordering Information

Model	Description
NPM140	Piezo-electric Open-loop Micrometer Adapter, 140 µm
NPM140SG	Piezoelectric Micrometer Adapter, 140 µm, Strain-gauge
NPM140-D	Piezoelectric Open-loop Micrometer Adapter, 140 µm, XPS
NPM140SG-D	Piezoelectric Micrometer Adapter, 140 µm, Strain-gauge, XPS
NPC3	3-channel piezo stack amplifier, open-loop control
NPC3SG	3-channel piezo amplifier, strain-gauge position control

Recommended Motion Controllers

NPC3 see page 173

NPC3SG see page 173

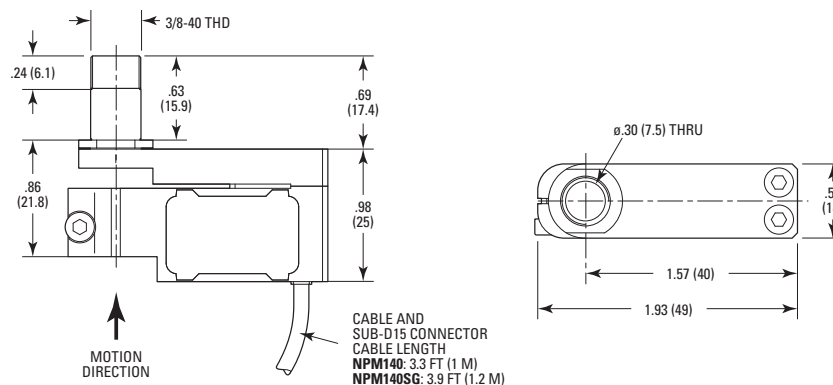
XPS-D see page 148 For -D version only

XPS-RL see page 153 For -D version only

NPC1USB see page 174 For -D version only

Note: NPM140 is compatible with NPC3. NPM140SG is compatible with NPC3SG.

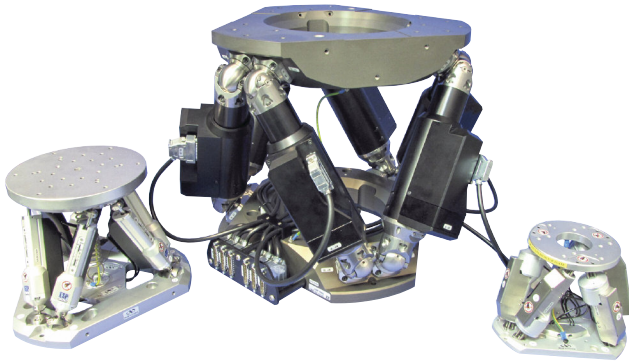
Dimensions



MODEL SHOWN: NPM140
DIMENSIONS IN INCHES (AND MILLIMETERS)

Hexapod

6-Axis Parallel Kinematic Positioning System



- Compact, integrated 6-axis positioner
- Light but with High stiffness (particularly in z)
- No moving cables
- No accumulation of motion errors
- Two Virtual centers of rotation, set by software
- 5, 20 or 450 kg centered load capacity
- Vacuum (10^{-6} hPa) versions available



A Hexapod is a parallel kinematic motion device that provides six degrees of freedom: X, Y, Z, pitch, roll, and yaw. Hexapods are ingenious and effective solutions to complex motion applications that require high load capacity and accuracy in up to six independent axes. Hexapods having the image of being complex and highly priced, Newport Hexapods, on the contrary, are not only affordable but extremely easy to use and easily re-configurable. Newport Hexapods are driven by six, industry-proven, high performance actuators using designs that leverage Newport's expertise in actuators. The quality of the actuators has obviously a strong impact on the overall motion performance of a Hexapod, but of almost equal importance are the joints connecting the actuators to the base and the moving top plate. Embracing this challenge, our engineers came up with a unique design of joints that are not only simple, but also provide significantly higher rigidity than ordinary universal joints. The result is a Newport Hexapod that provides more than five-times higher rigidity and twice the load capacity of other hexapods of similar size.

Applications

- Optics and satellite assembly and testing
- AED simulation
- Astronomy
- Biotechnology, surgery
- X-Ray diffraction
- Micromachining, micro-manipulation
- Device Alignment

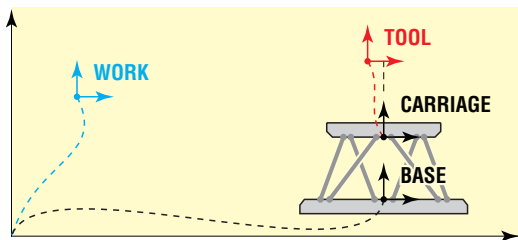
RightPath™ Advantage

Newport hexapods have other advantages in addition to stiffness. Two main advantages are two programmable pivot points (Tool and Work coordinate systems) and RightPath™ Trajectory Control. The locations of the Tool and Work Coordinate Systems can be changed via command, and all the transformations are automatically re-calculated without having to power down the controller. RightPath™ Trajectory Control enables scanning in a path along a defined trajectory, line, arc or rotation, with minimal runout and at a constant and definable speed.

Ordering Information

Model	Description
HXP50-MECA	6-Axis Hexapod, 5 kg Load Capacity
HXP50-ELEC	Hexapod Controller/Driver, For HXP50-MECA
HXP50-MECAV6	6-Axis Hexapod, 5 kg Capacity, Vacuum
HXP50-ELECV6	Hexapod Controller/Driver, HXP50-MECAV6
HXP100-MECA	6-Axis Hexapod, 20 kg Load Capacity
HXP100-ELEC	Hexapod Controller/Driver, For HXP100-MECA
HXP100-MECAV6	6-Axis Hexapod, 20 kg Load Capacity, Vacuum
HXP100-ELECV6	Hexapod Controller/Driver, For HXP100-MECAV6
HXP100P-MECA	6-Axis Hexapod, 6 kg Load Capacity
HXP100P-ELEC	Hexapod Controller/Driver, For HXP100P-MECA
HXP200-MECA	High Load Capacity Hexapod, 50 kg Centered, M6
HXP200-ELEC	Hexapod Controller and Driver, For HXP200-MECA
HXP200S-MECA	High Load Capacity Hexapod, 85 kg Centered, M6
HXP200S-ELEC	Hexapod Controller and Driver, For HXP200S-MECA
HXP1000-MECA	6-Axis Hexapod, 450 kg Load Capacity
HXP1000-ELEC	Hexapod Controller/Driver, For HXP1000-MECA

An HXPxxx-MECA must be ordered with an HXPxxx-ELEC controller.



Two virtual centers of rotations

Absolute moves and positions are defined in the work coordinate system. Incremental moves can be done in the tool or in the work coordinate systems.

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SPECIAL COLLECTIONS

High Precision HXP Specifications

	HXP50-MECA	HXP100-MECA	HXP100P-MECA
Size	Ø200 x 151 mm	Ø300 x 209 mm	Ø300 x 209 mm
Platform Diameter	125 mm	200 mm	200 mm
Travel Range X, Y, Z ¹	±17, ±15, ±7 mm	±27.5, ±25, ±14 mm	±27.5, ±25, ±14 mm
Travel Range ØX, ØY, ØZ	±9, ±8.5, ±18 °	±11.5, ±10.5, ±19 °	±11.5, ±10.5, ±19 °
Minimum Incremental Motion X, Y, Z ²	0.10, 0.10, 0.05 µm	0.5, 0.5, 0.25 µm	0.10, 0.10, 0.05 µm
Minimum Incremental Motion ØX, ØY, ØZ	0.05, 0.05, 0.10 mdeg	0.25, 0.25, 0.5 mdeg	0.05, 0.05, 0.10 mdeg
Uni-directional Repeatability X, Y, Z - Typical	±0.10, ±0.10, ±0.05 µm	±0.25, ±0.25, ±0.125 µm	±0.10, ±0.10, ±0.05 µm
Uni-directional Repeatability ØX, ØY, ØZ - Typical	±0.05, ±0.05, ±0.10 mdeg	±0.125, ±0.125, ±0.25 mdeg	±0.05, ±0.05, ±0.10 mdeg
Maximum Speed X, Y, Z	14, 12, 5 mm/s	2.5, 2, 1 mm/s	12, 10, 5 mm/s
Maximum Speed ØX, ØY, ØZ	6, 6, 15 °/s	1.8, 1.7, 3 °/s	8, 8, 16 °/s
Rigidity X, Y, Z ³	2, 2, 25 N/µm	5, 5, 40 N/µm	3, 3, 24 N/µm
Centered Load Capacity ⁴	50 N	200 N	60 N
Cable Length	3 m	1.5 m	3 m
Motor	DC Servo		
Weight	2.2 kg	7.2 kg	
Thread Type	M6	M6	M6
CE	Compliant		

1. Travel ranges are interdependent. The listed values are max. travels per axis when all other axis are in their centered position.
2. Open loop values shown
3. Stiffness depends on Hexapod position. Values are given for all axis in their centered position.
4. Value shown for horizontal base plate. See graphs for maximum payload height and cantilever distance on product pages.

High Accuracy HXP Specifications

	HXP50HA-MECA	HXP100HA-MECA	HXP100PHA-MECA
Size	Ø200 x 151 mm	Ø300 x 209 mm	Ø300 x 209 mm
Travel Range X, Y, Z ¹	±17, ±15, ±7 mm	±27.5, ±25, ±14mm	±27.5, ±25, ±14 mm
Travel Range ØX, ØY, ØZ	±9, ±8.5, ±18 °	±11.5, ±10.5, ±19 °	±11.5, ±10.5, ±9 °
Minimum Incremental Motion X, Y, Z ²	0.10, 0.10, 0.05 µm	0.30, 0.30, 0.16 µm	0.10, 0.10, 0.05 µm
Minimum Incremental Motion ØX, ØY, ØZ	0.05, 0.05, 0.10 mdeg	0.25, 0.25, 0.5 mdeg	0.05, 0.05, 0.10 mdeg
Uni-directional Repeatability X, Y, Z - Typical	±0.10, ±0.10, ±0.05 µm	±0.14, ±0.13, ±0.05µm	±0.10, ±0.10, ±0.05 µm
Uni-directional Repeatability X, Y, Z - Guaranteed	±0.15, ±0.15, ±0.075 µm	±0.25, ±0.25, ±0.125 µm	±0.15, ±0.15, ±0.075 µm
Uni-directional Repeatability ØX, ØY, ØZ - Typical	±0.05, ±0.05, ±0.10 mdeg	±0.125, ±0.125, ±0.25 mdeg	±0.05 ±0.05, ±0.10 mdeg
Accuracy XYZ, Guaranteed	±5.0, ±5.0, ±2.5 µm	±10, ±10, ±5µm	±5.0, ±5.0, ±2.5µm
Maximum Speed X, Y, Z	14, 12, 5 mm/s	2.5, 2, 1 mm/s	12, 10, 5 mm/s
Maximum Speed ØX, ØY, ØZ	6, 6, 15 °/s	1.8, 1.7, 3 °/s	8, 8, 16 °/s
Rigidity X, Y, Z ³	2, 2, 25 N/µm	5, 5, 40 N/µm	3, 3, 24 N/µm
Pitch X, Y, Z - Guaranteed	±50, ±50, ±25 µrad	±75, ±75, ±75 µrad	±37.5, ±37.5, ±37.5 µrad
Yaw X, Y, Z - Guaranteed	±50, ±50, ±25 µrad	±75, ±75, ±75 µrad	±37, ±37, ±37 µrad
Centered Load Capacity ⁴	50 N	200 N	60 N
Cable Length	3 m	1.5 m	3 m
Weight	2.2 kg	7.2 kg	7.2 kg
CE	Compliant		

1. Travel ranges are interdependent. The listed values are max. travels per axis when all other axis are in their centered position.
2. Open loop values shown
3. Stiffness depends on Hexapod position. Values are given for all axis in their centered position.
4. Value shown for horizontal base plate. See graphs for maximum payload height and cantilever distance on product pages.

High Load HXP Specifications

	HXP200-MECA	HXP200S-MECA	HXP1000-MECA
Size	Ø335 x 309 mm	Ø410 x 300 mm	Ø550 x 395 mm
Travel Range X, Y, Z ¹	±59, ±54, ±25 mm	±40, ±45, ±27 mm	-62/+93, ±69, ±39.5 mm
Travel Range Θ X, Θ Y, Θ Z	±15, ±14.5, ±30 °	±9, ±8, ±15 °	±11, ±10, ±19.5 °
Minimum Incremental Motion X, Y, Z ²	0.2, 0.2, 0.1 μ m	0.15, 0.15, 0.15 μ m	0.30, 0.30, 0.16 μ m
Minimum Incremental Motion Θ X, Θ Y, Θ Z	0.1, 0.1, 0.2 mdeg	0.1, 0.1 0.1 mdeg	0.06, 0.06, 0.10 mdeg
Uni-directional Repeatability X, Y, Z - Typical	±0.125, ±0.125, ±0.1 μ m	±0.1, ±0.1, ±0.1 μ m	±0.15, ±0.15, ±0.08 μ m
Uni-directional Repeatability Θ X, Θ Y, Θ Z - Typical	±0.1, ±0.1, ±0.125 mdeg	±0.1, ±0.1, ±0.1 mdeg	±0.03, ±0.03, ±0.05 mdeg
Maximum Speed X, Y, Z	81, 70, 26 mm/s	47, 54, 29 mm/s	9, 9, 4 mm/s
Maximum Speed \dot{X} , \dot{Y} , \dot{Z}	16, 15, 41 °/s	10, 9.3, 16.5 °/s	1.4, 1.4, 2.8 °/s
Rigidity X, Y, Z ³	3, 3, 40 N/ μ m	6, 6, 30 N/ μ m	10, 10, 100 N/ μ m
Centered Load Capacity ⁴	500 N	850 N	4500 N
Weight	15.5 kg	24.9 kg	60 kg
Thread Type	M6	M6	M6
CE	Compliant		

1. Travel ranges are interdependent. The listed values are max. travels per axis when all other axis are in their centered position.

2. Open loop values shown

3. Stiffness depends on Hexapod position. Values are given for all axis in their centered position.

4. Value shown for horizontal base plate. See graphs for maximum payload height and cantilever distance on product pages.

Vacuum HXP Specifications

	HXP50V6-MECA	HXP100V6-MECA
Size	Ø200 x 151 mm	Ø300 x 209 mm
Travel Range X, Y, Z ¹	±17, ±15, ±7 mm	±27.5, ±25, ±14 mm
Travel Range Θ X, Θ Y, Θ Z	±9, ±8.5, ±18 °	±11.5, ±10.5, ±19 °
Minimum Incremental Motion X, Y, Z ²	0.2, 0.2, 0.1 μ m	0.5, 0.5, 0.25 mm
Minimum Incremental Motion Θ X, Θ Y, Θ Z	0.1, 0.1, 0.2 mdeg	0.25, 0.25, 0.5 mdeg
Uni-directional Repeatability X, Y, Z - Typical	±0.20, ±0.20, ±0.20 μ m	±0.50, ±0.50, ±0.50 μ m
Uni-directional Repeatability Θ X, Θ Y, Θ Z - Typical	±0.40, ±0.40, ±0.20 mdeg	±0.25, ±0.25, ±0.50 mdeg
Maximum Speed X, Y, Z	2, 1.9, 0.8 mm/s	0.5, 0.5, 0.25 mm/s
Maximum Speed \dot{X} , \dot{Y} , \dot{Z}	2.4, 2.4, 6 °/s	0.2, 0.2, 0.4 °/s
Rigidity X, Y, Z ³	2, 2, 25 N/ μ m	5, 5, 40 N/ μ m
Centered Load Capacity ⁴	50 N	200 N
Connectors	DB25 Male (6) (not vacuum compatible)	
Cable Length	1.5 m	
Motor	Stepper motor	
Weight	2.2 kg	7.2 kg
Vacuum Compatibility	10 ⁻⁶ hPa	
CE	Compliant	

1. Travel ranges are interdependent. The listed values are max. travels per axis when all other axis are in their centered position.

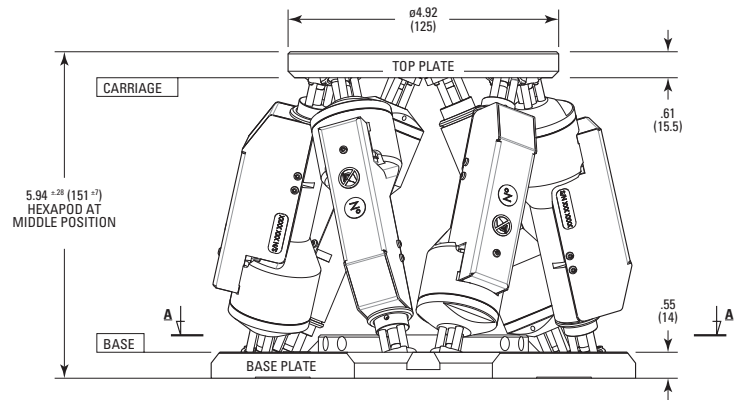
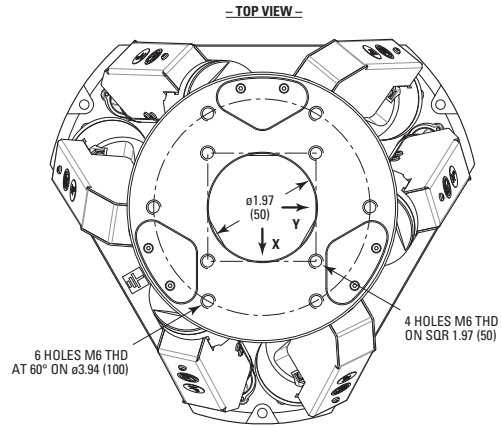
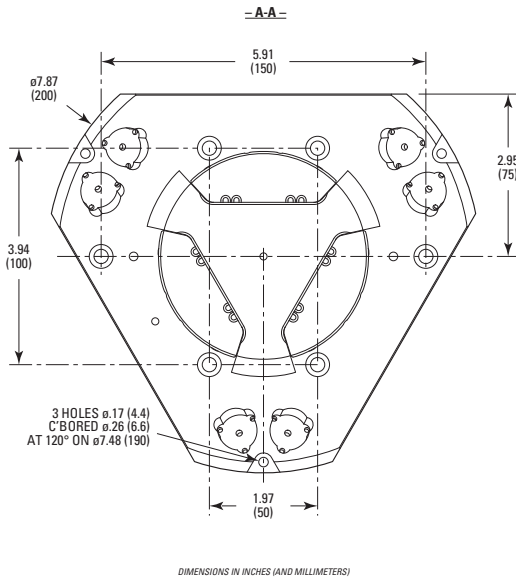
2. Open loop values shown

3. Stiffness depends on Hexapod position. Values are given for all axis in their centered position.

4. Value shown for horizontal base plate. See graphs for maximum payload height and cantilever distance on product pages.

Dimensions

HXP50-MECA



The HXP50 is a very compact hexapod ideal for complex motion applications in very confined spaces requiring high precision multi-axis control.



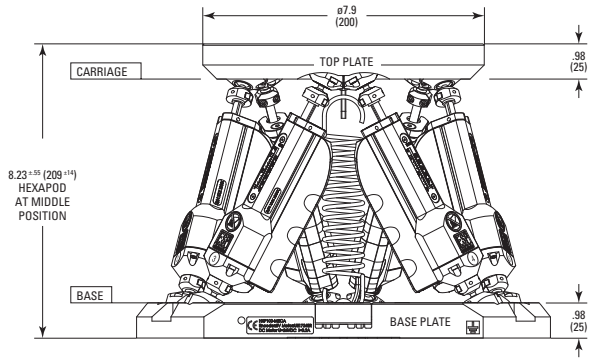
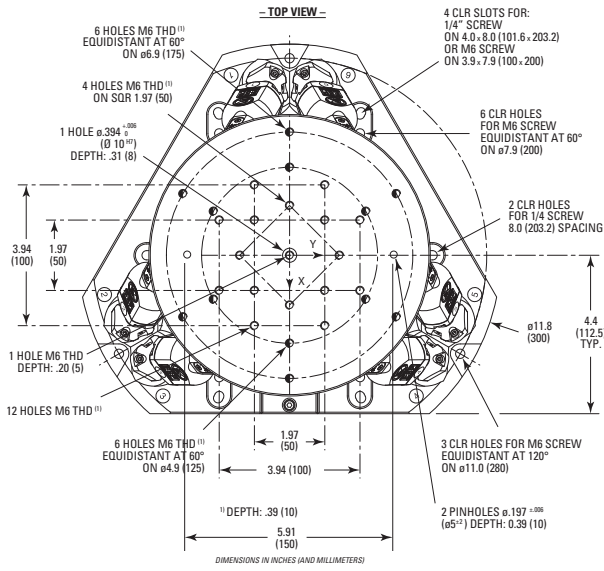
The HXP100 has excellent rigidity, load capacity and positioning performance in a compact size.



The HXP1000 has a load capacity up to 450 kg centered loads.

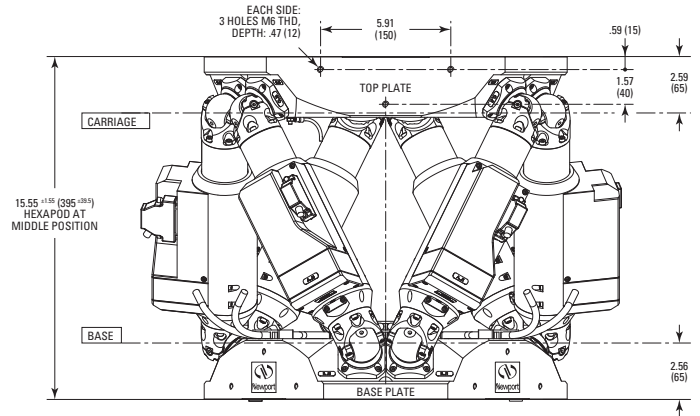
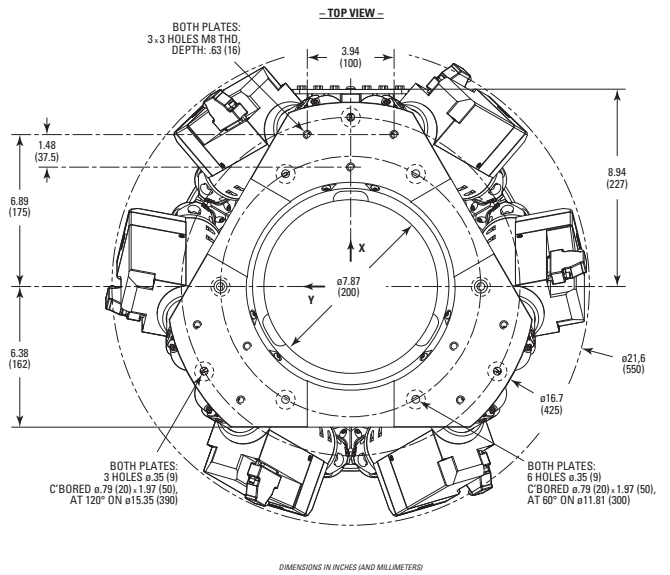
MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

HXP100-MECA



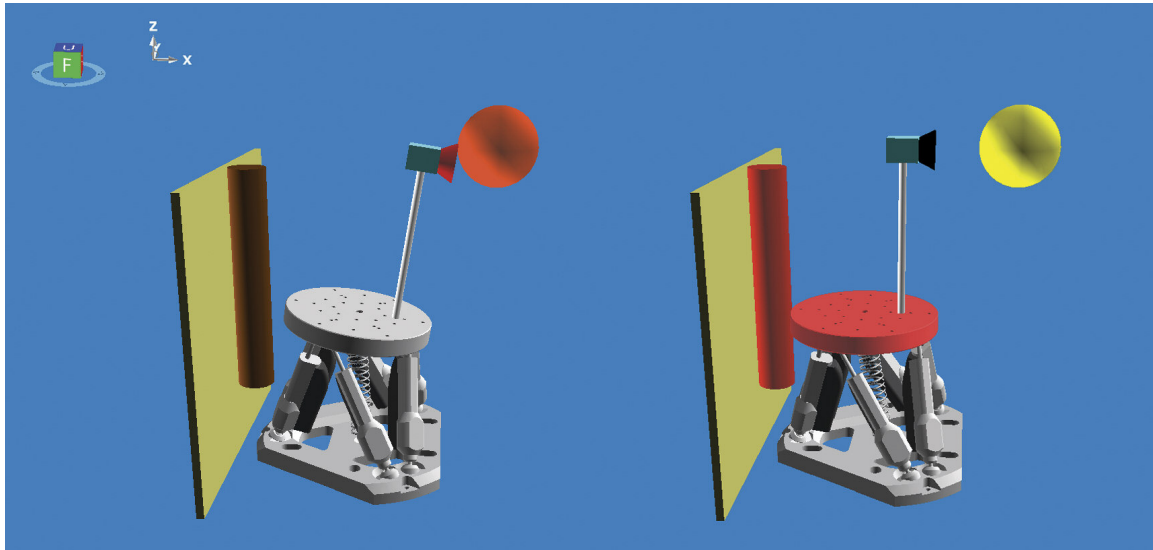
Note: Different top plate hole pattern or a central aperture are available upon request.

HXP1000-MECA

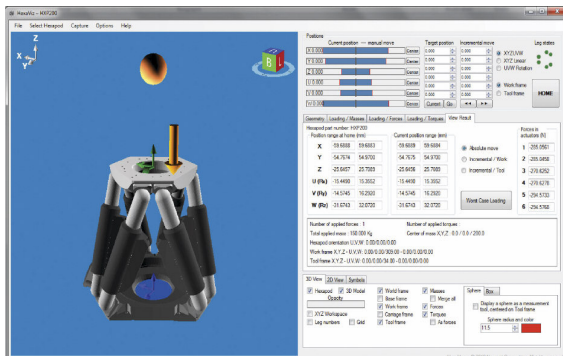


Hexaviz Hexapod Simulation Software for 6-Axis Motion Exploration

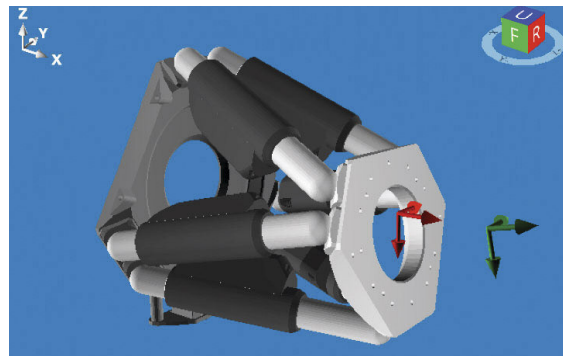
HexaViz hexapod simulator is a useful tool that allows to discover which Newport Hexapod model best fits specific application needs prior to your order. It's a FREE Simulation Software that provides an easy-to-use virtual hexapod interface to evaluate travel range, load capacity, force, torque and volume characteristics



Possible collisions



HexaViz main overview screen with current configuration, positions, load and force values.



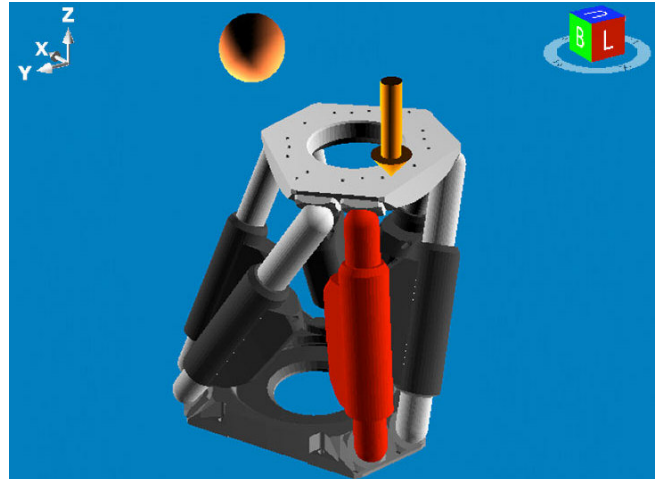
Virtual hexapod orientation, coordinate system adjustments, and motion simulation previews.

*NOTE: HexaViz runs on any PC equipped with DirectX 9-compatible graphics hardware capable of a WXGA display resolution. All modern Windows based PCs are capable of running HexaViz. It is possible to run this program under Windows XP SP3 or Vista SP1, provided a DirectX 9-compatible display driver is installed. Although the software works on these machines, we do not provide support for such legacy configurations.

MOTORIZED LINEAR STAGES
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 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

HexaViz Key Features

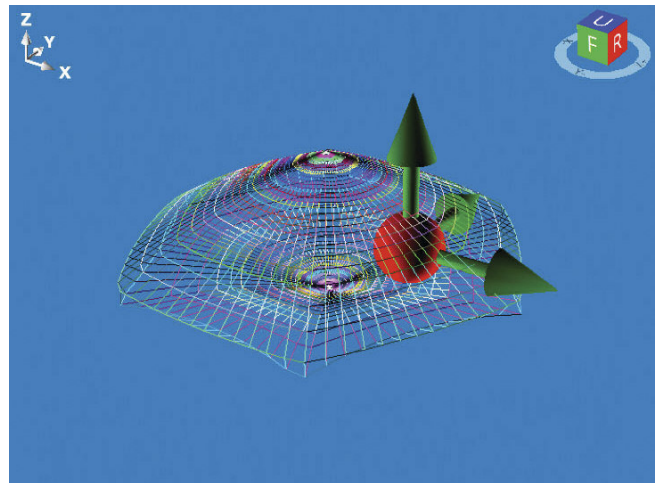
- Compatible with Newport's complete line of HXP Series Hexapods
- Graphical display of travel ranges axis-by-axis, in 2-D or XYZ 3-D views
- Manual sliders for motion
- Incremental motion capability -Coordinate system and Hexapod orientation configuration
- Hexapod actuator load capacity and overload condition verification, when loads, forces or torques are applied
- Display of worst case positions -Ability to save configuration for easy recall 3D file import or creation using an existing library
- Collision Simulation
 - Between hexapods and objects
 - Between objects on hexapods and fixed objects



Performance testing by load, force, and torque (useful in finding worst case positions).

Software Compatibility

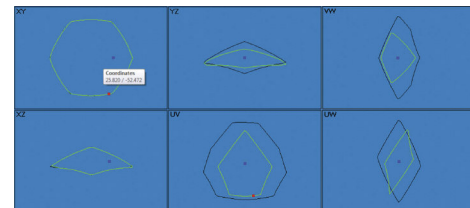
- Operating System: Microsoft Windows 7, 8 and 10*
- Free Disk Space: 2 GB
- Memory (RAM): 1 GB
- Graphics Hardware: DirectX 9 compatible
- Monitor Resolution: WXGA (1366x768) or higher
- Runtime requirement: Microsoft .NET Framework 4.0 Client Profile or higher



Validate entire XYZ workspace in 3-D.

Positions		Target position		Hexapod part number: HXP1000		Position range at home (mm)		Current position range (mm)	
X	-39.951	0.000	0.000	X	-63.1715	54.0029	-63.1715	54.0029	
Y	0.000	0.000	0.000	Y	-69.6361	69.6361	-80.3565	80.3565	
Z	0.000	0.000	0.000	Z	-40.3955	40.2003	-30.8260	17.0963	
U	0.000	0.000	0.000	U (Rx)	-12.0206	12.0206	-5.1921	5.1921	
V	0.000	0.000	0.000	V (Ry)	-10.7132	10.7442	-12.9648	8.1209	
W	0.000	0.000	0.000	W (Rz)	-20.3529	20.3529	-7.2931	7.2931	

Execute manual hexapod moves with sliders and perform absolute and incremental moves with 'Tool & Work' frames.



Explore multiple 2-D linear & angular workspaces simultaneously.

Motion Controller Selection Guide

Series	Series	Number of Axis	ESP Stage Detection	Display	Compatible Motors	Communications	I/O
	XPS-D Universal High-Performance Motion Controller/Driver see page 148	1 to 8	Yes	Remote, GUI	*DC, Stepper, Peizo, Galvo and Voice coil	Ethernet	8 Analog In, 8 Analog Out 40 TTL In, 40 TTL Out
	LMS Laser Machining Software see page 152			NA			
	XPS-RL High-Performance Motion Controller/Driver see page 153	1 to 4	Yes	Remote, GUI	*DC, Stepper, Peizo, Galvo and Voice coil	Ethernet	2 Analog In, 2 Analog Out 8 TTL In, 8 TTL Out
	ESP301 3-Axis Motion Controller/Driver see page 157	1 to 3	Yes	Front Panel, GUI	DC and Stepper	USB, RS232, IEEE-488.1	16 TTL I/O
	SMC Single-Axis Motion Controller/Driver see page 159	1	Yes	GUI	DC or Stepper	USB, RS232	1 Analog In 4 TTL In, 4 TTL Out
	CONEX-CC DC-Servo Controller and Accessories see page 161	1	Integrated with Stage	GUI	DC	USB	CONEX-100
	CONEX-PP Controller and Accessories see page 162	1	Integrated with Stage	GUI	Stepper	USB	CONEX-100
	Agilis™ Series Controllers see page 165	2 (up to 8 on AG-UC8)	Preconfigured	GUI	Agilis Piezo Motor	USB	No
	Open-Loop Picomotor Controller/Driver see page 166	4	Yes	Remote, GUI	Open-Loop Picomotor	Ethernet, USB, RS-485	No
	Closed-Loop Picomotor Controller/Driver see page 168	2	Yes	Remote, GUI	Closed-Loop Picomotor	Ethernet, USB, RS-485	No
	Picomotor Hand Controller see page 169	4	No	No	Picomotor	USB	No
	8742 and 8743-CL Picomotor Controller/Driver Module Accessories see page 170	4	No	No	Picomotor	USB	NA
	TTI and Analog Picomotor Motion Controller see page 171	1	No	No	Picomotor	NA	NA
	NanoPZ Controller see page 172	1 (up to 8 with PZC-SB)	Preconfigured	GUI	PZA12 Piezo Motor	USB, RS232	No
	NPC3 3-Channel Piezo Amplifier see page 173	3	No	Front Panel	NPx Series Piezo Stack	USB, RS232	1 Analog In 1 Analog Out
	NPC1USB Compact Single-Channel Piezo Stack Amplifier see page 174	1	No	No	NPx Series Piezo Stack	USB	1 Analog In 1 Analog Out

* Drivers for each motor type must be purchased separately. The XPS-DRV00P is required to control the drivers of 3rd-party galvos and voice coil motors.

Stage and Controller Compatibility



The following table lists all Newport positioners and the compatible Newport motion controllers. Most stages feature ESP technology that provides true plug and play compatibility, wherein the Newport controller recognizes the connected stage and automatically uploads the stage operating parameters. This eliminates the risk for incorrect setting of parameters. Listed also is the maximum power consumption for each stage when used at maximum speed, with full load and at maximum acceleration. In order to be able to operate all stages simultaneously, and at these values, the total power consumption of all stages connected to the same controller (same power supply for SMC100 and NSC200) must be less than the power of the controller's power supply: 500 W for XPS, 150 W for ESP301, 80 W for SMC100, 20 W for NSC200.

Dedicated controllers like, Agilis, iPico and NanoPZ are not included in this table, but additional information is available in the the respective product pages.

For Controller GUI's, firmware updates, software drivers, programming examples and user manuals, please download from site.

Family	Max Power Consumption (W)	XPS-RL ¹ Driver Module	XPS-D ¹ Driver Module	Compatibility		
				ESP301 ¹	SMC100CC ¹	SMC100PP ¹
BGM120BPP	60	XPS-DRV01	XPS-DRV11	x		
BGM120CC to BGM200CC	60	XPS-DRV01	XPS-DRV11	x		
BGM120BPE-BGM200BPE	20	XPS-DRV01	XPS-DRV11	x		Reduced ²
BGM160BPP-BGM200BPP	60	XPS-DRV01	XPS-DRV01	x		
BGS50CC ⁴	10	XPS-DRV01	XPS-DRV11	x	x	
BGS50PP	10	XPS-DRV01	XPS-DRV11	x		x
BGS80CC	40	XPS-DRV01	XPS-DRV11	x	x	
BGS80PP	20	XPS-DRV01	XPS-DRV11	x		Reduced ³
FMS-CC	50	XPS-DRV01	XPS-DRV11	x	x	
FMS-PP	20	XPS-DRV01	XPS-DRV11	Reduced ³		Reduced ³
FMS-PPHA	20	XPS-DRV01	XPS-DRV11			
GTS Series	25	XPS-DRV01	XPS-DRV11	x	x	
IDL165-LM	160	XPS-DRV02	XPS-DRV11			
IDL225-LM to IDL560-LM	NA	XPS-EDBL	XPS-EDBL			
IDL280-Z20	50	XPS-DRV01	XPS-DRV11			
ILS-CC	70	XPS-DRV01	XPS-DRV11	x		
ILS-CCL	30	XPS-DRV01	XPS-DRV11		x	
ILS-HA	70	XPS-DRV03	XPS-DRV11	x		
ILS-LM-S	80	XPS-DRV02	XPS-DRV02			
ILS-PP	40	XPS-DRV01	XPS-DRV01	x		x
IMS-CC, IMS-CCHA	170*	XPS-DRV03	XPS-DRV11			
IMS-LM-S	220*	XPS-DRV02	XPS-DRV02			
IMS-PP	40	XPS-DRV01	XPS-DRV01	x		
IMS-V	80	XPS-DRV01	XPS-DRV11	x		
LTA-HL, LTA-HS ⁴	10	XPS-DRV01	XPS-DRV11	x	x	
LTA-HLPPV6, LTA-HSPPV6	10	XPS-DRV01	XPS-DRV11	x		Reduced ²
MFA-CC 4, MFA-CCV6	10	XPS-DRV01	XPS-DRV11	x	x	
MFA-PPD	10	XPS-DRV01	XPS-DRV11	x		x
MTN-CC	170	XPS-DRV03	XPS-DRV11	x		
MTN-PP	75	XPS-DRV01	XPS-DRV11	x		
MTN-PPV6	10	XPS-DRV01	XPS-DRV11	x		
NPxxx-D Series	10	XPS-DRVP1	XPS-DRVP1			
ONE-XY Series		XPS-DRV02	XPS-DRV02			
PR50CC, SR50CC ⁴	10	XPS-DRV01	XPS-DRV11	x	x	
PR50PP, SR50PP	10	XPS-DRV01	XPS-DRV11	x		Reduced ²
RGV100BL-S	100*	XPS-DRV02	XPS-DRV11			
RGV100HL-S	100*	XPS-DRV02 or XPS-EDBL	XPS-DRV11 or XPS-EDBL			
RGV160BL-S	100*	XPS-EDBL	XPS-EDBL			
RV120BPE to RV350BPE	60	XPS-DRV01	XPS-DRV11			
RV120BPP to RV350BPP	60	XPS-DRV01	XPS-DRV11			
RV120CC to RV350CC	130*	XPS-DRV03	XPS-DRV11	x		

MOTORIZED LINEAR STAGES
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BEAM MANAGEMENT
SPECIAL COLLECTIONS

Family	Max Power Consumption (W)	XPS-RL ¹ Driver Module	XPS-D ¹ Driver Module	Compatibility		
				ESP301 ¹	SMC100CC ¹	SMC100PP ¹
RV120CCHL	40	XPS-DRV03	XPS-DRV11	x		
RV120HAHLT to RV350HAHLT	170*	XPS-DRV03	XPS-DRV03			
RV120HAT to RV350HAT	170*	XPS-DRV03	XPS-DRV03			
RV160CCHL to RV350CCHL	130*	XPS-DRV03	XPS-DRV11			
RVS80CC	40	XPS-DRV01	XPS-DRV11	x	x	
RVS80PP	20	XPS-DRV01	XPS-DRV11	x		Reduced ²
TRACC ⁴	10	XPS-DRV01	XPS-DRV01	x	x	
TRAPPD, TRAPPV6	10	XPS-DRV01	XPS-DRV01	x		x
TRBCC ⁴	10	XPS-DRV01	XPS-DRV01	x	x	
TRBPP	10	XPS-DRV01	XPS-DRV01	x		x
URB100CC	30	XPS-DRV01	XPS-DRV11	x	x	
URS50BCC	10	XPS-DRV01	XPS-DRV11	x	x	
URS50BPP	10	XPS-DRV01	XPS-DRV11	x		Reduced ^{2,3}
URS50BPPV6	5	XPS-DRV01	XPS-DRV11	x		Reduced ²
URS75BCC to URS150BCC	40	XPS-DRV01	XPS-DRV11	x	x	
URS75BPP to URS150BPP	20	XPS-DRV01	XPS-DRV11	x		Reduced ³
URS75BPPV6	5	XPS-DRV01	XPS-DRV11			Reduced ²
UTSCC	40	XPS-DRV01	XPS-DRV11	x	x	
UTSPP	20	XPS-DRV01	XPS-DRV11	Reduced ³		Reduced ³
UTSPPV6	10	XPS-DRV01	XPS-DRV11	Reduced ³		Reduced ^{2,3}
UZM160CC.05	40	XPS-DRV01	XPS-DRV11	x		
UZM160PE.05, UZM160PP.05	20	XPS-DRV01	XPS-DRV01	x		
UZM160PE.05V6	10	XPS-DRV01	XPS-DRV11	x		
UZS80CC	20	XPS-DRV01	XPS-DRV11	x	x	
UZS80PP	20	XPS-DRV01	XPS-DRV11	x		x
VP-25AA	30	XPS-DRV01 or XPS-DRV03	XPS-DRV11	x	x	
VP-25XA	30	XPS-DRV01 or XPS-DRV03	XPS-DRV11	x	x	
VP-25XL	30	XPS-DRV03	XPS-DRV03			
VP-5ZA	30	XPS-DRV01 or XPS-DRV03	XPS-DRV11	x	x	
XML-S Series	100	XPS-DRV02 or XPS-DRV02L	XPS-DRV11 or XPS-EDBL			
XMS-S Series	70	XPS-DRV02 or XPS-DRV02L	XPS-DRV11			
ZVR-PP and ZVR-PC (Z axis)	20	XPS-DRV01	XPS-DRV11	x		Reduced ²
ZVR-PC (Theta)	40	XPS-DRV01	XPS-DRV11	x	x	
ZVR-PP (Theta)	20	XPS-DRV01	XPS-DRV11	x		Reduced ²

¹ Enhanced System Performance (ESP) Controller.

² Compatible, but speed is reduced by 2.5x of the rated speed (ie, 40% of rated speed).

³ Compatible, but MIM is 1/20th of a full step.

⁴ For integrated stage and controller products, see page 161.

*When stages are not driven synchronously, consider the maximum power consumption only for the stage with the highest power consumption and use a 70% reduced RMS power for all other stages. Applies only for stages with this footnote. When stages are driven synchronously, consider the maximum power consumption for all stages.

If higher speeds are needed for any of the linear motor driven stages, please contact Tech Support to identify the appropriate driver.

XPS-D Universal High-Performance Motion Controller/Driver



- 1-8 axes universal motion controller
- High-speed 10/100/1000 Base-T Ethernet TCP/IP communication
- Up to 20 kHz servo loop with advanced variable PID's
- Wide variety of motion modes from basic to complex PVT trajectories
- Extensive Analog and Digital I/O Capability
- High speed up to 4-Axis PCO



scan QR code
to watch video

The XPS is an extremely high-performance, user-friendly, integrated motion controller/driver offering convenient, high-speed communication through 10/100 Base-T Ethernet. With outstanding motion profiling, complex trajectory control, positioning accuracy and powerful programming functionality, the XPS is capable of addressing the most demanding motion applications for up to 8-axes, while supporting 30 users working simultaneously. Multiple digital and analog I/O's, triggers and supplemental encoder inputs provide users with additional data acquisition, synchronization and control features that make the XPS an ideal control hub. When networked, users can access the same controller from any place in the world for remote control, code development (.NET, LabVIEW, C++, Python etc.), data transfer or diagnostics, all without the requirement to download any software. XPS hardware provides extensive analog and digital I/O, as well as a deep and intuitive command set, making applications deployment easy and efficient.

Proprietary universal driver modules allow the XPS to drive 1 to 8 axes of any Newport actuator, linear, rotary or NanoPositioning stage. By using pass-through drive modules, the XPS is also capable of controlling many other motion devices, whether they use stepper, DC brush, DC brushless rotary or linear, piezoelectric stacks or voice coil actuation.

Features

Inputs and Outputs for Integrating External Devices

The XPS has a 40 digital input and 40 digital output to read external switches, control valves or other digital devices and 8 analog Inputs and 8 analog outputs to precisely monitor any motion axis (such as position, velocity or acceleration). To synchronize external devices during a motion process, the XPS has dedicated "event and action" API's which users can use to trigger an action upon the occurrence of an event. Typical examples include sending a digital output when constant velocity is reached or initiating a TCL script when the motion is done. Once defined, the XPS autonomously

monitors the status of the event to trigger the action with a latency of less than 100 μ s! This powerful feature does not require any complex programming by the user and does not consume any time of the host PC or communication link since processing is done at the controller level. The XPS can be used as a master controller for a complete application.

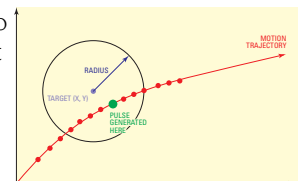
Based on the TCP/IP Internet communication protocol, the XPS controller can utilize up to 80 virtual communication ports, known as sockets. Users can split their application into segments that run independently on different threads or even on different computers. Another practical advantage for many laboratory users is that sockets allow them to concurrently share the same controller for different applications. For example, it is possible for one group to use one axis of the XPS controller for an optical delay line while another group simultaneously uses the other axes for a totally different application. Both applications can run independently without any delays or cross-talk.

Native Tool Command Language (TCL)

TCL scripts can be quickly generated then executed directly from the XPS GUI Terminal for rapid development for motion programs. TCL stands for Tool Command Language and is an open-source string-based command language. TCL is field-proven, very well documented and has many tutorials, applications, tools and books publicly available at www.tcl.tk

High speed up to 4-Axis PCO

XPS-D works in real time for up to 4 axes with one PCO connector. It generates pulses by comparing actual encoder feedback position with a set of predefined value within <35ns. The fast compensated PCO takes in account various mapping and compensations to fire trigger pulses at the desired positions within 5ns accuracy and frequency up to 1.6 MHz.



ESP Plug-and-Play Compatibility

When an ESP-compatible stage is connected to the XPS, the stage is quickly recognized and operating parameters are configured without the need for user inputs. This Plug and Play feature is not only transparent to the user, but it also ensures the safe operation of the stage.

Optimum Position Grouping

The XPS incorporates pre-configured motion groups and user-definable motion groups to optimize the performance and simplify the use of advanced features like line-arc trajectories, splines, contouring, and complex PVT trajectories. These motion groups can be single axis positioners, spindles, gantry groups, XY groups, XYZ groups or multiple axis groups. The flexibility of grouping stages greatly improves process flow and error handling and provides a uniform structure for easy application development.

Compensation for Maximum Accuracy

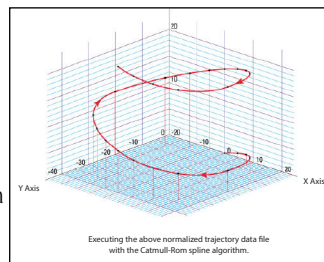
An extensive set of compensation features are available to the user including backlash, linear error and error mapping in single, 2D, or 3D. All compensations are corrected dynamically at each servo cycle, updated at the rate of 20 kHz. This broad selection of options transforms the most basic positioner into a high performance device; thus increasing the accuracy and performance of any motion application culminating in more reliable results.

Line-Arc, Spline and PVT Trajectories Motion Paths

The Line-arc trajectory is a motion path defined by a combination of straight and curved segments (available only for positioners in XY groups) such that constant speed is maintained throughout the entire region of interest. Sequential execution of the lines-arc trajectories eliminates discontinuities. A dedicated function performs a precheck of the trajectory to ensure optimized and safe execution within the positioners' parameters.

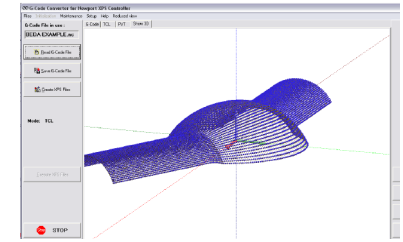
Real-time Processing and Multitasking

Based on QNX real-time operating system and multi-tasking functionality, the XPS is capable of executing complex, internally stored, user-generated applications using TCL scripts. The motion processor supports TCL program execution without adversely impacting higher-priority tasks. With this advanced real-time multi-tasking functionality, the XPS not only manages the most complex motion requirements but also serve as a powerful, standalone process controller to concurrently support multiple applications.



XPS-GCODE

XPS-GCODE software enables your XPS Universal Motion Controller to become a powerful, high-precision machining center that can read and convert G-codes, display the tool path, and execute trajectory routines with the power and precision of Newport Motion Control. The conversion process utilizes the advanced features of the XPS to generate smooth motion routines along optimized trajectories with controlled velocity. G-Codes are converted to native (TCL and PVT) format of the XPS, stored locally, and are easily accessed via the user GUI. The part to be fabricated can be viewed and manipulated in the 3D display window for closer inspection.



XPS-GCODE interface showing a 3D Model generated from a G-CODE

Command Motion With an External Analog Device

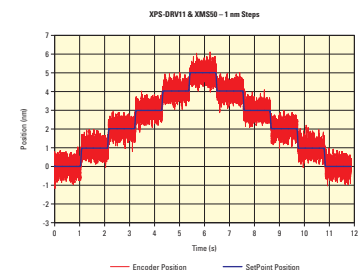
The XPS features four channels of 14-Bit analog-to-digital converters which can be integrated with a motion process using a TCL script. The analog inputs can be converted to directly control the position or speed of a motion axis via external analog inputs. This is critical in precision alignment or auto-focusing routines which require real-time feedback from other devices such as power meters, vision systems, or other sensors. Besides higher communication speed, the A-to-D conversion is internal to the XPS, therefore no processing burden is added to the host PC or the communication link. Consequently, this feature can improve process development and throughput.

Variable PIDs

The XPS features variable PID's that automatically adjust their values proportional to the distance from final position. This unique feature can tighten the gain loop when in position or close to final position while loosening the gain during motion to improve stability. Using variable PID's also allows dedicated tuning of the servo behavior for short and long stroke motion resulting in improved motion sensitivity.

1nm MIM

The MIM of 1nm is reachable without filtering



OEM Version

Higher axis (12 or 16) options, split AC power input, EtherCAT communication, and absolute encoder interface are available upon request. Contact Newport for more information.

Specifications

Number of Axes	<ul style="list-style-type: none"> • 1 to 8 axes of stepper, DC brush, DC brushless or linear motors using internal drives: • Other motion devices using external third-party drives
Firmware Features	<ul style="list-style-type: none"> • Powerful and intuitive, object-oriented command language • Native user-defined units (no need to program in encoder counts) • Real-time execution of custom tasks using TCL scripts • Multi-user capability • Concept of sockets for parallel processes • Distance spaced trigger output pulses, max. 1.6 MHz rate (5 MHz for less than 4096 pulses), programmable filter • Array-based compensated position trigger output pulses, max 1.6 MHz (5 MHz for less than 4096 pulses) • Time spaced trigger output pulses, 0.05 Hz to 20 MHz, 5 ns accuracy • Trigger output on trajectories (depending on servo rate) • Data gathering at servo rate, up to 1,000,000 data entries (depending on servo rate) • User-defined "actions at events" monitored by the controller autonomously at the servo rate • User-definable system referencing with hardware position latch of reference signal transition and "set current position to value" capability • Axis position or speed controlled by analog GPIO input • Axis position, speed or acceleration copied to analog GPIO output • Trajectory precheck function replying with travel requirement and max. possible speed • Auto-configuration, auto-tuning and auto-scaling
Motion	<ul style="list-style-type: none"> • Jogging mode including on-the-fly changes of speed and acceleration • Synchronized point-to-point • Spindle motion (continuous motion with periodic position reset) • Line-arc mode (linear and circular interpolation incl. continuous path contouring) • Splines (Catmull-Rom type) • PVT (complex trajectory based on position, velocity and time coordinates) • Analog tracking (using analog input as position or velocity command) • Master-slave including single master-multiple slaves and custom gear ratio
Compensation	<ul style="list-style-type: none"> • Linear error, Backlash, positioner error mapping • XY and XYZ error mapping • All corrections are taken into account on the servo loop
Servo Rate	<ul style="list-style-type: none"> • Adjustable up to 20 kHz
I/O	<ul style="list-style-type: none"> • 40 TTL inputs and 40 TTL outputs (open collector) • 8 synch. analog inputs ± 10 V, 16 bits • 8 synch. analog outputs ± 5 V, ± 10 V or ± 12.288 V (configurable), 16 bits
Control Loop	<ul style="list-style-type: none"> • Open loop, PI position, PIDFF velocity, PIDFF acceleration, PIDDualFF voltage • Variable PID's (PID values depending on distance to target position) • Deadband threshold Integration limit and integration time • Derivative cut-off filter 2 user-defined notch filters
Trigger In	<ul style="list-style-type: none"> • Hardware latch of all positions and all analog I/O's (on servo rate) • <50 ns latency on positions • <125 s time jitter on analog I/O's
Trigger Out	<ul style="list-style-type: none"> • One high-speed position compare output only for axes 1, 2, 5 and 6 that can be either configured for position synchronized pulses or for time synchronized pulses: 5 ns accuracy, <700 ns latency (from real stage position to pulse generation), 5 MHz max frequency • PCO: <ul style="list-style-type: none"> – interpolation x65536 – compensated
Dedicated Inputs Per Axis	<ul style="list-style-type: none"> • RS-422 differential inputs for A, B and I, Max. 25 MHz, over-velocity and quadrature error detection • 1 Vpp analog encoder input up to x65536 interpolation used for servo amplitude, phase and offset correction and synchronisation • Low noise encoder interpolator board for nanometer MIM • Forward and reverse limit, home, error input
Dedicated Outputs Per Axis (when using external drives)	<ul style="list-style-type: none"> • 2 channel 16-bit, ± 10 V D/A • Drive enable, error output
Drive Capability	<ul style="list-style-type: none"> • Voltage, acceleration (used with XPS-DRV11 for DC brush motor control). • Position (used with XPS-DRV11 for stepper motor control) • Acceleration and velocity (used with XPS-DRV11 for linear & brushless motors control) • Analog position (used with XPS-DRV00P and external drives for example 3rd party motors) • Step and direction and \pm pulse mode for stepper motors (used with XPS-DRV00P and external stepper motor driver) • 750 W (@ 230 VAC) total available power
AC Power Requirements	<ul style="list-style-type: none"> • 100–240 VAC 60/50 Hz 10 A– 6.9 A The controller should be connected to a power installation that incorporates appropriate protection devices. Refer to the installation requirements of your facility and local applicable Standards concerning the use of RCDs (residual current device).
Operating Temperature	<ul style="list-style-type: none"> • +5°C to +40°C (Derate 1.5%/Degree above 40°C)

Ordering Information

Model	Description
XPS-D2	High Performance Universal Motion Controller, 2-axis, Ethernet
XPS-D4	High Performance Universal Motion Controller, 4-axis, Ethernet
XPS-D6	High Performance Universal Motion Controller, 6-axis, Ethernet
XPS-D8	High Performance Universal Motion Controller, 8-axis, Ethernet
XPS-DRV11	Universal digital driver card for Stepper, DC, Brushless and Direct Motors
XPS-DRV00P	Pass-through driver module with pulse and direction capability
XPS-DRV1P	NanoPositioning drive module for piezo-stack based products
XPS-GCODE	Software to convert laser machining G-codes for the XPS controller

Call Newport for the following special XPS features:

- Dual power supply for safer shut down
- Option for additional I/O's
- Error mapping of stages for the best accuracy
- Higher axis (12 or 16)
- Split AC power input
- EtherCAT communication
- Absolute encoder interface

XPS Training and Support

Newport Motion offers product training and telephone support. For customers who need a quick introduction or require a deeper and effective utilization of controller products, Newport Motion can provide training at your facility or in Irvine, whichever is more convenient. In addition to remote troubleshooting services via Ethernet, Newport Motion application engineers can call and help you in real time.

If you prefer a customized training, installation or support, please contact techsupport@newport.com or (800) 222-6440.

Driver card and cable kit compatibility chart for direct drive motors

Stage series	XPS-RL & XPS-DRV02	XPS-RL & XPS-EDBL	XPS-D & XPS-DRV11	XPS-D & XPS-EDBL
ILS-LM-S	XPS-RK11	n/a	XPS-DK26 ¹	n/a
IMSLM-S	XPS-RK12	XPS-RK14	XPS-DK22	XPS-DK24
RGV100BL-S	XPS-RK11	n/a	XPS-DK21	n/a
RGV100HL-S	XPS-RK11	XPS-RK13	XPS-DK21	XPS-DK23
RGV160BL-S	n/a	XPS-RK15	n/a	XPS-DK25
XMS-S	XPS-RK12	n/a	XPS-DK22	n/a
XML-S	XPS-RK12	XPS-RK14	XPS-DK22	XPS-DK24

¹ Requires XPS-DRV02 not XPS-DRV11

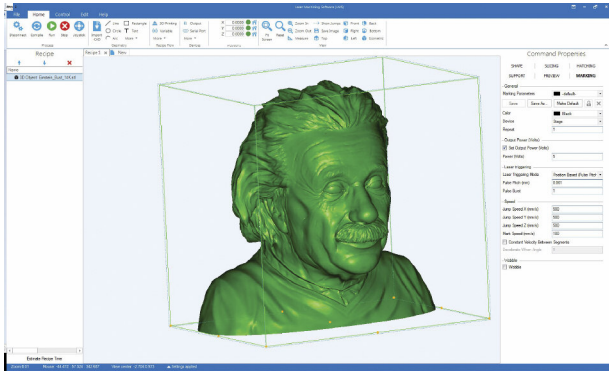
MOTORIZED
LINEAR STAGESMOTORIZED
VERTICAL STAGESMOTORIZED
ROTATION STAGESMOTORIZED
LINEAR ACTUATORS

HEXAPODS

CONTROLLERS
AND DRIVERSMOTORIZED
OPTICAL MOUNTSBEAM
MANAGEMENTSPECIAL
COLLECTIONS

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

LMS Software



- Easy to learn and intuitive machining software
- Single window functionality
- Saves time with fast processing
- Controls most of machining processes right away
- Can be tailored to your needs with a custom GUI & special functions
- Open architecture allows adding user created plugins

Laser Materials Processing Software

Newport Laser Machining Software (LMS) is a complete Human Machine Interface for laser materials processing tools. The software provides automated process recipe synchronization at the hardware layer for laser, stages, galvo scanners as well as machine vision systems, autofocus, surface profilers, material dispensing devices and other peripherals.

Complete Process From Design

LMS converts CAD models directly from design in the most popular formats, including: DXF, DWG, STL and many others. The CAD conversion and compile process is highly efficient, typically requiring only seconds for even complex 3D (STL) files. The conversion is performed in the native language of the controller, allowing the most optimized methods for dynamic trajectory profiling and laser synchronization methods.

Ordering Information

LMS-Lite	Laser Machining Software, Basic
LMS-Pro	Laser Machining Software, Professional, with 3D and PCB Module
LMS-Ultra	Laser Machining Software, Ultra, with Machine Vision

R&D, OEM and Customer Guided Development

LMS is available on any workstation driven by an XPS-RL or XPS-Q Controller. This allows the system integrator to choose the control solution that best fits the application and optimize cost/performance without requiring any additional development work or software modification.

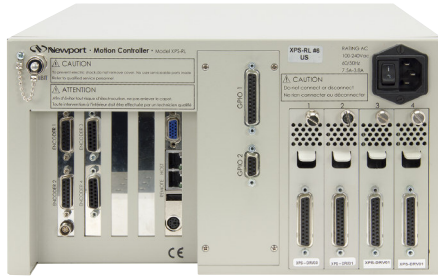
LMS is also offered in multiple versions, so there is an ideal option for home-built R&D workstations as well as complete industrial production tools. The highly intuitive software is also easy to learn, easy to use and can be customized for the OEM customer with their preferred pass-through interface while providing access to core drivers, to develop proprietary modules.

Features and Options

Complete laser workstation control software

- Standard and OEM versions available
- CAD conversion with automated process synchronization
- On-the-fly galvo synchronization
- 2D and 3d laser materials process control
- Integrated machine vision and AF support

XPS-RL Universal High-Performance Motion Controller/Driver



- 1-4 axes universal motion controller
- ESP Plug and Play
- User-friendly interface
- Single-click stage configuration
- Accessible documentation - errors, API's, etc.
- A complete library of LabVIEW, Python and Matlab drivers and .NET assemblies

The more user friendly, 4-axis, XPS-RL universal motion controller drives a variety of motor types and execute complex motion through high speed Ethernet TCP/IP interface. From its outstanding servo rate and triggering, to its intuitive GUI and Plug-and-Play ESP technology, the lower cost XPS-RL is an excellent choice for both research and OEM applications. Aside from its easy to use GUI, the XPS-RL also offers a smaller and lighter package when compared to the XPS-Q.

Ordering Information

Model	Description
XPS-RL2	2-axis Universal Controller/Driver, ethernet, Basic GPIO and PCO
XPS-RL2X	2-axis Universal Controller/Driver, ethernet, Extended GPIO and PCO
XPS-RL4	4-axis Universal Controller/Driver, ethernet, Basic GPIO and PCO
XPS-RL4X	4-axis Universal Controller/Driver, ethernet, Extended GPIO and PCO
XPS-RLM	1-axis Universal Controller/Driver, ethernet

Refer to the [ESP301 controller](#) for a list of stages and the compatible controller and driver cards.

Single-click Configuration

The new web interface now allows a quick configuration of the XPS, as simple as that in the ESP301 controller.

ESP Plug-and-Play Compatibility



When an ESP-compatible stage is connected to the XPS, the stage is quickly recognized and operating parameters are configured without the need for user inputs. This Plug and Play feature is not only transparent to the user, but it also ensures the safe operation of the stage.

Intuitive File Management

The system files stored in the XPS-RL are now easily accessible, much like a Windows environment. At the same time, these files can be edited and saved in situ, without having to pull them from the folders and opening them with notepad or other text editor.

Meaningful error messages

Moving away from numerical error codes, a new set of more descriptive error codes is now available and visible in the XPS-RL.

Optimum Position Grouping

The XPS incorporates pre-configured motion groups and user-definable motion groups to optimize the performance and simplify the use of advanced features like line-arc trajectories, splines, contouring, and complex PVT trajectories. These motion groups can be single axis positioners, spindles, gantry groups, XY groups, XYZ groups or multiple axis groups. The flexibility of grouping stages greatly improves process flow and error handling and provides a uniform structure for easy application development.

Compensation for Maximum Accuracy

An extensive set of compensation features are available to the user including backlash, linear error and error mapping in single, 2D, or 3D. All compensations are corrected dynamically at each servo cycle, default 8 kHz. This broad selection of options transforms the most basic positioner into a high performance device; thus increasing the accuracy and performance of any motion application culminating in more reliable results.

Real-time Processing and Multitasking

Based on QNX real-time operating system and multi-tasking functionality, the XPS is capable of executing complex, internally stored, user-generated applications using TCL scripts. The motion processor supports TCL program execution without adversely impacting higher-priority tasks. With this advanced real-time multi-tasking functionality, the XPS not only manages the most complex motion requirements but also serve as a powerful, standalone process controller to concurrently support multiple applications.

Command Motion With an External Analog Device

The XPS features two or eight channels of 12-Bit analog-to-digital converters which can be integrated with a motion process using a TCL script. The analog inputs can be converted to directly control the position or speed of a motion axis via external analog inputs. This is critical in precision alignment or auto-focusing routines which require real-time feedback from other devices such as power meters, vision systems, or other sensors. Besides higher communication speed, the A-to-D conversion is internal to the XPS, therefore no processing burden is added to the host PC or the communication link. Consequently, this feature can improve process development and throughput.

Line-Arc, Spline and PVT Trajectories Motion Paths

The Line-arc trajectory is a motion path defined by a combination of straight and curved segments (available only for positioners in XY groups) such that constant speed is maintained throughout the entire region of interest. Sequential execution of the lines-arc trajectories eliminates discontinuities. A dedicated function performs a precheck of the trajectory to ensure optimized and safe execution within the positioners' parameters.

The spline trajectory executes a Catmull-Rom spline on an XYZ group, passing through user-specified points with 3rd order polynomial segments at a constant speed. Similar to Line-arc trajectory, spline trajectory has functions for trajectory prechecking.

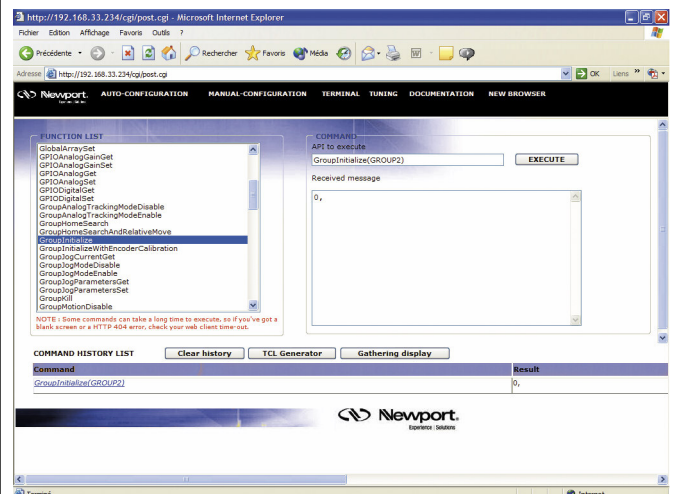
The PVT-mode is the most flexible mode for creating complex trajectories. In PVT, a trajectory element is defined by the end position (P) and end speed (V) of each positioner plus the duration for the element (T). The controller then calculates the cubic function trajectory that will pass through all defined positions at the defined times and velocities. PVT is a powerful tool for any kind of trajectory with varying speeds and for trajectories with nonlinear motion devices.

Inputs and Outputs for Integrating External Devices



The XPS-RL offers two GPIO options. The Basic GPIO has a total of 8 digital I/O's and 2 analog I/Os while power users have the Extended GPIO option which has a total of 40 digital I/Os and 8 analog I/Os. These GPIOs can be used to read external switches, control valves or other digital devices. The analog outputs can be used to precisely monitor any motion axis (such as position, velocity or acceleration). To synchronize external devices during a motion process, the XPS has dedicated "event and action" API's which users can use to trigger an action upon the occurrence of an event. Typical examples include sending a digital output when constant velocity is reached or initiating a TCL script when the motion is done. Once defined, the XPS autonomously monitors the status of the event to trigger the action with a latency of less than 125 μ s! This powerful feature does not require any complex programming by the user and does not consume any time of the host PC or communication link since processing is done at the controller level. The XPS can be used as a master controller for a complete application.

Native Tool Command Language (TCL)



The command screen lists all XPS functions including the necessary or available parameters. Once familiar with the XPS syntax, it is a convenient tool which allows for simple programming, code testing and debugging.

TCL scripts can be quickly generated then executed directly from the XPS GUI Terminal for rapid development for motion programs. TCL stands for Tool Command Language and is an open-source string-based command language. TCL is field-proven, very well documented and has many tutorials, applications, tools and books publicly available (www.tcl.tk).

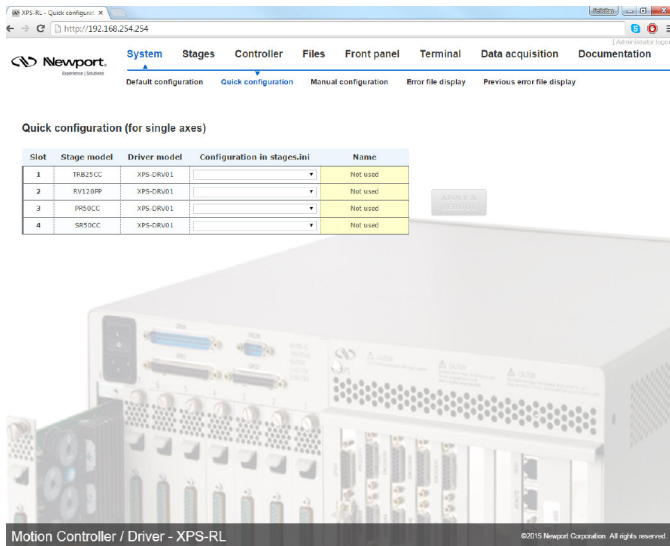
Accessories

Driver Cards

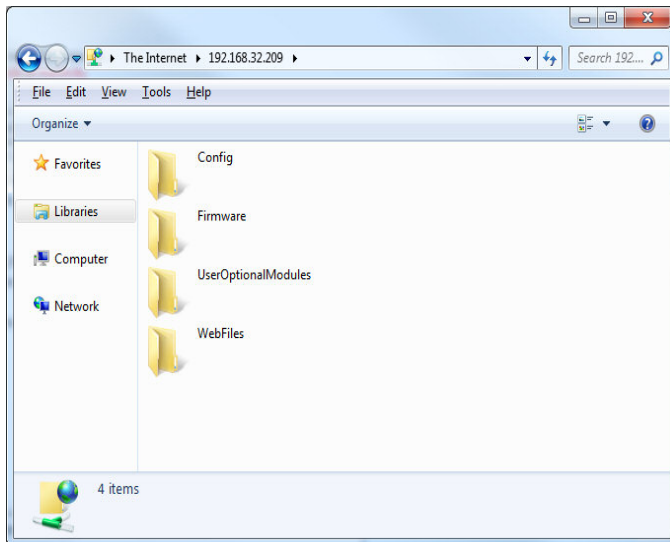
The XPS controller is capable of driving up to 4 axes of most Newport positioners with internal drivers that slide into the back of the mainframe. These factory-tested modules are powered by an internal 300 W power supply that is independent of the controller power supply. For compatible Newport stages and actuators, refer to the table below.

Model	Description
XPS-DRV00P	Pass-through driver module with pulse and direction capability
XPS-DRV01	PWM drive module for DC brush and stepper motors, 3A/48V max.
XPS-DRV02	PWM drive module for brushless motors, 5A/44Vpp max.
XPS-DRVP1	NanoPositioning drive module for piezo-stack based products
XPS-EDBL	High-power, 3-phase, sinusoidal DC brushless motor driver

Graphical User Interface (XPS-RL)



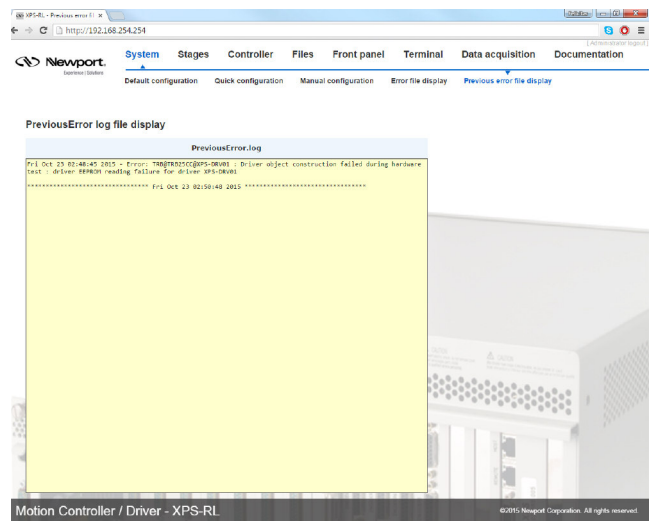
Single Click Configuration



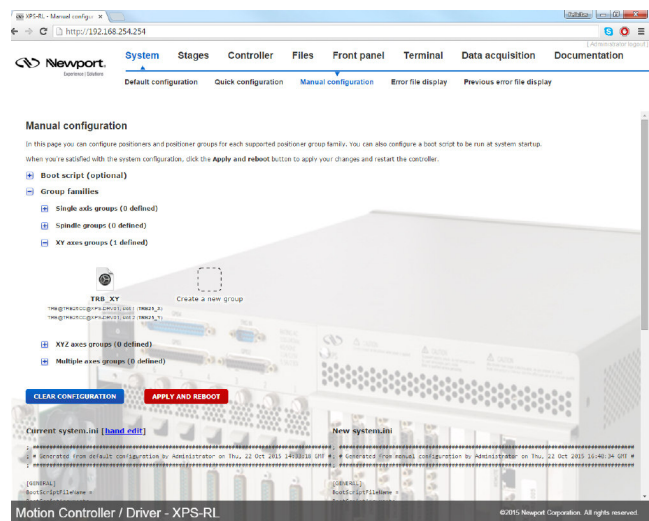
Intuitive File Management

EDBL Cables

Model	Description
EDBCABLE-E1	Limits Cable, XPS-EDBL, 5m
EDBCABLE-M1	Motor cable, XPS-EDBL, 5m
EDBCABLE-M2	Motor and Limits cable, XPS-EDBL, 5m
XPS-TG5	Trigger output cable, LEMO/flying leads, 5m



Meaningful Error Message



Optimum Positioner Grouping

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

Specifications

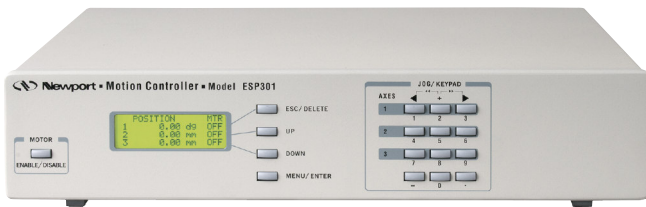
MOTORIZED LINEAR STAGES	Number of Axes	1, 2, 4 axes of stepper, DC brush, DC brushless motors or piezoelectric stacks using internal drives. Other devices using external third-party drives				
	Communication Interfaces	Internet protocol TCP/IP Two Ethernet 10/100/1000 Base-T (RJ45 connector). One with fixed IP address and DHCP server for local communication and one for networking, dynamic addressing with DHCP and DNS Typically 0.3 ms from sending a tell position command to receive the answer Remote control via Tablet				
MOTORIZED VERTICAL STAGES	Firmware Features	Powerful and intuitive, object-oriented command language Natural user defined units (no need to program in encoder counts) Real time execution of custom tasks using TCL scripts Multi-user capability using the concept of sockets for parallel processes Distance spaced trigger output pulses, less than 5 ns latency between position crossing and trigger pulse; max. 5 MHz rate Time spaced trigger output pulses, 0.02 to 2.5 MHz rate, 5 ns accuracy Trigger output on trajectories with 125 μ s resolution Data gathering at up to 8 kHz rate and up to 1,000,000 data entries User-defined "actions at events" monitored by the controller independently at the servo rate User-definable system referencing with hardware position latch of reference signal transition and "set current position to value" capability Axis position or speed controlled by analog input Axis position, speed or acceleration copied to analog output Trajectory pre-check function that returns travel requirement and max. possible speed Automatic newport stage configuration, Auto-tuning and auto-scaling				
		MOTORIZED ROTATION STAGES	Motion	Jogging mode including on-the fly changes of speed and acceleration Synchronized point-to-point motion Spindle motion (continuous motion with periodic position reset) Line-arc mode (linear and circular interpolation incl. continuous path contouring) Splines (Catmull-Rom type) PVT (complex trajectories based on position, velocity and time coordinates) PT (complex trajectories based on position and time coordinates) Master-slave incl. single master-multiple slaves and custom gear ratio		
				HEXAPODS	Compensation	Linear error, Backlash, 1D positioner error mapping 2D and 3D error mapping All corrections are taken into account on the servo loop
						Servo Rate
				CONTROLLERS AND DRIVERS	Control Loop	Open loop, PI position, PIDFF velocity, PIDFF acceleration, PIDDualFF voltage Variable PID's (PID values depending on distance to target position) Deadband threshold; Integration limit and integration time
						I/O
					MOTORIZED OPTICAL MOUNTS	Trigger In
		Trigger Out	One high-speed position compare output (for axes 1 and 2) configurable for position synchronized pulses or for time synchronized pulses : <5 ns accuracy, <700 ns latency (from real stage position to pulse generation), 5 MHz max. rate			
		BEAM MANAGEMENT	Dedicated Inputs Per Axis	RS-422 differential inputs for A, B and I, Max. 25 MHz, over-velocity and quadrature error detection 1 Vpp analog encoder input up to x65536 interpolation used for servo; amplitude, phase and offset correction and synchronization Forward and reverse limit, home, error input		
				Dedicated outputs per axis (when using external drives)	2 channel 16-bit, ± 10 V D/A Drive enable, error output	
SPECIAL COLLECTIONS	Drive capability				Analog voltage, analog velocity, and analog acceleration (used with XPS-DRV01 and XPS-DRV03 for DC brush motor control) Analog position (used with XPS-DRV01 for stepper motor control) Analog position (used with external drives for example for piezo control) Analog acceleration, sine acceleration and dual sine acceleration (used with XPS-DRV02 for brushless motor control) Step and direction and \pm pulse mode for stepper motors (XPS-DRV00P and external stepper motor driver) 300 W drive power	
		Dimensions (W x D x H)	12.6 x 13.4 x 6.94 in. 320 x 340 x 176(4U) mm			
			Weight	16.5 lb 7.5 kg		

(1) Advanced Trigger In/Out is for OEM orders only. For more information see features.

Note this section adds to the Controllers and Drivers section in the Precision Motion Catalog pp.124-144.

ESP301 Series

3 Axis Motion Controller/Driver



- 1 to 3 axes motion controller using universal driver technology
- ESP technology, Newport's exclusive plug-and-play compatibility
- 1000x programmable micro-step resolution for ultra-smooth positioning
- USB2.0, RS232 and optional GPIB communications



The ESP301 controller/driver can drive and control up to three axes of motion using any combination of DC or 2-phase stepper motors up to 3 A per axis. This enables driving a large selection of Newport stages and actuators. Featuring an integrated front panel interface and Newport's unique ESP stage auto-configuration, the ESP301 is the easiest controller to use with excellent functionality at an affordable price.

Technology

The ESP301 uses a 64-bit, floating point, DSP processor for high precision synchronized control. A digital PID-FF (feed-forward) servo loop ensures precise velocity profile tracking and accurate positioning. A 1000x programmable micro-step resolution provides ultra-smooth, low-speed stepper positioning capability, and 18-bit DC motor command output ensures improved stability for precision applications.

Motion

The ESP301 provides several modes of positioning including synchronized and non-synchronized point-to-point, jogging, linear or circular interpolation, and continuous path contouring. With electronic gearing, any axis of the ESP301 can be "slaved" to any other axis, even if they have different motor/gear ratios or lead screw pitches. Other sophisticated motion features include on-the-fly position, velocity, or trajectory changes for complex motion and alignment routines. Software limits can be set to improve systems safety. An advanced origin search routine includes encoder index pulse consideration for precision homing. Backlash and linear error compensation eliminate repeatable system errors.

Inputs/Outputs

16 bi-directional digital I/O can be user programmed as either inputs or outputs for internal or external event synchronization. When configured as inputs, they can be used to execute a program or to stop a motion. When configured as outputs, they can monitor the status of a motion to provide a hardware interface for external equipment. An additional watchdog timer and remote interlock are supplied as an invaluable safety feature.

Programming

The ESP301 makes programming complex motions easy using a powerful programming language with over 100 commands. Each ESP301 features a standard USB and RS-232-C communication link for easy computer interfacing. An optional IEEE-488 (GPIB) interface is available for high speed parallel communication. Newport recommends using National Instruments GPIB hardware for full compatibility. 64kB Flash non-volatile user program memory allows for storage of up to 100 user-defined programs for computer independent usage. A complete library of LabVIEW™ drivers and communication DLL's are available and continually updated.

Auto-Configuration

When used with ESP compatible motion devices, the ESP301 motion controller will automatically configure itself, providing true plug-and-play compatibility. PID parameters, motor types and gear ratios are automatically set for you at power up — there are no parameters to set and hence no risk of damage by inappropriate parameter settings. The ESP301 can also be configured to operate non-Newport stages that fit within driver module specifications.

Front panel

ESP301 options include a user-friendly front panel interface providing an intuitive menu system from which you can execute motion programs, initiate manual moves, and configure operating parameters. The position of all axis is displayed in a LCD screen. A digital joystick can provide convenient jog control.

Specifications

MOTORIZED LINEAR STAGES	Computing Power	400 μ s servo cycle up to 3 axes
		64 bits floating point DSP, with a peak performance of 1200 MFLOPS
		Digital PID servo loop with velocity and acceleration feed forward
MOTORIZED VERTICAL STAGES	Motion	Trapezoidal and s-curve velocity profile
		Synchronized and non-synchronized point-to-point
		Jogging, Continuous moves
		3D Linear interpolation, 2D Circular Interpolation
		Master-slave, Electronic gearing
MOTORIZED ROTATION STAGES	Contouring	On-the-fly changes of target position, speed, acceleration, and PID
		2D Contouring with continuous buffer loading
MOTORIZED LINEAR ACTUATORS	External Event Synchronization	Program execution depending on TTL I/O status
		Real-time command execution via computer interfaces
		Stand-Alone Execution of Programs
HEXAPODS	Operating Modes	Front panel manual motion command execution
		Digital joystick (optional)
		USB2.0 (32-bit), RS-232-C
CONTROLLERS AND DRIVERS	Computer Interfaces	Optional IEEE-488-1 included in ESP301-1G, -2G and -3G
		100+ intuitive, 2 letter ASCII commands
		Command set includes: User defined units, software limits, home search (with and w/o top zero), linear error and backlash compensation, etc.
MOTORIZED OPTICAL MOUNTS	Programming	Typical time to send a command and to read the response: RS-232-C: 7-30 ms; USB: 3.5 ms; IEEE-488-1: 1 ms
		Communication DLL for Windows 95/98/2000/NT/ME/XP, example.net (serial communication)
		Drivers for LabView
SPECIAL COLLECTIONS	Software Drivers	Software development tools compatible with Windows 95/98/2000/NT/ME/XP: Setup, PID tuning program, Motion Wizard (used to configure non-ESP compatible stages)
		Drivers for LabView
		16 user programmable TTL I/O (programmed in groups of 8)
MOTORIZED LINEAR STAGES	I/O	"Watchdog" timer and remote interlock
		64KB Flash Non-Volatile User Program Memory (last for approx. 6,000 commands)
		Backlit LCD display, 4 lines x 20 characters, 21 mm x 70 mm
MOTORIZED VERTICAL STAGES	Front Panel Display	DC brush motors at 48 V, 3 A max.
		Closed-loop operation
		16-bit DAC resolution
MOTORIZED ROTATION STAGES	Motor Control	5 MHz max. encoder input frequency
		2-phase stepper motors at 48 V, 3 A max.
		Open- or closed-loop operation
MOTORIZED LINEAR ACTUATORS	Stepper Motor Control	10 kHz commutation rate
		1000x max. (programmable) micro-step resolution
		Total Available Motor Power
HEXAPODS	Total Available Motor Power	150 W, 48 V, 3 A max per axis
		Power Requirements
		115/230 V, 50/60 Hz wide input range
CONTROLLERS AND DRIVERS	Dimensions (W x D x H)	429.5 x 436.0 x 76.2 mm
		SAT-Weight (kg)
		6

*Newport recommends using National Instruments GPIB hardware for full compatibility. Other GPIB products may not provide acceptable performance.

Ordering Information

Model	Description
ESP301-1N	ESP301 Motor Controller/Driver, 1 axis, USB
ESP301-1G	ESP301 Motor Controller/Driver, 1 axis, w/ GPIB and USB
ESP301-2N	ESP301 Motor Controller/Driver, 2 axis, USB
ESP301-2G	ESP301 Motor Controller/Driver, 2 axis, w/ GPIB and USB
ESP301-3N	ESP301 Motor Controller/Driver, 3 axis, USB
ESP301-3G	ESP301 Motor Controller/Driver, 3 axis, w/ GPIB and USB
ESP300-J	Joystick (digital joystick)
ESP300-R	19 in. Rack Mount Brackets



The digital joystick provides convenient manual jog control

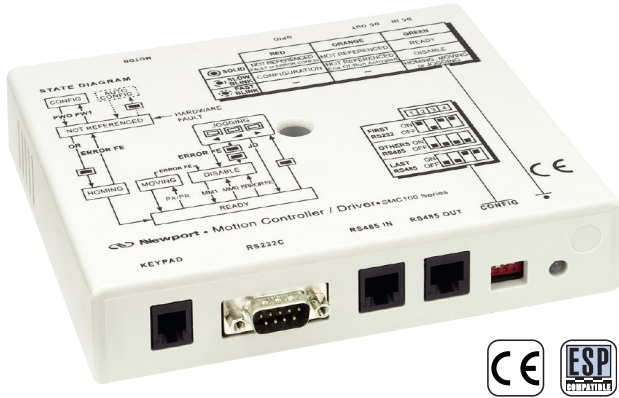


ESP301 Rear Panel. All connections to motors, computer and other devices are found in the rear panel

To view compatible Newport stages and actuators, see page 146.

SMC100

Single-Axis Motor Controller/Driver



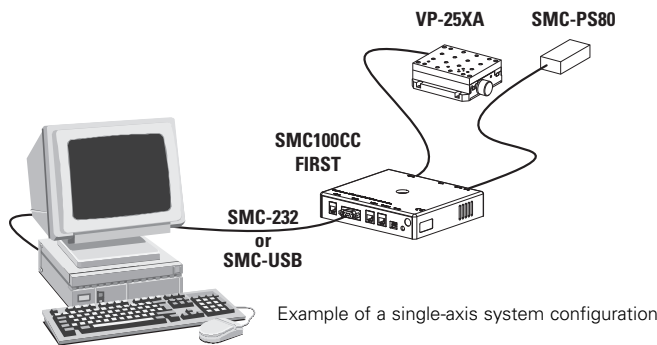
- Affordable single-axis control for DC or Stepper motors
- Plug-and-play with ESP compatible stages & actuators
- Control 31 axis systems by daisy-chaining through RS-485 port
- RS-232-C or USB communication for easy user interfacing
- A complete library of LabVIEW drivers and a convenient GUI
- Over 100 simple, two-character ASCII commands

The SMC100CC and SMC100PP are single axis motion controllers/drivers for DC servo motors (SMC100CC) and 2-phase stepper motors (SMC100PP) up to 48 VDC at 1.5 A rms. They provide a very compact and low-cost solution for driving most of Newport's stages, including the popular GTS and ILS linear stages, URS rotation stages, and LTA actuators.

Communication with the SMC100 is achieved via the integrated RS-232-C interface, or from a USB port using the external adapter SMC-USB (requires Windows™ operating system). Intuitive, Windows-based software supports all configurations and enables basic motion. Advanced application programming is simplified by an ASCII command interface and a set of two-letter mnemonic commands.

When used with Newport ESP enhanced positioners, the SMC100 will detect the connected product automatically for the most straightforward system configuration. This exclusive Newport feature does not only reduce configuration time, but provides also the best protection of your equipment from any accidental damage.

Up to 31 controllers can be networked through the internal RS-485 communication link. This internal multi-drop full-duplex serial link simplifies communication to several units, without the need for sending "address selection commands". This results in enhanced multi-axes management with improved program readability and faster communication compared to alternative systems based on an RS-232-C chain. The typical execution time for a tell position command, for instance, is only in the range of 10 to 20 ms. The SMC100 also features advanced "multi-axes" commands, such as "Stop all" or "Start a motion of all axes" and performs at a 57,600 baud rate communication speed. Furthermore, for an efficient process control, the SMC100 features dedicated digital outputs for "In Motion" and "Not referenced".



The SMC-RC is an affordable remote control for the SMC100 controller. It features a 16-character LCD for position display and 4 push buttons for +/- jog motion, configuration, homing, motor on and motor off.

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Specifications

Description	SMC100CC
Controller Capability	DC servo motors in open or closed loop operation
Motor Output Power	48 VDC @ 1.5 A rms, 3 A peak
Control Loop	Floating point digital PID loop with velocity and friction feedforward, 2kHz servo rate
Motion	Point-to-point motion with s-gamma motion profiler allowing acceleration and jerk time control; Backlash and Hysteresis compensation mode
Computer Interface	RS-232-C with 57,600 baud rate
	USB compatible with external adapter SMC-USB (requires Windows™ operating system) RS-485 internal link for chaining up to 31 controllers from the same COM port
Programming	40+ intuitive, 2 letter ASCII commands
	Command set includes software limits, user units, synchronized motion start, stop all
I/O	4 TTL out (open collector)
	4 TTL in (2.21 kΩ pull up to 5 V) 1 analog input, ±10 V, 8-Bit
Dedicated Inputs	RS-422 differential encoder input for A, B, and I, max. 2 MHz rate (SMC100CC only)
	Forward and reverse limit, home switch and index pulse
Dedicated Outputs	1 open-collector output for "InMotion" 1 open collector output for "NotReferenced"
Display	Two color LED
Internal Safety Feature	Watchdog timer
Software	Windows Utility program LabView™ drivers
Dimensions (W x D x H)	161 x 140 x 33 mm

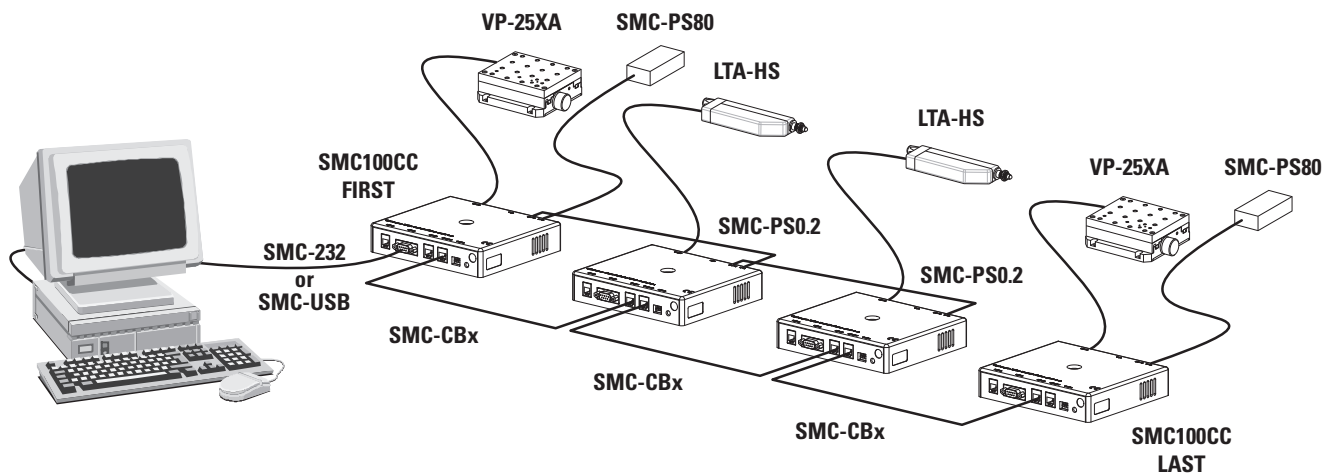
To view compatible Newport stages and actuators, see page 146.

Ordering Information

Model	Description
SMC100CC	SMC100 controller for DC servo motors. Includes 0.2m long power and RS-485 cables
SMC100PP	SMC100 controller for 2-phase stepper motors. Includes 0.2m long power and RS-485 cables
SMC-RC	Remote Control, SMC100, 16-Character LCD Display
SMC-PS80	Power Supply, SMC100 Series, 80W, 100-240 VAC, 47-63 Hz, 1.9 A max.
SMC-232	RS-232-C cable, 3 m length, DB9F to DB9F
SMC-USB	USB Interface, Includes USB to COM Port Adapter & RS-232-C Cable
SMC-CB1 ⁽¹⁾	RS-485 Cable for SMC100 Series, 1 m Length
SMC-CB3 ⁽¹⁾	RS-485 Cable for SMC100 Series, 3 m Length

¹ Only required when RS-485 cable included with SMC100 is too short.

For a complete list of compatible Newport stage, see page 146.



Example of a multi-axis system configuration

CONEX-CC

CONEX DC-Servo Controller and Accessories



- Easily Daisy chain additional modules
- Power supply can provide power for 5 modules
- Base plate is universal for all CONEX modules



The CONEX-CC is a very compact and inexpensive driver for Newport's low power DC servo motor driven devices. For out-of-the box control, the CONEX-CC is preconfigured and delivered with the motion device. Available configurations include TRA and LTA Series actuators, MFA linear stages, SR50 and PR50 rotation stages and BGS50 goniometers.

The linear amplifier of the CONEX-CC provides the optimum drive solution for low-power motors. Compared to other solutions relying on cheaper PWM amplifiers, the CONEX-CC delivers much smoother motion, with less electrical noise and significantly less motor heating.

CONEX CC Controller accessories include the base plate, power supply, and power chain cable. The base plate is universal to all CONEX modules to allow easy mounting to Newport standard tables. The power supply is a 24 Volt DC power supply for all CONEX CC devices. For added convenience, the power can be shared with up to 5 modules using the optional CONEX-PS-CB power chain cable.

CONEX-CC Specifications

Description	Single-axis motion controller/driver for low-power DC servo motors
Motor Output Power	24 VDC @ 0.15 A rms, 0.3 A peak, linear amplifier
Control Loop	Floating point digital PID loop with velocity and friction feedforward, 2 kHz servo rate
Motion	Point-to-point motion with S-gamma motion profiler allowing acceleration and jerk time control; Backlash and Hysteresis compensation mode
Computer Interface	USB2.0, 1.8 m long USB-A to Mini-B cable included
Programming	40+ intuitive, 2 letter ASCII commands
Dedicated Inputs	Encoder input for A, B, and I, max. 2 MHz rate, single ended Forward and reverse limit, home switch and index pulse
Display	Two-color LED
Safety Feature	Watchdog timer
Power Requirements	24 V, 8 W, female Ø 2.1 x Ø 5.5 x 11 mm
Dimensions [in. (mm)]	3.67 x 2.09 x 0.90 (93.2 x 53 x 23)
Cable Length [ft. (m)]	3 (9.8)

Ordering Information

Model	Description
CONEX-TRA6CC	TRA6CC Actuator Integrated with CONEX Controller
CONEX-TRA12CC	TRA12CC Actuator Integrated with CONEX Controller
CONEX-TRA25CC	TRA25CC Actuator Integrated with CONEX Controller
CONEX-LTA-HL	LTA-HL actuator Integrated with CONEX Controller
CONEX-LTA-HS	LTA-HS actuator Integrated with CONEX Controller
CONEX-MFACC	MFA-CC Linear Stage Integrated with CONEX Controller
CONEX-SR50CC	SR50CC Rotation Stage Integrated with CONEX Controller
CONEX-PR50CC	PR50CC Rotation Stage Integrated with CONEX Controller
CONEX-BGS50CC	BGS50CC goniometer with CONEX-CC controller
CONEX-PS	CONEX 24 V Power Supply
CONEX-PS-CB	CONEX Power Chain Cable, 100 mm length
CONEX-BP	CONEX Base Plate, For Mounting Multiple CONEX devices.



CONEX controllers mounted on CONEX-BP



CONEX-PS Power Supply



CONEX-PS-CB Cable Chain (Included in every CONEX-CC order)

CONEX-PP

CONEX-PP Controller and Accessories



- Compact solution for space confined applications
- Out of box control
- Fast USB communication for Plug and Play

These iPP intelligent stepper motor controllers are economic solutions for space restricted and low budget application.

The CONEX-NSA12 miniature motorized linear actuator is integrated with an iPP intelligent stepper motor controller and capable of 11 mm travel, is an economical solution for motorizing mirror mounts, rotation stages, linear stages and other manual motion devices. They are ideal for remote adjustment of sensitive, hard-to-reach optical components which can be influenced by the compressive and torsional forces imposed by traditional manual adjustment micrometers. Typical applications include optimizing the alignment of a laser cavity, zeroing in on coherence lengths or just adjusting the pointing of a beam over a long distance.

The CONEX-NSR1, with an integrated iPP stepper motor controller, is an economical and versatile rotary positioner for use as a filter wheel, a neutral density rotator, polarized optic rotator, flipper mount or basic rotation platform. It features a 1" threaded aperture, retaining ring and internal reference surface for 25.4 mm optics, a 1-° step resolution, and up to 120 %/s speed. The NSR1 serves as a base unit, and can be used as a rotator for 25.4 mm optics. Accessories are also available, including a filter wheel (NSFW-1) for up to 8 - 25.4 mm optics, a 127 mm diameter variable ND filter adapter (NSND), a tooling plate (NSTP-1) featuring an array of tapped holes, and a unique set of adapters to transform the rotator into a motorized flipper mount (NSFM-1).

CONEX-PP Controller Specifications

Description	Single-axis motion controller and driver for Intelligent Stepper Motors
Motor Output Power	24 VDC peak, 2.5 A peak PWM amplifier
Control Loop	- PI control of motor phase current with programmable idle state - 2kHz servo rate - Backlash compensation
Motion	Point-to-point motion with S-gamma profile and jerk time control
Computer Interface	USB +5V (USB): <0.5 A, Windows Compatible
Programming	- Natural user defined units - 40+ intuitive, 2-letter ASCII commands
Safety Feature	- End of range checks - Power limit checks - Watchdog timer
Power Requirements	+24 V (FC-PS40): <1.67 A
Dimensions [in. (mm)]	4.33 x 2.06 x 0.98 (110 x 52.2 x 25)
Cable Length [(m)]	9.8 (3)

CONEX-NSR1



Stage Specifications

	CONEX-NSR1
Travel Range (°)	360
Minimum Incremental Motion (°)	1
Uni-directional Repeatability, Guaranteed ¹ (°)	1
Bi-directional Repeatability, Guaranteed ¹ (°)	3
Absolute Accuracy, Guaranteed (°)	
Maximum Speed (°/s)	120
Wobble, Guaranteed (μrad)	600
MTBF (h)	
Weight [lb (kg)]	0.9 (0.4)

¹⁾ Shown are peak to peak, guaranteed specifications or ± half the value as sometimes shown. For the definition of typical specifications which are about 2X better than the guaranteed value, visit Newport.com for the Motion Control Metrology Primer.

CONEX-NSA12



Actuator Specifications

	CONEX-NSA12
Drive Type	Micro Step Drive Stepper
Travel (mm)	11
Minimum Incremental Motion (μm)	0.2
Uni-directional Repeatability, Guaranteed ⁽¹⁾ (μm)	2.2 ⁽³⁾
Bi-directional Repeatability, Guaranteed ^{(1),(2)} (μm)	10 or ± 5 ⁽³⁾
On-Axis Accuracy, Guaranteed ⁽¹⁾ (μm)	N/A
Maximum Speed (mm/s)	0.9
Axial Load Capacity (+Cx) (N)	28

¹⁾ Shown are peak to peak, guaranteed specifications or ± half the value as sometimes shown. For the definition of typical specifications which are about 2X better than the guaranteed values, visit www.newport.com.

²⁾ After backlash compensation

³⁾ Shown are peak to peak, typical specifications or ± half the value as sometimes shown.

Rotator Accessories

Model	Description
NSFM-1	Flip Mount Attachment, NewStep Universal Rotator
NSFW-1	Filter Wheel Attachment, NewStep Universal Rotator
NSND-3	ND Rotator Attachment, 50G02AV.1 ND Filter, NewStep Universal Rotator
NSND-4	ND Rotator Attachment, 50G02AV.2 ND Filter, NewStep Universal Rotator
NSND-5	ND Rotator Attachment, 50Q04AV.1 ND Filter, NewStep Universal Rotator
NSND-6	ND Rotator Attachment, 50Q04AV.2 ND Filter, NewStep Universal Rotator
NSTP-1	Tooling Plate Attachment, NewStep Universal Rotator, M4 and 1/4-20

Conex-PP Accessories

Model	Description
CONEX-BP	Base Plate, Mounts Multiple CONEX Controllers
FC-PS40	Power supply, iPP step motor, RoHS
USB-RS422-1.8	Cable adapter, USB to RS422, 1.8m
FC-CB1	1m communication cable, daisy chain, RS422

Power Supply and cables are sold separately.

Ordering Information

CONEX-NSR1	Rotation Stage

Conex-PP Accessories

Model	Description
CONEX-BP	Base Plate, Mounts Multiple CONEX Controllers
FC-PS40	Power supply, iPP step motor, RoHS
USB-RS422-1.8	Cable adapter, USB to RS422, 1.8m
FC-CB1	1m communication cable, daisy chain, RS422

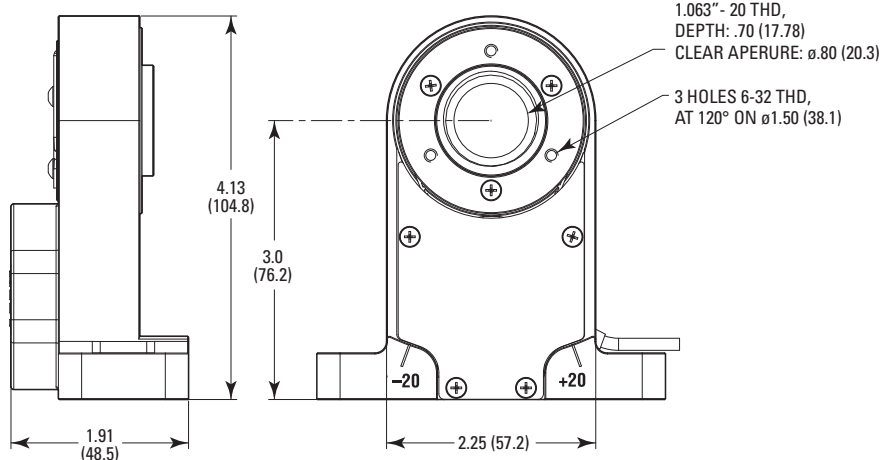
Power Supply and cables are sold separately.

Ordering Information

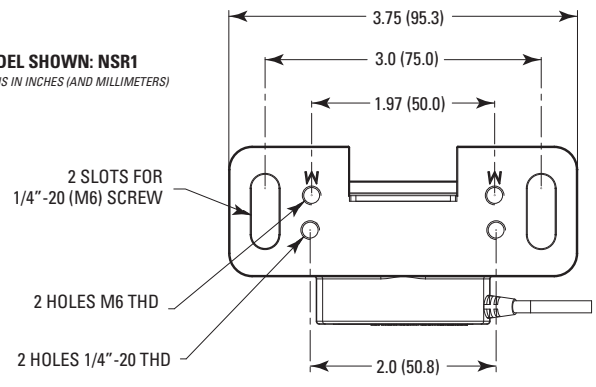
CONEX-NSA12	Motorized Actuator
CONEX-NSA12V6	Vacuum Actuator

Dimensions

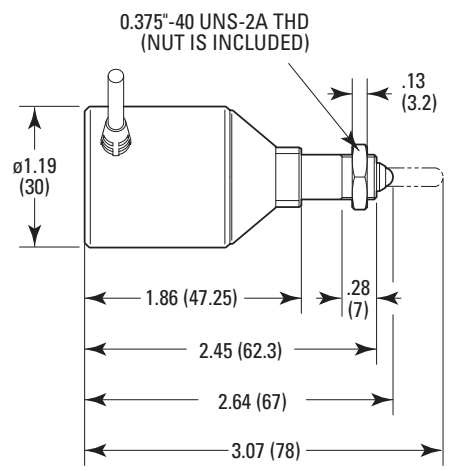
MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS



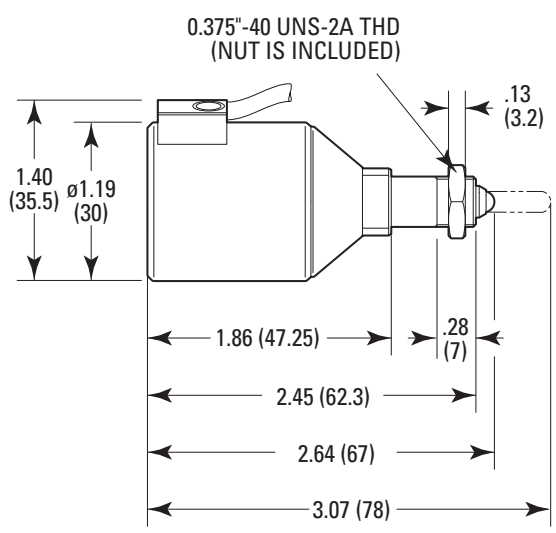
MODEL SHOWN: NSR1
 DIMENSIONS IN INCHES (AND MILLIMETERS)



MODEL SHOWN: NSA12
 DIMENSIONS IN INCHES (AND MILLIMETERS)



MODEL SHOWN: NSA12V6
 DIMENSIONS IN INCHES (AND MILLIMETERS)



Agilis™ Motion 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, Windows DLLs and LabView VI's included
- Optional USB power supply



Agilis piezo motor controllers are available in 2 or 8 channel versions. The 2-channel, hand-held, AG-UC2, can be driven through a USB port or from the independent USB-CH power supply. Both Agilis AG-UC8 and AG-UC8PC controllers have the capability to drive up to 8 piezoelectric motors. They can be powered through the USB port directly from the computer and the AG-UC8PC version can also be powered from an external power supply. A software utility allows driving two selected motors (1&2, 3&4, etc) at a time and switching to another motor pair.

A set of ASCII-commands, Windows DLL and LabViewVI's for all functions are provided.

Specifications

	AG-UC2	AG-UC8	AG-UC8PC
Number of axes	2	8	8
Interface	Push buttons and USB	USB	USB, RS-232 and RS-485
Power input	Through USB interface	Through USB interface	USB: Through USB RS-232 and RS-485: 5 V through HE10 connector
Size (mm)	177 x 57 x 19	135 x 90 x 25	130 x 85

Ordering Information

Model	Description
AG-UC2	Compact Piezo Motor Controller, 2 Axis, Hand-held
AG-UC8	Compact Piezo Motor Controller, 8 Axis
AG-UC8PC	8 Axis OEM Agilis Piezo Controller, USB/RS232/RS485
USB-CH ¹	USB Power Supply, Includes clips for US, EU, UK & Australia, 2m Cable

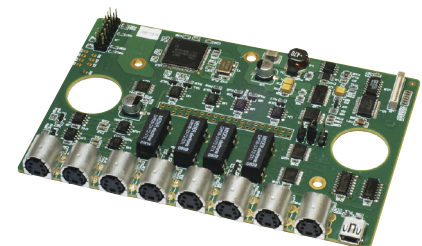
¹ The USB-CH is required only with the AG-UC2 and only if power is not available from a PC.



AG-UC2 Hand-held 2-axes controller



AG-UC8 Compact 8-axes controller



AG-UC8PC 8-axes PC Card controller

Open-Loop Picomotor™ Controller/Driver Modules



Intelligent Open-Loop Picomotor™ Controller / Driver Module – 12 Channels

- Intelligent 4-axis open-loop control
- Compact, integrated controller and driver design
- USB and 2.0 advanced 10/100 Ethernet connectivity
- Windows application for plug-and-play use
- LabVIEW™ and Windows™ DLL support



The New Focus model 8742 is a 4-axis open-loop intelligent motion controller/driver that provides a compact and low cost solution for driving New Focus open-loop Picomotor products.

It is a single-box solution that can be computer controlled via USB and Ethernet communication interfaces using Newport Motion Control Language (NMCL) command set. Both interfaces are well supported via Windows™ DLL, sample LabVIEW™ VIs, and intuitive graphical user interface (GUI) Windows™ application with device auto-discovery feature.

Each model 8742 controller/driver can control one of four 4-pin RJ-22 single output ports for use with any single-channel Picomotor actuator at any given time. The model 8725 multi-axis adapter can be used to connect the 4-pin RJ-22 output ports on the drivers to New Focus Picomotor products with 6-pin RJ-11 connectors.



Model 8742 Open-Loop Picomotor™ Controller/Driver

Picomotor™ Hand Control Pad

The 8758 hand control pad facilitates local (non-computer) control of Picomotor positioners connected to the 8742 or the 8743-CL Picomotor controller/drivers. Therefore it is a perfect solution when you need to run a quick test or just want a straightforward handheld controller device.

Model 8758 control functions are organized into four basic groups: (1) controller selection, (2) motor selection, (3) variable speed jog control, and (4) forward/reverse single-step & continuous jog control. When daisy-chained in a master and slave configuration, the 8758 is capable of interfacing with up to 31 Picomotor controllers/drivers. It draws its electrical power from the Picomotor controller via USB interface thus does not require a separate power supply and it is ergonomically designed to be compatible for both right or left handed users.

For applications where it is desirable that the model 8758 Hand control pad be securely fastened to an optical table surface, there is an accessory Model 8758-MTG-KIT available. This kit provides all the necessary hardware to accomplish that objective.



Model 8758 Picomotor™ Hand Control Pad

Open-Loop Picomotor™ Controller/Driver Kits

The 8742-4-KIT Four-Axis Open-Loop Picomotor Controller/Driver Module Kit has everything you need to get started quickly. We've bundled our picomotor controller/driver and accessories together to provide a simple-to-use 4-axis driver kit. Just plug in the included power supply and you're ready to go. The kit includes the following components: 1x Model 8742 module and software, 1x Model 8745-PS power supply, and 1x Model 8745-USB-CBL USB cable.

To control more picomotors, there are 8-axis 8742-8-KIT and 12-axis 8742-12-KIT kits which include the 8745-RS485-CBL.

Controller Specifications

Specifications	8742
Number of Channels	4
Maximum Pulse Rate	Up to 2 kHz
Input Voltage (VDC)	12 (Nominal), 10.5 to 14.5
Interface	10/100 Ethernet, USB 2.0
Power Consumption	11 Watts @ 2 kHz Sustained Speed kW, 2 Watts Idle
Size	5.45 in x 3.61 in x 1.02 in (148.3 mm x 91.7 mm x 25.8 mm)
Operating Temperature	0°C to 65°C
Storage Temperature	-40°C to 95°C
Weight	0.6 lb (272 g)

Hand Pad Specifications

Specifications	8758
Interface	USB 2.0
Number of Motors	31 Drivers
Cable Length (m)	3
Variable Speed Jog Control	Yes
Single Step Control	Yes
On/Off Switch	Yes
Axis per Controller/Driver	4 axis for 8742, 2 axis for 8743-CL

Ordering Information

Model	Description
8742	Open-Loop Picomotor Controller / Driver Module, 4 Channels
8742-4-KIT	Four-Axis 8742 Picomotor Controller/Driver Kit
8742-8-KIT	Eight-Axis 8742 Picomotor Controller/Driver Kit
8742-12-KIT	Twelve-Axis 8742 Picomotor Controller/Driver Kit
8758	Hand Control Pad for 874X Picomotor Controller/Drivers
8725	Multi-Axis Adapter, Picomotor, 6 pin to 3x 4 pin

Closed-Loop Picomotor™ Controller/Driver Module



- Intelligent 2-axis closed-loop control
- Compact, integrated controller and driver design
- USB 2.0, RS-485 & advanced 10/100 Ethernet connectivity
- Windows application with advanced device auto-discovery
- LabVIEW and Windows DLL support
- Newport Motion Control Language (NMCL) command set



Intelligent Closed-Loop Picomotor™
Controller / Driver Module – 2 Channels

The most recent addition to the New Focus Picomotor controller/driver family, model 8743-CL is a 2-axis closed-loop intelligent motion controller/driver that provides fine tuning, absolute positioning, compact and low cost solution for driving New Focus closed-loop Picomotors products.

It is a single-box solution that can be manually controlled with the New Focus 8758 hand control pad or computer controlled via USB, RS-485, or Ethernet communication interfaces using the Newport Motion Control Language (NMCL) command set. All three computer interfaces are well supported via Windows™ DLL, sample LabVIEW™ VIs, and intuitive graphical user interface (GUI) Windows™ application with device auto-discovery feature.

Each model 8743-CL controller/driver has two 4-pin RJ-22 single output ports and two 25-pin D connector for the encoder signal that can be used with any single-channel closed loop Picomotor actuator at any given time.

Specifications

Specifications	8743-CL
Number of Channels	2
Maximum Pulse Rate	Up to 2 kHz
Input Voltage (VDC)	12 (Nominal), 10.5 to 14.5
Interface	10/100 Ethernet, USB 2.0, RS-485
Power Consumption	11 Watts @ 2 kHz Sustained Speed kW, 2 Watts Idle
Size	5.45 in x 3.61 in x 1.02 in (148.3 mm x 91.7 mm x 25.8 mm)
Operating Temperature	0°C to 65°C
Storage Temperature	-40°C to 95°C
Weight	0.6 lb (272 g)

Ordering Information

Model	Description
8743-CL	Closed-Loop Picomotor Controller & Driver Module, 2 Channel
8743-CL-2-KIT	Two-Axis Picomotor Controller & Driver Kit, 8743-CL

Picomotor Hand Control Pad



Model 8758 Picomotor™ Hand Control Pad

- Manual local control of picomotor positioners
- Compatible with 8742 or 8743-CL Picomotor controllers
- Interfaces up to 31 Picomotor controllers/drivers

The 8758 hand control pad facilitates local (non-computer) control of Picomotor positioners connected to the 8742 or the 8743-CL Picomotor controller/drivers. Therefore it is a perfect solution when you need to run a quick test or just want a straightforward handheld controller device.

Features

- Controller selection
- Motor selection
- Variable speed jog control
- Forward/reverse single-step & continuous jog control.
- Up to 31 Picomotor control when daisy chained
- USB powered
- Ergonomically designed to be compatible for both right or left handed users.

Ordering Information

8758	Hand Control Pad, 874x Picomotor
8758-MTG-KIT	Optical Table Mounting Kit

8742 and 8743-CL Picomotor™ Controller/Driver Module Accessories



- Convenient communication cables for interfacing with the modules
- Kit for table mounting
- Stacking kit for multiple modules

These accessories allow you to customize your 8742 and 8743-CL module setup to meet your specific needs. Accessories include additional cables, power supplies, and even small kits for stacking modules, table mounting, and PC interfacing.

L-Shaped Stacking Plate Kit

The 8745-STK-KIT includes a mounting bracket and screws for stacking multiple controller/driver modules.



Optical Table Mounting Plate Kit

The 8745-MTG-KIT includes a mounting plate and 1/4-20 screws for securing your controller/driver module onto your non-metric optical table. The mounting plate allows the controller/driver to be mounted either horizontally or vertically.



Hand Control Pad Mounting Kit

The 8758-MTG-KIT provides all the necessary hardware for the model 8758 Hand control pad to be securely fastened to an optical table surface.



Ordering Information

Model	Description
8745-PS	Power Supply, 8742 and 8743-CL Controller/Driver, 12V
8745-PWR-CBL	Power Cable, 6 in. Length, 8742 and 8743-CL Controller/Driver
8745-USB-CBL	USB Cable, 3 Meters Length, 8742 and 8743-CL Controller/Driver
8745-STK-KIT	L-Shaped Stacking Plate Kit, 8742 and 8743-CL Controller/Driver
8745-MTG-KIT	Optical Table Mounting Plate Kit, 8742 and 8743-CL Controller/Driver
8758-MTG-KIT	Optical Table Mounting Plate Kit, 8758 Hand Control Pad

TTL and Analog Picomotor™ Motion Controller



8712 Picomotor™ Driver,
Single-Axis, PCB-Mountable

- Easy-to-use driver module interfaces with TTL or analog signals
- Comes mounted on its own printed-circuit interface board
- Ideal for OEM and laboratory applications

The Single-Axis Picomotor Driver modules are designed to be integrated into OEM equipment or laboratory setup by mounting directly onto your printed-circuit board (model 8712) or through our integrated PCB (model 8703).

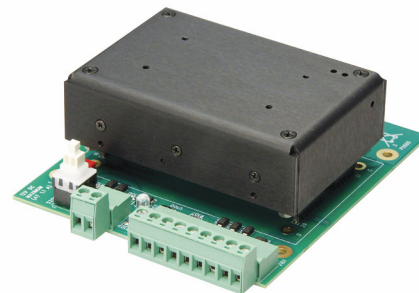
Specifications

	8712	8703
Number of Channels		1
Maximum Pulse Rate	2 kHz, (25 °C, continuous operation)	
Input Voltage	10 to 16 V (12 V nominal)	10-12
Interface	Pins for PCB Mounting	Input: 9-Pin Phoenix MSTBA, Output: RJ-11 Phoenix 3-Position Terminal Block
Power Consumption	≈7.5 W @ 1-kHz Sustained Speed	
Size	3.75 x 2.53x 1.09, (95.5 x 64.3 x 27.7)	4.62 x 4.09 x 1.63, (117.3 x 104 x 41.4)
Operating Temperature	0 °C to 65 °C	
Storage Temperature	-40 °C to 95 °C	
Weight	0.163 lb.	

NOTE: The Model 8703 driver module requires an external power supply (Model 8704NF recommended), and is not compatible with the Intelligent Picomotor modules or their accessories.

Ordering Information

Model	Description
8712	Single-Axis, PCB-Mountable
8703	Single-Axis Picomotor™ Driver Module, TTL/Analog



8703 Single-Axis Picomotor™ Driver Module, TTL/Analog

NanoPZ

PZC200 Controller



- Ergonomic hand controller
- Control up to 8 channels
- Windows application for plug-and-play use



The PZC200 controller provides convenient and ergonomic one hand speed control, and easy to use push button channel control for the PZC-SB switchbox. The PSC200 is equipped with a serial RS-485 computer link for computer control of up to 256 units in parallel. RS-485 is accessed by using the RS-485 to RS-232 converter NSC-485-232-I plugged into the PC's RS-232 port. For USB connectivity, use optional the SMC-USB RS-232 to USB converter. Use with the PZA12 Actuator or for a complete actuator/controller kit, order the PZC200-KT.

PZC-SB Switchbox

The PZC-SB allows control of up to 8 NanoPZ actuators from the same PZC200 controller. LEDs indicate which actuator is active, inactive, connected or disabled. The two buttons on the PZC200 controller allow the selection of the active actuator. The PZC-SB is controllable via PC using the same RS-485/RS-232 interface as the PZC200.

PZC200 Specifications

Number of Controlled Axes	1 without PZC-SB switchbox 8 with PZC-SB switchbox
Operating Modes	Local (manual) control mode Remote (computer) control mode
Controls, Local (manual) Mode	Rotate knob to adjust speed Select active switchbox channel Toggle between local and remote mode Set current position to zero
Controls, Remote (computer) Mode	ASCII commands I/O via RS-485 port
Motion Commands	Micro-steps, 1 micro-step equals approx. 10 nm of linear motion of a PZA12 depending on load, speed and other parameters
Mechanical Dimensions (H x W x D) [in. (mm)]	2 x 6 x 2 (50 x 150 x 50)
Weight [lb (kg)]	0.55 (0.250)

Ordering Information

Model	Description
PZC200	Hand-held controller for PZA12
PZC200-KT	PZA12 Actuator Kit, PZC200 Cont. NSC-PS25 Power Supply, NSC-PSC3 Cable
PZA12	NanoPZ Ultra-High Resolution Actuator, 12.5mm Travel
PZC-SB	PZC200 Switchbox, Includes Power, Driver & Controller Cables Switchbox allows one PZC200 to drive up to 8 actuators. Included cables: P/N 417971-01 1.8 m (6 ft) power cable to controller, P/N 44415-01 6 pin Mini DIN motor cable (6 ft), P/N NSC-CB2 1.8 m (6 ft) RS-485 cable to controller



PZC200 controller with PZA12 actuator.

NPC3/NPC3SG

3-channel Piezo Amplifier



- Compact and Easy to Use Amplifiers
- Low-noise, Wide Range Voltage Output
- Sensor Identification Chip (SIC) and Calibrated Pre-Amplifier
- Highly Flexible and Configurable Software
- Open-Loop and Closed-Loop Versions

The NPC3 and NPC3SG are 3-channel piezoelectric amplifiers for precision control of all Newport NanoPositioning products and other low voltage PZTs. Optimized for usability and versatility, these low-noise piezoelectric amplifiers can supply a permanent current of 40 mA per channel in a voltage range of -20 VDC to 130 VDC.

The piezoelectric amplifiers are available in two versions:

- The model NPC3SG is designed for NanoPositioning products with strain gauge position feedback (model numbers ending in SG). It supports open-loop (voltage) control and closed loop (position) control. In both cases, the monitor output provides a voltage signal proportional to the actual position (0-10V). Since the open-loop response of a piezoelectric element is faster than the closed-loop response, it can be advantageous for certain applications to use open-loop voltage control while monitoring the position via the monitor output.
- The model NPC3 can operate in open-loop only and doesn't read feedback from strain gauges. Use this model for all NanoPositioning products not ending with SG.

Specifications

	NPC3 NPC3SG
Number of channels	3
Output voltage	-20V to 130V DC
Output voltage noise	0.3 mV RMS @ 500 Hz
DC Voltage offset	Via 30-step encoder knob
Continuous output current	3 x 40 mA
Input impedance	10 k Ω
Position feedback ¹⁾	Strain gauge, pre-amplified, -5V to +5V
Typical non-linearity closed-loop ¹⁾	0.1%
Analog input	0V to 10V
Monitor output	0V to 10V
Inside resistance monitor output	< 100 Ω
Display	QVGA color screen
Computer interface	RS232, USB
Digital interface resolution	16 Bit
Dimensions (W x D x H)	210 mm x 240 mm x 88 mm
Weight	2.1 kg
Main supply voltage	24 VDC/2.5A (wide range power supply 90-264 VAC included)

¹⁾ Applies to model NPC3SG only.

Ordering Information

Model	Description
NPC3	3-channel piezo stack amplifier, open-loop control
NPC3SG	3-channel piezo amplifier, strain-gauge position control

NPC1USB



- Compact and Easy to Use Amplifiers
- Low-noise, Wide Range Voltage Output
- Sensor Identification Chip (SIC) and Calibrated Pre-Amplifier
- Highly Flexible and Configurable Software
- Open-Loop and Closed-Loop Versions

The NPC1USB Compact, Single Channel, Piezo Stack Amplifier is a low cost solution for applications that do not require high dynamic performance. Piezoelectric amplifiers offer precision control for all Newport piezo stack stages, microscope objectives and actuator products. These amplifiers have low noise voltage output ranging from -20V to 130V for Nanopositioning, and currently comes in an open-loop version. (Recommended: CONEX-PS).

Specifications

Type	NPC1USB
Number of Axis	1
Computer Interface	USB 2.0
Power Requirement	24 VDC / 0.2A
Operating Temperature	5 to 30°C
Weight	0.3 kg

Recommended Accessory

CONEX-PS Power Supply, 24 VDC, CONEX Motion Controllers

Ordering Information

Model	Description
NPC1USB	Single Channel, Piezo Stack Amplifier

Motorized Optical Mount Selection Guide

Newport offers a large selection of Motorized Optical Mounts to fulfill virtually any research or laboratory need. With the addition of New Focus, we have added the complete line of world class Picomotor driven optical mounts. Motorized optical mounts are great for automating sensitive lab or production optical systems, as well as making adjustments in tight spaces where manual adjustment is not possible.

Many of our standard mirror and optical mounts can be converted to motorized by adding our linear actuators. For a list of the options, see the motorized actuator and manual positioner compatibility guide on page 119.

For OEM or special applications, contact our sales and application engineers.

	Series	Optic Diameter [in. (mm)]	Angular Range (°)	Resolution
	Picomotor™ Mount with Controller Kits see page 176	1.0 (25.4)	±3	0.7 μrad
	Picomotor™ Series Motorized Optical Mounts see page 177	0.5 (12.7) to 2.0 (50.8)	±4	0.7 μrad
	Large Aperture Picomotor Optical Mounts see page 179	2.0 (50.8) to 4.0 (101.6)	±5°	0.7 μrad
	Pint-Sized Series Picomotor Optical Mounts see page 180	0.5 (12.7) to 1.0 (25.4)	±4	1.5 μrad
	Stability™ Series Piezomotor Optical Mounts see page 181	1.0 (25.4)	±4	0.7 μrad
	Stability™ Series Vacuum Compatible Motorized Optical Mounts see page 182			
	Motorized Flipper Mounts see page 183	1.0 (25.4) to 2.0 (50.8)	±2	87 to 183 μrad (resolution/5° turn)
	Agilis™ Series Piezo Motor Driven Optical Mounts see page 184	0.5 (12.7) to 1.0 (25.4)	±2	1 to 2 μrad
	FSM Series Fast Steering Mirrors see page 186	1.0 (25.4)	±1.5	≤1 μrad
	PSM2 Ultrafast Piezo Steering Mirror see page 187	Up to 1.0 (25.4)	±0.115	X, Y 0.004 μrad Z 0.03 nm
	NPO Series Objective NanoFocusing Stages see page 188	0.59 (15)	100 to 250 μm (linear)	0.3 to 0.5 nm (open loop)

New Focus Picomotor™ Mount with Controller Kits






- Picomotor controller and 2 mirror mount kits
- right/right, left/right or left/left handed configurations
- Includes model 8821 picomotor mirror mounts



The New Focus Picomotor™ Mount with Controller Kits utilize Model 8821 motorized optical mounts to combine the precision of standard mounts with the resolution of a Picomotor actuator to provide the ultimate in precision motorized optical alignment. The 8821 offers true set and forget stability, remote adjustment down to sub- μ rad, all in a very compact size that fits very well into tight spaces, including laser cavities.

For a complete and affordable solution to motorized tip and tilt alignment, use the Model 8742-4-8821-XX kits.

Model	Optic Diameter [in. (mm)]	Motorized Axes	Type
 8742-4-8821-LL	1.0 (25.4)	2	Clear Edge Center Mount
 8742-4-8821-RL	1.0 (25.4)	2	Clear Edge Center Mount
 8742-4-8821-RR	1.0 (25.4)	2	Clear Edge Center Mount

Specifications

8821	
Optic Diameter [in. (mm)]	1.0 (25.4)
Motorized Axes	2
Connector Type	4-Pin
Type	Clear Edge Center Mount
Angular Range (°)	± 3
Resolution- Angular (μ rad)	0.7
Cable Length [ft. (m)]	7 (2.1)
Thread Type	8-32 (M4) Thru

Ordering Information

Model	Description
8742-4-8821-LL	Picomotor Controller/Driver Kit, Inc. (2) 8821-L Picomotor Mounts
8742-4-8821-RL	Picomotor Controller/Driver Kit, Inc. 8821 & 8821-L Picomotor Mounts
8742-4-8821-RR	Picomotor Controller/Driver Kit, Inc. (2) 8821 Picomotor Mounts

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Picomotor™ Series

New Focus Motorized Optical Mounts



Left to right: Models 8809, 8853 and 8807

- Compact design
- 0.7 μ rad angular resolution
- Picomotor™ actuators
- Set-and-forget long-term stability
- Easy-to-use, flexible controller/drivers



The New Focus Model 88xx motorized optical mounts combine the precision of New Focus standard mounts with the resolution of New Focus Picomotor™ actuator to provide the ultimate in precision motorized optical alignment. The compact Picomotor actuator housing adds only 0.75" (19.1 mm) to the overall thickness of these mounts. The angular resolution of these mounts is 0.7 μ rad.

For an affordable solution to motorized tip and tilt alignment, use the Model 8807 motorized version of this popular 1" center mount. Unlike other New Focus motorized mounts, this mount has Picomotor actuators on just two of its three adjustment axes.

The popular self-centering Opti-Claw mounts are even more versatile with Picomotor™ actuator adjustment capability. The Opti-Claw mount can hold any component with a diameter of 0.10" (2.54 mm) to 2.0" (50.8 mm), to a concentricity of <0.005" (0.127 mm). The tilting capability on this mount is motorized, while the claw used to grip the optic is not. The built-in setscrew locks the jaws as solidly as a fixed-diameter mount.

Specifications

	8806	8808	8807	8809	8812	8821	8852	8853	8854
Optic Diameter [in. (mm)]	NA	0.5 (12.7)	1.0 (25.4)	1.0 (25.4)	1.0 (25.4)	1.0 (25.4)	2.0 (50.8)	2.0 (50.8)	1.0-2.0 (25.4-50.8)
Motorized Axes	3	3	2	3	3	2	3	3	3
Connector Type	4-Pin	6-Pin	4-Pin	6-Pin	6-Pin	4-Pin	6-Pin	6-Pin	6-Pin
Type	Blank Plate Mount	Corner Mount	Center Mount	Corner Mount	Gimbal Mount	Clear Edge Center Mount	Corner Mount	Gimbal Mount	Opti-Claw Mount
Angular Range (°)	± 4	± 4	± 4	± 4	± 4	± 3	± 4	± 4	± 4
Resolution- Angular (μ rad)					0.7				
Cable Length [ft. (m)]					7 (2.1)				
Thread Type					8-32 (M4) Thru				

Ordering Information

Model	Description
8806	Picomotor Motorized Blank Plate
8807	Picomotor Center Mount, 1.0 in. Diameter
8808	Picomotor Corner Mount, 0.5 in. Diameter
8809	Picomotor Corner Mount, 1.0 in. Diameter
8812	Picomotor Gimbal Mount, 1.0 in. Diameter
8821	Clear Edge Picomotor Mount, 1.0 in. Diameter
8821-L	Left-handed Clear Edge Picomotor Mount, 1.0 in. Diameter
8852	Picomotor Corner Mount, 2.0 in. Diameter
8853	Picomotor Gimbal Mount, 2.0 in. Diameter
8854	Picomotor Opti-Claw Mount, 0.1 to 2.0 in. Diameter

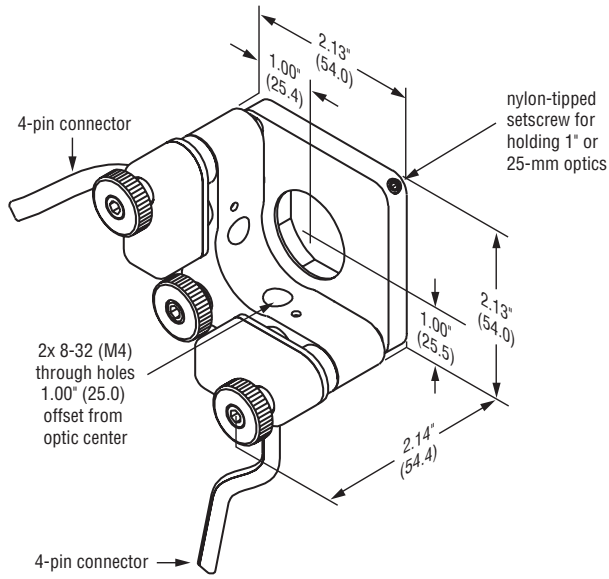
Recommended Motion Controller

8742 see page 166

MOTORIZED LINEAR STAGES
 MOTORIZED VERTICAL STAGES
 MOTORIZED ROTATION STAGES
 MOTORIZED LINEAR ACTUATORS
 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

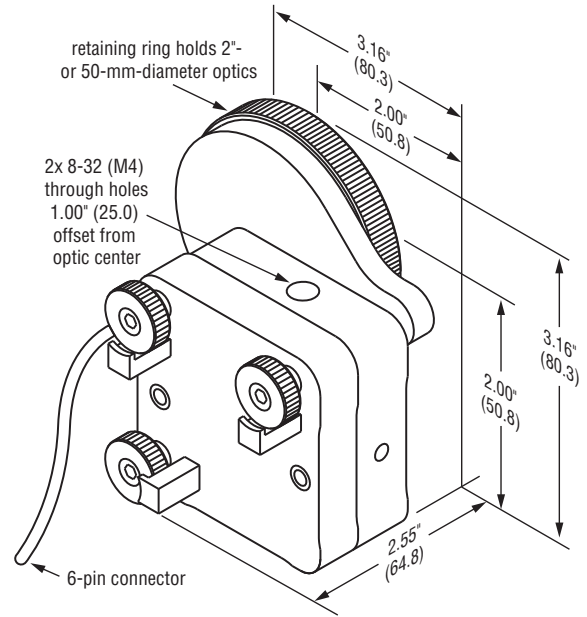
Model 8807

U.S. Patent #5,410,206



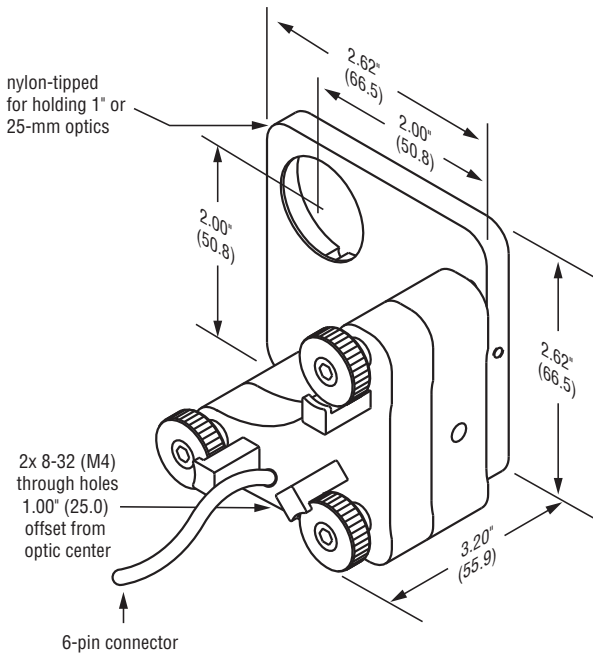
Model 8853

U.S. Patent #5,410,206



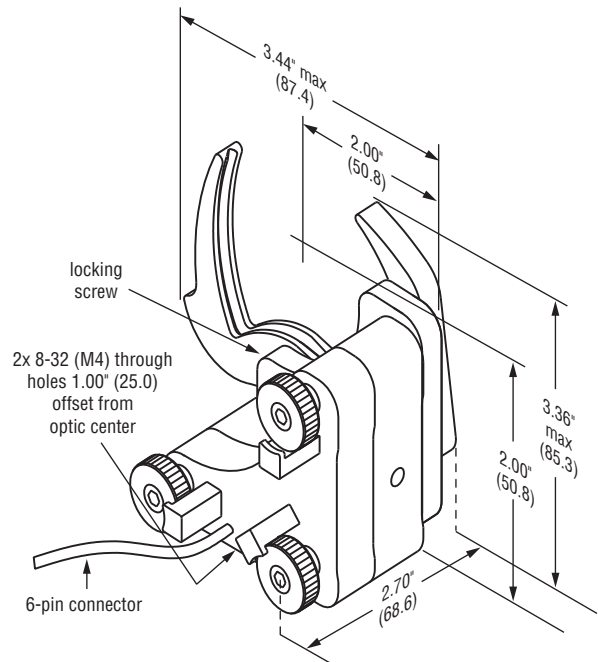
Model 8809

U.S. Patents #5,140,470 & #5,410,206



Model 8854

U.S. Patents #5,410,206, #5,140,470, & #5,168,168



New Focus Picomotor™ Large Aperture Optical Mounts



- Kinematic Mechanism
- Θ_x , Θ_y Adjustments
- 0.7 μrad Angular Resolution
- Set-and-Forget Long-Term Stability
- Clear Edge or Center Mount
- Easy-to-use, flexible controllers

The New Focus 882X series provides the precision and stability of Picomotor™ actuators with the industry leading and proven Ultima Precision Optical Mounts.

This new series is available in aperture versions 2.0, 3.0, or 4.0 in (50.8, 76.2, 101.6 mm) diameter optics. With the thick front and rear plates, carbide seats, and optimized stiff springs, the 882X provides for smooth, reliable motorized adjustment while maintaining a high level of thermal and mechanical stability. The Picomotor offers the additional advantage of sub μrad resolution or just utilizing the integrated knobs for quick, manual adjustment.

The 8822 and 8823 versions, with the clear quadrant design, for mounting 2.0 and 3.0 in mirrors provide greater beam access. The 8822-AC, 8823-AC, and 8824-AC versions, with its low-distortional axial clamping technique, minimizes mount-induced wavefront distortions.

Specifications

	8822	8822-L	8822-AC	8823	8823-AC	8824-AC
Optic Diameter [in. (mm)]	2.0 (50.8)	2.0 (50.8)	2.0 (50.8)	3.0 (76.2)	3.0 (76.2)	4.0 (101.6)
Type	Clear Edge	Clear Edge	Center Mount	Clear Edge	Center Mount	Center Mount
Angular Range (°)	± 5	± 5	± 5	± 3.5	± 3.5	± 3.5
Cable Length [ft. (m)]				7 (2.1)		
Resolution- Angular (μrad)				0.7		
Mounting				Post		
Thread Type				8-32 (M4) CLR		
Motorized Axes				2 (Θ_x , Θ_y)		
Connector Type				4-Pin		

Ordering Information

Model	Description
8822	Picomotor Clear Edge Mirror Mount, 2.0 in. Diameter
8822-L	Picomotor Clear Edge Mirror Mount, 2.0 in. Diameter, Left-Handed
8822-AC	Picomotor Center Mirror Mount, 2.0 in. Diameter
8823	Picomotor Clear Edge Mirror Mount, 3.0 in. Diameter
8823-AC	Picomotor Center Mirror Mount, 3.0 in. Diameter
8824-AC	Picomotor Center Mirror Mount, 4.0 in. Diameter

Recommended Motion Controller

8742 see page 166

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Pint Sized Series

New Focus Picomotor™ Optical Mounts



Model 8885



- Ultra compact design
- 1.5 µrad angular resolution
- Set-and-forget long-term stability
- Easy-to-use, flexible controller/drivers
- Ultra-high vacuum versions

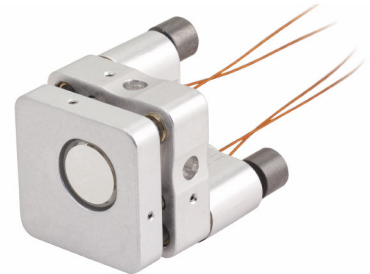
By adding New Focus Tiny Picomotor actuators to the popular Pint-sized mirror mounts, this results in an extremely small package, adding only 0.5" to the package, but with 1.5-µrad resolution. These motorized mounts eliminate problems usually associated with small systems where there is little room to make adjustments and requires highly sensitive adjustments by hand. These Pint-sized mounts are fully compatible with the posts, pedestals, and mounts.

The ultra-high vacuum version of the 8885 is designed for use in ultrahigh vacuum applications down to base pressures of 10⁻⁹ Torr which eliminates virtual leaks and utilizes materials with very low outgassing properties. The outgassing rate of this product is less than 5 ppm of volatile mass at 85°C over three hours. Kapton leads make this design more suitable in environments including vacuum ultraviolet (VUV) and extreme ultraviolet (EUV) applications. This pint-sized mount is fully compatible with standard posts, pedestals, and mounts.

Specifications

	8885	8886	8887
Optic Diameter [in. (mm)]	0.5 (12.7)	0.5 (12.7)	1.0 (25.4)
Motorized Axes	2	2	2
Resolution- Angular (µrad)	1.5	1.5	1.5
Angular Range (°)	±4	±4	±4
Connector Type	4-Pin	4-Pin	4-Pin
Cable Length [ft. (m)]	7 (2.1)	7 (2.1)	7 (2.1)
Type	Pint Sized Center Mount	Pint Sized Corner Mount	Pint Sized Corner Mount
Thread Type	#8 or M4 Counterbore	#8 or M4 Counterbore	#8 or M4 Counterbore

Model 8885-UHV



Ordering Information

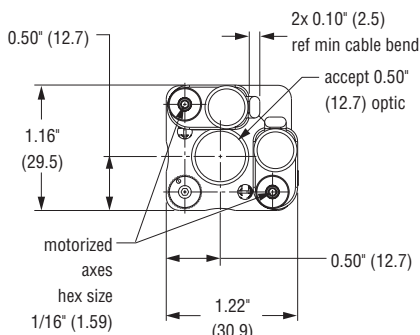
Model	Description
8885	Picomotor Pint-Sized Center Mount, 0.5 in. Diameter
8886	Picomotor Pint-Sized Corner Mount, 0.5 in. Diameter
8887	Picomotor Pint-Sized Corner Mount, 1.0 in. Diameter
8885-UHV	Ultra High Vacuum Picomotor Pint-Sized Center Mount, 0.5 in. Diameter

Recommended Motion Controller

8742 see page 166

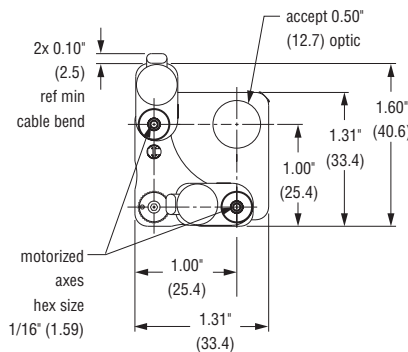
Model 8885

U.S. Patents #5,140,470 & #5,410,206

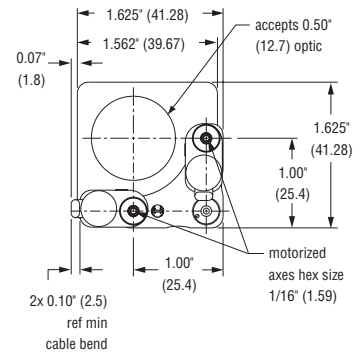


Model 8886

U.S. Patents #5,140,470 & #5,410,206



Model 8887



Stability™ Series

New Focus Picomotor™ Optical Mounts



Model 8816-6
U.S. Patent #5,410,206

- Unique retention system minimizes wavefront distortion
- 0.7 μ rad angular resolution
- Set-and-forget long-term stability
- Easy-to-use, flexible controller/drivers
- Vacuum versions



The Model 8816-X combines the stability of New Focus Stability™ mounts with the precision and stiffness of New Focus Picomotor™ actuators to provide the ultimate in precision motorized optical alignment. The compact Picomotor actuator housing adds only 0.75" (19.1 mm) to the overall thickness of these mounts. With two standard Picomotor actuators to provide tip and tilt adjustment, a complete remote control is provided. The unique optic-retention system minimizes wavefront distortion of the mounted optic as well as maximizes overall mechanical stability. Mirror installation and removal is simple and fast, requiring no adhesives.

The Model 8817-X is the vacuum-compatible version of the Model 8816-X. It offers ultraclean materials and components along with vacuum-compatible Picomotor™ actuators. Two “-V” vacuum-compatible Picomotor actuators provide full remote-control tip and tilt adjustment. As all New Focus vacuum-compatible products, the Model 8817-V is characterized using standard Gas Chromatography-Mass Spectrometry analysis (GCMS). It has been measured to outgas less than 0.1 ppm of volatile mass at 85 °C over three hours. Mass spectrograms detailing the exact outgassing compounds are available on request.

Specifications

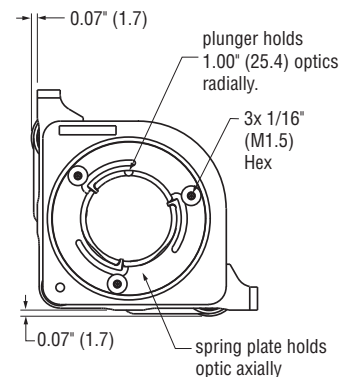
	8816-6	8816-8	8817-6-V	8817-8-V
Optic Diameter [in. (mm)]	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)
Max Optic Thickness (mm)	6	8	6	8
Motorized Axes	2	2	2	2
Angular Range (°)	±4	±4	±4	±4
Angular Resolution	0.7	0.7	0.7	0.7
Vacuum Compatibility (Torr)	NA	NA	10 ⁻⁶	10 ⁻⁶
Cable Length [ft. (m)]	7 (2.1)	7 (2.1)	7 (2.1)	7 (2.1)
Connector Type	4-pin RJ-22	4-pin RJ-22	4-pin RJ-22	4-pin RJ-22

Ordering Information

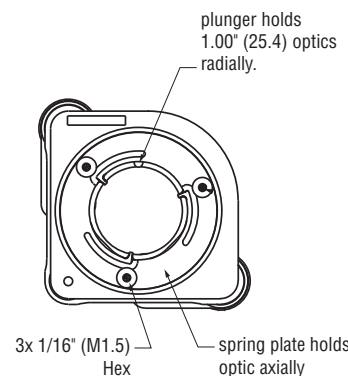
Model	Description
8816-6	Motorized Stability™ Mount, 1.0 in. Diameter, 6 mm Thick
8816-8	Motorized Stability™ Mount, 1.0 in. Diameter, 8 mm Thick
8817-6-V	Vacuum Motorized Stability™ Mount, 1.0 in. Diameter, 6 mm Thick
8817-8-V	Vacuum Motorized Stability™ Mount, 1.0 in. Diameter, 8 mm Thick

Recommended Motion Controller

8742 see page 166



Model 8817-V U.S. Patent #5,410,206



Model 8816

UHV Picomotor™ Large Aperture Optical Mounts



- Ultra-High vacuum compatible with kapton wires
- 0.7 μ rad angular resolution
- Clear edge or center mount versions
- Set-and-forget long-term stability
- Easy-to-use, flexible controller/drivers
- Kinematic Θ_x , Θ_y adjustments

Our ultra-high vacuum compatible Picomotor large aperture optical mounts are designed for vacuum applications. They provide the precision and stability of Picomotor actuators with our reliable Ultima Precision Optical Mounts. They are available in aperture versions for 1.0, 2.0, 3.0, or 4.0 in. diameter optics.

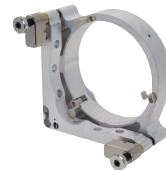
Clear Edge Versions

Versions with a clear quadrant design, offer a versatile positioning system for mounting 1.0 in, 2.0 and 3.0 in mirrors while providing the ability to pass a beam near the optic.



Center Versions Mount

Center mount versions offer a low-distortional axial clamping technique that minimizes mount-induced wave front distortions.



Specifications

	8821-UHV	8822-UHV	8822-L-UHV	8822-AC-UHV	8823-UHV	8823-AC-UHV	8824-AC-UHV
Optic Diameter [in. (mm)]	1.0 (25.4)	2.0 (50.8)	2.0 (50.8)	2.0 (50.8)	3.0 (76.2)	3.0 (76.2)	4.0 (101.6)
Type	Clear Edge	Clear Edge	Clear Edge	Center Mount	Clear Edge	Center Mount	Center Mount
Angular Range (°)	± 3	± 5	± 5	± 5	± 3.5	± 3.5	± 3.5
Cable Length [ft. (m)]				7 (2.1)			
Resolution- Angular (μ rad)				0.7			
Mounting				Post			
Thread Type				8-32 (M4) CLR			
Motorized Axes				2 (Θ_x , Θ_y)			
Connector Type				4-Pin			

Ordering Information

Model	Description
8821-UHV	Picomotor Clear Edge Mirror Mount, 1.0 in. Diameter
8822-UHV	Picomotor Clear Edge Mirror Mount, 2.0 in. Diameter
8822-L-UHV	Picomotor Clear Edge Mirror Mount, 2.0 in. Diameter, Left-Handed
8822-AC-UHV	Picomotor Center Mirror Mount, 2.0 in. Diameter
8823-UHV	Picomotor Clear Edge Mirror Mount, 3.0 in. Diameter
8823-AC-UHV	Picomotor Center Mirror Mount, 3.0 in. Diameter
8824-AC-UHV	Picomotor Center Mirror Mount, 4.0 in. Diameter

Recommended Motion Controller

8742 see page 166

New Focus Motorized Flipper Optical Mounts



- Fast and stable movement in & out of beam path
- Flip-to-flip repeatability to better than 25 μ m
- Adjustable optic tilt
- Remote TTL or handpad control



Remotely flip an optic in and out of the beam path with a transit time of less than half a second. Originally designed for demanding commercial applications, Model 8892-K motorized Flipper mount offers excellent stability and repeatability. Optic tilt is adjusted with precision 80-pitch screws, and locking nuts preserve settings during flips. The Flipper mount's included handpad allows simple thumb control from a distance or more remotely via its TTL interface.

Specifications

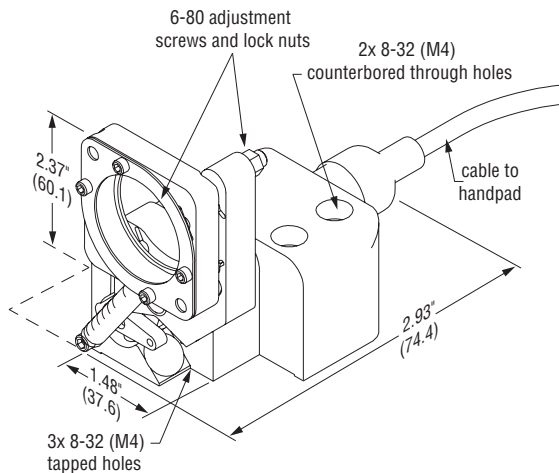
	8892-K	8892-K-M	8893-K	8893-K-M
Optic Diameter [in. (mm)]	1.0 (25.4)	1.0 (25.4)	2.0 (50.8)	2.0 (50.8)
Angular Range (°)	±2	±2	±2	±2
Connector Type	4 Pin	4 Pin	4 Pin	4 Pin
Type	Flipper Mount	Flipper Mount	Flipper Mount	Flipper Mount
Thread Type	8-32	M4	8-32	M4

Ordering Information

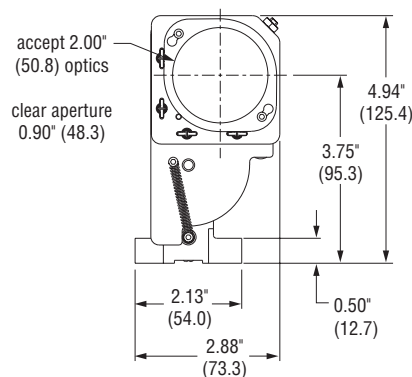
Model	Description
8892-K (8892-K-M)	Motorized Flipper Mount, 1.0 in. Diameter, Allen-Key Adjustment, 8-32
8892-K-M	Motorized Flipper Mount, 1.0 in. Diameter, Allen-Key Adjustment, M4
8893-K (8893-K-M)	Motorized Flipper Mount, 2.0 in. Diameter, Allen-Key Adjustment, 8-32
8893-K-M	Motorized Flipper Mount, 2.0 in. Diameter, Allen-Key Adjustment, M4



Model 8892-K



Model 8893-K



Agilis™ Series

Piezo Motor Driven Optical Mounts



- Outstanding adjustment sensitivity
- Set-and-forget long-term stability
- Limit switch versions
- Closed loop versions with integrated encoder
- Ultra-compact



Agilis optical mounts feature Newport's proven, proprietary, non-resonant piezo motors. These highly integrated motors are directly coupled to the moving optics holder for robust and predictable performance. When idle, the motor spring force locks the mirror in place, providing true set and forget stability. Agilis mounts also have a fast adjustment speed and are free of issues associated with backlash or hysteresis. In contrast to ultrasonic motors, the Agilis non-resonant motors makes small adjustments more predictable. With 50 nm minimum incremental motion capability on each motor, Agilis mounts are ideal for sensitive alignment and optical adjustments.

CONEX-Agilis mirror mounts have been designed with an integrated strain gauge to provide absolute positioning performance. Delivered with a compact, preconfigured CONEX controller, the CONEX-AG-M100D delivers repeatable positioning and is ideal for applications that require a return to a saved position. The CONEX-AG-M100D can also be power cycled without a loss to position feedback. This means that the position of the mount can be used as a diagnostic tool for alignment, while never requiring a reset of position. The integrated controller, also provides a full command set and only requires USB for power. CONEX-Agilis motorized mirror mounts are ideal for systems integration and remote adjustment of optics.

Specifications for Agilis Mirror Mounts

	AG-M050N	AG-M100N	AG-M050L	AG-M100L
Optic Diameter [in (mm)]	0.5 (12.7)	1.0 (25.4)	0.5 (12.7)	1.0 (25.4)
Angular Range (°)	±2	±2	±2	±2
Limit Switches	NA	NA	Proprietary electrical switches	
Adjustment Sensitivity (°)	0.0001	0.00006	0.0001	0.00006
Absolute Position Accuracy(°)	NA	NA	0.05 ⁽¹⁾	0.05 ⁽¹⁾
Maximum Speed (°/s)	0.75	0.5	0.75	0.5
Temperature Stability (°/°C)	0.0004	0.0002	0.0004	0.0002
Weight (kg)	0.025	0.085	0.025	0.085
Cable	1.2 m length, 4-wire mini-DIN connector			

⁽¹⁾ Maximum position deviation between before an MA command (measure absolute current position) and after a PA command (move to absolute position).

Specifications for CONEX-Agilis Mirror Mounts

CONEX-AG-M100D	
Optic Diameter [in. (mm)]	1.0 (25.4)
Dual Axis Travel Range (°)	±0.75
Closed Loop MIM (°)	0.001
Open Loop MIM (°)	0.0001
Repeatability (°)	0.01
Maximum Speed (°/s)	0.4
Temperature Stability (°/°C)	0.0003

Recommended Motion Controller for AG-xxx

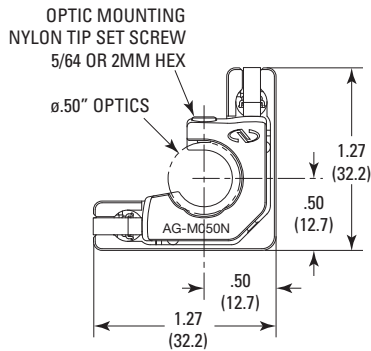
AG-UC2	see page 165
AG-UC8	see page 165
AG-UC8PC	see page 165

Ordering Information

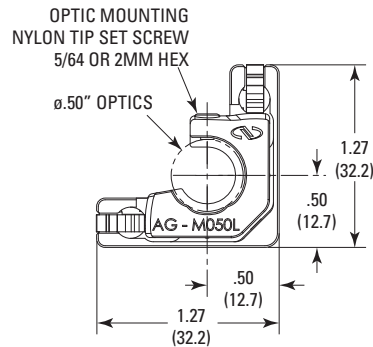
Model	Description
AG-M050N	Compact Piezo Driven Optical Mount, 0.5 inch Optic
AG-M050NV6	Compact Piezo Driven Optical Mount, 0.5 in., Vacuum Compatible
AG-M100N	Compact Piezo Driven Optical Mount, 1 inch Optic
AG-M100NV6	Compact Piezo Driven Optical Mount, 1 in., Vacuum Compatible
AG-M050L	Compact Piezo Motor Driven Optical Mount, 0.5 in., Limit Switches
AG-M050LV6	Piezo Driven Mount, 0.5 in., Limit Switches, Vacuum Compatible
AG-M100L	Compact Piezo Driven Optical Mount, 1 inch Optic, Limit Switches
AG-M100LV6	Piezo Driven Mount, 1 in., Limit Switches, Vacuum Compatible
CONEX-AG-M100D	Piezo Motor Mirror Mount, Absolute Positioning, Integrated Controller

Dimensions

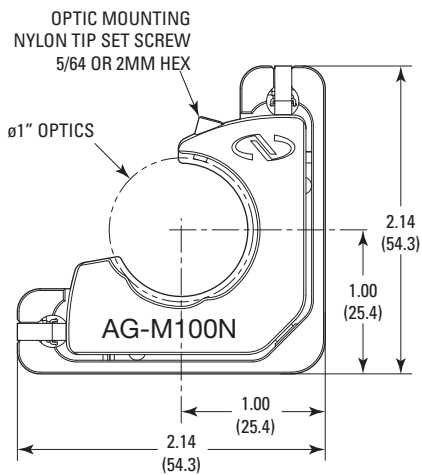
Model AG-M050N



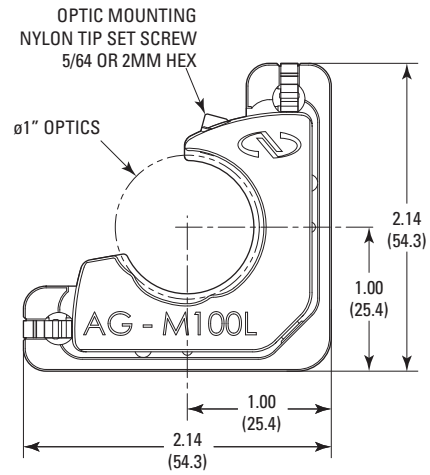
Model AG-M050L



Model AG-M100N



Model AG-M100L

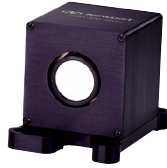


MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Fast Steering Mirrors



Model FSM-300-01



- Fast closed-loop control, up to 580 Hz
- Field replaceable 1 inch mirror assemblies
- Fast steering on a single pivot point for X and Y rotation

The Fast Steering Mirror (FSM Series) provides two-axis, high-bandwidth tip/tilt with sub-microradian resolution using voice-coil technology. The FSM's that are economically viable for widespread commercial use for applications such as laser beam stabilization, laser pointing, tracking and image stabilization. By utilizing a unique flexure suspension design to confine the motion of the mirror, it eliminates the bearing surfaces often used with galvanometer scanners, along with their associated stiction and wear. This results in ultra-smooth tip/tilt motion about a common pivot point, with very high accuracy, and practically infinite lifetime.

Newport offers a standard FSM-300 with a 1" (25.4mm) diameter mirror. A position transducer is included in the FSM mirror head to provide position feedback with reference to the support frame. A wide range of 1" mirror assemblies (mirror on carrier) with different coatings are offered. This allows the user to field replace the standard mirror with another mirror that best fits the specific application. The 1" mirror assemblies are sold separately.

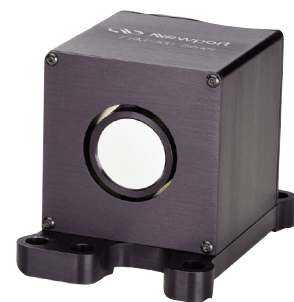
Typical Specifications

Mirror Assembly	FSM-300-01
Number of Axes	2 (tip-tilt)
Angular Range from ± 10 V (mrad)	± 26.2 ($\pm 1.5^\circ$), Mechanical ⁽¹⁾
Resolution, rms (μ rad)	1, Mechanical ⁽¹⁾
Repeatability, rms (μ rad)	3, Mechanical ⁽¹⁾
Accuracy from ± 26.2 mrad, 25°C ⁽¹⁾ (mrad)	0.262 (0.015°), Mechanical ⁽¹⁾
Linearity from ± 26.2 mrad, 25°C ⁽¹⁾	1.0%
Resolution of Local Position Sensor (μ rad)	0.5

1) Optical angular range is equal to twice the mechanical angular range.

2) Optical parameters apply to central 80% of mirror aperture.

Controller/Driver	
Command Input and Position Output	Analog, ± 10 V yields ± 26.2 mrad
Peak Operating Power to Mirror (W)	30
Continuous Maximum Operating Power to Mirror (W)	15
Envelope, w x h x d [in (mm)]	9 x 3.45 x 10 (229 x 88 x 254)



FSM-300 Mirror Assembly

Ordering Information

Model	Description
FSM-300-01	Fast Steering Mirror and controller, 1in Removable Mirrors w/ ER.1 Coating
FSM-300-02	Fast Steering Mirror and controller, 1in Removable Mirrors w/ ER.4 Coating
FSM-300-NM	Fast Steering System, 1 in. Mirror Fixture

For replacement mirror options visit www.newport.com



Front panel of the FSM-300 controller/driver.

PSM2

Ultra-fast Piezo Steering Mirror



- Sub-microradian positioning resolution
- Ultra-fast tip, tilt, and z motion
- Simple, maintenance-free operation
- Optional integrated strain-gauge



The PSM2 is a high-speed, tip, tilt, and z motion piezoelectric stage for mirrors, gratings and other optics with sub-microradian resolution. Equipped with a direct piezoelectric actuation system, minus the lever arm transmission, the PSM2 is ideally suited for high bandwidth laser beam steering, switching and stabilization, beam scanning, image stabilization, and laser cavity tuning.

Fast and reliable motion is supplied by three multi-layer, low-voltage piezo stacks (PZT) in a triangle configuration. The length of each piezo stack can be controlled individually. Applying a voltage to one stack, results in a rotation. Changing the length of all three stacks simultaneously, results in a linear z-displacement.

The PSM2 models are internally preloaded and can be mounted in any orientation. The PSM2 supports mirrors up to 50 mm diameter and can be glued directly to the top plate.

Specifications

Active Axes	PSM2	PSM2SG
	Open Loop (-D)	Closed Loop (-D)
Angular Range, x, y ($\pm 10\%$) (mrad)	2 ^(1,4)	1.6 ^(1,2,4)
Travel Range, Z ($\pm 10\%$) (μm)	16 ^(1,4)	12 ^(1,2,4)
Resolution, x, y (μrad)	0.004 ⁽³⁾	0.04 ⁽²⁾
Resolution, Z (nm)	0.03 ⁽³⁾	3 ⁽²⁾
Typ. Repeatability, x, y (μrad)	NA	1.3 ⁽²⁾
Typ. Repeatability, Z (nm)	NA	12 ⁽²⁾
Capacitance ($\pm 20\%$) (μF)	1.8	1.8
Resonant frequency, unloaded (Hz)	5400	5400
Stiffness in Z (N/ μm)	65	65
Max load (N)	1	1
Weight (kg)	0.085	0.085

¹ Typical value measured with NPC3 and NPC3SG, (-20 V to +130 VDC range).

² Applies to PSM2SG in closed-loop control only.

³ Equal to rms noise value measured with NPC3 and NPC3SG controller.

⁴ Linear travel and angular travel are interdependent. The values provided here are for pure linear or pure angular motion.

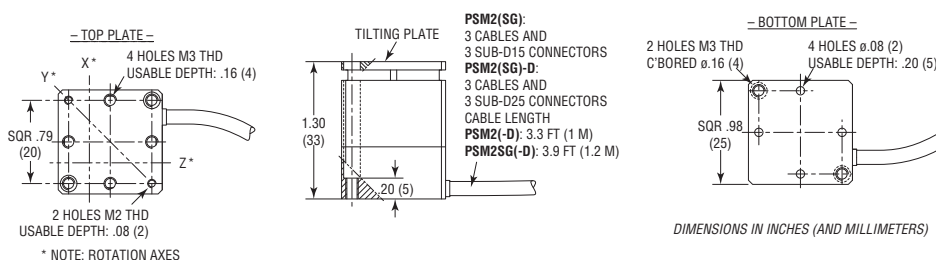
Ordering Information

Model	Description
PSM2	Piezo Steering Mirror, 2 mrad x 2 mrad x 16 μm , open-loop
PSM2SG	Piezo Steering Mirror, 2 mrad x 2 mrad x 16 μm , with strain gauge sensors

Order the -D version with an XPS controller.

Recommended Motion Controllers

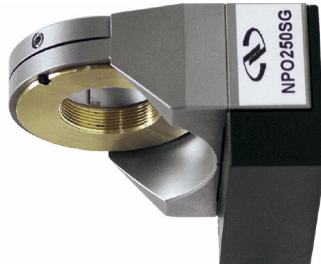
Model	Description
NPC3	3-channel piezo stack amplifier, open-loop control
NPC3SG	3-channel piezo amplifier, strain-gauge position control
NPC1USB	Piezo Stack Amplifier, Single Channel, Low Cost
XPS-RL	-D versions only
XPS-D	-D versions only



MOTORIZED LINEAR STAGES
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MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
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CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

NPO Series

Objective NanoFocusing Stages



- Sub-nanometer piezoelectric positioning resolution
- Piezoelectric travel range of 140 or 250 μm
- High resonant frequency for dynamic applications
- Precision parallelogram design minimizes beam offsets



The NPO Series NanoFocusing Objectives are high-speed, piezoelectric-driven devices providing fast focusing and scanning over long travel ranges of up to 250 μm and are compatible with most microscopes and objective lenses. Typical applications include surface profilometry, high-resolution imaging, auto-focusing, scanning interferometry, and confocal microscopy. NPO stages feature highly reliable, multi-layer, low-voltage, piezoelectric transducer (PZT) stacks. NPO NanoFocusing stages are available as open-loop (no position feedback) or closed-loop versions with integrated position feedback. The closed-loop systems (model numbers ending in SG) feature high resolution strain-gauge position sensors for highly accurate and repeatable motion.

The NPO NanoFocusing objective mount between the turret and the microscope objective and add only 11.5 mm to the optical path length. All models can be used for standard and inverted microscopes.

Specifications

	NPO140 (-D) NPO140SG (-D)	NPO250 (-D) NPO250SG (-D)
Open loop travel per axis ($\pm 10\%$), (μm) ⁽¹⁾	140	250
Closed loop travel per axis (μm) ^(1,2)	100	200
Open loop resolution (nm) ⁽³⁾	0.3	0.5
Closed loop resolution (nm) ⁽²⁾	3	5
Typ. Repeatability (nm) ⁽²⁾	30	46
Capacitance ($\pm 20\%$) (μF)	3.4	10.2
Resonant frequency, unloaded (Hz)	370	310
With 80 g load (Hz)	300	270
With 105 g load (Hz)	270	250
With 300 g load (Hz)	210	155
Axial stiffness (N/ μm)	1.4	0.4
Max lens weight (g)	500	500
Typ. Tilt, full travel (μrad)	<4	<10
Weight (g)	150	255

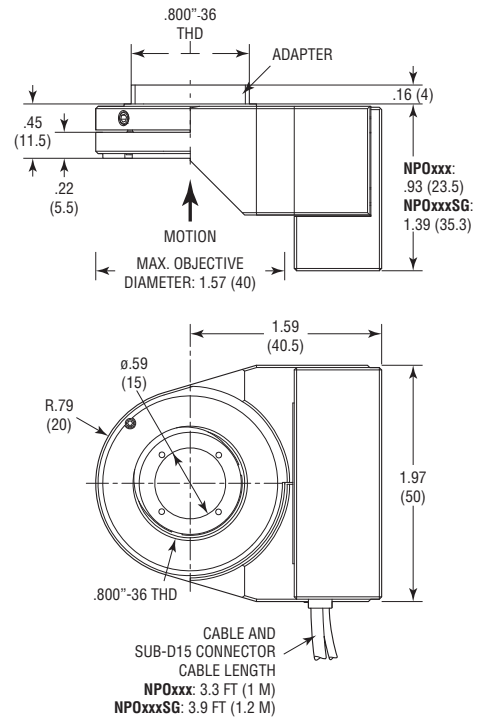
¹⁾ Typical value measured with NPC3 and NPC3SG, (-20 V to +130 VDC range).
²⁾ Applies to devices ending with SG in closed-loop control only.
³⁾ Equal to rms noise value measured with NPC3 and NPC3SG controller.

Ordering Information

Model	Description
NPO100	Nanofocusing Open-loop Objective Stage, 100 μm
NPO100SG	Nanofocusing Objective Stage, 100 μm , Strain-gauge
NPO140	Nanofocusing Open-loop Objective Stage, 140 μm
NPO140SG	Nanofocusing Objective Stage, 140 μm , Strain-gauge
NPO250	Nanofocusing Open-loop Objective Stage, 250 μm
NPO250V6	Vacuum Nanofocusing Open-loop Objective Stage, 250 μm
NPO250SG	Nanofocusing Objective Stage, 250 μm , Strain-gauge
NPO250SGV6	Vacuum Nanofocusing Objective Stage, 250 μm , Strain-gauge

The -D version is compatible with the XPS controller and must be ordered with the XPS-DRVP1.

Dimensions



DIMENSIONS IN INCHES (AND MILLIMETERS)

Recommended Motion Controllers

Model	Description
NPC3	3-channel piezo stack amplifier, open-loop
NPC3SG	3-channel piezo amplifier, strain-gauge position control
NPC1USB	Piezo Stack Amplifier, 1-Channel, Low Cost
XPS-RL	-D versions only
XPS-D	-D versions only

CONEX-PSD Series

CONEX-PSD



- Measures laser beam position and power
- 9 x 9 mm sensor size, 10 x 10 mm
- 320–1,100 nm wavelength range, 800-1700 nm
- Analog and adjustable digital filters to reduce noise
- Compatible with pulsed laser sources

The CONEX-PSD position sensing detectors provide accurate XY position information of laser beams and are ideally suited for laser beam stabilization, laser tracking and general beam diagnostics. Unlike quadrant detectors, the improved tetra-lateral effect diode of the CONEX-PSD is highly linear over the full sensor size, and delivers a third signal that is proportional to the beam power. Compared to many detectors that are tweaked for high bandwidth, the CONEX-PSD's have been optimized for stability and compatibility with pulsed laser beams. An analog input filters with 319 Hz (Si) and 6Hz(Ge) cut-off frequencies suppress high frequency noise and undesired signal ringing when used with pulsed lasers. An additional digital low pass filter can be set by software in a frequency range from 0 Hz to 1,000 Hz to further improve signal homogeneity

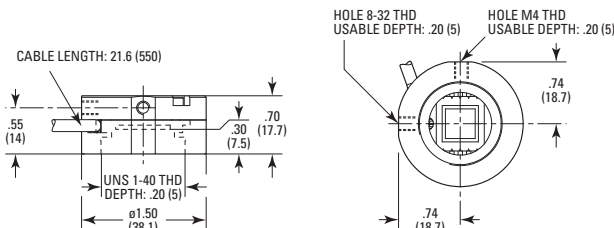
Specifications

	CONEX - PSD9	CONEX - PSD10GE
Wavelength range	320–1,100 nm	800-1700 nm
Sensor size	9 x 9 mm	10 x 10 mm
Peak responsivity	0.6 A/W @ 960 nm	0.85 A/W @ 1500 nm
Maximum photocurrent	500 A	1000 A (1mA)
Recommended spot size	BSx = 9 mm – X and BSY = 9 mm – Y	BSx = 10 mm – X and BSY = 10 mm – Y
Minimum spot size	>0.2mm	
A/D resolution	12 Bit	
Position sensitivity	2.5 m Typical	
Recommended power range	10–80% of max. power, see graph for details	
Computer interface	USB2.0, 1.8 m long USB-A to Mini-B cable included	
Programming	20+ intuitive, 2 letter ASCII commands	
Filters	Analog input filter, 319 Hz cut-off frequency, fixed Digital low-pass filter, 0–1,000 Hz, set by software	Analog input filter, 136 Hz cut-off frequency, fixed Digital low-pass filter, 0–1,000 Hz, set by software
Status display	Two-color LED	
Input power requirements	Powered through USB interface	
Sensor Dimensions	38.1 mm diameter, 17.7mm (H)	38.1 mm diameter, 22.9mm (H)
Controller Dimensions	3.67" x 2.09" x 0.91" (93.2 x 53 x 23 mm)	
Cable length (detector to electronic)	1.6 ft (0.5 m)	

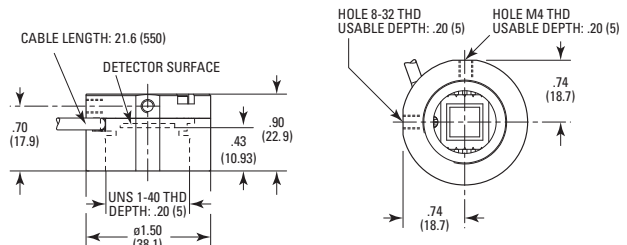
Ordering Information

CONEX-PSD9	Optical Beam Position Detector, Analog Output, 9-mm sensor
CONEX-PSD10GE	Optical Beam Position Detector, 10x10 mm Sensor, 800-1700 nm
883-OH	1 in. Optic Holder

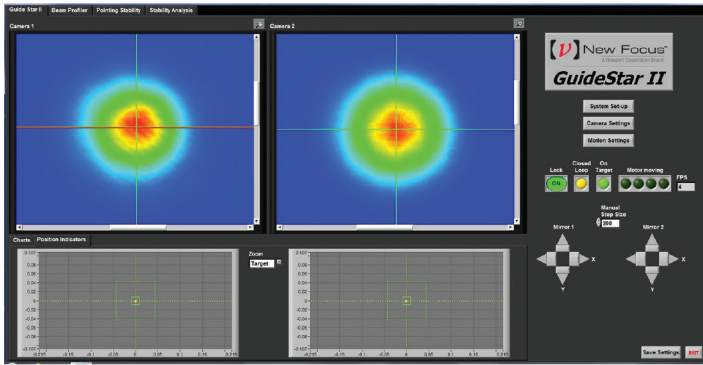
CONEX-PSD9



CONEX-PSD10GE



GuideStar II Laser Beam Steering Correction System



- Guarantees critical alignment of complex systems
- Convenient GUI for user friendly operation
- Trigger kit available for lower laser repetition rates
- Compatible with existing picomotor mirror mounts



The GuideStar™ II provides high-reliability high-precision compensation of laser pointing and position drift. Two independent New Focus™ Picomotor™ actuated motorized mirror mounts provide both manual and active 4-axis control with excellent passive stability. Two miniature position-sensing cameras provide continuous tracking of both laser beam positions and laser beam profiles. The position data is fed back to the mirror motion using our patented control algorithm (US Patent # 7,528,364 Optical Beam Steering and Sampling Apparatus and Method, 2009), the only technique that completely corrects the laser beam alignment in both x and y in near and farfield. The system is anchored by the small GuideStar™ II Controller and controlled through a computer with a host of user-friendly and convenient features. Full beam profiles and position and shape data are available in real time or can be tracked, stored and analyzed. An easy Set-up Menu guides new users through the install and simple settings menus allow complete control of a wide range of camera and beam stabilization parameters, including >100:1 dynamic camera exposure time adjustment to optimize profile levels and complete control of beam position target sizes and signal time averaging.

Designed for accuracy, reliability, and ease-of-use, the GuideStar™ II System is the answer to laser beam drift correction for the most demanding laser applications.

Specifications

GuideStar II System Specifications*

Laser	
Laser Wavelength	355 nm - 1200 nm
Laser Repetition Rate	>500 Hz** to CW
Laser Beam Size	<10 mm diameter
Detected Power Required	<1 mW
Position	
Beam Pointing Adjustment Range	+/-3 degrees, +/-50 mrad
Gains	Adjustable Target Sizes, Positions and Loop Gains
Minimum Pointing Step Size	<1 μrad
Pointing Stabilization	<10 μrad
Time	
Response Time	<10 seconds
Time Averaging	Adjustable Time Averaging
Refresh rate for beam profile and display	>3 Hz

*Specifications are subject to change.

**Trigger option available for <500 Hz.

Ordering Information

Model	Description
8783	8783 GuideStar™ II Controller
8784	8784 GuideStar II Camera Sensor (2 of)
8807	Picomotor Center Mount, 1.0 in. Diameter(2 of)

The GuideStar™ II requires one Model 8783 Controller, two Model 8784 Camera Sensors, and two Model 8807 Picomotor Mirror Mount Actuators. Other compatible Picomotor Mirror Mount Actuators include Models 8809, 8812, 8816, 8852, 8885, 8886, and 8887.

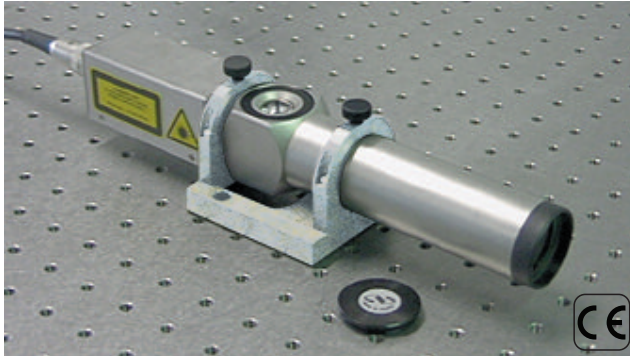
GuideStar II System Components

GuideStar II Controller Model 8783	
GUI	Executable GUI installer provided for user computer
Camera Connections	USB connections to Cameras and Computer
Mount Connections	RJ-22 connections to Picomotor Mirror Mounts
W x H x D	140 x 80 x 200 mm
Power	12 VDC via 100-220 VAC power adapter provided
GuideStar II Camera Sensor Model 8784	
Camera	1 Megapixel CMOS
Interface	USB 2.0
Image Size	>10 mm diameter
Beam Position Resolution	<1 μm
Computer Controlled Exposure Range	20 dB
Manually Controlled Exposure Range	50 dB
W x H x D	50 x 50 x 75 mm
Picomotor Mirror Mounts Model 8807*	
*Alternate Model #s	8816, 8852, 8885, 8886, 8887
User Computer	
Full HD Display	1920 x 1080
Operating System	64 and 32 Bit Windows 7

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

CONEX-LDS

Electronic Autocollimator



- High sensitivity with angular measurements down to 0.01 μrad
- Fast acquisition at 2 kHz
- Simple to setup using the alignment window
- Easy to use software
- Safe operation (Class II Laser Device)
- Every unit individually tested and delivered with calibration and certification report

The CONEX-LDS is a versatile electronic autocollimator with integrated controller for non-contact alignment or high resolution angular measurements. Using advanced optics and electronics technology with simplified design, the CONEX-LDS offers a high level of reliability for demanding metrology and industrial applications. With convenient features like the integrated controller, an eyepiece for rough alignment and mounting accessories, the CONEX-LDS enables quick convenient setups on-site or at the production floor. CONEX-LDS can be interfaced via USB or Ethernet for network communication.

Specifications

CONEX-LDS Autocollimator

Source	Visible laser diode modulated at 5 KHz; circular polarized
Wavelength (nm)	670
Peak Power (mW)	1 (Class II)
Beam Diameter (mm)	22.5
Beam Divergence (μrad)	100
Beam Direction (μrad)	500
Equivalent Focal Length (mm)	250
Measurement Field (μrad)	± 2000
Ocular Field (mrad)	± 15 ($\pm 0.85^\circ$)
Sensitivity (μrad)	0.01*
Analog Output Rate (Hz)	2000
Sensor Processing Rate (Hz)	5000
Measurement Distortion (μrad)	± 1 ($\pm 0.02 \times$ measurement) (i.e. 2%)
Reflector	Min. 2% reflectivity
Noise	0.003 $\mu\text{rad}/\sqrt{\text{Hz}}$ (at 100% reflectivity)
Weight (kg)	1.1
Operating Temperature Range ($^\circ\text{C}$)	+15 to +25
Storage Temperature Range ($^\circ\text{C}$)	-10 to + 50

* Sensitivity is based on 3σ of noise taken @ 1 Hz

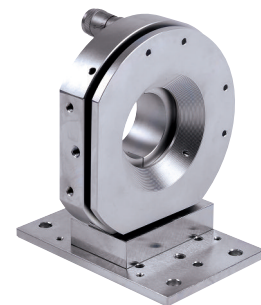
Ordering Information

Model	Model
CONEX-LDS	Autocollimator, Optical Head with Integrated Controller
CONEX-LDS-PS	Autoranging Power Supply, CONEX-LDS Autocollimator, 90-264 VAC
CONEX-LDS-SL	Precision Adjustable Two Axis Mount, CONEX-LDS Series
CONEX-LDS-SLXY	Precision Adjustable Four Axis Mount, CONEX-LDS Series
CONEX-USB-RS422	USB Interface converter for CONEX-LDS
CONEX-LDS-CABLE5	RS422 Cable, CONEX-LDS Autocollimator, 5 m
CONEX-LDS-CABLE20	RS422 Cable, CONEX-LDS Autocollimator, 20 m
CONEX-LDS-AOC	Analog Output Cable, 5m, CONEX-LDS Autocollimator
CONEX-LDS-VER	Calibration Verification Kit, CONEX-LDS Autocollimator

The CONEX-LDS comes with a CONEX-LDS-CABLE5 only. The CONEX-PS and CONEX-USB-RS422 must be ordered separately.

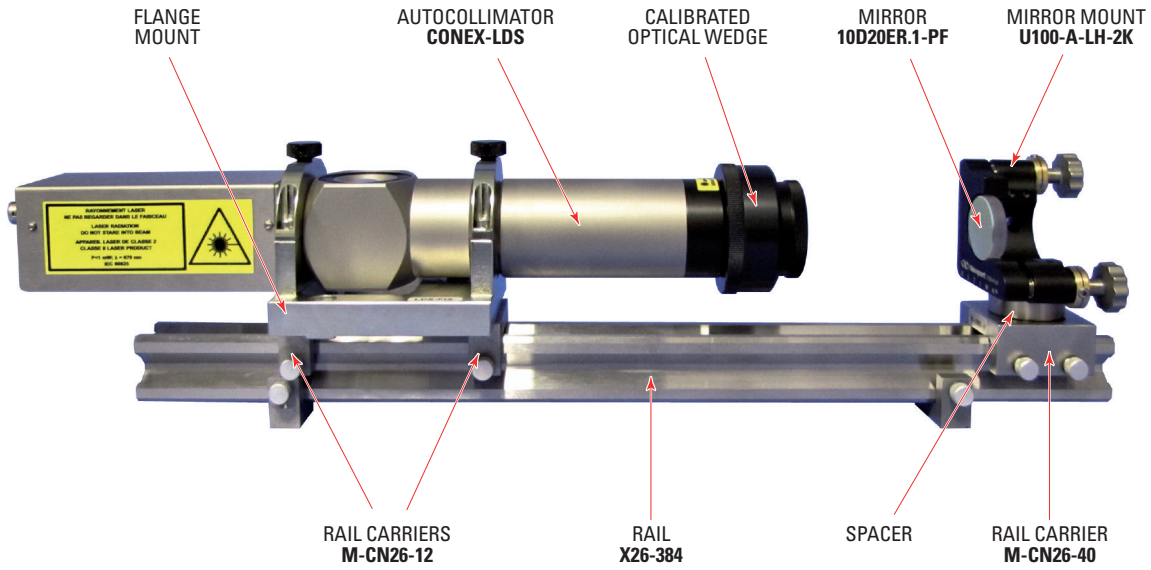
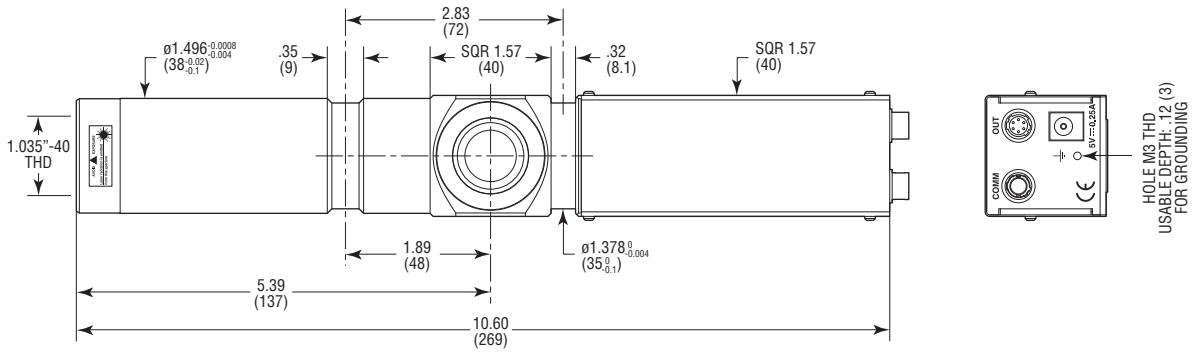
The CONEX-LDS is an ideal tool for:

- Pitch and yaw measurements
- Wobble control
- Rotation stage accuracy measurements
- Settling time and stage damping analysis
- Vibration analysis
- Concentricity alignments of multi-rotational setups
- Rotation axis orthogonality measurements
- Repeatability of XY stages
- Machine alignments
- Surface flatness measurements
- Beam set-up and alignment



The CONEX-LDS-SL is a convenient mounting tool for CONEX-LDS with two angular mount adjustments.

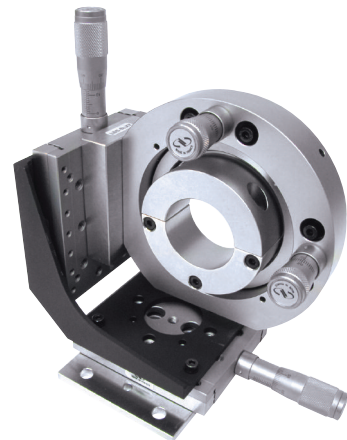
Dimensions



The CONEX-LDS-VER kit enables users to periodically perform a calibration verification of the CONEX-LDS autocollimator.



The CONEX-LDS can be used with Ethernet communication or USB via the CONEX-USB-RS422 converter.



The CONEX-LDS-SLXY provides a versatile mount for CONEX-LDS, offering four axes of control (two angular and two translation).

MOTORIZED LINEAR STAGES
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 HEXAPODS
 CONTROLLERS AND DRIVERS
 MOTORIZED OPTICAL MOUNTS
 BEAM MANAGEMENT
 SPECIAL COLLECTIONS

Vacuum Compatible Products



Newport has expanded its standard product offering for use in vacuum 10^{-6} hPa (7.5×10^{-7} Torr) and Ultra-High Vacuum 1.3×10^{-8} hPa (10^{-9} Torr). Vacuum compatible stages, actuators and optical mounts are prepared with special surface treatment, selected materials and components, and vacuum compatible lubricants and grease. Many of the vacuum compatible products have been designed specifically for semiconductor-capital-equipment manufacturers and the vacuum community.

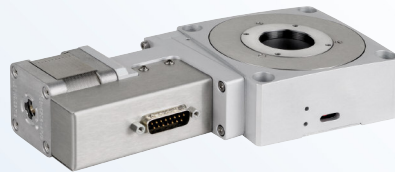
Newport also provides solutions for applications requiring special environmental preparation such as clean room, extreme high or low temperature, non magnetic and high energy EUV.

To learn more about special environmental preparation for motion products and systems, visit Newport.com

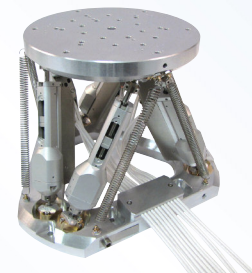
Vacuum Compatible Motorized Stages, Actuators and Mirror Mounts



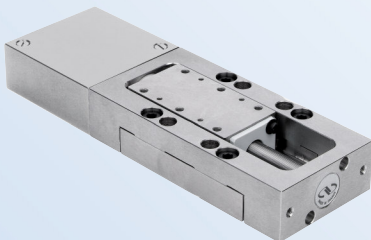
NSA12V6 actuator



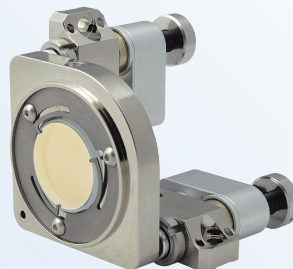
URS75BPPV6 rotation stage



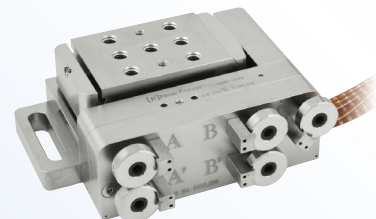
HXP100-MECAV6 hexapod



MFA-CCV6 linear stage



8817 mirror mount



8081-UHV 5-axis picomotor kinematic stage

MOTORIZED
LINEAR STAGES

MOTORIZED
VERTICAL STAGES

MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

HEXAPODS

CONTROLLERS
AND DRIVERS

MOTORIZED
OPTICAL MOUNTS

BEAM
MANAGEMENT

SPECIAL
COLLECTIONS

All Steel Construction Linear Stages

MOTORIZED
LINEAR STAGES

MOTORIZED
VERTICAL STAGES

MOTORIZED
ROTATION STAGES

MOTORIZED
LINEAR ACTUATORS

HEXAPODS

CONTROLLERS
AND DRIVERS

MOTORIZED
OPTICAL MOUNTS

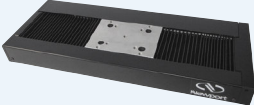



BEAM
MANAGEMENT

SPECIAL
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	Steel	Aluminum
Young's modulus (stiffness), E, (GPa)	210	70
Thermal Expansion, α ($\mu\text{in}/\text{in}/^\circ\text{F}$)	5.6	12.4
Thermal Conduction, c (BTU/hr-ft- $^\circ\text{F}$)	15.6	104

For applications requiring high flatness and straightness, excellent thermal stability and minimal deformation under load, Newport's all-steel stages offer advantages unmatched by competing designs that use a combination of steel and aluminum. Newport Steel Stages minimize thermally induced positioning errors endemic to bi-metallic construction, especially in environments that are not well controlled. With excellent load capacities and minimal deformation under load, Newport steel stages can move large payloads without loss of positioning performance. Newport steel stages are an excellent option for applications that include: surface metrology, inspection systems, bio-medical applications, laser systems, and many more. Newport steel stages can be integrated in custom motion systems, or provided with application specific modifications. To learn more, visit Newport.com.

Series	Travel Range (mm)	Minimum Incremental Motion (μm)	Maximum Speed (mm/s)	Normal Load Capacity (N)
 <p>FMS Series Linear Metrology Stage See page 54</p>	100-300	0.1-0.5	20-100	150
 <p>MTN Series Mid-travel Steel Linear Stages See page 56</p>	100-300	0.1-0.6	40-100	1000
 <p>UTS Series Mid-Travel Steel Linear Stages See page 58</p>	50-150	0.3	20-40	100 - 200
 <p>MFA-Series Miniature Steel Linear Stages See page 60</p>	25	0.1	1.0-2.5	50

iPP™ Technology – Intelligent Stepper Motor Stages

The FC series stages use the Newport-proprietary iPP™ intelligent stepper motor. The iPP™ technology completely eliminates controller or driver set up by integrating the electronics into the stepper motor housing. Just connect power and communication and install the GUI. Up to 4 FC stages can be daisy-chained and controlled with the same GUI. The FCL linear stage is an evolution of the industry proven ILS stage and is available in 50, 100 and 200 mm travel. The FCR100 combines a precision rotation stage and the fully integrated stepper motor controller in a small footprint.



CONEX™ – DC-Servo, Stepper or Piezo Controller and Driver

Newport's CONEX™ product families are integrated solutions that are easy to use, compact and inexpensive. CONEX control extends to linear, rotary stages and actuators with a DC servo motor, stepper motor and piezo stages, mirror mounts, beam positioners and a general I/O module. Ideal for system integration and precision application automation, CONEX controllers are fully programmable with simple, intuitive command sets that can perform a variety of basic and advanced functions. These compact integrated controllers provide plug-and-play operation with the convenience of immediate connectivity and operation.

CONEX-AG-LS25-27P
see page 161

CONEX-AG-GON-UP

CONEX-MFACC
see page 60

CONEX-TRAxxCC
see page 127

CONEX-CC
see page 161

CONEX-SR50CC
see page 161

CONEX-AG-PR100P
see page 115

CONEX-PSD9
see page 189

CONEX-NSR1
see page 163

CONEX-BGS50CC
see page 112

CONEX-AG-M100D
see page 184

CONEX-LTA-HL
see page 123

CONEX-NSA12
see page 163

MOTORIZED
LINEAR STAGES

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ROTATION STAGES

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LINEAR ACTUATORS

HEXAPODS

CONTROLLERS
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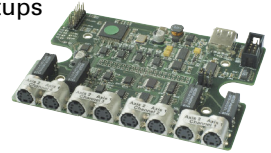
SPECIAL
COLLECTIONS

Agilis™ – Piezo Motor Driven Positioners

The new Agilis™ series of piezo motor driven miniature positioners took a novel 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



New Focus 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



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.

MOTORIZED LINEAR STAGES
MOTORIZED VERTICAL STAGES
MOTORIZED ROTATION STAGES
MOTORIZED LINEAR ACTUATORS
HEXAPODS
CONTROLLERS AND DRIVERS
MOTORIZED OPTICAL MOUNTS
BEAM MANAGEMENT
SPECIAL COLLECTIONS

Newport Worldwide Sales Network

ARGENTINA

Analitica S.A.
Jorge Newbery 1840 Of.3
C1426CXH - Buenos Aires
Argentina
email: analitica@analitica.com.ar
Tel: +54-11-4772-4450
Fax: +54-11-4775-7549

AUSTRALIA

NEWSPEC PTY. LTD.
330 Glen Osmond Road
Myrtle Bank, South Australia 5064
Tel: +61 (8) 8463 1967
Fax: +61 (8) 8338 1242
email: sales@newspec.com.au
email: sales@kabex.com.my

Austria

Newport Spectra-Physics GmbH
Guerickeweg 7 64291 Darmstadt
Germany
Tel: +49-(0) 6151-708-0
Fax: +49-(0) 6151-708-952

Beijing

Beijing Newport Spectra-Physics
Technologies Co., Ltd.
Room 2305 Building B Tri-Tower, No. 66
Zhong Guan Cun East Road, 66 B-2305
Beijing 100080 China
Tel: +86-10-6267-0065
Fax: +86-10-6267-2342

Brazil

Lynx Com. Imp. Ltda.
Rua Aimberê, 1887 - Perdizes
Sao Paulo 01258-020 Brazil
lynx@lynxbrasil.com.br
Tel: +55-11-3862-2099
Fax: 55-11-3672-0992

Bulgaria

Astel Ltd 15 Vorino Street
Sofia 1612 Bulgaria
office@astelbg.com
Tel: +359 2 958 78 85/86/89
Fax: +359 2 958 78 90

Canada

Newport Corporation
1791 Deere Avenue
Irvine, CA 92606 United States
Tel: (949)-863-3144
Fax: (949) 253-1680

China

Beijing Newport Spectra-Physics
Technologies Co., Ltd.
Room 2305 Building B Tri-Tower, No. 66
Zhong Guan Cun East Road, 66 B-2305
Beijing 100080 China
Tel: +86-10-6267-0065
Fax: +86-10-6267-2342

China, Shanghai

Newport Opto-Electronics Technologies
(Wuxi) Co., Ltd. 理波光电科技 (无锡)
有限公司
Lot J3-B, Wuxi Export Processing Zone,
New District J3 B Jiangsu 214028 China
Tel: +86-510-8113-5000 (sales/service)
Tel: +86-510-8113-2999 (all other)
Fax: +86 510 8526 9050

China

A & P Instrument Co., Ltd. 科艺仪器有限公司(代理商)
Rm 68, 1/F Sino Industrial Plaza, 9 Kai
Cheung Road, Kowloon Bay, Kowloon 9 1 68
HONG KONG China
info@anp.com.hk
Tel: +852-2755-6578
Fax: +852-2755-4549

Colombia

S&S INGENIERIA S.A.S.
Calle 79 No 61-58 Bogota
D.C. Colombia
javier.vega@sysingenieria.co
Tel: (571) 3108981 - 7954557

Cyprus

Sprel Ltd.
29 Evagoras Pallikarides Street
Lykavitos Nicosia, Cyprus
sprel@cytanet.com.cy
Tel: +357-22-3777159
Fax: +357-22-377284

Czech Republic

Slovakia MIT S.R.O.
Klanova 56 147 00 Praha 4
Czech Republic
email: info@mit-laser.com
Tel: +420-241-712-548
Fax: +420-241-710-252

Egypt

Al Nouh S.A.E. 399 Ramses St.
Cairo Abbassia
Egypt s.nouh@alnouh.com
Tel: +20-2-26846900
Fax: +20-2-6849997

France

Micro-Controle Spectra-Physics S.A.
9 Rue du Bois Sauvage 91055 Evry, France
Tel: +33 1 60 91 68 68
Fax: +33 1 60 91 68 69

Germany

Newport Spectra-Physics GmbH
Guerickeweg 7 64291
Darmstadt, Germany
Tel: +49-(0) 6151-708-0
Fax: +49-(0) 6151-708-952

Greece

d-Function
36 E Zagrafou Street
Ioannina GR 453 32
Greece
akm@delta-function.com
Tel: +30 2651 067600
Fax: 30-2651-234545

Hong Kong

A & P Instrument Co., Ltd.
Rm 68, 1/F Sino Industrial Plaza, 9 Kai
Cheung Road, Kowloon Bay, Kowloon 9 1 68
HONG KONG China
info@anp.com.hk
Tel: +852-2755-6578
Fax: +852-2755-4549

Hungary

RK Tech LTD Koszal u. 6
1163 Budapest Hungary
rktech@rktech.hu
Tel: +36-1-40-20721
Fax: +36-1-40-38375

India

Advanced Photonics PVT LTD
619 Nirmal Lifestyle Corporate Center,
Nirmal Lifestyle, L.B.S. Marg Mulund West
Mumbai, India
sales@advancedphotonicsindia.com
Tel: +91-22-25613101
Tel: +91-22-25613102
Fax: +91-22-25684777

India

Laser-Spectra Services India PVT
80/10, First Floor, Raj Towers, M. S. Ramiah
Main Road, Bangalore India
lss@bgl.vsnl.net.in
Tel: +91-802-3576 907
Fax: +91-802-3576 904

Israel

New Technology S.K. Ltd.
11 Tuval Street, 7th Floor,
Ramat Gan Israel
Nissim@newtech.co.il
Tel: +972-3-6792000
Fax: +972-3-6792007

Italy

Laser-Optronic S.p.A. - South
Via Tommaseo, 3 00063 Roma
Campagnano, Italy
lop@laseroptronic.it
Tel: +39-06-904-1786
Fax: +39-06-904-1470

Japan

Japan Laser Corporation
2-14-1 Nishi-waseda, Shinjuku-ku
Tokyo 169-0051 Japan
Newport@japanlaser.jp
Tel: +81-3-5285-0861
Fax: +81-3-5285-0860

Jordan

Nanotech Co.
2, Mecca Street, Karadsheh Tower, 5th
Floor, Office 52. PO Box 69, Al Fuhais 19152,
Jordan, Amman Jordan
hattar.majed@nanotech.jo
Tel: +962 65 373 160
Fax: +962-64-710 110

Liechtenstein

Newport Spectra-Physics GmbH
Guerickeweg 7 64291
Darmstadt, Germany
Tel: +49-(0) 6151-708-0
Fax: +49-(0) 6151-708-952

Lithuania, Latvia, Estonia

Interlux Co. Ltd.
Avieciu str. 16 LT-08418
Vilnius, Lithuania
vilnius.poderys@interlux.lt
Tel: +370 620 88559

Malaysia, Thailand, Vietnam

Kumpulan Abex SDN BHD
Lion Industrial Park, Section 26
40400 Shah Alam
Selangor Darul Ehsan, Malaysia
sales@kabex.com.my
Tel: +603-5192-2898
Fax: +603-5192-2633

Mexico

Satelsa, SA DE CV
Paseo de la Reforma #184. Col. Lomas del
Marqués CP 76148 Querétaro
Oro 76146 Mexico
satelsa@satelsa.com.mx
Tel: +52 442-2952600
Fax: +52 442-2451365

Netherlands

Newport Spectra-Physics BV
Vechtensteinlaan 12-16
3555 XS Utrecht Netherlands
Tel: +31-30-659-21-11
Fax: +31-30-659-21-20

Pakistan

AIDL PVT. LTD.
8/5th Floor Office Tower, Rimpia Plaza, M.A.
Jinnah Road, Saddar, PO Box 8612
Karachi 74400 Pakistan
aidl@cyber.net.pk
Tel: +92-32-122-6598
Fax: +92-21-773-6582

Poland

COMEF Aparatura Naukowo-Badawcza
Ul. Gdanska 240-719 Katowice
Poland comef@comef.com.pl
Tel: +48 32-203-41-49
Fax: +48 32-203-58-23

Portugal

M.T.Brandão, Lda
Rua de Serralves, 599
4150-708 Porto Portugal
mtb@mtbrandao.com
Tel: +351-22-6167372
Fax: +351 22 616 73 79

Puerto Rico

J.C. Gonzalez, Inc.
HC 1 Box 8389 San German
00683-9684 Puerto Rico
sales@jcgonzalezinc.com
Tel: (781) 892-0047
Fax: (787) 264-3816

Russian Federation

BEN Photonics LLC
Lesnaya Street 4B, Apartment 1, office 101
108840 Moscow, Troitsk
Russian Federation
n.b.buyanov@mail.ru
Tel: +7-910-459 23 70

Singapore

Newport Opto-Electronics Technologies
(Singapore) Private Ltd 10 Ang Mo Kio
Street 65 02-11 TechPoint
569059 Singapore
Tel: +65-6664-0400
Fax: +65-6664-0401

South Africa

Nkosi Innovations
Brumaberg 2198 Hans Pirow Street,
Bruma Johannesburg South Africa
sales@nkosi.co.za
Tel: +27 78 2357 580

South Korea

OMA Co.
1596-64, Yuseongdaero,
Yuseong-gu, Daejeon 34054
South Korea
mail@omacom.co.kr
Tel: +82-42-822-9501 / -9502 / -9503
Fax: +82-42-822-9504

Spain, Andorra

Lasing SA
Julian Camarillo, 26, Primera Planta, 7-8
28037 Madrid, Spain
info@lasing.com
Tel: +34 91 377 50 06
Fax: +34 91 407 36 24

Sweden

Azpect Photonics AB
Aminogatan 34 SE43153
Mölnådal, Sweden
info@azpect.com
Tel: +46-855-44 24 80
Fax: +46-855-44 24 99

Switzerland

Newport Spectra-Physics GmbH
Guerickeweg 7 64291
Darmstadt, Germany
Tel: +49-(0) 6151-708-0
Fax: +49-(0) 6151-708-952

Taiwan

Forter Technology Corporation
5F., No. 758, Zhongming S. Rd.,
South Dist. Taichung City
40255 Taiwan
sales@forter.com.tw
Tel: +886 4 2260 7729
Fax: +886 4 2260 7731

Turkey

Optomek
Mustafa Kemal Mahallesi 2142.
Sokak No:9/2 06520
Ankara /Ankara, Turkey
info@optomek.com.tr
Tel: +90 312 219 44 22
Fax: +90 312 219 44 33

Ukraine

BEN Photonics LLC
Lesnaya Street 4B,
Apartment 1, office 101 108840
Moscow, Troitsk
Russian Federation
n.b.buyanov@mail.ru
Tel: +7-910-459 23 70

United Kingdom

Newport Spectra-Physics Ltd.
Unit 7, Library Avenue, Harwell Oxford
Didcot, Oxfordshire, OX11 0SG
United Kingdom
Tel: +44 (0) 1235 432 710
Fax: +44 (0) 1235 821 045

United States, Canada

Newport Corporation
1791 Deere Avenue
Irvine, CA 92606 United States
Tel: (949)-863-3144
Fax: (949) 253-1680

Uzbekistan

BEN Photonics LLC
Lesnaya Street 4B, Apartment 1,
office 101 108840 Moscow,
Troitsk Russian Federation
n.b.buyanov@mail.ru
Tel: +7-910-459 23 70

Venezuela

Tecnologia Omega C.A.
Av. Francisco de Miranda-Edificio Centro
Peru, Oficina 64
Chacao, Caracas, Venezuela
tecnomega@gmail.com
Tel: +58-212-2641858
Fax: +58-212-2640626