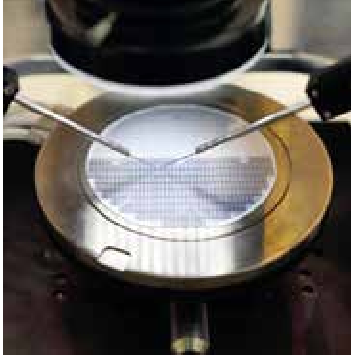
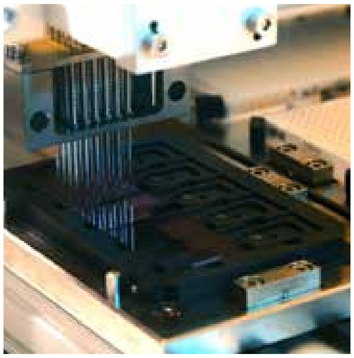











Precision & Industrial Positioning Systems

Motion Control Solutions

Parker

ENGINEERING YOUR SUCCESS.

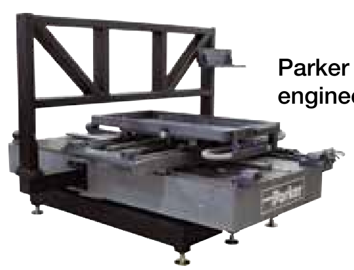
Parker Hannifin Corporation

Parker Hannifin is a Fortune 250 global leader in motion and control technologies. For more than 100 years the company has engineered the success of its customers in a wide range of diversified industrial and aerospace markets. Learn more at www.parker.com or @parkerhannifin.

Parker world headquarters in Cleveland, OH.

Total System Solutions

Parker's team of highly qualified application engineers, product development engineers, and system specialists can turn electromechanical components into an integrated system solution. Moreover, our Selectable Levels of Integration™ allows you to choose the appropriate system, subsystem, or component to meet your specific need.



Parker offers complete engineered solutions.

First in Delivery, Distribution, and Support

In today's competitive, fast-moving economy, what good is an application that isn't ready on time? This is especially true when compressed design cycles make the quick delivery of critical components essential. With factories strategically located on five continents, Parker offers an unrivaled delivery record, getting solutions out our door and onto your floor faster than ever.

Parker also has the industry's largest global distribution network, with more than 8,600 distributors worldwide. Each of these locations maintains ample product inventory to keep your downtime to a minimum. And many distributors have in-house design capabilities to support your system and subsystem requirements.

Training

Parker's best-in-class technology training includes hands-on classes, web-based instruction, and comprehensive texts for employees, distributors, and customers. Parker also provides computer-based training, PowerPoint presentations, exams, CAD and simulation software, and trainer stands. Get the in-person training schedule at **parkermotion.com/support_training.html.**

parker.com/emn

Our award-winning Web site is your single source for

- **Product information**
- **Downloadable catalogs**
- **Motion-sizing software**
- **3D CAD files**
- **Training materials**
- **Product-configuration software**
- **RFQ capabilities**
- **Videos and application stories**
- **Selection, Sizing Tools**

24/7 Emergency Breakdown Support

The Parker product information center is available any time of the day or night at 1-800-C-Parker. Our operators will connect you with a live, on-call representative who will identify replacement parts or services for all motion technologies.

Welcome!

Thank you for your interest in the products and systems offered by Parker Hannifin Corporation's Electromechanical Automation Division. This catalog presents Parker's "perfect fit" electromechanical solutions for high-precision positioning and high-speed automation. Our products and systems are recognized around the world for their functionality, performance, and reliability.

The products illustrated in this catalog can be combined to form single- or multi-axis systems. These systems are offered at Selectable Levels of Integration™ ranging from basic single-axis mechanical tables and actuators... to multi-axis mechanical subsystems... to complete electromechanical systems and robots including motors, drives, controls, and machine interface.

As you read through this catalog, you will discover that Parker offers the widest variety of electromechanical solutions that are delivered in the shortest amount of time.

Still, many customers require special solutions to satisfy unique or special requirements. Parker has been providing custom engineered solutions for over 30 years to satisfy those requirements. If your application cannot be fulfilled by the complement of products found in this catalog, please contact an authorized Parker Automation Technology Center or a factory applications engineer.

We are proud to present to you a complete spectrum of positioning and motion control products. We invite you to discover the advantages that can be realized by relying on Parker for products and systems which represent the very best value in the electromechanical marketplace.

Sincerely,

Chris Griffin
General Manager

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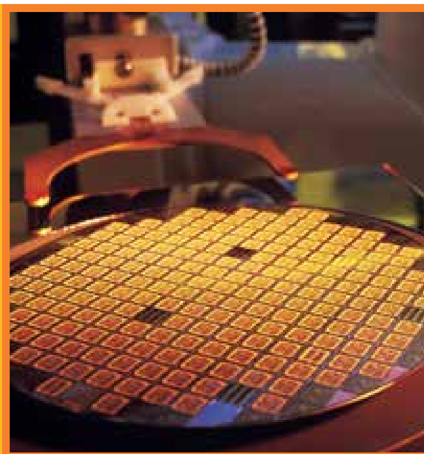
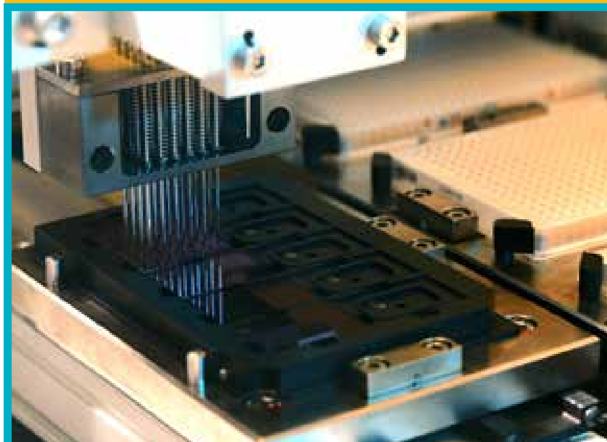
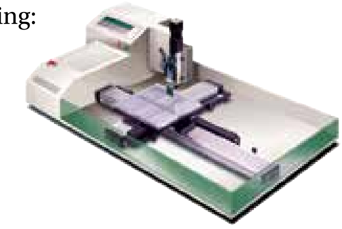
Partners in Automation



Today's automation applications demand performance in quality throughput, productivity and precision. Miniaturization of semiconductor, electronics and life science applications have created the need to partner with companies that have the experience and products to meet stringent specifications for smaller, more precise motion control solutions.



Parker's dedicated electromechanical business is rapidly becoming an industry leader in providing precision connectivity to PC-based controls for target industries including:

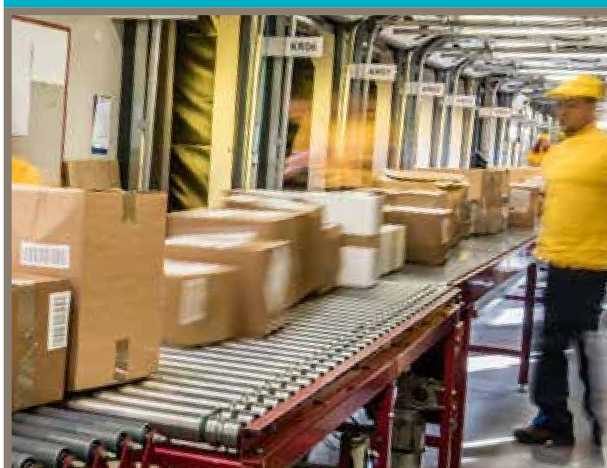


- **Semiconductor**
- **Electronics**
- **Life Science**
- **Medical Equipment**
- **Metrology**

In the industrial markets, solutions from Parker's Electromechanical Automation Division combine speed, accuracy and high-load capacities to give machine builders and OEMs a competitive edge in applications including:

- **Packaging**
- **Automotive Manufacturing and Assembly**
- **Printing**
- **Material Handling**
- **Metal & Plastics Fabrication**

Parker is about motion control engineering, manufacturing, application expertise and unparalleled customer service. Our electromechanical systems and solutions are available wherever needed—around the corner or around the world.



Unrivaled Support

Customization and Services

Unlike many other motion technologies, electromechanical applications often require custom solutions. Parker has a Custom Systems Group staffed by experienced engineers and technicians who utilize systematic processes for handling component modifications or complete one-of-a-kind systems.

The System is the Product

Many of the industrial systems shown in this catalog are built specifically to customer request and need. Parker system customers can receive many optional services such as:

- **3-D Custom Assembly Drawings**
- **Electronics Integration**
- **Finite Element Analysis**
- **Life Load Testing**
- **End Effector Integration**
- **High-Flex Cabling Systems**
- **Structural Frame & Guarding**
- **& more**

Our advanced manufacturing and assembly process allows us to build quality and consistency into every element of your motion system. Each mechanical system is fully assembled prior to shipment and each component is properly handled to protect finish and appearance. Performance and specifications are verified with state-of-the-art testing, including:

Cleanroom Testing

Parker is equipped with particulate testing to certify systems for your cleanroom application.

EMI Testing

Parker has an EMI test chamber, which allows us to test equipment to verify levels of electromagnetic interference.

Precision Metrology Lab

When precision is critical to your process, you need validated, proven performance data. Parker certifies all precision-grade positioners using state-of-the-art laser interferometers, and provides reports to validate accuracy and bidirectional repeatability.

24/7 Emergency Breakdown Referrals

The Parker product information center at 800-C-PARKER offers live operators 24/7 to help identify replacement parts or services.

Parker Automation Technology Centers

Parker Automation Technology Centers are a network of premier product and service providers who can serve you locally for your automation needs. Each Automation Technology Center is certified to have completed significant product training and has the ability to provide subsystem solutions with local support.

Your Delivery Date is Our Lead Time

We measure ourselves to your ship date to ensure we are aligned to our customers' needs. In emergency situations, we can ship a solution in as little as one day.

www.parker.com/emn

The Parker Electromechanical & Drives web site offers the most extensive online support tools in the industry, including:

- **Complete online catalog**
- **FAQ database with more than 500 answers to common questions**
- **Virtual Engineer interactive product sizing and selection tool**
- **Comprehensive CAD drawings and 3-D models for electronic and mechanical products**
- **User guides and detailed product specifications**
- **Latest software and firmware revisions**
- **Application case studies and videos**
- **Custom solutions photo library**
- **Innovative technology white papers**

One-on-One with a Motion Control Expert

Toll-Free Applications Engineering Assistance

When you have urgent questions, expert answers are only a phone call away. Our team of experienced engineers are ready to take your call. These engineers have practical field experience and can provide you with application and product assistance throughout the stages of your project and for the life of the product.

For presale support, including sizing and selecting systems, call 800-245-6903 (724-861-8200 outside the US). For post-sale support with technical questions on programming and troubleshooting, call 800-358-9070 (707-584-7558 outside the US). Our staffing and support tools allow us to resolve most issues and get your project rolling in less than one hour.

Selectable Levels of Integration™

Selectable Levels of Integration™ is Parker's philosophy of product development and management. A machine builder can choose the appropriate system, subsystem, or component that meets their specific need and optimizes their system design.

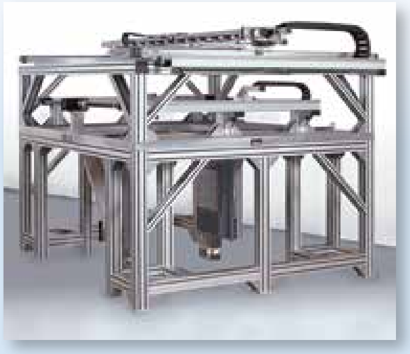
Parker designs solutions for customers of all types, whether you need a complete integrated system or want to build your own with the tailored components that match your performance and price requirements.

From comprehensive systems to single products, we'll help you create the best solution for your business.

Systems

Machine builders and OEMs often choose to integrate a complete electromechanical system into their existing machine. They rely on Parker's knowledge, experience, and support to make this process as simple and cost-effective as possible.

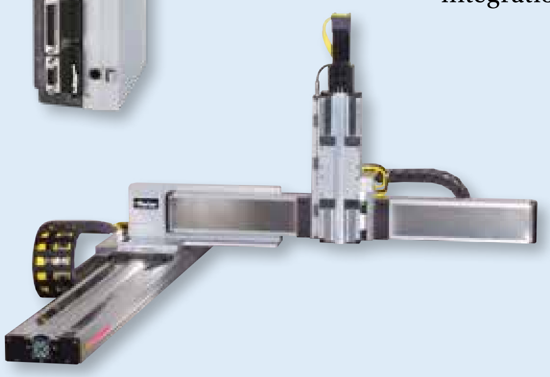
When you choose Parker as your design partner, our engineering expertise will reduce your design time, ensure components are compatible with each other, and bring your machine to life more quickly. Ultimately this results in savings of both time and money.

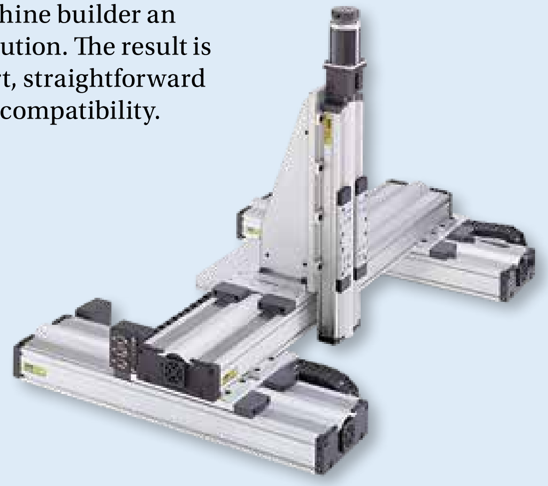


Modular Systems and Bundled Products

For an easy to use solution, Parker offers bundled or kitted systems. We can combine motors, gearheads, and positioning systems to deliver a configured subsystem ready for installation. Parker configuration and setup software accommodates the rest of the product line, making start-up a snap.

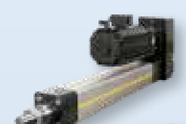
Combining ready-made subsystems with our custom product modification capabilities gives the machine builder an economical custom-fit solution. The result is reduced engineering effort, straightforward integration, and modular compatibility.





Component Solutions

Parker has the largest platform of standard electromechanical automation products on the market. This platform ranges from the user interface software and touchscreen (HMI) through the T-slot aluminum framing and guarding and includes everything in between. If you have the capability and experience to develop your own systems, our innovative, easy-to-use components will help you get the job done. Local manufacturing provides short lead times, large selection, and proven reliability.



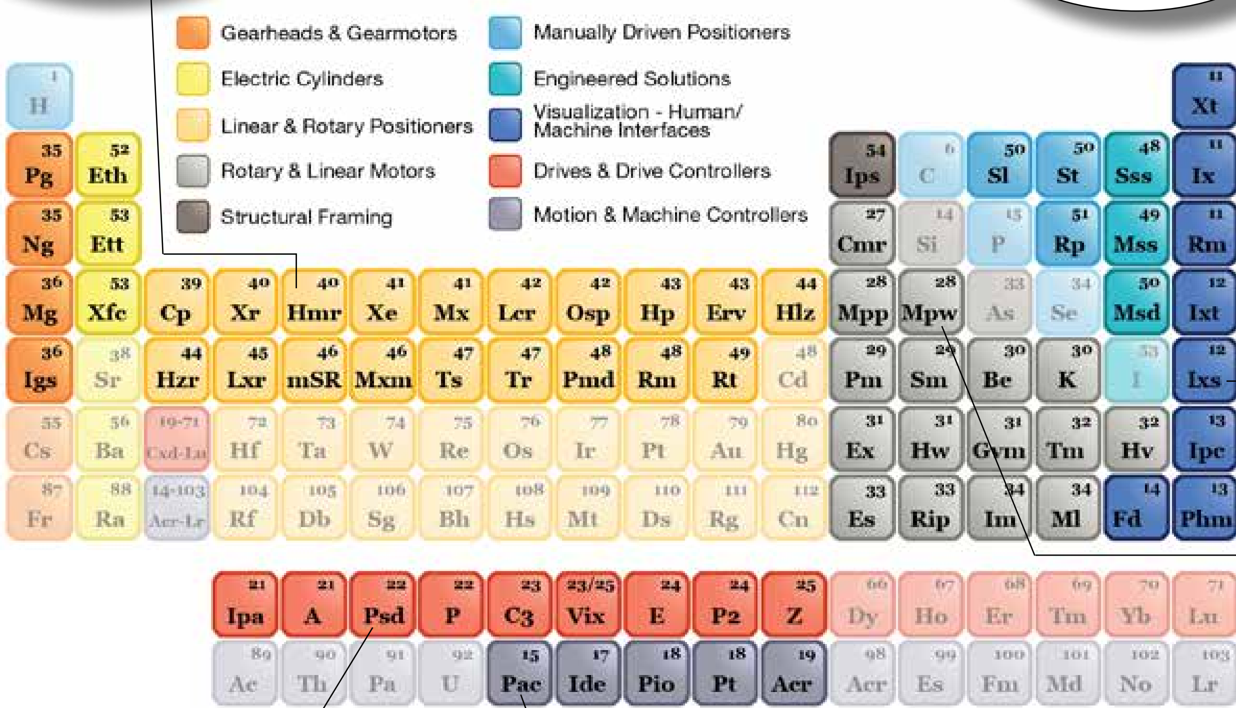
Parker Products & Technologies

The Fundamental Elements of Motion and Machine Control

Whether you need one component or an entire integrated system, Parker has the right solution for you. Designing your own or buying off the shelf, Parker Electromechanical & Drives Division offers an unmatched portfolio of electromechanical solutions for every application.

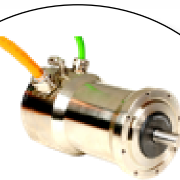
The HMR High Moment Rodless Series Positioner, extremely user friendly and versatile.

The InteractX Supervisory HMI, with powerful trending and analysis tools.



The PSD Series Global Servo Drive, with high performance servo technology and a rich feature set for OEMs.

The PAC, for integrated machine control, multi-axis motion, and embedded visualization.



The MPW Series Servo Motor, with IP69k rating for harsh wash-down environments.

A complete platform of electromechanical solutions and products

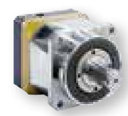
Visualization – Human-Machine Interfaces (HMI)
Parker offers HMI solutions for every application, from simple push-button replacement to sophisticated networking, multimedia, and data logging requirements. Parker pre-loads Interact Xpress or InteractX HMI software on PowerStation industrial computers to provide a ready-to-go HMI solution. This bundled approach reduces development and integration time for your HMI project.


Motion & Machine Controllers
Parker automation controllers have advanced features built-in, such as kinematics transformation for the control of robots and other non-linear functions. With a variety of communication protocol options, these controllers are easily adapted into your machine network and can help manage your internet data connectivity for machine to machine communications, with our embedded Xpress platform.

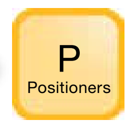

Drives & Drive/Controllers
Parker servo and stepper drives are designed to deliver a maximum amount of power output and performance. With optional integrated control capability, Add On Intructions for EtherNet/IP, and multiple communication protocols, Parker drives are optimized to ease integration and start-up.


Rotary & Linear Motors
Using advanced technologies, Parker rotary motors provide maximum torque density. Our designs also provide cog-free rotary motion for the best low-speed smoothness. Patented linear motor designs provide the greatest winding uniformity and accuracy in the industry, and our product offering scales from small linear motor components to the largest force capacity.

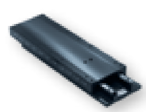

Gearheads & Gearmotors
With expert machining and high precision designs, the Parker gearheads have precision options with less than three arc-minutes of backlash. Our other gearhead options include NEMA sizes, right angle, dual drive, and more.



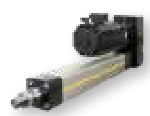
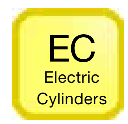

Linear & Rotary Positioners
Parker offers best-in-class positioner designs with screw, belt, or linear motor-drive technologies. Our award-winning designs lead the way with unmatched flexibility and precision capabilities. Parker's breadth of positioning product solutions includes positioners, miniatures, OEM-friendly linear motors, and precision and high-payload industrial rotary positioner products.

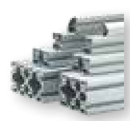
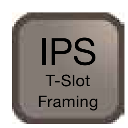
Manually Driven Positioning Slides and Stages
For over forty years, Parker has been a leader in supplying manual positioners to industries and laboratories around the world. Free travel linear slides and precision positioners are available in sizes ranging from less than half an inch wide to 6 inches wide, travels from 1 inch to 30+ feet, and payload capacities of hundreds of pounds.




Electric Cylinders
Since the early 1990s, Parker has led the market for high quality electric cylinders. Today, Parker has one of the most complete electric cylinder product lines available, offering high speed linear motor versions, high-force ball screw cylinders, extreme-force roller screw cylinders, and low- to medium-capacity lead screw/ball screw versions. Products range from ISO25 to 195 mm frame sizes with capabilities up to 80,000 lbs of thrust.

T-Slot Aluminum Framing (IPS)
Parker T-Slot aluminum framing utilizes aircraft-grade aluminum for robust, high-strength assemblies. Choose from individual components, bundled inventory, kits, and turnkey systems. We also offer full engineering, fabrication, and assembly services. We are the single source/complete resource for all your structural design needs.

Systems
Parker offers multi-axis Cartesian and gantry-style robots as standard pre-configured. If the application needs something more custom, we offer best-fit custom automation solutions ranging from precision cleanroom and laboratory motion to heavy-duty industrial automation. When you partner with Parker, you leverage the full extent of our global motion and control leadership to create unrivalled application solutions.


Application Solutions

The majority of today's positioning and motion control systems are involved in processes associated with "making" (manufacturing), "moving" (transferring), or "measuring" (testing).

Parker's electromechanical systems are utilized extensively in all three areas. This is attributed to our ability to provide "Perfect Fit" solutions covering a broad spectrum of requirements at various levels of integration and complexity.

Below and on the following pages are several examples of Parker engineered electromechanical solutions for customer-specific applications.

Make

The application examples shown here are a small sample of the multitude of manufacturing processes where Parker system solutions are being utilized. From factory floors to cleanrooms, Parker provides versatile motion systems and subsystems that maximize manufacturing productivity.

Automotive Component Assembly Machine

Tooling station positioner to replace mechanical cam.

- 6 inch vertical travel with electromechanical brake on ballscrew
- 0.0002 inch position repeatability
- Dowel holes in table base and carriage for precise mounting
- Strip seals on table to keep fingers and debris out of table

Catheter and Stent Manufacturing for Medical Industry

XY positioning for micromanufacturing of precision instruments.

- Miniature positioners with NEMA 16 servo motors
- 0.00002 inch resolution with linear encoder feedback
- Continuous duty cycle
- Precision grade tables with special laser interferometer testing

Sealant Dispensing for Engine Rocker Covers

Contour path – CAD to motion.

- XYZ (18 in x 14 in x 6 in) work area
- High stiffness tables for cantilevered mounting
- Cable carriers for multi-axis system
- Precision ground ballscrews for smooth, quiet operation

Rapid Prototype Machines

Automated process for fabricating dense metal parts by fusing metal powder within the focal beam of a laser.

- Combined linear motor, ballscrew and belt drive technologies
- Complete with machine base and cable management system
- Special straightness and flatness testing
- Custom engineered brackets

Food and Beverage Packaging

Filling machine in washdown environment.

- Stainless steel construction
- FDA approved lubrication
- 30 inch travel; 50 lb load
- Continuous duty at 120 in/sec velocity; 3 g acceleration

Move

The application examples shown here illustrate the types of material handling applications routinely solved by Parker system solutions. From overhead gantry robots to tabletop XY positioners, Parker provides the widest spectrum of material handling application solutions in the industry.

Electric Motor Container Handling

Automated transfer of product from conveyor to labeler to pallet.

- XYZ (80 in x 60 in x 40 in) work area
- Per axis repeatability of 0.004 inch
- Complete cable management system
- Custom end effector

Multi-Pick Storage and Retrieval System

Programmable order picker

- XYZ (20 ft x 13 ft x 3 ft) work area
- High dynamics (2 g accel.; 80 in/sec vel.)
- Custom end effectors

Genomic Specimen Handling

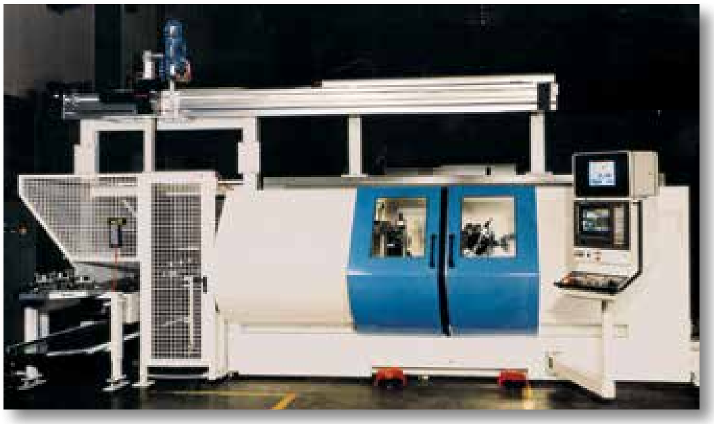
Accurate placement of 96, 384, or 1536 well microtiter plates for DNA sequencing and analysis

- XY (24 in x 20 in) work area
- Modular motion platform integrates into OEM machinery
- Attractive packaging of XY table with stainless steel protective covers
- Cleanroom compatible

Machine Tool Loader/Unloader

Automated machine tending for top entry machine access

- XZ (10 ft x 3 ft) work area
- 60 in/sec velocity requirement
- Clean cable / air hose routing
- Payloads up to 130 lb



Palletizer for Pharmaceutical Products

Product loading on automated guided vehicle

- XYZ (15 ft x 6 ft x 6 ft) work area
- Pneumatic rotary axis
- Custom end effector
- Overhead gantry mechanics allow floor space utilization

Measure

The examples shown here showcase Parker's ability to provide high-precision motion solutions for critical test and measurement applications. From miniature microscope mounted positioners to steel framed test systems, Parker provides solutions for the widest range of precision applications and ensures performance with laser testing and certification.

Surface Measurement of Turbine Blades

Precise positioning of contact probes.

- Custom 5-axes motion mechanics
- Complete with machine base and cable management system
- Special laser interferometer certification
- Heavy duty construction to minimize deflection

Flying Height Tester

Position a test specimen to simulate hard disk drive reader head operation.

- 6 in x 4 in XY travel designed for high accuracy
- Special materials for extreme rigidity and low ESD
- Cleanroom compatible mechanical system
- Special point of measurement laser interferometer testing

Wafer Inspection

Vision system raster scan.

- 350 mm x 350 mm work area
- Continuous duty cycle
- Cleanroom compatible mechanics
- Precision ballscrew or linear motor drive options

Inspection of Composite Parts for Aerospace Industry

Precision positioning of 300 lb test specimen relative to fixed test beam.

- 40 in x 20 in x 360° work envelope
- All axes of motion aligned to test beam for entire travel range
- Custom 16 ft x 8 ft x 5 ft steel machine frame
- Complete with control panel and cable management system

Camera Calibration Rig

Calibration of video camera used in space for vital display information.

- Ballscrew driven XYZ system with extended travel (144 in x 24 in x 24 in)
- Custom engineered brackets
- Pinned orthogonal
- Repeatable within 0.0005 in

MARKETS

PRECISION

The precision manufacturing industry depends on innovation, low tolerances, and extremely high quality standards to make superior products. Accuracy and performance monitoring improve manufacturers' ability to deliver reliably, even as the industry demands increasingly smaller products and assembly equipment. To meet the needs of precision manufacturers, Parker offers motion control components that satisfy the need for computerization, miniaturization, and ultra clean processing.

Parker provides solutions for OEMs of semiconductor and life science products, electronics consumables, automotive components, LED lighting products, 3D printing equipment, and medical devices, as well as for companies in the environmental and food processing sectors.

Specific Applications

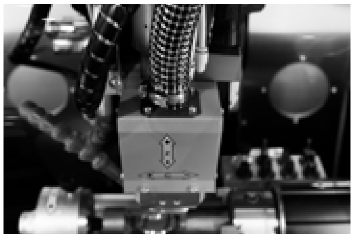
LIFE SCIENCES
- Automated Imaging
- Digital Pathology
- DNA Sequencing
- Liquid Handling
- Sample Handling

ELECTRONICS MANUFACTURING
- Non Contact Metrology
- Optical Profilometry
- Laser Profilometry
- Confocal Microscopy
- Shuttling and Handling

MATERIAL PROCESSING
- Laser Machining
- Cutting • Scribing • Drilling
- Ablation
- Micro machining
- 3D Printing

SEMICONDUCTOR
- Wafer Inspection
- Mask Alignment
- Lithography
- Atomic Force Microscopes
- Optical Profilometry






Parker Design

Parker is the design partner of choice for today's precision manufacturers. In order to improve the design process, Parker offers compact products with very high precision that easily mount to linear motion axes. A variety of different encoder options, linear motor technologies, and product sizes provide flexibility, accomodating performance and budget requirements. Features and options like limits and home sensors, high flex cabling, high performance bearings, and refined design packages add function and value.

Laser-grade precision testing ensures quality, and cleanroom capabilities build applications solutions anywhere that manufacturers need to meet clean production requirements. Parker is capable of validating stage cleanroom classification according to either Federal Standard 209E or ISO standard 14644-1 with an onsite cleanroom test chamber, and has years of experience adapting stages to meeting a variety of classifications. From a single axis component to multi-axis custom designed systems, Parker can provide solutions for the precision market.

Features
- High resolution and repeatability
- Submicron precision
- Value and high end options
- Excellent torque density without weight in rotary products

MARKETS

INDUSTRIAL

The changing landscape of the industrial sector means manufacturers need to focus on innovative solutions that improve efficiency, performance, clean operation, and throughput. Taking advantage of advanced manufacturing trends and the potential of the connected products of Industry 4.0 provides an opportunity to increase performance and profit. Parker offers motion control components that deliver the speed and robust capabilities needed by industrial manufacturers.

Parker provides solutions for OEMs involved in the heavy manufacturing sector, automotive assembly and production, printing and publishing, textile manufacture, food and beverage packaging, and for companies manufacturing various other industrial products such as fabricated metals and building products.

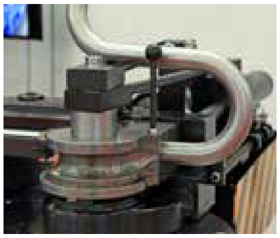
Specific Applications

MATERIAL FORMING
- Tube Bending
- Press operations
- Fluid Power Migration

PACKAGING
- Palletizing
- Cartoning
- Primary Packaging
- Bottle Filling

IN-PLANT AUTOMOTIVE
- Custom machine builders
- Forming, fabricating
- RTU
- Test equipment

FLIGHT SIMULATION
- Gate/door actuation
- Stage automation
- Flight simulation




Parker Design

Parker is the design partner of choice for today's industrial manufacturers. To reduce complexity and give OEMs maximum flexibility, Parker offers user friendly and versatile industrial products with many adaptable options and features. A choice of frame sizes, drive train options, and bearing type, plus a range of screw and belt driven configurations, make it simple to design the right solution for any application. Rugged construction and high payload capacities deliver the performance needed in heavy duty applications.

Customizable options accomodate a variety of performance and installation requirements. Selections include mounting, carriage, and sensor options. Features are often available for harsh conditions, such as protective covers and purge ports. Accessories include force and limit sensors, shock absorbing bumpers, and couplings and housings. These options create industrial products that are tailor made solutions for any application.

Features
- Modular designs
- Highly configurable product families
- High performance, load to life characteristics
- Low maintenance

Additional Capabilities

Gantry Systems

Page 293

Parker's gantry systems provide cost-effective, easy to integrate solutions that satisfy the vast majority of automation requirements. In addition to these standard gantry systems, Parker offers products with additional capabilities to fulfill the needs of special applications. Our engineering skill and manufacturing expertise have integrated these products into custom-tailored gantry solutions which have successfully addressed the most unique and exacting requirements of machine builders and integrators around the world.

Support Structures

Parker can include the support structure and machine guarding as part of your complete system solution. Parker's IPS extruded aluminum structures are suited for light to medium duty requirements. High strength steel supports are offered for applications involving greater loads and forces.

Motors, Drives, and Controls (Electrical Subsystems)

Page 512

A high speed multi-axis Gantry Robot requires a complete electromechanical solution where the machine Interface, Control and Motor/Drive functions are seamlessly integrated with the mechanical elements. Parker's wide range of electrical products and subsystems enable Gantry Robots to be supplied to the customer at the level of integration most suitable for his need. Whether you need a basic mechanical unit, a unit including drives and motors, or a full-blown electromechanical system ready to run or link to a PLC, Parker has the best solution.

Our Virtual Engineer: Shorten Your Design Cycle

Parker's Virtual Engineer an innovative design tool for linear motion applications in industrial automation. Virtual Engineer presents an intuitive interface for the user to enter application details for speed, load, external forces, and then accurately sizes the product, generating a custom report and seamlessly creating an RFQ. Virtual Engineer provides a new level of design collaboration with Parker motion control experts, and by doing so, can take the load off your own engineering team, and reduce your machine design time.

The graphical interface allows input of payload position and moment input, as well as axis orientation. Trapezoidal, triangle, or custom motion profiles may be specified, and an animated motion profile is displayed to confirm.

Other features include

- **Product life estimation for provided specifications**
- **Compare function for multiple products that meet your specifications**
- **"Save Progress" feature so you can return to a project at a later time. Virtual Engineer never goes on break, but you can!**
- **Project collaboration: Share your project with your team or ours for additional help**

Start using Virtual Engineer at parker.com/VirtualEngineer

Optimize Your Selection and Have Confidence in Your Results Using the "Compare" Feature

As you enter your motion specifications, a list of possible solutions appears on your screen. If any specification exceeds a particular actuator's capability, it is eliminated from the choices. After all specifications are entered, a "Compare" feature will show you the differences between the remaining products, including expected life and relative cost. This information can then be saved, downloaded, or submitted to Parker for a request for quote.

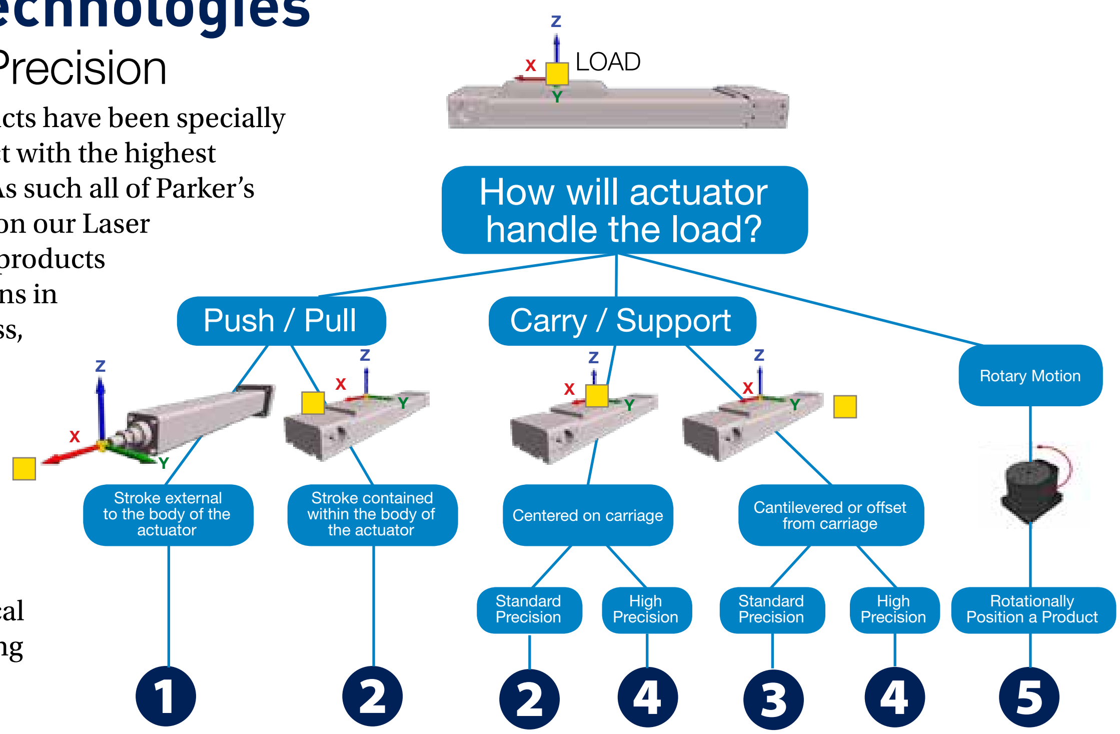
Virtual Engineer "My Projects" Platform

- **Experience a truly collaborative design environment**
- **Share application sizing details, product selection, project notes, drawings and much more, with colleagues or Parker engineers**
- **Personalize your projects, with name changes, detailed notes, and more**
- **Live chat with Parker engineers to help you with questions as you navigate the tool**

Electromechanical Automation Products & Technologies

Standard Versus Precision

All of Parker's precision products have been specially design to provide your product with the highest degree of precision possible. As such all of Parker's precision products are tested on our Laser Interferometer to ensure that products meet all precision specifications in the way of straightness, flatness, bidirectional repeatability, and stage accuracy. Parker also provides a linear slope corrected value for all precision products. This value can then be input into electronic controls to compensate for any mechanical errors electronically—providing you with a higher degree of precision than what pure mechanics alone can obtain.



1 Rod-Style Linear Actuator

A rod-style linear actuator provides linear motion via a rod that extends from the actuator providing a push/pull motion. The entire stroke of the unit happens exterior to the body of the actuator, so these actuators will require more space to capture the same stroke, compared to a rodless or high moment rodless actuator. Parker offers either a thrust dense ball screw version of this actuator or a high speed linear motor variation depending upon the needs of your application.

2 Rodless Actuators

A rodless linear actuator provides linear motion via a moving carriage in which the stroke happens within the body of the actuator itself. A rodless linear actuator contains only one linear guide rail which is capable of supporting a load. Parker supplies a variety of rodless linear actuator ranging from economical belt drives, to thrust dense screw versions, to linear motor driven versions which have superior acceleration and speed capacity.

3 Industrial High Moment Rodless

Industrial (High Moment Rodless) Linear actuators provide linear motion via a moving carriage in which the stroke happens within the body of the actuator itself. A High Moment Rodless linear actuator contains two linear guide rails allowing the actuator to better handle cantilever or offset loads. As a result these actuators often carry greater loads when compared to their rodless equivalent. Parker produces a wide variety of high moment rodless actuators driven with a wide variety of drive train options including belts, screw, or linear motor.

4 High Precision Positioners

Precision positioning product refers to any positioner that can move with repeatability below 3 microns of bi-directional repeatably. All precision products contain dual linear guides which are intended to maintain the positioners stability over the length of travel. The guidance systems within these actuators are laser indicated, and maintain a very specific straightness and flatness. Parker produces a variety of these positioners with two drivetrains of either a precision ground ball screw or a direct drive linear motor.

5 Rotary Positioner

Unlike the prior four product types which create motion along a linear path, rotary positioners support motion around a fixed rotary path. Rotary positioners can be driven through internal gearing transferring rotary motor torque into linear motion through a worm gear which is then transferred into rotary motion at the table surface, providing significant mechanical advantage. Alternatively, rotary positioners can be direct driven, in that rotary motor (traditionally brushless DC) stator and rotor elements are packaged inside of a robust guidance structure which provides much higher payload capacity than traditional rotary motors, which are not typically designed for axial loading conditions. Parker manufactures both gear driven and direct driven rotary tables and integrates cross roller and radial bearing guidance to provide a range of various payload, precision and overall performance characteristics.

Product List

				Drive Type									Bearing Type					Repeatability (µm)					Additional Information			
		Model	Page Number	Rolled Ball Screw	Whirled Ball Screw	Ground Ball Screw	Leadscrew	Worm Gear	Direct Drive Servo	Slotless Linear Motor	Ironless Linear Motor	Ironcore Linear Motor	Glider Bearing	Recirculating Ball	Square Rail	Cross Roller	Ball Bearing	<5	5-10	10-30	31-99	>100	Max Travel – mm	Normal Load - N (lbs)	Profile Width – mm	Max Speed – mm/sec
SCREW DRIVEN	Rodless	OSPE25	#	•			•						•								•	•	1000	500 (112)	41	250
SCREW DRIVEN	Rodless	OSPE32	#	•			•						•								•	•	2000	1200 (267)	52	500
SCREW DRIVEN	Rodless	OSPE50	#	•			•						•								•	•	3200	3000 (674)	87	1250
SCREW DRIVEN	Rodless	LCR30	#				•						•		•							•	600	90 (20)	30	150
SCREW DRIVEN	Industrial High Moment Rodless	HMRS08	#		•										•					•			1200	1800 (405)	80	600
SCREW DRIVEN	Industrial High Moment Rodless	HMRS11	#		•										•					•			1500	4450 (1000)	110	800
SCREW DRIVEN	Industrial High Moment Rodless	HMRS15	#		•										•					•			2000	8800 (1978)	150	1000
SCREW DRIVEN	Industrial High Moment Rodless	HMRS18	#		•										•					•			2100	16200 (3642)	180	1200
SCREW DRIVEN	Industrial High Moment Rodless	HMRS24	#		•										•					•			2300	26600 (5980)	240	1600
SCREW DRIVEN	Industrial High Moment Rodless	402XE	#	•										•					•				255	900 (205)	50	450
SCREW DRIVEN	Industrial High Moment Rodless	403XE	#	•										•					•				655	1600 (360)	60	800
SCREW DRIVEN	Industrial High Moment Rodless	404XE	#	•										•						•			700	1700 (382)	100	1440
SCREW DRIVEN	Precision	401XR	#			•									•			•	•				600	490 (110)	41	1000
SCREW DRIVEN	Precision	402XR	#			•									•			•	•				600	979 (220)	58	1000
SCREW DRIVEN	Precision	404XR	#			•	•								•			•	•				700	1700 (375)	95	1200
SCREW DRIVEN	Precision	406XR	#			•									•			•					2000	6300 (1390)	150	1200
SCREW DRIVEN	Precision	412XR	#			•									•				•				2000*	14700 (3241)	300	1175
		MINIATURE																								
SCREW DRIVEN	Precision	MX45S	#			•	•									•		•	•				25	68 (15)	45	30
SCREW DRIVEN	Precision	MX80S	#			•	•									•		•	•				150	80 (18)	80	200
																				IN ARC-SEC				THRUST	DIA	RPM
ROTARY DRIVEN	ROTARY SERVO STAGES	PMDD-B	#						•								•	•					-	1500 (337)	135	500
ROTARY DRIVEN	ROTARY SERVO STAGES	PMDD-C	#						•								•	•					-	3300 (742)	175	500
ROTARY DRIVEN	ROTARY SERVO STAGES	PMDD-D	#						•								•	•					-	4000 (900)	230	500
ROTARY DRIVEN	ROTARY SERVO STAGES	PMDD-E	#						•								•	•					-	11000 (2472)	290	300
ROTARY DRIVEN	ROTARY SERVO STAGES	PMDD-F	#						•								•	•					-	15000 (3371)	360	250
ROTARY DRIVEN	MINIATURE PRECISION ROTARY STAGES	mPR080	#						•								•	•	•				-	39 (9)	80	600
ROTARY DRIVEN	MINIATURE PRECISION ROTARY STAGES	mPR100	#						•								•	•	•				-	118 (26)	104	600
ROTARY DRIVEN	VERTICAL WEDGE	ZP200	#	•											•			•	•				25	735 (165)	200	440
ROTARY DRIVEN	STANDARD ROTARY TABLES	200RT 5in	#					•									•			•			-	111 (25)	197	15
ROTARY DRIVEN	STANDARD ROTARY TABLES	200RT 6in	#					•									•			•			-	668 (150)	236	15
ROTARY DRIVEN	STANDARD ROTARY TABLES	200RT 8in	#					•									•			•			-	668 (150)	315	15
ROTARY DRIVEN	STANDARD ROTARY TABLES	200RT 10in	#					•									•			•			-	890 (200)	394	15
ROTARY DRIVEN	STANDARD ROTARY TABLES	200RT 12in	#					•									•			•			-	890 (200)	472	15
ROTARY DRIVEN	WORM DRIVE PRECISION TABLES	R100M	#					•								•				•			-	998 (220)	100	30
ROTARY DRIVEN	WORM DRIVE PRECISION TABLES	R150M	#					•								•				•			-	3992 (880)	150	30
ROTARY DRIVEN	WORM DRIVE PRECISION TABLES	R200M	#					•								•				•			-	5988 (1320)	200	30
ROTARY DRIVEN	WORM DRIVE PRECISION TABLES	R300M	#					•								•				•			-	9980 (2220)	300	30
LINEAR MOTOR DRIVEN	HIGH PRECISION MINIATURE	mSR80	#									•			•			•					150	78 (18)	80	2000
LINEAR MOTOR DRIVEN	HIGH PRECISION MINIATURE	mSR100	#								•				•			•					500	118 (27)	100	2000
LINEAR MOTOR DRIVEN	HIGH PRECISION MINIATURE	MX80L	#								•					•		•	•				200	78 (18)	80	2000
LINEAR MOTOR DRIVEN	HIGH PRECISION	404LXR	#							•					•			•	•				1000	1700 (375)	100	3000
LINEAR MOTOR DRIVEN	HIGH PRECISION	406LXR	#							•					•			•	•				1950	6300 (1390)	150	3000
LINEAR MOTOR DRIVEN	HIGH PRECISION	412LXR	#							•					•			•	•				3000*	14700 (3241)	300	3000
LINEAR MOTOR DRIVEN	INDUSTRIAL GRADE	T1D/T1S	#								•				•			•	•				900	134 (30)	125	7000
LINEAR MOTOR DRIVEN	INDUSTRIAL GRADE	T2D/T2S	#								•				•			•	•				2941	445 (100)	145	7000
LINEAR MOTOR DRIVEN	INDUSTRIAL GRADE	T3D/T3S	#								•				•			•	•				2941	1068 (240)	190	7000
LINEAR MOTOR DRIVEN	INDUSTRIAL GRADE	T4D/T4S	#								•				•			•	•				2941	1780 (400)	229	7000

Product List

BELT DRIVEN

Group	Model	Page Number	Belt Drive	Ball Screw	Tubular Servo Motor	Glider Bearing	Steel/Polyamide Roller Wheel	Square Rail	<5	5-10	10-30	31-99	>100	Max Travel – mm	Normal Load - N (lbs)	Profile Width – mm	Max Speed – mm/sec
		Drive Type				Bearing Type			Repeatability (µm)					Additional Information			
Rodless	OSPE25B	#	•			•						•		3000	160 (36)	41	2000
Rodless	OSPE32B	#	•			•						•		5000	300 (67)	52	3000
Rodless	OSPE50B	#	•			•						•		5000	850 (191)	87	5000
Rodless	OSPEBHD20	#	•					•				•		5760	1600 (360)	73	3000
Rodless	OSPEBHD25	#	•					•				•		5700	3000 (674)	93	10000
Rodless	OSPEBHD32	#	•					•				•		5600	10000 (2248)	116	10000
Rodless	OSPEBHD50	#	•					•				•		5500	15000 (3372)	175	10000
Rodless	OSPEBV20	#	•					•				•		1000	1600 (360)	93	3000
	OSPEBV25	#	•					•				•		1500	3000 (674)	93	5000
	LCR30	#	•			•		•					•	1000	90 (20)	30	870
Industrial High Moment Rodless	HMRB08	#	•					•				•		3000	1800 (405)	85	2000
Industrial High Moment Rodless	HMRB11	#	•					•				•		4000	4450 (1000)	110	2000
Industrial High Moment Rodless	HMRB15	#	•					•				•		6000	8800 (1978)	150	5000
Industrial High Moment Rodless	HMRB18	#	•					•				•		6000	16200 (3642)	180	5000
Industrial High Moment Rodless	HMRB24	#	•					•				•		6000	26600 (5980)	240	5000
	HPLA080	#	•				•						•	5540	3000 (674)	80	5000
	HHPLA120	#	•				•						•	9470	6000 (1358)	120	5000
Rodless	HPLA180	#	•				•						•	9240	15000 (3372)	180	5000
Rodless	HLE60RB	#	•				•						•	4000	650 (150)	60	5000
Rodless	HLE100RB	#	•				•						•	6200	1140 (256)	100	5000
Rodless	HLA150RB	#	•				•						•	7900	2280 (512)	150	5000
Rodless	HLE60SR	#	•					•					•	3000	680 (157)	60	3000
Rodless	HLE100SR	#	•					•					•	6150	1680 (377)	100	3000
	HZR80	#	•				•						•	1500	2822 (635)	80	5000
	HZR100	#	•				•						•	2000	4410 (992)	100	5000

ELECTRIC CYLINDERS (ROD-STYLE)

Group	Model	Page Number	Belt Drive	Ball Screw	Tubular Servo Motor	Glider Bearing	Steel/Polyamide Roller Wheel	Square Rail	<5	5-10	10-30	31-99	>100	Max Travel – mm	AXIAL FORCE	Profile Width – mm	Max Speed – mm/sec
ELECTRIC CYLINDERS	ETH032	#		•		•					•			1000	3700 (831)	46.5	1067
ELECTRIC CYLINDERS	ETH050	#		•		•					•			1200	9300 (2099)	63.5	1333
ELECTRIC CYLINDERS	ETH080	#		•		•					•			1600	25100 (5640)	95	1707
ELECTRIC CYLINDERS	ETH100	#		•		•					•			2000	56000 (12584)	120	800
ELECTRIC CYLINDERS	ETH125	#		•		•					•			2000	114000 (25618)	150	833

Electromechanical Automation Products & Technologies

This catalog is divided into several sections based on primary distinguishing characteristics, such as drive technology, degree of precision, travel range, and acceleration. See the Product Selection Information on the following pages for more information.

If you don't find what you are looking for, please contact us for information on other suitable Parker products.

Visit our Website

Complete up-to-date technical assistance can be found on the web at **parker.com/emn**. This includes all the latest information on current products, new product introductions, local assistance and support, plus a comprehensive "Engineering Reference Library."

- **Complete Product Catalog**
- **Product Selection Wizards**
- **Performance Charts and Graphs**
- **Engineering Data and Calculations**
- **CAD Drawings**
- **Local Service and Support Directory**
- **On-Line Purchasing**
- **Application stories and videos**

Screw Driven Tables

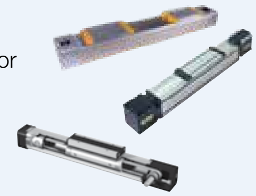
Drive Mechanisms
- Ground Ballscrew
- Ground Leadscrew
- Rolled Ballscrew
- Worm Gear

Bearing Systems
- Square Rail
- Round Rail
- Linear Ball & Rod
- Cross Roller

Belt Driven Tables

Drive Mechanisms
- Timing Belt
- Linear Servo Motor
- Rack-and-Pinion

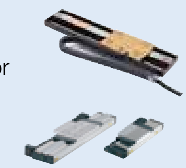
Bearing Systems
- Polyamide Wheel
- Steel Wheel
- Square Rail



Linear Motor Driven Tables

Drive Mechanisms
- Linear Servo Motor
- Direct Drive Rotary Motor

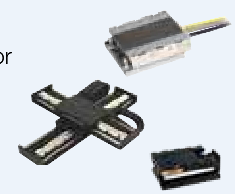
Bearing Systems
- Square Rail



Miniature Positioners

Drive Mechanisms
- Linear Servo Motor
- Ground Ballscrew
- Rolled Leadscrew

Bearing Systems
- Square Rail
- Cross Roller



Electric Cylinders

Drive Mechanisms
- Ground Ballscrew
- Roller Screw
- Tubular Servo

Bearing Systems
- Glider Bearing

Rotary Tables

Drive Mechanisms
- Worm Gear
- Direct Drive Servo

Bearing Systems
- Cross Roller
- Radial Ball

Complete Solutions

Complete Solutions
- Gearheads and Gearmotors
- Rotary & Linear Motors
- Drives & Drive/Controllers
- Motion & Machine Controllers
- Visualization & HMI

Technical Reference

Engineering Reference
- Overview & Motion Control Components
- Calculations
- Glossary

Screw-Driven Positioners

Parker high-precision screw driven tables are divided into families (or groups) which are distinguished by the primary bearing style and precision. All tables are offered with several drive mechanism options and are designed for direct connection to standard frame size stepper or servo motors. Parker offers the most comprehensive array of products in the industry and advanced product development. Screw-driven products integrate seamlessly with other Parker components including servo motors, motor drives, controls, interfaces, actuators, pneumatics, and structural components. Products are available with modular construction from standard catalog tables or custom systems designed and built to specification for any application.

Parker Screw-Driven Industrial Systems

- **Easy, multi-axis connectivity**
- **Submicron precision**
- **Velocities up to 1.5 meters/second**
- **Cleanroom and vacuum compatible**
- **Thorough testing and certification**

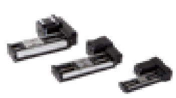
XR Series Precision Screw-Driven Positioners

The XR product family offers consistent accuracy, reliable performance, high strength, and unmatched versatility.
Page 22.

HMR High Moment Rodless Series Industrial Screw Driven Positioners

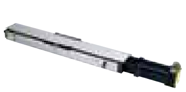
The user-friendly and versatile HMR has enormous moment and payload capacity bundled in a low-profile, yet sleek package. The HMRS is powerful and precise.
Page 56.

XE Series Economy Screw-Driven Positioners



Rugged steel body construction, integrated precision ballscrew, and bearing guide in a highly accurate, cost-effective line of positioners.
Page 91.

404XE Series Screw-Driven Positioners



The 404XE positioners combine versatility with rugged construction in a compact motion platform that is ideal for 24/7 process automation.
Page 107.

OSPE-SB and OSPE-ST Medium-Capacity Screw Driven Positioners

The OSPE offers reliability, performance, easy handling, and optimized design flexibility. Ballscrew for precise positioning and Trapezoidal Screw for zero backdrive.
Page 118

LCR Series Light-Capacity Screw Driven Positioners

The LCR Series is a completely pre-engineered, pre-tested, ready-to-use positioner solution for unmatched, easy-to- use flexibility.
Page 142.

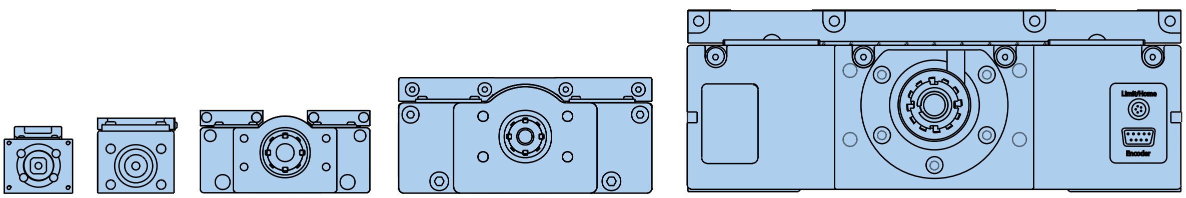
The 400XR Series

Screw Driven Positioners for Precision, High Force Applications

- Pre-engineered package
- Performance matched components
- Environmental protection
- Laser certified precision

Typical Enhancements

- **Limit/home position sensors**
- **Linear encoder feedback**
- **Cleanroom preparation**
- **Multi-axis brackets & adapters**
- **Numerous selectable motor mounts**
- **Servo motors and drives**
- **Programmable controls**
- **Cable management system**



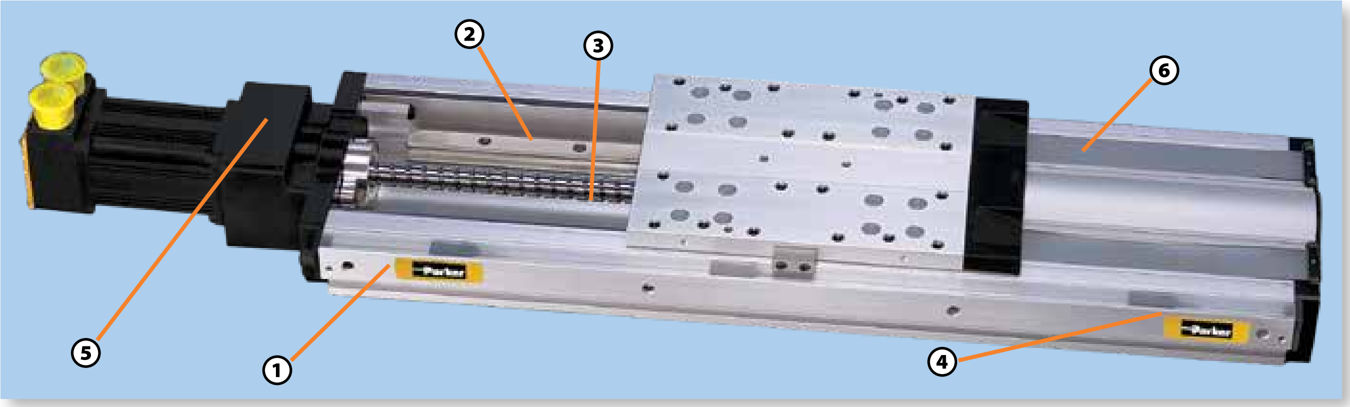
401XR **402XR** **404XR** **406XR** **412XR**

	401XR	402XR	404XR	406XR	412XR
Maximum Travel (mm)	300	600	600	2000	2000
Maximum Payload (N)	50	100	170	630	1470
Maximum Acceleration (m/sec^2)	20	20	20	20	20

The **400XR** precision linear positioner family has achieved global recognition for consistent accuracy, reliable performance, high strength, and unmatched versatility. The XRs have excelled in industries such as life sciences, fiber optics and instrumentation, where the highest degree of precision is required.

And yet, because of the rugged construction, strength, and sealed design, these units have been used extensively for industrial automation applications such as packaging, automotive, and more.

The XR family offers an unrivaled array of features and options which are easily matched to fit any application, from the very basic to the highly complex. Premier performance, modular compatibility, and quick delivery have made these tables the perfect building blocks for precision multi-axis systems.



① **High Strength Aluminum Body**
Extruded aluminum housing is precision machined to provide outstanding straightness and flatness.

② **Square Rail Linear Bearing**
These tables are equipped with square rail carriage support bearings which provide high load carrying capabilities, smooth precise motion and dependable performance.

③ **High Efficiency Ballscrew Drive**
Precision ground, or rolled ballscrew drive (5, 10, 20, 25, 32 mm lead) offers high throughput, efficiency, accuracy and repeatability.

④ **Limit/Home Sensors**
Proximity sensors establish “end of travel” and “home” location and are easily adjustable over entire length to restrict the travel envelope.

⑤ **Motor Mounts**
A large selection of servo and stepper motor sizes plus selectable mounting configurations (in-line, parallel) permit **hundreds** of motor mounting possibilities.

⑥ **IP30 Rated Strip Seals**
An anodized aluminum cover combined with stainless steel strip seals provide IP30 protection to interior components and enhance the overall appearance.

Cleanroom Preparation

Class 10 cleanroom preparation is a standard option for the 400XR series. For detailed technical information on cleanroom preparation, contact Parker’s Application Engineering Department at **1.800.245.6903**

Encoders

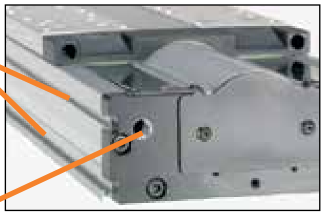
The linear encoder option offers direct positional feedback of the carriage location. The rotary shaft encoder couples directly to the drive shaft to nullify any incurred mechanical error (particularly useful with the parallel motor mount). Not shown.

Shaft Brake

The electromagnetic shaft brake option couples directly to the drive screw and is employed primarily on vertical axes to halt carriage motion during a power loss. Not shown.

Convenient Mounting Slots

Continuous T-slots along the side of the table body provide a convenient means of mounting the table to a work surface as well as mounting accessories to the table.



Positive Pressure Port

A standard port (1/8 NPT) for pressurizing the interior to prevent particle intrusion. (Standard on 404XR, 406XR, 412XR units.)

Easy Lube System

A standard option on some models, enables easy access for ballscrew and bearing lubrication.

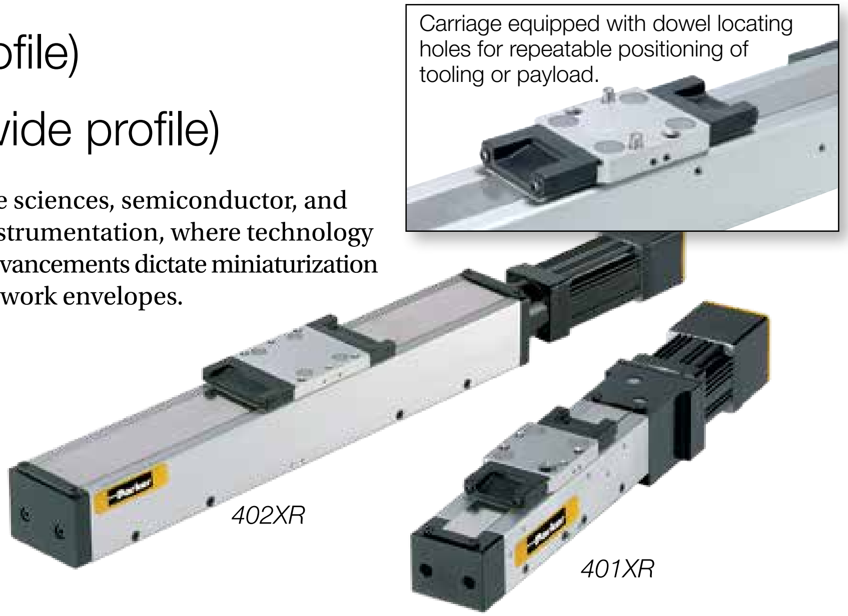
SPECIFICATIONS

401XR (41 mm wide profile)

402XR Series (58 mm wide profile)

The 401XR and 402XR Series positioners enhance the 400XR family of precision linear positioners, addressing applications which involve precise positioning of smaller payloads within a very small space envelope.

These ballscrew driven positioners were developed to address the needs of industries such as photonics, life sciences, semiconductor, and instrumentation, where technology advancements dictate miniaturization of work envelopes.



Carriage equipped with dowel locating holes for repeatable positioning of tooling or payload.

Common Specifications

		Precision*		Standard	
		401XR	402XR	401XR	402XR
Bidirectional Repeatability **2 mm lead** **5 or 10 mm lead**	µm	 ±1.3 ±1.3	 – ±1.3	 ±5 ±12	 – ±12
Duty Cycle	%	100	100	100	100
Maximum Acceleration	m/sec^2 (in/sec^2)	20 (773)	20 (773)	20 (773)	20 (773)
Normal Load Capacity (1)	kgf (lbs)	50 (110)	100 (220)	50 (110)	100 (220)
Axial Load Capacity (1) **2 mm lead** **5 or 10 mm lead**	kgf (lbs)	 5.5 (12.1) 15.5 (34.2)	 – 38 (84)	 5.5 (12.1) 15.5 (34.2)	 – 38 (84)
Drive Screw Efficiency	%	80	80	80	80
Maximum Breakaway Torque	Nm (in-oz)	0.03 (4.2)	0.086 (12.0)	0.03 (4.2)	0.086 (12.0)
Maximum Running Torque (2)	Nm (in-oz)	0.028 (4.0)	0.08 (11.3)	0.028 (4.0)	0.08 (11.3)
Linear Bearing Coefficient of Friction		0.01	0.01	0.01	0.01
Ballscrew Diameter **2 mm lead** **5 or 10 mm lead**	mm	 6 8	 – 12	 6 8	 – 12
Carriage Weight	kg (lbs)	0.045 (0.1)	0.11 (0.25)	0.045 (0.1)	0.11 (0.25)

* Requires linear encoder option E3 or E4. (1) Refer to life load charts found later in this section. (2) Ratings established at 2 rps.

Travel/Screw Lead Dependent Specifications

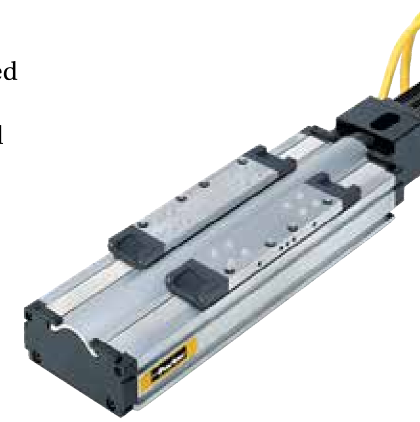
Travel (mm)	Positional Accuracy* (µm)				Straightness & Flatness		Input Inertia (10^{-5} kg-m^2)				Maximum Screw Speed (revs/sec)		Unit Weight (kg)	
	401XR		402XR				401XR		402XR					
	Precision	Standard	Precision	Standard	401XR	402XR	2 mm	10 mm	5 mm	10 mm	401XR	402XR	401XR	402XR
50	10	20	–	–	20	–	0.6	–	–	–	100	–	1.0	–
100	10	20	10	20	20	20	0.9	–	12.0	–	100	90	1.2	2.3
150	12	20	12	20	20	20	1.1	–	15.0	–	100	90	1.3	2.6
200	16	30	16	30	25	25	–	4.7	20.0	–	100	90	1.5	2.8
300	18	40	18	40	25	25	–	5.2	–	25.0	100	90	1.7	3.2
400	–	–	21	40	–	30	–	–	–	29.0	–	95	–	3.8
600	–	–	25	50	–	30	–	–	–	39.0	–	50	–	4.8

*Consult factory for higher accuracy capabilities via slope correction or stage mapping via laser interferometry.

404XR Series (95 mm wide profile)

The 404XR is a sleek compact positioner (47.3 x 95 mm profile) capable of carrying 170 kg loads up to a distance of 600 mm. Its quick and accurate positioning capability can be attributed to a high strength extruded housing, square rail ball bearing system, and precision ground ballscrew drive.

With its low profile design the 404XR is ideal for height restricted applications, and its lightweight construction makes it well suited as secondary axes on multi-axis systems. These units offer a wide array of easily adapted options and accessories which permit easy configuration to specific requirements.



Common Specifications

		Precision	Standard
Bidirectional Repeatability [5]			
Ballscrew	µm	±1.3	±3
Leadscrew		—	±12
Duty Cycle			
Ballscrew	%	100	100
Leadscrew		–	75
Maximum Acceleration	m/sec² (in/sec²)	20 (773)	20 (773)
Normal Load Capacity [1]	kgf (lbs)	170 (375)	170 (375)
Axial Load Capacity [2]			
Ballscrew	kgf (lbs)	90 (198)	90 (198)
Leadscrew		–	25 (55)
Drive Screw Efficiency	%		
Ballscrew - Inline Motor Mount		90	90
Ballscrew - Parallel Motor Wrap		N/A	81
Leadscrew - Inline Motor Mount		30	30
Leadscrew - Parallel Motor Wrap		N/A	27
Maximum Breakaway Torque	Nm (in-oz)	0.13 (18)	0.18 (26)
Maximum Running Torque [3]	Nm (in-oz)	0.11 (16)	0.17 (24)
Linear Bearing Coefficient of Friction		0.01	0.01
Screw Diameter			
Ballscrew	mm	16	16
Leadscrew		—	12.7
Carriage Weight	kg (lbs)	0.70 (1.55)	0.70 (1.55)

Parallel Motor Mount
(with limit/home sensor pack option)

(1) Refer to life load charts found later in this section.
(2) Axial load for parallel mount is limited by a maximum input torque of 2.5 Nm.
(3) Ratings established at 2 rps.
(4) Consult factory for higher accuracy capabilities via slope correction or stage mapping via laser interferometry.
(5) Consult factory for specifications with linear encoder.
(6) Consult factory for higher screw speeds.

Travel/Screw Lead Dependent Specifications

Travel (mm)	Positional Accuracy [4] [5] (µm) Ballscrew Precision	Ballscrew Standard	Leadscrew	Straightness & Flatness Ballscrew	Straightness & Flatness Leadscrew	Input Inertia (10^{-5} kg-m²) 5 mm	10 mm	20 mm	Max Screw Speed [6] (revs/sec) Ballscrew	Leadscrew	Unit Weight (kg)
50	8	12	20	6	8	1.68	1.81	2.34	60	25	2.8
100	8	12	20	6	8	1.93	2.07	2.60	60	25	3.0
150	10	14	30	9	12	2.19	2.32	2.85	60	25	3.3
200	12	20	40	10	16	2.44	2.57	3.11	60	25	3.6
250	12	22	50	12	16	2.69	2.83	3.36	60	25	3.9
300	14	24	60	13	18	2.95	3.08	3.61	60	25	4.2
350	14	26	70	15	23	3.20	3.33	3.87	60	25	4.5
400	16	26	80	16	27	3.46	3.59	4.12	60	25	4.8
450	19	28	90	18	30	3.71	3.84	4.37	60	25	5.1
500	21	34	100	19	30	3.96	4.10	4.63	60	20	5.4
550	23	36	110	21	30	4.22	4.35	4.88	60	20	5.7
600	25	40	112	22	30	4.47	4.60	5.14	54	20	6.0

406XR Series (150 mm wide profile)

The 406XR can position high loads (up to 630 kgf) over distances up to two meters. Because of its size and strength (270 Nm, 200 lb-ft moment load capacity) this durable table is ideal as the base unit in a multi-axis system.

From high resolution to high throughput, selectable ballscrew leads (5, 10, 20, 25 mm) make the desired resolution/velocity ratio easy to achieve, and stainless steel seal strips alleviate environmental concerns.

Parallel Motor Mount (with limit/ home sensor pack option)

Common Specifications

		Precision	Standard
Bidirectional Repeatability (5)	µm	±1.3	±3
Duty Cycle	%	100	100
Maximum Acceleration	m/sec² (in/sec²)	20 (773)	20 (773)
Normal Load Capacity (1)	kg (lbs)	630 (1390)	630 (1390)
Axial Load Capacity (2) 0 to 600 mm Travel 700 to 2000 mm Travel	kg (lbs)	90 (198) –	90 (198) 200 (440)
Drive Screw Efficiency	%	90	90
Maximum Breakaway Torque 0 to 600 mm Travel 700 to 2000 mm Travel	Nm (in-oz)	0.13 (18) –	0.18 (26) 0.39 (55)
Maximum Running Torque (3) 0 to 600 mm Travel 700 to 2000 mm Travel	Nm (in-oz)	0.11 (16) –	0.17 (24) 0.34 (48)
Linear Bearing Coefficient of Friction		0.01	0.01
Ballscrew Diameter 0 to 600 mm Travel 700 to 2000 mm Travel	mm	16 –	16 25
Carriage Weight	kg (lbs)	2.7 (5.94)	2.7 (5.94)

(1) Refer to life load charts found later in this section.
(2) Axial load for parallel mount is limited to: 140 lbs for the 5, 10 and 20 mm lead drives: 104 kg (230 lbs) for 25 mm lead drives
(3) Ratings established at 2 rps.
(4) Consult factory for higher accuracy capabilities via slope correction or stage mapping via laser interferometry.
(5) Consult factory for specifications with linear encoder.
(6) Consult factory for higher screw speeds.

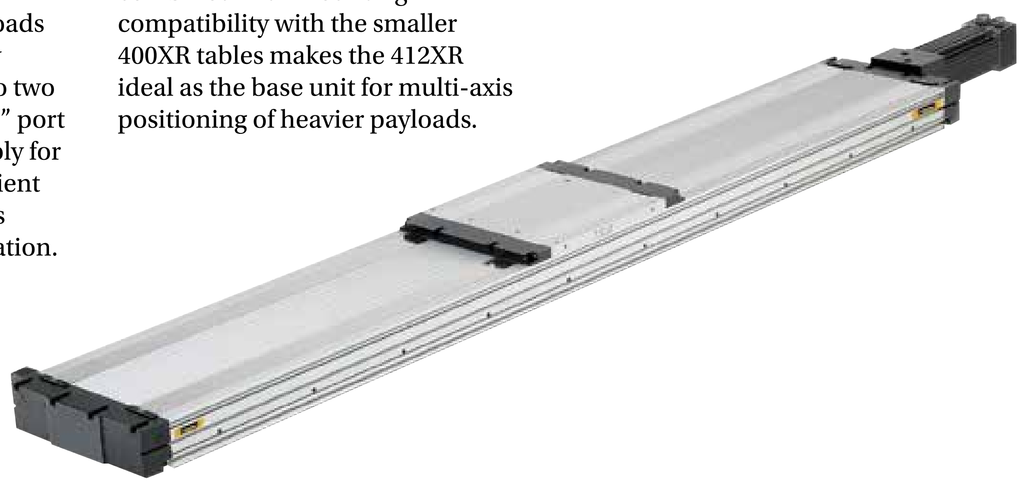
Travel/Screw Lead Dependent Specifications

Travel (mm)	Positional Accuracy (4) (5) (µm) Precision	Positional Accuracy (4) (5) (µm) Standard	Straightness & Flatness	Input Inertia (10^{-5} kg-m²) 5 mm	10 mm	20 mm	25 mm	Max Screw Speed (6) (revs/sec)	Unit Weight (kg)
100	8	12	6	3.34	3.85	5.90	–	60	8.7
200	12	20	10	3.92	4.43	6.48	–	60	10.0
300	14	24	13	4.50	5.01	7.06	–	60	11.3
400	16	26	16	5.08	5.59	7.64	–	60	12.6
500	21	34	19	5.65	6.17	8.22	–	55	13.9
600	25	40	22	6.23	6.75	8.80	–	44	15.2
700	–	92	25	36.51	37.02	–	40.61	47	19.2
800	–	94	29	39.96	40.47	–	44.07	47	20.7
900	–	103	32	43.41	43.93	–	47.52	47	22.2
1000	–	105	35	46.87	47.38	–	50.97	47	23.7
1250	–	118	42	55.50	56.01	–	59.61	35	27.6
1500	–	134	50	64.14	64.65	–	68.24	26	31.4
1750	–	154	57	72.77	73.28	–	76.88	20	35.2
2000	–	159	65	81.40	81.92	–	85.51	16	39.1

412XR Series (285 mm wide profile)

The 412XR is a rugged heavy duty linear table (285 mm x 105 mm profile) that enables massive loads (up to 1470 kgf) to be precisely positioned over distances up to two meters. Single point "easy lube" port is standard on carriage assembly for simple servicing and a convenient adapter plate (#100-6784-01) is available for easy X-Y configuration.

An unrivaled array of options combined with mounting compatibility with the smaller 400XR tables makes the 412XR ideal as the base unit for multi-axis positioning of heavier payloads.



Common Specifications

		Standard	
Screw Lead	mm	5, 10, 25	32
Bidirectional Repeatability (4)	µm	±5	±5
Duty Cycle	%	100	100
Maximum Acceleration	m/sec² (in/sec²)	20 (773)	20 (773)
Normal Load Capacity (1)	kg (lbs)	1470 (3241)	1470 (3241)
Axial Load Capacity	kg (lbs)	200 (441)	460 (1014)
Drive Screw Efficiency	%	90	80
Maximum Breakaway Torque	Nm (in-oz)	0.61 (86)	0.76 (108)
Maximum Running Torque (2)	Nm (in-oz)	0.55 (78)	0.69 (98)
Linear Bearing Coefficient of Friction		0.01	0.01
Ballscrew Diameter	mm	25	32
Carriage Weight	kg (lbs)	12 (27)	13 (28)

(1) Refer to life load charts found later in this section.
(2) Ratings established at 2 rps.
(3) Consult factory for higher accuracy capabilities via slope correction or stage mapping via laser interferometry.
(4) Consult factory for specifications with linear encoder.
(5) Consult factory for higher screw speeds.

Travel/Screw Lead Dependent Specifications

Travel (mm)	Positional Accuracy (3) (4) (µm)	Straightness & Flatness	Input Inertia (10⁻⁵ kg-m²)				Max Screw Speed (5) (revs/sec)		Unit Weight (kg)	
			5 mm	10 mm	25 mm	32 mm	5, 10, 25 mm	32 mm	5, 10, 25 mm	32 mm
150	64	9	27.20	29.45	46.76	98.20	47	42	39.6	41.5
250	66	12	30.21	32.46	49.78	106.28	47	42	42.9	45.0
350	71	15	33.23	35.48	52.79	114.37	47	42	46.2	48.5
650	91	24	42.27	44.52	61.83	138.63	47	42	56.1	59.0
800	94	29	46.79	49.04	66.35	150.76	47	42	61.0	64.2
1000	105	35	52.81	55.06	72.37	166.94	45	42	67.6	71.2
1250	118	42	58.84	61.09	78.40	183.11	34	41	74.2	78.2
1500	134	50	67.87	70.12	87.44	207.38	24	31	84.1	88.7
1750	154	57	75.41	77.66	94.97	227.59	18	24	92.4	97.5
2000	159	65	82.94	85.19	102.50	247.81	15	19	100.6	106.2

400XR Series Life/Load

The following performance information is provided as a supplement to the product specifications pages. The following graphs are used to establish the table life relative to the applied loads.

The useful life of a linear table at full catalog specifications is dependent on the forces acting upon it. These forces include both static components resulting from payload weight, and dynamic components due to acceleration/deceleration of the load. In multi-axes applications, the primary positioner at the bottom of the stack usually establishes the load limits for the combined axes. When determining life/load, it is critical to include the weight of all positioning elements that contribute to the load supported by the primary axis.

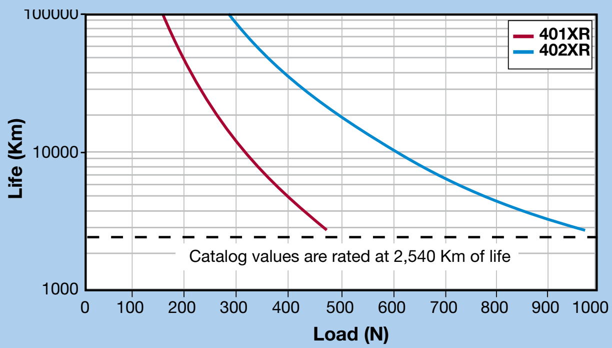
Catalog load specifications are rated for 100 million inches of travel or 2540 km.

For final evaluation of life vs load, including off center, tension, and side loads, refer to the charts and formulas found on our web site at **www.parker.com/emn/400XR**

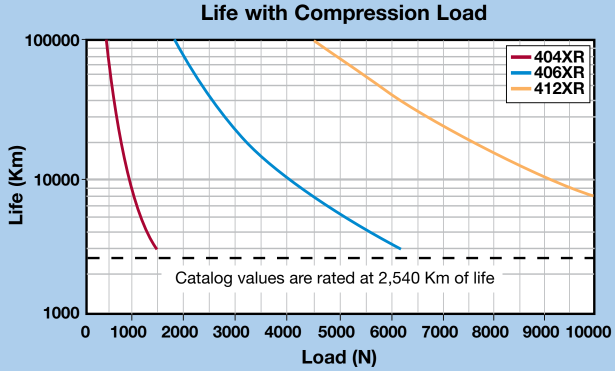
Normal Load (Compression)

These graphs provide a “rough cut” evaluation of the support bearing life/load characteristics. The curves show the life/load relationship when the applied load is centered on the carriage, normal (perpendicular) to the carriage mounting surface.

Life with Compression Load



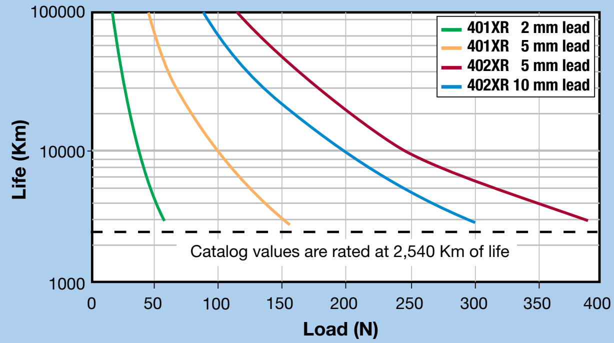
Life with Compression Load



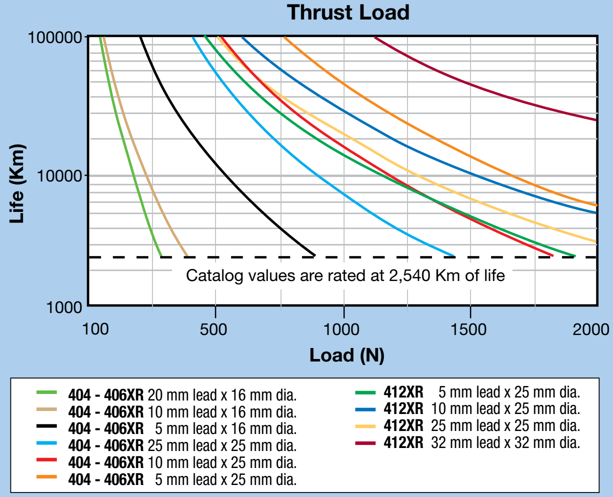
Axial Load (Thrust)

These graphs illustrate table ballscrew life relative to the axial load.

Thrust Load

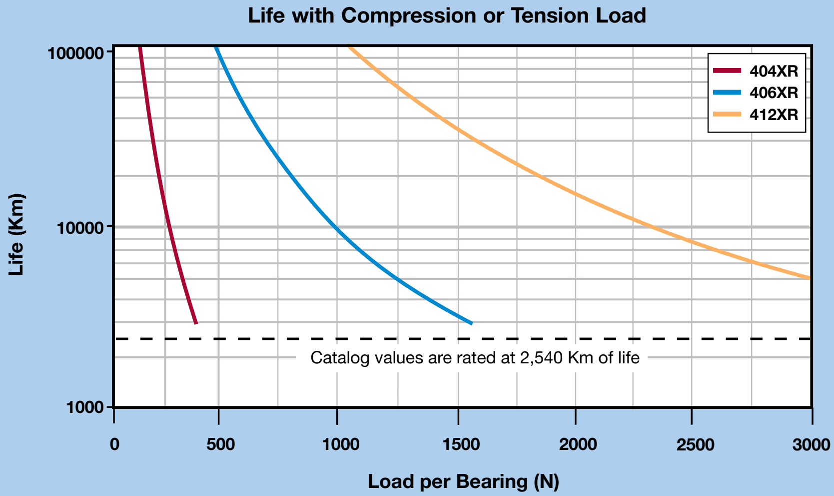


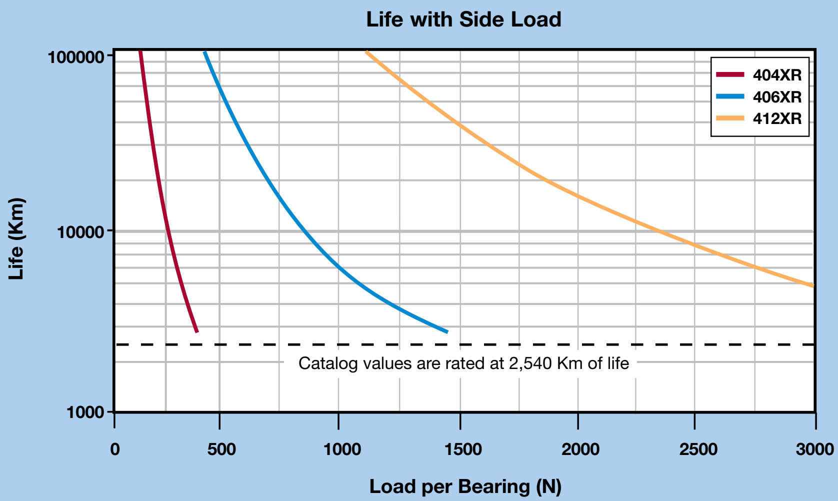
Thrust Load



400XR Series Bearing Life/Load*

Normal Load (Compression)





**For 401XR and 402XR moment loading capacities, please refer to the maintenance manual.*

These charts are to be used in conjunction with the corresponding formulas found in the product manuals to establish the life/load for each bearing (4 per table).

Several dimensions, which are specific to each linear positioning table model, and the load geometry are required for these computations. These dimensions are supplied in the catalog information for each positioner. The dimensions are referenced as follows:

d1 bearing block center-to-center longitudinal spacing
d2 bearing rail center-to-center lateral spacing
da Rail center-to-carriage mounting surface

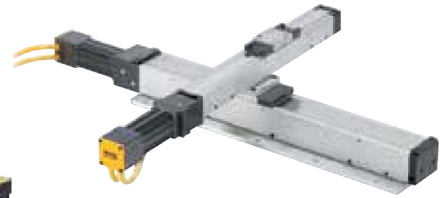
	d1	d2	da
404XR	80	57	28
406XR	114	90.3	42.5
412XR	205	192	43

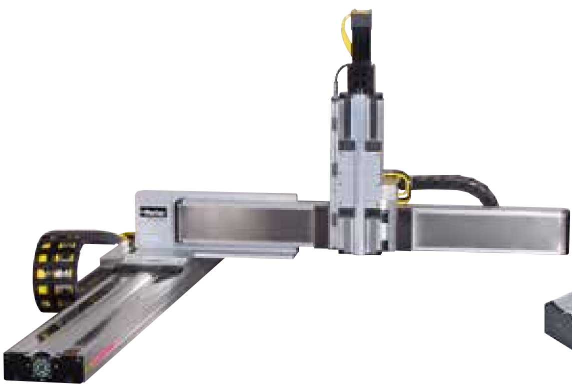
*Refer to Parker's website **www.parker.com/emn/400XR** for moment loading and other engineering data.*

CONFIGURATIONS

400XR Multi-Axis Cartesian Robot Configurations

Parker's XR Series can be designed into multi-axis systems that are the ideal solution for cost effective automation in life sciences, semiconductor, electronics, automated assembly, dispensing, and many other applications.





XR Mounting Plate Options

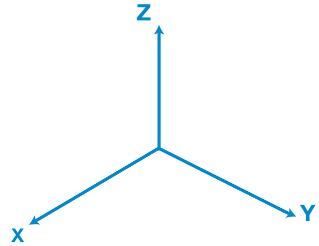
Second Axis (Y or Z)*

Base Axis (X) *	Orientation	401XR 50 mm	401XR >50 mm	402XR	404XR	404LXR	406XR	406LXR	412XR 412LXR	Wedge
401XR	X-Y	002-2126-01	002-2065-01	—	—	—	—	—	—	—
	X-Y Cartesian	002-2123-01	002-2068-01	—	—	—	—	—	—	—
	X-Z	—	101-0955-01	—	—	—	—	—	—	—
	X-Z Side Mount	002-2123-01	101-0955-01	—	—	—	—	—	—	—
402XR	X-Y	002-2130-01	002-2066-01	002-2066-01	—	—	—	—	—	—
	X-Y Cartesian	002-2069-01	002-2069-01	002-2069-01	—	—	—	—	—	—
	X-Z	—	002-2069-01	002-2069-01	—	—	—	—	—	—
	X-Z Side Mount	002-2125-01	002-2069-01	002-2069-01	—	—	—	—	—	—
404XR 404LXR	X-Y	100-9193-01	100-9193-01	100-9193-01	Direct Mount*	100-9584-01	—	—	—	100-9274-01
	X-Y Carriage to Carriage	—	—	—	100-3945-01	100-3945-01	—	—	—	—
	X-Y Cartesian Right Hand	002-2162-02	002-2162-02	002-2162-02	—	—	—	—	—	—
	X-Y Cartesian Left Hand	002-2162-02	002-2162-02	002-2162-02	—	—	—	—	—	—
	X-Z	—	—	—	002-1840-01	—	—	—	—	—
	X-Z Side Mount	—	—	—	002-1839-01	—	—	—	—	—
406XR 406LXR	X-Y	100-9194-01	100-9194-01	100-9194-01	Direct Mount*	Direct Mount*	Direct Mount*	Direct Mount*	—	100-9274-01
	X-Y Carriage to Carriage	—	—	—	100-4191-01	100-4191-01	100-4191-01	100-4191-01	—	—
	X-Y Cartesian	—	—	—	002-2163-01	002-2163-01	—	—	—	—
	X-Z	—	—	—	002-1823-01	—	002-1817-01	—	—	—
	X-Z Side Mount	—	—	—	002-1824-01	—	002-1818-01	—	—	—
412XR 412LXR	X-Y	—	—	—	Direct Mount* or Toe Clamp	Direct Mount* or Toe Clamp	Direct Mount* or Toe Clamp	Direct Mount* or Toe Clamp	100-6784-01	—
	X-Y Cartesian	—	—	—	—	—	002-2164-01	002-2164-01	—	—
ZP 200 Wedge	X-Y	—	—	—	100-9274-01	100-9274-01 or Toe Clamp	100-9274-01 or Toe Clamp	100-9274-01	—	—

* An adapter plate (100-3945-01) is required whenever the X-axis is a parallel motor mount model.
If the Y-axis is 404XR with 50 mm stroke, a special plate or toe clamp option is required.

400XR Multi Axis Configurations

These diagrams show the most popular variations of multi-axis configurations. Both standard and custom brackets are available. Standard X-Y orientation will place the X axis motor at the 6 o'clock position and the Y axis motor at the 3 o'clock position.



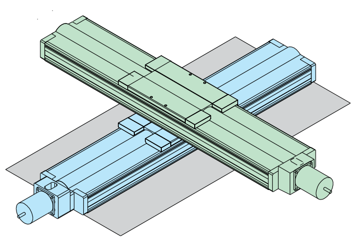


Figure 1
Two Axis (X-Y) Horizontal Mounting

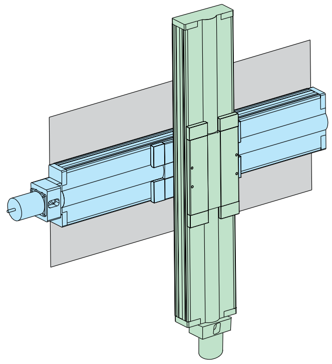


Figure 2
Two Axis (X-Z) Vertical Mounting

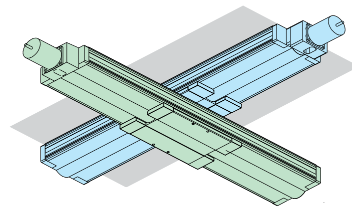


Figure 3
Two Axis (X-Y) Inverted Mounting

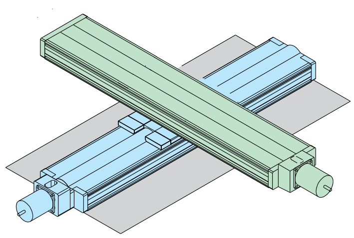


Figure 4
Two Axis-Carriage to Carriage (Y Axis Inverted)

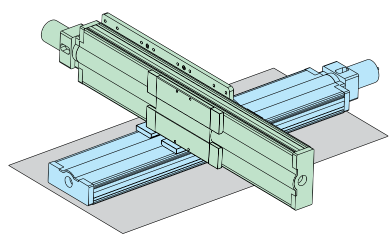


Figure 5
Two Axis (X-Y) Cartesian Horizontal Mounting

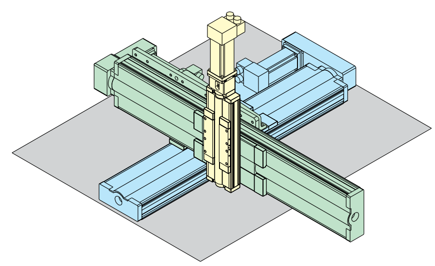


Figure 6
Three Axis (X-Y-Z) Cartesian Horizontal Mounting

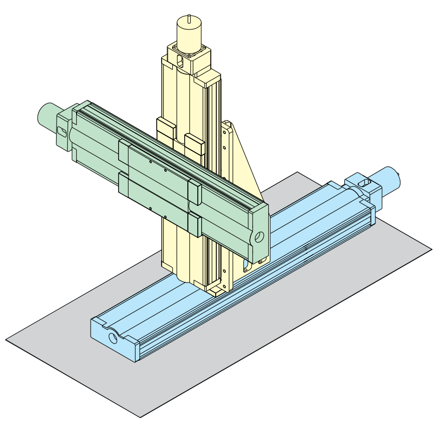


Figure 7
Three Axis (X-Z-Y) Horizontal Mounting

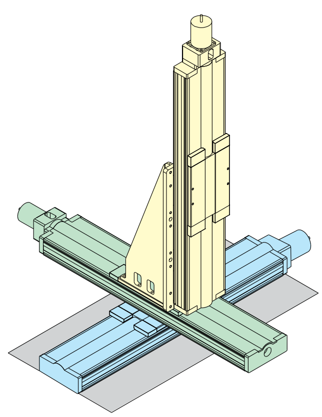


Figure 8
Three Axis (X-Y-Z) Horizontal Mounting

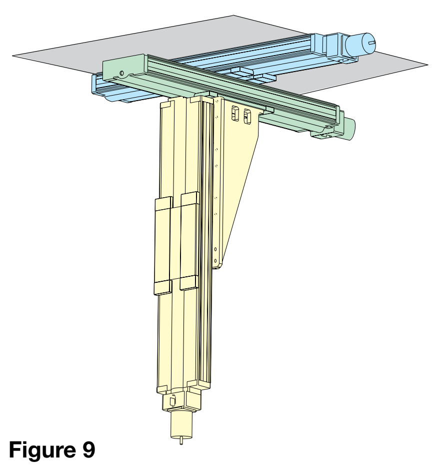
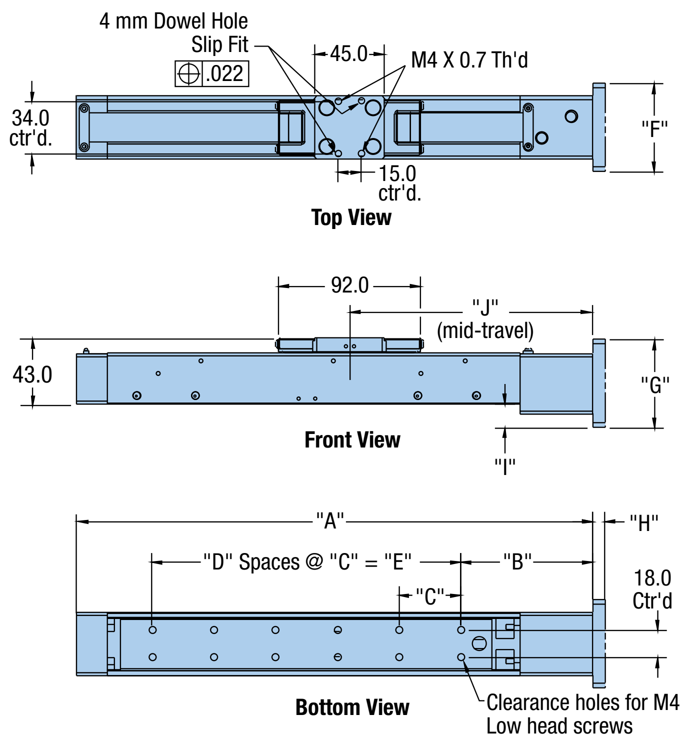


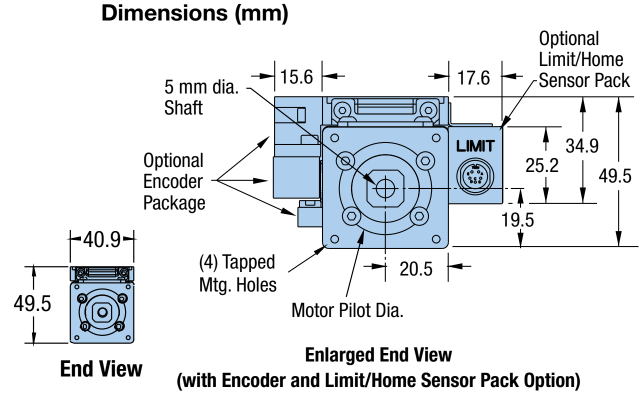
Figure 9
Three Axis (X-Y-Z) Inverted Mounting

DIMENSIONS

Download 2D & 3D files from www.parker.com/emn/401XR

401XR Dimensions



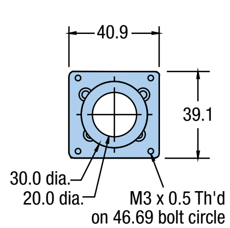


Model	Travel (mm)	Dimensions (mm) A	B	C	D	E	J
401050XR	50	209.3	82.8	80.0	1	80.0	123.0
401100XR	100	284.3	80.3	40.0	4	160.0	160.0
401150XR	150	334.3	85.3	40.0	5	200.0	185.0
401200XR	200	384.3	90.3	40.0	6	240.0	210.0
401300XR	300	509.3	92.8	40.0	9	360.0	260.0

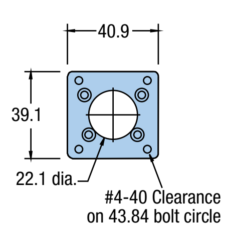
Motor Size	Order Code	Dimensions (mm) F	G	H	I
SM 16	M2	40.9	39.1	–	6.5
NEMA 23/SM 23	M3	57.2	57.2	4.0	15.6
NEMA 17	M37	40.9	39.1	–	6.5
BE 23	M61	57.2	57.2	8.0	15.6

In-Line Motor Adapters

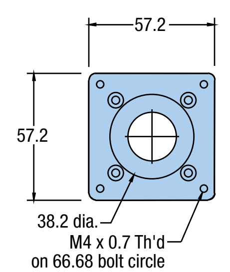
Used to easily accommodate the mounting of different servo or stepper motors.



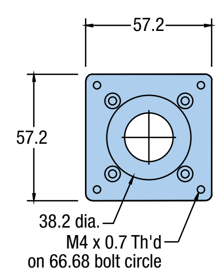
SM 16



NEMA 17



SM 23 or NEMA 23



BE 23

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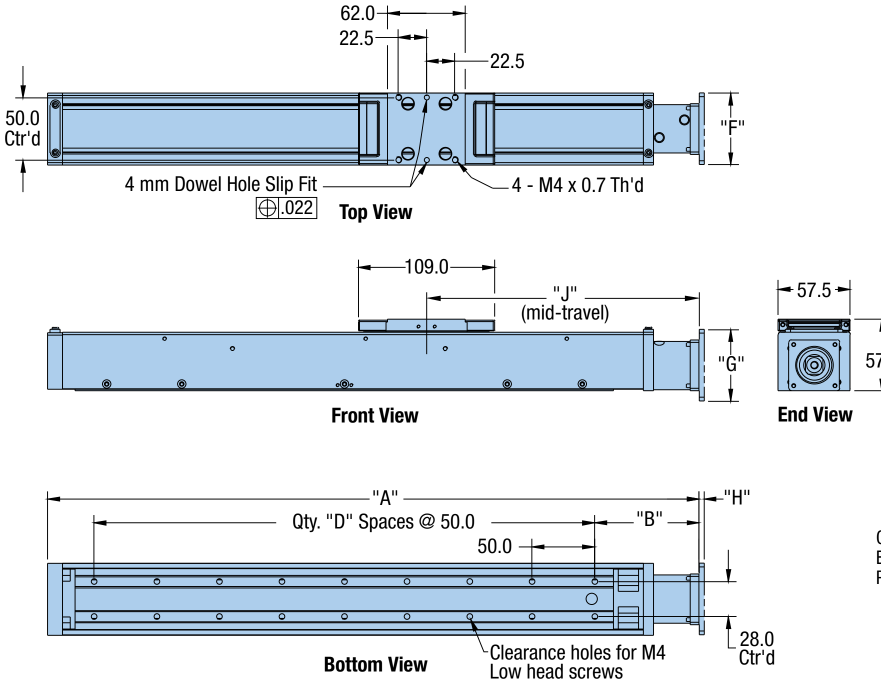
Virtual Engineer

402XR Dimensions

Download 2D & 3D files from www.parker.com/emn/402XR



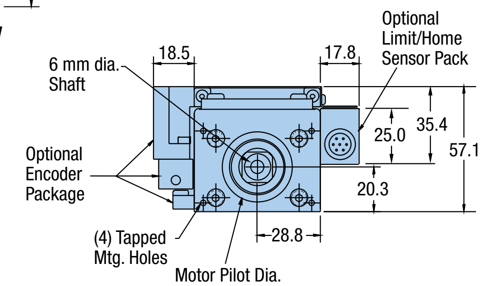
Top View

Front View

End View

Bottom View

Dimensions (mm)



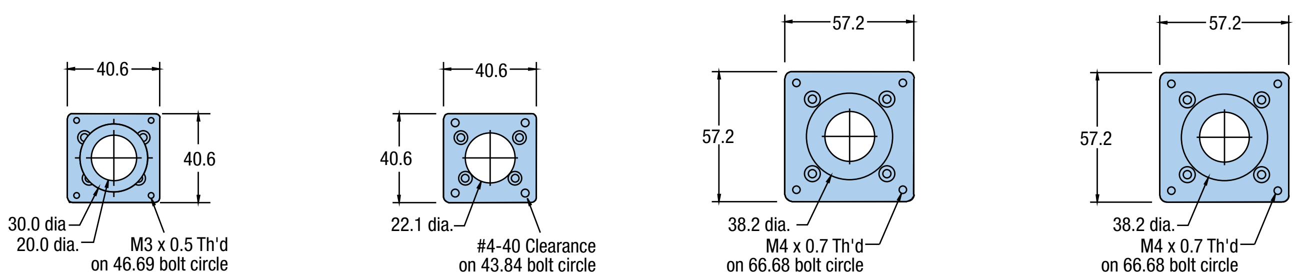
Enlarged End View (with Encoder and Limit/Home Sensor Pack Option)

Model	Travel (mm)	Dimensions (mm) A	B	D	J
402100XR	100	320.5	83.5	4	184.0
402150XR	150	370.5	83.5	5	214.0
402200XR	200	420.5	83.5	6	234.0
402300XR	300	520.5	83.5	8	284.0
402400XR	400	620.5	83.5	10	334.0
402600XR	600	820.5	83.5	14	434.0

Motor Size	Order Code	Dimensions (mm) F	G	H
SM 16	M2	40.6	40.6	–
NEMA 23/SM 23	M3	57.2	57.2	4.0
NEMA 17	M37	40.6	40.6	–
BE 23	M61	57.2	57.2	8.0

In-Line Motor Adapters

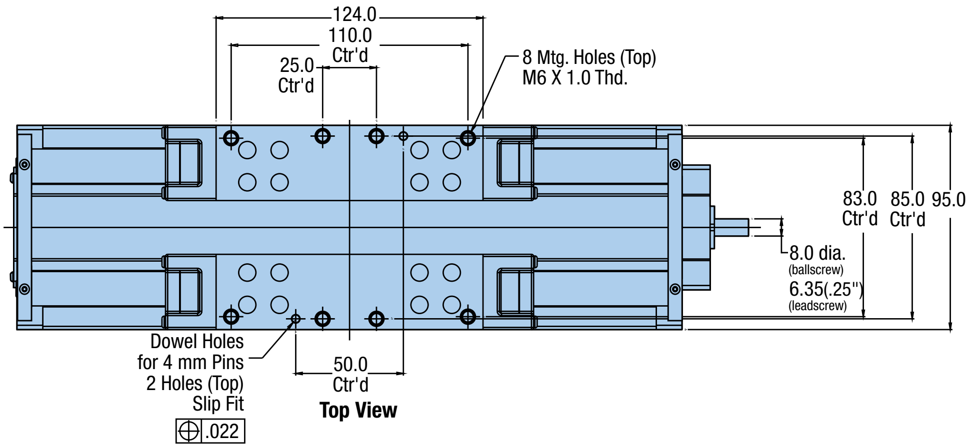
Used to easily accommodate the mounting of different servo or stepper motors.



SM 16 **NEMA 17** **SM 23 or NEMA 23** **BE 23**

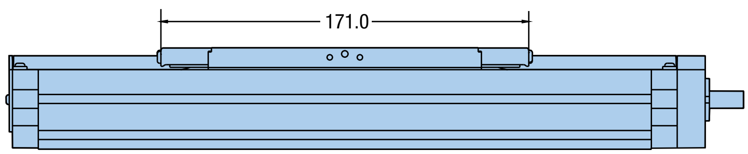
Download 2D & 3D files from
www.parker.com/emn/404XR

404XR Dimensions

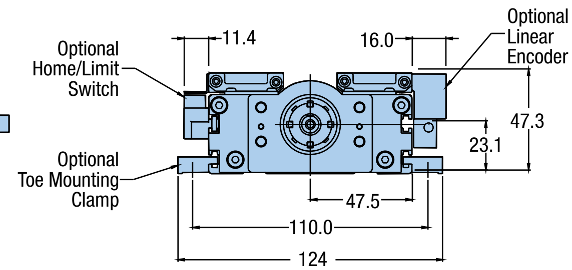


Top View

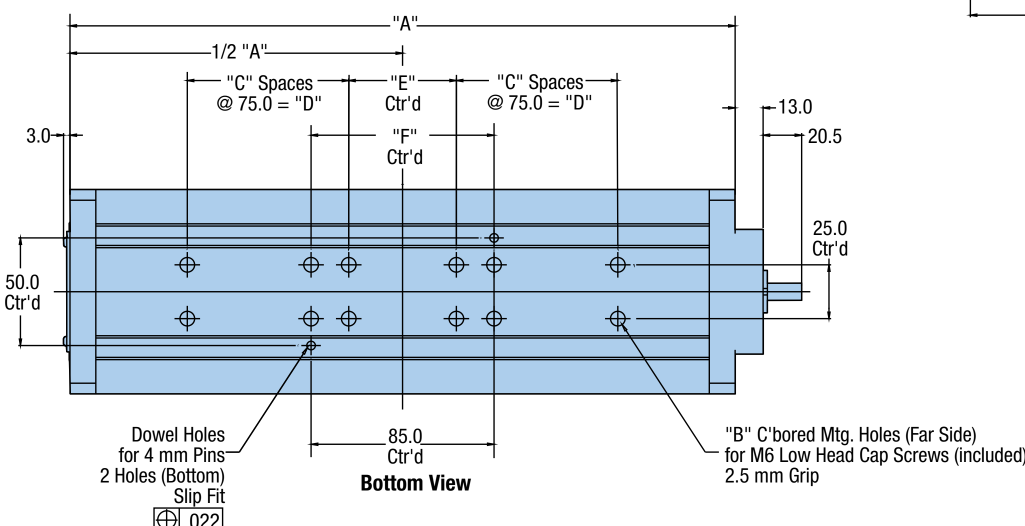
Dimensions (mm)



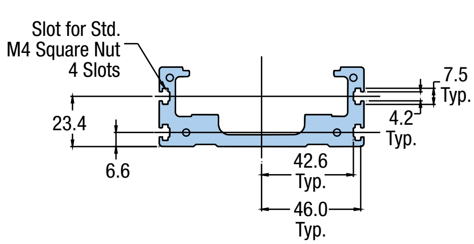
Front View



End View



Bottom View



View showing slots in extruded base

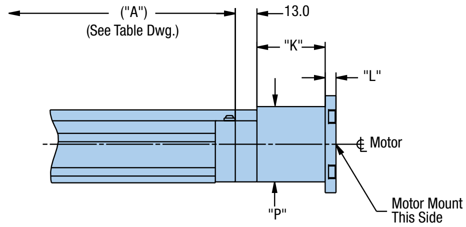
Model	Travel (mm)	Dimensions (mm) A	B	C	D	E	F
404050XR	50	259	4	–	–	–	–
404100XR	100	309	12	1	75.0	50.0	85.0
404150XR	150	359	12	1	75.0	50.0	85.0
404200XR	200	409	12	1	75.0	50.0	85.0
404250XR	250	459	16	2	150.0	50.0	85.0
404300XR	300	509	16	2	150.0	50.0	85.0
404350XR	350	559	16	2	150.0	50.0	85.0
404400XR	400	609	20	3	225.0	50.0	85.0
404450XR	450	659	20	3	225.0	50.0	85.0
404500XR	500	709	20	3	225.0	50.0	85.0
404550XR	550	759	24	4	300.0	50.0	85.0
404600XR	600	809	24	4	300.0	50.0	85.0

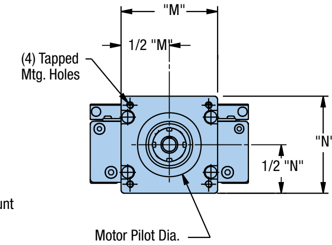
404XR Standard In-Line Motor Mounting

In-line motor mounting allows the motor to be mounted directly to the drive screw via the selected motor coupling.

Used to easily accommodate the mounting of different frame sizes. These adapter plates can be ordered separately by part number below.

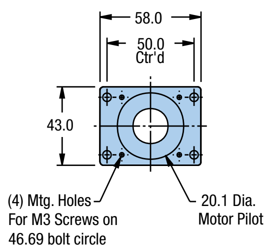
Dimensions (mm)



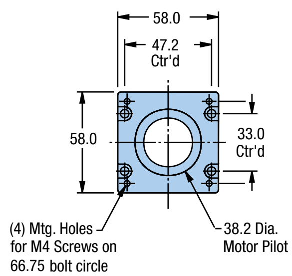


Dimensions (mm)

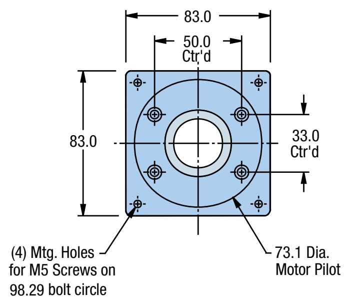
Motor Size	Order Code	Max. Motor Shaft Ø	K	L	M	N	P
SM 16	M2	9.5	41.0	4.3	58.0	43.0	42.7
NEMA 23	M3	9.5	41.0	6.5	58.0	58.0	42.7
NEMA 34	M4	9.5	41.0	12.5	83.0	83.0	42.7
NEO 70	M21	11.0	55.0	–	69.9	69.9	69.9



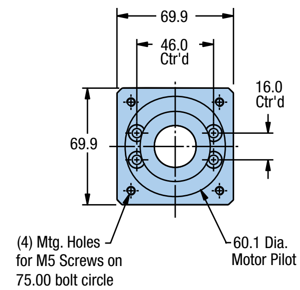
SM 16



NEMA 23



NEMA 34



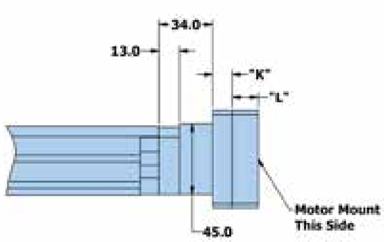
NEOMETRIC 70/SMN060

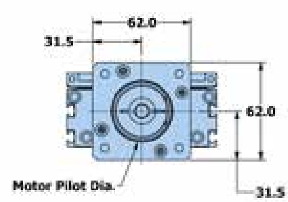
404XR Universal Motor Mounting

The new Universal Motor Adapter (UMA) makes adapting 3rd party motors to the 404XR easier than ever. The Universal Motor Adaptor option allow for the coupling of motor frame sizes from 62 mm on down, accommodating motor shaft diameters up to 16 mm. To determine if a 404XR has a mount to your preferred motor please visit **www.parker.com/emn/404XR**, and launch the online eConfigurator (note that these adapter kits establish fit to the actuator only, proper actuator sizing should still be conducted to ensure application performance).

Coupling Style	"K"
Oldham	12.5
Bellows	12.5

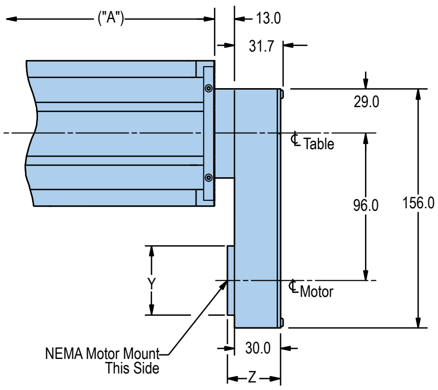
Motor Shaft Length	"L"
16 – 35	16.5
35.1 – 41	22.5





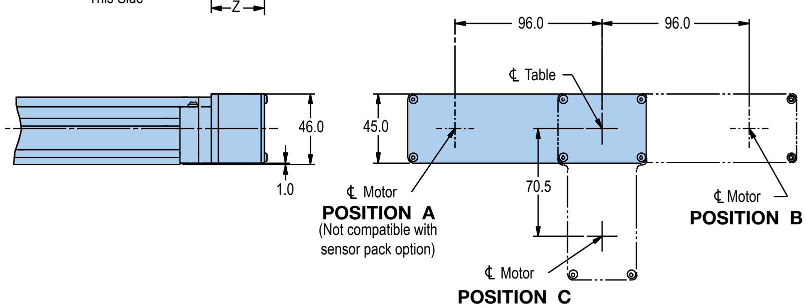
404XR Parallel Motor Mounting

Parallel motor mounting is employed whenever a shorter overall unit length is needed. The motor is positioned along the sides or bottom of the table as designated by position A, B, or C. (No coupling required.)

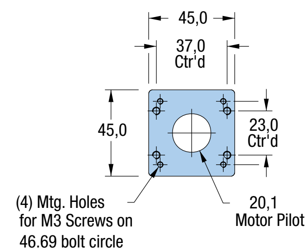


Dimensions

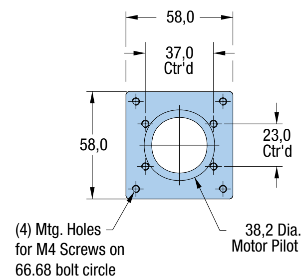
Motor Size	Y (mm)	Z (mm)	Motor Shaft Ø
SM 16	45.0	34.5	0.250”
SM 23/BE 23	58.0	34.5	0.375”
NEMA 23	58.0	34.5	0.250”



SM 16



NEMA 23



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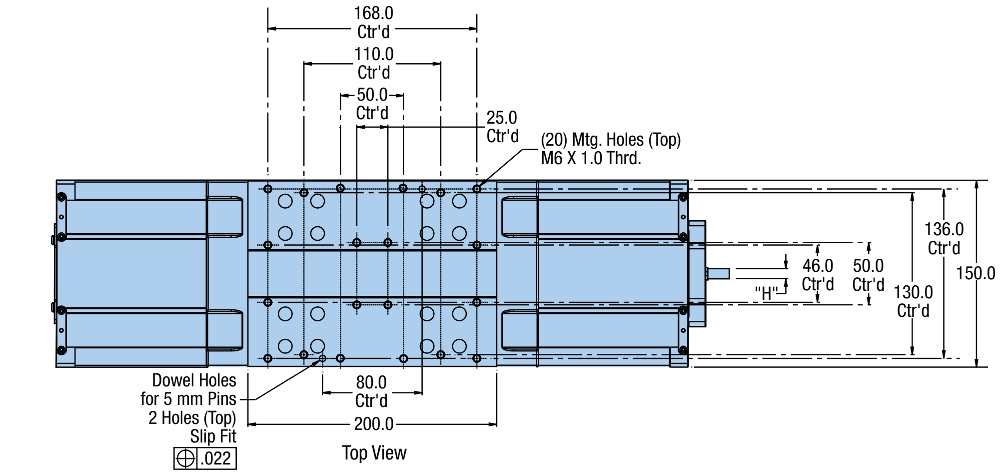
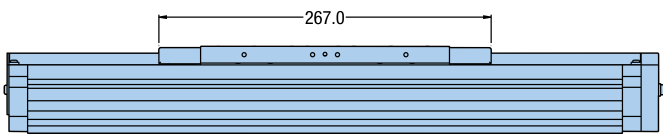
www.parker.com/emn/406XR

406XR Dimensions

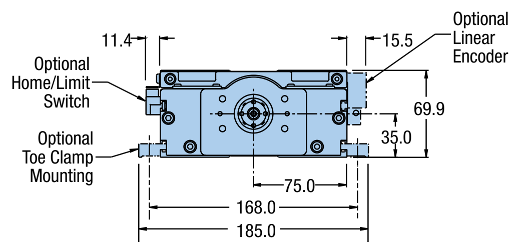


Top View

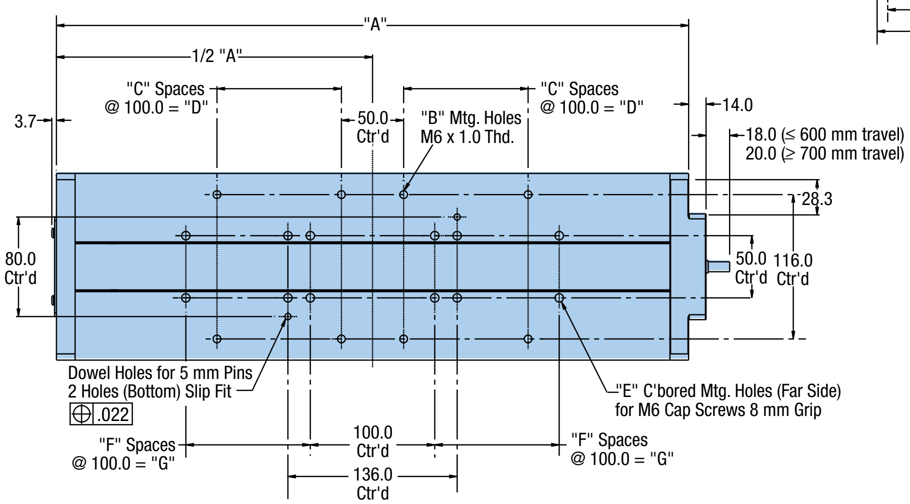
Dimensions (mm)



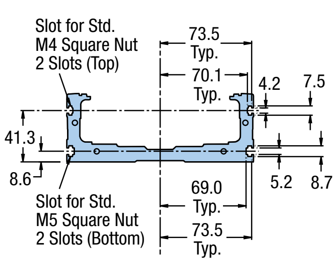
Front View



End View



Bottom View



View of Slots in Extrusion

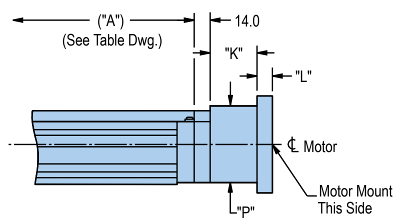
Model	Travel (mm)	Ballscrew Ø	A	B	C	D	E	F	G	H
			Dimensions (mm)							
4060100XR	100	16	408	8	1	100.0	12	1	100.0	8.0
4060200XR	200	16	508	8	1	100.0	12	1	100.0	8.0
4060300XR	300	16	608	12	2	200.0	16	2	200.0	8.0
4060400XR	400	16	708	12	2	200.0	16	2	200.0	8.0
4060500XR	500	16	808	16	3	300.0	20	3	300.0	8.0
4060600XR	600	16	908	16	3	300.0	20	3	300.0	8.0
4060700XR	700	25	1008	20	4	400.0	24	4	400.0	10.0
4060800XR	800	25	1108	20	4	400.0	24	4	400.0	10.0
4060900XR	900	25	1208	24	5	500.0	28	5	500.0	10.0
4061000XR	1000	25	1308	24	5	500.0	28	5	500.0	10.0
4061250XR	1250	25	1558	32	7	700.0	32	6	600.0	10.0
4061500XR	1500	25	1808	36	8	800.0	40	8	800.0	10.0
4061750XR	1750	25	2058	40	9	900.0	44	9	900.0	10.0
4062000XR	2050	25	2308	44	10	1000.0	48	10	1000.0	10.0

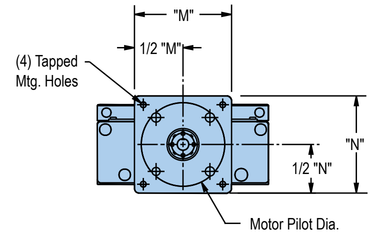
406XR In-Line Motor Mounting

In-line motor mounting allows the motor to be mounted directly to the drive screw via the selected motor coupling.

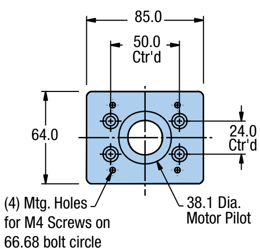
Used to easily accommodate the mounting of different frame sizes. These adapter plates can be ordered separately by part number below.

Dimensions (mm)

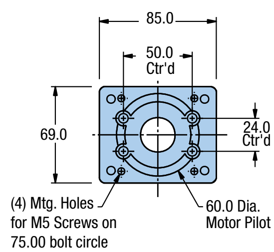




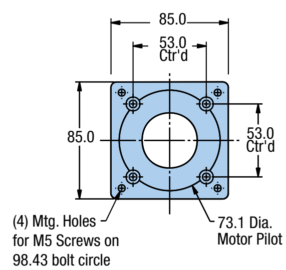
Motor Size	Order Code	Max. Motor Shaft Ø	K	L	M	N	P
			Dimensions (mm)				
MPP092	M90	16.0	53.0	12.5	92.0	92.0	69.0
NEMA 23/SM 23	M3	9.5	41.0	–	85.0	64.0	64.0
NEMA 34	M4	16.0	53.0	13.5	85.0	85.0	69.0
NEO 34	M17	16.0	53.0	13.5	85.0	85.0	69.0
NEO 70	M21	16.0	53.0	–	85.0	69.0	69.0
NEO 92	M29	16.0	53.0	12.5	92.0	92.0	69.0



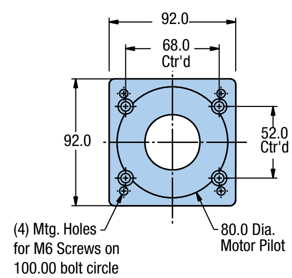
NEMA 23 or SM 23



NEO 70 / SMN060



NEMA 34 or NEO 34



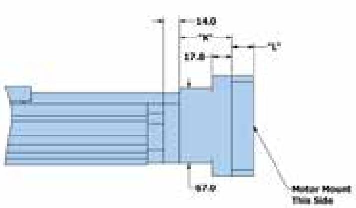
MPP092

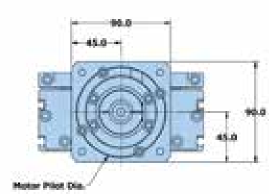
406XR Universal Motor Mounting

The new Universal Motor Adapter (UMA) makes adapting 3rd party motors to the 406XR easier than ever. The Universal Motor Adaptor option allow for the coupling of motor frame sizes from 90 mm on down, accommodating motor shaft diameters up to 20.5 mm. To determine if a 406XR has a mount to your preferred motor please visit **www.parker.com/emn/406XR,** and launch the online eConfigurator (note that these adapter kits establish fit to the actuator only, proper actuator sizing should still be conducted to ensure application performance).

Coupling Style	"K"
Oldham	35.8
Bellows	47.8

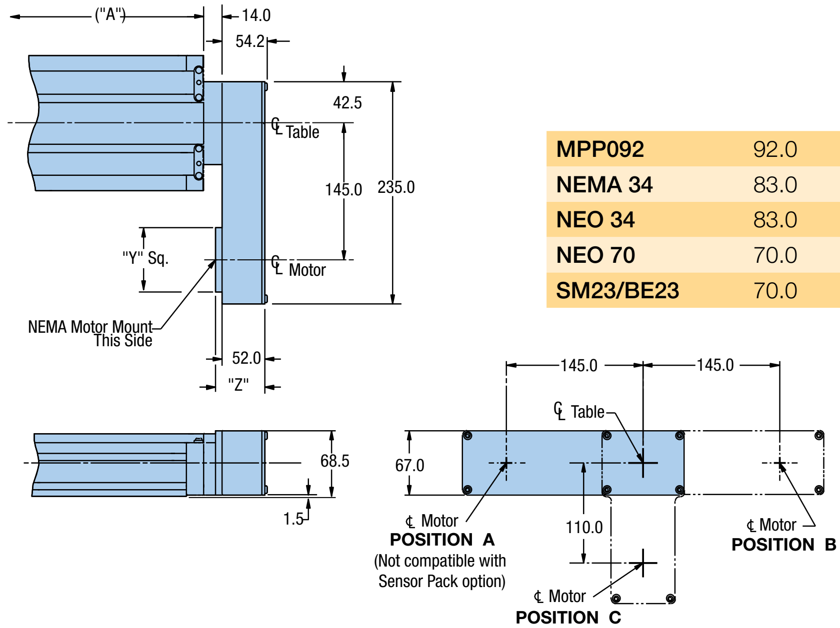
Motor Shaft Length	"L"
20 – 40	20.0
40.1 – 28.5	28.5





406XR Parallel Motor Mounting

Parallel motor mounting is employed whenever a shorter overall unit length is needed. The motor is positioned along the sides or bottom of the table as designated by position A, B, or C. (No coupling required.)



MPP092	92.0	65.7	16.0 mm
NEMA 34	83.0	62.0	0.375”
NEO 34	83.0	62.0	0.500”
NEO 70	70.0	60.0	11.0 mm
SM23/BE23	70.0	57.5	0.375”

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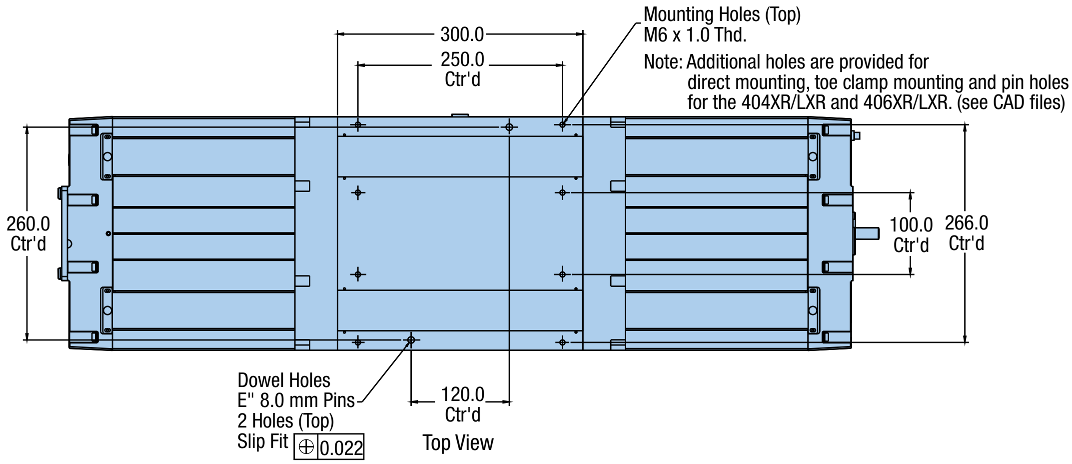
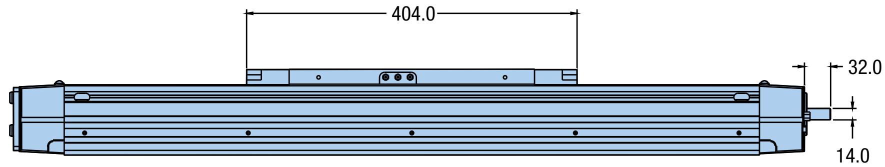
www.parker.com/emn/412XR

412XR Dimensions

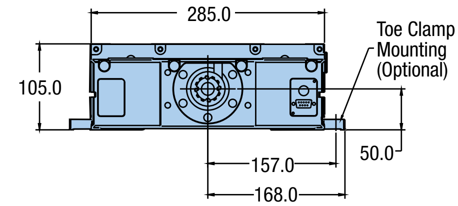


Top View

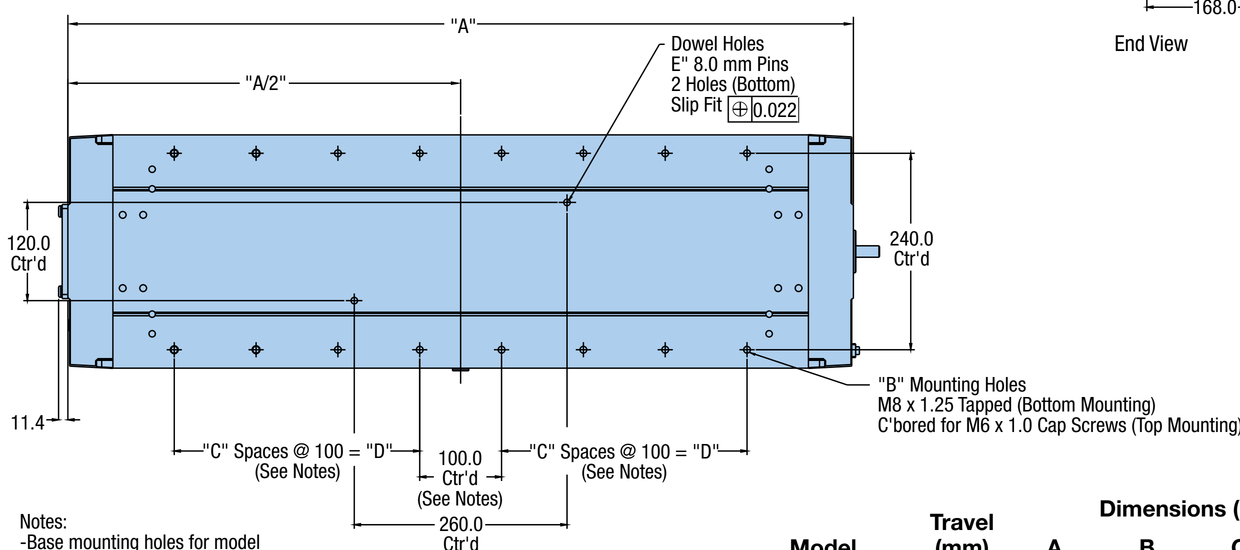
Dimensions (mm)



Front View



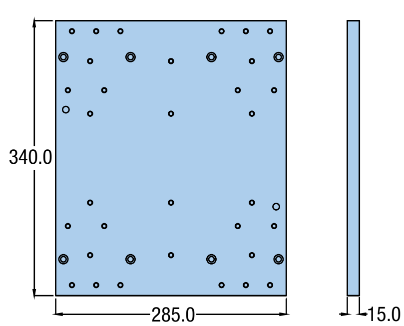
End View



Bottom View

Notes:
-Base mounting holes for model 412T10 and 412T12 are patterned from one hole on centerline

Model	Travel (mm)	Dimensions (mm) A	B	C	D
412T01	150	764	12	2	200
412T02	250	864	16	3	300
412T03	350	964	16	3	300
412T04	650	1264	24	5	500
412T05	800	1414	24	5	500
412T06	1000	1614	28	6	600
412T07	1200	1814	32	7	700
412T08	1500	2114	40	9	900
412T09	1750	2364	44	10	1000
412T10	2000	2614	50	12	1200



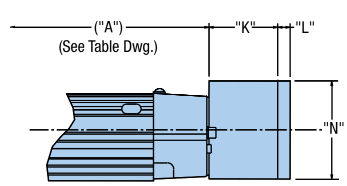
X-Y Adapter Plate #100-6784
(Used to mount any 404XR, 406XR
or 412XR with toe clamps)

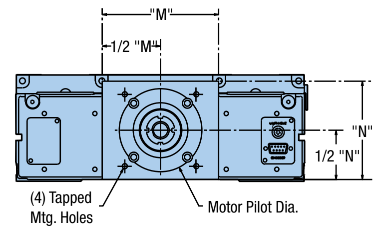
412XR In-Line Motor Mounting

In-line motor mounting allows the motor to be mounted directly to the drive screw via the selected motor coupling.

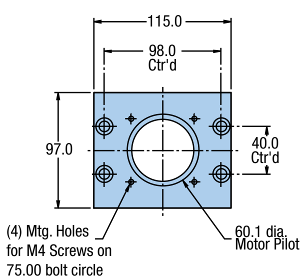
Used to easily accommodate the mounting of different frame sizes. These adapter plates can be ordered separately by part number below.

Dimensions (mm)

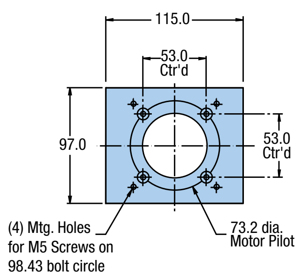




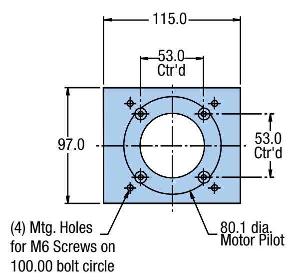
Motor Size	Order Code	K	L	M	N
		Dimensions (mm)			
MPP092	M90	68.0	12.0	115.0	97.0
M105, SMN100	M33	100.0	–	115.0	115.0
NEMA 34	M4	68.0	12.0	115.0	97.0
NEO 34	M17	68.0	12.0	115.0	97.0
NEO 70	M21	68.0	–	115.0	97.0
NEO 92	M29	68.0	12.0	115.0	97.0



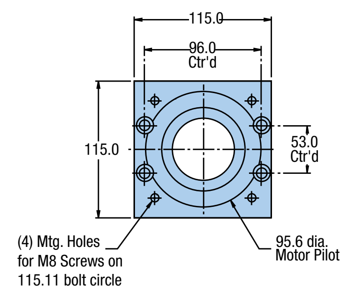
NEO 70 / SMN060



NEMA 34 or NEO 34



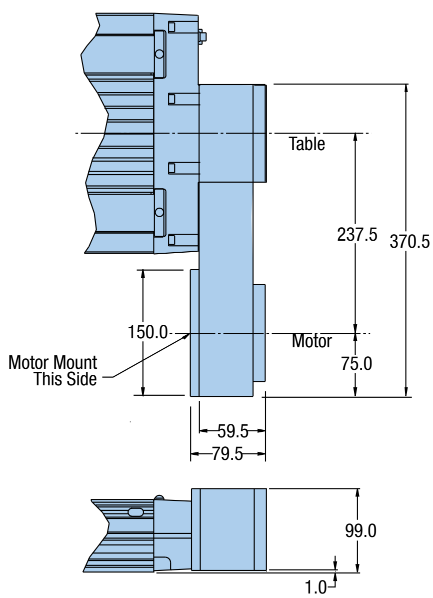
MPP092



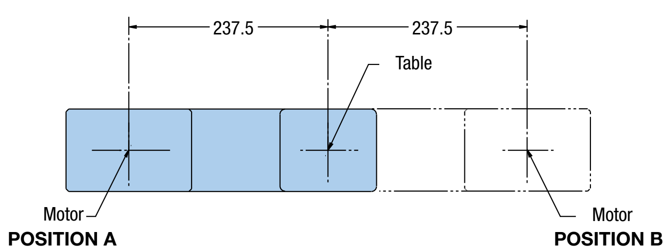
M105 / SMN100

412XR Parallel Motor Mounting

Parallel motor mounting is employed whenever a shorter overall unit length is needed. The motor is positioned along the sides or bottom of the table as designated by position A, B, or C. (No coupling required.)



Motor Size	Bolt Circle (mm)	Pilot Ø (mm)	Shaft Ø
	Dimensions		
MPP092	100.0	80.0	16.0 mm
NEMA 34	98.4	73.2	0.375”
NEO 34	98.4	73.2	0.500”
NEO 70	75.0	60.1	11.0 mm
NEO 92	100.0	80.1	14.0 mm



OPTIONS & ACCESSORIES

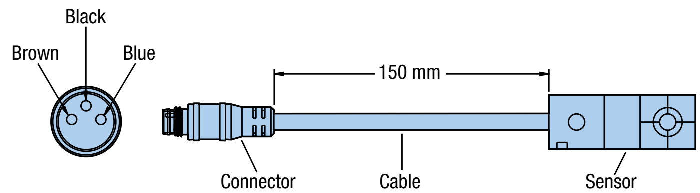
400XR Series Options

Home or Limit Sensor Options

End of Travel and Home Sensors for the 400XR series are available in a variety of styles. The sensors can be ordered as part of the table or as separate components with the associated mounting hardware or in an enclosed sensor pack. A 5 meter high-flex extension cable (Part No. 003-2918-01) is included for use with the 401XR thru 406XR models having the locking connector option.

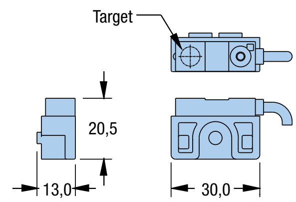
- NPN (Sinking) or PNP (Sourcing)
- Normally Closed (N.C.) or Normally Open (N.O.)
- Flying Leads or Locking Connector

401XR Limits and Home Sensor



Specifications

Input Power	5-30 VDC, 20 mA
Output	100mA max
Wire Color	(+) Supply: Brown
Code	(–) Supply: Blue NO Output: Black NC Output: White



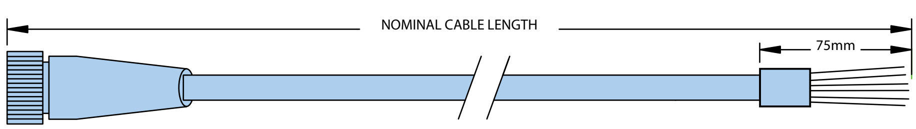
Sensor / Bracket Detail

Order Code	Part Number*	Switch Type	Logic	Cable Length	Connector Option
H2 or L2	006-1639-01	N.C.	Sinking	3.0 m	Flying Leads
H3 or L3	006-1639-02	N.O.	Sinking	3.0 m	Flying Leads
H4 or L4	006-1639-03	N.C.	Sourcing	3.0 m	Flying Leads
H5 or L5	006-1639-04	N.O.	Sourcing	3.0 m	Flying Leads
H6 or L6	006-1639-09	N.C.	Sinking	150 mm	Locking Connector
H7 or L7	006-1639-08	N.O.	Sinking	150 mm	Locking Connector
H8 or L8	006-1639-11	N.C.	Sourcing	150 mm	Locking Connector
H9 or L9	006-1639-10	N.O.	Sourcing	150 mm	Locking Connector
H11 or L11	See chart below	N.C.	Sinking	See chart below	Sensor Pack
H12 or L12	See chart below	N.O.	Sinking	See chart below	Sensor Pack
H13 or L13	See chart below	N.C.	Sourcing	See chart below	Sensor Pack
H14 or L14	See chart below	N.O.	Sourcing	See chart below	Sensor Pack

* Applies to 401XR thru 406XR models. 412XR models have limits and homes internally mounted with a connector termination. Sensor triggers (targets) ordered separately.

Sensor Pack Cable

406XR with Limit and Home Sensor Pack



Description	Part Number
3 Meters	006-1742-01
7.5 Meters	006-1742-02

Wire Color	Function	Pin Number
Red	+5 to +24 VDC	A
Blue	Limit 1 (LXR –)	B
Orange	Limit 2 (LXR +)	C
Green	Home	D
Black	Ground	E
Green/Yellow	Shield	Shield Case

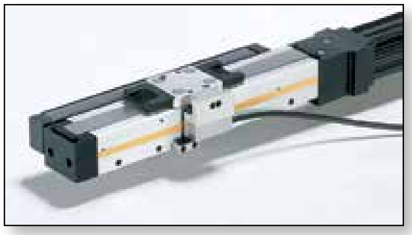
Linear Encoder Options (Tape Scale)

A linear position feedback device which mounts directly to the table carriage. (Factory installation required.)

- 1.0 µm resolution
- 0.5 µm resolution
- 0.1 µm resolution

Specifications

Input Power	5 VDC, 150mA
Output	A/B quadrature and reference mark, differential line drive output
Resolution	1.0, 0.5, 0.1 micron
Cable Length	3 m



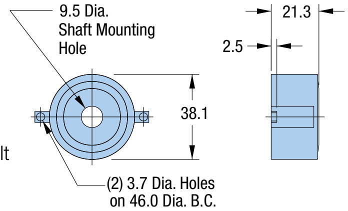
401XR with Linear Encoder plus Sensor Pack

Rotary Encoder Option

Modular rotary encoder couples directly to the drive screw for position feedback and is easily field installed. The rotary encoder cannot be installed with the brake assembly option.

- 5000 counts/rev

Note: Dimensions shown apply to 404XR and 406XR models. Consult factory for 412XR dimensions.

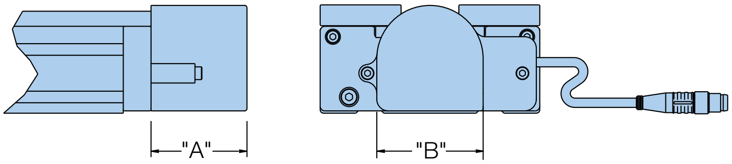


Specifications

Input Power	5 VDC, 135 mA
Output	A/B quadrature and reference mark, differential line drive output
Resolution	1250 lines/rev equals 5000 counts post quadrature (1 µm with 5 mm lead ballscrew)
Cable Length	150 mm

Brake Assembly Option

Electromagnetic brake assembly is used to prevent "backdriving" in vertical applications. The brake option includes a 5 meter extension cable. The brake option is easily field installed. The brake option cannot be installed with the rotary encoder option.



404XR with Brake Option

Table Series	Part Number	Input Power	Holding Torque	Dimensions (mm) A	Dimensions (mm) B
401XR/402XR	—	—	—	—	—
404XR	006-1627-01	24 VDC, 0.46 A	2.0 Nm	41.5	46.0
406XR	006-1656-01	24 VDC, 0.5 A	4.5 Nm	49.9	57.5
412XR	002-1916-01	24 VDC, 0.75 A	9.0 Nm	54.0	72.0

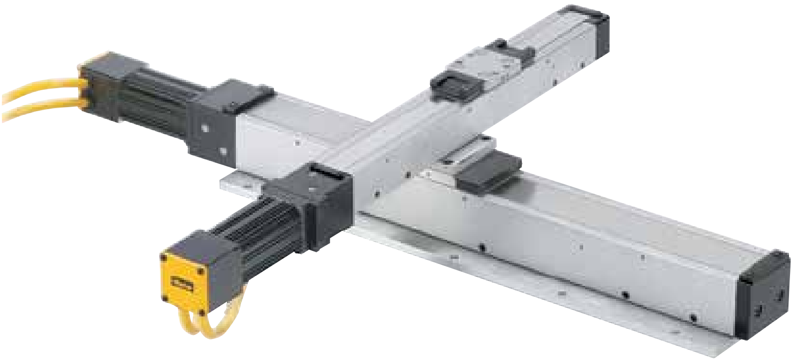
Dowel Pinning Options*

Standard dowel pin locating holes are offered on most 400XR units to facilitate repeatable mounting of tooling or payload.*

In addition, pinning options are offered for precise orthogonal mounting of the second axis in a multi-axis system. In this case, the bottom side of the table base is match drilled and reamed to the first axis to provide exact orthogonal location.

This convenient option eliminates concerns regarding contamination or damage often associated with machining for locating pins in an assembled unit.

*Not available with 401XR or 402XR or 50 mm travel 404XR.



Two locating dowel pins shown in carriage of a 401XR.

Standard pinning of XY axes will achieve 125 arc-sec of orthogonality. Through transfer pinning, 30 arc-sec is achievable. For high degrees of orthogonality consult the factory.

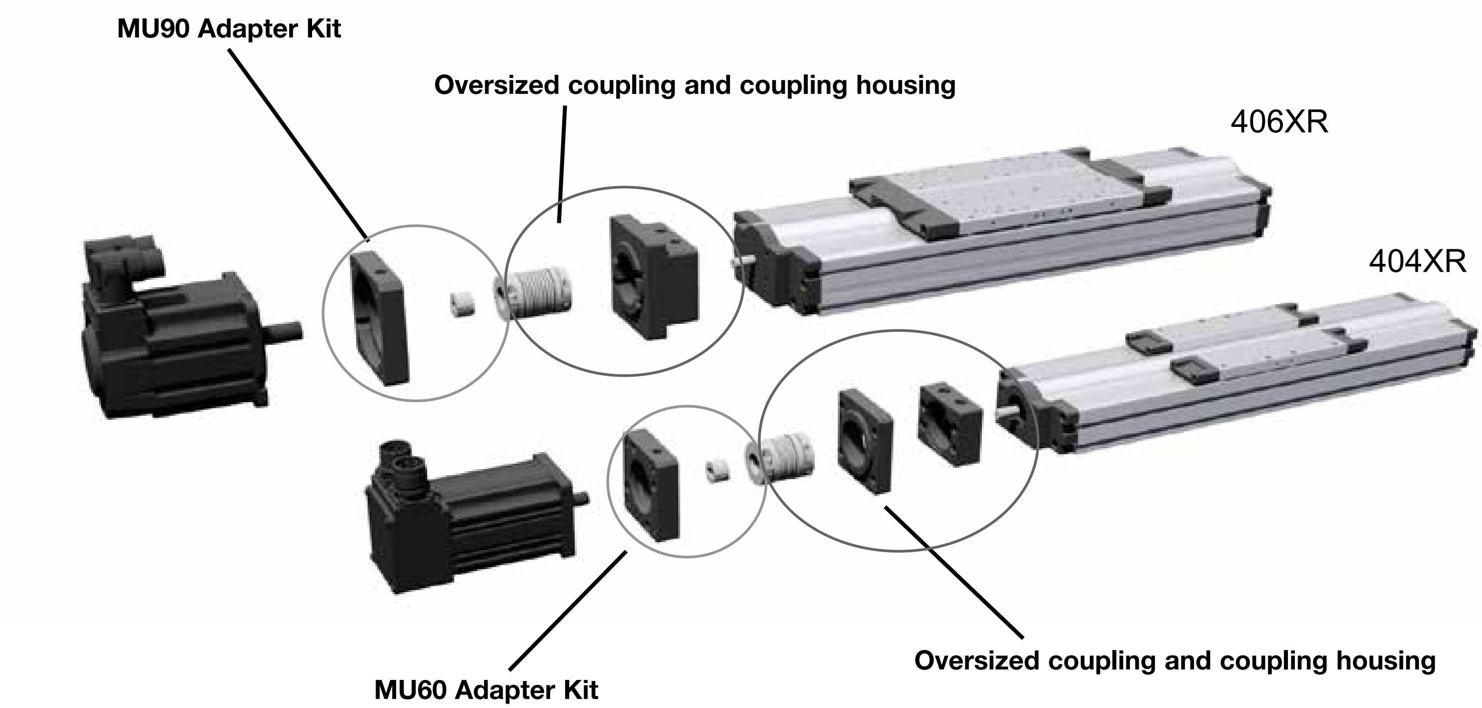
400XR Universal Motor Adapter (inline only)

The UMA is designed to make it easier than ever for our machine designers to specify their linear stage with whatever motor they'd like, while avoiding the often drawn out "customization" process.

Quick Motor Integration
The Universal Motor Adapter (UMA) is an innovative motor mount component that allows for simple configuration of the 404XR or 406XR to a variety of servo or steppers from a plethora of manufacturers. Utilizing a vast database of motor mounting flanges, the UMA allows for rapid integration of hundreds of motors from numerous manufacturers.

Convenient Ordering
For customers choosing to mount a third party, non-Parker motor, the UMA alleviates the hassle and lead time of having to create a "customized" motor mount. Typically, designers would have to place an additional custom motor request for a specific mount, but now designers can simply configure the motor manufacturer right into the XR part number

Easy Selection with Our Online e-Configurator
Now with the UMA, you can easily choose the right option for your motor through our online e-Configurator, saving time and money. With the UMA integrated into the e-Configurator, simply selecting the desired motor manufacturer and model type will configure the actuator with the appropriate selected motor.



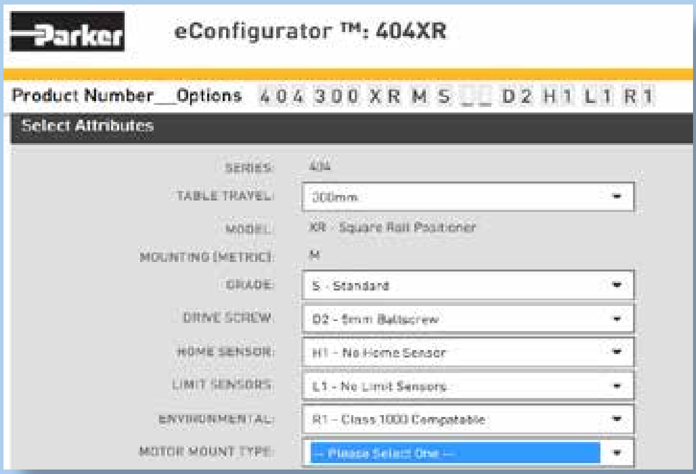
How to Order the Right Motor Mount

Motor mount configuration to 3rd party motors is now easier than ever through use of the universal motor adapter (UMA), and our online product configuration tool. Consult the online e-Configurator for a complete listing of supported motors.

If you do not find a specific motor you would like use in your application, please call our application's team at 1-800-358-9070.

STEP 1

In order to specify a 404 or 406 XR with a third party motor mount, launch the online configurator tool from **www.parker.com/emn/400XR** and for the appropriate 404 or 406 XR.



STEP 2

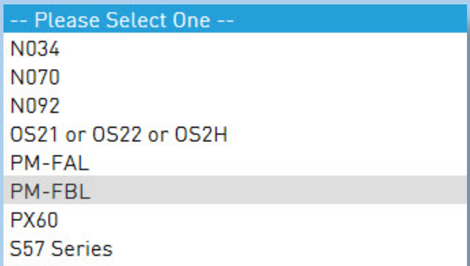
Configure the XR with all desired options and then specify the motor mount type. Select Standard for Parker motors or Universal for other motors.

STEP 3

Select the motor manufacturer.

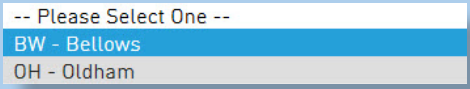
STEP 4

After motor manufacturer, choose the exact motor series from that manufacturer. This will automatically select the appropriate motor mount for the 400 XR stage.



STEP 5

Finally, select from either Bellows or Oldham style coupling options.

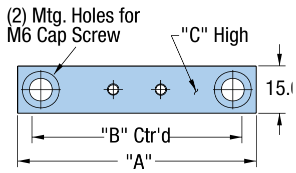


Riser Plate Accessory

Used to raise the table base to provide clearance for motors.

Model	Part Number
401XR	002-2063-01
402XR	002-2064-01
404XR	002-3619-01
406XR	002-3625-01
412XR	—

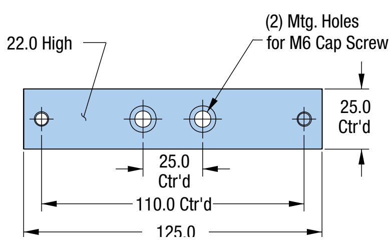
401XR/402XR
Part Number: 002-2063-01/ 002-2064-01



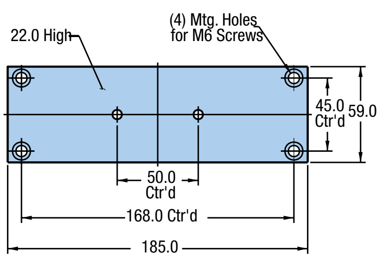
Dimensions (mm)

Table Series	A	B	C
401XR	65.0	50.4	17.0
402XR	90.0	75.4	10.0

404XR
Part Number: 002-3619-01



406XR
Part Number: 002-3625-01

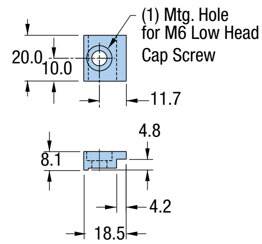


Toe Clamp Accessory

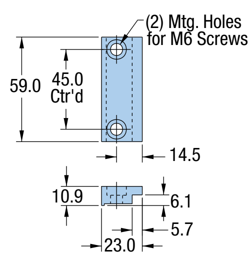
Used for convenient outboard mounting of table to a base plate, riser plates, Z-axis bracket, or other 400XR table. All hardware is included.

Model	Part Number
404XR	002-3618-01
406XR	002-3624-01
412XR	002-2160-01

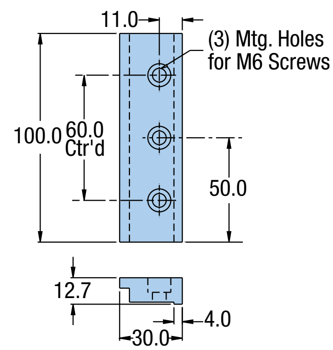
404XR
Part Number: 002-3618-01



406XR
Part Number: 002-3624-01



412XR
Part Number: 002-2160-01



ORDERING INFORMATION

401XR

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
Order Example:	401	100	XR	M	S	D9	H3	L2	C3	M2	E2	R1

① **Series ***
401

② **Travel – mm ***

050	50
100	100
150	150
200	200
300	300

③ **Model**

XR	Linear Table

④ **Mounting**

M	Metric

⑤ **Grade**

S	Standard
P	Precision (E3 or E4 encoder option required)

⑥ **Drive Screw ***

D3	10 mm Lead
D9	2 mm Lead

⑦ **Home Sensor ****

H1	None
H2	N.C. Current Sinking Flying Leads
H3	N.O. Current Sinking Flying Leads
H4	N.C. Current Sourcing Flying Leads
H5	N.O. Current Sourcing Flying Leads
H6	N.C. Current Sinking Locking Connector
H7	N.O. Current Sinking Locking Connector
H8	N.C. Current Sourcing Locking Connector
H9	N.O. Current Sourcing Locking Connector
H11	N.C. Current Sinking Sensor Pack
H12	N.O. Current Sinking Sensor Pack
H13	N.C. Current Sourcing Sensor Pack
H14	N.O. Current Sourcing Sensor Pack

⑧ **Limit Sensor ****

L1	None
L2	N.C. Current Sinking Flying Leads
L3	N.O. Current Sinking Flying Leads
L4	N.C. Current Sourcing Flying Leads
L5	N.O. Current Sourcing Flying Leads
L6	N.C. Current Sinking Locking Connector
L7	N.O. Current Sinking Locking Connector
L8	N.C. Current Sourcing Locking Connector
L9	N.O. Current Sourcing Locking Connector
L11	N.C. Current Sinking Sensor Pack
L12	N.O. Current Sinking Sensor Pack
L13	N.C. Current Sourcing Sensor Pack
L14	N.O. Current Sourcing Sensor Pack

⑨ **Motor Coupling**

C1	No Coupling
C2	6.3 mm (0.25 in) Bore Oldham
C3	6.3 mm (0.25 in) Bore Bellows
C5	9.5 mm (0.375 in) Bore Bellows
C24	5 mm (0.20 in) Bore Oldham
C25	5 mm (0.20 in) Bore Bellows

⑩ **Motor Mount**

M2	SM 16 In-Line Mounting
M3	NEMA 23 In-Line Mounting (0.375" dia. shaft)
M37	NEMA 17 In-Line Mounting
M61	BE 23 In-Line Mounting

⑪ **Encoder Option**

E1	None
E2	1.0 µm Resolution
E3	0.5 µm Resolution
E4	0.1 µm Resolution

⑫ **R1** Required Designator

*** Drive Screw Lead Availability**

Travel	401XR	
	2 mm	10 mm
50	•	
100	•	
150	•	
200		•
300		•

**** 50 mm stroke 401XR may only allow room for 2 sensors in sensor pack.**

Free sizing and selection support from Virtual Engineer at virtualengineer.com

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
Order Example:	402	100	XR	M	S	D9	H3	L2	C3	M2	E2	R1

① **Series ***

402

② **Travel – mm ***

100	100
150	150
200	200
300	300
400	400
600	600

③ **Model**

XR	Linear Table

④ **Mounting**

M	Metric

⑤ **Grade**

S	Standard
P	Precision (E3 or E4 encoder option required)

⑥ **Drive Screw ***

D2	5 mm Lead
D3	10 mm Lead

⑦ **Home Sensor**

H1	None
H2	N.C. Current Sinking Flying Leads
H3	N.O. Current Sinking Flying Leads
H4	N.C. Current Sourcing Flying Leads
H5	N.O. Current Sourcing Flying Leads
H6	N.C. Current Sinking Locking Connector
H7	N.O. Current Sinking Locking Connector
H8	N.C. Current Sourcing Locking Connector
H9	N.O. Current Sourcing Locking Connector
H11	N.C. Current Sinking Sensor Pack
H12	N.O. Current Sinking Sensor Pack
H13	N.C. Current Sourcing Sensor Pack
H14	N.O. Current Sourcing Sensor Pack

⑧ **Limit Sensor**

L1	None
L2	N.C. Current Sinking Flying Leads
L3	N.O. Current Sinking Flying Leads
L4	N.C. Current Sourcing Flying Leads
L5	N.O. Current Sourcing Flying Leads
L6	N.C. Current Sinking Locking Connector
L7	N.O. Current Sinking Locking Connector
L8	N.C. Current Sourcing Locking Connector
L9	N.O. Current Sourcing Locking Connector
L11	N.C. Current Sinking Sensor Pack
L12	N.O. Current Sinking Sensor Pack
L13	N.C. Current Sourcing Sensor Pack
L14	N.O. Current Sourcing Sensor Pack

⑨ **Motor Coupling**

C1	No Coupling
C2	6.3 mm (0.25 in) Bore Oldham
C3	6.3 mm (0.25 in) Bore Bellows
C4	9.5 mm (0.375 in) Bore Oldham*
C5	9.5 mm (0.375 in) Bore Bellows
C24	5 mm (0.20 in) Bore Oldham
C25	5 mm (0.20 in) Bore Bellows

*NEMA 23 frame size only (M3, M61)

⑩ **Motor Mount**

M2	SM 16 In-Line Mounting
M3	NEMA 23 In-Line Mounting
M37	NEMA 17 In-Line Mounting
M61	BE 23 In-Line Mounting

⑪ **Encoder Option**

E1	None
E2	1.0 µm Resolution
E3	0.5 µm Resolution
E4	0.1 µm Resolution

⑫ **R1** Required Designator

*** Drive Screw Lead Availability**

Travel	402XR	
	5 mm	10 mm
100	•	
150	•	
200	•	
300		•
400		•
600		•

404XR

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤		⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
Order Example:	404	450	XR	M	S	–	D33	H4	L2	C3	M4	E1	B1	R1	P1

① **Series**

404

② **Travel – mm ***

050	50 (no pinning available)
100	100
150	150
200	200
250	250
300	300
350	350
400	400
450	450
500	500
550	550
600	600

③ **Model**

XR	Linear Table

④ **Mounting**

M	Metric

⑤ **Grade**

S	Standard
P	Precision (only available with D2, D3, D4 drive screws)

⑥ **Drive Screw**

D1	Free Travel
D2	5 mm Ballscrew
D3	10 mm Ballscrew
D4	20 mm Ballscrew (standard grade only)
D31	1 mm V Thread Leadscrew
D32	2 mm V Thread Leadscrew
D33	5 mm V Thread Leadscrew
D34	0.10” V Thread Leadscrew
D35	0.10” Acme Thread Leadscrew

⑦ **Home Sensor Assembly (one sensor)**

H1	None-Free Travel (only)
H2	N.C. Current Sinking Flying Leads
H3	N.O. Current Sinking Flying Leads
H4	N.C. Current Sourcing Flying Leads
H5	N.O. Current Sourcing Flying Leads
H6	N.C. Current Sinking Locking Connector*
H7	N.O. Current Sinking Locking Connector*
H8	N.C. Current Sourcing Locking Connector*
H9	N.O. Current Sourcing Locking Connector*
H11	N.C. Current Sinking Sensor Pack**
H12	N.O. Current Sinking Sensor Pack**
H13	N.C. Current Sourcing Sensor Pack**
H14	N.O. Current Sourcing Sensor Pack**

⑧ **Travel Limit Sensor Assembly (two sensors)**

L1	None-Free Travel (only)
L2	N.C. Current Sinking Flying Leads
L3	N.O. Current Sinking Flying Leads
L4	N.C. Current Sourcing Flying Leads
L5	N.O. Current Sourcing Flying Leads
L6	N.C. Current Sinking w/Locking Connector*
L7	N.O. Current Sinking w/Locking Connector*
L8	N.C. Current Sourcing w/Locking Connector*
L9	N.O. Current Sourcing w/Locking Connector*
L11	N.C. Current Sinking Sensor Pack**
L12	N.O. Current Sinking Sensor Pack**
L13	N.C. Current Sourcing Sensor Pack**
L14	N.O. Current Sourcing Sensor Pack**

Motor Interface Option

- Standard Parker Motor Adapters (go to Standard Parker options in **blue**)

–OR–

- Universal Motor Adapter for other motors (go to Universal Motor Adapter in **grey**)

Standard Parker Motor Adapters

⑨ **Motor Coupling**

C1	No Coupling (required for parallel mounting)
C2	0.250” Oldham
C3	0.250” Bellows (required for precision grade)
C4	0.375” Oldham
C5	0.375” Bellows (required for precision grade)
C6	11 mm Oldham
C7	11 mm Bellows (required for precision grade)
C10	14 mm Oldham (M75 motor option)
C11	14 mm Bellows (M75 motor option)
C22	9 mm Oldham
C23	9 mm Bellows
C24	5 mm Oldham (M37 motor option)
C25	5 mm Bellows (M37 motor option)
C26	8 mm Oldham (M71 motor option)
C27	8 mm Bellows (M71 motor option)
C28	0.1875” Oldham (M37 motor option)
C29	0.1875” Bellows (M37 motor option)

(Motor Coupling continued next page)

* Sensors with locking connector include 5 m extension cable.
** Sensor Pack includes 3 m cable.

Fill in an order code from each of the numbered fields to create a complete model order code.

Standard Parker Motor Adapters

(Motor Coupling continued)

C30	0.250” Oldham (couplings for leadscrew grade)
C31	0.250” Bellows (couplings for leadscrew grade)
C32	0.375” Oldham (couplings for leadscrew grade)
C33	0.375” Bellows (couplings for leadscrew grade)
C39	9 mm Bellows (couplings for leadscrew grade)

Motor Mount *

M1	No Motor Mount
M2	SM 16 In-Line Mounting
M3	NEMA 23 & SM 23 In-Line Mounting
M4	NEMA 34 In-Line Mounting
M5	SM 16 Parallel Mounting, “A” Location*
M6	SM 16 Parallel Mounting, “B” Location*
M7	SM 16 Parallel Mounting, “C” Location*
M8	NEMA 23 Parallel Mounting, “A” Location*
M9	NEMA 23 Parallel Mounting, “B” Location*
M10	NEMA 23 Parallel Mounting, “C” Location*
M11	SM 23 Parallel Mounting, “A” Location*
M12	SM 23 Parallel Mounting, “B” Location*
M13	SM 23 Parallel Mounting, “C” Location*
M21	Neometric 70 In-Line Mounting
M37	NEMA 17 In-Line Mounting
M42	SM232AQ NPSN Servo Motor In-Line Mounting
M46	HV232-02-10 Stepper Motor In-Line Mounting
M49	Handcrank without Readout
M50	Handcrank with Readout (0.10” or 1 mm leads only)
M51	HDY55 In-Line Mounting
M61	BE 23 In-Line Mounting
M62	BE 23 Parallel Mounting, “A” Location*
M63	BE 23 Parallel Mounting, “B” Location*
M64	BE 23 Parallel Mounting, “C” Location*
M71	PM-FAL In-Line Mounting
M72	PM-FAL In-Line Mounting, “A” Location*
M73	PM-FAL In-Line Mounting, “B” Location*
M74	PM-FAL In-Line Mounting, “C” Location*
M75	PM-FBL In-Line Mounting

* See 404XR dimensions for maximum allowable motor shaft diameter. Parallel motor mounts not available with leadscrew drives.

► **Continue to step ⑪ for Encoders in the order process.**

⑨ **Motor Coupling**

BW	Bellows coupling option
OH	Oldham coupling option

Universal Motor Adapter

⑩ **Motor Mount**

U###	Consult the online eConfigurator at **www.parker.com/emn/404XR** to create a complete part number for the desired 404XR with motor mounting to a 3rd party motor. For more details on how to use the online configurator, see "How to Order the Right Motor Mount" in this product catalog

⑪ **Encoder Option**

E1	No Encoder
E2	1.0 µm Resolution Linear Encoder (tape scale)
E3	0.5 µm Resolution Linear Encoder (tape scale)
E4	0.1 µm Resolution Linear Encoder (tape scale)
E5	Rotary Shaft Encoder (not available with brake)

⑫ **Brake Option**

B1	No Brake
B2	Shaft Brake (Refer to 404XR holding torque specifications to confirm maximum load. Not available with rotary encoder)

⑬ **Cleanroom Preparation**

R1	Class 1000 Compatible
R2	Class 10 Compatible (consult factory)
R5	Class 1000 with Easy Lube System †

⑭ **Pinning Option ***

P1	No multi-axis pinning
P2* **	X axis transfer pinning to Y or Z axis - 30 arc-sec **
P3* **	Y axis transfer pinning to X axis - 30 arc-sec
P4* **	Z axis transfer pinning to X axis - 30 arc-sec
P5* **	X axis transfer pinning to Y axis - 125 arc-sec
P6* **	Y axis transfer pinning to X axis - 125 arc-sec

† Sensor pack options L11-L14 cannot be ordered with R5 option on 404XR. Linear encoder options E2-E4 cannot be ordered with R5 option on 404XR. R5 option not available for 50mm travel 404XR units. Consult factory if required.
* Pinning option is for pinning to other 404XR and 406XR tables. Transfer pinning is not available on some XR to LXR models. Contact factory for more information. Pinning XY orientation standard with Y motor at 3 o’clock position.
** Z pinning uses bracket (see figures 7, 8 and 9 in "400XR Multi Axis Configurations")
***Consult factory for multi-axis pinning options and quotation

406XR

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤		⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
Order Example:	406	900	XR	M	S	–	D3	H4	L1	C7	M4	E1	B1	R1	P1

① **Series**

406

② **Travel – mm ***

100	100
200	200
300	300
400	400
500	500
600	600
700	700
800	800
900	900
1000	1000
1250	1250
1500	1500
1750	1750
2000	2000

③ **Model**

XR Linear Table

④ **Mounting**

M Metric

⑤ **Grade ***

S	Standard
P	Precision

⑥ **Drive Screw ***

D1	Free Travel
D2	5 mm Ballscrew
D3	10 mm Ballscrew
D4	20 mm Ballscrew
D5	25 mm Ballscrew

⑦ **Home Sensor Assembly (one sensor)**

H1	None
H2	N.C. Current Sinking Flying Leads
H3	N.O. Current Sinking Flying Leads
H4	N.C. Current Sourcing Flying Leads
H5	N.O. Current Sourcing Flying Leads
H6	N.C. Current Sinking Locking Connector**
H7	N.O. Current Sinking Locking Connector**
H8	N.C. Current Sourcing Locking Connector**
H9	N.O. Current Sourcing Locking Connector**
H11	N.C. Current Sinking Sensor Pack***
H12	N.O. Current Sinking Sensor Pack***
H13	N.C. Current Sourcing Sensor Pack***
H14	N.O. Current Sourcing Sensor Pack***

⑧ **Travel Limit Sensor Assembly (two sensors)**

L1	None
L2	N.C. Current Sinking Flying Leads
L3	N.O. Current Sinking Flying Leads
L4	N.C. Current Sourcing Flying Leads
L5	N.O. Current Sourcing Flying Leads
L6	N.C. Current Sinking w/Locking Connector**
L7	N.O. Current Sinking w/Locking Connector**
L8	N.C. Current Sourcing w/Locking Connector**
L9	N.O. Current Sourcing w/Locking Connector**
L11	N.C. Current Sinking Sensor Pack ***
L12	N.O. Current Sinking Sensor Pack***
L13	N.C. Current Sourcing Sensor Pack***
L14	N.O. Current Sourcing Sensor Pack ***

*** Drive Screw Lead Availability**

Travel	Precision Grade		Standard Grade			
	5 mm	10 mm	5 mm	10 mm	20 mm	25 mm
100	•	•	•	•	•	
200	•	•	•	•	•	
400	•	•	•	•	•	
400	•	•	•	•	•	
500	•	•	•	•	•	
600	•	•	•	•	•	
700			•	•		•
800			•	•		•
900			•	•		•
1000			•	•		•
1250			•	•		•
1500			•	•		•
1750			•	•		•
2000			•	•		•

** Sensors with locking connector include 5 m extension cable.
*** Sensor Pack includes 3 m cable.

Motor Interface Option

- Standard Parker Motor Adapters (go to Standard Parker options in **blue**)

–OR–

- Universal Motor Adapter for other motors (go to Universal Motor Adapter in **grey**)

Standard Parker Motor Adapters

⑨ **Motor Coupling**

C1	No Coupling (required for parallel mounting)
C2	0.250" Oldham
C3	0.250" Bellows (required for precision grade)
C4	0.375" Oldham
C5	0.375" Bellows (required for precision grade)
C6	11 mm Oldham
C7	11 mm Bellows (required for precision grade)
C8	0.500" Oldham
C9	0.500" Bellows (required for precision grade)
C10	14 mm Oldham
C11	14 mm Bellows (required for precision grade)
C12	16 mm Oldham
C13	16 mm Bellows (required for precision grade)

Standard Parker Motor Adapters

⑩ **Motor Mount ***

M1	No Motor Mount
M3	NEMA 23 & SM 23 In-Line Mounting
M4	NEMA 34 In-Line Mounting
M11	SM 23 Parallel Mounting, "A" Location*
M12	SM 23 Parallel Mounting, "B" Location*
M13	SM 23 Parallel Mounting, "C" Location*
M14	NEMA 34 Parallel Mounting, "A" Location
M15	NEMA 34 Parallel Mounting, "B" Location
M16	NEMA 34 Parallel Mounting, "C" Location
M17	Neometric 34 In-Line Mounting
M18	Neometric 34 Parallel Mounting, "A" Location
M19	Neometric 34 Parallel Mounting, "B" Location
M20	Neometric 34 Parallel Mounting, "C" Location
M21	Neometric 70 In-Line Mounting
M22	Neometric 70 Parallel Mounting, "A" Location
M23	Neometric 70 Parallel Mounting, "B" Location
M24	Neometric 70 Parallel Mounting, "C" Location
M29	Neometric 92 In-Line Mounting
M61	BE 23 In-Line Mounting
M62	BE 23 Parallel Mounting, "A" Location
M63	BE 23 Parallel Mounting, "B" Location
M64	BE 23 Parallel Mounting, "C" Location
M75	PM-FBL In-Line Mounting
M90	MPP092 In-Line Mounting
M91	MPP092 Parallel Mounting, "A" Location
M92	MPP092 Parallel Mounting, "B" Location
M93	MPP092 Parallel Mounting, "C" Location

* See 406XR dimensions for maximum allowable motor shaft diameter. SM 23 parallel motor mounts not available with leadscrew drives.

Continue to step ⑪ for Encoders in the order process.

Universal Motor Adapter

Motor Coupling

BW	Bellows coupling option
OH	Oldham coupling option

Motor Mount

U####	Consult the online eConfigurator at **www.parker.com/emn/406XR** to create a complete part number for the desired 404XR with motor mounting to a 3rd party motor. For more details on how to use the online configurator, see "How to Order the Right Motor Mount" in this product catalog.

⑪ **Encoder Option**

E1	No Encoder
E2	1.0 µm Resolution Linear Encoder (tape scale)
E3	0.5 µm Resolution Linear Encoder (tape scale)
E4	0.1 µm Resolution Linear Encoder (tape scale)
E5	Rotary Shaft Encoder (not available with brake)

⑫ **Brake Option**

B1	No Brake
B2	Shaft Brake (Refer to 406XR holding torque specifications to confirm maximum load. Not available with rotary encoder)

⑬ **Cleanroom Preparation**

R1	Class 1000 Compatible
R2	Class 10 Compatible (consult factory)
R5	Class 1000 with Easy Lube System †

⑭ **Pinning Option ***

P1	No multi-axis pinning
P2***	X axis transfer pinning to Y or Z axis - 30 arc-sec **
P3***	Y axis transfer pinning to X axis - 30 arc-sec
P4***	Z axis transfer pinning to X axis - 30 arc-sec

†Please consult factory if selecting option R5.

* Pinning option is for pinning to other 404XR and 406XR tables. Transfer pinning is not available on some XR to LXR models. Contact factory for more information. Pinning XY orientation standard with Y motor at 3 o'clock position.

** Z pinning uses bracket (see figures 7, 8 and 9 in "400XR Multi Axis Configurations")

***Consult factory for multi-axis pinning options and quotation

Free sizing and selection support from Virtual Engineer at virtualengineer.com

412XR

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤		⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
Order Example:	412	T03	XR	M	S	–	D2	H3	L3	C15	M4	E3	B1	R1	P1

① **Series**
412

② **Travel – mm**

T01	150
T02	250
T03	350
T04	650
T05	800
T06	1000
T07	1200
T08	1500
T09	1750
T10	2000

③ **Model**

XR	Linear Table

④ **Mounting**

M	Metric

⑤ **Grade**

S	Standard

⑥ **Drive Screw**

D1	Free Travel
D2	5 mm Leadscrew
D3	10 mm Leadscrew
D5	25 mm Leadscrew
D6	32 mm Leadscrew

⑦ **Home Sensor ***

H1	None
H2	N.C. Current Sinking Flying Leads
H3	N.O. Current Sinking Flying Leads
H4	N.C. Current Sourcing Flying Leads
H5	N.O. Current Sourcing Flying Leads

* Includes a 3 meter extension cable with flying lead termination. A 7.5 meter extension cable can be ordered separately.

⑧ **Travel Limit Sensor ***

L1	None
L2	N.C. Current Sinking Flying Leads
L3	N.O. Current Sinking Flying Leads
L4	N.C. Current Sourcing Flying Leads
L5	N.O. Current Sourcing Flying Leads

* Includes a 3 meter extension cable with flying lead termination. A 7.5 meter extension cable can be ordered separately.

⑨ **Motor Coupling**

C1	No Coupling
C4	0.375” Oldham
C5	0.375” Bellows
C6	11 mm Oldham
C7	11 mm Bellows
C8	0.500” Oldham
C9	0.500” Bellows
C10	14 mm Oldham
C11	14 mm Bellows
C12	16 mm Oldham
C13	16 mm Bellows
C14	0.750” (19 mm) Oldham
C15	0.750” (19 mm) Bellows

Fill in an order code from each of the numbered fields to create a complete model order code.

⑩ **Motor Mount**

M1	No Motor Mount
M4	NEMA 34 In-Line Mounting
M14	NEMA 34 Parallel Mounting, “A” Location
M15	NEMA 34 Parallel Mounting, “B” Location
M17	Neometric 34 In-Line Mounting
M18	Neometric 34 Parallel Mounting, “A” Location
M19	Neometric 34 Parallel Mounting, “B” Location
M21	Neometric 70 In-Line Mounting
M22	Neometric 70 Parallel Mounting, “A” Location
M23	Neometric 70 Parallel Mounting, “B” Location
M29	Neometric 92 In-Line Mounting
M30	Neometric 92 Parallel Mounting, “A” Location
M31	Neometric 92 Parallel Mounting, “B” Location
M33	M105 & SMN100 In-Line Mounting
M90	MPP092 In-Line Mounting
M91	MPP092 Parallel Mounting, “A” Location
M92	MPP092 Parallel Mounting, “B” Location
M93	MPP092 Parallel Mounting, “C” Location

⑪ **Encoder Option**

E1	No Encoder
E2	1.0 µm Resolution Linear Encoder (tape scale)
E3	0.5 µm Resolution Linear Encoder (tape scale)
E4	0.1 µm Resolution Linear Encoder (tape scale)
E5	5.0 µm Resolution Linear Encoder (tape scale)
E6	Rotary Shaft Encoder (not available with brake)
E7	Sine Encoder

⑫ **Brake Option**

B1	No Brake
B2	Shaft Brake (Refer to 412XR holding torque specifications to confirm maximum load. Not available with rotary encoder)

⑬ **Cleanroom Preparation**

R1	Class 1000 with Strip Seals
R2	Class 100 without Strip Seals

⑭ **Pinning Option ***

P1	No multi-axis pinning
P2* **	X axis transfer pinning to Y or Z axis - 30 arc-sec **
P3* **	Y axis transfer pinning to X axis - 30 arc-sec (includes a required 15 mm thick adapter)
P4* **	Z axis transfer pinning to X axis - 30 arc-sec

* Pinning option is for pinning to other 404XR and 406XR tables. Transfer pinning is not available on some XR to LXR models. Contact factory for more information. Pinning XY orientation standard with Y motor at 3 o’clock position.

** Z pinning uses bracket (see figures 7, 8 and 9 in "400XR Multi Axis Configurations")

***Consult factory for multi-axis pinning options and quotation

The HMRS Series

Screw-Driven Actuators
for Industrial, High-Thrust, High Payload Positioning Applications

- **High dynamic control for precision positioning**
- **High thrust capacity**
- **High payload and moment load capacity**
- **Highly configurable design**
- **Ideal in multi-axis applications**

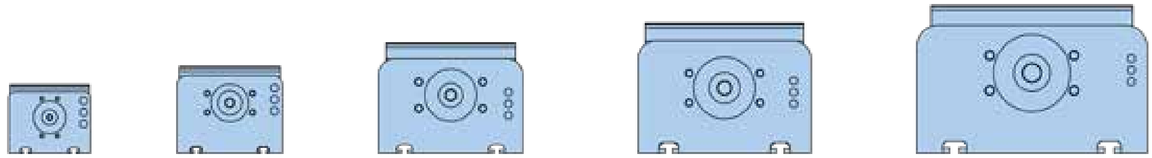
Features

- **5 different frame sizes to choose from**
- **Basic or reinforced profiles for supported or unsupported applications**
- **Tandem carriage with second carriage for higher load capabilities**
- **Long available strokes**
- **Complete motor and drive packages**
- **Easy lube feature for reduced maintenance**
- **Ambient operating temperature range -20˚C to +80˚C**
- **IP54 Rating**

Standard Profile

HMRS08 **HMRS11** **HMRS15** **HMRS18** **HMRS24**

Reinforced Profile

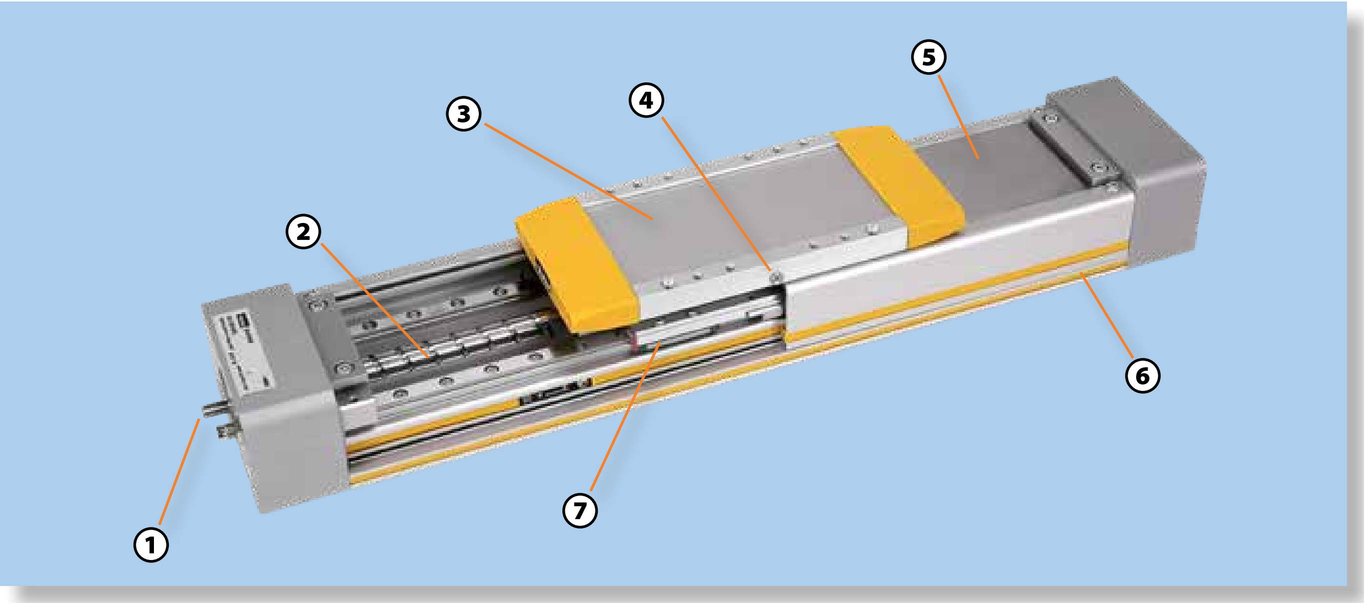


	HMRS08	HMRS11	HMRS15	HMRS18	HMRS24
Maximum Travel (mm)	1200	1400	2400	2700	3000
Maximum Payload (N)	1800	4450	8800	16200	26600
Maximum Acceleration (m/sec^2)	10	10	10	10	10

The HMRS is the screw driven version of the HMR family. The large diameter ball screw assembly allows this positioner to achieve very high thrust force capacity.

Having multiple screw lead options for every frame size promotes flexibility for diverse application demands. The HMRS can also achieve greater positional precision than the belt driven counterpart.

The compact design allows integration of the HMRS into any machine layout, providing superior dynamic performance with minimal space utilization.



1 **Drive shaft**
Designed to pair with a large assortment of motor and gearhead options

2 **High force ball screw**
Multiple lead options for every frame size, offering high thrust and high throughput

3 **Carriage assembly**
Low profile, high strength aluminum construction with threaded and pinning mounting options

4 **Lubrication ports**
Easy access maintenance (1x per side) allows for single point lubrication for all bearing trucks and the ball nut at any location along travel

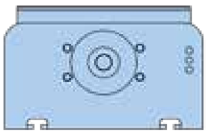
5 **Corrosion resistant steel sealing band**
Magnetically fastened to the actuator body and provides IP54 sealing

6 **Slotted profile**
Dovetail grooves for actuator & sensor mounting

7 **Recirculating profile rail bearing**
Two rails and four bearing trucks total for maximized payload capacity

Profile Options

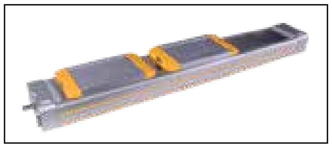
Basic profile - for applications where actuator is fully supported, this option provides a lower profile option.



Reinforced profile - for long un-supported spans (i.e. gantry style applications).

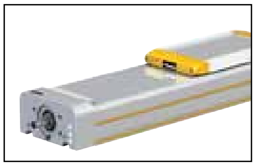
Carriage Options

Standard carriage or tandem carriage for higher load capabilities



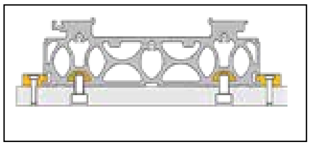
Cover Options

IP20 rated without protective cover, or IP54 rated protective cover with seal strip cover assemblies—ideal for harsh environments



Actuator Mounting Options

HMR actuators can be mounted from the underside into t-nuts in the bottom t-slots or via toe clamps into the t-slots on the side of the extrusion.



Pinning options are also available for mounting, carriage to base and carriage to carriage. Consult factory for additional information.

Multi-axis Systems

A wide range of adapter plates and intermediate drive shafts simplifies engineering and installation.

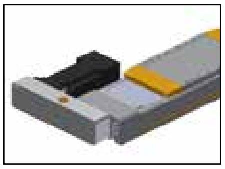
**Please consult factory for your individual system design.*

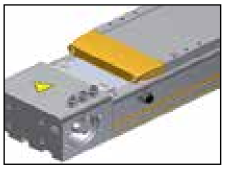
Other Options & Accessories

HMRS actuators can be outfitted with a variety of different options.

In addition to the standard configurable options highlighted in Options & Accessories, a list of commonly used non-standard options are highlighted below. Please contact us for assistance in choosing any of these or any other unique configurations.

- **Purge ports**
- **Parallel motor mount**
- **Longer than cataloged stroke**
- **...and many more**





SPECIFICATIONS

HMRS Series (HMRS08 and HMRS11)

Parker's High Moment Rodless (HMR) Series electric linear actuator is one of the most user friendly and versatile actuator lines on the market today.

Guided by two square rail bearings, the HMR has enormous moment and payload capacity bundled in a low-profile, yet sleek package. With five different frame sizes, two different drive train options, multiple mounting, carriage and sensor options, and an IP54 protective cover option—along with a multitude of other customizable features—the HMR was truly designed with flexibility in mind.

Common Specifications

Actuator Size			HMRS08		HMRS11	
Screw Type			12 x 5	12 x 12	16 x 5	16 x 16
Screw Lead	s_{lin}	mm	5	12	5	16
Screw Diameter		mm	12		16	
Duty Cycle		%	100		100	
Linear Speed (Max)	v_{max}	m/s	0.25	0.6	0.25	0.8
Acceleration (Max)	a_{max}	m/s²	10			
Repeatability (unidirectional)		µm	± 20			
Order Stroke (Max) (1)		mm	1,200		1,400	
Thrust Force (Max)	F_{Amax}	N	820		2,200	
		lbs	185		495	
Thrust Force @ 2540 km Life	F_{Amax}	N	820	650	1,550	1,150
		lbs	185	146	349	259
Torque on Drive Shaft (Max)	M_{Amax}	Nm	0.7	1.7	1.9	6.1
		in-lb	6.2	15.0	16.8	54.0
Torque on Drive Shaft @ 2540 km Life	M_{Amax}	Nm	0.7	1.3	1.3	3.1
		in-lb	6.2	11.5	11.5	27.4
Torque — No Load	M_0	Nm	0.2	0.2	0.3	0.4
		in-lb	1.8	1.8	2.7	3.5
Inertia						
@ Zero Stroke	J_0	kgmm²	4		13	
Per Meter of Stroke	J_{OS}	kgmm²/m	14		45	
Per 1 kg Moved Mass	J_m	kgmm²/kg	0.6	3.7	0.6	6.5

Unit Weight (by Order Code Option)			B	C	R	S	B	C	R	S
@ Zero Stroke	m_0	kg	1.8	2.1	2.2	2.5	3.5	3.9	4.6	5.0
Per Meter of Stroke	m_{OS}	kg/m	3.7	4.7	4.8	5.7	6.6	7.6	8.8	9.9
Carriage (by Order Code Option) (2)	m_C	kg	**0**: 1.0		**1**: 0.7		**0**: 1.6		**1**: 1.3	
Ambient Temperature Range		°C	-20 to +80							
IP Rating(3)			IP 54							

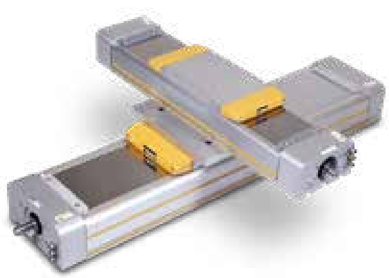
Note- For force and moment load specifications, see HMRS Loading Conditions

(1) Longer lengths available - please consult factory

(2) For tandem carriage weight add mass from column '0' and '1'

(3) For unit with protective covers - IP20 without covers

HMRS Series (HMRS15, HMRS18, and HMRS24)



Common Specifications

Actuator Size			HMRS15		HMRS18		HMRS24	
Screw Type			20 x 5	20 x 20	25 x 10	25 x 25	32 x 10	32 x 32
Screw Lead	s_{lin}	mm	5	20	10	25	10	32
Screw Diameter		mm	20		25		32	
Duty Cycle		%	100		100		100	
Linear Speed (Max)	v_{max}	m/s	0.25	1	0.5	1.25	0.5	1.6
Acceleration (Max)	a_{max}	m/s²	10					
Repeatability (unidirectional)		µm	± 20					
Order Stroke (Max) (1)		mm	2,400		2,700		3,000	
Thrust Force (Max)	F_{Amax}	N	2,600		4,800		5,500	
		lbs	585		1,080		1,238	
Thrust Force @ 2540 km Life	F_{Amax}	N	1,800	2,160	3,300	3,960	3,500	4,880
		lbs	405	486	743	891	788	1098
Torque on Drive Shaft (Max)	M_{Amax}	Nm	2.2	9	8.3	20.8	9.5	30.4
		in-lb	19.5	79.7	73.5	184.1	84.1	269.0
Torque on Drive Shaft @ 2540 km Life	M_{Amax}	Nm	1.6	7.5	5.7	17.1	6.1	27
		in-lb	14.2	66.4	50.4	151.3	54.0	239.0
Torque — No Load	M_0	Nm	0.7	0.9	0.9	1	1	1.1
		in-lb	6.2	8.0	8.0	8.9	8.9	9.7
Inertia								
@ Zero Stroke	J_0	kgmm²	14		35		96	
Per Meter of Stroke	J_{OS}	kgmm²/m	107		245		639	
Per 1 kg Moved Mass	J_m	kgmm²/kg	0.6	10.1	2.5	15.8	2.5	25.9

Unit Weight (by Order Code Option)			B	C	R	S	B	C	R	S	B	C	R	S
@ Zero Stroke	m_0	kg	5.2	6.1	7.1	7.9	8.9	10.0	11.2	12.3	16.5	18.1	20.5	22.2
Per Meter of Stroke	m_{OS}	kg/m	12.1	13.9	15.5	17.2	15.5	17.7	19.1	21.4	25.6	28.3	30.7	33.4

			HMRS15		HMRS18		HMRS24	
Carriage (by Order Code Option) (2)	m_C	kg	**0**	**1**	**0**	**1**	**0**	**1**
			2.6	1.8	4.7	3.7	9.2	7.3
Ambient Temperature Range		°C	-20 to +80					
IP Rating (3)			IP 54					

Note- For force and moment load specifications, see HMRS Loading Conditions

(1) Longer lengths available - please consult factory

(2) For tandem carriage weight add mass from column '0' and '1'

(3) For unit with protective covers - IP20 without covers

HMRS Loading Specifications (Max) - HMRS08 and HMRS11

Life and loading characteristics shown for both belt and screw driven units.

Rated Life			HMR08	HMR11
2540 km	F_Y / F_Z	N (lb)	1,800 (405)	4,450 (1,001)
2540 km Tandem	F_Y / F_Z	N (lb)	2,700 (608)	6,675 (1,508)
8000 km	F_Y / F_Z	N (lb)	1,250 (281)	3,000 (675)
8000 km Tandem	F_Y / F_Z	N (lb)	1,875 (422)	4,500 (1,013)
2540 km	M_X	Nm (in-lb)	45 (398)	155 (1,372)
	M_Y	Nm (in-lb)	80 (708)	200 (1,770)
	M_Z	Nm (in-lb)	80 (708)	200 (1,770)
2540 km Tandem	M_X	Nm (in-lb)	68 (602)	235 (2,080)
	M_Y	Nm (in-lb)	120 (1,062)	300 (2,655)
	M_Z	Nm (in-lb)	120 (1,062)	300 (2,655)
8000 km	M_X	Nm (in-lb)	30 (266)	105 (929)
	M_Y	Nm (in-lb)	55 (487)	135 (1,195)
	M_Z	Nm (in-lb)	55 (487)	135 (1,195)
8000 km Tandem	M_X	Nm (in-lb)	45 (398)	160 (1,416)
	M_Y	Nm (in-lb)	80 (708)	205 (1,814)
	M_Z	Nm (in-lb)	80 (708)	205 (1,814)

HMRS Stroke dependent speed - HMRS08 and HMRS11

Actuator Size			HMRS08		HMRS11	
Screw Diameter (mm)			12		16	
Screw Lead (mm)			5	12	5	16
Max. permissible speed at order stroke (mm/s)	200	[mm]	250	600	250	800
	400	[mm]	250	600	250	800
	600	[mm]	152	366	197	631
	800	[mm]	102	245	132	424
	1000	[mm]	73	176	95	304
	1200	[mm]	55	132	71	228
	1400	[mm]	-	-	56	178
	1600	[mm]	-	-	45	143
	1800	[mm]	-	-	-	-
	2000	[mm]	-	-	-	-
	2200	[mm]	-	-	-	-
	2400	[mm]	-	-	-	-
	2600	[mm]	-	-	-	-
	2800	[mm]	-	-	-	-
	3000	[mm]	-	-	-	-
	3200	[mm]	-	-	-	-
	3400	[mm]	-	-	-	-
	3600	[mm]	-	-	-	-
	3800	[mm]	-	-	-	-
	4000	[mm]	-	-	-	-

HMRS Loading Specifications (Max) - HMRS15, HMRS18, HMRS24

Life and loading characteristics shown for both belt and screw driven units.

Rated Life			HMR15	HMR18	HMR24
2540 km	F_Y / F_Z	N (lb)	8,800 (1,980)	16,200 (3,645)	26,600 (5,985)
2540 km Tandem	F_Y / F_Z	N (lb)	13,200 (2,970)	24,300 (5,468)	39,900 (8,978)
8000 km	F_Y / F_Z	N (lb)	6,000 (1,350)	11,000 (2,475)	18,200 (4,095)
8000 km Tandem	F_Y / F_Z	N (lb)	9,000 (2,025)	16,500 (3,713)	27,300 (6,143)
2540 km	M_X	Nm (in-lb)	430 (3,806)	940 (8,320)	2,150 (19,029)
	M_Y	Nm (in-lb)	560 (4,956)	1,230 (10,886)	2,430 (21,507)
	M_Z	Nm (in-lb)	560 (4,956)	1,230 (10,886)	2,430 (21,507)
2540 km Tandem	M_X	Nm (in-lb)	645 (5,708)	1,410 (12,480)	3,225 (28,544)
	M_Y	Nm (in-lb)	840 (7,435)	1,845 (16,330)	3,645 (32,261)
	M_Z	Nm (in-lb)	840 (7,435)	1,845 (16,330)	3,645 (32,261)
8000 km	M_X	Nm (in-lb)	290 (2,567)	640 (5,664)	1,460 (12,922)
	M_Y	Nm (in-lb)	380 (3,363)	840 (7,435)	1,660 (14,692)
	M_Z	Nm (in-lb)	380 (3,363)	840 (7,434)	1,660 (14,692)
8000 km Tandem	M_X	Nm (in-lb)	435 (3,850)	960 (8,497)	2,190 (19,383)
	M_Y	Nm (in-lb)	570 (5,045)	1,260 (11,152)	2,490 (22,038)
	M_Z	Nm (in-lb)	570 (5,045)	1,260 (11,152)	2,490 (22,038)

HMRS Stroke dependent speed - HMRS15, HMRS18, HMRS24

Actuator Size			HMRS15		HMRS18		HMRS24	
Screw Diameter (mm)			20		25		32	
Screw Lead (mm)			5	20	10	25	10	32
Max. permissible speed at order stroke (mm/s)	200	[mm]	250	1,000	500	1,250	500	1,600
	400	[mm]	250	1,000	500	1,250	500	1,600
	600	[mm]	250	1,000	500	1,250	500	1,600
	800	[mm]	169	678	382	956	423	1,354
	1000	[mm]	122	486	277	694	312	997
	1200	[mm]	91	366	211	526	239	765
	1400	[mm]	71	285	165	413	189	605
	1600	[mm]	57	228	133	333	153	491
	1800	[mm]	47	187	109	274	127	406
	2000	[mm]	39	156	92	229	107	342
	2200	[mm]	33	132	78	195	91	291
	2400	[mm]	28	113	67	167	79	251
	2600	[mm]	-	-	58	145	68	219
	2800	[mm]	-	-	51	128	60	193
	3000	[mm]	-	-	45	113	53	171
	3200	[mm]	-	-	40	100	48	152
	3400	[mm]	-	-	-	-	43	137
	3600	[mm]	-	-	-	-	39	123
	3800	[mm]	-	-	-	-	35	112
	4000	[mm]	-	-	-	-	32	102

HMRS Weight, Mass, and Inertia

Weight and mass HMRS

Product size			**HMRS08**				**HMRS11**				**HMRS15**			
			Weight of actuator											
Version of actuator (see order code)			B	C	R	S	B	C	R	S	B	C	R	S
Weight actuator. 0 - order stroke	m_0	[kg]	1.8	2.1	2.2	2.5	3.5	3.9	4.6	5.0	5.2	6.1	7.1	7.9
Weight actuator per 1 meter	m_{mt}	[kg/m]	3.7	4.7	4.8	5.7	6.6	7.6	8.8	9.9	12.1	13.9	15.5	17.2
			Moving mass											
Version of carriage (see order code)			0		1		0		1		0		1	
Weight carriage*	m_c	[kg]	1.0		0.7		1.6		1.3		2.6		1.8	

Weight and mass HMRS

Product size			**HMRS18**				**HMRS24**			
			Weight of actuator							
Version of actuator (see order code)			B	C	R	S	B	C	R	S
Weight actuator. 0 - order stroke	m_0	[kg]	8.9	10.0	11.2	12.3	16.5	18.1	20.5	22.2
Weight actuator per 1 meter	m_{mt}	[kg/m]	15.5	17.7	19.1	21.4	25.6	28.3	30.7	33.4
			Moving mass							
Version of carriage (see order code)			0		1		0		1	
Weight carriage*	m_c	[kg]	4.7		3.7		9.2		7.3	

*For tandem carriage weight add mass from column '0' and '1'

Total mass HMRS: $m_{tot} = m_0 + m_C$ + order stroke * m_{mt}

Inertia HMRS

Product size			**HMRS08**		**HMRS11**		**HMRS15**	
Pitch (see order code)			**5**	**12**	**5**	**16**	**5**	**20**
Inertia actuator. 0 - order stroke	J_0	[kgmm²]	4		13		14	
Inertia actuator per 1 meter	J_{mt}	[kgmm²/m]	14		45		107	
Inertia per 1 kg moving mass	J_{kg}	[kgmm²/kg]	0.6	3.7	0.6	6.5	0.6	10.1

Inertia HMRS

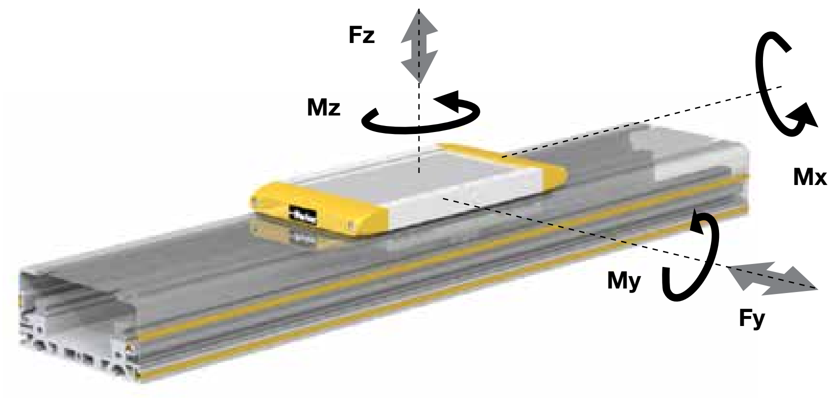
Product size			**HMRS18**		**HMRS24**	
Pitch (see order code)			**10**	**25**	**10**	**32**
Inertia actuator. 0 - order stroke	J_0	[kgmm²]	35		96	
Inertia actuator per 1 meter	J_{mt}	[kgmm²/m]	245		639	
Inertia per 1 kg moving mass	J_{kg}	[kgmm²/kg]	2.5	15.8	2.5	25.9

Total inertia HMRS: $J_{tot} = J_0$ + order stroke * $J_{mt} + m_C * J_{kg} + m * J_{kg}$

HMR Loading Conditions

Loading conditions, including external forces and moment loading, are application dependent. The center of gravity for the mass/payload attached to the carriage must be determined in order to properly size the ideal actuator for your application. Please note that when selecting the proper HMR actuator for your system the sum of all loading should not exceed "1" as per the formula below.

Loads, forces and bending moments



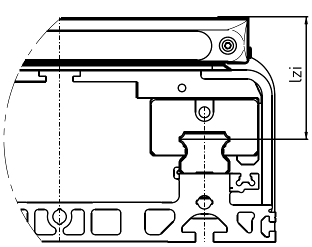
Calculating Load Factors - Combined Normal and Moment Load

The sum of combined loads (static and dynamic) must not exceed "1" at any time as shown in the formula below:

$$L = \frac{F_y}{Fy_{(max)}} + \frac{F_z}{Fz_{(max)}} + \frac{M_x}{Mx_{(max)}} + \frac{M_y}{My_{(max)}} + \frac{M_z}{Mz_{(max)}} \leq 1$$

$M = F \times d$ (Nm)
$M_x = M_{x\,static} + M_{x\,dynamic}$
$M_y = M_{y\,static} + M_{y\,dynamic}$
$M_z = M_{z\,static} + M_{z\,dynamic}$

Internal lever arm l_{zi}



Dimensions - Internal lever arm l_{zi}

Product size		l_{zi}
HMRx085	[mm]	33.0
HMRx110	[mm]	39.5
HMRx150	[mm]	50.0
HMRx180	[mm]	57.5
HMRx240	[mm]	68.0

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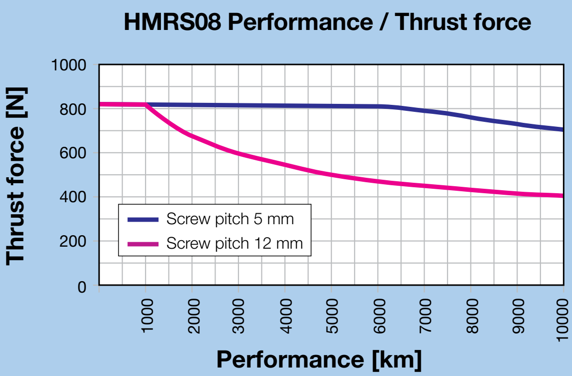
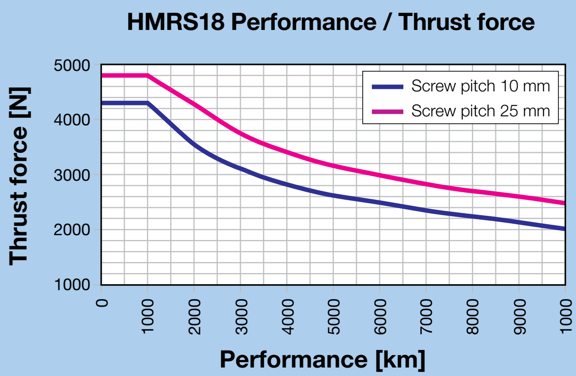
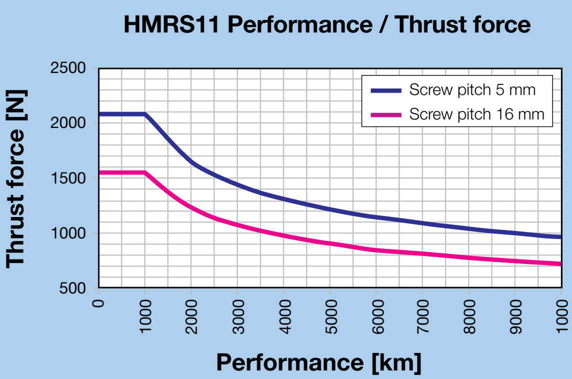
Virtual Engineer

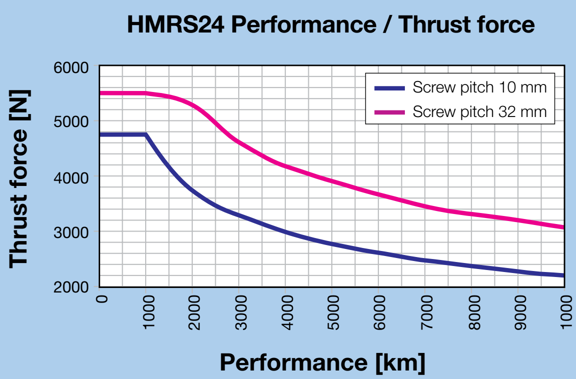
HMRS Thrust/Life Curve

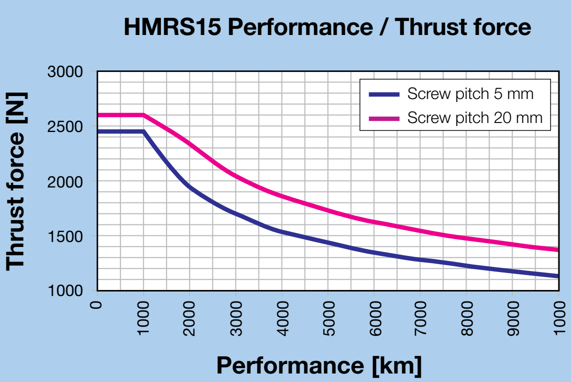
Performance expectancy depends on the application's required force. An increase in force will reduce performance.







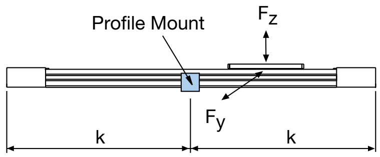




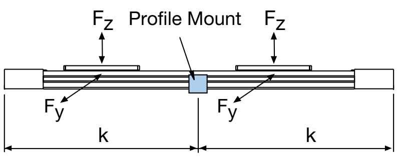
DIMENSIONS

HMRS Maximum Permissible Unsupported Length — *Determining actuator mounting placement*

HMR Series actuators need to be mounted onto a solid machine base or frame structure using appropriately positioned actuator mounts. This ensures that the actuator will not undergo excessive deflection based on the application's load and length requirements.

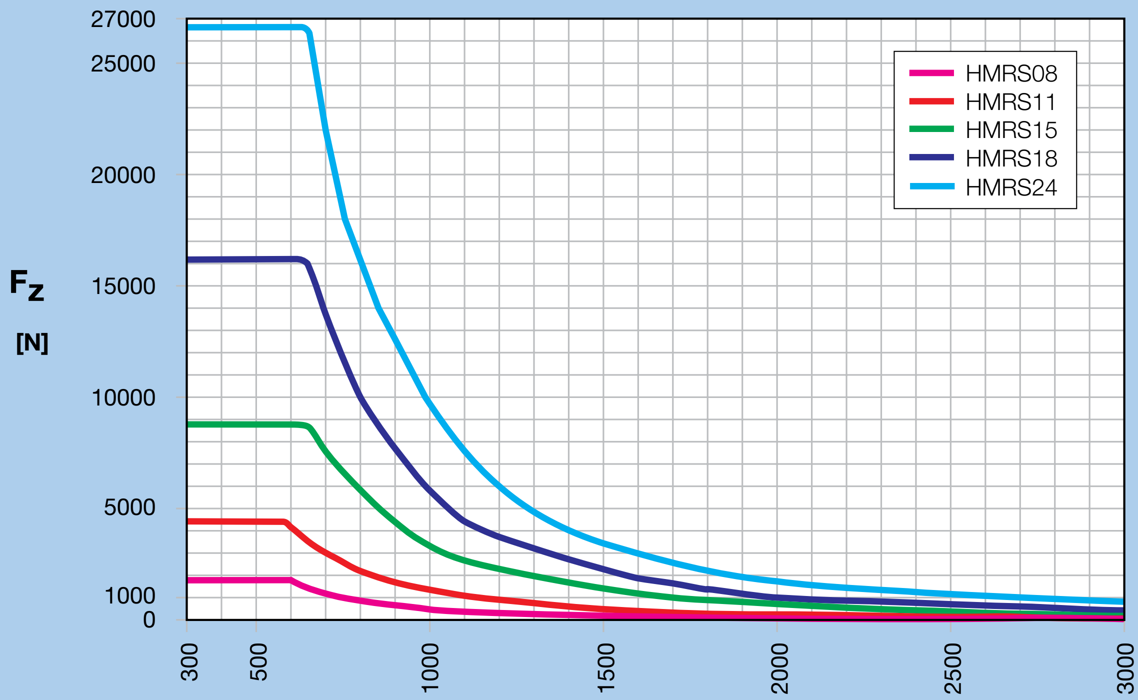


The greater the load and/or the longer the unsupported length between mounts, the more the actuator is susceptible to deflection.



Deflection is also dependent on the carriage orientation (F_z for standard mounted actuator or F_y for a side mounted actuator).

Max. admissible loads [N] and supporting distances [mm] (self-supporting- *reinforced profile only*)



Example F_z HMR 11:

For a 3160 N load the distance "d" between supporting elements is 700 mm.
For mounting accessories see "Actuator Mounting" in Options & Accessories.

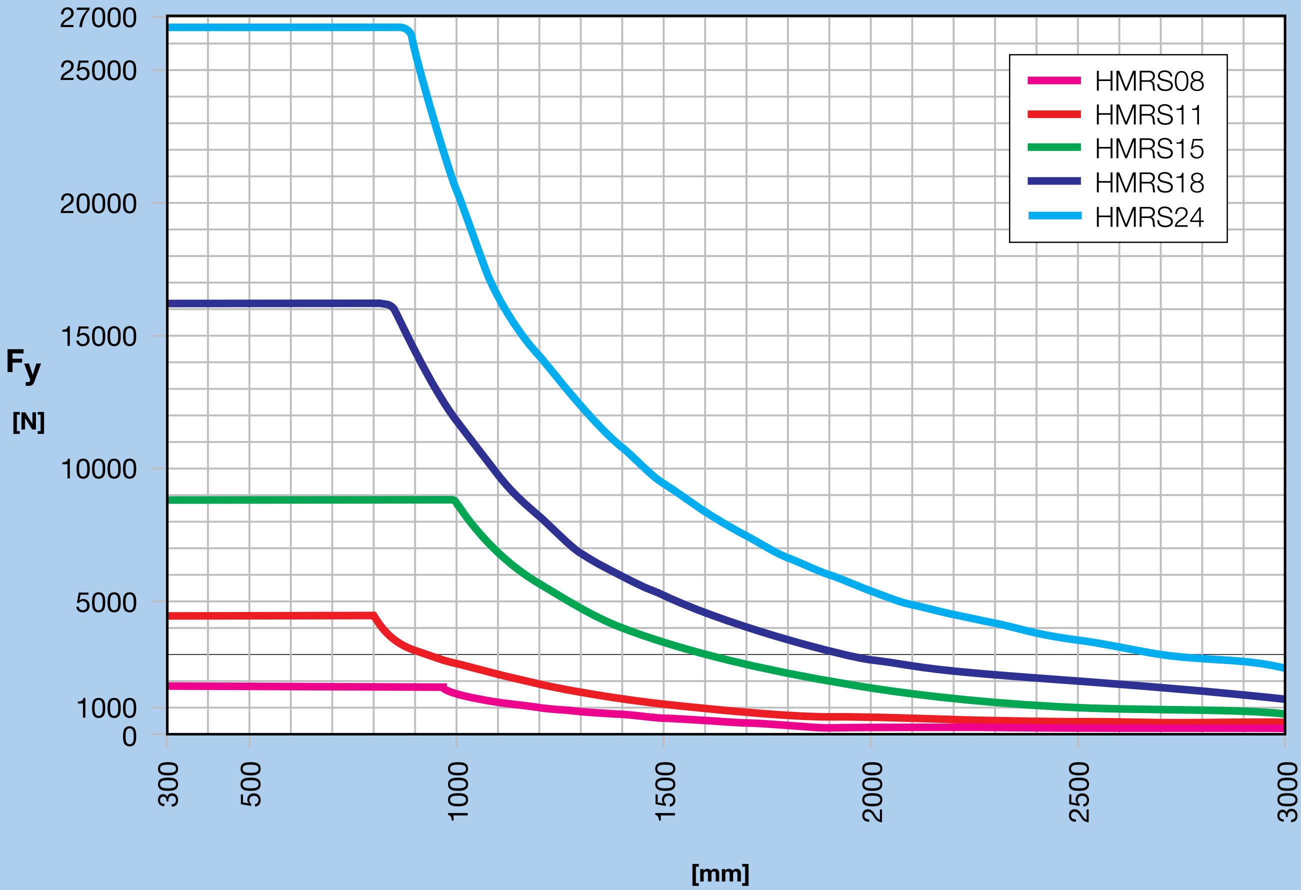
Maximum Permissible Unsupported Length

Determining actuator mounting placement

Use the appropriate deflection graph to ensure that the application load does not exceed the deflection curve. Supporting the actuator within the recommended maximum distance "k" will ensure that the installation will have a maximum deflection equal to 0.01% of distance "k."

To further reduce deflection, simply reduce the distance between actuator mounts as described in the examples below.

Max. admissible loads [N] and supporting distances [mm] (self-supporting- *reinforced profile only*)



Example F_y HMR 11:

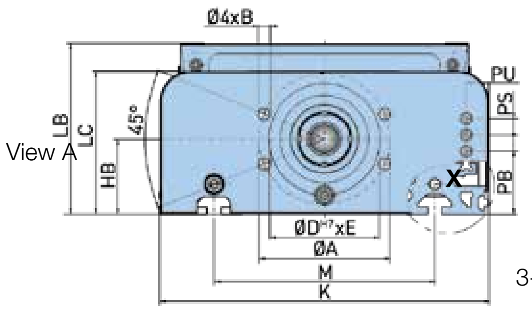
For a 3160 N load the distance "d" between supporting elements is 900 mm.
For mounting accessories see "Actuator Mounting" in Options & Accessories.

HMRS Dimensions – (mm)

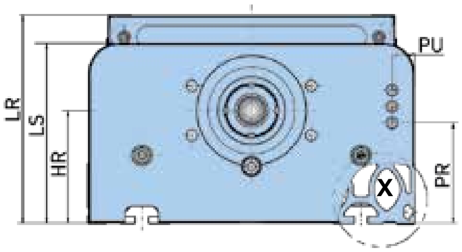
HMR actuators can be configured with either "Basic" or "Reinforced" profiles based on application demands. Basic profiles are suitable for applications where the actuator is secured to a machine base and constantly supported. Reinforced profiles can be utilized in applications with unsupported spans. See Maximum Permissible Unsupported Length for mounting support requirements.

Dimensions

"Basic" profile



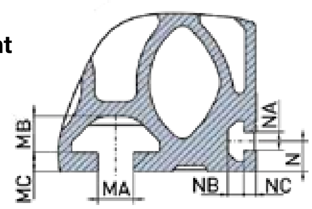
"Reinforced" profile



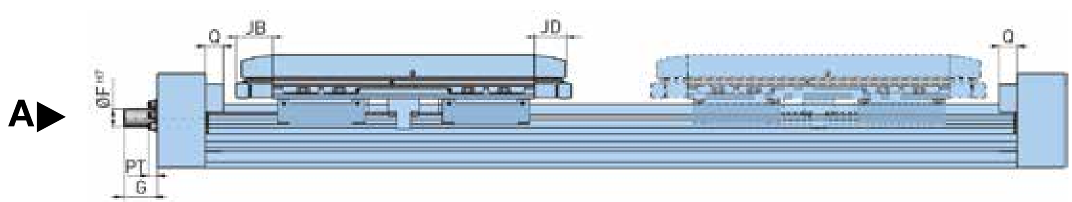
3-PIN M8 connections

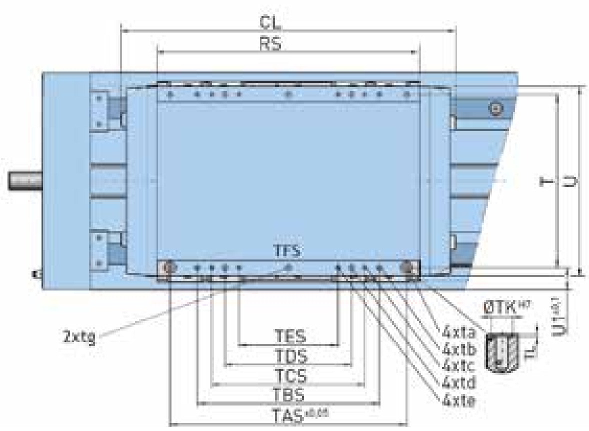
T-slot attachment

View X



Note: The same T-slot profile is used for both profile types





Carriage pinning option
See Options & Accessories
for dowel sleeve
information.

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Dimension table - HMRS

Product size		ØA	B	ØD^{H7}	E	ØF^{H7}	G	HB	HR	K	LB	LC	LR	LS
HMRS08	[mm]	42.0	M4	34.0	3.0	6.0	11.0	26.0	37.0	85.0	60.0	52.5	71.0	63.5
HMRS11	[mm]	51.0	M6	39.0	5.0	10.0	18.0	32.0	52.0	110.0	69.5	60.5	89.5	80.5
HMRS15	[mm]	72.0	M8	54.0	4.0	12.0	31.0	36.0	60.0	150.0	90.0	74.0	114.0	98.0
HMRS18	[mm]	80.0	M8	64.0	2.5	15.0	33.0	44.0	67.5	180.0	111.5	93.5	134.5	116.5
HMRS24	[mm]	95.0	M10	80.0	2.5	20.0	37.0	55.0	83.0	240.0	125.0	104.5	153.0	132.5

Dimension table - HMRS

Product size		M	MA	MB	MC	N	NA	NB	NC	PB	PR	PS	PT	PU	Q
HMRS08	[mm]	50.0	5.2	4.5	1.5	4.5	3.4	3.0	2.5	19.3	30.3	12.0	9.0	7.1	16.0
HMRS11	[mm]	70.0	5.2	4.5	1.8	4.5	3.4	3.0	2.5	23.5	43.5	12.0	9.0	8.5	20.0
HMRS15	[mm]	96.0	6.2	6.8	3.0	6.5	5.2	4.6	3.5	15.0	39.0	12.0	9.0	15.0	20.0
HMRS18	[mm]	116.0	8.0	7.8	4.5	8.5	5.2	4.5	3.5	28.0	51.0	12.0	9.0	18.0	20.0
HMRS24	[mm]	161.0	10.0	10.2	5.3	8.5	5.2	4.5	3.5	46.0	74.0	12.0	9.0	16.5	20.0

Dimension table - carriage standard HMRS

Product size		JB	JD	CL	RS	T	TAS	ta	TBS	tb	TCS	tc	TDS	td	TES
HMRS08	[mm]	33.5	30.0	195.0	128.0	74.0	97.0	M4x12	70.0	M4x12	40.0	M4x12	-	-	-
HMRS11	[mm]	37.5	34.0	225.0	150.0	96.0	122.0	M5x12	97.0	M5x12	65.0	M5x12	25.0	M5x12	-
HMRS15	[mm]	37.5	34.0	266.0	191.0	120.0	170.0	M5x12	122.0	M5x12	110.0	M5x12	70.0	M5x12	-
HMRS18	[mm]	40.0	34.0	311.0	231.0	150.0	202.0	M6x12	170.0	M5x10	122.0	M5x10	110.0	M5x12	90.0
HMRS24	[mm]	40.0	34.0	371.0	291.0	192.0	262.0	M8x16	202.0	M6x12	170.0	M5x10	140.0	M8x16	122.0

Dimension table - carriage standard HMRS

Product size		te	TFS	tf	tg	ØTKH7	TL	U	U1
HMRS08	[mm]	-	-	-	-	7.0	1.5	83.0	5.5
HMRS11	[mm]	-	-	-	-	7.0	1.5	105.0	7.0
HMRS15	[mm]	-	-	-	M5x12	7.0	1.5	135.0	15.0
HMRS18	[mm]	M6x12	-	-	M6x12	9.0	1.5	165.0	15.0
HMRS24	[mm]	M5x10	110.0	M5x12	M8x16	12.0	1.5	210.0	24.0

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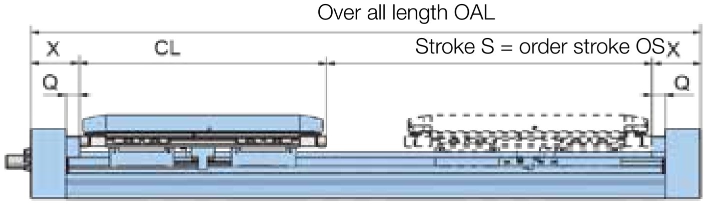
HMRS Order Stroke – (mm)

Order stroke dependent dimensions

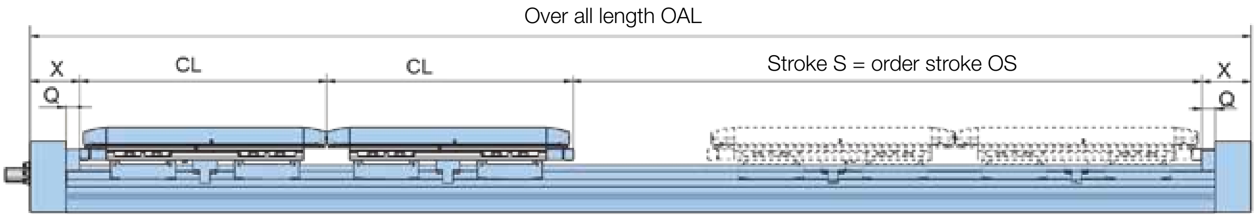
- ES = Effective Stroke
- SS = Safety Stroke
- CD = Carriage distance
- CL = Carriage length Standard
- S = Stroke
- OS = Order Stroke
- OAL = Over All Length

Standard design with one carriage



Order stroke OS = Effective stroke ES + 2 x Safety stroke SS
Over all length OAL = order stroke OS + carrier length CL + 2 x dimension end cap X

Tandem design with two carriages



Order stroke OS = Effective stroke ES + 2 x Safety stroke SS + Carrier distance CD (not shown)
Over all length OAL = Order stroke OS + 2 x carrier length CL + 2 x dimension end cap X

Dimensions - Carriage and end cap HMRS

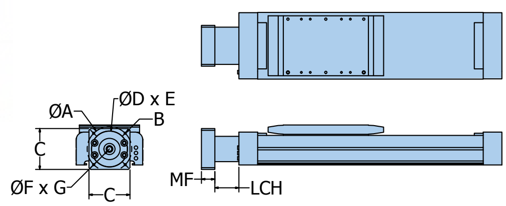
Product size		CL	Q	X
HMRS08	[mm]	195.0	16.0	54.0
HMRS11	[mm]	225.0	20.0	65.0
HMRS15	[mm]	266.0	20.0	62.0
HMRS18	[mm]	311.0	20.0	66.0
HMRS24	[mm]	371.0	20.0	73.0

Order Stroke Safety Distance:
The mechanical end position should not be used as a mechanical end stop, thus an additional ***Safety Distance*** at both ends of travel must be incorporated into the Order Stroke. The safety distance for servo-driven systems is equivalent to the travel distance per one revolution of the drive shaft. AC motor-driven systems with VFDs require a larger safety distance than servo systems. For further information and design assistance, please consult factory.

OPTIONS & ACCESSORIES

HMRS Screw Driven Actuators Gearhead Mounting Kit Options

Gearhead Mounting Kits include a coupling housing, coupling, and flange.



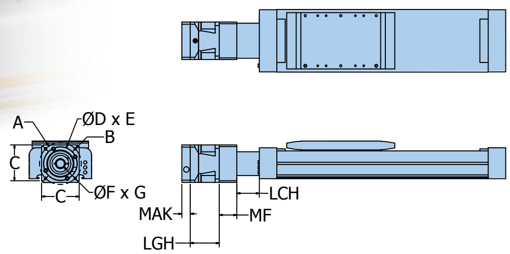
A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
MF = Motor flange

Actuator Size	0 Order Code [1]	Dimensions A	B	C	D	E	F	G	LCH	MF
HMRS08	C0	44	M4x0.7	60	35	6	12	25	28	20
HMRS11	A7	70	M5x0.8	60	50	15	16	40	37	35
	C0	44	M4x0.7	60	35	6	12	25	37	20
	C1	62	M5x0.8	80	52	8	16	40	37	35
	BX	70	M5x0.8	60	50	10	16	25	37	20
HMRS15	A7	70	M5x0.8	85	50	15	16	40	54	30
	A8	100	M6x1	90	80	20	22	52	54	42
	C1	62	M5x0.8	84	52	12	16	40	54	30
	C2	80	M6x1	92	68	5	22	46	54	36
	BX	70	M5x0.8	85	50	5	16	25	54	20
	BY	100	M6x1	92	80	15	20	40	54	30
HMRS18	A8	100	M6x1	100	80	30	22	52	70	40
	C2	80	M6x1	92	68	6	22	46	70	30
	BY	100	M6x1	92	80	15	20	40	70	30
	BZ	130	M8x1.25	115	110	25	24	50	70	40
HMRS24	A9	130	M8x1.25	115	110	25	32	68	85	40
	C3	108	M8x1.25	125	90	17	32	70	85	40
	BZ	130	M8x1.25	115	110	5	24	50	85	20

[1] When ordering with actuator, use order code 0 to specify appropriately sized gearhead mounting kit. See Ordering Information.

HMRS Screw Driven Actuators
Mounted Gearhead with Motor Mounting Kit Options

Mounted Gearhead with Motor Mounting Kits include a coupling housing, coupling, flange, and gearhead with coupler and flange.



A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
LGH = Length gearhead
MAK = Motor adapter
MF = Motor flange

Actuator Size	9 Order Code [1]	0 Order Code [2]	A	B	C	D	E	F	G	LCH	LGH	MAK	MF
			Dimensions										
HMRS08	Jx	AB	66.68	M4x0.7	55	38.10	3.5	6.35	20.8	28	48.5	15.7	20
	Jx	AC	66.68	M5x0.8	57	38.11	6	9.53	20.8		48.5	26	20
	Jx	AD	66.68	M5x0.8	57	38.11	6	9.53	31.8		48.5	26	20
	Jx	B6	63	M5x0.8	55	40	8	9	23	8	48.5	19	20
HMRS11	Fx	A3	100	M6x1	82	80	5	14	30	37	59.8	18	35
	Fx	AB	66.68	M4x0.7	62	38.10	4	6.35	20.8	37	59.8	16.5	35
	Fx	AC	66.68	M5x0.8	62	38.15	4	9.53	20.8	37	59.8	16.5	35
	Fx	AD	66.68	M5x0.8	62	38.15	4	9.53	31.8	37	59.8	16.5	35
	Fx	AE	98.43	M5x0.8	86.8	73.03	7	12.70	37.1	37	59.8	22.5	35
	Fx	AF	98.43	M5x0.8	86.8	73.03	7	12.70	31.8	37	59.8	22.5	35
	Fx	AH	63	M5x0.8	62	40	4	9	23	37	59.8	16.5	35
	Fx	AN	70	M5x0.8	62	50	4	14	30	37	59.8	16.5	35
	Fx	B6	63	M4x0.7	62	40	4	9	23	37	59.8	16.5	35
	Jx	AB	66.68	M4x0.7	55	38.10	3.5	6.35	20.8	37	48.5	15.7	20
	Jx	AC	66.68	M5x0.8	57	38.11	6	9.53	20.8	37	48.5	26	20
	Jx	AD	66.68	M5x0.8	57	38.11	6	9.53	31.8		48.5	26	20
	Jx	B6	63	M5x0.8	55	40	8	9	23	37	48.5	19	20
	Kx	AB	66.68	M4x0.7	62	38.10	4	6.35	20.8	37	67	16.5	35
	Kx	AC	66.68	M4x0.7	62	38.10	4	9.53	20.8	37	67	16.5	35
	Kx	AD	66.68	M5x0.8	62	38.10	8.5	9.53	31.8	37	67	22.5	35
	Kx	AE	98.43	M6x1	85	73.05	10	12.70	37.1	37	67	30	35
	Kx	AF	98.43	M5x0.8	80	73.05	7	12.70	31.8	37	67	22.5	35
	Kx	AH	63	M5x0.8	62	40	4	9	23	37	67	16.5	35
	Kx	AN	70	M5x0.8	62	50	11	14	30	37	67	22.5	35
	Kx	B6	63	M4x0.7	62	40	4	9	23	37	67	16.5	35

[1] When ordering with actuator, use order code 9 (see Ordering Information) to specify mounted gearhead size, ratio and orientation:
Gearhead size example: **F** = PS60 **G** = PS90 **H** = PS115 **J** = PV040TA **K** = PV60TA **L** = PV090TA **M** = PV115TA
Gearhead ratio and mounting orientation: (Replace "x" to specify)
1 = ratio 3:1 * **2** = ratio 5:1 **3** = ratio 10:1
* 3:1 ratio not available on "J" PV040TA gearhead
[2] Use order code 0 (see Ordering Information) to specify appropriately sized motor mounting kit.

Mounted Gearhead with Motor Mounting Kit Options

(continued from previous page)

Actuator Size	9 Order Code [1]	0 Order Code [2]	Dimensions A	B	C	D	E	F	G	LCH	LGH	MAK	MF
HMRS15	Fx	A3	100	M6x1	82	80	5	14	30	54	59.8	18	30
	Fx	AB	66.68	M4x0.7	62	38.10	4	6.35	20.8	54	59.8	16.5	30
	Fx	AC	66.68	M5x0.8	62	38.15	4	9.53	20.8	54	59.8	16.5	30
	Fx	AD	66.68	M5x0.8	62	38.15	4	9.53	31.8	54	59.8	16.5	30
	Fx	AE	98.43	M5x0.8	86.8	73.03	7	12.70	37.1	54	59.8	22.5	30
	Fx	AF	98.43	M5x0.8	86.8	73.03	7	12.70	31.8	54	59.8	22.5	30
	Fx	AH	63	M5x0.8	62	40	4	9	23	54	59.8	16.5	30
	Fx	AN	70	M5x0.8	62	50	4	14	30	54	59.8	16.5	30
	Fx	B6	63	M4x0.7	62	40	4	9	23	54	59.8	16.5	30
	Gx	A2	63	M5x0.8	90	40	3	11	23	54	69.5	20	42
	Gx	A3	100	M6x1	90	80	10	14	30	54	69.5	20	42
	Gx	A4	115	M8x1.25	100	95	10	19	40	54	69.5	28.5	42
	Gx	AB	66.68	M5x0.8	90	38.15	3	6.35	20.8	54	69.5	20	42
	Gx	AC	66.68	M5x0.8	90	38.15	3	9.53	20.8	54	69.5	20	42
	Gx	AD	66.68	M5x0.8	90	38.15	3	9.53	31.8	54	69.5	20	42
	Gx	AE	98.43	M5x0.8	90	73	10	12.70	37.1	54	69.5	20	42
	Gx	AF	98.43	M5x0.8	90	73	10	12.70	31.8	54	69.5	20	42
	Gx	AH	63	M5x0.8	90	40	3	9	23	54	69.5	20	42
	Gx	AL	100	M6x1	90	80	10	16	40	54	69.5	20	42
	Gx	AN	70	M5x0.8	90	50	10	14	30	54	69.5	20	42
	Gx	AP	90	M6x1	90	70	10	19	40	54	69.5	20	42
	Gx	B1	90	M5x0.8	90	60	10	11	23	54	69.5	20	42
	Gx	B3	95	M6x1	90	50	10	14	30	54	69.5	20	42
	Gx	B6	63	M4x0.7	90	40	3	9	23	54	69.5	20	42
	Kx	AB	66.68	M4x0.7	62	38.1	4	6.35	20.8	54	67	16.5	30
	Kx	AC	66.68	M4x0.7	62	38.1	4	9.53	20.8	54	67	16.5	30
	Kx	AD	66.68	M5x0.8	62	38.1	8.5	9.53	31.8	54	67	22.5	30
	Kx	AE	98.43	M6x1	85	73.05	10	12.70	37.1	54	67	30	30
	Kx	AF	98.43	M5x0.8	80	73.05	7	12	31.8	54	67	22.5	30
	Kx	AH	63	M5x0.8	62	40	4	9	23	54	67	16.5	30
	Kx	AN	70	M5x0.8	62	50	11	14	30	54	67	22.5	30
	Kx	B6	63	M4x0.7	62	40	4	9	23	54	67	16.5	30
	Lx	A2	63	M5x0.8	90	40	3	11	23	54	85.5	20	36
	Lx	A3	100	M6x1	90	80	10	14	30	54	85.5	20	36
	Lx	A4	115	M8x1.25	100	95	10	19	40	54	85.5	28.5	36
	Lx	AB	66.68	M4x0.7	90	38.15	3	6.35	20.8	54	85.5	20	36
	Lx	AC	66.68	M5x0.8	90	52	10	9.53	20.8	54	85.5	20	36
	Lx	AD	66.68	M5x0.8	90	52	10	9.53	31.8	54	85.5	20	36
	Lx	AE	98.43	M5x0.8	90	73.03	10	12.70	37.1	54	85.5	28.5	36
	Lx	AF	98.43	M5x0.8	90	73	10	12.70	31.8	54	85.5	20	36
	Lx	AH	63	M5x0.8	90	40	10	9	23	54	85.5		36
	Lx	AL	100	M6x1	90	80	10	16	40	54	85.5	28.5	36
	Lx	AN	70	M5x0.8	90	50	10	14	30	54	85.5	20	36
	Lx	AP	90	M6x1	90	70	10	19	40	54	85.5	28.5	36

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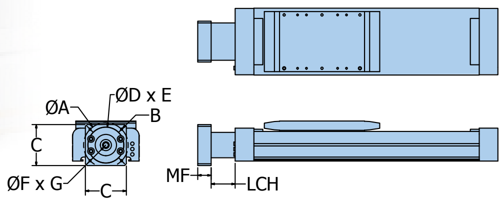
Actuator Size	⑨ Order Code [1]	⓪ Order Code [2]	A	B	C	D	E	F	G	LCH	LGH	MAK	MF
			Dimensions										
HMRS18	**Gx**	**A2**	63	M5x0.8	90	40	3	11	23	70	69.5	20	40
	Gx	**A3**	100	M6x1	90	80	10	14	30	70	69.5	20	40
	Gx	**A4**	115	M8x1.25	100	95	10	19	40	70	69.5	28.5	40
	Gx	**AB**	66.68	M5x0.8	90	38.15	3	6.35	20.8	70	69.5	20	40
	Gx	**AC**	66.68	M5x0.8	90	38.15	3	9.53	20.8	70	69.5	20	40
	Gx	**AD**	66.68	M5x0.8	90	38.15	3	9.53	31.8	70	69.5	20	40
	Gx	**AE**	98.43	M5x0.8	90	73	10	12.70	37.1	70	69.5	20	40
	Gx	**AF**	98.43	M5x0.8	90	73	10	12.70	31.8	70	69.5	20	40
	Gx	**AH**	63	M5x0.8	90	40	3	9	23	70	69.5	20	40
	Gx	**AL**	100	M6x1	90	80	10	16	40	70	69.5	20	40
	Gx	**AN**	70	M5x0.8	90	50	10	14	30	70	69.5	20	40
	Gx	**AP**	90	M6x1	90	70	10	19	40	70	69.5	20	40
	Gx	**B1**	90	M5x0.8	90	60	10	11	23	70	69.5	20	40
	Gx	**B3**	95	M6x1	90	50	10	14	30	70	69.5	20	40
	Gx	**B6**	63	M4x0.7	90	40	2.5	9	23	70	69.5	20	40
	Lx	**A2**	63	M5x0.8	90	40	3	11	23	70	85.5	20	30
	Lx	**A3**	100	M6x1	90	80	10	14	30	70	85.5	20	30
	Lx	**A4**	115	M8x1.25	100	95	10	19	40	70	85.5	28.5	30
	Lx	**AB**	66.68	M4x0.7	90	38.15	3	6.35	20.8	70	85.5	20	30
	Lx	**AC**	66.68	M5x0.8	90	52	10	9.53	20	70	85.5	20	30
	Lx	**AD**	66.68	M5x0.8	90	52	10	9.53	31	70	85.5	20	30
	Lx	**AE**	98.43	M5x0.8	90	73.03	10	12.70	37.1	70	85.5	28.5	30
	Lx	**AF**	98.43	M5x0.8	90	73	10	12.70	31.8	70	85.5	20	30
	Lx	**AH**	63	M5x0.8	90	40	10	9	23	70	85.5		30
	Lx	**AL**	100	M6x1	90	80	10	16	40	70	85.5	28.5	30
	Lx	**AN**	70	M5x0.8	90	50	10	14	30	70	85.5	20	30
	Lx	**AP**	90	M6x1	90	70	10	19	40	70	85.5	28.5	30
HMRS24	**Hx**	**A4**	115	M8x1.25	115	95	10	19	50	85	90.2	24	40
	Hx	**AF**	98.40	M5x0.8	115	73.03	10	12.70	31.8	85	90.2	24	40
	Hx	**AK**	130	M8x1.25	115	110	10	19	40	85	90.2	24	40
	Hx	**AL**	100	M6x1	115	80	10	16	40	85	90.2	24	40
	Hx	**AQ**	165	M10x1.5	140	130	10	28	60	85	90.2	35	40
	Hx	**AP**	90	M6x1	115	70	10	19	40	85	90.2	24	40
	Mx	**A4**	115	M8x1.25	115	95.05	10	19	50	85	110	24	40
	Mx	**AF**	98.40	M5x0.8	115	73	10	12.70	31.8	85	110	24	40
	Mx	**AK**	130	M8x1.25	115	110.05	10	24	40	85	110	35	40
	Mx	**AL**	100	M6x1	115	80	10	16	40	85	110	24	40
	Mx	**AP**	90	M6x1	115	70	10	19	40	85	110	35	40

[1] When ordering with actuator, use order code ⑨ (see Ordering Information) to specify mounted gearhead size, ratio and orientation:
Gearhead size example: **F** = PS60 **G** = PS90 **H** = PS115 **J** = PV040TA **K** = PV60TA **L** = PV090TA **M** = PV115TA
Gearhead ratio and mounting orientation: (Replace "x" to specify)
1 = ratio 3:1 * **2** = ratio 5:1 **3** = ratio 10:1
* 3:1 ratio not available on "J" PV040TA gearhead

[2] Use order code ⓪ (see Ordering Information) to specify appropriately sized motor mounting kit.

Motor Mounting Kit Options

Gearhead Mounting Kits include a coupling housing, coupling, and flange.



A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
MF = Motor flange

Actuator Size	0 Order Code [1]	Dimensions A	B	C	D	E	F	G	LCH	MF
HMRS08	**A2**	63	M5x0.8	60	40	10	11	23	28	20
	AB	66.68	M4x0.7	60	38.10	10	6.35	20.8	28	20
	AC	66.68	M5x0.8	60	38.10	10	9.53	20.8	28	20
	AD	66.68	M5x0.8	60	38.10	15	9.53	31.8	28	27
	AE	98.43	M6x1	85	73.03	15	12.70	37.1	28	33
	AF	98.43	M5x0.8	85	73.03	15	12.70	31.8	28	27
	AG	75	M5x0.8	70	60	10	11	23	28	20
	AH	63	M5x0.8	60	40	10	9	23	28	20
	AN	70	M5x0.8	60	50	15	14	30	28	25
	B0	75	M6x1	70	60	15	14	30	28	25
	B1	90	M5x0.8	75	60	10	11	23	28	20
	B2	90	M5x0.8	75	60	15	14	30	28	25
	B3	95	M6x1	80	50	15	14	30	28	25
	B6	63	M4x0.7	60	40	10	9	23	28	20
	B7	70	M5x0.8	60	50	15	8	30	28	25
	B8	70	M5x0.8	60	50	15	12	30	28	25
HMRS11	**A2**	63	M5x0.8	60	40	5	11	23	37	15
	AB	66.68	M4x0.7	60	38.10	10	6.35	20.8	37	15
	AC	66.68	M5x0.8	60	38.10	10	9.53	20.8	37	15
	AD	66.68	M5x0.8	60	38.10	15	9.53	31.8	37	25
	AE	98.43	M6x1	85	73.03	20	12.70	37.1	37	33
	AF	98.43	M5x0.8	85	73.03	15	12.70	31.8	37	27
	AG	75	M5x0.8	70	60	10	11	23	37	20
	AH	63	M5x0.8	60	40	5	9	23	37	15
	AL	100	M6x1	92	80	15	16	40	37	36
	AN	70	M5x0.8	60	50	15	14	30	37	25
	B0	75	M6x1	70	60	15	14	30	37	25
	B1	90	M5x0.8	80	60	10	11	23	37	20
	B2	90	M5x0.8	80	60	15	14	30	37	25
	B3	95	M6x1	80	50	15	14	30	37	25
	B7	70	M5x0.8	60	50	15	8	30	37	25
	B8	70	M5x0.8	60	50	15	12	30	37	25

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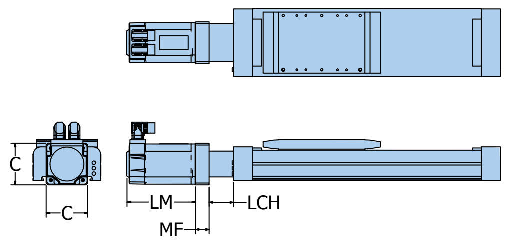
HMRS15	**A2**	63	M5x0.8	84	40	3	11	23	54	20
	A3	100	M6x1	92	80	5	14	30	54	20
	A4	115	M8x1.25	100	95	15	19	40	54	30
	AE	98.43	M6x1	85	73.03	15	12.70	37.1	54	25
	AF	98.43	M5x0.8	85	73.03	10	12.70	31.8	54	20
	AL	100	M6x1	92	80	15	16	40	54	30
	AN	70	M5x0.8	85	50	5	14	30	54	20
	AP	90	M6x1	84	70	15	19	40	54	30
	B0	100	M6x1	85	60	5	14	30	54	20
	B2	90	M5x0.8	85	60	5	14	30	54	20
HMRS18	**A3**	100	M6x1	92	80	5	14	30	70	20
	A4	115	M8x1.25	100	95	15	19	40	70	30
	AF	98.43	M5x0.8	90	73.03	10	12.70	31.8	70	20
	AK	130	M8x1.25	115	110	25	24	40	70	40
	AL	100	M6x1	92	80	15	16	40	70	30
	AP	90	M6x1	90	70	15	19	40	70	30
	B0	75	M6x1	90	60	10	14	30	70	20
	B2	90	M6x1	90	60	10	14	30	70	20
HMRS24	**A4**	115	M8x1.25	110	95	5	19	50	85	20
	AK	130	M8x1.25	115	110	5	24	40	85	20

[1] When ordering with actuator, use order code 0 to specify appropriately sized motor mounting kit. See Ordering Information.

Direct Motor Mount Options

Direct Motor Mounting options include a coupling housing, coupling, and flange.



C = Square dimension
LCH = Length coupling housing
LM = Length motor
MF = Mounting flange

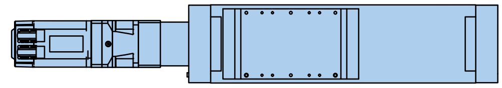
Actuator Size	9 Order Code [1]	0 Order Code [1]	Mounted Motor	C	LCH	LM	MF
HMRS08	**00**	**K0**	BE233FJ-KPSN	60	28	143.2	27
	00	**K1**	BE233FJ-KPSN with Brake (CM233FJ-115027)	60	28	178	27
	00	**K2**	BE344LJ-KPSN	85	28	188	27
	00	**K3**	BE344LJ-KPSB	85	28	231	27
	00	**K4**	PM-FBL04AMK	60	28	108.2	25
	00	**K5**	PM-FBL04AMK2 (w/ Brake)	60	28	148.2	25
HMRS11	**00**	**K0**	BE233FJ-KPSN	60	37	143.2	25
	00	**K1**	BE233FJ-KPSN with Brake (CM233FJ-115027)	60	37	178	25
	00	**K2**	BE344LJ-KPSN	85	37	188	27
	00	**K3**	BE344LJ-KPSB	85	37	231	27
	00	**K4**	PM-FBL04AMK	60	37	108.2	25
	00	**K5**	PM-FBL04AMK2 (w/ Brake)	60	37	148.2	25
	00	**M0**	MPP0923D1E-KPSN	92	37	178	36
	00	**M1**	MPP0923D1E-KPSB	92	37	212.5	36
HMRS15	**00**	**K2**	BE344LJ-KPSN	85	54	188	20
	00	**K3**	BE344LJ-KPSB	85	54	231	20
	00	**K4**	PM-FBL04AMK	85	54	108.2	20
	00	**K5**	PM-FBL04AMK2 (w/ Brake)	85	54	148.2	20
	00	**K6**	PM-FCL10AMK	84	54	152.7	30
	00	**K7**	PM-FCL10AMK2 (w/ Brake)	84	54	193	30
	00	**M0**	MPP0923D1E-KPSN	92	54	178	30
	00	**M1**	MPP0923D1E-KPSB	92	54	212.5	30
	00	**M2**	MPP1003D1E-KPSN	100	54	174.5	30
	00	**M3**	MPP1003D1E-KPSB	100	54	223	30
	00	**M4**	MPP1003R1E-KPSN	100	54	174.5	30
	00	**M5**	MPP1003R1E-KPSB	100	54	223	30

(continued from previous page)

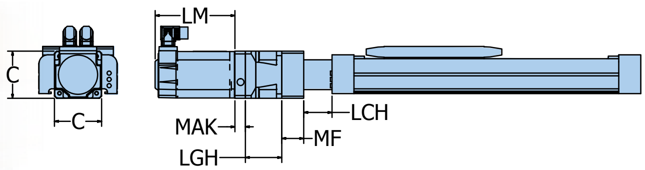
HMRS18	**00**	**K2**	BE344LJ-KPSN	90	70	188	20
	00	**K3**	BE344LJ-KPSB	90	70	231	20
	00	**K6**	PM-FCL10AMK	90	70	152.7	30
	00	**K7**	PM-FCL10AMK2 (w/ Brake)	90	70	193	30
	00	**M0**	MPP0923D1E-KPSN	92	70	178	30
	00	**M1**	MPP0923D1E-KPSB	92	70	212.5	30
	00	**M2**	MPP1003D1E-KPSN	100	70	174.5	30
	00	**M3**	MPP1003D1E-KPSB	100	70	223	30
	00	**M4**	MPP1003R1E-KPSN	100	70	174.5	30
	00	**M5**	MPP1003R1E-KPSB	100	70	223	30
	00	**M6**	MPP1154B1E-KPSN	115	70	203.2	40
	00	**M7**	MPP1154B1E-KPSB	115	70	251.7	40
	00	**M8**	MPP1154P1E-KPSN	115	70	203.2	40
	00	**M9**	MPP1154P1E-KPSB	115	70	251.7	40
HMRS24	**00**	**M2**	MPP1003D1E-KPSN	110	85	174.5	20
	00	**M3**	MPP1003D1E-KPSB	110	85	223	20
	00	**M4**	MPP1003R1E-KPSN	110	85	174.5	20
	00	**M5**	MPP1003R1E-KPSB	110	85	223	20
	00	**M6**	MPP1154B1E-KPSN	115	85	203.2	20
	00	**M7**	MPP1154B1E-KPSB	115	85	251.7	20
	00	**M8**	MPP1154P1E-KPSN	115	85	203.2	20
	00	**M9**	MPP1154P1E-KPSB	115	85	251.7	20
	00	**MA**	MPP1424C1E-KPSN	142	85	223.7	30
	00	**MB**	MPP1424C1E-KPSB	142	85	275.3	30
	00	**MC**	MPP1424R1E-KPSN	142	85	223.7	30
	00	**MD**	MPP1424R1E-KPSB	142	85	275.3	30

[1] When ordering with actuator, use order code 9 to specify no gearhead mounting kit, and order code 0 to specify mounted motor. See Ordering Information.

Mounted Gearhead and Motor Options



Mounted Gearhead and Motor options include a coupling housing, flange, and gearhead with coupler, flange, and motor.



C = Square dimension
LCH = Length coupling housing
LGH = Length gearhead
LM = Length motor
MAK = Motor adapter kit
MF = Mounting flange

Actuator Size	9 Order Code [1]	0 Order Code [2]	Mounted Motor	Dimensions C	LCH	LGH	LM	MAK	MF
HMRS08	Jx	K0	BE233FJ-KPSN	60	28	48.5	143.2	26	20
	Jx	K1	BE233FJ-KPSN with Brake (CM233FJ-115027)	60	28	48.5	178	26	20
HMRS11	Fx	K0	BE233FJ-KPSN	60	37	59.8	143.2	16.5	35
	Fx	K1	BE233FJ-KPSN with Brake (CM233FJ-115027)	60	37	59.8	178	16.5	35
	Fx	K2	BE344LJ-KPSN	60	37	59.8	188	22.5	35
	Fx	K3	BE344LJ-KPSB	60	37	59.8	231	22.5	35
	Fx	K4	PM-FBL04AMK	60	37	59.8	108.2	16.5	35
	Fx	K5	PM-FBL04AMK2 (w/ Brake)	60	37	59.8	148.2	16.5	35
	Jx	K0	BE233FJ-KPSN	60	37	48.5	143.2	26	20
	Jx	K1	BE233FJ-KPSN with Brake (CM233FJ-115027)	60	37	48.5	178	26	20
	Kx	K0	BE233FJ-KPSN	80	37	67	143.2	22.5	35
	Kx	K1	BE233FJ-KPSN with Brake (CM233FJ-115027)	80	37	67	178	22.5	35
	Kx	K2	BE344LJ-KPSN	80	37	67	188	22.5	35
	Kx	K3	BE344LJ-KPSB	80	37	67	231	22.5	35
	Kx	K4	PM-FBL04AMK	80	37	67	108.2	22.5	35
	Kx	K5	PM-FBL04AMK2 (w/ Brake)	80	37	67	148.2	22.5	35

[1] When ordering with actuator, use order code 9 (see Ordering Information) to specify mounted gearhead size, ratio and orientation:
Gearhead size example: **F** = PS60 **G** = PS90 **H** = PS115 **J** = PV040TA **K** = PV60TA **L** = PV090TA **M** = PV115TA
Gearhead ratio and mounting orientation: (Replace "x" to specify)
1 = ratio 3:1 * **2** = ratio 5:1 **3** = ratio 10:1
* 3:1 ratio not available on "J" PV040TA gearhead

[2] Use order code 0 (see Ordering Information) to specify appropriately sized motor mounting kit.

(continued from previous page)

Actuator Size	⑨ Order Code [1]	⓪ Order Code [2]	Mounted Motor	C	LCH	LGH	LM	MAK	MF
				Dimensions					
HMRS15	**Fx**	**K0**	BE233FJ-KPSN	85	54	59.8	143.2	16.5	30
	Fx	**K1**	BE233FJ-KPSN with Brake (CM233FJ-115027)	85	54	59.8	178	16.5	30
	Fx	**K2**	BE344LJ-KPSN	85	54	59.8	188	22.5	30
	Fx	**K3**	BE344LJ-KPSB	85	54	59.8	231	22.5	30
	Fx	**K4**	PM-FBL04AMK	85	54	59.8	108.2	16.5	30
	Fx	**K5**	PM-FBL04AMK2 (w/ Brake)	85	54	59.8	148.2	16.5	30
	Gx	**K2**	BE344LJ-KPSN	90	54	69.5	188	20	42
	Gx	**K3**	BE344LJ-KPSB	90	54	69.5	231	20	42
	Gx	**K6**	PM-FCL10AMK	90	54	69.5	152.7	20	42
	Gx	**K7**	PM-FCL10AMK2 (w/ Brake)	90	54	69.5	193	20	42
	Gx	**M0**	MPP0923D1E-KPSN	90	54	69.5	178	20	42
	Gx	**M1**	MPP0923D1E-KPSB	90	54	69.5	212.5	20	42
	Gx	**M2**	MPP1003D1E-KPSN	90	54	69.5	174.5	28.5	42
	Gx	**M3**	MPP1003D1E-KPSB	90	54	69.5	223	28.5	42
	Gx	**M4**	MPP1003R1E-KPSN	90	54	69.5	174.5	28.5	42
	Gx	**M5**	MPP1003R1E-KPSB	90	54	69.5	223	28.5	42
	Kx	**K0**	BE233FJ-KPSN	84	54	67	143.2	22.5	30
	Kx	**K1**	BE233FJ-KPSN with Brake (CM233FJ-115027)	84	54	67	178	22.5	30
	Kx	**K2**	BE344LJ-KPSN	84	54	67	188	22.5	30
	Kx	**K3**	BE344LJ-KPSB	84	54	67	231	22.5	30
	Kx	**K4**	PM-FBL04AMK	84	54	67	108.2	22.5	30
	Kx	**K5**	PM-FBL04AMK2 (w/ Brake)	84	54	67	148.2	22.5	30
	Lx	**K2**	BE344LJ-KPSN	92	54	85.5	188	20	36
	Lx	**K3**	BE344LJ-KPSB	92	54	85.5	231	20	36
	Lx	**K6**	PM-FCL10AMK	92	54	85.5	152.7	28.5	36
	Lx	**K7**	PM-FCL10AMK2 (w/ Brake)	92	54	85.5	193	28.5	36
	Lx	**M0**	MPP0923D1E-KPSN	92	54	85.5	178	28.5	36
	Lx	**M1**	MPP0923D1E-KPSB	92	54	85.5	212.5	28.5	36
	Lx	**M2**	MPP1003D1E-KPSN	92	54	85.5	174.5	28.5	36
	Lx	**M3**	MPP1003D1E-KPSB	92	54	85.5	223	28.5	36
	Lx	**M4**	MPP1003R1E-KPSN	92	54	85.5	174.5	28.5	36
	Lx	**M5**	MPP1003R1E-KPSB	92	54	85.5	223	28.5	36

[1] When ordering with actuator, use order code ⑨ (see Ordering Information) to specify mounted gearhead size, ratio and orientation:
Gearhead size example: **F** = PS60 **G** = PS90 **H** = PS115 **J** = PV040TA **K** = PV60TA **L** = PV090TA **M** = PV115TA
Gearhead ratio and mounting orientation: (Replace "x" to specify)
1 = ratio 3:1 * **2** = ratio 5:1 **3** = ratio 10:1
* 3:1 ratio not available on "J" PV040TA gearhead
[2] Use order code ⓪ (see Ordering Information) to specify appropriately sized motor mounting kit.

(continued next page)

Mounted Gearhead and Motor Options

(continued from previous page)

Actuator Size	⑨ Order Code [1]	⓪ Order Code [2]	Mounted Motor	Dimensions C	LCH	LGH	LM	MAK	MF
HMRS18	Gx	K2	BE344LJ-KPSN	100	70	69.5	188	20	40
	Gx	K3	BE344LJ-KPSB	100	70	69.5	231	20	40
	Gx	K6	PM-FCL10AMK	100	70	69.5	152.7	20	40
	Gx	K7	PM-FCL10AMK2 (w/ Brake)	100	70	69.5	193	20	40
	Gx	M0	MPP0923D1E-KPSN	100	70	69.5	178	20	40
	Gx	M1	MPP0923D1E-KPSB	100	70	69.5	212.5	20	40
	Gx	M2	MPP1003D1E-KPSN	100	70	69.5	174.5	28.5	40
	Gx	M3	MPP1003D1E-KPSB	100	70	69.5	223	28.5	40
	Gx	M4	MPP1003R1E-KPSN	100	70	69.5	174.5	28.5	40
	Gx	M5	MPP1003R1E-KPSB	100	70	69.5	223	28.5	40
	Lx	K2	BE344LJ-KPSN	92	70	85.5	188	20	30
	Lx	K3	BE344LJ-KPSB	92	70	85.5	231	20	30
	Lx	K6	PM-FCL10AMK	92	70	85.5	152.7	28.5	30
	Lx	K7	PM-FCL10AMK2 (w/ Brake)	92	70	85.5	193	28.5	30
	Lx	M0	MPP0923D1E-KPSN	92	70	85.5	178	28.5	30
	Lx	M1	MPP0923D1E-KPSB	92	70	85.5	212.5	28.5	30
	Lx	M2	MPP1003D1E-KPSN	92	70	85.5	174.5	28.5	30
	Lx	M3	MPP1003D1E-KPSB	92	70	85.5	223	28.5	30
	Lx	M4	MPP1003R1E-KPSN	92	70	85.5	174.5	28.5	30
	Lx	M5	MPP1003R1E-KPSB	92	70	85.5	223	28.5	30
HMRS24	Hx	M6	MPP1154B1E-KPSN	115	85	90.2	203.2	24	40
	Hx	M7	MPP1154B1E-KPSB	115	85	90.2	251.7	24	40
	Hx	M8	MPP1154P1E-KPSN	115	85	90.2	203.2	24	40
	Hx	M9	MPP1154P1E-KPSB	115	85	90.2	251.7	24	40
	Hx	MA	MPP1424C1E-KPSN	115	85	90.2	223.7	35	40
	Hx	MB	MPP1424C1E-KPSB	115	85	90.2	275.3	35	40
	Hx	MC	MPP1424R1E-KPSN	115	85	90.2	223.7	35	40
	Hx	MD	MPP1424R1E-KPSB	115	85	90.2	275.3	35	40
	Mx	M6	MPP1154B1E-KPSN	125	85	110	203.2	35	40
	Mx	M7	MPP1154B1E-KPSB	125	85	110	251.7	35	40
	Mx	M8	MPP1154P1E-KPSN	125	85	110	203.2	35	40
	Mx	M9	MPP1154P1E-KPSB	125	85	110	251.7	35	40

[1] When ordering with actuator, use order code ⑨ (see Ordering Information) to specify mounted gearhead size, ratio and orientation:
Gearhead size example: **F** = PS60 **G** = PS90 **H** = PS115 **J** = PV040TA **K** = PV60TA **L** = PV090TA **M** = PV115TA
Gearhead ratio and mounting orientation: (Replace "x" to specify)
1 = ratio 3:1 * **2** = ratio 5:1 **3** = ratio 10:1
* 3:1 ratio not available on "J" PV040TA gearhead

[2] Use order code ⓪ (see Ordering Information) to specify appropriately sized motor mounting kit.

Limit & Home Sensors

The HMR uses Parker's Global Sensor line, which can be mounted in the longitudinal t-slots running along the actuator body. These sensors mount flush to the extrusion body, minimizing the overall width of the actuator.

Parker's Global Sensors feature short circuit protection, power up pulse protection, and reverse polarity protection.

The sensor cable can be concealed under the yellow T-slot covers which are provided with each unit.

For internally configured sensors, the cables are routed internally and exit and the end cap of the unit through industrially hardened M8 connectors.

In the event internal sensors are configured, they cannot be re-positioned in the field. The pre-set location is configured in the part number model code. Please consult factory for further assistance.

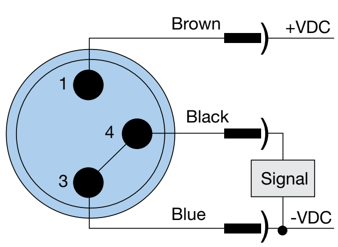
Permanent magnets integrated into the carriage assembly actuate the sensors as the carriage traverses it linear travel.

All actuators pre-configured with a sensor pack, come pre-configured with a 5 meter extension cable, with flying leads.

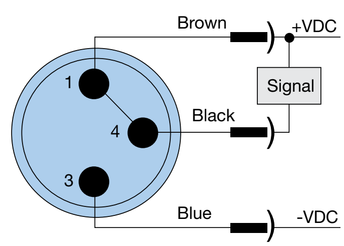
Common Specifications:

Electric current drain: 100 mA (max)
Switching current: 10 mA (max)
Supply voltage: 10 – 30 VDC
Switching Frequency: 1 kHz

PNP Wiring



NPN Wiring

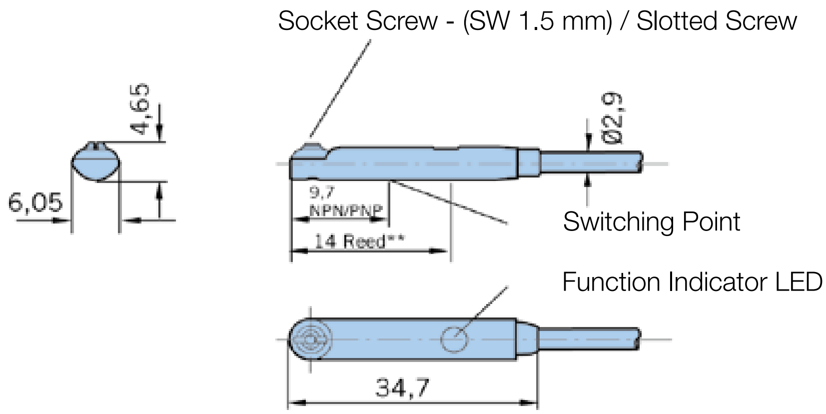


Magnetic LED Cylinder Sensors

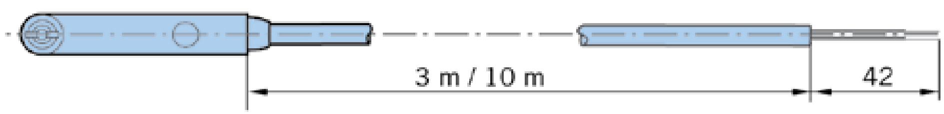
Model Number	Function	Logic	Cable
P8S-GPFAX	N.O.	PNP	3 m
P8S-GNFAX		NPN	
P8S-GPCHX		PNP	0.3 m cable with M8 connector*
P8S-GNCHX		NPN	
P8S-GQFAX	N.C.	PNP	3 m
P8S-GMFAX		NPN	
P8S-GQCHX		PNP	0.3 m cable with M8 connector*
P8S-GMCHX		NPN	

* 003-2918-01 is a 5 m extension cable to flying leads for these cables

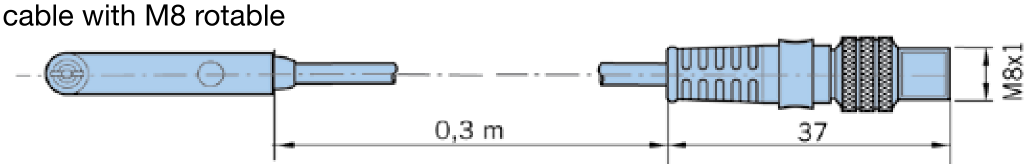
Limit & Home Sensor Dimensions



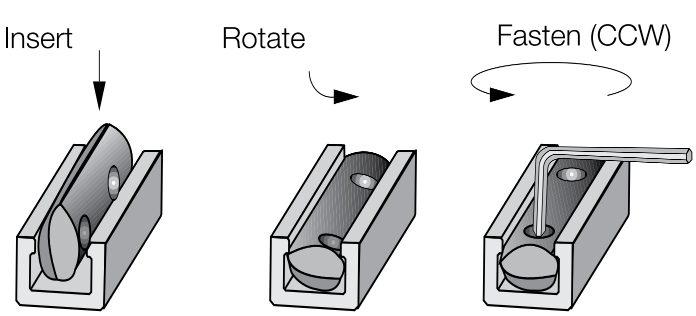
P8S-... cable with flying leads



P8S-... cable with M8 rotable



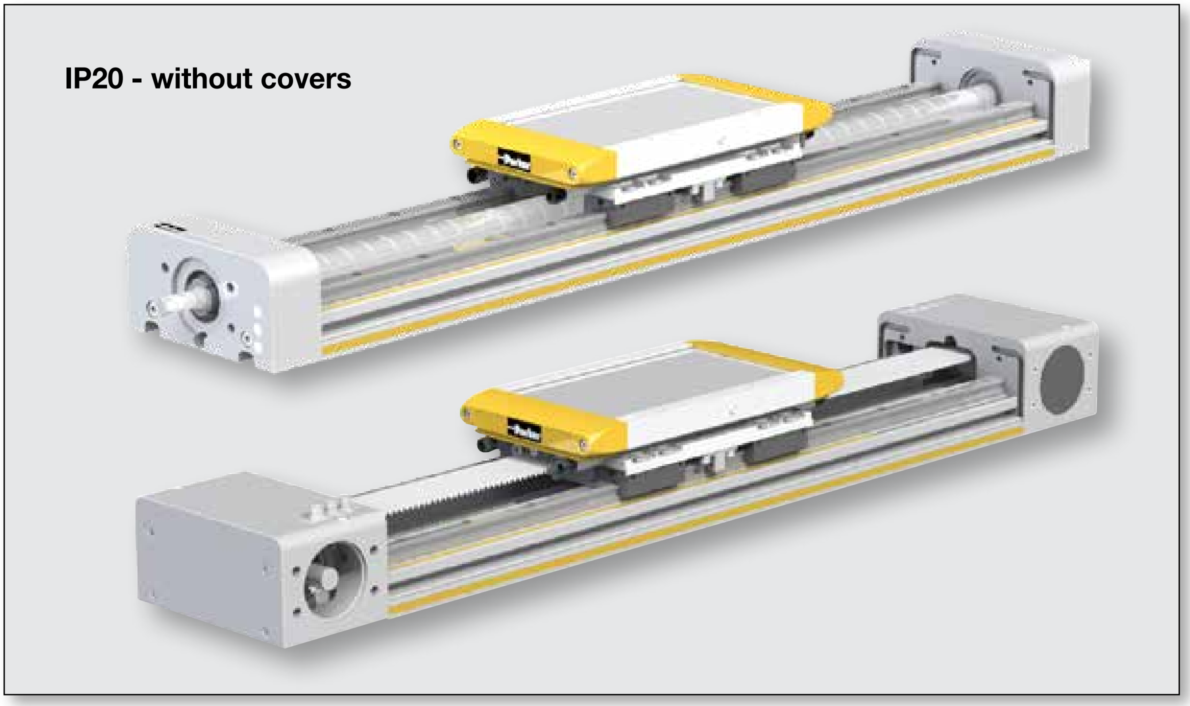
Installation for Magnetic T-Slot Sensors



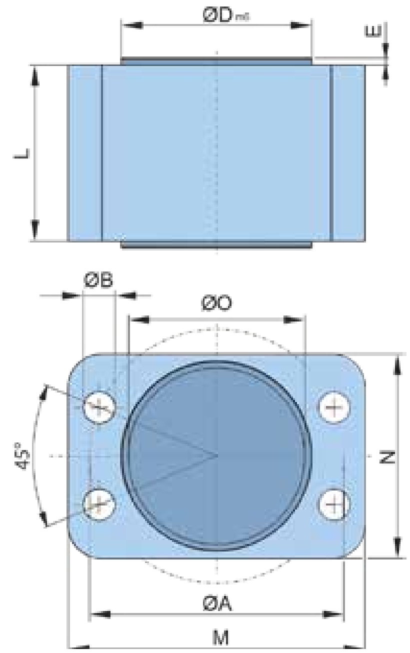
Protective Cover Options

Two versions available: Covers can be field retrofitted if initially configured without covers.

Consult maintenance manual or factory support for assistance in specifying replacement covers and installation procedures.



Coupling Housing



Dimension table - Coupling housing long HMRS / HMRB [mm]

Product size	Ø A	Ø B	Ø D_{m6}	E	Ø O	L	M	N	Order no.
HMRx08 (1)	42	4.5	34	2	30	28	49	37	56568FIL
HMRx11 (1)	51	6.6	39	1	35	37	60	42	56566FIL
HMRx15 (1)	72	9.0	54	2	50	54	84	58	50353FIL
HMRx18 (1)	80	9.0	64	2	60	70	90	68	50655FIL
HMRx24 (1)	95	11.0	80	2	77	85	107	85	56415FIL

(1)Suitable for all types of HMRS

(1)Suitable for HMRB with motor orientation 000° top
(HMRBxxxAP; HMRBxxxAD)

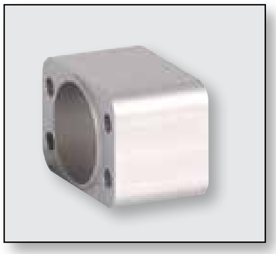
(1)Suitable for HMRB with motor orientation 180° bottom and profile version Basic
(HMRBxxBCP; HMRBxxBCD; HMRBxxCCP; HMRBxxCCD)

Dimension table - Coupling housing short HMRB [mm]

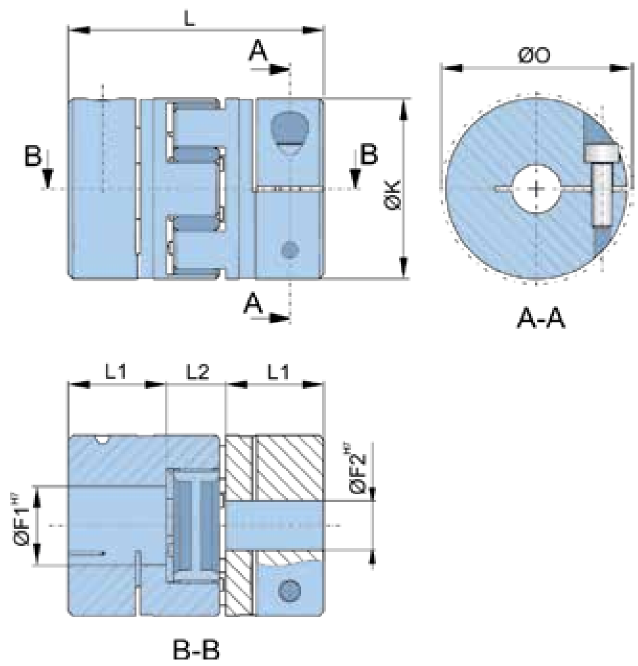
Product size	Ø A	Ø B	Ø D_{m6}	E	Ø O	L	M	N	Order no.
HMRB08 (1)	42	4.5	34	2	30	13	49	37	56567FIL
HMRB08 (2)	42	4.5	34	2	30	17	49	37	56569FIL
HMRB11 (1) (2)	51	6.6	39	1	35	15	60	42	56565FIL
HMRB15 (1) (2)	72	9.0	54	2	50	30	84	58	56412FIL
HMRB18 (1) (2)	80	9.0	64	2	60	42	90	68	56413FIL
HMRB24 (1) (2)	95	11.0	80	2	77	60	107	85	56414FIL

(1)Suitable for HMRB with motor orientation 090° front and 270° rear
(HMRBxxxBD; HMRBxxxDD)

(2)Suitable for HMRB with motor orientation 180° bottom re-inforced profile
(HMRBxxRCP; HMRBxxRCD; HMRBxxSCP; HMRBxxSCD)



Coupling



Ball screw

Dimension table - motor coupling HMRS [mm]

Product size	F_1	F_2	F	K	L	L_1	L_2	Ø O	Order no.
HMRS08	6	9	5 - 12	25	34	11	12	27.5	56562FIL
HMRS11	10	9	6 - 16	30	35	11	13	32.5	13210FIL
HMRS15	12	9	8 - 24	40	66	25	16	58.0	56400FIL
HMRS18	15	14	10 - 28	55	78	30	18	68.0	56402FIL
HMRS24	20	14	14 - 38	65	90	35	20	73.0	56510FIL

Belt

Dimension table - motor coupling HMRB [mm]

Product size	F_1	F_2	F	K	L	L_1	L_2	Ø O	Order no.
HMRB08	10	9	5 - 12	25	34	11	12	27.5	56563FIL
HMRB11	12	9	6 - 16	30	35	11	13	32.5	56560FIL
HMRB15	15	10	8 - 24	40	66	25	16	58.0	16239FIL
HMRB18	18	14	10 - 28	55	78	30	18	68.0	56411FIL
HMRB24	24	15	14 - 38	65	90	35	20	73.0	16260FIL

Shock Absorbing Bumper

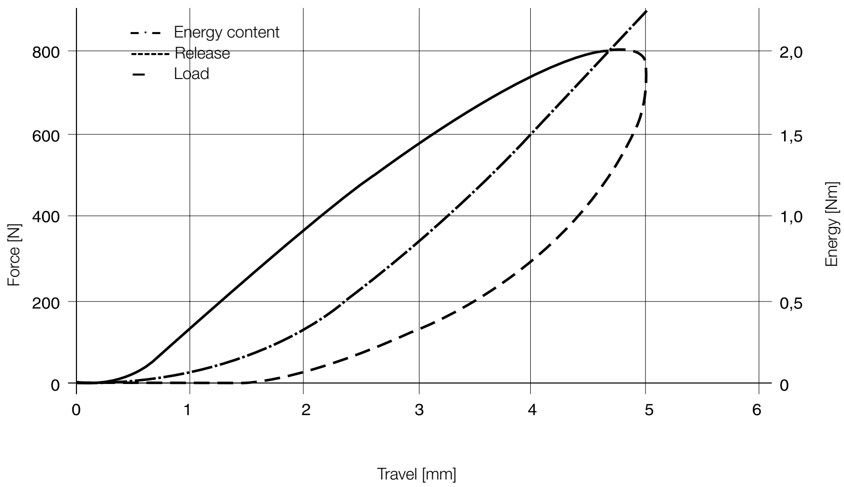
HMR actuators come factory installed with impact protection bumpers. These carriage-mounted bumpers can compensate the energy released by unintentional impact and afford some protection against mechanical damage.

Two bumpers (four total) are fitted to each side of the carriage.

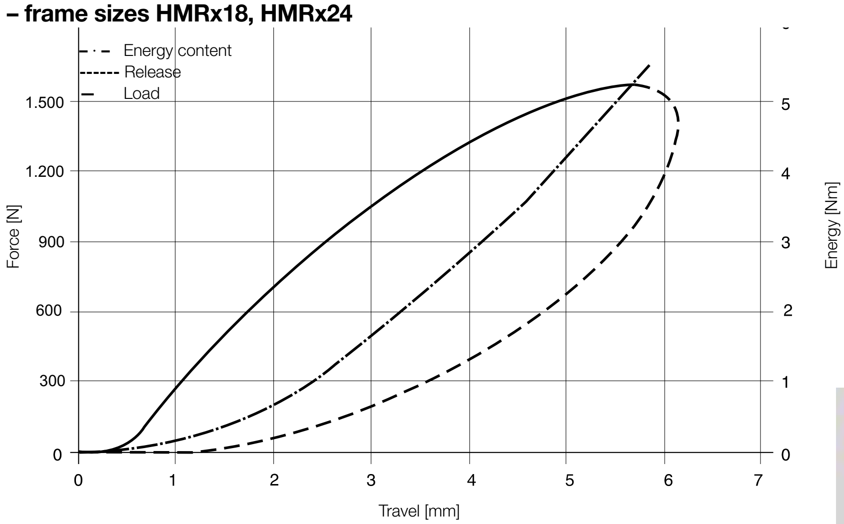
Shock absorbers for impact protection

Product size	HMRx08	HMRx11	HMRx15	HMRx18	HMRx24
Shock absorber	TA12-5	TA12-5	TA12-5	TA17-7	TA17-7
Energy absorption [Nm/stroke]	3.0	3.0	3.0	8.5	8.5

Distance-force and energy-distance characteristic curve (dynamic) – frame sizes HMRx08, HMRx11, HMRx15



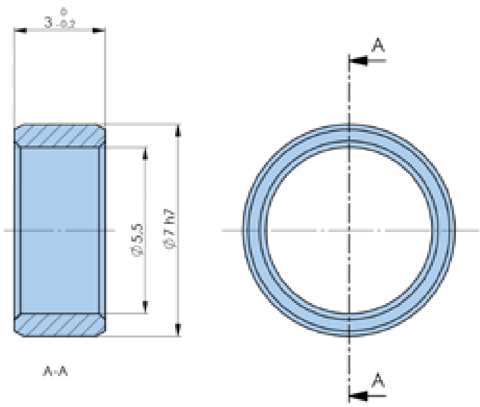
Distance-force and energy-distance characteristic curve (dynamic) – frame sizes HMRx18, HMRx24



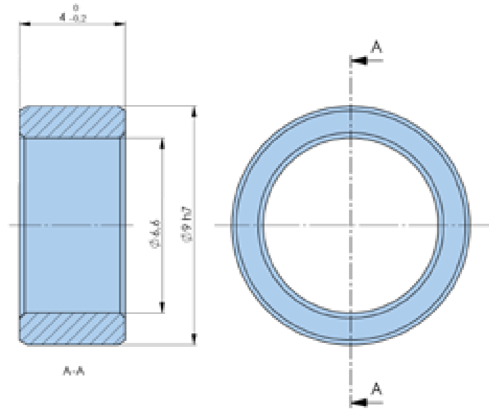
Dowel Sleeves

Dowel sleeves can be used to provide pinning functionality between the carriage mounting surface and the payload. These sleeves have a tightly toleranced outer diameter to accurately locate between the bore in the carriage and the end effector, but have a hollow center granting access to the threaded hole in the carriage underneath the pin bore. This means that these dowel pin bore can additionally function as a threaded connection to the carriage. See Dimensions for carriage mounting detail.

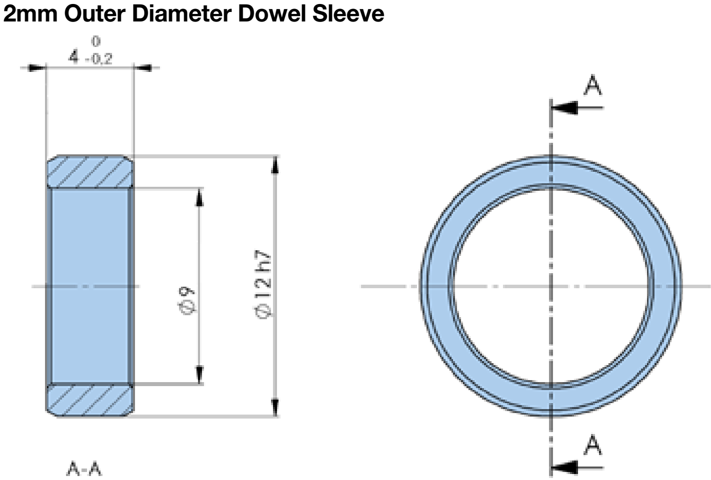
7mm Outer Diameter Dowel Sleeve



9mm Outer Diameter Dowel Sleeve

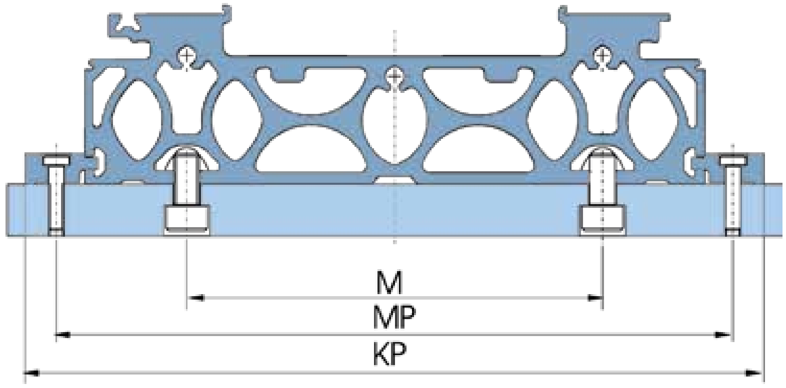


12mm Outer Diameter Dowel Sleeve



Part Number	Description	HMR Frame Size
56455FIL	7mm Dowel Sleeve- 4 Pack	HMRx08, HMRx11, HMRx15
56456FIL	7mm Dowel Sleeve- 10 Pack	HMRx08, HMRx11, HMRx15
56457FIL	9mm Dowel Sleeve- 4 Pack	HMRx18
56458FIL	9mm Dowel Sleeve- 10 Pack	HMRx18
56459FIL	12mm Dowel Sleeve- 4 Pack	HMR24

Actuator Mounting



Dimension table - Product width HMR [mm]

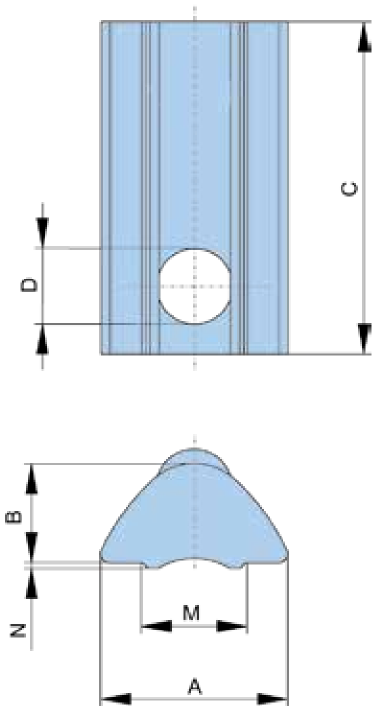
	Toe-clamp mounting (mm)		T-nut mounting (mm)
Product size	**MP**	**KP**	**M**
HMRx08	97	115	50
HMRx11	122	140	70
HMRx15	170	190	96
HMRx18	202	226	116
HMRx24	262	286	161

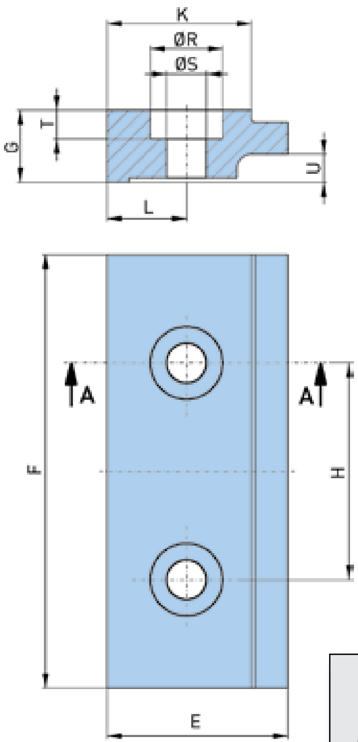
Holding force per mounting set [N]

	Toe-clamp				T-nut			
Product size	In longitudinal direction of the actuator*	Screw 2x	Tightening torque [Nm]	Max. load per screw	In longitudinal direction of the actuator*	Screw 1x	Tightening torque [Nm]	Max. load per screw
HMRx08	800	M4	3	900	1,000	M5	6	1,200
HMRx11	800	M4	3	900	1,000	M5	6	1,200
HMRx15	1,820	M5	6	1,200	1,600	M6	10	1,700
HMRx18	2,610	M6	10	1,700	2,700	M8	20	3,400
HMRx24	2,610	M6	10	1,700	3,200	M10	40	5,500

*A friction factor of 0.15 between profile and mounting surface was taken as a basis for the calculation of the forces that can be transmitted in longitudinal direction, Screw property class 8.8.

Actuator Mounting





Dimension table - T-nut mounting HMR [mm]

Product size	A	B	C	Ø D	M	N	Order no. *
HMRx08	8.0	4.0	11.5	M5	5.0	0.5	56351FIL
HMRx11	8.0	4.0	11.5	M5	5.0	0.5	56351FIL
HMRx15	10.5	6.4	22.5	M6	6.4	0.6	56352FIL
HMRx18	13.5	6.7	22.5	M8	8.5	1.0	56353FIL
HMRx24	16.5	8.9	28.5	M10	10.5	1.0	56354FIL

* Packing unit 10 pc

Dimension table - Toe-clamp mounting HMR [mm]

Product size	E	F	G	H	K	L	Ø R	Ø S	T	U	Order no. *
HMRx08	18.0	40.0	7.5	20.0	15.0	9.0	0.0	4.5	0.0	2.8	56363FIL
HMRx11	18.0	40.0	7.5	20.0	15.0	9.0	0.0	4.5	0.0	2.8	56363FIL
HMRx15	25.0	60.0	10.0	30.0	20.0	10.0	10.0	5.5	4.0	3.9	56355FIL
HMRx18	28.0	80.0	12.0	40.0	23.0	12.0	11.0	6.6	4.7	5.9	56356FIL
HMRx24	28.0	80.0	12.0	40.0	23.0	12.0	11.0	6.6	4.7	5.9	56356FIL

* Packing unit 1 pair (2 toe-clamps) and associated hardware

ORDERING INFORMATION
HMRS

Select an order code from each of the numbered fields to create a complete HMR screw-driven model order number. Include hyphens and non-selective characters as shown in example below.

			①	②	③	④		⑤		⑥	⑦	⑧			⑨	⓪
Order Number Example:	HMR	S	15	B	05	0	–	1000	–	A	B	1	0	0	F1	A7

① Frame Size (Profile Width)

08	85 mm
11	110 mm
15	150 mm
18	180 mm
24	240 mm

② Actuator Design (see Dimensions for further detail)

B	Basic Profile with Ball Bearing Guide, No Outer Cover
C	Basic Profile with Ball Bearing Guide, IP54 with Outer Cover
R**	Reinforced Profile with Ball Bearing Guide, No Outer Cover
S**	Reinforced Profile with Ball Bearing Guide, IP54 with Outer Cover

③ Screw lead by Frame Size (w/plain drive shaft)

05	5 mm lead for size 08, 11, 15
10	10 mm lead for size 18, 24
12	12 mm lead for size 08
16	16 mm lead for size 11
20	20 mm lead for size 15
25	25 mm lead for size 18
32	32 mm lead for size 24

④ Carriage Design

0	Standard
1	Tandem

⑤ Order Stroke

xxxx	4 digit input in mm (see max stroke by frame size in Specifications)

NOTE: If travel is less than 75mm either Home or Limit Sensors can be used, not both. If travel is less than 20mm, only a Home Sensor can be used.

⑥ Home Sensor* (one sensor)

0	No home sensor
A**	PNP, 3 Wire, N.O., Internal Mounting
K**	NPN, 3 Wire, N.O., Internal Mounting
C	PNP, 3 Wire, N.O., M8 Plug, 0.3 m Cable, External Mounting (P8S-GPCHX)
M	NPN, 3 Wire, N.O., M8 Plug, 0.3 m Cable, External Mounting (P8S-GNCHX)

*P/N 003-2918-01, 5 M extension cable included
***If internal switches are selected they cannot be manually re-positioned in the field.**
****Indicates longer lead time options**

⑦ Limit Sensor* (two sensors)

0	No home sensor
B**	PNP, 3 Wire, N.C., Internal Mounting
L*/*	NPN, 3 Wire, N.C., Internal Mounting
D	PNP, 3 Wire, N.C., M8 Plug, 0.3 m Cable, External Mounting (P8S-GQCHX)
N	NPN, 3 Wire, N.C., M8 Plug, 0.3 m Cable, External Mounting (P8S-GMCHX)

*P/N 003-2918-01, 5 M extension cable included
***If internal switches are selected they cannot be manually re-positioned in the field.**

⑧ Limit/Home Sensor Position*

0	No Home Sensor
1	10 mm
2	20 mm
3	30 mm
4	40 mm
5	50 mm
6	60 mm
7	70 mm
8	80 mm
9	90 mm
A	100 mm
B	110 mm
C	120 mm
D	130 mm
E	140 mm
F	150 mm
G	160 mm
H	170 mm
J	180 mm
K	190 mm
L	200 mm

*If limit and home sensors selected, this is the distance that limit sensors are positioned from both ends, home sensor positioned 50mm from limit sensor at drive end. If only home sensor selected, it is positioned this distance from the drive end.

⑨ Mounted Gearheads

(see Options & Accessories for frame size availability and dimensions)

⓪ Gearhead and Motor Mounting Kits

Gearhead Mounting Kit
(see Options & Accessories for availability and dimensions)

Motor Mounting Kit (Including Flange and Coupling For Direct Drive Motor or Flange on Mounted Gearhead
(see Options & Accessories for availability and dimensions)

Mounted Motor (Mated to Mounted Gearhead
(see Options & Accessories for availability and dimensions)

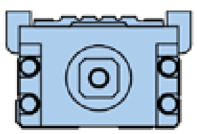
XE Series Positioners

Dependable, Cost-Effective Positioning

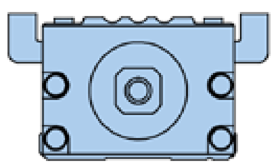
- **Integrated bearing and carriage assembly**
- **Rigid U-channel, steel body**
- **High force per dollar value**
- **Easily adapted into multi-axis configuration**
- **Small package size as compared to actuators with separate bearing arrangements**

Key Design Advantages

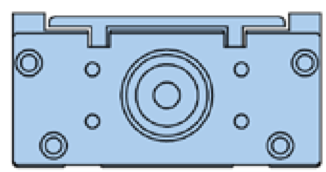
- **Integrated precision screw and linear guidance**
- **Flexible motor mounting options**
- **Rigid steel U-Channel body**
- **Packaged adjustable limit sensors**
- **Precision ballscrew drive train**



401XE



402XE



403XE

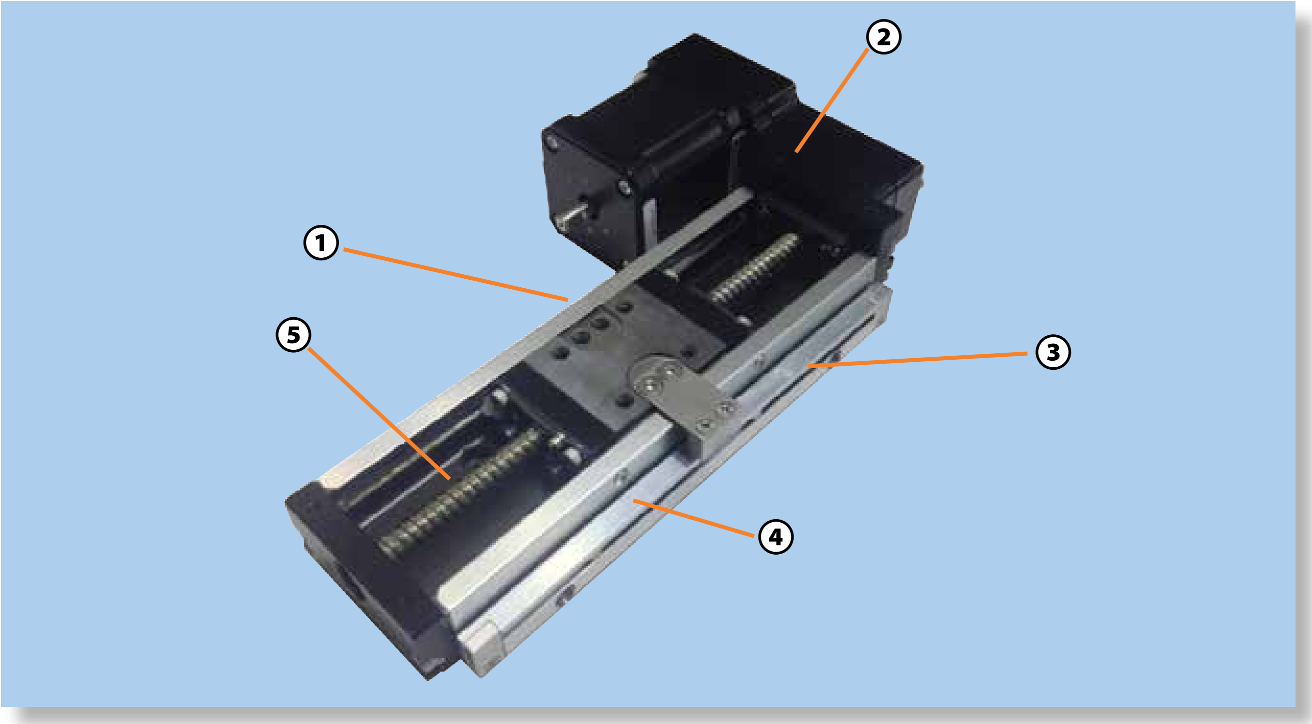
	401XE	402XE	403XE
Maximum Travel (mm)	160	220	655
Maximum Payload (N)	156	882	1,569
Maximum Acceleration (m/s²)	20	20	20

Parker's XE series, mono-carrier style linear positioners combine a rugged steel body with an integrated precision ball screw and bearing guide – producing a highly accurate, cost-effective line of linear positioners.

The XE series is the ideal linear positioner for applications in the manufacturing of electronics, semi-conductors, or life science applications requiring high precision, long life and compact packaging.

OEM's looking to produce machines that position moderate payloads with tight space constraints should look no further than the XE series of linear positioners. The XE series has superior load-life characteristics

The XE Series offers complete flexibility, from motor-mounting options to cleanroom compatibility and a variety of offerings in between. Whether the application calls for a hardcover protection for the linear guide, cleanroom compatible solutions, custom motors mounted at the factory, or an aesthetically appealing engineered limit sensor package, the 401/402/403XE can be customized to fit the task at hand. when compared to a lead screw driven positioner in similar packaging. The mono-carrier style arrangement of the XE series gives it the highest payload per packaging of any Parker ball screw driven linear stage.



① **Integrated Precision Screw and Linear Guidance**

Bearing provides a low profile, high accuracy, smooth motion, and robust adjustment free design over the life of the actuator.

② **Flexible Motor Mounting Options**

Provides a variety of motor drive options, including servo and stepper motors, which can either be mounted inline or parallel to the stage.

③ **Rigid Steel U-Channel Body**

Provides structural rigidity for minimal deflection. With the steel U channel body and integrated bearing design, the structural rigidity of the 401/402/403XE is significantly stiffer than most aluminum body positioners. The increased stiffness results in reduced overall cost due to the elimination of support structures.

④ **Packaged Adjustable Limit Sensors**

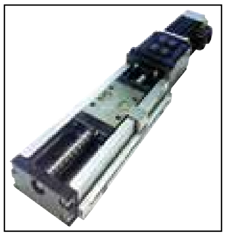
Provide adjustable stroke lengths, easily connected, fewer cables to manage, and no pinch points in an aesthetically pleasing manner.

⑤ **Precision Ballscrew Drive Train**

Provides smooth motion with high accuracy and high mechanical efficiency.

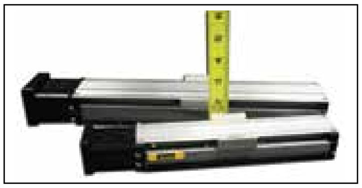
Motor Mounting Flexibility

With standard inline and parallel motor mounting options for the NEMA 11, NEMA 17, NEMA 16, NEMA 23, and other Parker Automation motors, the XE Series allows the user to select the motor of their choice without being restricted to one model. To further customize the application solution, the 401/402/403XE can be ordered ready to mount onto most other manufacturers' motors as well.



Low-Profile Design

The highly integrated ballscrew and guide bearing design allows for a greatly reduced overall height when compared to traditional stacking of a bearing and screw assembly. This results in a more compact footprint.



Hardcover Protection

or added protection to the bearing system and drive train, an optional hardcover is available. This will bring the positioner to an IP20 rating and prevent large particles from entering and damaging the screw or bearings.

SPECIFICATIONS

The XE series combines a rugged steel body construction with an integrated precision ball screw and bearing guide producing a highly accurate, cost effective line of tables ideal for applications in the hard disk, semiconductor, medical, machine building and many other industries.

		401	402		403	
Series	**Units**	**2 mm lead**	**2 mm lead**	**5 mm lead**	**5 mm lead**	**10 mm lead**
Travel (max)	mm	160	220	220	655	655
Repeatability						
Inline Motor Mount	µm	±10	±5	±5	±5	±5
Parallel Motor Mount		±30	±15	±30	±30	±60
Breakaway Torque	Nm	0.012	0.06	0.06	0.15	0.15
Maximum Input Speed	rev/sec	50	50	50	50	50
Maximum Velocity	mm/sec	100	100	250	250	500
Maximum Load (Normal and Inverted)	kg	16	90	90	160	160
Maximum Moment						
Pitch	Nm	10	46	46	101	101
Yaw		11	51	51	120	120
Roll		28	134	134	260	260
Screw Diameter	mm	6	8	8	10	10
Screw Efficiency						
Inline Motor Mount	%	90	90	90	90	90
Parallel Motor Mount		86	86	86	86	86
Linear Bearing Coefficient of Friction	-	0.01	0.01	0.01	0.01	0.01
Running Torque	Nm	0.011	0.05	0.05	0.1	0.1
Maximum Axial Load	kg	5	13	17	31	27
Moment of Inertia						
I_x of Guide Rail	mm^4	2710	14,400	14,400	38,800	38,800
I_y of Guide Rail		23,600	137,000	137,000	314,000	314,000
Weight of Carriage	kg	0.05	0.26	0.26	0.3	0.3
Maximum Acceleration	G's	2	2	2	2	2
Rated Duty Cycle	%	100	100	100	100	100

Travel-Dependent Performance Specifications

401 XE

	Performance Specification	Units	Travel Length (Order Option Code) 01	02	03
2 mm Lead	**Travel**	mm	60	110	160
	Flatness	µm	15	15	15
	Straightness	µm	15	15	15
	Accuracy				
	Inline Motor Mount	µm	65	70	75
	Parallel Motor Mount		95	100	105
	Input Inertia				
	Inline Motor Mount	kg-m² x 10^{-6}	0.122	0.171	0.224
	Parallel Motor Mount		0.327	0.376	0.429
	Weight				
	Inline Motor Mount*	kg	0.41	0.49	0.58

* Adding the parallel motor mount option adds 0.08 kg for the NEMA 11 option, and 0.10 kg for the NEMA 17 option.

402 XE

	Performance Specification	Units	Travel Length (Order Option Code) 01	02	03	04
2 mm Lead	**Travel**	mm	70	120	170	220
	Flatness	µm	15	15	15	15
	Straightness	µm	15	15	15	15
	Accuracy					
	Inline Motor Mount	µm	70	75	85	90
	Parallel Motor Mount		85	90	100	105
	Input Inertia					
	Inline Motor Mount	kg-m² x 10^{-6}	0.615	0.772	0.929	1.090
	Parallel Motor Mount		0.820	0.977	1.134	1.295
	Weight					
	Inline Motor Mount*	kg	1.19	1.40	1.60	1.81
5 mm Lead	**Travel**	mm	70	120	170	220
	Flatness	µm	15	15	15	15
	Straightness	µm	15	15	15	15
	Accuracy					
	Inline Motor Mount	µm	70	75	85	90
	Parallel Motor Mount		85	90	100	105
	Input Inertia					
	Inline Motor Mount	kg-m² x 10^{-6}	0.741	0.898	1.060	1.210
	Parallel Motor Mount		0.946	1.103	1.265	1.415
	Weight					
	Inline Motor Mount*	kg	1.19	1.40	1.60	1.81

* Adding the parallel motor mount option adds 0.11 kg for the NEMA 17 option, 0.15 kg for the NEMA 23 option, and 0.12 kg for the SM16 option.

Travel-Dependent Performance Specifications

403 XE

Lead	Performance Specification	Units	01	02	03	04	05	06	07	08
			Travel Length (Order Option Code)							
5 mm Lead	**Travel**	mm	55	105	205	305	405	505	605	655
5 mm Lead	**Flatness**	µm	15	15	15	15	25	25	25	25
5 mm Lead	**Straightness**	µm	15	15	15	15	25	25	25	25
5 mm Lead	**Accuracy**									
5 mm Lead	**Inline Motor Mount**	µm	70	80	90	95	100	110	120	130
5 mm Lead	**Parallel Motor Mount**	µm	100	110	120	125	130	140	150	160
5 mm Lead	**Input Inertia**									
5 mm Lead	**Inline Motor Mount**	kg-m^2 x 10^{-6}	1.720	2.100	2.870	3.630	4.400	5.170	5.930	6.690
5 mm Lead	**Parallel Motor Mount**	kg-m^2 x 10^{-6}	1.925	2.305	3.075	3.835	4.605	5.375	6.135	6.900
5 mm Lead	**Weight**									
5 mm Lead	**Inline Motor Mount***	kg	1.85	2.25	2.85	3.55	4.25	4.85	5.55	6.20
10 mm Lead	**Travel**	mm	55	105	205	305	405	505	605	655
10 mm Lead	**Flatness**	µm	15	15	15	15	25	25	25	25
10 mm Lead	**Straightness**	µm	15	15	15	15	25	25	25	25
10 mm Lead	**Accuracy**									
10 mm Lead	**Inline Motor Mount**	µm	70	80	90	95	100	110	120	130
10 mm Lead	**Parallel Motor Mount**	µm	130	140	150	155	160	170	180	190
10 mm Lead	**Input Inertia**									
10 mm Lead	**Inline Motor Mount**	kg-m^2 x 10^{-6}	2.500	2.880	3.650	4.420	5.180	5.950	6.700	7.100
10 mm Lead	**Parallel Motor Mount**	kg-m^2 x 10^{-6}	2.705	3.085	3.855	4.625	5.385	6.155	6.905	7.305
10 mm Lead	**Weight**									
10 mm Lead	**Inline Motor Mount***	kg	1.85	2.25	2.85	3.55	4.25	4.85	5.55	6.20

* Adding the parallel motor mount option adds 0.11 kg for the NEMA 17 motor option, 0.15 kg for the NEMA 23 option, and 0.12 kg for the SM16 option.

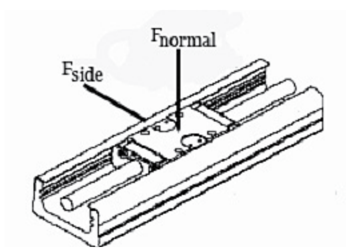
Standard XY Mounting Configurations with other XE products

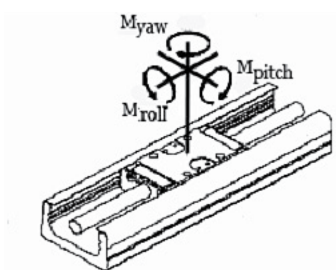
Bottom Stage	Top Stage: 401XE	402XE	403XE	404XE
401XE	X			
402XE	X	X		
403XE	X	X	X	
404XE		X	X	X

XE Series Load-Life Performance

The following performance information is provided as a supplement to the product specification pages. The useful life of a linear table at full catalog specifications is dependent on the forces acting upon it.

These forces include both static components resulting from payload weight, and dynamic components due to acceleration/deceleration of the load. In multi-axis applications, the primary positioner at the bottom of the stack usually establishes the load limits for the combined axes.

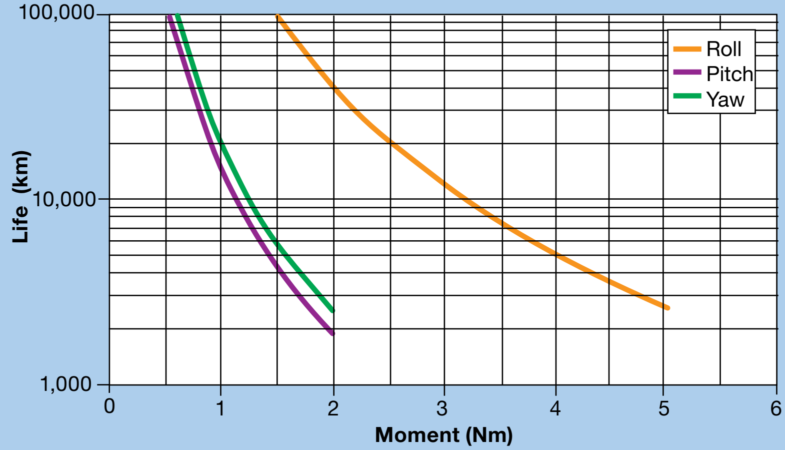




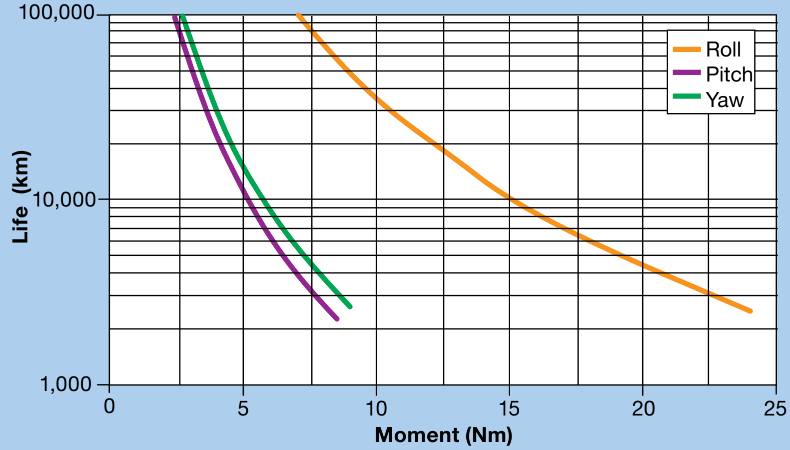
When evaluating life versus load, it is critical to include the weight of all positioning elements that contribute to the load supported by the primary axis. The following graphs are used to establish the table life relative to the applied loads. For more information, download the product manual at **parker.com/emn** or contact our applications department at (800) 245-6903.

Carriage Life with Moment

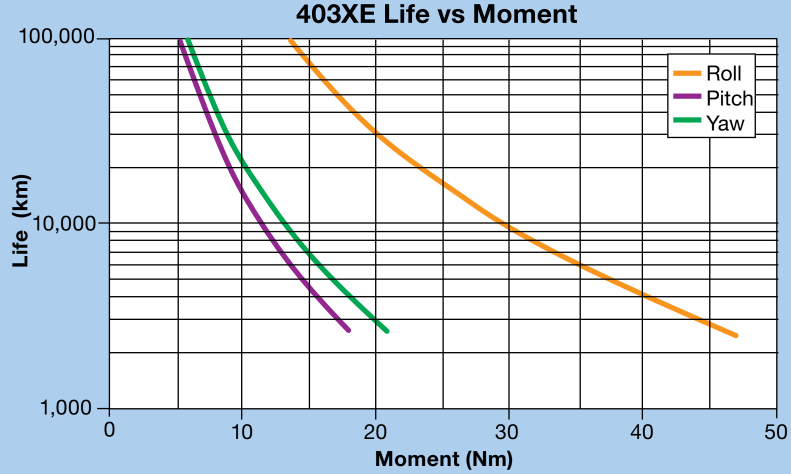
401XE Life vs Moment



402XE Life vs Moment

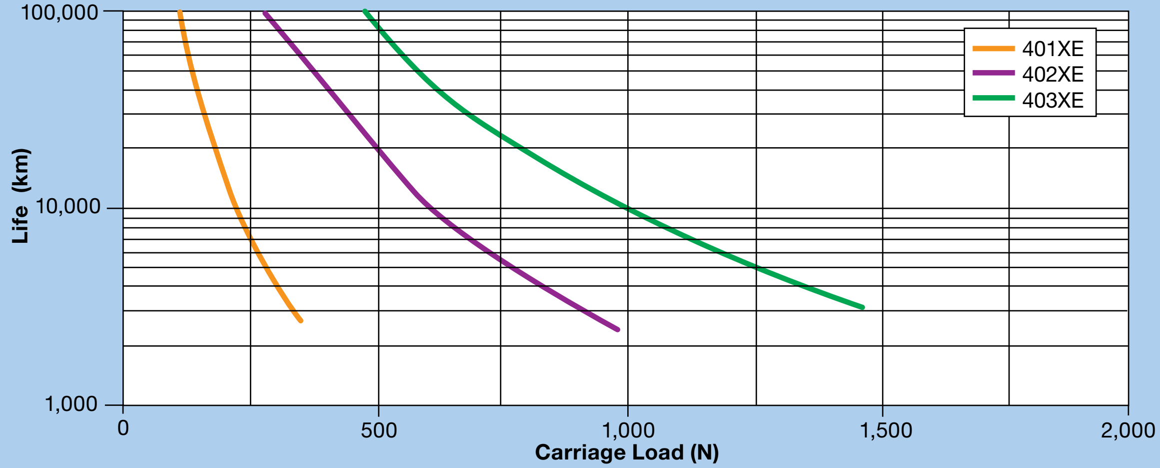


403XE Life vs Moment

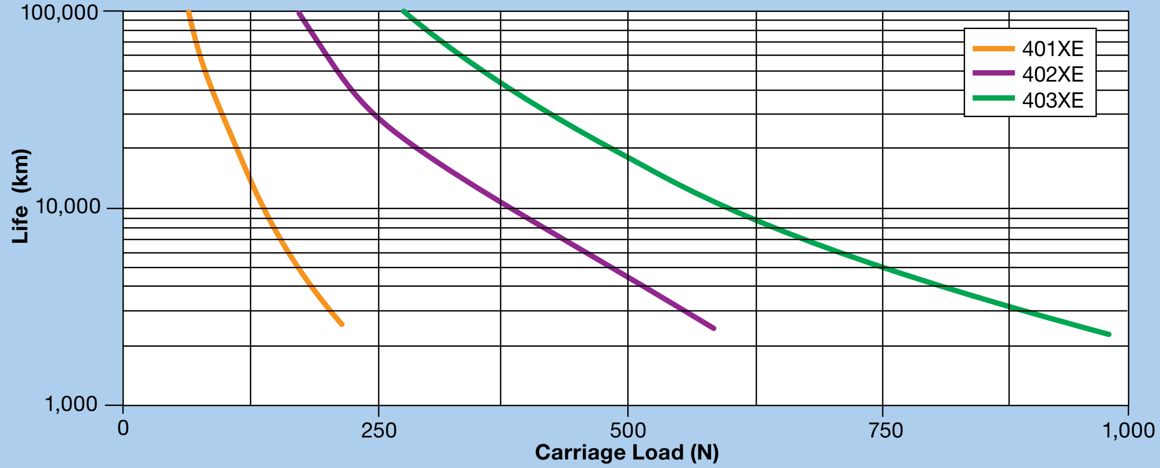


XE Series Load-Life Performance

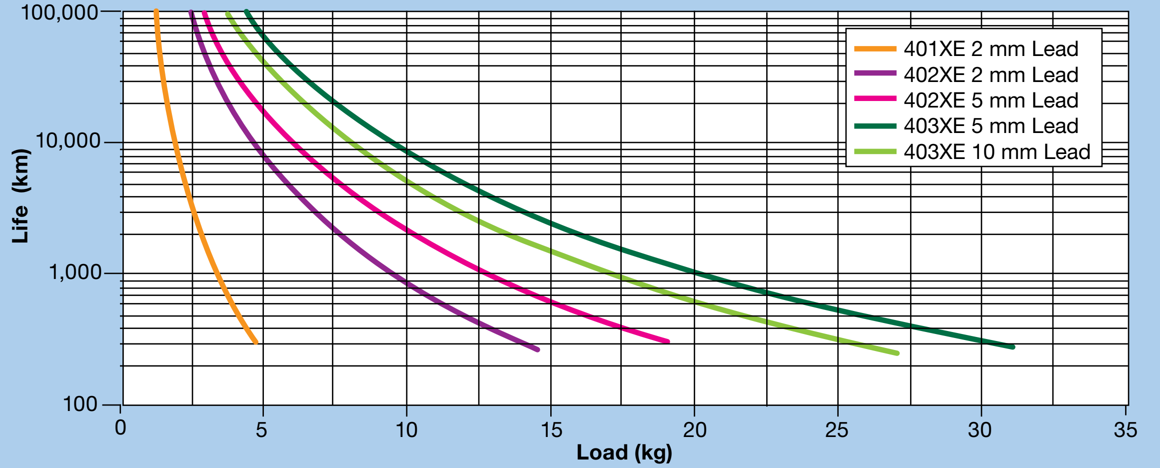
Carriage Life with Normal or Inverted Load



Carriage Life with Side Load



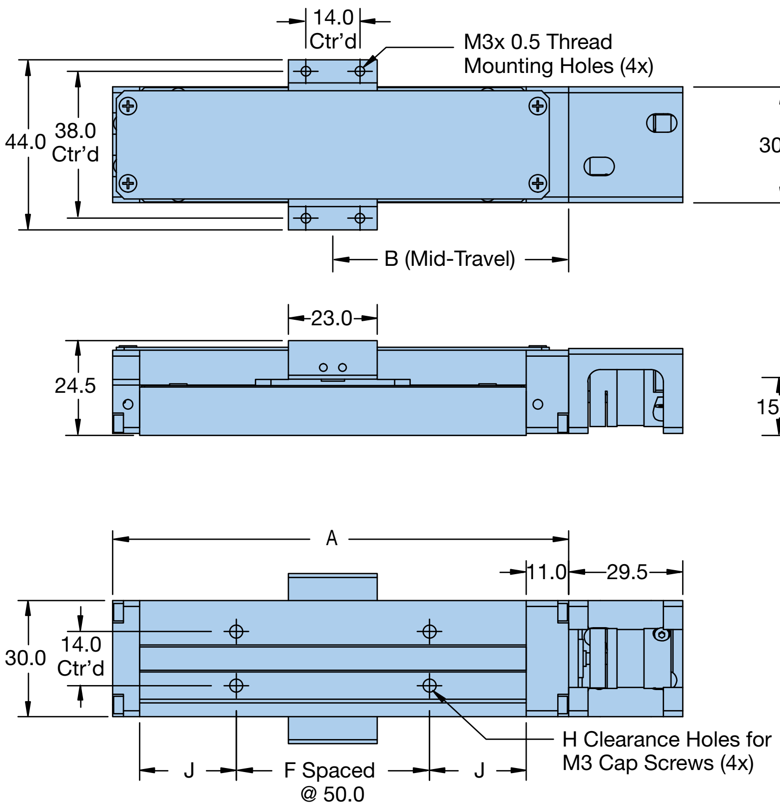
Ballscrew Life with Axial Load



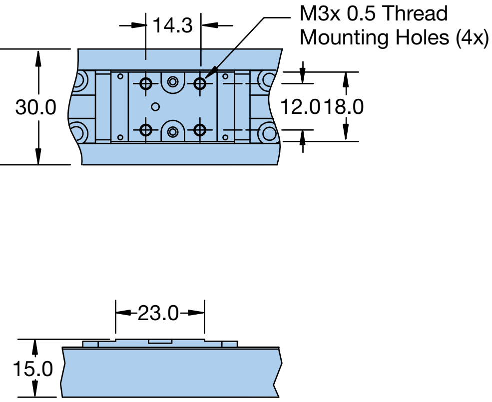
DIMENSIONS

401XE Dimensions (mm)

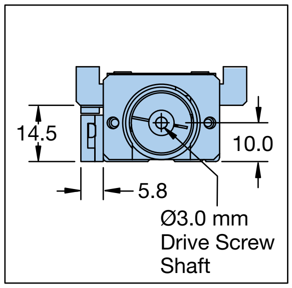
401XE with Hard Cover



401XE without Hard Cover

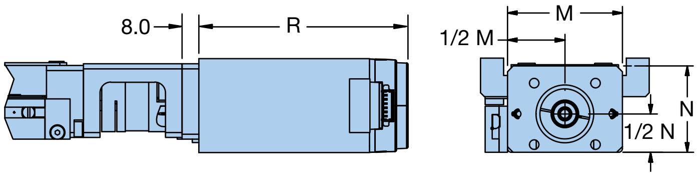


Optional Limit/Home Sensor



Order Code	Travel (mm)	A	B	F	H	J
01	60	118	61	1	4	25
02	110	168	86	2	6	25
03	160	218	111	3	8	25

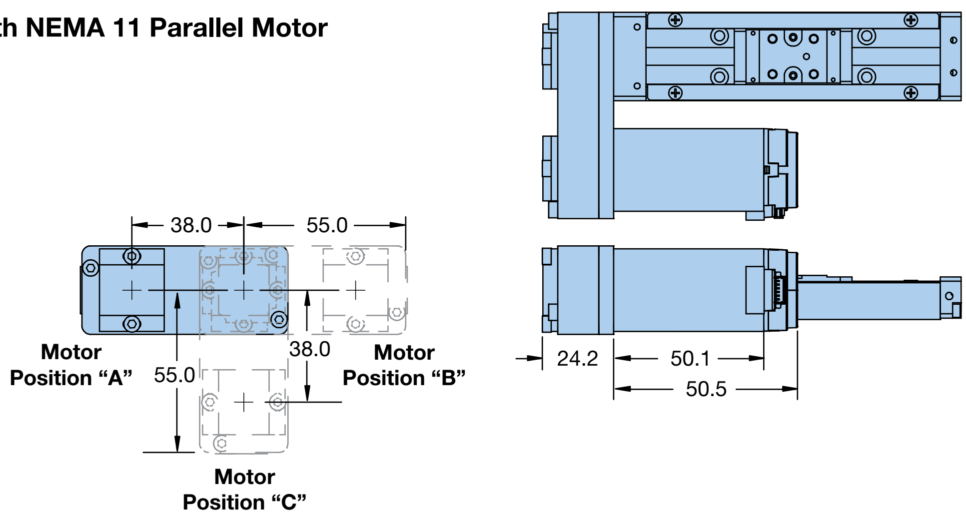
401XE with NEMA 11 & 17 Inline Motor



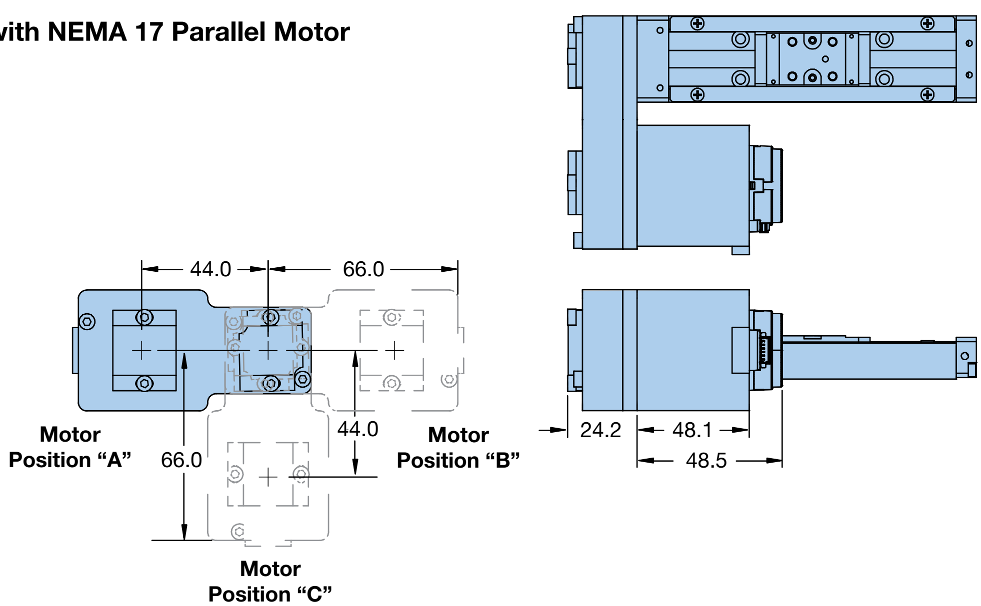
Motor Option*	Motor Size	M	N	R
M11	NEMA 11	28.2	28.2	50.5
M17	NEMA 17	43.0	37.0	48.5

***When configuring an XE stage and selecting your motor option in Ordering Information, note that the "M" motor options come with motors while "N" options are only prepped for those motors.**

401XE with NEMA 11 Parallel Motor

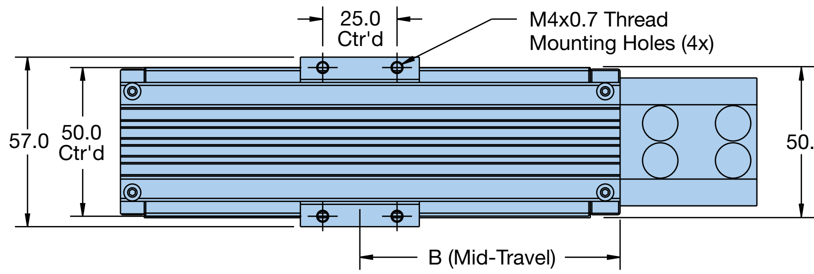


401XE with NEMA 17 Parallel Motor

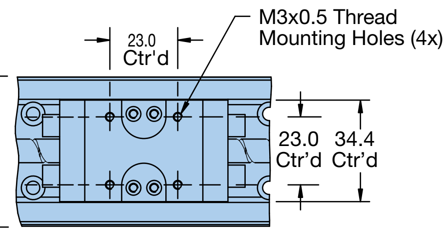


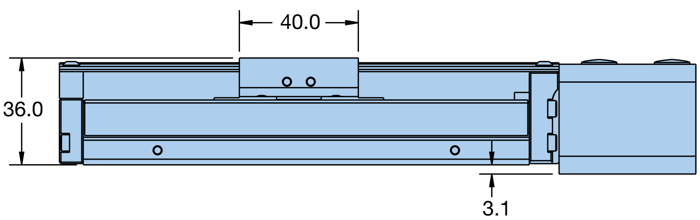
402XE Dimensions (mm)

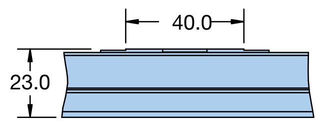
402XE with Hard Cover

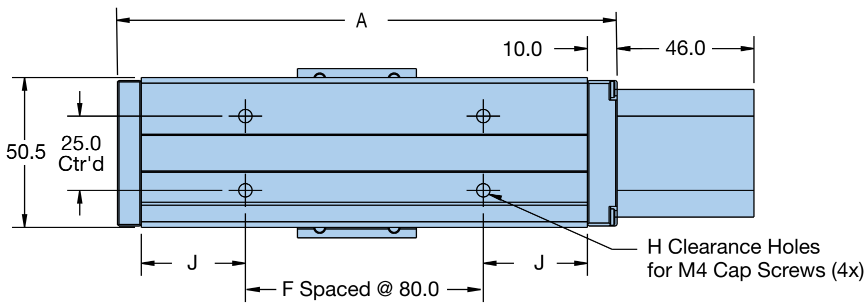


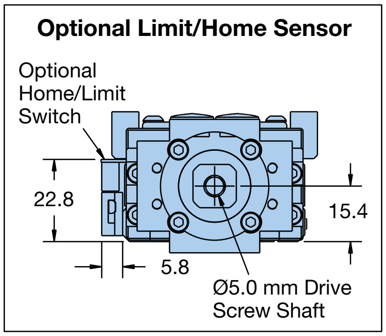
402XE without Hard Cover





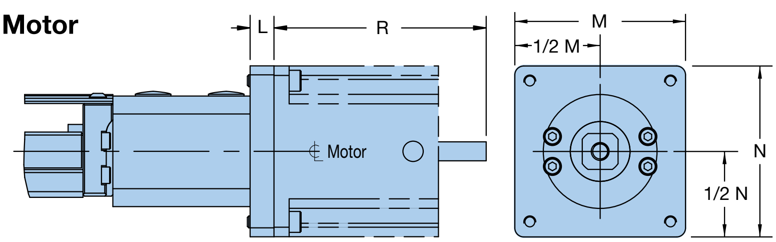






Order Code	Travel (mm)	A	B	F	H	J
01	70	168.0	87.5	1	4	35.0
02	120	218.0	112.5	2	6	20.0
03	170	268.0	137.5	2	6	45.0
04	220	318.0	162.5	3	8	30.0

402XE with Inline Motor



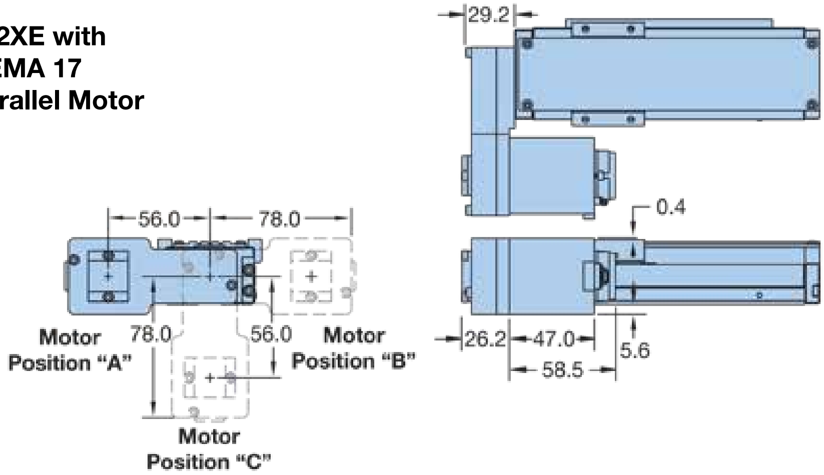
Rear shaft not available on SM162

Motor Option*	Motor Size	L	M	N	R
M17	NEMA 17	8.0	43.0	37.0	58.5
M16	SM162AE-N10N	8.0	42.2	42.2	136.5
M23	NEMA 23	9.5	57.2	57.2	51.2

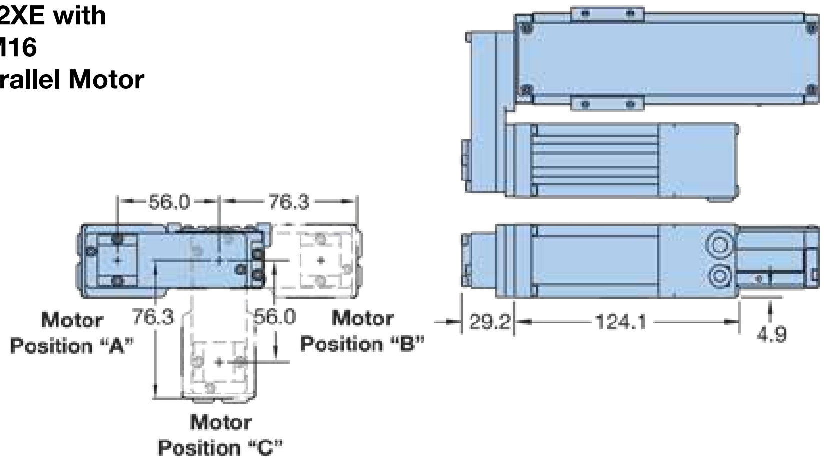
***When configuring an XE stage and selecting your motor option in Ordering Information, note that the "M" motor options come with motors while "N" options are only prepped for those motors.**

402XE Dimensions (mm)

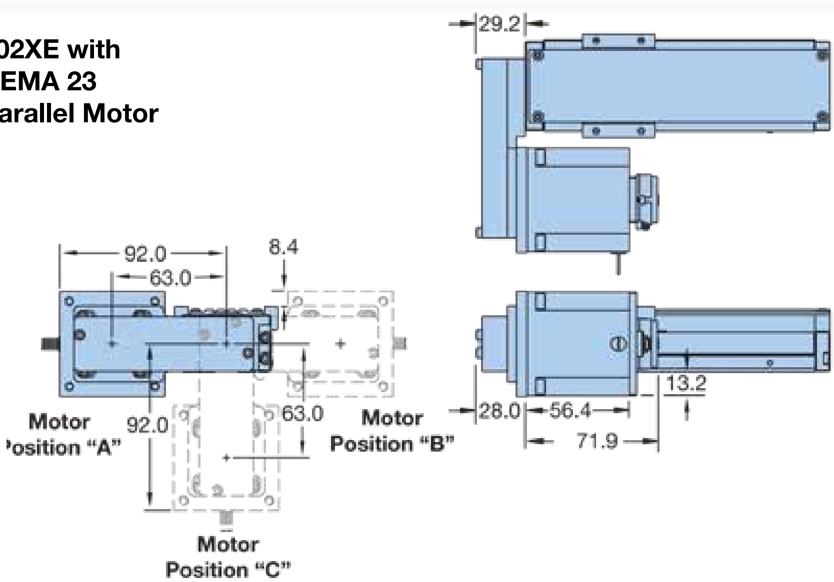
402XE with NEMA 17 Parallel Motor



402XE with SM16 Parallel Motor

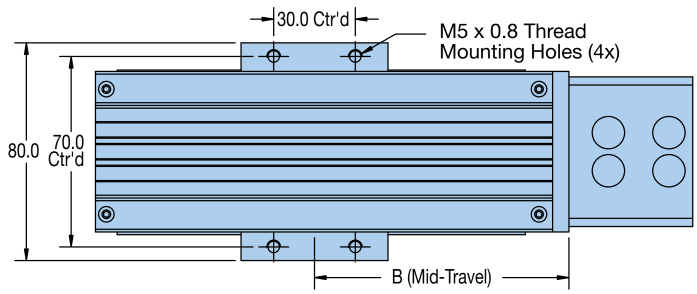


402XE with NEMA 23 Parallel Motor

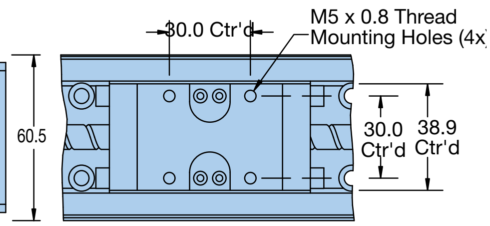


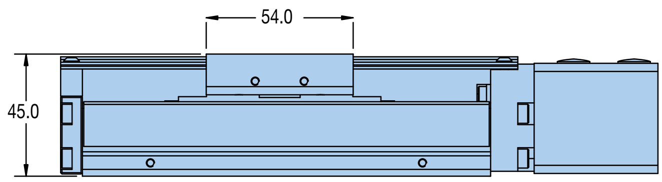
403XE Dimensions (mm)

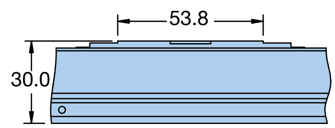
403XE with Hard Cover

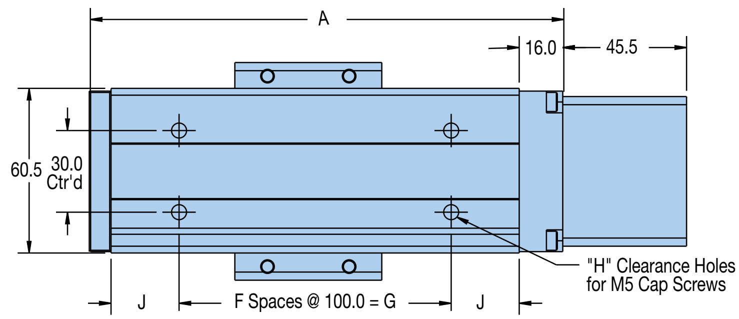


403XE without Hard Cover

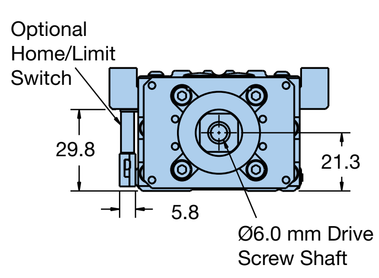






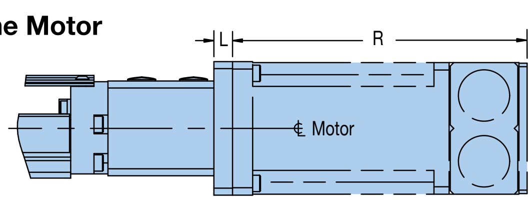


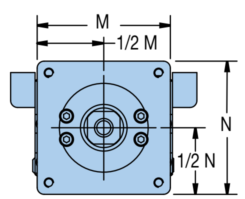
Optional Limit/Home Sensor



Order Code	Travel (mm)	A	B	F	G	H	J
01	55	174.0	93.5	1	100.0	4	25.0
02	105	224.0	118.5	1	100.0	4	50.0
03	205	324.0	168.5	2	200.0	6	50.0
04	305	424.0	218.5	3	300.0	8	50.0
05	405	524.0	268.5	4	400.0	10	50.0
06	505	624.0	318.5	5	500.0	12	50.0
07	605	724.0	368.5	6	600.0	14	50.0
08	655	774.0	383.5	7	700.0	16	25.0

403XE with Inline Motor



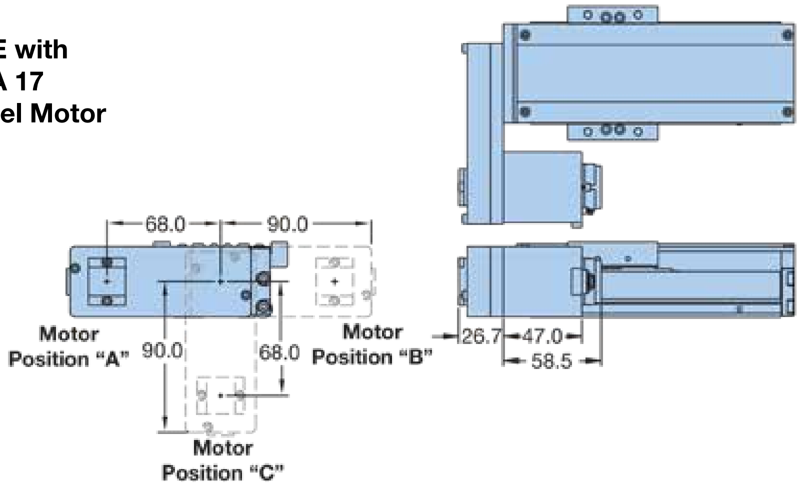


Motor Option*	Motor Size	L	M	N	R
M17	NEMA 17	8.0	43.0	37.0	58.5
M16	SM162AE-N10N	8.0	42.2	42.2	136.5
M23	NEMA 23	9.5	57.2	57.2	51.2

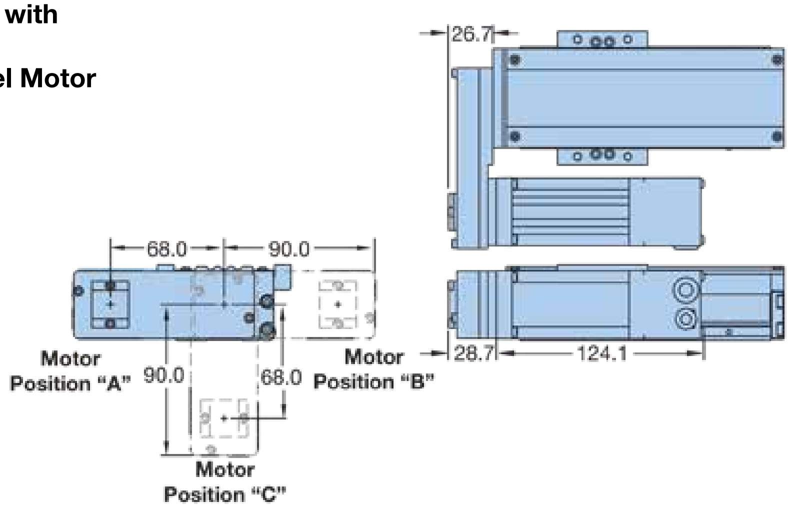
***When configuring an XE stage and selecting your motor option in Ordering Information, note that the "M" motor options come with motors while "N" options are only prepped for those motors.**

403XE Dimensions (mm)

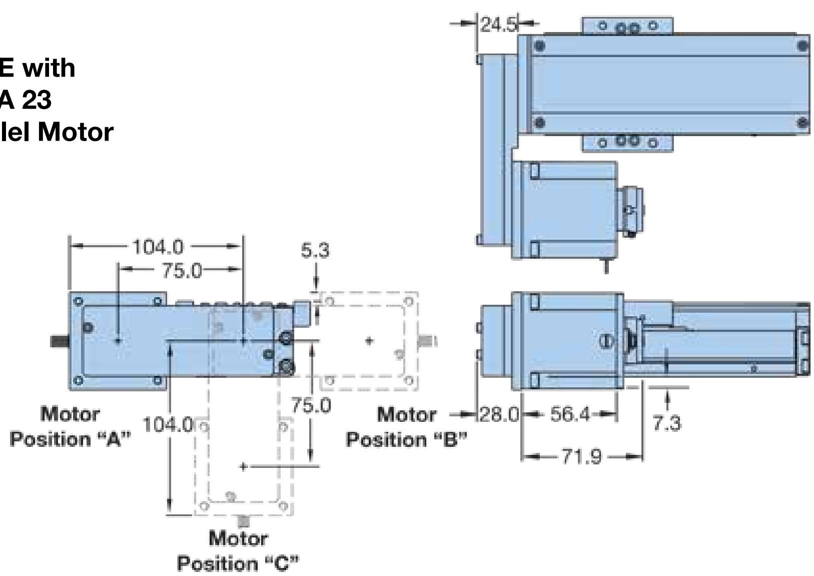
403XE with NEMA 17 Parallel Motor



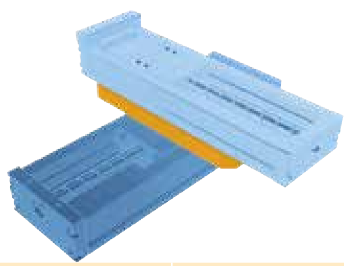
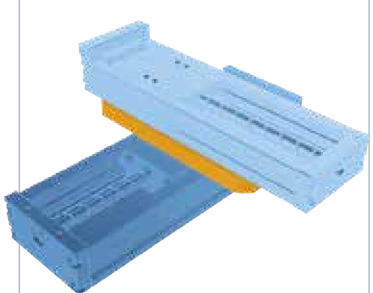
403XE with SM16 Parallel Motor



403XE with NEMA 23 Parallel Motor



Design Flexibility with Standard X-Y Bracket Options

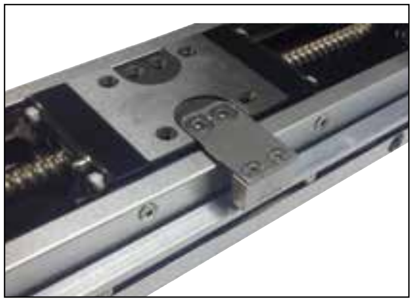
X-Axis	Y-Axis					
	401XE		**402XE**		**403XE**	
	Y-Axis Travel Length Order Code	**X-Y Bracket Part Number**	**Y-Axis Travel Length Order Code**	**X-Y Bracket Part Number**	**Y-Axis Travel Length Order Code**	**X-Y Bracket Part Number**
401XE						
	01 – 03	002-2975-01				
402XE						
			01	002-2819-01		
	01 – 03	002-2976-01	02 – 04	002-2820-01		
403XE						
			01	002-2821-01	01	002-2821-01
	01 – 03	002-2977-01	02 – 04	002-2822-01	02 – 04	002-2822-01
404XE						
			02 – 08	002-2823-01	02 – 08	002-2823-01

OPTIONS & ACCESSORIES

Packaged Limit Sensors

The XE series uses the Parker global mini sensors for home and limit sensing. These sensors are packaged within a miniature sensor housing which allows the flying-leads style cables to exit with 3 meters of cable from the point of the sensor. To further accommodate each application's unique needs, the sensors can be specified as either NPN, PNP, normally open, or normally closed varieties. The unmatched design of the sensor pack on the XE series, allows for fully adjustable sensors along the travel length of the positioner, which creates no pinch points for other cables or hoses to be sliced.

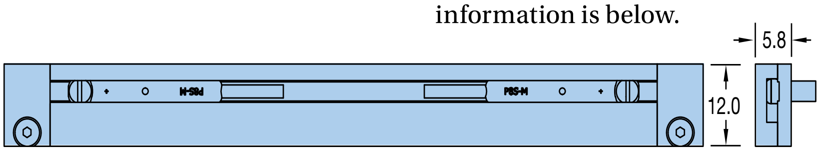
The limit/home switch installed on the XE series is a Hall effect sensor tripped by a magnet located on a flag which is attached to the moving carriage. On the switch body an LED indicates activation. Normally open sensors are typically used for home sensing and normally closed are typically used for limits. With a current sinking sensor, the output lead provides a path to ground when activated, and with a current sourcing sensor, the output lead provides a positive (+) voltage potential relative to ground. Refer to your controller's manual for sensor compatibility. Limit/home switch information is below.



Limit sensor mounting screws are reverse-thread style so tightening the screw loosens the limit sensor in the track and vice versa.

Specifications

Operating Voltage: 10-30 VDC
Repeatability: ≤±0.1 mm
EMC: EN 60 947-5-2
Short circuit protections: Yes
Reverse Polarity Protection: Yes
Enclosure Rating: IP 67
Operating Temperature Range: -25° to 75° C (-13° to 167° F)



Wiring Connection

Pin	Wire	Function
1	Brown	+ VDC
4	Black	NO
3	Blue	– VDC

Spare Limit/Home Sensors

Part Number	Switching Type	Logic	Cabling
P8SAMMFAZ	NPN	NC	3 Meter, Flying Leads
P8SAMNFAZ	NPN	NO	
P8SAMPFAZ	PNP	NO	
P8SAMQFAZ	PNP	NC	

Riser Plates

Most of the motors used with the 401/402/403XE and some of the 404XE motors have a taller profile than the positioner. Thus the motor can interfere with the positioner mounting surface.

To accommodate riser plates can be provided to space the unit above the mounting surface. See XE product manual for dimensional details and part numbers. Also available are X-Y transition plates for XE to XE mounting.

Cleanroom & Raydent Coatings

Cleanroom ratings are possible with the XE product. The actual cleanroom rating will be dependent upon such variables as the location of the sniffer device, the velocity of the table, etc. Consult the factory for specific cleanroom-capability details or test results.

Demo Units

Order 803-0346 for a multi-axis demo unit to learn the product and display for shows and presentations. The demo will come in a watertight pelican carrying case and will be ready for demonstration programmed from the factory.

ORDERING INFORMATION
XE Series

Fill in an order code from each of the numbered fields to create a complete model order code.

	1	2	3	4	5	6	7	8	9	10	11	12
Order Example:	401	01	XE	S	D9	H0	L0	L	N00	C1	E0	R0

1 Series

- **401**
- **402**
- **403**

2 Travel (mm)

	401XE	402XE	403XE
01	60	70	55
02	110	120	105
03	160	170	205
04	—	220	305
05	—	—	405
06	—	—	505
07	—	—	605
08	—	—	655

3 Family

XE	XE Series

4 Grade

S	Standard

5 Drive Screw [Q]

D9	2 mm lead (401, 402 only) [1]
D2	5 mm lead (402, 403 only) [2]
D3	10 mm lead (403 only) [3]

[1] D9 is a quick ship option for all 401XE travel options and 01 – 02 options for the 402XE.

[2] D2 is a quick ship option for the 03 – 04 for the 402XE, and the 01, 02 and 03 option for the 403XE.

[3] D3 is a quick ship option for the 04 – 06 options for the 403XE

6 Home Sensor (Qty 1)

H0	No home sensor [Q]
HA	NPN, N.C., flying leads [Q]
HB	NPN, N.O., flying leads [Q]
HC	PNP, N.C., flying leads [Q]
HD	PNP, N.O., flying leads [Q]

7 Limit Sensors (Qty 2)

L0	No limits sensors [Q]
LA	NPN, N.C., flying leads [Q]
LB	NPN, N.O., flying leads [Q]
LC	PNP, N.C., flying leads [Q]
LD	PNP, N.O., flying leads [Q]

8 Motor Mount Orientation

L	Inline motor mounting [Q]
A	Parallel motor mounting*
B	Parallel motor mounting*
C	Parallel motor mounting*

* Refer to dimension drawings for orientation

9 Motor option

N00	No motor mount [Q]
N11	NEMA 11 motor mount [1] [Q]
N17	NEMA 17 motor mount [Q]
N16	SM 16 servo motor mount [2] [Q]
N40	PM-FAL servo motor mount [2] [Q]
N23	NEMA 23 inline motor mount [2]
M11	NEMA 11 stepper motor [1]
M17	NEMA 17 stepper motor
M16	SM162AE-N10N servo motor, 1000 line encoder [2]
M40	MPE 0402A4E-KC1N [2]
M23	NEMA 23 stepper motor [2]

[1] 401XE only
[2] Not available on 401XE

10 Motor Coupling

C1	No coupler
C2	0.25" Oldham
C3	0.25" Bellows
C4	0.375" Oldham
C5	0.375" Bellows
C6	5 mm Oldham
C7	5 mm Bellows
C8	8 mm Oldham
C9	8 mm Bellows

11 Motor Encoder

E0	No encoder
E2	500 line encoder (Available only with M11, M17, M23 motor options)

12 Environmental Option

R0	No cover [Q]
R1	Hard cover [Q]

[Q] Need an XE in a Hurry?

The [Q] above designates quick ship options, that will give fastest delivery possible. These options are only good for the stroke and screw combinations denoted above, with any home and limit sensor option, inline motor mounts only, and are available with or without the hard cover option.

Free sizing and selection support from Virtual Engineer at virtualengineer.com

404XE Series Positioners

(95 mm wide profile)

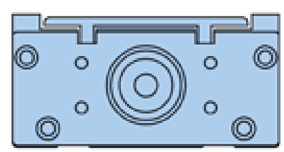
Versatile Compact Motion Platform

- Economy Grade Positioning
- 100% Duty Cycle
- High Strength Design
- Easy Multi-Axis Mounting
- Locating Dowel Holes

Key Design Advantages

- Three leadscrew options
- Two carriage options
- Standard inline and parallel motor mounting
- Optional hardcover available
- LXR and XR mounting compatible (toe clamp only)

	404XE
Maximum Travel (mm)	700
Maximum Payload (N)	1,202
Maximum Acceleration (m/s²)	20



404XE

Reliable and Cost Effective Positioning

The 404XE positioners combine versatility with rugged construction in a compact motion platform that is ideal for 24/7 process automation. A high efficiency ballscrew drive, recirculating square rail bearings and high strength aluminum body are the result of innovative engineering that has reduced costs while improving performance.

Unmatched Options and Features

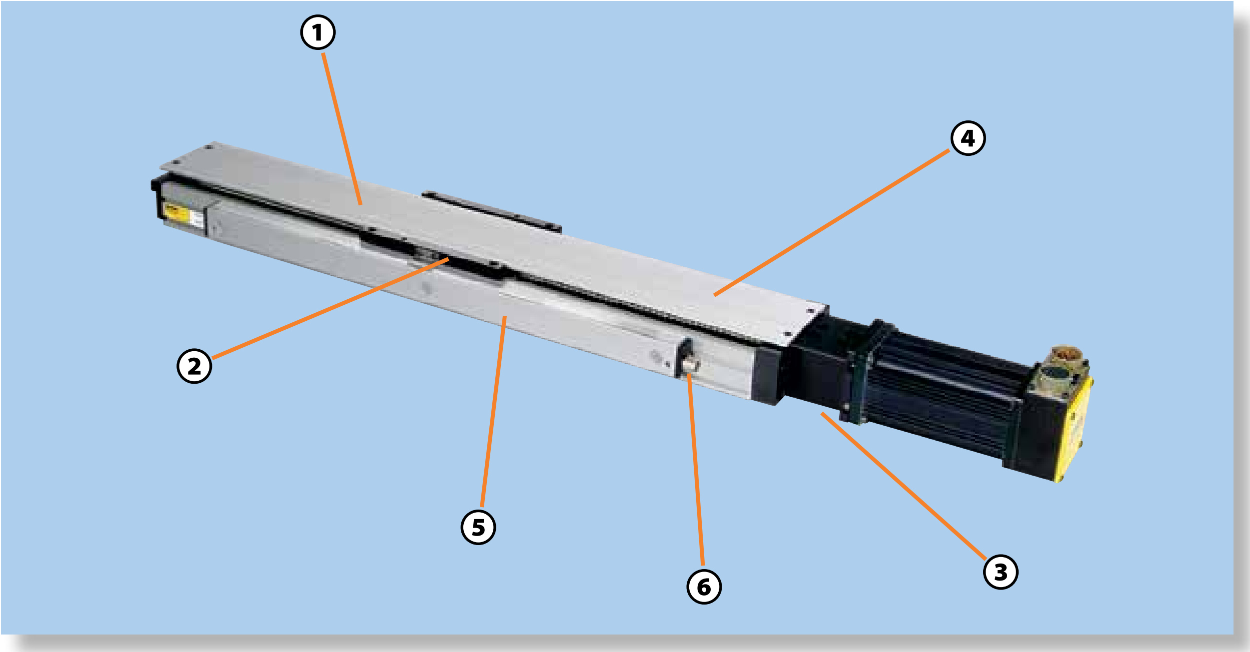
A vast assortment of “designer friendly” options and features simplify the engineering challenges often confronted with “base model” positioning devices. Features like precision dowel holes, linear feedback, sensor packs, parallel motor mounting, brakes, and cleanroom preparation simplify and speed your machine design process.

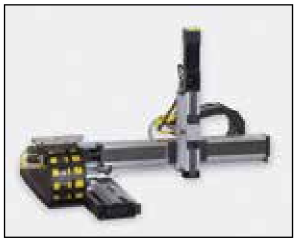
Multi-Axis Systems

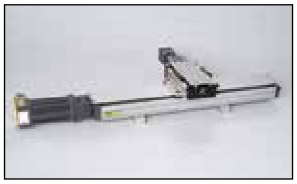
XY and XYZ systems are easily configured and pinned so that factory orthogonality can be reproduced in the field. Motors and cable management systems connect to the XE tables in a straightforward and simple manner.

Technology Evolution

The XE is direct mounting compatible with our precision series XR ballscrew tables and our LXR linear motor tables. It is possible to mix-and-match various levels of technology on a per axis basis allowing the most cost effective optimized application solutions.







1. **Three leadscrew options**
   Providing travel up to 700mm

2. **Two carriage options**
   Two choices available – short (2 bearing trucks) and long (4 bearing trucks)

3. **Standard inline and parallel motor mounting**
   Options for Parker and non-Parker Automation motors

4. **Optional hardcover**
   An optional hardcover is available. This will bring the positioner to an IP20 rating and prevent large particles from entering and damaging the screw or bearings.

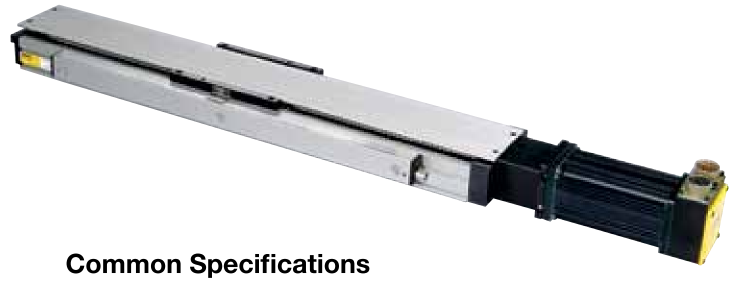
5. **Standard mounting**
   Compatible with XR and LXR Series (Toe Clamp Only)

6. **End of travel and home sensors**
   Sensors for the 404XE series are available in a variety of styles.

Standard XY Mounting Configurations with other XE products

Bottom Stage	Top Stage 401XE	402XE	403XE	404XE
401XE	X			
402XE	X	X		
403XE	X	X	X	
404XE		X	X	X

SPECIFICATIONS



The 404XE is the largest of the XE positioning table line, with a width of approximately 4" and travel length up to 700mm depending on selected carriage size. Ballscrew options range from 5mm lead to 20mm lead, and several motor mount and limit/home switch options are available, as well as feedback and brake options.

Common Specifications

Bidirectional Repeatability T01 to T11 models T12 to T15 models	 ±20 micron ±30 micron
Duty Cycle	100%
Max Acceleration(1)	20 m/sec^2 (773 in/sec^2)
Normal Load Capacity(2) NL (short carriage) VL (long carriage)	 61.3 kgf (135 lbs) 122.6 kgf (270 lbs)
Axial load capacity(2) 5 mm lead ballscrew 10 mm lead ballscrew 20 mm lead ballscrew	 60 kgf (132 lbs) 70 kgf (154 lbs) 70 kgf (154 lbs)
Drive Screw Efficiency	90%
Max Break-Away Torque	0.25 Nm (35in-oz)
Max Running Torque (rated @ 2 RPS)	0.21 Nm (30in-oz)
Linear Bearing – Coefficient of Friction	0.01
Ballscrew Diameter 5 & 10 mm lead 20 mm lead	 16 mm 15 mm
Carriage Weight NL (short carriage) VL (long carriage)	 0.215 kg (0.47 lbs) 0.495 kg (1.09 lbs)

(1) Applies to units with VL carriage
(2) Refer to life/load charts.

Travel Dependent Characteristics

	Travel (mm)		Positional Accuracy (3) (4)	Input Inertia NL Carriage Units (10^{-5} kg-m^2)			Input Inertia VL Carriage Units (10^{-5} kg-m^2)			Max. Screw Speed	Max. Velocity (meters/sec.)			Total Table Weight (kg)	
Code	NL	VL	(µm)	5 mm	10 mm	20 mm	5 mm	10 mm	20 mm	(RPS)	5 mm	10 mm	20 mm	NL	VL
T01	25	–	42	.81	–	–	–	–	–	72	0.36	0.73	1.50	1.42	1.70
T02	50	–	50	.94	.98	–	–	–	–	72	0.36	0.73	1.50	1.61	1.89
T03	100	33	58	1.19	1.23	1.12	1.21	1.30	1.4	72	0.36	0.73	1.50	1.95	2.23
T04	150	83	66	1.44	1.48	1.32	1.46	1.55	1.6	72	0.36	0.73	1.50	2.35	2.63
T05	200	133	74	1.69	1.73	1.51	1.71	1.80	1.79	72	0.36	0.73	1.50	2.59	2.87
T06	250	183	82	1.94	1.99	1.70	1.96	2.06	1.99	72	0.36	0.73	1.50	2.97	3.25
T07	300	233	90	2.20	2.24	1.90	2.21	2.31	2.18	72	0.36	0.73	1.50	3.34	3.62
T08	350	283	98	2.45	2.49	2.09	2.47	2.56	2.37	72	0.36	0.73	1.50	3.50	3.78
T09	400	333	106	2.70	2.74	2.29	2.72	2.81	2.57	72	0.36	0.73	1.50	3.83	4.11
T10	450	383	114	2.95	2.99	2.48	2.97	3.07	2.76	72	0.36	0.73	1.50	4.09	4.37
T11	500	433	122	3.21	3.25	2.67	3.22	3.32	2.96	72	0.36	0.73	1.50	4.22	4.50
T12	550	483	130	3.46	3.50	2.87	3.48	3.57	3.15	72	0.36	0.73	1.50	4.55	4.83
T13	600	533	138	3.71	3.75	3.06	3.73	3.82	3.34	69	0.34	0.68	1.32	4.87	5.15
T15	700	633	154	4.21	4.25	3.45	4.23	4.33	3.73	52	0.26	0.52	1.00	5.12	5.40

(3) Positional accuracy applies to in-line motor configurations only. Positional specifications are based on "no-load" conditions and apply to individual axes only.
(4) Consult factory for specs with linear feedback.

404XE Life/Load Performance

The following performance information is provided as a supplement to the product specifications pages. The useful life of a linear table at full catalog specifications is dependent on the forces acting upon it. These forces include both static components resulting from payload weight and dynamic components due to acceleration/deceleration of the load. In multi-axes applications, the primary positioner at the bottom of the stack usually establishes the load limits for the combined axes.

When determining life/load, it is critical to include the weight of all positioning elements that contribute to the load supported by the primary axis. The following graphs and formulas are used to establish the table life relative to the applied loads. **Catalog load specifications are rated for 100 million inches of travel or 2.540 km.**

Table Life/Thrust (Axial) Load

This graph illustrates table ballscrew life relative to the axial load.

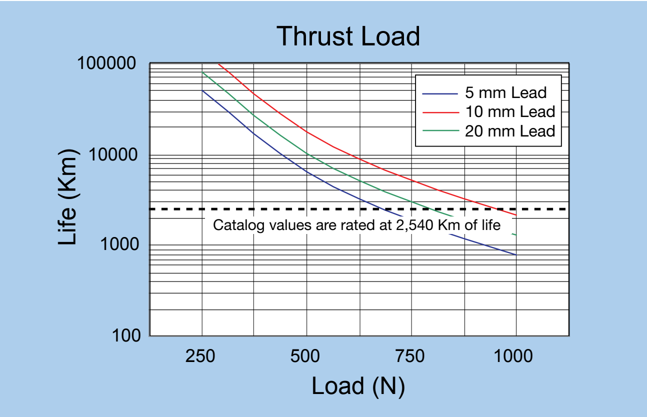


Table Life/Load Chart
Pitch Moment - NL (Short Carriage)

This graph illustrates table linear bearing life as a result of pitch moment.

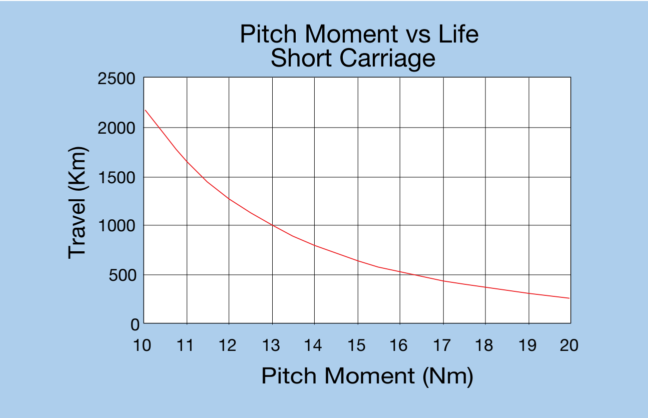
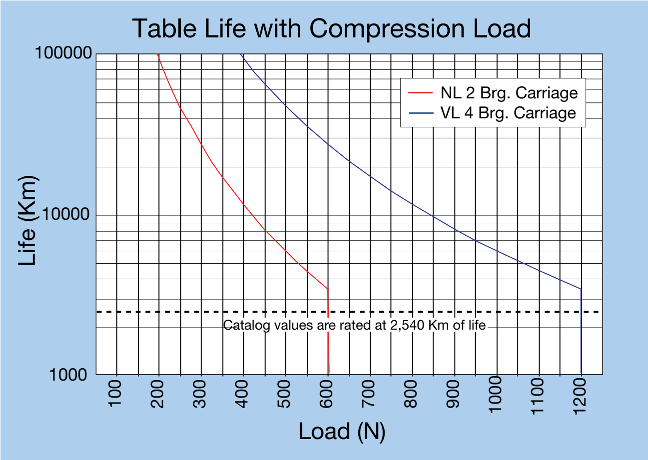


Table Life/Compression (Normal) Load

This graph provides an evaluation of the support bearing life/load characteristics. The curves show the life/load relationship when the applied load is centered on the carriage, normal (perpendicular) to the carriage mounting surface.

For final evaluation of life versus load, including off-center, tension, and side loads, refer to the pitch/moment chart for the NL carriage units or the bearing load charts (next page) for the VL carriage units.



404XE Life/Load Performance

Bearing Life/Load for VL Long Carriage Units

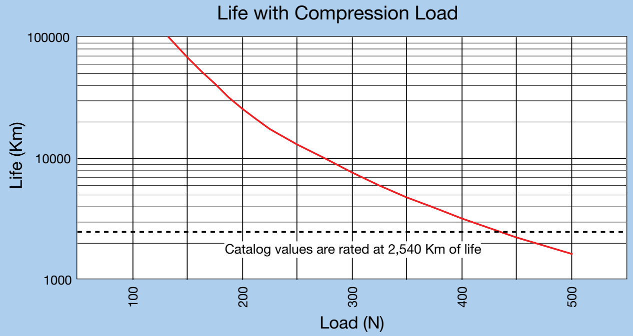
These charts are to be used to evaluate the VL Carriage units. They should be used in conjunction with the corresponding formulas (found under "Product Information" at www.parkermotion.com) to establish the life/load for each bearing (4 per table).

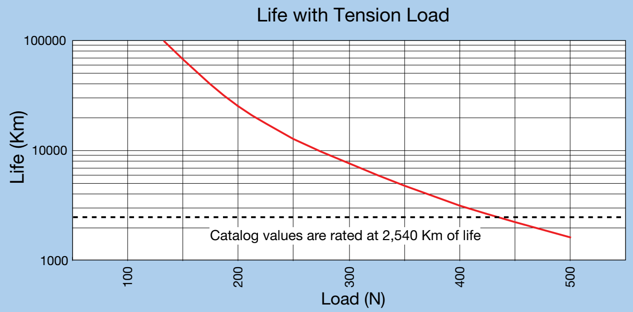
Several dimensions, which are specific to each linear positioning table model, and the load geometry are required for these computations. These dimensions are supplied in the catalog information for each positioner. The dimensions are referenced as follows:

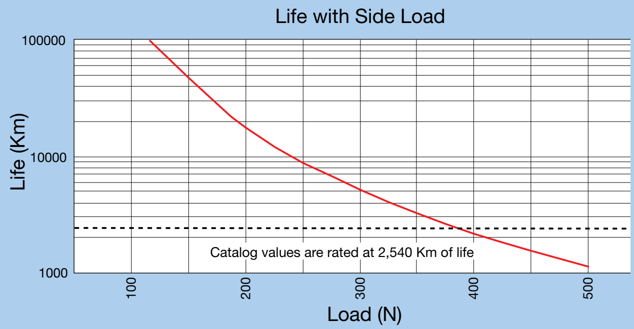
- d1 – Bearing block center-to-center longitudinal spacing
- d2 – Bearing rail center-to-center lateral spacing
- da – Rail center-to-carriage mounting surface

	d1	d2	da
404XE	80	57	28

Refer to Parker's website **www.parker.com/emn** for moment loading and other engineering data.

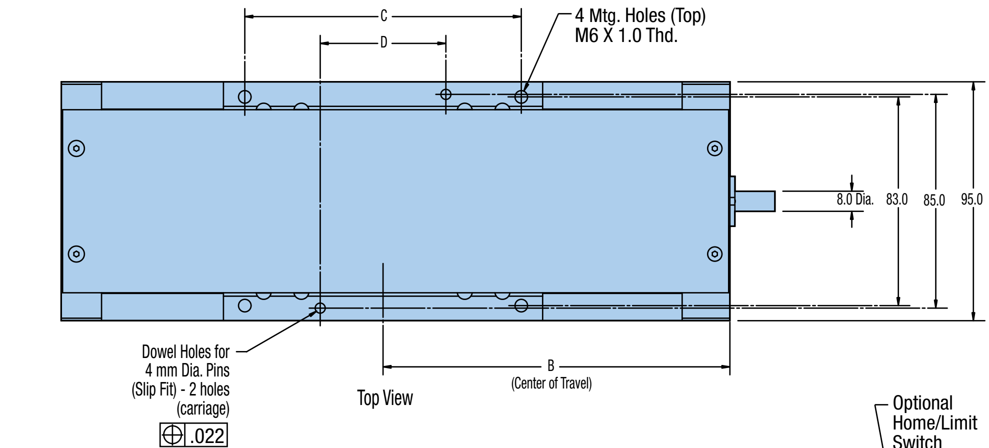




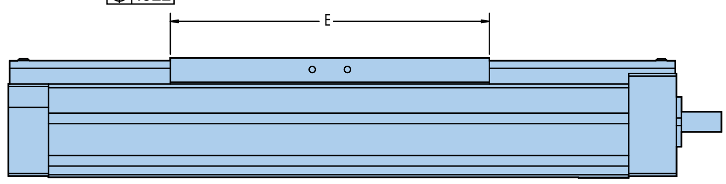


DIMENSIONS

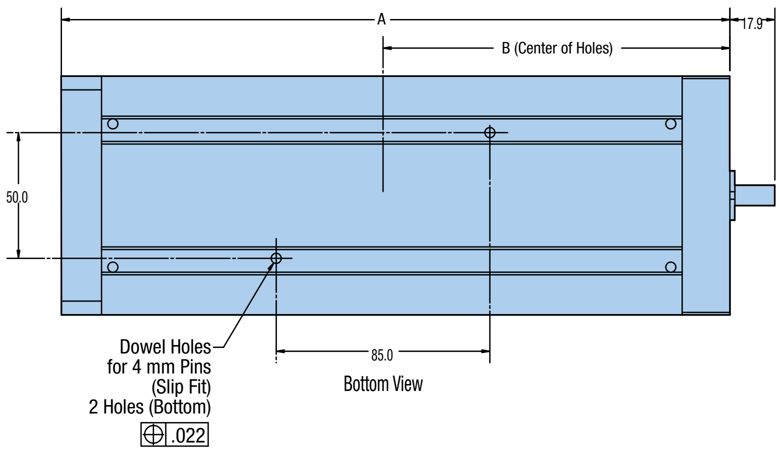
Download 2D & 3D files from www.parker.com/emn/404XE



Top View

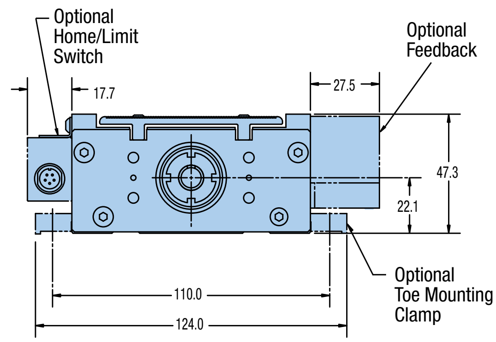


Front View

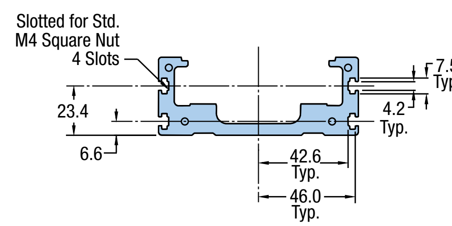


Bottom View

Carriage Type	C	D	E
NL	50.0	36.0	60.0
VL	110.0	50.0	127.0



End View



View showing slots in extruded base

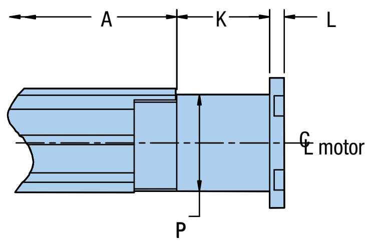
Designation	Carriage Travel NL (short)	VL (long)	A	B
T01	25	–	141.0	75.5
T02	50	–	166.0	88.0
T03	100	33	216.0	113.0
T04	150	83	266.0	138.0
T05	200	133	316.0	163.0
T06	250	183	366.0	188.0
T07	300	233	416.0	213.0
T08	350	283	466.0	238.0
T09	400	333	516.0	263.0
T10	450	383	566.0	288.0
T11	500	433	616.0	313.0
T12	550	483	666.0	338.0
T13	600	533	716.0	363.0
T15	700	633	816.0	413.0

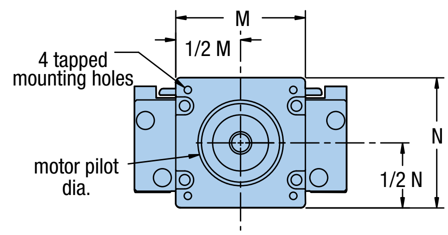
400XE Series Motor Mount Dimensions

Dimensions (mm)

In-Line Motor Mount

In-line motor mounting allows the motor to be mounted directly to the drive screw via the selected motor coupling.

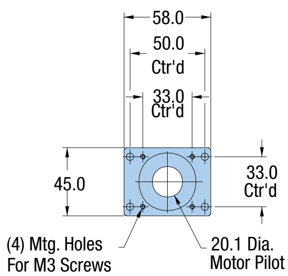




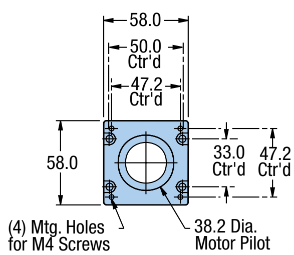
In-Line Adaptor Plates

Used to easily accommodate the mounting of different frame sizes. These adapter plates can be ordered separately by part number below.

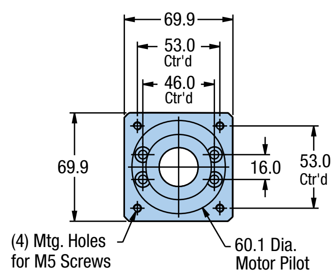
SM16	M2	9.5	41.0	4.3	58.0	45.0	45.0
NEMA 23	M3	9.5	41.0	6.5	58.0	58.0	45.0
NEMA 34	M4	9.5	41.0	12.5	83.0	83.0	45.0
Neometric 70	M21	11.0	53.0	0.0	69.9	69.9	69.9



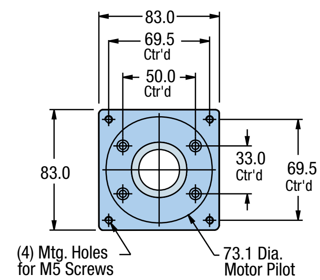
In-line SM 16



In-line NEMA 23

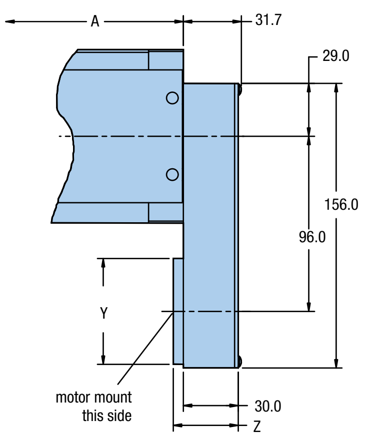


In-line NEOMETRIC 70 /SMN060

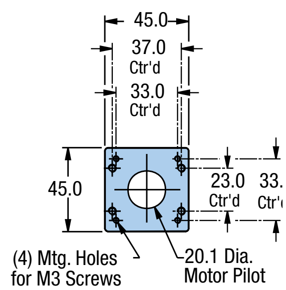


In-line NEMA 34

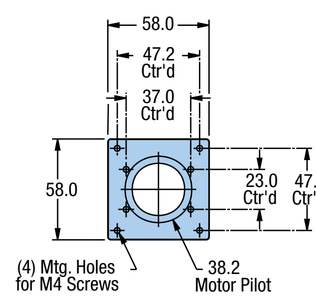
Parallel Motor Mounting



Parallel motor mounting is employed whenever a shorter overall unit length is needed. The motor is positioned along the sides or bottom of the table as designated by position A, B, or C. (No coupling required)

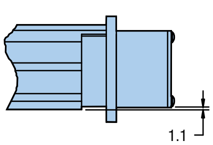


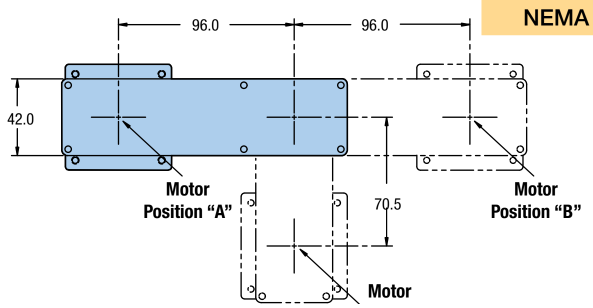
Reverse SM 16



Reverse NEMA 23

Motor Size	Y	Z	Motor Shaft Dia.
SM 16	45.0	34.5	0.250”
SM 23 / BE 23	58.0	35.5	0.375”
NEMA 23	58.0	35.5	0.250”





Note: Some sensor pack and encoder restriction apply when mounting motors larger than NEMA 23 in the A or B positions. Please consult factory.

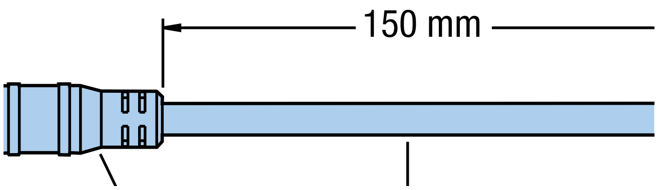
OPTIONS AND ACCESSORIES

Home or Limit Sensor

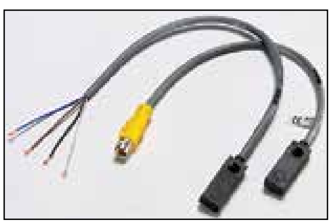
End of Travel and Home Sensors for the 404XE series are available in a variety of styles. The sensors can be ordered as part of the table or as separate components with the associated mounting hardware or in an enclosed sensor pack. A 5 meter high-flex extension cable (Part No. 003-2918-01) is available for use with models having the locking connector option.

- NPN (Sinking) or PNP (Sourcing)
- Normally Closed (N.C.) or Normally Open (N.O.)
- Flying Leads or Locking Connector

With Limits and Home Sensors



With Limits and Home Sensor Pack



Input Power 5-30 VDC, 20 mA
Output 100 mA max
Wire Color Code (+) Supply: Brown
(-) Supply: Blue
NO Output: Black
NC Output: White

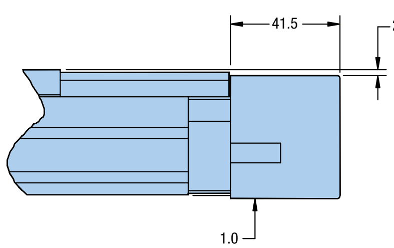
Order Code	Part No.* (Includes Mounting Bracket)	Switch Type	Logic	Cable Length	Connection Option
H2 or L2	006-1639-01	N.C.	Sinking	3.0 m	Flying Leads
H3 or L3	006-1639-02	N.O.	Sinking	3.0 m	Flying Leads
H4 or L4	006-1639-03	N.C.	Sourcing	3.0 m	Flying Leads
H5 or L5	006-1639-04	N.O.	Sourcing	3.0 m	Flying Leads
H6 or L6	006-1639-09	N.C.	Sinking	150 mm	Locking Connector
H7 or L7	006-1639-08	N.O.	Sinking	150 mm	Locking Connector
H8 or L8	006-1639-11	N.C.	Sourcing	150 mm	Locking Connector
H9 or L9	006-1639-10	N.O.	Sourcing	150 mm	Locking Connector

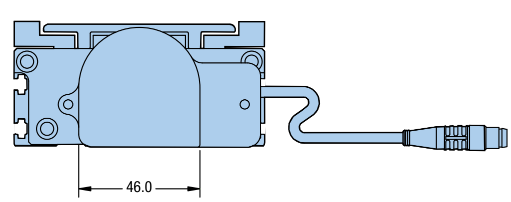
*Sensor triggers (targets) ordered separately.

Brake Assembly

Electromagnetic brake assembly used to prevent "backdriving" in vertical applications. Includes 5 meter cable.

Table Series	Part Number	Input Power	Holding Torque
404XE	006-1627-01	24 VDC, 0.46 A	2.0 N-m

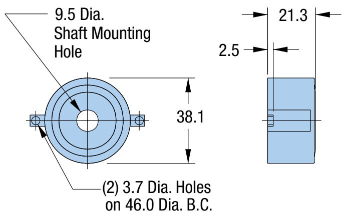




404XE

Rotary Encoder

Modular rotary encoder couples directly to the drive screw for position feedback. 150 mm cable included.

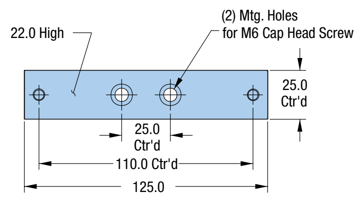


Part Number 06-1629-01

Input Power	5 VDC, 135 mA
Output	A/B quadrature and reference mark, differential line drive output
Resolution	1250 lines/rev equals 5000 counts post quadrature (1 µm with 5 mm lead ballscrew)

Riser Plate

Used to raise the table base to provide clearance for motors larger than NEMA 23 frame size.



Part Number 002-3619-01
(All hardware included)

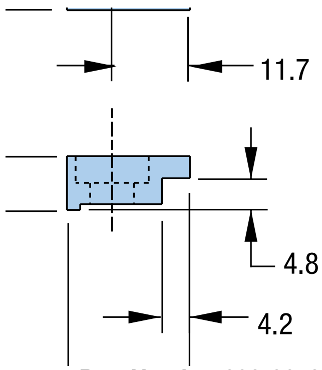
Linear Feedback

A magnetic linear position feedback device which mounts directly to the table carriage. (Factory installation required.)

Input Power	5 VDC, 240 mA
Output	A/B quadrature and reference marks, differential line drive output
Resolution	5.0 µmm

Toe Clamp

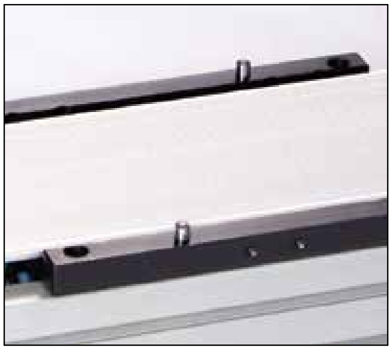
Used for convenient mounting of 404XE to a base plate, or riser plates.



Part Number 002-3618-01

Dowel Pinning

Standard dowel pin locating holes are offered on all 400XE units to facilitate repeatable mounting of tooling or payload.



Two locating dowel pins shown in carriage

Multi-axis options are offered with P20 for the base 'X' Axis and P33-59 for the 'Y' orientation and mounting method. "Clock position" call-outs refer to the position of the motor end of the table. The multi-axis option allows the user to choose the motor orientation and mounting style.

P43 & P49 provide toe clamp mounting.

P33 & P39 offers standard pins on the carriage in addition to the toe clamps.

P53 & P59 offers uniquely pinned and toe clamp mounting to ensure the best orthogonality. This is offered for precise orthogonal mounting of the second axis in a multi-axis system. In this case, the bottom side of the table base is match drilled and reamed to the first axis to provide exact orthogonal location. This convenient option eliminates concerns regarding contamination or damage often associated with machining an assembled unit.

X-Y showing 12:00 and 9:00 positions

ORDERING INFORMATION

404XE

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤		⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮
Order Example:	404	T08	XE	M	S	–	VL	D4	H8	L8	C3	M4	E1	B1	R11	P1

① Series

404

② Table Travel (mm)

	NL Short Carriage	**VL Long Carriage**
T01*	25	n/a
T02**	50	n/a
T03***	100	33
T04	150	83
T05	200	133
T06	250	183
T07	300	233
T08	350	283
T09	400	333
T10	450	383
T11	500	433
T12	550	483
T13	600	533
T15	700	633

* VL carriage, D3 & D4 drives, and Limit/Home Sensor Pack option are not offered with T01 travel models.
** VL carriage, D4 drive options are not offered with T02 travel models.
*** If selecting T03 travel model with VL carriage, H1 must be chosen and options L11-L14 are not available; Consult factory if required.

③ Table Style

XE XE Series

④ Mounting

M Metric

⑤ Grade

S Standard Grade

⑥ Carriage Style

NL Short
VL Long

⑦ Drive Screw

D1 Free travel
D2 5 mm ballscrew
D3* 10 mm ballscrew
D4* 20 mm ballscrew

* D3 & D4 drives are not available with T01 travel. D4 drives are not available with T02 travels.

⑧ Home Sensor (one sensor)

H1 No home sensor
H2 N.C. current sinking, flying leads
H3 N.O. current sinking flying leads
H4 N.C. current sourcing, flying leads
H5 N.O. current sourcing, flying leads
H6 N.C. current sinking, with locking connector
H7 N.O. current sinking, with locking connector
H8 N.C. current sourcing, with locking connector
H9 N.O. current sourcing, with locking connector
H11 N.C. current sinking, sensor pack*
H12 N.O. current sinking, sensor pack*
H13 N.C. current sourcing, sensor pack*
H14 N.O. current sourcing, sensor pack*

* Must be ordered with L11-L14 sensor option.

⑨ Travel Limit Sensor Assembly (two sensors)

L1 No limit sensors
L2 N.C. current sinking, flying leads
L3 N.O. current sinking, flying leads
L4 N.C. current sourcing, flying leads
L5 N.O. current sourcing, flying leads
L6 N.C. current sinking with locking connector*
L7 N.O. current sinking with locking connector*
L8 N.C. current sourcing with locking connector*
L9 N.O. current sourcing with locking connector*
L11 N.C. current sinking, sensor pack
L12 N.O. current sinking, sensor pack
L13 N.C. current sourcing, sensor pack
L14 N.O. current sourcing, sensor pack

* Sensors with locking connector include 5 m extension cable.

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤		⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮
Order Example:	404	T08	XE	M	S	–	VL	D4	H8	L8	C3	M4	E1	B1	R11	P1

⑩ Motor Coupling

C1 No coupling (required for parallel mounting)
C2 0.25" Oldham
C3 0.25" Bellows
C4 0.375" Oldham
C5 0.375" Bellows
C6 0.43" Oldham
C7 0.43" Bellows
C10 14 mm Oldham (M75 motor option)
C11 14 mm Bellows (M75 motor option)
C22 9 mm Oldham
C23 9 mm Bellows
C24 5 mm Oldham (M37 NEMA 17)
C25 5 mm Bellows (M37 NEMA 17)
C26 8 mm Oldham (M71 NEMA motor option)
C27 8 mm Bellows (M71 NEMA motor option)
C28 0.19" Oldham (M37 NEMA 17)
C29 0.19" Bellows (M37 NEMA 17)

⑪ Motor Mount*

M1 No motor mount
M2 SM 16 In-line mounting
M3 NEMA 23 & SM 23 – In-line mounting
M4 NEMA 34 – In-line mounting
M5 SM16 – Parallel mounting, "A" location
M6 SM16 – Parallel mounting, "B" location
M7 SM16 – Parallel mounting, "C" location
M8 NEMA 23 – Parallel mounting, "A" location
M9 NEMA 23 – Parallel mounting, "B" location
M10 NEMA 23 – Parallel mounting, "C" location
M11 SM23 – Parallel mounting, "A" location
M12 SM23 – Parallel mounting, "B" location
M13 SM23 – Parallel mounting, "C" location
M21 Neometric 70 – In-line mounting
M37 NEMA 17 – In-line mounting
M42 SM232AQ-NPSN Servo motor – In-line mounting
M46 HV232-02-10 Stepper motor – In-line mounting
M49 Handcrank/no read out
M51 HDY55 – In-line mounting
M61 BE23 – In-line mounting
M62 BE23 – Parallel mounting, "A" location
M63 BE23 – Parallel mounting, "B" location
M64 BE23 – Parallel mounting, "C" location
M71 SGM01 – In-line mounting
M72 SGM01 – Parallel mounting, "A" location
M73 SGM01 – Parallel mounting, "B" location
M74 SGM01 – Parallel mounting, "C" location
M75 SGM02 – In-line mounting

* Refer to "Motor Mounting Dimensions" for maximum allowable motor shaft diameter.

⑫ Feedback Option

E1 None
E2 Linear feedback – 5 micron magnetic (not available on T01 units with H2-H9 "home" and L2-L9 "limit" sensors)
E5 Rotary shaft encoder (cannot be used with brake option)

⑬ Brake Option

B1 No brake
B2 Shaft brake (cannot be used with rotary encoder option)

⑭ Environmental Protection

R11 Hard cover
R12 Hard cover, cleanroom prep
R13 No cover
R14 No cover, cleanroom prep

⑮ Multi-Axis Selections

P1 X axis – for single axis use
P20* X axis – for X-Y assembly (VL carriage units only) – motor @ 12:00
P33* Y axis, standard dowel pinned & toe clamped to X axis – motor @ 3:00
P39* Y axis, standard dowel pinned & toe clamped to X axis – motor @ 9:00
P43* Y axis, toe clamped to X axis motor @ 3:00
P49* Y axis, toe clamped to X axis motor @ 9:00
P53* Y axis, precision dowel pinned & toe clamped to X axis motor @ 3:00
P59* Y axis, precision dowel pinned & toe clamped to X axis motor @ 9:00

***Consult factory for multi-axis pinning options and quotation**

OSPE..SB/ST Screw-Driven Actuators

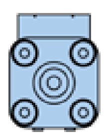
OSPE..SB Ball Screw Actuators for Precise Positioning
OSPE..ST Trapezoidal Screw Actuators for Zero Backdrive

- Medium precise and highly repeatable position control
- High thrust force output
- Easy installation
- Excellent low speed characteristics
- No back-drive with OSPE..ST
- Integrated drive train and glider bearing
- Complete motor, gearhead and control packages
- Diverse range of accessories and mountings
- Clean room option on request
- Ambient temperature range -20°C to +80°C
- IP54 rated

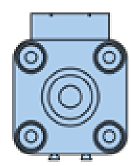
EXTERNAL GUIDE BEARING OPTIONS:

PowerSlide
- Designed for harsh environments
- Hardened steel guide rail
- Carriage with steel v-wheels
- Tough roller cover with wiper and grease access point

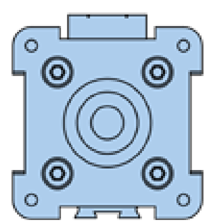
ProLine
- Designed for high-speed, precise, smooth and quiet operation
- Aluminum rail with ground and calibrated steel trucks
- Carriage supported by needle bearing rolls
- Integrated wipers to keep bearing system clean
- Lifetime lubricated bearing system



OSPE-25SB/ST



OSPE-32SB/ST



OSPE-50SB/ST

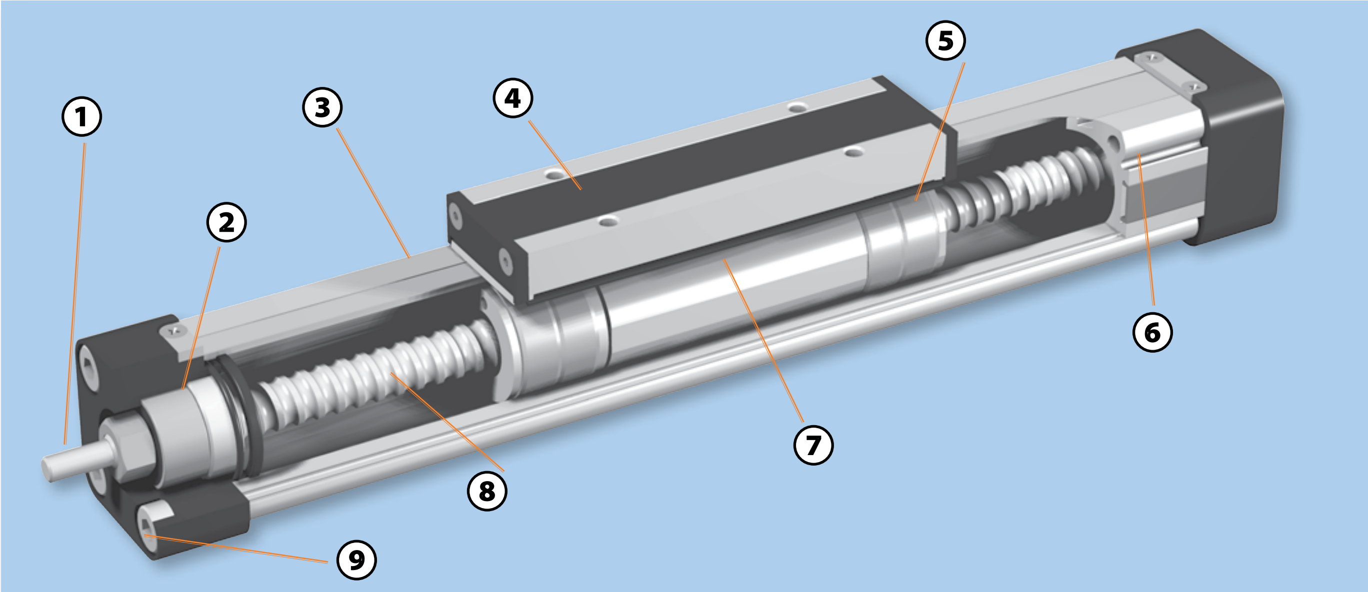
	OSPE 25SB	OSPE 32SB	OSPE 50SB	OSPE 25ST	OSPE 32ST	OSPE 50ST
Maximum Travel (mm)	1000	2000	3200	1000	2000	2400
Maximum Payload (N)	500	1200	3000	500	1000	1500
Maximum Acceleration (m/s^2)	10	10	10	2	2	2

* SB = Ball Screw, ST = Trapezoidal Screw
** Does not include external guide rail in values

The field-proven OSPE..SB/ST design is the industry standard for medium precise positioning with a ball screw or intermittent duty positioning without back-drive with a trapezoidal screw. Compact size and maximum configurability make the OSPE..SB/ST easy to integrate into any machine layout simply and neatly.

The OSPE..SB design utilizes a ball screw which is ideal for medium precise applications requiring a 50 micron unidirectional repeatability. A ball screw is used in machines requiring reliable positioning with continuous and medium to high thrust force output at 100% duty cycle.

The OSPE..ST design utilizes a trapezoidal screw, which is ideal for low-speed and high-thrust applications with a maximum duty cycle of 10%. The trapezoidal screw has no back drive and therefore can hold loads in position without a motor brake, even in vertical orientations.



① **Drive shaft**
Designed to pair with a large assortment of motor and gearhead mounting options

② **Double row angular contact ball bearing**
Optimized for high thrust force transmission

③ **Corrosion resistant steel sealing band**
Magnetically fastened to the actuator body and provides sealing to IP54

④ **Carriage**
Low profile, high strength aluminum carriage with threaded holes for ease of mounting

⑤ **Low friction support rings**
Polymer glider bushing to provide an economical guidance system with optimum performance

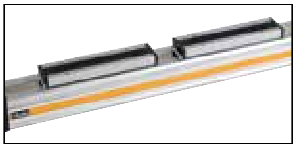
⑥ **Slotted profile**
With dovetail grooves for strength, actuator mounting, and mounting of sensor and other accessories

⑦ **Fastening**
SB actuators with hardened ball screw nut;
ST actuators with low friction plastic nut

⑧ **Lead screw**
Ball screw or trapezoidal

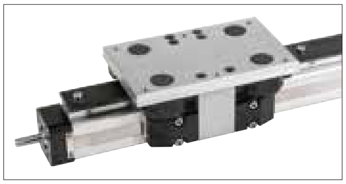
⑨ **End housing mounting**
Threaded mounting holes allow for a multitude of mounting options

Carriage Options
Standard or
Tandem carriage — for higher load capabilities (OSPE..SB only)



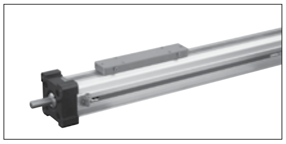
Actuator Mounting Options
End cap mounting — allows actuator to be anchored by the end caps
Profile mounting — supports long travel actuators or for direct mounting (as shown)

Carriage Bearing Design Configurations
Standard carriage (with internal glider bearing), PowerSlide (externally mounted steel roller guide for higher load capabilities specifically in harsh environments), and ProLine (externally mounted aluminum roller guide for higher load capabilities and precision positioning)



Carriage Mounting
Standard, clevis (provides compensation between actuator and external guide rails in machine designs), and Inversion mounting (allows outer band to be on the bottom, while keeping payload on top, for better actuator protection in dirty environments)

Market Specific Options
Cleanroom version — Specific scraper system and vacuum suction ports to operate in clean environments (OSPE.. SB only). Certified according to DIN EN ISO 146441-1. Please consult factory for more information.



Multi-axis Systems
A wide range of adapter plates and intermediate drive shafts simplifies engineering and installation. Please consult factory for your individual system design.

Options and Accessories
Information on all OSPE..SB/ST Series options are detailed in Options & Accessories. Simply select all the options needed to solve your application requirements, then order with the actuator using convenient order codes (see Ordering Information). To order an option separately as an upgrade to an existing system or as a replacement part, use the individual option part numbers provided.

SPECIFICATIONS

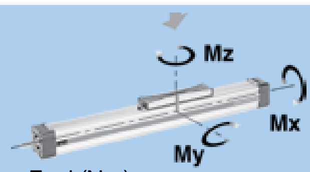
OSPE..SB/ST General Specifications

Actuator Size			OSPE25		OSPE32			OSPE50			
Screw Type (SB-Ball; ST-Trapezoidal)			**SB**	**ST**	**SB**	**SB**	**ST**	**SB**	**SB**	**SB**	**ST**
Screw Lead	s_{lin}	mm	5	4	5	10	4	5	10	25	6
Screw diameter		mm	12	16	16	16	20	25	25	25	30
Duty cycle*		%	100	10	100	100	10	100	100	100	10
Efficiency	η	%	90	40	90	90	40	90	90	90	40
Linear Speed (Max)	v_{max}	mm/s	250	100	250	500	100	250	500	1,250	150
Radial Speed (Max)		rpm	3,000	1,500	3,000	3,000	1,500	3,000	3,000	3,000	1,500
Acceleration (Max)	a_{max}	m/s²	2	2	2	4	2	2	4	10	2
Repeatability (unidirectional)		µm	± 50	± 500	± 50	± 50	± 500	± 50	± 50	± 50	± 500
Thrust Force (Max)	F_{Amax}	N	250	600	1,100	800	1,300	1,300	1,450	1,350	2,500
		lbs	56	135	247	180	292	292	326	303	562
Torque on Drive Shaft (Max)	M_{Amax}	Nm	0.4	1.3	1.2	1.7	2.5	1.5	3.1	6.7	6.6
		in-lb	3.7	11.1	10.4	15.2	21.9	13.7	27.1	59.0	58.1
Inertia											
@ Zero Stroke	J_0	kgmm²	2	6	8	8	22	84	84	84	152
Per Meter of Stroke	J_{OS}	kgmm²/m	11.0	30.0	32.0	32.0	81.0	225.0	225.0	225.0	400.0
Per 1 kg Moved Mass	J_m	kgmm²/kg	0.6	0.4	0.6	2.5	0.4	0.6	2.5	15.8	0.9
Ambient Temperature Range		°C	-20 to +80 (OSPE..SB); -20 to +70 (OSPE..ST)								
IP Rating			IP54								

* Due to the friction between the plastic nut and trapezoidal screw, the duty cycle must not exceed 10% to avoid early wear and increased noise emission.

Calculating Load Factors - Combined Normal and Moment Load

The sum of combined loads (static and dynamic) must not exceed "1" at any time as shown in the formula below:



$$\frac{F_z}{F_{z\,(max)}} + \frac{M_x}{M_{x\,(max)}} + \frac{M_y}{M_{y\,(max)}} + \frac{M_z}{M_{z\,(max)}} \leq 1$$

$$M = F \times l \text{ (Nm)}$$
$$M_x = M_{x\text{ static}} + M_{x\text{ dynamic}}$$
$$M_y = M_{y\text{ static}} + M_{y\text{ dynamic}}$$
$$M_z = M_{z\text{ static}} + M_{z\text{ dynamic}}$$

OSPE25SB/ST Performance

			Standard Carriage		PowerSlide			ProLine
Carriage (Bearing System)			**SB**	**ST**	**PS25/25**	**PS25/35**	**PS25/44**	**PL32**
Part Number [1]			—	—	20015	20016	20017	20856
Max Order Stroke [2]	OS_{max}	mm	1100	1100	1100	1100	1100	1100
Normal Load [3] (Max)	F_Y / F_Z	N (lbs)	500 (112)	500 (112)	297 (67)	330 (74)	575 (129)	1236 (278)
Moment Load [3] (Max)	M_X	Nm (in-lb)	2 (18)	2 (18)	5 (44)	6 (53)	10 (89)	24 (212)
	M_Y	Nm (in-lb)	12 (106)	24 (212)	21 (186)	23 (204)	85 (752)	55 (487)
	M_Z	Nm (in-lb)	8 (71)	7 (62)	21 (186)	23 (204)	85 (752)	55 (487)
Torque — No Load [4] **SB – 5 mm lead**	M_0	Nm (in-lb)	0.2 (1.8)	—	0.3 (2.7)	0.3 (2.7)	0.3 (2.7)	0.3 (2.7)
Torque — No Load [4] **ST – 4 mm lead**	M_0	Nm (in-lb)	—	0.3 (2.7)	0.4 (3.5)	0.4 (3.5)	0.4 (3.5)	0.4 (3.5)
Weight SB @ 0 Stroke	m_0	kg (lbs)	0.6 (1.32)	—	0.9 (1.98)	1.0 (2.20)	1.2 (2.64)	0.8 (1.76)
Weight SB Per Meter of Stroke	m_{OS}	kg (lbs)	2.3 (5.06)	—	3.7 (8.14)	4.1 (9.02)	4.9 (10.78)	4.0 (8.80)
Weight SB Carriage [4]	m_C	kg (lbs)	0.2 (0.44)	—	0.9 (1.98)	1.0 (2.20)	1.7 (3.74)	1.0 (2.20)
Weight ST @ 0 Stroke	m_0	kg (lbs)	—	0.7 (1.54)	1.0 (2.20)	1.1 (2.42)	1.3 (2.86)	0.9 (1.98)
Weight ST Per Meter of Stroke	m_{OS}	kg (lbs)	—	1.6 (3.52)	4.2 (9.24)	4.6 (10.12)	5.4 (11.88)	4.5 (9.90)
Weight ST Carriage [4]	m_C	kg (lbs)	—	0.2 (0.44)	0.9 (1.98)	1.0 (2.20)	1.7 (3.74)	1.0 (2.20)

OSPE32SB/ST Performance

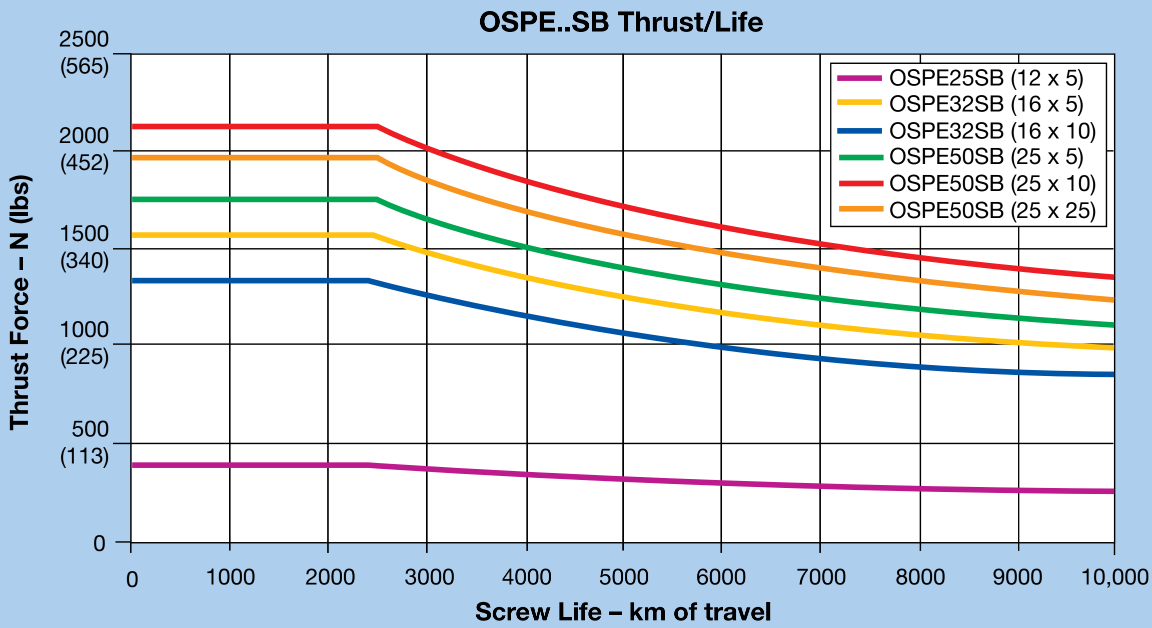
				Standard Carriage		PowerSlide		ProLine
Carriage (Bearing System)				SB	ST	PS32/35	PS32/44	PL32
Part Number [1]				—	—	20286	20287	20857
Max Order Stroke [2]		OS_{max}	mm	2000	2000	2000	2000	2000
Normal Load [3] (Max)		F_Y / F_Z	N (lbs)	1200 (270)	1000 (225)	458 (103)	1111 (250)	1689 (380)
Moment Load [3] (Max)		M_X	Nm (in-lb)	8 (71)	6 (53)	7 (62)	24 (212)	41 (363)
Moment Load [3] (Max)		M_Y	Nm (in-lb)	25 (221)	65 (575)	23 (204)	85 (752)	105 (929)
Moment Load [3] (Max)		M_Z	Nm (in-lb)	16 (142)	12 (106)	23 (204)	85 (752)	105 (929)
Torque — No Load [4]	SB – 5 mm lead	M_0	Nm (in-lb)	0.3 (2.7)	—	0.4 (3.5)	0.4 (3.5)	0.4 (3.5)
Torque — No Load [4]	SB – 10 mm lead	M_0	Nm (in-lb)	0.4 (3.5)	—	0.5 (4.4)	0.5 (4.4)	0.5 (4.4)
Torque — No Load [4]	ST – 4 mm lead	M_0	Nm (in-lb)	—	0.6 (5.3)	0.7 (6.2)	0.7 (6.2)	0.7 (6.2)
Weight SB	@ 0 Stroke	m_0	kg (lbs)	1.6 (3.52)	—	2.0 (4.40)	2.2 (4.84)	2.1 (4.62)
Weight SB	Per Meter of Stroke	m_{OS}	kg (lbs)	4.4 (9.68)	—	6.3 (13.86)	7.0 (15.40)	7.0 (15.40)
Weight SB	Carriage [4]	m_C	kg (lbs)	0.4 (0.88)	—	1.2 (2.64)	1.9 (4.18)	1.6 (3.52)
Weight ST	@ 0 Stroke	m_0	kg (lbs)	—	1.6 (3.52)	2.6 (5.72)	2.8 (6.16)	2.1 (4.62)
Weight ST	Per Meter of Stroke	m_{OS}	kg (lbs)	—	5.0 (11.00)	6.9 (15.18)	7.6 (16.72)	7.6 (16.72)
Weight ST	Carriage [4]	m_C	kg (lbs)	—	0.5 (1.10)	1.3 (2.86)	2.0 (4.40)	1.7 (3.74)

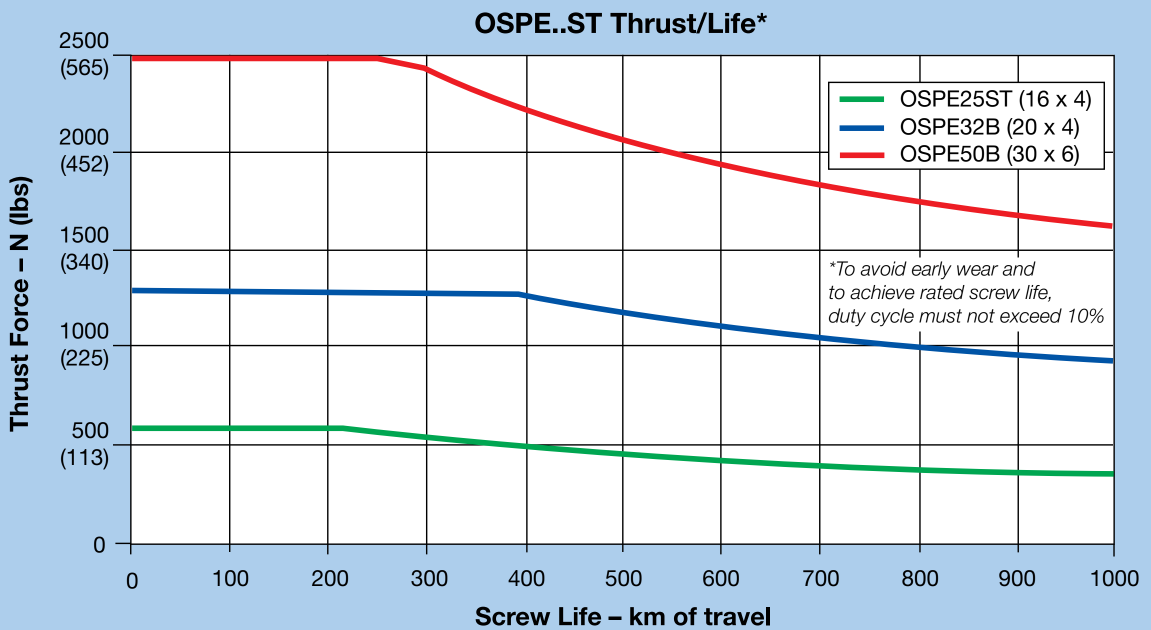
OSPE50SB/ST Performance

				Standard Carriage		PowerSlide		ProLine
Carriage (Bearing System)				SB	ST	PS50/60	PS50/76	PL50
Part Number [1]				—	—	20288	20289	20859
Max Order Stroke [2]		OS_{max}	mm	2000	2000	2000	2000	2000
Normal Load [3] (Max)		F_Y / F_Z	N (lbs)	3000 (674)	1500 (337)	1449 (326)	2518 (566)	4489 (1009)
Moment Load [3] (Max)		M_X	Nm (in-lb)	16 (142)	13 (115)	43 (381)	88 (779)	160 (1416)
Moment Load [3] (Max)		M_Y	Nm (in-lb)	80 (708)	155 (1372)	121 (1071)	220 (1947)	360 (3186)
Moment Load [3] (Max)		M_Z	Nm (in-lb)	32 (283)	26 (230)	121 (1071)	220 (1947)	360 (3186)
Torque — No Load [4]	SB – 5 mm lead	M_0	Nm (in-lb)	0.6 (5.3)	—	0.8 (7.1)	0.8 (7.1)	0.8 (7.1)
Torque — No Load [4]	SB – 10 mm lead	M_0	Nm (in-lb)	0.7 (6.2)	—	0.9 (8.0)	0.9 (8.0)	0.9 (8.0)
Torque — No Load [4]	SB – 25 mm lead	M_0	Nm (in-lb)	0.9 (8.0)	—	1.2 (10.6)	1.2 (10.6)	1.2 (10.6)
Torque — No Load [4]	ST – 6 mm lead	M_0	Nm (in-lb)	—	1.7 (15.0)	1.9 (16.8)	1.9 (16.8)	1.9 (16.8)
Weight SB	@ 0 Stroke	m_0	kg (lbs)	4.0 (8.80)	—	5.2 (11.44)	5.9 (12.98)	5.2 (11.44)
Weight SB	Per Meter of Stroke	m_{OS}	kg (lbs)	9.4 (20.68)	—	13.6 (29.92)	16.0 (35.20)	13.2 (29.04)
Weight SB	Carriage [4]	m_C	kg (lbs)	1.2 (2.64)	—	3.5 (7.70)	6.1 (13.42)	3.7 (8.14)
Weight ST	@ 0 Stroke	m_0	kg (lbs)	—	3.8 (8.36)	5.0 (11.00)	5.7 (12.54)	5.0 (11.00)
Weight ST	Per Meter of Stroke	m_{OS}	kg (lbs)	—	10.6 (23.32)	14.8 (32.56)	17.2 (37.84)	14.4 (31.68)
Weight ST	Carriage [4]	m_C	kg (lbs)	—	1.3 (2.86)	3.6 (7.92)	6.2 (13.64)	3.8 (8.36)

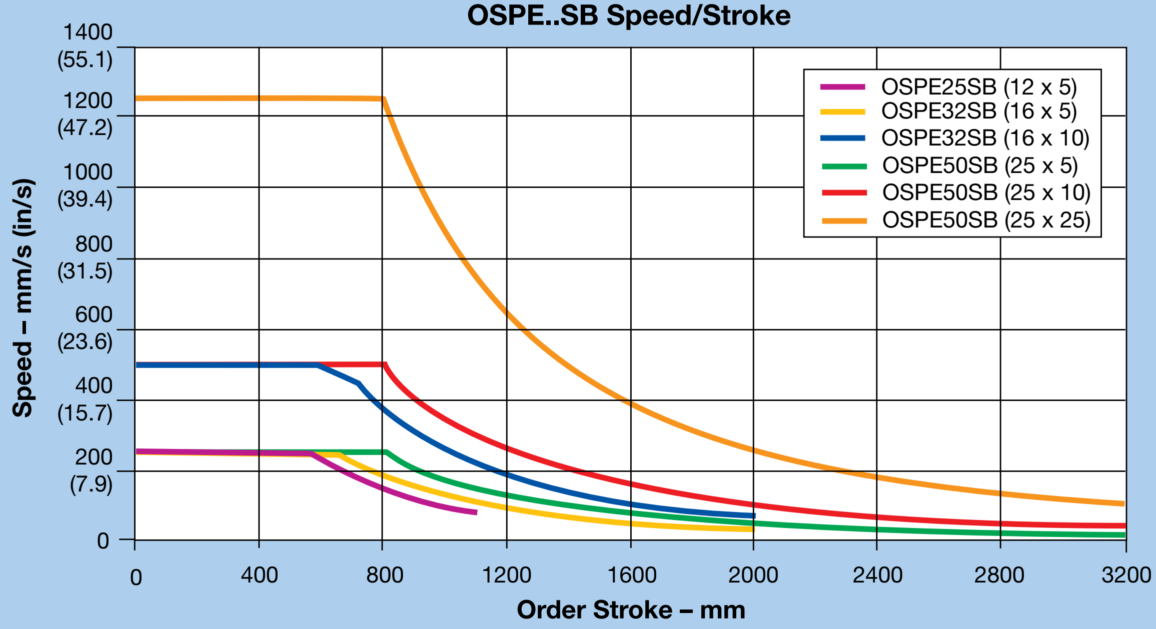
[1] PowerSlide or ProLine bearings can be ordered individually with assigned part number in the table and specified, five digit order stroke value (mm), following the part number (-nnnnn) to designate the appropriate length guide rail. To order PowerSlide or Proline bearing with the actuator, use the appropriate order code in item 10 of Ordering Information.
[2] Longer strokes available upon request. Contact factory.
[3] Load and moment based on 8000 km performance Refer to “Calculating Load Factors” for additional information.
[4] For tandem option (OSPE..SB), double the values listed.

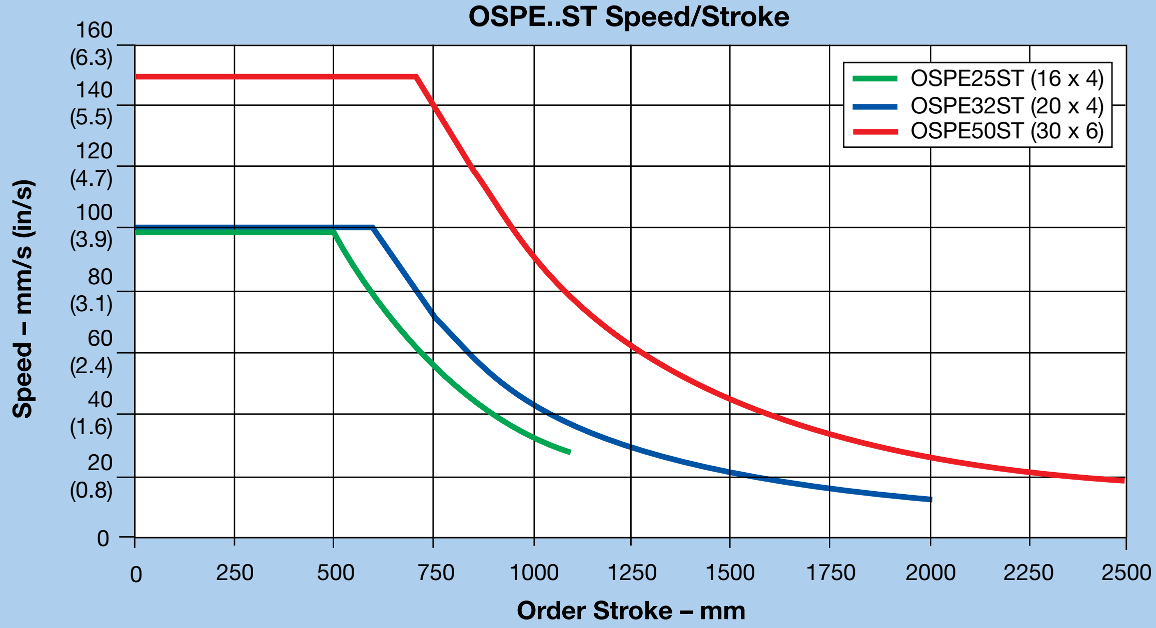
OSPE..SB/ST Life Performance





Speed Performance





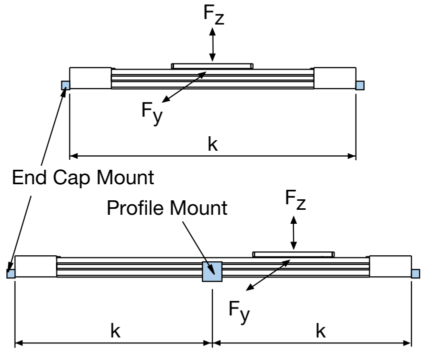
DIMENSIONS

Maximum Permissible Unsupported Length —
Determining end cap and profile mounting placement

OSPE..SB/ST Series actuators need to be mounted onto a solid machine base or frame structure using appropriately positioned end cap and profile mounts. This ensures that the actuator will not undergo excessive deflection based on the application's load and length requirements.

The greater the load and/or the longer the unsupported length between mounts, the more the actuator is susceptible to deflection. Loading is also dependent on the carriage orientation (F_Z for top oriented carriage or F_Y for a side mounted carriage).

Standard Carriage, Tandem Carriage, PowerSlide or ProLine



To determine correct end cap and profile mount placement, please follow the steps shown in the example below.

Use the deflection graphs on the next page to ensure that the load will not exceed the maximum allowed deflection.

Example:

A horizontal application uses an OSPE32B with a top oriented carriage. The maximum load to the carriage is 80 kg and the order stroke is 1,550 mm (see previous section to calculate order stroke).

Therefore, the overall length of the actuator will be 1,800 mm:

1,550 mm + 2 x Dim "X" (125 mm) = 1,800 mm

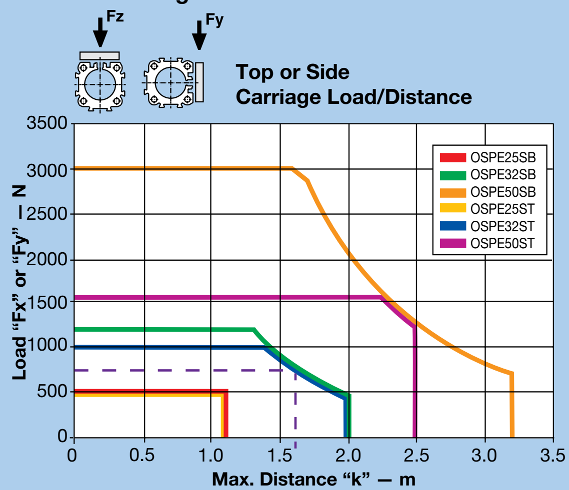
1) Use the appropriate Fz graph) for a top loaded carriage. (Note: with the standard carriage, top loaded Fz and side loaded Fy values are the same).
2) Calculate the Load "F" in Newtons based on the 80 kg application load requirement:

   80 kg x 9.81 kg/ms² = 784.8 N

3) Draw a line from 785 N on the Y-axis to the OSPE32B curve, then down to the X-axis.
4) The value of "k" is approximately 1,600 mm.
5) Since the overall length (1,800 mm) is greater than this value "k", the actuator will require an additional third fixture point — one end cap mount and two profile mounts — equally spaced to create a distance "k" of 800 mm in between.
6) Maximum deflection of the actuator with this mounting configuration will be less than 1.6 mm:

   0.2% of 800 mm = 1.6 mm

Standard Carriage Load-Distance

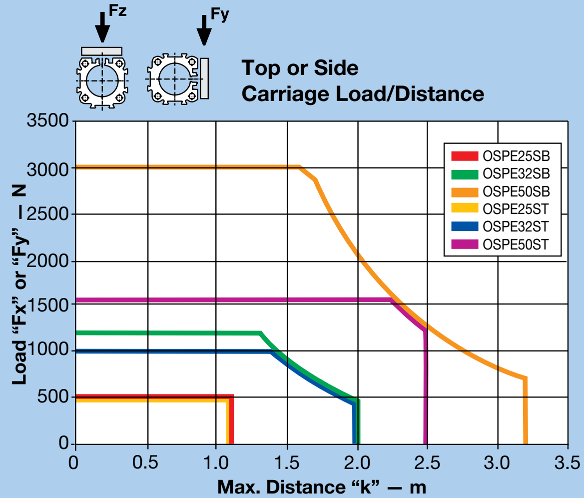


To further reduce deflection:

If the application requires less deflection, then simply reduce the distance "k" appropriately. In this example, for instance, the application must not exceed 1 mm (1/2 the maximum deflection calculated). Therefore, "k" must also be 1/2, or 400 mm.

To achieve this reduced maximum deflection, the actuator will require five fixture points — one end cap mount and four profile mounts — equally spaced with a distance "k" of 400 mm in between.

Standard Carriage Load-Distance



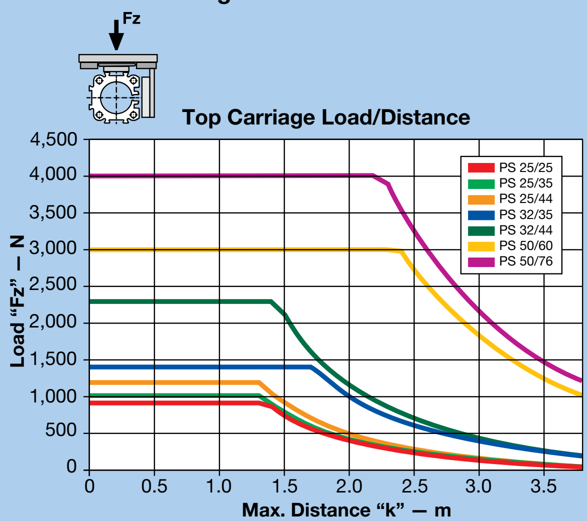
Maximum Permissible Unsupported Length

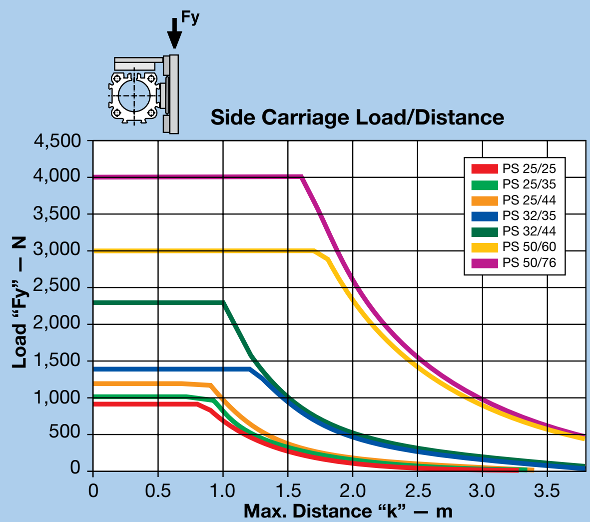
Determining end cap and profile mounting placement

Use the appropriate deflection graph to ensure that the application load does not exceed the deflection curve. Supporting the actuator within the recommended maximum distance "k" will ensure that the installation will have a maximum deflection equal to 0.2% of distance "k."

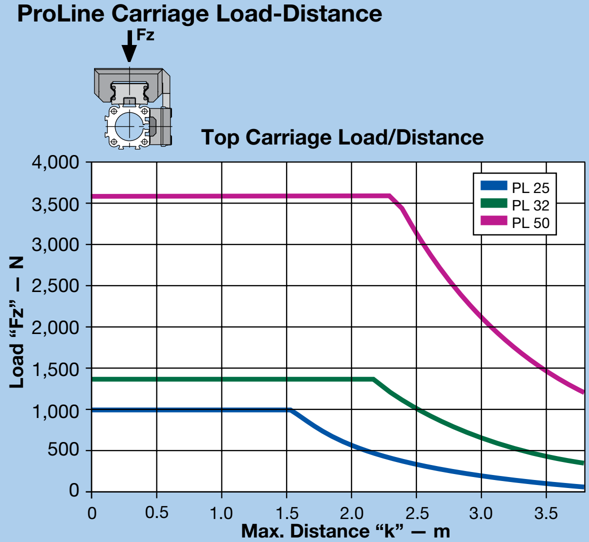
To further reduce deflection, simply reduce the distance between end cap and profile mounts as described in the example on the previous page.

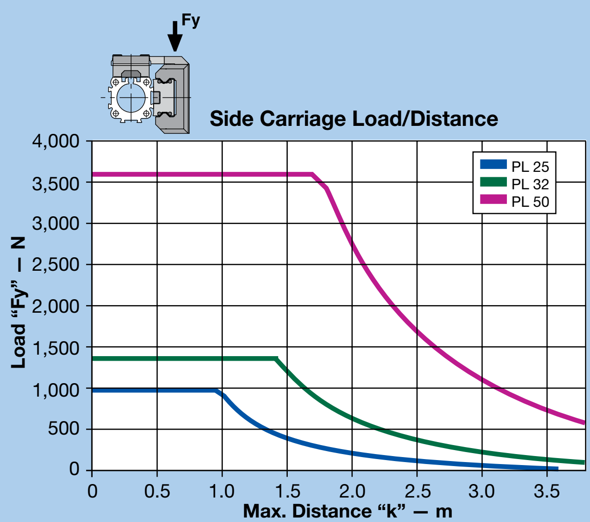
PowerSlide Carriage Load-Distance





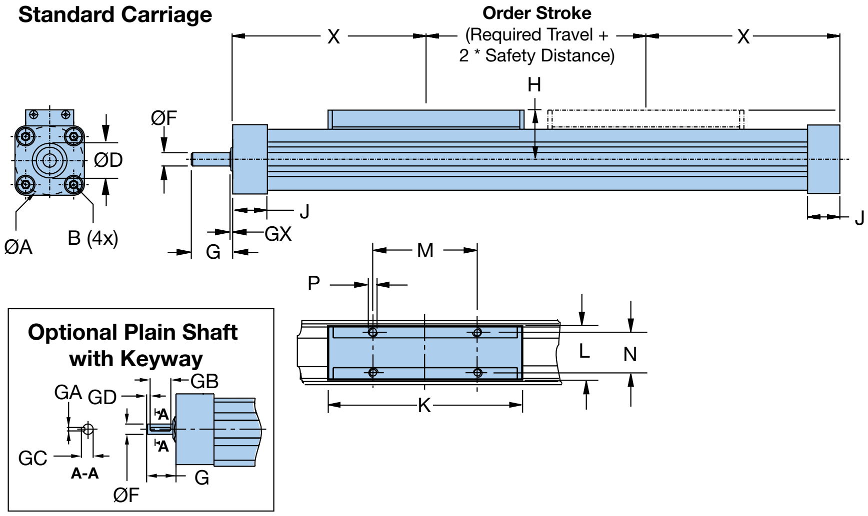
ProLine Carriage Load-Distance

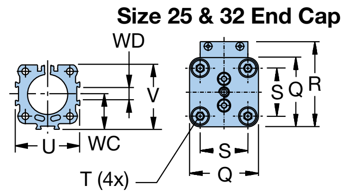


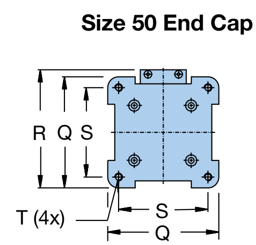


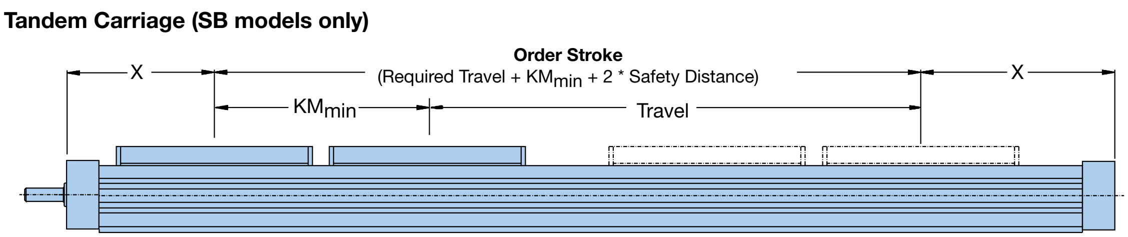
Base Unit Dimensions w/Standard Carriage — mm

Download 2D & 3D files from www.parker.com/emn









Actuator Size	A	B	D	F	G*	GA	GB	GC	GD	GX	H	J	K
OSPE25SB/ST	38.2	M5 x 10	19^{H7}	6_{h7}	17	2^{P9}	12	6.8	2	2	31	22.0	117
OSPE32SB/ST	50.9	M6 x 12	26^{H7}	10_{h7}	31	3^{P9}	16	11.2	5	2	38	25.5	152
OSPE50SB/ST	65.0	M6 x 12	40^{H7}	15_{h7}	43	5^{P9}	28	17.0	6	3	49	33.0	200

	L	M	N	P	Q	R	S	T	U	V	WC	WD	X
OSPE25SB/ST	33	65	25	M5 x 8	41	52.5	27	M5 x 10	40	39.5	21.5	10.4	100
OSPE32SB/ST	36	90	27	M6 x 10	52	66.5	36	M6 x 12	52	51.7	28.5	10.4	125
OSPE50SB/ST	36	110	27	M6 x 10	87	92.5	70	M6 x 12	76	77.0	43.0	10.4	175

* With optional long drive shaft with keyway, dimension "G" is 24 mm for OSPE25SB/ST; 41 mm for OSPE32SB/ST; 58 mm for OSPE50SB/ST
(See Ordering Information, order code 7, option "4 –")

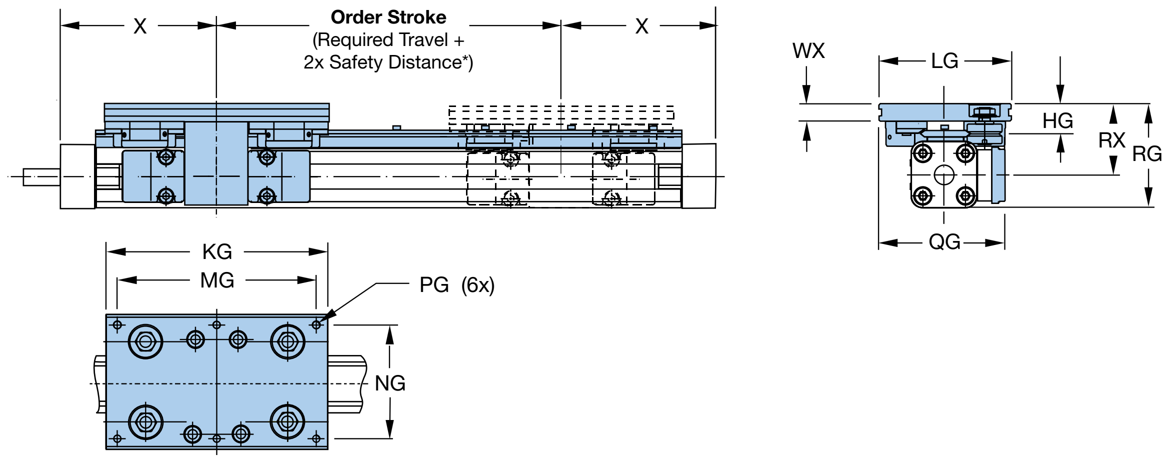
Order Stroke Dimensional Requirements

Actuator Size	KM_{min}	KM_{rec}
OSPE25SB/ST	120	190
OSPE32SB/ST	165	230
OSPE50SB/ST	235	320

KM_{min} is the minimum distance between two carriages possible; KM_{rec} is the recommended distance for optimal performance.

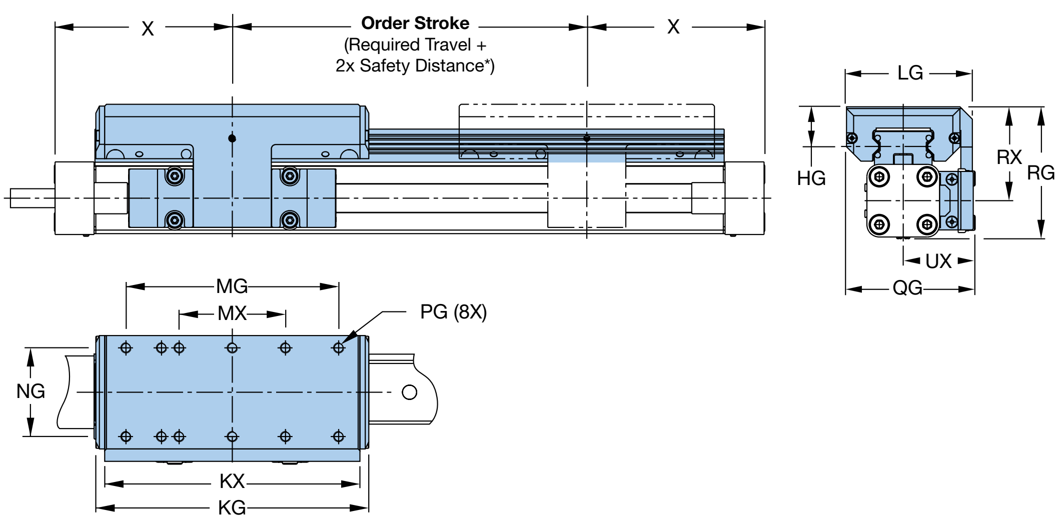
*** Order Stroke Safety Distance:**
The mechanical end position should not be used as a mechanical end stop, thus an additional ***Safety Distance*** at both ends of travel must be incorporated into the Order Stroke. The safety distance for servo-driven systems is equivalent to the travel distance per revolution of the drive shaft. AC motor-driven systems with VFD require a larger safety distance than servo systems. For further information and design assistance, please consult factory.

PowerSlide Dimensions — mm



Guide Rail Size	HG	KG	LG	MG	NG	PG	QG	RG	RX	WX	X
PS25/25	20.0	145	80	125	64	M6 x 11	79.5	73.5	53.0	11.0	100
PS 25/35	21.5	156	95	140	80	M6 x 12	89.5	73.0	52.5	12.5	100
PS25/44	26.0	190	116	164	96	M8 x 15	100.0	78.5	58.0	15.0	100
PS32/35	21.5	156	95	140	80	M6 x 12	95.5	84.5	58.5	12.5	125
PS 32/44	26.0	190	116	164	96	M8 x 15	107.0	90.0	64.0	15.0	125
PS50/60	28.5	240	135	216	115	M8 x 17	130.5	123.5	81.0	17.0	175
PS 50/76	39.0	280	185	250	160	M10 x 20	155.5	135.5	93.0	20.0	175

ProLine Dimensions — mm

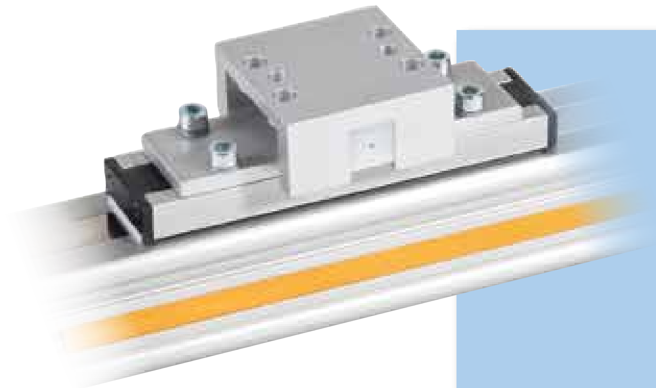


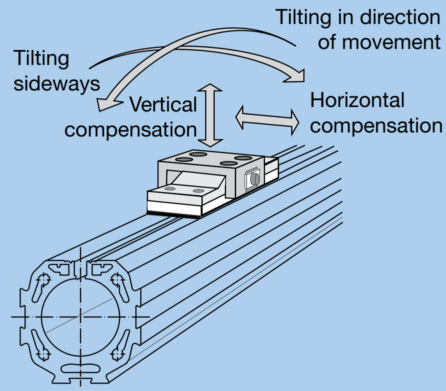
Guide Rail Size	HG	KG	KX	LG	MG	MX	NG	PG	QG	RG	RX	UX	X
PL 25	23	154	144	64	120	60	50	M6 x 12	72.5	74	53	40.5	100
PL 32	25	197	187	84	160	80	64	M6 x 12	91.0	88	62	49.0	125
PL 50	31.6	276	266	110	240	120	90	M6 x 16	117.0	118	75	62.0	175

OPTIONS & ACCESSORIES

Order Code

R Clevis Mounting Option for Standard Carriage

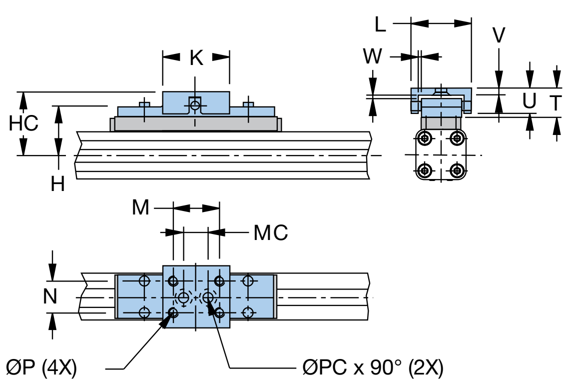




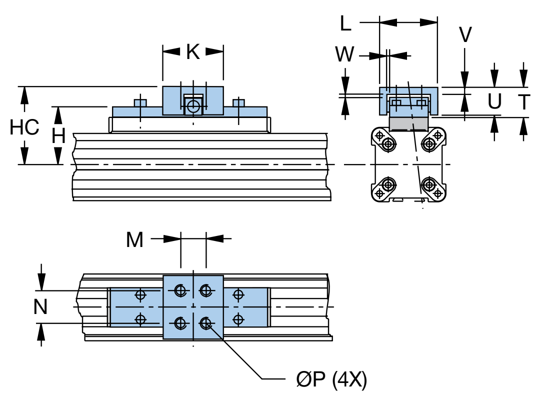
When external guides are involved in the application, slight parallelism deviations can lead to mechanical strain on the carriage and actuator. This can be avoided by the use of a clevis mount that provides freedom of movement compensation on several axes.

The aluminum clevis mount option bolts directly to the standard carriage to eliminate parallelism deviations and strain to the carriage when the actuator is mounted onto machine guide rails. Clevis mounting provides compensation for misalignment in Z and Y directions and can tilt around the X and Y axis.

OSPE25 and OSPE32



OSPE50



Dimensions — mm

Actuator Size	Part Number	Weight* (kg)	H	HC	K	L	M	MC	N	P	PC	T	U	V	W
OSPE25SB/ST	20005FIL	0.091	39	52	40	38	30	16	16	M5	5.5	21	19	3.5	2
OSPE32SB/ST	20096FIL	0.091	50	68	60	62	46	40	25	M6	6.6	30	28	6.0	2
OSPE50SB/ST	20097FIL	0.308	61	79	60	62	46	—	25	M6	—	30	28	6.0	2

*Part number and weight are for individual unit.

Order Code

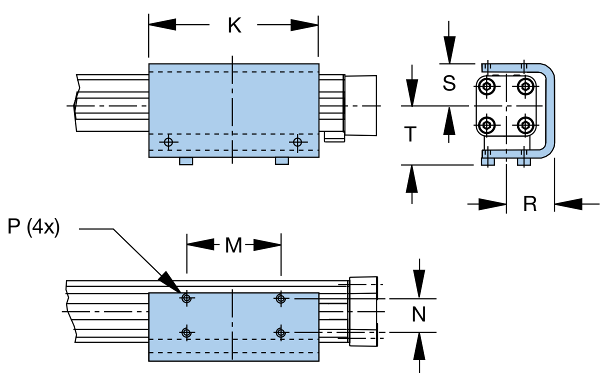
M Inversion Mounting Option for Standard Carriage

For dirty environments or space-restricted installations, inversion of the actuator is recommended.

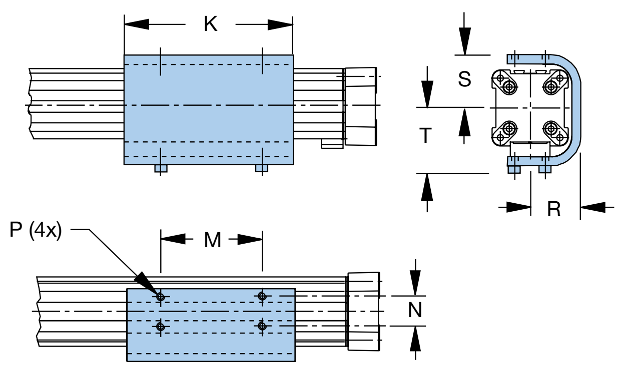
The aluminum inversion bracket transfers the driving force to the opposite side of the actuator allowing the load to be attached to the top side of the actuator while the carriage and sealing band remain protected on the bottom side. The size and position of the mounting holes are the same as on the standard carriage.

Note: Profile mounts and magnetic switches can only be used on the free side of the actuator.

OSPE25 and OSPE32



OSPE50



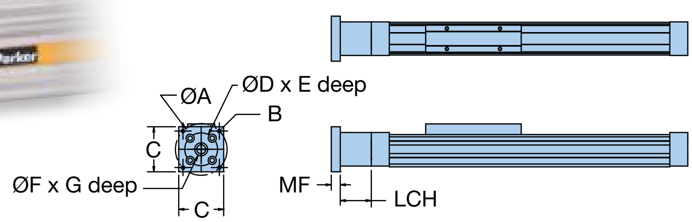
Actuator Size	Part Number	Weight* (kg)	Dimensions — mm K	M	N	P	R	S	T
OSPE25SB/ST	20037FIL	0.302	117	65	25	M5 x 6	33.5	31	43
OSPE32SB/ST	20161FIL	0.449	150	90	27	M6 x 6	39.5	38	51
OSPE50SB/ST	20166FIL	0.947	200	110	27	M6 x 8	52.0	55	65

*Part number and weight are for individual unit.

Motor Mounting Kit Options

Motor Mounting Kits include a coupling housing, coupling and flange

Note: Screw thread to mount motor to flange plate is M3



A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
MF = Motor flange

Actuator Size	Order Code 6 *	Order Code 7 *	A	B	C	D	E	F	G	LCH	MF
			Dimensions — mm								
OSPE25SB/ST	0	AA **	46.66	M3	56	20.00	1.6	6.35	24.8	38	10
	0	AB	66.67	M4	58	38.10	1.6	6.35	20.5	38	9
	0	AC	66.67	M5	58	38.10	1.6	9.53	20.8	38	9
	0	AD	66.67	M5	60	38.10	1.6	9.53	31.8	38	17
	0	B5 **	46.00	M4	56	30.00	2.5	6.00	25.0	38	10
	0	AM **	46.00	M3	56	30.00	2.5	8.00	25.0	38	10
	0	B6	63.00	M4	60	40.00	2.5	9.00	20.0	38	9
	0	AH	63.00	M5	60	40.00	2.5	9.00	20.0	38	10
	0	A2	63.00	M5	60	40.00	2.5	11.00	23.0	38	10
	0	B7	70.00	M5	60	50.00	3.0	8.00	25.0	38	15
	0	B8	70.00	M5	60	50.00	3.0	12.00	30.0	38	15
	0	AG	75.00	M5	70	60.00	2.5	11.00	23.0	38	10
	0	B1	90.00	M5	75	60.00	2.5	11.00	23.0	38	10
OSPE32SB/ST	0	AB	66.67	M5	60	38.10	1.6	6.35	20.5	54	10
	0	AC	66.67	M5	60	38.10	1.6	9.525	20.8	54	10
	0	AD	66.67	M5	60	38.10	1.6	9.525	31.8	54	17
	0	AE	98.43	M5	85	73.00	3.0	12.70	30.0	54	15
	0	AF	98.43	M6	85	73.00	3.0	12.70	37.0	54	25
	0	B6 **	63.00	M4	74	40.00	2.5	9.00	20.0	54	10
	0	AH **	63.00	M5	74	40.00	2.5	9.00	20.0	54	10
	0	A2 **	63.00	M5	74	40.00	2.5	11.00	23.0	54	10
	0	BJ	66.67	M5	60	38.10	1.6	12.70	20.0	54	10
	0	B7	70.00	M5	60	50.00	3.0	8.00	25.0	54	15
	0	B8	70.00	M5	60	50.00	3.0	12.00	30.0	54	15
	0	AN	70.00	M5	60	50.00	3.0	14.00	30.0	54	15
	0	AG	75.00	M5	70	60.00	2.5	11.00	23.0	54	10
	0	B9	75.00	M5	70	60.00	2.5	14.00	30.0	54	15
	0	BA	75.00	M5	70	60.00	3.0	16.00	40.0	54	25
	0	B0	75.00	M6	70	60.00	3.0	14.00	30.0	54	15
	0	B1	90.00	M5	75	60.00	2.5	11.00	23.0	54	10
	0	B2	90.00	M5	75	60.00	2.5	14.00	30.0	54	15
	0	BB	90.00	M6	80	70.00	3.0	14.00	30.0	54	15
	0	B4	90.00	M6	80	70.00	3.0	16.00	40.0	54	25
	0	B3	95.00	M6	80	50.00	2.5	14.00	30.0	54	15

* When ordering with actuator, use order code 6 (gearhead designation) and order code 7 to specify motor mounting kit. See Ordering Information.
** Motor mounts with 45° rotated

Blue order codes indicate rapid shipment availability

(continued on next page)

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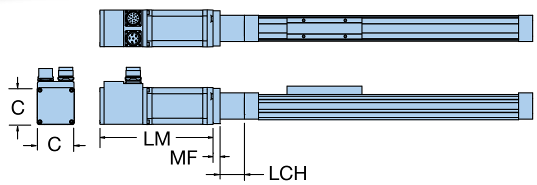
Actuator Size	Order Code 6*	Order Code 7*	A	B	C	D	E	F	G	LCH	MF
			Dimensions — mm								
OSPE50SB/ST	**0**	**AE**	98.43	M5	88	73.0	3.0	12.70	30.0	75	14
	0	**AF**	98.43	M6	88	73.0	3.0	12.70	37.0	84	15
	0	B9	75.00	M5	85	60.0	2.5	14.00	30.0	75	14
	0	BA **	75.00	M5	86	60.0	3.0	16.00	40.0	84	15
	0	B0	75.00	M6	88	60.0	3.0	14.00	30.0	75	14
	0	B2	90.00	M5	80	60.0	2.5	14.00	30.0	75	14
	0	BB	90.00	M6	80	70.0	3.0	14.00	30.0	75	14
	0	B4	90.00	M6	86	70.0	3.0	16.00	40.0	84	15
	0	**AP**	90.00	M6	86	70.0	3.0	19.00	40.0	84	15
	0	B3	95.00	M6	85	50.0	2.5	14.00	30.0	75	14
	0	A1	99.00	M6	88	73.0	3.0	9.525	31.5	75	14
	0	A3	100.00	M6	88	80.0	3.5	14.00	30.0	75	14
	0	**AL**	100.00	M6	88	80.0	3.0	16.00	40.0	84	15
	0	AJ	100.00	M6	88	80.0	3.0	19.00	40.0	84	15
	0	**A4**	115.00	M8	100	95.0	3.5	19.00	40.0	84	15
	0	BD	130.00	M8	115	95.0	3.0	19.00	40.0	84	15
	0	BF	130.00	M8	115	110.0	3.5	19.00	40.0	84	15

* When ordering with actuator, use order code 6 (gearhead designation) and order code 7 to specify motor mounting kit. See Ordering Information.
** Motor mounts with 45° rotated

Blue order codes indicate rapid shipment availability

Mounted Motor Options

Mounted Motor Options include a coupling housing, coupling, flange and motor



C = Square dimension
LCH = Length coupling housing
LM = Length motor
MF = Motor flange

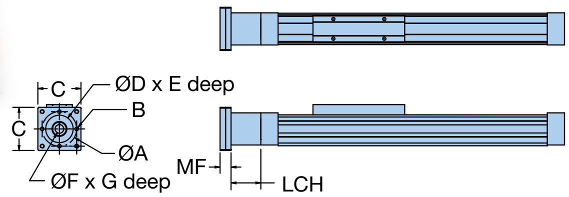
Actuator Size	Order Code 6 *	Order Code 7 *	Motor description	Dimensions — mm C	LCH	LM	MF
OSPE25SB/ST	0	L0	LV233-01-10	58	38	79	9
	0	L1	HV233-01-10	58	38	79	9
	0	KA	MPE0402A4E-KC1N	40	38	91	10
	0	K0	BE233FJ-KPSN	58	38	143	17
	0	K1	BE233FJ-KPSN with brake (CM233FJ-115027)	58	38	178	17
OSPE32SB/ST	0	L0	LV233-01-10	58	54	79	10
	0	L1	HV233-01-10	58	54	79	10
	0	L2	LV343-01-10	86	54	127	25
	0	L3	HV343-01-10	86	54	127	25
	0	KC	MPE0602A4E-KC1N	60	54	118	15
	0	K0	BE233FJ-KPSN	58	54	143	18
	0	K1	BE233FJ-KPSN with brake (CM233FJ-115027)	58	54	178	18
	0	K2	BE344LJ-KPSN	86	54	188	16
	0	K3	BE344LJ-KPSB	86	54	220	16
OSPE50SB/ST	0	L2	LV343-01-10	86	84	127	15
	0	L3	HV343-01-10	86	84	127	15
	0	KG	MPE0804A4E-KC1N	80	84	146	15
	0	K2	BE344LJ-KPSN	86	75	188	14
	0	K3	BE344LJ-KPSB	86	75	220	14
	0	M0	MPP0923D1E-KPSN	89	84	178	15
	0	M1	MPP0923D1E-KPSB	89	84	212	15
	0	M2	MPP1003D1E-KPSN	98	84	175	15
	0	M3	MPP1003D1E-KPSB	98	84	224	15
	0	M4	MPP1003R1E-KPSN	98	84	175	15
	0	M5	MPP1003R1E-KPSB	98	84	224	15

*When ordering with actuator, use order code 6 (gearhead designation) and order code 7 to specify mounted motor. See Ordering Information.

Blue order codes indicate rapid shipment availability

Gearhead Mounting Kit Options

Gearhead Mounting Kits include a coupling housing, coupling and flange



A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
MF = Motor flange

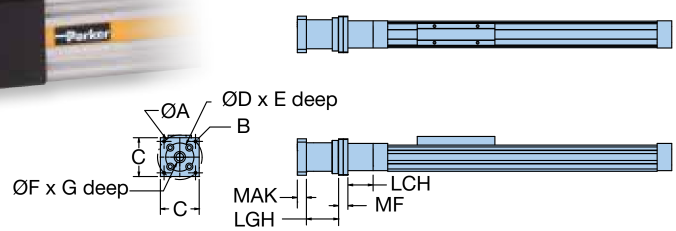
Actuator Size	Order Code ⑥*	Order Code ⑦*	Dimensions — mm A	B	C	D	E	F	G	LCH	MF
OSPE25SB/ST	0	C0	44	S4	54	35	3	12	25	38	14.0
OSPE32SB/ST	0	C0	44	S4	60	35	3	12	25	54	13.0
	0	C1	62	S5	75	52	8	16	36	54	20.0
OSPE50SB/ST	0	C1	62	S5	75	52	8	16	36	84	16.3
	0	C2	80	S6	95	68	10	22	46	84	23.0

*When ordering with actuator, use order code ⑥ (gearhead designation) and order code ⑦ to specify gearhead mounting kit See Ordering Information.

■ Blue order codes indicate rapid shipment availability

Mounted Gearhead with Motor Mounting Kit Options

Mounted Gearhead with Motor Mounting Kit include a coupling housing, coupling, flange, and gearhead with coupler and flange



A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
LGH = Length gearhead
MAK = Motor adapter
MF = Motor flange

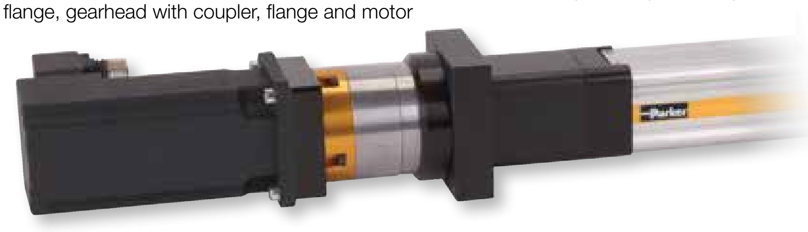
Actuator Size	Order Code 6 [1]	Order Code 7 [2]	Dimensions — mm A	B	C	D	E	F	G	LCH	LGH	MAK	MF
OSPE25SB/ST	A or B	AA	46.66	M3	43	20.00	1.6	6.35	24.8	38	48.5	19.0	14.0
	A or B	**AB**	66.67	M5	55	38.10	1.6	6.35	20.5	38	48.5	15.7	14.0
	A or B	B5	46.00	M4	43	30.00	2.5	6.00	25.0	38	48.5	19.0	14.0
	A or B	**AM**	46.00	M3	43	30.00	2.5	8.00	25.0	38	48.5	19.0	14.0
	A or B	B6	63.00	M4	55	40.00	2.5	9.00	20.0	38	48.5	13.7	14.0
	A or B	AH	63.00	M5	55	40.00	2.5	9.00	20.0	38	48.5	19.0	14.0
OSPE32SB/ST	**C, D or E**	**AB**	66.67	M5	62	38.10	1.6	6.35	20.5	54	67.0	16.5	20.0
	C, D or E	AC	66.67	M5	62	38.00	1.6	9.525	20.8	54	67.0	16.5	20.0
	C, D or E	**AD**	66.67	M5	62	38.10	1.6	9.525	31.8	54	67.0	22.5	20.0
	C, D or E	**AE**	98.43	M5	80	73.03	3.0	12.70	30.0	54	67.0	22.5	20.0
	C, D or E	**AF**	98.43	M6	85	73.03	3.0	12.70	37.0	54	67.0	30.0	20.0
	C, D or E	B6	63.00	M4	62	40.00	2.5	9.00	20.0	54	67.0	16.5	20.0
	C, D or E	AH	63.00	M5	62	40.00	2.5	9.00	20.0	54	67.0	16.5	20.0
	C, D or E	B8	70.00	M5	62	50.00	3.0	12.00	30.0	54	67.0	22.5	20.0
	C, D or E	**AN**	70.00	M5	62	50.00	3.0	14.00	30.0	54	67.0	22.5	20.0
	C, D or E	AG	75.00	M5	62	60.00	2.5	11.00	23.0	54	67.0	16.5	20.0
	C, D or E	B9	75.00	M5	62	60.00	2.5	14.00	30.0	54	67.0	22.5	20.0
	C, D or E	BB	90.00	M6	80	70.00	3.0	14.00	30.0	54	67.0	22.5	20.0
	C, D or E	A3	100.00	M6	89	80.00	3.5	14.00	30.0	54	67.0	22.5	20.0
OSPE50SB/ST	**C, D or E**	**AB**	66.67	M5	62	38.10	1.6	6.35	20.5	84	67.0	16.5	16.3
	C, D or E	AC	66.67	M5	62	38.00	1.6	9.525	20.8	84	67.0	16.5	16.3
	C, D or E	**AD**	66.67	M5	62	38.10	1.6	9.525	31.8	84	67.0	22.5	16.3
	C, D or E	**AE**	98.43	M5	80	73.03	3.0	12.70	30.0	84	67.0	22.5	16.3
	C, D or E	**AF**	98.43	M6	85	73.03	3.0	12.70	37.0	84	67.0	30.0	16.3
	C, D or E	B6	63.00	M4	62	40.00	2.5	9.00	20.0	84	67.0	16.5	16.3
	C, D or E	AH	63.00	M5	62	40.00	2.5	9.00	20.0	84	67.0	16.5	16.3
	C, D or E	B8	70.00	M5	62	50.00	3.0	12.00	30.0	84	67.0	22.5	16.3
	C, D or E	**AN**	70.00	M5	62	50.00	3.0	14.00	30.0	84	67.0	22.5	16.3
	C, D or E	AG	75.00	M5	62	60.00	2.5	11.00	23.0	84	67.0	16.5	16.3
	C, D or E	B9	75.00	M5	62	60.00	2.5	14.00	30.0	84	67.0	22.5	16.3
	C, D or E	BB	90.00	M6	80	70.00	3.0	14.00	30.0	84	67.0	22.5	16.3
	C, D or E	A3	100.00	M6	89	80.00	3.5	14.00	30.0	84	67.0	22.5	16.3

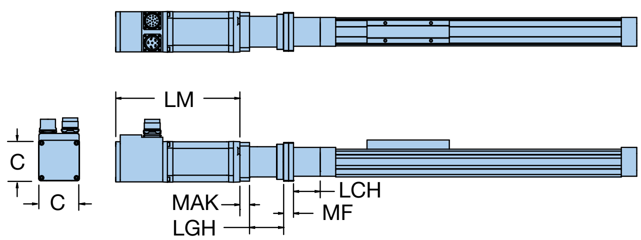
[1] When ordering with actuator, use order code 6 to specify mounted gearhead size and ratio: **A** PV40TA-005 (ratio 5:1); **B** PV40TA-010 (ratio10:1); **C** PV60TA-003 (ratio 3:1); **D** PV60TA-005 (ratio 5:1); **E** PV60TA-010 (ratio 10:1). See ordering information.
[2] When ordering with actuator, use order code 7 to specify motor mounting kit. See Ordering Information.

■ Blue order codes indicate rapid shipment availability

Mounted Gearhead and Motor Options

Mounted Gearhead and Mounted Motor Options include a coupling housing, coupling, flange, gearhead with coupler, flange and motor





C = Square dimension
LCH = Length coupling housing
LGH = Length gearhead
LM = Length motor
MAK = Motor adapter
MF = Motor flange

Actuator Size	Order Code 6 [1]	Order Code 7 [2]	Motor description	Dimensions — mm C	LCH	LGH	LM	MAK	MF
OSPE25SB/ST	A or B	L0	LV233-01-10	58	38	48.5	79	15.7	14.0
	A or B	L1	HV233-01-10	58	38	48.5	79	15.7	14.0
	A or B	**KA**	MPE0402A4E-KC1N	40	38	48.5	91	19.0	14.0
OSPE32SB/ST	C, D or E	L0	LV233-01-10	58	54	67.0	79	16.5	20.0
	C, D or E	L1	HV233-01-10	58	54	67.0	79	16.5	20.0
	C, D or E	L2	LV343-01-10	86	54	67.0	127	30.0	20.0
	C, D or E	L3	HV343-01-10	86	54	67.0	127	30.0	20.0
	C, D or E	**KC**	MPE0602A4E-KC1N	60	54	67.0	118	22.5	20.0
	C, D or E	K0	BE233FJ-KPSN	58	54	67.0	143	22.5	20.0
	C, D or E	K1	BE233FJ-KPSN with brake (CM233FJ-115027)	58	54	67.0	178	22.5	20.0
	C, D or E	K2	BE344LJ-KPSN	86	54	67.0	188	22.5	20.0
	C, D or E	K3	BE344LJ-KPSB	86	54	67.0	220	22.5	20.0
OSPE50SB/ST	C, D or E	L0	LV233-01-10	58	84	67.0	79	16.5	16.3
	C, D or E	L1	HV233-01-10	58	84	67.0	79	16.5	16.3
	C, D or E	L2	LV343-01-10	86	84	67.0	127	30.0	16.3
	C, D or E	L3	HV343-01-10	86	84	67.0	127	30.0	16.3
	C, D or E	**KC**	MPE0602A4E-KC1N	60	84	67.0	118	22.5	16.3
	C, D or E	K0	BE233FJ-KPSN	58	84	67.0	143	22.5	16.3
	C, D or E	K1	BE233FJ-KPSN with brake (CM233FJ-115027)	58	84	67.0	178	22.5	16.3
	C, D or E	K2	BE344LJ-KPSN	86	84	67.0	188	22.5	16.3
	C, D or E	K3	BE344LJ-KPSB	86	84	67.0	220	22.5	16.3

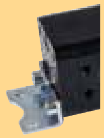
[1] When ordering with actuator, use order code 6 to specify mounted gearhead size and ratio: **A** PV40TA-005 (ratio 5:1); **B** PV40TA-010 (ratio10:1); **C** PV60TA-003 (ratio 3:1); **D** PV60TA-005 (ratio 5:1); **E** PV60TA-010 (ratio 10:1). See Ordering Information.
[2] When ordering with actuator, use order code 7 to specify mounted motor on gearhead. See Ordering Information.

Blue order codes indicate rapid shipment availability

End Cap Mounting Options

See "Maximum Permissible Unsupported Length" for end cap and profile mounting placement requirements.

End Cap Mounting Selection Overview

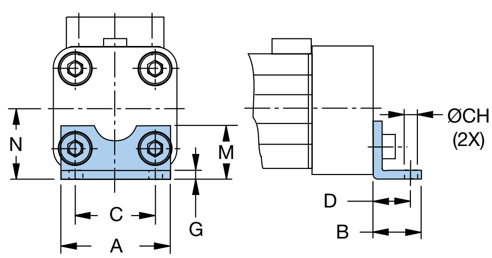
Type		Standard Carriage 25	32	50	PowerSlide 25/25	25/35	25/44	32/35	32/44	50/60	50/76	ProLine 25	32	50
Standard 	**A1**	●	●											
	A2											•	•	
	A3				•	•		•						
Reinforced 	**B1**	●	●		●	●	●	●	●			●	●	
	B4						•		•					
Block 	**C1**			●						●	●			●
	C2													•
	C3									•				
	C4										•			

● Recommended for mounting position with carriage on top • Recommended for mounting position carriage side only (3 or 9 o'clock position)

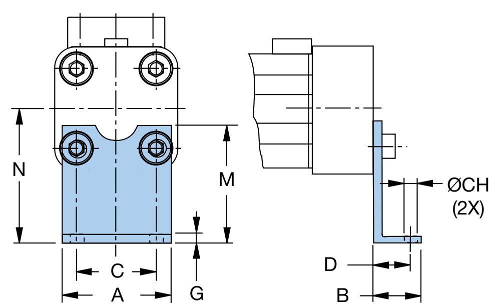
Order
Code

1, 2 or 3
(1 pair)

Type A1



Type A3



Type A1, A2 and A3 – Standard End Cap

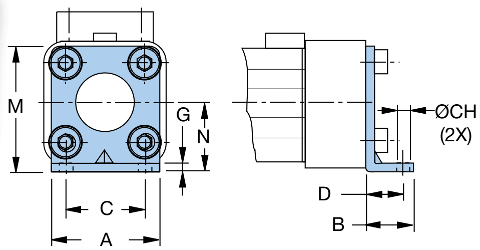
Actuator Size	Type	Part Number*	Weight* (kg)	Dimensions — mm A	B	C	CH	D	G	M	N
OSPE25SB/ST	A1	18156FIL	0.031	39	22	27	5.8	16	2.5	18	22
	A2	18157FIL	0.044							33	37
	A3	18158FIL	0.055							45	49
OSPE32SB/ST	A1	18161FIL	0.050	50	26	36	6.6	18	3.0	20	30
	A2	18162FIL	0.066							34	44
	A3	18163FIL	0.159							42	52

*Part number and weight are for individual unit.

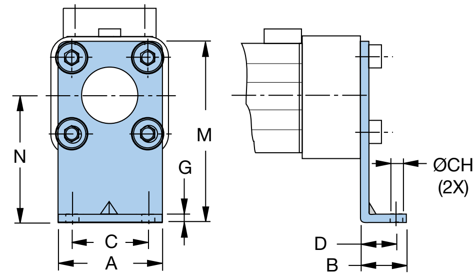
Order
Code

4 or 5
(1 pair)

Type B1



Type B4



Type B1 and B4 – Reinforced End Cap

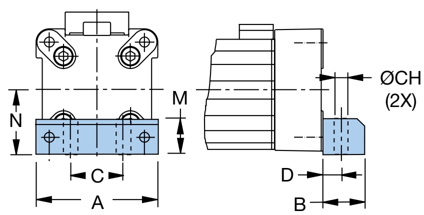
Actuator Size	Type	Part Number*	Weight* (kg)	Dimensions — mm A	B	C	CH	D	G	M	N
OSPE25SB/ST	B1	18159FIL	0.010	39	22	27	5.8	16	2.5	42	22
	B4	18160FIL	0.110							80	60
OSPE32SB/ST	B1	18164FIL	0.078	50	26	36	6.6	18	3.0	55	30
	B4	18165FIL	0.380							85	60

*Part number and weight are for individual unit.

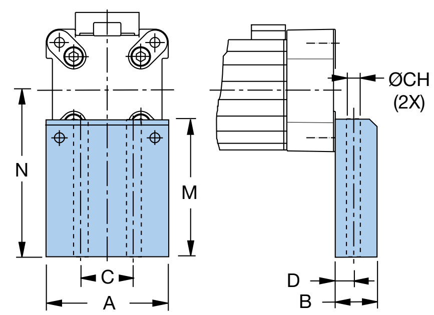
Order
Code

1, 2, 3 or 4
(1 pair)

Type C1



Type C4



Type C1, C2, C3 and C4 – Block End Cap

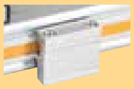
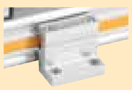
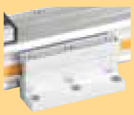
Actuator Size	Type	Part Number*	Weight* (kg)	Dimensions — mm A	B	C	CH	D	M	N
OSPE50SB/ST	C1	18166FIL	0.146	86	24	40	9.0	12.5	30	48
	C2	18167FIL	0.210						39	57
	C3	18168FIL	0.300						54	72
	C4	18169FIL	0.412						77	95

*Part number and weight are for individual unit.

Profile Mounting Options

See "Maximum Permissible Unsupported Length" for end cap and profile mounting placement requirements.

Profile Mounting Selection Overview

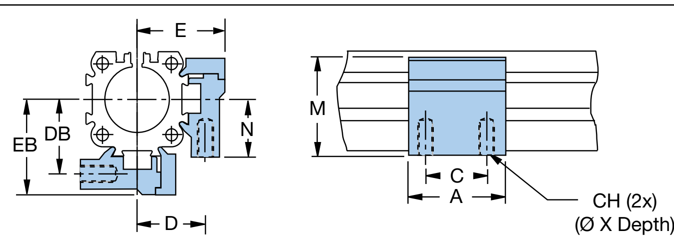
Type		Standard Carriage 25	32	50	PowerSlide 25/25	25/35	25/44	32/35	32/44	50/60	50/76	ProLine 25	32	50
2 Internal Threads 	D1	•	•	•	•	•	•	•	•	•	•	•	•	•
2 Thru Holes 	E1	•	•	•	•	•	•	•	•	•	•	•	•	•
	E2											○	○	○
	E3				○	○		○		○				
	E4						○		○		○			
3 Thru Holes 	MAE	•	•	•	•	•	•	•	•	•	•	•	•	•

• Recommended for mounting position with carriage on top ○ Recommended for mounting position carriage side only (3 or 9 o'clock position)

Order Code

2, 5 or 8
(1, 2 or 3 pair)

Type D1 (with two internal threads)



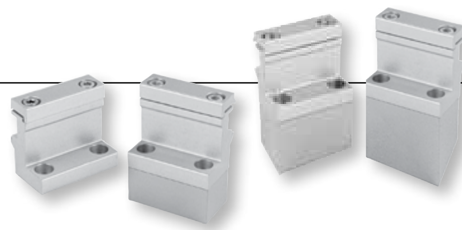
Actuator SIze	Part Number*	Weight* (kg)	Dimensions — mm A	C	CH	D	DB	E	EB	M	N
OSPE25SB/ST	20008FIL	0.061	50	36	M5 x 10	27	28.5	34.5	36	38	22
OSPE32SB/ST	20157FIL	0.072	50	36	M5 x 10	33	35.5	40.5	43	46	30
OSPE50SB/ST	20162FIL	0.167	60	45	M6 x 11	40	45.0	52.0	57	71	48

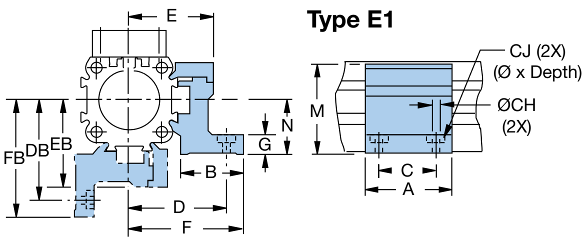
*Part number and weight are for individual unit.

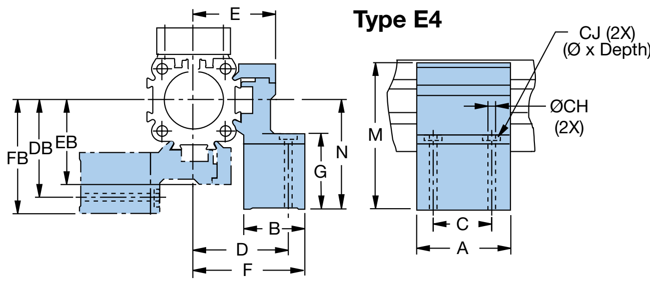
Order Code

E1 1, 4 or 7 (1, 2 or 3 pair) E3 L, P or S (1, 2 or 3 pair)

E2 K, N or R (1, 2 or 3 pair) E4 M, Q or T (1, 2 or 3 pair)







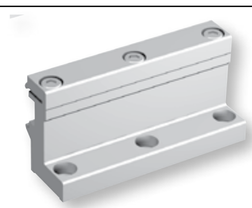
Type E1, E2, E3 and E4 (with two thru holes)

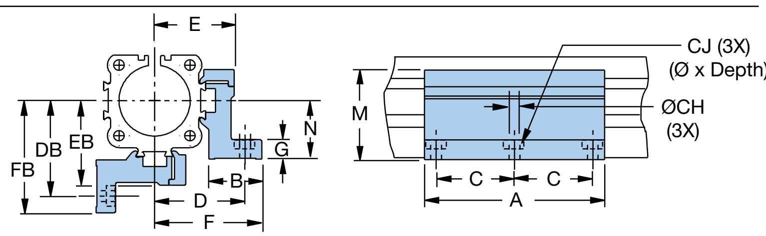
Actuator Size	Type	Part Number*	Weight* (kg)	A	B	C	CH	CJ	D	DB	E	EB	F	FB	G	M	N
				Dimensions — mm													
OSPE25SB/ST	E1	20009FIL	0.074	50	26	36	5.5	10 x 5.7	40	41.5	34.5	36	47.5	49	8	38	22
	E2	20352FIL	0.125												23	53	37
	E3	20353FIL	0.120												35	65	49
	E4	20354FIL	0.020												46	76	60
OSPE32SB/ST	E1	20158FIL	0.092	50	27	36	5.5	10 x 5.7	46	48.5	40.5	43	54.5	57	10	46	30
	E2	20355FIL	0.141												24	60	44
	E3	20356FIL	0.140												32	68	52
	E4	20357FIL	0.197												40	76	60
OSPE50SB/ST	E1	20163FIL	0.189	60	34	45	7.0	—	59	64.0	52.0	57	67.0	72	10	71	48
	E2	20361FIL	0.235												19	80	57
	E3	20362FIL	0.338												31	95	72
	E4	20363FIL	0.442												57	118	95

*Part number and weight are for individual unit.

Order Code

3, 6 or 9
(1, 2 or 3 pair)





Type MAE (with three thru holes)

Actuator Size	Part Number*	Weight* (kg)	A	B	C	CH	CJ	D	DB	E	EB	F	FB	G	M	N
			Dimensions — mm													
OSPE25SB/ST	12278FIL	0.271	92	26	40	5.5	10 x 5.7	40	41.5	34.5	36	47.5	49	8	38	22
OSPE32SB/ST	12279FIL	0.334	92	27	40	5.5	10 x 5.7	46	48.5	40.5	43	54.5	57	10	46	30
OSPE50SB/ST	12280FIL	0.668	112	34	45	7.0	—	59	64.0	52.0	57	67.0	72	10	71	48

*Part number and weight are for individual unit.

ORDERING INFORMATION

OSPE..SB/ST

Select an order code from each of the numbered fields to create a complete OSPE..SB or ST model order number. Include hyphens and non-selective characters as shown in example below.

	①	②		③	④	⑤	⑥	⑦	⑧		⑨	⑩	⑪	⑫	⑬	⑭
Order Number Example:	OSPE	25	–	1	0	0	0	0 –	00000	-	P	0	0	0	0	0

① Series

OSPE Origa System Plus Electromechanical

② Actuator Bore Size

25 41 mm W x 53 mm H

32 52 mm W x 67 mm H

50 87 mm W x 93 mm H

③ Drive Train

1 SB – Ball screw actuator with internal glider bearing

2 ST – Trapezoidal screw actuator with internal glider bearing

④ Carriage

0 Standard

1 Tandem (two carriages for higher load capabilities (OSPE..SB models only)

⑤ Screw Lead

OSPE..SB		Bore Size 25	32	50
3	5 mm	•	•	•
4	10 mm		•	•
5	25 mm			•

OSPE..ST		Bore Size 25	32	50
4	4 mm	•	•	
6	6 mm			•

⑥ Mounted Gearhead Options

0 No gearhead

A PV40TA-005 (gear ratio 5:1)*

B PV40TA-010 (gear ratio 10:1)*

C PV60TA-003 (gear ratio 3:1)*

D PV60TA-005 (gear ratio 5:1)*

E PV60TA-010 (gear ratio 10:1)*

* Requires selection from "Mounted Gearhead with Motor Mounting Kit" or "Mounted Gearhead and Motor" (see Options & Accessories) for item ⑦ below.

⑦ Drive Shaft and Gearhead/Motor Mounting Options

0 – Plain drive shaft

3 – Drive shaft with keyway

4 – Long drive shaft with keyway

Motor Mounting Kits* (see Options & Accessories for available option dimensions and delivery)

Mounted Motors* (see Options & Accessories for available option dimensions and delivery)

Gearhead Mounting Kits* (see Options & Accessories for available option dimensions and delivery)

Mounted Gearhead with Motor Mounting Kits* (see Options & Accessories for available option dimensions and delivery)

Mounted Gearhead and Motor (see Options & Accessories for available option dimensions and delivery)

* All gearhead and motor mounting options are equipped with a plain drive shaft (no keyway options)

⑧ Order Stroke*

00000 5-digit input (in mm)

* See Specifications to calculate required order stroke.
Maximum catalog stroke:
OSPE25SB/ST = 01100 mm;
OSPE32SB/ST = 02000 mm;
OSPE50SB/ST = 02000 mm
Longer strokes available upon request. Consult factory.

⑨ Hardware and Dovetail Grove Covers

P Standard hardware with Parker gold cover strip

Blue order codes indicate rapid shipment availability

Free sizing and selection support from Virtual Engineer at virtualengineer.com

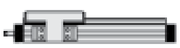
Virtual Engineer

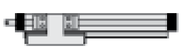
⑩ Carriage Options

0	No external guide rail
6	ProLine PL25, PL32, PL50*
E	PowerSlide PS25/25*
F	PowerSlide PS25/35 or PS32/35*
G	PowerSlide PS25/44 or PS32/44*
H	PowerSlide PS50/60*
I	PowerSlide PS50/76*
M	Inversion Mounting**
R	Clevis Mounting **

* Requires standard carriage (select order code "0" from ④). See Dimensions for additional information.
** Requires standard carriage (select order code "0" from ④). See Options & Accessories for Clevis Mounting and Inversion Mounting.

⑪ External Guide Rail Orientation

0  Guide Rail (right)

1  Guide Rail (left)

⑫ End Cap Mounting (see Options & Accessories)

0	No end cap mounting
1	1 piece A1* (standard end cap) or C1** (block end cap)
2	1 piece A2* (standard end cap) or C2** (block end cap)
3	1 piece A3* (standard end cap) or C3** (block end cap)
4	1 piece B1* (reinforced end cap) or C4** (block end cap)
5	1 piece B4* (reinforced end cap)

* For size 25 and 32
*8 For size 50

⑬ Profile Mounting (see Options & Accessories)

0	No profile mounting
2	1 pair D1 (with 2 internal threads)
5	2 pair D1 (with 2 internal threads)
8	3 pair D1 (with 2 internal threads)
1	1 pair E1 (with 2 thru holes)
4	2 pair E1 (with 2 thru holes)
7	3 pair E1 (with 2 thru holes)
3	1 pair MAE (with 3 thru holes)
6	2 pair MAE (with 3 thru holes)
9	3 pair MAE (with 3 thru holes)
K	1 pair E2 (with 2 thru holes)
N	2 pair E2 (with 2 thru holes)
R	3 pair E2 (with 2 thru holes)
L	1 pair E3 (with 2 thru holes)
P	2 pair E3 (with 2 thru holes)
S	3 pair E3 (with 2 thru holes)
M	1 pair E4 (with 2 thru holes)
Q	2 pair E4 (with 2 thru holes)
T	3 pair E4 (with 2 thru holes)

⑭ Magnetic Sensor Mounting*

0	No sensor mounting
A	1 pc. N.O., NPN, with M8 connector
B	2 pc. N.C., NPN, with M8 connector
C	1 pc. N.O., NPN, with M8 connector 2 pc. N.C., NPN, with M8 connector
D	1 pc. N.O., PNP, with M8 connector
E	2 pc. N.C., PNP, with M8 connector
F	1 pc. N.O., PNP, with M8 connector 2 pc. N.C., PNP, with M8 connector

* Extension cable with M8 plug and 5 m cable flying lead cable for Sensor with M8 connector can be ordered separately; use part number 003-2918-01

Blue order codes indicate rapid shipment availability

The LCR Series

Miniature Screw Driven Designs with Maximum Versatility

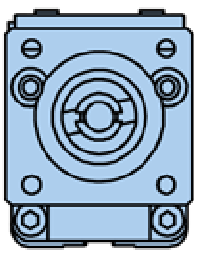
- **Miniature footprint – 30 x 40 mm cross-section**
- **Internal square rail or glider bearing design**
- **100% duty cycle**
- **IP30 stainless steel strip seal**
- **Low noise 2 and 10 mm leadscrew**
- **Travel lengths to 1000 mm**
- **Attractive black anodize finish**

Features

- **Extruded aluminum body incorporates dovetail mounting, T-slots and belt return**
- **Toe clamp mounting for easy installation**
- **Dowel pin holes in the LCR30 carriage for repeatable mounting**
- **Multiple motor mount options accommodate NEMA 11,17 and 23 steppers and NEMA 16 servo motors**
- **Flush-mounted NPN, PNP, N.O. or N.C. fully adjustable limit sensors maximize flexibility and minimize footprint impact**
- **Screw-driven version has an optional parallel motor mount for space constrained applications**

	LCR30
Maximum Travel (mm)	600
Maximum Payload (N)	500
Maximum Acceleration (m/s^2)	20

***Do not exceed allowable axial and moment loading.**



LCR30

For OEMs looking to automate light payloads, the new LCR (Light Capacity Rodless) linear positioner family provides the smallest form factor with unmatched, easy-to-use flexibility.

With any "build-it-yourself" positioner, all the parts required to build a linear motion axis from scratch must be ordered, tracked, received, inventoried, assembled and tested. In contrast, the LCR Series is a completely pre-engineered, pre-tested, ready-to-use positioner solution, which allows OEMs to significantly reduce their time to market with minimized design, procurement, manufacturing, assembly and qualification time or effort.

Based on the proven life science track record of Parker's MX80 and LP28 Series, the LCR was developed specifically to provide a high-quality, easy-to-use, off-the-shelf linear actuator.

LCR solutions are ideal for Maldi-plate and micro-titer tray automation. Rated for 100% duty cycle, the LCR offers smooth, quiet motion ideal for keeping instrument noise to a minimum. With selectable travel lengths up to 1000 mm and payloads up to 100 N (25 lbs), the ability to automate laboratory instruments has never been easier.

Bottom Line Impact

The LCR's proven pre-engineered design will significantly reduce your instrument time to market and improve your ROI.

Tailored to Meet Every Requirement

The LCR is an easy-to-configure off-the-shelf solution with a virtually unlimited array of standard configurations available.

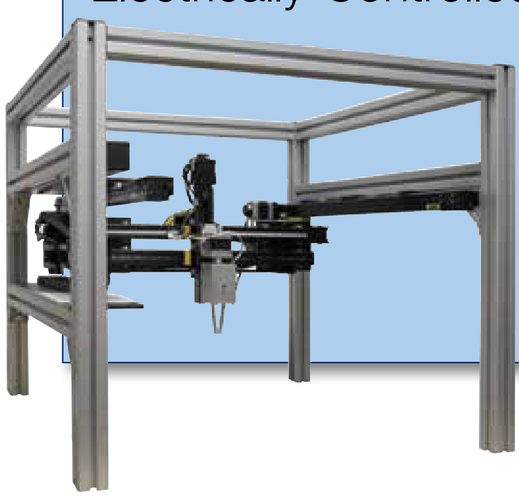
If your application demands a special design, Parker takes the next step and customizes the product to meet your required specification. Common modifications include:

- **Clean room components**
- **Special tool plates**
- **Mounts for 3rd party motors**
- **Single or parallel acting electric grippers**
- **Maximum height or length modifications for space constraints**
- **And much more**

Whether you need blue anodize or a design with a custom carriage for larger than standard payloads, or anything else, Parker excels at application solutions and will modify the LCR to fit your specific needs.

Please call us at 800-245-6903 to discuss your requirements.

Ideal for High-Volume, Light-Capacity, Electrically-Controlled Motion



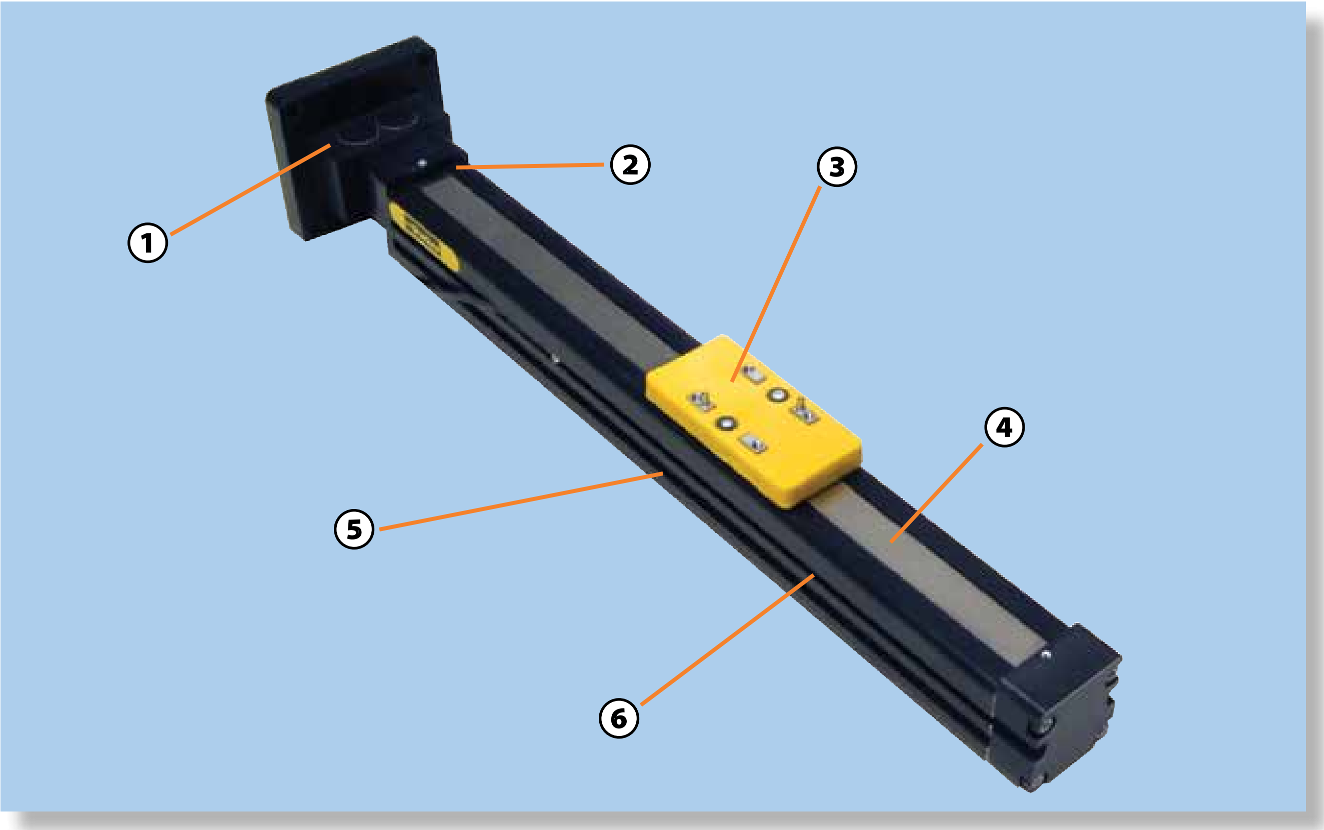
Life science applications:

- **Mass spectroscopy**
- **Course microscopy**
- **Analytical instruments**
- **Laboratory automation**
- **Micro titer automation**
- **MALDI plate automation**
- **Liquid handling**
- **Syringe pumps**

General-purpose applications:

- **Point-of-purchase kiosks**
- **Adjustable guide widths for conveyor lines**
- **Storage and retrieval**
- **Part shuttling**
- **Light payload automation conversion from rodless pneumatics to electric**
- **General automation for any ≤25 lb payload with basic repeatability requirements**

All LCR series actuators are compliant to RoHS and CE directives.



① **Motor mounting options** - The most motor mounting options standard with more options easily available

② **Encoder options** for position verification and position maintenance

③ **Carriage mounting surface -** Machined aluminum carriage mounting surface with locating holes

④ **Stainless steel sealing strip -** Best in class bearing and drive train protection

⑤ **Minimal instrument/machine size** including flush mount limit sensors

⑥ **Profile size** provides high rigidity for minimal deflection along with "T" and dovetail slots

Flexible drive train options with multiple screw leads for high thrust or reinforced belt drive for highest speeds

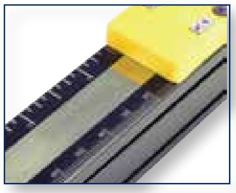
Parallel motor mounts

Stepper drive option - Simple and powerful plug and spin P2™ stepper drive option

Rugged internal square rail - Re-circulating bearing or quiet glider bearing for lighter payload needs

Quick and easy mounting options with toe clamps or standard multi-axis connection kits

Metric and Imperial graduated scales integral to the LCR body frame are among the many custom modifications available.



The P2™ Drive

An OEM-Friendly Design...
The P2 Completes the LCR as an Easy-to-Use Motion Solution

Pairing the LCR with the P2™ drive, instrument builders eliminate another costly design component and complete their motion package with a single-vendor, easy-to-use solution.

The P2 drive is only 1” x 1” x 3” in size, but packs 2 A of current at 24 VDC to provide superior power density for simple step and direction motion.

The Parker P2 Stepper Drive is a complete step and direction indexer for hybrid step motors. The P2 drive operates stepper motors in full, half, quarter, and sixteenth step modes with an output drive capacity up to 24 VDC and 2.0 amps.

Key Design Advantages

- **On board eyelets allow OEMs to measure output current and to set all drives equally**
- **Two potentiometers allow for easy adjustment of standby and run current**
- **No programming**
- **No code to learn**
- **Robust, high quality product with 100% pre-ship testing**

Key Design Features

- **Supply voltage 12 to 24 VDC**
- **2.0 amps max motor output current**
- **Adjustable run current and standby current**
- **Single or differential ended inputs**
- **Enable, step and direction inputs voltages up to ±14 VDC (low/high input): <0.8 V Low, >2 V High**
- **1.0 μs minimum step pulse width**
- **1.0 μs minimum step pulse low time**
- **0 to 40°C operating temperature with natural convection**
- **5 to 95% relative humidity, non-condensing**
- **Optional DIN rail mount**
- **Resolutions of 200, 400, 800 and 3200 steps/rev (with 1.8° step motor)**
- **Small package (80 mm x 25 mm x 25 mm)**
- **RoHS compliant**

P2 saves a lot more than space...

The P2 Series offers added value to customers who traditionally specify board level drives or design their own drives in house.

① Free-up engineering, procurement, quality, and assembly resources in house. The P2 Series reduces the instrument/ machine design time by utilizing an off-the-shelf solution.

The result: faster time to market for new products, allowing customers to focus on core competency.

② The P2 also reduces procurement complexity by reducing the need to chase multiple vendors versus a do-it-yourself drive design.

The result: better return on investment.

③ The P2 Series provides the customer added flexibility to mount the enclosed, protected drive directly onto a motion axis such as the Parker LCR Series, or DIN rail mount in a convenient location.

The result: a well protected, robust drive with quick and easy installation for an easy out-of-box user experience.

SPECIFICATIONS

Addressing applications which involve positioning of smaller payloads within a very small space envelope, the LCR30 is the ideal solution for OEM instrument manufacturers. The LCR30 offers a reduced overall cost of ownership and a complete solution including amplifier/drive, motor, actuator, bearings, seals, and limit sensors.

LCR Screw-Driven Performance by Profile Size

Specification	Units	LCR30	
Grade		**S (Square Rail)**	**B (Bushing)**
Bidirectional Repeatability	mm	± 0.1	± 0.2
Duty Cycle	%	100	100
Max. Acceleration*	m/s^2	20	20
Normal Load	N	90	45
Moment Load			
Roll	Nm	2.6	0.3
Yaw	Nm	6.5	0.8
Pitch	Nm	8.2	1.5
Max. Axial Load	N	70	70
Screw Efficiency			
2.0 mm Lead	%	50	50
10.0 mm Lead	%	70	70
Breakaway Torque	mNm	30 (2 mm lead) 45 (10 mm lead)	40 (2 mm lead) 90 (10 mm lead)
Screw Diameter	mm	6.4	6.4
Coefficient of Friction		0.02	0.10
Carriage Weight	N	0.5	0.5
Base Moment of Inertia			
Ixx	mm^4	39,778	36,162
Iyy	mm^4	46,273	42,066

*Do not exceed allowable axial and moment loading.

Model	LCR30
Width x Height (mm)	30 x 40
Repeatability (±mm)	0.1
Max. Speed[2] (mm/s)	150
Max. Travel Length (mm)	600
Screw Lead Options (mm/rev)	2, 10

[1] Specifications for square rail design, bushing version reduces normal load to 50% value.
[2] Specifications for fast screw lead, the fine screw lead will reduce maximum speed.

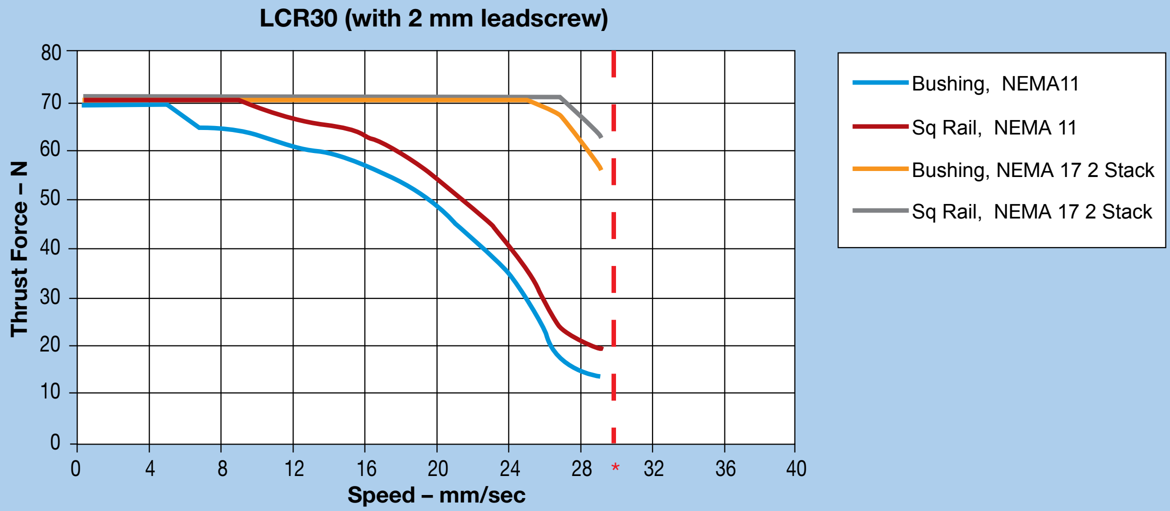
Performance by Travel Length

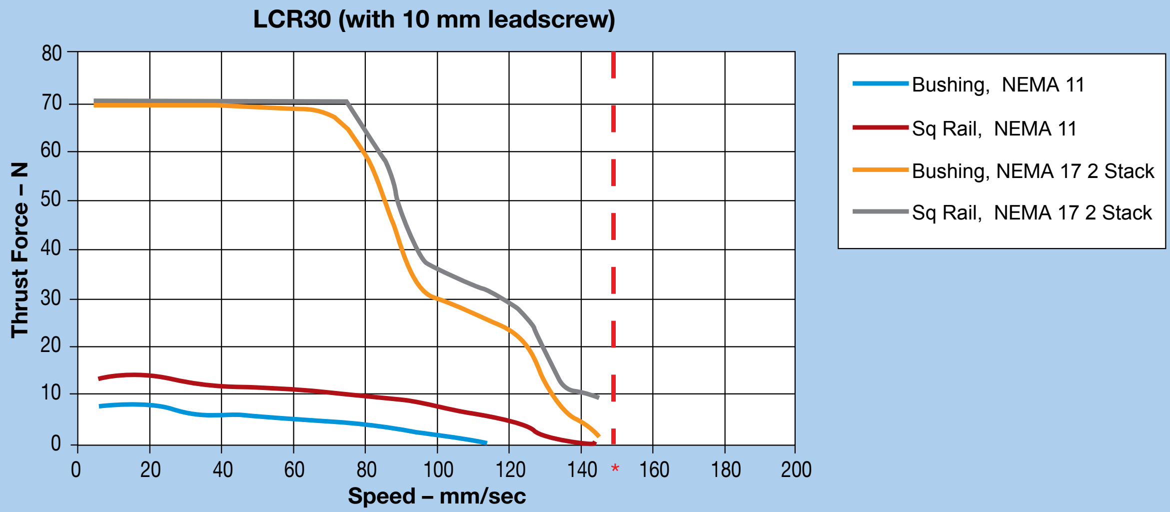
LCR30 Screw-Driven Performance by Travel Length

Travel	Max. Screw Speed* (RPS)	Max. Linear Speed (mm/s)		Table Weight **		Input Inertia 10^{-7} kg-m^2 ***	
		2.0 mm	10.0 mm	M11 (kg)	M17 (kg)	2.0 mm	10.0 mm
25	15	30	150	0.70	0.80	4.11	5.26
50	15	30	150	0.74	0.84	4.42	5.57
75	15	30	150	0.78	0.88	4.8	5.88
100	15	30	150	0.83	0.93	5.1	6.19
125	15	30	150	0.87	0.97	5.36	6.50
150	15	30	150	0.91	1.01	5.67	6.82
175	15	30	150	0.95	1.05	5.99	7.13
200	15	30	150	0.99	1.09	6.3	7.44
225	15	30	150	1.03	1.13	6.61	7.75
250	15	30	150	1.07	1.17	6.92	8.06
275	15	30	150	1.12	1.21	7.23	8.37
300	15	30	150	1.16	1.26	7.54	8.68
325	15	30	150	1.20	1.30	7.85	8.99
350	15	30	150	1.24	1.34	8.16	9.31
375	14	28	140	1.28	1.38	8.47	9.62
400	12	24	120	1.32	1.42	8.79	9.93
425	11	22	110	1.36	1.46	9.11	10.24
450	10	20	100	1.40	1.50	9.41	10.56
475	9	18	90	1.45	1.54	9.72	10.86
500	9	18	90	1.49	1.59	10.03	11.17
525	8	16	80	1.53	1.63	10.33	11.49
550	7	14	70	1.57	1.67	10.65	11.80
575	7	14	70	1.61	1.71	10.97	12.11
600	6	12	60	1.65	1.75	11.28	12.42

* Maximum Screw Speed of 15 rps is based upon stepper motor resonance zones, for higher speeds please consult product maintenance manual.
** For parallel motor configurations: table weight increases by 0.081 kg for NEMA 11, 0.101 kg for NEMA 17, 0.090 kg for SM 16.
*** Input inertia increases by 2.05 10^{-7} kg-m^2 with parallel motor mounts.

LCR30 Linear Speed-Force Performance





* Maximum speed with Parker P2™ stepper drive at 24VDC. To achieve faster speeds, motor must be connected to a drive with active damping, electronic viscosity, or other advanced anti-resonance zone features.

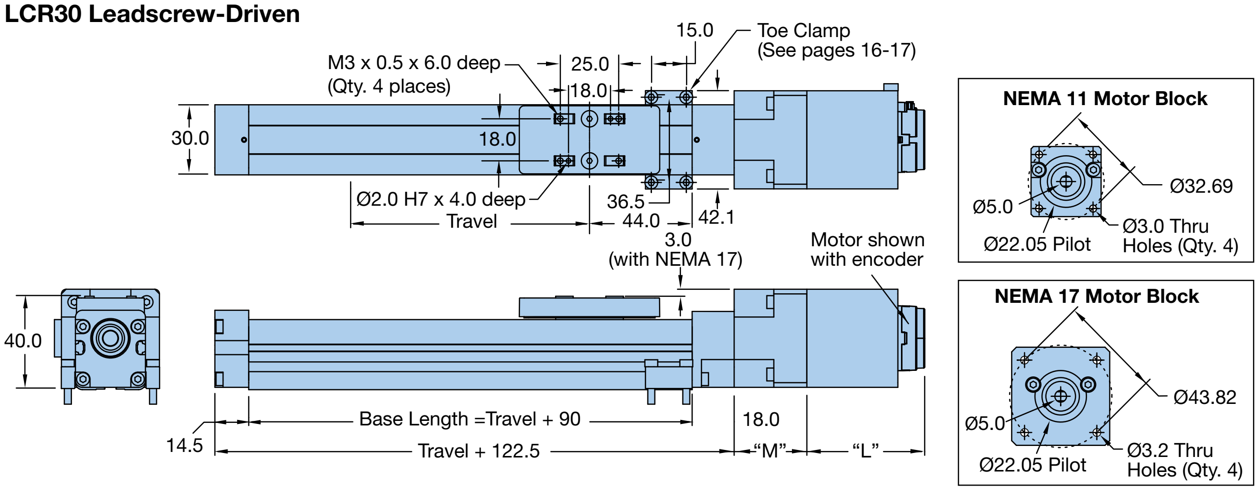
Refer to critical speed limitations for specific stroke length maximum speeds.

DIMENSIONS

LCR Series Leadscrew-Driven

Download 2D & 3D files from www.parker.com/emn

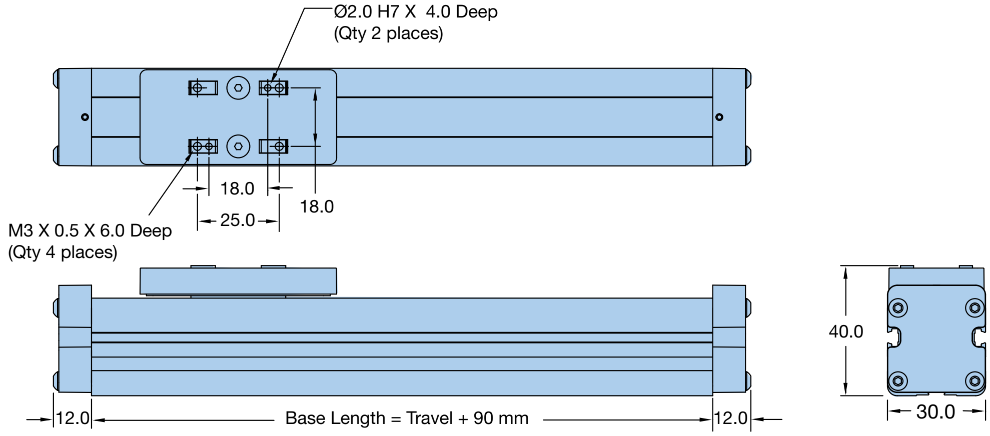
LCR30 Leadscrew-Driven



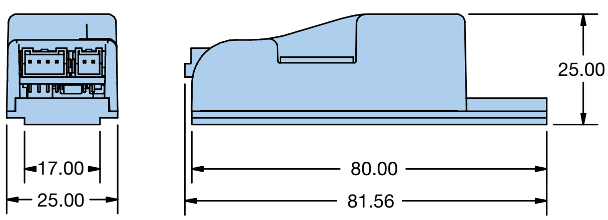
Motor Option	Encoder Option	M	L	Description
N11	**E0**	30.6	0	NEMA 11 Motor Mount
M11	**E0**	30.6	62.5	NEMA 11 Stepper Motor
M11	**E2**	30.6	62.5	NEMA 11 Stepper Motor with Encoder
N17	**E0**	31.2	0	NEMA 17 Motor Mount
M17	**E0**	31.2	51.0	NEMA 17 Stepper Motor
M17	**E2**	31.2	51.0	NEMA 17 Stepper Motor with Encoder

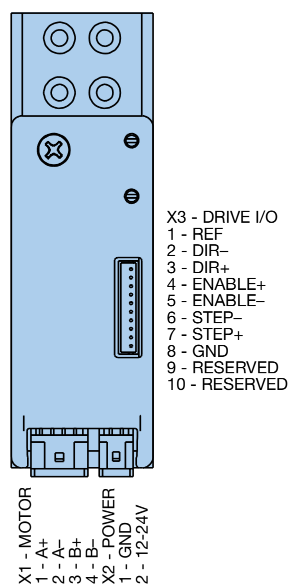
Idler Unit – Square Rail Models only

LCR30 Idler



P2™ Stepper Drive





Free sizing and selection support from Virtual Engineer at virtualengineer.com

Virtual Engineer

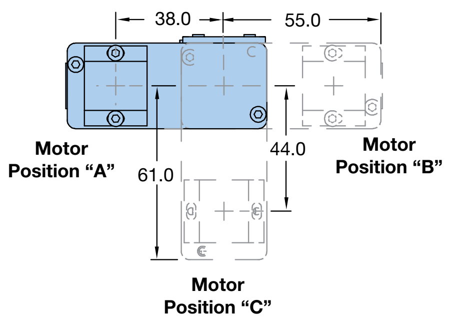
Parallel Motor Mounts

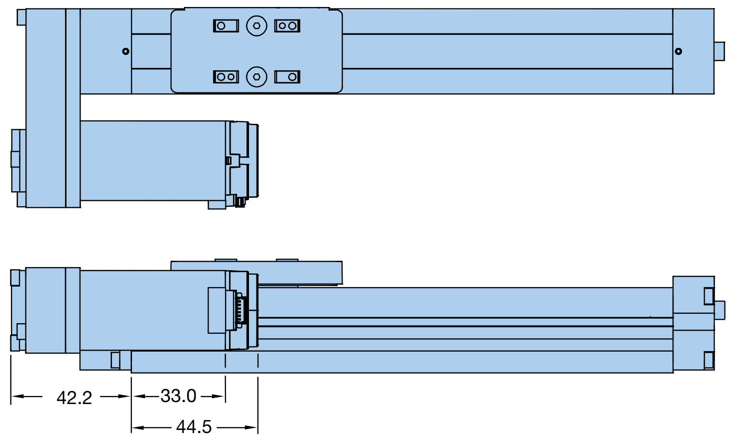
Tight on machine space?

Select a parallel motor mount to shorten the overall length of the LCR 30 per a given stroke. In using this motor mount option the motor is positioned along side the positioner in location's A, B, or C as denoted below.

LCR30 with NEMA 11 Motor

N11 Option: Mount only
M11 Option: Mounted NEMA 11 stepper





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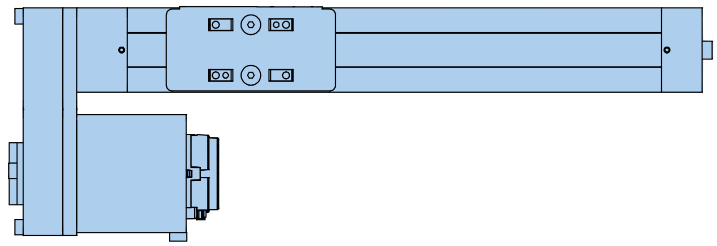
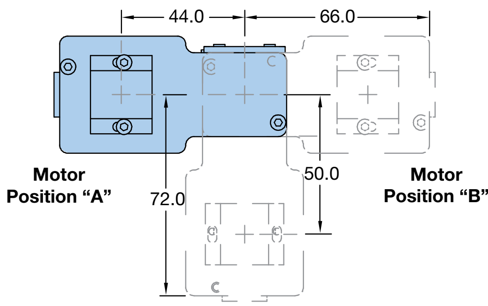
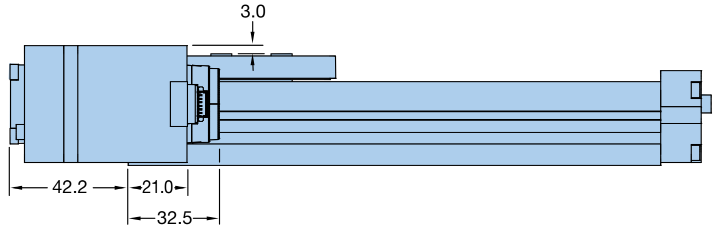
LCR30 with NEMA 17 Motor

N17 Option: Mount only
M17 Option: Mounted NEMA 17 stepper

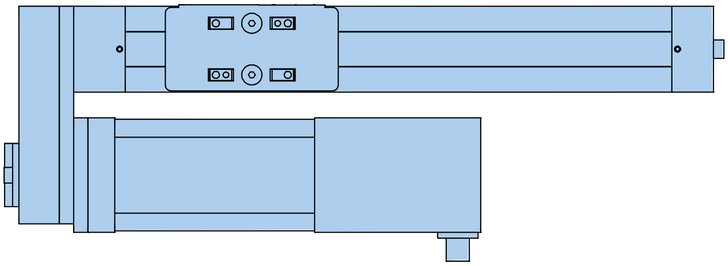


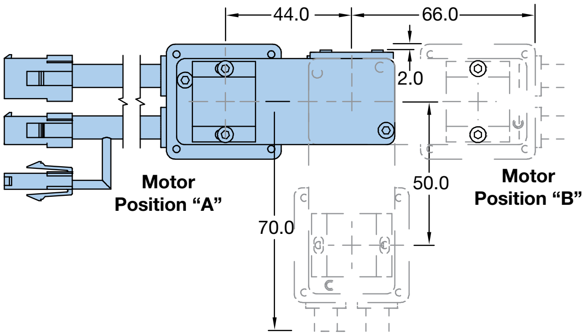


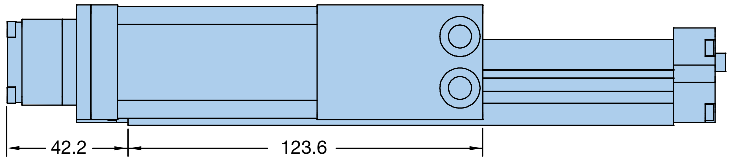


LCR30 with SM16 Motor

N16 Option: Mount only
M16 Option: Mounted SM16 servo motor







Free sizing and selection support from Virtual Engineer at virtualengineer.com

Virtual Engineer

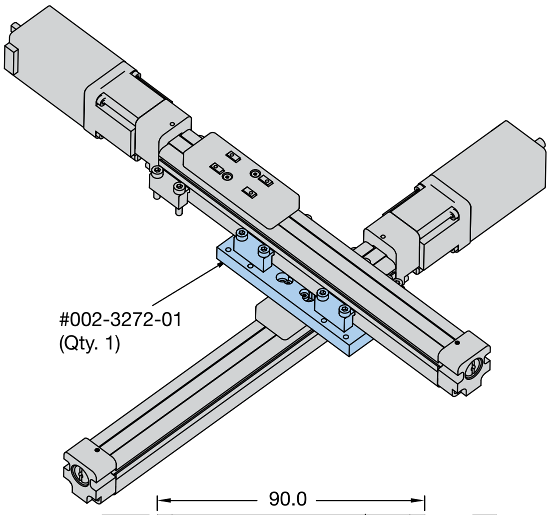
OPTIONS & ACCESSORIES

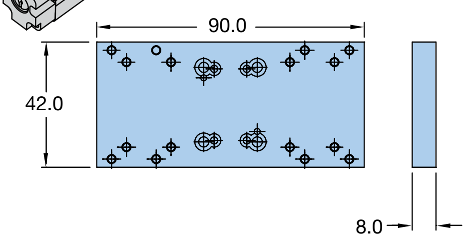
X-Y and X-Z Brackets

Dimensions — mm

X-Y Bracket for LCR30 Screw-Driven Units #002-3272-01

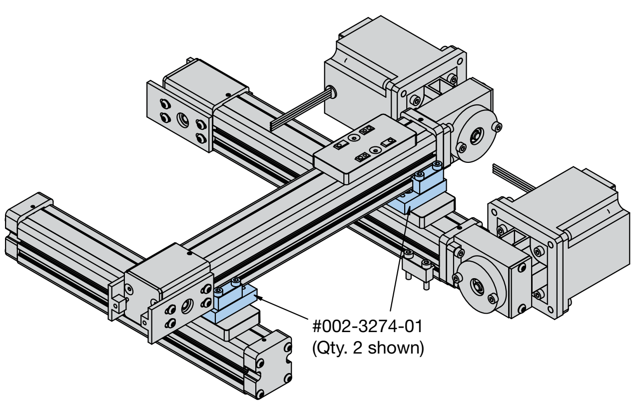
(includes four toe clamps with fasteners)

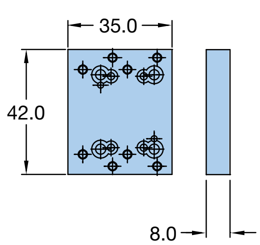




X-Y Bracket for LCR30 Belt-Driven Units #002-3274-01

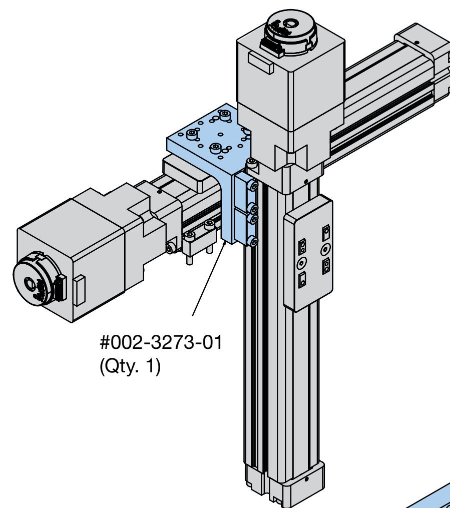
(includes two toe clamps with fasteners)

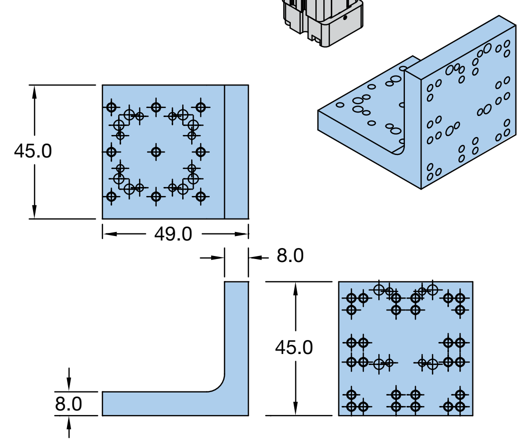




X-Z Bracket for LCR30 (All Units) #002-3273-01

(includes four toe clamps with fasteners)





Toe Clamps

Toe clamp kits include socket head fasteners to mount clamp.

Part Number	Quantity
002-3233-01	1
002-3233-04	4
002-3233-100	100

Encoder

When using stepper motors, positional feedback is readily available with the optional rotary encoder. The robust magnetic encoder withstands vibration and provides easy in-position confirmation.

Wiring Connection

Pin	Wire	Function
1	White	Ground
2	Green	A+
3	Yellow	A–
4	Brown	+5 VDC
5	Blue	B+
6	Red	B–
7	Pink	Not used
8	Gray	Not used

Encoder

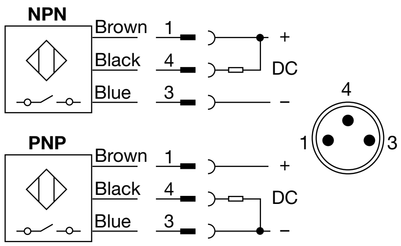
Part Number	Counts/rev	Bore
003-4590-01	400	4 mm
003-4590-02	400	5 mm
003-4590-03	500	4 mm
003-4590-04	500	5 mm
003-4590-05	400	6.35 mm
003-4590-06	500	6.35 mm

Encoder Cable (6-pin differential)

006-2398-1.0	1m high flex with flying leads
006-2398-3.0	3m high flex with flying leads

End-of-Travel Limit Sensors

Limit sensors offer home and end of travel protection in a flush mount design that minimizes the overall width of the LCR series. The limit sensors are available standard as NPN or PNP with normally open or normally closed designs.

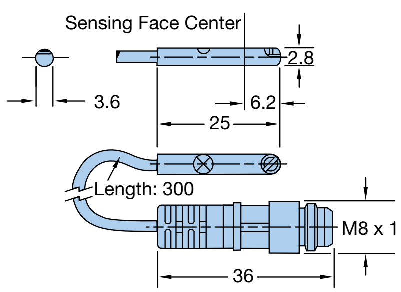


Specifications

Operating Voltage: 10-30 VDC
Repeatability: ≤±0.1 mm
EMC: EN 60 947-5-2
Short circuit protections: Yes
Reverse Polarity Protection: Yes
Enclosure Rating: IP 67
Operating Temperature Range: -25° to 75° C (-13° to 167° F)

Wiring Connection

Pin	Wire	Function
1	Brown	+ VDC
4	Black	NO
3	Blue	– VDC



Part Number	Logic	Cabling
P8S-P8SAMQFAZ	PNP N.C.	3 meter flying leads
P8S-P8SAMQCHZ	PNP N.C.	0.3 meter with M8
P8S-P8SAMMFAZ	NPN N.C.	3 meter flying leads
P8S-P8SAMMCHZ	NPN N.C.	0.3 meter with M8
P8S-P8SAMPFAZ	PNP N.O.	3 meter flying leads
P8S-P8SAMPCHZ	PNP N.O.	0.3 meter with M8
P8S-P8SAMNFAZ	NPN N.O.	3 meter flying leads
P8S-P8SAMNCHZ	NPN N.O.	0.3 meter with M8
003-2918-01	All cabling	5 meter extension cable for M8 connections

ORDERING INFORMATION

LCR Series

Fill in an order code from each of the numbered fields to create a complete part number.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
Order Example:	LCR	22	LN10	0075	S	S	A	N08	E0	L1	A1

① **Series**

LCR Series

② **Size (width in mm)**

30 30 mm wide profile

③ **Drive Train**

IDLR Idler unit; no drive mechanism

LN02 2 mm leadscrew with in-line motor mount

LN10 10 mm leadscrew with in-line motor mount (available with LCR30 size only)

BLT0 Single axis belt drive

④ **Travel Length (mm)**

xxxx 25 mm increments of travel
LCR30 Screw-Driven:
25 to 600 mm
LCR30 Belt-Driven:
25 to 1000 mm

⑤ **Bearing Type**

S Square rail bearing

B Glider bushing bearing

⑥ **Environmental Protection**

S Strip seal protection (standard)

⑦ **Motor Mount Position**

I Inline

A Parallel mount, Position “A”*

B Parallel mount, Position “B”*

C Parallel mount, Position “C”*

R Belt drive, motor right

L Belt drive, motor left

— No motor

*Not available with size BLT0 drive train options.

⑧ **Motor**

N00 No motor

N11 NEMA 11 motor mount [2)]

N16 SM16 motor mount [3)]

N17 NEMA 17 motor mount [3)]

N23 NEMA 23 motor mount [3)]

M11 NEMA 11 stepper motor [2)]

M16 SM162AE-N10N servo motor [3)]

M17 NEMA 17 stepper motor [3)]

M23 NEMA 23 stepper motor [4)]

[2)] Not available on BLT0 belt drive version
[4)] Only available on BLT0 belt drive version

⑨ **Motor Encoder Option**

E0 No encoder

E2 500 line encoder*

*Only available with M11, M17, and M23 motor options

⑩ **Home & End-of-Travel**

L0 No home or limit sensors

L1 3 NPN sensors (1 N.O.; 2 N.C.)

L2 1 NPN sensor (N.O.)

L3 3 PNP sensors (1 N.O.; 2 N.C.)

L4 1 PNP sensor (N.O.)

L5 3 NPN sensors (2 N.O.; 1 N.C.)

L6 1 NPN sensor (N.C.)

L7 3 PNP sensors (2 N.O.; 1 N.C.)

L8 1 PNP sensor (N.C.)

⑪ **Stepper Drive/Amplifier**

A0 No P2 Drive

A1 P2 Stepper Drive/Amplifier

A2 P2 Stepper Drive/Amplifier with 1 meter cable set* (flying leads)

A3 P2 Stepper Drive/Amplifier with 1 meter cable set* to ACR

A4 P2 Stepper Drive/Amplifier with 1 meter cable set* to 6K

*For longer cable needs please order the A1 option and order cables separately

P2™ Ordering Information

Ordering Information

Order Example:

①	②	③	④	⑤	⑥	⑦
P2	**D**	**2**	**SD**	**E0**	**FL·**	**K0**

① **Series**
P2 Series

② **Intelligence**
D Stepper drive

③ **Power Level**
2 2 amps max

④ **Communication**
SD Step and direction input

⑤ **Feedback**
E0 No encoder

⑥ **Cable Set**
FL0 No cable set
FL1
FL3
AC1 See chart at left
AC3
6K1
6K3

⑦ **Mounting Kit**
K0 Standard plate mounting kit included
K1 DIN Rail Mounting

P2 Options and Accessories

Part Number	Order Code	Description
006-2342-1.0	**–**	Power Cable – 1 m , High Flex
006-2342-3.0	**–**	Power Cable – 3 m , High Flex
006-2343-1.0	**–**	6K Control Cable – 1 m, High Flex
006-2343-3.0	**–**	6K Control Cable – 3 m, High Flex
006-2344-1.0	**–**	ACR Control Cable – 1 m, High Flex
006-2344-3.0	**–**	ACR Control Cable – 3 m, High Flex
006-2345-1.0	**–**	Control Cable – Flying Leads – 1 m, High Flex
006-2345-3.0	**–**	Control Cable – Flying Leads – 3 m, High Flex
006-2357-1.0	**–**	Motor Power Extension – 1 m
006-2357-3.0	**–**	Motor Power Extension – 3 m
002-3296-1.0	**FL1**	1 m Flying Lead Cable Set (contains power and communications cable from above list)
002-3296-3.0	**FL3**	3 m Flying Lead Cable Set (power and communications cable from above list)
002-3297-1.0	**AC1**	1 m Cable Set to ACR (power and communications cable from above list)
002-3297-3.0	**AC3**	3 m Cable Set to ACR (power and communications cable from above list)
002-3298-1.0	**6K1**	1 m Cable Set to 6K (power and communications cable from above list)
002-3298-3.0	**6K3**	3 m Cable Set to 6K (power and communications cable from above list)
002-3294-01	**K0**	DIN Rail Mounting Kit (DIN clip and screw)
002-3295-01	**K1**	Mounting kit to attach P2™ to LCR

Belt Driven Positioners

Belt-driven actuators are ideal for high speed, industrial automation applications. These positioners are used in either single or multi-axis configurations such as gantry robots, and are ideal for applications such as palletizing, storage and retrieval, machine loading, parts handling, material handling and automated assembly. Parker offers a wide array of belt driven positioners with thousands of configurable options that are able to scale to solve virtually any automation application. Parker can construct these positioners into complete motion systems, integrating motors, drives, controls, HMI, cable management, machine frames and guarding. Contact your Parker application engineering expert to help construct a complete system to fit your needs.

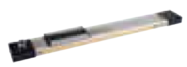
Parker Belt Driven Industrial Systems

Product Comparisons: Parker high-speed belt driven actuators are segmented into specific series that are distinguished by guidance technology as well as frame size and corresponding loading properties. All products are able to be pre-configured with Parker motor and gearheads or common industry mounting options.

HMR High Moment Rodless Series Industrial Belt Driven Positioners

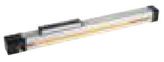
The user-friendly and versatile HMR has enormous moment and payload capacity bundled in a low-profile, yet sleek package. The HMRB is ideal for long travel lengths and high speed dynamic positioning.
Page 159.

OSPE..BHD Series Belt-Driven Positioners



The OSPE..BHD offers a compact design ideal for high-speed, long travel, heavy duty applications requiring robustness, dynamic precision, and extraordinary performance.
Page 190.

OSPE..B Series Belt-Driven Positioners



Ideal for precise point-to-point applications, the OSPE..B offers high-speed operation, easy installation, and low maintenance.
Page 207.

OSPE..BV Series Belt-Driven Positioners

Robust and compact, the OPSE..BV is a vertical fixed belt-driven actuator with integrated ball bearing guide designed to lift loads in a vertical orientation.
Page 229.

Continued next page...

Belt Driven Positioners

Continued from previous page...

LCR Series Light-Capacity Belt-Driven Positioners

The LCR Series is a completely pre-engineered, pre-tested, ready-to-use positioner solution for unmatched, easy-to- use flexibility.
Page 235.

HPLA Belt-Driven Linear Modules

Strong and rugged, the HPLA is a "next generation" linear module. The series offers high speed, high acceleration, and long travel, combined with stiff, rigid construction characteristics.
Page 247.

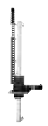
HLE-RB Belt-Driven Linear Modules

The HLE line is a proven performer offering long life and trouble-free operation, ideal as single axis products or as components for high speed multi-axis gantries. Roller Bearing system.
Page 261.

HLE-SR Belt-Driven Linear Modules

The HLE line is a proven performer offering long life and trouble-free operation, ideal as single axis products or as components for high speed multi-axis gantries. Square Rail bearing system.
Page 276.

HZR Vertical-Axis Belt Driven Positioners



The HZR is a rugged vertical axis unit unique to the high speed automation industry designed for mechanical demands placed on the vertical axis of a multi-axis gantry robot.
Page 287.

HPLA/HLE/HZR Options & Accessories

Page 303.

Additional Capabilities: Gantry Systems

Page 293.

Parker's gantry systems provide cost-effective, easy to integrate solutions that satisfy the vast majority of automation requirements. In addition to these standard gantry systems, Parker offers products with additional capabilities to fulfill the needs of special applications. Our engineering skill and manufacturing expertise have integrated these products into custom-tailored gantry solutions which have successfully addressed the most unique and exacting requirements of machine builders and integrators around the world.

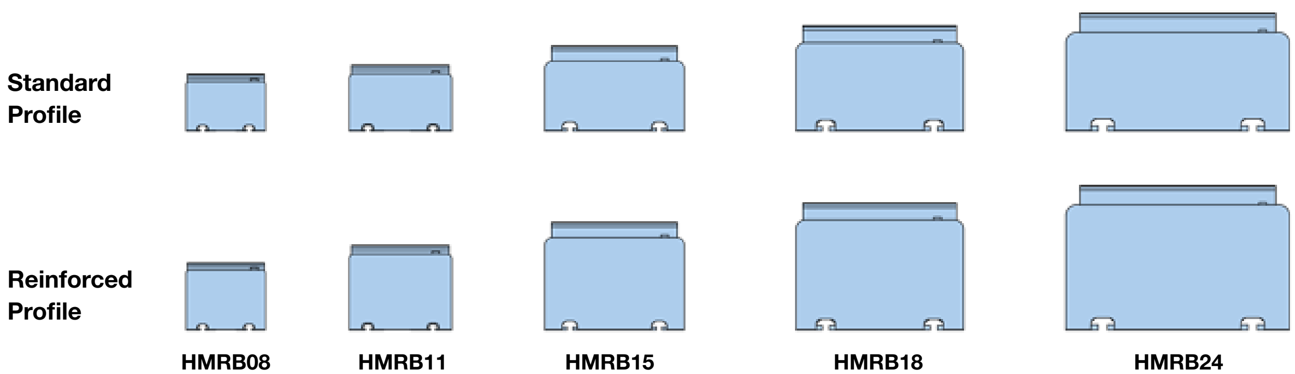
The HMRB Series

HMRB Belt-Driven Actuators
for High Speed, High Payload Positioning Applications

- High dynamic control for precision positioning
- High payload capacity
- High speed operation
- Easy installation
- Highly configurable design
- Ideal in multi axis applications

Features

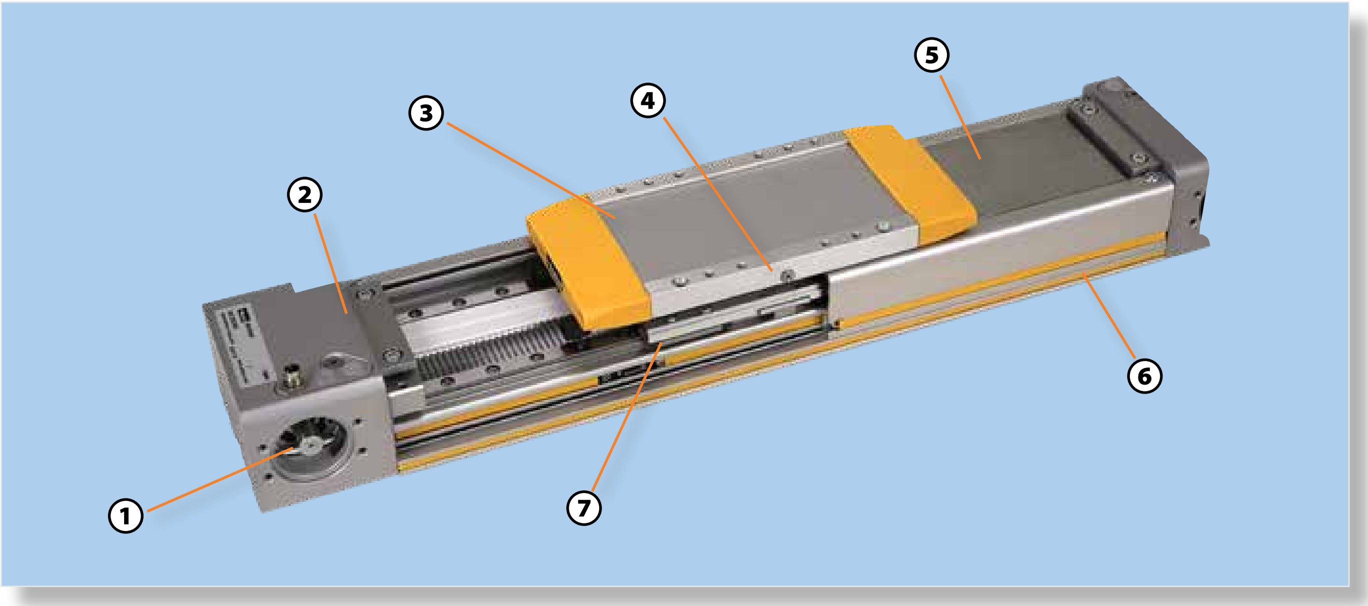
- 5 different frame sizes to choose from
- Basic or reinforced profiles for supported or unsupported applications
- Tandem carriage with second carriage for higher load capabilities
- Bi-parting carriage for centering applications
- Long available strokes
- Complete motor and drive packages
- Ambient operating temperature range -20°C to +80°C
- IP 54 Rating



	HMRB08	HMRB11	HMRB15	HMRB18	HMRB24
Maximum Travel (mm)	3000	4000	5800	5800	5800
Maximum Payload (N)	1800	4450	8800	16200	26600
Maximum Acceleration (m/sec^2)	10	10	10	10	10

The HMRB is the belt driven version in the HMR family. The steel reinforced timing belt used on this positioner features a round tooth profile for greater energy efficiency and smoother overall motion, as compared to traditional belt profiles. The HMRB is ideal for long travel lengths and high speed dynamic positioning.

The compact design allows integration of the HMRB in any machine layout, providing superior dynamic performance with minimal space utilization.



1 **Drive shaft**
Designed to pair with a large assortment of motor and gearhead options

2 **Steel reinforced timing belt**
High thrust force transmission and long life

3 **Carriage assembly**
Low profile, high strength aluminum construction with threaded and pinning mounting options

4 **Lubrication ports**
Easy access maintenance (1x per side) allows for single point lubrication for all bearing trucks and the ball nut at any location along travel

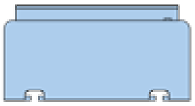
5 **Corrosion resistant steel sealing band**
Magnetically fastened to the actuator body and provides IP54 sealing

6 **Slotted profile**
Dovetail grooves for actuator & sensor mounting

7 **Recirculating profile rail bearing**
Two rails and four bearing trucks total for maximized payload capacity

Profile Options

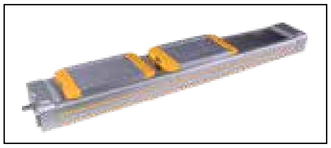
Basic profile - for applications where actuator is fully supported, this option provides a lower profile option.



Reinforced profile - for long unsupported spans (i.e. gantry style applications).

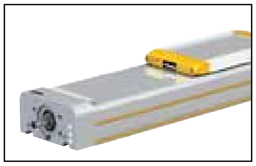
Carriage Options

Standard carriage or tandem carriage for higher load capabilities



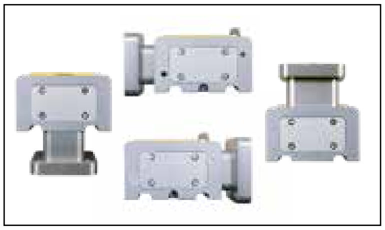
Cover Options

IP20 rated without protective cover, or IP54 rated protective cover with seal strip cover assemblies—ideal for harsh environments



Motor Mounting Options

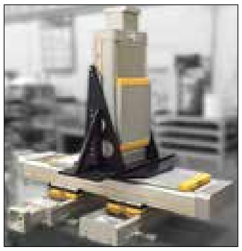
The HMRB belt driven positioner is designed to optimize flexibility in machine design. As such the drive and motor mounting can be positioned at any one of four different positions around the axis of motion. This option is configurable through the part number.



Multi-axis Systems

A wide range of adapter plates and intermediate drive shafts simplifies engineering and installation.

**Please consult factory for your individual system design.*

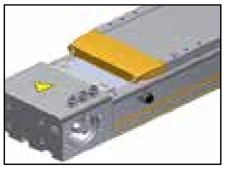


Other Options & Accessories

HMRB actuators can be outfitted with a variety of different options.

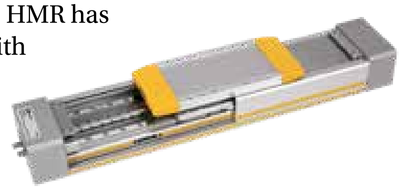
In addition to the standard configurable options highlighted in Options & Accessories, a list of commonly used non-standard options are highlighted below. Please contact us for assistance in choosing any of these or any other unique configurations.

- **Dual axis with link shaft**
- **Purge ports**
- **Parallel motor mount**
- **Longer than cataloged stroke**
- **...and many more**



SPECIFICATIONS

Parker Hannifin's High Moment Rodless (HMR) Series electric linear actuator is one of the most user friendly and versatile actuator lines on the market today. Guided by two square rail bearings, the HMR has enormous moment and payload capacity bundled in a low-profile, yet sleek package. With five different frame sizes, two different drive train options, multiple mounting, carriage and sensor options, and an IP54 protective cover option—along with a multitude of other customizable features—the HMR was truly designed with flexibility in mind.



Common Specifications

Actuator Size			HMRB08		HMRB11	
Belt drive orientation			090°/270°	000°/180°	090°/270°	000°/180°
Travel Distance per Revolution	s_{lin}	mm	66		90	
Pulley Diameter		mm	21.01		28.65	
Linear Speed (Max)	v_{max}	m/s	2			
Acceleration (Max)	a_{max}	m/s²	30			
Repeatability (unidirectional)		µm	± 50			
Order Stroke (Max) (1)		mm	3000		4000	
Thrust Force (Max)	F_{Amax}	N	295		630	
		lbs	66		142	
Thrust force (F_A)- corresponding to velocity (v)	$F_{A\ (v<1\ m/s)}$	N	295		630	
	$F_{A\ (v<2\ m/s)}$	N	295		550	
	$F_{A\ (v<3\ m/s)}$	N	-		-	
	$F_{A\ (v<4\ m/s)}$	N	-		-	
	$F_{A\ (v<5\ m/s)}$	N	-		-	
Thrust force (F_A)- corresponding to order stroke (OS)	$F_{A\ (OS<1\ m)}$	N	250		630	
	$F_{A\ (OS<2\ m)}$	N	140		550	
	$F_{A\ (OS<3\ m)}$	N	100		385	
	$F_{A\ (OS<4\ m)}$	N	-		295	
	$F_{A\ (OS<5\ m)}$	N	-		-	
	$F_{A\ (OS<6\ m)}$	N	-		-	
Torque on Drive Shaft (Max)	M_{Amax}	Nm	3.1		9.0	
		in-lb	27.4		80.0	
Torque (2) **— No Load**	M_0	Nm	1.0		1.2	
		in-lb	8.9		10.6	
Inertia						
@ Zero Stroke	J_0	kgmm²	14		52	
Per Meter of Stroke	J_{OS}	kgmm²/m	10		41	
Per 1 kg Moved Mass	J_m	kgmm²/kg	110		205	
Carriage (by Order Code Option) (3)	m_C	kg	**0**: 0.9	**1**: 0.7	**0**: 1.7	**1**: 1.3
Ambient Temperature Range		°C	-20 to +80			
IP Rating (4)			IP 54			

Unit Weight (by Order Code Option)			HMRB08 B	HMRB08 C	HMRB08 R	HMRB08 S	HMRB11 B	HMRB11 C	HMRB11 R	HMRB11 S
@ Zero Stroke	m_0	kg	2.4	2.7	3.1	3.4	4.4	4.8	6.1	6.5
Per Meter of Stroke	m_{OS}	kg/m	3.0	4.0	4.0	5.0	5.4	6.4	7.6	8.6

Note- For force and moment load specifications, see HMRB Loading Conditions

(1) Longer lengths available - please consult factory

(2) For tandem and bi-parting options, double the listed values

(3) For tandem and bi-parting carriage weight add mass from column '0' and '1'

(4) For unit with protective covers - IP20 without covers

Common Specifications

Actuator Size			HMRB15		HMRB18		HMRB24	
Belt drive orientation			**090°/270°**	**000°/180°**	**090°/270°**	**000°/180°**	**090°/270°**	**000°/180°**
Travel Distance per Revolution	s_{lin}	mm	100	125	130	150	160	224
Pulley Diameter		mm	31.83	39.79	41.38	47.74	50.93	71.30
Linear Speed (Max)	v_{max}	m/s	5					
Acceleration (Max)	a_{max}	m/s²	50					
Repeatability (unidirectional)		µm	± 50					
Order Stroke (Max) [1]		mm	5800					
Thrust Force (Max)	$F_{A_{max}}$	N	1050	630	1300	1000	4000	3750
		lbs	236	142	292	225	899	843
Thrust force (F_A)- corresponding to velocity (v)	F_A (v<1 m/s)	N	1050	630	1300	1000	4000	3750
	F_A (v<2 m/s)	N	990	630	1300	1000	4000	3380
	F_A (v<3 m/s)	N	930	630	1300	1000	3650	3140
	F_A (v<4 m/s)	N	890	630	1300	1000	3370	2950
	F_A (v<5 m/s)	N	840	630	1300	1000	3200	2800
Thrust force (F_A)- corresponding to order stroke (OS)	F_A (OS<1 m)	N	1050	630	1300	1000	4000	3750
	F_A (OS<2 m)	N	820	490	1000	775	4000	3360
	F_A (OS<3 m)	N	570	340	710	550	3370	2440
	F_A (OS<4 m)	N	445	265	550	430	2860	1880
	F_A (OS<5 m)	N	365	215	450	350	2350	1540
	F_A (OS<6 m)	N	305	185	380	295	2000	1300
Torque on Drive Shaft (Max)	$M_{A_{max}}$	Nm	17.0	13.0	27.0	24.0	101.0	134.0
		in-lb	150.5	115.1	239.0	212.4	894.0	1186.0
Torque [2] **— No Load**	M_0	Nm	1.2		2.0		5.5	
		in-lb	10.6		17.7		48.7	
Inertia								
@ Zero Stroke	J_0	kgmm²	102	145	297	394	1178	2758
Per Meter of Stroke	J_{OS}	kgmm²/m	79		134	222	689	900
Per 1 kg Moved Mass	J_m	kgmm²/kg	253	396	428	570	649	1271

Unit Weight (by Order Code Option)			HMRB15 B	HMRB15 C	HMRB15 R	HMRB15 S	HMRB18 B	HMRB18 C	HMRB18 R	HMRB18 S	HMRB24 B	HMRB24 C	HMRB24 R	HMRB24 S
@ Zero Stroke	m_0	kg	6.7	7.5	9.4	10.3	11.6	12.8	15.6	16.7	21.5	23.1	28.0	29.6
Per Meter of Stroke	m_{OS}	kg/m	8.2	9.9	11.5	13.3	12.8	15.1	16.5	18.7	21.6	24.4	26.7	29.5

			HMRB15 0	HMRB15 1	HMRB18 0	HMRB18 1	HMRB24 0	HMRB24 1
Carriage (by Order Code Option) [3]	m_C	kg	2.7	1.9	4.6	3.7	9.0	7.2
Ambient Temperature Range		°C	-20 to +80					
IP Rating [4]			IP 54					

Note- For force and moment load specifications, see HMRB Loading Conditions

[1] Longer lengths available - please consult factory

[2] For tandem and bi-parting options, double the listed values

[3] For tandem and bi-parting carriage weight add mass from column '0' and '1'

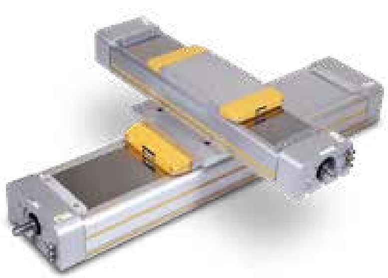
[4] For unit with protective covers - IP20 without covers

Loading Specifications (Max)

Life and loading characteristics shown for both belt and screw driven units.

Rated Life			HMR08	HMR11
2540 km	F_Y / F_Z	N (lb)	1,800 (405)	4,450 (1,001)
2540 km Tandem	F_Y / F_Z	N (lb)	2,700 (608)	6,675 (1,508)
8000 km	F_Y / F_Z	N (lb)	1,250 (281)	3,000 (675)
8000 km Tandem	F_Y / F_Z	N (lb)	1,875 (422)	4,500 (1,013)
2540 km	M_X	Nm (in-lb)	45 (398)	155 (1,372)
	M_Y	Nm (in-lb)	80 (708)	200 (1,770)
	M_Z	Nm (in-lb)	80 (708)	200 (1,770)
2540 km Tandem	M_X	Nm (in-lb)	68 (602)	235 (2,080)
	M_Y	Nm (in-lb)	120 (1,062)	300 (2,655)
	M_Z	Nm (in-lb)	120 (1,062)	300 (2,655)
8000 km	M_X	Nm (in-lb)	30 (266)	105 (929)
	M_Y	Nm (in-lb)	55 (487)	135 (1,195)
	M_Z	Nm (in-lb)	55 (487)	135 (1,195)
8000 km Tandem	M_X	Nm (in-lb)	45 (398)	160 (1,416)
	M_Y	Nm (in-lb)	80 (708)	205 (1,814)
	M_Z	Nm (in-lb)	80 (708)	205 (1,814)

Rated Life			HMR15	HMR18	HMR24
2540 km	F_Y / F_Z	N (lb)	8,800 (1,980)	16,200 (3,645)	26,600 (5,985)
2540 km Tandem	F_Y / F_Z	N (lb)	13,200 (2,970)	24,300 (5,468)	39,900 (8,978)
8000 km	F_Y / F_Z	N (lb)	6,000 (1,350)	11,000 (2,475)	18,200 (4,095)
8000 km Tandem	F_Y / F_Z	N (lb)	9,000 (2,025)	16,500 (3,713)	27,300 (6,143)
2540 km	M_X	Nm (in-lb)	430 (3,806)	940 (8,320)	2,150 (19,029)
	M_Y	Nm (in-lb)	560 (4,956)	1,230 (10,886)	2,430 (21,507)
	M_Z	Nm (in-lb)	560 (4,956)	1,230 (10,886)	2,430 (21,507)
2540 km Tandem	M_X	Nm (in-lb)	645 (5,708)	1,410 (12,480)	3,225 (28,544)
	M_Y	Nm (in-lb)	840 (7,435)	1,845 (16,330)	3,645 (32,261)
	M_Z	Nm (in-lb)	840 (7,435)	1,845 (16,330)	3,645 (32,261)
8000 km	M_X	Nm (in-lb)	290 (2,567)	640 (5,664)	1,460 (12,922)
	M_Y	Nm (in-lb)	380 (3,363)	840 (7,435)	1,660 (14,692)
	M_Z	Nm (in-lb)	380 (3,363)	840 (7,434)	1,660 (14,692)
8000 km Tandem	M_X	Nm (in-lb)	435 (3,850)	960 (8,497)	2,190 (19,383)
	M_Y	Nm (in-lb)	570 (5,045)	1,260 (11,152)	2,490 (22,038)
	M_Z	Nm (in-lb)	570 (5,045)	1,260 (11,152)	2,490 (22,038)



Weight, Mass, and Inertia

Weight and mass HMRB

Product size			**HMRB08**				**HMRB11**				**HMRB15**			
			Weight of actuator											
Version actuator (see order code)			**B**	**C**	**R**	**S**	**B**	**C**	**R**	**S**	**B**	**C**	**R**	**S**
Weight. 0 - order stroke	m_0	[kg]	2.4	2.7	3.1	3.4	4.4	4.8	6.1	6.5	6.7	7.5	9.4	10.3
Weight per 1 m order stroke	m_{mt}	[kg/m]	3.0	4.0	4.0	5.0	5.4	6.4	7.6	8.6	8.2	9.9	11.5	13.3
			Moving mass carrier											
Version of carriage (see order code)			**0**		**1**		**0**		**1**		**0**		**1**	
Weight carriage*	m_c	[kg]	0.9		0.7		1.7		1.3		2.7		1.9	

Weight and mass HMRB

Product size			**HMRB18**				**HMRB24**			
			Weight of actuator							
Version actuator (see order code)			**B**	**C**	**R**	**S**	**B**	**C**	**R**	**S**
Weight. 0 - order stroke	m_0	[kg]	11.6	12.8	15.6	16.7	21.5	23.1	28.0	29.6
Weight per 1 m order stroke	m_{mt}	[kg/m]	12.8	15.1	16.5	18.7	21.6	24.4	26.7	29.5
			Moving mass carrier							
Version of carriage (see order code)			**0**		**1**		**0**		**1**	
Weight carriage*	m_c	[kg]	4.6		3.7		9.0		7.2	

*For tandem and bi-parting carriage weight add mass from column '0' and '1'

Total mass HMRB: $m_{tot} = m_0 + m_C$ + order stroke * m_{mt}

Inertia HMRB

Product size			**HMRB08**		**HMRB11**		**HMRB15**	
Motor mounting position (see order code)			090°/270°	000°/180°	090°/270°	000°/180°	090°/270°	000°/180°
Inertia								
Inertia 0 - order stroke	J_0	[kgmm²]	14	14	52	52	102	145
Inertia per 1 m order stroke	J_{mt}	[kgmm²/m]	10	10	41	41	79	79
Inertia per 1 kg moving mass	J_{kg}	[kgmm²/kg]	110	110	205	205	253	396

Inertia HMRB

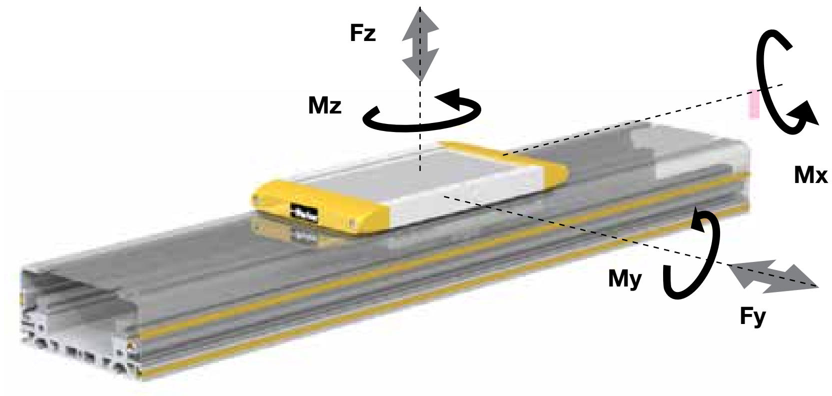
Product size			**HMRB18**		**HMRB24**	
Motor mounting position (see order code)			090°/270°	000°/180°	090°/270°	000°/180°
Inertia						
Inertia 0 - order stroke	J_0	[kgmm²]	297	394	1,178	2,758
Inertia per 1 m order stroke	J_{mt}	[kgmm²/m]	134	222	689	900
Inertia per 1 kg moving mass	J_{kg}	[kgmm²/kg]	428	570	649	1,271

Inertia total HMRB: $J_{tot} = J_0$ + order stroke * $J_{mt} + m_C * J_{kg} + m * J_{kg}$

HMR Loading Conditions

Loading conditions, including external forces and moment loading, are application dependent. The center of gravity for the mass/payload attached to the carriage must be determined in order to properly size the ideal actuator for your application. Please note that when selecting the proper HMR actuator for your system the sum of all loading should not exceed "1" as per the formula below.

Loads, forces, and bending moments



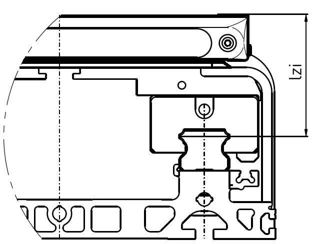
Calculating Load Factors - Combined Normal and Moment Load

The sum of combined loads (static and dynamic) must not exceed “1” at any time as shown in the formula below:

$$L = \frac{F_y}{Fy_{(max)}} + \frac{F_z}{Fz_{(max)}} + \frac{M_x}{Mx_{(max)}} + \frac{M_y}{My_{(max)}} + \frac{M_z}{Mz_{(max)}} \leq 1$$

$M = F \times d$ (Nm)
$M_x = M_{x\ static} + M_{x\ dynamic}$
$M_y = M_{y\ static} + M_{y\ dynamic}$
$M_z = M_{z\ static} + M_{z\ dynamic}$

Internal lever arm l_{zi}

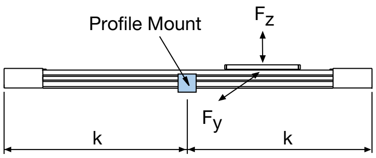


Dimensions - Internal lever arm l_{zi}

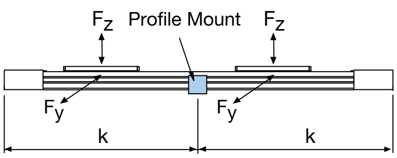
Product size		l_{zi}
HMRx085	[mm]	33.0
HMRx110	[mm]	39.5
HMRx150	[mm]	50.0
HMRx180	[mm]	57.5
HMRx240	[mm]	68.0

Maximum Permissible Unsupported Length — *Determining actuator mounting placement*

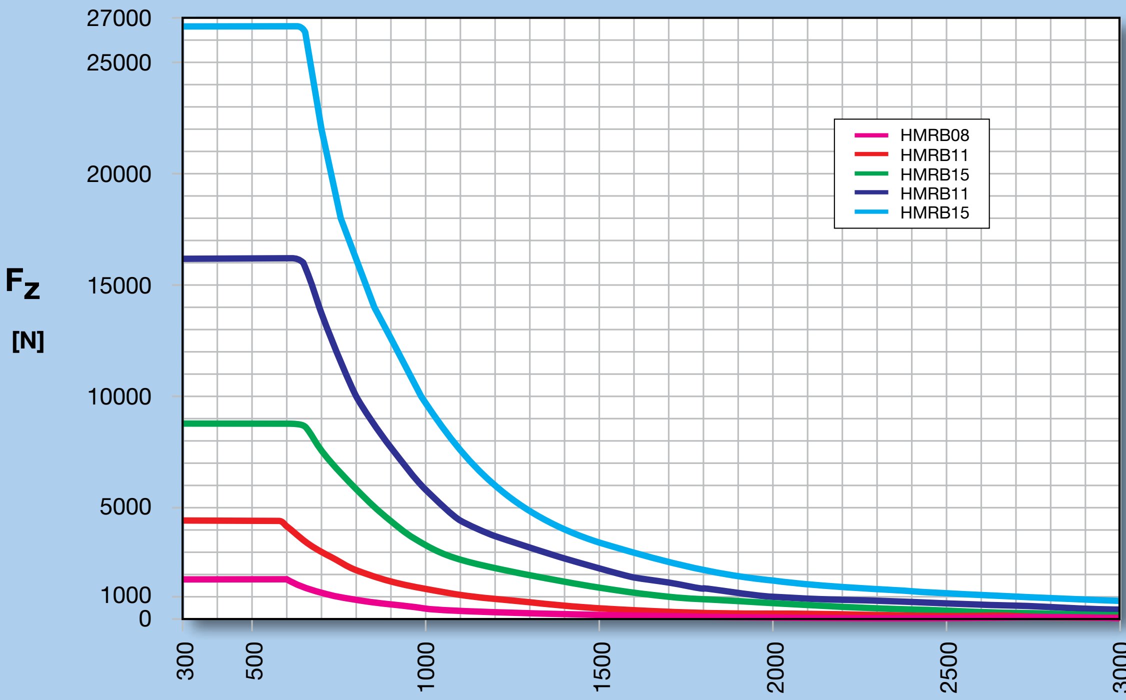
HMR Series actuators need to be mounted onto a solid machine base or frame structure using appropriately positioned actuator mounts. This ensures that the actuator will not undergo excessive deflection based on the application's load and length requirements.



The greater the load and/or the longer the unsupported length between mounts, the more the actuator is susceptible to deflection.



Deflection is also dependent on the carriage orientation (F_z for standard mounted actuator or F_y for a side mounted actuator).



Example F_z HMR 11:

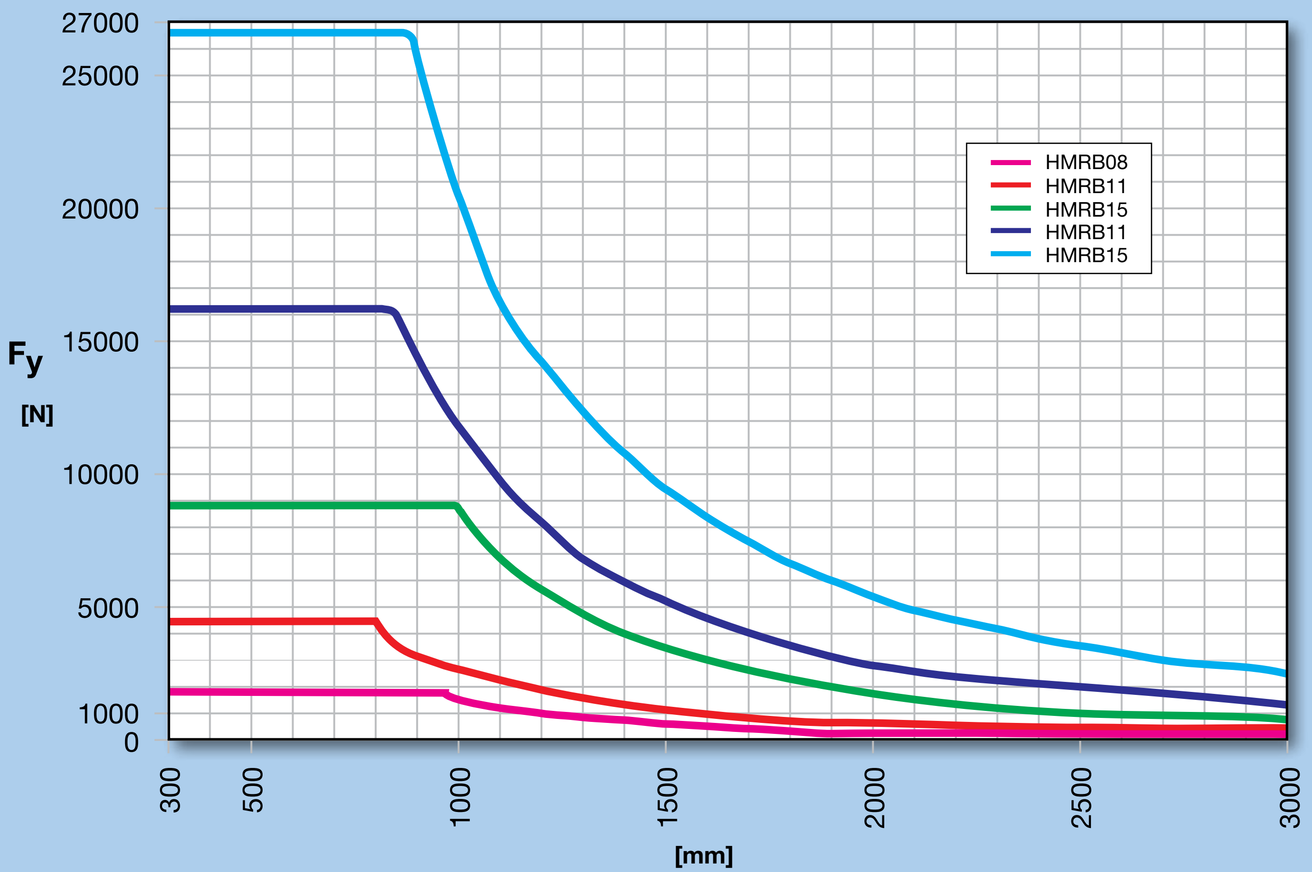
For a 3160 N load, the distance "d" between supporting elements is 700 mm.
For mounting accessories see "Actuator Mounting" in Options & Accessories.

Maximum Permissible Unsupported Length — *Determining actuator mounting placement*

Use the appropriate deflection graph to ensure that the application load does not exceed the deflection curve. Supporting the actuator within the recommended maximum distance "k" will ensure that the installation will have a maximum deflection equal to 0.01% of distance "k."

To further reduce deflection, simply reduce the distance between actuator mounts as described in the examples below.

Maximum admissible loads [N] and supporting distances [mm] (self-supporting- *reinforced profile only*)



Example F_y HMR 11:

For a 3160 N load, the distance "d" between supporting elements is 900 mm.
For mounting accessories see "Actuator Mounting" in Options & Accessories.

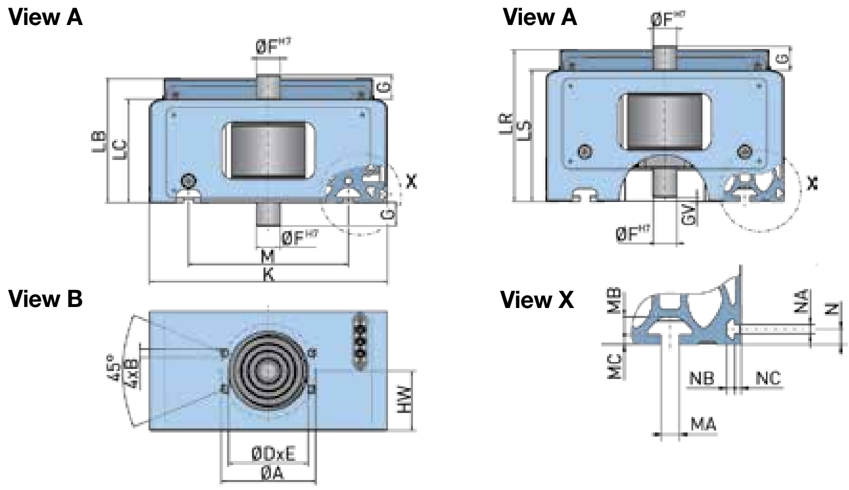
DIMENSIONS

Dimensions – (mm)

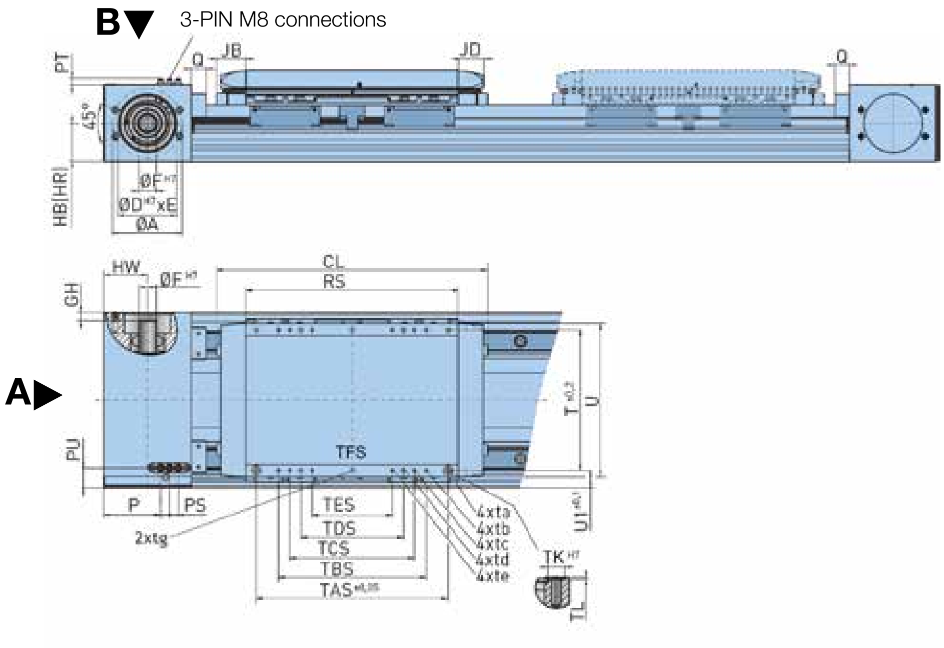
HMR actuators can be configured with either "Basic" or "Reinforced" profiles based on applications demands. Basic profiles are suitable for applications where the actuator is secured to a machine base and constantly supported. Reinforced profiles can be utilized in applications with unsupported spans. See Maximum Permissible Unsupported Length for mounting support instructions.

Dimensions - (000°/180° option shown)

"Basic" profile **"Reinforced" profile**



Dimensions carrier



Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

Dimensions – (mm)

Dimension table - HMRB

Size	Ø A	B	Ø D^{H7}	E	Ø F^{H7}	G	GV	GH	HB	HR	HW	K	LB	LC
HMRB08 [mm]	42.0	M4	34.0	2.5	10.0	13.5	2.5	3.0	26.5	37.5	25.0	85.0	60.0	52.5
HMRB11 [mm]	51.0	M6	39.0	1.2	12.0	20.0	0.0	5.0	30.0	50.0	31.0	110.0	69.5	60.5
HMRB15 [mm]	72.0	M8	54.0	2.1	15.0	19.3	7.0	5.5	36.5	60.5	45.0	150.0	90.0	74.0
HMRB18 [mm]	80.0	M8	64.0	4.0	18.0	21.8	1.5	8.0	45.0	68.0	50.0	180.0	111.5	93.5
HMRB24 [mm]	95.0	M10	80.0	2.5	24.0	24.0	4.0	11.0	52.5	80.5	60.0	240.0	125.0	104.5

Dimension table - HMRB

Product size	LR	LS	M	MA	MB	MC	N	NA	NB	NC	P	PS	PT	PU	Q
HMRB08 [mm]	71.0	63.5	50.0	5.2	4.5	1.5	4.5	3.4	3.0	2.5	23.8	12.0	9.0	12.0	16.0
HMRB11 [mm]	89.5	80.5	70.0	5.2	4.5	1.8	4.5	3.4	3.0	2.5	30.8	12.0	9.0	17.0	20.0
HMRB15 [mm]	114.0	98.0	96.0	6.2	6.8	3.0	6.5	5.2	4.6	3.5	48.0	12.0	9.0	21.0	20.0
HMRB18 [mm]	134.5	116.5	116.0	8.0	7.8	4.5	8.5	5.2	4.5	3.5	58.0	12.0	9.0	28.0	20.0
HMRB24 [mm]	153.0	132.5	161.0	10.0	10.2	5.3	8.5	5.2	4.5	3.5	78.0	12.0	9.0	28.6	20.0

Dimension table - carriage standard HMRB

Product size	JB	JD	CL	RS	T	TAS	ta	TBS	tb	TCS	tc	TDS	td	TES
HMRB08 [mm]	33.5	30.0	195.0	128.0	74.0	97.0	M4x12	70.0	M4x12	40.0	M4x12	-	-	-
HMRB11 [mm]	37.5	34.0	225.0	150.0	96.0	122.0	M5x12	97.0	M5x12	65.0	M5x12	25.0	M5x12	-
HMRB15 [mm]	37.5	34.0	266.0	191.0	120.0	170.0	M5x12	122.0	M5x12	110.0	M5x12	70.0	M5x12	-
HMRB18 [mm]	40.0	34.0	311.0	231.0	150.0	202.0	M6x12	170.0	M5x10	122.0	M5x10	110.0	M5x12	90.0
HMRB24 [mm]	40.0	34.0	371.0	291.0	192.0	262.0	M8x16	202.0	M6x12	170.0	M5x10	140.0	M8x16	122.0

Dimension table - carriage standard HMRB

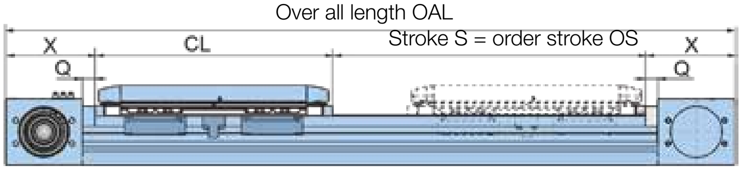
Product size	te	TFS	tf	tg	ØTKH7	TL	U	U1
HMRB08 [mm]	-	-	-	-	7.0	1.5	83.0	5.5
HMRB11 [mm]	-	-	-	-	7.0	1.5	105.0	7.0
HMRB15 [mm]	-	-	-	M5x12	7.0	1.5	135.0	15.0
HMRB18 [mm]	M6x12	-	-	M6x12	9.0	1.5	165.0	15.0
HMRB24 [mm]	M5x10	110.0	M5x12	M8x16	12.0	1.5	210.0	24.0

Dimensions – mm

Stroke depending dimensions

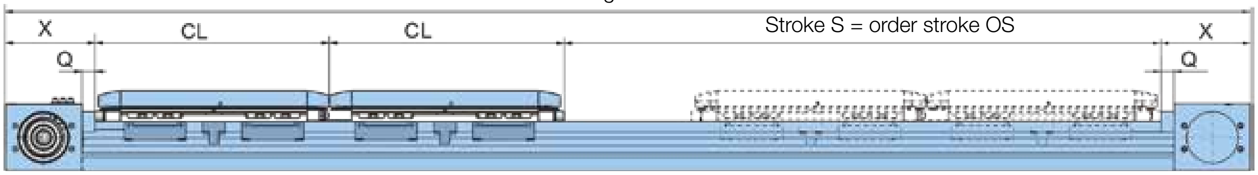
- ES = Effective Stroke
- SS = Safety Stroke
- CD = Carriage distance
- CL = Carriage length Standard
- S = Stroke
- OS = Order Stroke
- OAL = Over All Length

Option Carrier Standard



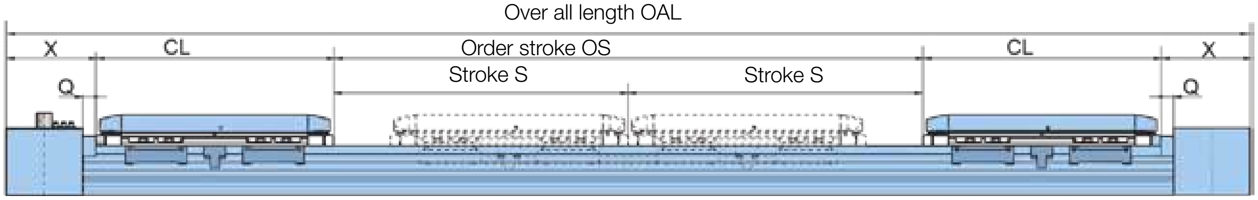
Order stroke OS = Effective stroke ES + 2 x Safety stroke SS
Over all length OAL = Order stroke OS + Carrier length CL + 2 x End cap length X

Option Carrier Tandem



Order stroke OS = Effective stroke ES + 2 x Safety stroke SS + Carrier distance CD (not shown)
Over all length OAL = Order stroke OS + 2 x Carrier length CL + 2 x End cap length X

Option Carrier Bi-part for opposite movements



Order stroke OS = 2 x Stroke S = 2 x Effective stroke ES + 4 x Safety stroke SS + Carrier distance CD (not shown)
Over all length OAL = Order stroke OS + 2 x Carrier length CL + 2 x End cap length X

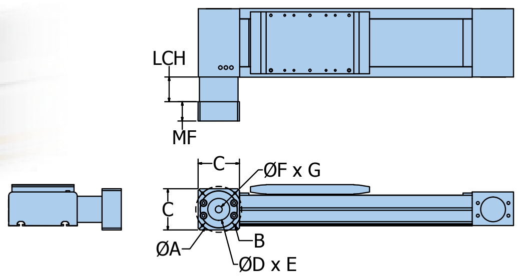
Dimensions - Carriage and end cap HMRB

Product size		CL	Q	X
HMRB08	[mm]	195.0	16.0	74.0
HMRB11	[mm]	225.0	20.0	85.0
HMRB15	[mm]	266.0	20.0	110.0
HMRB18	[mm]	311.0	20.0	120.0
HMRB24	[mm]	371.0	20.0	140.0

OPTIONS & ACCESSORIES

Gearhead Mounting Kit Options

Gearhead Mounting Kits include a coupling housing, coupling, and flange.



A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
MF = Motor flange

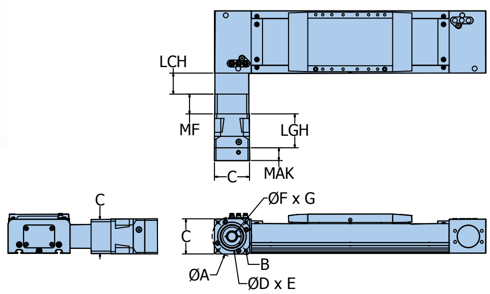
(see page 257 for LCH dimensions)

Actuator Size	⓪ Order Code [1]	Dimensions A	B	C	D	E	F	G	MF
HMRB08	**C0**	44	M4x0.7	60	35	6	12	25	20
HMRB11	**A7**	70	M5x0.8	60	50	15	16	40	35
	C0	44	M4x0.7	60	35	6	12	25	20
	C1	62	M5x0.8	80	52	8	16	40	35
	BX	70	M5x0.8	60	50	10	16	25	20
HMRB15	**A7**	70	M5x0.8	85	50	15	16	40	30
	A8	100	M6x1	90	80	20	22	52	42
	C1	62	M5x0.8	84	52	12	16	36	30
	C2	80	M6x1	92	68	5	22	46	36
	BX	70	M5x0.8	85	50	5	16	25	20
	BY	100	M6x1	92	80	15	20	40	30
HMRB18	**A8**	100	M6x1	100	80	30	22	52	40
	C2	80	M6x1	92	68	6	22	46	30
	BY	100	M6x1	92	80	15	20	40	30
	BZ	130	M8x1.25	115	110	25	24	50	40
HMRB24	**A9**	130	M8x1.25	115	110	25	32	68	40
	C3	108	M8x1.25	125	90	17	32	70	40
	BZ	130	M8x1.25	115	110	5	24	50	20

[1] When ordering with actuator, use order code ⓪ to specify appropriately sized gearhead mounting kit, and order code ③ to specify drive shaft orientation. See Ordering Information.

Mounted Gearhead with Motor Mounting Kit Options

Mounted Gearhead with Motor Mounting Kits include a coupling housing, coupling, flange, and gearhead with coupler and flange.



A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
LGH = Length gearhead
MAK = Motor adapter
MF = Motor flange

(see page 257 for LCH dimensions)

Actuator Size	9 Order Code [1]	0 Order Code [2]	A	B	C	D	E	F	G	LGH	MAK	MF
HMRB08	**Jx**	**AB**	66.68	M4x0.7	55	38.10	3.5	6.35	20.8	48.5	15.7	20
	Jx	**AC**	66.68	M5x0.8	57	38.11	6	9.53	20.8	48.5	26	20
	Jx	**AD**	66.68	M5x0.8	57	38.11	6	9.53	31.8	48.5	26	20
	Jx	**B6**	63	M5x0.8	55	40.05	8	9	23	48.5	19	20
HMRB11	**Fx**	**A3**	100	M6x1	82	80	5	14	30	59.8	18	35
	Fx	**AB**	66.68	M4x0.7	62	38.10	4	6.35	20.8	59.8	16.5	35
	Fx	**AC**	66.68	M5x0.8	62	38.15	4	9.53	20.8	59.8	16.5	35
	Fx	**AD**	66.68	M5x0.8	62	38.15	4	9.53	31.8	59.8	16.5	35
	Fx	**AE**	98.43	M5x0.8	86.8	73.03	7	12.70	37.1	59.8	22.5	35
	Fx	**AF**	98.43	M5x0.8	86.8	73.03	7	12.70	31.8	59.8	22.5	35
	Fx	**AH**	63	M5x0.8	62	40	4	9	23	59.8	16.5	35
	Fx	**AN**	70	M5x0.8	62	50	4	14	30	59.8	16.5	35
	Fx	**B6**	63	M4x0.7	62	40	4	9	23	59.8	16.5	35
	Jx	**AB**	66.68	M4x0.7	55	38.10	3.5	6.35	20.8	48.5	15.7	20
	Jx	**AC**	66.68	M5x0.8	57	38.11	6	9.53	20.8	48.5	26	20
	Jx	**AD**	66.68	M5x0.8	57	38.11	6	9.53	31.8	48.5	26	20
	Jx	**B6**	63	M5x0.8	55	40	8	9	23	48.5	19	20
	Kx	**AB**	66.68	M4x0.7	62	38.10	4	6.35	20.8	67	16.5	35
	Kx	**AC**	66.68	M4x0.7	62	38.10	4	9.53	20.8	67	16.5	35
	Kx	**AD**	66.68	M5x0.8	62	38.10	8.5	9.53	31.8	67	22.5	35
	Kx	**AE**	98.43	M6x1	85	73.05	10	12.70	37.1	67	30	35
	Kx	**AF**	98.43	M5x0.8	80	73.05	10	12.70	31.8	67	22.5	35
	Kx	**AH**	63	M5x0.8	62	40	4	9	23	67	16.5	35
	Kx	**AN**	70	M5x0.8	62	50	11	14	30	67	22.5	35
	Kx	**B6**	63	M4x0.7	62	40	4	9	23	67	16.5	35

[1] When ordering with actuator, use order code 9 (see Ordering Information) to specify mounted gearhead size, ratio and orientation:
Gearhead size example: **F** = PS60 **G** = PS90 **H** = PS115 **J** = PV040TA **K** = PV60TA **L** = PV090TA **M** = PV115TA
Gearhead ratio and mounting orientation: (Replace "x" to specify)
1 = ratio 3:1 * **2** = ratio 5:1 **3** = ratio 10:1
* 3:1 ratio not available on "J" PV040TA gearhead
[2] Use order code 0 (see Ordering Information) to specify appropriately sized motor mounting kit.

(continued on next page)

Mounted Gearhead with Motor Mounting Kit Options

(continued from previous page)

Actuator Size	9 Order Code [1]	0 Order Code [2]	A	B	C	D	E	F	G	LGH	MAK	MF
HMRB15	Fx	A3	100	M6x1	82	80	5	14	30	59.8	18	30
	Fx	AB	66.68	M4x0.7	62	38.10	4	6.35	20.8	59.8	16.5	30
	Fx	AC	66.68	M5x0.8	62	38.15	4	9.53	20.8	59.8	16.5	30
	Fx	AD	66.68	M5x0.8	62	38.15	4	9.53	31.8	59.8	16.5	30
	Fx	AE	98.43	M5x0.8	86.8	73.03	7	12.70	37.1	59.8	22.5	30
	Fx	AF	98.43	M5x0.8	86.8	73.03	7	12.70	31.8	59.8	22.5	30
	Fx	AH	63	M5x0.8	62	40	4	9	23	59.8	16.5	30
	Fx	AN	70	M5x0.8	62	50	4	14	30	59.8	16.5	30
	Fx	B6	63	M4x0.7	62	40	4	9	23	59.8	16.5	30
	Gx	A2	63	M5x0.8	90	40	3	11	23	69.5	20	42
	Gx	A3	100	M6x1	90	80	10	14	30	69.5	20	42
	Gx	A4	115	M8x1.25	100	95	10	19	40	69.5	28.5	42
	Gx	AB	66.68	M5x0.8	90	38.15	3	6.35	20.8	69.5	20	42
	Gx	AC	66.68	M5x0.8	90	38.15	3	9.53	20.8	69.5	20	42
	Gx	AD	66.68	M5x0.8	90	38.15	3	9.53	31.8	69.5	20	42
	Gx	AE	98.43	M5x0.8	90	73.03	10	12.70	37.1	69.5	20	42
	Gx	AF	98.43	M5x0.8	90	73.07	10	12.70	31.8	69.5	20	42
	Gx	AH	63	M5x0.8	90	40	2.5	9	23	69.5	20	42
	Gx	AL	100	M6x1	90	80	10	16	40	69.5	20	42
	Gx	AN	70	M5x0.8	90	50	10	14	30	69.5	20	42
	Gx	AP	90	M6x1	90	70	10	19	40	69.5	20	42
	Gx	B1	90	M5x0.8	90	60	10	11	23	69.5	20	42
	Gx	B3	95	M6x1	90	50	10	14	30	69.5	20	42
	Gx	B6	63	M4x0.7	90	40	3	9	23	69.5	20	42
	Kx	AB	66.68	M4x0.7	62	38.1	4	6.35	20.8	67	16.5	30
	Kx	AC	66.68	M4x0.7	62	38.1	4	9.53	20.8	67	16.5	30
	Kx	AD	66.68	M5x0.8	62	38.1	8.5	9.53	31.8	67	22.5	30
	Kx	AE	98.43	M6x1	85	73.05	10	12.70	37.1	67	30	30
	Kx	AF	98.43	M5x0.8	80	73.05	7	12.70	31.8	67	22.5	30
	Kx	AH	63	M5x0.8	62	40	4	9	23	67	16.5	30
	Kx	AN	70	M5x0.8	62	50	4	14	30	67	22.5	30
	Kx	B6	63	M4x0.7	62	40	11	9	23	67	16.5	30
	Lx	A2	63	M5x0.8	90	40	3	11	23	85.5	20	36
	Lx	A3	100	M6x1	90	80	10	14	30	85.5	20	36
	Lx	A4	115	M8x1.25	100	95	10	19	40	85.5	28.5	36
	Lx	AB	66.68	M4x0.7	90	38.15	3	6.35	20.8	85.5	20	36
	Lx	AC	66.68	M5x0.8	90	52	10	9.53	20.8	85.5	20	36
	Lx	AD	66.68	M5x0.8	90	52	10	9.53	31.8	85.5	20	36
	Lx	AE	98.43	M5x0.8	90	73.03	10	12.70	37.1	85.5	28.5	36
	Lx	AF	98.43	M5x0.8	90	73	10	12.70	31.8	85.5	20	36
	Lx	AH	63	M5x0.8	90	40	10	9	23	85.5		36
	Lx	AL	100	M6x1	90	80	10	16	40	85.5	28.5	36
	Lx	AN	70	M5x0.8	90	50	10	14	30	85.5	20	36
	Lx	AP	90	M6x1	90	70	10	19	40	85.5	28.5	36

(continued from previous page)

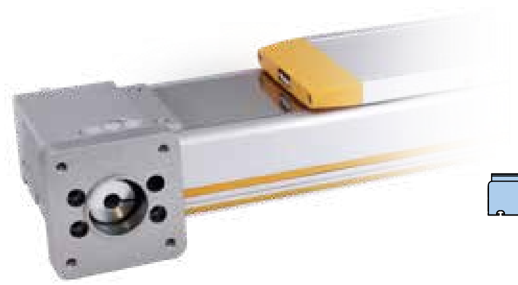
Actuator Size	9 Order Code [1]	0 Order Code [2]	A	B	C	D	E	F	G	LGH	MAK	MF
	Gx	A2	63	M5x0.8	90	40	3	11	23	69.5	20	40
	Gx	A3	100	M6x1	90	80	10	14	30	69.5	20	40
	Gx	A4	115	M8x1.25	100	95	10	19	40	69.5	28.5	40
	Gx	AB	66.68	M5x0.8	90	38.15	3	6.35	20.8	69.5	20	40
	Gx	AC	66.68	M5x0.8	90	38.15	3	9.53	20.8	69.5	20	40
	Gx	AD	66.68	M5x0.8	90	38.15	3	9.53	31.8	69.5	20	40
	Gx	AE	98.43	M5x0.8	90	73	10	12.70	37.1	69.5	20	40
	Gx	AF	98.43	M5x0.8	90	73	10	12.70	31.8	69.5	20	40
	Gx	AH	63	M5x0.8	90	40	3	9	23	69.5	20	40
	Gx	AL	100	M6x1	90	80	10	16	40	69.5	20	40
	Gx	AN	70	M5x0.8	90	50	10	14	30	69.5	20	40
	Gx	AP	90	M6x1	90	70	10	19	40	69.5	20	40
	Gx	B1	90	M5x0.8	90	60.01	10	11	23	69.5	20	40
HMRB18	Gx	B3	95	M6x1	90	50	10	14	30	69.5	20	40
	Gx	B6	63	M4x0.7	90	40	3	9	23	69.5	20	40
	Lx	A2	63	M5x0.8	90	40	3	11	23	85.5	20	30
	Lx	A3	100	M6x1	90	80	10	14	30	85.5	20	30
	Lx	A4	115	M8x1.25	100	95	10	19	40	85.5	28.5	30
	Lx	AB	66.68	M4x0.7	90	38.15	3	6.35	20.8	85.5	20	30
	Lx	AC	66.68	M5x0.8	90	52	10	9.53	20	85.5	20	30
	Lx	AD	66.68	M5x0.8	90	52	10	9.53	31	85.5	20	30
	Lx	AE	98.43	M5x0.8	90	73.03	10	12.70	37.1	85.5	28.5	30
	Lx	AF	98.43	M5x0.8	90	73	10	12.70	31.8	85.5	20	30
	Lx	AH	63	M5x0.8	90	40	10	9	23	85.5		30
	Lx	AL	100	M6x1	90	80	10	16	40	85.5	28.5	30
	Lx	AN	70	M5x0.8	90	50	10	14	30	85.5	20	30
	Lx	AP	90	M6x1	90	70	10	19	40	85.5	28.5	30
	Hx	A4	115	M8x1.25	115	95	10	19	50	90.2	24	40
	Hx	AF	98.4	M5x0.8	115	73.03	10	12.70	31.8	90.2	24	40
	Hx	AK	130	M8x1.25	115	110	10	24	40	90.2	24	40
	Hx	AL	100	M6x1	115	80	10	16	40	90.2	24	40
	Hx	AQ	165	M10x1.5	140	130	10	28	60	90.2	35	40
HMRB24	Hx	AP	90	M6x1	115	70	10	19	40	90.2	24	40
	Mx	A4	115	M8x1.25	115	95.05	10	19	50	110	24	40
	Mx	AF	98.4	M5x0.8	115	73	10	12.70	31.8	110	24	40
	Mx	AK	130	M8x1.25	115	110	10	24	40	110	35	40
	Mx	AL	100	M6x1	115	80	10	16	40	110	24	40
	Mx	AP	90	M6x1	115	70	10	19	40	110	35	40

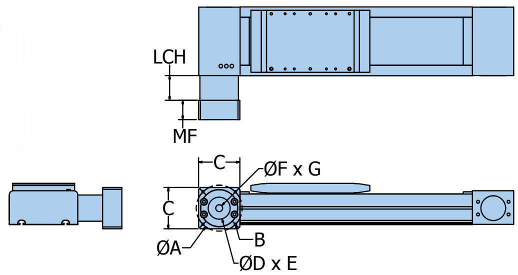
[1] When ordering with actuator, use order code 9 (see Ordering Information) to specify mounted gearhead size, ratio and orientation:
Gearhead size example: **F** = PS60 **G** = PS90 **H** = PS115 **J** = PV040TA **K** = PV60TA **L** = PV090TA **M** = PV115TA
Gearhead ratio and mounting orientation: (Replace "x" to specify)
1 = ratio 3:1 * **2** = ratio 5:1 **3** = ratio 10:1
* 3:1 ratio not available on "J" PV040TA gearhead

[2] Use order code 0 (see Ordering Information) to specify appropriately sized motor mounting kit.

Motor Mounting Kit Options

Motor Mounting Kits include a coupling housing, coupling, and flange.





A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
MF = Motor flange

Actuator Size	0 Order Code [1]	Dimensions A	B	C	D	E	F	G	MF
HMRB08	A2	63	M5x0.8	60	40	10	11	23	20
	AB	66.68	M4x0.7	60	38.10	10	6.35	20.8	20
	AC	66.68	M5x0.8	60	38.10	10	9.53	20.8	20
	AD	66.68	M5x0.8	60	38.10	15	9.53	31.8	27
	AE	98.43	M6x1	85	73.03	15	12.70	37.1	33
	AF	98.43	M5x0.8	85	73.03	15	12.70	31.8	27
	AG	75	M5x0.8	70	60	10	11	23	20
	AH	63	M5x0.8	60	40	10	9	23	20
	AN	70	M5x0.8	60	50	15	14	30	25
	B0	75	M6x1	70	60	15	14	30	25
	B1	90	M5x0.8	75	60	10	11	23	20
	B2	90	M5x0.8	75	60	15	14	30	25
	B3	95	M6x1	80	50	15	14	30	25
	B6	63	M4x0.7	60	40	10	9	23	20
	B7	70	M5x0.8	60	50	15	8	30	25
	B8	70	M5x0.8	60	50	15	12	30	25
HMRB11	A2	63	M5x0.8	60	40	5	11	23	15
	AB	66.68	M4x0.7	60	38.10	10	6.35	20.8	15
	AC	66.68	M5x0.8	60	38.10	10	9.53	20.8	15
	AD	66.68	M5x0.8	60	38.10	15	9.53	31.8	25
	AE	98.43	M6x1	85	73.03	20	12.70	37.1	33
	AF	98.43	M5x0.8	85	73.03	15	12.70	31.8	27
	AG	75	M5x0.8	70	60	10	11	23	20
	AH	63	M5x0.8	60	40	5	9	23	15
	AL	100	M6x1	92	80	15	16	40	36
	AN	70	M5x0.8	60	50	15	14	30	25
	B0	75	M6x1	70	60	15	14	30	25
	B1	90	M5x0.8	80	60	10	11	23	20
	B2	90	M5x0.8	80	60	15	14	30	25
	B3	95	M6x1	80	50	15	14	30	25
	B7	70	M5x0.8	60	50	15	8	30	25
	B8	70	M5x0.8	60	50	15	12	30	25

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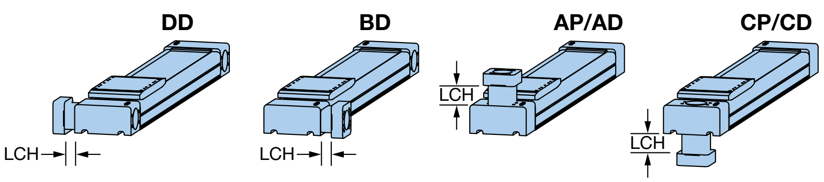
HMRB15	**A2**	63	M5x0.8	84	40	3	11	23	20
	A3	100	M6x1	92	80	5	14	30	20
	A4	115	M8x1.25	100	95	15	19	40	30
	AE	98.43	M6x1	85	73.03	15	12.70	37.1	25
	AF	98.43	M5x0.8	85	73.03	10	12.70	31.8	20
	AL	100	M6x1	92	80	15	16	40	30
	AN	70	M5x0.8	85	50	5	14	30	20
	AP	90	M6x1	84	70	15	19	40	30
	B0	100	M6x1	85	60	5	14	30	20
	B2	90	M5x0.8	85	60	5	14	30	20
HMRB18	**A3**	100	M6x1	92	80	5	14	30	20
	A4	115	M8x1.25	100	95	15	19	40	30
	AF	98.43	M5x0.8	90	73.03	10	12.70	31.8	20
	AK	130	M8x1.25	115	110	25	24	50	40
	AL	100	M6x1	92	80	15	16	40	30
	AP	90	M6x1	90	70	15	19	40	30
	B0	75	M6x1	90	60	10	14	30	20
	B2	90	M6x1	90	60	10	14	30	20
HMRB24	**A4**	115	M8x1.25	110	95	5	19	40	20
	AK	130	M8x1.25	115	110	5	24	50	20

[1] When ordering with actuator, use order code 0 to specify appropriately sized motor mounting kit. See Ordering Information.

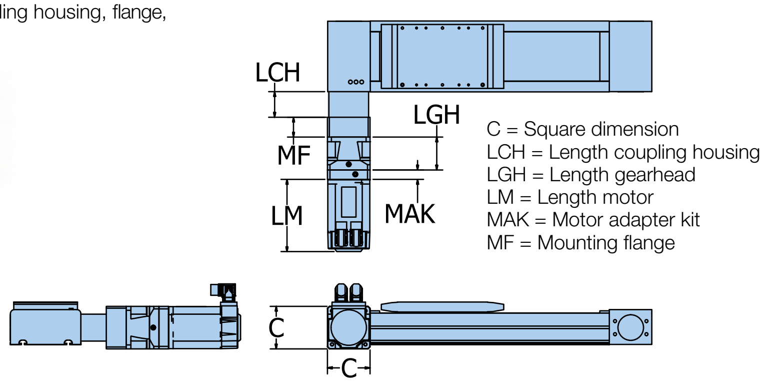
Coupling Housing LCH Dimensions (For all Gearhead and Motor Mounting Options)

Actuator Size	Order Code	LCH (mm)
HMRB08	**BD, DD**	13
	AP, CP, AD, CD	28
HMRB11	**BD, DD**	15
	AP, CP, AD, CD	37
HMRB15	**BD, DD**	30
	AP, CP, AD, CD	54
HMRB18	**BD, DD**	42
	AP, CP, AD, CD	70
HMRB24	**BD, DD**	60
	AP, CP, AD, CD	85



Mounted Gearhead and Motor Options

Mounted Gearhead and Motor options include a coupling housing, flange, gearhead with coupler, flange and motor



Actuator Size	9 Order Code [1]	0 Order Code [2]	Mounted Motor	C	LGH	LM	MAK	MF
HMRB08	**Jx**	**K0**	BE233FJ-KPSN	60	48.5	143.2	26	20
	Jx	**K1**	BE233FJ-KPSN with Brake (CM233FJ-115027)	60	48.5	178	26	20
HMRB11	**Fx**	**K0**	BE233FJ-KPSN	60	59.8	143.2	16.5	35
	Fx	**K1**	BE233FJ-KPSN with Brake (CM233FJ-115027)	60	59.8	178	16.5	35
	Fx	**K2**	BE344LJ-KPSN	60	59.8	188	22.5	35
	Fx	**K3**	BE344LJ-KPSB	60	59.8	231	22.5	35
	Fx	**K4**	PM-FBL04AMK	60	59.8	108.2	16.5	35
	Fx	**K5**	PM-FBL04AMK2 (w/ Brake)	60	59.8	148.2	16.5	35
	Jx	**K0**	BE233FJ-KPSN	60	48.5	143.2	26	20
	Jx	**K1**	BE233FJ-KPSN with Brake (CM233FJ-115027)	60	48.5	178	26	20
	Kx	**K0**	BE233FJ-KPSN	80	67	143.2	22.5	35
	Kx	**K1**	BE233FJ-KPSN with Brake (CM233FJ-115027)	80	67	178	22.5	35
	Kx	**K2**	BE344LJ-KPSN	80	67	188	22.5	35
	Kx	**K3**	BE344LJ-KPSB	80	67	231	22.5	35
	Kx	**K4**	PM-FBL04AMK	80	67	108.2	22.5	35
	Kx	**K5**	PM-FBL04AMK2 (w/ Brake)	80	67	148.2	22.5	35

[1] When ordering with actuator, use order code 9 (see Ordering Information) to specify mounted gearhead size, ratio and orientation:
Gearhead size example: **F** = PS60 **G** = PS90 **H** = PS115 **J** = PV040TA **K** = PV60TA **L** = PV090TA **M** = PV115TA
Gearhead ratio and mounting orientation: (Replace "x" to specify)
1 = ratio 3:1 * **2** = ratio 5:1 **3** = ratio 10:1
* 3:1 ratio not available on "J" PV040TA gearhead

[2] Use order code 0 (see Ordering Information) to specify appropriately sized motor mounting kit.

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Actuator Size	⑨ Order Code [1]	⓪ Order Code [2]	Mounted Motor	C	LGH	LM	MAK	MF
HMRB15	**Fx**	**K0**	BE233FJ-KPSN	85	59.8	143.2	16.5	30
	Fx	**K1**	BE233FJ-KPSN with Brake (CM233FJ-115027)	85	59.8	178	16.5	30
	Fx	**K2**	BE344LJ-KPSN	85	59.8	188	22.5	30
	Fx	**K3**	BE344LJ-KPSB	85	59.8	231	22.5	30
	Fx	**K4**	PM-FBL04AMK	85	59.8	108.2	16.5	30
	Fx	**K5**	PM-FBL04AMK2 (w/ Brake)	85	59.8	148.2	16.5	30
	Gx	**K2**	BE344LJ-KPSN	90	69.5	188	20	42
	Gx	**K3**	BE344LJ-KPSB	90	69.5	231	20	42
	Gx	**K6**	PM-FCL10AMK	90	69.5	152.7	20	42
	Gx	**K7**	PM-FCL10AMK2 (w/ Brake)	90	69.5	193	20	42
	Gx	**M0**	MPP0923D1E-KPSN	90	69.5	178	20	42
	Gx	**M1**	MPP0923D1E-KPSB	90	69.5	212.5	20	42
	Gx	**M2**	MPP1003D1E-KPSN	90	69.5	174.5	28.5	42
	Gx	**M3**	MPP1003D1E-KPSB	90	69.5	223	28.5	42
	Gx	**M4**	MPP1003R1E-KPSN	90	69.5	174.5	28.5	42
	Gx	**M5**	MPP1003R1E-KPSB	90	69.5	223	28.5	42
	Kx	**K0**	BE233FJ-KPSN	84	67	143.2	22.5	30
	Kx	**K1**	BE233FJ-KPSN with Brake (CM233FJ-115027)	84	67	178	22.5	30
	Kx	**K2**	BE344LJ-KPSN	84	67	188	22.5	30
	Kx	**K3**	BE344LJ-KPSB	84	67	231	22.5	30
	Kx	**K4**	PM-FBL04AMK	84	67	108.2	22.5	30
	Kx	**K5**	PM-FBL04AMK2 (w/ Brake)	84	67	148.2	22.5	30
	Lx	**K2**	BE344LJ-KPSN	92	85.5	188	20	36
	Lx	**K3**	BE344LJ-KPSB	92	85.5	231	20	36
	Lx	**K6**	PM-FCL10AMK	92	85.5	152.7	28.5	36
	Lx	**K7**	PM-FCL10AMK2 (w/ Brake)	92	85.5	193	28.5	36
	Lx	**M0**	MPP0923D1E-KPSN	92	85.5	178	28.5	36
	Lx	**M1**	MPP0923D1E-KPSB	92	85.5	212.5	28.5	36
	Lx	**M2**	MPP1003D1E-KPSN	92	85.5	174.5	28.5	36
	Lx	**M3**	MPP1003D1E-KPSB	92	85.5	223	28.5	36
	Lx	**M4**	MPP1003R1E-KPSN	92	85.5	174.5	28.5	36
	Lx	**M5**	MPP1003R1E-KPSB	92	85.5	223	28.5	36

[1] When ordering with actuator, use order code ⑨ (see Ordering Information) to specify mounted gearhead size, ratio and orientation:
Gearhead size example: **F** = PS60 **G** = PS90 **H** = PS115 **J** = PV040TA **K** = PV60TA **L** = PV090TA **M** = PV115TA
Gearhead ratio and mounting orientation: (Replace "x" to specify)
1 = ratio 3:1 * **2** = ratio 5:1 **3** = ratio 10:1
* 3:1 ratio not available on "J" PV040TA gearhead

[2] Use order code ⓪ (see Ordering Information) to specify appropriately sized motor mounting kit.

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Mounted Gearhead and Motor Options

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Actuator Size	⑨ Order Code [1]	⓪ Order Code [2]	Mounted Motor	C	LGH	LM	MAK	MF
HMRB18	Gx	K2	BE344LJ-KPSN	100	69.5	188	20	40
	Gx	K3	BE344LJ-KPSB	100	69.5	231	20	40
	Gx	K6	PM-FCL10AMK	100	69.5	152.7	20	40
	Gx	K7	PM-FCL10AMK2 (w/ Brake)	100	69.5	193	20	40
	Gx	M0	MPP0923D1E-KPSN	100	69.5	178	20	40
	Gx	M1	MPP0923D1E-KPSB	100	69.5	212.5	20	40
	Gx	M2	MPP1003D1E-KPSN	100	69.5	174.5	28.5	40
	Gx	M3	MPP1003D1E-KPSB	100	69.5	223	28.5	40
	Gx	M4	MPP1003R1E-KPSN	100	69.5	174.5	28.5	40
	Gx	M5	MPP1003R1E-KPSB	100	69.5	223	28.5	40
	Lx	K2	BE344LJ-KPSN	92	85.5	188	20	30
	Lx	K3	BE344LJ-KPSB	92	85.5	231	20	30
	Lx	K6	PM-FCL10AMK	92	85.5	152.7	28.5	30
	Lx	K7	PM-FCL10AMK2 (w/ Brake)	92	85.5	193	28.5	30
	Lx	M0	MPP0923D1E-KPSN	92	85.5	178	28.5	30
	Lx	M1	MPP0923D1E-KPSB	92	85.5	212.5	28.5	30
	Lx	M2	MPP1003D1E-KPSN	92	85.5	174.5	28.5	30
	Lx	M3	MPP1003D1E-KPSB	92	85.5	223	28.5	30
	Lx	M4	MPP1003R1E-KPSN	92	85.5	174.5	28.5	30
	Lx	M5	MPP1003R1E-KPSB	92	85.5	223	28.5	30
HMRB24	Hx	M6	MPP1154B1E-KPSN	115	90.2	203.2	24	40
	Hx	M7	MPP1154B1E-KPSB	115	90.2	251.7	24	40
	Hx	M8	MPP1154P1E-KPSN	115	90.2	203.2	24	40
	Hx	M9	MPP1154P1E-KPSB	115	90.2	251.7	24	40
	Hx	MA	MPP1424C1E-KPSN	115	90.2	223.7	35	40
	Hx	MB	MPP1424C1E-KPSB	115	90.2	275.3	35	40
	Hx	MC	MPP1424R1E-KPSN	115	90.2	223.7	35	40
	Hx	MD	MPP1424R1E-KPSB	115	90.2	275.3	35	40
	Mx	M6	MPP1154B1E-KPSN	125	110	203.2	35	40
	Mx	M7	MPP1154B1E-KPSB	125	110	251.7	35	40
	Mx	M8	MPP1154P1E-KPSN	125	110	203.2	35	40
	Mx	M9	MPP1154P1E-KPSB	125	110	251.7	35	40

[1] When ordering with actuator, use order code ⑨ (see Ordering Information) to specify mounted gearhead size, ratio and orientation:
Gearhead size example: **F** = PS60 **G** = PS90 **H** = PS115 **J** = PV040TA **K** = PV60TA **L** = PV090TA **M** = PV115TA
Gearhead ratio and mounting orientation: (Replace "x" to specify)
1 = ratio 3:1 * **2** = ratio 5:1 **3** = ratio 10:1
* 3:1 ratio not available on "J" PV040TA gearhead

[2] Use order code ⓪ (see Ordering Information) to specify appropriately sized motor mounting kit.

Limit & Home Sensors

The HMR uses Parker's Global Sensor line, which can be mounted in the longitudinal t-slots running along the actuator body. These sensors mount flush to the extrusion body, minimizing the overall width of the actuator.

Parker's Global Sensors feature short circuit protection, power up pulse protection, and reverse polarity protection.

The sensor cable can be concealed under the yellow T-slot covers which are provided with each unit.

For internally configured sensors, the cables are routed internally and exit and the end cap of the unit through industrially hardened M8 connectors.

In the event internal sensors are configured, they cannot be re-positioned in the field. The pre-set location is configured in the part number model code. Please consult factory for further assistance.

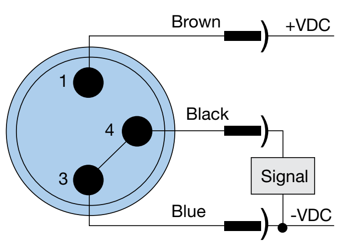
Permanent magnets integrated into the carriage assembly actuate the sensors as the carriage traverses it linear travel.

All actuators pre-configured with a sensor pack, come pre-configured with a 5 meter extension cable, with flying leads.

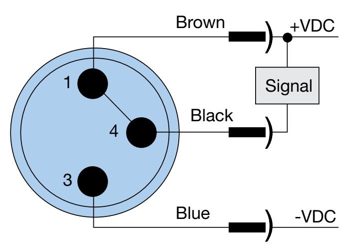
Common Specifications:

Electric current drain: 100 mA (max)
Switching current: 10 mA (max)
Supply voltage: 10 – 30 VDC
Switching Frequency: 1 kHz

PNP Wiring



NPN Wiring

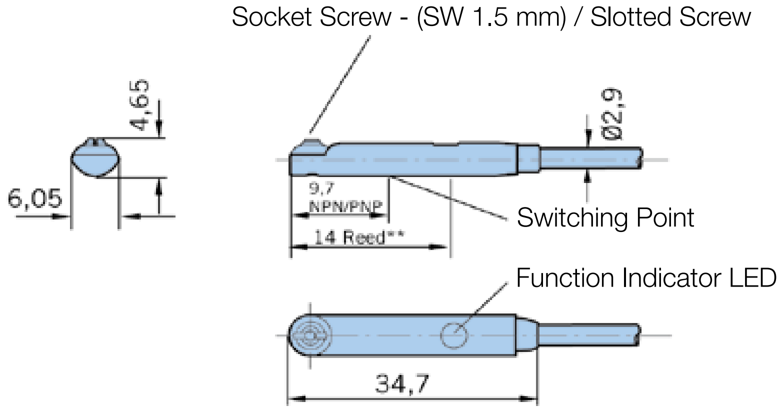


Magnetic LED Cylinder Sensors

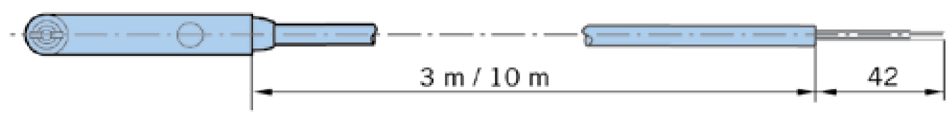
Model Number	Function	Logic	Cable
P8S-GPFAX	N.O.	PNP	3 m
P8S-GNFAX		NPN	
P8S-GPCHX		PNP	0.3 m cable with M8 connector*
P8S-GNCHX		NPN	
P8S-GQFAX	N.C.	PNP	3 m
P8S-GMFAX		NPN	
P8S-GQCHX		PNP	0.3 m cable with M8 connector*
P8S-GMCHX		NPN	

* 003-2918-01 is a 5 m extension cable to flying leads for these cables

Limit & Home Sensor Dimensions

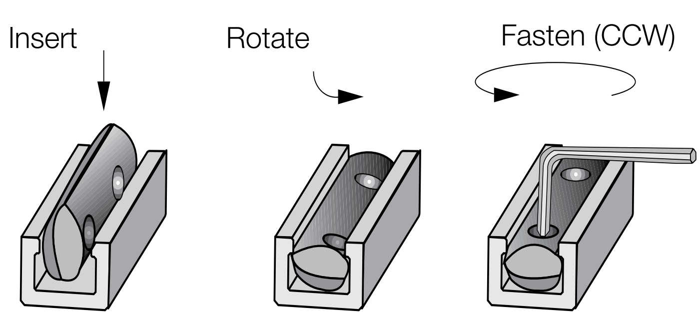


P8S-... cable with flying leads



P8S-... cable with M8 rotable

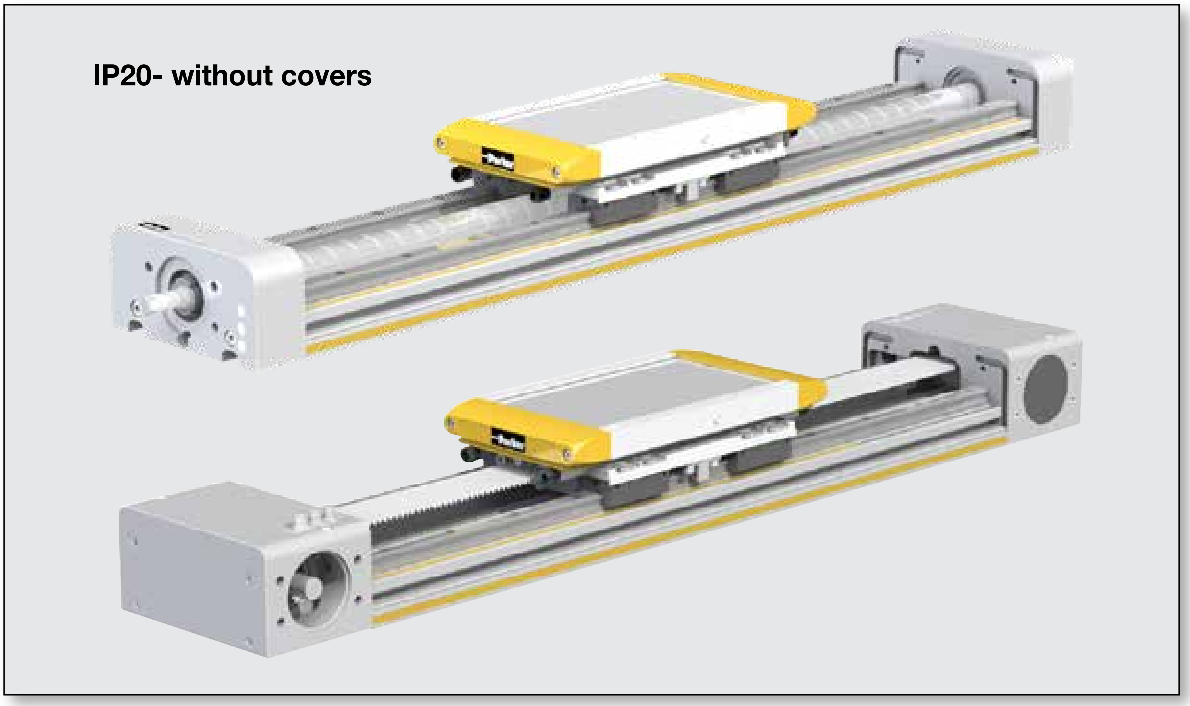
Installation for Magnetic T-Slot Sensors



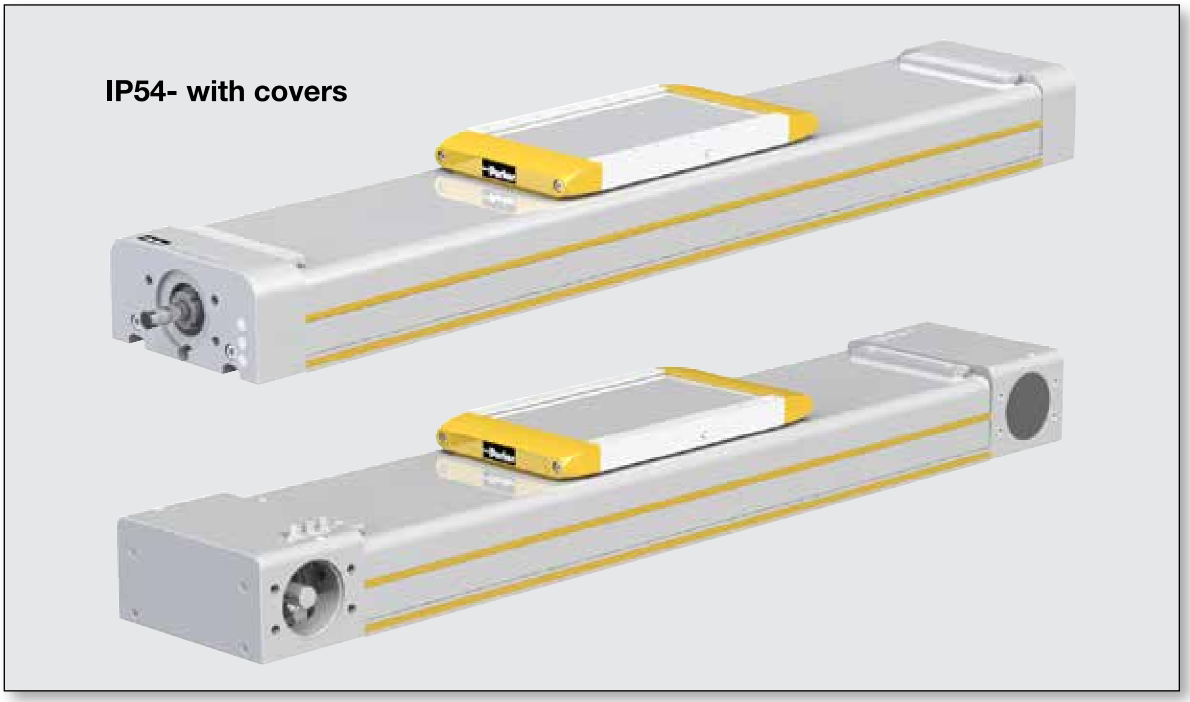
Protective Cover Options

Two Versions Available: Covers can be field retro-fitted if initially configured without covers.

Consult maintenance manual or factory support for assistance in specifying replacement covers and installation procedures.

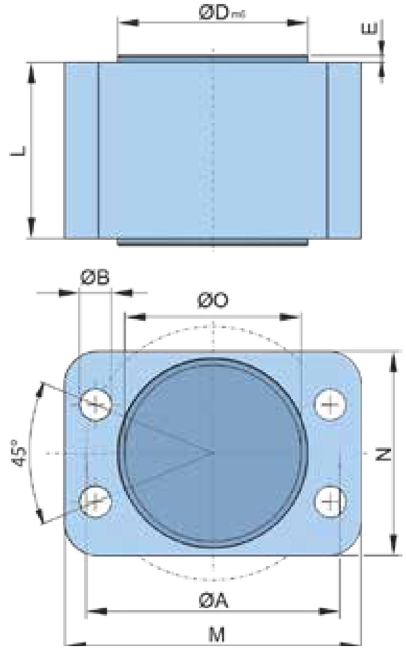


IP20- without covers



IP54- with covers

Coupling Housing



Dimension table - Coupling housing long HMRS / HMRB [mm]

Product size	Ø A	Ø B	Ø D_{m6}	E	Ø O	L	M	N	Order no.
HMRx08 [1]	42	4.5	34	2	30	28	49	37	56568FIL
HMRx11 [1]	51	6.6	39	1	35	37	60	42	56566FIL
HMRx15 [1]	72	9.0	54	2	50	54	84	58	50353FIL
HMRx18 [1]	80	9.0	64	2	60	70	90	68	50655FIL
HMRx24 [1]	95	11.0	80	2	77	85	107	85	56415FIL

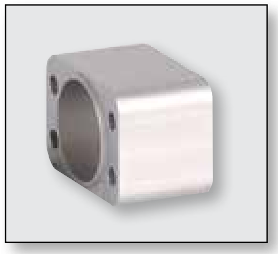
[1]Suitable for all types of HMRS

[1]Suitable for HMRB with motor orientation 000° top
(HMRBxxxAP; HMRBxxxAD)

[1]Suitable for HMRB with motor orientation 180° bottom and profile version Basic
(HMRBxxBCP; HMRBxxBCD; HMRBxxCCP; HMRBxxCCD)

Dimension table - Coupling housing short HMRB [mm]

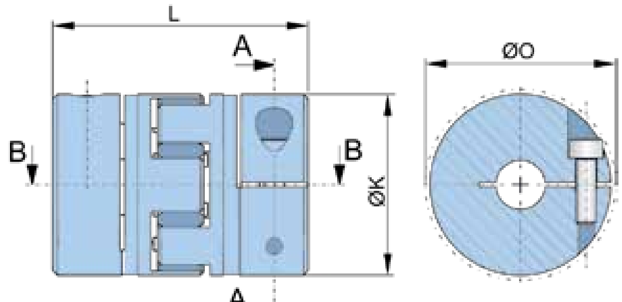
Product size	Ø A	Ø B	Ø D_{m6}	E	Ø O	L	M	N	Order no.
HMRB08 [1]	42	4.5	34	2	30	13	49	37	56567FIL
HMRB08 [2]	42	4.5	34	2	30	17	49	37	56569FIL
HMRB11 [1] [2]	51	6.6	39	1	35	15	60	42	56565FIL
HMRB15 [1] [2]	72	9.0	54	2	50	30	84	58	56412FIL
HMRB18 [1] [2]	80	9.0	64	2	60	42	90	68	56413FIL
HMRB24 [1] [2]	95	11.0	80	2	77	60	107	85	56414FIL



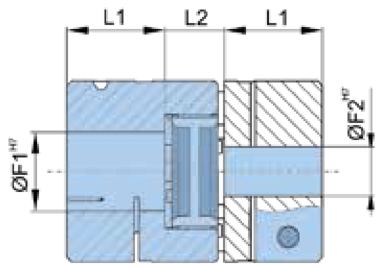
[1]Suitable for HMRB with motor orientation 090° front and 270° rear
(HMRBxxxBD; HMRBxxxDD)

[2]Suitable for HMRB with motor orientation 180° bottom re-inforced profile
(HMRBxxRCP; HMRBxxRCD; HMRBxxSCP; HMRBxxSCD)

Coupling



A-A



B-B

Ball screw

Dimension table - motor coupling HMRS [mm]

Product size	F_1	F_2	F	K	L	L_1	L_2	Ø O	Order no.
HMRS08	6	9	5 - 12	25	34	11	12	27.5	56562FIL
HMRS11	10	9	6 - 16	30	35	11	13	32.5	13210FIL
HMRS15	12	9	8 - 24	40	66	25	16	58.0	56400FIL
HMRS18	15	14	10 - 28	55	78	30	18	68.0	56402FIL
HMRS24	20	14	14 - 38	65	90	35	20	73.0	56510FIL

Belt

Dimension table - motor coupling HMRB [mm]

Product size	F_1	F_2	F	K	L	L_1	L_2	Ø O	Order no.
HMRB08	10	9	5 - 12	25	34	11	12	27.5	56563FIL
HMRB11	12	9	6 - 16	30	35	11	13	32.5	56560FIL
HMRB15	15	10	8 - 24	40	66	25	16	58.0	16239FIL
HMRB18	18	14	10 - 28	55	78	30	18	68.0	56411FIL
HMRB24	24	15	14 - 38	65	90	35	20	73.0	16260FIL

Shock Absorbing Bumper

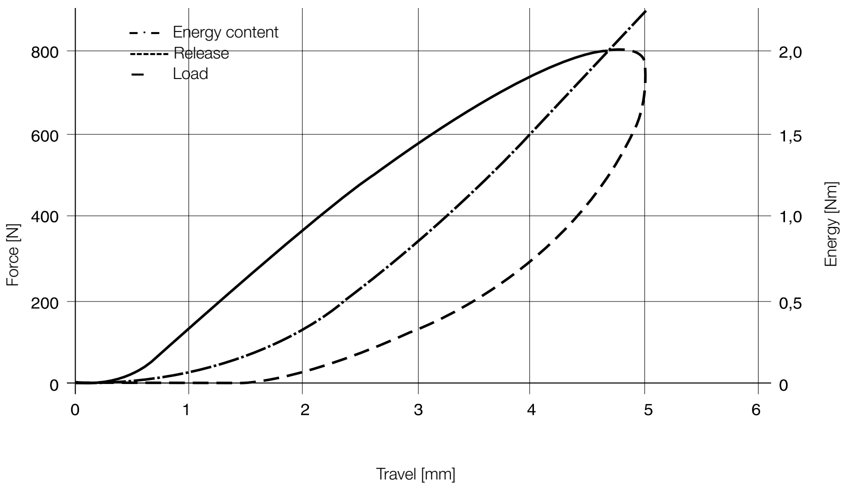
HMR actuators come factory installed with impact protection bumpers. These carriage mounted bumpers can compensate the energy released by unintentional impact and afford some protection against mechanical damage.

Two bumpers (four total) are fitted to each side of the carriage.

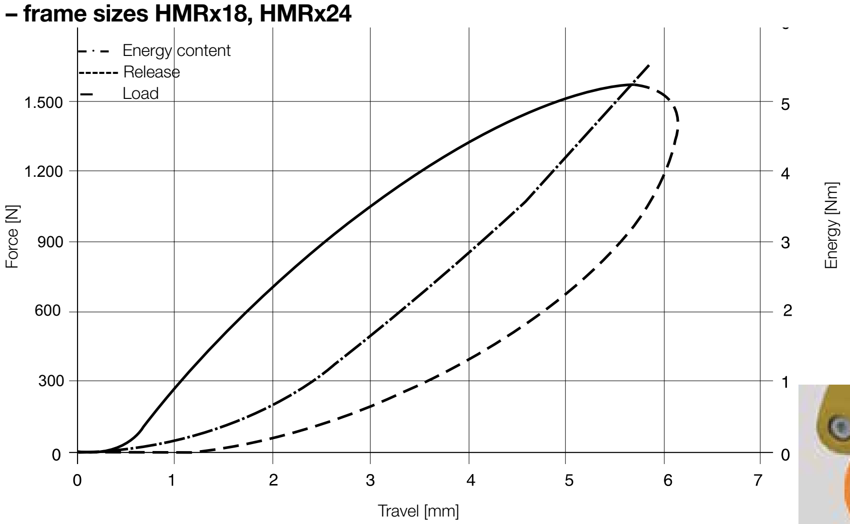
Shock absorbers for impact protection

Product size		HMRx08	HMRx11	HMRx15	HMRx18	HMRx24
Shock absorber		TA12-5	TA12-5	TA12-5	TA17-7	TA17-7
Energy absorption	[Nm/stroke]	3.0	3.0	3.0	8.5	8.5

Distance-force and energy-distance characteristic curve (dynamic) – frame sizes HMRx08, HMRx11, HMRx15



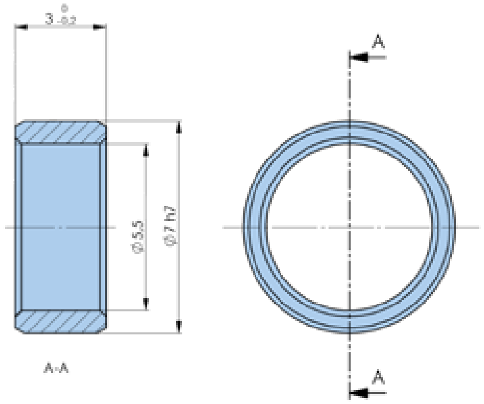
Distance-force and energy-distance characteristic curve (dynamic) – frame sizes HMRx18, HMRx24



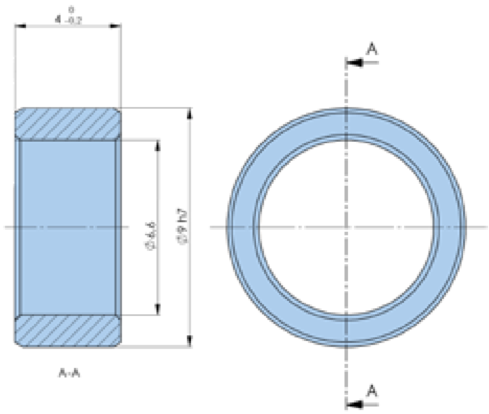
Dowel Sleeves

Dowel sleeves can be used to provide pinning functionality between the carriage mounting surface and the payload. These sleeves have a tightly toleranced outer diameter to accurately locate between the bore in the carriage and the end effector, but have a hollow center granting access to the threaded hole in the carriage underneath the pin bore. This means that these dowel pin bore can additionally function as a threaded connection to the carriage. See Dimensions for carriage mounting detail.

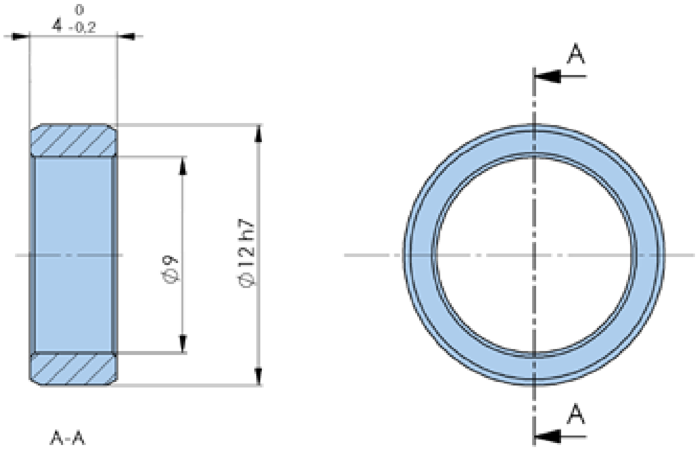
7mm Outer Diameter Dowel Sleeve



9mm Outer Diameter Dowel Sleeve

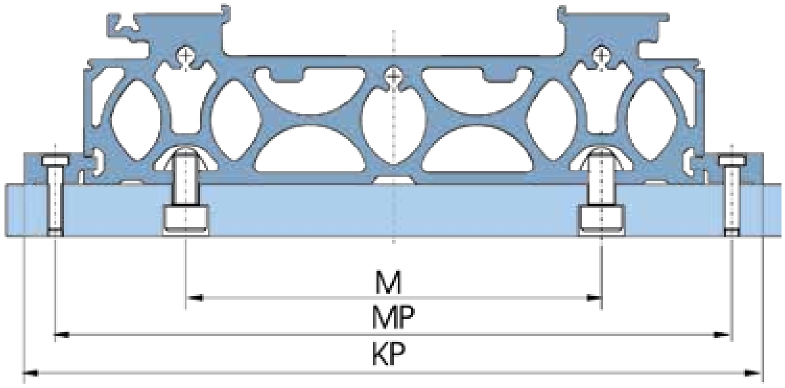


12mm Outer Diameter Dowel Sleeve



Part Number	Description	HMR Frame Size
56455FIL	7mm Dowel Sleeve- 4 Pack	HMRx08, HMRx11, HMRx15
56456FIL	7mm Dowel Sleeve- 10 Pack	HMRx08, HMRx11, HMRx15
56457FIL	9mm Dowel Sleeve- 4 Pack	HMRx18
56458FIL	9mm Dowel Sleeve- 10 Pack	HMRx18
56459FIL	12mm Dowel Sleeve- 4 Pack	HMR24

Actuator Mounting



Dimension table - Product width HMR [mm]

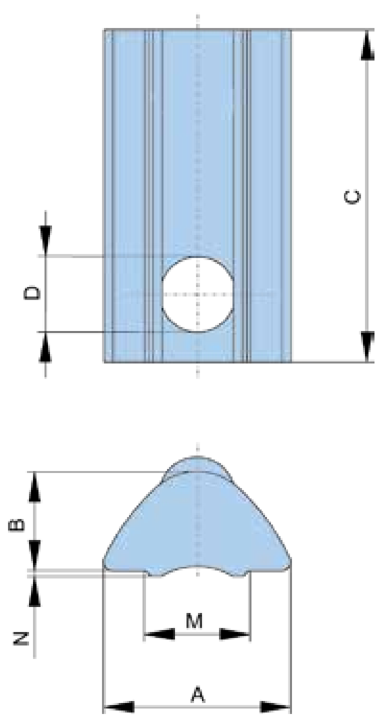
	Toe-clamp mounting (mm)		T-nut mounting (mm)
Product size	**MP**	**KP**	**M**
HMRx08	97	115	50
HMRx11	122	140	70
HMRx15	170	190	96
HMRx18	202	226	116
HMRx24	262	286	161

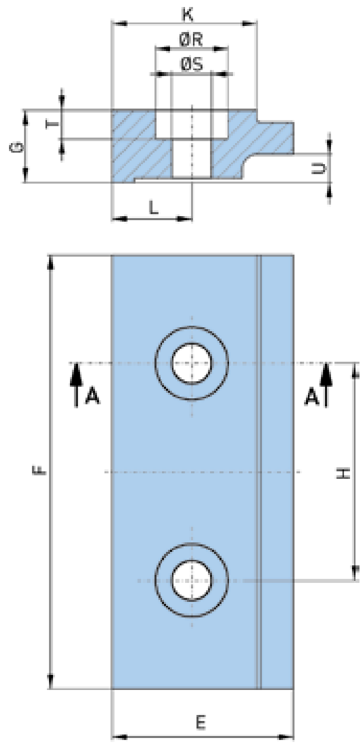
Holding force per mounting set [N]

	Toe-clamp				T-nut			
Product size	In longitudinal direction of the actuator*	Screw 2x	Tightening torque [Nm]	Max. load per screw	In longitudinal direction of the actuator*	Screw 1x	Tightening torque [Nm]	Max. load per screw
HMRx08	800	M4	3	900	1,000	M5	6	1,200
HMRx11	800	M4	3	900	1,000	M5	6	1,200
HMRx15	1,820	M5	6	1,200	1,600	M6	10	1,700
HMRx18	2,610	M6	10	1,700	2,700	M8	20	3,400
HMRx24	2,610	M6	10	1,700	3,200	M10	40	5,500

*A friction factor of 0.15 between profile and mounting surface was taken as a basis for the calculation of the forces that can be transmitted in longitudinal direction, Screw property class 8.8.

Actuator Mounting





Dimension table - T-nut mounting HMR [mm]

Product size	A	B	C	Ø D	M	N	Order no. *
HMRx08	8.0	4.0	11.5	M5	5.0	0.5	56351FIL
HMRx11	8.0	4.0	11.5	M5	5.0	0.5	56351FIL
HMRx15	10.5	6.4	22.5	M6	6.4	0.6	56352FIL
HMRx18	13.5	6.7	22.5	M8	8.5	1.0	56353FIL
HMRx24	16.5	8.9	28.5	M10	10.5	1.0	56354FIL

* Packing unit 10 pc

Dimension table - Toe-clamp mounting HMR [mm]

Product size	E	F	G	H	K	L	Ø R	Ø S	T	U	Order no. *
HMRx08	18.0	40.0	7.5	20.0	15.0	9.0	0.0	4.5	0.0	2.8	56363FIL
HMRx11	18.0	40.0	7.5	20.0	15.0	9.0	0.0	4.5	0.0	2.8	56363FIL
HMRx15	25.0	60.0	10.0	30.0	20.0	10.0	10.0	5.5	4.0	3.9	56355FIL
HMRx18	28.0	80.0	12.0	40.0	23.0	12.0	11.0	6.6	4.7	5.9	56356FIL
HMRx24	28.0	80.0	12.0	40.0	23.0	12.0	11.0	6.6	4.7	5.9	56356FIL

* Packing unit 1 pair (2 toe-clamps) and associated hardware

ORDERING INFORMATION
HMRB

Select an order code from each of the numbered fields to create a complete HMR belt-driven model order number. Include hyphens and non-selective characters as shown in example below.

			①	②	③	④		⑤		⑥	⑦	⑧			⑨	⓪
Order Number Example:	HMR	B	15	B	BD	0	–	1000	–	A	B	1	0	0	F1	A7

① Frame Size (Profile Width)

8	85 mm
11	110 mm
15	150 mm
18	180 mm
24	240 mm

② Actuator Design (see Dimensions for further detail)

B	Basic Profile with Ball Bearing Guide, No Outer Cover
C	Basic Profile with Ball Bearing Guide, IP54 with Outer Cover
R**	Reinforced Profile with Ball Bearing Guide, No Outer Cover
S**	Reinforced Profile with Ball Bearing Guide, IP54 with Outer Cover

③ Motor Mounting Position and Drive Shaft Design (see Options & Accessories for further detail)

BD	90° Front with Double Plain Shaft
DD	270° Back with Double Plain Shaft
AP**	0° Up with Single Plain Shaft
CP**	180° Down with Single Plain Shaft
AD**	0° Up with Double Plain Shaft
CD**	180° Down with Double Plain Shaft

④ Carriage Design

0	Standard
1	Tandem
2	Bi-parting (Not available with ③ BD and DD options)

⑤ Order Stroke

xxxx	4 digit input in mm (see max stroke by frame size in Specifications)

NOTE: If travel is less than 75mm either Home or Limit Sensors can be used, not both. If travel is less than 20mm, only a Home Sensor can be used.

⑥ Home Sensor* (one sensor)

0	No home sensor
A**	PNP, 3 Wire, N.O., Internal Mounting
K**	NPN, 3 Wire, N.O., Internal Mounting
C	PNP, 3 Wire, N.O., M8 Plug, 0.3 m Cable, External Mounting (P8S-GPCHX)
M	NPN, 3 Wire, N.O., M8 Plug, 0.3 m Cable, External Mounting (P8S-GNCHX)

*P/N 003-2918-01, 5 M extension cable included
***If internal switches are selected they cannot be manually re-positioned in the field.**
****Indicates longer lead time option**

⑦ Limit Sensor* (two sensors)

0	No home sensor
B**	PNP, 3 Wire, N.C., Internal Mounting
L**	NPN, 3 Wire, N.C., Internal Mounting
D	PNP, 3 Wire, N.C., M8 Plug, 0.3 m Cable, External Mounting (P8S-GQCHX)
N	NPN, 3 Wire, N.C., M8 Plug, 0.3 m Cable, External Mounting (P8S-GMCHX)

*P/N 003-2918-01, 5 M extension cable included
***If internal switches are selected they cannot be manually re-positioned in the field.**

⑧ Limit/Home Sensor Position*

0	No Home Sensor
1	10 mm
2	20 mm
3	30 mm
4	40 mm
5	50 mm
6	60 mm
7	70 mm
8	80 mm
9	90 mm
A	100 mm
B	110 mm
C	120 mm
D	130 mm
E	140 mm
F	150 mm
G	160 mm
H	170 mm
J	180 mm
K	190 mm
L	200 mm

*If limit and home sensors selected, this is the distance that limit sensors are positioned from both ends, home sensor positioned 50mm from limit sensor at drive end. If only home sensor selected, it is positioned this distance from the drive end.

⑨ Mounted Gearhead

see Options & Accessories for frame size availability and dimensions)

⓪ Gearhead and Motor Mounting Kits

Gearhead Mounting Kit
(see Options & Accessories for availability and dimensions)

Motor Mounting Kit (Including Flange and Coupling For Direct Drive Motor or Flange on Mounted Gearhead
(see Options & Accessories for availability and dimensions)

Mounted Gearhead and Motor
(see Options & Accessories for availability and dimensions)

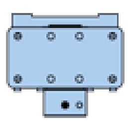
OSPE..BHD Belt-Driven Actuators

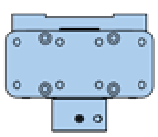
High-Speed, Long Travel, Heavy Duty Applications

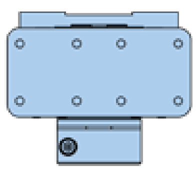
- High dynamic for precision positioning
- High thrust capacity
- High payload capacity
- High speed operation
- Easy installation
- Ideal in multi axis applications

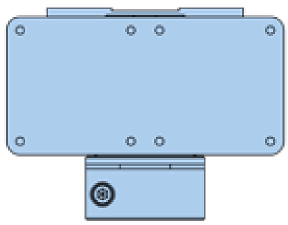
Features

- Integrated ball bearing guide or roller guide
- Clamp drive shaft design for compact and backlash free gearhead and motor mounting
- Tandem carriage with second carriage for higher load capabilities
- Long available strokes
- Complete motor and drive packages
- Bi-parting carriages and special options on request
- Ambient temperature range -30˚C to +80˚C
- IP 54 Rating


OSPE20BHD


OSPE25BHD

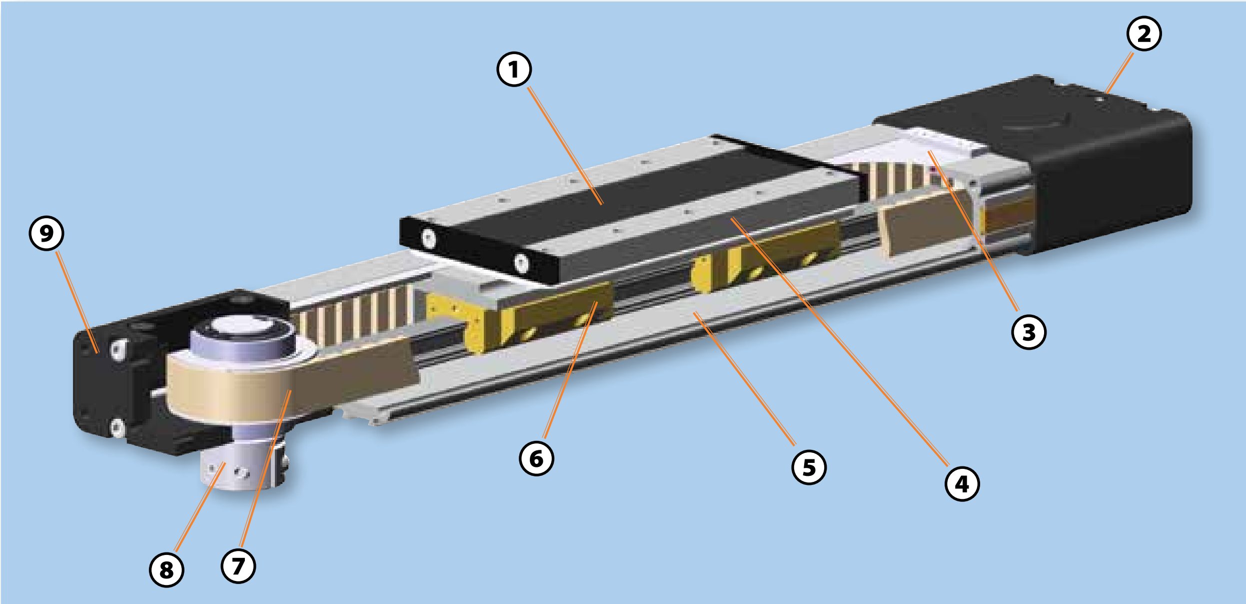

OSPE32BHD


OSPE50BHD

	OSPE20BHD	OSPE25BHD	OSPE32BHD	OSPE50BHD
Maximum Travel (mm)	5,760	5,700	5,600	5,500
Maximum Payload F_z (N)	1,600	3,000	10,000	15,000
Maximum Acceleration (m/sec²)	50	50	50	50

The OSPE..BHD is the highest capacity belt-driven actuator in the OSPE family. The integrated ball bearing guide or optional roller guide are proven in thousands of industrial machines requiring robustness, dynamic precision and extraordinary performance with an aesthetically pleasing design.

The compact design allows integration of the OSPE..BHD in any machine layout, providing very little space, without sacrificing payload or thrust capacity.



1. **Carriage**
   Low profile, high strength aluminum carriage with threaded holes for ease of mounting

2. **Belt tensioning station**
   Easy access for belt tension without removing the payload

3. **Corrosion resistant steel sealing band**
   Magnetically fastened to the actuator body and provides sealing to IP54

4. **Lubrication access port**
   Easy access maintenance allows for single point lubrication of bearing trucks at any point along travel

5. **Slotted profile**
   With dovetail grooves for strength, actuator mounting, and mounting of sensor and other accessories

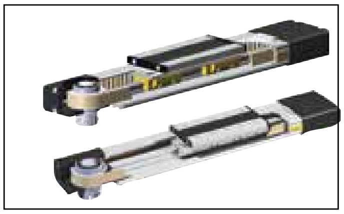
6. **Integrated ball bearing truck**
   For high performance, high payload and moment load demands. (Optional roller wheels available.)

7. **Steel reinforced timing belt**
   High thrust force transmission and long life

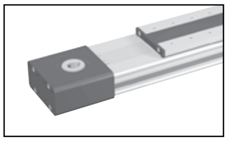
8. **Clamp shaft**
   Optimal, zero-backlash coupling for gearhead and motor

9. **End housing mounting**
   Threaded mounting holes allow for a multitude of mounting options

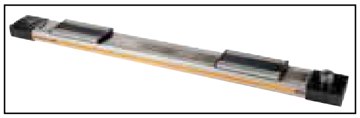
Integrated Bearing Design
Ball bearing - with a high-precision, hardened-steel rail and calibrated bearing trucks for high load capabilities
Roller bearing - with an aluminum grounded and calibrated steel track and needle bearing wheels for high-speed operation up to 10 m/s.



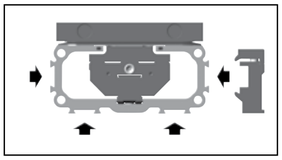
Drive Shaft Options
Clamp shaft (for zero-backlash coupling), plain shaft (for dual axis linking), clamp and plain shaft (for master unit to connect link shaft on plain shaft), and hollow shaft (for compact gearhead mounting)



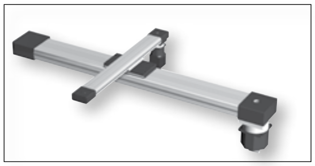
Carriage Options
Standard carriage, tandem carriage — for higher load capabilities, or bi-parting carriage — for opposing synchronized movements



Actuator Mounting Options
End cap mounting — allows the actuator to be anchored by the end caps
Profile mounts — support long travel actuators or for direct mounting



Multi-axis Systems
A wide range of adapter plates and intermediate drive shafts simplifies engineering and installation. Please consult factory for your individual system design.



Options and Accessories
Information on all OSPE..BHD Series options is detailed in Options & Accessories. Simply select all the options needed to solve your application requirements, then order with the actuator using convenient order codes (see Ordering Information). To order an option separately as an upgrade to an existing system or as a replacement part, use the individual option part numbers provided.

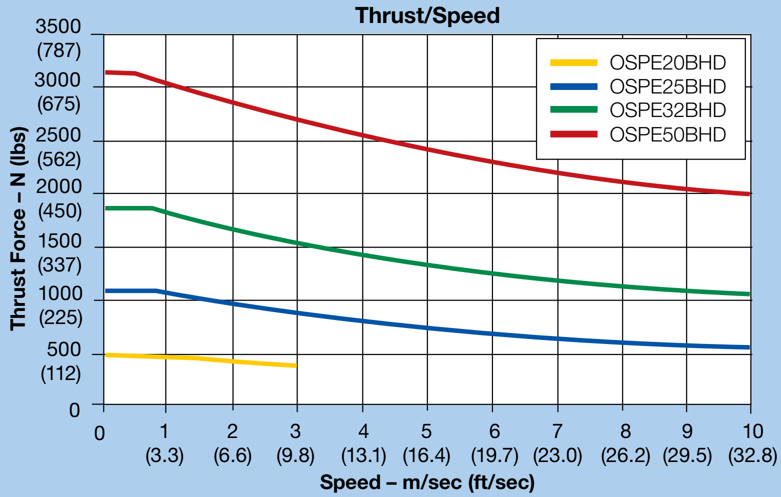
SPECIFICATIONS

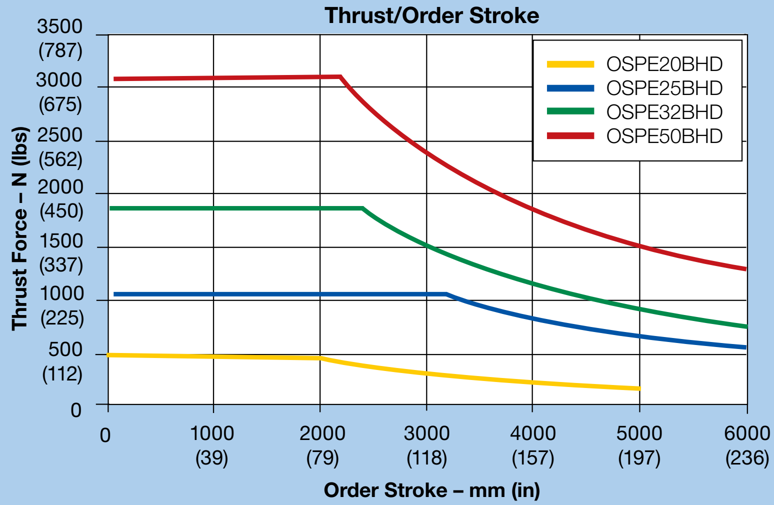
Parker Origa System Plus (OSPE) Series electric motor-driven actuator systems are field-proven worldwide. OSPE Actuator systems are completely modular to accommodate a broad range of application installation and performance requirements. Compact size, maximum configurability and the flexibility to select the right drive train technology for high speed and/ or precise positioning applications makes the OSPE easy to integrate into any machine layout simply and neatly.

Actuator Size			OSPE20BHD	OSPE25BHD		OSPE32BHD		OSPE50BHD	
Integrated Guide Rail [1]			B	B	R	B	R	B	R
Travel Distance per Revolution	s_{lin}	mm	125	180	180	240	240	350	350
Pulley Diameter		mm	39.79	57.30	57.30	76.39	76.39	111.41	111.41
Linear Speed (Max)	v_{max}	m/s	3	5	10	5	10	5	10
Acceleration (Max)	a_{max}	m/s²	50	50	40	50	40	50	40
Repeatability (unidirectional)		µm	± 50	± 50	± 50	± 50	± 50	± 50	± 50
Order Stroke (Max) [2]		mm	5,760	5,700	5,700	5,600	5,600	5,500	5,500
Thrust Force (Max)	F_{Amax}	N	550	1,070	1,070	1,870	1,870	3,120	3,120
		lbs	124	241	241	420	420	701	701
Torque on Drive Shaft (Max)	M_{Amax}	Nm	12	32	32	74	74	177	177
		in-lb	102	282	282	652	652	1,567	1,567
Torque [3] — RMS No Load	M_0	Nm	0.9	1.4	1.4	2.5	2.5	4.2	4.2
		in-lb	8	12	12	22	22	37	37
Torque [3] — Peak No Load	M_0	Nm	1.1	1.9	1.9	3.2	3.2	6.0	6.0
		in-lb	10	17	17	28	28	53	53
Load [4] (Max)	F_Y	N	1,600	2,000	986	5,000	1,348	12,000	3,704
		lbs	360	450	222	1,124	303	2,698	833
	F_Z	N	1,600	3,000	986	10,000	1,348	15,000	3,704
		lbs	360	674	222	2,248	303	3,372	833
Bending Moment Load [4] (Max)	M_X	Nm	21	50	11	120	19	180	87
		in-lb	186	443	97	1,062	168	1,593	770
	M_Y	Nm	150	500	64	1,000	115	1,800	365
		in-lb	1,328	4,425	566	8,851	1,018	15,931	3,231
	M_Z	Nm	150	500	64	1,400	115	2,500	365
		in-lb	1,328	4,425	566	12,391	1,018	22,127	3,231
Inertia									
@ Zero Stroke	J_0	kgmm²	280	1,229	984	3,945	3,498	25,678	19,690
Per Meter of Stroke	J_{OS}	kgmm²/m	41	227	227	496	496	1,738	1,738
Per 1 kg Moved Mass	J_m	kgmm²/kg	413	821	821	1,459	1,459	3,103	3,103
Weight									
@ Zero Stroke	m_0	kg	2.0	2.8	2.8	6.2	5.8	18.2	17.9
Per Meter of Stroke	m_{OS}	kg/m	4.0	4.5	4.3	7.8	6.7	17.0	15.2
Carriage	m_C	kg	0.8	1.5	1.0	2.6	1.9	7.8	4.7
Ambient Temperature Range		°C	-30 to +80						
IP Rating)			IP 54						

(1) B = Ball Bearing Guide Rail; R = Roller Guide
(2) Longer, extended order strokes on request OSPE20BHD = 6000 mm; OSPE25BHD = 9400 mm; OSPE32BHD = 9200 mm
(3) For tandem and bi-parting options double the values listed.
(4) Load and bending moment based on 8000 km performance

Available Thrust Force by Speed and Stroke

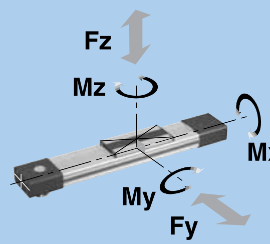




Calculating Load Factors - Combined Normal and Moment Load

The sum of combined loads (static and dynamic) must not exceed “1” at any time as shown in the formula below:

$$\frac{F_z}{F_{z\,(max)}} + \frac{M_x}{M_{x\,(max)}} + \frac{M_y}{M_{y\,(max)}} + \frac{M_z}{M_{z\,(max)}} \leq 1$$



$M = F \times l$ (Nm)

$M_x = M_{x\,static} + M_{x\,dynamic}$

$M_y = M_{y\,static} + M_{y\,dynamic}$

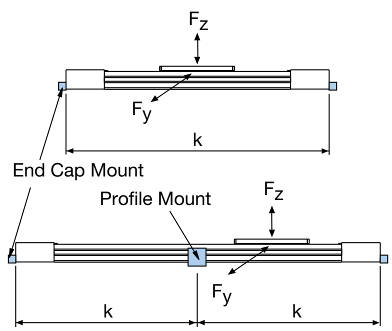
$M_z = M_{z\,static} + M_{z\,dynamic}$

Maximum Permissible Unsupported Length — *Determining end cap and profile mounting placement*

OSPE..BHD Series actuators need to be mounted onto a solid machine base or frame structure using appropriately positioned end cap and profile mounts. This ensures that the actuator will not undergo excessive deflection based on the application's load and length requirements.

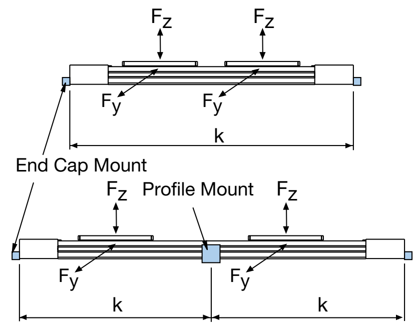
The greater the load and/or the longer the unsupported length between mounts, the more the actuator is susceptible to deflection. Deflection is also dependent on the carriage orientation (F_Z for top oriented carriage or F_Y for a side mounted carriage).

Standard or Tandem Carriage



To determine correct end cap and profile mount placement, please follow the steps shown in the example below.

Bi-Parting Carriage



Use the deflection graphs on the next page to insure that the load will not exceed the maximum allowed deflection.

Example:

A horizontal application uses an OSPE32BHD with a top oriented ball bearing carriage. The maximum load on the carriage is 30 kg and the order stroke is 2,400 mm (see previous section to calculate order stroke).

Therefore, the overall length of the actuator will be approximately 3,000 mm:

2,400 mm + 2 x Dim "X" (262 mm) = 2,924 mm

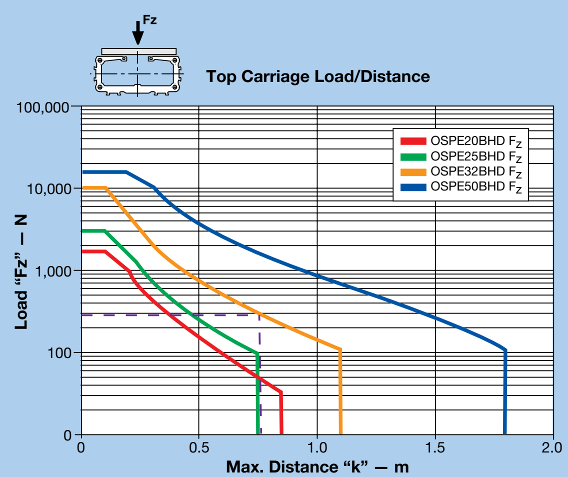
1) Use the Fz graph for a top loaded ball bearing carriage (shown at right)
2) Calculate the Load "F" in Newtons based on the 30 kg application load requirement:

   $30\ \text{kg} \times 9.81\ \text{kg/ms}^2 = 294.3\ \text{N}$

3) Draw a line from 294.3 N on the Y-axis to the OSPE32BHD curve, then down to the X-axis.
4) The value of "k" is approximately 750 mm.
5) Since the overall length (3000 mm) is greater than this value "k", the actuator will require additional fixture points— two end cap mounts and three sets of profile mounts — equally spaced to create a distance "k" of 750 mm in between.
6) Maximum deflection of the actuator with this mounting configuration will be less than 0.075 mm:

   0.01% of 750 mm = 0.075 mm

Ball Bearing Carriage Load-Distance



To further reduce deflection:

If the application requires less deflection, then simply reduce the distance "k" appropriately. In this example, for instance, the application must not exceed 0.05 mm. Therefore, "k" must also be 500 mm.

To achieve this reduced maximum deflection, the actuator will require seven fixture points — two end cap mounts and five pairs of profile mounts — equally spaced with a distance "k" of 500 mm in between.

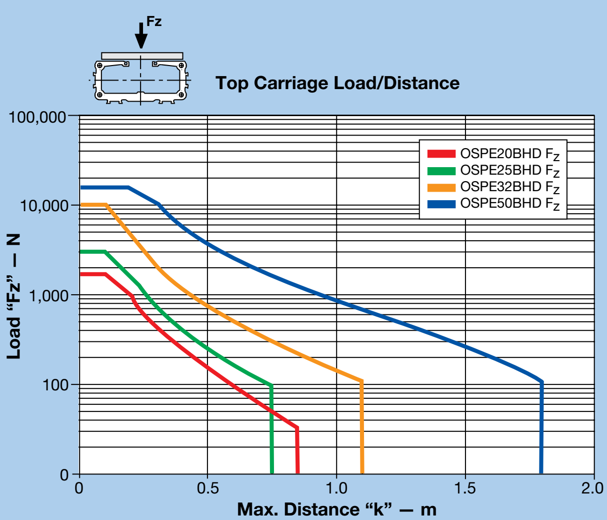
Maximum Permissible Unsupported Length

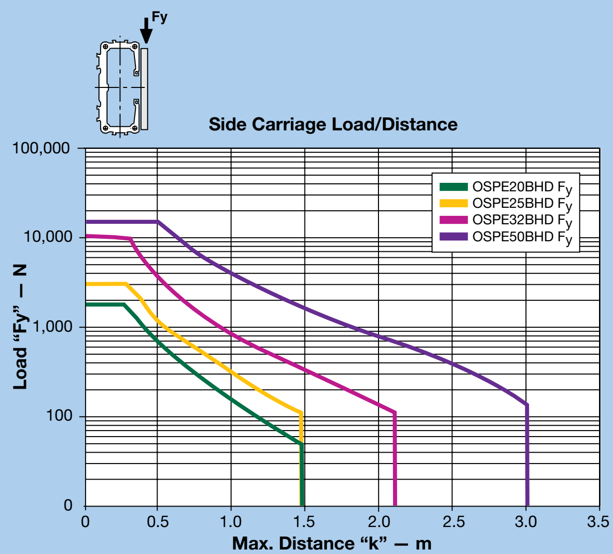
Determining end cap and profile mounting placement

Use the appropriate deflection graph to ensure that the application load does not exceed the deflection curve. Supporting the actuator within the recommended maximum distance "k" will ensure that the installation will have a maximum deflection equal to 0.01% of distance "k."

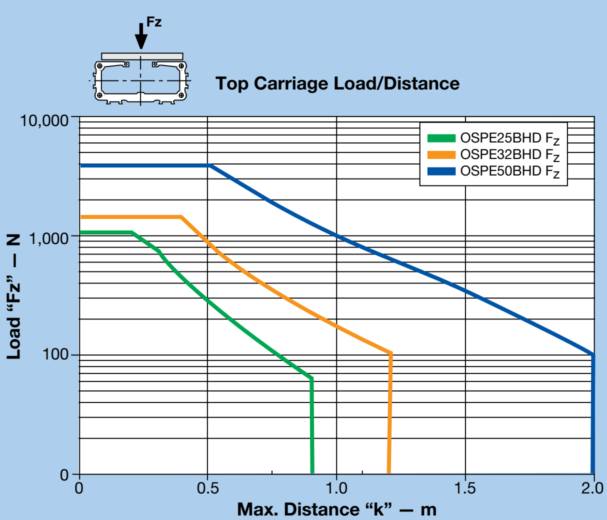
To further reduce deflection, simply reduce the distance between end cap and profile mounts as described in the example on the previous page.

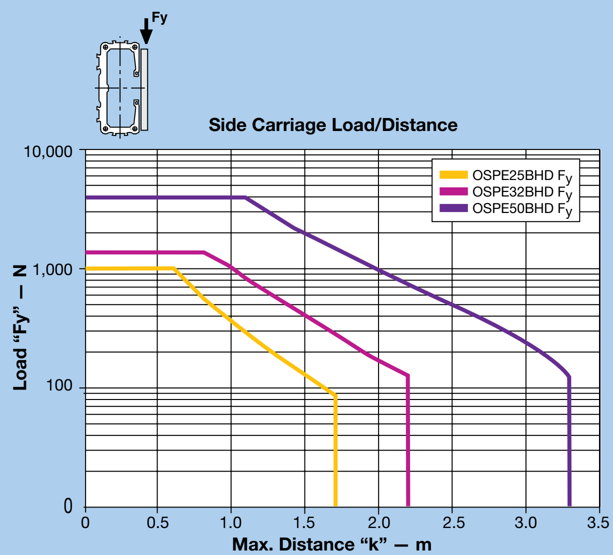
Ball Bearing Carriage Load-Distance





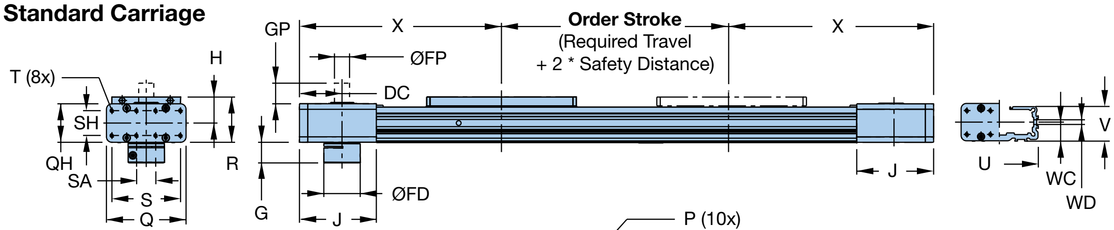
Roller Bearing Carriage Load-Distance

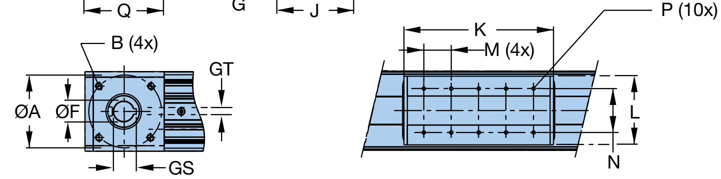




Download 2D & 3D files from www.parker.com/emn

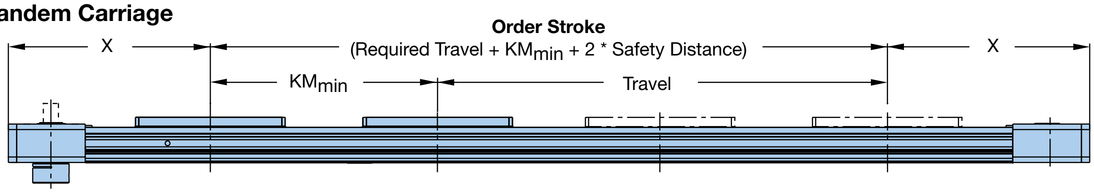
Standard Carriage



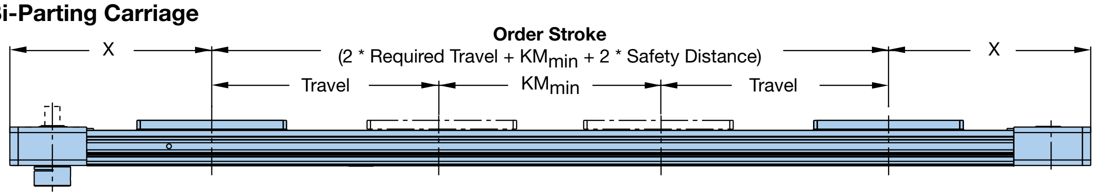


Dimensions — mm

Tandem Carriage



Bi-Parting Carriage



Actuator Size	A	B	DC	F	FD	FP	G	GP	GS	GT
OSPE20BHD	65.7	M6x8	42.5	12^{H7}	27	12_{h7}	18.0	25	13.8	4
OSPE25BHD	82.0	M8x8	49.0	16^{H7}	34	16_{h7}	21.7	30	18.3	5
OSPE32BHD	106.0	M10x12	62.0	22^{H7}	53	22_{h7}	30.0	30	24.8	6
OSPE50BHD	144.0	M12x19	79.5	32^{H7}	75	32_{h7}	41.0	35	35.3	10

* For OSPE50BHD with roller guide: Dimension K = 263

Actuator Size	H	J	K	L	M	N	P	Q	QH
OSPE20BHD	27.6	76.5	155	67	30	51	M5x8	73	38
OSPE25BHD	31.0	88.0	178	85	40	64	M6x8	93	42
OSPE32BHD	38.0	112.0	218	100	40	64	M6x10	116	56
OSPE50BHD	49.0	147.0	288*	124	60	90	M6x10	175	87

Actuator Size	R	S	SA	SH	T	U	V	WC	WD	X
OSPE20BHD	49.0	60	18	27	M5x8.5	73	36.0	21.1	10.4	185
OSPE25BHD	52.5	79	25	27	M5x10	92	39.5	21.5	10.4	218
OSPE32BHD	66.5	100	28	36	M6x12	116	51.7	28.5	10.4	262
OSPE50BHD	92.5	158	18	70	M6x12	164	77.0	43.0	10.4	347

Order Stroke Dimensional Requirements

Actuator Size	KM_{min}	KM_{rec}
OSPE20BHD	180	220
OSPE25BHD	210	250
OSPE32BHD	250	300
OSPE50BHD	354	400

KM_{min} is the minimum distance between two carriages possible.
KM_{rec} is the recommended distance between two carriages for optimal performance.

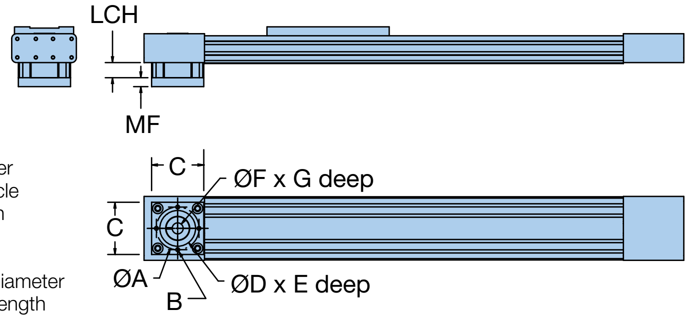
Order Stroke Safety Distance:
The mechanical end position should not be used as a mechanical end stop, thus an additional ***Safety Distance*** at both ends of travel must be incorporated into the Order Stroke. The safety distance for servo-driven systems is equivalent to the travel distance per one revolution of the drive shaft. AC motor-driven systems with VFDs require a larger safety distance than servo systems. For further information and design assistance, please consult factory.

OPTIONS & ACCESSORIES

OSPE..BHD Belt-Driven Actuators
Gearhead Mounting Kit Options

Gearhead Mounting Kits include a coupling housing and flange

A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
MF = Mounting flange



OSPE..BHD with Gearhead Mounting Kit

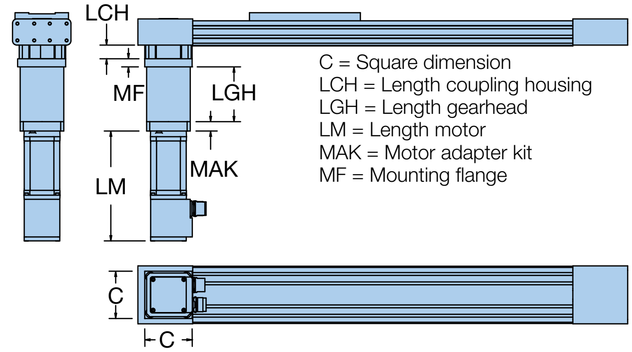
Actuator Size	Order Code 6 [1]	Order Code 9 [2]	Dimensions — mm A	B	C	D	E	F	G	LCH	MF
OSPE20BHD	02, 03, 04 or 05	C0	44	M4	60	35	4.0	12	25	19	9.0
	0A, 0B	C1	62	M5	75	52	6.0	16	36	79	18.5
OSPE25BHD	02, 03, 04 or 05	C1	62	M5	76	52	6.0	16	36	22	13.0
OSPE32BHD	02, 03, 04 or 05	C2	80	M6	98	68	6.0	22	46	30	14.0
OSPE50BHD	02, 03, 04 or 05	C3	108	M8	130	90	6.5	32	70	41	18.0

[1] When ordering with actuator, use order code 6 to specify drive shaft orientation and order code 9 to specify appropriately sized gearhead mounting kit. See Ordering Information.

Blue order codes indicate rapid shipment availability

Mounted Gearhead and Motor Options

Mounted Gearhead and Motor options include a coupling housing, flange, gearhead with coupler, flange and motor



C = Square dimension
LCH = Length coupling housing
LGH = Length gearhead
LM = Length motor
MAK = Motor adapter kit
MF = Mounting flange

Mounted Gearhead and Mounted Motor

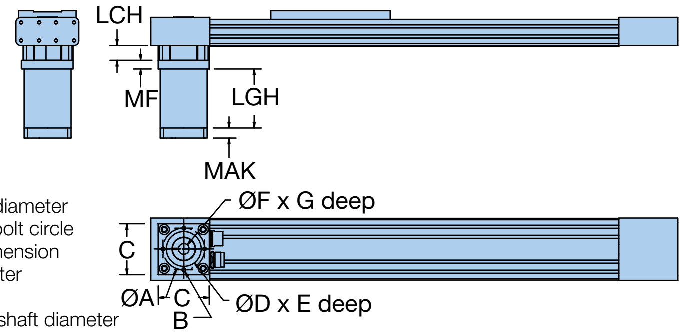
Actuator Size	Order Code 6 [1]	Order Code 9 [2]	Mounted Motor	Dimensions — mm C	LCH	LGH	LM	MAK	MF
OSPE20BHD	Kx	KC	PM-FBL04AMN	60	79	67.0	118	22.5	18.5
	Kx	K0	BE233FJ-KPSN	58	79	67.0	143	22.5	18.5
	Kx	K1	BE233FJ-KPSN with brake (CM233FJ-115027)	58	79	67.0	178	22.5	16.5
	Kx	K2	BE344LJ-KPSN	86	79	67.0	188	22.5	18.5
	Kx	K3	BE344LJ-KPSB	86	79	67.0	220	22.5	16.5
OSPE25BHD	Kx	KC	PM-FBL04AMN	60	22	67.0	118	22.5	13.0
	Kx	K0	BE233FJ-KPSN	58	22	67.0	143	22.5	13.0
	Kx	K1	BE233FJ-KPSN with brake (CM233FJ-115027)	58	22	67.0	178	22.5	13.0
	Kx	K2	BE344LJ-KPSN	86	22	67.0	188	22.5	13.0
	Kx	K3	BE344LJ-KPSB	86	22	67.0	220	22.5	13.0
OSPE32BHD	Lx	KG	PM-FCL06AMN	80	30	65.5	146	28.5	14.0
	Lx	K2	BE344LJ-KPSN	86	30	85.5	188	20.0	14.0
	Lx	K3	BE344LJ-KPSB	86	30	85.5	220	20.0	14.0
	Lx	M0	MPP0923D1E-KPSN	89	30	85.5	178	28.5	14.0
	Lx	M1	MPP0923D1E-KPSB	89	30	85.5	213	28.5	14.0
	Lx	M2	MPP1003D1E-KPSN	98	30	85.5	175	28.5	14.0
	Lx	M3	MPP1003D1E-KPSB	98	30	85.5	223	28.5	14.0
	Lx	M4	MPP1003R1E-KPSN	98	30	85.5	175	28.5	14.0
	Lx	M5	MPP1003R1E-KPSB	98	30	85.5	223	28.5	14.0
OSPE50BHD	Mx	KG	PM-FCL06AMN	80	41	110.0	146	35.0	18.0
	Mx	K2	BE344LJ-KPSN	86	41	110.0	188	24.0	18.0
	Mx	K3	BE344LJ-KPSB	86	41	110.0	220	24.0	18.0
	Mx	M0	MPP0923D1E-KPSN	89	41	110.0	178	24.0	18.0
	Mx	M1	MPP0923D1E-KPSB	89	41	110.0	213	24.0	18.0
	Mx	M2	MPP1003D1E-KPSN	98	41	110.0	175	24.0	18.0
	Mx	M3	MPP1003D1E-KPSB	98	41	110.0	223	24.0	18.0
	Mx	M4	MPP1003R1E-KPSN	98	41	110.0	175	24.0	18.0
	Mx	M5	MPP1003R1E-KPSB	98	41	110.0	223	24.0	18.0
	Mx	M6	MPP1154B1E-KPSN	113	41	110.0	203	35.0	18.0
	Mx	M7	MPP1154B1E-KPSB	113	41	110.0	252	35.0	18.0
	Mx	M8	MPP1154P1E-KPSN	113	41	110.0	203	35.0	18.0
	Mx	M9	MPP1154P1E-KPSB	113	41	110.0	252	35.0	18.0

[1] When ordering with actuator, use order code 6 (see Ordering Information), to specify mounted gearhead size, ratio and orientation:
Gearhead size: **K** = PV60TA **L** = PV90TA **M** = PV115TA
Gearhead ratio and mounting orientation: (Replace “x” to specify)
With mounting position opposite carriage: **1** = ratio 3:1 **2** = ratio 5:1 **3** = ratio 10:1
With mounting position same side as carriage: **4** = ratio 3:1 **5** = ratio 5:1 **6** = ratio 10:1

[2] Use order code 9 (see Ordering Information) to specify choice of mounted motor.

Mounted Gearhead with Motor Mounting Kit Options

Mounted Gearhead with Motor Mounting Kits include a coupling housing, flange and gearhead with coupler and flange



A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
LGH = Length gearhead
MAK = Motor adapter
MF = Mounting flange

Mounted Gearhead with Motor Mounting Kit

Actuator Size	Order Code 6[1]	Order Code 9[2]	Dimensions — mm A	B	C	D	E	F	G	LCH	LGH	MAK	MF
OSPE20BHD	Jx	AA	46.66	M3	43	20.00	1.6	6.35	24.8	19	48.5	19.0	9.0
	Jx	AB	66.67	M4	55	38.10	1.6	6.35	20.5	19	48.5	15.7	9.0
	Jx	B5	46.00	M4	43	30.00	2.5	6.00	25.0	19	48.5	19.0	9.0
	Jx	AM	46.00	M4	43	30.00	2.5	8.00	25.0	19	48.5	19.0	9.0
	Jx	B6	63.00	M4	55	40.00	2.5	9.00	20.0	19	48.5	13.7	9.0
	Jx	AH	63.00	M5	55	40.00	2.5	9.00	20.0	19	48.5	19.0	9.0
	Kx	AB	66.67	M5	62	38.10	1.6	6.35	20.5	79	67.0	16.5	18.5
	Kx	AC	66.67	M5	62	38.00	1.6	9.53	20.8	79	67.0	16.5	18.5
	Kx	AF	98.43	M6	85	73.00	3.0	12.70	37.0	79	67.0	30.0	18.5
	Kx	AD	66.67	M5	62	38.10	1.6	9.525	31.8	79	67.0	22.5	18.5
	Kx	AE	98.43	M5	80	73.03	3.0	12.70	30.0	79	67.0	22.5	18.5
	Kx	B6	63.00	M4	62	40.00	2.5	9.00	20.0	79	67.0	16.5	18.5
	Kx	AH	63.00	M5	62	40.00	2.5	9.00	20.0	79	67.0	16.5	18.5
	Kx	B8	70.00	M5	62	50.00	3.0	12.00	30.0	79	67.0	22.5	18.5
	Kx	AN	70.00	M5	62	50.00	3.0	14.00	30.0	79	67.0	22.5	18.5
	Kx	AG	75.00	M5	62	60.00	2.5	11.00	23.0	79	67.0	16.5	18.5
	Kx	B9	75.00	M5	62	60.00	2.5	14.00	30.0	79	67.0	22.5	18.5
	Kx	BB	90.00	M6	80	70.00	3.0	14.00	30.0	79	67.0	22.5	18.5
	Kx	A3	100.00	M6	89	80.00	3.5	14.00	30.0	79	67.0	22.5	18.5

[1] When ordering with actuator, use order code 6 (see Ordering Information), to specify mounted gearhead size, ratio and orientation:
Gearhead size: **J** = PV040TA **K** = PV60TA
Gearhead ratio and mounting orientation: (Replace "x" to specify)
With mounting position opposite carriage: **1** = ratio 3:1 * **2** = ratio 5:1 **3** = ratio 10:1
With mounting position same side as carriage: **4** = ratio 3:1 * **5** = ratio 5:1 **6** = ratio 10:1
* 3:1 ratio not available on size OSPE20BHD (with "J" PV040TA gearhead)

[2] Use order code 9 (see Ordering Information), to specify appropriately sized motor mounting kit. See ordering information.

Blue order codes indicate rapid shipment availability

(continued on next page)

(continued from previous page)

Mounted Gearhead with Motor Mounting Kit

Actuator Size	Order Code ⑥[1]	Order Code ⑨[2]	Dimensions — mm A	B	C	D	E	F	G	LCH	LGH	MAK	MF
OSPE25BHD	Kx	AB	66.67	M5	62	38.10	1.6	6.35	20.5	22	67.0	16.5	13
	Kx	AC	66.67	M5	62	38.00	1.6	9.53	20.8	22	67.0	16.5	13
	Kx	AF	98.43	M6	85	73.00	3.0	12.70	37.0	22	67.0	30.0	13
	Kx	AD	66.67	M5	62	38.10	1.6	9.525	31.8	22	67.0	22.5	13
	Kx	AE	98.43	M5	80	73.03	3.0	12.70	30.0	22	67.0	22.5	13
	Kx	B6	63.00	M4	62	40.00	2.5	9.00	20.0	22	67.0	16.5	13
	Kx	AH	63.00	M5	62	40.00	2.5	9.00	20.0	22	67.0	16.5	13
	Kx	B8	70.00	M5	62	50.00	3.0	12.00	30.0	22	67.0	22.5	13
	Kx	AN	70.00	M5	62	50.00	3.0	14.00	30.0	22	67.0	22.5	13
	Kx	AG	75.00	M5	62	60.00	2.5	11.00	23.0	22	67.0	16.5	13
	Kx	B9	75.00	M5	62	60.00	2.5	14.00	30.0	22	67.0	22.5	13
	Kx	BB	90.00	M6	80	70.00	3.0	14.00	30.0	22	67.0	22.5	13
	Kx	A3	100.00	M6	89	80.00	3.5	14.00	30.0	22	67.0	22.5	13
OSPE32BHD	Lx	AE	98.43	M5	90	73.03	3.0	12.70	30.0	30	85.5	20.0	14
	Lx	B6	63.00	M4	90	40.00	2.5	9.00	20.0	30	85.5	20.0	14
	Lx	AH	63.00	M5	90	40.00	2.5	9.00	20.0	30	85.5	20.0	14
	Lx	AN	70.00	M5	90	50.00	3.0	14.00	30.0	30	85.5	20.0	14
	Lx	AG	75.00	M5	90	60.00	2.5	11.00	23.0	30	85.5	20.0	14
	Lx	B9	75.00	M5	90	60.00	2.5	14.00	30.0	30	85.5	20.0	14
	Lx	B0	75.00	M6	90	60.00	3.0	14.00	30.0	30	85.5	20.0	14
	Lx	BB	90.00	M6	90	70.00	3.0	14.00	30.0	30	85.5	20.0	14
	Lx	B4	90.00	M6	90	70.00	3.0	16.00	40.0	30	85.5	28.5	14
	Lx	AP	90.00	M6	90	70.00	3.0	19.00	40.0	30	85.5	28.5	14
	Lx	B3	95.00	M6	90	50.00	2.5	14.00	30.0	30	85.5	20.0	14
	Lx	A3	100.00	M6	90	80.00	3.5	14.00	30.0	30	85.5	20.0	14
	Lx	AL	100.00	M6	90	80.00	3.0	16.00	40.0	30	85.5	28.5	14
	Lx	AJ	100.00	M6	90	80.00	3.0	19.00	40.0	30	85.5	30.0	14
	Lx	A4	115.00	M8	100	95.00	3.5	19.00	40.0	30	85.5	28.5	14
OSPE50BHD	Mx	AE	98.43	M5	115	73.03	3.0	12.70	30.0	41	110.0	24.0	18
	Mx	AG	75.00	M5	115	60.00	2.5	11.00	23.0	41	110.0	24.0	18
	Mx	B4	90.00	M6	115	70.00	3.0	16.00	40.0	41	110.0	35.0	18
	Mx	AP	90.00	M6	115	70.00	3.0	19.00	40.0	41	110.0	35.0	18
	Mx	A3	100.00	M6	115	80.00	3.5	14.00	30.0	41	110.0	24.0	18
	Mx	AL	100.00	M6	115	80.00	3.0	16.00	40.0	41	110.0	24.0	18
	Mx	AJ	100.00	M6	115	80.00	3.0	19.00	40.0	41	110.0	24.0	18
	Mx	A4	115.00	M8	115	95.00	3.5	19.00	40.0	41	110.0	24.0	18
	Mx	BD	130.00	M8	115	95.00	3.0	19.00	40.0	41	110.0	24.0	18
	Mx	AK	130.00	M8	115	110.00	3.5	24.00	50.0	41	110.0	35.0	18

[1] When ordering with actuator, use order code ⑥ (see Ordering Information), to specify mounted gearhead size, ratio and orientation:
Gearhead size: **L** = PV90TA **M** = PV115TA
Gearhead ratio and mounting orientation: (Replace "x" to specify)
With mounting position opposite carriage: **1** = ratio 3:1 **2** = ratio 5:1 **3** = ratio 10:1
With mounting position same side as carriage: **4** = ratio 3:1 **5** = ratio 5:1 **6** = ratio 10:1
[2] Use order code ⑨ to specify choice of appropriately sized mounted motor. See Ordering Information.

■ Blue order codes indicate rapid shipment availability

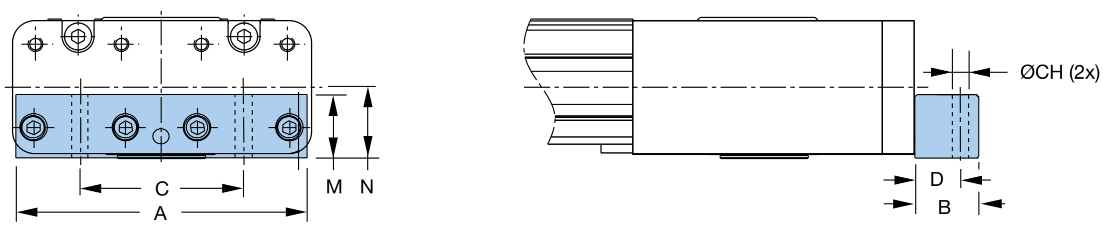
End Cap Mounting Options

See "Maximum Permissible Unsupported Length" for end cap and profile mounting placement requirements.

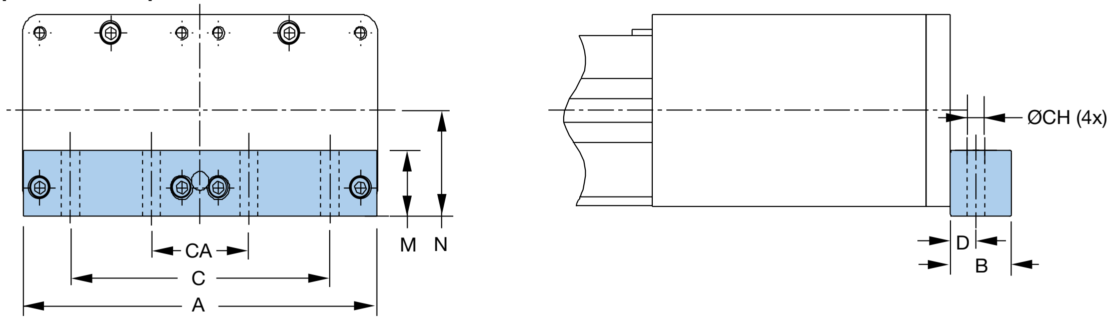
Order Code

A
(1 pair)

Type CN End Cap for OSPE20BHD, OSPE25BHD and OSPE32BHD



Type CN End Cap for OSPE50BHD



Type CN Top Mounting Block

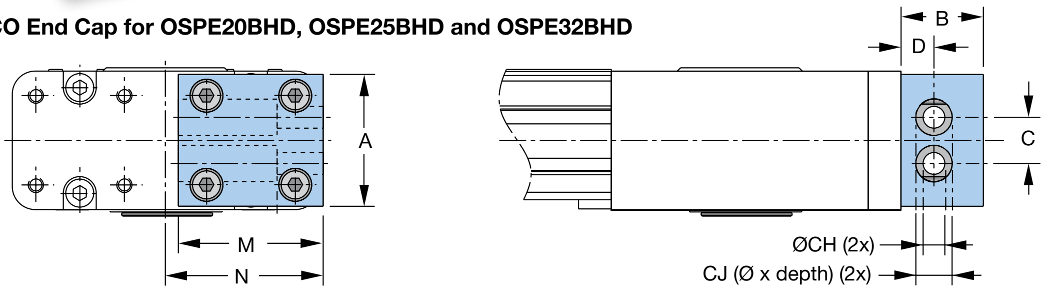
Actuator Size	Part Number*	Weight* (kg)	Dimensions — mm A	B	C	CA	ØCH	D	M	N
OSPE20BHD	16213FIL	0.165	74	20	40	—	6.6	10.0	20	22
OSPE25BHD	12266FIL	0.311	91	25	52	—	6.6	16.0	25	22
OSPE32BHD	12267FIL	0.500	114	25	64	—	9.0	18.0	25	30
OSPE50BHD	12268FIL	0.847	174	30	128	48	9.0	12.5	30	48

*When ordering with actuator, use order code 10. See Ordering Information. To order as replacement parts (per pair), use part numbers listed). Weights listed are for a single piece.

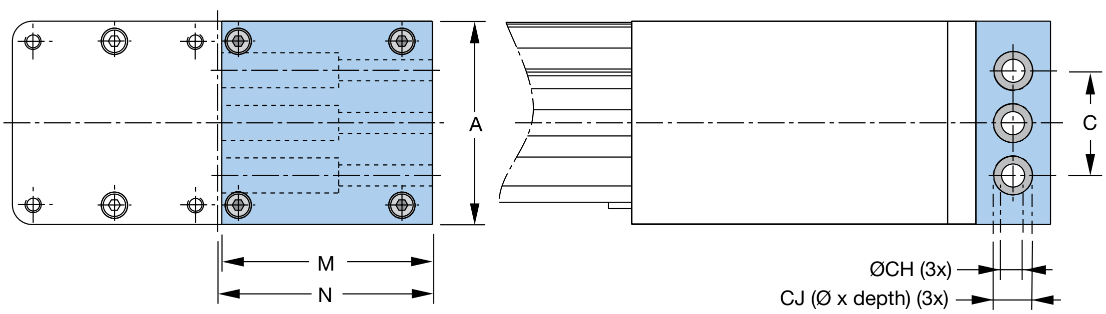
Order
Code

B
(1 pair)

Type CO End Cap for OSPE20BHD, OSPE25BHD and OSPE32BHD



Type CO End Cap for OSPE50BHD



Type CO Side Mounting Block

Actuator Size	Part Number*	Weight* (kg)	Dimensions — mm A	B	C	ØCH	CJ	D	M	N
OSPE20BHD	16241FIL	0.166	40	22	18	6.6	11 x 39	15.0	42	45
OSPE25BHD	16245FIL	0.221	40	25	14	6.6	11 x 30	10.0	44	48
OSPE32BHD	16246FIL	0.450	56	28	19	9.0	15 x 42	12.0	60	62
OSPE50BHD	16247FIL	1.159	87	32	45	9.0	15 x 50	16.0	90	92

*When ordering with actuator, use order code 10. See ordering information, Ordering Information. To order as replacement parts (per pair), use part numbers listed). Weights listed are for a single piece.

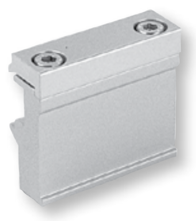
Profile Mounting Options

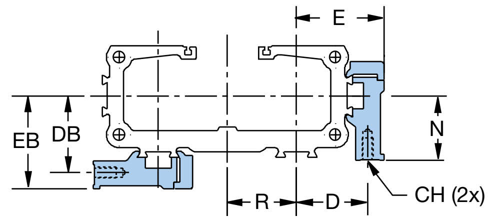
See "Maximum Permissible Unsupported Length" for end cap and profile mounting placement requirements.

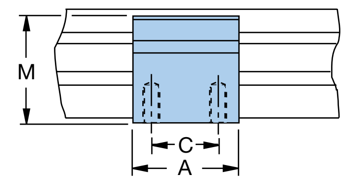
Order Code

2, 5, 8 or B

(1, 2, 3 or 4 pair)







Type D1 (with internal threads)

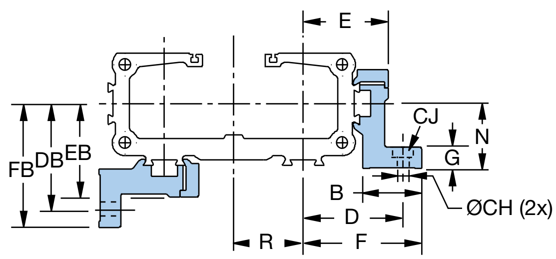
Actuator Size	Part Number*	Weight* (kg)	A	C	CH	D	DB	E	EB	M	N	R
			Dimensions — mm									
OSPE20BHD	20008FIL	0.061	50	36	M5 x 10	20.5	28.1	28.0	35.6	38	22	23
OSPE25BHD	20008FIL	0.061	50	36	M5 x 10	27.0	28.5	34.5	36.0	38	22	26
OSPE32BHD	20157FIL	0.177	50	36	M5 x 10	33.0	35.5	40.5	43.0	46	30	32
OSPE50BHD	15534FIL	0.167	60	45	M6 x 11	40.0	45.0	52.0	57.0	71	48	44

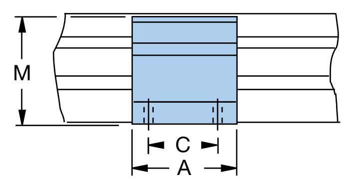
*When ordering with actuator, use order code 11. See ordering information, Ordering Information. To order replacement parts (per individual unit), use part numbers listed. Part numbers and weights are for a single piece.

Order Code

1, 4, 7 or A

(1, 2, 3 or 4 pair)





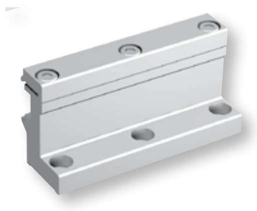
Type E1 (with 2 thru holes)

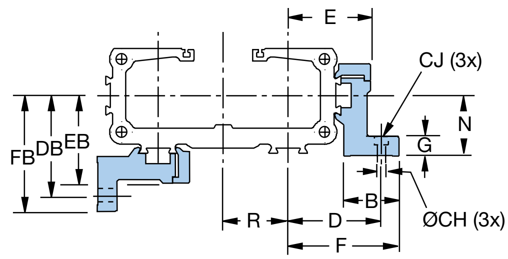
Actuator Size	Part Number*	Weight* (kg)	A	B	C	ØCH	CJ	D	DB	E	EB	F	FB	G	M	N	R
			Dimensions — mm														
OSPE20BHD	20009FIL	0.074	50	26	36	5.5	10 x 5.7	33.5	41.1	28.0	35.6	41.0	48.6	8	38	22	23
OSPE25BHD	20009FIL	0.074	50	26	36	5.5	10 x 5.7	40.0	41.5	34.5	36.0	47.5	49.0	8	38	22	26
OSPE32BHD	20158FIL	0.092	50	27	36	5.5	10 x 5.7	46.0	48.5	40.5	43.0	54.5	57.0	10	46	30	32
OSPE50BHD	15536FIL	0.189	60	34	45	7.0	—	59.0	64.0	52.0	57.0	67.0	72.0	10	71	48	44

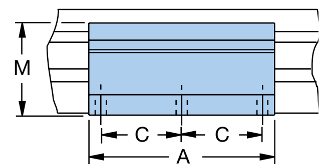
*When ordering with actuator, use order code 11. See ordering information, Ordering Information. To order replacement parts (per individual unit), use part numbers listed. Part numbers and weights are for a single piece.

Order
Code

3, 6, 9 or C
(1, 2, 3 or 4 pair)







Type MAE (with 3 thru holes)

Actuator Size	Part Number*	Weight* (kg)	A	B	C	ØCH	CJ	D	DB	E	EB	F	FB	G	M	N	R
			Dimensions — mm														
OSPE20BHD	12278FIL	0.271	92	26	40	5.5	10 x 5.7	33.5	41.1	28.0	35.6	41.0	48.6	8	38	22	23
OSPE25BHD	12278FIL	0.271	92	26	40	5.5	10 x 5.7	40.0	41.5	34.5	36.0	47.5	49.0	8	38	22	26
OSPE32BHD	12279FIL	0.334	92	27	40	5.5	10 x 5.7	46.0	48.5	40.5	43.0	54.5	57.0	10	46	30	32
OSPE50BHD	12280FIL	0.668	112	34	45	7.0	—	59.0	64.0	52.0	57.0	67.0	72.0	10	71	48	44

*When ordering with actuator, use order code 11. See ordering information, Ordering Information. To order replacement parts (per individual unit), use part numbers listed. Part numbers and weights are for a single piece.

ORDERING INFORMATION
OSPE

Select an order code from each of the numbered fields to create a complete OSPE..BHD model order number. Include hyphens and non-selective characters as shown in example below.

	1	2		3	4	5	6		7		8	9	10	11	12
Order Number Example:	OSPE	25	–	6	0	0	02	–	00000	–	P	00	0	0	0

1 Series

OSPE Origa System Plus Electromechanical

2 Actuator Bore Size

20	73 mm W x 49 mm H
25	93 mm W x 53 mm H
32	116 mm W x 67 mm H
50	175 mm W x 93 mm H

3 Drive Train

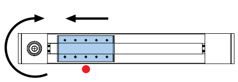
5	Belt actuator with integrated roller guide (Available upon request — consult factory)
6	Belt actuator with integrated ball bearing guide

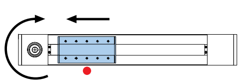
4 Carriage

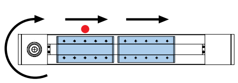
0	Standard
1	Tandem (two carriages for higher load capabilities)
2	Bi-Parting (two driven carriages with opposing movements)

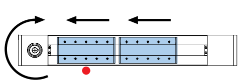
5 Operating Direction and Magnet Position*

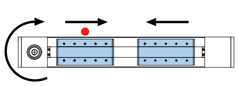
(See blue inset box (next page) for parallel actuators operating direction)

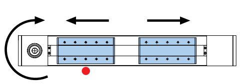
0  Standard (Carriage moves away from drive end)

1  Standard (Carriage moves toward drive end)

0  Tandem (Carriage moves away from drive end)

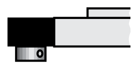
1  Tandem (Carriage moves toward drive end)

2  Bi-Parting (Carriages move toward mid-actuator)

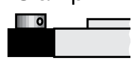
3  Bi-Parting (Carriages move away from mid-actuator)

* Sensors must be mounted in the side or bottom dovetail groove on the same side of the actuator with mounted magnet (•)

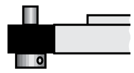
6 Drive Shaft and Gearhead/Motor Options Configuration and Orientation

02 

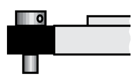
Clamp shaft[1] (opposite carriage side)

04 

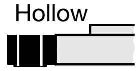
Clamp shaft[1] (same side as carriage)

03 

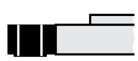
Clamp shaft[1] (opposite carriage side) with plain shaft to connect this master actuator in parallel with idler actuator using a link shaft

05 

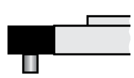
Clamp shaft[1] (same side as carriage) with plain shaft to connect this master actuator in parallel with idler actuator using a link shaft

06 

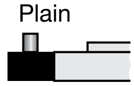
Hollow shaft with keyway (opposite carriage side)

07 

Hollow shaft with keyway (same side as carriage)

0A 

Plain shaft[2] (opposite carriage side) to connect this idler actuator in parallel with a master actuator using a link shaft

0B 

Plain shaft[2] (same side as carriage) to connect this idler actuator in parallel with a master actuator using a link shaft

Jx	PV040TA	Mounted Gearhead Options[3] (replace "x" with appropriate ratio and orientation)
Kx	PV060TA	
Lx	PV090TA	
Mx	PV115TA	

[1] See Options & Accessories for available Gearhead Mounting Kit Options.
[2] Only available with order code 00 "No gearhead mounting kit or motor option" (item 9)
[3] Requires motor or motor mounting kit selection for item 9 below. See Options & Accessories for "Mounted Gearhead and Motor" or "Mounted Gearhead with Motor Mounting Kit" for details and dimensions

■ Blue order codes indicate rapid shipment availability

Belt Driven Tables

⑦ Order Stroke* (see Dimensions)

00000 5-digit input (in mm)

* Maximum standard stroke:
OSPE20BHD = 05760 mm
OSPE25HD = 05700 mm
OSPE32BHD = 05600 mm
OSPE50BHD = 05500 mm
Longer strokes available upon request. Consult factory.

⑧ Hardware and Cover Strip

P Standard hardware with Parker gold cover strip

⑨ Gearhead/Motor Mounting Options

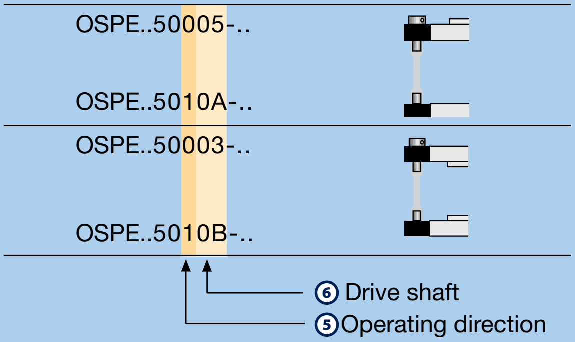
00 No gearhead or motor mounting option

Gearhead Mounting Kits (see Options & Accessories for available option dimensions and delivery)

Mounted Gearhead and Motor (see Options & Accessories for available option dimensions and delivery)

Mounted Gearhead with Motor Mounting Kit (see Options & Accessories for available option dimensions and delivery)

OSPE..BHD Parallel Actuator Designs Connected with a Link Shaft



■ Blue order codes indicate rapid shipment availability

⑩ End Cap Mounting (see Options & Accessories)

0	No end cap mounting
A	1 pair CN (for top carriage mounting)
B	1 pair CO (for side carriage mounting)

⑪ Profile Mounting (see Options & Accessories)

0	No profile mounting
2	1 pair D1 (with 2 internal threads)
5	2 pair D1 (with 2 internal threads)
8	3 pair D1 (with 2 internal threads)
B	4 pair D1 (with 2 internal threads)
1	1 pair E1 (with 2 thru holes)
4	2 pair E1 (with 2 thru holes)
7	3 pair E1 (with 2 thru holes)
A	4 pair E1 (with 2 thru holes)
3	1 pair MAE (with 3 thru holes)
6	2 pair MAE (with 3 thru holes)
9	3 pair MAE (with 3 thru holes)
C	4 pair MAE (with 3 thru holes)

⑫ Magnetic Sensor Mounting*

0	No sensor mounting
A	1 pc. N.O., NPN, with M8 connector
B	2 pc. N.C., NPN, with M8 connector
C	1 pc. N.O., NPN, with M8 connector 2 pc. N.C., NPN, with M8 connector
D	1 pc. N.O., PNP, with M8 connector
E	2 pc. N.C., PNP, with M8 connector
F	1 pc. N.O., PNP, with M8 connector 2 pc. N.C., PNP, with M8 connector

* Extension cable with M8 plug and 5 m cable flying lead cable for Sensor with M8 connector can be ordered separately; use part number 003-2918-01

Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

Virtual Engineer

OSPE..B Belt-Driven Actuators

Actuators for Point-to-Point Applications

- Precise path and position control
- High-speed operation
- Easy installation
- Low maintenance
- Ideal for precise point-to-point applications

Features

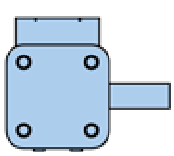
- Integrated drive and guidance system
- Tandem carriage with second carriage for increased load capabilities
- Long available strokes
- Complete motor, gearhead and control packages
- Diverse range of accessories and mountings
- Bi-parting carriages and special options available
- Ambient temperature range -30˚C to +80˚C
- IP 54 rated

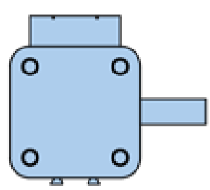
PowerSlide

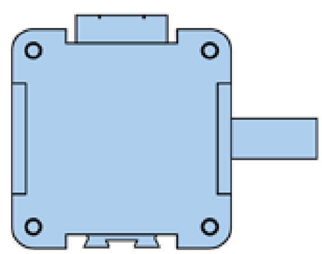
- Designed for harsh environments
- Speed up to 3 m/s
- Hardened steel guide rail
- Carriage with steel v-wheels
- Tough roller cover with wiper and grease access point

ProLine

- Designed for high-speed, precise, smooth and quiet operation
- Aluminum rail with ground and calibrated steel trucks
- Carriage supported by needle bearing rolls
- Integrated wipers to keep bearing system clean
- Lifetime lubricated bearing system


OSPE25BHD

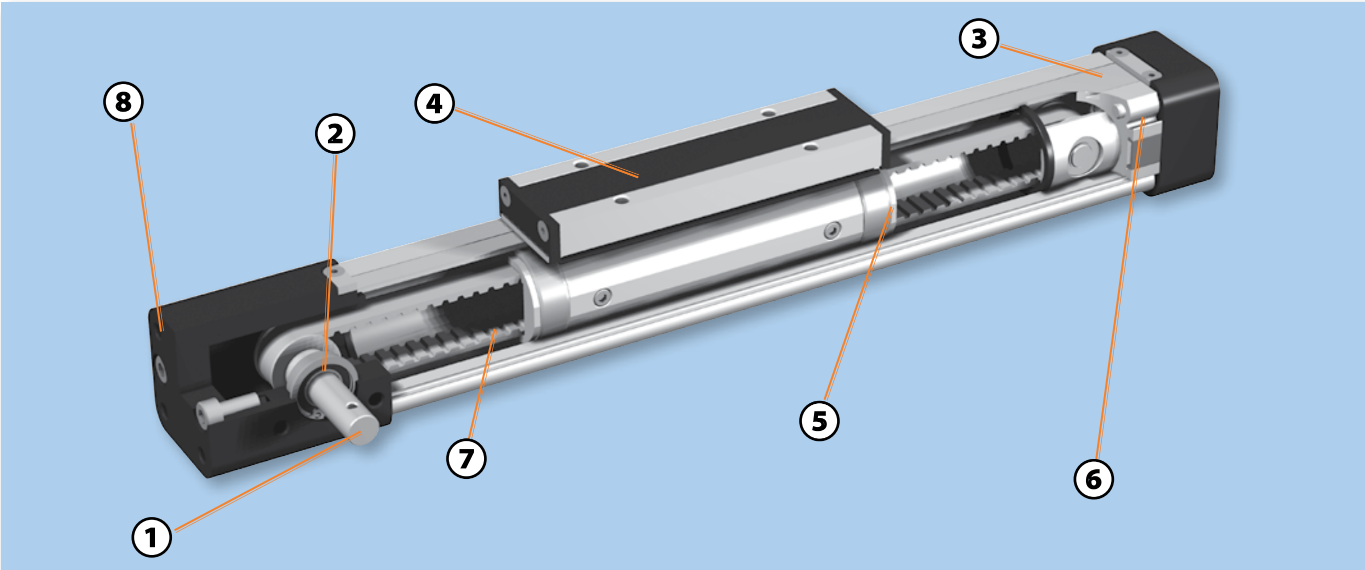

OSPE32BHD


OSPE50BHD

	OSPE25BHD	OSPE32BHD	OSPE50BHD
Maximum Travel (mm)	3,000	5,000	5,000
Maximum Payload F_z (N)	160	300	850
Maximum Acceleration (m/sec²)	10	10	10

The field-proven OSPE..B design is the industry standard for the widest array of point-to-point linear traverse applications. Compact size and maximum configurability make the OSPE..B easy to integrate into any machine layout simply and neatly.

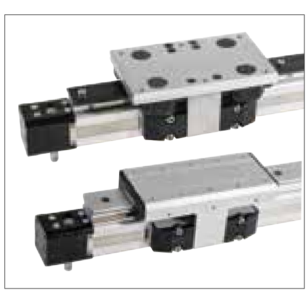
To meet rigorous environmental and maximum performance criteria, the OSPE..B Series is optionally available with the PowerSlide and ProLine external bearing which can be installed in any position (top, side or bottom of the actuator) and retrofitted to existing actuators.



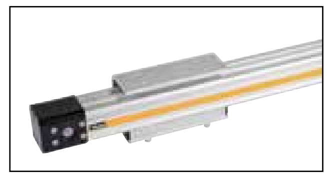
1. **Drive shaft**
   Designed to pair with a large assortment of motor and gearhead mounting options
2. **Double row angular contact ball bearing**
   Optimized for high thrust force transmission
3. **Corrosion resistant steel sealing band**
   Magnetically fastened to the actuator body and provides sealing to IP54
4. **Carriage**
   Low profile, high strength aluminum carriage with threaded holes for ease of mounting
5. **Low friction support rings**
   Polymer glider bushing to provide an economical guidance system with optimum performance
6. **Slotted profile**
   With dovetail grooves for strength, actuator mounting, and mounting of sensor and other accessories
7. **Steel reinforced toothed belt**
   Moderate force transmission and long life
8. **End housing mounting**
   Threaded mounting holes allow for a multitude of mounting options

Carriage Bearing Design Configurations

Standard carriage — with internal glider bearing
PowerSlide — externally mounted steel roller guide for higher load capabilities specifically in harsh environments
ProLine — externally mounted aluminum roller guide for higher load capabilities in high speed applications



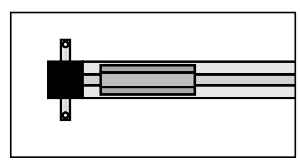
Optional Carriage Orientation
(for standard carriage only)
Tandem carriage (for higher load capabilities), bi-parting carriage (for opposing synchronized movements), clevis mounting (provides compensation between actuator and guide rails in machine designs), Inversion mounting (allows outer band to be on the bottom, while keeping payload on top, for better actuator protection in dirty environments)



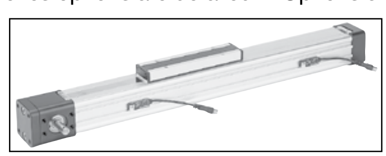
Actuator Mounting Options
End cap mounting — allows the actuator to be anchored by the end caps
Profile mounting — supports long travel actuators or for direct mounting

Multi-axis Systems
A wide range of adapter plates and intermediate drive shafts simplifies engineering and installation. Please consult factory for your individual system design.

Drive Shaft Options
Plain drive shaft left, plain drive shaft right, or double plain drive shaft to connect master unit with idler unit



Options and Accessories
Information on all OSPE..B Series options are detailed in Options & Accessories. Simply select all the options needed to solve your application requirements, then order with the actuator using convenient order codes (see Ordering Information). To order an option separately as an upgrade to an existing system or as a replacement part, use the individual option part numbers provided.



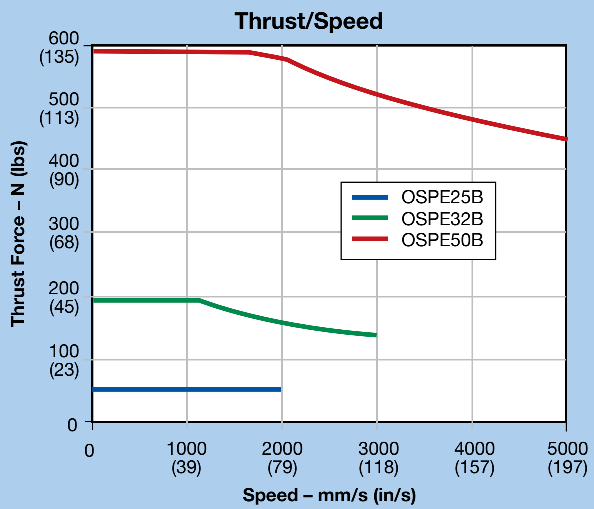
SPECIFICATIONS

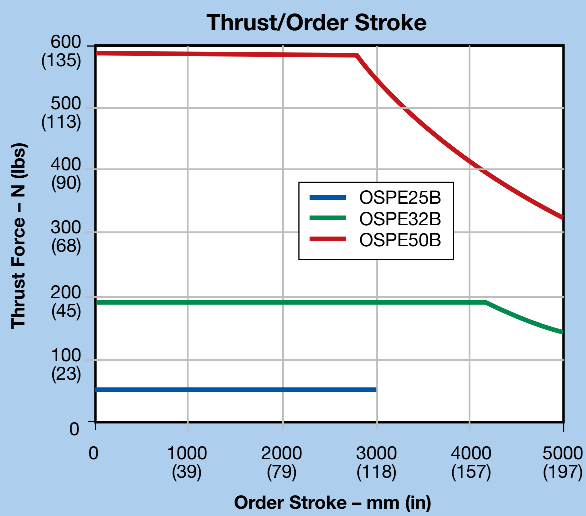
OSPE..B

Actuator Size			OSPE25B	OSPE32B	OSPE50B
Travel Distance per Rev	s_{lin}	mm	60	60	100
Pulley Diameter		mm	19.10	19.10	31.83
Linear Speed (Max)	v_{max}	m/s	2	3	5 [1]
Acceleration (Max)	a_{max}	m/s^2	10	10	10
Repeatability (unidirectional)		µm	± 50	± 50	± 50
Thrust Force (Max)	F_{Amax}	N	50	150	425
		lbs	11	34	96
Torque on Drive Shaft (Max)	M_{Amax}	Nm	0.9	1.9	7.4
		in-lb	8	17	65
Inertia @ Zero Stroke	J_0	$kgmm^2$	25	43	312
Per Meter of Stroke	J_{OS}	$kgmm^2/m$	6.6	10.0	45.0
Per 1 kg Moved Mass	J_m	$kgmm^2/kg$	91	91	253
Ambient Temperature Range		°C	-30 to +80		
IP Rating)			IP 54		

[1] Maximum linear speed for OSPE50B with PowerSlide bearing is 3 m/s

Available Thrust Force

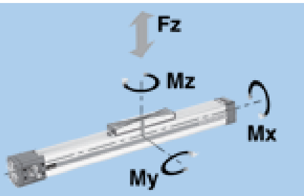




Calculating Load Factors - Combined Normal and Moment Load

The sum of combined loads (static and dynamic) must not exceed "1" at any time as shown in the formula below:

$$\frac{F_z}{F_{z\,(max)}} + \frac{M_x}{M_{x\,(max)}} + \frac{M_y}{M_{y\,(max)}} + \frac{M_z}{M_{z\,(max)}} \leq 1$$



$M = F \times l$ (Nm)

$M_x = M_{x\ static} + M_{x\ dynamic}$

$M_y = M_{y\ static} + M_{y\ dynamic}$

$M_z = M_{z\ static} + M_{z\ dynamic}$

OSPE25B Performance

Carriage (Bearing System)			Standard Carriage	PowerSlide PS25/25	PowerSlide PS25/35	PowerSlide PS25/44	ProLine PL25
Part Number [1]			—	20304	20305	20306	20874
Max Order Stroke [2]	OS_{max}	mm	3000	3000	3000	3000	3000
Normal Load [3] **(Max)**	F_Y / F_Z	N (lbs)	160 (36)	197 (44)	219 (49)	387 (87)	1549 (348)
Moment Load [3] **(Max)**	M_X	Nm (in-lb)	2 (18)	3 (27)	4 (35)	6 (53)	30 (266)
	M_Y	Nm (in-lb)	12 (106)	14 (124)	15 (133)	57 (504)	69 (611)
	M_Z	Nm (in-lb)	8 (71)	14 (124)	15 (133)	57 (504)	69 (611)
Torque — No Load [4]	M_0	Nm (in-lb)	0.4 (4)	0.6 (5)	0.6 (5)	0.6 (5)	0.6 (5)
Weight @ 0 Stroke	m_0	kg (lbs)	0.7 (1.54)	1.0 (2.20)	1.1 (2.42)	1.3 (2.86)	0.9 (1.98)
Weight Per Meter of Stroke	m_{OS}	kg (lbs)	1.6 (3.52)	3.0 (6.60)	3.4 (7.48)	4.2 (9.24)	3.3 (7.26)
Weight Carriage [4]	m_C	kg (lbs)	0.2 (0.44)	0.9 (1.98)	1.0 (2.20)	1.7 (3.74)	1.0 (2.20)

OSPE32B Performance

Carriage (Bearing System)			Standard Carriage	PowerSlide PS32/35	PowerSlide PS32/44	ProLine PL32
Part Number [1]			—	20307	20308	20875
Max Order Stroke [2]	OS_{max}	mm	5000	3500	3500	3750
Normal Load [3] **(Max)**	F_Y / F_Z	N (lbs)	300 (67)	303 (68)	747 (168)	2117 (476)
Moment Load [3] **(Max)**	M_X	Nm (in-lb)	8 (71)	4 (35)	16 (142)	52 (460)
	M_Y	Nm (in-lb)	25 (221)	15 (133)	57 (504)	132 (1168)
	M_Z	Nm (in-lb)	16 (142)	15 (133)	57 (504)	132 (1168)
Torque — No Load [4]	M_0	Nm (in-lb)	0.5 (4)	0.8 (7)	0.8 (7)	0.8 (7)
Weight @ 0 Stroke	m_0	kg (lbs)	1.5 (2.64)	1.9 (4.18)	2.1 (4.62)	2.0 (4.40)
Weight Per Meter of Stroke	m_{OS}	kg (lbs)	3.2 (7.04)	5.1 (11.22)	5.9 (12.98)	5.8 (12.76)
Weight Carriage [4]	m_C	kg (lbs)	0.4 (0.88)	1.2 (2.64)	1.9 (4.18)	1.6 (3.52)

OSPE50B Performance

Carriage (Bearing System)			Standard Carriage	PowerSlide PS50/60	PowerSlide PS50/76	ProLine PL50
Part Number [1]			—	20309	20310	20876
Max Order Stroke [2]	OS_{max}	mm	5000	3500	3500	3750
Normal Load [3] **(Max)**	F_Y / F_Z	N (lbs)	850 (191)	975 (219)	1699 (382)	5626 (1265)
Moment Load [3] **(Max)**	M_X	Nm (in-lb)	16 (142)	29 (257)	59 (522)	201 (1779)
	M_Y	Nm (in-lb)	80 (708)	81 (717)	149 (1319)	451 (3992)
	M_Z	Nm (in-lb)	32 (283)	81 (717)	149 (1319)	451 (3992)
Torque — No Load [4]	M_0	Nm (in-lb)	0.6 (5)	0.9 (8)	0.9 (8)	0.9 (8)
Weight @ 0 Stroke	m_0	kg (lbs)	4.2 (9.24)	5.5 (12.10)	6.3 (13.86)	5.4 (11.88)
Weight Per Meter of Stroke	m_{OS}	kg (lbs)	6.2 (13.64)	10.4 (22.88)	12.8 (28.16)	10.0 (22.00)
Weight Carriage [4]	m_C	kg (lbs)	1.0 (2.20)	3.3 (7.26)	5.9 (12.98)	3.5 (7.70)

[1] PowerSlide or ProLine guide bearings can be ordered individually with assigned part number in the table and specified, five digit order stroke value (mm), following the part number (-nnnnn) to designate the appropriate length guide rail. To order PowerSlide or Proline bearing with the actuator, use the appropriate order in item ⑩

[2] Longer strokes available upon request. Contact factory.

[3] Load and moment based on 8000 km performance Refer to “Calculating Load Factors” for additional information.

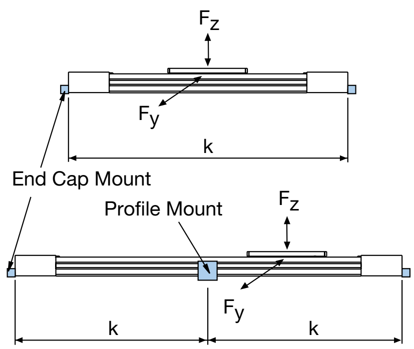
[4] For tandem and bi-parting options, double the values listed.

Maximum Permissible Unsupported Length — *Determining end cap and profile mounting placement*

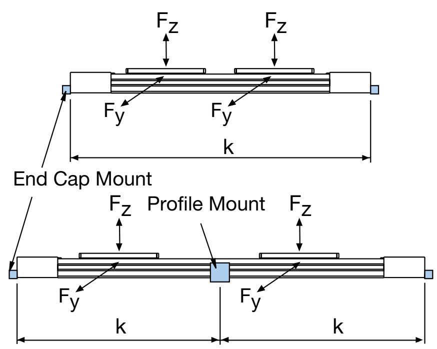
OSPE..B Series actuators need to be mounted onto a solid machine base or frame structure using appropriately positioned end cap and profile mounts . This ensures that the actuator will not undergo excessive deflection based on the application's load and length requirements.

The greater the load and/or the longer the length between mounts, the more the actuator is susceptible to deflection. Deflection is also dependent on the carriage orientation (Fz for top oriented carriage or Fy for a side mounted carriage).

Standard Carriage, Tandem Carriage, PowerSlide or ProLine



Bi-Parting Carriage



To determine correct end cap and profile mount placement, please follow the steps shown in the example below.

Use the deflection graphs (next page), to ensure that the load will not exceed the maximum allowed deflection.

Example:

A horizontal application uses an OSPE32B with a top oriented carriage. The maximum load to the carriage is 10 kg and the order stroke is 3,700 mm (see Dimensions to calculate order stroke).

Therefore, the overall length of the actuator will be 4,000 mm:

3,700 mm + 2 x Dim "X" (150 mm) = 4,000 mm

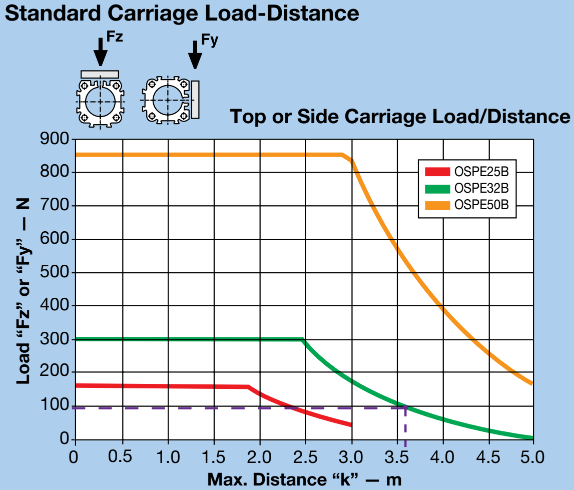
1) Use the appropriate Fz graph (next page) for a top loaded carriage. (Note: with the standard carriage, top loaded Fz and side loaded Fy values are the same).
2) Calculate the Load "F" in Newtons based on the 10 kg application load requirement:

   $10 \text{ kg} \times 9.81 \text{ kg/ms}^2 = 98.1 \text{ N}$

3) Draw a line from 98 N on the Y-axis to the OSPE32B curve, then down to the X-axis.
4) The value of "k" is approximately 3,600 mm.
5) Since the overall length (4,000 mm) is greater than this value "k", the actuator will require an additional third fixture point — two end cap mounts and one profile mount — equally spaced to create a distance "k" of 2000 mm in between.
6) Maximum deflection of the actuator with this mounting configuration will be less than 4 mm:

   0.2% of 2,000 mm = 4 mm

Standard Carriage Load-Distance

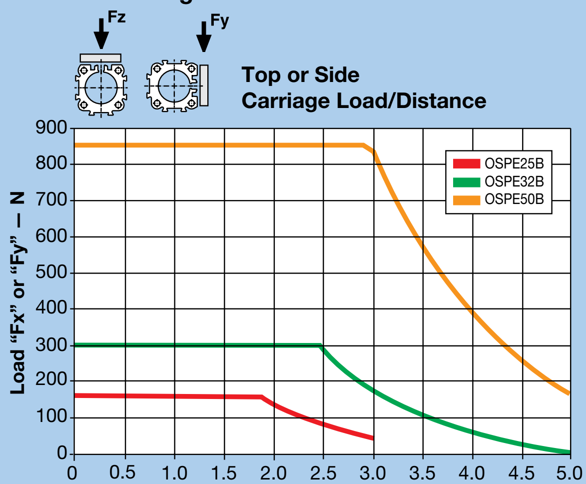


To further reduce deflection:

If the application requires less deflection, then simply reduce the distance "k" appropriately. In this example, for instance, the application must not exceed 2 mm (1/2 the maximum deflection calculated). Therefore, "k" must also be 1/2, or 1000 mm.

To achieve this reduced maximum deflection, the actuator will require five fixture points — two end cap mounts and three profile mounts — equally spaced with a distance "k" of 1000 mm in between.

Standard Carriage Load-Distance



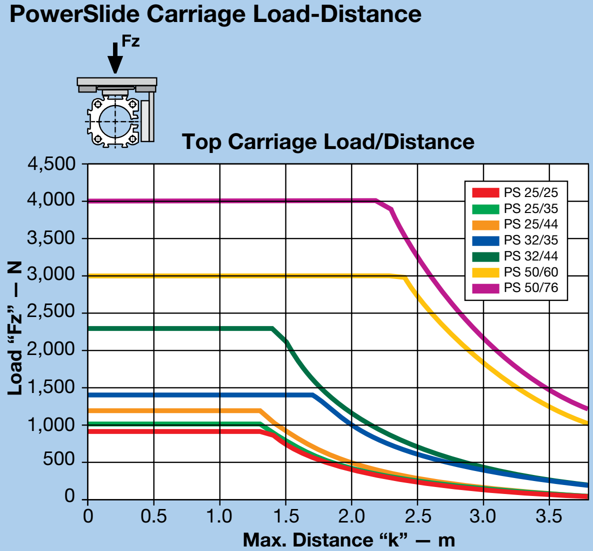
Maximum Permissible Unsupported Length

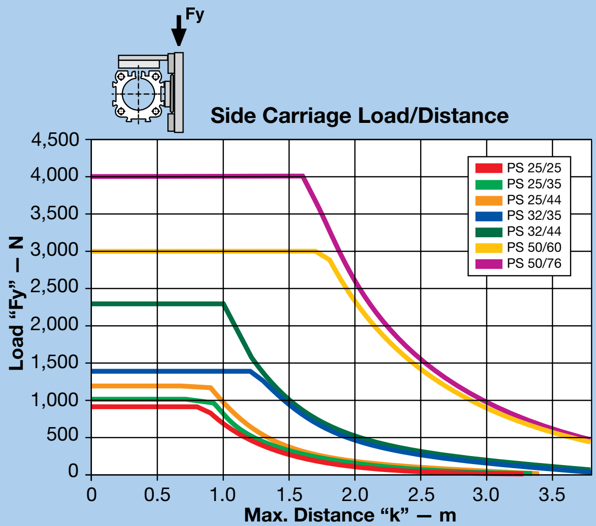
Determining end cap and profile mounting placement

Use the appropriate deflection graph to ensure that the application load does not exceed the deflection curve. Supporting the actuator within the recommended maximum distance "k" will ensure that the installation will have a maximum deflection equal to 0.2% of distance "k."

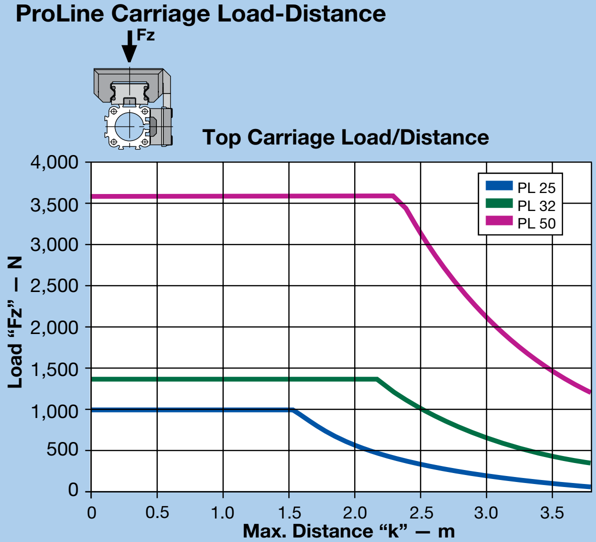
To further reduce deflection, simply reduce the distance between end cap and profile mounts as described in the example on the previous page.

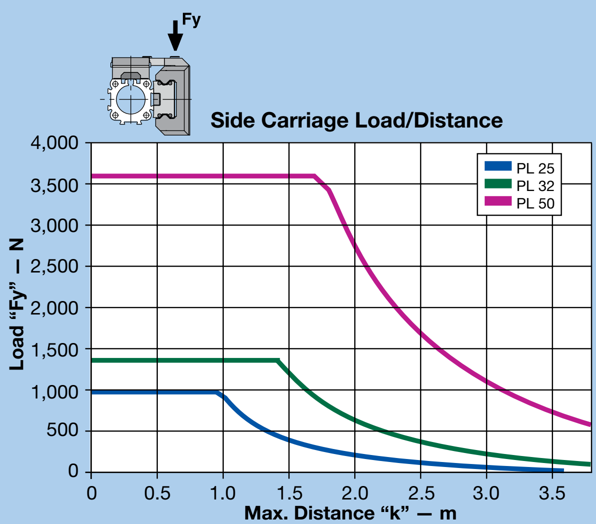
PowerSlide Carriage Load-Distance





ProLine Carriage Load-Distance





DIMENSIONS

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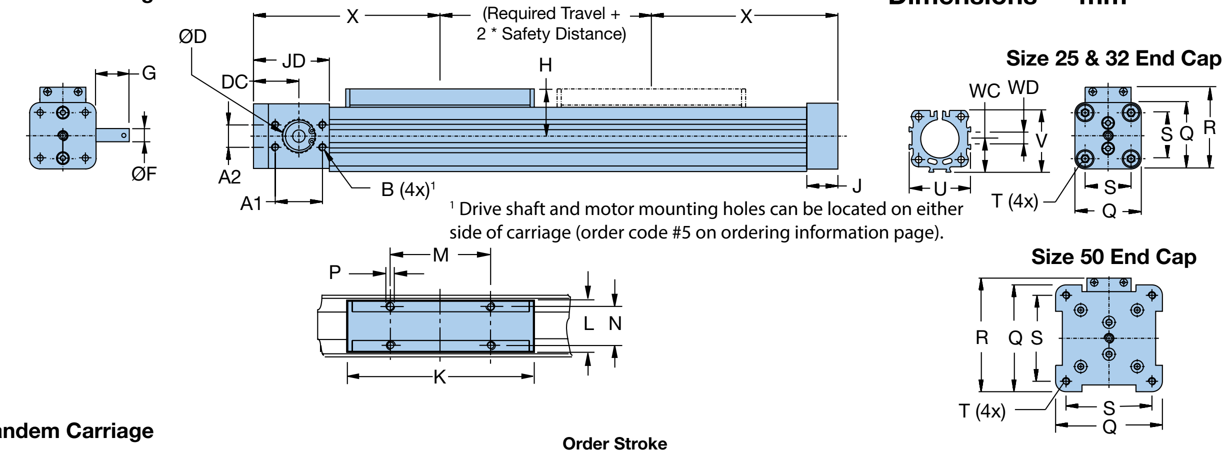
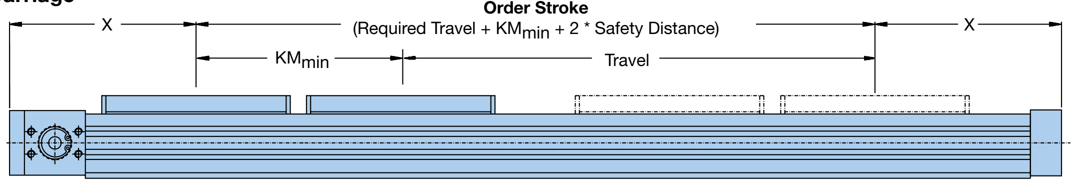
Base Unit Dimensions w/Standard Carriage

Standard Carriage

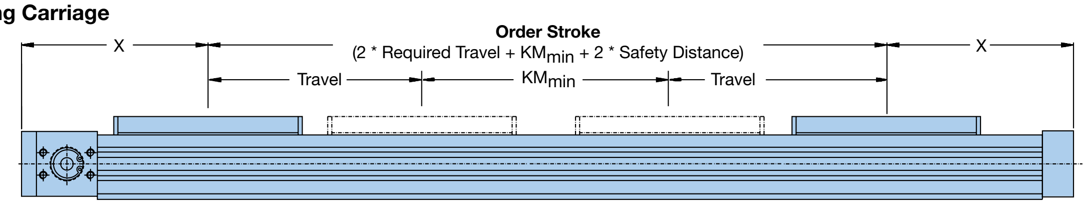
Dimensions — mm



Tandem Carriage



Bi-Parting Carriage



* See Options & Accessories for clevis mount and inversion mount optional carriage dimensions.

Actuator Size	A	A1	A2	B	D	DC	F	G	H	J	JD	K
OSPE25B	33.5	30	15	M5 x 10	19 ^{H7}	37.0	10 $_{j6}$	24	31	22	57	117
OSPE32B	42.0	38	18	M6 x 12	26 ^{H7}	36.5	10 $_{j6}$	26	38	25	61	152
OSPE50B	59.4	50	32	M8 x 16	40 ^{H7}	48.5	16 $_{h8}$	34	49	25	85	200

	L	H	N	P	Q	R	S	T	U	V	WC	WD	X
OSPE25B	33	65	25	M5 x 8	41	52.5	27	M5 x 10	40	39.5	21.5	10.4	125
OSPE32B	36	90	27	M6 x 10	52	66.5	36	M6 x 12	52	51.7	28.5	10.4	150
OSPE50B	36	110	27	M6 x 10	87	92.5	70	M6 x 12	76	77	43.0	10.4	200

Order Stroke Dimensional Requirements

Actuator Size	KM_{min}	KM_{rec}
OSPE25B	130	190
OSPE32B	170	230
OSPE50B	220	320

KM_{min} is the minimum distance between two carriages possible; KM_{rec} is the recommended distance for optimal performance.

Order Stroke Safety Distance:
The mechanical end position should not be used as a mechanical end stop, thus an additional ***Safety Distance*** at both ends of travel must be incorporated into the Order Stroke. The safety distance for servo-driven systems is equivalent to the travel distance per revolution of the drive shaft. AC motor-driven systems with VFD require a larger safety distance than servo systems. For further information and design assistance, please consult factory.

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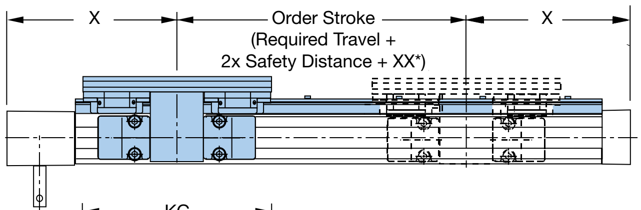
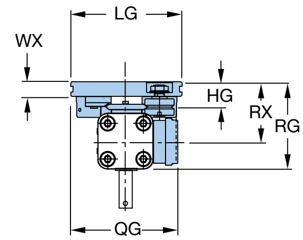
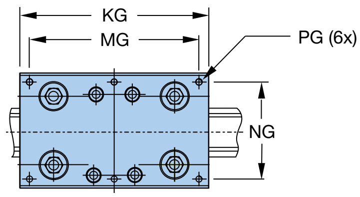
PowerSlide Dimensions

Dimensions — mm





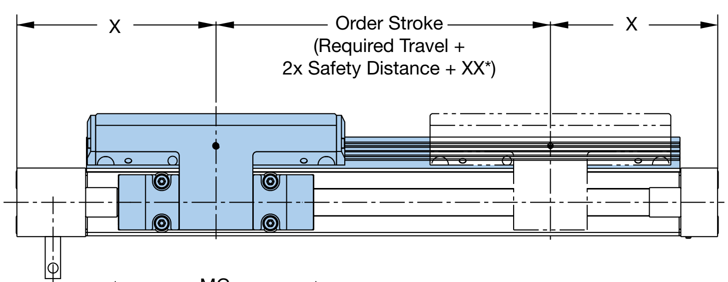


*Dimension XX is required on the drive side of the actuator to provide adequate clearance between the PowerSlide guide bearing and the motor/gearhead housing assembly.

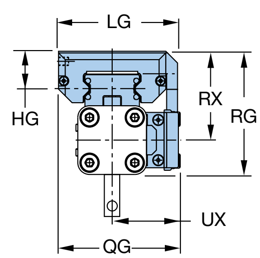
Please consult factory for assistance if you are retrofittting a PowerSlide onto an existing system.

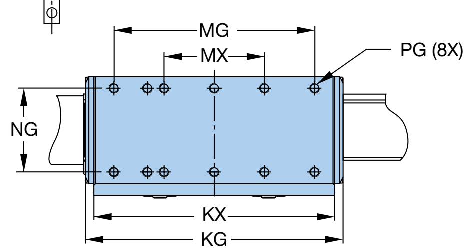
Guide Rail Size	HG	KG	LG	MG	NG	PG	QG	RG	RX	WX	X	XX
PS25/25	20.0	145	80	125	64	M6 x 11	79.5	73.5	53.0	11.0	125	5
PS25/35	21.5	156	95	140	80	M6 x 12	89.5	73.0	52.5	12.5	125	10
PS25/44	26.0	190	116	164	96	M8 x 15	100.0	78.5	58.0	15.0	125	27
PS32/35	21.5	156	95	140	80	M6 x 12	95.5	84.5	58.5	12.5	150	—
PS32/44	26.0	190	116	164	96	M8 x 15	107.0	90.0	64.0	15.0	150	6
PS50/60	28.5	240	135	216	115	M8 x 17	130.5	123.5	81.0	17.0	200	5
PS50/76	39.0	280	185	250	160	M10 x 20	155.5	135.5	93.0	20.0	200	25

ProLine Dimensions



Dimensions — mm





*Dimension XX is required on the drive side of the actuator to provide adequate clearance between the ProLine guide bearing and the motor/gearhead housing assembly.

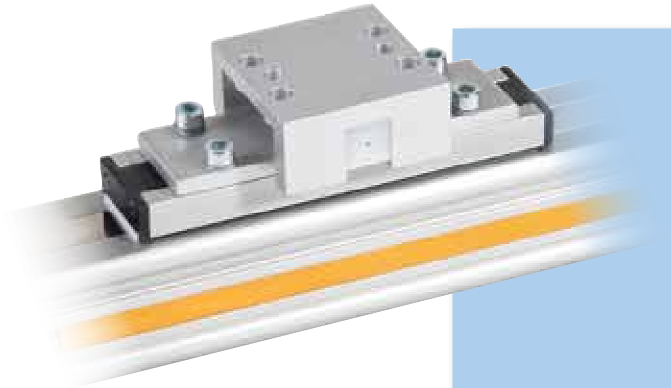
Please consult factory for assistance if you are retrofittting a ProLine onto an existing system.

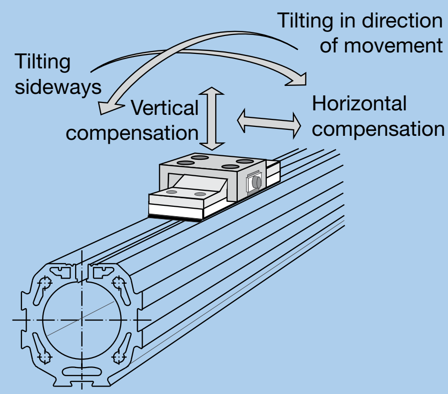
Guide Rail Size	HG	KG	KX	LG	MG	MX	NG	PG	QG	RG	RX	UX	X	XX
PL25	23	154	144	64	120	60	50	M6 x 12	72.5	74	53	40.5	125	10
PL32	25	197	187	84	160	80	64	M6 x 12	91.0	88	62	49.0	150	11
PL50	29	276	266	110	240	120	90	M6 x 16	117.0	118	75	62.0	200	24

OPTIONS & ACCESSORIES

Order Code

R Clevis Mounting Option for Standard Carriage

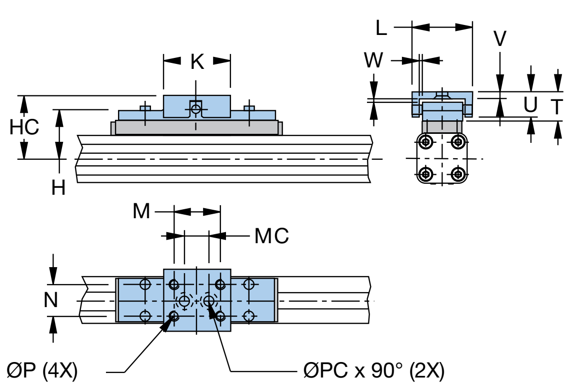




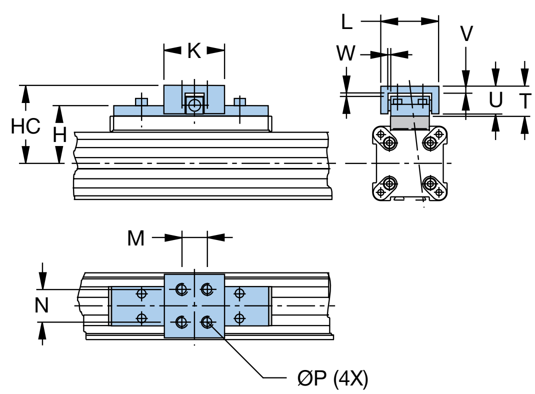
When external guides are involved in the application, slight parallelism deviations can lead to mechanical strain on the carriage and actuator. This can be avoided by the use of a clevis mount that provides freedom of movement compensation on several axes.

The aluminum clevis mount option bolts directly to the standard carriage to eliminate parallelism deviations and strain to the carriage when the actuator is mounted onto machine guide rails. Clevis mounting provides compensation for misalignment in Z and Y directions and can tilt around the X and Y axis.

OSPE25 and OSPE32



OSPE50



Actuator Size	Part Number*	Weight* (kg)	Dimensions — mm												
			H	HC	K	L	M	MC	N	P	PC	T	U	V	W
OSPE25B	20005FIL	0.091	39	52	40	38	30	16	16	M5	5.5	21	19	3.5	2
OSPE32B	20096FIL	0.091	50	68	60	62	46	40	25	M6	6.6	30	28	6.0	2
OSPE50B	20097FIL	0.308	61	79	60	62	46	—	25	M6	—	30	28	6.0	2

*Part number and weight are for individual unit.

Belt Driven Tables

Order
Code

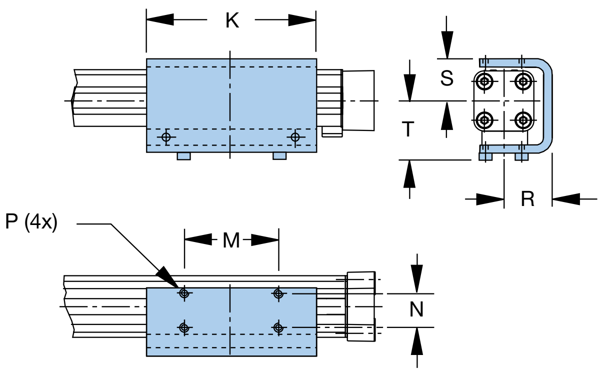
M Inversion Mounting Option for Standard Carriage

For dirty environments or space-restricted installations, inversion of the actuator is recommended.

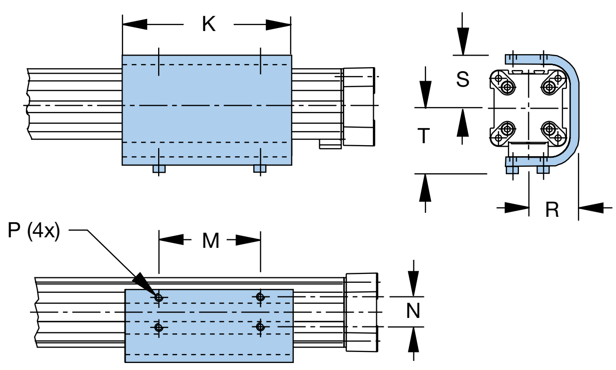
The aluminum inversion bracket transfers the driving force to the opposite side of the actuator allowing the load to be attached to the top side of the actuator while the carriage and sealing band remain protected on the bottom side. The size and position of the mounting holes are the same as on the standard carriage.

Note: Profile mounts and magnetic switches can only be used on the free side of the actuator.

OSPE25 and OSPE32



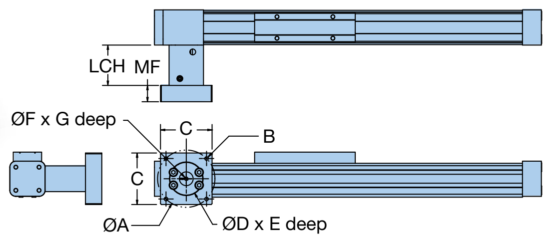
OSPE50



Actuator Size	Part Number*	Weight* (kg)	Dimensions — mm K	M	N	P	R	S	T
OSPE25B	20037FIL	0.302	117	65	25	M5 x 6	33.5	31	31
OSPE32B	20161FIL	0.449	150	90	27	M6 x 6	39.5	38	38
OSPE50B	20166FIL	0.947	200	110	27	M6 x 8	52.0	55	55

*Part number and weight are for individual unit.

Motor Mounting Kit Options



A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
MF = Motor flange

Motor Mounting Kits include a coupling housing, coupling and flange

Note: Screw thread to mount motor to flange plate is M3

Actuator Size	Order Code ⑥*	Order Code ⑦*	A	B	C	D	E	F	G	LCH	MF
			Dimensions — mm								
OSPE25B	0	AA	46.66	M3	41	20.00	1.6	6.35	24.8	47	12
	0	AB	66.67	M4	55	38.10	1.6	6.35	20.5	47	9
	0	AC	66.67	M5	60	38.10	1.6	9.53	20.8	47	9
	0	AD	66.67	M5	60	38.10	1.6	9.525	31.8	47	19
	0	B5	46.00	M4	60	30.00	2.5	6.00	25.0	47	12
	0	AM	46.00	M4[1]	41	30.00	2.5	8.00	25.0	47	12
	0	B6	63.00	M4	60	40.00	2.5	9.00	20.0	47	10
	0	AH	63.00	M5	60	40.00	2.5	9.00	20.0	47	12
	0	A2	63.00	M5	60	40.00	2.5	11.00	23.0	47	12
	0	B7	70.00	M5	60	50.00	3.0	8.00	25.0	47	17
	0	B8	70.00	M5	60	50.00	3.0	12.00	30.0	47	17
	0	AG	75.00	M5	70	60.00	2.5	11.00	23.0	47	10
	0	B1	90.00	M5	75	60.00	2.5	11.00	23.0	47	10
OSPE32B	0	AB	66.67	M5	60	38.10	1.6	6.35	20.5	49	10
	0	AC	66.67	M5	60	38.10	1.6	9.525	20.8	49	10
	0	AD	66.67	M5	60	38.10	1.6	9.525	31.8	49	18
	0	AE	98.43	M5	85	73.03	3.0	12.70	30.0	49	16
	0	AF	98.43	M6	85	73.03	3.0	12.70	37.0	49	26
	0	B6	63.00	M4	55	40.00	2.5	9.00	20.0	49	11
	0	AH	63.00	M5	60	40.00	2.5	9.00	20.0	49	11
	0	A2	63.00	M5	60	40.00	2.5	11.00	23.0	49	11
	0	BJ	66.67	M5	60	38.10	1.6	12.70	20.0	49	10
	0	B7	70.00	M5	60	50.00	3.0	8.00	25.0	49	16
	0	B8	70.00	M5	60	50.00	3.0	12.00	30.0	49	16
	0	AN	70.00	M5	60	50.00	3.0	14.00	30.0	49	16
	0	AG	75.00	M5	70	60.00	2.5	11.00	23.0	49	11
	0	B9	75.00	M5	70	60.00	2.5	14.00	30.0	49	16
	0	BA	75.00	M5	70	60.00	3.0	16.00	40.0	49	26
	0	B0	75.00	M6	70	60.00	3.0	14.00	30.0	49	16
	0	B1	90.00	M5	75	60.00	2.5	11.00	23.0	49	11
	0	B2	90.00	M5	75	60.00	2.5	14.00	30.0	49	16
	0	BB	90.00	M6	80	70.00	3.0	14.00	30.0	49	16
	0	B4	90.00	M6	80	70.00	3.0	16.00	40.0	49	26
	0	B3	95.00	M6	80	50.00	2.5	14.00	30.0	49	16

*When ordering with actuator, use order code ⑥ (gearhead designation) and order code ⑦ to specify motor mounting kit. See Ordering Information.

Blue order codes indicate rapid shipment availability

(continued on next page)

(continued from previous page)

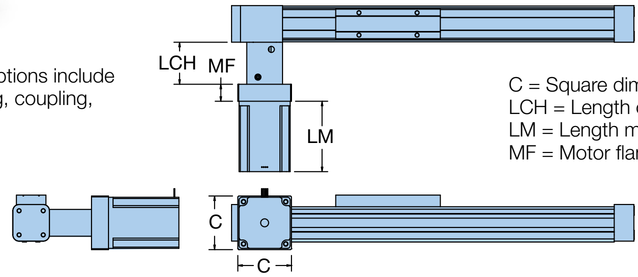
Actuator Size	Order Code ⑥*	Order Code ⑦*	Dimensions — mm A	B	C	D	E	F	G	LCH	MF
OSPE50B	**0**	**AF**	98.43	M6	85	73.03	3.0	12.70	37.0	76	15
	0	**AE**	98.43	M5	88	73.03	3.0	12.70	30.0	67	14
	0	B9	75.00	M5	75	60.00	2.5	14.00	30.0	67	14
	0	BA	75.00	M5	70	60.00	3.0	16.00	40.0	76	15
	0	B0	75.00	M6	75	60.00	3.0	14.00	30.0	67	14
	0	B2	90.00	M5	80	60.00	2.5	14.00	30.0	67	14
	0	BB	90.00	M6	80	70.00	3.0	14.00	30.0	67	14
	0	B4	90.00	M6	80	70.00	3.0	16.00	40.0	76	15
	0	**AP**	90.00	M6	80	70.00	3.0	19.00	40.0	76	15
	0	B3	95.00	M6	85	50.00	2.5	14.00	30.0	67	14
	0	A1	99.00	M6	88	73.00	3.0	9.525	31.5	67	14
	0	A3	100.00	M6	90	80.00	3.5	14.00	30.0	67	14
	0	**AL**	100.00	M6	88	80.00	3.0	16.00	40.0	76	15
	0	AJ	100.00	M6	88	80.00	3.0	19.00	40.0	76	15
	0	**A4**	115.00	M8	100	95.00	3.5	19.00	40.0	76	15
	0	BD	130.00	M8	115	95.00	3.0	19.00	40.0	76	15
	0	BF	130.00	M8	115	110.00	3.5	19.00	40.0	76	15

*When ordering with actuator, use order code ⑥ (gearhead designation) and order code ⑦ to specify motor mounting kit. See Ordering Information.

Blue order codes indicate rapid shipment availability

Mounted Motor Options

Mounted Motor Options include a coupling housing, coupling, flange and motor



C = Square dimension
LCH = Length coupling housing
LM = Length motor
MF = Motor flange

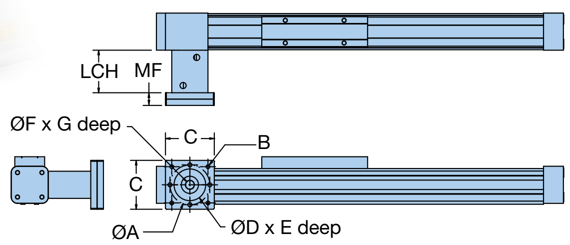
Actuator Size	Order Code ⑥*	Order Code ⑦*	Motor description	Dimensions — mm C	LCH	LM	MF
OSPE25B	0	L0	LV233-01-10	58	47	79	9
	0	L1	HV233-01-10	58	47	79	9
	0	KA	PM-FAL01AMN	40	47	91	12
	0	K0	BE233FJ-KPSN	58	47	143	19
	0	K1	BE233FJ-KPSN with brake (CM233FJ-115027)	58	47	178	19
OSPE32B	0	L0	LV233-01-10	58	49	79	10
	0	L1	HV233-01-10	58	49	79	10
	0	L2	LV343-03-10	86	49	127	26
	0	L3	HV343-01-10	86	49	127	26
	0	KC	PM-FBL04AMN	60	49	118	16
	0	K0	BE233FJ-KPSN	58	49	143	18
	0	K1	BE233FJ-KPSN with brake (CM233FJ-115027)	58	49	178	18
	0	K2	BE344LJ-KPSN	86	49	188	16
	0	K3	BE344LJ-KPSB	86	49	220	16
OSPE50B	0	L2	LV343-03-10	86	76	127	15
	0	L3	HV343-01-10	86	76	127	15
	0	KG	PM-FCL06AMN	80	76	146	15
	0	K2	BE344LJ-KPSN	86	67	188	14
	0	K3	BE344LJ-KPSB	86	67	220	14
	0	M0	MPP0923D1E-KPSN	89	76	178	15
	0	M1	MPP0923D1E-KPSB	89	76	212	15
	0	M2	MPP1003D1E-KPSN	98	76	175	15
	0	M3	MPP1003D1E-KPSB	98	76	224	15
	0	M4	MPP1003R1E-KPSN	98	76	175	15
	0	M5	MPP1003R1E-KPSB	98	76	224	15

*When ordering with actuator, use order code ⑥ (gearhead designation) and order code ⑦ to specify mounted motor. See Ordering Information.

■ Blue order codes indicate rapid shipment availability

Gearhead Mounting Kit Options

Gearhead Mounting Kits include a coupling housing, coupling and flange



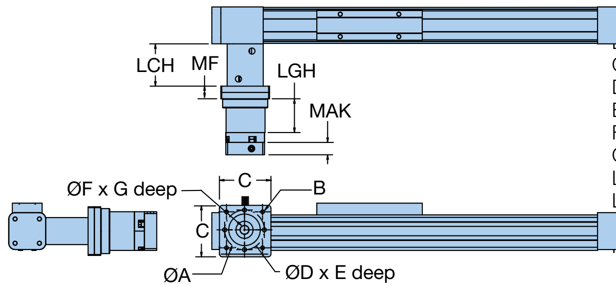
A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
MF = Motor flange

Actuator Size	Order Code 6 *	Order Code 7 *	Dimensions — mm A	B	C	D	E	F	G	LCH	MF
OSPE25B	0	C0	44	S4	54	35	3	12	25	47	14.0
OSPE32B	0	C0	44	S4	60	35	3	12	25	49	14.5
	0	C1	62	S5	75	52	8	16	36	49	23.0
OSPE50B	0	C1	62	S5	75	52	8	16	36	76	18.5
	0	C2	80	S6	95	68	10	22	46	76	23.0

*When ordering with actuator, use order code 6 (gearhead designation) and order code 7 to specify gearhead mounting kit. See Ordering Information.

Blue order codes indicate rapid shipment availability

Mounted Gearhead with Motor Mounting Kit Options



A = Bolt circle diameter
B = Screw for bolt circle
C = Square dimension
D = Pilot diameter
E = Pilot depth
F = Input drive shaft diameter
G = Input drive shaft length
LCH = Length coupling housing
LGH = Length gearhead
MAK = Motor adapter
MF = Motor flange

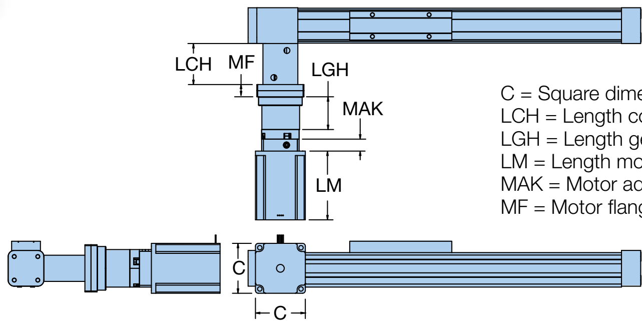
Mounted Gearhead with Motor Mounting Kit include a coupling housing, coupling, flange, and gearhead with coupler and flange

Actuator Size	Order Code ⑥ [1]	Order Code ⑦ [2]	Dimensions — mm A	B	C	D	E	F	G	LCH	LGH	MAK	MF
OSPE25B	A or B	AA	46.66	M3	43	20.00	1.6	6.35	24.8	47	48.5	19.0	14.0
	A or B	**AB**	66.67	M5	55	38.10	1.6	6.35	20.5	47	48.5	15.7	14.0
	A or B	B5	46.00	M4	43	30.00	2.5	6.00	25.0	47	48.5	19.0	14.0
	A or B	**AM**	46.00	M4	43	30.00	2.5	8.00	25.0	47	48.5	19.0	14.0
	A or B	B6	63.00	M4	55	40.00	2.5	9.00	20.0	47	48.5	13.7	14.0
	A or B	AH	63.00	M5	55	40.00	2.5	9.00	20.0	47	48.5	19.0	14.0
OSPE32B	**C, D or E**	**AB**	66.67	M5	62	38.10	1.6	6.35	20.5	49	67.0	16.5	23.0
	C, D or E	AC	66.67	M5	62	38.00	1.6	9.53	20.8	49	67.0	16.5	23.0
	C, D or E	**AD**	66.67	M5	62	38.10	1.6	9.525	31.8	49	67.0	22.5	23.0
	C, D or E	**AE**	98.43	M5	80	73.03	3.0	12.70	30.0	49	67.0	22.5	23.0
	C, D or E	**AF**	98.43	M6	85	73.03	3.0	12.70	37.0	49	67.0	30.0	23.0
	C, D or E	B6	63.00	M4	62	40.00	2.5	9.00	20.0	49	67.0	16.5	23.0
	C, D or E	AH	63.00	M5	62	40.00	2.5	9.00	20.0	49	67.0	16.5	23.0
	C, D or E	B8	70.00	M5	62	50.00	3.0	12.00	30.0	49	67.0	22.5	23.0
	C, D or E	**AN**	70.00	M5	62	50.00	11.0	14.00	30.0	49	67.0	22.5	23.0
	C, D or E	AG	75.00	M5	62	60.00	2.5	11.00	23.0	49	67.0	16.5	23.0
	C, D or E	B9	75.00	M5	62	60.00	2.5	14.00	30.0	49	67.0	22.5	23.0
	C, D or E	BB	90.00	M6	80	70.00	3.0	14.00	30.0	49	67.0	22.5	23.0
	C, D or E	A3	100.00	M6	89	80.00	3.5	14.00	30.0	49	67.0	22.5	23.0
OSPE50B	**C, D or E**	**AB**	66.67	M5	62	38.10	1.6	6.35	20.5	76	67.0	16.5	18.5
	C, D or E	AC	66.67	M5	62	38.00	1.6	9.53	20.8	76	67.0	16.5	18.5
	C, D or E	**AD**	66.67	M5	62	38.10	1.6	9.525	31.8	76	67.0	22.5	18.5
	C, D or E	**AE**	98.43	M5	80	73.03	3.0	12.70	30.0	76	67.0	22.5	18.5
	C, D or E	**AF**	98.43	M6	85	73.03	3.0	12.70	37.0	76	67.0	30.0	18.5
	C, D or E	B6	63.00	M4	62	40.00	2.5	9.00	20.0	76	67.0	16.5	18.5
	C, D or E	AH	63.00	M5	62	40.00	2.5	9.00	20.0	76	67.0	16.5	18.5
	C, D or E	B8	70.00	M5	62	50.00	3.0	12.00	30.0	76	67.0	22.5	18.5
	C, D or E	**AN**	70.00	M5	62	50.00	3.0	14.00	30.0	76	67.0	22.5	18.5
	C, D or E	AG	75.00	M5	62	60.00	2.5	11.00	23.0	76	67.0	16.5	18.5
	C, D or E	B9	75.00	M5	62	60.00	2.5	14.00	30.0	76	67.0	22.5	18.5
	C, D or E	BB	90.00	M6	80	70.00	3.0	14.00	30.0	76	67.0	22.5	18.5
	C, D or E	A3	100.00	M6	89	80.00	3.5	14.00	30.0	76	67.0	22.5	18.5

[1] When ordering with actuator, use order code ⑥ to specify mounted gearhead size and ratio: **A** PV40TA-005 (ratio 5:1); **B** PV40TA-010 (ratio10:1); **C** PV60TA-003 (ratio 3:1); **D** PV60TA-005 (ratio 5:1); **E** PV60TA-010 (ratio 10:1). See Ordering Information.
[2] When ordering with actuator, use order code ⑦ to specify motor mounting kit. See Ordering Information.

■ Blue order codes indicate rapid shipment availability

Mounted Gearhead and Motor Options



Mounted Gearhead and Mounted Motor Options include a coupling housing, coupling, flange, gearhead with coupler, flange and motor

Actuator Size	Order Code 6 [1]	Order Code 7 [2]	Motor description	Dimensions — mm C	LCH	LGH	LM	MAK	MF
OSPE25B	A or B	L0	LV233-01-10	58	47	48.5	79	15.7	14.0
	A or B	L1	HV233-01-10	58	47	48.5	79	15.7	14.0
	A or B	KA	PM-FAL01AMN	40	47	48.5	91	19.0	14.0
OSPE32B	C, D or E	L0	LV233-01-10	58	49	67.0	79	16.5	23.0
	C, D or E	L1	HV233-01-10	58	49	67.0	79	16.5	23.0
	C, D or E	L2	LV343-03-10	86	49	67.0	127	30.0	23.0
	C, D or E	L3	HV343-01-10	86	49	67.0	127	30.0	23.0
	C, D or E	KC	PM-FBL04AMN	60	49	67.0	118	22.5	23.0
	C, D or E	K0	BE233FJ-KPSN	58	49	67.0	143	22.5	23.0
	C, D or E	K1	BE233FJ-KPSN with brake (CM233FJ-115027)	58	49	67.0	178	22.5	23.0
	C, D or E	K2	BE344LJ-KPSN	86	49	67.0	188	22.5	23.0
	C, D or E	K3	BE344LJ-KPSB	86	49	67.0	220	22.5	23.0
OSPE50B	C, D or E	L0	LV233-01-10	58	76	67.0	79	16.5	18.5
	C, D or E	L1	HV233-01-10	58	76	67.0	79	16.5	18.5
	C, D or E	L2	LV343-03-10	86	76	67.0	127	30.0	18.5
	C, D or E	L3	HV343-01-10	86	76	67.0	127	30.0	18.5
	C, D or E	KC	PM-FBL04AMN	60	76	67.0	118	22.5	18.5
	C, D or E	K0	BE233FJ-KPSN	58	76	67.0	143	22.5	18.5
	C, D or E	K1	BE233FJ-KPSN with brake (CM233FJ-115027)	58	76	67.0	178	22.5	18.5
	C, D or E	K2	BE344LJ-KPSN	86	76	67.0	188	22.5	18.5
	C, D or E	K3	BE344LJ-KPSB	86	76	67.0	220	22.5	18.5

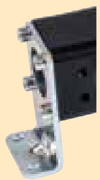
[1] When ordering with actuator, use order code 6 to specify mounted gearhead size and ratio: **A** PV40TA-005 (ratio 5:1); **B** PV40TA-010 (ratio10:1); **C** PV60TA-003 (ratio 3:1); **D** PV60TA-005 (ratio 5:1); **E** PV60TA-010 (ratio 10:1). See Ordering Information.
[2] When ordering with actuator, use order code 7 to specify mounted motor on gearhead. See Ordering Information.

Blue order codes indicate rapid shipment availability

End Cap Mounting Options

See "Maximum Permissible Unsupported Length" for end cap mounting placement requirements.

End Cap Mounting Selection Overview

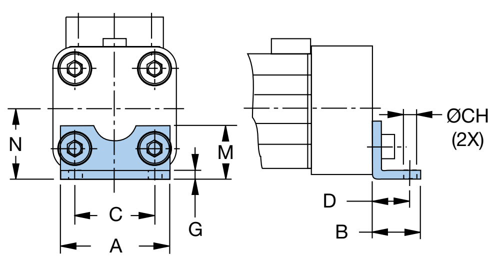
Type		Standard Carriage 25	32	50	PowerSlide 25/25	25/35	25/44	32/35	32/44	50/60	50/76	ProLine 25	32	50
Standard 	A1	•	•											
	A2											◦	◦	
	A3				◦	◦		◦						
Reinforced 	B1	•	•		•	•	•	•	•			•	•	
	B4						◦		◦					
Block 	C1			•						•	•			•
	C2													◦
	C3									◦				
	C4										◦			

• Recommended for mounting position with carriage on top ◦ Recommended for mounting position carriage side only (3 or 9 o'clock position)

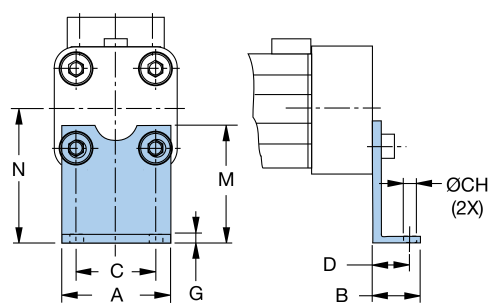
Order Code

1, 2 or 3
(1 pair)

Type A1



Type A3



Type A1, A2 and A3 – Standard End Cap

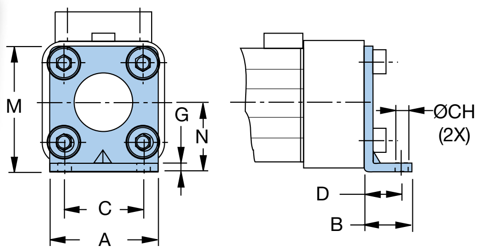
Actuator Size	Type	Part Number*	Weight* (kg)	Dimensions — mm A	B	C	CH	D	G	M	N
OSPE25B	A1	18156FIL	0.031	39	22	27	5.8	16	2.5	18	22
	A2	18157FIL	0.044							33	37
	A3	18158FIL	0.055							45	49
OSPE32B	A1	18161FIL	0.050	50	26	36	6.6	18	3.0	20	30
	A2	18162FIL	0.066							34	44
	A3	18163FIL	0.159							42	52

*Part number and weight are for individual piece.

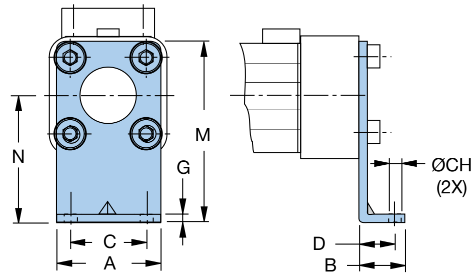
Order
Code

4 or 5
(1 pair)

Type B1



Type B4



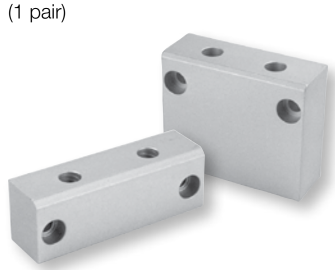
Type B1 and B4 – Reinforced End Cap

Actuator Size	Type	Part Number*	Weight* (kg)	Dimensions — mm A	B	C	CH	D	G	M	N
OSPE25B	B1	18159FIL	0.010	39	22	27	5.8	16	2.5	42	22
	B4	18160FIL	0.110							80	60
OSPE32B	B1	18164FIL	0.078	50	26	36	6.6	18	3.0	55	30
	B4	18165FIL	0.380							85	60

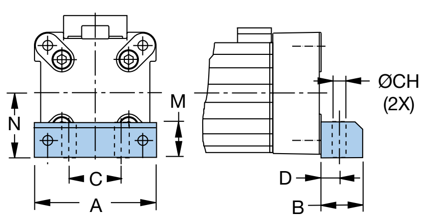
*Part number and weight are for individual piece.

Order
Code

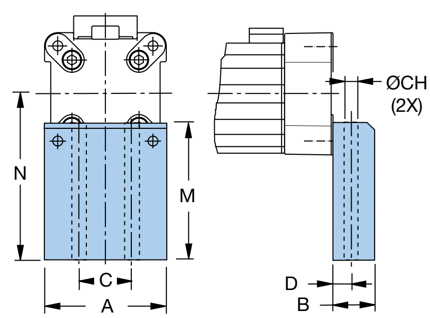
1, 2, 3 or 4
(1 pair)



Type C1



Type C4



Type C1, C2, C3 and C4 – Block End Cap

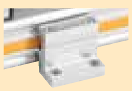
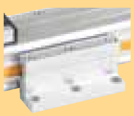
Actuator Size	Type	Part Number*	Weight* (kg)	Dimensions — mm A	B	C	CH	D	M	N
OSPE50B	C1	18166FIL	0.146	86	24	40	9.0	12.5	30	48
	C2	18167FIL	0.210						39	57
	C3	18168FIL	0.300						54	72
	C4	18169FIL	0.412						77	95

*Part number and weight are for individual piece.

Profile Mounting Options

See "Maximum Permissible Unsupported Length" for end cap and profile mounting placement requirements.

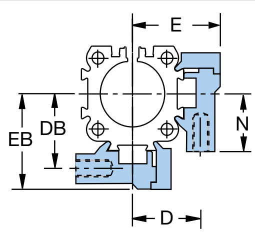
Profile Mounting Selection Overview

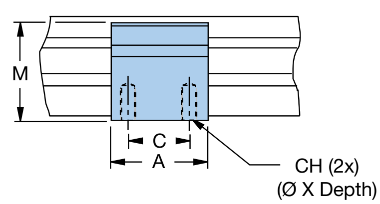
		Standard Carriage			PowerSlide							ProLine		
Type		25	32	50	25/25	25/35	25/44	32/35	32/44	50/60	50/76	25	32	50
2 Internal Threads 	D1	•	•	•	•	•	•	•	•	•	•	•	•	•
2 Thru Holes 	E1	•	•	•	•	•	•	•	•	•	•	•	•	•
	E2											●	●	●
	E3				●	●		●		●				
	E4						●		●		●			
3 Thru Holes 	MAE	•	•	•	•	•	•	•	•	•	•	•	•	•

• Recommended for mounting position with carriage on top ● Recommended for mounting position carriage side only (3 or 9 o'clock position)

Order
Code

2, 5 or 8
(1, 2 or 3 pair)





Type D1 (with two internal threads)

Actuator SIze	Part Number*	Weight* (kg)	Dimensions — mm A	C	CH	D	DB	E	EB	M	N
OSPE25B	20008FIL	0.061	50	36	M5 x 10	27	28.5	34.5	36	38	22
OSPE32B	20157FIL	0.072	50	36	M5 x 10	33	35.5	40.5	43	46	30
OSPE50B	20162FIL	0.167	60	45	M6 x 11	40	45.0	52.0	57	71	48

*Part number and weight are for individual piece.

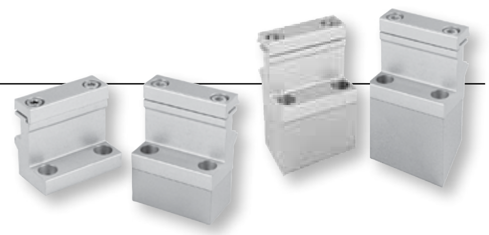
Order Code

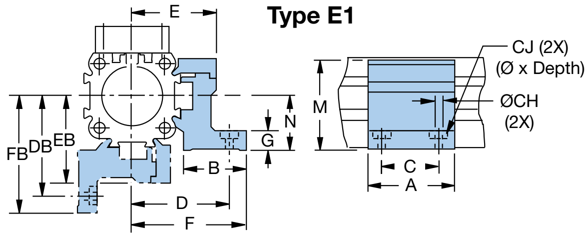
E1 1, 4 or 7 (1, 2 or 3 pair)

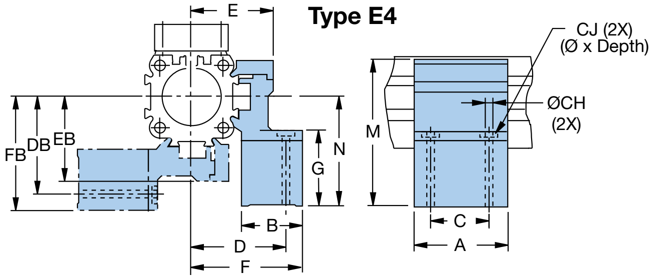
E2 K, N or R (1, 2 or 3 pair)

E3 L, P or S (1, 2 or 3 pair)

E4 M, Q or T (1, 2 or 3 pair)







Type E1, E2, E3 and E4 (with two thru holes)

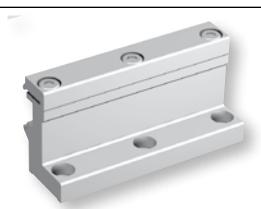
Actuator Size	Type	Part Number*	Weight* (kg)	A	B	C	CH	CJ	D	DB	E	EB	F	FB	G	M	N
				Dimensions — mm													
OSPE25B	E1	20009FIL	0.074	50	26	36	5.5	10 x 5.7	40	41.5	34.5	36	47.5	49	8	38	22
	E2	20352FIL	0.125												23	53	37
	E3	20353FIL	0.120												35	65	49
	E4	20354FIL	0.020												46	76	60
OSPE32B	E1	20158FIL	0.092	50	27	36	5.5	10 x 5.7	46	48.5	40.5	43	54.5	57	10	46	30
	E2	20355FIL	0.141												24	60	44
	E3	20356FIL	0.140												32	68	52
	E4	20357FIL	0.197												40	76	60
OSPE50B	E1	20163FIL	0.189	60	34	45	7.0	—	59	64.0	52.0	57	67.0	72	10	71	48
	E2	20361FIL	0.235												19	80	57
	E3	20362FIL	0.338												31	95	72
	E4	20363FIL	0.442												57	118	95

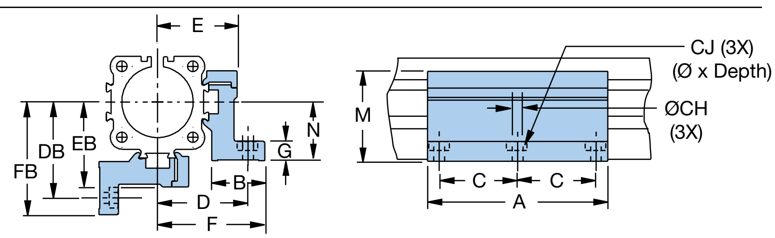
*Part number and weight are for individual piece.

Order Code

3, 6 or 9

(1, 2 or 3 pair)





Type MAE (with three thru holes)

Actuator Size	Part Number*	Weight* (kg)	A	B	C	CH	CJ	D	DB	E	EB	F	FB	G	M	N
			Dimensions — mm													
OSPE25B	12278FIL	0.271	92	26	40	5.5	10 x 5.7	40	41.5	34.5	36	47.5	49	8	38	22
OSPE32B	12279FIL	0.334	92	27	40	5.5	10 x 5.7	46	48.5	40.5	43	54.5	57	10	46	30
OSPE50B	12280FIL	0.668	112	34	45	7.0	—	59	64.0	52.0	57	67.0	72	10	71	48

*Part number and weight are for individual piece.

ORDERING INFORMATION
OSPE

Select an order code from each of the numbered fields to create a complete OSPE..B model order number. Include hyphens and non-selective characters as shown in example below.

	①	②		③	④	⑤	⑥	⑦	⑧		⑨	⑩	⑪	⑫	⑬	⑭
Order Number Example:	OSPE	25	–	0	0	0	0	0 –	00000	-	P	0	0	0	0	0

① Series

OSPE Origa System Plus Electromechanical

② Actuator Bore Size

25 41 mm W x 53 mm H

32 52 mm W x 67 mm H

50 87 mm W x 93 mm H

③ Drive Train

0 Belt actuator with internal glider bearing

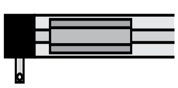
④ Carriage

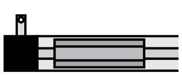
0 Standard

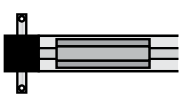
1 Tandem (two carriages for higher load capabilities)

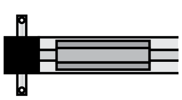
2 Bi-Parting (two driven carriages for opposing movements)

⑤ Drive Shaft and Motor Input

0  Plain shaft, motor input left

1  Plain shaft, motor input right

2  Double plain shaft, motor input left

3  Double plain shaft, motor input right

⑥ Mounted Gearhead Options

0 No gearhead

A PV40TA-005 (gear ratio 5:1)*

B PV40TA-010 (gear ratio 10:1)*

C PV60TA-003 (gear ratio 3:1)*

D PV60TA-005 (gear ratio 5:1)*

E PV60TA-010 (gear ratio 10:1)*

* Requires selection from "Mounted Gearhead with Motor Mounting Kit" or "Mounted Gearhead and Motor" (see Options & Accessories) for item ⑦ below.

⑦ Gearhead/Motor Mounting Options

0 – No gearhead or motor mounting option

Motor Mounting Kits (see Options & Accessories for available option dimensions and delivery)

Mounted Motors (see Options & Accessories for available option dimensions and delivery)

Gearhead Mounting Kits (see Options & Accessories for available option dimensions and delivery)

Mounted Gearhead with Motor Mounting Kit (see Options & Accessories for available option dimensions and delivery)

Mounted Gearhead and Motor (see Options & Accessories for available option dimensions and delivery)

⑧ Order Stroke*

00000 5-digit input (in mm)

* See Dimensions to calculate required order stroke.
Maximum catalog stroke:
OSPE25B = 03000 mm;
OSPE32B and OSPE50B = 05000 mm
Longer strokes available upon request. Consult factory.

⑨ Hardware and Dovetail Grove Covers

P Standard hardware with Parker gold cover strip

■ Blue order codes indicate rapid shipment availability

Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

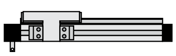
Virtual Engineer

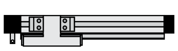
⑩ Carriage Options

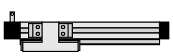
0	No external guide rail
6	ProLine PL25, PL32, PL50*
E	PowerSlide PS25/25*
F	PowerSlide PS25/35 or PS32/35*
G	PowerSlide PS25/44 or PS32/44*
H	PowerSlide PS50/60*
I	PowerSlide PS50/76*
M	Inversion Mounting**
R	Clevis Mounting **

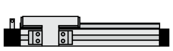
* Requires standard carriage (select order code "0" from ④).
See Dimensions for additional information.
** Requires standard carriage (select order code "0" from ④).
See Options & Accessories for Inversion Mounting and Clevis Mounting.

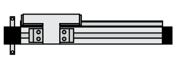
⑪ External Guide Rail Orientation

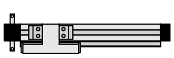
0  Guide Rail (right) with order code "0" from item ⑤ (plain shaft left)

1  Guide Rail (left) with order code "0" from item ⑤ (plain shaft left)

0  Guide Rail (left) with order code "1" from item ⑤ (plain shaft right)

1  Guide Rail (right) with order code "1" from item ⑤ (plain shaft right)

0  Guide Rail (right) with order code "2" from item ⑤ (double shaft – motor input left side)

1  Guide Rail (left) with order code "2" from item ⑤ (double shaft – motor input left side)

⑫ End Cap Mounting (see Options & Accessories)

0	No end cap mounting
1	1 pair A1* (standard end cap) or C1** (block end cap)
2	1 pair A2* (standard end cap) or C2** (block end cap)
3	1 pair A3* (standard end cap) or C3** (block end cap)
4	1 pair B1* (reinforced end cap) or C4** (block end cap)
5	1 pair B4* (reinforced end cap)

* For size 25 and 32
** For size 50

⑬ Profile Mounting (see Options & Accessories)

0	No profile mounting
2	1 pair D1 (with 2 internal threads)
5	2 pair D1 (with 2 internal threads)
8	3 pair D1 (with 2 internal threads)
1	1 pair E1 (with 2 thru holes)
4	2 pair E1 (with 2 thru holes)
7	3 pair E1 (with 2 thru holes)
3	1 pair MAE (with 3 thru holes)
6	2 pair MAE (with 3 thru holes)
9	3 pair MAE (with 3 thru holes)
K	1 pair E2 (with 2 thru holes)
N	2 pair E2 (with 2 thru holes)
R	3 pair E2 (with 2 thru holes)
L	1 pair E3 (with 2 thru holes)
P	2 pair E3 (with 2 thru holes)
S	3 pair E3 (with 2 thru holes)
M	1 pair E4 (with 2 thru holes)
Q	2 pair E4 (with 2 thru holes)
T	3 pair E4 (with 2 thru holes)

⑭ Magnetic Sensor Mounting*

0	No sensor mounting
A	1 pc. N.O., NPN, with M8 connector
B	2 pc. N.C., NPN, with M8 connector
C	1 pc. N.O., NPN, with M8 connector 2 pc. N.C., NPN, with M8 connector
D	1 pc. N.O., PNP, with M8 connector
E	2 pc. N.C., PNP, with M8 connector
F	1 pc. N.O., PNP, with M8 connector 2 pc. N.C., PNP, with M8 connector

* Extension cable with M8 connector and 5 m cable flying lead cable for Sensor with M8 plug can be ordered separately; use part number 003-2918-01

■ Blue order codes indicate rapid shipment availability

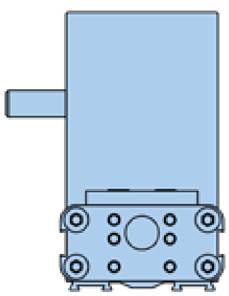
OSPE..BV Fixed Belt-Driven Actuators

Actuators with Fixed Belt for Vertical Applications

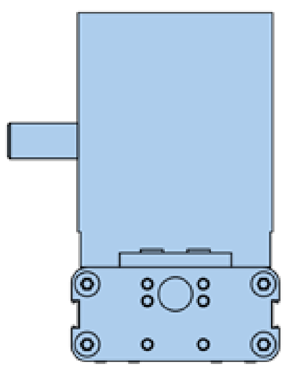
- Fixed actuator head for low moving mass
- Integrated ball bearing guide for high bending moments
- Magnetic switch set for contactless position sensing
- Easy to install
- Low maintenance

Features

- High acceleration and speeds
- Drive Shaft versions with clamp shaft or plain shaft
- Power transmission by belt
- Moving axis profile
- Complete motor and control packages
- IP 20 rating



OSPE20BHD

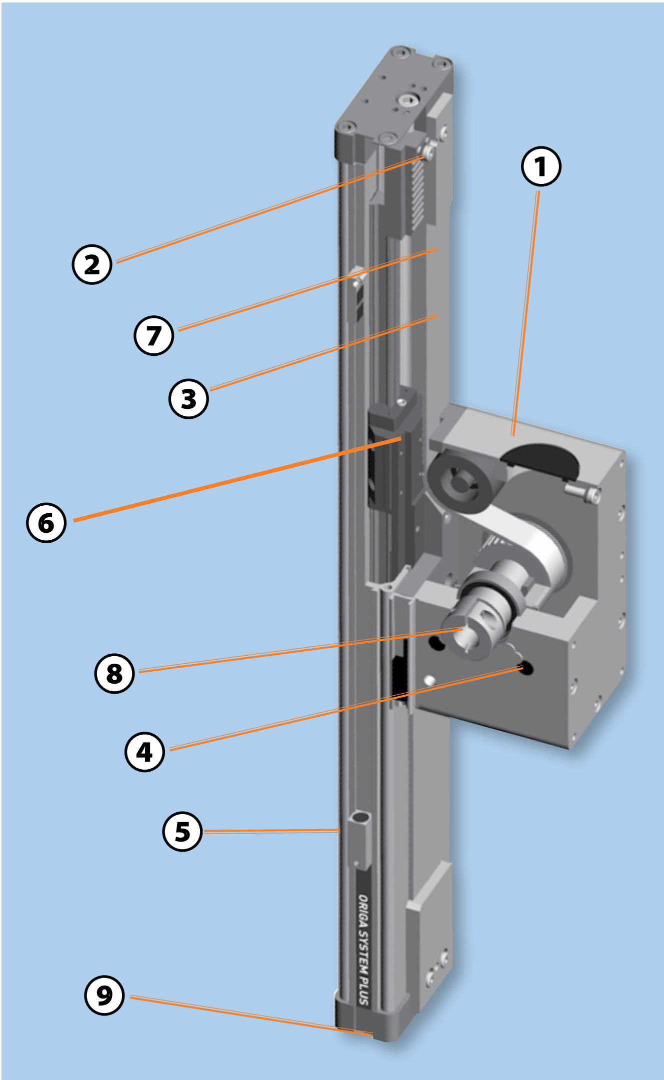


OSPE25BHD

	OSPE20BV	OSPE25BV
Maximum Travel (mm)	1,000	1,500
Maximum Payload F_z (N)	1,600	3,000
Maximum Acceleration (m/sec^2)	20	20

The OSPE..BV vertical fixed belt-driven actuator with integrated ball bearing guide is designed specifically for lifting loads in vertical orientation. The light weight design allows to use smaller motors with this actuator keeping the robust and aesthetically pleasing design of the OSPE series.

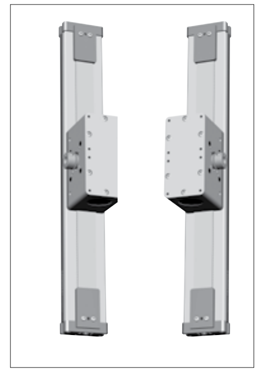
The compact and modular design allows the integration of the OSPE..BV in any machine layout, providing very little space, without sacrificing payload or thrust capacity.



1. **Carriage**
   Low profile, high strength aluminum carriage with threaded holes for ease of mounting
2. **Belt tensioning station**
   Easy access for belt tension without removing the payload
3. **Corrosion resistant steel sealing band**
   Magnetically fastened to the actuator body and provides sealing to IP54
4. **Lubrication access port**
   Easy access maintenance allows for single point lubrication of bearing trucks at any point along travel
5. **Slotted profile**
   With dovetail grooves for strength, actuator mounting, and mounting of sensor and other accessories
6. **Integrated ball bearing truck**
   For high performance, high payload and moment load demands. (Optional roller wheels available.)
7. **Steel reinforced timing belt**
   High thrust force transmission and long life
8. **Clamp shaft**
   Optimal, zero-backlash coupling for gearhead and motor
9. **End housing mounting**
   Threaded mounting holes allow for a multitude of mounting options

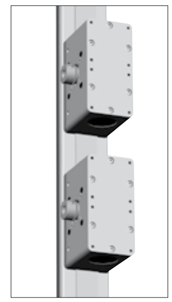
Drive Shaft Options

- Drive shaft with clamp shaft
- Drive shaft with both clamp and plain shaft
- Drive shaft with plain shaft
- Drive shaft with double plain shaft for parallel operation of two Z-axes with an intermediate drive shaft



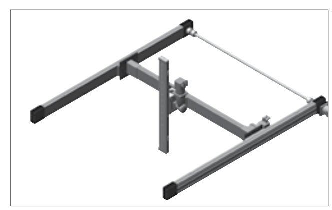
Actuator Head Orientation

All OSPE..BV actuator heads are standard with an integrated ball bearing guide and are available with either left or right side gearhead/motor mounting.



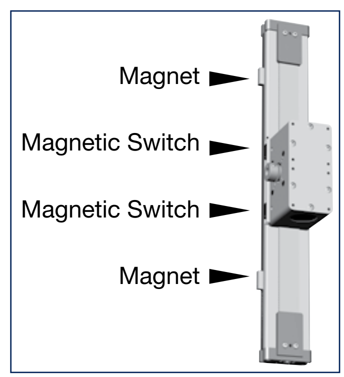
Drive Head Options

Standard or tandem with additional actuator head and two additional carriers for higher bending moments.



Multi-axis Systems

A wide range of adapter plates and intermediate drive shafts simplifies engineering and installation. Please consult factory for your individual system design.



Magnetic Switches Set

Magnetic switches with connector, mounting rail and magnets for contactless sensing of the end positions. Cable (suitable for cable chain) can be ordered separately in 5 m, 10 m or 15 m length.

Options and Accessories

Information on all OSPE..BV Series options is detailed in Options & Accessories. Simply select all the options needed to solve your application requirements, then order with the actuator using convenient order codes (see Ordering Information). To order an option separately as an upgrade to an existing system or as a replacement part, use the individual option part numbers provided.

SPECIFICATIONS

OSPE..BV Performance Data

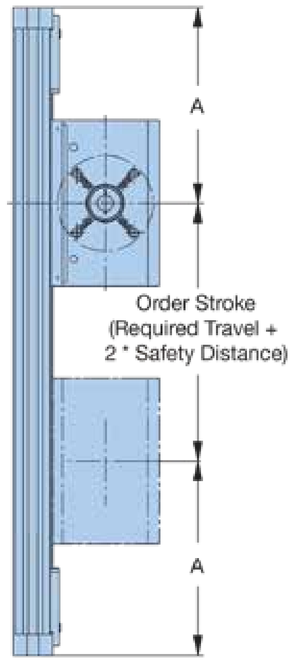
Actuator Size				OSPE20BV	OSPE25BV
Travel Distance per Revolution		s_{lin}	mm	108	160
Linear Speed (Max)		v_{max}	m/s	3	5
Acceleration (Max)		a_{max}	m/s²	20	20
Repeatability			µm	± 50	± 50
Order Stroke (Max)			mm	1,000	1,500
Recommended Permissible Mass (Max)			kg	10	20
Thrust Force (Max)		F_{Amax}	N	650	1,430
			lbs	146	321
Torque on Drive Shaft (Max)		M_{Amax}	Nm	12	38
			in-lb	104	333
Torque* — No Load	**RMS**	M_0	Nm	0.9	1.4
			in-lb	8	12
	Peak	M_0	Nm	1.1	1.9
			in-lb	10	17
Load (Max)**		F_Y	N	1,600	2,000
			lbs	360	450
		F_Z	N	1,600	3,000
			lbs	360	674
Bending Moment Load* (Max)		M_X	Nm	20	50
			in-lb	177	443
		M_Y	Nm	100	200
			in-lb	885	1,770
		M_Z	Nm	100	200
			in-lb	885	1,770
Thrust Force (Max) FA	**N @ Specified Speed**		<1 m/s	650	1,430
			<2 m/s	605	1,288
			<3 m/s	450	1,170
			<4 m/s	—	1,052
			<5 m/s	—	1,013
	N @ Specified Stroke		<1 m	650	1,430
			<2 m	605	1,367
Torque (Max) MA	**Nm @ Specified Speed**		<1 m/s	12	38
			<2 m/s	11	34
			<3 m/s	8	31
			<4 m/s	—	28
			<5 m/s	—	27
	Nm @ Specified Stroke		<1 m	12	38
			<2 m	11	36
Inertia					
@ Zero Stroke		J_0	kgmm²	486	1,695
Per Meter of Stroke		J_{OS}	kgmm²/m	1,144	2,668
Per 1 kg Moved Mass		J_m	kgmm²/kg	296	649
Weight					
@ Zero Stroke		m_0	kg	2.8	6.2
Per Meter of Stroke		m_{OS}	kg/m	4.5	7.8
Moved Mass of Carriage		m_C	kg	1.5	2.6
Ambient Temperature Range			°C	-30 to +80	
IP Rating				IP 20	

* For Tandem option double the values listed
** Load and bending moment based on 8000 km performance

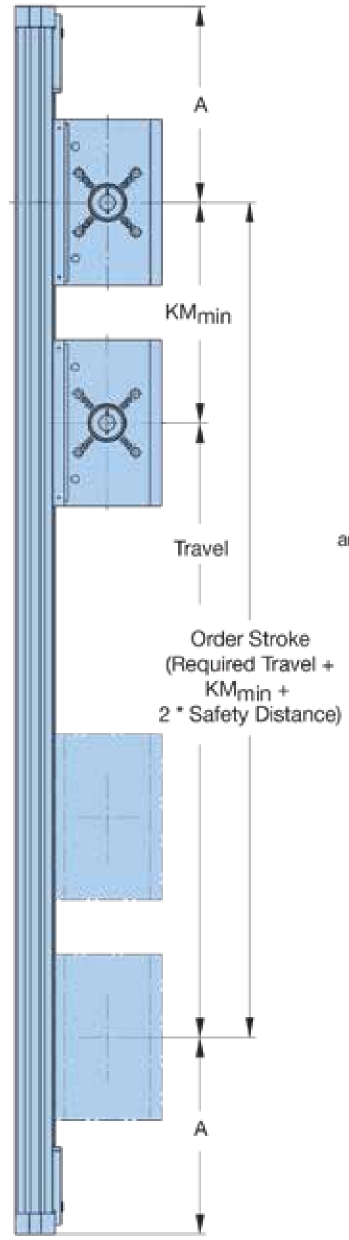
DIMENSIONS

OSPE..BV Order Stroke Dimensions

Standard Drive Head



Tandem Drive Head

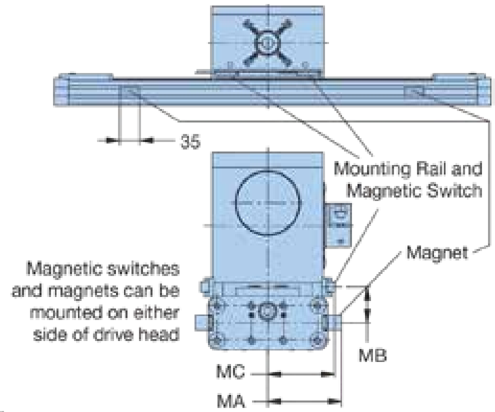


Actuator Size	OSPE20BV	OSPE25BV
A	148	210
KM_{min}	155	225
KM_{rec}	225	275

KM_{min} is the minimum distance between two drive heads possible.
KM_{rec} is the recommended distance between two drive heads for optimal performance.

Magnetic Switch Dimensions

The magnetic switch set provides contactless sensing of the end positions. The mounting rail and magnetic switches are mounted on the actuator drive head and the magnets are mounted in the dovetail slot on the profile.



Dimension (mm)

	OSPE20BV	OSPE25BV
MA	46.0	56.0
MB	23.7	26.0
MC	42.3	51.0

Order Stroke Safety Distance:
The mechanical end position should not be used as a mechanical end stop, thus an additional Safety Distance at both ends of travel must be incorporated into the Order Stroke.

The safety distance for servo-driven systems is equivalent to the travel distance per one revolution of the drive shaft.

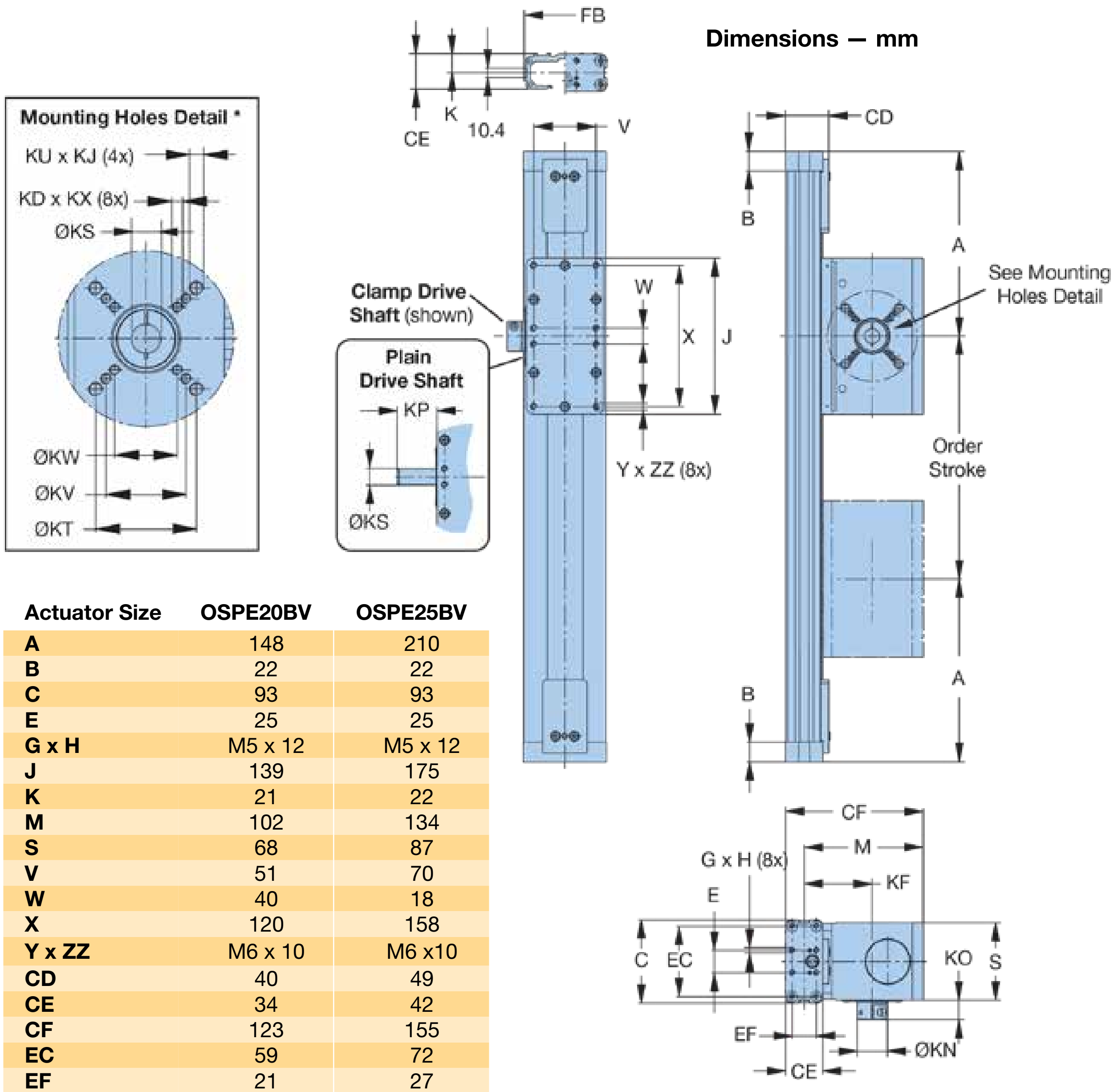
AC motor-driven systems with VFDs require a larger safety distance than servo systems. For further information and design assistance, please consult factory.

Base Unit Dimensions

Drive Shaft Versions:

- **Clamp shaft • Plain Shaft • Clamp Shaft with Plain Shaft • Double Plain Shaft**

Dimensions — mm



Actuator Size	OSPE20BV	OSPE25BV
A	148	210
B	22	22
C	93	93
E	25	25
G x H	M5 x 12	M5 x 12
J	139	175
K	21	22
M	102	134
S	68	87
V	51	70
W	40	18
X	120	158
Y x ZZ	M6 x 10	M6 x10
CD	40	49
CE	34	42
CF	123	155
EC	59	72
EF	21	27
FB	73	92
FH	36	40
KD x KX	—	M6 x 16
KF	61	76
KN	27	34
KO	16	22
KP	29	32
KS	12^{H7}	16^{H7}
KT	47	58
KU x KJ	M6 x 10	M8 x 16
KV	36	46
KW	—	36

* Mounting holes for motor flange or external planetary gearhead. Drive shaft and motor mounting holes can be located on either side of carriage (see Ordering Information for drive shaft options).

ORDERING INFORMATION
OSPE..BV

Select an order code from each of the numbered fields to create a complete OSPE..BV model order number. Include hyphens and non-selective characters as shown in example below.

	①	②		③	④		⑤		⑥		⑦	⑧			⑨
Order Number Example:	OSPE	20	–	7	0	0	02	–	00000	–	P	00	0	0	0

① **Series**

OSPE Origa System Plus Electromechanical

② **Bore Size**

20	73 mm W x 123.3 mm H
25	93 mm W x 154.5 mm H

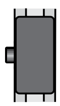
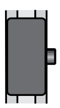
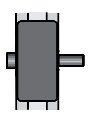
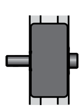
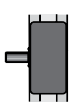
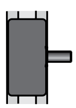
③ **Drive Train**

7	Vertical Fixed Belt-Driven Actuator w/Integrated Ball Bearing Guide

④ **Carriage**

0	Standard
1	Tandem (two drive heads for higher actuator stiffness)

⑤ **Drive Shaft Configuration and Orientation** (1)

02	Clamp			Clamp shaft* (left)
04			Clamp	Clamp shaft* (right)
03	Clamp		Plain	Clamp shaft* (left) with plain shaft for use with intermediate drive shaft for parallel actuator system
05	Plain		Clamp	Clamp shaft* (right) with plain shaft for use with intermediate drive shaft for parallel actuator system
0A	Plain			Plain shaft idler unit** (left) for parallel actuator system
0B			Plain	Plain shaft idler unit** (right) for parallel actuator system

* Consult factory for all gearhead and motor mounting options
** Only available with order code 00 "No gearhead mounting kit or motor option" (item ⑧)

⑥ **Order Stroke***

00000 5-digit input (in mm)*

* Maximum standard stroke: OSPE20BV = 1000 mm; OSPE25BV = 1500 mm. For example, to OSPE..V with maximum order stroke, specify 01500.
Longer strokes available upon request. Consult factory.

⑦ **Hardware and Cover Strip**

P	Standard hardware with Parker gold cover strip

⑧ **Gearhead/Motor Mounting Options**

00	No gearhead mounting kit or motor option
xx	Consult factory for all gGearhead and motor mounting options

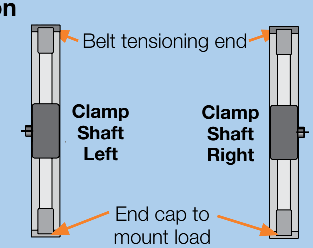
⑨ **Magnetic Sensor Mounting**

0	No sensor mounting
B	2 pc. N.C., NPN, with M8 connector
E	2 pc. N.C., PNP, with M8 connector

* Extension cable with M8 plug and 5 m cable flying lead cable for Sensor with M8 connector can be ordered separately; use part number 003-2918-01

(1) **Drive Shaft Orientation**

Drive shaft orientation is determined by viewing the actuator facing the drive head with the belt tensioning end facing up and the end cap for mounting the load facing down.



Note:
Special drive shafts are available – consult factory.

The LCR Series

Miniature Belt-Driven Designs with Maximum Versatility

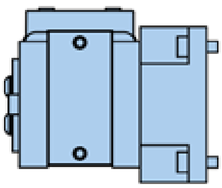
- **Miniature footprint – 30 x 40 mm cross-section**
- **Internal square rail or glider bearing design**
- **100% duty cycle**
- **IP30 stainless steel strip seal**
- **Low noise 2 and 10 mm leadscrew or long travel belt drive**
- **Travel lengths to 1000 mm**
- **Attractive black anodize finish**

Features

- **Extruded aluminum body incorporates dovetail mounting, T-slots and belt return**
- **Toe clamp mounting for easy installation**
- **Dowel pin holes in the LCR30 carriage for repeatable mounting**
- **Multiple motor mount options accommodate NEMA 11,17 and 23 steppers and NEMA 16 servo motors**
- **Flush-mounted NPN, PNP, N.O. or N.C. fully adjustable limit sensors maximize flexibility and minimize footprint impact**
- **Screw-driven version has an optional parallel motor mount for space constrained applications**

	LCR30
Maximum Travel (mm)	600
Maximum Payload (N)	500
Maximum Acceleration (m/s²)	20

***Do not exceed allowable axial and moment loading.**



LCR30

For OEMs looking to automate light payloads, the new LCR (Light Capacity Rodless) linear positioner family provides the smallest form factor with unmatched, easy-to-use flexibility.

With any "build-it-yourself" positioner, all the parts required to build a linear motion axis from scratch must be ordered, tracked, received, inventoried, assembled and tested. In contrast, the LCR Series is a completely pre-engineered, pre-tested, ready-to-use positioner solution, which allows OEMs to significantly reduce their time to market with minimized design, procurement, manufacturing, assembly and qualification time or effort.

Based on the proven life science track record of Parker's MX80 and LP28 Series, the LCR was developed specifically to provide a high-quality, easy-to-use, off-the-shelf linear actuator.

LCR solutions are ideal for Maldi-plate and micro-titer tray automation. Rated for 100% duty cycle, the LCR offers smooth, quiet motion ideal for keeping instrument noise to a minimum. With selectable travel lengths up to 1000 mm and payloads up to 100 N (25 lbs), the ability to automate laboratory instruments has never been easier.

Bottom Line Impact

The LCR's proven pre-engineered design will significantly reduce your instrument time to market and improve your ROI.

Tailored to Meet Every Requirement

The LCR is an easy-to-configure off-the-shelf solution with a virtually unlimited array of standard configurations available.

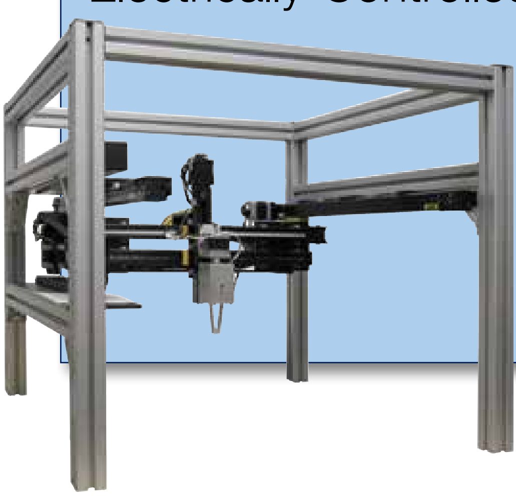
If your application demands a special design, Parker takes the next step and customizes the product to meet your required specification. Common modifications include:

- **Clean room components**
- **Special tool plates**
- **Mounts for 3rd party motors**
- **Single or parallel acting electric grippers**
- **Maximum height or length modifications for space constraints**
- **And much more**

Whether you need blue anodize or a design with a custom carriage for larger than standard payloads, or anything else, Parker excels at application solutions and will modify the LCR to fit your specific needs.

Please call us at 800-245-6903 to discuss your requirements.

Ideal for High-Volume, Light-Capacity, Electrically-Controlled Motion



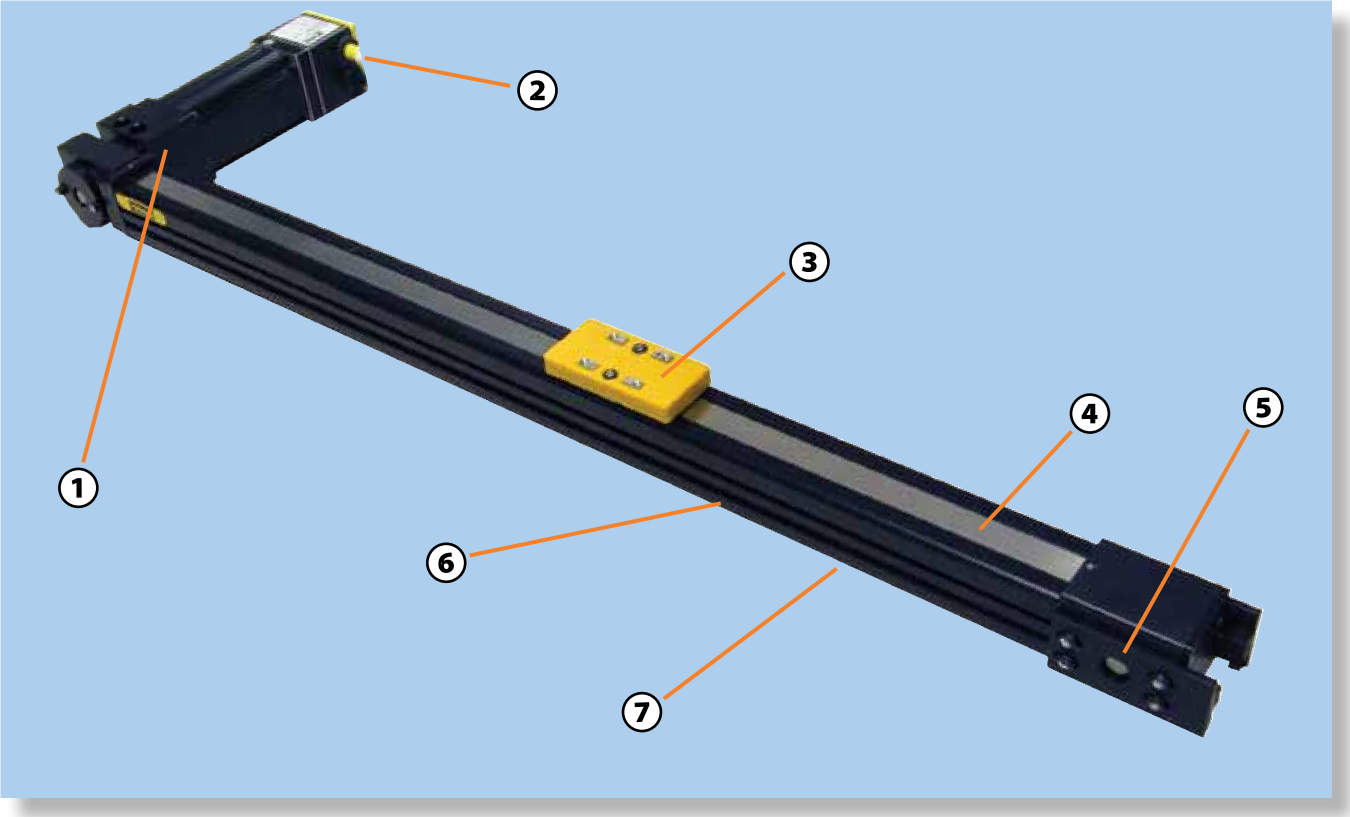
Life science applications:

- **Mass spectroscopy**
- **Course microscopy**
- **Analytical instruments**
- **Laboratory automation**
- **Micro titer automation**
- **MALDI plate automation**
- **Liquid handling**
- **Syringe pumps**

General-purpose applications:

- **Point-of-purchase kiosks**
- **Adjustable guide widths for conveyor lines**
- **Storage and retrieval**
- **Part shuttling**
- **Light payload automation conversion from rodless pneumatics to electric**
- **General automation for any ≤25 lb payload with basic repeatability requirements**

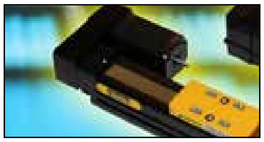
All LCR series actuators are compliant to RoHS and CE directives.



1. **Motor Mounting Options**
   The most motor mounting options standard with more options easily available
2. **Encoder options**
   For position verification and position maintenance
3. **Carriage mounting surface**
   Machined aluminum carriage mounting surface with locating holes
4. **Stainless steel sealing strip**
   Best in class bearing and drive train protection
5. **Easily adjustable belt tension system**
   Reduces maintainance and down time
6. **Minimal instrument/machine size**
   Including flush mount limit sensors
7. **Profile size**
   Provides high rigidity for minimal deflection along with "T" and dovetail slots

Flexible drive train options
With multiple screw leads for high thrust or reinforced belt drive for highest speeds

Parallel motor mounts available

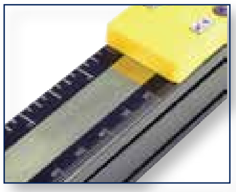


Stepper drive option
Simple and powerful plug and spin P2™ stepper drive option

Rugged internal square rail
Re-circulating bearing or quiet glider bearing for lighter payload needs

Quick and easy mounting options
With toe clamps or standard multi-axis connection kits

Metric and Imperial graduated scales
integral to the LCR body frame are among the many custom modifications available.



The P2™ Drive

An OEM-Friendly Design...
The P2 Completes the LCR as an Easy-to-Use Motion Solution

Pairing the LCR with the P2™ drive, instrument builders eliminate another costly design component and complete their motion package with a single-vendor, easy-to-use solution.

The P2 drive is only 1" x 1" x 3" in size, but packs 2 A of current at 24 VDC to provide superior power density for simple step and direction motion.

The Parker P2 Stepper Drive is a complete step and direction indexer for hybrid step motors. The P2 drive operates stepper motors in full, half, quarter, and sixteenth step modes with an output drive capacity up to 24 VDC and 2.0 amps.

Key Design Advantages

- **On board eyelets allow OEMs to measure output current and to set all drives equally**
- **Two potentiometers allow for easy adjustment of standby and run current**
- **No programming**
- **No code to learn**
- **Robust, high quality product with 100% pre-ship testing**

Key Design Features

- **Supply voltage 12 to 24 VDC**
- **2.0 amps max motor output current**
- **Adjustable run current and standby current**
- **Single or differential ended inputs**
- **Enable, step and direction inputs voltages up to ±14 VDC (low/high input): <0.8 V Low, >2 V High**
- **1.0 µs minimum step pulse width**
- **1.0 µs minimum step pulse low time**
- **0 to 40°C operating temperature with natural convection**
- **5 to 95% relative humidity, non-condensing**
- **Optional DIN rail mount**
- **Resolutions of 200, 400, 800 and 3200 steps/rev (with 1.8° step motor)**
- **Small package (80 mm x 25 mm x 25 mm)**
- **RoHS compliant**

P2 saves a lot more than space...

The P2 Series offers added value to customers who traditionally specify board level drives or design their own drives in house.

① Free-up engineering, procurement, quality, and assembly resources in house. The P2 Series reduces the instrument/machine design time by utilizing an off-the-shelf solution.

The result: faster time to market for new products, allowing customers to focus on core competency.

② The P2 also reduces procurement complexity by reducing the need to chase multiple vendors versus a do-it-yourself drive design.

The result: better return on investment.

③ The P2 Series provides the customer added flexibility to mount the enclosed, protected drive directly onto a motion axis such as the Parker LCR Series, or DIN rail mount in a convenient location.

The result: a well protected, robust drive with quick and easy installation for an easy out-of-box user experience.

SPECIFICATIONS

LCR Series Performance Specifications

Addressing applications which involve positioning of smaller payloads within a very small space envelope, the LCR30 is the ideal solution for OEM instrument manufacturers. The LCR30 offers a reduced overall cost of ownership and a complete solution including amplifier/drive, motor, actuator, bearings, seals, and limit sensors.

LCR Belt-Driven Performance by Profile Size

Specification	Units	LCR30	
Grade		**S (Square Rail)**	**B (Bushing)**
Bidirectional Repeatability	mm	± 0.2	± 0.5
Duty Cycle	%	100	100
Max. Acceleration*	m/s^2	20	20
Max. Linear Speed	mm/s	870	870
Normal Load	N	90	45
Moment Load			
Roll	Nm	2.6	0.3
Yaw		6.5	0.8
Pitch		8.2	1.5
Max. Axial Load	N	45	45
Linear Travel/Rev	mm	58.0	58.0
Breakaway Torque	mNm	85.0	85.0
Coefficient of Friction		0.02	0.10
Carriage Weight	N	0.5	0.5
Base Moment of Inertia			
Ixx	mm^4	39,778	36,162
Iyy		46,273	42,066

*Do not exceed allowable axial and moment loading.

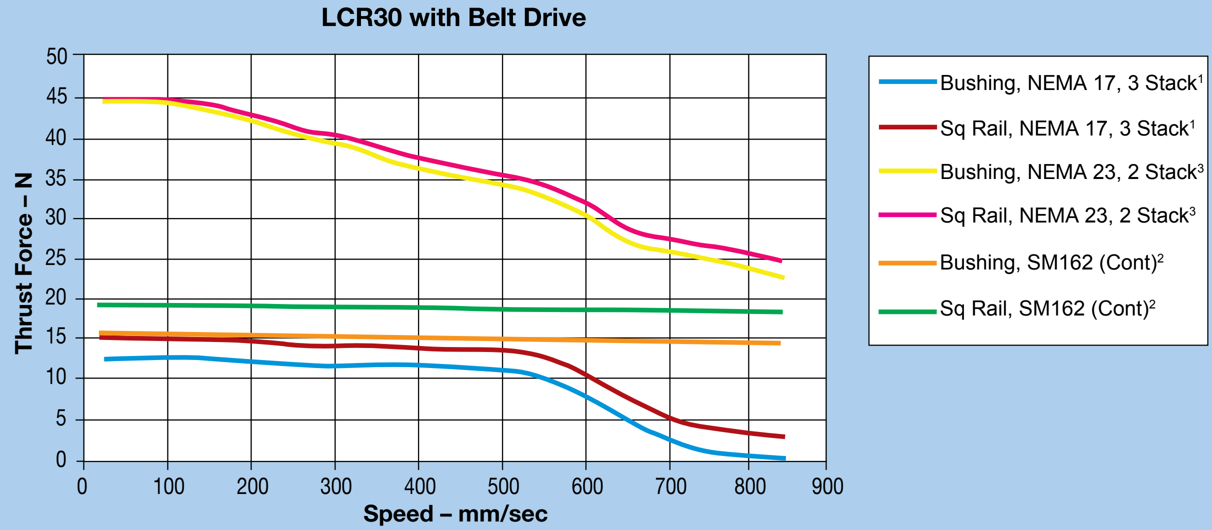
Model	**LCR30**
Width x Height (mm)	30 x 40
Repeatability (±mm)	0.2
Max. Normal Load[1] (N)	90
Max. Axial Load (N)	45
Max. Speed[2] (mm/s)	870
Max. Travel Length (mm)	1000
Screw Lead Options (mm/rev)	—

[1] Specifications for square rail design, bushing version reduces normal load to 50% value.
[2] Specifications for fast screw lead, the fine screw lead will reduce maximum speed.

LCR Belt-Driven Performance by Travel Length (no load)

		LCR30	
	Table Weight	Total Inertia Reflected (kg-m^2)	
Travel	(M23)	No Load	2.5 kg Load
25	1.23	3.111^{-6}	2.161^{-4}
50	1.27	3.145^{-6}	2.161^{-4}
75	1.30	3.189^{-6}	2.162^{-4}
100	1.34	3.232^{-6}	2.162^{-4}
125	1.37	3.276^{-6}	2.163^{-4}
150	1.41	3.319^{-6}	2.163^{-4}
175	1.44	3.363^{-6}	2.163^{-4}
200	1.48	3.406^{-6}	2.164^{-4}
225	1.52	3.500^{-6}	2.164^{-4}
250	1.55	3.493^{-6}	2.165^{-4}
275	1.59	3.536^{-6}	2.165^{-4}
300	1.62	3.580^{-6}	2.166^{-4}
325	1.66	3.623^{-6}	2.166^{-4}
350	1.69	3.667^{-6}	2.166^{-4}
375	1.73	3.710^{-6}	2.167^{-4}
400	1.76	3.754^{-6}	2.167^{-4}
425	1.80	3.797^{-6}	2.168^{-4}
450	1.83	3.841^{-6}	2.168^{-4}
475	1.87	3.884^{-6}	2.169^{-4}
500	1.90	3.927^{-6}	2.169^{-4}
525	1.94	3.980^{-6}	2.170^{-4}
550	1.97	4.014^{-6}	2.170^{-4}
575	2.01	4.058^{-6}	2.170^{-4}
600	2.04	4.101^{-6}	2.171^{-4}
625	2.08	4.145^{-6}	2.171^{-4}
650	2.11	4.188^{-6}	2.172^{-4}
675	2.15	4.232^{-6}	2.172^{-4}
700	2.18	4.275^{-6}	2.173^{-4}
725	2.22	4.319^{-6}	2.173^{-4}
750	2.25	4.362^{-6}	2.173^{-4}
775	2.29	4.405^{-6}	2.174^{-4}
800	2.32	4.449^{-6}	2.174^{-4}
825	2.36	4.492^{-6}	2.175^{-4}
850	2.40	4.536^{-6}	2.175^{-4}
875	2.43	4.579^{-6}	2.176^{-4}
900	2.47	4.623^{-6}	2.176^{-4}
925	2.50	4.666^{-6}	2.176^{-4}
950	2.54	4.710^{-6}	2.177^{-4}
975	2.57	4.753^{-6}	2.177^{-4}
1000	2.61	4.796^{-6}	2.178^{-4}

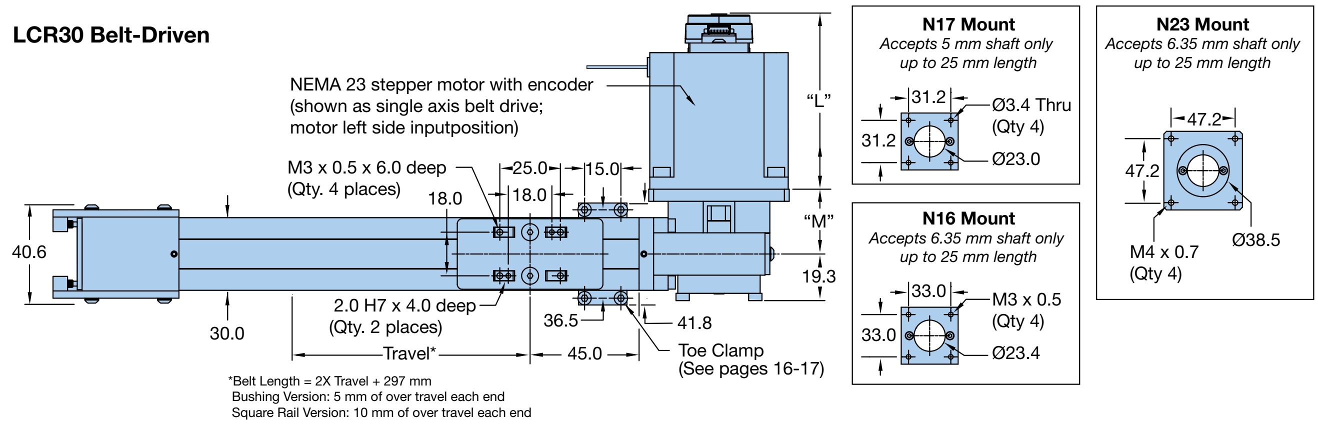
Linear Speed-Force Performance

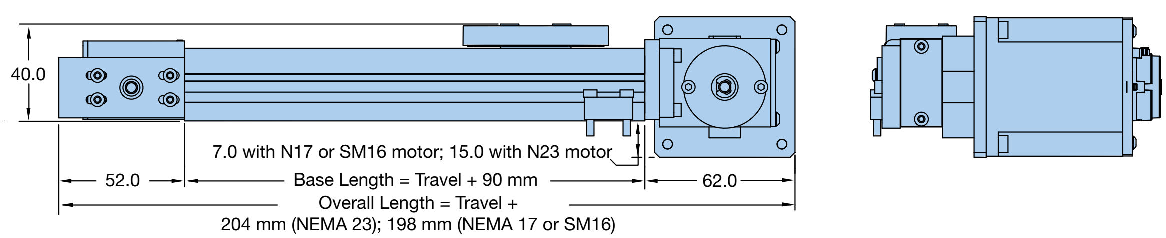


1 Performance with Parker P2™ stepper drive running at 24 VDC
2 Performance with Parker Aries AR04 servo drive
3 Performance with Parker ViX drive run at 48 VDC

DIMENSIONS

LCR30 Belt-Driven

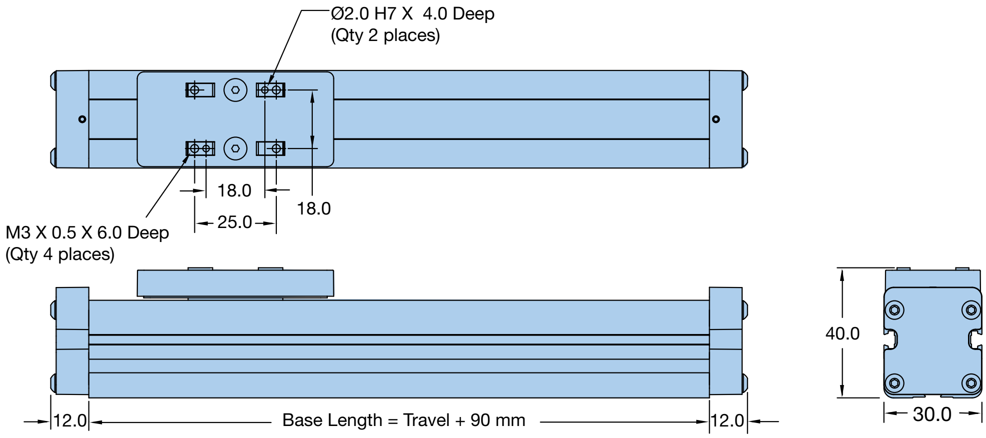




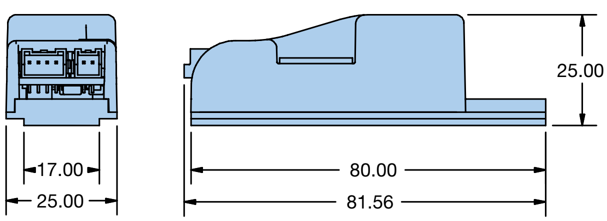
Motor Option	Encoder Option	M	L	Description
M23	**E0**	44.3	73.0	LV232 NEMA 23 Stepper Motor
M23	**E2**	44.3	73.0	LV232 NEMA 17 Stepper Motor with 500 Count Encoder
M17	**E0**	44.8	58.2	NEMA 17 Stepper Motor
M17	**E2**	44.8	58.2	NEMA 17 Stepper Motor with 500 Count Encoder
M16	**E0**	46.3	137.0	SM16 Servo Motor Mount with SM162-AE-N10N

Idler Unit – Square Rail Models only

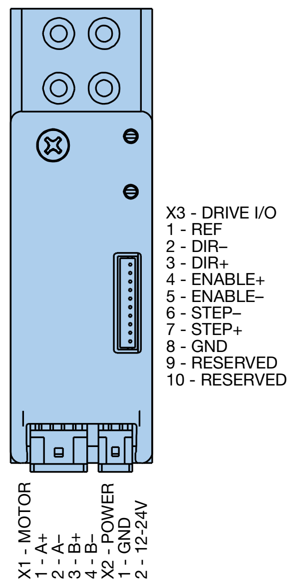
LCR30 Idler



P2™ Stepper Drive



P2 Pin Out Diagram

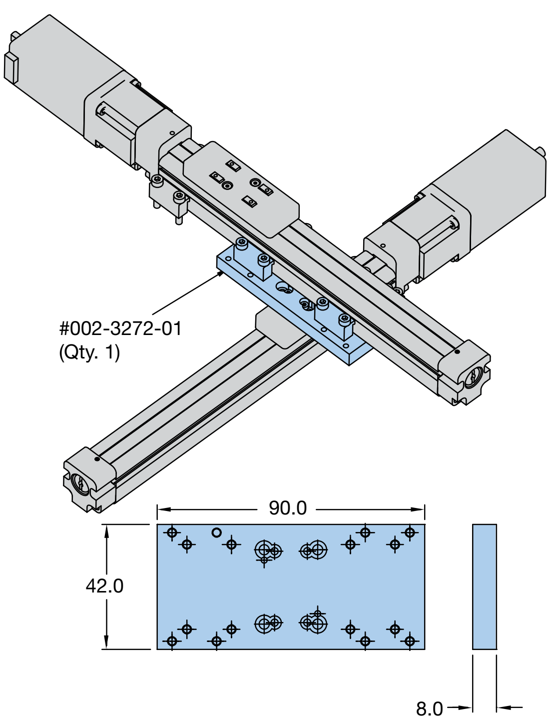


OPTIONS & ACCESSORIES

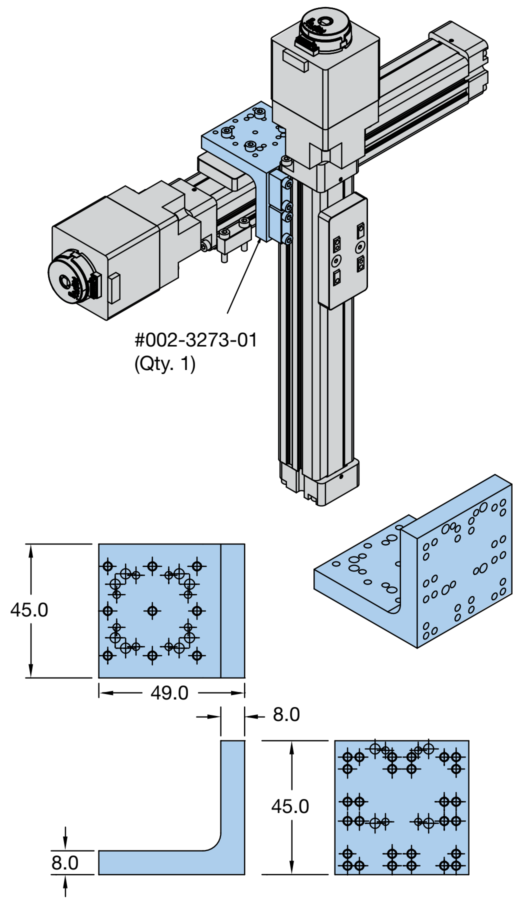
X-Y and X-Z Brackets

Dimensions — mm

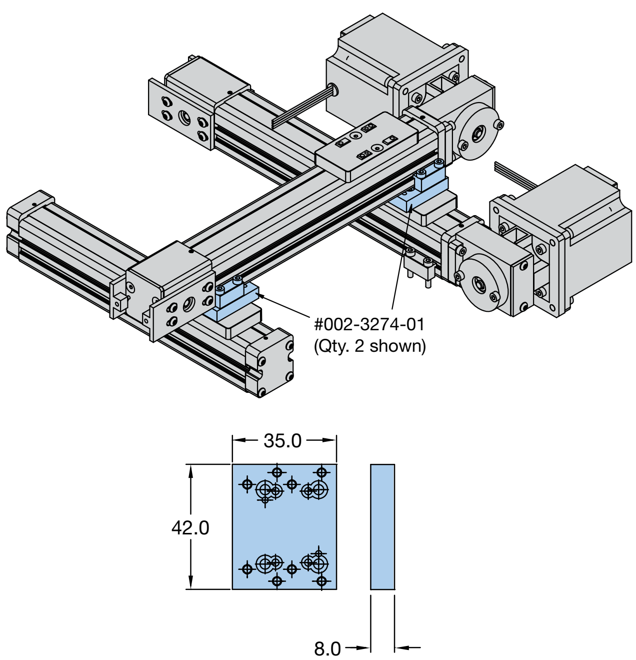
X-Y Bracket for LCR30 Screw-Driven Units
#002-3272-01
(includes four toe clamps with fasteners)



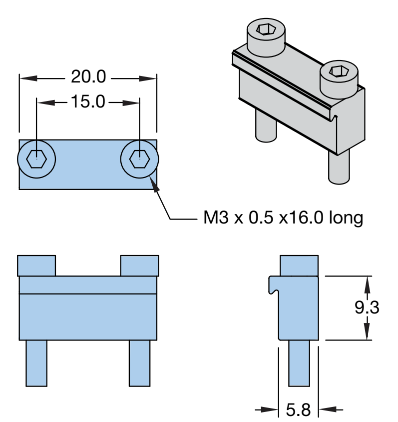
X-Z Bracket for LCR30 (All Units)
#002-3273-01
(includes four toe clamps with fasteners)



X-Y Bracket for LCR30 Belt-Driven Units
#002-3274-01
(includes two toe clamps with fasteners)



Toe Clamp Assembly #002-3233-01
(includes toe clamp and two socket head fasteners)



Belt Driven Tables

Toe Clamps

Toe clamp kits include socket head fasteners to mount clamp.

Part Number	Quantity
002-3233-01	1
002-3233-04	4
002-3233-100	100

Encoder

When using stepper motors, positional feedback is readily available with the optional rotary encoder. The robust magnetic encoder withstands vibration and provides easy in-position confirmation.

Wiring Connection

Pin	Wire	Function
1	White	Ground
2	Green	A+
3	Yellow	A–
4	Brown	+5 VDC
5	Blue	B+
6	Red	B–
7	Pink	Not used
8	Gray	Not used

Encoder

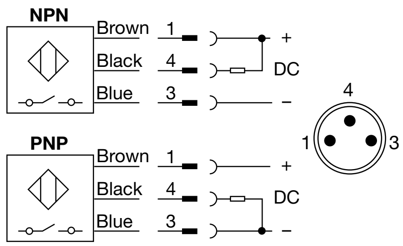
Part Number	Counts/rev	Bore
003-4590-01	400	4 mm
003-4590-02	400	5 mm
003-4590-03	500	4 mm
003-4590-04	500	5 mm
003-4590-05	400	6.35 mm
003-4590-06	500	6.35 mm

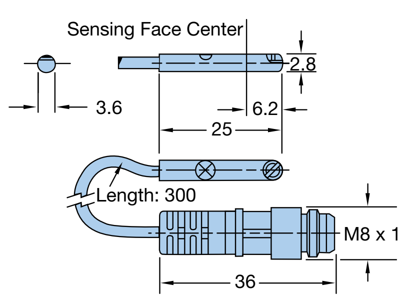
Encoder Cable (6-pin differential)

006-2398-1.0	1m high flex with flying leads
006-2398-3.0	3m high flex with flying leads

End-of-Travel Limit Sensors

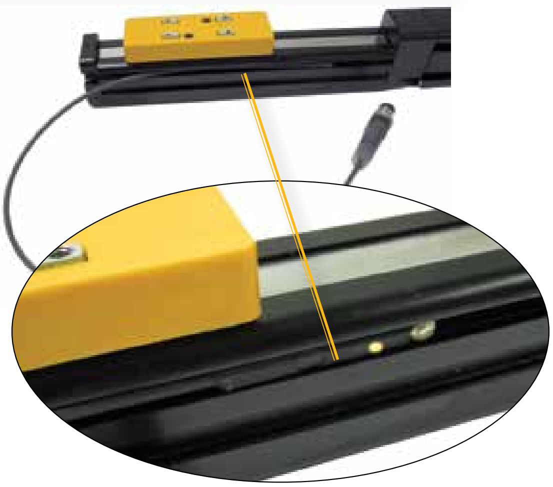
Limit sensors offer home and end of travel protection in a flush mount design that minimizes the overall width of the LCR series. The limit sensors are available standard as NPN or PNP with normally open or normally closed designs.





Specifications

Operating Voltage: 10-30 VDC
Repeatability: ≤±0.1 mm
EMC: EN 60 947-5-2
Short circuit protections: Yes
Reverse Polarity Protection: Yes
Enclosure Rating: IP 67
Operating Temperature Range: -25° to 75° C (-13° to 167° F)



Wiring Connection

Pin	Wire	Function
1	Brown	+ VDC
4	Black	NO
3	Blue	– VDC

Part Number	Logic	Cabling
P8SAMQFAZ	PNP N.C.	3 meter flying leads
P8SAMQCHZ	PNP N.C.	0.3 meter with M8
P8SAMMFAZ	NPN N.C.	3 meter flying leads
P8SAMMCHZ	NPN N.C.	0.3 meter with M8
P8SAMPFAZ	PNP N.O.	3 meter flying leads
P8SAMPCHZ	PNP N.O.	0.3 meter with M8
P8SAMNFAZ	NPN N.O.	3 meter flying leads
P8SAMNCHZ	NPN N.O.	0.3 meter with M8
003-2918-01	All cabling	5 meter extension cable for M8 connections

ORDERING INFORMATION
LCR

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
Order Example:	LCR	30	LN10	0075	S	S	A	N08	E0	L1	A1

① **Series**

LCR	Series

② **Size (width in mm)**

30	30 mm wide profile

③ **Drive Train**

IDLR	Idler unit; no drive mechanism
LN02	2 mm leadscrew with in-line motor mount
LN10	10 mm leadscrew with in-line motor mount (available with LCR30 size only)
BLT0	Single axis belt drive

④ **Travel Length (mm)**

xxxx	25 mm increments of travel LCR30 Screw-Driven: 25 to 600 mm LCR30 Belt-Driven: 25 to 1000 mm

⑤ **Bearing Type**

S	Square rail bearing
B	Glider bushing bearing

⑥ **Environmental Protection**

S	Strip seal protection (standard)

⑦ **Motor Mount Position**

I	Inline
A	Parallel mount, Position "A"*
B	Parallel mount, Position "B"*
C	Parallel mount, Position "C"*
R	Belt drive, motor right
L	Belt drive, motor left
—	No motor

*Not available with BLT0 drive train options.

⑧ **Motor**

N00	No motor
N11	NEMA 11 motor mount [2)]
N16	SM16 motor mount [3)]
N17	NEMA 17 motor mount [3)]
N23	NEMA 23 motor mount [3)]
M11	NEMA 11 stepper motor [2)]
M16	SM162AE-N10N servo motor [3)]
M17	NEMA 17 stepper motor [3)]
M23	NEMA 23 stepper motor [4)]

[2)] Not available on BLT0 belt drive version
[4)] Only available on BLT0 belt drive version

⑨ **Motor Encoder Option**

E0	No encoder
E2	500 line encoder*

*Only available with M11, M17, and M23 motor options

⑩ **Home & End-of-Travel**

L0	No home or limit sensors
L1	3 NPN sensors (1 N.O.; 2 N.C.)
L2	1 NPN sensor (N.O.)
L3	3 PNP sensors (1 N.O.; 2 N.C.)
L4	1 PNP sensor (N.O.)
L5	3 NPN sensors (2 N.O.; 1 N.C.)
L6	1 NPN sensor (N.C.)
L7	3 PNP sensors (2 N.O.; 1 N.C.)
L8	1 PNP sensor (N.C.)

⑪ **Stepper Drive/Amplifier**

A0	No P2 Drive
A1	P2 Stepper Drive/Amplifier
A2	P2 Stepper Drive/Amplifier with 1 meter cable set* (flying leads)
A3	P2 Stepper Drive/Amplifier with 1 meter cable set* to ACR
A4	P2 Stepper Drive/Amplifier with 1 meter cable set* to 6K

*For longer cable needs please order the A1 option and order cables separately

Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

Virtual Engineer

P2™ Ordering Information

Ordering Information

Order Example:

①	②	③	④	⑤	⑥	⑦
P2	D	2	SD	E0	FL1	K0

① **Series**
P2 Series

② **Intelligence**
D Stepper drive

③ **Power Level**
2 2 amps max

④ **Communication**
SD Step and direction input

⑤ **Feedback**
E0 No encoder

⑥ **Cable Set**
FL0 No cable set
FL1
FL3
AC1 See chart at left
AC3
6K1
6K3

⑦ **Mounting Kit**
K0 Standard plate mounting kit included
K1 DIN Rail Mounting Kit

P2 Options and Accessories

Part Number	Order Code	Description
006-2342-1.0	**—**	Power Cable – 1 m , High Flex
006-2342-3.0	**—**	Power Cable – 3 m , High Flex
006-2343-1.0	**—**	6K Control Cable – 1 m, High Flex
006-2343-3.0	**—**	6K Control Cable – 3 m, High Flex
006-2344-1.0	**—**	ACR Control Cable – 1 m, High Flex
006-2344-3.0	**—**	ACR Control Cable – 3 m, High Flex
006-2345-1.0	**—**	Control Cable – Flying Leads – 1 m, High Flex
006-2345-3.0	**—**	Control Cable – Flying Leads – 3 m, High Flex
006-2357-1.0	**—**	Motor Power Extension – 1 m
006-2357-3.0	**—**	Motor Power Extension – 3 m
002-3296-1.0	**FL1**	1 m Flying Lead Cable Set (contains power and communications cable from above list)
002-3296-3.0	**FL3**	3 m Flying Lead Cable Set (power and communications cable from above list)
002-3297-1.0	**AC1**	1 m Cable Set to ACR (power and communications cable from above list)
002-3297-3.0	**AC3**	3 m Cable Set to ACR (power and communications cable from above list)
002-3298-1.0	**6K1**	1 m Cable Set to 6K (power and communications cable from above list)
002-3298-3.0	**6K3**	3 m Cable Set to 6K (power and communications cable from above list)
002-3294-01	**—**	DIN Rail Mounting Kit (DIN clip and screw)
002-3295-01	**—**	Mounting kit to attach P2™ to LCR

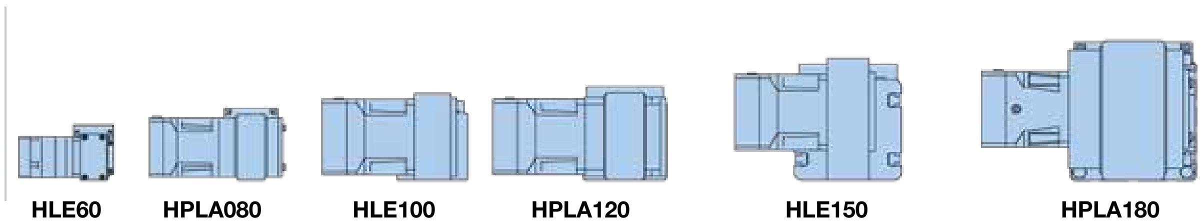
HPLA Series
Belt Driven Linear Modules

Belt-Drive Actuators for High Thrust, Long Stroke Applications

- **Strong – steel roller bearing option for highest load capacity – 1530 kg**
- **Rugged construction for heavy duty applications**
- **Thrust force capacity to 5455 N**
- **Standard travel up to 9 meters**
- **Velocity up to 5 meters/sec.**
- **Positional repeatability of ±0.2 mm**
- **Timing belt and pulley drive mechanism for fast, accurate positioning**

Proven Technology

- **Direct mounting for planetary gear reducers – eliminating complexity of additional machined parts or couplings**
- **Adjustable "end of travel" limit switches and "Home" position sensor**
- **Cable carrier systems**
- **Performance matched Parker servo systems**
- **Structural components for vertical and multi-axis mounting**
- **Toe clamps and hardware for fast/easy mounting**
- **External bumper option**
- **Link shafts and support bearing for dual unit axes**
- **Splice plates for extending travels beyond length available in a single profile**



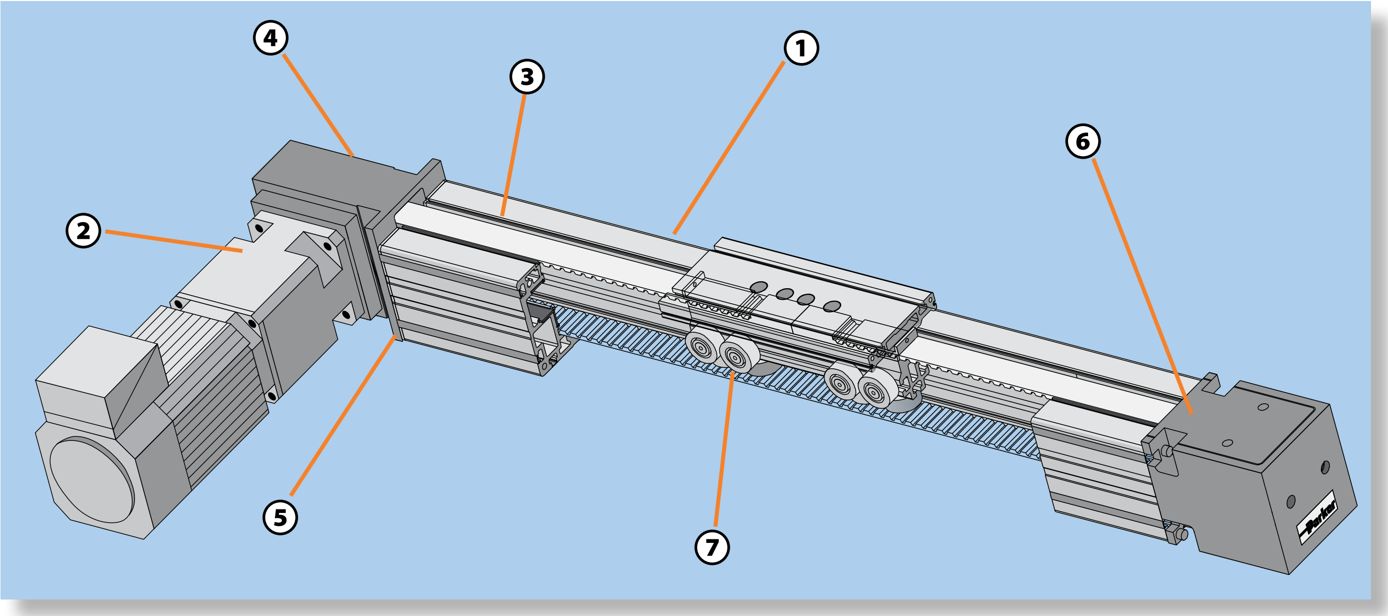
	HLE60	HPLA80	HLE100	HPLA120	HLE150	HPLA180
Maximum Travel (mm)	4,000	5,540	6,200	9,470	7,900	9,240
Maximum Payload (N)	353	1,304	1,549	2,598	3,402	4,501
Maximum Acceleration (m/s²)	10	10	10	10	10	10

***Do not exceed allowable axial and moment loading.**

The HPLA is a rugged "next generation" linear module that offers high speed, high acceleration, and long travel, combined with stiff, rigid construction characteristics. It is ideally suited as a single axis product or as a component for high speed multi-axis gantries.

The HPLA carriage is rigidly supported on three sides by heavy duty roller bearings, housed in a rugged aluminum housing. The bearing wheels are pre-loaded via eccentric bushings to eliminate play in the system, and are strategically located to evenly distribute the load across the length of the carriage.

A high strength steel reinforced drive belt and pulley system provides fast and highly repeatable positioning of the carriage. This high thrust drive belt is securely connected to the carriage by a unique clamping system. This system provides a secure connection and enables easy belt replacement without the need to remove the payload. Having a low coefficient of friction, the carriage design provides a high mechanical efficiency and long service life. Special carriage lengths and linear units with multiple carriages are available for custom applications.



1 Carriage

Roller bearing wheels on three sides of the carriage provide smooth linear motion and support and evenly distribute the load across the length of the carriage. Eccentric bearing wheel bushings eliminate play on all sides of the carriage.

2 Gearhead

Parker Stealth series gearheads integrated as direct drive options.

3 Drive Belt

A zero backlash, steel reinforced timing belt provides high speed, high force, and high acceleration. A serrated clamp mechanism between belt and carriage guarantees a safe, strong connection and allows belt replacement without removing the load.

4 Drive Station

The drive stations are designed to accept planetary gear reducers or provide different shaft outputs for driving the HPLA.

5 Housing

An extruded aluminum profile provides maximum rigidity (torsion and deflection) at minimum weight. It accommodates steel wheels that ride on integral hardened steel bearing ways, or polyamide wheels that ride in the extruded guideway.

6 Tensioning Station

An easily accessible tensioning station is used to set the drive belt tension.

7 Roller Bearing

Three rows of preloaded heavy duty steel roller bearings provide the highest load carrying capacity available.

Modular drive system

Increased system stiffness due to larger belt width. Low maintenance. High performance due to hollow shaft input.

Modular guide system

Provides an alternative to composite wheel material, with low maintenance and quiet operations. Steel wheel option on an integrated steel rolling surface for increased load capacity, plus high load-bearing capacity and high levels of rigidity.

Various options for adaptation to wide ranging applications

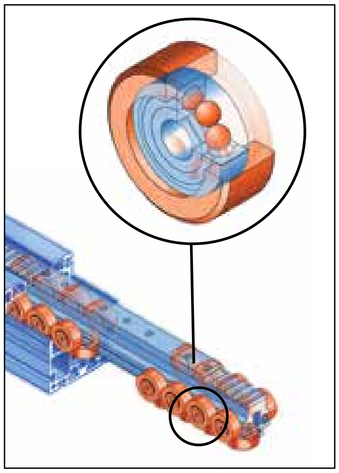
Steel cover strip, corrosion-resistant stainless steel version for application in clean rooms or in the food industry, and integrated position feedback system for maximum precision.

Optional IP30 Strip Seal

Magnetically attached stainless steel seal strip (not shown) provides environmental protection to interior components.

Roller Bearing Design

Each roller bearing incorporates a low friction, lubricated and sealed radial ball bearing enclosed in a hardened steel outer ring (or raceway). A polyamide tread can be substituted for the steel ring whenever whisper quiet motion is desired.



SPECIFICATIONS

As part of the advanced, cost-effective construction of machines and handling systems, the HPLA is a good choice for applications such as materials handling (palletizing, depalletizing, feeding, and part removal), warehouse technology (parts picking, storage and retrieval), and machine tool automation (workpiece loading and unloading, tool changing). Additional examples include textile machinery building (cross-cutting, slitting and stacking, quilting, seam stitching) and construction (formwork and placing reinforcing steel bars in concrete).

Other typical applications are process engineering (painting, coating, bonding), testing technology (guiding ultrasonic sensors, laboratory equipment), and cleanroom technology (wafer transport, wafer coating).

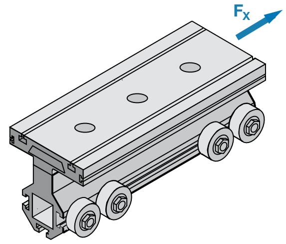
Characteristic	Units	HPLA80 Polyamide Wheel	HPLA80 Steel Wheel	HPLA120 Polyamide Wheel	HPLA120 Steel Wheel	HPLA180 Polyamide Wheel	HPLA180 Steel Wheel	HPLA180 (Rack Drive) Polyamide Wheel
Unit Weight (basic unit without stroke)								
Standard Carriage, NL	kg (lb)	6.8 (15.0)	7.5 (16.5)	20.2 (44.4)	21.6 (47.5)	57.2 (125.8)	61.6 (135.3)	78.4 (172.5)
Extended Carriage, VL	kg (lb)	8.6 (18.9)	9.5 (20.9)	25.2 (55.4)	27.1 (59.6)	74.8 (164.6)	80.9 (178.0)	95.2 (209.4)
Carriage Weight								
Standard Carriage, NL	kg (lb)	1.7 (3.7)	1.8 (4.0)	5.8 (12.8)	6.0 (13.2)	12.3 (27.1)	12.6 (27.7)	32.5 (71.5) (1)
Extended Carriage, VL	kg (lb)	2.6 (5.7)	2.8 (6.2)	8.8 (19.4)	9.2 (20.2)	21.1 (46.4)	21.8 (48.0)	39.8 (87.6) (1)
Weight/Meter of Additional Travel	kg/m (lb/ft)	6.1 (4.1)	7.3 (4.9)	13.7 (9.2)	15.5 (10.4)	29.4 (19.8)	33.6 (22.6)	31.5 (21.2)
Moment of Inertia (related to the drive shaft)								
Standard Carriage, NL	$kg\text{-}cm^2$ ($lb\text{-}in^2$)	17.8 (6.1)	18.4 (6.3)	142 (48)	146 (50)	725 (247)	743 (253)	698 (238)
Extended Carriage, VL	$kg\text{-}cm^2$ ($lb\text{-}in^2$)	25.4 (8.7)	26.5 (9.0)	197 (67)	204 (70)	1121 (382)	1154 (393)	845 (288)
Travel and Speed								
Maximum Speed(2)	m/s (in/s)	5 (200)		5 (200)		5 (200)		5 (200)
Maximum Acceleration(2)	m/s^2 (in/s^2)	10 (393)		10 (393)		10 (393)		10 (393)
Max. Travel, Standard Carriage NL(3)	mm (in)	5540 (218)	5520 (217)	9470 (372)	9440 (371)	9240 (363)	9200 (362)	8680 (341)
Max. Travel, Extended Carriage VL(3)	mm (in)	5390 (212)	5370 (211)	9270 (365)	9240 (363)	8940 (352)	8900 (350)	8380 (330)
Geometric Data								
Cross Section, Square	mm (in)	80 (3.15)		120 (4.72)		180 (7.09)		180 (7.09)
Moment of Inertia Ix	cm^4 (in^4)	139 (3.34)		724 (17.39)		3610 (86.73)		3610 (86.73)
Moment of Inertia Iy	cm^4 (in^4)	165 (3.96)		830 (19.94)		4077 (97.95)		4077 (97.95)
Moment of Elasticity	N/mm^2 (lb/in^2)	0.72×10^5 (0.1044×10^8)		0.72×10^5 (0.1044×10^8)		0.72×10^5 (0.1044×10^8)		0.72×10^5 (0.1044×10^8)
Pulley Data, Torques, Forces								
Travel Distance per Revolution	mm/rev (in/rev)	180 (7.09)		270 (10.63)		420 (16.54)		280 (11.02)
Response Radius of Drive Pulley	mm (in)	28.7 (1.13)		43.0 (1.69)		66.8 (2.63)		44.6 (1.75)
Maximum Drive Torque	Nm (lb-in)	47.4 (420)		131.4 (1165)		368 (3264)		58 (514)
Maximum Belt Traction (effective load)		Refer to Load-Bearing Capacity and Maximum Permissable Moment Load Charts						
Repeatability(3)(4)	mm (in)	± 0.2 (± 0.008)		± 0.2 (± 0.008)		± 0.2 (± 0.008)		± 0.05 (± 0.002)

(1) Includes weight of drive module.
(2) Greater speeds and accelerations may be achieved.
(3) Bumper to bumper maximum stroke - splicing possible for longer travel distances including safety zone.
(4) Nominal value - component dependent. For improved repeatability consult factory.

HPLA080 Series – Load-Bearing Capacity of Carriage and Timing Belt

Load-Bearing Capacity of HPLA080 Timing Belt (Fx)

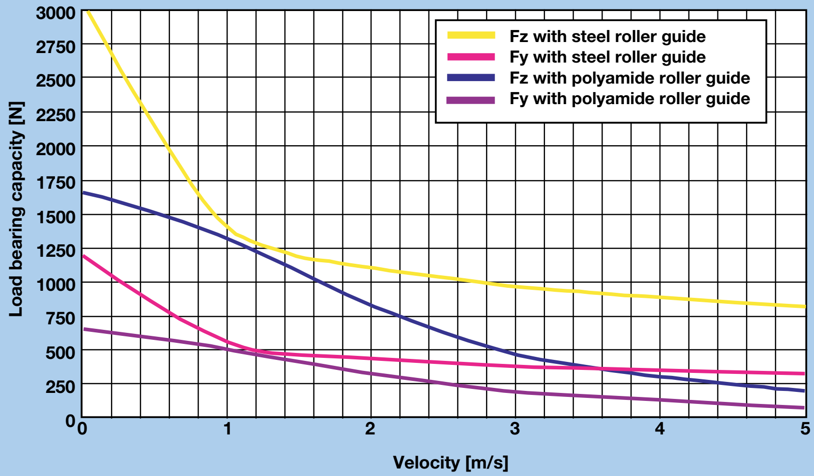
Description	Gearhead	Drive Option	Transferable Thrust Force (n) Nominal Belt Tension (81,000 km life)	Transferable Thrust Force (n) Maximum Belt Tension (46,000 km life)
Supported Pulley	PX90/PX115 PV90/PV115 PS90	S03/S04/ S08/S09	925	1115



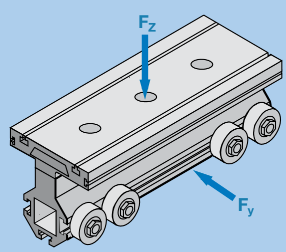
The forces and moments that the carriage is capable of transferring are speed-dependent. The curves shown in the graphs apply to a standard carriage (S). With the extended carriage (E), all the values apart from Fx (load-bearing capacity of timing belt) can be doubled if the load is applied equally to both halves of the carriage or distributed uniformly along its entire length.

HPLA080 Load-Bearing Capacity (Fy and Fz)

(Values double for extended carriage)

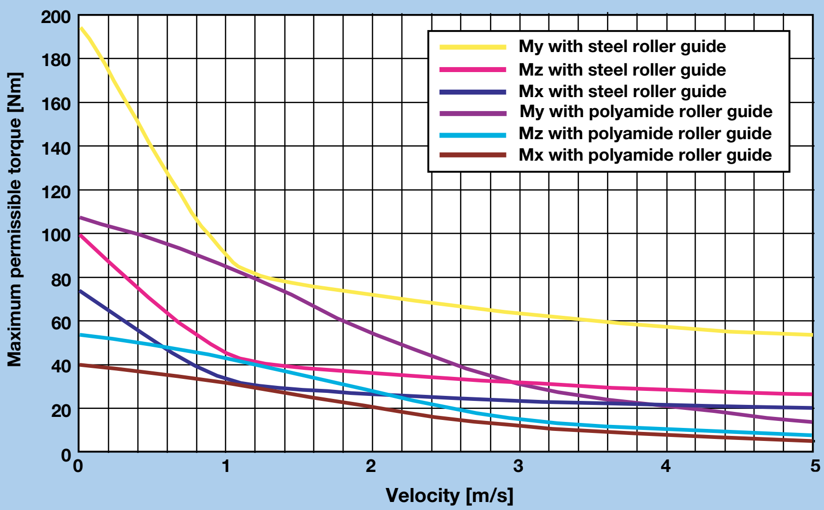


The curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied in different directions, the values given by the curves must be derated, i.e. the load or speed should be reduced if necessary.



HPLA080 Maximum Permissable Moment Load (Mx, My and Mz)

(Values double for extended carriage)



Virtual Engineer software is available for determination of precise carriage loading.

Virtual Engineer

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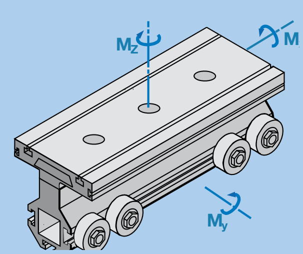
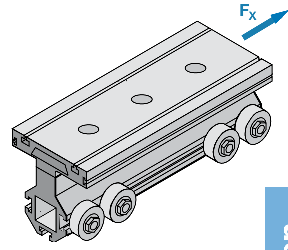


HPLA120 Series – Load-Bearing Capacity of Carriage and Timing Belt

Load-Bearing Capacity of HPLA120 Timing Belt (Fx)

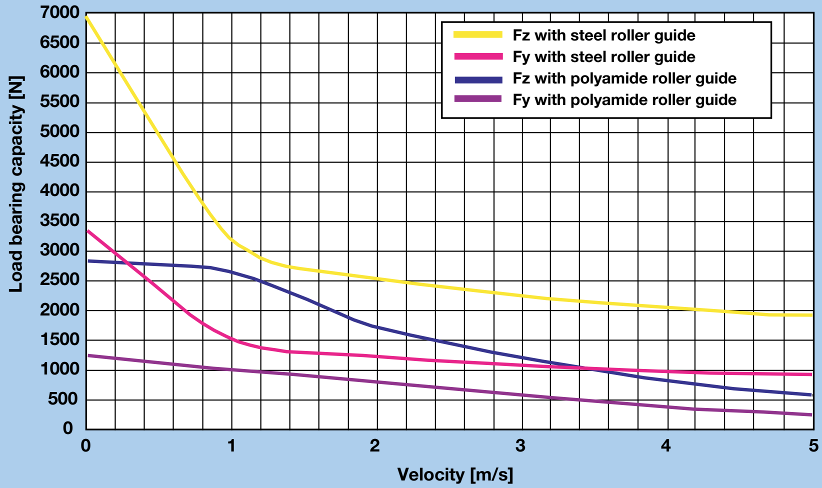
Description	Gearhead	Drive Option	Transferable Thrust Force (n) Nominal Belt Tension (81,000 km life)	Maximum Belt Tension (46,000 km life)
Supported Pulley	PV115 PX115 PS90/PS115	S03/S04/ S08/ S09	1700	2235



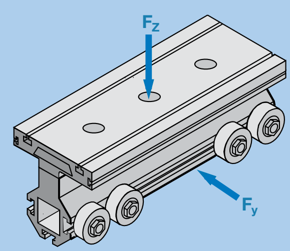
The forces and moments that the carriage is capable of transferring are speed-dependent. The curves shown in the graphs apply to a standard carriage (S). With the extended carriage (E), all the values apart from Fx (load-bearing capacity of timing belt) can be doubled if the load is applied equally to both halves of the carriage or distributed uniformly along its entire length.

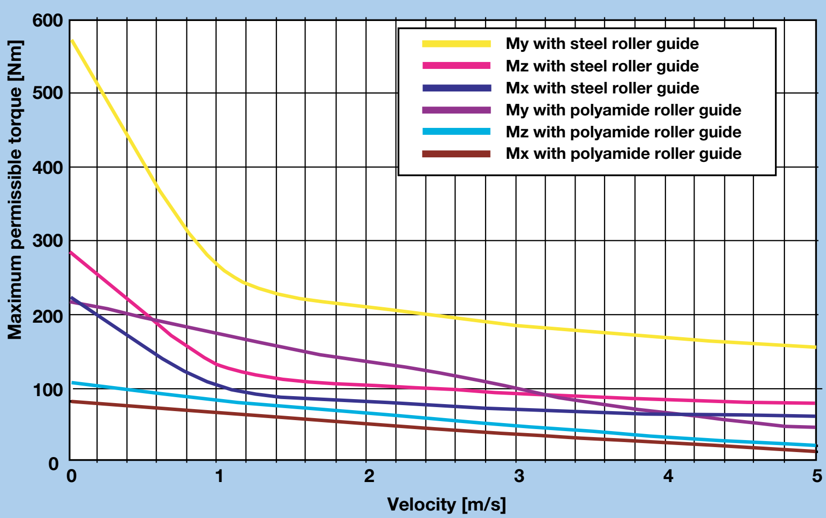
HPLA120 Load-Bearing Capacity (Fy and Fz)

(Values double for extended carriage)



The curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied in different directions, the values given by the curves must be derated, i.e. the load or speed should be reduced if necessary.





Virtual Engineer software is available for determination of precise carriage loading.

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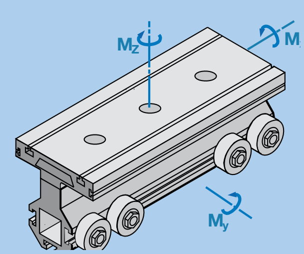
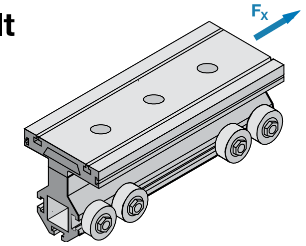


HPLA180 Series – Load-Bearing Capacity of Carriage and Timing Belt

Load-Bearing Capacity of HPLA180 Timing Belt (Fx)

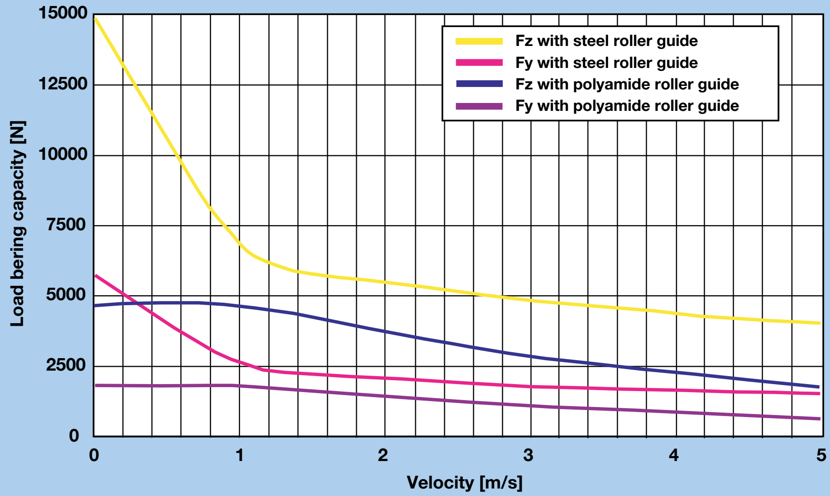
Description	Gearhead	Drive Option	Transferable Thrust Force (n) Nominal Belt Tension (81,000 km life)	Transferable Thrust Force (n) Maximum Belt Tension (46,000 km life)
Supported Pulley	PS115 PS142	S03/S04/ S08/S09	4170	5455



The forces and moments that the carriage is capable of transferring are speed-dependent.
The curves shown in the graphs apply to a standard carriage (S). With the extended carriage (E), all the values apart from Fx (load-bearing capacity of timing belt) can be doubled if the load is applied equally to both halves of the carriage or distributed uniformly along its entire length.

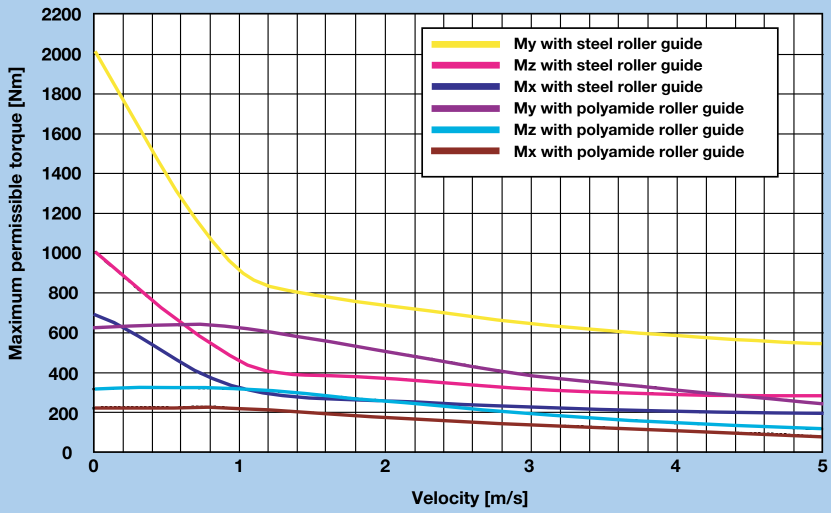
HPLA180 Load-Bearing Capacity (Fy and Fz)

(Values double for extended carriage)

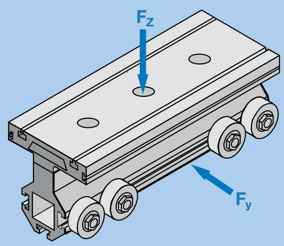


HPLA180 Maximum Permissable Moment Load (Mx, My and Mz)

(Values double for extended carriage)



The curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied in different directions, the values given by the curves must be derated, i.e. the load or speed should be reduced if necessary.



Virtual Engineer software is available for determination of precise carriage loading.

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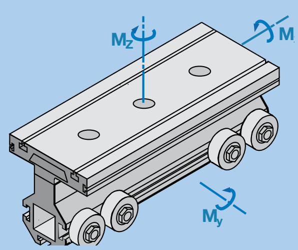
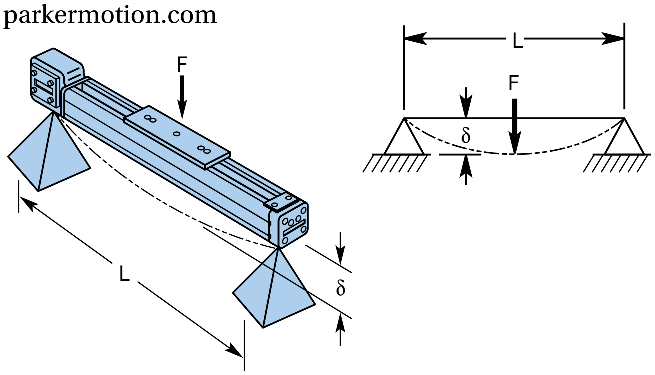


HPLA Characteristics

The HPLA deflection curves can be used for determining the deflection based on the profile length and the application load weight. Applications requiring high acceleration forces can place a severe strain on the system stability. In these cases, a solid substructure may be required with the HPLA product being supported at frequent intervals.

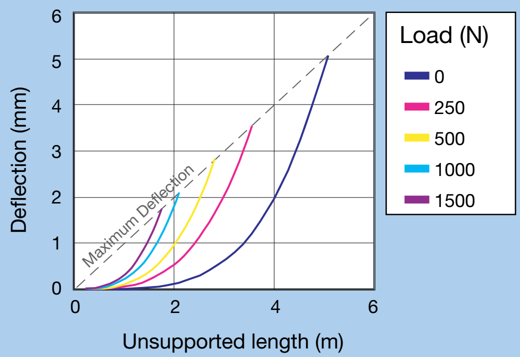
These deflection curves illustrate the deflection d, based on the HPLA profile being simply supported at both ends. The graphs take into consideration the self deflection due to the weight of the profile, along with the load to be transported. The maximum deflection cannot be exceeded. If the maximum deflection is exceeded based on your application parameters, then additional supports are required. Alternatively, the next larger profile size may be considered. For deflection formulas and calculations, please refer to the Technical Information Library found on our web site: www.parkermotion.com



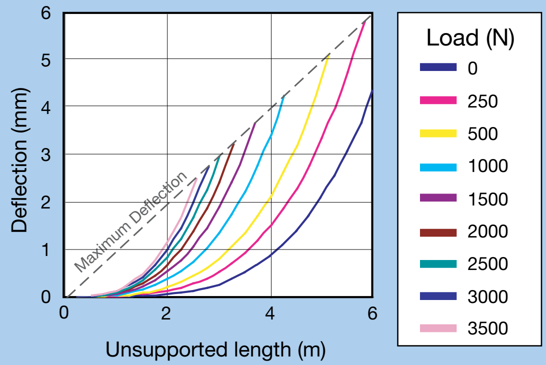
F = Force N
L = Unsupported length mm
δ = Deflection mm

Deflection Curves

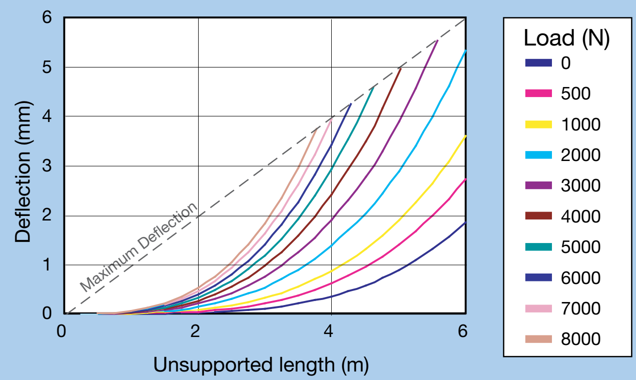
HPLA080



HPLA120



HPLA180

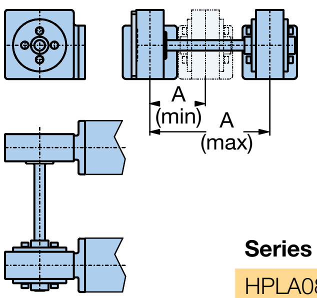


Dual Axis Considerations

When two parallel linear modules are required to form a single axis, the span or distance between each unit determines which type of shaft connection is required. In some cases, a link shaft support bearing might also be required.

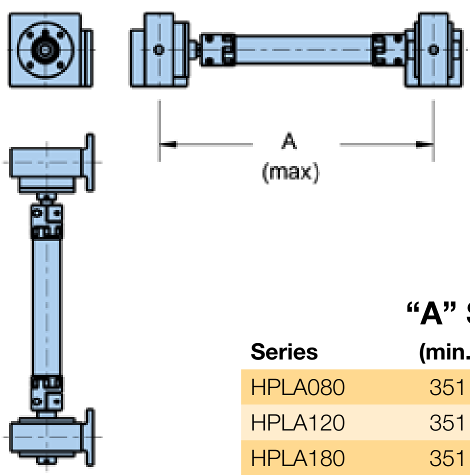
The link shaft bearing is used to support the linking shaft of an HPLA dual axis when there is a large center to center distance. This bearing must be used if the critical speed is exceeded with the dual-axis link shaft.

Figure A



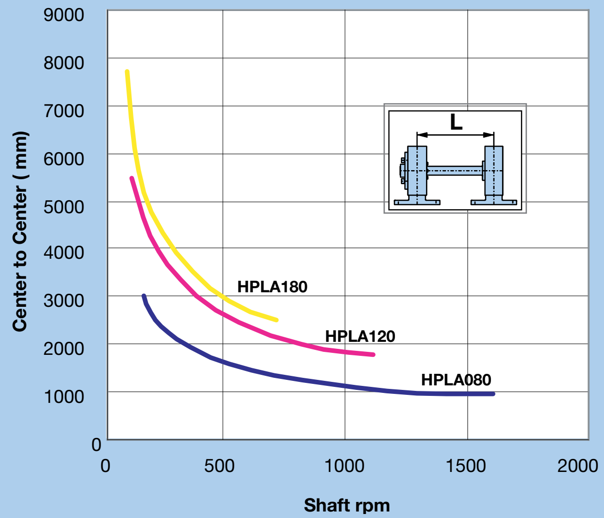
Series	"A" Span (mm) (min.)	(max.)
HPLA080	120	350
HPLA120	150	350
HPLA180	185	350

Figure B

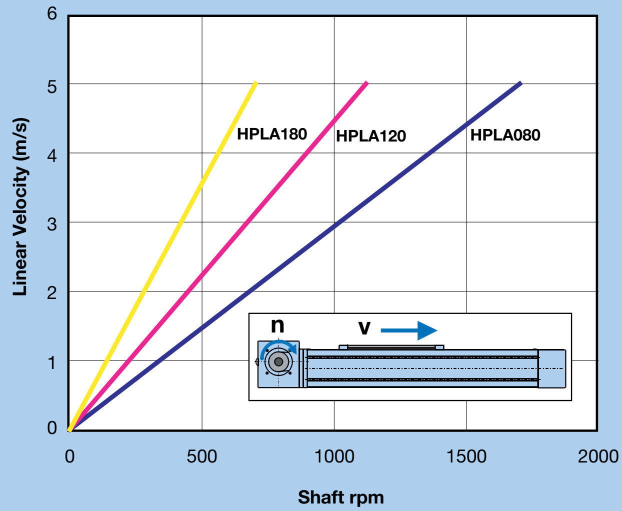


Series	"A" Span (mm) (min.)	(max.)
HPLA080	351	3000
HPLA120	351	3000
HPLA180	351	3000

Critical Speed



Linear Velocity

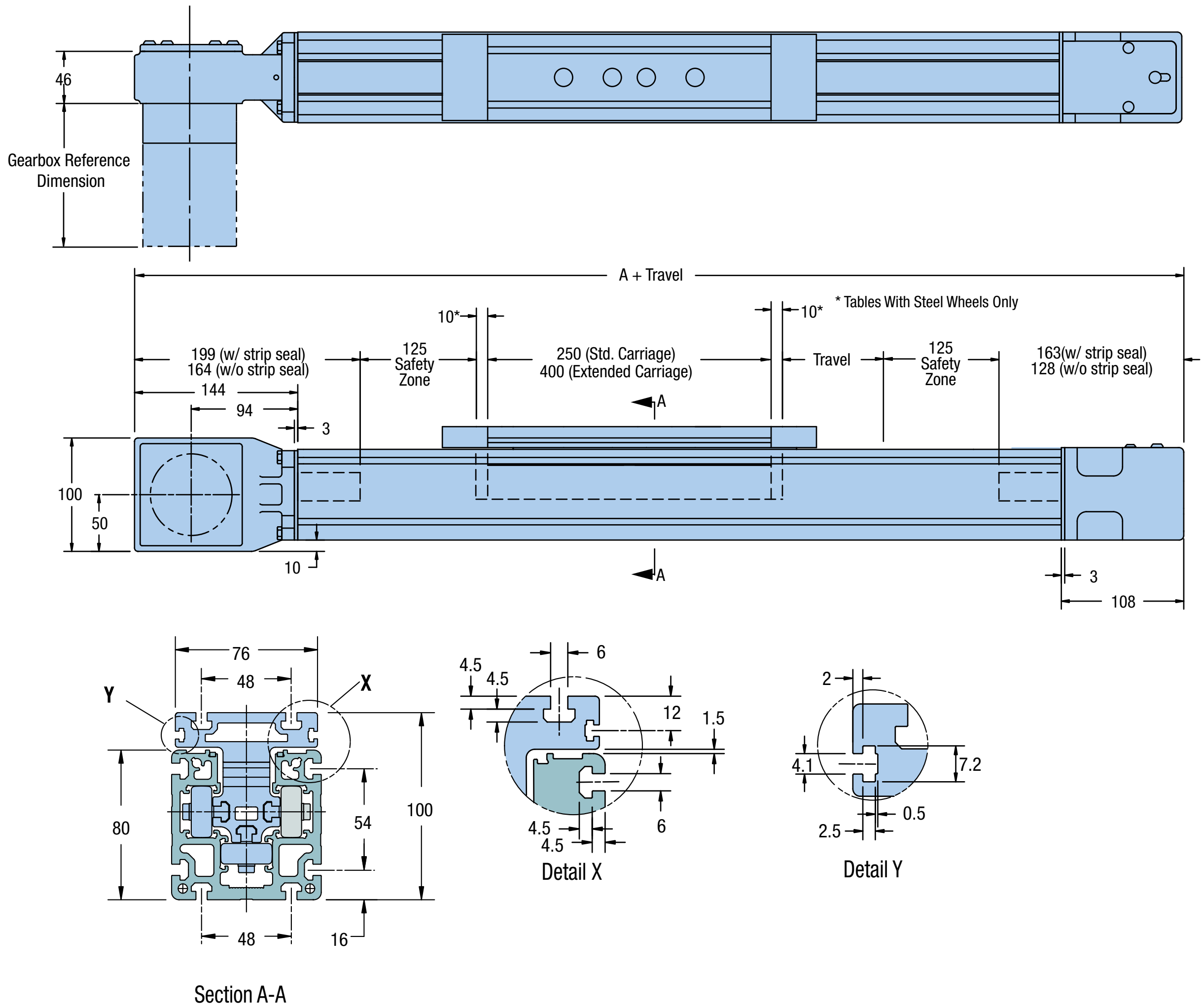


DIMENSIONS

Download 2D & 3D files from
www.parker.com/emn/HPLA080

HPLA080 Drive Unit

Dimensions (mm)

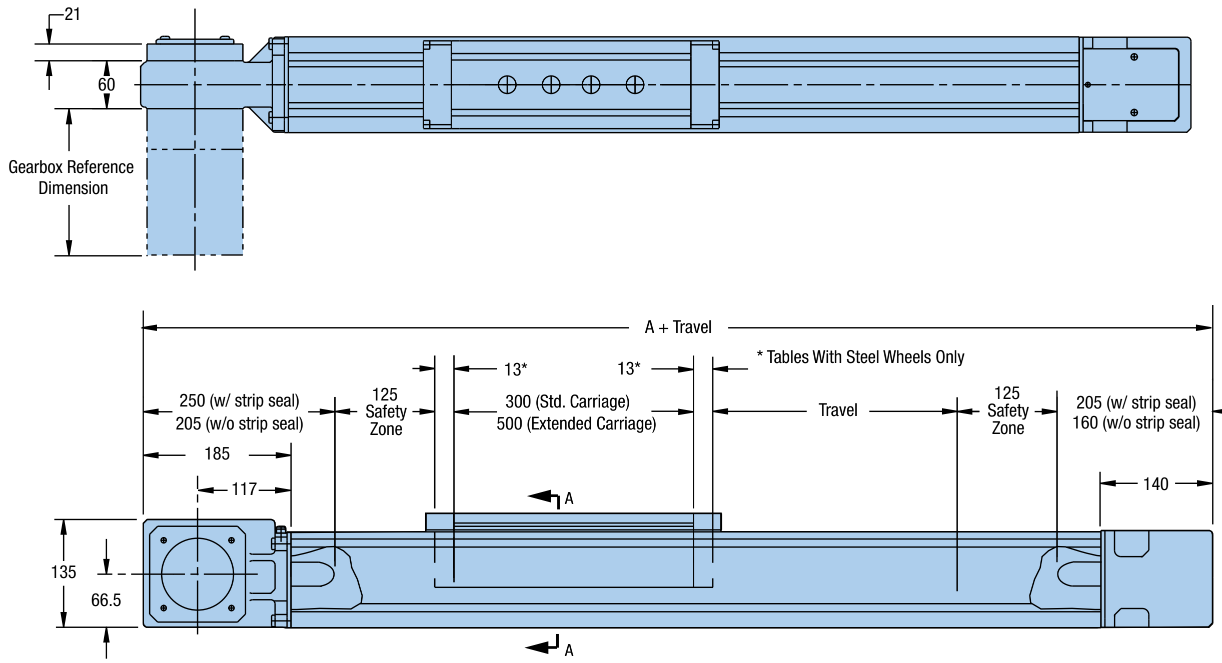


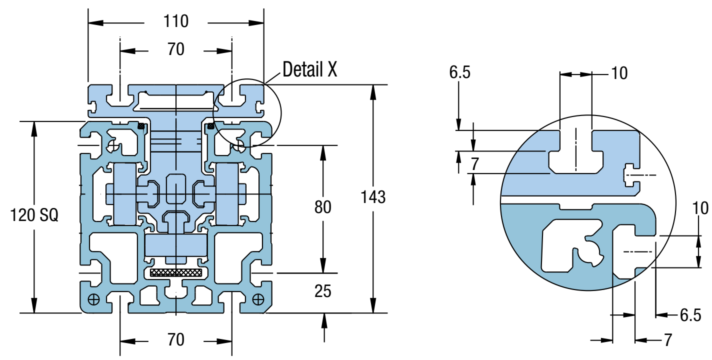
Dimension A (mm)

Description	With Strip Seal	Without Strip Seal
Standard Carriage - Polyamide Wheels	862	792
Standard Carriage - Steel Wheels	882	812
Extended Carriage - Polyamide Wheels	1012	942
Extended Carriage - Steel Wheels	1032	962

HPLA120 Drive Unit

Dimensions (mm)





Section A-A

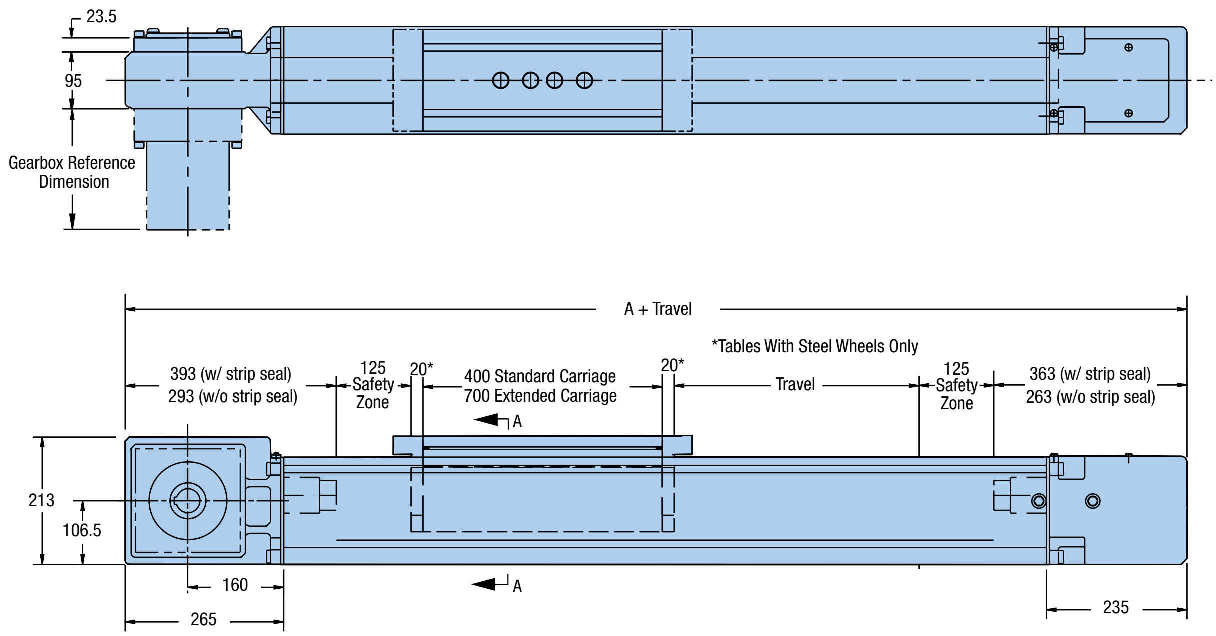
Detail X

Dimension A (mm)

Description	With Strip Seal	Without Strip Seal
Standard Carriage - Polyamide Wheels	1005	915
Standard Carriage - Steel Wheels	1031	941
Extended Carriage - Polyamide Wheels	1205	1115
Extended Carriage - Steel Wheels	1231	1141

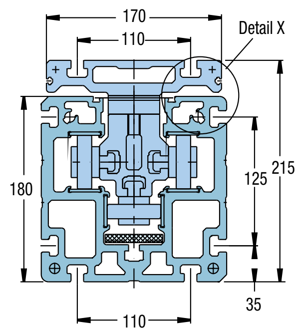
HPLA180 Drive Unit

Dimensions (mm)

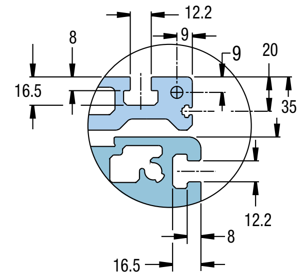


Dimension A (mm)

Description	With Strip Seal	Without Strip Seal
Standard Carriage - Polyamide Wheels	1408	1206
Standard Carriage - Steel Wheels	1446	1246
Extended Carriage - Polyamide Wheels	1706	1506
Extended Carriage - Steel Wheels	1746	1546



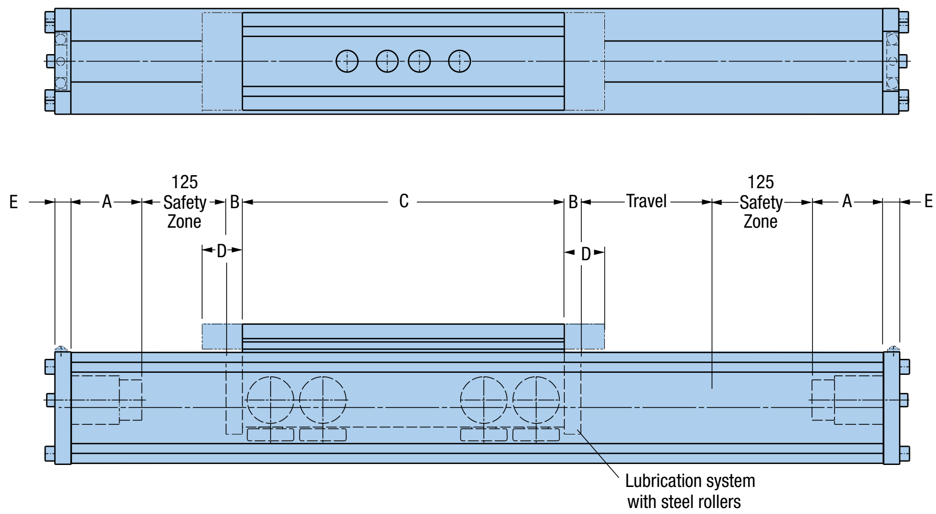
Section A-A



Detail X

Idler Unit Dimensions

Dimensions (mm)



Dimensions (mm)

Series	Carriage Length	Wheel Type	With Strip Seal					Without Strip Seal				
			A	B	C	D	E	A	B	C	D	E
HPLA080	Standard	Polyamide	55	-	250	40	10	20	-	250	-	10
HPLA080	Extended	Polyamide	55	-	400	40	10	20	-	400	-	10
HPLA080	Standard	Steel	55	10	250	40	10	20	10	250	-	10
HPLA080	Extended	Steel	55	10	400	40	10	20	10	400	-	10
HPLA120	Standard	Polyamide	65	-	300	50	15	20	-	300	-	15
HPLA120	Extended	Polyamide	65	-	500	50	15	20	-	500	-	15
HPLA120	Standard	Steel	65	13	300	50	15	20	13	300	-	15
HPLA120	Extended	Steel	65	13	500	50	15	20	13	500	-	15
HPLA180	Standard	Polyamide	128	-	400	100	20	28	-	400	-	20
HPLA180	Extended	Polyamide	128	-	700	100	20	28	-	700	-	20
HPLA180	Standard	Steel	128	20	400	100	20	28	20	400	-	20
HPLA180	Extended	Steel	128	20	700	100	20	28	20	700	-	20

HPLA/HLE OPTIONS & ACCESSORIES

Limit and home sensors, switches, cable carriers, splice plates, and more.

See Options & Accessories at the end of the belt-driven section.

ORDERING INFORMATION
HPLA

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
Order Example:	HPLA080	D1	B1	T2000	C1	DA1000	S08	F02	G2-05	K24	R1	H1	LH1	E1

① **Series**
HPLA080
HPLA120
HPLA180

② **Drive System**
D0 Idler Unit
D1 Timing Belt Drive, Nominal Thrust, Maximum Life
D2 Timing Belt Drive, Maximum Thrust, Nominal Life

③ **Bearing Option**
B1 Polyamide Rollers
***B2** Steel Rollers
* For steel roller option in vertical and inverted orientations, please consult factory for special instructions.

④ **Travel**
Tnnnn Specified travel in mm (nnnn = mm)

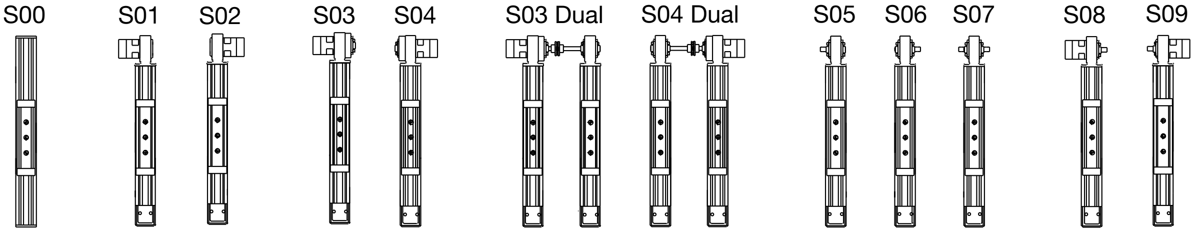
⑤ **Carriage**
C1 Standard Length Carriage with Load Plate*
C2 Extended Length Carriage with Load Plate*
C3 Standard Length Carriage with Clamping Bar*
C4 Extended Length Carriage with Clamping Bar*
* See photos below.

⑥ **Link Shaft Option**
DA0000 No Link Shaft - Single Axis or Idler Unit
DAnnnn Double Unit, Specify Center to Center Distance (mm)

⑦ **Drive Shaft Configuration**
S00 No Shaft, Idler Unit
S03 Supported Pulley, Flange Left
S04 Supported Pulley, Flange Right
S05 Supported Pulley, Shaft Option, Left
S06 Supported Pulley, Shaft Option, Right
S07 Supported Pulley, Shaft Option, Both
S08 Supported Pulley, Flange Left, Shaft Right
S09 Supported Pulley, Flange Right, Shaft Left

⑧ **Drive Housing Flange**
F00 No Flange
F08 PV90/PX90 Flange (HPLA80 ONLY)
F09 PX115/PV115 Flange (HPLA080 and HPLA120 only)
F10 PS90 Flange (HPLA080 and HPLA120 only)
F11 PS115 Flange (HPLA120 & HPLA180 only)
F12 PS142 Flange (HPLA180 only)

S00 S01 S02 S03 S04 S03 Dual S04 Dual S05 S06 S07 S08 S09



Belt Driven Tables

Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

Virtual Engineer

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
Order Example:	HPLA080	D1	B1	T2000	C1	DA1000	S08	F02	G2-05	K24	R1	H1	LH1	E1

⑨ **Gearbox Option**

G0-00	No Gearbox
G08-nn	PX90 Gearbox included
G09-nn	PX115 Gearbox included
G10-nn	PS90 Gearbox included
G11-nn	PS115 Gearbox included
G12-nn	PS142 Gearbox included
G14-nn	PV90 Gearbox included
G15-nn	PV115 Gearbox included

nn = ratio
Single stage ratios 3:1, 5:1, 10:1 Dual stage ratios 15:1, 25:1

⑩ **Motor Kit Option**

K00	No Flange
K20	NEMA23 stepper, 1/4" shaft
K21	BE23
K23	SMN60, MPM72 (metric), N070, J070
K24	SMN82, MPM89 (metric), N092, J092
K26	BE34
K34	MPP092x motor kit
K36	Parker MPP100/MPJ100
K39	Parker MPP115/MPJ115
K41	Parker MPP142/MPJ142
K50	Parker HDY55; MPL15XX (Allen Bradley)
K51	AKM3X-AN (Kollmorgen)
K52	SGMAH-04 (Yaskawa)
K53	SGMAH-08 (Yaskawa)
K54	MKD041 (Indramat)
K55	AKM4X-AN (Kollmorgen)
K56	MKD070 (Indramat)
K57	MKD090 (Indramat)

⑪ **Environmental Option**

R1	Standard preparation with strip seal [1]
R2	Standard preparation with no strip seal
R3	Corrosion resistant preparation with strip seal [1, 2]
R4	Corrosion resistant preparation with no strip seal [2]

[1] C1, C2 Carriage Load Plate Only
[2] B1 Bearing Option Polyamide Rollers Only)

⑫ **Mounting Orientation**

H1	Carriage Up
H2	Carriage Down
H3	Carriage on Side, Drive Station Up
H4	Carriage on Side, Drive Station Down

⑬ **Limit/Home Switch Option***

LH0	No Limit Switch Assembly
LH3	Three NPN Prox Switches,10-30 VDC
LH4	Three PNP Prox Switches, 10-30 VDC

*C1, C2 Carriage Load Plate Only

⑭ **Linear Encoder**

E1	Without Linear Encoder
E5*	5.0 Micron Resolution, Magnetic Type
E7*	Sine Cosine Output, Magnetic Type

*C1, C2 Carriage Load Plate Only
*Consult factory for linear encoder options and quotation.

HLE-RB Series Belt Driven Linear Modules

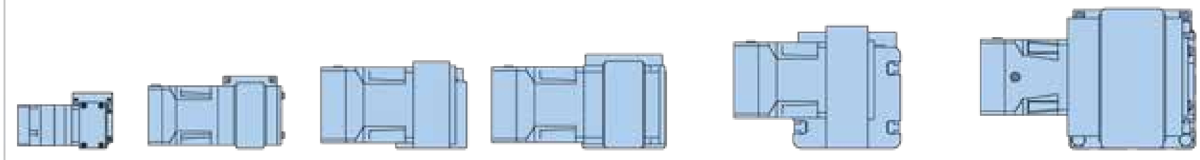
Belt-Drive Actuators for High Thrust, Long Stroke Applications

- **Standard travel up to 7.9 meters***
- **Load Capacities up to 600 kg**
- **±0.2 mm positional repeatability**
- **Timing belt and pulley drive mechanism for fast, accurate positioning**
- **Roller wheel bearings for smooth high speed linear motion**
- **IP30 strip seal**

*Longer travels available with splice kits.

Design Advantages

- **Low running friction**
- **Low particle generation (clean room suitability to class 100)**
- **Low wear and low maintenance**
- **Quiet operation**
- **High efficiency and long service life**
- **High dynamic performance due to low-mass, play-free wheels**
- **Minimal preventative maintenance required**
- **T-slots integrated on all sides of the profile for mounting attachments or for use as a cable duct**
- **Timing belts can be replaced without removing load attachment plate**
- **Multiple configuration options due to T-slots available on both the profile and load plate**



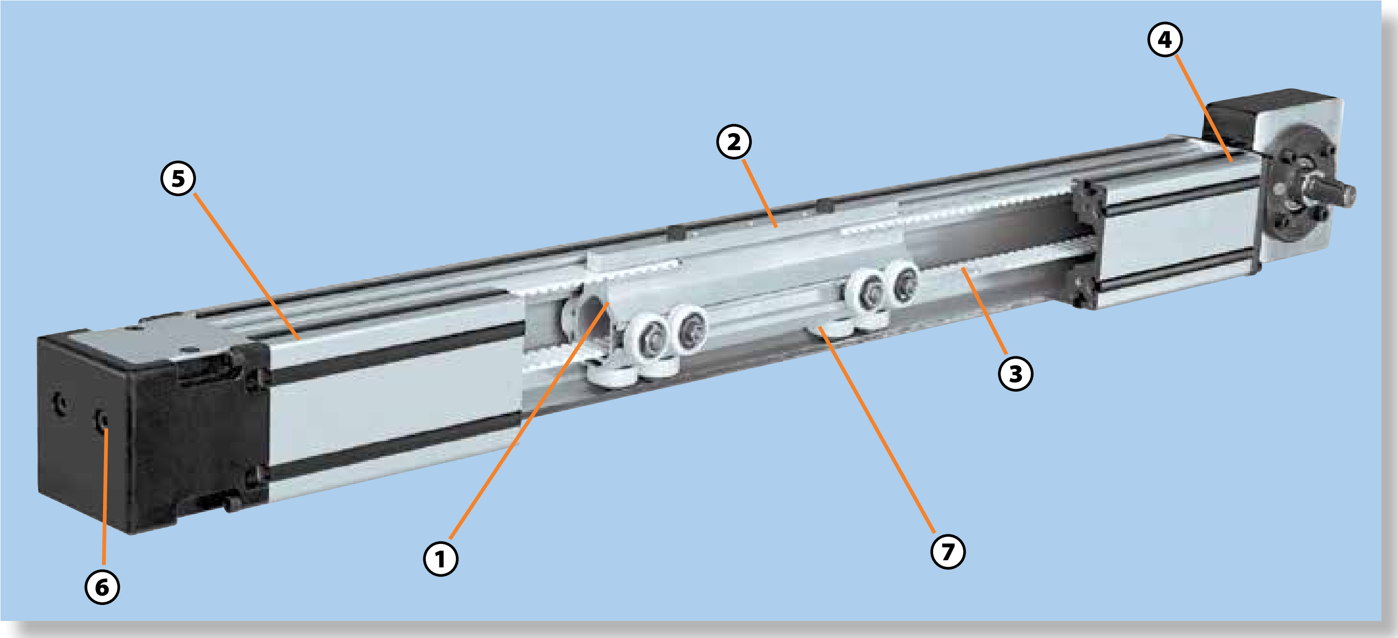
	HLE60	HPLA80	HLE100	HPLA120	HLE150	HPLA180
Maximum Travel (mm)	4,000	5,540	6,200	9,470	7,900	9,240
Maximum Payload (N)	353	1,304	1,549	2,598	3,402	4,501
Maximum Acceleration (m/s²)	10	10	10	10	10	10

***Do not exceed allowable axial and moment loading.**

The HLE-RB linear modules are ideal as single axis products or as components for high speed multi-axis gantries. With thousands of units in operation worldwide the HLEs are proven performers offering long life and trouble-free operation.

The HLE Linear Module consists of a lightweight carriage which can be precisely positioned within an extruded aluminum housing by a timing belt and pulley drive system. The housing, constructed from extruded aluminum with a square cross sectional geometry, demonstrates excellent deflection characteristics.

The protective anolite coating provides durability as well as an attractive silver appearance. It includes T-slots along its entire length for flexible mounting. The drive mechanism is a zero backlash steel reinforced timing belt. The tension station, conveniently located at the end of the unit provides for quick and easy belt adjustment. The drive station is designed to accept planetary gear reducers as well as a wide variety of servo and stepper motors. The bearing system for the RB models is comprised of three rows of roller wheels integral to the carriage which are guided by extruded tracks within the housing.



① **Carriage**

Roller bearing wheels are installed on three sides of the carriage to provide smooth linear motion and support. The wheels are positioned to evenly distribute the load across the length of the carriage. Eccentric bearing wheel bushings are adjusted to eliminate play on all sides of the carriage. Due to a low coefficient of friction, the carriage design provides a high mechanical efficiency and long service life. The carriages are available in standard and extended lengths. Special carriage lengths and linear units with multiple carriages are available for custom applications.

② **Load Attachment Plate**

Load attachment plates are available for every type of carriage. With integral T-slots or tapped with holes in a standard mounting pattern, they allow easy mounting of your load to the carriage of the HLE. Multiple HLEs can easily be mounted together by using standard clamping profiles. Tripping plates are mounted to the side of the load attachment plate to activate home or end of travel switches mounted to the side of the HLE. For special applications, the load plates can be designed to customer specified requirements.

③ **Drive Belt**

A zero backlash, steel reinforced timing belt provides high speed, high acceleration and good bidirectional repeatability.

④ **Drive Station**

Rigid cast housing with standard flanges for a variety of gearboxes. The drive stations are designed to accept planetary and worm gear reducers or provide different shaft outputs for driving the HLE.

⑤ **Housing**

Lightweight and self-supporting aluminum profiles are offered in three sizes:

HLE60:	60 x 60 mm
HLE100:	100 x 100 mm
HLE150:	150 x 150 mm

T-slots are provided for mounting the linear unit itself, applying additional components and accessories, or combining multiple HLEs. T-slots with plastic covers provide a simple cable conduit.

⑥ **Tensioning Station**

"Easy access" tensioning bolts allow external adjustment of belt tension.

⑦ **Roller Bearing**

Each wheel consists of a lubricated and sealed radial ball bearing to reduce friction and maintenance. The bearing is enclosed within a tough polyamide tread to reduce noise and provide long service life.

Optional Features

- **Direct mounting for planetary gear reducers**
- **Adjustable "end of travel" limit switches and "home" position sensor**
- **Clean room preparation option**
- **Cable carrier systems**
- **Performance matched Parker servo systems**
- **Structural components for vertical and multi-axis mounting**
- **Toe clamps and hardware for fast and easy mounting**
- **External bumpers**
- **Link shafts and support bearings for dual axis units**
- **Splice plates for extending travels beyond length available in a single profile**

IP30 Strip Seal

Magnetically attached stainless steel seal strip (not shown) provides environmental protection to interior components.

HPLA/HLE OPTIONS & ACCESSORIES

Limit and home sensors, switches, cable carriers, splice plates, and more.
See Options & Accessories at the end of the belt-driven section.

SPECIFICATIONS

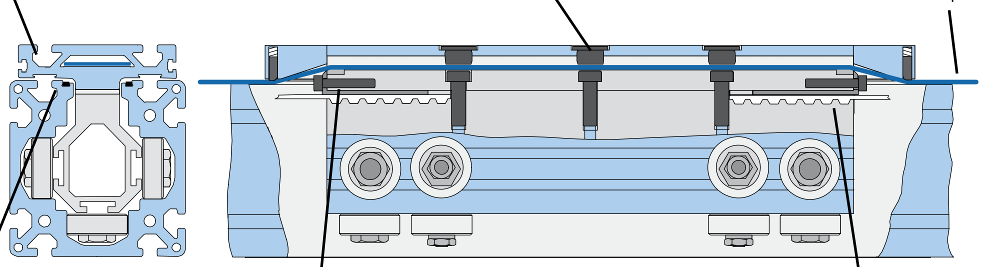
HLE-RB Series

As part of the advanced, cost-effective construction of machines and handling systems, the HPLA is a good choice for applications such as materials handling (palletizing, depalletizing, feeding, and part removal), warehouse technology (parts picking, storage and retrieval), and machine tool automation (workpiece loading and unloading, tool changing). Additional examples include textile machinery building (cross-cutting, slitting and stacking, quilting, seam stitching) and construction (formwork and placing reinforcing steel bars in concrete).

Other typical applications are process engineering (painting, coating, bonding), testing technology (guiding ultrasonic sensors, laboratory equipment), and cleanroom technology (wafer transport, wafer coating).

Characteristic	Units	HLE60-RB		HLE100-RB		HLE150-RB	
Unit Weight (basic unit without stroke)							
Standard Carriage, NL	kg (lb.)	2.28	(5.03)	12.70	(28.00)	31.20	(68.80)
Extended Carriage, VL	kg (lb.)	3.98	(8.77)	15.80	(34.84)	38.50	(84.89)
Carriage Weight							
Standard Carriage, NL	kg. (lb)	0.8	(1.76)	2.80	(6.17)	7.30	(16.10)
Extended Carriage, VL	kg. (lb)	1.3	(2.87)	4.40	(9.70)	11.50	(25.36)
Weight per meter of additional length	kg/m (lb/ft)	3.62	(2.43)	10.00	(6.72)	21.10	(14.18)
Moment of Inertia (related to the drive shaft)							
Standard Carriage, NL	kg-cm² (lb-in²)	3.07	(1.05)	24.60	(8.41)	123.30	(42.17)
Extended Carriage, VL	kg-cm² (lb-in²)	4.81	(1.64)	36.40	(12.45)	183.60	(62.79)
Travel and Speed							
Maximum Speed(1)	m/s (in/s)	5	(120)	5	(200)	5	(200)
Maximum Acceleration(1)	m/s² (in/s²)	10	(393)	10	(393)	10	(393)
Maximum Travel(2)—standard carriage, NL	m (in)	4.0	(160)	6.2	(244)	7.9	(311)
Maximum Travel(2)—extended carriage, VL	m (in)	3.8	(149)	6.0	(238)	7.7	(305)
Geometric Data	mm (in)	57.1	(2.25)	100.0	(3.94)	150.0	(5.91)
Cross Section, Square	cm⁴ (in⁴)	55.8	(1.34)	383.0	(9.20)	1940.0	(46.61)
Moment of Inertia Ix	cm⁴ (in⁴)	56.2	(1.35)	431.0	(10.35)	2147.0	(51.58)
Moment of Inertia Iy	N/mm²	0.72 x	(0.1044 x	0.72 x	(0.1044 x	0.72 x	(01044 x
Moment of Elasticity	(lb/in²)	10^5	10^8)	10^5	10^8)	10^5	10^8)
Pulley Data, Torques, Forces							
Travel Distance per Revolution	mm/rev (in/rev)	125	(4.92)	170	(6.69)	240	(9.45)
Pulley Diameter	mm (in)	39.8	(1.57)	54.1	(2.13)	76.4	(3.01)
Maximum Drive Torque(3)	Nm (lb-in)	8.87	(78.5)	40.0	(354.0)	108.0	(955.9)
Maximum Belt Traction(3) (effective load)	N (lb)						
Repeatability(4)	mm (in)	±0.2	(±0.008)	±0.2	(±0.008)	±0.2	(±0.008)

For the following deviations from the above standards, please contact Parker engineering:
(1) Greater speeds and accelerations may be achieved.
(2) Splicing possible for longer travel distances. This may cause reductions in effective load, drive torque, speed, acceleration, and repeatability. Consult factory for strip seal availability on spliced units.
(3) Increased timing belt tension required.
(4) Nominal value - component dependent. For improved repeatability consult factory.

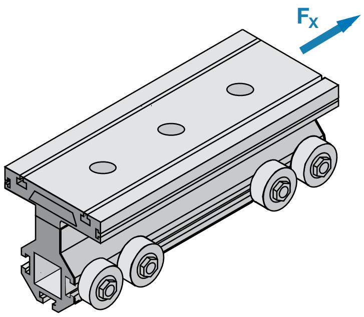


HLE60-RB Series – Load-Bearing Capacity of Carriage and Timing Belt

Load-Bearing Capacity of HLE-60RB Timing Belt (Fx)

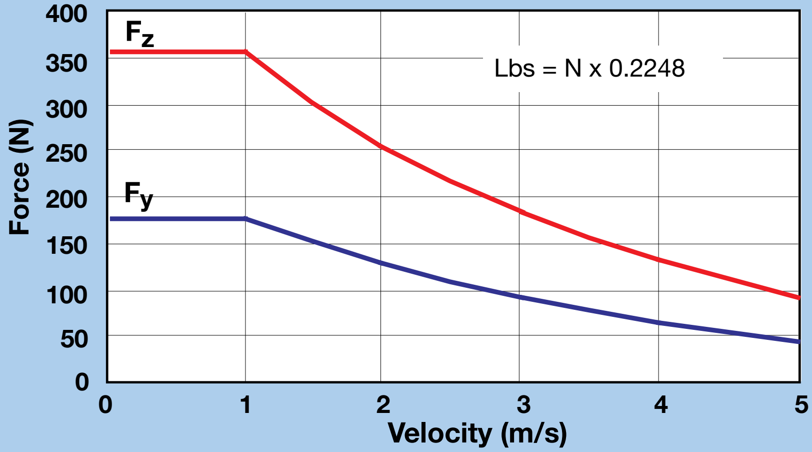
HLE60-RB	Transferable Thrust Force (n)	
	Nominal Belt Tension	Maximum Belt Tension
Drive Option	(81,000 km life)	(46,000 km life)
Supported Pulley (SP19 - SP30)	500	–

The forces and moments that the carriage is capable of transferring are speed-dependent. The curves shown in the graphs apply to a standard carriage (S). With the extended carriage (E), all the values apart from Fx (load-bearing capacity of timing belt) can be doubled if the load is applied equally to both halves of the carriage or distributed uniformly along its entire length.

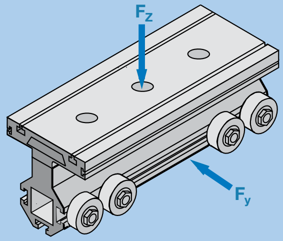


HLE60-RB Load-Bearing Capacity (Fy and Fz)

(Values double for extended carriage)

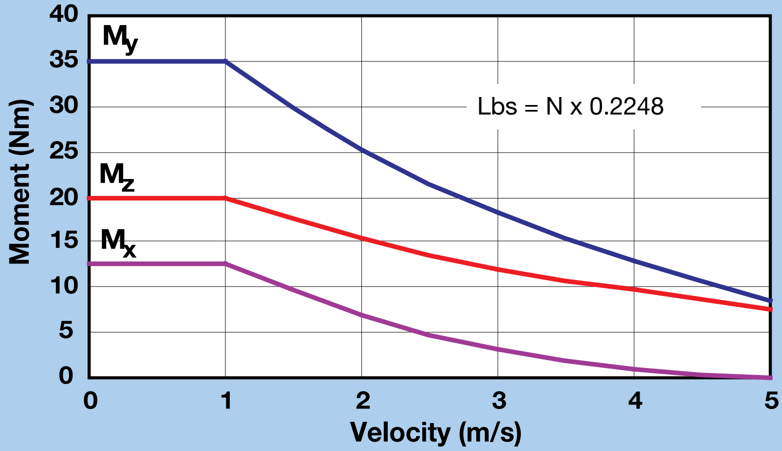


The curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied in different directions, the values given by the curves must be derated, i.e. the load or speed should be reduced if necessary.



HLE60-RB Maximum Permissable Moment Load (Mx, My and Mz)

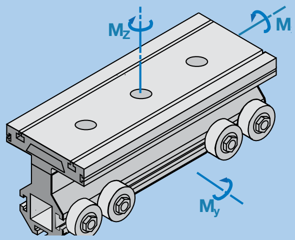
(Values double for extended carriage)



Virtual Engineer software is available for determination of precise carriage loading.

Virtual Engineer

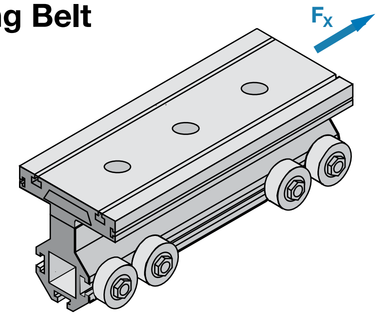
parker.com/VirtualEngineer



HLE100-RB Series – Load-Bearing Capacity of Carriage and Timing Belt

Load-Bearing Capacity of HLE100 Timing Belt (Fx)

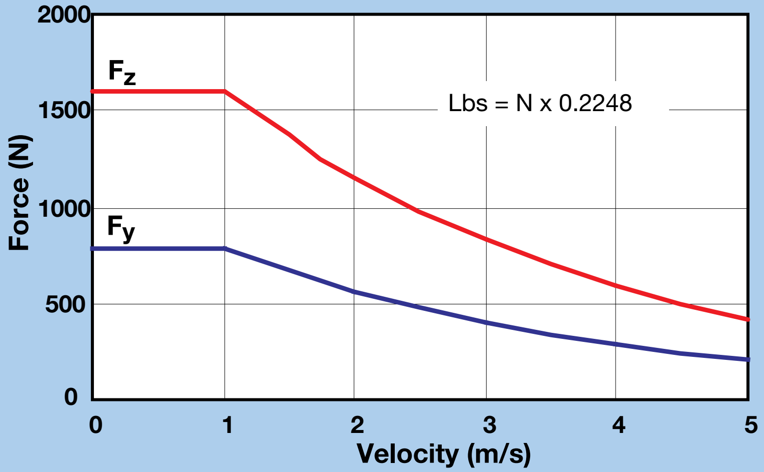
HLE-100RB			Transferable Thrust Force (n)	
Drive Option	Gearhead	Drive Option	Nominal Belt Tension (81,000 km life)	Maximum Belt Tension (46,000 km life)
ARO/ALO	PS90 PX115/PV115 PS115	SP10 SP11 SP12	675 675 925	900 900 1115
ARW/ALW/ DAR/DAL	PV90/PX90 PS90 PX115/PV115	SP9 SP10 SP11	500 675 675	675 900 900



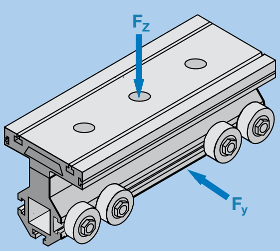
The forces and moments that the carriage is capable of transferring are speed-dependent. The curves shown in the graphs apply to a standard carriage (S). With the extended carriage (E), all the values apart from Fx (load-bearing capacity of timing belt) can be doubled if the load is applied equally to both halves of the carriage or distributed uniformly along its entire length.

HLE100-RB Load-Bearing Capacity (Fy and Fz)

(Values double for extended carriage)

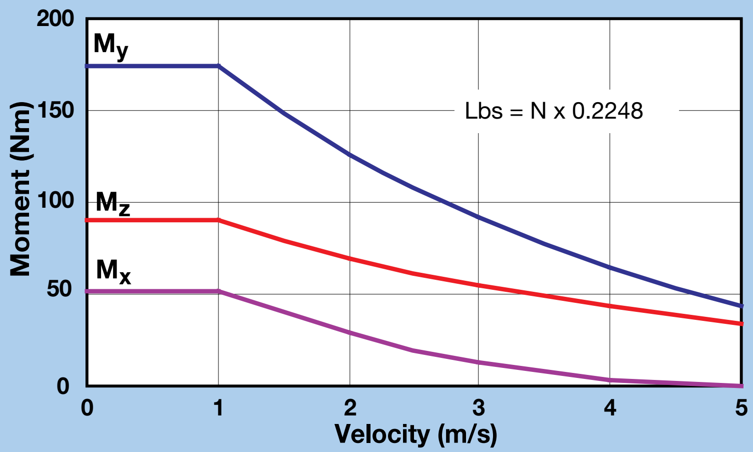


The curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied in different directions, the values given by the curves must be derated, i.e. the load or speed should be reduced if necessary.



HLE100-RB Maximum Permissable Moment Load (Mx, My and Mz)

(Values double for extended carriage)



Virtual Engineer software is available for determination of precise carriage loading.

Virtual Engineer

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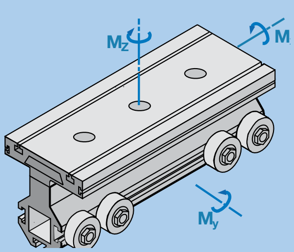
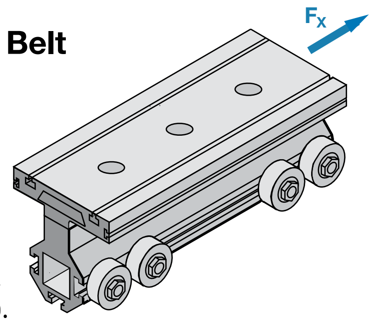


HLE150-RB Series – Load-Bearing Capacity of Carriage and Timing Belt

Load-Bearing Capacity of HLE150 Timing Belt (Fx)

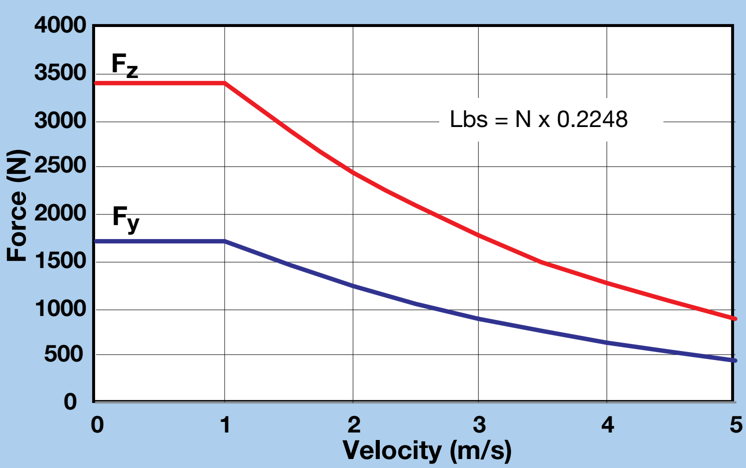


The forces and moments that the carriage is capable of transferring are speed-dependent. The curves shown in the graphs apply to a standard carriage (S). With the extended carriage (E), all the values apart from Fx (load-bearing capacity of timing belt) can be doubled if the load is applied equally to both halves of the carriage or distributed uniformly along its entire length.

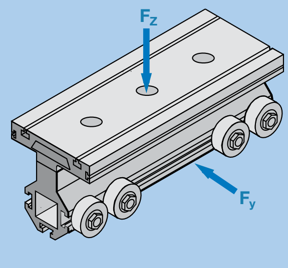
HLE150-RB			Transferable Thrust Force (n)	
Drive Option	Gearhead	Drive Option	Nominal Belt Tension (85,000 km life)	Maximum Belt Tension (37,000 km life)
ARO/ALO	PX115/PV115 PS115 PS142	SP10 SP11 SP12	675 1515 1700	900 2015 2235
ARW/ALW/ DAR/DAL	PX115/PV115 PS115 PS142	SP10 SP11 SP12	675 1515 1700	900 2015 2235

HLE150-RB Load-Bearing Capacity (Fy and Fz)

(Values double for extended carriage)

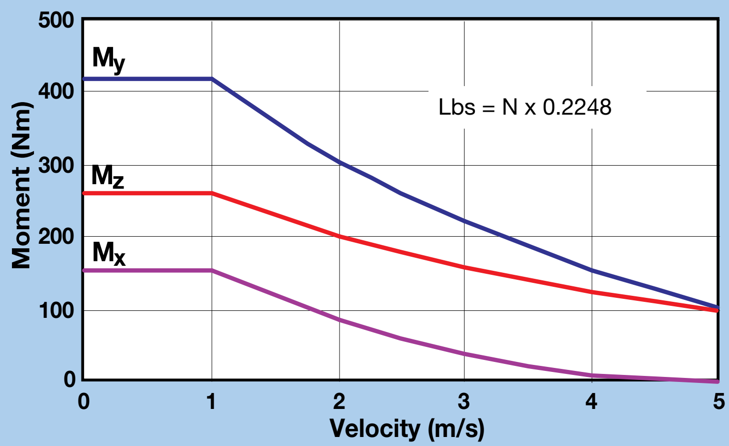


The curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied in different directions, the values given by the curves must be derated, i.e. the load or speed should be reduced if necessary.



HLE150-RB Maximum Permissable Moment Load (Mx, My and Mz)

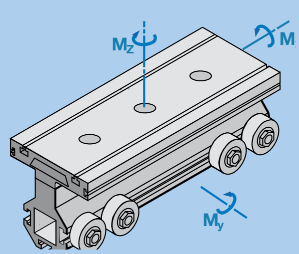
(Values double for extended carriage)



Virtual Engineer software is available for determination of precise carriage loading.

Virtual Engineer

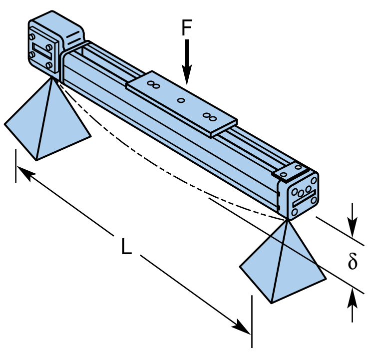
parker.com/VirtualEngineer

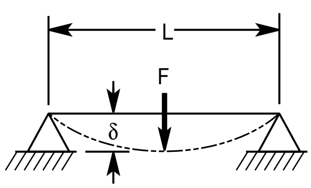


HLE-RB Deflection Characteristics

The HLE deflection curves can be used for determining the deflection based on the profile length and the application load weight. Applications requiring high acceleration forces can place a severe strain on the system stability. In these cases, a solid substructure may be required with the HLE product being supported at frequent intervals.

These deflection curves illustrate the deflection d, based on the HLE profile being simply supported at both ends. The graphs take into consideration the self deflection due to the weight of the profile, along with the load to be transported. The maximum deflection cannot be exceeded. If the maximum deflection is exceeded based on your application parameters, then additional supports are required. Alternatively, the next larger profile size may be considered. For deflection formulas and calculations, please refer to the Technical Information Library found on our web site www.parkermotion.com

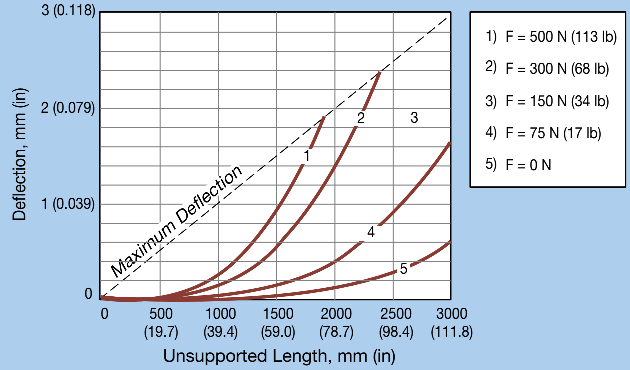




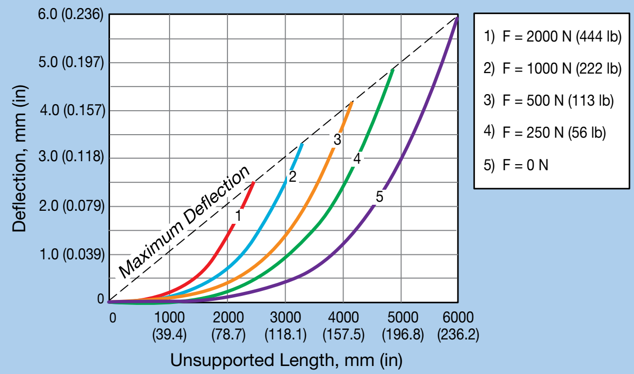
F = Force N
L = Unsupported length mm
δ = Deflection mm

Deflection Curves

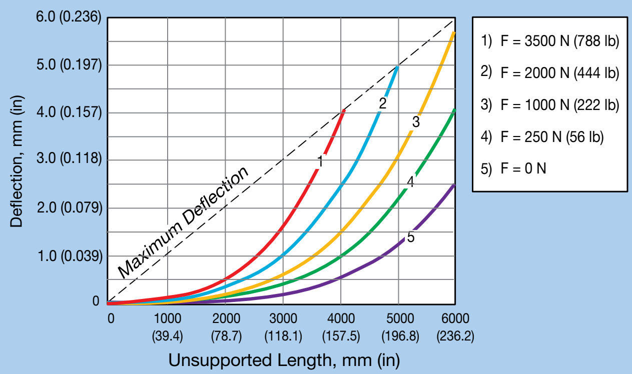
HLE60-RB



HLE100-RB



HLE150-RB

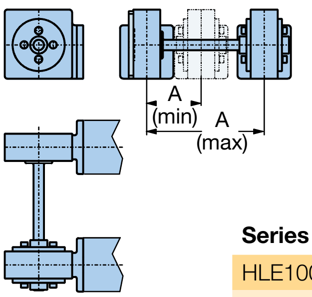


Dual Unit Axis Considerations

When two parallel linear modules are required to form a single axis, the span or distance between each unit determines which type of shaft connection is required. In some cases, a link shaft support bearing might also be required.

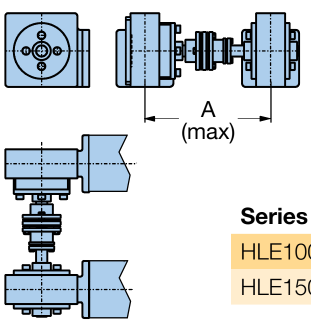
The link shaft bearing is used to support the linking shaft of an HLE dual axis when there is a large center to center distance. This bearing must be used if the critical speed is exceeded with the dual-axis link shaft.

Figure A



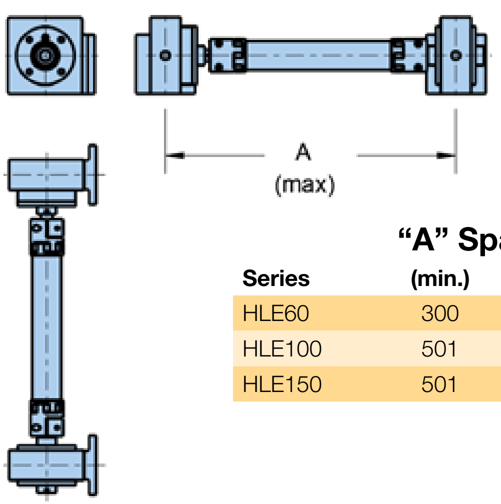
Series	"A" Span (mm) (min.)	"A" Span (mm) (max.)
HLE100	105	225
HLE150	155	260

Figure B



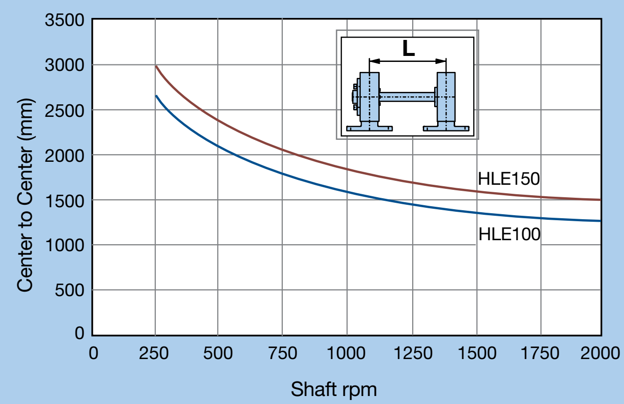
Series	"A" Span (mm) (min.)	"A" Span (mm) (max.)
HLE100	226	500
HLE150	261	500

Figure C

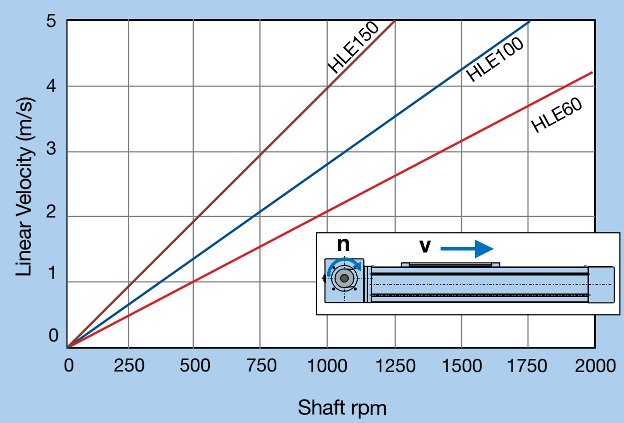


Series	"A" Span (mm) (min.)	"A" Span (mm) (max.)
HLE60	300	1500
HLE100	501	—
HLE150	501	—

Critical Speed*



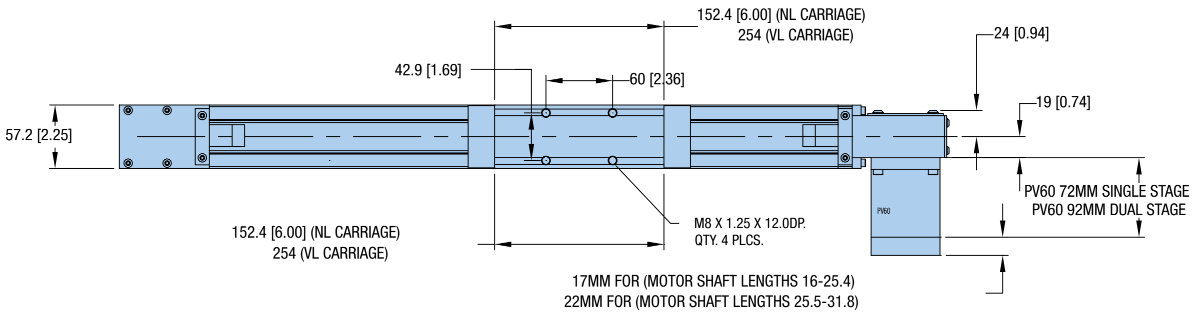
Linear Velocity

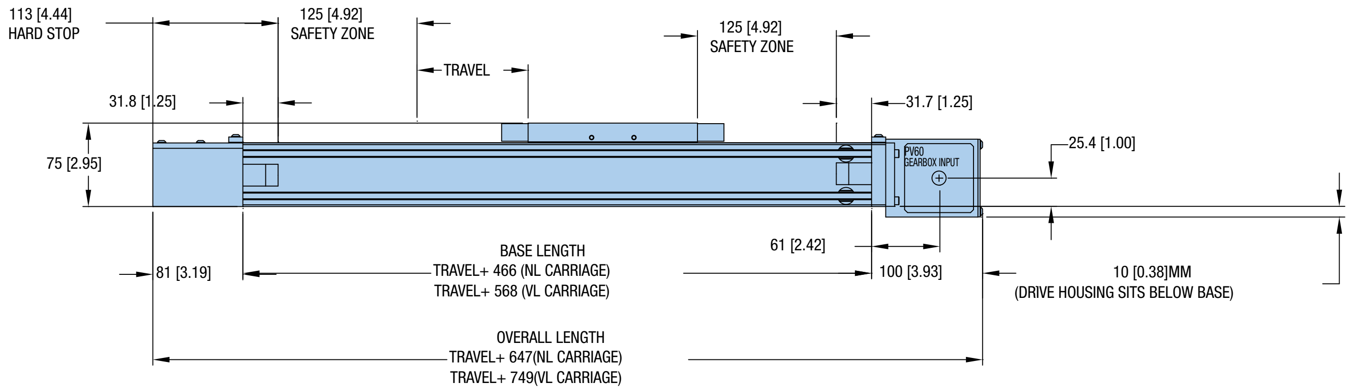


*HLE60 Critical speed is above charted 2000 RPM.

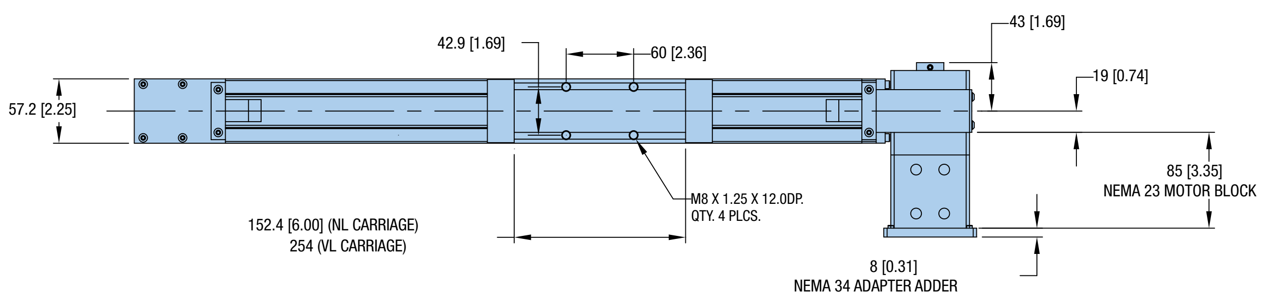
DIMENSIONS

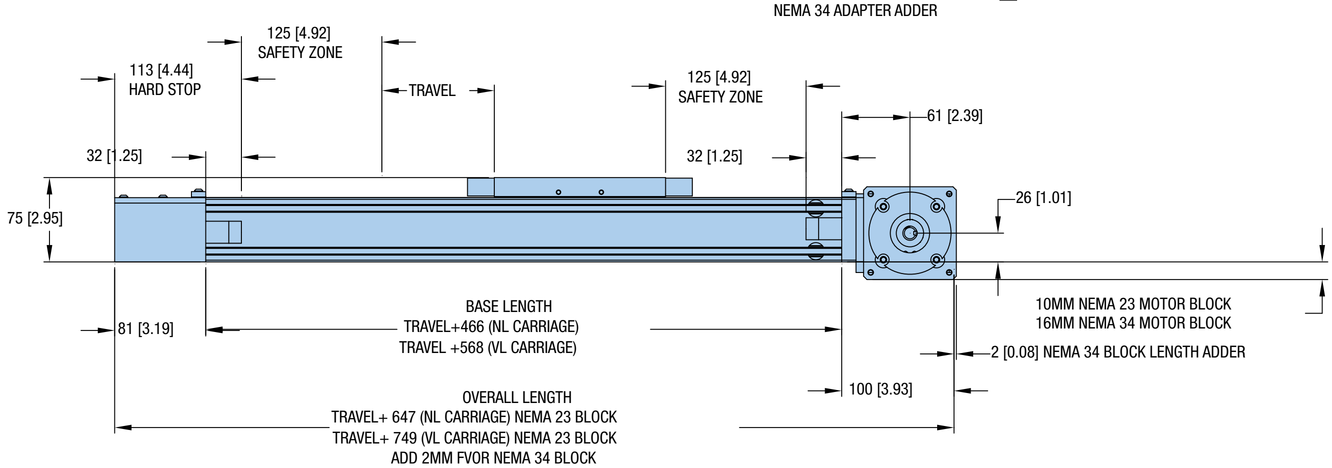
HLE60-RB with PV60 Direct Drive





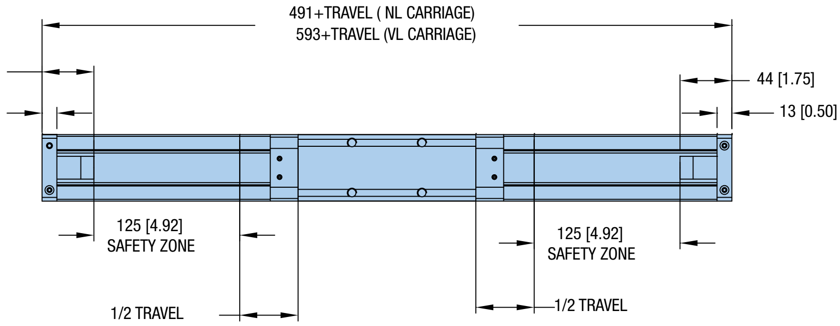
HLE60-RB Drive with Motor Block





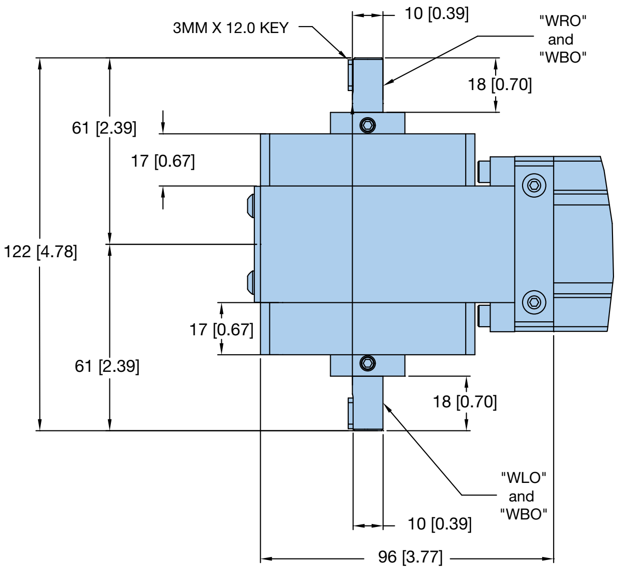
HLE60-RB Idler

Dimensions (mm)

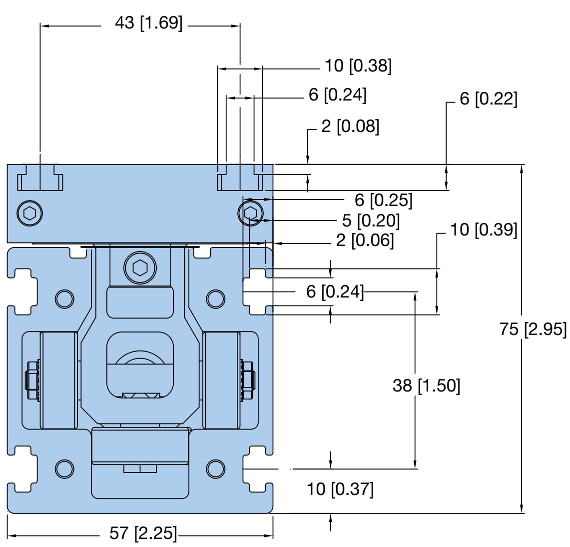


Drive Shaft Option

WRO Shaft on Right
WLO Shaft on Left
WBO Shaft on Both Sides



End View



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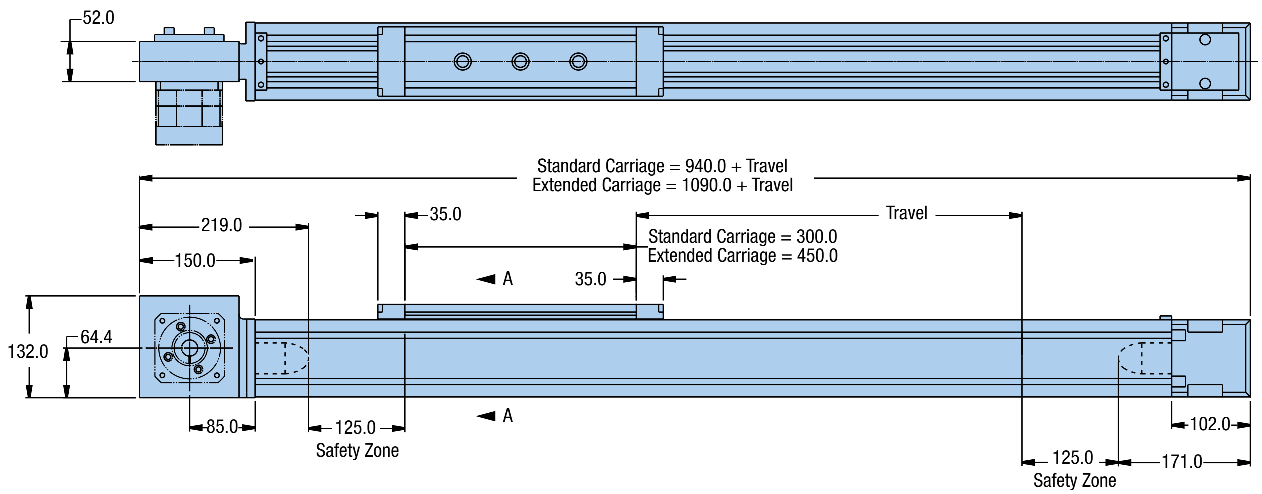
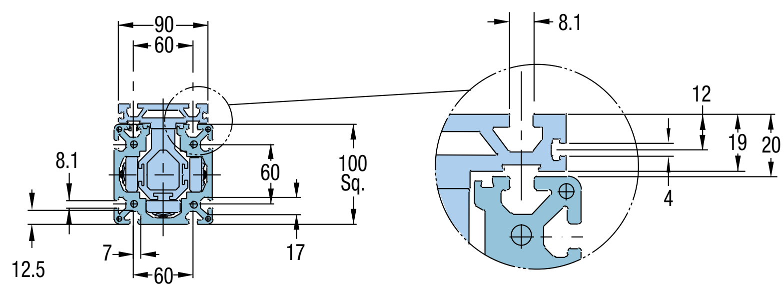
Download 2D & 3D files from
www.parker.com/emn/HLE60-RB

HLE100-RB Drive

Dimensions (mm)

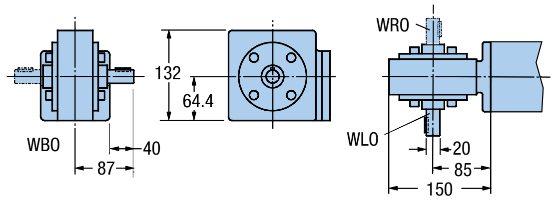




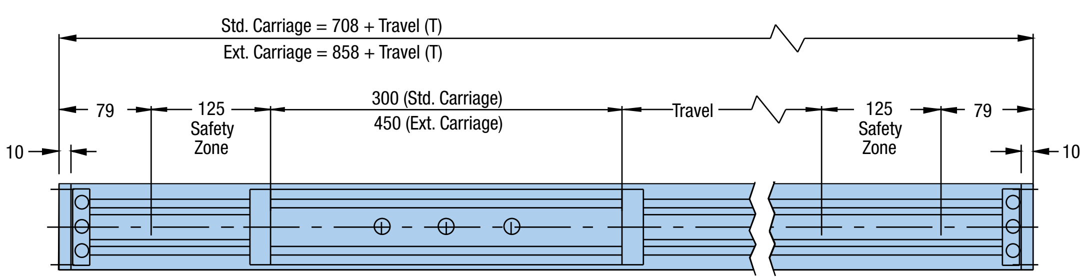
Section A-A

Drive Shaft Option

WRO Shaft on Right
WLO Shaft on Left
WBO Shaft on Both Sides



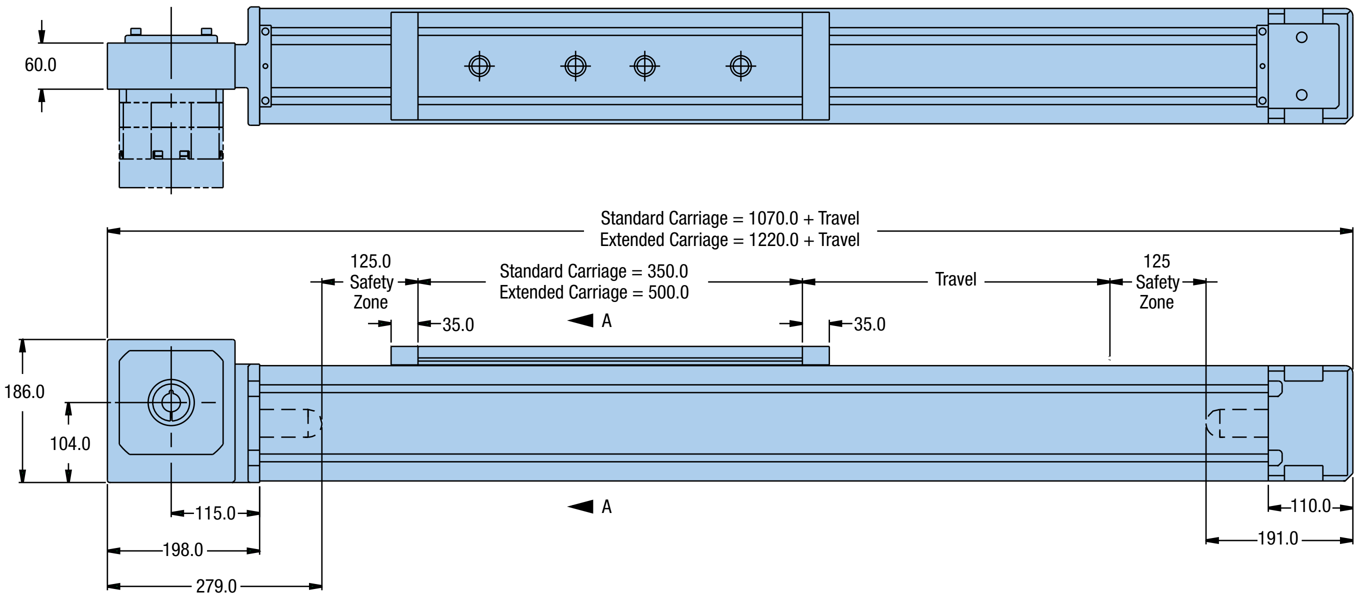
HLE100-RB Idler

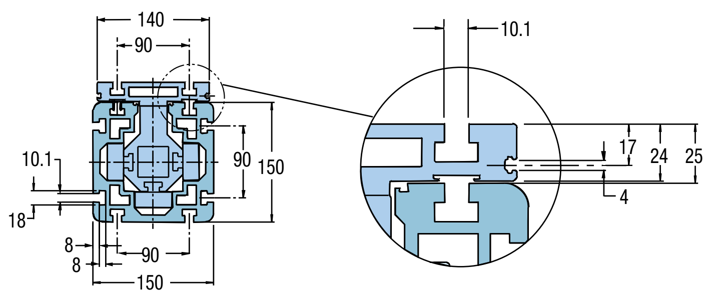


Download 2D & 3D files from
www.parker.com/emn/HLE150-RB

HLE150-RB Drive

Dimensions (mm)

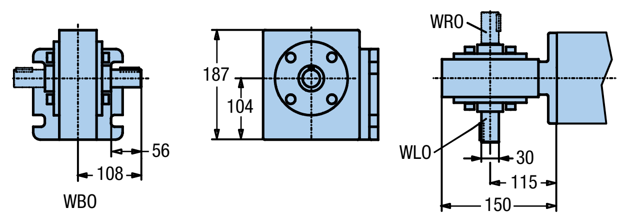




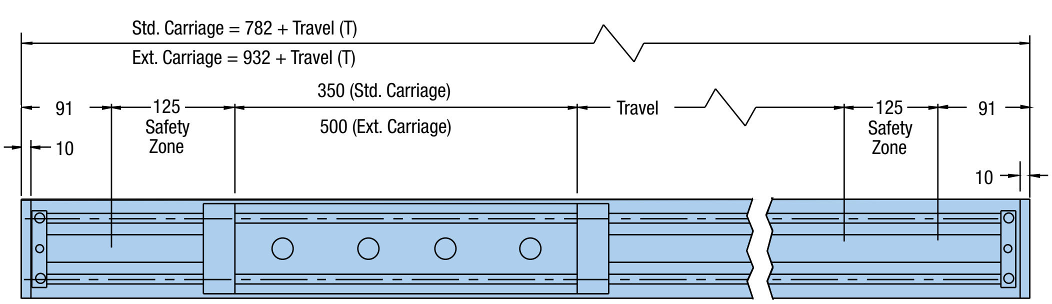
Section A-A

Drive Shaft Option

WRO Shaft on Right
WLO Shaft on Left
WBO Shaft on Both Sides



HLE150-RB Idler



ORDERING INFORMATION

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬
Order Example:	HLE060	RB	NL	E	1000	DA0000	MBL	SP5	G1205	H1	K24	ZA	LH0

① Series
HLE060

② Bearing Type
RB

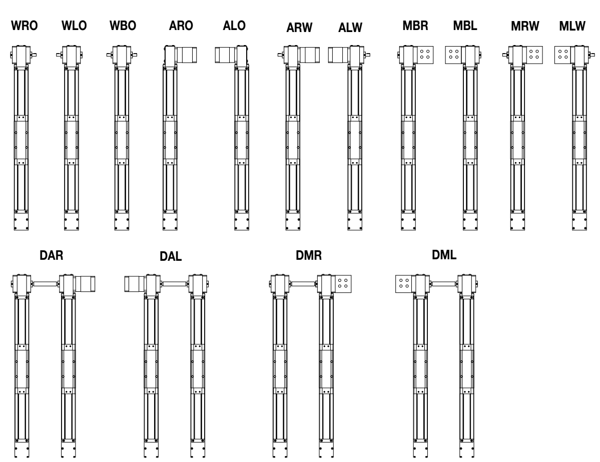
③ Carriage Type
NL Standard Carriage
VL Extended Carriage

④ Unit Type
M Idler
D Dual Axis Unit
E Single Axis Unit

⑤ Travel Length
nnnn nnnn=mm (3000 mm max for NLcarriage; 2900 mm max for VL carriage)

⑥ Drive Shaft Option - Center to Center
DA0000 No Drive Shaft - Single Axis or Idler Unit
DAnnnn (nnnn=mm) Dual Axis Center to Center (200 mm min; 1500 mm max)
DCnnnn (nnnn=mm) Dual Axis with Covered Link Shaft Center to Center (200 mm min; 1500 mm max)

⑦ Shaft Configuration Options
WOO No Shaft, Idler Unit
ARO Gearhead Right
ALO Gearhead Left
ARW Gearhead Right Shaft Left
ALW Gearhead Left Shaft Right
WLO Shaft Left
WRO Shaft Right
WBO Double Shaft
MBL Motor Block Left
MBR Motor Block Right
MLW Motor Block Left, Shaft Right
MRW Motor Block Right, Shaft Left
DAL Double Axis Gearhead, Drive Left
DAR Double Axis Gearhead, Drive Right
DML Double Axis, Motor Block Left
DMR Double Axis, Motor Block Right



⑧ Drive Station Interface
SP19 Drive Housing For PV60-FN
SP20 Idler Unit
SP21 No Motor Block
SP22 Motor Block NEMA 23 with 0.375" Bore Coupling
SP23 Motor Block NEMA 34 with 0.25" Bore Coupling
SP24 Motor Block NEMA 34 with 0.375" Bore Coupling
SP25 Motor Block NEMA 34 with 0.50" Bore Coupling
SP28 Motor Block NEMA 23 without Coupling
SP29 Motor Block NEMA 34 without Coupling
SP30 Motor Block Neo 70 with 11.0 mm Bore Coupling

⑨ Gearbox Option*
G0 No Gearbox (Requires MBR, MBL, MRW, MLW)
G1 Customer Supplied Gearhead*
G1203 PV60 Gearhead 3:1 Ratio
G1205 PV60 Gearhead 5:1 Ratio
G1210 PV60 Gearhead 10:1 Ratio
G1215 PV60 Gearhead 15:1 Ratio
G1225 PV60 Gearhead 25:1 Ratio

*Contact factory for approval of any alternative gearbox information.

⑩ Mounting Orientation
H1 Carriage Up
H2 Carriage Down
H3 Carriage on Side, Drive Station Up
H4 Carriage on Side, Drive Station Down

⑪ Motor Kit Option
K00 No Motor Kit
K21 Motor Kit LV23, HV23, OS23, ES23, VS23 to PV60
K22 Motor Kit BE23X to PV60
K23 Motor Kit SM23, SE23 to PV60
K24 Motor Kit LV34, HV34
K25 Motor Kit BE34, NO34X, JO34X, TS31, TS32 to PV60
K26 Motor Kit RS34, ES34 to PV60
K27 Motor Kit NO70, JO70 to PV60
K28 Motor Kit SMB60 to PV60

⑫ Strip Seal Option
ZA Unit with Strip Seal (IP30)
ZB Unit without Strip Seal

⑬ Limit/Home Switch Option
LH0 No Limit Switch Assembly
LH3 Three NPN Prox Switches, 10-30 VDC
LH4 Three PNP Prox Switches, 10-30 VDC

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬
Order Example:	HLE100	RB	NL	E	1000	DA0000	ARO	SP7	G2-05	H2	ZB	K6	LH0

① **Series**
HLE100

② **Bearing Type**
RB

③ **Carriage Type**
NL Standard Carriage
VL Extended Carriage

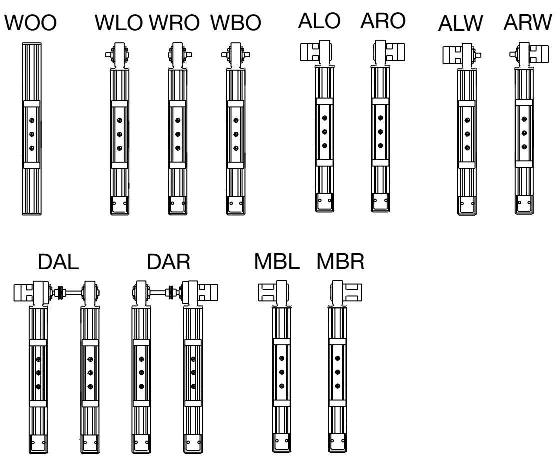
④ **Unit Type**
M Idler
D Dual Axis Unit
E Timing Belt Drive, Nominal Thrust, Maximum Life

⑤ **Travel Length**
nnnn Specified travel in mm (nnnn = mm)

⑥ **Drive Shaft Option - Center to Center**
DA0000 No Drive Shaft - Single Axis or Idler Unit
DAnnnn (nnnn=mm)

⑦ **Shaft Configuration Options**
WOO No Shaft, Idler Unit
WLO Shaft Left
WRO Shaft Right
WBO Double Shaft
ALO Reducer Left
ARO Reducer Right
ALW Reducer Left, Shaft Right
ARW Reducer Right, Shaft Left
DAL Double Axis, Drive Left
DAR Double Axis, Drive Right
MBL Motor Block Left
MBR Motor Block Right

⑧ **Drive Station Interface**
SP0 Idler or Shaft Option
SP3 Motor Block - NEMA 34 with 0.500 in. coupling
SP4 Motor Block - NEMA 34 with 0.375 in. coupling
SP5 Motor Block - NEMA 34 without coupling
SP6 Motor Block - with coupling for JO923 direct drive
SP7 Motor Block - NEMA 42 with 0.625 in. coupling
SP8 Motor Block - NEMA 42 without coupling
SP9 Drive Housing for PX90/PV90/PEN/PER-090
SP10 Drive Housing for PS90
SP11 Drive Housing for PX115/PV115
SP12 Drive Housing for PS115



⑨ **Gearbox Option**
G0-00 No Gearbox
G10-nn PS90
G11-nn PX115
G12-nn PS115
G13-nn PX90
G14-nn PV90
G15-nn PV115
nn = ratio
Single stage ratios 3:1, 5:1, 10:1 Dual stage ratios 15:1, 25:1

⑩ **Mounting Orientation**
H1 Carriage Up
H2 Carriage Down
H3 Carriage on Side, Drive Station Up
H4 Carriage on Side, Drive Station Down

⑪ **Strip Seal Option**
ZA Unit with Strip Seal (IP30)
ZB Unit without Strip Seal

⑫ **Motor Kit Option**
K0 No motor kit
K1 J034*, N034*, BE34*, TS31, TS32 to GT-090, PE-090
K2 J070*, N070* to GT-090, PE-090
K3 J090*, N090* to GT-090, PE-090
K4 M105* to GT-090, PE-090
K5 ES3*, OEM83-*, ZETA83-*, S83-*, RS3* to GT-090, PE-090
K6 J034*, N034*, BE34*, TS3
K7 J090*, N090*
K8 M105*
K9 ES3*, OEM83-*, ZETA83-*, S83-*, RS3*
K10 RS42, RE42, S106-205
K11 S106-178, S106-250
K12 M145
K35 Parker MPP092/MPJ092
K37 Parker MPP100/MPJ100
K39 Parker MPP115/MPJ115
K41 Parker MPP142/MPJ142
K50 Parker HDY55; MPL15XX (Allen Bradley)
K51 AKM3X-AN (Kollmorgen)
K52 SGMAH-04 (Yaskawa)
K53 SGMAH-08 (Yaskawa)
K54 MKD041 (Indramat)
K55 AKM4X-AN (Kollmorgen)
K56 MKD070 (Indramat)

⑬ **Limit/Home Switch Option**
LH0 No Limit Switch Assembly
LH3 Three NPN Prox Switches, 10-30 VDC
LH4 Three PNP Prox Switches, 10-30 VDC

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Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬
Order Example:	HLE150	RB	NL	E	1000	DA0000	ARO	SP1	G2-05	H2	ZA	K7	LH2

① **Series**
HLE150

② **Bearing Type**
RB

③ **Carriage Type**

NL	Standard Carriage
VL	Extended Carriage

④ **Unit Type**

M	Idler
E	Timing Belt Drive, Nominal Thrust, Maximum Life
F	Timing Belt Drive, Maximum Thrust, Nominal Life

⑤ **Travel Length**

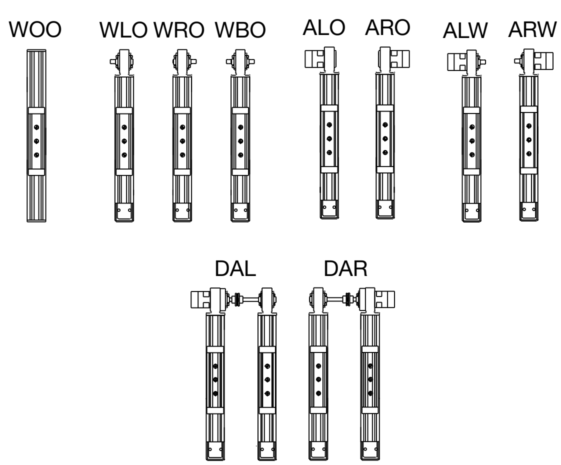
nnnn	Specified travel in mm (nnnn = mm)

⑥ **Drive Shaft Option - Center to Center**

DA0000	No Drive Shaft - Single Axis or Idler Unit
DAnnnn	(nnnn=mm)

⑦ **Shaft Configuration Options**

WOO	No Shaft, Idler Unit
WLO	Shaft Left
WRO	Shaft Right
WBO	Double Shaft
ALO	Reducer Left
ARO	Reducer Right
ALW	Reducer Left, Shaft Right
ARW	Reducer Right, Shaft Left
DAL	Double Axis, Drive Left
DAR	Double Axis, Drive Right



⑧ **Drive Station Interface**

SP0	Idler or Shaft Option
SP10	Drive Housing for PX115/PV115
SP11	Drive Housing for PS115
SP12	Drive Housing for PS142

⑨ **Gearbox Option**

G0-00	No Gearbox
G10-nn	PX115
G11-nn	PS115
G12-nn	PS142
G13-nn	PX90
G15-nn	PV115

nn = ratio
Single stage ratios 3:1, 5:1, 10:1 Dual stage ratios 15:1, 25:1

⑩ **Mounting Orientation**

H1	Carriage Up
H2	Carriage Down
H3	Carriage on Side, Drive Station Up
H4	Carriage on Side, Drive Station Down

⑪ **Strip Seal Option**

ZA	Unit with Strip Seal (IP30)
ZB	Unit without Strip Seal

⑫ **Motor Kit Option**

K0	No motor kit
K11	S106-178, S106-250 to GT-115, PE-115
K12	M145 to GT-115, PE-115
K13	M145 to GT-142, PE-142
K35	Parker MPP092/MPJ092
K37	Parker MPP100/MPJ100
K39	Parker MPP115/MPJ115
K41	Parker MPP142/MPJ142
K50	Parker HDY55; MPL15XX (Allen Bradley)
K51	AKM3X-AN (Kollmorgen)
K52	SGMAH-04 (Yaskawa)
K53	SGMAH-08 (Yaskawa)
K54	MKD041 (Indramat)
K55	AKM4X-AN (Kollmorgen)
K56	MKD070 (Indramat)
K57	MKD090 (Indramat)

*Single stage ratios: 3, 5, 8, 10; Dual stage ratios: 12, 15, 16, 20, 25

⑬ **Limit/Home Switch Option**

LH0	No Limit Switch Assembly
LH3	Three NPN Prox Switches, 10-30 VDC
LH4	Three PNP Prox Switches, 10-30 VDC

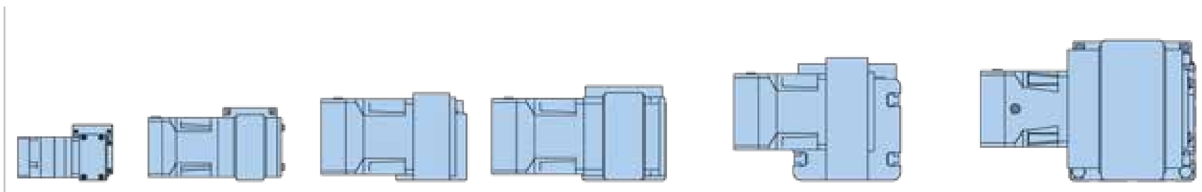
HLE-SR Series Belt Driven Linear Modules

Belt-Drive Actuators for High Thrust, Long Stroke Applications

- **Low running friction**
- **Low wear and low maintenance**
- **Quiet operation**
- **High efficiency**
- **Long service life**
- **High dynamic performance due to high load capacity square rail systems**

Proven Technology

- **Easily accessible lubrication points**
- **Minimal preventive maintenance required**
- **T-slots integrated on sides of the profile for mounting attachments or for use as a cable duct**
- **Timing belts can be replaced without removing load attachment plate**
- **Multiple configuration options due to T-slots available on both the profile and load plate**



HLE60 HPLA080 HLE100 HPLA120 HLE150 HPLA180

	HLE60	HPLA80	HLE100	HPLA120	HLE150	HPLA180
Maximum Travel (mm)	4,000	5,540	6,200	9,470	7,900	9,240
Maximum Payload (N)	353	1,304	1,549	2,598	3,402	4,501
Maximum Acceleration (m/s²)	10	10	10	10	10	10

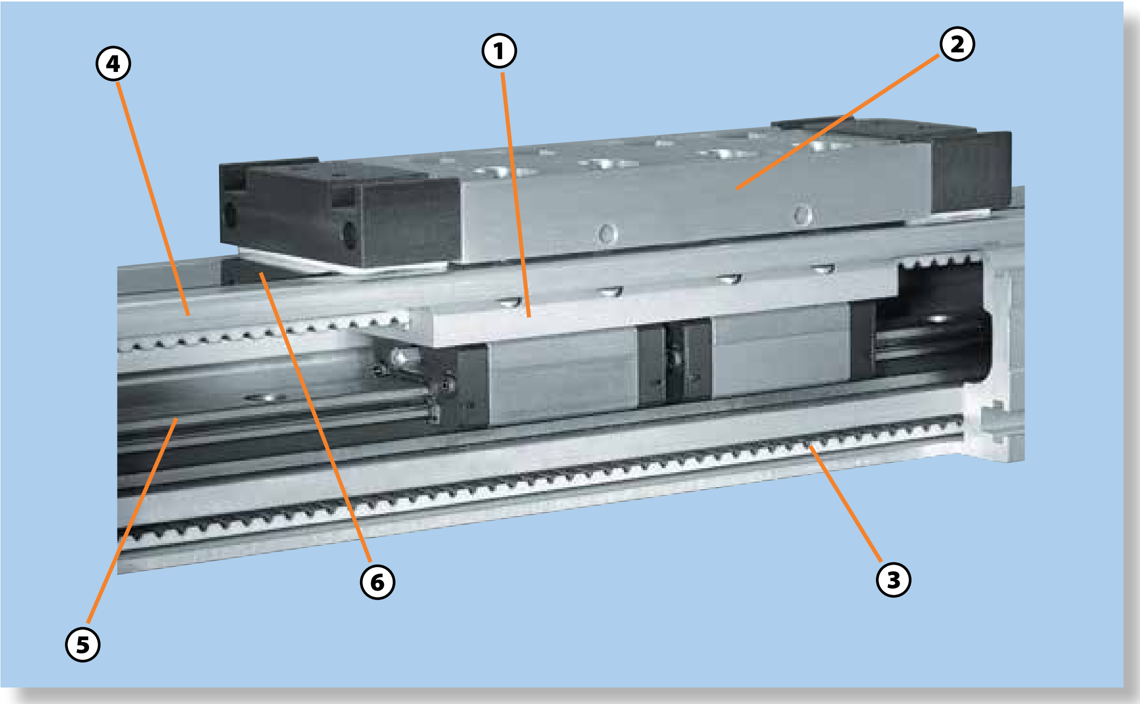
***Do not exceed allowable axial and moment loading.**

HLE-SR Bearing System

The bearing system is the principal distinction between the RB (Roller Bearing) type modules and the SR (Square Rail) type. The SR employs a square rail bearing system, which permits greater load carrying capability without increasing overall size. Square rail bearings are recirculating ball bearings designed to move heavy loads on a precise linear path. Linear guides, which house several rows of re-circulating ball bearings, ride on a high strength, steel square rail. The steel square rail cross section enables bearing ways to be ground into the sides of the rail. These bearing ways are shaped in an arch which approximates the same radius as the ball bearing. This increases the contact surface between the ball and the rail, thereby increasing the load capacity of the linear bearing.

HLE-SR Drive Principle

The HLE-SR employs the same high performance belt and pulley drive mechanism as the HLE-RB. It features a zero backlash steel reinforced timing belt drive, which provides high speeds, high acceleration, and good bidirectional repeatability. A belt tension station, conveniently located at the end of the unit provides for quick and easy belt adjustment. The drive station is designed to accept planetary gear reducers as well as a wide variety of servo and stepper motors.



① Carriage

A rigid carriage assembly is built upon two bearing housings which contain several rows of recirculating ball bearings designed to ride in grooves ground into a steel square rail linear raceway. Longer or custom carriages are also available.

Load Attachment Plate

Longitudinal T-Slots integrated on the top of this plate facilitate the assembly of attachments to the HLE-SR. Utilization of these T-Slots together with standard clamping profiles enables easy straight- forward construction of multi-axis systems.

② Drive Belt

A zero backlash, steel reinforced timing belt provides high speed, high acceleration and high bidirectional repeatability. A serrated clamp mechanism between belt and carriage guarantees a safe and strong connection.

③ Housing

The HLE-SR housing is a light-weight, compact and self-supporting extruded aluminum section. It is available in two cross-sections: 60 x 60 mm (HLE60) and 100 x 100 mm (HLE100). T-slots along the length are utilized for clamping mechanical components, joining units, and attaching sensors or mechanical switches.

④ Bearing Raceway

A high strength steel alloy bearing rail features precision ground “gothic arch” raceways to provide precise translation and high strength support of the recirculating ball bearings.

⑤ Optional IP30 Strip Seal

Magnetically attached stainless steel seal strip provides environmental protection to interior components.

Optional Features

- **Direct mounting for planetary gear reducers**
- **Adjustable “end of travel” limit switches and “Home” position sensor**
- **Cable carrier systems**
- **Performance matched Parker servo systems**
- **Structural components for vertical and multi-axis mounting**
- **Toe clamps and hardware for fast/easy mounting**
- **External bumpers**
- **Link shafts and support bearing for dual unit axes**
- **Splice plates for extending travels beyond length available in a single profile**

SPECIFICATIONS

As part of the advanced, cost-effective construction of machines and handling systems, the HPLA is a good choice for applications such as materials handling (palletizing, depalletizing, feeding, and part removal), warehouse technology (parts picking, storage and retrieval), and machine tool automation (workpiece loading and unloading, tool changing). Additional examples include textile machinery building (cross-cutting, slitting and stacking, quilting, seam stitching) and construction (formwork and placing reinforcing steel bars in concrete).

Other typical applications are process engineering (painting, coating, bonding), testing technology (guiding ultrasonic sensors, laboratory equipment), and cleanroom technology (wafer transport, wafer coating).

Characteristic	Units	HLE60-SR		HLE100-SR	
Unit Weight (basic unit without stroke)					
Standard Carriage, NL	kg (lb.)	3.5	(7.7)	16.2	(35.7)
Extended Carriage, VL	kg (lb.)	5.91	(13)	20.0	(44.1)
Carriage Weight					
Standard Carriage, NL	kg. (lb)	1.8	(4.0)	2.2	(4.9)
Extended Carriage, VL	kg. (lb)	2.1	(4.6)	3.8	(8.4)
Weight per meter of additional length	kg/m (lb/ft)	5.5	(3.7)	13.3	(8.9)
Moment of Inertia (related to the drive shaft)					
Standard Carriage, NL	kg-cm^2 (lb-in^2)	3.52	(1.20)	34.8	(11.9)
Extended Carriage, VL	kg-cm^2 (lb-in^2)	5.20	(1.83)	52.2	(17.9)
Travel and Speed					
Maximum Speed(1)	m/s (in/s)	3	(120)	3	(120)
Maximum Acceleration(1)	m/s^2 (in/s^2)	10	(393)	10	(393)
Maximum Travel(2), NL	m (in)	3.05	(120)	6.15	(242)
Maximum Travel(2), VL	m (in)	2.8	(114)	6.0	(236)
Geometric Data					
Cross Section, Square	mm (in)	57.2	(2.25)	100	(3.94)
Moment of Inertia Ix	cm^4 (in^4)	48.3	(1.16)	377	(9.06)
Moment of Inertia Iy	cm^4 (in^4)	59.5	(1.43)	432	(10.38)
Moment of Elasticity	N/mm^2 (lb/in^2)	0.72×10^5	(0.1044×10^8)	0.72×10^5	(0.1044×10^8)
Pulley Data, Torques, Forces					
Travel Distance per Revolution	mm/rev (in/rev)	125	(4.92)	240.0	(9.45)
Pulley Diameter	mm (in)	39.8	(1.57)	74.5	(2.93)
Maximum Drive Torque(3)	Nm (lb-in)	8.87	(79)	61.5	(544)
Maximum Belt Traction(3) (effective load)	N (lb)	668	(150)	1650	(371)
Repeatability(4)	mm (in)	±0.2	(±0.008)	±0.2	(±0.008)

For the following deviations from the above standards, please contact Parker engineering: (1) Greater speeds and accelerations may be achieved.
(2) Splicing possible for longer travel distances. This may cause reductions in effective load, drive torque, speed, acceleration, and repeatability.
(3) Increased timing belt tension required. (4) Nominal value - component dependant. For improved repeatability consult factory.

HPLA/HLE OPTIONS & ACCESSORIES

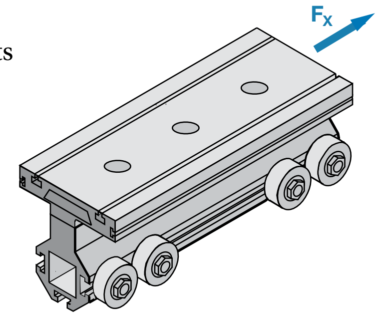
Limit and home sensors, switches, cable carriers, splice plates, and more.

See Options & Accessories at the end of the belt-driven section.

HLE-60SR Series – Load-Bearing Capacity of Carriage and Timing Belt

Load-Bearing Capacity of HLE-60SR Timing Belt (Fx)

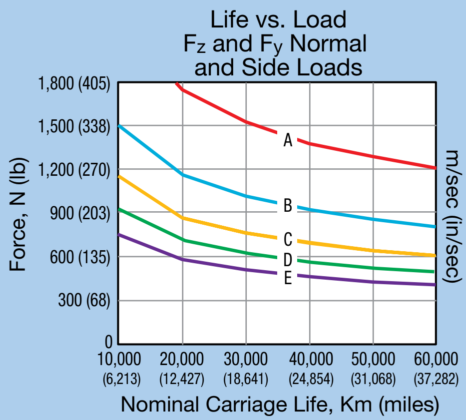
	Transferrable Thrust Force (n)	
	Nominal Belt Tension	Maximum Belt Tension
Drive Option	(81,000 km life)	(46,000 km life)
Supported Pulley (SP19 - SP30)	500	–



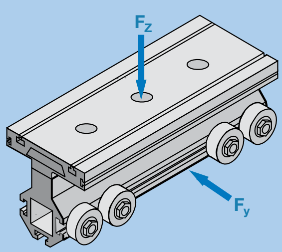
The forces and moments that the carriage is capable of transferring are speed-dependent. The curves shown in the graphs apply to a standard carriage (S). With the extended carriage (E), all the values apart from Fx (load-bearing capacity of timing belt) can be doubled if the load is applied equally to both halves of the carriage or distributed uniformly along its entire length.

HLE-60SR Load-Bearing Capacity (Fy and Fz)

(Values double for extended carriage)



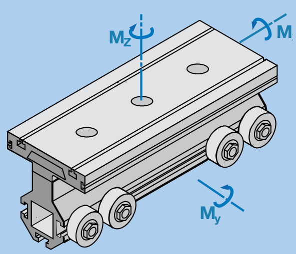
The curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied in different directions, the values given by the curves must be derated, i.e. the load or speed should be reduced if necessary.



Virtual Engineer software is available for determination of precise carriage loading.

Virtual Engineer

parker.com/VirtualEngineer

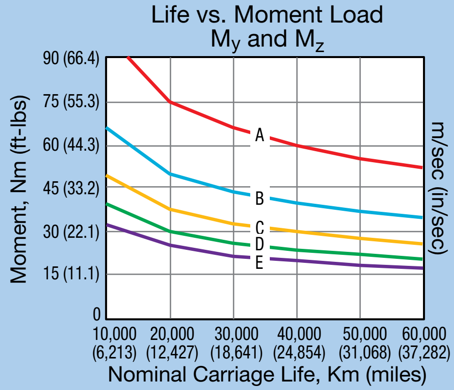


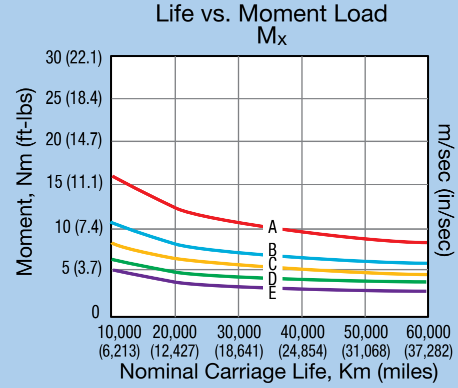
Velocity

Curve	m/sec.	(in/sec.)
A	0.25	(10)
B	0.50	(20)
C	1.00	(40)
D	2.00	(80)
E	3.00	(120)

HLE-60SR Maximum Permissable Moment Load (Mx, My and Mz)

(Values double for extended carriage)

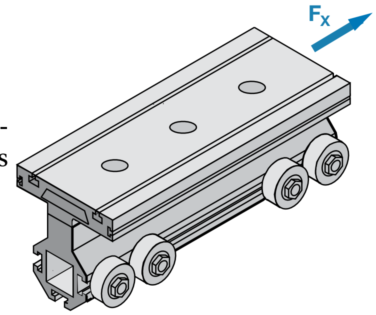




HLE-100SR Series – Load-Bearing Capacity of Carriage and Timing Belt

Load-Bearing Capacity of HLE-100SR Timing Belt (Fx)

Drive Option	Gearhead	Drive Option	Transferrable Thrust Force (n) Nominal Belt Tension (81,000 km life)	Maximum Belt Tension (46,000 km life)
ARO/ALO	PS90	SP10	675	900
	PX115/PV115	SP11	675	900
	PS115	SP12	925	1115
ARW/ALW/ DAR/DAL	PV90/PX90	SP9	500	675
	PS90	SP10	675	900
	PX115/PV115	SP11	675	900

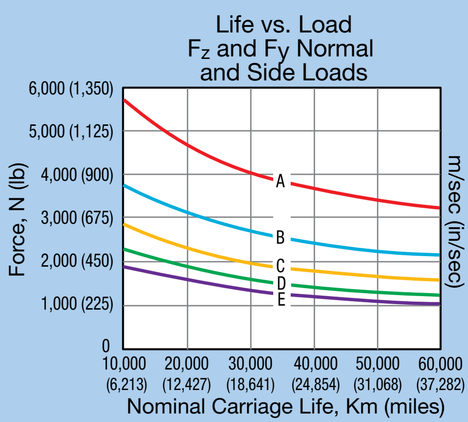


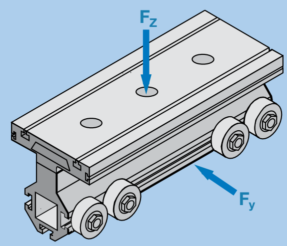
The forces and moments that the carriage is capable of transferring are speed-dependent. The curves shown in the graphs apply to a standard carriage (S). With the extended carriage (E), all the values apart from Fx (load-bearing capacity of timing belt) can be doubled if the load is applied equally to both halves of the carriage or distributed uniformly along its entire length.

HLE-100SR Load-Bearing Capacity (Fy and Fz)

(Values double for extended carriage)

The curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied in different directions, the values given by the curves must be derated, i.e. the load or speed should be reduced if necessary.





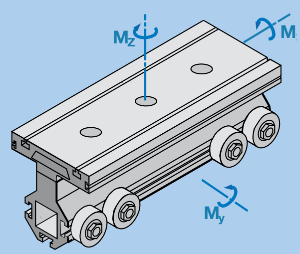
Virtual Engineer software is available for determination of precise carriage loading.

Virtual Engineer

parker.com/VirtualEngineer

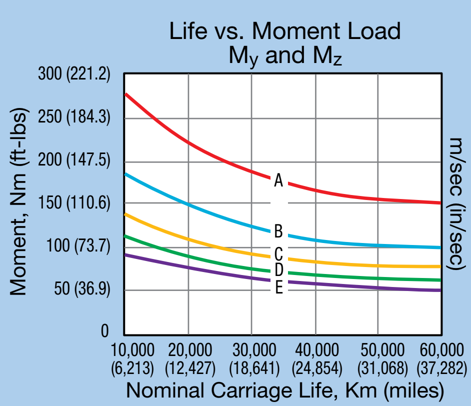
HLE-100SR Maximum Permissable Moment Load (Mx, My and Mz)

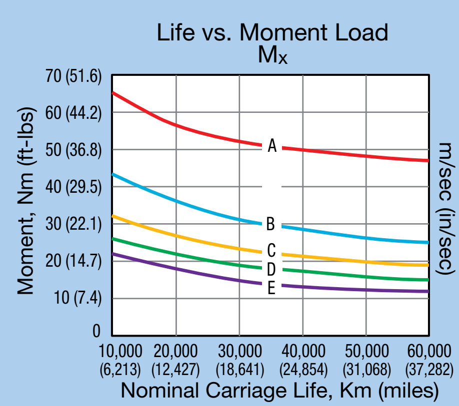
(Values double for extended carriage)



Velocity

Curve	m/sec.	(in/sec.)
A	0.25	(10)
B	0.50	(20)
C	1.00	(40)
D	2.00	(80)
E	3.00	(120)

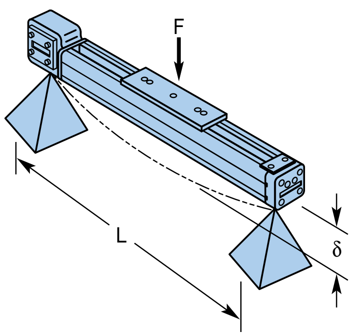


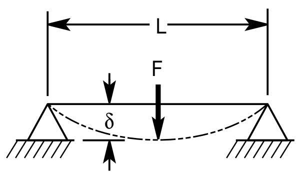


HLE-SR Deflection Characteristics

The HLE deflection curves can be used for determining the deflection based on the profile length and the application load weight. Applications requiring high acceleration forces can place a severe strain on the system stability. In these cases, a solid substructure may be required with the HLE product being supported at frequent intervals.

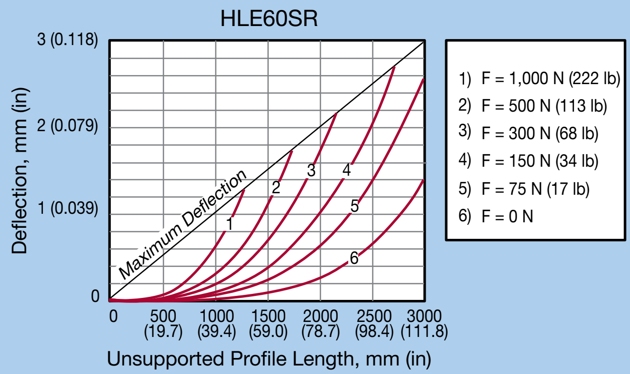
These deflection curves illustrate the deflection d, based on the HLE profile being simply supported at both ends. The graphs take into consideration the self deflection due to the weight of the profile, along with the load to be transported. The maximum deflection cannot be exceeded unless additional supports are implemented. Alternatively, the next larger profile size may be considered. For deflection formulas and calculations, please refer to the Technical Information Library found on our web site www.parkermotion.com.

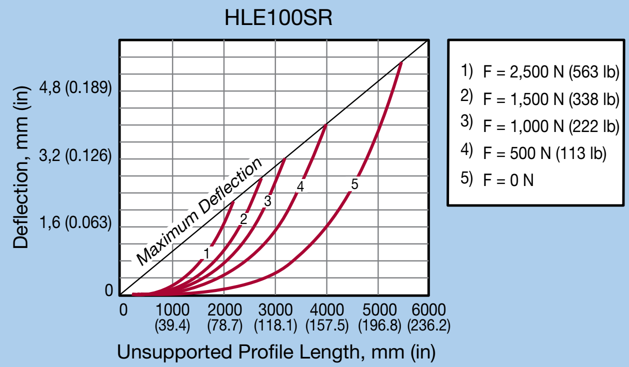




F = Force N
L = Unsupported length mm
δ = Deflection mm

Deflection Curves





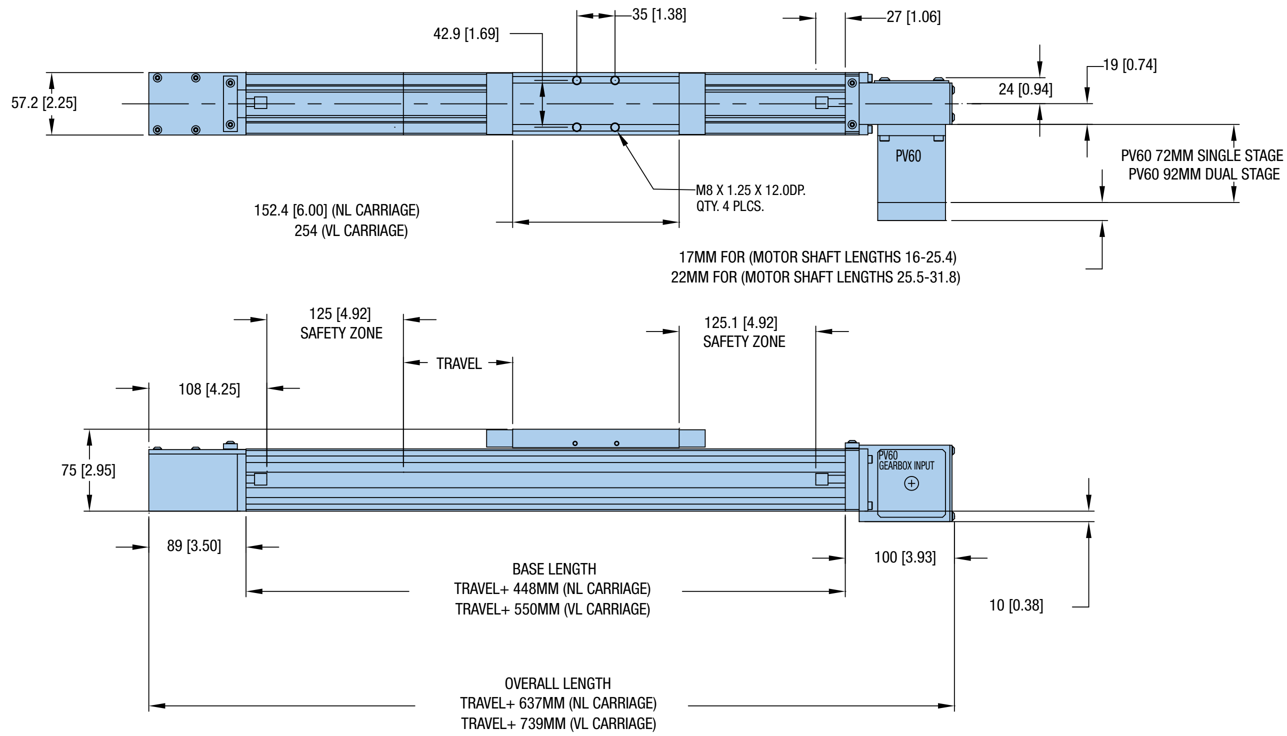
Belt Driven Tables

DIMENSIONS

Download 2D & 3D files from www.parker.com/emn/HLE60-SR

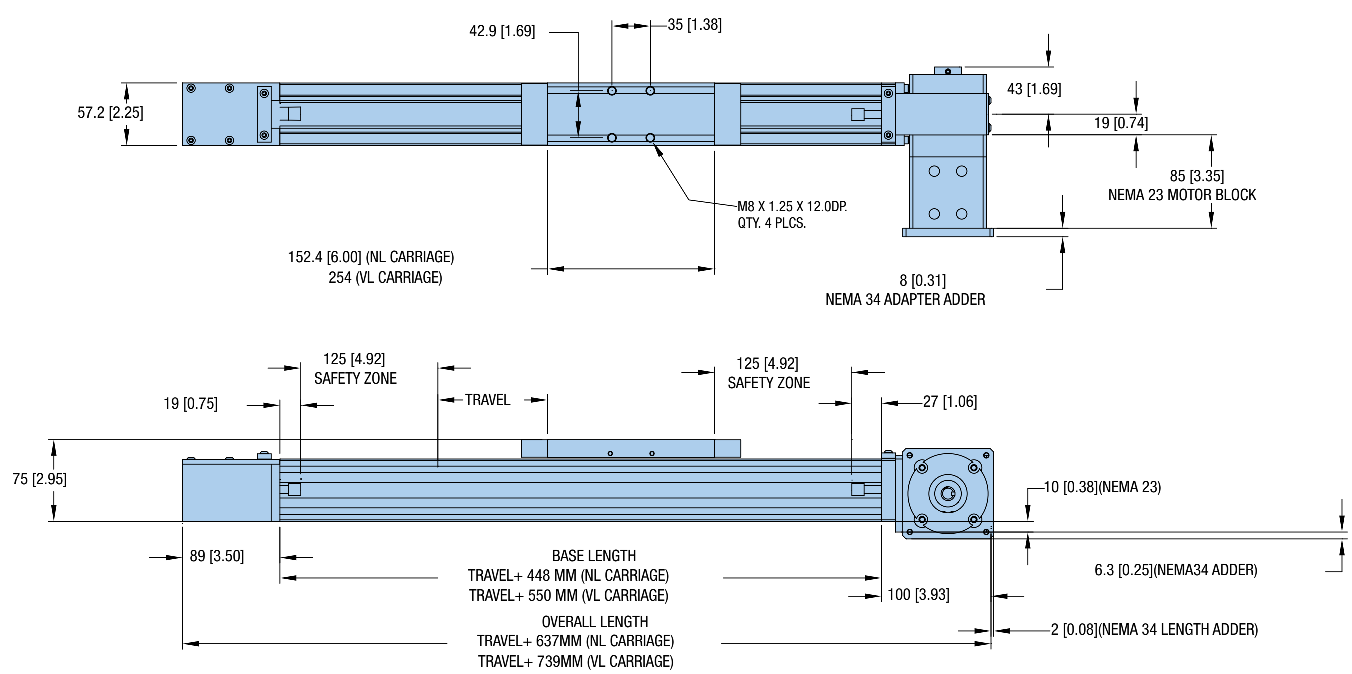
HLE60-SR with PV60 Direct Drive

Dimensions (mm)



HLE60-SR Drive with Motor Block

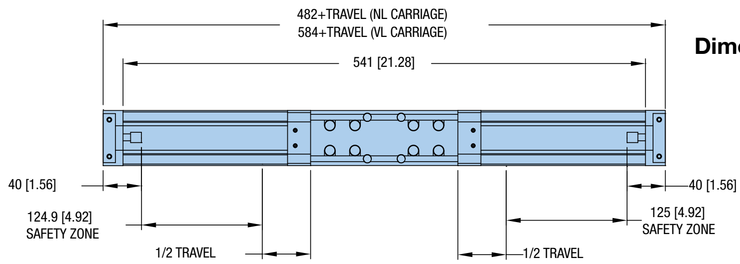
Dimensions (mm)



Download 2D & 3D files from www.parker.com/emn/HLE60-SR

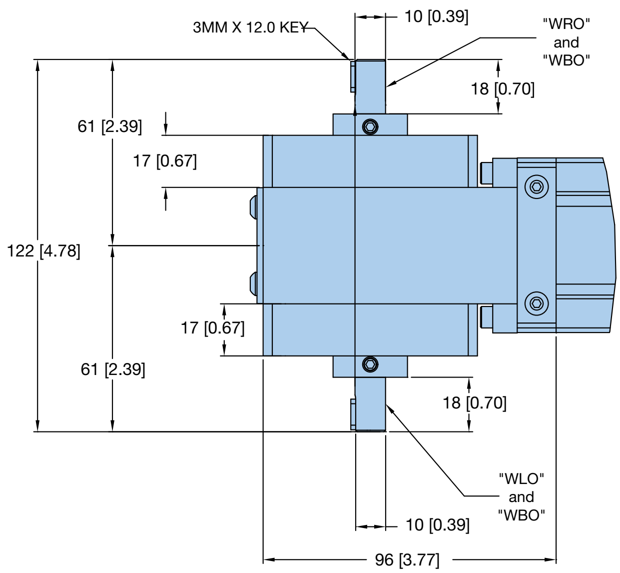
HLE60-SR Idler

Dimensions (mm)

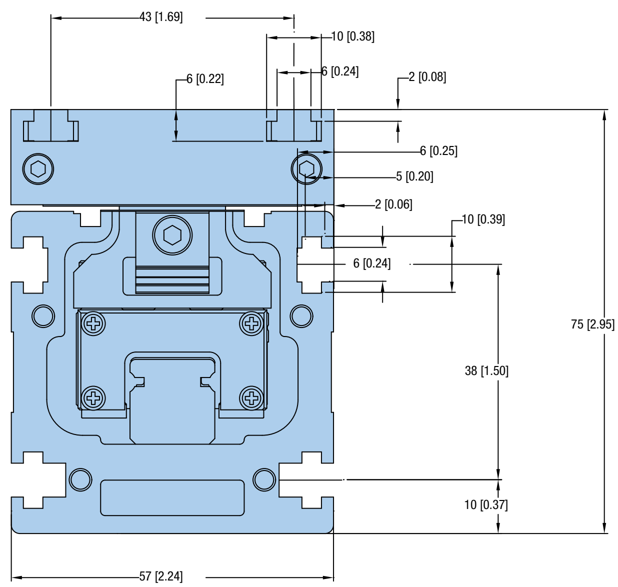


Drive Shaft Option

WRO Shaft on Right
WLO Shaft on Left
WBO Shaft on Both Sides



End View



HPLA/HLE OPTIONS & ACCESSORIES

Limit and home sensors, switches, cable carriers, splice plates, and more.

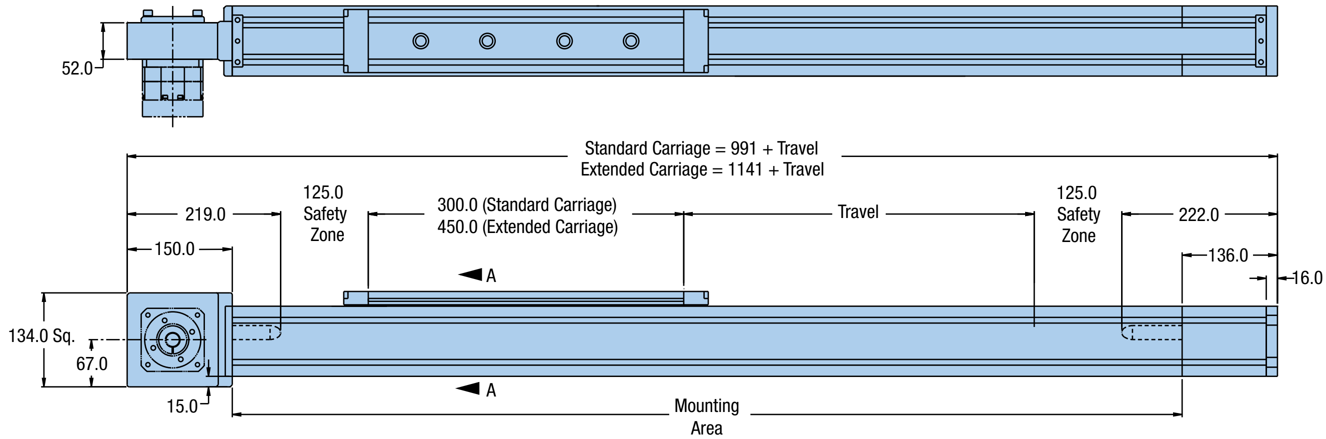
See Options & Accessories at the end of the belt-driven section.

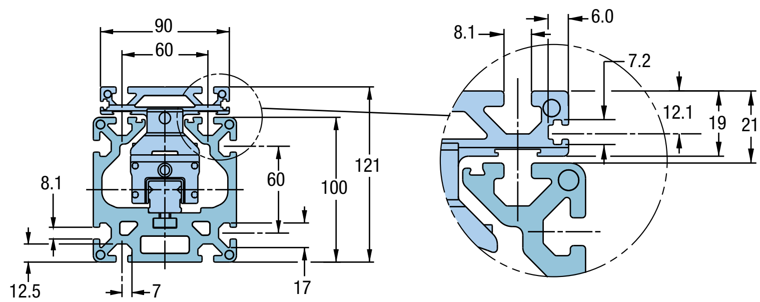
Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

Virtual Engineer

HLE100-SR Drive

Dimensions (mm)

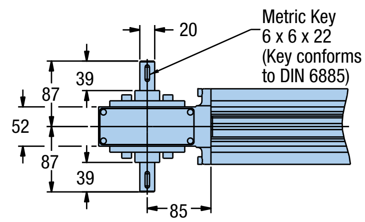




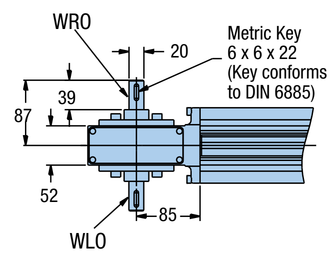
Section A-A

Drive Shaft Option

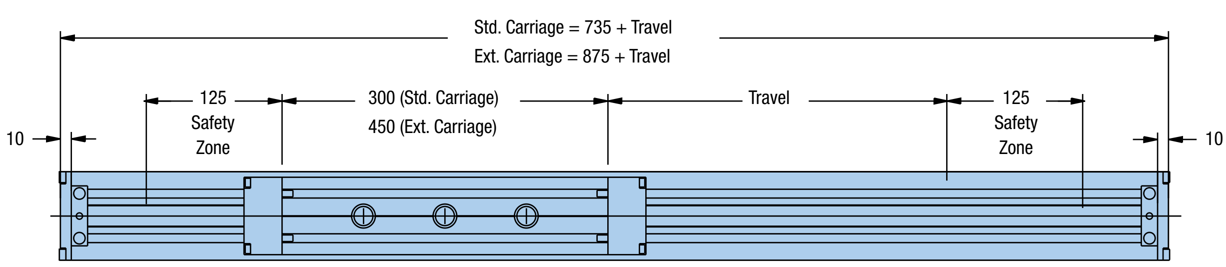
WRO Shaft on Right
WLO Shaft on Left
WBO Shaft on Both Sides



WBO



HLE100-SR Idler



ORDERING INFORMATION
HLE-SR

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬
Order Example:	HLE060	SR	NL	E	2000	DA000	MBR	SP5	G1205	H1	K24	ZA	LH0

① **Series**
HLE060

② **Bearing Type**
SR

③ **Carriage Type**

NL	Standard Carriage
VL	Extended Carriage

④ **Unit Type**

M	Idler
D	Dual Axis Unit
E	Single Axis Unit

⑤ **Travel Length**

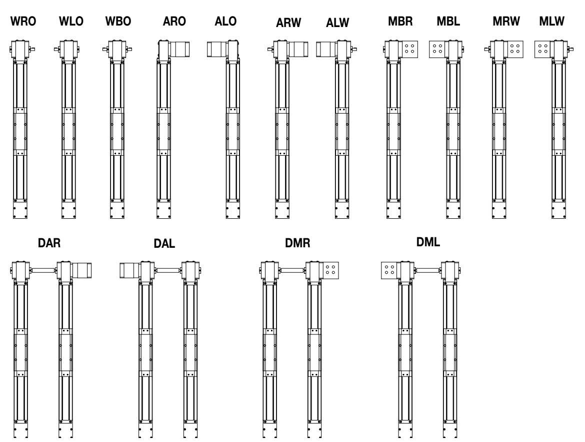
nnnn	nnnn=mm (3000 mm max for NL carriage; 2900 mm max for VL carriage)

⑥ **Drive Shaft Option - Center to Center**

DA0000	No Drive Shaft - Single Axis or Idler Unit
DAnnnn	(nnnn=mm) Dual Axis Center to Center (200 mm min; 1500 mm max)
DCnnnn	(nnnn=mm) Dual Axis with Covered Link Shaft Center to Center (200 mm min; 1500 mm max)

⑦ **Shaft Configuration Options**

WOO	No Shaft, Idler Unit
ARO	Gearhead Right
ALO	Gearhead Left
ARW	Gearhead Right Shaft Left
ALW	Gearhead Left Shaft Right
WLO	Shaft Left
WRO	Shaft Right
WBO	Double Shaft
MBL	Motor Block Left
MBR	Motor Block Right
MLW	Motor Block Left, Shaft Right
MRW	Motor Block Right, Shaft Left
DAL	Double Axis Gearhead, Drive Left
DAR	Double Axis Gearhead, Drive Right
DML	Double Axis, Motor Block Left
DMR	Double Axis, Motor Block Right



⑧ **Drive Station Interface**

SP19	Drive Housing For PV60-FN
SP20	Idler Unit
SP21	No Motor Block
SP22	Motor Block NEMA 23 with 0.375" Bore Coupling
SP23	Motor Block NEMA 34 with 0.25" Bore Coupling
SP24	Motor Block NEMA 34 with 0.375" Bore Coupling
SP25	Motor Block NEMA 34 with 0.50" Bore Coupling
SP28	Motor Block NEMA 23 without Coupling
SP29	Motor Block NEMA 34 without Coupling
SP30	Motor Block Neo 70 with 11.0 mm Bore Coupling

⑨ **Gearbox Option***

G0	No Gearbox (Requires MBR, MBL, MRW, MLW)
G1	Customer Supplied Gearhead*
G1203	PV60 Gearhead 3:1 Ratio
G1205	PV60 Gearhead 5:1 Ratio
G1210	PV60 Gearhead 10:1 Ratio
G1215	PV60 Gearhead 15:1 Ratio
G1225	PV60 Gearhead 25:1 Ratio

*Contact factory for approval of any alternative gearbox information.

⑩ **Mounting Orientation**

H1	Carriage Up
H2	Carriage Down
H3	Carriage on Side, Drive Station Up
H4	Carriage on Side, Drive Station Down

⑪ **Motor Kit Option**

K00	No Motor Kit
K21	Motor Kit LV23, HV23, OS23, ES23, VS23 to PV60
K22	Motor Kit BE23X to PV60
K23	Motor Kit SM23, SE23 to PV60
K24	Motor Kit LV34, HV34 to PV60
K25	Motor Kit BE34, NO34X, JO34X, TS31, TS32 to PV60
K26	Motor Kit RS34, ES34 to PV60
K27	Motor Kit NO70, JO70 to PV60
K28	Motor Kit SMB60 to PV60

⑫ **Strip Seal Option**

ZA	Unit with Strip Seal (IP30)
ZB	Unit without Strip Seal

⑬ **Limit/Home Switch Option**

LH0	No Limit Switch Assembly
LH3	Three NPN Prox Switches, 10-30 VDC
LH4	Three PNP Prox Switches, 10-30 VDC

HLE-SR

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬
Order Example:	HLE100	SR	NL	E	2000	DA000	ARO	SP2	G2-03	H1	ZB	K2	LH0

① Series
HLE100

② Bearing Type
SR

③ Carriage Type
NL	Standard Carriage
VL	Extended Carriage

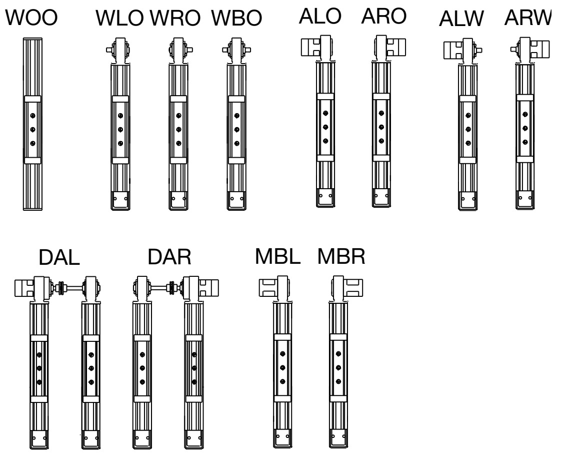
④ Unit Type
M	Idler
E	Timing Belt Drive, Nominal Thrust, Maximum Life
F	Timing Belt Drive, Nominal Thrust, Maximum Thrust

⑤ Travel Length
nnnn	Specified travel in mm (nnnn = mm)

⑥ Drive Shaft Option - Center to Center
DA0000	No Drive Shaft - Single Axis or Idler Unit
DAnnnn	(nnnn=mm)

⑦ Shaft Configuration Options
WOO	No Shaft, Idler Unit
WLO	Shaft Left
WRO	Shaft Right
WBO	Double Shaft
ALO	Reducer Left
ARO	Reducer Right
ALW	Reducer Left, Shaft Right
ARW	Reducer Right, Shaft Left
DAL	Double Axis, Drive Left
DAR	Double Axis, Drive Right
MBL	Motor Block Left
MBR	Motor Block Right

⑧ Drive Station Interface
SP0	Idler or Shaft Option
SP3	Motor Block - NEMA 34 with 0.500 in. coupling
SP4	Motor Block - NEMA 34 with 0.375 in. coupling
SP5	Motor Block - NEMA 34 without coupling
SP6	Motor Block - with coupling for JO923 direct drive
SP7	Motor Block - NEMA 42 with 0.625 in. coupling
SP8	Motor Block - NEMA 42 without coupling
SP9	Drive Housing for PX90/PV90/PEN/PER-090
SP10	Drive Housing for PS90
SP11	Drive Housing for PX115/PV115
SP12	Drive Housing for PS115



⑨ Gearbox Option
G0-00	No Gearbox
G10-nn	PS90
G11-nn	PX115
G12-nn	PS115
G13-nn	PX90
G14-nn	PV90
G15-nn	PV115

nn = ratio Single stage ratios 3:1, 5:1, 10:1 Dual stage ratios 15:1, 25:1

⑩ Mounting Orientation
H1	Carriage Up
H2	Carriage Down
H3	Carriage on Side, Drive Station Up
H4	Carriage on Side, Drive Station Down

⑪ Strip Seal Option
ZA	Unit with Strip Seal (IP30)
ZB	Unit without Strip Seal

⑫ Motor Kit Option
K0	No Motor Kit
K1	J034*, N034*, BE34*, TS3*
K2	J070*, N070*
K3	J090*, N090*
K4	M105*
K5	ES3*, OEM83-*, ZETA83-*, S83-*, RS3*
K6	J034*, N034*, BE34*, TS3*
K7	J090*, N090* to PE-115
K8	M105* to PE-115
K9	ES3*, OEM83-*, ZETA83-*, S83-*, RS3*
K10	RS42, RE42, S106-205
K11	S106-178, S106-250
K12	M145
K35	MPP092
K37	MPP100
K39	MPP115
K35	Parker MPP092/MPJ092
K37	Parker MPP100/MPJ100
K39	Parker MPP115/MPJ115
K41	Parker MPP142/MPJ142
K50	Parker HDY55; MPL15XX (Allen Bradley)
K51	AKM3X-AN (Kollmorgen)
K52	SGMAH-04 (Yaskawa)
K53	SGMAH-08 (Yaskawa)
K54	MKD041 (Indramat)
K55	AKM4X-AN (Kollmorgen)
K56	MKD070 (Indramat)
K57	MKD090 (INDRAMAT)

*Single stage ratios: 3, 4, 5, 8, 10; Dual stage ratios: 12, 15, 16, 20, 25

⑬ Limit/Home Switch Option
LH0	No Limit Switch Assembly
LH3	Three NPN Prox Switches, 10-30 VDC
LH4	Three PNP Prox Switches, 10-30 VDC

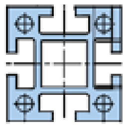
HZR Series

Belt-Drive Actuators for High Speed, Long Stroke Vertical Applications

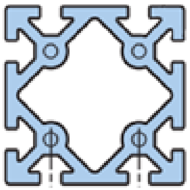
- **Designed as a vertical axis unit**
- **Load lifting capacities up to 150 kg**
- **Velocity up to 5 meters/sec.**
- **Positional repeatability of ±0.2 mm**
- **Torsion-resistant housing**
- **Roller wheel bearings for smooth vertical motion**
- **High vertical acceleration**

Typical Fields of Application

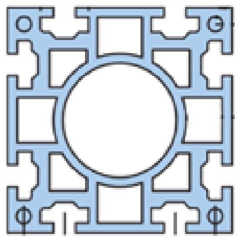
- Materials handling: palletization, feeding, removal
- Textile machinery building: crosscutting, slitting and stacking, quilting, seam stitching
- Process engineering: painting, coating, bonding
- Storage technology: commissioning, inventory
- Machine tool building: workpiece loading, tool changing
- Testing technology: guiding ultrasonic sensors



HZR050



HZR080



HZR100

	HZR50P Standard	HZR50E Extended	HZR80	HZR100
Maximum Travel (mm)	1,500	1,500	1,500	2,000
Maximum Payload (N)				
Maximum Acceleration (m/s²)	5		5	10

The HZR is a rugged vertical axis unit unique to the high speed automation industry. It is specifically designed to satisfy the mechanical demands placed on the vertical axis of a multi-axis gantry robot – utilized for high throughput lifting and transporting of heavy or bulky loads.

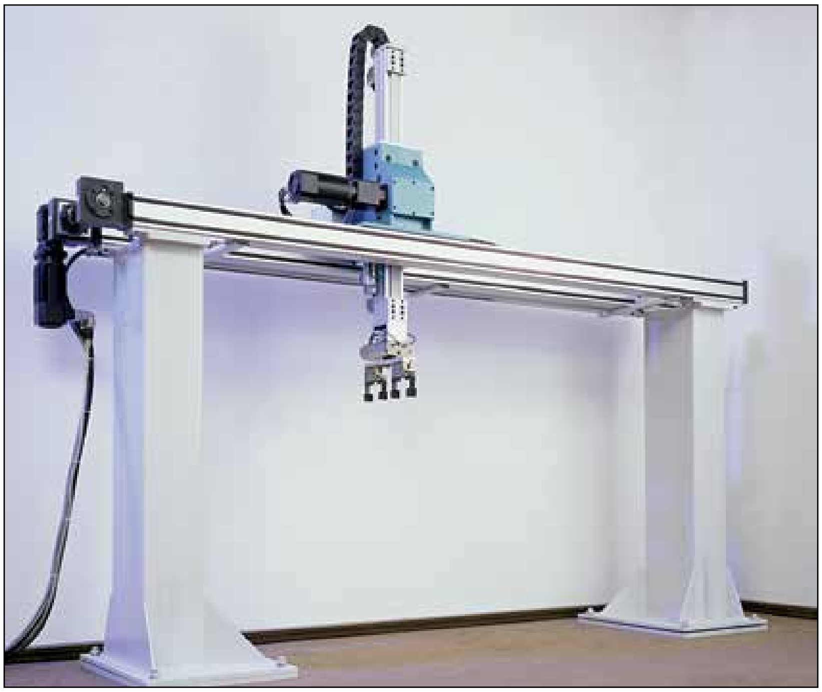
The payload is supported by a high strength extruded aluminum profile which is lifted and guided through a torsion-resistant cast aluminum housing. Maintenance-free, heavy duty polyamide bearing wheels evenly distribute and support the high forces induced by rapid horizontal acceleration of the load. A wear-free, steel cord reinforced timing belt transmits large traction forces to provide high accelerations and lifting capability in the vertical direction.

SPECIFICATIONS

HZR Series

Characteristics	Units	HZR50P (Standard)		HZR50E (Extended)		HZR80		HZR100	
Unit Weight									
Basic Unit (based on 1 meter travel)	kg (lb)	15.3	(33.73)	17.2	(37.92)	37	(81.8)	60	(132.3)
Weight of additional length	kg/m (lb/ft)	2.9	(1.95)	2.9	(1.95)	7.4	(4.9)	10.2	(6.85)
Moment of Inertia (based on 1 meter travel)									
Inertia reflected to drive pulley	kg-cm^2 (lb-in^2)	66.11	(22.58)	66.51	(22.72)	250	(85.4)	357	(122.0)
Travel and Speed1									
Maximum Speed	m/s (in/s)	5	(200)	5	(200)	5	(200)	5	(200)
Maximum Acceleration	m/s^2 (in/s^2)	5	(197)	5	(197)	10	(393)	10	(393)
Maximum Travel	m (in)	1.5	(59.1)	1.5	(59.1)	1.5	(59.1)	2.0	(78.7)
Geometric Data									
Cross Section (square profile)	mm (in)	50	(1.97)	50	(1.97)	80	(3.2)	100	(3.9)
Moment of Inertia Ix	cm^4 (in^4)	29.9	(0.72)	29.9	(0.72)	187.1	(4.5)	383.3	(9.2)
Section Modulus, W	cm^3 (in^3)	29.9	(1.82)	29.9	(1.82)	46.7	(2.85)	76.6	(4.67)
Pulley Data, Torques, Forces									
Travel Distance per Revolution	mm/rev (in/rev)	180	(7.09)	180	(7.09)	240	(9.45)	240	(9.45)
Pulley Diameter	mm (in)	57.3	(2.26)	57.3	(2.26)	76.4	(3.01)	76.4	(3.01)
Maximum Drive Torque	Nm (lb-in)	47	(416.3)	47	(416.3)	108	(956.7)	168	(1488.1)
Static Load	kg (lb)	45	(99.2)	45	(99.2)	75	(165)	150	(331)
Maximum Belt Traction (effective load)	N (lb)	1654	(371.8)	1654	(371.8)	2822	(635)	4410	(992)
Repeatability	mm (in)	±0.2	(±0.008)	±0.2	(±0.008)	±0.2	(±0.008)	±0.2	(±0.008)

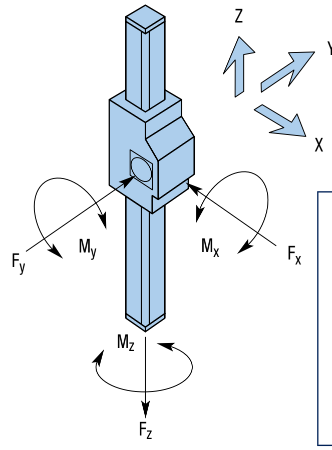
1 For higher speeds, accelerations or longer travel consult Parker Application Engineering for assistance.



Force and Moment Loads

The forces and moments that the carriage is capable of transferring are speed-dependent. The curves shown in the graphs apply to a standard guiding (P). With the extended guiding (E), all the values apart from Fx (load-bearing capacity of timing belt) can be doubled if the load is applied equally to both halves of the carriage or distributed uniformly along its entire length.

The curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied in different directions, the values given by the curves must be derated, i.e. the load or speed should be reduced if necessary.



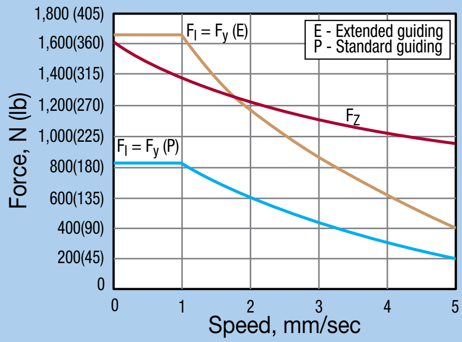
Virtual Engineer software is available for determination of precise carriage loading.

Virtual Engineer

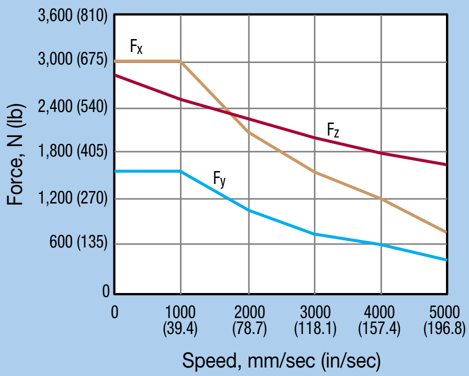
parker.com/VirtualEngineer

Force vs. Speed

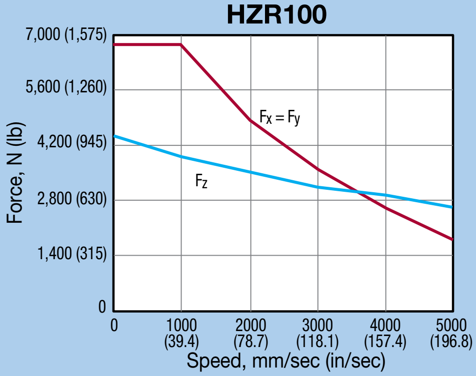
HZR50



HZR80

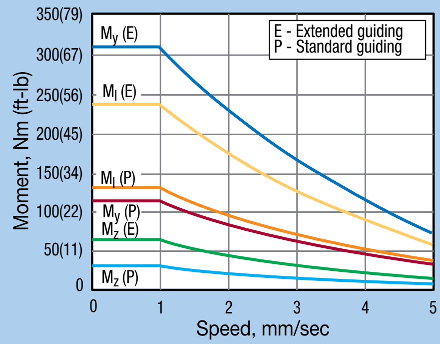


HZR100

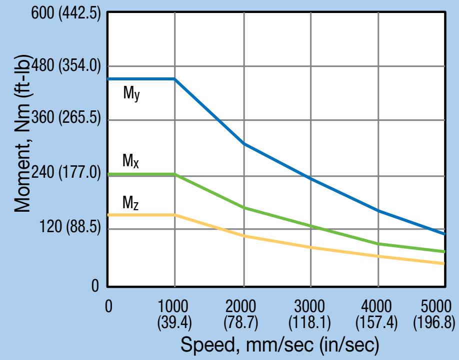


Moment Load vs. Speed

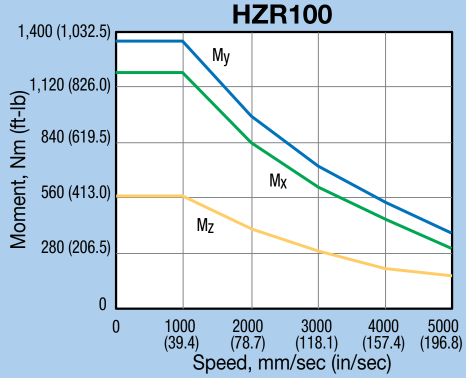
HZR50



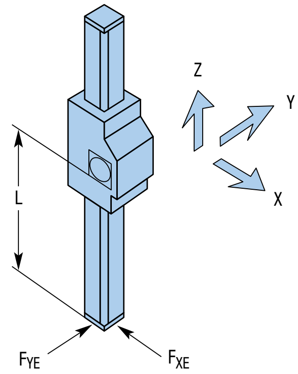
HZR80



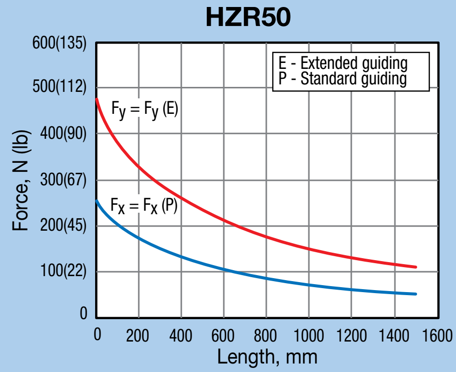
HZR100

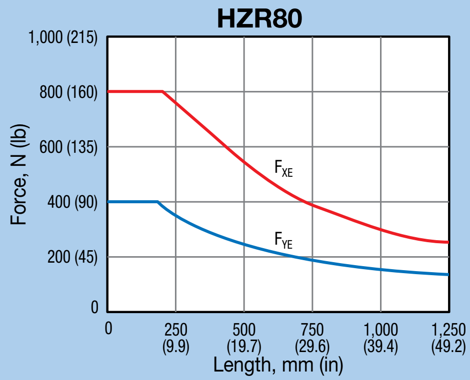


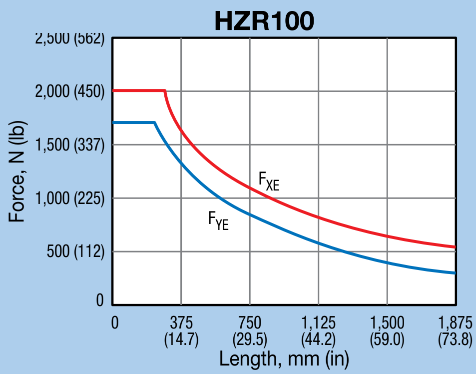
Extension Loads



Force vs. Extended Length

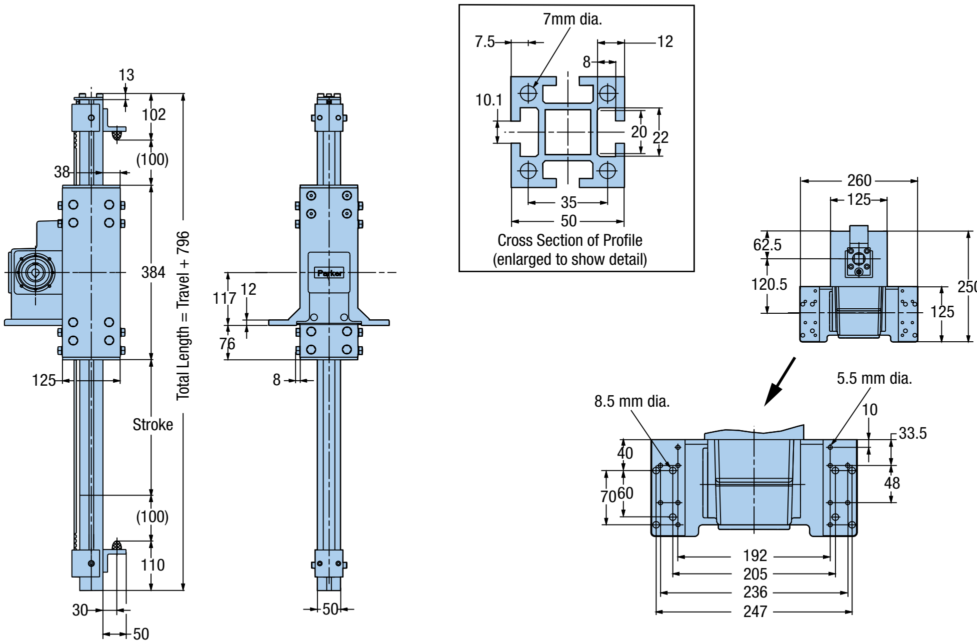




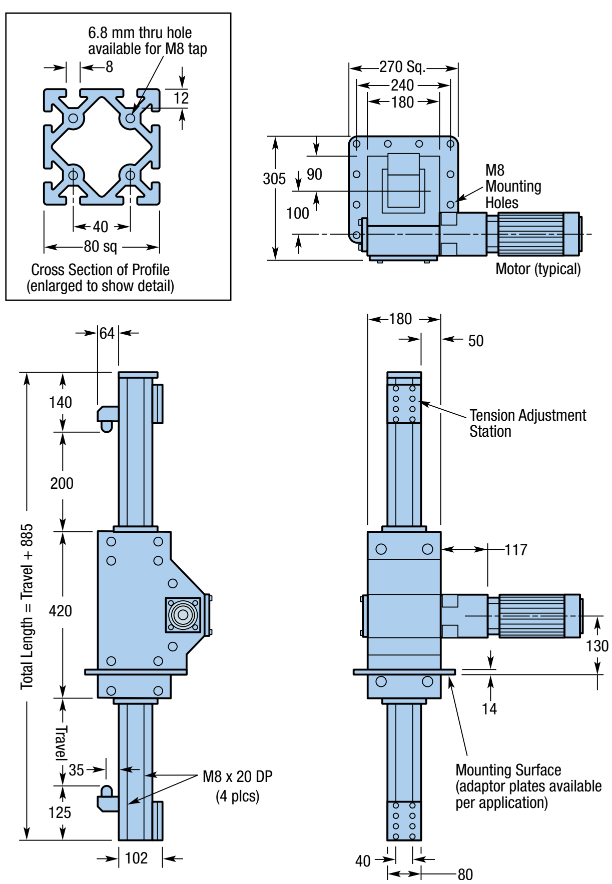


DIMENSIONS

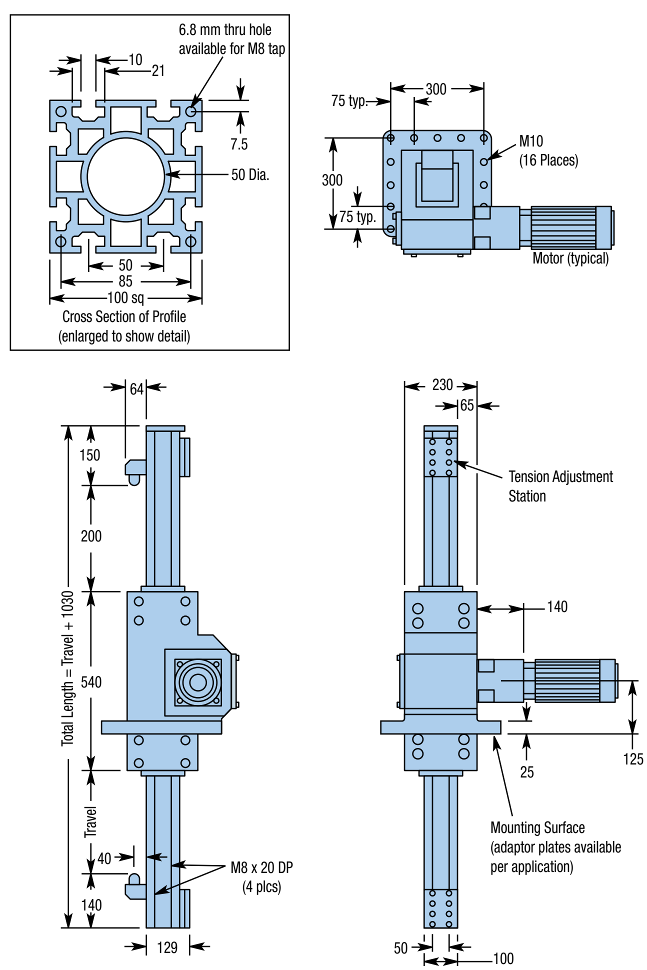
HZR50



HZR80



HZR100



ORDERING INFORMATION

HZR Series

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Order Example:	HZR80	1000	A	SP2	ARO	G2-03	K02	LH1	E

① **Series**

HZR50
HZR80
HZR100

② **Table Travel**

nnnn	Specified travel in mm (nnnn = mm)

③ **Mounting Flange Options**

A	No Mounting Flange
B	HZR Mounting to HPLA80
C	HZR Mounting to HLE100
D	HZR Mounting to HPLA120
E	HZR Mounting to HLE150

④ **Drive Station Interface**

SP10	Drive Housing for PX90/PV90
SP11	Drive Housing for PS90
SP12	Drive Housing for PX115/PV115
SP13	Drive Housing for PS115

⑤ **Orientation Options**

ARO	Gearbox Right
ALO	Gearbox Left

⑥ **Gearbox Option**

G0-00	No Gearbox
G1-nn	Customer Supplied
G08-nn	PX90 Gearbox included
G09-nn	PX115 Gearbox included
G10-nn	PS90 Gearbox included
G11-nn	PS115 Gearbox included
G12-nn	PS142 Gearbox included

nn = ratio
Single stage ratios 3:1, 5:1, 10:1 Dual stage ratios 15:1, 25:1

⑦ **Motor Kit Option**

K00	No Motor Kit
K20	Parker ES23X
K21	Parker BE23X
K23	Parker N070, ALlen Bradley MPL15XX
K24	Parker N092
K26	Parker LV/HV34
K34	Parker MPP092/MPJ092
K36	Parker MPP100/MPJ100
K39	Parker MPP115/MPJ115
K41	Parker MPP142/MPJ142
K50	Parker HDY55; MPL15XX (Allen Bradley)
K51	AKM3X-AN (Kollmorgen)
K52	SGMAH-04 (Yaskawa)
K53	SGMAH-08 (Yaskawa)
K54	MKD041 (Indramat)
K55	AKM4X-AN (Kollmorgen)
K56	MKD070 (Indramat)

⑧ **Limit Switch Assembly**

LH0	No Switch Assembly
LH1	Three mechanical switches, with 1 NO and 1 NC contact per switch (HZR80 and HZR100)
LH2	Two mechanical switches and 1 NPN proximity switch (HZR80 and HZR100)
LH3	Three NPN proximity switches NO/NC, 10-30 VDC (HZR80 and HZR100)
LH4	Three PNP proximity switches NO/NC, 10-30 VDC (HZR80 and HZR100)
LH5	Three NPN proximity switches NO “Home”; NC Travel Limits 10-30 VDC (HZR50 only)
LH6	Three NPN proximity switches NO “Home”; NC Travel Limits 10-30 VDC (HZR50 only)

⑨ **Extended Option**

E	16 Additional Rollers (HZR50 only)

Parker Gantry Robot Systems

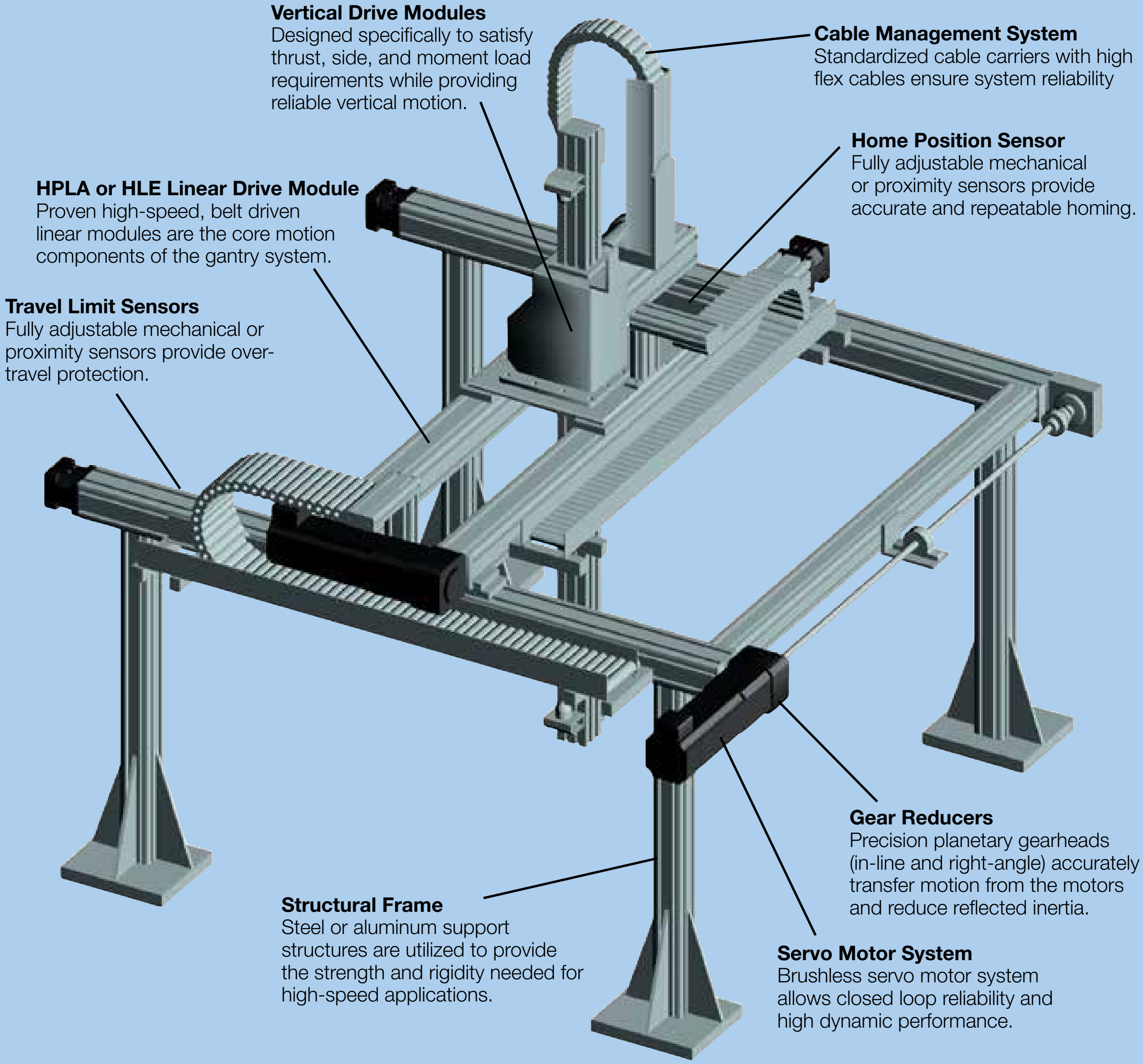
Minimize Your Engineering Effort

Parker's gantry systems provide cost-effective, easy to integrate solutions that satisfy the vast majority of automation requirements. In addition to our standard gantry systems, Parker offers products with additional capabilities to fulfill the needs of special applications. Our engineering skill and manufacturing expertise have integrated these products into custom-tailored gantry solutions which have successfully addressed the most unique and exacting requirements of machine builders and integrators around the world.

Additional Capabilities

- **Motors, Drives and Controls**
- **Extended Travels**
- **Rotary Motion Modules**
- **Cleanroom Preparations**
- **External Position Feedback**
- **Vertical Axis Brakes**
- **End Effectors**
- **Protective Guarding**
- **Custom Support Structures**

Gantry Robot Elements



Seven Standard Configurations

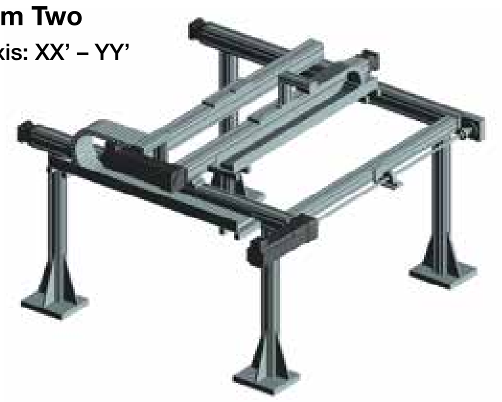
Parker's seven standard system configurations are designed to satisfy the vast majority of gantry robot applications. By standardizing on these configurations, Parker has simplified sizing and selection, shortened lead times, and reduced costs for users of these systems. The travels and loads indicated are nominal, and should not be considered limiting factors. Longer travels and increased loads are attainable depending upon the combination of parameters.

System One

Two Axis: XX' – Y

System Two

Two Axis: XX' – YY'

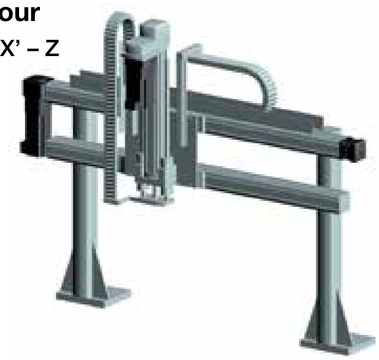


System Three

Two Axis: XX' – Z

System Four

Two Axis: XX' – Z



System Five

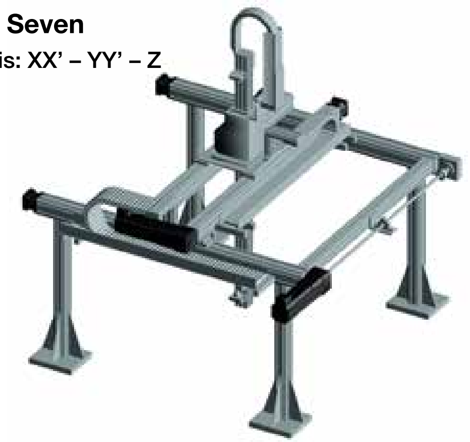
Two Axis: XX' – Z

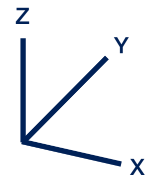
System Six

Three Axis: XX' – YY' – Z

System Seven

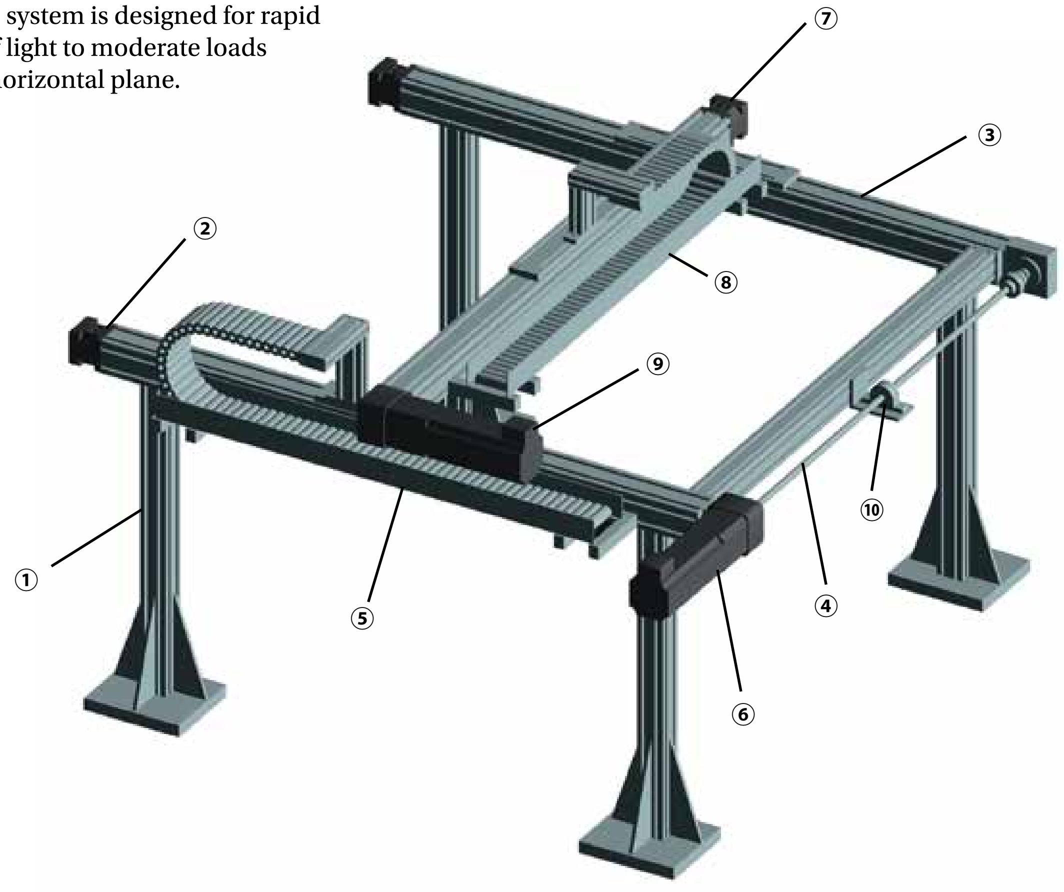
Three Axis: XX' – YY' – Z





System One

System One provides two axes of horizontal motion. The primary axis (X) is comprised of two HPLA or HLE Linear Modules linked by a common drive shaft, and the secondary axis (Y) is comprised of one HPLA or HLE Linear Module. These linear modules are capable of high speeds and accelerations over long travels. This system is designed for rapid transport of light to moderate loads in a single horizontal plane.



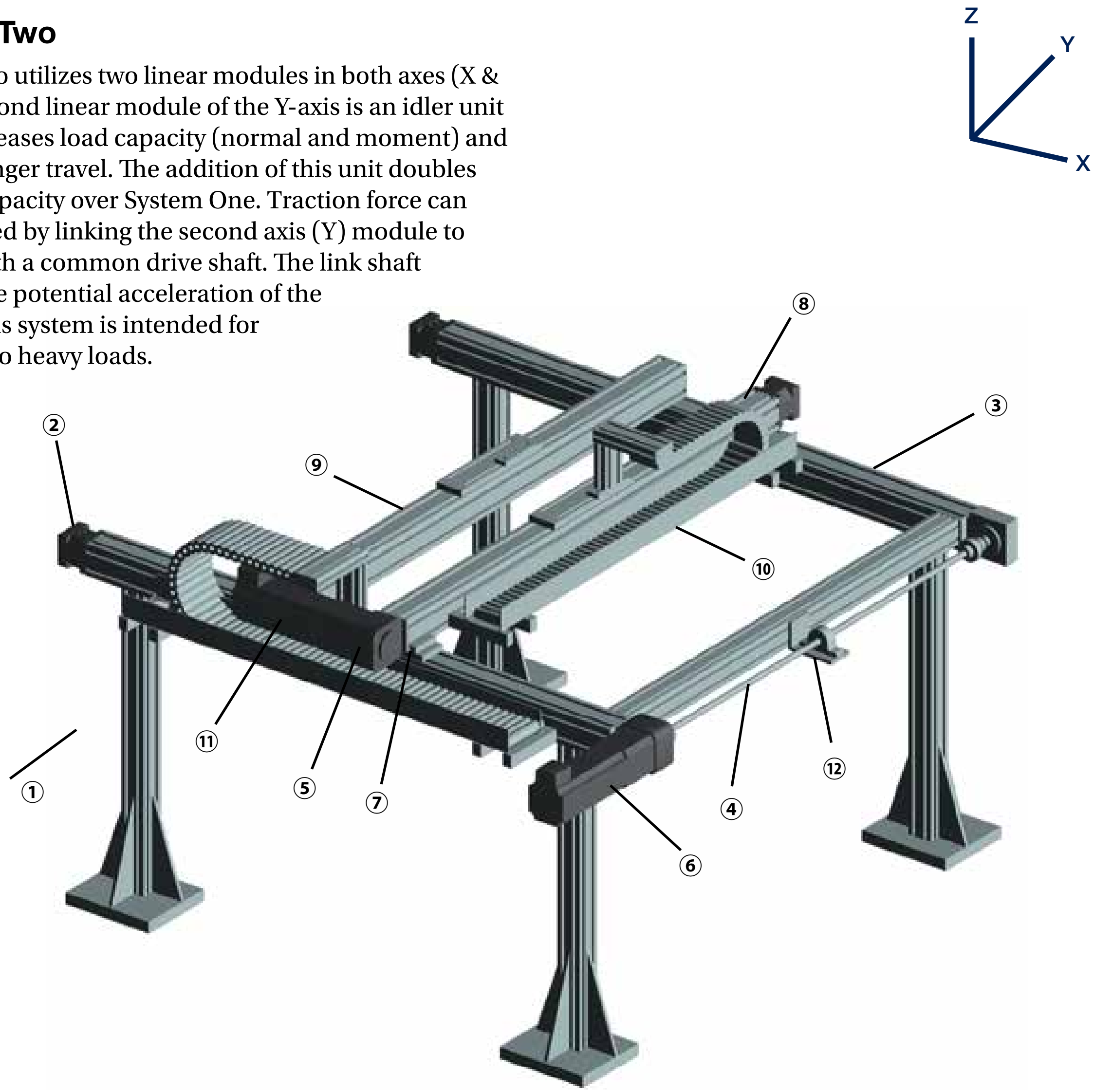
① Support Structure Available (steel or aluminum framing)
② X-Axis Drive Rail Assembly
③ X-Axis Driven Rail Assembly
④ X-Axis Link Shaft Assembly
⑤ X-Axis Cable Carrier
⑥ X-Axis Drive Motor
⑦ Y-Axis Drive Rail Assembly
⑧ Y-Axis Cable Carrier
⑨ Y-Axis Drive Motor
⑩ Pillow Block Bearing & Support (Based on Application)

	Axis Model Number			Load	Travel			Velocity		
Series No.	X-Axis	Y-Axis	Z-Axis	(kg)	X-Axis (meters)	Y-Axis (meters)	Z-Axis (meters)	X-Axis (m/sec.)	Y-Axis (m/sec.)	Z-Axis (m/sec.)
1	HLE60RB	HLE60RB	—	15	2.9	1.3	—	2.0	2.0	—
2	HLE60SR	HLE60SR	—	25	2.8	1.3	—	2.0	2.0	—
3	HPLA080	HPLA080	—	30	5.4	2.0	—	2.0	3.0	—
4	HLE100RB	HLE100RB	—	35	6.0	2.0	—	2.0	3.0	—
5	HLE100SR	HLE100SR	—	75	6.0	2.0	—	2.0	3.0	—
6	HPLA120	HPLA120	—	85	9.3	3.0	—	2.0	3.0	—
7	HLE150RB	HLE150RB	—	100	7.9	3.0	—	2.0	3.0	—

Note: Loads, travels, and velocities shown are interdependent. Increased values are attainable. Actual configuration will depend on application requirements. Please consult factory for more details.

System Two

System Two utilizes two linear modules in both axes (X & Y). The second linear module of the Y-axis is an idler unit which increases load capacity (normal and moment) and permits longer travel. The addition of this unit doubles the load capacity over System One. Traction force can be improved by linking the second axis (Y) module to the first with a common drive shaft. The link shaft doubles the potential acceleration of the system. This system is intended for moderate to heavy loads.



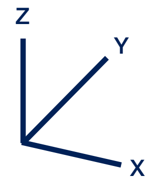
① Support Structure Available (steel or aluminum framing)
② X-Axis Drive Rail Assembly
③ X-Axis Driven Rail Assembly
④ X-Axis Link Shaft Assembly
⑤ X-Axis Cable Carrier
⑥ X-Axis Drive Motor
⑦ Clamping Profile
⑧ Y-Axis Drive Rail Assembly
⑨ Y-Axis Idler Rail Assembly
⑩ Y-Axis Cable Carrier
⑪ Y-Axis Drive Motor
⑫ Pillow Block Bearing & Support (Based on Application)

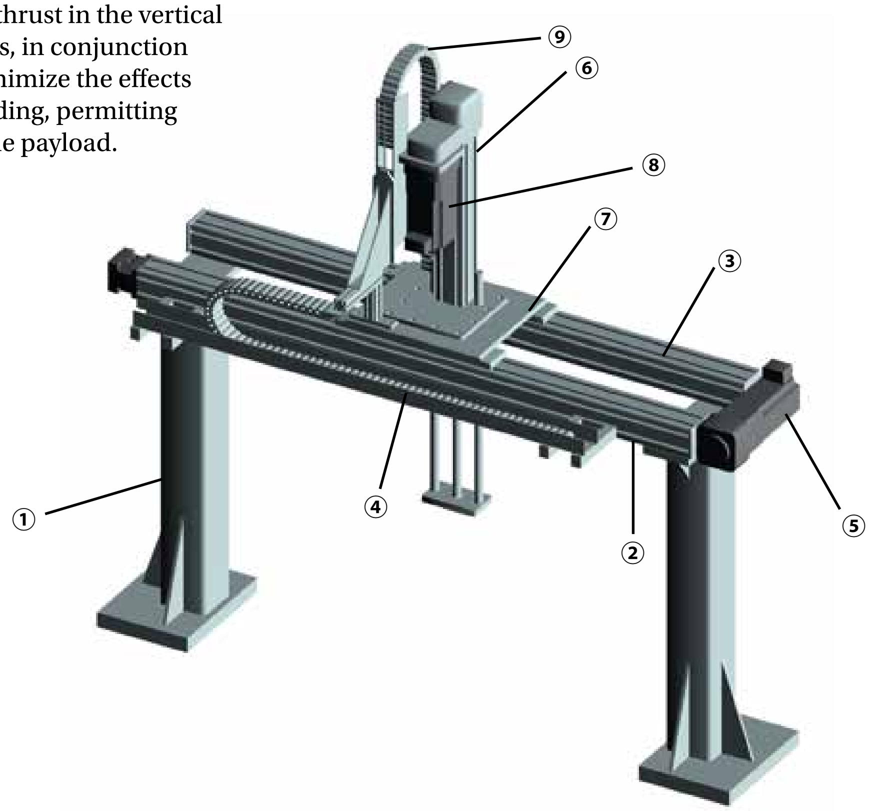
	Axis Model Number			Load	Travel			Velocity		
Series No.	X-Axis	Y-Axis	Z-Axis	(kg)	X-Axis (meters)	Y-Axis (meters)	Z-Axis (meters)	X-Axis (m/sec.)	Y-Axis (m/sec.)	Z-Axis (m/sec.)
1	HLE60RB	HLE60RB	—	30	2.9	1.3	—	1.0	2.0	—
2	HLE60SR	HLE60SR	—	50	2.8	1.3	—	1.0	2.0	—
3	HPLA080	HPLA080	—	60	5.4	2.0	—	2.0	3.0	—
4	HLE100RB	HLE100RB	—	70	6.0	2.0	—	1.5	4.0	—
5	HLE100SR	HLE100SR	—	150	6.0	2.0	—	1.5	4.0	—
6	HPLA120	HPLA120	—	170	9.3	3.0	—	2.0	4.0	—
7	HLE150RB	HLE150RB	—	200	7.9	3.0	—	2.0	4.0	—

Note: Loads, travels, and velocities shown are interdependent. Increased values are attainable. Actual configuration will depend on application requirements. Please consult factory for more details.

System Three

System Three provides two axes of motion in a vertical plane. A ballscrew driven ET Cylinder is utilized to provide high thrust in the vertical direction. ET Rod Guides, in conjunction with the dual X-axis, minimize the effects of moment and side loading, permitting higher acceleration of the payload.

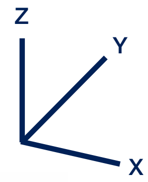




① Support Structure Available (steel or aluminum framing)
② X-Axis Drive Rail Assembly
③ X-Axis Idler Rail Assembly
④ X-Axis Cable Carrier
⑤ X-Axis Drive Motor
⑥ ET Cylinder Z-Axis with Flange Plate
⑦ Z-Axis Mounting Plate
⑧ Z-Axis Drive Motor
⑨ Z-Axis Cable Carrier

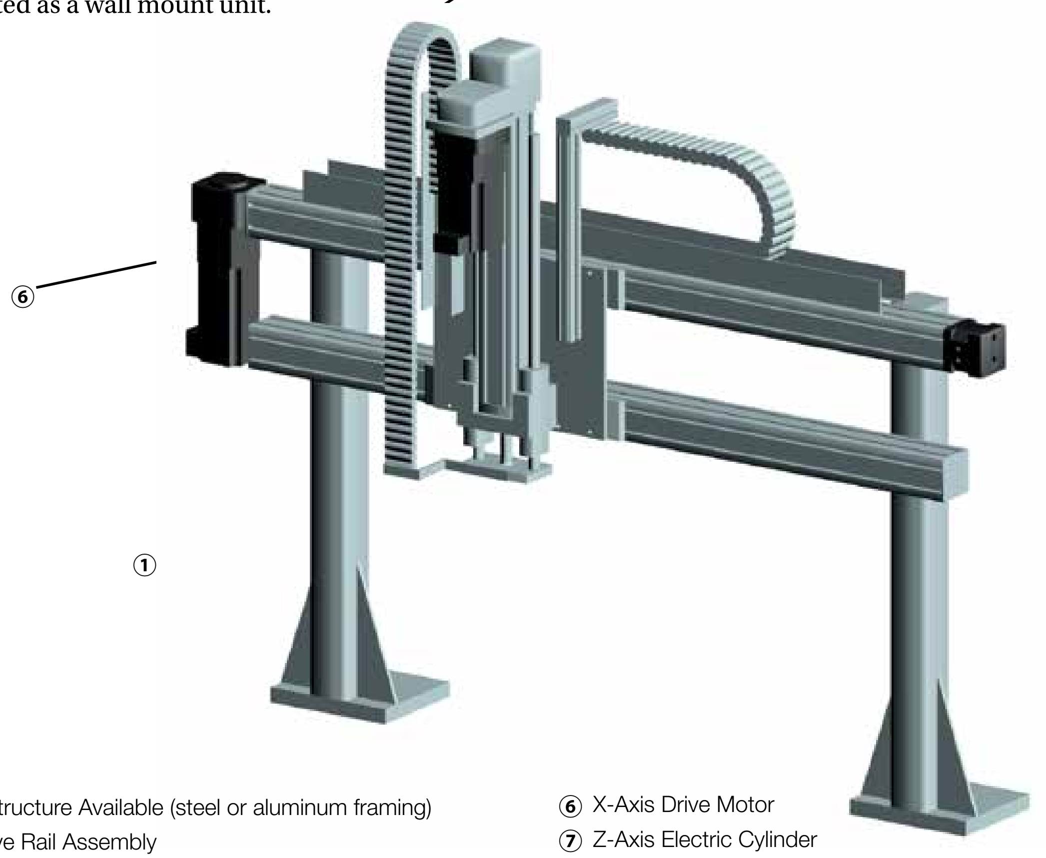
	Axis Model Number			Load	Travel			Velocity		
Series No.	X-Axis	Y-Axis	Z-Axis	(kg)	X-Axis (meters)	Y-Axis (meters)	Z-Axis (meters)	X-Axis (m/sec.)	Y-Axis (m/sec.)	Z-Axis (m/sec.)
1	HLE60RB	—	ETB32	10	2.9	—	0.3	1.5	—	0.5
2	HLE60RB	—	ETB50	20	2.9	—	0.5	1.5	—	0.8
3	HLE60SR	—	ETB32	10	2.8	—	0.3	1.5	—	0.5
4	HLE60SR	—	ETB50	20	2.8	—	0.5	1.5	—	0.8
5	HPLA080	—	ETB50	35	5.4	—	0.5	2.0	—	0.8
6	HLE100RB	—	ETB50	40	6.0	—	0.5	2.0	—	0.8
7	HLE100RB	—	ETB80	50	6.0	—	1.0	2.0	—	0.5
8	HLE100SR	—	ETB50	40	6.0	—	0.5	2.0	—	0.5
9	HLE100SR	—	ETB80	50	6.0	—	1.0	2.0	—	0.5
10	HPLA120	—	ETB80	75	9.3	—	1.0	2.5	—	0.5
11	HPLA120	—	ETB100	100	9.3	—	1.0	2.5	—	1.0
12	HLE150RB	—	ETB80	75	7.9	—	1.0	2.5	—	0.5
13	HLE150RB	—	ETB100	100	7.9	—	1.0	2.5	—	1.0

Note: Loads, travels, and velocities shown are interdependent. Increased values are attainable. Actual configuration will depend on application requirements. Please consult factory for more details.



System Four

System Four is a variation of System Three that offers an alternative mounting arrangement. It is a popular choice for front loading applications and is often implemented as a wall mount unit.



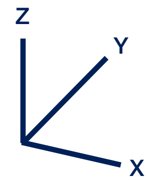
① Support Structure Available (steel or aluminum framing)
② X-Axis Drive Rail Assembly
③ X-Axis Idler Rail Assembly
④ Z-Axis Mounting Plate
⑤ X-Axis Cable Carrier
⑥ X-Axis Drive Motor
⑦ Z-Axis Electric Cylinder
⑧ Z-Axis Drive Motor
⑨ Z-Axis Cable Carrier

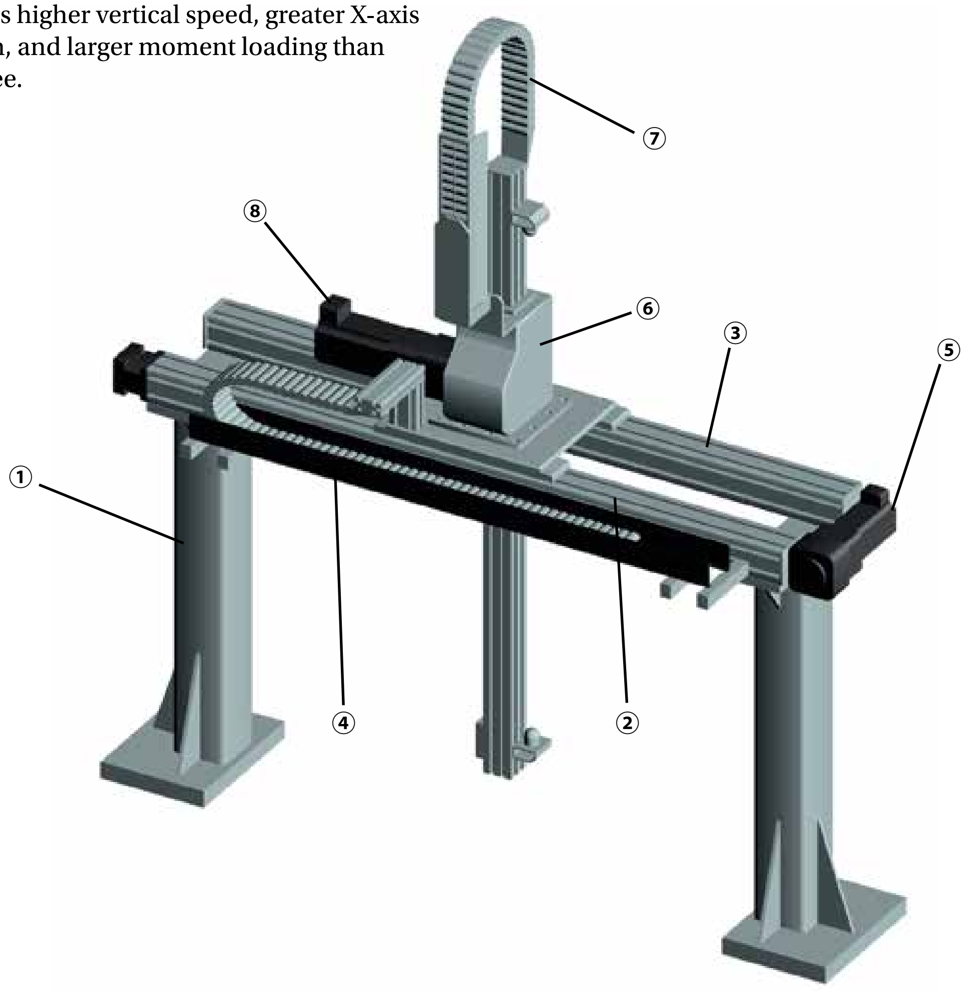
	Axis Model Number			Load	Travel			Velocity		
Series No.	X-Axis	Y-Axis	Z-Axis	(kg)	X-Axis (meters)	Y-Axis (meters)	Z-Axis (meters)	X-Axis (m/sec.)	Y-Axis (m/sec.)	Z-Axis (m/sec.)
1	HLE60RB	—	ETB32	10	2.9	—	0.3	1.5	—	0.5
2	HLE60RB	—	ETB50	20	2.9	—	0.5	1.5	—	0.8
3	HLE60SR	—	ETB32	10	2.8	—	0.3	1.5	—	0.5
4	HLE60SR	—	ETB50	20	2.8	—	0.5	1.5	—	0.8
5	HPLA080	—	ETB50	35	5.4	—	0.5	2.0	—	0.8
6	HLE100RB	—	ETB50	40	6.0	—	0.5	2.0	—	0.8
7	HLE100RB	—	ETB80	50	6.0	—	1.0	2.0	—	0.5
8	HLE100SR	—	ETB50	40	6.0	—	0.5	2.0	—	0.5
9	HLE100SR	—	ETB80	50	6.0	—	1.0	2.0	—	0.5
10	HPLA120	—	ETB80	75	9.3	—	1.0	2.5	—	0.5
11	HPLA120	—	ETB100	100	9.3	—	1.0	2.5	—	1.0
12	HLE150RB	—	ETB80	75	7.9	—	1.0	2.5	—	0.5
13	HLE150RB	—	ETB100	100	7.9	—	1.0	2.5	—	1.0

Note: Loads, travels, and velocities shown are interdependent. Increased values are attainable. Actual configuration will depend on application requirements. Please consult factory for more details.

System Five

System Five is an X-Z system utilizing the HZR belt driven unit for the vertical axis. The rigidity of the HZR permits higher vertical speed, greater X-axis acceleration, and larger moment loading than System Three.





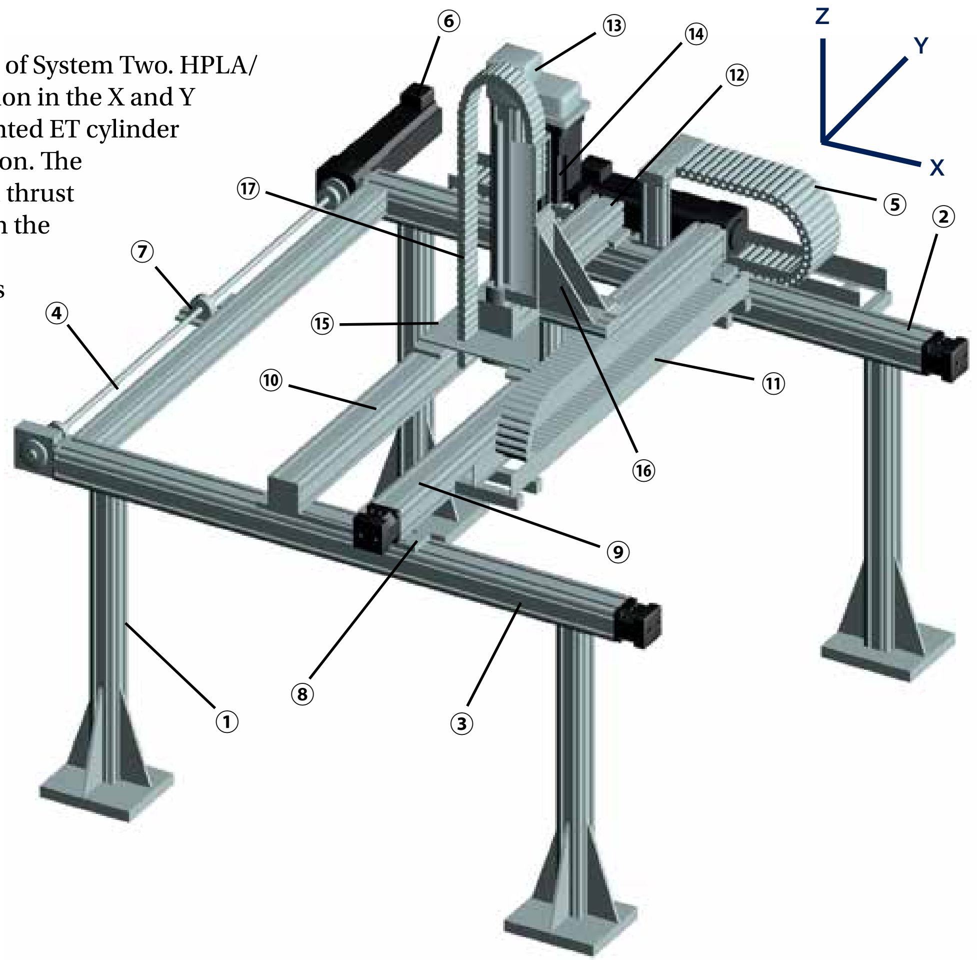
① Support Structure Available (steel or aluminum framing)
② X-Axis Drive Rail Assembly
③ X-Axis Idler Rail Assembly
④ X-Axis Cable Carrier
⑤ X-Axis Drive Motor
⑥ HZR Z-Axis with Flange Plate
⑦ Z-Axis Cable Carrier
⑧ Z-Axis Drive Motor

	Axis Model Number			Load	Travel			Velocity		
Series No.	X-Axis	Y-Axis	Z-Axis	(kg)	X-Axis (meters)	Y-Axis (meters)	Z-Axis (meters)	X-Axis (m/sec.)	Y-Axis (m/sec.)	Z-Axis (m/sec.)
1	HLE100RB	—	HZR80	50	6.0	—	1.0	2.0	—	1.5
2	HLE100RB	—	HZR100	100	6.0	—	1.5	2.0	—	1.5
3	HLE100SR	—	HZR80	50	6.0	—	1.0	2.0	—	1.5
4	HLE100SR	—	HZR100	100	6.0	—	1.5	2.0	—	1.5
5	HPLA120	—	HZR80	50	9.3	—	1.0	2.5	—	1.5
6	HPLA120	—	HZR100	100	9.3	—	1.5	2.5	—	1.5
7	HLE150RB	—	HZR80	50	7.9	—	1.0	2.5	—	1.5
8	HLE150RB	—	HZR100	100	7.9	—	1.5	2.5	—	1.5

Note: Loads, travels, and velocities shown are interdependent. Increased values are attainable. Actual configuration will depend on application requirements. Please consult factory for more details.

System Six

System Six is a three-axes version of System Two. HPLA/HLE linear modules provide motion in the X and Y directions while a vertically mounted ET cylinder provides the third axis (Z) of motion. The ET cylinder provides high vertical thrust capacity at moderate speeds. With the Z-axis retracted, this system can transport moderate to heavy loads at high rates of speed over long travel distances.



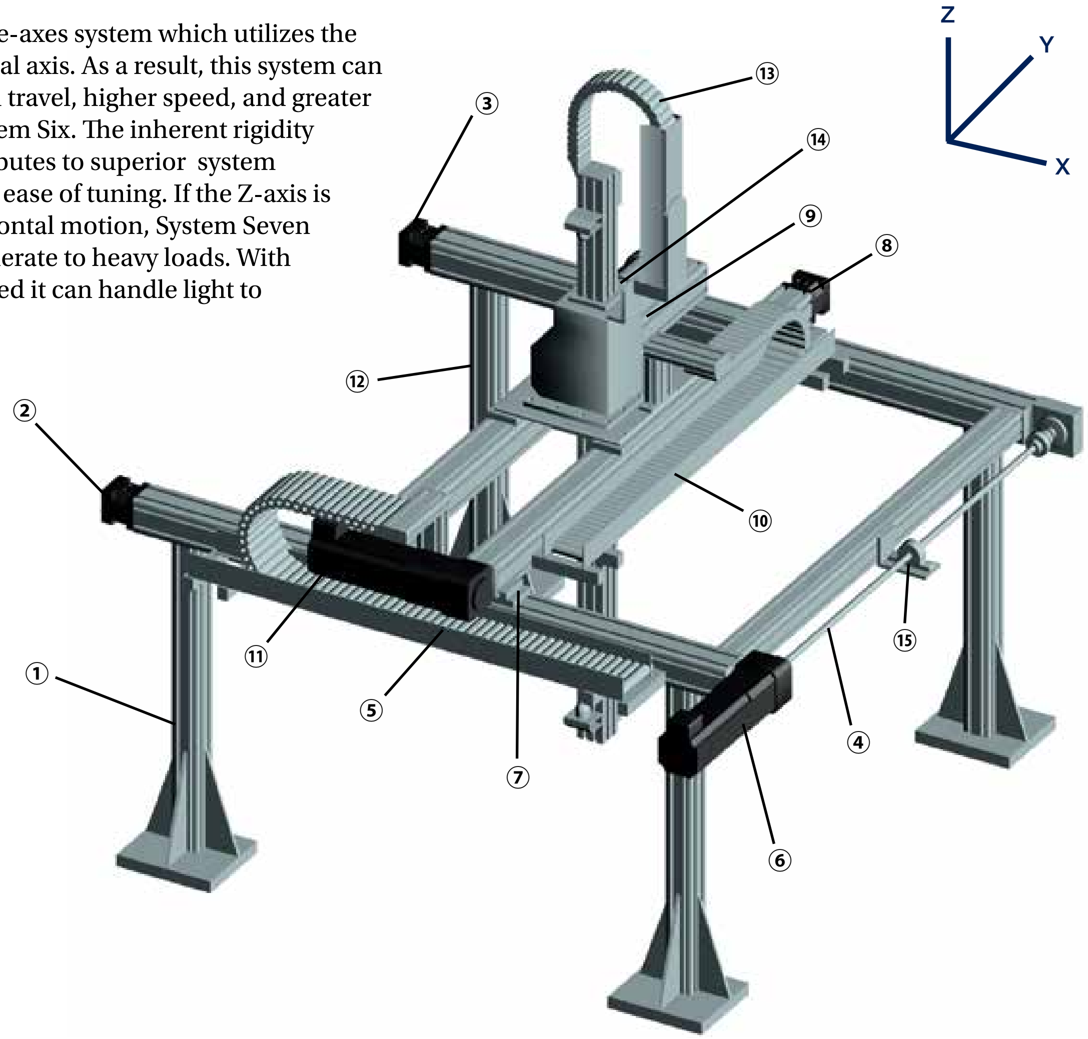
① Support Structure Available (steel or aluminum framing)
② X-Axis Drive Rail Assembly
③ X-Axis Driven Rail Assembly
④ X-Axis Link Shaft Assembly
⑤ X-Axis Cable Carrier
⑥ X-Axis Drive Motor
⑦ Pillow Block Bearing Support (Based on Application)
⑧ Clamping Profile
⑨ Y-Axis Drive Rail Assembly
⑩ Y-Axis Idler Rail Assembly
⑪ Y-Axis Cable Carrier
⑫ Y-Axis Drive Motor
⑬ Z-Axis ET Electric Cylinder
⑭ Z-Axis Drive Motor
⑮ Electric Cylinder Mounting Plate
⑯ Electric Cylinder Mounting Bracket
⑰ Z-Axis Cable Carrier

Series No.	Axis Model Number X-Axis	Y-Axis	Z-Axis	Load (kg)	Travel X-Axis (meters)	Y-Axis (meters)	Z-Axis (meters)	Velocity X-Axis (m/sec.)	Y-Axis (m/sec.)	Z-Axis (m/sec.)
1	HLE60RB	HLE60RB	ETB32	10	2.9	1.0	0.3	1.0	1.5	0.5
2	HLE60RB	HLE60RB	ETB50	20	2.9	0.5	0.5	1.0	1.5	0.8
3	HLE60SR	HLE60SR	ETB32	10	2.8	1.0	0.3	1.0	1.5	0.5
4	HLE60SR	HLE60SR	ETB50	20	2.8	0.5	0.5	1.0	1.5	0.8
5	HPLA080	HPLA080	ETB50	45	5.4	1.5	0.5	2.0	2.0	0.8
6	HLE100RB	HLE100RB	ETB80	50	6.0	1.5	1.0	2.0	2.0	0.5
7	HLE100SR	HLE100SR	ETB80	50	6.0	1.4	1.0	2.0	2.0	0.5
8	HPLA120	HPLA120	ETB100	100	9.3	3.0	1.0	2.5	2.5	1.0
9	HLE150RB	HLE150RB	ETB100	100	7.9	3.0	1.0	2.5	2.5	1.0

Note: Loads, travels, and velocities shown are interdependent. Increased values are attainable. Actual configuration will depend on application requirements. Please consult factory for more details.

System Seven

System Seven is a three-axes system which utilizes the HZR unit for the vertical axis. As a result, this system can provide longer vertical travel, higher speed, and greater acceleration than System Six. The inherent rigidity of the HZR also contributes to superior system stiffness, stability, and ease of tuning. If the Z-axis is retracted during horizontal motion, System Seven can easily handle moderate to heavy loads. With the Z-axis fully extended it can handle light to moderate loads.



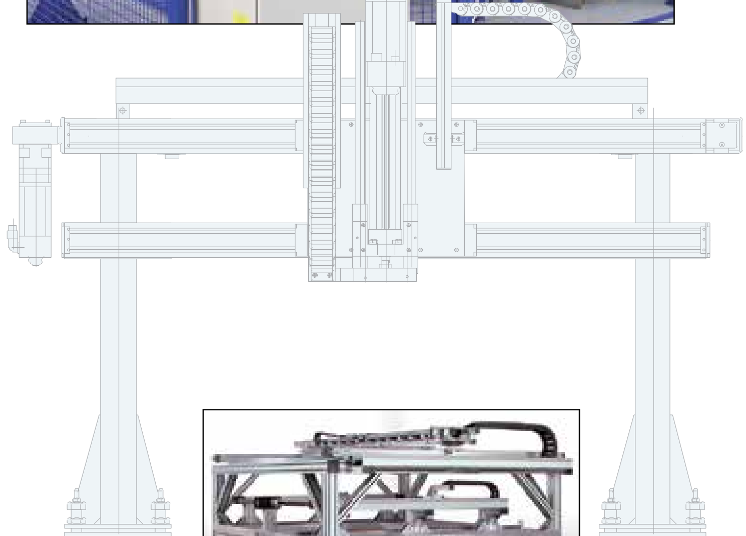
① Support Structure Available (steel or aluminum framing)
② X-Axis Drive Rail Assembly
③ X-Axis Driven Rail Assembly
④ X-Axis Link Shaft Assembly
⑤ X-Axis Cable Carrier
⑥ X-Axis Drive Motor
⑦ Clamping Profile
⑧ Y-Axis Drive Rail Assembly
⑨ Y-Axis Idler Rail Assembly
⑩ Y-Axis Cable Carrier
⑪ Y-Axis Drive Motor
⑫ HZR Z-Axis with Flange Plate
⑬ Z-Axis Cable Carrier
⑭ Z-Axis Drive Motor
⑮ Pillow Block Bearing & Support (Based on Application)

Series No.	Axis Model Number X-Axis	Y-Axis	Z-Axis	Load (kg)	Travel X-Axis (meters)	Y-Axis (meters)	Z-Axis (meters)	Velocity X-Axis (m/sec.)	Y-Axis (m/sec.)	Z-Axis (m/sec.)
1	HLE100RB	HLE100RB	HZR80	50	6.0	2.0	1.0	2.0	2.0	1.5
2	HLE100RB	HLE100RB	HZR100	100	6.0	1.3	1.5	2.0	2.0	1.5
3	HLE100SR	HLE100SR	HZR80	50	6.0	2.0	1.0	2.0	2.0	1.5
4	HLE100SR	HLE100SR	HZR100	100	6.0	1.3	1.5	2.0	2.0	1.5
5	HPLA120	HPLA120	HZR80	50	9.3	4.0	1.0	2.5	2.5	1.5
6	HPLA120	HPLA120	HZR100	100	9.3	3.3	1.5	2.5	2.5	1.5
7	HLE150RB	HLE150RB	HZR80	50	7.9	4.0	1.0	2.5	2.5	1.5
8	HLE150RB	HLE150RB	HZR100	100	7.9	3.3	1.5	2.5	2.5	1.5

Note: Loads, travels, and velocities shown are interdependent. Increased values are attainable. Actual configuration will depend on application requirements. Please consult factory for more details.

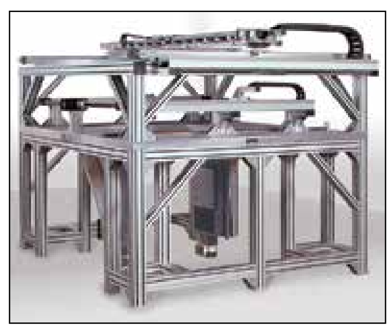
Gantry Systems Capabilities & Accessories

Parker's gantry systems provide cost-effective, easy to integrate solutions that satisfy the vast majority of automation requirements. In addition to these standard gantry systems, Parker offers products with additional capabilities to fulfill the needs of special applications. Our engineering skill and manufacturing expertise have integrated these products into custom-tailored gantry solutions which have successfully addressed the most unique and exacting requirements of machine builders and integrators around the world.



Support Structures

Parker can include the support structure and machine guarding as part of your complete system solution. Parker's ParFrame™ extruded aluminum structures are suited for light to medium duty requirements. High strength steel supports are offered for applications involving greater loads and forces.



Aluminum Structures

- **Lightweight aluminum extrusions**
- **Economical modular construction**
- **Standard metric sizes – compatible with linear drive units**

Steel Support Structures

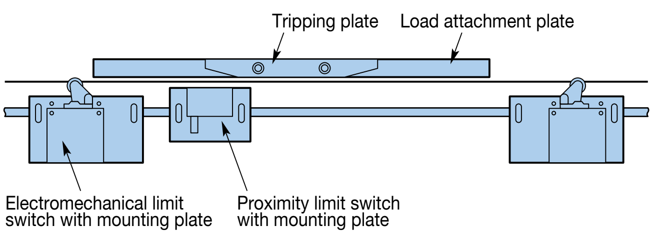
- **Heavy duty support**
- **High system stiffness**
- **Ideal for higher overhead gantries**
- **Engineered and fabricated to customer specifications**

HPLA/HLE/HZR OPTIONS & ACCESSORIES

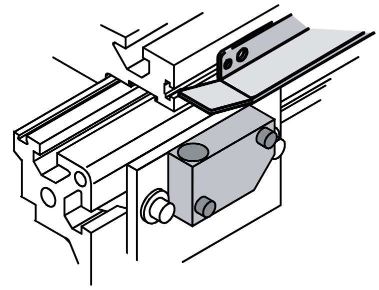
Limit and Home Sensors

"End of Travel" Limit Sensors are offered to assure safe operation of the unit by restricting travel to within allowable parameters. This range is dependent upon the load, velocity and acceleration factors determined by the application.

A "Home" Sensor can be positioned to establish a "Machine Start-up" location within the range of travel. Either mechanical or electrical proximity switches can be selected. Limit sensors can be easily positioned along the length of travel to further reduce the allowable operating envelope.



Electrical Proximity Switches



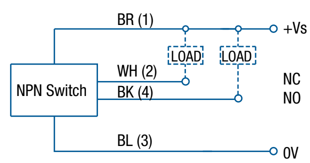
4-wire NPN switch with mounting hardware

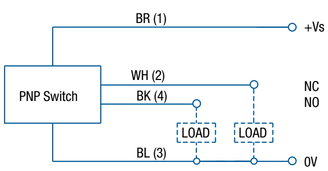
Product	Part Number
HPLA (all models):	002-2440-03
HLE60-RB, HLE60-SR	002-1892-01
HLE100-RB, HLE100-SR	510-900010
HLE150-RB, HLE150-Z	510-900030

4-wire PNP switch with mounting hardware

Product	Part Number
HPLA (all models):	002-2440-01
HLE60-RB, HLE60-SR	002-1892-02
HLE100-RB, HLE100-SR	510-900020
HLE150-RB, HLE150-Z	510-900040

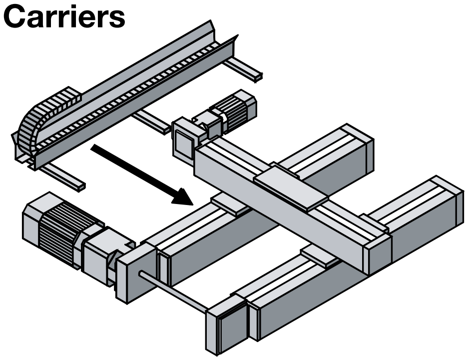
Inductive proximity switches are triggered by a standard tripping plate mounted to the side of the carriage. Available in both NPN and PNP 4-wire DC complementary outputs, the switches can be wired either NO or NC operation.

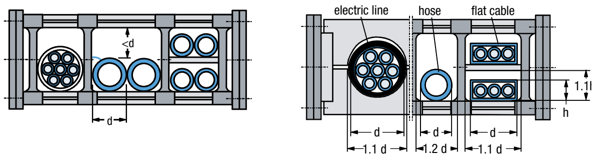




Sensing Distance	4 mm ± 10%
Voltage Supply	10-30 VDC
Switching Capacity	200 mA
Switching Response	2000 Hz
Current Consumption	<200 mA
Voltage Drop	<3 V
Protection Class	IP67
Operating Temperature	-25° C to 70° C (-13° F to 158° F)
Lead Termination	5 meter (200 in)
Reverse Polarity Protection	Yes
Short Circuit Protection	Yes

Cable Carriers





Typical Cross Sections

A cable carrier assembly is normally needed to transport cables to the carriage or custom payload. A complete cable carrier assembly includes the carrier, trough, end brackets, and mounting hardware. The cable carrier should be specifically matched to the linear actuator and other application requirements. Because of the extreme amount of cable flexing associated with high speed cable management, Parker uses only long life high-flex cables with its gantry systems. We recommend that all electric cables be approved for high speed cable carrier usage and that manufacturer's guidelines for bend radii are followed.

Cable Carrier Guidelines

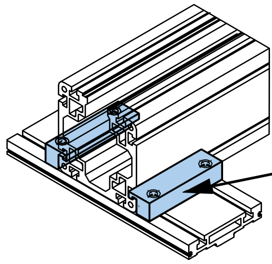
Hose lines should be highly flexible and should only extend slightly under pressure. Weight should be distributed across the cable track as evenly as possible. Cables must not be twisted when routed in the cable carrier and should be routed next to one another with approximately 10% additional space.

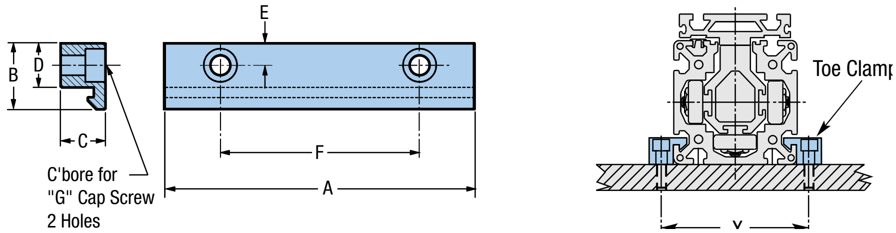
Avoid laying several lines on top of each other and laying lines of different diameters directly next to one another. If multiple layers must be used, divides should be inserted between each layer – should such circumstances arise, please contact a Parker application engineer. If there is no alternative to routing several lines beside each other without subdivisions, the clearance height within the carrier must be less than line diameter. This is the only way of preventing the cables from twisting. The supply cables must be able to move freely in the cable carrier – they must never be fastened or bundled together. Separating strips must always be inserted between flat cables routed in multiple layers.

Due to diversity of the requirements associated with high speed cable management systems, it is recommended that you contact your Parker applications engineer.

Toe Clamps

The toe clamps are used to rapidly install and fasten various combinations of linear actuators to each other; to a ParFrame™ structure; or to a mounting surface. Two clamps are required to fasten an HLE, HPLA, or HLEZ to a load attachment plate. The table at right shows the profiles for the various axis combinations.



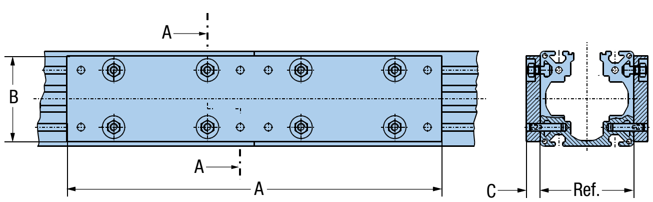


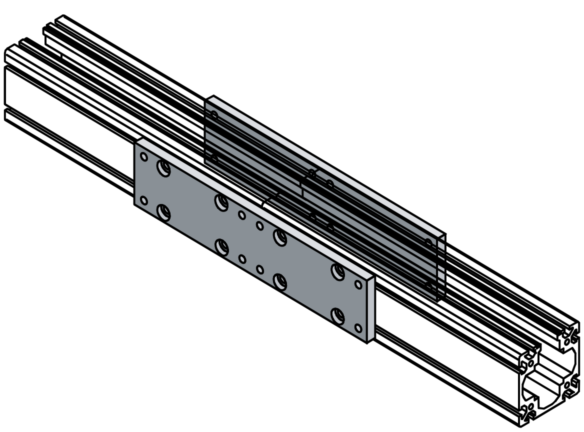
Dimensions

Used With	Part Number	A	B	C	D	E	F	G	X
HLE60-RB, HLE60-SR	000-7752-01	54	18	10	12	6	43	M5	70
HPLA080	500-000931	76	27	17	20	10	48	M5	100
HPLA080	500-000932	90	27	17	20	10	60	M8	100
HPLA080	500-000930	110	27	17	20	10	70	M8	100
HLE100-RB, HLE100-SR	500-000905	90	30	20	20	10	60	M6	120
HPLA120	500-000925	110	37.5	26	25	12.5	70	M8	145
HPLA180	500-000920	170	45	36	30	15	110	M10	210
HLE150-RB, HLE150-Z	500-000902	140	40	30	25	12	90	M8	176

Splice Plates

Splice Plates enable travels to be extended significantly beyond the standard range which is limited by extrusion length. Design concepts and factory installation expertise combine to produce perfectly splicevd units which are easily recreated on site. The splice plate connection is only recommended for units with the carriage in the top or the bottom position.



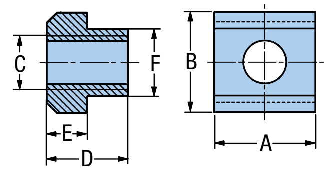


Dimensions

Model/Size	A	B	C	Ref.
HPLA080	300	70	15	80
HLE100-RB, HLE100-SR	400	90	15	100
HPLA120	400	110	15	120
HLE150-RB, HLE150-Z	500	130	15	150
HPLA180	500	165	20	180

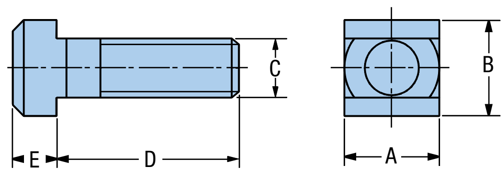
T-Nuts and T-Bolts

The T-nuts and bolts are used to fasten any element into the T-slots of the profile and to the upper side of the flange plate.



T-Nuts

Standard Part Number	Corrosion Resistant Part Number	Used With	Dimensions (mm) A	B	C	D	E	F
100-2353-01	—	HLE60-RB, HLE60-SR	11	9	M5	3	–	–
131-700102	135-725390	HPLA080	10	10	M5	8	4	5.6
131-700147	—	HPLA080	20	10	M5	8	4	5.6
131-700103	135-725400	HLE100-RB, HLE100-SR	13	13	M6	10	6	–
131-700135	—	HPLA120, HLE150-RB, HLE150-Z	15	15	M6	12	6	10
131-700104	135-725402	HPLA120, HLE150-RB, HLE150-Z	15	15	M8	12	6	10
131-700141	—	HPLA120, HLE150-RB, HLE150-Z	30	15	M8	12	6	10
131-700112	135-725401	HPLA180	18	18	M6	14	7	12
131-700111	135-725420	HPLA180	35	18	M10	14	7	12

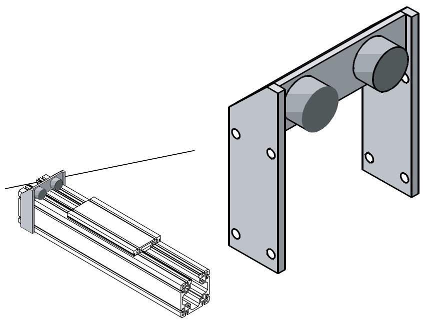


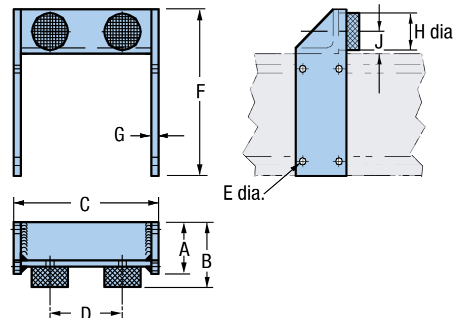
T-Bolts

Standard Part Number	Corrosion Resistant Part Number	Used With	Dimensions (mm) A	B	C	D	E
131-700030	135-725430	HPLA080	10	10	M6	15	4
131-700031	—	HPLA080	10	10	M6	25	4
131-700032	—	HPLA080	10	10	M6	30	4
131-700001	—	HLE100-RB, HLE100-SR	13	13	M8	25	6
131-700002	135-725450	HLE100-RB, HLE100-SR	13	13	M8	32	6
131-700007	135-725459	HPLA120	15	15	M10	25	6
131-700008	135-725460	HPLA120, HLE150-RB, HLE150-Z	15	15	M10	32	6
131-700009	135-725465	HLE150-RB, HLE150-Z	15	15	M10	40	6
131-700016	135-725482	HPLA180	18	18	M12	25	7
131-700015	135-725480	HPLA180	18	18	M12	50	7

External Bumpers

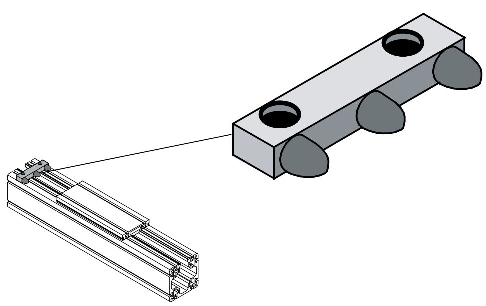
External bumpers serve as adjustable hard stops. They are fitted to the grooves in the housing profile and are often utilized for restricting total travel.

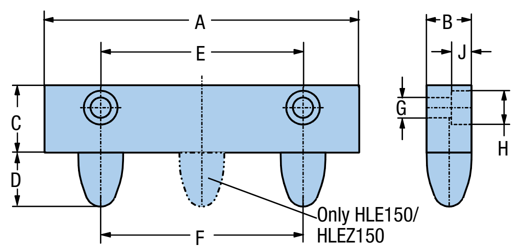




HPLA Series

Part Number	Used With	A	B	C	D	E	F	G	H	J
					Dimensions (mm)					
510-006497	HPLA080	30	45	90	56	5.5	91	5	15	11
510-007497	HPLA120	50	60	140	74	9	150	10	30	17
510-008497	HPLA150	70	88	200	100	11	225	10	50	30





HLE Series

Part Number	Used With	A	B	C	D	E	F	G	H	J
					Dimensions (mm)					
510-300004	HLE100-RB, HLE100-SR	90	20	30	24	60	40	6.6	11	6.8
510-300005	HLE150-RB, HLE150-Z	140	20	30	24	90	90	6.6	11	9.0

Linear Servo Motor Driven Positioners

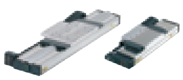
High Speed, High Precision Tables

Positioning systems needed for many of today's high-technology applications must satisfy an ever-increasing demand for high throughput and the need for extreme precision. Semiconductor, fiber optics, computer peripherals, metrology, solar scribing, digital printing, and other high-end industries require positioning systems which demonstrate quick response, high acceleration, high velocity, and fast settling time, in conjunction with micron and submicron level positioning.

Parker's linear motor product group is designed to satisfy this attribute combination of performance and precision. Products and systems in this section feature advanced direct-drive technology, which enables payloads to be directly driven by highly efficient brushless servo motors.

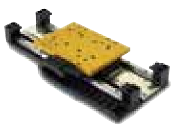
- Velocity up to 5 m/sec.
- Acceleration to 5 Gs
- Encoder resolution to 0.1 microns
- Long life cable management system
- Certified accuracy and repeatability

400LXR Series Linear Motor Tables



Optimum performance through slotless motor technology and performance-matched mechanical elements and feedback devices.
Page 309.

Trilogy Ironless Motor Positioning Tables

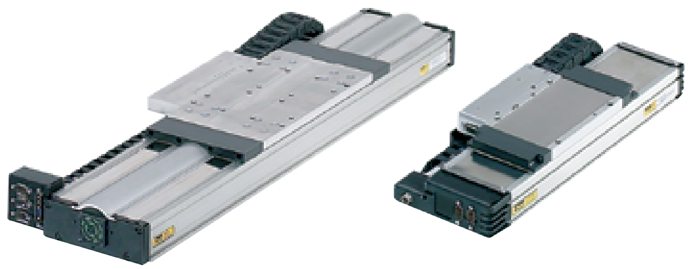


Trilogy motor and positioner combined in a pre-engineered, easily integrated, ready-to-run package.
Page 317.

400LXR Series Linear Motor Tables

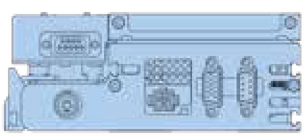
High precision “plug and play” modules

- Pre-engineered package
- Performance matched components
- Protection from environment
- Laser certified precision

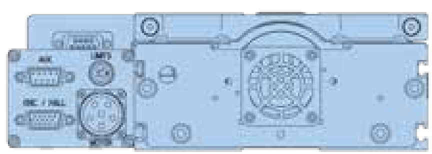


Typical Enhancements

- Velocity to 3 m/sec.
- Acceleration to 5 Gs
- Encoder resolution to 0.1 microns
- Long life cable management system
- Proven protective strip seal
- Certified accuracy and repeatability



404LXR



406LXR

Series	404LXR	406LXR
Travel (mm)	1000	1950
Load (kg)	45	180
Continuous Force (N)	50	110
Peak Force (N)	180	330

Linear motors cannot function on their own. Before motion can occur, a platform must be engineered to provide support, direction, and feedback for the linear motor. Bearings, cables, connectors, encoder, travel stops, homing sensor and other components must be performance matched and integrated to achieve desired motion and control.

Parker linear motor tables provide all this and more in a pre-engineered, easily mounted, ready to run package. The linear motor magnet rail is mounted to a stationary base and the forcer is mounted to the moveable carriage. The only contact between the moving carriage and the stationary base is through the linear support bearings. High-precision square rail bearings provide load support, low-friction translation, and a precise linear path.

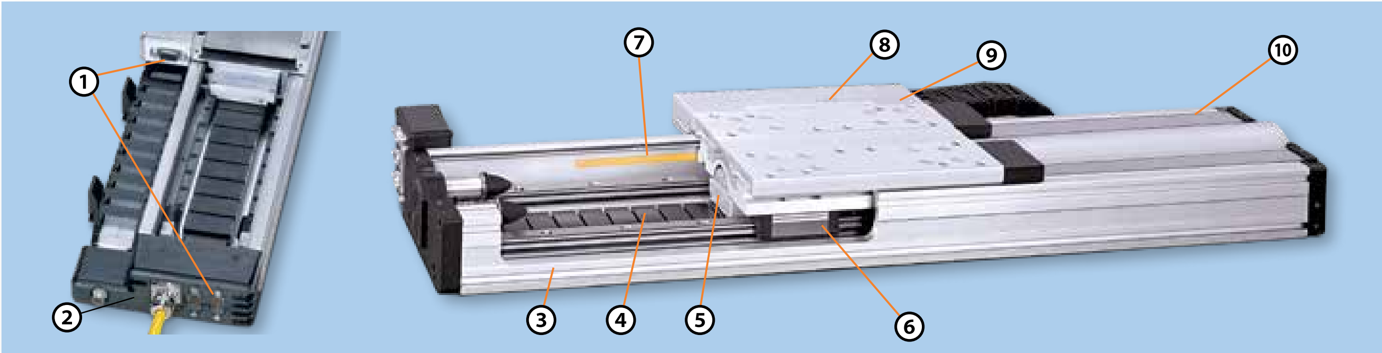
A high resolution linear encoder provides the required velocity and positional information to the motor controller, and a unique cable management system enables high performance motion with a life of 10 million cycles, dependent on motion cycle speeds, acceleration, and environmental condition.

Parker tables, with the slotless linear motor, are offered in two sizes: 404LXR and 406LXR.

The 400LXR Series linear servo motor tables achieve optimum performance by combining slotless motor technology with performance matched mechanical elements and feedback devices. Fast response, high acceleration, smooth translation, high velocity, and quick settling time describe the performance characteristics found in the 400LXR while high repeatability, precise accuracy, and sub-micron resolution define the positioning attributes.

The 400LXR Tables are offered in two widths (100 and 150mm), and travel lengths up to 2 meters to accommodate the size and performance requirements of many industries including life sciences, photonics, semiconductor, digital printing, solar panel, and general automation.

A vast assortment of “designer friendly” features and options simplify the engineering challenges often confronted with “base model” positioning devices. Features like the IP30 protective strip seal and long life cable management system exemplify the built-in value found in the 400LXR units. Other selectable enhancements like cleanroom compatibility, travel limit sensors, motor drives, encoder resolution, and pinning holes for tooling location, simplify machine design and integration efforts.



① **"Pass-Through" Cabling**

Pre-wired, plug-in connection of the moving payload for easy hookup of user instruments or end effectors.

② **Connector Panel**

Electrically shielded panel provides "plug-in" connectivity and quick disconnect for all signal and power requirements.

③ **High Strength Aluminum Body**

Extruded aluminum housing is precision machined to provide outstanding straightness and flatness.

④ **Magnet Rail**

Single rail of high energy rare earth magnets offers lower weight and lower cost than double magnet type.

⑤ **Slotless Linear Motor**

Provides a highly responsive, zero backlash drive system. Slotless motors offer excellent heat management, durability, and have built-in thermal sensor and hall sensors.

⑥ **Linear Guidance System**

The highly engineered carriage and bearing system effectively counters the combined problematic effects of heat, high-speed and high acceleration.

⑦ **Integral Linear Encoder**

Protected non-contact feedback with selectable resolutions to 0.1 micron. Z channel is factory aligned to home sensor for precise homing.

⑧ **Limit/Home Sensors**

Proximity sensors establish end of travel and "home" location and are easily adjustable over entire length to restrict the travel envelope.

⑨ **"Quick Change" Cabling**

Innovative cable transport module offers extended life (10 million cycles, dependent on motion cycle speeds, acceleration, and environmental condition) and a simple cable changing system for preventative maintenance.

⑩ **Protective Seals**

Hard shell aluminum cover combined with stainless steel strip seals provide IP30 protection to interior components as well as enhances overall appearance.

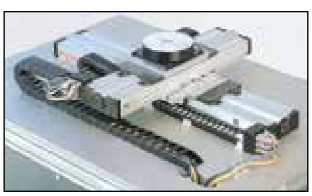
"Designer Friendly" Features and Options

A vast assortment of "designer friendly" features and options simplify the engineering challenges often confronted with "base model" positioning devices. Features like the IP30 protective strip seal and long life cable management system exemplify the built-in value found in the 400LXR units. Other selectable enhancements like cleanroom compatibility, travel limit sensors, motor drives, encoder resolution, and pinning holes for tooling location, simplify machine design and integration efforts.

Flexibility and Multi-Axis Compatibility

The 400LXR's selection flexibility and mounting compatibility with the 400XR ballscrew driven tables enables single-axis or complex multi-axis units to be configured in a straightforward manner. Parker's matching servo drives and motion controllers can be included to complete the motion system.

Customs and Systems



For specialized applications requiring customization, Parker design engineers can easily modify these tables to suit, or engineer complete interactive linear motion systems to desired specifications. Parker's 400LXR series tables have taken the mystery, difficulty and cost out of integrating linear motor tables into high throughput precision positioning applications.

SPECIFICATIONS

404LXR and 406LXR

The 400LXR Series linear servo motor tables are pre-engineered "plug and play" modules that combine slotless linear motor technology with performance matched mechanical elements.

Model		404LXR	406LXR	
Motor		**8 Pole**	**8 Pole**	**12 Pole**
Rated Load	kg (lb)	45 (99)	180 (396)	180 (396)
Maximum Acceleration		5 Gs		
Maximum Velocity	(m/sec)			
Encoder Resolution:				
0.1 µm		0.3	0.3	0.3
0.5 µm		1.5	1.5	1.5
1.0 µm		3.0	3.0	3.0
5.0 µm		3.0	3.0	3.0
Sine Output		3.0	3.0	3.0
Positional Repeatability				
Encoder Resolution:				
0.1 µm		± 1.0 µm		
0.5 µm		± 1.0 µm		
1.0 µm		± 2.0 µm		
5.0 µm		± 10.0 µm		
Sine Output		(Interpolation Dependent)		
Peak Force	N (lb)	180 (40)	225 (50)	330 (75)
Continuous Force	N (lb)	50 (11)	75 (17)	110 (25)
Carriage Mass	(kg)	1.4	3.2	4.1

Travel Dependent Specifications

Travel (mm)	Accuracy* (µm) Positional Resolution 0.1 0.5 1.0	5.0	Straightness & Flatness	Unit Weight (Kg) 404LXR 8-Pole	406LXR 8-Pole	406LXR 12-Pole
50	6	16	6	4.4	8.7	11.1
100	7	17	6	4.8	–	–
150	8	18	9	5.2	10.3	13.4
200	10	20	10	5.6	–	–
250	12	22	12	6.0	12.6	14.1
300	14	24	13	6.4	–	–
350	16	26	15	6.8	13.3	15.7
400	18	28	16	7.2	–	–
450	20	30	18	–	14.8	17.2
500	21	31	19	8.0	–	–
550	23	33	21	–	16.4	18.7
600	25	35	22	8.9	–	–
650	26	36	24	–	17.9	20.2
700	28	38	25	9.7	–	–
750	29	39	27	–	19.4	21.8
800	31	41	29	10.6	–	–
850	32	43	30	–	20.9	23.3
900	33	44	32	11.5	–	–
950	34	44	33	–	22.5	–
1000	35	45	35	12.4	–	27.1
1050	37	47	36	–	–	–
1200	39	49	41	–	26.3	–
1350	42	52	45	–	–	30.9
1450	43	53	48	–	30.1	–
1500	44	54	50	–	–	–
1600	45	55	53	–	–	34.7
1700	46	56	56	–	33.9	–
1750	46	56	57	–	–	–
1850	47	57	60	–	–	38.6
1950	48	58	63	–	37.7	–
2000	48	58	65	–	–	–
2350	49	59	76	–	–	–
2500	50	60	80	–	–	–
2850	50	60	84	–	–	–
3000	50	60	84	–	–	–

* Accuracy stated is at 20° C, utilizing slope correction factor provided

Encoder Specifications

Description	Specification
Input Power	5 VDC ±5% 150 mA
Output (Incremental)	Square wave differential line driver (EIA RS422) 2 channels A and B in quadrature (90°) phase shift.
Reference (Z Channel)	Synchronized pulse, duration equal to one resolution bit. Repeatability of position is unidirectional moving toward positive direction.

Limit and Home Specifications

Description	Specification
Input Power	+5 to +24 VDC 60 mA (20 mA per sensor)
Output	Output form is selectable with product: Normally Closed Current Sinking Normally Open Current Sinking Normally Closed Current Sourcing Normally Open Current Sourcing All types Sink or Source max of 50 mA
Repeatability	Limits: ±10 microns (unidirectional) Home: See Z channel specifications

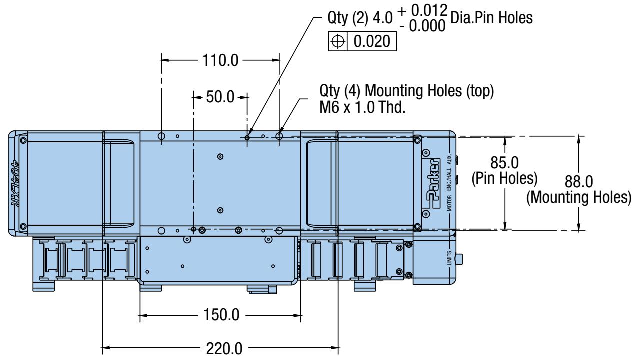
Hall Effect Specifications

Description	Specification
Input Power	+5 to +24 VDC, 30 mA
Output	Open Collector, Current Sinking, 20 mA Max

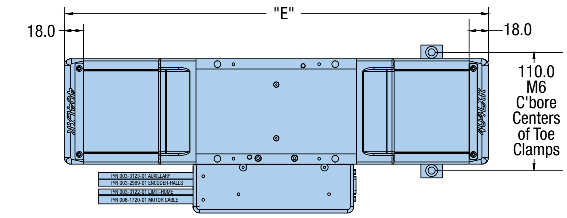
DIMENSIONS
404LXR

Download 2D & 3D files from www.parker.com/emn/404LXR

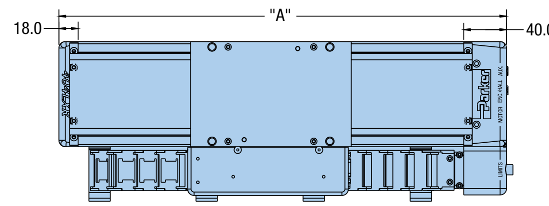
Dimensions (mm)



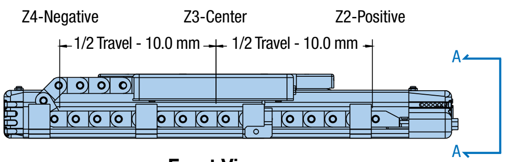
Top View
(With Cable Transport Module)



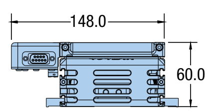
OEM Cables (Strip Seal/Hardcover)



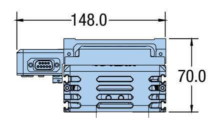
Cable Module (Strip Seal/Hardcover)



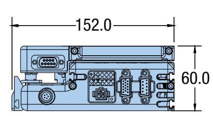
Front View
Z-Channel Location



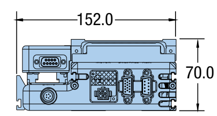
OEM Cables/Strip Seal



OEM Cables/Hardcover

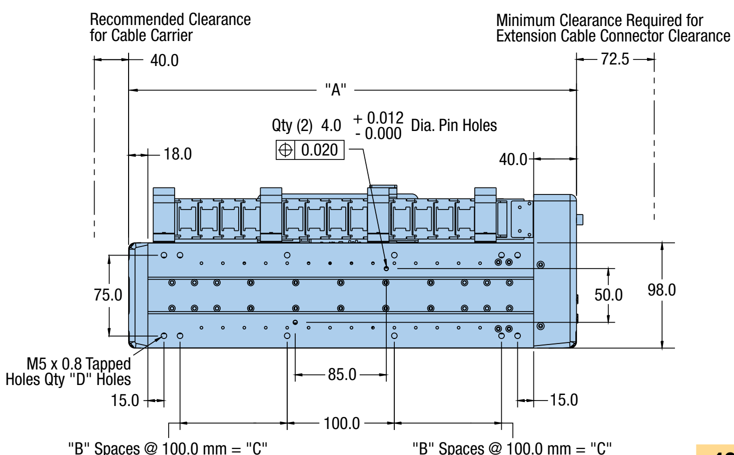


Cable Module/Strip Seal



Cable Module/Hardcover

End Views A-A



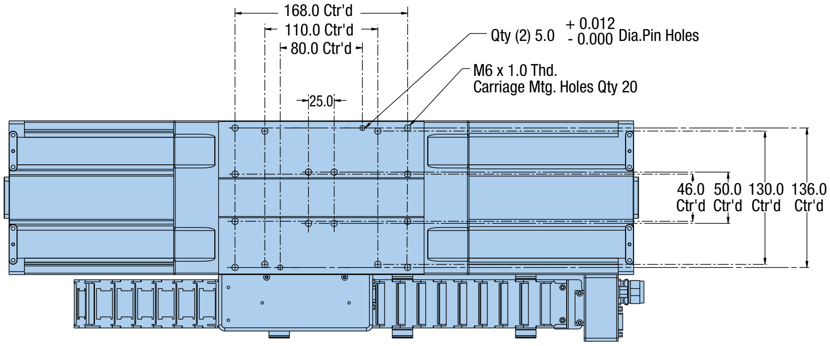
Bottom View

Model	Travel (mm)	Dimensions (mm) A	B	C	D	E
404T00LXR	50	368.0	1	100.0	12	346.0
404T01LXR	100	418.0	1	100.0	12	396.0
404T02LXR	150	468.0	1	100.0	12	446.0
404T03LXR	200	518.0	1	100.0	12	496.0
404T04LXR	250	568.0	1	100.0	12	546.0
404T05LXR	300	618.0	2	200.0	16	596.0
404T06LXR	350	668.0	2	200.0	16	646.0
404T07LXR	400	718.0	2	200.0	16	696.0
404T09LXR	500	818.0	3	300.0	20	796.0
404T11LXR	600	918.0	3	300.0	20	896.0
404T13LXR	700	1018.0	4	400.0	24	996.0
404T15LXR	800	1118.0	4	400.0	24	1096.0
404T17LXR	900	1218.0	5	500.0	28	1196.0
404T19LXR	1000	1318.0	5	500.0	28	1296.0

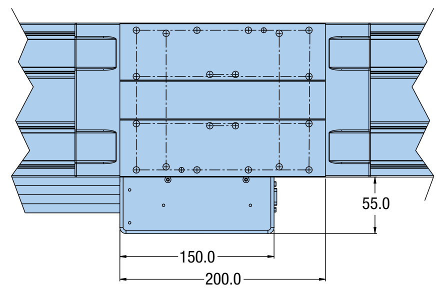
Download 2D & 3D files from
www.parker.com/emn/406LXR

406LXR 8 or 12 Pole Slotless Motor

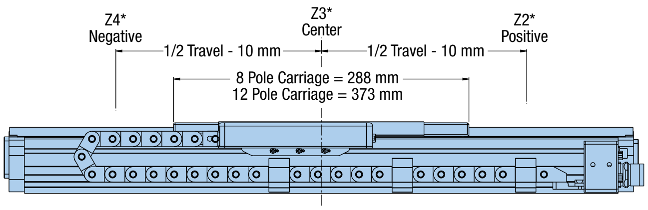
Dimensions (mm)



Top View
(with Cable Transport Module)

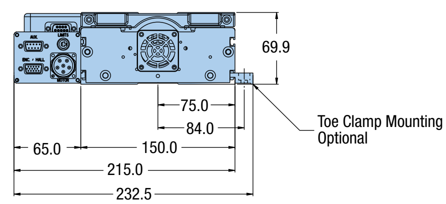


Top View
(with OEM Cable System)

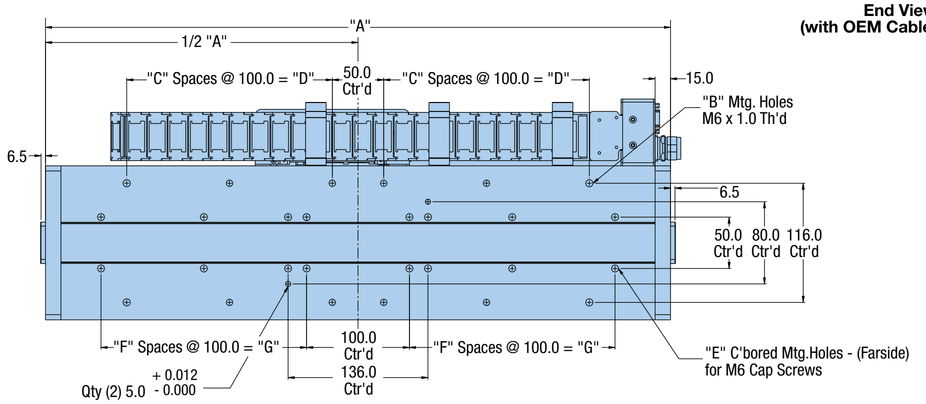


Front View
(Z-Channel Location)

*Z2, Z3, Z4 shows Carriage Center-line Location for Selected Z-Channel Position



End View
(with OEM Cable System)



Bottom View

	Travel (mm)		Dimensions (mm)						
Model	**8 Pole**	**12 Pole**	**A**	**B**	**C**	**D**	**E**	**F**	**G**
406T01LXR	50	—	408	8	1	100.0	12	1	100.0
406T02LXR	150	50	508	8	1	100.0	12	1	100.0
406T03LXR	250	150	608	12	2	200.0	16	2	200.0
406T04LXR	350	250	708	12	2	200.0	16	2	200.0
406T05LXR	450	350	808	16	3	300.0	20	3	300.0
406T06LXR	550	450	908	16	3	300.0	20	3	300.0
406T07LXR	650	550	1008	20	4	400.0	24	4	400.0
406T08LXR	750	650	1108	20	4	400.0	24	4	400.0
406T09LXR	850	750	1208	24	5	500.0	28	5	500.0
406T10LXR	950	850	1308	24	5	500.0	28	5	500.0
406T11LXR	1200	1100	1558	32	7	700.0	32	6	600.0
406T12LXR	1450	1350	1808	36	8	800.0	40	8	800.0
406T13LXR	1700	1600	2058	40	9	900.0	44	9	900.0
406T14LXR	1950	1850	2308	44	10	1000.0	48	10	1000.0

OPTIONS & ACCESSORIES

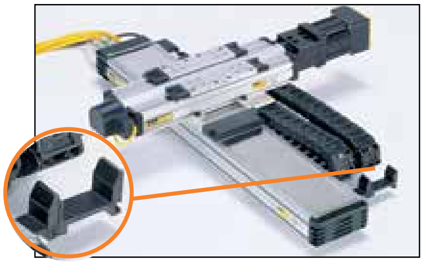
Cable Transport Module

The LXR's Cable Transport Module offers the convenience of "plug and play" connectivity for fast, easy table installation and "quick change" replacement. This system of cable management includes the highest quality high-flex cable with a life rating of 10 million cycles (dependent on motion cycle speeds, acceleration, and environmental condition), a cable track with support brackets, a "quick change" carriage cartridge, and a plug-in connector panel housing. It also provides a "pass-through" connection and cabling for customer application. This transport module option is ideal for high throughput continuous duty requirements where downtime is not acceptable.


"Quick Change" Cartridge


Cable Extensions – Flying Leads Terminations


404LXR Cable Transport Module


2-Axis System w/Expandable Cable Management

Connection Ends


404LXR


406LXR

Cable Transport Module Order Code

Order Code	Extension Cable	
	Length (m)	Termination
CM02	No Extension Cables	
CM07	3.0	Flying Leads
CM08	7.5	Flying Leads
CM13	3.0	IPA/ACR7000/ViX Conn.
CM14	7.5	IPA/ACR7000/ViX Conn.
CM17	3.0	Compax3
CM18	7.5	Compax3

OEM Cable System

The LXR's unharnessed cable system is offered for OEMs and others who have independent methods of routing and managing cables. These systems offer the "quick change" cartridge, "pass-through" connection and round high-flex cables in lengths of 3.0 or 7.5 meters. They are available with flying lead end terminations, as well as Gemini connectors.


406LXR with OEM cables and flying leads

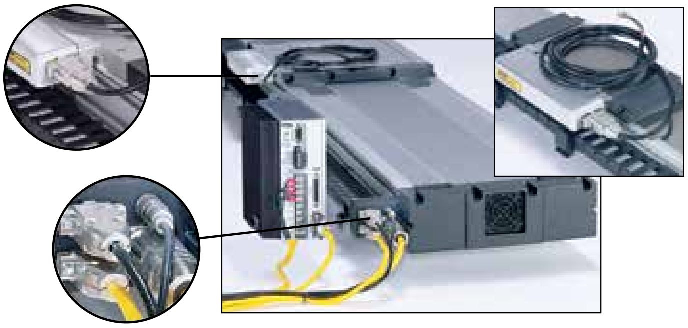
OEM Cable System Order Code

Order Code	Extension Cable	
	Length (m)	Termination
CM03	3.0	Flying Leads
CM04	7.5	Flying Leads
CM11	3.0	IPA/ACR7000/ViX Conn.
CM12	7.5	IPA/ACR7000/ViX Conn.
CM15	3.0	Compax3
CM16	7.5	Compax3

User "Pass-Through" Cabling

Cable concerns regarding routing and durability for payload or instrument signals are addressed by the pass-through connectivity feature included with both of the LXR cable management systems. Nine pin D-connectors provided on the carriage (with the transport module units) and the cable connecting block combine with high-flex, long life cables for easy setup and dependable performance.

Note: Extension cables are available and can be ordered separately: 006-1743-01 (3 meters); 006-1743-02 (7.5 meters).

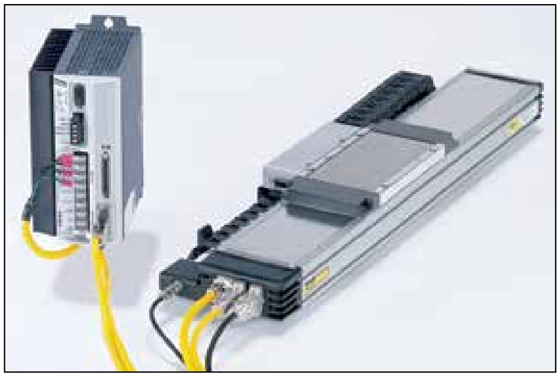


- Pre-wired plug-in connection to the moving payload
- Nine user conductors for end-effectors or instruments
- High-flex long life cables:
  - Ribbon Cable – Transport Module System
  - Round Cable – OEM System

Simple Configuration

Digital Drive Options

All digital drives ordered in the LXR part number configuration come set up with a motor file including electrical parameters to set continuous and peak currents, current loop compensation values, and default gain settings. Users will have the ability to override these parameters for special application requirements. Tuning is easy to use and intuitive for users and is available via a variety of methods. The motor and loading information must be known by the drive to determine the baseline tuning gains. These are simple parameter entries the user can complete with the help of standard Parker supplied front-end software tools.



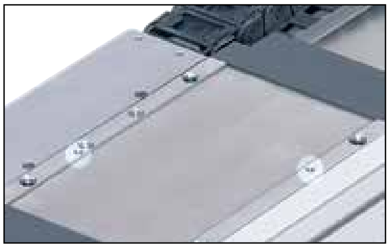
For complete details on drive product features and specifications, please refer to the "Drives & Controllers" section of this catalog.

Dowel Pinning Options

Order Codes: P1 P2 P3

Standard dowel pin locating holes P1 are offered on all 400LXR units to facilitate repeatable mounting of tooling or payload.

In addition, pinning options P2 and P3 are offered for precise orthogonal mounting of the second axis in a multi-axis system. In this case, the bottom side of the table base is match drilled and reamed to the first axis to provide exact orthogonal location. This convenient option eliminates concerns regarding contamination or damage often associated with machining for locating pins in an assembled unit. In some instances a 404LXR pinning adapter may be required part number 100-9584-01.



Two locating dowel holes, right (P1 option) shown in 404LXR carriage

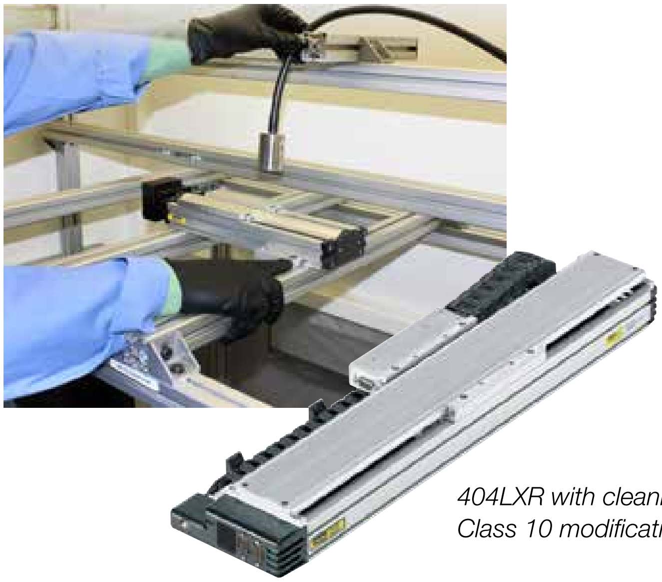
Cleanroom Preparation Option

Order Codes: R2

Cleanroom compatible linear tables are often required for laboratory and production applications in industries such as semiconductor, life science, electronics, and pharmaceuticals.

400LXR tables with cleanroom preparation were tested in Parker's vertical laminar flow work station, which utilizes ULPA filters to produce an environment having a cleanliness of class 1 prior to testing. Tables were tested in a variety of orientations with sampling both below the table and at the carriage mounting surface. Laminar flow rate is 0.65 inches W.C.

Special cleanroom testing can be provided upon request. For more information on cleanroom testing, contact a Parker Applications Engineer at 800-245-6903.



404LXR with cleanroom Class 10 modification

About Cleanrooms

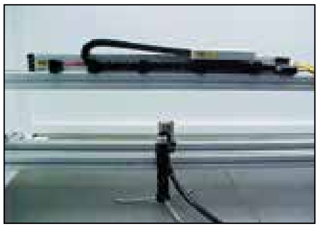
A room in which the concentration of airborne particles is controlled within defined limits. Federal Standard 209E statistically defines the allowable number of particles per cubic foot of air.

The chart below describes the conditions that must be maintained for the cleanroom to have a specific "class" rating.

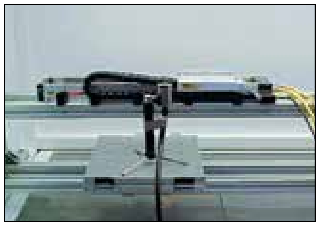
	Number of Allowable Particles (Measured particle size in microns µm)				
Class	**0.1**	**0.2**	**0.3**	**0.5**	**5**
1	35	7.5	3	1	0
10	350	75	30	10	0
100	—	750	300	100	0
1000	—	—	—	1000	7
10000	—	—	—	10000	70
100000	—	—	—	100000	700

Standard Cleanroom Preparation

- **Stringent cleaning and handling measures**
- **Cleanroom rated lubrication**
- **Strip seal replaced with hard shell cover**



Testing at 4.5 inches below table



Testing at carriage mounting surface

400LXR Cleanroom Compatibility

	Class	
Table Velocity	**4.5" Below Table**	**At Carriage Surface**
250 mm/sec	10	1
500 mm/sec	25	1
1000 mm/sec	50	5
2000 mm/sec	250	25
3000 mm/sec	500	100

Toe Clamp Accessories

Part Number: **100-8376-01 (404LXR)**
002-3624-01 (406LXR)

Toe clamps for mounting 400LXR tables are ordered separately.

Note that 400LXR Series toe clamps are not interchangeable with toe clamps for 400XR Series tables.

ORDERING INFORMATION

404LXR

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
Order Example:	404	T04	LXR	M	P	D13	H3	L2	CM09	Z2	E2	R1	A4	P1

① **Series**
404

② **Travel – mm**

	8 Pole Motor
T00	50
T01	100
T02	150
T03	200
T04	250
T05	300
T06	350
T07	400
T09	500
T11	600
T13	700
T15	800
T17	900
T19	1000

③ **Model**
LXR Linear Motor

④ **Mounting**
M Metric

⑤ **Grade**
P Precision

⑥ **Drive Type**
D3 Free Travel (No Motor)
D13 8 Pole Motor

⑦ **Home Sensor**
H1 None-Free Travel (only)
H2 N.C. Current Sinking
H3 N.O. Current Sinking
H4 N.C. Current Sourcing
H5 N.O. Current Sourcing

⑧ **Limit Sensor**
L1 None-Free Travel (only)
L2 N.C. Current Sinking
L3 N.O. Current Sinking
L4 N.C. Current Sourcing
L5 N.O. Current Sourcing

⑨ **Cable Management**
CM01 No Cables – Free Travel
CM02 Cable Transport Module (only)
CM03 3.0 m OEM Cable Set-FL
CM04 7.5 m OEM Cable Set-FL
CM07 Cable Trans Mod. w/3.0 m-FL*
CM08 Cable Trans Mod. w/7.5 m-FL*
CM11 3.0 m OEM Cable Set-ViX
CM12 7.5 m OEM Cable Set-ViX
CM13 Cable Trans Mod. w/3.0 m-IPA/ACR7000/ViX*
CM14 Cable Trans Mod. w/7.5 m-IPA/ACR7000/ViX*
CM15 3.0 m OEM Cable Set-Compax3**
CM16 7.5 m OEM Cable Set-Compax3**
CM17 Cable Trans Mod. w/3.0 m-Compax3* & **
CM18 Cable Trans Mod. w/7.5 m-Compax3* & **
* Extension cable for pass through connection is available and can be ordered separately: #006-1743-01 (3 meters); #006-1743-02 (7.5 meters)
** When wiring to a Compax3 please select current sourcing sensors

⑩ **Z Channel Location***
Z1 None
Z2 Positive End Position
Z3 Center Position
Z4 Negative End Position
* Refer to dimensions

⑪ **Encoder Option**
E1 None
E2 1.0 µm Resolution
E3 0.5 µm Resolution
E4 0.1 µm Resolution
E5 5.0 µm Resolution
E7 Sine Output Encoder

⑫ **Environmental**
R1 Strip Seal
R2 Hard Cover w/Class 10 Cleanroom Prep
R3 Hard Cover without Cleanroom Prep

⑬ **Digital Drive**
A1 No Drive

⑭ **Pinning Option**
P1 No multi-axis pinning
P2 * X axis transfer pinning to Y or Z axis - 30 arc-sec
P3 * Y axis transfer pinning to X axis - 30 arc-sec
* Transfer pinning to XR from LXR requires additional bracket and EPS request. Call 1-800-245-6903 for multi-axis pinning options & quote

ORDERING INFORMATION

406LXR

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
Order Example:	406	T08	LXR	M	P	D13	H2	L2	CM09	Z2	E2	R1	A4	P1

① **Series**

406

② **Travel – mm**

	8 Pole Motor	12 Pole Motor
T01	50	—
T02	150	50
T03	250	150
T04	350	250
T05	450	350
T06	550	450
T07	650	550
T08	750	650
T09	850	750
T10	950	850
T11	1200	1100
T12	1450	1350
T13	1700	1650
T14	1950	1850

③ **Model**

LXR Linear Motor

④ **Mounting**

M Metric

⑤ **Grade**

P Precision

⑥ **Drive Type**

Free Travel (No Motor)

D3 8 Pole Motor (No Motor)
D5 12 Pole Motor (No Motor)

Linear Motor

D13 8 Pole Motor Carriage
D15 12 Pole Motor Carriage

⑦ **Home Sensor**

H1 None-Free Travel (only)
H2 N.C. Current Sinking
H3 N.O. Current Sinking
H4 N.C. Current Sourcing
H5 N.O. Current Sourcing

⑧ **Limit Sensor**

L1 None-Free Travel (only)
L2 N.C. Current Sinking
L3 N.O. Current Sinking
L4 N.C. Current Sourcing
L5 N.O. Current Sourcing

⑨ **Cable Management**

CM01 No Cables – Free Travel
CM02 Cable Transport Module (only)
CM03 3.0 m OEM Cable Set-FL
CM04 7.5 m OEM Cable Set-FL
CM07 Cable Trans Mod. w/3.0 m-FL*
CM08 Cable Trans Mod. w/7.5 m-FL*
CM11 3.0 m OEM Cable Set-ViX
CM12 7.5 m OEM Cable Set-ViX
CM13 Cable Trans Mod. w/3.0 m-IPA/ACR7000/ViX*
CM14 Cable Trans Mod. w/7.5 m-IPA/ACR7000/ViX*
CM15 3.0 m OEM Cable Set-Compax3**
CM16 7.5 m OEM Cable Set-Compax3**
CM17 Cable Trans Mod. w/3.0 m-Compax3* & **
CM18 Cable Trans Mod. w/7.5 m-Compax3* & **

* Extension cable for pass through connection is available and can be ordered separately: #006-1743-01 (3 meters); #006-1743-02 (7.5 meters)

** When wiring to a Compax3 please select current sourcing sensors

⑩ **Z Channel Location***

Z1 None
Z2 Positive End Position
Z3 Center Position
Z4 Negative End Position

* Refer to dimensions

⑪ **Encoder Option**

E1 None
E2 1.0 µm Resolution
E3 0.5 µm Resolution
E4 0.1 µm Resolution
E5 5.0 µm Resolution
E7 Sine Output Encoder

⑫ **Environmental**

R1 Strip Seal
R2 Hard Cover w/Class 10 Cleanroom Prep

⑬ **Digital Drive**

A1 No Drive

⑭ **Pinning Option**

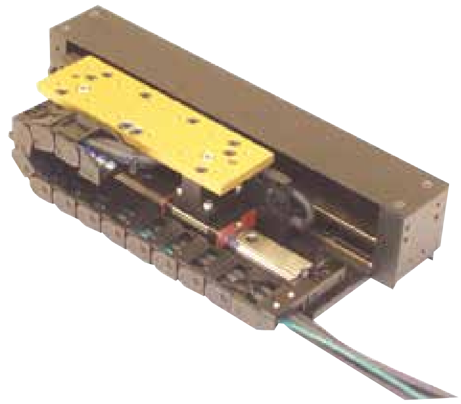
P1 No multi-axis pinning
P2 * X axis transfer pinning to Y or Z axis - 30 arc-sec
P3 * Y axis transfer pinning to X axis - 30 arc-sec

* Transfer pinning to XR from LXR requires additional bracket and EPS request. Call 1-800-245-6903 for multi-axis pinning options & quote

Trilogy I-FORCE Ironless Linear Positioners

High performance and design flexibility

- Trilogy positioners use ground steel or aluminum bases for flatness and parallelism
- Single- or dual-bearing rail positioners for application flexibility
- Available with magnetic or optical encoder

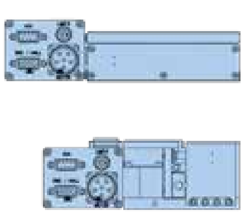


- **Dual-rail positioners have bellows as a standard option.**
- **Multiple carriage options are available on all positioner series.**
- **Different cable track widths available for added stiffness and rigidity**
- **Different cable track widths available as custom options for user payload tubes and cables**

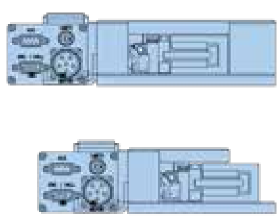
Series	T1S / T1D	T2S / T2D	T3S / T3D	T4S / T4D
Motor	110 ironless	210 ironless	310 ironless	410 ironless
Max base length (in)	33.6	120	144	137.76
Load (kg)	11.3*/13.5**	27.2*/45.3**	72*/108**	90*/181**
Acceleration (G's) * **	5	5	5	5
Velocity (m/s) †	up to 3	up to 5	up to 5	up to 5
Peak force (N)	202.5	494.2	1170.0	3928.1
Continuous force (N)	45.4	110.3	262.0	878.6
Resolution (micron)	0.1 to 5.0	0.1 to 5.0	0.1 to 5.0	0.1 to 5.0
Repeatability (micron) ‡	±1	±1	±1	±1

* Single rail load specifications
** Dual rail load specifications
*** Consult factory for higher accelerations

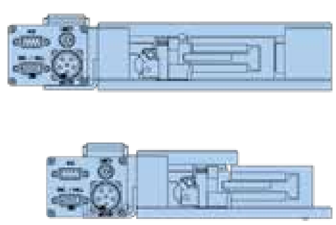
† Peak velocity is encoder dependent
‡ Repeatability is resolution dependent



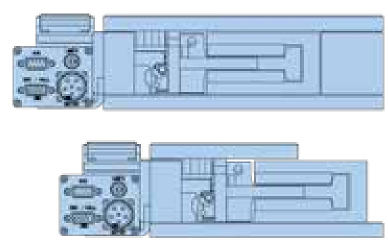
T1D/T1S



T2D/T2S



T3D/T3S

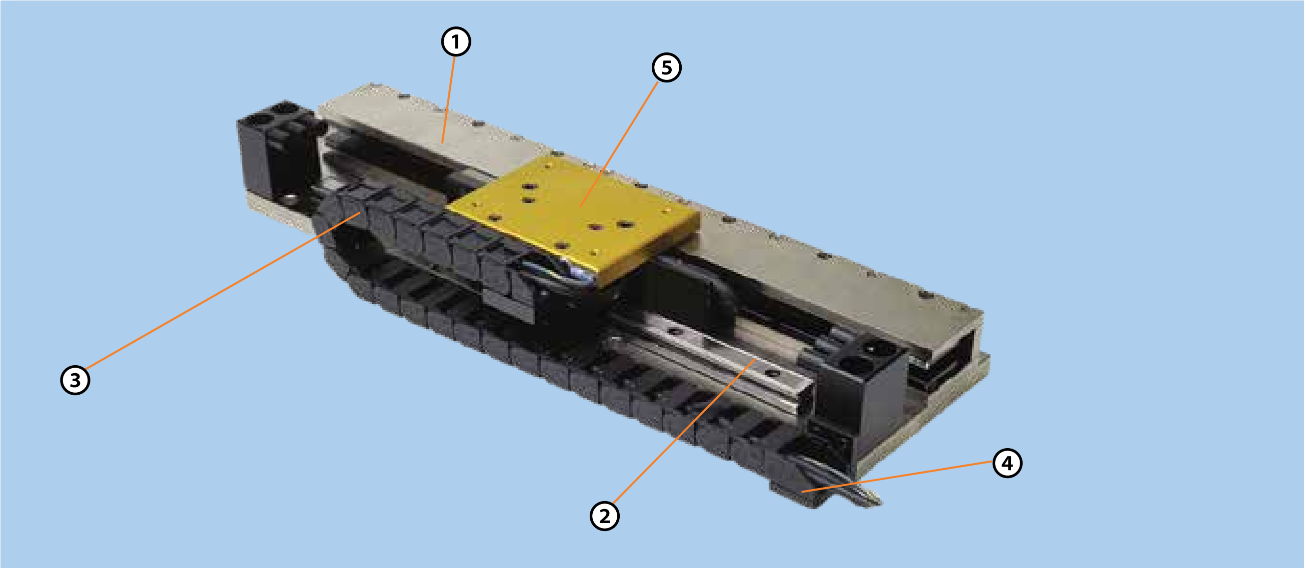


T4D/T4S

Parker Trilogy's I-Force linear positioners utilize our high-performance I-Force ironless linear motors in a pre-engineered, easily integrated, ready-to-run package. The principal design goal for these positioners is to achieve high performance at an economical cost while preserving the design flexibility to accommodate customization.

Trilogy's positioners have selectable single- or dual-bearing to match the performance and cost requirements for each application. In addition, they are designed to connect together using transition plates for XY or multi-axis configurations. Options include a variety of cable management systems in addition to bellows and hard covers. Consult the factory for more details on the bellows positioner option (2D, 3D, and 4D positioners).

Flexibility, multi-axis compatibility, and ease of customization make the I-Force linear positioners a superior choice for high performance and value.



1. Trilogy positioners use **ground steel or aluminum bases** for flatness and parallelism because aluminum extrusions often do not meet the accuracy requirements for straightness and flatness.
2. Trilogy has **single- or dual-bearing rail positioners** to better match the performance and cost requirements for each application
3. **Flexible cable management system** for various customer options
4. **Single rail of high energy rare earth magnets** offers lower weight and lower cost than double magnet type.
5. **Multiple carriage options** available for each Trilogy Series model

Trilogy positioners are powered by Trilogy I-FORCE Ironless Linear Motors

For detailed specifics on standalone Trilogy Linear Motors, visit **http://bit.ly/AT_IM.**

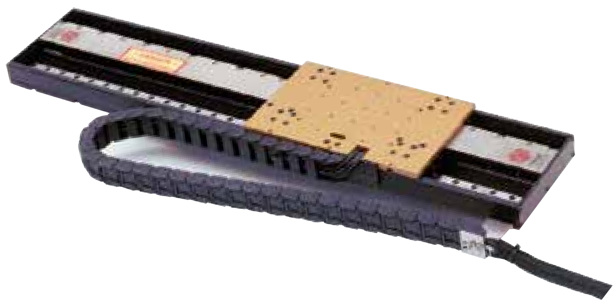
Series	**I-Force Ironless**
Continuous force	5.5 to 197.5 lbf (24.5 to 878.6 N)
Peak force	45.5 to 883 lbf (202.5 to 3928 N)
Cogging force	Zero
Attractive force	Zero
Magnet tracks	Dual
Heat dissipation	Good
Applications	Rapid accelerations, extremely smooth motion

SPECIFICATIONS

T1D

PERFORMANCE		LINEAR MAGNETIC ENCODER 5.0µm	LINEAR MAGNETIC ENCODER 1.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 5.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 1.0µm
Peak Velocity	in/s (m/s)	275 (7)	100 (2.5)	196 (5)	120 (3)
Resolution	in (µm)	0.0002 (5)	0.000 04 (1.0)	0.000 02 (0.5)	0.000 004 (0.1)
Repeatability	in (µm)	±0.0004 (±10)	±0.000 8 (2.0)	±0.000 06 (1.5)	±0.000 04 (1.0)
Accuracy – Magnetic		±(30µm +50µm/m)	± (25µm +50µm/m)		
Accuracy – Optical				±(5µm +30µm/m)	

Note: For travels less than 1 meter, accuracy should be calculated at 1 meter



MOTOR MODEL		110-1	110-2
Peak Force	N	108.5	202.5
	lb	24.4	45.5
Continuous Force	N	24.5	45.4
	lb	5.5	10.2
Peak Power	W	938	1641
Continuous Power	W	47	82

ACCURACY	STANDARD	LASER ALIGNMENT OPTION
Straightness restrained on flat surface in (µm)	±.000127 in/in (±127µm/m)	±.000013 in/in (±13µm/m)
Flatness restrained on flat surface in (µm)	±0.013 (±330)	

Note: Straightness/Flatness specifications based on system mounted to surface of flatness ±0.0005in/ft

PHYSICAL		- 1	- 2
Carriage Assembly	lbs (kg)	Please consult factory for weight.	
Base Assembly			
T1DA Aluminum (0.375” thick)	lbs/ft (kg/m)	Please consult factory for weight.	
Carriage Assembly	in (mm)	5.4 (137.2)	7.8 (198.1)
Coil Bar Length	in (mm)	3.20 (81.3)	5.60 (142.2)

LOAD			
Vertical (Fv) see note 11	lbs (kg)	30 (13.5)	30 (13.5)
Side (Fs) see note 11	lbs (kg)	15 (6.8)	15 (6.8)
Moments - Roll (Mr) see note 11	Lb-ft (N-m)	15 (20)	15 (20)
Moments - Pitch (Mp) see note 11	Lb-ft (N-m)	52 (70)	52 (70)
Moments - Yaw (My) see note 11	Lb-ft (N-m)	52 (70)	52 (70)

1. Total travel = OAL – .45” (11.43 mm) – carriage length.
2. Maximum base length is 33.6” (853.4 mm).
3. Aluminum base is black anodized.
4. For complete motor specifications, refer to 110 series motor data sheet.
5. Optical encoder, RGH series, available in 0.05µm, 0.1µm, 0.5µm, 1.0µm, 5.0µm.
6. Cables extend past base by approximately 0.6˝ when carriage is at negative hard stop.
7. Cable Track extends 0.280˝ higher than carriage mounting surface. Space must be taken into account when mounting load.
8. Standard cable track provided is 20mm wide 18mm BR.
9. Base mounting holes are equidistant, 1.200” (12.0, 16.8, 21.6....) or 2.400” (9.6, 14.4, 19.2, 24.0....) from each end depending on base length.
10. Specification subject to change without notice.
11. Listed specifications based on motor size and typical performance requirements. Bearing manufacturer specifications exceed listed specifications.
12. For high load, high speed applications, customer-supplied deceleration shocks are required (not included with product).
13. The repeatability for the home switch is estimated to be +/- 10-20 microns. However, repeatability of the home switch does not dictate the system or encoder repeatability.

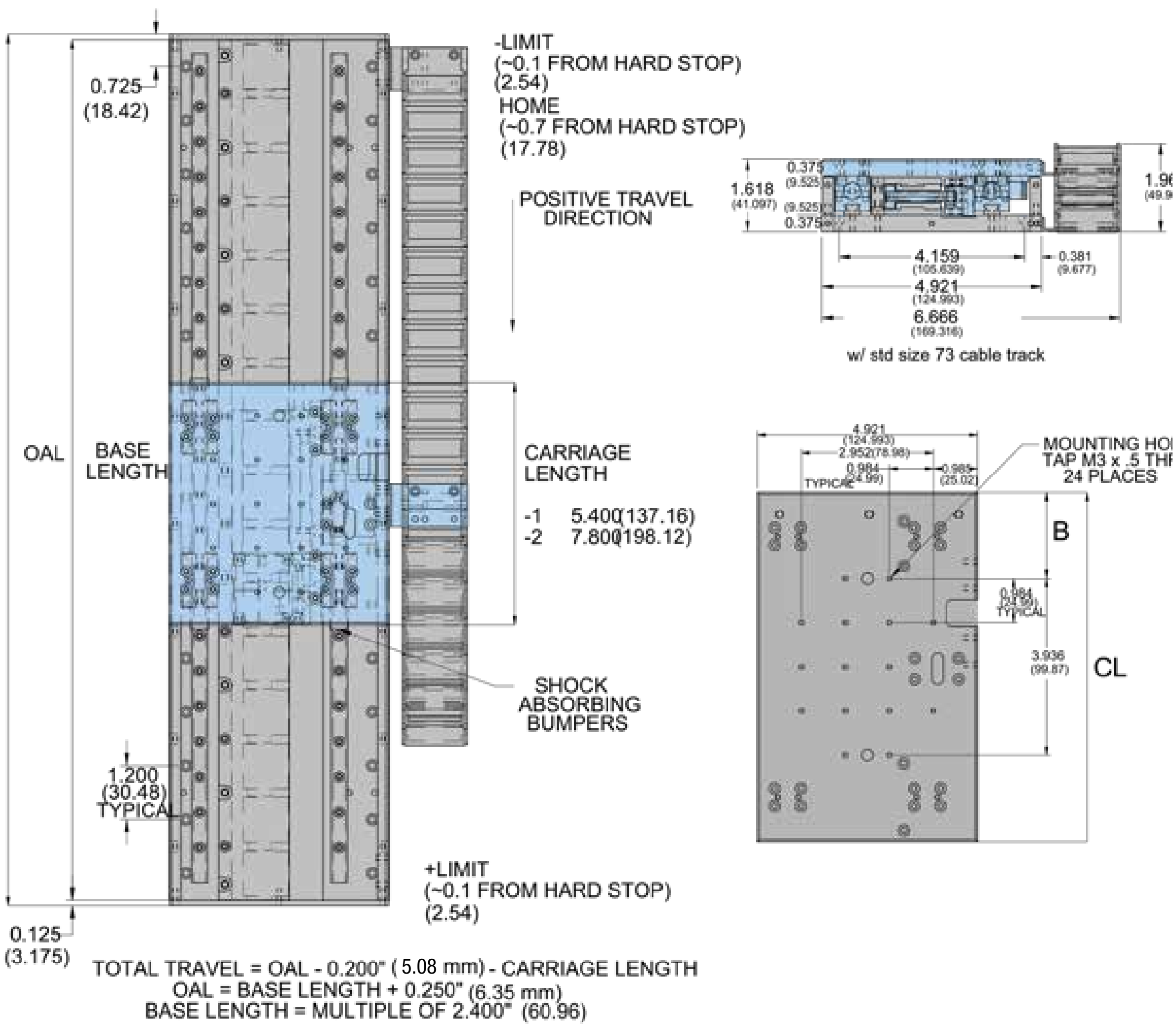
DIMENSIONS
T1D

Download 2D & 3D files from www.parker.com/emn/T1D

Dimensions shown in inches.

- Moving Carriage Assembly
- Stationary Base Assembly

Dimensions – mm (in)



CARRIAGE SIZE

	- 1	mm	- 2	mm
CL	5.400	137.16	7.800	198.12
B	0.732	18.59	1.932	49.07
Coil	110-1	110-1	110-2	110-2

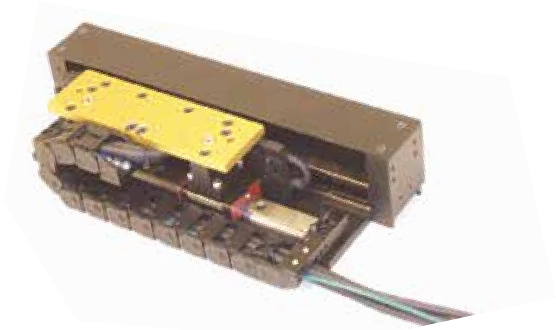
Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

SPECIFICATIONS
T1S

PERFORMANCE		LINEAR MAGNETIC ENCODER 5.0µm	LINEAR MAGNETIC ENCODER 1.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 5.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 1.0µm
Peak Velocity	in/s (m/s)	275 (7)	100 (2.5)	196 (5)	120 (3)
Resolution	in (µm)	0.0002 (5)	0.000 04 (1.0)	0.000 02 (0.5)	0.000 004 (0.1)
Repeatability	in (µm)	±0.0004 (±10)	±0.000 8 (2.0)	±0.000 06 (1.5)	±0.000 04 (1.0)
Accuracy – Magnetic		±(30µm +50µm/m)	±(25µm +50µm/m)		
Accuracy – Optical				±(5µm +30µm/m)	

Note: For travels less than 1 meter, accuracy should be calculated at 1 meter

MOTOR MODEL		110-1	110-2
Peak Force	N	108.5	202.5
	lb	24.4	45.5
Continuous Force	N	24.5	45.4
	lb	5.5	10.2
Peak Power	W	938	1641
Continuous Power	W	47	82



ACCURACY	STANDARD	LASER ALIGNMENT OPTION
Straightness restrained on flat surface in [µm]	±0.000127 in/in (±127µm/m)	±.000013 in/in (±13µm/m)
Flatness restrained on flat surface in [µm]	±0.013 (±330)	

Note: Straightness/Flatness specifications based on system mounted to surface of flatness ±0.0005in/ft

PHYSICAL		- 2	- 3
Carriage Assembly	lbs (kg)	1.1 (0.50)	1.5 (0,68)
Base Assembly			
T1SA Aluminum (0.375'' thick))	lbs/ft (kg/m)	2.8 (1.3)	2.8 (1.3)
Carriage Assembly	in (mm)	3.40 (86.4)	5.80 (147.3)
Coil Bar Length	in (mm)	3.20 (81.3)	5.60 (142.2)

LOAD		- 1	- 2
Vertical (Fv) see note 11	lbs (kg)	25 (11.3)	25 (11.3)
Side (Fs) see note 11	lbs (kg)	13 (5.7)	13 (5.7)
Moments - Roll (Mr) see note 11	Lb-ft (N-m)	11 (15)	11 (15)
Moments - Pitch (Mp) see note 11	Lb-ft (N-m)	44 (60)	44 (60)
Moments - Yaw (My) see note 11	Lb-ft (N-m)	44 (60)	44 (60)

1. Total travel = OAL – 2.85˝ (72.39 mm) – carriage length.
2. Maximum base length is 33.6˝ (853.4mm).
3. Aluminum base is black anodized.
4. For complete motor specifications, refer to 110 series motor data sheet.
5. Optical encoder, RGH series, available in 0.05µm, 0.1µm, 0.5µm, 1.0µm, 5.0µm.
6. Cables extend past base by approximately 0.6˝ when carriage is at negative hard stop.
7. Standard cable track provided is 33mm wide 18mm BR.
8. Base mounting holes are equidistant, 1.200" (12.0, 16.8, 21.6....) or 2.400" (9.6, 14.4, 19.2, 24.0....) from each end depending on base length.
9. Specification subject to change without notice.
10. Listed specifications based on motor size and typical performance requirements. Bearing manufacturer specifications exceed listed specifications.
11. For high load, high speed applications, customer-supplied deceleration shocks are required (not included with product).
12. The repeatability for the home switch is estimated to be +/- 10-20 microns. However, repeatability of the home switch does not dictate the system or encoder repeatability.

Linear Motor Driven Tables

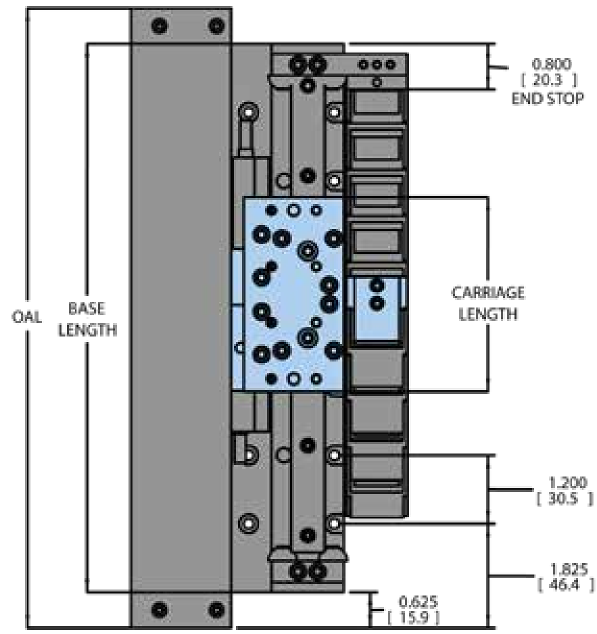
DIMENSIONS
T1S

Download 2D & 3D files from www.parker.com/emn/T1S

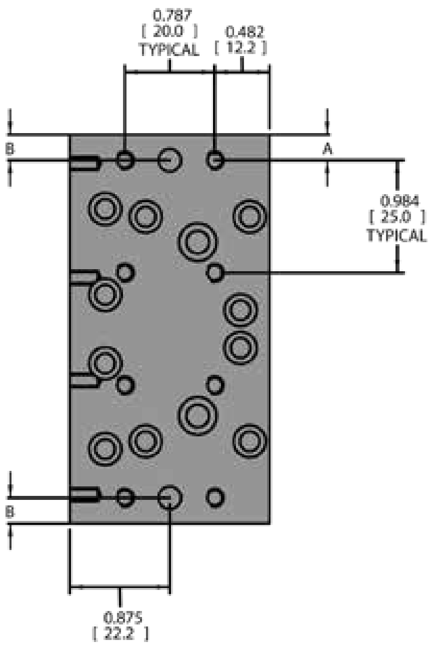
Dimensions shown in inches.

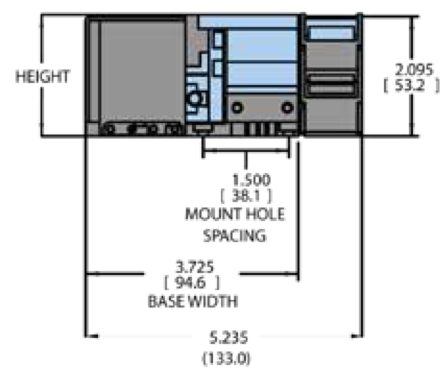
Moving Carriage Assembly

Stationary Base Assembly



OAI = BASE LENGTH + 1.25 IN (31.75)
TRAVEL = BASE LENGTH - 1.6 - CARRIAGE LENGTH
TRAVEL (mm) = BASE LENGTH - 40.64 - CARRIAGE LENGTH





COIL SIZE

	- 1	- 2
CARRIAGE LENGTH	3.4 (86.4)	5.8 (147.3)
A (1ST MOUNTING HOLE)	0.224 (5.7)	0.440 (11.2)
B (DOWEL PIN HOLE)	0.224 (5.7)	0.440 (11.2)

Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

Virtual Engineer

ORDERING INFORMATION

T1D/T1S

*Fill in an order code from each of the numbered fields to create a complete model order code **for T1D/T1S**.*

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
Order Example:	T	1	D	A	012	3	N	S	B	A	G	2

① **Series**

T	Open Positioner

② **Motor Coil Series**

1	110 Motor Coil

③ **Bearing Rail Configuration**

D	Dual Bearing Rails
S	Single Bearing Rails

④ **Base Material**

A	0.375" Al

⑤ **Length of Base**

XXX Length of base in inches*
Maximum: 33.6"
Minimum: 9.6"
Increment: 2.4"
T1S Base Length (increments of 2.4" [60.96mm]) =
Travel + Carriage Length + 1.6" [40.64mm]
T1D Base Length (increments of 2.4" [60.96mm]) =
Travel + Carriage Length + 0.2" [5.08mm]

*Truncate base length in part number. Example: for a 16.8 inch base, "XXX" equals "016"

⑥

Coil Size		**Carriage Length**
1	1 pole	T1S 3.4" (86.4mm)
2	2 pole	T1S 5.8" (147.3mm)
	1 pole	T1D 5.4" (137.6mm)
	2 pole	T1D 7.8" (198.12mm)

⑦ **Cooling**

N	No cooling

⑧ **Winding Type**

S	Series
P	Parallel

⑨ **Encoder**

A	Magnetic 1µm
B	Magnetic 5µm
Q	Optical 5µm
L	Optical 1µm
M	Optical 0.5µm
P	Optical 0.1µm
R	Optical 1 V p-p sine/cosine
X	No encoder

⑩ **Cable Length**

A	1 Meter Flying Leads
B	3 Meter Flying Leads
C	7.5 Meter Flying Leads
L	3 Meter Extension Cables (with Connector Box)
M	7.5 Meter Extension Cables (with Connector Box)
Z	Connector Box ONLY (no cables)

*Flying Leads: cable measured from last cable carrier link
*Extension Cables: cable measured from connection box at end of base.

⑪ **Cable Connectorization**

B	Flying Leads
C	Compax3
G	Gemini
V	ViX
Z	no cables

⑫ **Cable Track**

0	None
2	Standard

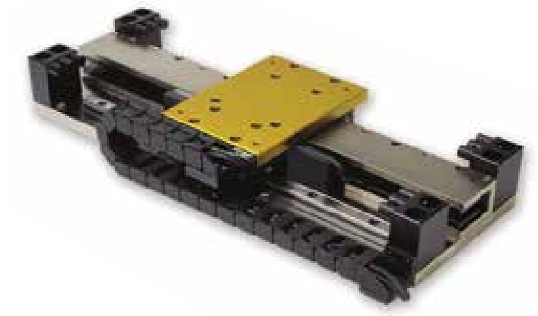
SPECIFICATIONS

T2D

PERFORMANCE		LINEAR MAGNETIC ENCODER 5.0µm	LINEAR MAGNETIC ENCODER 1.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 5.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 1.0µm
Peak Velocity	in/s (m/s)	275 (7)	100 (2.5)	196 (5)	120 (3)
Resolution	in (µm)	0.0002 [5]	0.000 04 (1.0)	0.000 02 (0.5)	0.000 004 (0.1)
Repeatability	in (µm)	±0.0004 [±10]	±0.000 8 (2.0)	±0.000 06 (1.5)	±0.000 04 (1.0)
Accuracy – Magnetic		±(30µm +50µm/m)	±(25µm +50µm/m)		
Accuracy – Optical				±(5µm +30µm/m)	

Note: For travels less than 1 meter, accuracy should be calculated at 1 meter

MOTOR MODEL		210-2	210-3	210-4
Peak Force	N	255.8	375.0	494.2
	lb	57.5	84.3	111.1
Continuous Force	N	57.4	84.1	110.3
	lb	12.9	18.9	24.8
Peak Power	W	1583	2261	2940
Continuous Power	W	79	113	147



ACCURACY	STANDARD	LASER ALIGNMENT OPTION
Straightness restrained on flat surface in (µm)	±0.000127 in/in (±127µm/m)	±.000013 in/in (±13µm/m)
Flatness restrained on flat surface in (µm)	±0.003 + .000254 in/in (±76 + 254µm/m)	

Note: Straightness/Flatness specifications based on system mounted to surface of flatness ±0.0005in/ft

PHYSICAL		- 2	- 3	-4
Carriage Assembly	lbs (kg)	3.1 (1.4)	4.1 (1.9)	5.5 (2.5)
Base Assembly				
T2DA Aluminum (0.375'' thick)	lbs/ft (kg/m)	10.8 (4.9)	10.8 (4.9)	10.8 (4.9)
Carriage Assembly	in (mm)	4.20 (106.7)	6.60 (167.6)	9.00 (228.6)
Coil Bar Length	in (mm)	7.20 (182.9)	9.60 (243.8)	12.00 (304.8)

LOAD		- 2	- 3	- 4
Vertical (Fv) see note 11	lbs (kg)	60 (27. 1)	80 (36.3)	100 (45.3)
Side (Fs) see note 11	lbs (kg)	40 (18.1)	60 (27.2)	60 (27.2)
Moments - Roll (Mr) see note 11	Lb-ft (N-m)	40 (53)	60 (80)	60 (80)
Moments - Pitch (Mp) see note 11	Lb-ft (N-m)	100 (34)	200 (270)	200 (270)
Moments - Yaw (My) see note 11	Lb-ft (N-m)	100 (34)	200 (270)	200 (270)

1. Total travel = OAL – 3.00˝ (76.2 mm) – carriage length.
2. Maximum base length is 120˝ (3048 mm).
3. Aluminum base is black anodized.
4. For complete motor specifications, refer to 210 series motor data sheet.
5. Optical encoder, RGH series, available in 0.05µm, 0.1µm, 0.5µm, 1.0µm, 5.0µm.
6. Cables extend past base by approximately 0.6˝ when carriage is at negative hard stop.
7. Cable Track extends 0.15˝ higher than carriage mounting surface. Space must be taken into account when mounting load.
8. Standard cable track provided is 30mm wide 18mm BR.
9. Base mounting holes are equidistant, 1.200” (12.0, 16.8, 21.6....) or 2.400” (9.6, 14.4, 19.2, 24.0....) from each end depending on base length.
10. Specification subject to change without notice.
11. Listed specifications based on motor size and typical performance requirements. Bearing manufacturer specifications exceed listed specifications.
12. For high load, high speed applications, customer-supplied deceleration shocks are required (not included with product).
13. The repeatability for the home switch is estimated to be +/- 10-20 microns. However, repeatability of the home switch does not dictate the system or encoder repeatability.

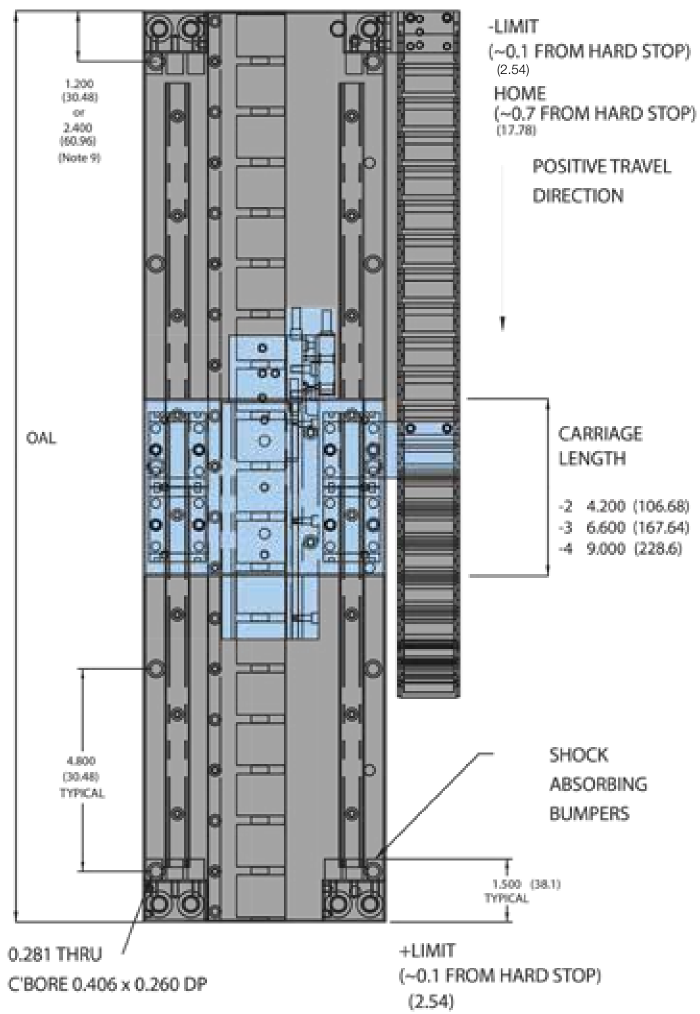
DIMENSIONS

T2D

Download 2D & 3D files from www.parker.com/emn/T2D

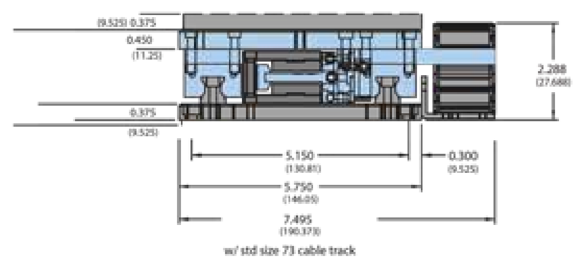
Dimensions shown in inches.

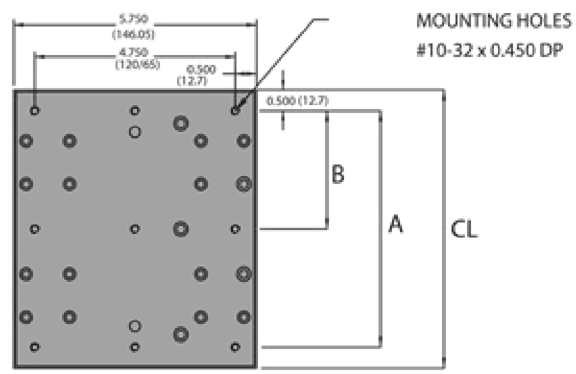
- **Moving Carriage Assembly**
- **Stationary Base Assembly**



TOTAL TRAVEL = OAL - 3.00" (76.2 mm) - CARRIAGE LENGTH
OAL = MULTIPLE OF 2.400" (60.96)

0.375 THICK CARRIAGE SPACER PLATE (optional)
(9.525)





CARRIAGE SIZE

	- 2	mm	- 3	mm	- 4	mm
CL	4.200	106.68	6.600	167.64	9.00	228.6
A	3.200	81.28	5.600	142.24	8.00	203.80
B	—	—	2.800	71.12	4.0	101.60
Coil	210-2		210-3		210-4	

SPECIFICATIONS

T2S

PERFORMANCE		LINEAR MAGNETIC ENCODER 5.0µm	LINEAR MAGNETIC ENCODER 1.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 5.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 1.0µm
Peak Velocity	in/s (m/s)	275 (7)	100 (2.5)	196 (5)	120 (3)
Resolution	in (µm)	0.0002 (5)	0.000 04 (1.0)	0.000 02 (0.5)	0.000 004 (0.1)
Repeatability	in (µm)	±0.0004 (±10)	±0.000 8 (2.0)	±0.000 06 (1.5)	±0.000 04 (1.0)
Accuracy – Magnetic		±(30µm +50µm/m)	±(25µm +50µm/m)		
Accuracy – Optical				±(5µm +30µm/m)	

Note: For travels less than 1 meter, accuracy should be calculated at 1 meter

MOTOR MODEL		210-2	210-3	210-4
Peak Force	N	255.8	375.0	494.2
	lb	57.5	84.3	111.1
Continuous Force	N	57.4	84.1	110.3
	lb	12.9	18.9	24.8
Peak Power	W	1583	2261	2940
Continuous Power	W	79	113	147

ACCURACY	STANDARD	LASER ALIGNMENT OPTION
Straightness restrained on flat surface in (µm)	±0.000127 in/in (±127µm/m)	±.000013 in/in (±13µm/m)
Flatness restrained on flat surface in (µm)	±0.003 + .000254 in/in (±76 + 254µm/m)	

Note: Straightness/Flatness specifications based on system mounted to surface of flatness ±0.0005in/ft

PHYSICAL		- 2	- 3	-4
Carriage Assembly	lbs(kg)	2.1 (0,9)	3.1 (1.4)	3.8 (1.7)
Base Assembly				
T2SA Aluminum (0.375'' thick)	lbs/ft (kg/m)	9.10 (4.2)	9.10 (4.2)	9.10 (4.2)
Carriage Assembly	in (mm)	4.20 (106.7)	6.60 (167.6)	9.00 (228.6)
Coil Bar Length	in (mm)	7.20 (182.9)	9.60 (243.8)	12.00 (304.8)

LOAD		- 2	- 3	- 4
Vertical (Fv) see note 11	lbs (kg)	40 (18.1)	50 (22.7)	60 (27.2)
Side (Fs) see note 11	lbs (kg)	20 (9.1)	30 (13.6)	30 (13.6)
Moments - Roll (Mr) see note 11	Lb-ft (N-m)	20 (27)	30 (40)	30 (40)
Moments - Pitch (Mp) see note 11	Lb-ft (N-m)	50 (67)	100 (135)	100 (135)
Moments - Yaw (My) see note 11	Lb-ft (N-m)	50 (67)	100 (135)	100 (135)

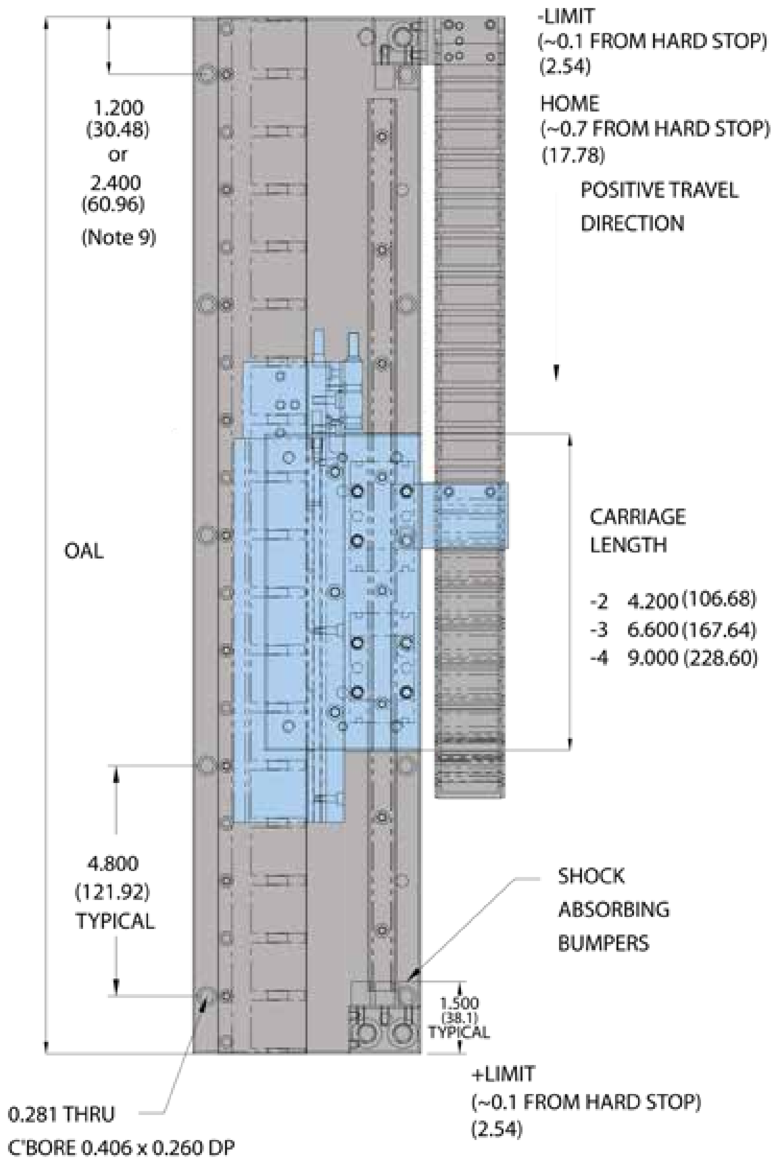
1. Total travel = OAL – 3.00˝ (76.2 mm) – carriage length.
2. Maximum base length is 120˝ (3048 mm).
3. Aluminum base is black anodized.
4. For complete motor specifications, refer to 210 series motor data sheet.
5. Optical encoder, RGH series, available in 0.05µm, 0.1µm, 0.5µm, 1.0µm, 5.0µm.
6. Cables extend past base by approximately 0.6˝ when carriage is at negative hard stop.
7. Cable Track extends 0.15˝ higher than carriage mounting surface. Space must be taken into account when mounting load.
8. Standard cable track provided is 30mm wide 18mm BR.
9. Base mounting holes are equidistant, 1.200” (12.0, 16.8, 21.6....) or 2.400” (9.6, 14.4, 19.2, 24.0....) from each end depending on base length.
10. Specification subject to change without notice.
11. Listed specifications based on motor size and typical performance requirements. Bearing manufacturer specifications exceed listed specifications.
12. For high load, high speed applications, customer-supplied deceleration shocks are required (not included with product).
13. The repeatability for the home switch is estimated to be +/- 10-20 microns. However, repeatability of the home switch does not dictate the system or encoder repeatability.

Download 2D & 3D files from www.parker.com/emn/T2S

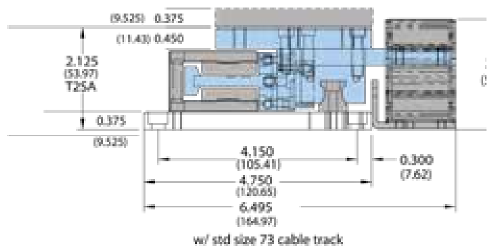
DIMENSIONS
T2S

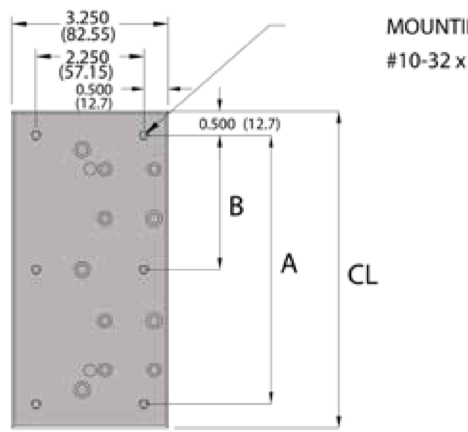
Dimensions shown in inches.

- **Moving Carriage Assembly**
- **Stationary Base Assembly**



0.375 THICK CARRIAGE SPACER PLATE (optional)
(9.525)





TOTAL TRAVEL = OAL - 3.00" - CARRIAGE LENGTH
= OAL - 76.2 mm - CARRIAGE LENGTH

OAL = MULTIPLE OF 2.400" (60.96)

CARRIAGE SIZE

	- 2	mm	- 3	mm	- 4	mm
CL	4.200	106.68	6.600	167.64	9.00	228.6
A	3.200	81.28	5.600	142.24	8.00	203.80
B	—	71.12	2.800	101.60	4.00	101.64
Coil	210-2		210-3		210-4	

ORDERING INFORMATION

T2D/T2S

Fill in an order code from each of the numbered fields to create a complete model order code ***for T2D/T2S****.*

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
Order Example:	T	2	D	A	012	3	N	S	B	A	B	3

① **Series**

T	Open Positioner
B	Bellows Positioner available - consult factory for details

② **Motor Coil Series**

2	210 Motor Coil

③ **Bearing Rail Configuration**

D	Dual Bearing Rails
S	Single Bearing Rails

④ **Base Material**

A	0.375" Al

⑤ **Length of Base**

XXX Length of base in inches*
Maximum: 120.0" *
Minimum: 9.6"
Increment: 2.4"
Base Length (increments of 2.4" [60.96mm]) =
Travel + Carriage Length + 3.0" [76.2mm]

*Truncate base length in part number. Example: for a 16.8 inch base, "XXX" equals "016"
*Consult factory for longer lengths.

⑥

Coil Size		**Carriage Length**
2	2 pole	4.2" (106.68mm)
3	3 pole	6.6" (106.64mm)
4	4 pole	9.0" (228.60mm)

⑦ **Cooling**

N	No cooling

⑧ **Winding Type**

S	Series
P	Parallel

⑨ **Encoder**

A	Magnetic 1µm
B	Magnetic 5µm
Q	Optical 5µm
L	Optical 1µm
M	Optical 0.5µm
P	Optical 0.1µm
R	Optical 1 V p-p sine/cosine
X	No encoder

⑩ **Cable Length**

A	1 Meter Flying Leads
B	3 Meter Flying Leads
C	7.5 Meter Flying Leads
L	3 Meter Extension Cables (with Connector Box)
M	7.5 Meter Extension Cables (with Connector Box)
Z	Connector Box ONLY (no cables)

*Flying Leads: cable measured from last cable carrier link
*Extension Cables: cable measured from connection box at end of base.
*7.5 Meter Flying Lead Cables available on:

- All bases with Magnetic encoder
- All bases with Optical encoder under 86"
- For bases with Optical encoder over 86" the cable length will be CL = 10M - (base length in meters + 0.3M)

⑪ **Cable Connectorization**

B	Flying Leads
C	Compax3
G	Gemini
V	ViX
Z	no cables

⑫ **Cable Track**

0	None
3	Standard

Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

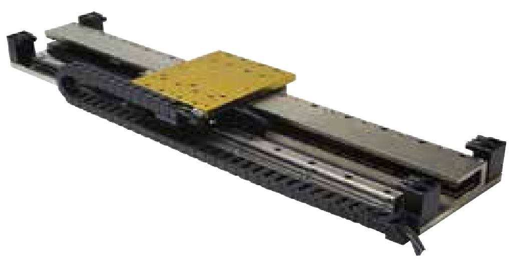
SPECIFICATIONS

T3D

PERFORMANCE		LINEAR MAGNETIC ENCODER 5.0µm	LINEAR MAGNETIC ENCODER 1.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 5.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 1.0µm
Peak Velocity	in/s (m/s)	275 (7)	100 (2.5)	196 (5)	120 (3)
Resolution	in (µm)	0.0002 (5)	0.000 04 (1.0)	0.000 02 (0.5)	0.000 004 (0.1)
Repeatability	in (µm)	±0.0004 (±10)	±0.000 8 (2.0)	±0.000 06 (1.5)	±0.000 04 (1.0)
Accuracy – Magnetic		±(30µm +50µm/m)	±(25µm +50µm/m)		
Accuracy – Optical				±(5µm +30µm/m)	

Note: For travels less than 1 meter, accuracy should be calculated at 1 meter

MOTOR MODEL		310-2	310-3	310-4	310-5	310-6
Peak Force	N	409.3	600.0	790.0	980.0	1170.0
	lb	92.0	135.1	177.2	220.3	263.2
Continuous Force	N	91.6	133.9	176.2	219.3	262.0
	lb	20.6	30.1	39.6	49.3	58.9
Peak Power	W	1885	2693	3500	4308	5116
Continuous Power	W	4	135	179	215	256



ACCURACY	STANDARD	LASER ALIGNMENT OPTION
Straightness restrained on flat surface in (µm)	±0.000127 in/in (±127µm/m)	±.000013 in/in (±13µm/m)
Flatness restrained on flat surface in (µm)	±0.003 + .000254 in/in (±76 + 254µm/m)	

Note: Straightness/Flatness specifications based on system mounted to surface of flatness ±0.0005in/ft

PHYSICAL		- 2	- 3	-4	- 5	- 6
Carriage Assembly	lbs (kg)	4.6 (2.1)	6.7 (3.0)	8.1 (3.7)	9.5 (4.3)	11.0 (5.0)
Base Assembly						
T3DB Aluminum (0.500'' thick)	lbs/ft (kg/m)	16.9 (25.1)	16.9 (25.1)	16.9 (25.1)	16.9 (25.1	16.9 (25.1)
Carriage Assembly	in (mm)	4.20 (106.7)	6.60 (167.6)	9.00 (228.6)	11.40 (289.6)	13.80 (350.5)
Coil Bar Length	in (mm)	7.20 (182.9)	9.60 (243.8	12.00 (304.8)	14.40 (365.8)	16.8 (426.7)

LOAD		- 2	- 3	- 4	- 5	- 6
Vertical (Fv) see note 11	lbs (kg)	120 (54)	150 (68)	180 (81)	210 (95)	240 (108)
Side (Fs) see note 11	lbs (kg)	80 (36)	100 (45)	100 (45)	100 (45)	100 (45)
Moments - Roll (Mr) see note 11	Lb-ft (N-m)	80 (107)	100 (134)	100 (134)	100 (134)	100 (134)
Moments - Pitch (Mp) see note 11	Lb-ft (N-m)	160 (214)	300 (402)	300 (402)	300 (402)	300 (402)
Moments - Yaw (My) see note 11	Lb-ft (N-m)	160 (214)	300 (402)	300 (402)	300 (402)	300 (402)

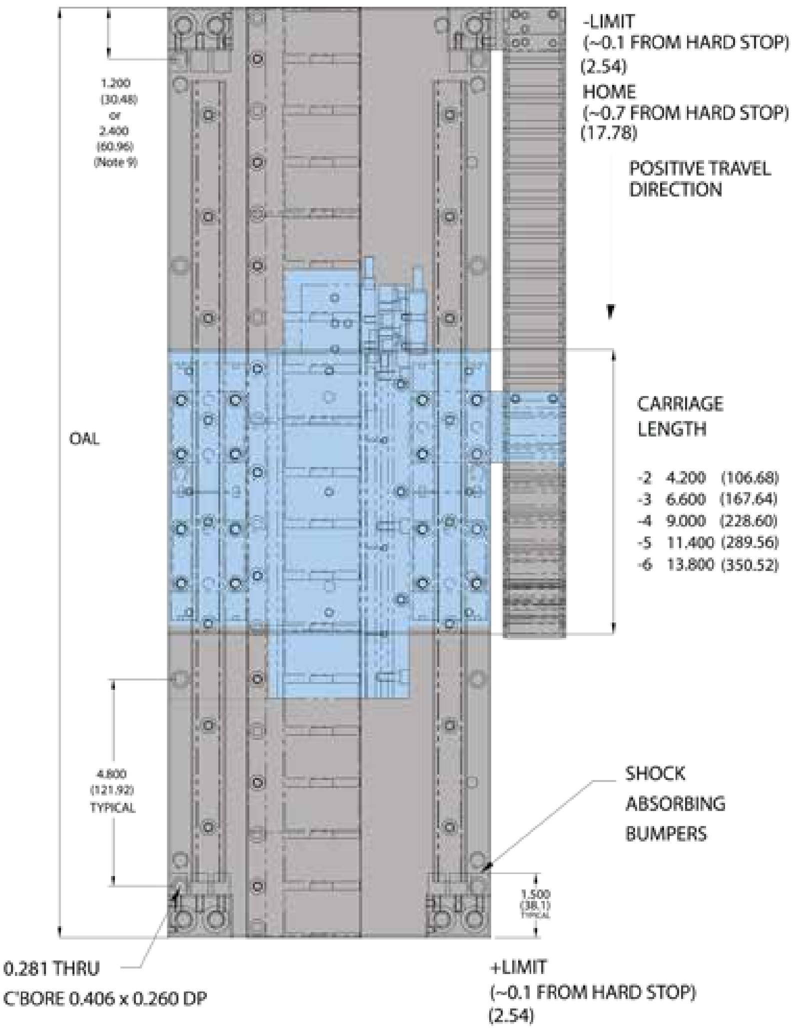
1. Total travel = OAL – 3.00˝ (76.2 mm) – carriage length.
2. Maximum base length is 144˝ (3657 mm).
3. Aluminum base is black anodized.
4. For complete motor specifications, refer to 310 series motor data sheet.
5. Optical encoder, RGH series, available in 0.05µm, 0.1µm, 0.5µm, 1.0µm, 5.0µm.
6. Cables extend past base by approximately 0.6˝ when carriage is at negative hard stop.
7. Cable Track extends 0.15˝ higher than carriage mounting surface. Space must be taken into account when mounting load.
8. Standard cable track provided is 30mm wide 18mm BR.
9. Base mounting holes are equidistant, 1.200” (12.0, 16.8, 21.6....) or 2.400” (9.6, 14.4, 19.2, 24.0....) from each end depending on base length.
10. Specification subject to change without notice.
11. Listed specifications based on motor size and typical performance requirements. Bearing manufacturer specifications exceed listed specifications.
12. For high load, high speed applications, customer-supplied deceleration shocks are required (not included with product).
13. The repeatability for the home switch is estimated to be +/- 10-20 microns. However, repeatability of the home switch does not dictate the system or encoder repeatability.

Linear Motor Driven Tables

DIMENSIONS
T3D

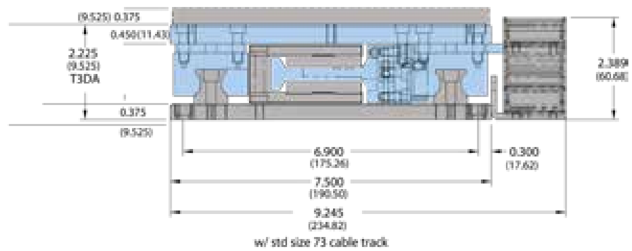
Download 2D & 3D files from www.parker.com/emn/T3D

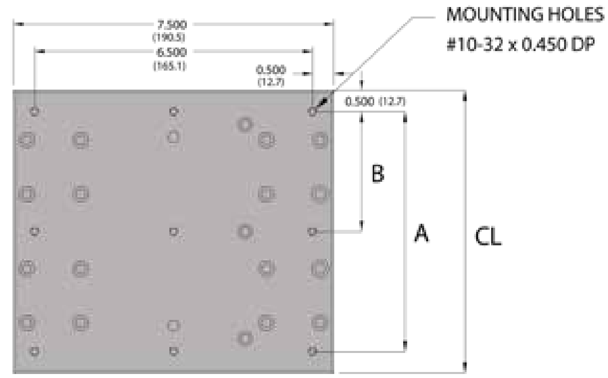
Dimensions shown in inches.
- Moving Carriage Assembly
- Stationary Base Assembly



TOTAL TRAVEL = OAL - 3.00" (76.2) - CARRIAGE LENGTH
OAL = MULTIPLE OF 2.400" (60.96)

0.375 THICK CARRIAGE SPACER PLATE (optional) (9.525)





CARRIAGE SIZE

	- 2	mm	- 3	mm	- 4	mm	- 5	mm	- 6	mm
CL	4.200	106.68	6.600	167.64	9.00	228.6	11.400	289.56	13.800	350.52
A	3.200	81.28	5.600	142.24	8.00	203.80	10.400	264.16	12.800	325.12
B	—	71.12	2.800	101.60	4.00	101.64	5.200	132.08	6.400	162.56
Coil	310-2		310-3		310-4		310-5		310-6	

SPECIFICATIONS

T3S

PERFORMANCE		LINEAR MAGNETIC ENCODER 5.0µm	LINEAR MAGNETIC ENCODER 1.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 5.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 1.0µm
Peak Velocity	in/s (m/s)	275 (7)	100 (2.5)	196 (5)	120 (3)
Resolution	in (mm)	0.0002 (5)	0.000 04 (1.0)	0.000 02 (0.5)	0.000 004 (0.1)
Repeatability	in (mm)	±0.0004 (±10)	±0.000 8 (2.0)	±0.000 06 (1.5)	±0.000 04 (1.0)
Accuracy – Magnetic		±(30µm +50µm/m)	±(25µm +50µm/m)		
Accuracy – Optical				±(5µm +30µm/m)	

Note: For travels less than 1 meter, accuracy should be calculated at 1 meter

MOTOR MODEL		310-2	310-3	310-4	310-5	310-6
Peak Force	N	409.3	600.0	790.0	980.0	1170.0
	lb	92.0	135.1	177.2	220.3	263.2
Continuous Force	N	91.6	133.9	176.2	219.3	262.0
	lb	20.6	30.1	39.6	49.3	58.9
Peak Power	W	1885	2693	3500	4308	5116
Continuous Power	W	4	135	179	215	256

ACCURACY	STANDARD	LASER ALIGNMENT OPTION
Straightness restrained on flat surface in (µm)	±0.000127 in/in (±127µm/m)	±.000013 in/in (±13µm/m)
Flatness restrained on flat surface in (µm)	±0.003 + .000254 in/in (±76 + 254µm/m)	

Note: Straightness/Flatness specifications based on system mounted to surface of flatness ±0.0005in/ft

PHYSICAL		- 2	- 3	- 4	- 5	- 6
Carriage Assembly	lbs (kg)	3.0 (1.4)	4.4 (2.0)	5.5 (2.5)	6.4 (2.9)	7.4 (3.4)
Base Assembly						
T3SB Aluminum (0.500'' thick)	lbs/ft (kg/m)	14.3 (21.2)	14.3 (21.2)	14.3 (21.2)	14.3 (21.2)	14.3 (21.2)
Carriage Assembly	in (mm)	4.20 (106.6)	6.60 (167.6)	9.00 (228.6)	11.40 (289.6)	13.80 (350.5)
Coil Bar Length	in (mm)	7.20 (182.9)	9.60 (243.8)	12 (304.8)	14.40 (365.8)	16.80 (426.7)

LOAD		- 2	- 3	- 4	- 5	- 6
Vertical (Fv) see note 11	lbs (kg)	80 (36)	100 (45)	120 (54)	140 (63)	160 (72)
Side (Fs) see note 11	lbs (kg)	30 (13)	50 (22)	50 (22)	50 (22)	50 (22)
Moments - Roll (Mr) see note 11	Lb-ft (N-m)	35 (47)	50 (67)	50 (67)	50 (67)	50 (67)
Moments - Pitch (Mp) see note 11	Lb-ft (N-m)	75 (100)	150 (201)	150 (201)	150 (201)	150 (201)
Moments - Yaw (My) see note 11	Lb-ft (N-m)	75 (100)	150 (201)	150 (201)	150 (201)	150 (201)

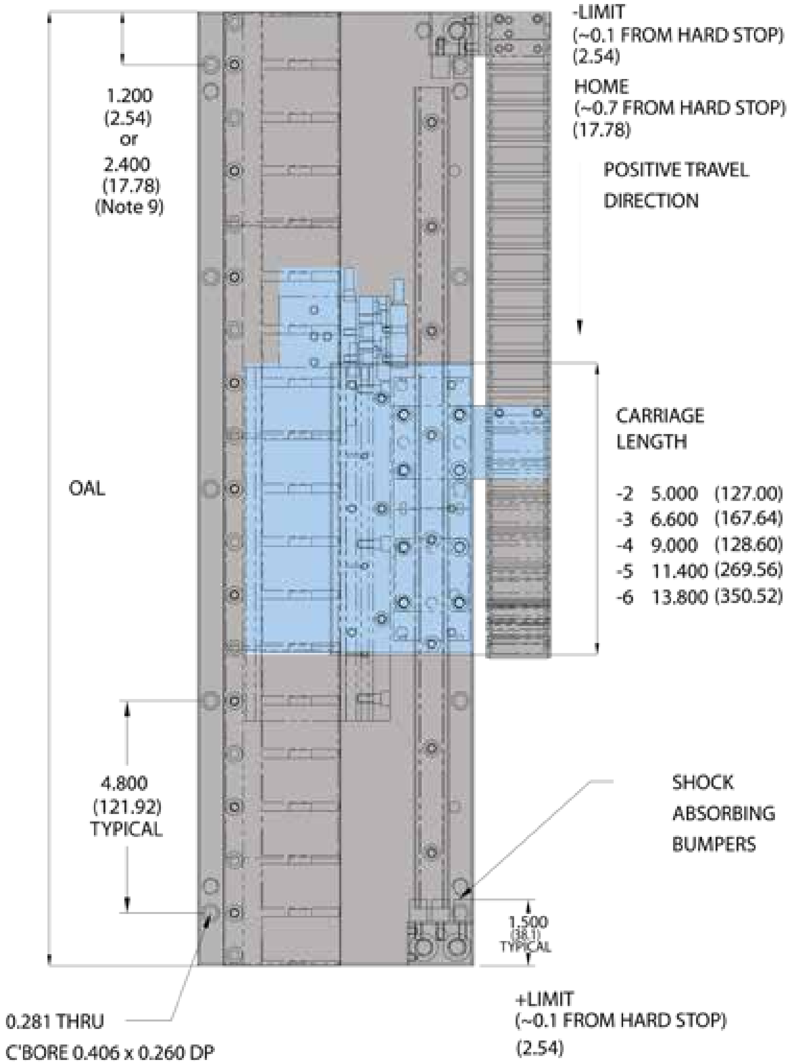
1. Total travel = OAL – 3.00˝ (76.2 mm) – carriage length.
2. Maximum base length is 144˝ (3657 mm).
3. Aluminum base is black anodized.
4. For complete motor specifications, refer to 310 series motor data sheet.
5. Optical encoder, RGH series, available in 0.05µm, 0.1µm, 0.5µm, 1.0µm, 5.0µm.
6. Cables extend past base by approximately 0.6˝ when carriage is at negative hard stop.
7. Cable Track extends 0.15˝ higher than carriage mounting surface. Space must be taken into account when mounting load.
8. Standard cable track provided is 30mm wide 18mm BR.
9. Base mounting holes are equidistant, 1.200" (12.0, 16.8, 21.6....) or 2.400" (9.6, 14.4, 19.2, 24.0....) from each end depending on base length.
10. Specification subject to change without notice.
11. Listed specifications based on motor size and typical performance requirements. Bearing manufacturer specifications exceed listed specifications.
12. For high load, high speed applications, customer-supplied deceleration shocks are required (not included with product).
13. The repeatability for the home switch is estimated to be +/- 10-20 microns. However, repeatability of the home switch does not dictate the system or encoder repeatability.

DIMENSIONS
T3S

Download 2D & 3D files from www.parker.com/emn/T3S

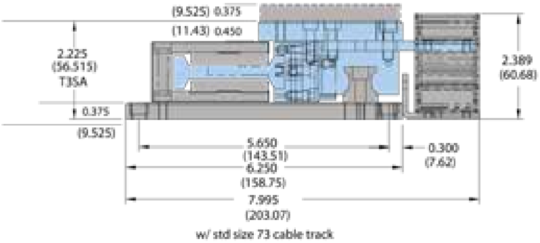
Dimensions shown in inches.

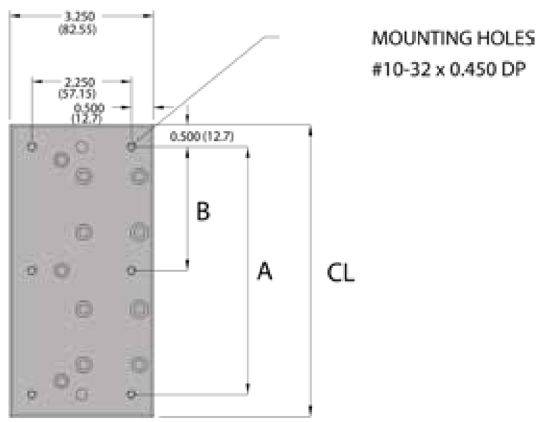
- Moving Carriage Assembly
- Stationary Base Assembly



TOTAL TRAVEL = OAL - 3.00" (76.2) - CARRIAGE LENGTH
OAL = MULTIPLE OF 2.400" (60.96)

0.375 THICK CARRIAGE SPACER PLATE (optional)
(9.525)





CARRIAGE SIZE

	- 2	mm	- 3	mm	- 4	mm	- 5	mm	- 6	mm
CL	5.00	127.00	6.600	167.64	9.00	228.6	11.400	289.56	13.800	350.52
A	4.00	101.60	5.650	142.24	8.00	203.2	10.400	264.16	12.800	325.12
B	2.00	50.8	2.800	71.12	4.00	101.64	5.200	132.08	6.400	162.56
Coil	310-2		310-3		310-4		310-5		310-6	

ORDERING INFORMATION

T3D/T3S

Fill in an order code from each of the numbered fields to create a complete model order code ***for T3D/T3S****.*

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
Order Example:	T	3	D	B	012	3	N	S	B	A	C	3

① **Series**

T	Open Positioner
B	Bellows Positioner available - consult factory for details

② **Motor Coil Series**

3	310 Motor Coil

③ **Bearing Rail Configuration**

D	Dual Bearing Rails
S	Single Bearing Rails

④ **Base Material**

B	0.5" Al

⑤ **Length of Base**

XXX Length of base in inches*
Maximum: 144.0"
Minimum: 9.6"
Increment: 2.4"
Base Length (increments of 2.4" [60.96mm]) =
Travel + Carriage Length + 3.0" [76.2mm]

*Truncate base length in part number. Example: for a 16.8 inch base, "XXX" equals "016"

⑥

Coil Size		**Carriage Length**
2	2 pole	4.2" (106.68mm)
3	3 pole	6.6" (106.64mm)
4	4 pole	9.0" (228.60mm)
5	5 pole	11.4" (289.56mm)
6	6 pole	13.8" (350.52mm)

⑦ **Cooling**

N	No cooling

⑧ **Winding Type**

S	Series
P	Parallel

⑨ **Encoder**

A	Magnetic 1µm
B	Magnetic 5µm
Q	Optical 5µm
L	Optical 1µm
M	Optical 0.5µm
P	Optical 0.1µm
R	Optical 1 V p-p sine/cosine
X	No encoder

⑩ **Cable Length**

A	1 Meter Flying Leads
B	3 Meter Flying Leads
C	7.5 Meter Flying Leads
L	3 Meter Extension Cables (with Connector Box)
M	7.5 Meter Extension Cables (with Connector Box)
Z	Connector Box ONLY (no cables)

*Flying Leads: cable measured from last cable carrier link
*Extension Cables: cable measured from connection box at end of base.
*7.5 Meter Flying Lead Cables available on:

- All bases with Magentic encoder
- All bases with Optical encoder under 86"
- For bases with Optical encoder over 86" the cable length will be CL = 10M - (base length in meters + 0.3M)

⑪ **Cable Connectorization**

B	Flying Leads
C	Compax3
G	Gemini
V	ViX
Z	no cables

⑫ **Cable Track**

0	None
3	Standard

Linear Motor Driven Tables

Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

SPECIFICATIONS
T4D

PERFORMANCE		LINEAR MAGNETIC ENCODER 5.0µm	LINEAR MAGNETIC ENCODER 1.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 5.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 1.0µm
Peak Velocity	in/s (m/s)	275 (7)	100 (2.5)	196 (5)	120 (3)
Resolution	in (µm)	0.0002 (5)	0.000 04 (1.0)	0.000 02 (0.5)	0.000 004 (0.1)
Repeatability	in (µm)	±0.0004 (±10)	±0.000 8 (2.0)	±0.000 06 (1.5)	±0.000 04 (1.0)
Accuracy – Magnetic		±(30µm +50µm/m)	±(25µm +50µm/m)		
Accuracy – Optical				±(5µm +30µm/m)	

Note: For travels less than 1 meter, accuracy should be calculated at 1 meter

MOTOR MODEL		410-2	410-3	410-4	410-5	410-6
Peak Force	N	1041.4	1523.6	2006.3	2967.2	3928.1
	lb	234.1	342.5	451.0	667.0	883.0
Continuous Force	N	233.1	340.8	448.9	663.7	878.6
	lb	52.4	76.6	100.9	149.2	197.5
Peak Power	W	2835	4050	5265	7695	10125
Continuous Power	W	142	203	263	385	506

ACCURACY	STANDARD	LASER ALIGNMENT OPTION
Straightness restrained on flat surface in [µm]	±0.000127 in/in (±127µm/m)	±.000013 in/in (±13µm/m)
Flatness restrained on flat surface in [µm]	±0.003 + .000254 in/in (±76 + 254µm/m)	

Note: Straightness/Flatness specifications based on system mounted to surface of flatness ±0.0005in/ft

PHYSICAL		- 2	- 3	-4	- 6	- 8
Carriage Assembly						
T4DB Aluminum (0.500'' thick)	lbs (kg)	9.0 (4.1)	14.9 (6.8)	18.1 (8.2)	24.1 (11.0)	30.0 (13.6)
Base Assembly						
T4DB Aluminum (0.500'' thick)	lbs/ft (kg/m)	29.4 (43.8)	29.4 (43.8)	29.4 (43.8)	29.4 (43.8)	29.4 (43.8)
Carriage Assembly	in (mm)	4.8 (121.9)	8.15 (207.0)	11.50 (292.1)	18.20 (462.3)	24.90 (632.5)
Coil Bar Length	in (mm)	10.00 (254)	13.36 (339)	16.72 (424)	23.44 (595)	30.16 (766)

LOAD		- 2	- 3	- 4	- 5	- 6
Vertical (Fv) see note 11	lbs (kg)	200 (90)	250 (113)	300 (136)	400 (181)	400 (181)
Side (Fs) see note 11	lbs (kg)	150 (68)	150 (68)	150 (68)	150 (68)	150 (68)
Moments - Roll (Mr) see note 11	Lb-ft (N-m)	100 (133)	150 (200)	150 (200)	150 (200)	150 (200)
Moments - Pitch (Mp) see note 11	Lb-ft (N-m)	200 (266)	400 (532)	400 (532)	400 (532)	400 (532)
Moments - Yaw (My) see note 11	Lb-ft (N-m)	200 (266)	400 (532)	400 (532)	400 (532)	400 (532)

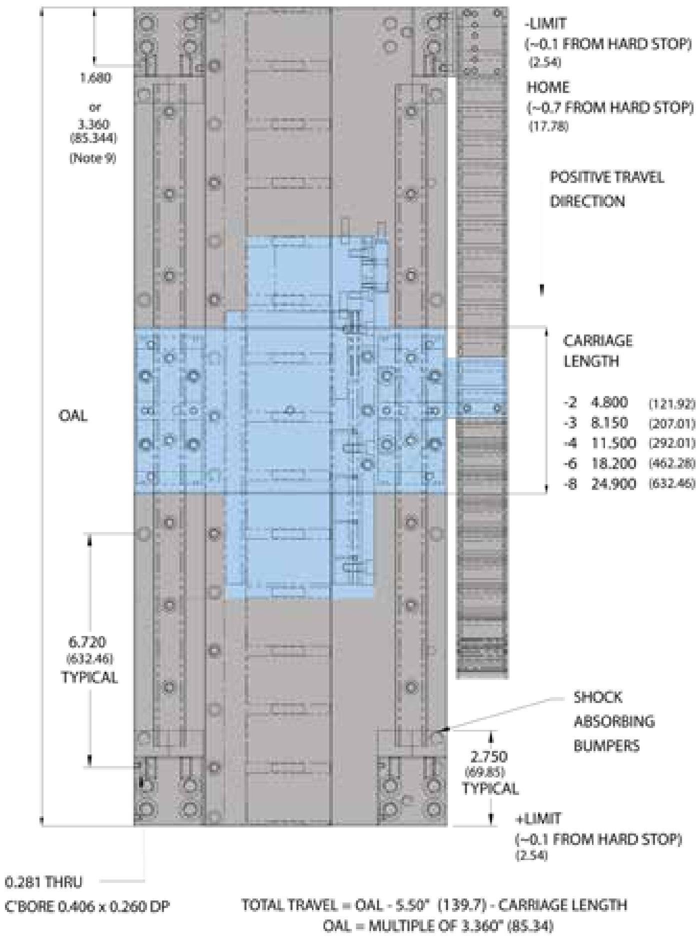
1. Total travel = OAL – 5.5˝ (139.7 mm) – carriage length.
2. Maximum base length is 137.76˝ (3499 mm).
3. Aluminum base is black anodized.
4. For complete motor specifications, refer to 410 series motor data sheet.
5. Optical encoder, RGH series, available in 0.05µm, 0.1µm, 0.5µm, 1.0µm, 5.0µm.
6. Cables extend past base by approximately 0.6˝ when carriage is at negative hard stop.
7. Cable Track extends 0.050˝ below carriage mounting surface. Space must be taken into account when mounting load.
8. Standard cable track provided is 40mm wide 18mm BR.
9. Base mounting holes are equidistant, 1.68" (12.0, 16.8, 21.6....) or 3.36" (9.6, 14.4, 19.2, 24.0....) from each end depending on base length.
10. Specification subject to change without notice.
11. Listed specifications based on motor size and typical performance requirements. Bearing manufacturer specifications exceed listed specifications.
12. For high load, high speed applications, customer-supplied deceleration shocks are required (not included with product).
13. The repeatability for the home switch is estimated to be +/- 10-20 microns. However, repeatability of the home switch does not dictate the system or encoder repeatability.

DIMENSIONS
T4D

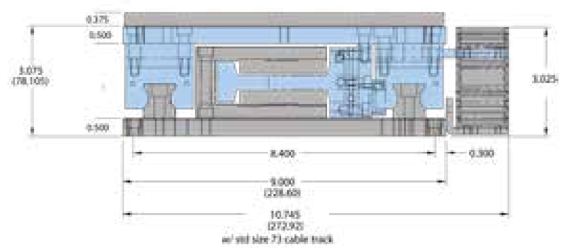
Download 2D & 3D files from www.parker.com/emn/T4D

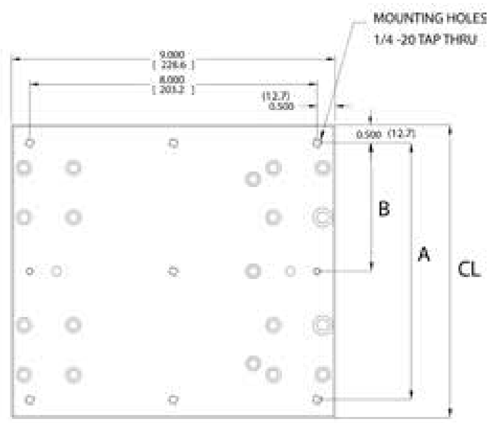
Dimensions shown in inches.

- Moving Carriage Assembly
- Stationary Base Assembly



0.375 THICK CARRIAGE SPACER PLATE (optional) (9.525)





CARRIAGE SIZE

	- 2	mm	- 3	mm	- 4	mm	- 6	mm	- 8	mm
CL	4.80	121.92	8.150	207.01	11.50	292.10	18.200	462.28	24.900	632.46
A	3.800	96.52	7.150	181.61	10.500	266.70	17.200	436.88	23.900	607.66
B	—	—	3.575	90.805	5.250	133.35	8.600	218.44	11.950	303.53
Coil	410-2		410-3		410-4		410-5		410-6	

SPECIFICATIONS

T4S

PERFORMANCE		LINEAR MAGNETIC ENCODER 5.0µm	LINEAR MAGNETIC ENCODER 1.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 5.0µm	LINEAR OPTICAL ENCODER OPTIONS (NOTE 5) 1.0µm
Peak Velocity	in/s (m/s)	275 (7)	100 (2.5)	196 (5)	120 (3)
Resolution	in (µm)	0.0002 (5)	0.000 04 (1.0)	0.000 02 (0.5)	0.000 004 (0.1)
Repeatability	in (µm)	±0.0004 (±10)	±0.000 8 (2.0)	±0.000 06 (1.5)	±0.000 04 (1.0)
Accuracy – Magnetic		±(30µm +50µm/m)	±(25µm +50µm/m)		
Accuracy – Optical				±(5µm +30µm/m)	

Note: For travels less than 1 meter, accuracy should be calculated at 1 meter

MOTOR MODEL		410-2	410-3	410-4	410-6	410-8
Peak Force	N	1041.4	1523.6	2006.3	2967.2	3928.1
	lb	234.1	342.5	451.0	667.0	883.0
Continuous Force	N	233.1	340.8	448.9	663.7	878.6
	lb	52.4	76.6	100.9	149.2	197.5
Peak Power	W	2835	4050	5265	7695	10125
Continuous Power	W	142	203	263	385	506

ACCURACY	STANDARD	LASER ALIGNMENT OPTION
Straightness restrained on flat surface in (µm)	±0.000127 in/in (±127µm/m)	±.000013 in/in (±13µm/m)
Flatness restrained on flat surface in (µm)	±0.003 + .000254 in/in (±76 + 254µm/m)	

Note: Straightness/Flatness specifications based on system mounted to surface of flatness ±0.0005in/ft

PHYSICAL		- 2	- 3	-4	- 6	- 8
Carriage Assembly						
T4SB Aluminum (0.500” thick)	lbs (kg)	6.5 (3.0)	10.3 (4.7)	13.0 (5.9)	17.8 (8.1)	22.7 (10.3)
Base Assembly						
T4SB Aluminum (0.500” thick)	lbs/ft (kg/m)	26.7 (39.8)	26.7 (39.8)	26.7 (39.8)	26.7 (39.8)	26.7 (39.8)
Carriage Assembly	in (mm)	4.8 (121.9)	8.15 (207.0)	11.50 (292.1)	18.20 (462.3)	24.90 (632.5)
Coil Bar Length	in (mm)	10.00 (254)	13.36 (339)	16.72 (424)	23.44 (595)	30.16 (766)

LOAD		- 2	- 3	- 4	- 6	- 8
Vertical (Fv) see note 11	lbs (kg)	150 (68)	175 (79)	175 (79)	200 (90)	200 (90)
Side (Fs) see note 11	lbs (kg)	75 (34)	75 (34)	75 (34)	75 (34)	75 (34)
Moments - Roll (Mr) see note 11	Lb-ft (N-m)	50 (66)	100 (133)	100 (133)	100 (133)	100 (133)
Moments - Pitch (Mp) see note 11	Lb-ft (N-m)	100 (133)	200 (266)	200 (266)	200 (266)	200 (266)
Moments - Yaw (My) see note 11	Lb-ft (N-m)	100 (133)	200 (266)	200 (266)	200 (266)	200 (266)

1. Total travel = OAL – 5.5˝ (139.7 mm) – carriage length.
2. Maximum base length is 137.76˝ (3499 mm).
3. Aluminum base is black anodized.
4. For complete motor specifications, refer to 410 series motor data sheet.
5. Optical encoder, RGH series, available in 0.05µm, 0.1µm, 0.5µm, 1.0µm, 5.0µm.
6. Cables extend past base by approximately 0.6˝ when carriage is at negative hard stop.
7. Cable Track extends 0.050˝ below carriage mounting surface. Space must be taken into account when mounting load.
8. Standard cable track provided is 40mm wide 18mm BR.
9. Base mounting holes are equidistant, 1.68” (12.0, 16.8, 21.6....) or 3.36” (9.6, 14.4, 19.2, 24.0....) from each end depending on base length.
10. Specification subject to change without notice.
11. Listed specifications based on motor size and typical performance requirements. Bearing manufacturer specifications exceed listed specifications.
12. For high load, high speed applications, customer-supplied deceleration shocks are required (not included with product).
13. The repeatability for the home switch is estimated to be +/- 10-20 microns. However, repeatability of the home switch does not dictate the system or encoder repeatability.

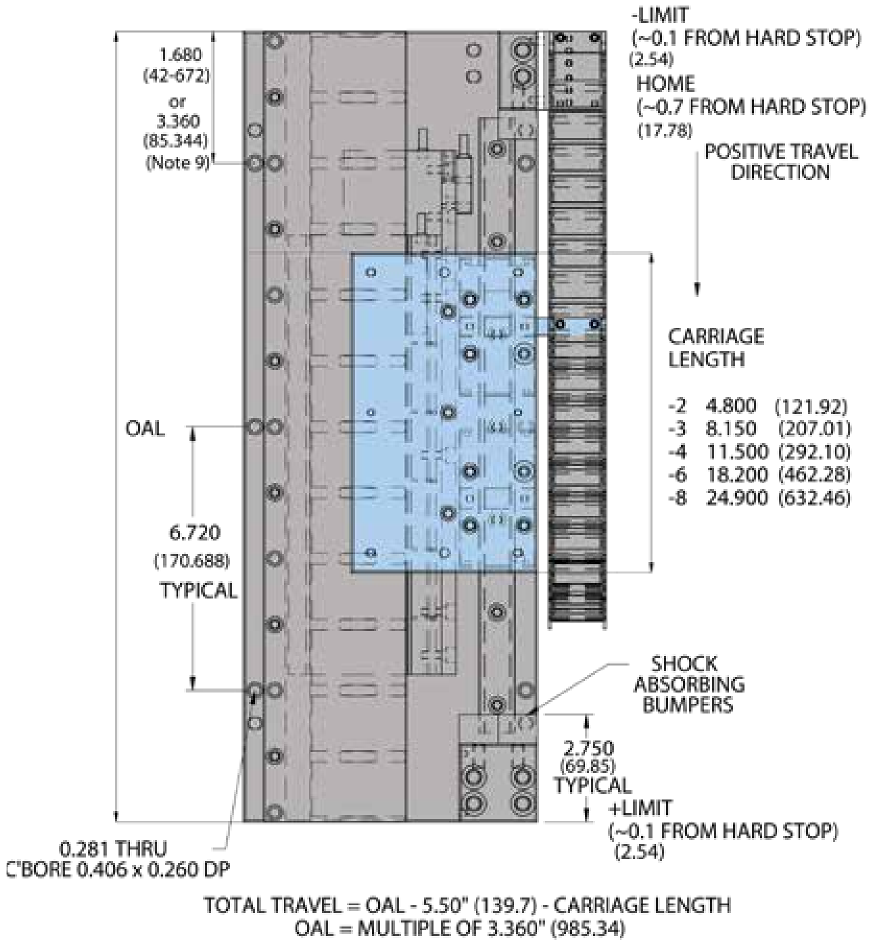
DIMENSIONS
T4S

Download 2D & 3D files from www.parker.com/emn/T4S

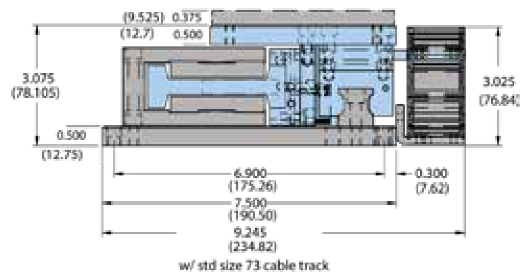
Dimensions shown in inches.

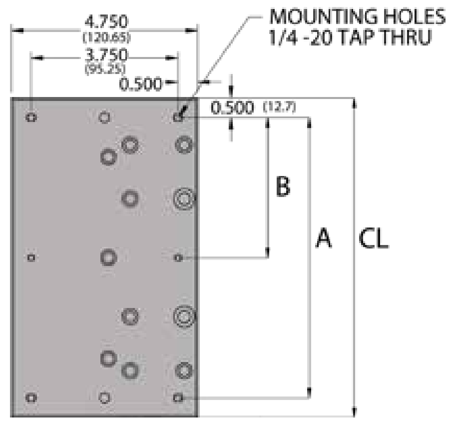
Moving Carriage Assembly

Stationary Base Assembly



0.375 THICK CARRIAGE SPACER PLATE (optional)
9.525





CARRIAGE SIZE

	- 2	mm	- 3	mm	- 4	mm	- 6	mm	- 8	mm
CL	4.800	121.92	8.150	207.01	11.50	292.10	18.200	462.28	24.900	632.46
A	3.800	96.52	7.150	181.61	10.500	266.70	17.200	436.88	23.900	607.66
B	—	—	3.575	90.805	5.250	133.35	8.600	218.44	11.950	303.53
Coil	410-2		410-3		410-4		410-6		410-8	

ORDERING INFORMATION

T4D/T4S

Fill in an order code from each of the numbered fields to create a complete model order code ***for T4D/T4S***.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
Order Example:	T	4	D	B	012	3	N	S	B	A	B	4

① **Series**

T	Open Positioner
B	Bellows Positioner available - consult factory for details

② **Motor Coil Series**

4	410 Motor Coil

③ **Bearing Rail Configuration**

D	Dual Bearing Rails
S	Single Bearing Rails

④ **Base Material**

B	0.5" Al

⑤ **Length of Base**

XXX Length of base in inches*
Maximum: 137.76" *
Minimum: 13.44"
Increment: 3.36"
Base Length (increments of 3.36" [85.344mm]) =
Travel + Carriage Length + 5.5" [39.7mm]

*Truncate base length in part number. Example: for a 16.8 inch base, "XXX" equals "016"
*Consult factory for longer lengths.

⑥

Coil Size		**Carriage Length**
2	2 pole	4.8" (121.92mm)
3	3 pole	8.15" (207.01mm)
4	4 pole	11.5" (292.10mm)
6	6 pole	18.2" (462.28mm)
8	8 pole	24.9" (632.46mm)

⑦ **Cooling**

N	No cooling

⑧ **Winding Type**

S	Series
P	Parallel

⑨ **Encoder**

A	Magnetic 1µm
B	Magnetic 5µm
Q	Optical 5µm
L	Optical 1µm
M	Optical 0.5µm
P	Optical 0.1µm
R	Optical 1 V p-p sine/cosine
X	No encoder

⑩ **Cable Length**

A	1 Meter Flying Leads
B	3 Meter Flying Leads
C	7.5 Meter Flying Leads
L	3 Meter Extension Cables (with Connector Box)
M	7.5 Meter Extension Cables (with Connector Box)
Z	Connector Box ONLY (no cables)

*Flying Leads: cable measured from last cable carrier link
*Extension Cables: cable measured from connection box at end of base.
*7.5 Meter Flying Lead Cables available on:

- All bases with Magnetic encoder
- All bases with Optical encoder under 86"
- For bases with Optical encoder over 86" the cable length will be CL = 10M - (base length in meters + 0.3M)

⑪ **Cable Connectorization**

B	Flying Leads
C	Compax3
G	Gemini
V	ViX
Z	no cables

⑫ **Cable Track**

0	None
4	Standard

Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

Miniature Positioners

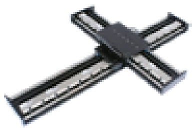
Linear Motor and Screw Driven Stages

Miniaturization of fiber optics, photonics, electronics and biomedical processes has driven the need for smaller and more efficient positioners. Parker offers numerous miniature stage solutions.

Miniature Positioning Stages Common Features

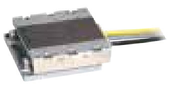
- Miniature profile stages as small as 25 X 80 mm
- Travel lengths to 500 mm
- Acceleration to 5 g; velocity to 3 m/sec
- Encoder resolution to 0.01 microns
- Internal cable management or non-moving cables
- Square rail or cross roller bearing systems
- Compatible mounting for multi-axis systems
- Cleanroom prep, low ESD coating and vacuum prep options
- Submicron precision options
- Thorough testing and certification

mSR Miniature Square Rail Positioner



The most accurate standard positioner ever made by Parker. Compact, with an all-encompassing design ideal for a variety of applications.
Page 342.

MX80L Linear Motor Driven Stages



Exceptional straightness and flatness of travel for positioning light loads within a small workspace.
Page 362.

MX80S Ballscrew & Leadscrew Driven Stages

The MX80S offers features like high stiffness, extremely smooth linear translation, and anti-cage creep design. The unique Master Reference Surface allows aligning the process to the actual travel path within microns.
Page 370.

MX80M Free Travel and Micrometer Driven Stages

The MX80M is available in free travel or micrometer driven units, with innovative tooling features that make mounting and precision alignment quicker and easier.
Page 377.

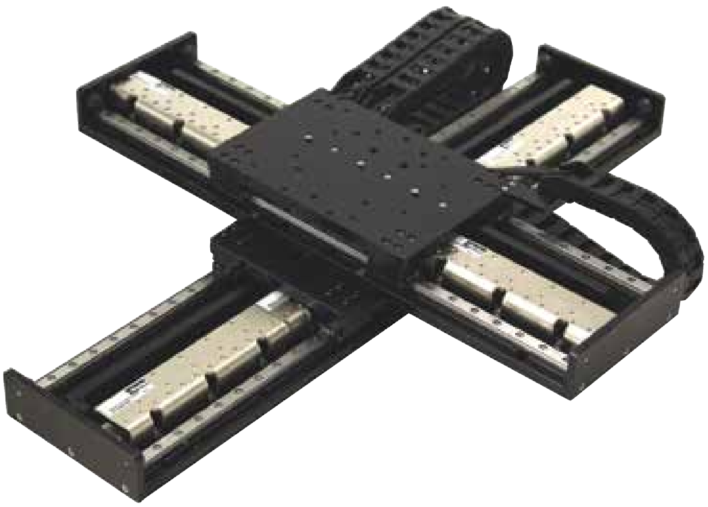
MX45S Linear Positioning Stages

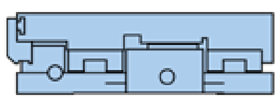
Ultra-miniature, high performance positioners for OEMs requiring linear positioning in space restricted applications.
Page 380.

mSR Miniature Square Rail Positioner

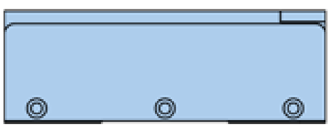
Optimize your design and its footprint.

- Two miniature form factors: the mSR 80 measuring 80 x 25 mm, or the mSR 100 measuring 100 x 35 mm.
- Dual precision square rail bearings
- Six different linear encoder options
- Two different linear motor technologies
- Standard travel options ranging from 25 mm to 500 mm of stroke





mSR80



mSR100

- Integrated and adjustable home and limit sensing
- Common tapped mounting holes and dowel locating holes
- Complete error mapping on each precision grade version – with linear slope correction value provided
- CE and RoHS compliance
- A standard magnetic counterbalance (mSR 80 - 25 mm stroke)

	HMRS08
Maximum Travel (mm)	1200
Maximum Payload (N)	1800
Maximum Acceleration (m/sec^2)	10

For instrument builders who need smooth motion in a small package, the mSR is a linear positioner that provides sub-micron level precision in two different form factors (80 and 100).

The mSR series is a precision machined, square rail bearing guided linear positioner which is driven with one of two different linear servo motor technologies, and utilizes selectable levels of linear encoder technology that are configured to match the application need.

The mSR was developed to complement the successful MX80L positioner, and allows OEM's developing equipment a number of added layers of value, in an extremely compact package, which is easy to apply, and can be tailor-fitted to match the need regardless if one is interested in the reliability of a cost-competitive mechanically driven alternative, or a high precision positioner delivering best of breed performance – all in the same footprint.

Because of its compact, all-encompassing design, the mSR is an ideal positioning solution for applications in the life sciences. Typical applications range from imaging systems performing scanning operations to identify biological markers, to high-throughput processing of micro plates, to applications in cellular therapeutics requiring cell selection and high precision placement to supplement regenerative medicine techniques. Know that the mSR has been designed with typical instrument regulations and certifications in mind as all versions meet CE and RoHS requirements.

Likewise, the mSR is also ideal in application in electronics manufacturing due to its low profile and precision performance. Typical applications could range from semiconductor metrology, to wafer scribing.

The Best of Both Worlds

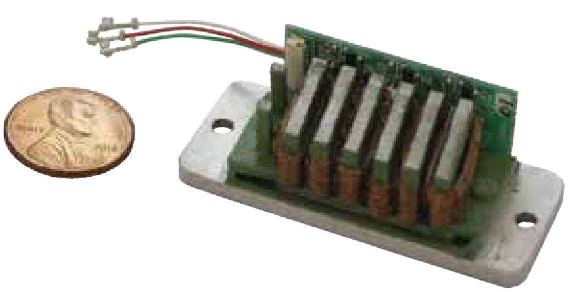
The mSR design has been optimized around two different linear motor technologies to best suit packaging restraints and application needs. Each of these motors has been optimized to deliver best in class performance and response.

mSR80 Ironcore

Ironcore Technology Benefits

- **High force per size**
- **Lower cost**
- **Excellent heat dissipation**

The mSR80 uses the same ironcore linear motor technology used on the MX80L, but it allows for a wider variety of encoder technologies to be applied in a similar foot print, delivering higher performance at a lower relative cost. The mSR80 has been designed to minimize the overall packaging while still achieving MX80L level thrust.



mSR100 Ironless

Ironless Technology Benefits

- **No attractive forces between stator and magnet track – yielding smoother phase transitions**
- **No cogging**
- **Lower forcer weight**

The mSR100 makes use of Parker's latest ironless linear motor, the ML18. As a result the mSR100 is ideal for applications requiring a higher load than the mSR 80, extremely smooth motion, or minimal velocity ripple. The mSR100 also allows for strokes up to 500 mm, as well as a BiSS-C absolute encoder for applications requiring constant positional information.

Within the same form factor, OEMs have two options:

- The precision grade mSR is the most accurate **standard** positioner ever made by Parker, achieving a repeatability of 100 nm and an accuracy of 5.0 microns over 50 millimeters of stroke.
- The more cost competitive standard version takes advantage of magnetic encoder technology, which is ideal for applications which do not require the same level of precision, to compete with similar ballscrew driven stages.

These positioners are ideal for a variety of applications, ranging from imaging systems in digital pathology equipment to metrology instruments in semiconductor or electronics manufacturing.

Maximize Instrument Performance — Not Its Size

The mSR (miniature square rail) positioner offers instrument builders optimized packaging of a linear motor, guidance and encoder, as well as limits and home senors in one complete solution.

Best of Breed Encoder Technology

The mSR positioner offers instrument builder's a plethora of different encoding technologies and resolutions to select from.

Standard incremental optical resolutions range from one micron all the way down to ten nanometers of resolution. This optical encoder offers exceptionally low sub-divisional errors, allowing for very tight control over velocity ripple.

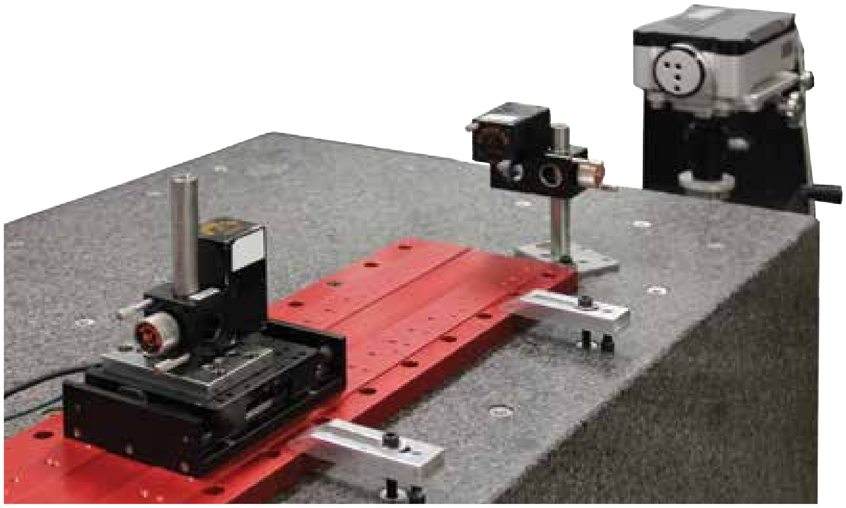
The analog (sine/cosine) encoder option is an ideal way to reach high resolution when paired with controls using interpolating technology to achieve high precision and high speed.

A one micron magnetic option is ideal for cost sensitive applications requiring more basic positioning, and lastly, the mSR 100 offers a BiSS-C encoder option to give absolute feedback for applications requiring constant positional information.

mSR Series Specifications

	Units	mSR80	mSR100
Size (W x H)	mm	80 x 25	100 x 35
Travel (Max)	mm	150	500
Normal Load (Max)	kg	8	12
Thrust (Max)			
Continuous	N	8	16.7
Peak		24	50
Acceleration (Max – no load)	G	3	3
Speed (Max – no load) [1]	mm/s	2000	3000
Rated Bus Voltage	Volts DC	48	48
Repeatability [2]	µm	±0.1	±0.2
Accuracy [2, 3]	µm	5	5
Straightness & Flatness [2]	µm	±4	±4
Feedback Compatibility			
1 µm Optical (incremental)		•	•
0.1 µm Optical (incremental)		•	•
0.01 µm Optical (incremental)		•	•
Analog Sine/Cosine		•	•
1 µm Magnetic (incremental)		•	•
0.05 µm BiSS-C (absolute)			•

[1] At 48 Volt DC bus
[2] Precision grade version stage mounted to granite surface, 0.01 micron optical encoder, 50 mm stroke
[3] Measurements taken at 35 mm above the center of the carriage, with linear slope correction

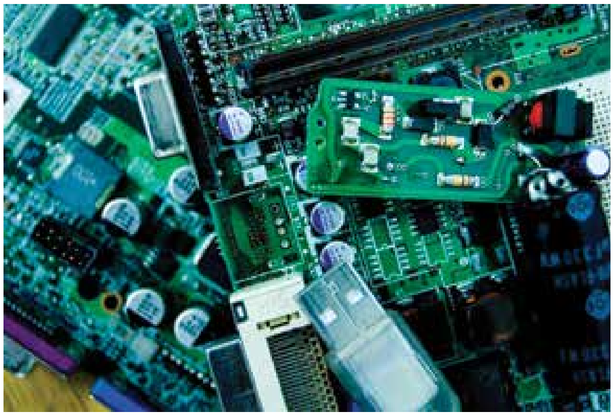


Laser Grade Precision

Every precision grade mSR is thoroughly tested with Parker's laser interferometer to ensure that it meets product specification. Parker also provides test data, with a linear slope corrected value noted, yielding higher stage accuracy with controller compensation.

mSR Application Solutions

Electronics Manufacturing



The mSR is an ideal positioning system for high throughput electronics manufacturing equipment, as it design combines high performance linear motor technology with a variety of high resolution feedback devices for quick, precise placement of miniature components. The mSR also provides an extremely robust solution for electronics inspection systems, as its direct drive linear motor technology has been designed to stand the test of time.

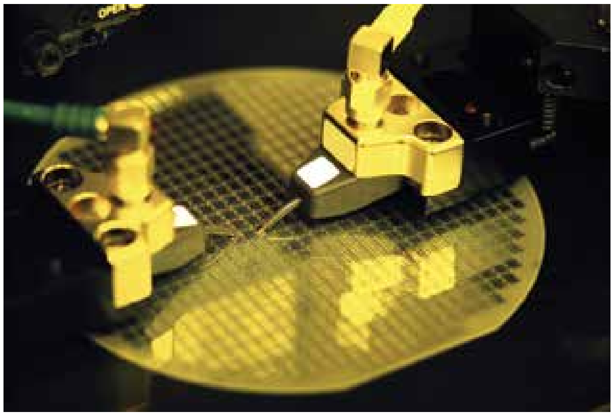
Life Sciences - Cellular Therapeutics

With the emergence of cellular therapeutics, the mSR provides a high precision, miniature means of picking and placing cells for cell therapy instruments. These instruments require highly repeatable positioning to pick cells of interest and incubate them for future cell based therapies.

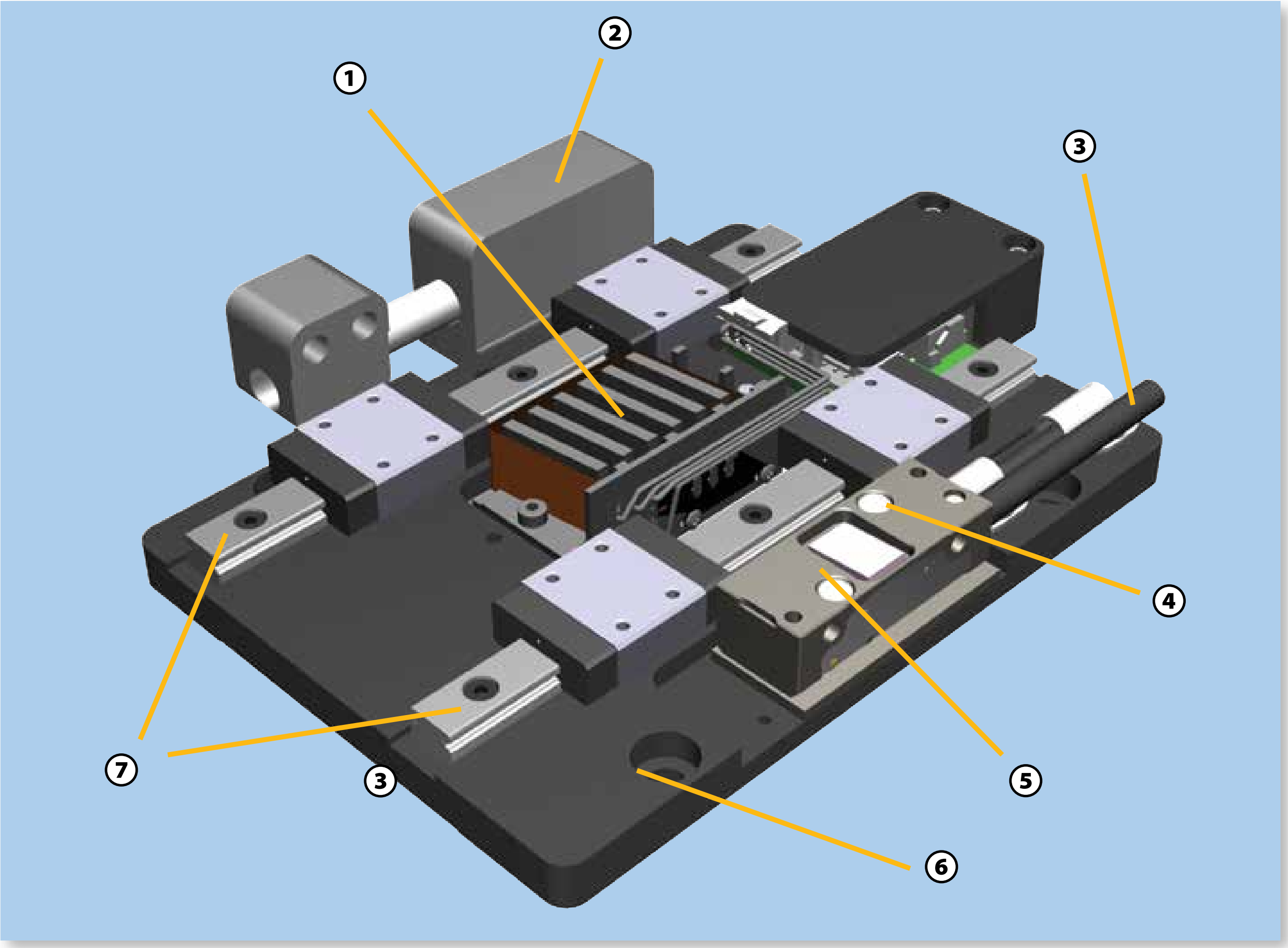
Life Sciences - Digital Pathology

Miniature packaging, high precision performance, and quick settling times make the mSR an optimum solution for imaging instruments used in digital pathology. With limited wear components the mSR is a durable stage that will minimize the risk of machine downtime.

Semiconductor Handling and Metrology



Given the combination of its superior geometric performance and miniature packaging, the mSR series positioner is ideal for semiconductor handling and metrology applications. Regardless of whether you examining features on the micro or nano-scale – the mSR can be adapted to meet the need with its wide array of encoder options. The mSR also offers a stroke scalable mechanical solution with standard designs up to 500 mm.



① **Center Driven Ironcore Linear Motor**
The mSR80 offers both a 4 and 8 pole ironcore linear motor based upon the application thrust requirements. Each of these motors have been optimized to operate on 48 Volts DC.

② **An Optional Magnetic Counterbalance**
The mSR80 with 25 mm stroke has an optional magnetic counterbalance that can be used for Z axis applications. The magnetic counter balance is a more robust solution when compared to spring or pneumatic driven alternatives.

③ **High Flex Cabling**
The mSR uses high flex cabling as standard to ensure maximum life of the stage regardless of whether it's integrated into a multi or single axis system.

④ **Integrated and Adjustable Home and Limit Sensing**
Home and limit sensors have been integrated into the mSR80 encoder read head, and signals are passed through the same cable, minimizing the amount of cables requiring cable management

⑤ **Five Different Linear Encoder Technologies**
The mSR80 provides maximum versatility with three different optical encoder resolutions (1, 0.1, and 0.01 micron), an analog sine/cosine option as well as an economical 1 micron magnetic option.

⑥ **Tapped Holes and Dowel Pinning**
The mSR has tapped holes in both the top and base for ease of mounting and dowel pins to ensure repeatable mounting when configuring XY systems made with mSR's.

⑦ **Dual Precision Square Rails**
Two precision aligned square rail bearings support the payload and provide superior straightness and flatness.

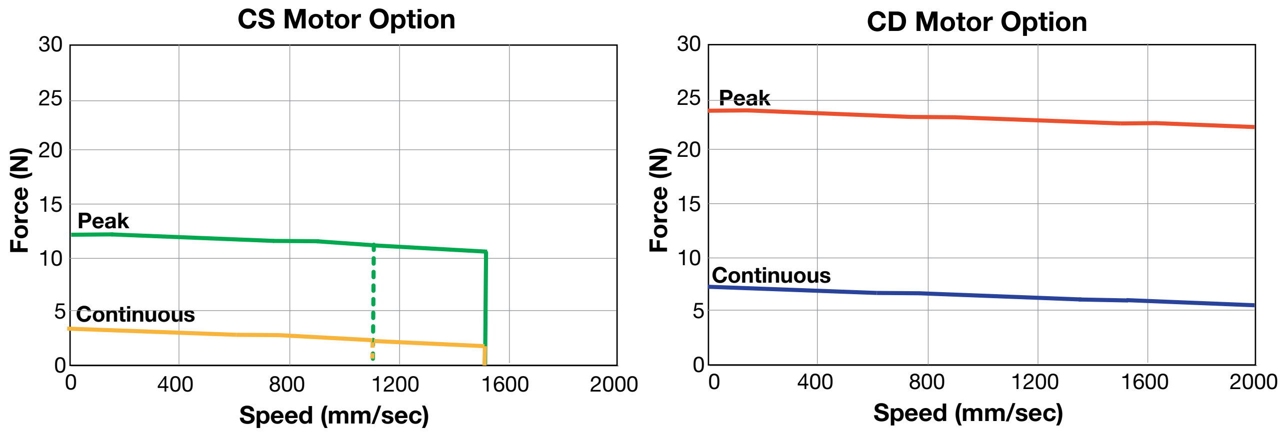
CE and RoHS Compliance
The mSR conforms to both CE and RoHS directives as standard.

SPECIFICATIONS

The mSR series of miniature, dual square rail guided, linear motor positioners have been engineered to deliver a combination of modularity, flexibility, and performance in an extremely compact package.

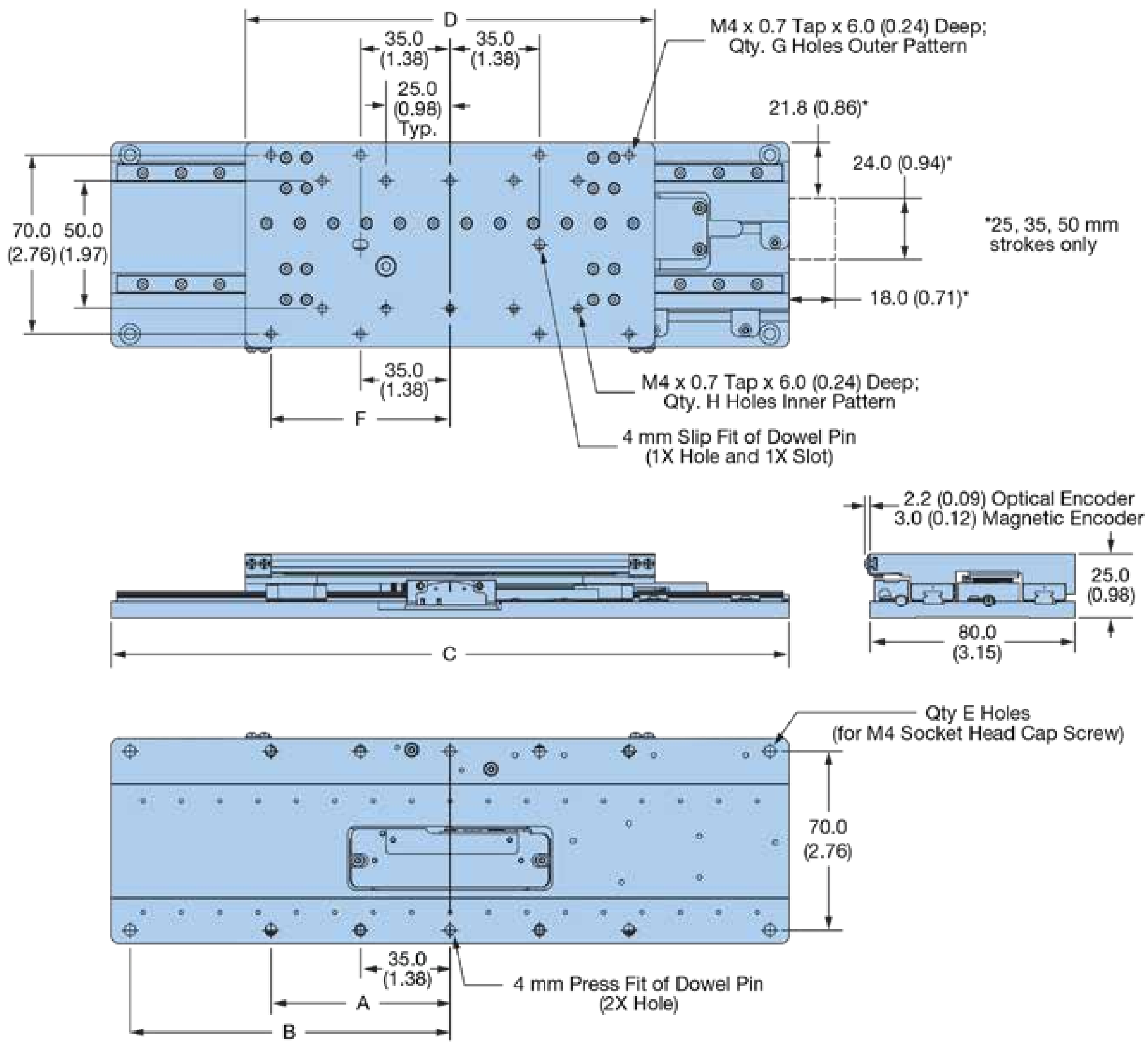
Specification		Units	Travel (mm) 25	35	50	100	150
Max. Load		kg (lb)	4 (9)	4 (9)	8 (18)	8 (18)	8 (18)
Peak Thrust		N (lb)	12 (2.7)	12 (2.7)	24 (5.4)	24 (5.4)	24 (5.4)
Continuous Thrust		N (lb)	4 (0.9)	4 (0.9)	8 (1.8)	8 (1.8)	8 (1.8)
Duty Cycle (Acceleration and Load Dependent)		%			100		
Acceleration (Unloaded)		G's			3		
Straightness & Flatness	**Standard Grade**	µm	±6	±6	±8	±10	±15
	Precision Grade		±3	±3	±4	±5	±10
Carriage Mass		kg	0.2365	0.2365	0.3065	0.4115	0.519
Stage Mass		kg	0.525	0.5815	0.7395	1.0665	1.403
Magnetic Encoder – 1 Micron Resolution							
Max. Speed		mm/s	1100	1500	2000	2000	2000
Bi-Directional Repeatability		µm			±5.0		
Positional Accuracy		µm	40	40	60	80	80
Optical Encoder – 1 Micron Resolution							
Max. Speed		mm/s	1100	1500	2000	2000	2000
Bi-Directional Repeatability		µm			±2.0		
Positional Accuracy		µm	9	9	9	11	13
Positional Accuracy (Slope Corrected)		µm	5	6	6	6	7
Optical Encoder – 0.1 Micron Resolution							
Max. Speed		mm/s	300	300	300	300	300
Bi-Directional Repeatability		µm			±0.3		
Positional Accuracy		µm	8	8	8	10	12
Positional Accuracy (Slope Corrected)		µm	4	5	5	5	6
Optical Encoder – 0.01 Micron Resolution							
Max. Speed		mm/s	30	30	30	30	30
Bi-Directional Repeatability		µm			±0.1		
Positional Accuracy		µm	8	8	8	10	12
Positional Accuracy (Slope Corrected)		µm	4	5	5	5	6

mSR80 Force/Speed Performance



DIMENSIONS

Dimensions – mm (in)



Dimensions – mm (in)

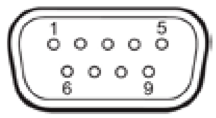
Travel (mm)	A	B	C	D	Qty. E	F	Qty. G	Qty. H
25	—	—	110 (4.33)	80	4	—	4	6
35	—	—	120 (4.72)	80	4	—	4	6
50	70 (2.76)	—	165 (6.50)	110 (4.33)	8	—	8	6
100	70 (2.76)	125 (4.92)	265 (10.43)	160 (6.30)	12	70 (2.76)	8	10
150	100 (3.94)	175 (6.89)	365 (14.37)	210 (8.27)	12	100 (3.94)	8	14

OPTIONS & ACCESSORIES

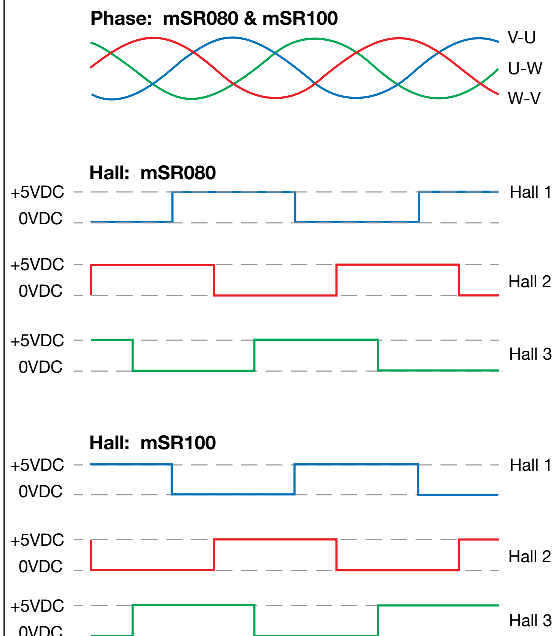
mSR Motor Information

Motor Specifications	Units	mSR80 4 Pole (CS Option)	mSR80 8 Pole (CD Option)	mSR100 3 Pole (LS Option)	mSR100 5 Pole (LD Option)
Magnetic Pitch	mm	13	13	40	40
Continuous Force [1]	N	4	8	11	16.7
Peak Force	N	12	24	33	50
Continuous Current [1]	A(rms)	0.8	1.6	1.2	2.18
Peak Current [2, 3]	A(rms)	2.4	4.8	3.5	6.5
Voltage Constant [2, 3]	Volts/m/s	4.5	4.5	7.7	6.3
Force Constant [2]	N/A(rms)	5.51	5.51	9.4	7.65
Resistance [2]	Ohms	8.8	4.3	6.3	2.82
Inductance [4]	mH	2.4	1.6	1	0.5
Max Bus Voltage	VDC	48	48	48	48
Rated/Max Winding Temperature	Degrees C	25/95	25/95	25/125	25/125
Thermal Resistance (winding to case)	C/Watt	3.68	1.32	1.6	0.92
Thermal Resistance (case to ambient)	C/Watt	3.16	2.08	3.9	2.64
Winding Thermal Time Constant	Minutes	0.5	0.5	1.3	0.8
Motor Thermal Time Constant	Minutes	0.8	0.8	15	10

[1] @ 25° C ambient
[2] Measured line to line
[3] Value is measured peak of sine
[4] ±30% Line-to-Line, induction bridge measurement @ 1 Khz



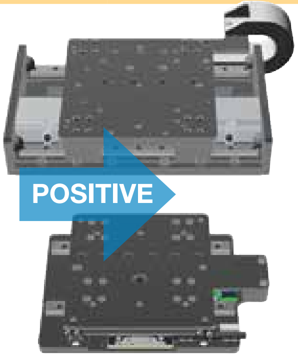
Phase/Encoder/Hall Signals While Moving in the Positive Direction



Note: For incremental signals B rising edge signal leads rising edge of A

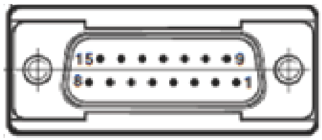
Motor and Hall Wiring

Function	Color	Pin #
Motor Phase U	Red	1
Motor Phase V	Brown	2
Motor Phase W	Orange	3
PE Ground	Green/Yellow	4
Hall Power (+5 Volts DC)	Black	5
Hall Ground	White	6
Hall 1	Yellow	7
Hall 2	Blue	8
Hall 3	Green	9



Optical Encoder

Function	Signal	Pin #
Power	5 Volts DC	8
	Ground	2, 9
Incremental Signals	A+	14
	A-	6
	B+	13
	B-	5
Reference Mark	Z+	12
	Z-	4
Limits	Positive Limit	11
	Negative Limit	10
Setup	(Used in installation)	1
Error Output	NPN	3



Sine Cosine Encoder

Function	Signal	Pin #
Power	5 Volts DC	4, 5
	0 Volts DC	12, 13
Incremental Signals	Cosine +	9
	Cosine -	1
	Sine +	10
	Sine -	2
Reference Mark	Z+	3
	Z-	11
Limits	Positive Limit	7
	Negative Limit	8
Setup	(Used in installation)	6
Remote Calibration	NPN	14

Magnetic Encoder

Function	Signal	Pin #
Power	5 Volts DC	8
	Ground	9
Incremental Signals	A +	14
	A -	6
	B +	13
	B -	5
Reference Mark	Z+	12
	Z-	4
Limits	Positive Limit	11
	Negative Limit	10
Home	NPN	2
Error Output	NPN	3

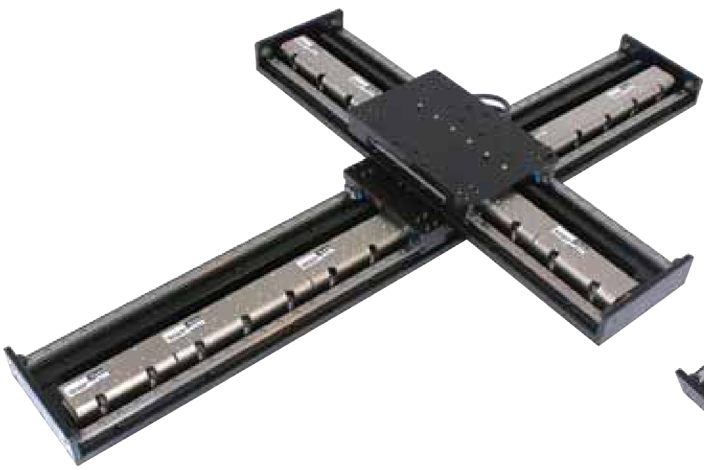
BiSS-C Absolute Encoder (mSR100 only)

Function	Signal	Color
Power	5 Volts DC	Brown
	Ground	Green
		White
Serial Communications	MA+	Violet
	MA-	Yellow
	SLO+	Grey
	SLO-	Pink
Shield	Innersheild	-
	Outer	Case

Multi-axis Systems

The mSR series was designed to be highly modular, such that it can easily be configured into multi-axis systems made out of other mSR or MX80L positioners as the mSR80 uses the same bolt pattern. Since the entire mSR series was designed with this common hole pattern in mind, X-Y systems can be developed without the need for an additional transition plate.

Example mSR80 X-Y system

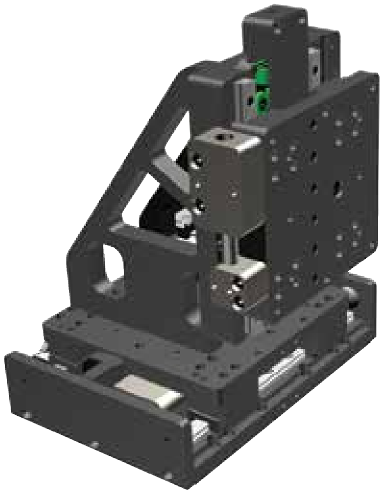


mSR100 X-Y standard orientation

mSR100 X-Y carriage-to-carriage direct mount orientation

The mSR100 was designed such that it can be configured into two different X-Y orientations: one reflecting a standard X-Y design and the other with the carriages mounted directly to one another. If you choose to develop your machine with the carriage-to-carriage approach, the Y axis cable carrier is eliminated.

The mSR100 is also populated with mounting holes to mount an mSR80 directly to it so that X-Y, X-Z or X-Y-Z systems can be created with any combination of the mSR80 and mSR100. Pictured here is the mSR80 with a standard Z bracket.



mSR100 X with mSR80 Z including magnetic counterbalance

Z-Axis Brackets

mSR80 & mSR100	Part Number
25, 35, and 50 mm	002-2238-01
100 & 150 mm	002-2240-01

ORDERING INFORMATION
mSR80

Fill in an order code from each of the numbered fields to create a complete part number

Order Example:

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑫
MSR	080	L	050	P	CD	E3	H1	L1	CM01	X0

① **Series**

MSR Series

② **Size (width in mm)**

080 80 mm wide profile

③ **Drive Train**

L Linear Motor Drive

④ **Stroke Length (mm)**

025 25 mm
035 35 mm
050 50 mm
100 100 mm
150 150 mm

⑤ **Grade**

P Precision
S Standard

⑥ **Motor**

CS Ironcore, single (25 and 35 mm travels only)
CD Ironcore, double (50, 100, and 150 mm travels only)

⑦ **Encoder**

E1 1µm optical incremental*
E2 0.1µm optical incremental*
E3 0.01µm optical incremental*
SC Sine/Cosine*
M1 1µm magnetic incremental**

*Available on precision grade only
**Available on standard grade only

⑧ **Home Sensor**

H1 Home Sensor (M1 Option), Index Mark (E1, E2, E3, and SC Options)

⑨ **Limit Sensor**

L1 End-of-travel limit sensors

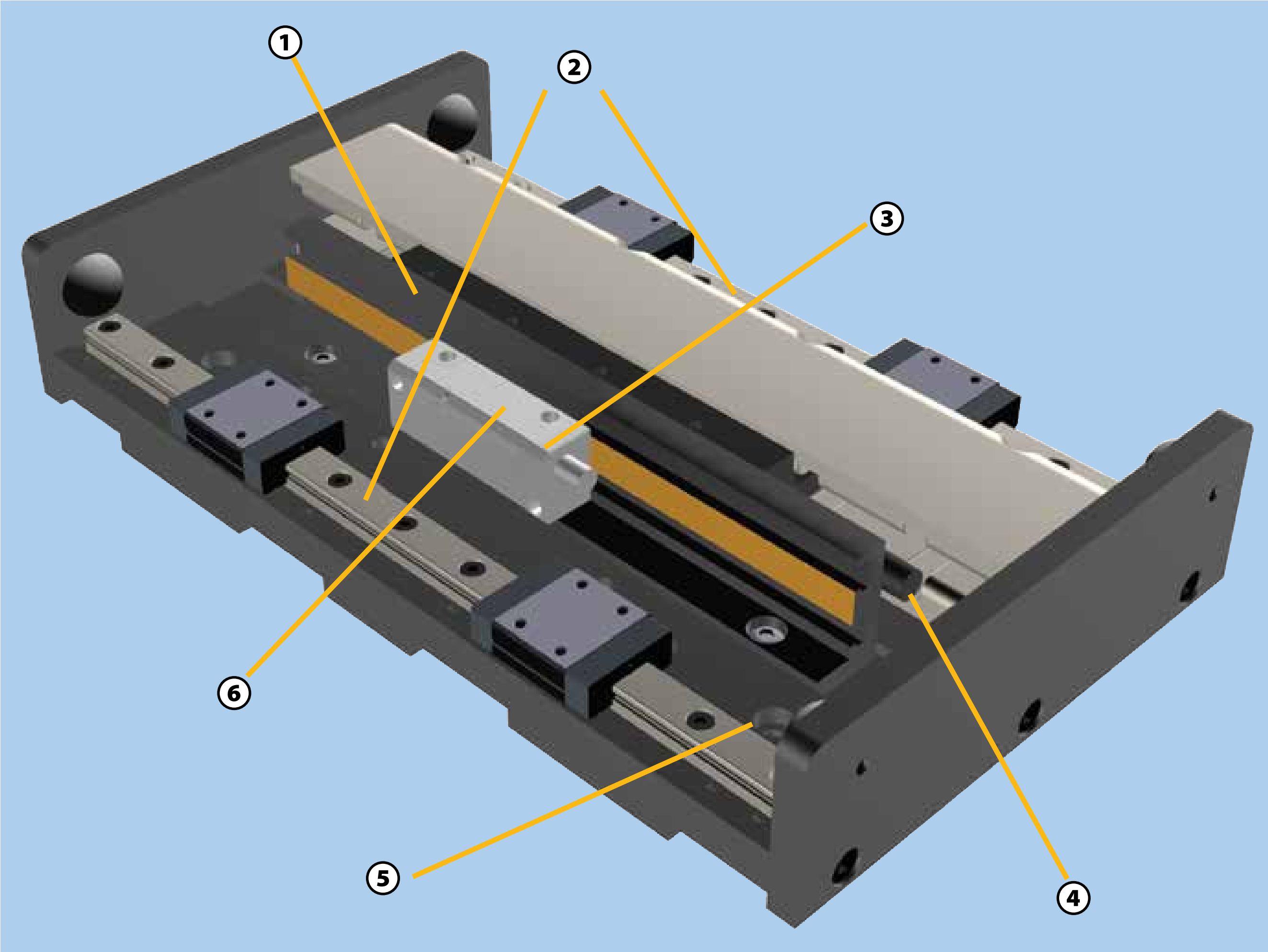
⑩ **Cable Options**

CM01 No cable management, 1 meter
CM03 No cable management, 3 meter

⑪ **Other Options**

X0 No counter balance
X1 Magnetic counterbalance* (0.5 N)
X2 Magnetic counterbalance* (2.0 N)
X3 Magnetic counterbalance* (3.0 N)
X4 Magnetic counterbalance* (3.5 N)
X5 Magnetic counterbalance* (4.3 N)
X6 Magnetic counterbalance* (6.3 N)

*Available on 25 mm stroke only



1 **Center Driven Ironless Linear Motor**
The mSR100 offers both a 3 and 5 pole ironless linear motor (mL18) — space based upon the application thrust requirements. Each of these motors have been optimized to operate on 48 Volts DC.

2 **Dual Precision Square Rails**
Two precision aligned square rail bearings to support the payload and provide superior straightness and flatness.

3 **Integrated Home and Limit Sensing**
Home and limit sensors have been integrated into the mSR100 encoder read head, and signals are passed through the same cable, minimizing the amount of cables requiring cable management.

4 **High Flex Cabling**
The mSR uses high flex cabling as standard to ensure maximum life of the stage regardless of whether it's integrated into a multi or single axis system.

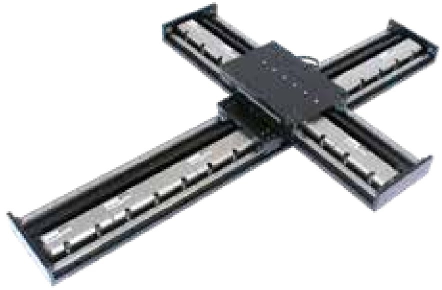
5 **Tapped Holes and Dowel Pinning**
The mSR has tapped holes in both the top and base for ease of mounting, and dowel pins to ensure repeatable mounting when configuring XY systems made with mSR's.

6 **Six Different Linear Encoder Technologies**
The mSR100 provides maximum versatility with three different optical encoder resolutions (1, 0.1, and 0.01 micron), an analog sine/cosine option as well as an economical 1 micron magnetic option. The mSR100 also offers a BiSS-C, 0.05 micron absolute encoder option for application that require constant positional feedback.

CE and RoHS Compliance
The mSR conforms to both CE and RoHS directives as standard.

SPECIFICATIONS

The mSR series of miniature, dual square rail guided, linear motor positioners have been engineered to deliver a combination of modularity, flexibility, and performance in an extremely compact package.

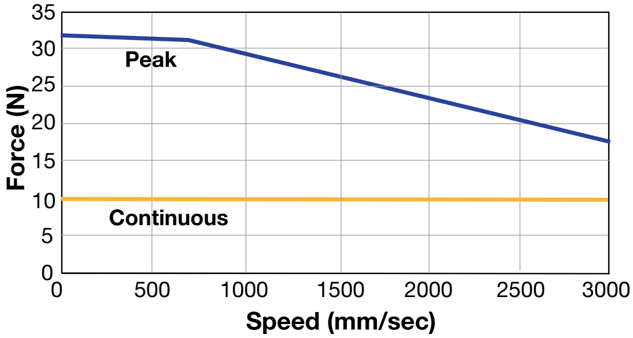


Specification	Units	Travel (mm) 25 (LS)	50 (LS)	50 (LD)	100 (LS)	100 (LD)	150 (LS)	150 (LD)	200 (LS)	200 (LD)	250 (LS)	250 (LD)
Max. Load	kg (lb)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)
Peak Thrust	N (lb)	33 (7.4)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)
Continuous Thrust	N (lb)	11 (2.5)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)
Duty Cycle (Acceleration and Load Dependent)	%	100										
Acceleration (Unloaded)	G's	3										

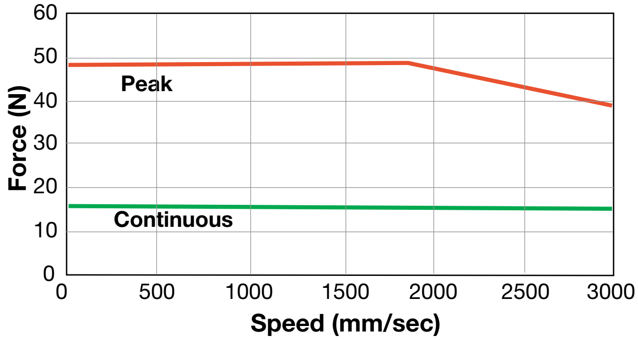
Specification		Units	Travel (mm) 300 (LS)	300 (LD)	350 (LS)	350 (LD)	400 (LS)	400 (LD)	450 (LS)	450 (LD)	500 (LS)	500 (LD)
Max. Load		kg (lb)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)
Peak Thrust		N (lb)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)
Continuous Thrust		N (lb)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)
Duty Cycle (Acceleration and Load Dependent)		%	100									
Acceleration (Unloaded)		G's	3									
Straightness & Flatness	**Standard Grade**	µm	±10	±10	±12	±12	±16	±16	±20	±20	±20	±20
	Precision Grade	µm	±5	±5	±6	±6	±8	±8	±10	±10	±12	±12
Carriage Mass		kg	0.34	0.46	0.34	0.46	0.34	0.46	0.34	0..46	0.34	0.46
Stage Mass		kg	2.47	2.82	2.7	3.05	2.93	3.37	3.25	3.6	3.48	3.84

mSR100 Force/Speed Performance

LS Motor Option



LD Motor Option



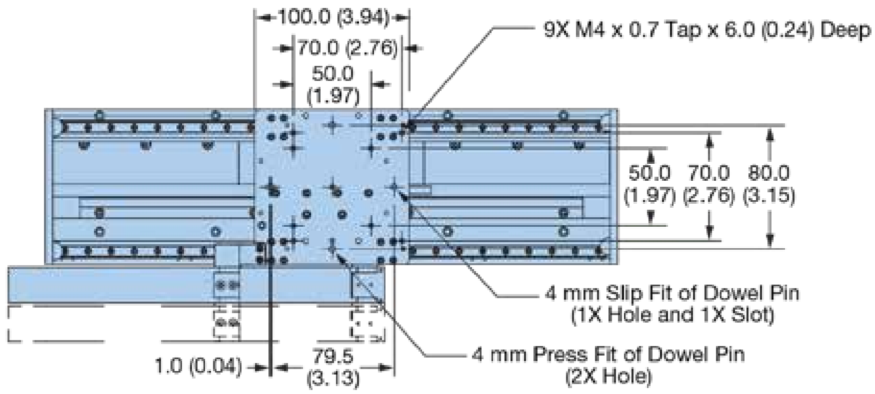
mSR100 Specifications (Travel & Encoder Dependent)

Specification	Units	25 (LS)	50 (LS)	50 (LD)	100 (LS)	100 (LD)	150 (LS)	150 (LD)	200 (LS)	200 (LD)	250 (LS)	250 (LD)
		Travel (mm)										
Magnetic Encoder – 1 Micron Resolution												
Max. Speed	mm/s	1100	1500	3000	3000	3000	3000	3000	3000	3000	3000	3000
Bi-directional Repeatability	µm	±5.0										
Positional Accuracy	µm	40	40	40	80	80	80	80	100	100	100	100
Optical Encoder – 1 Micron Resolution												
Max. Speed	mm/s	1100	1500	3000	3000	3000	3000	3000	3000	3000	3000	3000
Bi-directional Repeatability	µm	±2.0										
Positional Accuracy	µm	10	10	10	10	10	10	10	12	14	14	14
Positional Accuracy (Slope Corrected)	µm	6	6	6	6	6	7	7	7	7	8	8
Optical Encoder – 0.1 Micron Resolution												
Max. Speed	mm/s	300	300	300	300	300	300	300	300	300	300	300
Bi-directional Repeatability	µm	±0.4										
Positional Accuracy	µm	9	9	9	9	9	9	9	11	11	13	13
Positional Accuracy (Slope Corrected)	µm	5	5	5	5	5	6	6	6	6	7	7
Optical Encoder – 0.01 Micron Resolution												
Max. Speed	mm/s	30	30	30	30	30	30	30	30	30	30	30
Bi-directional Repeatability	µm	±0.2										
Positional Accuracy	µm	8	8	8	8	8	8	8	10	10	12	12
Positional Accuracy (Slope Corrected)	µm	4	4	4	4	4	5	5	5	5	6	6
BiSS-C Absolute Encoder – 0.05 Micron Resolution												
Max. Speed	mm/s	1100	1500	3000	3000	3000	3000	3000	3000	3000	3000	3000
Bi-directional Repeatability	µm	±0.4										
Positional Accuracy	µm	9	9	9	9	9	9	9	11	11	13	13
Positional Accuracy (Slope Corrected)	µm	5	5	5	5	5	6	6	6	6	7	7

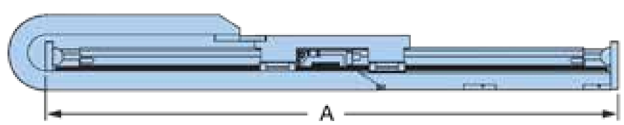
mSR100 Specifications (Travel & Encoder Dependent)

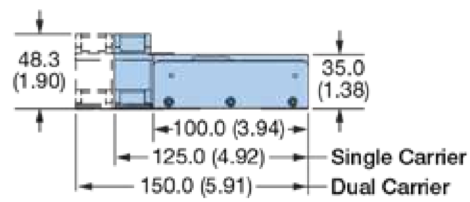
Specification	Units	Travel (mm) 300 (LS)	300 (LD)	350 (LS)	350 (LD)	400 (LS)	400 (LD)	450 (LS)	450 (LD)	500 (LS)	500 (LD)
Magnetic Encoder – 1 Micron Resolution											
Max. Speed	mm/s	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Bi-directional Repeatability	µm	±5.0									
Positional Accuracy	µm	100	100	100	100	100	100	100	100	100	100
Optical Encoder – 1 Micron Resolution											
Max. Speed	mm/s	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Bi-directional Repeatability	µm	±2.0									
Positional Accuracy	µm	16	16	18	18	20	20	22	22	24	24
Positional Accuracy (Slope Corrected)	µm	8	8	9	9	9	9	10	10	10	10
Optical Encoder – 0.1 Micron Resolution											
Max. Speed	mm/s	300	300	300	300	300	300	300	300	300	300
Bi-directional Repeatability	µm	±0.4									
Positional Accuracy	µm	15	15	17	17	19	19	21	21	23	23
Positional Accuracy (Slope Corrected)	µm	7	7	8	8	8	8	9	9	9	9
Optical Encoder – 0.01 Micron Resolution											
Max. Speed	mm/s	30	30	30	30	30	30	30	30	30	30
Bi-directional Repeatability	µm	±0.2									
Positional Accuracy	µm	14	14	16	16	18	18	20	20	22	22
Positional Accuracy (Slope Corrected)	µm	6	6	7	7	7	7	8	8	8	8
BiSS-C Absolute Encoder – 0.05 Micron Resolution											
Max. Speed	mm/s	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Bi-directional Repeatability	µm	±0.4									
Positional Accuracy	µm	15	15	17	17	19	19	21	21	23	23
Positional Accuracy (Slope Corrected)	µm	7	7	8	8	8	8	9	9	9	9

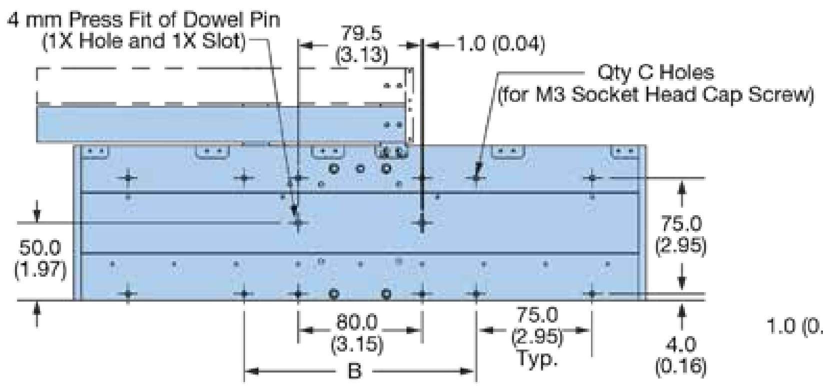
DIMENSIONS

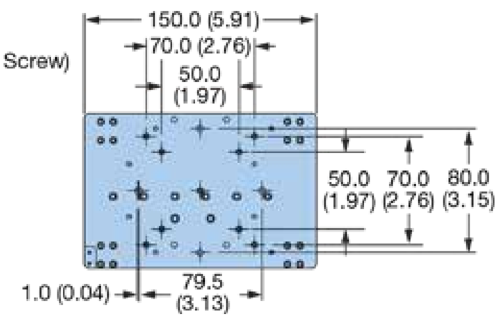


Dimensions – mm (in)









LD Option

Dimensions – mm (in)

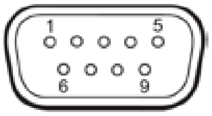
Travel (mm) LS Option	LD Option	A	B	Qty. C
25	**–**	145 (5.71)	100 (3.94)	8
50	**–**	170 (6.69)	125 (4.92)	8
100	**50**	220 (8.66)	150 (5.91)	8
150	**100**	270 (10.63)	200 (7.87)	8
200	**150**	320 (12.60)	125 (4.92)	8
250	**200**	370 (14.57)	150 (5.91)	12
300	**250**	420 (16.54)	200 (7.87)	12
350	**300**	470 (18.50)	125 (4.92)	12
400	**350**	520 (20.47)	150 (5.91)	12
450	**400**	570 (22.44)	200 (7.87)	16
500	**450**	620 (24.41)	125 (4.92)	16
–	**500**	670 (26.38)	150 (5.91)	16

OPTIONS & ACCESSORIES

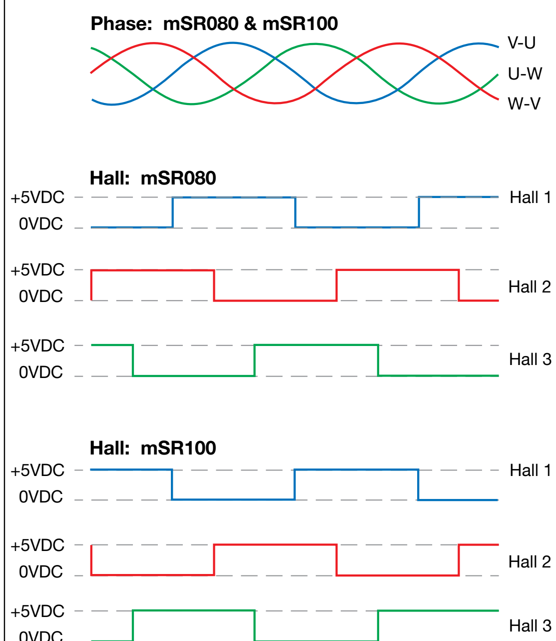
mSR Motor Information

Motor Specifications	Units	mSR80 4 Pole (CS Option)	mSR80 8 Pole (CD Option)	mSR100 3 Pole (LS Option)	mSR100 5 Pole (LD Option)
Magnetic Pitch	mm	13	13	40	40
Continuous Force [1]	N	4	8	11	16.7
Peak Force	N	12	24	33	50
Continuous Current [1]	A(rms)	0.8	1.6	1.2	2.18
Peak Current [2, 3]	A(rms)	2.4	4.8	3.5	6.5
Voltage Constant [2, 3]	Volts/m/s	4.5	4.5	7.7	6.3
Force Constant [2]	N/A(rms)	5.51	5.51	9.4	7.65
Resistance [2]	Ohms	8.8	4.3	6.3	2.82
Inductance [4]	mH	2.4	1.6	1	0.5
Max Bus Voltage	VDC	48	48	48	48
Rated/Max Winding Temperature	Degrees C	25/95	25/95	25/125	25/125
Thermal Resistance (winding to case)	C/Watt	3.68	1.32	1.6	0.92
Thermal Resistance (case to ambient)	C/Watt	3.16	2.08	3.9	2.64
Winding Thermal Time Constant	Minutes	0.5	0.5	1.3	0.8
Motor Thermal Time Constant	Minutes	0.8	0.8	15	10

[1] @ 25° C ambient
[2] Measured line to line
[3] Value is measured peak of sine
[4] ±30% Line-to-Line, induction bridge measurement @ 1 Khz



Phase/Encoder/Hall Signals While Moving in the Positive Direction



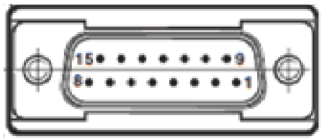
Note: For incremental signals B rising edge signal leads rising edge of A

Motor and Hall Wiring

Function	Color	Pin #
Motor Phase U	Red	1
Motor Phase V	Brown	2
Motor Phase W	Orange	3
PE Ground	Green/Yellow	4
Hall Power (+5 Volts DC)	Black	5
Hall Ground	White	6
Hall 1	Yellow	7
Hall 2	Blue	8
Hall 3	Green	9

Optical Encoder

Function	Signal	Pin #
Power	5 Volts DC	8
	Ground	2, 9
Incremental Signals	A+	14
	A-	6
	B+	13
	B-	5
Reference Mark	Z+	12
	Z-	4
Limits	Positive Limit	11
	Negative Limit	10
Setup	(Used in installation)	1
Error Output	NPN	3



Sine Cosine Encoder

Function	Signal	Pin #
Power	5 Volts DC	4, 5
	0 Volts DC	12, 13
Incremental Signals	Cosine +	9
	Cosine -	1
	Sine +	10
	Sine -	2
Reference Mark	Z+	3
	Z-	11
Limits	Positive Limit	7
	Negative Limit	8
Setup	(Used in installation)	6
Remote Calibration	NPN	14

Magnetic Encoder

Function	Signal	Pin #
Power	5 Volts DC	8
	Ground	9
Incremental Signals	A +	14
	A -	6
	B +	13
	B -	5
Reference Mark	Z+	12
	Z-	4
Limits	Positive Limit	11
	Negative Limit	10
Home	NPN	2
Error Output	NPN	3

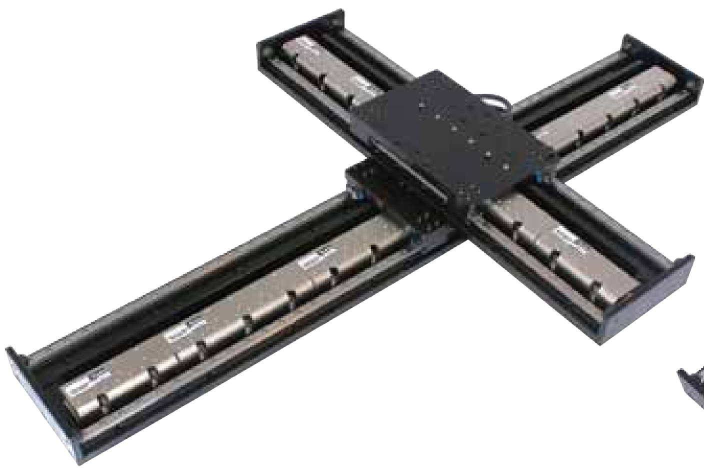
BiSS-C Absolute Encoder (mSR100 only)

Function	Signal	Color
Power	5 Volts DC	Brown
	Ground	Green
		White
Serial Communications	MA+	Violet
	MA-	Yellow
	SLO+	Grey
	SLO-	Pink
Shield	Innersheild	-
	Outer	Case

Multi-axis Systems

The mSR series was designed to be highly modular, such that it can easily be configured into multi-axis systems made out of other mSR or MX80L positioners as the mSR80 uses the same bolt pattern. Since the entire mSR series was designed with this common hole pattern in mind, X-Y systems can be developed without the need for an additional transition plate.

Example mSR80 X-Y system

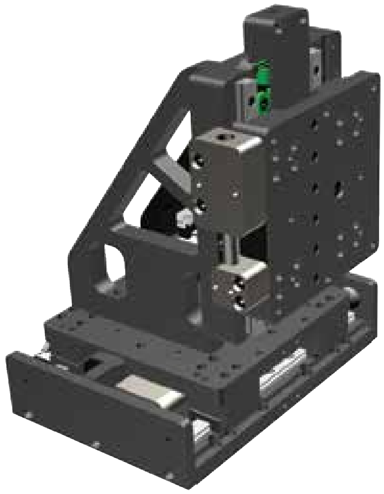


mSR100 X-Y standard orientation

mSR100 X-Y carriage-to-carriage direct mount orientation

The mSR100 was designed such that it can be configured into two different X-Y orientations: one reflecting a standard X-Y design and the other with the carriages mounted directly to one another. If you choose to develop your machine with the carriage-to-carriage approach, the Y axis cable carrier is eliminated.

The mSR100 is also populated with mounting holes to mount an mSR80 directly to it so that X-Y, X-Z or X-Y-Z systems can be created with any combination of the mSR80 and mSR100. Pictured here is the mSR80 with a standard Z bracket.



mSR100 X with mSR80 Z including magnetic counterbalance

Z-Axis Brackets

mSR80 & mSR100	Part Number
25, 35, and 50 mm	002-2238-01
100 & 150 mm	002-2240-01

ORDERING INFORMATION
mSR100

Fill in an order code from each of the numbered fields to create a complete part number

Order Example:

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
MSR	100	L	050	P	LS	E3	H1	L1	CM03	X0

① **Series**

MSR Series

② **Size (width in mm)**

100 100 mm wide profile

③ **Drive Train**

L Linear Motor Drive

④ **Stroke Length (mm)**

025 25 mm
050 50 mm
100 100 mm
150 150 mm
200 200 mm
250 250 mm
300 300 mm
350 350 mm
400 400 mm
450 450 mm
500 500 mm

⑤ **Grade**

P Precision (Optical, Sine/Cosine, and BiSS-C Absolute only)
S Standard (Magnetic Encoder only)

⑥ **Motor**

LS Ironless, single
LD Ironless, double (50 to 500 mm stroke only)

⑦ **Encoder**

E1 1μ optical incremental
E2 0.1μ optical incremental
E3 0.01μ optical incremental
SC Sine/Cosine
M1 1μ magnetic incremental
R1 0.05μ BiSS-C Absolute

⑧ **Home Sensor**

H0 No home sensor (BiSS-C Absolute Only)
H1 Home Sensor (M1 Option), Index Mark (E1, E2, E3, and SC Options)

⑨ **Limit Sensor**

L0 No limit sensor (BiSS-C Absolute Only)
L1 End-of-travel limit sensors (Magnetic, Optical and Sine/Cosine only)

⑩ **Cable Options**

CM03 No cable management, 3 meter
CM13 Single cable carrier, 3 meter
CM23 Double cable carrier, 3 meter
*Cable length is given as length from carriage, it does not take into account any reduction in length due to cable managment

⑫ **Other Options**

X0 No options

Miniature Positioners

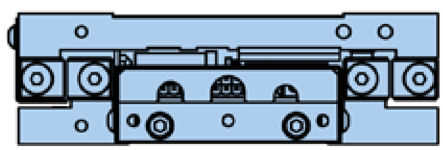
MX80L
Linear Servo Motor Driven Stages

High performance in a small package

- Miniature size
- Fast settling
- Submicron precision
- High velocity (2 m/sec.)
- Multi-axis platform

Attributes

- Low profile miniature size - (25 mm high X 80 mm wide)
- Linear servo motor drive
- Six linear encoder resolutions (0.01 μm to 5.0 μm)
- 25, 50, 100, 150 and 200 mm travels
- Cross Roller bearing (zero cage creep design)
- Precision or standard grade
- Cleanroom and low ESD options
- Fully adjustable home and limit sensors
- Dowel holes for repeatable mounting of payload
- Master reference surface to travel path
- “Plug-in” intelligent drive
- Pneumatic z-axis counterbalance
- No moving cables



MX80L

MX80L Table

Duty Cycle	Max Acceleration	Max Load	Max Travel	Peak Force	Repeatability (+/-)
100%	5G	8KG	200mm	24N	0.4μm

High Performance in a Small Package

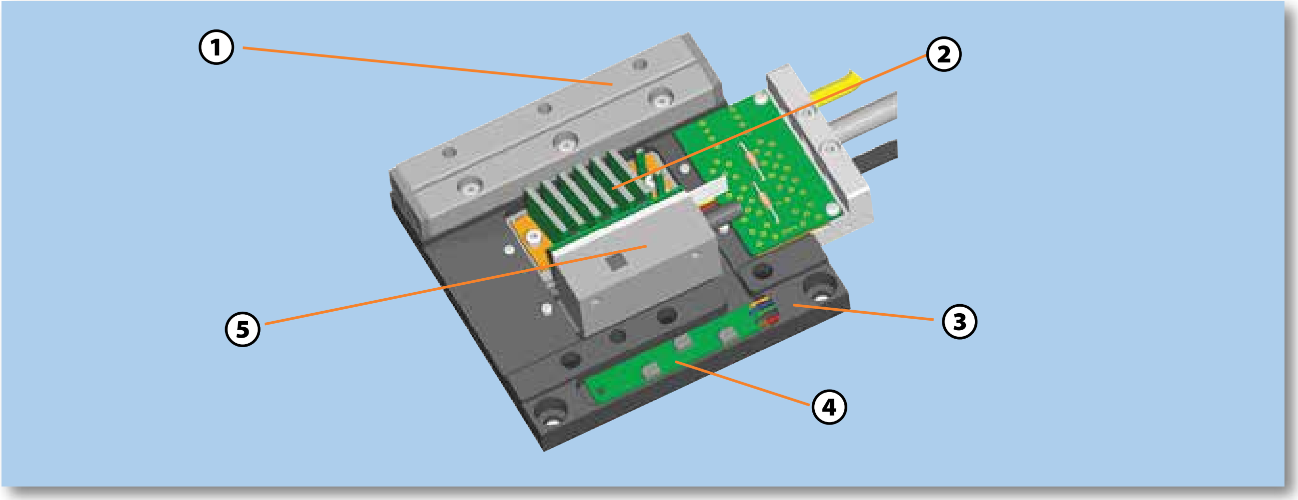
Miniaturization of fiber optics, photonics, electronics and biomedical processes has driven the need for smaller and more efficient positioners. Parker’s MX80 miniature stage, the smallest linear servomotor driven positioner in the industry, is loaded with high-performance features for both rapid linear translation and precise positioning of lighter loads in small work envelopes.

Designed for today’s 24/7 production demands, the MX80 has redefined “high-throughput automation” in the world of miniature positioners.

While the MX80 is small in size, it is large on performance and reliability. All key components are “built-in” – residing within the body of the stage to provide a clean looking, reliable, unobstructed package.

At the heart of the MX80 is an innovative non-contact linear servo motor (patent pending). This direct drive motor has been optimized for force, speed, and acceleration, to deliver outstanding performance and response. A high-precision non-contact linear encoder provides submicron resolution, repeatability and accuracy.

Selectable resolutions range from 10 nanometers to 5 microns. Precision ground cross roller bearing sets with a “zero cage creep” feature provide extremely smooth, precise linear translation. Digital Hall effect travel limit and home sensors are conveniently designed into the unit for easy adjustment over the entire travel of the stage. Although there are no moving cables, a meter of high-flex cabling is included and wired directly into the units. This high-flex cabling addresses cable flexing concerns associated with the second or third axis in multi-axis system.



① **Cross Roller Bearings**
provide high stiffness and extremely smooth linear translation. A rack and pinion anti-cage creep design within the bearing races prevents cage creep even at 5g acceleration, or with cantilevered loads.

② **Linear Servo Motor**
features a patent pending ironcore design that provides high thrust density for linear acceleration to 5g's and velocities to 2 meters/second. The non-contact design offers long life and clean operation.

③ **Master Reference Surface**
is a feature unique to the MX80 that enables customers to align their process to the actual travel path within microns.

④ **Home/Limit Sensors**
are magnetic sensors completely housed within the body of the stage, and fully adjustable over the entire travel range.

⑤ **Optical Linear Encoders**
are available in six standard resolutions (10 nm, 20 nm, 0.1 µm, 0.5 µm, 1.0 µm, 5.0 mm) and is fully integrated within the body of the stage. The non-contact design offers long life and clean operation.

Zero Cage Creep Feature

High acceleration and smooth translation are both desired attributes in a linear-motor stage. The cross roller bearing system found in the MX80 provides extremely smooth linear translation, and with an anti-cage creep design, operates very well in high acceleration applications. This design employs a rack and pinion feature within the bearing races to eliminate bearing creep. As a result, the MX80 performs well, even at 5g acceleration.

Tooling Features

Innovative tooling features make mounting and alignment much quicker and easier.

- A hardened steel master reference surface is provided along the side of the stage to allow fixturing or other tooling elements to be precisely aligned with the actual travel path.
- Two dowel pin holes are provided on the carriage top and base for repeatable mounting of positioner or tooling.

SPECIFICATIONS

Download 2D & 3D files from www.parker.com/emn/MX80L

The MX80L is a high performance linear servo motor stage designed to meet today's 24/7 production demands requiring rapid-fire positioning of light loads within a small work envelope.

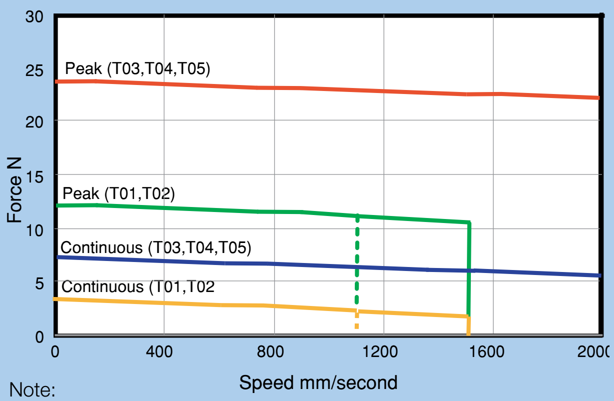
		MX80LP Precision Grade				MX80LS Standard Grade				
Travel (mm)		**25**	**50**	**100**	**150**	**25**	**50**	**100**	**150**	**200**
Normal Load Capacity	kg (lb)	8 (18)	8 (18)	8 (18)	8 (18)	8 (18)	8 (18)	8 (18)	8 (18)	8 (18)
Maximum Acceleration	g-force	4	4	4	3	5	5	5	4	3
Maximum Velocity	mm/sec^2									
5.0 µm		1100	1500	2000	2000	1100	1500	2000	2000	2000
1.0 µm		1100	1500	2000	2000	1100	1500	2000	2000	2000
0.5 µm		1100	1500	1500	1500	1100	1500	1500	1500	1500
0.1 µm		300	300	300	300	300	300	300	300	300
0.02 µm		60	60	60	60	60	60	60	60	60
0.01 µm		30	30	30	30	30	30	30	30	30
Peak Force	N (lb)	12 (2.7)	12 (2.7)	24 (5.4)	24 (5.4)	12 (2.7)	12 (2.7)	24 (5.4)	24 (5.4)	24 (5.4)
Continuous Force	N (lb)	4 (0.9)	4 (0.9)	8 (1.8)	8 (1.8)	4 (0.9)	4 (0.9)	8 (1.8)	8 (1.8)	8 (1.8)
Duty Cycle	%	100	100	100	100	100	100	100	100	100
Straightness & Flatness	µm	4	4	5	6	6	6	10	12	14
Positional Accuracy*	µm									
5.0 µm		13	14	15	15	25	30	35	35	35
1.0 µm		5	6	7	7	15	20	25	25	25
0.5 µm		4	5	6	6	12	15	20	20	20
0.1 µm		3	4	5	5	12	15	20	20	20
0.02 µm		3	4	5	5	12	15	20	20	20
0.01 µm		3	4	5	5	12	15	20	20	20
Bi-directional Repeatability*	µm									
5.0 µm		±10.0	±10.0	±10.0	±10.0	±10.0	±10.0	±10.0	±10.0	±10.0
1.0 µm		±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0
0.5 µm		±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0
0.1 µm		±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.7
0.02 µm		±0.4	±0.4	±0.4	±0.4	±0.4	±0.4	±0.4	±0.4	±0.5
0.01 µm		±0.4	±0.4	±0.4	±0.4	±0.4	±0.4	±0.4	±0.4	±0.5
Unit Mass	g	590	590	1027	1345	475	475	875	1125	1370
Carriage Mass (unloaded)	g	282	282	509	676	213	213	405	537	695

* Notes:

MX80LP Precision Grade:
(1) Measured at the carriage center, 35 mm above the mounting surface @ 20 C with no load. Unit bolted to granite surface, flat to within 1 micron/300 mm.
(2) Total accuracy and bi-directional repeatability over full travel (peak to peak).
(3) Precision grade with slope correction value provided. Consult factory if better accuracy is required.

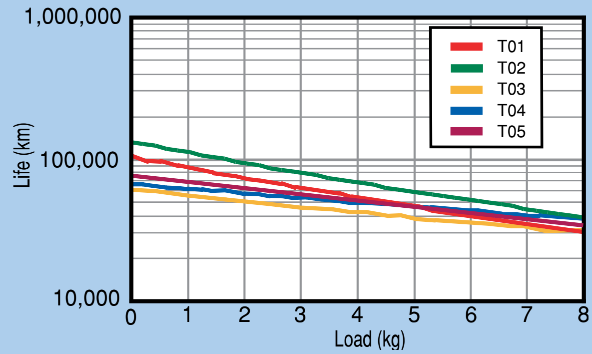
MX80LS Standard Grade:
(1) Total accuracy and bi-directional repeatability over full travel (peak to peak).

Force - Speed

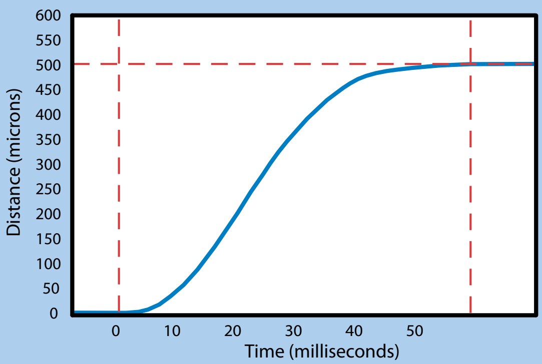


Note:
T01(25 mm travel) is limited to a maximum speed of 1100 mm/sec.
T02 (50 mm) is limited to 1500 (due to limited travel).

Life – Load (Normal Load)

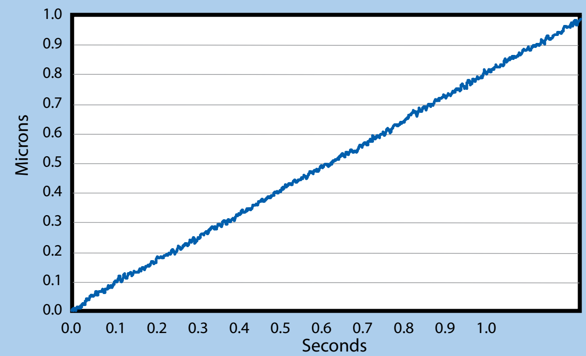


Distance vs Time



Note: 1 Kg payload, 500 micron move:
Move and settle to within 1 micron in 47 milliseconds.

Velocity Ripple



Note: Test were performed using a model MX80LT04D13E8 with a 20 nanometer linear encoder

MX80LP Precision Series

Precision grade models are designed for high-performance applications requiring the highest degree of positioning accuracy. They offer a steel body design with precisely ground mounting surfaces & bearing ways. They include higher resolution linear encoders, and are slope corrected, laser tested and certified for optimum precision.

- **4 g acceleration**
- **Repeatability to ±0.4 μm**
- **Straightness 4 μ**
- **Steel body construction**
- **Precision ground mounting and bearing surfaces**
- **Electroless nickel protective finish**

MX80LS Standard Series

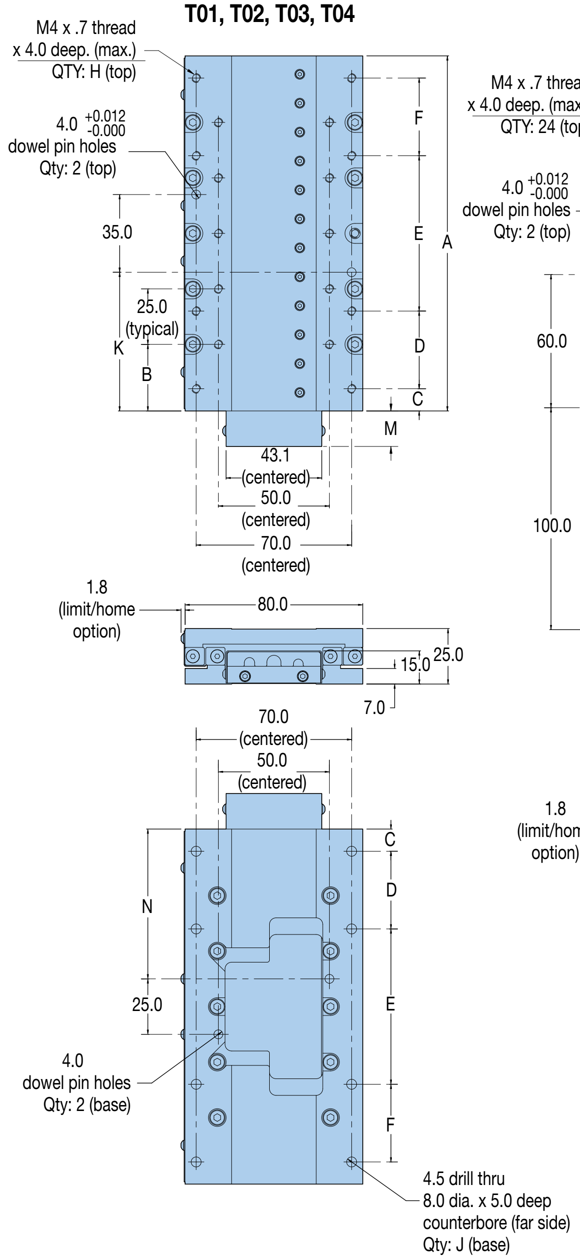
Standard grade units offer a lower cost alternative for applications requiring high throughput performance with less demanding positioning requirements. They are constructed of high alloy aluminum, providing a lighter weight design which can accelerate to 5 g's.

- **5 g acceleration**
- **Repeatability to ±0.8 μm**
- **Straightness 6 μ**
- **Steel body construction**
- **Light weight aluminum body**
- **Low luster black anodize finish**

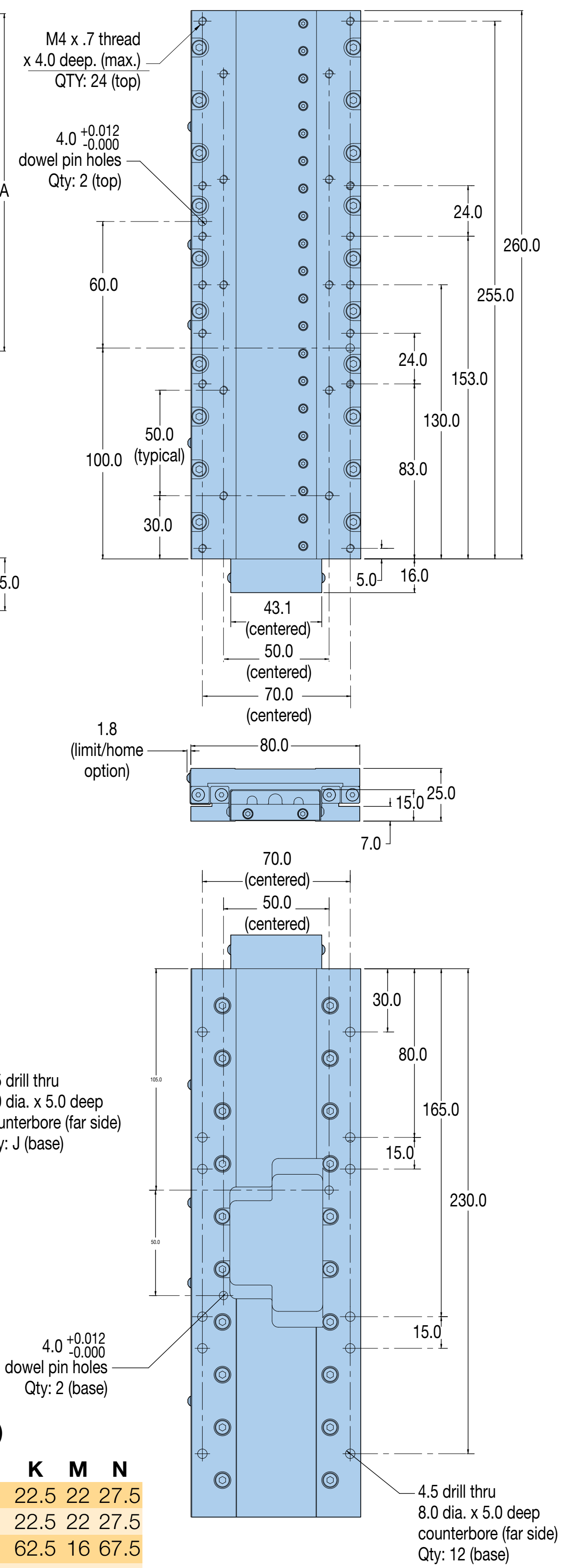
DIMENSIONS

Download 2D & 3D files from www.parker.com/emn/MX80L

T01, T02, T03, T04



T05

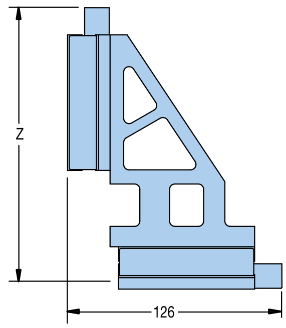


Dimensions (mm)

Travel	A	B	C	D	E	F	H	J	K	M	N
25	80	15	5	70	—	—	10	4	22.5	22	27.5
50	80	15	5	70	—	—	10	4	22.5	22	27.5
100	160	30	10	35	70	35	18	8	62.5	16	67.5
150	210	30	5	65	70	65	22	8	87.5	16	92.5

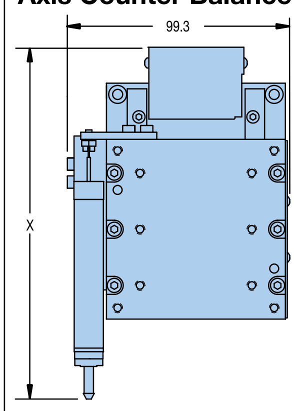
Dimensions – mm (in)

Z-axis



Travel	Dim Z
25	166
50	166
100	251
150	326
200	–

Pneumatic Vertical Axis Counter Balance



Travel	Dim X
25	156.6
50	156.6
100	230.6
150	310.6
200	–

OPTIONS & ACCESSORIES

Simple Configuration Digital Drive Options

All digital drives ordered in the MX80 part number configuration come set up with a motor file including electrical parameters to set continuous and peak currents, current loop compensation values, and default gain settings. Users will have the ability to override these parameters for special application requirements.

Tuning is easy and intuitive for users and is available via a variety of methods. The motor and loading information must be known by the drive to determine the baseline tuning gains. These are simple parameter entries the user can complete with the help of standard Parker supplied front-end software tools. Seamless integration of drives and controls ensures performance matched functionality of the completed motion system.

Servo & Microstepping Drives/Controllers

Parker servo and microstepping drives are the perfect drive solution to be paired with the MX80 family. We are happy to assist with the selection of a suitable drive.

For complete details on drive product features and specifications, please refer to the "Drives & Controllers" section of this catalog.

"Plug & Play" Cable Options

User convenience is high on the list of cable attributes found in the MX80. The high-flex cabling and connectors are reliable, durable and offer easy hook-up for "plug and run" installation.

- **High-flex cables**
- **CE compliant connectors and shielding**
- **CE compliant ferrite beads**
- **Color coded jackets and labeling**
- **Connectors simplify installation**

Encoder Options

Order Codes: E2 E3 E4 E5 E8 E9

A non-contact linear optical encoder provides a quadrature output and offers resolution ranging from 10 nanometer to 5 micron. On the MX80L, the encoder is internal to the stage body. There is no increase to the footprint of the unit and no additional external cabling is required.

Home and Limit Sensor Options

Order Codes: H1 H2 H3 L1 L2 L3

Magnetic home and limit sensors are completely housed within the body of the stage. An innovative design adds functionality without sacrificing geometry. Sensor triggers can be easily adjusted over the travel. The output format is an open collector type capable of sinking up to 50 mA, and be set as N.O. or N.C.

Cleanroom Option

Order Codes: R2 R20

Both precision and standard grade products can be prepared for cleanroom compatibility. Preparation involves material changes, element modification and cleanroom compatible lubricants. MX80L and MX80S stages with this option are class 10 cleanroom compatible. When applying an XY or XYZ combination in a cleanroom environment, moving wires need to be considered – please consult a Parker application engineer.

Low ESD Coating Option

Order Codes: R10 R20

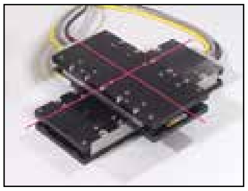
An optional low ESD electroless nickel or Armoloy coating is offered for improved electrically conductivity, providing a low resistance to ground path for electric discharge.

Environmental Protection Option

Both precision and standard grade units have a hard coat protective finish. The precision units have a hard coat (Rc 78) satin chrome finish, and the standard units have a low luster black anodized finish.

System Orthogonality Option

Order Codes: S2 S3 S4 S5 S6



In any multi-axis positioning system, the perpendicular alignment of the axes must be clearly specified. “Degree of orthogonality” defines the perpendicular alignment of axis one to another. The MX80 offers two choices for orthogonality. As standard, perpendicularity is held to within 60 arc seconds. For more exacting applications the MX80 can be optioned for 15 arc seconds orthogonality.

Z-axis Counterbalance Option

Order Codes: X2

A pneumatic Z-axis counterbalance is offered to prevent a sudden load drop if power to the motor is interrupted. A controlled vertical force is applied to the stage top to negate the effect of gravity and achieve equilibrium. A precisely regulated clean air supply of 0 to 60 psi is required for operation. (See Pneumatic Accessory Package.)

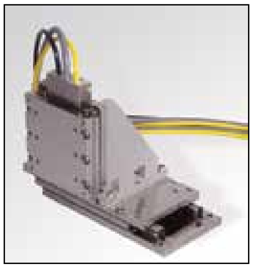
Pneumatic Accessory Package

This accessory is offered for use with the pneumatic counterbalance option. It consists of a pre-filter, a pressure regulator, a coalescing filter, and a precision regulator to precisely regulate air pressure and remove oil, water or debris down to 3 microns.

Part Number: **002-2236-01**

Z-Axis Bracket Accessory

Lightweight aluminum Z-brackets are available for easy construction of vertical axis combinations.



Standard Model Part Numbers:

25 & 50 mm:	**002-2238-01**
100 & 15 0mm:	**002-2240-01**

Low ESD Model Part Numbers:

5 & 50 mm:	**002-2239-01**
100 & 150 mm:	**002-2241-01**

ORDERING INFORMATION

MX80L

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
Order Example:	MX80L	T02	M	P	– D11	H3	L2	CM05	Z3	E8	R1	A25	X1	S1

① **Series**
MX80L

② **Travel – mm**

T01	25
T02	50
T03	100
T04	150
T05	200

③ **Mounting**

M	Metric

④ **Grade**

S	Standard
P	Precision (not available with T05 Travel option)

⑤ **Drive Type**

D1	Free Travel (No Motor)
D11	4 Pole (25 & 50 mm travel only)
D13	8 Pole (100, 150 & 200 mm travel only)

⑥ **Home Sensor**

H1	None-Free Travel (only)
H2	N.C. Current Sinking
H3	N.O. Current Sinking

⑦ **Limit Sensor**

L1	None-Free Travel (only)
L2	N.C. Current Sinking
L3	N.O. Current Sinking

⑧ **Cable Options**

CM03	No Cables – Free Travel

⑨ **Z Channel Location**

Z1	None
Z3	Center Position

⑩ **Digital Linear Encoder Option**

E1	None
E2	1.0 µm Resolution
E3	0.5 µm Resolution
E4	0.1 µm Resolution
E5	5.0 µm Resolution
E7	Sine output encoder
E8	0.02 µm Resolution (20 nanometer)
E9	0.01 µm Resolution (10 nanometer)

⑪ **Environmental**

R1	Standard Finish (black anodized)
R2	Cleanroom Prep
R10	Low ESD Finish
R20	Low ESD Finish & Cleanroom Prep

⑫ **Digital Drive**

A1	No Drive

⑬ **Other Options**

X1	None
X2	Z-axis Pneumatic Counter Balance*

* Not available with T05 Travel.

⑭ **Axis Designator**

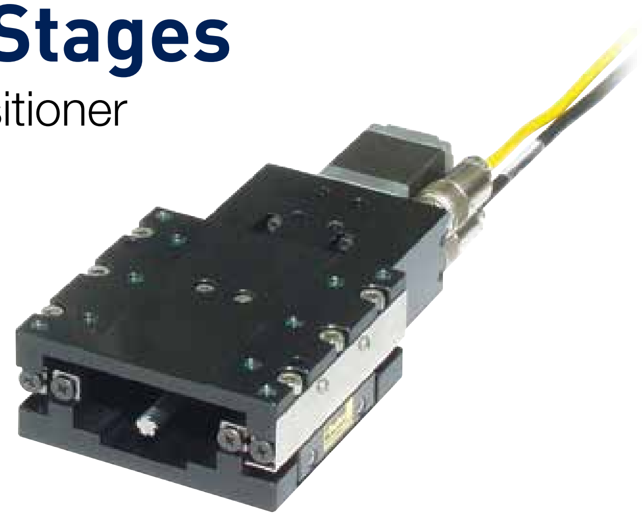
S1	None (single-axis)
S2*	X-axis base unit (cables @ 12 o'clock)
S3*	Y-axis 60 arc-sec (cables @ 3 o'clock)
S4*	Y-axis 60 arc-sec (cables @ 9 o'clock)
S5*	Y-axis 15 arc-sec (cables @ 3 o'clock)
S6*	Y-axis 15 arc-sec (cables @ 9 o'clock)

*Consult factory for multi-axis pinning options and quotation

MX80S Ballscrew and Leadscrew Driven Stages

Reliable, low profile miniature positioner

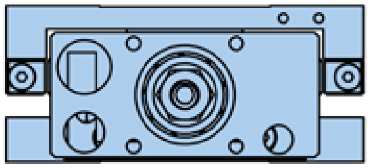
- **Cross roller bearing (zero cage creep option)**
- **Stepper or servo motor drive**
- **Digital limit/home system**
- **Optional linear encoder**
- **Cleanroom prep. option**
- **Low ESD option for electrically sensitive applications**



- **Miniature Size - Low Profile (35 mm high X 80 mm wide)**
- **Normal or cleanroom environments**
- **25, 50, 100, 150 mm travels**
- **Multi-axis platform**
- **Ballscrew or leadscrew drive options**

MX80S Table

Duty Cycle	Max Acceleration	Max Load	Max Travel	Peak Force	Repeatability (+/-)
100%	2G	8KG	150mm	123N	1.5µm



MX80S

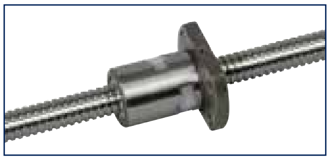
The MX80S miniature positioner is the screw driven member of Parker's MX80 family. Like its counterparts, the MX80L linear motor driven stage and MX80M manual stage, the MX80S is designed for applications requiring reliable linear positioning in space restricted applications. It is the complementary product that bridges the product spectrum between the high dynamic linear motor performance of the MX80L, and the manual precision of the MX80M.

The MX80S can be supplied with a high-efficiency leadscrew drive capable of reaching 200 mm per second velocity, or a precision ground ballscrew drive offering axial thrust to 123 N.

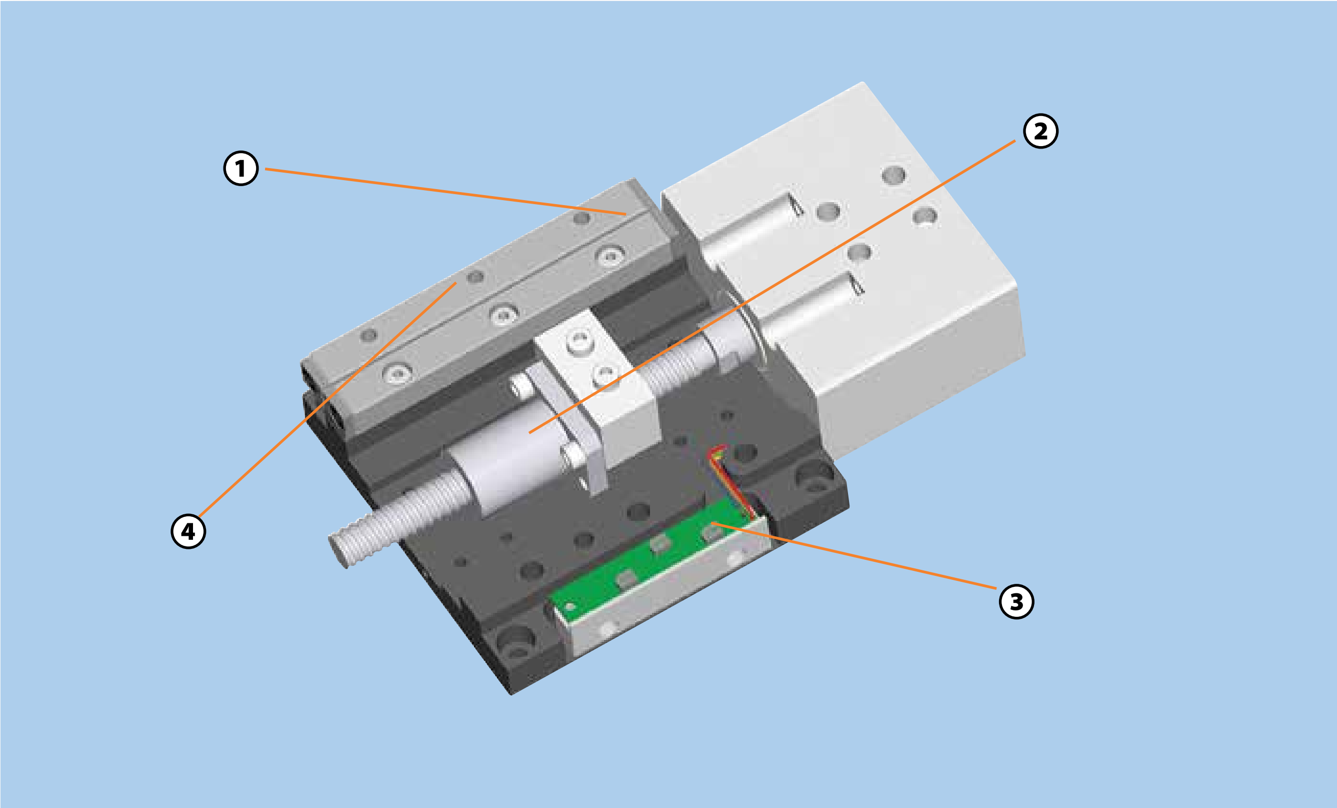
The leadscrew drive employs a PTFE coated leadscrew with a preloaded nut to produce extremely smooth linear translation. A choice of three leads provides improved opportunity for matching desired velocity/ resolution requirements.

The 2.0 mm lead ballscrew stage offers high performance 24/7 operation with a thrust load capacity of 123 N (28 lb) and velocity to 100 mm/second at 100% duty cycle.

Leadscrew drive



Ballscrew drive

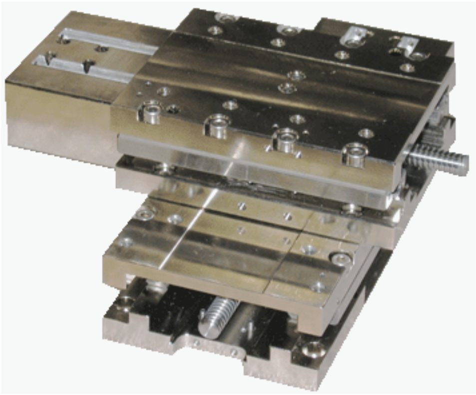


① **Cross Roller Bearings**
provide high stiffness and extremely smooth linear translation. A rack and pinion anti-cage creep design within the bearing races prevents cage creep even at 5 g acceleration, or with cantilevered loads.

② **Ballscrew or leadscrew drive**
The 2.0 mm lead ballscrew driven stage offers high performance 24/7 operation with a thrust load capacity of 123 N (28 lb.) and velocity to 100 mm/second at 100% duty cycle. Leadscrew driven stages are available with 1 mm, 2 mm, or 10 mm leads. The PTFE coated leadscrew provides extremely smooth linear translation at velocities up to 200 mm/second.

③ **Home/Limit Sensors**
are magnetic sensors completely housed within the body of the stage, and fully adjustable over the entire travel range.

④ **Master Reference Surface**
is a feature unique to the MX80 that enables customers to align their process to the actual travel path within microns.



SPECIFICATIONS

The MX80S low profile miniature positioner offers reliable linear positioning for space restricted applications. Various screw and drives options are available to best suit the application's needs.

		MX80S Leadscrew Drive				MX80S Ballscrew Drive			
Travel (mm)		**25**	**50**	**100**	**150**	**25**	**50**	**100**	**150**
Normal Load Capacity	kg (lb)	8 (18)	8 (18)	8 (18)	8 (18)	8 (18)	8 (18)	8 (18)	8 (18)
Thrust Load Capacity	N (lb)	44 (10)	44 (10)	44 (10)	44 (10)	123 (28)	123 (28)	123 (28)	123 (28)
Maximum Velocity **1.0 mm lead** **2.0 mm lead** **10.0 mm lead**	mm/sec	 20 40 200	 20 40 200	 20 40 200	 20 40 200	 — 100 —	 — 100 —	 — 100 —	 — 100 —
Breakaway Torque	Nm	0.029	0.029	0.033	0.033	0.050	0.050	0.050	0.050
Running Torque **1.0 mm lead** **2.0 mm lead** **10.0 mm lead**	Nm	 0.028 0.028 0.028	 0.028 0.028 0.028	 0.032 0.032 0.032	 0.032 0.032 0.032	 — 0.047 —	 — 0.047 —	 — 0.047 —	 — 0.047 —
Duty Cycle	%	50	50	50	50	100	100	100	100
Straightness & Flatness*	µm	8	12	16	20	8	12	16	20
Positional Accuracy* **1.0 mm lead** **2.0 mm lead** **10.0 mm lead**	µm	 30 30 35	 45 45 50	 75 75 80	 100 100 105	 — 10 —	 — 15 —	 — 18 —	 — 20 —
Bi-directional Repeatability* **1.0 mm lead** **2.0 mm lead** **10.0 mm lead**	µm	 ±5.0 ±5.0 ±10.0	 ±5.0 ±5.0 ±10.0	 ±5.0 ±5.0 ±10.0	 ±5.0 ±5.0 ±10.0	 — ±1.5 —	 — ±1.5 —	 — ±1.5 —	 — ±1.5 —
Inertia (without motor & coupling) **1.0 mm lead** **2.0 mm lead** **10.0 mm lead**	10^{-7}kg-m^2	 1.47 1.62 6.34	 1.47 1.62 6.34	 2.42 2.68 11.30	 3.06 3.42 14.90	 — 4.19 —	 — 4.19 —	 — 6.08 —	 — 7.68 —
Screw Speed (max)	rps	20	20	20	20	50	50	50	50
Leadscrew Efficiency **1.0 mm lead** **2.0 mm lead** **10.0 mm lead**	%	 40 59 78	 40 59 78	 40 59 78	 40 59 78	 — 90 —	 — 90 —	 — 90 —	 — 90 —
Screw Diameter	mm	6.35	6.35	6.35	6.35	8.00	8.00	8.00	8.00
Bearing Coefficient of Friction		0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Unit Mass **Table only** **With 2-stack stepper**	g	 597 748	 597 748	 1003 1154	 1268 1419	 694 845	 694 845	 1114 1265	 1392 1513
Carriage Mass (unloaded)	g	194	194	353	471	291	291	464	595

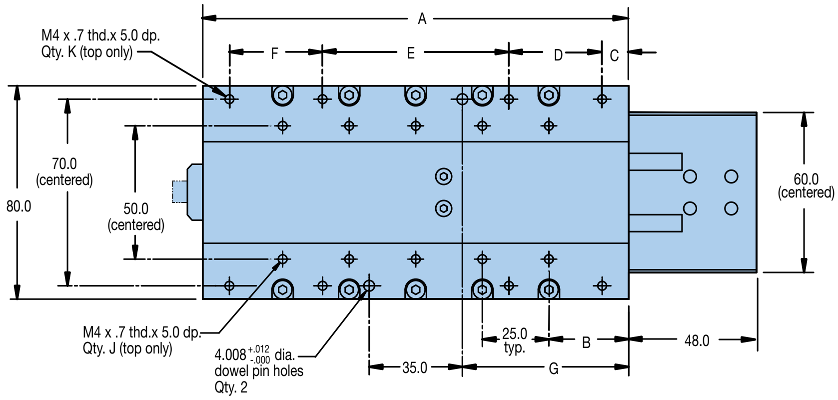
* Notes:

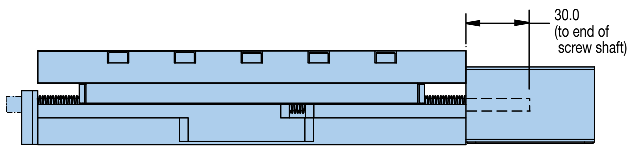
Leadscrew Drive:
(1) Measured at the carriage center, 35 mm above the mounting surface @ 20 C with no load. Unit bolted to granite surface, flat to within 1 micron/300 mm.
(2) Total accuracy and bi-directional repeatability over full travel (peak to peak).

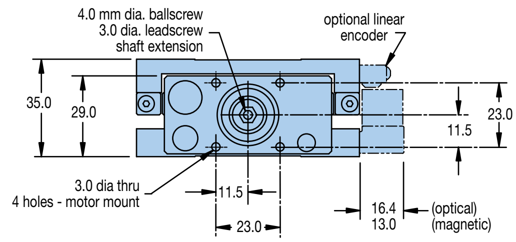
Ballscrew Drive:
(1) Measured at the carriage center, 35 mm above the mounting surface @ 20 C with no load. Unit bolted to granite surface, flat to within 1 micron/300 mm.
(2) Total accuracy and bi-directional repeatability over full travel (peak to peak).
(3) Repeatability valid with M21 servo motor.

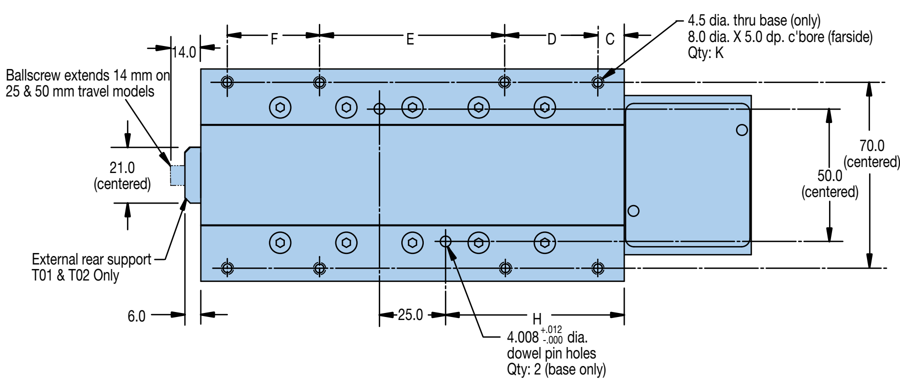
DIMENSIONS

Dimensions – mm (in)







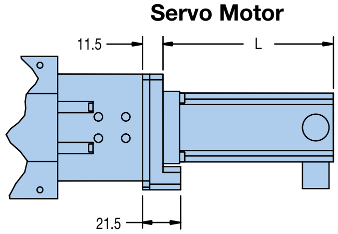


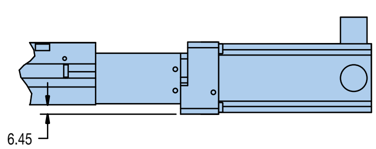
Dimensions (mm)

Travel	A	B	C	D	E	F	G	H	J	K
25	80	15	5	70	—	—	22.5	27.5	6	4
50	80	15	5	70	—	—	22.5	27.5	6	4
100	160	30	10	35	70	35	62.5	67.5	10	8
150	210	30	5	65	70	65	87.5	92.5	14	8

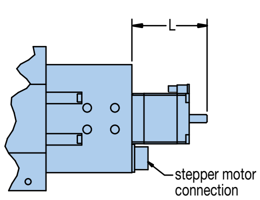
Mounting

Servo Motor





Stepper Motor



Model	# Stack	NEMA	Dimension L (mm)
Stepper	1 2 3	11	42.0 50.0 61.5
Servo	1	16	83.6

OPTIONS & ACCESSORIES

Simple Configuration Digital Drive Options

All digital drives ordered in the MX80 part number configuration come set up with a motor file including electrical parameters to set continuous and peak currents, current loop compensation values, and default gain settings. Users will have the ability to override these parameters for special application requirements.

Tuning is easy and intuitive for users and is available via a variety of methods. The motor and loading information must be known by the drive to determine the baseline tuning gains. These are simple parameter entries the user can complete with the help of standard Parker supplied front-end software tools. Seamless integration of drives and controls ensures performance matched functionality of the completed motion system.

Servo & Microstepping Drives/Controllers

Parker servo and microstepping drives are the perfect drive solution to be paired with the MX80 family. We are happy to assist with the selection of a suitable drive.

E-AC and E-DC Microstepping Drive

Order Codes: A31

Parker's E-Series microstepping drives are a low-cost, high-performance and high-reliability drive in a small package which can be paired with the MX80 family. To better suit any MX80 application, the E-Series is available in both alternating and direct current options. The E-AC drive provides up to 3.5 Amps of current to the motor and accepts 120VAC direct-online power only. The E-DC drive is designed for a 48VDC input power requirement and provides current up to 4.8 Amps peak of current to the motor.

Plug & Play" Cable Options

Order Codes: CM02 CM03 CM06 CM07 CM08 CM09 CM10 CM11 CM12 CM13 CM15 CM17

"User convenience" is high on the list of cable attributes found in the MX80. The high-flex cabling and connectors are reliable, durable and offer easy hook-up for "plug and run" installation.

- **High-flex cables**
- **CE compliant connectors and shielding**
- **CE compliant ferrite beads**
- **Color coded jackets and labeling**
- **Connectors simplify installation**

Encoder Options

Order Codes: E2 E3 E4 E5 E7

A non-contact linear optical encoder provides a quadrature output and offers resolution ranging from 10 nanometer to 5 micron. On the MX80L, the encoder is internal to the stage body. There is no increase to the footprint of the unit and no additional external cabling is required.

Home and Limit Sensor Options

Order Codes: H2L2 H2L3 H3L2 H3L3

Magnetic home and limit sensors are completely housed within the body of the stage. An innovative design adds functionality without sacrificing geometry. Sensor triggers can be easily adjusted over the travel. The output format is an open collector type capable of sinking up to 50 mA, and be set as N.O. or N.C.

For complete details on drive product features and specifications, please refer to the "Drives, Motors, Gearheads, & Controllers" section of this catalog.

Cleanroom Option

Order Codes: R2 R20

Both precision and standard grade products can be prepared for cleanroom compatibility. Preparation involves material changes, element modification and cleanroom compatible lubricants. MX80L and MX80S stages with this option are class 10 cleanroom compatible. When applying an XY or XYZ combination in a cleanroom environment, moving wires need to be considered – please consult a Parker application engineer.

Low ESD Coating Option

Order Codes: R10 R20

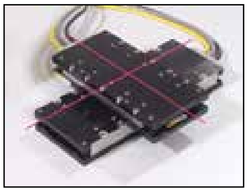
An optional low ESD electroless nickel or Armoloy coating is offered for improved electrically conductivity, providing a low resistance to ground path for electric discharge.

Environmental Protection Option

Both precision and standard grade units have a hard coat protective finish. The precision units have a hard coat (Rc 78) satin chrome finish, and the standard units have a low luster black anodized finish.

System Orthogonality Option

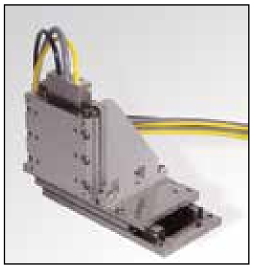
Order Codes: S2 S3 S4 S5 S6



In any multi-axis positioning system, the perpendicular alignment of the axes must be clearly specified. "Degree of orthogonality" defines the perpendicular alignment of axis one to another. The MX80s offer two choices for orthogonality. As standard, perpendicularity is held to within 60 arc seconds. For more exacting applications the MX80 can be optioned for 15 arc seconds orthogonality.

Z-Axis Bracket Accessory

Lightweight aluminum Z-brackets are available for easy construction of vertical axis combinations.



Standard Model Part Numbers:

25 & 50 mm:	**002-2238-01**
100 & 150 mm:	**002-2240-01**

Low ESD Model Part Numbers:

5 & 50 mm:	**002-2239-01**
100 & 150 mm:	**002-2241-01**

Miniature Positioners

ORDERING INFORMATION

MX80S

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤		⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮
Order Example:	MX80S	T04	M	P	K	–	D1	M1	H3L3	CM12	E1	Z1	R1	A11	X1	S1

① **Series**
MX80S

② **Travel – mm**
T01 25
T02 50
T03 100
T04 150

③ **Mounting**
M Metric

④ **Grade**
S Standard
P Precision*
* Must order E3 or E4 Digital Option to meet catalog specification.

⑤ **Bearing Type**
J Standard Cross Roller
K ACS Cross Roller

⑥ **Drive Type**
D1 1 mm Leadscrew (1)
D2 2 mm Leadscrew (1)
D3 10 mm Leadscrew (1,3)
D6 2 mm Ballscrew (2,3)
(1) Standard grade only (2) Precision grade only
(3) Not available with 1- or 2-stack stepper motor.

⑦ **Motor**
M0 No motor, flange, coupling
M1 NEMA 16 flange, no motor, coupling
M14 Stepper, 1 stack, NEMA 11
M15 Stepper, 2 stack, NEMA 11
M16 Stepper, 3 stack, NEMA 11
M21 Servo, 1 stack, NEMA 16

⑧ **Home/Limit Switch***
H1L1 None
H2L2 N.C. Home/N.C. Limit
H2L3 N.C. Home/N.O. Limit
H3L2 N.O. Home/N.C. Limit
H3L3 N.O. Home/N.O. Limit
*NC = Normally Closed; NO = Normally Open

⑨ **Cable Options (High-flex)**
CM01 None
CM02 Limits (only) w/Flying Leads (1 meter)
CM03 Limits (only) w/Flying Leads (3 meter)
CM06 Stepper Motor & Limits (1 meter)
CM07 Stepper Motor & Limits (3 meter)
CM08 Stepper Motor (no Limits) (1 meter)

Cable Options continued next column

CM09 Stepper Motor (no Limits) (3 meter)
CM10 Stepper Motor (E Drive) & Limits (1 meter)
CM11 Stepper Motor (E Drive) & Limits (3 meter)
CM12 Stepper Motor (E Drive) no Limits (1 meter)
CM13 Stepper Motor (E Drive) no Limits (3 meter)
CM15 Servo Motor, Encoder & Limits (3 m)
CM17 Servo Motor, Encoder (no Limits) (3 m)

⑩ **Digital Option**
E1 None
E2 1.0 µm Resolution
E3 0.5 µm Resolution
E4 0.1 µm Resolution
E5 5.0 µm Resolution
E7 Sine Output

⑪ **Z Channel Location**
Z1 None
Z3 Center Position

⑫ **Environmental**
R1 Standard Finish (black anodized)
R2 Cleanroom Prep
R10 Low ESD Finish
R20 Low ESD Finish & Cleanroom Prep

⑬ **Digital Drive**
A1 No Drive
A31 E-DC Stepper Drive

⑭ **Axis Designator**
S1 None (single-axis)
S2* X-axis base unit (cables @ 12 o'clock)
S3* Y-axis 60 arc-sec (cables @ 3 o'clock)
S4* Y-axis 60 arc-sec (cables @ 9 o'clock)
S5* Y-axis 15 arc-sec (cables @ 3 o'clock)
S6* Y-axis 15 arc-sec (cables @ 9 o'clock)
*Consult factory for multi-axis pinning options and quotation

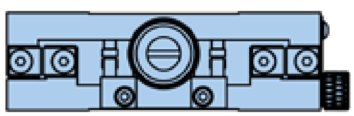
⑮ **Required Designator**
X1

MX80M Free Travel and Micrometer Driven Stages

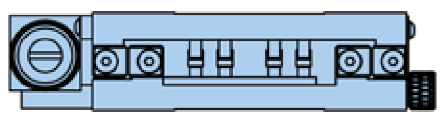
Manual stage with precision control

The MX80M stages are offered as free travel or micrometer driven units with 25 mm or 50 mm travel. They include innovative tooling features to make mounting and precision alignment quicker and easier. A hardened steel master reference surface is provided along the side of the stage to allow fixturing or other tooling elements to be precisely aligned with the actual travel path. Dowel pin holes are provided on the carriage top for repeatable mounting or tooling. Also available are custom features such as a steel body design, vacuum prepped units, and anti cage creep bearings for high-dynamic applications up to 150 mm travel.

- **Precision cross roller bearings**
- **Optional cleanroom prep.**
- **Optional low ESD coating**
- **Dowel holes in top & base**
- **Interchangeable mounting with motorized MX80 models**
- **Positive position lock**



MX80M Center Drive with Micrometer



MX80M Side Drive with Micrometer

SPECIFICATIONS

Completing the MX80 family, the MX80M is a manual stage with a black anodized aluminum body. The stage can be ordered with or without various micrometer options to best fit the needs of the customer and their application.

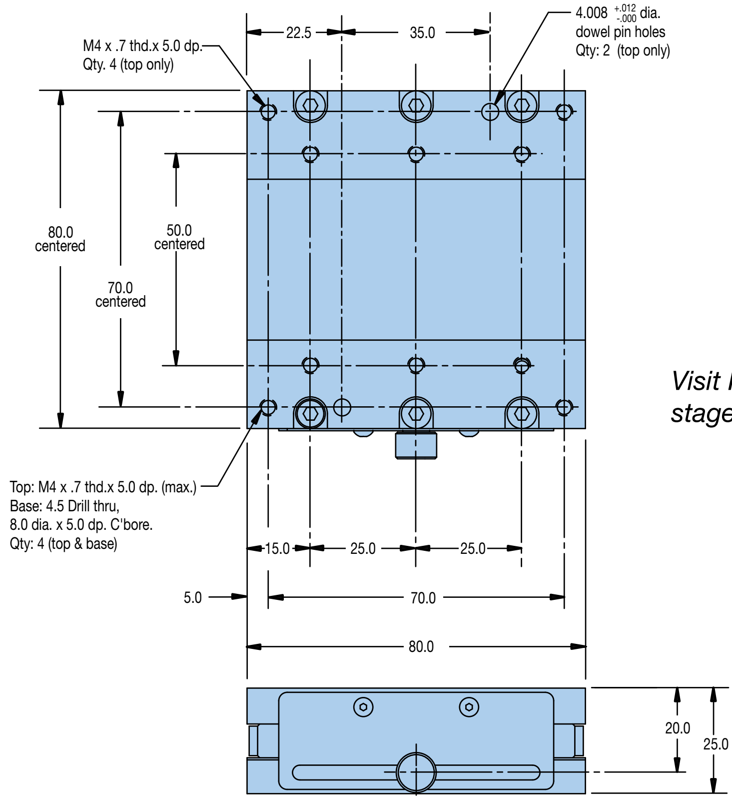
		MX80M Free Travel		MX80LM Micrometer Driven	
Travel (mm)		**25**	**50**	**25**	**50**
Normal Load Capacity	kg (lb)	20 (44)	20 (44)	20 (44)	20 (44)
Axial Force (1)					
F_a	kg	—	—	4.5	4.5
F_b	kg	—	—	0.6	1.0
Straight Line Accuracy (per 25 mm travel)	µm	2	2	2	2
Micrometer Resolution					
0.001 in		—	—	Yes	Yes
0.01 mm		—	—	Yes	Yes
Digital Micrometer					
0.00005 in		—	—	Yes	Yes
0.001 mm		—	—	Yes	Yes

(1) Fa (force acting against micrometer)
Fb (force acting against spring)

Download 2D & 3D files from www.parker.com/emn/MX80M

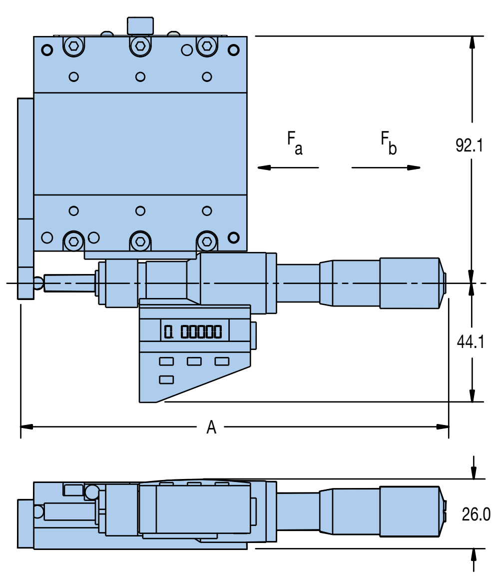
Dimensions – mm (in)

Free Travel (with position lock)

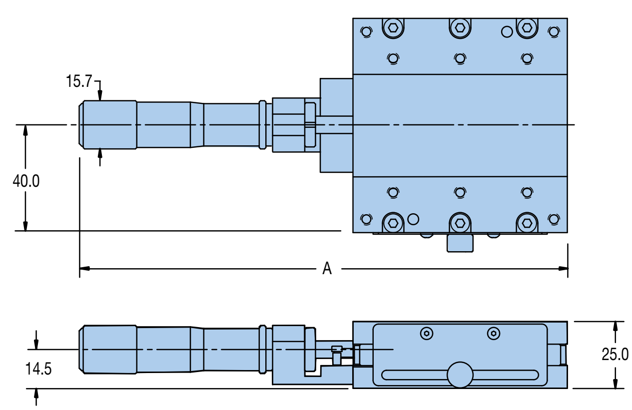


Visit Parker.com to see other manual stage and slide options available!

Digital Micrometer (side drive shown)



Standard Micrometer (center drive shown)



Drive Orientation	Travel	Dimension A (mm)
Center	25 50	225.6 273.5
Side	25 50	160.6 209.5

Center	25 50	182.2 231.4
Side	25 50	117.2 167.4

ORDERING INFORMATION

MX80M

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③		④	⑤	⑥	⑦	⑧	⑨
Order Example:	MX80M	T02	M	–	S	C2	D22	R1	X4	S1

① **Series**

MX80M

② **Travel – mm**

T01	25
T02	50

③ **Mounting**

M	Metric

④ **Grade**

S	Standard

⑤ **Style**

C1	Free Travel
C2	Center Drive
C3	Side Drive

⑥ **Drive Type**

D1	None
D20	Metric Micrometer
D21	English Micrometer
D22	Digital Micrometer

⑦ **Environmental**

R1	Standard Finish (black anodized)
R2	Cleanroom Prep
R10	Low ESD Finish
R20	Low ESD Finish & Cleanroom Prep

⑧ **Lock Options**

X1	No Lock
X4	With Lock

⑨ **Axis Designator**

S1	None (single-axis)
S2*	X-axis base unit (micrometer @ 12 o'clock)
S3*	Y-axis 60 arc-sec (micrometer @ 3 o'clock)
S4*	Y-axis 60 arc-sec (micrometer @ 9 o'clock)
S5*	Y-axis 15 arc-sec (micrometer @ 3 o'clock)
S6*	Y-axis 15 arc-sec (micrometer @ 9 o'clock)

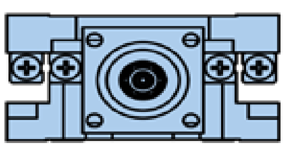
*Consult factory for multi-axis pinning options and quotation

MX45S Linear Positioning Stages

Single- and multi-axis, ultra-miniature, high-performance positioners

- **Ultra compact profile (25 mm high X 45 mm wide x 65, 75 or 90 mm long)**
- **5, 15 and 25 mm travels**
- **Ballscrew or leadscrew drive options**
- **Anti-cage creep crossed roller bearings**
- **Up to 40 N axial thrust**
- **30 mm/s max velocity**

- **Stepper motor driven**
- **Optional digital limit/home sensor pack**
- **Optional rotary or linear encoders**
- **Multi-axis platforms**
- **Ideal for normal or cleanroom environments**



MX45S

MX45S Table

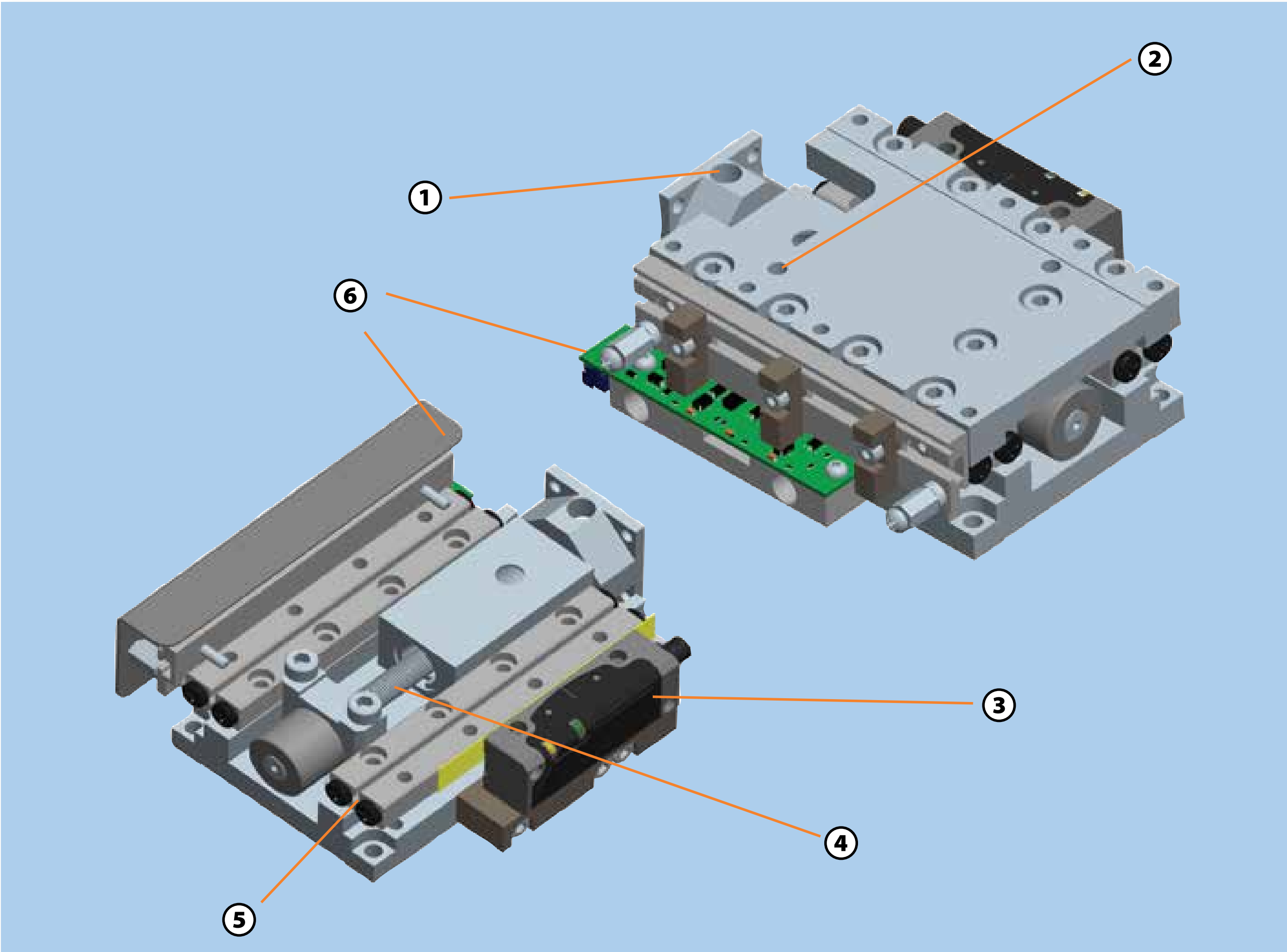
Duty Cycle	Max Acceleration	Max Load	Max Travel	Positional Accuracy	Repeatability (+/-)
100%	2G	7KG	25mm	6µm	1.0µm

The MX45S is a 45 mm wide miniature screw driven positioner based on the award winning MX80 family. Like its predecessor, the MX45S is designed for OEMs requiring reliable linear positioning in space restricted applications. Designed with anti-cage creep crossed roller bearings, the MX45S allows users to position up to 7 Kg of normal load on the stage's three standard travel lengths (5 mm, 15 mm & 25 mm).

The MX45S can be supplied with a high efficiency leadscrew or a high precision ground ballscrew, both of which are capable of producing 40 N of thrust and reaching linear velocities of 20 mm/s and 30 mm/s respectively.

The leadscrew drive employs a PTFE-coated screw with a preloaded nut to deliver extremely smooth and quiet linear motion. A choice of two leads allows the user to match the desired mix of velocity and resolution in order to best match the application's requirements.

The ballscrew drive is available in a 1 mm lead offering the user 3 µm bi-directional repeatability and 24/7 operation (100% duty cycle).



1 **Motor Mount**

NEMA 8 stepper motor mounts directly to stage housing

2 **Dowel Pin Holes**

Ensure precise repeatable mounting

3 **Optical Linear Encoders**

Optional field installed feature is available in three standard resolutions (1.0 µm, 0.1 µm and sine output)

4 **Ballscrew or Leadscrew Drive**

The 1.0 mm lead ballscrew driven stage offers high performance 24/7 operation with a thrust load capacity of 40 N (9 lb.) and velocity to 30 mm/s. The leadscrew driven stages are available with 0.5 or 1.0 mm leads. The PTFE coated leadscrew provides extremely smooth linear translation at velocities of 20 mm/s

5 **Crossed Roller Bearings**

provide high stiffness and extremely smooth linear translation. A rack and pinion anti-cage creep design within the bearing races prevents cage creep even at 5 g acceleration, or with cantilevered loads

6 **Home/Limit Sensor Pack**

This optional field installable feature consists of three NPN or PNP switches, each of which is fully adjustable over the entire range of travel

SPECIFICATIONS

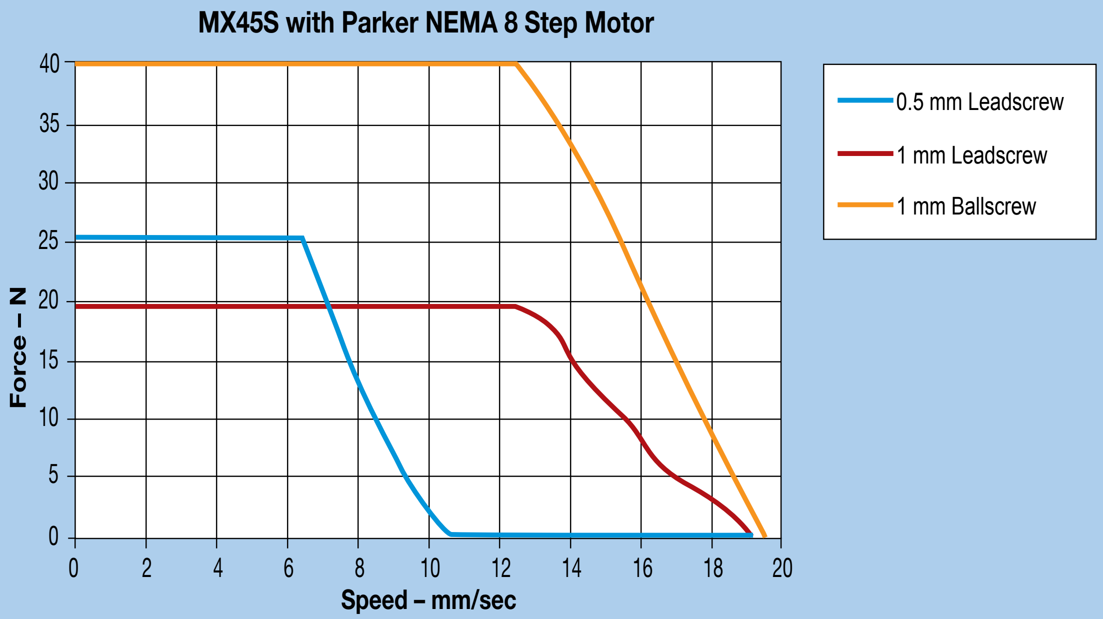
The MX45S screw driven positioner is perfect for applications requiring Z-axis focal adjustment, optics alignment, or short indexing of slides. It is the ideal automation solution to replace manual slides and stages.

Performance

		MX45S Leadscrew Drive			MX45S Ballscrew Drive		
Travel [1]	mm	5	15	25	5	15	25
Normal Load Capacity	kg (lb)	5.0 (11.0)	5.0 (11.0)	7.0 (15.4)	5.0 (11.0)	5.0 (11.0)	7.0 (15.4)
Thrust Load Capacity	N (lb)		40 (9)			40 (9)	
Maximum Velocity [2]							
0.5 mm lead	mm/sec		10			—	
1.0 mm lead			20			30	
Acceleration/Deceleration	g		2			2	
Running Torque	mNm (oz-in)		11.0 (1.5)			11.0 (1.5)	
Duty Cycle	%		50			100	
Straightness & Flatness [3]	µm	3	5	8	3	5	8
Positional Accuracy [4]							
With 2000 Count Rotary Encoder	µm	10	18	30	8	12	15
With 1 or 0.1 µm linear Encoder		6	10	12	6	10	12
Bi-directional Repeatability [4,5]							
With 2000 Count Rotary Encoder			±8			±3	
With 1 µm Linear Encoder	µm		±4			±2	
With 0.1 µm Linear Encoder			±2			±1	
Input Inertia (without motor)							
0.5 mm lead	10^8 Kg-m^2	2.37	2.76	3.14	—	—	—
1 mm lead		2.58	2.96	3.35	1.41	1.6	1.79
Maximum Screw Speed	rps		20			30	
Screw Efficiency							
0.5 mm lead	%		30			—	
1 mm lead			47			90	
Screw Diameter	mm		4.7			4.0	
Bearing Coefficient of Friction			0.003			0.003	
Unit Mass							
Stage Only		177	200	238	182	205	243
Carriage Only		70	82	100	73	84	104
Additional Mass of Motors & Options	g						
NEMA 8 Stepper [6]			95			95	
Linear Encoder Option [7]			16			16	
Limit option Sensor Board [7]			5			5	
Limit Option Tripper Assembly [7]		12	13	15	12	13	15

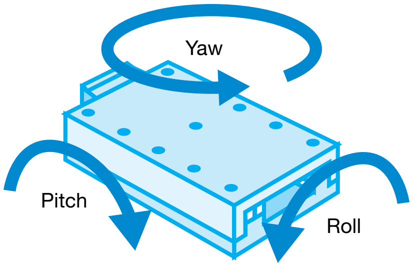
Notes:
[1] Travel is in the direction of the motor mount only
[2] See speed/force curve for performance with Parker motor.
[3] Measured at the carriage center, 35 mm above the mounting surface @ 20° C with no load. Unit bolted to granite surface, flat within 1 µmn/300 mm.
[4] Total accuracy and bi-directional repeatability over full travel (peak to peak) (with 0.5 or 1 mm leadscrew)
[5] Repeatability valid with NEMA 8 stepper motor and encoder noted.
[6] Includes rotary encoder (part of base)
[7] Part of base

MX45S Speed-Force Performance



Performance Loading with 2540 km Life Rating

Normal Load Capacity		
5 mm travel	kg (lb)	5.0 (11.0)
15 mm travel		5.0 (11.0)
25 mm travel		7.0 (15.4)
Pitch & Yaw Moment Loading		
25 mm Lever Arm	kg (lb)	1.0 (2.2)
50 mm Lever Arm		0.6 (1.3)
75 mm Lever Arm		0.5 (1.1)
100 mm Lever Arm		0.4 (0.9)
Roll Moment Loading		
25 mm Lever Arm	kg (lb)	2.0 (4.4)
50 mm Lever Arm		1.2 (2.7)
75 mm Lever Arm		0.9 (2.0)
100 mm Lever Arm		0.7 (1.5)



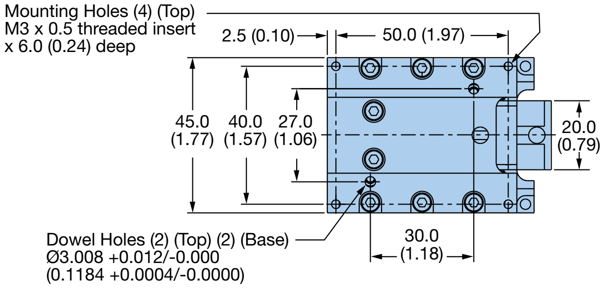
DIMENSIONS

Download 2D & 3D files from www.parker.com/emn

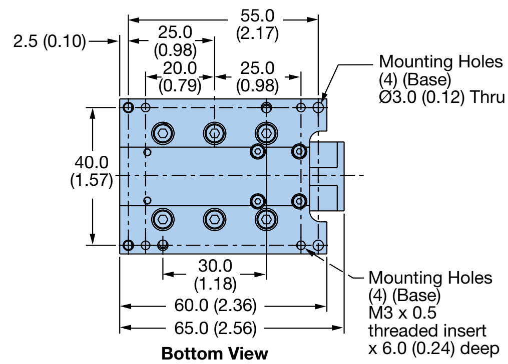
Dimensions – mm (in)

Note: For T01, T02 and T03, the carriage is shown at end of travel, available stroke towards motor mount only.

T01 — 5 mm Travel

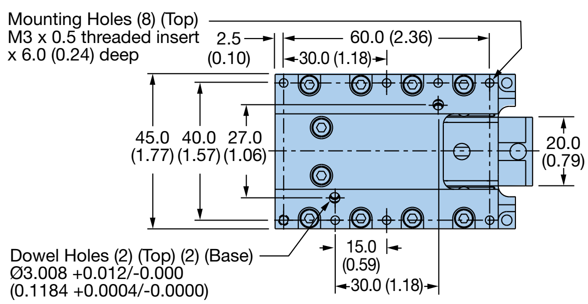


Top View

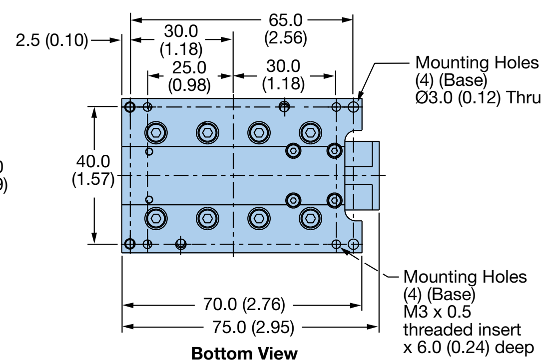


Bottom View

T02 — 15 mm Travel

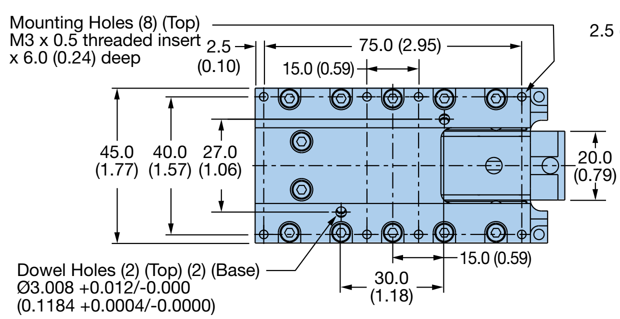


Top View

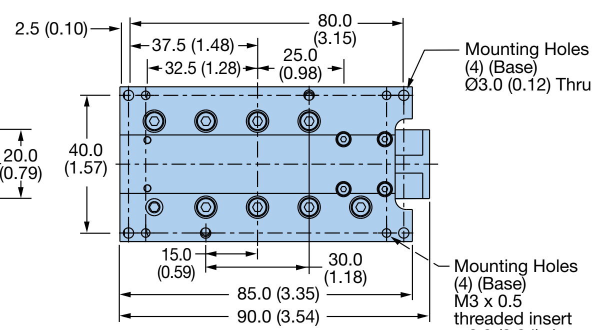


Bottom View

T03 — 25 mm Travel

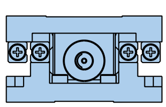


Top View

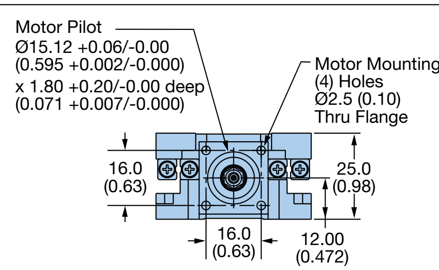


Bottom View

Common Dimensions for T01, T02, T03



Bearing End View



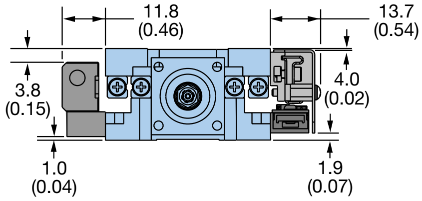
Motor Side End View

MX45S Option Dimensions

Encoder and Limit/Home (T01, T02, T03)

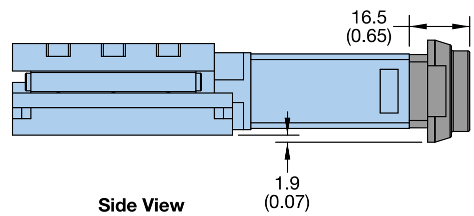
Dimensions – mm (in)

Linear Encoder **Limit/Home**



Motor End View

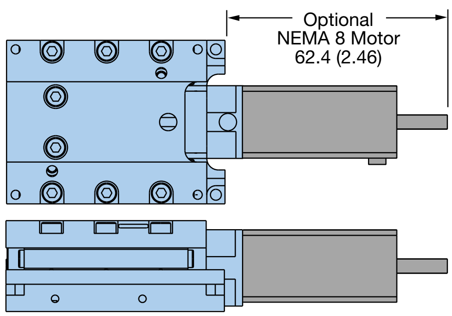
Rotary Encoder

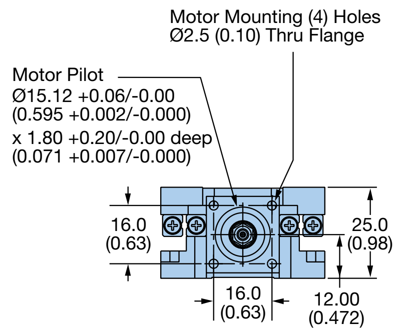


Side View

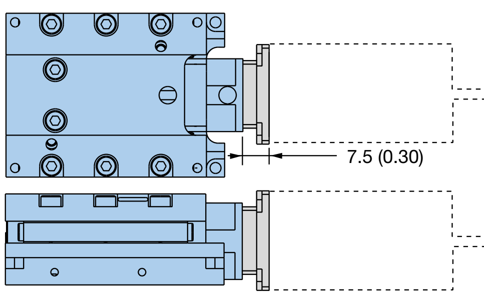
Motor Mounting (T01, T02, T03)

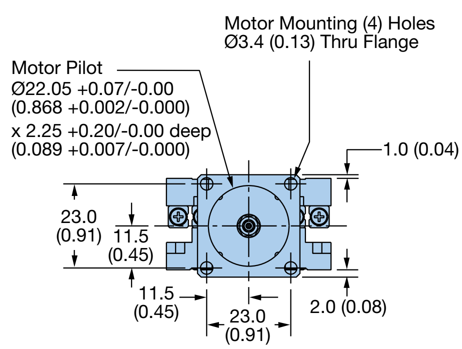
NEMA 8 Motor Mount





NEMA 11 Motor Mount





Miniature Positioners

OPTIONS & ACCESSORIES

Encoder Options

Rotary Encoder

When using stepper motors, positional feedback is readily available with the optional rotary encoder. 400- and 500-line rotary encoders provide position verification and position maintenance. Each encoder comes standard with a 1 meter high-flex cable.

Linear Encoder

A non-contact linear optical encoder provides quadrature output and offers resolutions of 1.0 um, 0.1 um and sine output. On the MX45S, the encoder is mounted externally to the stage body, an addition which can be added later if application requirements change. Each encoder comes standard with a 1 meter high-flex cable.

Rotary Encoder Connections

Function	Wire Color
Ground	White
A+	Green
A–	Yellow
+5 VDC	Brown
B+	Blue
B–	Red
Not used	Pink
Not used	Gray

Rotary Encoder Cable (6-pin differential)

Part Number	Description
006-2398-1.0	1 m high-flex with flying leads
006-2398-1.0	1 m high-flex with flying leads

Linear Encoder Digital Outputs

Function	Signal	Interface Pin
Power	5 V	7.8
	0 V	2.9
Incremental	A+	14
	A–	6
	B+	13
	B–	5
Reference Mark	Z+	12
	Z–	4
Limits	P	11
	Q	10
Set-Up	X	1
Alarm	E–	3
Shield	Inner	—
	Outer	Case

Linear Encoder Analog Outputs

Function		Signal	Readhead Color	Interface Pin
Power		5 V	Brown	4, 5
		0 V	White	12, 13
Incremental	**Cosine**	V_1+	Red	9
		V_1–	Blue	1
	Sine	V_2+	Yellow	10
		V_2–	Green	2
Reference Mark		V_0+	Violet	3
		V_0–	Gray	11
Limits		V_p	Pink	7
		V_q	Black	8
Set-Up		V_x	Clear	6
Remote CAL		CAL	Orange	14
Shield		Inner	Green/Yellow	—
		Outer	Outer Screen	Case

Stepper Motor

The MX45S is available with a standard 1.8 degree NEMA 8 stepper motor capable of providing 4 oz-in of holding torque. Each motor comes standard with a 1 m high-flex cable.

Motor Cable Connections

Function	Color
A +	Red
A –	Black
B +	White
B –	Green

Home/Limit Options

The MX45S features an innovative, compact, fully adjustable and field-installed home/limit sensor pack. The output format is either NPN or PNP and is available as either N.O. or N.C. The sensor pack is powered with +5 to +24 VDC and is capable of sinking or sourcing up to 50 mA per switch.

Limit/Home Cable Connections

Pin Number	Function	Color
1	+ V	Red
2	Ground	Black
3	+ Limit	Orange
4	Home	Green
5	– Limit	Blue

P2™ Microstepping Drive

The P2™ Series stepper drive is an OEM-friendly miniature motion drive capable of up to 2 Amps in a 1” x 1” x 3.3” square package.

- **Adjustable run current via potentiometer**
- **Auto standby adjustable current to reduce heat generation and power consumption**
- **Stepper resolution to 3200 steps per rev**
- **RoHS compliant**
- **DIN rail mountable**
- **Accepts single or differential step and direction inputs**

Visit our website at www.parkermotion.com for complete details on these MX45S system compatible products.

E-DC Microstepping Drive

The DC-input E-DC is a high-performing, low-cost packaged microstepping drive.

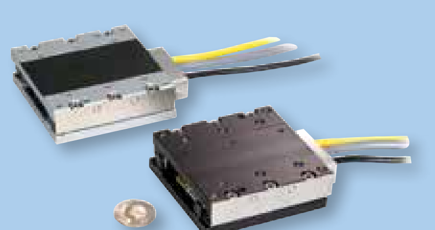
- **Anti-resonance circuitry suppresses mid-range instability**
- **Recommended motor inductance range of 0.5 mH to 80 mH**
- **Selectable resolution up to 50,800 steps/rev**
- **Auto standby reduces motor current (and heating)**
- **Current waveforms to optimize smoothness**
- **Optically isolated step and direction inputs**
- **Short-circuit and over-temperature protection**

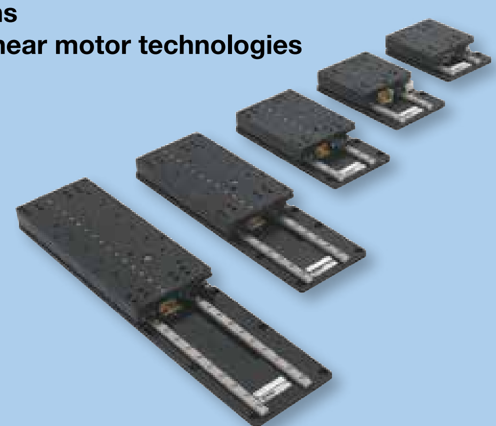
Miniature Positioners

Complete your system by integrating one or more of Parker’s other miniature linear products.

- **MX80 Series 80 mm wide, available in 5 different drive trains**
- **mSR Series linear motor stage, available in two different linear motor technologies**
- **LCR Series miniature belt and screw driven actuators**

For complete information, go to: www.parker.com/emn





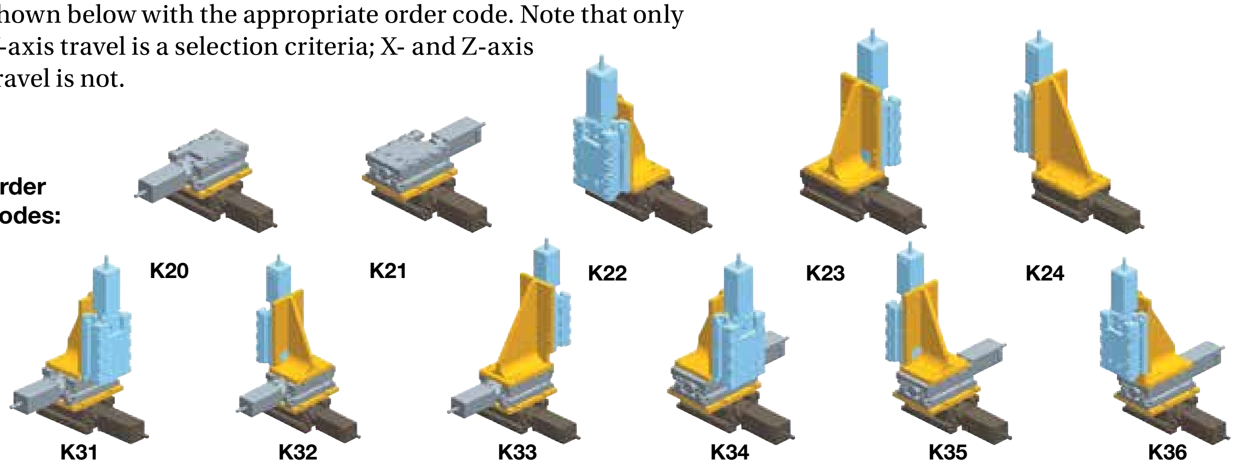
Multi-Axis Bracket Kit Options

MX45S to MX45S Mounting Bracket Kits

To build multi-axis MX45S systems, mounting bracket kits are available to build the two and three-axis configurations shown below with the appropriate order code. Note that only Y-axis travel is a selection criteria; X- and Z-axis travel is not.

Consult factory or visit our website for complete bracket dimensions.

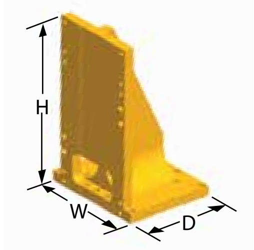
Order Codes:



Bracket Kit	Part Number T01*	T02*	T03*
K20	002-2956-200	002-2956-201	002-2956-202
K21	002-2956-200	002-2956-201	002-2956-202
K22	—	002-2956-220	—
K23	—	002-2956-220	—
K24	—	002-2956-240	—
K31	002-2956-310	002-2956-311	002-2956-312
K32	002-2956-310	002-2956-311	002-2956-312
K33	002-2956-330	002-2956-331	002-2956-332
K34	002-2956-310	002-2956-311	002-2956-312
K35	002-2956-310	002-2956-311	002-2956-312
K36	002-2956-330	002-2956-331	002-2956-332

*T01, T02 and T03 designates Y axis travel only

Z-Axis Bracket

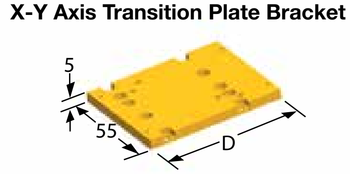


Z-Axis Bracket* – H x W x D (mm)

Bracket Kit	T01, T02, T03
K22, K23	85 x 45 x 55
K24, K33, K36	104 x 45 x 55
K31, K32, K34, K35	85 x 55 x 45

*Not compatible with N11 motor mounts

X-Y Axis Transition Plate Bracket



X-Y Axis Bracket – Dimension "D" (mm)

Bracket Kit	T01	T02	T03
K20, K21, K31, K32, K33, K34, K35, K36	60	70	85

MX45S to MX80 Mounting Brackets

MX45S positioners can also be used as a Y- or Z-axis in conjunction with MX80 positioners.

Kit	Configuration	Part Number	H x W x D (mm)
X-Y	MX45ST01 to MX80	002-2958-01	5 x 80 x 80
	MX45ST02 to MX80	002-2958-02	5 x 80 x 80
	MX45ST03 to MX80	002-2958-03	5 x 80 x 92.5
X-Z*	MX45S (all) to MX80	002-2958-04	87.5 x 80 x 80

*Not compatible with N11 motor mounts

ORDERING INFORMATION

MX45S

Fill in an order code from each of the numbered fields to create a complete model order code. Note that for multi-axis systems, an order code is required for each axis in the system.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
Order Example:	MX45S	T01	S	K	D1	N00	E000	L0	K00	S

① **Series**
MX45S

② **Travel**

T01	5 mm
T02	15 mm
T03	25 mm

③ **Grade**

S	Standard (specify leadscrew option, item 5)
P	Precision (specify ballscrew option, item 5)

④ **Bearing Type***

K	Anti-Creep System (ACS) Crossed Roller

* Consult factory for other bearing options

⑤ **Drive Type**

D1	0.5 mm Leadscrew [1]
D2	1 mm Leadscrew [1]
D3	1 mm Ballscrew [2]

[1] With standard grade only [2] With precision grade only

⑥ **Motor Options (see drive and drive/controller accessories)**

N00	No motor, no motor mount, no coupler
N08	No motor, NEMA 8 motor mount & coupler
N11	No motor, NEMA 11 motor mount & coupler [1]
M10	NEMA 8 stepper motor [2]
M11	NEMA 8 stepper motor [3]

[1] Not available with T03 travel option on K20 and K22 X-Y axis bracket kits or Z-axis bracket kits (K22 thru K36)
[2] With 1 meter cable, flying leads
[3] With 1 meter cable with P2™ drive connector

⑦ **Encoder Options (see Options & Accessories)***

E000	No Encoder
ER10	Rotary Encoder, 400-Line [1] (flying leads)
ER11	Rotary Encoder, 400-Line [1] (ViX connector)
ER12	Rotary Encoder, 400-Line [1] (ACR connector)
ER13	Rotary Encoder, 400-Line [1] (6K connector)
ER20	Rotary Encoder, 500-Line [1] (flying leads)
ER21	Rotary Encoder, 500-Line [1] (ViX connector)
ER22	Rotary Encoder, 500-Line [1] (ACR connector)
ER23	Rotary Encoder, 500-Line [1] (6K connector)
EL20	Linear Encoder [2] (1 µm resolution)
EL40	Linear Encoder [2] (0.1 µm resolution)
EL70	Linear Encoder [2] (sine output)

* Consult factory for other encoder options
[1] Encoder equipped with 1 meter high-flex cable
[2] Encoder equipped with 1 meter high-flex cable, 15-pin D-sub connector; Z-channel in center position

⑧ **Home/Limit Switch Options (see Options & Accessories***

L0	None
L2	N.O. Home/N.C. Limits, NPN, 1 meter cable to flying leads
L4	N.O. Home/N.C. Limits, PNP, 1 meter cable to flying leads

*NC = Normally Closed; NO = Normally Open. Home switch not available with T01; use one of the limits as home for T01.

⑨ **Multi-axis Kit Options (see Options & Accessories)**

K00	No kit (single-axis)
K20	Refer to system kit configuration illustrations in Multi-Axis Bracket Kit Options Note: all appropriate mounting bracket hardware is included with the kit number
K21	
K22	
K23	
K24	
K31	
K32	
K33	
K34	
K35	
K36	

⑩ **Axis Designator**

S	None (single-axis)
X	X-axis for multi-axis system
Y	Y-axis for multi-axis system
Z	Z-axis for multi-axis system

Electric Cylinders

Electric cylinders are often in high-force, thrust style applications, but with the advent of linear motor driven cylinders, high-speed diverting applications area also available. Electric cylinders are commonly used in push-to-force, holding, reach and retract, and fluid power conversion applications. Parker offers a full range of cylinder products, each with a multitude of configurable options to suit almost any application. Pair these cylinders with Parker motor, drive, and control technologies to provide a complete solution.

ETH Series
High-Force Electric Cylinders

The ETH design offers unrivaled power density due to larger screw and bearing designs in smaller packages. User-friendly and offered in a diversified range of configurations.
Page 391.

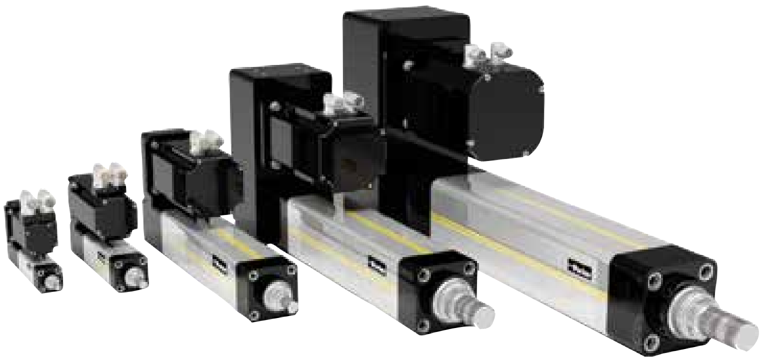
XFC Extreme Force
Electric Thrust Cylinder

This industrially hardened cylinder product utilizes an all-steel contruction and achieves far greater thrust capacities than typical electric cylinders. Maximum thrust up to 356,000N (80,000lbs).
Page 441.

The ETH Series

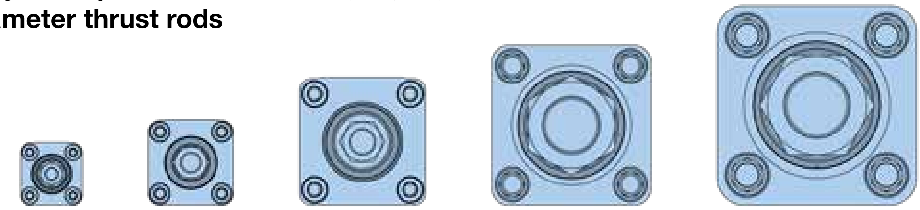
High Force Ballscrew Driven Electric Cylinders

- **Unrivaled power density — high forces and small frame sizes**
- **Sensor cables can be concealed in the profile**
- **Optimized for safe handling and simple cleaning**
- **Long service life**
- **Reduced maintenance costs with lubricating hole in the cylinder flange**
- **Pneumatic ISO flange norm (DIN ISO 15552:2005-12) conformity**
- **Anti-rotation device integrated**
- **Reduced noise emission**
- **Complete system from a single source: parker offers matching controllers, motors and gearheads for all ETH cylinders**



NEW frame sizes available! ETH cylinders are now available in five sizes with 32 up to 125 mm profiles. Both in-line and parallel motor configurations provide stroke lengths up to 2000 mm and speeds to 1.7 m/sec.

- **High mechanical efficiency up to 90%**
- **Strokes up to 2000 mm**
- **High traction/thrust force up to 114,000 N (25,628 lbs)**
- **Repeatability up to ±0.03 mm**
- **Speeds up to 1.7 m/s**
- **Toothed belt drive (for parallel motor mounting)**
- **5 to 32 mm screw leads offering fine resolution or high speed options**
- **Three ISO cylinder profile sizes with 30, 40, 60, 90 and 110 mm diameter thrust rods**
- **Predefined standardized motor and gearhead flanges for simplified selection. The motors are available directly from Parker (all from one source).**
- **Three protection classes available:**
  - **IP54 with galvanized steel hardware**
  - **IP54 with stainless steel hardware**
  - **IP65 epoxy coated cylinder**



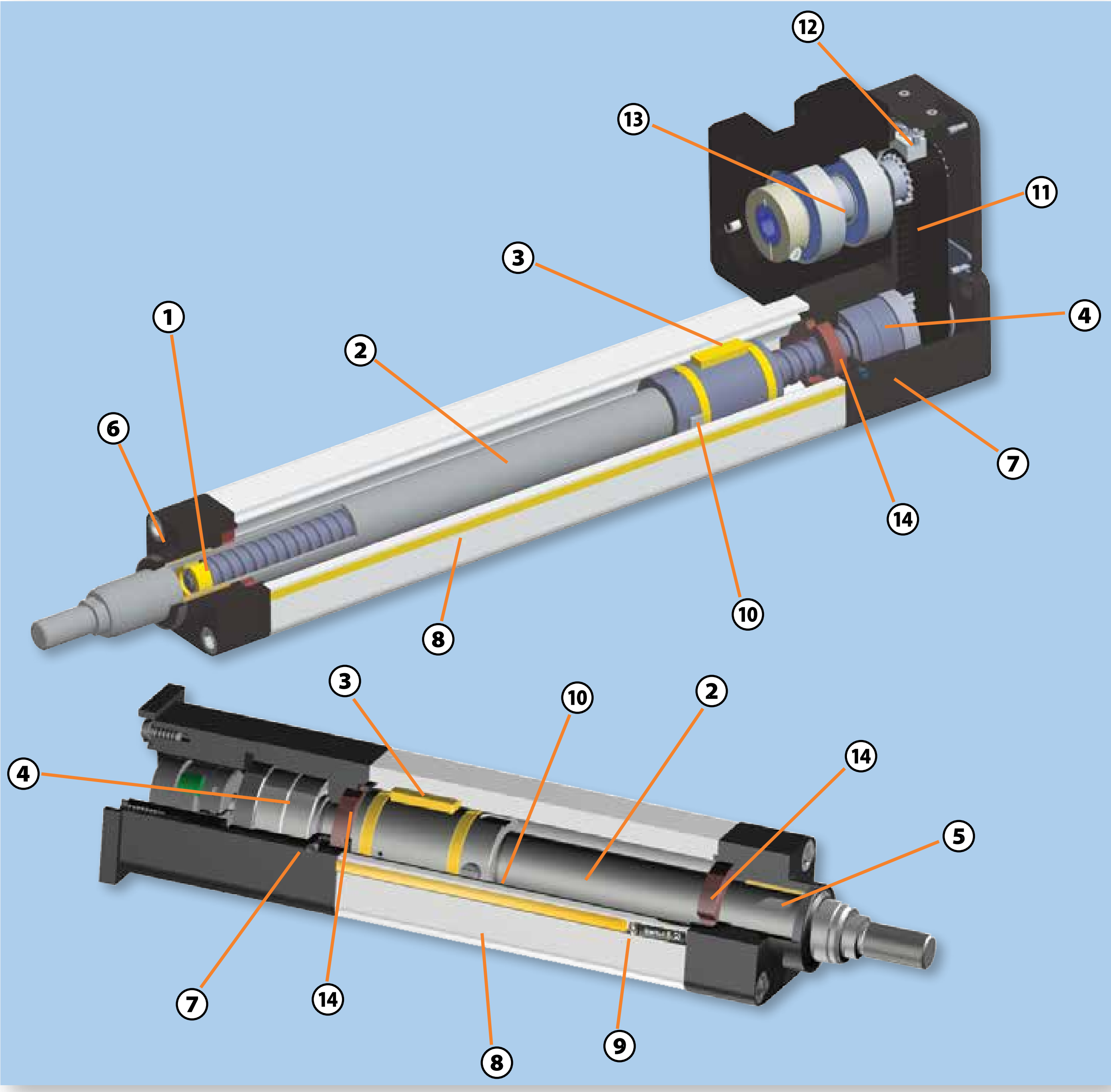
Series	ETH032	ETH060	ETH080	ETH100	ETH125
Maximum Travel (mm)	1,000	1,200	1,600	2,000	2,000
Maximum Payload (N)	3,700	9,300	25,100	56,000	114,000
Maximum Acceleration (m/sec²)	12	15	15	10	10

The Parker ETH series is the next generation version of the well known, widely used ET Series.

The ETH design offers unrivaled power density due to larger screw and bearing designs in smaller packages. The result is a product that offers increased force output from a given frame size or increased product life at the same force output.

The ETH is a user-friendly design offered in a diversified range of configurations in order to meet specific application requirements. Motor and cylinder design versatility and flexibility make the ETH Series the most user-friendly design.

For applications where overall length requirements restrict the actuator's footprint, the parallel motor configurations are the best solution. The parallel mount configuration is offered with multiple motor options, motor locations and motor orientations. This flexibility gives the user multiple smaller package solutions for solving applications that require increased force density in space-restricted applications.



① **Support Bearing**

The non-motor end of the screw is supported by a hardened polymer bushing which eliminates vibration and minimizes noise for smoother, quieter motion. This also improves precision, increases dynamic performance, and lengthens screw life.

② **Precision Ballscrew Drive**

The ETH drive train features a Class 7 ballscrew (ISO 3408) providing low frictional resistance for smooth motion over the entire speed range. This design also ensures longer product life, excellent efficiency and a lower dB rating. The ballscrew drive provides higher speeds and force capabilities than comparably-sized alternative drive mechanisms.

③ **Unique Anti-rotation Guide**

The ETH features a unique piston rod anti-rotation device. This high quality, maintenance free polymer bushing offers robust guidance that prevents the piston rod from twisting as the rod extends and retracts.

④ **Screw Support Bearing**

A set of double stacked angular contact bearings allows high thrust forces in both extend and retract directions. This design provides high force density and minimizes backlash when changing the direction of motion.

(Continued next page)

5 Piston Rod Support Bearing

The piston rod is supported by an extra long rod bushing. This bushing braces the rod in all directions allowing for smooth travel with high side loading capabilities.

6 Combination Lip and Wiper Seal

The lip and wiper seal keeps contaminants out and lubricating grease in for increased actuator life. For harsh environments, the ETH is available in a robust IP65 version for maximum protection.

7 Lubrication Port

The ETH comes standard with an integrated lubrication port located in the rear endcap of the cylinder, making scheduled maintenance quick, simple and easy. An optional lubrication bore is available in the middle of the cylinder body for applications where the integrated lubrication port is inaccessible.

8 Extruded Cylinder Body

The extrusion of the ETH was designed to reduce the number of negative geometry slots and grooves for a cleaner, and more environmentally friendly design. In addition to that, the ETH ships standard with sensor groove covers to help eliminate areas where debris can be trapped.

9 Home/End of Travel Sensors

The ETH was designed to use Parker's Global Series sensors which mount into the dovetail grooves that run the entire length of the cylinder body. The sensors mount flush to the extrusion body, having no effect on the overall product width. The sensor cables can be concealed with dovetail groove covers giving the actuator a clean, aesthetically appealing appearance. The Global Series sensors are compatible with other Parker products, including pneumatics, helping reduce inventory and spare part complexity.

ETH Solutions for Critical Conditions

If you have harsh environmental conditions or critical design specifications, please contact us. We offer many non-standard design options not covered in this brochure that will help match the ETH to your specific application requirements, such as:

- **Oil-splash lubrication**
- **Customized mountings and rod ends**
- **Mounting of customer motors**
- **Hardened cylinder protection for aggressive environmental conditions**
- **Overlong, polished or chrome-plated thrust rods**
- **Rod bellows**

10 Permanent magnets

All ETH cylinders are equipped with several permanent magnets integrated into the screw nut which actuate the home/end of travel sensors.

11 High Force Timing Belt

The parallel mount configuration utilizes a robust toothed timing belt, offering slip-free motion with minimal belt wear. The 1:1 ratio design was designed to transmit higher torques, allowing greater thrust forces at higher speeds. Contact the factory for additional timing belt ratios.

12 Belt Tensioning

A patent-pending belt tensioning station makes the parallel belt tensioning process quick and easy. This unique design allows for precise and repeatable tensioning, allowing for faster installation time and reduced down time.

13 Overhung Load Adaptor

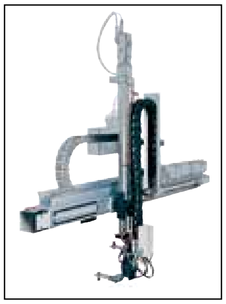
For all parallel mounting options which do not include a gearhead, an Overhung Load Adaptor (OLA) is included as part of the actuator assembly. The OLA simplifies the motor mounting process and protects the bearings of the motor from the radial forces induced by the parallel belt tensioning.

14 Over-stroke Bumpers

Polyurethane over-stroke bumpers are designed in at both ends of the cylinder to protect the internal components from damage as a result of unintended crashes.

Typical ETH Applications

The ETH closes the gap between electromechanical and hydraulic cylinder performance, making it suitable for higher force applications where increased reliability is required in the production process.Taking the costs of the hydraulic system components into consideration, in most cases an electromechanical system such as the ETH electric cylinder offers the more economical solution. Combined with a wide choice of accessories, it offers many possibilities in the following areas of application:



- **Test equipment and laboratory**
- **Valve and flap actuation**
- **Pressing**
- **Packaging machinery**
- **Food and beverage process automation**
- **Material handling and feed systems including: wood and plastic working, vertical actuators for machine tool loading, textile tensioning/gripping, automotive component transport/feeding**

Electric Cylinders

SPECIFICATIONS

Performance by Cylinder Size and Screw Lead*

Cylinder Size		**ETH032**			**ETH050**			**ETH080**		
Screw Lead Designation		**M05**	**M10**	**M16**	**M05**	**M10**	**M20** 1)	**M05**	**M10**	**M32**
Screw Lead	mm	5	10	16	5	10	20	5	10	32
Screw Diameter	mm		16			20			32	
Available Strokes**	mm		50 – 1000			50 – 1200			50 – 1600	
Max. Speed at Designated Stroke:	mm/s									
50 – 400 mm		333	667	1067	333	667	1333	267	533	1707
600 mm		286	540	855	333	666	1318	267	533	1707
800 mm		196	373	592	238	462	917	267	533	1707
1000 mm		146	277	440	177	345	684	264	501	1561
1200 mm		–	–	–	139	270	536	207	394	1233
1400 mm		–	–	–	–	–	–	168	320	1006
1600 mm		–	–	–	–	–	–	140	267	841
Max. Acceleration	m/s²	4	8	12	4	8	15	4	8	15
Max. Axial Traction/Thrust Force –										
In-Line	N	3600	3700	2400	9300	7000	4400	17,800	25,100	10,600
Parallel **n < 100**	N		3280	2050	9300	4920	2460		11,620	3630
(@ "n" rpm **100 < n < 300**		3600	2620	1640	7870	3930	1960	17,800	11,620	3630
Motor Speed) **n > 300**			1820	1140	5480	2740	1370		10,720	3350
Axial Force – 2500 km Service Life	N	1130	1700	1610	2910	3250	2740	3140	7500	6050
Max. Transmissible Torque –										
In-Line	Nm	3.2	6.5	6.8	8.2	12.4	15.6	15.7	44.4	60.0
Parallel **n < 100**	Nm	3.5	6.4	6.4	9.1	9.3	9.3	17.5	22.8	22.8
(@ "n" rpm **100 < n < 300**		3.5	5.2	5.2	7.7	7.7	7.7	17.5	22.8	22.8
Motor Speed) **n > 300**		3.5	3.6	3.6	5.4	5.4	5.4	17.5	21.1	21.1
Force Constant* –** **In-Line**	N/Nm	1131	565	353	1131	565	283	1131	565	177
Parallel		1018	509	318	1018	509	254	1018	509	159
Max Torque – No Load	Nm	0.77	0.85	0.94	0.85	1.28	1.70	1.87	2.13	2.38
Weight – (including cylinder rod)										
Base Unit with Zero Stroke	kg	1.2	1.2	1.3	2.2	2.3	2.5	6.9	7.6	8.7
Additional Stroke	kg/m	4.8	4.8	4.8	8.6	8.6	8.6	18.7	18.7	18.7
Weight – (cylinder rod only)										
Base Unit with Zero Stroke	kg		0.06			0.15			0.59	
Additional Stroke	kg/m		0.99			1.85			4.93	
Moments of Inertia										
In-line – without stroke	kgmm²	7.1	7.6	12.9	25.3	25.7	33.1	166.2	164.5	252.9
Parallel – without stroke		8.3	8.8	14.1	30.3	30.6	38.0	215.2	213.6	301.9
In-line/Parallel – per meter stroke	kgmm²/m	41.3	37.6	41.5	97.7	92.4	106.4	527.7	470.0	585.4
Accuracy: Repeatability (ISO230-2)	mm									
In-line						±0.03				
Parallel						±0.05				
Efficiency – (incl. friction torques)	%									
In-line						90				
Parallel						81				
Temperature	°C									
Operating						-10 ... +70				
Ambient						-10 ... +40				
Storage						-20 ... +40				
Humidity	%					0 ... 95 % (non-condensing)				
Elevation (Max.)	m					3000				

* Technical data based on normal conditions and only for single cylinder and load mode. For compound loads, please verify in accordance with normal physical laws and technical standards whether individual ratings should be reduced. Please contact Parker with any questions.

** Refer to Ordering Information for standard strokes available for specified model size and type.

***Efficiency factors are included in force constants

1) ATEX on request

ETH Series Performance by Cylinder Size and Screw Lead*

Cylinder Size		ETH100		ETH125	
Screw Lead Designation		**M10**	**M20**	**M10 1)**	**M20 1)**
Screw Lead	mm	10	20	10	20
Screw Diameter	mm	50		63	
Available Strokes**	mm	200 – 2000		200 – 2000	
Max. Speed at Designated Stroke:	mm/s				
200 – 400 mm		400	800	417	833
500 mm		400	747	417	807
600 mm		333	622	395	684
800 mm		241	457	290	514
1000 mm		185	354	224	405
1200 mm		148	284	180	329
1400 mm		122	235	148	275
1600 mm		102	198	125	234
2000 mm		76	148	94	170
Max. Acceleration	m/s²	8	10	8	10
Max. Axial Traction/Thrust Force –					
In-Line	N	54,800	56,000	88,700	114,000
Parallel (@ "n" rpm Motor Speed) n < 100	N	54,800	50,800	76,300	81,400
100 < n < 300			43,200		73,700
n > 300			35,600		61,000
Axial Force – 2500 km Service Life	N	18,410	27,100	27,100	49,600
Max. Transmissible Torque –					
In-Line	Nm	100	200	150	400
Parallel (@ "n" rpm Motor Speed) n < 100	Nm	108	200	150	320
100 < n < 300			170		290
n > 300			140		240
Force Constant* – In-Line**	N/Nm	565	283	565	283
Force Constant* – Parallel**	N/Nm	509	254	509	254
Max Torque – No Load	Nm	Please consult factory.			
Weight – (including cylinder rod)					
Base Unit with Zero Stroke	kg				
Additional Stroke	kg/m				
Weight – (cylinder rod only)					
Base Unit with Zero Stroke	kg				
Additional Stroke	kg/m				
Moments of Inertia					
In-line – without stroke	kgmm²	2240	2620	12,960	13,400
Parallel – without stroke	kgmm²	5860	6240	17,050	17,990
In-line/Parallel – per meter stroke	kgmm²/m	4270	4710	10,070	10,490
Accuracy: Repeatability (ISO230-2)	mm				
In-line	mm	±0.03			
Parallel	mm	±0.05			
Efficiency – (incl. friction torques)	%				
In-line	%	90			
Parallel	%	81			
Temperature	°C				
Operating	°C	-10 ... +70			
Ambient	°C	-10 ... +40			
Storage	°C	-20 ... +40			
Humidity	%	0 ... 95 % (non-condensing)			
Elevation (Max.)	m	3000			

* Technical data based on normal conditions and only for single cylinder and load mode. For compound loads, please verify in accordance with normal physical laws and technical standards whether individual ratings should be reduced. Please contact Parker with any questions.

** Refer to Ordering Information (page 52) for standard strokes available for specified model size and type.

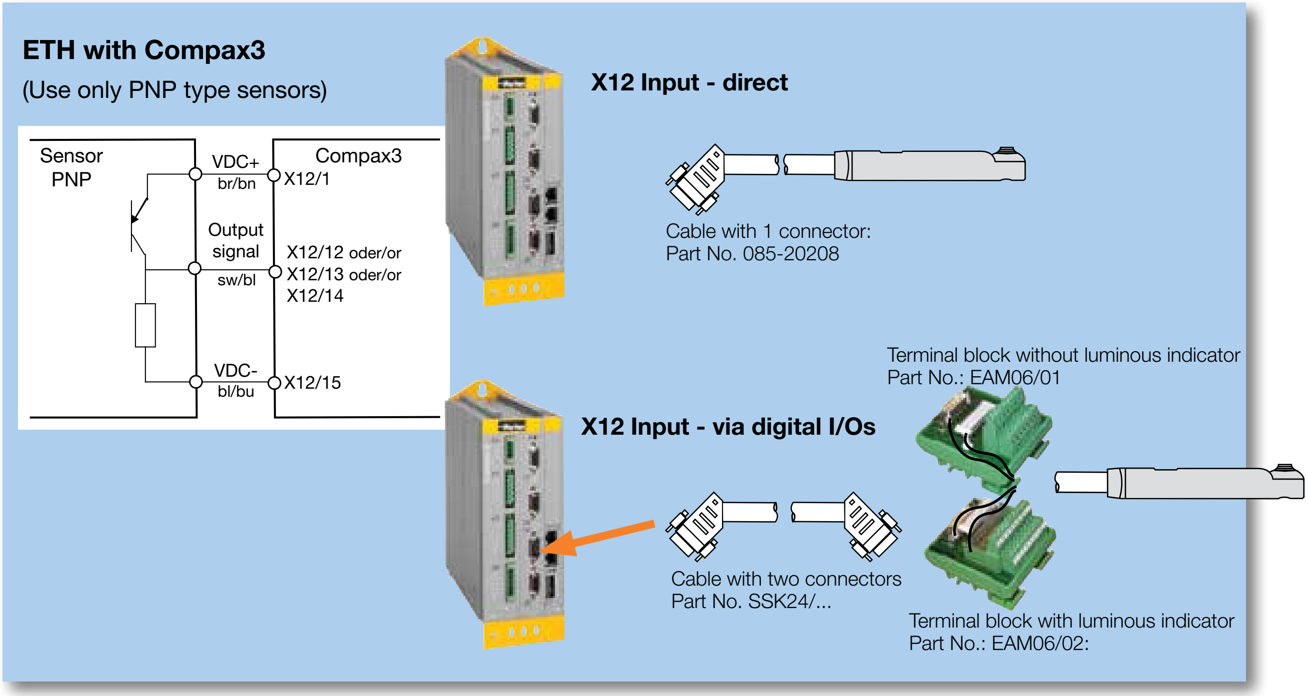
***Efficiency factors are included in force constants

1) ATEX on request

Sizing/Selection Design Considerations

Step	Sizing/Selection Design Consideration	Recommendation
1	**Basic Operating Parameters**	Check the basic conditions for the use of the ETH in your application. Use the performance chart and the speed-thrust graphs to confirm the ETH can meet your application's basic performance (e.g. force, velocity, acceleration) mechanical and environmental conditions
2	**Required Space**	Check the space available in your application and choose the appropriate motor mounting option: inline or parallel. Basic cylinder dimensions, along with dimensions for motor mounting options, can be found in the Dimensions section.
3	**Maximum Velocity**	Select the screw lead required to reach the application's maximum velocity
4	**Maximum Acceleration**	Verify that the maximum acceleration does not exceed the cylinder's limits
5	**Axial Forces**	Calculate the axial forces required in the individual segments of the application.
6	**Maximum Force Required**	Determine the maximum required axial force that the electric cylinder must provide.
7	**Select Stroke**	Determine the usable stroke and safety travels required for the application, then: • Select the desired stroke from the list of standard strokes • Or, if standard stroke will not work choose a desired stroke in steps of one mm. Please do not exceed the maximum permissible stroke given for each frame size.
8	**Buckling Risk**	Check that the maximum required axial force does not exceed the rod buckling limitations.
9	**Service Life**	Calculate the service life using the equivalent axial forces, the operational environment (application factor), and the load-life curves.
10	**Lateral Forces/Side Loads**	Determine the lateral forces present in the application and compare them to the permissible lateral forces for the cylinder.
11	**Relubrication**	Determine the lubricating cycle (maintenance schedule) and check that it is suitable.
12	**Motor/Gearhead Selection**	Calculate the required torque needed to the generate the required force of the ETH.
13	**Motor Mounting Flange**	Select a suitable motor mounting flange
14	**Mounting Type**	Select the mounting method of the electric cylinder
15	**Cylinder Rod End**	Select the desired rod end for load mounting
16	**Model number**	Develop model number

ETH Cylinders Connection with Compax3 Drives/Controllers



Xpress Motion Packages

Mounting Code	Motor Part Number	Gearhead Part Number[1]	Recommended Compax3 Servo Drive(s)	Motor Cable	Feedback Cable
XPC	BE233FJ-KPSN	—	C3S063V2F12IxxTxxMxx	P-1A1-xx	F-2C1-xx
XPD	BE233FJ-KPSB[2]	—			
XPG	BE344LJ-KPSN	—	C3S100V2F12IxxTxxMxx	P-3B1-xx	
XPH	BE344LJ-KPSB	—			
XPL	MPP1003D1E-KPSN	—	C3S150V2F12IxxTxxMxx		
XPM	MPP1003D1E-KPSB	—			
XPN	MPP1003D1E-KPSN	PV34/PV90-003			
XPP	MPP1003D1E-KPSB	PV34/PV90-004			
XPQ	MPP1003R1E-KPSN	—	CS3S063V2F12IxxTxxMxx[3] or C3S075V4F12IxxTxxMxx		
XPR	MPP1003R1E-KPSB	—			
XPS	MPP1003R1E-KPSN	PV34/PV90-003			
XPT	MPP1003R1E-KPSB	PV34/PV90-004			
XPU	MPP1154B1E-KPSN	—	C3S150V2F12IxxTxxMxx		
XPV	MPP1154B1E-KPSB	—			
XPW	MPP1154B1E-KPSN	PV115-003			
XPX	MPP1154B1E-KPSB	PV115-004			
XPY	MPP1154P1E-KPSN	—	CS3S063V2F12IxxTxxMxx[3] or C3S075V4F12IxxTxxMxx		
XPZ	MPP1154P1E-KPSB	—			
XP1	MPP1154P1E-KPSN	PV115-003			
XP2	MPP1154P1E-KPSB	PV115-004			

[1] PV34 will be used for all inline motor mounting configurations. PV90 will be used when the motor is mounted in parallel.
[2] BE233FJ-KPSN with a brake (CM233FJ-115027)
[3] Motors are rated for 460 volts AC. This combination, with the 230 volt drive, will result in motor running at 1/2 its rated speed

ETH032 Speed-Thrust with Motors (170 VDC)

Maximum Thrust with Motor*:

Parallel motor mount limitation

Max thrust w/2540 km life (see page 45 for details)

XPC – BE233FJ
Peak
Continuous

XPG – BE344LJ
Peak
Continuous

Maximum Speed:

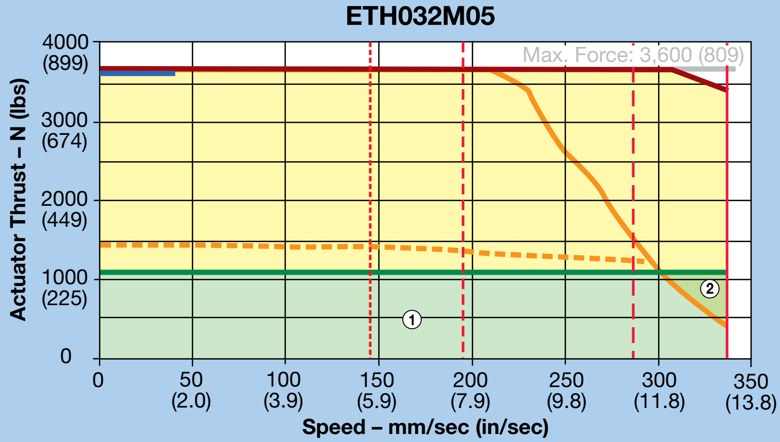
1000 mm stroke
800 mm stroke
600 mm stroke
Max actuator speed

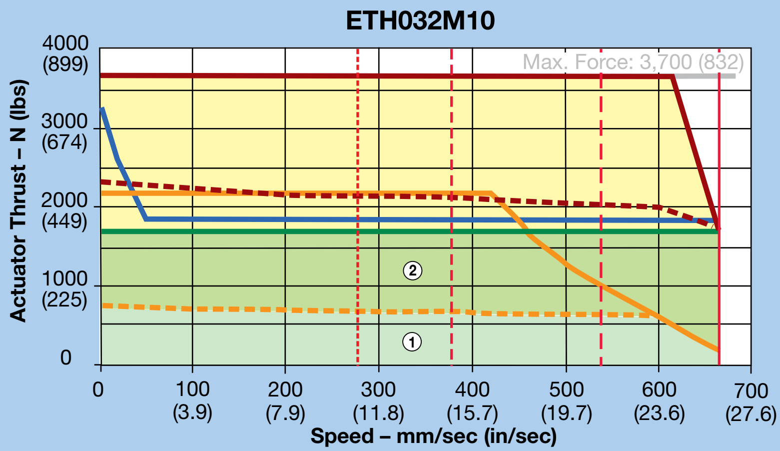
Performance Zones:

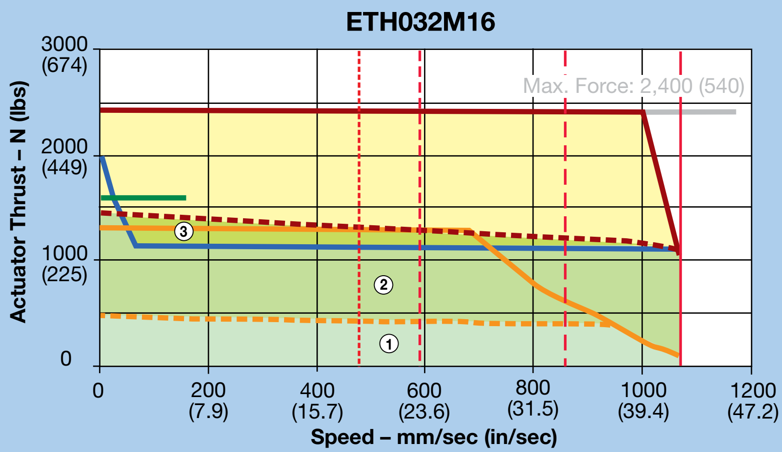
Motor Codes	Continuous Operation		
	1	2	3
XPC [(1)]	•		
XPD [(2)]	•		
XPG [(1)]	•	•	•*
XPH [(2)]	•	•	•*

[(1)] Without brake [(2)] With brake
* In-line motor mount only

Intermittent Zone – Consult Factory
(operation will result in reduced life of the actuator and is not acceptable for parallel motor options if above the parallel motor mount limitation curve)







** Maximum thrust assumes a cylinder mounting orientation with a fixed mounting position and a guided load. For limitations on column buckling, please see page 43.*

ETH032 Speed-Thrust with Motors (340 VDC)

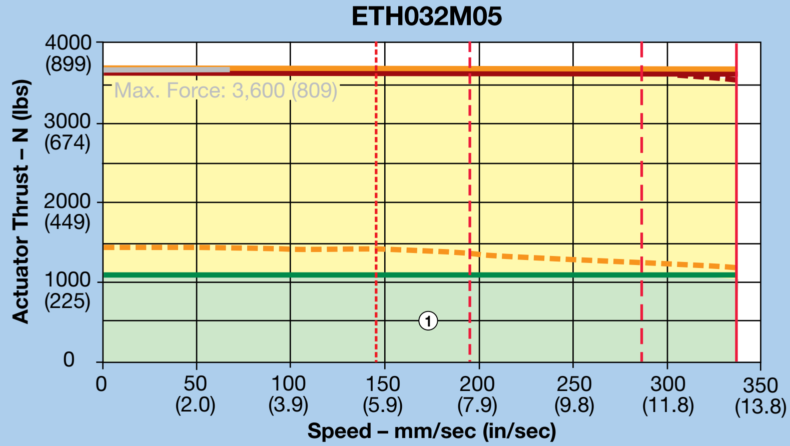
Maximum Thrust with Motor*:

Parallel motor mount limitation

Max thrust w/2540 km life (see page 45 for details)

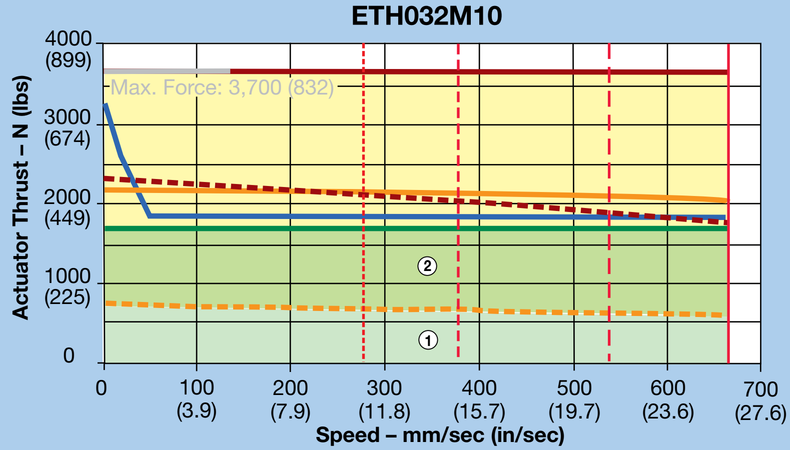
XPC – BE233FJ
Peak
Continuous

XPG – BE344LJ
Peak
Continuous



Maximum Speed:

1000 mm stroke
800 mm stroke
600 mm stroke
Max actuator speed

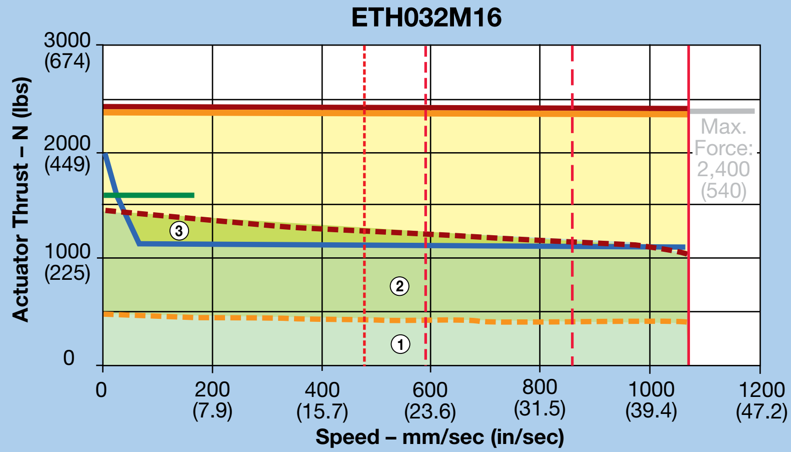


Performance Zones:

Motor Codes	Continuous Operation		
	①	②	③
XPC (1)	•		
XPD (2)	•		
XPG (1)	•	•	•*
XPH (2)	•	•	•*

(1) Without brake (2) With brake
* In-line motor mount only

Intermittent Zone – Consult Factory
(operation will result in reduced life of the actuator and is not acceptable for parallel motor options if above the parallel motor mount limitation curve)



** Maximum thrust assumes a cylinder mounting orientation with a fixed mounting position and a guided load. For limitations on column buckling, please see page 43.*

Electric Cylinders

ETH050 Speed-Thrust with Motors (170 VDC)

Maximum Thrust with Motor*:

Parallel motor mount limitation

Max thrust w/2540 km life (see page 45 for details)

XPG – BE344LJ

Peak

Continuous

Maximum Speed:

1200 mm stroke

1000 mm stroke

800 mm stroke

Max actuator speed

Performance Zones:

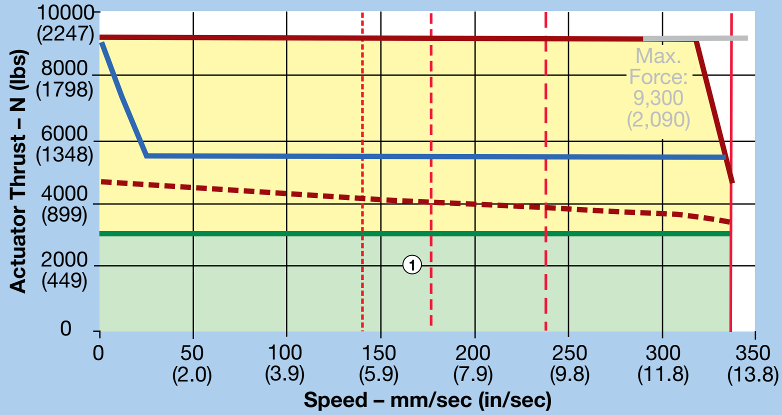
Motor Codes	Continuous Operation
	①
XPG (1)	•
XPH (2)	•

(1) Without brake (2) With brake

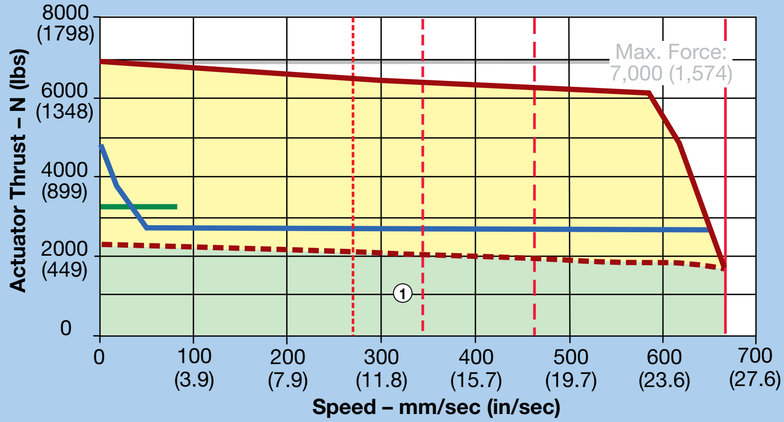
* In-line motor mount only

Intermittent Zone – Consult Factory
(operation will result in reduced life of the actuator and is not acceptable for parallel motor options if above the parallel motor mount limitation curve)

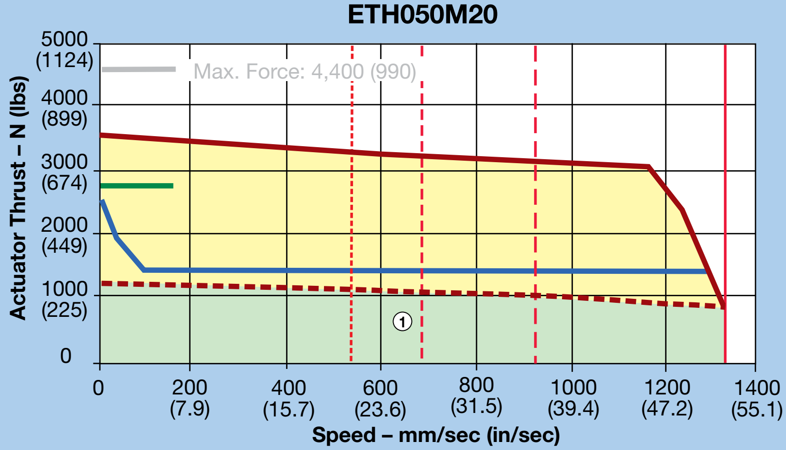
ETH050M05



ETH050M10



ETH050M20



** Maximum thrust assumes a cylinder mounting orientation with a fixed mounting position and a guided load. For limitations on column buckling, please see page 43.*

ETH050 Speed-Thrust with Motors (340 VDC)

Maximum Thrust with Motor*:

Parallel motor mount limitation

Max thrust w/2540 km life (see page 45 for details)

XPL – MPP1003D1E
Peak
Continuous

XPN – MPP1003D1E (with PV34FE-003)
Peak
Continuous

Maximum Speed:

1200 mm stroke
1000 mm stroke
800 mm stroke
Max actuator speed

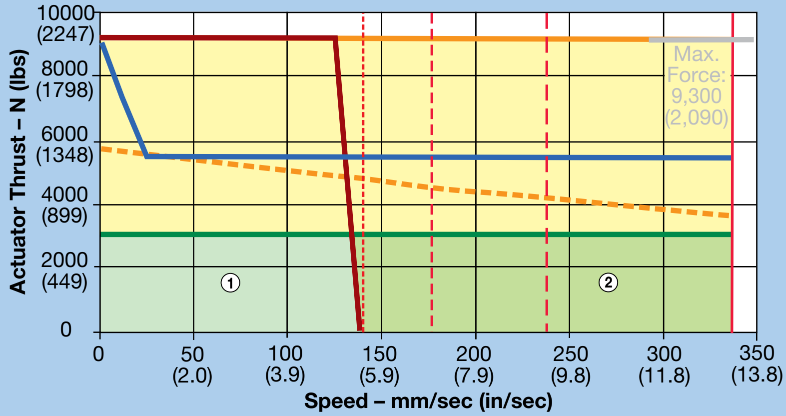
Performance Zones:

Motor Codes	Continuous Operation			
	1	2	3	4
XPL [(1)]	•		•	
XPM [(2)]	•		•	
XPN [(1)]	•	•		•*
XPP [(2)]	•	•		•*

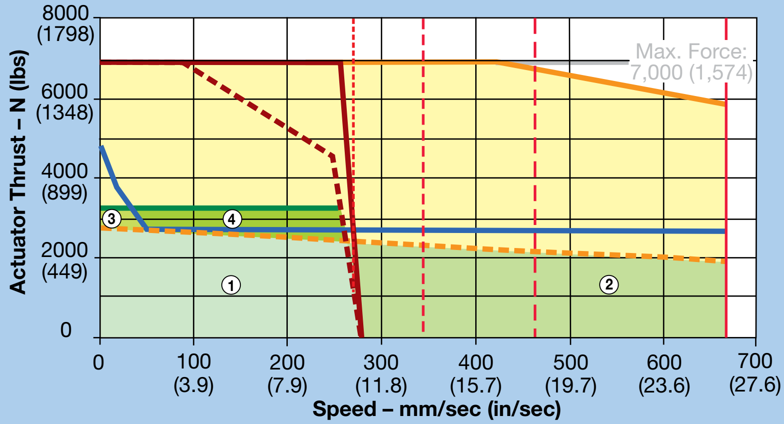
[(1)] Without brake [(2)] With brake
* In-line motor mount only

Intermittent Zone – Consult Factory
(operation will result in reduced life of the actuator and is not acceptable for parallel motor options if above the parallel motor mount limitation curve)

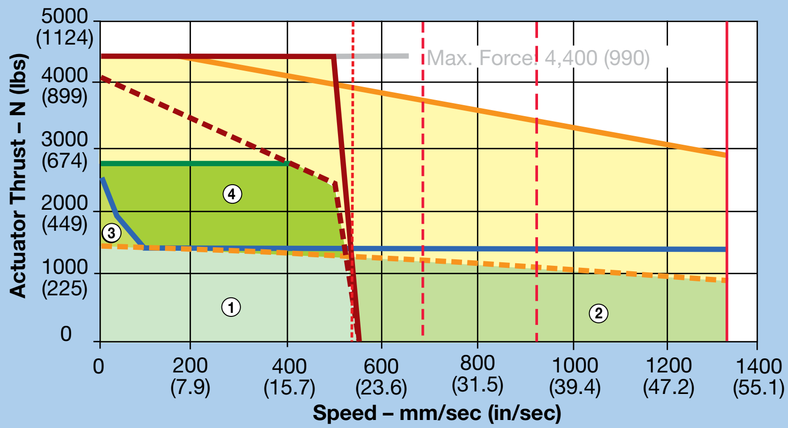
ETH050M05



ETH050M10



ETH050M20



** Maximum thrust assumes a cylinder mounting orientation with a fixed mounting position and a guided load. For limitations on column buckling, please see page 43.*

Electric Cylinders

ETH050 Speed-Thrust with Motors (680 VDC)

Maximum Thrust with Motor*:

Parallel motor mount limitation

Max thrust w/2540 km life (see page 45 for details)

XPQ – MPP1003R1E
Peak
Continuous

XPS – MPP1003R1E (with PV34FE-003)
Peak
Continuous

Maximum Speed:

1200 mm stroke
1000 mm stroke
800 mm stroke
Max actuator speed

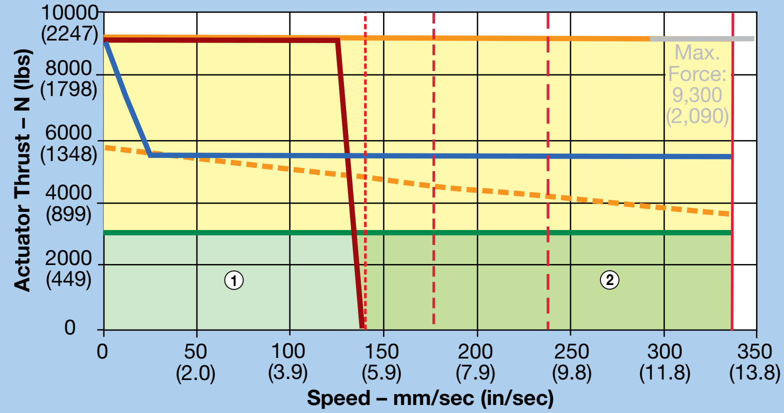
Performance Zones:

Motor Codes	Continuous Operation ①	②	③	④
XPQ (1)	•		•	
XPR (2)	•		•	
XPS (1)	•	•		•*
XPT (2)	•	•		•*

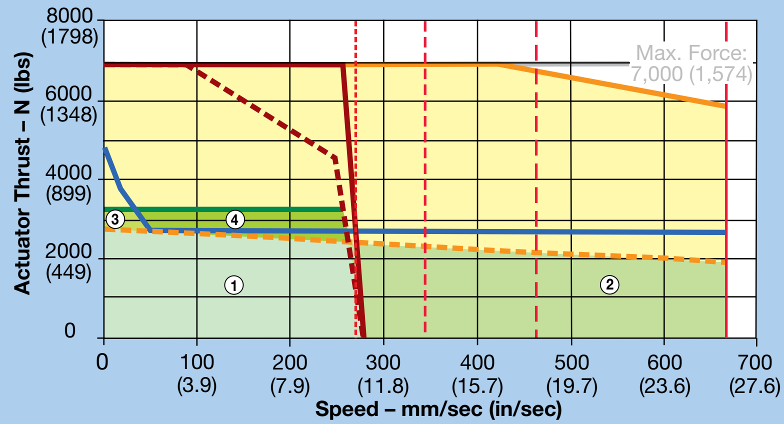
(1) Without brake (2) With brake
* In-line motor mount only

Intermittent Zone – Consult Factory
(operation will result in reduced life of the actuator and is not acceptable for parallel motor options if above the parallel motor mount limitation curve)

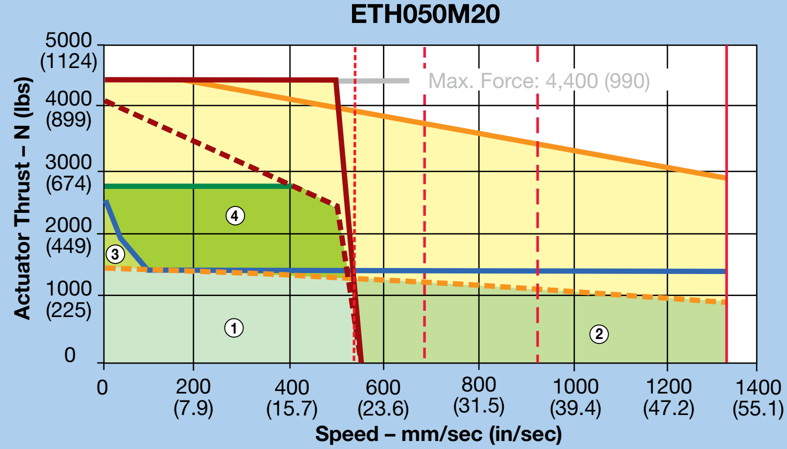
ETH050M05



ETH050M10



ETH050M20



** Maximum thrust assumes a cylinder mounting orientation with a fixed mounting position and a guided load. For limitations on column buckling, please see page 43.*

ETH080 Speed-Thrust with Motors (340 & 680 VDC)

Maximum Thrust with Motor*:

- Parallel motor mount limitation
- Max thrust w/2540 km life (see page 45 for details)

XPQ – MPP1003R1E
- Peak
- Continuous

XPS – MPP1003R1E (with PV34FE-003)
- Peak
- Continuous

XPU – MPP1154B1E
- Peak
- Continuous

XPW – MPP1154B1E (with PV115-003)
- Peak
- Continuous

Maximum Speed:
- 1600 mm stroke
- 1400 mm stroke
- 1200 mm stroke
- 1000 mm stroke
- Max actuator speed

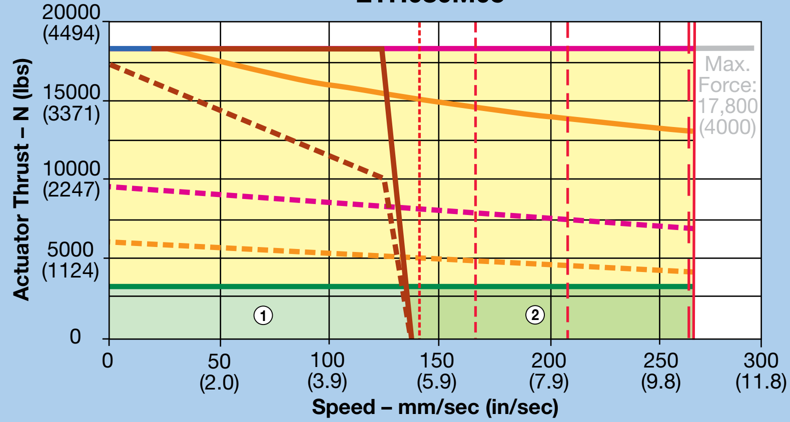
Performance Zones:

Motor Codes	Continuous Operation ①	②	③	④	⑤	⑥
XPQ (1)	•	•	•			
XPR (2)	•	•	•			
XPS (1)	•	•		•		
XPT (2)	•	•		•		
XPU (1)	•	•	•			
XPV (2)	•	•	•			
XPW (1)	•			•	•	•*
XPX (2)	•			•	•	•*

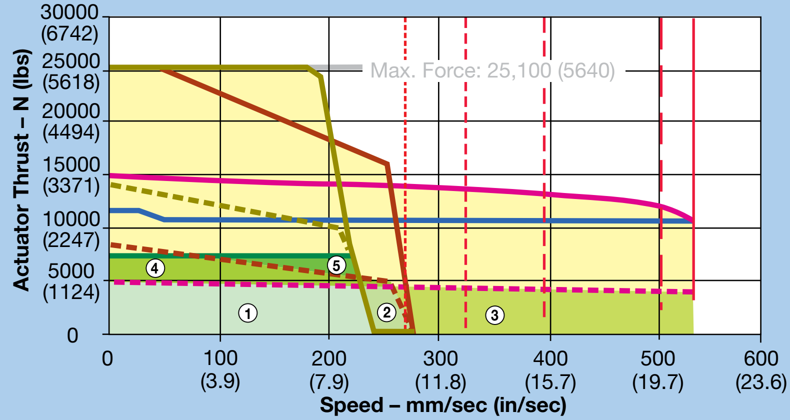
(1) Without brake (2) With brake
* In-line motor mount only

Intermittent Zone – Consult Factory
(operation will result in reduced life of the actuator and is not acceptable for parallel motor options if above the parallel motor mount limitation curve)

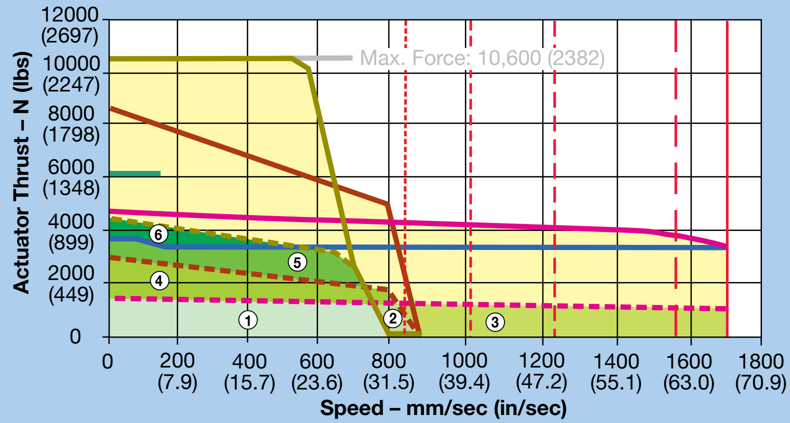
ETH080M05



ETH080M10



ETH080M32



** Maximum thrust assumes a cylinder mounting orientation with a fixed mounting position and a guided load. For limitations on column buckling, please see page 43.*

Electric Cylinders

Design Considerations — Calculating Axial Force

Use the equations below to calculate the thrust required to extend and retract the piston rod.

Once the individual segments are calculated, the maximum required axial force can be determined. This maximum axial force is used to determine the size of the cylinder and to check that the buckling load limit is not exceeded (see Permissible Axial Force, next page). Note that the axial forces calculated for each segment are later used as the calculation basis for the service life (see Design Considerations – Service Life).

Calculation of Axial Forces:

Determine the axial forces occurring during each individual segment of the application cycle. (Index "j" for the individual segments of the application cycle.)

Cylinder Rod Extending:

$$F_{x,a,j} = \left| F_{x,ext} + (m_{ext} + m_{Kse} + m_{Ks,0} + m_{Ks,Hub} \bullet \text{Hub}) \bullet (a_{K,j} + \sin\alpha \bullet 9{,}81\tfrac{m}{s^2}) \right|$$

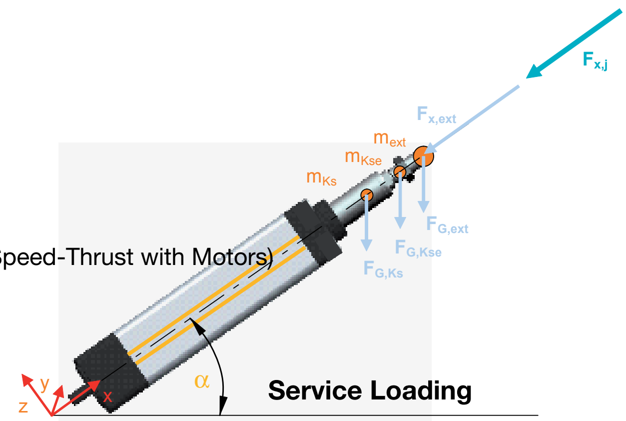
Cylinder Rod Retracting:

$$F_{x,e,j} = \left| - F_{x,ext} + (m_{ext} + m_{Kse} + m_{Ks,0} + m_{Ks,Stroke} \bullet \text{Stroke}) \bullet (a_{K,j} + \sin\alpha \bullet 9{,}81\tfrac{m}{s^2}) \right|$$

The values Fx,a,j and Fx,e,j are always positive.

Formula Abbreviations

$F_{x,a,j}$	Axial forces during extension (N)
$F_{x,e,j}$	Axial forces during retraction (N)
$F_{x,ext}$	External axial force (N)
$F_{G,ext}$	Weight force caused by an additional mass (N)
$F_{G,Kse}$	Weight force caused by the cylinder rod end (N)
$F_{G,Ks}$	Weight force caused by the cylinder rod (N)
m_{ext}	Additional mass (kg)
m_{Kse}	Mass of the cylinder rod end (kg) (see "Rod End Options" in Options & Accessories)
$m_{Ks,0}$	Mass of the cylinder rod at zero stroke in kg (see Speed-Thrust with Motors)
$m_{Ks,stroke}$	Mass of the cylinder rod per mm of stroke (kg)
Stroke	Selected stroke (m)
$a_{K,j}$	Acceleration at the cylinder rod (m/s²)
α	Alignment angle (°)
$F_{x,max}$	Maximum permissible axial force (N)

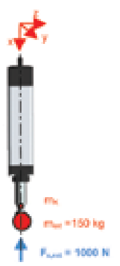


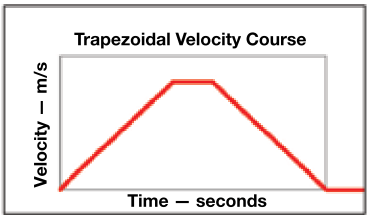
Index "j" for the individual segments of the application cycle

Example Calculation

Vertical Mounting

- ETH50
- Stroke = 500 mm = 0.5 m
- Pitch = 5 mm
- Rod End: External thread
- Trapezoidal velocity course
- Acceleration a_K = 4 m/s²
- m_{ext} = 150 kg
- $F_{x,ext}$ = 1000 N
- m_{Kse} = 0.15 kg
- $m_{Ks,0}$ = 0.15 kg
- $m_{Ks,Stroke}$ = 1.85 kg/m
- Alignment angle α = -90°





Thrust rod extending: Mass is moved downwards

Load case: Acceleration

$$F_{x,1} = \left| 1000N + \left(150kg + 0{,}15kg + 0{,}15kg + 1{,}85\frac{kg}{m} \cdot 0{,}5m\right) \cdot \left(4\frac{m}{s^2} + \sin(-90°) \cdot 9{,}81\frac{m}{s^2}\right) \right| = 121N$$

Load case: Constant Velocity

$$F_{x,2} = \left| 1000N + \left(150kg + 0{,}15kg + 0{,}15kg + 1{,}85\frac{kg}{m} \cdot 0{,}5m\right) \cdot \left(0\frac{m}{s^2} + \sin(-90°) \cdot 9{,}81\frac{m}{s^2}\right) \right| = 484N$$

Load case: Deceleration

$$F_{x,3} = \left| 1000N + \left(150kg + 0{,}15kg + 0{,}15kg + 1{,}85\frac{kg}{m} \cdot 0{,}5m\right) \cdot \left(-4\frac{m}{s^2} + \sin(-90°) \cdot 9{,}81\frac{m}{s^2}\right) \right| = 1088N$$

Thrust rod retracting: Mass is moved upwards

Load case: Acceleration

$$F_{x,4} = \left| -1000N + \left(150kg + 0{,}15kg + 0{,}15kg + 1{,}85\frac{kg}{m} \cdot 0{,}5m\right) \cdot \left(4\frac{m}{s^2} - \sin(-90°) \cdot 9{,}81\frac{m}{s^2}\right) \right| = 1088N$$

Load case: Constant Velocity

$$F_{x,5} = \left| -1000N + \left(150kg + 0{,}15kg + 0{,}15kg + 1{,}85\frac{kg}{m} \cdot 0{,}5m\right) \cdot \left(0\frac{m}{s^2} - \sin(-90°) \cdot 9{,}81\frac{m}{s^2}\right) \right| = 484N$$

Load case: Deceleration

$$F_{x,6} = \left| -1000N + \left(150kg + 0{,}15kg + 0{,}15kg + 1{,}85\frac{kg}{m} \cdot 0{,}5m\right) \cdot \left(-4\frac{m}{s^2} - \sin(-90°) \cdot 9{,}81\frac{m}{s^2}\right) \right| = 121N$$

Design Considerations — Permissible Axial Force

The risk of buckling is dependent on the stroke and mounting method. Use the charts below for the applicable mounting method and cylinder size to verify that the application's maximum axial force (calculations on previous page), is possible with the planned mounting method at the desired stroke. Please note that the retraction forces do not pose a buckling risk.

Method 1

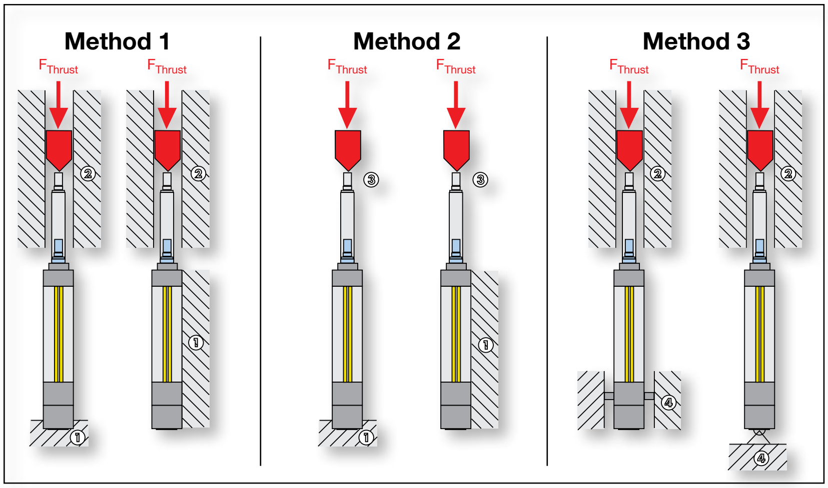
1. Cylinders fixed with mounting flanges, foot mounting or mounting plates
2. Thrust rod with axial guiding

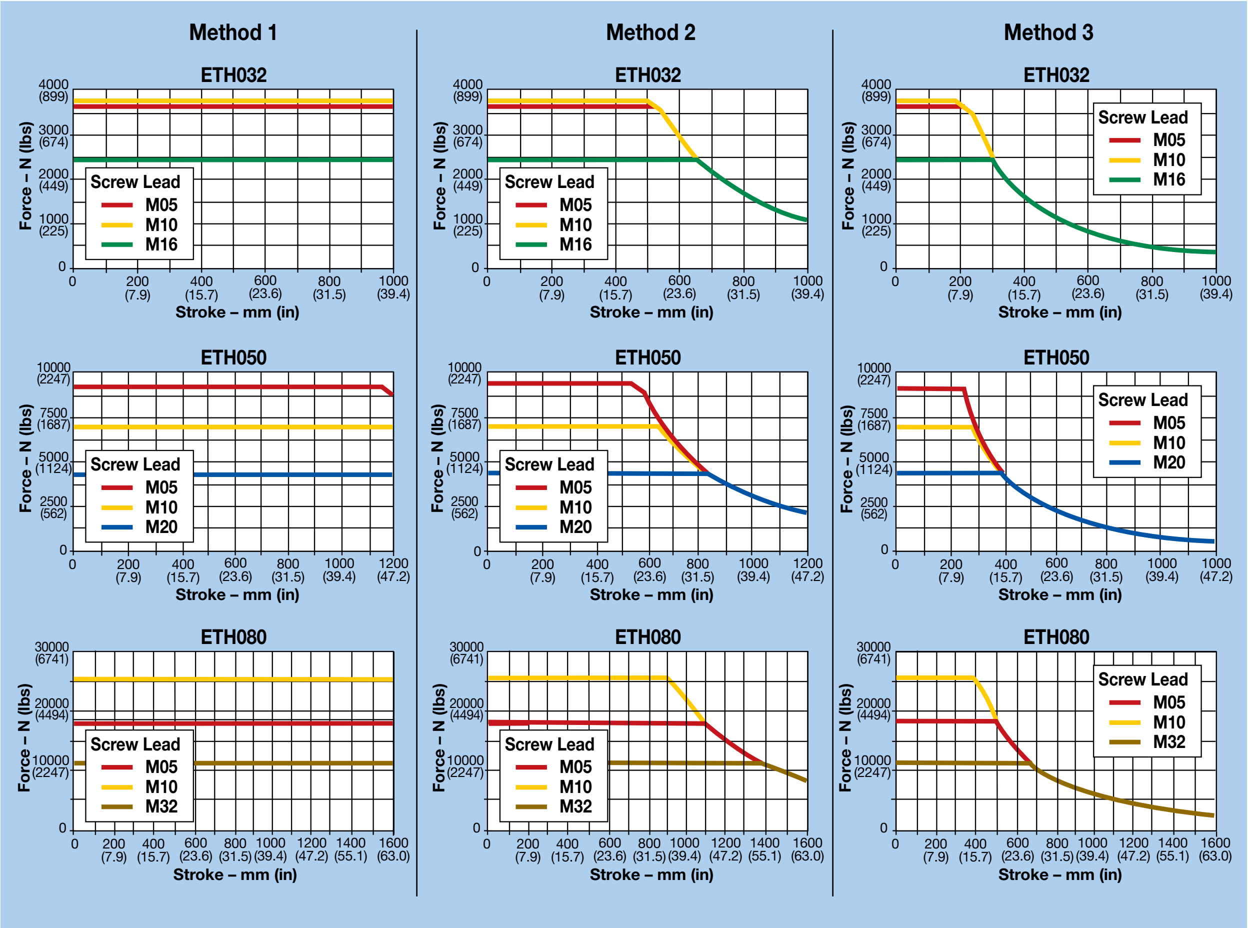
Method 2

1. Cylinders fixed with mounting flanges, foot mounting or mounting plates
3. Thrust rod without axial guiding

Method 3

4. Cylinders mounted via center trunnion or rear clevis
2. Thrust rod with axial guiding





Electric Cylinders

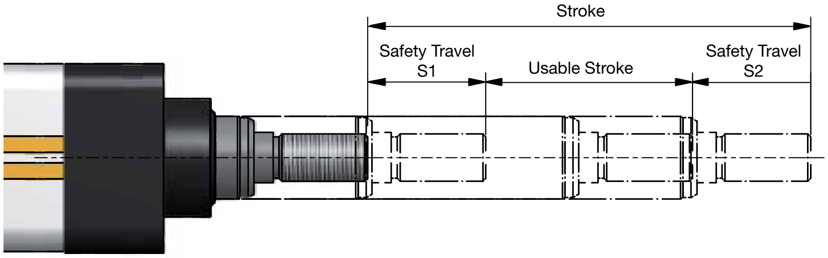
Design Considerations — Stroke, Usable Stroke and Safety Travel

Stroke:

The stroke to be indicated in the order code is the mechanically maximal possible stroke, which is the stroke between the internal end stops.

Usable Stroke:

The usable stroke is the distance needed for the application. It is always shorter than the stroke.



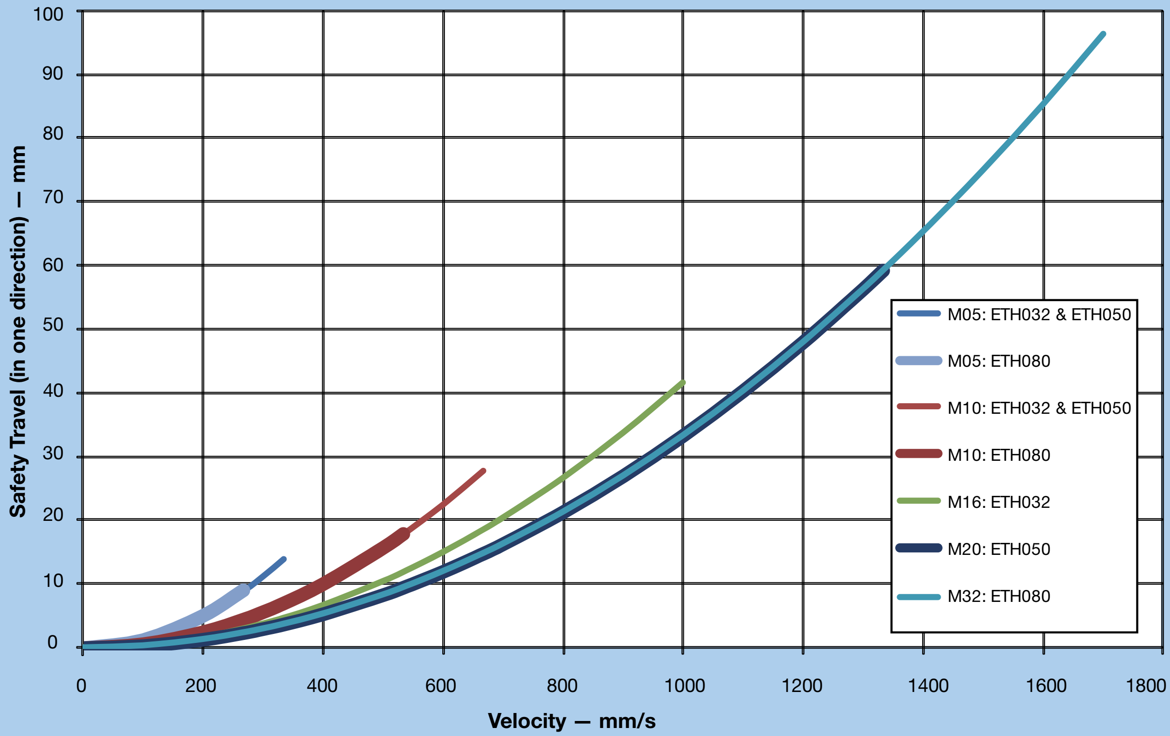
Safety Travel (S1 & S2)

The safety travels are required to slow down the cylinder after it has passed a limit switch, Emergency stop in order to avoid contact with the mechanical limit stops.

Depending on the screw lead and the maximum speed, the following diagram recommends a minimum safety travel, which is sufficient for most applications according to experience.

With demanding applications (great masses and high dynamic), the safety travel has to be calculated and enlarged accordingly (dimensioning on demand).

The safety travel shown in the diagram is for one direction only. The diagram value must be multiplied by two for the total safety travel for both extend and retract directions.



Design Considerations — Service Life

Nominal Service Life[1]

The nominal service life of the electric cylinder can be determined with the aid of the known forces.

The nominal service life is calculated as follows:

The forces calculated for each individual segment of the application cycle must be summarized into an equivalent axial force F_m (see "Calculating Required Axial Force" in previous section).

$$F_m = \sqrt[3]{\frac{1}{s_{ges}} (F^3_{x,1} \bullet s_1 + F^3_{x,2} \bullet s_2 + F^3_{x,3} \bullet s_3 + ...)}$$

(Index "j" for the individual segments of the application cycle. For example, the first segment would be F^3_{x1} where j = 1, the second segment would be F^3_{x2} where j = 2, etc.)

Nominal Service Life Prerequisites

- Bearing and screw temperature between 20°C and 40°C
- No impairment of the lubrication, for example by external particles
- Relubrication in accordance with the specifications
- The given values for thrust force, speed and acceleration must be adhered to at any rate
- No approaching the mechanical end stops (external or internal), no other abrupt loads, as the given maximum force of the cylinder may never be exceeded
- The given lateral forces applied to the cylinder rod must always be respected
- No high exploitation of several power features at a time (for example maximum speed or thrust force)
- No regulating oscillation at standstill

[1] Nominal service life is the service life reached by 90 % of a sufficient number of similar electric cylinders until the first signs of material fatigue occur.

Actual Service Life

The actual service life can only be approximated due to a variety of different effects. The nominal service life L calculation does, for instance, not take insufficient lubrication, impacts and vibrations into consideration. These effects can however be estimated with the aid of the application factor f_w.

The actual service life is calculated as follows:

$$L_{fw} = \frac{L}{f_w^{\,3}}$$

If you need the service life as the number of possible cycles, just divide the service life in kilometers by twice the stroke traveled.

Standstill times are not taken into consideration when determining the equivalent axial force (Fm), as sj=0.

CAUTION: always consider the stroke as well as the return stroke.

Formula Abbreviations

F_m	Equivalent axial force (N)
F_x F_j	Resulting axial force in N (see formula 1 & 2, Calculating Axial Force)
s_j	Travel given a defined force Fx,a,j (mm)
s_{total}	Total travel (mm)
L	Nominal service life in km (see Service Life graphs)
L_{fw}	Service life as a function of the application factor (km)
f_w	Application factor (see "Application Factor F_w" table at right)

Application Factor f_w **

Movement Cycle	Shocks/Vibrations None	Light	Medium	Heavy
More than 2.5 screw rotations	1.0	1.2	1.4	1.7
1.0 to 2.5 screw rotations* **(short stroke applications)**	1.8	2.1	2.5	3.0

* After max. 10 000 movement cycles, a lubrication run must be performed (see lubrication run intervals table).

**** Boundary Conditions for Application Factor f_w:**

- Externally guided electric cylinders
- Accelerations <10 m/s²
- Application factor <1.5
- For other conditions, please contact Parker

Lubrication Run Lengths for Short Stroke Applications

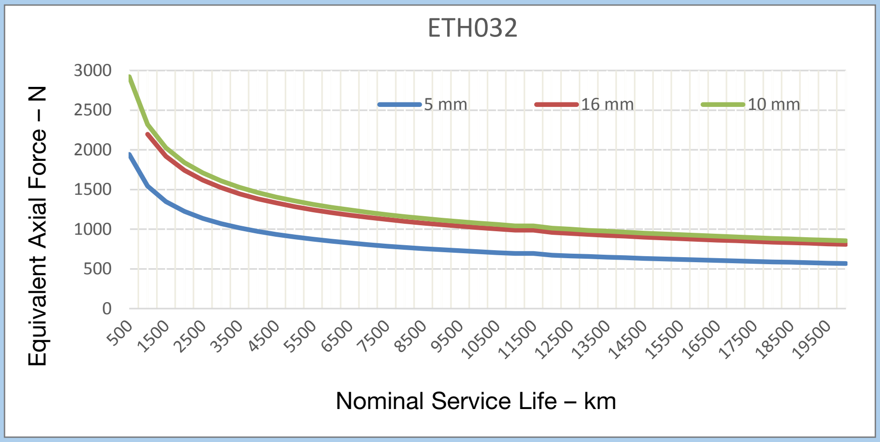
	ETH032			ETH050			ETH080			ETH100		ETH125	
Run Length	**M05**	**M10**	**M16**	**M05**	**M10**	**M20**	**M05**	**M10**	**M32**	**M10**	**M20**	**M10**	**M20**
mm	>45	>54	>58	>40	>46	>58	>47	>65	>95	>102	>140	>122	>210

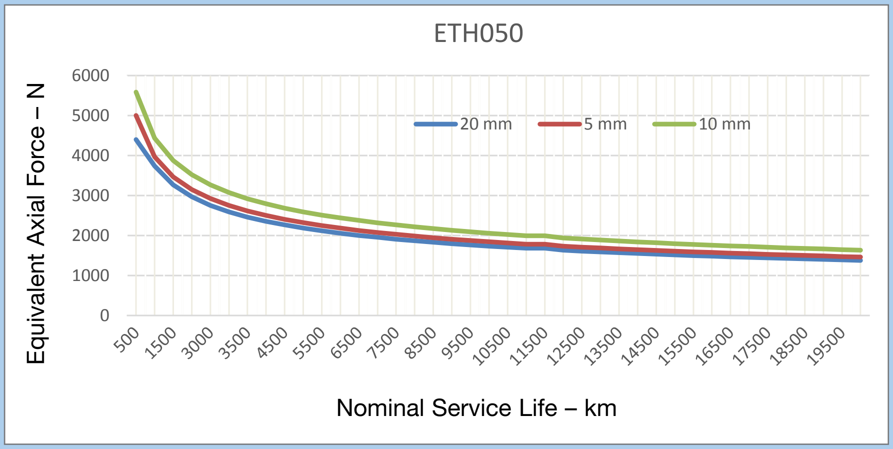
Electric Cylinders

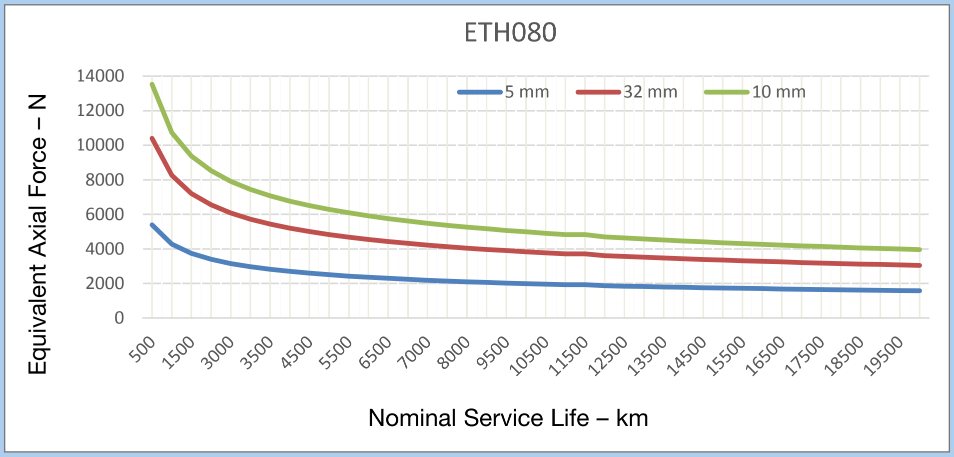
Design Considerations — Service Life

Values are based on following recommended lubrication intervals.

(See Relubrication for details in Sizing & Selection.





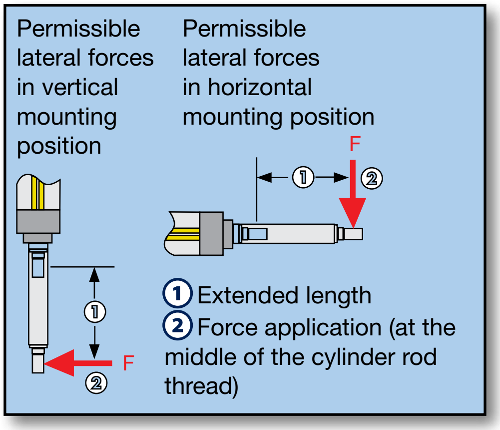


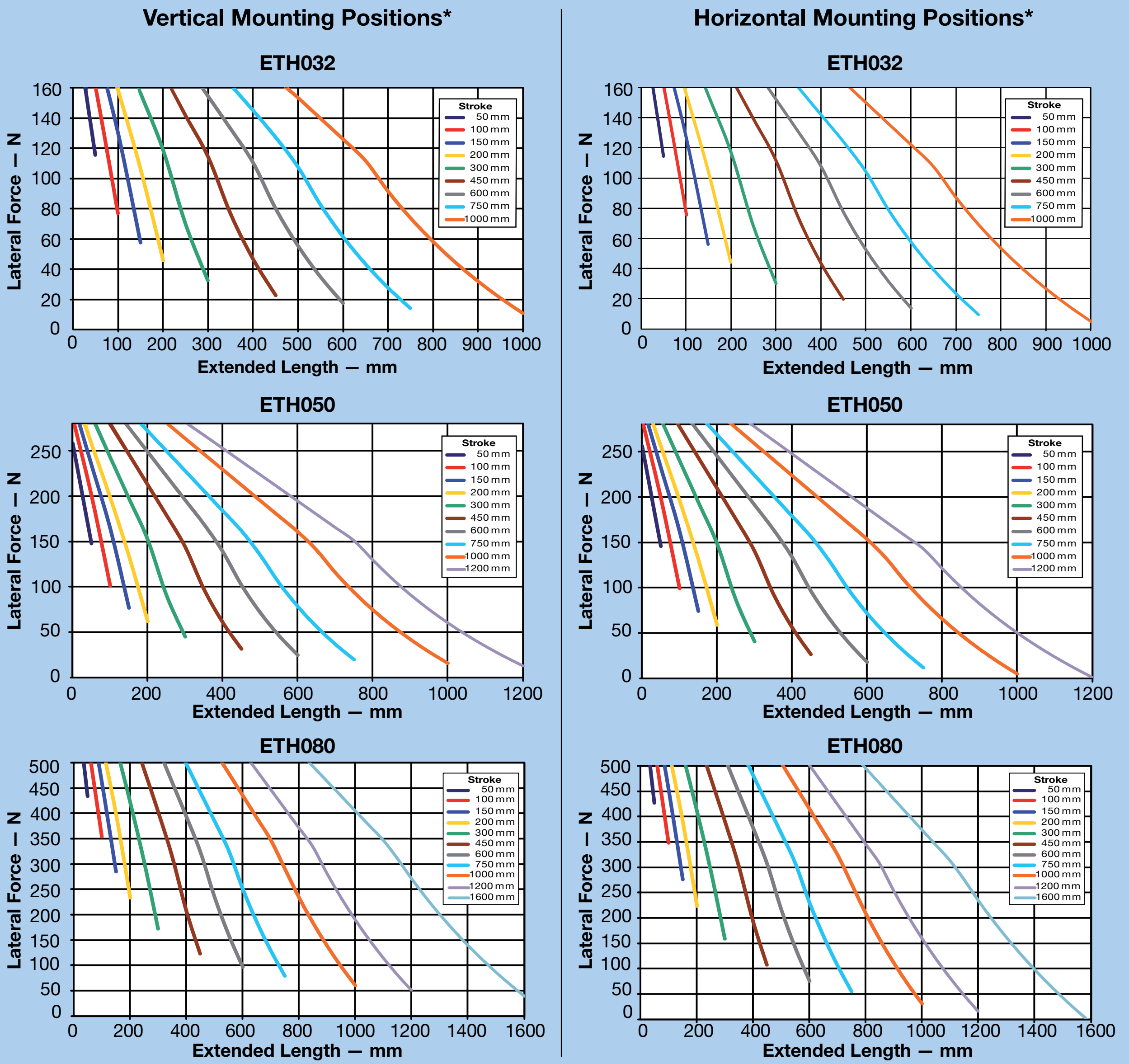
Design Considerations — Permissible Side Load

The electric cylinder features a generously dimensioned cylinder rod and screw nut bearing in the form of high-quality plastic sliding bushings to absorb the lateral force.

Please note that electric cylinders with a longer stroke permit a higher lateral force at the same extension length. It may therefore be useful to choose a longer stroke than required for the application in order to increase the permissible lateral force.

If the permissible lateral forces are exceeded or if the maximum axial force occurs at the same time, the optional outrigger bearing (option R) must be used.



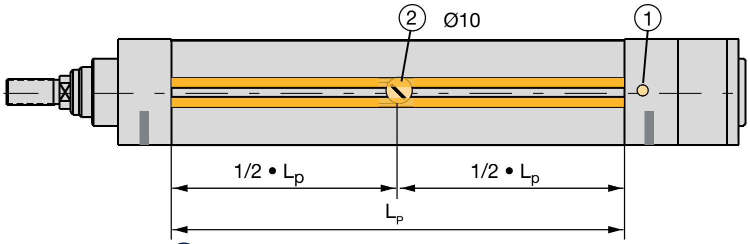


* The diagrams apply for a medium travel speed of 0.5 m/s, an ambient temperature of 20°C and all housing orientations.

Electric Cylinders

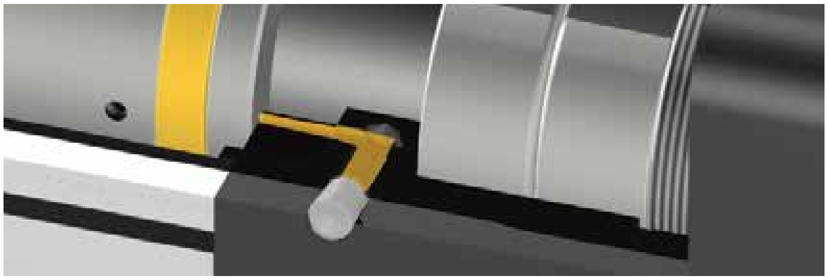
Design Considerations — Relubrication

All frame sizes are designed with a range of lubrication port locations for maximum easy access. Contact factory for special needs not shown.



1 Central lubrication (standard)
2 Optional lubrication (possible on all 4 sides):
L_P: Length of profile

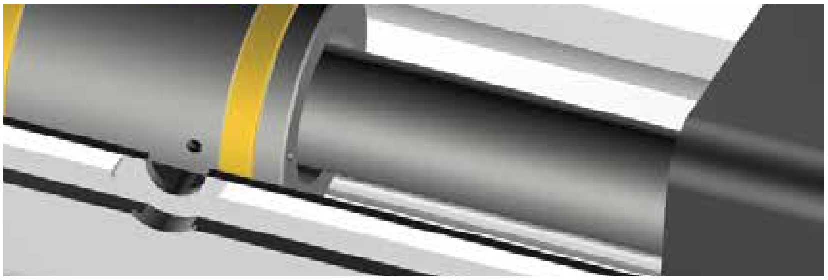
Option 1: Integrated lubrication Port (standard)



Relubrication is simple with the easy access port. Users simply perform a controlled retract of the cylinder approaching the endstop under slow speed and grease the cylinder.

The standard easy access port is always at the 3 o'clock position.

Option 2...5: Lubrication Hole (optional)



If a space constraint does not allow easy access to the standard lubrication port, other options in the part number configuration allow for a port at the center of the extrusion.

Free access to this bore even after integration of the cylinder into a system can be ensured by choosing the corresponding profile orientation (see Ordering Information). The bore is located exactly in the middle of the aluminum profile.

Lubrication Intervals*

Lubrication intervals depend on the operating conditions (nominal size, pitch, speed, acceleration, loads, etc.) and the ambient conditions (e.g. temperature). Ambient influences such as high loads, impacts and vibrations shorten the lubrication intervals.

Under normal operating conditions, the given lubrication intervals apply. If the total travel per year is shorter than the given intervals, the cylinder must be relubricated at least once per year. In the event of small loads and if the application is impact and vibration free, the lubrication intervals can be extended.

The lubricant used is Klüber and is available worldwide.

Normal Operating Conditions:

- Medium screw velocity 2000 rpm
- Operating factor f_w=1.0
- No impacts and vibrations

ETH032			ETH050			ETH080		
M05	**M10**	**M16**	**M05**	**M10**	**M20**	**M05**	**M10**	**M32**
300 km	600 km	960 km	300 km	600 km	1200 km	300 km	600 km	1500 km

Design Considerations — Motor and Gearhead Selection

Drive Torque Calculation

The torques to be produced by the motor result from the acceleration, the load and the friction torque. The drive torques must be calculated for all segments of the application cycle (represented by index "j"). Index "j" for the individual segments of the application cycle.

Calculation of the **acceleration torque** with respect to the rotary moments of inertia:

$$M_{B,j} = \left((J_{i/p,0} + J_{i/p,Hub} \bullet Hub) \bullet \frac{1}{\eta_{ETH}} \bullet \boxed{\frac{1}{i_G^{\,2} \bullet \eta_G} + J_G} + J_M \right) \bullet 10^{-3} \bullet \frac{6{,}28 \bullet a_{K,j}}{P_h}$$

(use only with gearhead)

The acceleration forces due to the translatory moved masses are taken into consideration in the calculation of the axial forces (see Design Considerations — Calculating Axial Force.)

The **load torques** result from the occurring axial forces:

$$M_{L,j} = \frac{F_{x,a/e,j}}{\text{Thrust force factor}} \bullet \boxed{\frac{1}{i_G \bullet \eta_G}}$$

(use only with gearhead)

The motor must therefore generate the following **drive torques**:

$$M_{M,j} = M_{B,j} + M_{L,j}$$

The peak torque of the motor must exceed the maximum occurring drive torque.

The **effective torque** can be deduced from the drive torques for all segments of the application cycle:

$$M_{eff} = \sqrt[2]{\frac{1}{t_{ges}} \bullet (M_{M1}^{\,2} \bullet t_1 + M_{M2}^{\,2} \bullet t_2 + \ldots)}$$

The nominal torque of the motor must exceed the calculated effective torque. Refer to the Motor Mounting Configuration charts (see Dimensions), to verify that the motor is mechanically compatible to the corresponding electric cylinder.

Formula Abbreviations

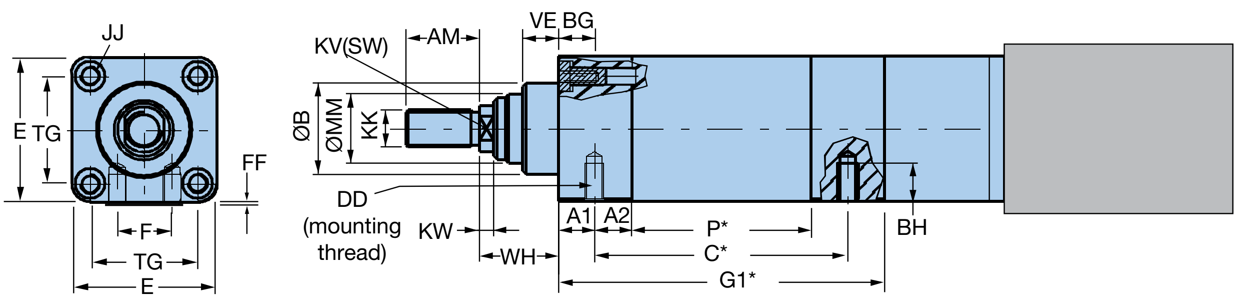
$M_{B,j}$	Variable acceleration torque in Nm
$J_{i/p,0}$	Red. rot. mass moment of inertia at zero stroke for inline/parallel motor configuration in kgmm² (see graphs in Speed/Thrust with Motors)
$J_{i/p,\,stroke}$	Red. rot. mass moment of inertia per mm of stroke for inline/parallel motor configuration in kgmm² (see graphs in Speed/Thrust with Motors)
Stroke	Selected stroke in mm
η_{ETH}	Efficiency of the electric cylinder (0.9 – inline drive configuration; 0.81 – parallel motor)
i_G	Gearhead ratio
ηG	Efficiency of the gearhead (see gearhead manufacturer specifications)
J_M	Motor mass moment of inertia in kgmm² (see motor manufacturer specifications)
J_G	Gearhead mass moment of inertia in kgmm² (see gearhead manufacturer specifications)
$a_{K,j}$	Acceleration at the cylinder rod in m/s²
P_h	Screw pitch in mm
$M_{L,j}$	Load torque in Nm
$F_{x,a/e,j}$	Loads in x direction in N (see Design Considerations — Calculating Axial Force)
$M_{M,j}$	Drive torque in Nm
M_{eff}	Effective value — motor in Nm
t_{total}	Total cycle time in s
t_j	Amount of time in the cycle in s

DIMENSIONS

ETH Motor Mounting Configurations

Download 2D & 3D files from www.parker.com/emn

Inline Dimensions (mm)

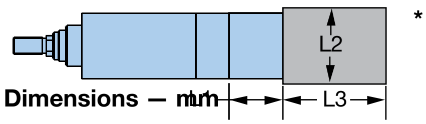


* Specified dimension + selected stroke

Cylinder Size		ETH032			ETH050			ETH080			ETH100		ETH125	
Screw Lead		**M05**	**M10**	**M16**	**M05**	**M10**	**M20**	**M05**	**M10**	**M32**	**M10**	**M20**	**M10**	**M20**
C	IP54	93.5	103.0	106.5	99.5	105.5	117.5	141.5	159.5	189.5	— [2]	— [2]	— [2]	— [2]
	IP65	94.5	103.5	107.5	100.5	106.5	118.5	142.5	160.5	190.5	— [2]	— [2]	— [2]	— [2]
G1	IP54	133.0	142.0	146.0	154.0	160.0	172.0	197.0	215.0	245.0	323.0	361.0	461.0	549.0
	IP65	180.5	189.5	193.5	198.5	204.5	216.5	259.5	277.5	307.5	349.5	387.5	487.5	575.5
P		66.0	75.0	79.0	67.0	73.0	85.0	89.0	107.0	137.0	162.0	200.0	192.0	280.0
A1	IP54	14.0			15.5			21.0			— [2]		— [2]	
	IP65	60.0			58.5			82.0			— [2]		— [2]	
A2		17.0			18.5			32			— [2]		— [2]	
AM		22.0			32.0			40.0			70.0		96.0	
BG		16.0			25.0			26.0			32.0		44.0	
BH		9.0			12.7			18.5			— [2]		— [2]	
DD		M6x1.0			M8x1.25			M12x1.75			— [2]		— [2]	
E		46.5			63.5			95.0			120.0		150.0	
F		16.0			24.0			30.0			— [2]		— [2]	
FF		0.5			0.5			1.0			0		0	
JJ		M6x1.0 [1]			M8x1.25			M10x1.5			M16x2		M20x2.5	
KK		M10x1.25			M16x1.5			M20x1.5			M10x1.5		M20x2.5	
KV		10.0			17.0			22.0			46.0		55.0	
ØMM		22.0			28.0			45.0			70.0		85.0	
TG		32.5			46.5			72.0			89.0		105.0	
KW		5.0			6.5			10.0			10.0		10.0	
VE		12.0			16.0			20.0			20.0		20.0	
WH		26.0			37.0			46.0			51.0		53.0	
ØB		30.0			40.0			60.0			90.0		110.0	

[1] Thru holes should have a minimum diameter of 7 mm on any component attached to the front threaded screw holes on bolt pattern TG.
[2] ETH100 & ETH125 do not have a mounting thread on the underside
For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

Inline Mounts with Xpress Motors



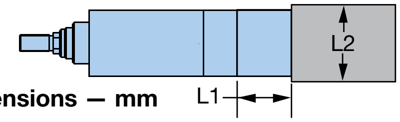
Flange & Coupling to Accept Xpress Motor **Dimensions — mm**

Cylinder Size	Xpress Order Code	Motor (w/Gearhead) Description	Pilot	Bolt Circle	Shaft Ø	Shaft Length	L1	L2	L3
ETH032	**XPC**	BE233FJ-KPSN	38.10	66.68	9.52	20.8	66.0	58.0	145.0
	XPD	CM233FJ-115027	38.10	66.68	9.52	20.8	66.0	58.0	177.0
	XPG	BE344LJ-KPSN	73.03	98.43	12.70	30.2	65.0	85.0	188.0
	XPH	BE344LJ-KPSB	73.03	98.43	12.70	30.2	65.0	85.0	231.0
ETH050	**XPC**	BE233FJ-KPSN	38.10	66.68	9.52	31.8	65.0	65.0	145.0
	XPD	CM233FJ-115027	38.10	66.68	9.52	31.8	65.0	65.0	177.0
	XPG	BE344LJ-KPSN	73.03	98.43	12.70	30.2	63.0	85.0	188.0
	XPH	BE344LJ-KPSB	73.03	98.43	12.70	30.2	63.0	85.0	231.0
	XPL [3]	MPP1003D1E-KPSN	95.00	115.00	19.00	40.0	88.0	98.0	175.0
	XPM [3]	MPP1003D1E-KPSB	95.00	115.00	19.00	40.0	88.0	98.0	223.0
	XPN	MPP1003D1E-KPSN [1]	73.03	98.43	12.70	31.8	63.0	100.0	288.0
	XPP	MPP1003D1E-KPSB [1]	73.03	98.43	12.70	31.8	63.0	100.0	336.0
	XPQ [3]	MPP1003R1E-KPSN	95.00	145.00	19.00	40.0	88.0	98.0	175.0
	XPR [3]	MPP1003R1E-KPSB	95.00	145.00	19.00	40.0	88.0	98.0	223.0
	XPS	MPP1003R1E-KPSN [1]	73.03	98.43	12.70	31.8	63.0	100.0	288.0
	XPT	MPP1003R1E-KPSB [1]	73.03	98.43	12.70	31.8	63.0	100.0	336.0
ETH080	**XPG**	BE344LJ-KPSN	73.03	98.43	12.70	30.2	92.5	98.0	188.0
	XPH	BE344LJ-KPSB	73.03	98.43	12.70	30.2	92.5	98.0	231.0
	XPL	MPP1003D1E-KPSN	95.00	115.00	19.00	40.0	101.5	98.0	175.0
	XPM	MPP1003D1E-KPSB	95.00	115.00	19.00	40.0	101.5	98.0	223.0
	XPN	MPP1003D1E-KPSN [1]	73.03	98.43	12.70	31.8	92.5	100.0	288.0
	XPP	MPP1003D1E-KPSB [1]	73.03	98.43	12.70	31.8	92.5	100.0	336.0
	XPQ	MPP1003R1E-KPSN	95.00	115.00	19.00	40.0	101.5	98.0	175.0
	XPR	MPP1003R1E-KPSB	95.00	115.00	19.00	40.0	101.5	98.0	223.0
	XPS	MPP1003R1E-NPSN [1]	73.03	98.43	12.70	31.8	92.5	100.0	288.0
	XPT	MPP1003R1E-NPSB [1]	73.03	98.43	12.70	31.8	92.5	100.0	336.0
	XPU	MPP1154B1E-KPSN	110.00	130.00	24.00	50.0	111.5	113.0	203.0
	XPV	MPP1154B1E-KPSB	110.00	130.00	24.00	50.0	111.5	113.0	252.0
	XPW	MPP1154B1E-KPSN [2]	110.00	130.00	24.00	50.0	111.5	115.0	352.5
	XPX	MPP1154B1E-KPSB [2]	110.00	130.00	24.00	50.0	111.5	115.0	401.5
	XPY	MPP1154P1E-KPSN [2]	110.00	130.00	24.00	50.0	111.5	115.0	203.0
	XPZ	MPP1154P1E-KPSB [2]	110.00	130.00	24.00	50.0	111.5	115.0	252.0
	XP1	MPP1154P1E-KPSN [2]	110.00	130.00	24.00	50.0	111.5	115.0	352.5
	XP2	MPP1154P1E-KPSB [2]	110.00	130.00	24.00	50.0	111.5	115.0	401.5

[1] With Parker PV34FE-003 gearhead
[2] With Parker PV115FB-003 gearhead
[3] Requires coupling housing on ETH050 with a square dimension of 80 mm to accommodate a larger coupling.
For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

* L1 = Length Coupling Housing + Flange
L2 = Maximum Motor or Gearhead Square Flange
L3 = Length Motor + Gearhead

Inline Mounts for other Parker Motors



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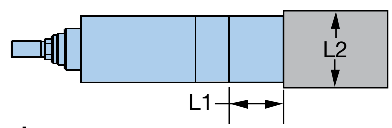
Flange & Coupling to Accept Parker Motor

Dimensions — mm

Cylinder Size	Kit Order Code	Parker Motor Description	Pilot	Bolt Circle	Shaft Ø	Shaft Length	L1	L2
ETH032	**KCB**	SM23X	38.10	66.68	9.52	20.8	60.0	58.0
	KBB	BE23X	38.10	66.68	9.52	31.8	66.0	58.0
	KCA	SM16/BE16	20.00	46.69	6.35	25.0	62.0	58.0
	KEA	LV23/HV23	38.10	66.68	6.35	20.8	60.0	58.0
	KBC	BE34X	73.03	98.43	12.70	30.2	65.0	85.0
	KEB	LV34/HV34	73.03	98.43	12.70	37.1	73.0	85.0
ETH050	**KCB**	SM23X	38.10	66.68	9.52	20.8	57.5	65.0
	KBB	BE23X	38.10	66.68	9.52	31.8	65.0	65.0
	KBC	BE34X	73.03	98.43	12.70	30.2	63.0	85.0
	KAA	MPP92/MPJ92	80.00	100.00	16.00	40.1	74.0	90.0
	KEB	LV34/HV34	73.03	98.43	12.70	37.1	70.0	85.0
	KAB [1]	MPP100/MPJ100	95.00	115.00	19.00	40.1	88.0	98.0
ETH080	**KBC**	BE34X	73.03	98.43	12.70	30.2	92.5	98.0
	KAA	MPP92/MPJ92	80.00	100.00	16.00	40.1	101.5	98.0
	KAB	MPP100/MPJ100	95.00	115.00	19.00	40.0	101.5	98.0
	KAC	MPP115/MPJ115	110.00	130.00	24.00	50.0	111.5	113.0

[1] Requires coupling housing on ETH050 with a square dimension of 80 mm to accommodate a larger coupling.
For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

Inline Mounts for Parker Gearheads



*

Flange & Coupling to Accept Parker Gearhead

Dimensions — mm

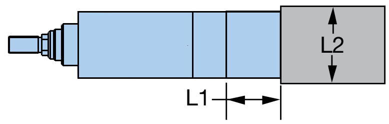
Cylinder Size	Kit Order Code	Parker Gearhead Description	Pilot	Bolt Circle	Shaft Ø	Shaft Length	L1	L2
ETH032	**PAN**	PV60FB/PX60	50.00	70.00	16.00	25.0	61.0	62.0
	PCN	PV23FE/PX23	38.10	66.68	9.52	25.4	60.0	58.0
	PDN	PV34FE/PX34	73.03	98.43	12.70	31.8	65.0	85.0
ETH050	**PAN**	PV60FB/PX60	50.00	70.00	16.00	25.0	60.5	65.0
	PBN [1]	PV90FB/PX90	80.00	100.00	20.00	40.0	93.0	90.0
	PCN	PV23FE/PX23	38.10	66.68	9.52	25.4	65.0	65.0
	PDN	PV34FE/PX34	73.03	98.43	12.70	31.8	63.0	85.0
ETH080	**PBN**	PV90FB/PX90	80.00	100.00	20.00	40.0	101.5	90.0
	PJN	PV115FB/PX115	110.00	130.00	24.00	50.0	111.5	115.0
	PDN	PV34FE/PX34	73.03	98.43	12.70	31.8	92.5	98.0
	PEN	PV42FE/PX42	55.55	125.70	15.88	38.1	100.0	113.0

[1] Requires coupling housing on ETH050 with a square dimension of 80 mm to accommodate a larger coupling.
For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

* L1 = Length Coupling Housing + Flange
L2 = Maximum Motor or Gearhead Square Flange

Inline Mounts for Non-Standard Motors

Inline Mounting Compatible Motor Dimensions – mm



* L1 = Length Coupling Housing + Flange
L2 = Maximum Motor or Gearhead Square Flange

	Maximum Motor Shaft Ø	
Model	**With Key**	**Without Key**
ETH032	16	16
ETH050	24	24
ETH080	28	28

For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

Couplers

Order Code	Coupler Size (Motor Shaft Ø)	Compatibility ETH032	ETH050	ETH080
A	No Coupler	•	•	•
B	0.25”	•	•	
C	0.375”	•	•	
D	0.5”	•	•	•
E	0.625”	•	•	•
H	6 mm	•	•	
J	8 mm	•	•	
K	9 mm	•	•	
L	11 mm	•	•	
M	14 mm	•	•	•
N [1]	16 mm	•	•	•
P [1]	19 mm		•	•
Q [1]	20 mm		•	•
R [1]	22 mm		•	•
S [1]	24 mm		•	•

[1] Requires coupling housing on ETH050 with a square dimension of 80 mm to accommodate a larger coupling.
For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

Ordering Non-Standard Motor Mounts

Use the appropriate order codes from the charts to build the desired “Flange Only” or “Flange and Coupler” Kit Order Code. Note: all non-standard motor mount kits use three character descriptions beginning with an N, followed by a Coupler and a Flange designator.

Kit Order Code Designators: 1 N 2 3

1 **Non-standard motor mount**
2 **Coupler order code**
3 **Flange order code**

Kit Order Code Examples	**Kit Order Code**
No flange, no coupler	NAA
Flange C (for ETH050), no coupler	NAC
Flange C (for ETH050), 0.5” coupler	NDC

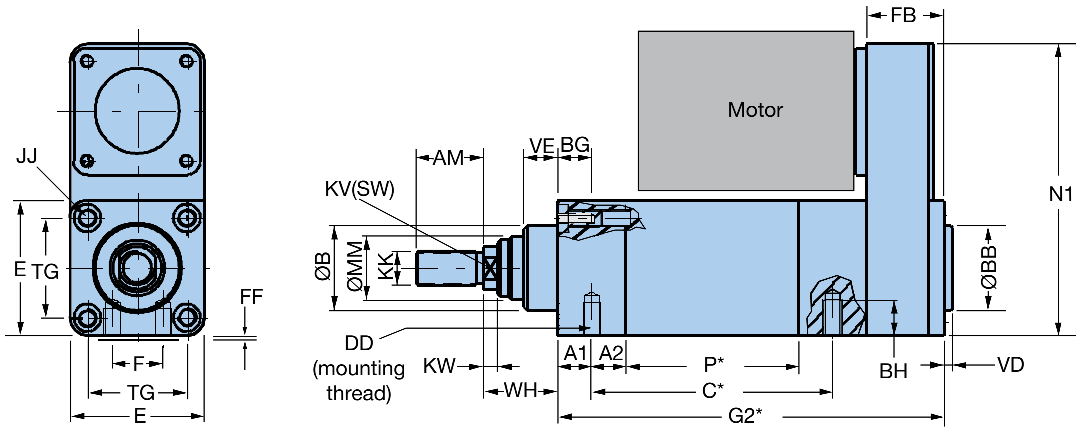
Flanges

Dimensions — mm

Order Code	Bolt Circle	Bolt Hole	Pilot Ø	Pilot Depth	Motor Shaft Length	Compatibility ETH032 L1	ETH032 L2	ETH050 L1	ETH050 L2	ETH080 L1	ETH080 L2
A			No Flange			0.0		0.0		0.0	
B	46.00	M4	30.00	3.5	25.0	60.0	58.0	—	—	—	—
C	63.00	M5	40.00	3.5	20.0	60.0	58.0	57.5	65.0	—	—
D	70.00	M5	50.00	3.5	30.0	67.0	65.0	65.5	65.0	—	—
E	75.00	M5	60.00	3.5	23.0	60.0	70.0	59.0	70.0	—	—
F	75.00	M5	60.00	3.5	30.0	66.0	70.0	65.5	70.0	—	—
G	90.00	M6	70.00	3.5	40.0	—	—	84.0	96.0	92.5	96.0
H	95.00	M6	50.00	3.5	30.0	76.0	82.0	65.5	82.0	—	—
J	100.00	M6	80.00	3.5	40.0	76.0	89.0	84.0	96.0	94.5	96.0
K	115.00	M8	95.00	3.5	40.0	—	—	84.0	100.0	94.5	100.0
L	130.00	M8	110.00	3.5	50.0	—	—	—	—	104.5	115.0
M	130.00	M8	95.00	3.5	50.0	—	—	—	—	101.5	115.0

For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

Parallel Dimensions

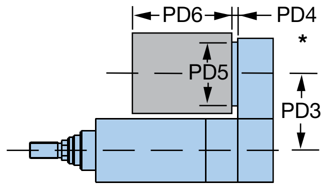


* Specified dimension + selected stroke

Cylinder Size		ETH032			ETH050			ETH080			ETH100		ETH125	
Screw Lead		M05	M10	M16	M05	M10	M20	M05	M10	M32	M10	M20	M10	M20
C	IP54	93.5	103.0	106.5	99.5	105.5	117.5	141.5	159.5	189.5	— (2)	— (2)	— (2)	— (2)
	IP65	94.5	103.5	107.5	100.5	106.5	118.5	142.5	160.5	190.5	— (2)	— (2)	— (2)	— (2)
G2	IP54	180.5	189.5	193.5	194.0	200.0	212.0	257.0	275.0	305.0	451.0	489.0	624.0	712.0
	IP65	228.5	237.5	241.5	239.0	245.0	257.0	320.0	338.0	368.0	478.0	516.0	651.0	739.0
P		66.0	75.0	79.0	67.0	73.0	85.0	89.0	107.0	137.0	162.0	200.0	192.0	280.0
A1	IP54	14.0			15.5			21.0			— (2)		— (2)	
	IP65	60.0			58.5			82.0			— (2)		— (2)	
A2		17.0			18.5			32			— (2)		— (2)	
AM		22.0			32.0			40.0			70.0		96.0	
BG		16.0			25.0			26.0			32.0		44.0	
BH		9.0			12.7			18.5			— (2)		— (2)	
DD		M6x1.0			M8x1.25			M12x1.75			— (2)		— (2)	
E		46.5			63.5			95.0			120.0		150.0	
F		16.0			24.0			30.0			— (2)		— (2)	
FF		0.5			0.5			1.0			0		0	
JJ		M6x1.0 (1)			M8x1.25			M10x1.5			M16x2		M20x2.5	
KK		M10x1.25			M16x1.5			M20x1.5			M42x2		M48x2	
KV		10.0			17.0			22.0			46.0		55.0	
ØMM		22.0			28.0			45.0			70.0		85.0	
TG		32.5			46.5			72.0			89.0		105.0	
KW		5.0			6.5			10.0			10.0		10.0	
N1		126.0			160.0			233.5			347.0		450.0	
FB	IP54	47.5			40.0			60.0			128.0		163.0	
	IP65	48.0			40.5			60.5			128.5		163.5	
VD		4.0			4.0			4.0			4.0		5.0	
ØBB		30.0			40.0			45.0			90.0		110.0	
VE		12.0			16.0			20.0			20.0		20.0	
WH		26.0			37.0			46.0			51.0		53.0	
ØB		30.0			40.0			60.0			90.0		110.0	

(1) Thru holes should have a minimum diameter of 7 mm on any component attached to the front threaded screw holes on bolt pattern TG.
(2) ETH100 & ETH125 do not have a mounting thread on the underside.
For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

Parallel Mounts with Xpress Motors

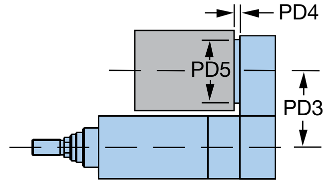


Flange & Coupling to Accept Xpress Motor **Dimensions — mm**

Cylinder Size	Xpress Order Code	Motor (w/Gearhead) Description	Pilot	Bolt Circle	Shaft Ø	Shaft Length	PD3	PD4	PD5	PD6
ETH032	**XPC**	BE233FJ-KPSN	38.10	66.68	9.52	31.8	67.5	78.5	62.0	145.0
	XPD	BE233FJ-KPSB	38.10	66.68	9.52	31.8	67.5	78.5	62.0	177.0
	XPG	BE344LJ-KPSN	73.03	98.43	12.70	30.2	67.5	78.5	80.0	188.0
	XPH	BE344LJ-KPSB	73.03	98.43	12.70	30.2	67.5	78.5	80.0	231.0
ETH050	**XPC**	BE233FJ-KPSN	38.10	66.68	9.52	31.8	87.5	78.5	62.0	145.0
	XPD	BE233FJ-KPSB	38.10	66.68	9.52	31.8	87.5	78.5	62.0	177.0
	XPG	BE344LJ-KPSN	73.03	98.43	12.70	30.2	87.5	84.0	90.0	188.0
	XPH	BE344LJ-KPSB	73.03	98.43	12.70	30.2	87.5	84.0	90.0	231.0
	XPL	MPP1003D1E-KPSN	95.00	115	19.00	40.0	87.5	92.5	100.0	175.0
	XPM	MPP1003D1E-KPSB	95.00	115	19.00	40.0	87.5	92.5	100.0	223.0
	XPN	MPP1003D1E-KPSN *	73.03	98.43	12.70	31.8	87.5	128.0	100.0	175.0
	XPP	MPP1003D1E-KPSB *	73.03	98.43	12.70	31.8	87.5	128.0	100.0	223.0
	XPQ	MPP1003R1E-KPSN	73.03	98.43	12.70	31.8	87.5	92.5	100.0	175.0
	XPR	MPP1003R1E-KPSB	73.03	98.43	12.70	31.8	87.5	92.5	100.0	223.0
	XPS	MPP1003R1E-KPSN *	73.03	98.43	12.70	31.8	87.5	128.0	100.0	175.0
	XPT	MPP1003R1E-KPSB *	73.03	98.43	12.70	31.8	87.5	128.0	100.0	223.0
ETH080	**XPG**	BE344LJ-KPSN	73.03	98.43	12.70	30.2	130.0	84.0	90.0	188.0
	XPH	BE344LJ-KPSB	73.03	98.43	12.70	30.2	130.0	84.0	90.0	231.0
	XPL	MPP1003D1E-KPSN	95.00	115.00	19.00	40.0	130.0	95.3	100.0	175.0
	XPM	MPP1003D1E-KPSB	95.00	115.00	19.00	40.0	130.0	95.3	100.0	223.0
	XPN	MPP1003D1E-KPSN **	73.03	98.43	12.70	31.8	130.0	137.0	100.0	175.0
	XPP	MPP1003D1E-KPSB **	73.03	98.43	12.70	31.8	130.0	137.0	100.0	223.0
	XPQ	MPP1003R1E-KPSN	95.00	115.00	19.00	40.0	130.0	95.3	100.0	175.0
	XPR	MPP1003R1E-KPSB	95.00	115.00	19.00	40.0	130.0	95.3	100.0	223.0
	XPS	MPP1003R1E-KPSN **	73.03	98.43	12.70	31.8	130.0	137.0	100.0	175.0
	XPT	MPP1003R1E-KPSB **	73.03	98.43	12.70	31.8	130.0	137.0	100.0	223.0
	XPU	MPP1154B1E-KPSN	110.00	130.00	24.00	50.0	130.0	127.0	115.0	203.0
	XPV	MPP1154B1E-KPSB	110.00	130.00	24.00	50.0	130.0	127.0	115.0	252.0
	XPW	MPP1154B1E-KPSN ***	110.00	130.00	24.00	50.0	130.0	170.0	115.0	203.0
	XPX	MPP1154B1E-KPSB ***	110.00	130.00	24.00	50.0	130.0	170.0	115.0	252.0
	XPY	MPP1154P1E-KPSN	110.00	130.00	24.00	50.0	130.0	127.0	115.0	203.0
	XPZ	MPP1154P1E-KPSB	110.00	130.00	24.00	50.0	130.0	127.0	115.0	252.0
	XP1	MPP1154P1E-KPSN ***	110.00	130.00	24.00	50.0	130.0	170.0	115.0	203.0
	XP2	MPP1154P1E-KPSB ***	110.00	130.00	24.00	50.0	130.0	170.0	115.0	252.0

* With Parker PV34FE-003 gearhead
** With Parker PV90FB-003 gearhead
*** With Parker PV115FB-003 gearhead
For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

* PD4 = Flange + Gearhead/overhung load adaptor
PD5 = Flange + Gearhead/overhung load adaptor
PD6 = Motor only



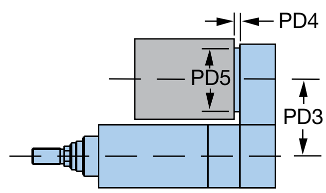
*

Parallel Mounts for other Parker Motors

Flange & Coupling to Accept Parker Motor **Dimensions — mm**

Cylinder Size	Kit Order Code	Parker Motor Description	Pilot	Bolt Circle	Shaft Ø	Shaft Length	PD3	PD4	PD5
ETH032	KCB	SM23X	38.10	66.68	9.52	20.8	67.5	72.5	62.0
	KBB	BE23X	38.10	66.68	9.52	31.8	67.5	78.5	62.0
	KCA	SM16/BE16	20.00	46.69	6.35	25.0	67.5	72.5	62.0
	KEA	LV23/HV23	38.10	66.68	6.35	20.8	67.5	72.5	62.0
	KBC	BE34X	73.03	98.43	12.70	30.2	67.5	78.5	80.0
	KEB	LV34/HV34	73.03	98.43	12.70	37.1	67.5	78.5	80.0
ETH050	KCB	SM23X	38.10	66.68	9.52	20.8	87.5	72.5	62.0
	KBB	BE23X	38.10	66.68	9.52	31.8	87.5	78.5	62.0
	KBC	BE34X	73.03	98.43	12.70	30.2	87.5	84.0	90.0
	KAA	MPP92/MPJ92	80.00	100	16.00	40.1	87.5	92.5	90.0
	KEB	LV34/HV34	73.03	98.43	12.70	37.1	87.5	92.5	90.0
	KAB	MPP100/MPJ100	95.00	115	19.00	40.1	87.5	92.5	100.0
ETH080	KBC	BE34X	73.03	98.43	12.70	30.2	130.0	87.0	90.0
	KAA	MPP92/MPJ92	80.00	100.00	16.00	40.1	130.0	96.0	90.0
	KAB	MPP100/MPJ100	95.00	115.00	19.00	40.0	130.0	96.0	100.0
	KAC	MPP115/MPJ115	110.00	130.00	24.00	50.0	130.0	127.0	115.0

For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.



*

Parallel Mounts for Parker Gearheads

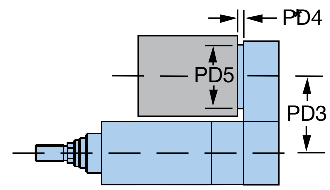
Flange & Coupling to Accept Parker Motor **Dimensions — mm**

Cylinder Size	Kit Order Code	Parker Gearhead Description	Pilot	Bolt Circle	Shaft Ø	Shaft Length	PD3	PD4	PD5
ETH032	PAN	PV60FB/PX60	50.00	70.00	16.00	25.0	67.5	12.0	62.0
ETH050	PAN	PV60FB/PX60	50.00	70.00	16.00	25.0	87.5	12.0	63.5
	PDN	PV34FE/PX34	73.03	98.43	12.70	31.8	87.5	15.0	90.0
ETH080	PBN	PV90FB/PX90	80.00	100.00	20.00	40.0	130.0	18.0	90.0
	PJN	PV115FB/PX115	110.00	130.00	24.00	50.0	130.0	20.0	115.0

For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

* PD4 = Flange + Gearheadoverhung load adaptor
PD5 = Flange + Geahead/overhung load adaptor
PD6 = Motor only

Parallel Mounts for Non-Standard Motors



* PD4 = Flange + Gearheadoverhung load adaptor
PD5 = Flange + Geahead/overhung load adaptor
PD6 = Motor only

Parallel Mounting Compatible Motor Dimensions - mm

Cylinder Size	Max. Shaft Ø With Key	Max. Shaft Ø Without Key	Max. Square Motor Flange
ETH032	–	14 (w/PV60 gearhead)	85
ETH050	–	20 (w/PV90 gearhead} or	100
ETH080	–	24 (w/PV115 gearhead}	150

For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

Sleeves

Order Code	Sleeve Size (Motor Shaft Ø)	Compatibility ETH032	ETH050	ETH080
A	No Sleeve			
B	0.25"	•		
C	0.375"	•	•	
D	0.5"	•	•	
E	0.625"	•	•	
H	6 mm	•		
J	8 mm	•		
K	9 mm	•	•	
L	11 mm	•	•	
M	14 mm	•	•	•
N	16 mm		•	•
P	19 mm		•	•
Q	20 mm			•
R	22 mm			•
S	24 mm			•

For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

Ordering Non-Standard Motor Mounts

Use the appropriate order codes from the charts to build the desired "Flange Only" or "Flange and Sleeve" Kit Order Code. Note: all non-standard motor mount kits use three character descriptions beginning with an N, followed by a Sleeve and a Flange designator.

	①	②	③
Kit Order Code Designators:	N		

① **Non-standard motor mount**
② **Sleeves order code**
③ **Flange order code**

Kit Order Code Examples	Kit Order Code
No flange, no sleeve	NAA
Flange C (for ETH050), no sleeve	NAC
Flange C (for ETH050), 0.5" sleeve	NDC

Flanges

Dimensions — mm

Order Code	Bolt Circle	Bolt Hole	Pilot Ø	Pilot Depth	Motor Shaft Length	ETH032 PD3	ETH032 PD4	ETH032 PD5	ETH050 PD3	ETH050 PD4	ETH050 PD5	ETH080 PD3	ETH080 PD4	ETH080 PD5
A	No Flange						0.0			0.0			0.0	
B	46.00	M4	30.00	3.5	25.0	67.5	72.5	62.0	—	—	—	—	—	—
C	63.00	M5	40.00	3.5	20.0	67.5	72.5	62.0	87.5	72.5	60.0	—	—	—
D	70.00	M5	50.00	3.5	30.0	67.5	78.5	62.0	87.5	78.5	63.5	—	—	—
E	75.00	M5	60.00	3.5	23.0	67.5	78.5	62.0	87.5	84.0	90.0	—	—	—
F	75.00	M5	60.00	3.5	30.0	67.5	72.5	62.0	87.5	84.0	90.0	—	—	—
G	90.00	M6	70.00	3.5	40.0	—	—	—	87.5	92.5	90.0	130.0	96.0	90.0
H	95.00	M5	50.00	3.5	30.0	67.5	78.5	82.0	87.5	84.0	90.0	—	—	—
J	100.00	M6	80.00	3.5	40.0	—	—	—	87.5	92.5	90.0	130.0	96.0	90.0
K	115.00	M8	95.00	3.5	40.0	—	—	—	87.5	92.5	100.0	130.0	96.0	100.0
L	130.00	M8	110.00	3.5	50.0	—	—	—	—	—	—	130.0	127.0	115.0
M	130.00	M8	95.00	3.5	50.0	—	—	—	—	—	—	130.0	116.0	115.0

For ETH100 and 125 sizes, please consult factory for motor and gearhead mounting options.

How to use Speed Thrust Curves

Option 1: Xpress System Sizing

Parker offers pre-selected motor and motor/gearhead combinations to maximize the power output of each ETH frame size. This option is ideal for customer's working on time-sensitive applications and/or those that value the many benefits of a single-source solution.

To select the system solution, use the Speed/Thrust with Motors graphs in Specifications to locate the application's required linear velocity and thrust.

If the point lies within a green shaded region, and it is not to the right of the relevant critical speed line, then the application can be solved with the motor or motor/gearhead combination corresponding to the number in that region while still getting full rated life (2,540 Km).

If the point is in the yellow intermittent zone, then the actuator will experience a reduced life, in which case another screw lead or a larger profile size is recommended.

If the point falls above the solid blue line, then the application cannot be solved with that actuator profile size and lead combination when using a motor mounted in parallel.

Once a solution is found simply order the ETH with the correct Xpress motor code and pair with the recommended Compax3 drive and motor power and feedback cables from Limit Sensors in Options & Accessories 31 to complete the Xpress system.

Example:

For an application needing 1000 N thrust at 400 mm/sec velocity, both the XPG and XPH motor/gearhead combinations will solve the application. Note: the actuator stroke must be less than approximately 900 mm in order to reach the required speed.

Solution:

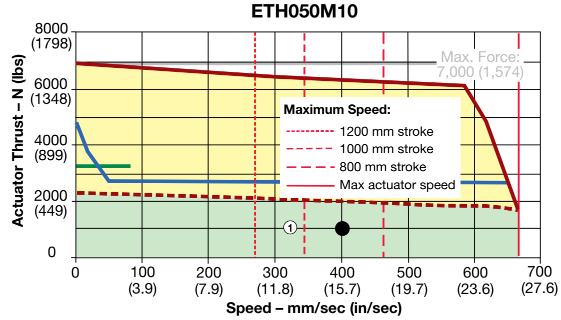
Cylinder: ETH050M10xxXPGxxxxxxxx
Servo motor: BE344LJ-KPSN
Drive: C3S100V2F12IxxTxxMxx
Cables: P-3B1-xx and F-2C1-xx

Performance Zones:

Motor Codes	Continuous Operation
	1
XPG [1]	•
XPH [2]	•

[1] Without brake [2] With brake
* In-line motor mount only

ETH050M10



Option 2: Hybrid Speed/Thrust Graphs

Back by popular demand, Parker has recreated the hybrid speed/thrust graphs for the new ETH Series actuators. These graphs are an ideal way to size an actuator for non-Xpress or third-party motors. These speed/thrust graphs plot linear velocity, linear thrust, required motor velocity, required motor torque, and critical speed.

To select a motor or motor/gearhead combination, use the graphs on the following pages to locate the application's required linear velocity and thrust on the graph.

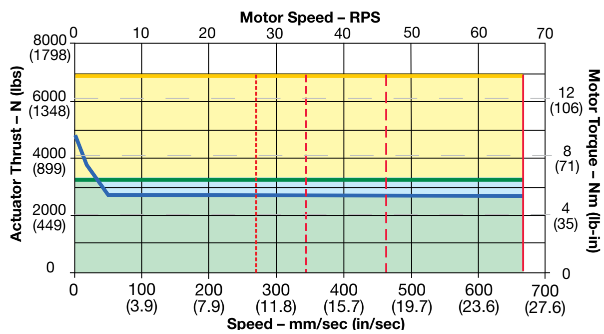
Once that point is determined, extend the lines to the secondary axes to determine the required motor torque and motor speed for the application.

Once the motor requirements are known, simply order the ETH with the proper Parker motor or gearhead mounting kits or use one of the non-standard mounting kit options.

Example:

For an application needing 1000 N thrust at 400 mm/sec linear velocity, and requiring a minimum life of 2,540 Km, the motor would have to be sized for 2 Nm of torque at 40 rps. Note: the actuator stroke must be less than approximately 900 mm to reach the required speed.

ETH050M10



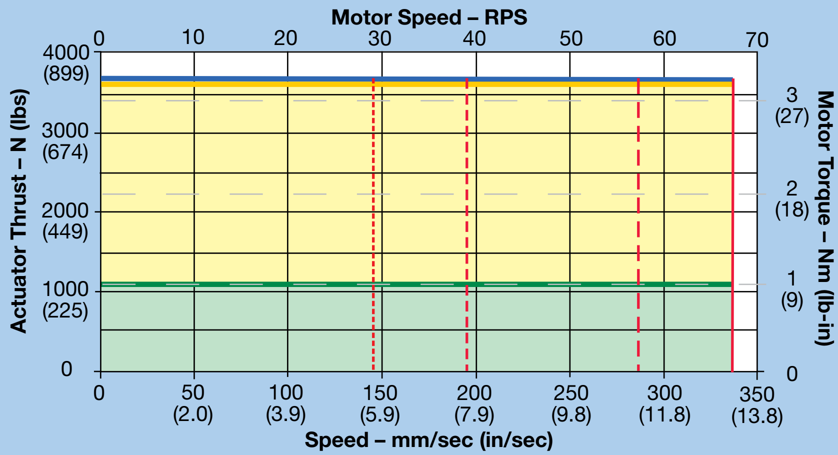
Option 3: Traditional Step-by-step Selection Process

For the most dynamic applications, or to double check critical application elements when using sizing options 1 and 2, the traditional step-by-step process (starting with Sizing/Selection Design Considerations), can be used to size the ETH cylinder.

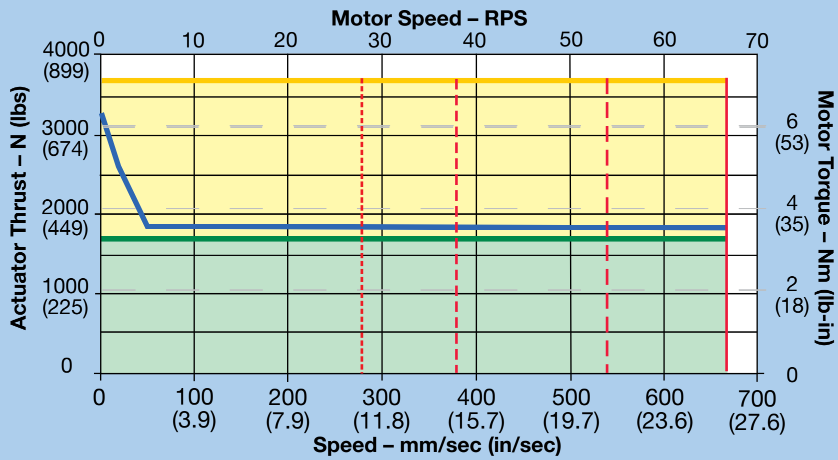
ETH032 Speed-Thrust

See graphs in Sizing & Selection for information on Speed-thrust with Motors.

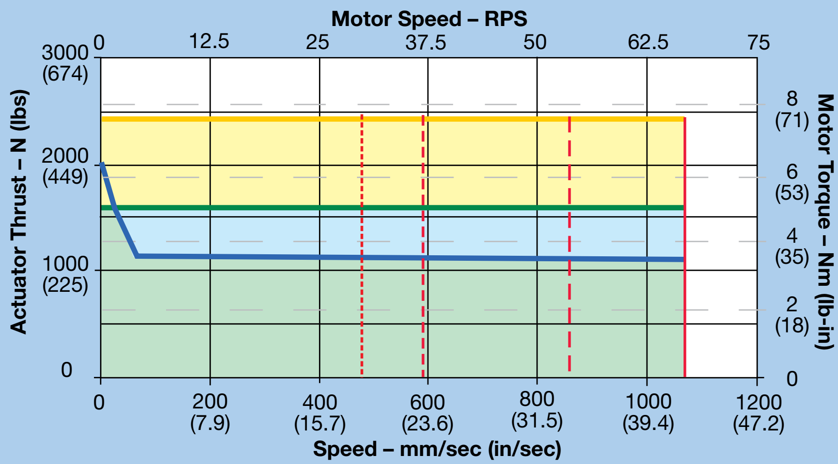
ETH032M05



ETH032M10



ETH032M16



Maximum Thrust*:

- Inline motor mount
- Parallel motor with timing belt limitation
- Max thrust at 2540 km of life (see page 45 for details)

Maximum Speed:

- 1000 mm stroke
- 800 mm stroke
- 600 mm stroke
- Max actuator speed

Performance Zones:

- Full life region (greater than 2540 km of life)
- Acceptable zone for Inline motor mounts only (motor mount option A or B)
- Intermittent zone (operation will result in reduced life of the actuator and is not acceptable for parallel motor options if above the parallel limitation curve)

*Maximum thrust assumes a cylinder mounting orientation with a fixed mounting position and a guided load, for limitations on column buckling, please see page 43.

Electric Cylinders

ETH050 Speed-Thrust

Maximum Thrust*:

- Inline motor mount
- Parallel motor with timing belt limitation
- Max thrust at 2540 km of life (see page 45 for details)

Maximum Speed:

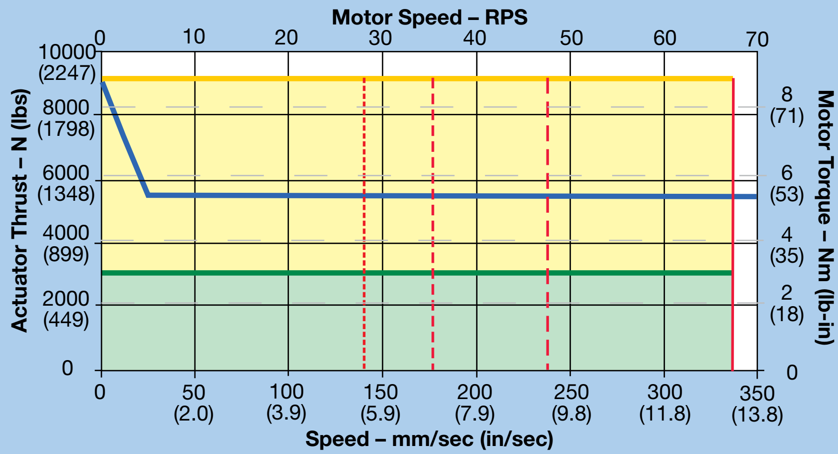
- 1200 mm stroke
- 1000 mm stroke
- 800 mm stroke
- Max actuator speed

Performance Zones:

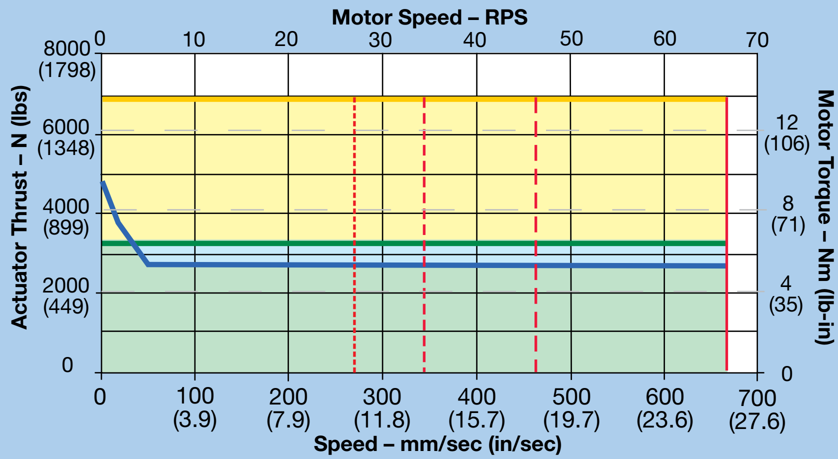
- Full life region (greater than 2540 km of life)
- Acceptable zone for Inline motor mounts only (motor mount option A or B)
- Intermittent zone (operation will result in reduced life of the actuator and is not acceptable for parallel motor options if above the parallel limitation curve)

*Maximum thrust assumes a cylinder mounting orientation with a fixed mounting position and a guided load, for limitations on column buckling, please see page 43.

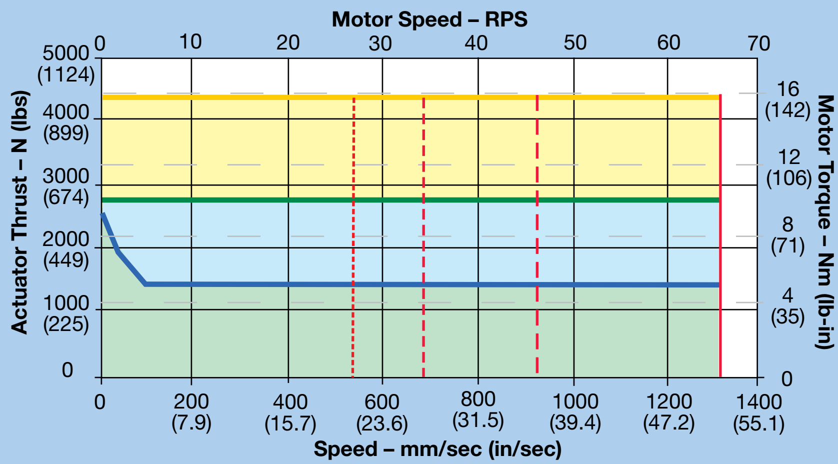
ETH050M05



ETH050M10



ETH050M20



ETH080 Speed-Thrust

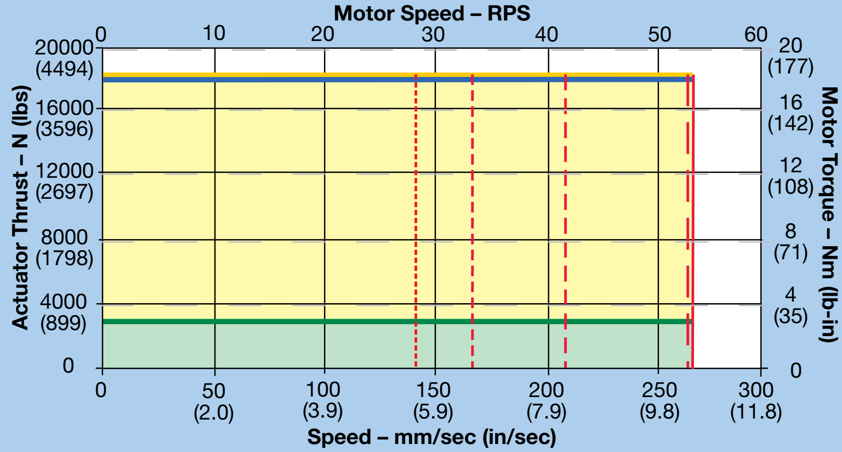
Maximum Thrust*:
- Inline motor mount
- Parallel motor with timing belt limitation
- Max thrust at 2540 km of life (see page 45 for details)

Maximum Speed:
- 1600 mm stroke
- 1400 mm stroke
- 1200 mm stroke
- 1000 mm stroke
- Max actuator speed

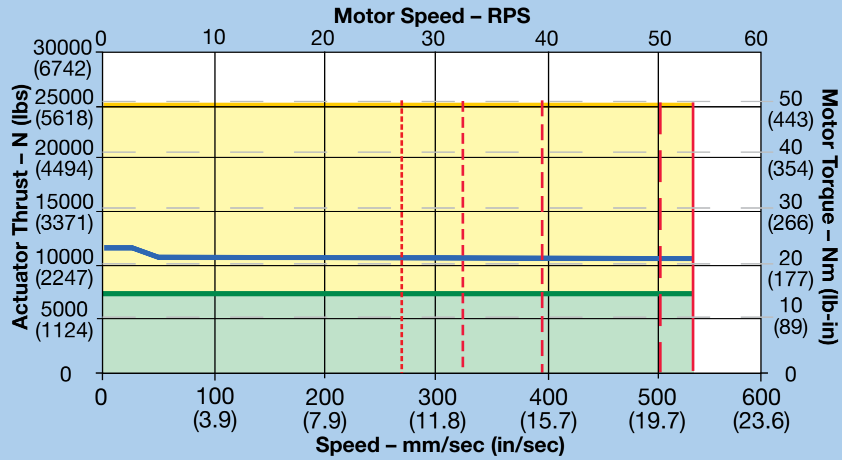
Performance Zones:
- Full life region (greater than 2540 km of life)
- Acceptable zone for Inline motor mounts only (motor mount option A or B)
- Intermittent zone (operation will result in reduced life of the actuator and is not acceptable for parallel motor options if above the parallel limitation curve)

*Maximum thrust assumes a cylinder mounting orientation with a fixed mounting position and a guided load, for limitations on column buckling, please see page 43.

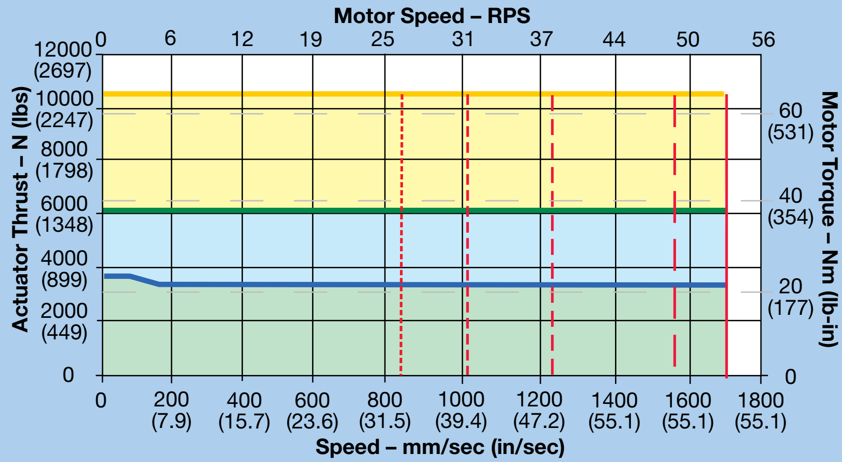
ETH080M05



ETH080M10



ETH080M32



Electric Cylinders

ETH100 Speed-Thrust

Maximum Thrust*:

- Inline motor mount
- Parallel motor with timing belt limitation
- Max thrust at 2540 km of life (see page 45 for details)

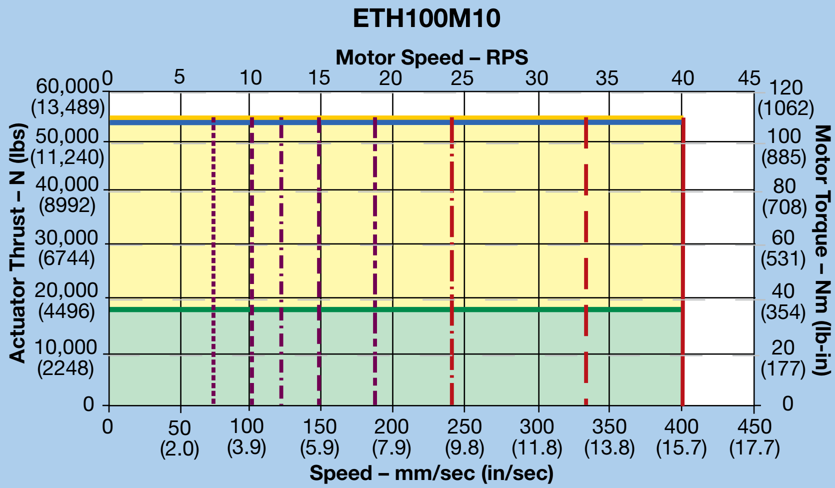
Maximum Speed:

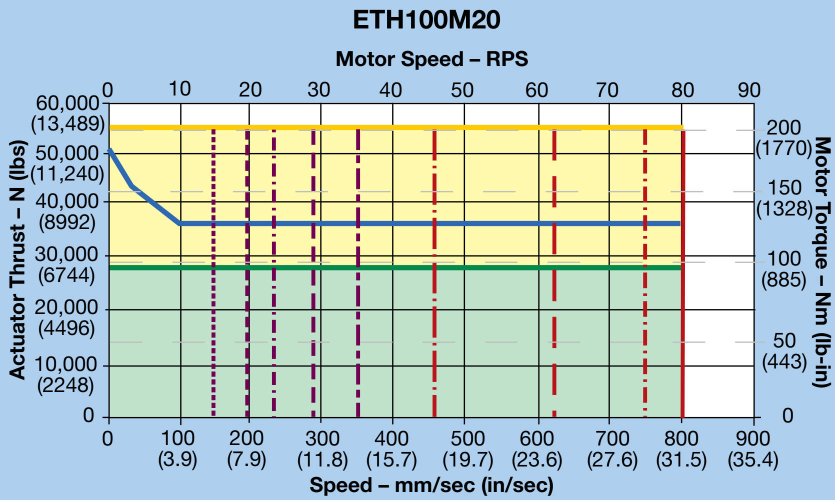
- 2000 mm stroke
- 1600 mm stroke
- 1400 mm stroke
- 1200 mm stroke
- 1000 mm stroke
- 800 mm stroke
- 600 mm stroke
- 500 mm stroke
- Max actuator speed

Performance Zones:

- Full life region (greater than 2540 km of life)
- Acceptable zone for Inline motor mounts only (motor mount option A or B)
- Intermittent zone (operation will result in reduced life of the actuator and is not acceptable for parallel motor options if above the parallel limitation curve)

*Maximum thrust assumes a cylinder mounting orientation with a fixed mounting position and a guided load, for limitations on column buckling, please see page 43.



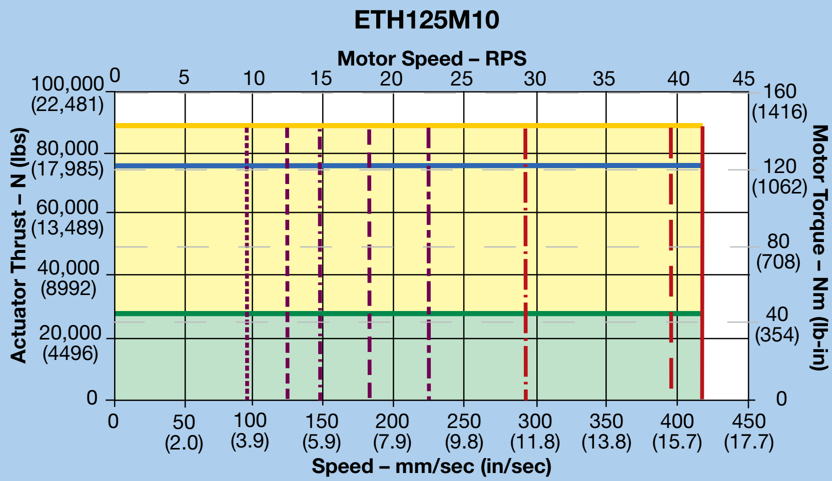


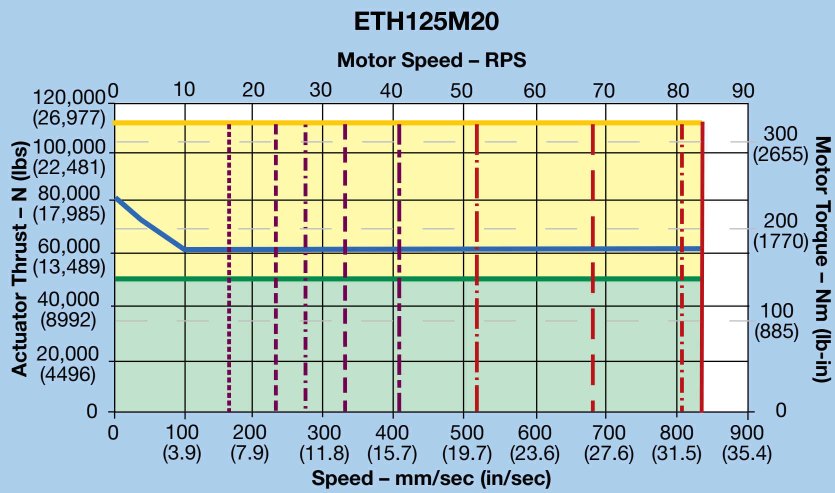
ETH125 Speed-Thrust

Maximum Thrust*:
- Inline motor mount
- Parallel motor with timing belt limitation
- Max thrust at 2540 km of life (see page 45 for details)

Maximum Speed:
- 2000 mm stroke
- 1600 mm stroke
- 1400 mm stroke
- 1200 mm stroke
- 1000 mm stroke
- 800 mm stroke
- 600 mm stroke
- 500 mm stroke
- Max actuator speed

Performance Zones:
- Full life region (greater than 2540 km of life)
- Acceptable zone for Inline motor mounts only (motor mount option A or B)
- Intermittent zone (operation will result in reduced life of the actuator and is not acceptable for parallel motor options if above the parallel limitation curve)





*Maximum thrust assumes a cylinder mounting orientation with a fixed mounting position and a guided load, for limitations on column buckling, please see page 43.

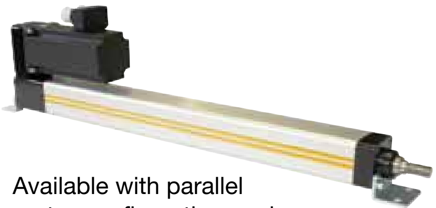
Electric Cylinders

OPTIONS & ACCESSORIES

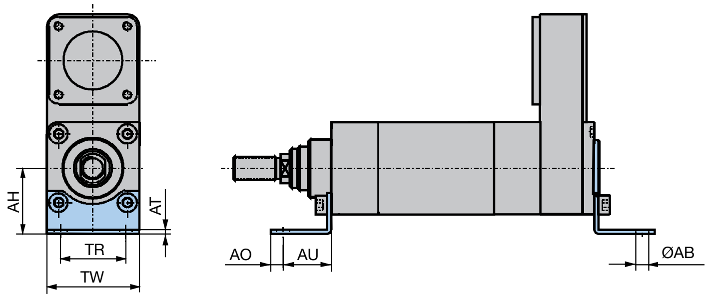
ETH Cylinder Mounting Options

Order Code

B Foot Mount



Available with parallel motor configurations only



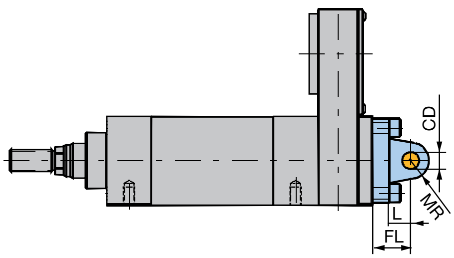
Dimensions — mm

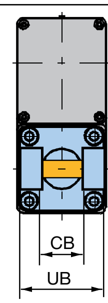
Size	Part Number* (1 piece each) Rear Bracket	Part Number* (1 piece each) Front Bracket	AH	AT	TR	ØAB (H14)	AO	AU	TW
ETH032	0111.065		32	4	32	7.0	8	24	48
ETH050	0121.065		45	4	45	9.0	12	32	65
ETH080	0131.065-01	0131.065-02	63	6	63	13.5	15	41	95
ETH100	0142.916		94	14				164	
ETH125	0152.916		114	14				214	

* Use order code when ordering cylinder; use part number for ordering spare replacement parts

C Rear Clevis Mount

Available with parallel motor configurations only





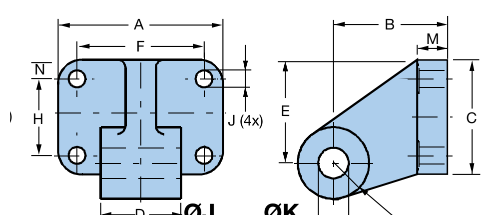
Dimensions — mm

Size	Part Number*	UB (h13)	CB (H14)	ØCD (H9)	MR	L	FL ±0.2
ETH032	0112.031	46.5	26	10	9.5	13	22
ETH050	0122.031	63.5	32	12	12.5	16	27
ETH080	0132.031	95	50	16	17.5	22	36
ETH100	0142.031	120	60.5	30	100	40	65
ETH125	0152.031	150	70.5	50	145	55	90

* Use order code when ordering cylinder; use part number for ordering spare replacement parts

Optional Bearing Block

Mating mount bracket to rear clevis. Please order separately.

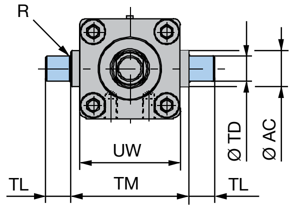


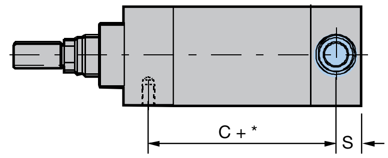
Dimensions — mm

Cylinder Size	Part Number	A	B	C	D	E	F	H	H1	ØJ (H13)	ØK (H9)	M	N	R1
ETH032	0112.039	55	32	55	26	51.5	38	38	—	9	10	8	8.5	11.0
ETH050	0122.039	70	45	70	32	63.5	48	48	—	11	12	12	11	13.0
ETH080	0132.039	95	63	150	50	143.0	72	45	40	13	18	16	12.5	16.5
ETH100	0142.039	120	95	200	60	215.0					30	25	15	30.0
ETH125	0152.039	150	130	350	70	365.0					50	35	20	45.0

Order
Code

D Center Trunnion Mount





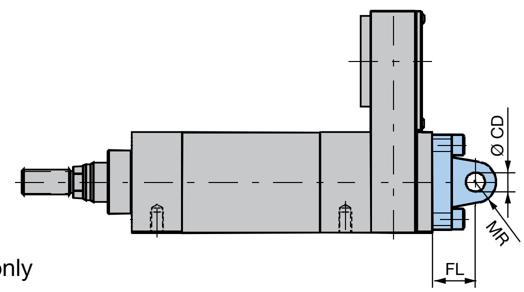
Factory installed. Cannot be ordered separately.

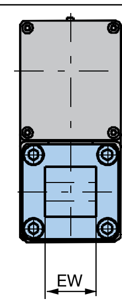
Dimensions — mm

Cylinder Size	UW	ØTD**	R	TL	TM	ØAC	S
ETH032	46.5	12	1	12	50	18	25.5
ETH050	63.5	16	1	16	75	25	39
ETH080	95.3	25	2	25	110	35	34.5
ETH100	120	40	4	40	140	57	57
ETH125	150	50	10	52	160	90	100

* Dimension C+ = Dimension + length of desired stroke (see Stroke, Usable Stroke and Safety Travel in Sizing & Selection for calculating stroke)
**: ØTD in accordance with ISO tolerance zone h8
Note: For relubrication option "1" (Integrated lubrication port) please see mounting method with option "D" center trunnion always on 6 o'clock!

E Rear Eye Mount





Available with parallel motor configurations only

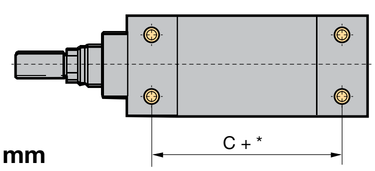
Dimensions — mm

Cylinder Size	Part Number*	EW	ØCD	MR (H9)	FL ±0.2
ETH032	0112.033	26	10	11	22
ETH050	0122.033	32	12	13	27
ETH080	0132.033	50	16	17	36
ETH100	0142.033	60	30	35	80
ETH125	0152.033	70	50	45	115

* Use order code when ordering cylinder; use part number for ordering spare replacement parts

F Tapped Bottom Holes (Standard)

Mounting with 4 threaded holes on bottom of the cylinder.
Available ETH032 – ETH080 only.



Dimension C + — mm

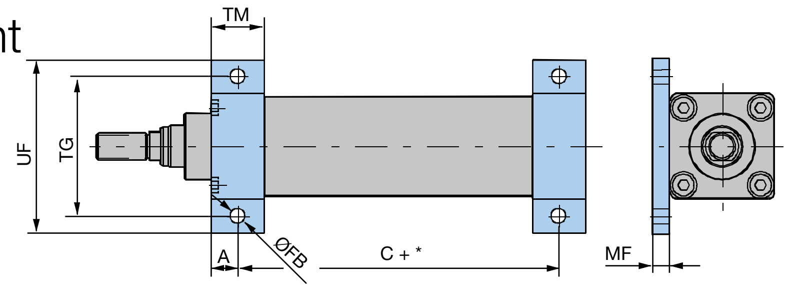
Cylinder Size		ETH032			ETH050			ETH080	
Screw Lead		**M05**	**M10**	**M16**	**M05**	**M10**	**M20**	**M05**	**M10**	**M32**
C + *	IP54	93.5	103.0	106.5	99.5	105.5	117.5	141.5	159.5	189.5
	IP65	94.5	103.5	107.5	100.5	106.5	118.5	142.5	160.5	190.5

* Dimension C+ = Dimension + length of desired stroke (see Stroke, Usable Stroke and Safety Travel in Sizing & Selection for calculating stroke)

Electric Cylinders

Order
Code

G Side Flange Mount



Flanges are stainless steel

Cylinder Size	Part Number**	TG	UF	ØFB	TM	MF	A
		Dimensions — mm					
ETH032	1440.079	62	78	6.6	25	8	12.5
ETH050	1441.093	84	104	9.0	30	10	15.0
ETH080	0131.078	120	144	13.5	40	12	20.0

* Dimension C+ = Dimension + length of desired stroke (see Stroke, Usable Stroke and Safety Travel in Sizing & Selection for calculating stroke)
** Use order code when ordering cylinder; use part number for ordering spare replacement parts (one piece per part number)

H Rear Plate Mount

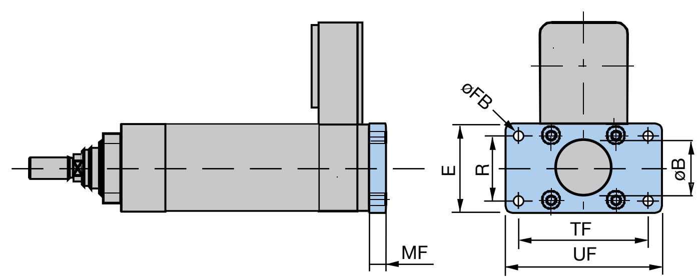


Plate is stainless steel

Cylinder Size	Part Number*	MF	UF	TF	E	R	ØFB	ØB
		Dimensions — mm						
ETH032	0111.064	10	80	64	48	32	7	30
ETH050	0121.064	12	110	90	65	45	9	40
ETH080	0131.064-01	16	150	126	95	63	12	45
ETH100	0142.918	25	258	220	120	80	17.5	90
ETH125	0152.918	40	320	270	150	100	21.5	110

* Use order code when ordering cylinder; use part number for ordering spare replacement parts (one piece per part number)

Order
Code

J Front Plate Mount

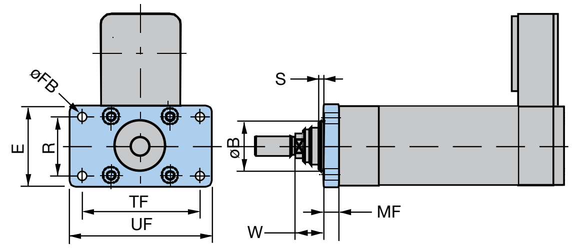
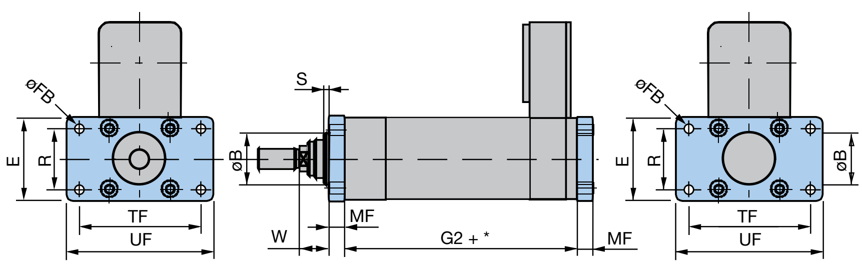


Plate is stainless steel

Cylinder Size	Part Number*	S	W	MF	UF	TF	E	R	ØFB	ØB
		Dimensions — mm								
ETH032	0111.064	2	16	10	80	64	48	32	7	30
ETH050	0121.064	4	25	12	110	90	65	45	9	40
ETH080	0131.064-02	4	30	16	150	126	95	63	12	60

* Use order code when ordering cylinder; use part number for ordering spare replacement parts (one piece per part number)

N Front & Rear Plate Mount



Plates are stainless steel

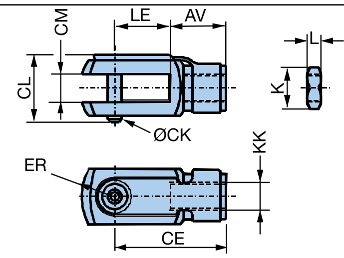
Cylinder Size	Part Number**		S	W	MF	UF	TF	E	R	ØFB	ØB
			Dimensions — mm								
ETH032	Front & Rear	0111.064	2	16	10	80	64	48	32	7	30
ETH050	Front & Rear	0121.064	4	25	12	110	90	65	45	9	40
ETH080	Front	0131.064-02	4	30	16	150	126	95	63	12	60
	Rear	0131.064-01									45
ETH100	Front & Rear	0142.918	-	26	25	258	220	120	80	17.5	90
ETH125	Front & Rear	0152.918	-	13	40	320	270	150	100	21.5	110

* Dimension G2+ (parallel) or G1+ (inline) = Dimension + length of desired stroke (see Stroke, Usable Stroke and Safety Travel in Sizing & Selection for calculating stroke)
** Use order code when ordering cylinder; use part number for ordering spare replacement parts (one piece per part number)

ETH Rod End Options

Order
Code

C Clevis Rod End

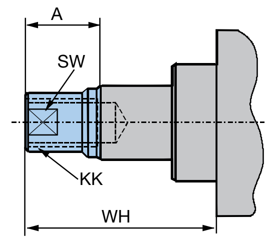


Dimensions — mm

Cylinder Size	Part Number*	Mass [kg]	KK	CL	CM	LE	CE	AV	ER	ØCK (h11/E9)	K	L
ETH032	4309	0.09	M10 x 1.25	26.0	10.2 +0.13/-0.05	20	40	20	14	10	17	5
ETH050	4312	0.34	M16 x 1.5	39.0	16.2 +0.13/-0.05	32	64	32	22	16	24	8
ETH080	4314	0.69	M20 x 1.5	52.5	20.1 +0.02/-0.0	40	80	40	30	20	30	10

*Use order code when ordering cylinder; use part number for ordering spare replacement parts (cylinder rod with male thread is required)

F Female Threaded Rod End

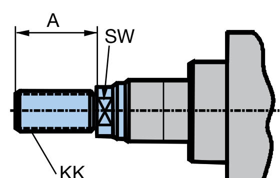


Dimensions — mm

Cylinder Size	Part Number*	Mass [kg]	A	KK	WH	SW**
ETH032	0111.029	0.04	14	M10 x 1.25	32	12
ETH050	0121.029	0.14	24	M16 x 1.5	50	20
ETH080	0131.029	0.42	29	M20 x 1.5	59	26

*Use order code when ordering cylinder; use part number for ordering spare replacement parts
** SW = width across flat (position of the flat is not fixed)

M Male Threaded Rod End



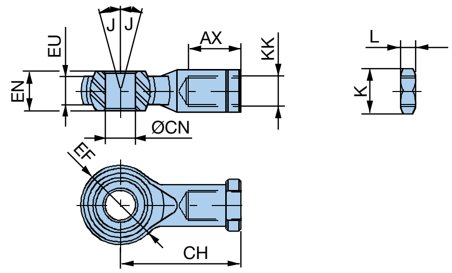
Dimensions — mm

Cylinder Size	Part Number*	Mass [kg]	A	KK	SW**
ETH032	0111.028	0.06	22	M10 x 1.25	10
ETH050	0121.028	0.15	32	M16 x 1.5	17
ETH080	0131.028	0.48	40	M20 x 1.5	22

*Use order code when ordering cylinder; use part number for ordering spare replacement parts
** SW = width across flat (position of the flat is not fixed)

Order
Code

S Spherical Rod End



Dimensions — mm

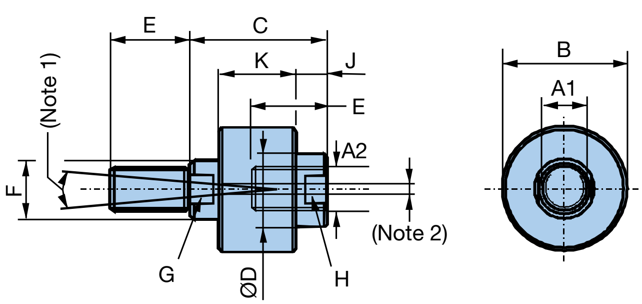
Cylinder Size	Part Number*	Mass [kg]	KK	ØCN (H9)	EN (h12)	EU	AX	CH	ØEF	J°	K	L
ETH032	4078-10	0.07	M10 x 1.25	10	14	10.5	20	43	28	13	17	5
ETH050	4078-16	0.23	M16 x 1.5	16	21	15.0	28	64	42	15	24	8
ETH080	4078-20	0.41	M20 x 1.5	20	25	18.0	33	77	50	14	30	10

* Use order code when ordering cylinder; use part number for ordering spare replacement parts (cylinder rod with male thread is required)

L Alignment Coupler

The alignment coupler mounts on the end of the cylinder rod to:

- Balance misalignments
- Increase the mounting tolerance
- Simplify cylinder mounting
- Increase cylinder guide service life
- Compensate for offsets between components and relieves guides from lateral force influences
- Maintain traction/thrust force bearing capacity



(1) Angle offset ±5° from centerline (2) Axial offset: ±1.5 mm from centerline

Cylinder Size	Part Number*	Mass [kg]	A1	A2	B	C	ØD	E	F	G	H	J	K
			Dimensions — mm										
ETH032	LC32-1010	0.26	M10x1.25	M10x1.25	40	51	19	19	16	13	16	13	26
ETH050	LC50-1616	0.64	M16x1.5	M16x1.5	54	59	32	29	25	22	29	14	33
ETH080	LC80-2020	1.30	M20x1.5	M20x1.5	54	59	32	29	25	22	29	14	33

*Use order code when ordering cylinder; use part number for ordering spare replacement parts (cylinder rod with male thread is required)

Electric Cylinders

Order
Code

R Linear Guide Module

Linear Guide Module offers:

- Anti-rotation control for higher torques
- Absorption of lateral forces

Additional stability and precision is achieved by:

- 2 hardened stainless steel guiding rods
- 4 linear ball bearings

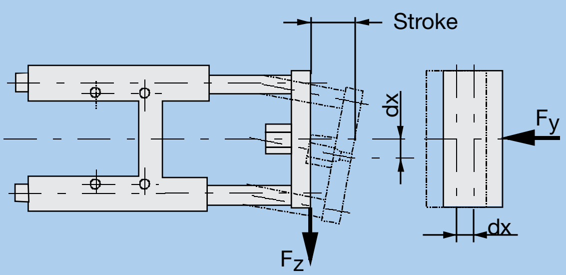
Not available with IP65 models

Linear Guide Module Specifications

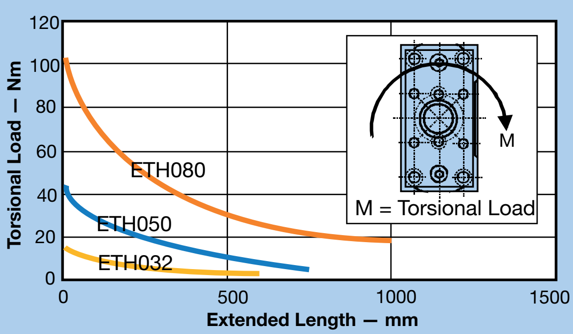
Cylinder Size	Part Number*	Total Mass (w/Zero Stroke) [kg]	Moving Mass (w/Zero Stroke) [kg]	Additional Mass [kg/m]
ETH032	32-2800R-xxxx	0.97	0.60	1.78
ETH050	50-2800R-xxxx	2.56	1.84	4.93
ETH080	80-2800R-xxxx	6.53	4.36	7.71

*Use order code when ordering cylinder; use part number for ordering spare replacement parts replacing xxxx with the desired stroke length. For example, order 50-2800R-0200 for 200 mm stroke. (Be sure to specify the same stroke as ordered on the matching ETH cylinder.)

Deflection*



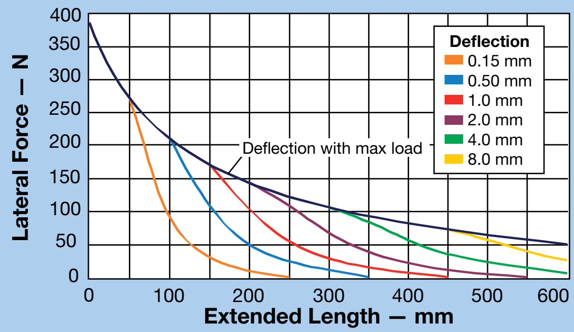
dx: Deflection valid for F_y and F_z



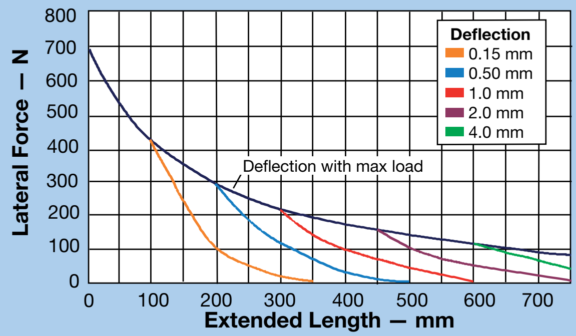
* Deflection curves represent cylinders mounted in any orientation

Cylinder Rigidity with Linear Guide Module

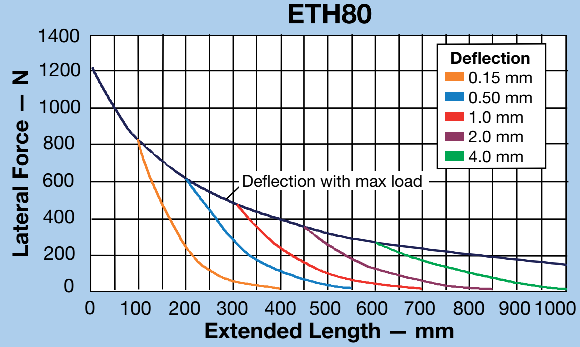
ETH32



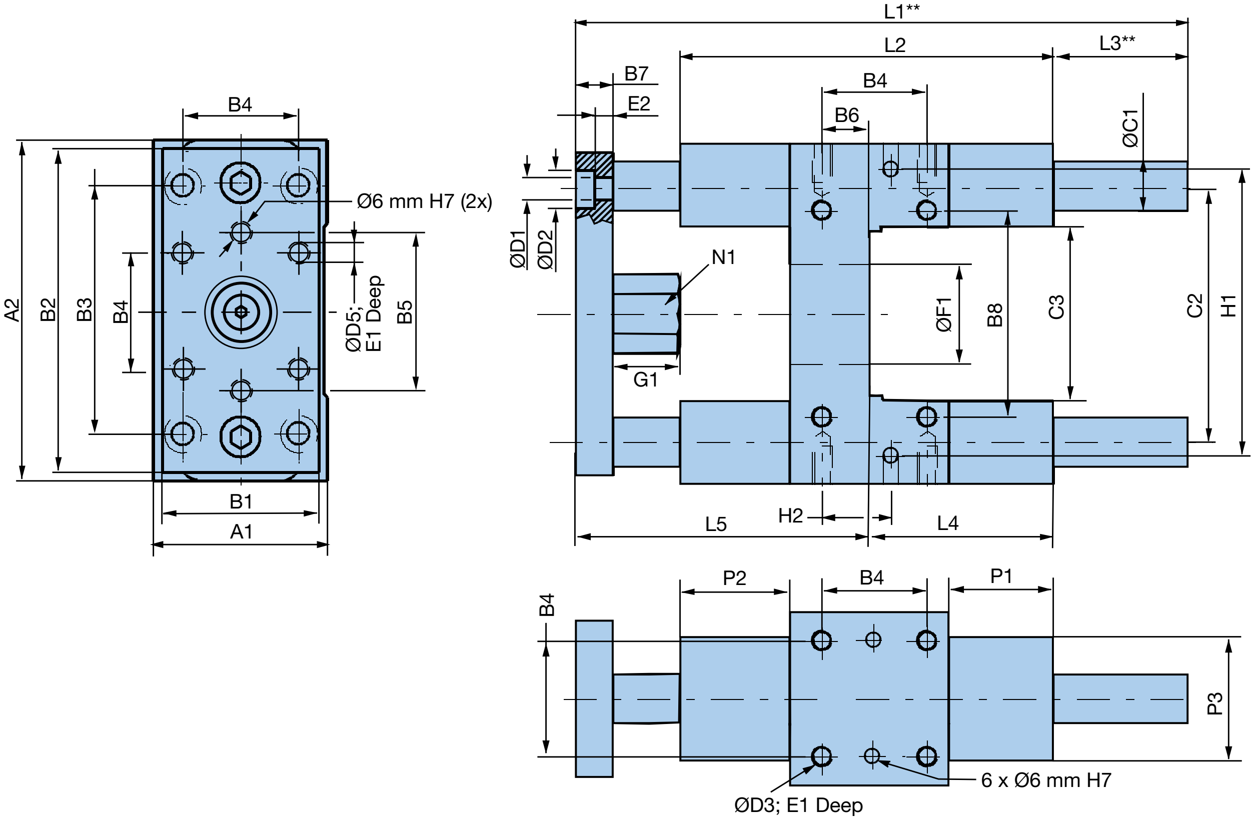
ETH50



ETH80



Linear Guide Module Dimensions



Dimensions — mm

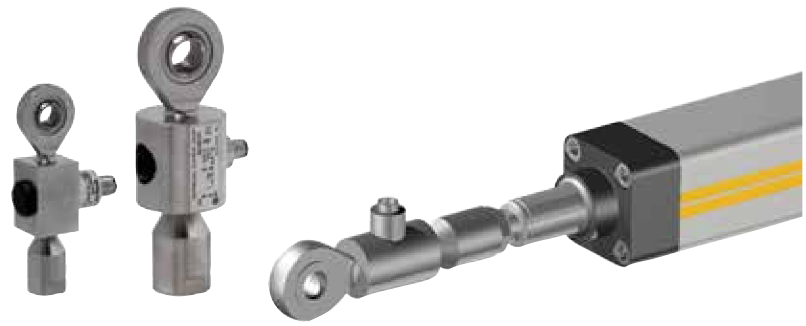
Part Number	A1	A2	B1	B2	B3	B4	B5	B6	B7	B8
32-2800R-xxxx	50.0	97.0	45.0	90.0	78.0	32.5	50.0	4.0	12.0	61.0
50-2800R-xxxx	70.0	137.0	63.0	130.0	100.0	46.5	72.0	19.0	15.0	85.0
80-2800R-xxxx	105.0	189.0	100.0	180.0	130.0	72.0	106.0	21.0	20.0	130.0

Part Number	ØC1	C2	C3	ØD1	ØD2	ØD3	E1 (Depth)	E2 (Depth)	ØF1	G1
32-2800R-xxxx	12.0	73.5	50.0	6.6	11.0	M6 x 1.00	12.0	7.25	30.0	17.0
50-2800R-xxxx	20.0	103.5	70.0	8.4	15.0	M8 x 1.25	16.0	9.25	40.0	27.0
80-2800R-xxxx	25.0	147.0	105.0	10.5	18.0	M10 x 1.50	20.0	11.25	60.0	32.0

Part Number	H1	H2	L1+*	L2	L3+*	L4	L5	N1 **	P1	P2	P3
32-2800R-xxxx	81.0	16.0	152.0	120.0	17.0	71.0	64.0	17.0	36.0	31.0	40.0
50-2800R-xxxx	119.0	23.0	193.0	150.0	25.0	79.0	89.0	24.0	42.0	44.0	50.0
80-2800R-xxxx	166.0	36.0	253.0	200.0	30.0	113.0	110.0	30.0	50.0	52.0	70.0

* L1+ and L3+ = Dimension + length of desired stroke (see see Stroke, Usable Stroke and Safety Travel in Sizing & Selection for calculating stroke)
** N1: Hexagon head; Linear guide module not available on IP65 models

Force Sensor Rod End



Jointed swivel head design with integrated force sensor

Swivel heads are important construction components with respect to rotary, pivoting and tilting movements. Force measurements are more and more frequently required in those applications.

The force transducers are suitable for direct mounting on the cylinder rod. They can, for example, be used to measure contact forces or overloads.

Thanks to thin film technology, the swivel head force transducers are very robust and long time stable. An integrated amplifier emits an output signal of 4 ... 20 mA.

The sensors correspond to the EN 61326 standard for electromagnetic compatibility (EMC) and are sense both thrust and traction forces.

Requires male thread rod end option "M", see Plate Mounts in Options & Accessories 22.

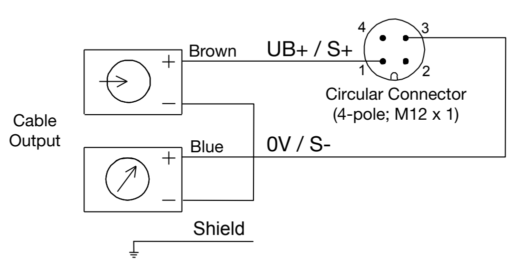
Features

- **Measuring range: traction/ thrust forces up to ±25 kN**
- **Thin film implants (instead of conventional bonded foil strain gauges)**
- **Corrosion resistant stainless steel version**
- **Integrated amplifier**
- **Small temperature drift**
- **High long term stability**
- **High shock and vibration resistance**
- **For dynamic or static measurements**
- **Good repeatability**
- **Simple mounting**

	ETH032		ETH050			ETH080			ETH100	ETH125	
	M05/M10	M16	M05	M10	M20	M05	M10	M32	M10/M20	M10	M20
Part Number	0111.916	0111.917	0121.916	0121.917	0121.918	0131.916	0131.917	0131.918	0131.918	0131.918	0131.918
Accuracy – %	2								1	1	1
Material	Stainless steel										
Protection class	IP67										
Calibration – kN	±3.7	±2.4	±9.3	±7.0	±4.4	±17.8	±25.1	±10.6	±56	±88.7	±114.0
Accuracy – N	14.8	9.6	37.2	28.0	17.6	71.2	100.4	42.4	1120	1774	2280

Electrical Connection

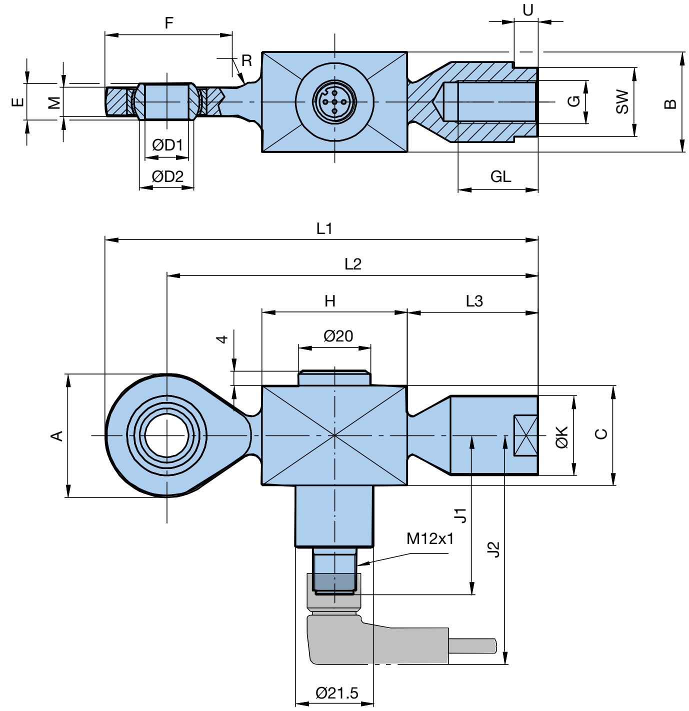
Analog output 4...20 mA (two-wire technology)



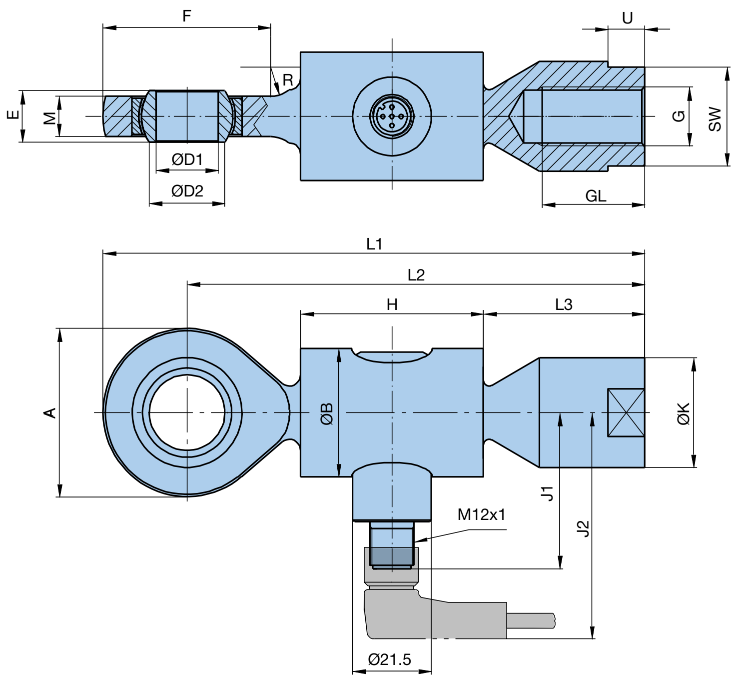
Force Sensor Cables

Part Number	Description
080-900446	2M sensor cable, straight connector, M12 to flying leads
080-900447	5M sensor cable, straight connector, M12 to flying leads
080-900456	2M sensor cable, 90 degree (symbol) angled connector, M12 to flying leads
080-900457	5M sensor cable, 90 degree (symbol) angled connector, M12 to flying leads

Force Sensor Rod End for ETH032



Force Sensor Rod End for ETH050 & ETH080

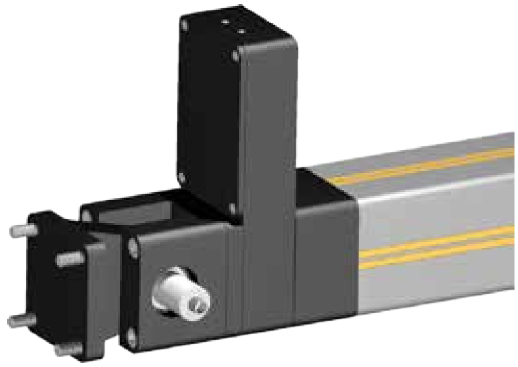


Dimensions — mm

Cylinder Size	A	B	ØB	C	ØD1	ØD2 0.008	E	F	G	GL	H	J1	J2	ØK	L1	L2	L3	M	SW*	U
ETH032	34	27	—	27	12	15	10	35	M10x1.25	22	40	44	63	22	119	102	36	8	19	8
ETH050	46	—	35	—	17	20.7	14	46	M16x1.5	28	50	43	62	30	148	125	44	11	27	12
ETH080	53	—	54	—	20	24.2	16	54	M20x1.5	33	54	44	63	35	171	144.5	54	13	32	13

*SW = width across flat

Force Sensor Rear Clevis



In some force measurement applications, a force sensor on the cylinder rod is not possible or will affect the application's scope. For these applications, Parker developed a special option for the ETH, where the force sensor is integrated into the end-cap of the cylinder. One of the main advantages of this design is that the sensor cable does not move as the rod extends and retracts. All force sensors are configured as traction/thrust sensors.

Analog standard output signals 4...20 mA are available. The sensors correspond to the EN 61326 standard for electromagnetic compatibility (EMC).

Features

- **Measuring range: traction/ thrust forces up to ±25 kN**
- **Thin film implants (instead of conventional bonded foil strain gauges)**
- **Corrosion resistant stainless steel version**
- **Integrated amplifier**
- **Small temperature drift**
- **High long term stability**
- **High shock and vibration resistance**
- **For dynamic or static measurements**
- **Good repeatability**
- **Simple mounting**

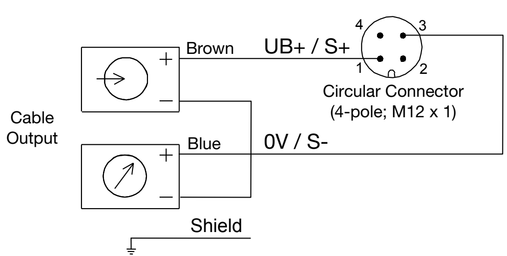
Compatible with parallel motor configurations only.

Requires tapped bottom hole cylinder mounting option "F", see Rear Clevis Mount in Optons & Accessories 19.

	ETH032			ETH050			ETH080			ETH100	ETH125
	M05	M10	M16	M05	M10	M20	M05	M10	M32	M10/M20	
Part Number	0112.034-01	0112.034-01	0112.034-02	0122.034-01	0122.034-02	0122.034-03	0132.034-01	0132.034-02	0132.034-03	0142.034-01	0152.034-01
Accuracy — %	1									2	2
Material	Stainless steel										
Protection class	IP67										
Calibration — kN	±3.7	±3.7	±2.4	±9.3	±7.0	±4.4	±17.8	±25.1	±10.6	±54.8	±81.4
Accuracy – N	74.0	74.0	48.0	186.0	140.0	88.0	356.0	502.0	212.0	2192.0	3256.0

Electrical Connection

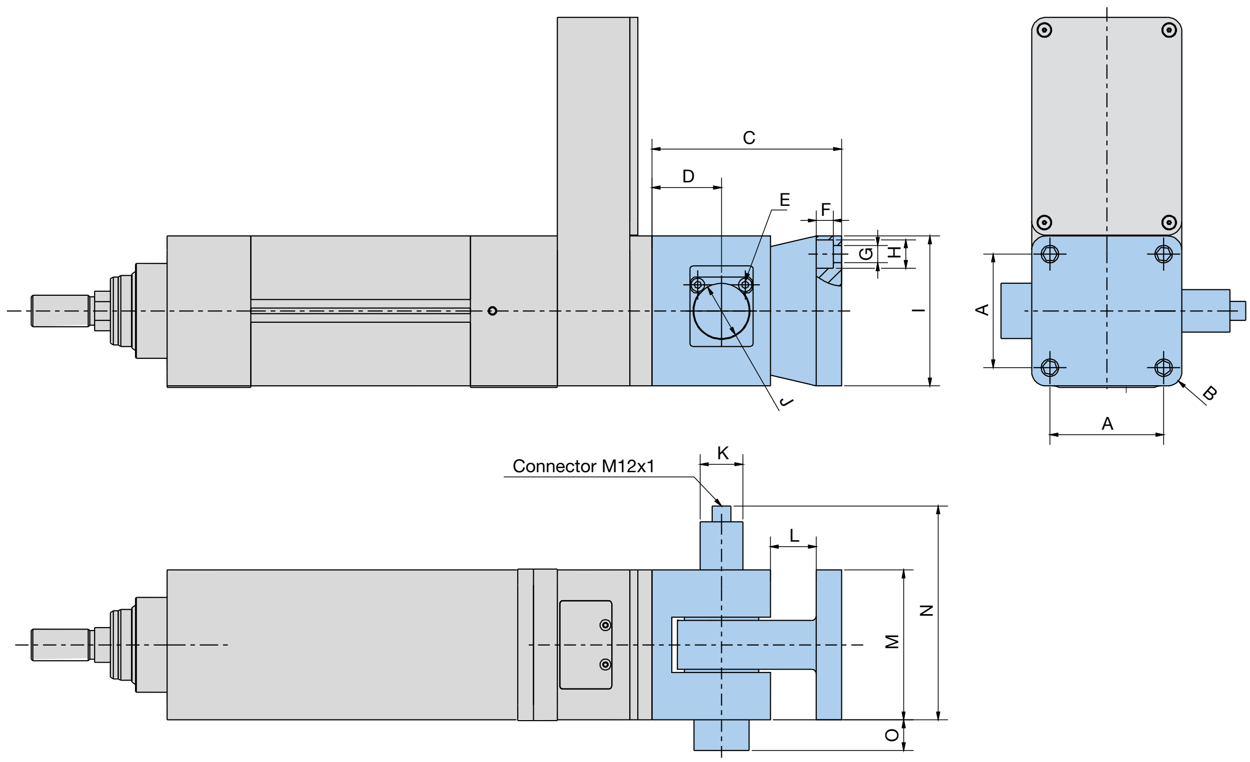
Analog output 4...20 mA (two-wire technology)



Force Sensor Cables

Part Number	Description
080-900446	2M sensor cable, straight connector, M12 to flying leads
080-900447	5M sensor cable, straight connector, M12 to flying leads
080-900456	2M sensor cable, 90 degree (symbol) angled connector, M12 to flying leads
080-900457	5M sensor cable, 90 degree (symbol) angled connector, M12 to flying leads

Force Sensor Rear Clevis for ETH032, ETH050, ETH080



Dimensions — mm

Size	A	B	C	D	E*	F	G	H	I	ØJ	ØK	L	M	N	O
ETH032	32.5	R7	72	27	SW3	6.4	6.6	11	46.5	20	27	12	46.5	98.25	6.75
ETH050	46.5	R8.5	89	32	SW3	8.8	9	15	63.5	25	27	17	63.5	111.75	3.25
ETH080	72.0	R9	123	47	SW4	10.8	11	18	95.0	35	27	29	95.0	135.50	0

*SW = width across flat

Electric Cylinders

Limit Sensors

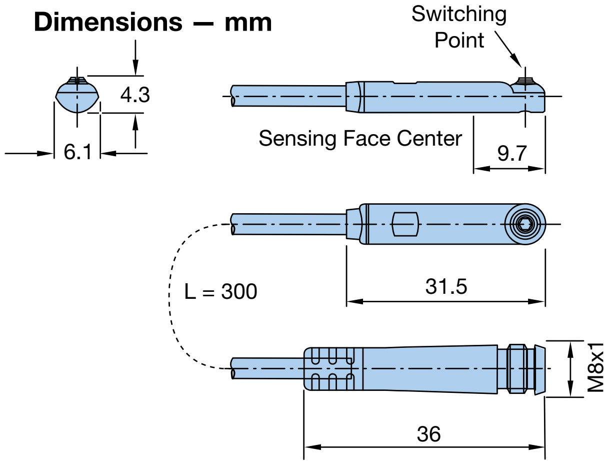
The ETH uses the Parker Global Sensor which can be mounted in the longitudinal grooves running along the cylinder body. These new sensors mount flush to the extrusion body, minimizing the overall width of the actuator.

The sensor cable can be concealed under the yellow T-slot covers which are provided with each unit.

Permanent magnets integrated into the screw nut actuate the sensors as the rod extends and retracts.

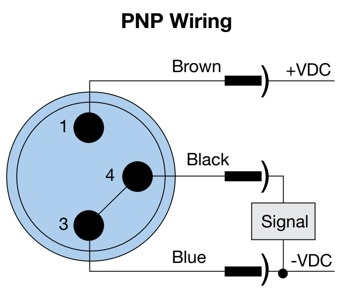
ETH032 and ETH050 sizes have two grooves on opposite sides of the cylinder; the ETH080 has two grooves on all four sides of the cylinder.

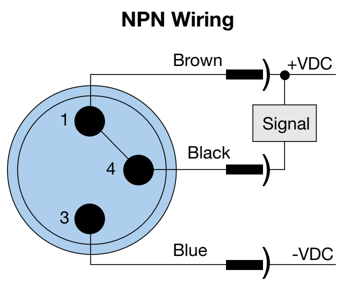
Note: Only PNP logic sensors are compatible with Compax3.



Common Specifications:

Electric current drain: 100 mA (max)
Switching current: 10 mA (max)
Supply voltage: 10 – 30 VDC
Switching Frequency: 5 kHz





Magnetic LED Cylinder Sensors

Model Number	Function	Logic	Cable	Compatible w/ Compax3
P8S-GPFAX	N.O.	PNP	3 m	Yes
P8S-GNFAX		NPN		No
P8S-GPCHX		PNP	0.3 m cable with M8 connector*	Yes
P8S-GNCHX		NPN		No
P8S-GQFAX	N.C.	PNP	3 m	Yes
P8S-GMFAX		NPN		No
P8S-GQCHX		PNP	0.3 m cable with M8 connector*	Yes
P8S-GMCHX		NPN		No

* 003-2918-01 is a 5 m extension cable to flying leads for these cables

ORDERING INFORMATION
ETH Series

Fill in an order code from each of the numbered fields to create a complete ETH model order code. Refer to the section listed for further details.

	①	②	③	④	⑤	⑥	⑦	⑧		⑨	⑩	
Order Example:	ETH	032	M05	A	2	XPC	B	C	N	0200	C	B

① **Series**
ETH

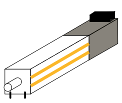
② **Frame Size**
(see "Performance by Cylinder Size and Screw Lead" chart and graphs in Specifications)

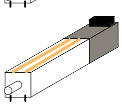
032	ISO32 cylinder size
050	ISO50 cylinder size
080	ISO80 cylinder size
100	ISO100 cylinder size
125	ISO125 cylinder size

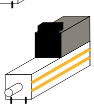
③ **Drive Screw**
(see "Performance by Cylinder Size and Screw Lead" chart in Specifications)

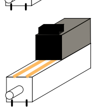
M05	5 mm metric ballscrew
M10	10 mm metric ballscrew
M16	16 mm metric ballscrew (size ETH032 only)
M20	20 mm metric ballscrew (size ETH050 only)
M32	32 mm metric ballscrew (size ETH080 only)

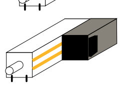
④ **Motor Mount/Cylinder Orientation**

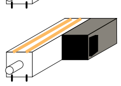
A  Inline w/groove for Initiator 3 & 9 o'clock

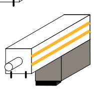
B  Inline w/groove for Initiator 6 & 12 o'clock

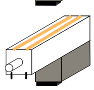
C  Parallel 12 o'clock w/groove for Initiator 3 & 9 o'clock

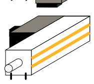
D  Parallel 12 o'clock w/groove for Initiator 6 & 12 o'clock

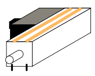
E  Parallel 3 o'clock w/groove for Initiator 3 & 9 o'clock*

F  Parallel 3 o'clock w/groove for Initiator 6 & 12 o'clock*

G  Parallel 6 o'clock w/groove for Initiator 3 & 9 o'clock

H  Parallel 6 o'clock / groove for Initiator 6 & 12 o'clock

J  Parallel 9 o'clock / groove for Initiator 3 & 9 o'clock

K  Parallel 9 o'clock w/groove for Initiator 6 & 12 o'clock

*When ordered with a lubrication bore option (item 5, order code 3), check to make sure the motor/gearbox length does not block the lubrication port option. This will be an issue for shorter strokes.

⑤ **Lubrication Bore Option**
(see Relubrication Section for details in Sizing & Selection)

1	Integrated lubrication port*
2	Lubrication hole at center of extrusion 12 o´clock
3	Lubrication hole at center of extrusion 3 o´clock
4	Lubrication hole at center of extrusion 6 o´clock
5	Lubrication hole at center of extrusion 9 o´clock

* Not available with Motor Mount/Cylinder Orientation with 3 o'clock orientation (order codes E and F)

⑥ **Motor Mounting Configurations**
Motor-specific mounting configurations are categorized into four primary groups:

"XP": With Parker Xpress motor systems (listed below)

"K": Flange & coupling kits for other Parker motor

"P": Flange & coupling kits for Parker Gearheads

"N": Kits for Non standard motors

(Refer to Dimensions for appropriate order codes and mounting specifications for available inline and parallel motor mounting configurations)

Parker Xpress Motor Systems		ETH032	ETH050	ETH080
XPC	BE233FJ-KPSN	•	•	
XPD	BE233FJ-KPSB	•	•	
XPG	BE344LJ-KPSN	•	•	•
XPH	BE344LJ-KPSB	•	•	•
XPL	MPP1003D1E-KPSN		•	•
XPM	MPP1003D1E-KPSB		•	•
XPN	MPP1003D1E-KPSN *		•	•
XPP	MPP1003D1E-KPSB *		•	•
XPQ	MPP1003R1E-KPSN		•	•
XPR	MPP1003R1E-KPSB		•	•
XPS	MPP1003R1E-KPSN *		•	•
XPT	MPP1003R1E-KPSB *		•	•
XPU	MPP1154B1E-KPSN			•
XPV	MPP1154B1E-KPSB			•
XPW	MPP1154B1E-KPSN **			•
XPX	MPP1154B1E-KPSB **			•
XPY	MPP1154P1E-KPSN			•
XPZ	MPP1154P1E-KPSB			•
XP1	MPP1154P1E-KPSN **			•
XP2	MPP1154P1E-KPSB **			•

* With PV34FE-003 gearhead on all inline and parallel sizes <u>except size ETH080 parallel</u> which comes with PV90FB-003
** With PV115FB-003 gearhead

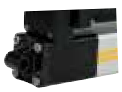
Electric Cylinders

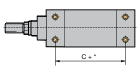
⑦ Cylinder Mounting Options
(see Options & Accessories for details)

B  Foot mount

C  Rear clevis

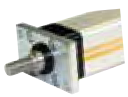
D  Center trunnion

E  Rear eye

F  Bottom tapped (standard)

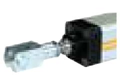
G  Side flange mount

H  Rear flange plate

J  Front flange plate

N Front and rear flange plates (combining H and J options

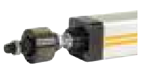
⑧ Rod End Mounting Options
(see Options & Accessories for details)

C  Clevis

F  Female thread

M  Male thread

S  Spherical rod end

L  Alignment coupler

R  Linear guide module

⑨ Stroke
For fastest delivery please choose a standard stroke length from the chart below. (See page 43 “Stroke, Usable Stoke and Safety Travel” to calculate appropriate stroke length.)

=32023Custom Lengths

	ETH032	ETH050	ETH080	ETH100	ETH125
XXXX	50 – 1000	50 – 1200	50 – 1600	200 – 1600	200 – 1600

(Customized length in 1 mm increments)

Standard Lengths

	ETH032	ETH050	ETH080	ETH100	ETH125
0050	•	•			
0100	•	•	•		
0150	•	•	•		
0200	•	•	•	•	•
0300	•	•	•	•	•
0400	•	•	•	•	•
0600	•	•	•	•	•
0900		•	•		
1000	•				•
1200		•	•	•	•
1600			•	•	•

⑩ IP Rating

A IP54 with galvanized steel hardware
B IP54 with stainless steel hardware
C IP65 epoxy coated cylinder

Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

Virtual Engineer

The XFC Series

Extreme Force Roller Screw Driven Electric Cylinders

Design Features

- Pre-engineered package
- Performance matched components
- Environmental protection
- Laser certified precision
- All steel construction with standard metric hydraulic type tie rod construction for durability, stiffness, and rigidity
- Elastomeric seals throughout with no gaskets for complete sealing
- Opposed preloaded angular contact bearings for bi-directional force capability
- Roller screw drive system for increased life, load, and shock loading capabilities
- Inline and parallel gear drive configurations for full transfer of thrust force
- Parker Stealth family advanced planetary gearheads direct mount to cylinder for standard reduction options from 3:1 to 10:1 with 100:1 available
- Parker MPP Series brushless servo motors for complete Parker system solution with gearhead, motor, drive, and controls
- Rod wiper and seal based on proven TS2000 design and composite rod bearing designed to survive rugged environments with minimal maintenance for the life of the cylinder

- **High mechanical efficiency up to 90%**
- **Strokes up to 2000mm**
- **Extreme thrust force up to 356,000 N / 80,000 lbs**
- **Repeatability up to ±0.03mm**
- **Speeds up to 1016 mm/s**
- **Six metric profile sizes: 075, 090,115,140,165, 190**
- **Anti-rotate option**

	075	090	115	140	165	190
Maximum Travel (mm)	1,150	1,700	2,000	2,000	2,000	2,000
Maximum Payload (N)	40,000	68,000	108,000	160,000	240,000	356,000
Maximum Acceleration (m/sec²)	1,016	712	548	444	712	568

Parker is pleased to introduce a new family of high thrust electric cylinders featuring roller screw drive technology. The XFC Series further extends the feature rich and force dense offering of Parker's electric cylinder products.The XFC Electric Cylinder is designed to provide machine builders a high force electromechanical solution: offering long life, minimal maintenance, low operating costs, and structural rigidity. All this, in addition to Parker's world class customer service and industry leading delivery times.

As a worldwide leader in fluid power cylinder products, Parker has combined the best of both worlds into one unique product. All the benefits of electromechanical control and cleanliness combined with the structural rigidity and durability of a traditional hydraulic tie rod cylinder.

Flexibility & Versatile Programmability

In applications where high loads are required, roller screws offer a very attractive solution:

- **Servo motors and controls feature simplified programming**
- **Electromechanical control systems provide infinite programmability**
- **Performance advantages not easily obtained by comparable fluid power technology include multiple move profiles, adjustable acceleration and deceleration, force control, and absolute positioning capabilities**

These features allow the system to easily adapt to changing application conditions and performance requirements with minimal modification.

Design Considerations

Installation

Due to the reduced number of components required for a complete system, the commissioning time required for operation is significantly reduced relative to comparable fluid power systems. This allows system builders to quickly install, troubleshoot, and test system capabilities faster and more reliably than other alternatives.

Additionally machine break-down and set-up can be accomplished with relative ease and without concern of hydraulic fluid spillage.

Environmental Considerations

With electromechanical system technology, fluid leaks, filter changes, and air bleeding are a thing of the past. Simply mount the cylinder, plug in the cables, download a program and you are up and running in record time.

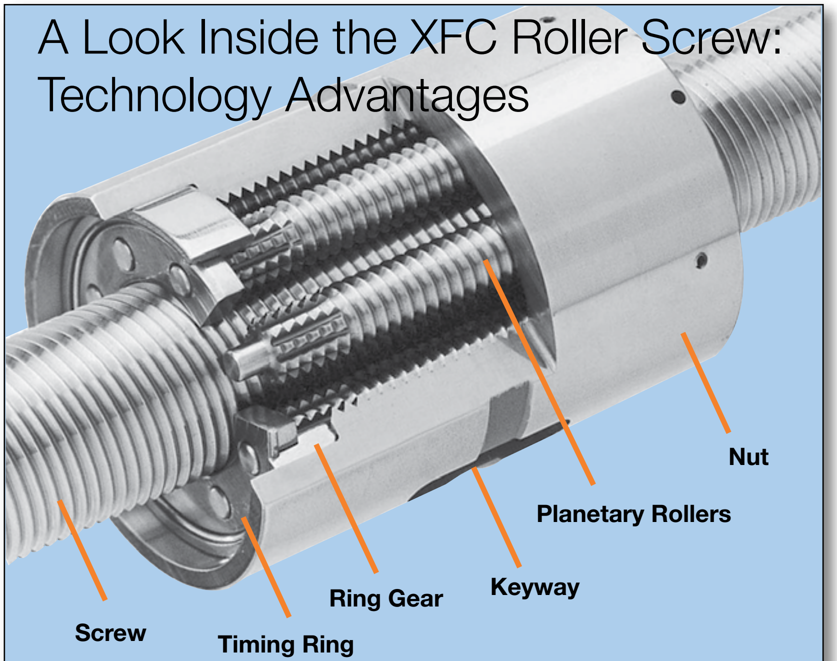
Anti-Rotation

Anti-rotation can now be achieved in XFC actuators thanks to a new design that incorporates a keying feature on the internal surface of the tubular body. This option can be configured through our standard part number structure.

Maintenance

Roller screw cylinder systems require little or no maintenance when compared to their fluid power alternatives, while still delivering long life and high performance. Series XFC cylinders are designed to be low maintenance with the factory installed full synthetic lubrication. For high duty cycle applications (>50%), oil filled cylinders are available with ports for recirculation as required.

A Look Inside the XFC Roller Screw: Technology Advantages



Planetary roller screws offer distinct benefits over traditional ball screw and lead screw mechanisms, and add features not easily attainable with hydraulic or pneumatic linear devices.

A planetary roller screw transmits rotary motion into linear motion similar to a ball or lead screw. The key difference in the roller screw design is the use of planetary rollers in place of ball bearings as the primary rolling elements.

The planetary rollers provide an increased number of contact surfaces between the external screw shaft and the internal threads of the roller nut relative to traditional ball or lead screw technology. The expanded number of contact points allow for:

- **Enhanced thrust capacity— 5X more thrust!**
- **Enhanced load carrying capabilities**
- **Higher speeds than traditional hydraulic cylinders**
- **Greatly extended life — 10X longer life!**

SPECIFICATIONS

Performance

XFC Frame Size		075	090	115	140	165	190
Continuous Thrust	kN (lbs)	20 (4,500)	34 (7,500)	54 (12,000)	80 (17,500)	120 (26,500)	178 (40,000)
Maximum Thrust	kN (lbs)	40 (9,000)	68 (15,000)	108 (24,000)	160 (35,000)	240 (53,000)	356 (80,000)
Maximum Acceleration	mm/sec^2 (in/sec^2)	19,600 (773)	19,600 (773)	19,600 (773)	19,600 (773)	19,600 (773)	19,600 (773)
Maximum Stroke 1)	mm (in)	1150 (55.12)	1700 (66.93)	2,000 (78.75)	2,000 (78.75)	2,000 (78.75)	2,000 (78.75)
Recommended Maximum Stroke Length of Unsupported Cylinder 2)	mm (in)	750 (29.53)	750 (29.53)	750 (29.53)	1,000 (39.37)	1,000 (39.37)	1,250 (49.21)

1) Consult factory for non-standard stroke lengths
2) Secondary support required for longer stroke lengths (consult factory)

System Characteristics

XFC Frame Size		075	090	115	140	165	190
Accuracy	mm (in)	0.08 (0.003)	0.08 (0.003)	0.08 (0.003)	0.08 (0.003)	0.13 (0.005)	0.13 (0.005)
Repeatability	mm (in)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)	0.05 (0.002)	0.05 (0.002)
Backlash	mm (in)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)

Screw Characteristics

XFC Size	Screw Diameter mm	Standard Lead 1) mm (in)/rev	Efficiency %	Ca Rating kN (lbf)	Thrust Tube Torque mN-m/N (lb-in/lbf)	Max. Speed 2) mm/sec (in/sec)
075	21	5 (0.197)	88.78	40.4 (9,082)	0.889 (0.035)	508 (20.0)
		10 (0.394)	91.17	44.6 (10,026)	1.752 (0.069)	1016 (40.0)
090	30	5 (0.197)	87.05	73.6 (16,546)	0.914 (0.036)	356 (14.0)
		10 (0.394)	90.38	74.4 (16,726)	1.752 (0.069)	712 (28.0)
115	39	5 (0.197)	85.18	103.4 (23,245)	0.939 (0.037)	274 (10.8)
		10 (0.394)	89.37	116.5 (26,190)	1.778 (0.070)	548 (21.6)
140	48	5 (0.197)	82.50	158.5 (35,632)	0.965 (0.038)	222 (8.7)
		10 (0.394)	88.34	171.2 (38,487)	1.803 (0.071)	444 (17.4)
165	60	10 (0.394)	87.05	238.6 (53,639)	1.829 (0.072)	356 (14.0)
		20 (0.787)	90.38	238.6 (53,639)	3.531 (0.139)	712 (28.0)
190	75	10 (0.394)	85.45	356.5 (80,144)	1.854 (0.073)	284 (11.2)
		20 (0.787)	90.97	356.5 (80,144)	3.658 (0.144)	568 (22.4)

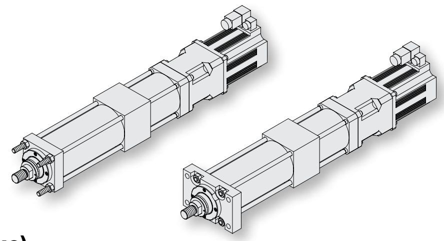
1) Consult factory for availability of non-standard leads
2) Speed is stroke dependant, see Maximum Speed charts for speed/stroke chart

Cylinder Temperature Rating*

Standard seals	-23 to 73°C (-10 to 165°F)
Fluorocarbon seals	-23 to 110°C (-10 to 230°F)

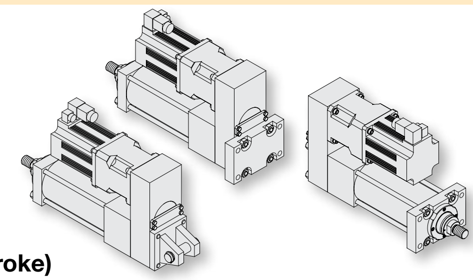
* Verify motor and gear box performance at higher temperatures.

Cylinder Weight — kg (lb)



Inline Configurations

XFC Frame Size	Base Weight with Mount (at Zero Stroke) J Front Flange	C Foot	D Trunnion	K Extended Tie Rod	Weight (Per 100 mm Stroke)
075	9.1 (20)	9.1 (20)	9.5 (21)	8.6 (19)	1.41 (3.1)
090	14.5 (32)	14.1 (31)	14.5 (32)	14.1 (31)	1.93 (4.3)
115	27.7 (61)	27.7 (61)	28.1 (62)	26.8 (59)	3.08 (6.8)
140	48.1 (106)	47.6 (105)	49.4 (109)	46.7 (103)	4.53 (10.0)
165	103.4 (182)	102.1 (180)	104.3 (185)	100.2 (175)	7.17 (15.8)
190	132.9 (293)	131.5 (290)	134.3 (296)	127.0 (280)	9.48 (20.9)



Parallel Configurations

XFC Frame Size	Base Weight with Mount (at Zero Stroke) J Front Flange	C Foot	D Trunnion	K, L, M Extended Tie Rod	H Rear Flange	B Rear Clevis	Weight (Per 100 mm Stroke)
075	11.3 (25)	10.9 (24)	11.3 (25)	10.9 (24)	11.3 (25)	11.3 (25)	1.41 (3.1)
090	17.7 (39)	17.2 (38)	17.7 (39)	17.2 (38)	18.1 (40)	18.6 (41)	1.93 (4.3)
115	34.0 (75)	34.0 (75)	34.9 (77)	33.1 (73)	35.4 (78)	35.4 (78)	3.08 (6.8)
140	59.4 (131)	58.5 (129)	60.3 (133)	57.6 (127)	61.7 (136)	62.1 (137)	4.53 (10.0)
165	103.4 (228)	102.1 (225)	104.3 (230)	100.2 (221)	107.0 (236)	110.7 (244)	7.17 (15.8)
190	163.7 (361)	162.4 (358)	170.6 (376)	158.8 (350)	171.5 (378)	171.9 (379)	9.48 (20.9)

Note: All weights above assume oil filled lubrication

Cylinder Inertia

Inertia matching of the cylinder assembly to the motor will improve the performance of the mechanical system. The inertia ratio of the cylinder and load to the motor should be less than 10:1. A general rule for screw driven systems is 5:1.

$$I_{Total} = I_{GearHead} + \frac{(I_{XFC} + I_{Mass})}{(GearHeadRatio)^2}$$

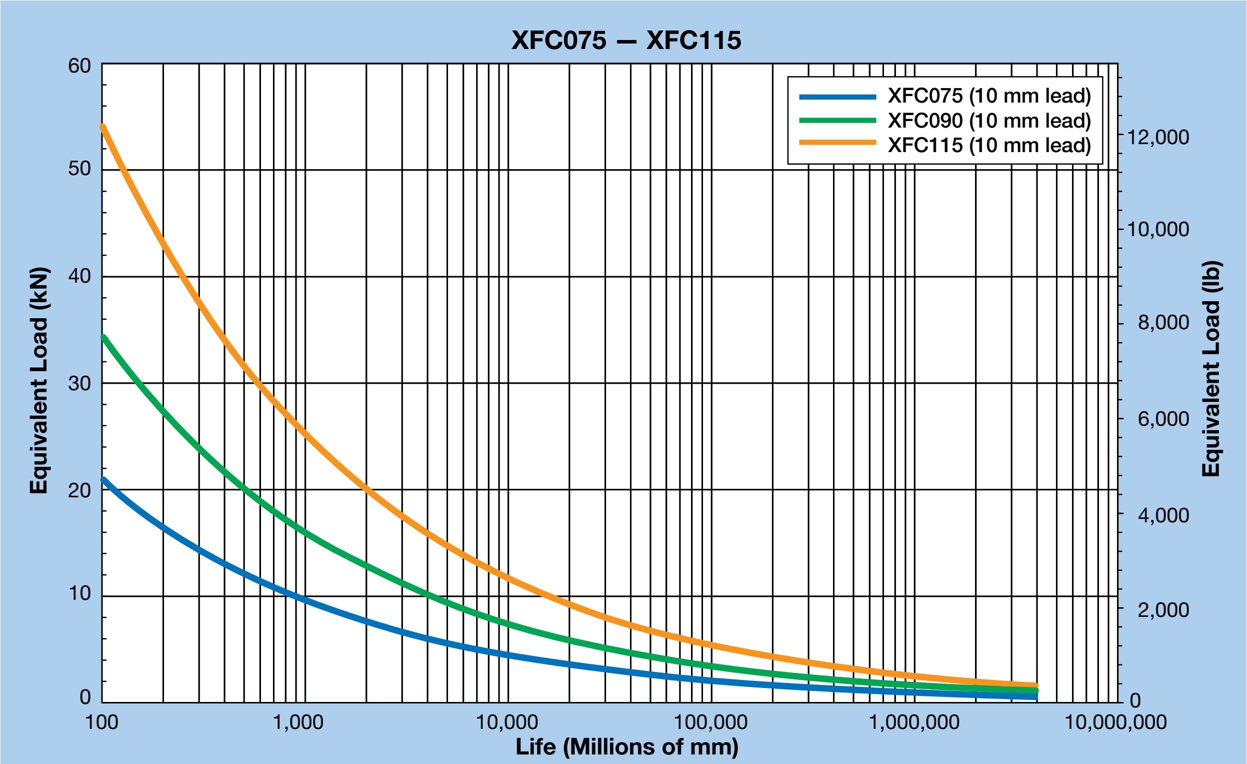
$$I_{Mass} = Mass_{Load}\,(kg) \left(\frac{Lead\ (mm)}{3141.6}\right)^3$$

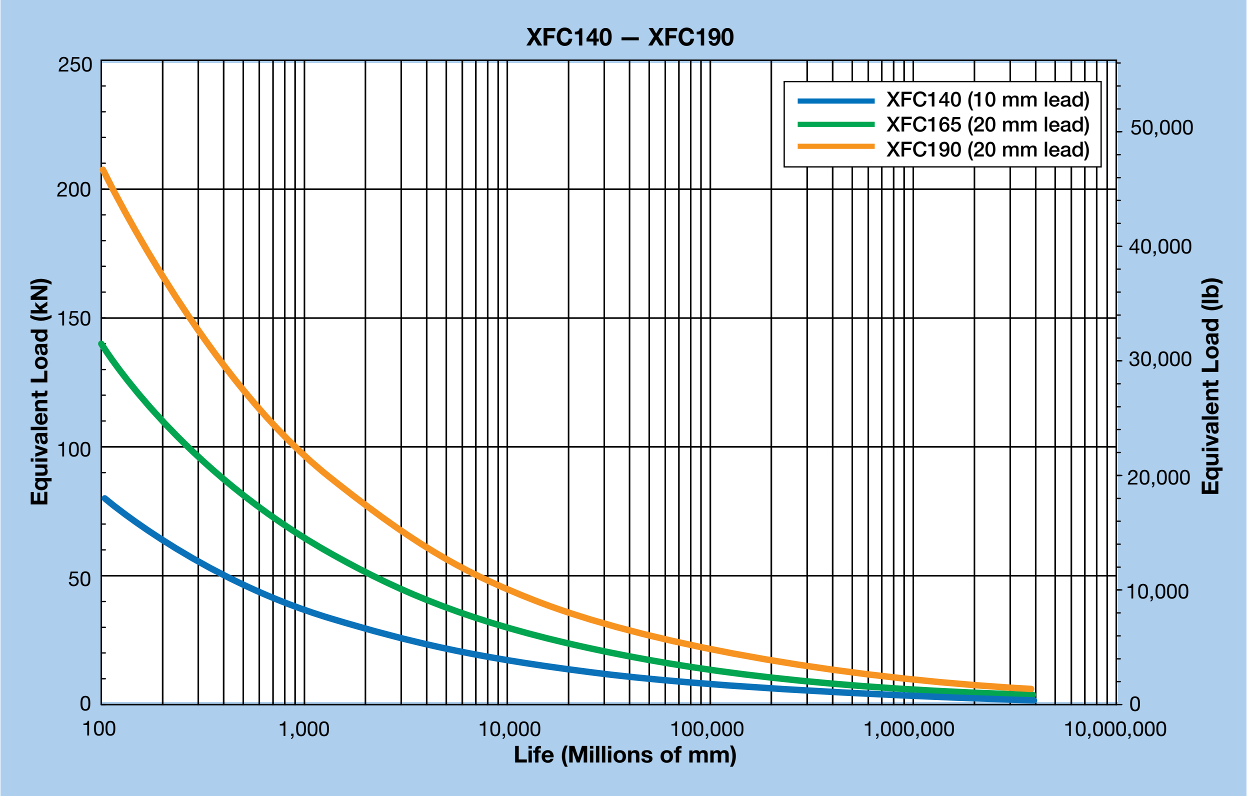
For PS Series gearhead inertia information, see: www.parkermotion.com

XFC Inertia I (kg-m²)

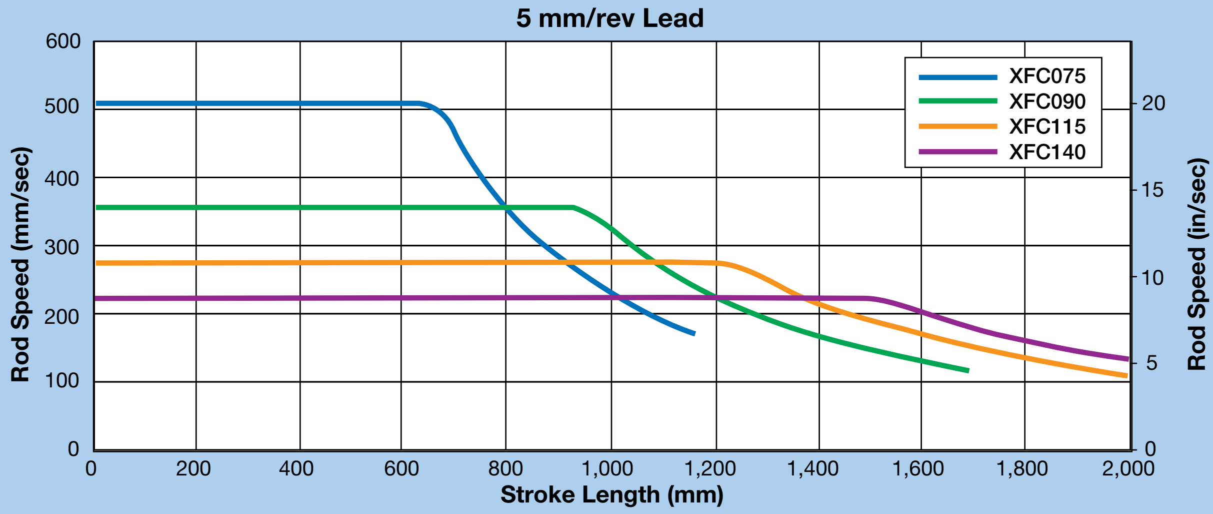
XFC Size	Inline (Zero Stroke)	Parallel (Zero Stroke)	Stroke (Per 100 mm)
075	0.00008903	0.00037951	0.00001499
090	0.00031974	0.00089394	0.00006242
115	0.00107620	0.00349671	0.00017800
140	0.00229637	0.00923002	0.00040900
165	0.00655544	0.02428162	0.00099900
190	0.02702120	0.05552601	0.00244000

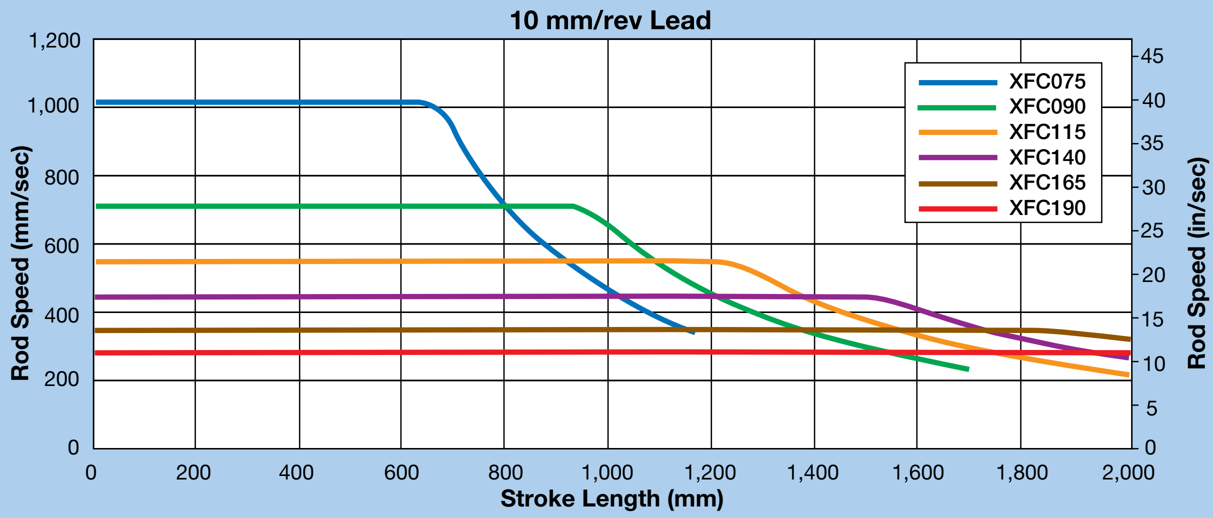
Life Charts

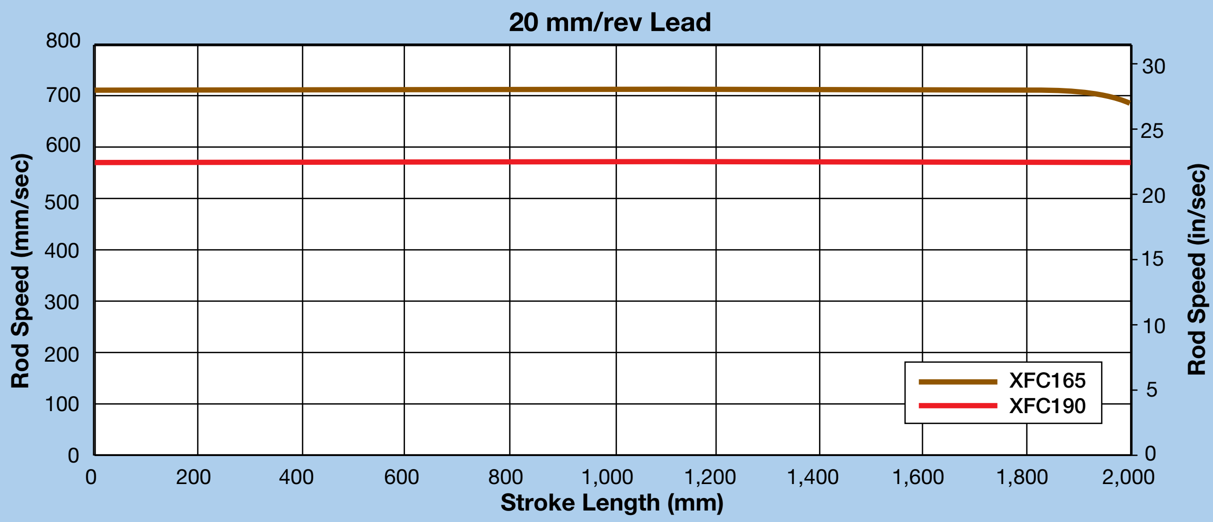

XFC075 — XFC115
XFC075 (10 mm lead)
XFC090 (10 mm lead)
XFC115 (10 mm lead)
Equivalent Load (kN)
0
10
20
30
40
50
60
Equivalent Load (lb)
0
2,000
4,000
6,000
8,000
10,000
12,000
100
1,000
10,000
100,000
1,000,000
10,000,000
Life (Millions of mm)


XFC140 — XFC190
XFC140 (10 mm lead)
XFC165 (20 mm lead)
XFC190 (20 mm lead)
Equivalent Load (kN)
0
50
100
150
200
250
Equivalent Load (lb)
0
10,000
20,000
30,000
40,000
50,000
100
1,000
10,000
100,000
1,000,000
10,000,000
Life (Millions of mm)

Maximum Speed Charts



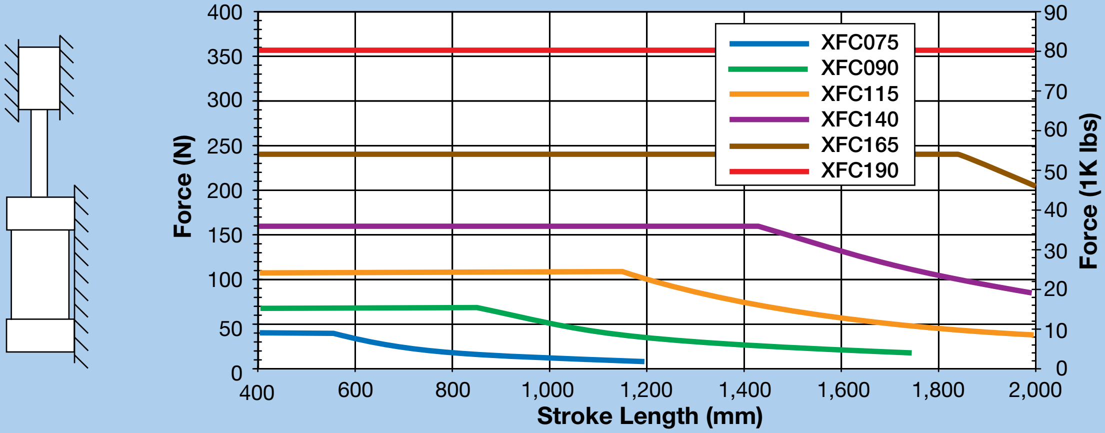




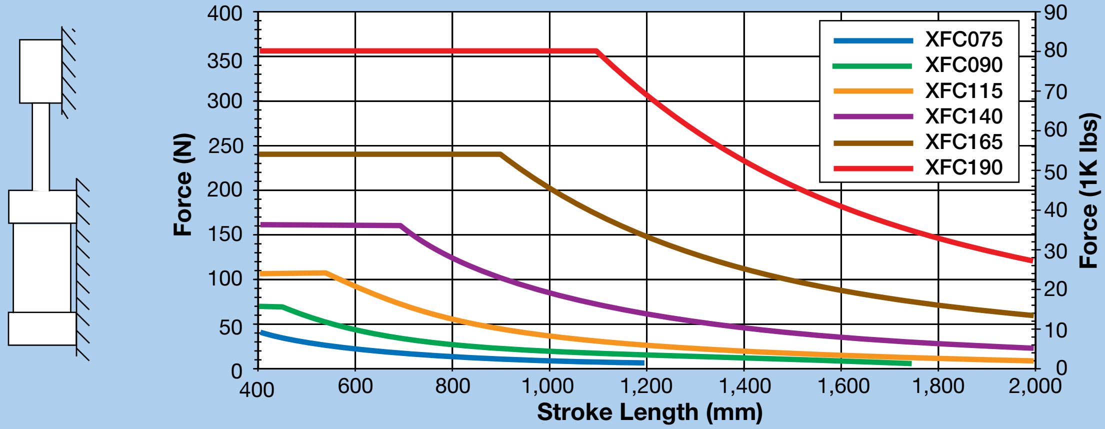
Buckling Strength Charts

The buckling strength of the cylinder is the maximum compressive load able to be exerted through the cylinder. These values are a function of the screw and thrust tube size and do not account for specific motor or gearbox performance. The force value from the specific mounting class and length of stroke should not be exceeded to ensure safe mechanical performance. Tension loads are not subject to buckling strength restrictions.

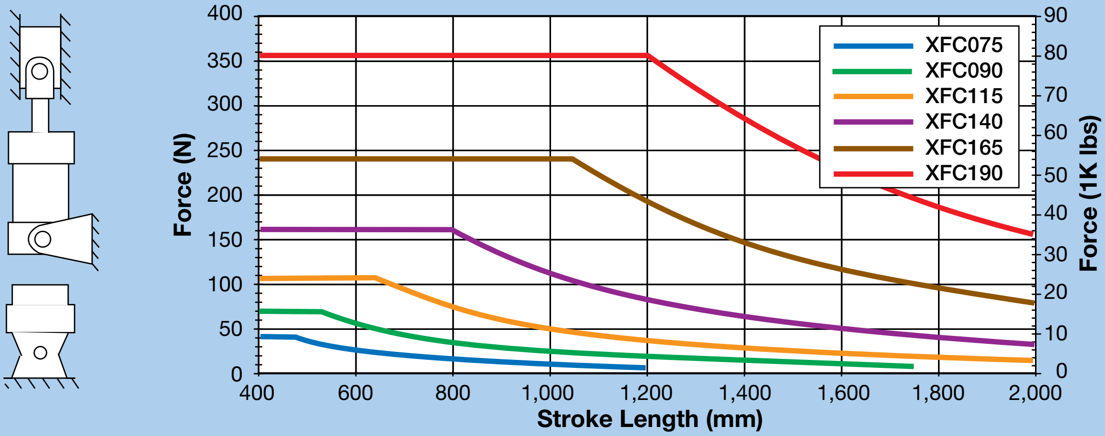
Maximum Compressive Force – Fixed Mount, Guided



Maximum Compressive Force – Fixed Mount, Not Guided



Maximum Compressive Force – Rear Pivot Mount, Guided



Electric Cylinders

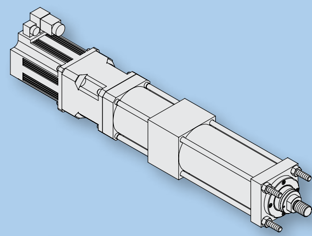
Available Mounts

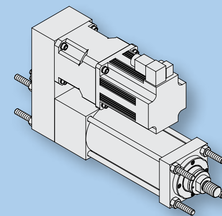
Inline | **Parallel**

K, L, M Extended Tie Rod Mount

Cylinders with Extended Tie Rods are suitable for straight line force applications, and are particularly useful where space is limited.

K Front Mount (inline and parallel)
L Rear Mount (parallel only)
M Both Front & Rear Mount (parallel only)

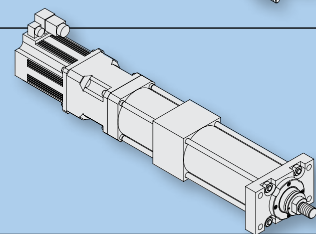


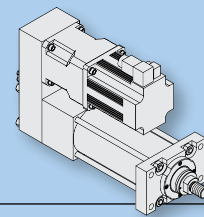


J Integral Front Flange Mount

These cylinders are suitable for use on straight line force transfer applications.

J Front Flange Mount (inline and parallel)

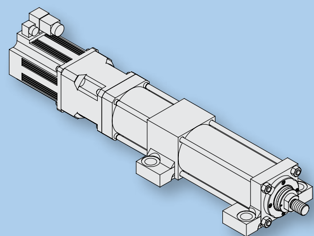


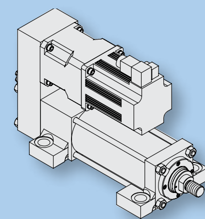


Foot Mount

Foot mounted cylinders do not absorb forces along their center line. As a result, the application of force by the cylinder produces a moment which attempts to rotate the cylinder about its mounting bolts. It is therefore very important that the cylinder be firmly secured to the mounting surface and the load should be rigidly guided to avoid side loads being applied to the cylinder bearings.

C Foot Mount (inline and parallel)

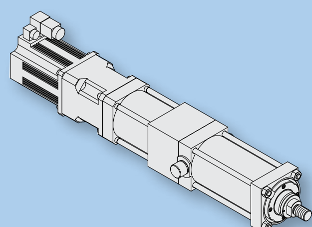


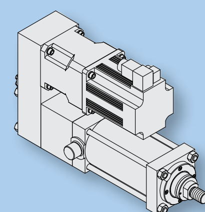


T Rear Trunnion Mount

Trunnion mounting is used for rotary or arc-line motion and offer flexibility when designing applications that are not confined to linear movements. Consult factory to review specific applications for stroke and configuration.

T Rear Trunnion Mount (inline and parallel)

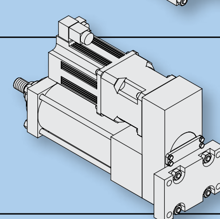




H Rear Flange Mount

These cylinders are suitable for use on straight line force transfer applications.

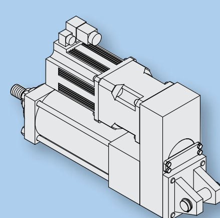
H Rear Flange Mount (parallel only)



B Rear Clevis Mount

Cylinders with pivot mountings, which absorb forces on their center lines, should be used where the machine member to be moved travels in a curved path. Pivot mountings may be used in tension (pull) or compression (push) applications. Cylinders using a fixed clevis may be used if the curved path of the thrust tube travels in a single plane.

B Rear Clevis Mount (parallel only)



DIMENSIONS

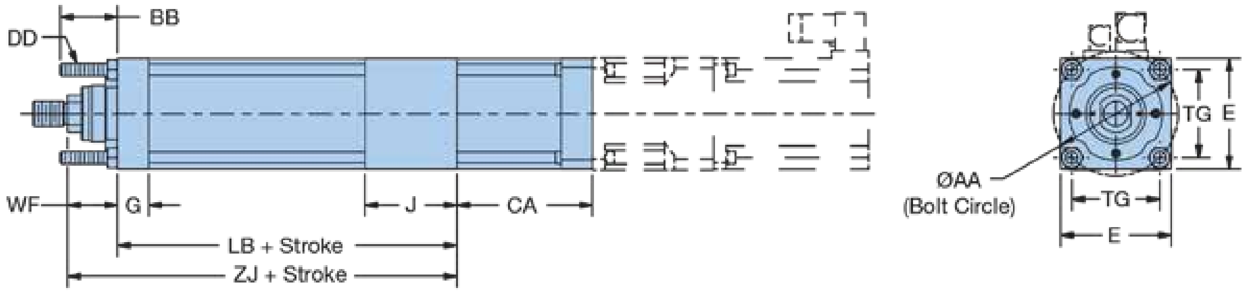
XFC Mount Options

Extended Tie Rod Mount — Inline

Order Code

FIRST ANGLE VIEW PROJECTION

K **Front Extended Tie Rods**



Dimensions — mm (in)

XFC Size	Ø AA	BB	DD	E	G	J	TG	WF	Add Stroke LB	Add Stroke ZJ
075	83 (3.27)	30 (1.18)	M8x1	76.2 (3.00)	22 (0.87)	62 (2.44)	58.69 (2.31)	38 (1.50)	205.5 (8.09)	243.5 (9.59)
090	100 (3.94)	35 (1.38)	M10x1.5	88.9 (3.50)	25 (0.98)	74 (2.91)	70.71 (2.78)	40 (1.57)	248 (9.76)	288 (11.34)
115	127 (5.00)	40 (1.57)	M12x1.25	114.3 (4.50)	30 (1.18)	91 (3.58)	89.80 (3.54)	45 (1.77)	293 (11.54)	338 (13.31)
140	155 (6.10)	50 (1.97)	M16x1.5	139.7 (5.50)	35 (1.38)	108 (4.25)	109.60 (4.32)	45 (1.77)	348 (13.70)	393 (15.47)
165	185 (7.28)	60 (2.36)	M22x1.5	165.1 (6.50)	40 (1.57)	123 (4.84)	130.81 (5.15)	60 (2.36)	417 (16.42)	477 (18.78)
190	215 (8.46)	75 (2.95)	M22x1.5	190.5 (7.50)	50 (1.97)	152 (5.98)	152.03 (5.99)	62 (2.44)	503 (19.80)	565 (22.24)

Motor/Gearhead

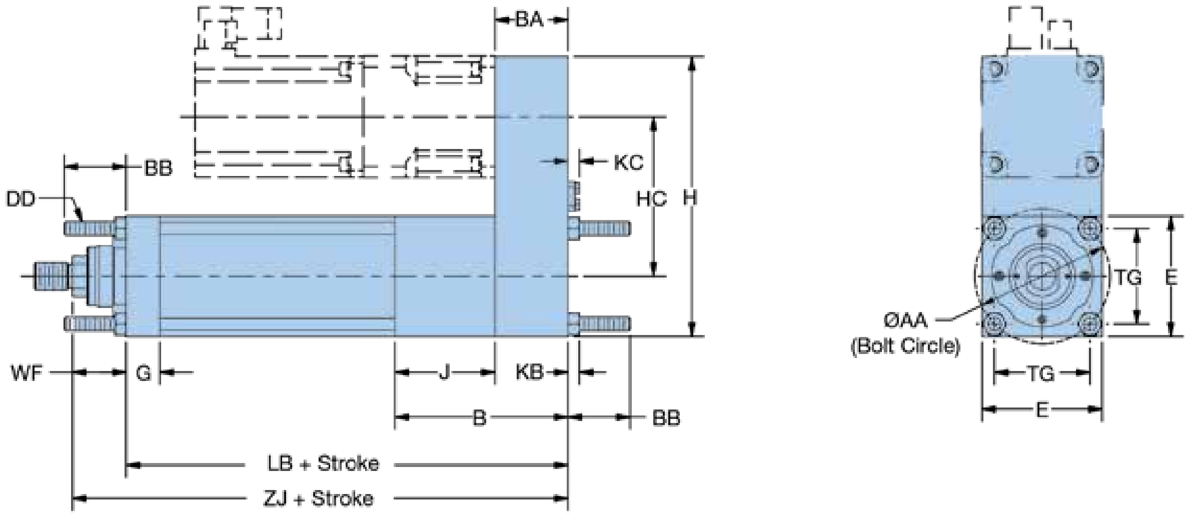
XFC Size	Dimension CA PS090	PS115	PS142	PS180	PS220	MPP115	MPP142	MPP190	MPP270
075	113 (4.45)	115 (4.53)	—	—	—	98 (3.86)	109 (4.29)	—	—
090	115 (4.53)	117 (4.61)	—	—	—	100 (3.94)	111 (4.37)	—	—
115	—	130 (5.12)	158 (6.22)	—	—	—	113 (4.45)	136 (5.35)	—
140	—	—	161 (6.34)	190 (7.48)	—	—	—	139 (5.47)	—
165	—	—	164 (6.46)	193 (7.60)	—	—	—	—	183 (7.20)
190	—	—	—	194 (7.64)	—	—	—	—	214 (8.43)

Electric Cylinders

Parallel Extended Tie Rod Mount — Parallel

FIRST ANGLE VIEW PROJECTION

Order Code	
K	**Front Extended Tie Rods**
L	**Rear Extended Tie Rods**
M	**Both Front & Rear Extended Tie Rods**



Dimensions — mm (in)

XFC Size	Ø AA	B	BA	BB	DD	E	G	H
075	83 (3.27)	106 (4.17)	44 (1.73)	30 (1.18)	M8x1	76.2 (3.00)	22 (0.87)	174.2 (6.86)
090	100 (3.94)	128 (5.04)	54 (2.13)	35 (1.38)	M10x1.5	88.9 (3.50)	25 (0.98)	206.9 (8.15)
115	127 (5.00)	154 (6.06)	63 (2.48)	40 (1.57)	M12x1.25	114.3 (4.50)	30 (1.18)	271 (10.67)
140	155 (6.10)	180 (7.09)	72 (2.83)	50 (1.97)	M16x1.5	139.7 (5.50)	35 (1.38)	332.2 (13.08)
165	185 (7.28)	211 (8.31)	88 (3.46)	60 (2.36)	M22x1.5	165.1 (6.50)	40 (1.57)	379.1 (14.93)
190	215 (8.46)	252 (9.92)	100 (3.94)	75 (2.95)	M22x1.5	190.5 (7.50)	50 (1.97)	455.5 (17.93)

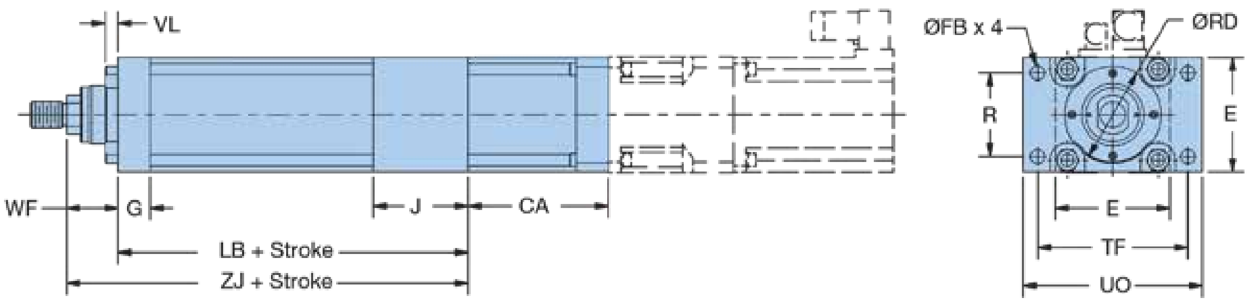
XFC Size	HC	J	KB	KC	TG	WF	Add Stroke LB	Add Stroke ZJ
075	98 (3.86)	62 (2.44)	6.5 (0.26)	6.93 (0.27)	58.69 (2.31)	38 (1.50)	249.5 (9.82)	287.5 (11.32)
090	118 (4.65)	74 (2.91)	8 (0.31)	8.65 (0.34)	70.71 (2.78)	40 (1.57)	302 (11.89)	342 (13.46)
115	156 (6.14)	91 (3.58)	10 (0.39)	10.15 (0.40)	89.80 (3.54)	45 (1.77)	356 (14.02)	401 (15.79)
140	192.5 (7.58)	108 (4.25)	13 (0.51)	13.65 (0.54)	109.60 (4.32)	45 (1.77)	420 (16.54)	465 (18.31)
165	224 (8.82)	123 (4.84)	18 (0.71)	13.65 (0.54)	130.81 (5.15)	60 (2.36)	505 (19.88)	565 (22.24)
190	265 (10.43)	152 (5.98)	18 (0.71)	17.18 (0.68)	152.03 (5.99)	62 (2.44)	603 (23.74)	665 (26.18)

Front Flange Mount — Inline

Order Code

J

FIRST ANGLE VIEW PROJECTION



Dimensions — mm (in)

XFC Size	E	Ø FB	G	J	R	Ø RD_{f8}	TF	UO	VL	WF	Add Stroke LB	Add Stroke ZJ
075	76.2 (3.00)	9 (0.35)	22 (0.87)	62 (2.44)	52 (2.05)	65 (2.559)	105 (4.13)	125 (4.92)	10 (0.39)	38 (1.50)	205.5 (8.09)	243.5 (9.59)
090	88.9 (3.50)	11 (0.43)	25 (0.98)	74 (2.91)	65 (2.56)	75 (2.953)	117 (4.61)	139.7 (5.50)	10 (0.39)	40 (1.57)	248 (9.76)	288 (11.34)
115	114.3 (4.50)	14 (0.55)	30 (1.18)	91 (3.58)	83 (3.27)	95 (3.740)	149 (5.87)	175 (6.89)	12 (0.47)	45 (1.77)	293 (11.54)	338 (13.31)
140	139.7 (5.50)	18 (0.71)	35 (1.38)	108 (4.25)	107 (4.21)	110 (4.331)	172 (6.77)	210 (8.27)	12 (0.47)	45 (1.77)	348 (13.70)	393 (15.47)
165	165.1 (6.50)	21 (0.83)	40 (1.57)	123 (4.84)	120 (4.72)	135 (5.315)	215 (8.46)	260 (10.24)	14 (0.55)	60 (2.36)	417 (16.42)	477 (18.78)
190	190.5 (7.50)	22 (0.87)	50 (1.97)	152 (5.98)	155 (6.10)	155 (5.315)	253 (9.96)	300 (11.81)	16 (0.63)	62 (2.44)	503 (19.80)	565 (22.24)

Motor/Gearhead

XFC Size	Dimension CA PS090	PS115	PS142	PS180	PS220	MPP115	MPP142	MPP190	MPP270
075	113 (4.45)	115 (4.53)	—	—	—	98 (3.86)	109 (4.29)	—	—
090	115 (4.53)	117 (4.61)	—	—	—	100 (3.94)	111 (4.37)	—	—
115	—	130 (5.12)	158 (6.22)	—	—	—	113 (4.45)	136 (5.35)	—
140	—	—	161 (6.34)	190 (7.48)	—	—	—	139 (5.47)	—
165	—	—	164 (6.46)	193 (7.60)	—	—	—	—	183 (7.20)
190	—	—	—	194 (7.64)	—	—	—	—	214 (8.43)

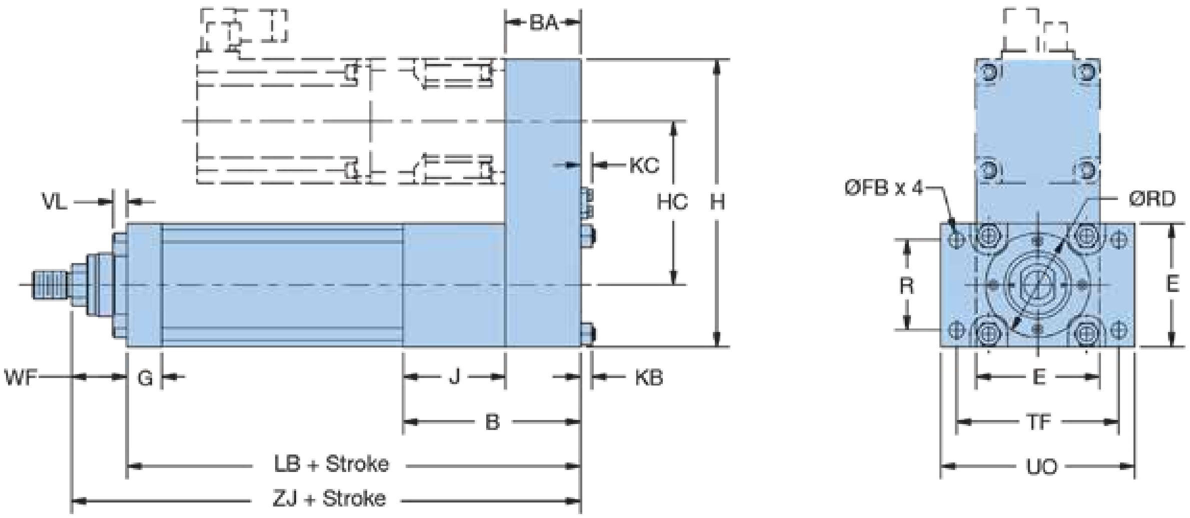
Electric Cylinders

Front Flange Mount — Parallel

Order Code

J

FIRST ANGLE VIEW PROJECTION



Dimensions — mm (in)

XFC Size	B	BA	E	Ø FB	G	H	HC	J	KB
075	106 (4.17)	44 (1.73)	76.2 (3.00)	9 (0.35)	22 (0.87)	174.2 (6.86)	98 (3.86)	62 (2.44)	6.5 (0.26)
090	128 (5.04)	54 (2.13)	88.9 (3.50)	11 (0.43)	25 (0.98)	206.9 (8.15)	118 (4.65)	74 (2.91)	8 (0.31)
115	154 (6.06)	63 (2.48)	114.3 (4.50)	14 (0.55)	30 (1.18)	271 (10.67)	156 (6.14)	91 (3.58)	10 (0.39)
140	180 (7.09)	72 (2.83)	139.7 (5.50)	18 (0.71)	35 (1.38)	332.2 (13.08)	192.5 (7.58)	108 (4.25)	13 (0.51)
165	211 (8.31)	88 (3.46)	165.1 (6.50)	21 (0.83)	40 (1.57)	379.1 (14.93)	224 (8.82)	123 (4.84)	18 (0.71)
190	252 (9.92)	100 (3.94)	190.5 (7.50)	22 (0.87)	50 (1.97)	455.5 (17.93)	265 (10.43)	152 (5.98)	18 (0.71)

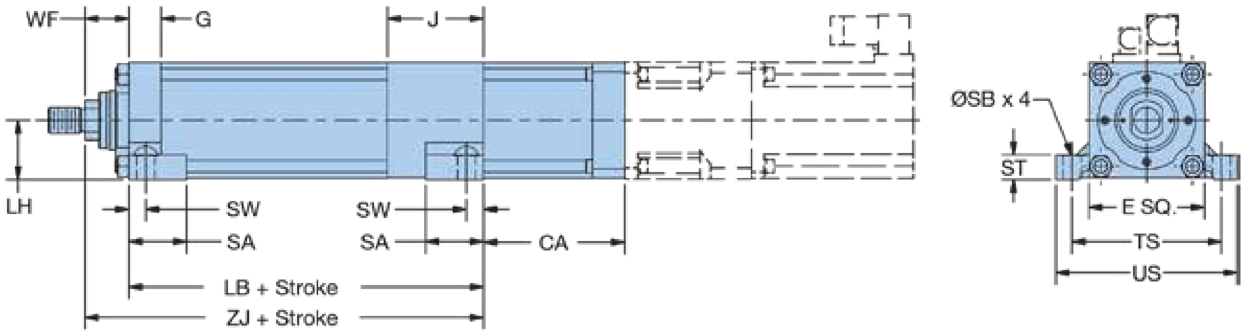
XFC Size	KC	R	Ø RD_{f8}	TF	UO	VL	WF	Add Stroke LB	Add Stroke ZJ
075	6.93 (0.27)	52 (2.05)	65 (2.559)	105 (4.13)	125 (4.92)	10 (0.39)	38 (1.50)	249.5 (9.82)	287.5 (11.32)
090	8.65 (0.34)	65 (2.56)	75 (2.953)	117 (4.61)	139.7 (5.50)	10 (0.39)	40 (1.57)	302 (11.89)	342 (13.46)
115	10.15 (0.40)	83 (3.27)	95 (3.740)	149 (5.87)	175 (6.89)	12 (0.47)	45 (1.77)	356 (14.02)	401 (15.79)
140	13.65 (0.54)	107 (4.21)	110 (4.331)	172 (6.77)	210 (8.27)	12 (0.47)	45 (1.77)	420 (16.54)	465 (18.31)
165	13.65 (0.54)	120 (4.72)	135 (5.315)	215 (8.46)	260 (10.24)	14 (0.55)	60 (2.36)	505 (19.88)	565 (22.24)
190	17.18 (0.68)	155 (6.10)	155 (5.315)	253 (9.96)	300 (11.81)	16 (0.63)	62 (2.44)	603 (23.74)	665 (26.18)

Foot Mount — Inline

Order
Code

C

FIRST ANGLE
VIEW PROJECTION



Dimensions — mm (in)

XFC Size	E	G	J	LH$_{h10}$	SA	ØSB	ST	SW	TS	US	WF	LB (Add Stroke)	ZJ (Add Stroke)
075	76.2 (3.00)	22 (0.87)	62 (2.44)	39 (1.535)	33.3 (1.31)	11 (0.43)	12.7 (0.50)	11 (0.43)	97 (3.82)	114.3 (4.50)	38 (1.50)	205.5 (8.09)	243.5 (9.59)
090	88.9 (3.50)	25 (0.98)	74 (2.91)	45.5 (1.791)	44.5 (1.75)	14 (0.55)	19.1 (0.75)	13 (0.51)	115 (4.53)	139.7 (5.50)	40 (1.57)	248 (9.76)	288 (11.34)
115	114.3 (4.50)	30 (1.18)	91 (3.58)	58 (2.283)	57.2 (2.25)	18 (0.71)	25.4 (1.00)	15 (0.59)	155 (6.10)	184.2 (7.25)	45 (1.77)	293 (11.54)	338 (13.31)
140	139.7 (5.50)	35 (1.38)	108 (4.25)	71 (2.795)	57.2 (2.25)	18 (0.71)	25.4 (1.00)	18 (0.71)	175 (6.89)	209.6 (8.25)	45 (1.77)	348 (13.70)	393 (15.47)
165	165.1 (6.50)	40 (1.57)	123 (4.84)	83.5 (3.287)	73.0 (2.87)	22 (0.87)	31.8 (1.25)	20 (0.79)	210 (8.27)	254 (10.00)	60 (2.36)	417 (16.42)	477 (18.78)
190	190.5 (7.50)	50 (1.97)	152 (5.98)	96.5 (3.799)	92.1 (3.63)	26 (1.02)	38.1 (1.50)	25 (0.98)	260 (10.24)	304.8 (12.00)	62 (2.44)	503 (19.80)	565 (22.24)

Motor/Gearhead

XFC Size	Dimension CA								
	PS090	PS115	PS142	PS180	PS220	MPP115	MPP142	MPP190	MPP270
075	113 (4.45)	115 (4.53)	—	—	—	98 (3.86)	109 (4.29)	—	—
090	115 (4.53)	117 (4.61)	—	—	—	100 (3.94)	111 (4.37)	—	—
115	—	130 (5.12)	158 (6.22)	—	—	—	113 (4.45)	136 (5.35)	—
140	—	—	161 (6.34)	190 (7.48)	—	—	—	139 (5.47)	—
165	—	—	164 (6.46)	193 (7.60)	—	—	—	—	183 (7.20)
190	—	—	—	194 (7.64)	—	—	—	—	214 (8.43)

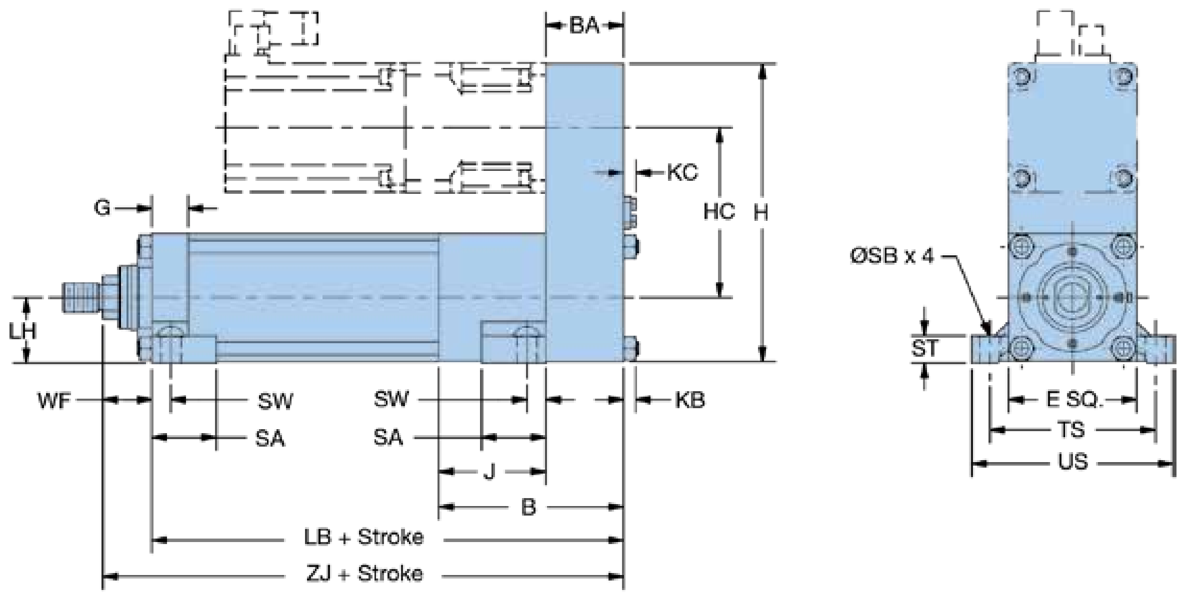
Electric Cylinders

Foot Mount — Parallel

Order Code

C

FIRST ANGLE VIEW PROJECTION



Dimensions — mm (in)

XFC Size	B	BA	E	G	H	HC	J	KB	KC
075	106 (4.17)	44 (1.73)	76.2 (3.00)	22 (0.87)	174.2 (6.86)	98 (3.86)	62 (2.44)	6.5 (0.26)	6.93 (0.27)
090	128 (5.04)	54 (2.13)	88.9 (3.50)	25 (0.98)	206.9 (8.15)	118 (4.65)	74 (2.91)	8 (0.31)	8.65 (0.34)
115	154 (6.06)	63 (2.48)	114.3 (4.50)	30 (1.18)	271 (10.67)	156 (6.14)	91 (3.58)	10 (0.39)	10.15 (0.40)
140	180 (7.09)	72 (2.83)	139.7 (5.50)	35 (1.38)	332.2 (13.08)	192.5 (7.58)	108 (4.25)	13 (0.51)	13.65 (0.54)
165	211 (8.31)	88 (3.46)	165.1 (6.50)	40 (1.57)	379.1 (14.93)	224 (8.82)	123 (4.84)	18 (0.71)	13.65 (0.54)
190	252 (9.92)	100 (3.94)	190.5 (7.50)	50 (1.97)	455.5 (17.93)	265 (10.43)	152 (5.98)	18 (0.71)	17.18 (0.68)

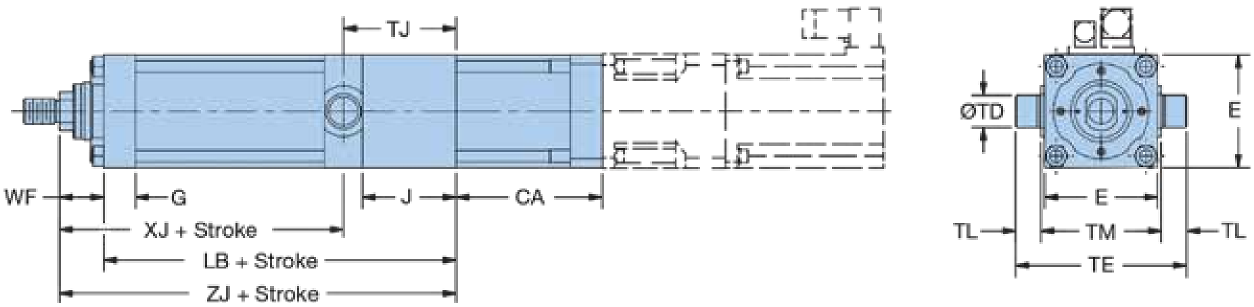
XFC Size	LH_{h10}	SA	ØSB	ST	SW	TS	US	WF	Add Stroke LB	Add Stroke ZJ
075	39 (1.535)	33.3 (1.31)	11 (0.43)	12.7 (0.50)	11 (0.43)	97 (3.82)	114.3 (4.50)	38 (1.50)	249.5 (9.82)	287.5 (11.32)
090	45.5 (1.791)	44.5 (1.75)	14 (0.55)	19.1 (0.75)	13 (0.51)	115 (4.53)	139.7 (5.50)	40 (1.57)	302 (11.89)	342 (13.46)
115	58 (2.283)	57.2 (2.25)	18 (0.71)	25.4 (1.00)	15 (0.59)	155 (6.10)	184.2 (7.25)	45 (1.77)	356 (14.02)	401 (15.79)
140	71 (2.795)	57.2 (2.25)	18 (0.71)	25.4 (1.00)	18 (0.71)	175 (6.89)	209.6 (8.25)	45 (1.77)	420 (16.54)	465 (18.31)
165	83.5 (3.287)	73.0 (2.87)	22 (0.87)	31.8 (1.25)	20 (0.79)	210 (8.27)	254 (10.00)	60 (2.36)	505 (19.88)	565 (22.24)
190	96.5 (3.799)	92.1 (3.63)	26 (1.02)	38.1 (1.50)	25 (0.98)	260 (10.24)	304.8 (12.00)	62 (2.44)	603 (23.74)	665 (26.18)

Rear Trunnion Mount — Inline

Order Code

T

FIRST ANGLE VIEW PROJECTION



Dimensions — mm (in)

XFC Size	E	G	J	TJ	Ø TD_{f8}	TL	TE	TM	WF	Add Stroke LB	Add Stroke XJ	Add Stroke ZJ
075	76.2 (3.00)	22 (0.87)	62 (2.44)	74.5 (2.93)	20 (0.787)	16 (0.63)	112 (4.41)	80 (3.15)	38 (1.50)	205.5 (8.09)	169 (6.65)	243.5 (9.59)
090	88.9 (3.50)	25 (0.98)	74 (2.91)	89 (3.50)	25 (0.984)	20 (0.79)	135 (5.32)	95 (3.74)	40 (1.57)	248 (9.76)	199 (7.83)	288 (11.34)
115	114.3 (4.50)	30 (1.18)	91 (3.58)	111 (4.37)	32 (1.260)	25 (0.98)	170 (6.69)	120 (4.72)	45 (1.77)	293 (11.54)	227 (8.94)	338 (13.31)
140	139.7 (5.50)	35 (1.38)	108 (4.25)	132 (5.20)	40 (1.575)	32 (1.26)	209.4 (8.244)	145.4 (5.72)	45 (1.77)	348 (13.70)	261 (10.28)	393 (15.47)
165	165.1 (6.50)	40 (1.57)	123 (4.84)	152 (5.98)	50 (1.969)	40 (1.57)	250 (9.84)	170 (6.69)	60 (2.36)	417 (16.42)	325 (12.80)	477 (18.78)
190	190.5 (7.50)	50 (1.97)	152 (5.98)	188 (7.40)	63 (2.480)	50 (1.97)	295.4 (11.63)	195.4 (7.69)	62 (2.44)	503 (19.80)	377 (14.84)	565 (22.24)

Motor/Gearhead

XFC Size	Dimension CA PS090	PS115	PS142	PS180	PS220	MPP115	MPP142	MPP190	MPP270
075	113 (4.45)	115 (4.53)	—	—	—	98 (3.86)	109 (4.29)	—	—
090	115 (4.53)	117 (4.61)	—	—	—	100 (3.94)	111 (4.37)	—	—
115	—	130 (5.12)	158 (6.22)	—	—	—	113 (4.45)	136 (5.35)	—
140	—	—	161 (6.34)	190 (7.48)	—	—	—	139 (5.47)	—
165	—	—	164 (6.46)	193 (7.60)	—	—	—	—	183 (7.20)
190	—	—	—	194 (7.64)	—	—	—	—	214 (8.43)

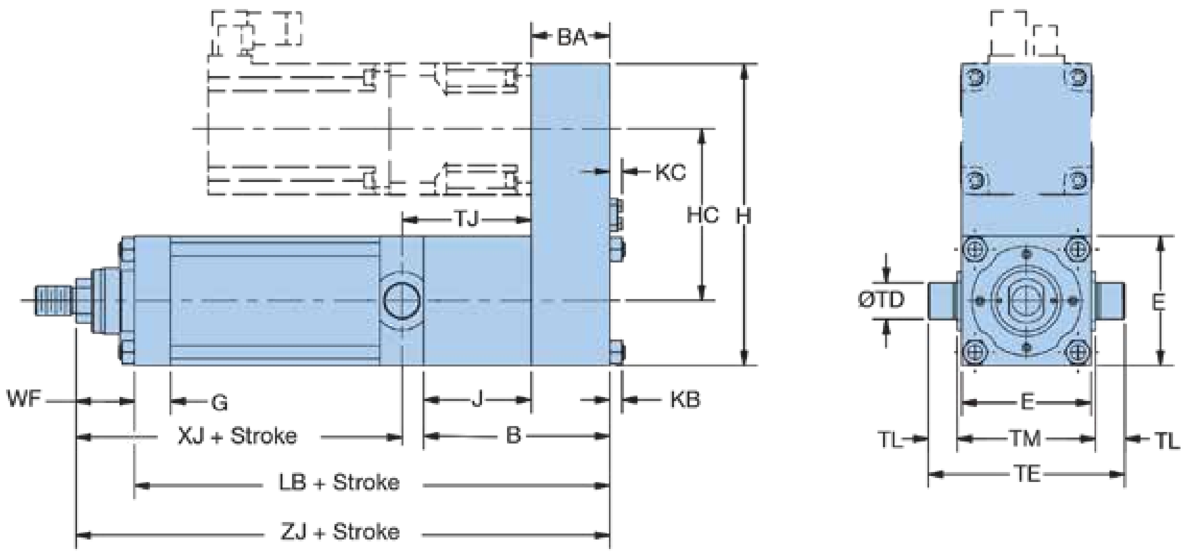
Electric Cylinders

Rear Trunnion Mount — Parallel

Order Code

T

FIRST ANGLE VIEW PROJECTION



Dimensions — mm (in)

XFC Size	B	BA	E	G	H	HC	J	KB	KC
075	106 (4.17)	44 (1.73)	76.2 (3.00)	22 (0.87)	174.2 (6.86)	98 (3.86)	62 (2.44)	6.5 (0.26)	6.93 (0.27)
090	128 (5.04)	54 (2.13)	88.9 (3.50)	25 (0.98)	206.9 (8.15)	118 (4.65)	74 (2.91)	8 (0.31)	8.65 (0.34)
115	154 (6.06)	63 (2.48)	114.3 (4.50)	30 (1.18)	271 (10.67)	156 (6.14)	91 (3.58)	10 (0.39)	10.15 (0.40)
140	180 (7.09)	72 (2.83)	139.7 (5.50)	35 (1.38)	332.2 (13.08)	192.5 (7.58)	108 (4.25)	13 (0.51)	13.65 (0.54)
165	211 (8.31)	88 (3.46)	165.1 (6.50)	40 (1.57)	379.1 (14.93)	224 (8.82)	123 (4.84)	18 (0.71)	13.65 (0.54)
190	252 (9.92)	100 (3.94)	190.5 (7.50)	50 (1.97)	455.5 (17.93)	265 (10.43)	152 (5.98)	18 (0.71)	17.18 (0.68)

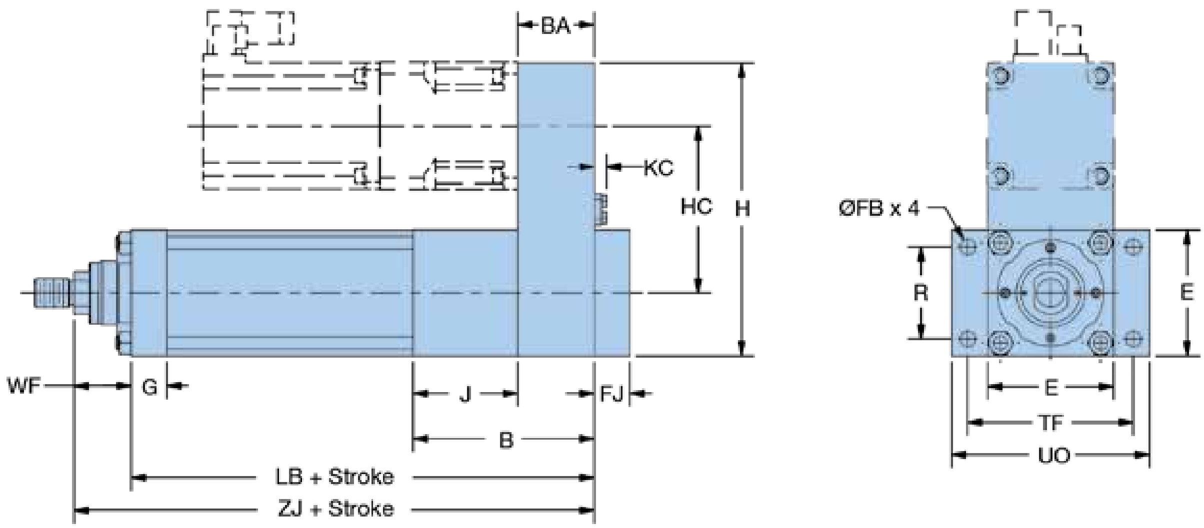
XFC Size	TJ	Ø TD_{f8}	TL	TE	TM	WF	Add Stroke LB	Add Stroke XJ	Add Stroke ZJ
075	74.5 (2.93)	20 (0.787)	16 (0.63)	112 (4.41)	80 (3.15)	38 (1.50)	249.5 (9.82)	169 (6.65)	287.5 (11.32)
090	89 (3.50)	25 (0.984)	20 (0.79)	135 (5.32)	95 (3.74)	40 (1.57)	302 (11.89)	199 (7.83)	342 (13.46)
115	111 (4.37)	32 (1.260)	25 (0.98)	170 (6.69)	120 (4.72)	45 (1.77)	356 (14.02)	227 (8.94)	401 (15.79)
140	132 (5.20)	40 (1.575)	32 (1.26)	209.4 (8.244)	145.4 (5.72)	45 (1.77)	420 (16.54)	261 (10.28)	465 (18.31)
165	152 (5.98)	50 (1.969)	40 (1.57)	250 (9.84)	170 (6.69)	60 (2.36)	505 (19.88)	325 (12.80)	565 (22.24)
190	155 (6.10)	63 (2.480)	155 (5.315)	300 (11.81)	253 (9.96)	62 (2.44)	603 (23.74)	377 (14.84)	665 (26.18)

Rear Flange Mount — Parallel Only

Order Code

H

FIRST ANGLE VIEW PROJECTION



Dimensions — mm (in)

XFC Size	B	BA	E	Ø FB	FJ	G	H	HC
075	106 (4.17)	44 (1.73)	76.2 (3.00)	9 (0.35)	12 (0.47)	22 (0.87)	174.2 (6.86)	98 (3.86)
090	128 (5.04)	54 (2.13)	88.9 (3.50)	11 (0.43)	14 (0.55)	25 (0.98)	206.9 (8.15)	118 (4.65)
115	154 (6.06)	63 (2.48)	114.3 (4.50)	14 (0.55)	16 (0.63)	30 (1.18)	271 (10.67)	156 (6.14)
140	180 (7.09)	72 (2.83)	139.7 (5.50)	18 (0.71)	20 (0.79)	35 (1.38)	332.2 (13.08)	192.5 (7.58)
165	211 (8.31)	88 (3.46)	165.1 (6.50)	21 (0.83)	25 (0.98)	40 (1.57)	379.1 (14.93)	224 (8.82)
190	252 (9.92)	100 (3.94)	190.5 (7.50)	22 (0.87)	30 (1.18)	50 (1.97)	455.5 (17.93)	265 (10.43)

XFC Size	J	KC	R	TF	UO	WF	Add Stroke LB	Add Stroke ZJ
075	62 (2.44)	6.93 (0.27)	52 (2.05)	105 (4.13)	125 (4.92)	38 (1.50)	249.5 (9.82)	287.5 (11.32)
090	74 (2.91)	8.65 (0.34)	65 (2.56)	117 (4.61)	139.7 (5.50)	40 (1.57)	302 (11.89)	342 (13.46)
115	91 (3.58)	10.15 (0.40)	83 (3.27)	149 (5.87)	175 (6.89)	45 (1.77)	356 (14.02)	401 (15.79)
140	108 (4.25)	13.65 (0.54)	107 (4.21)	172 (6.77)	210 (8.27)	45 (1.77)	420 (16.54)	465 (18.31)
165	123 (4.84)	13.65 (0.54)	120 (4.72)	215 (8.46)	260 (10.24)	60 (2.36)	505 (19.88)	565 (22.24)
190	152 (5.98)	17.18 (0.68)	155 (6.10)	253 (9.96)	300 (11.81)	62 (2.44)	603 (23.74)	665 (26.18)

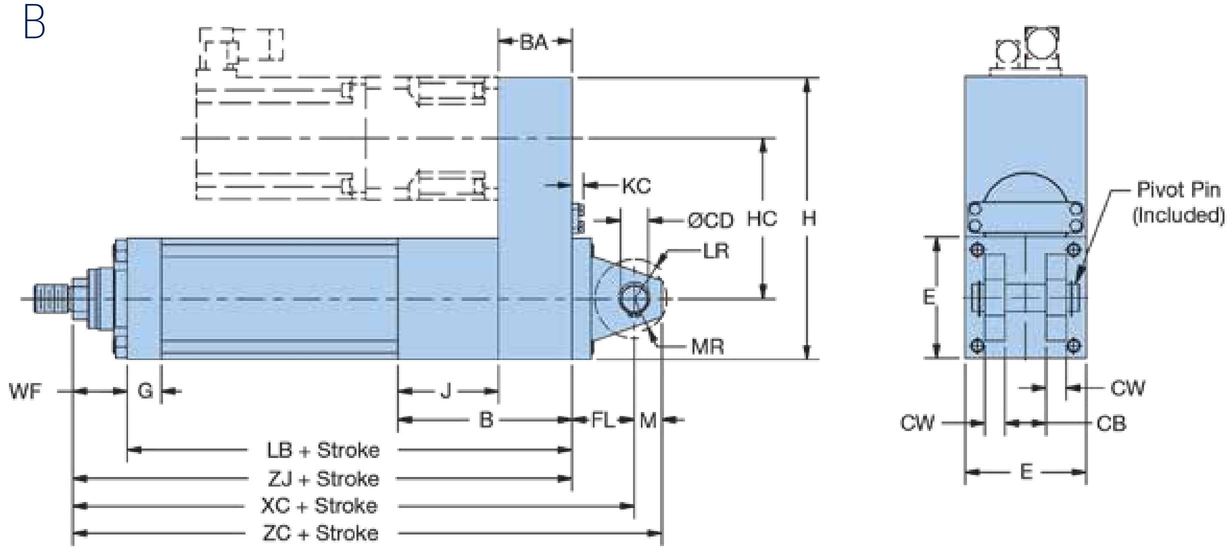
Electric Cylinders

Rear Clevis Mount — Parallel Only

Order Code

B

FIRST ANGLE VIEW PROJECTION



Dimensions — mm (in)

XFC Size	B	BA	CB	Ø CD_{H9}	CW	E	FL	G	H	HC
075	106 (4.17)	44 (1.73)	20 (0.79)	14 (0.551)	10 (0.39)	76.2 (3.00)	31 (1.22)	22 (0.87)	174.2 (6.86)	98 (3.86)
090	128 (5.04)	54 (2.13)	30 (1.18)	20 (0.787)	15 (0.59)	88.9 (3.50)	46 (1.81)	25 (0.98)	206.9 (8.15)	118 (4.65)
115	154 (6.06)	63 (2.48)	30 (1.18)	20 (0.787)	15 (0.59)	114.3 (4.50)	48 (1.89)	30 (1.18)	271 (10.67)	156 (6.14)
140	180 (7.09)	72 (2.83)	40 (1.57)	28 (1.102)	20 (0.79)	139.7 (5.50)	59 (2.32)	35 (1.38)	332.2 (13.08)	192.5 (7.58)
165	211 (8.31)	88 (3.46)	50 (1.97)	36 (1.417)	25 (0.98)	165.1 (6.50)	79 (3.11)	40 (1.57)	379.1 (14.93)	224 (8.82)
190	252 (9.92)	100 (3.94)	60 (2.36)	45 (1.772)	30 (1.18)	190.5 (7.50)	87 (3.43)	50 (1.97)	455.5 (17.93)	265 (10.43)

							Add Stroke			
XFC Size	J	KC	LR	M	MR	WF	LB	XC	ZC	ZJ
075	62 (2.44)	6.93 (0.27)	17 (0.67)	14 (0.55)	17 (0.67)	38 (1.50)	249.5 (9.82)	318.5 (12.54)	332.5 (13.09)	287.5 (11.32)
090	74 (2.91)	8.65 (0.34)	29 (1.14)	20 (0.79)	25 (0.98)	40 (1.57)	302 (11.89)	388 (15.28)	408 (16.06)	342 (13.46)
115	91 (3.58)	10.15 (0.40)	29 (1.14)	20 (0.79)	25 (0.98)	45 (1.77)	356 (14.02)	449 (17.68)	469 (18.46)	401 (15.79)
140	108 (4.25)	13.65 (0.54)	34 (1.34)	28 (1.10)	34 (1.34)	45 (1.77)	420 (16.54)	524 (20.63)	552 (21.73)	465 (18.31)
165	123 (4.84)	13.65 (0.54)	50 (1.97)	36 (1.42)	45 (1.77)	60 (2.36)	505 (19.88)	644 (25.35)	680 (26.77)	565 (22.24)
190	152 (5.98)	17.18 (0.68)	53 (2.09)	45 (1.77)	54 (2.13)	62 (2.44)	603 (23.74)	752 (29.61)	797 (31.38)	665 (26.18)

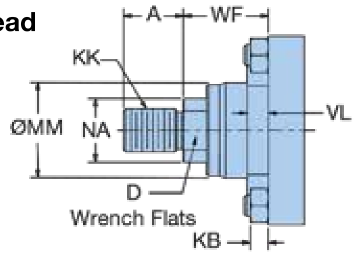
Male Rod End

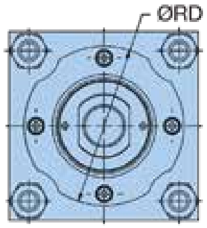
Order
Code

FIRST ANGLE
VIEW PROJECTION

A **Metric Thread**

B **Imperial Thread**





Dimensions — mm (in)

XFC Size	A	D	KB	KK A	KK B	ØMM	NA	$ØRD_{f8}$	VL	WF
075	22 (0.87)	19 (0.75)	6.5 (0.26)	M16x1.5	5/8-18	36 (1.42)	24 (0.94)	65 (2.558)	10 (0.39)	38 (1.50)
090	28 (1.10)	24 (0.94)	8 (0.31)	M20x1.5	3/4-16	45 (1.77)	30 (1.18)	75 (2.952)	10 (0.39)	40 (1.57)
115	36 (1.42)	32 (1.26)	10 (0.39)	M27x2	1-14	56 (2.20)	40 (1.57)	95 (3.739)	12 (0.47)	45 (1.77)
140	45 (1.77)	39 (1.54)	13 (0.51)	M33x2	1 1/4-12	70 (2.76)	49 (1.93)	110 (4.329)	12 (0.47)	45 (1.77)
165	56 (2.21)	48 (1.89)	18 (0.71)	M42x2	1 1/2-12	90 (3.54)	60 (2.36)	135 (5.313)	14 (0.55)	60 (2.36)
190	63 (2.48)	55 (2.17)	18 (0.71)	M48x2	1 3/4-12	110 (4.33)	70 (2.76)	155 (6.101)	16 (0.63)	62 (2.44)

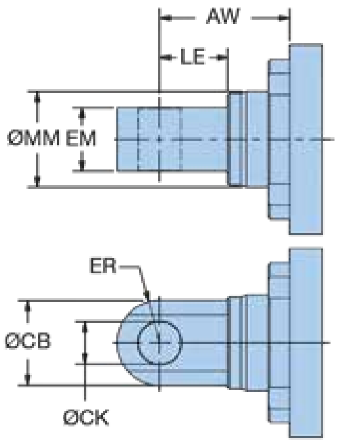
Rod Eye

Order
Code

C

Dimensions — mm (in)

XFC Size	AW	ØCB	$ØCK_{H9}$	EM_{h13}	ER_{MAX}	LE	ØMM
075	48 (1.89)	32 (1.26)	14 (0.551)	20 (0.787)	16 (0.63)	19 (0.75)	36 (1.42)
090	61 (2.40)	40 (1.57)	20 (0.787)	30 (1.181)	20 (0.79)	32 (1.26)	45 (1.77)
115	66 (2.60)	45 (1.77)	20 (0.787)	30 (1.181)	23 (0.89)	32 (1.26)	56 (2.20)
140	73 (2.87)	60 (2.36)	28 (1.102)	40 (1.575)	30 (1.18)	39 (1.53)	70 (2.76)
165	99 (3.90)	80 (3.15)	36 (1.417)	50 (1.969)	40 (1.57)	54 (2.13)	90 (3.54)
190	104 (4.09)	100 (3.94)	45 (1.772)	60 (2.362)	50 (1.97)	57 (2.24)	110 (4.33)

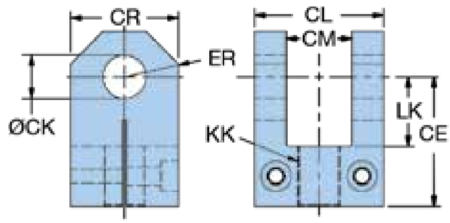


Electric Cylinders

Mounting Accessories

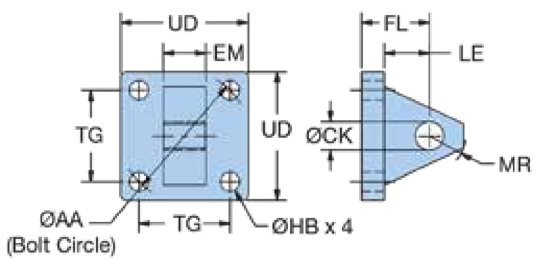
FIRST ANGLE VIEW PROJECTION

Dimensions — mm (in)

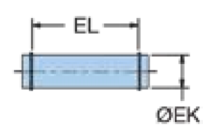


Rod Clevis

XFC Size	Part No.	CE	CL	CM_{A16}	$ØCK_{H9}$	CR	LK_{MIN}	ER_{MAX}	KK	Load Rating kN (lb)
075	0950250075	41 (1.61)	40 (1.57)	20 (0.787)	14 (0.551)	30 (1.18)	19 (0.75)	15.53 (0.61)	M16x1.5	20 (4,500)
090	0950250090	60 (2.36)	60 (2.36)	30 (1.181)	20 (0.787)	50 (1.97)	32 (1.26)	25.32 (1.00)	M20x1.5	34 (7,500)
115	0950250115	68 (2.68)	60 (2.36)	30 (1.181)	20 (0.787)	50 (1.97)	32 (1.26)	25.71 (1.01)	M27x2	54 (12,000)
140	0950250140	84 (3.31)	83 (3.27)	40 (1.575)	28 (1.102)	60 (2.36)	39 (1.54)	32.50 (1.28)	M33x2	80 (17,500)
165	0950250165	110 (4.33)	103 (4.06)	50 (1.969)	36 (1.417)	76 (2.99)	54 (2.13)	41.04 (1.62)	M42x2	120 (26,500)
190	0950250190	120 (4.72)	123 (4.84)	60 (2.362)	45 (1.772)	101.5 (4.00)	57 (2.24)	51.83 (2.04)	M48x2	178 (40,000)



Clevis Bracket



Pivot Pin

XFC Size	Part No.	ØAA	Ø CK_{H9}	EM	FL	ØHB	LE_{MIN}	MR_{MAX}	TG	UD	Part No.	Ø EK_{f8}	EL
075	1448100000	59 (2.32)	14 (0.551)	20 (0.79)	29 (1.14)	9 (0.35)	19 (0.75)	17 (0.67)	41.7 (1.64)	64 (2.52)	1434790000	14 (0.551)	45 (1.77)
090	1448110000	74 (2.91)	20 (0.787)	30 (1.18)	48 (1.89)	13.5 (0.53)	32 (1.26)	29 (1.14)	52.3 (2.06)	75 (2.95)	1434800000	20 (0.787)	66 (2.60)
115	1448120000	91 (3.58)	20 (0.787)	30 (1.18)	48 (1.89)	13.5 (0.53)	32 (1.26)	29 (1.14)	64.3 (2.53)	90 (3.54)	1434800000	20 (0.787)	66 (2.60)
140	1448130000	117 (4.61)	28 (1.102)	40 (1.58)	59 (2.32)	17.5 (0.69)	39 (1.54)	34 (1.34)	82.7 (3.26)	115 (4.53)	1434810000	28 (1.102)	87 (3.43)
165	1448140000	137 (5.39)	36 (1.417)	50 (1.97)	79 (3.11)	17.5 (0.69)	54 (2.13)	50 (1.97)	96.9 (3.82)	127 (5.00)	1434820000	36 (1.417)	107 (4.21)
190	1448150000	178 (7.01)	45 (1.772)	60 (2.36)	87 (3.43)	26 (1.02)	57 (2.24)	53 (2.09)	125.9 (4.96)	165 (6.50)	1434830000	45 (1.772)	129 (5.08)

OPTIONS & ACCESSORIES

Motors, Gearheads & Adapter Plates

Motor and gearhead selection is critical to the performance of the XFC electromechanical cylinder and must be sized based on the application requirements.

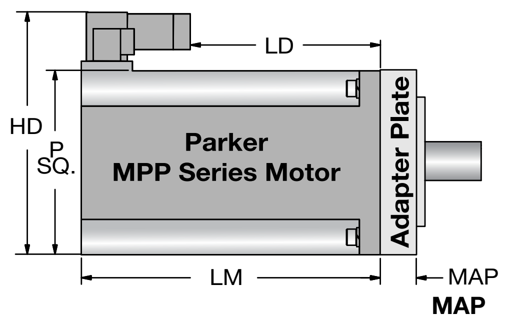
The tables below and on the next page provide information on Parker MPP motors or PS Series gearheads that are appropriate with the XFC.

A motor-only selection is typically used in high-speed/low-force applications, whereas a motor/gearhead combination is beneficial for slow speed/high force.

Standard configurations are available if a number is listed in the adapter plate columns (MAP, LAP). This number represents the adapter plate width and corresponds to the appropriate size motor and gearhead.

If the number is zero, the motor or gearhead combination is possible, but an adapter plate is not required. A dash indicates that a suitable combination is not available as a standard configuration.

Consult the factory to inquire about other options or configurations.



MPP Series Motors

Dimensions — mm (in)

MPP Motor Size	Length	LM	LD	HD	P	Inline 075	Inline 090	Inline 115	Inline 140	Inline 165	Inline 190	Parallel 075	Parallel 090	Parallel 115	Parallel 140	Parallel 165	Parallel 190
115	2	152.4 (6.00)	89.2 (3.51)	159.0 (6.26)	113.0 (4.45)	0.0	0.0	—	—	—	—	12 (0.47)	12 (0.47)	—	—	—	—
	3	177.8 (7.00)	115.2 (4.54)					—	—	—	—			—	—	—	—
	4	203.2 (8.00)	140.2 (5.52)					—	—	—	—			—	—	—	—
142	2	172.9 (6.81)	109.9 (4.33)	188.8 (7.43)	142.7 (5.62)	16 (0.63)	16 (0.63)	16 (0.63)	—	—	—	—	16 (0.63)	16 (0.63)	—	—	—
	4	223.7 (8.81)	160.8 (6.33)						—	—	—	—			—	—	—
	6	274.5 (10.81)	211.9 (8.34)						—	—	—	—			—	—	—
	8	325.3 (12.81)	261.9 (10.31)						—	—	—	—			—	—	—
190	4	224.0 (8.82)	110.3 (4.34)	260.1 (10.24)	184.9 (7.28)	—	—	25 (0.98)	25 (0.98)	—	—	—	—	25 (0.98)	25 (0.98)	—	—
	6	275.0 (10.83)	161.3 (6.35)			—	—			—	—	—	—			—	—
	8	325.3 (12.81)	211.3 (8.32)			—	—			—	—	—	—			—	—
270	6	293.3 (11.55)	175.3 (6.90)	335.9 (13.22)	266.7 (10.50)	—	—	—	30 (1.18)	30 (1.18)	—	—	—	—	—	30 (1.18)	—
	8	344.1 (13.55)	255.5 (10.06)			—	—	—			—	—	—	—	—		—

Note: Make sure the output torque on the motor is sufficient for the application. MPP torque information can be found at www.parkermotion.com

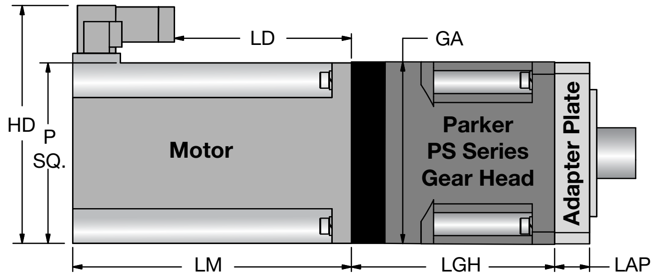
Motor Brake Option

For vertical applications, a static brake should be used to resist back-driving the screw mechanism. A motor brake increases the overall length of the motor as indicated in the chart.

Brake Option Additional Motor Length

Motor size	092	100	115	142	190	270
LM and LD Increase by:	34.5 (1.36)	48.5 (1.91)	48.5 (1.91)	51.6 (2.03)	89.0 (3.50)	127.0 (5.00)

For specific motor holding torque, refer to MPP motor data at www.parkermotion.com



PS Series Gearheads

Dimensions — mm (in)

Gear size	MPP Motor Size	MPP Motor Length	LM	LD	HD	P	GA	LGH	LAP[1] 075	LAP[1] 090	LAP[1] 115	LAP[1] 140	LAP[1] 165	LAP[1] 190
PS90	092	1	127.2 (5.01)	64.2 (2.53)	136.4 (5.37)	88.8 (3.50)	90 (3.54)	89.5 (3.52)	19 (0.75)	0.0	—	—	—	—
		2	152.6 (6.01)	90.2 (3.55)							—	—	—	—
		3	178.0 (7.01)	115.2 (4.52)							—	—	—	—
	100	2	149.1 (5.87)	86.2 (3.39)	143.8 (5.66)	97.8 (3.85)		98 (3.86)			—	—	—	—
		3	174.5 (6.87)	111.2 (4.38)							—	—	—	—
PS115	092	1	127.2 (5.01)	64.2 (2.53)	136.4 (5.37)	88.8 (3.50)	115 (4.53)	114.2 (4.50)	24 (0.94)	22 (0.87)	0.0	—	—	—
		2	152.6 (6.01)	90.2 (3.55)								—	—	—
		3	178.0 (7.01)	115.2 (4.52)								—	—	—
	100	2	149.1 (5.87)	86.2 (3.39)	143.8 (5.66)	97.8 (3.85)						—	—	—
		3	174.5 (6.87)	111.2 (4.38)								—	—	—
	115	2	152.4 (6.00)	89.2 (3.51)	159.0 (6.26)	113.0 (4.45)						—	—	—
		3	177.8 (7.00)	115.2 (4.54)								—	—	—
		4	203.2 (8.00)	140.2 (5.52)								—	—	—
PS142	100	2	149.1 (5.87)	86.2 (3.39)	143.8 (5.66)	97.8 (3.85)	142 (5.59)	133.7 (5.26)	—	—	29 (1.14)	5.0 (0.20)	5.0 (0.20)	—
		3	174.5 (6.87)	111.2 (4.38)					—	—				—
	115	2	152.4 (6.00)	89.2 (3.51)	159.0 (6.26)	113.0 (4.45)			—	—				—
		3	177.8 (7.00)	115.2 (4.54)					—	—				—
		4	203.2 (8.00)	140.2 (5.52)					—	—				—
	142	2	172.9 (6.81)	109.9 (4.33)	188.8 (7.43)	142.7 (5.62)			—	—				—
		4	223.7 (8.81)	160.8 (6.33)					—	—				—
		6	274.5 (10.81)	211.9 (8.34)					—	—				—
		8	325.3 (12.81)	261.9 (10.31)					—	—				—
PS180	115	2	152.4 (6.00)	89.2 (3.51)	159.0 (6.26)	113.0 (4.45)	182 (7.17)	148.5 (5.85)	—	—	—	24 (0.94)	24 (0.94)	0.0
		3	177.8 (7.00)	115.2 (4.54)					—	—	—			
		4	203.2 (8.00)	140.2 (5.52)					—	—	—			
	142	2	172.9 (6.81)	109.9 (4.33)	188.8 (7.43)	142.7 (5.62)		151 (5.95)	—	—	—			
		4	223.7 (8.81)	160.8 (6.33)					—	—	—			
		6	274.5 (10.81)	211.9 (8.34)					—	—	—			
		8	325.3 (12.81)	261.9 (10.31)					—	—	—			
	190	4	224.0 (8.82)	110.3 (4.34)	260.1 (10.24)	184.9 (7.28)		192.5 (7.58)	—	—	—			
		6	275.0 (10.83)	161.3 (6.35)					—	—	—			
		8	325.3 (12.81)	211.3 (8.32)					—	—	—			
PS220	190	4	224.0 (8.82)	110.3 (4.34)	260.1 (10.24)	184.9 (7.28)	220 (8.66)	212 (8.35)	—	—	—	—	—	36 (1.42)
		6	275.0 (10.83)	161.3 (6.35)					—	—	—	—	—	
		8	325.3 (12.81)	211.3 (8.32)					—	—	—	—	—	
	270	6	293.3 (11.55)	175.3 (6.90)	335.9 (13.22)	266.7 (10.50)		252 (9.92)	—	—	—	—	—	
		8	344.1 (13.55)	255.5 (10.06)					—	—	—	—	—	

[1] LAP dimension is required for parallel mounting only; 0.0 means no adapter plate required. Inline configurations do not require adapter plates.

Note: Make sure the output torque on the gear head is sufficient for the application. PS torque information can be found at www.parkermotion.com

Compax3 Drive/Controller

Compax3 Power Range

Compax3 Device	Current A_{RMS} I_{cont}	I_{peak}(<5s)	Supply Voltage
S025V2	2.5	5.5	1Ø 230/240VAC
S063V2	6.3	12.6	
S100V2	10	20	3Ø 230/240VAC
S150V2	15	30	
S038V4[1]	3.8	9.0	3Ø 400/480VAC
S075V4[1]	7.5	15	
S150V4[1]	15	30	
S300V4[1]	30	60	
H050V4[1]	50	75	3Ø 400/480VAC
H090V4[1]	90	135	
H125V4[1]	125	187.5	
H155V4[1]	155	232.5	

[1]Rated at 400 VAC

Standard Features

- **Power range of 1kW…75kW**
- **8 digital inputs, 4 digital outputs**
- **Available with ETHERNET Powerlink, and EtherCat**
- **RS232 / RS485 – interfaces**
- **2 analog inputs (+/-10V, 14 bits)**
- **2 analog outputs (+/-10V, 8 bits)**
- **Encoder input or output**
- **Motors supported:**
  - **Synchronous servo motors**
  - **Asynchronous motors**
  - **Linear motors**
  - **Torque motors**
- **Position sensing at the motor shaft via:**
  - **Resolver**
  - **Rotary/linear encoder**
  - **Sine-cosine feedback**
  - **Hiperface interface**
  - **EnDat 2.2 interface**
  - **Compatible with most feedback systems**
- **Support for SSI feedback**

Extensions

- **Real-time bus for axis coupling**
- **Scalable technology and control functions**
- **Integrated or external controls**

Functions (summary)

- **Programmable according to IEC61131-3**
- **Reg-related positioning, electronic gearing, dynamic positioning (motion superimposition) and torque-force control**
- **Cam – modular, with coupling and decoupling functions, cam switching mechanism**

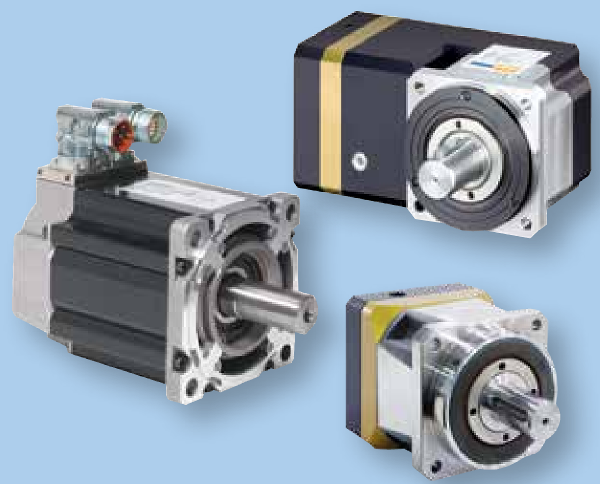
Technologies

- **T10: Step/Direction and Analog Command Input**
- **T11: Positioning indexer**
- **T30: IEC61131-3 Positioning with function modules according to PLCopen**
- **T40: IEC61131-3 Positioning plus Cam function modules**

For further information on Compax3 Drive/Controllers or assistance with sizing and selection, please consult parkermotion.com, or consult the factory

Complementary Parker Products

Parker offers HMI solutions for any application from simple push button replacement through sophisticated networking, multimedia and data logging requirements. Products range from entry level embedded displays through full Windows-based Industrial PC solutions.



Parker offers a broad family of motors with unparalleled performance, a torque range of 1.2 in-lbs to 4000 in-lbs and complete customization capabilities. For higher torque requirements, Parker's Stealth gearheads are the perfect solution.

Solid State Switches

Global Drop-In Solid State Switches

Specifications

Switch Classification	Standard PNP or NPN
Type	Electronic
Output Function	Normally Open/Closed
Switch Output	PNP/NPN
Operating Voltage	10 - 30VDC
Continuous Current	100 mA max.
Response Sensitivity	28 Gauss min.
Switching Frequency	5 KHz
Power Consumption	10 mA max.
Voltage Drop	2.5 VDC max.
Ripple	10% of Operating Voltage
Hysteresis	1.5 mm max.
Repeatability	0.1 mm max.
EMC	EN 60 947-5-2
Short-circuit Protection	Yes
Power-up Pulse Suppression	Yes
Reverse Polarity Protection	Yes
Enclosure Rating	IP68
Shock and Vibration Stress	30g, 11 ms, 10 to 55Hz, 1 mm
Operating Temperature Range	-25°C to +75°C (-13°F to +167°F)
Housing Material	PA 12 Black
Connector Cable	PVC
Connector	PUR

Global solid state switch outputs may be influenced by an external magnetic field. Care must be taken to avoid external magnetic field exposure.

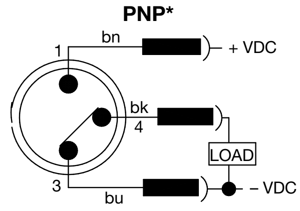
Solid State Switch Ordering Information

	PNP*		**NPN**	
	Nomally Open	**Normally Closed**	**Normally Open**	**Normally Closed**
3 m Flying Leads	P8S-GPFIX	P8S-GQFIX	P8S-GNFIX	P8S-GMFIX
10 m Flying Leads	P8S-GPFTX	—	P8S-GNFTX	—
0.3 m Lead with 8 mm connector	P8S-GPSHX	P8S-GQSHX	P8S-GNSHX	P8S-GMSHM
1 m Lead with 8 mm connector	P8S-GPSCX	—	P8S-GNSCX	—
Compax3 Compatible	Yes	Yes	No	No

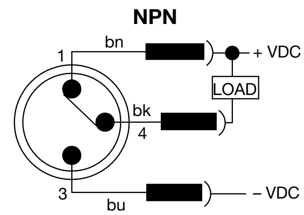
*PNP needed for Compax3 Servo Drive.

Wiring Connection

Flying Lead or 8 mm Connector (shown)

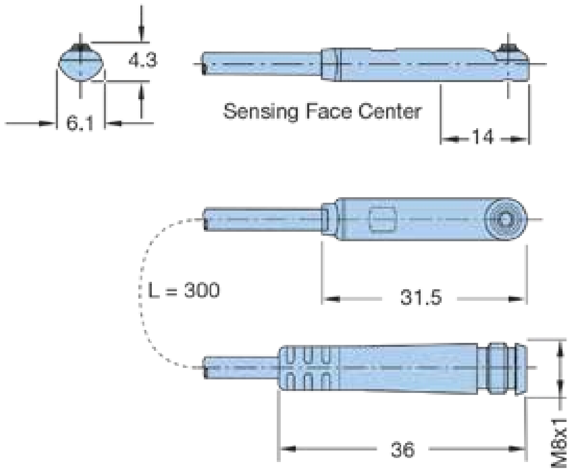


**PNP needed for Compax3 Servo Drive*



Pin	Wire	Function
1	Brown	Operating Voltage (+VDC)
4	Black	Output signal (N.O.)
3	Blue	–VDC

Dimensions — mm



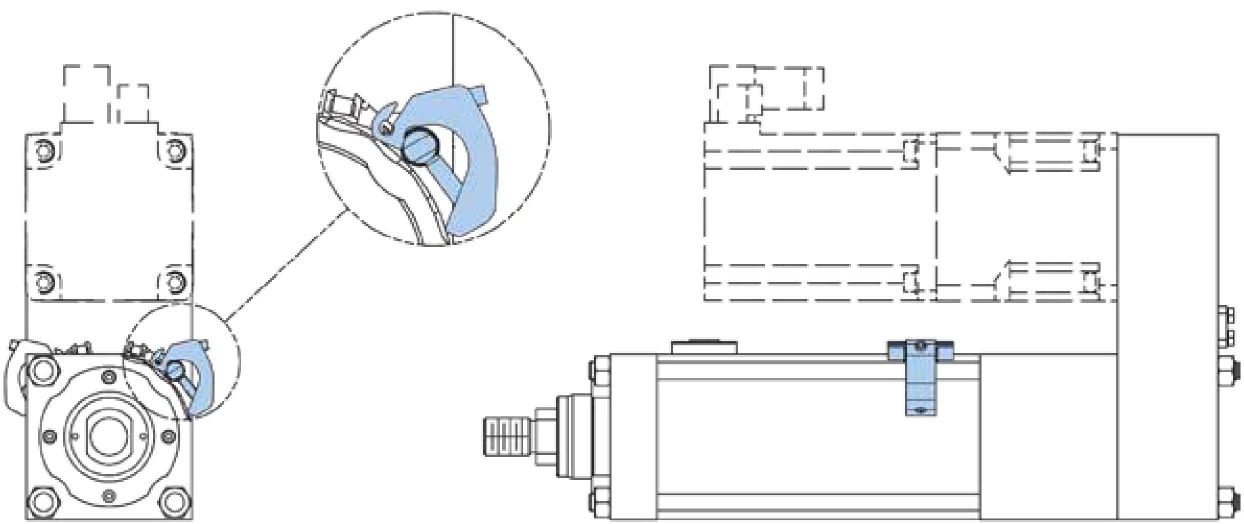
8 mm Threaded Cord Set to Flying Leads

086620T002	2 meter
086620T005	5 meter

Tie Rod Bracket Assembly

Global switch bracket fits XFC 075 – 115 cylinders. Global switches and bracket assemblies must be ordered separately.

P8S-TMA0X	Tie Rod Bracket Assembly



ORDERING INFORMATION

XFC

Select an order code from each of the numbered fields to create a complete XFX model order number. Include hyphens and non-selective characters as shown in example below.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩		⑪	⑫		⑬	⑭	⑮		⑯
Order Example:	XFC	075	LA	05	J	N	A	A	N	XXXX	–	A	03	–	A09A	A	1	–	A

① **Series**

XFC Extreme Force Cylinder

② **Frame Size**

075 75 mm
090 90 mm
115 115 mm
165 165 mm
190 190 mm

③ **Configuration**

Inline Motor

LA Mounting Position A*
LB Mounting Position B*
LC Mounting Position C*
LD Mounting Position D*

Parallel Motor

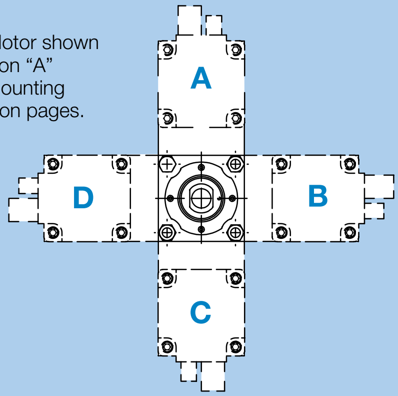
PA Mounting Position A*
PB Mounting Position B*
PC Mounting Position C*
PD Mounting Position D*

④ **Screw Lead**

05 5 mm Lead (XFC075, 090, 115, 140)
10 10 mm Lead (XFC075, 090, 115, 140, 165, 190)
20 20 mm Lead (XFC165 & 190)

*** Motor Mounting and Port Positions**

Note: Motor shown in position "A" for all mounting dimension pages.



⑤ **Primary Mount**
⑥ **Secondary Mount**

Inline Motor Configuration

C Foot Mount
J Front Flange Mount
K Extended Tie Rod Mount (Front)
T Rear Trunnion Mount
N No Secondary Mount

Parallel Motor Configuration

B Rear Clevis
C Foot Mount
H Rear Flange
J Front Flange Mount
K Extended Tie Rod Mount (Front)
L Extended Tie Rod Mount (Rear)
M Extended Tie Rod Mount (Front & Rear)
T Rear Trunnion Mount
N No Secondary Mount

⑦ **Rod End**

A Metric Thread – Male End
B Imperial Thread – Male End
C Rod Eye
X Special

⑧ **Lubrication**

A Oil Filled Port Position A*
B Oil Filled Port Position B*
C Oil Filled Port Position C*
D Oil Filled Port Position D*
E Grease Filled (required for vertical applications)

*Refer to illustration at left. For parallel configurations, the oil fill port position and the motor mount position cannot be the same.

⑨ **Options**

A Prepped for Limit Switches*
B Fluorocarbon Seals
C Fluorocarbon Seals and Limit Switch Ready*
N None

Electric Cylinders

*Options A and C are only available with XFC 075, 090 and 115 with grease-filled lubrication

⑩ **Stroke Length — mm**

XXXX	50 – 2000 mm (See Specifications for max stroke by bore size. For stroke <50 or >2000 please consult factory)

⑪ **Gearhead Frame Size** 1)

A	PS90 Frame for Size XFC075 & 090
B	PS115 Frame for Size XFC075, 090 & 115
C	PS142 Frame for Size XFC115, 140 & 165
D	PS180 Frame for Size XFC140, 165 & 190
E	PS220 Frame for Size XFC190
X	Special
N	No Gearhead (Motor only)

⑫ **Gearhead Ratio**

00	No Gearhead
03	Gearhead with 3:1 ratio
04	Gearhead with 4:1 ratio
05	Gearhead with 5:1 ratio
07	Gearhead with 7:1 ratio
10	Gearhead with 10:1 ratio
XX	Custom Gear Ratio

⑬ **Motor Selection*** 1)

240 VAC		460 VAC	
A09A	MPP0921C	**A09B**	MPP0921R
A09C	MPP0922D	**A09D**	MPP0922R
A09E	MPP0923D	**A09F**	MPP0923R
A10A	MPP1002D	**A10B**	MPP1002R
A10C	MPP1003C	**A10D**	MPP1003R
A11A	MPP1152D	**A11B**	MPP1152R
A11C	MPP1153C	**A11D**	MPP1153R
A11E	MPP1154B	**A11F**	MPP1154P
A14A	MPP1422C	**A14B**	MPP1422R
A14C	MPP1424C	**A14D**	MPP1424R
A14E	MPP1426B	**A14F**	MPP1426P
—	—	**A14G**	MPP1428Q
—	—	**A19A**	MPP1904P
A19B	MPP1906B	**A19C**	MPP1906P
—	—	**A19D**	MPP1908P
	—	**A27A**	MPP2706P
—	—	**A27B**	MPP2708N
X00X	Special	**X00X**	Special

*Refer to Motors, Gearheads & Adapter Plates in Options & Accesories for motor pairing options by bore size.

⑭ **Motor Feedback** 2)

A	2000 Count Encoder (1E)
B	2000 Count Encoder – Serial Interface (3E)
C	Single Speed Resolver (41)
D	Multi-Turn Absolute Encoder (6S)
E	Single-Turn Absolute Encoder (9S)
N	No Motor or Special Motor

⑮ **Motor Options*** 2)

1	No Brake
2	24 VDC Brake (B)
3	Shaft Seal (V)
4	24 VDC Brake (B) and Shaft Seal (V)
0	No Motor or Special Motor

*Brake required for vertical applications

⑯ **Revision Identifier**

A	Standard Cylinder
B	Anti-rotation Option (When selecting anti-rotation option, grease filled option must also be selected [Option "E" from ⑧ Lubrication section]. Consult factory for rotation torque greater than stated catalog values in Specifications)

1) Includes proper mounting surface for selected gearhead and motor.
2) For customer supplied motors, not provided by Parker, select option "N" for **Motor Feedback** and "0" for **Motor Options.**

Free sizing and selection support from Virtual Engineer at parker.com/VirtualEngineer

Rotary and Lift Positioning

Delivering precise positioning for rotary or vertical motion, products in this section have been designed for high performance and flexibility of use. They are designed to function independently or in conjunction with linear stages. Accurate and robust, these components integrate with other Parker motion control elements, streamlining the machine design process.

- Multiple drive train options available
- Profile stages as small as 80 mm in diameter
- Speed up to 600 rpm
- Repeatability to +/- 1 arc-sec
- Easily mountable to other Parker Stages to form multi-axis systems

mPR Miniature Precision Rotary Stage

Self-contained stage includes direct drive motor, high resolution feedback, and high precision rotary bearing. Easily mounted to existing Parker product lines.
Page 472.

PM-DD Powerful Direct Drive Motors

Ideal for applications that require attaching a load directly to the motor, the PMDD offers robust power and smooth motion with no backlash.
Page 487.

RM Series Worm Drive Rotary Tables

The RM Series offers an unparalleled combination of smooth operation plus high accuracy and high-load capacity.
Page 496.

200RT Series Rotary Tables

Low profile and light weight make these ideal indexing units for multi-axis combinations with high-precision linear tables.
Page 501.

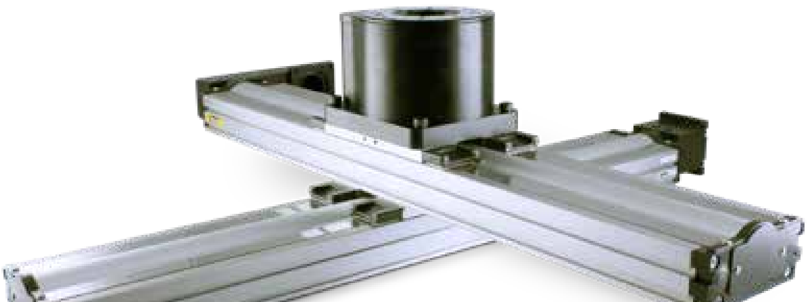
ZP200 Vertical Lift “Wedge” Stages

Support platform providing precise vertical translation and positioning while maintaining X-Y integrity.
Page 507.

The mPR Series

Miniature High Precision Rotary Stage

- Compact size
- Self-contained stage includes direct drive motor, high resolution feedback, and high precision rotary bearing
- Easily mounted to existing Parker mSR, MX, and XR product lines
- Very high precision rotary motion

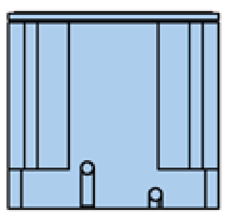


mPR rotary stage mounted on 404XR multi-axis system.

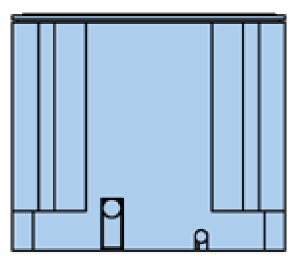
Typical Enhancements

- **Hall effect sensors for commutation**
- **Direct mounting pattern for mSR, MX, and XR products**
- **3 meter length high-flex cables**
- **Integrated servo motor**
- **Ample through hole**
- **Clean room option available**
- **3 digital encoder resolution options, plus a 1 Vp-p analog option**
- **CE and RoHS compliant as standard**

	mPR Series
Maximum Diameter (mm)	104
Maximum Payload (N)	117
Maximum Velocity (rpm)	600



mPR80



mPR100

The Miniature Precision Rotary (mPR) stage is designed to meet the needs of OEMs and machine builders seeking very high precision in a compact direct drive product.

Two form factors of 80mm and 104mm diameter mount easily on top of small linear motion axes for building complete multi-axis motion systems.

The mPR is lightweight without sacrificing precision and stiffness and delivers excellent torque density.

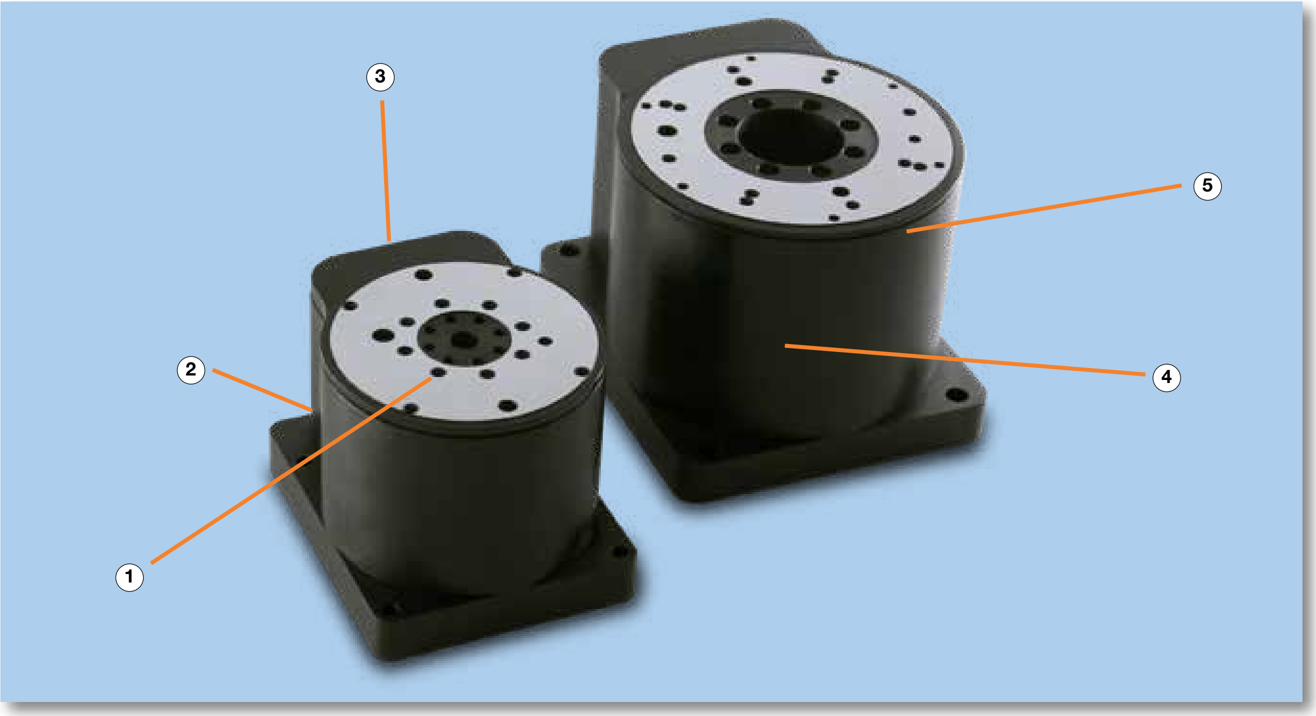
High angular resolution and precision angular repeatability, combined with high precision runout values, make the mPR a high performer in the field of precision rotary motion control.

The mPR is driven with a direct drive, 3 phase AC servo motor which is integrated directly to the products Aluminum base. The direct drive eliminates mechanical compliance which might exist from gearing or screw driven devices.

As a result the mPR delivers excellent angular dynamic response, and high precision rotary positioning. The combination of all of these features make the mPR the ideal stage for applications in laser processing, electronics manufacturing, semiconductor inspection, and high precision metrology.

For examples of multi-axis systems, visit **www.parker.com/emn/mPR.**

mPR Design Advantages



1 **Tapped Holes and Dowel Pinning**
The mPR has tapped holes in both the top and base for ease of mounting and dowel pins to ensure repeatable mounting when mounting additional tooling to the stage.

2 **High Flex Cabling**
The mPR uses high flex cabling as standard to ensure maximum life of the stage regardless of whether it's integrated into a multi or single axis system.

3 **Integrated, Optical Linear Encoder**
The mPR provides maximum versatility with three different optical digital encoder resolutions and an analog sine/cosine option. Easily change resolutions with an external interface, instead of changing the entire head.

4 **Frameless Kit Motor Direct Drive**
The frameless kit motor is directly integrated with the drive train to deliver reliable performance in small spaces.

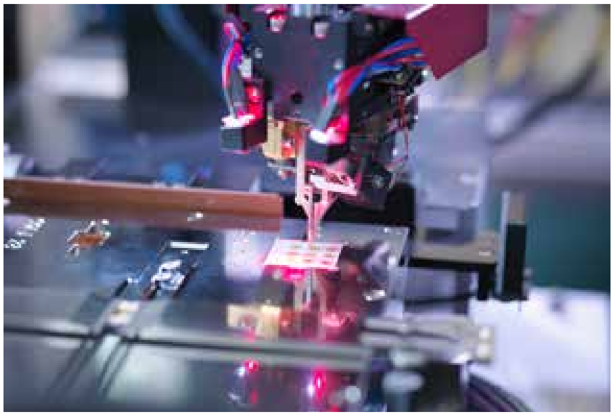
5 **High Precision Crossed Roller Bearings**
High performance precision-grade bearings have up to five times the life expectancy of typical ball bearings. These bearings are lubricated for the life of the product to reduce maintenance.

Standard Features

Travel	360 Degree Continuous
Motor	Frameless Direct Drive Motor (will hall Effect Device)
Feedback	Non-Contact Optical Encoder
Scale	20um Pitch Stainless Steel Ring
Resolution	1Vp-p Analog Output (see specifications) Digital Output Options (see specifications)
Sensors	Integrated Home Mark (Encoder Channel C)
Runout	Axial: < 6um available (see specifications) Radial: < 6um available (see specifications)
Bearings	High Precision Crossed Roller Bearings
Encoder Cable	High Flex, 10M Cycle, 3m length
Motor / Hall Cable	Integrated with Motor
Structure	Anodized Aluminum 6064-T6
Environment	Standard Optional: Clean Room
Temperature	0–50 degrees Celsius
Humidity	10–80% Non-Condensing

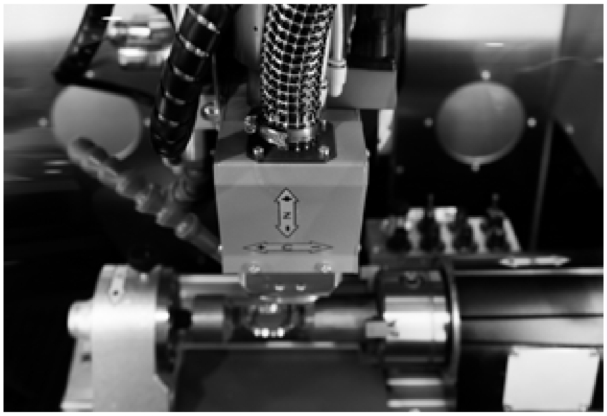
6 **Clean Room Tested**
Limited contact surfaces within the product make the mPR ideal for clean room applications. Higher clean room versions are available for order as custom. Contact the Parker applications engineering department for more details at 1.800.358.9070.

Application Solutions: Rotary Driven Automation Tables



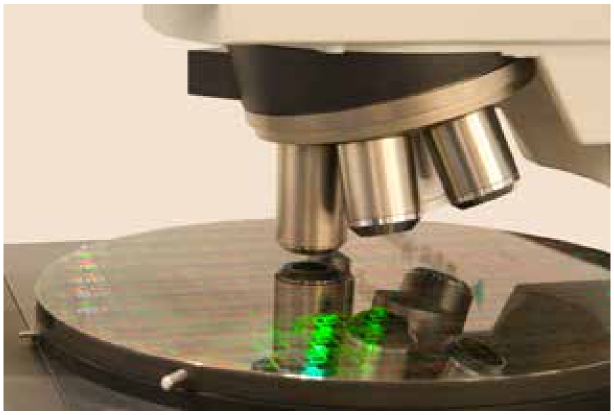
Electronics Manufacturing

The mPR is an ideal theta axis for electronics manufacturing given its combination of tight geometric performance, precision and speed. The combination of precision cross roller bearing, high resolution feedback device, and high performance servo drive make the mPR extremely responsive for high speed pick and place of miniature components for electronics manufacturing. In addition to its geometric and dynamic performance, the mPR is also very robust, as it is designed for 100% duty cycle, and lubricated for the life of the product, requiring no preventative maintenance.



Laser Machining and Laser Processing

The mPR is an excellent rotary axis for laser machining and laser processing applications given its spectacular bearing performance and smooth motion. Regardless if cutting, marking, etching or welding the mPR is an ideal rotary stage for laser processing equipment given the tight integration of slotless rotary servo motor, high resolution feedback and high precision rotary bearing. The combination of all these key design elements in the mPR will make all features in the work piece smooth and precisely positioned.



Semiconductor Manufacturing, Handling, and Metrology

The mPR in combination with other Parker precision linear axes (XR, mSR, and MX) make ideal building blocks for applications in semiconductor manufacturing, handling, and metrology. The precision and clean operation make the mPR ideal for applications for skew adjustment of the wafer. Direct mounting to the XR, mSR and MX is also very advantageous when making XY-theta systems**.**

Precision Metrology

The mPR makes for a spectacular rotary axis for automated metrology equipment. Smooth precise angular motion, and limited runout errors make the mPR an ideal rotary stage for optical metrology equipment measuring miniature parts or features. The compact size and ease of integration make the mPR an ideal rotary compliment to multi axis metrology systems.

SPECIFICATIONS
mPR80
(80 mm diameter profile)

The mPR80 is a miniature precision rotary stage that has been engineered to deliver a combination of modularity, flexibility, and performance in an extremely compact package.

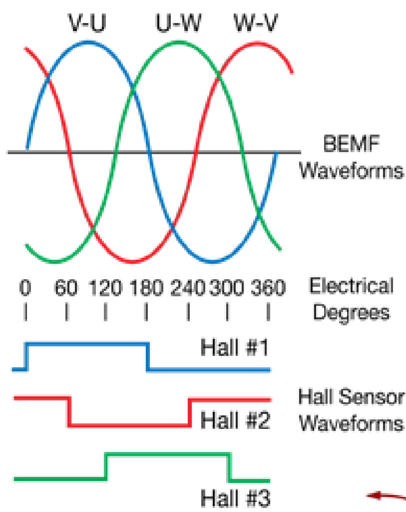
mPR mounted atop an mSR XY system.

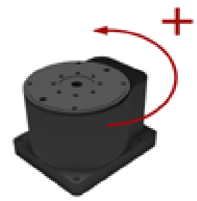
Stage Information

Stage Information		
Stage Mass	kg	1.45
Max Load (Axial)	kg	4.0
Max Load (Radial)	kg	4.0
Moving Mass	kg	0.54
Rotating Moment of Inertia	kg*mm^2	320

Motor Information

Motor Information		
Stall Current	Arms	1.6
Peak Current	Arms	5.04
Voltage Constant	Vrms/krpm	13.86
Torque Constant	Nm/Arms	0.229
Resistance	Ohms	6.5
Inductance	mH	5.5
Stall Torque Continuous	Nm	0.36
Peak Torque	Nm	0.9
Max Bus Voltage	Vdc	340
Max Winding Temperature	Degree C	125
Winding Thermal Resistance	Deg C / watt	2.36
Magnet Pitch	Deg	120
Motor Thermal Time Constant	minutes	11
Motor Cable Diameter	mm	4.7
Encoder Diameter	mm	4.5
Cable Length	m	3





Encoder Dependent Specifications

Encoder Dependent Specifications		Encoder Option E1	E2	E3	SC
Travel	Degrees	360	360	360	360
Home Position Location	+/- Degrees	1	1	1	1
Encoder lines Per Revolution	lines / rev	11,840	11,840	11,840	11,840
Encoder Resolution	Arc-Sec	5.47	0.547	0.0547	Analog Sine/Cos
Bi-directional Repeatability	+/- Arc-Sec	11	2.5	1.25	*
Axial Runout	µm	6	6	6	6
Radial Runout	µm	6	6	6	6
Wobble	Arc-Sec	15	15	15	15
Max Velocity	RPM	600	100	10	600

* SC encoder resolution is dependent upon drive input resolution.

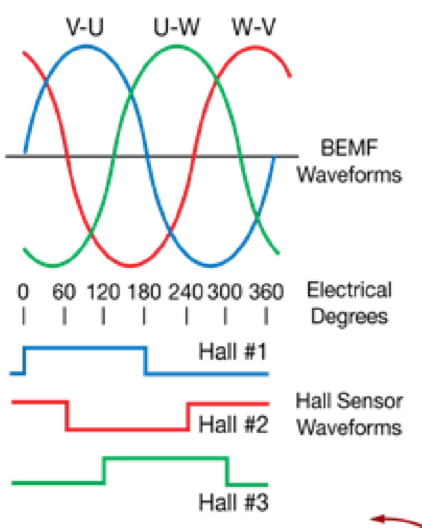
mPR100
(104 mm diameter profile)

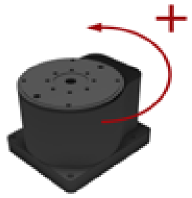
The mPR100 is a self-contained precision rotary stage, including a direct drive motor, feedback device, and precision rotary bearings.

mPR mounted atop a single axis XR.

Stage Information		
Stage Mass	kg	2.9
Max Load (Axial)	kg	12.0
Max Load (Radial)	kg	12.0
Moving Mass	kg	1.0
Rotating Moment of Inertia	kg*mm^2	1000

Motor Information		
Stall Current	Arms	3.79
Peak Current	Arms	11.95
Voltage Constant	Vrms/krpm	41.28
Torque Constant	Nm/Arms	0.68
Resistance	Ohms	3.9
Inductance	mH	8.9
Stall Torque Continuous	Nm	2.0
Peak Torque	Nm	6.2
Max Bus Voltage	Vdc	340
Max Winding Temperature	Degree C	125
Winding Thermal Resistance	Deg C / watt	1.02
Magnet Pitch	Deg	60
Motor Thermal Time Constant	minutes	28
Motor Cable Diameter	mm	7.5
Encoder Cable Diamter	mm	4.5
Cable Length	m	3





Encoder Dependent Specifications		Encoder Interpolator E1	E2	E3	SC
Travel	Degrees	360	360	360	360
Home Position Location	+/- Degrees	1	1	1	1
Encoder lines Per Revolution	lines / rev	15,744	15,744	15,744	15,744
Encoder Resolution	Arc-Sec	4.116	0.4116	0.0412	Analog Sine/Cos
Bi-directional Repeatability	+/- Arc-Sec	10	2	1	*
Axial Runout	µm	6	6	6	6
Radial Runout	µm	6	6	6	6
Wobble	Arc-Sec	12.5	12.5	12.5	12.5
Max Velocity	RPM	600	95	9.5	600

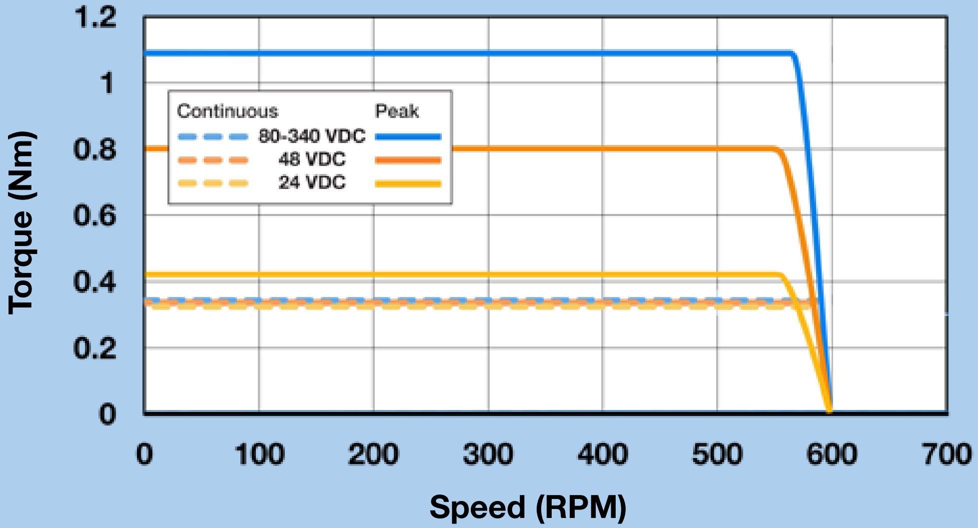
* SC encoder resolution is dependent upon drive input resolution.

Speed-Torque Performance

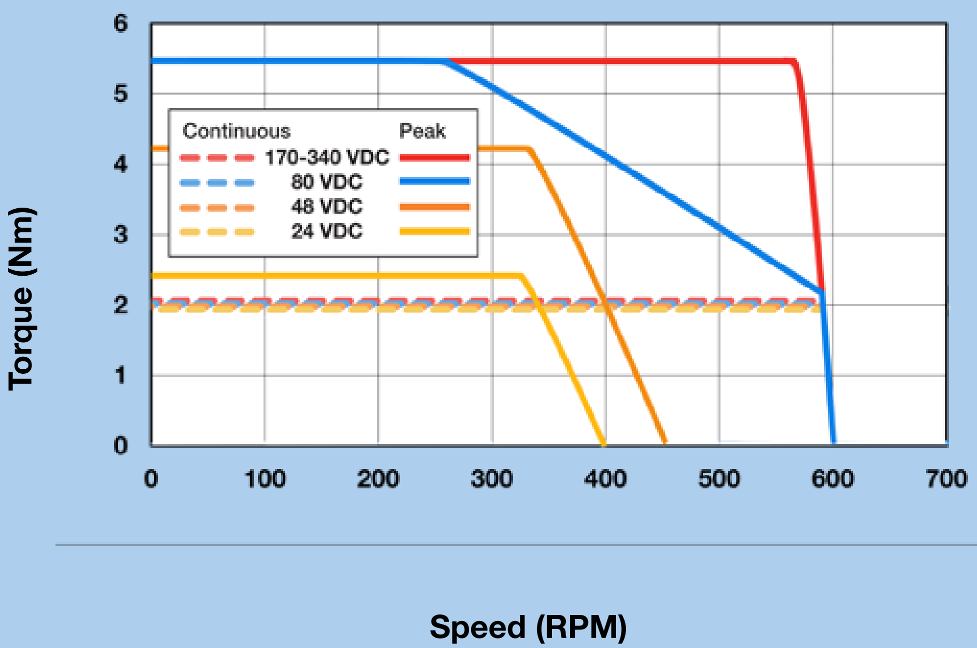
Parker MotionSizer sizing software available for free download at www.parker.com/emn.

Below are speed-torque performance curves at a variety of different bus voltages supplied to the mPR. To achieve full speed-torque performance of the motor, a bus voltage of 170–340 volts is required. ******Note: Speed is limited by encoder resolution. See specifications sheet for limits.***

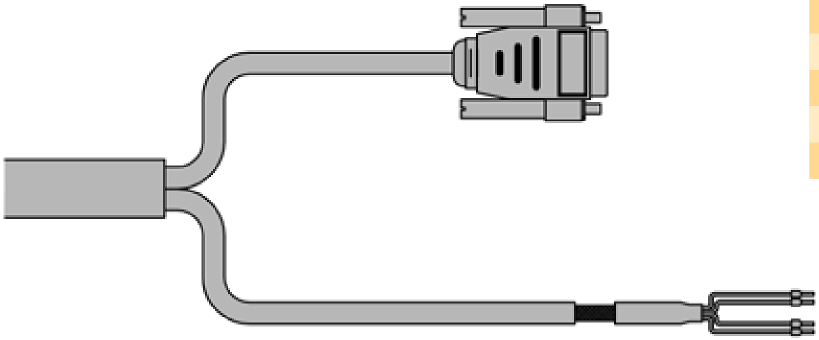
mPR80



mPR100



Motor Hall and Power Cable Information



Male 9 Pin D-Sub

Color	Function	Pin Number
Black	Hall Power	5
White	Hall Ground	6
Yellow	H1	7
Blue	H2	8
Green	H3	9

Motor Leads

Color	Function
Red	U
Brown	V
Orange	W
Green/Yellow	Ground

Stage Wiring Encoder Information

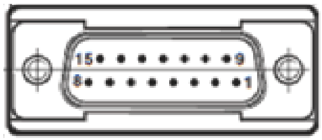
Optical Encoder (E1, E2, E3 Option)

Function	Signal	Pin #
Power	5 Volts DC	8
	Ground	2, 9
Incremental Signals	A+	14
	A-	6
	B+	13
	B-	5
Reference Mark	Z+	12
	Z-	4
Limits*	Not connected	10, 11
Setup	(Used in installation)	1
Error Output	NPN	3

Sine Cosine Encoder (SC Option)

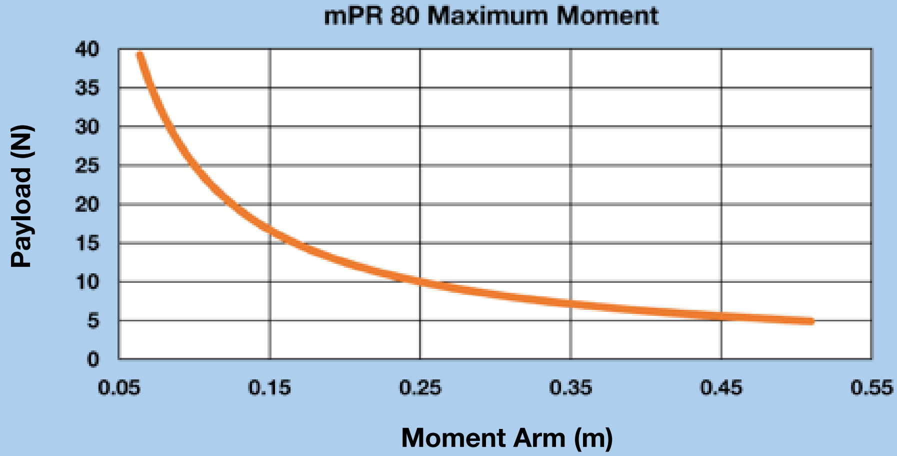
Function	Signal	Pin #
Power	5 Volts DC	4, 5
	0 Volts DC	12, 13
Incremental Signals	Cosine +	9
	Cosine -	1
	Sine +	10
	Sine -	2
Reference Mark	Z+	3
	Z-	11
Limits*	Not connected	7, 8
Setup	(Used in installation)	6
Remote Calibration	NPN	14

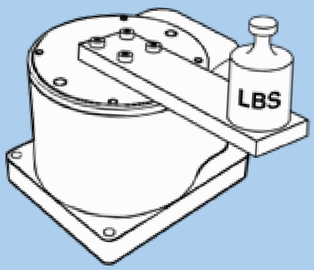
*** The mPR is not equipped with limit sensors. However, the unit's encoder system can be equipped with limit sensors "integral" to the scale. Consult the factory for more information.**

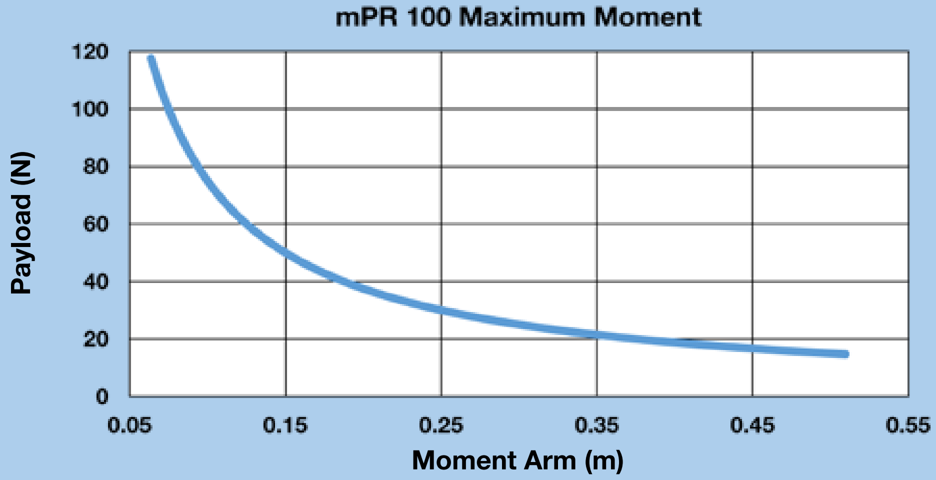


Moment Loading

Below are two plots indicating the maximum allowable moment arms at a given payload to ensure product life of 1 billion revolutions.





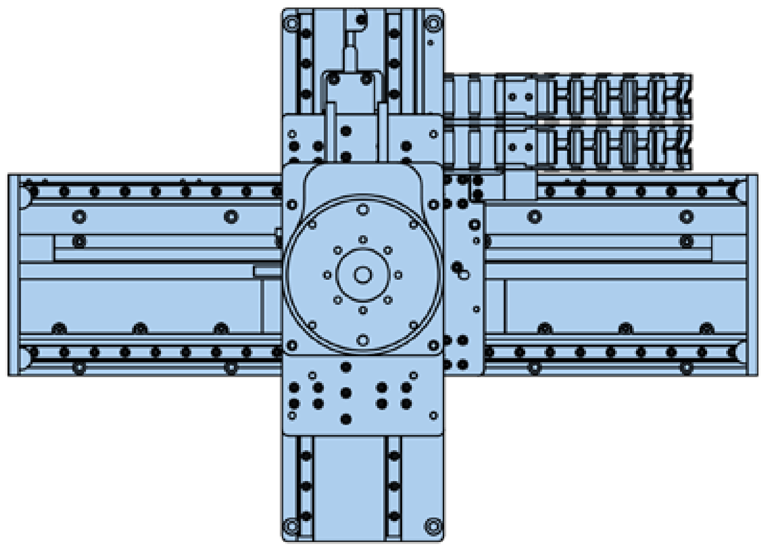


Rotary Tables

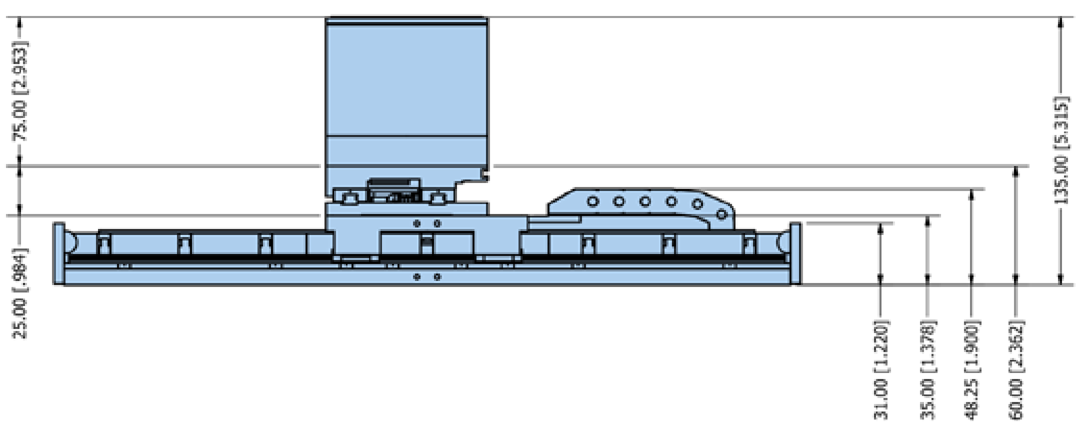
CONFIGURATIONS

mPR80 Multi-Axis Cartesian Robot Configurations

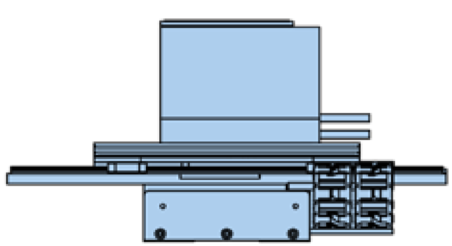
Top



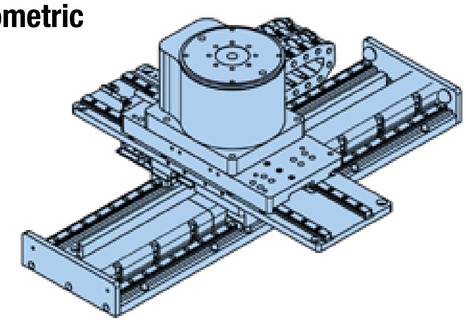
Side



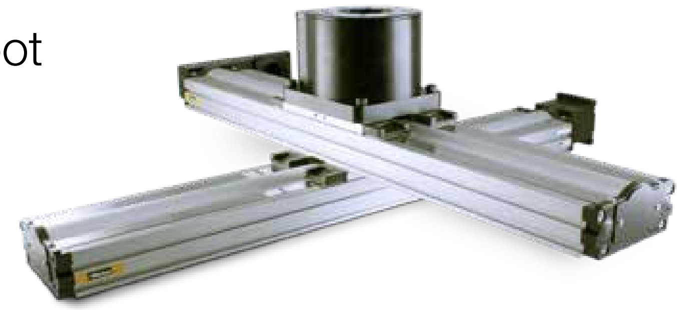
Front



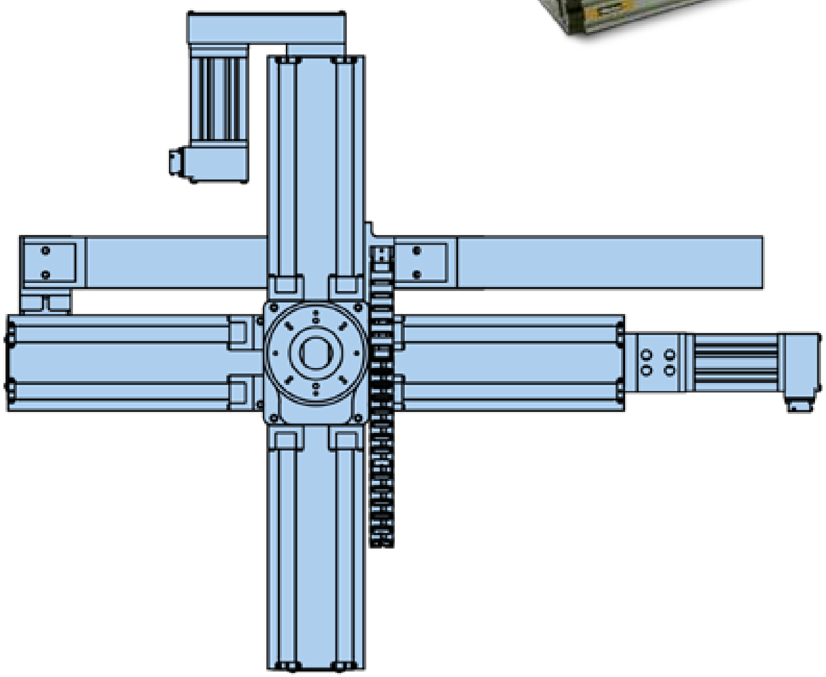
Isometric



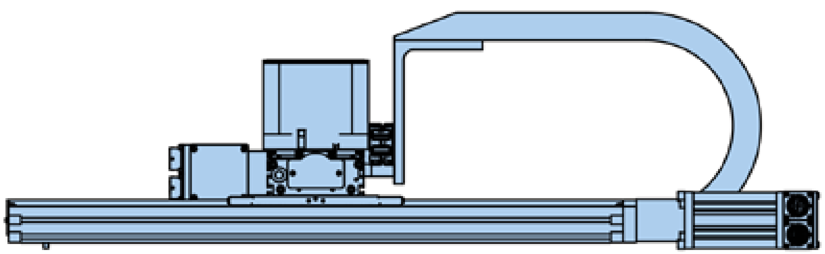
mPR100 Multi-Axis Cartesian Robot Configurations



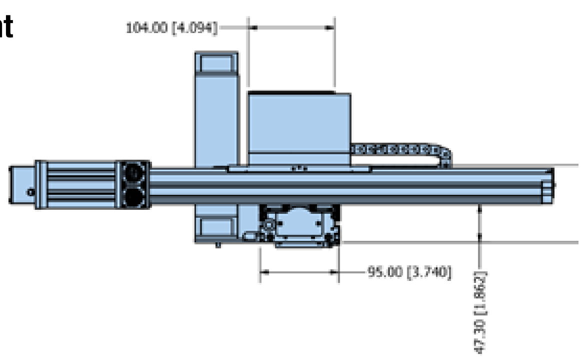
Top



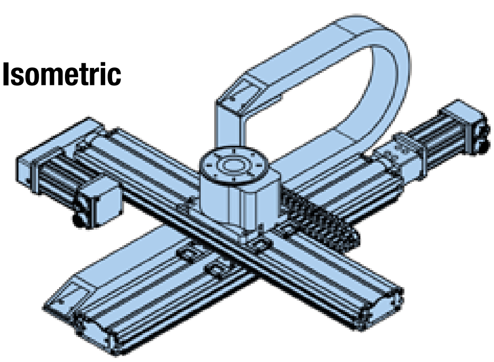
Side



Front



Isometric



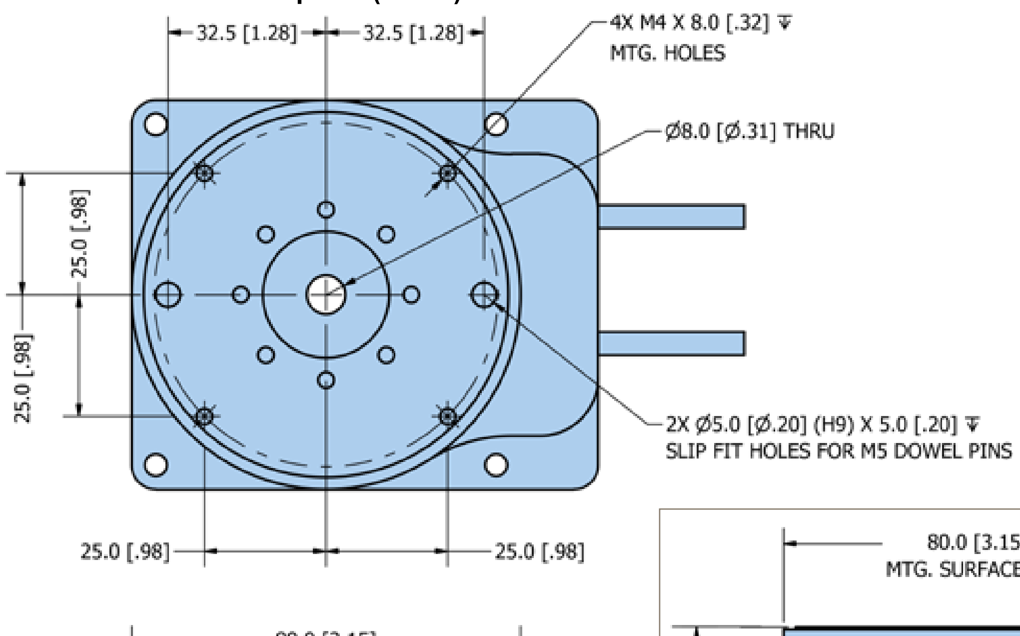
DIMENSIONS

mPR80 Dimensions

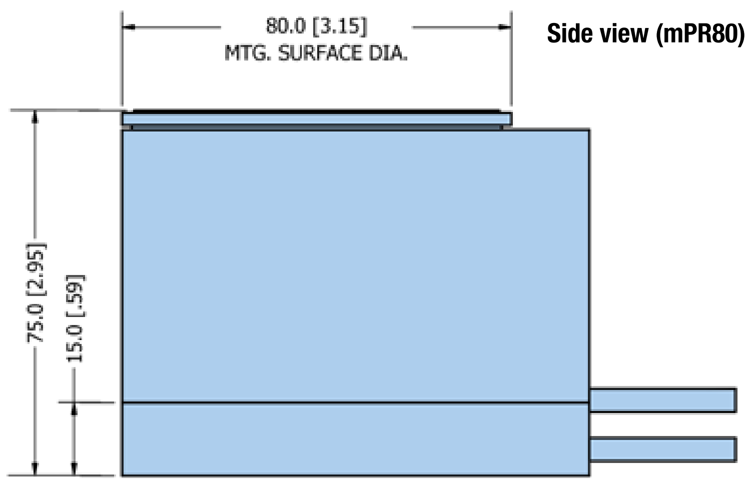
Download 2D & 3D files from www.parker.com/emn/mPR

Dimensions (mm)

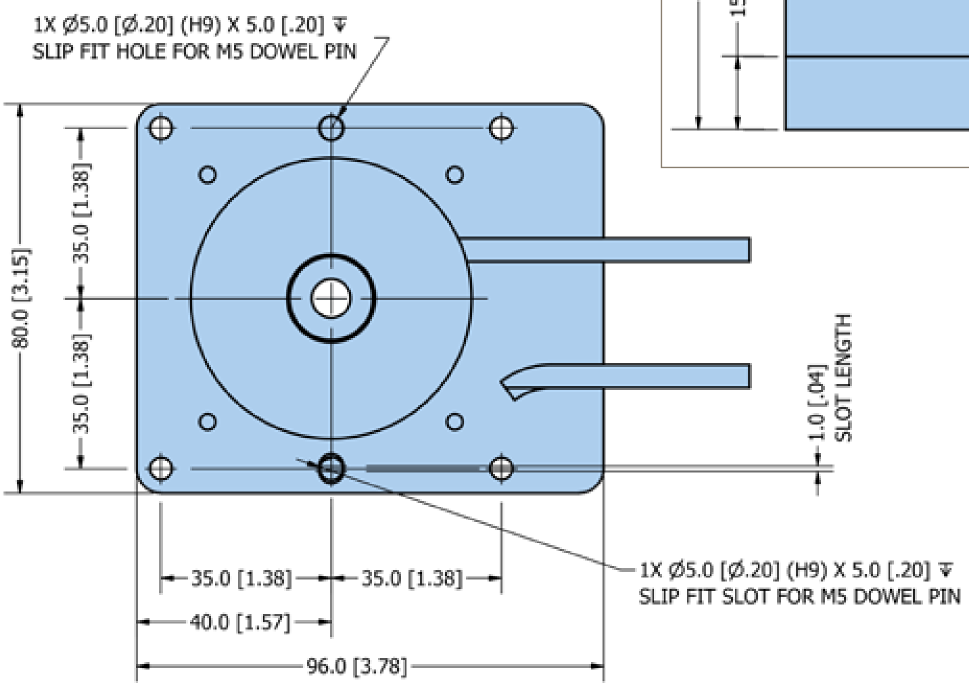
Top view (mPR80)



Side view (mPR80)

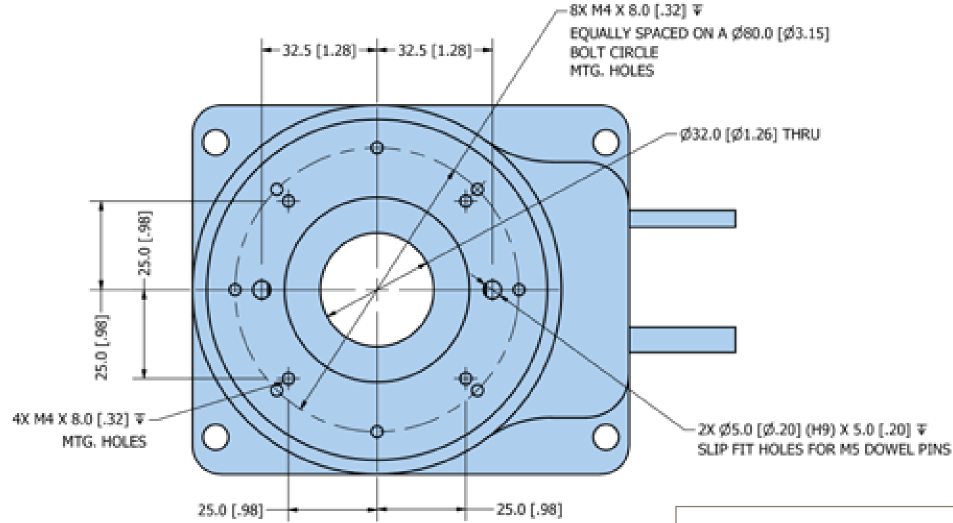


Bottom view (mPR80)

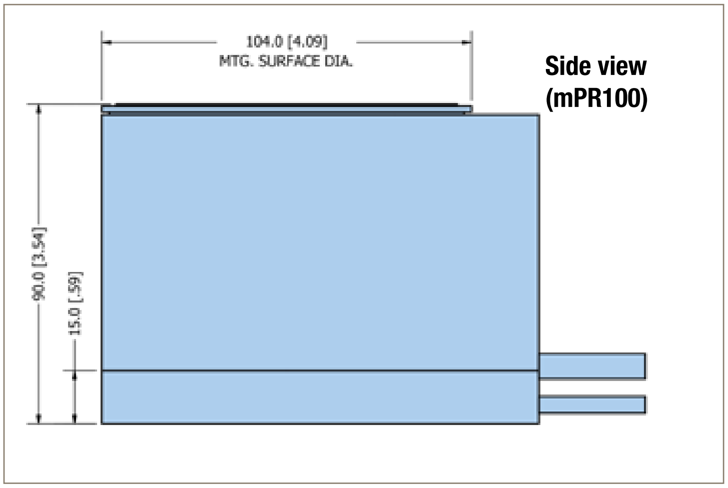


mPR100 Dimensions

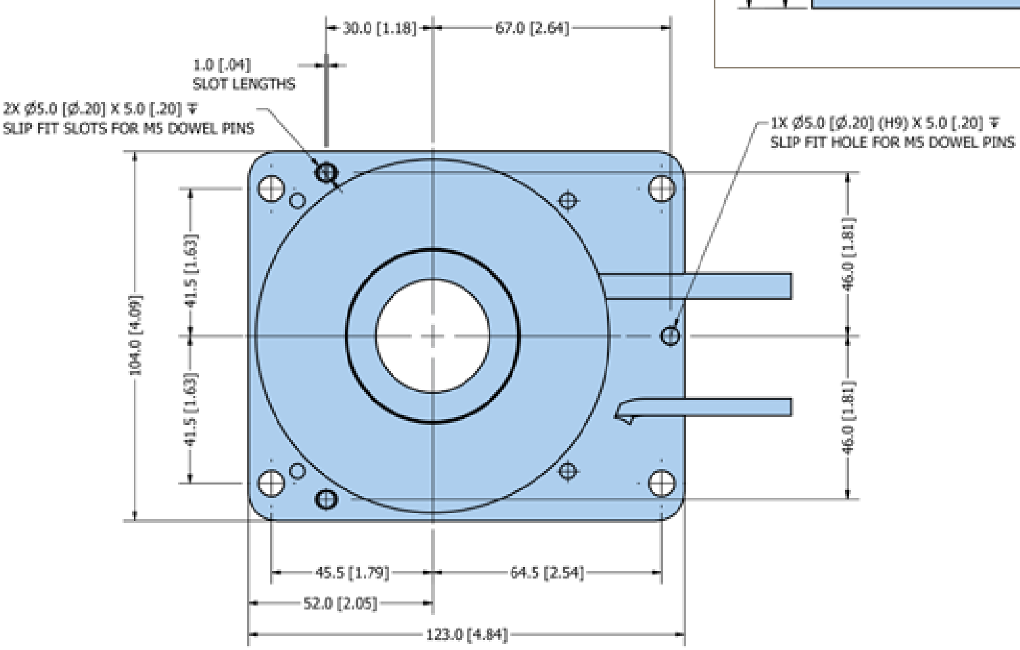
Top view (mPR100)



Side view (mPR100)

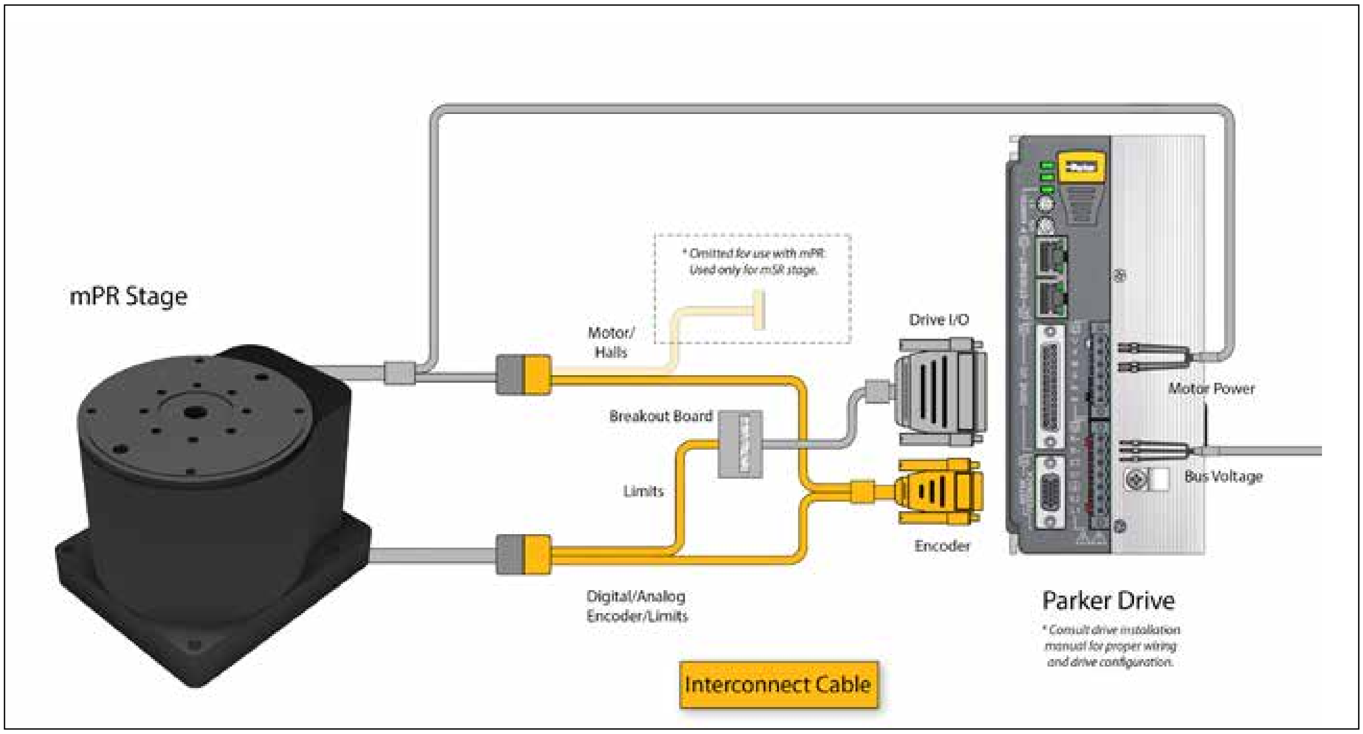


Bottom view (mPR100)



Rotary Tables

OPTIONS & ACCESSORIES



Parker Drives and Cable Accessory Part Numbers

Encoder Type	Drive	Cable Interconnect Part Number
Digital	IPA	006-2690-01
Analog	IPA	006-2692-01
Digital	P Series	006-2691-01
Digital/Analog	Motor Power and Hall Flying Lead	006-2678-01
Digital	Digital Encoder Flying Lead	006-2679-01
Analog	Analog Encoder Flying Lead	006-2680-01

ORDERING INFORMATION

mPR Series

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧
Order Example:	mPR	080	D	A	E2	H	3	N

① **Series**
mPR

② **Size**

080	80mm
100	104mm

③ **Drive**

D	Direct

④ **Motor Option**

A	Standard Option

⑤ **Encoder Resolution**

	mPR80	mPR100
E1	5.47 Arc-Sec	4.116 Arc-Sec
E2	0.547 Arc-Sec	0.4116 Arc-Sec
E3	0.0547 Arc-Sec	0.0412 Arc-Sec
SC	Analog Sine/Cosine	Analog Sine/Cosine

⑥ **Home**

H	H

⑦ **Cable Option**

3	3 meter high-flex

⑧ **Clean Room Option**

N	Standard Class 1000
*	Consult factory for higher cleanroom options

mPR Drive Solutions

Drive/Control Solutions

The Intelligent Parker Amplifier, or IPA, is a versatile servo drive/controller based on the ACR control platform.

The IPA provides a dual port Ethernet interface which gives the machine builder the flexibility needed to create cost effective motion control solutions.

The IPA operates as a fully programmable stand-alone motion controller with on-board I/O and virtual axis capability or can be integrated into a PLC or PC-based machine control solution.

Software tools are included to optimize motion performance and efficiently monitor and manage the application.

EtherNet/IP gives IPA users a popular connectivity option to PLCs for easy integration of servo motion in larger machine control application. The IPA is an EtherNet/IP adapter device supporting both I/O and Explicit Messaging. Add-On Instructions are available for seamless integration with Logix controllers.

Drive Solutions

P Series Drive

P Series - DC version

The P-Series drives operate with a variety of machine control architectures, and offer sophisticated servo functionality. Accurate and easy to use inertia detection leads to fast set-up of tuning parameters and minimal settling time.

Advanced filtering and vibration suppression features can be used to increase throughput and improve positioning performance.

For high speed, real-time network applications, the P-Series is available with, EtherCAT, the fastest growing, most flexible industrial Ethernet protocol. Ideal for use with the Parker Automation Controller, the P-Series also follows the open standards for EtherCAT.

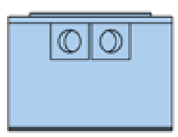
The Pulse version can be configured for step and direction control input and includes analog inputs for torque or velocity control. Select Indexer mode to create up to 64 position table entries triggered via inputs or over a RS422 interface.

The PM-DD Series

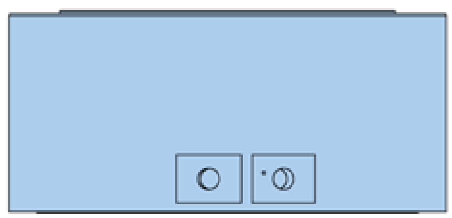
Powerful Direct Drive Rotary Motors

- Robust power and smooth motion with no backlash
- Ideal for applications that require attaching a load directly to the motor
- Compact and accurate with high torque density
- Easily configured with multiple control options
- Very high precision rotary motion

- **Easy configuration**
- **Multiple control options**
- **Predefined Profile mode provides ideal indexing features for your machine**
- **EtherCAT gives high speed communication for multi-axis solutions**



PM-DDB06B



PM-DDFA6G

** Several other sizes available. Bracket shown is only available with home switch option.*

	PM-DD Series
Maximum Diameter (mm)	360
Maximum Payload (N)	15,000
Maximum Velocity (rpm)	500

P Series direct-drive rotary motors are high performance integrated positioning systems. The combination of high torque, zero backlash, and precision bearing structure results in fast settling time and outstanding accuracy.

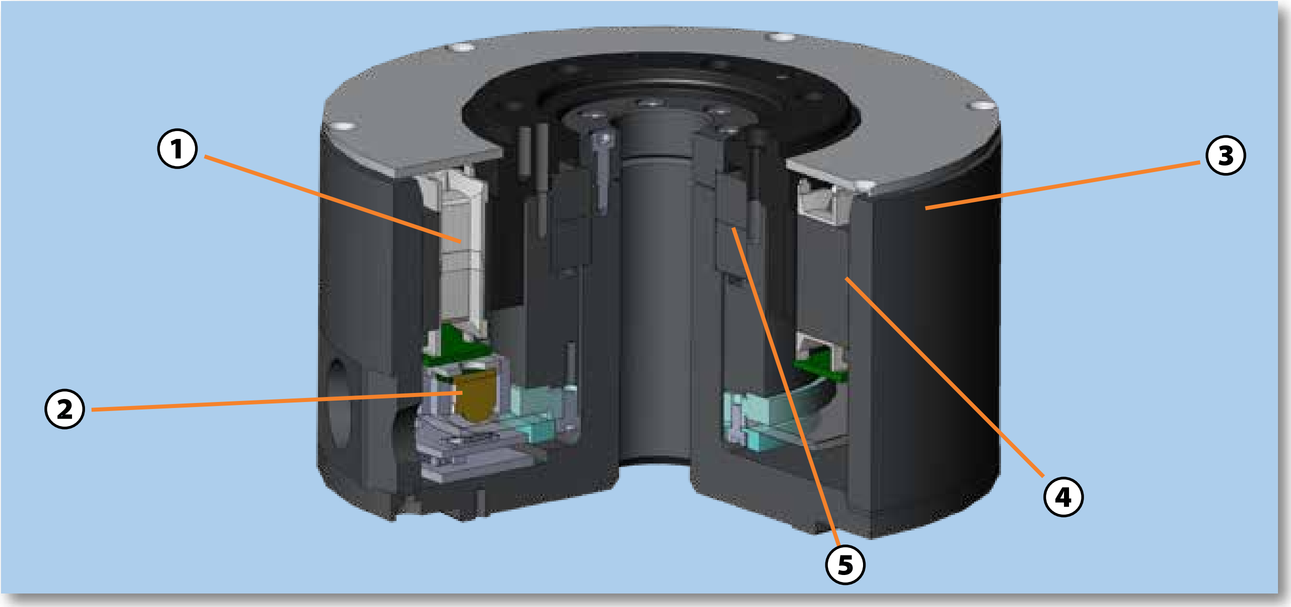
The PM-DD servo motor is designed to provide high torque and high accuracy. Tapped mounting holes and a hollow through bore allow this robust motor to be used in a variety of applications that require the load to be attached directly to the motor.

By eliminating the use of couplings or belts, the load can be driven in a smooth, nearly frictionless motion with no backlash.

PM-DD motors are a perfect match with the P Series Servo Drives. The absolute encoders in the motor populate motor nameplate data back to the drives for simplified commissioning. Accurate and easy to use inertia detection leads to fast set-up of tuning parameters and minimal settling time. Once the motor is connected to a P series drive, it will automatically recognize the motor.

The pulse version of the drive can be configured for step and direction control input and includes analog inputs for torque or velocity control. Select indexer mode to create up to 64 position table entries triggered via inputs or over a RS422 interface.

For high speed, real-time network applications, the P-Series is available with EtherCAT, the fastest growing, most flexible industrial Ethernet protocol. Ideal for use with the Parker Automation Controller, the P-Series also follows the open standards for EtherCAT.



① **Winding**
Optimized winding structure provides high performance in a compact package.

② **Encoder**
For accurate control, the PM-DD is equipped with 20 bit absolute feedback with BISS-C communication as standard. This allows accuracy of +/- 30 arc-sec. with repeatability of +/- 1.3 arc-sec.

③ **Frame**
The PM-DD is made in five frame sizes: 135mm, 175mm, 230mm, 290mm, and 360mm. 13 models provide power options that can meet a wide variety of application requirements.

- **Rated speed: 200 RPM/150 RPM**
- **Rated torque: 3 Nm to 160 Nm**

④ **Magnet**
High torque density by using highest class rated Neodymium permanent magnet.

⑤ **Bearing**
Improved bearing design yields low vibration and outstanding mechanical accuracy. Load carrying capabilities extend to 15,000N.

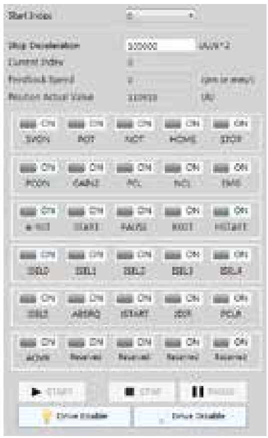
SERVO DRIVE

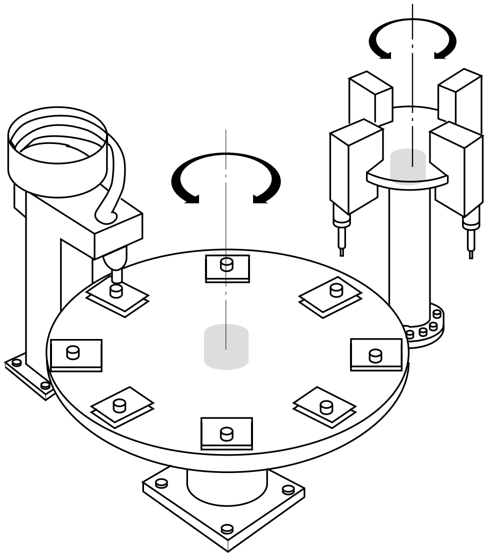
Ideal direct drive solution for P series drive

- **100~400W : PD-04P & 04C**
- **400~1kW : PD-10P & 10C**
- **1kW~3.5kW : PD-35P & 35C**

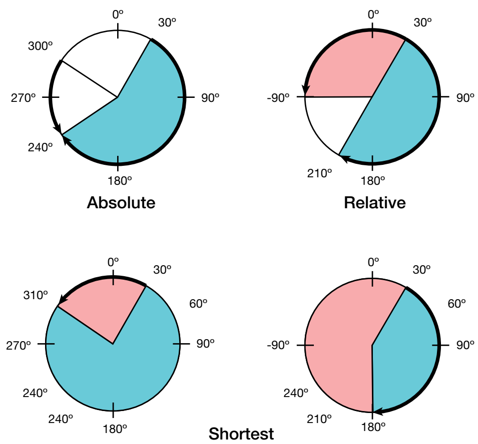
Pre-Defined Profile Function with Parker Drives

- **Available in 64 profiles**





- **Rotary Absolute/Relative/ Shortest move**



SPECIFICATIONS

PM-DD Series

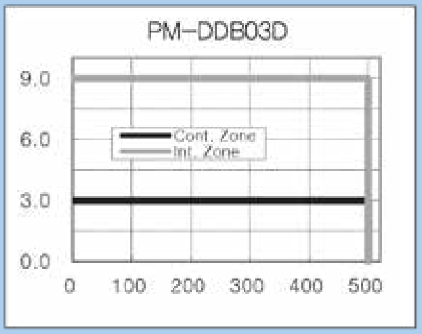
With 5 frame sizes (13 models)available, the PM-DD Series can provide peak torques up to 480 Nm and load carrying capabilities up to 15,000 N.

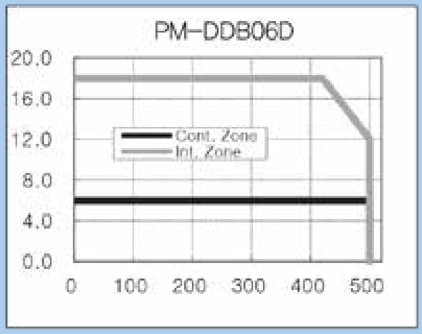
		PM-DDB□□D□H			PM-DDC□□D□H			PM-DDD□□D□H			PM-DDE□□D□H		PM-DDF□□G□H	
		03	06	09	06	12	18	12	22	34	40	60	A1	A6
P series Drive		PD-04	PD-04	PD-04	PD-04	PD-04	PD-04	PD-04	PD-10	PD-10	PD-10	PD-35	PD-35	PD-35
Diameter	mm	ø135			ø175			ø230			ø290		ø360	
Rated Power	W	63	126	188	126	251	377	251	461	712	838	1,257	1,728	2,513
Rated Torque	N-m	3	6	9	6	12	18	12	22	34	40	60	110	160
Peak Torque	N-m	9	18	27	18	36	54	36	66	102	120	180	330	480
Rated Current	Arms	1.12	1.46	2.63	1.48	2.41	3	2.58	3.33	5.72	5.3	8.33	9.48	14.6
Peak Current	Arms	3.36	4.38	7.89	4.44	7.23	9	7.74	9.99	17.16	15.9	24.99	28.44	43.8
Rated Velocity	rpm	200			200			200			200		150	
Max Velocity	rpm	500	500	500	500	500	400	500	400	400	300	300	250	250
Torque Constant	N-m/ Arms	2.76	4.25	3.57	4.18	5.13	6.12	4.8	6.81	6.13	7.77	7.42	11.95	11.29
Moment of Inertia	kg -m^2×10^{-4}	5.74	8.67	11.5	27.32	38.9	50.48	54.14	68.15	82.16	311.55	371.71	1410.2	1763.4
Power Rate	kW/s	15.68	42.35	70.43	13.18	52.71	118.59	26.6	71.02	140.7	51.36	96.68	85.9	145.4
Angular Acceleration	rad/s^2	191.2	141.6	127.7	455.03	323.9	280.3	450.9	309.6	241.5	778.35	619.1	1281.13	1101.4
Accuracy for ABS Position	arc-sec	±30												
Accuracy for Repeatability	arc-sec	±1.3												
Axial run-out	mm	0.015												
Radial run-out	mm	0.03												
Allowable thrust load	N	1500			3300			4000			11000		15000	
Allowable moment load	N-m	40			70			93			250		350	
Encoder		20-bit single turn serial encoder (BiSS-C / Absolute)												
Weight (Approx.)	kg	6.3	7.2	9.2	8.7	10.6	12.6	17.3	19.6	21.9	28.2	35	54	70.3

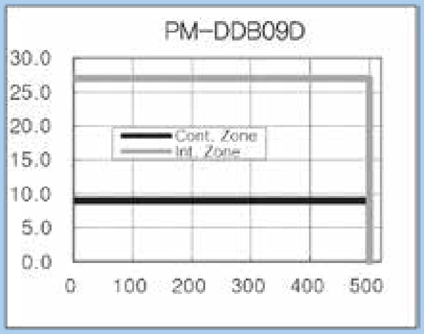
Working Environment	Ambient Temperature	Operating: 32–104°F (0–40°C) Storage: -4–140°F (-20–60°C)
	Ambient Humidity	20–80% RH (avoid dew/condensation)
	Atmosphere	Avoid direct sunlight. No corrosive gas, inflammable gas, oil mist, or dust.

Speed-Torque Performance

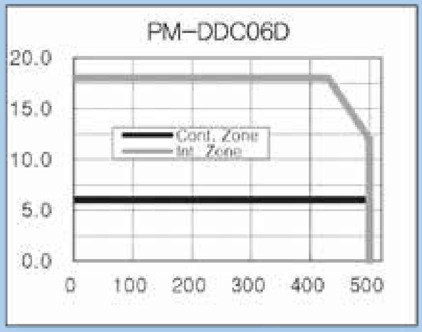
Size B

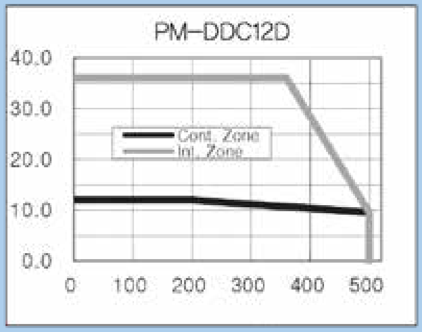


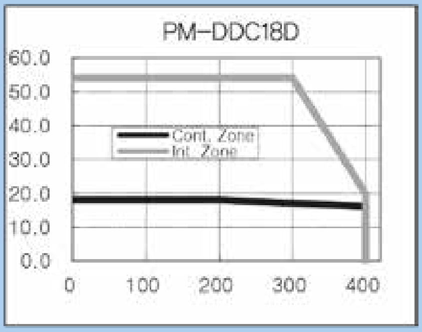




Size C

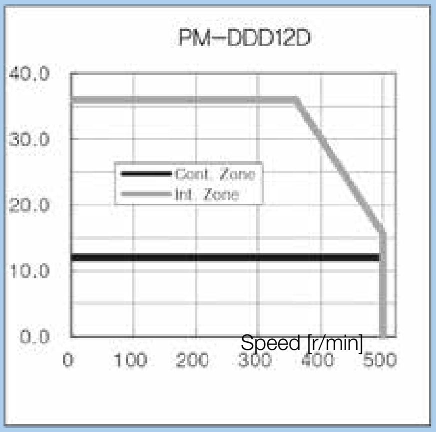




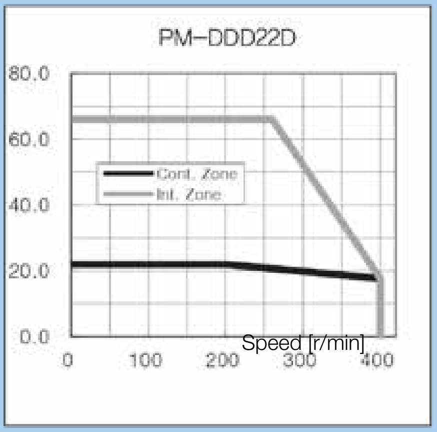


Size D

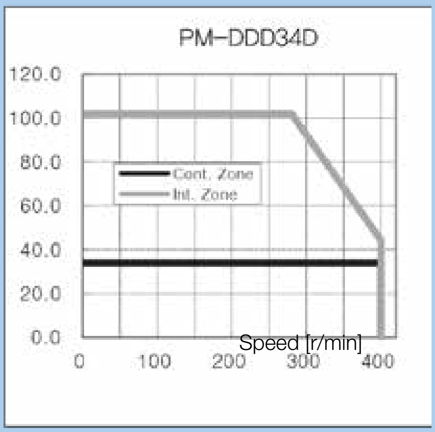
Torque [Nm]



Torque [Nm]

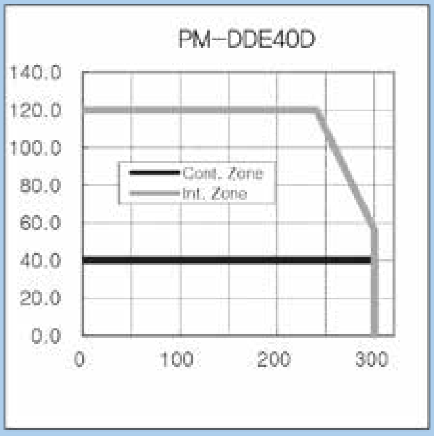


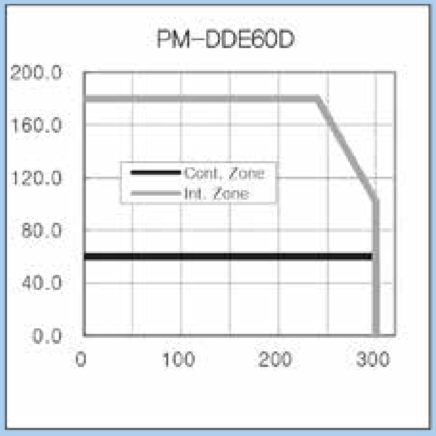
Torque [Nm]



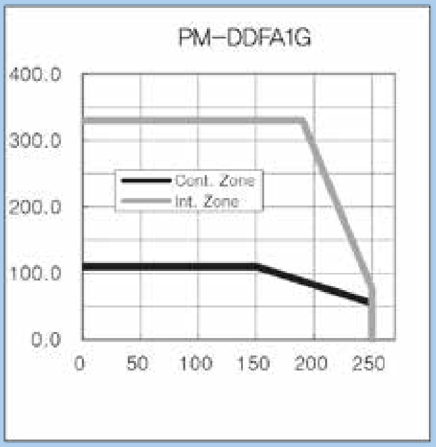
Speed-Torque Performance

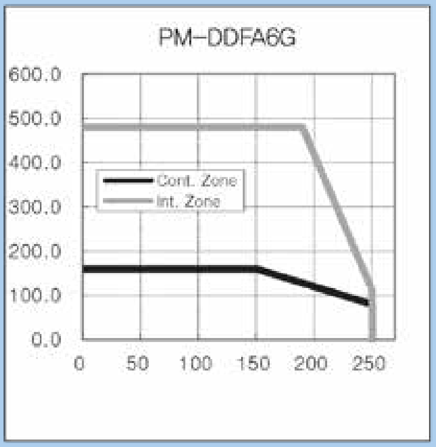
Size E





Size F

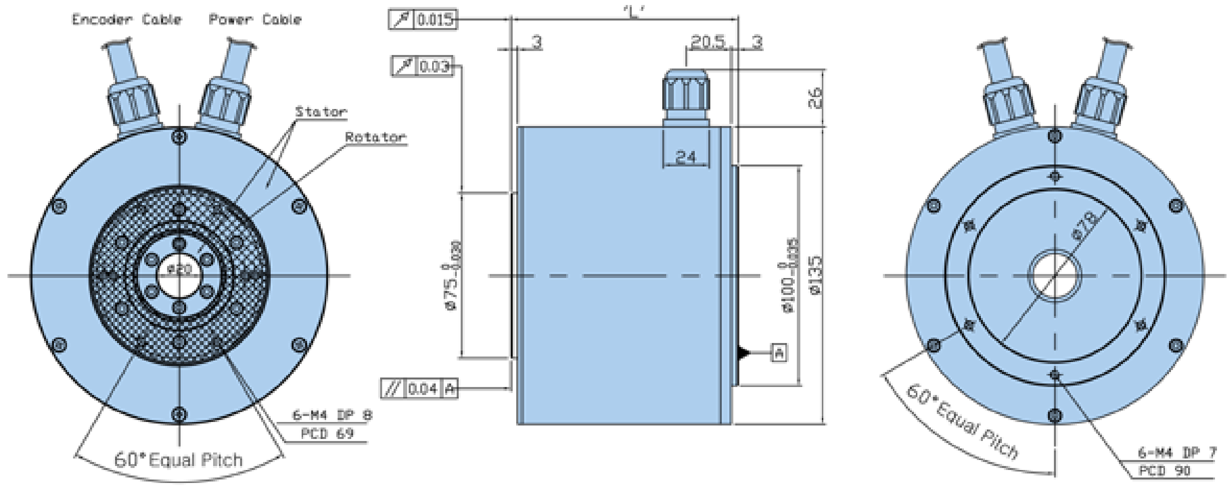




Rotary Tables

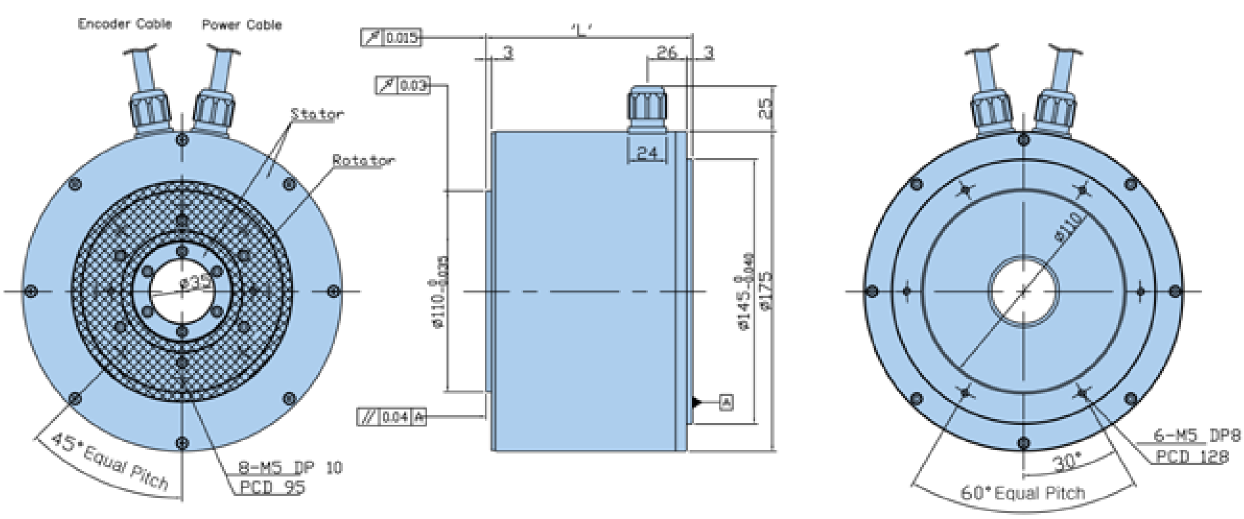
DIMENSIONS

PM-DD Series



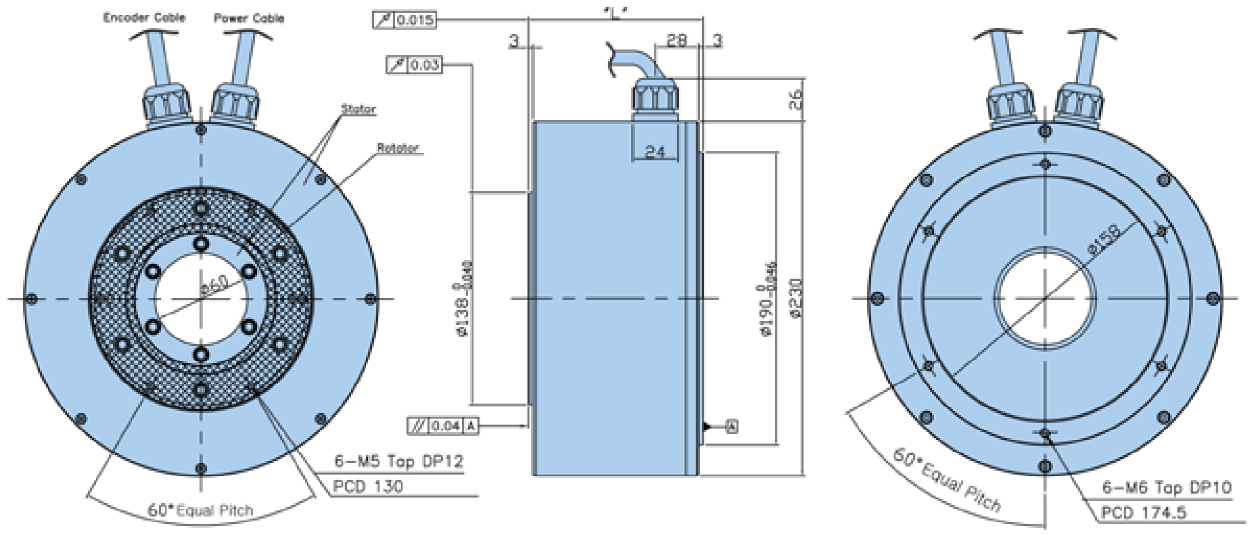
Size B

Motor	Length (mm) 'L'	Weight (Kg)
PM-DDB03D	78	6.3
PM-DDB06D	100	7.2
PM-DDB09D	124	9.2



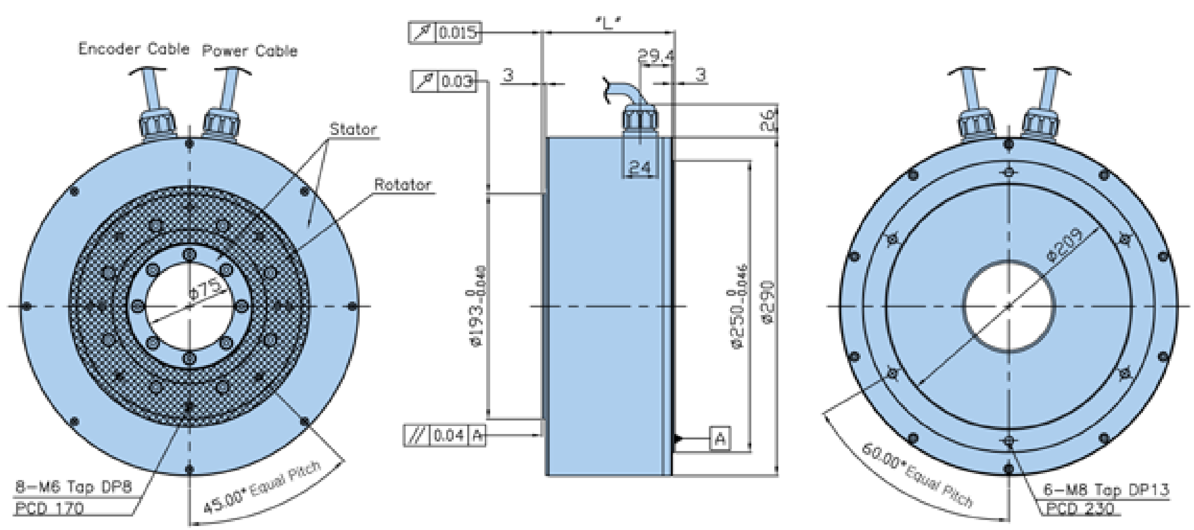
Size C

Motor	Length (mm) 'L'	Weight (Kg)
PM-DDC06D	77	8.7
PM-DDC12D	95	10.6
PM-DDC18D	113	12.6



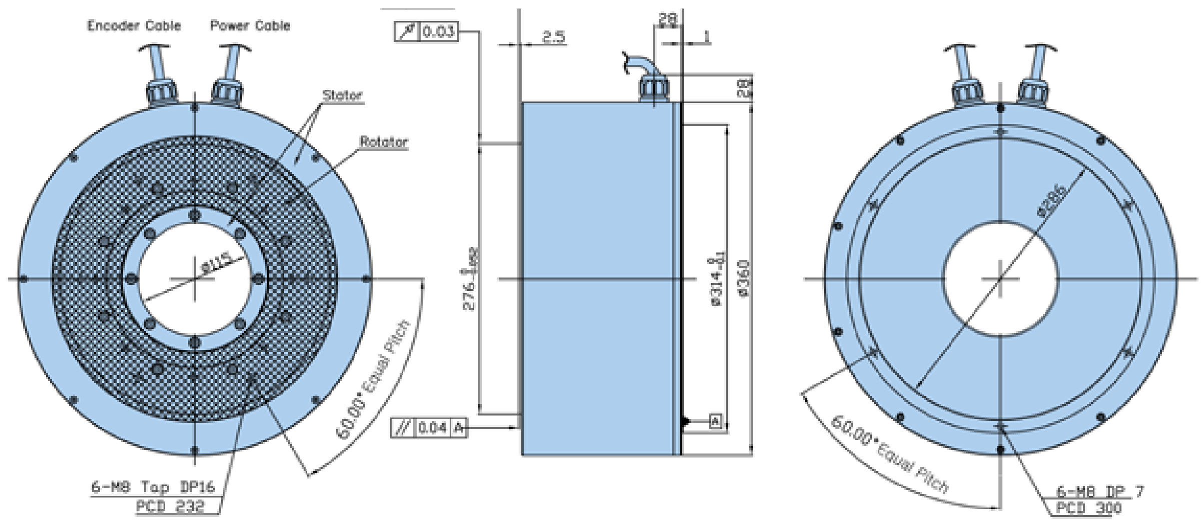
Size D

Motor	Length (mm) 'L'	Weight (Kg)
PM-DDD12D	82.5	17.3
PM-DDD22D	100.5	19.6
PM-DDD34D	118.5	21.9



Size E

Motor	Length (mm) 'L'	Weight (Kg)
PM-DDE40D	95.4	28.2
PM-DDE60D	113.4	35



Size B

Product	Length (mm) 'L'	Weight (Kg)
PM-DDFA1G	131	54
PM-DDFA6G	167	70.3

ORDERING INFORMATION
PM-DD Series

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦
MOTOR Order Example:	PM-DD	B	60	A	NO	H	

① **Series**
DD DD Motor

② **Size**
B External Diameter 135mm
C External Diameter 175mm
D External Diameter 230mm
E External Diameter 290mm
F External Diameter 360mm

③ **Torque**
03 3Nm
06 6Nm
09 9Nm
60 60Nm
A6 160Nm

④ **Rated Speed**
A 300rpm
D 200rpm (Standard, ø135~ø290 : 200rpm)
G 150rpm (Standard, ø360 : 150rpm)
M 100rpm

⑤ **Encoder**
NO 135 | 175 | 230 | 290 | 360
20Bit (Single turn ABS, Biss-C communication)

⑥ **Shaft Type**
H Standard hollow shaft

⑦ **Voltage**
200V DD Motor (no entry needed)

	①	②	③	④
CABLE Order Example:	APCS	E	03	ZS

① **Cable Type**
APCS APCS

② **Cable**
E Encoder Feedback
PN Motor Power

③ **Length**
03 3m
05 5m
10 10m
20 20m

④ **Rated Speed**
ZS Standard Feedback Cable
Standard Power Cable (PM-DDF series)
YS Standard Power Cable(PM-DDB~E series)

RM Series Worm Drive Precision Stages

Precision for High Load Applications

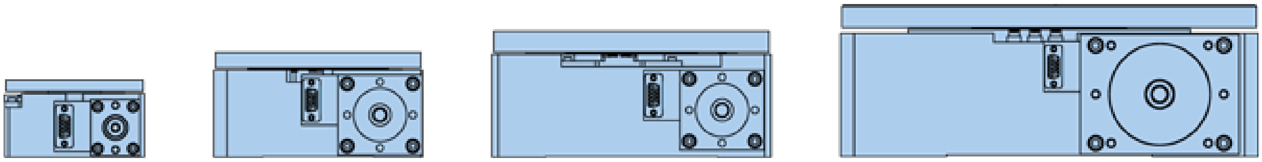
- **Unique self-compensating preload to limit backlash**
- **Solid or thru bore construction**
- **Robust bearing design for high-load capacity**
- **Built-in limit switches**
- **Aluminum construction with stainless steel top plate**

Applications

- Electronic assembly
- Fiber optics
- Medical
- Packaging
- Pharmaceutical
- Robotics
- Semiconductor

When to Use

- High accuracy
- High loads
- Compact
- High stiffness

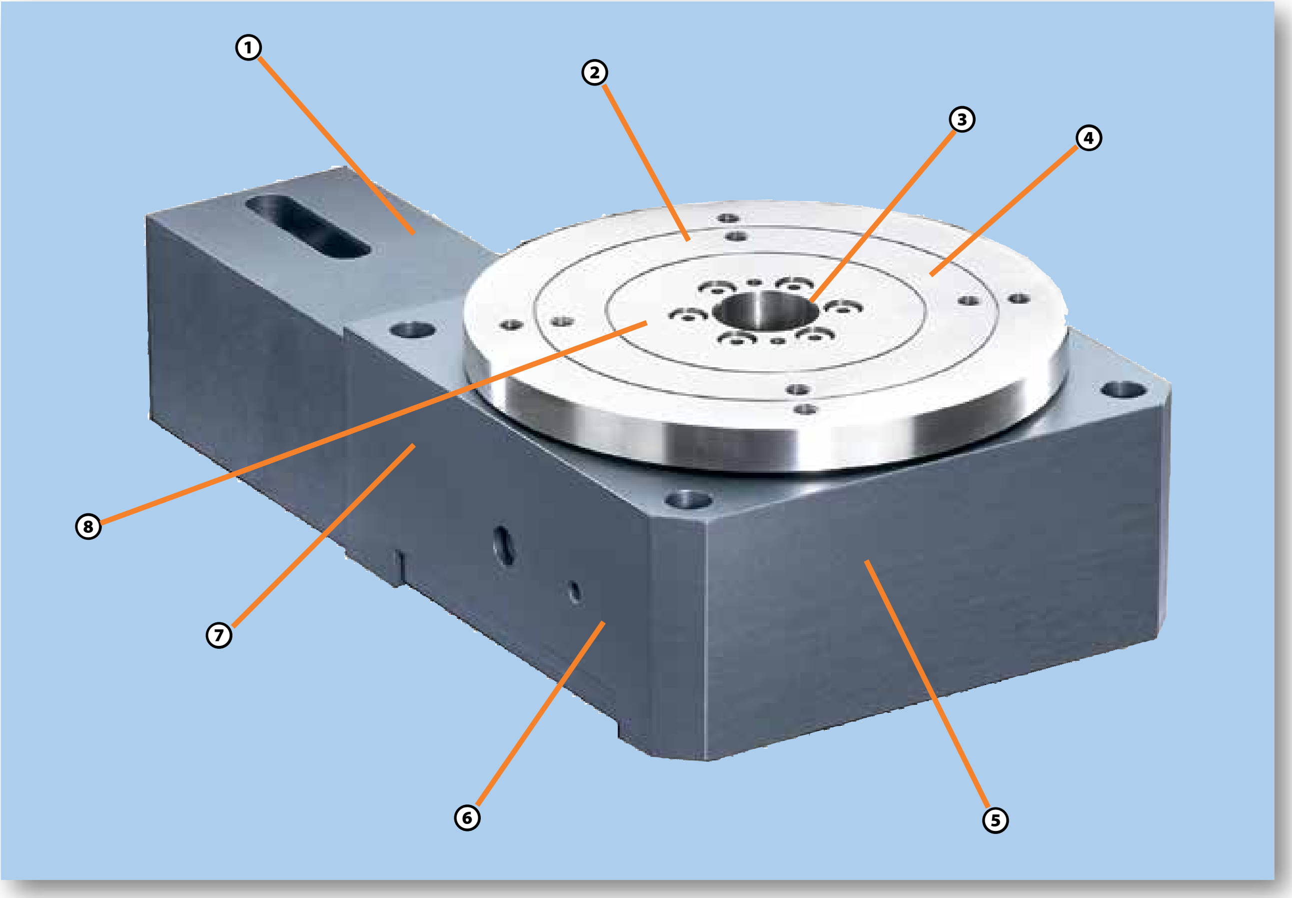


RM100 **RM150** **RM200** **RM300**

**Bracket shown is only available with home switch option.*

	RM Series
Maximum Diameter (mm)	297
Maximum Payload (N)	4,511
Maximum Velocity (rpm)	30

The RM Series offers an unparalleled combination of high accuracy and high load capacity. These rotary stages utilize a precision worm gear with the worm "flexed" against the gear to ensure a proper mesh. This feature provides high repeatability with very smooth operation. Additionally, the rotary stages incorporate an oversized preloaded cross roller bearing, offering exceptional stiffness and load capacity.



1 **Motor Mounting and Coupling**
for easy installation

2 **Integral Limit Switches**
mounted under top plate for safety

3 **Preloaded Cross Roller Bearings**
for high loads and spindle stiffness

4 **Stainless Steel Top Plate**
with solid or through hole construction

5 **Optional Inline Rotary Encoder**
for direct position feedback

6 **Completely Sealed and Lubricated**
for long life even in harsh environments

7 **Heavy Duty Stainless Steel Worm with Bronze Gear**
for smooth operation and high torque

8 **Self-Compensating Preload**
for zero backlash

SPECIFICATIONS

RM Series Worm Drive Precision Stages

The Rotary Stage Series is ideal for traditional industrial applications which require high load and thrust capacities while achieving precision motion.

Performance Specifications

	Axial Capacity		Perpendicular Capacity @ 25 mm		Perpendicular Capacity @150 mm	
Model No.	(kg)	(lb)	(kgf)	(lb)	(kgf)	(lb)
R100M	100	220	22	48	7	15
R150M	400	880	88	194	33	73
R200M	600	1320	200	440	85	187
R300M	1000	2220	325	715	160	352

Model No.	Worm Gear Ratio	Unidirectional Repeatability (1) (arc-min)	Peak Output Torque @100 RPM Input (Nm)	Peak Output Torque @100 RPM Input (in-lb)	Peak Output Speed (RPM)	Weight (kgf)	Weight (lbf)	Inertia gm-cm sec²	Inertia oz-in sec²
R100M	60:1	0.2	8	70.8	30	2.3	5.0	0.0057	0.0000784
R150M	72:1	0.2	25	221	30	6.0	13.0	0.055	0.00076
R200M	72:1	0.2	55	487	30	15.0	33.0	0.148	0.00210
R300M	90:1	0.2	75	664	30	35.0	77.0	0.368	0.00516

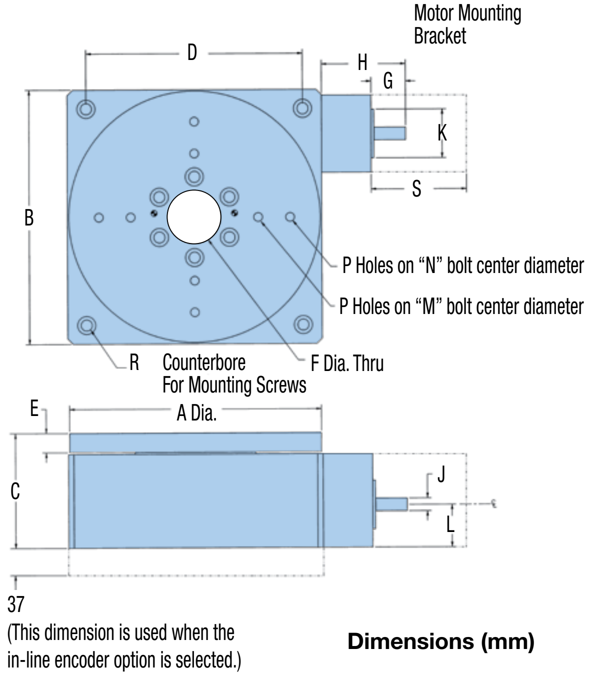
Accuracy Specifications (1)

	Main Bearing Runout	Wobble	Positional Accuracy (1)	Bidirectional Repeatability (1)	Maximum Running Torque (Unloaded at 2 rps)	
	(microns)	(arc-min)	(arc-min)	(arc-min)	(Nm)	(oz-in)
R100M	±15	±0.5	5	0.5	0.141	20
R150M	±20	±0.5	3	0.5	0.177	25
R200M	±25	±0.5	3	0.5	0.212	30
R300M	±30	±0.5	3	0.5	0.247	35

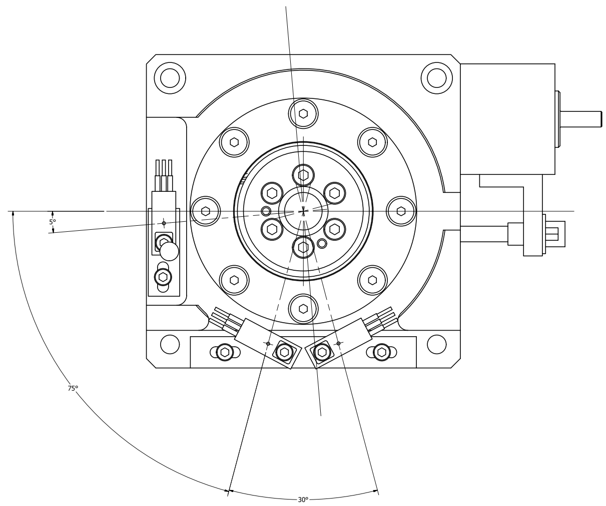
(1) Accuracy and repeatability are based on stage mounted to a flat granite surface and measured at 25 mm above the center of the stage.

DIMENSIONS

RM Series Dimensions



Dimensions (mm)



RM Series Sensor Locations

	A		B		C		D		E	
Model No.	**(mm)**	**(in)**	**(mm)**	**(in)**	**(mm)**	**(in)**	**(mm)**	**(in)**	**(mm)**	**(in)**
R100M	98.5	3.88	100	3.94	55	2.16	85	3.35	8	0.32
R150M	147.6	5.81	150	5.90	75	2.95	125	4.92	11	0.43
R200M	197.7	7.78	200	7.87	90	3.54	170	6.70	15	0.59
R300M	297.7	11.72	300	11.81	108	4.25	270	10.63	16	0.63

	F		G		H		J		K	
Model No.	**(mm)**	**(in)**	**(mm)**	**(in)**	**(mm)**	**(in)**	**(mm)**	**(in)**	**(mm)**	**(in)**
R100M	12.700	0.50	15	0.59	45	1.77	5	0.197	18	0.709
R150M	26.187	1.03	27	1.06	66	2.60	10	0.394	38.1	1.50
R200M	41.280	1.63	27	1.06	66	2.60	10	0.394	38.1	1.50
R300M	55.575	2.19	39	1.53	113	4.45	12	0.472	73	2.875

	L		M		N		P	R	Stage Weight	
Model No.	**(mm)**	**(in)**	**(mm)**	**(in)**	**(mm)**	**(in)**	**Tap**	**CBore**	**(kg)**	**(lb)**
R100M	21	0.83	45	1.772	75	2.953	M5 x 0.8	M5	1.8	3.97
R150M	30.1	1.18	100	3.937	125	4.921	M6 x 1	M6	5	11
R200M	33.5	1.32	100	3.937	150	5.905	M8 x 1.25	M8	13	28.66
R300M	44.3	1.74	150	5.905	250	9.843	M8 x 1.25	M8	29	63.93

Rotary Tables

ORDERING INFORMATION

RM Series Worm Drive Precision Stages

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧
Order Example:	R	150M	7	MP2	C04	L1H1	E0	R1

① **Series**

R	Worm Gear Rotary Series

② **Metric Square Width**

100M	100 mm
150M	150 mm
200M	200 mm
300M	300 mm

③ **Gear Ratio**

6	60:1 (R100)
7	72:1 (R150 and R200)
9	90:1 (R300)

④ **Motor Mounting**

M00	No motor block included
M16	Motor block for Parker BE16(1,2,3 stack)
M22	Motor block for Parker LV/HV23, SM23(1,2,3)
M23	Motor block for Parker BE23(1,2,3 stack)
M34	Motor block for Parker BE34 motors
MP1	Including motor and mount with BE163CJ-NPSN
MP2	Including motor and mount with BE233FJ-NSPN
MP3	Including motor and mount with HV233-02-10

⑤ **Coupling Code**

C00	No coupling included
C01	0.1875 inch coupling included
C02	5 mm coupling included
C03	0.250 inch coupling included (for BE16,LV/HV23)
C04	0.375 inch coupling included (for BE23/SM23(1,2,3)
C05	8 mm coupling included
C06	9 mm coupling included
C07	11 mm coupling included
C08	0.500 inch coupling included (for BE34 motors)
C09	14 mm coupling included
C10	16 mm coupling included

⑥ **Limits Switches**

L0H0	No Home or Limit Sensors included
L0H1	1 normally open NPN home sensor included
L1H0	2 normally closed NPN limit sensors included
L1H1	1 home and 2 limit sensors included

⑦ **Encoder in Line with Top Plate**

E0	No encoder included
E1	2000 line in-line rotary encoder included

⑧ **Environment**

R1	Standard environmental protection
R2	Cleanroom preparation included to class XX(TBD)

200RT Series Rotary Tables

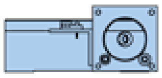
Precise Rotary Positioning and Indexing

- **Highly repeatable indexing (12 arc-sec)**
- **Load capacities to 200 lbs**
- **360 degrees continuous travel**
- **Performance tested worm gear drive**
- **Selectable table sizes and drive ratio**
- **Dual race angular contact support bearing**
- **Quality design and construction**

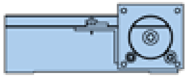
	200RT
Maximum Diameter (mm)	304
Maximum Payload (N)	889
Maximum Input Velocity (rpm)	900

Options

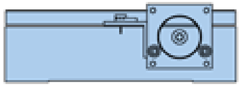
- **Motor couplings in a wide range of coupling styles and bores**
- **Motor mounts**
- **Home sensor for fixed reference point**
- **High resolution, high accuracy rotary encoders**
- **Custom designed sealed units**
- **Motors, drives & controls available for complete system solutions**



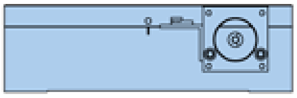
205RT



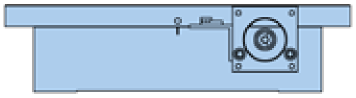
206RT



208RT



210RT



212RT

**Bracket shown is only available with home switch option.*

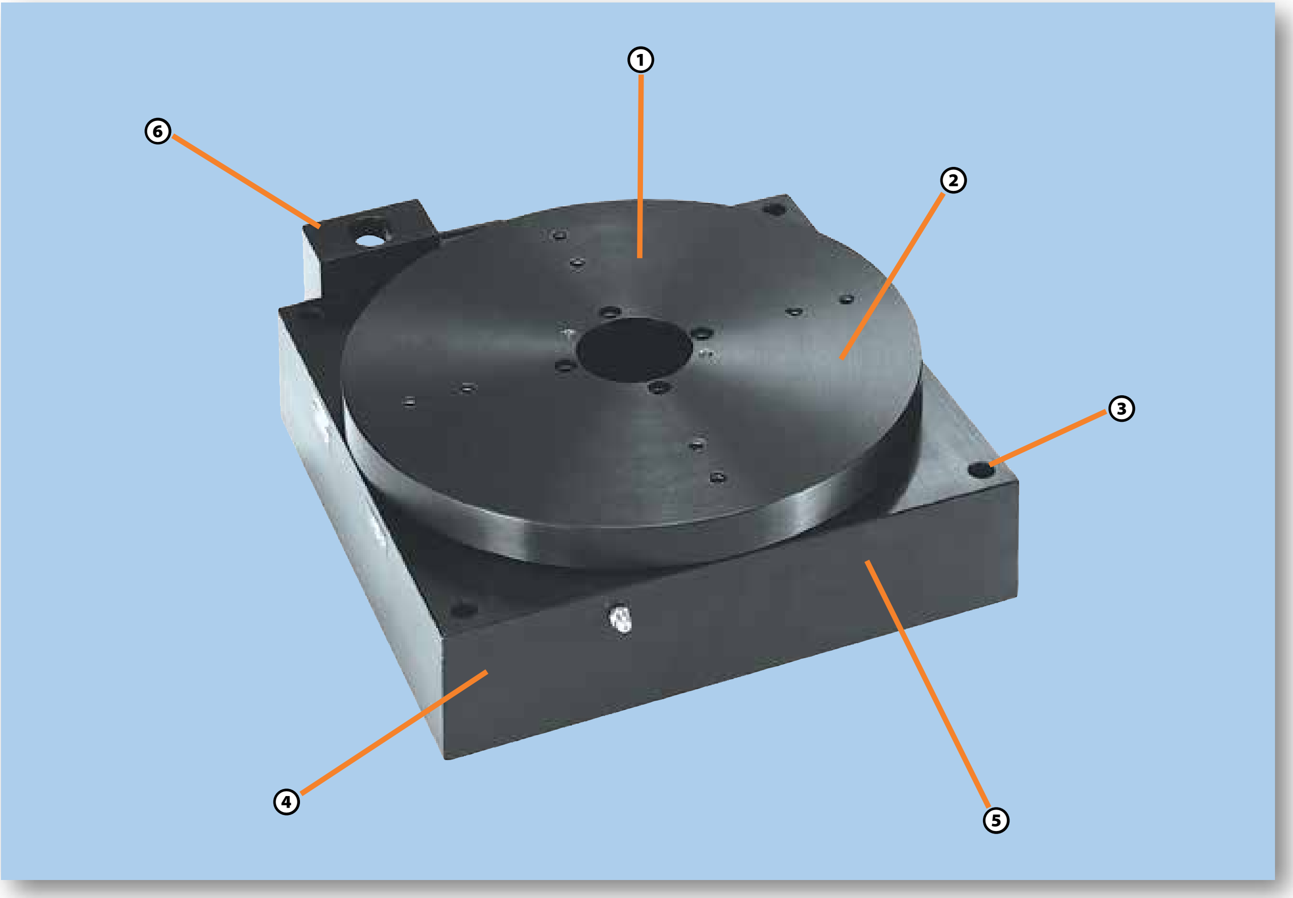
The 200RT Series Rotary Tables are designed for precise motor-driven rotary positioning and indexing. These tables are designed to function independently or in conjunction with linear tables used in the high-precision and precision automation applications.

Their low profile design minimizes stack height in multi-axis configurations and enables them to fit in many places where other motorized rotary devices cannot.

Models are available in 5, 6, 8, 10, or 12 inch diameters and are offered with four gear ratios making it convenient to match size, speed, and load requirements. They can be selected in either English or metric mounting.

They are found in virtually all industries where intermittent part indexing, part scanning, skew adjustment, or precise angular alignment is required.

At the heart of these tables is a rugged main support bearing which is comprised of two preloaded angular contact bearing races. It is designed for high load capacity and smooth, flat rotary motion. The drive is a precision worm gear assembly which is preloaded to remove backlash. The top and base are constructed of high quality aluminum with an attractive black anodized finish. The top and bottom mounting surfaces are precision ground to assure flatness.



① **Multiple sizes**
Models are available in five diameter sizes and are offered with four gear ratios

② **Load capacities**
to 200 pounds

③ **Available with English or Metric Mounting**

④ **Low profile design**
minimizes stack height in multi-axis configurations

⑤ **High resolution, high accuracy rotary encoders**
can be added for direct positional feedback of the table top position.

⑥ **Custom designed sealed units**
are offered to prevent excessive wear or internal damage resulting from dust and contaminants

SPECIFICATIONS

The various table sizes of the 200RT Series makes it convenient to match size, speed, and load requirements for any application.

200RT Common Characteristics

	Units	Precision	Standard
Positional Repeatability (unidirectional)	arc-min	0.2	0.5
Duty Cycle	%	50	50
Table Runout (maximum) *	in (µm)	±0.001 (±25)	±0.003 (±75)
Concentricity **	in (µm)	±0.001 (±25)	±0.005 (±127)
Wobble	arc-sec	30	60
Input Velocity (maximum) ***	revs/sec	15	15

* Runout refers to the vertical deviation of the table top while rotating.

** Concentricity refers to the horizontal deviation of the table top while rotating.

*** Maximum output velocity is dependent on the drive ratio selected.

Travel Dependent Characteristics

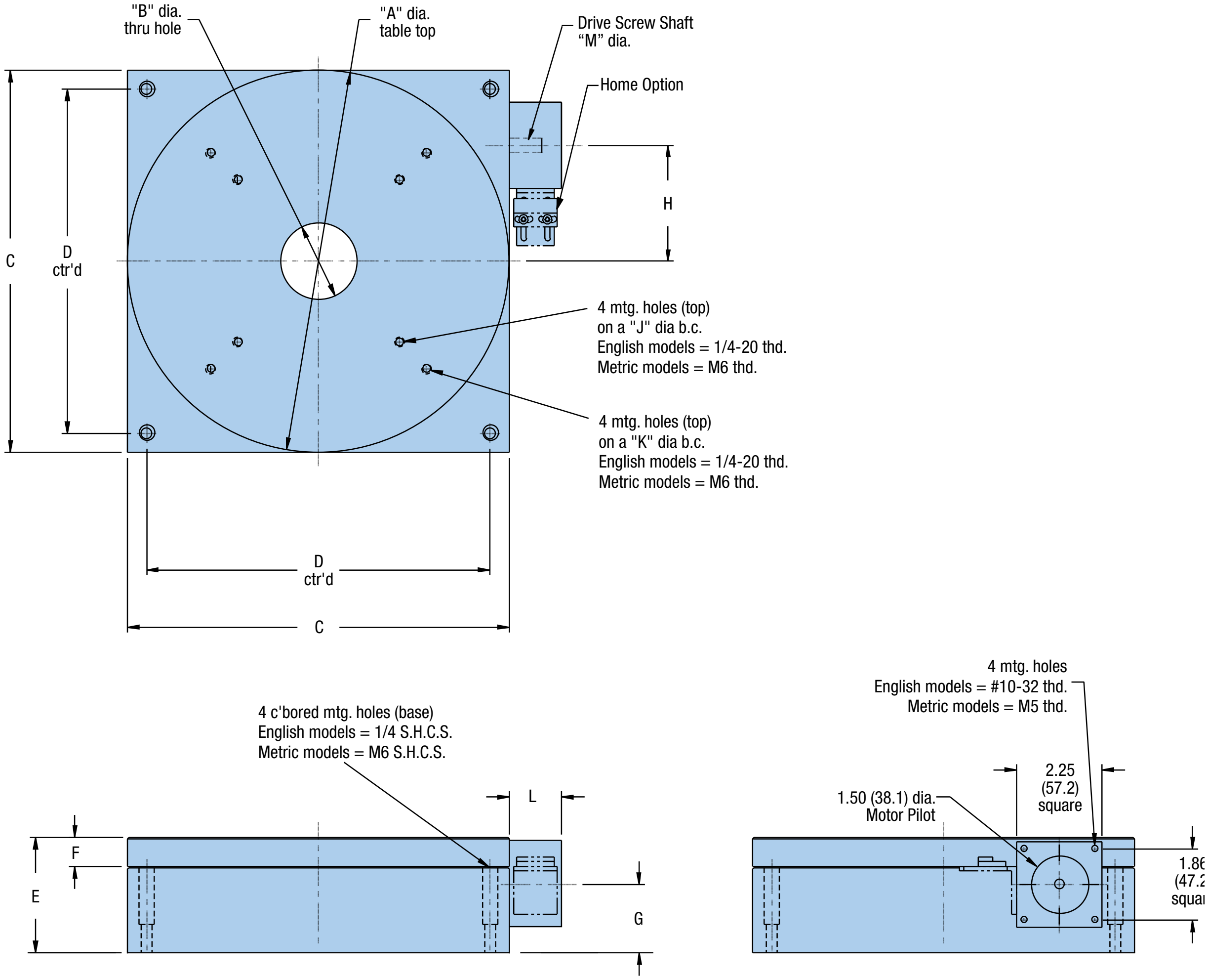
			Accuracy arc-min						Weight lb (kgf)	
Table Diameter inches	**Drive Ratio**	**Load Capacity lbs (kgf)***	**Precision**	**Standard**	**Output Torque in-lb (N-m)**	**Inertia 10^{-3}-oz.-in-sec^2 (10^{-6} kg-m-sec^2)**	**Input Breakaway Torque (max.) oz.-in (N-m)**	**Running Torque (max) oz-in (N-m)**	**Standard Top**	**Total**
5.0	180:1	25 (11)	3	10	25 (2.8)	0.14 (0.102)	22 (0.16)	20 (0.13)	0.67 (0.3)	6.0 (2.7)
5.0	90:1	25 (11)	3	10	25 (2.8)	0.15 (0.112)	22 (0.16)	20 (0.13)	0.67 (0.3)	6.0 (2.7)
5.0	36:1	25 (11)	5	12	25 (2.8)	0.24 (0.173)	22 (0.16)	20 (0.13)	0.67 (0.3)	6.0 (3.6)
6.0	180:1	150 (68)	3	10	120 (13.6)	0.16 (0.112)	22 (0.16)	20 (0.13)	0.91 (0.42)	8.0 (2.7))
6.0	90:1	150 (68)	3	10	120 (13.6)	0.20 (0.132)	22 (0.16)	20 (0.13)	0.91 (0.42)	8.0 (3.6)
6.0	45:1	150 (68)	5	12	120 (13.6)	0.29 (0.204)	22 (0.16)	20 (0.13)	0.91 (0.42)	8.0 (3.6)
8.0	180:1	150 (68)	3	10	120 (13.6)	0.24 (0.163)	28 (0.19)	25 (0.18)	2.23 (1.01)	15.0 (6.8)
8.0	90:1	150 (68)	3	10	120 (13.6)	0.66 (0.459)	28 (0.19)	25 (0.18)	2.23 (1.01)	15.0 (6.8)
8.0	36:1	150 (68)	5	12	120 (13.6)	0.90 (0.642)	28 (0.19)	25 (0.18)	2.30 (1.05)	15.0 (6.8)
10.0	180:1	200 (90)	3	10	190 (21.5)	0.74 (0.530)	33 (0.22)	30 (0.21)	5.26 (2.30)	29.0 (13.1)
10.0	90:1	200 (90)	3	10	190 (21.5)	1.02 (0.734)	33 (0.22)	30 (0.21)	5.26 (2.30)	29.0 (13.1)
10.0	45:1	200 (90)	5	12	190 (21.5)	2.13 (1.53)	33 (0.22)	30 (0.21)	5.26 (2.30)	29.0 (13.1)
12.0	180:1	200 (90)	3	10	190 (21.5)	0.99 (0.713)	33 (0.22)	30 (0.21)	7.67 (3.49)	32.0 (14.5)
12.0	90:1	200 (90)	3	10	190 (21.5)	1.59 (1.12)	33 (0.22)	30 (0.21)	7.67 (3.49)	32.0 (14.5)
12.0	45:1	200 (90)	5	12	190 (21.5)	3.83 (2.75)	33 (0.22)	30 (0.21)	7.67 (3.49)	32 (14.5)

* Load centered on table. If offset, see charts for moment capacity.

DIMENSIONS

Download 2D & 3D files from
www.parker.com/emn/RTSeries

Dimensions - inches (mm)



English Units

A	B	C	D	E Standard (T2)	E Option (T3)	F Standard (T2)	F Option (T3)	G	H	J	K	L	M
5.0	1.0	5.0	4.0	1.8	2.42	0.38	1.00	1.11	1.66	3.0	4.0	1.38	0.188
6.0	1.75	6.0	5.0	2.0	2.62	0.38	1.00	1.23	2.04	4.0	5.0	1.38	0.25
8.0	1.75*	8.0	6.0	2.5	3.12	0.50	1.00	1.57	2.04	4.0	6.0	1.38	0.25
10.0	2.0	10.0	9.0	3.0	3.62	0.75	1.00	1.81	3.03	6.0	8.0	1.38	0.25
12.0	2.0	10.0	9.0	3.0	3.62	0.75	1.00	1.81	3.03	8.0	10.0	2.38	0.25

*On the 8.0" (203,2) diameter table with 36:1 ratio, this dimension is 1.0" (25,4).

Metric Units

A	B	C	D	E Standard (T2)	E Option (T3)	F Standard (T2)	F Option (T3)	G	H	J	K	L	M
127.0	25.4	127.0	100	46.0	61.5	9.6	25.0	28.1	42.1	75	100	35	4.76
152.4	44.5	152.4	125	50.8	66.5	9.6	25.0	31.4	51.8	100	125	35	6.35
203.2	44.5*	203.2	175	63.5	79.2	12.7	25.0	39.8	51.8	100	150	35	6.35
254.0	50.8	254.0	225	76.2	91.9	19.0	25.0	45.9	76.9	150	200	35	6.35
304.8	50.8	254.0	225	76.2	91.9	19.0	25.0	45.9	76.9	200	250	60.4	6.35

*On the 8.0" (203,2) diameter table with 36:1 ratio, this dimension is 1.0" (25,4).

OPTIONS & ACCESSORIES

Motor Couplings

A wide range of coupling styles and bores are available to match motor requirements. Bellows-style couplings, offering the lowest windup are required for all precision grade tables, while the aluminum and stainless steel helix couplers offer good windup characteristics and high durability at a lower cost.

Motor Mounts

The motor mount is designed for an industry standard NEMA 23 motor flange and a maximum shaft length of 0.85".

Home Sensor

The Home sensor provides a fixed reference point to which the table can always return. This is a mechanical reed switch which is mounted the body of the rotary table and is activated by a magnet embedded on the table top.

Rotary Encoders

High resolution, high accuracy rotary encoders can be added for direct positional feedback of the table top position.

Rotary encoders can be mounted directly to the base of the rotary table. The encoder input shaft is then coupled directly to the rotary table top, supplying positional feedback of the table top, with no drive train errors. They can be supplied with or without a base housing which encloses and protects the encoder.

Seals

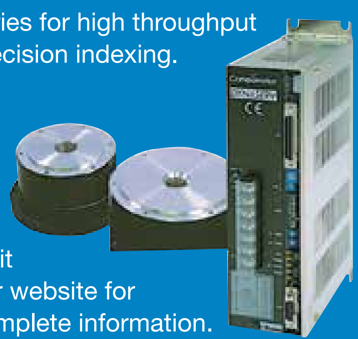
Custom designed sealed units are offered to prevent excessive wear or internal damage resulting from dust and contaminants.

Motors, Drives & Controls

Micro-step motors with drives are available for direct mounting to the rotary tables. Motion controllers can also be added to provide systems with seamless connectivity.

High Performance Direct Drive Rotary Tables

Parker's DM1004 direct drive brushless servo motor tables offer an alternative to the 200RT series for high throughput precision indexing.



Visit our website for complete information.

Rotary inspection stand

Rotary Tables

ORDERING INFORMATION

200RT Rotary Tables

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
Order Example:	2	08	01	RT	M	S	H1	C1	M1	E0	T1

① **Series**

2

② **Table Diameter**

05	5 in, 125 mm
06	6 in, 150 mm
08	8 in, 200 mm
10	10 in, 250 mm
12	12 in, 300 mm

③ **Gear Ratio**

01	180:1, Available on all dia.
02	90:1, Available on all dia.
04	45:1, Available on 6”, 10” and 12” dia. only
05	36:1, Available on 5” and 8” dia. only

④ **Table Style**

RT

⑤ **Mounting**

E	English
M	Metric (800CT only)

⑥ **Grade**

S	Standard
P	Precision

⑦ **Home**

H1	No home switches
H2	Magnetic home switches

⑧ **Motor Coupling**

C1	No coupling
C2	0.25 in bore, helix, aluminum
C3	0.25 in bore, helix, stainless steel (not available on 205 model)
C4	0.25 in bore, bellows, required for precision grade
C6	0.375 in bore, helix, stainless steel (not available on 205 model)
C7	0.375 in bore, bellows, required for precision grade

⑨ **Motor Mount**

M1	23 frame size

⑩ **Encoder**

E0	No encoder
E8	Ring encoder – 314,880 post quad. counts/rev

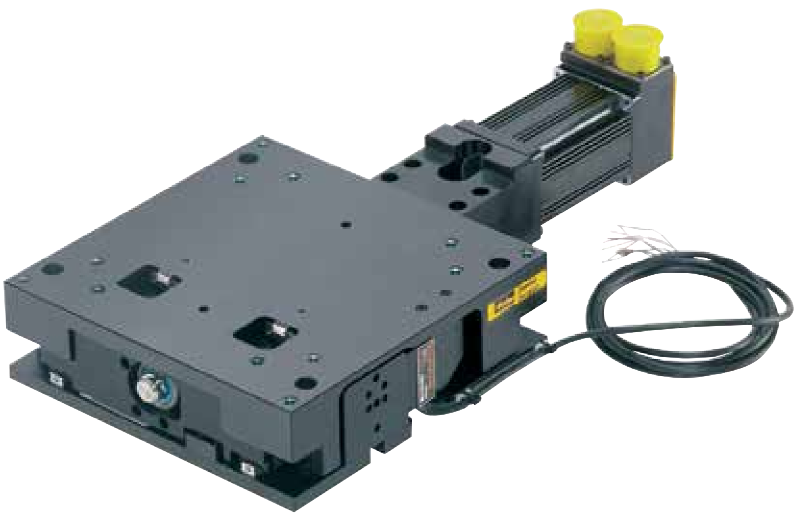
⑪ **Table Top**

T1	No top
T2	Standard top
T3	Oversized top (raises height to clear NEMA 23 motor)

ZP200 Series Vertical Lift "Wedge" Table

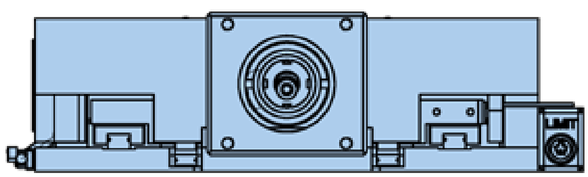
Precise Vertical Translation, Small Form Factor

- **Precision platform for vertical (Z-axis) positioning**
- **Continuous duty - High dynamic performance**
- **Precision straightness (±5 arc-sec) throughout range of motion**
- **Precision ground ballscrew drive - 5, 10, or 20 mm lead**
- **Multi-axis compatibility with XR and LXR tables**
- **Laser tested and certified with calibrated lead value**
- **Quality design and construction**



Options

- **Linear Encoder option with selectable resolutions of 0.1, 0.5, 1.0 µm**
- **Fail-safe brake (field installable - mounts directly to the ballscrew drive)**
- **Class 10 cleanroom preparation**
- **Selectable motor mounting and couplings for SM16 or NEMA 23 servo or stepper motors**
- **Easily adjusted travel "limit" and "home" sensors are provided in an enclosed sensor pack**



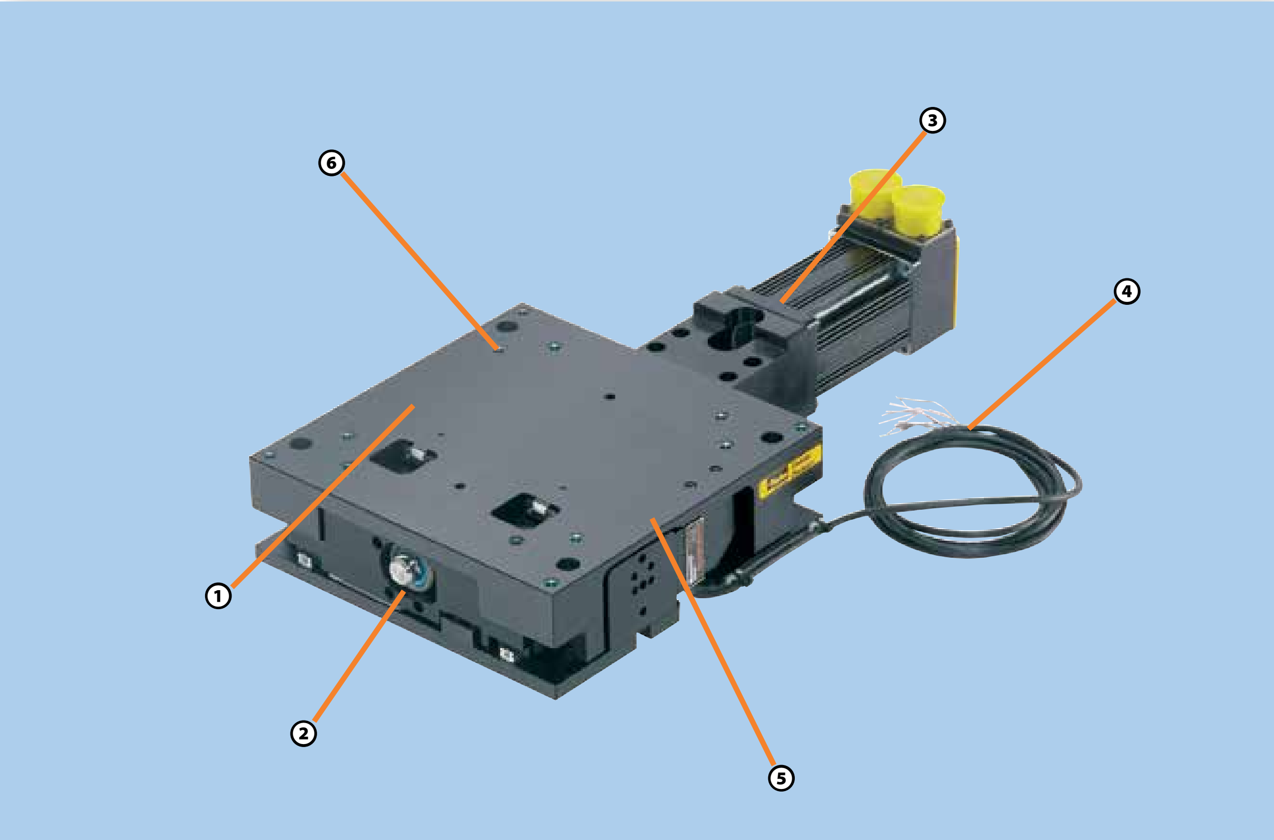
ZP200

	ZP200 Series
Maximum Travel (mm)	25
Maximum Payload (N)	735
Maximum Acceleration (m/sec^2)	7.2

The ZP200 Z axis lift table is a stable support platform which provides precise vertical translation and positioning, while maintaining X-Y integrity.

Recirculating square rail bearings are incorporated into a unique variation of "wedge" mechanics to enable reliable high dynamic performance without the potential loss of travel encountered with cross roller bearings.

The ZP200 is compatible with XR and LXR tables for multi-axis systems, and it can be utilized as the system base axis or top axis to fit the motion requirements of the application. Standard mounting holes and dowel pin holes accommodate repeatable mounting.



① **Up to 25 mm Vertical Travel**
with positional accuracy down to 8 microns

② **Three leadscrew options**
of 5, 10 and 20 mm to provide to best solution for your applications

③ **Selectable motor mounting and couplings**
for SM16 or NEMA 23 servo or stepper motors

④ **Linear Encoder option**
with selectable resolutions of 0.1, 0.5, 1.0 µm

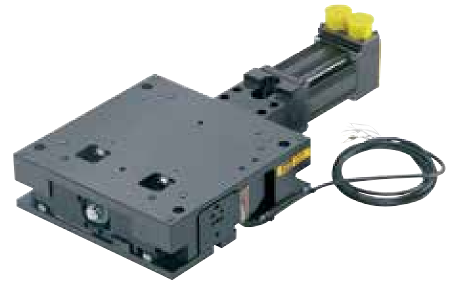
⑤ **Compatible with XR and LXR tables**
for multi-axis systems, and it can be utilized as the system base axis or top axis to fit motion requirements

⑥ **Standard mounting holes and dowel pin holes**
accommodate repeatable mounting

ZP200 utilized in a laser test set-up

SPECIFICATIONS

The rugged bearing design of the ZP200 Series provides platform stiffness and stability while the precision ground ball-screw drive assures positional accuracy and worry-free operation.



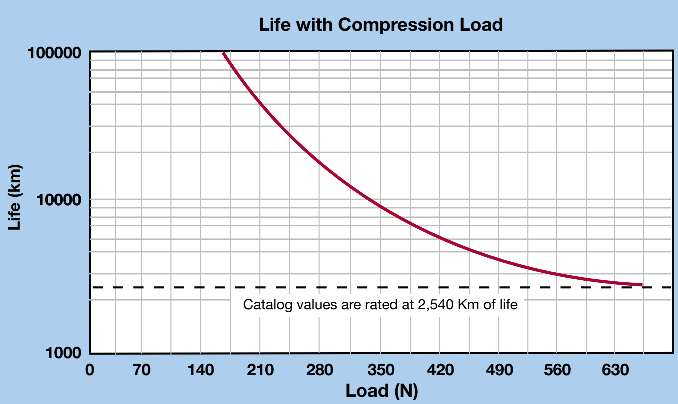
ZP200 Specifications

	Precision	Standard
Travel (Z-axis)	25 mm (limit to limit)	25 mm (limit to limit)
Positional Accuracy		
with no encoder [1,2,7]	8 µm	20 µm
with linear encoder [3,6,7]	8 µm	—
Positional Repeatability		
with no encoder [1,7]	± 3 µm	± 10 µm
with 1.0 µm linear encoder [6,7]	± 5 µm	—
with 0.5 µm linear encoder [6,7]	± 4 µm	—
with 0.1 µm linear encoder [6,7]	± 3 µm	—
Lift Lead Ratio [4]		
5 mm lead ballscrew drive	1.8199 mm/rev	
10 mm lead ballscrew drive	3.6397 mm/rev	
20 mm lead ballscrew drive	7.2794 mm/rev	
Lift Velocity		
5 mm lead ballscrew drive	110 mm/sec	
10 mm lead ballscrew drive	220 mm/sec	
20 mm lead ballscrew drive	440 mm/sec	
Load Capacity (normal)	15 kg (33 lb)	75 kg (165 lb)
Duty Cycle	100%	
Max Acceleration	7.2 m/sec^2	
Efficiency	90%	
Max Breakaway Torque [5]	0.15 Nm	
Max Running Torque [5]	0.13 Nm	
Linear Bearing – Coefficient Of Friction	0.01	
Ballscrew Diameter	16 mm	
Unit Weight	5.82 kg	
Top Plate Weight	2.25 kg	
Pitch [7]	± 15 Arc-sec	± 45 Arc-sec
Roll [7]	± 15 Arc-sec	± 25 Arc-sec
Input Inertia		
5 mm lead ballscrew drive	2.32 x 10^{-5} Kg-m^2	
10 mm lead ballscrew drive	2.51 x 10^{-5} Kg-m^2	
20 mm lead ballscrew drive	3.12 x 10^{-5} Kg-m^2	

1) Measured 38 mm directly above the true center of the top mounting surface.
2) Measured using calibrated lead value (provided).
3) Slope correction value provided
4) Lift per 1 motor shaft revolution. Lift lead listed is nominal. All units are provided with calibrated lead value.
5) Torque ratings are measured with unit unloaded, traveling upward.
6) Measured directly over encoder on outer edge.
7) Pitch and Roll Specifications are measured with <1kg load. Addition of load increases pitch and roll error by 10 arc-sec per 5 kg of load assuming the load center of gravity is located at the center of the stage platform. Cantilevered loading increases these errors more.

Table Life/Compression (Normal) Load

The graph provides a preliminary evaluation of the support bearing life/load characteristics. The curves show the life/load relationship when the applied load is centered on the carriage, normal (perpendicular) to the carriage mounting surface. For final evaluation of life vs load, including off center, tension, and side loads contact Parker Applications Engineering at 800-245-6903.

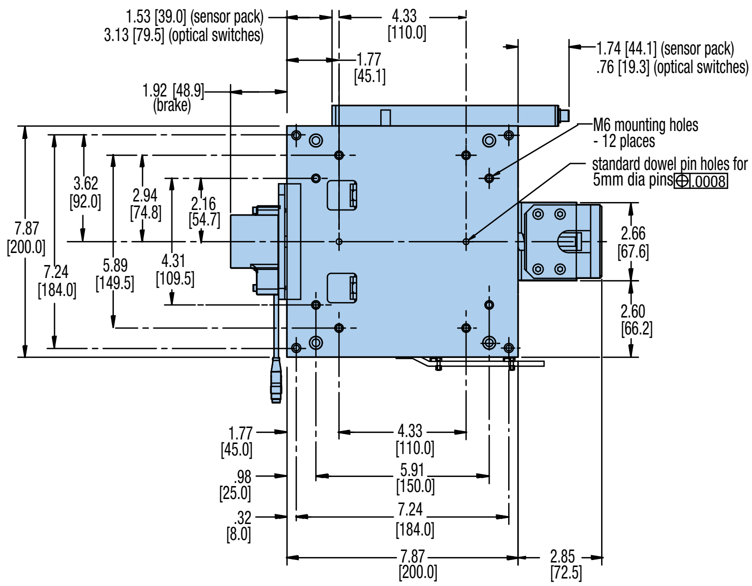


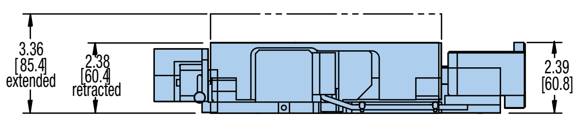
Rotary Tables

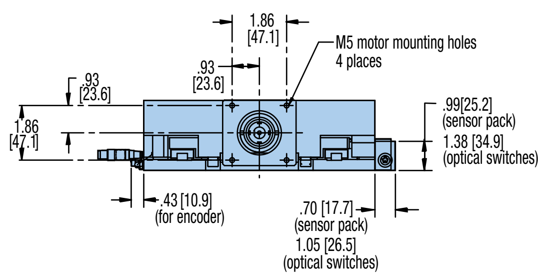
DIMENSIONS

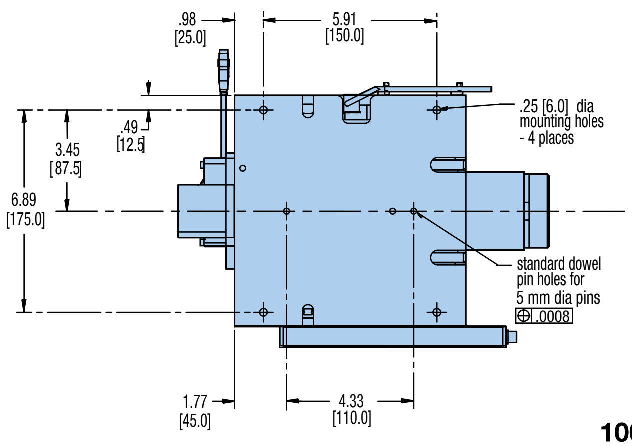
Download 2D & 3D files from www.parker.com/emn/ZP200

Dimensions - inches (mm)









100-9274-01 XR Adapter Plate

A multi-axis adapter plate is available to mount the ZP200 to an XR/LXR table or, mount an XR/LXR table to the ZP200. This plate is 9.53 mm thick and includes standard dowel pin holes for repeatable alignment.

	ZP200 as Base	ZP200 as Top Axis
404XR	Yes	—*
404LXR	Yes	—*
406XR	Yes	Yes
406LXR	Yes	Yes
206 Rotary	Yes	—*

*Not recommended - consult factory.

ORDERING INFORMATION

ZP200 Series

Fill in an order code from each of the numbered fields to create a complete model order code.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬
Order Example:	ZP200	T01	M	S	D2	H12	L12	C3	M3	E3	B2	R1	P1

① **Series**
ZP200

② **Travel**
T01 25 mm

③ **Mounting**
M Metric

④ **Grade**
P Precision
S Standard

⑤ **Drive Screw**
D2 5 mm lead
D3 10 mm lead
D4 20 mm lead

⑥ **Home Sensor**
H1 No sensor
H11 N.C. current sinking, sensor pack
H12 N.O. current sinking, sensor pack
H13 N.C. current sourcing, sensor pack
H14 N.O. current sourcing, sensor pack

⑦ **Travel Limit Sensors**
L1 No sensor
L11 N.C. current sinking, sensor pack
L12 N.O. current sinking, sensor pack
L13 N.C. current sourcing, sensor pack
L14 N.O. current sourcing, sensor pack

⑧ **Coupling**
C1 No coupling
C3 0.25" bore bellows
C5 0.38" bore bellows
C23 9.0 mm (0.35") bore bellows

⑨ **Motor Mount**
M1 No motor mounts
M2 SM16/BE16 motor
M3 NEMA 23 and SM23 motors
M61 BE23 motor mount

⑩ **Linear Encoder Option**
E1 No encoder
E2 1.0 micron
E3 0.5 micron
E4 0.1 micron
E5 5.0 micron
E7 Sine/cosine encoder

⑪ **Brake Option**
B1 No brake
B2 Shaft brake

⑫ **Environmental**
R1 Class 1000
R2 Class 10

⑬ **P1** Place holder

Drives, Motors, Gearheads, & Controllers

Components and Systems for Complete Solutions

Parker Electromechanical & Drive products are built using industry standard interfaces and market-leading features that combine great value and performance. For a cost-effective and efficient solution, Parker offers bundled or kitted systems. We can combine motors, gearheads, and positioning systems to deliver a configured subsystem ready for installation. Parker configuration and setup software accommodates the rest of the product line, making start-up a snap. Combining this with our custom product modification capabilities gives the machine builder an economical custom-fit solution, with reduced engineering effort, straightforward integration, and modular compatibility.

Gearheads & Gearmotors

Precision options with less than 3 arc-minutes of backlash. NEMA sizes, right angle, dual drive, and more.
Page 513.

Rotary & Linear Motors

Motors with maximum torque density, cog-free rotary motion, and the greatest winding uniformity and accuracy in the industry.
Page 516.

Servo Drives & Drive/Controllers

Servo drives and controllers deliver maximum power output and performance–and they're optimized for easy setup.
Page 525.

Stepper Drives & Drive/Controllers

Stepper drives and controllers for a variety of applications and machine types.
Page 526.

Motion & Machine Controllers

Parker controllers offer a variety of communication protocol options and built-in advanced features. They easily adapt to existing networks.
Page 527.

Visualization–Human-Machine Interfaces

Solutions for every application, from simple push-button replacement to sophisticated network and data requirements.
Page 528.

Gearheads & Gearmotors

Gearhead Selection Guide

Gearheads

	Precision		Gear Geometry				Orientation		Metric Frame Size (NEMA)				Max Continuous Torque Nm (in-lb)				Ratios						IP Rating		
SERIES	High	Low	Helical Planetary	Planetary	Spiral Bevel/Helical	Spur	In-Line	Right Angle	60–220	40–90 (NEMA 17–NEMA 34	90–220	NEMA 23–NEMA 42	6–40 (50–350)	6.5–71 (57–630)	23–565 (200–5,000)	40–1800 (355–16,000)	1–3	1–30	1–100	3–30	3–100	5–100	IP54	IP64	IP65
PS	•		•				•		•							•					•				•
RS	•		•					•	•							•						•			•
PV		•		•			•			•				•							•			•	
NE		•				•	•	•				•	•								•		•		
NR		•				•	•	•				•	•						•				•		
RT	•				•			•			•				•					•					•
RD	•				•			•			•				•			•							•
RB	•				•			•			•				•		•								•

PV Series Precision Gearheads

www.parker.com/em/pgearheads

The PV Series gearhead combines power and versatility in an economical package. It comes in a wide range of options including dimensional output face crossovers to the Parker Bayside PX, Alpha LP, Neugart PLE, Stober PE and Standard NEMA gearheads.

The PV Series is available in metric and NEMA frame sizes ranging from 40mm to 115mm, NEMA sizes 17, to 42. Ratios are available in 3:1 thru 100:1.

Whether you're an OEM or an end-user searching for competitive alternatives, the PV offers a superior solution.

- **Higher radial load capacity: Taper roller output bearings**
- **Competitive alternatives: Five drop-in output face options**
- **Universal mounting kits: Quicker deliveries and easier mounting**
- **Higher gear wear resistance: Plasma Nitriting heat treating**

Product Series	Gear Geometry	Configuration	Frame Sizes (mm)	Continuous Torque (Nm)	Radial Load (N)	Backlash
PV40/17	Planetary	In-Line	40 (NEMA 17)	3.5 to 6.7	375 to 575	<6
PV60/23	Planetary	In-Line	60 (NEMA 23)	10.2 to 22.5	665 to 2535	<4
PV90/34	Planetary	In-Line	90 (NEMA 34)	33 to 71	1040 to 4270	<12
PV115/42	Planetary	In-Line	115 (NEMA 42)	67 to 144	1235 to 8550	<8

Complete Solutions

Planetary Gearheads

Our Generation II Stealth® Series provides high radial load, increased service life, and easy mounting. The Stealth Generation II Helical Planetary Gearhead design yields superior performance in the most demanding high-performance applications.

For larger frame sizes, Parker offers Generation I Stealth® Series gearheads in 180 to 220 mm and NEMA 56 frame sizes.

For standard precision applications, the PV Series gearhead combines power and versatility in an economical package with a wide range of options.

- **Nominal continuous torque from 3.5 to 1808 Nm (31 to 16,091 in-lb)**
- **In-line or right-angle configurations**
- **Higher radial and axial load capacity—widely spaced angular contact output bearings**
- **Increased service life—full complement planet needle bearings**
- **Universal mounting kits—quicker deliveries and easier mounting**
- **Helical planetary gearing—high torque and low backlash**
- **High stiffness—integral ring gear**
- **Plasma nitrited gear treating—higher gear wear resistance**
- **Some models available with special shafts for flange/face mounting**

Product Series	Gear Geometry	Configuration	Frame Sizes (mm)	Continuous Torque (Nm)	Radial Load (N)	Service Life (hrs)	Backlash
PS	Helical Planetary	In-Line	60 to 220	40 to 1800	>8400	20,000	<3
PX	Helical Planetary	In-Line	60 to 142 (NEMA 23 to 56)	30 to 280	>4050	20,000	<6
RS	Helical Planetary/ Spiral Bevel	Right Angle	60 to 220	35 to 1800	>8400	20,000	<4
RX	Helical Planetary/ Spiral Bevel	Right Angle	60 to 142 (NEMA 23 to 56)	25 to 130	>4500	20,000	<12

The Stealth Gen II Helical Planetary Gearheads incorporate design enhancements to provide superior performance for the most demanding high performance applications.

Stealth Gen II incorporates dual angular contact bearings providing higher radial load capacities while maintaining high input speeds. Design enhancements also include full compliment needle bearings allowing for increased service life and extended warranties. Internal design changes and optimized gearing geometries allow for one fill level for any orientation, resulting in shortened part number designation and simplified order placement.

Universal mounting kits provide common mounting kits across multiple product lines to promote quicker deliveries and ease of mounting to any servo motor.

Applications that require either high precision (PS/RS Series Gearheads), or mid-range precision (PX/RX Series Gearheads) or lower precision (PV Series Gearheads), utilize the same mounting kit part numbers within the same frame size.

- **High stiffness: Integral ring gear and rigid sun gear**

MultiDrive Gearheads

Stealth® MultiDrive offers three different output options for true flexibility:

RB Series low ratio
RD Series double shaft
RT Series hollow shaft

All models are configured in a compact, right-angle package. MultiDrive gearheads feature Stealth® helical gearing for high torque, high accuracy and quiet operation.

With five frame sizes and multiple ratios to choose from, you are sure to find a Stealth® MultiDrive to fit your servo motor application.

- **Frame sizes from 90 to 180 mm**
- **Continuous torque from 23 to 260 Nm (204 to 2,300 in-lb)**
- **Space saving—compact, right-angle design saves space in many applications**
- **Low backlash—standard as low as 8 arc-minutes and 4 arc-minutes optional**
- **Smooth, quiet operation and long life—hardened precision spiral bevel gears ensure quiet operation**
- **Quick, error-free mounting to any servo or stepper motor using Parker's ServoMount® design**
- **Sealed unit: seals and O-rings provide IP65 protection to prevent leaks and to protect against harsh environments**

Complete Solutions

Rotary & Linear Motors

Rotary & Linear Motor Selection Guide

Rotary Servo Motors

	Max Continuous Torque Nm (in-lb)					Max Speed (rpm)		Frame Sizes								Feedback							Application Advantages			
SERIES	1.2 (10.6)	3.0 (28.0)	4.9 (43.4)	25.7 (227.0)	158.0 (1398.0)	5,000	7,500	NEMA 16	NEMA 23	NEMA 34	40 mm	60 mm	80 mm	7 sizes, 92 to 270 mm	3 sizes, 92 to 142mm	Incremental	Hiperface	EnDat	Sine-Cosine	Hiperface DSL	Resolver	BiSS-C	No cogging	High inertia	High acceleration	IP69K washdown
MPP/MPJ					•	•								•		•	•		•	•	•				•	
MPW				•		•									•	•	•	•		•	•				•	•
P Series		•				•					•	•	•									•				
SM	•						•	•	•							•	•			•	•		•	•		
BE			•			•		•	•	•						•	•			•	•				•	

Specialty Rotary Servo Motors

	Max Continuous Torque Nm (in-lb)				Max Speed (rpm)			Frame Sizes				Feedback				Application Advantages								
SERIES	35.0 (311.0)	58.4 (516.4)	1080.0 (9558.8)	21000.0 (187110.0)	510	4,000	50,000	10 sizes, 32 to 254 mm	4 sizes, 92 to 145 mm	6 sizes, 85 to 310 mm	3 sizes, 360 to 762 mm	Hall sensors	Customer supplied	Resolver	EnDat	Very high system stiffness	High acceleration	Suitable for explosive environments	Direct integration into machine	High speeds	Constant power	Direct drive	Low speed	High torque
K		•					•	•				•	•			•			•	•				
EX	•					•			•					•	•		•	•						
HW/HKW			•				•			•			•						•	•	•			
TMW/TMA				•	•						•			•	•							•	•	•

Rotary Stepper Motors

	Max Static Torque Nm (in-lb)		Max Speed (rpm)		NEMA Frame Sizes					Feed-back	Application Advantages			Drive Family				
SERIES	4.6	9.07 (1285.0)	3,000	5,000	11	14	17	23	34	Encoder Optional	< 48 VDC	< 80 VDC	120 VAC	E-DC	P2	Vix	E-AC	ZETA
LV		•	•		•	•	•	•	•	•	•	•		•	•	•		
HV		•		•			•	•	•	•		•	•				•	•

Linear Motors

SERIES	Max Cont.Force (N) (lbs): 878.6 (197.5)	Max Cont.Force (N) (lbs): 2230.0 (501.0)	Peak Force (N): 3928 (883)	Peak Force (N): 7433 (1671)	Cogging Force (N): Zero	Cogging Force (N): Low	Attractive Force (N): Zero	Attractive Force (N): High	Magnet Tracks: Dual	Magnet Tracks: Single	Heat Dissipation: Good	Heat Dissipation: Better	Applications: Rapid accelerations	Applications: Extremely smooth motion	Applications: High force	Applications: Lower cost for long travels
Ironless	•		•		•		•		•		•		•	•		
Ironcore		•		•		•		•		•		•			•	•

Modified and Custom Motor Resources

Parker's standard shaft, feedback, and connection motor options meet the needs of most customers. However, we also engineer custom designs for customers whose applications require unique connectors, mountings, or windings.

Purchasing a custom motor from Parker is cost-effective, in part because we don't require you to order minimum quantities of your design. Plus, we offer short lead times for custom design services. Whether you buy a standard or custom motor, you can count on Parker to provide the best servo motor solution.

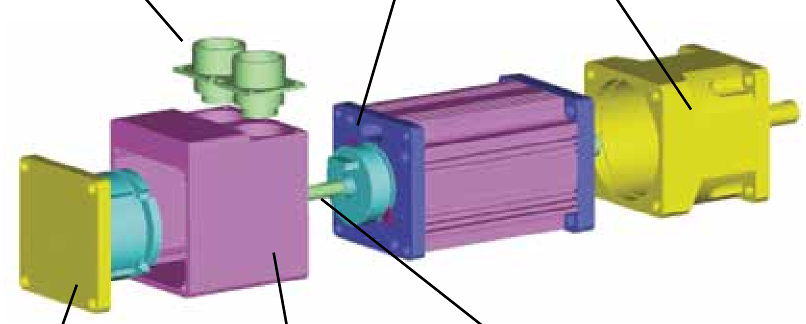
Other Modification Services
- Private labeling
- Special paints/coatings
- Special windings
- Shorter lengths
- High-speed balancing

http://bit.ly/AT_CMR

Flanges
- Tapped mounting holes
- NEMA flanges
- Face mount
- Customer-specified flanges

Connectors
- MS connectors
- Right-angle rotatable
- MS connectors on back cover
- Special cable lengths
- High-flex cables
- Custom cables and connectors
- Cable exiting through rear cover

Gearheads
- Custom ratios
- Customer-specified flanges
- Customer-specified output shaft



Brakes
- Spring released
- Permanent magnet
- 24 and 90 volt brakes

Feedback
- Incremental and smart encoders
- Absolute encoders — single- and multi-turn
- Resolver
- Custom feedback devices

Shafts
- Special lengths
- Special flats
- Special keyways
- Special shaft diameters
- Hollow shafts
- Rear shaft extension
- Double flats
- Shaft pinning
- Pressed-on gears
- Center tapped
- Special shaft materials

MPP/MPJ Series Rotary Servo Motors

http://bit.ly/AT_MPP

The MaxPlusPlus (MPP) family of brushless servo motors is redefining performance, flexibility, and reliability. The industry's highest-performing servo motor uses eight-pole segmented lamination technology, which produces more torque in a shorter package. Use MaxPlusPlus motors for higher torque applications, customization options, or when high performance is required.

When higher inertia is desired to improve system performance, the MPJ is the perfect choice. It includes all the same features and benefits of the MPP, but increases the rotor inertia by 3 to 8 times over the standard MPP.

- **MPP: 92 to 270 mm frame sizes MPJ: 92 to 142 mm frame sizes**
- **1.5 to 158 Nm (13 to 1398 in-lb) continuous stall torque**
- **4.3 to 402 Nm (38.1 to 3558 in-lb) peak torque**
- **Very high torque-to-inertia ratio**
- **Right-angle rotatable connectors**
- **Eight different feedback devices including encoder, serial encoder, resolver, Hiperface DSL, Heidenhain and Stegmann single and multi-turn absolute encoders**
- **IP64 standard, IP65 optional**
- **Special shaft, front flange, and feedback devices available**
- **CE and UL**

Series MPP	092x	100x	115x	142x	190x	270x
Continuous stall torque range Nm (in-lb)	1.55 (14) to 4.0 (36)	4.6 (41) to 6.3 (56)	5.7 (51) to 9.8 (87)	11.1 (98) to 33.4 (295)	35.5 (315) to 62.4 (552)	120.1 (1,063) to 162 (1,433)
Peak torque range Nm (in-lb)	4.93 (50) to 12.8 (113)	14.5 (129) to 20.1 (178)	18.1 (160) to 31.2 (277)	35.1 (311) to 106 (935)	113 (996) to 198 (1,750)	380 (3,366) to 512 (4,537)
Rated speed (rpm)	3800 to 5000	4000 to 5000	1800 to 4000	2800 to 4000	2000 to 3000	800 to 1600
Rated output range (rpm)	0.5 to 1.6	1.5 to 1.9	1.6 to 2.7	3.4 to 7.0	8.3 to 11.8	12.1 to 20.3
Rotor Inertia kg-m^2						
MPP	7.8x10^{-5}	2.6x10^{-4}	4.1x10^{-4}	2.1x10^{-3}	6.2x10^{-3}	3.5x10^{-2}
MPJ	4.2x10^{-4}	8.2x10^{-4}	1.1x10^{-3}	8.3x10^{-3}	–	–

MPW Series Stainless Steel Servo Motors Series

http://bit.ly/AT_MPW

IP69K certified

The new MPW Series extends the MPP motor family to meet the needs of those applications exposed to high pressure, highly caustic, washdown environments. Specific applications can be found in such markets as food and beverage, pharmaceutical, packaging, and any other application that may be exposed to harsh conditions like salt, fog, and humidity.

The NSF mark represents Parker's company wide commitment to quality, safety, and compliance with The Public Health and Safety Organization standard requirements for safe food handling.

- **10 models covering three frame sizes**
- **Sealed to IP69K for 1200 psi washdown requirements**
- **Potted stator design for improved thermal efficiency**
- **35 to 227 in-lbs continuous torque (230 and 460 VAC supply)**
- **Options include high resolution encoders, resolvers, and 24 V brake**
- **Cable options available to plug and play with a wide variety of drives**
- **Complies with all NSF standard 169**

P Series Motors

http://bit.ly/AT_PD

The P Series brushless servo motors are the perfect match with P Series drives, providing high torque and fast settling times with one-touch tuning.

All motors include high resolution BiSS-C absolute encoders that populate motor nameplate data back to the drives for simplified commissioning. Economical, low profile cable connections help machine builders meet demanding size and budget requirements.

- **40, 60, 80 mm frame sizes**
- **0.2 to 3 Nm (2 to 28 in-lb) continuous stall torque**
- **0.5 to 10 Nm (4 to 85 in-lb) peak torque**
- **Allowable load inertia up to 30 x rotor**
- **BiSS-C absolute feedback, up to 524288ppr**
- **Performance matched with P drives**
- **3000 rpm rated, 5000 rpm max speed**
- **Low-profile cable connections**
- **Static brakes available**
- **IP67 rated (body and connectors)**
- **CE (EMC & LVD) and UL (pending)**

SM Series Servo Motors

http://bit.ly/AT_SM

The SM Series brushless servo motors feature a slotless stator design eliminating all detent torque in the motor to provide extremely smooth motion, especially at low speeds.

The slotless design also creates a higher rotor inertia, which is ideal for applications involving high inertial loads (such as lead screws and belt drives). This higher rotor inertia simplifies tuning and increases system stiffness.

The SM Series motors also feature a rugged anodized aluminum body and connector housing. An IP65 rating can be obtained on motors with PS connectors and an optional shaft seal. All SM motors are CE (LVD) compliant.

Parker's wide range of planetary gearheads are well-suited for the SM Series motor. Easy sizing and selection can be done using Parker's Motion Sizer.

- **NEMA size 16 and 23**
- **0.19 to 1.2 Nm (1.7 to 10.6 in-lb) continuous stall torque**
- **0.57 to 3.6 Nm (5.0 to 31.9 in-lb) peak torque**
- **Up to 7500 RPM rated speed**
- **Brushless construction**
- **Slotless design**
  - **– Negligible detent torque**
  - **– Reduced torque ripple**
  - **– High inertia**
- **High-performance neodymium magnets**
- **Thermostat protected**
- **TENV housing**
- **IP65 option**
- **Feedback options**
  - **– Encoder/Hall effect**
  - **– Resolver**
- **CE compliant**

Series SM	161	162	231**	232**	233**
Continuous stall torque Nm (oz-in)	0.2 (26)	0.3 (47)	0.4 (54)	0.7 (106)	1.1 (156)
Peak torque Nm (oz-in)	0.6 (78)	0.1 (141)	1.1 (160)	2.2 (316)	3.3 (467)
Rated speed (rpm)	7,500	7,500	7,500	7,500	5,800
Rotor inertia kg-m^2 (oz-in-s^2)	1.1×10^{-5} (1.5×10^{-3})	1.8×10^{-6} (2.6×10^{-4})	5.2×10^{-5} (7.4×10^{-3})	9.3×10^{-5} (1.3×10^{-2})	1.4×10^{-4} (1.9×10^{-2})

*All specifications represent encoder feedback.
**Resolver version available with higher stall and peak torques.

Complete Solutions

BE Series Servo Motors

http://bit.ly/AT_BE

BE Series brushless servo motors produce high continuous stall torque in a cost-reduced package.

The exceptional torque of the BE Series motors is the result of an increased number of magnetic poles on the rotor.

Traditional motors in these frame sizes have four magnetic poles, while the BE Series motors have eight poles.

The BE motors incorporate Parker's proven bridged stator design. This two-piece lamination design simplifies the winding process, creating cost savings. The bridged stator construction also results in less audible noise generated by the motor.

Parker's wide range of planetary gearheads is well suited for the BE Series motor. Easy sizing and selection can be done using Parker's Motion Sizer.

- **NEMA 16, 23, and 34 sizes**
- **0.15 to 4.9 Nm (1.3 to 43.4 in-lb) continuous stall torque**
- **0.45 to 14.6 Nm (4.0 to 129.2 in-lb) peak torque**
- **Up to 5000 rpm rated speed**
- **Brushless construction**
- **Eight-pole open-lamination design provides increased torque and lower cost**
- **High torque density packaging**
- **Bridged stator design— quiet operation**
- **High-performance neodymium magnets**
- **Thermoswitch protection**
- **Feedback options**
  – Encoder/Hall effect
  – Resolver
- **CE compliant**

K Series Frameless Kit Motors

http://bit.ly/AT_K

Frameless kit motors are the ideal solution for machine designs that require high performance in small spaces. Kit motors are directly integrated with the drive train, resulting in a smaller, more reliable motor package. Direct drive motion construction also gives equipment designers the advantages of lower costs, increased reliability, and improved performance.

Best Used for:

- **A significant cost savings**
- **Reduced mechanical complexity**
- **Greater design flexibility**
- **High performance in a compact package**
- **Improved dynamic response and settling**
- **Minimum motor size per application space**
- **Low cogging for smooth operation**
- **Low inertia for high acceleration**

Features

- **High peak torque up to 93.37 Nm (826.4 in-lb)**
- **High speeds up to 50,000 rpm**
- **Superior performance – high stiffness and better response**
- **High reliability—no mechanical couplings**
- **Compact design—minimizes product size**
- **Low cogging—special orientation of the laminations and odd slot count**
- **Very low torque ripple at low speeds for smooth and precise rotary motion**

EX Series Explosion Proof Servo Motors

The EX Servo motors are designed to function in Category II, Group II explosive atmospheres in respect to the EN 50014 standard. These servo motors are certified according to directive ATEX 94/9/CE and are available in a Gas or Gas-Dust version. The motors differ in that the Gas-Dust version is equipped with a special lip seal on the customer end shaft.

- **Explosion-proof material "D" according to directive ATEX 94/9/CE**
- **Stall torque from 1.75 to 35 Nm (15.5 to 311 in-lb)**
- **Rated speeds up to 4000 rpm**
- **Extremely compact**
- **High dynamics**
- **Integrated resolver does not require an additional encoder**
- **Maintenance-free, lubricated-for-life bearings**

HW/HKW Series Synchronous Water Cooled Spindle Motors

The HW servomotors are water-cooled brushless synchronous motors delivered as individual components (rotor, stator and resolver) to make a complete spindle unit. These motors are driven by Compax3 Series servo drives.

- **Permanent magnet cold rotor**
- **Compact size with low rotor inertia**
- **Stable balancing**
- **Speed range to 50,000 rpm**
- **Reduced maintenance**
- **High torque at zero speed**
- **Positioning capability**

GVM Series for Vehicle Electrification

The GVM (Global Vehicle Motor) is Parker's PMAC offering for electric and hybrid electric powertrain motors, and electro-hydraulic actuation.

The GVM's highly engineered magnetics achieve efficiencies in peak regions not obtainable in other designs. The GVM uses a new patent-pending advanced cooling system that has minimal impact on the size and weight of the motor.

The scalability and customization of the GVM allows the widest performance range available. Tested to the demanding heavy duty vehicle grade standards of SAE J1455, the GVM can handle the toughest job for any on or off-road vehicle.

- **Multiple frame sizes, stack lengths, and windings**
- **Peak power density up to 4.2 kW/kg**
- **Continuous power density up to 2.3 kW/kg**
- **24–800 VDC operating voltages**
- **Samarium Cobalt (SmCo) magnets allow high temperature operation and remove demagnetization failure mode**
- **Highly efficient design reduces thermal dissipation requirements, lowering overall cooling system costs**
- **Very low torque ripple—even at peak current**
- **Low rotor inertia for high dynamic responsiveness**
- **Up to 20% more range for a given battery pack**
- **Ultra-thin stator laminations with reduced slots virtually eliminates eddy currents**

TMW/TMA Series Torque Motors

The torque motor is a permanent magnet brushless motor, optimized to operate at low speeds. It is particularly suitable for direct drive applications requiring high torque capabilities at low speeds.

As a replacement for asynchronous or direct current motors coupled with a gearbox, torque motors are advantageous with their more compact, quieter, maintenance-free design.

- **No more gearbox**
- **No maintenance**
- **Energy savings**
- **Silent operation (European directive 2003/20/Ce)**
- **Better speed regulation**
- **Compact design**
- **Stall torque from 391 to 21,000 Nm (289 to 15,540 ft-lb)**
- **Rated speeds up to 800 RPM**
- **TMA Series air cooled, without fan; TMW Series water cooled with anticorrosive**
- **IP55 rating**
- **Sincos Hiperface, EnDat feedback**

LV/HV Series Rotary Stepper Motors

http://bit.ly/AT_HV

The LV (Low Voltage) and HV (High Voltage) motor series provide outstanding performance at a competitive price. The LV motors are available in five frame sizes, and the HV are available in three frame sizes, so it is easy to choose the optimal speed and torque combination.

The LV motors are rated for use with drives running up to 80 VDC; the HV are rated for use with drives running off of 120 VAC power.

The LV/HV Series is optimized for use with the E-Series microstepping drives.

- **High performance**
- **Cost effective**
- **Optimized motors for both low-voltage and high-voltage applications**

- **Static torques from 6.5 to 1285 in-oz)**
- **LV: 11, 14, 17, 23, and 34 frame sizes**
  HV: 17, 23, and 34 frame sizes
- **Single, double, or triple stack lengths available**
- **LV: up to 80 VDC windings**
  HV: up to 170 VDC windings
- **Single or double shaft options**
- **Flying leads or 10-foot cable options**
- **Customization available**
- **Encoder options available**
- **CE (LVD)**

RIPPED Ironcore Linear Motors

http://bit.ly/AT_RIP

Parker RIPPED ironcore linear motors, with their patented anti-cog technology, can produce the large forces needed for many industrial applications—without the roughness associated with traditional ironcore linear motors.

The RIPPED family is well suited for a broad range of extremely demanding applications.

- **Patented anti-cog technology for extremely smooth motion**
- **3 different cross sections**
- **Single magnet row for high performance at an economical price**
- **Connector module allows for quick installation and easy cable management**
- **Ultra high-flex cable standard**

I-Force Ironless Linear Motors

http://bit.ly/AT_IM

Parker I-Force ironless motors offer high force and rapid accelerations in a compact package. Parker's patented I-beam shape, with its overlapping windings, allows for a higher power density in a smaller motor, improved heat removal, and added structural stiffness. A forgiving air gap and no attractive forces allow for easy installation and zero cogging during motion.

- **4 different cross sections (110, 210, 310, and 410) with up to 8 poles**
- **Compact size with high force density and superior heat removal**
- **Air and water cooling**
- **Vacuum rated to 10^{-6} torr**
- **Ultra high-flex cable standard**

ML18 I-Force Ironless Linear Motor

http://bit.ly/AT_ML

Introducing the newest (and smallest) member of Parker's I-Force ironless linear motor family. The ML18 incorporates the I-Force I-beam shape with overlapping windings allowing for high power density, improved heat removal, and added structural stiffness.

- **Height of 35mm, width of 18mm offers a compact solution**
- **Three coil lengths provide peak force up to 50N**
- **Ironless design produces zero cogging**
- **Light weight allows for rapid accelerations**
- **Innovative magnet track provides a low cost solution**

Servo Drives and Controller Drives

Servo Drive Family Attributes

Series	P Series	PSD	Compax3	IPA	ACR7000-V
Input power	24 to 80 VDC, 120/240 VAC	120/240/480 VAC	120/240/480 VAC	120/240 VAC	24 to 48 VDC
Power range	100W to 3.5kW	200W to 15kW	200W to 100kW	400W to 1.5kW	50W to 400 W
Feedback	BiSS-C, Encoder, Endat	HiperfaceDSL, Encoder, Resolver	Encoder, Resolver, Sincos, Endat, Sincos Hiperface	BiSS-C, HiperfaceDSL, Encoder, Endat	BiSS-C, Encoder
Fieldbus communications options	EtherCAT	EtherCAT, EtherNet/IP, PROFINET	EtherCAT, PROFINET, ETHERNET Powerlink, Profibus, CANopen	EtherNet/IP	EtherNet/IP
Command input	±10V analog step/ direction		±10V analog step/ direction		
Programmable controller version	Indexer		Indexer, IEC61131-3	AcroBASIC	AcroBASIC
PC communications	USB, Modbus-RTU	Ethernet TCP/IP	RS-232	Ethernet TCP/IP	Ethernet TCP/IP
Form factor	Single axis with direct AC input	Single axis with direct AC input, Multi-Axis with shared DC supply	Single axis with direct AC input, Multi-Axis with shared DC supply	Single axis with direct AC input	Multi-axis Controller with up to 8 drives, external DC supply

*T11 - Basic indexer, T30 - Full programmable IEC61131-3; T40 - T30 plus electronic camming, gearing, PLS, etc.

PSD Servo Drive

EtherCAT

EtherNet/IP™

PROFINET®

ACR7000 Multi-Axis Servo Drive/Control

EtherNet/IP™

Complete Solutions

Stepper Drives and Controller Drives

Stepper Drive Family Attributes

Series	E-AC	E-DC	eCL	ACR7000-T
Power input	120 VAC	24 to 48 VDC	24 VDC	24 VDC
Peak current output (Amps)	Up to 3.5	Up to 4.8	Up to 4.0	Up to 4.0 (per axis)
Command input	Step/Direction	Step/Direction	EtherCAT	Programmable, standalone controller with Ethernet communications
Recommended Parker motors	HV series	LV series	eCL	LV, eCL
Encoder input	No	No	Yes - required	Yes - 1 per axis
Form factor	Single axis with direct AC input	Single axis with external DC supply	Single axis with external DC supply	Multi-Axis Controller with up to 4 drives, external DC supply

E-AC and E-DC Microstepping Drives

www.parker.com/em/e-ac
www.parker.com/em/e-dc

ACR7000 Multi-Axis Drive/Controller

Motion & Machine Control

Series	Communication					Drives		Encoder		Programming						Axes				I/O	
	EtherCAT	Ethernet/IP	Profinet	OPC-UA	Ethernet TCP/UDP	Integrated stepper	Integrated servo	Incremental encoder	BISS-C	IEC 61131-3 & PLCOpen	AcroBasic	Multi-axis coordination	G-code (DIN66025)	Embedded HMI webserver	Windows API	2	4	8	1-8+	Network accessory	Embedded
PAC320	•	•	•	•	•					•		•	•	•					•	•	
ACR7xV		•			•		•	•	•		•	•			•		•	•			•
ACR7xT		•			•	•		•			•	•			•	•	•				•

PAC (Parker Automation Controller)

EtherCAT. OPC UA

The PAC is an all-in-one machine controller that leverages EtherCAT to provide a high-performance automation solution. Programmed with IEC 61131-3 and utilizing PLCOpen and G-code for motion control, the PAC seamlessly integrates PLC, Motion Control, and HMI Visualization into a single device.

Hardware

- **1.60GHz, 64-bit dual-core Intel Atom**
- **Local PACIO via E-bus connector**
- **Remote PACIO via EtherCAT network**
- **SD card application memory**

Features

- **Programmed using Parker Automation Manager IDE**
- **Industry 4.0 and IIoT Ready**
- **Capable of simple to complex Robotics motion control**
- **HTML5-based embedded remote & local HMI**

Additional communication

PROFINET

EtherNet/IP Modbus

ACR 7000 Series

The ACR series is Parker's staple motion controller. Built upon decades of motion expertise, the 7000 blends control with embedded stepper or servo drives resulting in a small, economic package perfect for table top and laboratory-style instruments.

Motion Control

- **Linear, circular, and helical interpolation of up to 8 axes**
- **Segmented electronic camming**
- **Electronic gearing with real-time phase shifting**
- **Libraries for PC based applications**

Stepper Drives

- **2 or 4 axes at 4 Amps/axis**
- **µStepping selectable to 51,200 steps/rev**

Servo Drives

- **Up to 8 axes with Amps/axis continuous and 16 Amps/axis peak**
- **62.5 µsec servo update rate**

Additional communication

EtherNet/IP

Complete Solutions

Visualization & HMI

Visualization & HMI Selection Guide

Product Families

SERIES	Page number	Display: No Display	Display: 7" Display (800 x 480 px)	Display: 10" Display (1280 x 800 px)	Display: 15" Display (1280 x 800 px)	Display: 22" Display (1920 x 1080 px)	Software: Interact Xpress	Software: Interact X	Features: Xpress Remote Manager	Features: Drag-and-drop HMI Programming	Features: Remote access via web browser	Features: Support for 50+ device drivers	Features: Recipe management	Features: Unlimited tags	Features: 3rd party application support	Features: Data logging	Features: VBA scripting	Features: ActiveX controls	System: 1.0 GHz AMD Cortex	System: 1.86 GHz Baytrail Quad-core	System: Android 4.1	System: Windows CE7	System: Windows ES7P
XT	11	•	•	•	•	•	•		•	•	•	•	•	•						•		•	
IX	12	•	•	•	•	•		•		•		•	•	•	•	•	•	•		•			•
PC	13	•	•	•	•	•									•					•			•
PT*	18		•	•	•		•		•	•	•	•	•	•					•		•		

* The HMI application is developed through Parker Automation Controller and the HMI runtime is running on the PAC itself. The PT simply acts as a thin-client HMI displaying the embedded WebVisu application on the PAC.

Human Machine Interface

(0”) Headless

The next generation has arrived! Create the new face of your machine using Parker’s proven and intuitive HMI development software on powerful new hardware and gorgeous displays. The latest generation of Parker’s HMIs—the XT, IX, PT, and PC—offer powerful flexibility in a modern form factor.

With the same look and feel, any of the XT, IX, and PC modules could be interchanged in the same cut-out space. On the inside, these HMIs vary drastically, offering the right fit for any application.

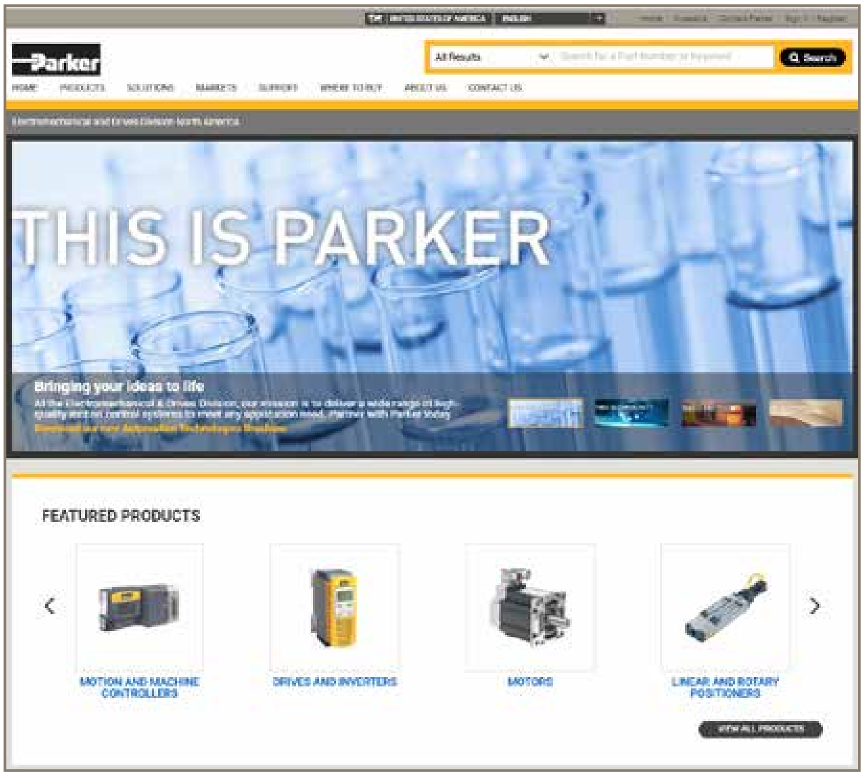
The lightning-fast XT hardware provides a powerful boost to our award-winning, drag-and-drop HMI creation software, Xpress. For power users looking for more control with data logging and VBA scripting, our InteractX software platform has moved to the new sleek IX series.

The PC option includes Windows Standard Embedded 7 enabling users to run 3rd party software or develop their own.

Find More Online

For complete information on all other Parker Electromechanical & Drives product lines not covered in this catalog, please visit our website at:

parker.com/emn



The Parker Community offers a knowledge base with frequently asked questions, up-to-date division blog posts, and an interactive user forum. Access is free and signing up is easy! To join the community, please visit:

community.parker.com/technologies/electromechanical-group

Parker Hannifin offers thousands of product lines ranging from viton seals and brass fittings to hydraulic cylinders with kilo-newtons of force.

To find out more about the complete Parker Hannifin family of products, please visit:

parker.com

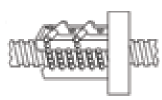
Technical Reference

With over 80 years of motion and control experience Parker Hannifin has the engineering expertise to assist in design, development, and production of challenging automation projects. The following pages detail some of the engineering considerations when dealing with electromechanical motion control. In a changing business environment where business partnerships are more important than ever, Parker is pleased to offer the engineering excellence a company should expect from a premier partner. Whether the question is about thermal effects on submicron accuracies, outgassing materials in a vacuum rated environment, particulate generation in a clean room environment, or simply critical speeds of ground versus rolled ball screws, Parker has experience in providing proven solutions.

Engineering Overview

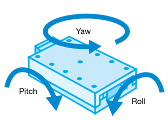
Overview of motion technologies, components, and system variables and parameters to consider when designing a motion system.
Page 531.

Linear Mechanics



Linear positioner components, rotary-to-linear conversion information, and drive technologies comparison.
Page 533.

System Considerations

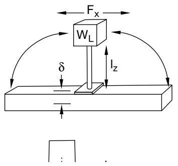


Assembly configurations, loading, precision, and motor components.
Page 540.

Electronic Components

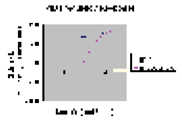
Linear encoder types used in linear positioning systems, and controller/amplifier/motion controllers.
Page 546.

How to Size and Select



Thrust and motion profile calculations, torque requirements, load and cylinder orientations, bearing tables, load, and life expectancy.
Page 549.

Complete System Analysis



System modeling for overall positioning system performance, and frequency response for analysis of motion characteristics.
Page 557.

Glossary of Terms

List of common terms and definitions used in the design of electromechanical positioning systems.
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Offer of Sale

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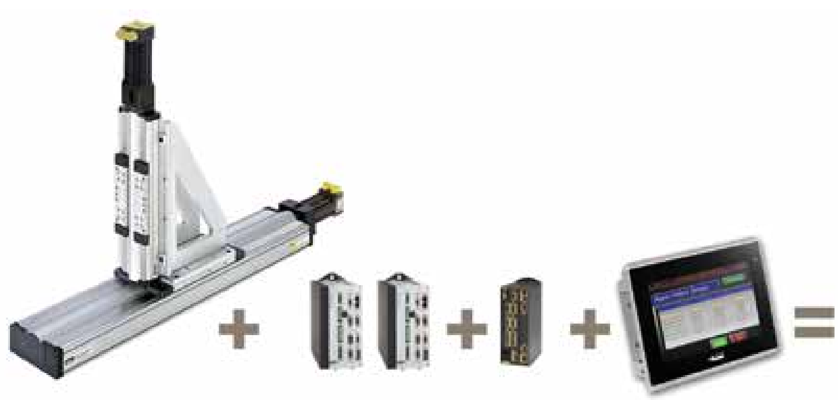
ENGINEERING OVERVIEW

Electromechanical motion systems utilize various technologies as building blocks for obtaining point to point, scanning, and contouring motions.

These technologies or components include (but are not limited to):

- **Ballscrews (rolled, ground, or whirled)**
- **Leadscrews (rolled or ground)**
- **Belt drives (herringbone design or trapezoidal tooth design)**
- **Linear motors (ironless, ironcore, or back iron designs)**
- **Cross roller bearings (standard and anti-cage creep designs)**
- **Square rail bearings (precision and standard designs)**
- **Roller bearing wheels (steel or polyamide designs)**
- **Round rail bearings (bushing and recirculating ball designs)**
- **Motors (DC, Stepper, and Servo designs)**
- **Encoders (Linear, Rotary, Absolute, Incremental)**
- **Amplifiers (also known as drives)**
- **Controllers (single and multi-axis)**
- **HMI (Touch screen user interface devices)**

By understanding the trade-offs in technologies (for example between a precision ground ball screw versus a rolled ball screw or a servo motor versus a stepper motor) engineers are more efficient in designing the right motion solution. The following pages are intended as a resource for trying to understand the benefits of the technologies and other important things to consider when designing a motion system.

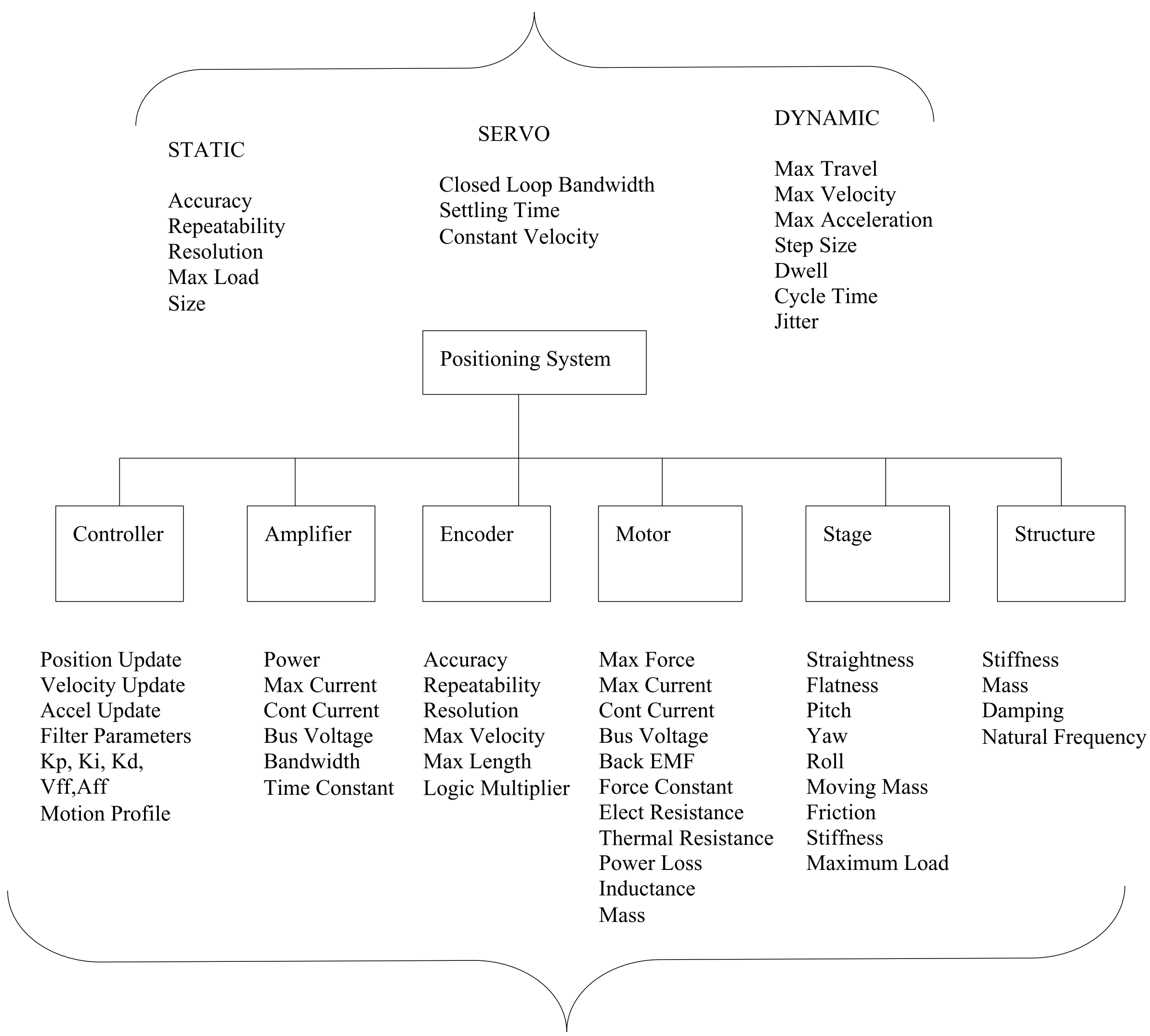


System Variables and Parameters

The following diagram represents a product tree of a modeled positioning system. The upper section represents various System Variables, which describe the STATIC, SERVO and DYNAMIC specifications of the machine. These variables are modeled as a function of system parameters as shown below.

The bottom section of the diagram represents system parameters that characterize the various motion control components of the positioning system. These parameters are needed to be selected for various reasons including structural design, component sizing, and servo tuning. The model relates these parameters to the performance variables as shown above. It can therefore be used to assist in the selection of these parameters to result in a cost-effective solution.

Positioning System Performance Requirements



Motion Control Component Parameters

LINEAR MECHANICS

Linear Positioner Components:

Bearings:

Recirculation Bearing

Typically used for highest stiffness and high speed (Pitch, Yaw and Roll on the order of 10 arc-sec).

Crossed Roller Bearing

Typically used for a combination of high stiffness and high smoothness of motion (Pitch, Yaw, Roll on the order of 5 arc sec).

Air Bearing

Typically used for highest precision (sub micron) and highest smoothness of motion. (Pitch, Yaw, Roll on the order of 1 arc-sec).

Drive Transmission

Ball Screw

Typically used for high acceleration, high force.

Lead Screw

Typically used for high smoothness of motion.

Linear Motor (Ironless)

Typically used for very high smoothness of motion at low or high velocity.

Linear Motor (Iron Core)

Typically used for achieving a combined high force (up to 20,000 N), long travel (unlimited) and high speed (up to 10 m/sec).

Belt Drive

Typically used for high speed applications.

Motors

See Motion Control Components in System Considerations section.

Encoders

Rotary Encoder

Typically mounted to the back of a rotary motor and used for lower precision at lower cost.

Linear Encoder

Typically used for higher precision at higher cost.

Rotary to Linear Conversion

Linear motion systems driven by rotating electric motors commonly employ one of three rotary-to-linear conversion systems: ballscrew, acme screw or belt drive.

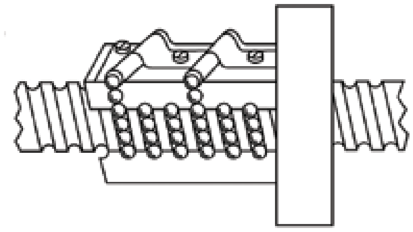
Leadscrew

Screw-drive mechanisms, whether Acme screw or ballscrew, provide high thrust (to thousands of pounds) but are often limited by critical speed, maximum recirculation speed of ball nut circuits, or sliding friction of Acme nut systems.

Ballscrew

The majority of linear motion applications convert motor torque to linear thrust using ballscrews due to their ability to convert more than 90% of the motor's torque to thrust. As seen below, the ball nut uses one or more circuits of recirculating steel balls which roll between the nut and ball screw threads. Ballscrews provide an effective solution when the application requires:

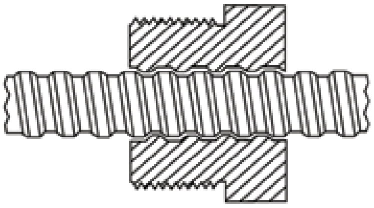
- **High efficiency, low friction**
- **High duty cycle (>50%)**
- **Long life, low wear**



Acme Screw

The acme screw uses a plastic or bronze solid nut that slides along the threads of the screw, much like an ordinary nut and bolt. Since there are no rolling elements between the nut and the lead screw, acme screws yield only 30-50% of the motor's energy to driving the load. The remaining energy is lost to friction and dissipated as heat. This heat generation limits the duty cycle to less than 50%. A great benefit of the acme screw is its ability to hold a vertical load in a power-off situation. The acme screw is a good choice for applications requiring:

- **Low speeds**
- **Low duty cycles (50%)**
- **The ability to hold position while motor power is off**



Ballscrew/Leadscrew Comparison

Considerations	Acme Screw	Ballscrew	Comments
Audible noise	Quiet operation	Noisy	Acme screws are quieter, while one can hear the ball bearings recirculating within a ballscrew. In any case, the motor sound is typically the most audible part of the cylinder assembly.
Back-driving loads	Self-locking	Easily backdrives	When vibration is apparent in a system, an acme may backdrive. Ballscrews may require a brake.
Backlash	Increases with wear	Constant throughout life of screw	Due to high friction, acme screws wear sooner, and therefore, the backlash increases over the life of the leadscrew.
Duty cycle rating	Low/Medium (<60%)	High (100%)	Because excessive heat can deform the screw, acmes are limited to 60%. The high efficiency of ballscrews allows for 100%.
Efficiency rating	Low: Plastic nut (45%) Bronze nut (35%)	High (90%)	Acme screw ratings are lower due to sliding friction while ballscrews are higher due to rolling contact.
Life (mechanical wear)	Shorter life due to high friction	Longer	Acme screw life is load dependent and is rated in travel distance. The higher the load, the shorter the travel life. (See life expectancy charts for ballscrews)
Smoothness of operation	Smooth operation at lower speeds	Smooth operation at all speeds	Ballscrews are generally smoother at all operating speeds.
Speeds	Low	All	Ballscrews operate well at all speeds, while Acme screws are best suited for lower speed applications.

Screw Characteristics and Effects of Changes

Feature	Change	Effected Performance	How
Screw Lead	Faster Lead	Required Torque	Increases
Screw Lead	Faster Lead	Load Capacity	Increases
Screw Lead	Faster Lead	Accuracy	Decreases
Screw Lead	Faster Lead	RPM required for same speed	Decreases
Screw Lead	Faster Lead	Ball Bearing Diameter	Increases
Load Capacity	Increases	Life	Decreases
Screw Length	Increases	Critical Speed	Decreases
Screw Length	Increases	Column Loading Capacity	Decreases
Screw Diameter	Larger Diameter	Load Capacity	Increases
Screw Diameter	Larger Diameter	Column Loading Capacity	Increases
Screw Diameter	Larger Diameter	Stiffness of Screw	Increases
Screw Diameter	Larger Diameter	Spring Rate	Increases
Screw Diameter	Larger Diameter	Critical Speed	Increases
Screw Diameter	Larger Diameter	Screw Inertia	Increases
Screw Mounting	Increase Rigidity	Critical Speed	Increases
Screw Mounting	Increase Rigidity	System Stiffness	Increases
Ball Nut Length (1)	Lengthen	Load Capacity	Increases
Ball Nut Length (1)	Lengthen	System Stiffness	Increases
Ball Bearings per Nut	More Bearings	System Stiffness	Increases
Ball Bearings per Nut	More Bearings	Load Capacity	Increases
Preload Force of Nut	Increase Preload	Continuous torque	Increases
Preload Force of Nut	Increase Preload	Positional Accuracy	Increases
Preload Force of Nut	Increase Preload	System Stiffness	Increases
Preload Force of Nut	Increase Preload	Finest Resolution	Decreases
Ball Diameter in Nut	Larger Diameter	Life	Increases
Ball Diameter in Nut	Larger Diameter	System Stiffness	Increases
Ball Diameter in Nut	Larger Diameter	Load Capacity	Increases

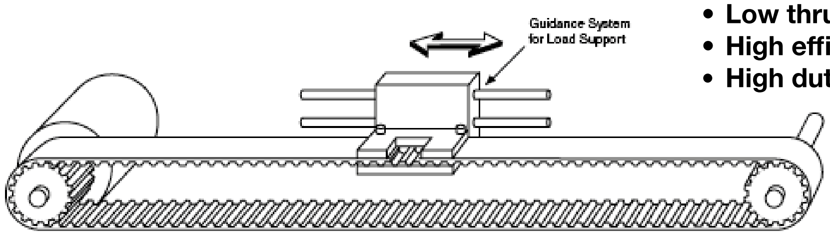
(1) Note 7 turn Max

Attribute Comparison of Drive Technologies

Attribute	Leadscrew with Composite Nut	Leadscrew with Bronze Nut	Ballscrew with Rolled Threads	Ballscrew with Ground Threads	Belt Drive
Smoothness	Excellent	Excellent	Fair	Good	Fair
Positional Accuracy	Excellent	Excellent	Fair	Excellent	Fair
Positional Repeatability	Excellent	Excellent	Good	Excellent	Fair
Axial Load Capacity	Low	Moderate	High	High	Moderate
Axial Stiffness	Fair	Good	Very Good	Excellent	Low
Speed	To 15 RPS	To 25 RPS	To 40 RPS	To 40 RPS	120 inches/sec
Duty Cycle	50%	75%	100%	100%	100%
Where used	PROMech MX80	Legacy Products	HD	400XR HD MX80 800CT	HPLA HLE

Timing Belt

Belt drive systems offer many of the benefits of ball screws, yet have fewer moving parts, and do not have the critical speed limits of leadscrew-driven systems. They generally provide greater linear motion from the same motor movement, resulting in higher travel speeds with minimal component wear. In contrast, this design results in lower repeatability and accuracy. Thrust capability is also less compared to screw-drive systems due to the tensile strength limitation of the transport belt.



A toothed belt passes around a pulley in each end of the actuator and is attached to the carriage to pull it back and forth along the length of travel. The carriage is supported by a linear bearing system to provide load carrying capacity. The belt is reinforced with steel tensile elements to provide strength and minimize belt stretch. Timing belt systems are a good solution for applications requiring:

- **High speeds**
- **Low thrusts**
- **High efficiency**
- **High duty cycle**

Backlash

The clearance between elements in a drive train or leadscrew assembly which produces a mechanical "dead band" or "dead space" when changing directions is known as the backlash in a system.

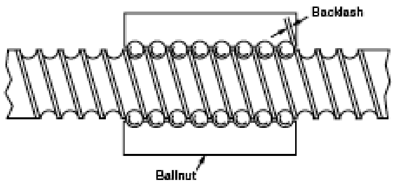
In most mechanical systems, some degree of backlash is necessary to reduce friction and wear. Usually 0.006 - 0.008" is attributed to the lead screw/nut assembly. For ballscrews, backlash will remain constant throughout the life of the actuator, while acme screws will increase backlash with wear.

Reducing the Effects of Backlash

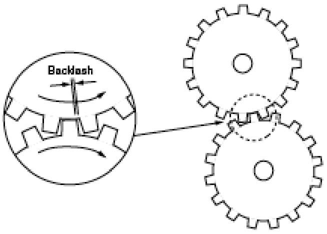
1. Approach a stop position from the same direction.
2. Apply a constant linear force on the cylinder thrust tube or carriage. This is done automatically for cylinders used in vertical orientations with a backdriving load.
3. For programmable positioning devices, it is possible to program out backlash by specifying a small incremental move (enough to take out the backlash) prior to making your normal moves in a particular direction.
4. Use a preloaded nut on a lead screw to counteract the backlash. Contact Actuator Division about the precision ground screw option which reduces backlash in the drive nut.
5. An inline actuator with the motor directly coupled to the leadscrew has less backlash than parallel or reverse parallel units which utilize a gear train or drive belt/pulley.

Primary Sources of Backlash

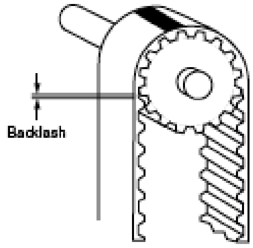
Drive Nut/Lead Screw Assembly



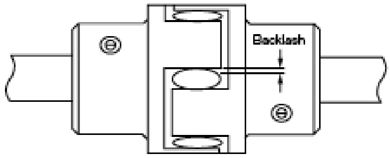
Drive Train (Gears, Timing Belt/Pulley)



Timing Belt/Pulley



Coupling



Bearing Characteristics

	Cross Roller	Round Rail	Square Rail	Slider/Bushing	Roller Wheel
Normal Load Capacity	High	Medium	Med-High	High	Med
Accuracy	High	Medium	Med-High	Low	Med-Low
Stiffness	High	Low	Med	Low	Med-Low
Preload	High	Low	Medium	Medium	Medium
Moment Loading	High	Low	Medium	Low	High
Single Rail Support	No	No	Yes	Yes	No
Same Load in All Directions	Yes	No	Yes	No	Yes
Sealing	No	Yes	Yes	No	Yes
Smoothness	Medium	High	Med-High	low - High	Med
Drag	Med- Low	Low	Med	High	Low
Ease of Install	Med	Simple	Med-Simple	Simple	Med
Mounting Surface Precision Required	High	Medium	Med-High	Low	Low
Self Aligning	No	Yes	No	No	Yes
Life	Med	Medium	High	Low	High
Cost	High	Low	Medium	Low	Med-Low
Continual support needed	No	Yes	Yes	Yes	Yes
Load Cap/Size	High	Low	Med-High	High	Medium
Effeciency	High	High	Medium	Low	Med-High
Velocity Ripple	Low	Low-High	Med-High	High	Med-High

Round Rail Linear Bearings

Round rail bearings are a recirculating type linear bearing consisting of a large diameter centerless ground rod on which ball bushings ride. The design allows very long travel lengths which are only limited by the available rail and base length. The ball bushing with it recirculating ball bearings, provide good load capacity with very low friction. With its modular design, the bearing components can be replaced easily. These bearings are ideal for assembly and automation applications where high speed, long life and fast low cost maintenance is a must.

Ball and Rod Bearings

Ball and rod bearings consist of two rows of hardened steel balls each pre-loaded between four hardened ground 440C stainless steel rods. This design provides ultra smooth extremely low friction motion by reducing the contact area between the balls and the ways. This design provides extremely good straight line and flatness accuracy.

Square Rail Linear Bearings

Also known as linear guides, these bearings are very similar to the round rail bearing. The major difference is in the shape of the raid and the bearing ways. Square rail bearings have a square or rectangular cross section that enables bearing ways to be ground into the sides of the rail. These bearing ways are shaped in an arch which is approximately the same radius as the ball bearing. This increases the contact surface between the ball and the rail thereby increasing the load capacity of the linear bearing. As with the round rail, travel is only limited by the available base and rail length.

Cross Roller Linear Bearings

Very similar to the ball and rod bearing except the balls have been replaced by rollers and the rods by ground “V” ways. These changes increase the load capacity of this type of bearing up to 2-3 times that of an equivalent size ball and rod bearing. The straightness and flatness specification of these tables is excellent.

Linear Motor Engineering Reference

What are linear motors?

Simply stated, a linear motor is the same as a rotary motor that has been "unwrapped." They operate exactly the same as rotary motors, where the same electromagnetic equations that describe how a rotary motor produces torque now describe how a linear motor produces a direct force.

In many applications, linear motors offer distinct advantages over conventional rotary drive systems. When using a linear motor, there is no need to couple the motor to the load by means of intermediate mechanical components such as gears, ballscrews, or belt drives. The load is directly connected to the motor. Therefore, there is no backlash or elasticity from the moving elements. Thus, the dynamic behavior of the servo control is improved and higher levels of accuracy are achieved.

The absence of a mechanical transmission component results in a drive system with low inertia and noise. In addition, mechanical wear only occurs in the guidance system. As a result, linear motors have better reliability and lower frictional losses than traditional rotary drive systems.

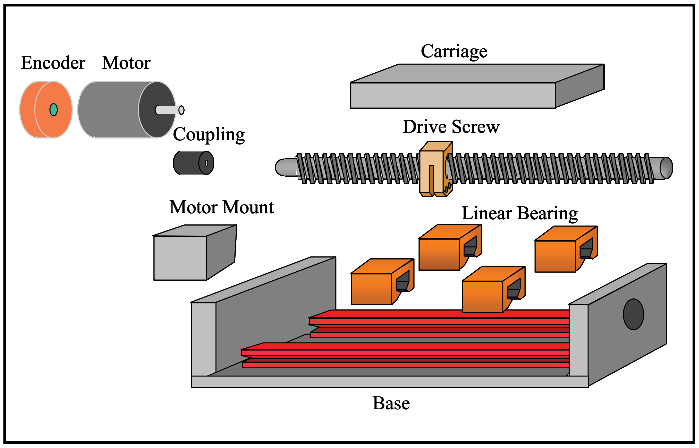


Fig. 1: Precision table fitted with ballscrew drive

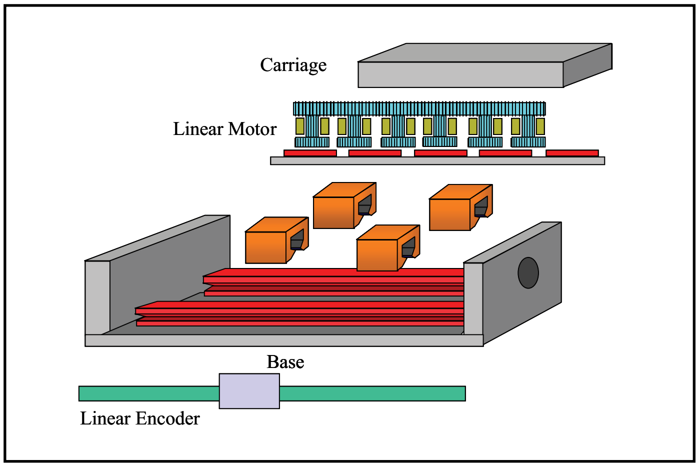


Fig. 2: Precision table fitted with linear motor

Differences in construction

The differences in construction between a direct-drive linear motor and a conventional rotary drive system are shown in (Fig. 1 and Fig. 2,) using the examples of a linear motor drive and a ballscrew drive. Due to the absence of mechanical transmission elements converting rotary movement into linear movement, the axis fitted with a linear motor has a much simpler mechanical construction, resulting in a low-inertia drive for highly dynamic applications. Though not always required, the linear motor table is equipped with a linear encoder, which provides extremely accurate positional feedback.

Though the linear encoder in (Fig. 2) can be considered a high-cost component, the selection of the feedback system can be optimally suited to the requirements of the application. For instance, Parker offers extremely high-resolution optical encoders for applications with demanding precision requirements. In addition, Parker offers lower- resolution, low-cost magnetic encoders for applications where overall system cost is a concern. Actually, it is not uncommon for a linear motor with an economical form of feedback to outperform and actually cost the same or even less than a rotary system using a precision ground ballscrew.

Selection Guide

Attribute	Ironcore	Ironless	Slotless
Cost	Best	Good	Better
Bearing Sizes	Good	Best	Better
Velocity Ripple	Good	Best	Better
Force Density	Best	Good	Better
Thermal Characteristics	Best	Good	Better
Forcer Weight	Good	Best	Better
Forcer Strength	Best	Good	Better
Cooling Options	Best	Good	Better
Parker Force Outputs	35 - 1,800 lbs	5 - 600 lbs	5 - 200 lbs
Industry Use	Industrial	High Precision	Moderate/ High Precision

Fig. 3: Linear motor components include a separate coil and magnet rail

Fig. 4: Linear motor positioning systems include a base, bearings, carriage, feedback and typically cable management

Types of linear motors

There are many different types of linear motors. Each type exhibits its inherent advantages and benefits to the user. Parker manufactures 3 styles of linear motors – ironless, ironcore, and an interesting variant known as the "slotless" design.

Linear motors are either offered as individual components or complete systems. Components, or "kits" (Fig. 3), consist of a motor coil and separate magnet rail. The coil assembly is known as the "forcer" or sometimes as the "primary" element. The forcer generally consists of the motor coil and an attachment plate or mounting bar which allows the coil to connect to the carriage.

The motor cables typically exit from one side of the package. The magnet track is sometimes referred to as the "secondary" element. Depending on the type of linear motor used, the magnet track can either be a single row of magnets or a double-sided configuration offering balanced attraction forces.

A complete linear motor system (Fig. 4) is typically made up of the individual motor components, base, bearings, feedback elements, and cable management.

By selecting linear motor components, the user is given an economical solution and is allowed complete flexibility with respect to integration into the machine. However, this requires a high degree of specific knowledge on the part of the machine builder. The designing engineer must have an understanding of the motor characteristics, linear feedback technology, cooling methods, and the performance of the servo amplifier and control system.

By selecting integrated linear motor positioning systems, the design engineer is given a pre-engineered, robustly designed, fully tested package. This takes the worry out of designing and aligning bearings, encoders, heat sinks, cables, connectors, travel stops, and limit / home sensors. Parker linear motor tables provide all this and more in easily mounted and ready-to-run packages.

SYSTEM CONSIDERATIONS

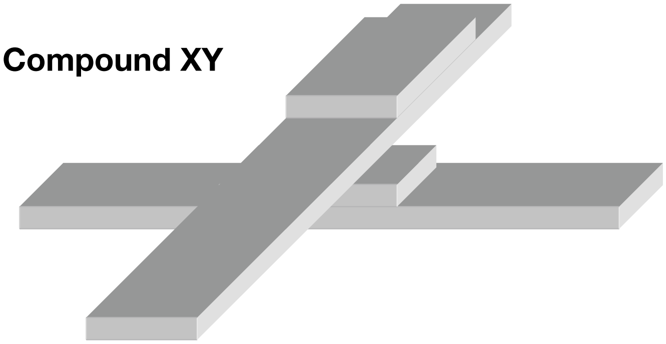
Assembly

Configurations:

Single Axis

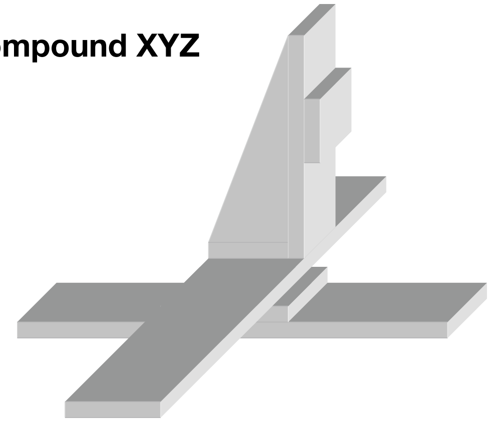
The simplest form of positioning stage. Sometimes referred to as “Table”, “Slide”, “Actuator” or “Stage”. It typically consists of slide, base, bearing, motor, encoder, limits, home, cable carrier and hard stops. The base can be mounted to a rigid structure or to the slides of other stages in various configurations as shown below. The slide, which is the moving part, can be used to move another stage, or any object such as a tool, work, test and measuring devices.

Compound XY



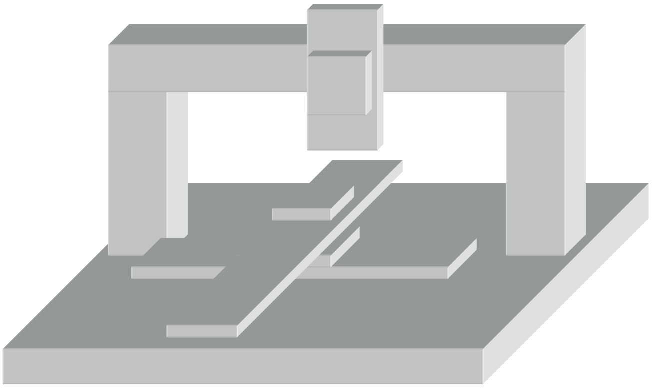
This configuration provides the simplest form of 2 linear degrees of freedom of a positioning system where the base of the top axis is bolted to the slide of the lower axis. For a high-performance positioning application, a “monolithic” design can be used where the base of the top axis and the slide of the bottom axis are rigidly made as a single part. In a compound XY configuration care should be given in consideration to the Abbe Error of the top axis due to cantilever “diving board” effect.

Compound XYZ



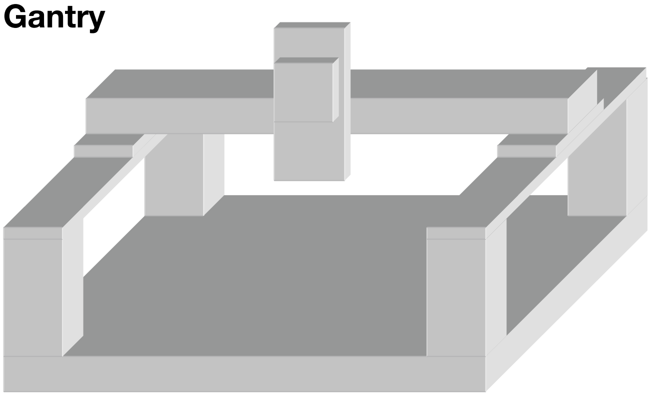
This configuration provides the simplest form of 3 linear degrees of freedom of a positioning system with the smallest footprint. In using this configuration care must be given to calculate the three dimensional accuracy. In particular the Abbe error. (Due to large offset between the bearing of the lowest stage and the point of interest at the top of the vertical stage.)

Split XYZ Axes



A split axes positioning stage typically provides higher precision and higher stiffness than a compound configuration of the same number of axes. The reason is that at least 2 axes are mounted to a flat, rigid, stationary base with a fewer number of stages that ride on other stages. The result is smaller Abbe Errors and less cantilever effects at the expense of a larger footprint. Note that although this structure looks similar to a Gantry configuration, as shown below, the Z Axis is rigidly mounted to a stationary bridge, and the X Axis is mounted to a stationary Base.

Gantry

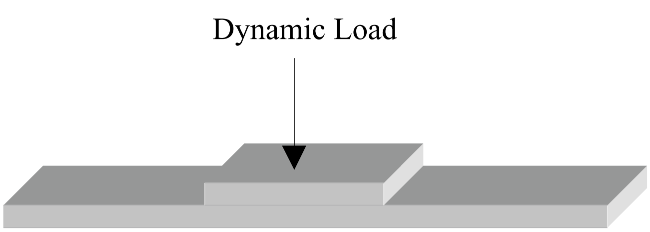


This configuration has the best accessibility to the space around it per footprint of the machine. It is commonly used as single cell or in process application where several machines are operating over a conveyor. Gantry configuration, driven by linear motors and designed for high natural frequency (typically 150 Hz), can provide an excellent solution that combines high precision, high speed and low settling time. Gantry can further be classified according to the following options:

- **Single-sided motor drive typically used for small size applications**
- **Double-sided motor, driven together by a single amplifier with 1 sided encoder typically used in large system, with low accuracy requirements**
- **Double-sided motor, driven as two independent axes X1, X2 operating as master slave with two sided encoder typically used for large machines that require high precision. Flexure slides may be needed on the X Axis to prevent cleavage (motion resistance at the bearing of the X Axis due to skewed movement of the Y Axis.)**

Loading

Dynamic Loading

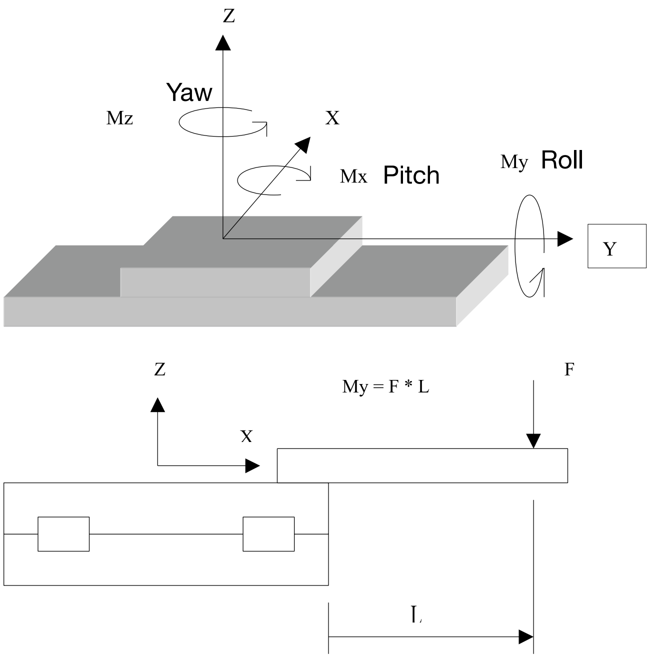


Dynamic loading of a stage is the maximum load that may be applied for a bearing life of 254,000 m (10 Million inches) of travel with no evidence of fatigue appearing in 90% of the bearing. This assumes that the load is constant in magnitude and direction and that all forces are perpendicular to the motion of the stage.

Axial Force (Maximum)

The maximum thrust force that the stage can generate in the direction of travel. This force is used to overcome friction, damping, tool resistance and acceleration.

Moment Loading



A moment loading defines a twisting load about the bearings. The impact of a moment load is that it is not distributed about all of the bearings uniformly. A moment load can be created in a variety of orientations:

Mx When a load is cantilevered off the end of an axis, parallel to the direction of travel

My When the load is cantilevered off the sides of an axis, perpendicular to the direction of travel

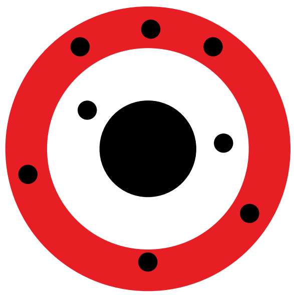
Mz When a force causes a rotational moment about the center of an axis.

Precision

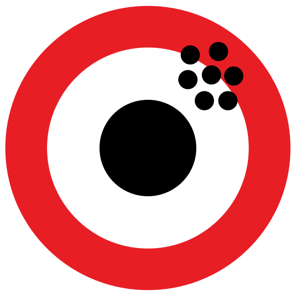
Linear Definitions:

Accuracy

The difference between a commanded position and an actual position of a positioning stage. Accuracy is typically specified in microns that represent specified number of standard deviation "Sigma" (see definition below), per given travel, at a specified height above the stage mounting plate. For example: a +3 micron accuracy, 3 Sigma, per 500 mm travel means that if the controller commands the positioning stage to move to a location 500 mm away from a known "home" position in space, then, in 99.8% of the times that this move will be made, the actual position of the stage, at 25 mm above the mounting surface, will end up being between 499.997 and 500.003 mm.



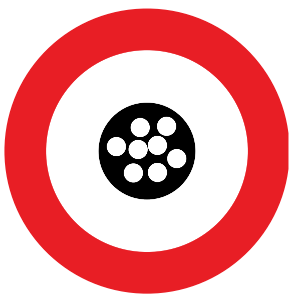
Low repeatability, low accuracy



High repeatability, low accuracy

Repeatability

Repeatability represents the maximum deviation between actual position values, obtained in repetitive moves of a positioning stage, to a desired position. Repeatability, like accuracy, corresponds to a specified number of "Sigma", per specified travel, at a specified height above the mounting surface of the stage.



High repeatability, high accuracy

Resolution (Motion)

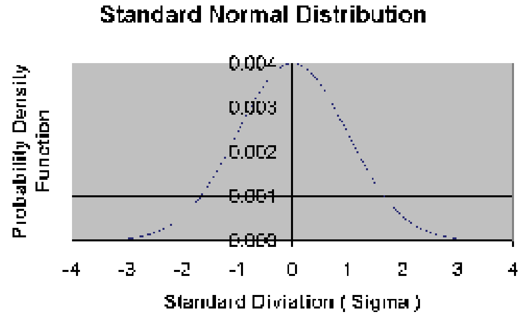
The smallest positioning movement that can be achieved by a positioning stage.

Resolution (Encoder)

The smallest increment of the position feedback signal that can be measured by a feedback device (e.g., encoder).

Standard Deviation (Sigma)

The average deviation of a Random Variable (a variable such as position error, whose outcome is of a statistical nature) from its average value (mean). The chart below represents a Standard Normal distribution of a random variable with zero mean and sigma of 1. The X Axis



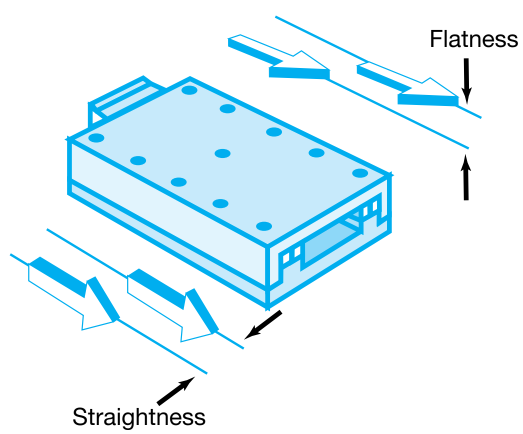
represents the random variable in units of Sigma, and the Y Axis represents the Probability Density function of the random variable. The density function is used to calculate the probability that the random variable will occur between two values on the X Axis. More specifically, the probability of a random variable occurring between two values on the X Axis equals to the area under the Probability Density Function between these two values. The total area under the curve equals 1. Some important areas are as follows: the area between +1 sigma is 0.84, between +2 sigma it is 0.977 and between +3 sigma it is 0.998. This means, for example, that the probability of a random variable occurring between +3 Sigma is 99.8%.

Flatness

The maximum boundaries of positioning path of motion projected on the vertical plane.

Straightness

The maximum boundaries of positioning path of motion projected on a horizontal plane.



Angular Definitions:

Pitch

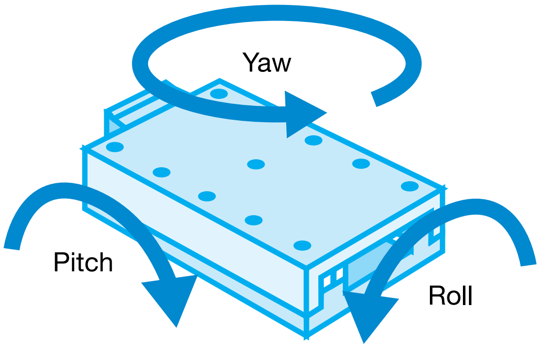
An angular deviation possible in positioning systems, in which the table leading edge rises or falls as the table translates along the direction of travel. This represents rotation around a horizontal axis, perpendicular to the axis of travel.

Yaw

An angular deviation from ideal straight line motion, in which the positioning table rotates around the Z (vertical) Axis as it translates along its travel axis.

Roll

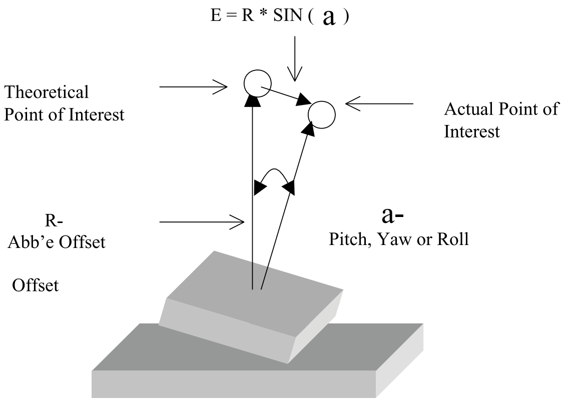
An angular deviation from ideal straight line motion, in which the positioning table rotates around its axis of travel as it translates along that axis.



Abbe Error

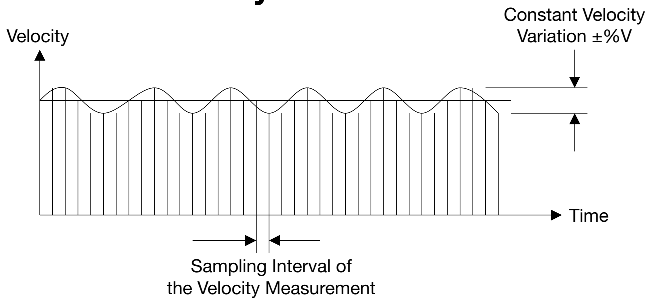
A linear positioning error caused by a combination

of an angular error in the bearing of the positioning stage, and an offset between the bearing and the actual point of interest.



Dynamic:

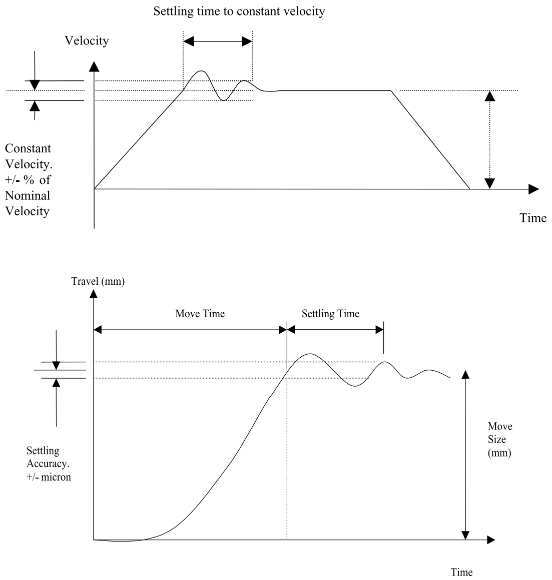
Constant Velocity



A measure of smoothness of motion of a positioning stage. Typically measured in percent variation from a nominal value at a given sampling interval. High smoothness of motion can be achieved by using crossed roller or air bearing stages with ironless linear motors.

Settling Time

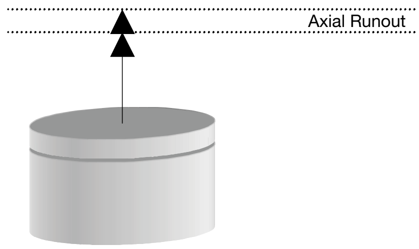
The time required for a step response of a system parameter to stop oscillating or ringing and reach its final value. For example, the time it takes for a velocity profile to settle to a specified value of constant velocity after the acceleration ramp phase. Also, the time it takes for a displacement profile to settle to specified accuracy after the deceleration phase at the end of a positioning move. Settling time is greatly affected by the shock, jerk, structural damping and resonance frequencies. Improved settling time in positioning systems can be achieved by high structural stiffness, low moving mass, high natural frequency of the structure, structural damping, high closed loop band width at the overall positioning system and good servo tuning.



Rotary Positioning Stages

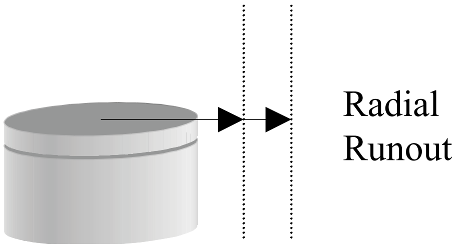
Precision:

Axial Runout Error



The total indicated reading (TIR) of axis movement along the axis of rotation.

Radial Runout Error

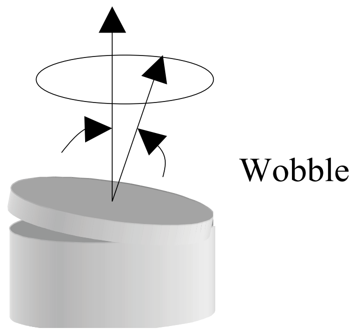


The total indicated reading of the horizontal movement of the rotary table.

Backlash Error

The error in rotational position due to clearance between a worm and a gear as a result of changing direction of motion. Backlash has an effect on two directional repeatability since the motion of worm is lost while reversing direction and traveling through the gap it has with the gear.

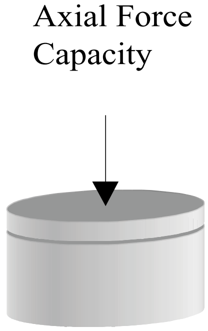
Wobble Error



The angular error between the actual axis of rotation and the theoretical axis of rotation.

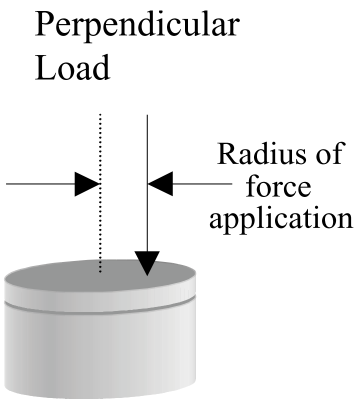
Loading:

Axial Load Capacity



The maximum allowable force acting along the axis of rotation of the rotary stage.

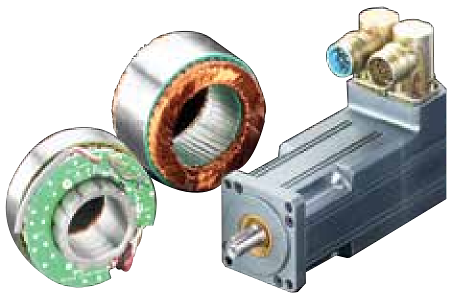
Perpendicular Load Capacity



The maximum load perpendicular to the positioning stage top surface, applied at a specified radius from the axis of rotation of the table.

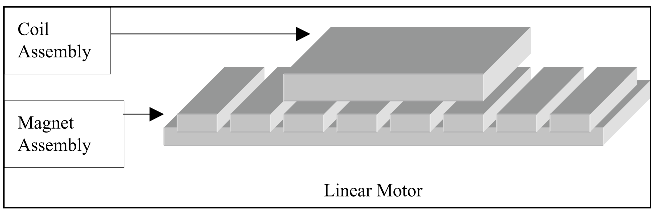
Motion Control Components

Motors



Brushless rotary motor & brushless direct Drive

Linear Motor



Motors Types Used in Positioning Systems

Servomotor

A device that converts electrical current to mechanical energy where the current is varied by a servo amplifier in a closed loop control system.

DC Motor

A device that converts electrical direct current into mechanical energy. It requires a commutating device, either brushes or electronic. Usually requires source of DC power or DC drive.

AC Motor

A device that converts electrical alternating current into mechanical energy. Requires no commutation devices such as brushes. Normally operated off commercial AC power or a VFD. Can be single or multiple phase.

Synchronous Motor

Another term for a Brushless DC motor.

Permanent Magnet Motor

A motor utilizing permanent magnets to produce a magnetic field. Has linear torque/speed or force/speed characteristic.

Brushless Motor

A type of direct current motor that utilizes electronic commutation rather than brushless to transfer current.

Iron Core Linear Motor

A permanent magnet motor consisting of laminated ferrous coil assembly and a single-sided secondary magnet assembly.

Ironless Linear Motor

A permanent magnet motor consisting of a non laminated coil assembly and a U-channel secondary magnet assembly

Piezo Ceramic Motor

A motor made of a small ceramic plate, oscillating at high frequency (e.g. 40Khz), causing its tip to form circular motion. As the tip comes in contact with a longer ceramic plate, attached to the slide of a positioning stage, it applies friction forces on the plate and causes it to move in the direction of the tip circular rotation.

ELECTRONIC COMPONENTS

Encoders

An encoder is a position feedback device that converts mechanical motion into electrical signals to indicate actuator actual position. The basic configuration of an encoder can be linear or rotary, incremental or absolute. A rotary encoder is typically attached to the rotary motor and measures the motor shaft rotation. Therefore, any windage effect at the ball screw or lost motion due to backlash and friction will not be seen at the encoder. The linear encoder, on the other hand, reads the actual position closer to the point it takes place and therefore the resulting precision is higher.

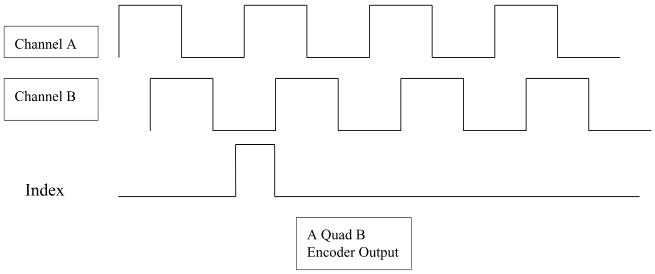
Linear Encoder Types Used in Positioning Systems

Absolute Encoder
A digital position transducer in which the output is representative of the absolute position of the input shaft within one (or more) revolutions. Output is usually a parallel digital word.

Incremental Encoder
A position transducer in which the output represents incremental changes in position.

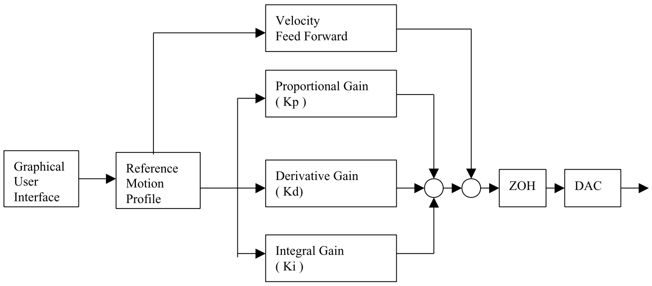
Linear Encoder
A digital position transducer that directly measures linear position.

Quadrature Encoder
This is a special incremental encoder with two channels A and B, sometimes referred to as A Quad B. The two channels are 90 degrees out of phase. This configuration allows detection of direction as well as increasing the resolution by a factor of four.



Controller/Amplifier/Motion Controllers

A motion controller is an electronic device that communicates with a host computer and has the capability to store a desired motion profile as a function of time or any other reference signal, read the actual position feedback, calculate the error, and send out a command signal to the servo amplifier as a complex function of the error and its derivatives. It can also monitor various I/O signals and control several axes in a coordinated moves.



PID controller block diagram with Feed Forward and ZOH

PID Controller Functional Elements

ZOH

Zero Order Hold represents the controller time delay in processing the input signals before the output to the amplifier is updated.

DAC

Digital to Analog Convertor component that receives a digital signal from the controller filter and outputs an Analog signal to the Amplifier.

Compensation

The corrective or control action in a feedback loop system that is used to improve system performance characteristics such as accuracy and response time.

Compensation, Feed forward

A control action that depends on the command only and not the error to improve system response time.

Compensation, Integral

A control action that is proportional to the integral or accumulative time error value product of the feedback loop error signal. It is usually used to reduce static error.

Compensation, Lag

A control action that causes the lag at low frequencies and tends to increase the delay between the input and output of a system while decreasing static error.

Compensation, Lead

A control action that causes the phase to lead at high frequencies and tends to decrease the delay between the input and output of a system.

Compensation, Lead Lag

A control action that combines the characteristics of lead and lag compensations.

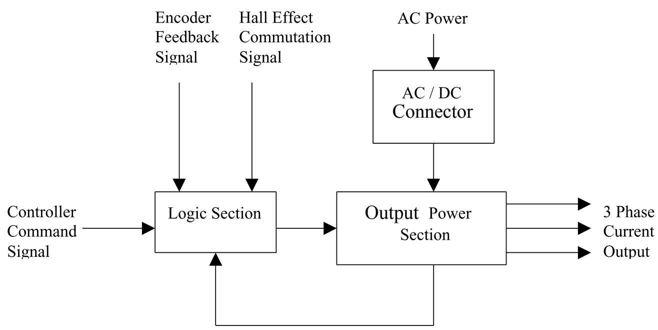
Compensation, Proportional

A control action that is directly proportional to the error signal of a feedback loop. It is used to improve system accuracy and response time.

Compensation, Derivative

A control action that is directly proportional to the rate of change of the error signal of the feedback loop. It is used to improve system damping to provide smooth motion and reduce settling time.

Servo Amplifier



Servo Amplifier Functional Elements

Servo Amplifier
An amplifier that utilizes internal servo feedback loops for accurate control of motor current and or velocity.

Analog Amplifier
An amplifier that has an analog signal as an input.

Digital Amplifier
An amplifier in which tuning and parameter setting is done digitally. Input can be an analog or digital signal.

Linear Amplifier
An amplifier that has output directly proportional to either voltage or current input. Normally both input and output signals are analog.

PWM Amplifier
An amplifier utilizing Pulse Width Modulation techniques to control power to the motor. Typically a high-efficiency drive that can be used for high response applications.

HOW TO SIZE AND SELECT

Actuator Sizing & Selection

① Thrust Calculation

Calculate the thrust generated by the application. Total thrust generally consists of three components:

Acceleration Thrust	F_a	=	$L/g \times V/T_a$
Thrust Due to Gravity*	F_g	=	$L\sin\alpha$
Thrust Due to Friction	F_f	=	$\mu_s L\cos\alpha$

Total Thrust = $F_t = F_a + F_g + F_f$

*Horizontal applications do not apply.

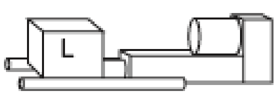
Terms used:

F_t = Total (maximum) thrust force (N, lb)
F_f = Friction force (N, lb)
F_g = Force of gravity (N, lb)
α = Angle of inclination (see illustration below)
μ_s = Coefficient of Sliding Friction (Load friction only, actuator friction excluded)
L = Actual load (N, lb)
g = Acceleration due to gravity ($9800\ mm/sec^2$, $386\ in/sec^2$)
V = Velocity (mm/sec, in/sec)
T_a = Acceleration time (sec)
D = Move distance (mm, in)
t = Move time (sec)
A = Acceleration (mm/sec^2, in/sec^2)

Actuator Orientation

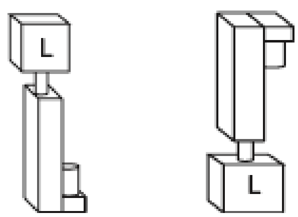
The terms used and their values depend upon the orientation of the actuator. Refer to the illustrations and equations below to determine the form of the thrust equation.

Horizontal



Horizontal Equations:
$F_t = F_a + F_f$

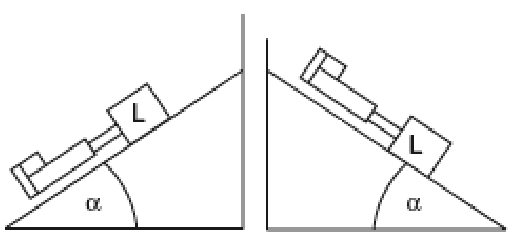
Vertical



Vertical Equations:
Upward: $F_t = F_a + F_g + F_f$

Downward: $F_t = F_a - F_g + F_f$

Angular



Angular Equations:
Upward: $F_t = F_a + F_g + F_f$

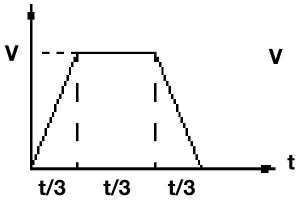
Downward: $F_t = F_a + F_g + F_f$

② Motion Profile Calculations

Two common motion profiles that relate velocity to time are the Trapezoidal and Triangular motion profiles. They serve as good starting points for calculating motion parameters and thrusts.

Determine the required velocities and accelerations for the application.

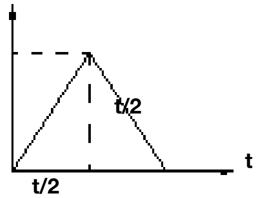
Trapezoidal Motion Profile



V= 1.5 x D/t

A= 4.5 x D/t²

Triangular Motion Profile



V= 2 x D/t

A= 4 x D/t²

Acceleration ≤ 1 g (9.8 m/sec²)

Note on Acceleration: In general, any acceleration less than or equal to 1 g (9.8 m/sec² or 386 in/sec²) is considered acceptable. Accelerations greater than 1 g should be referred to the factory before ordering.

③ Determine Motor Torque Requirements

Maximum Torque

$$T = \frac{\text{Thrust x Lead}}{\eta_s \times \eta_b \times 2\pi \times \text{Ratio}}$$

Where:

Lead = Screw Lead (in/Rev)

Thrust = Calculated thrust value in N (lbf)
= F_a + Fg + Ff
F_a (acceleration thrust)
= Load/(9800 mm/sec²) × Velocity/acceleration time
F_g (force of gravity) = Load × sinα
F_f (friction force) = μs (see table) × Load × cosα

η_b = Timing belt efficiency:
for parallel driven versions (typically 0.9 or 90%)
for in-line versions, use 1.

η_s = Screw efficiency (see table)
Belt drive efficiencies = 0.9

T = Input torque required, Nm (in-lb)

Ratio = Drive ratio (if timing belt is not 1:1 or another reducer is used)

Friction Coefficient

Material (dry contact unless noted)	μs
Steel on steel	0.80
Steel on steel (lubricated)	0.16
Aluminum on steel	0.45
Copper on steel	0.22
Brass on steel	0.35
Teflon on steel	0.04

④ Continuous Torque (Servo systems only)

With servo motors, it is important to understand the relationship between peak torque and continuous torque. Continuous or rms torque refers to the torque a servo motor system can produce continuously, or at 100% duty cycle. Peak torque refers to torque produced in intermittent time quantities, generally less than 5 seconds. This allows the user to better size the servo motor required based on what the actual torque needs are for the application. The maximum torque calculated in the previous section will represent the peak torque requirement. To determine the continuous torque requirement, first establish a sequence of use over a given duty cycle.

It is necessary to calculate the torque required at different instances of thrust. There are three general types of torque, and they correspond to thrusts calculated earlier:

Acceleration Torque

Torque when generating total thrust F_t (This is normally the maximum torque required.)

Constant Speed Torque

Torque when generating friction and gravity thrust ($F_f + F_g$)

Static Torque

Torque when holding a static load (typically gravity thrust F_g)

To calculate the continuous (rms) torque:

$$T_{rms} = \sqrt{[\Sigma T_i^2 t_i / \Sigma t_i]}$$

Where:

T_i = Torque required over time interval ti (Nm, in-lb)
t_i = Time interval i (sec)

Example: For a typical trapezoidal profile, let

T_1 = acceleration torque = 1000 Nm
t_1 = 1 sec
T_2 = torque at a constant speed (friction) = 25 Nm
t_2 = 1 sec
T_3 = deceleration torque = 1000-25 = 975 Nm
t_3 = 1 sec
T_4 = torque at rest = 0 Nm (horizontal orientation)
t_4 = 10 sec

When viewing servo motor speed-torque curves, let T_{rms} represent the maximum continuous torque value, while T_{max} may represent the peak torque value. Stepper motors run constantly at full torque and consequently require only the maximum torque value for sizing and selection.

Terms used:

Lead = Screw lead (in/Rev)

V_L = Maximum linear velocity in m/s (in/sec)

Ratio = Reduction ratio, if any (i.e. 2:1, Ratio =)

Speed = Required motor speed in rev/sec

This would represent a single duty cycle.
To calculate T_{rms}.

$$T_{rms} = \sqrt{[((1000\ Nm)^2 \times 1\ sec)+((25\ Nm)^2 \times 1sec)+((975\ Nm)^2 \times 1\ sec)+(0\ Nm)^2 \times 10\ sec)]/[1+1+1+10\ sec]}$$

T_{rms} = 387.42 Nm

Breakaway Torque

This information should be taken into consideration when selecting an appropriate motor to drive the actuator and load. The breakaway torque will factor into the initial peak torque required to accelerate the mass from rest.

Before each actuator ships, it is tested for breakaway and running torques. The report generated is shipped with the maintenance manual and other paperwork included with the actuator. This allows a customer to view the specific details of the custom actuator ordered.

Calculating Smallest Linear Resolution

First find the number of steps required to produce breakaway torque:

$$X = \frac{T_b}{\sin(M_{res}/D_{res}) \times T_s}$$

Where:

X = Steps required to produce breakaway torque

T_b = Breakaway Torque

T_s = Motor Static Torque

M_{res} = Motor resolution in electrical degrees per rev (18,000 electrical deg/rev)

D_{res} = Drive resolution in steps per rev

Then calculate resolution:

Resolution = (screw lead / drive resolution) × X

Determine the maximum speed required

$$\text{Speed} = \frac{\text{VL x Ratio}}{\text{Lead}}$$

Where:

Lead = Screw lead (mm/rev), see product Ordering Information

VL = Maximum linear velocity in m/s (in/sec)

Ratio = Reduction ratio, if any (i.e. 2:1, Ratio = 2)

Speed = Required motor speed in rev/sec

Calculate the total inertia of the system

$$I_{total} = I_{mass} + I_{drive}$$

Where:

I_{total} = Total inertia of system (excluding motor inertia), kg-m^2 (oz-in^2)

I_{mass} = Inertia of mass in kg-m^2 (oz-in^2)
Metric: $I_{mass} = M \times [\text{Lead} / (2\pi \times 1000)]^2$
English: $I_{mass} = W \times (\text{Lead} / 2\pi)^2$

M = Load mass (kg) for metric calculation

W = Load weight (lb) for English calculation

Lead = Screw lead (m/rev, in/rev)

I_{drive} = Inertia of the actuator drive train (see tables)

Is a reducer being included in the system?

To calculate the reflected inertia to the motor, divide the inertia of the mass and drive pulley by the square of the reduction ratio. Add the inertia of the reducer to the total inertia.

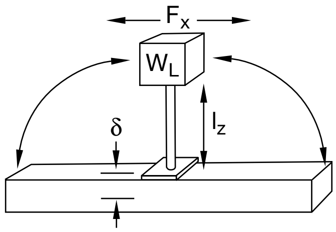
$$I_{total} = I_{reducer} + \frac{(I_{mass} + I_{drive})}{R^2}$$

Where:

R = Reduction ratio (i.e., 3:1 ratio, R = 3)

Load and Cylinder Orientation

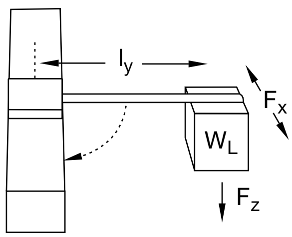
Refer to actuator series for "δ" values.



$Fn = Fz = WL$

$My = Fx\ (lz + \delta)$

Fx = Thrust



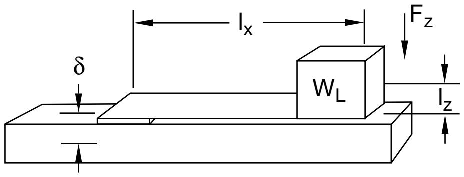
$Fn = Fz = WL$

$My = Fx\ (lz + \delta)$

$Mx = Fz\ (ly)$

$Mz = Fx\ (ly)$

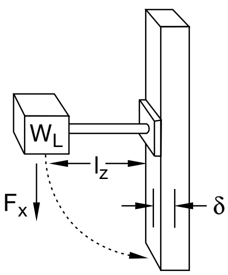
Fx = Thrust



$Fn = Fz = WL$

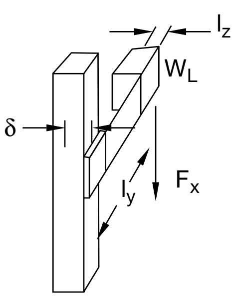
$My = Fz\ (lx) + Fx\ (lz + \delta)$

Fx = Thrust



$My = Fx\ (lz + \delta)$

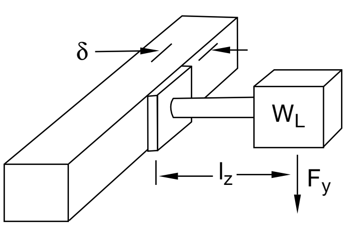
Fx = Thrust



$My = Fx\ (lz + \delta)$

$Mz = Fx\ (ly)$

Fx = Thrust



$Fy = WL$

$My = Fx\ (lz + \delta)$

$Mx = Fy\ (lz + \delta)$

Fx = Thrust

Recirculating Bearing Tables Calculations

The useful life of any linear translation table at full catalog specifications is dependent upon the forces acting on its bearing system. These forces include both static components, due to load weight, as well as dynamic components due to accelerations and decelerations of the load required by the motion profile. In multi-axes applications, the load capacity is usually limited by the positioner at the bottom of the stack. In the load/life calculations, it is critical to include the weight of all positioning elements in the total load carried by this lowest table.

The following formulas and examples illustrate the calculation of the forces acting on each bearing block. The service life and suitability of a positioner for a given application are determined by vectorial forces on the critically loaded bearing element.

Several dimensions, which are specific to each linear positioning table model, and the load geometry are required for these computations. These dimensions are supplied in the catalog information for each positioner. The dimensions are referenced as follows:

d_1 = bearing block center-to-center longitudinal spacing

d_2 = bearing rail center-to-center lateral spacing

d_a = rail center-to-carriage mounting surface

General Limitations

Linear positioning tables are rated at catalog specifications for performance with a maximum load to provide 100 million inches of travel life. *While loads greater than this maximum may be supported, we cannot generally guarantee the accuracy, durability or safety of an overloaded positioner. Please contact our applications engineering team for assistance with highly loaded applications.*

Horizontal Translation with Normal Load

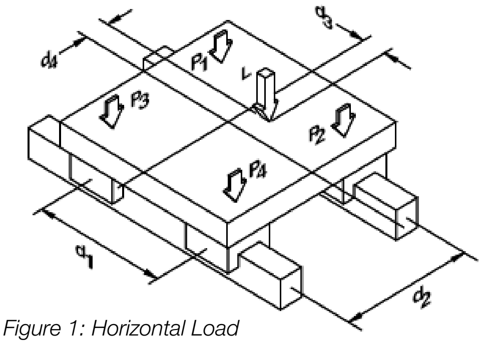


Figure 1: Horizontal Load

Figure 1 shows a normal load applied to the carriage translating horizontally. The vector L, defined by the CG of the load, is shown applied at a point whose coordinate distances from the center of the carriage are given by distances d_3 and d_4.

With the positioner at rest or moving with uniform velocity, the loads on each of the four bearing blocks are given by the following equations:

$$P_1 = \left[\frac{L}{4}\right] - \left[\frac{L}{2} \cdot \frac{d_3}{d_1}\right] + \left[\frac{L}{2} \cdot \frac{d_4}{d_2}\right]$$

$$P_2 = \left[\frac{L}{4}\right] + \left[\frac{L}{2} \cdot \frac{d_3}{d_1}\right] + \left[\frac{L}{2} \cdot \frac{d_4}{d_2}\right]$$

$$P_3 = \left[\frac{L}{4}\right] - \left[\frac{L}{2} \cdot \frac{d_3}{d_1}\right] - \left[\frac{L}{2} \cdot \frac{d_4}{d_2}\right]$$

$$P_4 = \left[\frac{L}{4}\right] + \left[\frac{L}{2} \cdot \frac{d_3}{d_1}\right] - \left[\frac{L}{2} \cdot \frac{d_4}{d_2}\right]$$

Note that each of the four bearing blocks will experience either compressional or tensional loading; the magnitude of these forces at each bearing is dependent upon the location of the load vector with respect to the center of the positioner carriage. For each bearing, the maximum of the forces in tension and compression is plotted on the load charts for the specific model positioner to determine the life of the table in the application.

The calculations for loads whose CG falls outside the carriage mounting surface area, as shown in Figure 2, are identical to those used with Figure 1. In either case, accelerations and decelerations of the load must be considered in calculating the dynamic forces which determine the life of the system in a particular application.

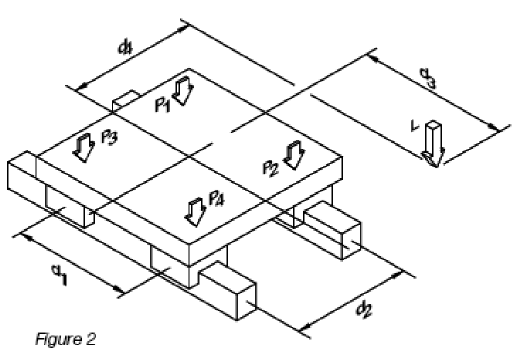


Figure 2

Horizontal Translation with Side Load

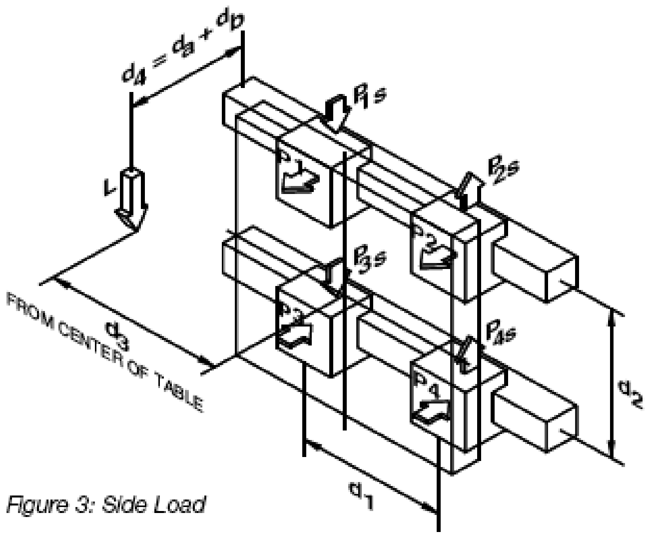


Figure 3: Side Load

Consider a positioner as shown in Figure 3, which involves a lateral (side) load applied to the carriage which translates horizontally. The load vector (L) is shown applied at a point whose coordinate distances from the center of the carriage bearing system are given by dimensions d_3 and d_4. Note that d_4 is the sum of distance d_a—the distance between bearing and center and carriage surface which is provided for each linear positioner—plus d_b, the distance of the load CG from the mounting surface of the carriage.

The loading felt by each of the four bearing blocks when the positioner is stationary or moving with uniform velocity is given by the following equations:

$$P_1 = P_2 = \frac{L}{2}\left[\frac{d_4}{d_2}\right]$$

$$P_3 = P_4 = -\frac{L}{2}\left[\frac{d_4}{d_2}\right]$$

$$P_{1s} = P_{3s} = \frac{L}{4} + \left[\frac{L}{2} * \frac{d_3}{d_1}\right]$$

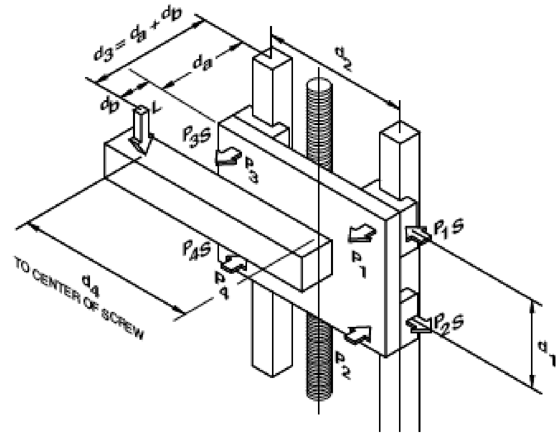
$$P_{2s} = P_{4s} = \frac{L}{4} - \left[\frac{L}{2} * \frac{d_3}{d_1}\right]$$

Here P_1, P_2, P_3 and P_4 are the normal loads (tensional and compressional) and P_{1S}, P_{2S}, P_{3S} and P_{4S} are the side loads. For each bearing, the largest side loads and normal loads in both tension and compression are identified for calculating the positioner life in the application.

For round rail/ball bushing type bearings, the forces are plotted individually on the appropriate curves to determine the service life.

For linear motion guide bearing positioners, an "equivalent load per bearing" is calculated for the life determination.

Vertical Translation



The figure above shows a load applied to the positioner carriage which translates vertically. The load vector (L) is shown applied at a point whose coordinate distances from the center of the carriage bearing system are given by distances d_3 and d_4. Note that here d_3 is the sum of distance d_a, which is given for the particular linear positioner plus d_b, the distance of the load CG from the mounting surface of the carriage. d_4 is the horizontal distance of the load vector (L) from the carriage center-line.

The loading felt by each of the four bearing blocks when the positioner is stationary or moving with uniform velocity is given by the following equations:

$$P_1 = P_3 = \frac{L}{2}\left[\frac{d_3}{d_1}\right]$$

$$P_2 = P_4 = -\frac{L}{2}\left[\frac{d_3}{d_1}\right]$$

$$P_{1s} = P_{3s} = \frac{L}{d_1}\left[\frac{d_4}{d_2}\right]$$

$$P_{2s} = P_{4s} = \frac{-}{d_1} - \frac{L}{2}\left[\frac{d_4}{d_2}\right]$$

P_1 through P_4 and P_{1S} through P_{4S} are respectively the normal and side loads on each bearing block. For each bearing, the largest side loads and normal loads in both tension and compression are determined and, for linear motion guides, "equivalent loads" are computed from the equations in the XR manual following the same procedure described in the preceding section for Horizontal Translation with Side Load to calculate the positioner life in the applications.

Once more, accelerations and decelerations of the load must be considered in calculating the dynamic forces which determine the life of the system in a particular application.

Calculate Life Expectancy

As with all mechanical components, the life expectancy of the screw driven actuators is influenced by many factors, including loads, speeds, lubrication, temperature, and mounting.

Measurement of Usable Life

Ballscrew

Usable life is the length of travel that 90% of a group of ball bearing screws will complete or exceed before metal fatigue develops. Fatigue is from the flexing of metal as the balls pass over a given point under load. This is in evidence when "rough spots" or "drag" (points of excessive friction) begin to appear along the travel of the actuator.

Note: Predicting the life of a ball screw is done in the same manner as the bearing industry rates ball bearings, by its B_{10} life. The B_{10} life means that 10% of the units could fail before reaching the required travel (at max rated load) and that 50% of the units will exceed 5 times the rated travel.

Belt Drive Life Expectancy

Parker EM&D specifies the loading capacity of the HPLA and HLE units to 15,000 hours of operation. Specifying for this life would equate to operating in motion for 10 hours per day, 250 days per year, for 6 years continuously. For information on sizing and selecting our belt driven products please refer to parker.com/emn and download DimAxes sizing software.

To Use Charts in Each Section:
(Ballscrew actuators only)

1. Determine required life (in millions of millimeters or inches of travel). Life is determined by multiplying the total stroke in inches or mm by the total number of strokes required for the designed life of the equipment.

$$L_m = \sqrt{\frac{\%1(L_1)^2 + \%_2(L_2)^2 + \%_3(L_3)^2 + \%_n(L_n)^2}{100}}$$

Where
L_m = equivalent load
L_n = each increment of load
$\%_n$ = percent of stroke at load L_n

For Example:
L_1 = 150# $\%_1$ = 30%
L_2 = 225# $\%_2$ = 45%
L_3 = 725# $\%_3$ = 25%

$$L_m = \sqrt{\frac{30\,(150)^2 + 45(225)^2 + 25(725)^2}{100}}$$

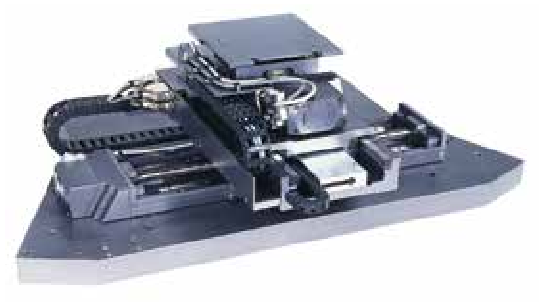
L_m = 466 lbs.

2. Calculate the equivalent load L_m
3. Find the point at which load and life intersect.
4. Select actuator screw combination to the right of or above the point of intersection.

COMPLETE SYSTEM ANALYSIS

Positioning System Analysis

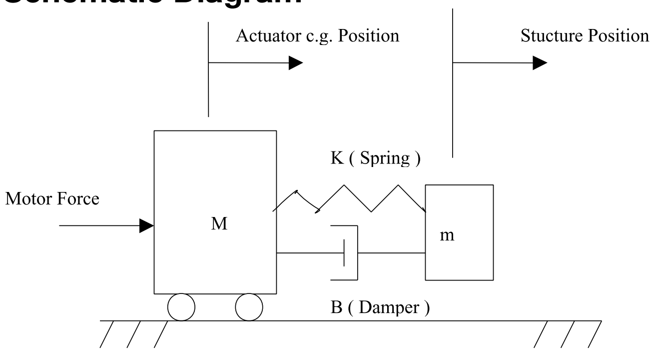
System Modeling



Physical Model

System modeling is important for developing a better understanding of the effects that various design variables, operating conditions and selected motion control components have on the overall positioning system performance. Modeling starts with a physical system to be modeled. For example, the picture shows a positioning system in a compound X,Y,Z configuration. In the following sections we will model and analyze a typical axis of similar machines.

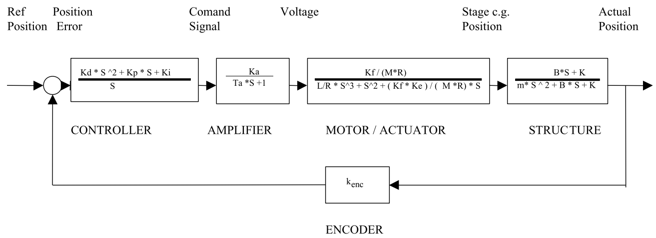
Schematic Diagram



Once the physical model is defined, a schematic diagram shows the main mechanical components, which are included in the theoretical model, and the way they interact. The diagram shows for example a model of a positioning stage with mass M, driven by a motor force and carrying a flexible structure with mass m, stiffness K and Damping B. The schematic diagram is then used for writing the equations of motion of the theoretical model.

Block Diagram & Transfer Functions

(See the next section on Frequency Response for Parameter definitions.)



The block diagram represents the motion control process within the system with all of its modeled components. The arrows represent the flow of signals within the system from one component to another. The block themselves contain expressions that are called Transfer Functions. Transfer Functions include operators (e.g., "S" designating differentiation and "1/S" designating Integration) and parameters that together describe the equations of motion of each block, which relate the output variable of a block to its input variable.

Transfer functions are used to determine the ratio between the magnitude of the output variable to the magnitude of the input variable. This ratio is called "gain" and it is measured in units of dB, where dB is defined as 20* Log (output / Input). Furthermore, Transfer Functions are used to calculate the "phase angle" which is the lag or lead of the output signal versus the input signal measured in degrees. The plot that shows the gain and the phase angle as a function of input frequency is called "Bode Plot".

Frequency Response

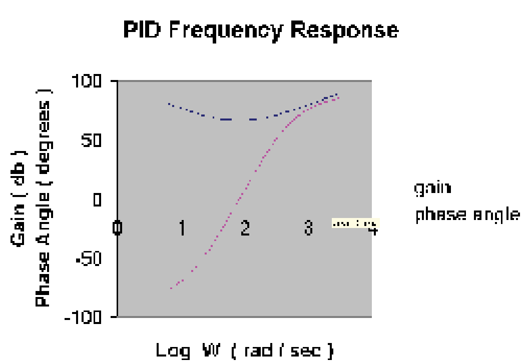
The purpose of Frequency Response Analysis, as shown below, is to help in understanding the motion characteristic of each component in the positioning system, as well as the characteristics of the system as a whole. The plots display the "gain" in units of db, (20* log (output / input) and "phase angle" in degrees for each block in the Block Diagram. Both plots are shown as a function of the frequency of the input variable and referred to as Bode Plots. The frequency in the plots is displayed in logarithmic scale. For example 1 represents 10^1 rad/sec, 2 represents $10^2 = 100$ rad/sec, etc. The analysis is important in determining the Closed Loop Bandwidth of the system, as well as its stability.

Components

Controller - PID

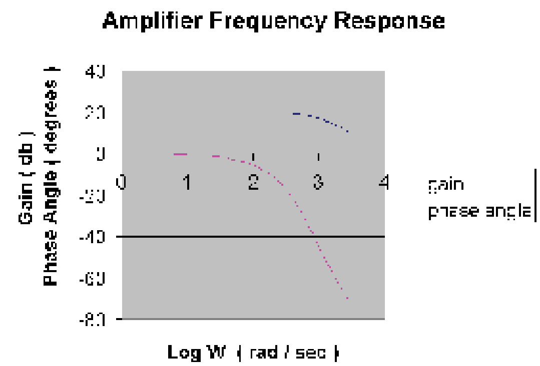
The PID transfer function, has the "positioning error" signal as an input and the "Controller command" signal to the amplifier as an output. It shows high gain (ratio of output signal to input signal) in low frequencies, acting as a low pass filter. It also has high gain at high frequencies, acting as a high pass filter. And finally it has lower gain in some intermediate frequencies, reducing the effects of various vibration causes such as structural resonance, bearing jitter, cogging, and tool vibrations.

The low pass filter, caused by the integrator term, Ki, amplifies small errors, such as those caused by friction, and reduces them over time. The high-pass filter, caused by the derivative gain, Kd, allows the system to lead its reaction to high frequency errors. The phase angle of the output signal versus the input signal starts at -90 degrees Lag and ends up at 90 degrees lead. The purpose of the PID transfer function is to shape the overall transfer function of the positioning system, by choosing the right set of PID parameters, Kp, Ki, Kd, to obtain a fast responding, stable, system with high closed-loop bandwidth.



Servo Amplifier

The amplifier transfer function, has "controller command" signal as an input and "motor voltage" as an output. As shown, the output signal follows the input signal at low frequencies with a constant gain, as determined by the parameter, Ka, of the amplifier. At a certain frequency, called the cutoff frequency, the gain starts to attenuate as frequency increases. The phase angle shows zero lag until the frequency reached the cutoff value, then the output starts to lag to a maximum of -90 degrees at very high frequencies. The cutoff frequency is the inverse of the amplifier time constant Ta, as shown in the transfer function. A time constant is the time it takes for the output signal to reach the level of 63% of a step in the input signal.

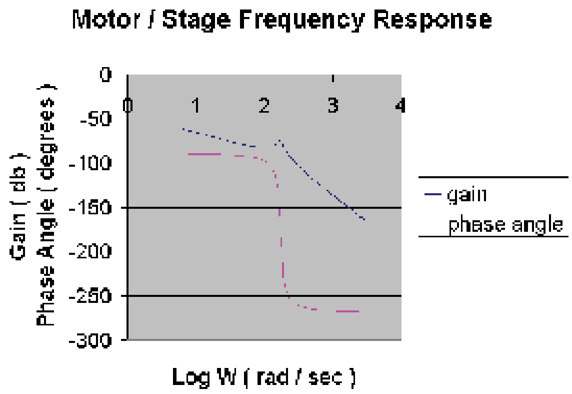


Motor/Stage

The combined Motor/Stage transfer function, has "motor voltage" as an input and "stage position" as an output. The gain shows a characteristic of reducing magnitude at a rate of 20 db/decade (decade is a multiple of 10 in frequency change) until a resonant frequency is reached. Then the gain attenuation becomes steeper and reduces at a rate of 60 db/decade. The phase angle starts out at a -90 degrees until the resonance frequency and then it drops an additional 180 degrees to a total of -270. The transfer function of this block has two time constants. One is the electrical time constant of the motor (L/R) and the other is the mechanical time constant of the stage (M•R /Kf•K_E). Where,

L = Motor Coil Inductance
R = Motor Coil Resistance
Kf = Motor Force Constant
K_E = Motor Back EMF
M = Stage Moving Weight

Structure



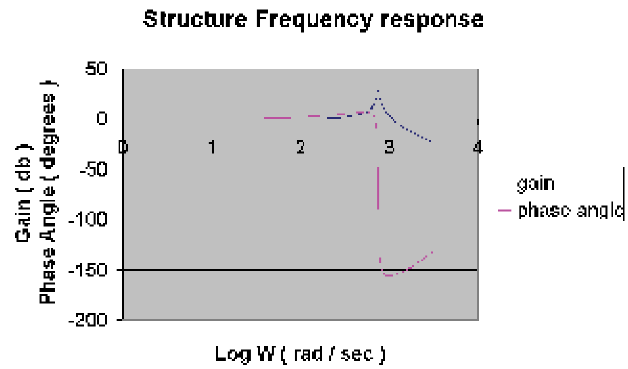
The structure transfer function, has the “stage position” as an input and the actual “structure position” of a point of interest on the structure (e.g. Encoder location) as the output. This is a classical transfer function of a mass, spring, damper system with a positive position excitation of the base.

The gain starts at 1 (zero dB) with low frequencies and gradually increases and reaches a peak at the natural frequency of the structure. Then the gain drops at a rate of 40 dB / decade at higher frequencies. The phase angle starts out as zero, at low frequency, and drops 180 degrees around the natural frequency. Finally it gains additional 90 degrees to a total of -90 degrees at very high frequencies. The parameters that characterize this system are as follows:

- m- Structural Mass
- K- Structural Stiffness
- B- Structural Damping

Where the natural frequency of the structure Wn = sqrt (K/m)

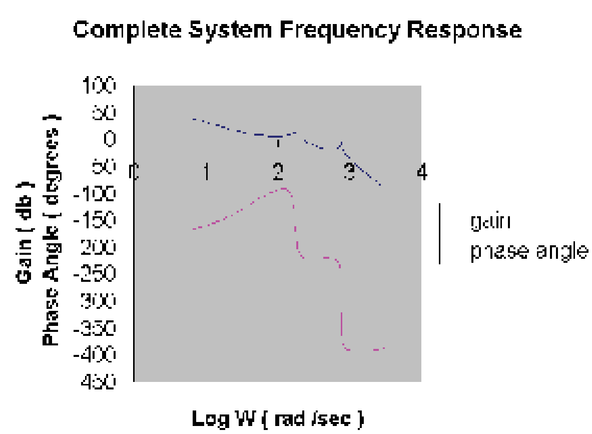
Complete System



Overall Positioning System Bode Plot

The overall transfer function of the positioning system model, as shown in the Bode Plot, is made as the superposition of all transfer functions of the individual components. The most important features of this plot are the closed loop bandwidth of the system and the two stability criteria: Phase Margin and Gain Margin. The closed loop bandwidth is determined by the frequency where the gain of the overall transfer function (known as open loop transfer function) crosses the 0 dB line, also referred to as a cross over frequency. The difference between the phase angle at the cross over frequency and -180 degrees is called Phase Margin. For a stable system the Phase margin must be greater than zero. The difference between the gain of zero db and the gain at -180 degrees is called the Gain Margin. For a stable system the gain margin must be greater than zero.

The closed loop bandwidth in the example at the chart is about 48 Hz (300 rad/sec, between 102 and 103 in the chart). The phase margin is about 30 degrees and the gain margin is a few dB, indicating a marginally stable system. The signatures of the PID, Motor/Amplifier and structure are clearly noticeable in the overall plot.



GLOSSARY OF TERMS

Absolute Positioning: Refers to a motion control system employing position feedback devices (absolute encoders) to maintain a given mechanical location.

Accuracy: The difference between the expected The maximum deviation between a commanded position and an actual position of a positioning stage. Accuracy is typically specified for + 3 sigma deviation per given travel.

Actuator: A device which creates mechanical motion by converting various forms of energy to mechanical energy.

Adaptive Control: A technique to allow the control to automatically compensate for changes in system parameters such as load variations.

Abbe Error: A linear positioning error caused by a combination of an angular error in the ways, and an offset between the precision determining element (lead screw, feedback device, etc.) and the actual point of interest.

Ambient Temperature: The temperature of the cooling medium, usually air, immediately surrounding the device such as a motor.

Amplifier: Electronics which convert low level command signals to high power voltages and currents to operate a servomotor.

Back EMF: The electromagnetic force (voltage) generated as coil windings move through the magnetic field of the permanent magnets in a brushless servomotor. This voltage is proportional to motor speed and is present regardless of whether the motor windings are energized or de-energized.

Closed Loop: A broadly applied term relating to any system where the output is measured and compared to the input. The output is then adjusted to reach the desired condition. In motion control the term is used to describe a system wherein a velocity or position (or both) transducer is used to generate correction signals by comparison to desired parameters.

Coefficient of Friction: This is defined as the ratio of the force required to move a given load to the magnitude of that load. Typical values for the ball and crossed roller slides are 0.001 to 0.005.

Cogging: A term used to describe non-uniform angular velocity. Cogging appears as jerkiness especially at low speeds.

Command Position: The desired angular or linear position of an actuator.

Commutation: A term which refers to the action of steering currents or voltage to the proper motor phases so as to produce optimum motor torque. In brush type motors, commutation is done electromechanically via brushes and commutator. In brushless motors, commutation is done by the switching electronics using rotor position information typically obtained by hall sensors, a resolver or an encoder.

Compliance: The amount of displacement per unit of applied force.

Coordinated Motion: Multi-axis motion where the position of each axis is dependent on the other axis such that the path and velocity of a move can be accurately controlled (requires coordination between axes).

Damping: An indication of the rate of decay of a signal to its steady state value.

Dead Band: A range of input signals for which there is no system response.

Detent Torque: The maximum torque that can be applied to an de-energized stepping motor without causing continuous rotating motion.

Duty Cycle: For a repetitive cycle, the ratio of on time to total cycle time: Duty Cycle = On Time/(On Time + Off Time) x 100%

Dynamic Braking: A passive technique for stopping a permanent magnet brush or brushless motor. The motor windings are shorted together through a resistor which results in motor braking with an exponential decrease in speed.

Efficiency: The ratio of output power to input power.

Explosion-proof: A motor classification that indicates a motor is capable of withstanding internal explosions without bursting or allowing ignition to reach beyond the confines of the motor frame.

Flatness of Travel: Deviation from ideal straight line travel in a vertical plane, also referred to as vertical runout.

Following Error: The positional error during motion resulting from use of a position control loop with proportional gain only.

Friction: A resistance to motion caused by surfaces rubbing together. Friction can be constant with varying speed (coulomb friction) or proportional to speed (viscous friction) or present at rest (static friction).

Hall Sensors: A feedback device which is used in a brushless servo system to provide information for the amplifier to electronically commutate the motor. The device uses a magnetized wheel and hall-effect sensors to generate the commutation signals.

Holding Torque: Sometimes called static torque, it specifies the maximum external force or torque that can be applied to a stopped, energized motor without causing the rotor to rotate continuously.

Home Position: A reference position for all absolute positioning movements. Usually defined by a home limit switch and/or encoder marker. Normally set at power up and retained for as long as the control system is operational.

Horsepower (HP): One horsepower is equal to 746 watts. Since Power = Torque x Speed, horsepower is a measure of a motor's torque and speed capability (e.g. a 1 HP motor will produce 35 in-lb. at 1,800 RPM).

Hunting: The oscillation of the system response about a theoretical steady-state value.

Incremental Motion: A motion control term that is used to describe a device that produces one step of motion for each step command (usually a pulse) received.

Indexer: Electronics which convert high level motion commands from a host computer, programmable controller, or operator panel into step and direction pulse streams for use by the stepping motor driver.

Inertia: The property of an object to resist changes in velocity unless acted upon by an outside force. Higher inertia objects require larger torques to accelerate and decelerate. Inertia is dependent upon the mass and shape of the object.

Inertial Match: An inertial match between motor and load is obtained by selecting the coupling ratio such that the load moment of inertia referred to the motor shaft is equal to the motor moment of inertia.

Limits: Motion control systems may have sensors called limits that alert the control electronics that the physical end of travel is being approached and that motion should stop.

Linear Coordinated Move: A coordinated move where the path between endpoints is a line.

Linearity: For a speed control system it is the maximum deviation between actual and set speed expressed as a percentage of set speed. Parameter is mechanical velocity.

Master Slave Motion Control: A type of coordinated motion control where the master axis position is used to generate one or more slave axis position commands.

Optically Isolated: A system or circuit that transmits signals with no direct electrical connection. Used to protectively isolate electrically noisy machine signals from low-level control logic.

Orthogonality: The degree of perpendicularity, or squareness, between the two axes in an X-Y or X-Z table. This parameter is usually measured in arc-seconds or microradians.

Oscillation: An effect that varies periodically between two values.

Overshoot: The amount that the parameter being controlled exceeds the desired value for a step input.

Phase-Locked Servo System: A hybrid control system in which the output of an optical tachometer is compared to a reference square wave signal to generate a system error signal proportional to both shaft velocity and position errors.

Point-to-Point Move: A multi-axis move from one point to another where each axis is controlled independently. (No coordination between axes is required).

Position Error: The difference between the present actuator (feedback) value and the desired position command for a position loop.

Position Feedback: Present actuator position as measured by a position transducer.

Power: The rate at which work is done. In motion control, Power = Torque x Speed.

Repeatability: The degree to which the positioning accuracy for a given move performed repetitively can be duplicated.

Resolution: The smallest positioning increment that can be achieved. Frequently defined as the number of steps or feedback units required for a motor's shaft to rotate one complete revolution.

Resolver: A position transducer utilizing magnetic coupling to measure absolute shaft position over one resolution.

Resonance: The effect of a periodic driving force that causes large amplitude increases at a particular frequency. (Resonance frequency).

Settling Time: The time required for a step response of a system parameter to stop oscillating or ringing and reach its final value.

Slew: In motion control, the portion of a move made at a constant non-zero velocity.

Slew Speed: The maximum velocity at which an encoder will be required to perform.

Stiffness: Ratio of an applied force or torque to change in position for a mechanical system. Ability of an object to resist deformation.

Straightness of Travel: Deviation from straight line motion in a horizontal plane. Also referred to as horizontal runout. This error is usually traceable to an underlying angular error of the ways.

T.I.R.: This stands for Total Indicator Reading, which reflects the total absolute deviation from a mean value (versus a + value which indicates the deviation from a nominal value).

Torque Constant: A number representing the relationship between motor input current and motor output torque. Typically expressed in units of torque/amp.

Torque Ripple: The cyclical variation of generated torque given by product of motor angular velocity and number of commutator segments.

Torque-to-Inertia Ratio: Defined as a motor's torque divided by the inertia of its rotor, the higher the ratio the higher the acceleration will be.

Transducer: Any device that translates a physical parameter into an electrical parameter. Tachometers and encoders are examples of transducers.

Velocity Ripple: Disturbances in the programmed velocity profile due to changes in magnetic flux and commutation switching.

Voltage Constant: (or Back EMF Constant) A number representing the relationship between Back EMF voltage and angular velocity. Typically expressed as V / kRPM.

Yaw: An angular deviation from ideal straight line motion, in which the positioning table rotates around the Z (vertical) Axis as it translates along its travel axis.

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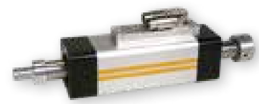

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