A global Fortune 300 company with sales of $9 billion and more than 400,000 customers in 46 countries, Parker Hannifin is the world’s leading supplier of motion control components and system solutions serving the industrial, mobile, and aerospace markets. Parker is the only manufacturer offering customers a choice of hydraulic, pneumatic, electromechanical, or computer motion control.

**Total Systems Solutions**
Parker’s team of highly qualified applications engineers, product development engineers, and system specialists can turn electromechanical, structural extrusion and pneumatic products into an integrated system solution. And our Selectable Levels of Integration™ provides the components, subsystems and controlled motion systems to suit any level of integration you may choose.

Parker’s highly trained field sales force, strategically located throughout the world, provides knowledgeable assistance within hours. Linked by global communication systems, these experts will work together with a local Parker distributor on any product application to fulfill your needs.

Put Parker’s industry-leading response and delivery to the test when you contact Parker or one of its Automation Technology Centers, ATCs. ATCs are Parker distribution partners who specialize in the application of Parker’s electromechanical technology products. With degreed engineers on staff, Parker’s ATC network has the expertise to provide complete motion control solutions, from human machine interface to integrated control products and mechanical actuator systems.
Training
Parker’s best-in-class technology training includes hands-on classes, web-based training, and comprehensive texts for employees, distributors, and customers. Parker also provides computer-based training, exams, drafting and simulation software, and trainer stands.

24/7 Emergency Breakdown Referrals
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 on-call representatives who will quickly identify replacement parts or services for all motion technologies. Talk to a real person!
Actuator Division
Parker Hannifin’s Actuator Division provides a comprehensive range of electromechanical actuator products and integrated product solutions for a wide range of industrial markets and applications. Headquartered in Wadsworth, Ohio, the Actuator Division is committed to providing the highest level of customer service, the right products for your needs, and the highest level of product availability from our plants and service centers across North America.

**Electromechanical Actuator Products**

**Rodless Actuators**

**New LCB Series Rodless Actuator**
- High-speed Belt and pulley drive
- 100% duty cycle slider bearing carriage
- Pages 70-90

**ER Series Rodless Actuator**
- Ball screw, lead screw or belt and pulley drive
- Sealed internal bearing carriage
- Pages 30-51

**ERV Series Rodless Actuator**
- Belt and pulley drive
- High-load external bearing carriage
- Pages 54-67

**Electric Cylinders**

**ET Series Electric Cylinder**
- Ball screw and lead screw drive
- Thrust force to 10,000 lbf (44kN)
- Pages 2-27

**ETR Series Electric Cylinder**
- High-load roller screw drive
- Thrust force to 22,000 lbf (80kN)
- Overview on page 102 or request Catalog 1898

**ISO 9000:2001 Quality System**
Actuator Division’s quality system conforms to ISO 9000:2001 specifications and resides through the process, from order entry to final testing and shipment. Each actuator is cycle tested in a dedicated test cell prior to shipment. With more than a decade of experience in this technology, Actuator Division understands our customers’ needs for project quality and performance.
Electromechanical Actuator Products

Custom Applications
A growing number of customers have special applications requiring component or system performance that is not easily met with standard products or configurations. Actuator Division is well established as a provider of engineering and application expertise in the field of factory automation, and can design, build and test a cost-effective custom system.

Multi-Axis Motion Systems
Parker brings together pneumatic, electromechanical and structural components to form economical and customized multi-axis motion systems. Create simple two or three-axis motions, add one or more axes of pneumatic motion, or produce coordinated motion with Parker end effector products.

Service and Support
Actuator Division offers unrivaled application support through our Applications Engineering Team. Staffed by degreed engineers, the Applications Team is ready to assist in the sizing and selection of actuator products, as well as provide post-sales support. Call us at 866-PARK ACT (727-5228) for assistance.
Electromechanical Actuator Products

Complementary Products

Structural Aluminum
- Custom fit with standardized modular frames
- No painting, welding or drilling

Servo Motors
- Industry’s broadest range
- Industry leading delivery
- CE compliant

Servo Drives
- Maximum power and performance in compact package
- Designs that ease integration and start-up

Pneumatic Actuators
- Pneumatic cylinders, slides and rotary actuators available in a variety of shapes and sizes
- Meet ISO, NFPA standards

Parker’s Automation Group
is home to a range of complementary products, including:
- Electric motors, drives and controllers
- HMI technology and software
- Precision mechanics
- Pneumatic control and air preparation products
- Pneumatic cylinders and actuators
- Structural aluminum framework and assemblies

www.parkermotion.com

Innovative Solutions, new products, online 3-D CAD and much more

Parker’s extensive web site is your on-line resource for electromechanical technology. It is the industry’s most comprehensive site and includes product information, downloadable 3-D CAD drawings, catalogs, contact information, training materials and product selection software. The user-friendly interface allows you to search by general product families, specific product type, or keywords.
ET Series
Electric Cylinders
- 32, 50, 80, 100, 125mm profile sizes
- Screw drive

ER Series
Rodless Actuators
- 32, 50, 80mm profile sizes
- Belt or screw drive

ERV Series
Rodless Actuators
- 56 & 80mm profile sizes
- Belt drive

LCB Series
Compact Linear Actuators
- 40 & 60mm profile sizes
- Belt drive

Multi-Axis Systems
- System types
- Application considerations
- System accessories

Complementary Products
- LR & ETR linear actuators
- Drives and controllers
- Operator interface
- Motors and precision gearboxes
- Pneumatic components
- Structural framing systems

Motor and Gearbox Reference
- Motor Compatibility Matrix
- Servo motor coding
- Stepper motor coding
WARNING - USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

OFFER OF SALE

The items described in this document are hereby offered for sale by Parker-Hannifin Corporation, its subsidiaries or its authorized distributor. This offer and its acceptance are governed by the provisions stated in the detailed "Offer of Sale" elsewhere in this document.

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Rotary to Linear Conversion
Linear motion systems driven by rotating electric motors commonly employ one of three rotary-to-linear conversion systems: ball screw, Acme screw or belt drive.

Lead Screws
Screw-drive mechanisms, whether Acme screw or ball screw, 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.

Ball Screw
The majority of linear motion applications convert motor torque to linear thrust using ball screws 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. Ball screws 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

Leadscrew Comparison

<table>
<thead>
<tr>
<th>Considerations</th>
<th>Acme Screw</th>
<th>Ball Screw</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audible noise</td>
<td>Quiet operation</td>
<td>Noisy</td>
<td>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.</td>
</tr>
<tr>
<td>Back-driving loads</td>
<td>Self-locking</td>
<td>Easily backdrives</td>
<td>When vibration is apparent in a system, an Acme may backdrive. Ball screws may require a brake.</td>
</tr>
<tr>
<td>Backlash</td>
<td>Increases with wear</td>
<td>Constant throughout life of screw</td>
<td>Due to high friction, Acme screws wear sooner, and therefore, the backlash increases over the life of the leadscrew.</td>
</tr>
<tr>
<td>Duty cycle rating</td>
<td>Low/Medium (&lt;60%)</td>
<td>High (100%)</td>
<td>Because excessive heat can deform the screw, Acmes are limited to 60%. The high efficiency of ball screws allows for 100%.</td>
</tr>
<tr>
<td>Efficiency rating</td>
<td>Low: Plastic nut (45%) Bronze nut (35%)</td>
<td>High (90%)</td>
<td>Acme screw ratings are lower due to sliding friction while ball screws are higher due to rolling contact.</td>
</tr>
<tr>
<td>Life (mechanical wear)</td>
<td>Shorter life due to high friction</td>
<td>Longer</td>
<td>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)</td>
</tr>
<tr>
<td>Smoothness of operation</td>
<td>Smooth operation at lower speeds</td>
<td>Smooth operation at all speeds</td>
<td>Ball screws are generally smoother at all operating speeds.</td>
</tr>
<tr>
<td>Speeds</td>
<td>Low</td>
<td>All</td>
<td>Ball screws operate well at all speeds, while Acme screws are best suited for lower speed applications.</td>
</tr>
</tbody>
</table>
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

Gear Drive

Actuator Division also manufactures a gear drive option for both the ET and ER/ERV series actuators.

Today's high energy motors can produce large torques while operating at high speeds. At times, this can put a mechanical strain or create resolution problems on all the devices that are trying to utilize this power. Gear Drive Series is the solution to link your motor to these demanding applications.

The Spur Gear Drive can reduce your speed while multiplying the torque output to properly harness all of your motor's power. The Gear Drive generally proves very useful when large inertias must be moved because the inertia of the load reflected back to the motor through the gearing is divided by the square of the gear ratio. In this manner, large inertial loads can be moved while maintaining a good load-inertia to rotor-inertia ratio (Typically 20:1 for servo motors and 10:1 for steppers).

Think about using Spur Gear Drives in applications requiring dynamic braking and zero back driving. Because of the high kinetic forces generated, gearing and other machine elements may be damaged if not selected and applied properly. It is important to remember that the Gear Drive is positioned between the inertial load and the motor's rotor. Both the inertia of the motor's rotor and the external inertial load can subject the Gear Drive components to dynamic braking.

The resistance to back driving manifests itself as a locking effect. The amount of resistance to back driving increases with the number of stages of gearing. The Gear Drive has a 4 stage Spur Gear that offers considerable resistance to back driving.

Gear Drive Systems are a good solution for applications requiring:

- High speeds (7500 RPM)
- High duty cycle
- Torque multiplier
- Inertial matching
- High efficiency (90%)
- Smooth operation
Actuator Precision

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute Accuracy</td>
<td>The maximum error between expected and actual position.</td>
<td>• Accuracy of the motor/drive system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lead screw pitch error (lead accuracy)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• System backlash (drive train, leadscrew and nut assembly)</td>
</tr>
<tr>
<td>Repeatability</td>
<td>The ability of a positioning system to return to a location during operation when approaching from the same direction, <em>at the same speed and deceleration rate</em>.</td>
<td>• Angular repeatability of the motor/drive system</td>
</tr>
<tr>
<td>Resolution</td>
<td>The smallest positioning increment achievable. In digital control systems, resolution is the smallest specifiable position increment.</td>
<td>• Angular resolution of the motor/drive system</td>
</tr>
<tr>
<td>Backlash</td>
<td>The amount of play (lost motion) between a set of moveable parts.</td>
<td>• Leadscrew wear</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Drive train wear</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Spaces between moving parts</td>
</tr>
</tbody>
</table>

Accuracy and Repeatability

A linear system repeatedly moves toward an expected position. How successful it is in reaching the position and in reaching it over a number of tries is illustrated below.

**System 1** is both accurate and repeatable. The end positions are tightly grouped together and are close to the expected position.

- **Degree of Accuracy** High
- **Degree of Repeatability** High

**System 3** is inaccurate but repeatable. The end positions are tightly grouped around a point, but are not close to the expected position.

- **Degree of Accuracy** Low
- **Degree of Repeatability** High

**System 2** is accurate but not repeatable. The end positions are not tightly grouped together but are relatively close to the expected position.

- **Degree of Accuracy** High
- **Degree of Repeatability** Low

**System 4** is neither accurate nor repeatable. The end positions are not tightly grouped and are not close to the expected position.

- **Degree of Accuracy** Low
- **Degree of Repeatability** Low
Backlash
The clearance between elements in a drive train or lead screw 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 ball screws, 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 lead screw 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
ET Series Electric Cylinders

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e-mail: actuatorsales@parker.com
website: www.parker.com/actuator
The ET Series Electric Cylinder
The automation industry demands flexibility and durable design. The ET Series Electric Cylinder serves both demands. Introduced as the world's first complete stepper and servo driven electric cylinder system, the ET Series combines an unparalleled design with a variety of options that make it easy to integrate into both new and existing applications.

Produced to hard metric ISO standards, the ET Series can mount into existing fluidpower cylinder applications, adding infinite programmability to the durability and long life expected of hydraulic and pneumatic cylinders. Its modular design includes nine different actuator mounting styles in addition to available custom mounting. The ET Series' range of five profile sizes present the user with the flexibility to configure the actuator to the application.

Combined with a Parker Hannifin motor and control system, the ET Series arrives at the customer's dock complete and ready to mount. Backed by an industry-leading 2 year warranty and Parker Hannifin's worldwide customer support network, the ET Series is a global automation solution.

ET Markets and Applications
With thousands of axes installed worldwide, the ET series electric cylinder has proven to be a robust and reliable solution for numerous motion control applications across many markets and industries. Listed below are some examples of where and how the ET series electric cylinder has been successfully applied.

### Markets and Industries Served

| Automotive | Transportation | Machine Tool |
| Tire & Rubber | Wood & Lumber | Aerospace |
| Packaging | Conveyor | Military |
| Food & Beverage | Medical | Semiconductor |
| Glass / Fiber | Recreation / Amusement Park | Plastics |
| Computer / Electronics | Pharmaceutical | Factory Automation |

### Application Examples

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<tr>
<th>Force / Position Control</th>
<th>Discrete / Multi-Point Positioning</th>
<th>Reach In &amp; Retract</th>
<th>Complex Motion Control</th>
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<td>Assembly Presses</td>
<td>Vertical Stackers / Elevator Lift</td>
<td>Inspection / Measurement</td>
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<tr>
<td>Weld Gun Actuation</td>
<td>Door &amp; Hatch Closures</td>
<td>Labeling / Marking</td>
<td>Flying Die Cut-to-Length</td>
</tr>
<tr>
<td>Parts Clamping</td>
<td>Lane Diverters</td>
<td>Parts Load / Unload</td>
<td>Mechanical Cam Replacement</td>
</tr>
<tr>
<td>Tube Bending</td>
<td>Mold Toggle</td>
<td>Tool Change</td>
<td>Web Edge Guiding</td>
</tr>
<tr>
<td>Joining / Fastening</td>
<td>Backstop / Blade positioning</td>
<td>Z-Axis Pick &amp; Place</td>
<td>Contoured Glue Dispensing</td>
</tr>
<tr>
<td>Molding / Forming / Stamping</td>
<td>Volumetric Dispensing / Filling</td>
<td>Automated Assembly</td>
<td>Servo Valve Control</td>
</tr>
<tr>
<td>Compression Packing</td>
<td>Medical Bed Actuation</td>
<td>Hydraulic &amp; Pneumatic Replacement</td>
<td>Web Tension Control</td>
</tr>
</tbody>
</table>
ET Features & Benefits

Construction
Inline Motor Mounting Shown

1 Five Profile Sizes
(32, 50, 80, 100, 125)
With thrust capacity ranging from 135 lbf to 10,000 lbf, the ET series electric cylinder is designed to fit a wide range of applications.

2 High Capacity Thrust Bearings
Dual angular contact thrust bearings are pre-loaded to eliminate axial play and provide high thrust capacity.

3 Precision Ball or Acme Screw Drive
High efficiency, precision rolled ball screws allow for continuous duty operation and long, reliable life. Quality acme screws are less efficient than ball screws and are well suited for failsafe (self-locking) vertical loads and lower duty cycles.

4 Long Length Rod Bearing
The extra long rod bearing design reduces bearing pressure allowing higher side load capacity and life.

5 Precision Stainless Steel Rod
The cylinder rod is ground and polished stainless steel which provides long life and corrosion resistance.

6 Combination Lip & Wiper Seal
The lip and wiper seal keeps contaminants out and lubricating grease in, increasing actuator life.

7 Screw Shaft Nose Bearing
The substantial support provided by the screw nose bearing eliminates whipping, vibration, and run out.

8 Extruded Limit Sensor Grooves
Sensor grooves are incorporated into the anodized extrusion body design allowing for easy placement and adjustment. An internal magnet is used as a target for the external Hall effect or reed sensors.

9 Precision Anti-Rotation Bearing Carriage
The anti-rotation bearing carriage rigidly supports the screw while eliminating rod play and prolonging screw life.

10 Parker Motor/Gearbox Mounting Options
The ET electric cylinder can be supplied with a number of different Parker stepper or servo motors as well as precision gearboxes for increased mechanical resolution.

11 Parallel Motor Mount with Timing Belt
Motor mount can be wrapped or rotated in all directions to optimize overall envelope dimension.

12 Parallel Motor Mount with Gear Drive
Optional gear drive parallel mount allows for higher thrust capacity and reduction ratios than the timing belt drive.
### ET Specifications

#### ET-Screw Overview

<table>
<thead>
<tr>
<th>Units</th>
<th>ET032</th>
<th>ET050</th>
<th>ET080</th>
</tr>
</thead>
<tbody>
<tr>
<td>A08</td>
<td>135 (600)</td>
<td>720 (3200)</td>
<td>1600 (7120)</td>
</tr>
<tr>
<td>A04</td>
<td>396</td>
<td>792</td>
<td>1270</td>
</tr>
<tr>
<td>B08</td>
<td>396</td>
<td>792</td>
<td>1270</td>
</tr>
<tr>
<td>B02</td>
<td>1270</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Performance Limits

- **Max Thrust Fx** (lbf (N))
- **Max Speed** (in/s)
- **Max Speed** (mm/s)
- **Max Acceleration** (in/s²)
- **Max Travel** (in (mm))

#### System Characteristics

- **Screw Lead** (in/rev)
- **Efficiency - inline** (%)
- **Max Breakaway/Torque** (oz-in)
- **Repeatability** (± in)
- **System Backlash** (mm)

#### Reflected Rotational Inertia

- **Base Unit Inertia, 100mm travel** (oz-in²)
- **Base Parallel Unit Inertia, 100mm travel** (oz-in²)
- **Additional Inertia per 100mm travel** (oz-in²)

#### Weight & Inertia Data

- **Base Unit Weight, 100mm travel** (lb (kg))
- **Additional Travel Weight** (lb (kg) / 100mm)

#### Critical Speeds

<table>
<thead>
<tr>
<th>Model</th>
<th>Lead</th>
<th>Critical Speed: mm/s (in/s) vs. Stroke: mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET032</td>
<td>A08</td>
<td>396 (15.6) 325 (12.7) 165 (6.5) 100 (3.9) 70 (2.7) 50 (1.9) — —</td>
</tr>
<tr>
<td></td>
<td>A04</td>
<td>792 (31.2) 651 (25.6) 331 (13.0) 200 (7.8) 139 (5.4) 100 (3.9) — —</td>
</tr>
<tr>
<td></td>
<td>B08</td>
<td>423 (16.6) 339 (13.3) 174 (6.8) 106 (4.1) 74 (2.9) 54 (2.1) — —</td>
</tr>
<tr>
<td></td>
<td>B02</td>
<td>1270 (50) 1270 (50) 779 (30.6) 480 (18.8) 325 (12.7) 225 (8.8) — —</td>
</tr>
<tr>
<td>ET050</td>
<td>A05</td>
<td>635 (25.0) 634 (24.9) 332 (13.0) 204 (8.0) 138 (5.4) 88 (3.4) 66 (2.6) 48 (1.9)</td>
</tr>
<tr>
<td></td>
<td>B05</td>
<td>403 (15.8) 403 (15.8) 403 (15.8) 257 (10.1) 175 (6.8) 113 (4.4) 87 (3.4) 64 (2.5)</td>
</tr>
<tr>
<td></td>
<td>B02</td>
<td>1006 (39.6) 1006 (39.6) 1006 (39.6) 642 (25.2) 438 (17.2) 282 (11.1) 219 (8.6) 157 (6.1)</td>
</tr>
<tr>
<td></td>
<td>B01</td>
<td>1524 (60.0) 1524 (60.0) 1524 (60.0) 1524 (60.0) 876 (34.4) 563 (22.1) 438 (17.2) 305 (12.0)</td>
</tr>
<tr>
<td>ET080</td>
<td>A04</td>
<td>792 (31.2) 792 (31.2) 674 (26.5) 426 (16.7) 293 (11.5) 178 (7.0) 125 (4.9) 91 (3.5)</td>
</tr>
<tr>
<td></td>
<td>B04</td>
<td>318 (12.5) 318 (12.5) 318 (12.5) 318 (12.5) 318 (12.5) 203 (8.0) 144 (5.6) 106 (4.1)</td>
</tr>
<tr>
<td></td>
<td>B02</td>
<td>635 (25.0) 635 (25.0) 635 (25.0) 635 (25.0) 635 (25.0) 393 (15.5) 282 (11.1) 206 (8.1)</td>
</tr>
<tr>
<td></td>
<td>B01</td>
<td>1270 (50.0) 1270 (50.0) 1270 (50.0) 1270 (50.0) 1270 (50.0) 785 (30.9) 565 (22.2) 414 (16.2)</td>
</tr>
</tbody>
</table>

1. Parallel driven unit efficiency = inline efficiency x 0.9
2. Repeatability is unidirectional achieved under ideal conditions and slow speeds. Actual repeatability may vary with the application.
3. ACME screw backlash will increase over time due to the nature of the friction bearing. Initial values <0.009".
4. Zero-backlash, pre-loaded ball screws are available as a special option. Thrust capacity and life may be derated with preloaded option.
# ET Specifications

## ET Screw Overview

<table>
<thead>
<tr>
<th>Units</th>
<th>ET100</th>
<th>ET125</th>
</tr>
</thead>
<tbody>
<tr>
<td>A04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B05</td>
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<tr>
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</tr>
<tr>
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## Thrust & Speed Limits

<table>
<thead>
<tr>
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<th>ET100</th>
<th>ET125</th>
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<tbody>
<tr>
<td>Max Thrust Fx (lbf (N))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Speed (in/s)</td>
<td>15.6</td>
<td></td>
</tr>
<tr>
<td>Max Speed (mm/s)</td>
<td>396</td>
<td></td>
</tr>
<tr>
<td>Max Acceleration (in/s²)</td>
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<tr>
<td>Max Travel in (mm)</td>
<td>59.0</td>
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## System Characteristics

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<tr>
<td>Screw Lead (in/rev)</td>
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<tr>
<td>Efficiency - inline</td>
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<td>30%</td>
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<tr>
<td>Max Breakaway Torque</td>
<td>385</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>±0.001</td>
<td></td>
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<tr>
<td>System Backlash</td>
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</table>

## Reflected Rotational Inertia

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</thead>
<tbody>
<tr>
<td>Base Inline Unit Inertia, 100mm travel (oz-in²)</td>
<td>35.3</td>
<td></td>
</tr>
<tr>
<td>Base Parallel Unit Inertia, 100mm travel (oz-in²)</td>
<td>37.4</td>
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</tr>
<tr>
<td>Additional Inertia per 100mm travel (oz-in²/100mm)</td>
<td>8.6</td>
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## Weight & Inertia Data

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<tr>
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<th>ET125</th>
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</thead>
<tbody>
<tr>
<td>Base Unit Weight, 100mm travel (lb (kg))</td>
<td>31.5 (14.3)</td>
<td>62.0 (28.2)</td>
</tr>
<tr>
<td>Additional Travel Weight per 100mm travel (lb (kg)/100mm)</td>
<td>4.4 (2.0)</td>
<td>9.24 (4.4)</td>
</tr>
</tbody>
</table>

1. Parallel driven unit efficiency = inline efficiency x 0.9
2. Repeatability is unidirectional achieved under ideal conditions and slow speeds. Actual repeatability may vary with the application
3. ACME screw backlash will increase over time due to the nature of the friction bearing. Initial values <0.009"
4. Zero-backlash, pre-loaded ball screws are available as a special option. Thrust capacity and life may be derated with preloaded option.

## Critical Speeds

<table>
<thead>
<tr>
<th>Model</th>
<th>Lead</th>
<th>Critical Speed: mm/s (in/s) vs. Stroke: mm</th>
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<tr>
<td></td>
<td>50 - 200</td>
<td>300</td>
</tr>
<tr>
<td>ET100</td>
<td>A04</td>
<td>792 (31.2)</td>
</tr>
<tr>
<td></td>
<td>B04</td>
<td>212 (8.3)</td>
</tr>
<tr>
<td></td>
<td>B02</td>
<td>423 (16.7)</td>
</tr>
<tr>
<td></td>
<td>B05</td>
<td>1588 (62.5)</td>
</tr>
<tr>
<td>ET125</td>
<td>M05</td>
<td>200 (7.9)</td>
</tr>
<tr>
<td></td>
<td>M10</td>
<td>400 (15.7)</td>
</tr>
<tr>
<td></td>
<td>M20</td>
<td>533 (20.9)</td>
</tr>
<tr>
<td></td>
<td>M50</td>
<td>1333 (52.5)</td>
</tr>
</tbody>
</table>

## Operating Temperature Range

0°C to 60°C (32°F to 140°F)
ET Performance Curves

**ET032-A08**
Acme Screw, 0.125" Lead

**ET032A04**
Acme Screw, 0.250" Lead

**ET032B08**
Ball Screw, 0.125" Lead

**ET032B08**
Ball Screw, 0.125" Lead

**ET032-B02**
Ball Screw, 0.500" Lead

Maximum velocity is limited for longer stroke lengths. Reference stroke limits on right edge of graphs.

---

Actuator Division

1-866-PARK-ACT
Maximum velocity is limited for longer stroke lengths. Reference stroke limits on right edge of graphs.
Maximum velocity is limited for longer stroke lengths. Reference stroke limits on right edge of graphs.
### Rod Side Loading

The ET Series Electric Cylinder incorporates a generous rod bearing and a unique triple bearing anti-rotate assembly. However, care should be taken to limit the amount of side loading exerted on the cylinder rod. The charts below show basic load data for various stroke lengths of cylinders. Note that the load capacity increases as the available stroke increases due to greater bearing separation. For greater load capacity for a given application, a cylinder can be specified with a longer stroke, then "shortstroked" in the application.

For example, an ET32 with 450 mm of stroke has a maximum load capacity of 2 kg at full extension. An ET32 with 600 mm of available stroke, used in the same application, but only stroked to 450 mm would have a maximum side load capacity of 9.5 kg.

**Note:** If an application requires more side load than an ET cylinder allows, an optional Linear Rod Guide Module can be specified.

#### To use charts:
1. Find the chart and curve for the chosen model number and maximum stroke (stroke length of each curve is shown in blue text).
2. Find the corresponding maximum rod load permissible at the desired stroke distance as measured from full retraction.
3. Rod side load is assumed to be perpendicularly applied directly at the rod end.

#### Important:
- Load data is applicable for cylinders with side load applied in plane parallel to bottom tapped holes in cylinder. This ensures internal double support rollers on screw carriage are properly loaded. (Internal rollers are located on sides of cylinder with reference to the switch groove on top of the cylinder. ET100 and ET125 have switch grooves on all 4 sides.)

---

**Actuator Division**

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1-866-PARK-ACT
Lead Screw Life Expectancy

Acme Screw Life: As a result of the high friction inherent to acme screws, life expectancy is unpredictable. Load, duty cycle, speed, temp, and lubrication all affect the amount of heat generated and thread wear by the acme nut which ultimately determines the life of the mechanism. Acme screws typically have lower life expectancies than ball screws and should only be used in low duty cycle applications.

Ball Screw Life: Ball screws are high efficiency mechanisms that utilize a rolling friction, ball bearing nut to translate rotary motion and torque to linear motion and thrust. Life expectancy can be predicted by comparing the effective load to the screw’s basic dynamic load rating. Basic dynamic load rating is the load at which a screw has a 90% probability of achieving 1,000,000 revs of life before metal fatigue develops – L10 life.

To Use Charts:

1. Determine required life in millions of inches of travel.
   Life is determined by multiplying the total stroke in inches by the total number of strokes required for the designed life of the equipment.

2. Calculate the equivalent load \( L_m \).
   \[
   L_m = \sqrt{\frac{\%_1 (L_1)^2 + \%_2 (L_2)^2 + \%_3 (L_3)^2 + \ldots + \%_n (L_n)^2}{100}}
   \]
   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

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.

For more detailed information and examples on calculating screw life, reference the ET technical manual.
Linear Rod Guide Module
Rod End Code R

Some applications may require guided rod movement or may experience side loads exerted on the cylinder rod. The Linear Rod Guide Module is a simple, bolt-on accessory that will support significant side loads and extend the life of the cylinder rod bearing.

Notes:
1) Please consider switch groove mounting orientation when using linear rod guide module and parallel style motor mounting.
2) Not compatible with B, G, J, or N mounting options.
3) Not available with ET125 units.

Features
- Anti-rotation is achieved by two stainless steel guide rods. The linear rod is attached to the end plate by a self-aligning coupling.
- Four linear ball bearings running on fixed guide rods provide accuracy, stability and rigidity.
- The units provide high resistance to torque loading and greatly increase cylinder side load bearing capacity.
- The cast aluminum body is a compact and light weight design and provides mounting in vertical or horizontal positions. The front flange plate incorporates several threaded and drilled holes for easy connection to customer tooling.

Ordering Information

<table>
<thead>
<tr>
<th>Cylinder</th>
<th>Rod Guide Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET032</td>
<td>32-2800R-****</td>
</tr>
<tr>
<td>ET050</td>
<td>50-2800R-****</td>
</tr>
<tr>
<td>ET080</td>
<td>80-2800R-****</td>
</tr>
<tr>
<td>ET100</td>
<td>100-2800R-****</td>
</tr>
</tbody>
</table>

**** = stroke in mm, i.e. 50-2800R-0200 for 200mm stroke length. Specify same stroke as ordered on the matching ET cylinder.

NOTE:
To order Linear Rod Guide Module mounted to cylinder, specify “R” for Cylinder Rod End in Model Code.

Permissible Torque
Use the following formula to calculate the moment loading of the rod guide.

\[ C(\text{lb-in}) = F(\text{lb}) \times L(\text{in}) \]

To use chart:
1. Vertical axis indicates maximum torque capacity for specified conditions.
2. For greater torque capacity, either reduce stroke distance or use larger size actuator.

Linear Rod Guide Module
Attached to an ET032 Cylinder
The linear rod guide module load and deflection ratings are in the charts below. All load capacities are based on one million meters of travel. To use charts:

1. For given size module, determine permissible deflection for application, based on stroke distance.
2. Maximum load capacity is indicated by upper curve.
3. Deflections are shown on lower curves.
**ET Basic Dimensions**

![Diagram of ET Basic Dimensions](image)

### Basic Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>AM</th>
<th>ØB</th>
<th>BG</th>
<th>BH</th>
<th>DD</th>
<th>DD1</th>
<th>E</th>
<th>F</th>
<th>KV</th>
<th>A/F</th>
<th>KV</th>
<th>ØMM</th>
<th>TG</th>
<th>VE</th>
<th>WH</th>
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<tbody>
<tr>
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<td>30.0</td>
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<td>M6x1</td>
<td>M6x1</td>
<td>46.5</td>
<td>16.0</td>
<td>M10x1.25</td>
<td>10.0</td>
<td>4.8</td>
<td>10.0</td>
<td>18.0</td>
<td>32.5</td>
<td>13.0</td>
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<tr>
<td>ET050</td>
<td>16.0</td>
<td>32.0</td>
<td>40.0</td>
<td>16.0</td>
<td>12.7</td>
<td>M8x1.25</td>
<td>M8x1.25</td>
<td>63.5</td>
<td>24.0</td>
<td>M16x1.5</td>
<td>17.0</td>
<td>6.4</td>
<td>25.0</td>
<td>46.5</td>
<td>16.0</td>
<td>37.0</td>
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<tr>
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<td>40.0</td>
<td>50.0</td>
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<td>17.5</td>
<td>M10x1.5</td>
<td>M10x1.5</td>
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<td>30.0</td>
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<td>M12x1.75</td>
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### Stroke Chart (Add Stroke Length to Dimension)

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<th>GF°</th>
<th>XD°</th>
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<td>192.0</td>
<td>277.0</td>
<td>308.0</td>
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<td>550.8</td>
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<td>576.8</td>
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<td>369.5</td>
<td>537.8</td>
<td>603.8</td>
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</tbody>
</table>

*Dimensions shown on mounting options pages.*

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### Actuator Division

1-866-PARK-ACT
Motor Mounting

**Inline (Direct Drive)**
Dimensions L1 and L2 are dependent on drive motor dimensions. Consult factory.

**Parallel (Timing Belt)**

### Common Dimensions

<table>
<thead>
<tr>
<th>Size</th>
<th>ØBB</th>
<th>P1</th>
<th>P3</th>
<th>P4</th>
<th>VD</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>30.0 (1.18)</td>
<td>106.4 (4.19)</td>
<td>36.4 (1.43)</td>
<td>14.0 (0.55)</td>
<td>4.0 (0.16)</td>
<td>46.5 (1.83)</td>
</tr>
<tr>
<td>50</td>
<td>40.0 (1.57)</td>
<td>139.5 (5.49)</td>
<td>39.3 (1.55)</td>
<td>14.4 (0.57)</td>
<td>4.0 (0.16)</td>
<td>63.5 (2.50)</td>
</tr>
<tr>
<td>80</td>
<td>45.0 (1.77)</td>
<td>191.3 (7.53)</td>
<td>55.6 (2.19)</td>
<td>21.1 (0.83)</td>
<td>5.0 (0.20)</td>
<td>95.2 (3.75)</td>
</tr>
<tr>
<td>100</td>
<td>55.0 (2.17)</td>
<td>254.0 (10.0)</td>
<td>75.5 (2.97)</td>
<td>31.0 (1.22)</td>
<td>4.0 (0.16)</td>
<td>114.3 (4.50)</td>
</tr>
<tr>
<td>125</td>
<td>90.0 (3.54)</td>
<td>334.5 (13.17)</td>
<td>127.1 (5.00)</td>
<td>40.0 (1.57)</td>
<td>7.0 (0.28)</td>
<td>139.7 (5.50)</td>
</tr>
</tbody>
</table>

Dimensions P5 and P6 are dependent on drive motor dimensions. Consult factory.

**Parallel (Gear Drive)**

### Common Dimensions

<table>
<thead>
<tr>
<th>Size</th>
<th>ØBB</th>
<th>G1</th>
<th>G3</th>
<th>G4</th>
<th>VD</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>30.0 (1.18)</td>
<td>125.5 (4.94)</td>
<td>53.3 (2.10)</td>
<td>24.3 (0.96)</td>
<td>4.0 (0.16)</td>
<td>46.5 (1.83)</td>
</tr>
<tr>
<td>50</td>
<td>40.0 (1.57)</td>
<td>157.5 (6.20)</td>
<td>77.5 (3.05)</td>
<td>31.6 (1.24)</td>
<td>4.0 (0.16)</td>
<td>63.5 (2.50)</td>
</tr>
<tr>
<td>80</td>
<td>45.0 (1.77)</td>
<td>207.2 (8.16)</td>
<td>76.0 (2.99)</td>
<td>38.0 (1.50)</td>
<td>5.0 (0.20)</td>
<td>95.2 (3.75)</td>
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Dimensions G5 and G6 are dependent on drive motor dimensions. Consult factory.
ET Mounting Options

Foot Mounting (MS1)
Cylinder Mounting Code B
Parallel Motor Mounting only

<table>
<thead>
<tr>
<th>Cylinder</th>
<th>AH</th>
<th>AT</th>
<th>TR CRS</th>
<th>∅AB</th>
<th>AO</th>
<th>AU</th>
<th>TW</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET032</td>
<td>32.0 (1.26)</td>
<td>3.0 (0.12)</td>
<td>31.7/32.2 (1.25/1.27)</td>
<td>7.0 (0.28)</td>
<td>7.2 (0.28)</td>
<td>24.0 (0.94)</td>
<td>46.5 (1.83)</td>
</tr>
<tr>
<td>ET050</td>
<td>45.0 (1.77)</td>
<td>3.0 (0.12)</td>
<td>44.7/45.3 (1.76/1.78)</td>
<td>9.0 (0.35)</td>
<td>9.5 (0.37)</td>
<td>32.0 (1.26)</td>
<td>64.0 (2.52)</td>
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<tr>
<td>ET080</td>
<td>63.0 (2.48)</td>
<td>4.0 (0.16)</td>
<td>62.7/63.3 (2.47/2.49)</td>
<td>12.0 (0.47)</td>
<td>16.5 (0.65)</td>
<td>41.0 (1.61)</td>
<td>96.0 (3.78)</td>
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<tr>
<td>ET100</td>
<td>71.0 (2.80)</td>
<td>4.0 (0.16)</td>
<td>74.7/75.3 (2.94/2.96)</td>
<td>14.0 (0.55)</td>
<td>19.0 (0.75)</td>
<td>41.0 (1.61)</td>
<td>113.0 (4.45)</td>
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<tr>
<td>ET125</td>
<td>90.0 (3.54)</td>
<td>8.3 (0.33)</td>
<td>90.4 (3.56)</td>
<td>17.0 (0.67)</td>
<td>25.0 (0.98)</td>
<td>45.0 (1.77)</td>
<td>140.0 (5.51)</td>
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Side Lug Mounting
Cylinder Mounting Code G
Not available with Q or M motor mounting.

<table>
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<th>Cylinder</th>
<th>TG</th>
<th>UF</th>
<th>FB</th>
<th>TM</th>
<th>MF</th>
<th>WH</th>
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</thead>
<tbody>
<tr>
<td>ET032</td>
<td>62.0 (2.44)</td>
<td>78.0 (3.07)</td>
<td>6.7 (0.266)</td>
<td>25.4 (1.00)</td>
<td>8.0 (0.315)</td>
<td>40.0 (1.57)</td>
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<tr>
<td>ET050</td>
<td>84.0 (3.31)</td>
<td>104.0 (4.09)</td>
<td>8.7 (0.344)</td>
<td>31.8 (1.25)</td>
<td>10.0 (0.394)</td>
<td>53.0 (2.09)</td>
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<tr>
<td>ET080</td>
<td>120.0 (4.72)</td>
<td>144.0 (5.65)</td>
<td>11.0 (0.433)</td>
<td>38.1 (1.50)</td>
<td>12.0 (0.472)</td>
<td>67.0 (2.64)</td>
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<tr>
<td>ET100</td>
<td>150.0 (5.91)</td>
<td>185.0 (7.28)</td>
<td>12.8 (0.50)</td>
<td>57.2 (2.25)</td>
<td>12.0 (0.472)</td>
<td>78.0 (3.09)</td>
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<tr>
<td>ET125</td>
<td>175.0 (6.89)</td>
<td>210.0 (8.27)</td>
<td>17.0 (0.67)</td>
<td>69.9 (2.75)</td>
<td>20.0 (0.79)</td>
<td>110.0 (4.33)</td>
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Trunnion Mount (MT4)
Cylinder Mounting Code D

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<th>∅TD</th>
<th>R</th>
<th>TL</th>
<th>TM</th>
<th>∅AC</th>
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<tbody>
<tr>
<td>ET032</td>
<td>46.5 (1.83)</td>
<td>12.0 (0.47)</td>
<td>0.8 (0.03)</td>
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<td>18.0 (0.71)</td>
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<td>ET050</td>
<td>63.5 (2.50)</td>
<td>16.0 (0.63)</td>
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<td>75.0 (2.95)</td>
<td>25.0 (0.98)</td>
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<td>0.8 (0.03)</td>
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<td>110.0 (4.33)</td>
<td>30.0 (1.18)</td>
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<tr>
<td>ET100</td>
<td>114.3 (4.50)</td>
<td>25.0 (0.98)</td>
<td>1.6 (0.06)</td>
<td>25.0 (0.98)</td>
<td>132.0 (5.20)</td>
<td>40.0 (1.57)</td>
</tr>
<tr>
<td>ET125</td>
<td>139.7 (5.50)</td>
<td>32.0 (1.26)</td>
<td>2.0 (0.08)</td>
<td>32.0 (1.26)</td>
<td>149.7 (5.89)</td>
<td>45.0 (1.77)</td>
</tr>
</tbody>
</table>

* See stroke chart on page 14.
## ET Mounting Options

### Front & Rear Flange Mounting (MF1 & MF2)

Cylinder Mounting Codes J, H, N

*Inline Mounting not available with Rear Flange*

### Cylinder Mounting Codes

- **J**: Front & Rear Flange Mounting (MF1 & MF2)
- **H**: Inline Mounting not available with Rear Flange
- **N**: Rear Eye Mounting (MP4)

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<th>Cylinder</th>
<th>UF (mm)</th>
<th>E (mm)</th>
<th>TF (mm)</th>
<th>ØFB (mm)</th>
<th>R (mm)</th>
<th>W (mm)</th>
<th>MF (mm)</th>
<th>H (mm)</th>
<th>ØB (mm)</th>
<th>S (mm)</th>
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<td>47.0</td>
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<td>7.0/7.2 (0.27/0.28)</td>
<td>31.7/32.2 (1.25/1.27)</td>
<td>16.0 (0.63)</td>
<td>9.88/10.12 (0.39/0.40)</td>
<td>6.0 (0.24)</td>
<td>30.0 (1.18)</td>
<td>3.0 (0.12)</td>
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<tr>
<td>ET050</td>
<td>113.0</td>
<td>65.0</td>
<td>89.6/90.4 (3.53/3.56)</td>
<td>9.0/9.2 (0.35/0.36)</td>
<td>44.7/45.3 (1.76/1.78)</td>
<td>25.0 (0.98)</td>
<td>11.88/12.12 (0.47/0.48)</td>
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<td>40.0 (1.58)</td>
<td>4.0 (0.16)</td>
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<tr>
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<td>153.0</td>
<td>97.0</td>
<td>125.5/126.5 (4.94/4.98)</td>
<td>12.0/12.2 (0.47/0.48)</td>
<td>62.7/63.3 (2.47/2.49)</td>
<td>30.0 (1.18)</td>
<td>15.88/16.12 (0.62/0.63)</td>
<td>11.0 (0.43)</td>
<td>50.0 (1.97)</td>
<td>4.0 (0.16)</td>
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<td>111.0</td>
<td>149.5/150.5 (5.89/5.93)</td>
<td>14.0/14.2 (0.55/0.56)</td>
<td>74.7/75.3 (2.94/2.96)</td>
<td>35.0 (1.38)</td>
<td>15.88/16.12 (0.62/0.63)</td>
<td>12.0 (0.47)</td>
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<td>4.0 (0.16)</td>
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<tr>
<td>ET125</td>
<td>220.0</td>
<td>139.5</td>
<td>179.9/180.1 (7.08/7.09)</td>
<td>16.9/17.1 (0.66/0.67)</td>
<td>89.9/90.1 (3.54/3.55)</td>
<td>53.0 (2.09)</td>
<td>19.9/20.1 (0.78/0.79)</td>
<td>13.0 (0.51)</td>
<td>90.0 (3.54)</td>
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*See stroke chart on page 14.*

### Rear Eye Mounting (MP4)

Cylinder Mounting Code E

*Parallel Motor Mounting only*

### Rear Clevis (MP2-R)

Cylinder Mounting Code C

*Parallel Motor Mounting only*

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<th>EW (mm)</th>
<th>ØCD (mm)</th>
<th>MR (mm)</th>
<th>FL (mm)</th>
<th>L (mm)</th>
<th>CB Rear Only (mm)</th>
<th>UB (mm)</th>
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<tbody>
<tr>
<td>ET032</td>
<td>25.3/25.8 (0.99/1.02)</td>
<td>10.0 (0.39)</td>
<td>10.0 (0.39)</td>
<td>22.0 (0.87)</td>
<td>12.0 (0.47)</td>
<td>26.0 (1.02)</td>
<td>44.4/45.0 (1.75/1.77)</td>
</tr>
<tr>
<td>ET050</td>
<td>31.3/31.8 (1.23/1.25)</td>
<td>12.0 (0.47)</td>
<td>13.0 (0.51)</td>
<td>27.0 (1.06)</td>
<td>15.0 (0.59)</td>
<td>32.0 (1.26)</td>
<td>59.2/60.0 (2.33/2.36)</td>
</tr>
<tr>
<td>ET080</td>
<td>49.7/49.8 (1.96/1.96)</td>
<td>16.0 (0.63)</td>
<td>20.0 (0.79)</td>
<td>36.0 (1.42)</td>
<td>20.0 (0.79)</td>
<td>50.0 (1.97)</td>
<td>89.4/90.0 (3.52/3.54)</td>
</tr>
<tr>
<td>ET100</td>
<td>59.3/59.8 (2.33/2.35)</td>
<td>20.0 (0.79)</td>
<td>22.0 (0.87)</td>
<td>41.0 (1.61)</td>
<td>25.0 (0.98)</td>
<td>60.0 (2.36)</td>
<td>109.0/110.0 (4.29/4.33)</td>
</tr>
<tr>
<td>ET125</td>
<td>29.6/30.0 (1.17/1.18)</td>
<td>20.0 (0.79)</td>
<td>29.0 (1.14)</td>
<td>73.0 (2.87)</td>
<td>32.0 (1.26)</td>
<td>30.0 (1.18)</td>
<td>60.0 (2.36)</td>
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*See stroke chart on page 14.*
ET Rod End Options

Male
Rod End Code M (Metric)
Rod End Code K (inch)

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<th>A (Metric)</th>
<th>ØB (Metric)</th>
<th>KK (Metric)</th>
<th>KK (Inch)</th>
<th>KV (Metric)</th>
<th>LA (Metric)</th>
<th>ØMM (Metric)</th>
<th>WH (Metric)</th>
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<tbody>
<tr>
<td>ET032</td>
<td>22.0 (0.87)</td>
<td>30.0 (1.18)</td>
<td>M10 x 1.25</td>
<td>7/16-20</td>
<td>10.0 (0.39)</td>
<td>35.0 (1.38)</td>
<td>18.0 (0.71)</td>
<td>26.0 (1.02)</td>
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<tr>
<td>ET050</td>
<td>32.0 (1.26)</td>
<td>40.0 (1.57)</td>
<td>M16 x 1.5</td>
<td>5/8-18</td>
<td>17.0 (0.67)</td>
<td>53.0 (2.09)</td>
<td>25.0 (0.98)</td>
<td>37.0 (1.46)</td>
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<tr>
<td>ET080</td>
<td>40.0 (1.57)</td>
<td>50.0 (1.97)</td>
<td>M20 x 1.5</td>
<td>3/4-16</td>
<td>22.0 (0.87)</td>
<td>66.0 (2.60)</td>
<td>35.0 (1.38)</td>
<td>46.0 (1.81)</td>
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<tr>
<td>ET100</td>
<td>54.0 (2.13)</td>
<td>65.0 (2.56)</td>
<td>M27 x 2.0</td>
<td>1-14</td>
<td>27.0 (1.06)</td>
<td>85.0 (3.35)</td>
<td>50.0 (1.97)</td>
<td>51.0 (2.01)</td>
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<tr>
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<td>71.5 (2.81)</td>
<td>90.0 (3.54)</td>
<td>M36 x 2.0</td>
<td>1³⁄₈-12</td>
<td>41.0 (1.61)</td>
<td>119.1 (4.69)</td>
<td>70.0 (2.76)</td>
<td>73.0 (2.87)</td>
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Female
Rod End Code F (Metric)

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<th>ØB (Metric)</th>
<th>KK (Metric)</th>
<th>KV (Metric)</th>
<th>ØMM (Metric)</th>
<th>WH (Metric)</th>
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<tbody>
<tr>
<td>ET032</td>
<td>15.0 (0.59)</td>
<td>30.0 (1.18)</td>
<td>M10 x 1.25</td>
<td>12.0 (0.47)</td>
<td>18.0 (0.71)</td>
<td>32.0 (1.26)</td>
</tr>
<tr>
<td>ET050</td>
<td>25.0 (0.98)</td>
<td>40.0 (1.57)</td>
<td>M16 x 1.5</td>
<td>20.0 (0.79)</td>
<td>25.0 (0.98)</td>
<td>50.0 (1.96)</td>
</tr>
<tr>
<td>ET080</td>
<td>30.0 (1.18)</td>
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<td>M20 x 1.5</td>
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<td>59.0 (2.32)</td>
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<tr>
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<td>65.0 (2.56)</td>
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<td>37.0 (1.46)</td>
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<td>73.0 (2.87)</td>
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<tr>
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<td>55.0 (2.17)</td>
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Rod Clevis
Rod End Code C

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<th>CL (Metric)</th>
<th>CM (Metric)</th>
<th>LE (Metric)</th>
<th>CE (Metric)</th>
<th>AV (Metric)</th>
<th>ER (Metric)</th>
<th>ØCK (Metric)</th>
<th>K (A/F)</th>
<th>L (Metric)</th>
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</thead>
<tbody>
<tr>
<td>ET032</td>
<td>M10 x 1.25</td>
<td>26.0 (1.02)</td>
<td>10.2 +0.13,-0.05</td>
<td>20.0 (0.78)</td>
<td>40.0 (1.57)</td>
<td>20.0 (0.78)</td>
<td>14.0 (0.55)</td>
<td>10.0 +0.1</td>
<td>17.0 (0.67)</td>
<td>6.0 (0.24)</td>
</tr>
<tr>
<td>ET050</td>
<td>M16 x 1.5</td>
<td>39.0 (1.54)</td>
<td>16.2 +0.13,-0.05</td>
<td>32.0 (1.26)</td>
<td>64.0 (2.52)</td>
<td>32.0 (1.26)</td>
<td>22.0 (0.87)</td>
<td>16.0 +0.2</td>
<td>24.0 (0.94)</td>
<td>8.0 (0.31)</td>
</tr>
<tr>
<td>ET080</td>
<td>M20 x 1.5</td>
<td>52.5 (2.07)</td>
<td>20.1 +0.02,-0.0</td>
<td>40.0 (1.57)</td>
<td>80.0 (3.15)</td>
<td>40.0 (1.57)</td>
<td>30.0 (1.18)</td>
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<td>30.0 (1.18)</td>
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</tr>
<tr>
<td>ET100</td>
<td>M27 x 2.0</td>
<td>63.0 (2.48)</td>
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<td>54.0 (2.13)</td>
<td>110.0 (4.33)</td>
<td>56.0 (2.20)</td>
<td>35.0 (1.38)</td>
<td>30.0 +0.2</td>
<td>41.0 (1.61)</td>
<td>12.0 (0.47)</td>
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<tr>
<td>ET125</td>
<td>M36 x 2.0</td>
<td>70.0 (2.76)</td>
<td>35.0 (1.38)</td>
<td>72.0 (2.83)</td>
<td>144.0 (5.67)</td>
<td>72.0 (2.83)</td>
<td>57.0 (2.24)</td>
<td>35.0 (1.38)</td>
<td>55.0 (2.17)</td>
<td>18.0 (0.71)</td>
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</table>
ET Series

Actuator Division

1-866-PARK-ACT

ET Rod End Options

Rod End Options
Spherical Rod Eye
Rod End Code S

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<th>Cylinder</th>
<th>ØCN</th>
<th>EN</th>
<th>EU</th>
<th>AX</th>
<th>CH</th>
<th>ØEF</th>
<th>KK</th>
<th>J°</th>
<th>K (A/F)</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET032</td>
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<td>14.0 (0.55)</td>
<td>10.5 (0.41)</td>
<td>20.0 (0.79)</td>
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<td>M10 x 1.25</td>
<td>13</td>
<td>17.0 (0.66)</td>
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<tr>
<td>ET050</td>
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<td>64.0 (2.52)</td>
<td>42.0 (1.65)</td>
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<td>15</td>
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<td>ET125</td>
<td>35.0 (1.38)</td>
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<td>28.0 (1.10)</td>
<td>56.0 (2.20)</td>
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<td>80.0 (3.15)</td>
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Linear Rod Guide Module
Rod End Code R

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<th>B4</th>
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<th>B6</th>
<th>B7</th>
<th>B8</th>
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<td>78.0</td>
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<td>11</td>
<td>5.2</td>
<td>9</td>
<td>M6x1.00</td>
</tr>
<tr>
<td>ET050</td>
<td>70</td>
<td>137</td>
<td>63</td>
<td>132</td>
<td>100</td>
<td>46.5</td>
<td>50</td>
<td>19</td>
<td>15</td>
<td>85</td>
<td>20</td>
<td>103.5</td>
<td>70</td>
<td>9</td>
<td>14</td>
<td>6.4</td>
<td>11</td>
<td>M8x1.25</td>
</tr>
<tr>
<td>ET080</td>
<td>105</td>
<td>189</td>
<td>101.6</td>
<td>180</td>
<td>130</td>
<td>72</td>
<td>76</td>
<td>21</td>
<td>20</td>
<td>130</td>
<td>25</td>
<td>147</td>
<td>105</td>
<td>11</td>
<td>17</td>
<td>8.4</td>
<td>14</td>
<td>M10x1.50</td>
</tr>
<tr>
<td>ET100</td>
<td>130</td>
<td>213</td>
<td>120</td>
<td>200</td>
<td>150</td>
<td>89</td>
<td>76</td>
<td>24.5</td>
<td>20</td>
<td>150</td>
<td>25</td>
<td>171.5</td>
<td>130</td>
<td>11</td>
<td>17</td>
<td>8.4</td>
<td>14</td>
<td>M10x1.50</td>
</tr>
</tbody>
</table>

| Cylinder | E1 | E2 | E3 | ØF1 | G1 | H1 | H2 | L1 | L2 | L3 | L4 | L5 | N1 | P1 | P2 | P3 | Basic Unit, kg (lb) | Extra per 100mm Stroke, kg (lb) |
|----------|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|-----------------|-------------------------------|
| ET032    | 12 | 7 | 4 | 30 | 17 | 81 | 16 | 152 | 120 | 17 | 71 | 64 | 17 | 36 | 31.0 | 40 | 0.97 (2.14) | 0.175 (0.39) |
| ET050    | 16 | 9 | 9 | 40 | 27 | 119 | 23 | 193 | 150 | 25 | 79 | 89 | 24 | 42 | 44 | 50 | 2.56 (5.64) | 0.495 (1.09) |
| ET080    | 20 | 11 | 5 | 45 | 32 | 166 | 36 | 253 | 200 | 30 | 113 | 110 | 30 | 50 | 52 | 70 | 6.53 (14.4) | 0.770 (1.70) |
| ET100    | 20 | 11 | 5 | 55 | 55 | 190 | 45 | 273 | 220 | 30 | 128 | 138 | 30 | 49 | 51 | 70 | 8.76 (19.32) | 0.770 (1.70) |
Linear Alignment Coupler
Order separately from table below.

- Prevents binding and reduces side loads induced by misalignment.
- Increases cylinder life by reducing wear on rod and screw bearings.
- Simplifies cylinder installation and reduces assembly costs.
- Metric and Imperial thread type available.

**Brake**
A brake option is available on ET electric cylinders to prevent back driving of the cylinder rod when power is removed from the motor. The brake is a spring loaded, friction disc type that requires a separate power signal (24 VDC or 115 VAC) to the solenoid that releases the brake.

The brake option attaches directly to the rear of the ball or Acme screw, preventing movement of the cylinder rod for static conditions. Options which mount to the rear of the actuator are not available with the brake option.

---

### ET Other Options

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Order separately from table below.

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Preloaded Ball Screws
The introduction of a second ball nut, preloaded against the first ball nut, eliminates backlash in the ball screw. This option is available on all ball screw-actuator combinations. This option will increase overall actuator length.

Precision Ground Ball Screws
Substituting a precision ground ball screw for the standard rolled ball screw improves lead error and overall system accuracy.

Bellows (Rod Boot) Option
Protect the stainless steel thrust tube with a hypalon/polyester rod boot, or bellows. The bellows option is tied on both ends and shields the thrust tube from splatter. Special bellows installations are available for weld splatter.

Extended and Non-Standard Stroke Lengths
Where high linear speed is not crucial to the performance of the system, it may be possible to extend the standard length of any size actuator. Screw critical speed is a function of the diameter of the screw and the distance between its bearing supports. Additionally, non-standard or intermediate stroke lengths are available. Consult the factory for any special stroke needs.

Special Lubricants
The Actuator Division has provided special lubrication for drive screws and thrust tubes as specified by the customer. Non-silicon based greases are available for clean room and vacuum-rated applications.

Breather Tube Option
The aluminum actuator housing is an ideal platform for the installation of air fittings. Breather tubes may be fitted to either create positive pressurization (air purge) or create a vacuum to minimize particle contamination.

Special Rod Seals
Substances in the application environment or the environment itself may unfavorably react with the combination lip and wiper seal on the thrust tube (rod). Special materials are available to suit most applications.

High and Low Temperature Modifications
Aluminum and steel have different thermal expansion coefficients. It may be necessary to modify the fit tolerances on certain parts to accommodate extreme temperatures. Contact the factory if the application environment exceeds the recommended temperature range.

External Linear Potentiometer
Attached to the cylinder by a standard bracket mount, the external linear potentiometer can accommodate stroke lengths from 100 to 1400mm. Repeatability is 0.01% of full stroke. Available in 4-20mA or 0-10 VDC, the enclosure has an IP67 rating and is designed to meet CE requirements.

Double Stack Angular Contact Bearings
Available with sizes 50 and 80 actuators. The standard 50 has a maximum thrust rating of 720 pounds of thrust and the 80 1600 pounds of thrust. By using a double stack of angular contact bearings, the 50 series will provide 900 pounds of thrust and the 80 series will provide 2500 pounds of thrust.

IP65 Rating
The IP65 version is particularly suitable for washdown, external and contaminated environments in which the standard version could suffer long-term deterioration.
- Available for four sizes (32, 50, 80 & 100)
- Epoxy-coated cylinder body
- High performance dual position rod seal
- Optional metal scraper seal
- All external hardware in stainless steel
- Optional stainless steel rod ends and cylinder mountings
- Uses existing home and limit sensors
- Parallel or in-line motor mounting options retained
- Stroke length up to 1500mm
- Ballscrew pitches from 5-40mm/rev
- Thrust forces in excess of 20,000 N (4496 lbf)
- Speeds up to 2m/s
- High mechanical efficiency, typically 90%
- Some cylinder mountings not available with IP65 mounting. Consult factory.

Clean Room Requirements
Clean room applications often require modifications to actuators to make the product permissible in clean room environments. Special lubricants, bearing materials, seals, motors and couplers may be required to prepare an actuator for clean room environments. Parker has tested the ET for clean room rating. Based off the actuator and the drive mechanics, Parker can provide 1000 to 10 clean rating. Please consult Actuator Division Application Engineering Department for further information.
**Position Sensing Devices**

ET Series actuators are equipped with permanent nitrile barium magnets on the bearing carriage. These magnets serve to activate available Hall Effect sensors or reed switches. ET Series actuators include dual sensor/switch mounting grooves on one side of the actuator (see figure 1). The ETB100 has grooves on all sides. *Sensors must be ordered separately.*

**Comparing Sensors and Switches**

<table>
<thead>
<tr>
<th>Hall Effect</th>
<th>Reed</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO or NC</td>
<td>NO or NC</td>
</tr>
<tr>
<td>Fully adjustable travel</td>
<td>Fully adjustable travel</td>
</tr>
<tr>
<td>Solid state electronics</td>
<td>Mechanical reed</td>
</tr>
<tr>
<td>LED indicator</td>
<td>LED indicator</td>
</tr>
<tr>
<td>5-24 VDC</td>
<td>5-24VDC or 85-150 VAC</td>
</tr>
<tr>
<td>PNP and NPN</td>
<td>Low Amp and High Amp</td>
</tr>
<tr>
<td>Medium cost</td>
<td>Lowest cost</td>
</tr>
<tr>
<td>Long life</td>
<td>Medium life</td>
</tr>
</tbody>
</table>

**Dimensions**

1. Housing material: plastic
2. Cable type: ø3.3mm, 3C wire, 24AWG
3. Clamp screw: M3x6mm, stainless steel
4. Adjustable clamp: stainless steel
5. LED color when activated: red
6. IP67 and CE certified

**Hall Effect Sensors**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Type</th>
<th>LED Color</th>
<th>Logic</th>
<th>Cable/Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMH-1P</td>
<td>N.O.</td>
<td>Green</td>
<td>PNP</td>
<td>1.5m black with leads</td>
</tr>
<tr>
<td>SMH-1N</td>
<td>N.O.</td>
<td>Red</td>
<td>NPN</td>
<td></td>
</tr>
<tr>
<td>SMC-1P</td>
<td>N.C.</td>
<td>Yellow</td>
<td>PNP</td>
<td></td>
</tr>
<tr>
<td>SMC-1N</td>
<td>N.C.</td>
<td>White/Red</td>
<td>NPN</td>
<td></td>
</tr>
<tr>
<td>SMH-1PC</td>
<td>N.O.</td>
<td>Green</td>
<td>PNP</td>
<td>150mm black with connector*</td>
</tr>
<tr>
<td>SMH-1NC</td>
<td>N.O.</td>
<td>Red</td>
<td>NPN</td>
<td></td>
</tr>
<tr>
<td>SMC-1PC</td>
<td>N.C.</td>
<td>Yellow</td>
<td>PNP</td>
<td></td>
</tr>
<tr>
<td>SMC-1NC</td>
<td>N.C.</td>
<td>White/Red</td>
<td>NPN</td>
<td></td>
</tr>
</tbody>
</table>

* Order cable separately.

**Reed Switches**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Type</th>
<th>LED</th>
<th>Current Rating</th>
<th>Cable/Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMR-1</td>
<td>N.O.</td>
<td>Green</td>
<td>High</td>
<td>1.5m gray with leads</td>
</tr>
<tr>
<td>SMR-1L</td>
<td>N.O.</td>
<td>Red</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>SMD-1L</td>
<td>N.C.</td>
<td>Yellow</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>SMR-1C</td>
<td>N.O.</td>
<td>Green</td>
<td>High</td>
<td>150mm gray with connector*</td>
</tr>
<tr>
<td>SMR-1LC</td>
<td>N.O.</td>
<td>Red</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>SMD-1LC</td>
<td>N.C.</td>
<td>Yellow</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

* Order cable separately.

**Connector Option**

A mating cable/connector is available for sensors with the connector option. Hall Effect sensors use all three wires while reed switches use only blue and brown.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8786</td>
<td>5m (16 ft.) polyurethane covered cable/connector</td>
</tr>
</tbody>
</table>

---

Figure 1

Switch shown with optional 8mm miniature 3-pin circular plug with universal snap-in/locking device. Flying lead also available.
Hall Effect Sensors

Two types of Hall effect sensors are available for use with ET Series actuators. The normally open sensor is typically used for mid-position sensing, such as homing applications. The normally closed sensor is generally used to indicate over-travel at the end of the stroke, and is used in a safety circuit to prevent damage to components caused by over-travel.

![Hall Effect Sensor Schematic](image)

Note: End of travel sensors do not reduce available stroke.
ZETA6104 controls use NPN sensors for Home and End-of-Travel.

### Hall Effect Specifications

<table>
<thead>
<tr>
<th></th>
<th>Solid State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Solid State Type (PNP or NPN)</td>
</tr>
<tr>
<td>Switching Logic</td>
<td>Normally Open or Normally Closed</td>
</tr>
<tr>
<td>Supply Voltage Range</td>
<td>5 - 24 VDC</td>
</tr>
<tr>
<td>Switch Current</td>
<td>150 mA max</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>7 mA at 12 VDC, 14 mA at 24 VDC</td>
</tr>
<tr>
<td>Switching Response</td>
<td>500 Hz Maximum</td>
</tr>
<tr>
<td>Residual Voltage</td>
<td>0.8 V Maximum (150 mA)</td>
</tr>
<tr>
<td>Leakage Current</td>
<td>10 µA Maximum</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>100 M Ohm min.</td>
</tr>
<tr>
<td>Min. LED Current</td>
<td>1 mA</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-10° to 85°C (14° to 185°F)***</td>
</tr>
<tr>
<td>Lead Termination</td>
<td>1500 mm (60 in) or 150mm (6 in) w/connector</td>
</tr>
<tr>
<td>Industrial Protection</td>
<td>IP67</td>
</tr>
<tr>
<td>Shock Resistance</td>
<td>50 g's, 490 m/sec²</td>
</tr>
</tbody>
</table>

**Notes:**
* Polarity is restricted for DC operation: (+) to Brown (-) to Blue
  If these connections are reversed for TTL levels the contacts will close, but the LED will not light.
** Due to minimum current requirement, LED will not display when used with all Gemini 6K and 6K products.
*** Exceeds temperature range for ET Series mechanical components.

Reed Switches

Reed switches are available in a normally open or normally closed configuration. The low amp switch is suitable for connection to PLCs or other low current devices. The high amp switch can be used to drive sequencers, relays, coils, or other devices directly. Not compatible with TTL level I.O. Logic (switch will work with TTL level if wired backwards but LED will not light).

**DC Operation**

Required for proper operation 24VDC.
Put Diode parallel to load (CR) with polarity as shown.

- CR: Relay coil (under 0.5 W coil rating)

**AC Operation**

Recommended for longer switch life 125VAC.
Put resistor and capacitor parallel to load (CR).

- CR: Relay coil (under 2 W coil ratings)
- R: Resistor under 1 K Ohm
- C: Capacitor 0.1 µF

### Reed Switch Specifications

<table>
<thead>
<tr>
<th></th>
<th>Low Amp</th>
<th>High Amp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching Logic</td>
<td>Normally Open (NO) Normally Open (NO)</td>
<td></td>
</tr>
<tr>
<td>Voltage Rating</td>
<td>85-125 VAC (NO) 6-24 VDC (NO) 6-24 VAC, 6-24 VDC (NC)</td>
<td></td>
</tr>
<tr>
<td>Power Rating</td>
<td>Resistive load 10 Watts (NO) Inductive 5 Watts (NO) 3 Watts (NC)</td>
<td></td>
</tr>
<tr>
<td>Switching Current Range</td>
<td>Resistive load: 5-40 mA (NO) 5-25 mA (NC) Inductive load 5-25 mA</td>
<td></td>
</tr>
<tr>
<td>Min. LED Current</td>
<td>5 mA 18mA**</td>
<td></td>
</tr>
<tr>
<td>Switching Response</td>
<td>300 Hz (NO) 200 Hz (NC) 300 Hz max</td>
<td></td>
</tr>
<tr>
<td>Breakdown Voltage</td>
<td>200 VDC</td>
<td></td>
</tr>
<tr>
<td>Contact Resistance</td>
<td>100 M Ohm min.</td>
<td></td>
</tr>
<tr>
<td>Operating Temp.</td>
<td>-10° to 85°C (14° to 185°F)***</td>
<td></td>
</tr>
<tr>
<td>Lead Termination</td>
<td>1500 mm (60 in) or 150mm (6 in) w/connector</td>
<td></td>
</tr>
<tr>
<td>Industrial Protection</td>
<td>IP67</td>
<td></td>
</tr>
<tr>
<td>Shock Resistance</td>
<td>30 g’s, 300 m/sec²</td>
<td></td>
</tr>
</tbody>
</table>
ET Ordering Information

**ET**
- **Series**
- **Profile Size**
- **Drive Type**
- **Motor Mounting Style**
- **Drive Ratio**
- **Gearbox**

<table>
<thead>
<tr>
<th>Code</th>
<th>Profile Size</th>
<th>Code</th>
<th>Drive Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>032</td>
<td>32mm</td>
<td>B02</td>
<td>Ball Screw, 0.500 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B08</td>
<td>Ball Screw, 0.125 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A04</td>
<td>Acme Screw, 0.250 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A08</td>
<td>Acme Screw, 0.125 in. Lead</td>
</tr>
<tr>
<td>050</td>
<td>50mm</td>
<td>B01</td>
<td>Ball Screw, 1.000 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B02</td>
<td>Ball Screw, 0.500 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B05</td>
<td>Ball Screw, 0.200 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A05</td>
<td>Acme Screw, 0.200 in. Lead</td>
</tr>
<tr>
<td>080</td>
<td>80mm</td>
<td>B01</td>
<td>Ball Screw, 1.000 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B02</td>
<td>Ball Screw, 0.500 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B04</td>
<td>Ball Screw, 0.250 in. Lead</td>
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<td>A04</td>
<td>Acme Screw, 0.250 in. Lead</td>
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<td>100mm</td>
<td>B53</td>
<td>Ball Screw, 1.875 in. Lead</td>
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<td></td>
<td></td>
<td>B02</td>
<td>Ball Screw, 0.500 in. Lead</td>
</tr>
<tr>
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<td></td>
<td>B04</td>
<td>Ball Screw, 0.250 in. Lead</td>
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<tr>
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<td></td>
<td>A04</td>
<td>Acme Screw, 0.250 in. Lead</td>
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<tr>
<td>125</td>
<td>125mm</td>
<td>M50</td>
<td>Ball Screw, 50mm Lead</td>
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<tr>
<td></td>
<td></td>
<td>M20</td>
<td>Ball Screw, 20mm Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M10</td>
<td>Ball Screw, 10mm Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M05</td>
<td>Ball Screw, 5mm Lead</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Gearbox Option 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PX23</td>
</tr>
<tr>
<td>B</td>
<td>PS60 – Shaft Horizontal</td>
</tr>
<tr>
<td>C</td>
<td>PS60 - Shaft Vertical</td>
</tr>
<tr>
<td>D</td>
<td>PX34</td>
</tr>
<tr>
<td>E</td>
<td>PS90 - Shaft Horizontal</td>
</tr>
<tr>
<td>F</td>
<td>PS90 - Shaft Vertical</td>
</tr>
<tr>
<td>G</td>
<td>PX115</td>
</tr>
<tr>
<td>H</td>
<td>PS115 - Shaft Horizontal</td>
</tr>
<tr>
<td>J</td>
<td>PS115 - Shaft Vertical</td>
</tr>
<tr>
<td>K</td>
<td>PX56</td>
</tr>
<tr>
<td>L</td>
<td>PS142 - Shaft Horizontal</td>
</tr>
<tr>
<td>M</td>
<td>PS142 - Shaft Vertical</td>
</tr>
<tr>
<td>P</td>
<td>PV23FE</td>
</tr>
<tr>
<td>Q</td>
<td>PV34FE</td>
</tr>
<tr>
<td>0</td>
<td>No Gearbox</td>
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<table>
<thead>
<tr>
<th>Code</th>
<th>Gearbox Ratio</th>
</tr>
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<tbody>
<tr>
<td>00</td>
<td>Flange Only 2</td>
</tr>
<tr>
<td>03</td>
<td>3:1</td>
</tr>
<tr>
<td>04</td>
<td>4:1</td>
</tr>
<tr>
<td>05</td>
<td>5:1</td>
</tr>
<tr>
<td>07</td>
<td>7:1</td>
</tr>
<tr>
<td>10</td>
<td>10:1</td>
</tr>
<tr>
<td>15</td>
<td>15:1</td>
</tr>
<tr>
<td>20</td>
<td>20:1</td>
</tr>
<tr>
<td>25</td>
<td>25:1</td>
</tr>
<tr>
<td>30</td>
<td>30:1</td>
</tr>
<tr>
<td>40</td>
<td>40:1 (PS only)</td>
</tr>
<tr>
<td>50</td>
<td>50:1</td>
</tr>
<tr>
<td>70</td>
<td>70:1</td>
</tr>
<tr>
<td>A0</td>
<td>100:1</td>
</tr>
</tbody>
</table>

1 Not all motor/gearbox options physically fit on all cylinder sizes and mounting styles. Reference mounting matrix to determine suitable combinations. PS precision gearboxes are oil filled. Shaft orientation is required to insure proper oil fill levels.

2 When combined with Gearbox Option “0” (no gearbox), this option is direct mount with no flange included.

3 For ET032, ET050 and ET080, switch mounting groove access will be obstructed. The cylinder body can be rotated in 90° increments to remedy this. However, at 90° and 270°, the load capacity of the rod is reduced by half due to roller bearing orientation. At 180° the side load is unchanged.

**Actuator Division**

1-866-PARK-ACT
**ET Ordering Information**

**Motor**
- Code: F13
- Cylinder Mounting: F
- Rod End: M

**Body Orientation**
- Code: A
- Brake Option: N
- Standard Stroke: 0750
- Design Level: A

**Motor Option**
1. Not all motor/gearbox options physically fit on all cylinder sizes and mounting styles. Reference mounting matrix to determine suitable combinations. PS precision gearboxes are oil filled. Shaft orientation is required to insure proper oil fill levels.
2. Reference Motor Section for motor compatibility and coding.
3. Parallel motor mounting only.
5. Some parallel motor mounting styles obstruct access to limit switch grooves. Body orientation as viewed from rod end can be changed to avoid obstruction.
7. All screws have a critical speed limit that will cause damage to the actuator if exceeded. Consult factory or catalog for maximum speeds. Stroke is measured bumper to bumper.
8. Non-standard stroke lengths available in increments of 1mm.

**Cylinder Mounting**
- Code: F
  - Bottom Tap (Std)
- Code: B
  - Foot Mount
- Code: C
  - Rear Clevis
- Code: D
  - Trunnion
- Code: E
  - Rear Eye
- Code: G
  - Foot Side Lug
- Code: H
  - Rear Flange
- Code: J
  - Front Flange
- Code: N
  - Front and Rear Flange

**Motor Model**
- Code: 00
  - Motor Flange only
- Code: 01-99
  - Reference Motor Section for Specific Models (01-99)

**Rod End**
- Code: M
  - Metric Male (Std)
- Code: K
  - Imperial Male
- Code: C
  - Metric Clevis
- Code: F
  - Metric Female
- Code: S
  - Spherical Rod Eye
- Code: R
  - Linear Rod Guide Module

**Brake Option**
- Code: N
  - No Brake
- Code: E
  - 115VAC w/3.5m Flying Leads
- Code: F
  - 24VDC w/3.5m Flying Leads
- Code: G
  - 115VAC w/3-Pin Connector and 4m Mating Cable
- Code: H
  - 24VDC w/3-Pin Connector and 4m Mating Cable

**Standard Stroke**
- Code: 0050
  - 50mm (1.97 in.)
- Code: 0100
  - 100mm (3.94 in.)
- Code: 0150
  - 150mm (5.91 in.)
- Code: 0200
  - 200mm (7.87 in.)
- Code: 0300
  - 300mm (11.81 in.)
- Code: 0450
  - 450mm (17.72 in.)
- Code: 0600
  - 600mm (23.62 in.)
- Code: 0750
  - 750mm (29.53 in.)
- Code: 1000
  - 1000mm (39.37 in.)
- Code: 1250
  - 1250mm (49.21 in.)
- Code: 1500
  - 1500mm (59.05 in.)
- Code: xxxx
  - Non-standard Stroke

**Body Orientation**
- Code: A
  - 3 O’clock (obstructed by M)
- Code: B
  - 6 O’clock (obstructed by N)
- Code: C
  - 9 O’clock (obstructed by Q)
- Code: D
  - 12 O’clock (obstructed by P)

**Maximum Standard Stroke Length (Consult factory for longer lengths)**

<table>
<thead>
<tr>
<th>Code</th>
<th>ET032</th>
<th>ET050</th>
<th>ET080</th>
<th>ET100</th>
<th>ET125</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Rod Guide</td>
<td>750mm</td>
<td>1000mm</td>
<td>1500mm</td>
<td>1500mm</td>
<td>1500mm</td>
</tr>
<tr>
<td>w/Rod Guide</td>
<td>600mm</td>
<td>750mm</td>
<td>1000mm</td>
<td>1500mm</td>
<td>N/A</td>
</tr>
</tbody>
</table>

1 Not all motor/gearbox options physically fit on all cylinder sizes and mounting styles. Reference mounting matrix to determine suitable combinations. PS precision gearboxes are oil filled. Shaft orientation is required to insure proper oil fill levels.

3 Reference Motor Section for motor compatibility and coding.

4 Parallel motor mounting only.

5 Not compatible with M, N or Q motor mounting styles.

6 May obstruct switch grooves with body orientation A & C. Not compatible with G, J, D, B or N cylinder mounting. Rod Guide may limit maximum stroke length. Not available on ET125.

7 Some parallel motor mounting styles obstruct access to limit switch grooves. Body orientation as viewed from rod end can be changed to avoid obstruction.

8 Not compatible with cylinder mounting options B, C, E, H, N.

9 All screws have a critical speed limit that will cause damage to the actuator if exceeded. Consult factory or catalog for maximum speeds. Stroke is measured bumper to bumper.

10 Non-standard stroke lengths available in increments of 1mm.
ET Application Fax Form

Fax completed form to (330) 334-3335 or email to actuatorsales@parker.com

Contact Information:
Name ___________________________ Phone ___________________________
Company _________________________ email ___________________________
City, State, Zip __________________________

Application Sketch

NOTES:
Please include the critical dimensions in your sketch.
In order to achieve the best solution, it is important that you provide as much information as possible.

Motion Profile

<table>
<thead>
<tr>
<th>Moves</th>
<th>Distance (Stroke)</th>
<th>Time</th>
<th>Thrust or Load</th>
<th>Dwell</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Motion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second Motion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Third Motion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fourth Motion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Max. Rod Side Load

- X distance ________
- Y distance ________
- Force ________

Environmental Requirements
1. Operating Temperature
   Max ________ Min ________
2. Contamination (check one)
   □ Particle □ Liquid
   Type: __________________
3. Special Considerations __________________

Application Requirements:
1. Overall Stroke (add 25mm per end minimum) ____________
2. Cylinder Orientation (check one)
   □ Horizontal
   □ Angle: Degrees ________ □ Shaft Up □ Shaft Down
   □ Vertical: □ Shaft Up □ Shaft Down
3. Load/Tooling Weight __________________________
4. Repeatability Requirements __________________________
   □ Unidirectional □ Bidirectional
5. Is the load externally guided? (check one)
   □ Yes □ No
   If yes, how? __________________________
6. Life Requirements (cycles, distance or years)
   Hours per day ________ Days per year ________
7. Type of Screw
   □ Acme □ Ball Screw
8. Special Considerations __________________________

Please attach another sheet if more room is needed.
ET Application Fax Form

Cylinder Requirements
1. Rod End (check one)
   ☐ Metric Male (std) ☐ Metric Female ☐ Metric Clevis ☐ Spherical Rod Eye
   ☐ Linear Rod Guide ☐ Imperial Male ☐ Other ______________________

2. Mounting Style (check one) — * = Parallel Motor Mount only
   ☐ Bottom Tap (std) ☐ Foot Mount* ☐ Trunnion
   ☐ Front Flange ☐ Rear Flange* ☐ Foot Side Lug
   ☐ Rear Eye* ☐ Rear Clevis* ☐ Other ______________________

3. Motor Mounting (check one)
   ☐ Inline Mount ☐ Parallel Mount Position ______
   Parallel mounts can limit the actuator’s total thrust capacity.
   Parallel mount is also available in Reverse Parallel configuration. See catalog page 24.

Motor, Drive and Control Options:
1. Motor Options (check all that apply)
   ☐ Stepper ☐ Servo
   ☐ Parker Supplied ☐ Customer Supplied (provide print)
   ☐ Gearhead

2. Other Options (check one)
   ☐ Drive ☐ Drive/Controller ☐ Controller

3. Available Line Voltage

4. Switches/Sensors (quantity)
   End of Travel _______ Home _______

5. Brake Option (check one)
   ☐ Actuator* ☐ Motor ☐ None
   *With parallel motor mount only

6. Special Options __________________________________________
   __________________________________________________________
   __________________________________________________________

1-866-PARK-ACT 27 Actuator Division
ER Series Rodless Actuators

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Parker Hannifin Corporation
Actuator Division
Wadsworth, Ohio USA
Phone: 1-866-PARK-ACT
email: actuatorsales@parker.com
website: www.parker.com/actuator
**ER Series Rodless Actuator**
Automated linear motion can have a variety of requirements. Increasingly, programmability, high repeatability, and simplicity of design are among them. The ER Series from Parker Hannifin's Actuator Division was designed to provide a solution to a variety of linear motion applications by offering a low cost, modular design electric rodless actuator. The ER Series is available in three profile sizes as a belt-driven, Acme screw-driven or ball screw-driven unit. The load-bearing carriage is supported either by precision roller bearing wheels or an internally mounted square rail. Combined with a Parker Hannifin stepper or servo motor system, the ER Series offers full programmability and high resolution and repeatability. Backed by an industry-leading 2-year standard warranty and worldwide application support, the ER Series is the ideal solution to many linear motion applications.

**ER Markets and Applications**
With thousands of axes installed worldwide, the ER series rodless actuator has proven to be a robust and reliable solution for numerous motion control applications across many markets and industries. Listed below are some examples of where and how the ER series rodless actuator has been successfully applied.

### Markets and Industries Served

<table>
<thead>
<tr>
<th>Automotive</th>
<th>Life Sciences</th>
<th>Machine Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tire &amp; Rubber</td>
<td>Medical</td>
<td>Wood &amp; Lumber</td>
</tr>
<tr>
<td>Packaging</td>
<td>Conveyor</td>
<td>Research &amp; Testing</td>
</tr>
<tr>
<td>Glass / Fiber</td>
<td>Transportation</td>
<td>Food &amp; Beverage</td>
</tr>
<tr>
<td>Computer / Electronics</td>
<td>Pharmaceutical</td>
<td>Aerospace</td>
</tr>
<tr>
<td>Textile</td>
<td>Semiconductor</td>
<td>Factory Automation</td>
</tr>
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</table>

### Application Examples

<table>
<thead>
<tr>
<th>Discrete / Multi-Point Positioning</th>
<th>Small Area Gantry</th>
<th>Opposing Carriage</th>
<th>Complex Motion Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical Stackers / Elevator Lift</td>
<td>Pick &amp; Place</td>
<td>Door &amp; Hatch Closures</td>
<td>Flying Cut-to-Length</td>
</tr>
<tr>
<td>Scanning / Inspection</td>
<td>Contoured Glue Dispensing</td>
<td>Joining / Inserting</td>
<td>Crosscutting / Slitting</td>
</tr>
<tr>
<td>Lane Diverters</td>
<td>Part Load &amp; Unload</td>
<td>Clamping / Gripping</td>
<td>Mechanical Cam Replacement</td>
</tr>
<tr>
<td>Backstop Index</td>
<td>Profile Engraving / Etching</td>
<td>Stretching</td>
<td>High Speed Winding Traverse</td>
</tr>
<tr>
<td>Pneumatic Replacement</td>
<td>Storage &amp; Retrieval</td>
<td>Automated Pull Test</td>
<td>Web Tension Control</td>
</tr>
</tbody>
</table>
**Roller Bearing Carriage with Belt Drive**

- Steel reinforced drive belt
- Belt tensioning clamp
- Single-piece precision roller bearing carriage
- Stainless steel strip seal
- Nylatron roller bearing wheels
- Anodized aluminum actuator body
- Robust overtravel bumper

**Roller Bearing Carriage with Screw Drive**

- Stainless steel strip seal
- Single-piece precision roller bearing carriage
- Nylatron roller bearing wheels
- Parker step or brushless servo motor
- Quality rolled ball or Acme screw
- Hall Effect sensors or reed switches with attachment clamp
- Robust overtravel bumper
- Anodized aluminum actuator body
- Ball or Acme nut
- Angular contact thrust bearings
- Optional parallel motor mounting with timing belt (shown) or with gear drive

**Square Rail Bearing Carriage with Screw Drive**

- Robust overtravel bumper
- Stainless steel strip seal
- Single-piece aluminum carriage
- Angular contact thrust bearings
- Parker step or brushless servo motor
- Quality rolled ball or Acme screw
- Square rail bearing block (2)
- Precision linear guide rail
- Ball or Acme nut
- Anodized aluminum actuator body
Make your ER Selection based on what your application demands . . .

**Belt-Drive or Screw-Drive?**

**Belt Drive Systems offer...**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel-reinforced belt drive</td>
<td>Higher Speeds</td>
<td>Greater throughput</td>
</tr>
<tr>
<td>Quality low-cost design</td>
<td>Low cost positioning system</td>
<td>Lower total system cost</td>
</tr>
<tr>
<td>Simple, modular construction</td>
<td>Field serviceable</td>
<td>Shorter downtimes</td>
</tr>
</tbody>
</table>

**Screw Drive Systems offer...**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acme or ball screw drive</td>
<td>Higher thrust capability</td>
<td>Greater thrust in a smaller package</td>
</tr>
<tr>
<td>Quality rolled ball screws, milled Acme screws</td>
<td>Greater accuracy, repeatability</td>
<td>More precise positioning system, better machine performance</td>
</tr>
<tr>
<td>Self-locking Acme screws</td>
<td>Ideal for vertical applications</td>
<td>Greater machine safety</td>
</tr>
<tr>
<td>High efficiency ball screw assemblies</td>
<td>Higher duty cycle, greater system efficiency</td>
<td>Better throughput, longer cycle times</td>
</tr>
</tbody>
</table>

**Roller Bearing or Square Rail Bearing?**

**Roller Bearing Systems provide...**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precision ball bearing wheels</td>
<td>High efficiency, durable load support</td>
<td>Longer product life</td>
</tr>
<tr>
<td></td>
<td>Rolling friction rather than sliding</td>
<td>High duty cycles, longer product life</td>
</tr>
<tr>
<td></td>
<td>High speed capability</td>
<td>Higher throughput</td>
</tr>
<tr>
<td>Nylatron wheel covers</td>
<td>Low wheel wear</td>
<td>Longer carriage and actuator life</td>
</tr>
</tbody>
</table>

**Square Rail Systems provide...**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precision linear guide bearing (square rail)</td>
<td>Greater direct loading capacity</td>
<td>Ideal for heavier duty applications, longer life</td>
</tr>
<tr>
<td></td>
<td>Increased moment loading capacity</td>
<td>Allows for greater variety of more complex loading scenarios</td>
</tr>
<tr>
<td></td>
<td>High speed, smooth motion</td>
<td>Higher throughput, solid feel</td>
</tr>
<tr>
<td></td>
<td>Improved carriage stiffness</td>
<td>Reduced carriage play</td>
</tr>
</tbody>
</table>
### ER Screw Drive Overview

#### Performance Limits

<table>
<thead>
<tr>
<th>ER-Screw Overview</th>
<th>Units</th>
<th>ER032</th>
<th>ER050</th>
<th>ER080</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A08</td>
<td>B08</td>
<td>A05</td>
</tr>
<tr>
<td>Max Thrust Fx</td>
<td>lbf (N)</td>
<td>135 (600)</td>
<td>1600 (7120)</td>
<td></td>
</tr>
<tr>
<td>Max Speed</td>
<td>in/s</td>
<td>15.6</td>
<td>15.6</td>
<td>25.0</td>
</tr>
<tr>
<td>Max Acceleration</td>
<td>mm/s</td>
<td>396</td>
<td>792</td>
<td>396</td>
</tr>
<tr>
<td>Max Travel</td>
<td>in/s² (m/s²)</td>
<td>386 (9.8)</td>
<td>386 (9.8)</td>
<td>386 (9.8)</td>
</tr>
</tbody>
</table>

#### System Characteristics

<table>
<thead>
<tr>
<th>ER-Screw Overview</th>
<th>Units</th>
<th>ER032</th>
<th>ER050</th>
<th>ER080</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A08</td>
<td>B08</td>
<td>A05</td>
</tr>
<tr>
<td>Screw Lead</td>
<td>in/rev</td>
<td>0.125</td>
<td>0.250</td>
<td>0.125</td>
</tr>
<tr>
<td>Efficiency 1 - inline</td>
<td>%</td>
<td>48%</td>
<td>63%</td>
<td>90%</td>
</tr>
<tr>
<td>Max Breakaway Torque</td>
<td>oz-in</td>
<td>41</td>
<td>43</td>
<td>39</td>
</tr>
<tr>
<td>Repeatability 2 - inline / parallel</td>
<td>in</td>
<td>±0.001 / ±0.006</td>
<td>±0.001 / ±0.006</td>
<td>±0.001 / ±0.006</td>
</tr>
<tr>
<td>System Backlash 3,4</td>
<td>in</td>
<td>—</td>
<td>—</td>
<td>0.003</td>
</tr>
</tbody>
</table>

#### Reflected Rotational Inertia

<table>
<thead>
<tr>
<th>ER-Screw Overview</th>
<th>Units</th>
<th>ER032</th>
<th>ER050</th>
<th>ER080</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A08</td>
<td>B08</td>
<td>A05</td>
</tr>
<tr>
<td>Base Inline Unit Inertia, 50mm travel</td>
<td>oz-in²</td>
<td>0.136</td>
<td>0.157</td>
<td>0.136</td>
</tr>
<tr>
<td>Base Parallel Unit Inertia, 50mm travel</td>
<td>oz-in²</td>
<td>0.141</td>
<td>0.163</td>
<td>0.141</td>
</tr>
<tr>
<td>Additional Inertia per 100mm travel</td>
<td>oz-in²/100mm</td>
<td>0.027</td>
<td>0.027</td>
<td>0.027</td>
</tr>
</tbody>
</table>

#### Bearing Carriage Load Capacity

<table>
<thead>
<tr>
<th>ER-Screw Overview</th>
<th>Units</th>
<th>ER032</th>
<th>ER050</th>
<th>ER080</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A08</td>
<td>B08</td>
<td>A05</td>
</tr>
<tr>
<td>Normal Load Fz</td>
<td>lbf (N)</td>
<td>50 (222)</td>
<td>100 (445)</td>
<td>150 (667)</td>
</tr>
<tr>
<td>Side Load Fy</td>
<td>lbf (N)</td>
<td>16 (71)</td>
<td>30 (133)</td>
<td>50 (222)</td>
</tr>
<tr>
<td>Pitch Moment My</td>
<td>ft-lbf (Nm)</td>
<td>15 (20)</td>
<td>29 (39)</td>
<td>119 (161)</td>
</tr>
<tr>
<td>Roll Moment Mx</td>
<td>ft-lbf (Nm)</td>
<td>4 (5)</td>
<td>10 (14)</td>
<td>21 (28)</td>
</tr>
<tr>
<td>Yaw Moment Mz</td>
<td>ft-lbf (Nm)</td>
<td>7 (9)</td>
<td>35 (48)</td>
<td>15 (20)</td>
</tr>
</tbody>
</table>

#### Weight & Inertia Data

<table>
<thead>
<tr>
<th>ER-Screw Overview</th>
<th>Units</th>
<th>ER032</th>
<th>ER050</th>
<th>ER080</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A08</td>
<td>B08</td>
<td>A05</td>
</tr>
<tr>
<td>Base Unit Weight, 50mm travel</td>
<td>lb (kg)</td>
<td>4.82 (2.18)</td>
<td>10.35 (4.68)</td>
<td>27.03 (12.23)</td>
</tr>
<tr>
<td>Carriage Weight</td>
<td>lb (kg)</td>
<td>1.29 (0.58)</td>
<td>3.65 (1.65)</td>
<td>9.28 (4.20)</td>
</tr>
<tr>
<td>Additional Travel Weight</td>
<td>lb (kg)/100mm</td>
<td>0.50 (0.23)</td>
<td>1.13 (0.51)</td>
<td>2.64 (1.20)</td>
</tr>
</tbody>
</table>

1. Parallel driven unit efficiency = inline efficiency x 0.9
2. Repeatability is unidirectional achieved under ideal conditions and slow speeds. Actual repeatability may vary with the application.
3. ACME screw backlash will increase over time due to the nature of the friction bearing. Initial values <0.009".
4. Zero-backlash, pre-loaded ball screws are available as a special option. Thrust capacity may be derated with preloaded option.

**NOTE:** ER parallel mounting limits available output thrust. Reference ET force-speed curves for thrust performance with parallel mounting.
ER Belt Drive Overview

<table>
<thead>
<tr>
<th>ER-Belt Overview</th>
<th>Units</th>
<th>ER032</th>
<th>ER050</th>
<th>ER080</th>
</tr>
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<tbody>
<tr>
<td><strong>Performance Limits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Thrust (Belt Traction Force) Fx</td>
<td>lbf (N)</td>
<td>30 (134)</td>
<td>60 (267)</td>
<td>95 (400)</td>
</tr>
<tr>
<td>Max Speed</td>
<td>in/s (m/s)</td>
<td>140 (3.5)</td>
<td>200 (5.0)</td>
<td>200 (5.0)</td>
</tr>
<tr>
<td>Max Acceleration</td>
<td>in/s² (m/s²)</td>
<td>386 (9.8)</td>
<td>386 (9.8)</td>
<td>386 (9.8)</td>
</tr>
<tr>
<td>Max Travel</td>
<td>in (mm)</td>
<td>179 (4550)</td>
<td>179 (4550)</td>
<td>101 (2575)</td>
</tr>
</tbody>
</table>

| **System Characteristics** |       |       |       |       |
| Pulley Lead (travel distance per rev) | mm/rev | 70 | 100 | 150 |
| Pulley Diameter | in (mm) | 0.887 (22.28) | 1.253 (31.83) | 1.880 (47.75) |
| Pulley Tooth Count | # Teeth | 14 | 20 | 30 |
| Efficiency ¹ - inline | % | 90% | 90% | 90% |
| Max Breakaway Torque | oz-in | 45 | 94 | 141 |
| Repeatability ² - inline / parallel | in | ±0.004 / ±0.008 | ±0.004 / ±0.008 | ±0.004 / ±0.008 |
| System Backlash | in | 0.004 | 0.004 | 0.004 |

| **Reflected Rotational Inertia** |       |       |       |       |
| Base Unit Inertia, 50mm travel | oz-in² | 3.87 | 16.20 | 113.08 |
| Additional Inertia per 100mm travel | oz-in²/100mm | 0.02 | 0.03 | 0.05 |

| **Bearing Carriage Load Capacity** |       |       |       |       |
| Normal Load Fz | lbf (N) | 50 (222) | 100 (445) | 150 (667) |
| Side Load Fy | lbf (N) | 16 (71) | 30 (133) | 50 (222) |
| Pitch Moment My | ft-lbf (Nm) | 15 (20) | 29 (39) | 53 (72) |
| Roll Moment Mx | ft-lbf (Nm) | 4.5 (5) | 10 (14) | 24 (33) |
| Yaw Moment Mz | ft-lbf (Nm) | 7 (9) | 15 (20) | 23 (31) |

| **Weight & Inertia Data** |       |       |       |       |
| Base Unit Weight, 50mm travel | lb (kg) | 4.52 (2.05) | 10.17 (4.60) | 26.41 (11.95) |
| Carriage Weight | lb (kg) | 2.18 (0.99) | 3.32 (1.50) | 8.84 (4.00) |
| Additional Travel Weight | lb (kg) / 100mm | 0.43 (0.20) | 0.98 (0.45) | 2.15 (0.98) |

1. Parallel driven unit efficiency = inline efficiency x 0.9.
2. Repeatability is unidirectional achieved under ideal conditions and slow speeds. Actual repeatability may vary with the application.

Operating Temperature Range

0°C to 60°C (32°F to 140°F)

Extrusion Profiles

The ER Series lightweight aluminum extrusion body is available in three profile sizes to meet a broad range of application demands. The actuator body is designed with T-slots for easy access and adjustment of limit and home switches.
Roller Bearing Carriage Load Ratings

The ER series roller bearing carriage was designed with carriage life of 100,000,000 inches (2,540 km) when fully loaded. Certain factors, such as speed, temperature, and compound moment loading reduce the load capacity of the roller bearing carriage. Speed dependent de-ratings are already factored into the graphs below, but ambient temperature and compound loading must be examined as well.

The graphs below provide a “rough cut” evaluation of the loading capacities of the roller bearing carriage. The ER technical manual should be referenced for a more information on calculating and analyzing carriage loading.

**Temperature Factor:**

Use the graph below to determine the temperature de-rating factor. This factor should be multiplied by the values in the curves to determine de-rated load capacity due to temperature.

**Compound Loading:**

The roller bearings responsible for Yaw moments are independent of those designed to support Pitch & Roll moments. Thus, Yaw-Pitch and Yaw-Roll combinations are considered single-acting and can be analyzed separately. Pitch-Roll combinations, however, are considered compound moment loads and require the values shown to be de-rated. Use the right vertical axis (Compound Moment Load) on the graphs to analyze compound moment loads.

---

### Normal Load (Fz) vs. Speed

<table>
<thead>
<tr>
<th>Speed, mm/sec (in/sec)</th>
<th>ER80</th>
<th>ER50</th>
<th>ER32</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>89 (20)</td>
<td>266 (60)</td>
<td>266 (60)</td>
</tr>
<tr>
<td>1270</td>
<td>178 (40)</td>
<td>355 (80)</td>
<td>222 (60)</td>
</tr>
<tr>
<td>2540</td>
<td>266 (60)</td>
<td>355 (80)</td>
<td>133 (30)</td>
</tr>
<tr>
<td>3810</td>
<td>355 (80)</td>
<td>355 (80)</td>
<td>89 (20)</td>
</tr>
<tr>
<td>5080</td>
<td>355 (80)</td>
<td>355 (80)</td>
<td>44 (10)</td>
</tr>
<tr>
<td>6350</td>
<td>355 (80)</td>
<td>355 (80)</td>
<td>0</td>
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</table>

### Pitch Moment (My) vs. Speed

When determining the pitch moment arm, it is necessary to consider the distance from the top of the load attachment plate to the center of the carriage bearings. This distance (δ) is given in the table below.

<table>
<thead>
<tr>
<th>Profile</th>
<th>δ (in)</th>
<th>δ (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER32</td>
<td>1.53</td>
<td>38.8</td>
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<tr>
<td>ER50</td>
<td>1.98</td>
<td>50.3</td>
</tr>
<tr>
<td>ER80</td>
<td>2.85</td>
<td>72.4</td>
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</table>

### Yaw Moment (Mz) vs. Speed

<table>
<thead>
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<th>Speed, mm/sec (in/sec)</th>
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<th>ER50</th>
<th>ER32</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>7 (5)</td>
<td>7 (5)</td>
<td>3 (2.5)</td>
</tr>
<tr>
<td>1270</td>
<td>14 (10)</td>
<td>14 (10)</td>
<td>14 (10)</td>
</tr>
<tr>
<td>2540</td>
<td>20 (15)</td>
<td>20 (15)</td>
<td>14 (10)</td>
</tr>
<tr>
<td>3810</td>
<td>27 (20)</td>
<td>27 (20)</td>
<td>14 (10)</td>
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<td>5080</td>
<td>34 (25)</td>
<td>34 (25)</td>
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</tr>
<tr>
<td>6350</td>
<td>41 (30)</td>
<td>41 (30)</td>
<td>14 (10)</td>
</tr>
</tbody>
</table>

### Roll Moment (Mx) vs. Speed

<table>
<thead>
<tr>
<th>Speed, mm/sec (in/sec)</th>
<th>ER80</th>
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<th>ER32</th>
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<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1270</td>
<td>7 (5)</td>
<td>7 (5)</td>
<td>3 (2.5)</td>
</tr>
<tr>
<td>2540</td>
<td>14 (10)</td>
<td>14 (10)</td>
<td>14 (10)</td>
</tr>
<tr>
<td>3810</td>
<td>20 (15)</td>
<td>20 (15)</td>
<td>14 (10)</td>
</tr>
<tr>
<td>5080</td>
<td>27 (20)</td>
<td>27 (20)</td>
<td>14 (10)</td>
</tr>
<tr>
<td>6350</td>
<td>34 (25)</td>
<td>34 (25)</td>
<td>14 (10)</td>
</tr>
</tbody>
</table>

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1-866-PARK-ACT  
Actuator Division
Square Rail Carriage Load Ratings

The ER Series square rail carriage option is available on screw driven models only. The square rail carriage provides higher load carrying capacity than the standard roller bearing carriage. Also, unlike the roller bearing carriage, the square rail carriage load capacity remains constant throughout the ER screw driven series max speed range and ambient temperature rating. Refer to the graphs below to determine expected square rail bearing carriage life. The ER technical manual should be referenced for more detailed information on calculating and analyzing moment loads.

Pitch Moment

When determining the pitch moment arm, it is necessary to consider the distance from the top of the load attachment plate to the center of the carriage bearings. This distance (δ) is given in the table below.

<table>
<thead>
<tr>
<th>Profile</th>
<th>δ (in)</th>
<th>δ (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER32</td>
<td>1.90</td>
<td>48.3</td>
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<tr>
<td>ER50</td>
<td>2.50</td>
<td>63.5</td>
</tr>
<tr>
<td>ER80</td>
<td>3.50</td>
<td>88.9</td>
</tr>
</tbody>
</table>

Profile d (in) d (mm)

ER32 1.90 48.3
ER50 2.50 63.5
ER80 3.50 88.9

Pitch Moment

When determining the pitch moment arm, it is necessary to consider the distance from the top of the load attachment plate to the center of the carriage bearings. This distance (δ) is given in the table below.

<table>
<thead>
<tr>
<th>Profile</th>
<th>δ (in)</th>
<th>δ (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER32</td>
<td>1.90</td>
<td>48.3</td>
</tr>
<tr>
<td>ER50</td>
<td>2.50</td>
<td>63.5</td>
</tr>
<tr>
<td>ER80</td>
<td>3.50</td>
<td>88.9</td>
</tr>
</tbody>
</table>

Profile d (in) d (mm)

ER32 1.90 48.3
ER50 2.50 63.5
ER80 3.50 88.9
Lead Screw Life Expectancy

Acme Screw Life: As a result of the high friction inherent to acme screws, life expectancy is unpredictable. Load, duty cycle, speed, temp, and lubrication all affect the amount of heat generated and thread wear by the acme nut which ultimately determines the life of the mechanism. Acme screws typically have lower life expectancies than ball screws and should only be used in low duty cycle applications.

Ball Screw Life: Ball screws are high efficiency mechanisms that utilize a rolling friction, ball bearing nut to translate rotary motion and torque to linear motion and thrust. Life expectancy can be predicted by comparing the effective load to the screw's basic dynamic load rating. Basic dynamic load rating is the load at which a screw has a 90% probability of achieving 1,000,000 revs of life before metal fatigue develops – L10 life.

Calculate the effective load required by the application with the following formula and use the chart to determine life expectancy.

\[ L_m = \sqrt{\frac{\%_1 (L_1)^2 + \%_2 (L_2)^2 + \%_3 (L_3)^2 + \%_n (L_n)^2}{100}} \]

Where:
- \( L_m \) = equivalent load
- \( L_n \) = each increment of load
- \( \%_n \) = percent of stroke at load \( L_n \)

For more detailed information and examples on calculating screw life, reference the ER technical manual.

Deflection

Curves depict values for upright mounting only.

Deflection formulas and additional specifications are available in the ER technical manual.

Note: Diagonal line represents maximum deflection.
### ER Basic Dimensions – Belt Drive

**Belt Drive Actuator**

Standard Bottom Tap Mount (MS4)
Mounting Code F

![Diagram of Belt Drive Actuator](image)

**Dimensions, mm (inch)**

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>AH</th>
<th>AM</th>
<th>B</th>
<th>ØBB</th>
<th>BD x BI</th>
<th>C</th>
<th>CL</th>
<th>CM</th>
<th>D</th>
<th>DD x BG</th>
<th>DD x BH</th>
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</thead>
<tbody>
<tr>
<td>ER32</td>
<td>14.4</td>
<td>18.7</td>
<td>28.0</td>
<td>51.9</td>
<td>29.9</td>
<td>M4x0.7 x 8</td>
<td>364.2</td>
<td>222.1</td>
<td>28.0</td>
<td>210.1</td>
<td>M6x1.0 x 16</td>
<td>M6x1.0 x 8.8</td>
</tr>
<tr>
<td>ER50</td>
<td>18.4</td>
<td>23.7</td>
<td>40.0</td>
<td>68.9</td>
<td>40.0</td>
<td>M5x0.8 x 10</td>
<td>413.8</td>
<td>234.1</td>
<td>40.0</td>
<td>222.1</td>
<td>M8x1.25 x 18</td>
<td>M8x1.25 x 12</td>
</tr>
<tr>
<td>ER80</td>
<td>25.4</td>
<td>28.7</td>
<td>40.0</td>
<td>100.6</td>
<td>45.0</td>
<td>M8x1.25 x 16</td>
<td>538.6</td>
<td>282.1</td>
<td>40.0</td>
<td>270.1</td>
<td>M10x1.5 x 18</td>
<td>M10x1.5 x 17</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>E</th>
<th>F</th>
<th>H</th>
<th>J</th>
<th>L</th>
<th>N</th>
<th>P</th>
<th>S</th>
<th>T</th>
<th>TG</th>
<th>U</th>
<th>VD</th>
<th>W</th>
<th>WH</th>
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</thead>
<tbody>
<tr>
<td>ER32</td>
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<td>16.0</td>
<td>393.0</td>
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<td>196.5</td>
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<td>17.2</td>
<td>M2x8</td>
<td>8.7</td>
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<td>8.0</td>
<td>4.0</td>
<td>49.9</td>
<td>62.0</td>
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<tr>
<td>ER50</td>
<td>63.5</td>
<td>24.0</td>
<td>450.6</td>
<td>60.9</td>
<td>225.3</td>
<td>206.9</td>
<td>23.7</td>
<td>M2x8</td>
<td>8.7</td>
<td>46.5</td>
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<td>4.0</td>
<td>69.2</td>
<td>82.0</td>
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<tr>
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<td>95.3</td>
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<td>72.0</td>
<td>14.0</td>
<td>5.0</td>
<td>101.3</td>
<td>120.0</td>
</tr>
</tbody>
</table>

**Actuator Division**

1-866-PARK-ACT
**ER Basic Dimensions – Screw Drive**

**Screw Drive Actuator**  
Standard Bottom Tap Mount (MS4)  
Mounting Code F

---

**Inline Mounted Motor**

**Parallel Mounted Motor**

---

### Dimensions, mm (inch)

<table>
<thead>
<tr>
<th>Model</th>
<th>Model</th>
<th>A</th>
<th>AH</th>
<th>AM</th>
<th>B</th>
<th>Ø</th>
<th>BB</th>
<th>BD x BI</th>
<th>C</th>
<th>CL</th>
<th>CM</th>
<th>D</th>
<th>DD x BG</th>
<th>DD x BH</th>
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<tbody>
<tr>
<td>ER32</td>
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<td>14.0</td>
<td>(0.55)</td>
<td>18.2</td>
<td>(0.72)</td>
<td>28.0</td>
<td>(1.102)</td>
<td>M4x0.7 x 8</td>
<td>212.1</td>
<td>(8.35)</td>
<td>180.1</td>
<td>(7.09)</td>
<td>28.0</td>
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<td></td>
<td>51.8</td>
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<td>(1.18)</td>
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<td>(1.77)</td>
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<td></td>
<td>M10x1.5 x 18</td>
<td>M10x1.5 x 17</td>
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</table>

**Model** | **E** | **F** | **H** | **J** | **L** | **N** | **N2** | **S** | **T** | **TG** | **U** | **VD** | **VF** | **WH** |
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<tbody>
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<td>(0.63)</td>
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<td>42.6</td>
<td>(1.68)</td>
<td>120.1</td>
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<td>(4.18)</td>
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<td>(4.18)</td>
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<td>(1.28)</td>
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<td>(0.16)</td>
<td>4.0</td>
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<td>(4.48)</td>
<td>114.0</td>
<td>(4.49)</td>
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<td>(1.83)</td>
<td>8.0</td>
<td>(0.31)</td>
<td>4.0</td>
<td>(0.16)</td>
<td>16.0</td>
<td>(0.63)</td>
<td>82.0</td>
<td>(3.23)</td>
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<td>(1.18)</td>
<td>326.7</td>
<td>(12.86)</td>
<td>50.0</td>
<td>(1.97)</td>
<td>159.6</td>
<td>(6.29)</td>
<td>143.1</td>
<td>(5.63)</td>
<td>144.6</td>
<td>(5.69)</td>
</tr>
<tr>
<td></td>
<td>16.0</td>
<td>(0.63)</td>
<td>72.0</td>
<td>(2.83)</td>
<td>14.0</td>
<td>(0.55)</td>
<td>5.0</td>
<td>(0.20)</td>
<td>22.5</td>
<td>(0.89)</td>
<td>120.0</td>
<td>(4.72)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Roller bearing carriage and square rail carriage dimensions are identical.
**Motor Mounting**

**Inline (Direct Drive)**

Dimensions L1 and L2 are dependent on drive motor dimensions. Consult factory.

---

**Parallel (Timing Belt)**

**Common Dimensions**

<table>
<thead>
<tr>
<th>Size</th>
<th>Drive</th>
<th>ØBB</th>
<th>P1</th>
<th>P3</th>
<th>P4</th>
<th>VD</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>Screw</td>
<td>30.0 (1.18)</td>
<td>106.4 (4.19)</td>
<td>36.4 (1.43)</td>
<td>14.0 (0.55)</td>
<td>4.0 (0.16)</td>
<td>46.5 (1.83)</td>
</tr>
<tr>
<td></td>
<td>Belt</td>
<td>30.0 (1.18)</td>
<td>106.4 (4.19)</td>
<td>36.4 (1.43)</td>
<td>30.3 (1.19)</td>
<td>4.0 (0.16)</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Screw</td>
<td>40.0 (1.57)</td>
<td>139.5 (5.49)</td>
<td>39.3 (1.55)</td>
<td>14.4 (0.57)</td>
<td>4.0 (0.16)</td>
<td>63.5 (2.50)</td>
</tr>
<tr>
<td></td>
<td>Belt</td>
<td>40.0 (1.57)</td>
<td>139.5 (5.49)</td>
<td>39.3 (1.55)</td>
<td>34.7 (1.37)</td>
<td>4.0 (0.16)</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Screw</td>
<td>45.0 (1.77)</td>
<td>191.3 (7.53)</td>
<td>55.6 (2.19)</td>
<td>21.1 (0.83)</td>
<td>5.0 (0.20)</td>
<td>95.2 (3.75)</td>
</tr>
<tr>
<td></td>
<td>Belt</td>
<td>45.0 (1.77)</td>
<td>191.3 (7.53)</td>
<td>55.6 (2.19)</td>
<td>45.4 (1.79)</td>
<td>5.0 (0.20)</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions P5 and P6 are dependent on drive motor dimensions. Consult factory.

---

**Parallel (Gear Drive)**

**Common Dimensions**

<table>
<thead>
<tr>
<th>Size</th>
<th>Drive</th>
<th>ØBB</th>
<th>G1</th>
<th>G3</th>
<th>G4</th>
<th>VD</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>Screw</td>
<td>30.0 (1.18)</td>
<td>125.5 (4.94)</td>
<td>53.3 (2.10)</td>
<td>24.3 (0.96)</td>
<td>4.0 (0.16)</td>
<td>46.5 (1.83)</td>
</tr>
<tr>
<td></td>
<td>Belt</td>
<td>30.0 (1.18)</td>
<td>125.5 (4.94)</td>
<td>53.3 (2.10)</td>
<td>40.6 (1.60)</td>
<td>4.0 (0.16)</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Screw</td>
<td>40.0 (1.57)</td>
<td>157.5 (6.20)</td>
<td>77.5 (3.05)</td>
<td>31.6 (1.24)</td>
<td>4.0 (0.16)</td>
<td>63.5 (2.50)</td>
</tr>
<tr>
<td></td>
<td>Belt</td>
<td>40.0 (1.57)</td>
<td>157.5 (6.20)</td>
<td>77.5 (3.05)</td>
<td>51.7 (2.04)</td>
<td>4.0 (0.16)</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Screw</td>
<td>45.0 (1.77)</td>
<td>207.2 (8.16)</td>
<td>76.0 (2.99)</td>
<td>38.0 (1.50)</td>
<td>5.0 (0.20)</td>
<td>95.2 (3.75)</td>
</tr>
<tr>
<td></td>
<td>Belt</td>
<td>45.0 (1.77)</td>
<td>207.2 (8.16)</td>
<td>76.0 (2.99)</td>
<td>62.4 (2.46)</td>
<td>5.0 (0.20)</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions G5 and G6 are dependent on drive motor dimensions. Consult factory.

---

Visit [www.parker.com/actuator](http://www.parker.com/actuator) for 3D models.
### ER Actuator Mounting Options

#### Foot Mounting (MS1)
**Mounting Code B**

<table>
<thead>
<tr>
<th>Model</th>
<th>AH</th>
<th>AO</th>
<th>AT</th>
<th>AU</th>
<th>TR</th>
<th>TW</th>
<th>∅AB</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER32</td>
<td>32.0 (1.26)</td>
<td>7.2 (0.28)</td>
<td>3.0 (0.12)</td>
<td>24.0 (0.94)</td>
<td>32.0 (1.26)</td>
<td>46.5 (1.83)</td>
<td>7.0 (0.28)</td>
</tr>
<tr>
<td>ER50</td>
<td>45.0 (1.77)</td>
<td>9.5 (0.37)</td>
<td>3.0 (0.12)</td>
<td>32.0 (1.26)</td>
<td>45.0 (1.77)</td>
<td>64.0 (2.52)</td>
<td>9.0 (0.35)</td>
</tr>
<tr>
<td>ER80</td>
<td>63.0 (2.48)</td>
<td>16.5 (0.65)</td>
<td>4.0 (0.16)</td>
<td>41.0 (1.61)</td>
<td>63.0 (2.48)</td>
<td>96.0 (3.78)</td>
<td>12.0 (0.47)</td>
</tr>
</tbody>
</table>

#### Side Lug Mounting
**Mounting Code G**

#### Screw Drive

<table>
<thead>
<tr>
<th>Model</th>
<th>∅FB</th>
<th>MF</th>
<th>TG</th>
<th>TM</th>
<th>UF</th>
<th>WR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER32</td>
<td>6.7 (0.27)</td>
<td>8.0 (0.32)</td>
<td>62.0 (2.44)</td>
<td>25.4 (1.00)</td>
<td>78.0 (3.07)</td>
<td>18.0 (0.71)</td>
</tr>
<tr>
<td>ER50</td>
<td>8.7 (0.34)</td>
<td>10.0 (0.39)</td>
<td>84.0 (3.31)</td>
<td>31.8 (1.25)</td>
<td>104.0 (4.09)</td>
<td>22.0 (0.87)</td>
</tr>
<tr>
<td>ER80</td>
<td>11.0 (0.43)</td>
<td>12.0 (0.47)</td>
<td>120.0 (4.72)</td>
<td>38.1 (1.50)</td>
<td>144.0 (5.65)</td>
<td>21.6 (0.85)</td>
</tr>
</tbody>
</table>

#### Belt Drive

<table>
<thead>
<tr>
<th>Model</th>
<th>∅FB</th>
<th>MF</th>
<th>TG</th>
<th>TM</th>
<th>UF</th>
<th>WR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER32</td>
<td>6.7 (0.27)</td>
<td>8.0 (0.32)</td>
<td>62.0 (2.44)</td>
<td>25.4 (1.00)</td>
<td>78.0 (3.07)</td>
<td>18.0 (0.71)</td>
</tr>
<tr>
<td>ER50</td>
<td>8.7 (0.34)</td>
<td>10.0 (0.39)</td>
<td>84.0 (3.31)</td>
<td>31.8 (1.25)</td>
<td>104.0 (4.09)</td>
<td>22.0 (0.87)</td>
</tr>
<tr>
<td>ER80</td>
<td>11.0 (0.43)</td>
<td>12.0 (0.47)</td>
<td>120.0 (4.72)</td>
<td>38.1 (1.50)</td>
<td>144.0 (5.65)</td>
<td>21.6 (0.85)</td>
</tr>
</tbody>
</table>

#### Flange Mounting
**MF1 or MF2**

- Mounting Code J (Front)
- Mounting Code H (Rear)
- Mounting Code N (Front & Rear)

**NOTE:** When using this option, it is important that both ends of the actuator are supported.

<table>
<thead>
<tr>
<th>Model</th>
<th>∅FB</th>
<th>MF</th>
<th>MS</th>
<th>R</th>
<th>TF</th>
<th>UF</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER32</td>
<td>6.0 (0.24)</td>
<td>6.0 (0.24)</td>
<td>10.0 (0.39)</td>
<td>6.0 (0.24)</td>
<td>32.0 (1.26)</td>
<td>64.0 (2.52)</td>
</tr>
<tr>
<td>ER50</td>
<td>8.0 (0.32)</td>
<td>8.0 (0.32)</td>
<td>12.0 (0.47)</td>
<td>8.0 (0.32)</td>
<td>45.0 (1.77)</td>
<td>90.0 (3.54)</td>
</tr>
<tr>
<td>ER80</td>
<td>11.0 (0.43)</td>
<td>11.0 (0.43)</td>
<td>16.0 (0.63)</td>
<td>11.0 (0.43)</td>
<td>63.0 (2.48)</td>
<td>126.0 (4.96)</td>
</tr>
</tbody>
</table>
Brake Option

A brake option is available to prevent back driving of the carriage when power is removed from the motor. The brake is a spring loaded, friction disc type that requires a separate power signal (24 VDC or 115 VAC) to the solenoid that releases the brake. The brake option attaches directly to the rear of the ball or Acme screw, preventing movement of the cylinder rod or bearing carriage for static conditions.

Options which mount to the rear of the actuator are not available with the brake option. The brake should be used as a static brake only. It is not intended for dynamic braking.

For details, see ET section.
### Preloaded Ball Screws
The introduction of a second ball nut, preloaded against the first ball nut, eliminates backlash in the ball screw. This option is available on all ball screw-actuator combinations.

### Precision Ground Ball Screws
Substituting a precision ground ball screw for the standard rolled ball screw improves lead error and overall system accuracy.

### Extended and Non-Standard Stroke Lengths
Where high linear speed is not crucial to the performance of the system, it may be possible to extend the standard length of any size actuator. Screw critical speed is a function of the diameter of the screw and the distance between its bearing supports.

Additionally, non-standard or intermediate stroke lengths are available for a nominal charge. Consult the factory for any special stroke needs.

### Shortened, Extended and Dual Carriages
Non-standard carriage lengths and dual carriages are available for special applications. Consult factory for your special carriage needs.

### Breather Tube Option
The aluminum actuator housing is an ideal platform for the installation of air fittings. Breather tubes may be fitted to either create positive pressurization (air purge) or create a vacuum to minimize particle contamination.

### High and Low Temperature Modifications
Aluminum and steel have different thermal expansion coefficients. It may be necessary to modify the fit tolerances on certain parts to accommodate extreme temperatures. Contact the factory if the application environment exceeds the recommended operating temperature range.

### External Linear Potentiometer
Attached to the actuator by a standard bracket mount, the external linear potentiometer can accommodate stroke lengths from 153 to 3356 mm. Repeatability is 0.01% of full stroke. Available in 4-20mA or 0-10 VDC, the enclosure has an IP67 rating and is designed to meet CE requirements.

### Special Lubricants
The Actuator Division has provided special lubrication for drive screws and thrust tubes as specified by the customer. Non-silicon based greases are available for clean room and vacuum-rated applications.

### Washdown Applications
- Special Coatings
- Stainless Steel Components
- FDA Approved for Food Applications

Have any other special needs? Please consult the factory.
Position Sensing Devices

ER Series actuator products are equipped with permanent nitrile barium magnets on both sides of the bearing carriage. These magnets serve to activate Hall Effect sensors or reed switches.

When attached to available sensor/switch clamps, sensors and switches may be mounted to T-slots in the ER Series actuator body (see illustration). The clamp positions the switch/sensor at the thinnest section of the extrusion wall, through which the magnetic target is sensed.

Comparing Sensors and Switches

<table>
<thead>
<tr>
<th></th>
<th>Hall Effect</th>
<th>Reed</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO or NC</td>
<td>NO or NC</td>
<td></td>
</tr>
<tr>
<td>Fully adjustable travel</td>
<td>Fully adjustable travel</td>
<td></td>
</tr>
<tr>
<td>Solid state electronics</td>
<td>Mechanical reed</td>
<td></td>
</tr>
<tr>
<td>LED indicator</td>
<td>LED indicator</td>
<td></td>
</tr>
<tr>
<td>5-24 VDC</td>
<td>5-24VDC or 85-150 VAC</td>
<td></td>
</tr>
<tr>
<td>PNP and NPN</td>
<td>Low Amp and High Amp</td>
<td></td>
</tr>
<tr>
<td>Medium cost</td>
<td>Lowest cost</td>
<td></td>
</tr>
<tr>
<td>Long life</td>
<td>Medium life</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions

1. Housing material: plastic
2. Cable type: 0.3 mm, 3C, wires, 24 AWG
3. Clamp screw: M3x8mm, stainless steel
4. Adjustable clamp: stainless steel
5. LED color when activated: red
6. IP67 and CE certified

Hall Effect Sensors with Clamp

<table>
<thead>
<tr>
<th>Part No.**</th>
<th>Type</th>
<th>LED Color</th>
<th>Logic</th>
<th>Cable/Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMHnn-1P</td>
<td>N.O.</td>
<td>Green</td>
<td>PNP</td>
<td>1.5m black with leads</td>
</tr>
<tr>
<td>SMHnn-1N</td>
<td>N.O.</td>
<td>Red</td>
<td>NPN</td>
<td>150mm black with connector*</td>
</tr>
<tr>
<td>SMCnn-1P</td>
<td>N.C.</td>
<td>Yellow</td>
<td>PNP</td>
<td></td>
</tr>
<tr>
<td>SMCnn-1N</td>
<td>N.C.</td>
<td>White/Red</td>
<td>NPN</td>
<td></td>
</tr>
<tr>
<td>SMHnn-1PC</td>
<td>N.O.</td>
<td>Green</td>
<td>PNP</td>
<td></td>
</tr>
<tr>
<td>SMHnn-1NC</td>
<td>N.O.</td>
<td>Red</td>
<td>NPN</td>
<td></td>
</tr>
<tr>
<td>SMCnn-1PC</td>
<td>N.C.</td>
<td>Yellow</td>
<td>PNP</td>
<td></td>
</tr>
<tr>
<td>SMCnn-1NC</td>
<td>N.C.</td>
<td>White/Red</td>
<td>NPN</td>
<td></td>
</tr>
</tbody>
</table>

* Order cable separately below.
** Replace nn with 32 for ER032, 50 for ER050, 80 for ER080.

Reed Switches with Clamp

<table>
<thead>
<tr>
<th>Part No.*</th>
<th>Type</th>
<th>LED</th>
<th>Current Rating</th>
<th>Cable/Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMRnn-1</td>
<td>N.O.</td>
<td>Green</td>
<td>High</td>
<td>1.5m gray with leads</td>
</tr>
<tr>
<td>SMRnn-1L</td>
<td>N.O.</td>
<td>Red</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>SMDrn-1L</td>
<td>N.C.</td>
<td>Yellow</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>SMRnn-1C</td>
<td>N.O.</td>
<td>Green</td>
<td>High</td>
<td>150mm gray with connector*</td>
</tr>
<tr>
<td>SMRnn-1LC</td>
<td>N.O.</td>
<td>Red</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>SMDrn-1LC</td>
<td>N.C.</td>
<td>Yellow</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

* Order cable separately below.
** Replace nn with 32 for ER032, 50 for ER050, 80 for ER080.

Connector Option

A mating cable/connector is available for sensors with the connector option. Hall Effect sensors use all three wires while reed switches use only blue and brown.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8786</td>
<td>5m (16 ft.) polyurethane covered cable/connector</td>
</tr>
</tbody>
</table>
Hall Effect Sensors

Two types of Hall effect sensors are available for use with ER Series actuators. The normally open sensor is typically used for mid-position sensing, such as homing applications. The normally closed sensor is generally used to indicate over-travel at the end of the stroke, and is used in a safety circuit to prevent damage to components caused by over-travel.

![Hall Effect Sensor Diagram]

Note: End of travel sensors do not reduce available stroke. ZETA6104 controls use NPN sensors for Home and End-of-Travel.

Hall Effect Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Solid State Type (PNP or NPN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching Logic</td>
<td>Normally Open or Normally Closed</td>
</tr>
<tr>
<td>Supply Voltage Range</td>
<td>5 - 24 VDC</td>
</tr>
<tr>
<td>Switch Current</td>
<td>150 mA max</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>7 mA at 12 VDC, 14 mA at 24 VDC</td>
</tr>
<tr>
<td>Switching Response</td>
<td>500 Hz Maximum</td>
</tr>
<tr>
<td>Residual Voltage</td>
<td>0.8 V Maximum (150 mA)</td>
</tr>
<tr>
<td>Leakage Current</td>
<td>10 μA Maximum</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>100 M Ohm min.</td>
</tr>
<tr>
<td>Min. LED Current</td>
<td>1 mA</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-10° to 85°C (14° to 185°F)***</td>
</tr>
<tr>
<td>Lead Termination</td>
<td>1500 mm (60 in) or 150mm (6 in) w/connector</td>
</tr>
<tr>
<td>Industrial Protection</td>
<td>IP67</td>
</tr>
<tr>
<td>Shock Resistance</td>
<td>50 gr's, 490 m/sec²</td>
</tr>
</tbody>
</table>

Notes:
* Polarity is restricted for DC operation: (+) to Brown (-) to Blue
  If these connections are reversed for TTL levels the contacts will close, but the LED will not light.
** Due to minimum current requirement, LED will not display when used with all Gemini 6K and 6K products.
*** Exceeds temperature range for ER Series mechanical components.

Reed Switches

Reed switches are available in a normally open or normally closed configuration. The low amp switch is suitable for connection to PLCs or other low current devices. The high amp switch can be used to drive sequencers, relays, coils, or other devices directly. Not compatible with TTL level I.O. Logic (switch will work with TTL level if wired backwards but LED will not light).

DC Operation

- Required for proper operation 24VDC.
- Put Diode parallel to load (CR) with polarity as shown.
- D: Diode: select a Diode with the breakdown voltage and current rating according to the load.
- CR: Relay coil (under 0.5 W coil rating)

AC Operation

- Recommended for longer switch life 125VAC.
- Put resistor and capacitor parallel to load (CR).
- CR: Relay coil (under 2 W coil rating)
- R: Resistor under 1 K Ohm
- C: Capacitor 0.1 µF

Reed Switch Specifications

<table>
<thead>
<tr>
<th></th>
<th>Low Amp</th>
<th>High Amp</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Switching Logic</strong></td>
<td>Normally Open (NO) Normal Closed (NC)</td>
<td>Normally Open (NO)</td>
</tr>
<tr>
<td><strong>Voltage Rating</strong></td>
<td>85-125 VAC (NO) 6-24 VDC* (NO) 6-24 VAC, 6-24 VDC* (NC)</td>
<td>85-125 VAC 6-24 VDC*</td>
</tr>
<tr>
<td><strong>Power Rating</strong></td>
<td>Resistive: 10 Watts (NO) Inductive: 5 Watts (NO) 3 Watts (NC)</td>
<td>Resistive load 10 Watts Inductive load 5 Watts</td>
</tr>
<tr>
<td><strong>Switching Current Range</strong></td>
<td>Resistive load: 5-40 mA (NO) 5-25 mA (NC) Inductive load 5-25 mA</td>
<td>Resistive load 30-300 mA Inductive load 30-100 mA</td>
</tr>
<tr>
<td><strong>Min. LED Current</strong></td>
<td>5 mA</td>
<td>18mA**</td>
</tr>
<tr>
<td><strong>Switching Response</strong></td>
<td>300 Hz (NO) 200 Hz (NC)</td>
<td>300 Hz max</td>
</tr>
<tr>
<td><strong>Breakdown Voltage</strong></td>
<td></td>
<td>200 VDC</td>
</tr>
<tr>
<td><strong>Contact Resistance</strong></td>
<td></td>
<td>100 M Ohm min.</td>
</tr>
<tr>
<td><strong>Operating Temp.</strong></td>
<td>-10° to 85°C (14° to 185°F)***</td>
<td></td>
</tr>
<tr>
<td><strong>Lead Termination</strong></td>
<td>1500 mm (60 in) or 150mm (6 in) w/connector</td>
<td></td>
</tr>
<tr>
<td><strong>Industrial Protection</strong></td>
<td>IP67</td>
<td></td>
</tr>
<tr>
<td><strong>Shock Resistance</strong></td>
<td>30 g's, 300 m/sec²</td>
<td></td>
</tr>
</tbody>
</table>
### ER Ordering Information – Belt

#### Series
- **ER**
- **080**

#### Profile Size
- **Code**: 032
  - **Profile Size**: 32mm
- **Code**: 050
  - **Profile Size**: 50mm
- **Code**: 080
  - **Profile Size**: 80mm

#### Drive Type
- **BLT**: Belt Drive

#### Motor Mounting Style
- **R**: Direct Drive Right
- **L**: Direct Drive Left
- **M**: Parallel Over Right with Timing Belt or Gear Drive
- **N**: Parallel Under Right with Timing Belt or Gear Drive
- **S**: Parallel Over Left with Timing Belt or Gear Drive
- **T**: Parallel Under Left with Timing Belt or Gear Drive
- **V**: Reverse Parallel Over Right with Timing Belt or Gear Drive
- **W**: Reverse Parallel Under Right with Timing Belt or Gear Drive
- **Y**: Reverse Parallel Over Left with Timing Belt or Gear Drive
- **Z**: Reverse Parallel Under Left with Timing Belt or Gear Drive
- **J**: Reverse Parallel Rear Right with Timing Belt or Gear Drive
- **K**: Reverse Parallel Rear Left with Timing Belt or Gear Drive

#### Drive Ratio
- **A**: 1:1 Inline Direct Drive
- **Z**: 1:1.5 Timing Belt (32 Parallel)
- **B**: 1:5:1 Timing Belt (50, 80 Parallel)
- **D**: 2:1 Timing Belt (50, 80 Parallel)
- **K**: 1:1 Gear Drive (32, 50, 80 Parallel)
- **E**: 3:1 Gear Drive (32, 50, 80 Parallel)
- **F**: 5:1 Gear Drive (32, 50, 80 Parallel)
- **G**: 7:5:1 Gear Drive (32, 50, 80 Parallel)
- **H**: 9:5:1 Gear Drive (32, 50, 80 Parallel)

#### Gearbox Option
- **0**: No Gearbox
- **A**: PX23
- **B**: PS60 – Shaft Horizontal
- **C**: PS60 - Shaft Vertical
- **D**: PX34
- **E**: PS90 - Shaft Horizontal
- **F**: PS90 - Shaft Vertical
- **G**: PX115
- **P**: PV23FE
- **Q**: PV34FE

#### Gearbox Ratio
- **00**: Flange Only
- **03**: 3:1
- **04**: 4:1
- **05**: 5:1
- **07**: 7:1
- **10**: 10:1
- **15**: 15:1
- **20**: 20:1
- **25**: 25:1
- **30**: 30:1
- **40**: 40:1 (PS only)
- **50**: 50:1
- **70**: 70:1
- **A0**: 100:1

---

1. Not all motor/gearbox options physically fit on all cylinder sizes and mounting styles. Reference the mounting matrix to determine suitable combinations. PS precision gearboxes are oil filled. Shaft orientation is required to insure proper oil fill levels.
2. When combined with Gearbox Option “0” (no gearbox), this option is direct mount with no flange included.

---

**Actuator Division**

1-866-PARK-ACT
### ER Ordering Information – Belt

**Motor**
- J13

**Actuator Mounting**
- F: Bottom Tap (Std)
- B: Foot Mount ⁴
- E: Rear Eye ⁴
- J: Front Flange

**Carriage Style**
- S: Standard

**Carriage Bearing**
- R: Roller Bearing Carriage

**Brake Option**
- N: No Brake
- E: 115VAC w/Flying Leads ⁴
- F: 24VDC w/Flying Leads ⁴
- G: 115VAC w/Connector ⁴
- H: 24VDC w/Connector ⁴

**Motor Model**
- 00: Motor Flange only
- 01-99: Reference Motor Section for Specific Models (01-99)

**Motor Option**
- A: S57, ES2x - Round Shaft
- B: S83, ES3x - Round Shaft
- C: HV34, LV34 - Shaft Flat
- D: HV23, LV23 - Shaft Flat
- E: SM23x***-T*** (x = 1, 2, 3)
- F: BE23***-K***
- G: BE34***-K***
- H: SMN0602***-K***
- J: SMN0822***-K***
- K: SMN1002***-K***
- L: SMN1152***-K***
- M: SMN1422***-K***
- N: MPP092***-K***
- P: MP100***-K***
- Q: MPP115***-K***
- R: MPP142x***-K*** (x = 2, 4, 6)
- S: MPP1428***-K***

**Standard Stroke**
- 0050: 50mm (1.97 in.)
- 0100: 100mm (3.94 in.)
- 0150: 150mm (5.91 in.)
- 0200: 200mm (7.87 in.)
- 0300: 300mm (11.81 in.)
- 0450: 450mm (17.72 in.)
- 0600: 600mm (23.62 in.)
- 0750: 750mm (29.53 in.)
- 1000: 1000mm (39.37 in.)
- 1250: 1250mm (49.21 in.)
- 1500: 1500mm (59.05 in.)
- xxxx: Non-standard Stroke ⁷

**Maximum Standard Stroke Length**

<table>
<thead>
<tr>
<th>ER032</th>
<th>ER050</th>
<th>ER080</th>
</tr>
</thead>
<tbody>
<tr>
<td>4550mm</td>
<td>4550mm</td>
<td>2575mm</td>
</tr>
</tbody>
</table>

*Longer strokes may be available with splice. Consult factory.

---

1. Not all motor/gearbox options physically fit on all cylinder sizes and mounting styles. Reference mounting matrix to determine suitable combinations. PS precision gearboxes are oil filled. Shaft orientation is required to insure proper oil fill levels.


4. Parallel mounting only.

5. Not compatible with actuator mounting option B.

6. Stroke is measured bumper to bumper.

7. Non-standard stroke lengths available in increments of 1mm.
### ER Ordering Information – Screw

#### ER Series
- **Profile Size**
- **Drive Type**
- **Motor Mounting Style**
- **Drive Ratio**
- **Gearbox Option**

<table>
<thead>
<tr>
<th>Code</th>
<th>Profile Size</th>
<th>Code</th>
<th>Drive Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>032</td>
<td>32mm</td>
<td>B08</td>
<td>Ball Screw, 0.125 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A04</td>
<td>Acme Screw, 0.250 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A08</td>
<td>Acme Screw, 0.125 in. Lead</td>
</tr>
<tr>
<td>050</td>
<td>50mm</td>
<td>B01</td>
<td>Ball Screw, 1.000 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B02</td>
<td>Ball Screw, 0.500 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B05</td>
<td>Ball Screw, 0.200 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A05</td>
<td>Acme Screw, 0.200 in. Lead</td>
</tr>
<tr>
<td>080</td>
<td>80mm</td>
<td>B01</td>
<td>Ball Screw, 1.000 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B02</td>
<td>Ball Screw, 0.500 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B04</td>
<td>Ball Screw, 0.250 in. Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A04</td>
<td>Acme Screw, 0.250 in. Lead</td>
</tr>
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</table>

#### Motor Mounting Style
- **Code**
- **Drive Ratio**

<table>
<thead>
<tr>
<th>Code</th>
<th>Drive Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>1:1 Inline</td>
</tr>
<tr>
<td>M</td>
<td>1:1 Timing Belt (32 Parallel)</td>
</tr>
<tr>
<td>N</td>
<td>1:1.5 Timing Belt (50, 80 Parallel)</td>
</tr>
<tr>
<td>Q</td>
<td>1:1 Gear Drive (32, 50, 80 Parallel)</td>
</tr>
<tr>
<td>R</td>
<td>3:1 Gear Drive (32, 50, 80 Parallel)</td>
</tr>
<tr>
<td>S</td>
<td>5:1 Gear Drive (32, 50, 80 Parallel)</td>
</tr>
<tr>
<td>T</td>
<td>7:1 Gear Drive (32, 50, 80 Parallel)</td>
</tr>
<tr>
<td>V</td>
<td>9:1.5 Gear Drive (32, 50, 80 Parallel)</td>
</tr>
<tr>
<td>A</td>
<td>10:1 Gear Drive (80 Parallel)</td>
</tr>
</tbody>
</table>

#### Gearbox Option
- **Code**
- **Gearbox Ratio**

<table>
<thead>
<tr>
<th>Code</th>
<th>Gearbox Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Flange Only 2</td>
</tr>
<tr>
<td>A</td>
<td>PX23</td>
</tr>
<tr>
<td>B</td>
<td>PS60 – Shaft Horizontal</td>
</tr>
<tr>
<td>C</td>
<td>PS60 - Shaft Vertical</td>
</tr>
<tr>
<td>D</td>
<td>PX34</td>
</tr>
<tr>
<td>E</td>
<td>PS90 - Shaft Horizontal</td>
</tr>
<tr>
<td>F</td>
<td>PS90 - Shaft Vertical</td>
</tr>
<tr>
<td>G</td>
<td>PX115</td>
</tr>
<tr>
<td>P</td>
<td>PV23FE</td>
</tr>
<tr>
<td>Q</td>
<td>PV34FE</td>
</tr>
</tbody>
</table>

1. Not all motor/gearbox options physically fit on all cylinder sizes and mounting styles. Reference mounting matrix to determine suitable combinations. PS precision gearboxes are oil filled. Shaft orientation is required to insure proper oil fill levels.
2. When combined with Gearbox Option “0” (no gearbox), this option is direct mount with no flange included.

---

**Continued on next page**

---

**Actuator Division**

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1-866-PARK-ACT
ER Ordering Information – Screw

Motor Option

<table>
<thead>
<tr>
<th>Code</th>
<th>Motor Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>S57, ES2x - Round Shaft</td>
</tr>
<tr>
<td>B</td>
<td>S83, ES3x - Round Shaft</td>
</tr>
<tr>
<td>C</td>
<td>HV34, LV34 - Shaft Flat</td>
</tr>
<tr>
<td>D</td>
<td>HV23, LV23 - Shaft Flat</td>
</tr>
<tr>
<td>E</td>
<td>SM23x***-T*** (x = 1, 2, 3)</td>
</tr>
<tr>
<td>F</td>
<td>BE23***-K***</td>
</tr>
<tr>
<td>G</td>
<td>BE34***-K***</td>
</tr>
<tr>
<td>H</td>
<td>SMN0602***-K***</td>
</tr>
<tr>
<td>J</td>
<td>SMN0822***-K***</td>
</tr>
<tr>
<td>K</td>
<td>SMN1002***-K***</td>
</tr>
<tr>
<td>L</td>
<td>SMN1152***-K***</td>
</tr>
<tr>
<td>M</td>
<td>SMN1422***-K***</td>
</tr>
<tr>
<td>N</td>
<td>MPP92****-K***</td>
</tr>
<tr>
<td>P</td>
<td>MP100****-K***</td>
</tr>
<tr>
<td>Q</td>
<td>MPP115****-K***</td>
</tr>
<tr>
<td>R</td>
<td>MPP142x***-K*** (x = 2, 4, 6)</td>
</tr>
<tr>
<td>S</td>
<td>MPP1428***-K***</td>
</tr>
</tbody>
</table>

Actuator Mounting

<table>
<thead>
<tr>
<th>Code</th>
<th>Actuator Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Bottom Tap (Std)</td>
</tr>
<tr>
<td>B</td>
<td>Foot Mount 4</td>
</tr>
<tr>
<td>E</td>
<td>Rear Eye 4</td>
</tr>
<tr>
<td>G</td>
<td>Foot Side Lug 5</td>
</tr>
<tr>
<td>H</td>
<td>Rear Flange 4</td>
</tr>
<tr>
<td>J</td>
<td>Front Flange</td>
</tr>
<tr>
<td>N</td>
<td>Front and Rear Flange 4</td>
</tr>
</tbody>
</table>

Carriage Style

<table>
<thead>
<tr>
<th>Code</th>
<th>Carriage Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Standard</td>
</tr>
</tbody>
</table>

Carriage Bearing

<table>
<thead>
<tr>
<th>Code</th>
<th>Carriage Bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Roller Bearing Carriage</td>
</tr>
<tr>
<td>S</td>
<td>Square Rail Bearing Carriage</td>
</tr>
</tbody>
</table>

Brake Option

<table>
<thead>
<tr>
<th>Code</th>
<th>Brake Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>No Brake</td>
</tr>
<tr>
<td>E</td>
<td>115VAC w/Flying Leads 4</td>
</tr>
<tr>
<td>F</td>
<td>24VDC w/Flying Leads 4</td>
</tr>
<tr>
<td>G</td>
<td>115VAC w/Connector 4</td>
</tr>
<tr>
<td>H</td>
<td>24VDC w/Connector 4</td>
</tr>
</tbody>
</table>

Standard Stroke

<table>
<thead>
<tr>
<th>Code</th>
<th>Standard Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>0050</td>
<td>50mm (1.97 in.)</td>
</tr>
<tr>
<td>0100</td>
<td>100mm (3.94 in.)</td>
</tr>
<tr>
<td>0150</td>
<td>150mm (5.91 in.)</td>
</tr>
<tr>
<td>0200</td>
<td>200mm (7.87 in.)</td>
</tr>
<tr>
<td>0300</td>
<td>300mm (11.81 in.)</td>
</tr>
<tr>
<td>0450</td>
<td>450mm (17.72 in.)</td>
</tr>
<tr>
<td>0600</td>
<td>600mm (23.62 in.)</td>
</tr>
<tr>
<td>0750</td>
<td>750mm (29.53 in.)</td>
</tr>
<tr>
<td>1000</td>
<td>1000mm (39.37 in.)</td>
</tr>
<tr>
<td>1250</td>
<td>1250mm (49.21 in.)</td>
</tr>
<tr>
<td>1500</td>
<td>1500mm (59.05 in.)</td>
</tr>
<tr>
<td>xxxx</td>
<td>Non-standard Stroke</td>
</tr>
</tbody>
</table>

Maximum Standard Stroke Length

(Consult factory for longer lengths)

<table>
<thead>
<tr>
<th></th>
<th>ER032</th>
<th>ER050</th>
<th>ER080</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>1000mm</td>
<td>1500mm</td>
<td>1500mm</td>
</tr>
</tbody>
</table>

1. Not all motor/gearbox options physically fit on all cylinder sizes and mounting styles. Reference mounting matrix to determine suitable combinations. PS precision gearboxes are oil filled. Shaft orientation is required to insure proper oil fill levels.


4. Parallel mounting only.

5. Not compatible with M, N or Q motor mounting styles.


7. All screws have a critical speed limit that will cause damage to the actuator if exceeded. Consult factory or catalog for maximum speeds. Stroke is measured bumper to bumper.

8. Non-standard stroke lengths available in increments of 1mm.
ER Application Fax Form

Fax completed form to (330) 334-3335 or email to actuatorsales@parker.com

Contact Information:
Name __________________________________ Phone _____________________________
Company __________________________________ email _________________________
City, State, Zip _________________________________________________________

Application Sketch

NOTES:
Please include the critical dimensions in your sketch.
In order to achieve the best solution, it is important that you provide as much information as possible.

Application Requirements:
1. Overall Stroke (add 25mm per end minimum) __________
2. Cylinder Orientation (check one)
   □ Horizontal   □ Inverted   □ Side Mount
   □ Vertical     □ Angle: Degrees _________
3. Load/Tooling Weight __________________________
4. Repeatability Requirements ______________________
   □ Unidirectional   □ Bidirectional
5. Is the load externally guided? (check one)
   □ Yes    □ No
   If yes, how? ___________________________________
6. Is the actuator body supported? (check one)
   □ Yes    □ No
   If yes, how? ___________________________________
7. Life Requirements (cycles, distance or years)
   Hours per day __________     Days per year __________
8. Special Considerations __________________________
   ______________________________________________
   ______________________________________________
   ______________________________________________
   ______________________________________________

Please attach another sheet if more room is needed.
Actuator Type and Mounting

1. Drive Type (check one)
   - Belt
   - Screw

2. Mounting Style (check one)
   - Bottom Tap (std)
   - Foot Mount*
   - Front Flange
   - Rear Flange
   - Foot Side Lug (screw drive only)
   - Rear Eye

3. Carriage Bearing Style (check one)
   - Roller (std)
   - Square Rail (screw drive only)

4. Motor Mount (check one)
   - Screw Drive:
     - Inline
   - Belt Drive:
     - Inline – Direct Drive Left (Pictured)
     - Inline – Direct Drive Right

Motor, Drive and Control Options:

1. Motor Options (check all that apply)
   - Stepper
   - Parker Supplied
   - Customer Supplied (provide print)
   - Gearhead

2. Other Options (check one)
   - Drive
   - Drive/Controller
   - Controller

3. Available Line Voltage

4. Switches/Sensors (quantity)
   - End of Travel
   - Home

5. Brake Option (check one)
   - Actuator*
   - Motor
   - None
   *
   With parallel motor mount only

6. Special Options

Parallel mounts can limit the actuator's total thrust capacity.
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The ERV Series
Expanding on the ER, the ERV was designed with an external carriage containing outboard roller bearing support for higher loads. The actuator is designed to directly interface with our structural framing, providing a simple and cost effective solution for single or multiple-axis systems.

The ERV design means . . .
- High loading to 3590 N
- High speeds to 5m/sec
- High thrust to 808 N
- Multi-axis connectivity for Gantry systems
- Strokes to 6 meters for single extrusion, spliced units for longer strokes.
- Internal belt drive
- Extrusion body cylinder with additional center web for rigidity and axial stiffness.

The ERV multiple design options can be matched to your application demands.
- 2 profile sizes (56 and 80mm)
- Polyurethane steel reinforced drive belt
- Standard and extended carriages for high loads
- Ready to mount stepper or brushless servo motors.

ERV Markets and Applications
With thousands of axes installed worldwide, the ERV series rodless actuator has proven to be a robust and reliable solution for numerous motion control applications across many markets and industries. Listed below are some examples of where and how the ERV series rodless actuator has been successfully applied.

### Markets and Industries Served

| Automotive | Life Sciences | Machine Tool |
| Tire & Rubber | Medical | Wood & Lumber |
| Packaging | Conveyor | Research & Testing |
| Food & Beverage | Transportation | Aerospace |
| Computer / Electronics | Pharmaceutical | Glass / Fiber |
| Textile | Semiconductor | Factory Automation |

### Application Examples

<table>
<thead>
<tr>
<th>Discrete / Multi-Point Positioning</th>
<th>Small Area Gantry</th>
<th>Large Area Gantry</th>
<th>Complex Motion Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical Stackers / Elevator Lift</td>
<td>Pick &amp; Place</td>
<td>Walking Beam</td>
<td>Flying Cut-to-Length</td>
</tr>
<tr>
<td>Scanning / Inspection Transfer Unit</td>
<td>Contoured Glue Dispensing Part Load &amp; Unload</td>
<td>Palletizing / Depalletizing Material Handling</td>
<td>Crosscutting / Slitting</td>
</tr>
<tr>
<td>Lane Diverter</td>
<td>Profile Engraving / Etching</td>
<td>Storage &amp; Retrieval</td>
<td>Mechanical Cam Replacement</td>
</tr>
<tr>
<td>Backstop Index</td>
<td>Automated Assembly</td>
<td>Parts Transfer</td>
<td>Profile Contouring</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>High Speed Winding Traverse</td>
</tr>
</tbody>
</table>
## ERV Specifications

### ERV-Belt Overview

<table>
<thead>
<tr>
<th>Units</th>
<th>ERV5</th>
<th>ERV8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard Carriage</td>
<td>Extended Carriage</td>
</tr>
<tr>
<td><strong>Performance Limits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Thrust (Belt Traction Force) Fx</td>
<td>lbf (N)</td>
<td>132 (587)</td>
</tr>
<tr>
<td>Max Speed</td>
<td>in/s (m/s)</td>
<td>200 (5.0)</td>
</tr>
<tr>
<td>Max Acceleration</td>
<td>in/s² (m/s²)</td>
<td>386 (9.8)</td>
</tr>
<tr>
<td>Max Travel with bumpers</td>
<td>in (mm)</td>
<td>235 (5970)</td>
</tr>
<tr>
<td>Max Travel without bumpers</td>
<td>in (mm)</td>
<td>238 (6050)</td>
</tr>
<tr>
<td><strong>System Characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulley Lead (travel distance per rev)</td>
<td>mm/rev</td>
<td>100</td>
</tr>
<tr>
<td>Pulley Diameter</td>
<td>in (mm)</td>
<td>1.253 (31.83)</td>
</tr>
<tr>
<td>Pulley Tooth Count</td>
<td># Teeth</td>
<td>20</td>
</tr>
<tr>
<td>Efficiency 1 - inline</td>
<td>%</td>
<td>90%</td>
</tr>
<tr>
<td>Max Breakaway Torque</td>
<td>oz-in</td>
<td>96</td>
</tr>
<tr>
<td>Repeatability 2 - inline / parallel</td>
<td>in</td>
<td>±0.004 / ±0.008</td>
</tr>
<tr>
<td>System Backlash</td>
<td>in</td>
<td>0.004</td>
</tr>
<tr>
<td><strong>Reflected Rotational Inertia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Unit Inertia, 100mm travel</td>
<td>oz-in²</td>
<td>20.71</td>
</tr>
<tr>
<td>Additional Inertia per 100mm travel</td>
<td>oz-in²/100mm</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Bearing Carriage Load Capacity²</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal Load Fz</td>
<td>lbf (N)</td>
<td>253 (1126)</td>
</tr>
<tr>
<td>Side Load Fy</td>
<td>lbf (N)</td>
<td>126 (563)</td>
</tr>
<tr>
<td>Pitch Moment My</td>
<td>ft-lbf (Nm)</td>
<td>39 (53)</td>
</tr>
<tr>
<td>Roll Moment Mx</td>
<td>ft-lbf (Nm)</td>
<td>40 (54)</td>
</tr>
<tr>
<td>Yaw Moment Mz</td>
<td>ft-lbf (Nm)</td>
<td>32 (43)</td>
</tr>
<tr>
<td><strong>Weight &amp; Inertia Data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Unit Weight, Zero Stroke</td>
<td>lb (kg)</td>
<td>10.2 (4.65)</td>
</tr>
<tr>
<td>Carriage Weight</td>
<td>lb (kg)</td>
<td>2.99 (1.36)</td>
</tr>
<tr>
<td>Additional Travel Weight</td>
<td>lb (kg) / 100mm</td>
<td>1.0 (0.45)</td>
</tr>
</tbody>
</table>

1. Parallel driven unit efficiency = inline efficiency x 0.9
2. Repeatability is unidirectional achieved under ideal conditions and slow speeds. Actual repeatability may vary with the application.
3. Load Capacities shown are based on 1 billion inches of expected travel life @ 1 m/s.
4. Traction Force is speed dependent. The values shown are based on 0.5 m/s speed.

## Operating Temperature Range

0° to 60°C (32° to 140°F)
**Static Moment Loads**
Determine which moment loads are induced by the static load. Locate the center of gravity of the load and the length of the moment arm.

**Moment Arm Lengths**
Determine the moment arm lengths associated with each moment load by measuring the distance from the center of the load to the center of the carriage in each moment load direction.

**Pitch Moment**
When determining the pitch moment arm, it is necessary to consider the distance from the top of the load attachment plate to the center of the carriage bearings. For the ERV5 Series, this distance is 40mm.

**Graph Legend**
- 1m/s
- 2m/s
- 3m/s
- 4m/s
- 5m/s

**ERV Technical Data**

**ERV5 Loading**

**Static Moment Loads**
Determine which moment loads are induced by the static load. Locate the center of gravity of the load and the length of the moment arm.

**Moment Arm Lengths**
Determine the moment arm lengths associated with each moment load by measuring the distance from the center of the load to the center of the carriage in each moment load direction.

**Pitch Moment**
When determining the pitch moment arm, it is necessary to consider the distance from the top of the load attachment plate to the center of the carriage bearings. For the ERV5 Series, this distance is 40mm.
ERV8 Loading

Static Moment Loads
Determine which moment loads are induced by the static load. Locate the center of gravity of the load and the length of the moment arm.

Moment Arm Lengths
Determine the moment arm lengths associated with each moment load by measuring the distance from the center of the load to the center of the carriage in each moment load direction.

Pitch Moment
When determining the pitch moment arm, it is necessary to consider the distance from the top of the load attachment plate to the center of the carriage bearings. For the ERV8 Series, this distance is 47mm.

Graph Legend
- 1m/s
- 2m/s
- 3m/s
- 4m/s
- 5m/s
ERV Technical Data

Deflection

ERV5

ERV8

Effective Belt Pull

ERV5

ERV8
**ERV Dimensions**

### Basic Dimensions

![Diagram of basic dimensions](image)

<table>
<thead>
<tr>
<th>Size</th>
<th>Carriage</th>
<th>Option</th>
<th>A</th>
<th>B*</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Standard</td>
<td>w/o bumpers</td>
<td>369.8</td>
<td>232.5</td>
<td>116.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>w/ bumpers</td>
<td>470.8</td>
<td>333.5</td>
<td>166.7</td>
</tr>
<tr>
<td></td>
<td>Extended</td>
<td>w/o bumpers</td>
<td>509.8</td>
<td>372.5</td>
<td>186.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>w/ bumpers</td>
<td>610.8</td>
<td>473.5</td>
<td>236.7</td>
</tr>
<tr>
<td>8</td>
<td>Standard</td>
<td>w/o bumpers</td>
<td>473.8</td>
<td>272.5</td>
<td>136.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>w/ bumpers</td>
<td>586.8</td>
<td>386.0</td>
<td>193.0</td>
</tr>
<tr>
<td></td>
<td>Extended</td>
<td>w/o bumpers</td>
<td>598.8</td>
<td>397.5</td>
<td>198.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>w/ bumpers</td>
<td>711.8</td>
<td>511.0</td>
<td>255.5</td>
</tr>
</tbody>
</table>

*Dimension is referenced from hard stop to hard stop. Note: Felt wipers do not increase A, B or C dimensions.

### Carriage Mounting Detail

#### ERV5 Standard Carriage

![Diagram of ERV5 Standard Carriage](image)

#### ERV5 Extended Carriage

![Diagram of ERV5 Extended Carriage](image)

#### ERV8 Standard Carriage

![Diagram of ERV8 Standard Carriage](image)

#### ERV8 Extended Carriage

![Diagram of ERV8 Extended Carriage](image)
ERV Options

Carriage Style (S, L)

Standard carriage

Extended carriage

Carriage Features
- Bearing Wheels
  - 12 wheels for standard carriage
  - 24 wheels for extended carriage
- Eccentric Pre-loaded wheels
- Concentric Wheel
- 2 options for carriage loading,
  - Positive (Toward Actuator)
  - Negative (Away from Actuator).
- Magnet for Limit and Home Switches.

Spliced Units
Standard units are available in lengths up to 20 feet.
For additional length, spliced units are available.

Bumpers (B)
Optional bumpers are designed to prevent over-travel and can be adjusted along the full length of travel.
The bumpers are fixed to the actuator extrusion via a standard T-slot (M8 SHCS and T-nut).

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERV5</td>
<td>25.4</td>
<td>23.9</td>
<td>52.5</td>
<td>25.1</td>
</tr>
<tr>
<td>ERV8</td>
<td>25.4</td>
<td>30.3</td>
<td>71</td>
<td>31.1</td>
</tr>
</tbody>
</table>
**Felt Wiper (W)**

Although not 100% sealed, the felt wiper option is designed to wipe contaminants away from entering the carriage assembly.

**Carriage with Wiper**

**Carriage without Wiper**

<table>
<thead>
<tr>
<th>Model</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERV5</td>
<td>99</td>
<td>9.5</td>
</tr>
<tr>
<td>ERV8</td>
<td>129</td>
<td>9.5</td>
</tr>
</tbody>
</table>
Machined Gussets
Machined gussets provide a high strength, accurate right angle connection for ERV5 profiles. The mounting surfaces are milled perpendicular.

Material: 6063-T6 Aluminum alloy, clear anodized
Machining: None

<table>
<thead>
<tr>
<th>Model</th>
<th>Gusset Part Number</th>
<th>Recommended Fasteners</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERV</td>
<td>20-2828M</td>
<td>(2) 24-112-6 BHSCS and (2) 20-099 Drop-in T-Nuts</td>
</tr>
<tr>
<td></td>
<td>20-2856M</td>
<td>(4) 24-112-6 BHSCS and (4) 20-099 Drop-in T-Nuts</td>
</tr>
<tr>
<td>ERV8</td>
<td>20-4040M</td>
<td>(2) 20-118-8 BHSCS and (2) 20-098 Drop-in T-Nuts</td>
</tr>
<tr>
<td></td>
<td>20-4080M</td>
<td>(4) 20-118-8 BHSCS and (4) 20-098 Drop-in T-Nuts</td>
</tr>
</tbody>
</table>

20-2828M Dimensions

20-2856M Dimensions

20-4040M Dimensions

20-4080M Dimensions

Drop-In T-Nuts

Drop-In T-Nuts

2 x 6.8 (.27) THRU

4 x 6.8 (.27) THRU

2 x 8.3 (.33) THRU

4 x 8.3 (.33) THRU

Toe Clamp
For attachment of ERV8 profiles to each other, to a structural profile or a mounting surface. Must be used in pairs. Requires M6 socket head cap screws.

Part Number 500-000900

Dimensions

M6 Socket Head Cap Screws

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>24-310-6</td>
</tr>
<tr>
<td>12</td>
<td>24-312-6</td>
</tr>
<tr>
<td>14</td>
<td>24-314-6</td>
</tr>
<tr>
<td>16</td>
<td>24-316-6</td>
</tr>
<tr>
<td>20</td>
<td>24-320-6</td>
</tr>
<tr>
<td>25</td>
<td>24-325-6</td>
</tr>
<tr>
<td>27</td>
<td>24-327-6</td>
</tr>
<tr>
<td>30</td>
<td>24-330-6</td>
</tr>
<tr>
<td>33</td>
<td>24-333-6</td>
</tr>
<tr>
<td>35</td>
<td>24-335-6</td>
</tr>
<tr>
<td>40</td>
<td>24-340-6</td>
</tr>
<tr>
<td>45</td>
<td>24-345-6</td>
</tr>
<tr>
<td>50</td>
<td>24-350-6</td>
</tr>
<tr>
<td>80</td>
<td>24-380-6</td>
</tr>
<tr>
<td>90</td>
<td>24-390-6</td>
</tr>
<tr>
<td>100</td>
<td>24-3100-6</td>
</tr>
</tbody>
</table>
Sensors

Two types of Hall effect sensors are available for use with ERV Series actuators. The normally open sensor is typically used for mid-position sensing, such as homing applications. The normally closed sensor is generally used to indicate over-travel at the end of the stroke, and is used in a safety circuit to prevent damage to components caused by over-travel.

**Hall Effect Sensors with Clamp**

<table>
<thead>
<tr>
<th>Part No.**</th>
<th>Type</th>
<th>LED Color</th>
<th>Logic</th>
<th>Cable/Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMHnn-1P</td>
<td>N.O.</td>
<td>Green</td>
<td>PNP</td>
<td>1.5m Black with Leads</td>
</tr>
<tr>
<td>SMHnn-1N</td>
<td>N.O.</td>
<td>Red</td>
<td>NPN</td>
<td></td>
</tr>
<tr>
<td>SMCnn-1P</td>
<td>N.C.</td>
<td>Yellow</td>
<td>PNP</td>
<td></td>
</tr>
<tr>
<td>SMCnn-1N</td>
<td>N.C.</td>
<td>White/Red</td>
<td>NPN</td>
<td></td>
</tr>
<tr>
<td>SMHnn-1PC</td>
<td>N.O.</td>
<td>Green</td>
<td>PNP</td>
<td>150mm Black with Connector*</td>
</tr>
<tr>
<td>SMHnn-1NC</td>
<td>N.O.</td>
<td>Red</td>
<td>NPN</td>
<td></td>
</tr>
<tr>
<td>SMCnn-1PC</td>
<td>N.C.</td>
<td>Yellow</td>
<td>PNP</td>
<td></td>
</tr>
<tr>
<td>SMCnn-1NC</td>
<td>N.C.</td>
<td>White/Red</td>
<td>NPN</td>
<td></td>
</tr>
</tbody>
</table>

* Mating sensor cable assembly B8786 purchased separately.
** nn = V5 to fit ERV5 or V8 to fit ERV8

**Hall Effect Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Solid State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Solid State Type (PNP or NPN)</td>
</tr>
<tr>
<td>Switching Logic</td>
<td>Normally Open or Normally Closed</td>
</tr>
<tr>
<td>Supply Voltage Range</td>
<td>5 - 24 VDC</td>
</tr>
<tr>
<td>Switch Current</td>
<td>150 mA max</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>7 mA at 12 VDC, 14 mA at 24 VDC</td>
</tr>
<tr>
<td>Switching Response</td>
<td>500 Hz Maximum</td>
</tr>
<tr>
<td>Residual Voltage</td>
<td>0.8 V Maximum (150 mA)</td>
</tr>
<tr>
<td>Leakage Current</td>
<td>10 µA Maximum</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>100 M Ohm min.</td>
</tr>
<tr>
<td>Min. LED Current</td>
<td>1 mA</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-10° to 85°C (14° to 185°F)**</td>
</tr>
<tr>
<td>Lead Termination</td>
<td>1500 mm (60 in) or 150mm (6 in) w/connector</td>
</tr>
<tr>
<td>Industrial Protection</td>
<td>IP67</td>
</tr>
<tr>
<td>Shock Resistance</td>
<td>50 g's, 490 m/sec²</td>
</tr>
</tbody>
</table>

**Dimensions**

1. Housing material: plastic
2. Cable type: Ø3.3mm, 3C wire, 24AWG
3. Clamp screw: M3x8mm, stainless steel
4. Adjustable clamp: stainless steel
5. LED color when activated: red
6. IP67 and CE certified

**Cable Connection**

- Pin 3 (Blue)
- Pin 4 (Black)
- Pin 1 (Brown)
ERV Ordering Information

**ERV** Series

**5** Profile Size

**BLT** Drive Type

**R** Motor Mounting Style

**A** Drive Ratio

**D25** Gearbox

<table>
<thead>
<tr>
<th>Code</th>
<th>Motor Mounting Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Direct Drive Right</td>
</tr>
<tr>
<td>L</td>
<td>Direct Drive Left</td>
</tr>
<tr>
<td>M</td>
<td>Parallel Over Right with Timing Belt or Gear Drive</td>
</tr>
<tr>
<td>N</td>
<td>Parallel Under Right with Timing Belt or Gear Drive</td>
</tr>
<tr>
<td>S</td>
<td>Parallel Over Left with Timing Belt or Gear Drive</td>
</tr>
<tr>
<td>T</td>
<td>Parallel Under Left with Timing Belt or Gear Drive</td>
</tr>
<tr>
<td>V</td>
<td>Reverse Parallel Over Right with Timing Belt or Gear Drive</td>
</tr>
<tr>
<td>W</td>
<td>Reverse Parallel Under Right with Timing Belt or Gear Drive</td>
</tr>
<tr>
<td>Y</td>
<td>Reverse Parallel Over Left with Timing Belt or Gear Drive</td>
</tr>
<tr>
<td>Z</td>
<td>Reverse Parallel Under Left with Timing Belt or Gear Drive</td>
</tr>
<tr>
<td>J</td>
<td>Reverse Parallel Rear Right with Timing Belt or Gear Drive</td>
</tr>
<tr>
<td>K</td>
<td>Reverse Parallel Rear Left with Timing Belt or Gear Drive</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Drive Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLT</td>
<td>Belt Drive</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Gearbox Option 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Gearbox</td>
</tr>
<tr>
<td>A</td>
<td>PX23</td>
</tr>
<tr>
<td>B</td>
<td>PS60 – Shaft Horizontal</td>
</tr>
<tr>
<td>C</td>
<td>PS60 - Shaft Vertical</td>
</tr>
<tr>
<td>D</td>
<td>PX34</td>
</tr>
<tr>
<td>E</td>
<td>PS90 - Shaft Horizontal</td>
</tr>
<tr>
<td>F</td>
<td>PS90 - Shaft Vertical</td>
</tr>
<tr>
<td>G</td>
<td>PX115</td>
</tr>
<tr>
<td>P</td>
<td>PV23FE</td>
</tr>
<tr>
<td>Q</td>
<td>PV34FE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Gearbox Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Flange Only</td>
</tr>
<tr>
<td>03</td>
<td>3:1</td>
</tr>
<tr>
<td>04</td>
<td>4:1</td>
</tr>
<tr>
<td>05</td>
<td>5:1</td>
</tr>
<tr>
<td>07</td>
<td>7:1</td>
</tr>
<tr>
<td>10</td>
<td>10:1</td>
</tr>
<tr>
<td>15</td>
<td>15:1</td>
</tr>
<tr>
<td>20</td>
<td>20:1</td>
</tr>
<tr>
<td>25</td>
<td>25:1</td>
</tr>
<tr>
<td>30</td>
<td>30:1</td>
</tr>
<tr>
<td>40</td>
<td>40:1 (PS only)</td>
</tr>
<tr>
<td>50</td>
<td>50:1</td>
</tr>
<tr>
<td>70</td>
<td>70:1</td>
</tr>
<tr>
<td>A0</td>
<td>100:1</td>
</tr>
</tbody>
</table>

1 Not all motor/gearbox options physically fit on all cylinder sizes and mounting styles. Reference mounting matrix to determine suitable combinations. PS precision gearboxes are oil filled. Shaft orientation is required to insure proper oil fill levels.

2 When combined with Gearbox Option “0” (no gearbox), this option is direct mount with no flange included.

Continued on next page
### ERV Ordering Information

**Motor**
- **J13**

**Carriage Style**
- **L** - Extended

**Normal Carriage Loading**
- **P** - Positive (Toward Actuator)
- **G** - Negative (Away from Actuator)

**Carriage Options**
- **W** - Wipers
- **B** - Bumpers
- **Y** - Wipers and Bumpers
- **N** - None

**Brake Option**
- **0750**

**Stroke**
- **A**

**Design Level**
- **0750**

**Standard Stroke**
- **xxxx**
  - Standard increments of 1mm. See table for maximum travel lengths.

**Motor Option**
- **A** - S57, ES2x - Round Shaft
- **B** - S83, ES3x - Round Shaft
- **C** - HV34, LV34 - Shaft Flat
- **D** - HV23, LV23 - Shaft Flat
- **E** - SM2x***-T*** (x = 1, 2, 3)
- **F** - BE23***-K***
- **G** - BE34***-K***
- **H** - SMN0602***-K***
- **J** - SMN0822***-K***
- **K** - SMN1002***-K***
- **L** - SMN1152***-K***
- **M** - SMN1422***-K***
- **N** - MPP092***-K***
- **P** - MP100***-K***
- **Q** - MPP115***-K***
- **R** - MPP142x***-K*** (x = 2, 4, 6)
- **S** - MPP1428***-K***

**Motor Model**
- **00** - Motor Flange only
- **01-99** - Reference Motor Section for Specific Models (01-99)

**Carriage Style**
- **S** - Standard
- **L** - Extended

**Normal Carriage Loading**
- **P** - Positive (Toward Actuator)
- **G** - Negative (Away from Actuator)

**Carriage Options**
- **W** - Wipers
- **B** - Bumpers
- **Y** - Wipers and Bumpers
- **N** - None

**Brake Option**
- **7**
  - **N** - No Brake
  - **E** - 115VAC w/Flying Leads
  - **F** - 24VDC w/Flying Leads
  - **G** - 115VAC w/Connector
  - **H** - 24VDC w/Connector

**Standard Stroke**
- **xxxx**
  - Standard increments of 1mm. See table for maximum travel lengths.

**Options**
- **N** - None
- **X** - Dust Shield (Consult Factory)

### Maximum Standard Stroke Length
(Consult factory for longer lengths)

<table>
<thead>
<tr>
<th>Model</th>
<th>Standard Carriage</th>
<th>Extended Carriage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERV5 - No Bumpers</td>
<td>6050mm</td>
<td>5900mm</td>
</tr>
<tr>
<td>ERV5 - With Bumpers</td>
<td>5970mm</td>
<td>5800mm</td>
</tr>
<tr>
<td>ERV8 - No Bumpers</td>
<td>6025mm</td>
<td>5900mm</td>
</tr>
<tr>
<td>ERV8 - With Bumpers</td>
<td>5920mm</td>
<td>5785mm</td>
</tr>
</tbody>
</table>

1. Not all motor/gearbox options physically fit on all cylinder sizes and mounting styles. Reference mounting matrix to determine suitable combinations. PS precision gearboxes are oil filled. Shaft orientation is required to insure proper oil fill levels.

2. Reference Motor Section for motor compatibility and coding.

3. Parallel mounting only.

4. Non-standard stroke lengths available in increments of 1mm.
ERV Application Fax Form

Fax completed form to (330) 334-3335 or email to actuatorsales@parker.com

Contact Information:
Name ___________________________ Phone ___________________________
Company _________________________ email ___________________________
City, State, Zip ______________________

Application Sketch

Application Requirements:
1. Overall Stroke (add 25mm per end minimum) __________________
2. Cylinder Orientation (check one)
   - Horizontal
   - Vertical
   - Inverted
   - Side Mount
   - Angle: Degree ________
3. Load/Tooling Weight __________________
4. Repeatability Requirements __________________
   - Unidirectional
   - Bidirectional
5. Is the load externally guided? (check one)
   - Yes    No
   If yes, how? __________________
6. Is the actuator body supported? (check one)
   - Yes    No
   If yes, how? __________________
7. Life Requirements (cycles, distance or years)
   Hours per day ________ Days per year ________
8. Special Considerations __________________
   __________________
   __________________
   __________________

Please attach another sheet if more room is needed.

NOTES:
Please include the critical dimensions in your sketch.
In order to achieve the best solution, it is important that you provide as much information as possible.

Motion Profile

<table>
<thead>
<tr>
<th>Moves</th>
<th>Distance (Stroke)</th>
<th>Time</th>
<th>Thrust or Load</th>
<th>Dwell</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Motion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second Motion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Third Motion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fourth Motion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Environmental Requirements
1. Operating Temperature
   Max _______ Min _______
2. Contamination (check one)
   - Particle
   - Liquid
   Type: __________________
3. Special Considerations __________________

Moment Loading

X distance _______
Y distance _______
Z distance _______
Actuator Type and Mounting

1. Carriage Type (check one)
   - Standard
   - Extended
   - No Preference

2. Carriage Options (check one)
   - Wipers
   - Bumpers
   - Wipers & Bumpers

3. Motor Mount (check one)
   - Inline – Direct Drive Left (shown)
   - Inline – Direct Drive Right
   - Parallel Over Right
   - Parallel Over Left
   - Parallel Under Right
   - Parallel Under Left
   - Other Parallel Option (select from catalog page 64)

Motor, Drive and Control Options:

1. Motor Options (check all that apply)
   - Stepper
   - Servo
   - Parker Supplied
   - Customer Supplied (provide print)
   - Gearhead

2. Other Options (check one)
   - Drive
   - Drive/Controller
   - Controller

3. Available Line Voltage

4. Switches/Sensors (quantity)
   - End of Travel
   - Home

5. Brake Option (check one)
   - Motor
   - None

6. Special Options

Parallel mounts can limit the actuator's total thrust capacity.
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Actuator Division
Wadsworth, Ohio USA
Phone: 1-866-PARK-ACT
e-mail: actuatorsales@parker.com
website: www.parker.com/actuator
The LCB Series
The LCB series of linear actuators incorporates a low friction, dry running sliding bearing carriage that provides long and reliable travel life even at 100% duty cycle. The low mass of the carriage and steel reinforced timing belt design allows for very high acceleration and velocity. With accelerations exceeding 2G's and speeds up to 8 m/s, the LCB can achieve comparable throughput to linear motors at a fraction of the cost.

The simple, cost effective design of the LCB is also well suited for replacing pneumatic actuators in applications requiring a higher level of performance and control. Combined with Parker motors and controls, the LCB offers a fully programmable, high performance solution at a great value.

The LCB design means . . . .

- Increased throughput – 100% Duty Cycle Operation
- High acceleration (20 m/s²) and velocity (8 m/s)
- Two profile sizes (LCB040 & LCB060)
- Dry running, low friction bearings provide long, reliable life
- Lower noise generated during operation compared to other bearing type
- High static load capacity - Well suited to withstand pressing forces at standstill
- Short, medium, and long carriages available to optimize moment load capacity

LCB Markets and Applications
The LCB series rodless actuator has proven to be a robust and reliable solution for numerous motion control applications across many markets and industries. Listed below are some examples of where and how the LCB series rodless actuator has been successfully applied.

Markets and Industries Served

<table>
<thead>
<tr>
<th>Packaging</th>
<th>Life Sciences</th>
<th>Pharmaceutical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food &amp; Beverage</td>
<td>Medical</td>
<td>Research &amp; Testing</td>
</tr>
<tr>
<td>Automotive</td>
<td>Conveyor</td>
<td>Semiconductor</td>
</tr>
<tr>
<td>Tire &amp; Rubber</td>
<td>Computer / Electronics</td>
<td>Factory Automation</td>
</tr>
</tbody>
</table>

Application Examples

<table>
<thead>
<tr>
<th>Discrete / Multi-Point Positioning</th>
<th>Small Area Gantry</th>
<th>Complex Motion Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical Stackers / Elevator Lift</td>
<td>Pick &amp; Place</td>
<td>Flying Cut-to-Length</td>
</tr>
<tr>
<td>Backstop Index</td>
<td>Contoured Glue Dispensing</td>
<td>Crosscutting / Slitting</td>
</tr>
<tr>
<td>Transfer Unit</td>
<td>Part Load &amp; Unload</td>
<td>Profile Contouring</td>
</tr>
<tr>
<td>Scanning / Inspection</td>
<td>Labeling / Wrapping</td>
<td>High Speed Winding Traverse</td>
</tr>
<tr>
<td>Pneumatic Rodless Replacement</td>
<td>Storage &amp; Retrieval</td>
<td>Linear Motor Alternative</td>
</tr>
</tbody>
</table>
**Construction**

1 **Guide**
The external sliding guide is incorporated as part of the aluminum profile. It is unnecessary to adjust two separate guiding rails. The guide is maintenance free with integrated dry-film lubricant.

2 **Sliding Carriage**
The sliding carriage is available in three lengths. With a longer sliding carriage, there is greater distance between the sliding blocks. This improves the load capacity with respect to yaw and pitch moments.

3 **Sliding Blocks**
Low friction sliding blocks provide smooth motion throughout travel. Sliding blocks can be easily changed within 2 minutes without detensioning the timing belt.

4 **Spacer Plates**
The timing belt of the LCB040 is tensioned directly at the sliding carriage by means of spacer plates.

5 **Tensioning Station**
On the LCB060, the timing belt is tensioned via tensioning screws at the tensioning station.

6 **Profile**
The profile is available in two sizes and resistant to flexing. The closed profile provides high torsional stiffness. Profiles are dirt tolerant, chemically and mechanically robust. The compact design means minimum installation space is required.

7 **Timing Belt Drive**
High stiffness and accuracy are provided by the generously-dimensioned timing belt.

8 **Drive Options**
- Linear actuator with free shaft end
- Coupling (9) & gearbox
- Coupling, gearbox & motor
- Coupling & direct drive motor (10)
**Dual Axis Actuators**

For a dual-axis actuator with the drive on the left side, you need two LCB basic units: 1) the left unit with drive option LDN and 2) the right unit with drive option LSN.

For a dual-axis actuator with the drive on the right side, you need two LCB basic units: 1) the right unit with drive option RDN and 2) the left unit with drive option RSN.

For a dual-axis actuator, two LCB basic units and a shaft corresponding to the desired center-distance are required. Parker will deliver the two basic units (with mounted couplings – if this was ordered) and a separate shaft kit. See page 88 for shaft kit ordering.
## LCB Specifications

<table>
<thead>
<tr>
<th>LCB Overview</th>
<th>Units</th>
<th>LCB040</th>
<th>LCB060</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance Limits</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Thrust (Belt Traction Force) $F_x$</td>
<td>lbf (N)</td>
<td>36 (160)</td>
<td>126 (560)</td>
</tr>
<tr>
<td>Max Normal Load $F_z$</td>
<td>lbf (N)</td>
<td>13 (60)</td>
<td>66 (295)</td>
</tr>
<tr>
<td>Max Speed</td>
<td>in/s (m/s)</td>
<td>315 (8.0)</td>
<td>315 (8.0)</td>
</tr>
<tr>
<td>Max Acceleration</td>
<td>in/s$^2$ (m/s$^2$)</td>
<td>787 (20)</td>
<td>787 (20)</td>
</tr>
<tr>
<td>Max Travel</td>
<td>in (mm)</td>
<td>78 (2.0)</td>
<td>216 (5.5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System Characteristics</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulley Lead (travel distance per rev)</td>
<td>mm/rev</td>
<td>125</td>
<td>170</td>
</tr>
<tr>
<td>Pulley Diameter</td>
<td>in (mm)</td>
<td>1.567 (39.79)</td>
<td>2.130 (54.11)</td>
</tr>
<tr>
<td>Pulley Tooth Count</td>
<td># Teeth</td>
<td>25</td>
<td>17</td>
</tr>
<tr>
<td>Efficiency</td>
<td>%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Repeatability</td>
<td>in (mm)</td>
<td>±0.008 (±0.2)</td>
<td>±0.008 (±0.2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reflected Rotational Inertia</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Carriage, 1m travel</td>
<td>oz-in$^2$ (kg-cm$^2$)</td>
<td>13.3 (2.44)</td>
<td>80.9 (14.8)</td>
</tr>
<tr>
<td>Medium Carriage, 1m travel</td>
<td>oz-in$^2$ (kg-cm$^2$)</td>
<td>14.8 (2.72)</td>
<td>86.2 (15.8)</td>
</tr>
<tr>
<td>Long Carriage, 1m travel</td>
<td>oz-in$^2$ (kg-cm$^2$)</td>
<td>16.4 (3.00)</td>
<td>91.2 (16.7)</td>
</tr>
<tr>
<td>Additional Inertia per 1m travel</td>
<td>oz-in$^2$ (kg-cm$^2$) / m</td>
<td>2.0 (0.37)</td>
<td>27.3 (5.00)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit weight, Zero Stroke</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Carriage, S</td>
<td>lb (kg)</td>
<td>3.24 (1.47)</td>
<td>9.55 (4.33)</td>
</tr>
<tr>
<td>Medium Carriage, M</td>
<td>lb (kg)</td>
<td>3.66 (1.66)</td>
<td>10.38 (4.71)</td>
</tr>
<tr>
<td>Long Carriage, L</td>
<td>lb (kg)</td>
<td>4.08 (1.85)</td>
<td>11.24 (5.10)</td>
</tr>
<tr>
<td>Additional Travel Weight</td>
<td>lb (kg) / m</td>
<td>5.39 (2.45)</td>
<td>11.46 (5.21)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Carriage Weight</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Carriage, S</td>
<td>lb (kg)</td>
<td>0.86 (0.39)</td>
<td>3.11 (1.41)</td>
</tr>
<tr>
<td>Medium Carriage, M</td>
<td>lb (kg)</td>
<td>1.01 (0.46)</td>
<td>3.37 (1.53)</td>
</tr>
<tr>
<td>Long Carriage, L</td>
<td>lb (kg)</td>
<td>1.17 (0.53)</td>
<td>3.66 (1.66)</td>
</tr>
</tbody>
</table>

1. Repeatability is unidirectional, achieved under ideal conditions and slow speeds. Actual repeatability may vary with the application.

### Operating Temperature Range

$0^\circ$ to $60^\circ$C ($32^\circ$ to $140^\circ$F)

### Available Stroke Lengths

<table>
<thead>
<tr>
<th>Stroke</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
<th>500</th>
<th>600</th>
<th>700</th>
<th>800</th>
<th>900</th>
<th>1000</th>
<th>1250</th>
<th>1500</th>
<th>1750</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCB040</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>LCB060</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stroke</th>
<th>2250</th>
<th>2500</th>
<th>2750</th>
<th>3000</th>
<th>3250</th>
<th>3500</th>
<th>3750</th>
<th>4000</th>
<th>4250</th>
<th>4500</th>
<th>4750</th>
<th>5000</th>
<th>5250</th>
<th>5500</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCB060</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>
**LCB Technical Data**

**LCB040 Life vs. Load**

The diagrams are valid solely for guidance and under ideal operating conditions.

The diagrams are based on a trapezoidal motion sequence with 3 identically long sections for acceleration, constant travel and deceleration.

The diagrams are based on defined payloads of 1 kg. Shown are the respective mass centroids with their typical load arms.

**Actuator Life**

Naturally, the sliding guiding has already a slight play under new condition, so that the guiding does not jam and the sliding carriage moves smoothly. The play is measured as a gap for each slide and is approx. 0.1 to 0.2mm in normal direction and at the sides.

During the operation, the play increases according to the loads shown in the diagrams.

If a certain state of wear is reached (the wear limit is 0.5mm for the LCB040), the slides can be exchanged easily within a few minutes. After the exchange, a new lifetime cycle begins according to the diagrams.

**Using the Diagrams**

Life is shown for each length of carriage: short (S), medium (M) and long (L). The diagrams can be interpolated with respect to lifetime and extrapolated with respect to load. (for example: halved operational performance results in halved wear, doubled load will result in halved mileage in km).
### LCB060 Life vs. Load

The diagrams are valid solely for guidance and under ideal operating conditions.

The diagrams are based on a trapezoidal motion sequence with 3 identically long sections for acceleration, constant travel and deceleration.

The diagrams are based on defined payloads of 5 kgs. Shown are the respective mass centroids with their typical load arms.

#### Actuator Life

Naturally, the sliding guiding has already a slight play under new condition, so that the guiding does not jam and the sliding carriage moves smoothly. The play is measured as a gap for each slide and is approx. 0.1 to 0.2mm in normal direction and at the sides.

During the operation, the play increases according to the loads shown in the diagrams.

If a certain state of wear is reached, at the lastest however at the wear limit (1.0mm for the LCB060), the slides can be exchanged easily within a few minutes. After the exchange, a new lifetime cycle begins according to the diagrams.

#### Using the Diagrams

Life is shown for each length of carriage: short (S), medium (M) and long (L). The diagrams can be interpolated with respect to lifetime and extrapolated with respect to load. (for example: halved operational performance results in halved wear, doubled load will result in halved mileage in km).
LCB Drive Torque Requirements
The graphs include both acceleration and friction forces.

**LCB040 – Horizontal Mounting Position**

**LCB040 – Vertical Mounting Position**

**LCB060 – Horizontal Mounting Position**

**LCB060 – Vertical Mounting Position**

**Location of Mass Barycenter or Point of Force Application**

2:1 Rule

Drawing shows example of the pitch moment. Also valid for roll and yaw moments respectively.

\[ I_L < 2 \times I_T \]

\( I_L \) = Load lever

\( I_T \) = Support Lever

---

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Deflection
Graphs show deflection vs. distance between mountings and load.

LCB040

LCB060
**Drive Orientation (R, L)**
Right/left indication looking from load attachment plate to drive module.

**Drive Shaft (S, D)**
Double shaft (D) models have an additional shaft on the opposite side of the coupling. This is used to attach the shaft for dual-axis actuators.

**With Free Drive Shaft**
The threads to attach the coupling are on the side defined under "Drive Orientation".

**With Attached Coupling Kit**
The coupling kit is always mounted in the factory.

**Carriage Length (S, M, L)**
All sliding carriages have 4 sliding blocks. On a longer sliding carriage, the load bearing capacity for yaw and pitch moments (My and Mz) is greater.
Sliding Blocks
The sliding block is a wearing part. Four (4) pieces are required per linear actuator.

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Block Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCB040</td>
<td>127-004016</td>
</tr>
<tr>
<td>LCB060</td>
<td>127-006014</td>
</tr>
</tbody>
</table>

External Bumpers

1) It is recommended to mount two external bumpers per side.

<table>
<thead>
<tr>
<th>Actuator Model</th>
<th>Part Number</th>
<th>Part Number Stainless</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCB040</td>
<td>510-001445</td>
<td>510-001495</td>
</tr>
<tr>
<td>LCB060</td>
<td>510-001645</td>
<td>510-001695</td>
</tr>
</tbody>
</table>

Dimensions

<table>
<thead>
<tr>
<th>Actuator Model</th>
<th>L Min</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>EØD</th>
<th>E</th>
<th>F</th>
<th>V</th>
<th>W</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCB040</td>
<td>66</td>
<td>35</td>
<td>25</td>
<td>50</td>
<td>10</td>
<td>10</td>
<td>15.6</td>
<td>50</td>
<td>52</td>
<td>57</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>LCB060</td>
<td>97</td>
<td>55</td>
<td>40</td>
<td>85</td>
<td>15</td>
<td>20</td>
<td>26.7</td>
<td>80</td>
<td>82.5</td>
<td>90</td>
<td>20</td>
<td>5</td>
</tr>
</tbody>
</table>
Electrical Limit Switches

Specifications

<table>
<thead>
<tr>
<th>Electrical Characteristics</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Voltage</td>
<td>24VDC</td>
</tr>
<tr>
<td>Voltage Range</td>
<td>10...35VDC</td>
</tr>
<tr>
<td>Supply Current</td>
<td>&lt; 15mA</td>
</tr>
<tr>
<td>Maximum Load Current</td>
<td>300mA</td>
</tr>
<tr>
<td>Residual Voltage</td>
<td>&lt; 2.5VDC</td>
</tr>
<tr>
<td>Max. Switching Frequency</td>
<td>2 kHz</td>
</tr>
<tr>
<td>Connecting Cables</td>
<td>3 x 0.25mm²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technical Data</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching Distance</td>
<td>2mm / 4mm ± 10%</td>
</tr>
<tr>
<td>Switch Hysteresis</td>
<td>&gt; 1%...&lt; 15%</td>
</tr>
<tr>
<td>Repeatability</td>
<td>0.01mm</td>
</tr>
<tr>
<td>Temperature Drift</td>
<td>&lt; 10%</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>-25°C to +70°C</td>
</tr>
<tr>
<td>Protection Class</td>
<td>IP67</td>
</tr>
<tr>
<td>Cable Length</td>
<td>6m</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCB040</td>
<td>NPN normally closed contact with 6m cable and fixing material</td>
<td>510-001435</td>
</tr>
<tr>
<td></td>
<td>NPN normally open contact with 6m cable and fixing material</td>
<td>510-001436</td>
</tr>
<tr>
<td></td>
<td>PNP notmaually closed contact with 6m cable and fixing material</td>
<td>510-001437</td>
</tr>
<tr>
<td></td>
<td>PNP normally open contact with 6m cable and fixing material</td>
<td>510-001438</td>
</tr>
<tr>
<td>LCB060</td>
<td>NPN normally closed contact with 6m cable and fixing material</td>
<td>510-001635</td>
</tr>
<tr>
<td></td>
<td>NPN normally open contact with 6m cable and fixing material</td>
<td>510-001636</td>
</tr>
<tr>
<td></td>
<td>PNP notmaually closed contact with 6m cable and fixing material</td>
<td>510-001637</td>
</tr>
<tr>
<td></td>
<td>PNP normally open contact with 6m cable and fixing material</td>
<td>510-001638</td>
</tr>
</tbody>
</table>
Clamping Profiles
The toe clamps are used in conjunction with the standard load attachment plate to rapidly install and attach various combinations of linear actuators. Two clamping profiles are needed to mount an LCB on a flange plate. The clamping profiles may not be used in the range of the drive or of the clamping station.

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCB040</td>
<td>500-000910</td>
</tr>
<tr>
<td>LCB060</td>
<td>500-000905</td>
</tr>
</tbody>
</table>
# T-Nuts and Bolts

The T-nuts and bolts are used to attach external components to the T-slots of the profile.

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Description</th>
<th>D</th>
<th>E</th>
<th>i1</th>
<th>K</th>
<th>GA</th>
<th>L</th>
<th>Part Number</th>
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<td>22</td>
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<td>7.5</td>
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<td>400-000034</td>
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</tbody>
</table>

* Square and hexagon nuts should only be used for lightly-loaded attachments.

## T-Nuts

![T-Nut Diagram]

## T-Slot Bolts and Nuts

- **DIN 562**
- **DIN 934**
- **DIN 787**
LCB Ordering Information

**LCB Series 040**

- **Profile Size**: 040 (56mm), 060 (80mm)
- **Drive Orientation**: R (Drive Shaft Right), L (Drive Shaft Left)
- **Drive Shaft**: Single Shaft (S), Double Shaft (D)
- **Gearbox**: No Gearbox (0), PX23 (A), PX34 (D), PV23FE (P), PV34FE (Q)
- **Motor**: S57, ES2x - Round Shaft (A), S83, ES3x - Round Shaft (B), HV34, LV34 - Shaft Flat (C), HV23, LV23 - Shaft Flat (D)
- **Carriage Style**: Short Sliding Carriage (S), Medium Sliding Carriage (M), Long Sliding Carriage (L)
- **Stroke**: See table on page 73 for available travel lengths.
- **Design Level**: 0750 (A)

**Code**

<table>
<thead>
<tr>
<th>Code</th>
<th>Profile Size</th>
<th>Drive Orientation</th>
<th>Drive Shaft</th>
<th>Gearbox</th>
<th>Motor Option</th>
<th>Carriage Style</th>
<th>Stroke</th>
<th>Design Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>040</td>
<td>56mm</td>
<td>R</td>
<td>S</td>
<td>No Gearbox</td>
<td>A</td>
<td>S</td>
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<td>0750</td>
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<tr>
<td>060</td>
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<td>L</td>
<td>D</td>
<td>PX23</td>
<td>B</td>
<td>M</td>
<td></td>
<td>A</td>
</tr>
</tbody>
</table>

**Motor Model**

- A: S57, ES2x - Round Shaft
- B: S83, ES3x - Round Shaft
- C: HV34, LV34 - Shaft Flat
- D: HV23, LV23 - Shaft Flat
- E: SM23x***-T*** (x = 1, 2, 3)
- F: BE23***-K***
- G: BE34***-K***
- H: SMN0602***-K***
- J: SMN0822***-K***
- K: SMN1002***-K***
- L: SMN1152***-K***
- N: MPP092****-K***
- P: MP100****-K***
- Q: MPP115****-K***

**Motor Model (continued)**

- 00: Motor Flange only
- 01-99: Reference Motor Section for Specific Models (01-99)

**Standard Stroke**

- See table on page 73 for available travel lengths.

**Maximum Standard Stroke Length**

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum Travel</th>
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<tbody>
<tr>
<td>LCB040</td>
<td>2000mm</td>
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<tr>
<td>LCB060</td>
<td>5500mm</td>
</tr>
</tbody>
</table>

1. Not all motor/gearbox options physically fit on all cylinder sizes and mounting styles. Reference mounting matrix to determine suitable combinations.
2. When combined with Gearbox Option “0” (no gearbox), this option is direct mount with no flange included.
3. Reference Motor Section for motor compatibility and coding.
4. Stroke is measured bumper to bumper.
LCB Ordering Information – Shaft

**LCB**
- **Series**
- **Profile Size**

**040**
- **Connecting Shaft**

**W**
- **Center Distance**

**0750**
- **Profile Size**

<table>
<thead>
<tr>
<th>Code</th>
<th>Profile Size</th>
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<tbody>
<tr>
<td>040</td>
<td>56mm</td>
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<tr>
<td>060</td>
<td>80mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Center Distance</th>
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</thead>
<tbody>
<tr>
<td>xxxx</td>
<td>Distance from center line to center line in mm.</td>
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</tbody>
</table>

**Dual-Axis Actuator Dimensions**

**LCB040**

**LCB060**

** Center Distances (mm)**

<table>
<thead>
<tr>
<th>Center Distance</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
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<td>x</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
LCB Application Fax Form

Fax completed form to (330) 334-3335 or email to actuatorsales@parker.com

Contact Information:
Name __________________________ Phone __________________________
Company __________________________ email __________________________
City, State, Zip __________________________

Application Sketch

NOTES:
Please include the critical dimensions in your sketch.
In order to achieve the best solution, it is important that you provide as much information as possible.

Motion Profile

<table>
<thead>
<tr>
<th>Moves</th>
<th>Distance (Stroke)</th>
<th>Time</th>
<th>Thrust or Load</th>
<th>Dwell</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Motion</td>
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<tr>
<td>Second Motion</td>
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<tr>
<td>Third Motion</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fourth Motion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Application Requirements:
1. Overall Stroke (add 25mm per end minimum) ____________
2. Cylinder Orientation (check one)
   - Horizontal
   - Inverted
   - Side Mount
   - Vertical
   - Angle: Degree ____________
3. Load/Tooling Weight ____________
4. Repeatability Requirements ____________
   - Unidirectional
   - Bidirectional
5. Is the load externally guided? (check one)
   - Yes
   - No
   If yes, how? ____________
6. Is the actuator body supported? (check one)
   - Yes
   - No
   If yes, how? ____________
7. Life Requirements (cycles, distance or years)
   Hours per day ________ Days per year ________
8. Special Considerations ____________
   ____________
   ____________
   ____________
   Please attach another sheet if more room is needed.

1-866-PARK-ACT

Actuator Division
Actuator Type and Mounting

1. Drive Orientation (check one)
   - Drive Shaft Right
   - Drive Shaft Left

2. Drive Shaft (check one)
   - Single Shaft
   - Double Shaft

3. Carriage Style (check one): See
   - Short Carriage
   - Medium Carriage
   - Long Carriage

Motor, Drive and Control Options:

1. Motor Options (check all that apply)
   - Stepper
   - Servo
   - Parker Supplied
   - Customer Supplied (provide print)
   - Gearhead

2. Other Options (check one)
   - Drive
   - Drive/Controller
   - Controller

3. Available Line Voltage

4. Switches/Sensors (quantity)
   - End of Travel
   - Home

5. Brake Option (check one)
   - Motor
   - None

6. Special Options
   - __________________________________________________________
   - __________________________________________________________
   - __________________________________________________________
   - __________________________________________________________
Multi-Axis Systems

Contents
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System Accessories ..................................................................................97
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Overview

Multi-Axis Solutions from the Actuator Division
Using Parker Electric Cylinders, Rodless Actuators and Structural Aluminum Framework

Many applications require multi-axis integration rather than a single axis solution. With their modular design, both ET Series Electric Cylinders and ER, ERV and LCB Series Rodless Actuators are well suited to multi-axis connection. The Actuator Division is ready to provide a multi-axis solution to your application by providing the connection hardware in addition to standard and modified actuator products to make integration of the system into the application simple and reliable.

Multi-Axis Features:

• Transition kits for connecting ER Series Rodless Actuators
• Transition kits to connect ET Series Linear Actuators to ER Series Rodless Actuators
• Non-driven Idler Units to provide additional bearing support
• Outrigger bearing units to control deflection and provide additional loading capacity
• Link-shafts to connect belt-driven actuators to a single motor/gearbox

Sample System

Statement of the System Provider: The Actuator Division provides multi-axis actuator systems as unassembled kits, unless agreed to otherwise, with the understanding that the end user is responsible for final field assembly and electronic integration. Each kit will include re-assembly instructions in the form of mechanical assembly drawings.
Using the ET, ER, ERV and LCB actuators as building blocks, Parker can create economical and customized cartesian systems. These work cell-level robotic solutions are ideal for pick-and-place and dispensing applications. Beyond the base system, Parker can integrate pneumatic axes, grippers, vacuum cups, custom structures and guarding.

- Standard or custom configurations available
- Economical robotic solution
- Optional hardware:
  - Cable management
  - Machine base and guarding
  - Pneumatic actuators
  - Vacuum cups and generators

### System Types

**System 1**  
**XX’-Y**  
A dual actuator X-axis supports a single Y-axis actuator. The dual X-axis may be belt-driven with a linked drive shaft, dual screw drive or driven by one actuator, while the other actuator serves as a non-driven idler.

**System 2**  
**XX’-YY’**  
A dual actuator X-axis supports dual Y-axis actuators. Better suited to large or cumbersome loads.

**System 3**  
**X-Z**  
A single actuator X-axis supports a single Z-axis. The Z-axis may be electromechanical or pneumatic.

**System 4**  
**XX’-Z**  
A dual actuator X-axis supports a single Z-axis. Offers increased rigidity for pick and place applications.

**System 5**  
**XX’-Y-Z**  
A Z-axis is added to System 1. The third axis may be electromechanical or pneumatic and may carry Parker end effector hardware.

**System 6**  
**XX’-YY’-Z**  
A Z-axis is added to System 2. The third axis may be electromechanical or pneumatic and may carry Parker end effector hardware.
Application Considerations for Multi-Axis Systems:

1. **Number of Axes of Motion**
   It is important to understand the operating environment of the motion system and the most cost effective quantity and placement of motion components. It is equally important when ordering to understand the orientation of systems as specified by the Actuator Division.

   **The X, or Base Axis.** The axis which provides the base for all other axes of motion is referred to as the x-axis in all System Type considerations. Regardless of whether the base axis rests on a horizontal or on a vertical surface, the most heavily loaded axis shall be called the x-axis.

   **The Second Axis.** When placed on a base axis and traveling in the same plane, the second axis is referred to as the y-axis. When placed on a base axis and traveling in the plane perpendicular to the base axis plane, the second axis becomes the z-axis, as in System Types 3 and 4. The second axis may be mounted upright, inverted or on its side.

   **The Third Axis.** The third axis is referred to as the z-axis when traveling perpendicular to the plane of the base x-axis and second y-axis.

2. **Orientation of the Load**
   Does the load need to be free from any interference from the motion components?
   The ET Series Electric Cylinder is non-intrusive and allows the load to travel free from interference when mounted to the rod end. The ER Series Rodless Actuator may or may not create interference, depending on load orientation and placement of the actuator.

   **Does the load need to be free of vibration or any other movement while being positioned?**
   Depending on the size and center of gravity of the load, any movement may induce a response to acceleration and deceleration from the load. This means that the load may not come completely to rest for several seconds, even though the motion system has stopped. The introduction of parallel bearing systems, as in the X-X’ and Y-Y’ dual axis configurations, serves to minimize this effect. For ET Series Electric Cylinders, adding a Linear Rod Guide Module option minimizes rod end movement and increases side load capacity (see ET Rod Options).

   **Does the load need to be free of deflection?**
   Again, depending on the size and center of gravity of the load, any acceleration or deceleration may cause the load bearing carriage to deflect and thereby cause the load to leave its “at rest” position. The introduction of parallel bearing systems, as in the X-X’ and Y-Y’ dual axis configuration usually eliminates this problem. Rod side load curves for the ET Series Electric Cylinder are located on page 10, while deflection curves for the Linear Rod Guide Module option may be found on page 13. Consult the factory for ER Series carriage deflection information.
3. Motion Profile Consideration

What is the speed requirement of the application?
Higher speed motion typically requires belt drive actuators. In general, any speed over 20 in/sec may exceed the capabilities of a screw drive system. Higher accelerations may also make non-driven idler units ineffective, as the non-driven units will tend to lag behind the driven axis and cause the system to bind.

What is the repeatability and accuracy requirement of the motion profile?
Screw drive systems offer repeatability values 10 times smaller than those of belt drive systems. Linear accuracy values are comparable for both systems, with the exception of precision ground ball screws.

4. Dual Drive Actuators

If the dual axis option has been selected for balanced load support, there are three basic options.

Idler Separation
In most cases, the idler separation from the drive axis should not exceed the length of a single bearing carriage. As a general rule, any separation greater than 10 inches (254 mm) may present a problem. The idler separation problem resides in the case of the idler bearing axis lagging behind the drive bearing axis upon acceleration and deceleration, or lagging due to misalignment or friction. If the attachment between the two axes is not rigid, the lagging may become more pronounced. Any idler bearing application is best discussed with the Applications Department.

Linked Belt Drive (Link Shafts)
Linked belt drive parallel axes are simple and cost-effective. In this case, a link shaft is coupled between the output shaft of the drive axis and the input shaft of a driven axis. Depending on the parallel axis separation, the link shaft may or may not require additional bearing support. Link shafts are speed limited, which is dependent upon axis separation.

5. Environmental Considerations

Environmental conditions can affect the performance and life expectancy of an electromechanical system. Extreme temperatures may compromise the functionality of actuators with aluminum housings and steel drive screws, bearings and fasteners. Particulate matter and other debris can damage the actuator drive system if not accounted for. In many cases, it may be advantageous to invert one or more actuators to shield the carriage from airborne matter. Positive actuator body pressurization also serves to minimize damage. Considerations are discussed in detail in both the ET and ER sections or consult the factory with any environmental concerns.

Application Consideration Summary

<table>
<thead>
<tr>
<th>Application Consideration</th>
<th>Potential Issues</th>
<th>System Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhung Load</td>
<td>Carriage deflection, oscillatory response from acceleration forces</td>
<td>Dual axis bearing, both driven or one driven, one idler</td>
</tr>
<tr>
<td>Speeds Below 500 mm/sec (20 in/sec)</td>
<td>Low speed smoothness</td>
<td>Screw drive actuator for smoothness</td>
</tr>
<tr>
<td>Speeds Above 500 mm/sec (20 in/sec)</td>
<td>Screw whipping (critical speed), screw noise, reduced screw life</td>
<td>Belt drive actuator for high speeds (to 200 inches)</td>
</tr>
<tr>
<td>Travel Beyond 1500 mm (59 in)</td>
<td>Low critical speed for screw drives</td>
<td>Belt drive actuator for long travel</td>
</tr>
<tr>
<td>Dual drive actuator separation greater than 10 inches</td>
<td>Idler unit lagging driven unit</td>
<td>Dual drive screw or linked belt drives</td>
</tr>
<tr>
<td>Repeatability less than 0.004 in</td>
<td>Beyond capabilities of belt drive actuator</td>
<td>Screw drive actuator for repeatability</td>
</tr>
<tr>
<td>Airborne particles and other debris</td>
<td>May damage drive train or bearings</td>
<td>Invert actuator, positively pressurize the cylinder body</td>
</tr>
<tr>
<td>Load-Motor Inertia Matching</td>
<td>Little mechanical advantage with belt drive, more advantage with screw drive</td>
<td>Consider inline gearbox reducer or timing belt reduction</td>
</tr>
</tbody>
</table>
System Ordering

**Systems Ordering Procedure**

Actuator Division uses several quality verification steps to guaranty that a system will arrive at the customer with an accurate and complete component set.

The first step is a hard quote from the EM Applications Department. The basic information for the hard quote comes from several different sources such as:

- Budgetary Quoting Software
- Multi-Axis Systems Application Fax Page
- Customer Fax

The Customer verifies the quote content.

The verified hard quote is then used by Actuator Division's Engineering Department to prepare the Customer Sign-off Print. *This is the second and probably one of the most important quality checks.*

For every new system that is ordered, a System Print is developed by Actuator Division.

- This print details the various components to be incorporated as well as basic system orientations and dimensions.
- This print is used by the Customer to verify that the system is dimensionally acceptable for their application.

After the print is verified by the Customer, a signed-off copy is returned to Actuator Division for the development of the production bill of materials.

Typical Lead Time for a system from this point is 4 to 6 weeks. This lead time depends on the complexity of the system and the level of integration that is requested of Actuator Division. Please consult Actuator Division Electromechanical Applications Engineering for a specific application lead time.

After the Bill of Materials is produced the production of the system falls into Actuator Division's standard quality system and its associated quality checks.

**Actuator and System Prints**

At the time of this publication Actuator Division uses Inventor Release 10 as their CAD/CAM interface. Actuator Division is capable of generating most of the generic file formats (DXF, IGS, SAT, STP, PDF, etc.)
Connection Kits
With each type of system, there are standardized kits for each connection required. Certain applications may require custom kits due to application envelope or loading. The Actuator Division will submit the standard kits for each application, and will design custom hardware as the application demands.

System Accessories
Upon request, the Actuator Division can include the following system accessories:

- Cable Carriers and Supports
- Special Motor, Brake and Limit Switch/Sensor Cabling
- Structural Framework and Related Accessories (See following pages)
- System Safety Guarding
- Custom Mounting Hardware for Customer Supplied Accessories

Cable Carrier Assemblies
Please note that cable carriers are sized based on the electrical cables, air hoses, sensor cables, etc. that pass through them. The cable with the largest minimum bend radius is the controlling factor along with the cross sectional volume of the cables. The cable carrier is then sized as the next larger standard radius for the cable track.

Developing Multi-Axis Applications
Consult the Application Considerations in this section. We have included a Multi-Axis Application Worksheet at the end of this section. Use this as a guide and also as a fax form when contacting the Actuator Division or your local Automation Technology Center.

Fax: (330) 334-3335
Attention: Electromechanical Application Dept.
System Application Fax Form

Fax completed form to (330) 334-3335 or email to actuatorsales@parker.com

Contact Information:
Name ______________________ Phone ______________________
Company ____________________ email ______________________
City, State, Zip ______________________

Application Sketch

NOTES:
Please include the critical dimensions in your sketch.
In order to achieve the best solution, it is important that you provide as much information as possible.

Motion Profile

<table>
<thead>
<tr>
<th>Move*</th>
<th>Axis of Motion</th>
<th>Distance (Stroke)</th>
<th>Time**</th>
<th>Thrust of Load</th>
<th>Dwell</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

NOTES:
* Please indicate any moves that can be done simultaneously.
** If individual move times are not important, enter "x" and enter the total cycle time here ________.

System Configuration
(Check the figure that resembles your system)

☐ Type 1 X-X'-Y
☐ Type 2 X-X'-Y'
☐ Type 3 X-Z
☐ Type 4 X-X'-Z
☐ Type 5 X-X'-Y-Z
☐ Type 6 X-X'-Y-Y'-Z
☐ Other (Provide sketch)
Please note the following:

a. The X and Y axes must be the same series of actuators.
b. Idlers can only be used when actuators are less than 12” apart.
c. A bearing block will be used when actuators are greater than 36” apart.

**Application Requirements:**

1. Stroke Length:  X ______ Y ______ Z ______
2. X and/or Y axis:
   - [ ] ER
   - [ ] ERV
3. IPS Framework needed?  [ ] Yes  [ ] No
   - If yes, please describe your working envelope: Height ______ Length ______ Width ______
4. Load/Tooling Weight ______________
5. Repeatability Requirements ______________________
   - [ ] Unidirectional
   - [ ] Bidirectional
6. Life Requirements (cycles, distance or years)
   - Hours per day ______ Days per year ______
7. Special Considerations ______________________________________________________
   - ______________________________________________________
   - ______________________________________________________
   - ______________________________________________________

Please attach another sheet if more room is needed.

**Motor Mounting Options (check all that apply)**

1. Z-axis:
   - [ ] Inline Mount  [ ] Parallel Mount  [ ] Reverse
2. Y-axis:
   - [ ] Direct Drive  [ ] Parallel Mount  [ ] Reverse  [ ] Best Way
3. X-axis:
   - [ ] Direct Drive  [ ] Parallel Mount  [ ] Reverse  [ ] Best Way

**Motor, Drive and Control Options:**

1. Motor Options (check all that apply)
   - [ ] Stepper  [ ] Servo
   - [ ] Parker Supplied  [ ] Customer Supplied (provide print)
   - Gearhead(s) if needed:
     - [ ] Parker Supplied  [ ] Customer Supplied
2. Other Options (check one)
   - [ ] Drive  [ ] Controller
3. Available Line Voltage ______________
4. Switches/Sensors (quantity)
   - End of Travel ______  Home ______
5. Brake Option (check one)
   - [ ] Actuator *
   - [ ] Motor
   - [ ] None
   - *With parallel motor mount only
6. Cable Track:  [ ] Yes  [ ] No
7. Special Options ______________________________________________________
   - ______________________________________________________
   - ______________________________________________________
   - ______________________________________________________

Please note that parallel mounts can limit the actuator’s total thrust capacity.
Application Examples
## Contents

Linear Actuators

- ETR ..................................................................................................102
- LR ..................................................................................................102

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ETR Series
Electric Cylinders


- Stainless steel thrust tube
- Internal tie rods permit high thrusts
- Anti-rotate guide bearing
- Tapered roller thrust bearings
- CAD drawings available

<table>
<thead>
<tr>
<th>Series</th>
<th>ETR50</th>
<th>ETR80</th>
<th>ETR100</th>
<th>ETR125</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max thrust N (lbf)</td>
<td>6,500 (1,460)</td>
<td>18,000 (4,045)</td>
<td>45,200 (10,110)</td>
<td>100,000 (22,470)</td>
</tr>
<tr>
<td>Max velocity m/sec (in/sec)</td>
<td>1.2 (47)</td>
<td>0.93 (24)</td>
<td>1.3 (50)</td>
<td>0.97 (25)</td>
</tr>
<tr>
<td>Rated acceleration (g’s)</td>
<td>0.9</td>
<td>1.1</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Max travel (m)</td>
<td>0.8</td>
<td>0.8</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Repeatability (mm)</td>
<td>±0.025</td>
<td>±0.025</td>
<td>±0.025</td>
<td>±0.025</td>
</tr>
</tbody>
</table>

LR Series
Linear Actuators

Linear Roller (LR) Series products provide a high level of accuracy, load-bearing strength and flexibility in a modular, low-cost package. These products utilize standard components and can adapt to a wide range of applications.

- Custom carriage options
- Easy mounting to AC motors
- Instant motor/gearbox approval
- Ideal for material handling, gantry systems, visual inspection, and assembly and transfer lines

<table>
<thead>
<tr>
<th>Series</th>
<th>LR 6</th>
<th>LR 14</th>
<th>LR14HD</th>
<th>LR25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max carriage load, N (lb)</td>
<td>649 (146)</td>
<td>2669 (600)</td>
<td>3350 (753)</td>
<td>11,552 (2597)</td>
</tr>
<tr>
<td>Max travel w/o splice (mm)</td>
<td>5900</td>
<td>5850</td>
<td>5840</td>
<td>5680</td>
</tr>
<tr>
<td>Min travel (mm)</td>
<td>300</td>
<td>250</td>
<td>240</td>
<td>80</td>
</tr>
<tr>
<td>Max drive torque, reversing unit 40 (Nm)</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Max drive torque, reversing unit 80 (Nm)</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>Max speed (m/s)</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Max acceleration at no load (m/s²)</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Repeatability (mm)</td>
<td>±0.10</td>
<td>±0.10</td>
<td>±0.10</td>
<td>±0.10</td>
</tr>
</tbody>
</table>

For more information, visit www.parker.com/actuator.
Parker motion controllers are powerful multi-axis designs that have the processing power to coordinate multiple axes of motion. Parker controllers have advanced features built in, such as kinematics transformation for the control of robots and other non-linear functions. Each Parker controller comes with free libraries for Visual Basic® and C++®.

For more information, visit [www.parkermotion.com](http://www.parkermotion.com).

Parker drives are digital designs that deliver a maximum amount of power output and performance in minimal package size. These drives have industry leading power density and smart digital designs with features to ease integration and start-up. Output power levels range from 50W - 20kW to match your application requirements. Control level is also selectable between Drive only, Drive/Indexer and Drive/Controller depending on your application requirements. Drive/Indexer and Drive/Controller versions can also be configured with Profibus, CANopen, and DeviceNet interfaces for seamless integration into any control system.

For more information, visit [www.parkermotion.com](http://www.parkermotion.com).

Known for robust design and exceptional quality, Parker’s microstepping drives offer high performance and value all in one package. Anti-resonant technology developed by Parker and high selectable resolutions (up to 128,000 steps/rev) allow for very smooth operation at all speeds. Drive families are optimized to work with either VAC or VDC input power with output current ratings up to 12 Amps. Simple positional indexing or full blown motion control can also be achieved with drive/indexer and drive/controller options.

For more information, visit [www.parkermotion.com](http://www.parkermotion.com).
Parker offers a complete line of rotary and linear servo motor products designed to meet the demands of a broad range of applications in both the industrial and high tech marketplaces. With both ironcore and ironless technologies, Parker offers industry leading linear motor solutions that can achieve the highest performance and throughput requirements. Parker's comprehensive line of rotary servo motors range from 40mm frame sizes up to 270mm.

Parker also offers an extensive line of rotary gearmotors, frameless kit motors, cost effective stepper motors, and customized solutions such as stainless steel, food grade motors.

For more information, visit www.parkermotion.com.

Parker precision gearheads incorporate a helical planetary design resulting in higher torque output, quieter operation, and lower backlash. Standard inline and right angle gearheads are available with frame sizes ranging from 40mm to 300mm and nominal output torques up to 40,000 in-lbs. Custom gearhead solutions prepped for special environments such as cleanroom, vacuum, and washdown can be engineered to meet your application requirements.

For more information, visit www.parkermotion.com.

Parker HMI incorporates Windows®-based software into rugged touchscreen computers to ease the development of the user interface without sacrificing the benefits of open architecture.

Parker HMI also incorporates multiple connection options to easily tie the machine into higher level IT/IS systems.

For more information, visit www.parkermotion.com.
**Pneumatic Cylinders**

Parker pneumatic cylinders are engineered to meet ISO, NFPA and other standards, and they come in a variety of shapes (compact, round body and tie rod) and sizes (6-200 mm, 5/16" to 14" bores). Whether you need to move a load fast or slow, in a straight line or through an arc, or even sense the load's position, Parker has a cylinder for your application.

For more information, visit [www.parker.com/actuator](http://www.parker.com/actuator).

**Rotary Actuators**

Parker is the industry leader in Pneumatic Rotary Actuators with output torques from 1 to 10,000 in-lbs at 100 PSI. Configurations include rack and pinion and vane and are available in both metric and imperial designs. Rotary actuators are suitable for lubricated and non-lubricated service and will produce millions of trouble-free cycles making them suitable for a wide range of pneumatic applications.

For more information, visit [www.parker.com/actuator](http://www.parker.com/actuator).

**Grippers**

Parker's grippers are designed to incorporate high grip force to weight ratio, making them ideal for end of arm tooling and high-speed applications. Grippers are available in parallel, angular and three jaw configuration with grip forces to 3,000 lbs and feature single acting, double acting, spring assist or spring return options.

For more information, visit [www.parker.com/actuator](http://www.parker.com/actuator).

**Vacuum Products**

To complement its pneumatic product offerings, Parker has a complete line of vacuum generators and cups. Integrated sensors provide feedback for improved system response time. Additionally, emergency stop systems hold parts during electrical power loss to prevent product/machine damage. Parker’s space saving manifold systems and extensive cup availability provide unlimited automation solutions.

For more information, visit [www.parker.com/pneumatics](http://www.parker.com/pneumatics).
Industrial Profile Systems

Parker Industrial Profile Systems (IPS) structural automation products offer unique benefits over traditional methods of structural fabrication. All systems and assemblies are pre-engineered to customer requirements, yet offer extreme flexibility as needs change.

Profiles and accessories are available in metric or inch-based designs.

Benefits
- Extremely short turnaround time from design to completion
- No welding, grinding, cleaning, painting or distortions
- Lower cost through the elimination of costly traditional manufacturing processes
- Flexibility to reconfigure as requirements change

Profiles
Parker Industrial Profile Systems has one of the most comprehensive product offerings in the industry.
- More than 130 individual high-strength aluminum profiles
- Metric- and inch-based profiles and accessories
- Metric sizes range from 20 mm to 160 mm
- Inch sizes range from 1" to 6"
- Extensive range of smooth, grooveless profiles
- Provide attractive and robust structures

Linear Motion
- Roller bearing systems
- Extrusion-based linear actuators
- Delrin and UHMW slide bearings

Fasteners and Accessories
- Unique T-slot design for reliable connection and easy modification
- Metric and Inch-based hardware available
- Complete line of accessories

Typical Applications
- Enclosures and guarding
- Machine bases and frames
- Work stations and tables
- Material handling systems

For more information, visit www.parker.com/industrialprofile.
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Motor Compatibility Chart

Table 1

<table>
<thead>
<tr>
<th>Parker Gearbox/Motor Options</th>
<th>Gearbox Code</th>
<th>ET032 / ER032</th>
<th>ET050 / ER050 / ERV5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inline</td>
<td>Parallel</td>
<td>Inline</td>
</tr>
<tr>
<td></td>
<td>Direct</td>
<td>Timing Belt</td>
<td>Geardrive</td>
</tr>
<tr>
<td></td>
<td>Gear</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Gear</td>
<td>A</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Gear</td>
<td>B</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Gear</td>
<td>C</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Gear</td>
<td>D</td>
<td>X</td>
</tr>
</tbody>
</table>

Parker Actuator Division offers a broad array of Parker motors and gearboxes for easy configuration with our electromechanical products. When configured in the part number, these motors and/or gearboxes will be mounted to the actuator at the factory and shipped as a complete package. This service not only saves our customers time and money, but it provides peace of mind that all components are properly mounted and that the actuator is ready for installation as soon as it arrives.

- Table #1 & Table #2 show the compatible gearbox/actuator combinations and motor/actuator combinations
- Table #3 shows compatible motor/gearbox combinations

Example 1: Motor mounting directly to actuator – no gearbox
1) Find actuator mounting configuration (inline, parallel, timing belt, gear drive) on Table #1 or Table #2.
2) Follow column down to determine compatible motors.

Example 2: Motor & gearbox mounting to actuator
1) Find actuator mounting configuration (inline, parallel, timing belt, gear drive) on Table #1 or Table #2.
2) Follow column down to determine compatible gearboxes.
3) Use Table #3 to determine compatible motors with gearbox.

Visit [www.parkermotion.com](http://www.parkermotion.com) for complete motor specifications.
## Motor Compatibility Chart

### Table 2

<table>
<thead>
<tr>
<th>Parker Gearbox/Motor Options</th>
<th>Gearbox Code</th>
<th>ET080 / ER080 / ERV8</th>
<th>ET100</th>
<th>ET125</th>
<th>LCB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Inline Direct</td>
<td>Timing Belt</td>
<td>Geardrive</td>
<td>Inline Direct</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>D</td>
</tr>
<tr>
<td>Gearbox Options</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PX23</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS60 shaft horizontal</td>
<td>B</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS60 shaft vertical</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PX34</td>
<td>D</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>PS90 shaft horizontal</td>
<td>E</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
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<td>PS90 shaft vertical</td>
<td>F</td>
<td>X</td>
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<td></td>
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<td>PX115</td>
<td>G</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>PS115 shaft horizontal</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>PS115 shaft vertical</td>
<td>J</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>PX56</td>
<td>K</td>
<td></td>
<td></td>
<td></td>
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<td>PS142 shaft horizontal</td>
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<td>PS142 shaft vertical</td>
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<td></td>
</tr>
<tr>
<td>PV23FE</td>
<td>P</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV34FE</td>
<td>Q</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 3

<table>
<thead>
<tr>
<th>Gearbox Options</th>
<th>Gearbox Code</th>
<th>Applicable Motor Code in Combination with Gearbox</th>
</tr>
</thead>
<tbody>
<tr>
<td>PX23</td>
<td>A</td>
<td>Stepper Motors A, D</td>
</tr>
<tr>
<td>PS60</td>
<td>B, C</td>
<td>Servo Motors F, H</td>
</tr>
<tr>
<td>PV23FE</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>PX34</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>PS90</td>
<td>E, F</td>
<td>Stepper Motors B, C</td>
</tr>
<tr>
<td>PV34FE</td>
<td>Q</td>
<td>Servo Motors G, J, K, N, P</td>
</tr>
<tr>
<td>PX115</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>PS115</td>
<td>H, J</td>
<td>Servo Motors K, L, M, P, Q</td>
</tr>
<tr>
<td>PX56</td>
<td>K</td>
<td>Servo Motors L, M, Q, R, S</td>
</tr>
<tr>
<td>PS142</td>
<td>L</td>
<td></td>
</tr>
</tbody>
</table>

1-866-PARK-ACT
SM Series High-Performance Slotless Design

The SM Series brushless servo motors feature a slotless stator design. This design eliminates all detent torque in the motor allowing the SM series motors to provide extremly smooth motion, especially at low speeds. The slotless design also creates a higher rotor inertia which allows for better stability and control of larger inertia payloads.

<table>
<thead>
<tr>
<th>Motor Series</th>
<th>Motor Type</th>
<th>Design Type</th>
<th>Cont Torque Tc (lb-in)</th>
<th>Inertia</th>
<th>Feedback Options</th>
<th>Frame Size</th>
<th>Brake Option</th>
<th>IP Rating</th>
<th>Max Speed</th>
<th>Certification</th>
<th>Winding (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>Brushless</td>
<td>Slotless</td>
<td>1.7 to 10.1</td>
<td>High</td>
<td>Encoder, Resolver, Smart Encoder</td>
<td>NEMA 23</td>
<td>No</td>
<td>64</td>
<td>6500 to 7500</td>
<td>CE</td>
<td>170, 340</td>
</tr>
<tr>
<td>BE</td>
<td>Brushless</td>
<td>Bridged Stator</td>
<td>3.6 to 43.3</td>
<td>Low</td>
<td>Encoder, Resolver, Smart Encoder</td>
<td>NEMA 23 NEMA 34</td>
<td>34 only</td>
<td>40</td>
<td>5000</td>
<td>CE</td>
<td>170, 340</td>
</tr>
<tr>
<td>SMN</td>
<td>Brushless</td>
<td>Segmented Lamination</td>
<td>11.9 to 128.7</td>
<td>Medium</td>
<td>Encoder, Resolver, Multi-turn Absolute (SinCos)</td>
<td>60mm to 142mm</td>
<td>All</td>
<td>64</td>
<td>4500 to 7500</td>
<td>CE, UL</td>
<td>340, 680</td>
</tr>
<tr>
<td>MPP</td>
<td>Brushless</td>
<td>Segmented Lamination</td>
<td>13.8 to 552.5</td>
<td>Low</td>
<td>Encoder, Resolver, Single-turn Absolute (EnDat), Multi-turn Absolute (EnDat)</td>
<td>92mm to 190mm</td>
<td>All</td>
<td>64</td>
<td>1700 to 5000</td>
<td>CE, UL</td>
<td>340, 650</td>
</tr>
</tbody>
</table>

SM23x**-T*** (x=1,2,3)

<table>
<thead>
<tr>
<th>Motor Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E00</td>
<td>Prepped for SM23x**-T*** (x=1,2,3) motor</td>
</tr>
<tr>
<td>E01</td>
<td>SM233BE-TQON - Encoder - TQ connector</td>
</tr>
<tr>
<td>E02</td>
<td>SM233BR-TMSN - Resolver - MS connector</td>
</tr>
<tr>
<td>E03</td>
<td>SM233AE-TGSN - Encoder - GS connector</td>
</tr>
<tr>
<td>E10</td>
<td>SM231AE-TPSN - 1000 line encoder</td>
</tr>
<tr>
<td>E11</td>
<td>SM231AQ-TPSN - Smart encoder</td>
</tr>
<tr>
<td>E12</td>
<td>SM231BE-TPSN - 1000 line encoder</td>
</tr>
<tr>
<td>E13</td>
<td>SM232AE-TPSN - 1000 line encoder</td>
</tr>
<tr>
<td>E14</td>
<td>SM232AQ-TPSN - Smart encoder</td>
</tr>
<tr>
<td>E15</td>
<td>SM232BE-TPSN - 1000 line encoder</td>
</tr>
<tr>
<td>E16</td>
<td>SM233AE-TPSN - 1000 line encoder</td>
</tr>
<tr>
<td>E17</td>
<td>SM233AQ-TPSN - Smart encoder</td>
</tr>
<tr>
<td>E18</td>
<td>SM233BE-TPSN - 1000 line encoder</td>
</tr>
</tbody>
</table>

Visit www.parkermotion.com for complete motor specifications.
BE Series High-Torque, Low-Cost Design

The BE series brushless servo motors produce high continuous stall torque in a cost-reduced package. The increased torque of the BE series is the result of an increased number of magnetic poles on the rotor. Traditional motors in these frame sizes have 4 magnetic poles on the rotor, while the BE series utilizes 8 magnetic poles.

The cost reduction of the BE series is achieved from its open lamination design. Unlike traditional servo motors, the BE series does not have a metal housing. Instead, the laminations of the motor stator are shaped into the body of the motor which reduces both material and assembly costs.

<table>
<thead>
<tr>
<th>Motor Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F00</td>
<td>Prepped for BE23***-K*** motor</td>
</tr>
<tr>
<td>F01</td>
<td>BE230DJ-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>F02</td>
<td>BE230FJ-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>F03</td>
<td>BE230GJ-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>F04</td>
<td>BE231DJ-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>F05</td>
<td>BE231FJ-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>F06</td>
<td>BE231GJ-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>F07</td>
<td>BE232DJ-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>F08</td>
<td>BE232FJ-KPSN - 2000 line encoder</td>
</tr>
<tr>
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<td>F28</td>
<td>BE233FR-KPSN - Resolver</td>
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</tbody>
</table>

Visit [www.parkermotion.com](http://www.parkermotion.com) for complete motor specifications.
SMN Series High-Torque, Compact Design

Parker’s SMN Series of brushless servo motors combine a high-performance segmented stator with competitive pricing for today’s demanding motion control applications. The modern 8-pole segmented stator produces extremely high torques in a compact package. The SMN motor family is offered in frame sizes from 60mm to 142mm and is available with numerous feedback options.

### SMN0602***-K***

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<td>H02</td>
<td>SMN0602Z41-KPSN - Resolver</td>
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<tr>
<td>H03</td>
<td>SMN0602T2F-KPSN - 2048 line encoder</td>
</tr>
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<td>H04</td>
<td>SMN0602Z2F-KPSN - 2048 line encoder</td>
</tr>
<tr>
<td>H05</td>
<td>SMN0602T5D-KPSN - SinCos absolute encoder</td>
</tr>
<tr>
<td>H06</td>
<td>SMN0602Z5D-KPSN - SinCos absolute encoder</td>
</tr>
<tr>
<td>H07</td>
<td>SMN0602T41-KPSB - Resolver + brake</td>
</tr>
<tr>
<td>H08</td>
<td>SMN0602Z41-KPSB - Resolver + brake</td>
</tr>
<tr>
<td>H09</td>
<td>SMN0602T2F-KPSB - 2048 line encoder + brake</td>
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<td>H10</td>
<td>SMN0602Z2F-KPSB - 2048 line encoder + brake</td>
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<td>SMN0602T5D-KPSB - SinCos absolute encoder + brake</td>
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### SMN0822***-K***

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<td>SMN0822V2F-KPSN - 2048 line encoder</td>
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<td>SMN0822S5D-KPSN - SinCos absolute encoder</td>
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<td>SMN0822V5D-KPSN - SinCos absolute encoder</td>
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<td>J07</td>
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<td>SMN1002P2F-KPSN - 2048 line encoder</td>
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<td>K05</td>
<td>SMN1002S5D-KPSN - SinCos absolute encoder</td>
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<td>SMN1002P5D-KPSN - SinCos absolute encoder</td>
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<td>SMN1002P41-KPSB - Resolver + brake</td>
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<td>K09</td>
<td>SMN1002S2F-KPSB - 2048 line encoder + brake</td>
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<td>SMN1002P2F-KPSB - 2048 line encoder + brake</td>
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### SMN1152***-K***

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### SMN1422***-K***

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<td>SMN1422P2F-KPSB - 2048 line encoder + brake</td>
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<tr>
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<td>SMN1422P5D-KPSB - SinCos absolute encoder + brake</td>
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</tbody>
</table>

Visit [www.parkermotion.com](http://www.parkermotion.com) for complete motor specifications.
MPP Series - Low Inertia, High-Power

The MPP series of brushless servo motors features a new design that offers lower inertia and higher power, all in a smaller package. These motors are designed for today’s high-performance motion control applications.

The MPP motors feature segmented core technology, which can yield up to 40% higher torque per unit size than conventionally wound servo motors. “Potted” stators improve thermal efficiency allowing increased torque at the motor shaft.

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Visit www.parkermotion.com for complete motor specifications.
### MPP115****-K***

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<tr>
<td>Q28</td>
<td>MPP1154A6D-KPSN - Mult-turn absolute encoder</td>
</tr>
<tr>
<td>Q29</td>
<td>MPP1154B6D-KPSN - Mult-turn absolute encoder</td>
</tr>
<tr>
<td>Q30</td>
<td>MPP1154P6D-KPSN - Mult-turn absolute encoder</td>
</tr>
<tr>
<td>Q31</td>
<td>MPP1152C8E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>Q32</td>
<td>MPP1152B8E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>Q33</td>
<td>MPP1153B8E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>Q34</td>
<td>MPP1153C8E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>Q35</td>
<td>MPP1154B8E-KPSN - 2000 line encoder</td>
</tr>
</tbody>
</table>

### MPP142x***-K*** (x=2,4,6)

<table>
<thead>
<tr>
<th>Motor Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R00</td>
<td>Prepped for MPP142x***-K*** (x=2,4,6) motor</td>
</tr>
<tr>
<td>R01</td>
<td>MPP1422C1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>R02</td>
<td>MPP1422R1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>R03</td>
<td>MPP1422B1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>R04</td>
<td>MPP1422C1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>R05</td>
<td>MPP1422R1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>R06</td>
<td>MPP1422B1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>R07</td>
<td>MPP1422C1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>R08</td>
<td>MPP1422R1E-KPSN - Resolver</td>
</tr>
<tr>
<td>R09</td>
<td>MPP1422R41-KPSN - Resolver</td>
</tr>
<tr>
<td>R10</td>
<td>MPP1422B41-KPSN - Resolver</td>
</tr>
<tr>
<td>R11</td>
<td>MPP1422C41-KPSN - Resolver</td>
</tr>
<tr>
<td>R12</td>
<td>MPP1422R41-KPSN - Resolver</td>
</tr>
<tr>
<td>R13</td>
<td>MPP1422B41-KPSN - Resolver</td>
</tr>
<tr>
<td>R14</td>
<td>MPP1422R41-KPSN - Resolver</td>
</tr>
<tr>
<td>R15</td>
<td>MPP1422C41-KPSN - Resolver</td>
</tr>
<tr>
<td>R16</td>
<td>MPP1422R6D-KPSN - Mult-turn absolute encoder</td>
</tr>
<tr>
<td>R17</td>
<td>MPP1422B6D-KPSN - Mult-turn absolute encoder</td>
</tr>
<tr>
<td>R18</td>
<td>MPP1422C6D-KPSN - Mult-turn absolute encoder</td>
</tr>
<tr>
<td>R19</td>
<td>MPP1422R6D-KPSN - Mult-turn absolute encoder</td>
</tr>
<tr>
<td>R20</td>
<td>MPP1422B6D-KPSN - Mult-turn absolute encoder</td>
</tr>
<tr>
<td>R21</td>
<td>MPP1422C6D-KPSN - Mult-turn absolute encoder</td>
</tr>
<tr>
<td>R22</td>
<td>MPP1422C3E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>R23</td>
<td>MPP1422B3E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>R24</td>
<td>MPP1422C3E-KPSN - 2000 line encoder</td>
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### MPP1428***-K***

<table>
<thead>
<tr>
<th>Motor Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>S00</td>
<td>Prepped for MPP1428***-K***</td>
</tr>
<tr>
<td>S01</td>
<td>MPP1428P1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>S02</td>
<td>MPP1428Q1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>S03</td>
<td>MPP1428P41-KPSN - Resolver</td>
</tr>
<tr>
<td>S04</td>
<td>MPP1428Q41-KPSN - Resolver</td>
</tr>
<tr>
<td>S05</td>
<td>MPP1428P6D-KPSN - Multi-turn absolute encoder</td>
</tr>
<tr>
<td>S06</td>
<td>MPP1428Q6D-KPSN - Multi-turn absolute encoder</td>
</tr>
<tr>
<td>S07</td>
<td>MPP1428P1E-KPSB - 2000 line encoder + brake</td>
</tr>
<tr>
<td>S08</td>
<td>MPP1428Q1E-KPSB - 2000 line encoder + brake</td>
</tr>
<tr>
<td>S09</td>
<td>MPP1428P41-KPSB - Resolver + brake</td>
</tr>
<tr>
<td>S10</td>
<td>MPP1428Q41-KPSB - Resolver + brake</td>
</tr>
<tr>
<td>S11</td>
<td>MPP1428P6D-KPSB - Multi-turn absolute encoder + brake</td>
</tr>
<tr>
<td>S12</td>
<td>MPP1428Q6D-KPSB - Multi-turn absolute encoder + brake</td>
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### MPP190****-K***

<table>
<thead>
<tr>
<th>Motor Code</th>
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<tbody>
<tr>
<td>T00</td>
<td>Prepped for MPP190****-K*** motor</td>
</tr>
<tr>
<td>T01</td>
<td>MPP1904P1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>T02</td>
<td>MPP1906B1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>T03</td>
<td>MPP1906P1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>T04</td>
<td>MPP1908N1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>T05</td>
<td>MPP1908P1E-KPSN - 2000 line encoder</td>
</tr>
<tr>
<td>T06</td>
<td>MPP1904P41-KPSN - Resolver</td>
</tr>
<tr>
<td>T07</td>
<td>MPP1906B41-KPSN - Resolver</td>
</tr>
<tr>
<td>T08</td>
<td>MPP1906P41-KPSN - Resolver</td>
</tr>
<tr>
<td>T09</td>
<td>MPP1908N41-KPSN - Resolver</td>
</tr>
<tr>
<td>T10</td>
<td>MPP1908P41-KPSN - Resolver</td>
</tr>
<tr>
<td>T11</td>
<td>MPP1904P6D-KPSN - Multi-turn absolute encoder</td>
</tr>
<tr>
<td>T12</td>
<td>MPP1906B6D-KPSN - Multi-turn absolute encoder</td>
</tr>
<tr>
<td>T13</td>
<td>MPP1906P6D-KPSN - Multi-turn absolute encoder</td>
</tr>
<tr>
<td>T14</td>
<td>MPP1908N6D-KPSN - Multi-turn absolute encoder</td>
</tr>
<tr>
<td>T15</td>
<td>MPP1908P6D-KPSN - Multi-turn absolute encoder</td>
</tr>
<tr>
<td>T16</td>
<td>MPP1904P1E-KPSB - 2000 line encoder + brake</td>
</tr>
<tr>
<td>T17</td>
<td>MPP1906B1E-KPSB - 2000 line encoder + brake</td>
</tr>
<tr>
<td>T18</td>
<td>MPP1906P1E-KPSB - 2000 line encoder + brake</td>
</tr>
<tr>
<td>T19</td>
<td>MPP1908N1E-KPSB - 2000 line encoder + brake</td>
</tr>
<tr>
<td>T20</td>
<td>MPP1908P1E-KPSB - 2000 line encoder + brake</td>
</tr>
<tr>
<td>T21</td>
<td>MPP1904P41-KPSB - Resolver + brake</td>
</tr>
<tr>
<td>T22</td>
<td>MPP1906B41-KPSB - Resolver + brake</td>
</tr>
<tr>
<td>T23</td>
<td>MPP1906P41-KPSB - Resolver + brake</td>
</tr>
<tr>
<td>T24</td>
<td>MPP1908N41-KPSB - Resolver + brake</td>
</tr>
<tr>
<td>T25</td>
<td>MPP1908P41-KPSB - Resolver + brake</td>
</tr>
<tr>
<td>T26</td>
<td>MPP1904P6D-KPSB - Multi-turn absolute encoder + brake</td>
</tr>
<tr>
<td>T27</td>
<td>MPP1906B6D-KPSB - Multi-turn absolute encoder + brake</td>
</tr>
<tr>
<td>T28</td>
<td>MPP1906P6D-KPSB - Multi-turn absolute encoder + brake</td>
</tr>
<tr>
<td>T29</td>
<td>MPP1908N6D-KPSB - Multi-turn absolute encoder + brake</td>
</tr>
<tr>
<td>T30</td>
<td>MPP1908P6D-KPSB - Multi-turn absolute encoder + brake</td>
</tr>
</tbody>
</table>

Visit [www.parkermotion.com](http://www.parkermotion.com) for complete motor specifications.
ES Series Stepper Motors - Smoothest Velocity Performance

The quality construction of the ES series stepper motor allows for exceptional velocity performance and reliable operation year after year. Also known as the S series and ZETA series of motors, the ES series is optimized for use with drives running on 120VAC input power, such as the ZETA, GT, and E-AC.

### S57, ES2x with Round Shaft

<table>
<thead>
<tr>
<th>Motor Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A00</td>
<td>Prepped for S57, ES2x stepper motor w/ Round Shaft</td>
</tr>
<tr>
<td>A01</td>
<td>S57-51-MO - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>A02</td>
<td>S57-83-MO - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>A03</td>
<td>S57-102-MO - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>A04</td>
<td>S57-5122 - Double Shaft, Conduit Connector</td>
</tr>
<tr>
<td>A05</td>
<td>S57-8322 - Double Shaft, Conduit Connector</td>
</tr>
<tr>
<td>A06</td>
<td>S57-10222 - Double Shaft, Conduit Connector</td>
</tr>
<tr>
<td>A07</td>
<td>S57-5123 - Double Shaft, Brad Harrison Connector*</td>
</tr>
<tr>
<td>A08</td>
<td>S57-8323 - Double Shaft, Brad Harrison Connector*</td>
</tr>
<tr>
<td>A09</td>
<td>S57-10223 - Double Shaft, Brad Harrison Connector*</td>
</tr>
</tbody>
</table>

* Brad Harrison connector option includes 4m mating cable

### S83, ES3x with Round Shaft

<table>
<thead>
<tr>
<th>Motor Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B00</td>
<td>Prepped for S83, ES3x stepper motor w/ Round Shaft</td>
</tr>
<tr>
<td>B01</td>
<td>S83-62-MO - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>B02</td>
<td>S83-93-MO - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>B03</td>
<td>S83-102-MO - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>B04</td>
<td>S83-6232 - Double Shaft, Conduit Connector</td>
</tr>
<tr>
<td>B05</td>
<td>S83-9332 - Double Shaft, Conduit Connector</td>
</tr>
<tr>
<td>B06</td>
<td>S83-13532 - Double Shaft, Conduit Connector</td>
</tr>
<tr>
<td>B07</td>
<td>S83-6233 - Double Shaft, Brad Harrison Connector*</td>
</tr>
<tr>
<td>B08</td>
<td>S83-9333 - Double Shaft, Brad Harrison Connector*</td>
</tr>
<tr>
<td>B09</td>
<td>S83-13533 - Double Shaft, Brad Harrison Connector*</td>
</tr>
</tbody>
</table>

* Brad Harrison connector option includes 4m mating cable

Visit [www.parkermotion.com](http://www.parkermotion.com) for complete motor specifications.
### LV & HV Stepper Motors

**Optimized Performance for High and Low Voltage Drives**

The LV (Low Voltage) and HV (High Voltage) motors provide outstanding performance at a competitive price. The LV motors are rated for use with DC stepper drives up to 80VDC, such as the ViX and E-DC. The HV motors are optimized for use with drives running on 120VAC power, such as the Zeta, GT, and E-AC.

#### HV23, LV23 with Shaft Flat

<table>
<thead>
<tr>
<th>Motor Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D00</td>
<td>Prepped for HV23, LV23 stepper motor w/ Shaft Flat</td>
</tr>
<tr>
<td>D10</td>
<td>HV231-02-10 - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>D11</td>
<td>HV232-02-10 - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>D12</td>
<td>HV233-02-10 - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>D13</td>
<td>HV231-01-10 - Single Shaft, 10ft cable</td>
</tr>
<tr>
<td>D14</td>
<td>HV232-01-10 - Single Shaft, 10ft cable</td>
</tr>
<tr>
<td>D15</td>
<td>HV233-01-10 - Single Shaft, 10ft cable</td>
</tr>
<tr>
<td>D16</td>
<td>HV231-02-FL - Double Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>D17</td>
<td>HV232-02-FL - Double Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>D18</td>
<td>HV233-02-FL - Double Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>D19</td>
<td>HV231-01-FL - Single Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>D20</td>
<td>HV232-01-FL - Single Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>D21</td>
<td>HV233-01-FL - Single Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>D30</td>
<td>LV231-02-10 - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>D31</td>
<td>LV232-02-10 - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>D32</td>
<td>LV233-02-10 - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>D33</td>
<td>LV231-01-10 - Single Shaft, 10ft cable</td>
</tr>
<tr>
<td>D34</td>
<td>LV232-01-10 - Single Shaft, 10ft cable</td>
</tr>
<tr>
<td>D35</td>
<td>LV233-01-10 - Single Shaft, 10ft cable</td>
</tr>
<tr>
<td>D36</td>
<td>LV231-02-FL - Double Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>D37</td>
<td>LV232-02-FL - Double Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>D38</td>
<td>LV233-02-FL - Double Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>D39</td>
<td>LV231-01-FL - Single Shaft, 18&quot; flying leads</td>
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<tr>
<td>D40</td>
<td>LV232-01-FL - Single Shaft, 18&quot; flying leads</td>
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<tr>
<td>D41</td>
<td>LV233-01-FL - Single Shaft, 18&quot; flying leads</td>
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</table>

#### HV34, LV34 with Shaft Flat

<table>
<thead>
<tr>
<th>Motor Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C00</td>
<td>Prepped for HV34, LV34 stepper motor w/ Shaft Flat</td>
</tr>
<tr>
<td>C01</td>
<td>HV341-02-10 - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>C02</td>
<td>HV342-02-10 - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>C03</td>
<td>HV343-02-10 - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>C04</td>
<td>HV341-01-10 - Single Shaft, 10ft cable</td>
</tr>
<tr>
<td>C05</td>
<td>HV342-01-10 - Single Shaft, 10ft cable</td>
</tr>
<tr>
<td>C06</td>
<td>HV343-01-10 - Single Shaft, 10ft cable</td>
</tr>
<tr>
<td>C07</td>
<td>HV341-02-FL - Double Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>C08</td>
<td>HV342-02-FL - Double Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>C09</td>
<td>HV343-02-FL - Double Shaft, 18&quot; flying leads</td>
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<tr>
<td>C10</td>
<td>HV341-01-FL - Single Shaft, 18&quot; flying leads</td>
</tr>
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<td>C11</td>
<td>HV342-01-FL - Single Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>C12</td>
<td>HV343-01-FL - Single Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>C21</td>
<td>LV341-02-10 - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>C22</td>
<td>LV342-02-10 - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>C23</td>
<td>LV343-02-10 - Double Shaft, 10ft cable</td>
</tr>
<tr>
<td>C24</td>
<td>LV341-01-10 - Single Shaft, 10ft cable</td>
</tr>
<tr>
<td>C25</td>
<td>LV342-01-10 - Single Shaft, 10ft cable</td>
</tr>
<tr>
<td>C26</td>
<td>LV343-01-10 - Single Shaft, 10ft cable</td>
</tr>
<tr>
<td>C27</td>
<td>LV341-02-FL - Double Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>C28</td>
<td>LV342-02-FL - Double Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>C29</td>
<td>LV343-02-FL - Double Shaft, 18&quot; flying leads</td>
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<tr>
<td>C30</td>
<td>LV341-01-FL - Single Shaft, 18&quot; flying leads</td>
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<tr>
<td>C31</td>
<td>LV342-01-FL - Single Shaft, 18&quot; flying leads</td>
</tr>
<tr>
<td>C32</td>
<td>LV343-01-FL - Single Shaft, 18&quot; flying leads</td>
</tr>
</tbody>
</table>

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6. Changes, Reschedules and Cancellations: Buyers may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding the fact that the items purchased by Buyer are manufactured using such apparatus which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings or similar information furnished by Buyer, or any items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Buyer shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter "Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Right. If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgements resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any other terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder of this Agreement may be brought by either party more than two (2) years after the cause of action accrues.
# Extensive Automation Solutions

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<th>Category</th>
<th>Description</th>
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<tr>
<td>HMI and Controllers</td>
<td>Superior integration and support for machine control as well as HMI hardware and software.</td>
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<tr>
<td>Electric Actuators</td>
<td>Screw, belt-driven, and linear motor actuators for complete range of industrial applications, offering precise motion and flexibility.</td>
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<tr>
<td>Motors and Drives</td>
<td>Parker’s family of innovative servo/stepper motors and drives continues to expand to meet the challenges of new technologies.</td>
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<tr>
<td>Pneumatic Linear Actuators</td>
<td>Aluminum and steel pneumatic cylinders, guided cylinders, rodless cylinders, and short stroke thrusters from the industry leader.</td>
</tr>
<tr>
<td>Rotary Actuators</td>
<td>Industry leader in the design and manufacture of pneumatic rack-and-pinion, and vane-style rotary actuators.</td>
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<tr>
<td>Vacuum Products and Sensors</td>
<td>Vacuum solutions include a broad range of generators (integrated/inline), cups, and pressure sensors.</td>
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<tr>
<td>Grippers</td>
<td>Parallel, angular, and three-jaw grippers are available in over 1,000 configurations.</td>
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<tr>
<td>Airline Accessories</td>
<td>Airline accessories include silencers, flow controls, and mufflers to round out Parker’s pneumatic solution.</td>
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<tr>
<td>Air Control Valves</td>
<td>Valve technology that meets even the most demanding requirements in any industrial application.</td>
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<tr>
<td>Air Preparation</td>
<td>Parker, the industry leader in air preparation, offers a complete line of products to ensure clean, dry, oil-free air.</td>
</tr>
<tr>
<td>Connectors and Tubing</td>
<td>The most complete line of fluid connectors worldwide will meet virtually any automation application.</td>
</tr>
<tr>
<td>Parker IPS Structural Automation</td>
<td>More than 150 metric and inch profiles, integral motion components, and accessories for unlimited, flexible configurations. Pre-machined kits or complete assemblies.</td>
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