Overview

Operation of an electric cylinder is simple. An electric motor – through either a timing belt or gear drive – rotates a ballscrew or acme screw, which translates the thrust tube.

As you can see by the cutaway actuator below, while the concept is simple, much expertise has been invested in the specification, design and selection of each component.

An Electric Cylinder Is Preferred When:
- Positioning an externally guided and supported load, or a very light unsupported load, or
- Moving a load that pivots, or
- There is a high concentration of airborne contaminants (rodless actuators are inherently less protected), or
- Replacing a hydraulic cylinder with a similar size electrically powered replacement.

Other Choices
If you need an integrated linear bearing system packaged with the cylinder, go to the Rodless Actuator section page B-1.

If you need more than 1330 mm/sec [52.5 in/sec] speeds, go to the Linear Motor section page C1.

If you need rotary motion, go to the Step Motors page G1, Servo Motors section page H1, or Gearhead section page I1.
Overview

**EC Series**
- Designed for performance
- Highest quality precision rolled ballscrews or acme screw – for quiet, long-life operation
- Thrust up to 25000 N [5620 lb]
- Speed up to 1.3 m/s [52.5 in/sec]
- Metric design (ISO 6431)
- Step Motor, Brushless Servo, 24 or 160 Volt DC Motor

**NV Series**
- Smallest package
- Time-proven design
- Thrust up to 1800 N [400 lb]
- Speed up to 0.3 m/s [12 in/sec]
- English dimensions
- 24 Volt DC, 160 Volt DC, or Step Motor
**Overview**

**Principle of Operation**
Operation of Industrial Devices electric cylinders is simple. When power is supplied, the motor - through either a timing belt, gear drive or direct coupling - rotates the lead screw, causing the drive nut to translate, extending the thrust tube. Reversing the motor rotation retracts the thrust tube.

While the concept is simple, much expertise has been invested in the specification, design and selection of each component to provide performance, reliability and value.

IDC offers electric cylinder drive mechanisms based on either acme or ballscrews. Ballscrews, which utilize ball nuts riding on recirculating ball bearings, are the most efficient, allowing for higher speeds, loads and cycle rates. They can, however, be back-driven when power is removed. Acme screws are capable of holding the load in position when power is removed, but are less efficient in operation.

Industrial Devices’ patented guide system prevents rotation of the drive nut, thus eliminating any torque loading to machine linkage.

**NV Series**

- Standard motor mounting configurations include parallel (as shown), and inline.
- Long life bearing guides thrust tube.
- Internally-guided output tube cannot rotate: eliminates all torque onto the load.
- Mechanical non-jamming end-of-stroke cushion provides over-stroke protection. In conjunction with Industrial Devices Controls, cylinder power is automatically shut off.
- Lubricated polyacetal drive nut provides low-friction, smooth operation and high resistance to shock loads.
- Guide bearing prevents thrust tube rotation, provides screw support, and holds sensing magnets which trip cylinder-mounted switches.
- Several NFPA style mounting configurations available, thus the cylinder can be configured to adapt to a wide variety of mounting requirements. English and Metric.
- Aluminum extruded square body offers exceptional stiffness and strength.
Overview

EC Series

Available with permanent magnet DC motor (24V or 160V servo), 1.8° step motor, or brushless servo motor.

Quick connect cabling simplifies installation.

Wiper seal on polished stainless steel output tube keeps contaminants out and lubricants in.

Ground stainless steel thrust tube for long wear and corrosion resistance.

Metric (ISO 6431) and English rod ends available

Long sleeve bearing supports side loads and minimizes runout.

Timing belt and geared drives provide long life with a wide variety of drive ratios.

Angular contact bearings ensure long life with minimal backlash.

Acme or recirculating ball bearing lead screws provide smooth, high thrust drive, acme screws hold load without power.

Housing is hard-coat anodized and teflon impregnated for long life, permanent lubrication, resistance to corrosion, and protection of all internal components.

Electric Cylinder
Operation of an electric cylinder is pretty basic. An electric motor – through either a timing belt, a gear drive or via in-line direct coupling – rotates a ballscrew or acme screw, which translates the torque into force through the thrust tube.

**N Series (N2 & NV)**
- Smallest Package Size
- Time-Proven Design
- Improved Durability (metal guide flange)
- NV Series Quick Delivery - Lowest Price
- Thrust up to 2670 N [600 lb]
  NV max = 1780 N [400 lb]
- Speed up to .76 m/s [30 in/sec]
  NV max = .3 m/s [12 in/sec]
- English dimensions (to NFPA standards)
- 24 Volt DC, 160 Volt DC, Step Motor, or Servo Motor

While the concept is straightforward, as illustrated by the cylinder cutaways on these pages, significant expertise and development has been invested in the specification and design of each component.

**N2**

- Standard motor mounting configurations include parallel (as shown), and inline.
- Aluminum extruded square body offers exceptional stiffness and strength.
- Lubricated polyacetal drive nut provides low-friction, smooth operation and high resistance to shock loads.
- Several NFPA style mounting configurations available, thus the cylinder can be configured to adapt to a wide variety of mounting requirements. English and Metric.

**NV**

- See page A-199 for expanded view
- Long life bearing guides thrust tube.
- Internally-guided output tube cannot rotate: eliminates all torque onto the load.
- Improved, more durable metal guide bearing prevents thrust tube rotation, provides screw support and holds sensing magnets which trip cylinder mounted switches.
- Mechanical non-jamming end-of-stroke cushion provides over-stroke protection. In conjunction with Industrial Devices Controls, cylinder power is automatically shut off.
- New improved, quick-disconnect limit switches available on EC, N2, and NV Series.
Cross Section Comparison

IDC offers electric cylinder drive mechanisms designed around either acme or ballscrews. Ballscrews, being the more efficient of the two, utilize ball nuts riding on recirculating ball bearings resulting in higher speeds, loads and cycle rates. However, the more efficient design of ballscrew technology lends it to being back-driven when power is removed if precautions are not taken (e.g., electric brakes or counter loading).

**EC Series**
- Designed for performance
- Highest quality precision rolled ballscrews and acme screws – for quiet, long-life operation
- 24 or 160 VDC motor, Step Motor, or Brushless Servo.
- Sealed for IP54 protection. IP65 option available.

- Thrust up to 25000 N [5620 lb]
- Speed up to 1.3 m/s [52.5 in/sec]
- Metric design (ISO 6431)
- Now available in 4 power ranges - EC2, 3, 4 & 5

Acme screws are capable of holding the load in position when power is removed, but are less efficient in operation.

Industrial Devices’ patented guide system prevents rotation of the drive nut, thus eliminating any torque loading to machine linkage.

**EC Series**
- Thrust up to 25000 N [5620 lb]
- Speed up to 1.3 m/s [52.5 in/sec]
- Metric design (ISO 6431)
- Now available in 4 power ranges - EC2, 3, 4 & 5

Available with permanent magnet DC motor (24V or 160V servo), 1.8° step motor, or brushless servo motor.

Angular contact bearings ensure long life with minimal backlash.

Long sleeve bearing supports side loads and minimizes runout.

Housing is hard-coat anodized and teflon impregnated for long life, permanent lubrication, resistant to corrosion, and protection of all internal components.

Ground stainless steel thrust tube for long wear and corrosion resistance.

Timing belt and geared drives (as shown) provide long life with a wide variety of drive ratios.

Acme or recirculating ball bearing lead screws provide smooth, high thrust drive. Acme screws hold load without power.

Wiper seal on polished stainless steel output tube keeps contaminants out and lubricants in.

Quick connect cabling simplifies installation.

Metric (ISO 6431) and English rod ends available.
**Simple Selection**
IDC offers five sizes of electric cylinders, each with three types of motor options (DC, step motor & servo motor). To help you select the right electric cylinder system, each individual NV, N2, EC2, EC3, EC4, and EC5 model’s complete specifications are given. The motion performance of each motor-cylinder combination is characterized on force-speed curves for our full range of motors and control options. See the pages listed below.

**Rapid Delivery**
Electric Cylinders generally ship within 7-10 working days when ordered with a standard travel length, motor, mounting or other catalog option. IDC can also provide fast turnaround on custom configurations to satisfy our customers’ need to meet tight time-to-market schedules.

The tables and graphs below are designed to help you contrast and compare the performance range of the NV, N2 and EC Series electric cylinders.

When getting high force out of a small package is important, you will find that the EC Series offers Industry leading performance.

---

### Cylinder Cross Section Comparison

Organized by thrust.

<table>
<thead>
<tr>
<th></th>
<th>NV</th>
<th>N2</th>
<th>EC2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Types Available</td>
<td>24 VDC</td>
<td>24 VDC</td>
<td>24 VDC</td>
</tr>
<tr>
<td></td>
<td>160 VDC Stepper</td>
<td>160 VDC Stepper</td>
<td>160 VDC Stepper</td>
</tr>
<tr>
<td></td>
<td>Brushless Servo</td>
<td>Brushless Servo</td>
<td>Brushless Servo</td>
</tr>
</tbody>
</table>

For details see page
- A-201
- A-155
- A-23
Performance Comparison

Stroke Length Comparison

Organized by thrust.

<table>
<thead>
<tr>
<th></th>
<th>EC3</th>
<th>EC4</th>
<th>EC5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust (N [lb])</td>
<td>7200 [1620]</td>
<td>12000 [2700]</td>
<td>25000 [5620]</td>
</tr>
<tr>
<td>Max. Speed (mm/s [in/s])</td>
<td>1280 [50.4]</td>
<td>1330 [52.4]</td>
<td>1330 [52.4]</td>
</tr>
<tr>
<td>Max. Stroke (mm [in])</td>
<td>1000 [29.5]</td>
<td>1500 [59.1]</td>
<td>1500 [59.1]</td>
</tr>
<tr>
<td>Size (cross-section) (mm [in])</td>
<td>68 [2.68]</td>
<td>92.2 [3.63]</td>
<td>92.2 [3.63]</td>
</tr>
</tbody>
</table>

Motor Types Available:
- EC3: 160 VDC Stepper Brushless Servo
- EC4: 160 VDC Stepper Brushless Servo
- EC5: Stepper Brushless Servo

For details see page A-63 A-101 A-129
For many applications, hydraulic or pneumatic linear cylinders are a better choice than their electromechanical alternatives. For example, when extremely heavy loads (>25,000 N [5,620 lb]) must be moved, hydraulic cylinders are usually the best solution. Or, when very light loads must be moved rapidly and repeatedly from one fixed location to another fixed location, pneumatic cylinders may be the most economical solution.

### Electric Cylinders vs. Hydraulics & Pneumatics

<table>
<thead>
<tr>
<th><strong>Industrial Devices Electric Cylinders</strong></th>
<th><strong>Hydraulic Cylinders</strong></th>
<th><strong>Pneumatic Cylinders</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Installation</strong></td>
<td>All electric operation requires simple wiring; directly compatible with other electronic controls.</td>
<td>Requires expensive plumbing, filtering, pumps, etc. Must pay close attention to compatibility of components.</td>
</tr>
<tr>
<td><strong>Precise Positioning</strong></td>
<td>Cost-effective, repeatable (to ±0.013mm [±0.0005in]), rigid multi-stop capabilities.</td>
<td>Requires expensive position sensing and precise electro-hydraulic valving to implement; has tendency to creep.</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>Solid-state microprocessor-based controls allow automatic operation of complex motion sequences.</td>
<td>Requires electronic/fluid interfaces and sometimes exotic valve designs. Hysteresis, dead zone, supply pressure and temperature changes complicate control.</td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td>Smooth, variable speed capabilities from 0.5 to 1330 mm/sec [0.02 to 52.5 in/sec].</td>
<td>Difficult to control accurately. Varies with temperature and wear. Stick slip can be a problem.</td>
</tr>
<tr>
<td><strong>Reliability</strong></td>
<td>Reversible, repeatable operation throughout useful life of product; little maintenance required.</td>
<td>Very contamination sensitive. Fluid sources require maintenance. Seals are prone to leak. Good reliability with diligent maintenance.</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td>Up to 25,000 N [5620 lb], 3kW [4 HP].</td>
<td>Virtually unlimited force. Most powerful.</td>
</tr>
<tr>
<td><strong>Cycle Life</strong></td>
<td>Up to millions of cycles at rated load. Easy to predict.</td>
<td>Dependent on design and seal wear; usually good.</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td>Standard models rated for -20° to 160° F. Inherently clean and energy efficient.</td>
<td>Temperature extremes can be a major problem. Seals are prone to leak. Waste disposal is increasingly problematic.</td>
</tr>
<tr>
<td><strong>Safe Load Holding</strong></td>
<td>Acme screw units are self-locking if power fails. Fail-safe brakes available for ball screw models.</td>
<td>Complex back-up safety devices must be used.</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>Moderate initial cost; very low operating cost.</td>
<td>Components often cost less, but installation and maintenance are increased. Hydraulic power unit cost is high if not pre-existing. Most economical above 10 HP.</td>
</tr>
</tbody>
</table>
But when simplicity, flexibility, programmability, accuracy and reliability are important and loads are within the capacity of the technology, electromechanical solutions often are the most desirable.

Further, electromechanical systems are inherently more compatible with today’s automation controls.
Stepper, Servo or DC Motor Controls?

IDC offers control solutions from all three technologies, but how do you determine what technology is best for your application? Many times, the technology selection is based on performance requirements, technology preference, or control and interface requirements.

- **Performance Requirements** – In those rare situations where an electric cylinder system (viewing the motor, drive and cylinder as a system) is being pushed to its performance limits, selecting the right motor technology can make a significant difference; DC motors will economically deliver torque and high speeds, however you can’t beat a step motor for continuous power vs. package size, and a properly sized servo system can deliver optimum performance for a premium. To learn everything you need to know about the strengths and weaknesses of each technology, refer to “Introduction to Motion Control Technology” in the Engineering section of this catalog (Section K). We also strongly recommend that rigorous attention be given to the guidelines provided in our Product Selection Checklist (A-20) as well as our Product Selection Worksheets (A-17). These two documents will help to ensure application success. Checklists and Worksheets are found in each product section.

- **Technology Preference** – Many system designers have a technology preference that they like to stay with whenever possible. There are many good reasons for this approach. Often a controller has already been selected dictating a type of control signal that will be used (e.g., step & direction pulse train, analog command signal, etc.). Another common reason for selecting one technology over another is that the designer, machine operator or technician might be more familiar and comfortable with a particular technology. Why change something that has been successful in the past? These are just a few of the reasons why IDC maintains a broad range of motor technologies and control options for our customers to choose from.

- **Control and Interface Requirements** – Most of the time, electric cylinders are selected for their unique mechanical design attributes and are often sized with plenty of headroom to extend life and to limit the need for maintenance. As a result, the capability of the controller becomes a more significant influence to technology selection than does performance. Finding a controller that offers the programmability, I/O options, and/or interface features desired can end up dictating the technology selected. When considering IDC controls, there are very few tradeoffs that have to be made when selecting between a servo control system and a stepper control system (See Chart A). IDC delivers many of the same features and options in both technology platforms. We refer to these closely related families of stepper and servo control products as SmartDrive and SmartControl products.

Aside from all the similarities there is one big difference regarding step motors that makes IDC the industry’s front runner in step motor control technology - the NextStep Drive, and SmartStep Indexer/Drive products (Section G). These are the highest performing microstepping drive packages available, narrowing the performance gap between step motor and servo motor systems.

When considering DC Controls from IDC, you will find some of the most unique, simple, application specific, PLC friendly, and cost effective solutions available today. Designed specifically with electric cylinders and rodless actuators in mind, IDC’s D & H Series controls (Section F) utilize limit switches or analog command signals to solve the most common application challenges (See Figure 1). The simplistic way in which these control products solve a variety of commonplace applications has contributed significantly to the growth of the actuator market.

Use the chart below to guide you to the optimum control solution for your application.

### When Using IDC Controls with Electric Cylinders or Rodless Actuators...

<table>
<thead>
<tr>
<th>DC Motor Controls are IDEal solutions when you need:</th>
<th>Servo &amp; Stepper Smart Drive packages are IDEal solutions when you need:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The same stopping point each cycle</td>
<td>To change stopping points under program control</td>
</tr>
<tr>
<td>Analog Position Control (0 - 10V, or 0/4 - 20 mA)</td>
<td>A user interface (i.e., keypad, display)</td>
</tr>
<tr>
<td>Simple push button operation &amp; control</td>
<td>The flexibility and integrity of Optically Isolated I/O</td>
</tr>
<tr>
<td>One or two speed requirements per direction</td>
<td>Mathematical functions</td>
</tr>
<tr>
<td>To replace pneumatic cylinders</td>
<td>Force Control (e.g., clamping, nut running, etc)</td>
</tr>
<tr>
<td>To replace low thrust hydraulic cylinders</td>
<td>Computer interfacing or control</td>
</tr>
<tr>
<td>Automatic cycling between two locations</td>
<td>Complex and customized motion profiles</td>
</tr>
<tr>
<td>An end-of-move dwell timer</td>
<td>High repeatability, resolution and/or accuracy</td>
</tr>
<tr>
<td>To change speed when a sensor is triggered</td>
<td>Multi-axis Control</td>
</tr>
<tr>
<td>Web or Edge Guide Control</td>
<td>Multiple program selection or “if - then” conditional logic</td>
</tr>
<tr>
<td>The lowest system cost</td>
<td>Stepper or brushless servo performance</td>
</tr>
</tbody>
</table>
As described previously, it often comes down to a question of your flexibility, complexity or operator interface requirements. The programmability of IDC’s Smart products allows machine designers to refine their applications beyond their initial intentions or expectations. Learning to program a Smart product is quick and easy with IDC’s Windows® based Application Developer software. The optional Front Panel for Smart products can be used to create or edit programs and, through the use of lockout features, it can also become a remote operator interface. By virtue of your program design, an operator can input data and/or answer questions that influence program flow, or the value of motion parameter through the use of program variables.

On the other hand, many positioning applications are simple in nature, requiring only a few fixed stopping positions, or the flexibility of following a simple analog control signal. In these situations, there is less of a need for programmability and operator influence. Why introduce the added complexity of a programmable motion controller when a simple application specific DC Control product from IDC can adequately solve your needs?

The following two pages provide more detail regarding your control options for IDC Electric Cylinders. When in doubt, don’t hesitate to consult an IDC Applications Engineer at (800)747-0064.
IDC’s Electric Cylinder Control Options

**Limit Switch Controls**
- Attractive pricing – exceptional value.
- Point-to-point moves.
- No program to write.
- Cylinder mounted sensors set stop and reverse positions.
- Interface to PLCs, operator switch panels, or I/O from industrial PC.
- Common Applications:
  - conveyor diverter gate
  - indexing
  - part rejection
  - manual jog operations

**Reference:** Section F

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>Compatible Cylinders</th>
<th>Control Models</th>
<th>Interface Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>24V Brushed DC</td>
<td>NV-D, N2-D, EC2-D</td>
<td>D220x, D230x, D240x</td>
<td>Discrete TTL or contact inputs.</td>
</tr>
<tr>
<td></td>
<td>EC4-H</td>
<td>H4501</td>
<td></td>
</tr>
</tbody>
</table>

**Analog Position**
- Simplest Closed-loop Positioning System.
- No homing required.
- Received an analog voltage or current position signal from:
  - PLC
  - Analog Sensor
  - Industrial PC I/O
  - Potentiometer or Joystick
- Common Applications:
  - Remote positioning (manual or PC/PLC controlled)
  - Valve control (flow/mixing)
- Absolute Positioning

**Reference:** Section F

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>Compatible Cylinders</th>
<th>Control Models</th>
<th>Interface Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>24V Brushed DC</td>
<td>NV-D-L, N2-D-L, EC2-D-L</td>
<td>D250x</td>
<td>Analog voltage or current position control.</td>
</tr>
<tr>
<td></td>
<td>EC4-H-L</td>
<td>H4501</td>
<td></td>
</tr>
</tbody>
</table>

**Edge Guide Control**
- Reads 2 or 4 web edge positioning sensors. Moves as required to maintain constant web position.
- No need for PLC decoding of inputs.
- Auto/Manual (jog) mode
- Common Applications:
  - Reel stand (let-off/re-reel)
  - Steering roller
  - Pivoting roller

**Reference:** Section F

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>Compatible Cylinders</th>
<th>Control Models</th>
<th>Interface Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>160V Brushed DC</td>
<td>NV-H, N2-H, EC2-H, EC3-H</td>
<td>H3501B</td>
<td>Web edge position control of using an array of 2 or 4 discrete (on/off) sensors.</td>
</tr>
<tr>
<td></td>
<td>EC4-H</td>
<td>H4321</td>
<td></td>
</tr>
</tbody>
</table>
SmartDrives and SmartControls

Fully Integrated Stepper and Servo Motion Control Products

- Easy to use IDdeal Programming Language
- Fully supported by IDC’s Windows®-based Application Developer Software
- Short implementation time
- Control only versions available (961 & 962)
- Optional Dual Purpose Interface
  - Remote Programmer/Editor
  - Operator Interface with Lockout protect
- Built in power supplies
- Dedicated EOT and Home inputs
- Programmable I/O
- Compatible with OPTO-22 and Grayhill Signal Conditioner Modules

Reference: Section G (Step Motor Systems) and Section H (Servo Motor Systems)

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>Compatible Cylinders</th>
<th>Control Models</th>
<th>Interface Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step Motor</td>
<td>NV-P, N2-P, EC2-S/P</td>
<td>SmartStep23</td>
<td>SmartDrives and Controls are programmed over a standard PC serial port (RS-232C), or by using the optional, detachable front panel interface. Up to 99 SmartDrives can be daisy chained together for communication convenience.</td>
</tr>
<tr>
<td></td>
<td>EC3-S, EC4-P, EC5-S</td>
<td>S6961</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S6962 (2-axis)</td>
<td></td>
</tr>
<tr>
<td>Brushless Servo</td>
<td>NV-BN, N2-B, EC2-B,</td>
<td>B8961</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EC3-B, EC4-B, EC5-B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B8962 (2-axis)</td>
<td></td>
</tr>
</tbody>
</table>

Drive

- Fully compatible with industry standard motion controllers.
- 120 or 240 VAC operation.
- Provides more usable torque than other drives.
- Largest selection of motors available.

Custom and Modified Products (next page)
If you don’t see exactly what you need in this catalog, call us

Industrial Devices will modify standard catalog products to fit your unique needs. In fact, many of our now popular features and options began as special customer requests. Our willingness and ability to “Customer-ize” our products is one of many factors that differentiates IDC from our competition.

Knowledge is power! Industrial Devices is capable of developing fully custom mechanical and electronic designs, when the application demands it and the business opportunity supports it.

Detail your application design, performance and cost requirements in the Application Data Form provided and fax it to the factory or your local IDC Distributor. We will review your specifications and contact you with a recommendation.
Project Time Frame | Volume Requirements
--- | ---
Proposal | Next 12 months: 
Build prototype | Year 2: 
In production | Year 3: 

Action Required
- Demo
- Price quotation
- Recommend product
- Call me to discuss

Please include drawings, comments or additional information on separate pages.
### Electric Cylinder Selection Data

#### Electric Cylinder

![Electric Cylinder Icon]

#### Loads

<table>
<thead>
<tr>
<th>Payload</th>
<th>Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight: lbs</td>
<td>□ Vertical</td>
</tr>
<tr>
<td>□ Payload Externally Supported, by: (rails, etc.)</td>
<td>□ Horizontal</td>
</tr>
<tr>
<td>Hold Position: □ After Move □ Power Off</td>
<td>□ Inclined ° (angle from horizontal plane)</td>
</tr>
</tbody>
</table>

#### Motion

**Travel**

- Stroke Length Required: ___ in (usable travel distance + min. 2 inches for limit switches)
- Shortest Move: ___ in
- Max. Available Stroke Length: ___ in

**Electric Cylinders:**
- NV - 12 in
- EC3 - 750 mm
- EC2 - 600 mm
- EC5 - 1500 mm

**Speed (WCM=Worst-Case Move)**

- WCM Distance: ___ in
- Time for WCM: ___ sec
  - or
- Max. Speed: ___ in/sec
- Min. Speed: ___ in/sec

**Complete Move Profile Chart (see p. A24)**

**Precision**

- Repeatability: ___ in
- Accuracy: ___ in
- Max. Backlash: ___ in
- Resolution: ___ in
- Straightness/Flatness: ___ in

#### Thrust Calculation

(See Engineering Section in IDC catalog for assistance)

**Thrust**

\[
\text{Thrust} = \text{Force}_{\text{ACCELERATED MASS}} + \text{Force}_{\text{FRICTION}} + \text{Force}_{\text{GRAVITY}} + \text{Force}_{\text{EXTERNAL}}
\]

\[= \quad \text{lbs} + \quad \text{lbs} + \quad \text{lbs} + \quad \text{lbs} \]

#### Duty Cycle/Life

**Duty Cycle**

- Total Cycle Time: ___ sec.
- Extend/Retract Cycles per day: ___
- Sum of Move Times: ___ sec.
- Move Distance per cycle: ___

**Complete Move Profile Chart (see page A-19)**

**Required Life**

- Units: □ Inches □ Meters □ Cycles □ Months □ Years
- Minimum Life: ___
- Maintenance/Lube Interval: ___

#### Environment

**Operating Temperature**

- □ Normal 32-140°F [0-60°C]
- □ High Temp. ___ °F / °C
- □ Low Temp. ___ °F / °C

**Contaminants (Check all that apply)**

- Solid: □ non-abrasive □ coarse chips □ abrasive □ fine dust
- Liquid: □ Dripping □ Non-corrosive □ Mist / Spray □ Corrosive □ Splashing □ High Pressure

**Conditions**

- □ Washdown □ Outdoor □ Vacuum □ Cleanroom
Motion Profile
Graph your most demanding cycle, include accel/decel, velocity and dwell times. You may also want to indicate load variations and I/O changes during the cycle. Label axes with proper scale and units.

Motor Type Preferred
☐ Servo  ☐ Stepper
☐ Other _______________________

Axes of Motion
☐ Single  ☐ Multiple # _________
☐ Synchronized

Interface
Host
☐ PLC  ☐ Computer
☐ Analog I/O  ☐ RS232
☐ Digital I/O Control
☐ Other _______________________

Operator
☐ Keypad/LCD Display
☐ Pushbuttons
☐ Potentiometer/Joystick
☐ Thumbwheels

Supply Voltage
☐ 110 AC  ☐ 220 AC
☐ Other _______________________

Feedback Required
☐ Encoder  ☐ Linear Potentiometer
☐ Other _______________________

Input Functions

Output Functions

Control Method
☐ Programmable  ☐ External Control Signal
☐ Manual Jog  ☐ Digital (Step & Direction)  ☐ Analog Velocity
☐ Limit Switches  ☐ Analog Torque  ☐ Analog Position

Description of Application

Graph your most demanding cycle, include accel/decel, velocity and dwell times. You may also want to indicate load variations and I/O changes during the cycle. Label axes with proper scale and units.
The following details the recommended step-by-step process of selecting an electric cylinder model which best matches your application requirements.

1) **Complete Product Selection Worksheet** (see pages A-17 to A-19)

   Effort and accuracy invested here can be directly proportional to the success of your applications. We encourage you to invest heavily in this critical and early phase of your applications development.

2) **Maximum Thrust Required**

   Determine thrust requirement for your application, then adjust with safety factor for selected motor technology. (See Engineering Section)

   Formula: \[ \text{Max Thrust} = F_{\text{applied}} + F_{\text{gravity}} + F_{\text{accel}} + F_{\text{friction}} \]

   Sample Calculation:
   \[ 50 + 30 + 1 + 5 = 86 \text{ lbs thrust (required by application)} \]

   Adjust the required thrust to ensure appropriate safety margin. Multiply by the appropriate safety factor, from the table shown:

   **Thrust Safety Factors**

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>Safety Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brushed DC Servo Motor</td>
<td>1.20 (20%)</td>
</tr>
<tr>
<td>Step Motors</td>
<td>1.30 (30%)</td>
</tr>
<tr>
<td>Brushless Servo Motors</td>
<td>1.20 (20%)</td>
</tr>
</tbody>
</table>

   Sample Calculation:
   \[ 86 \times 1.20 = 103.2 \text{ lbs thrust (required for selection of brushless servo)} \]

3) **Duty Cycle**

   Determine the operating Duty Cycle, over a maximum ten-minute time interval. The thrust available from a given actuator is higher when thrust duration is less than continuous. (See Engineering Section)

   Formula: \[ \text{Duty Cycle} = \frac{\text{ON time}}{\text{TOTAL time}}\]

   Sample Calculation:
   REPEATED MOTION: 30 seconds ON, 15 seconds Dwell, then repeat. \[ \text{DUTY CYCLE} = \frac{30 \text{ seconds ON}}{45 \text{ seconds TOTAL CYCLE TIME}} = 66\% \text{ Duty Cycle} \]

4) **Peak Speed Requirement** (see Engineering Section)

   Calculate the peak speed required to complete the desired motion profile.

   Formula: Trapezoidal Move Profile (peak speed = 1.5 times average speed)

   Sample Calculation:
   Desired Motion: Move 10 inches in 2.0 seconds.
   \[ \text{Peak Speed Requirement:} \ 10 \text{ inches} \times 2.0 \text{ seconds} \times 1.5 = 7.5 \text{ inches per second} \]

5) **Select Cylinder Family and Motor/Drive Technology**

   Use the charts and information on pages A-2, A-3, A-8, and A-9 to ball park a cylinder that comes closest to your performance requirements. Review the introductory section of the specific cylinder family (e.g., EC2, EC3, NV, etc.). You will find that each family of cylinders is subdivided by motor technology (e.g., EC2-D & EC2-H (DC Motors), EC2-S (Step Motor), and EC2-B (Servo)). Refer to the chart at the bottom of the next page A-21. For tips on motor/drive technology selection, refer to pages A-12 and A-13.
6) **Select Speed-Thrust Curve**

Search through the performance curves to select an actuator which can provide both the speed and thrust calculated above. You might want to narrow your search using one of the following criteria:
- Control Features
- Price Range
- Motor Technology

7) **Stroke Length**

Select the stroke length required for your application. Add extra travel at each end for placement of end-of-travel position sensors. The following formula can be used as a guideline for determining the appropriate added distance.

- **Operating Stroke Distance**
  
  Start with the required operating stroke distance. If you need to move 18 inches back and forth in a repeated cycle, then this distance is 18 inches.

- **Increase Stroke Length for End-of-travel Position Sensors**
  
  Include a short ‘over-travel distance’ to prevent hard-stopping when an end-of-travel sensor is triggered.

  Use this formula to calculate how much additional stroke is required in your application:

  1. Stopping Distance: \(X = \frac{m v^2}{2F}\)

     Where: 
     - \(X\) = deceleration distance (inches)
     - \(m\) = mass of payload (lbf/386)
     - \(v\) = velocity before deceleration (inches per second)
     - \(F\) = force available to decelerate, from performance curve (lbf)

  2. Add twice the \(X\) value to your required motion distance.

**High Speed Example:** You require 18” actual travel. Payload = 100 lb. Max Speed = 30 in/sec. The actuator model you have selected shows 80 lb peak thrust capacity. The equation above predicts stopping distance \(X\) is 1.46 inches. This safety area is needed at each end-of-travel, ~3 inches (two times 1.46 inches) is added to 18”, so you need to order an actuator with a stroke of 21” or greater.

**NOTE:** When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2) it is recommended that the cylinder be extended to only 90-95% of its fully extended length. This increases the system’s rigidity and extends the life of the guide bearings and rod seal.

8) **Critical Speed, Column Loading Limits**

Verify that the speed and thrust performance are not limited by the stroke length of your actuator. Compare the Critical Speed and Column Loading limits shown on the chart at the bottom page where you found your performance curve. Many shorter stroke actuators are not limited, which makes the entire performance curve available. See the Engineering Section for more information.

9) **Proceed to How To Order Section**

The motor, transmission ratio, and stroke have now been selected. Next, continue with the selection of mounting and other required options as directed in the **How To Order** section for your selected motor type (see chart below). Consider the added benefits of ordering an IDEal System from IDC (see page A-22).

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>NV</th>
<th>N2</th>
<th>EC2</th>
<th>EC3</th>
<th>EC4</th>
<th>EC5</th>
</tr>
</thead>
<tbody>
<tr>
<td>D: 24 VDC Motors</td>
<td>A-204</td>
<td>A-160</td>
<td>A-28</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
The EC2 series is a low cost linear motion package for light to moderate thrust loads ranging up to 3600 N [810 lb] and travel up to 750 mm [29.5 in]. Precision rolled ball screws are standard, yielding quiet operation, low backlash and high accuracy. (See the following pages for detailed specifications).

EC2 Series electric cylinders are available with brushless servo, step motors, or DC servo for compatibility with every motion control environment.

Both ball screw and acme screw models provide a variety of speed and thrust capabilities. Ball screw models are used in applications that require higher speed and duty cycles. Acme screw models generally perform best in low duty cycle applications, and where load holding is required without a brake or in the case of electrical power loss. The life expectancy of a ball screw is generally better than an acme screw. Standard ball screws are 5 mm and 16 mm lead, and acme screws are available in 4 mm lead.

EC2 timing belt or gear reductions between the motor and leadscrew allow selection of the best match between motor power and your linear speed and thrust range.

**Metric Series Advantages**

- meets the needs of customers who manufacture for the international marketplace
- both English and Metric versions of threaded mounting options are standard

**Options**

Options include rotary encoders or linear potentiometers for position feedback, load-holding brakes, protective boots, and quick-disconnect cables. Industrial Devices will also discuss unique modifications at your request.

<table>
<thead>
<tr>
<th></th>
<th>EC2-D Series</th>
<th>EC2-H Series</th>
<th>EC2-S/P Series</th>
<th>EC2-B Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Type</td>
<td>24 volt DC Servo</td>
<td>160 volt DC Servo</td>
<td>1.8° Hybrid Stepper</td>
<td>Brushless Servo</td>
</tr>
<tr>
<td>Max No Load Speed</td>
<td>840 mm/sec [33 in/sec]</td>
<td>930 mm/sec [36.5 in/sec]</td>
<td>800 mm/sec [31.5 in/sec]</td>
<td>1280 mm/sec [50.5 in/sec]</td>
</tr>
<tr>
<td>Repeatability</td>
<td>0.13mm [±0.005in]</td>
<td>0.015mm [±0.0005in]</td>
<td>0.015mm [±0.0005in]</td>
<td>0.015mm [±0.0005in]</td>
</tr>
<tr>
<td>Compatible Controls</td>
<td>D2200</td>
<td>H3301B</td>
<td>NextStep</td>
<td>B8001</td>
</tr>
<tr>
<td>Offered</td>
<td>D2300</td>
<td>H3321B</td>
<td>SmartStep</td>
<td>B8961</td>
</tr>
<tr>
<td></td>
<td>D2400</td>
<td>H3501</td>
<td>S6002</td>
<td>B8962</td>
</tr>
<tr>
<td></td>
<td>D2500B</td>
<td></td>
<td>S6961</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S6962</td>
<td></td>
</tr>
</tbody>
</table>
**General Specifications**

**Travel Lengths**  
50, 100, 150, 200, 250, 300, 450, 600, 750 mm.  
Custom strokes available in increments of 1 mm.

**Construction Materials**  
- **Bearing & Drive Housing**: 6063-T6 aluminum, anodized  
- **Cylinder Body**: 6063-T6 aluminum, hard anodized with PTFE impregnation  
- **Mounting Plates**: 6061-T6 aluminum and cast aluminum plate, anodized  
- **Thrust Tube**: 300 Series Stainless Steel, 1/8 hard, ground

**Speed Reducer Options**  
- **Belt/Pulley**: AT-5, polyurethane with steel tensile cords  
- **Gears**: Alloy steel, case hardened

**Transport Screw Options**  
- **Ball screw/Ballnut**: Lead: 16 mm [0.630 in], or 5 mm [0.197 in]  
- **Acme Screw/Nut**: Lead: 4 mm [0.157 in]  
- **Thrust Bearings**: Angular contact, high thrust ball bearings

**Weight** (Approximate, without options)  
- **EC2-D**:  
  
  \[ kg = 4.28 + 0.006 \times [\text{mm stroke}] \]  
  \[ lb = 9.4 + 0.33 \times [\text{inches stroke}] \]  
- **EC2-H**:  
  
  \[ kg = 6.82 + 0.006 \times [\text{mm stroke}] \]  
  \[ lb = 15.0 + 0.33 \times [\text{inches stroke}] \]  
- **EC2-P22**:  
  
  \[ kg = 4.04 + 0.006 \times [\text{mm stroke}] \]  
  \[ lb = 8.9 + 0.33 \times [\text{inches stroke}] \]  
- **EC2-S32**:  
  
  \[ kg = 5.94 + 0.006 \times [\text{mm stroke}] \]  
  \[ lb = 13.1 + 0.33 \times [\text{inches stroke}] \]  
- **EC2-B23**:  
  
  \[ kg = 4.63 + 0.006 \times [\text{mm stroke}] \]  
  \[ lb = 10.2 + 0.33 \times [\text{inches stroke}] \]

**Motor**  

**Environmental Operation**  
- **Temperature**: -30° to 70°C [-22° to 158°F]  
  When operating below 2°C [35°F], vent tubing fitting must be installed. Consult the factory for more information.

  - **Moisture/Contaminants**: IP 54 rated: Polyurethane thrust tube wiper seal. Mating surfaces gasket sealed. Protected against dust and splashing water (non-corrosive, non-abrasive). Limited ingress permitted.
    - **Vent Tube Fitting**: A vent tube fitting is included, which can be installed to permit the actuator to breathe from a non-contaminated area, or receive a positive pressure continuous purge (14-20kPa [2-3 psi]).
    - **PB Protective Boot (IP65) Option**: An optional thrust tube boot prevents moisture and dry contaminants from bypassing the thrust tube wiper seal, providing IP65 protection when used with included vent tube fitting. The boot also prevents contaminant buildup on the thrust tube.
    - **Clean Room & Vacuum Applications**: IDC has designed special actuators for clean room and vacuum applications. Please consult the factory if your application requires special environmental compatibility.

**Maintenance**  
The EC2 Series actuator design eliminates the need for most routine maintenance. Re-lubrication is required in high cycle applications. Acme screw models include a lube port and adapter for a standard grease gun. See the EC Series Operator’s Manual for replacement parts.
Ballscrew

Ballscrew life is rated in inches of travel at a given load. The values in the chart to the right indicate the travel life where 90% of all units in a sample will continue to work, while 10% have failed. This is similar to the B10 rating of a ball bearing mechanism. Be sure to consider acceleration loads as well as thrust, gravity and friction loads.

Acme Screw

Usable life for an acme screw is defined as the length of travel completed before backlash (of leadscrew/nut) exceeds 0.020” [0.5 mm].

A travel life of 25km [1 million inches] under the maximum rated load can be used as a general approximation. However, since life is directly dependent on application conditions (load, duty cycle, move profiles, and environment), it is difficult to predict a statistical travel life.

Thrust Tube Capacity

Thrust Tube Torque Capacity

Thrust tube does not rotate during operation. Maximum allowable torque during operation and installation is 5.0 N-m [45 lb-in]

Thrust Tube Side Load Capacity

EC2 Series Actuator Inertia

Equations

Rotary Inertia (reflected to motor) = A + B* (stroke, in) + C* (load, lb)

<table>
<thead>
<tr>
<th>Model</th>
<th>Ratio</th>
<th>Screw</th>
<th>A (lb-in-s²)</th>
<th>B (lb-in-s²/in)</th>
<th>C (lb-in-s²/lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2-...10-16B</td>
<td>1:1</td>
<td>16 x 16</td>
<td>3.184 E-04</td>
<td>1.072 E-05</td>
<td>2.604 E-05</td>
</tr>
<tr>
<td>EC2-...15-16B</td>
<td>1.5:1</td>
<td>1.541 E-04</td>
<td>4.958 E-06</td>
<td>1.204 E-05</td>
<td></td>
</tr>
<tr>
<td>EC2-...20-16B</td>
<td>2:1</td>
<td>1.005 E-04</td>
<td>2.680 E-06</td>
<td>6.510 E-06</td>
<td></td>
</tr>
<tr>
<td>EC2-...50-16B</td>
<td>5:1</td>
<td>5.568 E-05</td>
<td>4.252 E-07</td>
<td>1.033 E-06</td>
<td></td>
</tr>
<tr>
<td>EC2-...100-16B</td>
<td>10:1</td>
<td>4.595 E-05</td>
<td>1.071 E-07</td>
<td>2.601 E-07</td>
<td></td>
</tr>
<tr>
<td>EC2-...10-05B</td>
<td>1:1</td>
<td>16 x 5</td>
<td>2.895 E-04</td>
<td>8.296 E-06</td>
<td>2.543 E-06</td>
</tr>
<tr>
<td>EC2-...15-05B</td>
<td>1.5:1</td>
<td>1.408 E-04</td>
<td>3.836 E-06</td>
<td>1.176 E-06</td>
<td></td>
</tr>
<tr>
<td>EC2-...50-05B</td>
<td>5:1</td>
<td>5.254 E-05</td>
<td>3.290 E-07</td>
<td>1.008 E-07</td>
<td></td>
</tr>
<tr>
<td>EC2-...100-05B</td>
<td>10:1</td>
<td>4.566 E-05</td>
<td>8.287 E-08</td>
<td>2.540 E-08</td>
<td></td>
</tr>
<tr>
<td>EC2-...10-04A</td>
<td>1:1</td>
<td>16 x 4 ACME</td>
<td>2.894 E-04</td>
<td>8.202 E-06</td>
<td>1.627 E-06</td>
</tr>
<tr>
<td>EC2-...15-04A</td>
<td>1.5:1</td>
<td>1.407 E-04</td>
<td>3.792 E-06</td>
<td>7.525 E-07</td>
<td></td>
</tr>
<tr>
<td>EC2-...20-04A</td>
<td>2:1</td>
<td>9.328 E-05</td>
<td>2.050 E-06</td>
<td>4.069 E-07</td>
<td></td>
</tr>
<tr>
<td>EC2-...50-04A</td>
<td>5:1</td>
<td>5.253 E-05</td>
<td>3.252 E-07</td>
<td>6.454 E-08</td>
<td></td>
</tr>
<tr>
<td>EC2-...100-04A</td>
<td>10:1</td>
<td>4.566 E-05</td>
<td>8.1928 E-08</td>
<td>1.6257 E-08</td>
<td></td>
</tr>
</tbody>
</table>

Metric Conversions:

1 mm = 0.03937 in
1 kg = 2.205 lb
1 lb-in-s² = 1129 kg-cm² = 1.152 kg-cm-s²
16 mm Lead Ballscrew Models

**EC2-D-10-16B**
- Max. No-Load Accel.: 176 in/sec² [4.46 m/s²]
- Repeatability: ±0.25 mm [±0.010 in]
- Backlash: 0.25 mm [0.010 in]
- Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-D-15-16B**
- Max. No-Load Accel.: 3.49 m/s² [137 in/sec²]
- Repeatability: ±0.25 mm [±0.010 in]
- Backlash: 0.25 mm [0.010 in]
- Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-D-20-16B**
- Max. No-Load Accel.: 2.7 m/s² [110 in/sec²]
- Repeatability: ±0.25 mm [±0.010 in]
- Backlash: 0.25 mm [0.010 in]
- Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-D-50-16B**
- Max. No-Load Accel.: 1.18 m/s² [47 in/sec²]
- Repeatability: ±0.25 mm [±0.010 in]
- Backlash: 0.25 mm [0.010 in]
- Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-D-100-16B**
- Max. No-Load Accel.: 0.60 m/s² [24 in/sec²]
- Repeatability: ±0.25 mm [±0.010 in]
- Backlash: 0.25 mm [0.010 in]
- Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-D-10L-16B**
- Max. No-Load Accel.: 1.18 m/s² [47 in/sec²]
- Repeatability: ±0.25 mm [±0.010 in]
- Backlash: 0.25 mm [0.010 in]
- Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-D-16L-16B**
- Max. No-Load Accel.: 2.7 m/s² [110 in/sec²]
- Repeatability: ±0.25 mm [±0.010 in]
- Backlash: 0.25 mm [0.010 in]
- Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-D-20L-16B**
- Max. No-Load Accel.: 3.49 m/s² [137 in/sec²]
- Repeatability: ±0.25 mm [±0.010 in]
- Backlash: 0.25 mm [0.010 in]
- Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-D-50L-16B**
- Max. No-Load Accel.: 6.9 m/s² [176 in/sec²]
- Repeatability: ±0.25 mm [±0.010 in]
- Backlash: 0.25 mm [0.010 in]
- Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-D-100L-16B**
- Max. No-Load Accel.: 176 in/sec² [4.46 m/s²]
- Repeatability: ±0.25 mm [±0.010 in]
- Backlash: 0.25 mm [0.010 in]
- Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]
**EC2-D Electric Cylinders**

**5mm Lead Ballscrew Models**

<table>
<thead>
<tr>
<th>Model</th>
<th>Gear Ratio</th>
<th>Timing Belt Type</th>
<th>Max. No-Load Accel.</th>
<th>Repeatability</th>
<th>Backlash</th>
<th>Lead Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2-D-10-05B</td>
<td>1:1</td>
<td>5 mm/rev</td>
<td>1.45 m/s²</td>
<td>±0.13 mm</td>
<td>0.25 mm</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC2-D-10L-05B</td>
<td>1:1</td>
<td>Inline Coupling</td>
<td>1.45 m/s²</td>
<td>±0.13 mm</td>
<td>0.25 mm</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC2-D-15-05B</td>
<td>1.5:1</td>
<td>5 mm/rev</td>
<td>1.11 m/s²</td>
<td>±0.13 mm</td>
<td>0.25 mm</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC2-D-20-05B</td>
<td>2:1</td>
<td>5 mm/rev</td>
<td>0.88 m/s²</td>
<td>±0.13 mm</td>
<td>0.25 mm</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC2-D-50-05B</td>
<td>5:1</td>
<td>5 mm/rev</td>
<td>0.37 m/s²</td>
<td>±0.13 mm</td>
<td>0.25 mm</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC2-D-100-05B</td>
<td>10:1</td>
<td>5 mm/rev</td>
<td>0.19 m/s²</td>
<td>±0.13 mm</td>
<td>0.25 mm</td>
<td>±0.05 mm/300 mm</td>
</tr>
</tbody>
</table>

- Performance using D2200, D2300 and D2400 Series Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
- For D2500B control, derate thrust by 50%.
- Repeatability achievable with D2300 control. Reduce cylinder speed prior to final positioning.

**Critical Speed (mm/sec)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Critical Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2-D-10L-05B</td>
<td>57 in/s²</td>
</tr>
<tr>
<td>EC2-D-15-05B</td>
<td>44 in/s²</td>
</tr>
<tr>
<td>EC2-D-20-05B</td>
<td>35 in/s²</td>
</tr>
<tr>
<td>EC2-D-50-05B</td>
<td>15 in/s²</td>
</tr>
<tr>
<td>EC2-D-100-05B</td>
<td>7 in/s²</td>
</tr>
</tbody>
</table>

**Stroke (mm)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2-D-10L-05B</td>
<td>414</td>
</tr>
<tr>
<td>EC2-D-15-05B</td>
<td>414</td>
</tr>
<tr>
<td>EC2-D-20-05B</td>
<td>414</td>
</tr>
<tr>
<td>EC2-D-50-05B</td>
<td>224</td>
</tr>
<tr>
<td>EC2-D-100-05B</td>
<td>224</td>
</tr>
</tbody>
</table>

**Column Load Limit (N)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Column Load Limit (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2-D-10L-05B</td>
<td>310</td>
</tr>
<tr>
<td>EC2-D-15-05B</td>
<td>310</td>
</tr>
<tr>
<td>EC2-D-20-05B</td>
<td>310</td>
</tr>
<tr>
<td>EC2-D-50-05B</td>
<td>224</td>
</tr>
<tr>
<td>EC2-D-100-05B</td>
<td>224</td>
</tr>
</tbody>
</table>
### Performance

#### 4 mm Lead Acme Screw Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Timing Belt</th>
<th>Gear Ratio</th>
<th>Max. No-Load Accel.</th>
<th>Repeatability</th>
<th>Backlash</th>
<th>Lead Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2-D-10-04A</td>
<td>1:1</td>
<td>1:1</td>
<td>1.16 m/s² [46 in/s²]</td>
<td>±0.13 mm</td>
<td>0.40 mm</td>
<td>±0.10 mm/300 mm [±0.004 in/ft]</td>
</tr>
<tr>
<td>EC2-D-10L-04A</td>
<td>1:1 Inline</td>
<td>1:1</td>
<td>0.89 m/s² [35 in/s²]</td>
<td>±0.13 mm</td>
<td>0.40 mm</td>
<td>±0.10 mm/300 mm [±0.004 in/ft]</td>
</tr>
<tr>
<td>EC2-D-15-04A</td>
<td>1.5:1</td>
<td>1:1</td>
<td>0.70 m/s² [28 in/s²]</td>
<td>±0.13 mm</td>
<td>0.40 mm</td>
<td>±0.10 mm/300 mm [±0.004 in/ft]</td>
</tr>
<tr>
<td>EC2-D-20-04A</td>
<td>2:1</td>
<td>1:1</td>
<td>0.30 m/s² [12 in/s²]</td>
<td>±0.13 mm</td>
<td>0.40 mm</td>
<td>±0.10 mm/300 mm [±0.004 in/ft]</td>
</tr>
<tr>
<td>EC2-D-50-04A</td>
<td>5:1 Gears</td>
<td>1:1</td>
<td>0.15 m/s² [6 in/s²]</td>
<td>±0.13 mm</td>
<td>0.40 mm</td>
<td>±0.10 mm/300 mm [±0.004 in/ft]</td>
</tr>
<tr>
<td>EC2-D-10-04A</td>
<td>10:1</td>
<td>1:1</td>
<td>0.15 m/s² [6 in/s²]</td>
<td>±0.13 mm</td>
<td>0.40 mm</td>
<td>±0.10 mm/300 mm [±0.004 in/ft]</td>
</tr>
</tbody>
</table>

- Performance using D2200, D2300 and D2400 Series Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
- For D2500B control, derate thrust by 50%.
- Repeatability achievable with D2600 control. Reduce cylinder speed prior to final positioning.

To configure your system see page A-30 to A-31.
Steps to Ordering a Complete EC2-D System

You are ready to specify an EC2-D actuator model number after you have:

a. completed and verified all necessary information on an IDC Product Selection Worksheet.
b. completed the steps in the EC Selection Guidelines on pages (A-20 to A-21).
c. selected a control that is compatible with the D-series motor.

Your local IDC Distributor and our Applications Engineering Department are available to help with your selection process.

1. Base Model

Choose the model with sufficient speed and thrust with a comfortable safety margin. Refer to the EC2-D Speed vs. Thrust curves in this section.

EC2-D cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. Inline models have the motor coupled directly to the leadscrew with no reduction.

2. Stroke Length

Eight standard lengths are available from 50 to 750 mm. Custom lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact the physical end-of-travel on either end. Extra travel length is necessary to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed. For further information on this refer to the EC Selection Guidelines on pages (A-20 to A-21) or the Engineering Section.

### Make It An IDEAL System

See Intro Pages 6 & 7
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-52.
Cylinder base mount options -MS1, -MP2, -MP3, -MF2, and -MF3 cannot be ordered with inline models.
MF1, 2, 3 Rectangular Flanges
-MS1 Side End Angles
MS2 Side Lugs
MP2 Rear Clevis (MP3 includes pivot base)
MS6M and MS6E Side Tapped Holes
MT4 Trunnion

4. Rod Ends
Industrial Devices offers 4 rod end options for EC2-D series cylinders.
-FT1M or -FT1E Female Thread
-MT1M or -MT1E Male Thread
-FS2 Spherical Joint
-FC2 Clevis

5. Other Options
See the Options and Accessories section for complete specifications.

BS – Holding Brake
35 in-lb holding brake mounted on the rear lead screw shaft extension.
Not available on inline models or with cylinder base mount options. (-MF2, -MF3, -MS1, -MP2, -MP3).

EMK – Encoder
1000 line incremental encoder mounted on the rear shaft of the motor.
Not available on EC2-D series with -Q quick disconnect option.

L – Linear Potentiometer Output
Linear potentiometer mounted on inside the EC2-D cylinder. For use with D2500B Series control.

Pivot Mount Caution:
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90-95% of its full stroke. This increases the system's rigidity and extends the life of the guide bearings and rod seal.

6. Accessories
Magnetic Position Sensors
Position sensors are available for triggering stop, speed/direction change, or end-of-travel.

To maximize cylinder life, IDC recommends the use of end-of-travel sensors with all cylinders.
Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

<table>
<thead>
<tr>
<th>Reed</th>
<th>Leads 3m</th>
<th>Leads 4m Quick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normally open</td>
<td>PSR-1</td>
<td>PSR-1Q</td>
</tr>
<tr>
<td>Normally closed</td>
<td>PSR-2</td>
<td>PSR-2Q</td>
</tr>
<tr>
<td>Hall Effect</td>
<td>PSN-1</td>
<td>PSN-1Q</td>
</tr>
<tr>
<td>Normally closed, NPN</td>
<td>PSN-2</td>
<td>PSN-2Q</td>
</tr>
</tbody>
</table>

See page A-240 for more limit switch options, including quick-disconnect versions.

7. Compatible Controls
Details of controls are in Sections F.
The EC2-D is compatible with:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D2200</td>
<td>Simple limit switch</td>
</tr>
<tr>
<td>D2300</td>
<td>Limit switch</td>
</tr>
<tr>
<td>D2400</td>
<td>Limit switch w/delay</td>
</tr>
<tr>
<td>D2500B</td>
<td>Analog position</td>
</tr>
</tbody>
</table>
### Electric Cylinders

#### EC2-H

**Electric Cylinder**
- **3600 N (810 lb) Thrust**
- **160 Volt DC Motor**

#### Performance

**16 mm Lead Ballscrew Models**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
</tr>
<tr>
<td>150</td>
<td>n/a</td>
<td>n/a</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
</tr>
<tr>
<td>200</td>
<td>150</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
</tr>
<tr>
<td>300</td>
<td>150</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
</tr>
<tr>
<td>450</td>
<td>150</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
</tr>
<tr>
<td>600</td>
<td>150</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
</tr>
<tr>
<td>750</td>
<td>150</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
</tr>
</tbody>
</table>

**Critical Speed (mm/sec)**
- **EC2-H-10-16B**: 1:1 Timing Belt, 16 mm/rev Ballscrew
- **EC2-H-10L-16B**: 1:1 Inline Coupling, 16 mm/rev Ballscrew
- **EC2-H-15-16B**: 1.5:1 Timing Belt, 16 mm/rev Ballscrew
- **EC2-H-20-16B**: 2.0:1 Timing Belt, 16 mm/rev Ballscrew
- **EC2-H-50-16B**: 5:1 Gears, 16 mm/rev Ballscrew
- **EC2-H-100-16B**: 10:1 Gears, 16 mm/rev Ballscrew

**Maximum No-Load Acceleration**
- **EC2-H-10-16B**: 4.90 m/s² [193 in/s²]
- **EC2-H-15-16B**: 3.50 m/s² [138 in/s²]
- **EC2-H-20-16B**: 2.69 m/s² [106 in/s²]
- **EC2-H-50-16B**: 1.10 m/s² [43 in/s²]
- **EC2-H-100-16B**: 0.55 m/s² [22 in/s²]

**Repeatability**
- ±0.25 mm [±0.010 in]

**Backlash**
- 0.25 mm [±0.010 in]

**Lead Accuracy**
- ±0.05 mm/300 mm [±0.002 in/ft]

**Duty Cycle**
- Percentage of actuator "on time" or movement over 10 minute interval:
  - 100%
  - 60%
  - 30%

**Lead Accuracy**
- ±0.05 mm/300 mm [±0.002 in/ft]

**Critical Speed (mm/sec)**
- **Stroke (mm)**
  - 50
  - 150
  - 200
  - 300
  - 450
  - 600
  - 750

**Column Load Limit (N)**
- n/a

---

*Performance using H3000 Series Controls.*

*Duty Cycle is percentage of actuator "on time" or movement over 10 minute interval.*
Performance

5 mm Lead Ballscrew Models

EC2-H-10-05B
EC2-H-10L-05B

EC2-H-15-05B

EC2-H-20-05B

EC2-H-50-05B

EC2-H-100-05B

100% Duty Cycle  60% Duty Cycle  30% Duty Cycle

EC2-H-10-05B: 1:1 Timing Belt, 5 mm/rev Ballscrew
EC2-H-10L-05B: 1:1 Inline Coupling, 5 mm/rev Ballscrew
Max. No-Load Accel. 1.56 m/s² [61 in/s²]
Repeatability ±0.13 mm [±0.005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC2-H-15-05B: 1.5:1 Timing Belt, 5 mm/rev Ballscrew
Max. No-Load Accel. 1.10 m/s² [43 in/s²]
Repeatability ±0.13 mm [±0.005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC2-H-20-05B: 2:1 Timing Belt, 5 mm/rev Ballscrew
Max. No-Load Accel. 0.84 m/s² [33 in/s²]
Repeatability ±0.13 mm [±0.005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC2-H-50-05B: 5:1 Gears, 5 mm/rev Ballscrew
Max. No-Load Accel. 0.34 m/s² [14 in/s²]
Repeatability ±0.13 mm [±0.005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC2-H-100-05B: 10:1 Gears, 5 mm/rev Ballscrew
Max. No-Load Accel. 0.17 m/s² [7 in/s²]
Repeatability ±0.13 mm [±0.005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

• Performance using H3000 Series Controls.
• Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.

5 mm Lead Ballscrew

<table>
<thead>
<tr>
<th>Critical Speed (mm/sec)</th>
<th>Stroke (mm)</th>
<th>Column Load Limit (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>414, 414, 310, 172, 103</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>50 thru 100, 150, 200, 300, 450, 600, 750</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

• Consider leadscrew critical speed and column load limits when specifying longer lengths.

Please refer to the Industrial Devices Corporation website for complete specifications.

Industrial Devices Corporation
707-789-1000 • http://www.idcmotion.com • 24 hour info by fax 916-431-6548

A-33
EC2-H

4 mm Lead Acme Screw Models

EC2-H-10-04A
EC2-H-10L-04A

EC2-H-15-04A
EC2-H-15L-04A

EC2-H-20-04A
EC2-H-20L-04A

EC2-H-50-04A
EC2-H-50L-04A

EC2-H-100-04A
EC2-H-100L-04A

Performance

- 50% Duty Cycle
- 30% Duty Cycle

EC2-H-10-04A: 1:1 Timing Belt, 4 mm/rev Acme Screw
EC2-H-10L-04A: 1:1 Inline Coupling, 4 mm/rev Acme Screw

Max. No-Load Accel. 1.35 m/s² [49 in/s²]
Repeatability ±0.13 mm [±0.005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC2-H-15-04A: 1.5:1 Timing Belt, 4 mm/rev Acme Screw
Max. No-Load Accel. 0.88 m/s² [35 in/s²]
Repeatability ±0.13 mm [±0.005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC2-H-20-04A: 2:1 Timing Belt, 4 mm/rev Acme Screw
Max. No-Load Accel. 0.68 m/s² [27 in/s²]
Repeatability ±0.13 mm [±0.005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC2-H-50-04A: 5:1 Gears, 4 mm/rev Acme Screw
Max. No-Load Accel. 0.28 m/s² [11 in/s²]
Repeatability ±0.13 mm [±0.005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC2-H-100-04A: 10:1 Gears, 4 mm/rev Acme Screw
Max. No-Load Accel. 0.14 m/s² [5 in/s²]
Repeatability ±0.13 mm [±0.005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

To configure your system see page A-36 to A-37.

- Performance using H3000 or Series Controls.
- Duty Cycle is percentage of actuator "on time" or movement over 10 minute interval.

4 mm Lead Acme Screw

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>50</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>450</th>
<th>600</th>
<th>750</th>
<th>2500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Speed (mm/sec)</td>
<td>233</td>
<td>233</td>
<td>233</td>
<td>233</td>
<td>233</td>
<td>233</td>
<td>233</td>
<td>233</td>
</tr>
</tbody>
</table>

To consider leadscrew critical speed and column load limits when specifying longer lengths.
Steps to Ordering a Complete EC2-H System

You are ready to specify an EC2-H actuator model number after you have:

a. completed and verified all necessary information on an IDC Product Selection Worksheet.
b. completed the steps in the EC Selection Guidelines on pages (A-20 to A-21).
c. selected a control that is compatible with the H-series motor.

Your local IDC Distributor and our Applications Engineering Department are available to help with your selection process.

1. Base Model

Choose the model with sufficient speed and thrust with a comfortable safety margin. Refer to the EC2-H Speed vs. Thrust curves in this section.

EC2-H cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. Inline models have the motor coupled directly to the leadscrew with no reduction.

Parallel Models

 Inline Models

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Drive Ratio</th>
<th>Screw Lead, Type</th>
<th>(mm)</th>
<th>Rod End</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2-H-10-16B</td>
<td>H</td>
<td></td>
<td>Acme Screw</td>
<td>50</td>
<td></td>
<td>No Charge</td>
</tr>
<tr>
<td>EC2-H-15-16B</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td></td>
<td>-MF1</td>
</tr>
<tr>
<td>EC2-H-20-16B</td>
<td></td>
<td></td>
<td></td>
<td>150</td>
<td></td>
<td>-MP2</td>
</tr>
<tr>
<td>EC2-H-50-16B</td>
<td></td>
<td></td>
<td></td>
<td>200</td>
<td></td>
<td>-FT1M</td>
</tr>
<tr>
<td>EC2-H-100-16B</td>
<td></td>
<td></td>
<td></td>
<td>250</td>
<td></td>
<td>-FT1E</td>
</tr>
</tbody>
</table>

Inline Models (Direct Drive)

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Drive Ratio</th>
<th>Screw Lead, Type</th>
<th>(mm)</th>
<th>Rod End</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2-H-10L-16B</td>
<td></td>
<td></td>
<td></td>
<td>300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-H-10L-05B</td>
<td></td>
<td></td>
<td></td>
<td>450</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-H-10L-04A</td>
<td></td>
<td></td>
<td></td>
<td>600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-H-10L-03A</td>
<td></td>
<td></td>
<td></td>
<td>750</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Stroke Length

Eight standard lengths are available from 50 to 750 mm. Custom lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact the physical end-of-travel on either end. Extra travel length is necessary to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed. For further information on this refer to the EC Selection Guidelines on pages (A-20 to A-21) or the Engineering Section.
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-52.
Cylinder base mount options -MS1, -MP2, -MP3, -MF2, and -MF3 cannot be ordered with inline models.
MF1, 2, 3 Rectangular Flanges

MF1 Front Flange
MF2 Rear Flange
MF3 Both Flanges

MS1 Side End Angles

MS2 Side Lugs

MP2 Rear Clevis (MP3 includes pivot base)

MS6M and MS6E Side Tapped Holes

MT4 Trunnion

4. Rod Ends
Industrial Devices offers 4 rod end options for EC2-H series cylinders.
-FT1M or -FT1E Female Thread
-MT1M or -MT1E Male Thread
-FS2 Spherical Joint
-FC2 Clevis

Pivot Mount Caution:
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90–95% of its full stroke. This increases the system’s rigidity and extends the life of the guide bearings and rod seal.

5. Other Options
See the Options and Accessories section for complete specifications.

BM – Motor Holding Brake

BS – Holding Brake
35 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on inline models or with cylinder base mount options. (-MF2, -MF3, -MS1, -MP2, -MP3).

EMK – Encoder
Reverse-compatible 500 line incremental encoder mounted on the rear shaft of the motor. Not available on EC2-H with -BM motor holding brake option.

L – Linear Potentiometer Output
Linear potentiometer mounted on inside the EC2-H cylinder. For use with H3501 control.

How To Order

3600 N (810 lb) Thrust
160 Volt DC Motor

6. Accessories
Magnetic Position Sensors
Position sensors are available for triggering stop, speed/direction change, or end-of-travel.

To maximize cylinder life, IDC recommends the use of end-of-travel sensors with all cylinders.

Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

Reed
Normally open PSR-1 PSR-1Q
Normally closed PSR-2 PSR-2Q

Hall Effect
Normally open, NPN PSN-1 PSN-1Q
Normally closed, NPN PSN-2 PSN-2Q

See page A-240 for more limit switch options, including quick-disconnect versions.

7. Compatible Controls
Details of controls are in Sections F. The EC2-H is compatible with:

Model Description
H3301B Limit switch
H3321B Edge guide
H3501 Analog position
### EC2-S/P Performance

**Electric Cylinder**

3600 N (810 lb) Thrust

Step Motor

#### Electric Cylinder

<table>
<thead>
<tr>
<th>EC2-S32(T/V)-10-16B</th>
<th>EC2-S32(T/V)-10L-16B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Speed</strong> mm/s</td>
<td>376</td>
</tr>
<tr>
<td></td>
<td>5125</td>
</tr>
<tr>
<td><strong>Thrust</strong> N</td>
<td>50</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

#### EC2-S32(T/V)-15-16B: 1:1 Timing Belt, 16 mm/rev Ballscrew

Max. No-Load Accel. 31.7 m/s² [1247 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

#### EC2-S32(T/V)-100-16B: 10:1 Gears, 16 mm/rev Ballscrew

Max. No-Load Accel. 4.30 m/s² [169 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

#### EC2-S32(T/V)-50-16B: 5:1 Gears, 16 mm/rev Ballscrew

Max. No-Load Accel. 8.52 m/s² [335 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

#### EC2-S32(T/V)-10L-16B: 1:1 Inline Coupling, 16 mm/rev Ballscrew

Max. No-Load Accel. 25.0 m/s² [983 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

#### EC2-S32(T/V)-20-16B: 2.0:1 Timing Belt, 16 mm/rev Ballscrew

Max. No-Load Accel. 20.0 m/s² [787 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

#### EC2-S32(T/V)-50-16B: 5:1 Gears, 16 mm/rev Ballscrew

Max. No-Load Accel. 8.52 m/s² [335 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

#### EC2-S32(T/V)-100-16B: 10:1 Gears, 16 mm/rev Ballscrew

Max. No-Load Accel. 4.30 m/s² [169 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

#### EC2-S32(T/V)-20-16B: 2.0:1 Timing Belt, 16 mm/rev Ballscrew

Max. No-Load Accel. 20.0 m/s² [787 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

#### EC2-S32(T/V)-50-16B: 5:1 Gears, 16 mm/rev Ballscrew

Max. No-Load Accel. 8.52 m/s² [335 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

#### EC2-S32(T/V)-100-16B: 10:1 Gears, 16 mm/rev Ballscrew

Max. No-Load Accel. 4.30 m/s² [169 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- Consider leadscrew critical speed and column load limits when specifying longer lengths.

### 16mm Lead Ballscrew

<table>
<thead>
<tr>
<th>Critical Speed (mm/sec)</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1280 1280 993 550 331 230</td>
<td>50 thru 100 150 200 300 450 600 750</td>
</tr>
<tr>
<td>n/a n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
</tbody>
</table>

### Specifications

- Performance using S6000 Series, NextStep™, and smartStep™ Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
**Performance**

**16mm Lead Ballscrew Models**

<table>
<thead>
<tr>
<th>Model</th>
<th>Speed (mm/s)</th>
<th>Thrust (lbs)</th>
<th>Critical Speed (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2-P22(T/V)-10-16B</td>
<td>89 to 467</td>
<td>100%</td>
<td>390</td>
</tr>
<tr>
<td>EC2-P22(T/V)-10L-16B</td>
<td>89 to 467</td>
<td>50%</td>
<td>295</td>
</tr>
<tr>
<td>EC2-P22(T/V)-15-16B</td>
<td>178 to 467</td>
<td>100%</td>
<td>390</td>
</tr>
<tr>
<td>EC2-P22(T/V)-20-16B</td>
<td>278 to 467</td>
<td>100%</td>
<td>390</td>
</tr>
<tr>
<td>EC2-P22(T/V)-50-16B</td>
<td>1134 to 467</td>
<td>100%</td>
<td>390</td>
</tr>
<tr>
<td>EC2-P22(T/V)-100-16B</td>
<td>222 to 467</td>
<td>100%</td>
<td>390</td>
</tr>
</tbody>
</table>

**EC2-P22(T/V)-10-16B**
- 1:1 Timing Belt, 16 mm/rev Ballscrew
- Max. No-Load Accel. 28.4 m/s² [1119 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-15-16B**
- 1.5:1 Timing Belt, 16 mm/rev Ballscrew
- Max. No-Load Accel. 27.4 m/s² [1078 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-20-16B**
- 2.0:1 Timing Belt, 16 mm/rev Ballscrew
- Max. No-Load Accel. 24.3 m/s² [955 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-50-16B**
- 5:1 Gears, 16 mm/rev Ballscrew
- Max. No-Load Accel. 11.6 m/s² [458 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-100-16B**
- 10:1 Gears, 16 mm/rev Ballscrew
- Max. No-Load Accel. 6.0 m/s² [236 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

* Consider leadscrew critical speed and column load limits when specifying longer lengths.

**16mm Lead ball screw**

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Critical Speed (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>150</td>
<td>250</td>
</tr>
<tr>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>250</td>
<td>350</td>
</tr>
<tr>
<td>300</td>
<td>400</td>
</tr>
<tr>
<td>350</td>
<td>450</td>
</tr>
<tr>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>450</td>
<td>550</td>
</tr>
<tr>
<td>500</td>
<td>600</td>
</tr>
<tr>
<td>550</td>
<td>650</td>
</tr>
<tr>
<td>600</td>
<td>700</td>
</tr>
<tr>
<td>650</td>
<td>750</td>
</tr>
<tr>
<td>700</td>
<td>800</td>
</tr>
<tr>
<td>750</td>
<td>900</td>
</tr>
<tr>
<td>800</td>
<td>1000</td>
</tr>
<tr>
<td>850</td>
<td>1100</td>
</tr>
<tr>
<td>900</td>
<td>1200</td>
</tr>
<tr>
<td>950</td>
<td>1300</td>
</tr>
<tr>
<td>1000</td>
<td>1400</td>
</tr>
</tbody>
</table>

---

**EC2-S/P**

**Electric Cylinder 3600 N (810 lb) Thrust**

**Step Motor**

**EC2-P22(T/V)-10L-16B**
- 1:1 Inline Coupling, 16 mm/rev Ballscrew
- Max. No-Load Accel. 24.3 m/s² [955 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

---

**Performance**

**Electric Cylinders**

**EC2-P22(T/V)-10-16B**
- 1:1 Timing Belt, 16 mm/rev Ballscrew
- Max. No-Load Accel. 28.4 m/s² [1119 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-15-16B**
- 1.5:1 Timing Belt, 16 mm/rev Ballscrew
- Max. No-Load Accel. 27.4 m/s² [1078 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-20-16B**
- 2.0:1 Timing Belt, 16 mm/rev Ballscrew
- Max. No-Load Accel. 24.3 m/s² [955 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-50-16B**
- 5:1 Gears, 16 mm/rev Ballscrew
- Max. No-Load Accel. 11.6 m/s² [458 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-100-16B**
- 10:1 Gears, 16 mm/rev Ballscrew
- Max. No-Load Accel. 6.0 m/s² [236 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]
**Performance**

**5mm Lead Ballscrew Models**

**EC2-S32(T/V)-10-05B**

- 1:1 Timing Belt, 5 mm/rev Ballscrew
- Speed vs. Thrust graph

**EC2-S32(T/V)-15-05B**

- 1.5:1 Timing Belt, 5 mm/rev Ballscrew
- Speed vs. Thrust graph

**EC2-S32(T/V)-20-05B**

- 2:1 Timing Belt, 5 mm/rev Ballscrew
- Speed vs. Thrust graph

**EC2-S32(T/V)-50-05B**

- 5:1 Gears, 5 mm/rev Ballscrew
- Speed vs. Thrust graph

### Electric Cylinders

- **EC2-S/P**
- 3600 N (810 lb) Thrust
- Step Motor

### Critical Speed (mm/sec)

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Critical Speed (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 thru 100</td>
<td>150</td>
</tr>
<tr>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>300</td>
<td>450</td>
</tr>
<tr>
<td>450</td>
<td>600</td>
</tr>
<tr>
<td>600</td>
<td>750</td>
</tr>
</tbody>
</table>

### Note:

- Consider leadscrew critical speed and column load limits when specifying longer lengths.

---

**EC2-S32(T/V)-10-05B**

- Max. No-Load Accel. 10.3 m/s² [405 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-S32(T/V)-15-05B**

- Max. No-Load Accel. 8.00 m/s² [314 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-S32(T/V)-20-05B**

- Max. No-Load Accel. 6.32 m/s² [249 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-S32(T/V)-50-05B**

- Max. No-Load Accel. 2.67 m/s² [105 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

---

**Electric Cylinders**

- 5/8 x 10-24 in/nut
- 5/8 x 10-24 in/nut

---

**Performance**

- 100% Duty Cycle
- 50% Duty Cycle

---

**5mm lead ballscrew**

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Critical Speed (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 thru 100</td>
<td>150</td>
</tr>
<tr>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>300</td>
<td>450</td>
</tr>
<tr>
<td>450</td>
<td>600</td>
</tr>
<tr>
<td>600</td>
<td>750</td>
</tr>
</tbody>
</table>

---

**Column Load Limit (N)**

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Column Load Limit (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 thru 100</td>
<td>n/a</td>
</tr>
<tr>
<td>150</td>
<td>n/a</td>
</tr>
<tr>
<td>200</td>
<td>n/a</td>
</tr>
<tr>
<td>300</td>
<td>n/a</td>
</tr>
<tr>
<td>450</td>
<td>n/a</td>
</tr>
<tr>
<td>600</td>
<td>n/a</td>
</tr>
<tr>
<td>750</td>
<td>n/a</td>
</tr>
</tbody>
</table>

---

**Note:**

- Performance using S6000 Series, NextStep™, and SmartStep™ Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
5mm Lead Ballscrew Models

**EC2-P22(T/V)-10-05B**

Max. No-Load Accel. 9.62 m/s² [379 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-10L-05B**

Max. No-Load Accel. 9.62 m/s² [379 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-15-05B**

Max. No-Load Accel. 9.01 m/s² [355 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-20-05B**

Max. No-Load Accel. 7.84 m/s² [308 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-50-05B**

Max. No-Load Accel. 3.66 m/s² [144 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-P22(T/V)-100-05B**

Max. No-Load Accel. 1.88 m/s² [74 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- Performance using S6000 Series, NextStep™, and iMotion™ Controls.
- Duty Cycle is percentage of actuator ‘on time’ or movement over 10 minute interval.

**EC2-P22(T/V)-10-05B: 1:1 Timing Belt, 5 mm/rev Ballscrew**

EC2-P22(T/V)-10L-05B: 1:1 Inline Coupling, 5 mm/rev Ballscrew

Max. No-Load Accel. 9.62 m/s² [379 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

Max. No-Load Accel. 9.62 m/s² [379 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

Consider leadscrew critical speed and column load limits when specifying longer lengths.
**Performance**

---

**EC2-S32(T/V)-10-04A**

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>0</th>
<th>220</th>
<th>440</th>
<th>670</th>
<th>890</th>
<th>1110</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
</tr>
<tr>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
</tr>
<tr>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
</tr>
<tr>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
</tr>
<tr>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
</tr>
</tbody>
</table>

**EC2-S32(T/V)-15-04A**

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>0</th>
<th>220</th>
<th>440</th>
<th>670</th>
<th>890</th>
<th>1110</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
</tr>
<tr>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
</tr>
<tr>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
</tr>
<tr>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
</tr>
<tr>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
</tr>
</tbody>
</table>

**EC2-S32(T/V)-20-04A**

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>0</th>
<th>220</th>
<th>440</th>
<th>670</th>
<th>890</th>
<th>1110</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
</tr>
<tr>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
</tr>
<tr>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
</tr>
<tr>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
</tr>
<tr>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
</tr>
</tbody>
</table>

**EC2-S32(T/V)-50-04A**

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>0</th>
<th>220</th>
<th>440</th>
<th>670</th>
<th>890</th>
<th>1110</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
<td>251</td>
</tr>
<tr>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
</tr>
<tr>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
<td>4100</td>
</tr>
<tr>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
<td>5125</td>
</tr>
<tr>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
<td>8205</td>
</tr>
</tbody>
</table>

---

* To configure your system see page A-44 to A-45.

* Consider leadscrew critical speed and column load limits when specifying longer lengths.

---

**4mm Lead Acme Screw Models**

**EC2-S32(T/V)-10-04A**

- 1:1 Timing Belt, 4 mm/rev Acme Screw
- Max. No-Load Accel. 8.24 m/s² [324 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.40 mm [±0.016 in]
- Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

**EC2-S32(T/V)-15-04A**

- 1.5:1 Timing Belt, 4 mm/rev Acme Screw
- Max. No-Load Accel. 6.38 m/s² [251 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.40 mm [±0.016 in]
- Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

**EC2-S32(T/V)-20-04A**

- 2:1 Timing Belt, 4 mm/rev Acme Screw
- Max. No-Load Accel. 5.06 m/s² [199 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.40 mm [±0.016 in]
- Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

**EC2-S32(T/V)-50-04A**

- 5:1 Gears, 4 mm/rev Acme Screw
- Max. No-Load Accel. 2.13 m/s² [84 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.40 mm [±0.016 in]
- Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

**EC2-S32(T/V)-100-04A**

- 10:1 Gears, 4 mm/rev Acme Screw
- Max. No-Load Accel. 1.08 m/s² [42 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.40 mm [±0.016 in]
- Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

---

* Performance using S6000 Series, NextGen, and NextGen+ Controls.
* Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.

---

To configure your system see page A-44 to A-45.
Performance

EC2-S/P

Electric Cylinder
3600 N (810 lb) Thrust
Step Motor

EC2-P22(T/V)-10-04A: 1:1 Timing Belt, 4 mm/rev Acme Screw
EC2-P22(T/V)-10L-04A: 1:1 Inline Coupling, 4 mm/rev Acme Screw
Max. No-Load Accel. 7.71 m/s² [303 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC2-P22(T/V)-15-04A: 1.5:1 Timing Belt, 4 mm/rev Acme Screw
Max. No-Load Accel. 7.22 m/s² [284 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC2-P22(T/V)-20-04A: 2:1 Timing Belt, 4 mm/rev Acme Screw
Max. No-Load Accel. 6.27 m/s² [247 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC2-P22(T/V)-50-04A: 5:1 Gears, 4 mm/rev Acme Screw
Max. No-Load Accel. 2.93 m/s² [115 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC2-P22(T/V)-100-04A: 10:1 Gears, 4 mm/rev Acme Screw
Max. No-Load Accel. 1.50 m/s² [59 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

• Consider leadscrew critical speed and column load limits when specifying longer lengths.

4mm Lead Acme Screw Models

EC2-P22(T/V)-10-04A
EC2-P22(T/V)-10L-04A

EC2-P22(T/V)-15-04A

EC2-P22(T/V)-20-04A

EC2-P22(T/V)-50-04A

EC2-P22(T/V)-100-04A

<table>
<thead>
<tr>
<th>Speed mm/s in/s</th>
<th>Thrust 89 178 267 356 445 534 623 712 N</th>
</tr>
</thead>
<tbody>
<tr>
<td>203</td>
<td>178</td>
</tr>
<tr>
<td>178</td>
<td>152</td>
</tr>
<tr>
<td>152</td>
<td>127</td>
</tr>
<tr>
<td>127</td>
<td>106</td>
</tr>
<tr>
<td>106</td>
<td>80</td>
</tr>
<tr>
<td>80</td>
<td>60</td>
</tr>
<tr>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

EC2-P22(T/V)-10-04A: 1:1 Timing Belt, 4 mm/rev Acme Screw
EC2-P22(T/V)-10L-04A: 1:1 Inline Coupling, 4 mm/rev Acme Screw
Max. No-Load Accel. 7.71 m/s² [303 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC2-P22(T/V)-15-04A: 1.5:1 Timing Belt, 4 mm/rev Acme Screw
Max. No-Load Accel. 7.22 m/s² [284 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC2-P22(T/V)-20-04A: 2:1 Timing Belt, 4 mm/rev Acme Screw
Max. No-Load Accel. 6.27 m/s² [247 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC2-P22(T/V)-50-04A: 5:1 Gears, 4 mm/rev Acme Screw
Max. No-Load Accel. 2.93 m/s² [115 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC2-P22(T/V)-100-04A: 10:1 Gears, 4 mm/rev Acme Screw
Max. No-Load Accel. 1.50 m/s² [59 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

4mm lead acme screw

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Critical Speed (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 thru 100</td>
<td>233</td>
</tr>
<tr>
<td>150</td>
<td>n/a</td>
</tr>
<tr>
<td>200</td>
<td>n/a</td>
</tr>
<tr>
<td>300</td>
<td>n/a</td>
</tr>
<tr>
<td>450</td>
<td>n/a</td>
</tr>
<tr>
<td>600</td>
<td>n/a</td>
</tr>
<tr>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>2500</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Performance using S6000 Series. NextStep® and iMotion® Controls.
Duty Cycle is percentage of actuator "on time" or movement over 10 minute interval.

Industrial Devices Corporation
707-789-1000 • http://www.idcmotion.com • 24 hour info by fax 916-431-6548

A-43
**Electric Cylinders**

**How To Order**

**1. Base Model Number**

Choose the model with sufficient speed and thrust with a comfortable safety margin. **IDC recommends at least 30% reserve thrust for step motor driven systems.** The EC2-S/P Series offers two motor wiring choices, ‘T’ (Series), and ‘V’ (Parallel). The ‘T’ and ‘V’ versions include a 12 foot motor quick disconnect cable.

EC2-S/P cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. Inline models have the motor coupled directly to the leadscrew with no reduction.

**2. Stroke Length**

Eight standard lengths are available from 50 to 750 mm. Custom lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact the physical end-of-travel on either end. Extra travel length is necessary to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed. For further information on this refer to the EC Selection Guidelines on pages (A-20 to A-21) or the Engineering Section.

---

### Parallel Models

![Parallel Models Diagram](image)

---

### Inline Models

![Inline Models Diagram](image)

---

### Electric Cylinder Models

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Stroke Length (mm)</th>
<th>Screw Lead, Type</th>
<th>Cylinder Mounting</th>
<th>Rod End</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2-S32x10-16B</td>
<td>S/P</td>
<td>50</td>
<td>Acme Screw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-S32x15-16B</td>
<td>S/P</td>
<td>100</td>
<td>EC2-S32x10-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-S32x20-16B</td>
<td>S/P</td>
<td>150</td>
<td>EC2-S32x10-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-S32x50-16B</td>
<td>S/P</td>
<td>200</td>
<td>EC2-S32x10-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-S32x100-16B</td>
<td>S/P</td>
<td>250</td>
<td>EC2-S32x10-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-P22x10-16B</td>
<td>S/P</td>
<td>300</td>
<td>EC2-P22x10-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-P22x15-16B</td>
<td>S/P</td>
<td>400</td>
<td>EC2-P22x15-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-P22x20-16B</td>
<td>S/P</td>
<td>500</td>
<td>EC2-P22x20-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-P22x50-16B</td>
<td>S/P</td>
<td>600</td>
<td>EC2-P22x50-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-P22x100-16B</td>
<td>S/P</td>
<td>700</td>
<td>EC2-P22x100-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Inline Models (Direct Drive)

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Stroke Length (mm)</th>
<th>Screw Lead, Type</th>
<th>Cylinder Mounting</th>
<th>Rod End</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2-S32x10L-10B</td>
<td>S/P</td>
<td>50</td>
<td>Acme Screw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-S32x15L-10B</td>
<td>S/P</td>
<td>100</td>
<td>EC2-S32x10-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-S32x20L-10B</td>
<td>S/P</td>
<td>150</td>
<td>EC2-S32x10-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-S32x50L-10B</td>
<td>S/P</td>
<td>200</td>
<td>EC2-S32x10-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-S32x100L-10B</td>
<td>S/P</td>
<td>250</td>
<td>EC2-S32x10-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-P22x10L-10B</td>
<td>S/P</td>
<td>300</td>
<td>EC2-P22x10-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-P22x15L-10B</td>
<td>S/P</td>
<td>400</td>
<td>EC2-P22x15-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-P22x20L-10B</td>
<td>S/P</td>
<td>500</td>
<td>EC2-P22x20-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-P22x50L-10B</td>
<td>S/P</td>
<td>600</td>
<td>EC2-P22x50-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-P22x100L-10B</td>
<td>S/P</td>
<td>700</td>
<td>EC2-P22x100-04A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Options**

- FT1M
- FT1E
- MS1
- MT4
- MS2
- MP3
- FS2
- BS
- EMK
- L
- LR
- PB

---

*Electric Cylinder 3600 N (810 lb) Thrust Step Motor*

*Make It An IDEAL System*

See Intro Pages 6 & 7
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-52.
Cylinder base mount options -MS1, -MP2, -MP3, -MF2, and -MF3 cannot be ordered with inline models.

MF1 Front Flange
MF2 Rear Flange
MF3 Both Flanges

MS1 Side End Angles

MS2 Side Lugs

MP2 Rear Clevis (MP3 includes pivot base)

MS6M and MS6E Side Tapped Holes

MT4 Trunnion

4. Rod Ends
Industrial Devices offers 4 rod end options for EC2 series cylinders.
-FT1M or -FT1E Female Thread
-MT1M or -MT1E Male Thread
-FS2 Spherical Joint
-FC2 Clevis

Pivot Mount Caution:
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90–95% of its full stroke. This increases the system’s rigidity and extends the life of the guide bearings and rod seal.

5. Other Options
See the Options and Accessories section for complete specifications.

BS – Holding Brake
35 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on inline models or with cylinder base mount options. (-MF2, -MF3, -MS1, -MP2, -MP3).

EMK – Encoder
1000 line incremental encoder mounted on the rear shaft of the motor.

L – Linear Potentiometer Output
Linear potentiometer mounted on inside the EC2 cylinder.

LR – Linear Rod Bearing
Linear rod bearing support for the thrust tube. Increases side load rating.

PB – Protective Boot
Protects the thrust tube from solid contaminants and prevents liquids from entering the cylinder through the rod end bearing. (Not available with -MS1.)

6. Accessories
Magnetic Position Sensors
Position sensors are available for indicating end-of-travel and home positions, or for use with user supplied controls.
To maximize cylinder life, IDC recommends the use of end-of-travel sensors with all cylinders.

Common Application Requirements: For most applications, one home and two end-of-travel sensors are required for each cylinder. Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

7. Compatible Controls
Details of controls are in Sections G. The EC2-S/P is compatible with:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NextStep</td>
<td>Stepper drive</td>
</tr>
<tr>
<td>S6002</td>
<td>2-Axis Stepper drive</td>
</tr>
<tr>
<td>SmartStep</td>
<td>IDeal™ programmable</td>
</tr>
<tr>
<td>S6961</td>
<td>IDeal™ programmable</td>
</tr>
<tr>
<td>S6962</td>
<td>2-Axis IDeal™ programmable</td>
</tr>
</tbody>
</table>
16mm Lead Ballscrew Models

EC2-B23-10-16B: 1:1 Timing Belt, 16 mm/rev Ballscrew
- Max. No-Load Accel. 85.0 m/s² [3330 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC2-B23-15-16B: 1.5:1 Timing Belt, 16 mm/rev Ballscrew
- Max. No-Load Accel. 96.0 m/s² [3780 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC2-B23-20-16B: 2.0:1 Timing Belt, 16 mm/rev Ballscrew
- Max. No-Load Accel. 95.1 m/s² [3750 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC2-B23-50-16B: 5:1 Gears, 16 mm/rev Ballscrew
- Max. No-Load Accel. 53.8 m/s² [2120 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC2-B23-100-16B: 10:1 Gears, 16 mm/rev Ballscrew
- Max. No-Load Accel. 28.8 m/s² [1130 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

* Consider leadscrew critical speed and column load limits when specifying longer lengths.

16mm lead ball screw

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>50 thru 100</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>450</th>
<th>600</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column Load Limit (N)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
**Performance**

**Electric Cylinder**

3600 N (810 lb) Thrust  
Brushless Servo

---

**EC2-B23-10-05B**: 1:1 Timing Belt, 5 mm/rev Ball Screw

- **Max. No-Load Accel.**: 29.5 m/s² [1160 in/s²]
- **Repeatability**: ±0.013 mm [±0.0005 in]
- **Backlash**: 0.25 mm [0.010 in]
- **Lead Accuracy**: ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-B23-15-05B**: 1.5:1 Timing Belt, 5 mm/rev Ball Screw

- **Max. No-Load Accel.**: 32.6 m/s² [1285 in/s²]
- **Repeatability**: ±0.013 mm [±0.0005 in]
- **Backlash**: 0.25 mm [0.010 in]
- **Lead Accuracy**: ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-B23-20-05B**: 2:1 Timing Belt, 5 mm/rev Ball Screw

- **Max. No-Load Accel.**: 31.5 m/s² [1240 in/s²]
- **Repeatability**: ±0.013 mm [±0.0005 in]
- **Backlash**: 0.25 mm [0.010 in]
- **Lead Accuracy**: ±0.05 mm/300 mm [±0.002 in/ft]

**EC2-B23-50-05B**: 5:1 Gears, 5 mm/rev Ball Screw

- **Max. No-Load Accel.**: 17.0 m/s² [670 in/s²]
- **Repeatability**: ±0.013 mm [±0.0005 in]
- **Backlash**: 0.25 mm [0.010 in]
- **Lead Accuracy**: ±0.05 mm/300 mm [±0.002 in/ft]

---

- **Performance using B8000 Series Controls (not B8501).**
- **Duty Cycle** is percentage of actuator “on time” or movement over 10 minute interval.

---

**5mm Lead Ballscrew Models**

- **EC2-B23-10L-05B**: 1:1 Inline Coupling, 5 mm/rev Ballscrew
- **Max. No-Load Accel.: 29.5 m/s² [1160 in/s²]**
- **Repeatability**: ±0.013 mm [±0.0005 in]
- **Backlash**: 0.25 mm [0.010 in]
- **Lead Accuracy**: ±0.05 mm/300 mm [±0.002 in/ft]

---

- **EC2-B23-10-05B**: 1:1 Timing Belt, 5 mm/rev Ballscrew
- **Max. No-Load Accel.: 29.5 m/s² [1160 in/s²]**
- **Repeatability**: ±0.013 mm [±0.0005 in]
- **Backlash**: 0.25 mm [0.010 in]
- **Lead Accuracy**: ±0.05 mm/300 mm [±0.002 in/ft]

---

- **EC2-B23-15-05B**: 1.5:1 Timing Belt, 5 mm/rev Ball Screw
- **Max. No-Load Accel.: 32.6 m/s² [1285 in/s²]**
- **Repeatability**: ±0.013 mm [±0.0005 in]
- **Backlash**: 0.25 mm [0.010 in]
- **Lead Accuracy**: ±0.05 mm/300 mm [±0.002 in/ft]

---

- **EC2-B23-20-05B**: 2:1 Timing Belt, 5 mm/rev Ball Screw
- **Max. No-Load Accel.: 31.5 m/s² [1240 in/s²]**
- **Repeatability**: ±0.013 mm [±0.0005 in]
- **Backlash**: 0.25 mm [0.010 in]
- **Lead Accuracy**: ±0.05 mm/300 mm [±0.002 in/ft]

---

- **EC2-B23-50-05B**: 5:1 Gears, 5 mm/rev Ball Screw
- **Max. No-Load Accel.: 17.0 m/s² [670 in/s²]**
- **Repeatability**: ±0.013 mm [±0.0005 in]
- **Backlash**: 0.25 mm [0.010 in]
- **Lead Accuracy**: ±0.05 mm/300 mm [±0.002 in/ft]

---

- **Consider leadscrew critical speed and column load limits when specifying longer lengths.**

---

**5mm lead ballscrew**

<table>
<thead>
<tr>
<th>414</th>
<th>414</th>
<th>414</th>
<th>310</th>
<th>172</th>
<th>103</th>
<th>71</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Speed (mm/sec)</td>
<td>50 thru 100</td>
<td>150</td>
<td>200</td>
<td>300</td>
<td>450</td>
<td>600</td>
</tr>
<tr>
<td>Stroke (mm)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

---

**5mm Lead Ballscrew Models**

**EC2-B23-10-05B**

- **EC2-B23-10-05B**: 1:1 Timing Belt, 5 mm/rev Ball Screw
- **Max. No-Load Accel.: 29.5 m/s² [1160 in/s²]**
- **Repeatability**: ±0.013 mm [±0.0005 in]
- **Backlash**: 0.25 mm [0.010 in]
- **Lead Accuracy**: ±0.05 mm/300 mm [±0.002 in/ft]
### 4mm Lead Acme Screw Models

**EC2-B23-10-04A**  1:1 Timing Belt, 4 mm/rev Acme Screw

- Max. No-Load Accel. 23.6 m/s² [950 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.40 mm [0.016 in]
- Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

**EC2-B23-10L-04A**  1:1 Inline Coupling, 4 mm/rev Acme Screw

- Max. No-Load Accel. 23.6 m/s² [950 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.40 mm [0.016 in]
- Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

**EC2-B23-15-04A**  1.5:1 Timing Belt, 4 mm/rev Acme Screw

- Max. No-Load Accel. 26.2 m/s² [1030 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.40 mm [0.016 in]
- Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

**EC2-B23-20-04A**  2:1 Timing Belt, 4 mm/rev Acme Screw

- Max. No-Load Accel. 25.3 m/s² [995 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.40 mm [0.016 in]
- Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

**EC2-B23-50-04A**  5:1 Gears, 4 mm/rev Acme Screw

- Max. No-Load Accel. 13.6 m/s² [540 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.40 mm [0.016 in]
- Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

**EC2-B23-100-04A**  10:1 Gears, 4 mm/rev Acme Screw

- Max. No-Load Accel. 7.1 m/s² [280 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.40 mm [0.016 in]
- Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

*To configure your system see page A-50 to A-51.*

- Performance using B8000 Series Controls (not B8501).
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.

---

#### Critical Speed (mm/sec)

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>50 thru 100</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>450</th>
<th>600</th>
<th>750</th>
<th>2500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Speed (mm/sec)</td>
<td>233</td>
<td>233</td>
<td>233</td>
<td>219</td>
<td>119</td>
<td>72</td>
<td>48</td>
<td>Critical Speed (mm/sec)</td>
</tr>
</tbody>
</table>

---

**Performance**

- 50% Duty Cycle
- 30% Duty Cycle
- 10% Duty Cycle
- Intermittent (<2 sec)

---

**To configure your system see page A-50 to A-51.**

- Consider lead screw critical speed and column load limits when specifying longer lengths.

---

**4mm lead acme screw**

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>50 thru 100</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>450</th>
<th>600</th>
<th>750</th>
<th>2500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Speed (mm/sec)</td>
<td>233</td>
<td>233</td>
<td>233</td>
<td>219</td>
<td>119</td>
<td>72</td>
<td>48</td>
<td>Critical Speed (mm/sec)</td>
</tr>
</tbody>
</table>

---

**Industrial Devices Corporation**

- 707-789-1000 • 800-747-0064 • E-mail: info@idcmotion.com

---

**Electric Cylinders**

3600 N (810 lb) Thrust  
Brushless Servo
**Steps to Ordering a Complete EC2-B System**

You are ready to specify an EC2-B actuator model number after you have:

- completed and verified all necessary information on an IDC Product Selection Worksheet.
- completed the steps in the EC Selection Guidelines on pages (A20-A21).
- selected a control that is compatible with the B-series motor.

Your local IDC Distributor and our Applications Engineering Department are available to help with your selection process.

---

**How To Order**

**1. Base Model Number**

Choose the model with sufficient speed and thrust with a comfortable safety margin. Refer to the EC2-B Speed vs. Thrust curves in this section.

EC2-B cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. Inline models have the motor coupled directly to the leadscrew with no reduction.

**Note:** All EC2-B cylinders include an encoder.

**Parallel Models**

![Parallel Models Diagram]

**Inline Models**

![Inline Models Diagram]

**2. Stroke Length**

Eight standard lengths are available from 50 to 750 mm. Custom lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact the physical end-of-travel on either end. Extra travel length is necessary to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed. For further information on this refer to the EC Selection Guidelines on pages (A-20 to A-21) or the Engineering Section.

---

**Make It An IDeal System**

See Intro Pages 6 & 7

---

### Electric Cylinder

**EC2-B**

**3600 N [810 lb] Thrust**

**Brushless Servo System**

**Make It An IDeal System**

See Intro Pages 6 & 7

---

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Drive Ratio</th>
<th>Screw Lead, Type</th>
<th>Stroke Length (mm)</th>
<th>Cylinder Mounting</th>
<th>Rod End</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ballscrew</td>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-10-16B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-15-16B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-20-16B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-50-16B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-100-16B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acme Screw</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-10-05B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-15-05B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-20-05B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-50-05B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-100-05B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>250</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>300</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>450</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>600</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>750</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inline Models (Direct Drive)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-10L-16B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-10L-05B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC2-B23-10L-04A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Charge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MP3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-FC2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-FS2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-BM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-FT1M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MF1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MP2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-FT1E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MF2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MS6M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MT1M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MF3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MS6E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MT1E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MS1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MT4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-MS2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Industrial Devices Corporation**

707-789-1000 • 800-747-0064 • E-mail: info@idcmotion.com
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-52.

Cylinder base mount options -MS1, -MP2, -MP3, -MF2, -MF3 cannot be ordered with inline models.

MF1, 2, 3 Rectangular Flanges

4. Rod Ends
Industrial Devices offers 4 rod end options for EC2-B series cylinders.
-FT1M or -FT1E Female Thread
-MT1M or -MT1E Male Thread
-FS2 Spherical Joint
-FC2 Clevis

5. Other Options
See the Options and Accessories section for complete specifications.

BM – Motor Holding Brake
10 in-lb holding brake mounted on the B23 motor.

BS – Holding Brake
35 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on inline models or with cylinder base mount options. (-MF2, -MF3, -MS1, -MP2, -MP3).

6. Accessories

Magnetic Position Sensors
Position sensors are available for indicating end-of-travel and home positions, or for use with user supplied controls.

To maximize cylinder life, IDC recommends the use of end-of-travel sensors with all cylinders.

Common Application Requirements: For most applications, one home and two end-of-travel sensors are required for each cylinder. Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

Reed
Home (N.O.) PSR-1 PSR-1Q
End-of-travel (N.C.) PSR-2 PSR-2Q

Hall Effect
Home (N.O./NPN) PSN-1 PSN-1Q
End-of-travel (N.C./NPN) PSN-2 PSN-2Q

See page A-240 for more limit switch options, including quick-disconnect versions.

7. Compatible Controls
Details of controls are in Sections H. The EC2-B is compatible with:

Model Description
B8001 Digital servo drive
B8501 Analog position
B8961 IDeal™ programmable servo
B8962 2 Axis IDeal™ programmable servo

Pivot Mount Caution:
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90–95% of its full stroke. This increases the system’s rigidity and extends the life of the guide bearings and rod seal.

PB – Protective Boot
Protects the thrust tube from solid contaminants and prevents liquids from entering the cylinder through the rod end bearing. (Not available with -MS1.)
Dimensions

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-58 to A-61
- For rod-end dimensions, go to page A-62

### MS2 Side Lugs Mounting
Parallel

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH 8.22 [208.8] + STROKE</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH 9.58 [243.4] + STROKE</td>
</tr>
<tr>
<td>C</td>
<td>MOUNTING LENGTH 5.70 [144.8] + STROKE</td>
</tr>
</tbody>
</table>

### MS6 Side Tapped Holes Mounting
Parallel

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH 8.22 [208.8] + STROKE</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH 9.58 [243.4] + STROKE</td>
</tr>
<tr>
<td>C</td>
<td>MOUNTING LENGTH 5.70 [144.8] + STROKE</td>
</tr>
</tbody>
</table>
MP2/MP3 Clevis Mount with Pivot Base and Pin

Parallel

Note:
- Order MP3 to specify complete mounting kit, including actuator clevis, pin and pivot base.
- Order MP2 to omit the pivot base.

MF1 Head Rectangular Flange Mounting

Parallel
**Dimensions**

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-58 to A-61
- For rod-end dimensions, go to page A-62

**MF2 Cap Rectangular Flange Mounting**

**Parallel**

**MF3 Both Ends Rectangular Flange Mounting**

**Parallel**

**FLANGE DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 50mm BORE SIZE**

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH 8.60 [218.5] + STROKE</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH 9.96 [253.0] + STROKE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH 8.60 [218.5] + STROKE</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH 9.96 [253.0] + STROKE</td>
</tr>
</tbody>
</table>
**MT4 Trunnion Mounting**

**Parallel**

![Diagram of MT4 Trunnion Mounting](image)

**Dimensions**

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette.
- For motor dimensions, go to pages A-58 to A-61.
- For rod-end dimensions, go to page A-62.

**MS1 Side End Angles Mounting**

**Parallel**

![Diagram of MS1 Side End Angles Mounting](image)

**Dimensions**

Not available with –PB option.
Dimensions

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette.
- For motor dimensions, go to pages A-58 to A-61.
- For rod-end dimensions, go to page A-62.

**MS2 Side Lugs Mounting**

**Inline**

**MS6 Side Tapped Holes Mounting**

**Inline**

---

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
<th>OPTION CODE</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH 8.70 [220.9] + STROKE</td>
<td>D</td>
<td>MS6E 5/16-18 UNC-2B x 0.33 Dp</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH 10.06 [255.5] + STROKE</td>
<td></td>
<td>MS6M MI x 1.25-6H x 8.4mm Dp</td>
</tr>
<tr>
<td>C</td>
<td>MOUNTING LENGTH 5.70 [144.8] + STROKE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**MF1 Head Rectangular Flange Mounting**

**Inline**

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-58 to A-61
- For rod-end dimensions, go to page A-62

**MT4 Trunnion Mounting**

**Inline**

- FLANGE DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 50mm BORE SIZE
- TRUNNION DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 50mm BORE SIZE

---

**Dimensions**

**FLANGE DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 50mm BORE SIZE**

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH</td>
</tr>
</tbody>
</table>

**TRUNNION DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 50mm BORE SIZE**

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH</td>
</tr>
<tr>
<td>C</td>
<td>MOUNTING LENGTH</td>
</tr>
</tbody>
</table>
**Electric Cylinder Motor Specifications**

**EC2-D Series**

**Permanent Magnet 2-pole, 24 volt DC Motor**

**Winding Data**
- D motor
- Inductance: 1.8 mH
- Resistance: 1.0
- Torque Constant: 8.8 oz-in/Amp
- Voltage Constant: 6.5 V/krpm

**Motor Specifications**

<table>
<thead>
<tr>
<th>Shaft Cover*</th>
<th>0.2500/0.2494 [6.350/6.335]</th>
</tr>
</thead>
</table>

**Torque**
- Continuous: 39.6 oz-in (4.5 Amps)
- Peak: 88 oz-in (10 Amps)

**Rotor Inertia**
- 0.018 oz-in-sec²

**Connections**
- Inline Models: 2 leads, 6 inch [150 mm] length
- Parallel Models: Quick Disconnect: 3 contact receptacle in anodized or painted aluminum shell, includes 12 ft. [3.7 m] cable with molded plug. (Not available on inline models).

**Temperature**
- 180°F [82°C] maximum allowable motor case temperature
- Actual motor case temperature is ambient, duty cycle, speed and load dependent. Refer to speed vs. thrust curves for system duty ratings.

---

*REAR SHAFT COVER PROVIDED ON MOTORS WITHOUT ENCODERS*
Permanent Magnet 2-pole, 160 volt DC Motor

**Winding Data**
- H motor
- Inductance: 19 mH
- Resistance: 6.4
- Torque Constant: 54 oz-in/Amp
- Voltage Constant: 40 V/krpm

**Torque**
- Continuous: 108 oz-in (2.0 Amps)
- Peak: 432 oz-in (8.0 Amps)

**Rotor Inertia**: 0.049 oz-in-sec^2

**Connections**
- Quick Disconnect: 3 contact receptacle in anodized or painted aluminum shell, includes 12 ft. [3.7 m] cable with molded plug.

**Temperature**
- 180°F [82°C] maximum allowable motor case temperature
- Actual motor case temperature is ambient, duty cycle, speed and load dependent. Refer to speed vs. thrust curves for system duty ratings.

---

**H Motor**

* REAR SHAFT COVER PROVIDED ON MOTORS WITHOUT ENCODERS
1.8° Permanent Magnet Hybrid Step Motor

**Winding Data**
- P22T and P22V: Series (T), 63mH; Parallel (V), 16mH
- S32T and S32V: Series (T), 6.2mH; Parallel (V), 1.5mH

**Inductance**
- Series (T), 14.8; Parallel (V), 3.7
- Series (T), 0.39; Parallel (V), 0.26

**Resistance**
- Parallel (V) at 120 VAC, 1.5 Amps
- Series (T) at 120 VAC, 2.8 Amps
- Series (T) at 240 VAC, 0.7 Amps

**Current Settings**
- Parallel (V) at 120 VAC or Series (T) at 240 VAC, 5.6 Amps

**Static Torque**
- 200 oz-in max

**Rotor Inertia**
- 3.81 × 10^-4 oz-in-sec^2

**Connections**
- EC2-P22N: 8 leads, 12 ft. sheathed cable for inline mount.
- EC2-S32T, EC2-S32V, EC2-P22T, and EC2-P22V: 5 contact quick disconnect receptacle in anodized or painted aluminum shell, includes 12 ft [3.7 m] cable with molded plug.

**Temperature**
- 212°F [100°C] maximum allowable motor case temperature.
- Actual motor case temperature is ambient, duty cycle, speed and load dependent. Refer to speed vs. thrust curves for system duty ratings.

**P22/S32 Motor**

* Rear shaft cover provided on motors without encoders.
## Motor Specifications

### EC2-B Series

**Rare Earth Magnet Brushless Servo Motor with 2,000 Line Encoder and Commutation Sensors**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winding Data</td>
<td>B23</td>
</tr>
<tr>
<td>Inductance</td>
<td>16 mH</td>
</tr>
<tr>
<td>Resistance</td>
<td>10.6</td>
</tr>
<tr>
<td>Torque Constant</td>
<td>57.6 oz-in/Amp</td>
</tr>
<tr>
<td>Voltage Constant</td>
<td>45.5 V/krpm</td>
</tr>
<tr>
<td>Torque</td>
<td><strong>Continuous</strong>: 144 oz-in (2.5 Amps)</td>
</tr>
<tr>
<td></td>
<td><strong>Peak</strong>: 414 oz-in (7.2 Amps)</td>
</tr>
<tr>
<td>Rotor Inertia</td>
<td>0.0019 oz-in-sec²</td>
</tr>
<tr>
<td>Connections</td>
<td>MS-type connectors for motor winding and encoder on motor. Includes 12 ft. [3.7 m] cable with mating connector.</td>
</tr>
<tr>
<td>Temperature</td>
<td>212°F [100°C] maximum allowed case temperature.</td>
</tr>
<tr>
<td>Environmental</td>
<td>IP65 Rating</td>
</tr>
</tbody>
</table>

### B23 Motor

![Diagram of B23 Motor](image-url)
## Rod End Dimensions

### Dimensions in [mm]

#### MT1 Male Threads

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.47</td>
<td></td>
</tr>
<tr>
<td>1.26</td>
<td></td>
</tr>
<tr>
<td>0.10</td>
<td></td>
</tr>
</tbody>
</table>

#### FT1 Female Threads

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.47</td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>0.10</td>
<td></td>
</tr>
</tbody>
</table>

#### FC2 Clevis with Pin

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.63 [25.2]</td>
<td></td>
</tr>
<tr>
<td>1.00 [25.4]</td>
<td></td>
</tr>
<tr>
<td>0.83 [21]</td>
<td></td>
</tr>
<tr>
<td>1.50 [38]</td>
<td></td>
</tr>
</tbody>
</table>

#### FS2 Spherical

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.88 [34.4]</td>
<td></td>
</tr>
<tr>
<td>1.26 [50]</td>
<td></td>
</tr>
<tr>
<td>0.6325/0.6294 [16.065/15.988]</td>
<td></td>
</tr>
</tbody>
</table>
The EC3 series is a robust linear motion package for moderate to heavy thrust loads ranging up to 7200 N [1620 lb] and travel up to 1000 mm [39.4 in]. Precision rolled ball screws are standard, yielding quiet operation, low backlash and high accuracy. (See the following pages for detailed specifications).

EC3 Series electric cylinders are available with brushless servo, step motors, or DC servo for compatibility with every motion control environment.

Both ball screw and acme screw models provide a variety of speed and thrust capabilities. Ball screw models are used in applications that require higher speed and duty cycles. Acme screw models generally perform best in low duty cycle applications, and where load holding is required without a brake or in the case of electrical power loss. The life expectancy of a ball screw is generally better than an acme screw. Standard ball screws are 5 mm, 10 mm and 16 mm lead, and acme screws are available in 4 mm lead.

EC3 timing belt or gear reductions between the motor and leadscrew allow selection of the best match between motor power and your linear speed and thrust range.

**Options**

Options include rotary encoders or linear potentiometers for position feedback, load-holding brakes, protective boots, and quick-disconnect cables. Industrial Devices will also discuss unique modifications at your request.

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>EC3-H Series</th>
<th>EC3-P Series</th>
<th>EC3-B Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust Load Capacity</td>
<td>7200 N [1620 lbs]</td>
<td>7200 N [1620 lbs]</td>
<td>7200 N [1620 lbs]</td>
</tr>
<tr>
<td>No Load Speed</td>
<td>930 mm/sec [36.5 in/sec]</td>
<td>800 mm/sec [31.5 in/sec]</td>
<td>1280 mm/sec [50.5 in/sec]</td>
</tr>
<tr>
<td>Repeatability</td>
<td>0.025mm [±0.001]</td>
<td>0.013mm [±0.0005]</td>
<td>0.013mm [±0.0005]</td>
</tr>
<tr>
<td>Compatible Controls Offered</td>
<td>H3501B</td>
<td>NextStep</td>
<td>B8001</td>
</tr>
<tr>
<td></td>
<td>H3521B</td>
<td>SmartStep</td>
<td>B8961</td>
</tr>
<tr>
<td></td>
<td>H3501</td>
<td></td>
<td>B8962</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S6002</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S6961</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S6962</td>
<td></td>
</tr>
</tbody>
</table>

**Performance Curves**

- EC3-H Series: Page A-68
- EC3-P Series: Page A-74
- EC3-B Series: Page A-80
### General Specifications

<table>
<thead>
<tr>
<th>Travel Lengths</th>
<th>50, 100, 150, 200, 250, 300, 450, 600, 750, 1000 mm. Custom strokes available in increments of 1 mm.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Materials</strong></td>
<td></td>
</tr>
<tr>
<td>Bearing &amp; Drive Housing</td>
<td>6063 T6 aluminum, anodized</td>
</tr>
<tr>
<td>Cylinder Body</td>
<td>6063 T6 aluminum, hard anodized with PTFE impregnation</td>
</tr>
<tr>
<td>Mounting Plates</td>
<td>6061 T6 aluminum and cast aluminum plate, anodized</td>
</tr>
<tr>
<td>Thrust Tube</td>
<td>300 Series Stainless Steel, 1/8 hard and ground</td>
</tr>
<tr>
<td><strong>Speed Reducer Options</strong></td>
<td></td>
</tr>
<tr>
<td>Belt/Pulley</td>
<td>AT-5, polyurethane with steel tensile cords</td>
</tr>
<tr>
<td>Gears</td>
<td>Alloy steel, case hardened</td>
</tr>
<tr>
<td><strong>Transport Screw Options</strong></td>
<td></td>
</tr>
<tr>
<td>Ballscrew/Ballnut</td>
<td>Lead: 16 mm [0.630 in], 10 mm [0.394 in], or 5 mm [0.197 in]</td>
</tr>
<tr>
<td></td>
<td>Heat treated carbon steel alloy</td>
</tr>
<tr>
<td>Acme Screw/Nut</td>
<td>Lead: 4 mm [0.157 in]</td>
</tr>
<tr>
<td></td>
<td>Bronze acme drive nut; carbon steel alloy acme screw</td>
</tr>
<tr>
<td>Thrust Bearings</td>
<td>Angular contact, high thrust ball bearings</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td></td>
</tr>
<tr>
<td>EC3-H</td>
<td>$kg = 8.4 + 0.008 \times [\text{mm stroke}]$; $lb = 18.4 + 0.46 \times [\text{inches stroke}]$</td>
</tr>
<tr>
<td>EC3-P32</td>
<td>$kg = 8.5 + 0.008 \times [\text{mm stroke}]$; $lb = 18.7 + 0.46 \times [\text{inches stroke}]$</td>
</tr>
<tr>
<td>EC3-B23</td>
<td>$kg = 6.2 + 0.008 \times [\text{mm stroke}]$; $lb = 13.6 + 0.46 \times [\text{inches stroke}]$</td>
</tr>
<tr>
<td>EC3-B32</td>
<td>$kg = 8.7 + 0.008 \times [\text{mm stroke}]$; $lb = 19.2 + 0.46 \times [\text{inches stroke}]$</td>
</tr>
<tr>
<td><strong>Motor</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Environmental Operation</strong></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>-30° to 70°C [-22° to 158°F]</td>
</tr>
<tr>
<td></td>
<td>When operating below 2°C [35°F], vent tubing fitting must be installed. Consult the factory for more information.</td>
</tr>
<tr>
<td>Moisture/Contaminants</td>
<td><strong>IP 54 rated</strong>: Polyurethane thrust tube wiper seal. Mating surfaces gasket sealed. Protected against dust and splashing water (non-corrosive, non-abrasive). Limited ingress permitted.</td>
</tr>
<tr>
<td></td>
<td><strong>Vent Tube Fitting</strong>: A vent tube fitting is included, which can be installed to permit the actuator to breathe from a non-contaminated area, or receive a positive pressure continuous purge (14-20kPa [2-3 psi]).</td>
</tr>
<tr>
<td></td>
<td><strong>PB Protective Boot (IP65) Option</strong>: An optional thrust tube boot prevents moisture and dry contaminants from bypassing the thrust tube wiper seal, providing IP65 protection when used with included vent tube fitting. The boot also prevents contaminant buildup on the thrust tube.</td>
</tr>
<tr>
<td></td>
<td><strong>Clean Room &amp; Vacuum Applications</strong>: IDC has designed special actuators for clean room and vacuum applications. Please consult the factory if your application requires special environmental compatibility.</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td>The EC3 Series actuator design eliminates the need for most routine maintenance. Re-lubrication is required in high cycle applications. Acme screw models include a lube port and adapter for a standard grease gun. See the EC Series Operator’s Manual for replacement parts.</td>
</tr>
</tbody>
</table>
**Ballscrew**

Ballscrew life is rated in inches of travel at a given load. The values in the chart to the right indicate the travel life where 90% of all units in a sample will continue to work, while 10% have failed. This is similar to the B10 rating of a roller bearing mechanism. Be sure to consider acceleration loads as well as thrust, gravity and friction loads.

**Acme Screw**

Usable life for an acme screw is defined as the length of travel completed before backlash (of leadscrew/nut) exceeds 0.020" [0.5 mm].

A travel life of 25km [1 million inches] under the maximum rated load can be used as a general approximation. However, since directly dependent on application conditions (load, duty cycle, move profiles, and environment), it is difficult to predict a statistical travel life.

**Thrust Tube Capacity**

**Thrust Tube Torque Capacity**

Thrust tube does not rotate during operation. Maximum allowable torque during operation and installation is 7.5 N-m [67 lb-in]

**Thrust Tube Side Load Capacity**

**EC3 Ballscrew Life**

**EC3 Side Load Capacity vs. Extension**
**General Specifications**

**EC3 Series Actuator Inertia Equations**

Rotary Inertia (reflected to motor) = A + B* (stroke, in) + C* (load, lb)

<table>
<thead>
<tr>
<th>Model</th>
<th>Ratio</th>
<th>Screw</th>
<th>A (lb-in-s²)</th>
<th>B (lb-in-s²/in)</th>
<th>C (lb-in-s²/lb)</th>
<th>Motor</th>
<th>Inertia (lb-in-s²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC3-...-10-16B</td>
<td>1:1</td>
<td>16 x 16</td>
<td>1.188 E-03</td>
<td>1.176 E-05</td>
<td>2.604 E-05</td>
<td>H</td>
<td>3.063 E-03</td>
</tr>
<tr>
<td>EC3-...-15-16B</td>
<td>1.5:1</td>
<td>16 x 16</td>
<td>7.435 E-04</td>
<td>5.228 E-06</td>
<td>1.157 E-05</td>
<td>P32</td>
<td>2.375 E-03</td>
</tr>
<tr>
<td>EC3-...-20-16B</td>
<td>2:1</td>
<td>16 x 16</td>
<td>4.779 E-04</td>
<td>2.765 E-06</td>
<td>6.121 E-06</td>
<td>B23</td>
<td>1.188 E-04</td>
</tr>
<tr>
<td>EC3-...-50-16B</td>
<td>5:1</td>
<td>16 x 16</td>
<td>2.280 E-04</td>
<td>4.635 E-07</td>
<td>1.026 E-06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-70-16B</td>
<td>7:1</td>
<td>16 x 16</td>
<td>1.975 E-04</td>
<td>2.401 E-07</td>
<td>5.314 E-07</td>
<td>B32</td>
<td>1.000 E-03</td>
</tr>
<tr>
<td>EC3-...-10-10B</td>
<td>1:1</td>
<td>20 x 10</td>
<td>1.199 E-03</td>
<td>1.874 E-05</td>
<td>1.017 E-05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-15-10B</td>
<td>1.5:1</td>
<td>20 x 10</td>
<td>7.487 E-04</td>
<td>8.328 E-06</td>
<td>4.521 E-06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-20-10B</td>
<td>2:1</td>
<td>20 x 10</td>
<td>4.806 E-04</td>
<td>4.405 E-06</td>
<td>2.391 E-06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-50-10B</td>
<td>5:1</td>
<td>20 x 10</td>
<td>2.285 E-04</td>
<td>7.384 E-07</td>
<td>4.008 E-07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-70-10B</td>
<td>7:1</td>
<td>20 x 10</td>
<td>1.977 E-04</td>
<td>3.824 E-07</td>
<td>2.076 E-07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-10-05B</td>
<td>1:1</td>
<td>20 x 5</td>
<td>1.199 E-03</td>
<td>1.874 E-05</td>
<td>1.017 E-05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-15-05B</td>
<td>1.5:1</td>
<td>20 x 5</td>
<td>7.487 E-04</td>
<td>8.328 E-06</td>
<td>4.521 E-06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-20-05B</td>
<td>2:1</td>
<td>20 x 5</td>
<td>4.806 E-04</td>
<td>4.405 E-06</td>
<td>2.391 E-06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-50-05B</td>
<td>5:1</td>
<td>20 x 5</td>
<td>2.285 E-04</td>
<td>7.384 E-07</td>
<td>4.008 E-07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-70-05B</td>
<td>7:1</td>
<td>20 x 5</td>
<td>1.977 E-04</td>
<td>3.824 E-07</td>
<td>2.076 E-07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-10-04A</td>
<td>1:1</td>
<td>20 x 4 ACME</td>
<td>2.894 E-04</td>
<td>8.202 E-06</td>
<td>1.627 E-06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-15-04A</td>
<td>1.5:1</td>
<td>20 x 4 ACME</td>
<td>1.407 E-04</td>
<td>3.792 E-06</td>
<td>7.525 E-07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-20-04A</td>
<td>2:1</td>
<td>20 x 4 ACME</td>
<td>9.328 E-05</td>
<td>2.050 E-06</td>
<td>4.069 E-07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-50-04A</td>
<td>5:1</td>
<td>20 x 4 ACME</td>
<td>5.253 E-05</td>
<td>3.252 E-07</td>
<td>6.454 E-08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC3-...-70-04A</td>
<td>7:1</td>
<td>20 x 4 ACME</td>
<td>4.566 E-05</td>
<td>8.1928 E-08</td>
<td>1.6257 E-08</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Metric Conversions:
1 mm = 0.03937 in
1 kg = 2.205 lb
1 lb-in-s² = 1129 kg-cm² = 1.152 kg-cm-s²
**16 mm Lead Ballscrew Models**

<table>
<thead>
<tr>
<th>Model</th>
<th>Gear Ratio</th>
<th>Timing Belt</th>
<th>Max. No-Load Accel.</th>
<th>Repeatability</th>
<th>Backlash</th>
<th>Lead Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC3-H-10-16B</td>
<td>1:1</td>
<td>1:1 Timing Belt</td>
<td>3.92 m/s²</td>
<td>±0.025 mm</td>
<td>±0.001 in</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC3-H-10L-16B</td>
<td>1:1 Inline Coupling</td>
<td>16 mm/rev Ballscrew</td>
<td>2.96 m/s²</td>
<td>±0.025 mm</td>
<td>±0.001 in</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC3-H-15-16B</td>
<td>1.5:1</td>
<td>1:1 Timing Belt</td>
<td>2.41 m/s²</td>
<td>±0.025 mm</td>
<td>±0.001 in</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC3-H-20-16B</td>
<td>2.0:1</td>
<td>1:1 Timing Belt</td>
<td>1.04 m/s²</td>
<td>±0.025 mm</td>
<td>±0.001 in</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC3-H-50-16B</td>
<td>5:1 Gears</td>
<td>16 mm/rev Ballscrew</td>
<td>0.75 m/s²</td>
<td>±0.025 mm</td>
<td>±0.001 in</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC3-H-70-16B</td>
<td>7:1 Gears</td>
<td>16 mm/rev Ballscrew</td>
<td>0.75 m/s²</td>
<td>±0.025 mm</td>
<td>±0.001 in</td>
<td>±0.05 mm/300 mm</td>
</tr>
</tbody>
</table>

- **Critical Speed (mm/sec)**: 1200 1280 1280 866 530 318 216 127
- **Stroke (mm)**: 50 thru 100
- **Column Load Limit (N)**: 4900

- **Performance using H3000 Series Controls.**
- **Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.**

*Consider lead screw critical speed and column load limits when specifying longer lengths.*

---

**EC3-H-10-16B**

- **Max. No-Load Accel.**: 3.92 m/s²
- **Repeatability**: ±0.025 mm
- **Backlash**: 0.25 mm
- **Lead Accuracy**: ±0.05 mm/300 mm

**EC3-H-15-16B**

- **Max. No-Load Accel.**: 2.96 m/s²
- **Repeatability**: ±0.025 mm
- **Backlash**: 0.25 mm
- **Lead Accuracy**: ±0.05 mm/300 mm

**EC3-H-20-16B**

- **Max. No-Load Accel.**: 2.41 m/s²
- **Repeatability**: ±0.025 mm
- **Backlash**: 0.25 mm
- **Lead Accuracy**: ±0.05 mm/300 mm

---

**Electric Cylinders**

**EC3-H**

**7200 N (1620 lb) Thrust**

**160 Volt DC Motor**

**A-68**

**Industrial Devices Corporation**

**707-789-1000 • 800-747-0064 • E-mail: info@idcmotion.com**
**Performance**

**EC3-H**

7200 N (1620 lb) Thrust
160 Volt DC Motor

---

**10 mm Lead Ballscrew Models**

**EC3-H-10-10B**

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>635</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust (lbs)</td>
<td>890</td>
<td>190</td>
</tr>
</tbody>
</table>

**EC3-H-15-10B**

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>405</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust (lbs)</td>
<td>220</td>
<td>50</td>
</tr>
</tbody>
</table>

**EC3-H-20-10B**

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>305</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust (lbs)</td>
<td>300</td>
<td>50</td>
</tr>
</tbody>
</table>

**EC3-H-50-10B**

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>125</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust (lbs)</td>
<td>1000</td>
<td>100</td>
</tr>
</tbody>
</table>

**EC3-H-70-10B**

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>125</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust (lbs)</td>
<td>1000</td>
<td>100</td>
</tr>
</tbody>
</table>

**Performance**

• Consider leadscrew critical speed and column load limits when specifying longer lengths.

---

**EC3-H-10-10B**

- **EC3-H-10-10B: 1:1 Timing Belt, 10 mm/rev Ballscrew**
  - Max. No-Load Accel.: 2.40 m/s² [94 in/s²]
  - Repeatability: ±0.025 mm [±0.001 in]
  - Backlash: 0.25 mm [0.010 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-H-15-10B**

- **EC3-H-15-10B: 1.5:1 Timing Belt, 10 mm/rev Ballscrew**
  - Max. No-Load Accel.: 1.83 m/s² [72 in/s²]
  - Repeatability: ±0.025 mm [±0.001 in]
  - Backlash: 0.25 mm [0.010 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-H-20-10B**

- **EC3-H-20-10B: 2:1 Timing Belt, 10 mm/rev Ballscrew**
  - Max. No-Load Accel.: 1.49 m/s² [59 in/s²]
  - Repeatability: ±0.025 mm [±0.001 in]
  - Backlash: 0.25 mm [0.010 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-H-50-10B**

- **EC3-H-50-10B: 5:1 Gears, 10 mm/rev Ballscrew**
  - Max. No-Load Accel.: 0.65 m/s² [26 in/s²]
  - Repeatability: ±0.025 mm [±0.001 in]
  - Backlash: 0.25 mm [0.010 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-H-70-10B**

- **EC3-H-70-10B: 7:1 Gears, 10 mm/rev Ballscrew**
  - Max. No-Load Accel.: 0.47 m/s² [19 in/s²]
  - Repeatability: ±0.25 mm [±0.001 in]
  - Backlash: 0.25 mm [0.010 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

---

To configure your system see page A-72 to A-73.
Electric Cylinders

7200 N (1620 lb) Thrust
160 Volt DC Motor

**EC3-H**

**5 mm Lead Ballscrew Models**

**EC3-H-10-05B**

**EC3-H-10L-05B**

**EC3-H-15-05B**

**EC3-H-20-05B**

**EC3-H-50-05B**

**EC3-H-70-05B**

- 100% Duty Cycle
- 60% Duty Cycle
- 30% Duty Cycle

- **Max. No-Load Accel.**
- **Repeatability**
- **Backlash**
- **Lead Accuracy**

### EC3-H-10-05B: 1:1 Timing Belt, 5 mm/rev Ballscrew

Max. No-Load Accel. 1.25 m/s² [49 in/s²]

Repeatability ±0.025 mm [±0.001 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

### EC3-H-10L-05B: 1:1 Inline Coupling, 5 mm/rev Ballscrew

Max. No-Load Accel. 1.25 m/s² [49 in/s²]

Repeatability ±0.025 mm [±0.001 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

### EC3-H-15-05B: 1.5:1 Timing Belt, 5 mm/rev Ballscrew

Max. No-Load Accel. 0.93 m/s² [37 in/s²]

Repeatability ±0.025 mm [±0.001 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

### EC3-H-20-05B: 2:1 Timing Belt, 5 mm/rev Ballscrew

Max. No-Load Accel. 0.76 m/s² [30 in/s²]

Repeatability ±0.025 mm [±0.001 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

### EC3-H-50-05B: 5:1 Gears, 5 mm/rev Ballscrew

Max. No-Load Accel. 0.35 m/s² [15 in/s²]

Repeatability ±0.025 mm [±0.001 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

### EC3-H-70-05B: 7:1 Gears, 5 mm/rev Ballscrew

Max. No-Load Accel. 0.24 m/s² [9 in/s²]

Repeatability ±0.025 mm [±0.001 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- Consider lead screw critical speed and column load limits when specifying longer lengths.
- **Critical Speed (mm/sec)**
- **Stroke (mm)**
- **Column Load Limit (N)**

---

Industrial Devices Corporation
707-789-1000 • 800-747-0064 • E-mail: info@idcmotion.com
4 mm Lead Acme Screw Models

- **EC3-H-10-04A**: 1:1 Timing Belt, 4 mm/rev Acme Screw
  - Max. No-Load Accel. 0.97 m/s² [38 in/s²]
  - Repeatability ±0.025 mm [±0.001 in]
  - Backlash 0.40 mm [0.016 in]
  - Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

- **EC3-H-15-04A**: 1.5:1 Timing Belt, 4 mm/rev Acme Screw
  - Max. No-Load Accel. 0.74 m/s² [29 in/s²]
  - Repeatability ±0.025 mm [±0.001 in]
  - Backlash 0.40 mm [0.016 in]
  - Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

- **EC3-H-20-04A**: 2:1 Timing Belt, 4 mm/rev Acme Screw
  - Max. No-Load Accel. 0.60 m/s² [24 in/s²]
  - Repeatability ±0.025 mm [±0.001 in]
  - Backlash 0.40 mm [0.016 in]
  - Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

- **EC3-H-50-04A**: 5:1 Gears, 4 mm/rev Acme Screw
  - Max. No-Load Accel. 0.26 m/s² [10 in/s²]
  - Repeatability ±0.025 mm [±0.001 in]
  - Backlash 0.40 mm [0.016 in]
  - Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

- **EC3-H-70-04A**: 7:1 Gears, 4 mm/rev Acme Screw
  - Max. No-Load Accel. 0.19 m/s² [7 in/s²]
  - Repeatability ±0.25 mm [±0.001 in]
  - Backlash 0.40 mm [0.016 in]
  - Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

• Performance using H3000 Series Controls.
• Duty Cycle is percentage of actuator "on time" or movement over 10 minute interval.

To configure your system see page A-98 to A-99.

- Consider leadscrew critical speed and column load limits when specifying longer lengths.

<table>
<thead>
<tr>
<th>4mm lead acme screw</th>
<th>Critical Speed (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke (mm)</td>
<td></td>
</tr>
<tr>
<td>50 thru 100</td>
<td>150</td>
</tr>
<tr>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Steps to Ordering a Complete EC3-H System
You are ready to specify an EC3-H actuator model number after you have:

a. completed and verified all necessary information on an IDC Product Selection Worksheet.
b. completed the steps in the EC Selection Guidelines on pages A-20 to A-21.
c. selected a control that is compatible with the H-series motor.

Your local IDC Distributor and our Applications Engineering Department are available to help with your selection process.

1. Base Model
Choose the model with sufficient speed and thrust with a comfortable safety margin. Refer to the EC3-H Speed vs. Thrust curves in this section.

EC3-H cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. Inline models have the motor coupled directly to the leadscrew with no reduction.

Parallel Models

2. Stroke Length
Nine standard lengths are available from 50 to 1000 mm. Custom lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact the physical end-of-travel on either end. Extra travel length is necessary to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed. For further information on this refer to the EC Selection Guidelines on pages (A-20 to A-21) or the Engineering Section.

Parallel Models

Inline Models

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Drive Ratio</th>
<th>Screw Lead, Type (mm)</th>
<th>Cylinder Mounting</th>
<th>Rod End</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC3-H-10-16B</td>
<td>H</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC3-H-15-16B</td>
<td>H</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC3-H-20-16B</td>
<td>H</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC3-H-50-16B</td>
<td>H</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC3-H-70-16B</td>
<td>H</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC3-H-10L-16B</td>
<td>H</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC3-H-15-16B</td>
<td>H</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC3-H-20-16B</td>
<td>H</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC3-H-50-16B</td>
<td>H</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC3-H-70-10B</td>
<td>H</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Inline Models (Direct Drive)
EC3-H-10L-16B EC3-H-10L-05B EC3-H-10L-04A-

Make It An IDEal System
See Intro Pages 6 & 7
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-90.
Cylinder base mount options -MS1, -MP2, -MP3, -MF2, -MF3 cannot be ordered with inline models.
MF1, 2, 3 Rectangular Flanges

4. Rod Ends
Industrial Devices offers 4 rod end options for EC3-H series cylinders.
-FT1M or -FT1E Female Thread
-MT1M or -MT1E Male Thread
-FS2 Spherical Joint
-FC2 Clevis

5. Other Options
See the Options and Accessories section for complete specifications.

Pivot Mount Caution:
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90-95% of its full stroke. This increases the system’s rigidity and extends the life of the guide bearings and rod seal.

6. Accessories
Magnetic Position Sensors
Position sensors are available for triggering stop, speed/direction change, or end-of-travel.

To maximize cylinder life, IDC recommends the use of end-of-travel sensors with all cylinders.

Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

3m 4m
Reed Leads Quick
Normally open PSR-1 PSR-1Q
Normally closed PSR-2 PSR-2Q

Hall Effect
Normally open, NPN PSN-1 PSN-1Q
Normally closed, NPN PSN-2 PSN-2Q

See page A-240 for more limit switch options, including quick-disconnect versions.

7. Compatible Controls
Details of controls are in Sections F. The EC3-H is compatible with:

Model Description
H3301B Limit switch
H3321B Edge guide
H3501 Analog position

L – Linear Potentiometer Output
Linear potentiometer mounted on inside the EC3-H cylinder. For use with H3501 control.

PB – Protective Boot
Protects the thrust tube from solid contaminants and prevents liquids from entering the cylinder through the rod end bearing.
### Electric Cylinder

**Electric Cylinder**

- **EC3-P32(T/V)-10-16B**
- **EC3-P32(T/V)-10L-16B**
- **EC3-P32(T/V)-15-16B**
- **EC3-P32(T/V)-50-16B**
- **EC3-P32(T/V)-70-16B**

**16mm Lead Ballscrew Models**

<table>
<thead>
<tr>
<th>Model</th>
<th>Gear Ratio</th>
<th>Ballscrew</th>
<th>Max. No-Load Accel.</th>
<th>Repeatability</th>
<th>Backlash</th>
<th>Lead Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC3-P32(T/V)-10-16B</td>
<td>1:1</td>
<td>16 mm/rev</td>
<td>21.34 m/s² [840 in/s²]</td>
<td>±0.013 mm [±0.0005 in]</td>
<td>0.25 mm [0.010 in]</td>
<td>±0.05 mm/300 mm [±0.002 in/ft]</td>
</tr>
<tr>
<td>EC3-P32(T/V)-10L-16B</td>
<td>1:1 Inline Coupling, 16 mm/rev Ballscrew</td>
<td>16 mm/rev</td>
<td>17.24 m/s² [679 in/s²]</td>
<td>±0.013 mm [±0.0005 in]</td>
<td>0.25 mm [0.010 in]</td>
<td>±0.05 mm/300 mm [±0.002 in/ft]</td>
</tr>
<tr>
<td>EC3-P32(T/V)-15-16B</td>
<td>1.5:1</td>
<td>16 mm/rev</td>
<td>17.24 m/s² [679 in/s²]</td>
<td>±0.013 mm [±0.0005 in]</td>
<td>0.25 mm [0.010 in]</td>
<td>±0.05 mm/300 mm [±0.002 in/ft]</td>
</tr>
<tr>
<td>EC3-P32(T/V)-50-16B</td>
<td>5:1</td>
<td>16 mm/rev</td>
<td>6.74 m/s² [265 in/s²]</td>
<td>±0.013 mm [±0.0005 in]</td>
<td>0.25 mm [0.010 in]</td>
<td>±0.05 mm/300 mm [±0.002 in/ft]</td>
</tr>
<tr>
<td>EC3-P32(T/V)-70-16B</td>
<td>7:1</td>
<td>16 mm/rev</td>
<td>4.90 m/s² [193 in/s²]</td>
<td>±0.013 mm [±0.0005 in]</td>
<td>0.25 mm [0.010 in]</td>
<td>±0.05 mm/300 mm [±0.002 in/ft]</td>
</tr>
</tbody>
</table>

**Critical Speed (mm/sec)**

<table>
<thead>
<tr>
<th>Speed (in/s)</th>
<th>4.5</th>
<th>4.0</th>
<th>3.5</th>
<th>3.0</th>
<th>2.5</th>
<th>2.0</th>
<th>1.5</th>
<th>1.0</th>
<th>0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke (mm)</td>
<td>25km</td>
<td>21.7</td>
<td>18.8</td>
<td>16.1</td>
<td>13.7</td>
<td>11.4</td>
<td>9.2</td>
<td>6.5</td>
<td>4.2</td>
</tr>
</tbody>
</table>

**Performance**

- **100% Duty Cycle**
- **50% Duty Cycle**

- **EC3-P32(T/V)-10-16B**
  - 1:1 Timing Belt, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 21.34 m/s² [840 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-P32(T/V)-10L-16B**
  - 1:1 Inline Coupling, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 17.24 m/s² [679 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-P32(T/V)-15-16B**
  - 1.5:1 Timing Belt, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 17.24 m/s² [679 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-P32(T/V)-50-16B**
  - 5:1 Gears, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 6.74 m/s² [265 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-P32(T/V)-70-16B**
  - 7:1 Gears, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 4.90 m/s² [193 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-P32(T/V)-70-16B**
  - 7:1 Gears, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 4.90 m/s² [193 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-P32(T/V)-70-16B**
  - 7:1 Gears, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 4.90 m/s² [193 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-P32(T/V)-70-16B**
  - 7:1 Gears, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 4.90 m/s² [193 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-P32(T/V)-70-16B**
  - 7:1 Gears, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 4.90 m/s² [193 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-P32(T/V)-70-16B**
  - 7:1 Gears, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 4.90 m/s² [193 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-P32(T/V)-70-16B**
  - 7:1 Gears, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 4.90 m/s² [193 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-P32(T/V)-70-16B**
  - 7:1 Gears, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 4.90 m/s² [193 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-P32(T/V)-70-16B**
  - 7:1 Gears, 16 mm/rev Ballscrew
  - Max. No-Load Accel. 4.90 m/s² [193 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]
10mm Lead Ballscrew Models

EC3-P32(T/V)-10-10B: 1:1 Timing Belt, 10 mm/rev Ballscrew
EC3-P32(T/V)-10L-10B: 1:1 Inline Coupling, 10 mm/rev Ballscrew
Max. No-Load Accel. 12.93 m/s² [509 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC3-P32(T/V)-15-10B: 1.5:1 Timing Belt, 10 mm/rev Ballscrew
Max. No-Load Accel. 10.60 m/s² [417 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC3-P32(T/V)-50-10B: 5:1 Gears, 10 mm/rev Ballscrew
Max. No-Load Accel. 4.20 m/s² [165 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC3-P32(T/V)-70-10B: 7:1 Gears, 10 mm/rev Ballscrew
Max. No-Load Accel. 3.06 m/s² [120 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- Performance using S8000 Series, NextGen®, and InMotion® Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
- Consider leadscrew critical speed and column load limits when specifying longer lengths.
**EC3-P**

7200 N (1620 lb) Thrust

*Step Motor*

**Electric Cylinders**

**Electric Cylinder**

7200 N (1620 lb) Thrust

**EC3-P**

<table>
<thead>
<tr>
<th>Step Motor</th>
<th>EC3-P</th>
<th>n/a</th>
<th>50 thru 100</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>450</th>
<th>600</th>
<th>750</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Speed (mm/sec)</td>
<td>199</td>
<td>199</td>
<td>199</td>
<td>199</td>
<td>199</td>
<td>199</td>
<td>199</td>
<td>199</td>
<td>199</td>
<td>199</td>
</tr>
<tr>
<td>Stroke (mm)</td>
<td>261</td>
<td>261</td>
<td>261</td>
<td>261</td>
<td>261</td>
<td>261</td>
<td>261</td>
<td>261</td>
<td>261</td>
<td>261</td>
</tr>
</tbody>
</table>

**Performance**

**5mm Lead Ballscrew Models**

**EC3-P32(T/V)-10-05B**

Max. No-Load Accel. 6.85 m/s² [270 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-P32(T/V)-10L-05B**

Max. No-Load Accel. 6.85 m/s² [270 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-P32(T/V)-15-05B**

Max. No-Load Accel. 5.46 m/s² [215 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-P32(T/V)-50-05B**

Max. No-Load Accel. 2.11 m/s² [83 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-P32(T/V)-70-05B**

Max. No-Load Accel. 1.5 m/s² [59 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- Consider leadscrew critical speed and column load limits when specifying longer lengths.

- Performance using S8000 Series, NextGen, and Instant™ Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.

Industrial Devices Corporation
707-789-1000 • 800-747-0064 • E-mail: info@idcmotion.com
4mm Lead Acme Screw Models

EC3-P32(T/V)-10-04A
EC3-P32(T/V)-10L-04A
EC3-P32(T/V)-15-04A
EC3-P32(T/V)-50-04A
EC3-P32(T/V)-70-04A

Performance

--- 50% Duty Cycle --- 30% Duty Cycle

EC3-P32(T/V)-10-04A: 1:1 Timing Belt, 4 mm/rev Acme Screw
Max. No-Load Accel. 5.23 m/s² [206 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC3-P32(T/V)-10L-04A: 1:1 Inline Coupling, 4 mm/rev Acme Screw
Max. No-Load Accel. 5.23 m/s² [206 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC3-P32(T/V)-15-04A: 1.5:1 Timing Belt, 4 mm/rev Acme Screw
Max. No-Load Accel. 4.26 m/s² [168 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC3-P32(T/V)-50-04A: 5:1 Gears, 4 mm/rev Acme Screw
Max. No-Load Accel. 1.68 m/s² [66 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC3-P32(T/V)-70-04A: 7:1 Gears, 4 mm/rev Acme Screw
Max. No-Load Accel. 1.22 m/s² [48 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

To configure your system see page A-78 to A-79.

- Performance using S6000 Series, NextStep, and MotionWorks Controls.
- Duty Cycle is percentage of actuator "on time" or movement over 10 minute interval.

• Consider leadscrew critical speed and column load limits when specifying longer lengths.

4mm lead acme screw

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>200</th>
<th>300</th>
<th>450</th>
<th>600</th>
<th>750</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Speed (mm/sec)</td>
<td>50</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>200</td>
<td>300</td>
<td>450</td>
<td>600</td>
<td>750</td>
<td>1000</td>
</tr>
<tr>
<td>Column Load Limit (N)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>4650</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Steps to Ordering a Complete EC3-P System

You are ready to specify an EC3-P actuator model number after you have:

a. completed and verified all necessary information on an IDC Product Selection Worksheet.
b. completed the steps in the EC Selection Guidelines on pages A-20 to A-21.
c. selected a control that is compatible with the S-series motor.

Your local IDC Distributor and our Applications Engineering Department are available to help with your selection process.

1. Base Model Number
Choose the model with sufficient speed and thrust with a comfortable safety margin. **IDC recommends at least 30% reserve thrust for step motor driven systems.**

The EC3-P Series offers two motor wiring choices, ‘T’ (Series) and ‘V’ (Parallel). The ‘T’ and ‘V’ versions include a 12 foot motor quick disconnect cable.

EC3 cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. Inline models have the motor coupled directly to the leadscrew with no reduction.

2. Stroke Length
Nine standard lengths are available from 50 to 1000 mm. Custom lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact the physical end-of-travel on either end. Extra travel length is necessary to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed. For further information on this refer to the EC Selection Guidelines on pages (A-20 to A-21) or the Engineering Section.

### Parallel Models

![Parallel Model Diagram]

### Inline Models

![Inline Model Diagram]

### Make It An IDeal System

See Intro Pages 6 & 7

### Electric Cylinder

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Drive Ratio</th>
<th>Screw Lead, Type</th>
<th>(mm)</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC3-P32x10-10B</td>
<td>P</td>
<td>-</td>
<td>-</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>EC3-P32x15-10B</td>
<td>P</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>EC3-P32x20-10B</td>
<td>P</td>
<td>-</td>
<td>-</td>
<td>150</td>
<td>-</td>
</tr>
<tr>
<td>EC3-P32x25-10B</td>
<td>P</td>
<td>-</td>
<td>-</td>
<td>200</td>
<td>-</td>
</tr>
<tr>
<td>EC3-P32x30-10B</td>
<td>P</td>
<td>-</td>
<td>-</td>
<td>250</td>
<td>-</td>
</tr>
<tr>
<td>EC3-P32x40-10B</td>
<td>P</td>
<td>-</td>
<td>-</td>
<td>300</td>
<td>-</td>
</tr>
<tr>
<td>EC3-P32x50-10B</td>
<td>P</td>
<td>-</td>
<td>-</td>
<td>450</td>
<td>-</td>
</tr>
<tr>
<td>EC3-P32x60-10B</td>
<td>P</td>
<td>-</td>
<td>-</td>
<td>600</td>
<td>-</td>
</tr>
<tr>
<td>EC3-P32x70-10B</td>
<td>P</td>
<td>-</td>
<td>-</td>
<td>750</td>
<td>-</td>
</tr>
<tr>
<td>EC3-P32x100-10B</td>
<td>P</td>
<td>-</td>
<td>-</td>
<td>1000</td>
<td>-</td>
</tr>
</tbody>
</table>

### Additional Charge

- MF1
- MF2
- MF3
- MS1
- MS2
- MP5
- FC2
- PS2
- BS
- EMK
- L
- PB

**Ballscrew**

EC3-P32x10-05B
EC3-P32x15-05B
EC3-P32x20-05B
EC3-P32x25-05B
EC3-P32x30-05B
EC3-P32x40-05B
EC3-P32x50-05B
EC3-P32x60-05B
EC3-P32x70-05B
EC3-P32x100-05B

**Acme Screw**

EC3-P32x10-04A
EC3-P32x15-04A
EC3-P32x20-04A
EC3-P32x25-04A
EC3-P32x30-04A
EC3-P32x40-04A
EC3-P32x50-04A
EC3-P32x60-04A
EC3-P32x70-04A
EC3-P32x100-04A

**Inline Models (Direct Drive)**

EC3-P32x10L-05B
EC3-P32x10L-04A
EC3-P32x10L-10B

**T (Series) or V (Parallel)**

IDC recommends at least 30% reserve thrust for step motor driven systems.
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-90.

Cylinder base mount options -MS1, -MP2, -MP3, -MF2, -MF3 cannot be ordered with inline models.

MF1, 2, 3 Rectangular Flanges

MF1 Front Flange

MF2 Rear Flange

MF3 Both Flanges

MS1 Side End Angles

MS2 Side Lugs

MP2 Rear Clevis (MP3 includes pivot base)

MS6M and MS6E Side Tapped Holes

MT4 Trunnion

4. Rod Ends
Industrial Devices offers 4 rod end options for EC3 series cylinders.

-FT1M or -FT1E Female Thread

-MT1M or -MT1E Male Thread

-FS2 Spherical Joint

-FC2 Clevis

5. Other Options
See the Options and Accessories section for complete specifications.

BS – Holding Brake
60 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on inline models or with cylinder base mount options. (-MF2, -MF3, -MS1, -MP2, -MP3).

EMK – Encoder
1000 line incremental encoder mounted on the rear shaft of the motor.

L – Linear Potentiometer Output
Linear potentiometer mounted on inside the EC3 cylinder.

PB – Protective Boot
Protects the thrust tube from solid contaminants and prevents liquids from entering the cylinder through the rod end bearing.

6. Accessories
Magnetic Position Sensors
Position sensors are available for indicating end-of-travel and home positions, or for use with user supplied controls.

To maximize cylinder life, IDC recommends the use of end-of-travel sensors with all cylinders.

Common Application Requirements: For most applications, one home and two end-of-travel sensors are required for each cylinder. Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

7. Compatible Controls
Details of controls are in Sections G. The EC3-P is compatible with:

**Model** | **Description**
--- | ---
NextStep S6002 | 2-Axis Stepper drive
SmartStep S6961 | IDeal™ programmable
 | IDeal™ programmable
 | 2-Axis IDeal™ programmable
Electric Cylinder
7200 N (1620 lb) Thrust
Brushless Servo

**EC3-B**

**Performance**

16mm Lead Ballscrew Models

---

**EC3-B23-10-16B**

Max. No-Load Accel. 33.03 m/s² [1301 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

---

**EC3-B23-15-16B**

Max. No-Load Accel. 34.45 m/s² [1356 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

---

**EC3-B23-20-16B**

Max. No-Load Accel. 37.93 m/s² [1493 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

---

**EC3-B23-50-16B**

Max. No-Load Accel. 27.11 m/s² [1067 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

---

**EC3-B23-70-16B**

Max. No-Load Accel. 21.38 m/s² [842 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.25 mm [0.010 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

---

* Consider leadscrew critical speed and column load limits when specifying longer lengths.

16mm lead ballscrew

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>450</th>
<th>600</th>
<th>750</th>
<th>900</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Speed (mm/sec)</td>
<td>1280</td>
<td>1280</td>
<td>1280</td>
<td>866</td>
<td>530</td>
<td>318</td>
<td>216</td>
<td>127</td>
<td>90</td>
</tr>
<tr>
<td>Column Load Limit (N)</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
<td>866</td>
<td>530</td>
<td>318</td>
<td>216</td>
<td>127</td>
<td>90</td>
</tr>
</tbody>
</table>

---

* Performance using B8000 Series Controls (not B8501).

* Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
### 16mm Lead Ballscrew Models

**EC3-B32-10-16B**
- 1:1 Timing Belt, 16 mm/rev Ballscrew
- Max. No-Load Accel. 27.36 m/s² [1077 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-B32-15-16B**
- 1.5:1 Timing Belt, 16 mm/rev Ballscrew
- Max. No-Load Accel. 23.51 m/s² [926 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-B32-20-16B**
- 2.0:1 Timing Belt, 16 mm/rev Ballscrew
- Max. No-Load Accel. 21.07 m/s² [830 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-B32-50-16B**
- 5:1 Gears, 16 mm/rev Ballscrew
- Max. No-Load Accel. 10.32 m/s² [406 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-B32-70-16B**
- 7:1 Gears, 16 mm/rev Ballscrew
- Max. No-Load Accel. 7.58 m/s² [298 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

### Notes
- Performance using B8000 Series Controls (not B8501).
- Duty Cycle is percentage of actuator "on time" or movement over 10 minute interval.

### Specifications
- **16mm Lead ballscrew**
  - Critical Speed (mm/sec)
  - Stroke (mm)
  - Column Load Limit (N)

---

**Performance**

**Electric Cylinder**

2600 N (1620 lb) Thrust
Brushless Servo

---

**EC3-B**

---

**Industrial Devices Corporation**

707-789-1000 • http://www.idcmotion.com • 24 hour info by fax 916-431-6548

A-81
### 10mm Lead Ballscrew Models

#### Electric Cylinder
7200 N (1620 lb) Thrust
Brushless Servo

<table>
<thead>
<tr>
<th>Model</th>
<th>1:1 Timing Belt</th>
<th>10 mm/rev Ballscrew</th>
<th>100% Duty Cycle</th>
<th>Intermittent (&lt;2 sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC3-B23-10-10B</td>
<td>19.39 m/s²</td>
<td>[763 in/s²]</td>
<td>±0.013 mm</td>
<td>±0.0005 in</td>
</tr>
<tr>
<td>EC3-B23-10L-10B</td>
<td>20.60 m/s²</td>
<td>[811 in/s²]</td>
<td>±0.013 mm</td>
<td>±0.0005 in</td>
</tr>
<tr>
<td>EC3-B23-15-10B</td>
<td>22.91 m/s²</td>
<td>[902 in/s²]</td>
<td>±0.013 mm</td>
<td>±0.0005 in</td>
</tr>
<tr>
<td>EC3-B23-20-10B</td>
<td>16.77 m/s²</td>
<td>[660 in/s²]</td>
<td>±0.013 mm</td>
<td>±0.0005 in</td>
</tr>
<tr>
<td>EC3-B23-50-10B</td>
<td>13.28 m/s²</td>
<td>[523 in/s²]</td>
<td>±0.013 mm</td>
<td>±0.0005 in</td>
</tr>
<tr>
<td>EC3-B23-70-10B</td>
<td>15.28 m/s²</td>
<td>[523 in/s²]</td>
<td>±0.013 mm</td>
<td>±0.0005 in</td>
</tr>
</tbody>
</table>

#### Performance

- max. no-load accel.: 19.39 m/s² [763 in/s²]
- repeatability: ±0.013 mm [±0.0005 in]
- backlash: 0.25 mm [0.010 in]
- lead accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

#### Critical Speed (mm/sec)

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Critical Speed (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 thru 100</td>
<td>150 200 300 450 600 750 1000</td>
</tr>
<tr>
<td>n/a</td>
<td>n/a n/a n/a n/a n/a n/a 5340</td>
</tr>
</tbody>
</table>

#### Consider leadscrew critical speed and column load limits when specifying longer lengths.
10mm Lead Ballscrew Models

**EC3-B32-10-10B**
- 1:1 Timing Belt, 10 mm/rev Ballscrew
- Max. No-Load Accel. 16.44 m/s² [647 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-B32-15-10B**
- 1.5:1 Timing Belt, 10 mm/rev Ballscrew
- Max. No-Load Accel. 14.36 m/s² [565 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-B32-20-10B**
- 2:1 Timing Belt, 10 mm/rev Ballscrew
- Max. No-Load Accel. 12.98 m/s² [511 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-B32-50-10B**
- 5:1 Gears, 10 mm/rev Ballscrew
- Max. No-Load Accel. 6.43 m/s² [253 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-B32-70-10B**
- 7:1 Gears, 10 mm/rev Ballscrew
- Max. No-Load Accel. 4.73 m/s² [186 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- Consider leadscrew critical speed and column load limits when specifying longer lengths.

---

### Performance

**10mm Lead Ballscrew Models**

- **EC3-B32-10-10B**
  - 1:1 Timing Belt, 10 mm/rev Ballscrew
  - Max. No-Load Accel. 16.44 m/s² [647 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-B32-15-10B**
  - 1.5:1 Timing Belt, 10 mm/rev Ballscrew
  - Max. No-Load Accel. 14.36 m/s² [565 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-B32-20-10B**
  - 2:1 Timing Belt, 10 mm/rev Ballscrew
  - Max. No-Load Accel. 12.98 m/s² [511 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-B32-50-10B**
  - 5:1 Gears, 10 mm/rev Ballscrew
  - Max. No-Load Accel. 6.43 m/s² [253 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- **EC3-B32-70-10B**
  - 7:1 Gears, 10 mm/rev Ballscrew
  - Max. No-Load Accel. 4.73 m/s² [186 in/s²]
  - Repeatability ±0.013 mm [±0.0005 in]
  - Backlash 0.25 mm [0.010 in]
  - Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

---

- **10mm lead ballscrew**
  - Critical Speed (mm/sec)
  - Stroke (mm)
  - Column Load Limit (N)

---

- Performance using B800 Series Controls (not B8501).
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
**EC3-B**

**5mm Lead Ballscrew Models**

**EC3-B23-10-05B**
- 1:1 Timing Belt, 5 mm/rev Ballscrew
- Max. No-Load Accel. 10.90 m/s² [429 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**Performance**

- 100% Duty Cycle
- Intermittent (<2 sec)

**EC3-B23-15-05B**
- 1.5:1 Timing Belt, 5 mm/rev Ballscrew
- Max. No-Load Accel. 11.18 m/s² [440 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-B23-20-05B**
- 2:1 Timing Belt, 5 mm/rev Ballscrew
- Max. No-Load Accel. 12.21 m/s² [481 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-B23-50-05B**
- 5:1 Gears, 5 mm/rev Ballscrew
- Max. No-Load Accel. 8.55 m/s² [336 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC3-B23-70-05B**
- 7:1 Gears, 5 mm/rev Ballscrew
- Max. No-Load Accel. 6.71 m/s² [264 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.25 mm [0.010 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**Performance**

- 100% Duty Cycle
- Intermittent (<2 sec)

**Consider leadscrew critical speed and column load limits when specifying longer lengths.**

**5mm lead ballscrew**

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>450</th>
<th>600</th>
<th>750</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Speed (mm/sec)</td>
<td>261</td>
<td>261</td>
<td>261</td>
<td>261</td>
<td>199</td>
<td>119</td>
<td>84</td>
<td>48</td>
<td>n/a</td>
</tr>
<tr>
<td>Column Load Limit (N)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>6530</td>
<td>n/a</td>
</tr>
</tbody>
</table>

*Performance using B6000 Series Controls (not B6501).*

*Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.*
Electric Cylinders

EC3-B

Performance

Electric Cylinder
7200 N (1620 lb) Thrust
Brushless Servo

5mm Lead Ballscrew Models

EC3-B32-10-05B: 1:1 Timing Belt, 5 mm/rev Ballscrew
EC3-B32-10L-05B: 1:1 Inline Coupling, 5 mm/rev Ballscrew

Max. No-Load Accel. 8.84 m/s² [348 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/500 mm [±0.002 in/ft]

EC3-B32-15-05B: 1.5:1 Timing Belt, 5 mm/rev Ballscrew

Max. No-Load Accel. 7.49 m/s² [295 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC3-B32-20-05B: 2:1 Timing Belt, 5 mm/rev Ballscrew

Max. No-Load Accel. 6.66 m/s² [262 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC3-B32-50-05B: 5:1 Gears, 5 mm/rev Ballscrew

Max. No-Load Accel. 3.23 m/s² [127 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.25 mm [0.010 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- Consider leadscrew critical speed and column load limits when specifying longer lengths.

5mm lead ballscrew

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Critical Speed (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>261</td>
<td>261</td>
</tr>
<tr>
<td>261</td>
<td>261</td>
</tr>
<tr>
<td>199</td>
<td>119</td>
</tr>
<tr>
<td>84</td>
<td>48</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>50 thru 100</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>450</th>
<th>600</th>
<th>750</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>6530</td>
</tr>
</tbody>
</table>

- Performance using B8000 Series Controls (not B8501).
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
4mm Lead Acme Screw Models

EC3-B23-04A: 1:1 Timing Belt, 4 mm/rev Acme Screw
Max. No-Load Accel. 7.93 m/s² [312 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC3-B23-15-04A: 1.5:1 Timing Belt, 4 mm/rev Acme Screw
Max. No-Load Accel. 8.37 m/s² [350 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC3-B23-20-04A: 2:1 Timing Belt, 4 mm/rev Acme Screw
Max. No-Load Accel. 9.28 m/s² [365 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC3-B23-50-04A: 5:1 Gears, 4 mm/rev Acme Screw
Max. No-Load Accel. 6.73 m/s² [265 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC3-B23-70-04A: 7:1 Gears, 4 mm/rev Acme Screw
Max. No-Load Accel. 5.32 m/s² [210 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

- Performance using B8000 Series Controls (not B8501).
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
- Consider leadscrew critical speed and column load limits when specifying longer lengths.

50 thru 100 150 200 300 450 600 750 1000 4650 Stroke (mm)
N/a N/a N/a N/a N/a N/a N/a N/a Column Load Limit (N)

Critical Speed (mm/sec)
200 200 200 144 89 61 33

Industrial Devices Corporation
707-789-1000 • 800-747-0064 • E-mail: info@idcmotion.com

A-86
EC3-B

4mm Lead Acme Screw Models

EC3-B32-10-04A
EC3-B32-10L-04A

EC3-B32-15-04A

EC3-B32-20-04A

EC3-B32-50-04A

EC3-B32-70-04A

EC3-B32-15-04A: 1.5:1 Timing Belt, 4 mm/rev Acme Screw

Max. No-Load Accel. 5.79 m/s² [228 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC3-B32-20-04A: 2:1 Timing Belt, 4 mm/rev Acme Screw

Max. No-Load Accel. 5.22 m/s² [206 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC3-B32-50-04A: 5:1 Gears, 4 mm/rev Acme Screw

Max. No-Load Accel. 2.58 m/s² [101 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

EC3-B32-70-04A: 7:1 Gears, 4 mm/rev Acme Screw

Max. No-Load Accel. 1.89 m/s² [75 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.40 mm [0.016 in]
Lead Accuracy ±0.10 mm/300 mm [±0.004 in/ft]

To configure your system see page A-88 to A-89.

Performance

7200 N (1620 lb) Thrust
Brushless Servo

• Consider leadscrew critical speed and column load limits when specifying longer lengths.

4mm lead acme screw

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>50 thru 100</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>450</th>
<th>600</th>
<th>750</th>
<th>1000</th>
<th>Critical Speed (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>144</td>
<td>89</td>
<td>61</td>
<td>33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Industrial Devices Corporation
707-789-1000 • http://www.idcmotion.com • 24 hour info by fax 916-431-6548

A-87
How To Order

1. Base Model Number

Choose the model with sufficient speed and thrust with a comfortable safety margin. Refer to the EC3-B Speed vs. Thrust curves in this section.

EC3-B cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. Inline models have the motor coupled directly to the lead screw with no reduction.

Note: All EC3-B cylinders include an encoder.

Parallel Models

Inline Models

2. Stroke Length

Nine standard lengths are available from 50 to 1000 mm. Custom lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact the physical end-of-travel on either end. Extra travel length is necessary to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed. For further information on this refer to the EC Selection Guidelines on pages (A-20 to A-21) or the Engineering Section.

Steps to Ordering a Complete EC3-B System

You are ready to specify an EC3-B actuator model number after you have:

a. completed and verified all necessary information on an IDC Product Selection Worksheet.

b. completed the steps in the EC Selection Guidelines on pages A-20 to A-21.

c. selected a control that is compatible with the B-series motor.

Your local IDC Distributor and our Applications Engineering Department are available to help with your selection process.

Make It An IDeal System

See Intro Pages 6 & 7
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-90.

Cylinder base mount options -MS1, -MP2, -MP3, -MF2, and -MF3 cannot be ordered with inline models. MF1, 2, 3 Rectangular Flanges

MT4 Trunnion

MF1 Front Flange
MF2 Rear Flange
MF3 Both Flanges

MS1 Side End Angles

MS2 Side Lugs

MP2 Rear Clevis (MP3 includes pivot base)

MS6M and MS6E Side Tapped Holes

4. Rod Ends
Industrial Devices offers 4 rod end options for EC3-B series cylinders.

-FT1M or -FT1E Female Thread

-MT1M or -MT1E Male Thread

-FS2 Spherical Joint

-FC2 Clevis

5. Other Options
See the Options and Accessories section for complete specifications.

BM – Motor Holding Brake
10 in-lb holding brake mounted on the B23 motor.

60 in-lb holding brake mounted on the B32 motor.

BS – Holding Brake
60 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on inline models or with cylinder base mount options. (-MF2, -MF3, -MS1, -MP2, -MP3).

Pivot Mount Caution:
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90-95% of its full stroke. This increases the system's rigidity and extends the life of the guide bearings and rod seal.

L – Linear Potentiometer Output
Linear potentiometer mounted on inside the EC3 cylinder required for use with B8501 control.

PB – Protective Boot
Protects the thrust tube from solid contaminants and prevents liquids from entering the cylinder through the rod end bearing.

6. Accessories
Magnetic Position Sensors
Position sensors are available for indicating end-of-travel and home positions, or for use with user supplied controls.

To maximize cylinder life, IDC recommends the use of end-of-travel sensors with all cylinders.

Common Application Requirements: For most applications, one home and two end-of-travel sensors are required for each cylinder. Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reed</td>
<td>PSR-1</td>
<td>PSR-2</td>
<td>PSN-1</td>
<td>PSN-2</td>
</tr>
<tr>
<td>Hall Effect</td>
<td>PSR-1Q</td>
<td>PSR-2Q</td>
<td>PSN-1Q</td>
<td>PSN-2Q</td>
</tr>
</tbody>
</table>

See page A-240 for more limit switch options, including quick-disconnect versions.

7. Compatible Controls
Details of controls are in Sections H. The EC3-B is compatible with:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8001</td>
<td>Digital servo drive</td>
</tr>
<tr>
<td>B8501</td>
<td>Analog position</td>
</tr>
<tr>
<td>B8961</td>
<td>IDeal™ programmable servo</td>
</tr>
<tr>
<td>B8962</td>
<td>2 Axis IDeal™ programmable servo</td>
</tr>
</tbody>
</table>
Dimensions

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-96 to A-99
- For rod-end dimensions, go to page A-100

* Actual Distance Determined by Drive Ratio

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
<th>DIMENSION</th>
<th>OPTION CODE</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH</td>
<td>9.19 [233.4] + STROKE</td>
<td>MS6E</td>
<td>M3-8 UNC-2A x 0.40 Dp</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH</td>
<td>10.67 [271.1] + STROKE</td>
<td>MS6M</td>
<td>M10 x 1.5-6H x 10.2mm Dp</td>
</tr>
<tr>
<td>C</td>
<td>MOUNTING LENGTH</td>
<td>6.25 [158.8] + STROKE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MP2/MP3 Clevis Mount with Pivot Base and Pin
Parallel

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-96 to A-99
- For rod-end dimensions, go to page A-100

Note:
- Order MP3 to specify complete mounting kit, including actuator clevis, pin and pivot base.
- Order MP2 to omit the pivot base.

### MF1 Head Rectangular Flange Mounting
Parallel

- FLANGE DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 63mm BORE SIZE
- ACTUAL DISTANCE DETERMINED BY DRIVE RATIO

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH</td>
</tr>
</tbody>
</table>

**Note:**
- CLEVIS DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 63mm BORE SIZE EXCEPT AS INDICATED
- **DIMENSION NOT ISO 6431 FOR 63mm BORE SIZE**

• ORDER MP3 TO SPECIFY COMPLETE MOUNTING KIT, INCLUDING ACTUATOR CLEVIS, PIN AND PIVOT BASE.
• ORDER MP2 TO OMIT THE PIVOT BASE.

---

**Dimensions**

**Electric Cylinder CAD Drawings**

EC3

Industrial Devices Corporation
707-789-1000 • http://www.idcmotion.com • 24 hour info by fax 916-431-6548

A-91
**MF2 Cap Rectangular Flange Mounting**

**Parallel**

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-96 to A-99
- For rod-end dimensions, go to page A-100

**MF3 Both Ends Rectangular Flange Mounting**

**Parallel**

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-96 to A-99
- For rod-end dimensions, go to page A-100
MT4 Trunnion Mounting
Parallel

MS1 Side Angles Mounting
Parallel

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-96 to A-99
- For rod-end dimensions, go to page A-100

TRUNNION DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 63mm BORE SIZE * ACTUAL DISTANCE DETERMINED BY DRIVE RATIO

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH</td>
</tr>
<tr>
<td>C</td>
<td>MOUNTING LENGTH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>MOUNTING LENGTH</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH</td>
</tr>
</tbody>
</table>

* ACTUAL DISTANCE DETERMINED BY DRIVE RATIO
Electric Cylinders

**Dimensions**

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette.
- For motor dimensions, go to pages A-96 to A-99.
- For rod-end dimensions, go to page A-100.

---

**MS2 Side Lugs Mounting Inline**

---

**MS6 Side Tapped Holes Mounting Inline**

---

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH 10.25 [260.5] + STROKE</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH 11.74 [298.1] + STROKE</td>
</tr>
<tr>
<td>C</td>
<td>MOUNTING LENGTH 6.25 [158.8] + STROKE</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>OPTION CODE</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>MS6E 3/8-16 UNC-2A x 0.40 Dp</td>
</tr>
<tr>
<td></td>
<td>MS6M M10 x 1.5-6H x 10.2 mm Dp</td>
</tr>
</tbody>
</table>
**Dimensions**

**Electric Cylinder CAD Drawings**

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-96 to A-99
- For rod-end dimensions, go to page A-100

---

**MF1 Head Rectangular Flange Mounting**

**Inline**

**FLANGE DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 63mm BORE SIZE**

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A CYLINDER LENGTH</td>
<td>19.76 [298.3] + STROKE</td>
</tr>
<tr>
<td>B RETRACT LENGTH</td>
<td>10.76 [273.4] + STROKE</td>
</tr>
</tbody>
</table>

---

**MT4 Trunnion Mounting**

**Inline**

**TRUNNION DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 63mm BORE SIZE**

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A CYLINDER LENGTH</td>
<td>10.25 [256.0] + STROKE</td>
</tr>
<tr>
<td>B RETRACT LENGTH</td>
<td>10.76 [273.4] + STROKE</td>
</tr>
<tr>
<td>C MOUNTING LENGTH</td>
<td>6.74 [171.2] + STROKE</td>
</tr>
</tbody>
</table>
**EC3-H Series**

### Motor Specifications

**Permanent Magnet 2-pole, 160 volt DC Motor**

**Winding Data**
- H motor
- Inductance: 19 mH
- Resistance: 6.4
- Torque Constant: 54 oz-in/Amp
- Voltage Constant: 40 V/krpm

**Torque**
- Continuous: 108 oz-in (2.0 Amps)
- Peak: 432 oz-in (8.0 Amps)

**Rotor Inertia**
- 0.049 oz-in-sec²

**Connection**
- Quick Disconnect: 3 contact receptacle in anodized or painted aluminum shell, includes 12 ft. [3.7 m] cable with molded plug.

**Temperature**
- 180°F [82°C] maximum allowable motor case temperature
- Actual motor case temperature is ambient, duty cycle, speed and load dependent. Refer to speed vs. thrust curves for system duty ratings.

### H Motor

[Diagram of H Motor with dimensions and notes]

*REAR SHAFT COVER PROVIDED ON MOTORS WITHOUT ENCODERS*
**EC3-P32 Series**

1.8° Permanent Magnet Hybrid Step Motor

**Winding Data**
P32T and P32V

**Inductance**
Series (T), 120mH; Parallel (V), 30mH

**Resistance**
Series (T), 8.4; Parallel (V), 1.8

**Current Settings**
Parallel (V) at 120 VAC, 3.3 Amps
Series (T) at 240 VAC, 1.6 Amps

**Static Torque**
900 oz-in max

**Rotor Inertia**
0.038 oz-in-sec²

**Connections**
EC3-P32T, EC3-P32V: 5 contant quick disconnect receptacle in anodized or painted aluminum shell, includes 12 ft [3.7 m] cable with molded plug.

**Temperature**
212°F [100°C] maximum allowable motor case temperature.

Actual motor case temperature is ambient, duty cycle, speed and load dependent. Refer to speed vs. thrust curves for system duty ratings.

**P32 Motor**
**Motor Specifications**

**EC3-B23 Series**

Rare Earth Magnet Brushless Servo Motor with 2,000 Line Encoder and Commutation Sensors

- **Winding Data**
  - B23

- **Inductance**
  - 16 mH

- **Resistance**
  - 10.6

- **Torque Constant**
  - 57.6 oz-in/Amp

- **Voltage Constant**
  - 45.5 V/krpm

- **Torque**
  - **Continuous** 144 oz-in (2.5 Amps)
  - **Peak** 414 oz-in (7.2 Amps)

- **Rotor Inertia**
  - 0.0019 oz-in-sec²

- **Connections**
  - MS-type connectors for motor winding and encoder on motor.
  - Includes 12 ft. [3.7 m] cable with mating connector.

- **Temperature**
  - 212°F [100°C] maximum allowed case temperature.

- **Environmental**
  - IP65 Rating

---

**B23 Motor**

![Motor Diagram](image)
EC3-B32 Series

Rare Earth Magnet Brushless Servo Motor with 2,000 Line Encoder and Commutation Sensors

Winding Data
- B32

Inductance
- 9.8 mH

Resistance
- 3.4

Torque Constant
- 99.2 oz-in/Amp

Voltage Constant
- 45.5 V/krpm

Torque
- Continuous: 476 oz-in (2.5 Amps)
- Peak: 992 oz-in (7.2 Amps)

Rotor Inertia
- 0.016 oz-in-sec²

Connections
- MS-type connectors for motor winding and encoder on motor.
- Includes 12 ft. [3.7 m] cable with mating connector.

Temperature
- 212°F [100°C] maximum allowed case temperature.

Environmental
- IP65 Rating

B32 Motor

*ACTUAL DISTANCE DETERMINED BY DRIVE RATIO
Electric Cylinders

EC3

Rod End Dimensions

Dimensions in [mm]

MT1 Male Threads

FT1 Female Threads

FC2 Clevis with Pin

FS2 Spherical

Jam Nut/ Washer
1.25 [31.75] HEX (MT1 M Rod End)

Jam Nut/ Washer
1.25 [31.75] HEX (MT1 M Rod End)
The EC4 series is a heavy-duty cylinder, for thrust loads ranging up to 12000 N [2700 lb] and travel up to 1500 mm [59.1 in]. Precision rolled ballscrews are standard, yielding quiet operation, low backlash and high accuracy. (See the following pages for detailed specifications).

EC4 Series electric cylinders are available with brushless servo, step motors, or DC servo for compatibility with every motion control environment.

Both ball screw models provide a variety of speed and thrust capabilities. Ball screw models are used in applications that require high speed and duty cycles. Standard ball screws are 10 mm and 25 mm lead.

EC4 timing belt or gear reductions between the motor and leadscrew allow selection of the best match between motor power and your linear speed and thrust range.

**Options**

Options include rotary encoders or linear potentiometers for position feedback, load-holding brakes, protective boots, and quick-disconnect cables. Industrial Devices will also discuss unique modifications at your request.

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>160 volt DC Servo</th>
<th>1.8° Hybrid Stepper</th>
<th>Brushless Servo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust Load Capacity</td>
<td>12000 N [2700 lbs]</td>
<td>12000 N [2700 lbs]</td>
<td>12000 N [2700 lbs]</td>
</tr>
<tr>
<td>No Load Speed</td>
<td>1330 mm/sec [52.5 in/sec]</td>
<td>1330 mm/sec [52.5 in/sec]</td>
<td>1330 mm/sec [52.5 in/sec]</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±0.025 mm [±0.001 in]</td>
<td>±0.013 mm [±0.0005 in]</td>
<td>±0.013 mm [±0.0005 in]</td>
</tr>
<tr>
<td>Compatible Controls Offered</td>
<td>H4301</td>
<td>NextStep B8001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H4321</td>
<td>SmartStep B8961</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H4501</td>
<td>H4501</td>
<td></td>
</tr>
</tbody>
</table>

Performance Curves

Page A-106

Page A-110

Page A-114
## General Specifications

### Travel Lengths
- 50, 100, 150, 200, 250, 300, 450, 600, 750, 1000, 1250, 1500 mm.
- Custom strokes available in increments of 1 mm.

### Construction Materials
- **Bearing & Drive Housing**: 6063-T6 aluminum, anodized
- **Cylinder Body**: 6063-T6 aluminum, hard anodized with PTFE impregnation
- **Mounting Plates**: 6061-T6 aluminum and cast aluminum plate, anodized
- **Thrust Tube**: 300 Series Stainless Steel, 1/8 hard and ground

### Speed Reducer Options
- **Belt/Pulley**: AT-5, polyurethane with steel tensile cords
- **Gears**: Alloy steel, case hardened

### Transport Screw Options
- **Ball screw/Ball nut**: Lead: 25 mm [0.984 in], or 10 mm [0.394 in]
- **Thrust Bearings**: Angular contact, high thrust ball bearings

### Weight (Approximate, without options)
- **EC4-H**
  - kg = 17.8 + 0.0188 × [mm stroke]; lb = 39.4 + 1.05 × [inches stroke]
- **EC4-P32**
  - kg = 16.3 + 0.0188 × [mm stroke]; lb = 35.8 + 1.05 × [inches stroke]
- **EC4-B32**
  - kg = 16.7 + 0.0188 × [mm stroke]; lb = 36.7 + 1.05 × [inches stroke]

### Motor

### Environmental Operation
- **Temperature**: -30° to 70°C [-22° to 158°F]
- When operating below 2°C [35°F], vent tubing fitting must be installed. Consult the factory for more information.

- **Moisture/Contaminants**
  - **IP 54 rated**: Polyurethane thrust tube wiper seal. Mating surfaces gasket sealed.
  - Protected against dust and splashing water (non-corrosive, non-abrasive). Limited ingress permitted.

  - **Vent Tube Fitting**: A vent tube fitting is included, which can be installed to permit the actuator to breathe from a non-contaminated area, or receive a positive pressure continuous purge (14-20kPa [2-3 psi]).

  - **PB Protective Boot (IP65) Option**: An optional thrust tube boot prevents moisture and dry contaminants from bypassing the thrust tube wiper seal, providing IP65 protection when used with included vent tube fitting. The boot also prevents contaminant buildup on the thrust tube.

  - **Clean Room & Vacuum Applications**: IDC has designed special actuators for clean room and vacuum applications. Please consult the factory if your application requires special environmental compatibility.

### Maintenance
- The EC4 Series actuator design eliminates the need for most routine maintenance. Re-lubrication is required in high cycle applications. All EC4 models include a lube port and adapter for a standard grease gun. See the EC Series Operator’s Manual for replacement parts.
**Ballscrew**

Ballscrew life is rated in inches of travel at a given load. The values in the chart to the right indicate the travel life where 90% of all units in a sample will continue to work, while 10% have failed. This is similar to the B10 rating of a roller bearing mechanism. Be sure to consider acceleration loads as well as thrust, gravity and friction loads.

**Thrust Tube Capacity**

**Thrust Tube Torque Capacity**  Thrust tube does not rotate during operation. Maximum allowable torque during operation and installation is 10 N·m [90 lb-in]

**Thrust Tube Side Load Capacity**

**EC4 Ball Screw Life**

- EC4 Side Load Capacity vs. Extension
- Maximum Side Load
## EC4 Series Actuator Inertia

### Equations

Rotary Inertia (reflected to motor) = \( A + B \cdot (\text{stroke, in}) + C \cdot (\text{load, lb}) \)

<table>
<thead>
<tr>
<th>Model</th>
<th>Ratio</th>
<th>Screw</th>
<th>A (lb-in-s²)</th>
<th>B (lb-in-s²/in)</th>
<th>C (lb-in-s²/lb)</th>
<th>Motor</th>
<th>Inertia (lb-in-s²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC4-...-10-25B</td>
<td>1:1</td>
<td>25 x 25</td>
<td>4.908 E+03</td>
<td>7.014 E+05</td>
<td>6.357 E+05</td>
<td>H</td>
<td>12.5 E+03</td>
</tr>
<tr>
<td>EC4-...-15-25B</td>
<td>1.5:1</td>
<td></td>
<td>2.800 E+03</td>
<td>3.117 E+05</td>
<td>2.825 E+05</td>
<td>P32</td>
<td>2.375 E+03</td>
</tr>
<tr>
<td>EC4-...-20-25B</td>
<td>2:1</td>
<td></td>
<td>2.711 E+03</td>
<td>1.753 E+05</td>
<td>1.589 E+05</td>
<td>B32</td>
<td>1.000 E+03</td>
</tr>
<tr>
<td>EC4-...-50-25B</td>
<td>5:1</td>
<td></td>
<td>6.267 E+04</td>
<td>2.686 E+06</td>
<td>2.434 E+06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC4-...-100-25B</td>
<td>10:1</td>
<td></td>
<td>3.473 E+04</td>
<td>7.004 E+07</td>
<td>6.348 E+07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC4-...-10-10B</td>
<td>1:1</td>
<td>25 x 10</td>
<td>4.682 E+03</td>
<td>5.543 E+05</td>
<td>1.017 E+05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC4-...-15-10B</td>
<td>1.5:1</td>
<td></td>
<td>2.699 E+03</td>
<td>2.463 E+05</td>
<td>4.521 E+06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC4-...-20-10B</td>
<td>2:1</td>
<td></td>
<td>2.654 E+03</td>
<td>1.386 E+05</td>
<td>2.543 E+06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC4-...-50-10B</td>
<td>5:1</td>
<td></td>
<td>6.180 E+04</td>
<td>2.122 E+06</td>
<td>3.895 E+07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC4-...-100-10B</td>
<td>10:1</td>
<td></td>
<td>3.451 E+04</td>
<td>5.534 E+07</td>
<td>1.016 E+07</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Metric Conversions:**

- 1 mm = 0.03937 in
- 1 kg = 2.205 lb
- 1 lb-in-s² = 1129 kg-cm² = 1.152 kg-cm-s²
Electric Cylinder
12000 N (2700 lb) Thrust
DC Motor

Performance

• Performance using H4000 Series Controls.
• Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.

25 mm Lead Ballscrew Models

EC4-H4-10-25B: 1:1 Timing Belt, 25 mm/rev Ballscrew
Max. No-Load Accel. 4.57 m/s² [180 in/s²]
Repeatability ±0.025 mm [±0.001 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC4-H4-15-25B: 1.5:1 Timing Belt, 25 mm/rev Ballscrew
Max. No-Load Accel. 3.54 m/s² [140 in/s²]
Repeatability ±0.025 mm [±0.001 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC4-H4-20-25B: 2.0:1 Timing Belt, 25 mm/rev Ballscrew
Max. No-Load Accel. 2.70 m/s² [106 in/s²]
Repeatability ±0.025 mm [±0.001 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC4-H4-50-25B: 5:1 Gears, 25 mm/rev Ballscrew
Max. No-Load Accel. 1.27 m/s² [50 in/s²]
Repeatability ±0.025 mm [±0.001 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC4-H4-100-25B: 10:1 Gears, 25 mm/rev Ballscrew
Max. No-Load Accel. 0.65 m/s² [26 in/s²]
Repeatability ±0.30 mm [±0.010 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

• Consider leadscrew critical speed and column load limits when specifying longer lengths.

50 thru 100 150 200 300 450 600 750 1000 1250 1500 Column Load Limit (N)

50 thru 100 150 200 300 450 600 750 1000 1250 1500 Stroke (mm)
10 mm Lead Ballscrew Models

EC4-H4-10-10B
EC4-H4-10L-10B

Max. No-Load Accel. 1.72 m/s² [68 in/s²]
Repeatability ±0.025 mm [±0.001 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC4-H4-15-10B: 1.5:1 Timing Belt, 10 mm/rev Ballscrew

Max. No-Load Accel. 1.38 m/s² [54 in/s²]
Repeatability ±0.025 mm [±0.001 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC4-H4-20-10B: 2:1 Timing Belt, 10 mm/rev Ballscrew

Max. No-Load Accel. 1.06 m/s² [42 in/s²]
Repeatability ±0.025 mm [±0.001 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC4-H4-50-10B: 5:1 Gears, 10 mm/rev Ballscrew

Max. No-Load Accel. 0.50 m/s² [20 in/s²]
Repeatability ±0.025 mm [±0.001 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC4-H4-100-10B: 10:1 Gears, 10 mm/rev Ballscrew

Max. No-Load Accel. 0.26 m/s² [10 in/s²]
Repeatability ±0.025 mm [±0.001 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

Performance

EC4-H4-10-10B: 1:1 Timing Belt, 10 mm/rev Ballscrew
EC4-H4-10L-10B: 1:1 Inline Coupling, 10 mm/rev Ballscrew

Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.

- Consider lead screw critical speed and column load limits when specifying longer lengths.

10 mm lead ballscrew

Critical Speed (mm/sec)

<table>
<thead>
<tr>
<th>50 thru 100</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>450</th>
<th>600</th>
<th>750</th>
<th>1000</th>
<th>1250</th>
<th>1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Stroke (mm)

<table>
<thead>
<tr>
<th>388</th>
<th>388</th>
<th>388</th>
<th>388</th>
<th>350</th>
<th>254</th>
<th>156</th>
<th>99</th>
<th>72</th>
</tr>
</thead>
<tbody>
<tr>
<td>388</td>
<td>388</td>
<td>388</td>
<td>388</td>
<td>350</td>
<td>254</td>
<td>156</td>
<td>99</td>
<td>72</td>
</tr>
</tbody>
</table>

Column Load Limit (N)

<table>
<thead>
<tr>
<th>388</th>
<th>388</th>
<th>388</th>
<th>388</th>
<th>350</th>
<th>254</th>
<th>156</th>
<th>99</th>
<th>72</th>
</tr>
</thead>
<tbody>
<tr>
<td>388</td>
<td>388</td>
<td>388</td>
<td>388</td>
<td>350</td>
<td>254</td>
<td>156</td>
<td>99</td>
<td>72</td>
</tr>
</tbody>
</table>

n/a

Electric Cylinder
12000 N (2700 lb) Thrust
DC Motor
**Steps to Ordering a Complete EC4-H4 System**

You are ready to specify an EC4-H4 actuator model number after you have:

a. completed and verified all necessary information on an IDC Product Selection Worksheet.

b. completed the steps in the EC Selection Guidelines on pages (A-20 to A-21).

c. selected a control that is compatible with the H4-series motor.

Your local IDC Distributor and our Applications Engineering Department are available to help with your selection process.

**1. Base Model**

Choose the model with sufficient speed and thrust with a comfortable safety margin. Refer to the EC4-H4 Speed vs. Thrust curves in this section.

EC4-H4 cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. Inline models have the motor coupled directly to the lead screw with no reduction.

**Parallel Models**

**Inline Models**

**2. Stroke Length**

Twelve standard lengths are available from 50 to 1500 mm. Custom lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact the physical end-of-travel on either end. Extra travel length is necessary to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed. For further information on this refer to the EC Selection Guidelines on pages (A-20 to A-21) or the Engineering Section.

**Make It An IDeal System**

See Intro Pages 6 & 7
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-118.

Cylinder base mount options -MP2, -MP3, -MF2, and -MF3 cannot be ordered with inline models.

MF1, 2, 3 Rectangular Flanges

MF1 Front Flange
MF2 Rear Flange
MF3 Both Flanges

MS2 Side Lugs

MP2 Rear Clevis (MP3 includes pivot base)

MS6M and MS6E Side Tapped Holes

MT4 Trunnion

4. Rod Ends
Industrial Devices offers 4 rod end options for EC4-H4 series cylinders.

-FT1M or -FT1E Female Thread

-MT1M or -MT1E Male Thread

-FS2 Spherical Joint

-FC2 Clevis

5. Options
See the Options and Accessories section for complete specifications of these options.

BM – Motor Holding Brake
20 in-lb holding brake mounted on the rear shaft of the H4-series motor. Not available on EO4-H4 with -EMK encoder option.

BS – Holding Brake
350 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on inline models or with cylinder base mount options. (-MF2, -MF3, -MP2, -MP3).

EM – Encoder
Reverse-compatible 500 line incremental encoder mounted on the rear shaft of the motor. Not available on EO4-H4 with -BM motor holding brake option.

6. Accessories

Magnetic Position Sensors
Position sensors are available for triggering stop, speed/direction change, or end-of-travel.

To maximize cylinder life, IDC recommends the use of end-of-travel sensors with all cylinders.

Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

- Reed Leads
  - Normally open: PSR-1, PSR-1Q
  - Normally closed: PSR-2, PSR-2Q

- Hall Effect Leads
  - Normally open, NPN: PSN-1, PSN-1Q
  - Normally closed, NPN: PSN-2, PSN-2Q

See page A-240 for more limit switch options, including quick-disconnect versions.

7. Compatible Controls
Details of controls are in Sections F. The EC4-H4 is compatible with:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H4301</td>
<td>Limit switch</td>
</tr>
<tr>
<td>H4321</td>
<td>Edge guide</td>
</tr>
<tr>
<td>H4501</td>
<td>Analog position</td>
</tr>
</tbody>
</table>
**Performance**

**EC4-P32(T/V)-10-25B**: 1:1 Timing Belt, 25 mm/rev Ballscrew

Max. No-Load Accel. 27.59 m/s² [1086 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.30 mm [0.012 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC4-P32(T/V)-15-25B**: 1.5:1 Timing Belt, 25 mm/rev Ballscrew

Max. No-Load Accel. 26.92 m/s² [1060 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.30 mm [0.012 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC4-P32(T/V)-20-25B**: 2:1 Timing Belt, 25 mm/rev Ballscrew

Max. No-Load Accel. 21.14 m/s² [832 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.30 mm [0.012 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC4-P32(T/V)-50-25B**: 5:1 Gears, 25 mm/rev Ballscrew

Max. No-Load Accel. 14.76 m/s² [581 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.30 mm [0.012 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC4-P32(T/V)-100-25B**: 10:1 Gears, 25 mm/rev Ballscrew

Max. No-Load Accel. 8.20 m/s² [323 in/s²]

Repeatability ±0.013 mm [±0.0005 in]

Backlash 0.30 mm [0.012 in]

Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

---

- Performance using S6000 Series, NextDrive, and InTouch Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.

---

Performance using S6000 Series, NextDrive, and InTouch Controls.

<table>
<thead>
<tr>
<th>EC4-P32(T/V)</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-25B</td>
<td>150</td>
</tr>
<tr>
<td>10L-25B</td>
<td>150</td>
</tr>
<tr>
<td>15-25B</td>
<td>150</td>
</tr>
<tr>
<td>20-25B</td>
<td>150</td>
</tr>
<tr>
<td>50-25B</td>
<td>150</td>
</tr>
<tr>
<td>100-25B</td>
<td>150</td>
</tr>
</tbody>
</table>

Critical Speed (mm/sec)

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Critical Speed (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>133</td>
</tr>
<tr>
<td>100</td>
<td>133</td>
</tr>
<tr>
<td>150</td>
<td>133</td>
</tr>
<tr>
<td>200</td>
<td>150</td>
</tr>
<tr>
<td>250</td>
<td>150</td>
</tr>
<tr>
<td>300</td>
<td>150</td>
</tr>
<tr>
<td>450</td>
<td>150</td>
</tr>
<tr>
<td>600</td>
<td>150</td>
</tr>
<tr>
<td>750</td>
<td>150</td>
</tr>
<tr>
<td>8600</td>
<td>131</td>
</tr>
</tbody>
</table>

Column Load Limit (N)

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Column Load Limit (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>1059</td>
</tr>
<tr>
<td>100</td>
<td>657</td>
</tr>
<tr>
<td>150</td>
<td>462</td>
</tr>
<tr>
<td>200</td>
<td>298</td>
</tr>
<tr>
<td>250</td>
<td>171</td>
</tr>
<tr>
<td>300</td>
<td>131</td>
</tr>
<tr>
<td>450</td>
<td>133</td>
</tr>
<tr>
<td>600</td>
<td>133</td>
</tr>
<tr>
<td>750</td>
<td>133</td>
</tr>
<tr>
<td>8600</td>
<td>133</td>
</tr>
</tbody>
</table>
10mm Lead Ballscrew Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Gear Ratio</th>
<th>Timing Belt</th>
<th>Lead Screw</th>
<th>Max. No-Load Accel.</th>
<th>Repeatability</th>
<th>Backlash</th>
<th>Lead Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC4-P32(T/V)-10-10B</td>
<td>1:1</td>
<td>1:1</td>
<td>10 mm/rev</td>
<td>9.73 m/s²</td>
<td>±0.013 mm</td>
<td>0.30 mm</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC4-P32(T/V)-10L-10B</td>
<td>1:1</td>
<td>1:1</td>
<td>10 mm/rev</td>
<td>9.73 m/s²</td>
<td>±0.013 mm</td>
<td>0.30 mm</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC4-P32(T/V)-15-10B</td>
<td>1.5:1</td>
<td>1:1</td>
<td>10 mm/rev</td>
<td>9.90 m/s²</td>
<td>±0.013 mm</td>
<td>0.30 mm</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC4-P32(T/V)-20-10B</td>
<td>2.0:1</td>
<td>1:1</td>
<td>10 mm/rev</td>
<td>8.04 m/s²</td>
<td>±0.013 mm</td>
<td>0.30 mm</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC4-P32(T/V)-50-10B</td>
<td>5:1</td>
<td>1:1</td>
<td>10 mm/rev</td>
<td>5.82 m/s²</td>
<td>±0.013 mm</td>
<td>0.30 mm</td>
<td>±0.05 mm/300 mm</td>
</tr>
<tr>
<td>EC4-P32(T/V)-100-10B</td>
<td>10:1</td>
<td>1:1</td>
<td>10 mm/rev</td>
<td>3.27 m/s²</td>
<td>±0.013 mm</td>
<td>0.30 mm</td>
<td>±0.05 mm/300 mm</td>
</tr>
</tbody>
</table>

**Performance**

**100% Duty Cycle**

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Critical Speed (mm/sec)</th>
<th>Column Load Limit (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>100</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>150</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>200</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>300</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>450</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>600</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>750</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>1000</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>1250</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>1500</td>
<td>388</td>
<td>1000</td>
</tr>
</tbody>
</table>

**50 thru 100**

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Critical Speed (mm/sec)</th>
<th>Column Load Limit (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>200</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>300</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>450</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>600</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>750</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>1000</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>1250</td>
<td>388</td>
<td>1000</td>
</tr>
<tr>
<td>1500</td>
<td>388</td>
<td>1000</td>
</tr>
</tbody>
</table>

**Critical Speed**

- **Critical Speed (mm/sec)**: The critical speed is the speed at which the ballscrew will resonate. It is important to operate the actuator below the critical speed to avoid resonant vibrations that can lead to damage or reduced performance.
- **Column Load Limit (N)**: The maximum load that can be applied to the ballscrew without exceeding the design limits.

**10mm lead ballscrew**

- Performance using S6000 Series, NextStep™, and Smartworx Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.

**Consider** leadscrew critical speed and column load limits when specifying longer lengths.
**How To Order**

### Steps to Ordering a Complete EC4-P System

You are ready to specify an EC4-P actuator model number after you have:

a. completed and verified all necessary information on an IDC Product Selection Worksheet.

b. completed the steps in the EC Selection Guidelines on pages (A-20 to A-21).

c. selected a control that is compatible with the P-series motor.

Your local IDC Distributor and our Applications Engineering Department are available to help with your selection process.

### 1. Base Model Number

Choose the model with sufficient speed and thrust with a comfortable safety margin. **IDC recommends at least 30% reserve thrust for step motor driven systems.**

**EC4-P Series offers two motor wiring choices, ‘T’ (Series) and ‘V’ (Parallel).** They ‘T’ and ‘V’ versions include a 12-foot motor quick disconnect cable.

EC4-P cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. Inline models have the motor coupled directly to the leadscrew with no reduction.

**Parallel Models**

**Inline Models**

### 2. Stroke Length

Twelve standard lengths are available from 50 to 1500 mm. Custom lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact the physical end-of-travel on either end. Extra travel length is necessary to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed. For further information on this refer to the EC Selection Guidelines on pages (A-20 to A-21) or the Engineering Section.

### Electric Cylinder Specifications

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Drive Ratio</th>
<th>Screw Lead, Type</th>
<th>Stroke Length (mm)</th>
<th>Cylinder Mounting</th>
<th>Rod End</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC4-P32-10-25B</td>
<td>P32</td>
<td>T</td>
<td>-</td>
<td>50</td>
<td>No Charge</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC4-P32-15-25B</td>
<td></td>
<td>T</td>
<td>-</td>
<td>100</td>
<td>-MF1</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-20-25B</td>
<td></td>
<td>T</td>
<td>-</td>
<td>150</td>
<td>-MF2-MT1M</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-25-25B</td>
<td></td>
<td>T</td>
<td>-</td>
<td>200</td>
<td>-MF3-FT1M</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-30-25B</td>
<td></td>
<td>T</td>
<td>-</td>
<td>250</td>
<td>-MF4-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-35-25B</td>
<td></td>
<td>T</td>
<td>-</td>
<td>300</td>
<td>-MF5-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-40-25B</td>
<td></td>
<td>T</td>
<td>-</td>
<td>500</td>
<td>-MF6-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-50-25B</td>
<td></td>
<td>T</td>
<td>-</td>
<td>1000</td>
<td>-MF7-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-60-25B</td>
<td></td>
<td>T</td>
<td>-</td>
<td>1500</td>
<td>-MF8-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-70-25B</td>
<td></td>
<td>T</td>
<td>-</td>
<td>2000</td>
<td>-MF9-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-80-25B</td>
<td></td>
<td>T</td>
<td>-</td>
<td>2500</td>
<td>-MF10-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
</tbody>
</table>

**Inline Models (Direct Drive)**

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Drive Ratio</th>
<th>Screw Lead, Type</th>
<th>Stroke Length (mm)</th>
<th>Cylinder Mounting</th>
<th>Rod End</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC4-P32-10L-25B</td>
<td>P32</td>
<td>T (Series)</td>
<td>-</td>
<td>50</td>
<td>No Charge</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC4-P32-15L-25B</td>
<td></td>
<td>T (Series)</td>
<td>-</td>
<td>100</td>
<td>-MF1-MT1M</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-20L-25B</td>
<td></td>
<td>T (Series)</td>
<td>-</td>
<td>150</td>
<td>-MF2-FT1M</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-25L-25B</td>
<td></td>
<td>T (Series)</td>
<td>-</td>
<td>200</td>
<td>-MF3-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-30L-25B</td>
<td></td>
<td>T (Series)</td>
<td>-</td>
<td>250</td>
<td>-MF4-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-35L-25B</td>
<td></td>
<td>T (Series)</td>
<td>-</td>
<td>300</td>
<td>-MF5-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-40L-25B</td>
<td></td>
<td>T (Series)</td>
<td>-</td>
<td>500</td>
<td>-MF6-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-50L-25B</td>
<td></td>
<td>T (Series)</td>
<td>-</td>
<td>1000</td>
<td>-MF7-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-60L-25B</td>
<td></td>
<td>T (Series)</td>
<td>-</td>
<td>1500</td>
<td>-MF8-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-70L-25B</td>
<td></td>
<td>T (Series)</td>
<td>-</td>
<td>2000</td>
<td>-MF9-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
<tr>
<td>EC4-P32-80L-25B</td>
<td></td>
<td>T (Series)</td>
<td>-</td>
<td>2500</td>
<td>-MF10-FT1E</td>
<td>-PB</td>
<td>-EMK</td>
</tr>
</tbody>
</table>

**Additional Charge**

- MP3
- -PB
- -EMK
- -L
- -PB
**3. Cylinder Mounting**
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-118.

Cylinder base mount options -MP2, -MP3, -MF2, and -MF3 cannot be ordered with inline models.

MF1, 2, 3 Rectangular Flanges

**How To Order**

**Pivot Mount Caution:**
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90-95% of its full stroke. This increases the system's rigidity and extends the life of the guide bearings and rod seal.

**4. Rod Ends**
Industrial Devices offers 4 rod end options for EC4-P series cylinders.

-FT1M or -FT1E Female Thread

-MT1M or -MT1E Male Thread

-FS2 Spherical Joint

-FC2 Clevis

**5. Other Options**
See the Options and Accessories section for complete specifications.

**BS – Holding Brake**
350 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on inline models or with cylinder base mount options. (-MF2, -MF3, -MP2, -MP3).

**EMK – Encoder**
1000 line incremental encoder mounted on the rear shaft of the motor.

**L – Linear Potentiometer Output**
Linear potentiometer mounted on inside the EC4-P cylinder.

**PB – Protective Boot**
Protects the thrust tube from solid contaminants and prevents liquids from entering the cylinder through the rod end bearing.

**6. Accessories**

**Magnetic Position Sensors**
Position sensors are available for indicating end-of-travel and home positions, or for use with user supplied controls.

To maximize cylinder life, IDC recommends the use of end-of-travel sensors with all cylinders.

Common Application Requirements: For most applications, one home and two end-of-travel sensors are required for each cylinder. Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

See page A-240 for more limit switch options, including quick-disconnect versions.

**7. Compatible Controls**
Details of controls are in Sections G. The EC4-P are compatible with:

**Model** | **Description**
---|---
NextStep | Stepper drive
S6002 | 2-Axis Stepper drive
SmartStep | IDeal™ programmable
S6961 | IDeal™ programmable
S6962 | 2-Axis IDeal™ programmable
**Electric Cylinders**

**Electric Cylinder**

12000 N (2700 lb) Thrust

**Performance**

- **EC4-B32-10-25B**
  - 1:1 Timing Belt, 25 mm/rev Ballscrew
  - Max. No-Load Accel.: 14.77 m/s² [581 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

- **EC4-B32-15-25B**
  - 1.5:1 Timing Belt, 25 mm/rev Ballscrew
  - Max. No-Load Accel.: 15.91 m/s² [626 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

- **EC4-B32-20-25B**
  - 2:1 Timing Belt, 25 mm/rev Ballscrew
  - Max. No-Load Accel.: 12.69 m/s² [500 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

- **EC4-B32-50-25B**
  - 5:1 Gears, 25 mm/rev Ballscrew
  - Max. No-Load Accel.: 12.00 m/s² [472 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

- **EC4-B32-100-25B**
  - 10:1 Gears, 25 mm/rev Ballscrew
  - Max. No-Load Accel.: 7.34 m/s² [289 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

- **25mm Lead Ballscrew Models**

  - **EC4-B32-10-25B**
  - **EC4-B32-10L-25B**
  - **EC4-B32-15-25B**
  - **EC4-B32-20-25B**
  - **EC4-B32-50-25B**
  - **EC4-B32-100-25B**

  - **EC4-B32-10-25B: 1:1 Timing Belt, 25 mm/rev Ballscrew**
  - Max. No-Load Accel.: 14.77 m/s² [581 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

  - **EC4-B32-15-25B: 1.5:1 Timing Belt, 25 mm/rev Ballscrew**
  - Max. No-Load Accel.: 15.91 m/s² [626 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

  - **EC4-B32-20-25B: 2:1 Timing Belt, 25 mm/rev Ballscrew**
  - Max. No-Load Accel.: 12.69 m/s² [500 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

  - **EC4-B32-50-25B: 5:1 Gears, 25 mm/rev Ballscrew**
  - Max. No-Load Accel.: 12.00 m/s² [472 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

  - **EC4-B32-100-25B: 10:1 Gears, 25 mm/rev Ballscrew**
  - Max. No-Load Accel.: 7.34 m/s² [289 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/300 mm [±0.002 in/ft]

- **Performance using B8000 Series Controls (not B8501).**
- **Duty Cycle** is percentage of actuator “on time” or movement over 10 minute interval.

* Consider leadscrew critical speed and column load limits when specifying longer lengths.

- **25mm lead ballscrew**
  - **Critical Speed (mm/sec)**
    - 1333 1333 1333 1333 1059 657 462 298 171 131
  - **Stroke (mm)**
    - 50 thru 100 150 200 300 450 600 750 1000 1250 1500
  - **Column Load Limit (N)**
    - n/a n/a n/a n/a n/a n/a n/a n/a n/a 8600
Performance

10mm Lead Ballscrew Models

**EC4-B32-10-10B**
EC4-B32-10L-10B

- 1:1 Timing Belt, 10 mm/rev Ballscrew
- Max. No-Load Accel. 5.08 m/s² [200 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC4-B32-15-10B**
EC4-B32-15L-10B

- 1.5:1 Timing Belt, 10 mm/rev Ballscrew
- Max. No-Load Accel. 5.70 m/s² [224 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC4-B32-20-10B**
EC4-B32-20L-10B

- 2.0:1 Timing Belt, 10 mm/rev Ballscrew
- Max. No-Load Accel. 4.75 m/s² [187 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC4-B32-50-10B**
EC4-B32-50L-10B

- 5:1 Gears, 10 mm/rev Ballscrew
- Max. No-Load Accel. 4.68 m/s² [184 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC4-B32-100-10B**
EC4-B32-100L-10B

- 10:1 Gears, 10 mm/rev Ballscrew
- Max. No-Load Accel. 2.91 m/s² [115 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- Consider leadscrew critical speed and column load limits when specifying longer lengths.
- 10mm lead ballscrew

<table>
<thead>
<tr>
<th>Diameter</th>
<th>388</th>
<th>388</th>
<th>388</th>
<th>388</th>
<th>388</th>
<th>350</th>
<th>254</th>
<th>156</th>
<th>99</th>
<th>72</th>
<th>50 thru 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke (mm)</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Column Load Limit (N)</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
</tr>
</tbody>
</table>

• Performance using B8000 Series Controls (not B8501).
• Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
### How To Order

#### 1. Base Model Number

Choose the model with sufficient speed and thrust with a comfortable safety margin. Refer to the EC4-B Speed vs. Thrust curves in this section.

EC4-B cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. Inline models have the motor coupled directly to the leadscrew with no reduction.

Note: All EC4-B cylinders include an encoder.

#### 2. Stroke Length

Twelve standard lengths are available from 50 to 1500 mm. Custom lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact the physical end-of-travel on either end. Extra travel length is necessary to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed. For further information on this refer to the EC Selection Guidelines on pages (A-20 to A-21) or the Engineering Section.

#### Make It An IDEAL System

See Intro Pages 6 & 7

### Parallel Models

![Parallel Model Diagram](image)

### Inline Models

![Inline Model Diagram](image)

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Drive Ratio</th>
<th>Screw Lead, Type</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC4-B32-10-25B</td>
<td>B32</td>
<td>10</td>
<td>No Charge</td>
<td>BM, BS, L, PB</td>
</tr>
<tr>
<td>EC4-B32-10-10B</td>
<td>B32</td>
<td>10</td>
<td>No Charge</td>
<td>-MP3</td>
</tr>
<tr>
<td>EC4-B32-15-25B</td>
<td>B32</td>
<td>15</td>
<td>No Charge</td>
<td>-MF1, -MP2, -MT1M</td>
</tr>
<tr>
<td>EC4-B32-15-10B</td>
<td>B32</td>
<td>15</td>
<td>No Charge</td>
<td>-MF2, -MS6M, -MT1E</td>
</tr>
<tr>
<td>EC4-B32-20-25B</td>
<td>B32</td>
<td>20</td>
<td>No Charge</td>
<td>-MF3, -MS6E, -FT1M</td>
</tr>
<tr>
<td>EC4-B32-20-10B</td>
<td>B32</td>
<td>20</td>
<td>No Charge</td>
<td>-MS2, -MT4, -FT1E</td>
</tr>
<tr>
<td>EC4-B32-50-25B</td>
<td>B32</td>
<td>50</td>
<td>No Charge</td>
<td>-FC2</td>
</tr>
<tr>
<td>EC4-B32-50-10B</td>
<td>B32</td>
<td>50</td>
<td>No Charge</td>
<td>-FS2</td>
</tr>
<tr>
<td>EC4-B32-100-25B</td>
<td>B32</td>
<td>100</td>
<td>No Charge</td>
<td>-MT1M</td>
</tr>
<tr>
<td>EC4-B32-100-10B</td>
<td>B32</td>
<td>100</td>
<td>No Charge</td>
<td>-MT1E</td>
</tr>
</tbody>
</table>

Custom lengths available

Additional Charge
- -MP3
- BM
- BS
- L
- PB
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-118.
Cylinder base mount options -MP2, -MP3, -MF2, and -MF3 cannot be ordered with inline models.
MF1, 2, 3 Rectangular Flanges

MF1 Front Flange
MF2 Rear Flange
MF3 Both Flanges

MS2 Side Lugs

MP2 Rear Clevis (MP3 includes pivot base)

MS6M and MS6E Side Tapped Holes

MT4 Trunnion

4. Rod Ends
Industrial Devices offers 4 rod end options for EC4-B series cylinders.

-FT1M or -FT1E Female Thread

-MT1M or -MT1E Male Thread

-FS2 Spherical Joint

-FC2 Clevis

5. Other Options
See the Options and Accessories section for complete specifications.

BM – Motor Holding Brake
60 in-lb holding brake mounted on the B32 motor.

BS – Holding Brake
350 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on inline models or with cylinder base mount options. (-MP2, -MF3, -MP2, -MF3).

L – Linear Potentiometer Output
Linear potentiometer mounted on inside the EC4-B cylinder. For use with B8501 control.

PB – Protective Boot
Protects the thrust tube from solid contaminants and prevents liquids from entering the cylinder through the rod end bearing.

6. Accessories
Magnetic Position Sensors
Position sensors are available for indicating end-of-travel and home positions, or for use with user supplied controls.

To maximize cylinder life, IDC recommends the use of end-of-travel sensors with all cylinders.

Common Application Requirements: For most applications, one home and two end-of-travel sensors are required for each cylinder. Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

Reed
Home (N.O.) 3m 4m
End-of-travel (N.C.) PSR-1 PSR-1Q

Hall Effect
Home (N.O./NPN) PSN-1 PSN-1Q
End-of-travel (NC/NPN) PSN-2 PSN-2Q

See page A-240 for more limit switch options, including quick-disconnect versions.

7. Compatible Controls
Details of controls are in Sections H. The EC4-B is compatible with:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8001</td>
<td>Digital servo drive</td>
</tr>
<tr>
<td>B8501</td>
<td>Analog position</td>
</tr>
<tr>
<td>B8961</td>
<td>IDeal™ programmable servo</td>
</tr>
<tr>
<td>B8962</td>
<td>2 Axis IDeal™ programmable servo</td>
</tr>
</tbody>
</table>
**Dimensions**

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette.
- For motor dimensions, go to pages A-124 to A-126.
- For rod-end dimensions, go to page A-128.

### MS2 Side Lugs Mounting

**Parallel**

![Diagram of MS2 Side Lugs Mounting Parallel]

### MS6 Side Tapped Holes Mounting

**Parallel**

![Diagram of MS6 Side Tapped Holes Mounting Parallel]

---

**CAD Drawings**

**Electric Cylinders**

EC4

**Industrial Devices Corporation**

707-789-1000 • 800-747-0064 • E-mail: info@idcmotion.com
MP2/MP3 Clevis Mount with Pivot Base and Pin
Parallel

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-124 to A-126
- For rod-end dimensions, go to page A-128

Note:
- Order MP3 to specify complete mounting kit, including actuator clevis, pin and pivot base.
- Order MP2 to omit the pivot base.

MF1 Head Rectangular Flange Mounting
Parallel

Dimensions
Dimensions

MF2 Cap Rectangular Flange Mounting
Parallel

MF3 Both Ends Rectangular Flange Mounting
Parallel

* FLANGE DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 80mm BORE SIZE

For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette.

For motor dimensions, go to pages A-124 to A-126.

For rod-end dimensions, go to page A-128.
MT4 Trunnion Mounting

Parallel

Dimensions

Electric Cylinder
CAD Drawings

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-124 to A-126
- For rod-end dimensions, go to page A-128

MS2 Side End Angles Mounting

Inline
**MS6 Side Tapped Holes Mounting**

**Inline**

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-124 to A-126
- For rod-end dimensions, go to page A-128

**MF1 Head Rectangular Flange Mounting**

**Inline**

*FLANGE DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 80mm BORE SIZE*
**Dimensions**

**MT4 Trunnion Mounting**

**Inline**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH 14.62 [371.3] + STROKE</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH 16.74 [425.3] + STROKE</td>
</tr>
<tr>
<td>C</td>
<td>MOUNTING LENGTH 10.30 [261.6] + STROKE</td>
</tr>
</tbody>
</table>

For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette.

For motor dimensions, go to pages A-124 to A-126.

For rod-end dimensions, go to page A-128.
EC4-H4 Series

**Permanent Magnet 2-pole, 160 volt DC Motor**

- **H4 motor**
- **Inductance**: 12 mH
- **Resistance**: 1.5
- **Torque Constant**: 67 oz-in/Amp
- **Voltage Constant**: 49 V/krpm

**Torque**
- **Continuous**: 335 oz-in (5.0 Amps)
- **Peak**: 670 oz-in (10.0 Amps)

**Rotor Inertia**: 0.20 oz-in-sec²

**Connections**
Quick Disconnect: 3 contact receptacle in anodized or painted aluminum shell, includes 12 ft. [3.7 m] cable with molded plug.

**Temperature**
180°F [82°C] maximum allowable motor case temperature
Actual motor case temperature is ambient, duty cycle, speed and load dependent. Refer to speed vs. thrust curves for system duty ratings.

**H4 Motor**

![H4 Motor Diagram]
EC4-P Series 1.8° Permanent Magnet Hybrid Step Motor

Winding Data
- P32T and P32V
  - Series (T), 120mH; Parallel (V), 32mH
  - Series (T), 6.5; Parallel (V), 1.8

Resistance
- Parallel (V) at 120 VAC, 1.6 Amps
- Series (T) at 240 VAC, 3.3 Amps

Current Settings
- Parallel (V) at 120 VAC, 1.6 Amps
- Series (T) at 240 VAC, 3.3 Amps

Static Torque
- 920 oz-in max

Rotor Inertia
- 0.038 oz-in-sec²

Connections
- EC4-P32T, EC4-P32V: 5 contact quick disconnect receptacle in anodized or painted aluminum shell, includes 12 ft [3.7 m] cable with molded plug.

Temperature
- 212°F [100°C] maximum allowable motor case temperature.
- Actual motor case temperature is ambient, duty cycle, speed and load dependent.
- Refer to speed vs. thrust curves for system duty ratings.

---

P32 Motor

**Electric Cylinder Specifications & Dimensions**
**EC4-B Series**

**Rare Earth Magnet Brushless Servo Motor with 2,000 Line Encoder and Commutation Sensors**

- **Winding Data**: B32
- **Inductance**: 9.8 mH
- **Resistance**: 3.4
- **Torque Constant**: 99.2 oz-in/Amp
- **Voltage Constant**: 45.5 V/krpm

**Motor Specifications**

**B32 Motor**

- **Continuous Torque**: 476 oz-in (4.8 Amps)
- **Peak Torque**: 992 oz-in (10.0 Amps)
- **Rotor Inertia**: 0.016 oz-in-sec^2
- **Encoder Connector**: PT02E14-18P
- **Motor Connector**: PT02E14-5P
- **Connection**:
  - MS-type connectors for motor winding and encoder on motor.
  - Includes 12 ft. [3.7 m] cable with mating connector.
- **Temperature**: 212°F [100°C] maximum allowed case temperature.
- **Environmental**: IP65 Rating
Rod End Dimensions

Dimensions in [mm]

MT1 Male Threads

FT1 Female Threads

FC2 Clevis with Pin

FS2 Spherical

Electric Cylinders

Electric Cylinder Rod Ends
The EC5 series is our highest thrust cylinder, for heavy thrust loads ranging up to 25000 N [5620 lb] and travel up to 1500 mm [59.1 in]. Precision rolled ball screws are standard, yielding quiet operation, low backlash and high accuracy. (See the following pages for detailed specifications).

EC5 Series electric cylinders are available with brushless servo or step motors for compatibility with every motion control environment.

Ball screw models are used in applications that require high speed and duty cycles. Standard ball screws are 10 mm and 32 mm lead.

EC5 timing belt or gear reductions between the motor and leadscrew allow selection of the best match between motor power and your linear speed and thrust range.

**Options**

Options include rotary encoders or linear potentiometers for position feedback, load-holding brakes, protective boots, and quick-disconnect cables. Industrial Devices will also discuss unique modifications at your request.

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>1.8° Hybrid Stepper</th>
<th>Brushless Servo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust Load Capacity</td>
<td>25,000 N [5620 lbs]</td>
<td>25,000 N [5620 lbs]</td>
</tr>
<tr>
<td>No Load Speed</td>
<td>1330 mm/sec [52.5 in/sec]</td>
<td>1330 mm/sec [52.5 in/sec]</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±0.013 mm [±0.0005 in]</td>
<td>±0.013 mm [±0.0005 in]</td>
</tr>
<tr>
<td>Compatible Controls Offered</td>
<td><strong>Next Step</strong>&lt;sup&gt;®&lt;/sup&gt;</td>
<td>B8001</td>
</tr>
<tr>
<td></td>
<td><strong>Smart Step</strong>&lt;sup&gt;®&lt;/sup&gt;</td>
<td>B8961</td>
</tr>
<tr>
<td></td>
<td>S6002</td>
<td>B8962</td>
</tr>
<tr>
<td></td>
<td>S6961</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S6962</td>
<td></td>
</tr>
<tr>
<td>Performance Curves</td>
<td>Page A-134</td>
<td>Page A-138</td>
</tr>
</tbody>
</table>
General Specifications

Travel Lengths
50, 100, 150, 200, 250, 300, 450, 600, 750, 1000, 1250, 1500 mm.
Custom strokes available in increments of 1mm.

Construction Materials
- Bearing & Drive Housing: 6063-T6 aluminum, anodized
- Cylinder Body: 6063-T6 aluminum, hard anodized with PTFE impregnation
- Mounting Plates: 6061-T6 aluminum and cast aluminum plate, anodized
- Thrust Tube: 300 Series Stainless Steel, 1/8 hard and ground

Speed Reducer Options
- Belt/Pulley: AT-5, polyurethane with steel tensile cords
- Gears: Alloy steel, case hardened

Transport Screw Options
- Ballscrew/Ballnut: Lead: 32 mm [0.630 in], or 10 mm [0.394 in]
- Heat treated carbon steel alloy
- Thrust Bearings: Angular contact, high thrust ball bearings

Weight (approximate, without options)
- EC5-S42: kg = 21.0 + 0.0188 × [mm stroke]; lb = 46.4 + 1.05 × [inches stroke]
- EC5-B32: kg = 16.7 + 0.0188 × [mm stroke]; lb = 36.7 + 1.05 × [inches stroke]
- EC5-B41: kg = 20.4 + 0.0188 × [mm stroke]; lb = 44.9 + 1.05 × [inches stroke]

Motor Specifications/Dimensions
See pages A-150 to A-152.

Environmental Operation
- Temperature: -30°C to 70°C [-22°F to 158°F]
  When operating below 2°C [35°F], vent tubing fitting must be installed. Consult the factory for more information.
  Protected against dust and splashing water (non-corrosive, non-abrasive). Limited ingress permitted.
  Vent Tube Fitting: A vent tube fitting is included, which can be installed to permit the actuator to breathe from a non-contaminated area, or receive a positive pressure continuous purge (14-20kPa [2-3 psi]).
  PB Protective Boot (IP65) Option: An optional thrust tube boot prevents moisture and dry contaminants from bypassing the thrust tube wiper seal, providing IP65 protection when used with included vent tube fitting. The boot also prevents contaminant buildup on the thrust tube.
  Clean Room & Vacuum Applications: IDC has designed special actuators for clean room and vacuum applications. Please consult the factory if your application requires special environmental compatibility.

Maintenance
The EC5 Series actuator design eliminates the need for most routine maintenance. Re-lubrication is required in high cycle applications. See the EC Series Operator’s Manual for replacement parts.

Lube Port
All EC5 models include a lube port and adapter for a standard grease gun.
**Ballscrew**

Ballscrew life is rated in inches of travel at a given load. The values in the chart to the right indicate the travel life where 90% of all units in a sample will continue to work, while 10% have failed. This is similar to the B10 rating of a roller bearing mechanism. Be sure to consider acceleration loads as well as thrust, gravity and friction loads.

**Thrust Tube Capacity**

**Thrust Tube Torque Capacity** Thrust tube does not rotate during operation. Maximum allowable torque during operation and installation is 10 N-m [90 lb-in]

**Thrust Tube Side Load Capacity**

**EC5 Side Load Capacity vs. Extension**

**Maximum Side Load**
## EC5 Series Actuator Inertia

### General Specifications

**Equations**

Rotary Inertia (reflected to motor) = A + B* (stroke, in) + C* (load, lb)

<table>
<thead>
<tr>
<th>Model</th>
<th>Ratio</th>
<th>Screw</th>
<th>A (lb-in-s²)</th>
<th>B (lb-in-s²/in)</th>
<th>C (lb-in-s²/lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC5-10-32B</td>
<td>1:1</td>
<td>32 x 32</td>
<td>5.627 E-03</td>
<td>1.666 E-04</td>
<td>1.042 E-04</td>
</tr>
<tr>
<td>EC5-20-32B</td>
<td>2:1</td>
<td></td>
<td>2.890 E-03</td>
<td>4.166 E-05</td>
<td>2.604 E-05</td>
</tr>
<tr>
<td>EC5-50-32B</td>
<td>5:1</td>
<td></td>
<td>6.541 E-04</td>
<td>6.380 E-06</td>
<td>3.988 E-06</td>
</tr>
<tr>
<td>EC5-100-32B</td>
<td>10:1</td>
<td></td>
<td>3.545 E-04</td>
<td>1.664 E-06</td>
<td>1.040 E-06</td>
</tr>
<tr>
<td>EC5-10-10B</td>
<td>1:1</td>
<td>32 x 10</td>
<td>5.164 E-03</td>
<td>1.407 E-04</td>
<td>1.017 E-05</td>
</tr>
<tr>
<td>EC5-15-10B</td>
<td>1.5:1</td>
<td></td>
<td>2.914 E-03</td>
<td>6.255 E-05</td>
<td>4.521 E-06</td>
</tr>
<tr>
<td>EC5-20-10B</td>
<td>2:1</td>
<td></td>
<td>2.775 E-03</td>
<td>3.518 E-05</td>
<td>2.543 E-06</td>
</tr>
<tr>
<td>EC5-50-10B</td>
<td>5:1</td>
<td></td>
<td>6.365 E-04</td>
<td>5.389 E-06</td>
<td>3.895 E-07</td>
</tr>
<tr>
<td>EC5-100-10B</td>
<td>10:1</td>
<td></td>
<td>3.499 E-04</td>
<td>1.405 E-06</td>
<td>1.016 E-07</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motor</th>
<th>Inertia (lb-in-s²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S42</td>
<td>7.13 E-03</td>
</tr>
<tr>
<td>B32</td>
<td>1.00 E-03</td>
</tr>
<tr>
<td>B41</td>
<td>2.63 E-03</td>
</tr>
</tbody>
</table>

Metric Conversions:

- 1 mm = 0.03937 in
- 1 kg = 2.205 lb
- 1 lb-in-s² = 1129 kg-cm² = 1.152 kg-cm-s²
Electric Cylinders

Performance

32mm Lead Ballscrew Models

EC5-S42(T/V)-10-32B: 1:1 Timing Belt, 32 mm/rev Ballscrew
Max. No-Load Accel. 21.62 m/s² [851 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC5-S42(T/V)-10L-32B: 1:1 Inline Coupling, 32 mm/rev Ballscrew
Max. No-Load Accel. 21.62 m/s² [851 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC5-S42(T/V)-15-32B: 1.5:1 Timing Belt, 32 mm/rev Ballscrew
Max. No-Load Accel. 19.08 m/s² [751 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC5-S42(T/V)-20-32B: 2.0:1 Timing Belt, 32 mm/rev Ballscrew
Max. No-Load Accel. 15.15 m/s² [596 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC5-S42(T/V)-50-32B: 5:1 Gears, 32 mm/rev Ballscrew
Max. No-Load Accel. 8.11 m/s² [319 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC5-S42(T/V)-100-32B: 10:1 Gears, 32 mm/rev Ballscrew
Max. No-Load Accel. 4.24 m/s² [167 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- Consider leadscrew critical speed and column load limits when specifying longer lengths.

32mm lead ballscrew

<table>
<thead>
<tr>
<th>Stroke (mm/sec)</th>
<th>Critical Speed (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>133</td>
<td>133</td>
</tr>
<tr>
<td>133</td>
<td>133</td>
</tr>
<tr>
<td>133</td>
<td>1120</td>
</tr>
<tr>
<td>814</td>
<td>499</td>
</tr>
<tr>
<td>316</td>
<td>229</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Column Load Limit (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>300</td>
<td>450</td>
</tr>
<tr>
<td>600</td>
<td>750</td>
</tr>
<tr>
<td>1000</td>
<td>1250</td>
</tr>
<tr>
<td>1500</td>
<td>2000</td>
</tr>
</tbody>
</table>

- Performance using S6000 Series, Newall™, and Symbus™ Controls.
- Duty Cycle is percentage of actuator "on time" or movement over 10 minute interval.

Industrial Devices Corporation
707-789-1000 • 800-747-0064 • E-mail: info@idcmotion.com
10mm Lead Ballscrew Models

EC5-S42(T/V)-10-10B: 1:1 Timing Belt, 10 mm/rev Ballscrew
Max. No-Load Accel. 7.13 m/s² [281 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC5-S42(T/V)-10L-10B: 1:1 Inline Coupling, 10 mm/rev Ballscrew
Max. No-Load Accel. 6.15 m/s² [242 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC5-S42(T/V)-15-10B: 1.5:1 Timing Belt, 10 mm/rev Ballscrew
Max. No-Load Accel. 4.82 m/s² [190 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC5-S42(T/V)-20-10B: 2.0:1 Timing Belt, 10 mm/rev Ballscrew
Max. No-Load Accel. 2.54 m/s² [100 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC5-S42(T/V)-50-10B: 5:1 Gears, 10 mm/rev Ballscrew
Max. No-Load Accel. 1.33 m/s² [52 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

EC5-S42(T/V)-100-10B: 10:1 Gears, 10 mm/rev Ballscrew
Max. No-Load Accel. 1.03 m/s² [41 in/s²]
Repeatability ±0.013 mm [±0.0005 in]
Backlash 0.30 mm [0.012 in]
Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- Performance using S6000 Series, NextStep, and MPG Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.

• Consider leadscrew critical speed and column load limits when specifying longer lengths.

10mm lead ballscrew

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Critical Speed (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 thru 100</td>
<td>n/a</td>
</tr>
<tr>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Industrial Devices Corporation
707-789-1000 • http://www.idcmotion.com • 24 hour info by fax 916-431-6548
How To Order

Steps to Ordering a Complete EC5 System

You are ready to specify an EC5-S actuator model number after you have:

a. completed and verified all necessary information on an IDC Product Selection Worksheet.
b. completed the steps in the EC Selection Guidelines on pages (A-20 to A-21).
c. selected a control that is compatible with the S series motor.

Your local IDC Distributor and our Applications Engineering Department are available to help with your selection process.

1. Base Model Number

Choose the model with sufficient speed and thrust with a comfortable safety margin. **IDC recommends at least 30% reserve thrust for step motor driven systems.**

The EC5-S Series offers two motor wiring choices, ‘T’ (Series) and ‘V’ (Parallel). The ‘T’ and ‘V’ versions include a 12 foot motor quick disconnect cable.

EC5-S cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. Inline models have the motor coupled directly to the lead screw with no reduction.

2. Stroke Length

Parallel Models

<table>
<thead>
<tr>
<th>Rod End</th>
<th>Stroke Length (mm)</th>
<th>Cylinder Mounting Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>T (Series) or V (Parallel)</td>
<td>50</td>
<td>No Charge</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>MF1, MP2, MT1M</td>
</tr>
<tr>
<td></td>
<td>150</td>
<td>MF2, MS6M, MT1E</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>MF3, MS6E, FT1M</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>MS2, MT4, FT1E</td>
</tr>
<tr>
<td></td>
<td>300</td>
<td>MT5, FT1E</td>
</tr>
<tr>
<td></td>
<td>500</td>
<td>MT2, FT2E</td>
</tr>
<tr>
<td></td>
<td>1000</td>
<td>MT3, FT3E</td>
</tr>
<tr>
<td></td>
<td>Custom lengths available in 1 mm increments</td>
<td>Additional Charge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-MP3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-BS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-EMK</td>
</tr>
</tbody>
</table>

Inline Models

<table>
<thead>
<tr>
<th>Stroke Length (mm)</th>
<th>Cylinder Mounting Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>T (Series) or V (Parallel)</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>Custom lengths available in 1 mm increments</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Twelve standard lengths are available from 50 to 1500 mm. Custom lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact the physical end-of-travel on either end. Extra travel length is necessary to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed. For further information on this refer to the EC Selection Guidelines on pages (A-20 to A-21) or the Engineering Section.
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-144.

Cylinder base mount options -MP2, -MP3, -MF2, and -MF3 cannot be ordered with inline models.
MF1, 2, 3 Rectangular Flanges

MF1 Front Flange
MF2 Rear Flange
MF3 Both Flanges

MS2 Side Lugs

MP2 Rear Clevis (MP3 includes pivot base)

MS6M and MS6E Side Tapped Holes

MT4 Trunnion

Pivot Mount Caution:
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90-95% of its full stroke. This increases the system's rigidity and extends the life of the guide bearings and rod seal.

4. Rod Ends
Industrial Devices offers 4 rod end options for EC5 series cylinders.
-FT1M or -FT1E Female Thread

-MT1M or -MT1E Male Thread

-FS2 Spherical Joint

-FC2 Clevis

5. Other Options
See the Options and Accessories section for complete specifications.

BS – Holding Brake
350 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on inline models or with cylinder base mount options (-MF2, -MF3, -MP2, -MP3).

EMK – Encoder
1000 line incremental encoder mounted on the rear shaft of the motor.

L – Linear Potentiometer Output
Linear potentiometer mounted on inside the EC5-S cylinder.

PB – Protective Boot
Protects the thrust tube from solid contaminants and prevents liquids from entering the cylinder through the rod end bearing.

6. Accessories
Magnetic Position Sensors
Position sensors are available for indicating end-of-travel and home positions, or for use with user supplied controls.

To maximize cylinder life, IDC recommends the use of end-of-travel sensors with all cylinders.

Common Application Requirements: For most applications, one home and two end-of-travel sensors are required for each cylinder. Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

3m 4m
Reed Leads Quick Home (N.O.) 3m PSR-1 PSR-1Q
End-of-travel (N.C.) PSR-2 PSR-2Q

Hall Effect
Home (N.O./NPN) PSN-1 PSN-1Q
End-of-travel (N.C./NPN) PSN-2 PSN-2Q

See page A-240 for more limit switch options, including quick-disconnect versions.

7. Compatible Controls
Details of controls are in Sections G. The EC5-S are compatible with:

Model Description
NextStep
S6002 2-Axis Stepper drive
S6961 IDeal™ programmable
S6962 2-Axis IDeal™ programmable
32mm Lead Ballscrew Models

**EC5-B32-10-32B**
EC5-B32-10L-32B

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% 115 VAC</td>
<td>1270</td>
</tr>
<tr>
<td>205VAC</td>
<td>1020</td>
</tr>
<tr>
<td>307VAC</td>
<td>760</td>
</tr>
<tr>
<td>401VAC</td>
<td>600</td>
</tr>
<tr>
<td>501VAC</td>
<td>500</td>
</tr>
<tr>
<td>601VAC</td>
<td>400</td>
</tr>
</tbody>
</table>

**EC5-B32-15-32B**

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% 230 VAC</td>
<td>1270</td>
</tr>
<tr>
<td>115 VAC</td>
<td>1020</td>
</tr>
<tr>
<td>760 VAC</td>
<td>760</td>
</tr>
<tr>
<td>600 VAC</td>
<td>600</td>
</tr>
<tr>
<td>500 VAC</td>
<td>500</td>
</tr>
<tr>
<td>400 VAC</td>
<td>400</td>
</tr>
</tbody>
</table>

**EC5-B32-20-32B**

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% 230 VAC</td>
<td>1270</td>
</tr>
<tr>
<td>115 VAC</td>
<td>1020</td>
</tr>
<tr>
<td>760 VAC</td>
<td>760</td>
</tr>
<tr>
<td>600 VAC</td>
<td>600</td>
</tr>
<tr>
<td>500 VAC</td>
<td>500</td>
</tr>
<tr>
<td>400 VAC</td>
<td>400</td>
</tr>
</tbody>
</table>

**EC5-B32-50-32B**

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% 230 VAC</td>
<td>1270</td>
</tr>
<tr>
<td>115 VAC</td>
<td>1020</td>
</tr>
<tr>
<td>760 VAC</td>
<td>760</td>
</tr>
<tr>
<td>600 VAC</td>
<td>600</td>
</tr>
<tr>
<td>500 VAC</td>
<td>500</td>
</tr>
<tr>
<td>400 VAC</td>
<td>400</td>
</tr>
</tbody>
</table>

**EC5-B32-100-32B**

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% 230 VAC</td>
<td>1270</td>
</tr>
<tr>
<td>115 VAC</td>
<td>1020</td>
</tr>
<tr>
<td>760 VAC</td>
<td>760</td>
</tr>
<tr>
<td>600 VAC</td>
<td>600</td>
</tr>
<tr>
<td>500 VAC</td>
<td>500</td>
</tr>
<tr>
<td>400 VAC</td>
<td>400</td>
</tr>
</tbody>
</table>

* Performance using B8000 Series Controls (not B8501).

* Duty Cycle is percentage of actuator "on time" or movement over 10 minute interval.

---

**32mm Lead Ballscrew**

<table>
<thead>
<tr>
<th>Stroke (mm)</th>
<th>Column Load Limit (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1333</td>
<td>n/a</td>
</tr>
<tr>
<td>1333</td>
<td>n/a</td>
</tr>
<tr>
<td>1333</td>
<td>n/a</td>
</tr>
<tr>
<td>1333</td>
<td>n/a</td>
</tr>
<tr>
<td>1120</td>
<td>814</td>
</tr>
<tr>
<td>814</td>
<td>499</td>
</tr>
<tr>
<td>499</td>
<td>316</td>
</tr>
<tr>
<td>316</td>
<td>229</td>
</tr>
</tbody>
</table>

• Consider leadscrew critical speed and column load limits when specifying longer lengths.

---

EC5-B32-10-32B: 1:1 Timing Belt, 32 mm/rev Ballscrew
EC5-B32-10L-32B: 1:1 Inline Coupling, 32 mm/rev Ballscrew
Max. No-Load Accel. | 14.81 m/s² [585 in/s²]
Repeatability       | ±0.013 mm [±0.0005 in]
Backlash            | 0.30 mm [0.012 in]
Lead Accuracy        | ±0.05 mm/300 mm [±0.002 in/ft]

EC5-B32-15-32B: 1.5:1 Timing Belt, 32 mm/rev Ballscrew
Max. No-Load Accel. | 17.00 m/s² [669 in/s²]
Repeatability       | ±0.013 mm [±0.0005 in]
Backlash            | 0.30 mm [0.012 in]
Lead Accuracy        | ±0.05 mm/300 mm [±0.002 in/ft]

EC5-B32-20-32B: 2.0:1 Timing Belt, 32 mm/rev Ballscrew
Max. No-Load Accel. | 14.53 m/s² [572 in/s²]
Repeatability       | ±0.013 mm [±0.0005 in]
Backlash            | 0.30 mm [0.012 in]
Lead Accuracy        | ±0.05 mm/300 mm [±0.002 in/ft]

EC5-B32-50-32B: 5:1 Gears, 32 mm/rev Ballscrew
Max. No-Load Accel. | 14.72 m/s² [580 in/s²]
Repeatability       | ±0.013 mm [±0.0005 in]
Backlash            | 0.30 mm [0.012 in]
Lead Accuracy        | ±0.05 mm/300 mm [±0.002 in/ft]

EC5-B32-100-32B: 10:1 Gears, 32 mm/rev Ballscrew
Max. No-Load Accel. | 9.27 m/s² [365 in/s²]
Repeatability       | ±0.013 mm [±0.0005 in]
Backlash            | 0.30 mm [0.012 in]
Lead Accuracy        | ±0.05 mm/300 mm [±0.002 in/ft]
**32mm Lead Ballscrew Models**

**EC5-B41-10-32B**
EC5-B41-10L-32B

- 1:1 Timing Belt, 32 mm/rev Ballscrew
- Max. No-Load Accel. 24.98 m/s² [983 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC5-B41-15-32B**
EC5-B41-15L-32B

- 1.5:1 Timing Belt, 32 mm/rev Ballscrew
- Max. No-Load Accel. 25.75 m/s² [1014 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC5-B41-20-32B**
EC5-B41-20L-32B

- 2.0:1 Timing Belt, 32 mm/rev Ballscrew
- Max. No-Load Accel. 21.28 m/s² [838 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC5-B41-50-32B**
EC5-B41-50L-32B

- 5:1 Gears, 32 mm/rev Ballscrew
- Max. No-Load Accel. 15.30 m/s² [602 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC5-B41-100-32B**
EC5-B41-100L-32B

- 10:1 Gears, 32 mm/rev Ballscrew
- Max. No-Load Accel. 8.56 m/s² [337 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

---

- Performance using B8000 Series Controls (not B8501).
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
- Consider leadscrew critical speed and column load limits when specifying longer lengths.
Performance

10mm Lead Ballscrew Models

**EC5-B32-10-10B**
- 1:1 Timing Belt, 10 mm/rev Ballscrew
- Max. No-Load Accel. 5.08 m/s² [200 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC5-B32-15-10B**
- 1.5:1 Timing Belt, 10 mm/rev Ballscrew
- Max. No-Load Accel. 5.70 m/s² [224 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC5-B32-20-10B**
- 2.0:1 Timing Belt, 10 mm/rev Ballscrew
- Max. No-Load Accel. 4.75 m/s² [187 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC5-B32-50-10B**
- 5:1 Gears, 10 mm/rev Ballscrew
- Max. No-Load Accel. 4.68 m/s² [184 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

**EC5-B32-100-10B**
- 10:1 Gears, 10 mm/rev Ballscrew
- Max. No-Load Accel. 2.91 m/s² [115 in/s²]
- Repeatability ±0.013 mm [±0.0005 in]
- Backlash 0.30 mm [0.012 in]
- Lead Accuracy ±0.05 mm/300 mm [±0.002 in/ft]

- Consider lead screw critical speed and column load limits when specifying longer lengths.

**10mm Lead ballscrew**

- Performance using B8000 Series Controls (not B8501).
- Duty Cycle is percentage of actuator "on time" or movement over 10 minute interval.
### Performance

**10mm Lead Ballscrew Models**

#### EC5-B41-10-10B

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>Thrust (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>51</td>
</tr>
<tr>
<td>100%</td>
<td>159</td>
</tr>
<tr>
<td>230 VAC</td>
<td>220</td>
</tr>
</tbody>
</table>

- Max. No-Load Accel.: 8.44 m/s² [332 in/s²]
- Repeatability: ±0.013 mm [±0.0005 in]
- Backlash: 0.30 mm [0.012 in]
- Lead Accuracy: ±0.05 mm/500 mm [±0.002 in/ft]

#### EC5-B41-15-10B

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>Thrust (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>51</td>
</tr>
<tr>
<td>100%</td>
<td>159</td>
</tr>
<tr>
<td>230 VAC</td>
<td>220</td>
</tr>
</tbody>
</table>

- Max. No-Load Accel.: 8.48 m/s² [334 in/s²]
- Repeatability: ±0.013 mm [±0.0005 in]
- Backlash: 0.30 mm [0.012 in]
- Lead Accuracy: ±0.05 mm/500 mm [±0.002 in/ft]

#### EC5-B41-20-10B

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>Thrust (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>51</td>
</tr>
<tr>
<td>100%</td>
<td>159</td>
</tr>
<tr>
<td>230 VAC</td>
<td>220</td>
</tr>
</tbody>
</table>

- Max. No-Load Accel.: 6.87 m/s² [271 in/s²]
- Repeatability: ±0.013 mm [±0.0005 in]
- Backlash: 0.30 mm [0.012 in]
- Lead Accuracy: ±0.05 mm/500 mm [±0.002 in/ft]

#### EC5-B41-50-10B

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>Thrust (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>51</td>
</tr>
<tr>
<td>100%</td>
<td>159</td>
</tr>
<tr>
<td>230 VAC</td>
<td>220</td>
</tr>
</tbody>
</table>

- Max. No-Load Accel.: 4.82 m/s² [190 in/s²]
- Repeatability: ±0.013 mm [±0.0005 in]
- Backlash: 0.30 mm [0.012 in]
- Lead Accuracy: ±0.05 mm/500 mm [±0.002 in/ft]

#### EC5-B41-100-10B

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
<th>Thrust (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>51</td>
</tr>
<tr>
<td>100%</td>
<td>159</td>
</tr>
<tr>
<td>230 VAC</td>
<td>220</td>
</tr>
</tbody>
</table>

- Max. No-Load Accel.: 2.68 m/s² [106 in/s²]
- Repeatability: ±0.013 mm [±0.0005 in]
- Backlash: 0.30 mm [0.012 in]
- Lead Accuracy: ±0.05 mm/500 mm [±0.002 in/ft]

---

- Performance using B8000 Series Controls (not B8501).
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.

---

**Electric Cylinder**

25000 N (5620 lb) Thrust
Servo Motor

---

**EC5-B**

- 100% Duty Cycle
- Intermittent (<2 sec)

---

**10mm Lead Ballscrew Models**

#### EC5-B41-10-10B

- 1:1 Timing Belt, 10 mm/rev Ballscrew
- EC5-B41-10L-10B: 1:1 Inline Coupling, 10 mm/rev Ballscrew
  - Max. No-Load Accel.: 8.44 m/s² [332 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/500 mm [±0.002 in/ft]

#### EC5-B41-15-10B

- 1.5:1 Timing Belt, 10 mm/rev Ballscrew
  - Max. No-Load Accel.: 8.48 m/s² [334 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/500 mm [±0.002 in/ft]

#### EC5-B41-20-10B

- 2:1 Timing Belt, 10 mm/rev Ballscrew
  - Max. No-Load Accel.: 6.87 m/s² [271 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/500 mm [±0.002 in/ft]

#### EC5-B41-50-10B

- 5:1 Gears, 10 mm/rev Ballscrew
  - Max. No-Load Accel.: 4.82 m/s² [190 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/500 mm [±0.002 in/ft]

#### EC5-B41-100-10B

- 10:1 Gears, 10 mm/rev Ballscrew
  - Max. No-Load Accel.: 2.68 m/s² [106 in/s²]
  - Repeatability: ±0.013 mm [±0.0005 in]
  - Backlash: 0.30 mm [0.012 in]
  - Lead Accuracy: ±0.05 mm/500 mm [±0.002 in/ft]

---

*Consider lead screw critical speed and column load limits when specifying longer lengths.*

---

**10mm Lead Ballscrew**

<table>
<thead>
<tr>
<th>Model</th>
<th>Critical Speed (mm/sec)</th>
<th>Stroke (mm)</th>
<th>Column Load Limit (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC5-B41</td>
<td>388</td>
<td>388</td>
<td>388</td>
</tr>
<tr>
<td>100-10B</td>
<td>254</td>
<td>200</td>
<td>300</td>
</tr>
</tbody>
</table>
How To Order

Steps to Ordering a Complete EC5-B System

You are ready to specify an EC5-B actuator model number after you have:

a. completed and verified all necessary information on an IDC Product Selection Worksheet.

b. completed the steps in the EC Selection Guidelines on pages (A-20 to A-21).

c. selected a control that is compatible with the B-series motor.

Your local IDC Distributor and our Applications Engineering Department are available to help with your selection process.

1. Base Model Number

Choose the model with sufficient speed and thrust with a comfortable safety margin. Refer to the EC5-B Speed vs. Thrust curves in this section.

EC5-B cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. Inline models have the motor coupled directly to the leadscrew with no reduction.

Note: All EC5-B cylinders include an encoder.

2. Stroke Length

Twelve standard lengths are available from 50 to 1500 mm. Custom lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact the physical end-of-travel on either end. Extra travel length is necessary to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed.

For further information on this refer to the EC Selection Guidelines on pages (A-20 to A-21) or the Engineering Section.

### Electric Cylinder

<table>
<thead>
<tr>
<th>Base Model</th>
<th>Stroke Length (mm)</th>
<th>Cylinder Mounting</th>
<th>Rod End</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC5-B41-10-32B</td>
<td>50 450</td>
<td>No Charge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC5-B41-15-32B</td>
<td>100 600</td>
<td>-MF1 -MP2 -MT1M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC5-B41-20-32B</td>
<td>150 750</td>
<td>-MF2 -MS6M -MT1E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC5-B41-50-32B</td>
<td>200 1000</td>
<td>-MF3 -MS6E -FT1M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC5-B41-100-32B</td>
<td>250 1250</td>
<td>-MS2 -MT4 -FT1E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC5-B32-10-32B</td>
<td>300 1500</td>
<td>-FM4 -FT2E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC5-B32-15-32B</td>
<td>Custom lengths</td>
<td>-FM5 -FT1M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC5-B32-20-32B</td>
<td>available in 1 mm increments</td>
<td>-FM6 -FT1E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC5-B32-50-32B</td>
<td></td>
<td>-FM7 -FS2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC5-B32-100-32B</td>
<td></td>
<td>-FM8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ballscrew

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor Drive Ratio</th>
<th>Screw Lead, Type</th>
<th>(mm)</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC5-B41-10-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B41-15-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B41-20-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B41-50-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B41-100-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B32-10-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B32-15-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B32-20-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B32-50-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B32-100-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Inline Models (Direct Drive)

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor Drive Ratio</th>
<th>Screw Lead, Type</th>
<th>(mm)</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC5-B41-10-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B41-15-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B41-20-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B41-50-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B41-100-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B32-10-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B32-15-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B32-20-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B32-50-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EC5-B32-100-10B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Additional Charge

| -MP3 | -BM |
| -BS   | |
| -L    | |
| -PB   | |
**How To Order**

**3. Cylinder Mounting**
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-144.

Cylinder base mount options -MP2, -MF3, -MF2, and -MF3 cannot be ordered with inline models.

- MF1, 2, 3 Rectangular Flanges
- MF1 Front Flange
- MF2 Rear Flange
- MF3 Both Flanges

- MS2 Side Lugs
- MP2 Rear Clevis (MP3 includes pivot base)
- MS6M and MS6E Side Tapped Holes

**Pivot Mount Caution:**
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90–95% of its full stroke. This increases the system’s rigidity and extends the life of the guide bearings and rod seal.

**4. Rod Ends**
Industrial Devices offers 4 rod end options for EC5-B series cylinders.

- FT1M or FT1E Female Thread
- MT1M or MT1E Male Thread
- FS2 Spherical Joint
- FC2 Clevis

**5. Other Options**
See the Options and Accessories section for complete specifications.

**BM – Motor Holding Brake**
240 in-lb holding brake mounted on the B41 motor.

**BS – Screw Holding Brake**
350 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on inline models or with cylinder base mount options. (-MF2, -MF3, -MP2, -MP3).

**L – Linear Potentiometer Output**
Linear potentiometer mounted on inside the EC5-B cylinder. For use with B8501 control.

**PB – Protective Boot**
Protects the thrust tube from solid contaminants and prevents liquids from entering the cylinder through the rod end bearing.

**6. Accessories**

**Magnetic Position Sensors**
Position sensors are available for indicating end-of-travel and home positions, or for use with user supplied controls.

To maximize cylinder life, IDC recommends the use of end-of-travel sensors with all cylinders.

Common Application Requirements: For most applications, one home and two end-of-travel sensors are required for each cylinder. Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

<table>
<thead>
<tr>
<th>Reed</th>
<th>3m Leads</th>
<th>4m Quick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home (N.O.)</td>
<td>PSR-1</td>
<td>PSR-1Q</td>
</tr>
<tr>
<td>End-of-travel (N.C.)</td>
<td>PSR-2</td>
<td>PSR-2Q</td>
</tr>
<tr>
<td>Hall Effect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home (N.O./NPN)</td>
<td>PSN-1</td>
<td>PSN-1Q</td>
</tr>
<tr>
<td>End-of-travel (NC/NPN)</td>
<td>PSN-2</td>
<td>PSN-2Q</td>
</tr>
</tbody>
</table>

See page A-240 for more limit switch options, including quick disconnect versions.

**7. Compatible Controls**
Details of controls are in Sections H. The EC5-B is compatible with:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8001</td>
<td>Digital servo drive</td>
</tr>
<tr>
<td>B8501</td>
<td>Analog position</td>
</tr>
<tr>
<td>B8961</td>
<td>IDEAL™ programmable servo</td>
</tr>
<tr>
<td>B8962</td>
<td>2 Axis IDEAL™ programmable servo</td>
</tr>
</tbody>
</table>
MS2 Side Lugs Mounting
Parallel

MS6 Side Tapped Holes Mounting
Parallel

Dimensions

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-150 to A-152
- For rod-end dimensions, go to page A-154
**MP2/MP3 Clevis Mount with Pivot Base and Pin**

**Parallel**

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette.
- For motor dimensions, go to pages A-150 to A-152.
- For rod-end dimensions, go to page A-154.

**Note:**
- Order MP3 to specify complete mounting kit, including actuator clevis, pin and pivot base.
- Order MP2 to omit the pivot base.

---

**MF1 Head Rectangular Flange Mounting**

**Parallel**

---

---

---
**MF2 Cap Rectangular Flange Mounting**  
Parallel

**MF3 Both Ends Rectangular Flange Mounting**  
Parallel

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette.
- For motor dimensions, go to pages A-150 to A-152.
- For rod-end dimensions, go to page A-154.

* FLANGE DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 100mm BORE SIZE

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH</td>
</tr>
</tbody>
</table>
**MT4 Trunnion Mounting**

**Parallel**

**MS2 Side End Angles Mounting**

**Inline**

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette.
- For motor dimensions, go to pages A-150 to A-152.
- For rod-end dimensions, go to page A-154.

---

**TRUNNION DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 100mm BORE SIZE**

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: CYLINDER LENGTH</td>
<td>14.62 [371.3] + STROKE</td>
</tr>
<tr>
<td>B: RETRACT LENGTH</td>
<td>16.74 [425.3] + STROKE</td>
</tr>
<tr>
<td>C: MOUNTING LENGTH</td>
<td>3.55 [90.2] + STROKE</td>
</tr>
</tbody>
</table>

---

**CIRCLIP R CLIPS**

- For rod-end dimensions, go to page A-154.
Electric Cylinders

**MS6 Side Tapped Holes Mounting**

**Inline**

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
<th>DM</th>
<th>OPTION CODE</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CYLINDER LENGTH</td>
<td>14.62 (371.3) + STROKE</td>
<td>D</td>
<td>MS6E</td>
</tr>
<tr>
<td>B</td>
<td>RETRACT LENGTH</td>
<td>16.74 (425.3) + STROKE</td>
<td></td>
<td>MS6M</td>
</tr>
<tr>
<td>C</td>
<td>MOUNTING LENGTH</td>
<td>9.65 (242.6) + STROKE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MF1 Head Rectangular Flange Mounting**

**Inline**

* Flange dimensions in accordance with ISO 6431 for 100mm bore size.
MT4 Trunnion Mounting
Inline

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-150 to A-152
- For rod-end dimensions, go to page A-154

**Dimensions**

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A CYLINDER LENGTH</td>
<td>14.62 [371.3] + STROKE</td>
</tr>
<tr>
<td>B RETRACT LENGTH</td>
<td>16.74 [425.3] + STROKE</td>
</tr>
<tr>
<td>C MOUNTING LENGTH</td>
<td>10.30 [261.6] + STROKE</td>
</tr>
</tbody>
</table>

**TRUNNION DIMENSIONS IN ACCORDANCE WITH ISO 6431 FOR 100mm BORE SIZE**

Industrial Devices Corporation
707-789-1000 • http://www.idcmotion.com • 24 hour info by fax 916-431-6548

A-149
1.8° Permanent Magnet Hybrid Step Motor

Winding Data
- S42T and S42V
- Series (T), 8mH; Parallel (V), 2mH

Resistance
- Series (T), 4.4; Parallel (V), 1.1

Current Settings
- Series (T) at 120 VAC, 6.0 Amps
- Parallel (V) at 120 VAC or
- Series (T) at 240 VAC, 7.9 Amps

Static Torque
- Series (T) 1000 oz-in, Parallel (V) 725 oz-in

Rotor Inertia
- 0.114 oz-in·sec²

Connections
- EC5-S42T, and EC5-S42V: 5 contant quick disconnect receptacle in anodized or painted aluminum shell, includes 12 ft [3.7 m] cable with molded plug.

Temperature
- 212°F [100°C] maximum allowable motor case temperature.
- Actual motor case temperature is ambient, duty cycle, speed and load dependent.
- Refer to speed vs. thrust curves for system duty ratings.
EC5-B Series

Rare Earth Magnet Brushless Servo Motor with 2,000 Line Encoder and Commutation Sensors

Winding Data
- B32
- Inductance: 9.8 mH
- Resistance: 3.4
- Torque Constant: 99.2 oz-in/Amp
- Voltage Constant: 45.5 V/krpm

Torque
- Continuous: 476 oz-in (4.8 Amps)
- Peak: 992 oz-in (10.0 Amps)

Rotor Inertia: 0.016 oz-in-sec²

Connections
- MS-type connectors for motor winding and encoder on motor.
- Includes 12 ft. [3.7 m] cable with mating connector.

Temperature
- 212°F [100°C] maximum allowed case temperature.

Environmental
- IP65 Rating

B32 Motor

[Diagram of motor specifications and dimensions]
EC5-B Series

Rare Earth Magnet Brushless Servo Motor with 2,000 Line Encoder and Commutation Sensors

Winding Data
Inductance 24.0 mH
Resistance 3.6
Torque Constant 187 oz-in/Amp
Voltage Constant 148 V/krpm
Torque
Continuous 935 oz-in (4.8 Amps)
Peak 1870 oz-in (10.0 Amps)
Rotor Inertia 0.0416 oz-in-sec²
Connections MS-type connectors for motor winding and encoder on motor. Includes 12 ft. [3.7 m] cable with mating connector.
Temperature 212°F [100°C] maximum allowed case temperature.
Environmental IP65 Rating

B41 Motor
## Rod End Dimensions

**Dimensions in [mm]**

### MT1 Male Threads

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø1.57 [50]</td>
<td>4.19</td>
</tr>
<tr>
<td>MT1M</td>
<td></td>
</tr>
<tr>
<td>Ø1.97 [50]</td>
<td>5.00</td>
</tr>
<tr>
<td>MT1M</td>
<td></td>
</tr>
<tr>
<td>Ø1.97 [50]</td>
<td>5.00</td>
</tr>
<tr>
<td>MT1M</td>
<td></td>
</tr>
<tr>
<td>Ø1.97 [50]</td>
<td>5.00</td>
</tr>
</tbody>
</table>

### FT1 Female Threads

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø1.57 [50]</td>
<td>4.19</td>
</tr>
<tr>
<td>FT1F</td>
<td></td>
</tr>
<tr>
<td>Ø1.97 [50]</td>
<td>5.00</td>
</tr>
<tr>
<td>FT1F</td>
<td></td>
</tr>
<tr>
<td>Ø1.97 [50]</td>
<td>5.00</td>
</tr>
</tbody>
</table>

### FC2 Clevis with Pin

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEX</td>
<td>0.79</td>
</tr>
<tr>
<td>(MT1M Rod End)</td>
<td></td>
</tr>
<tr>
<td>Ø0.984/0.979 PIN</td>
<td>0.98</td>
</tr>
<tr>
<td>(MT1M Rod End)</td>
<td></td>
</tr>
<tr>
<td>Ø0.79 [20]</td>
<td>1.97</td>
</tr>
</tbody>
</table>

### FS2 Spherical

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEX</td>
<td>0.79</td>
</tr>
<tr>
<td>(MT1M Rod End)</td>
<td></td>
</tr>
<tr>
<td>Ø0.9868/0.9838</td>
<td>0.9868</td>
</tr>
<tr>
<td>(MT1M Rod End)</td>
<td></td>
</tr>
<tr>
<td>Ø0.79 [20]</td>
<td>1.97</td>
</tr>
</tbody>
</table>
N2 Series electric cylinders are available with four motor types to meet a variety of application requirements. The N2-D family features a cost effective 24 VDC motor. When combined with D Series controls, the complete system provides simple extend–retract motion, positioning to predetermined stopping locations, or positioning to an analog voltage command; all at the lowest installed cost.

Operating with a powerful 160 VDC motor, the N2-H family of cylinders are ideally suited for high load and duty cycle applications. Controls provide simple limit switch positioning and edge guiding, or positioning to an analog voltage command.

The N2-S/P family is a step motor based linear actuator. These systems are selected for applications that require high load and duty cycle, in-position holding, open loop operation, repeatable positioning to 0.0005 inches [0.013 mm] and maintenance-free operation.

Industrial Devices’ N2-B Series Electric Cylinders offer very high acceleration and duty cycle for the most demanding automated motion applications. The B8000 Servo Drives are designed to optimize the performance of the brushless servo motor.

All N2 Series Cylinders are available with several time-proven options to enhance operation in the industrial environment. Options include holding brakes, linear potentiometers or encoders for position feedback, dual rod-end bearings to increase side load and more. See the end of this section for more information.

<table>
<thead>
<tr>
<th></th>
<th>N2-D Series</th>
<th>N2-H Series</th>
<th>N2-S/P Series</th>
<th>N2-B Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Type</td>
<td>24 VDC</td>
<td>160 VDC</td>
<td>1.8° Rare Earth Magnet</td>
<td>Rare Earth Magnet</td>
</tr>
<tr>
<td></td>
<td>Permanent Magnet</td>
<td>Permanent Magnet Servo</td>
<td>Hybrid Stepper</td>
<td>Brushless Servo</td>
</tr>
<tr>
<td>Repeatability</td>
<td>in [mm]</td>
<td>±0.005 [.127]</td>
<td>± 0.005 [.127]</td>
<td>±0.0005 [.0127]</td>
</tr>
<tr>
<td>Compatible Controls Offered</td>
<td></td>
<td>NextStep B8001</td>
<td></td>
<td>SmartStep B8051</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H3301B</td>
<td>B8961</td>
<td>S6002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D2200</td>
<td>H3302B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>D2400</td>
<td>H3501</td>
<td>B8962</td>
</tr>
</tbody>
</table>
General Specifications
System Backlash 0.015 inches [0.38 mm]
Thrust Tube
Side Load Moment Consult factory.
Rotation Does not rotate.
Standard Travel Lengths 2, 4, 6, 8, 10, 12, and 16.5 (18-DB); custom stroke lengths available

Construction Materials
Bearing Housings Type 380 die cast aluminum, epoxy coated
Cylinder Housing 6063 T-6 aluminum, hard-coated anodized and Teflon impregnated
Thrust Tube 300 Series stainless steel, 1/8 hard, ground
Wiper Seal Polyurethane
Lead Screw
Pitch Choices 2, 5 Ball; 5, 8 Acme
Support Bearings Ball bearings
Acme Screw; drive nut 0.625 inch diameter, carbon steel screw; lubricated polyacetal plastic (N2-D, N2-P) or bronze (N2-H, N2-S, N2-B) nut
Ball Screw; drive nut 0.625 inch diameter, carbon steel screw; alloy steel, heat-treated ball nut

Life
Acme Screw Life: Usable life for an acme screw is defined as the length of travel completed before backlash (of leadscrew/nut) exceeds 0.020 inches [0.5 mm]. A travel life of 1 million inches under the maximum rated load can be used as a general approximation, however, since wear is directly dependent on application conditions (load, duty cycle, move profiles and environment) it is difficult to quantify an accurate travel life.

Weight (Approximate, 2 inch stroke unit without options. Add 0.25 lbs [0.11kg] per additional inch of stroke.)
N2-D Series 7 lbs [3.2 kg]
N2-H Series 9 lbs [4.1 kg]
N2-S/P Series
  N2-P22 6 lbs [2.7 kg]
  N2-S32 9 lbs [4.1 kg]
N2-B Series 6 lbs [2.7 kg]

Motor Specifications/Dimensions See pages A-194 to A-198

Environmental Operation (See the Options and Accessories section, page A-231.)
Temperature Range 32° to 140°F, [0° to 60°C]
  -H high temperature option allows 32° to 160°F [0° to 70°C]
  -F sub-freezing temperature option allows -20° to 105°F [-29° to 40°C]
Moisture Humid, but not direct moisture contact
  -W water resistant option allows some direct moisture contact
Contaminants Non-corrosive, non-abrasive
  -PB protective boot option prevents moisture and dry contaminants from entering the cylinder through the wiper ring on the rod

Ball Screw Life: Load vs. Travel Life Chart

- Lead (lbs)
  - Travel Life (1 = 1,000,000 inches)

  1  2  3  4  5  6  7  8  9 10 20 30 40 50 60 70 80 90 100 110 120 130 140

  -SM/2B
### High-Speed Ballscrew Models

**N2-D-10-2B and N2-D-10L-2B**

- **Min. Backdrive Load**: 10 lbs (45 N)
- **Max. No-Load Accel.**: 180 in/s² (4572 mm/s²)
- **Repeatability**: ±0.010 in (±0.254 mm)

**N2-D-15-2B**

- **Min. Backdrive Load**: 10 lbs (45 N)
- **Max. No-Load Accel.**: 150 in/s² (3810 mm/s²)
- **Repeatability**: ±0.010 in (±0.254 mm)

**N2-D-20-2B**

- **Min. Backdrive Load**: 10 lbs (45 N)
- **Max. No-Load Accel.**: 150 in/s² (3810 mm/s²)
- **Repeatability**: ±0.010 in (±0.254 mm)

---

- Performance using D2200 or D2300 Series Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
- For D2500B control, derate thrust by 50%.
- Repeatability achievable with D2300 control. Reduce cylinder speed prior to final positioning.

---

**Critical Speed (in/sec)**

<table>
<thead>
<tr>
<th>Stroke (in)</th>
<th>Column Load Limit (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 thru 18-DB</td>
<td>n/a</td>
</tr>
</tbody>
</table>

---

**30.0**
Ballscrew Models

N2-D-10-5B and N2-D-10L-5B

N2-D-15-5B

N2-D-20-5B

N2-D-31-5B

N2-D-120-5B

Performance

Electric Cylinder

600 lb

24 Volt DC Motor

--- 100% Duty Cycle --- 60% Duty Cycle --- 30% Duty Cycle ---

N2-D-10-5B: 1:1 Timing Belt, 5 rev/inch Ballscrew
N2-D-10L-5B: Inline Coupling, 5 rev/inch Ballscrew

Min. Backdrive Load 10 lbs 45 N
Max. No-Load Accel. 180 in/s² 4572 mm/s²
Repeatability ±0.010 in ±0.254 mm

N2-D-15-5B: 1.5:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load 20 lbs 89 N
Max. No-Load Accel. 80 in/s² 2032 mm/s²
Repeatability ±0.005 in ±0.127 mm

N2-D-20-5B: 2:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load 20 lbs 89 N
Max. No-Load Accel. 70 in/s² 1778 mm/s²
Repeatability ±0.005 in ±0.127 mm

N2-D-31-5B: 3:1 Helical Gear, 5 rev/inch Ballscrew

Min. Backdrive Load 20 lbs 89 N
Max. No-Load Accel. 40 in/s² 1016 mm/s²
Repeatability ±0.005 in ±0.127 mm

N2-D-120-5B: 12:1 Helical Gear, 5 rev/inch Ballscrew

Min. Backdrive Load 20 lbs 89 N
Max. No-Load Accel. 13 in/s² 350 mm/s²
Repeatability ±0.005 in ±0.127 mm

• Consider leadscrew critical speed and column load limits when specifying longer lengths.

5B

15.0 Critical Speed (in/sec)

2 thru 18-DB Stroke (in)

n/a Column Load Limit (lb)
Electric Cylinders

**Performance**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-D-10-5A</td>
<td>1:1 Timing Belt, 5 rev/inch Acme Screw</td>
<td>100</td>
<td>305–12</td>
</tr>
<tr>
<td>N2-D-10L-5A</td>
<td>1:1 Inline Coupling, 5 rev/inch Acme Screw</td>
<td>100</td>
<td>305–12</td>
</tr>
<tr>
<td>N2-D-15-5A</td>
<td>1.5:1 Timing Belt, 5 rev/inch Acme Screw</td>
<td>100</td>
<td>127</td>
</tr>
<tr>
<td>N2-D-20-5A</td>
<td>2:1 Timing Belt, 5 rev/inch Acme Screw</td>
<td>100</td>
<td>76</td>
</tr>
<tr>
<td>N2-D-31-5A</td>
<td>3.1:1 Helical Gear, 5 rev/inch Acme Screw</td>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>N2-D-120-5A</td>
<td>12:1 Helical Gear, 5 rev/inch Acme Screw</td>
<td>100</td>
<td>127</td>
</tr>
</tbody>
</table>

**Specifications**

- **Min. Backdrive Load**: 100 lbs
- **Max. No-Load Accel.**: 100 in/s²
- **Repeatability**: ±0.005 in

**Duty Cycle**

- **100% Duty Cycle**
- **60% Duty Cycle**
- **30% Duty Cycle**

**Additional Notes**

- Performance using D2200 or D2300 Series Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
- For D2500B control, derate thrust by 50%.
- Repeatability achievable with D2300 control. Reduce cylinder speed prior to final positioning.
**Acme Screw Models**

**N2-D-10-8A and N2-D-10L-8A**

- **Min. Backdrive Load**: 600 lbs (2669 N)
- **Max. No-Load Accel.**: 60 in/s² (1524 mm/s²)
- **Repeatability**: ±0.005 in (±0.127 mm)

**N2-D-15-8A**

- **Min. Backdrive Load**: 600 lbs (2669 N)
- **Max. No-Load Accel.**: 50 in/s² (1270 mm/s²)
- **Repeatability**: ±0.005 in (±0.127 mm)

**N2-D-20-8A**

- **Min. Backdrive Load**: 600 lbs (2669 N)
- **Max. No-Load Accel.**: 40 in/s² (1016 mm/s²)
- **Repeatability**: ±0.005 in (±0.127 mm)

**N2-D-31-8A**

- **Min. Backdrive Load**: 600 lbs (2669 N)
- **Max. No-Load Accel.**: 25 in/s² (635 mm/s²)
- **Repeatability**: ±0.005 in (±0.127 mm)

**N2-D-120-8A**

- **Min. Backdrive Load**: 600 lbs (2669 N)
- **Max. No-Load Accel.**: 8 in/s² (203 mm/s²)
- **Repeatability**: ±0.005 in (±0.127 mm)

- **N2-D-10-8A**: 1:1 Timing Belt, 8 rev/inch Acme Screw
- **N2-D-10L-8A**: 1:1 Inline Coupling, 8 rev/inch Acme Screw

- **N2-D-15-8A**: 1.5:1 Timing Belt, 8 rev/inch Acme Screw
- **N2-D-20-8A**: 2:1 Timing Belt, 8 rev/inch Acme Screw
- **N2-D-31-8A**: 3.1:1 Helical Gear, 8 rev/inch Acme Screw
- **N2-D-120-8A**: 12:1 Helical Gear, 8 rev/inch Acme Screw

- **Note**: Consider leadscrew critical speed and column load limits when specifying longer lengths.
### Steps To Ordering A Complete N2-D System

The following steps will guide you to a complete N2-D Series system for your application.

For help:
- Complete Application Data Form.
- Review the N2-D Series specifications on pages A-159 to A-163.
- Refer to the Engineering section for selection assistance.
- Consult your local Industrial Devices distributor, or call the factory.

### How To Order

#### 1. Base Model Number
Select the N2-D model which provides sufficient thrust and speed for the application, with a comfortable margin of safety. Refer to the N2-D Speed vs. Thrust curves in this section. When making this selection, be sure to consider duty cycle, side loading, back driving, and the other design considerations from the IDC Application Data Form.

N2-D cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. With in-line units, the motor is always coupled directly to the screw shaft, with no reduction.

#### 2. Stroke Length
Seven standard travel lengths are available from 2 to 16.5 inches. Longer lengths and custom in-between lengths also are available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact either physical end-of-stroke during normal operation. Extra travel length is needed to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed.

**Dual Rod End Bearing (-DB) is**
- required above 12 inch stroke
- optional with 12 inches and below

The -DB option reduces actual travel by 1.5 inches (e.g., N2-18-DB has 16.5 in travel).

**Pivot Mount Caution:**
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90–95% of its full stroke. This increases the system’s rigidity and extends the life of the guide bearings and rod seal.

#### Parallel Models

![Parallel Model Diagram](image)

#### In-Line Models

![In-Line Model Diagram](image)

### Electric Cylinder

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Drive Ratio</th>
<th>Screw Pitch, Type</th>
<th>(in)</th>
<th>Cylinder Mounting</th>
<th>Rod End</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-D-10-2B</td>
<td>2</td>
<td></td>
<td>2</td>
<td>No Charge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N2-D-15-2B</td>
<td>4</td>
<td></td>
<td>4</td>
<td>-MF1*</td>
<td>-FS1*</td>
<td>-DB</td>
</tr>
<tr>
<td>N2-D-20-2B</td>
<td>6</td>
<td></td>
<td>6</td>
<td>-MF2*</td>
<td>-FS2*</td>
<td></td>
</tr>
<tr>
<td>N2-D-31-2B</td>
<td>8</td>
<td></td>
<td>8</td>
<td>-MF3*</td>
<td>-FS3*</td>
<td></td>
</tr>
<tr>
<td>N2-D-10-5B</td>
<td>10</td>
<td></td>
<td>10</td>
<td>-MP2</td>
<td>-MT2*</td>
<td></td>
</tr>
<tr>
<td>N2-D-15-5B</td>
<td>12</td>
<td></td>
<td>12</td>
<td>-MP3</td>
<td>-MT3*</td>
<td></td>
</tr>
<tr>
<td>N2-D-20-5B</td>
<td>18</td>
<td></td>
<td>18</td>
<td>-MP4</td>
<td>-MT4*</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inline Models</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-D-10-2B</td>
<td>2</td>
<td></td>
<td>2</td>
<td>No Charge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N2-D-15-2B</td>
<td>4</td>
<td></td>
<td>4</td>
<td>-MF1*</td>
<td>-FS1*</td>
<td>-DB</td>
</tr>
<tr>
<td>N2-D-20-2B</td>
<td>6</td>
<td></td>
<td>6</td>
<td>-MF2*</td>
<td>-FS2*</td>
<td></td>
</tr>
<tr>
<td>N2-D-31-2B</td>
<td>8</td>
<td></td>
<td>8</td>
<td>-MF3*</td>
<td>-FS3*</td>
<td></td>
</tr>
<tr>
<td>N2-D-10-5B</td>
<td>10</td>
<td></td>
<td>10</td>
<td>-MP2</td>
<td>-MT2*</td>
<td></td>
</tr>
<tr>
<td>N2-D-15-5B</td>
<td>12</td>
<td></td>
<td>12</td>
<td>-MP3</td>
<td>-MT3*</td>
<td></td>
</tr>
<tr>
<td>N2-D-20-5B</td>
<td>18</td>
<td></td>
<td>18</td>
<td>-MP4</td>
<td>-MT4*</td>
<td></td>
</tr>
</tbody>
</table>

1) 16.5 in actual travel

> Make It An IDeal System

See Intro Pages 6 & 7

---

**Additional Charge**

- MP5
- FC2
- BS
- EMK
- F
- H
- L
- PB
- Q
- W

---

Industrial Devices Corporation
707-789-1000 • 800-747-0064 • E-mail: info@idcmotion.com
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-189.

Cylinder base mount options -MP2, -MP3, -MF2, and -MF3 cannot be ordered with in-line models.

MF1, 2, 3 Rectangular Flanges

MF1 Front Flange (Metric MF1M)
MF2 Rear Flange (Metric MF2M)
MF3 Both Flanges (Metric MF3M)

MP2 Rear Clevis (MP3 includes pivot base)

MS1 Side End Angles

MS2 Side Lugs

MS6 Side Tapped Holes (Metric MS6M)

MT4 Trunnion (In-Line Models Only)

4. Rod Ends
Industrial Devices offers 5 rod end options for N2-D Series cylinders.

-FT1 Female Thread

-MT1 Male Thread

-FE2 Female Eye

-FS2 Spherical Joint

-FC2 Clevis

5. Options
See the Options and Accessories section for complete specifications.

-BS Holding Brake
20 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on in-line models or with cylinder base mount options (-MF2, -MF3, -MS1, -MP2, -MP3).

-DB Dual Rod End Bearing
Increases side load rating. Reduces actual stroke length by 1.5 inches.

-EMK Encoder
1000 line incremental encoder mounted on the rear shaft of the motor. Not available on N2-D Series with -Q quick disconnect option.

-F Sub-Freezing Environment
For operation to -20°F. Increases system backlash to 0.025 inches max.

-H High Temperature
Increases maximum cylinder operating temperature to 180°F. Note: -F and -H are not compatible.

-L Linear Potentiometer Output
Linear potentiometer mounted inside the N2-D cylinder.

-PB Protective Boot
Protects the thrust tube from solid contaminants and prevents liquids from entering the cylinder through the rod end bearing. Includes the -W option. (Not included with -MS1.)

-W Water Resistant Option
Provides protection from moisture contact with cylinder.

-Q Motor Quick Disconnect
Male quick disconnect receptacle installed in the back of the cylinder drive housing, including a 12 ft. motor cable with molded quick disconnect plug. Cannot be ordered with N2-D inline models.

6. Accessories
Magnetic Position Sensors
Position sensors are available for triggering stop, speed/direction change, or end-of-travel.

To maximize cylinder life, IDC recommends the use of end-of-travel limit switches with all cylinders.

Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

- Reed Leads 3m 4m
  Normally open PSR-1 PSR-1Q
  Normally closed PSR-2 PSR-2Q

- Hall Effect
  Normally open, NPN PSN-1 PSN-1Q
  Normally closed, NPN PSN-2 PSN-2Q

See page A-240 for more limit switch options, including quick-disconnect versions.

7. D2000 Series Controls
Details of the D2000 Series 24 volt DC controls are in Section F.

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D2200</td>
<td>Simple limit switch</td>
</tr>
<tr>
<td>D2300</td>
<td>Limit switch</td>
</tr>
<tr>
<td>D2500</td>
<td>Analog position</td>
</tr>
</tbody>
</table>
Electric Cylinder
600 lb
160 Volt DC Motor

High-Speed Ball Screw Models

N2-H-10-2B and N2-H-10L-2B

Min. Backdrive Load: 10 lbs (45 N)
Max. No-Load Accel.: 200 in/s² (5080 mm/s²)
Repeatability: ±0.010 in (±0.254 mm)

N2-H-15-2B

Min. Backdrive Load: 10 lbs (45 N)
Max. No-Load Accel.: 140 in/s² (3556 mm/s²)
Repeatability: ±0.010 in (±0.254 mm)

N2-H-20-2B

Min. Backdrive Load: 10 lbs (45 N)
Max. No-Load Accel.: 140 in/s² (3556 mm/s²)
Repeatability: ±0.010 in (±0.254 mm)

Performance

• Performance using H3000 Series Controls.
• Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
For operation in the 60% or 30% region, motor temperature rise due to load, speed, number of acceleration/decelerations, and ambient temperature require consideration.
### N2-H-10-5B and N2-H-10L-5B
- **Speed (mm/s):**
  - 381.5
  - 305.12
  - 229.9
  - 152.9
  - 76.3
  - 3.0

- **Thrust (lbs):**
  - 0
  - 311
  - 623
  - 934
  - 1245
  - 1557

- **Duty Cycles:**
  - 100%
  - 60%
  - 30%

### N2-H-15-5B
- **Speed (mm/s):**
  - 254
  - 10
  - 203
  - 102
  - 51

- **Thrust (lbs):**
  - 0
  - 489
  - 979
  - 1,468
  - 2,097
  - 2,547

- **Duty Cycles:**
  - 100%
  - 60%
  - 30%

### N2-H-20-5B
- **Speed (mm/s):**
  - 178
  - 7
  - 6
  - 5
  - 3

- **Thrust (lbs):**
  - 0
  - 100
  - 200
  - 300
  - 400
  - 500

- **Duty Cycles:**
  - 100%
  - 60%
  - 30%

### N2-H-31-5B
- **Speed (mm/s):**
  - 102
  - 4.0
  - 89.0
  - 76.0
  - 64.0

- **Thrust (lbs):**
  - 0
  - 445
  - 600
  - 700

- **Duty Cycles:**
  - 100%
  - 60%
  - 30%

---

**N2-H-10-5B:** 1:1 Timing Belt, 5 rev/inch Ballscrew
- **Min. Backdrive Load:** 20 lbs 89 N
- **Max. No-Load Accel.:** 110 in/s² 2794 mm/s²
- **Repeatability:** ±0.005 in ±0.127 mm

**N2-H-10L-5B:** 1:1 Inline Coupling, 5 rev/inch Ballscrew
- **Min. Backdrive Load:** 20 lbs 89 N
- **Max. No-Load Accel.:** 110 in/s² 2794 mm/s²
- **Repeatability:** ±0.005 in ±0.127 mm

**N2-H-15-5B:** 1.5:1 Timing Belt, 5 rev/inch Ballscrew
- **Min. Backdrive Load:** 20 lbs 89 N
- **Max. No-Load Accel.:** 90 in/s² 2286 mm/s²
- **Repeatability:** ±0.005 in ±0.127 mm

**N2-H-20-5B:** 2:1 Timing Belt, 5 rev/inch Ballscrew
- **Min. Backdrive Load:** 20 lbs 89 N
- **Max. No-Load Accel.:** 70 in/s² 1778 mm/s²
- **Repeatability:** ±0.005 in ±0.127 mm

**N2-H-31-5B:** 3.1:1 Helical Gears, 5 rev/inch Ballscrew
- **Min. Backdrive Load:** 20 lbs 89 N
- **Max. No-Load Accel.:** 40 in/s² 1016 mm/s²
- **Repeatability:** ±0.005 in ±0.127 mm

---

- Consider leadscrew critical speed and column load limits when specifying longer lengths.

<table>
<thead>
<tr>
<th>Stroke</th>
<th>Critical Speed (in/sec)</th>
<th>Column Load Limit (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 thru 18-DB</td>
<td>30.0</td>
<td>n/a</td>
</tr>
<tr>
<td>5B</td>
<td>15.0</td>
<td>n/a</td>
</tr>
</tbody>
</table>
**Acme Screw Models**

**N2-H-10-5A and N2-H-10L-5A**

- **Min. Backdrive Load**: 400 lbs (1779 N)
- **Max. No-Load Accel.**: 90 in/s² (2286 mm/s²)
- **Repeatability**: ±0.005 in (±0.127 mm)

**N2-H-15-5A**

- **Min. Backdrive Load**: 400 lbs (1779 N)
- **Max. No-Load Accel.**: 110 in/s² (2794 mm/s²)
- **Repeatability**: ±0.005 in (±0.127 mm)

**N2-H-20-5A**

- **Min. Backdrive Load**: 400 lbs (1779 N)
- **Max. No-Load Accel.**: 70 in/s² (1778 mm/s²)
- **Repeatability**: ±0.005 in (±0.127 mm)

**N2-H-31-5A**

- **Min. Backdrive Load**: 400 lbs (1779 N)
- **Max. No-Load Accel.**: 40 in/s² (1016 mm/s²)
- **Repeatability**: ±0.005 in (±0.127 mm)

- Performance using H3000 Series Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
  For operation in the 60% or 30% region, motor temperature rise due to load, speed, number of acceleration/decelerations, and ambient temperature require consideration.
Performance

Electric Cylinder 600 lb 160 Volt DC Motor

Acme Screw Models

**N2-H-10-8A and N2-H-10L-8A**

- Min. Backdrive Load: 600 lb (2669 N)
- Max. No-Load Accel.: 60 in/s² (1524 mm/s²)
- Repeatability: ±0.005 in ±0.127 mm

**N2-H-15-8A**

- Min. Backdrive Load: 600 lb (2669 N)
- Max. No-Load Accel.: 50 in/s² (1270 mm/s²)
- Repeatability: ±0.005 in ±0.127 mm

**N2-H-20-8A**

- Min. Backdrive Load: 600 lb (2669 N)
- Max. No-Load Accel.: 45 in/s² (1143 mm/s²)
- Repeatability: ±0.005 in ±0.127 mm

**N2-H-31-8A**

- Min. Backdrive Load: 600 lb (2669 N)
- Max. No-Load Accel.: 25 in/s² (655 mm/s²)
- Repeatability: ±0.005 in ±0.127 mm

*Consider leadscrew critical speed and column load limits when specifying longer lengths.*

5A

| Stroke (in) | 2 thru 12 | 15.0 | Critical Speed (in/sec) | 13.8 |
|-------------|--|------|--|------|--|
| n/a | n/a | Critical Load Limit (lb) | n/a |

8A

<table>
<thead>
<tr>
<th>Stroke (in)</th>
<th>2 thru 18-DB</th>
<th>9.4</th>
<th>Critical Speed (in/sec)</th>
<th>13.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>n/a</td>
<td>Critical Load Limit (lb)</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>
Steps To Ordering A Complete N2-H System

The following steps will guide you to a complete N2-H Series system for your application.

For help:
- Complete Application Data Form.
- Review the N2-H Series specifications on pages A-159 and A-166 to A-169.
- Refer to the Engineering section for selection assistance.
- Consult your local Industrial Devices distributor, or call the factory.

1. Base Model Number

Select the N2-H model which provides sufficient thrust and speed for the application, with a comfortable margin of safety. Refer to the N2-H Speed vs. Thrust curves in this section. When making this selection, be sure to consider duty cycle, side loading, back driving, and other design considerations from the IDC Application Data Form.

N2-H cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. With in-line units, the motor is always coupled directly to the screw shaft, with no reduction.

Parallel Models

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Drive Ratio</th>
<th>Screw Pitch, Type</th>
<th>(in)</th>
<th>Rod End</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2H-10-2B</td>
<td>N2H-10-5B</td>
<td>2</td>
<td>N2H-10-5A</td>
<td>16.5</td>
<td>DB</td>
<td></td>
</tr>
<tr>
<td>N2H-20-2B</td>
<td>N2H-20-5B</td>
<td>6</td>
<td>N2H-20-5A</td>
<td>16.5</td>
<td>DB</td>
<td></td>
</tr>
<tr>
<td>N2H-31-2B</td>
<td>N2H-31-5B</td>
<td>8</td>
<td>N2H-31-5A</td>
<td>16.5</td>
<td>DB</td>
<td></td>
</tr>
</tbody>
</table>

| Inline Models     |       |             |                   |      |         |         |
| N2H-10-2B         | N2H-10-5B | 2          | N2H-10-5A         | 16.5 | DB      |         |
| N2H-10-5A         | N2H-10-8A | 8          | N2H-10-8A         | 16.5 | DB      |         |

2. Stroke Length

Seven standard travel lengths are available from 2 to 16.5 inches. Longer lengths and custom in-between lengths also are available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact either physical end-of-stroke during normal operation. Extra travel length is needed to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed.

Dual Rod End Bearing (-DB) is
- required above 12 inch stroke
- optional with 12 inches and below

The -DB option reduces actual travel by 1.5 inches (e.g., N2-18-DB has 16.5 in travel).

Pivot Mount Caution:
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90—95% of its full stroke. This increases the system’s rigidity and extends the life of the guide bearings and rod seal.
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-189.
Cylinder base mount options -MP2, -MP3, -MF2, and -MF3 cannot be ordered with in-line models.
- MF1, 2, 3 Rectangular Flanges
- MF1 Front Flange (Metric MF1M)
- MF2 Rear Flange (Metric MF2M)
- MF3 Both Flanges (Metric MF3M)
- MP2 Rear Clevis (MP3 options includes pivot base)

4. Rod Ends
Industrial Devices offers 5 rod end options for N2-H Series cylinders.
- FT1 Female Thread
- MT1 Male Thread
- FE2 Female Eye
- FS2 Spherical Joint
- FC2 Clevis

5. Options
See the Options and Accessories section for complete specifications.
- BM – Motor Holding Brake
- BS – Holding Brake
  20 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on in-line models or with cylinder base mount options (-MF2, -MF3, -MS1, -MP2, -MP3).
- DB – Dual Rod End Bearing
  Increases side load rating, reduces actual stroke length by 1.5 inches.
- EMK – Encoder
  1000 line incremental encoder mounted on the rear shaft of the motor.
- F – Sub-Freezing Environment
  For operation to -20°F. Increases system backlash to 0.025 inches max.
- H – High Temperature
  Increases maximum cylinder operating temperature to 180°F. Note: -F and -H are not compatible.

6. Accessories
Magnetic Position Sensors
Position sensors are available for triggering stop, speed/direction change, or end-of-travel.
To maximize cylinder life, IDC recommends the use of end-of-travel limit switches with all cylinders. Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.
- Reed Leads Quick
  3m 4m
  Normally open PSR-1 PSR-1Q
  Normally closed PSR-2 PSR-2Q
- Hall Effect
  Normally open, NPN PSN-1 PSN-1Q
  Normally closed, NPN PSN-2 PSN-2Q
See page A-240 for more limit switch options, including quick-disconnect versions.

7. Compatible IDC Controls
Details of controls are in Section F. The N2-H is compatible with:
- Model Control Description
  H3301B Limit Switch
  H3321B Edge Guide Control
  H3501 Analog Position
Electric Cylinders

**N2-S/P**

**Industrial Devices Corporation**

**Electric Cylinder**
600 lb
Step Motor

**Performance**

- **N2-P22(V/T)-10-2B**: 1:1 Timing Belt, 2 rev/inch Ballscrew
- **N2-P22(V/T)-10L-2B**: 1:1 Inline Coupling, 2 rev/inch Ballscrew

<table>
<thead>
<tr>
<th>Model</th>
<th>Speed (mm/s)</th>
<th>Thrust (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-P22(V/T)-10-2B</td>
<td>762</td>
<td>0</td>
</tr>
<tr>
<td>N2-P22(V/T)-10L-2B</td>
<td>635</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Speed (mm/s)</th>
<th>Thrust (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-P22(V/T)-15-2B</td>
<td>457</td>
<td>0</td>
</tr>
<tr>
<td>N2-P22(V/T)-20-2B</td>
<td>356</td>
<td>0</td>
</tr>
</tbody>
</table>

- **Min. Backdrive Load**: 10 lbs 45 N
- **Repeatability**: ±0.0005 in ±0.0127 mm

**Ball Screw Models**

- **N2-P22(V/T)-10-2B**: 1:1 Timing Belt, 2 rev/inch Ballscrew
- **N2-P22(V/T)-10L-2B**: 1:1 Inline Coupling, 2 rev/inch Ballscrew

<table>
<thead>
<tr>
<th>Model</th>
<th>Lead Screw</th>
<th>Critical Speed (in/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-P22(V/T)-10-2B</td>
<td>2 thru 18-DB</td>
<td>30.0</td>
</tr>
<tr>
<td>N2-P22(V/T)-15-2B</td>
<td>2 thru 18-DB</td>
<td>25.0</td>
</tr>
<tr>
<td>N2-P22(V/T)-20-2B</td>
<td>2 thru 18-DB</td>
<td>20.0</td>
</tr>
</tbody>
</table>

- **Stroke (in)**: n/a
- **Column Load Limit (lb)**: n/a

- Consider lead screw critical speed and column load limits when specifying longer lengths.

*Performance using S6000 Series, NextStep, and SmartStep Controls.*

* Duty Cycle is percentage of actuator "on time" or movement over 10 minute interval.
Ball Screw Models

N2-S32(V/T)-10-2B
N2-S32(V/T)-10L-2B

Performance

-100% Duty Cycle -60% Duty Cycle

N2-S32(V/T)-10-2B: 1:1 Timing Belt, 2 rev/inch Ballscrew
Min. Backdrive Load 10 lbs 45 N
Repeatability ±0.0005 in ±0.0127 mm

N2-S32(V/T)-10L-2B: 1:1 Inline Coupling, 2 rev/inch Ballscrew
Min. Backdrive Load 10 lbs 45 N
Repeatability ±0.0005 in ±0.0127 mm

N2-S32(V/T)-15-2B: 1.5:1 Timing Belt, 5 rev/inch Ballscrew
Min. Backdrive Load 10 lbs 45 N
Repeatability ±0.0005 in ±0.0127 mm

- Performance using S6000 Series, NextStep, and SmartStep Controls.
- Duty Cycle is percentage of actuator 'on time' or movement over 10 minute interval.

Industrial Devices Corporation
707-789-1000 • http://www.idcmotion.com • 24 hour info by fax 916-431-6548

A-173
**Electric Cylinders**

**Performance**

**Ball Screw Models**

**N2-P22(V/T)-10-5B**

- 1:1 Timing Belt, 5 rev/inch Ballscrew
- Min. Backdrive Load: 20 lbs 89 N
- Repeatability: ±0.0005 in ±0.0127 mm

**N2-P22(V/T)-10L-5B**

- 1:1 Inline Coupling, 5 rev/inch Ballscrew
- Min. Backdrive Load: 20 lbs 89 N
- Repeatability: ±0.0005 in ±0.0127 mm

**N2-P22(V/T)-15-5B**

- 1.5:1 Timing Belt, 5 rev/inch Ballscrew
- Min. Backdrive Load: 20 lbs 89 N
- Repeatability: ±0.0005 in ±0.0127 mm

**N2-P22(V/T)-20-5B**

- 2:1 Timing Belt, 5 rev/inch Ballscrew
- Min. Backdrive Load: 20 lbs 89 N
- Repeatability: ±0.0005 in ±0.0127 mm

**N2-P22(V/T)-31-5B**

- 3.1:1 Helical Gear, 5 rev/inch Ballscrew
- Min. Backdrive Load: 20 lbs 89 N
- Repeatability: ±0.0005 in ±0.0127 mm

**N2-P22(V/T)-120-5B**

- 12:1 Helical Gear, 5 rev/inch Ballscrew
- Min. Backdrive Load: 20 lbs 89 N
- Repeatability: ±0.0005 in ±0.0127 mm

**Critical Speed (in/sec)**

- S6000 Series, NextStep, and SmartStep Controls
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.

---

**Note:**

- Performance using S6000 Series, NextStep, and SmartStep Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
**Performance**

**Electric Cylinder**

**600 lb**

**Step Motor**

---

**Ball Screw Models**

**N2-S32(V/T)-10-5B**

<table>
<thead>
<tr>
<th>Thrust (N)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>222</td>
<td>100</td>
</tr>
<tr>
<td>445</td>
<td>3114</td>
</tr>
<tr>
<td>667</td>
<td>600</td>
</tr>
<tr>
<td>890</td>
<td>2669</td>
</tr>
<tr>
<td>1112</td>
<td>2224</td>
</tr>
<tr>
<td>1334</td>
<td>1779</td>
</tr>
<tr>
<td>1557</td>
<td>1334</td>
</tr>
<tr>
<td>1779</td>
<td>995</td>
</tr>
</tbody>
</table>

**N2-S32(V/T)-10L-5B**

<table>
<thead>
<tr>
<th>Thrust (N)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>222</td>
<td>100</td>
</tr>
<tr>
<td>445</td>
<td>3114</td>
</tr>
<tr>
<td>667</td>
<td>600</td>
</tr>
<tr>
<td>890</td>
<td>2669</td>
</tr>
<tr>
<td>1112</td>
<td>2224</td>
</tr>
<tr>
<td>1334</td>
<td>1779</td>
</tr>
<tr>
<td>1557</td>
<td>1334</td>
</tr>
<tr>
<td>1779</td>
<td>995</td>
</tr>
</tbody>
</table>

**N2-S32(V/T)-15-5B**

<table>
<thead>
<tr>
<th>Thrust (N)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>222</td>
<td>100</td>
</tr>
<tr>
<td>445</td>
<td>3114</td>
</tr>
<tr>
<td>667</td>
<td>600</td>
</tr>
<tr>
<td>890</td>
<td>2669</td>
</tr>
<tr>
<td>1112</td>
<td>2224</td>
</tr>
<tr>
<td>1334</td>
<td>1779</td>
</tr>
<tr>
<td>1557</td>
<td>1334</td>
</tr>
<tr>
<td>1779</td>
<td>995</td>
</tr>
</tbody>
</table>

**N2-S32(V/T)-20-5B**

<table>
<thead>
<tr>
<th>Thrust (N)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>222</td>
<td>100</td>
</tr>
<tr>
<td>445</td>
<td>3114</td>
</tr>
<tr>
<td>667</td>
<td>600</td>
</tr>
<tr>
<td>890</td>
<td>2669</td>
</tr>
<tr>
<td>1112</td>
<td>2224</td>
</tr>
<tr>
<td>1334</td>
<td>1779</td>
</tr>
<tr>
<td>1557</td>
<td>1334</td>
</tr>
<tr>
<td>1779</td>
<td>995</td>
</tr>
</tbody>
</table>

---

**N2-S32(V/T)-10-5B**: 1:1 Timing Belt, 5 rev/inch Ballscrew

**N2-S32(V/T)-10L-5B**: 1:1 Inline Coupling, 5 rev/inch Ballscrew

- Min. Backdrive Load: 20 lbs, 89 N
- Repeatability: ±0.0005 in, ±0.0127 mm

**N2-S32(V/T)-15-5B**: 1:5:1 Timing Belt, 5 rev/inch Ballscrew

- Min. Backdrive Load: 20 lbs, 89 N
- Repeatability: ±0.0005 in, ±0.0127 mm

**N2-S32(V/T)-20-5B**: 2:5:1 Helical Gear, 5 rev/inch Ballscrew

- Min. Backdrive Load: 20 lbs, 89 N
- Repeatability: ±0.0005 in, ±0.0127 mm

---

- Consider leadscrew critical speed and column load limits when specifying longer lengths.

---

**Critical Speed (in/sec)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Critical Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-S32(V/T)-10-5B</td>
<td>15.0</td>
</tr>
</tbody>
</table>

**Stroke (in)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-S32(V/T)-10-5B</td>
<td>2 thru 18-DB</td>
</tr>
</tbody>
</table>

**Column Load Limit (lb)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Column Load Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-S32(V/T)-10-5B</td>
<td>n/a</td>
</tr>
</tbody>
</table>

---

- Performance using S6000 Series, NextGen, and SmartStar Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
**Electric Cylinders**

**Performance**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Duty Cycle</th>
<th>Min. Backdrive Load</th>
<th>Repeatability</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-P22(V/T)-10-5A</td>
<td>1:1 Timing Belt, 5 rev/inch Acme Screw</td>
<td>60%</td>
<td>100 lbs</td>
<td>±0.0005 in</td>
</tr>
<tr>
<td>N2-P22(V/T)-10L-5A</td>
<td>1:1 Inline Coupling, 5 rev/inch Acme Screw</td>
<td>60%</td>
<td>100 lbs</td>
<td>±0.0005 in</td>
</tr>
<tr>
<td>N2-P22(V/T)-15-5A</td>
<td>1.5:1 Timing Belt, 5 rev/inch Acme Screw</td>
<td>60%</td>
<td>100 lbs</td>
<td>±0.0005 in</td>
</tr>
<tr>
<td>N2-P22(V/T)-20-5A</td>
<td>2:1 Timing Belt, 5 rev/inch Acme Screw</td>
<td>60%</td>
<td>100 lbs</td>
<td>±0.0005 in</td>
</tr>
<tr>
<td>N2-P22(V/T)-31-5A</td>
<td>3.1:1 Helical Gear, 5 rev/inch Acme Screw</td>
<td>60%</td>
<td>100 lbs</td>
<td>±0.0005 in</td>
</tr>
<tr>
<td>N2-P22(V/T)-120-5A</td>
<td>12:1 Helical Gear, 5 rev/inch Acme Screw</td>
<td>60%</td>
<td>100 lbs</td>
<td>±0.0005 in</td>
</tr>
</tbody>
</table>

- Consider leadscrew **critical speed** and **column load limits** when specifying longer lengths.

---

**Acme Screw Models**

- Performance using S6000 Series, NexStep, and SmartStep Controls.
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
**Performance**

**Electric Cylinder**

---

**Size:** 600 lb

**Step Motor**

---

**N2-S/P**

---

**Acme Screw Models**

- **N2-S32(V/T)-10-5A:** 1:1 Timing Belt, 5 rev/inch Acme Screw
  - Min. Backdrive Load: 400 lbs (1779 N)
  - Repeatability: ±0.0005 in (±0.0127 mm)

- **N2-S32(V/T)-10L-5A:** 1:1 Inline Coupling, 5 rev/inch Acme Screw
  - Min. Backdrive Load: 400 lbs (1779 N)
  - Repeatability: ±0.0005 in (±0.0127 mm)

- **N2-S32(V/T)-15-5A:** 1.5:1 Timing Belt, 5 rev/inch Acme Screw
  - Min. Backdrive Load: 400 lbs (1779 N)
  - Repeatability: ±0.0005 in (±0.0127 mm)

- **N2-S32(V/T)-25-5A:** 2.5:1 Helical Gear, 5 rev/inch Acme Screw
  - Min. Backdrive Load: 400 lbs (1779 N)
  - Repeatability: ±0.0005 in (±0.0127 mm)

---

- **Critical Speed (in/sec):**
  - 15.0
  - 13.8

- **Stroke (in):**
  - 2 thru 12
  - 18-DB

- **Column Load Limit (lb):**
  - n/a

---

- **Performance using S6000 Series, NextStep, and SmartStep Controls.**
- **Duty Cycle is percentage of actuator "on time" or movement over 10 minute interval.**

---

**Industrial Devices Corporation**

707-789-1000 • http://www.idcmotion.com • 24 hour info by fax 916-431-6548

A-177
Acme Screw Models

**N2-P22(V/T)-10-8A**

- **N2-P22(V/T)-10L-8A**

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
<th>Speed (in/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>178</td>
<td>7.0</td>
</tr>
<tr>
<td>50</td>
<td>150</td>
<td>5.9</td>
</tr>
<tr>
<td>100</td>
<td>122</td>
<td>4.8</td>
</tr>
<tr>
<td>150</td>
<td>95</td>
<td>3.7</td>
</tr>
<tr>
<td>200</td>
<td>72</td>
<td>2.8</td>
</tr>
<tr>
<td>250</td>
<td>51</td>
<td>2.0</td>
</tr>
<tr>
<td>300</td>
<td>33</td>
<td>1.3</td>
</tr>
<tr>
<td>350</td>
<td>19</td>
<td>0.8</td>
</tr>
<tr>
<td>400</td>
<td>12</td>
<td>0.5</td>
</tr>
<tr>
<td>450</td>
<td>7</td>
<td>0.3</td>
</tr>
<tr>
<td>500</td>
<td>5</td>
<td>0.2</td>
</tr>
<tr>
<td>550</td>
<td>3</td>
<td>0.1</td>
</tr>
<tr>
<td>600</td>
<td>2</td>
<td>0.1</td>
</tr>
</tbody>
</table>

**N2-P22(V/T)-15-8A**

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
<th>Speed (in/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>114</td>
<td>4.5</td>
</tr>
<tr>
<td>50</td>
<td>92</td>
<td>3.6</td>
</tr>
<tr>
<td>100</td>
<td>72</td>
<td>2.8</td>
</tr>
<tr>
<td>150</td>
<td>51</td>
<td>2.0</td>
</tr>
<tr>
<td>200</td>
<td>33</td>
<td>1.3</td>
</tr>
<tr>
<td>250</td>
<td>25</td>
<td>1.0</td>
</tr>
<tr>
<td>300</td>
<td>19</td>
<td>0.8</td>
</tr>
<tr>
<td>350</td>
<td>15</td>
<td>0.6</td>
</tr>
<tr>
<td>400</td>
<td>12</td>
<td>0.5</td>
</tr>
<tr>
<td>450</td>
<td>10</td>
<td>0.4</td>
</tr>
<tr>
<td>500</td>
<td>8</td>
<td>0.3</td>
</tr>
<tr>
<td>550</td>
<td>6</td>
<td>0.2</td>
</tr>
<tr>
<td>600</td>
<td>4</td>
<td>0.2</td>
</tr>
</tbody>
</table>

**N2-P22(V/T)-20-8A**

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
<th>Speed (in/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>89</td>
<td>3.5</td>
</tr>
<tr>
<td>50</td>
<td>64</td>
<td>2.5</td>
</tr>
<tr>
<td>100</td>
<td>45</td>
<td>1.8</td>
</tr>
<tr>
<td>150</td>
<td>31</td>
<td>1.2</td>
</tr>
<tr>
<td>200</td>
<td>25</td>
<td>1.0</td>
</tr>
<tr>
<td>250</td>
<td>20</td>
<td>0.8</td>
</tr>
<tr>
<td>300</td>
<td>16</td>
<td>0.6</td>
</tr>
<tr>
<td>350</td>
<td>13</td>
<td>0.5</td>
</tr>
<tr>
<td>400</td>
<td>10</td>
<td>0.4</td>
</tr>
<tr>
<td>450</td>
<td>8</td>
<td>0.3</td>
</tr>
<tr>
<td>500</td>
<td>6</td>
<td>0.2</td>
</tr>
<tr>
<td>550</td>
<td>4</td>
<td>0.2</td>
</tr>
<tr>
<td>600</td>
<td>3</td>
<td>0.1</td>
</tr>
</tbody>
</table>

**N2-P22(V/T)-31-8A**

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
<th>Speed (in/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>51</td>
<td>2.0</td>
</tr>
<tr>
<td>50</td>
<td>38</td>
<td>1.5</td>
</tr>
<tr>
<td>100</td>
<td>25</td>
<td>1.0</td>
</tr>
<tr>
<td>150</td>
<td>19</td>
<td>0.8</td>
</tr>
<tr>
<td>200</td>
<td>15</td>
<td>0.6</td>
</tr>
<tr>
<td>250</td>
<td>12</td>
<td>0.5</td>
</tr>
<tr>
<td>300</td>
<td>10</td>
<td>0.4</td>
</tr>
<tr>
<td>350</td>
<td>8</td>
<td>0.3</td>
</tr>
<tr>
<td>400</td>
<td>6</td>
<td>0.2</td>
</tr>
<tr>
<td>450</td>
<td>4</td>
<td>0.2</td>
</tr>
</tbody>
</table>

**N2-P22(V/T)-120-8A**

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
<th>Speed (in/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>152</td>
<td>6.0</td>
</tr>
<tr>
<td>50</td>
<td>127</td>
<td>5.0</td>
</tr>
<tr>
<td>100</td>
<td>102</td>
<td>4.0</td>
</tr>
<tr>
<td>150</td>
<td>80</td>
<td>3.2</td>
</tr>
<tr>
<td>200</td>
<td>62</td>
<td>2.4</td>
</tr>
<tr>
<td>250</td>
<td>47</td>
<td>2.0</td>
</tr>
<tr>
<td>300</td>
<td>35</td>
<td>1.4</td>
</tr>
<tr>
<td>350</td>
<td>28</td>
<td>1.1</td>
</tr>
<tr>
<td>400</td>
<td>23</td>
<td>0.9</td>
</tr>
<tr>
<td>450</td>
<td>19</td>
<td>0.7</td>
</tr>
<tr>
<td>500</td>
<td>16</td>
<td>0.6</td>
</tr>
<tr>
<td>550</td>
<td>13</td>
<td>0.5</td>
</tr>
<tr>
<td>600</td>
<td>10</td>
<td>0.4</td>
</tr>
</tbody>
</table>

- **Min. Backdrive Load**: 600 lbs 2670 N
- **Repeatability**: ±0.0005 in ±0.0127 mm
- **Performance using S6000 Series**, NextStep**, and InMotion Controls.
- **Duty Cycle**: percentage of actuator “on time” or movement over 10 minute interval.

* Consider leadscrew critical speed and column load limits when specifying longer lengths.
**Steps To Ordering A Complete N2-S/P System**

The following steps will guide you to a complete N2-S/P Series system for your application.

For help:
- Complete Application Data Form.
- Review the N2-S/P Series specifications on pages A-159 and A-172 to A-178.
- Refer to the Engineering section for selection assistance.
- Consult your local Industrial Devices distributor, or call the factory.

1. **Base Model Number**

Select the N2-S/P model which provides sufficient thrust and speed for the application, with a comfortable margin of safety. IDC recommends at least a 30% reserve thrust for step motor driven systems.

The **NS-S/P Series offers three motor wiring Choices.**

The “T” and the “V” versions include a male quick disconnect receptable, and a 12-foot [3.7 m] motor cable with molded quick disconnect plug.

N2-S/P cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. With inline units, the motor is always coupled directly to the screw shaft, with no reduction.

### Parallel Models

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Drive Ratio</th>
<th>Screw Pitch, Type</th>
<th>Stroke Length (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-P22x-10-2B</td>
<td>N-S/P</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N2-P22x-15-2B</td>
<td>N-S/P</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N2-P22x-20-2B</td>
<td>N-S/P</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N2-P22x-25-2B</td>
<td>N-S/P</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N2-S32x-10-2B</td>
<td>N-S/P</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N2-S32x-15-2B</td>
<td>N-S/P</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N2-S32x-18.5-2B</td>
<td>N-S/P</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Inline Models

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Drive Ratio</th>
<th>Screw Pitch, Type</th>
<th>Stroke Length (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-P22x-10L-2B</td>
<td>N-S/P</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N2-P22x-15L-2B</td>
<td>N-S/P</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N2-P22x-20L-2B</td>
<td>N-S/P</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N2-P22x-25L-2B</td>
<td>N-S/P</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### How To Order

2. **Stroke Length**

Seven standard travel lengths are available from 2 to 16.5 inches. Longer lengths and custom in-between lengths also are available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact either physical end-of-stroke during normal operation. Extra travel length is needed to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed.

**Dual Rod End Bearing (-DB) is**
- **required above 12 inch stroke**
- **optional with 12 inches and below**

The -DB option reduces actual travel by 1.5 inches (e.g., N2-18-DB has 16.5 in travel).

---

* Available in metric; add M after designation. Example: MF1 becomes MF1M
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-189.

Cylinder base mount options -MP2, -MP3, -MF2, and -MF3 cannot be ordered with in-line models.

MF1, 2, 3 Rectangular Flanges

MF1 Front Flange (Metric MF1M)
MF2 Rear Flange (Metric MF2M)
MF3 Both Flanges (Metric MF3M)

MP2 Rear Clevis (MP3 options includes pivot base)

MS1 Side End Angles

MS2 Side Lugs

MS6 Side Tapped Holes (Metric MS6M)

MT4 Trunnion (Inline Models Only)

Pivot Mount Caution:
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90-95% of its full stroke. This increases the system’s rigidity and extends the life of the guide bearings and rod seal.

4. Rod Ends
Industrial Devices offers 5 rod end options for N2 Series cylinders.

-FT1 Female Thread

-MT1 Male Thread

-FE2 Female Eye

-FS2 Spherical Joint

-FC2 Clevis

5. Options
See the Options and Accessories section for complete specifications.

-BS Holding Brake
20 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on inline models or with cylinder base mount options (-MF2, -MF3, -MS1, -MP2, -MP3).

-DB Dual Rod End Bearing
Increases side load rating. Reduces actual stroke length by 1.5 inches.

-EMK Encoder
1000 line incremental encoder mounted on the rear shaft of the motor.

-ES Sub-Freezing Environment
For operation to -20°F. Increases system backlash to 0.025 inches max.

-H High Temperature
Increases maximum cylinder operating temperature to 180°F. Note: -F and -H are not compatible.

-L Linear Potentiometer Output
Linear potentiometer mounted inside the N2 cylinder.

-PB Protective Boot
Protects the thrust tube from solid contaminants and prevents liquids from entering the cylinder through the rod end bearing. Includes the -W option. (Not available with -MS1.)

-W Water Resistant Option
Provides protection from light moisture contact with cylinder.

6. Accessories
Magnetic Position Sensors
Position sensors are available for triggering stop, speed/direction change, or end-of-travel.

To maximize cylinder life, IDC recommends the use of end-of-travel limit switches with all cylinders. Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

<table>
<thead>
<tr>
<th>Reed Leads</th>
<th>Hall Effect Leads</th>
</tr>
</thead>
<tbody>
<tr>
<td>3m</td>
<td>3m</td>
</tr>
<tr>
<td>4m</td>
<td>4m</td>
</tr>
<tr>
<td>Normally open</td>
<td>Normally open</td>
</tr>
<tr>
<td>PSR-1</td>
<td>PSN-1</td>
</tr>
<tr>
<td>Normally closed</td>
<td>Normally closed</td>
</tr>
<tr>
<td>PSR-2</td>
<td>PSN-2</td>
</tr>
</tbody>
</table>

See page A-240 for more limit switch options, including quick disconnect versions.

7. S6000 Controls
Details of the S Series controls are in Section G. The N2-S/P is compatible with:

Model | Control Description
--- | ---
NextStep | Microstepping Drive
S6002 | 2-axis Drive
SmartStep | IDeal™ programmable
S6961 | IDeal™ programmable
S6962 | 2-axis IDeal™ programmable
**Performance**

**Electric Cylinder**

**N2-B**

**600 lb**

**Brushless Servo Motor**

**Ball Screw Models**

|--------------------------------|--------------|--------------|--------------------------------|

**230 VAC**

**115 VAC**

**Thrust**

<table>
<thead>
<tr>
<th>Speed (in/s)</th>
<th>765</th>
<th>635</th>
<th>508</th>
<th>381</th>
<th>254</th>
<th>127</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-50 lbs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>350</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>450</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**100% Duty Cycle**

**100% Duty Cycle**

**Intermittent (<2 sec)**

**Min. Backdrive Load**

<table>
<thead>
<tr>
<th>N2-B23-10-2B: 1:1 Timing Belt, 2 rev/inch Ballscrew</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 lbs 45 N</td>
</tr>
<tr>
<td>N2-B23-10L-2B: 1:1 Inline Coupling, 2 rev/inch Ballscrew</td>
</tr>
<tr>
<td>10 lbs 45 N</td>
</tr>
<tr>
<td>10 lbs 45 N</td>
</tr>
<tr>
<td>N2-B23-20-2B: 2:1 Timing Belt, 2 rev/inch Ballscrew</td>
</tr>
<tr>
<td>10 lbs 45 N</td>
</tr>
<tr>
<td>N2-B23-10-5B: 1:1 Timing Belt, 5 rev/inch Ballscrew</td>
</tr>
<tr>
<td>20 lbs 89 N</td>
</tr>
<tr>
<td>N2-B23-10L-5B: 1:1 Inline Coupling, 5 rev/inch Ballscrew</td>
</tr>
<tr>
<td>20 lbs 89 N</td>
</tr>
</tbody>
</table>

**Max. No-Load Accel**

<table>
<thead>
<tr>
<th>N2-B23-10-2B: 1:1 Timing Belt, 2 rev/inch Ballscrew</th>
</tr>
</thead>
<tbody>
<tr>
<td>700 in/s² 17.8 m/s²</td>
</tr>
<tr>
<td>N2-B23-10L-2B: 1:1 Inline Coupling, 2 rev/inch Ballscrew</td>
</tr>
<tr>
<td>700 in/s² 17.8 m/s²</td>
</tr>
<tr>
<td>770 in/s² 19.6 m/s²</td>
</tr>
<tr>
<td>N2-B23-20-2B: 2:1 Timing Belt, 2 rev/inch Ballscrew</td>
</tr>
<tr>
<td>760 in/s² 19.3 m/s²</td>
</tr>
<tr>
<td>N2-B23-10-5B: 1:1 Timing Belt, 5 rev/inch Ballscrew</td>
</tr>
<tr>
<td>303 in/s² 7.7 m/s²</td>
</tr>
<tr>
<td>N2-B23-10L-5B: 1:1 Inline Coupling, 5 rev/inch Ballscrew</td>
</tr>
<tr>
<td>303 in/s² 7.7 m/s²</td>
</tr>
</tbody>
</table>

**Repeatability**

<table>
<thead>
<tr>
<th>N2-B23-10-2B: 1:1 Timing Belt, 2 rev/inch Ballscrew</th>
</tr>
</thead>
<tbody>
<tr>
<td>±0.001 in ±0.025 mm</td>
</tr>
<tr>
<td>N2-B23-10L-2B: 1:1 Inline Coupling, 2 rev/inch Ballscrew</td>
</tr>
<tr>
<td>±0.001 in ±0.025 mm</td>
</tr>
<tr>
<td>±0.001 in ±0.025 mm</td>
</tr>
<tr>
<td>N2-B23-20-2B: 2:1 Timing Belt, 2 rev/inch Ballscrew</td>
</tr>
<tr>
<td>±0.001 in ±0.025 mm</td>
</tr>
<tr>
<td>N2-B23-10-5B: 1:1 Timing Belt, 5 rev/inch Ballscrew</td>
</tr>
<tr>
<td>±0.001 in ±0.025 mm</td>
</tr>
<tr>
<td>N2-B23-10L-5B: 1:1 Inline Coupling, 5 rev/inch Ballscrew</td>
</tr>
<tr>
<td>±0.001 in ±0.025 mm</td>
</tr>
</tbody>
</table>

- Performance using B8000 Series Controls (not B8501).
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.
### Ball Screw Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Critical Speed (in/sec)</th>
<th>Stroke (in)</th>
<th>Column Load Limit (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-B23-15-5B</td>
<td>3.5</td>
<td>15.0</td>
<td>n/a</td>
</tr>
<tr>
<td>N2-B23-20-5B</td>
<td>3.0</td>
<td>20.0</td>
<td>89 N</td>
</tr>
<tr>
<td>N2-B23-25-5B</td>
<td>2.5</td>
<td>25.0</td>
<td>89 N</td>
</tr>
<tr>
<td>N2-B23-31-5B</td>
<td>2.0</td>
<td>31.0</td>
<td>89 N</td>
</tr>
</tbody>
</table>

- Consider leadscrew critical speed and column load limits when specifying longer lengths.

---

**N2-B23-15-5B: 1.5:1 Timing Belt, 5 rev/inch Ballscrew**
- Min. Backdrive Load: 20 lb 89 N
- Max. No-Load Accel: 340 in/s² 7.7 m/s²
- Repeatability: ±0.001 in ±0.025 mm

**N2-B23-20-5B: 2:1 Timing Belt, 5 rev/inch Ballscrew**
- Min. Backdrive Load: 20 lb 89 N
- Max. No-Load Accel: 320 in/s² 8.1 m/s²
- Repeatability: ±0.001 in ±0.025 mm

**N2-B23-25-5B: 2.5:1 Helical Gears, 5 rev/inch Ballscrew**
- Min. Backdrive Load: 20 lb 89 N
- Max. No-Load Accel: 295 in/s² 7.5 m/s²
- Repeatability: ±0.001 in ±0.025 mm

**N2-B23-31-5B: 3.1:1 Helical Gears, 5 rev/inch Ballscrew**
- Min. Backdrive Load: 20 lb 89 N
- Max. No-Load Accel: 260 in/s² 6.7 m/s²
- Repeatability: ±0.001 in ±0.025 mm

---

**Performance**

- **100% Duty Cycle**
- **Intermittent (<2 sec)**
N2-B

Acme Screw Models

N2-B23-10-5A and N2-B23-10L-5A

- Performance using B8000 Series Controls (not B8501).
- Duty Cycle is percentage of actuator “on time” or movement over 10 minute interval.

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 222</td>
<td>0 - 51</td>
</tr>
<tr>
<td>222 - 445</td>
<td>51 - 102</td>
</tr>
<tr>
<td>445 - 890</td>
<td>102 - 152</td>
</tr>
<tr>
<td>890 - 1335</td>
<td>152 - 204</td>
</tr>
<tr>
<td>1335 - 1799</td>
<td>204 - 256</td>
</tr>
<tr>
<td>1799 - 2224</td>
<td>256 - 308</td>
</tr>
<tr>
<td>2224 - 2669</td>
<td>308 - 360</td>
</tr>
<tr>
<td>2669 - 3557</td>
<td>360 - 400</td>
</tr>
</tbody>
</table>

N2-B23-15-5A

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 100</td>
<td>0 - 25</td>
</tr>
<tr>
<td>100 - 200</td>
<td>25 - 50</td>
</tr>
<tr>
<td>200 - 300</td>
<td>50 - 75</td>
</tr>
<tr>
<td>300 - 400</td>
<td>75 - 100</td>
</tr>
<tr>
<td>400 - 500</td>
<td>100 - 125</td>
</tr>
<tr>
<td>500 - 600</td>
<td>125 - 150</td>
</tr>
<tr>
<td>600 - 700</td>
<td>150 - 175</td>
</tr>
<tr>
<td>700 - 890</td>
<td>175 - 200</td>
</tr>
<tr>
<td>890 - 1335</td>
<td>200 - 225</td>
</tr>
<tr>
<td>1335 - 2224</td>
<td>225 - 250</td>
</tr>
<tr>
<td>2224 - 2669</td>
<td>250 - 275</td>
</tr>
<tr>
<td>2669 - 3557</td>
<td>275 - 300</td>
</tr>
</tbody>
</table>

N2-B23-10-8A and N2-B23-10L-8A

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 100</td>
<td>0 - 25</td>
</tr>
<tr>
<td>100 - 200</td>
<td>25 - 50</td>
</tr>
<tr>
<td>200 - 300</td>
<td>50 - 75</td>
</tr>
<tr>
<td>300 - 400</td>
<td>75 - 100</td>
</tr>
<tr>
<td>400 - 500</td>
<td>100 - 125</td>
</tr>
<tr>
<td>500 - 600</td>
<td>125 - 150</td>
</tr>
<tr>
<td>600 - 700</td>
<td>150 - 175</td>
</tr>
<tr>
<td>700 - 890</td>
<td>175 - 200</td>
</tr>
<tr>
<td>890 - 1335</td>
<td>200 - 225</td>
</tr>
<tr>
<td>1335 - 2224</td>
<td>225 - 250</td>
</tr>
<tr>
<td>2224 - 2669</td>
<td>250 - 275</td>
</tr>
<tr>
<td>2669 - 3557</td>
<td>275 - 300</td>
</tr>
</tbody>
</table>

N2-B23-20-5A

<table>
<thead>
<tr>
<th>Thrust (lbs)</th>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 100</td>
<td>0 - 25</td>
</tr>
<tr>
<td>100 - 200</td>
<td>25 - 50</td>
</tr>
<tr>
<td>200 - 300</td>
<td>50 - 75</td>
</tr>
<tr>
<td>300 - 400</td>
<td>75 - 100</td>
</tr>
<tr>
<td>400 - 500</td>
<td>100 - 125</td>
</tr>
<tr>
<td>500 - 600</td>
<td>125 - 150</td>
</tr>
<tr>
<td>600 - 700</td>
<td>150 - 175</td>
</tr>
<tr>
<td>700 - 890</td>
<td>175 - 200</td>
</tr>
<tr>
<td>890 - 1335</td>
<td>200 - 225</td>
</tr>
<tr>
<td>1335 - 2224</td>
<td>225 - 250</td>
</tr>
<tr>
<td>2224 - 2669</td>
<td>250 - 275</td>
</tr>
<tr>
<td>2669 - 3557</td>
<td>275 - 300</td>
</tr>
</tbody>
</table>

— 50% Duty Cycle — 30% Duty Cycle — 10% Duty Cycle — Intermittent (<2 sec)

N2-B23-10-5A: 1:1 Timing Belt, 5 rev/inch Acme Screw
N2-B23-10L-5A: 1:1 Inline Coupling, 5 rev/inch Acme Screw
Min. Backdrive Load: 400 lbs 1779 N
Max. No-Load Accel: 300 in/s² 7.7 m/s²
Repeatability: ±0.001 in ±0.025 mm

N2-B23-15-5A: 1.5:1 Timing Belt, 5 rev/inch Acme Screw
Min. Backdrive Load: 400 lbs 1779 N
Max. No-Load Accel: 330 in/s² 8.36 m/s²
Repeatability: ±0.001 in ±0.025 mm

N2-B23-10-8A: 1:1 Timing Belt, 8 rev/inch Acme Screw
N2-B23-10L-8A: 1:1 Inline Coupling, 8 rev/inch Acme Screw
Min. Backdrive Load: 600 lbs 2670 N
Max. No-Load Accel: 190 in/s² 4.8 m/s²
Repeatability: ±0.001 in ±0.025 mm

N2-B23-20-5A: 2:1 Timing Belt, 5 rev/inch Acme Screw
Min. Backdrive Load: 400 lbs 1779 N
Max. No-Load Accel: 320 in/s² 8.1 m/s²
Repeatability: ±0.001 in ±0.025 mm
**Acme Screw Models**

**N2-B23-15-8A**

- **Critical Speed (in/sec)**: 9.4
- **Stroke (in)**: 2 thru 18-DB
- **5A**
  - Critical Speed (in/sec): 15.0
  - Stroke (in): 2 thru 18-DB

**N2-B23-20-8A**

- **Critical Speed (in/sec)**: 11.5
- **Stroke (in)**: 2 thru 12
- **5A**
  - Critical Speed (in/sec): 13.8
  - Stroke (in): 2 thru 18-DB

**N2-B23-31-5A**

- **Critical Speed (in/sec)**: 13.8
- **Stroke (in)**: 2 thru 12
- **5A**
  - Critical Speed (in/sec): 15.0
  - Stroke (in): 2 thru 18-DB

**N2-B23-31-8A**

- **Critical Speed (in/sec)**: 15.0
- **Stroke (in)**: 2 thru 18-DB
- **5A**
  - Critical Speed (in/sec): 13.8
  - Stroke (in): 2 thru 18-DB

---

- Consider leadscrew **critical speed** and **column load limits** when specifying longer lengths.

---

**N2-B23-15-8A**

- **Min. Backdrive Load**: 810 lbs 3723 N
- **Max. No-Load Accel**: 210 in/s² 5.2 m/s²
- **Repeatability**: ±0.001 in ±0.025 mm

**N2-B23-20-8A**

- **Min. Backdrive Load**: 600 lbs 2669 N
- **Max. No-Load Accel**: 200 in/s² 5.0 m/s²
- **Repeatability**: ±0.001 in ±0.025 mm

**N2-B23-31-5A**

- **Min. Backdrive Load**: 400 lbs 1779 N
- **Max. No-Load Accel**: 260 in/s² 6.7 m/s²
- **Repeatability**: ±0.001 in ±0.025 mm

**N2-B23-31-8A**

- **Min. Backdrive Load**: 600 lbs 2669 N
- **Max. No-Load Accel**: 165 in/s² 4.2 m/s²
- **Repeatability**: ±0.001 in ±0.025 mm
How To Order

1. Base Model Number
Select the N2-B model which provides sufficient thrust and speed for the application, with a comfortable margin of safety. Refer to the N2-B Speed vs. Thrust curves in this section. Be sure to consider duty cycle, side loading, back driving, and the other design considerations from the IDC Application Data Form.

N2-B cylinders with gear or timing belt drive reductions have the motor mounted parallel to the lead screw. With in-line units, the motor is always coupled directly to the screw shaft, with no reduction.

2. Stroke Length
Seven standard travel lengths are available from 2 to 16.5 inches. Longer lengths and custom in-between lengths are also available. Consult your IDC distributor or the factory for details.

To maximize cylinder life, the thrust tube should not impact either physical end-of-stroke during normal operation. Extra travel length is needed to decelerate the load to a stop when an end-of-travel limit switch is encountered. This extra travel distance depends on load and speed.

Dual Rod End Bearing (-DB) is
• required above 12 inch stroke
• optional with 12 inches and below

The -DB option reduces actual travel by 1.5 inches (e.g., N2-18-DB has 16.5 in travel).

Parallel Models

<table>
<thead>
<tr>
<th>Electric Cylinder</th>
<th>Motor</th>
<th>Drive Ratio</th>
<th>Screw Pitch, Type</th>
<th>(Inches)</th>
<th>Cylinder Mounting</th>
<th>Rod End</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-B</td>
<td>B23</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Parallel Models

Ball Screw
N2-B23-10-2B
N2-B23-15-2B
N2-B23-20-2B
N2-B23-10-5B
N2-B23-15-5B
N2-B23-20-5B
N2-B23-10-8A
N2-B23-15-8A
N2-B23-20-8A

Acme Screw
N2-B23-10-5A
N2-B23-15-5A
N2-B23-20-5A
N2-B23-31-5A

Inline Models
N2-B23-10L-2B N2-B23-10L-5A
N2-B23-10L-8A

* Available in metric; add M after designation. Example: MF1 becomes MF1M
3. Cylinder Mounting
Specify any one of these cylinder mounting options. Dimensional drawings start on page A-189.
Cylinder base mount options -MP2, -MP3, -MF2, and -MF3 cannot be ordered with in-line models.
MF1, 2, 3 Rectangular Flanges

MF1 Front Flange (Metric MF1M)
MF2 Rear Flange (Metric MF2M)
MF3 Both Flanges (Metric MF3M)

MP2 Rear Clevis (MP3 option includes the pivot base)

MS1 Side End Angles

MS2 Side Lugs

MS6 Side Tapped Holes (Metric MS6M)

MT4 Trunnion (Inline Models Only)

Pivot Mount Caution:
When utilizing a pivot mounting option (MP2 or MT4) in conjunction with a pivot rod end (FS2 or FC2), it is recommended that the actuator be extended only to 90–95% of its full stroke. This increases the system’s rigidity and extends the life of the guide bearings and rod seal.

4. Rod Ends
Industrial Devices offers 5 rod end options for N2-B Series cylinders.

-FT1 Female Thread

-MT1 Male Thread

-FE2 Female Eye

-FS2 Spherical Joint

-FC2 Clevis

5. Options
See the Options and Accessories section for complete specifications.

-BS  Holding Brake
20 in-lb holding brake mounted on the rear lead screw shaft extension. Not available on inline models or with cylinder base mount options (-MF2, -MF3, -MS1, -MP2, -MP3).

-DB  Dual Rod End Bearing
Increases side load rating. Reduces actual stroke length by 1.5 inches.

-EMK Encoder
1000 line incremental encoder mounted on the rear shaft of the motor.

-F  Sub-Freezing Environment
For operation to -20°F. Increases system backlash to 0.025 inches max.

-H High Temperature
Increases maximum cylinder operating temperature to 180°F. Note: -F and -H are not compatible.

-L  Linear Potentiometer Output
Linear potentiometer mounted inside the N2-B cylinder.

-PB Protective Boot
Protects the thrust tube from solid contaminants and prevents liquids from entering the cylinder through the rod end bearing. Includes the -W option. (Not available with -MS1.)

-W  Water Resistant Option
Provides protection from light moisture contact with cylinder.

6. Accessories
Magnetic Position Sensors
Position sensors are available for triggering stop, speed/direction change, or end-of-travel.

To maximize cylinder life, IDC recommends the use of end-of-travel limit switches with all cylinders.
Either Reed or Hall Effect (NPN transistor) switches are compatible with IDC controls.

Reed
-3m Leads
-4m Quick

 Normally open  PSR-1  PSR-1Q
 Normally closed  PSR-2  PSR-2Q

Hall Effect
-Normally open, NPN  PSN-1  PSN-1Q
-Normally closed, NPN  PSN-2  PSN-2Q

See page A-240 for more limit switch options, including quick-disconnect versions.

7. B8000 Series Controls
Details of the B8000 Series controls are in Section H. The N2-B is compatible with:

Model  Control Description
B8001  Digital Drive
B8501  Analog Position
B8961  iDeal™ programmable servo Smart Drive
B8962  2-axis iDeal™ Smart Drive
**Dimensions**

**MF1 Head Rectangular Flange Mounting**

Parallel

For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette.

For motor dimensions, go to pages A-194 to A-198.

For rod-end dimensions, go to page A-199.

### MF1 Head Rectangular Flange Mounting

**Parallel**

- **D** 2.75 (72*)
- **E** 0.34 (9*)
- **F** 1.43 (36*)

* Meets ISO 40mm bore standard

**English Option** | **Metric Option**
--- | ---
**D** | **MF1 (inches)** | **MF1M (mm)**
2.75 | 72*
0.34 | 9*
1.43 | 36*

**A Strokes**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.00</td>
<td>(50.8)</td>
<td>8.00</td>
</tr>
</tbody>
</table>

**B Retract**

stroke + 5.37 (136.4)

**C Mounting**

stroke + 5.06 (128.5)

---

**MF2 Cap Rectangular Flange Mounting**

**Parallel**

**A Strokes**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.00</td>
<td>(50.8)</td>
<td>8.00</td>
</tr>
</tbody>
</table>

**B Retract**

stroke + 5.75 (146.1)

**C Mounting**

stroke + 5.06 (128.5)

---
## MF3 Rectangular Mounting Flanges

**Parallel**

<table>
<thead>
<tr>
<th>English Option</th>
<th>Metric Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF3 (inches)</td>
<td>MF3M (mm)</td>
</tr>
<tr>
<td>D</td>
<td>2.75</td>
</tr>
<tr>
<td>E</td>
<td>0.34</td>
</tr>
<tr>
<td>F</td>
<td>1.43</td>
</tr>
</tbody>
</table>

* Meets ISO 40mm bore standard

For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette.

For motor dimensions, go to pages A-194 to A-198

For rod-end dimensions, go to page A-199

### Dimensions

<table>
<thead>
<tr>
<th>A Strokes</th>
<th>2.00 (50.8)</th>
<th>8.00 (203.2)</th>
<th>24.00 (609.6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Retract</td>
<td>stroke + 5.75 (146.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Mounting</td>
<td>stroke + 5.44 (138.2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A Strokes</th>
<th>2.00 (50.8)</th>
<th>8.00 (203.2)</th>
<th>24.00 (609.6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Retract</td>
<td>stroke + 6.47 (164.3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MP2 Cap Double Clevis Mounting

**Parallel**

A Strokes

4.00 (101.6)

6.00 (152.4)
Electric Cylinders

N2

Electric Cylinder CAD Drawings

Dimensions

MS1 Side End Angles Mounting
Parallel

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-194 to A-198
- For rod-end dimensions, go to page A-199

A Strokes

<table>
<thead>
<tr>
<th>Strokes</th>
<th>2.00</th>
<th>8.00</th>
<th>24.00</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50.8</td>
<td>203.2</td>
<td>609.6</td>
</tr>
</tbody>
</table>

B Retract

<table>
<thead>
<tr>
<th>Stroke</th>
<th>+ 6.75</th>
<th>171.5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>101.6</td>
<td>304.8</td>
</tr>
<tr>
<td></td>
<td>152.4</td>
<td>457.2</td>
</tr>
</tbody>
</table>

C Mounting

<table>
<thead>
<tr>
<th>Stroke</th>
<th>+ 6.69</th>
<th>169.9</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>101.6</td>
<td>304.8</td>
</tr>
<tr>
<td></td>
<td>152.4</td>
<td>457.2</td>
</tr>
</tbody>
</table>

MS2 Side Lugs
Parallel

A Strokes

<table>
<thead>
<tr>
<th>Strokes</th>
<th>2.00</th>
<th>8.00</th>
<th>24.00</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50.8</td>
<td>203.2</td>
<td>609.6</td>
</tr>
</tbody>
</table>

B Retract

<table>
<thead>
<tr>
<th>Stroke</th>
<th>+ 5.37</th>
<th>136.4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>101.6</td>
<td>304.8</td>
</tr>
<tr>
<td></td>
<td>152.4</td>
<td>457.2</td>
</tr>
</tbody>
</table>

C Mounting

<table>
<thead>
<tr>
<th>Stroke</th>
<th>+ 2.56</th>
<th>65.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>101.6</td>
<td>304.8</td>
</tr>
<tr>
<td></td>
<td>152.4</td>
<td>457.2</td>
</tr>
</tbody>
</table>
### MS6 Side Tapped Mounting

**Parallel**

- **A Strokes**: 2.00 (50.8), 8.00 (203.2), 24.00 (609.6)
- **B Retract**: stroke + 5.37 (136.4)
- **C Mounting**: stroke + 2.56 (65.0)

### MS1 Side End Angles Mounting

**Inline**

- **A Strokes**: 2.00 (50.8), 8.00 (203.2), 24.00 (609.6)
- **B Retract**: stroke + 6.12 (155.4)
- **C Mounting**: stroke + 4.06 (103.1)
- **D Overall**: stroke + 6.43 (163.2)

---

For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette.

For motor dimensions, go to pages A-194 to A-198.

For rod-end dimensions, go to page A-199.
Dimensions

• For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
• For motor dimensions, go to pages A-194 to A-198
• For rod-end dimensions, go to page A-199

### MF1 Head Rectangular Flange
**Inline**

![Diagram of MF1 Head Rectangular Flange Inline]

<table>
<thead>
<tr>
<th>A Strokes</th>
<th>2.00 (50.8)</th>
<th>8.00 (203.2)</th>
<th>24.00 (609.6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Retract</td>
<td>stroke + 6.12 (155.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Mounting</td>
<td>stroke + 3.44 (87.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D Overall</td>
<td>stroke + 5.81 (147.5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MS6 Side Tapped Mounting
**Inline**

![Diagram of MS6 Side Tapped Mounting Inline]

<table>
<thead>
<tr>
<th>A Strokes</th>
<th>2.00 (50.8)</th>
<th>8.00 (203.2)</th>
<th>24.00 (609.6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Retract</td>
<td>stroke + 6.12 (155.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Mounting</td>
<td>stroke + 2.56 (65.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D Overall</td>
<td>stroke + 5.43 (137.8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Dimensions**

### MT4 Trunnion Mounting

**Inline**

The MT4 mounting replaces the identical MT2 mounting with the same dimensions. The name was changed to be consistent with the EC Series.

### MS2 Side Foot Mounting

**Inline**

- For AutoCAD® DXF drawings, go to our website, or call the factory for a diskette
- For motor dimensions, go to pages A-194 to A-198
- For rod-end dimensions, go to page A-199

<table>
<thead>
<tr>
<th>A Strokes</th>
<th>2.00 (50.8)</th>
<th>8.00 (203.2)</th>
<th>24.00 (609.6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Retract</td>
<td>stroke + 6.12 (155.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Mounting</td>
<td>stroke + 3.47 (88.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D Overall</td>
<td>stroke + 5.43 (137.8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A Strokes</th>
<th>2.00 (50.8)</th>
<th>8.00 (203.2)</th>
<th>24.00 (609.6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Retract</td>
<td>stroke + 6.12 (155.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Mounting</td>
<td>stroke + 2.56 (65.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D Overall</td>
<td>stroke + 5.43 (137.9)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**N2-D Series**

**Permanent magnet 2-pole, 24 volt DC motor**

**Winding Data**
- **D Motor**
- Inductance: 1.8 mH
- Resistance: 1.0
- Torque Constant: 8.8 oz-in/Amp
- Voltage Constant: 6.5 V/krpm

**Torque**
- Continuous: 39.6 oz-in (4.5 Amps)
- Peak: 88 oz-in (10 Amps)

**Rotor Inertia**
- 0.018 oz-in-sec²

**Connections**
- 2 leads, 6 inch [150 mm] length
- Q Quick Disconnect option: 3 contact receptacle in anodized or painted aluminum shell, includes 12 ft [3.7 m] cable with molded plug.

**Temperature**
- 180°F [82°C] maximum allowable motor case temperature
- Actual motor case temperature is ambient, duty cycle, speed and load dependent. Refer to speed vs. thrust curves for system duty ratings.

---

**D Motor Dimensions**

**Parallel**

![Parallel Dimensions Diagram]

**Inline**

![Inline Dimensions Diagram]
**N2-H Series**

**Winding Data**
- **H Motor**
- **Inductance** 19 mH
- **Resistance** 6.4
- **Torque Constant** 54 oz-in/Amp
- **Voltage Constant** 40 V/krpm

**Torque**
- **Continuous** 108 oz-in (2.0 Amps)
- **Peak** 432 oz-in (8.0 Amps)

**Rotor Inertia** 0.049 oz-in-sec²

**Connections**
- 2 leads, 6 inch [150 mm] length
- Q Quick Disconnect option: 3 contact receptacle in anodized or painted aluminum shell, includes 12 ft [3.7 m] cable with molded plug.

**Temperature**
- 180°F [82°C] maximum allowable motor case temperature
- Actual motor case temperature is ambient, duty cycle, speed and load dependent. Refer to speed vs. thrust curves for system duty ratings.

---

**H Motor Dimensions**

**Parallel**

![Parallel Motor Dimensions Diagram]

**Inline**

![Inline Motor Dimensions Diagram]
**N2-P22 Series**

**1.8° Permanent magnet hybrid step motor**

**P22 Motor**

Inductance  
63.2 mH in Series (P22T), 15.8 mH in Parallel (P22V)

Motor Current  
0.7 Amps in Series (P22T), 1.5 Amps in Parallel (P22V)

Hipot Breakdown  
500 VAC/1800 VDC (phase-to-phase, phase-to-ground)

Connections  
P22N: 8 leads, each 12” long  
P22T/P22V: quick disconnect receptacle on actuator timing belt housing; includes 12 ft [3.7 m] cable with molded plug

User Cabling  
Less than 100 feet (20 AWG), 100–200 ft (18 AWG)

Temperature  
212°F (100°C) maximum allowable case temperature  
Actual motor case temperature is dependent on ambient temperature, duty cycle, speed and load. Refer to speed vs. thrust performance curves for system duty ratings.

**Dimensions in [mm]**

**Parallel**

![Diagram](image-url)
**N2-S Series**

**1.8° Permanent Magnet Hybrid Step Motor**

Inductance
- NS32T 10 mH
- NS32V 2.5 mH

HIPOT breakdown
- 750 VAC

Static Torque
- 300 oz-in [2.1 N-m] max
- N2-S32N: 8 leads, 8 inch length (except inline models with 12 ft [3.7 m] cable)

Connections
- N2-S32T, N2-S32V: 5 contact quick disconnect receptacle in anodized aluminum shell, includes 12 ft [3.7 m] cable with molded plug

Temperature
- 212°F [100°C] maximum allowable motor case temperature
- Actual motor case temperature is ambient, duty cycle and speed dependent. Refer to speed vs. thrust performance curves for system duty ratings.

**S32 Motor Dimensions**
**Motor Specifications**

**N2-B Series**

**Rare Earth Magnet Brushless Servo Motor with 2,000 Line Encoder and Commutation Sensors**

- **Winding Data**
  - Inductance: 16 mH
  - Resistance: 10.6 Ohms
  - Torque Constant (Kt): 3.6 in-lbs/Amp

- **Torque**
  - Continuous: 6 in-lbs [0.68 N-m]
  - Peak: 30 in-lbs [3.4 N-m]

- **Rotor Inertia**: 0.00012 in-lb-sec² [0.135 kg-cm²]

- **Connections**: MS-type connectors for motor winding and encoder, and 12 ft [3.7 m] cables with mating connectors

- **Temperature**: 212°F [100°C] max allowed case temperature

- **Environmental**: Rugged IP65 dust and waterproof construction

**B23 Motor Dimensions**

**Parallel**

- **Drawing**

**Inline**

- **Drawing**
**Rod End Dimensions**

### Dimensions in [mm]

**FC2**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>English Option</th>
<th>Metric Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7/16-20 UNF</td>
<td>M12 x 1.25*</td>
</tr>
<tr>
<td>B</td>
<td>0.75</td>
<td>24*</td>
</tr>
</tbody>
</table>

* Meets ISO 40mm bore standard

**FS2**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>English Option</th>
<th>Metric Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7/16-20 UNF</td>
<td>M12 x 1.25*</td>
</tr>
<tr>
<td>B</td>
<td>0.75</td>
<td>24*</td>
</tr>
</tbody>
</table>

**MT1**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>English Option</th>
<th>Metric Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5/8-18 UNF</td>
<td>M12 x 1.25</td>
</tr>
<tr>
<td>B</td>
<td>0.94</td>
<td>24</td>
</tr>
</tbody>
</table>

**FT1**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>English Option</th>
<th>Metric Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5/8-18 UNF</td>
<td>M12 x 1.25</td>
</tr>
<tr>
<td>B</td>
<td>0.94</td>
<td>24</td>
</tr>
</tbody>
</table>

**FE2**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>English Option</th>
<th>Metric Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5/8-18 UNF</td>
<td>M12 x 1.25</td>
</tr>
<tr>
<td>B</td>
<td>0.94</td>
<td>24</td>
</tr>
</tbody>
</table>
The -BS and -BM brake options are typically used with electric cylinders employing ball screw drive assemblies. The electrically released, spring set brake prevents backdriving when the unit is at rest, or in case of a power failure.

When power is applied, the brake releases and the cylinder is free to move. When power is off, springs engage the brake to hold the load in position.

The -BS brake is mounted directly to the leadscrew to provide holding torque, without relying on the rest of the drive train.

The -BM brake is mounted to the motor shaft. This is advantageous because the brake torque is multiplied by the belt or gear reduction, and does not interfere with certain rear mounting options. But if the belt fails, the brake will be inoperative.

**-BS is not available with:**
- Inline motor orientation
- NV models
- Rear mounting options: -MP2, -MP3, -MS1, -MF2, -MF3

**-BM is only available with:**
- EC2-H, EC2-B
- EC3-H, EC4-H, EC3-B, EC4-B
- EC5-B
- N2-H, N2-B

**Connections**

**Brake Option**

### Specifications

**-BS Leadscrew Brake Option**

<table>
<thead>
<tr>
<th>Mounting Location</th>
<th>Leadscrew (see dimensions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Options</td>
<td>115 VAC (-BS115), 24 VDC (-BS24), 230 VAC (-BS230)</td>
</tr>
<tr>
<td>Cable Type/Length</td>
<td>EC2/3/4/5 – 3.7 m [12 ft] with quick disconnect</td>
</tr>
</tbody>
</table>

**Holding Torque**

EC2 – 3.9 N·m [35 in-lb], 12.5 W electrical power
EC3 – 6.7 N·m [60 in-lb], 17 W electrical power
EC4/5 – 39.2 N·m [350 in-lb], 15 W electrical power
N2 – 3.4 N·m [30 in-lb], 13 W electrical power

<table>
<thead>
<tr>
<th>Holding Force</th>
<th>With -BS Option</th>
<th>Without -BS Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2</td>
<td>-16B Ball</td>
<td>1550 N [350 lb]</td>
</tr>
<tr>
<td></td>
<td>-05B Ball</td>
<td>3600 N [810 lb]</td>
</tr>
<tr>
<td></td>
<td>-04A Acme</td>
<td>3600 N [810 lb]</td>
</tr>
<tr>
<td>EC3</td>
<td>-16B Ball</td>
<td>2660 N [600 lb]</td>
</tr>
<tr>
<td></td>
<td>-10B Ball</td>
<td>4260 N [960 lb]</td>
</tr>
<tr>
<td></td>
<td>-05B Ball</td>
<td>7200 N [1620 lb]</td>
</tr>
<tr>
<td></td>
<td>-04A Acme</td>
<td>7200 N [1620 lb]</td>
</tr>
<tr>
<td>EC4</td>
<td>-25B Ball</td>
<td>9940 N [2230 lb]</td>
</tr>
<tr>
<td></td>
<td>-10B Ball</td>
<td>12000 N [2700 lb]</td>
</tr>
<tr>
<td>EC5</td>
<td>-32B Ball</td>
<td>7770 N [1750 lb]</td>
</tr>
<tr>
<td></td>
<td>-10B Ball</td>
<td>24800 N [5590 lb]</td>
</tr>
<tr>
<td>N2</td>
<td>-2B Ball</td>
<td>1100 N [240 lb]</td>
</tr>
<tr>
<td></td>
<td>-5B Ball</td>
<td>2670 N [600 lb]</td>
</tr>
<tr>
<td></td>
<td>-5A Acme (N2-D/P)</td>
<td>2670 N [600 lb]</td>
</tr>
<tr>
<td></td>
<td>-5A Acme (N2-other)</td>
<td>1780 N [400 lb]</td>
</tr>
<tr>
<td></td>
<td>-8A Acme</td>
<td>2670 N [600 lb]</td>
</tr>
</tbody>
</table>

**-BM Motor Brake Option**

(additional lead time may apply. Consult factory for current lead time.)

<table>
<thead>
<tr>
<th>Mounting Location</th>
<th>Rear motor shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Options</td>
<td>B23/32/41 – 24 VDC (-BM24)</td>
</tr>
<tr>
<td></td>
<td>H/H4 – 115 VAC (-BM115), 24VDC (-BM24); 230 VAC (-BM230)</td>
</tr>
<tr>
<td>Cable Type/Length</td>
<td>3.7 m [12 ft] flying leads (no quick disconnect)</td>
</tr>
</tbody>
</table>

**Notes:**
- High vibration in a machine may cause an acme screw to backdrive at lower values than indicated above. In such applications, a brake may be necessary.
- The -BS and -BM brakes should only be used to hold static (already stopped) loads. They are not designed for repeated use as dynamic brakes.

**Dimensions**

**Electric Cylinder Options & Accessories**

**Connections**

**Dimensions [in mm]**

**-BS Option**

**Note:** Quick-disconnect cable provided only on EC models. N2 includes flying leads cable from grommet on brake can.
-DB Dual Rod-End Bearing

Our standard N2 Series electric cylinder contains a single rod-end bearing. The dual rod-end bearing (-DB) option increases thrust tube side load capacity and reduces undesirable thrust tube runout, while reducing the stroke by 1.5 inches. (All EC Series cylinders are equipped with a dual rod-end bearing automatically, so this option does not apply to them.)

-DB available with:
• N2 Series 12 inch stroke and below

-DB required with:
• N2 Series above 12 inch stroke

Notes:
• The -DB option reduces stroke by 1.5 inches (e.g. 18” with -DB yields only 16.5” actual stroke.)

Side Load

All IDC electric cylinders are designed to withstand a limited amount of side load on the thrust tube. The thrust tube in a standard N2 Series cylinder is supported by a single rod-end bearing and by a patented internal guide assembly. This bearing system has a limited capacity to handle side loads, shown in the curve below.

When increased side load capacity or stiffness is required, or when moving a load that is not externally supported, the dual rod-end bearing (-DB) option is recommended. This option adds a second thrust tube rod-end bearing for additional support, while subtracting 1.5 inches from the available stroke. N2 models above 12 inches stroke require the -DB option.

Another means of increasing side load capacity is to use the higher capacity EC series, which includes the dual rod-end bearing in its standard configuration.

N2 Series — Side Load Capacity vs. Extended Length

Runout

The -DB option reduces thrust tube runout by lengthening the thrust tube support bearing in the rod-end housing.

IDC recommends the -DB option to reduce runout whenever the thrust tube is the only means of guiding the load. Performance improvement is most observable for cylinders with stroke length above 12 inches, or whenever runout is critical as the thrust tube approaches full extension.

For the least amount of runout possible for a standard product, specify the -DB option and also increase the stroke of the cylinder while “short-stroking” the unit.

If the load is guided externally by linear bearings, the standard bearing is preferred since it allows greater mounting misalignment and minimal friction.

Selection Criteria

-DB Option
• When using clevis or trunnion mount
• >12 inches
• Unguided thrust tube (externally)
• High side load
• Low runout critical

Standard
• When rigidly mounted
• <12 inches
• Guided thrust tube
-EMK/-EM Encoder Option

The -EMK/-EM encoder option provides an incremental rotary encoder coupled to the rear shaft of the motor.

-EMK is an industry-standard, 1000-line version, while -EM is a reverse-compatible 500-line version

Step Motor Models (ECx-S, ECx-P, Nx-S, Nx-P)

An encoder is typically used to improve system accuracy, and provide stall detection.

DC Motor Models (ECx-D, ECx-H, Nx-D, Nx-H)

While encoders are not required for IDC DC motor controls, some applications use them to provide precise position feedback when using external control or monitoring devices.

Brushless Servo Models (ECx-B, N2-B, NV-BN)

All brushless servo motors are by default equipped with an encoder. Therefore, the -EMK/EM encoder option is not required.

-EMK/-EM available with:

- EC2-D/H/S/P
- EC3-H/P
- EC4-H/P
- EC5-S
- N2-D/H/S/P
- NV-D/H/P

Electrical Specifications

Motor Model

<table>
<thead>
<tr>
<th>D/H/H4</th>
<th>P22/S32/S33/S42</th>
<th>P32/P33</th>
<th>B23/B32/B41</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulses per Revolution</td>
<td>-EMK 1000 line (4000 post-quad)</td>
<td>-EMK 1000 line (4000 post-quad)</td>
<td>Std: 2000 line (8000 post-quad)</td>
</tr>
<tr>
<td></td>
<td>-EM 500 line (2000 post-quad)</td>
<td>-EM 500 line (2000 post-quad)</td>
<td></td>
</tr>
</tbody>
</table>

Output Pulse Format

Incremental, Dual Square Wave Quadrature, with Index Pulse

- Cable Length/Type: m[ft] 3.7 [12]/Leads 3.7 [12]/Leads [Note 1] 3.7 [12]/MS Connector
- Voltage: 5 VDC ±5% 5 VDC ±5% 5 VDC ±5%
- Current: mA 120 135 200
- Max. Speed: rpm 6000 6000 6000
- Weight: kg [oz] 0.17 [6.0] 0.057 [2.0] 0.25 [8.8]
- Inertia: kg-m² [oz-in-sec²] 5.1 x 10⁻³ [7.3 x 10⁻⁴] 3.1 x 10⁻² [4.4 x 10⁻⁵] 1.0 x 10⁻⁵ [1.4 x 10⁻⁷]
- Operating Temperature: °C [°F] -10 to +70 [+14 to +158] -10 to +100 [+14 to +212] -20 to +100 [-4 to +212]
- Storage Temperature: °C [°F] -20 to +80 [-4 to +176] -30 to +110 [-22 to +230] -25 to +100 [-13 to +212]

Note: [Note 1] Quick disconnect encoder fitting and extension cable is included when ordered as -EQ instead of -EM.

Wiring Color Codes for -EMK/EM Encoders

(applies to D, H, H4, P22, S32, S33 and S42 motors).

<table>
<thead>
<tr>
<th>+5 VDC</th>
<th>Ground</th>
<th>Ch A+</th>
<th>Ch A-</th>
<th>Ch B+</th>
<th>Ch B-</th>
<th>Index Ch Z+</th>
<th>Index Ch Z-</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>Black</td>
<td>Red</td>
<td>Pink or Purple</td>
<td>Green</td>
<td>Blue</td>
<td>Yellow</td>
<td>Orange</td>
</tr>
</tbody>
</table>
The -L linear potentiometer option is required for operation with our Analog Position Controls, and is used in applications where analog position feedback voltage signal is needed.

The linear potentiometer resides within the cylinder housing and is energized by an external DC voltage source. The potentiometer wiper arm is attached to the drive nut/guide flange assembly, and moves the same distance as the thrust tube. The signal from the linear potentiometer is an absolute voltage, proportional to linear displacement of the cylinder.

-L available with:
- All EC, N2 and NV cylinders

Specifications
Operating Temperature -28° to +70°C [-20° to +160°F]
Power Rating 1.0 Watt max. (11 mA at 24V; 6mA at 12V; 3mA at 5V)
Resistance see table below
Linearity see table below
Stroke Available in the lengths shown below. Consult factory for lengths.

<table>
<thead>
<tr>
<th>Cylinder Model</th>
<th>Stroke</th>
<th>Resistance (±30%)</th>
<th>Linearity</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC2, EC3, EC4, EC5</td>
<td>50 mm [1.97 in]*</td>
<td>3000</td>
<td>3000</td>
</tr>
<tr>
<td>100 mm</td>
<td>[3.94 in]</td>
<td>6000</td>
<td></td>
</tr>
<tr>
<td>150 mm</td>
<td>[5.91 in]</td>
<td>9000</td>
<td></td>
</tr>
<tr>
<td>200 mm</td>
<td>[7.87 in]</td>
<td>9000</td>
<td></td>
</tr>
<tr>
<td>250 mm</td>
<td>[9.84 in]</td>
<td>9000</td>
<td></td>
</tr>
<tr>
<td>300 mm</td>
<td>[11.81 in]</td>
<td>7000</td>
<td></td>
</tr>
<tr>
<td>450 mm</td>
<td>[17.72 in]</td>
<td>7000</td>
<td></td>
</tr>
<tr>
<td>600 mm</td>
<td>[23.62 in]</td>
<td>7000</td>
<td></td>
</tr>
<tr>
<td>N2, NV</td>
<td>50.8mm [2.00 in]</td>
<td>3000</td>
<td></td>
</tr>
<tr>
<td>101.6 mm</td>
<td>[4.00 in]</td>
<td>6000</td>
<td></td>
</tr>
<tr>
<td>152.4 mm</td>
<td>[6.00 in]</td>
<td>9000</td>
<td>±1% of full stroke</td>
</tr>
<tr>
<td>203.2 mm</td>
<td>[8.00 in]</td>
<td>9000</td>
<td></td>
</tr>
<tr>
<td>254.0 mm</td>
<td>[10.00 in]</td>
<td>9000</td>
<td></td>
</tr>
<tr>
<td>304.8 mm</td>
<td>[12.00 in]</td>
<td>7000</td>
<td></td>
</tr>
<tr>
<td>419.1 mm</td>
<td>[16.50 in]</td>
<td>7000</td>
<td></td>
</tr>
</tbody>
</table>

*50mm stroke not available with EC5-B41 cylinder, due to motor interference.
-LR Linear Rod Bearing Option

The -LR linear rod bearing option is used in applications where side loads are present, or when the load is not externally supported.

Reasons for using the -LR Linear Rod Bearing are:

- Increased side load capacity
- Anti-rotation—reduces any rotational motion of the moving load
- Higher actuator efficiency when side loads are present
- Lower thrust tube runout

-LR available with:
- EC2

-LR not available with:
- MF1, MF3, MS1, MS2 mounting options

Weight calculation:

Weight (lb) = 0.0147 stroke (mm) + 7.6 lb

Dimensions in [mm]

To order the Linear Rod Bearing as a separate component:

**Linear Rod Bearing Part Number**

Example: LR-EC2-0200-A
-PB Protective Boot Option

With the -PB option, a durable polyurethane boot protects the thrust tube area from solid contaminants (dust, wood and metal shavings), and splashed liquids, etc.

EC Series cylinders equipped with the -PB are protected to the IP65 standard. Note that some IDC motor options are not protected to this level.

Consult the factory for assistance when special environmental protection is required.

We also have special options for clean room applications, where outgassing and contamination by the cylinder are a concern.

-**PB available with:**

- All cylinders except NV series

<table>
<thead>
<tr>
<th>Cylinder Model</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Series</strong></td>
<td><strong>Add'l Length in [mm]</strong></td>
</tr>
<tr>
<td>EC2</td>
<td>1.16 [29.5]</td>
</tr>
<tr>
<td></td>
<td>1.83 [46.5]</td>
</tr>
<tr>
<td></td>
<td>2.54 [64.5]</td>
</tr>
<tr>
<td></td>
<td>3.21 [81.5]</td>
</tr>
<tr>
<td></td>
<td>3.75 [95.5]</td>
</tr>
<tr>
<td>EC3</td>
<td>1.46 [37.1]</td>
</tr>
<tr>
<td></td>
<td>2.13 [54.0]</td>
</tr>
<tr>
<td></td>
<td>2.83 [71.9]</td>
</tr>
<tr>
<td></td>
<td>3.54 [89.9]</td>
</tr>
<tr>
<td></td>
<td>4.06 [103.1]</td>
</tr>
<tr>
<td>EC4</td>
<td>1.60 [40.6]</td>
</tr>
<tr>
<td></td>
<td>2.47 [62.7]</td>
</tr>
<tr>
<td></td>
<td>3.35 [85.1]</td>
</tr>
<tr>
<td></td>
<td>4.17 [105.9]</td>
</tr>
<tr>
<td></td>
<td>5.05 [128.3]</td>
</tr>
<tr>
<td></td>
<td>5.93 [150.6]</td>
</tr>
<tr>
<td>EC5</td>
<td>1.60 [40.6]</td>
</tr>
<tr>
<td></td>
<td>2.47 [62.7]</td>
</tr>
<tr>
<td></td>
<td>3.35 [85.1]</td>
</tr>
<tr>
<td></td>
<td>4.17 [105.9]</td>
</tr>
<tr>
<td></td>
<td>5.05 [128.3]</td>
</tr>
<tr>
<td></td>
<td>5.93 [150.6]</td>
</tr>
<tr>
<td>N2</td>
<td>0.75 [19.1]</td>
</tr>
<tr>
<td></td>
<td>1.00 [25.4]</td>
</tr>
<tr>
<td></td>
<td>1.30 [33.0]</td>
</tr>
<tr>
<td></td>
<td>1.40 [35.6]</td>
</tr>
<tr>
<td></td>
<td>1.90 [48.5]</td>
</tr>
<tr>
<td></td>
<td>2.80 [71.1]</td>
</tr>
</tbody>
</table>
The optional -Q quick disconnect option gives the machine builder or user a convenient method of connecting the motor to the control. A male quick disconnect receptacle is installed in the cylinder drive housing, or in some cases, the motor. The -Q option includes a 3.7m [12 ft] motor power cable, with mating molded quick disconnect plug.

**-Q available with:**
- NV-D, -H, -P*
- N2-D, -H, -S*, -P*
  * included when ordered as a T (series) or V (parallel)

**-Q Included with:**
(-Q does not need to be in model number):
- All B Series cylinders
- All EC Series cylinders

B Series brushless servo cylinders (ECx-B, N2-B) include an MS-style quick disconnect fitting(s) and cable(s), with the standard actuator. The -Q option is not required for these models.

All EC models include quick disconnect fitting(s) where applicable, with the standard actuator. The -Q option is not required for these models.

**Features**
- D & H motors: 3 conductor cable (2 motor and chassis ground)
- S & P motors: 5 conductor shielded cable (4 motor, shield)
- Keyed to prevent mis-wiring.
- Forms a contaminant resistant seal to protect the conductors from the environment.
- A 3.7m [12 ft] cable is supplied with the -Q option.

**Notes:**
- Inline Models with D and P22 motors: The -Q option is not available with “-10L” inline models when D or P22 motors are used.
- Inline Models with H motors: The -Q option is included with EC2-H-10L, N2-H-10L and EC3-H-10L models.
- Contact the factory when custom quick disconnect mounting locations are required.
# N2 Environmental Options

## Electric Cylinders

### Electric Cylinder Options & Accessories

## Temperature Ranges (N2 Series)

<table>
<thead>
<tr>
<th></th>
<th>Operating</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard N2</td>
<td>32°F to 140°F</td>
<td>-40 to 185°F</td>
</tr>
<tr>
<td></td>
<td>[0°C to 60°C]</td>
<td>[-40°C to 85°C]</td>
</tr>
<tr>
<td>-F Freezing</td>
<td>-20°F to 105°F</td>
<td>-40°F to 185°F</td>
</tr>
<tr>
<td></td>
<td>[-29°C to 41°C]</td>
<td>[-40°C to 85°C]</td>
</tr>
<tr>
<td>-H High Temp</td>
<td>32°F to 160°F</td>
<td>-40°F to 185°F</td>
</tr>
<tr>
<td></td>
<td>[0°C to 70°C]</td>
<td>[-40°F to 85°C]</td>
</tr>
</tbody>
</table>

### -F Sub-Freezing Environment

In extremely cold conditions the lubricating grease in the actuator thickens, rubber parts (belts and stops) stiffen, and mechanical clearances tighten. This option includes two alterations:

1. Bearing grease is replaced with a less viscous lubricant.
2. Acme drive nut tolerances are increased. Both thread clearance and pitch length are increased to allow for the varying coefficients of expansion between the steel leadscrew and polyacetal or bronze drive nut.

The result is a device which can operate at these low temperatures, but with reduced life (due to the pre-worn acme nut surfaces).

Contact IDC for more details. No change is necessary in ball nut models since there is steel to steel contact (same coefficient of thermal expansion).

### -W Water Resistant Option

The water resistant option (-W) is recommended in applications where the cylinder is exposed to light mist or occasional splashing with water or non-corrosive liquids. In addition to a sealant on all mating surfaces, a 10 foot (3m) breather tube and fitting is provided to allow the unit to breathe from a non-contaminated dry area.

Or, the customer may choose to apply positive, low pressure (2-3 psi [14-20 kPa]) dry air to the cylinder through this fitting.

### Notes:

- This option increases system backlash to 0.025 inches (0.64mm) max. for acme screw units.
- Should a -F sub-freezing option acme screw unit be operated at room temperature or above, noisy operation and increased backlash are normal.

### Notes:

- The -W option does not provide a waterproof cylinder. The cylinder cannot be submerged or immersed repeatedly in water.

### -W Breather Dimensions

#### N2 Series Cylinders

- F available with:
  - All N2 Series

- W available with:
  - All N2 Series

Notes:

- Consideration must be given to the operating temperature ranges of the motor, encoder, and limit switches.

---

Contact IDC for more details. No change is necessary in ball nut models since there is steel to steel contact (same coefficient of thermal expansion).
Magnetic Position Sensors

Electric cylinders are equipped with position indicating magnets installed internally on both sides of the guide cylinder. Six non-contacting position sensors are available to sense the magnet as it passes by.

All six position sensors mount directly to standard EC, N2 and NV Series cylinders. Three sensors, PSR-1, PSN-1 and PSP-1 are normally open switches. Three PSR-2, PSN-2 and PSP-2 are normally closed switches. Type PSR sensors consist of a reed switch, and type PSN and PSP sensors use a Hall-effect sensing element and a simple solid state electrical circuit.

End-of-Travel Limits

To maximize cylinder life, Industrial Devices recommends the use of end-of-travel “limit switches” (position sensors) with all cylinders. The purpose of an end-of-travel sensor is to signal the controller that the cylinder is about to travel beyond its normal safe operating region, and is nearing its physical end of stroke. The controller brings the cylinder to a stop to prevent physical contact, and to avoid damage to the cylinder, the load, or the machine. The sensors must be located such that an adequate stopping distance is provided between the sensing position and the physical end of stroke. Normally closed switches are generally used for end-of-travel sensing. Normally closed switches are considered “fail safe” because when a cable becomes accidentally severed or disconnected, motion is prevented.

Position Sensing

Limit Switch controls use position sensors as inputs for extend and retract position indication, or for reversing direction. The D2300, H3301B and H4301 also use position sensors for changing speed during a move, usually to reduce cylinder speed before reaching the final stopping position for greater repeatability.

Programmable position controls use position sensors for two purposes. A normally open switch is generally used to establish a home, or zero reference position. Normally closed switches are used for extend and retract end-of-travel limits.
Position Sensor Specifications

<table>
<thead>
<tr>
<th>Connection</th>
<th>PSR-1</th>
<th>PSR-2</th>
<th>PSN-1</th>
<th>PSN-2</th>
<th>PSP-1</th>
<th>PSP-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Led Color</td>
<td>Norm. open</td>
<td>Norm. closed</td>
<td>Norm. open</td>
<td>Norm. closed</td>
<td>Norm. open</td>
<td>Norm. closed</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>Red</td>
<td>Green</td>
<td>Red</td>
<td>Yellow</td>
<td>Red</td>
</tr>
<tr>
<td>Switch Type</td>
<td>Mechanical Reed</td>
<td>Hall-effect</td>
<td>Hall-effect</td>
<td>Hall-effect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Type</td>
<td>Contact closure</td>
<td>Open collector, sinking output (NPN)</td>
<td>Sourcing (PNP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Leads</td>
<td>2 + Shield</td>
<td>5 + Shield</td>
<td>3 + Shield</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>4–120 V AC or DC</td>
<td>10–24 VDC</td>
<td>10–24 VDC</td>
<td>10–24 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>n/a</td>
<td>7 mA @ 12 VDC; 13 mA @ 24 VDC</td>
<td>0.24 W</td>
<td>7 mA @ 12 VDC; 13 mA @ 24 VDC</td>
<td>0.24 W</td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC Voltage max</td>
<td>120VDC</td>
<td>24VDC</td>
<td>24VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC Voltage max</td>
<td>120VAC</td>
<td>AC not allowed</td>
<td>AC not allowed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current max</td>
<td>50mA</td>
<td>100mA</td>
<td>100mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power max</td>
<td>6W</td>
<td>3W</td>
<td>3W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-4° to 158°F [-20° to 70°C]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-4° to 176°F [-20° to 80°C]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection Rating</td>
<td>IP67</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Approved                    | Yes         |             |             |             |             |             |

Wireing for PSR-1 and PSR-2

2 CONDUCTOR SHIELDED CABLE

CONTROLLER

24VDC

SENSOR (REED)

Brown

Blue

Shield

Note: Black wire in QPS-4M/QPS-9M Cables is not used with any version of the PSR switch.

Comparison of Hall-Effect and Reed Switches

PSR Reed Switch
- More noise immune (EMI)
- Does not require a power supply
- Slightly lower cost
- Does not work with inductive loads
- Switches AC voltages

PSN & PSP Hall-Effect Switch
- Higher tolerance to vibration
- Greater durability and reliability (no moving parts)
- Requires external DC power. Available on IDC controls.
Position Sensor Mounting
The diagrams below show sensor mounting location when cylinder magnet and sensor are physically aligned.

This location is recommended as a starting point when setting up a cylinder for the first time. Depending on the speed and payload of the application, switches may need to be moved inward to prevent hard-stop crash when the load travels at full speed past a limit switch.

Notes:
• Position sensors can be mounted along either side of a cylinder.
• Recommended minimum distance between switches is 0.65 inches.
• D2200, D2300 and D2400 series controls use only Normally Open (N.O.), Reed or NPN position sensors (PSR-1, PSN-1)
• Using position sensors for end-of-travel protection reduces effective travel distance. Consult the factory.

Position Sensors

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
<th>Led</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Quick Leads</td>
<td>Disconnect</td>
<td>10 ft [3 m] 13 ft [4 m]</td>
</tr>
<tr>
<td>PSR-1</td>
<td>PSR-1Q</td>
<td>N.O. (Normally Open) Reed</td>
</tr>
<tr>
<td>PSR-2</td>
<td>PSR-2Q</td>
<td>N.C. (Normally Closed) Reed</td>
</tr>
<tr>
<td>PSN-1</td>
<td>PSN-1Q</td>
<td>N.O. NPN Hall Effect Reed</td>
</tr>
<tr>
<td>PSN-2</td>
<td>PSN-2Q</td>
<td>N.C. NPN Hall Effect</td>
</tr>
<tr>
<td>PSP-1²</td>
<td>PSP-1Q²</td>
<td>N.O. PNP Hall Effect</td>
</tr>
<tr>
<td>PSP-2²</td>
<td>PSP-2Q²</td>
<td>N.C. PNP Hall Effect</td>
</tr>
</tbody>
</table>

Notes:
1 Long length 30 ft [9m] quick-disconnect cables are available, specify by adding –C9M to part number (example: PSN-1Q-C9M).
² PNP Hall Effect Switches are not compatible with IDC controls. These versions are offered for compatibility with devices which require PNP style sensors.

Spare Quick Disconnect Cables

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QPS-4M</td>
<td>13 ft [4 m] extension cable</td>
</tr>
<tr>
<td>QPS-9M</td>
<td>30 ft [9 m] extension cable</td>
</tr>
</tbody>
</table>

Dimensions in [mm]

N2/NV Cylinder Position Sensor Mounting

EC Cylinder Position Sensor Mounting

NOTE: Dimensions “A” and “B” are approximate End of Stroke Locations for the Position Sensors.

ORDERING INFORMATION

Position Sensors

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
<th>Led</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Quick Leads</td>
<td>Disconnect</td>
<td>10 ft [3 m] 13 ft [4 m]</td>
</tr>
<tr>
<td>PSR-1</td>
<td>PSR-1Q</td>
<td>N.O. (Normally Open) Reed</td>
</tr>
<tr>
<td>PSR-2</td>
<td>PSR-2Q</td>
<td>N.C. (Normally Closed) Reed</td>
</tr>
<tr>
<td>PSN-1</td>
<td>PSN-1Q</td>
<td>N.O. NPN Hall Effect Reed</td>
</tr>
<tr>
<td>PSN-2</td>
<td>PSN-2Q</td>
<td>N.C. NPN Hall Effect</td>
</tr>
<tr>
<td>PSP-1²</td>
<td>PSP-1Q²</td>
<td>N.O. PNP Hall Effect</td>
</tr>
<tr>
<td>PSP-2²</td>
<td>PSP-2Q²</td>
<td>N.C. PNP Hall Effect</td>
</tr>
</tbody>
</table>

Notes:
1 Long length 30 ft [9m] quick-disconnect cables are available, specify by adding –C9M to part number (example: PSN-1Q-C9M).
² PNP Hall Effect Switches are not compatible with IDC controls. These versions are offered for compatibility with devices which require PNP style sensors.

Spare Quick Disconnect Cables

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QPS-4M</td>
<td>13 ft [4 m] extension cable</td>
</tr>
<tr>
<td>QPS-9M</td>
<td>30 ft [9 m] extension cable</td>
</tr>
</tbody>
</table>

Dimensions in [mm]

N2/NV Cylinder Position Sensor Mounting

EC Cylinder Position Sensor Mounting

NOTE: Dimensions “A” and “B” are approximate End of Stroke Locations for the Position Sensors.